NMG
Geotechnical, Inc.

April 19, 2017

Project No. 16098-01

To: Toll Brothers, Inc.
725 Town & Country Road, Suite 200
Orange, California 92868

Attention: Mr. Peter H. Kim

Subject: Geotechnical Evaluation of Proposed Residential and School Site Development, Nakase Property, Lake Forest, California

INTRODUCTION

In accordance with your request, NMG Geotechnical, Inc. (NMG) has conducted a feasibility level study for the residential and school site development planned at the subject site. The site is approximately 120 acres and is located south of the intersection of Bake and Rancho Parkways in the city of Lake Forest (Figure 1). A 100-scale mass grading plan prepared by Hunsaker Associates was provided for our review and utilized as a base plan for our geotechnical map (Plate 1). The purpose of our geotechnical study was to evaluate the proposed residential and school site development in light of the existing geologic conditions and provide mitigation recommendations for the geotechnical constraints. Our work is based on the topographic map and mass grading plan prepared by Hunsaker Associates; our background research; site reconnaissance; subsurface exploration; limited laboratory testing; evaluation of the compiled data; and meetings/ conversations with Toll Brothers and the project team.

ATTACHMENTS

Figure 1 – Site Location Map – Rear of Text
Figure 2 – Seismic Hazards Map – Rear of Text
Appendix A – References
Appendix B – Geotechnical Boring and CPT Logs
Appendix C – Laboratory Test Results
Plate 1 – Geotechnical Map – In Pocket

SCOPE OF SERVICES

Our scope of services included the following:

- Acquisition and review of available published geologic maps and data pertinent to the subject site. The list of references utilized is included in Appendix A.
- Review of historic stereographic aerial photographs relevant to the site. The list of photographs reviewed is included in Appendix A.
- Drilling, sampling and logging of six hollow-stem auger borings (B-1 through B-6) to depths of 51.5 to 55 feet below ground surface (bgs). Thirteen CPT soundings (CPT-1 through CPT-13) were also advanced to depths of up to 50 feet bgs. The approximate location of our borings and CPTs is provided on the Geotechnical Map (Plate 1). Boring and CPT logs are included in Appendix B. Notification and coordination with Underground Service Alert to identify and locate any underground utilities was also performed prior to subsurface exploration.
- Limited Laboratory testing of selected samples to determine in-situ moisture and density and evaluate consolidation potential. The test results are provided in Appendix C.
- Review of the mass grading plan.
- Compilation and evaluation of the collected geotechnical data with respect to the anticipated improvements and evaluation of preliminary mitigation measures.
- Preparation of this report, including our findings, discussion of geotechnical issues, conclusions, and recommendations for the planned development.

SITE LOCATION AND EXISTING CONDITIONS

The proposed residential and school site development is located on an approximate 120-acre parcel in the city of Lake Forest bounded by Bake Parkway on the northwest, Rancho Parkway on the northeast, Serrano Creek on the southeast and existing commercial property on the southwest.

The site consists of relatively gentle terrain ranging in elevations from 705 to 735 feet across the northern half of the site with low points of approximately 685 feet at the southwest and southeast corners and a ridge in the south central ranging from 720 to 750 feet. Rancho Parkway is roughly 10 feet above the northern perimeter; Bake Parkway 5 to 10 feet above the western perimeter; the commercial development 10 feet above to 25 feet below the southern perimeter and Serrano Creek is 5 to 10 feet (locally up to 17 feet) below the eastern perimeter. There is a central drainage ditch that extends from the northern boundary (collecting water from a storm- drain pipe adjacent to Rancho parkway) across the site to a low point where it empties into a storm drain pipe at the southern boundary. Currently, the site is an operating plant nursery consisting of extensive rows of container plants which are periodically rotated. Some areas are covered by netting providing partial shade. There is an area of stockpiled soil and onsite borrow cutting. Trailer trucks and a plant loading area are located northwest of the ridge. An extensive sprinkler system exists throughout the site and the ground surface drains generally towards the central drainage ditch and locally towards Serrano Creek.

PREVIOUS GRADING

The property was graded to its current condition before the Nakase family purchased the nursery site in the late 1970s. Based on comparison of the 1949 USGS topographic map for this area to the current topography recently obtained by Hunsaker, the site has been raised substantially along Serrano Creek (5 to 15 feet) and adjacent to Rancho Parkway (4 to 10 feet). It appears that the undocumented fill was removed from the site along Bake Parkway at the northwest portion of the site (minus 3 to 8 feet) and from the northern flank of the bedrock ridge (minus 5 to 12 feet) and placed in the northern half to flatten out the topography. We estimate that approximately 200,000 yards of fill has been placed to create the site conditions. We assume remedial grading was not performed for this work and the undocumented fill is underlain by unsuitable alluvium. The undocumented fill was encountered in our recent borings and CPTs (Appendix B).

Prior grading was performed for the segments of Bake Parkway and Rancho Parkway adjacent to the subject site. Along Rancho Parkway up to approximately 25 feet of fill was placed over alluvium in the two primary canyons and minor cut in the middle ridge was performed to create the road grades. Along Bake Parkway, grading consisted primarily of cuts into the hillside and fills up to 15 feet thick in the side canyon areas. We understand Bake Parkway was graded by the AJ West development (circa 1992) and Rancho Parkway was graded by the Home Depot commercial center development (circa 2001).

PROPOSED GRADING

Based on review of the mass grading plan by Hunsaker the rough finish grade surface will range from an elevation of 700 feet at the southwest corner to 727 feet at the northeast corner. Cut and fill grading will be required to achieve this condition. Both ascending and descending slopes are shown around the perimeter of the site ranging from 0 to 26 feet high.

SUBSURFACE EXPLORATION

Geotechnical exploration was performed by NMG across the site for this study. The exploration consisted of drilling, sampling and logging of six hollow-stem auger borings (B-1 through B-6) to depths ranging from 50 to 55 feet below existing grades. Thirteen CPT soundings (CPT-1 through CPT-13) were also advanced to depths of up to 50 feet. The approximate location of our borings and CPTs is provided on the Geotechnical Map (Plate 1) and boring and CPT logs are included in Appendix B

Relatively undisturbed soil ring samples were obtained from NMG's exploratory Borings with a 2.5-inch-inside-diameter, split-barrel sampler. The drive samples were also used to obtain a measure of resistance of the soil to penetration (recorded as blows-per-foot on our geotechnical boring logs). Within hollow-stem borings, samplers were driven with a 140-pound hammer, free-falling 30 inches. Bulk samples of onsite soil were collected from the hollow-stem cuttings and used for additional soil identification purposes and laboratory testing. Soil samples were visually classified in accordance with the Unified Soil Classification System (USCS).

LABORATORY TESTING

For this study, limited laboratory testing was performed on representative samples of onsite soils collected to characterize basic soil engineering properties of the alluvium. Laboratory tests on selected relatively undisturbed and bulk soil samples included:

- Moisture content and dry density
- Consolidation

Laboratory tests were conducted in general conformance with applicable American Society for Testing and Materials (ASTM) standard test methods. Laboratory test results are provided in Appendix C. In-situ moisture content and dry density data are included on the geotechnical boring logs (Appendix B).

Geologic Conditions

The majority of the site is underlain by deep quaternary alluvium deposited in three distinct canyons trending roughly northeast across the site. The central canyon and Serrano Creek merge together at the site and the canyon parallel to Bake Parkway extends through the site. Undocumented fill covers the alluvium in the northern half of the site and along Serrano Creek. Sandstone of the Capistrano Formation is exposed in the ridge in the south-central portion of the site and in limited exposures along Bake Parkway and Rancho Parkway. Bedding generally dips at low angles (8-19 degrees) northeast to northwest. Slope wash deposits are mapped on the lower flanks of the natural slopes immediately adjacent to the bedrock exposures. The geologic conditions are depicted on Plate 1 (in pocket).

Groundwater

Groundwater is present within the alluvium beneath the site. The groundwater encountered in our recent borings and CPTs ranged from 20 to 40 feet deep. Based on maps published by the State of California, the historic high groundwater levels at the site ranged from 15 to 20 feet deep. Currently, there is a water-well located in the southwest corner of the site that provides irrigation water for the nursey operation.

Surface Water

Currently, Serrano Creek is essentially dry except for the southeast corner of the site where runoff from the nursery flows into the creek via small-diameter drain pipes. The primary surface flow coming into the site is from a storm drain pipe under Rancho Parkway. This surface water flows through the site in an open ditch and exits the site at the southwest end into a storm drain inlet.

DISCUSSION OF GEOTECHNICAL ISSUES

The following is a discussion of the geotechnical issues pertinent to the development planned at the subject site. It is important to note that, at this time, finish grades for the development are

uncertain which may have a significant impact on many of the geotechnical issues. These issues are summarized below:

1) Undocumented Fill: The property was graded before the Nakase family purchased the nursery site circa 1977. Based on comparison of the 1949 USGS topographic map to the current topography, the site has been raised substantially along Serrano Creek (5 to 15 feet) and adjacent to Rancho Parkway (4 to 10 feet). It appears that the undocumented fill was removed from the site along Bake Parkway at the northwest portion of the site where grades were lowered 3 to 8 feet and from the northern flank of the bedrock ridge which was cut down 5 to 12 feet. The undocumented fill was encountered in the borings and CPTs and appears to be place directly over native alluvium. The undocumented fill should be removed during remedial grading.

2) Alluvium: Quaternary alluvium is exposed throughout the majority of the site in the old canyon areas (CDMG, 1974). The borings and CPTs were excavated/advanced to a depth of 50 feet and generally exposed alluvium to the total depths. The alluvium consisted of silty to clayey sands with occasional layers of gravel and beds of silt and clay. Based the collected data and experience on adjacent properties, the alluvium is most likely up to 70 to 80 feet thick in the deepest part of the old canyons. The alluvium is subject to an average remedial removal of 12 feet deep across the site and up to 15 feet deep in the old blue-line streams. Additional subsurface exploration is planned to further evaluate this earth unit once a more final grading plan is available for review.

3) Slope Wash: Slope wash is exposed on the lower flanks of the main bedrock ridge and the tips of the ridges exposed along Bake and Rancho Parkways (CDMG, 1974). This material is similar to colluvium and removals on the order of 10 feet deep are anticipated during remedial grading. Some subsurface exploration is planned to evaluate this earth unit.

4) Sandstone of Capistrano Formation: Sandstone bedrock will be exposed at finish grade in the central ridge area and locally along Bake and Rancho Parkways (CDMG, 1974). The sandstone is expected to be rippable with standard heavy equipment during grading. The density of the sandstone typically increases with depth and there are occasional layers of cemented sandstone. Residential lots founded in sandstone are planned to be over-excavated and capped with a minimum 5 feet of compacted fill. The deepest underground utility in these areas should be evaluated for rippability based on the typical trenching equipment to be utilized. Some subsurface exploration is planned to further evaluate this earth unit.

5) Faulting and Seismicity: There are no active faults within or immediately adjacent to the site based on review of the reports and maps published by the California Geologic Survey (CDMG, 2007). The closest active fault is the San Joaquin Hills Blind Thrust Fault, located 3.9 miles southwest of the site. This is the controlling fault for seismic design for this site and has a maximum moment magnitude estimated at 7.0 M_W (USGS, 2013a) and an estimated pga of 0.53g horizontal (USGS, 2013b).

The primary seismic hazard for this site is ground shaking due to a future earthquake on one of the major regional active faults, such as the San Joaquin Hills Blind Thrust, Whittier-Elsinore, Newport-Inglewood, San Jacinto and San Andreas Faults.

The site is located within an area of potential liquefaction (Figure 2), as defined by the State's Seismic Hazard Mapping Act (CDMG, 2001). Liquefaction is discussed in section 12. Secondary seismic hazards, such as tsunami or seiche, are considered slight to nil, as the site is located away from the ocean or confined bodies of water and at elevations well above (700 +/-feet) mean sea level.

6) Groundwater: Groundwater is present within the alluvium beneath the site. The groundwater encountered in our recent borings and CPTs ranged from 20 to 40 feet deep. These depths were measured during a time of extended drought conditions. Based on maps published by the State of California, the historic high groundwater levels at the site ranged from 15 to 20 feet deep (CDMG, 2000).

7) Serrano Creek Edge: The southeastern edge of the property is bounded by Serrano Creek. This boundary is approximately 2,600 feet long. The creek ranges from 10 to 14 feet deep for most of the length and 6 to 7 feet deep for the most southerly 500 feet near the entrance to the site. We understand that Serrano Creek is to remain in its natural state and there is an existing environmental setback line on both sides of the creek as previously documented by Glenn Lukos Associates. Due to the effects of liquefaction potential in the alluvium during a significant seismic shaking event, the exposed slope associated with Serrano Creek is subject to lateral slope failure. We have initially explored this condition with CPTs, advanced to 50 feet deep, in selected areas along this perimeter. Based on our initial analysis, a seismic shear key is needed to mitigate this condition. The top of the front cut for this key will start at the environmental setback boundary and the key will extend along the Serrano Creek edge. The actual dimensions of the key will be dependent on additional subsurface exploration and site specific analysis once the planned grades are established.

8) Storm Drain from Rancho Parkway: The storm drain pipe beneath Rancho Parkway is planned to be extended through the project by a storm drain pipe of similar capacity and connected to the storm drain inlet at the southwest end of the property. Subsequent to remedial grading the proposed storm drain pipe is anticipated to be underlain by compacted fill over alluvium.

9) Possible Open Channel: An open shallow channel or swale is planned from the northeast end of the site to the southwest corner where it will connect to a drainage basin. Although this channel will be underlain by compacted fill over alluvium the actual design will be important from a geotechnical standpoint. Specifically, the depth of the channel, adjacent slopes and horizontal distance from the adjacent structures will need to be evaluated.

10) Slope Stability along the Bake and Rancho Parkway Edges: There are two different issues along the Bake and Rancho Parkway edges. Both require detailed information of the graded conditions beneath the roads (e.g. fill thickness, any topsoil/colluvium left in place, any subdrains installed, etc.). If the project grade is raised to match the adjacent road grade, then it is important to rely on sound geotechnical conditions (e.g. fill over bedrock, fill over competent alluvium, etc.). If there is any soft soil or poor quality fill left in place, it would be subject to removal during remedial grading. If some of this material cannot be removed in order to prevent undermining the existing road, then a structural setback would be required to protect the planned structures from excessive differential settlement induced by the new fill loading.

If the project grades are below Bake and Rancho Parkways and the existing slopes are to essentially remain in place, then the stability of the slopes should be evaluated to ensure they have been graded to a standard that resulted in a 1.5 safety factor for gross and surficial stability. If there are any deficiencies with the existing slope then they would have to be regraded to project standards or a structural setback established to protect the planned structures.

Regardless of which option is selected, some subsurface exploration is planned to further evaluate these edge conditions. At this time, we understand that no geotechnical work can be performed until access is gained to that area of the project site.

11) Settlement: Fill placement planned for the site will induce minor settlement of the underlying alluvium. In order to limit the total and differential post-grading settlements within tolerable limits, partial removal of alluvium and settlement monitoring will need to be performed. To mitigate differential settlement in the design cut/fill transition areas over-excavation should be performed to mitigate this condition.

12) Liquefaction: Due to the site conditions of some of the layers within the granular alluvium and relatively shallow groundwater over most of the site, there is a potential for liquefaction to occur during a future major earthquake impacting the site. The anticipated remedial grading and compacted fill placement is anticipated to reduce the potential for surface manifestations. However, there may be the potential for a minor amount of seismic settlement to occur during a liquefaction event. This minor amount of liquefaction-induced settlement is anticipated to be mitigated by the foundation design for the planned structures.

13) Foundation Design: The onsite soils are generally granular in nature and are expected to have low expansion potential and be corrosive to metals. Post-tensioned slabs are anticipated for the proposed residential structures. Soil samples will be collected during our ongoing investigation, and laboratory testing will be performed to determine the preliminary parameters for foundation design. Imported fill should have similar soil engineering characteristics. If the imported fill has a higher expansion then the foundation design would need to be adjusted accordingly.

14) Scour Mitigation: We understand that the project will be required to provide scour protection related to periodic surface flow in Serrano Creek. Hunsaker will provide the scour depth needed and we will assist in design of the mitigation measures. We will help support the mitigation option when the selection is made. Laboratory testing and analysis will be required for any option considered.

15) Flood Control Issues: Hunsaker will be evaluating the stream flow within Serrano Creek and surface flows from the project site. They will be coordinating with the Orange County Flood Control District and other agencies as it relates to the proposed project. NMG will provide geotechnical support as needed for this work.

16) Water Quality Basin(s): A water quality basin is planned at the southwest end of the project. Other infiltration features may be planned within the site. Each of the locations considered for infiltration will need to have percolation testing performed and the data provided to the designer of the infiltration features.

17) School Site: A school site is planned to be incorporated within this development. It is our experience that it is best to grade the school site with onsite earth materials only. If imported fill is placed in the school site, then environmental testing of each import source will be required in accordance with DTSC requirements. Also, the school site needs to be investigated/designed in accordance with the requirements of DSA and CGS Note 48.

CONCLUSIONS AND RECOMMENDATIONS

We conclude the site is feasible for the planned residential and school site developments provided the geotechnical constraints impacting the site are mitigated to the standard of practice and the governing agency requirements. Specific recommendations are highlighted below:

1. Geotechnical investigation and grading reports for Bake and Rancho Parkways pertinent to the subject site should be acquired.

2. The geotechnical constraints should be taken into consideration as site development plan options are developed.

3. Additional subsurface exploration, laboratory testing, and analyses should be performed once more final development and grading plans are available.

LIMITATIONS

This report has been prepared for the exclusive use of our client, Toll Brothers Inc., within the specific scope of services requested by our client for the geotechnical evaluation of the subject residential and school site development. This report or its contents should not be used or relied upon for other projects or purposes or by other parties without the written consent of NMG. Our methodology for this study is based on local geotechnical standards of practice, care, and requirements of governing agencies. No warranty or guarantee, express or implied is given.

The findings, conclusions, and recommendations are professional opinions based on interpretations and inferences made from geologic and engineering data from specific locations and depths, observed or collected at a given time. By nature, geologic conditions can be very different in between points, and can also change over time. Our conclusions and recommendations are subject to verification and/or modification with more exploration and/or during grading and construction when more subsurface conditions are exposed.

If you have any questions regarding this report, please contact our office. We appreciate the opportunity to provide our services.

Respectfully submitted,

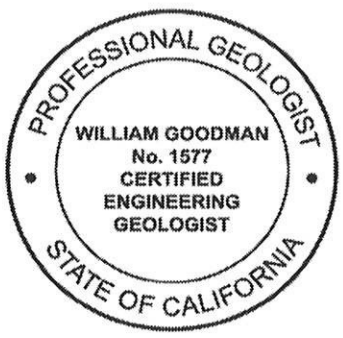
NMG GEOTECHNICAL, INC.

William Goodman, CEG 1577
Principal Geologist

Ted Miyake, RCE 44864
Principal Engineer

WG/TM/je

Distribution: (1) Addressee (E-Mail)
(1) Mr. Rick Nelson, Toll Brothers, Inc. (E-Mail)
(1) Mr. Fred Graylee, Hunsaker and Associates (E-Mail)



APPENDIX A

REFERENCES

California Division of Mines and Geology, 2000, Seismic Hazard Zone Report for the El Toro 7.5-Minute Quadrangle, Orange County, California, SHZR 047.

California Division of Mines and Geology, 2001, Seismic Hazard Zones Map for the El Toro Quadrangle, Official Map, Released January 17, 2001.

Fife, D.L., 1974, Geology of the South Half of the El Toro Quadrangle, Orange County, California, California Division of Mines and Geology Special Report 110

Hart, E. W. and Bryant, W.A., 2007, Fault Rupture Hazard Zones in California, Alquist Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault zones Maps, Department of Conservation, Division of Mines and Geology, Special Publication 42, Revised 1997, Interim Revision 2007.

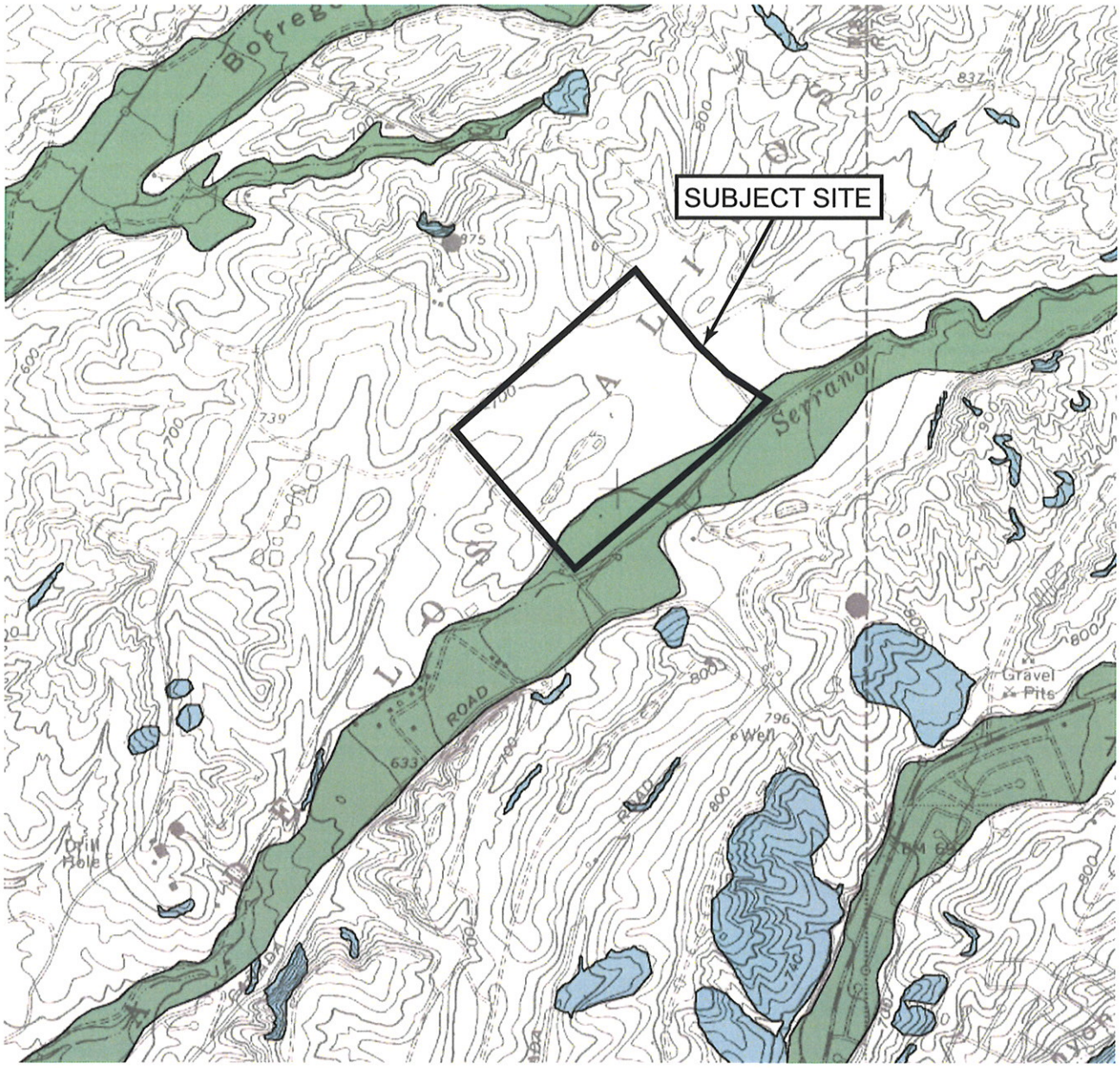
Jennings, Charles W., 2010, Fault Activity Map of California and Adjacent Areas, Department of Conservation, Division of Mines and Geology, Geologic Data Map No. 6.

U. S. Geological Survey, 2013a, 2008 Interactive Deaggregations Program; web site address: https://geohazards.usgs.gov/deaggint/2008/

U.S. Geological Survey, 2013b, U.S. Seismic Design Maps, web site address: http://geohazards.usgs.gov/designmaps/us/application.php

AERIAL PHOTOGRAPHS REVIEWED

Date	*Flight*	*Photo No.*	*Scale (1"=)*	*Source*
12/12/1952	3K	73-75	N/A	Continental
3/28/1959	261	139-141	N/A	Continental
8/15/1959	261	21-23	1,000	Continental
9/20/1965	1FF	105, 106	N/A	Continental
3/30/1967	2	132-134	N/A	Continental
1/31/1970	61	166-168	N/A	Continental
10/30/1973	132	9-11	N/A	Continental
1/13/1975	157	253, 254	N/A	Continental
4/21/1977	181	7-9	N/A	Continental
12/13/1978	203	24, 25	N/A	Continental
1/9/1978	F	253, 254	N/A	Continental
2/25/1980	80033	159, 160	N/A	Continental
1/31/1981	211	15-17	2,000	Continental
4/8/1983	218	17-19	N/A	Continental
1/20/1992	C85	7-9	N/A	Continental
2/2/1993	C86	35, 36	N/A	Continental
1/28/1995	C-102	98, 99	2,000	Continental
9/11/1997	C-116	22, 23	2,000'	Continental
3/2/1999	135	154-156	N/A	Continental



Liquefaction

Areas where historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

Earthquake-Induced Landslides

Areas where previous occurance of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

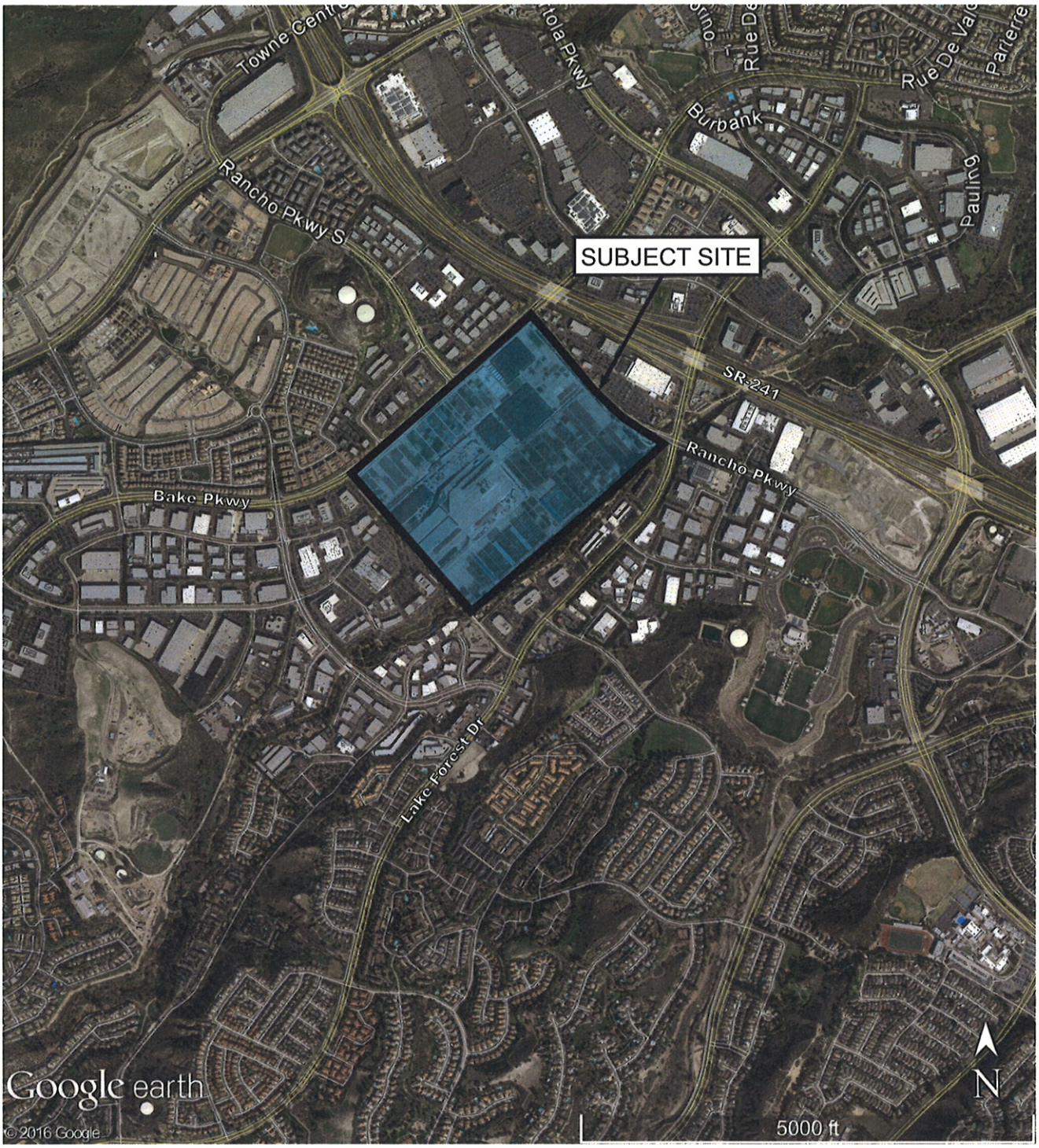
BASE: DIVISION OF MINES AND GEOLOGY SEISMIC HAZARDS MAP,
EL TORO QUADRANGLE
Dated: Jan. 17, 2001

N

SEISMIC HAZARDS MAP

Project Number: 16098-01 By: WG
Project Name: Toll Brothers / Lake Forest Nursery
Date: 4/19/17 Figure 2

NMG Geotechnical, Inc.



Base Map: Google Earth, 2016

SITE LOCATION MAP	Project Number: 16098-01 By: WG Project Name: Toll Brothers / Lake Forest Nursery Date: 4/19/17 Figure 1	NMG Geotechnical, Inc.

NMG Geotechnical, Inc.

July 13, 2018

Project No. 16098-01

To: Toll Brothers
725 Town & Country Road, Suite 200
Orange, California 92868

Attention: Mr. Peter H. Kim

Subject: Preliminary Geotechnical Exploration, Proposed Development, Nakase Nursery Site, Tentative Tract 18142, Lake Forest, Orange County, California

In accordance with your request and authorization, NMG Geotechnical, Inc. (NMG) has performed preliminary geotechnical exploration at the site to evaluate the proposed residential development and school site. The purpose of our study was to evaluate the proposed development in light of the existing geotechnical conditions and provide geotechnical recommendations for grading and construction. Our scope of work included background research, site reconnaissance, geologic field mapping, review of historic aerial photographs, review of city files, drilling of hollow-stem auger borings, cone penetrometer tests (CPTs), excavation of backhoe pits/trenches, laboratory testing, geotechnical analysis, determination of preliminary remedial grading measures, and preparation of this report. We utilized the 100-scale Area Plan, prepared by Hunsaker and Associates (Hunsaker), dated February 23, 2018 and received by NMG on June 18, 2018, as a base map for our 80-scale Geotechnical Map (Plate 1).

The subject site is located on gentle hillside terrain that is underlain by sedimentary bedrock with alluvial deposits occupying the adjacent canyon areas. Significant amounts of undocumented fill cover the majority of the site and were placed prior to and during the nursery's operation. The planned grading consists largely of daylight cut in the central hill-top area and along Rancho and Bake Parkways and design fills in the adjacent canyon areas. The majority of the site boundaries will daylight against the existing streets (Rancho and Bake Parkways) and the existing commercial development along the southwest edge. The development along the southeast property line will be immediately adjacent to Serrano Creek.

The primary geotechnical mitigations for the proposed development will consist of removal of undocumented fill and unsuitable alluvial deposits to expose competent earth material and slope stabilization along the perimeter of the development area (e.g., Bake Parkway, Rancho Parkway, the Pacific Commercentre Business Park and Serrano Creek). Remedial grading along the perimeter will require protecting any existing improvements in place.

Based on our study, the proposed residential and school development is considered geotechnically feasible provided the geotechnical constraints at the site are mitigated during

future design and mass grading. This report includes our findings and conclusions and provides our recommendations for grading the subject development.

If you have any questions regarding this report, please contact our office. We appreciate the opportunity to provide our services.

Respectfully submitted,

NMG GEOTECHNICAL, INC.

Lynne Yost, CEG 2317
Associate Geologist

Ted Miyake, RCE 44864
Principal Engineer

ZKH/WG/LY/TM/grd

Distribution: (1) Addressee (E-Mail)
(1) Mr. Fred Graylee, Hunsaker and Associates (E-Mail)

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Purpose and Scope 1
1.2 Site Location and Conditions 2
1.3 Site History and Prior Grading 2
1.4 Field Exploration 3
1.5 Laboratory Testing 4
1.6 Proposed Grading and Development 4

2.0 GEOTECHNICAL FINDINGS 5
2.1 Geologic Setting 5
2.2 Earth Units 5
2.3 Geologic Structure 6
2.4 Regional Faulting and Seismicity 6
2.5 Surface Water and Groundwater 7
2.6 Mass Movements 7
2.7 Slope Stability 7
2.8 Liquefaction Potential 7
2.9 Settlement Considerations 8
2.10 Earthwork Shrinkage/Bulking and Subsidence 8
2.11 Existing Utilities and Structures 9
2.12 Engineering Characteristics of Onsite Soils 9
2.13 Rippability and Generation of Oversize Material 9
2.14 Perimeter Conditions 10

3.0 CONCLUSION AND RECOMMENDATIONS 11
3.1 General Conclusion and Recommendation 11
3.2 Site Clearing and Preparation 11
3.3 General Earthwork and Grading 11
3.4 Remedial Removals 12
3.5 Slope Stabilization 12
3.6 Protection of Existing Utilities 13
3.7 Rippability and Placement of Oversize Material 13
3.8 Lot Overexcavation 13
3.9 Groundwater 14
3.10 Liquefaction Potential 14
3.11 Settlement Potential 14
3.12 Surface Drainage and Slope Maintenance 14
3.13 Preliminary Feasibility of Infiltration 15
3.14 Future Geotechnical Review and Engineering Analysis 15

4.0 LIMITATIONS 16

TABLE OF CONTENTS (Continued)

ATTACHMENTS

Figures

Figure 1 – Site Location – Rear of Text
Figure 2 – Seismic Hazards Map – Rear of Text

Plate 1 – Geotechnical Map – In Pocket

Appendices

Appendix A – References and Aerial Photographs Reviewed
Appendix B – Boring, CPT and Trench Logs
Appendix C – Laboratory Test Results
Appendix D – General Earthwork and Grading Specifications

1.0 INTRODUCTION

1.1 Purpose and Scope

NMG Geotechnical, Inc. (NMG) has reviewed the 100-scale Area Plan for the proposed development at the Nakase Nursery site, Lake Forest, California. The purpose of this study was to evaluate the planned development in light of the existing geotechnical conditions in order to provide recommendations for grading and construction of the future residential and school site development. The Area Plan, prepared by Hunsaker & Associates, received by NMG on June 18, 2018 was reviewed for this study and enlarged to 80-scale for use as the base map of our accompanying Geotechnical Map (Plate 1).

The scope of services for this study included the following tasks:

- **Background Research:** Review of available geotechnical reports and maps and compilation of data onto the Area Plan. Review of stereoscopic aerial photographs dating back to the 1950s to review site history and evaluate geomorphic conditions. References and aerial photos reviewed are listed in Appendix A.
- **Site Reconnaissance:** Site reconnaissance to review the existing field conditions, photo document the site, and perform boring/CPT and trench location staking related to the subsurface exploration.
- **Geologic Field Mapping:** Geologic mapping to document bedrock exposures, geologic contacts, geomorphic features and condition of existing slopes.
- **Subsurface Exploration:** Excavation, sampling and surface logging of 20 hollow-stem auger borings, advancement and continuous logging of 23 Cone Penetration Tests (CPTs) and 22 test pits/trenches.
- **Laboratory Testing:** Laboratory testing consisting of moisture content, in situ density, maximum density, consolidation, direct shear, Atterberg limits, expansion index, soluble sulfate and grain size.
- **Geotechnical Analysis:** Compilation of data from our field mapping, subsurface exploration, and data from adjacent sites. The data is presented on the Geotechnical Map (Plate 1). Analysis was performed to provide remedial grading measures including slope stabilization and remedial removals. Geotechnical analysis also included preliminary liquefaction evaluation, settlement evaluation, and an estimation of earthwork shrinkage and bulking.
- **Plan Review:** The Area Plan was reviewed in light of the geologic site conditions and the collected geotechnical data, including the data from surrounding sites.
- **Geotechnical Recommendations for Design and Grading:** Based on the collected data, geotechnical recommendations for design and future mass grading were determined for the project.
- **Report Preparation:** Preparation of this geotechnical report with the accompanying illustrations and appendices. This report summarizes our findings, conclusions, and recommendations for the planned development.

1.2 Site Location and Conditions

The proposed residential and school site development is located on an approximate 120-acre parcel in the city of Lake Forest currently used as a plant nursery. The site is bounded by Bake Parkway to the northwest, Rancho Parkway to the northeast, Serrano Creek to the southeast and the Pacific Commercentre Business Park to the southwest, as depicted on Figure 1.

The site is accessible from Lake Forest Drive, adjacent to the Foothill Center retail parking lot. A paved road/alleyway provides access to the site. Dirt and gravel roads are present throughout the site and delineate the existing nursery plots.

The project is located in a gently sloping hillside terrain. The existing slope ratios range from 3H:1V to 12H:1V within and adjacent to the proposed development area. The total topographic relief within the subject site is nearly 75 feet, ranging from a high elevation of 750 feet mean sea level (msl) in the central portion of the site to a low elevation of 675 feet msl in the southwestern portion of the site.

The site has been historically used for agriculture (citrus groves) and nursery operations. There is an extensive dirt road network and some underground and overhead utilities (water, electric, cable, etc.) throughout the site and possibly a residential structure in the southeast portion of the site. Two Irvine Ranch Water District (IRWD) water lines within easements are located at varying depths along the southwest edge of the site, adjacent to the existing business park development. Storm drain inlet and outlet structures are located at the northeast and southwest portions of the site, respectively, and provide drainage for the existing nursery as well as the commercial developments upstream of the subject site. An active water well is also located on the site, which we understand extends approximately 1,100 feet deep. According to nursery representatives, water is pumped at approximately 380 feet below ground surface, at an average rate of 225 gallons per minute when in use.

1.3 Site History and Prior Grading

Historical stereographic aerial photographs and available satellite photographs dating from 1952 through 2017 (listed in Appendix A) were reviewed to determine past uses and conditions at the site. The following summarizes our aerial photographic review.

The property was graded to its current condition after the Nakase family purchased the land for use as a nursery in the late 1970s. Based on comparison of the 1949 USGS topographic map for this area to the current topography obtained by Hunsaker, the site has been raised substantially along Serrano Creek (5 to 15 feet) and adjacent to Rancho Parkway (4 to 10 feet). It appears that the site was lowered along portions of Bake Parkway by 3 to 8 feet and from the northern flank of the bedrock ridge by 5 to 12 feet and that material was placed in the northern portion of the site to level out the topography. Based on our subsurface exploration, we estimate that approximately 200,000 cubic yards of undocumented fill has been placed to create the current site conditions. Remedial grading was not performed for this work and the undocumented fill is underlain by unsuitable alluvium and slopewash materials.

Prior grading was also performed for the segments of Bake Parkway and Rancho Parkway adjacent to and within the subject site, although reports documenting the observation and testing were not found during our extensive background review. In the late 1990s, Rancho Parkway was graded in conjunction with the Home Depot commercial center development. Along Rancho Parkway, up to approximately 25 feet of fill was placed over alluvium in the two primary canyons and minor cut in the middle ridge was performed to create the road grades. According to the Nakase Nursery representatives, some fill was placed within their property to construct ascending slopes to reach design grades for Rancho Parkway. In the early 1990s, Bake Parkway was graded which consisted primarily of cuts into the hillside and fills up to 15 feet thick in the side canyon areas. Within the west corner of the subject site, adjacent to Bake Parkway and the business park, the grading of Bake Parkway allowed Nakase Brothers Nursery to continue using the corner of their property by constructing a 12H:1V fill slope descending toward the drainage channel within the nursery. Improvements to the storm drain structures within the site were also performed during this time.

1.4 Field Exploration

Field exploration conducted by NMG included excavation, surface logging and soil sampling of 20 hollow-stem auger borings, advancement of 23 cone penetrometer tests and excavation and logging of 22 trenches/test pits to evaluate the near-surface condition of the existing fill and alluvium/slopewash material throughout the subject site. The boring, CPT, and test pit logs are provided in Appendix B and the locations are depicted on the Geotechnical Map (Plate 1).

Relatively undisturbed soil ring samples were obtained from the exploratory borings with a 2.5-inch inside-diameter, split-barrel sampler. The drive samples were also used to obtain a measure of resistance of the soil to penetration (recorded as blows-per-foot on our geotechnical boring logs). Within the hollow-stem borings, samplers were driven with a 140-pound hammer, free-falling 30 inches. Bulk samples of onsite soil were collected from the hollow-stem cuttings and were used for additional soil identification purposes and laboratory testing. Soil samples were visually classified in accordance with the Unified Soil Classification System (USCS). Groundwater levels were measured in the borings prior to backfilling.

The Cone Penetration Test (CPT) uses an integrated electronic cone system which measures and records tip resistance, sleeve friction, and friction ratio parameters at 5-cm depth intervals by advancement of a 1.25 inch diameter, pointed steel probe that is hydraulically pushed into the ground at a constant rate. In granular soils, pore pressure measurements can also be taken to estimate the depth to groundwater. The CPT provides a more detailed subsurface profile and a better assessment of the potential liquefaction hazards. The CPT data was used with the adjacent boring information and laboratory test data to develop a consistent interpretation of the subsurface conditions.

The test pit exploration consisted of nineteen trenches (T-1 to T-22) excavated with a rubber tired backhoe to depths of 3.5 to 16 feet. The excavations were geotechnically logged by an engineering geologist, and samples were taken at selected intervals. Relatively undisturbed soil ring samples were obtained from the exploratory trenches with a 2.5-inch inside-diameter (ID), hand-driven, ring sampler. Representative bulk samples of onsite soil were collected from the

trenches and backhoe cuttings and used for additional soil identification purposes and laboratory testing.

1.5 Laboratory Testing

Laboratory testing was performed on representative samples of onsite soils collected during our field exploration to characterize their soil engineering properties.

The laboratory testing program included the following:

- In-place moisture content and dry density;
- Consolidation;
- Direct Shear;
- Atterberg Limits;
- Expansion Index;
- Soluble Sulfate;
- Grain-size distribution; and
- Maximum dry density and optimum moisture.

Laboratory tests were conducted in general conformance with applicable ASTM test standards. Laboratory test results are presented in Appendix C. The in-situ moisture content and dry density data are included on the geotechnical boring and trench logs (Appendix B).

1.6 Proposed Grading and Development

The plan reviewed for this study is the 100-scale Area Plan which shows five residential neighborhoods, a senior affordable housing parcel, an elementary school site, a central park, a multi-purpose water quality basin, and an open space habitat and restoration area along Serrano Creek as depicted on Plate 1. The proposed Area Plan also includes backbone streets providing access from Bake Parkway (A and C Streets) and from Rancho Parkway (B Street). Streets A, B and C provide the main circulation throughout the development. School traffic will circulate through BB Street, which connects to A and B Streets. Streets M, S and T provide access around the central park.

The planned development will require design cuts up to 40 feet deep and design fills on the order of 15 feet thick and locally up to 20 feet thick. The fill slopes are expected to be on the order of 5 to 15 feet in height throughout the site, including slopes for the proposed detention basin. The cut slopes are expected to range from 5 to 30 feet high, primarily along the perimeter of the site. Several smaller fill and cut slopes (less than 10 feet in height) are expected to achieve grades within the neighborhoods. We anticipate the design slopes will be at slope ratios of 2H:1V or flatter.

2.0 GEOTECHNICAL FINDINGS

2.1 Geologic Setting

The project site is located within the Peninsular Range geomorphic province at the southeastern margins of the middle to upper Miocene-age Los Angeles Basin. The site lies in the southwestern foothills of the Santa Ana Mountains. This province is bounded by the Whittier-Elsinore Fault Zone to the north and east and by the Newport-Inglewood Fault Zone to the south.

2.2 Earth Units

The site is primarily underlain by bedrock of the Tertiary-age Capistrano Formation (Oso Member). Quaternary-age slopewash and alluvial deposits and existing undocumented fill is present throughout the site. The limits of these earth units are depicted on the accompanying Geotechnical Maps (Plate 1).

Capistrano Formation, Oso Member (Map Symbol - Tco): This bedrock was deposited in a shallow marine environment during the Tertiary Period approximately 1.5 to 5 million years ago. It underlies the entire site and is exposed at the surface within the main ridge and along Bake and Rancho Parkways. In the excavations where it was encountered, it consists of white to pale yellow sandstone and silty sandstone, which is dense to very dense, and generally friable to locally cemented. A few exposures contain bedding highlighted by micaceous-rich beds; however, it is generally massive. Based on our experience with this bedrock unit, some micaceous clay beds and/or bentonitic clay beds may also be present.

Slopewash Material (Map Symbol - Qsw): Slopewash material flanks the lower portions of the bedrock slopes within the site. Slopewash is the product of residual weathering or from soil and bedrock materials that have been transported downslope. The slopewash material is typically yellowish- to grayish-brown, silty/clayey sands with occasional pebbles. The material ranges from loose near the surface to dense at depth and is damp to moist.

Alluvium (Map Symbol – Qal): Quaternary-age alluvial deposits are found in the major drainages and low-lying areas within the site. These sediments originated from the surrounding bedrock and bedrock units upstream of the subject site and have been transported primarily by water. The soil types of the alluvium are variable, generally consisting of silty/clayey well graded sands, sandy clays and silts and some clean sands at depth. Alluvial deposits within the northern portion of the site are in excess of 51.5 feet below ground surface (bgs).

Undocumented Artificial Fill (Map symbol – Afu): Undocumented artificial fill was encountered across the site generally associated with previous nursery activities, including access roads, in-filled old drainage channels, drainage basins and irrigation/water lines. The depth and/or nature of these fills are generally uncertain except where directly encountered in borings or trenches during our subsurface investigation. These fills are mostly derived from onsite soils and bedrock materials and consist of loosely compacted silty to clayey sands and sandy silts and clays with varying amounts of debris. These fill materials were placed over previous native ground where no remedial grading was performed.

We anticipate engineered fills to be present below Bake Parkway and Rancho Parkway and within the IRWD water line easement. However, the exact limits and nature of these fills are unknown at this time.

2.3 Geologic Structure

The general overall geologic structure within the site consists of a homoclinal sequence with bedding dipping gently (less than 20 degrees) towards the south and west. Local variations are apparent due to cross-bedding and paleo-erosional surfaces. Fife (1974) along with Morton and Miller (1976 and 1981) mapped the hills within the site as the Oso Member of the Capistrano Formation, surrounded by slopewash material along the lower slopes, and alluvium within the canyons.

The alluvium within the site was deposited by three streams that flow through and adjacent to the site (Fife, 1974). The alluvium is generally flat-lying, with a gentle dip toward the southwest (down-gradient).

2.4 Regional Faulting and Seismicity

Faulting: The site is not located within a fault-rupture hazard zone as defined by the Alquist-Priolo Special Studies Zones Act (Hart and Bryant, 2007). There are no known major or active faults mapped within the proposed development area, and no evidence of active faulting was observed during our investigation at the site. Therefore, the potential for primary ground rupture at the site is considered slight to nil.

Using the USGS deaggragation program (USGS, 2017) and the site coordinates of 33.6679 degrees north latitude and 117.6668 degrees longitude, the closest major active faults to the site are the San Joaquin Hills Blind Thrust located 6.8 kilometers (km) southwest of the site, the Elsinore Fault located approximately 19 km to the east of the site, and the Newport-Inglewood Fault (offshore) located approximately 21.5 km to the southwest of the site.

Seismicity: Properties in southern California are subject to seismic hazards of varying degrees depending upon the proximity, degree of activity, and capability of nearby faults. These hazards can be primary (i.e., directly related to the energy release of an earthquake such as surface rupture and ground shaking) or secondary (i.e., related to the effect of earthquake energy on the physical world which can cause phenomena such as liquefaction and ground lurching). Since there are no known major or seismically active faults mapped at the site, the potential for primary ground rupture is considered slight to nil. The primary seismic hazard for this site is ground shaking due to a future earthquake on one of the major regional active faults, such as the San Joaquin Hills Blind Thrust, Chino, Newport-Inglewood, Whittier-Elsinore, San Andreas, and San Jacinto faults.

Secondary Seismic Hazards: Secondary seismic hazards, such as tsunami and seiche, need not be considered since the site is located away from the ocean or confined bodies of water. Liquefaction potential at the site is discussed in the Section 2.8.

2.5 Surface Water and Groundwater

Currently, and for the majority of the year, Serrano Creek is essentially dry except during very heavy precipitation and within the southeast corner of the site where runoff from the nursery flows into the creek via small-diameter drain pipes. The primary surface flow entering the site is from a storm drain pipe under Rancho Parkway. This surface water flows through the site in an open ditch and exits the site at the southwest end into a storm drain inlet.

Groundwater was observed in many of the borings during our field exploration. Where encountered, groundwater ranges from 20 bgs in the southern portion of the site to 45 feet bgs in the northern portion of the site and appears to be perched within the alluvium and weathered bedrock materials at the contact with the underlying unweathered bedrock. Based on mapping by the State (CDMG, 2000), historic high groundwater at the site is on the order of 20 feet bgs.

2.6 Mass Movements

There are no landslides mapped at the site. Seismic hazard mapping by the State (CDMG, 2001) show no areas of potential seismically induced landslides within the subject site (Figure 2).

2.7 Slope Stability

There are numerous cut and fill slopes that will be required to achieve the planned development grades throughout the site. We anticipate the design slopes will be on the order of 30 feet in height or less and at a slope ratio of 2H:1V or less. The highest slopes will be adjacent to the business park.

The design cut slopes will need to be analyzed on a case-by-case basis when grading plans are available, however since the perimeter cut slopes will likely expose existing undocumented fill, alluvium or alluvium overlying sandstone bedrock we anticipate stabilization fill keys on the order of 15 to 20 feet wide by 5 feet deep will be adequate to provide global and surficial stability.

Due to the effects of liquefaction potential of the alluvium during a significant seismic shaking event, the exposed slope associated with Serrano Creek is subject to lateral movements. Based on our data review and preliminary liquefaction analysis, a seismic shear key will be needed to mitigate this condition. The lateral extent of the keyway excavation would need to start at the environmental setback boundary and the key will extend along the Serrano Creek edge.

2.8 Liquefaction Potential

Liquefaction is a phenomenon in which earthquake-induced cyclic stresses generate excess pore water pressure in low density (loose), saturated sandy soils and soft silts below the water table. This causes a loss of shear strength and, in many cases, ground settlement. For liquefaction to occur, all of the following conditions must be present:

- There must be severe ground shaking, such as occurs during a strong earthquake.

- The soil material must be saturated or nearly saturated (generally below the water table).
- The corrected normalized standard penetration test (SPT) blow counts $(N_1)60$ or the CPT tip resistance (Q) must be relatively low.
- The soil material must be granular (usually sands or silts) with, at most, only low plasticity. Clayey soils and silts of relatively high plasticity and dense sands are generally not subject to liquefaction.

Seismic hazard mapping by the State shows a significant portion of the site lies within potential liquefaction areas along the southerly edge of the property, paralleling Serrano Creek (Figure 2). We have explored this condition with CPTs, advanced to 50 feet bgs, in selected areas along this perimeter. Hollow-stem auger borings were also excavated, sampled, and logged to depths of 55 feet bgs. Based on our assessment of the collected subsurface information and using historic, some layers within the alluvial soils are subject to liquefaction. However, the remedial grading measures recommended herein (including the seismic shear key described above) are designed to significantly reduce the liquefaction potential.

2.9 Settlement Considerations

The amount of potential settlement can vary significantly over the site due to variations in the subsurface conditions and depths of the planned cuts and fills. In conducting our preliminary settlement assessment, we have assumed that remedial grading will be implemented to remove the upper unsuitable soils, that maximum fill loading will be no more than 20 feet over existing ground, and the proposed structures at the site will generally consist of two- to three-story residential and school buildings. After remedial and rough grading is complete, we anticipate the remaining long-term consolidation settlement to be on the order of 1 to 2 inches and differential settlement to be on the order of ½ inch to 1 inch over a 30-foot span.

2.10 Earthwork Shrinkage/Bulking and Subsidence

The loss or gain of volume (shrinkage or bulking, respectively) of excavated natural materials and re-compaction as fill, varies according to earth material type and location. This volume change is represented as a percentage shrinkage (volume loss) and as a percentage bulking (volume gain) after re-compaction of a unit volume of cut in this same material in its natural state. The onsite materials will have varying shrinkage or bulking characteristics. The following table presents the projected range of values for each type of material:

Earth Unit	***Approximate Percent Shrinkage/Bulking***
Alluvium/colluvium	10 percent shrinkage
Undocumented Fill	5 percent shrinkage
Slope Wash Deposits	5 percent shrinkage
Bedrock	2 percent bulking

Ground subsidence at the site is estimated to be on the order of 0.1 foot across the site.

2.11 Existing Utilities and Structures

There are several nursery irrigation pipelines that cross the property. There are also numerous existing buried and above-ground utilities that service the existing office trailers at the site. According to the nursery representatives, there may be an existing septic system and/or cesspool associated with the structure in the southeast portion of the site adjacent to Serrano Creek.

An existing storm drain outlet and inlet structure direct water onto and off the subject site. We understand that the storm drain system being designed for the site will connect these two structures to properly manage this drainage.

Numerous other utilities may have been installed along the perimeter of the project that will require tie-ins to the proposed project utilities. The tie-in locations may require geotechnical evaluation, for trench stability and/or settlement of the utilities, especially where the utilities are deeper than approximately 5 feet. Utilities associated with prior land use and not designated to be protected in place are to be removed during grading.

2.12 Engineering Characteristics of Onsite Soils

Laboratory testing of select onsite soils indicate that the grain size distribution of the samples have fine contents (Passing Sieve No. 200) in the range of 37 to 49 percent with clay contents in the range of 14 to 19 percent. The Atterberg limit tests indicate that the samples have liquid limits (LLs) in the range of 29 to 33 percent with plasticity indices (PIs) in the range of 15 to 21. The samples indicate that onsite soils have "low" to "medium" expansion potential with expansion indices ranging from 28 to 55. The soluble sulfate exposure of the samples is classified as "S0" per Table 19.3.1.1 of ACI-318-14. Laboratory test results are included in Appendix C.

2.13 Rippability and Generation of Oversize Material

The rippability characteristics of bedrock depend upon the rock type, hardness, the depth of weathering, degree of fracturing, and the structure of the rock. The deepest cuts within the site are on the order of 40 feet, and with remedial grading, cuts may be up to 45 feet deep.

Borings excavated throughout the site using hollow-stem auger drill rigs were excavated to a maximum depth of 30 feet into the bedrock without refusal. The equipment used to excavate these borings typically cannot excavate earth materials that are not rippable.

Based on exploration at the site and prior explorations and grading adjacent to the site, the bedrock is anticipated to be rippable with D-8 and D-9 bulldozers. Proper equipment selection and sound ripping techniques are important for effective earthwork operations. Deeper cuts may encounter local areas of cemented sandstone which will be the most difficult to excavate and oversize rock may be generated (rocks greater than 8 inches in the maximum diameter). NMG anticipates that a minor amount of oversize rock will be generated from localized cemented zones within the bedrock cut areas.

2.14 Perimeter Conditions

The subject rectangular shaped site is bounded on three sides by improved public areas and on one side by Serrano Creek. Specific geotechnical issues related to the perimeter conditions are discussed below.

Serrano Creek: The southeastern edge of the property is bounded by Serrano Creek. This boundary is approximately 2,600 feet long. The creek ranges from 10 to 14 feet deep for most of the length and 6 to 7 feet deep for the most southerly 500 feet near the entrance to the site. We understand that Serrano Creek is to remain in its natural state and there is an existing environmental setback line on both sides of the creek as previously documented by the environmental consultant, Glenn Lukos Associates.

Bake Parkway: Bake Parkway defines the northwest property line along the subject site. The grading to construct Bake Parkway encroached within the subject site, leaving areas of non-structural fill overlying unsuitable alluvium and slopewash material. Within the west corner of the site, recent borings and trenches indicated unsuitable fills generally 10 feet deep and locally up to 25 feet deep. Other potentially unsuitable fill areas may be located along Bake Parkway as well as undocumented fills placed by the nursery.

Rancho Parkway: Rancho Parkway was graded and constructed simultaneously with the construction of the Home Depot Center. According to nursery representatives, the grading of the Rancho Parkway encroached into the nursery property. An outlet structure also enters the site along this property edge which provides drainage for the commercial facilities and Rancho Parkway. We understand that a new storm drain system will be constructed to accommodate drainage from this outlet structure.

Pacific Commercentre Business Park: The property line adjacent to the Pacific Commercentre Business Park delineates the southwestern boundary of the subject site. This boundary includes an existing retaining wall near Bake Parkway and placement of fills on the order of 10-feet thick. We understand the proposed grading along this boundary consists of descending design cut and fill slopes. An existing IRWD easement exists which includes 12-inch domestic and reclaimed water lines traversing the entire length of the property boundary. We understand that Hunsaker is currently designing a realignment of the subject lines and will provide their plan at a later date. The geotechnical consultant should review the plans once they become available. An inlet structure also exits the site along this property edge and drains the subject site. We understand that the storm drain pipe connected to this inlet structure will be incorporated into the subject storm drain plan.

3.0 CONCLUSION AND RECOMMENDATIONS

3.1 General Conclusion and Recommendation

Based on the results of our subsurface exploration and review of the referenced reports, the proposed residential and school site development is considered acceptable from a geotechnical viewpoint provided the recommendations of this report and future plan reviews are incorporated during grading, design and construction. Our recommendations are considered minimum and may be superseded by more stringent requirements of others (i.e., governing agency, architect and/or structural engineer). Additional geotechnical reviews will be required once the grading plans are available. The grading and construction should be performed in accordance with the City of Lake Forest Grading Code and the grading specifications provided in Appendix D, except as superseded below.

3.2 Site Clearing and Preparation

Prior to grading, deleterious material (including highly organic topsoil, vegetation, trash, and construction debris) should be removed, and disposed of offsite. There are local large trees and local heavy vegetation that will require disposal offsite. Since the site has been utilized as a nursery for over 40 years, there are various remains of structures and numerous irrigation lines that cross the site. These items will need to be demolished and removed from the site.

Numerous concrete (PCC) improvements such as swales and rip-rap will require demolition. If the PCC is free of metals, it may be disposed of in the same manner specified for oversize rock in Appendix D. Rebar or other metals should not be placed in fill but disposed of offsite. PCC pieces that are greater than 18 inches in the maximum dimension should not be placed within the upper 15 feet of fill below design grade. Pulverized PCC may be used as select backfill or placed as general fill, but should not be used in the upper 5 feet of fill below design grade. We understand that the designed storm drain system will tie into the existing storm drain inlet and outlet structures within the site. Partial demolition of the existing structures may be necessary to tie in the existing utilities. Demolition of these structures is to be performed in accordance with the recommendations herein. Unsuitable soils below these existing structures may be subject to remedial removals.

3.3 General Earthwork and Grading

Grading and excavations should be performed in accordance with the City of Lake Forest Grading Code and the General Earthwork and Grading Specifications in Appendix D. Prior to placement of compacted fill, removal bottoms should be scarified a minimum of 6 inches, moisture-conditioned to over optimum, and compacted to a minimum 90 percent relative compaction. Relative compaction should be based upon ASTM Test Method D1557.

Fill material should be placed in loose lifts no greater than 8 inches in thickness and compacted prior to placement of the next lift. Ground sloping greater than 5H:1V should be prepared by benching into firm, competent material as fill is placed.

Moisture content of the fill should generally be a minimum of 2 to 3 percent over optimum moisture content. The grading contractor should note that the onsite soils generally are moist to very moist, however, the sandstone bedrock tends to have relatively low moisture contents in the upper approximately 30 feet (see boring logs in Appendix B). Significant amounts of water may need to be added in order to achieve the recommended moisture contents. Also, depending on the time of year grading commences, some onsite soils may be saturated which may require drying back prior to placement as fill.

Native materials that are relatively free of deleterious material should be suitable for use as compacted fill. If import soils are required in order to achieve design grades, they should be evaluated by the geotechnical consultant prior to and during transport to the site to verify their suitability.

3.4 Remedial Removals

The unsuitable earth materials should be removed prior to placement of proposed fill. Unsuitable materials at the site include topsoil, uncertified fills, slopewash, weathered alluvium, and weathered bedrock. The estimated depths for remedial removal generally range from 5 to 10 feet and locally up to 15 feet deep bgs. Undocumented fills should be completely removed down to native soils. The unsuitable topsoil and weathered alluvium below the undocumented fill should also be removed.

The removal bottoms should be carefully reviewed to make sure there are no buried trash fills or utilities/structures left in place. The geotechnical consultant should review and geotechnically map the removal bottoms prior to placement of fill. The removal bottoms should be scarified, moisture-conditioned and recompacted prior to placement of compacted fill.

3.5 Slope Stabilization

Once a rough grading plan is available, the plan should be reviewed and slope stability analysis performed where applicable. For preliminary purposes and based on our knowledge of the subsurface conditions, including shear strengths of the alluvium and bedrock unit, we anticipate stabilization fill keys will be required for all cut slopes measuring 10 feet or higher. The perimeter of the site along Serrano Creek should be provided with a seismic shear key in order to remove the near-surface liquefiable soils and provide lateral support for the development.

Keyway excavations should be mapped and evaluated by the geotechnical consultant to verify the anticipated geologic conditions. The keyways and excavations should be evaluated and accepted by the geotechnical consultant prior to placement of the subdrain and/or backfill. The keyway excavations should be provided with proper subdrainage in accordance with the standard details in Appendix D.

The reworked onsite soils are anticipated to provide adequate strength for the gross stability of the proposed fill and replacement fill slopes of up to approximately 15 feet in height at 2H:1V inclinations or flatter. It should be noted that some of the onsite materials that will be used for compacted fill are clean granular material with very little cohesion. We recommend that the fill materials used for the outer 15 feet of slopes be constructed with earth materials that have some

cohesive characteristics to help reduce the potential for erosion during storm events. If cohesive earth materials are not available, then finished slopes should be protected against erosion by using deeply and extensively rooted plants, spray-on protective coverings, and/or other special protective erosion control measures. Slope faces should be compacted to a minimum 90 percent relative compaction.

Temporary slopes will be created by the backcuts for the recommended stabilization fills as well as for remedial removals. Backcuts will be up to 20 feet in height and should be designed with a slope ratio of 1.5H:1V to 2H:1V, except where constrained by existing improvements along the perimeter of the site. The actual stability of the backcuts will depend on many factors, including exposed earth materials, slope ratio, and amount of time the excavation remains exposed. Proper remedial measures should be provided to protect the adjacent properties in-place.

3.6 Protection of Existing Utilities

Existing utilities that are to remain undisturbed should be located and visually marked prior to grading operations. Grading and construction activities over the pipelines should be performed in accordance with the requirements of the pipeline owner. Stockpiling of soils over these lines should not be allowed without prior approval by the utility owner. Excavations adjacent to any pipeline easement should be performed with care, so as not to undermine or destabilize the adjacent ground. Operation of heavy equipment and crossings over these lines with heavy equipment should be in conformance with the appropriate utility company guidelines (e.g., fill ramps, plating, etc.).

3.7 Rippability and Placement of Oversize Material

The bedrock at the site includes locally dense cemented sandstone that will be difficult to rip. We anticipate that the bedrock will be rippable, though, potentially difficult at times (using D-8 and D-9 bulldozers) in the planned excavations (design cuts and remedial excavations less than 50 feet deep).

Local excavations within the bedrock cuts may produce oversize rock (greater than 8 inches in size) that will require special placement in the fill. Oversize rock may be placed in fills deeper than 10 feet, and a minimum of 2 feet below the deepest utilities within the streets. Placement of oversize material should be performed in accordance with our General Earthwork and Grading Specifications in Appendix D. Grading operations should be planned so that the fills deeper than 15 feet can accept oversize rock from the cuts.

3.8 Lot Overexcavation

Final overexcavation recommendations should be based on review of the rough grading plan, once individual lot layouts are determined. The proposed grading is anticipated to expose cut and fill transitions at finish grade throughout the site. Lots fully or partially exposing bedrock should be overexcavated to a minimum depth of 5 feet below design grade and replaced with compacted fill to provide a uniform fill cap over each lot. Lots exposing alluvium or slopewash near the cut and fill transition may be subject to deeper overexcavation depths to achieve the nearby remedial

removal depths for similar materials. Deeper lot overexcavation/capping (up to 10 feet) may also be recommended during grading if highly differing earth materials are encountered on a given lot, such as in areas where highly expansive clay beds are encountered in the sandstone.

3.9 Groundwater

Groundwater is generally relatively deep at the site and is not expected to be encountered during remedial earthwork and rough grading. Depending on the time of year grading occurs, nuisance water and local seepage may be present, which may require local dewatering (sump pumps) and/or placement of crushed rock to stabilize the removal bottoms prior to fill placement. Subdrains are should be placed in the backcuts of the stabilization keys, as shown in the standard details provided in Appendix D.

3.10 Liquefaction Potential

A portion of the site is located in a mapped liquefaction hazard zone (Figure 2), adjacent to Serrano Creek. Based on the known subsurface conditions and implementation of the remedial recommendations during rough grading including a seismic shear key, we anticipate the potential for liquefaction across the site to be low. The remainder of the site is not in a potential liquefaction hazard zone.

3.11 Settlement Potential

Recommended remedial removals (Section 3.4) will remove the majority of the potentially collapsible and/or more compressible near-surface alluvium, slopewash, undocumented fill and weathered bedrock materials. Design fill loading is on the order of 15 feet and locally up to 20 feet, over the existing ground surface. After remedial and rough grading is complete, we anticipate the remaining long-term consolidation settlement to be on the order of 1 to 2 inches and differential settlement to be on the order of ½ inch to 1 inch over a 30-foot span.

3.12 Surface Drainage and Slope Maintenance

Surface drainage should be carefully taken into consideration during all grading, landscaping, and building construction. Positive surface drainage should be provided to direct surface water away from structures and slopes and toward the street or suitable drainage devices. Ponding of water adjacent to the structures should not be allowed. Paved areas should be provided with adequate drainage devices, gradients, and curbing to reduce run-off flowing from paved areas onto adjacent unpaved areas.

To reduce the erosion and slumping potential of the graded slopes, all permanent manufactured slopes should be protected from erosion by planting with appropriate vegetation or suitable erosion protection should be applied as soon as is practical. Proper drainage should be designed and maintained to collect surface waters and direct them away from slopes. The maintenance program should take into account the granular, more erodible nature of the soils that are likely to be present at the slope face at the completion of grading. Consideration should be given to the use of spray-on protective products and frequent use of straw waddles or other temporary runoff

control devices immediately after slopes are constructed. In addition, the design and construction of permanent improvements and landscaping should also provide appropriate mitigation measures for sandy soils. A rodent-control program should be established and maintained as well, to reduce the potential for damage related to burrowing.

3.13 Preliminary Feasibility of Infiltration

Our subsurface investigation within the site exposed mostly fine grained soils in the upper 20 feet throughout the site. Remedial and design earthwork will leave the site with a compacted fill blanket ranging from 5 to 35 feet thick overlying bedrock and alluvium. The historic high groundwater (i.e., design groundwater table) for the site is approximately 20 feet bgs. Infiltration systems are required to infiltrate no deeper than 10 feet above this design groundwater table. As such, the potential zones for infiltration across this site extremely limited, and is not likely feasible.

3.14 Future Geotechnical Review and Engineering Analysis

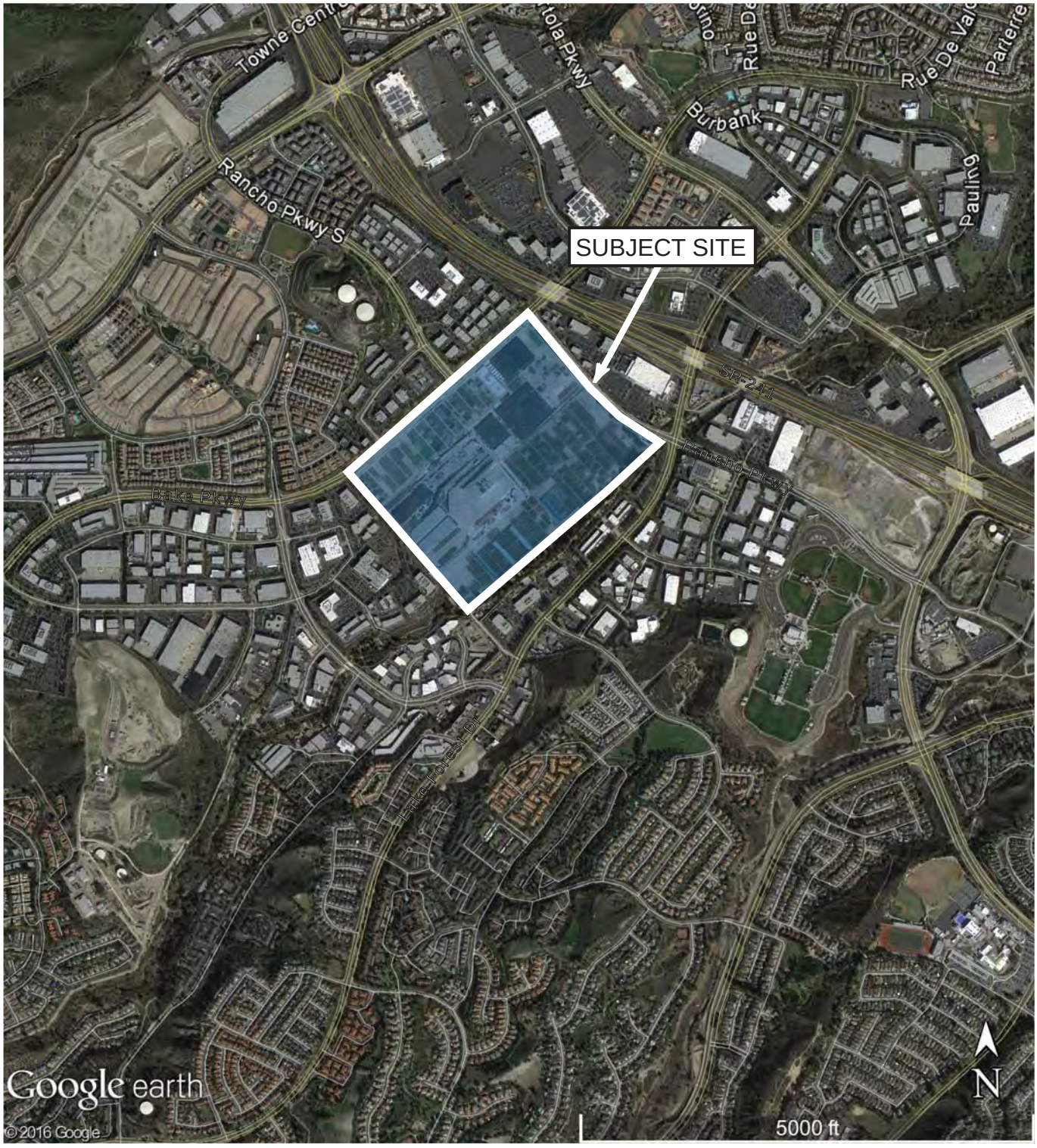
The geotechnical consultant should review future rough, improvement, precise grading plans and construction plans in light of the site-specific geotechnical conditions. Additional engineering analysis related to slope stability, remedial measures, liquefaction and settlement potential, expansive and corrosive soil characteristics should be performed based on the rough grading plan and finish design profile. This additional geotechnical analysis will be required to provide project-specific recommendations for rough and remedial grading, design of structures, and other improvements.

4.0 LIMITATIONS

This report has been prepared for the exclusive use of our client, Toll Brothers Inc., based on the specific scope of services requested by Toll Brothers, Inc. for the Nakase Nursery project described herein. This report or its contents should not be used or relied upon for other projects or by other parties without the consent of NMG and the involvement of a geotechnical professional. The means and methods used by NMG for this study are based in part on local geotechnical standards of practice, care, and requirements of governing agencies. No warranty or guarantee, express or implied is given.

The findings, conclusions, and recommendations are professional opinions based on interpretations and inferences made from geologic and engineering data from specific locations and depths, observed or collected at a given time. By nature, geologic conditions can vary from point to point, can be very different in between points, and can also change over time. Grading and other project plans also are still being developed. Therefore, our conclusions and recommendations are by nature preliminary and are subject to verification and possible modification as plans develop.

Inherently, geotechnical recommendations are also preliminary until the geotechnical consultant observes and tests exposed subsurface conditions during grading and construction. The recommendations in place at that time are subject to modification at the discretion of the geotechnical consultant depending upon exposed geotechnical conditions.



Base Map: Google Earth, 2016

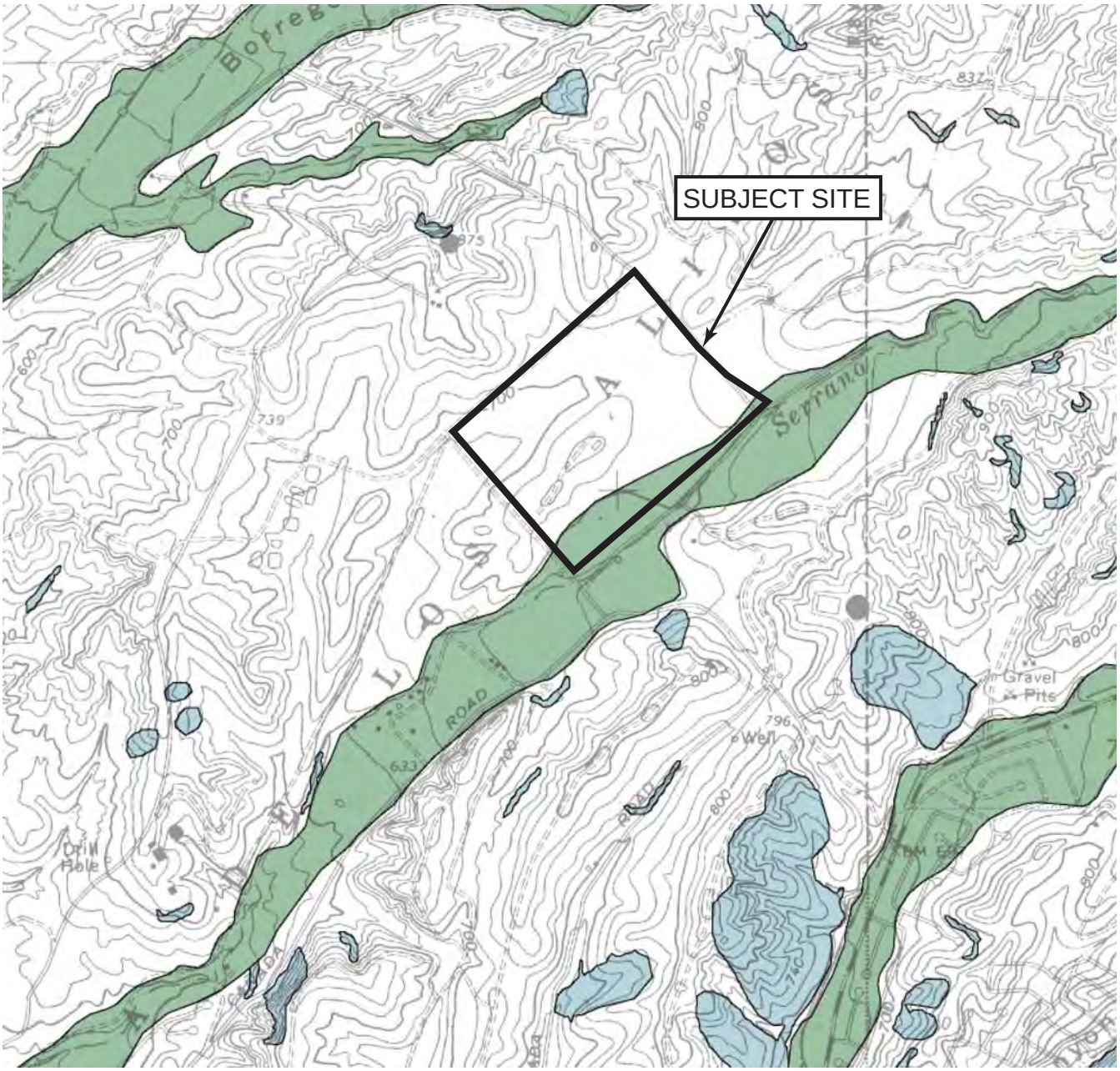
SITE LOCATION MAP

Project Number: 16098-01 By: WG

Project Name: Toll Brothers / Lake Forest Nursery

Date: 7/13/2018 Figure 1

NMG Geotechnical, Inc.



Liquefaction

Areas where historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

Earthquake-Induced Landslides

Areas where previous occurance of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

BASE: DIVISION OF MINES AND GEOLOGY SEISMIC HAZARDS MAP,
EL TORO QUADRANGLE
Dated: Jan. 17, 2001

N

SEISMIC HAZARDS MAP

Project Number: 16098-01 By: WG

Project Name: Toll Brothers / Lake Forest Nursery

Date: 7/13/2018 Figure 2

NMG Geotechnical, Inc.

APPENDIX A

APPENDIX A

REFERENCES

California Division of Mines and Geology, 1973, Geo-Environmental Maps of Orange County, California, Preliminary Report 15.

California Division of Mines and Geology, 1981, Geologic Map of Orange County, California, Showing Mines and Mineral Deposits, Bulletin 204, Plate 1.

California Department of Conservation, Division of Mines and Geology (CDMG), 1997, Guidelines for Evaluation and Mitigating Seismic Hazards in California, Special Publication 117.

California Division of Mines and Geology, 1999, Fault-Rupture Hazard Zones in California, Special Publication 42, Revised 1997, 1 and 2 added 1999.

California Division of Mines and Geology, 2000, Seismic Hazard Evaluation of the El Toro 7.5-Minute Quadrangle, Orange County, California, SHZR 047.

California Division of Mines and Geology, 2001, Seismic Hazard Zones Map for the El Toro Quadrangle, Official Map, Released January 17, 2001.

Campbell, 1993, "Empirical Prediction of Near-Source Ground Motion From Large Earthquakes," Proceedings, International Workshop on Earthquake Hazard and Large Dams in the Himalaya Sponsored by the Indian National Trust for Art and Cultural Heritage (INTACH), New Delhi, India, January 15-16.

Fife, D.L., 1974, Geology of the South Half of the El Toro Quadrangle, Orange County, California, California Division of Mines and Geology Special Report 110.

Hart, E. W. and Bryant, W.A., 2007, Fault Rupture Hazard Zones in California, Alquist Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault zones Maps, Department of Conservation, Division of Mines and Geology, Special Publication 42, Revised 1997, Interim Revision 2007.

Jennings, C. W., 1994, Fault Activity Map of California and Adjacent Areas, with Locations and Ages of Recent Volcanic Eruptions, California Department of Conservation, Division of Mines and Geology, Geologic Data Map No. 6.

Morton, P. K., Miller, R. V., and Evans, J. R., et. al. 1976, Environmental Geology of Orange County, California, California Division of Mines and Geology, Open-File Report 79-8 LA.

Morton, P. K. and Miller, R. V., 1981, Geologic Maps of Orange County, California, showing Mines and Mineral Deposits, California Division of Mines and Geology, Bulletin 204.

NMG Geotechnical, Inc., 2017, Geotechnical Evaluation of Proposed Residential and School Site Development, Nakase Property, Lake Forest, California, Project No 16098-01, dated April 19, 2017.

Norcal Engineering, 1999, Report of Geotechnical Observation and Testing Of Precise Grading Operations, Proposed Home Depot Development, 2021 Lake Forest Drive, Lake Forest, California, Project Number 7563-98, October 20, 1999.

Rogers, T.H., 1965, Geologic Map of California, Olaf P. Jenkins Edition, Santa Ana Sheet, fourth printing 1978.

APPENDIX A

REFERENCES (Continued)

Schoellhamer, J.E., Kinney, D.M., Yerkes, R.F., and Vedder, J.G., 1954, Geologic Map of the Northern Santa Ana Mountains, Orange and Riverside Counties, California: U.S. Geol. Survey Oil and Gas Inv. Map OM-154.

Schoellhamer, J.E., Vedder, J.G., Yerkes, R.F., and Kinney, D.M., 1981, Geology of the Northern Santa Ana Mountains, California, USGS Professional Paper 420-D.

Southern California Earthquake Center (SCEC), University of Southern California, 1999, Recommended Procedures for Implementation of DMG Special Publication 117 Guidelines for Analyzing and Mitigating Liquefaction Hazards in California, dated March 1999.

Tan, S. S., Miller, R. V., Fife, D.L., 1984, Engineering Geology of the North Half of the El Toro Quadrangle, Orange County, California: California Division of Mines and Geology Open File Report 84-28.

U.S. Department of Agriculture, Soil Conservation Service and Forest Service, September, 1978, Soil Survey of Orange County and Western Part of Riverside County, California.

U. S. Geological Survey, 1981, Geology of the Northern Santa Ana Mountains, California; by Schoellhammer, Vedder, Yerkes and Kinney, U.S. Geological Survey, Professional Paper 420-D, 1981.

U.S. Geological Survey, 2017, Unified Hazard Tool, Dynamic: Conterminous US 2008 (v3.3.1) Deaggregation Program; web site address: https://earthquake.usgs.gov/hazards/interactive/

AERIAL PHOTOGRAPHS REVIEWED

Date	*Flight*	*Photograph No.*	*Scale*	*Source*
12/12/1952	AXK	35-37, 74-76		Continental
3/28/1959	261-726	139-142		Continental
9/20/1965	AXK 1FF	73	1:20,000	Continental
3/30/1967	2	105, 106, 132, 133		Continental
7/19/1971	ASL 94	39, 40	1:24,000	Continental
11/21/1972	72202	232, 233		Continental
10/29/1973	132-10	10, 11		Continental
1/13/1975	157	11-14,15 12-15, 16		Continental
1/24/1977	181-11	17, 18		Continental
12/18/1978	203	11-22, 23, 12-23, 24		Continental
2/25/1980	80033	159-161	1"=2,000'	Continental
1/31/1981	211	12-15,16		Continental
4/8/1983	218	12-17, 18	1"=2,000'	Continental
7/26/1988	C-3	205, 206		Continental
1/20/1992	685-11	8, 9	1"=2,000'	Continental
2/2/1993	C89-9	36, 37	1"=2,000'	Continental
1/28/1995	G102-39	97-99	1"=2,000'	Continental
9/11/1997	C116-39	20-23	1"=2,000'	Continental
3/2/1999	C-135-39	155-157	1"=2,000'	Continental
1946-2005	--	--	--	Historic Aerials.com
1994-2009	--	--	--	Google Earth

APPENDIX B

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Date(s) Drilled	9/3/16	Logged By	ZKH
Drilling Company	2R Drilling	Drill Bit Size/Type	10"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs @ 30" Drop
Sampling Method(s)	Modified California		
Approximate Groundwater Depth:	22.5 Feet		
Comments			

B- 1

Sheet 1 of 3

Total Depth Drilled (ft)	55.7
Approximate Ground Surface Elevation (ft)	687.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SM	Surface: Nursery **Artificial Fill, Undocumented (Afu)**			
						SM	**Alluvium (Qal)**			
	5		D-1	18			@ 5': Light olive brown silty fine to medium SAND, moist, medium dense, trace caliche, trace gravel.	8.1	114.1	DS
680										
	10		D-2	19			@ 10': Pale yellow brown silty fine to medium SAND, moist, medium dense, trace silty layering.	4.6	112.3	
	15		D-3	18		SP	@ 15': Light brown fine to medium SAND, moist, medium dense, trace fine to coarse gravel.	11.4	97.9	
670						SC	Tip: Brown clayey fine SAND, very moist, stiff.			
	20		D-4	21		SM	@ 20': Light olive brown silty fine SAND, saturated, medium dense, micaceous.	20.0	107.4	
	25									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25		D-5	58		SM-SC	@ 25': Olive silty/clayey fine to medium SAND, saturated, very dense, micaceous.	15.6	115.2	
660										
	30						Very hard drilling, cobbles.			
	35		D-6	27			@ 35': Olive silty/clayey fine to medium SAND, saturated, medium dense, weathered bedrock look, fractures/cracks infilled with clayey soil, pinhole pores.	20.4	105.0	
650										
	40									
	45		D-7	37		SM	@ 45': Olive silty fine SAND, saturated, very dense, micaceous.	21.0	106.6	
640										
	50		D-8	50/1"		SM	**Capistrano Formation, Oso Member (Tco)** @ 50': No Recovery.			

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California

PROJECT NO. 16098-01

NMG

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Elevation (ft)	Depth (ft)	SAMPLES Type Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	55	D-9 / SB-1	50/4" 50/4"			@ 55': No Recovery. @ 55.3': Greenish gray to olive silty fine to medium SANDSTONE, saturated, hard, micaceous.			
630									
	60					Notes: Total Depth: 55.7 Feet. Groundwater Encountered at 22.5 Feet After 15 Minutes. Backfilled With Cuttings and Tamped.			
	65								
620									
	70								
	75								
610									
	80								

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California

PROJECT NO. 16098-01

NMG

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Date(s) Drilled	9/3/16	Logged By	ZKH
Drilling Company	2R Drilling	Drill Bit Size/Type	10"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs @ 30" Drop
Sampling Method(s)	Modified California, Bulk		
Approximate Groundwater Depth:	37.6 Feet		
Comments			

B- 2

Sheet 1 of 3

Total Depth Drilled (ft)	55.3
Approximate Ground Surface Elevation (ft)	712.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SM-SC	Surface: Nursery **Artificial Fill, Undocumented (Afu)**			
710			B-1							B-1 @ 0'-5' AL, DS, MD
	5		D-1	8			@ 5': Dark brown silty/clayey SAND, moist, medium dense, mottled, trace mica, trace pinhole pores.	11.4	111.5	
	10		D-2	50			@ 10': Upper: Dark brown silty/clayey fine SAND, moist, very dense, mottled.	3.0		Sample Disturbed
700						GP	**Alluvium (Qal)** Lower: Brown fine to coarse sandy GRAVEL, damp, very dense, sub-angular meta-volcanic clasts, friable.			
	15		D-3	19		SP	@ 15': Pale yellow fine to coarse SAND, damp, medium dense, highly friable, trace fine gravel.	3.5	108.3	CN
	20		D-4	13			@ 20': Pale yellow fine to coarse SAND, damp, medium dense, highly friable, fine to medium gravel.	3.2	112.3	
690			B-2			SM	Tip: Light olive brown silty fine sand, moist, medium dense.			B-2 @ 20'-25'
	25									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25		D-5	18		SM	@ 25': Light olive brown silty fine SAND, moist, medium dense, trace mica, slightly friable, trace fine gravel.	14.0	106.0	
	30		D-6	23		SM-SC	@ 30': Olive brown silty/clayey fine SAND, very moist, medium dense, pinhole pores, trace mica, caliche.	17.9	110.6	
680										
	35		D-7	13		SP	@ 35': Upper: Pale yellow fine to medium SAND, saturated, medium dense, friable, black MnO staining.	41.2	79.2	
						CL	Lower: Light olive brown silty CLAY, saturated, stiff, pinhole pores, root stains, micaceous. ▼			
	40		D-8	18		SM-SC	@ 40': Upper: Dark brown silty/clayey fine SAND, saturated, medium dense, pinhole pores.	19.1	109.0	
670						SM	**Capistrano Formation, Oso Member (Tco)** Tip: Yellow brown silty fine to medium SANDSTONE. @ 42': Very hard drilling			
	45									
	50		D-9	50/5"			@ 50': Olive brown silty fine to coarse SAND, saturated, very dense, weathered.	16.6	113.0	
660										

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California

PROJECT NO. 16098-01

NMG

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Elevation (ft)	Depth (ft)	SAMPLES Type Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	55	D-10	50/4"			@ 55': Olive brown silty fine to coarse SAND, saturated, very dense.	12.3	121.6	
						Notes: Total Depth: 55.3 Feet. Groundwater Encountered at 37.6 Feet After 10 Minutes. Backfilled With Cuttings and Tamped.			
650	60								
	65								
	70								
640									
	75								
	80								
630									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California

PROJECT NO. 16098-01

NMG

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Date(s) Drilled	9/3/16	Logged By	ZKH
Drilling Company	2R Drilling	Drill Bit Size/Type	10"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs @ 30" Drop
Sampling Method(s)	Modified California, Bulk		
Approximate Groundwater Depth:	44.6 Feet		
Comments			

B- 3

Sheet 1 of 2

Total Depth Drilled (ft)	51.5
Approximate Ground Surface Elevation (ft)	722.5 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SM	Surface: Nursery **Artificial Fill, Undocumented (Afu)**			
720			B-1							B-1 @ 0'-5'
	5		D-1	4		SM	**Alluvium (Qal)** @ 5': Brown silty fine SAND, moist, loose, mica, friable.	8.5	101.5	CN
	10		D-2	26		SP	@ 10': Pale yellow brown gravelly fine to coarse SAND, damp, medium dense, friable, subangular clasts.	1.9	109.0	
710										
	15		D-3	23		SM	@ 15': Light brown silty fine SAND, moist, medium dense, caliche, trace pinhole pores, trace gravel (Oso member).	13.3	112.2	DS
	20		D-4	26		SM-SC	@ 20': Light brown silty/clayey fine SAND, moist, medium dense, caliche, trace pinhole pores.	17.5	107.6	
700										
	25									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25	D	5	22		SM-SC	@ 25': Light brown silty/clayey fine SAND, moist, medium dense, caliche, trace pinhole pores.	20.9	102.9	
	30	D	6	22		ML	@ 30': Brown SILT, very moist, stiff, micaceous, powdery texture.	26.5	95.2	CN
690										
	35	D	7	16		SM	@ 35': Upper: Olive gray silty fine SAND, very moist, medium dense, micaceous, pinhole pores.	8.1	104.2	
						SC	Lower: Brown clayey SAND, very moist, medium dense, micaceous.			
	40	D	8	27		ML-CL	@ 40': Brown sandy SILT/CLAY, saturated, very stiff, micaceous, pinhole pores, caliche.	29.5	95.8	
680						SM	Tip: Gray silty fine to medium SAND, saturated, medium dense.			
	45	D	9	28		SP	@ 45': Upper (Not in Sample): Yellow brown fine to coarse SAND, saturated, medium dense, friable.	26.3	99.0	
						SM-SC	Lower (In Sample): Gray brown silty/clayey fine SAND, saturated, medium dense.			
						CL	Tip: Brown sandy CLAY, saturated, very stiff.			
	50	D	10	57		SP	@ 50': Pale yellow brown fine to coarse SAND, saturated, very dense, friable, trace fine to coarse gravel.	16.5	113.0	
670							Notes: Total Depth: 51.5 Feet. Groundwater Encountered at 44.6 Feet After 15 Minutes. Backfilled with Cuttings and Tamped.			

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California

PROJECT NO. 16098-01

NMG

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Date(s) Drilled	9/3/16	Logged By	ZKH
Drilling Company	2R Drilling	Drill Bit Size/Type	10"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs @ 30" Drop
Sampling Method(s)	Modified California, Bulk		
Approximate Groundwater Depth:	44.6 Feet		
Comments			

B- 4

Sheet 1 of 2

Total Depth Drilled (ft)	51.5
Approximate Ground Surface Elevation (ft)	717.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SC	Surface: Nursery **Artificial Fill, Undocumented (Afu)**			
			B-1							
	5		D-1	34			@ 5': Brown clayey fine to coarse SAND, very moist, medium dense.	12.5	125.4	
710										
	10		D-2	14		SM-SC	**Alluvium (Qal)** @ 10': Upper (Not in Sample): Light brown silty/clayey SAND, moist, medium dense.	4.4	105.5	CN
						SP	Lower (In Sample): White fine to coarse SAND, moist, medium dense, friable.			
	15		D-3	26		SC	@ 15': Upper: Brown clayey fine to coarse SAND, moist, medium dense.	13.8	108.3	
700						SM	Lower: Brown fine to coarse silty SAND, moist, medium dense, friable. Tip: Silty fine to coarse SAND with trace clayey lense.			
	20		D-4	36		SP	@ 20': White fine to coarse SAND, moist, medium dense, highly friable, trace mica.	5.0	101.0	
	25									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25		D-5	12		SC	@ 25': Dark brown clayey fine to coarse SAND, very moist to wet, medium dense, pinhole pores, confining layer?	14.2	116.6	
690										
	30		D-6	16			@ 30': Dark brown clayey fine to coarse SAND, very moist to wet, medium dense, pinhole pores, trace FeO staining.	17.6	108.1	
	35		D-7	67		SM-SC	@ 35': Dark brown silty/clayey fine to medium SAND, wet, very dense, pinhole pores, trace FeO staining.	12.4	121.9	
680										
	40		D-8	62			@ 40': Dark brown silty/clayey fine to medium SAND, wet, very dense, pinhole pores, trace FeO staining.	11.6	121.5	
	45		D-9	48		SM	@ 45': Light olive brown silty fine to medium SAND, saturated, very dense, micaceous.	14.9	116.7	
670										
	50		D-10	64		SM	**Capistrano Formation, Oso Member (Tco)** @ 50': White medium to coarse SANDSTONE, saturated, very dense, friable, trace fine gravel.	12.0	118.1	
							Notes: Total Depth: 51.5 Feet. Groundwater Encountered at 44.6 Feet After 7 Minutes. Backfilled with Cuttings and Tamped.			

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California

PROJECT NO. 16098-01

NMG

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Date(s) Drilled	9/3/16	Logged By	TBF
Drilling Company	2R Drilling	Drill Bit Size/Type	10"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs @ 30" Drop
Sampling Method(s)	Modified California		
Approximate Groundwater Depth:	30.7 Feet		
Comments			

B- 5

Sheet 1 of 2

Total Depth Drilled (ft)	51.5
Approximate Ground Surface Elevation (ft)	691.8 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SM	Surface: Nursery **Artificial Fill, Undocumented (Afu)**			
690			B-1							B-1 @ 0-'5'
	5		D-1	12			@ 5': Upper: Gray to olive silty fine SAND, damp, loose.	7.0	116.6	
						SC	Lower: Dark brown to black clayey fine to coarse SAND, damp, loose,			
	10		D-2	27		SC-CL	**Alluvium (Qal)** @ 10': Brown clayey fine SAND/fine sandy CLAY, very moist, medium dense/very stiff, caliche.	18.2	108.8	DS
680			B-2							B-2 @ 10'-15' DS, MD, AL, GS
	15		D-3	15		SM	@ 15': Upper: Light brown silty fine SAND, loose, very moist, micaceous.	25.4	98.6	CN
						CL	Lower: Black fine sandy CLAY, stiff, very moist.			
	20		D-4	12		SC	@ 20': Light brown slightly clayey fine to coarse SAND, moist, loose.	17.6	107.3	
670										
	25									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25		D-5	50		SM	@ 25': Light brown slightly silty fine SAND, moist, dense.	8.7	116.5	
	30		D-6	20		SC	@ 30': Grayish brown clayey fine to coarse SAND, wet, medium dense.	18.7	110.7	
660	35		D-7	29		SP	**Capistrano Formation, Oso Member (Tco)** @ 35': Light brown fine to medium SANDSTONE, wet, medium dense, friable.	18.4	106.4	
	40		D-8	71/5"			@ 40': Light brown fine to medium SANDSTONE, wet, dense, friable.	21.0	106.7	
650	45									
	50		D-9	65			@ 50': Upper: Light brown fine to medium SANDSTONE, wet, dense, friable.	19.2	108.8	
640						SM	Lower: Brown silty fine SANDSTONE, wet, dense.			
							Notes: Total Depth: 51.5 Feet. Groundwater Encountered at 30.7 Feet After 20 Minutes. Backfilled with Cuttings and Tamped.			

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California

PROJECT NO. 16098-01

NMG

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Date(s) Drilled	9/3/16	Logged By	TBF
Drilling Company	2R Drilling	Drill Bit Size/Type	10"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs @ 30" Drop
Sampling Method(s)	Modified California		
Approximate Groundwater Depth:	43.3 Feet		
Comments			

B- 6

Sheet 1 of 2

Total Depth Drilled (ft)	51.5
Approximate Ground Surface Elevation (ft)	719.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SC	Surface: Nursery **Artificial Fill, Undocumented (Afu)**			
			B-1							B-1 @ 0'-5' DS, GS, MD, AL
	5		D-1	12			@ 5': Upper: Black clayey SAND, moist, loose.	12.7	116.6	
710						SC	**Alluvium (Qal)** Lower: Strong brown clayey SAND, damp, loose, micaceous.			
	10		D-2	17		SM-ML	@ 10': Light brown silty fine SAND/fine sandy SILT, moist, medium dense/stiff.	23.4	96.3	
			B-2							B-2 @ 10'-15'
	15		D-3	14		SM	@ 15': Light brown silty, slightly clayey fine SAND, moist, loose, trace fine sub-angular to sub-rounded gravel.	11.3	113.5	CN
700										
	20		D-4	17		SC	@ 20': Light brown clayey fine-medium SAND, moist, medium dense.	18.3	105.2	
	25									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25					SP	@ 25': Light brown fine to coarse SAND, damp to moist, trace sub-angular/sub-rounded fine gravel, friable.			
			D-5	35				3.5	109.5	
690										
	30						@ 30': White fine to coarse SAND, damp to moist, medium dense, friable.			
			D-6	43				3.6	105.8	
	35					SM	@ 35': Upper: White silty fine to coarse SAND, moist to very moist, medium dense.			
			D-7	21		CL	Lower: Dark brown silty CLAY, very moist, stiff, micaceous.	19.1	100.7	
680										
	40						@ 40': Black silty CLAY, very moist to wet, stiff.			
			D-8	22			▼	28.0	95.1	
	45					SM	@ 45': Grayish brown silty fine to coarse SAND, saturated, medium dense, micaceous.			
			D-9	32				17.7	109.7	
670										
	50					CL	@ 50': Upper: Black to brown fine sandy CLAY, saturated, very stiff.			
			D-10	33		SM	Lower: Pale brown silty fine to coarse silty SAND, saturated, medium dense.	15.6	110.0	
							Notes: Total Depth: 51.5 Feet. Groundwater Encountered at 43.3 Feet After 15 Minutes. Backfilled With Cuttings and Tamped.			

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California

PROJECT NO. 16098-01

NMG

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Date(s) Drilled	12/12/17	Logged By	ZKH
Drilling Company	2R Drilling	Drill Bit Size/Type	10"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs @ 30" Drop
Sampling Method(s)	Modified California		
Approximate Groundwater Depth:	No Groundwater Encountered		
Comments			

B- 7

Sheet 1 of 2

Total Depth Drilled (ft)	25.5
Approximate Ground Surface Elevation (ft)	694.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					CL	**Artificial Fill, Undocumented (Afu)** Surface: Gravel Road Base. Yellowish brown sandy silty CLAY, moist, stiff, few pebbles.			
690			D-1	19		SM-SC	@ 2.5': Mottled brown to olive silty/clayey fine SAND, moist, medium dense.	6.6	116.2	
	5		D-2	37			@ 5': Mottled brown to light olive brown silty/clayey fine to coarse SAND, moist, medium dense.	11.0	123.0	
			D-3	27		SM-SC	**Slopewash Material (Qsw)** @ 7.5': Yellowish brown silty/clayey fine to medium SAND, moist, medium dense, trace pinhole pores, ~2" diameter well-rounded gravel in upper rings.	12.2	114.4	
	10		D-4	26		SC	@ 10': Dark yellowish brown clayey fine to coarse SAND, moist, medium dense, pedogenic surfaces.	13.6	115.1	
680						SM	**Capistrano Formation, Oso Member (Tco)** Tip: Pale olive silty fine SANDSTONE, moist, medium dense, micaceous.			
	15		D-5	90/9"			@ 15': Pale olive silty fine to medium SANDSTONE, moist, very dense, micaceous, trace FeO stained.	7.1	107.9	
	20		D-6	50/6"			@ 20': Pale olive silty fine to medium SANDSTONE, moist, very dense, micaceous, trace FeO stained.	10.6	106.5	
670	25									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25		D-7	50/6"		SM	@ 25': Light olive gray silty fine to medium SANDSTONE, moist, very dense, friable, micaceous, FeO stained.	7.4	113.6	
							Notes: Total Depth: 25.5 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
	30									
660										
	35									
	40									
650										
	45									
	50									
640										

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California

PROJECT NO. 16098-01

NMG

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Date(s) Drilled	12/12/17	Logged By	ZKH
Drilling Company	2R Drilling	Drill Bit Size/Type	10"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs @ 30" Drop
Sampling Method(s)	Modified California		
Approximate Groundwater Depth:	No Groundwater Encountered		
Comments			

B- 8

Sheet 1 of 2

Total Depth Drilled (ft)	25.5
Approximate Ground Surface Elevation (ft)	704.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
700	0					CL	**Artificial Fill, Undocumented (Afu)** Surface: Gravel Road Base. Yellowish brown sandy silty CLAY, moist, stiff, few pebbles.			
	5		D-1	10		SM	**Slopewash Material (Qsw)** @ 5': Very dark grayish brown silty fine SAND, moist, loose to medium dense, trace FeO stained.	7.8	109.9	
			D-2	36		SM-SC	@ 7.5': Yellowish brown silty/clayey fine SAND, moist, medium dense, micaceous, trace pinhole pores.	12.1	118.8	
690	10		D-3	33			@ 10': Yellowish brown silty/clayey fine SAND, moist, medium dense, micaceous.	11.9	118.1	
	15		D-4	19		SM	@ 15': Yellowish brown silty fine to medium SAND, moist, medium dense, sugary appearance, slightly friable.	11.8	105.4	
680	20		D-5	77/11"		SM	**Capistrano Formation, Oso Member (Tco)** @ 20': Light brownish gray silty fine SANDSTONE, moist, very dense, micaceous, MnO stained.	11.9	119.4	
	25									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25	■	D-6	50/6"		SM	@ 25': Gray silty fine SANDSTONE, moist, very dense, micaceous, MnO stained.	11.1	104.1	
							Notes: Total Depth: 25.5 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
	30									
670										
	35									
	40									
660										
	45									
	50									
650										

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California

PROJECT NO. 16098-01

NMG

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Date(s) Drilled	12/12/17	Logged By	ZKH
Drilling Company	2R Drilling	Drill Bit Size/Type	10"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs @ 30" Drop
Sampling Method(s)	Modified California, Bulk		
Approximate Groundwater Depth:	No Groundwater Encountered		
Comments			

B- 9

Sheet 1 of 2

Total Depth Drilled (ft)	31.5
Approximate Ground Surface Elevation (ft)	716.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SM	**Artificial Fill, Undocumented (Afu)** Surface: Gravel Road Base. @ 1': Dark brown clayey SAND with gravel, moist.			
						SM-SC	**Alluvium (Qal)**			
710	5		D-1	9			@ 5': Brown to dark brown silty/clayey fine SAND, moist, loose, pinhole pores, micaceous.	10.8	111.2	
			B-1 D-2	10		SM	@ 7.5': Brown silty fine to medium SAND, moist, loose to medium dense, trace pinhole pores, caliche stringers, slightly micaceous.	6.1	109.1	B-1 @ 5'-10'
	10		D-3	12		ML-CL	@ 10': Upper: Light brown SILT/CLAY, moist, stiff, pinholes pores, abundant caliche stringers.	16.0	103.2	
						SP-SM	Lower: Very pale brown silty fine to medium SAND, moist, loose to medium dense, friable, trace gravel <1" in diameter.			
700	15		D-4	8		SM	@ 15': Light yellowish brown silty fine to medium SAND, moist, loose, caliche stringers, trace pinhole pores, trace gravel <0.5" in diameter, micaceous.	10.0	106.2	
	20		D-5	11		SM-SC	@ 20': Brown silty/clayey fine to medium SAND, moist, loose to medium dense, pinhole pores, caliche stringers, micaceous.	14.3	108.8	
						CL	Tip: Brown silty CLAY, moist, stiff, abundant caliche, pinhole pores.			
	25									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25					SM-ML	@ 25': Upper (Not in Sample): Grayish brown silty fine SAND/sandy SILT, moist, medium dense/stiff, pinhole pores, caliche, micaceous.	12.8	104.9	
690			D-6	15		SM-SC	Lower: Grayish brown silty/clayey fine SAND, moist, medium dense, pinhole pores, trace caliche, micaceous.			
	30		D-7	16		SP-SM	@ 30': Light yellowish brown silty fine to coarse SAND, moist, medium dense, trace subangular gravel ~1" in diameter, trace caliche.	10.7	99.2	
						ML	Tip: Gray SILT, moist, stiff, caliche, pinhole pores.			
							Notes: Total Depth: 31.5 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
	35									
680										
	40									
	45									
670										
	50									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California

PROJECT NO. 16098-01

NMG

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Date(s) Drilled	12/12/17	Logged By	ZKH
Drilling Company	2R Drilling	Drill Bit Size/Type	10"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs @ 30" Drop
Sampling Method(s)	Modified California, Bulk		
Approximate Groundwater Depth:	No Groundwater Encountered		
Comments			

B-10

Sheet 1 of 2

Total Depth Drilled (ft)	25.8
Approximate Ground Surface Elevation (ft)	717.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					CL	**Artificial Fill, Undocumented (Afu)** Surface: Graded Road Base. Very dark brown to black silty CLAY, moist, medium stiff.			
						CL	**Alluvium (Qal)**			
	5	D	D-1	17			@ 5': Very dark brown to black silty CLAY, moist, stiff, trace root hairs, trace gravel.	17.7	109.6	
710		B	B-1							B-1 @ 5'-10'
	10	D	D-2	13		SM	@ 10': Light olive brown silty fine SAND, moist, medium dense, caliche stringers, pinhole pores, micaceous.	11.8	114.7	
	15	D	D-3	33		SC	@ 15': Light olive brown clayey fine to coarse SAND, moist, medium dense, micaceous.	11.8	118.7	
700										
	20	D	D-4	22		SM	**Capistrano Formation, Oso Member (Tco)** @ 20': Pale brown to light gray silty fine to coarse SANDSTONE, moist, medium dense, micaceous, friable, slightly weathered.	7.8	113.3	
	25									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25		D-5	80/10"		SM	@ 25': Pale yellow silty fine to coarse SANDSTONE, moist, very dense, friable, micaceous.	6.8	113.7	
690							Notes: Total Depth: 25.8 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
	30									
	35									
680										
	40									
	45									
670										
	50									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California

PROJECT NO. 16098-01

NMG

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Date(s) Drilled	12/18/17	Logged By	ZKH
Drilling Company	2R Drilling	Drill Bit Size/Type	10"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs @ 30" Drop
Sampling Method(s)	Modified California		
Approximate Groundwater Depth:	No Groundwater Encountered		
Comments			

B-11

Sheet 1 of 2

Total Depth Drilled (ft)	36.5
Approximate Ground Surface Elevation (ft)	716.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SC	Surface: Gravel Road Base. **Artificial Fill, Undocumented (Afu)** Yellowish brown clayey fine to coarse SAND, moist, loose.			
						SC	**Alluvium (Qal)**			
710	5	D	1	6			@ 5': Yellowish brown clayey fine to coarse SAND, moist, loose, pinhole pores, caliche.	9.1	108.5	
	10	D	2	16		SM	@ 10': Brown silty fine SAND, moist, medium dense, some caliche stringers, pinhole pores, micaceous.	16.5	106.7	
700	15	D	3	16		SM-SC	@ 15': Brown silty/clayey fine SAND, moist, medium dense, trace caliche and pinhole pores.	9.5	115.8	
	20	D	4	12		SP	@ 20': Light yellowish brown fine to coarse SAND, damp, loose/medium dense, friable, pinhole pores, micaceous, upper rings were slightly silty.	2.4	103.5	
						SC-CL	Tip: Brown clayey fine SAND/sandy CLAY, damp, loose/medium stiff.			
	25									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25									
690			D-5	14		SM-SC	@ 25': Light brown silty/clayey fine to medium SAND, moist, medium dense, few pinhole pores, caliche stringers.	11.3	115.8	
	30									
			D-6	40		SP	@ 30': Pale yellow fine to medium SAND, damp, medium dense, friable, MnO stained, micaceous.	3.2	104.1	
	35									
			D-7	24		ML	@ 35': Upper (Not in Sample): Light brown very fine sandy SILT, moist, very stiff, micaceous.	7.3	118.3	
680						SC	Lower: Brown clayey fine to coarse SAND, moist, medium dense, micaceous.			
							Notes: Total Depth: 36.5 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
	40									
	45									
670										
	50									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California

PROJECT NO. 16098-01

NMG

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Date(s) Drilled	12/12/17	Logged By	ZKH
Drilling Company	2R Drilling	Drill Bit Size/Type	10"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs @ 30" Drop
Sampling Method(s)	Modified California, Bulk		
Approximate Groundwater Depth:	No Groundwater Encountered		
Comments			

B-12

Sheet 1 of 2

Total Depth Drilled (ft)	30.4
Approximate Ground Surface Elevation (ft)	736.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SM	Surface: Dirt Road. **Capistrano Formation, Oso Member (Tco)**			
	5		D-1	85/9"			@ 5': White to pale yellow silty fine to medium SANDSTONE, moist, very dense, micaceous, friable.	4.8	109.8	
730										
	10		D-2	80/9"			@ 10': White to pale yellow silty fine SANDSTONE, moist, very dense, micaceous, friable.	10.5	107.7	
	15		B-1							B-1 @ 10'-20'
720										
	20		D-3	50/4"			@ 20': White to pale yellow silty fine SANDSTONE, moist, very dense, micaceous, friable.	6.5	101.6	
			B-2							B-2 @ 20'-30'
	25									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
710	25		B-2							B-2 @ 20'-30'
	30	D-4		50/5"		SM	@ 30': White to pale yellow silty fine SANDSTONE, moist, very dense, micaceous, friable.	6.9	103.3	
							Notes: Total Depth: 30.4 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
700	35									
	40									
690	45									
	50									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California

PROJECT NO. 16098-01

NMG

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Date(s) Drilled		Logged By	ZKH
Drilling Company	2R Drilling	Drill Bit Size/Type	10"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs @ 30" Drop
Sampling Method(s)	Modified California		
Approximate Groundwater Depth:			
Comments			

B-13

Sheet 1 of 2

Total Depth Drilled (ft)	40.0
Approximate Ground Surface Elevation (ft)	750.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
750	0									
	5		D-1							
740	10		D-2							
	15									
730	20		D-3							
	25									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25									
720	30		D-4							
	35									
710	40		D-5							
	45									
700	50									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California

PROJECT NO. 16098-01

NMG

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Date(s) Drilled	12/18/17	Logged By	ZKH
Drilling Company	2R Drilling	Drill Bit Size/Type	10"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs @ 30" Drop
Sampling Method(s)	Modified California		
Approximate Groundwater Depth:	25.3 Feet		
Comments			

B-14

Sheet 1 of 2

Total Depth Drilled (ft)	35.5
Approximate Ground Surface Elevation (ft)	735.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					CL	**Artificial Fill, Undocumented (Afu)** Surface: Gravel Road Base. **Alluvium (Qal)** Pale olive to brown sandy CLAY, very moist, medium stiff.			
730	5	D	D-1	12			@ 5': Pale olive to brown sandy CLAY, very moist, medium stiff, caliche stringers, trace pinhole pores, micaceous.	18.6	104.7	
	10	D	D-2	11		SM-SC	@ 10': Brown silty/clayey fine SAND, moist, loose to medium dense, some pencil-tip pores and pinhole pores, caliche, micaceous.	11.4	112.0	
720	15	D	D-3	50		SC	@ 15': Brown clayey/gravelly fine to coarse SAND, moist to very moist, dense, gravel in tip and lower rings, trace pinhole pores.	12.9	123.0	
						GP-GC	@ 17': Rig chatter, possible gravel layer.			
	20	D	D-4	66/10"		SM	@ 20': Yellowish brown clayey fine to medium SAND, moist to very moist, very dense.	13.9	113.8	
						GC	Tip: Yellowish brown sandy/clayey gravel.			
710	25									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
710	25		D-5	27		SM-SC	@ 25': Upper (Not in Sample): Pale yellow silty/clayey fine SAND, saturated, medium dense.	23.7	99.7	
						CL	Lower: Pale yellow CLAY, saturated, very stiff, caliche pinhole pores.			
	30		D-6	70/10"		SC-GC	@ 30': Dark yellowish brown clayey medium to coarse SAND/clayey GRAVEL, saturated, very dense, micaceous, gravel is subangular.	12.9	118.5	
						SM	**Capistrano Formation (Tco)** @ 32': Rig almost hit refusal.			
700	35		D-7	50/6"			@ 35': Light gray silty fine to medium SAND, saturated, very dense, micaceous, slightly friable.	16.5	112.0	
							Notes: Total Depth: 35.5 Feet. Groundwater Encountered at 25.3 Feet After 10 Minutes. Backfilled with Cuttings and Tamped.			
	40									
690	45									
	50									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California

PROJECT NO. 16098-01

NMG

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Date(s) Drilled	12/12/17	Logged By	ZKH
Drilling Company	2R Drilling	Drill Bit Size/Type	10"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs @ 30" Drop
Sampling Method(s)	Modified California, Bulk		
Approximate Groundwater Depth:	23.5 Feet		
Comments			

B-15

Sheet 1 of 2

Total Depth Drilled (ft)	36.5
Approximate Ground Surface Elevation (ft)	684.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					CL	**Artificial Fill, Undocumented (Afu)** Surface: Gravel Road Base. Very dark brown to black CLAY, very moist, soft to medium stiff.			
680			B-1							B-1 @ 0'-7.5'
	5		D-1	6			@ 5': Mottled very dark brown to black CLAY, very moist, soft to medium stiff, organic odor, root hairs.	21.2	102.5	
			D-2	16			@ 7.5': Upper (Not in Sample): Dark brown to black CLAY, moist to very moist, stiff, large angular quartzite cobble within sampler's upper rings.	13.8	117.9	
						SC	**Alluvium (Qal)**			
	10		D-3	11			Lower: Olive brown clayey fine SAND, moist to very moist, medium dense, root hairs, pinhole pores, caliche. @ 10': Olive brown clayey fine SAND, moist to very moist, medium dense, root hairs, pinhole pores, abundant caliche.	13.9	115.0	
670										
	15		D-4	14		CL	@ 15': Dark grayish brown sandy CLAY, very moist, stiff, caliche, pinhole pores, roots up to 6" long.	19.5	105.7	
	20		SB-1 D-5	12			@ 20': Brown silty CLAY, very moist, medium stiff, wood fragments in sample, caliche, pinhole pores, some clayey sand in upper rings (not in sample).	21.6	100.8	SB-1 @ 20'
660							▼			
	25									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25									
			D-6	11		SC	@ 25': Gray clayey fine to medium SAND, saturated, loose to medium dense, caliche, trace pinhole pores.	20.0	101.1	
	30									
			D-7	38		SP-SM	@ 30': Gray silty fine to coarse SAND, saturated, medium dense, friable, trace gravel.	12.9	119.2	
650										
	35									
			D-8	52			@ 35': Gray silty fine to coarse SAND, saturated, very dense, gravel and very coarse sand in sampler tip.	13.9	120.3	
							Notes: Total Depth: 36.5 Feet. Groundwater Encountered at 23.5 Feet After 10 Minutes. Backfilled with Cuttings and Tamped.			
	40									
640										
	45									
	50									
630										

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California

PROJECT NO. 16098-01

NMG

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Date(s) Drilled	12/18/17	Logged By	ZKH
Drilling Company	2R Drilling	Drill Bit Size/Type	10"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs @ 30" Drop
Sampling Method(s)	Modified California		
Approximate Groundwater Depth:	No Groundwater Encountered		
Comments			

B-16

Sheet 1 of 2

Total Depth Drilled (ft)	26.5
Approximate Ground Surface Elevation (ft)	687.0 msl

Elevation (ft)	Depth (ft)	Sample Type	Sample Number	Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SM	**Artificial Fill, Undocumented (Afu)** Surface: Gravel Road Base.			
			D-1	22			@ 2.5': Upper: Pale yellow to grayish brown silty fine to coarse SAND, moist, medium dense, micaceous, coarse gravel in upper sample rings.	11.5	110.0	
						SC	Lower: Pale yellow clayey fine to coarse SAND, moist, medium dense, micaceous.			
	5		D-2	17		SM-SC	**Alluvium (Qal)** @ 5': Brown silty/clayey fine to coarse SAND, moist, medium dense, trace pinhole pores, micaceous.	6.6	111.4	
680						SP	Tip: Pale yellow fine to medium SAND, damp, medium dense, friable.			
			D-3	6			@ 7.5': Upper (Not in Sample): Gray fine SAND, moist, loose, friable.	13.4	111.2	
						SM-SC	Lower: Dark brown silty/clayey fine to coarse SAND, moist, loose, trace pinhole pores, micaceous.			
	10		D-4	24		SC	@ 10': Dark brown clayey fine to coarse SAND, moist to very moist, medium dense, trace pinhole pores, micaceous, trace gravel.	12.8	121.5	
	15		D-5	21		SM-SC	@ 15': Brown silty/clayey fine to coarse SAND, very moist, medium dense, trace pinhole pores, micaceous.	14.0	117.5	
670										
	20		D-6	31			@ 20': Brown silty/clayey fine to coarse SAND, very moist, medium dense, trace pinhole pores, micaceous.	14.8	114.7	
	25									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25	D-7	25			CL	@ 25': Upper: Brown CLAY, very moist, very stiff, caliche, trace pinhole pores, micaceous.	41.1	88.0	
						SC	Lower: Brown clayey fine to medium SAND, very moist, medium dense, micaceous.	33.1	94.9	
660							Notes: Total Depth: 26.5 Feet. Groundwater Not Encountered. Backfilled with Cuttings and Tamped.			
	30									
	35									
650										
	40									
	45									
640										
	50									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California

PROJECT NO. 16098-01

NMG

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Date(s) Drilled	12/12/17	Logged By	ZKH
Drilling Company	2R Drilling	Drill Bit Size/Type	10"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs @ 30" Drop
Sampling Method(s)	Modified California, Bulk		
Approximate Groundwater Depth:	33.9 Feet		
Comments			

B-17

Sheet 1 of 2

Total Depth Drilled (ft)	50.4
Approximate Ground Surface Elevation (ft)	701.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
700	0					SM	**Artificial Fill (Afu)** Surface: Gravel Road Base. Brown silty fine SAND, moist, loose.			
			D-1	13		SM	**Alluvium (Qal)** @ 2.5': Brown silty fine SAND, moist, medium dense, trace pinhole pores, trace caliche, micaceous.	6.8	113.1	
	5		D-2	14		SC	@ 5': Brown clayey fine SAND, very moist, medium dense, few zones of sandy CLAY, pinhole pores, caliche, micaceous.	15.7	111.6	
			B-1 D-3	17		SM	@ 7.5': Brown silty fine to medium SAND, very moist, medium dense, pinhole pores, caliche stringers, micaceous.	15.8	114.4	B-1 @ 5'-10'
690	10		D-4	34		SC-CL	@ 10': Dark gray to dark brown clayey fine SAND/sandy CLAY, very moist, medium dense/very stiff, abundant caliche, pinhole pores.	14.0	116.0	
	15		D-5	9		SP	@ 15': Upper (Not in Sample): Light gray fine to coarse SAND, damp to moist, loose, friable, micaceous.	12.7	109.8	
						SM	Lower: Gray silty fine to coarse SAND, moist, loose, trace pinhole pores, caliche, trace gravel.			
680	20		D-6	23		SP	@ 20': Light gray fine to coarse SAND, damp to moist, medium dense, friable, micaceous, trace clayey sand in upper rings, not in sample.	5.2	110.4	
	25									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25		D-7	20		CL	@ 25': Upper: Very dark gray CLAY, wet to saturated, stiff, caliche, zones of coarse SAND, well-defined contacts between clay and sand.	27.2	96.3	
						SM-SC	Lower: Gray silty/clayey fine to coarse SAND, wet to saturated, medium dense, micaceous.			
	30		D-8	16		SP	@ 30': Upper: White to light gray medium to coarse SAND, saturated, medium dense.	20.3	104.5	
670						CH	Lower: Black CLAY, saturated, stiff, highly plastic.			
	35		D-9	33		SP	@ 35': Gray fine to coarse SAND, saturated, medium dense, friable.	16.9	113.5	
	40		D-10	42		SM	@ 40': Upper: Dark gray silty fine SAND, saturated, medium dense, MnO stained.	15.3	110.9	
660						SP	Lower: Gray fine to coarse SAND, saturated, medium dense, friable.			
	45		D-11	50/5"		SM	**Capistrano Formation, Oso Member (Tco)** @ 45': Pale yellow silty fine to medium SANDSTONE, saturated, very dense, trace MnO stained, micaceous.	13.9	118.2	
	50		D-12	50/5"		SP-SM	@ 50': Pale yellow silty fine to coarse SANDSTONE, trace MnO stained, micaceous.	16.1	112.9	
650							Notes: Total Depth: 50.4 Feet. Groundwater Encountered at 33.9 Feet After 15 Minutes. Backfilled with Cuttings and Tamped.			

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California

PROJECT NO. 16098-01

NMG

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Date(s) Drilled	12/18/17	Logged By	ZKH
Drilling Company	2R Drilling	Drill Bit Size/Type	10"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs @ 30" Drop
Sampling Method(s)	Modified California		
Approximate Groundwater Depth:	48.1 Feet		
Comments			

B-18

Sheet 1 of 2

Total Depth Drilled (ft)	51.5
Approximate Ground Surface Elevation (ft)	724.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SC	**Artificial Fill, Undocumented (Afu)** Surface: Gravel Road Base.			
							Alluvium (Qal) Very dark grayish brown clayey fine to coarse SAND, moist, loose to medium dense.			
720										
	5		D-1	18			@ 5': Very dark grayish brown clayey fine to coarse SAND, moist, medium dense, micaceous, trace pinhole pores.	10.5	123.8	
	10		D-2	21		SM-SC	@ 10': Brown to light brown silty/clayey fine to coarse SAND, moist, medium dense, micaceous, trace pinhole pores.	11.7	105.7	
710										
	15		D-3	20		SC	@ 15': Brown to light brown clayey fine to coarse SAND, moist, medium dense, micaceous, no visible pores.	14.2	112.1	
	20		D-4	31			@ 20': Brown to light brown clayey fine to coarse SAND, moist, medium dense, micaceous.	12.9	112.8	
						SP	Tip: White fine to coarse SAND, moist, medium dense, friable.			
700										
	25									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25					SP	@ 25': Upper: White fine to coarse SAND, moist, medium dense.	10.0	114.6	
		D	5	17		SC	Lower: Grayish brown clayey fine to coarse SAND, moist to very moist, medium dense.			
	30	D	6	18		SC-CL	@ 30': Dark gray to grayish brown clayey fine SAND/sandy CLAY, wet, medium dense/stiff, FeO stained, possible root hairs.	18.1	108.1	
690										
	35	D	7	44		SP	@ 35': Gray fine to coarse SAND, moist, medium dense, friable, micaceous, trace gravel.	3.3	123.4	
	40	D	8	25		SC	@ 40': Brown clayey fine to coarse SAND, wet, medium dense, micaceous.	15.0	113.0	
680										
	45	D	9	33			@ 45': Brown clayey fine to coarse SAND, saturated, medium stiff, some zones of clay. ▼	15.8	112.5	
	50	D	10	48			@ 50': Gray clayey fine to coarse SAND, saturated, medium dense, FeO stained, micaceous, few zones of clay, possibly weathered bedrock?	14.0	116.9	
670							Notes: Total Depth: 51.5 Feet. Groundwater Encountered at 48.1 Feet After 10 Minutes. Backfilled with Cuttings and Tamped.			

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California

PROJECT NO. 16098-01

NMG

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Date(s) Drilled	12/18/17	Logged By	ZKH
Drilling Company	2R Drilling	Drill Bit Size/Type	10"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs @ 30" Drop
Sampling Method(s)	Modified California		
Approximate Groundwater Depth:	No Groundwater Encountered		
Comments			

B-19

Sheet 1 of 2

Total Depth Drilled (ft)	26.5
Approximate Ground Surface Elevation (ft)	699.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SM-SC	**Artificial Fill (Afu)** Surface: Gravel Road Base. Mottled light yellow to dark brown silty clayey fine to medium SAND, moist, medium dense.			
	5		D-1	17			@ 5': Mottled light yellow to dark brown silty clayey fine to medium SAND, moist, medium dense.	11.3	115.1	
			D-2	11			@ 7.5': Mottled light yellow to dark brown silty clayey fine to medium SAND, moist, medium dense.	12.7	113.8	
690	10		D-3	15		SM	@ 10': Mottled pale yellow to light yellowish brown, silty fine to medium SAND, moist, medium dense, trace nylon rope fibers.	8.3	113.3	
	15		D-4	42			@ 15': Mottled pale yellow to light yellowish brown, silty fine to medium SAND, moist, medium dense, circular zones of slightly gray sand.	13.3	115.6	
680	20		D-5	18		SM-SC	@ 20': Gray to brownish gray silty clayey fine to medium SAND, very moist, mottled, nylon rope fragment in sample.	14.1	119.3	
	25									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25		D-6	41		SC	**Slopewash Material (Qsw)** @ 25': Dark brown clayey fine to medium SAND, very moist, medium dense, root stained pores, caliche nodules, effervescent with acid.	14.6	117.4	
670	30						Notes: Total Depth: 26.5 Feet. Groundwater Not Encountered. Backfilled with Cuttings and Tamped.			
660	35									
	40									
	45									
650	50									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California

PROJECT NO. 16098-01

NMG

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Date(s) Drilled	12/18/17	Logged By	ZKH
Drilling Company	2R Drilling	Drill Bit Size/Type	10"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs @ 30" Drop
Sampling Method(s)	Modified California		
Approximate Groundwater Depth:	No Groundwater Encountered		
Comments			

B-20

Sheet 1 of 2

Total Depth Drilled (ft)	31.5
Approximate Ground Surface Elevation (ft)	699.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SC	**Artificial Fill, Undocumented (Afu)** Surface: Gravel Road Base.			
			D-1	34			@ 2.5': Mottled grayish brown to brown clayey fine to coarse SAND, very moist, medium dense, micaceous.	12.1	124.0	
	5		D-2	31		CL	@ 5': Upper: Brown to black CLAY, very moist, very stiff.	12.4	120.4	
						SC	Lower: Brown clayey fine to medium SAND, very moist, medium dense, laminated surfaces, visible thin layers of fill.			
			D-3	24			@ 7.5': Mottled brown clayey fine to medium SAND, very moist, medium dense, micaceous.	14.4	116.3	
690										
	10		D-4	28		SC	**Alluvium (Qal)** @ 10': Brown to dark brown clayey fine to coarse SAND, very moist, medium dense, trace pinhole pores, micaceous.	13.7	119.0	
	15		D-5	36			@ 15': Brown clayey fine to coarse SAND, moist, medium dense, micaceous, trace gravel.	10.6	112.7	
680										
	20		D-6	56			@ 20': Upper (Not in Sample): Gray clayey fine to coarse SAND, moist, medium dense, micaceous.	3.3	109.4	
						SP	Lower: White fine to medium SAND, damp to moist, medium dense to dense, micaceous, friable.			
	25									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25									
			D-7	41		SP	@ 25': Upper: Gray fine to coarse SAND, damp to moist, medium dense, micaceous, friable.	3.7	109.7	
						SC	Lower: Brown to olive brown clayey fine to coarse SAND, damp to moist, medium dense, micaceous.			
670										
	30									
			D-8	53			@ 30': Brownish gray clayey fine to coarse SAND, moist, dense, micaceous.	9.5	115.5	
							Notes: Total Depth: 31.5 Feet. Groundwater Not Encountered. Backfilled with Cuttings and Tamped.			
	35									
660										
	40									
	45									
650										
	50									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California

PROJECT NO. 16098-01

NMG

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

Date(s) Drilled	12/18/17	Logged By	ZKH
Drilling Company	2R Drilling	Drill Bit Size/Type	10"
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs @ 30" Drop
Sampling Method(s)	Modified California		
Approximate Groundwater Depth:	No Groundwater Encountered		
Comments			

B-21

Sheet 1 of 2

Total Depth Drilled (ft)	41.5
Approximate Ground Surface Elevation (ft)	728.0 msl

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	0					SC	**Artificial Fill, Undocumented (Afu)** Surface: Gravel Base Road.			
							Alluvium (Qal) Very dark brown to gray clayey fine to coarse SAND, moist, loose to medium dense.			
	5		D-1	27			@ 5': Very dark brown to gray clayey fine to coarse SAND, moist, medium dense, trace pinhole pores, micaceous.	11.0	124.6	
720										
	10		D-2	17			@ 10': Brown to grayish brown clayey fine to coarse SAND, moist, medium dense, trace pinhole pores, micaceous.	9.9	118.6	
	15		D-3	31		SM-SC	@ 15': Dark brown silty/clayey fine to coarse SAND, moist, medium dense, few pinhole pores, micaceous, trace caliche.	12.1	119.5	
710										
	20		D-4	39		SC	@ 20': Gray clayey fine to coarse SAND, moist, medium dense, trace gravel, caliche, trace pinhole pores, FeO stained.	11.5	121.2	
	25									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG

Elevation (ft)	Depth (ft)	SAMPLES Type	SAMPLES Number	SAMPLES Blows per foot	Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
	25									
		D	5	41		SC	@ 25': Gray clayey fine to coarse SAND, damp to moist, medium dense, trace pinhole pores, micaceous.	13.3	119.8	
700						SM	Tip: Light gray silty fine to coarse SAND, damp to moist, medium dense, micaceous.			
	30									
		D	6	32		SM-SC	@ 30': Gray to brown silty/clayey fine to coarse SAND, very moist, medium dense, micaceous.	14.3	116.0	
	35									
		D	7	25		SM	@ 35': Light gray silty fine to medium SAND, moist, medium dense, micaceous.	5.9	114.4	
690										
	40									
		D	8	33		SP	@ 40': Gray fine to medium SAND, moist, medium dense, trace coarse sand in upper rings, micaceous.	6.0	112.9	
							Notes: Total Depth: 41.5 Feet. Groundwater Not Encountered. Backfilled and Tamped with Cuttings.			
	45									
680										
	50									

LOG OF BORING

Toll Brothers/Lake Forest Nursery
Lake Forest, California

PROJECT NO. 16098-01

NMG

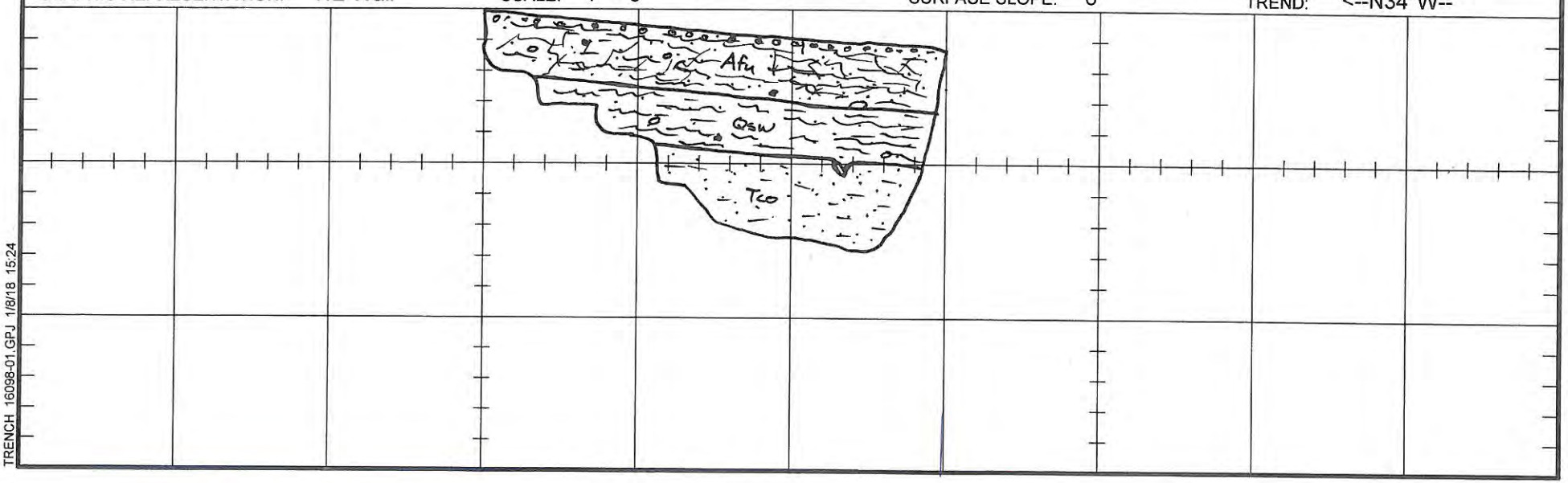
Report: HOLLOW STEM; Project: 16098-01.GPJ; Data Template: NMG_GINT_2016.GDT; Printed: 7/13/18

NMG

Project Name: Toll Brothers/Lake Forest Nursery
Project Number: 16098-01
Equipment: JCB 214 Backhoe
Logged By: ZKH/TD
Elevation: 704 ±
Location: Southern End
TRENCH NO.: T-1

GEOLOGIC ATTITUDES	DESCRIPTION: DATE: 12/11/17	GEOLOGIC UNIT	ENGINEERING PROPERTIES: U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0-2': Yellowish brown sandy silty CLAY, moist, stiff, few rounded pebbles.	Afu	CL			
	Slopewash Material (Qsw) @ 2-4': Yellowish brown sandy silty CLAY, moist, stiff, moderate caliche begins from 2.5' to 3.5', some pebbles.	Qsw	CL			
	Capistrano Formation, Oso Member (Tco) @ 4': Weathered at 4' to 5', pale brownish yellow silty fine SANDSTONE, moist, very dense, trace clayey SANDSTONE, decrease in caliche.	Tco	SM	B-1 @ 6.8'		
	Notes: Total Depth: 7.0 Feet. No Groundwater Encountered. Backfilled with Cuttings.					

GRAPHIC REPRESENTATION: NE Wall SCALE: 1" = 5' SURFACE SLOPE: 6° TREND: <--N34°W--



TRENCH 16098-01.GPJ 1/8/18 15:24

NMG Geotechnical, Inc.

LOG OF TRENCH NO: T-1

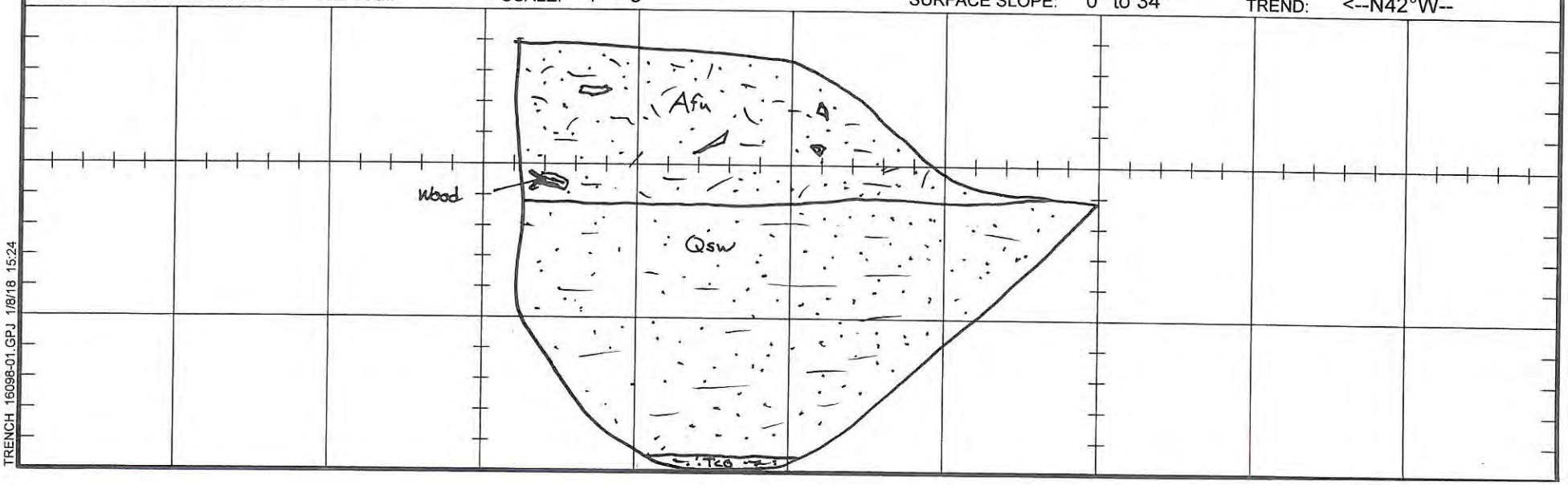
NMG

Project Name: Toll Brothers/Lake Forest Nursery
Project Number: 16098-01
Equipment: JCB 214 Backhoe
Logged By: ZKH/TD
Elevation: 719 ±
Location: Southern End

TRENCH NO.: T- 2

GEOLOGIC ATTITUDES	DESCRIPTION: DATE: 12/11/17	GEOLOGIC UNIT	ENGINEERING PROPERTIES: U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0'-5': Mottled medium brown silty fine to medium SAND, damp, loose to medium dense, scattered concrete pipe fragments, wood debris.	Afu	SM			
	Slopewash Material (Qsw) @ 5'-11': Olive brown to brown silty fine SAND, moist, grades to wet below 11', loose to medium dense, slightly micaceous. @ 11'-13.5': Dark yellow brown silty fine to medium SAND, moist to wet, medium dense, slightly micaceous.	Qsw	SM			
	Capistrano Formation, Oso Member (Tco) @ 13.5': Yellowish brown silty fine SANDSTONE, moist to wet, medium dense, increasingly micaceous with depth, weathered in upper 0.5'.	Tco	SM			
	Notes: Total Depth: 14.0 Feet. No Groundwater Encountered. Backfilled with Cuttings.					

GRAPHIC REPRESENTATION: NE Wall SCALE: 1" = 5' SURFACE SLOPE: 0° to 34° TREND: <--N42°W--



NMG Geotechnical, Inc.

LOG OF TRENCH NO: T- 2

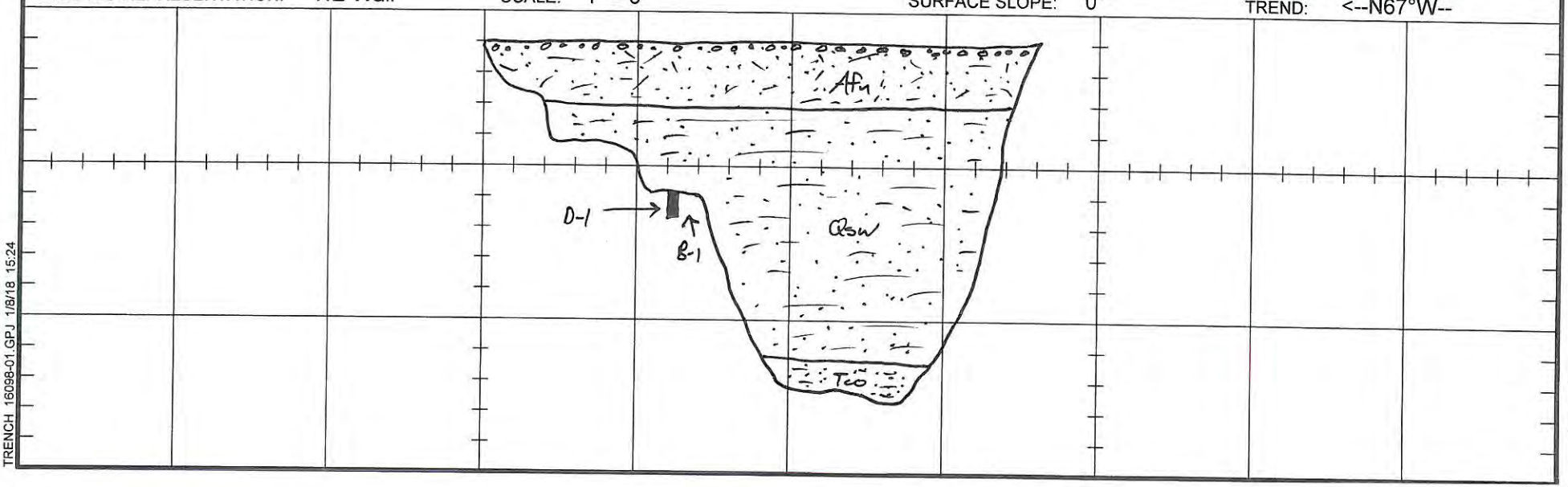
TRENCH 16098-01.GPJ 1/8/18 15:24

NMG

Project Name: Toll Brothers/Lake Forest Nursery
Project Number: 16098-01
Equipment: JCB 214 Backhoe
Logged By: ZKH/TD
Elevation: 715 ±
Location: Central Portion
TRENCH NO.: T- 3

GEOLOGIC ATTITUDES	DESCRIPTION: DATE: 12/11/17	GEOLOGIC UNIT	ENGINEERING PROPERTIES U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0'-2': Mottled gray to brown silty fine SAND, damp to moist, loose, scattered gravel at surface.	Afu	SM			
	Slopewash Material (Qsw) @ 2': Brown silty fine SAND, moist to wet, loose at 2', grades to medium dense by 4', no visible pores, slightly micaceous, trace clay. @ 5': Brown silty fine SAND, moist to wet, medium dense, slightly micaceous. @ 6': Light yellowish brown silty fine SAND, wet, medium dense.	Qsw	SM	D-1 @ 5' B-1 @ 5'	11.34	112.0
	Capistrano Formation, Oso Member (Tco) @ 10.5': Light olive silty fine SANDSTONE, moist, very dense, slightly micaceous. @ 11.5': Coarsens downward to silty fine to medium SANDSTONE, moist, very dense.	Tco	SM			
	Notes: Total Depth: 11.5 Feet. No Groundwater Encountered. Backfilled with Cuttings.					

GRAPHIC REPRESENTATION: NE Wall SCALE: 1" = 5' SURFACE SLOPE: 0° TREND: <--N67°W--



NMG Geotechnical, Inc.

LOG OF TRENCH NO: T- 3

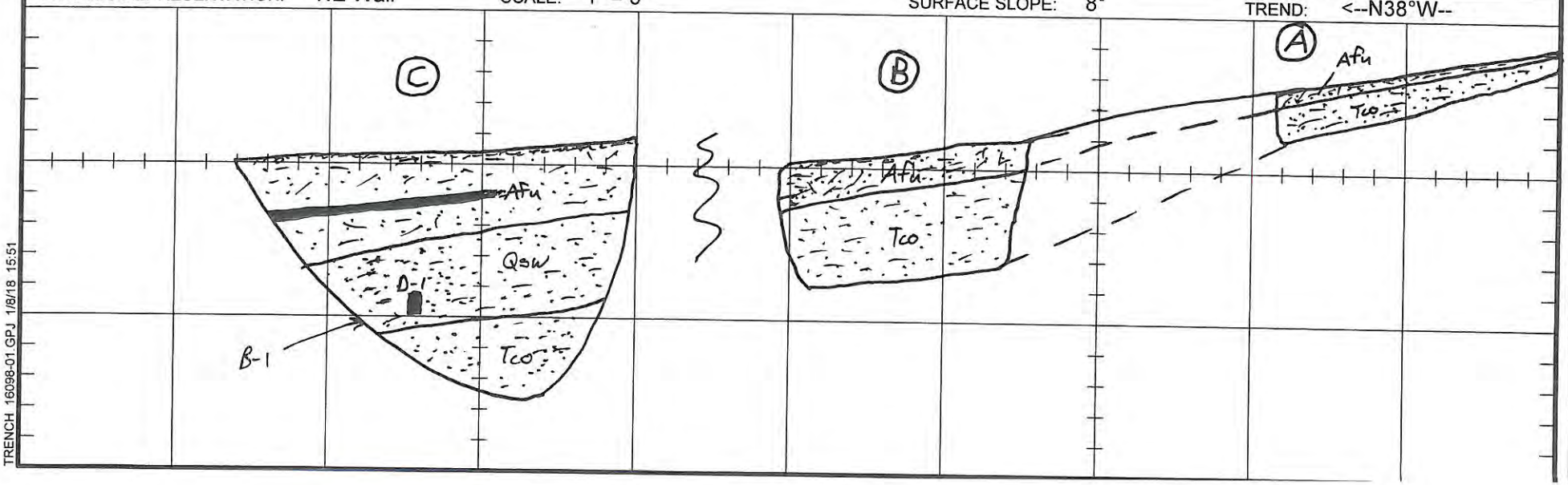
TRENCH 16098-01.GPJ 1/8/18 15:24

Project Name: Toll Brothers/Lake Forest Nursery
Project Number: 16098-01
Equipment: JCB 214 Backhoe
Logged By: ZKH/TD
Elevation: 703 to±713
Location: Western Perimeter
TRENCH NO.: T-4

GEOLOGIC ATTITUDES	DESCRIPTION: DATE: 12/11/17	GEOLOGIC UNIT	ENGINEERING PROPERTIES U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	(A) Artificial Fill, Undocumentend (Afu) @ 0'-0.3': Pale olive yellow silty SAND, dry, abundant mulch in upper 2" to 3".	Afu	OH/SM			
	Capistrano Formation, Oso Member (Tco) @ 0.3': Pale olive to yellow silty fine to medium SANDSTONE, moist, very dense, FeO stained.	Tco	SM			
	(B) Artificial Fill, Undocumentend (Afu) @ 0'-2': Brown silty fine SAND with some clay, damp to moist, loose, abundant mulch in upper 2" to 3".	Afu	OH/SM			
	Capistrano Formation, Oso Member (Tco) @ 2': Olive yellow silty fine SANDSTONE, moist, medium dense to dense, caliche stringers, massive, slightly micaceous.	Tco	SM			
	(C) Artificial Fill, Undocumentend (Afu) @ 0'-3': Pale olive silty fine SAND, moist, loose. @ 1 to 1.6': Mixture of dark brown to olive brown silty fine SAND, moist, loose to medium dense. @ 2" thick asphalt layer, 2" to 3" thick mulch on the surface.	Afu	OH/SM			
	Slopewash Material (Qsw) @ 3': Dark brown silty fine to coarse SAND, moist, medium dense, slightly friable. Clean fine to coarse SAND on downslope side of trench.	Qsw	SM/SP	D-1 @ 4.5' B-1 @ 4.5'-5.5'	10.97	116.9
	Capistrano Formation, Oso Member (Tco) @ 6': Yellowish brown fine to coarse SANDSTONE, moist to wet, medium dense, weathered. @ 8': Yellowish olive fine to medium SANDSTONE, moist to wet, very dense, massive.	Tco	SM			

Notes:
Total Depth: 9 Feet.
No Groundwater Encountered.
Backfilled with Cuttings.

GRAPHIC REPRESENTATION: NE Wall SCALE: 1" = 5' SURFACE SLOPE: 8° TREND: <--N38°W--



NMG Geotechnical, Inc.

LOG OF TRENCH NO: T-4

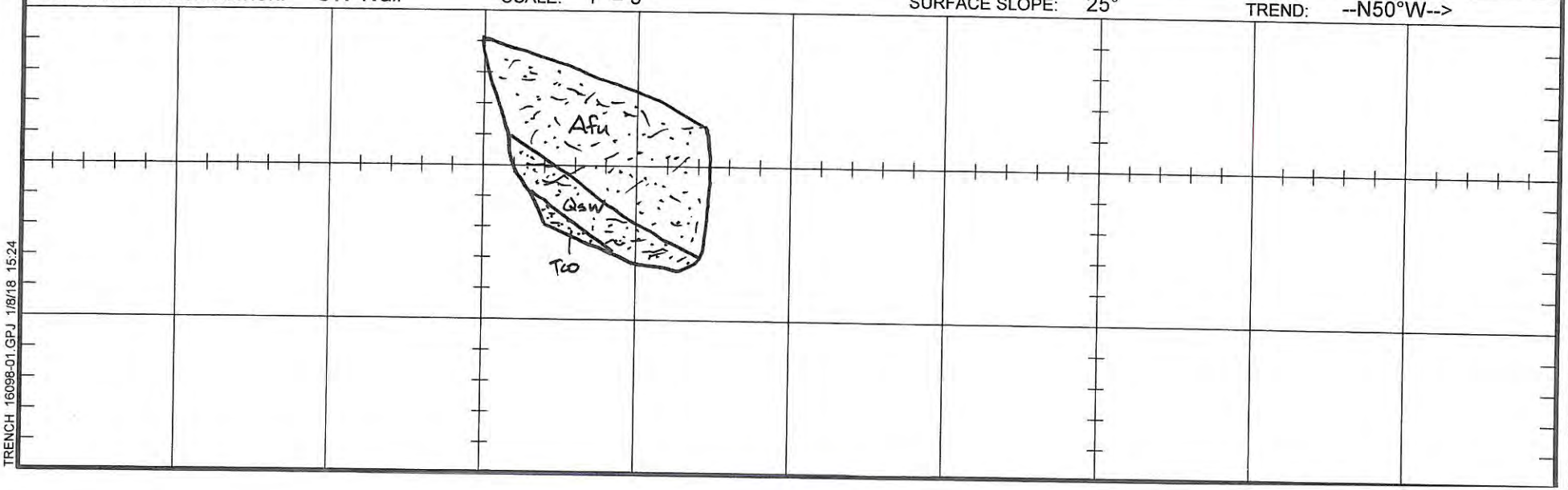
TRENCH 16098-01.GPJ 1/8/18 15:51

NMG

Project Name: Toll Brothers/Lake Forest Nursery
Project Number: 16098-01
Equipment: JCB 214 Backhoe
Logged By: ZKH/TD
Elevation: 706 to±710
Location: Central Portion
TRENCH NO.: T- 5

GEOLOGIC ATTITUDES	DESCRIPTION: DATE: 12/15/17	GEOLOGIC UNIT	ENGINEERING PROPERTIES U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0'-3': Mottled grayish brown silty SAND, damp to moist, loose.	Afu	SM			
	Slopewash Material (Qsw) @ 3'-5': Dark brown silty/clayey fine to medium SAND, moist, loose.	Qsw	SM-SC			
	Capistrano Formation, Oso Member (Tco) @ 5': Olive silty fine SANDSTONE, moist, very dense, micaceous, slightly cemented.	Tco	SM			
	Notes: Total Depth: 6 Feet. No Groundwater Encountered. Backfilled with Cuttings.					

GRAPHIC REPRESENTATION: SW Wall SCALE: 1" = 5' SURFACE SLOPE: 25° TREND: --N50°W-->



NMG Geotechnical, Inc.

LOG OF TRENCH NO: T- 5

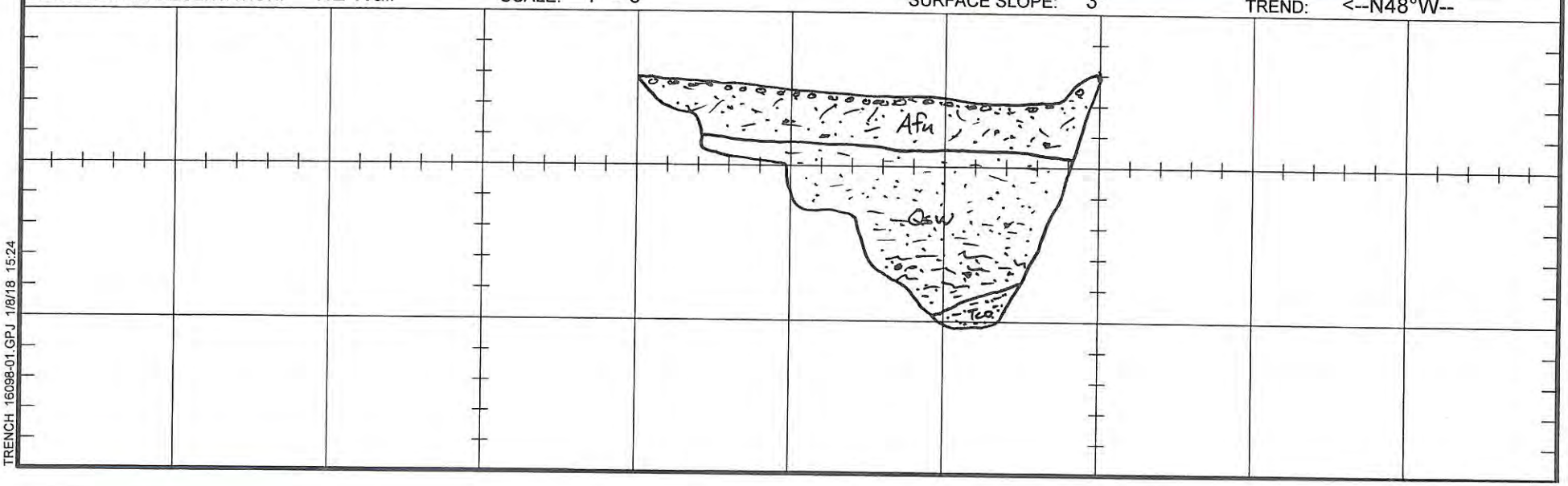
TRENCH 16098-01.GPJ 1/8/18 15:24

NMG Geotechnical, Inc.

Project Name: Toll Brothers/Lake Forest Nursery
Project Number: 16098-01
Equipment: JCB 214 Backhoe
Logged By: ZKH/TD
Elevation: 700 ±
Location: Central Portion Near Well
TRENCH NO.: T- 6

GEOLOGIC ATTITUDES	DESCRIPTION: DATE: 12/15/17	GEOLOGIC UNIT	ENGINEERING PROPERTIES U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0'-2': Grayish brown silty fine SAND, moist, loose to medium dense, plastic debris, scattered gravel, trace roots.	Afu	SM			
	Slopewash Material (Qsw) @ 2'-3': Brown silty fine SAND, moist, loose to medium dense, friable.	Qsw	SM			
	@ 3'-4': Light brown medium to coarse SAND, with scattered gravel, moist, medium dense, highly friable.		SP			
	@ 4'-4.8': Light yellow brown silty fine SAND, moist, loose to medium dense.		SM			
	@ 4.8'-6': Light brown silty/clayey fine SAND, scattered gravel, moist, loose to medium dense, micaceous, grades medium dense by 5'.		SM-SC			
	Capistrano Formation, Oso Member (Tco) @ 6': Weathered pale olive silty fine to medium SANDSTONE, moist, very dense, slightly cemented, caliche.	Tco	SM			
	Notes: Total Depth: 7.0 Feet. No Groundwater Encountered. Backfilled with Cuttings.					

GRAPHIC REPRESENTATION: NE Wall SCALE: 1" = 5' SURFACE SLOPE: 3° TREND: <--N48°W--



LOG OF TRENCH NO: T- 6

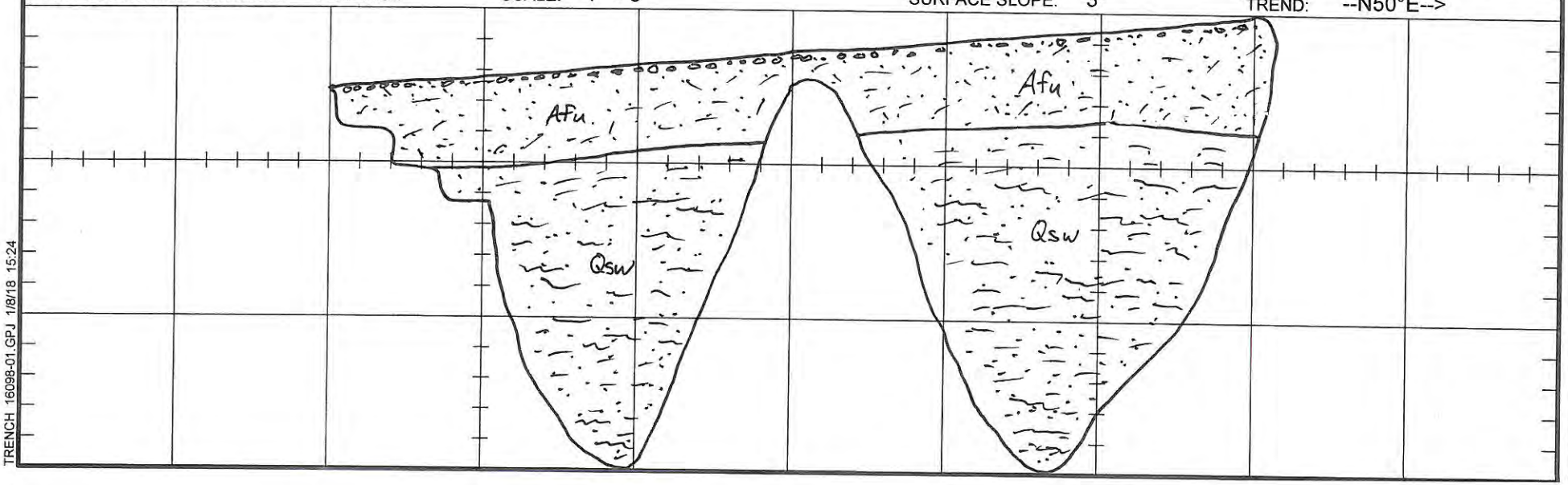
TRENCH 16098-01.GPJ 1/8/18 15:24

NMG Geotechnical, Inc.

Project Name: Toll Brothers/Lake Forest Nursery
Project Number: 16098-01
Equipment: JCB 214 Backhoe
Logged By: ZKH/TD
Elevation: 721 ±
Location: North Central
TRENCH NO.: T-7

GEOLOGIC ATTITUDES	DESCRIPTION: DATE: 12/15/17	GEOLOGIC UNIT	ENGINEERING PROPERTIES U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0': 2" of 3/4" gravel. @ 0.2': Layered 3" to 6" thick gray silty SAND, damp, medium dense. @ 0.5'- 4': Dark brown silty fine to medium SAND, moist, loose to medium dense, slightly friable, scattered gravel, organics at contact with unit below.	Afu	GP SM			
	Slopewash Material (Qsw) @ 3'-4': Brown silty fine to medium SAND, moist, loose to medium dense. @ 4': Dark brown clayey fine to medium SAND, moist, medium dense, trace pinhole pores, trace root hairs, slightly micaceous. @ 7': Brown silty fine to medium SAND, moist to wet, medium dense, fine sand is slightly clayey. @ 9': Strong brown and lighter brown with depth silty fine SAND, wet, medium dense, trace pores, slightly friable. @ 12.5': Light brown silty fine to coarse SAND, wet, medium dense, friable, micaceous. @ 13.5': Light brown clayey fine to medium SAND, wet, medium dense to dense.	Qsw	SM SC SM SC			
	Notes: Total Depth: 14.0 Feet. No Groundwater Encountered. Backfilled with Cuttings.					

GRAPHIC REPRESENTATION: NW Wall SCALE: 1" = 5' SURFACE SLOPE: 3° TREND: --N50°E-->



LOG OF TRENCH NO: T-7

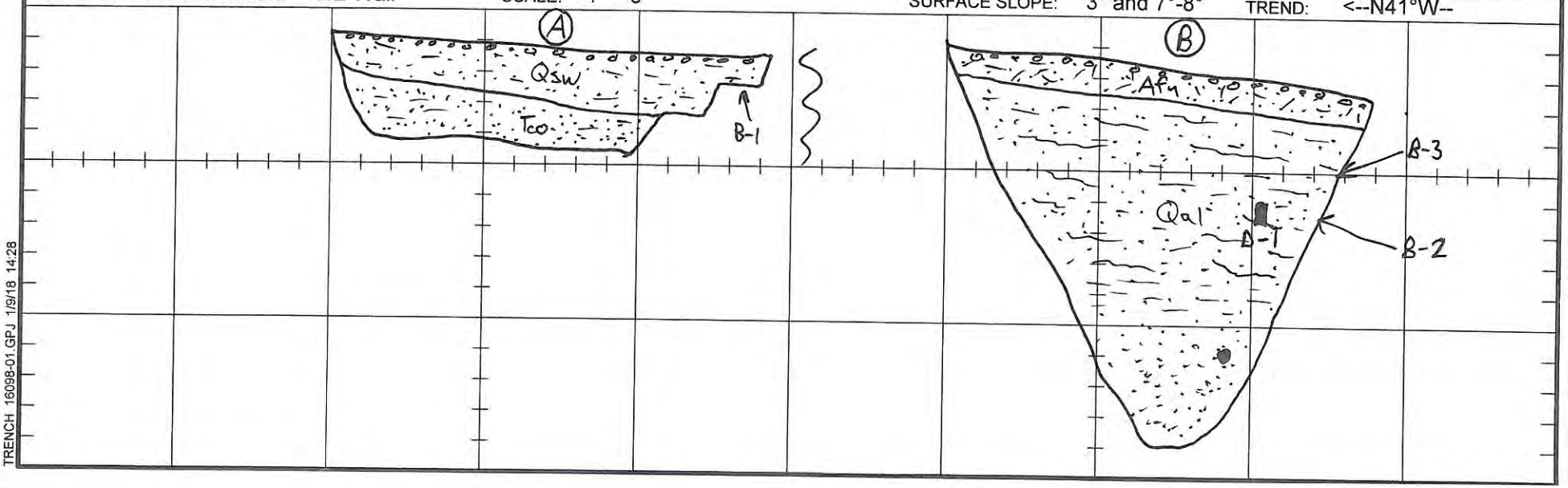
TRENCH 16098-01.GPJ 1/8/18 15:24

NMG Geotechnical, Inc.

Project Name: Toll Brothers/Lake Forest Nursery
Project Number: 16098-01
Equipment: JCB 214 Backhoe
Logged By: ZKH
Elevation: 731 and 729
Location: North Central
TRENCH NO.: T- 8
DATE: 12/15/17

GEOLOGIC ATTITUDES	DESCRIPTION:	GEOLOGIC UNIT	ENGINEERING PROPERTIES: U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	(A) Slopewash Material (Qsw) @ 0'-3': Brown silty fine to medium SAND, moist, loose to medium dense, 6" chucks of SANDSTONE clast at base.	Qsw	SM			
	Capistrano Formation, Oso Member (Tco) @ 3': White to gray silty fine to coarse SANDSTONE, moist, very dense, micaceous, friable.	Tco	SP-SM	B-1 @ 1'-2'		
	(B) Artificial Fill, Undocumented (Afu) @ 0'-1': Gray to brown silty fine to medium SAND, damp, loose, layered, trace plastic debris.	Afu	SM			
	Alluvium (Qal) @ 1'-7': Dark brown silty/clayey fine to coarse SAND, moist, trace pinhole pores, micaceous.	Qal	SC/SM	B-3 @ 3'-4'		
	@ 7': Yellowish brown silty medium to coarse SAND, moist, loose to medium dense, trace 6" to 8" cobble @ 8'.		SM/SP	D-1 @ 4' B-2 @ 4'-5'	8.58	110.0
	@ 8'-9': Pale yellow brown to pale brownish yellow medium to coarse SAND, moist to very moist, friable, trace cobble at 9.5'.		SP			
	Notes: Total Depth: 13.0 Feet. No Groundwater Encountered. Backfilled with Cuttings.					

GRAPHIC REPRESENTATION: NE Wall SCALE: 1" = 5' SURFACE SLOPE: 3° and 7°-8° TREND: <--N41°W--



LOG OF TRENCH NO: T-8

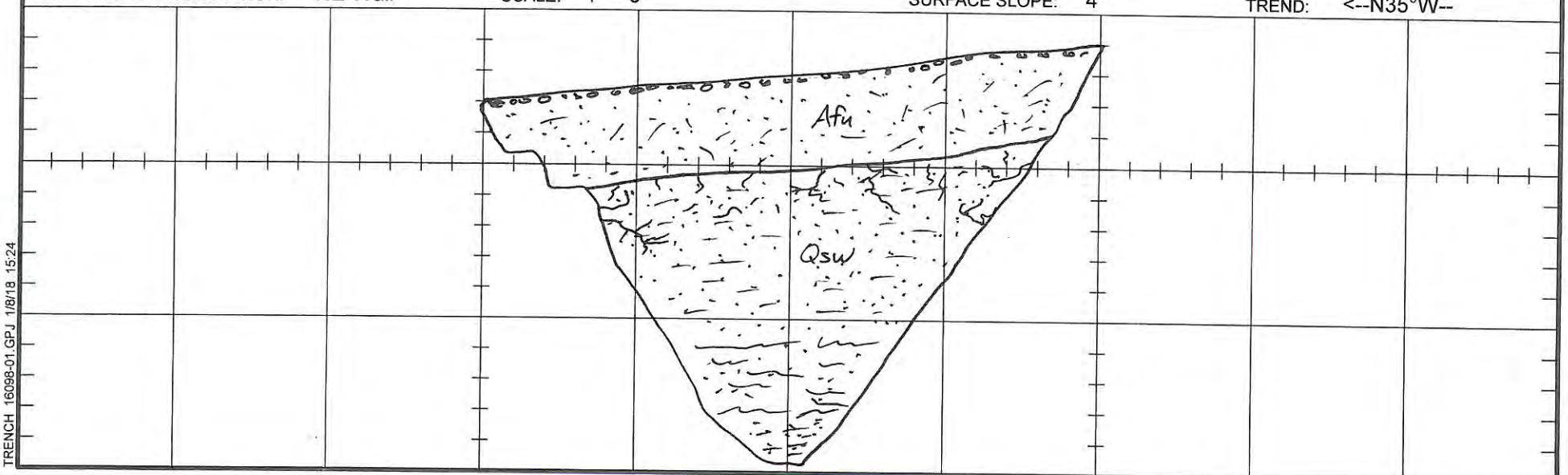
TRENCH 16098-01.GPJ 1/9/18 14:28

NMG Geotechnical, Inc.

Project Name: Toll Brothers/Lake Forest Nursery
Project Number: 16098-01
Equipment: JCB 214 Backhoe
Logged By: TD
Elevation: 723 ±
Location: North Central
TRENCH NO.: T- 9

GEOLOGIC ATTITUDES	DESCRIPTION: DATE: 12/15/17	GEOLOGIC UNIT	ENGINEERING PROPERTIES U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0'-2": Gravel with SAND, dry.	Afu	GP			
	@ 0.2'-3': Gray and dark brown silty fine to medium SAND, moist, loose to medium dense, layered, slightly friable, trace plastic debris.		SM			
	Slopewash Material (Qsw) @ 3': Brown silty fine to medium SAND, moist to wet, loose, highly friable, some coarse sand, abundant root hairs down to 5.5', some 1/2" roots. @ 5.5': Light brown silty fine to coarse SAND, wet, loose to medium dense, friable, micaceous. @ 8': Light brown silty/clayey medium to coarse SAND, wet, medium dense, FeO stained, micaceous.	Qsw	SM SM-SC			
	@ 13': Light brown silty fine to coarse SAND, wet, medium dense, friable.		SM-SP			
	Notes: Total Depth: 13.0 Feet. No Groundwater Encountered. Backfilled with Cuttings.					

GRAPHIC REPRESENTATION: NE Wall SCALE: 1" = 5' SURFACE SLOPE: 4° TREND: <--N35°W--



LOG OF TRENCH NO: T- 9

TRENCH 16098-01.GPJ 1/8/18 15:24

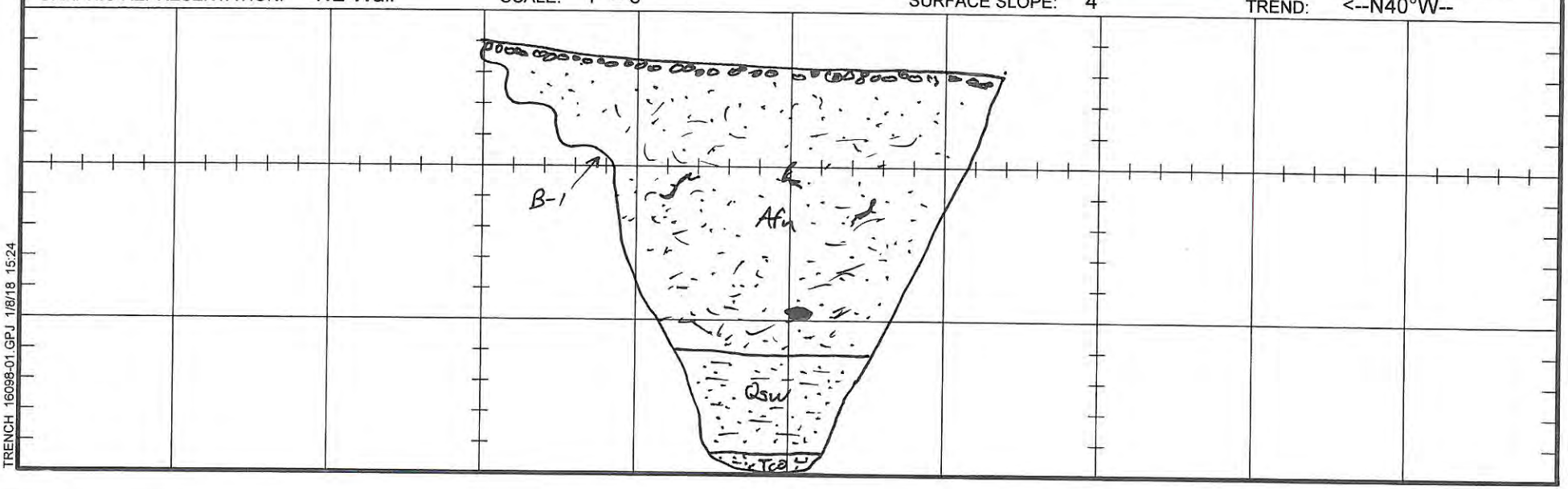
NMG Geotechnical, Inc.

Project Name:	Toll Brothers/Lake Forest Nursery	Logged By:	ZKH/TD
Project Number:	16098-01	Elevation:	694 ±
Equipment:	JCB 214 Backhoe	Location:	West Corner

TRENCH NO.: **T-10**

GEOLOGIC ATTITUDES	DESCRIPTION: DATE: 12/11/17	GEOLOGIC UNIT	ENGINEERING PROPERTIES: U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0'-0.5": Gravelly SAND at surface. Below is brown silty fine to medium SAND, moist, loose, scattered debris/plastic, trace clay.	Afu	GP SM			
	@ 4': Green plastic ribbon debris.			B-1 @ 4'-5		
	@ 9'-11': Grades to olive brown silty SAND, very moist, loose to medium dense, micaceous, plastic bag debris.					
	Slopewash Material (Qsw) @ 10': Olive silty fine SAND, moist, medium dense, caliche.	Qsw	SM			
	Capristrano Formation, Oso Member (Tco) @ 13.5': Gray silty fine to medium SANDSTONE, moist, dense, slightly cemented, slightly micaceous.	Tco	SM			
	Notes: Total Depth: 14.0 Feet. No Groundwater Encountered. Backfilled with Cuttings.					

GRAPHIC REPRESENTATION: NE Wall SCALE: 1" = 5' SURFACE SLOPE: 4° TREND: <--N40°W--



LOG OF TRENCH NO: T-10

TRENCH 16098-01.GPJ 1/8/18 15:24

NMG Geotechnical, Inc.

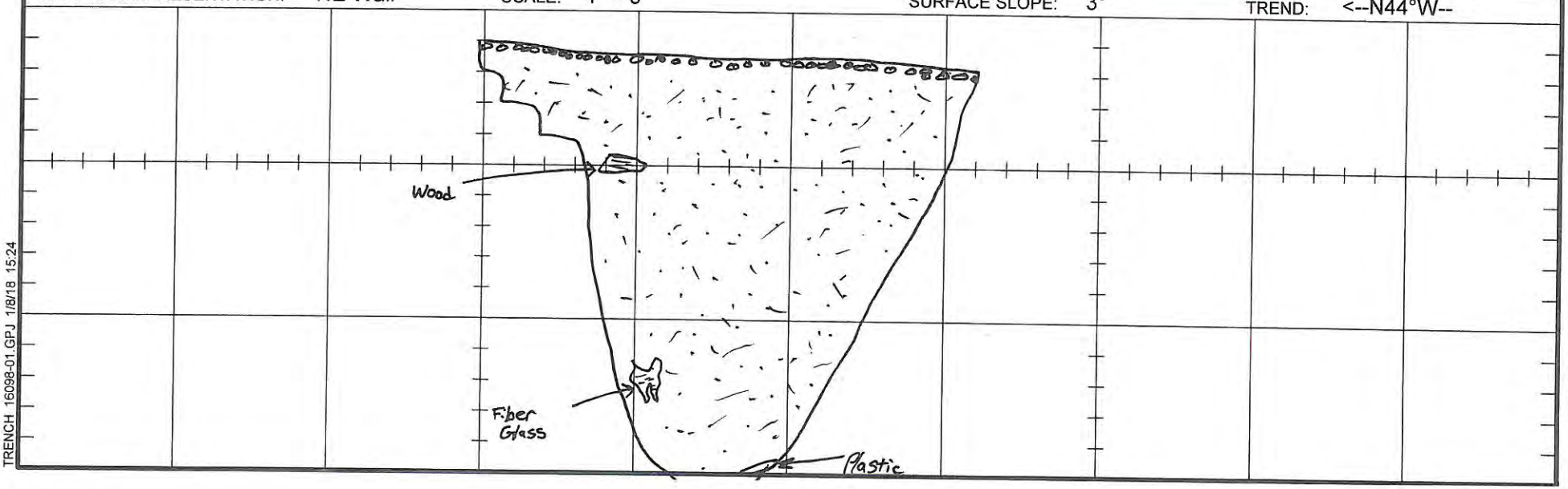
Project Name:	Toll Brothers/Lake Forest Nursery	Logged By:	ZKH/TD
Project Number:	16098-01	Elevation:	700 ±
Equipment:	JCB 214 Backhoe	Location:	West Corner

TRENCH NO.: **T-11**

DATE: 12/11/17

GEOLOGIC ATTITUDES	DESCRIPTION:	GEOLOGIC UNIT	ENGINEERING PROPERTIES: U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0': Yellowish brown silty fine SAND, moist, loose to medium dense. @ 4': Scattered wood debris. @ 7': Yellowish brown silty fine to medium SAND, wet, loose to medium dense. @ 11': Fiber glass debris, approximately 4"x10". @ 11'-14': Pale yellowish brown silty fine to medium SAND, moist, loose to medium dense, scattered plastic pipe debris, scattered cemented nodules. @ 15': Plastic debris.	Afu	SM SM			
	Notes: Total Depth: 16.0 Feet. No Groundwater Encountered. Backfilled with Cuttings.					

GRAPHIC REPRESENTATION: NE Wall SCALE: 1" = 5' SURFACE SLOPE: 3° TREND: <--N44°W--



LOG OF TRENCH NO: T-11

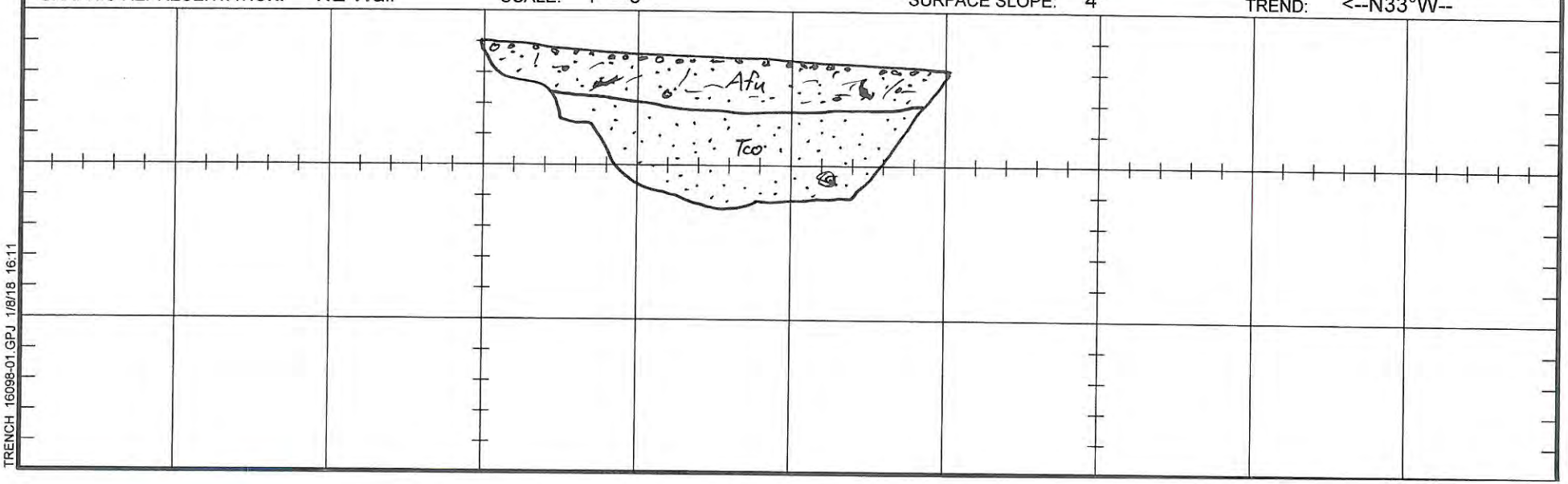
TRENCH 16098-01.GPJ 1/8/18 15:24

NMG Geotechnical, Inc.

Project Name: Toll Brothers/Lake Forest Nursery
Project Number: 16098-01
Equipment: JCB 214 Backhoe
Logged By: ZKH/TD
Elevation: 700 ±
Location: NW Portion Along Bake Pkwy
TRENCH NO.: T-12

GEOLOGIC ATTITUDES	DESCRIPTION: DATE: 12/11/17	GEOLOGIC UNIT	ENGINEERING PROPERTIES: U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0'-1.5': Olive brown silty fine SAND, wet, scattered pebbles, trace plastic debris.	Afu	SM			
	Capristrano Formation, Oso Member (Tco) @ 1.5': White to pale olive silty fine to coarse SANDSTONE, moist, medium dense to very dense, scattered concretions.	Tco	SP			
	Notes: Total Depth: 5.0 Feet. No Groundwater Encountered. Backfilled with Cuttings.					

GRAPHIC REPRESENTATION: NE Wall SCALE: 1" = 5' SURFACE SLOPE: 4° TREND: <--N33°W--



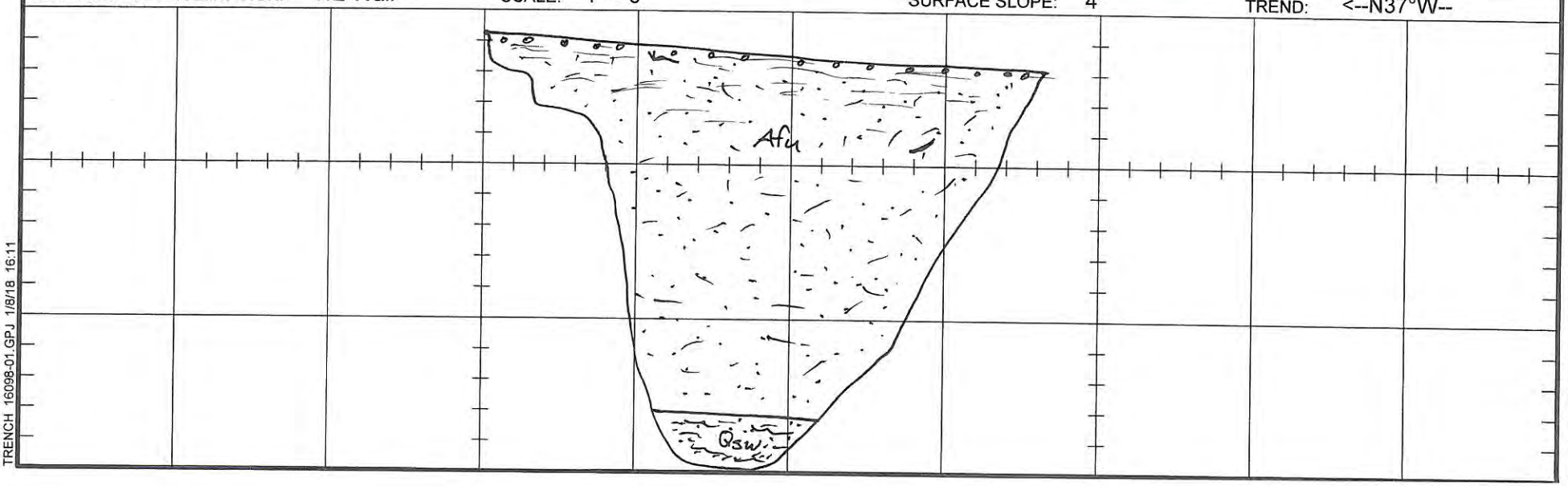
LOG OF TRENCH NO: T-12

TRENCH 16098-01.GPJ 1/8/18 16:11

Project Name: Toll Brothers/Lake Forest Nursery
Project Number: 16098-01
Equipment: JCB 214 Backhoe
Logged By: ZKH
Elevation: 696 ±
Location: NW Portion Along Bake Pkwy
TRENCH NO.: T-13

GEOLOGIC ATTITUDES	DESCRIPTION: DATE: 12/11/17	GEOLOGIC UNIT	ENGINEERING PROPERTIES U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0': Mottled olive brown to brown silty fine to medium SAND, moist, loose to medium dense, trace plastic debris, distinct visible lifts of fill.	Afu	SM			
	@ 5': White to pale yellow silty fine SAND, moist to wet, loose to medium dense.		SM			
	Slopewash Material (Qsw) @ 12': Brown silty/clayey fine SAND, moist, medium dense, slightly blocky, pinhole pores.	Qsw	SM-SC			
	Notes: Total Depth: 14.0 Feet. No Groundwater Encountered. Backfilled with Cuttings.					

GRAPHIC REPRESENTATION: NE Wall SCALE: 1" = 5' SURFACE SLOPE: 4° TREND: <--N37°W--



NMG Geotechnical, Inc.

LOG OF TRENCH NO: T-13

TRENCH 16098-01.GPJ 1/8/18 16:11

NMG

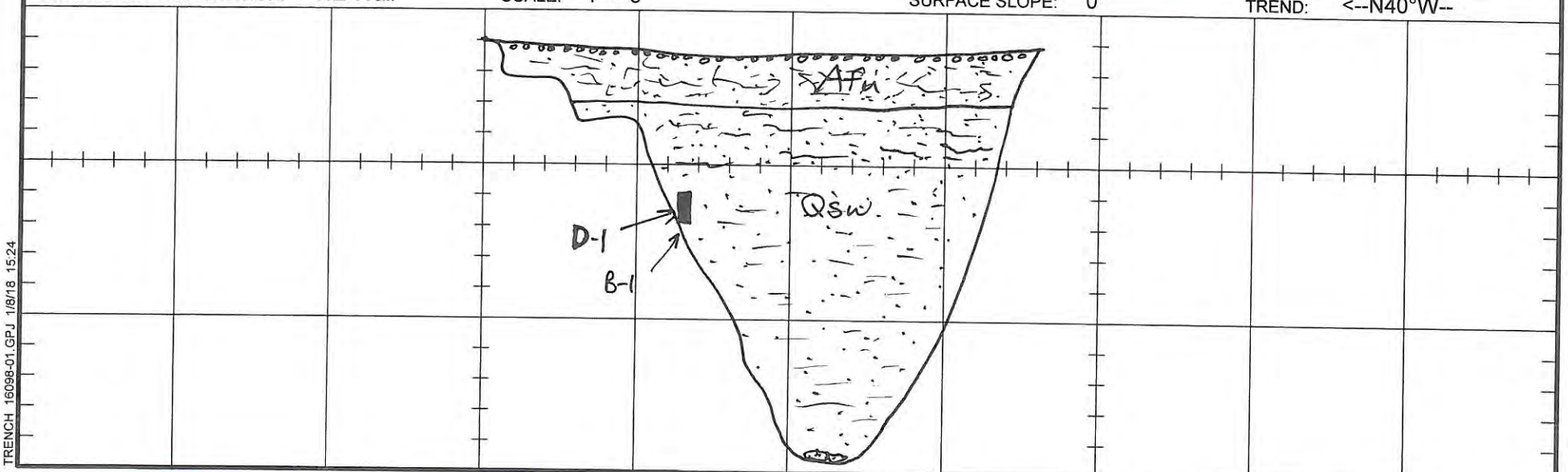
Project Name: Toll Brothers/Lake Forest Nursery
Project Number: 16098-01
Equipment: JCB 214 Backhoe
Logged By: ZKH
Elevation: 695 ±
Location: Adjacent to Bake Pkwy

TRENCH NO.: **T-14**

DATE: 12/11/17

GEOLOGIC ATTITUDES	DESCRIPTION:	GEOLOGIC UNIT	ENGINEERING PROPERTIES: U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0'-2': Dark brown to black silty/clayey fine to medium SAND, moist, loose to medium dense, olive sand layer at base of fill.	Afu	SM-SC			
	Slopewash Material (Qsw) @ 2': Brown silty/clayey fine SAND, moist, medium dense, trace pores.	Qsw	SM-SC			
	@ 5' SAMPLE: Brown silty fine SAND, moist, medium dense, trace pinhole pores, caliche.		SM	D-1 @ 5' B-1 @ 5'-6'	9.5	112.0
	@ 9'-12': Trace 1/4" pores from roots. No roots in pores. Slightly more dense.					
	@ 13.5': Trace fragments of SANDSTONE bedrock.					
	Notes: Total Depth: 13.5 Feet. No Groundwater Encountered. Backfilled with Cuttings.					

GRAPHIC REPRESENTATION: NE Wall SCALE: 1" = 5' SURFACE SLOPE: 0° TREND: <--N40°W--



NMG Geotechnical, Inc.

LOG OF TRENCH NO: T-14

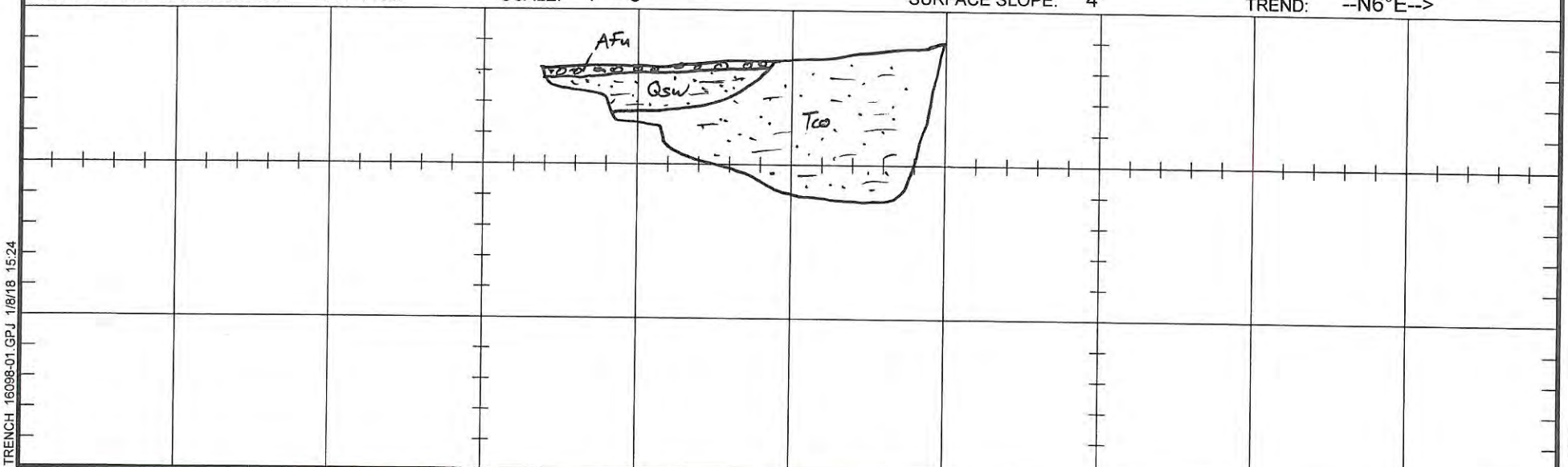
TRENCH 16098-01.GPJ 1/8/18 15:24

NMG

Project Name: Toll Brothers/Lake Forest Nursery
Project Number: 16098-01
Equipment: JCB 214 Backhoe
Logged By: ZKH
Elevation: 726 ±
Location: Adjacent to Bake Pkwy
TRENCH NO.: **T-15**
DATE: 12/11/17

GEOLOGIC ATTITUDES	DESCRIPTION:	GEOLOGIC UNIT	ENGINEERING PROPERTIES: U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0'-1.5': Upper 6" gravelly SAND. @ 0.5': Light brown silty SAND, moist.	Afu	GP SM			
	Slopewash Material (Qsw) @ 1.5': Light brown fine to medium silty SAND, moist, loose to medium dense.	Qsw	SM			
..., 17SE	**Capistrano Formation, Oso Member (Tco)** @ 0'-5': White to pale yellow silty fine to medium SANDSTONE, damp to moist, very dense, micaceous.	Tco	SM			
	Notes: Total Depth: 5.0 Feet. No Groundwater Encountered. Backfilled with Cuttings.					

GRAPHIC REPRESENTATION: NW Wall SCALE: 1" = 5' SURFACE SLOPE: 4° TREND: --N6°E-->



NMG Geotechnical, Inc.

LOG OF TRENCH NO: T-15

TRENCH 16098-01.GPJ 1/8/18 15:24

NMG

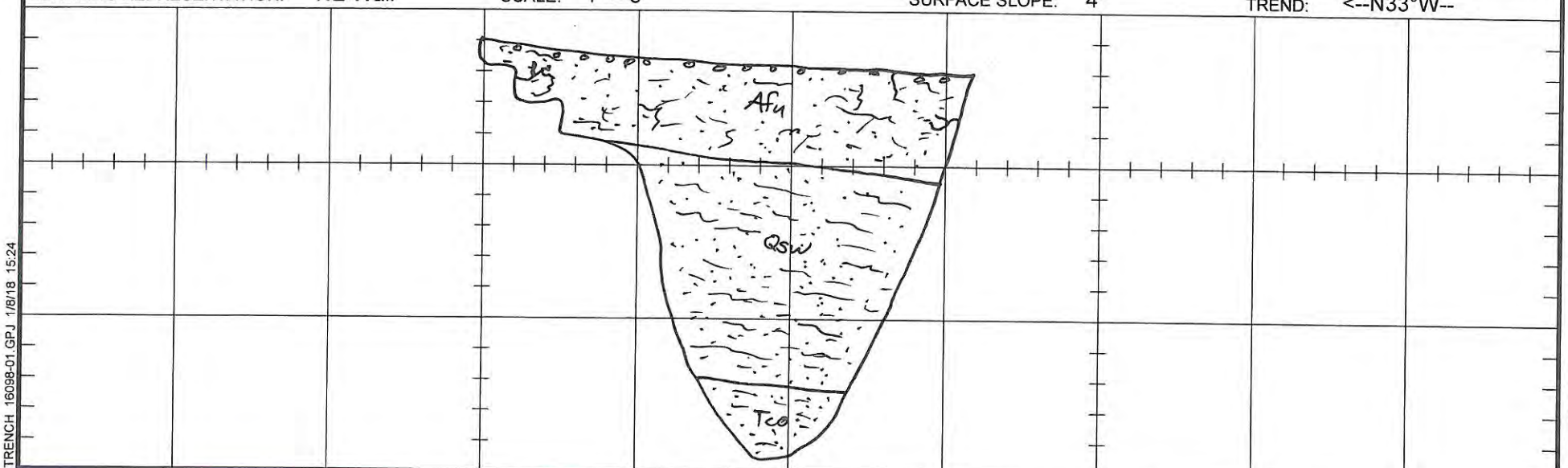
Project Name: Toll Brothers/Lake Forest Nursery
Project Number: 16098-01
Equipment: JCB 214 Backhoe
Logged By: ZKH
Elevation: 718 ±
Location: Adjacent to Bake Pkwy

TRENCH NO.: **T-16**

DATE: 12/11/17

GEOLOGIC ATTITUDES	DESCRIPTION:	GEOLOGIC UNIT	ENGINEERING PROPERTIES: U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0'-3': Dark brown mottled silty/clayey fine to medium SAND, moist, loose, trace roots.	Afu	SM-SC			
	Slopewash Material (Qsw) @ 3': Dark brown silty/clayey fine to medium SAND, moist, loose to medium dense, trace pinhole pores. @ 5': Slightly more dense.	Qsw	SM-SC			
	Capistrano Formation, Oso Member (Tco) @ 11': Weathered bedrock @ 12': Yellow brown to olive silty fine to medium SANDSTONE, moist, dense, slightly friable, micaceous.	Tco	SM			
	Notes: Total Depth: 13.0 Feet. No Groundwater Encountered. Backfilled with Cuttings.					

GRAPHIC REPRESENTATION: NE Wall SCALE: 1" = 5' SURFACE SLOPE: 4° TREND: <--N33°W--



NMG Geotechnical, Inc.

LOG OF TRENCH NO: T-16

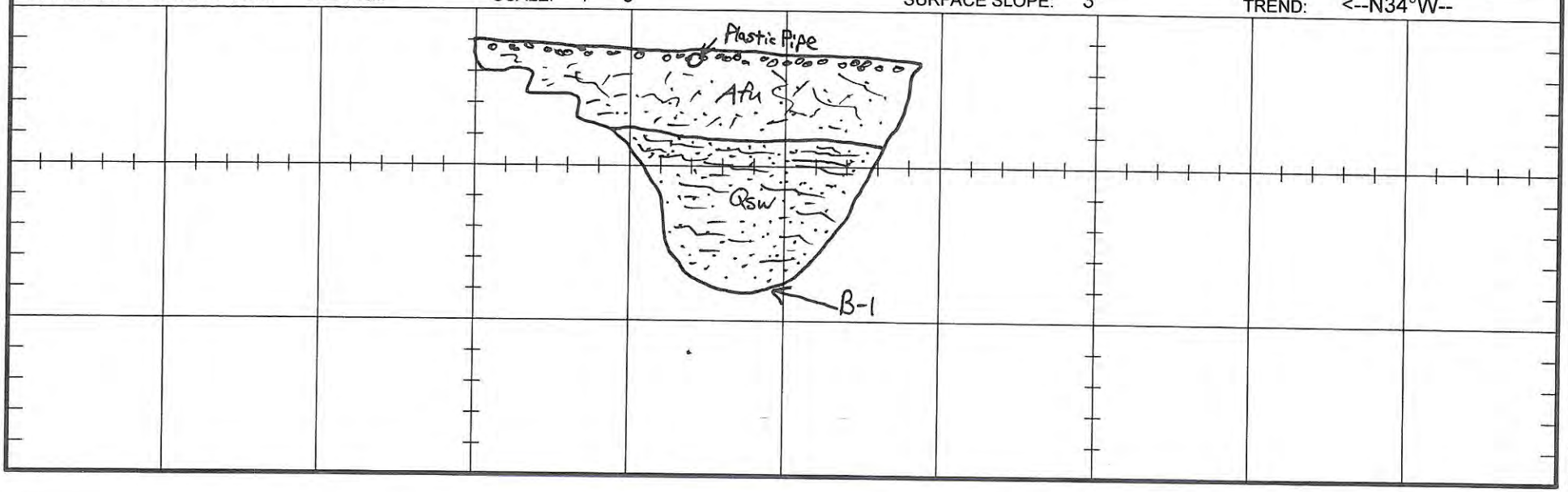
TRENCH 16098-01.GPJ 1/8/18 15:24

NMG

Project Name: Toll Brothers/Lake Forest Nursery
Project Number: 16098-01
Equipment: JCB 214 Backhoe
Logged By: ZKH
Elevation: 713 ±
Location: Adjacent to Bake Pkwy
TRENCH NO.: T-17

GEOLOGIC ATTITUDES	DESCRIPTION: DATE: 12/11/17	GEOLOGIC UNIT	ENGINEERING PROPERTIES U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0'-2': Dark brown/black to white silty/clayey SAND, moist, loose, pipe debris in upper foot.	Afu	SM-SC			
	Slopewash (Qsw) @ 2': Dark brown clayey fine to medium SAND, wet, loose, pinhole pores, trace roots.	Qsw	SC			
	@ 3.5': Brown to dark grayish brown silty/clayey fine to coarse SAND, wet, medium dense, pinhole pores.		SM-SC			
	@ 7': Slightly more dense, less pores.			B-1 @ 7.0'		
	Notes: Total Depth: 7.0 Feet. No Grounwater Encountered. Backfilled with Cuttings.					

GRAPHIC REPRESENTATION: NE Wall SCALE: 1" = 5' SURFACE SLOPE: 3° TREND: <--N34°W--



NMG Geotechnical, Inc.

LOG OF TRENCH NO: T-17

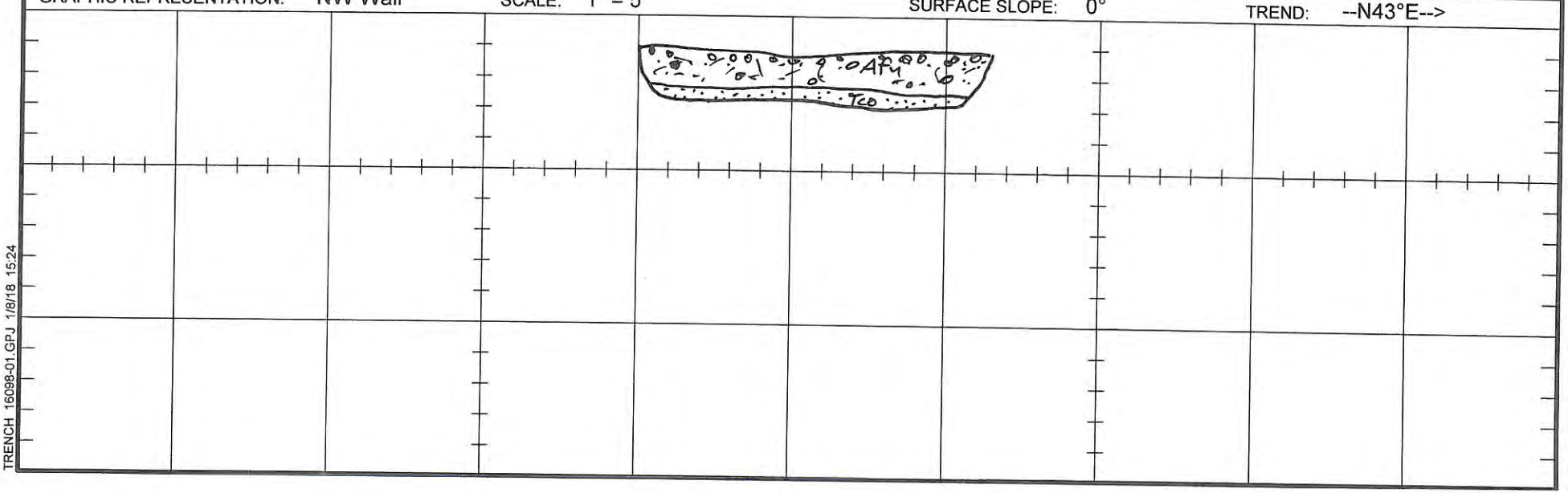
NMG Geotechnical, Inc.

Project Name: Toll Brothers/Lake Forest Nursery
Project Number: 16098-01
Equipment: JCB 214 Backhoe
Logged By: ZKH
Elevation: 715 ±
Location: Central Portion Near Drainage

TRENCH NO.: **T-18**

GEOLOGIC ATTITUDES	DESCRIPTION: DATE: 12/15/17	GEOLOGIC UNIT	ENGINEERING PROPERTIES: U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0'-1.5': Light brown silty fine to medium SAND, damp to moist, loose, gravel in upper 3".	Afu	GP SM			
	Capistrano Formation, Oso Member (Tco) @ 1.5': Olive fine to coarse SANDSTONE, moist to wet, friable.	Tco	SP			
	Notes: Total Depth: 2.0 Feet. No Groundwater Encountered. Backfilled with Cuttings.					

GRAPHIC REPRESENTATION: NW Wall SCALE: 1" = 5' SURFACE SLOPE: 0° TREND: --N43°E-->



LOG OF TRENCH NO: T-18

TRENCH 16098-01.GPJ 1/8/18 15:24

NMG

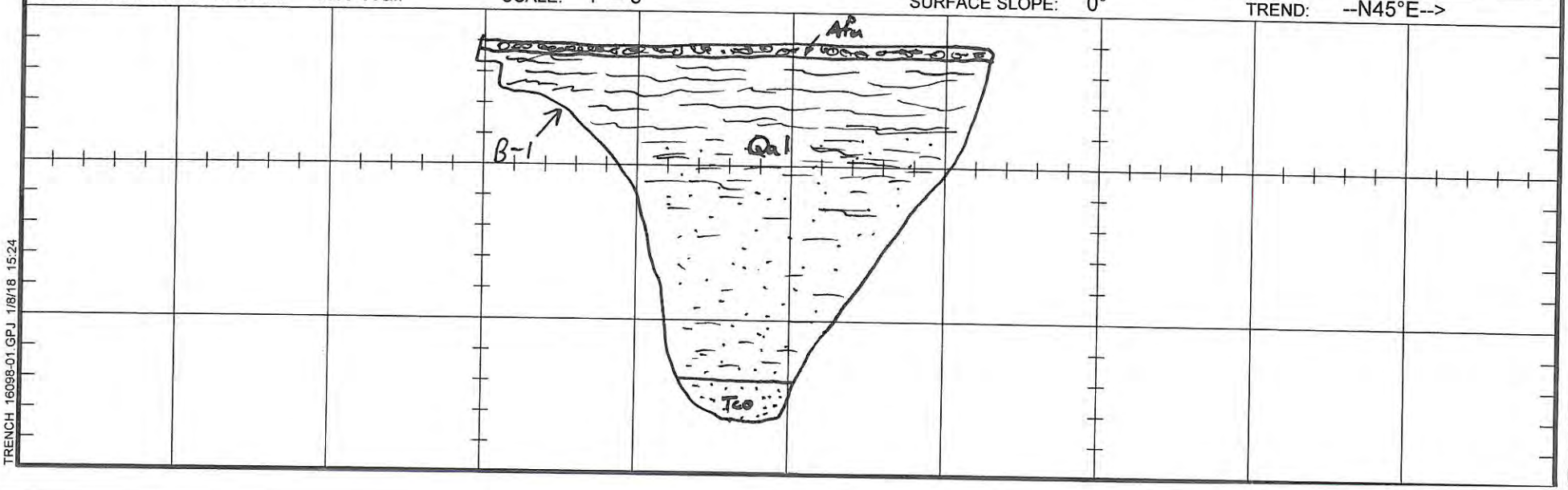
Project Name: Toll Brothers/Lake Forest Nursery
Project Number: 16098-01
Equipment: JCB 214 Backhoe
Logged By: ZKH
Elevation: 710 ±
Location: Central Portion Near Drainage

TRENCH NO.: **T-19**

DATE: 12/15/17

GEOLOGIC ATTITUDES	DESCRIPTION:	GEOLOGIC UNIT	ENGINEERING PROPERTIES: U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0': Brown silty sandy GRAVEL, loose, damp.	Afu	GM/GP			
	Alluvium (Qal) @ 0.5'-3': Very dark brown CLAY, wet, medium stiff, plastic, some ~1" tree roots, micaceous, trace pinhole pores, caliche. @ 3'-5.5': Brown sandy clayey SILT, wet, medium stiff, trace pinhole pores, abundant caliche, micaceous. @ 8': Brown silty SAND, very moist, medium dense.	Qal	CL ML SM	B-1 @ 2'		
	Capistrano Formation, Oso Member (Tco) @ 11': Pale olive fine to coarse SANDSTONE, moist, very dense, slightly cemented, caliche, micaceous, slightly friable where not cemented.	Tco	SP			
	Notes: Total Depth: 12.0 Feet. No Groundwater Encountered. Backfilled with Cuttings.					

GRAPHIC REPRESENTATION: NW Wall SCALE: 1" = 5' SURFACE SLOPE: 0° TREND: --N45°E-->



NMG Geotechnical, Inc.

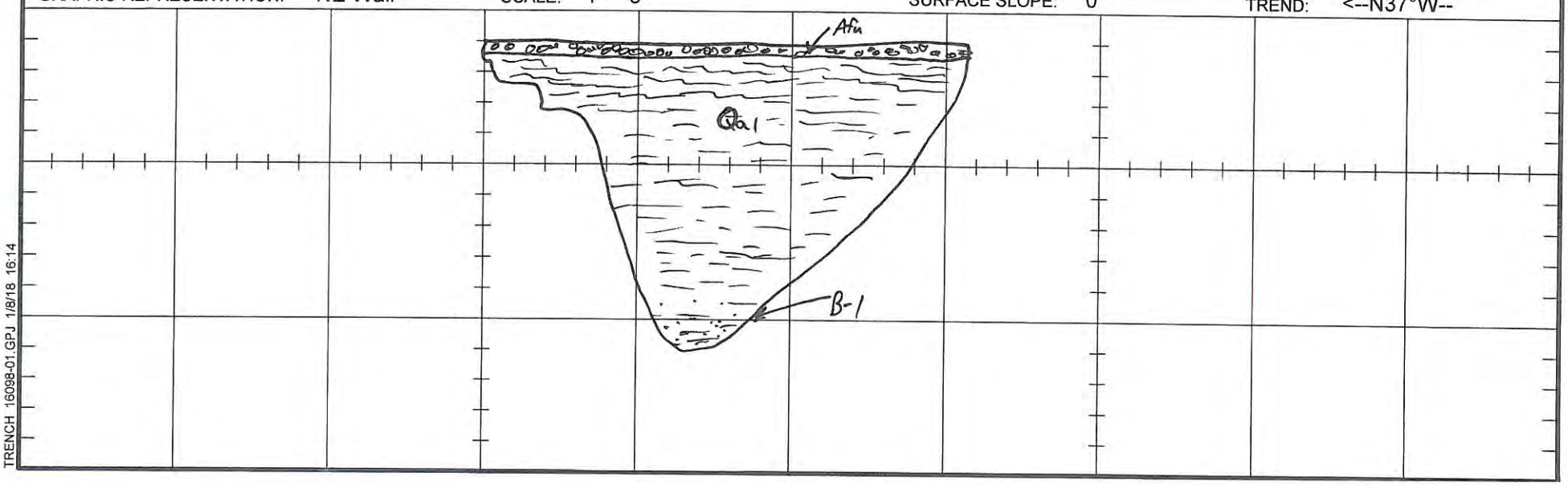
LOG OF TRENCH NO: T-19

TRENCH 16098-01.GPJ 1/8/18 15:24

Project Name: Toll Brothers/Lake Forest Nursery
Project Number: 16098-01
Equipment: JCB 214 Backhoe
Logged By: ZKH
Elevation: 707 ±
Location: Central Portion, Near Serrano Creek
TRENCH NO.: T-20

GEOLOGIC ATTITUDES	DESCRIPTION: DATE: 12/15/17	GEOLOGIC UNIT	ENGINEERING PROPERTIES U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0'-0.5': Gravelly silty SAND, moist to saturated, loose.	Afu	SM			
	Alluvium (Qal) @ 0.5'-1.5': Dark brown sandy CLAY, moist to wet, medium stiff.	Qal	CL			
	@ 1.5'-9': Brown clayey SILT, moist to very moist, medium stiff, some pinhole and pencil-tip pores, root hairs, moderate caliche.		ML			
	@ 9'-10': Brown silty fine SAND/sandy SILT, moist, medium dense, some pinhole pores, moderate caliche.		SM-ML	B-1 @ 9'-10'		
	Notes: Total Depth: 10.0 Feet. No Groundwater Encountered. Backfilled with Cuttings.					

GRAPHIC REPRESENTATION: NE Wall SCALE: 1" = 5' SURFACE SLOPE: 0° TREND: <--N37°W--



NMG Geotechnical, Inc.

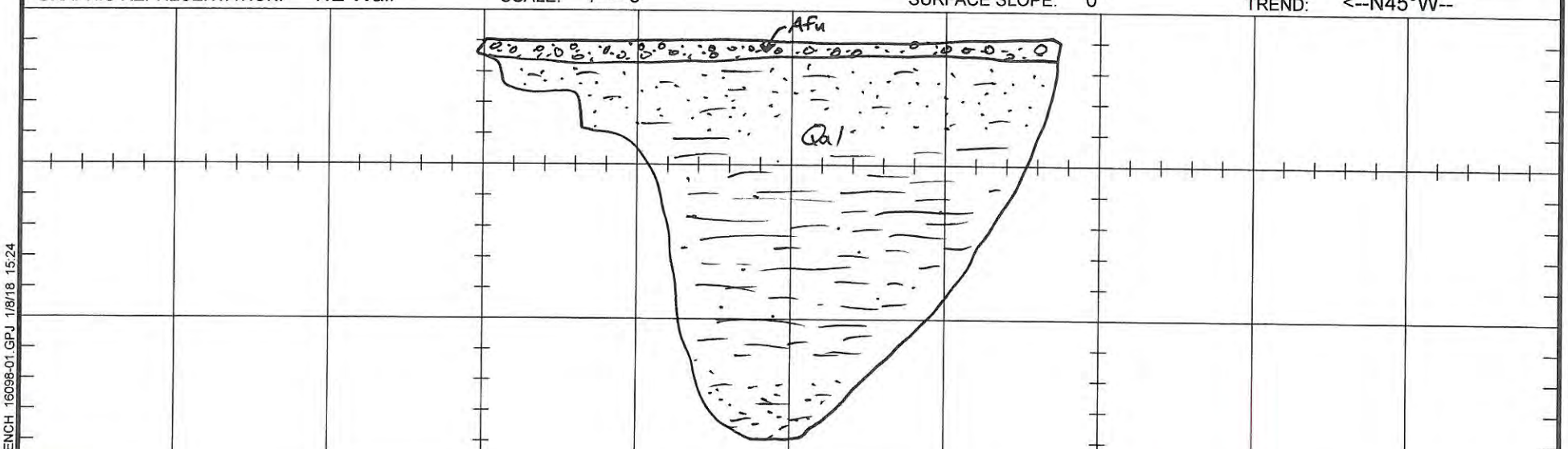
LOG OF TRENCH NO: T-20

TRENCH 16098-01.GPJ 1/8/18 16:14

Project Name: Toll Brothers/Lake Forest Nursery
Project Number: 16098-01
Equipment: JCB 214 Backhoe
Logged By: ZKH
Elevation: 717 ±
Location: Central Portion, Near Serrano Creek
TRENCH NO.: T-21

GEOLOGIC ATTITUDES	DESCRIPTION: DATE: 12/15/17	GEOLOGIC UNIT	ENGINEERING PROPERTIES U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0'-0.5': Gravelly SAND.	Afu	SP/GP			
	Alluvium (Qal) @ 0.5'-3': Brown silty fine SAND, moist, loose to medium dense.	Qal	SM			
	@ 3': Yellowish brown sandy SILT, moist to very moist, loose to medium dense, caliche, some pinhole pores, micaceous.		ML			
	@ 11': Brown silty SAND, moist, medium dense, caliche.		SM			
	Notes: Total Depth: 13.0 Feet. No Groundwater Encountered. Backfilled with Cuttings.					

GRAPHIC REPRESENTATION: NE Wall SCALE: 1" = 5' SURFACE SLOPE: 0° TREND: <--N45°W--



NMG Geotechnical, Inc.

LOG OF TRENCH NO: T-21

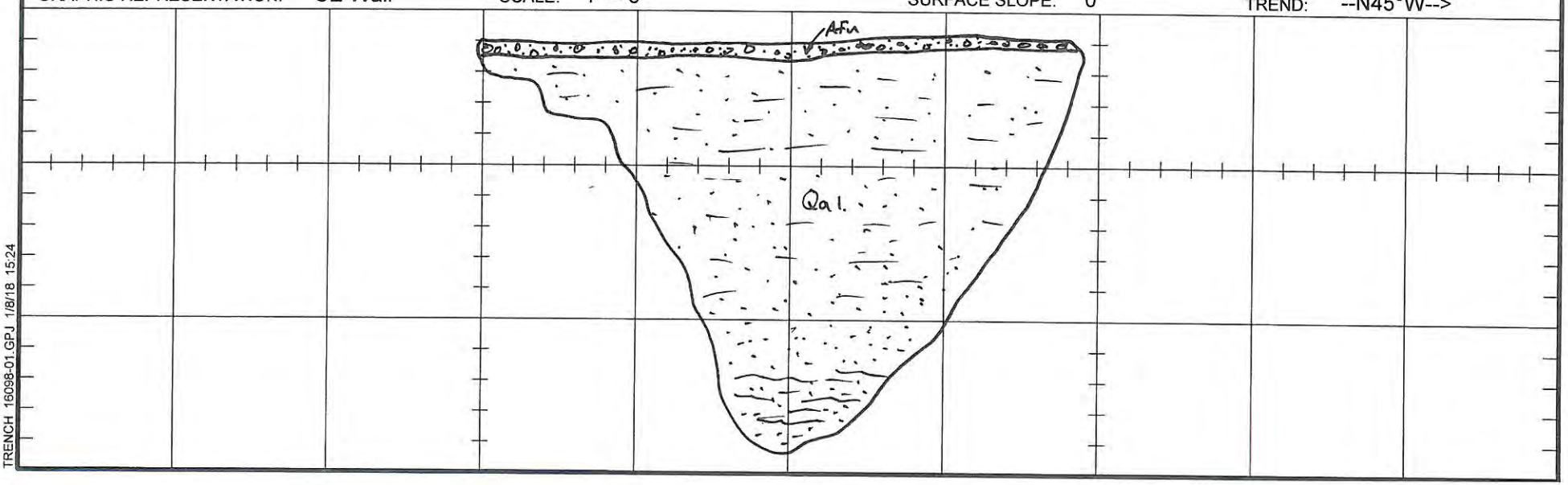
TRENCH 16098-01.GPJ 1/8/18 15:24

NMG Geotechnical, Inc.

Project Name: Toll Brothers/Lake Forest Nursery
Project Number: 16098-01
Equipment: JCB 214 Backhoe
Logged By: ZKH
Elevation: 730 ±
Location: Central Portion, Near Rancho Pkwy
TRENCH NO.: T-22

GEOLOGIC ATTITUDES	DESCRIPTION: DATE: 12/15/17	GEOLOGIC UNIT	ENGINEERING PROPERTIES U.S.C.S.	SAMPLE NO.	MOISTURE CONTENT (%)	DRY DENSITY (pcf)
	Artificial Fill, Undocumented (Afu) @ 0'-0.5': Gray to brown silty fine SAND, damp, loose, some gravel.	Afu	SM			
	Alluvium (Qal) @ 0.5'-5': Brown silty fine to medium SAND, moist, loose to medium dense, pinhole pores, root hairs, roots to 5'. @ 4': Pedogenic surfaces, some gravel and cobbles. @ 9': Sandier, less silt, fine to medium SAND, moist, grades to clean SAND by 10'. @ 11': Silty/clayey fine to coarse SAND, moist, medium dense, abundant pinhole pores, few pencil-tip pores, caliche, trace roots.	Qal	SM SP SM-SC			
	Notes: Total Depth: 13.0 Feet. No Groundwater Encountered. Backfilled with Cuttings.					

GRAPHIC REPRESENTATION: SE Wall SCALE: 1" = 5' SURFACE SLOPE: 0° TREND: --N45°W-->



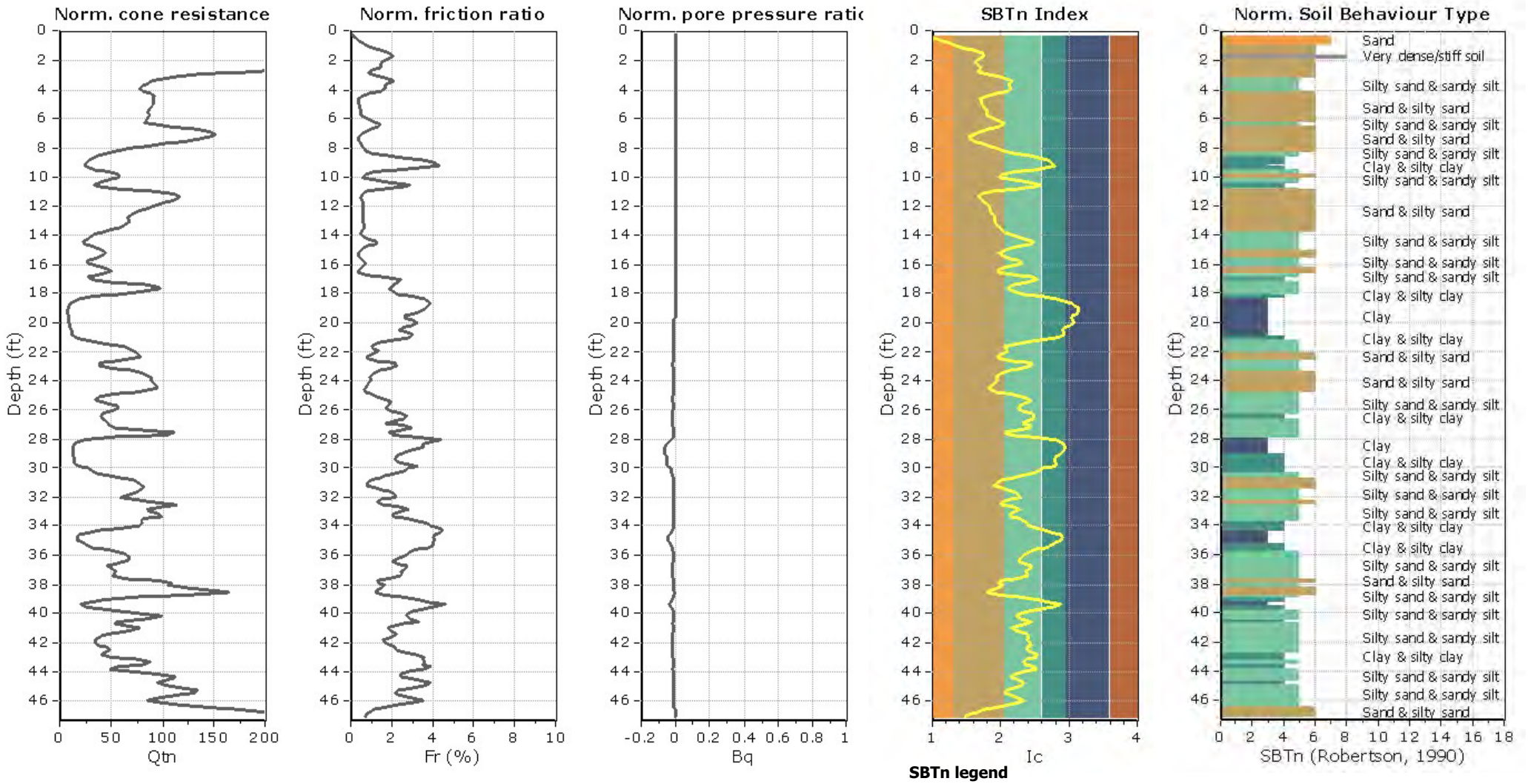
LOG OF TRENCH NO: T-22

TRENCH 16098-01.GPJ 1/8/18 15:24

NMG Geotechnical
17991 Fitch
Irvine, CA 92614
(949) 442-2442

Project: **Toll Bros./Lake Forest Nursery**
Location: **Lake Forest, CA**

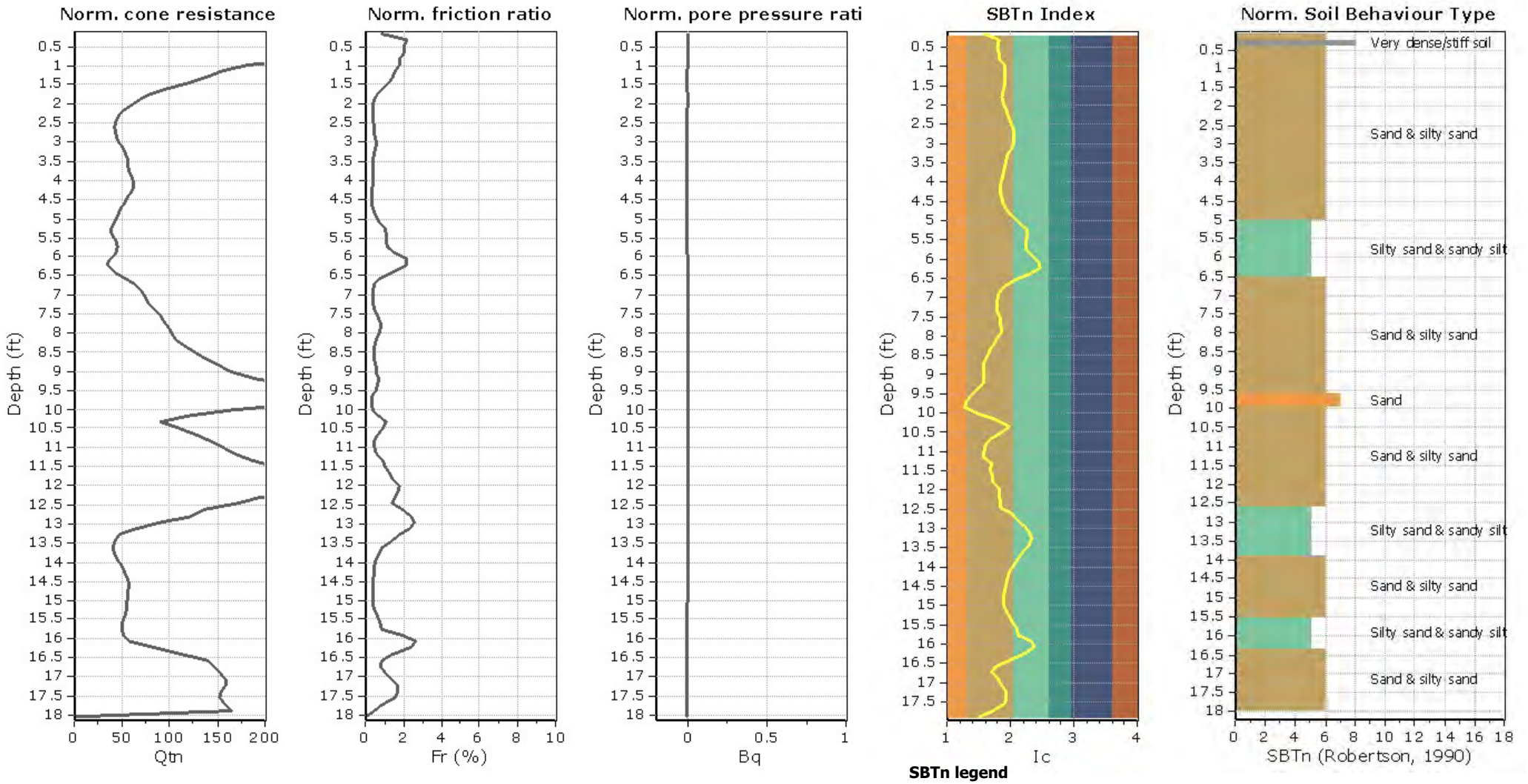
CPT: CPT-1
Total depth: 47.08 ft, Date: 9/30/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Vertek
Cone Operator: Kehoe Testing



NMG Geotechnical
17991 Fitch
Irvine, CA 92614
(949) 442-2442

Project: **Toll Bros./Lake Forest Nursery**
Location: **Lake Forest, CA**

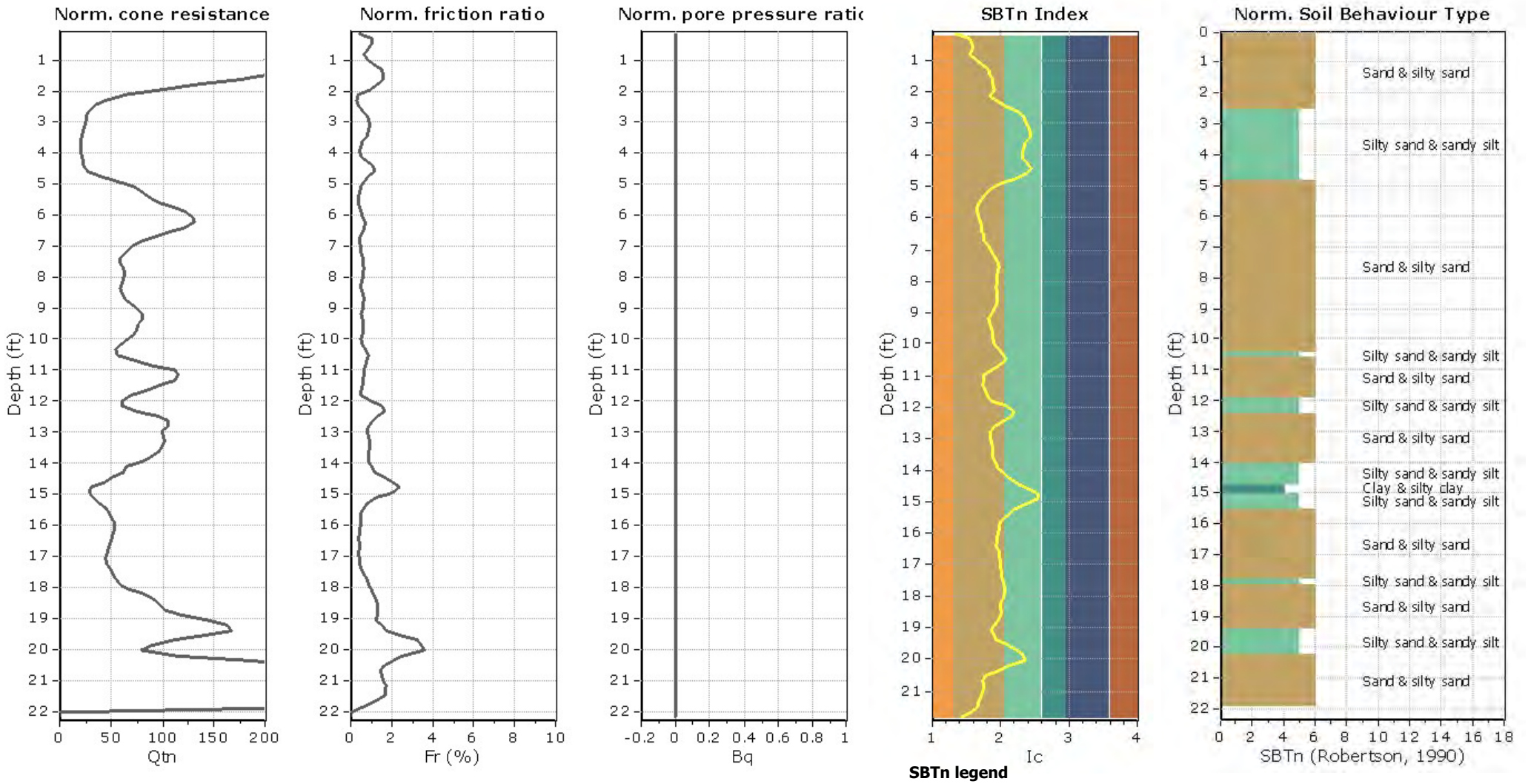
CPT: CPT-2
Total depth: 18.04 ft, Date: 9/30/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Vertek
Cone Operator: Kehoe Testing



NMG Geotechnical
17991 Fitch
Irvine, CA 92614
(949) 442-2442

Project: **Toll Bros./Lake Forest Nursery**
Location: **Lake Forest, CA**

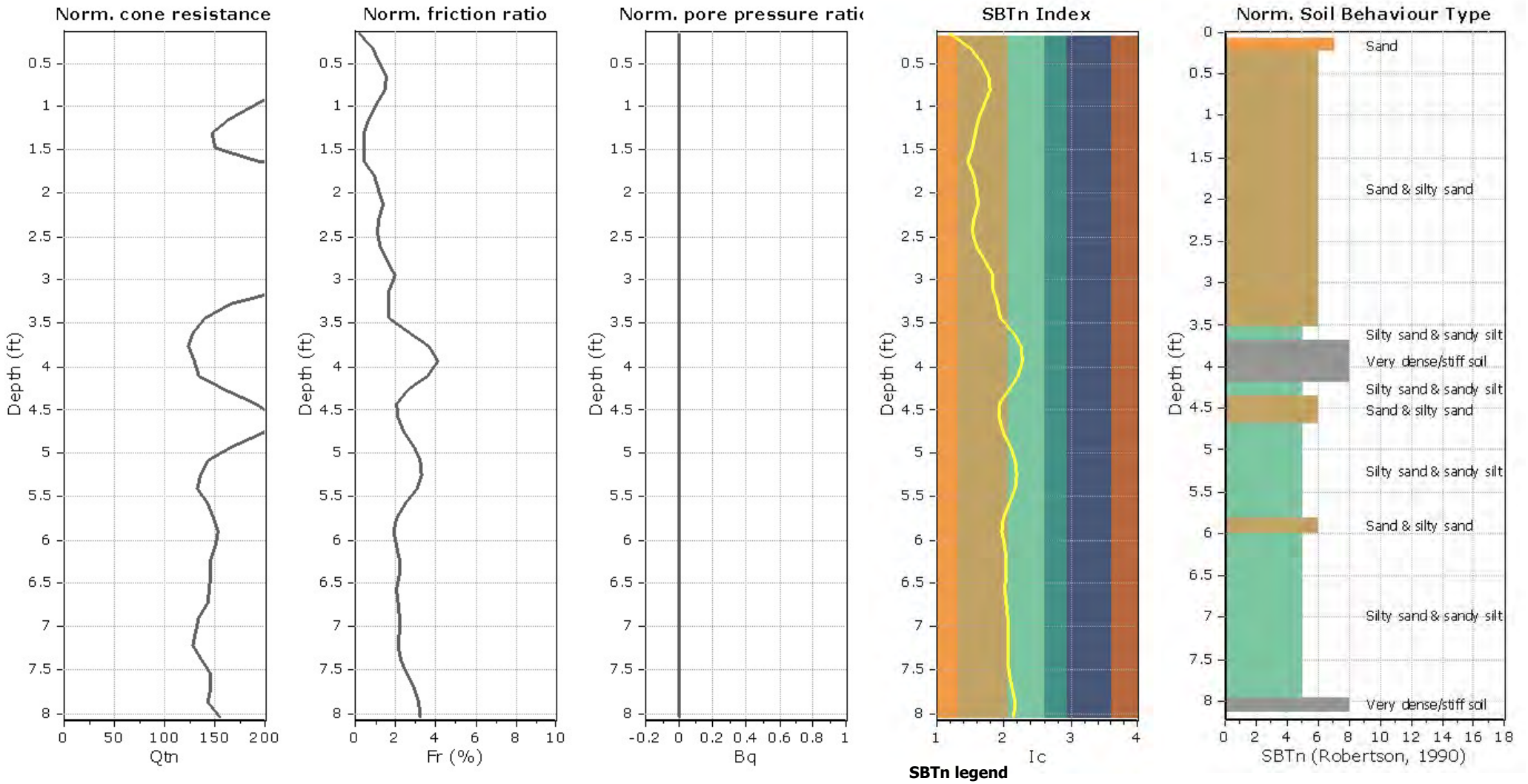
CPT: CPT-2A
Total depth: 22.15 ft, Date: 9/30/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Vertek
Cone Operator: Kehoe Testing



NMG Geotechnical
17991 Fitch
Irvine, CA 92614
(949) 442-2442

Project: **Toll Bros./Lake Forest Nursery**
Location: **Lake Forest, CA**

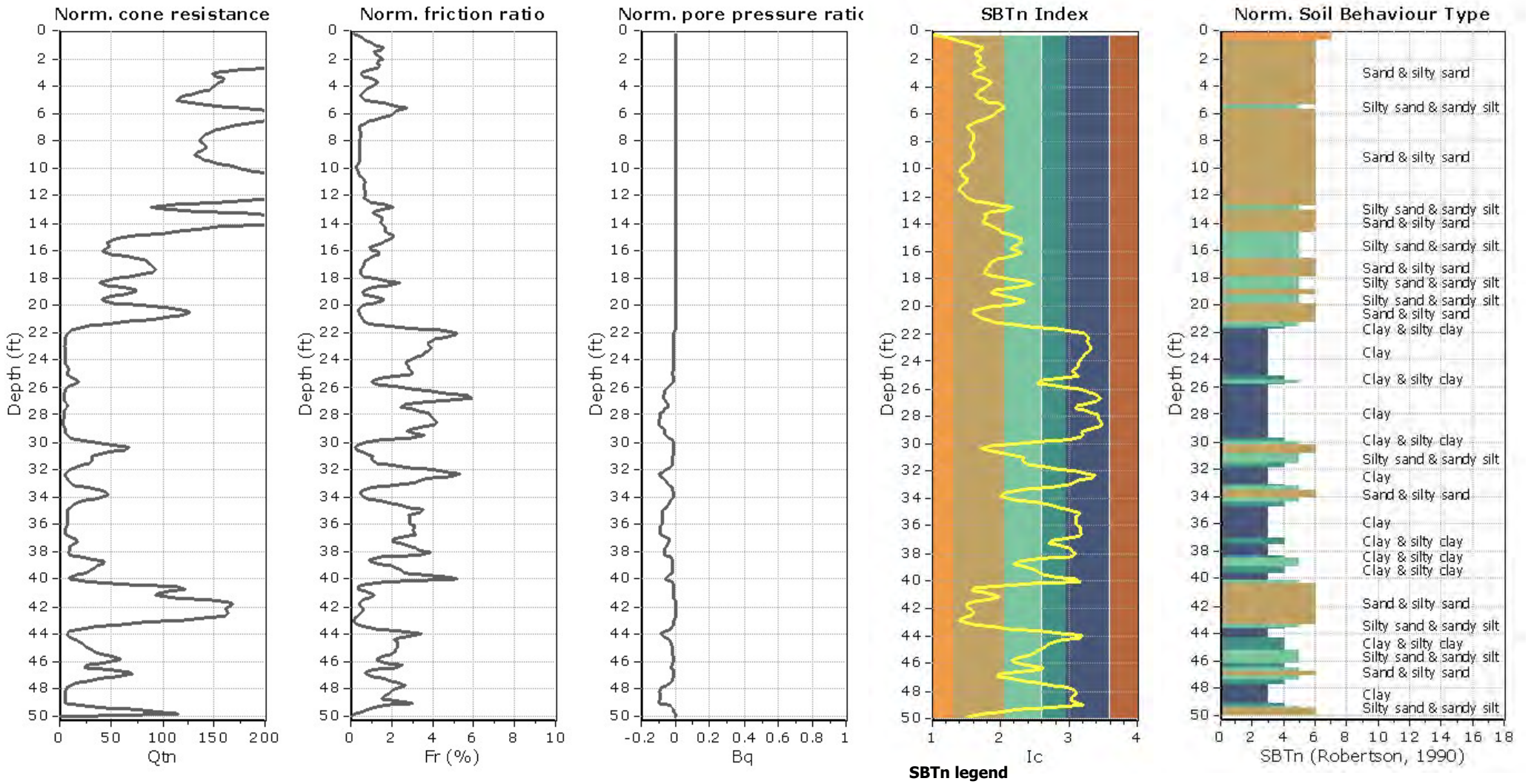
CPT: CPT-3
Total depth: 8.04 ft, Date: 9/30/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Vertek
Cone Operator: Kehoe Testing



NMG Geotechnical
17991 Fitch
Irvine, CA 92614
(949) 442-2442

Project: **Toll Bros./Lake Forest Nursery**
Location: **Lake Forest, CA**

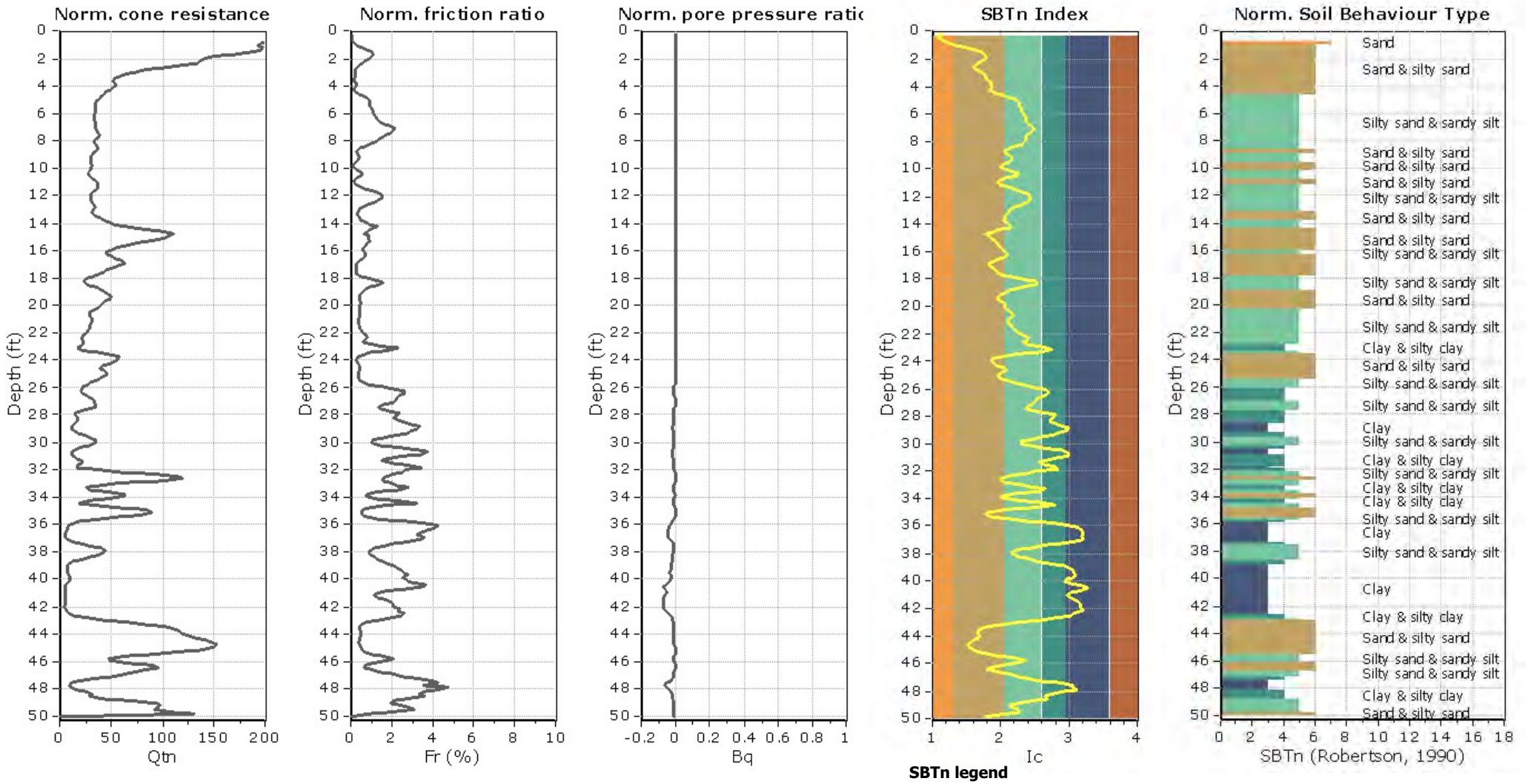
CPT: CPT-4
Total depth: 50.03 ft, Date: 9/30/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Vertek
Cone Operator: Kehoe Testing



NMG Geotechnical
17991 Fitch
Irvine, CA 92614
(949) 442-2442

Project: **Toll Bros./Lake Forest Nursery**
Location: **Lake Forest, CA**

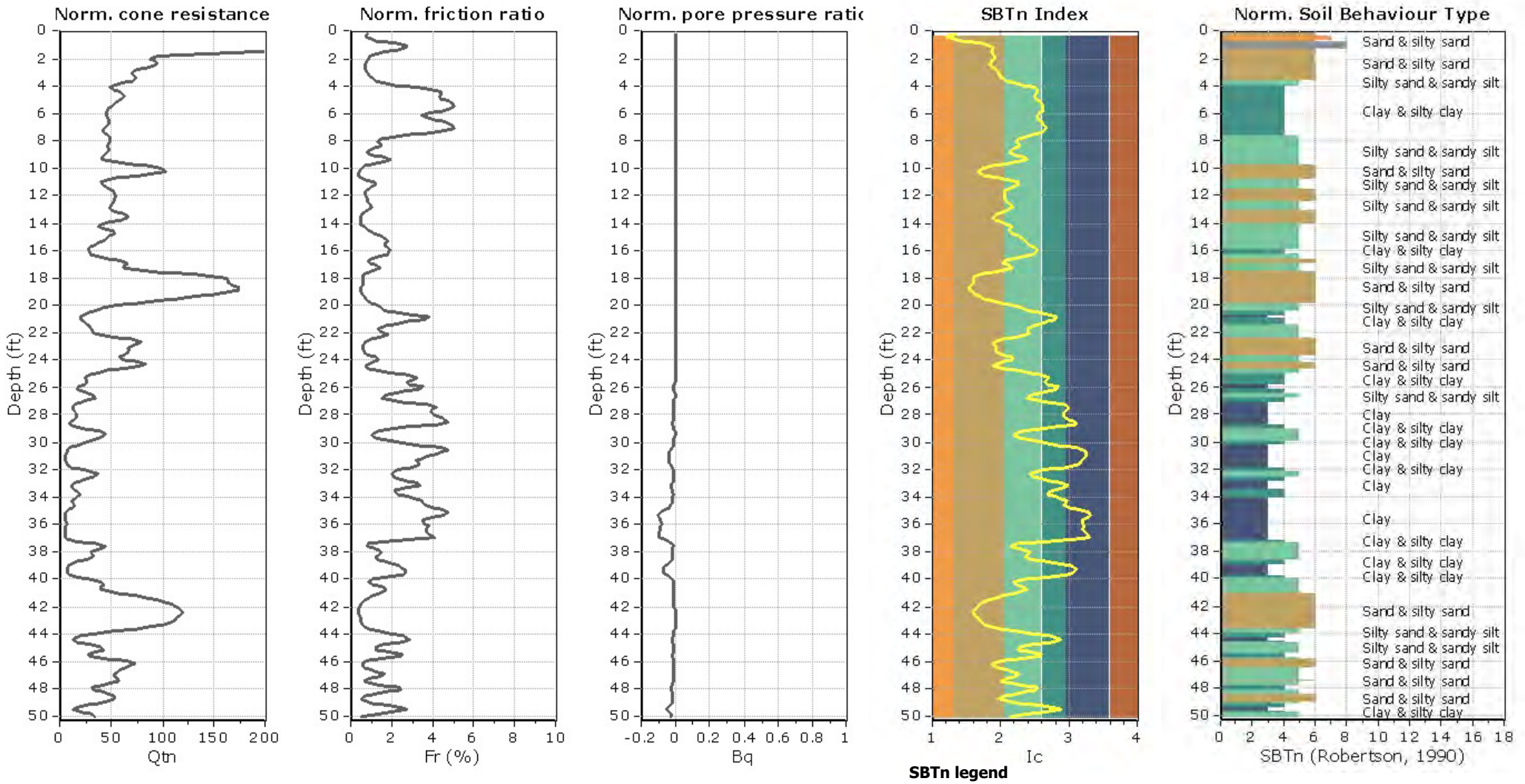
CPT: CPT-5
Total depth: 50.03 ft, Date: 9/30/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Vertek
Cone Operator: Kehoe Testing



NMG Geotechnical
17991 Fitch
Irvine, CA 92614
(949) 442-2442

Project: **Toll Bros./Lake Forest Nursery**
Location: **Lake Forest, CA**

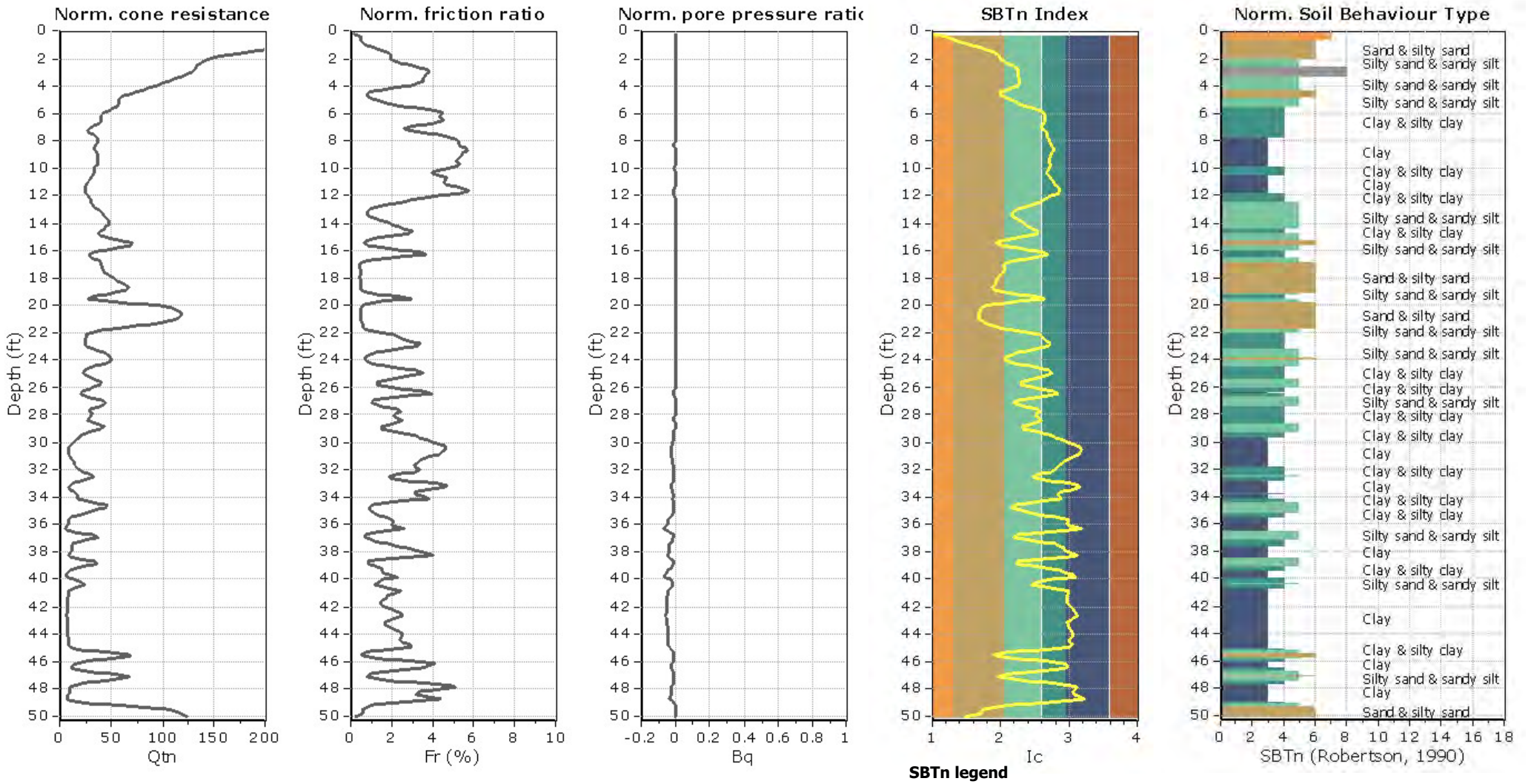
CPT: CPT-6
Total depth: 50.03 ft, Date: 9/30/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Vertek
Cone Operator: Kehoe Testing



NMG Geotechnical
17991 Fitch
Irvine, CA 92614
(949) 442-2442

Project: **Toll Bros./Lake Forest Nursery**
Location: **Lake Forest, CA**

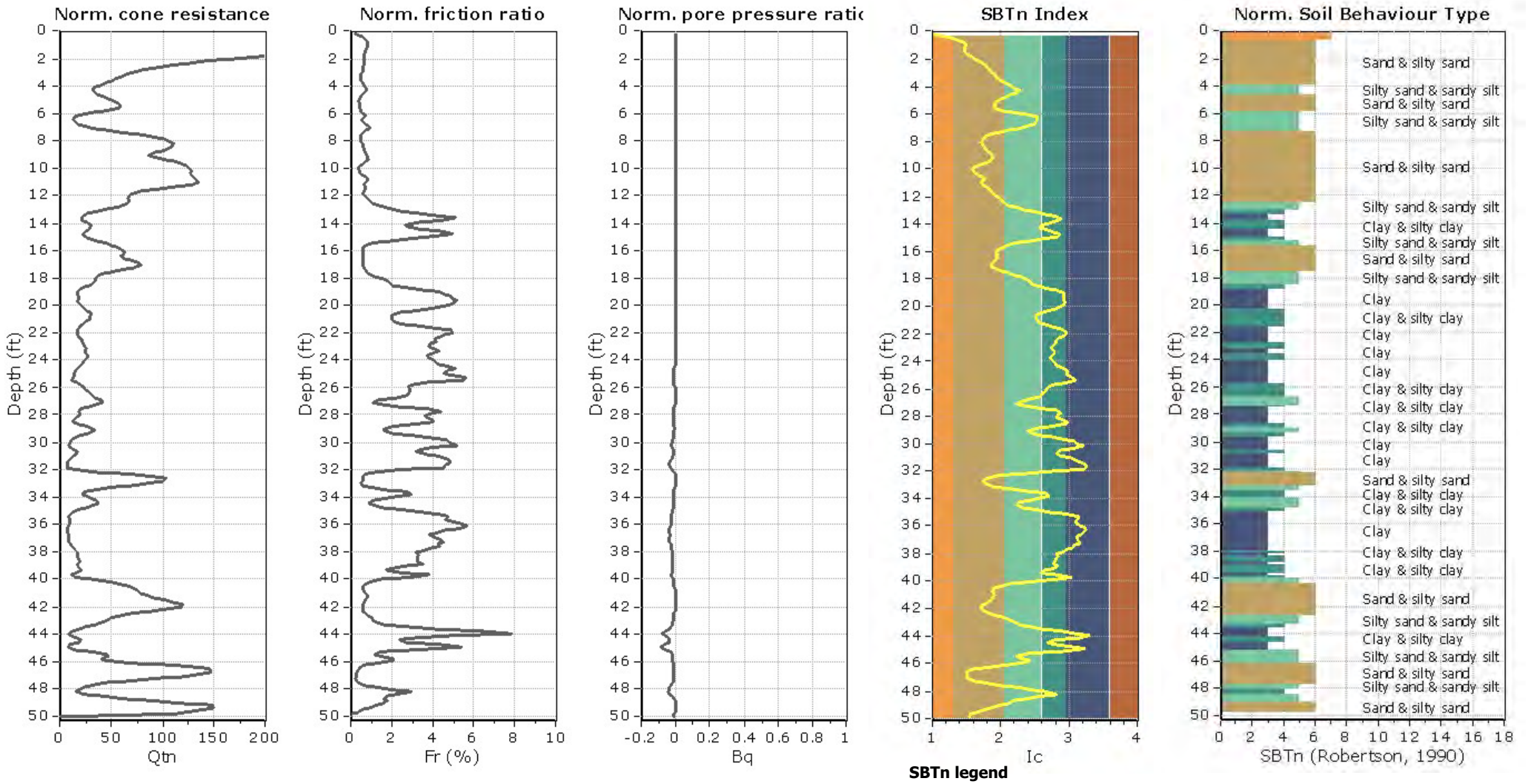
CPT: CPT-7
Total depth: 50.03 ft, Date: 9/30/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Vertek
Cone Operator: Kehoe Testing



NMG Geotechnical
17991 Fitch
Irvine, CA 92614
(949) 442-2442

Project: **Toll Bros./Lake Forest Nursery**
Location: **Lake Forest, CA**

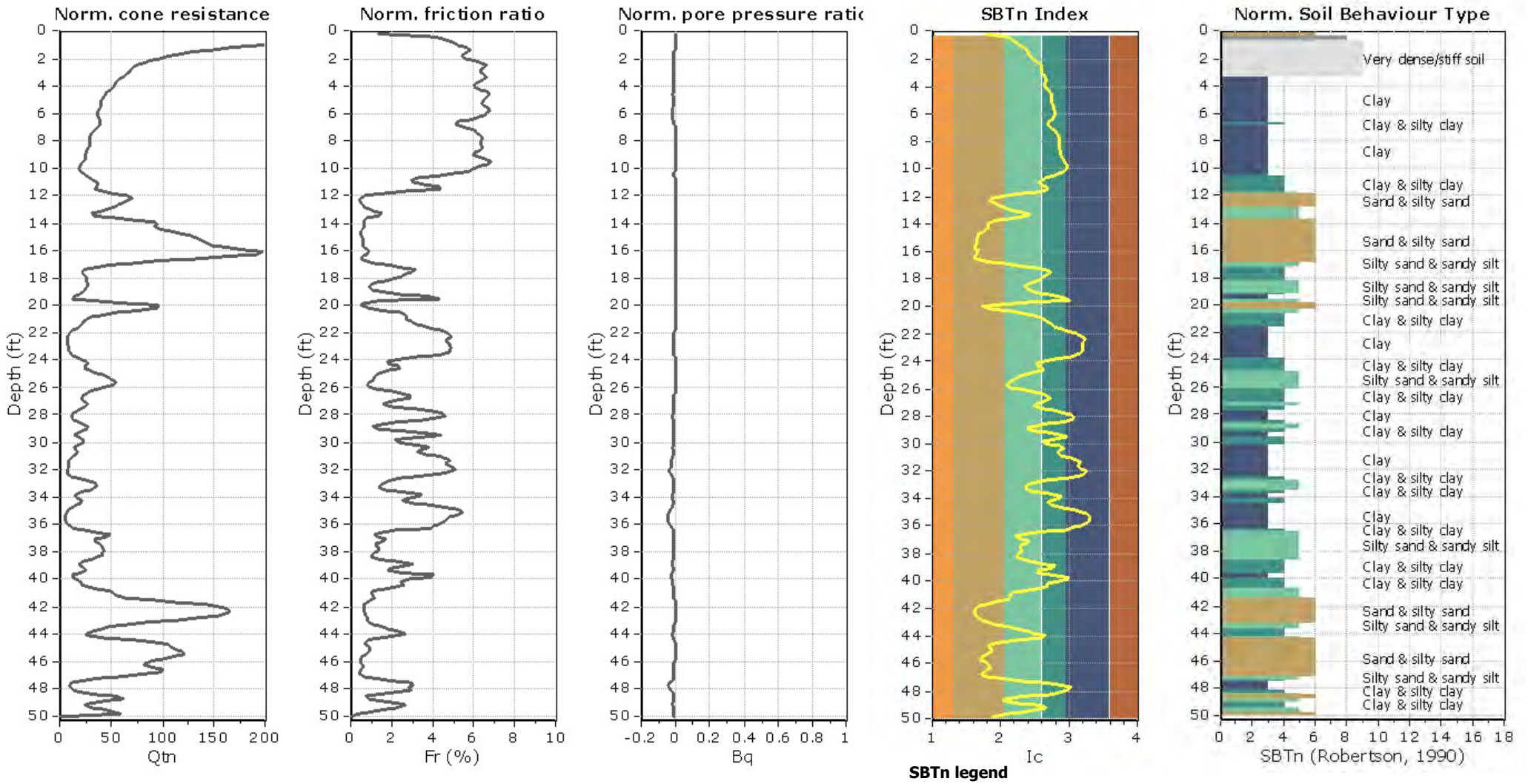
CPT: CPT-8
Total depth: 50.03 ft, Date: 9/30/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Vertek
Cone Operator: Kehoe Testing



NMG Geotechnical
17991 Fitch
Irvine, CA 92614
(949) 442-2442

Project: **Toll Bros./Lake Forest Nursery**
Location: **Lake Forest, CA**

CPT: CPT-9
Total depth: 50.03 ft, Date: 9/30/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Vertek
Cone Operator: Kehoe Testing



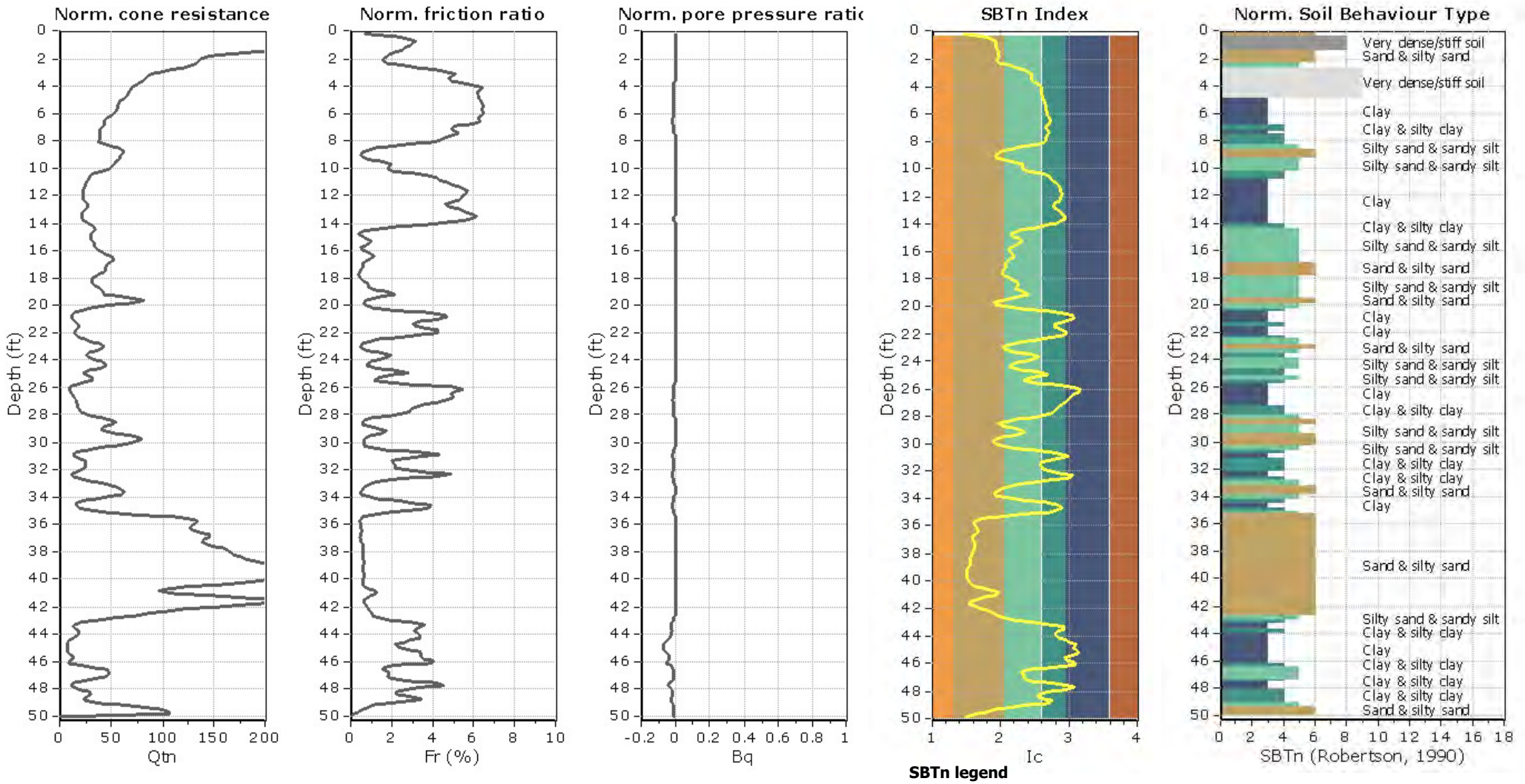
SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

NMG Geotechnical
17991 Fitch
Irvine, CA 92614
(949) 442-2442

CPT: CPT-10
Total depth: 50.03 ft, Date: 9/30/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Vertek
Cone Operator: Kehoe Testing

Project: **Toll Bros./Lake Forest Nursery**
Location: **Lake Forest, CA**



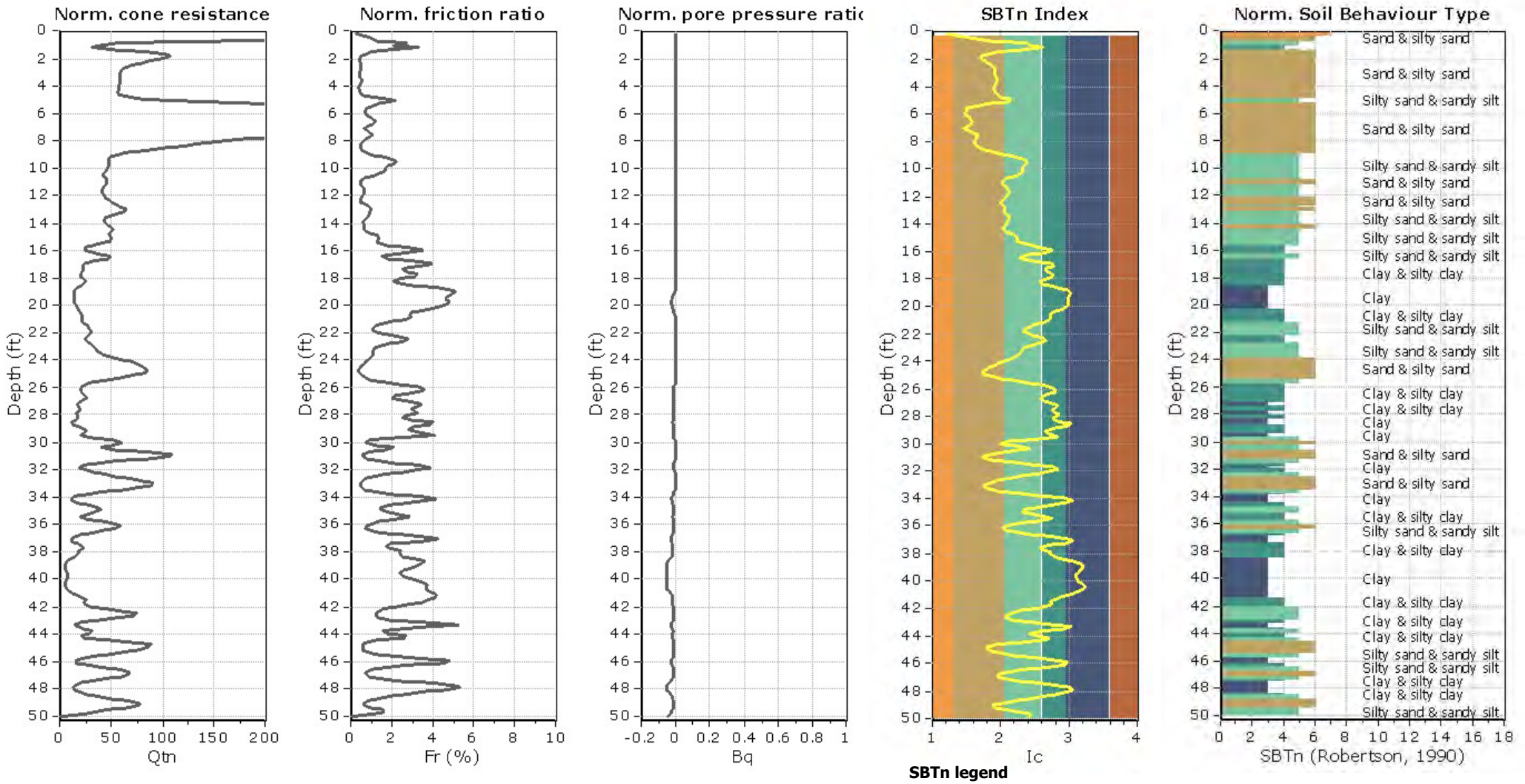
SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

NMG Geotechnical
17991 Fitch
Irvine, CA 92614
(949) 442-2442

Project: **Toll Bros./Lake Forest Nursery**
Location: **Lake Forest, CA**

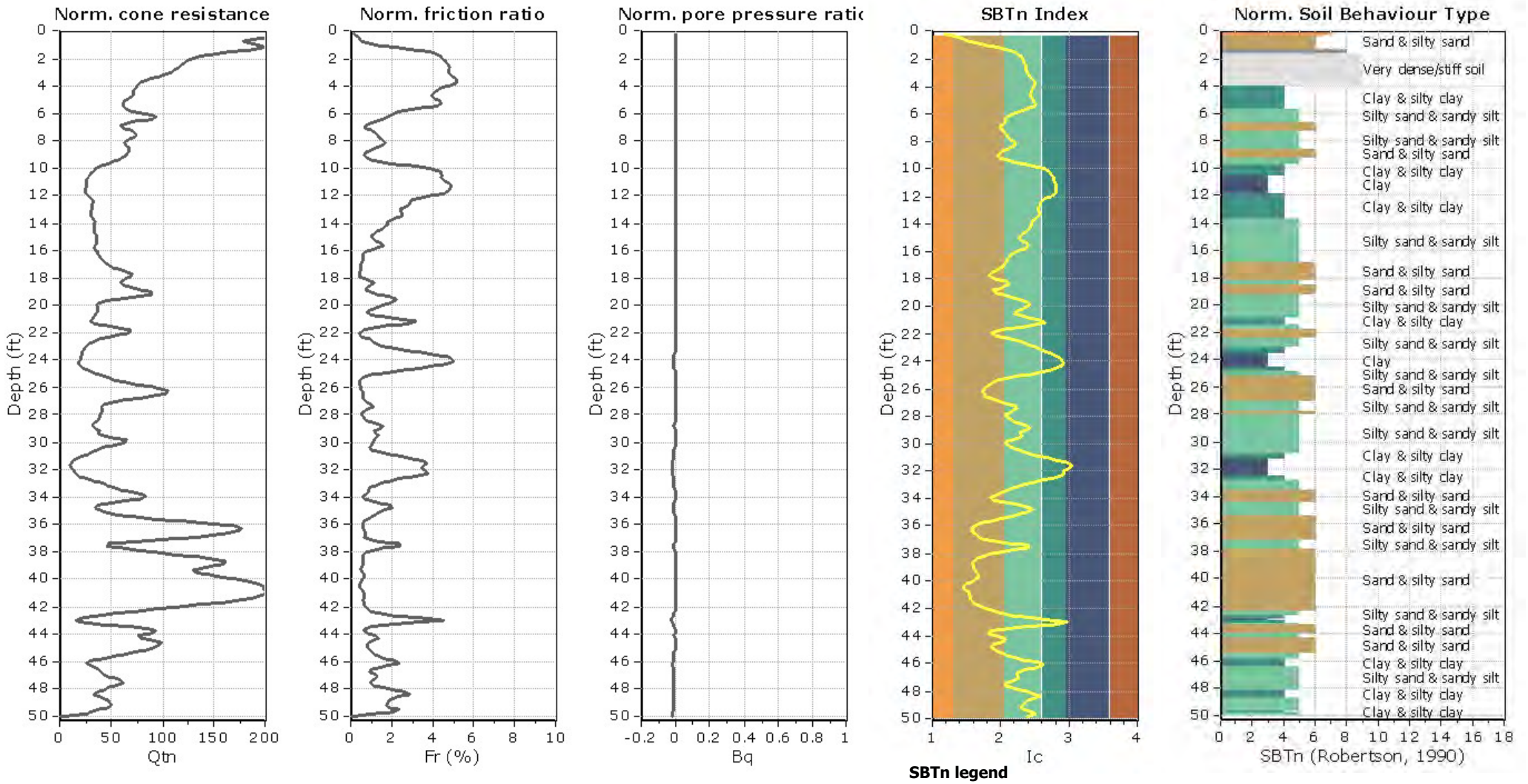
CPT: CPT-11
Total depth: 50.03 ft, Date: 9/30/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Vertek
Cone Operator: Kehoe Testing



NMG Geotechnical
17991 Fitch
Irvine, CA 92614
(949) 442-2442

Project: **Toll Bros./Lake Forest Nursery**
Location: **Lake Forest, CA**

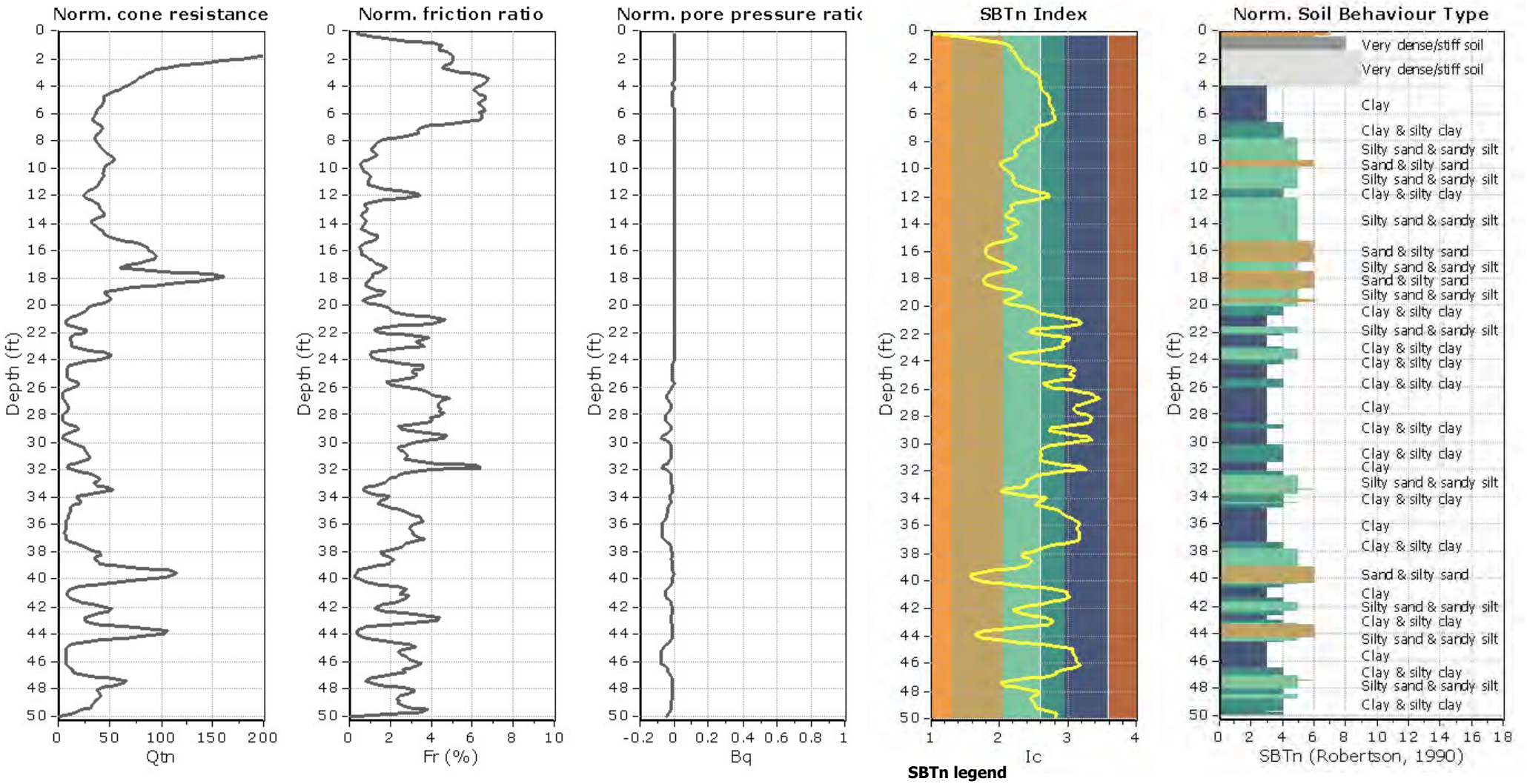
CPT: CPT-12
Total depth: 50.03 ft, Date: 9/30/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Vertek
Cone Operator: Kehoe Testing



NMG Geotechnical
17991 Fitch
Irvine, CA 92614
(949) 442-2442

Project: **Toll Bros./Lake Forest Nursery**
Location: **Lake Forest, CA**

CPT: CPT-13
Total depth: 50.03 ft, Date: 9/30/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Vertek
Cone Operator: Kehoe Testing



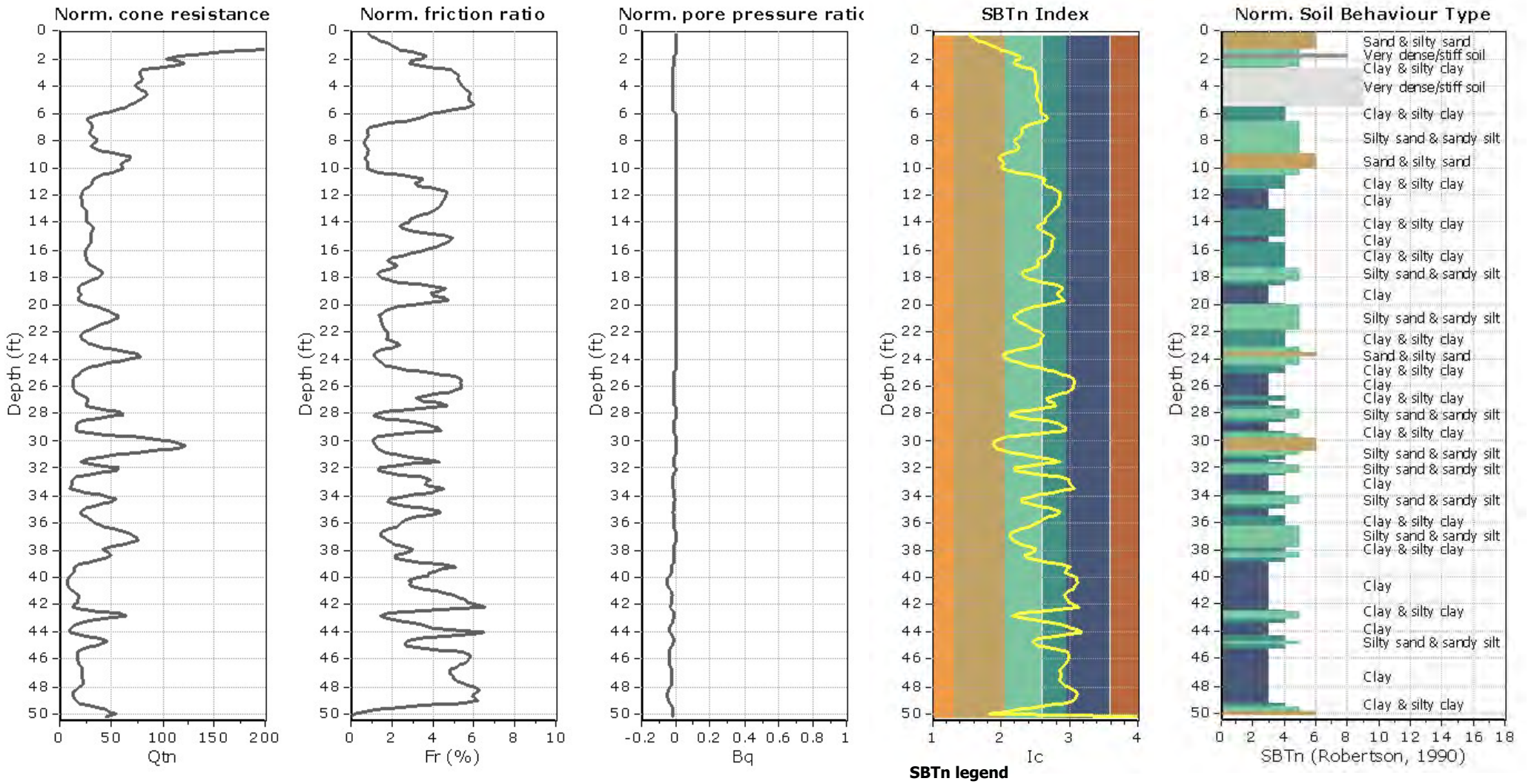
SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

NMG Geotechnical
17991 Fitch
Irvine, CA 92614
(949) 442-2442

CPT: CPT-14
Total depth: 50.20 ft, Date: 9/30/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Vertek
Cone Operator: Kehoe Testing

Project: **Toll Bros./Lake Forest Nursery**
Location: **Lake Forest, CA**



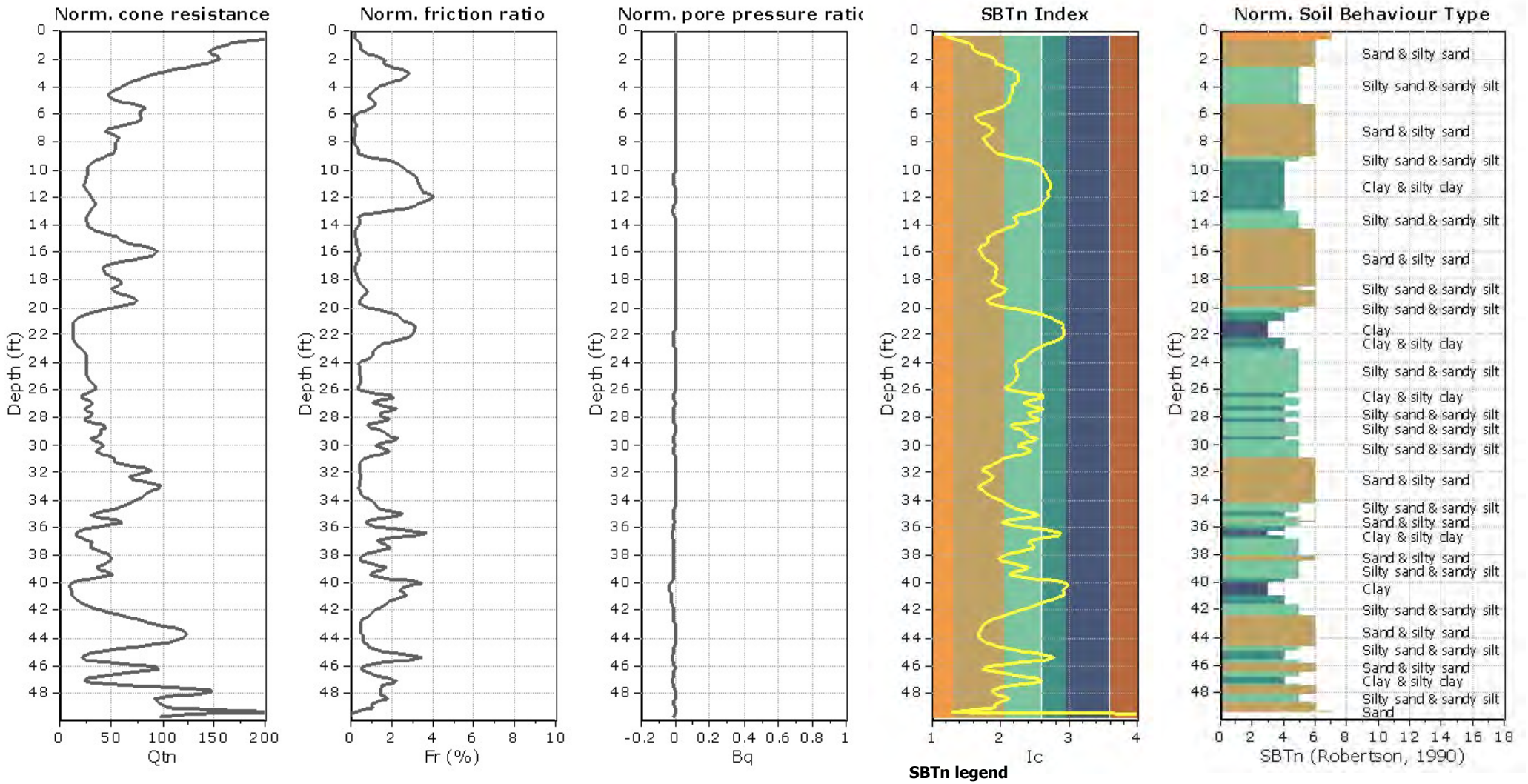
SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

NMG Geotechnical
17991 Fitch
Irvine, CA 92614
(949) 442-2442

Project: **Toll Bros./Lake Forest Nursery**
Location: **Lake Forest, CA**

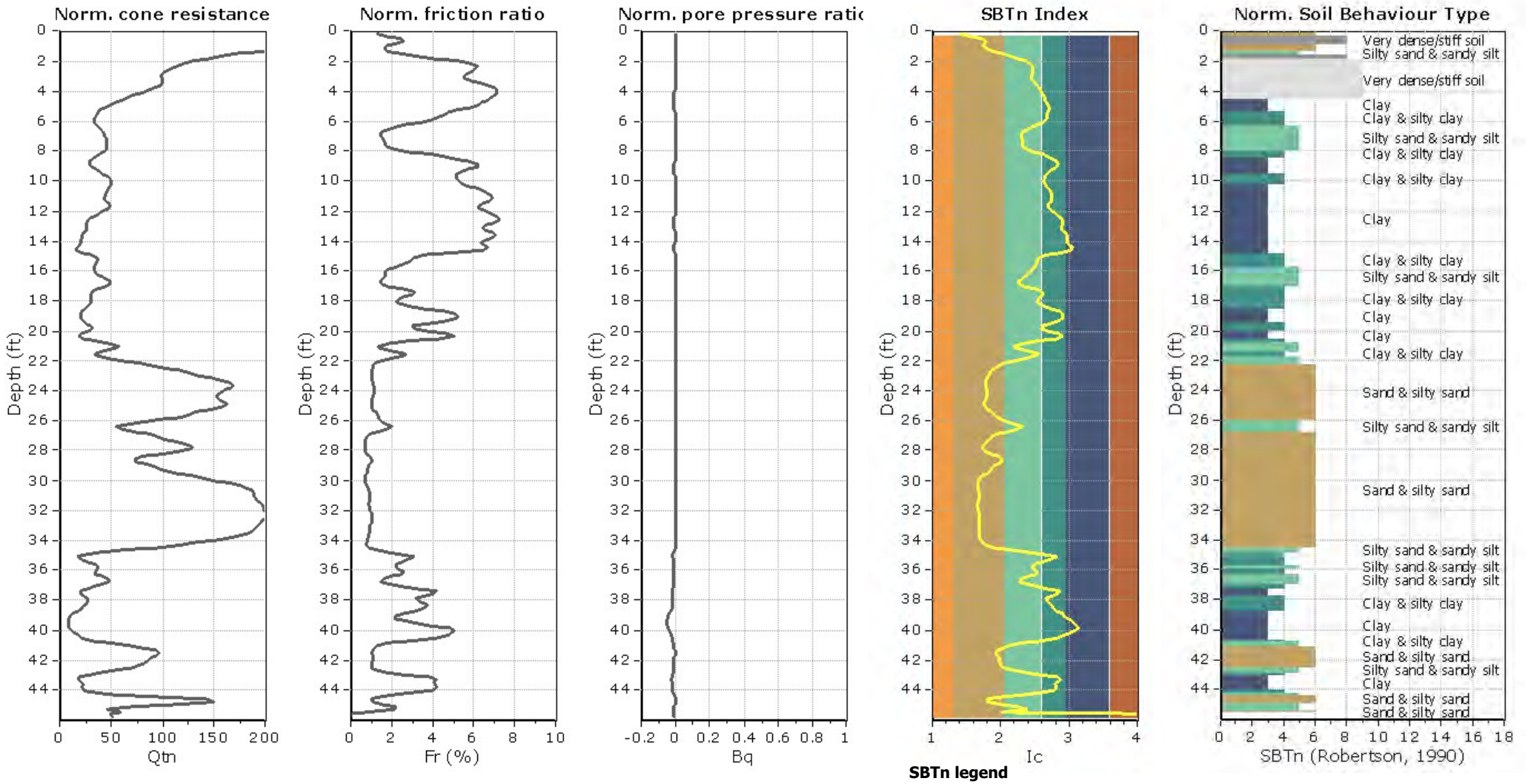
CPT: CPT-15
Total depth: 49.70 ft, Date: 9/30/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Vertek
Cone Operator: Kehoe Testing



NMG Geotechnical
17991 Fitch
Irvine, CA 92614
(949) 442-2442

Project: **Toll Bros./Lake Forest Nursery**
Location: **Lake Forest, CA**

CPT: CPT-16
Total depth: 45.77 ft, Date: 9/30/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Vertek
Cone Operator: Kehoe Testing



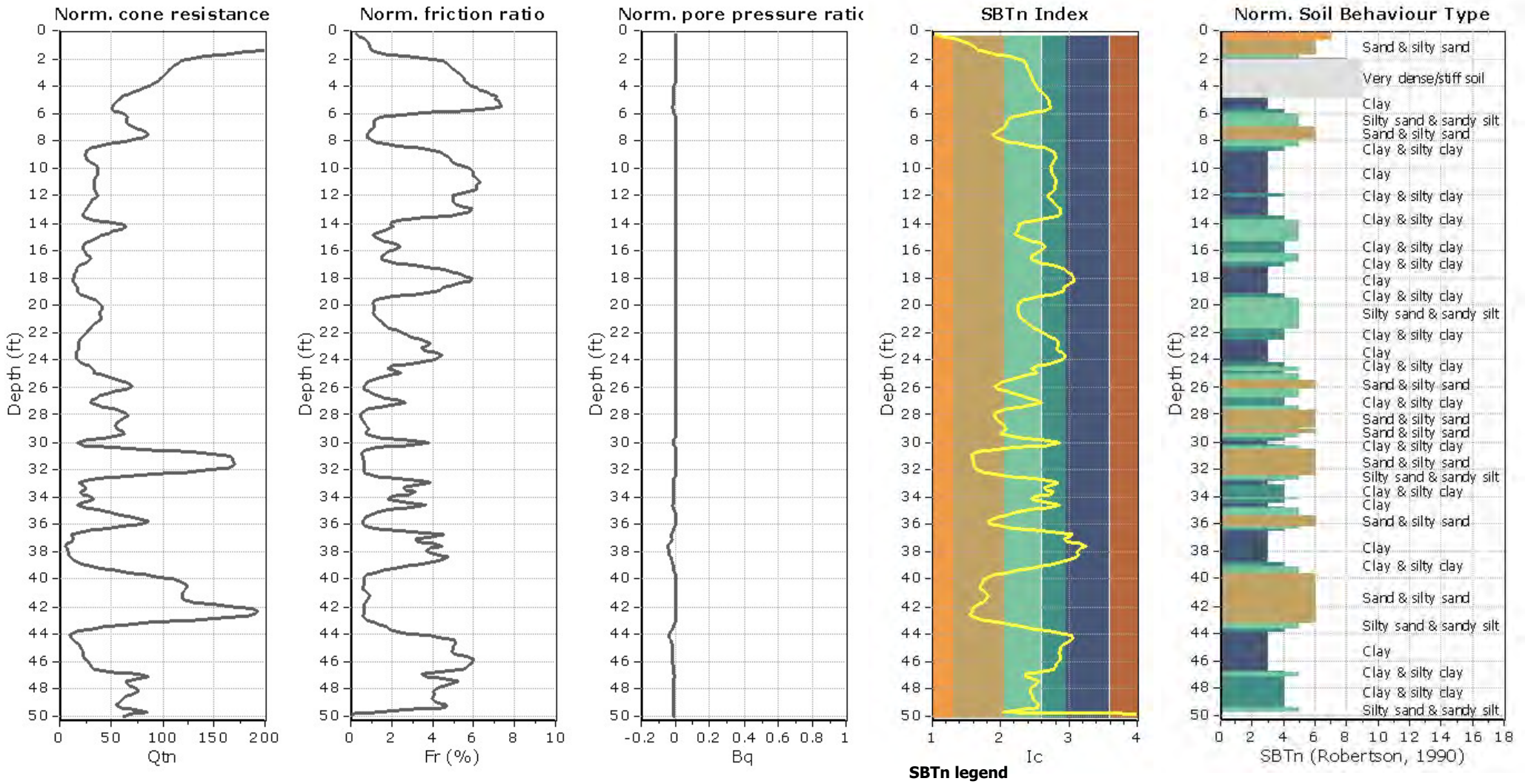
SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

NMG Geotechnical
17991 Fitch
Irvine, CA 92614
(949) 442-2442

Project: **Toll Bros./Lake Forest Nursery**
Location: **Lake Forest, CA**

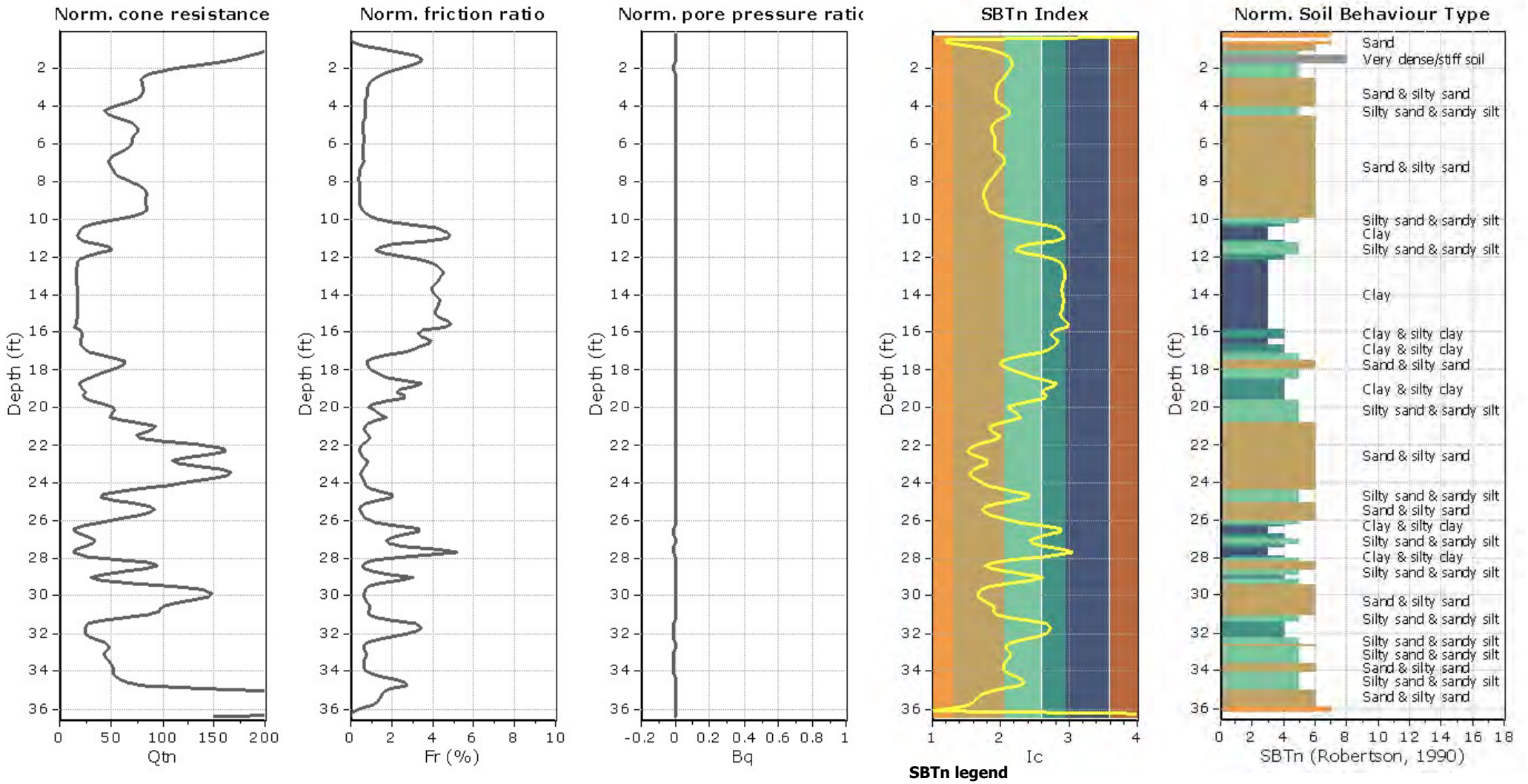
CPT: CPT-17
Total depth: 50.03 ft, Date: 9/30/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Vertek
Cone Operator: Kehoe Testing



NMG Geotechnical
17991 Fitch
Irvine, CA 92614
(949) 442-2442

Project: **Toll Bros./Lake Forest Nursery**
Location: **Lake Forest, CA**

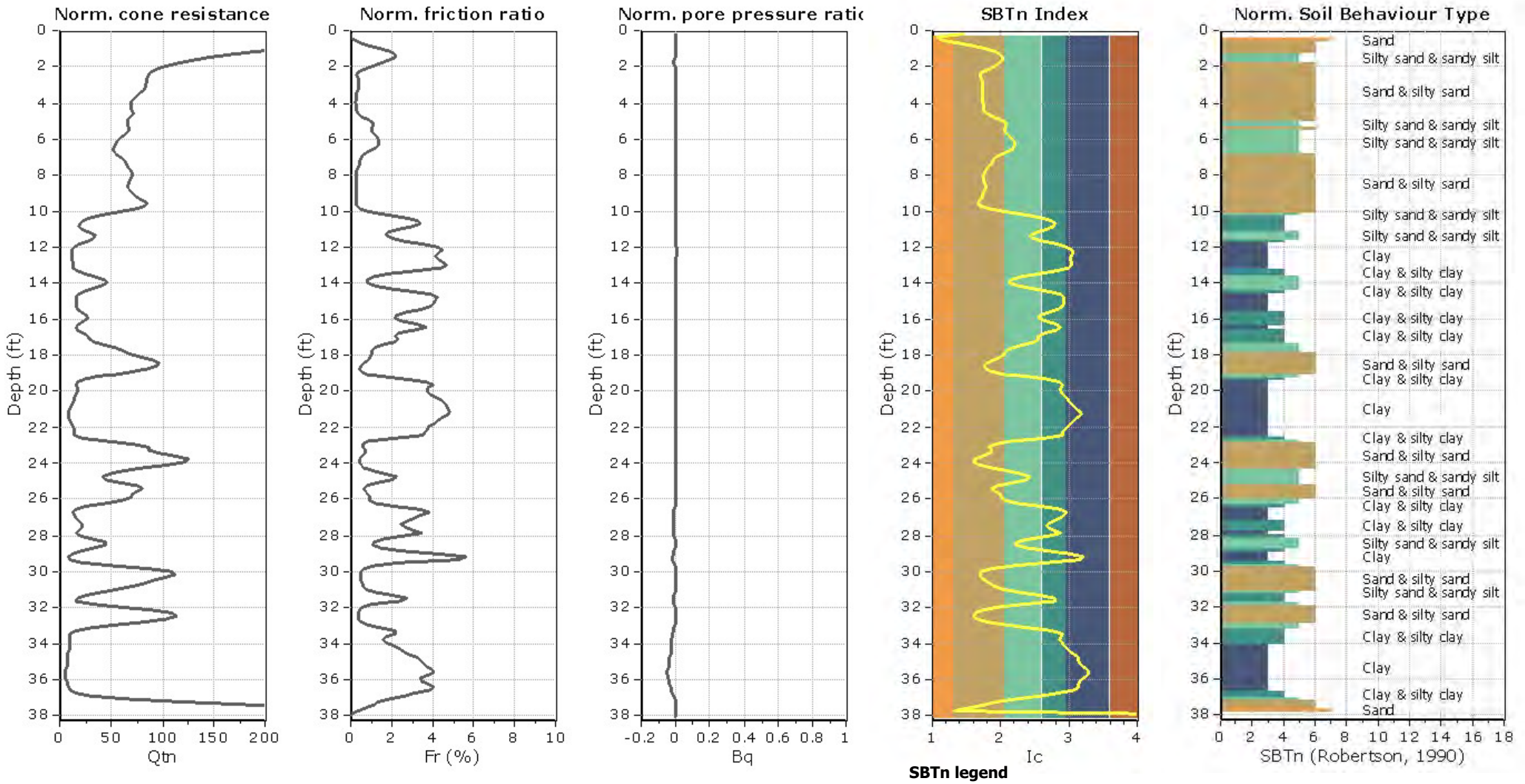
CPT: CPT-18
Total depth: 36.42 ft, Date: 9/30/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Vertek
Cone Operator: Kehoe Testing



NMG Geotechnical
17991 Fitch
Irvine, CA 92614
(949) 442-2442

CPT: CPT-18B
Total depth: 38.06 ft, Date: 9/30/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Vertek
Cone Operator: Kehoe Testing

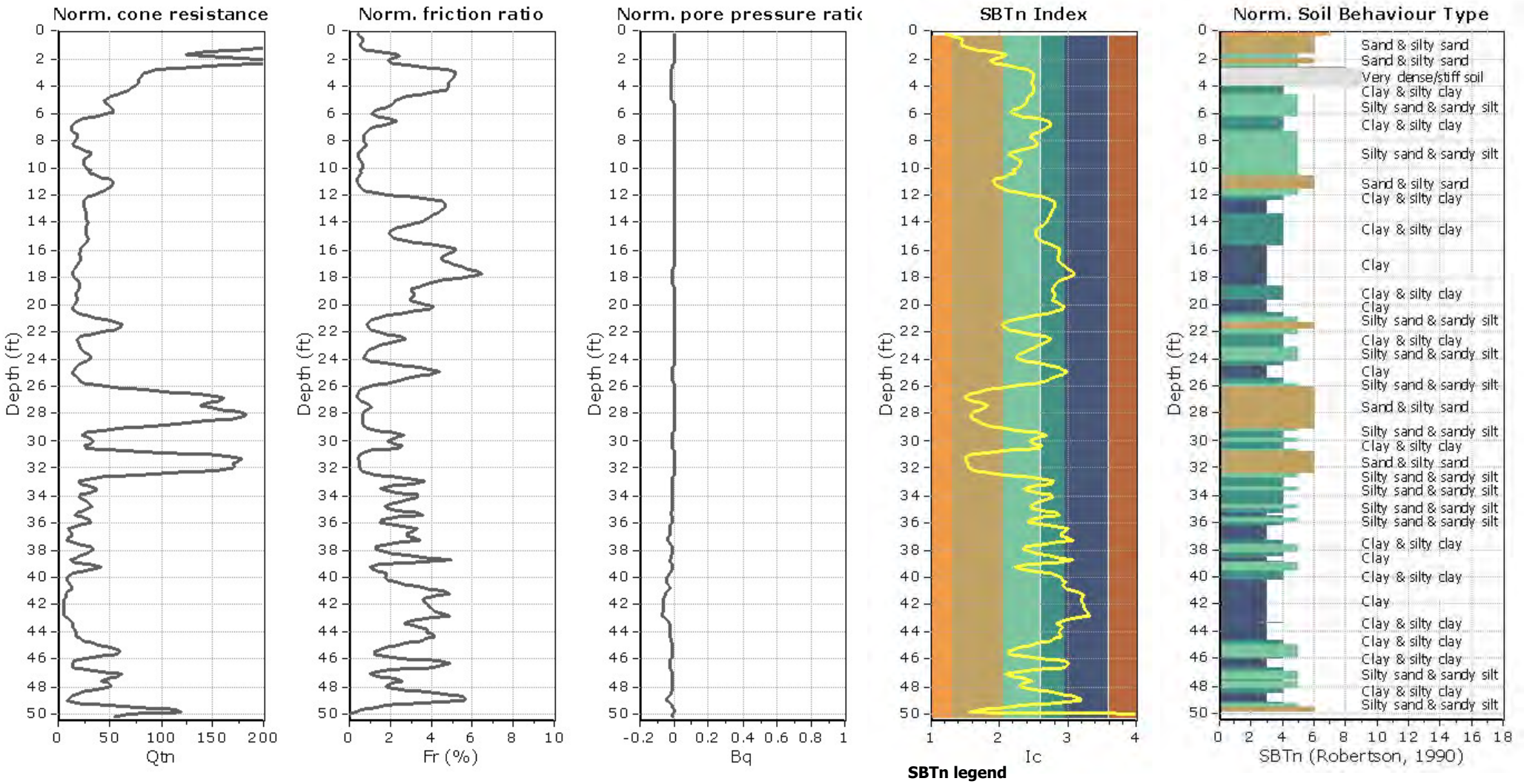
Project: **Toll Bros./Lake Forest Nursery**
Location: **Lake Forest, CA**



NMG Geotechnical
17991 Fitch
Irvine, CA 92614
(949) 442-2442

Project: **Toll Bros./Lake Forest Nursery**
Location: **Lake Forest, CA**

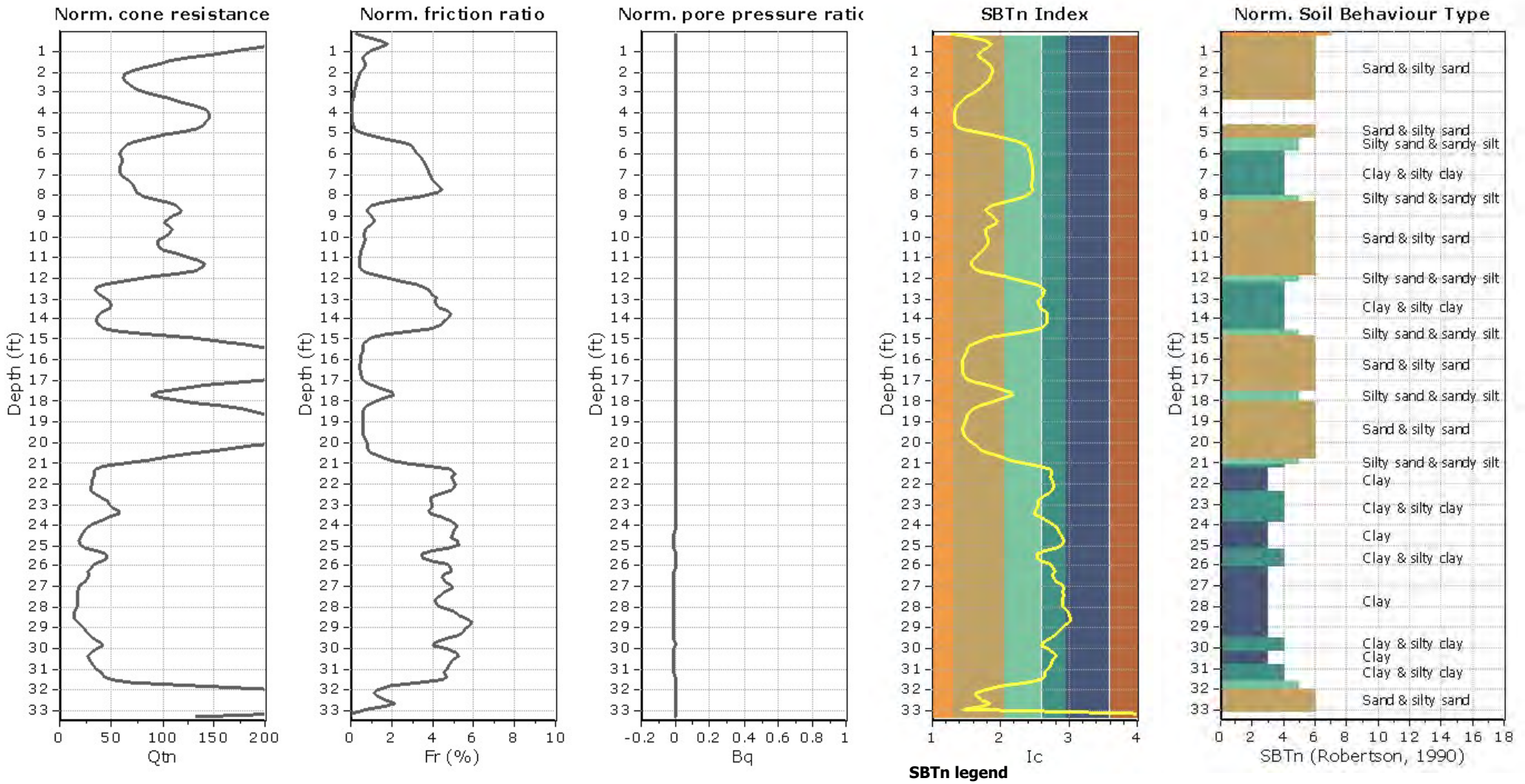
CPT: CPT-19
Total depth: 50.20 ft, Date: 9/30/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Vertek
Cone Operator: Kehoe Testing



NMG Geotechnical
17991 Fitch
Irvine, CA 92614
(949) 442-2442

Project: **Toll Bros./Lake Forest Nursery**
Location: **Lake Forest, CA**

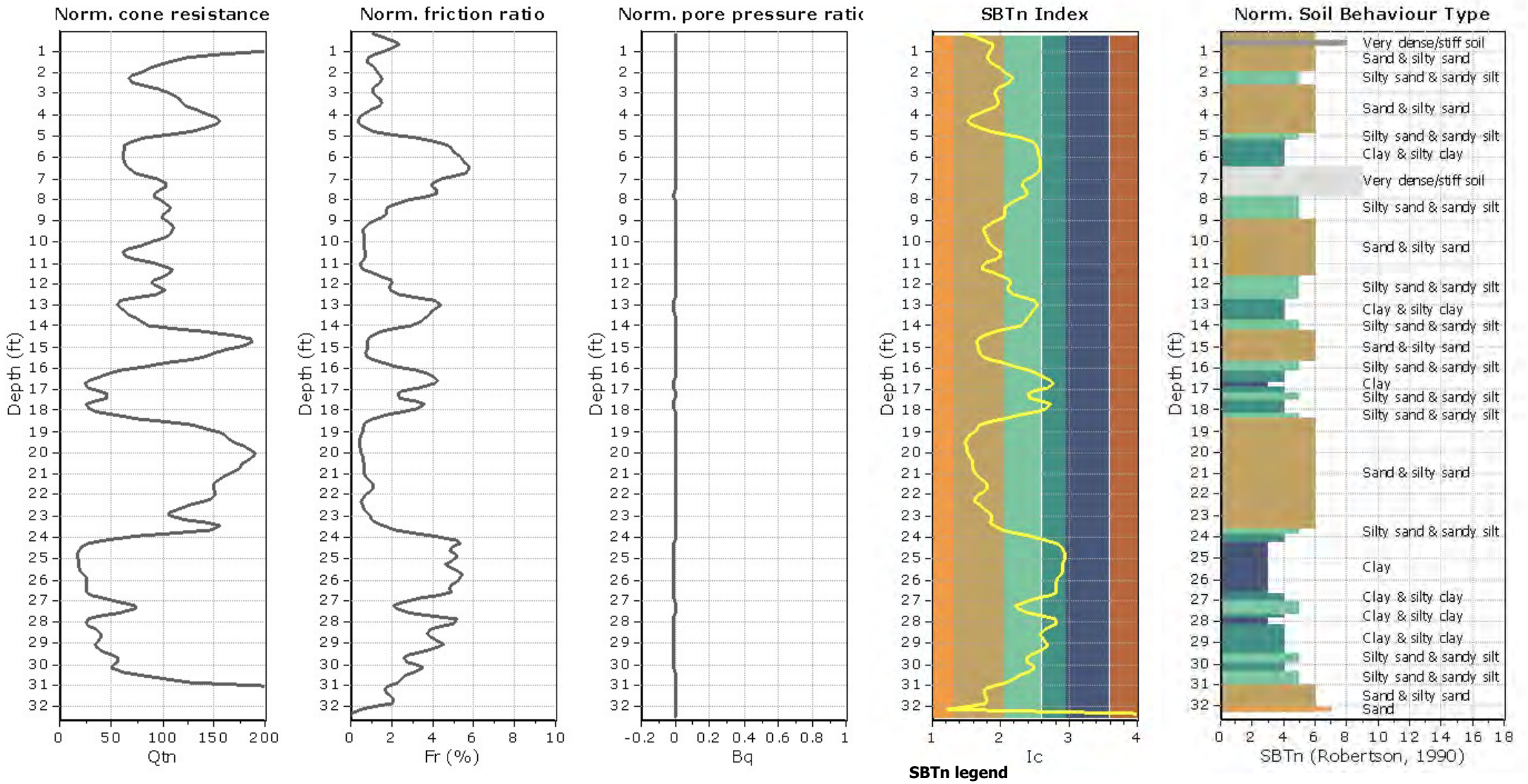
CPT: CPT-20
Total depth: 33.30 ft, Date: 9/30/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Vertek
Cone Operator: Kehoe Testing



NMG Geotechnical
17991 Fitch
Irvine, CA 92614
(949) 442-2442

Project: **Toll Bros./Lake Forest Nursery**
Location: **Lake Forest, CA**

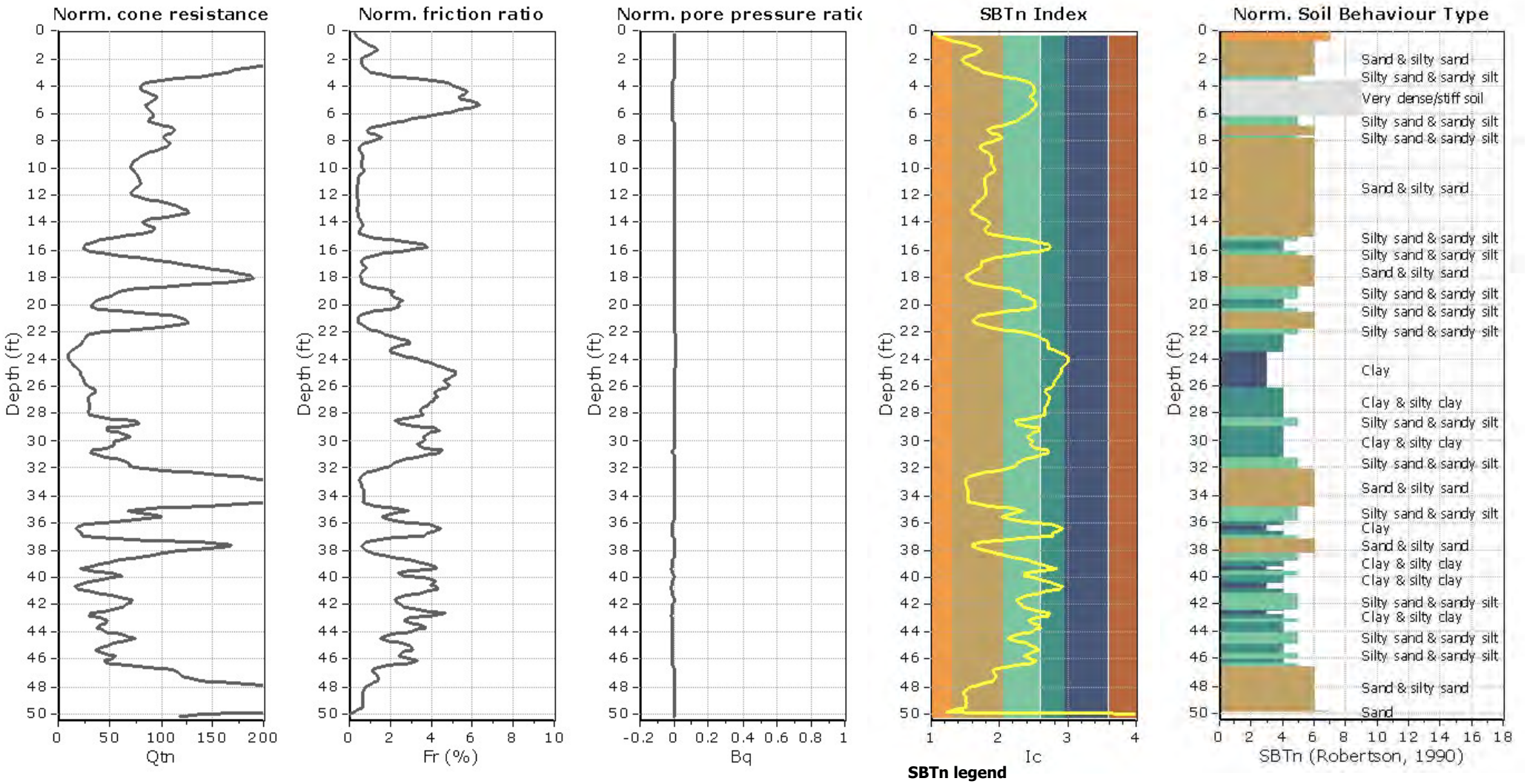
CPT: CPT-20B
Total depth: 32.48 ft, Date: 9/30/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Vertek
Cone Operator: Kehoe Testing



NMG Geotechnical
17991 Fitch
Irvine, CA 92614
(949) 442-2442

Project: **Toll Bros./Lake Forest Nursery**
Location: **Lake Forest, CA**

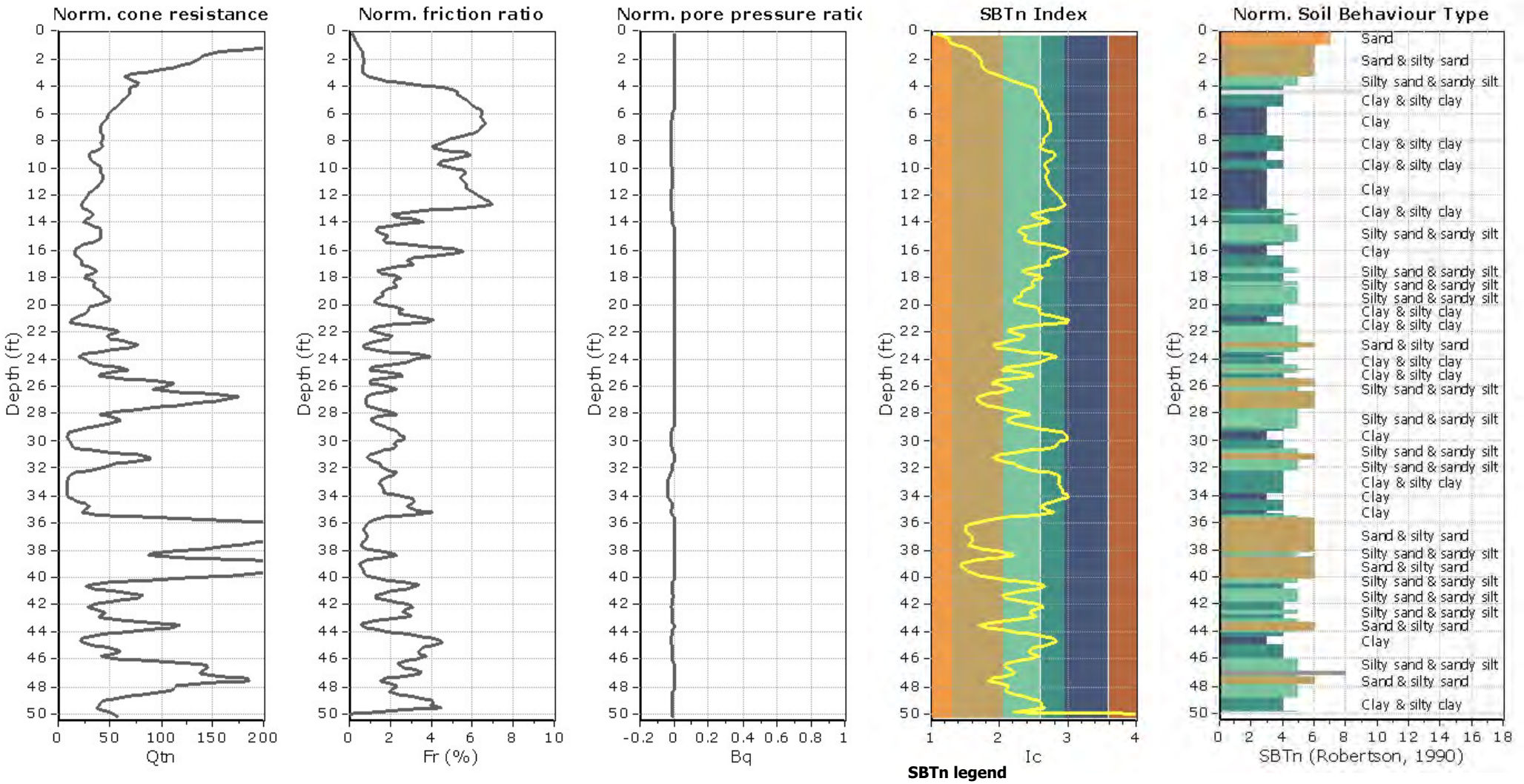
CPT: CPT-21
Total depth: 50.20 ft, Date: 9/30/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Vertek
Cone Operator: Kehoe Testing



NMG Geotechnical
17991 Fitch
Irvine, CA 92614
(949) 442-2442

Project: **Toll Bros./Lake Forest Nursery**
Location: **Lake Forest, CA**

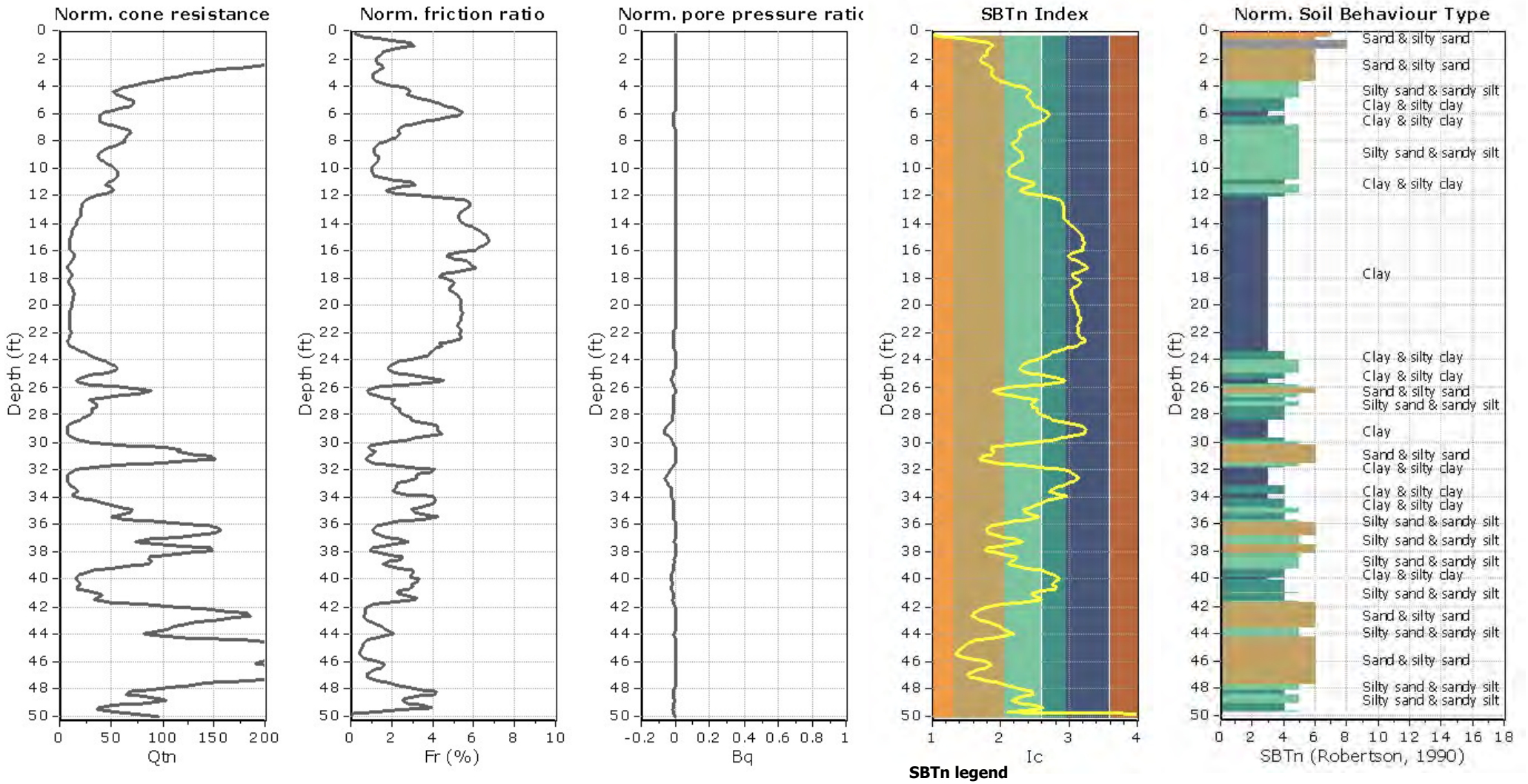
CPT: CPT-22
Total depth: 50.20 ft, Date: 9/30/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Vertek
Cone Operator: Kehoe Testing



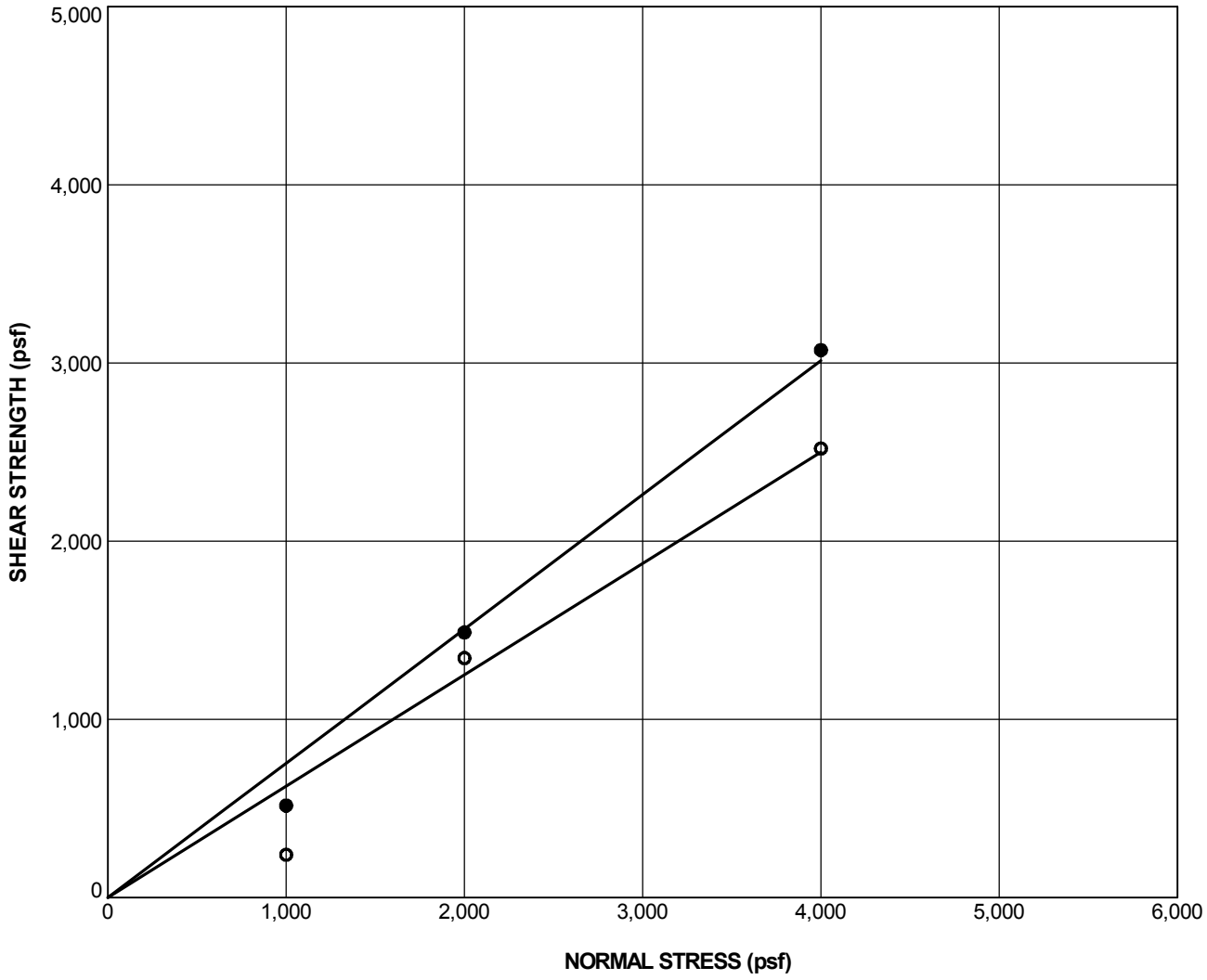
NMG Geotechnical
17991 Fitch
Irvine, CA 92614
(949) 442-2442

Project: **Toll Bros./Lake Forest Nursery**
Location: **Lake Forest, CA**

CPT: CPT-23
Total depth: 50.03 ft, Date: 9/30/2016
Surface Elevation: 0.00 ft
Coords: X:0.00, Y:0.00
Cone Type: Vertek
Cone Operator: Kehoe Testing



APPENDIX C



Boring No. B- 1	Sample No. D-5	Depth: 25.0 ft
Sample Description: (Qal) Gray clayey silty SAND		**USCS:** SM-SC
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:**
Moisture Content (%): 24.9	**Dry Density (pcf):** 106.8	**Degree of Saturation (%):** 100
Sample Type: Undisturbed	**Rate of Shear (in./min.):** 0.005	

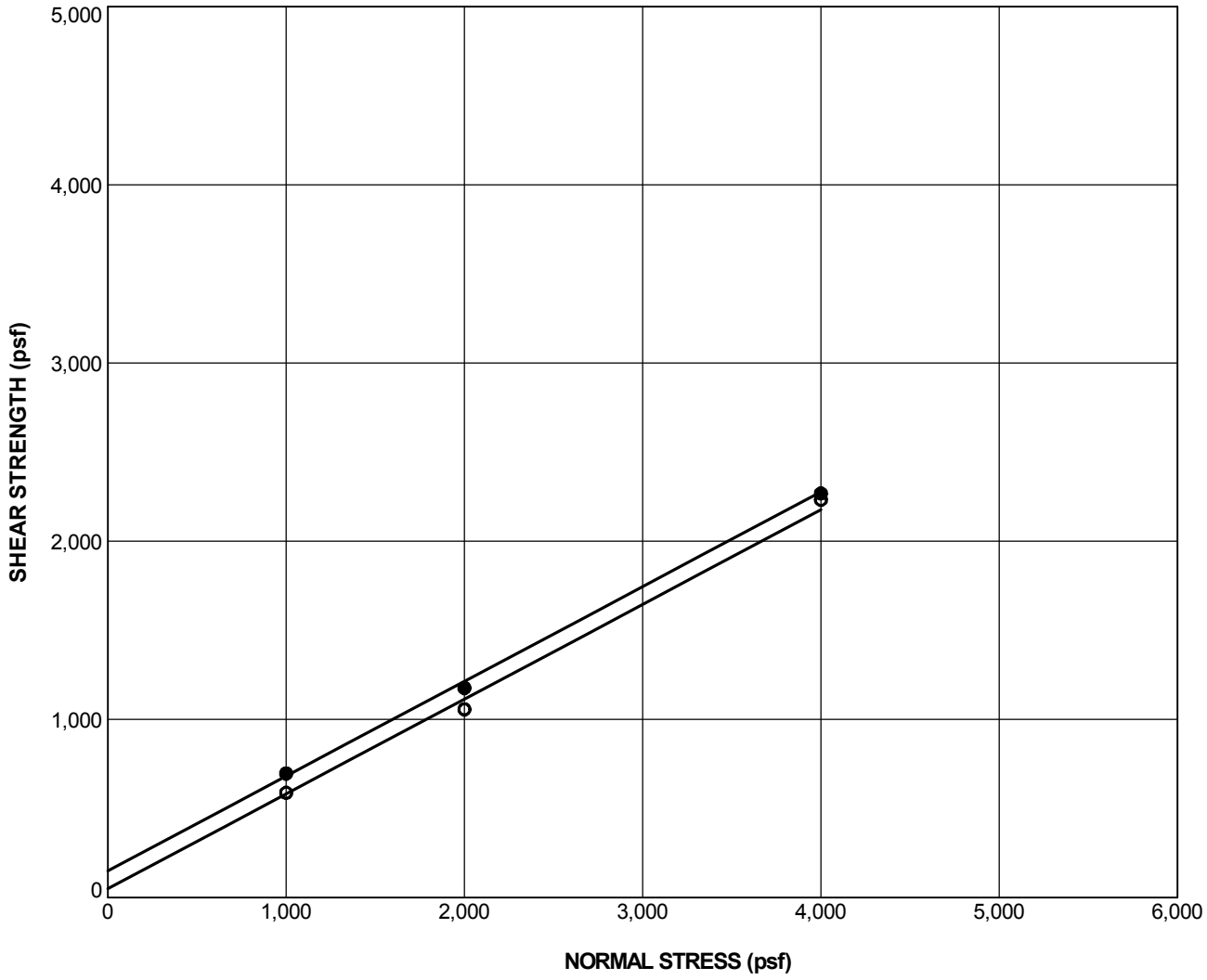
SHEAR STRENGTH PARAMETERS

Parameter	Peak ●	Ultimate ○
Cohesion (psf)	0	0
Friction Angle (degrees)	37.0	32.0

DIRECT SHEAR TEST RESULTS

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG Geotechnical, Inc.



Boring No. B- 2	Sample No. B-1	Depth: 0.0 ft
Sample Description: (Afu) Dark grayish brown clayey SAND		**USCS:** SC
Liquid Limit: 29	**Plasticity Index:** 15	**Percent Passing No. 200 Sieve:** 37
Moisture Content (%): 17.5	**Dry Density (pcf):** 117.4	**Degree of Saturation (%):** 100
Sample Type: Remolded to 91%	**Rate of Shear (in./min.):** 0.005	

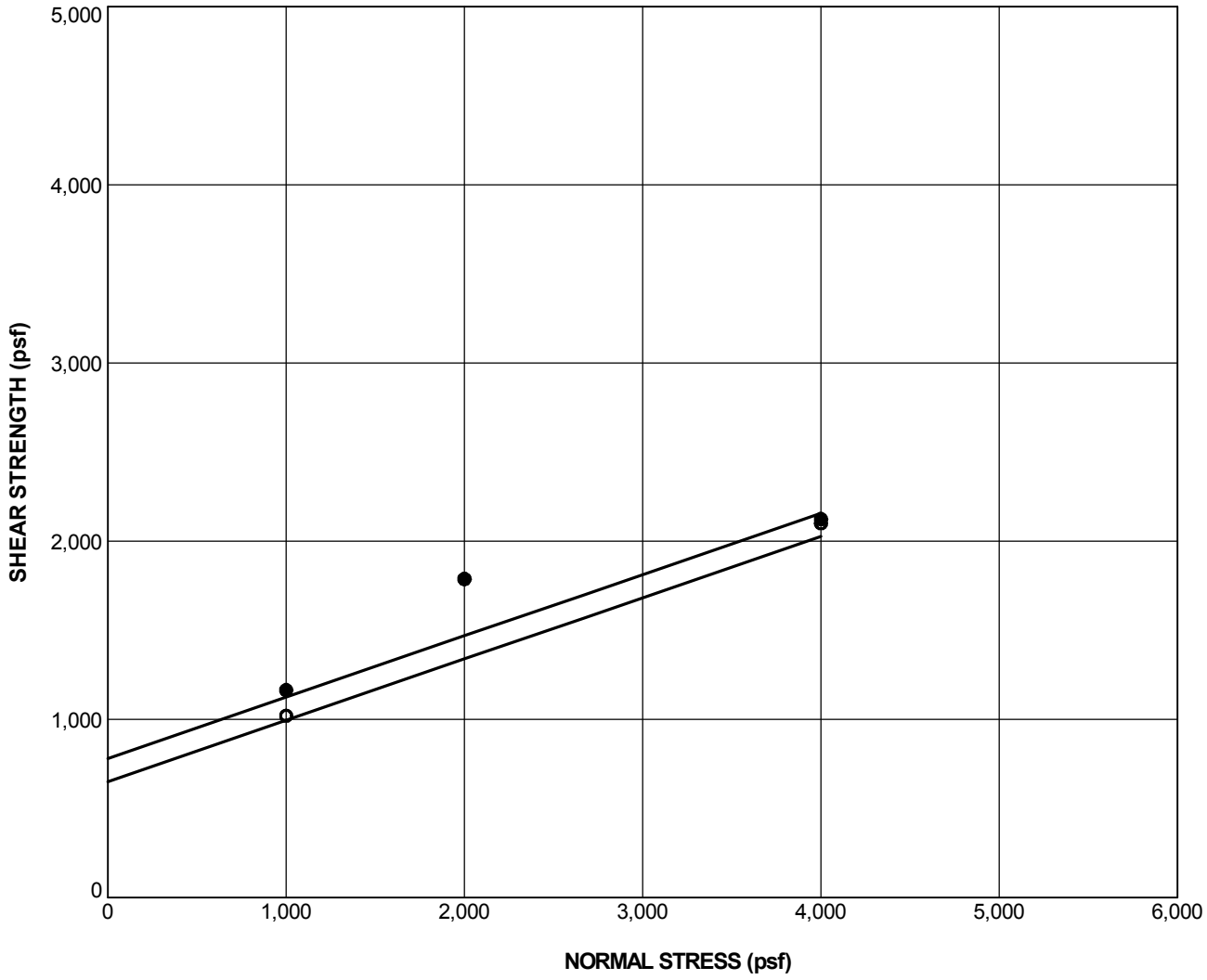
SHEAR STRENGTH PARAMETERS

Parameter	Peak ●	Ultimate ○
Cohesion (psf)	150	50
Friction Angle (degrees)	28.0	28.0

DIRECT SHEAR TEST RESULTS

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG Geotechnical, Inc.



Boring No. B- 3	Sample No. D-3	Depth: 15.0 ft
Sample Description: (Qal) Light brown silty SAND		**USCS:** SM
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:**
Moisture Content (%): 22.4	**Dry Density (pcf):** 104.3	**Degree of Saturation (%):** 98
Sample Type: Undisturbed	**Rate of Shear (in./min.):** 0.005	

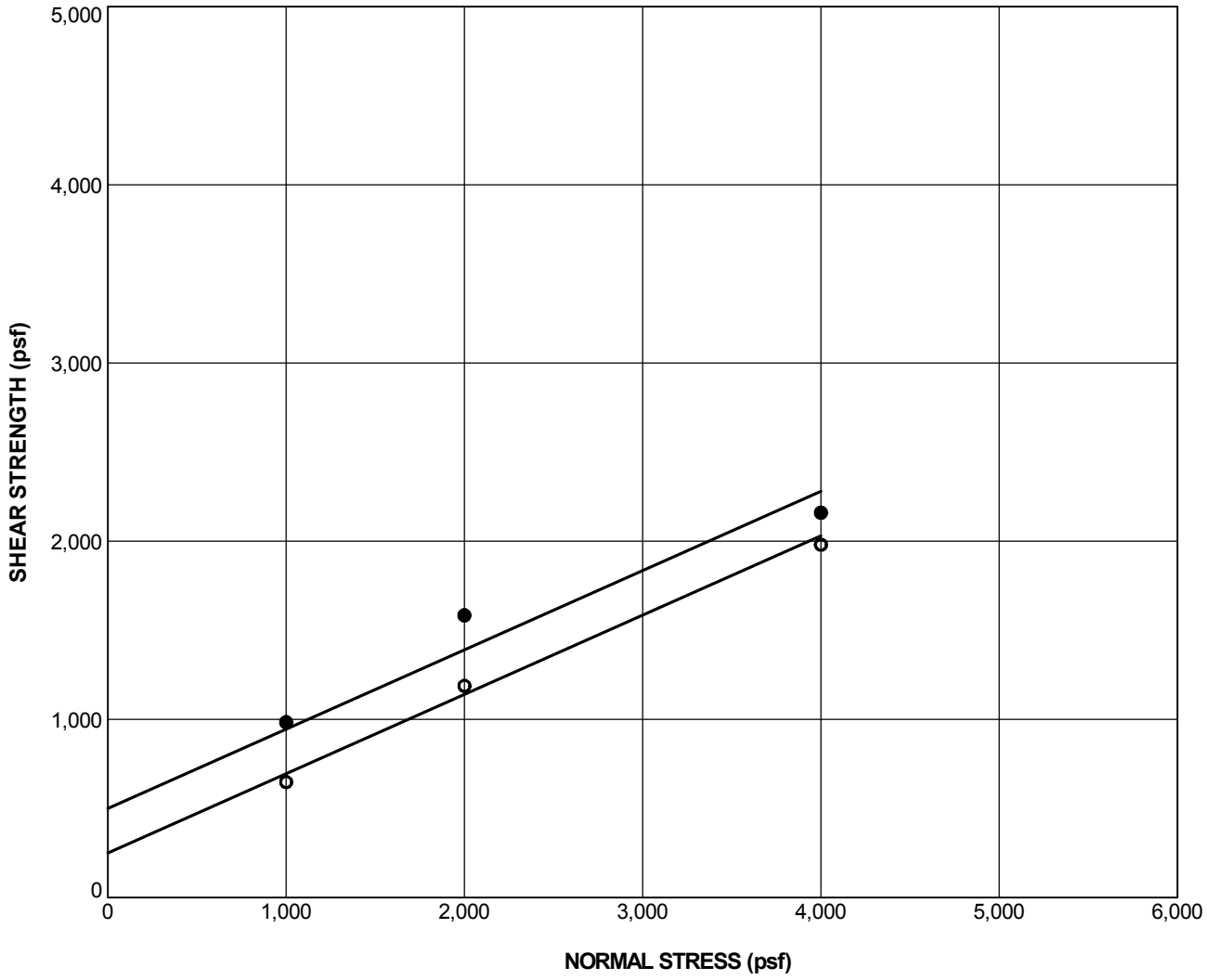
SHEAR STRENGTH PARAMETERS

Parameter	Peak ●	Ultimate ○
Cohesion (psf)	780	650
Friction Angle (degrees)	19.0	19.0

DIRECT SHEAR TEST RESULTS

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG Geotechnical, Inc.



Boring No. B- 5	Sample No. D-2	Depth: 10.0 ft
Sample Description: (Qal) Brown clayey SAND/sandy CLAY		**USCS:** SC-CL
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:**
Moisture Content (%): 24.2	**Dry Density (pcf):** 108.8	**Degree of Saturation (%):** 100
Sample Type: Undisturbed	**Rate of Shear (in./min.):** 0.005	

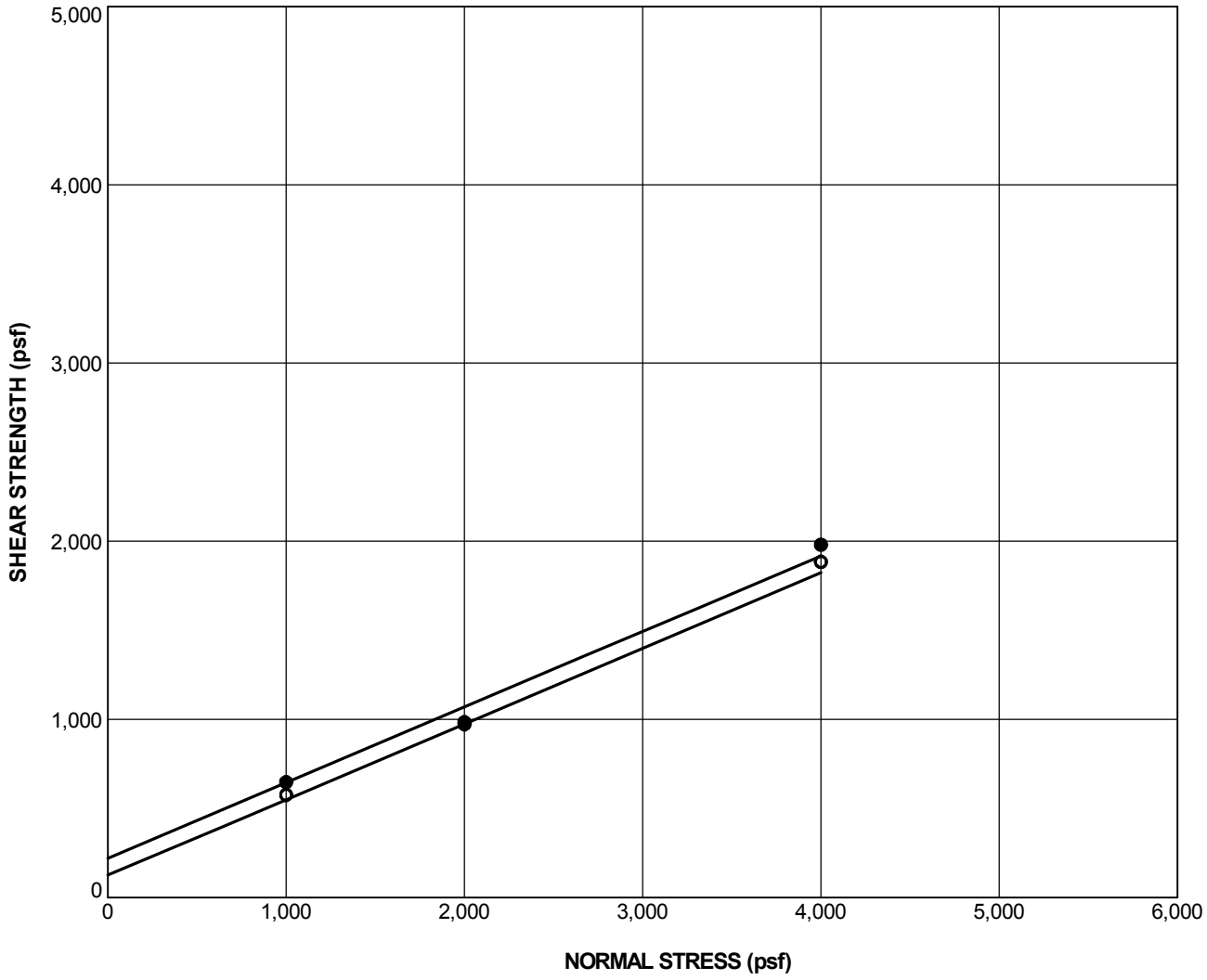
SHEAR STRENGTH PARAMETERS

Parameter	Peak ●	Ultimate ○
Cohesion (psf)	500	250
Friction Angle (degrees)	24.0	24.0

DIRECT SHEAR TEST RESULTS

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG Geotechnical, Inc.



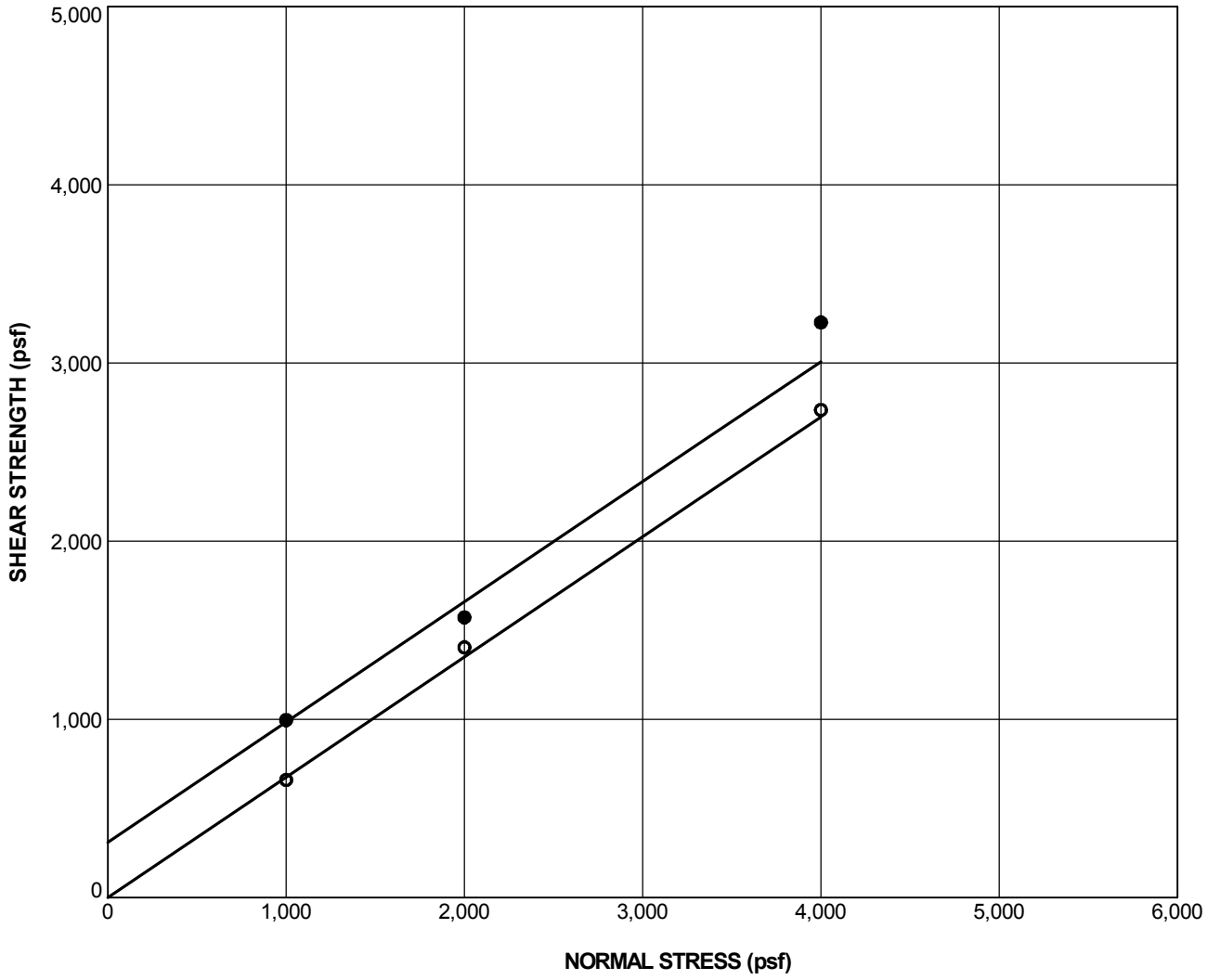
Boring No. B- 5		Sample No. B-2		Depth: 10.1 ft	
Sample Description:	(Qal) Grayish brown sandy CLAY			**USCS:**	CL
Liquid Limit:	33	**Plasticity Index:**	21	**Percent Passing No. 200 Sieve:**	52
Moisture Content (%):	17.7	**Dry Density (pcf):**	116.9	**Degree of Saturation (%):**	100
Sample Type:	Remolded to 91%	**Rate of Shear (in./min.):**	0.005		

SHEAR STRENGTH PARAMETERS		
Parameter	**Peak ●**	**Ultimate ○**
Cohesion (psf)	220	125
Friction Angle (degrees)	23.0	23.0

DIRECT SHEAR TEST RESULTS

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG Geotechnical, Inc.



Boring No. B- 6	Sample No. B-1	Depth: 0.0 ft
Sample Description: (Afu) Brown gray clayey SAND		**USCS:** SC
Liquid Limit: 33	**Plasticity Index:** 18	**Percent Passing No. 200 Sieve:** 49
Moisture Content (%): 18.0	**Dry Density (pcf):** 116.0	**Degree of Saturation (%):** 100
Sample Type: Remolded to 91%	**Rate of Shear (in./min.):** 0.005	

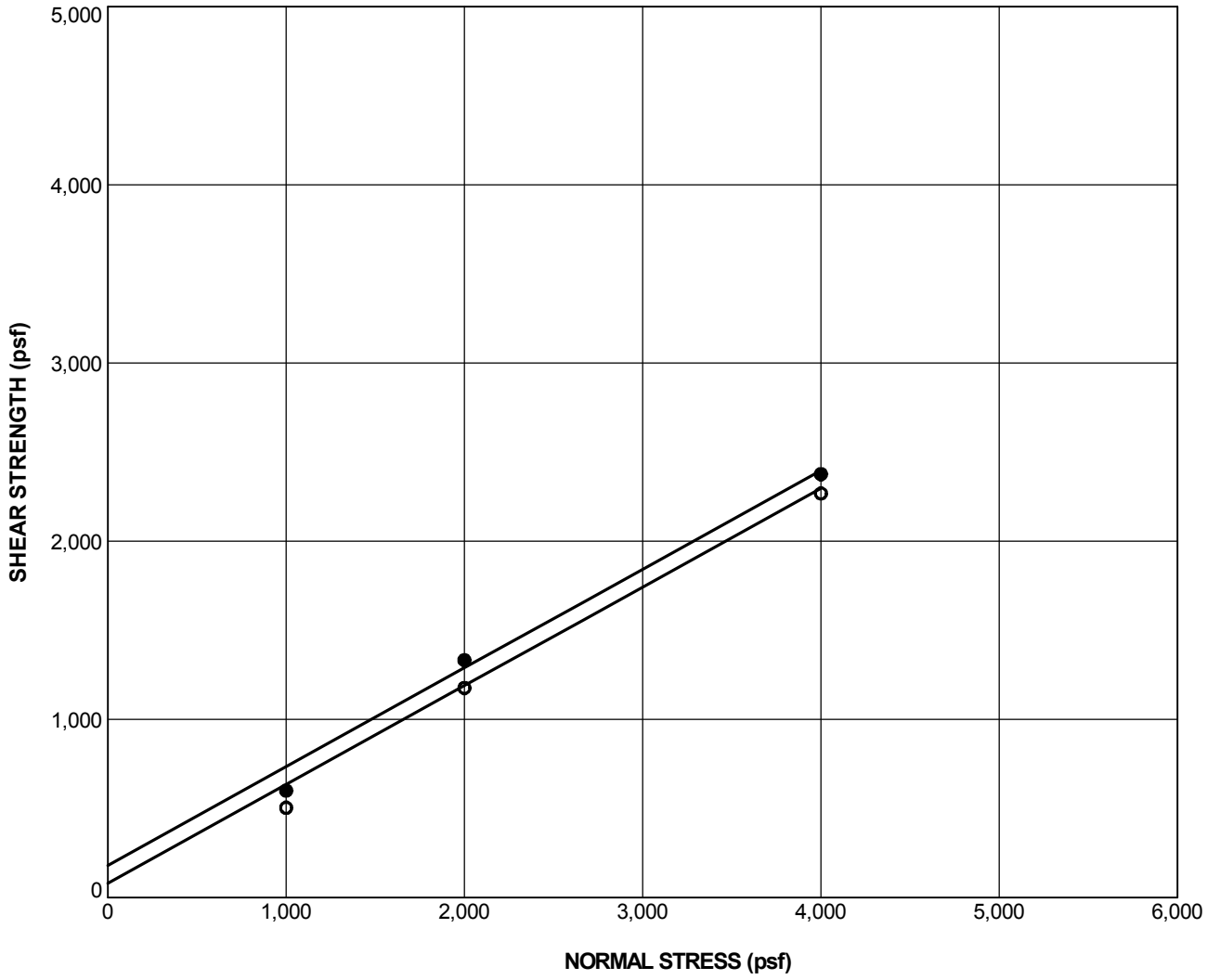
SHEAR STRENGTH PARAMETERS

Parameter	Peak ●	Ultimate ○
Cohesion (psf)	310	0
Friction Angle (degrees)	34.0	34.0

DIRECT SHEAR TEST RESULTS

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG Geotechnical, Inc.



Boring No. B-19	Sample No. D-1	Depth: 5.0 ft
Sample Description: Gray silty calyey SAND		**USCS:** SC
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:**
Moisture Content (%): 21.2	**Dry Density (pcf):** 109.3	**Degree of Saturation (%):** 100
Sample Type: Undisturbed	**Rate of Shear (in./min.):** 0.005	

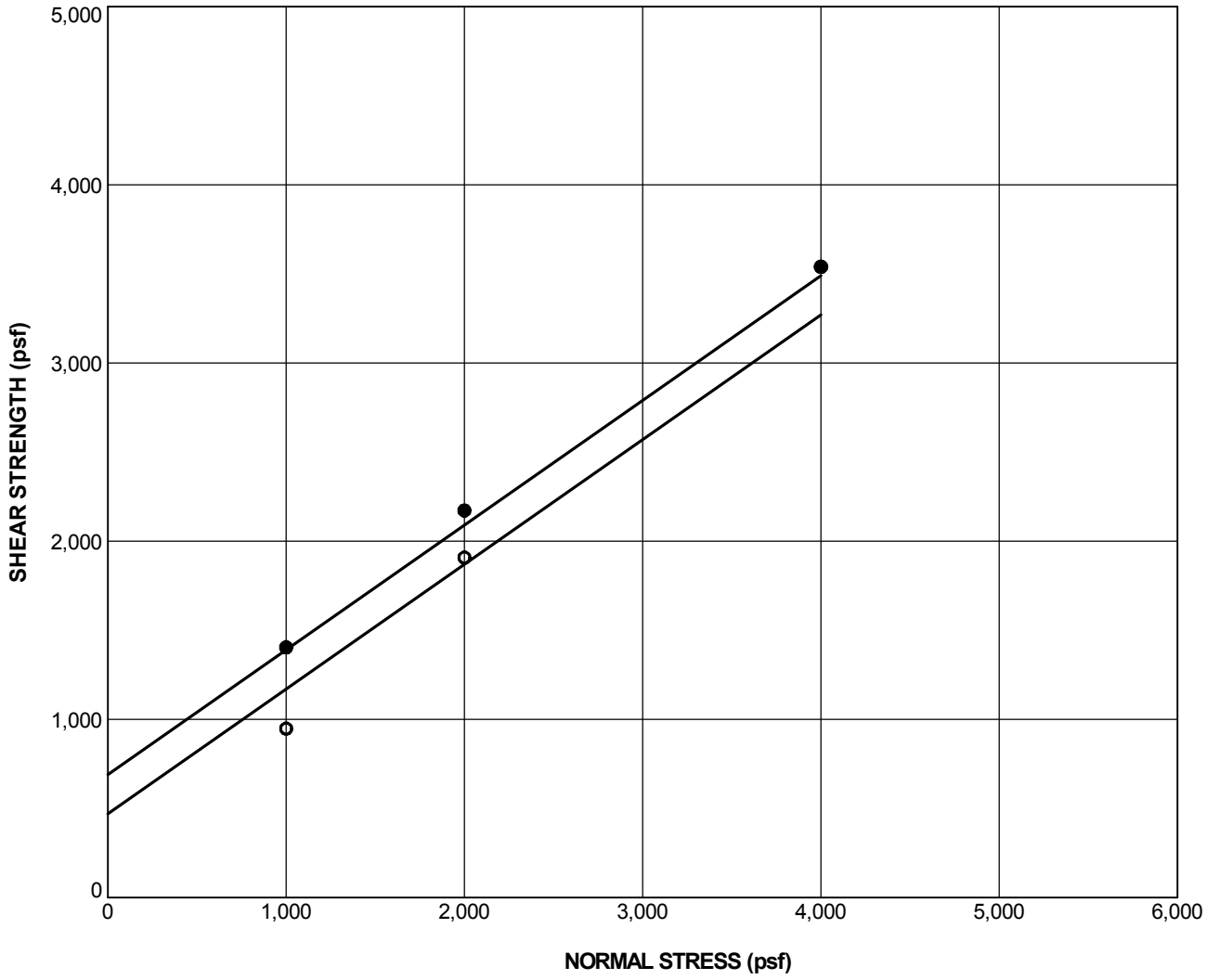
SHEAR STRENGTH PARAMETERS

Parameter	Peak ●	Ultimate ○
Cohesion (psf)	180	80
Friction Angle (degrees)	29.0	29.0

DIRECT SHEAR TEST RESULTS

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG Geotechnical, Inc.



Boring No. B-20	Sample No. D-1	Depth: 2.5 ft
Sample Description: Grayish brown clayey SAND		**USCS:** SC
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:**
Moisture Content (%): 17.6	**Dry Density (pcf):** 118.6	**Degree of Saturation (%):** 100
Sample Type: Undisturbed	**Rate of Shear (in./min.):** 0.005	

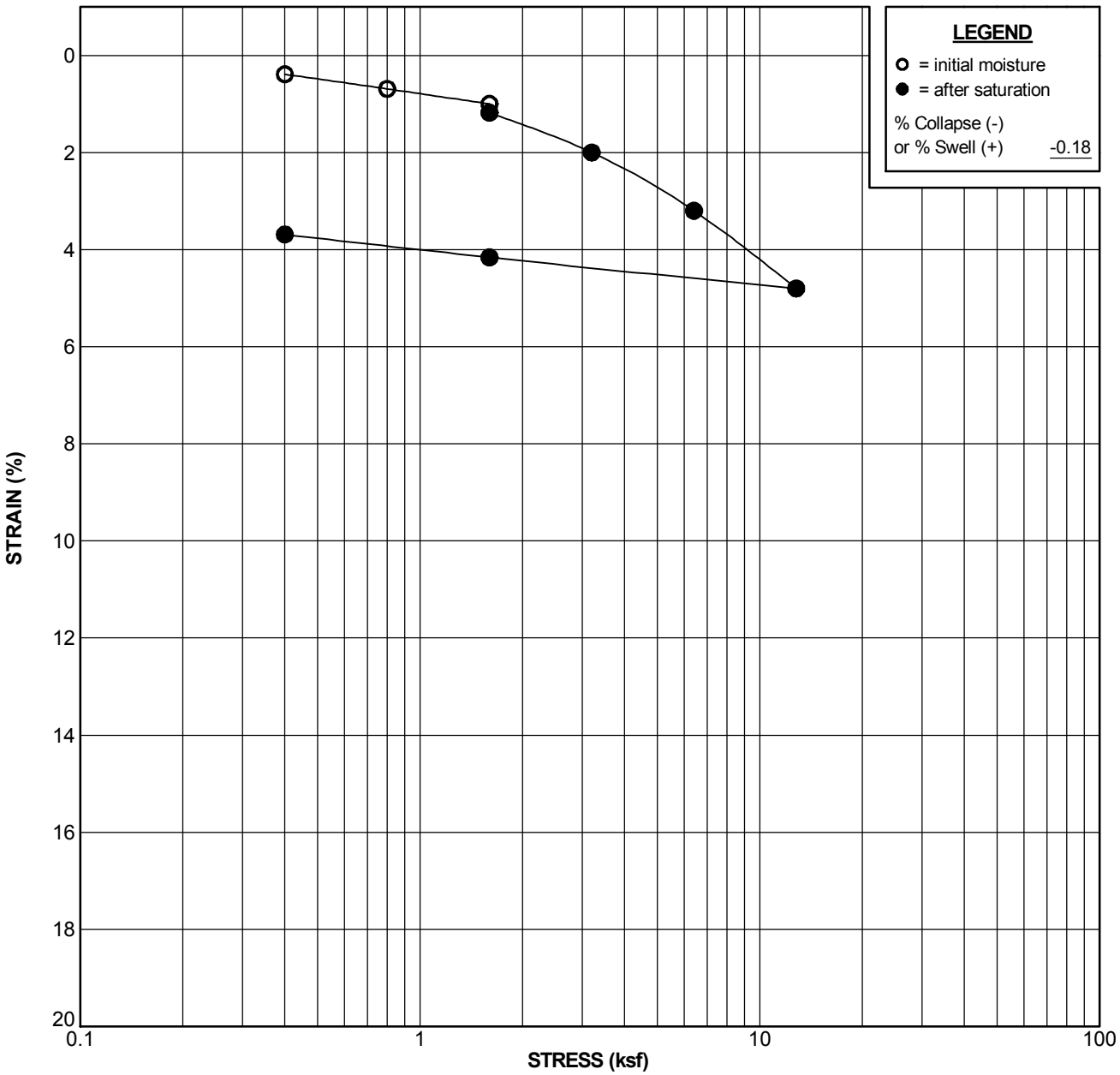
SHEAR STRENGTH PARAMETERS

Parameter	Peak ●	Ultimate ○
Cohesion (psf)	690	470
Friction Angle (degrees)	35.0	35.0

DIRECT SHEAR TEST RESULTS

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG Geotechnical, Inc.



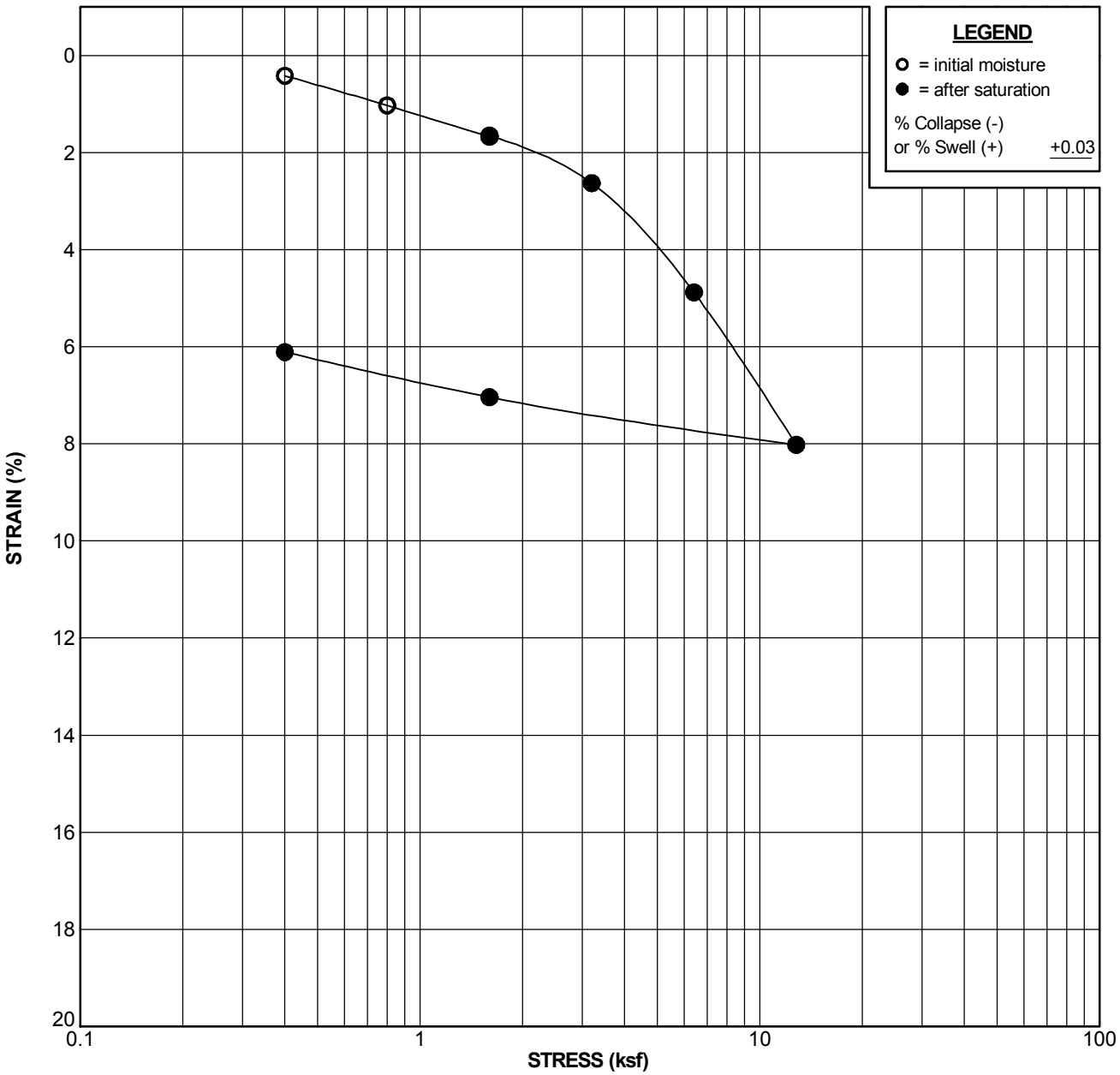
Boring No. B- 2	Sample No. D-3	Depth: 15.0 ft
Sample Description: (Qal) Light yellowish brown silty SAND		**USCS:** SM
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:**

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	12.3	94.5	42.4	0.783
Final	24.3	98.0	91.2	0.719

CONSOLIDATION TEST RESULTS

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG Geotechnical, Inc.



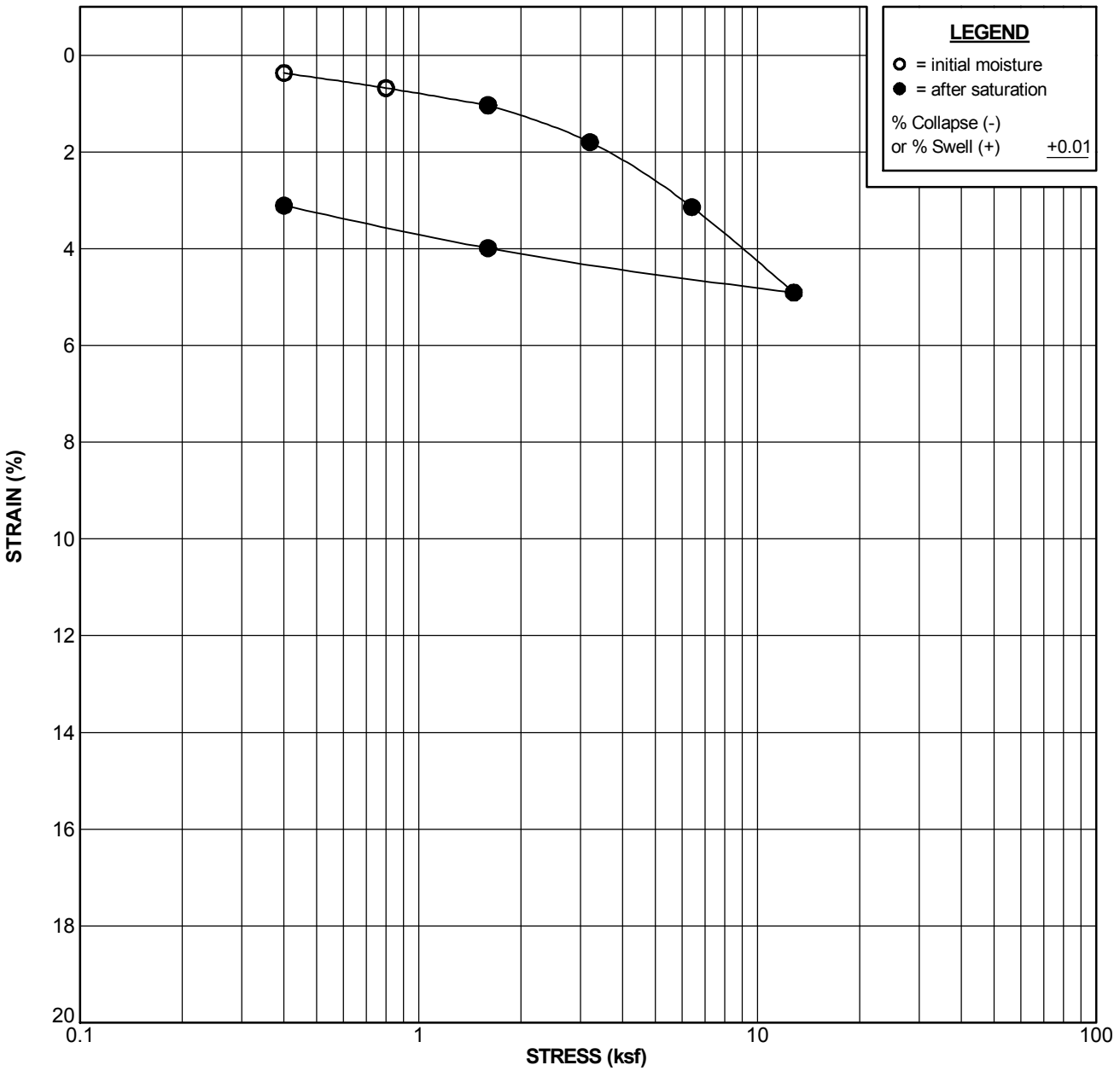
Boring No. B- 3	Sample No. D-1	Depth: 5.0 ft
Sample Description: (Qal) Brown silty SAND		**USCS:** SM
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:**

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	21.4	92.2	69.8	0.827
Final	23.9	97.8	89.3	0.723

CONSOLIDATION TEST RESULTS

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG Geotechnical, Inc.



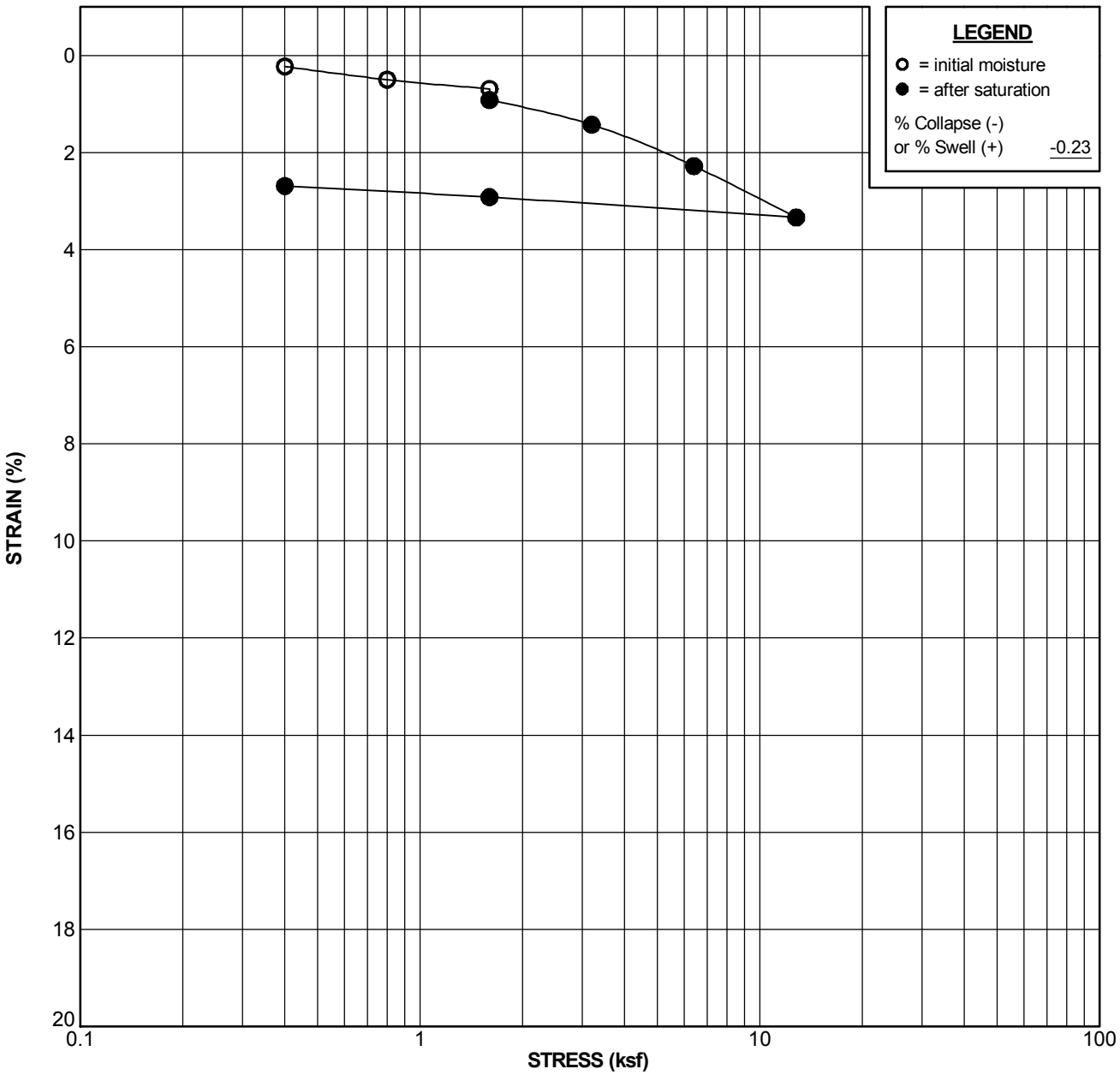
Boring No. B- 3	Sample No. D-6	Depth: 30.0 ft
Sample Description: (Qal) Brown sandy SILT		**USCS:** ML
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:**

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	24.6	94.8	85.5	0.777
Final	25.5	97.7	95.0	0.724

CONSOLIDATION TEST RESULTS

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG Geotechnical, Inc.



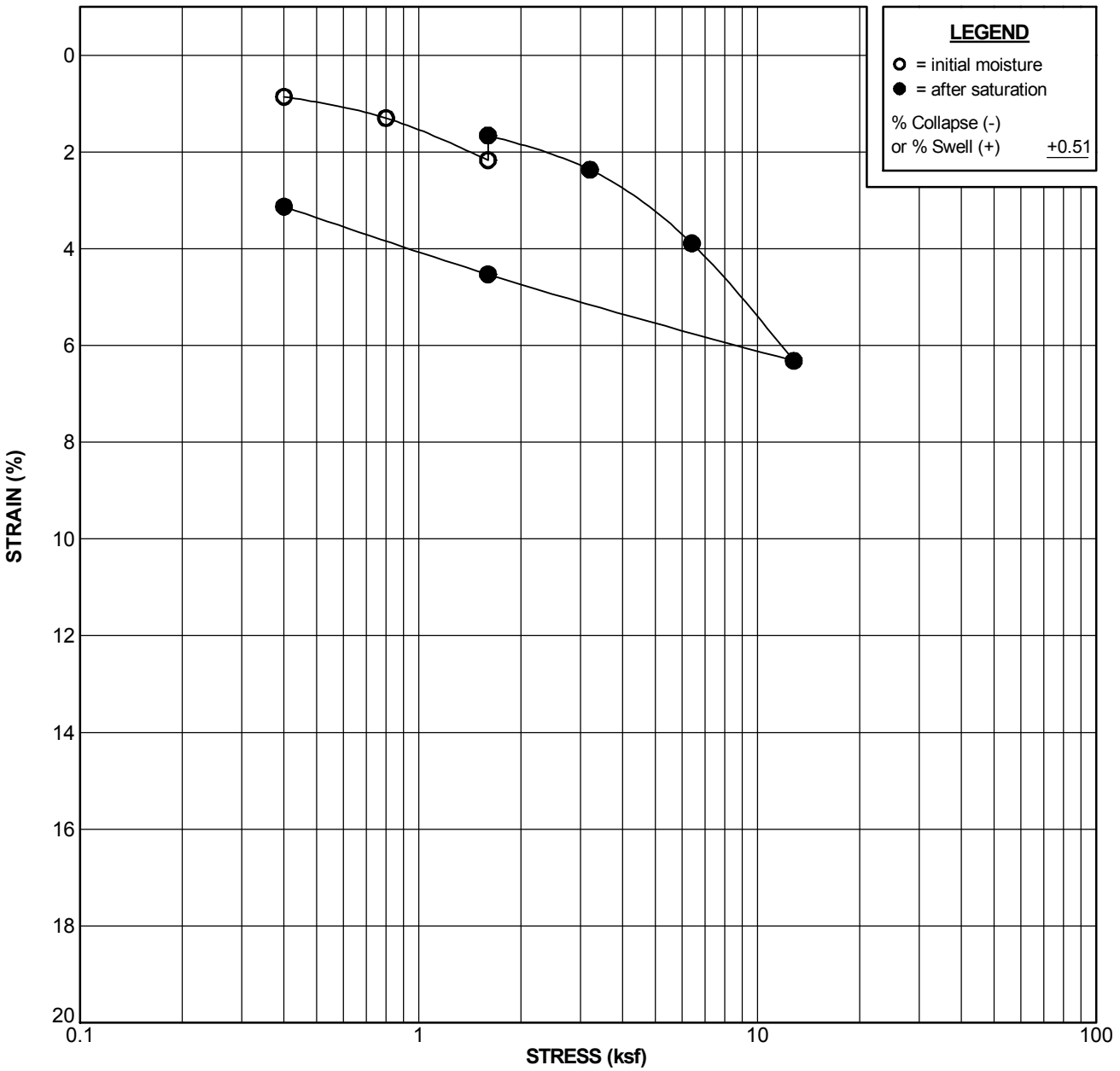
Boring No. B- 4	Sample No. D-2	Depth: 10.0 ft
Sample Description: (Qal) Light gray silty SAND		**USCS:** SM
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:**

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	6.6	102.7	27.8	0.641
Final	17.2	105.5	77.8	0.597

CONSOLIDATION TEST RESULTS

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG Geotechnical, Inc.



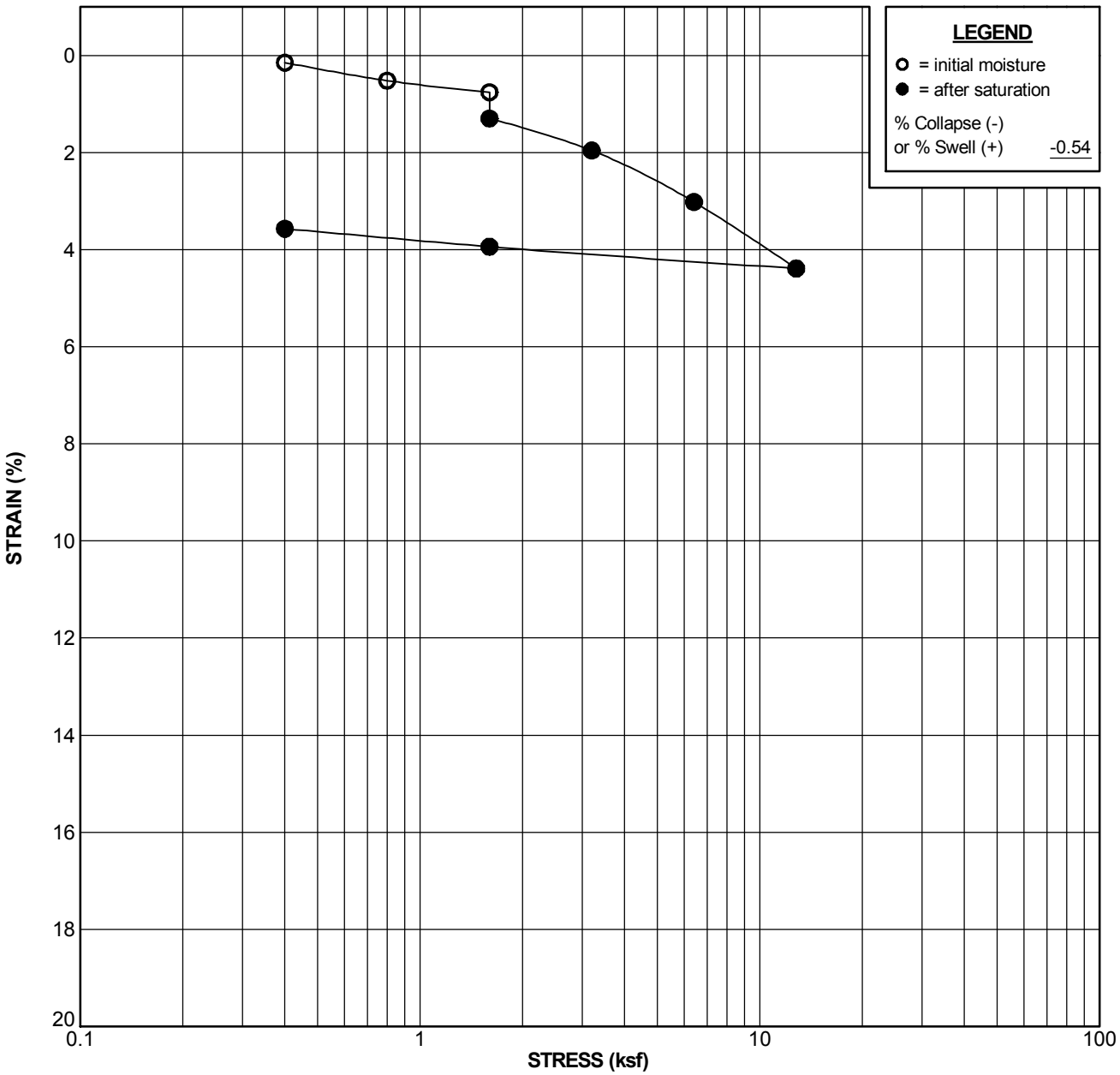
Boring No. B- 5	Sample No. D-3	Depth: 15.0 ft
Sample Description: (Qal) Dark brown silty CLAY		**USCS:** CL
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:**

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	18.7	98.2	70.5	0.716
Final	19.6	101.3	79.8	0.663

CONSOLIDATION TEST RESULTS

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG Geotechnical, Inc.



Boring No. B- 6	Sample No. D-3	Depth: 15.0 ft
Sample Description: (Qal) Brown silty SAND		**USCS:** SM
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:**

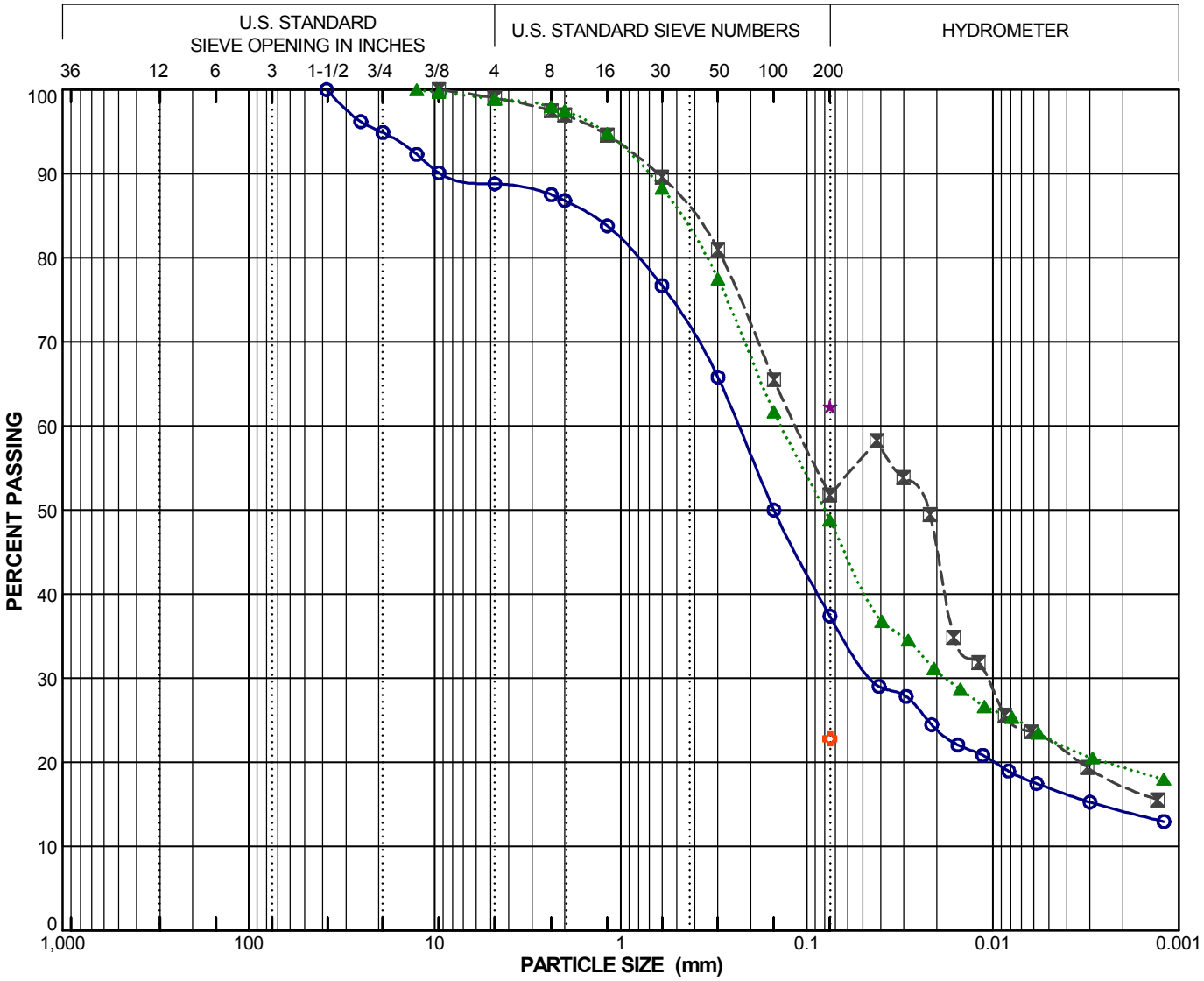
Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	8.2	108.9	40.5	0.547
Final	15.7	112.8	85.9	0.494

CONSOLIDATION TEST RESULTS

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG Geotechnical, Inc.

BOULDERS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		coarse	fine	coarse	medium	fine	



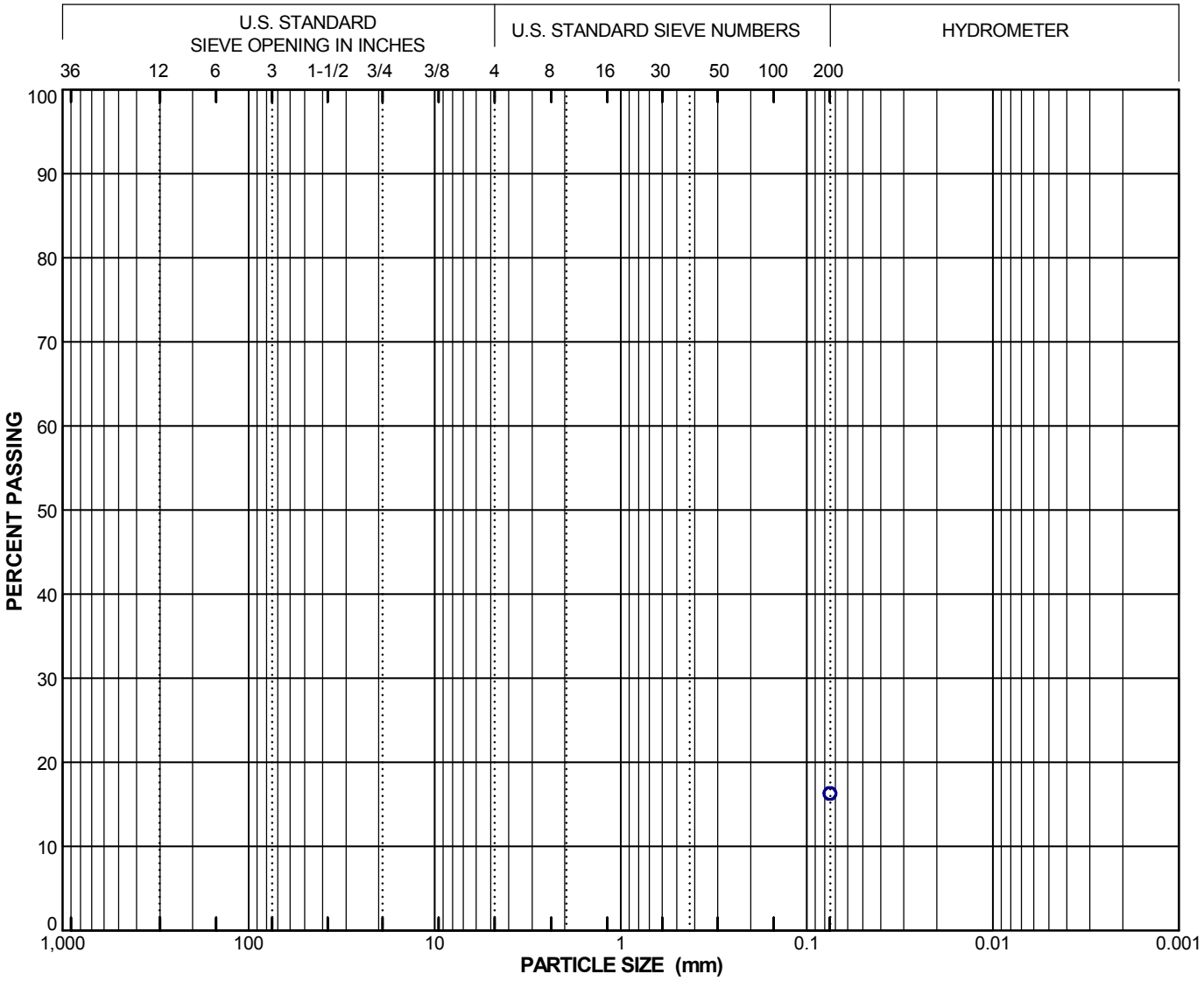
Symbol	Boring Number	Sample Number	Depth (feet)	Field Moisture (%)	LL	PI	Activity PI/-2μ	C_u	C_c	Passing No. 200 Sieve (%)	Passing 2μ (%)	USCS
○	B- 2	B-1	0.0		29	15	1.07			37	14	SC
⊠	B- 5	B-2	10.1		33	21	1.24			52	17	CL
▲	B- 6	B-1	0.0		33	18	0.95			49	19	SC
★	B-10	B-1	15.0							62		CL
✿	B-12	B-1	7.5							23		SM

PARTICLE SIZE DISTRIBUTION

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG Geotechnical, Inc.

BOULDERS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		coarse	fine	coarse	medium	fine	



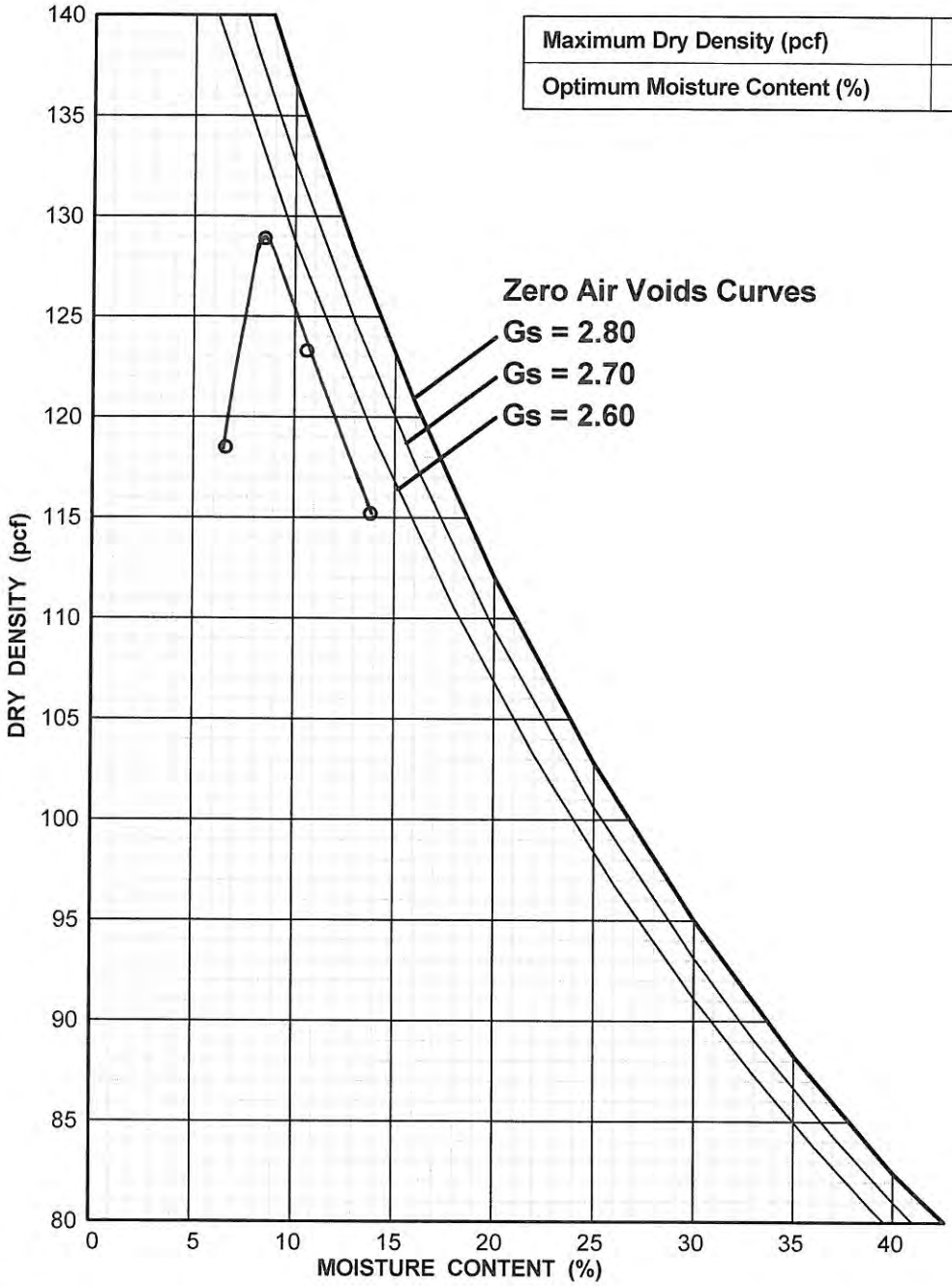
Symbol	Boring Number	Sample Number	Depth (feet)	Field Moisture (%)	LL	PI	Activity PI/-2μ	C_u	C_c	Passing No. 200 Sieve (%)	Passing 2μ (%)	USCS
O	T- 8	B-1	1.5							16		SM

PARTICLE SIZE DISTRIBUTION

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG Geotechnical, Inc.

Maximum Dry Density (pcf)	129.0
Optimum Moisture Content (%)	8.5



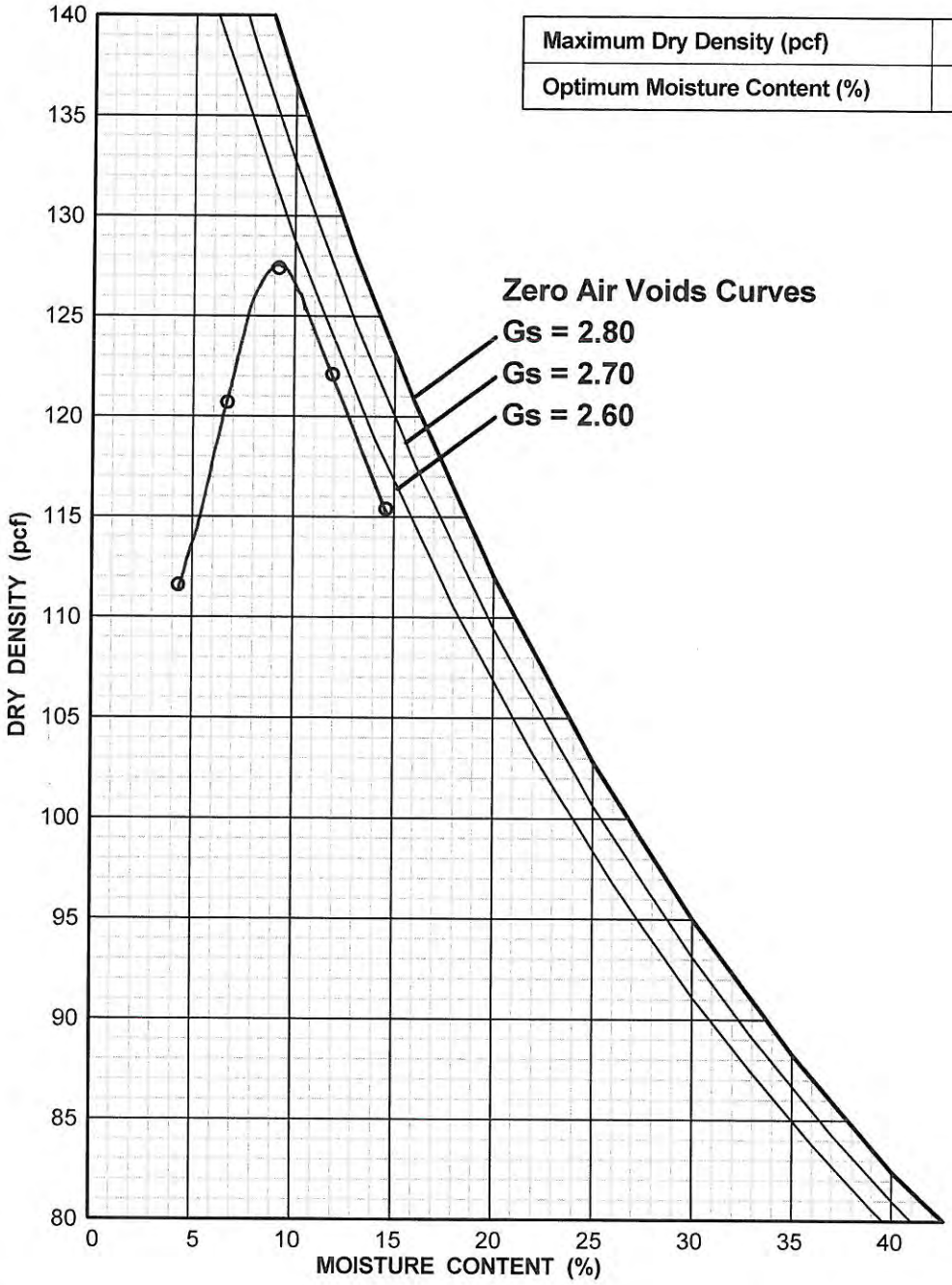
Boring No. B- 2	**Sample No. B-1**	**Depth: 0.0 ft**
Sample Description: (Afu) Dark grayish brown clayey SAND		**USCS:** SC
Liquid Limit: 29	**Plasticity Index:** 15	**Percent Passing No. 200 Sieve:** 37
Comments: 1557A		

COMPACTION TEST RESULTS

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG Geotechnical, Inc.

Maximum Dry Density (pcf)	128.5
Optimum Moisture Content (%)	9.0



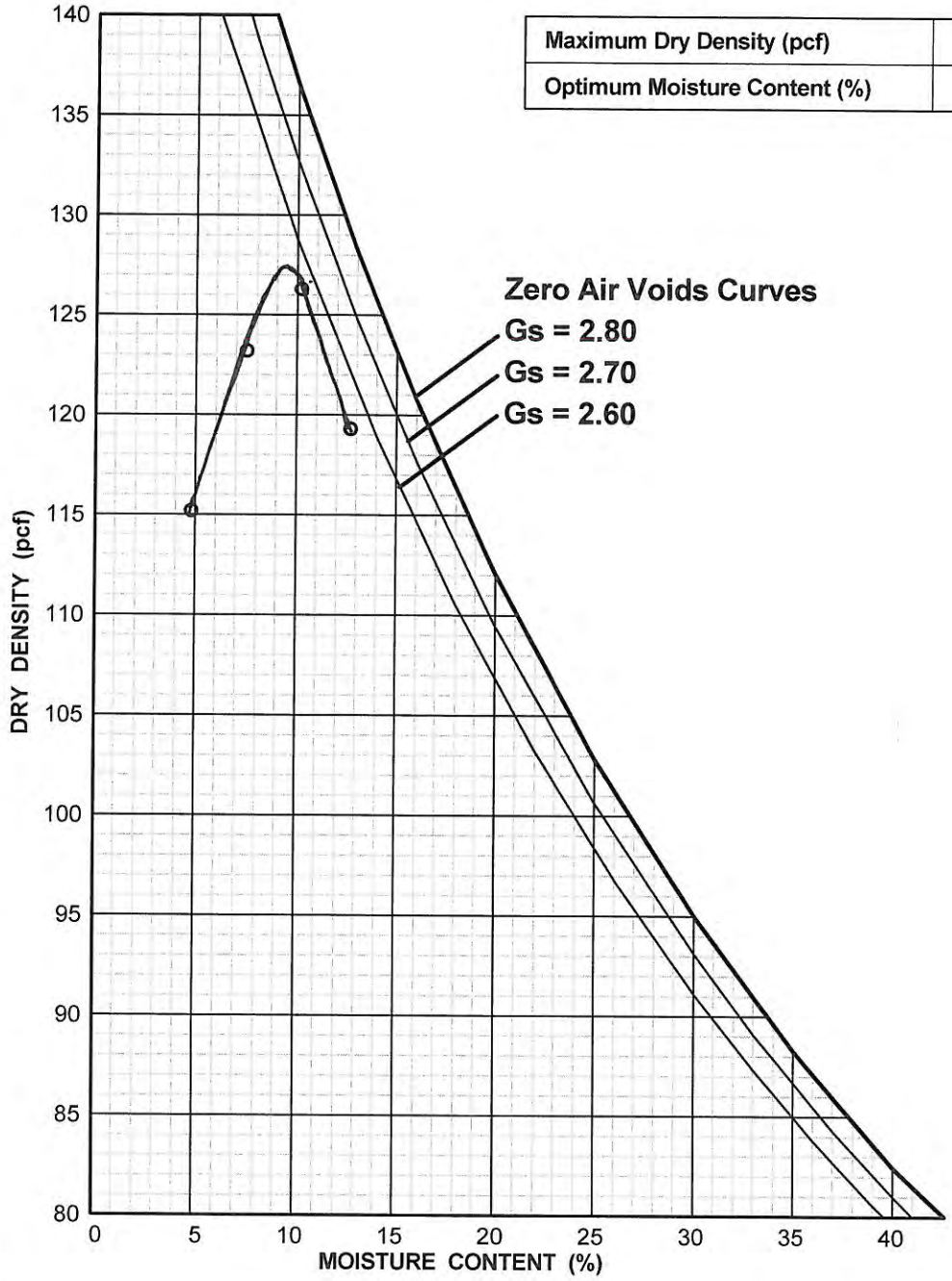
Boring No. B- 5	Sample No. B-2	Depth: 10.1 ft
Sample Description: (Qal) Grayish brown sandy CLAY		USCS: CL
Liquid Limit: 33	Plasticity Index: 21	Percent Passing No. 200 Sieve: 52
Comments: 1557A		

COMPACTION TEST RESULTS

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG Geotechnical, Inc.

Maximum Dry Density (pcf)	127.5
Optimum Moisture Content (%)	9.5



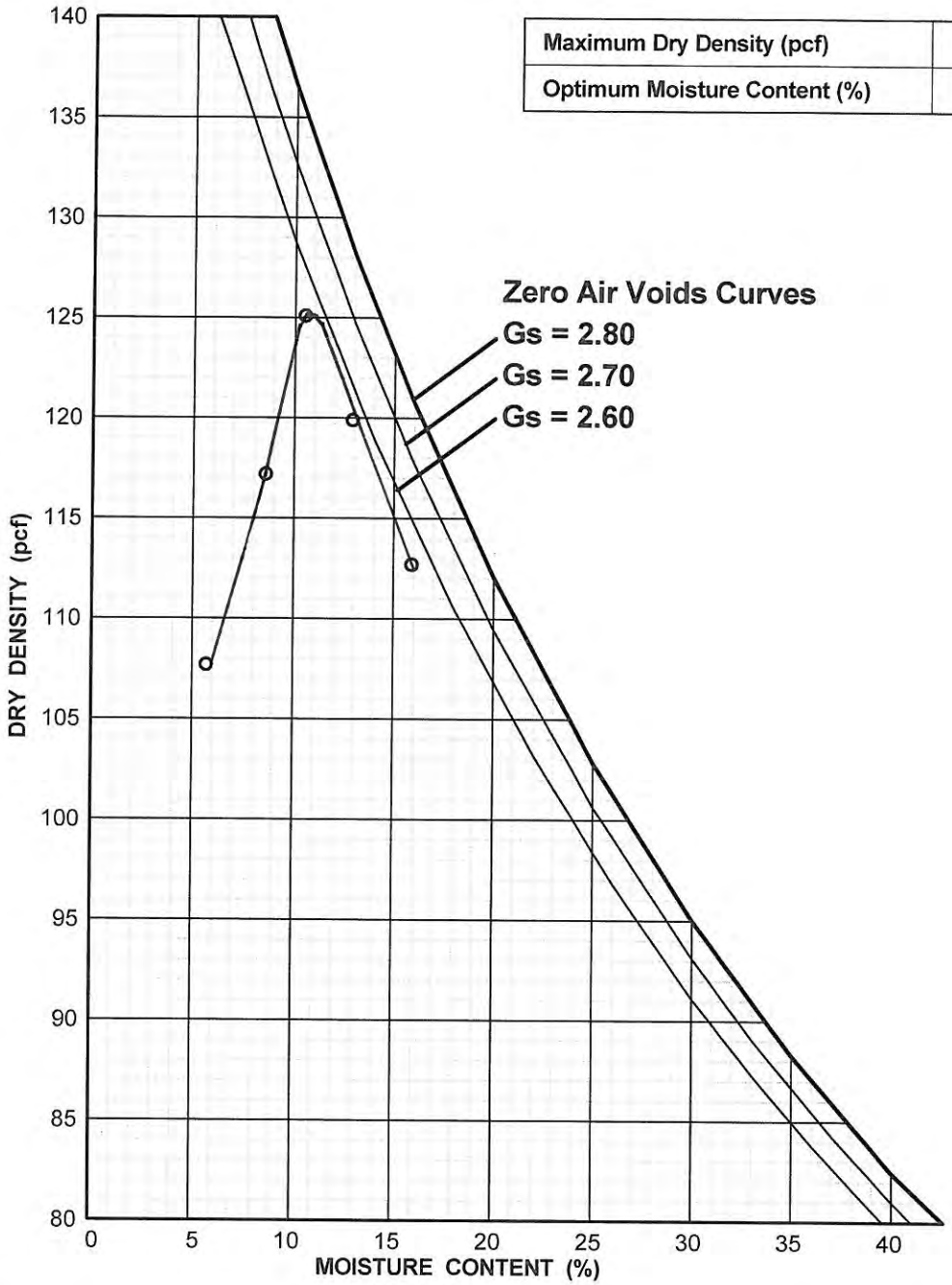
Boring No. B- 6	**Sample No. B-1**	**Depth: 0.0 ft**
Sample Description: (Afu) Brown gray clayey SAND		**USCS:** SC
Liquid Limit: 33	**Plasticity Index:** 18	**Percent Passing No. 200 Sieve:** 49
Comments: 1557A		

COMPACTION TEST RESULTS

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG Geotechnical, Inc.

Maximum Dry Density (pcf)	125.0
Optimum Moisture Content (%)	11.0



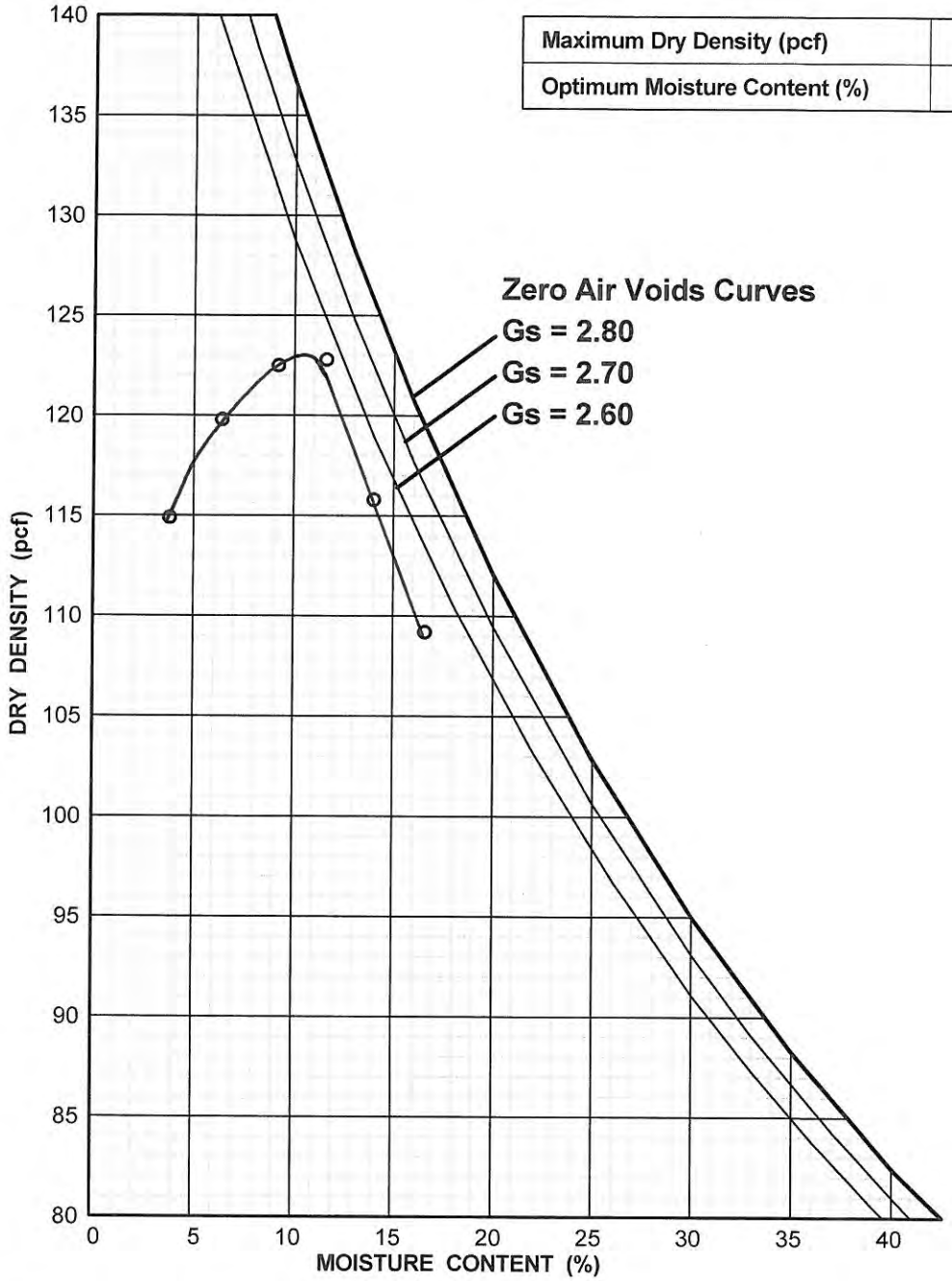
Boring No. B-10	Sample No. B-1	Depth: 15.0 ft
Sample Description: Dark brown sandy CLAY		USCS: CL
Liquid Limit:	Plasticity Index:	Percent Passing No. 200 Sieve: 62
Comments: 1557A		

COMPACTION TEST RESULTS

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG Geotechnical, Inc.

Maximum Dry Density (pcf)	123.0
Optimum Moisture Content (%)	10.5



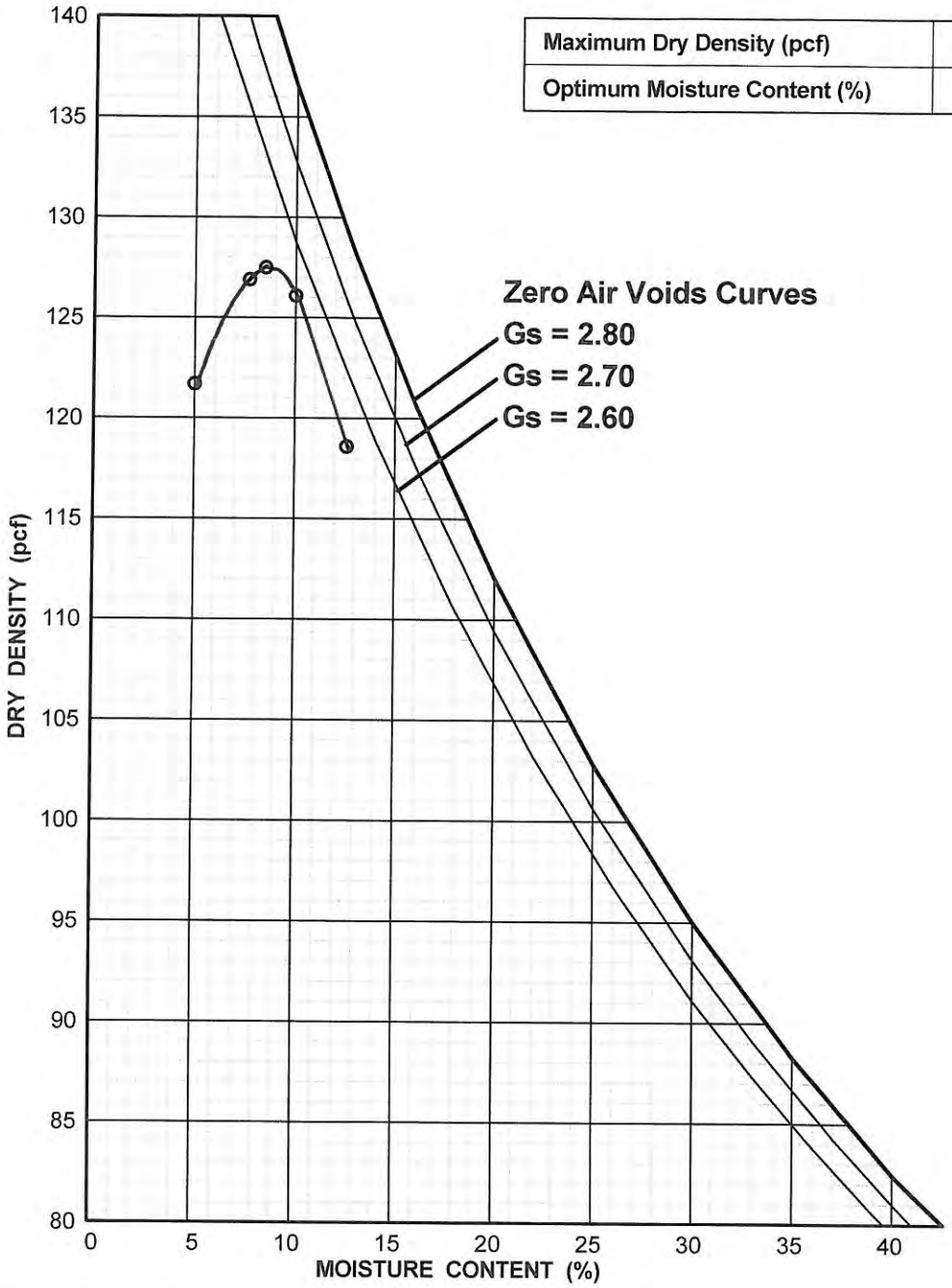
Boring No. B-12	**Sample No. B-1**	**Depth: 7.5 ft**
Sample Description: Olive gray silty SAND		**USCS:** SM
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:** 23
Comments: 1557A		

COMPACTION TEST RESULTS

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG Geotechnical, Inc.

Maximum Dry Density (pcf)	127.5
Optimum Moisture Content (%)	8.5

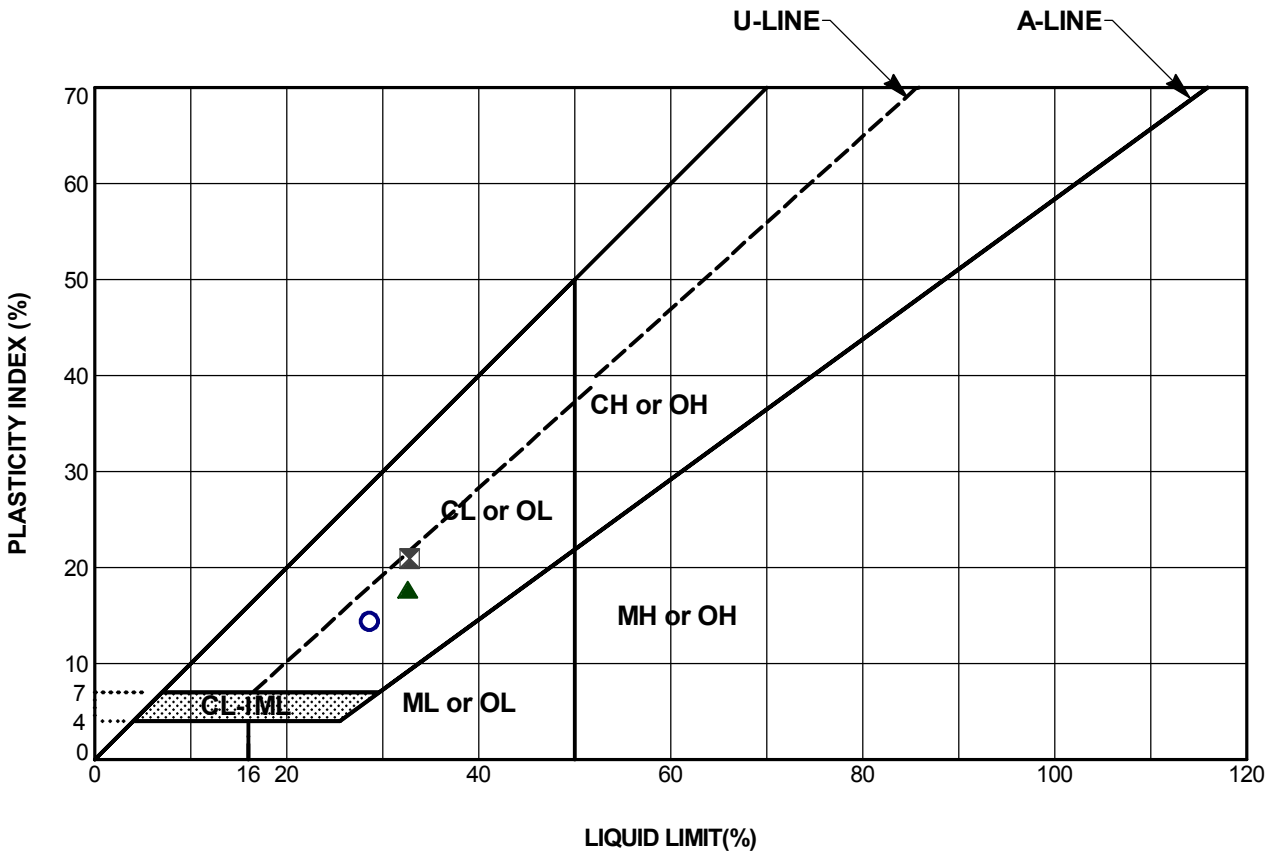


Boring No. T- 8	**Sample No. B-1**	**Depth: 1.5 ft**
Sample Description: Brown silty SAND		**USCS:** SM
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:** 16
Comments: 1557A		

COMPACTION TEST RESULTS

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG Geotechnical, Inc.



Symbol	Boring Number	Sample Number	Depth (feet)	Passing No. 200 Sieve (%)	LL	PI	USCS	Description
○	B- 2	B-1	0.0	37	29	15	SC	(Afu) Dark grayish brown clayey SAND
⊠	B- 5	B-2	10.1	52	33	21	CL	(Qal) Grayish brown sandy CLAY
▲	B- 6	B-1	0.0	49	33	18	SC	(Afu) Brown gray clayey SAND

PLASTICITY CHART

Toll Brothers/Lake Forest Nursery
Lake Forest, California
PROJECT NO. 16098-01

NMG Geotechnical, Inc.

Sample	*Compacted Moisture (%)*	*Compacted Dry Density (pcf)*	*Final Moisture (%)*	*Volumetric Swell (%)*	*Expansion Index[1] Value/Method*		*Expansive Classification[2]*	*Soluble Sulfate (%)*	*Sulfate Exposure[3]*
B-2 B-1 0-5'	10.0	113.9	15.8	2.5	28	B	Low	0.05	S0
B-5 B-2 10-15'	11.0	108.3	20.2	5.3	55	B	Medium	0.05	S0
B-6 B-1 0-5'	9.5	109.6	19.7	4.3	42	B	Low	0.06	S0

Test Method:
ASTM D4829

HACH SF-1 (Turbidimetric)

Notes:
1. Expansion Index (EI) method of determination*:*
   [A] E.I. determined by adjusting water content to achieve a 50 ±1% degree of saturation
   [B] E.I. calculated based on measured saturation within the range of 40% and 60%
2. ASTM D4829 *(Classification of Expansive Soil)*
3. ACI-318-14 Table 19.3.1.1 *(Requirement for Concrete Exposed to Sulfate-Containing Solutions)*

Expansion Index and Soluble Sulfate Test Results

(FRM001 Rev.5)

Project No. 16098-01

Project Name: Toll/Nakase

NMG

APPENDIX D

APPENDIX D

GENERAL EARTHWORK AND GRADING SPECIFICATIONS

1.0 General

1.1 Intent: These General Earthwork and Grading Specifications are for the grading and earthwork shown on the approved grading plan(s) and/or indicated in the geotechnical report(s). These Specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the specific recommendations in the geotechnical report shall supersede these more general Specifications. Observations of the earthwork by the project Geotechnical Consultant during the course of grading may result in new or revised recommendations that could supersede these specifications or the recommendations in the geotechnical report(s).

1.2 Geotechnical Consultant: Prior to commencement of work, the owner shall employ a geotechnical consultant. The geotechnical consultant shall be responsible for reviewing the approved geotechnical report(s) and accepting the adequacy of the preliminary geotechnical findings, conclusions, and recommendations prior to the commencement of the grading.

Prior to commencement of grading, the Geotechnical Consultant shall review the "work plan" prepared by the Earthwork Contractor (Contractor) and schedule sufficient personnel to perform the appropriate level of observation, mapping, and compaction testing.

During the grading and earthwork operations, the Geotechnical Consultant shall observe, map, and document the subsurface exposures to verify the geotechnical design assumptions. If the observed conditions are found to be significantly different than the interpreted assumptions during the design phase, the Geotechnical Consultant shall inform the owner, recommend appropriate changes in design to accommodate the observed conditions, and notify the review agency where required. Subsurface areas to be geotechnically observed, mapped, elevations recorded, and/or tested include natural ground after it has been cleared for receiving fill but before fill is placed, bottoms of all "remedial removal" areas, all key bottoms, and benches made on sloping ground to receive fill.

The Geotechnical Consultant shall observe the moisture-conditioning and processing of the subgrade and fill materials and perform relative compaction testing of fill to determine the attained level of compaction. The Geotechnical Consultant shall provide the test results to the owner and the Contractor on a routine and frequent basis.

1.3 The Earthwork Contractor: The Earthwork Contractor (Contractor) shall be qualified, experienced, and knowledgeable in earthwork logistics, preparation and processing of ground to receive fill, moisture-conditioning and processing of fill, and compacting fill. The Contractor shall review and accept the plans, geotechnical report(s), and these Specifications prior to commencement of grading. The Contractor shall be solely responsible for performing the grading in accordance with the plans and specifications.

The Contractor shall prepare and submit to the owner and the Geotechnical Consultant a work plan that indicates the sequence of earthwork grading, the number of "spreads" of work and the estimated quantities of daily earthwork contemplated for the site prior to commencement of grading. The Contractor shall inform the owner and the Geotechnical Consultant of changes in work schedules and updates to the work plan at least 24 hours in advance of such changes so that appropriate observations and tests can be planned and accomplished. The Contractor shall not assume that the Geotechnical Consultant is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish the earthwork in accordance with the applicable grading codes and agency ordinances, these Specifications, and the recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as unsuitable soil, improper moisture condition, inadequate compaction, insufficient buttress key size, adverse weather, etc., are resulting in a quality of work less than required in these specifications, the Geotechnical Consultant shall reject the work and may recommend to the owner that construction be stopped until the conditions are rectified.

2.0 Preparation of Areas to be Filled

2.1 Clearing and Grubbing: Vegetation, such as brush, grass, roots, and other deleterious material shall be sufficiently removed and properly disposed of in a method acceptable to the owner, governing agencies, and the Geotechnical Consultant.

The Geotechnical Consultant shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 1 percent of organic materials (by volume). No fill lift shall contain more than 5 percent of organic matter. Nesting of the organic materials shall not be allowed.

If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed

immediately for proper evaluation and handling of these materials prior to continuing to work in that area.

As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) have chemical constituents that are considered to be hazardous waste. As such, the indiscriminate dumping or spillage of these fluids onto the ground may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall not be allowed.

2.2 Processing: Existing ground that has been declared satisfactory for support of fill by the Geotechnical Consultant shall be scarified to a minimum depth of 6 inches. Existing ground that is not satisfactory shall be overexcavated as specified in the following section. Scarification shall continue until soils are broken down and free of large clay lumps or clods and the working surface is reasonably uniform, flat, and free of uneven features that would inhibit uniform compaction.

2.3 Overexcavation: In addition to removals and overexcavations recommended in the approved geotechnical report(s) and the grading plan, soft, loose, dry, saturated, spongy, organic-rich, highly fractured or otherwise unsuitable ground shall be overexcavated to competent ground as evaluated by the Geotechnical Consultant during grading.

2.4 Benching: Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical units), the ground shall be stepped or benched. Please see the Standard Details for a graphic illustration. The lowest bench or key shall be a minimum of 15 feet wide and at least 2 feet deep, into competent material as evaluated by the Geotechnical Consultant. Other benches shall be excavated a minimum height of 4 feet into competent material or as otherwise recommended by the Geotechnical Consultant. Fill placed on ground sloping flatter than 5:1 shall also be benched or otherwise overexcavated to provide a flat subgrade for the fill.

2.5 Evaluation/Acceptance of Fill Areas: All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by the Geotechnical Consultant as suitable to receive fill. The Contractor shall obtain a written acceptance from the Geotechnical Consultant prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys, and benches.

3.0 Fill Material

3.1 General: Material to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by the Geotechnical Consultant prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to the Geotechnical Consultant or mixed with other soils to achieve satisfactory fill material.

3.2 Oversize: Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 12 inches, shall not be buried or placed in fill unless location, materials, and placement methods are specifically accepted by the Geotechnical Consultant. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 vertical feet of finish grade or within 2 feet of future utilities or underground construction.

3.3 Import: If importing of fill material is required for grading, proposed import material shall meet the requirements of Section 3.1. The potential import source shall be given to the Geotechnical Consultant at least 48 hours (2 working days) before importing begins so that its suitability can be determined and appropriate tests performed.

4.0 Fill Placement and Compaction

4.1 Fill Layers: Approved fill material shall be placed in areas prepared to receive fill (per Section 3.0) in near-horizontal layers not exceeding 8 inches in loose thickness. The Geotechnical Consultant may accept thicker layers if testing indicates the grading procedures can adequately compact the thicker layers. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.

4.2 Fill Moisture Conditioning: Fill soils shall be watered, dried back, blended, and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly over optimum. Maximum density and optimum soil moisture content tests shall be performed in accordance with the American Society of Testing and Materials (ASTM Test Method D1557-91).

4.3 Compaction of Fill: After each layer has been moisture-conditioned, mixed, and evenly spread, it shall be uniformly compacted to not less than 90 percent of maximum dry density (ASTM Test Method D1557-91). Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction with uniformity.

4.4 Compaction of Fill Slopes: In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by backrolling of slopes with sheepsfoot rollers at increments of 3 to 4 feet in fill elevation, or by other methods producing satisfactory results acceptable to the Geotechnical Consultant. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of maximum density per ASTM Test Method D1557-91.

4.5 Compaction Testing: Field tests for moisture content and relative compaction of the fill soils shall be performed by the Geotechnical Consultant. Location and frequency of tests shall be at the Consultant's discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).

4.6 Frequency of Compaction Testing: Tests shall be taken at intervals not exceeding 2 feet in vertical rise and/or 1,000 cubic yards of compacted fill soils embankment. In addition, as a guideline, at least one test shall be taken on slope faces for each 5,000 square feet of slope face and/or each 10 feet of vertical height of slope. The Contractor shall assure that fill construction is such that the testing schedule can be accomplished by the Geotechnical Consultant. The Contractor shall stop or slow down the earthwork construction if these minimum standards are not met.

4.7 Compaction Test Locations: The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of each test location. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations with sufficient accuracy. At a minimum, two grade stakes within a horizontal distance of 100 feet and vertically less than 5 feet apart from potential test locations shall be provided.

5.0 Subdrain Installation

Subdrain systems shall be installed in accordance with the approved geotechnical report(s), the grading plan, and the Standard Details. The Geotechnical Consultant may recommend additional subdrains and/or changes in subdrain extent, location, grade, or material depending on conditions encountered during grading. All subdrains shall be surveyed by a land surveyor/civil engineer for line and grade after installation and prior to burial. Sufficient time should be allowed by the Contractor for these surveys.

6.0 Excavation

Excavations, as well as over-excavation for remedial purposes, shall be evaluated by the Geotechnical Consultant during grading. Remedial removal depths shown on geotechnical plans are estimates only. The actual extent of removal shall be determined by the Geotechnical Consultant based on the field evaluation of exposed conditions during grading. Where fill-over-cut slopes are to be graded, the cut portion of the slope shall be made, evaluated, and accepted by the Geotechnical Consultant prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by the Geotechnical Consultant.

7.0 Trench Backfills

7.1 Contractor shall follow all OHSA and Cal/OSHA requirements for safety of trench excavations.

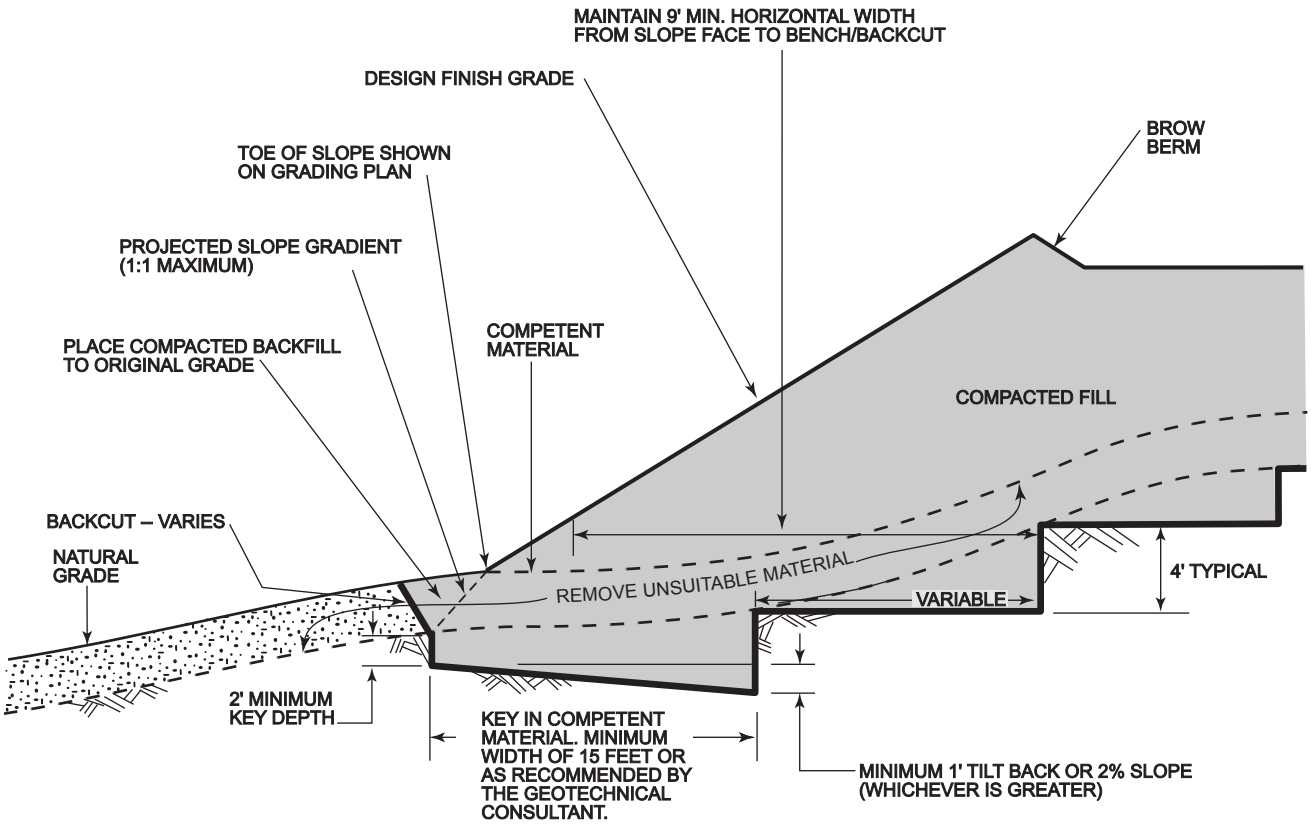
7.2 Bedding and backfill of utility trenches shall be done in accordance with the applicable provisions of Standard Specifications of Public Works Construction. Bedding material shall have a Sand Equivalent greater than 30 (SE>30). The bedding shall be placed to 1 foot over the top of the conduit and densified by jetting. Backfill shall be placed and densified to a minimum 90 percent of maximum from 1 foot above the top of the conduit to the surface, except in traveled ways (see Section 7.6 below).

7.3 Jetting of the bedding around the conduits shall be observed by the Geotechnical Consultant.

7.4 Geotechnical Consultant shall test the trench backfill for relative compaction. At least one test should be made for every 300 feet of trench and 2 feet of fill.

7.5 Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to the Geotechnical Consultant that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method.

7.6 Trench backfill in the upper foot measured from finish grade within existing or future traveled way, shoulder, and other paved areas (or areas to receive pavement) should be placed to a minimum 95 percent relative compaction.

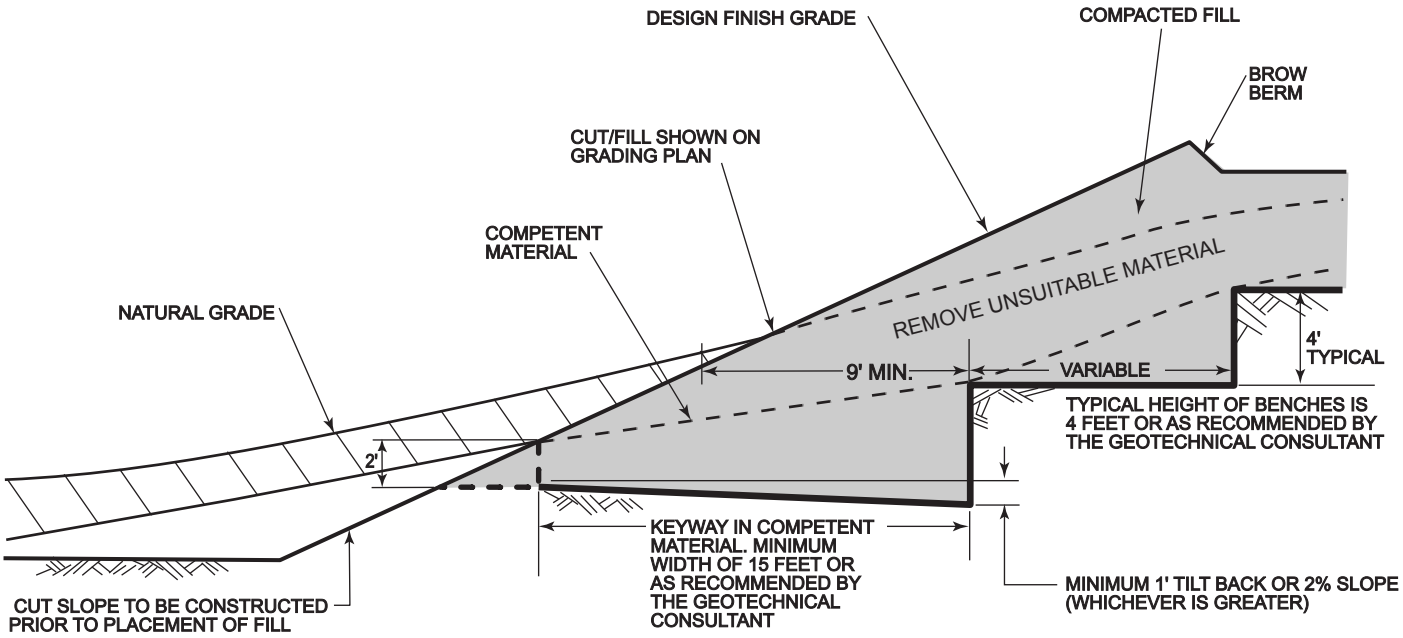


NOTE: BENCHING SHALL BE REQUIRED WHEN NATURAL SLOPES ARE EQUAL TO OR STEEPER THAN 5:1 OR WHEN RECOMMENDED BY THE SOIL ENGINEER. WHERE THE NATURAL SLOPE APPROACHES OR EXCEEDS THE DESIGN SLOPE RATIO, SPECIAL RECOMMENDATIONS WILL BE PROVIDED BY THE GEOTECHNICAL ENGINEER.

FIGURE 1

TYPICAL FILL KEY ABOVE NATURAL SLOPE MINIMUM STANDARD GRADING DETAILS

NMG Geotechnical, Inc.



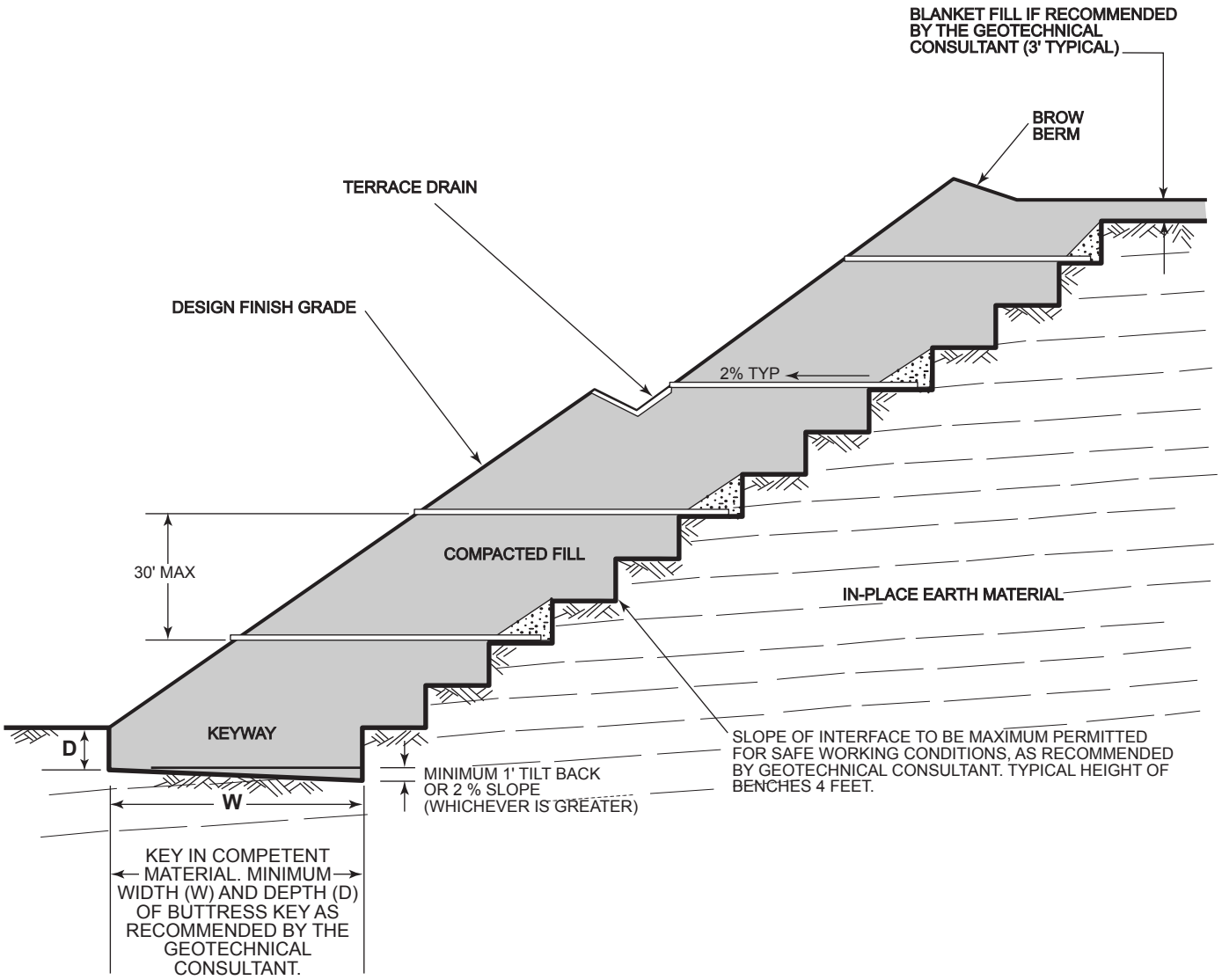
NOTE: THE FILL PORTION OF THE SLOPE SHALL BE COMPACTED AS STATED IN THE PROJECT SPECIFICATIONS.

FIGURE 2

TYPICAL FILL ABOVE CUT SLOPE
MINIMUM STANDARD GRADING DETAILS

NMG
Geotechnical, Inc.

8/03 TYP FILL ABOVE CUT SLOPE.ai



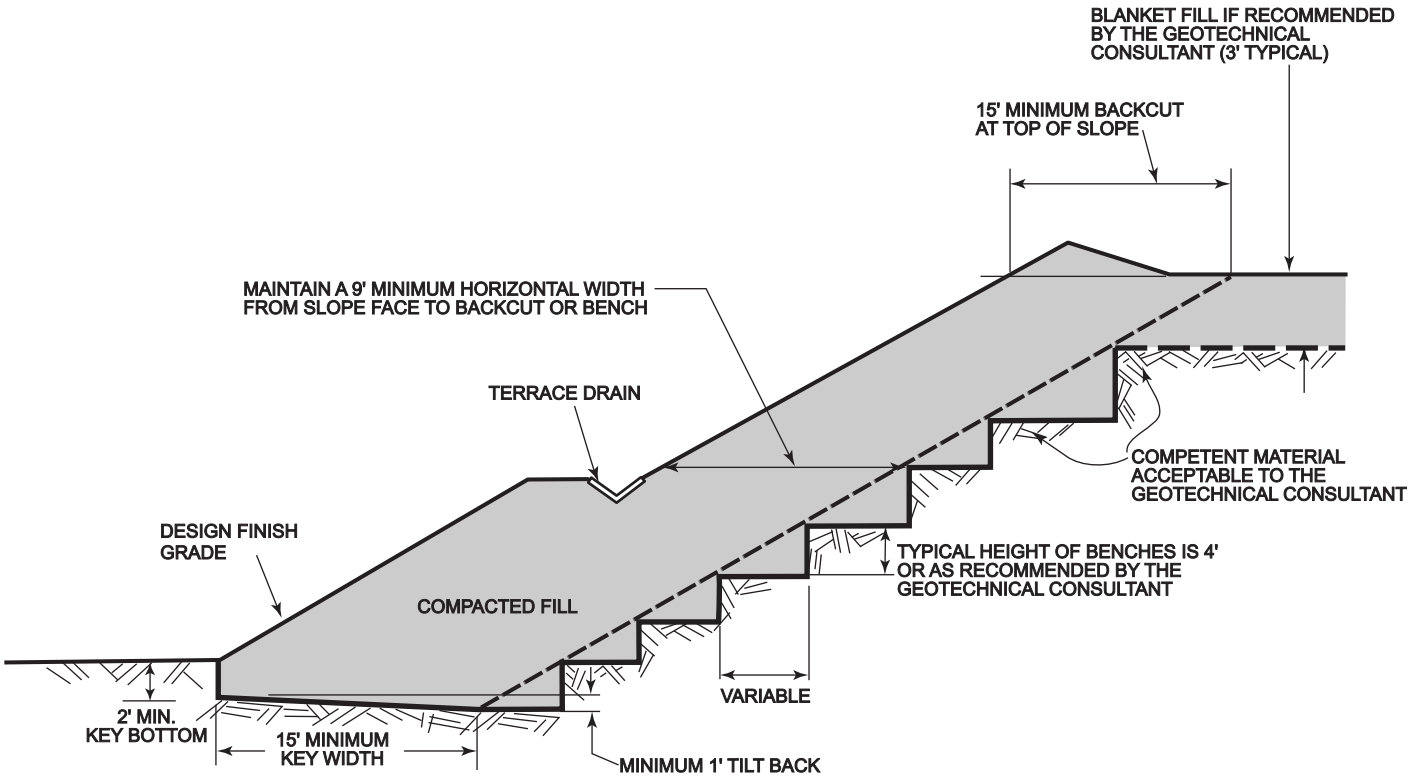
NOTE: SUBDRAIN DETAILS, SEE FIGURE 5.

FIGURE 3

TYPICAL BUTTRESS FILL
MINIMUM STANDARD GRADING DETAILS

NMG Geotechnical, Inc.

1/04 TYP BUTTRESS FILL.ai

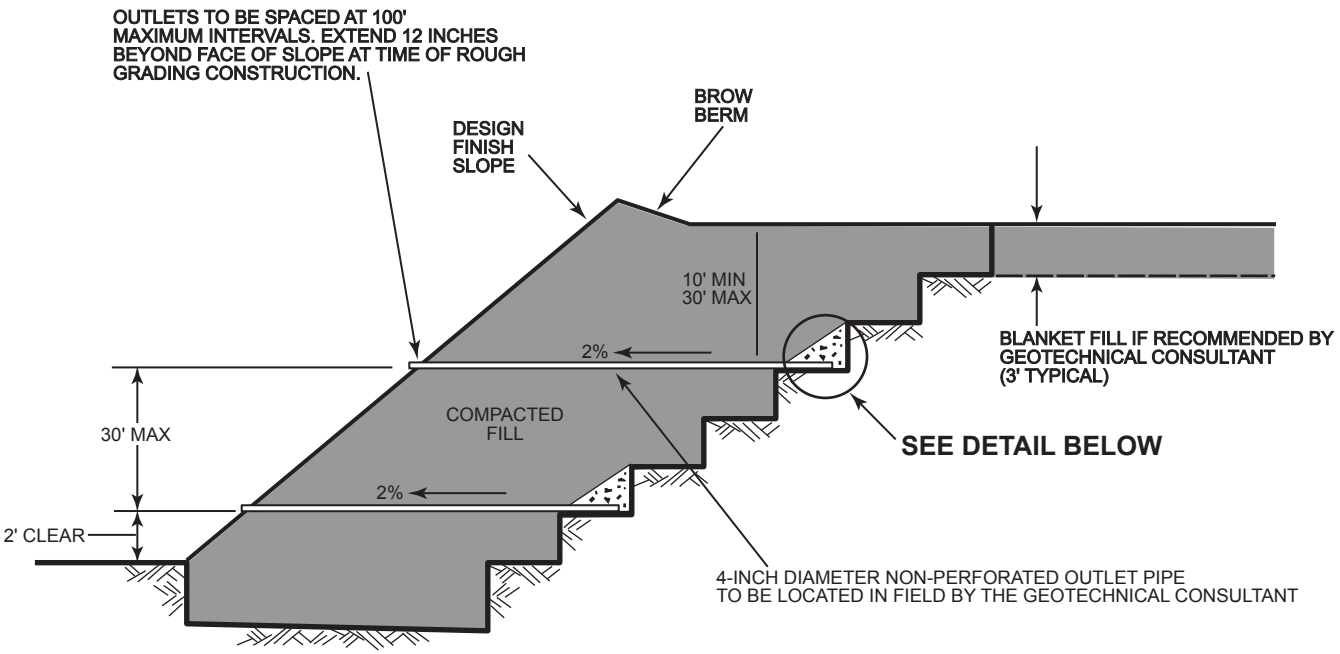


NOTE:
SEE FIGURE 5 FOR TYPICAL SUBDRAIN DETAILS FOR STABILIZATION FILLS

FIGURE 4

TYPICAL STABILIZATION FILL MINIMUM STANDARD GRADING DETAILS

NMG Geotechnical, Inc.



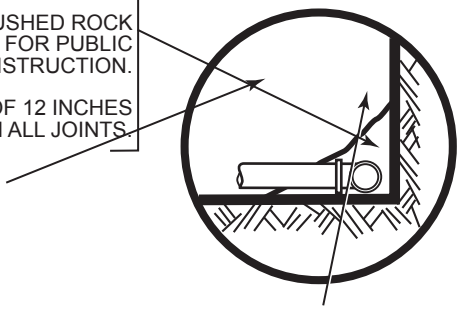
FILTER MATERIAL - MINIMUM OF THREE CUBIC FEET PER FOOT OF PIPE. SEE FILTER MATERIAL SPECIFICATION.

ALTERNATE: IN LIEU OF FILTER MATERIAL, THREE CUBIC FEET OF GRAVEL PER FOOT OF SUBDRAIN (WITHOUT PIPE) MAY BE ENCASED IN FILTER FABRIC. SEE GRAVEL SPECIFICATION, AND FIGURE 6 FOR FILTER FABRIC SPECIFICATION

"GRAVEL" TO CONSIST OF 1/2" TO 1" CRUSHED ROCK PER STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.

FILTER FABRIC SHALL BE LAPPED A MINIMUM OF 12 INCHES ON ALL JOINTS.

DETAIL



OUTLET PIPE TO BE CONNECTED TO SUBDRAIN PIPE WITH TEE OR ELBOW

"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT.	
SIEVE SIZE	PERCENTAGE PASSING
1"	100
3/4"	90-100
3/8"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

NOTE:
TRENCH FOR OUTLET PIPES TO BE BACKFILLED WITH ON-SITE SOIL.

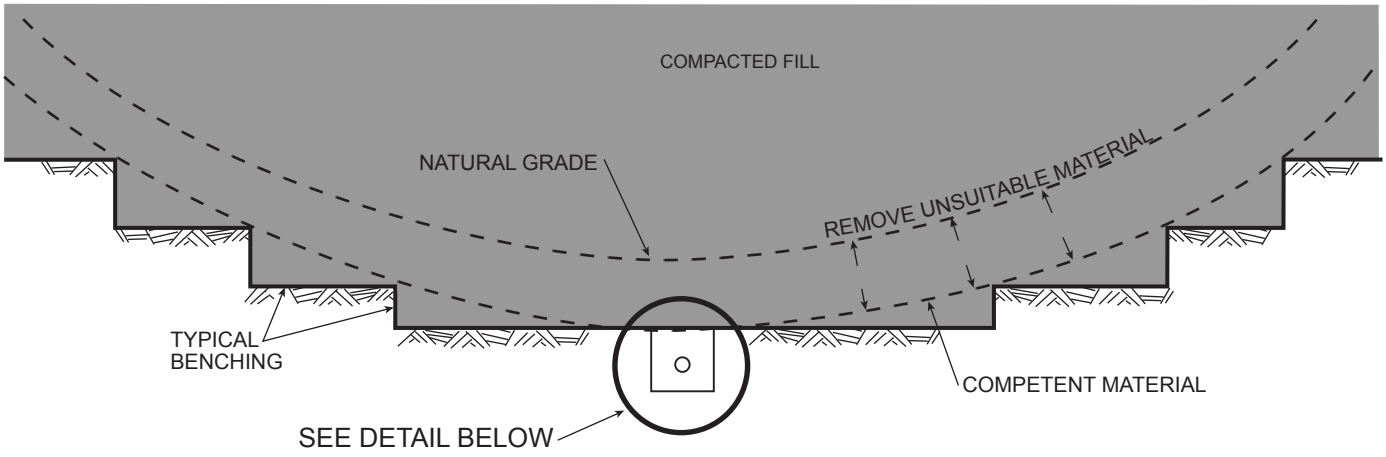
MINIMUM 4-INCH DIAMETER SCHEDULE 40 ASTM D1527 OR D1785 OR SDR 35 ASTM D2751 OR D 3034. FOR FILL DEPTH OF 90 FEET OR GREATER, USE ONLY SCHEDULE 40 OR EQUIVALENT. THERE SHALL BE A MINIMUM OF 8 UNIFORMLY SPACED PERFORATIONS PER FOOT OF PIPE INSTALLED WITH PERFORATIONS ON BOTTOM OF PIPE. PROVIDE CAP AT UPSTREAM END OF PIPE. SLOPE AT 2 PERCENT TO OUTLET PIPE.

FIGURE 5

TYPICAL STABILIZATION AND BUTTRESS FILL SUBDRAINS MINIMUM STANDARD GRADING DETAILS

NMG Geotechnical, Inc.

8/96 STAB. BUTTRESS FILL SUBDRAINS.ai



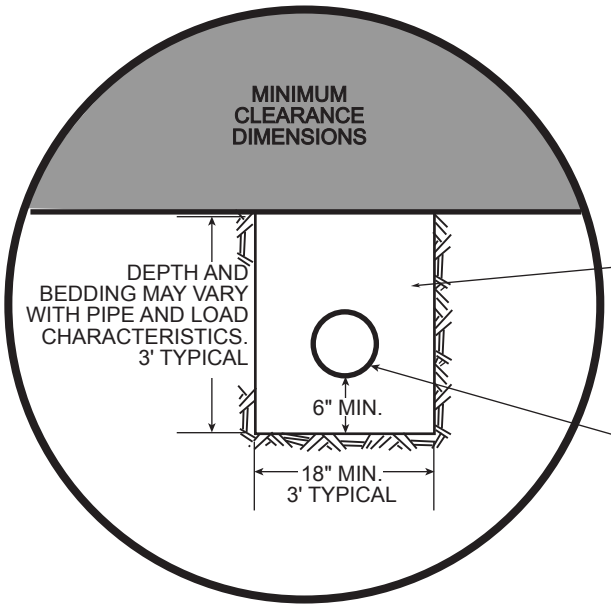
FILTER FABRICS SHALL BE PERMEABLE NON-WOVEN POLYESTER, NYLON, OR POLYPROPYLENE MATERIAL CONFORMING TO THE FOLLOWING:

1) GRAB TENSILE STRENGTH. POUNDS, MIN. ASTM D 4632.....90
2) ELONGATION, AT PEAK LOAD, PERCENT, MIN. ASTM D 4632.....50
3) PUNCTURE STRENGTH, LBS., MIN. ASTM D 3787.....45
4) COEFFICIENT OF WATER PERMITTIVITY, 1/SEC. ASTM D 4491.....>0.7
5) BURST STRENGTH, P.S.I., MIN. ASTM D 3786.....180

NOTES: DOWNSTREAM 20' OF PIPE AT OUTLET SHALL BE NON-PERFORATED AND BACKFILLED WITH FINE-GRAINED MATERIAL

PIPE SHALL BE A MINIMUM OF 4-INCH DIAMETER. FOR RUNS OF 500 FEET OR MORE, USE 6-INCH DIAMETER PIPE, OR AS RECOMMENDED BY THE GEOTECHNICAL CONSULTANT

DETAIL



FILTER MATERIAL - MINIMUM OF NINE CUBIC FEET PER FOOT OF PIPE. SEE FIGURE 5 FOR FILTER MATERIAL SPECIFICATIONS.

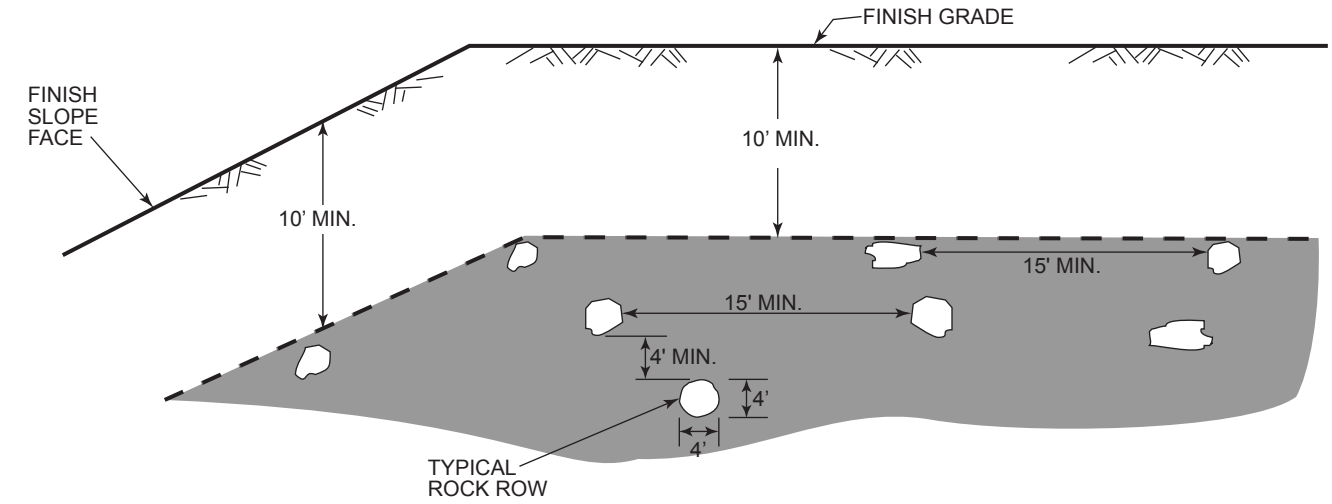
ALTERNATE: IN LIEU OF FILTER MATERIAL, NINE CUBIC FEET OF GRAVEL PER FOOT OF SUBDRAIN (WITHOUT PIPE) MAY BE ENCASED IN FILTER FABRIC. SEE FIGURE 5 TO GRAVEL SPECIFICATION. SEE ABOVE FOR FILTER FABRIC SPECIFICATION. FILTER FABRIC SHALL BE LAPPED MINIMUM OF 12 INCHES ON ALL JOINTS.

MINIMUM 4 INCH DIAMETER SCHEDULE 40 ASTM D 1527, OR D 1785, OR SDR 35 ASTM 2751 OR D 3034. FOR FILL DEPTH OF 90 FEET OR GREATER, USE ONLY SCHEDULE 40 OR APPROVED EQUIVALENT. THERE SHALL BE A MINIMUM OF 8 UNIFORMLY SPACED PERFORATIONS PER FOOT OF PIPE INSTALLED WITH PERFORATIONS ON BOTTOM OF PIPE.

FIGURE 6

TYPICAL CANYON SUBDRAIN MINIMUM STANDARD GRADING DETAILS

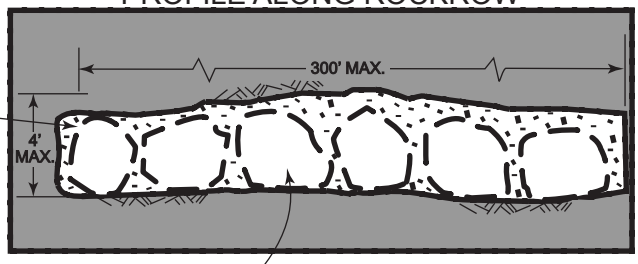
NMG Geotechnical, Inc.



SECTION THROUGH ROCKROW

FILL VOIDS WITH SELECT GRANULAR SOIL PLACED BY WATER DENSIFICATION AND MECHANICAL COMPACTION. NESTING OR STACKING OF OVERSIZE MATERIAL IS NOT ACCEPTABLE.

PROFILE ALONG ROCKROW



PLACE OVERSIZE MATERIAL IN TRENCH. FALSE SLOPE OR CUT SLOT INTO APPROVED MATERIAL. OVERSIZE MATERIAL MAY BE PLACED SIDE BY SIDE IF SIZE PERMITS. (NOT TO EXCEED A WIDTH OF 4 FEET)

NOTES:

A) OVERSIZED ROCK IS DEFINED AS LARGER THAN 12" IN SIZE (IN GREATEST DIMENSION).

B) SPACE BETWEEN ROCKROWS SHOULD BE ONE EQUIPMENT WIDTH OR A MINIMUM OF 15 FEET.

C) THE WIDTH AND HEIGHT OF THE ROCKROW SHALL BE LIMITED TO FOUR FEET AND THE LENGTH LIMITED TO 300 FEET UNLESS APPROVED OTHERWISE BY THE GEOTECHNICAL CONSULTANT. OVERSIZE SHOULD BE PLACED WITH FLATEST SIDE ON THE BOTTOM.

D) OVERSIZE MATERIAL EXCEEDING FOUR FEET MAY BE PLACED ON AN INDIVIDUAL BASIS IF APPROVED BY THE GEOTECHNICAL CONSULTANT.

E) FILLING OF VOIDS WILL REQUIRE SELECT GRANULAR SOIL (SE > 20, OR LESS THAN 20 PERCENT FINES) AS APPROVED BY THE GEOTECHNICAL CONSULTANT. VOIDS IN THE ROCKROW TO BE FILLED BY WATER DENSIFYING GRANULAR SOIL INTO PLACE ALONG WITH MECHANICAL COMPACTION EFFORT.

F) IF APPROVED BY THE GEOTECHNICAL CONSULTANT, ROCKROWS MAY BE PLACED DIRECTLY ON COMPETENT MATERIALS OR BEDROCK, PROVIDED ADEQUATE SPACE IS AVAILABLE FOR COMPACTION.

G) THE FIRST LIFT OF MATERIAL ABOVE THE ROCKROW SHALL CONSIST OF GRANULAR MATERIAL AND SHALL BE PROOF-ROLLED WITH A D-8 OR LARGER DOZER OR EQUIVALENT.

H) ROCKROWS NEAR SLOPES SHOULD BE ORIENTED PARALLEL TO SLOPE FACE.

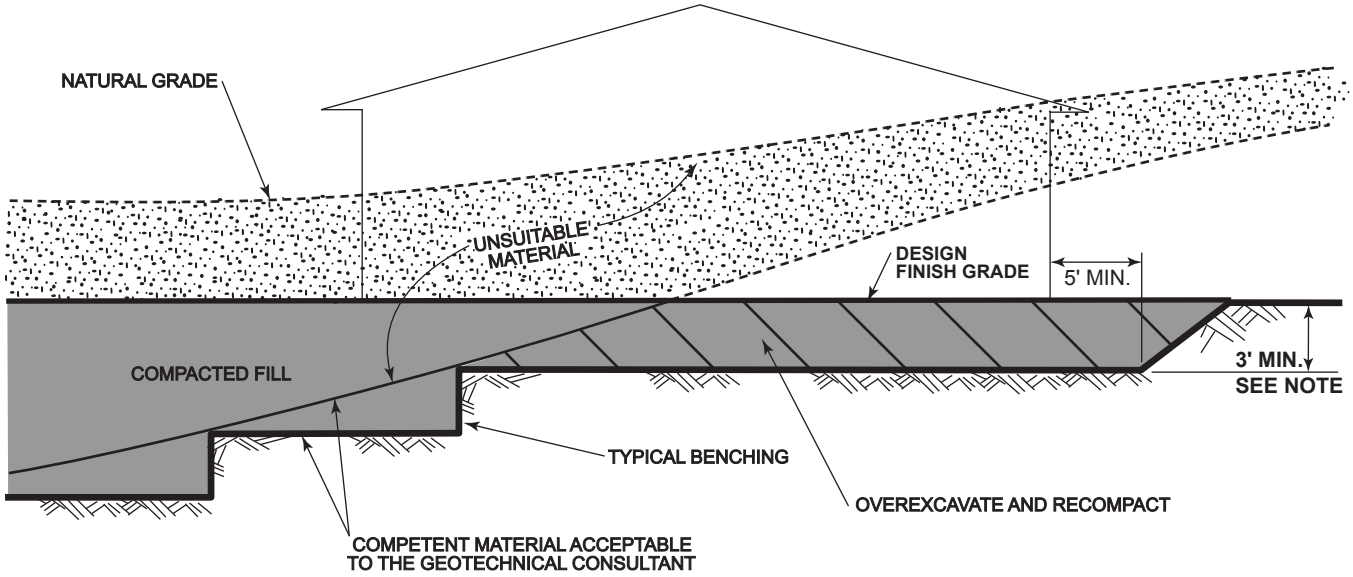
I) NESTING OR STACKING OF ROCKS IS NOT ACCEPTABLE.

FIGURE 7

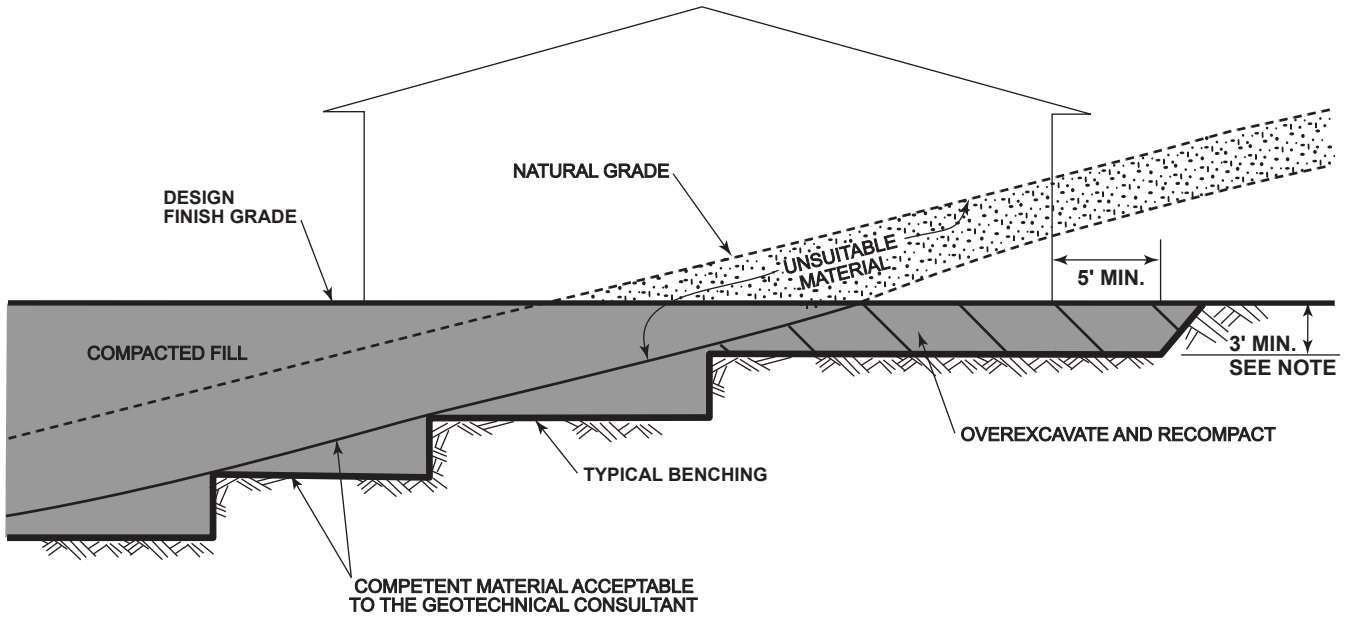
TYPICAL OVERSIZE ROCK PLACEMENT METHOD MINIMUM STANDARD GRADING DETAIL FOR STRUCTURAL FILL

NMG Geotechnical, Inc.

CUT LOT



CUT FILL LOT (TRANSITION)



NOTE: DEEPER THAN THE 3-FOOT OVEREXCAVATION MAY BE RECOMMENDED BY THE GEOTECHNICAL CONSULTANT IN STEEP TRANSITIONS.

FIGURE 8

TYPICAL OVEREXCAVATION OF DAYLIGHT LINE MINIMUM STANDARD GRADING DETAILS

NMG Geotechnical, Inc.

GEOTECHNICAL MAP
NAKASE NURSERY
CITY OF LAKE FOREST, CALIFORNIA

Project No.:16098-01 By:TM/WG
Project Name:Toll/Nakase Nursery
Date: 7/13/2018 SCALE: 1"=80

NMG Geotechnical, Inc.

PLATE 1

BAKE PARKWAY

SENIOR AFFORDABLE HOUSING

MULTI-PURPOSE WATER QUALITY BASIN

NEIGHBORHOOD 1

NEIGHBORHOOD 2

ELEMENTARY SCHOOL SITE

RANCHO PARKWAY

"BB" STREET

"C" STREET

"A" STREET

"B" STREET

"S" STREET

"T" STREET

"M" STREET

CENTRAL PARK

NEIGHBORHOOD 3

NEIGHBORHOOD 4

NEIGHBORHOOD 5

OPEN SPACE & HABITAT RESTORATION AREA

SERRANO CREEK

Cal Fish and Wildlife Boundary (CDFW)

LEGEND

EARTH UNITS - CIRCLED WHERE BURIED

Afu	UNDOCUMENTED FILL
Qsw	SLOPE/WASH MATERIAL
Qal	ALLUVIUM
Tco	CAPISTRANO FORMATION, OSO MEMBER

OTHER SYMBOLS - LOCATIONS ARE APPROXIMATE

- B-21 (T.D. 41.5' Qal@ 0-41.5' No GW ▼@43.3') — HOLLOW-STEM AUGER BORING, SHOWING TOTAL DEPTH, DEPTH TO EARTH UNIT AND GROUNDWATER
- CPT-23 (T.D. 50') — CONE PENETROMETER TEST, SHOWING TOTAL DEPTH AND DEPTH TO GROUND WATER
- T-22 (T.D. 13' Afu@ 0-0.5' Qal@ 0-13') — EXPLORATORY TEST PIT, SHOWING TOTAL DEPTH & DEPTH TO EARTH UNITS
- GEOLOGIC CONTACT, DOTTED WHERE BURIED
- E-W / 30 — BEDDING

GRAPHIC SCALE
80 0 40 80 160
(IN FEET)
1 inch = 80 ft.

PREPARED FOR:
TOLL BROTHERS, INC.
725 W. TOWN & COUNTRY ROAD, SUITE 200
ORANGE, CA 92686

PREPARED BY:
H&A
HUNSAKER & ASSOCIATES IRVINE, INC.
PLANNING • ENGINEERING • SURVEYING
Three Hughes • Irvine, CA 92618
FX: (949) 583-0759 • PH: (949) 583-1010

ASSEMBLY BILL 52 NATIVE AMERICAN CONSULTATION RECORD
Nakase Nursery/Toll Brothers Project EIR, Lake Forest, Orange County, California

Date the Sacred Lands File Search request was submitted to the Native American Heritage Commission (NAHC): February 8, 2018

Date the NAHC responded: February 9, 2018

Results of the NAHC Sacred Lands File Search: The Sacred Lands File search was completed with **negative** results for the presence of Native American cultural resources in the Area of Potential Effect (APE); however the NAHC recommended that the 20 Native American individuals listed in the table below be contacted for information regarding cultural resources that could be affected by the project.

Groups/Individuals Contacted	Date of Project Notification Letter	Date of Tribal Response to Letter	Date and Results of Follow-up Telephone Calls and/or Emails
Campo Band of Mission Indians Ralph Goff, Chairperson *Kumeyaay*	04/24/2018	No response received.	
Ewiiaapaayp Tribal Office Michael Garcia, Vice Chairperson *Kumeyaay*	04/24/2018	No response received.	
Ewiiaapaayp Tribal Office Robert Pinto, Chairperson *Kumeyaay*	04/24/2018	No response received.	
Gabrieleno Band of Mission Indians – Kizh Nation Andrew Salas, Chairperson *Gabrieleno*	04/24/2018	05/04/2018: Mr. Salas's group responded to the City of Lake Forest directly via email, stating that the project falls within their tribal territory and they would like to consult with the agency.	07/19/2018: A phone consultation was held between the City of Lake Forest, LSA, Toll Brothers, and members of the Tribe. 07/25/2018: A summary of the phone consultation meeting was sent to attendees. 08/27/2018: The City followed up with the Tribe to request the mitigation measures that the Tribe had offered to send for the project as recommendations. Mr. Salas responded that the information would be sent soon. 08/28/2018: The Administrative Specialist with the Tribe sent an email with the recommended mitigation measures attached. 06/11/2019: The City sent an email to Mr. Salas to

Groups/Individuals Contacted	Date of Project Notification Letter	Date of Tribal Response to Letter	Date and Results of Follow-up Telephone Calls and/or Emails
			summarize the timeline of the consultation process and inform the Tribe that the City had reformatted the mitigation measures for inclusion in the EIR. The City invited Mr. Salas to review the measures and respond with any questions or comments. 08/14/2019: The City sent an email to Mr. Salas and Mr. Teutimez to inform the Tribe that the City has decided to revise the mitigation measure language out of a desire for consistency with similar mitigation measures used on another large-scale development project in the City. A copy of the revised mitigation measure was attached to the e-mail. The City also informed the Tribe of the City's intent to make the Draft EIR for the project available for a 45-day public review period starting August 20, 2019. The City invited the Tribe to review the measure and consider submitting written comments during the Draft EIR's public review period. The City also invited the Tribe to respond with any questions.
Gabrieleno/Tongva San Gabriel Band of Mission Indians Anthony Morales, Chairperson *Gabrieleno*	04/24/2018	No response received.	
Gabrielino/Tongva Nation Sandonne Goad, Chairperson *Gabrielino*	04/24/2018	No response received.	
Gabrielino Tongva Indians of California Tribal Council Robert Dorame, Chairperson *Gabrielino*	04/24/2018	No response received.	
Gabrielino-Tongva Tribe Charles Alvarez *Gabrielino*	04/24/2018	No response received.	

ASSEMBLY BILL 52 NATIVE AMERICAN CONSULTATION RECORD
Nakase Nursery/Toll Brothers Project EIR, Lake Forest, Orange County, California

Groups/Individuals Contacted	Date of Project Notification Letter	Date of Tribal Response to Letter	Date and Results of Follow-up Telephone Calls and/or Emails
Jamul Indian Village Erica Pinto, Chairperson *Kumeyaay*	04/24/2018	No response received.	
Juaneño Band of Mission Indians Sonia Johnston, Chairperson *Juaneño*	04/24/2018	No response received.	
Juaneño Band of Mission Indians Acjachemen Nation – Belardes Matias Belardes, Chairperson *Juaneño*	04/24/2018	No response received.	
Juaneño Band of Mission Indians Acjachemen Nation – Romero Teresa Romero, Chairperson *Juaneño*	04/24/2018	No response received.	
La Posta Band of Mission Indians Javaughn Miller, Tribal Administrator Kumeyaay	04/24/2018	No response received.	
La Posta Band of Mission Indians Gwendolyn Parada, Chairperson *Kumeyaay*	04/24/2018	No response received.	
Manzanita Band of Kumeyaay Nation Angela Elliott Santos, Chairperson *Kumeyaay*	04/24/2018	No response received.	
Pauma Band of Luiseño Indians – Pauma & Yuima Reservation Temet Aguilar, Chairperson *Luiseño*	04/24/2018	No response received.	
San Fernando Band of Mission Indians John Valenzuela, Chairperson *Kitanemuk Serrano Tataviam*	04/24/2018	No response received.	
San Pasqual Band of Mission Indians Allen E. Lawson, Chairperson *Kumeyaay*	04/24/2018	No response received.	

ASSEMBLY BILL 52 NATIVE AMERICAN CONSULTATION RECORD
Nakase Nursery/Toll Brothers Project EIR, Lake Forest, Orange County, California

Groups/Individuals Contacted	Date of Project Notification Letter	Date of Tribal Response to Letter	Date and Results of Follow-up Telephone Calls and/or Emails
Sycuan Band of the Kumeyaay Nation Cody J. Martinez, Chairperson *Kumeyaay*	04/24/2018	No response received.	
Viejas Band of Kumeyaay Indians Robert Welch, Chairperson *Kumeyaay*	04/24/2018	No response received.	

LSA

BERKELEY
CARLSBAD
FRESNO
IRVINE
LOS ANGELES
PALM SPRINGS
POINT RICHMOND
RIVERSIDE
ROSEVILLE
SAN LUIS OBISPO

February 8, 2018

Gayle Totton, M.A., PhD.
Associate Governmental Program Analyst
Native American Heritage Commission
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691

Subject: Senate Bill 18 and Assembly Bill 52 Consultation Lists and Sacred Lands File Search Request for the proposed Nakase Nursery/Toll Brothers EIR Project in Lake Forest, Orange County, California

Dear Dr. Totton:

Attached please find a Local Government Tribal Consultation List Request and a map showing the location of the proposed Nakase Nursey/Toll Brothers EIR Project (project) in Lake Forest, Orange County, California. Specifically, the project is depicted on the United States Geological Survey *El Toro, California* 7.5-minute topographic quadrangle map in Township 06 South, Range 08 West, Sections 1 and 12, San Bernardino Baseline and Meridian.

LSA is assisting Marie Luna (mluna@lakeforestca.gov), Senior Planner for the City of Lake Forest, in preparing for Native American consultation for the project per Senate Bill 18 and Assembly Bill 52. As indicated on the attached request, please conduct a Sacred Lands File search, notify us of any Native American cultural resources that might be impacted, and include a consultation list of Native Americans that may be contacted for the Senate Bill 18 and Assembly Bill 52 Native American consultation processes.

Thank you very much for your assistance. If you have any questions or comments, please contact me at (949) 553-0666, or at kerrie.collison@lsa.net.

Best Regards,

LSA Associates, Inc.

Kerrie Collison, RPA
Archaeologist

Attachments: Local Government Tribal Consultation List Request
Figure 1 – Project Location Map

20 Executive Park, Suite 200, Irvine, California 92614 949.553.0666 www.lsa.net

Local Government Tribal Consultation List Request

Native American Heritage Commission
1550 Harbor Blvd, Suite 100
West Sacramento, CA 95691
916-373-3710
916-373-5471 – Fax
nahc@nahc.ca.gov

Type of List Requested

☒ **CEQA Tribal Consultation List (AB 52)** – ***Per Public Resources Code § 21080.3.1, subs. (b), (d), (e) and 21080.3.2***

☒ **General Plan (SB 18)** - ***Per Government Code § 65352.3.***

Local Action Type:

___ General Plan ___ General Plan Element _x_ General Plan Amendment

___ Specific Plan ___ Specific Plan Amendment ___ Pre-planning Outreach Activity

Required Information

Project Title: Nakase Nursery/Toll Brothers EIR

Local Government/Lead Agency: City of Lake Forest

Contact Person: Marie Luna, Senior Planner

Street Address: 25550 Commercentre Drive, Suite 100

City: Lake Forest **Zip:** 92630

Phone: (949) 461-3466 **Fax:**

Email: mluna@lakeforestca.gov

Specific Area Subject to Proposed Action

County: Orange **City/Community:** Lake Forest

Project Description:

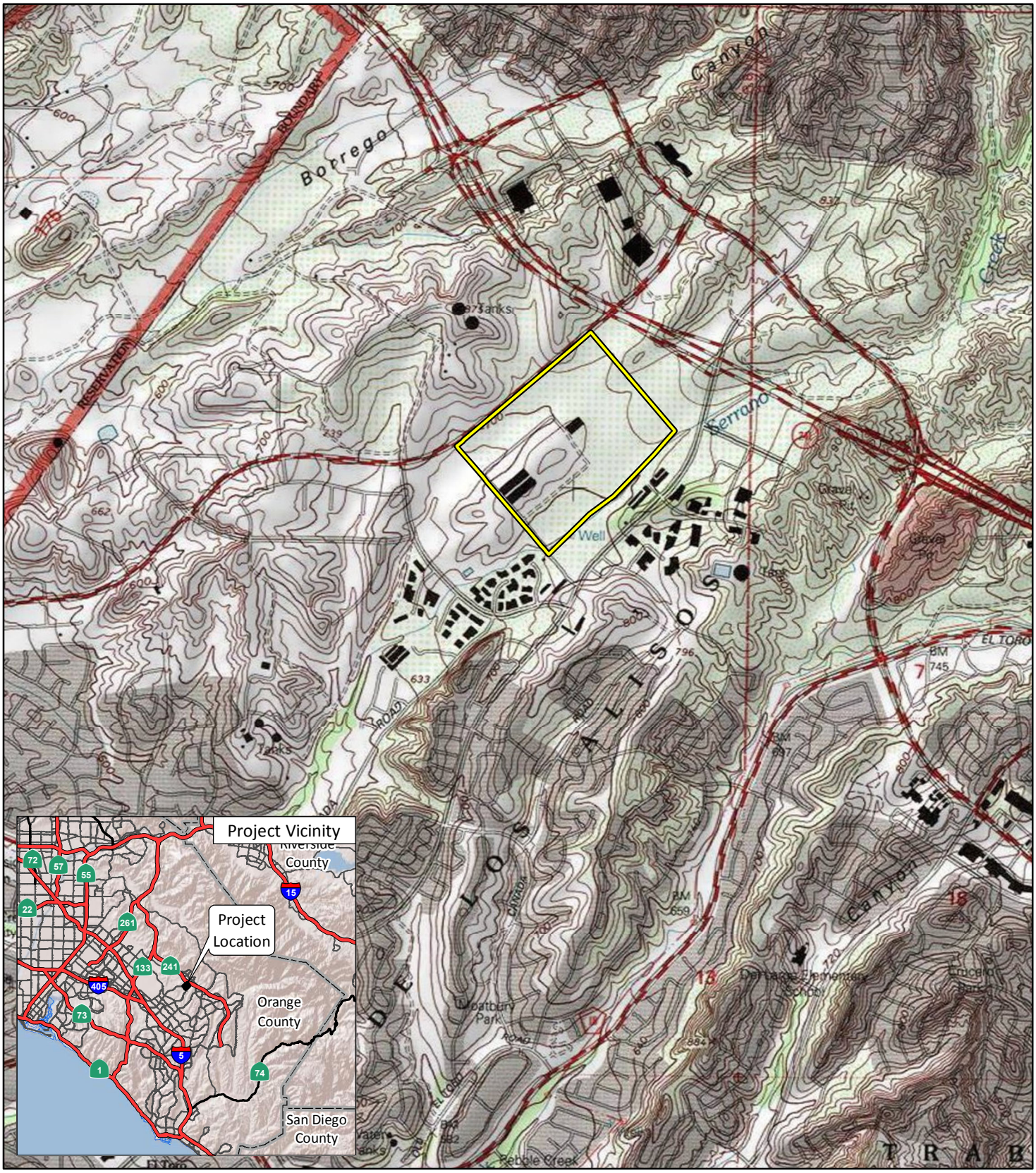
The proposed Project includes a Development Agreement, Area Plan, Master Tentative Tract Map, General Plan Amendment, and Zone Change for a parcel encompassing 122 acres on what is currently known as the Nakase Nursery (APN #612-221-01). If approved, the proposed Project would allow the development of: (1) approximately 600 to 800 residential units at a density ranging between 6 to 18 units per acre, (2) a senior affordable rental community, (3) parks, (4) open space and walking trails, (5) a recreation facility, and (6) an elementary school for approximately 1,000 kindergarten through sixth grade students. (School site locations are currently under review with the Saddleback Unified School District and California Department of Education. The school site may be located along either Bake or Rancho Parkways or a combination thereof.)

Additional Request

☒ **Sacred Lands File Search** - ***Required Information:***

USGS Quadrangle Name(s): El Toro, California

Township: 6 South **Range:** 8 West **Section(s):** 1, 12



LSA

LEGEND

Project Location

FIGURE 1

SOURCE: USGS (2017)

\\vcorp12\images\CLF1801\GIS\ProjectLocation.mxd (2/6/2018)

Nakase Nursery/Toll Brothers EIR

Project Location

NATIVE AMERICAN HERITAGE COMMISSION
Cultural and Environmental Department
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691
(916) 373-3710

February 9, 2018

Marie Luna, Senior Planner
City of Lake Forest

Sent via e-mail: mluna@lakeforestca.gov

RE: Proposed Nakase Nursery/ Toll Brothers Project, City of Lake Forest; El Toro USGS Quadrangle, Orange County, California

Dear Ms. Luna:

Attached is a Consultation List of tribes with traditional lands or cultural places located within the boundaries of the above referenced project.

Government Code §65352.3 (SB-18) **requires local governments** to consult with California Native American tribes identified by the Native American Heritage Commission (NAHC) for the purpose of avoiding, protecting, and/or mitigating impacts to cultural places in creating or amending general plans, including specific plans. As of July 1, 2015, Public Resources Code Sections 21080.3.1 and 21080.3.2 (AB-52) require **public agencies to consult** with California Native American tribes identified by the NAHC for the purpose mitigating impacts to tribal cultural resources:

> Within 14 days of determining that an application for a project is complete or a decision by a public agency to undertake a project, **the lead agency** shall provide formal notification to the designated contact of, or a tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, which shall be accomplished by means of at least one written notification that includes a brief description of the proposed project and its location, the lead agency contact information, and a notification that the California Native American tribe has 30 days to request consultation pursuant to this section. (Public Resources Code Section 21080.1(d))

The law does not preclude agencies from initiating consultation with the tribes that are culturally and traditionally affiliated with their jurisdictions. The NAHC believes that in fact that this is the best practice to ensure that tribes are consulted commensurate with the intent of the law.

In accordance with Public Resources Code Section 21080.1(d), formal notification must include a brief description of the proposed project and its location, the lead agency contact information, and a notification that the California Native American tribe has 30 days to request consultation. The NAHC requests that lead agencies include in their notifications information regarding any cultural resources assessment that has been completed on a potential "area of project affect" (APE), such as:

1. The results of any record search that may have been conducted at an Information Center of the California Historical Resources Information System (CHRIS), including, but not limited to:

   - A listing of any and all known cultural resources have already been recorded on or adjacent to the APE;
   - Copies of any and all cultural resource records and study reports that may have been provided by the Information Center as part of the records search response;
   - If the probability is low, moderate, or high that cultural resources are located in the APE.

- Whether the records search indicates a low, moderate or high probability that unrecorded cultural resources are located in the potential APE; and
- If a survey is recommended by the Information Center to determine whether previously unrecorded cultural resources are present.

2. The results of any archaeological inventory survey that was conducted, including:

   - Any report that may contain site forms, site significance, and suggested mitigation measurers.

     All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for pubic disclosure in accordance with Government Code Section 6254.10.

3. The results of any Sacred Lands File (SFL) check conducted through Native American Heritage Commission. A search of the SFL was completed with negative results.

4. Any ethnographic studies conducted for any area including all or part of the potential APE; and

5. Any geotechnical reports regarding all or part of the potential APE.

Lead agencies should be aware that records maintained by the NAHC and CHRIS is not exhaustive, and a negative response to these searches does not preclude the existence of a cultural place. A tribe may be the only source of information regarding the existence of a tribal cultural resource.

This information will aid tribes in determining whether to request formal consultation. In the case that they do, having the information beforehand well help to facilitate the consultation process.

Lead agencies or agencies potentially undertaking a project are encouraged to send more than one written notice to tribes that are traditionally and culturally affiliated to a potential APE during the 30-day notification period to ensure that the information has been received.

If you receive notification of change of addresses and phone numbers from tribes, please notify me. With your assistance we are able to assure that our consultation list contains current information.

If you have any questions, please contact me at my email address: gayle.totton@nahc.ca.gov.

Sincerely,

Gayle Totton

Gayle Totton, M.A., PhD.
Associate Government Planning Analyst
(916) 373-3714

Native American Heritage Commission
Tribal Consultation List
Orange County
2/9/2018

Campo Band of Mission Indians
Ralph Goff, Chairperson
36190 Church Road, Suite 1 — Kumeyaay
Campo, CA, 91906
Phone: (619) 478 - 9046
Fax: (619) 478-5818
rgoff@campo-nsn.gov

Ewiiaapaayp Tribal Office
Michael Garcia, Vice Chairperson
4054 Willows Road — Kumeyaay
Alpine, CA, 91901
Phone: (619) 445 - 6315
Fax: (619) 445-9126
michaelg@leaningrock.net

Ewiiaapaayp Tribal Office
Robert Pinto, Chairperson
4054 Willows Road — Kumeyaay
Alpine, CA, 91901
Phone: (619) 445 - 6315
Fax: (619) 445-9126

Gabrieleno Band of Mission Indians - Kizh Nation
Andrew Salas, Chairperson
P.O. Box 393 — Gabrieleno
Covina, CA, 91723
Phone: (626) 926 - 4131
admin@gabrielenoindians.org

Gabrieleno/Tongva San Gabriel Band of Mission Indians
Anthony Morales, Chairperson
P.O. Box 693 — Gabrieleno
San Gabriel, CA, 91778
Phone: (626) 483 - 3564
Fax: (626) 286-1262
GTTribalcouncil@aol.com

Gabrielino /Tongva Nation
Sandonne Goad, Chairperson
106 1/2 Judge John Aiso St., #231 — Gabrielino
Los Angeles, CA, 90012
Phone: (951) 807 - 0479
sgoad@gabrielino-tongva.com

Gabrielino Tongva Indians of California Tribal Council
Robert Dorame, Chairperson
P.O. Box 490 — Gabrielino
Bellflower, CA, 90707
Phone: (562) 761 - 6417
Fax: (562) 761-6417
gtongva@gmail.com

Gabrielino-Tongva Tribe
Charles Alvarez,
23454 Vanowen Street — Gabrielino
West Hills, CA, 91307
Phone: (310) 403 - 6048
roadkingcharles@aol.com

Jamul Indian Village
Erica Pinto, Chairperson
P.O. Box 612 — Kumeyaay
Jamul, CA, 91935
Phone: (619) 669 - 4785
Fax: (619) 669-4817

Juaneno Band of Mission Indians
Sonia Johnston, Chairperson
P.O. Box 25628 — Juaneno
Santa Ana, CA, 92799
sonia.johnston@sbcglobal.net

Juaneno Band of Mission Indians Acjachemen Nation - Belardes
Matias Belardes, Chairperson
32161 Avenida Los Amigos — Juaneno
San Juan Capisttrano, CA, 92675
Phone: (949) 293 - 8522

Juaneno Band of Mission Indians Acjachemen Nation - Romero
Teresa Romero, Chairperson
31411-A La Matanza Street — Juaneno
San Juan Capistrano, CA, 92675
Phone: (949) 488 - 3484
Fax: (949) 488-3294
tromero@juaneno.com

This list is current only as of the date of this document and is based on the information available to the Commission on the date it was produced. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is applicable only for consultation with Native American tribes under Government Code Sections 65352.3, 65362.4 et seq. and Public Resources Code Sections 21080.3.1 for the proposed Nakase Nursery/ Toll Brothers Project, Orange County.

Native American Heritage Commission
Tribal Consultation List
Orange County
2/9/2018

La Posta Band of Mission Indians
Javaughn Miller, Tribal Administrator
8 Crestwood Road
Boulevard, CA, 91905
Phone: (619) 478 - 2113
Fax: (619) 478-2125
jmiller@LPtribe.net
Kumeyaay

La Posta Band of Mission Indians
Gwendolyn Parada, Chairperson
8 Crestwood Road
Boulevard, CA, 91905
Phone: (619) 478 - 2113
Fax: (619) 478-2125
LP13boots@aol.com
Kumeyaay

Manzanita Band of Kumeyaay Nation
Angela Elliott Santos, Chairperson
P.O. Box 1302
Boulevard, CA, 91905
Phone: (619) 766 - 4930
Fax: (619) 766-4957
Kumeyaay

Pauma Band of Luiseno Indians - Pauma & Yuima Reservation
Temet Aguilar, Chairperson
P.O. Box 369
Pauma Valley, CA, 92061
Phone: (760) 742 - 1289
Fax: (760) 742-3422
Luiseno

San Fernando Band of Mission Indians
John Valenzuela, Chairperson
P.O. Box 221838
Newhall, CA, 91322
Phone: (760) 885 - 0955
tsen2u@hotmail.com
Kitanemuk
Serrano
Tataviam

San Pasqual Band of Mission Indians
Allen E. Lawson, Chairperson
P.O. Box 365
Valley Center, CA, 92082
Phone: (760) 749 - 3200
Fax: (760) 749-3876
allenl@sanpasqualtribe.org
Kumeyaay

Sycuan Band of the Kumeyaay Nation
Cody J. Martinez, Chairperson
1 Kwaaypaay Court
El Cajon, CA, 92019
Phone: (619) 445 - 2613
Fax: (619) 445-1927
ssilva@sycuan-nsn.gov
Kumeyaay

Viejas Band of Kumeyaay Indians
Robert Welch, Chairperson
1 Viejas Grade Road
Alpine, CA, 91901
Phone: (619) 445 - 3810
Fax: (619) 445-5337
jhagen@viejas-nsn.gov
Kumeyaay

This list is current only as of the date of this document and is based on the information available to the Commission on the date it was produced. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is applicable only for consultation with Native American tribes under Government Code Sections 65352.3, 65362.4 et seq. and Public Resources Code Sections 21080.3.1 for the proposed Nakase Nursery/ Toll Brothers Project, Orange County.

Mayor
Dr. Jim Gardner

Mayor Pro Tem
Leah Basile

Council Members
Tom Cagley
Dwight Robinson
Scott Voigts

City Manager
Debra DeBruhl Rose

April 24, 2018

Charles Alvarez
Gabrielino-Tongva Tribe
23454 Vanowen Street
West Hills, CA 91307

Dear Mr. Alvarez:

Please consider this letter as formal notification of a proposed project as required under the California Environmental Quality Act, specifically Public Resources Code (PRC) Section 21080.3.1 and Chapter 532 Statutes of 2014 (i.e., Assembly Bill 52). Please respond within 30 days, pursuant to PRC Section 21080.3.1(d), if you would like to consult on this project. Please provide a designated lead contact person if you have not provided that information to us already.

The City of Lake Forest proposes a project that will include a Development Agreement, an Area Plan, a Master Tentative Tract Map, a General Plan Amendment, and a Zone Change for a parcel encompassing 122 acres on what is currently known as the Nakase Nursery in Lake Forest, Orange County, California. Please see Figure 1 (attached) for the project's location.

If approved, the project would allow the development of: (1) approximately 600 to 800 residential units at a density ranging between 6 to 18 units per acre; (2) a senior affordable rental community; (3) parks; (4) open space and walking trails; (5) a recreation facility; and (6) an elementary school for approximately 1,000 Kindergarten through sixth grade students. School site locations are currently under review with the Saddleback Valley Unified School District and the California Department of Education. The school site may be located along either Bake or Rancho Parkways or a combination thereof.

Example Letter

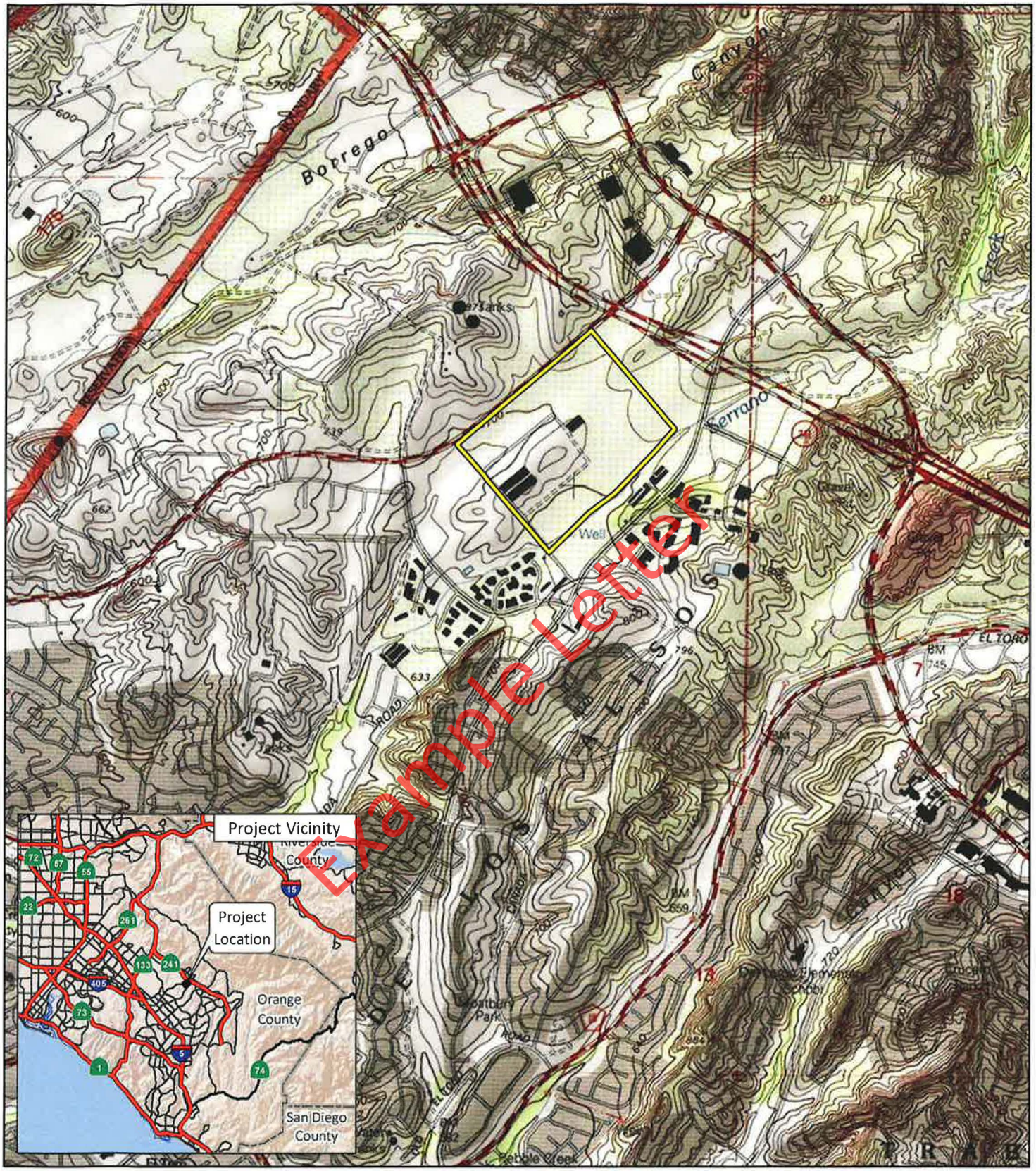
A records search for the project area was completed at the South Central Coastal Information Center of the California Historical Resources Information System at California State University, Fullerton. The records search indicated there are no known prehistoric sites within the project area. Twenty-five cultural resources are located within 0.25 mile of the project. A Sacred Lands File search requested from the Native American Heritage Commission was negative for the project area.

If you have any questions or concerns about the project, please contact Marie Luna, Senior Planner for the City of Lake Forest, via email at mluna@lakeforestca.gov or by phone at (949) 461-3466.

Sincerely,

Marie Luna
Senior Planner, City of Lake Forest

Attachment: Figure 1: Project Location Map



LSA

LEGEND

Project Location

FIGURE 1

N

0 1000 2000

FEET

SOURCE: USGS (2017)

\\vcorp12\images\CLF1801\GIS\ProjectLocation.mxd (2/6/2018)

Nakase Nursery/Toll Brothers EIR

Project Location

From: Administration Gabrieleno Indians [mailto:admin@gabrielenoindians.org]
Sent: Friday, May 04, 2018 12:20 PM
To: Luna, Marie
Subject: LSA -Nakase Nursery/Toll Brothers Projects Environmental Impact Report Lake Forest Orange County CA

Thank you for your letter dated April 19, 2018 regarding the proposed project. This project does fall in our Tribal territory, therefor our Tribal Government would like to consult with your agency.

Thank you

Sincerely,

Admin Specialist
Gabrieleno Band of Mission Indians - Kizh Nation
PO Box 393
Covina, CA 91723
Office: 844-390-0787
website: www.gabrielenoindians.org

From: Luna, Marie [mailto:mluna@lakeforestca.gov]
Sent: Wednesday, July 25, 2018 2:03 PM
To: matthew.teutimez@gabrielenoindians.org; admin@gabrielenoindians.org
Cc: Ackerman, Gayle; Wetzel, Niki; Lauffer, Amanda; Winterswyk, Alisha; Ryan Bensley
Subject: Nakase - Tribal Consultation Meeting Notes

Hi Matt,

Attached are the meeting notes from the tribal consultation on July 19, 2018.
Please review them and let me know if any edits are required. Also, please send me the mitigation measures you would like us to consider.

In addition, please send me the correct e-mail address for Dr. Gary Stickel. I have tried to send information to him twice and both times my e-mails have bounced back undelivered.

Thank you!
~Marie

Marie Swami Luna
Senior Planner
City of Lake Forest
mluna@lakeforestca.gov
949.461.3466/fax: 949.461.3511

LSA

CARLSBAD
FRESNO
IRVINE
LOS ANGELES
PALM SPRINGS
POINT RICHMOND
RIVERSIDE
ROSEVILLE
SAN LUIS OBISPO

MEMORANDUM

DATE: July 25, 2018

TO: Marie Luna, Senior Planner, City of Lake Forest

FROM: Ryan Bensley, Project Manager, LSA

SUBJECT: Tribal Consultation Call with the Gabrieleno-Kizh Nation related to the Nakase Property Area Plan

The following provides a summary of key points discussed during the City's tribal consultation call held with the Gabrieleno-Kizh Nation on July 19, 2018 related to the Nakase Property Area Plan. The call was conducted pursuant to Senate Bill 18 and Assembly Bill 52 tribal consultation requirements.

The consultation call included the following participants:

- Marie Luna, Senior Planner, City of Lake Forest
- Amanda Lauffer, Assistant Planner, City of Lake Forest
- Alisha Winterswyk, City Attorney, City of Lake Forest
- Niki Wetzl, Assistant Director of Community Development, City of Lake Forest
- Andrew Salas, Tribal Chairman, Kizh Nation
- Dr. Gary Stickel, Tribal Archaeologist, Kizh Nation
- Matt Teutimez, Tribal Biologist, Kizh Nation
- Ryan Bensley, Associate, LSA
- Ashley Davis, Principal, LSA
- Alicia Guerra, Attorney, Toll Brothers

The tribal representatives noted that the Sacred Lands File and CHRIS databases only reflect information that has been added to them. Lake Forest is between two sites that were sacred to the Gabrieleno-Kizh (the Saddleback [traditionally known by the tribe as Har-wo-vet] and geoglyphs in the Laguna Hills area [which have since been destroyed]).

Cogstones, which the tribe referred to as "sunstones," were important to the tribe's culture. Some sunstones have been found along Aliso Creek.

The tribe will provide United States Geological Survey (USGS) maps showing the waterway and other tribal cultural resources (TCRs). The information should help City staff understand how the topographic nature of this area provided for the human activity here. There were many springs in the hills. The springs were used for what the fabric of life was – trade. Every family was involved in trade activity. Trade existed because they were provided gifts (on land and ocean), compared to

other tribes. Trade did not exist strictly for sustenance or to make a living. In Taos, they have the abalone clan – they self-identified because of the abalone that came from the shores of the tribe's ancestral territory. The creeks and the drainages/waterways were all their paths. They either used the upland component or the creek itself (with boats) to transport commodities. These routes are heavily used over thousands of years. During this time, any amount of accidents can happen. Unfortunately, accidents happen and they lead to deaths. The tradition back then was to bury persons where they died. The idea is that the creator took you from the Earth in that spot so that we will honor that spot by putting the person back there. The highest numbers of random burials are along trade routes. Many times, burials are associated with waterways because of the aesthetics of the waterways – the birds singing and the willows providing shade. It makes for a nice place to pray and visit your ancestors.

So, because this project is adjacent to the historic waterways that are identified on USGS maps, the tribe has higher concerns than normal about uncovering anything. The tribe's main type of burial was cremation rather than full human burial. Cremation can still leave evidence that can be discovered – bone fragments and discoloration of the soil; oily sheen on the soil.

The tribe wants monitors on site during site disturbing activities.

The tribe (Matt) will send the City a summary of the mitigation that they would like to see incorporated into a tribal cultural resource protection plan on 7/19/18. The tribe will also provide the screenshots for the City's records.

The tribe would like to hold a follow-up call with the City after they have had a chance to review the Initial Study.

There is a wetland plant that the tribe uses to cure cancer (sweet leaf or marsh fleabane [*Pluchea Odorata*]). This water source area was thought of as sacred because this is how one of the tribe's members cured his mom of cancer and the plant came from the spring. Plant life today – where it is today – gives them an indication of where it was prehistorically. But, for the tribe, the plants provide certain indications to them.

From: Luna, Marie [mailto:mluna@lakeforestca.gov]
Sent: Tuesday, August 28, 2018 10:17 AM
To: Andrew Salas
Cc: matthew.teutimez@gabrielenoindians.org; Ryan Bensley; Ashley Davis; Winterswyk, Alisha; Administration KNRM
Subject: RE: Nakase Tribal Consultation - Mitigation Measures

No worries Andrew; we look forward to receiving your information and continuing to work with you.
My condolences to your family.

Take care,
~Marie

From: Andrew Salas [mailto:gabrielenoindians@yahoo.com]
Sent: Monday, August 27, 2018 8:55 PM
To: Luna, Marie
Cc: matthew.teutimez@gabrielenoindians.org; Ryan Bensley; Ashley Davis; Winterswyk, Alisha; Administration KNRM
Subject: Re: Nakase Tribal Consultation - Mitigation Measures

Hello Marie it's Andy sorry for the delay in responding . We had a Few deaths in the family so that kept us a little busy . I will have Matt or one of staff members forward you that mitigation and any other info needed. Again Sorry for the delay .

Sent from my iPhone

On Aug 27, 2018, at 6:21 PM, Luna, Marie <mluna@lakeforestca.gov> wrote:

> Hi Matt,
>
> I reached out to you on two prior occasions in July after our tribal consultation meeting with you over the phone on July 19, 2018, regarding the Nakase development project in the City of Lake Forest. You offered to send me the mitigation measures you would like to see implemented, and indicated you would like us to have a second consultation with you.
>
> Unfortunately, I have not received any additional communication from you, but I would like to reach out to you again as I think it's important to have your input. To facilitate your response, I am attaching documents previously e-mailed to you so that you can take a fresh look at them. They include the Initial Study, the Notice of Preparation, and a summary of our consultation with you on July 19th.
>
> If I can answer any questions, please give me a call. I look forward to hearing from you soon.
>
> Thank you!
> ~Marie

Marie Swami Luna
Senior Planner
City of Lake Forest
mluna@lakeforestca.gov
949.461.3466/fax: 949.461.3511

<Nakase Initial Study_July.pdf>

<Final Notice of Preparation.pdf>

<Final 7-19-18 Tribal Consultation Memo.pdf>

From: Administration Gabrieleno Indians [mailto:admin@gabrielenoindians.org]
Sent: Tuesday, August 28, 2018 3:58 PM
To: Luna, Marie
Cc: GAckerman@lakeforestca.gov; Wetzel, Niki; Lauffer, Amanda; Winterswyk, Alisha; Ryan Bensley; Ashley Davis; Matthew Teutimez; gabrielenoindians@yahoo.com
Subject: Re: FW: Nakase - Tribal Consultation with Gabrieleno Indians

Ms. Luna,

Thank you for your patience in this matter and we apologize for the delay in communications. Attached are the mitigation measures recommended by our Tribal Government for use with this project. If you have any questions or would like to discuss these measures further, please do not hesitate to call or email. Thank you

Sincerely,
Admin Specialist
Gabrieleno Band of Mission Indians - Kizh Nation
PO Box 393
Covina, CA 91723
Office: 844-390-0787
website: www.gabrielenoindians.org

Gabrieleno Band of Mission Indians – Kizh Nation

Protection of Tribal Cultural Resources (TCRs)

Most Important Things for Agencies to Know About AB52:

- An EIR, MND or ND can not be certified, until AB-52 tribal consultation has concluded
- Agreed mitigation measures with the tribe, MUST be recommended for inclusion in the environmental document.
- Signature confirming acceptance of these mitigation measures recommended by our Tribal Government is required within 14 days of receipt to conclude AB52 consultation.

Tribal Cultural Resources Mitigation Measures within Kizh Nation Tribal Territory:

Note: To avoid compliance issues with the following laws, all Native American Monitoring shall be conducted by a documented lineal descendant from the ancestral Tribe of the project area.

- The Native American Graves Protection and Repatriation Act (NAGPRA), Public Law - 101-601, 25 U.S.C. 3001 et seq., 104 Stat. 3048.
- CEQA Guidelines Section15064.5, PRC 5097.98 (d)(1).
- The United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP).

If you are receiving these measures, The Gabrieleño Band of Mission Indians Kizh -Nation are the direct lineal descendants of your project area. The Kizh Nation ONLY responds and consults on projects within their ANCESTRAL tribal territory. Therefore, to remain in compliance with above referenced laws and to enable our Tribe with the ability to protect and preserve our last remaining and irreplaceable Tribal Cultural Resources, it is recommended that the project applicant retain a qualified professional tribal monitor/consultant from the Gabrieleño Band of Mission Indians Kizh -Nation. The Kizh Nation possesses Tribal archives including documented historical information as well as multiple members who possess unique knowledge derived from oral tradition passed down through generations of the Tribe in order to provide the expertise needed to identify whether a project is located within a culturally sensitive area given its proximity to village areas, commerce areas, recreation areas, ceremonial areas, and burial locations.

Native American Heritage Commission (NAHC) Guidelines for Native American Monitors/Consultants (approved 9/13/05): By acting as a liaison between Native American, archaeologist, developers, contactors and public agency, a Native American monitor/consultant can ensure that cultural features are treated appropriately from the Native American point of view. This can help others involved in a project to coordinate mitigation measures. These guidelines are intended to provide prospective monitors/consultants, and people who hire monitors/consultants, with an understanding of the scope and extant of knowledge that should be expected.

Mitigation Guidelines for Tribal Cultural Resources (TCRs): CEQA now defines TCRs as an independent element separate from archaeological resources. Environmental documents shall address a separate Tribal Cultural Resources section that includes a thorough analysis of the impacts to only TCRs and includes separate and independent mitigation measures created with tribal input under AB-52 consultations. Therefore, all agreements, mitigation, and conditions of approval regarding TCRs shall be handled solely with the Tribal Government and conversely all agreements, mitigation, and conditions of approval regarding Archaeological Resources shall be handled by an Archaeological resource company.

Retain a Native American Monitor/Consultant: The Project Applicant shall be required to retain and compensate for the services of a Tribal monitor/consultant who is both approved by the Gabrieleño Band of Mission Indians-Kizh Nation Tribal Government and is listed under the NAHC's Tribal Contact list for the area of the project location. This list is provided by the NAHC. The monitor/consultant will only be present on-site during the construction phases that involve ground disturbing activities. Ground disturbing activities are defined by the Gabrieleño Band of Mission Indians-Kizh Nation as activities that may include, but are not limited to, pavement removal, pot-holing or auguring, grubbing, tree removals, boring, grading, excavation, drilling, and trenching, within the project area. The Tribal Monitor/consultant will complete daily monitoring logs that will provide descriptions of the day's activities, including construction activities, locations, soil, and any cultural materials identified. The on-site monitoring shall end when the project site grading and excavation activities are completed, or when the Tribal Representatives and monitor/consultant have indicated that the site has a low potential for impacting Tribal Cultural Resources.

Unanticipated Discovery of Tribal Cultural and Archaeological Resources: Upon discovery of any archaeological resources, cease construction activities in the immediate vicinity of the find until the find can be assessed. All archaeological resources unearthed by project construction activities shall be evaluated by the qualified archaeologist and tribal monitor/consultant approved by the Gabrieleño Band of Mission Indians-Kizh Nation. If the resources are Native American in origin, the Gabrieleño Band of Mission Indians-Kizh Nation shall coordinate with the landowner regarding treatment and curation of these resources. Typically, the Tribe will request reburial or preservation for educational purposes. Work may continue on other parts of the project while evaluation and, if necessary, mitigation takes place (CEQA Guidelines Section15064.5 [f]). If a resource is determined by the qualified archaeologist to constitute a "historical resource" or "unique archaeological resource", time allotment and funding sufficient to allow for implementation of avoidance measures, or appropriate mitigation, must be available. The treatment plan established for the resources shall be in accordance with CEQA Guidelines Section 15064.5(f) for historical resources and

Public Resources Code Sections 21083.2(b) for unique archaeological resources. Preservation in place (i.e., avoidance) is the preferred manner of treatment. If preservation in place is not feasible, treatment may include implementation of archaeological data recovery excavations to remove the resource along with subsequent laboratory processing and analysis. Any historic archaeological material that is not Native American in origin shall be curated at a public, non-profit institution with a research interest in the materials, such as the Natural History Museum of Los Angeles County or the Fowler Museum, if such an institution agrees to accept the material. If no institution accepts the archaeological material, they shall be offered to a local school or historical society in the area for educational purposes.

Unanticipated Discovery of Human Remains and Associated Funerary Objects:
Native American human remains are defined in PRC 5097.98 (d)(1) as an inhumation or cremation, and in any state of decomposition or skeletal completeness. Funerary objects, called associated grave goods in PRC 5097.98, are also to be treated according to this statute. Health and Safety Code 7050.5 dictates that any discoveries of human skeletal material shall be immediately reported to the County Coroner and excavation halted until the coroner has determined the nature of the remains. If the coroner recognizes the human remains to be those of a Native American or has reason to believe that they are those of a Native American, he or she shall contact, by telephone within 24 hours, the Native American Heritage Commission (NAHC) and PRC 5097.98 shall be followed.

Resource Assessment & Continuation of Work Protocol:

Upon discovery, the tribal and/or archaeological monitor/consultant/consultant will immediately divert work at minimum of 50 feet and place an exclusion zone around the burial. The monitor/consultant(s) will then notify the Tribe, the qualified lead archaeologist, and the construction manager who will call the coroner. Work will continue to be diverted while the coroner determines whether the remains are Native American. The discovery is to be kept confidential and secure to prevent any further disturbance. If the finds are determined to be Native American, the coroner will notify the NAHC as mandated by state law who will then appoint a Most Likely Descendent (MLD).

Kizh-Gabrieleno Procedures for burials and funerary remains:

If the Gabrieleno Band of Mission Indians – Kizh Nation is designated MLD, the following treatment measures shall be implemented. To the Tribe, the term "human remains" encompasses more than human bones. In ancient as well as historic times, Tribal Traditions included, but were not limited to, the burial of funerary objects with the deceased, and the ceremonial burning of human remains. These remains are to be treated in the same manner as bone fragments that remain intact. Associated funerary objects are objects that, as part of the death rite or ceremony of a culture, are reasonably believed to have been placed with individual human remains either at the time of death or later; other items made exclusively for burial purposes or to contain human remains can also be considered as associated funerary objects.

Treatment Measures:

Prior to the continuation of ground disturbing activities, the land owner shall arrange a designated site location within the footprint of the project for the respectful reburial of the human remains and/or ceremonial objects. In the case where discovered human remains cannot be fully documented and recovered on the same day, the remains will be covered with muslin cloth and a steel plate that can be moved by heavy equipment placed over the excavation opening to protect the remains. If this type of steel plate is not available, a 24-hour guard should be posted outside of working hours. The Tribe will make every effort to recommend diverting the project and keeping the remains in situ and protected. If the project cannot be diverted, it may be determined that burials will be removed. The Tribe will work closely with the qualified archaeologist to ensure that the excavation is treated carefully, ethically and respectfully. If data recovery is approved by the Tribe, documentation shall be taken which includes at a minimum detailed descriptive notes and sketches. Additional types of documentation shall be approved by the Tribe for data recovery purposes. Cremations will either be removed in bulk or by means as necessary to ensure completely recovery of all material. If the discovery of human remains includes four or more burials, the location is considered a cemetery and a separate treatment plan shall be created. Once complete, a final report of all activities is to be submitted to the Tribe and the NAHC. The Tribe does NOT authorize any scientific study or the utilization of any invasive diagnostics on human remains.

Each occurrence of human remains and associated funerary objects will be stored using opaque cloth bags. All human remains, funerary objects, sacred objects and objects of cultural patrimony will be removed to a secure container on site if possible. These items should be retained and reburied within six months of recovery. The site of reburial/repatriation shall be on the project site but at a location mitigated between the Tribe and the landowner at a site to be protected in perpetuity. There shall be no publicity regarding any cultural materials recovered.

Professional Standards: Archaeological and Native American monitoring and excavation during construction projects will be consistent with current professional standards. All feasible care to avoid any unnecessary disturbance, physical modification, or separation of human remains and associated funerary objects shall be taken. Principal personnel must meet the Secretary of Interior standards for archaeology and have a minimum of 10 years of experience as a principal investigator working with Native American archaeological sites in southern California. The Qualified Archaeologist shall ensure that all other personnel are appropriately trained and qualified.

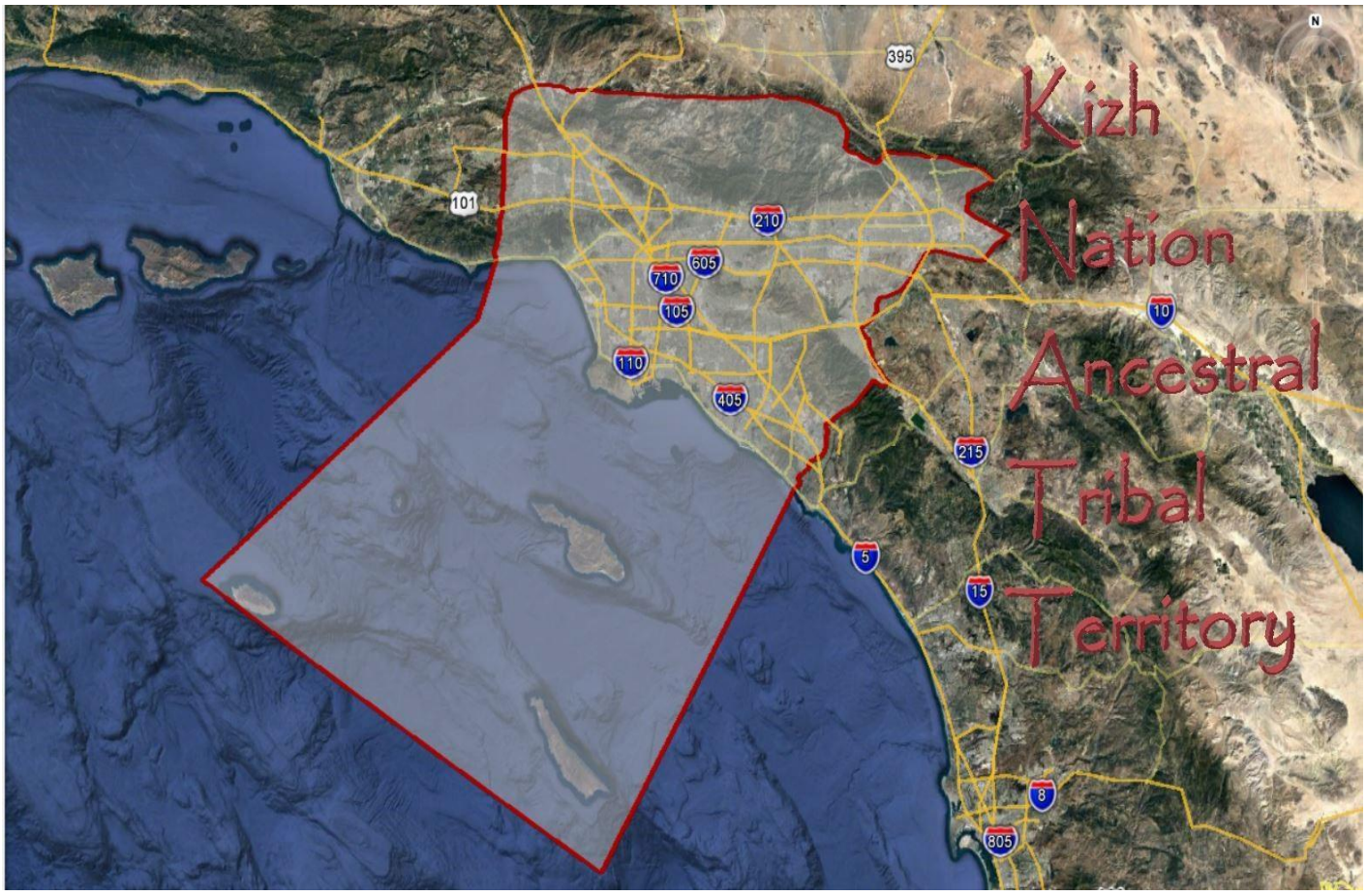
Acceptance of Tribal Government Recommended Mitigation Measures:

By _____ Date: _____
Lead Agency Representative Signature

Revised: August 2018

Attachment A

Kizh Nation Ancestral Tribal Territory extended along the coast from Malibu Creek in Los Angeles County down to Aliso Creek in Orange County and encompassed the Channel Islands of Catalina (Pimugna), San Nicolas (Haraasnga), and San Clemente (Kiinkenga). Our inland border was the San Gabriel Mountains (Hidakupa) and eastwardly our territory extended to parts of San Bernardino (Waatsngna), Orange, and Riverside counties.



From: Luna, Marie [mailto:mluna@lakeforestca.gov]
Sent: Tuesday, June 11, 2019 5:49 PM
To: Andrew Salas
Cc: Nicole Dubois; Ryan Bensley; Winterswyk, Alisha; Ackerman, Gayle; Wetzel, Niki
Subject: Nakase - Tribal Mitigation Measures for the Nakase Project proposed in the City of Lake Forest

Dear Mr. Salas,

On July 19, 2018, we engaged in a tribal consultation call related to the Nakase Property Area Plan with you and other representatives from the Gabrieleno-Kizh Nation. The call was conducted pursuant to Senate Bill 18 and Assembly Bill 52 tribal consultation requirements. On August 28, 2018, we received a list of mitigation measures from you for incorporation into the project environmental impact report (EIR). The project EIR is being prepared by LSA, the City's environmental consultant for the Nakase project. The Nakase EIR will provide environmental documentation related to project applications filed by Toll Brothers for an Area Plan , a General Plan Amendment (GPA 05-17-5033), and a Zone Change (ZA 05-17-5034). We have reviewed the mitigation measures you provided and reformatted them for inclusion in the EIR. Please review the mitigation measures attached, and let me know if you have any questions or comments.

Thank you,
~Marie

Marie Luna
Senior Planner
City of Lake Forest
mluna@lakeforestca.gov
949.461.3466/fax: 949.461.3511

GABRIELEÑO BAND OF MISSION INDIANS – KIZH NATION
MITIGATION MEASURES

MM TCR-1: The Project Applicant shall be required to retain the services of a qualified Native American Monitor(s) (Monitor) approved by the Tribal Representatives from the Gabrieleño Band of Mission Indians–Kizh Nation. The Monitor must be present during all construction related ground disturbance activities. Ground disturbance is defined as rough grading and remediation excavation activities within the Project area. The Monitor will complete monitoring logs on a daily basis. The logs will provide descriptions of the daily activities, including construction activities, locations, soil, and any cultural materials identified. The on-site monitoring shall end at the earliest of when either the Project Site rough grading and remediation excavation activities are completed, or when the Tribal Representatives and monitor have indicated that the site has a low potential for archeological resources.

MM TCR-2: All archaeological resources unearthed by Project construction activities shall be evaluated by the Monitor. If the resources are Native American in origin, the Tribe shall coordinate with the landowner regarding treatment and curation of these resources. The preferred treatment will be reburial or preservation in place.

MM TCR-3: If any human skeletal material or related funerary objects are discovered during ground disturbance, the Monitor will immediately divert work at minimum of 50 feet and place an exclusion zone around the burial. The Monitor will then notify the construction manager who will call the coroner. Work will continue to be diverted while the coroner determines whether the remains are Native American. The discovery is to be kept confidential and secure to prevent any further disturbance. If the remains are Native American, the coroner will notify the Native American Heritage Commission (NAHC) as mandated by state law who will then appoint a Most Likely Descendent. In the case where discovered human remains cannot be fully documented and recovered on the same day, the remains will be covered with muslin cloth and a steel plate that can be moved by heavy equipment placed over the excavation opening to protect the remains. The preferred treatment will be to keep the remains in situ and protected. If that treatment is not feasible, as determined by the applicant, the burials may be removed. The Tribe will work closely with the Qualified Archaeologist to ensure that the excavation is treated carefully, ethically, and respectfully. If data recovery is approved by the Tribe, documentation shall be taken which includes at a minimum detailed descriptive notes and sketches. Additional types of documentation shall be approved by the Tribe for data recovery purposes. Cremations will either be removed in bulk or by means as necessary to ensure complete recovery of all material. Once complete, a final report of all activities is to be submitted to the NAHC.

From: Luna, Marie
To: Matthew.Teutimez@gabrielenoindians.org; Andrew Salas
Cc: Nicole Dubois; Ryan Bensley; Winterswyk, Alisha
Subject: Nakase - Tribal Mitigation Measures
Date: Wednesday, August 14, 2019 5:23:47 PM
Attachments: Mitigation Measure 4.5.1.docx

Hello Matt and Andrew,

As you may recall, we held a tribal consultation via conference call with you and other representatives from the Gabrieleno-Kizh Nation on July 19, 2018 regarding proposed development on the Nakase property in the City of Lake Forest. The Nakase property is approximately a 122-acre site located at the intersection of Bake Parkway and Rancho Parkway at the west and north, respectively. The call was conducted pursuant to Senate Bill 18 and Assembly Bill 52 tribal consultation requirements.

On August 28, 2018, we received a list of mitigation measures from you for incorporation into the project environmental impact report (EIR). The project EIR is being prepared by LSA, the City's environmental consultant for the Nakase project. The Nakase EIR will provide environmental documentation related to project applications filed by Toll Brothers for an Area Plan , a General Plan Amendment (GPA 05-17-5033), and a Zone Change (ZA 05-17-5034). We reviewed the mitigation measures you provided, reformatted them for inclusion in the EIR, and sent them to you for input on June 11, 2019. We did not receive any return comments from you, and upon closer review we decided to revise the mitigation measures we had previously sent. The reason for revising the mitigation measures was due to our desire for consistency with similar mitigation measures used on another large-scale development project (Portola Center) also located in the City of Lake Forest. A copy of the revised mitigation measures are attached.

We would like to make you aware of these revised mitigation measures, and let you know that they will appear in the Draft EIR which will be made available for public review on Tuesday, August 20, 2019. You will receive a copy of the Draft EIR, and will have an opportunity to provide written comments on these mitigation measures and/or any other aspects of the Draft EIR. The Draft EIR will be available for public review for the legally required 45-day review period. During that time we ask that you submit written comments to me at the City of Lake Forest. In the meantime, if you have any questions, please call or e-mail me.

Thank you!
~Marie

Marie Luna
Senior Planner
City of Lake Forest
mluna@lakeforestca.gov
949.461.3466/fax: 949.461.3511

Mitigation Measure 4.5.1 **Archaeological Resources, Tribal Cultural Resources, and Human Remains.** Prior to issuance of a grading permit for any site within the Project area, a qualified archaeologist shall be retained by the Applicant for that grading permit to provide professional archaeological services. The archaeologist shall be present at the pre-grading conference to establish procedures for archaeological resource surveillance. Those procedures shall include provisions for temporarily halting or redirecting work to permit sampling, identification, and evaluation of resources deemed by the archaeologist to potentially be historical resources or unique archaeological resources under the California Environmental Quality Act (CEQA). The archaeologist also shall conduct on-site archaeological monitoring for the grading operation. Should historical resources or unique archaeological resources be discovered during the grading operation, grading activities shall be modified to allow expeditious and proper analysis and/or salvage of the resources. Disposition of the resources shall be within the discretion of the City of Lake Forest.

Prior to Approval of Grading or Improvement plans, the Applicant shall implement a grading monitoring plan to mitigate potential impacts to undiscovered buried archaeological resources and tribal cultural resources on the Nakase Nursery/Toll Brothers Project to the satisfaction of the City of Lake Forest. This program shall include, but shall not be limited to, the following actions:

1. Provide evidence to the Lead Agency that a qualified archaeologist has been contracted to implement a grading monitoring program to the satisfaction of the City of Lake Forest. A letter from the Project Archaeologist shall be submitted to the City of Lake Forest Director of Community Development. The letter shall include the following guidelines:

    a. The consulting archaeologist shall contract with a Native American monitor to be involved with the grading monitoring program.

    b. The qualified archaeologist/historian and Native American monitor shall attend the pre-grading meeting with the contractors to explain and coordinate the requirements of the monitoring program.

    c. The consulting archaeologist shall monitor all areas identified for development.

d. An adequate number of monitors (archaeological/ historical/Native American) shall be present to ensure that all earth-moving activities are observed and shall be on site during all grading activities.

e. During the original cutting (used in this mitigation to refer to the “cut” part of “cut and fill”) of previously undisturbed deposits, the archaeological monitor(s) and Native American monitor(s) shall be on site full time. Inspections will vary based on the rate of excavation, the materials excavated, and the presence and abundance of artifacts and features. The frequency and location of inspections shall be determined by the Principal Investigator.

f. During the cutting of previously disturbed deposits, the archaeological monitor(s) and Native American monitor(s) shall be on site as determined by the Principal Investigator of the excavations. Inspections will vary based on the rate of excavation, the materials excavated, and the presence and abundance of artifacts and features. The frequency and location of inspections shall be determined by the Principal Investigator in consultation with the Native American monitor.

g. Isolates and clearly non-significant deposits shall be minimally documented in the field, and the monitored grading can then proceed.

h. In the event that previously unidentified, potentially significant cultural resources are discovered, the archaeologist shall have the authority to divert or temporarily halt ground disturbance operations in the area of discovery to allow for evaluation. The archaeologist shall contact the City of Lake Forest Director of Community Development at the time of discovery. Disposition of the resources shall be within the discretion of the City of Lake Forest. For significant cultural resources, a Research Design and Data Recovery Program to mitigate impacts shall be prepared by the consulting archaeologist, then carried out using professional archaeological methods.

i. If any human bones are discovered, the Principal Investigator shall contact the County Coroner. In the event the remains are determined to be of Native American origin, the Most Likely Descendant, as identified by the

Native American Heritage Commission, shall be contacted in order to determine proper treatment and disposition of the remains.

j. Before construction activities are allowed to resume in the affected area, the artifacts shall be recovered and features recorded using professional archaeological methods. The Principal Investigator shall determine the amount of material to be recovered for an adequate artifact sample for analysis.

k. In the event that previously unidentified cultural resources are discovered, all cultural material collected during the grading monitoring program shall be processed and curated at a facility that meets federal standards per 36 CFR Part 79, and therefore shall be professionally curated and made available to other archaeologists/researchers for further study. The collections and associated records shall be transferred, including title, to the John D. Cooper Archaeological and Paleontological Curation Center, to be accompanied by payment of the fees necessary for permanent curation. Evidence shall be in the form of a letter from the curation facility identifying that archaeological materials have been received and that all fees have been paid.

l. In the event that previously unidentified cultural resources are discovered, a report documenting the field and analysis results and interpreting the artifact and research data within the research context shall be completed and submitted to the satisfaction of the City of Lake Forest prior to the issuance of any building permits. The report shall include California Department of Parks and Recreation Primary and Archaeological Site Forms.

m. In the event that no cultural resources are discovered, a brief letter to that effect shall be sent to the City of Lake Forest by the consulting archaeologist that the grading monitoring activities have been completed.

2. Provide evidence to the City of Lake Forest that the following notes have been placed on the Grading Plan:

   a. The qualified archaeologist/historian and Native American monitor shall attend the pre-construction meeting with the

contractors to explain and coordinate the requirements of the monitoring program.

b. During the original cutting of previously undisturbed deposits, the archaeological monitor(s) and Native American monitor(s) shall be on site to perform full-time monitoring as determined by the Principal Investigator of the excavations. The frequency of inspections shall depend on the rate of excavation, the materials excavated, and the presence and abundance of artifacts and features.

c. During the cutting of previously disturbed deposits, the archaeological monitor(s) and Native American monitor(s) shall be on site as determined by the Principal Investigator of the excavations. Inspections will vary based on the rate of excavation, the materials excavated, and the presence and abundance of artifacts and features. The frequency and location of inspections shall be determined by the Principal Investigator in consultation with the Native American monitor.

d. In the event that previously unidentified, potentially significant cultural resources are discovered, the archaeologist shall have the authority to divert or temporarily halt ground disturbance operations in the area of discovery to allow for evaluation. The archaeologist shall contact the City of Lake Forest Director of Community Development at the time of discovery. Disposition of the resources shall be within the discretion of the City of Lake Forest. For significant cultural resources, a Research Design and Data Recovery Program to mitigate impacts shall be prepared by the consulting archaeologist, then carried out using professional archaeological methods.

e. The consulting archaeologist shall monitor all areas identified for development.

f. If any human bones are discovered, the Principal Investigator shall contact the County Coroner. In the event the remains are determined to be of Native American origin, the Most Likely Descendant, as identified by the Native American Heritage Commission, shall be contacted in order to determine proper treatment and disposition of the remains.

g. Prior to rough grading inspection sign-off, provide evidence that the field grading monitoring activities have been completed to the satisfaction of the City of Lake Forest. Evidence shall be in the form of a letter from the Project Archaeologist.

h. Prior to final grading release, submit to the satisfaction of the City of Lake Forest a final report that documents the results, analysis, and conclusions of all phases of the Archaeological Monitoring Program. The report shall also include the following:

    1) California Department of Parks and Recreation Primary and Archaeological Site Forms.

    2) Evidence that all cultural materials collected during the grading monitoring program have been curated, and therefore shall be professionally curated and made available to other archaeologists/researchers for further study. The collections and associated records shall be transferred, including title, to the John D. Cooper Archaeological and Paleontological Curation Center, to be accompanied by payment of the fees necessary for permanent curation. Evidence shall be in the form of a letter from the curation facility identifying that archaeological materials have been received and that all fees have been paid.

3. In the event that no cultural resources are discovered, a brief letter to that effect shall be sent to the City of Lake Forest by the consulting archaeologist that the grading monitoring activities have been completed.

4. The qualified archaeologist retained shall prepare monthly progress reports to be filed with the site developer(s) and the City of Lake Forest.

5. Artifacts recovered shall be prepared, identified, and cataloged before donation to the accredited repository designated by the City of Lake Forest. Any artifacts determined to be insignificant shall be offered to local schools for use in educational programs.

6. The qualified archaeologist retained shall prepare a final report to be filed with the site developer(s) and the City of Lake Forest. The report shall include a list of specimens recovered,

documentation of each locality, and interpretation of artifacts recovered, and shall include all specialists' reports as appendices.

Nakase Property

AIR QUALITY IMPACT ANALYSIS

CITY OF LAKE FOREST

PREPARED BY:

Haseeb Qureshi
hqureshi@urbanxroads.com
(949) 336-5987

Alyssa Tamase
atamase@urbanxroads.com
(949) 336-5988

July 9, 2019 (Revised)
MAY 13, 2019

TABLE OF CONTENTS

TABLE OF CONTENTS I
APPENDICES II
LIST OF EXHIBITS II
LIST OF TABLES II
LIST OF ABBREVIATED TERMS I
EXECUTIVE SUMMARY 1
Summary of CEQA Significance Findings & Mitigation Measures 1
1 INTRODUCTION 3
1.1 Site Location 3
1.2 Project Description 3
1.3 Standard Regulatory Requirements 6
1.4 Project Design Features 6
1.5 Construction-Source and Operational-Source Air Pollutant Emissions Mitigation Measures 7
2 AIR QUALITY SETTING 9
2.1 South Coast Air Basin 9
2.2 Regional Climate 9
2.3 Wind Patterns and Project Location 11
2.4 Existing Air Quality 11
2.5 Regional Air Quality 14
2.6 Local Air Quality 14
2.7 Regulatory Background 20
2.8 Existing Project Site Air Quality Conditions 21
3 PROJECT AIR QUALITY IMPACT 23
3.1 Introduction 23
3.2 Standards of Significance 23
3.3 Project-Related Sources of Potential Impact 24
3.4 Construction Emissions 24
3.5 Operational Emissions 27
3.6 Comparison to the Currently Approved General Plan Use 30
3.7 Localized Significance - Construction Activity 31
3.8 Localized Significance – Long-Term Operational Activity 35
3.9 CO “Hot Spot” Analysis 35
3.10 Air Quality Management Planning 38
3.11 Potential Impacts to Sensitive Receptors 40
3.12 Odors 40
3.13 Cumulative Impacts 41
4 FINDINGS & CONCLUSIONS 44
5 REFERENCES 46
6 CERTIFICATION 48

APPENDICES

APPENDIX 2.1: STATE/FEDERAL ATTAINMENT STATUS OF CRITERIA POLLUTANTS
APPENDIX 3.1: CALEEMOD CONSTRUCTION (UNMITIGATED) EMISSIONS MODEL OUTPUTS
APPENDIX 3.2: CALEEMOD OPERATIONAL (OTHER USES - WITH PROJECT DESIGN FEATURES) EMISSIONS MODEL OUTPUTS
APPENDIX 3.3: CALEEMOD OPERATIONAL (RESIDENTIAL USES - WITH PROJECT DESIGN FEATURES) EMISSIONS MODEL OUTPUTS
APPENDIX 3.4: CALEEMOD OPERATIONAL (EXISTING) EMISSIONS MODEL OUTPUTS

LIST OF EXHIBITS

EXHIBIT 1-A: LOCATION MAP 4
EXHIBIT 1-B: SITE PLAN 5
EXHIBIT 3-A: RECEPTOR LOCATIONS 34

LIST OF TABLES

TABLE ES-1: SUMMARY OF CEQA SIGNIFICANCE FINDINGS 1
TABLE 2-1: AMBIENT AIR QUALITY STANDARDS (1 OF 2) 12
TABLE 2-1: AMBIENT AIR QUALITY STANDARDS (1 OF 2) 13
TABLE 2-2: ATTAINMENT STATUS OF CRITERIA POLLUTANTS IN THE SCAB 14
TABLE 2-3: PROJECT AREA AIR QUALITY MONITORING SUMMARY 2015-2017 15
TABLE 2-4: EXISTING DEVELOPMENT 21
TABLE 3-1: MAXIMUM DAILY EMISSIONS THRESHOLDS (1 OF 2) 23
TABLE 3-1: MAXIMUM DAILY EMISSIONS THRESHOLDS (2 OF 2) 24
TABLE 3-2: CONSTRUCTION DURATION 25
TABLE 3-3: CONSTRUCTION EQUIPMENT ASSUMPTIONS 26
TABLE 3-4: EMISSIONS SUMMARY OF CONSTRUCTION 27
TABLE 3-5: SUMMARY OF OPERATIONAL EMISSIONS (1 OF 2) 29
TABLE 3-5: SUMMARY OF OPERATIONAL EMISSIONS (2 OF 2) 30
TABLE 3-6: OPERATIONAL EMISSIONS COMPARISON (CURRENTLY APPROVED USE VS PROPOSED PROJECT) 31
TABLE 3-7: MAXIMUM DAILY DISTURBED-ACREAGE 32
TABLE 3-8: LOCALIZED SIGNIFICANCE SUMMARY CONSTRUCTION 33
TABLE 3-9: LOCALIZED SIGNIFICANCE SUMMARY OF OPERATIONS (PROJECT) 35
TABLE 3-10: CO MODEL RESULTS 36
TABLE 3-11: TRAFFIC VOLUMES FOR INTERSECTIONS EVALUATED IN AQMP 37
TABLE 3-12: PROJECT (WITHOUT PORTOLA) TRAFFIC VOLUMES 38
TABLE 3-13: PROJECT (WITH PORTOLA) TRAFFIC VOLUMES 38

LIST OF ABBREVIATED TERMS

(1)	Reference
µg/m^3	Microgram per Cubic Meter
AADT	Annual Average Daily Trips
AQIA	Air Quality Impact Analysis
AQMD	Air Quality Management District
AQMP	Air Quality Management Plan
ARB	California Air Resources Board
BACM	Best Available Control Measures
CAA	Federal Clean Air Act
CAAQS	California Ambient Air Quality Standards
CalEEMod	California Emissions Estimator Model
Caltrans	California Department of Transportation
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CO	Carbon Monoxide
EPA	Environmental Protection Agency
LST	Localized Significance Threshold
NAAQS	National Ambient Air Quality Standards
NO_2	Nitrogen Dioxide
NO_X	Oxides of Nitrogen
PDF	Project Design Features
Pb	Lead
PM_{10}	Particulate Matter 10 microns in diameter or less
$PM_{2.5}$	Particulate Matter 2.5 microns in diameter or less
PPM	Parts Per Million
Project	Nakase Property
ROG	Reactive Organic Gases
SSAB	Salton Sea Air Basin
SCAB	South Coast Air Basin
SCAQMD	South Coast Air Quality Management District
SIPs	State Implementation Plans
SRA	Source Receptor Area
TAC	Toxic Air Contaminant

TIA	Traffic Impact Analysis
TOG	Total Organic Gases
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds

EXECUTIVE SUMMARY

SUMMARY OF CEQA SIGNIFICANCE FINDINGS & MITIGATION MEASURES

The results of this *Nakase Property Air Quality Impact Analysis* are summarized below based on the significance criteria in Section 3 of this report consistent with Appendix G of the California Environmental Quality Act (CEQA) Guidelines (1). Table ES-1 shows the findings of significance for each potential air quality impact under CEQA before and after any required mitigation measures described below.

TABLE ES-1: SUMMARY OF CEQA SIGNIFICANCE FINDINGS

Analysis	Report Section	Significance Findings	
		Unmitigated	Mitigated
Regional Construction Emissions	3.4	*Less Than Significant*	*n/a*
Localized Construction Emissions	3.7	*Less Than Significant*	*n/a*
Regional Operational Emissions	3.5	*Less Than Significant*	*n/a*
Localized Operational Emissions	3.8	*Less Than Significant*	*n/a*
CO "Hot Spot" Analysis	3.9	*Less Than Significant*	*n/a*
Air Quality Management Plan	3.10	*Less Than Significant*	*n/a*
Sensitive Receptors	3.11	*Less Than Significant*	*n/a*
Odors	3.12	*Less Than Significant*	*n/a*
Cumulative Impacts	3.13	*Less Than Significant*	*n/a*

This page intentionally left blank

1 INTRODUCTION

This report presents the results of the air quality impact analysis (AQIA) prepared by Urban Crossroads, Inc., for the Nakase Property Project (referred to as "Project"). The purpose of this AQIA is to evaluate the potential impacts to air quality associated with construction and operation of the proposed Project and recommend measures to mitigate impacts considered potentially significant in comparison to established regulatory thresholds.

1.1 SITE LOCATION

The proposed Project is located east of Bake Parkway and south of Rancho Parkway in the City of Lake Forest, as shown on Exhibit 1-A. The Project site is currently occupied by the Nakase Brothers Wholesale Nursery. State Route 241 (SR-241) is located roughly 325 feet north of the Project site boundaries. Existing residential uses are located west of the Project site, and office and commercial uses are located north, south, east, and west of the Project site. The Serrano Creek Trail runs adjacent to the southern Project site boundaries.

1.2 PROJECT DESCRIPTION

The proposed Project consists of 675 single-family dwelling units, 101 senior affordable residential units, an elementary school with athletic/sports fields which could accommodate up to 1,000 students, and park/open space uses. The proposed residences would predominantly consist of single-family detached units. Any single-family attached units would be located in Neighborhoods 2 and 5, as shown on Exhibit 1-B. Construction is expected to commence in November 2019 and will last through June 2025. The Project's Opening Year for analytical purposes is 2025.

According to the *Traffic Impact Analysis*, the proposed Project is anticipated to generate a total of approximately 8,789 trip-ends per day on a typical weekday. The Project trips will be 14,122 fewer trips per day, with 1,377 fewer vehicles per hour during the AM peak hour and 1,442 fewer vehicles per hour during the PM peak hour, in comparison to the approved General Plan designation of business park land use for the site (2). It should be noted that comparison to the approved General Plan land use designation has been included for informational purposes only and this information is not used to make any CEQA findings.

The Project site is currently operating as Nakase Brothers Wholesale Nursery, an agricultural wholesale plant nursery. The Project site is currently generating traffic and consequently emissions associated with its ongoing operations.

EXHIBIT 1-A: LOCATION MAP

EXHIBIT 1-B: SITE PLAN

1.3 STANDARD REGULATORY REQUIREMENTS

SCAQMD Rules that are currently applicable during construction activity for this Project include but are not limited to: Rule 1113 (Architectural Coatings) (3) and Rule 403 (Fugitive Dust) (4).

BACM AQ-1

- The following measures shall be incorporated into Project plans and specifications as implementation of Rule 403.
- All clearing, grading, earth-moving, or excavation activities shall cease when winds exceed 25 mph per SCAQMD guidelines in order to limit fugitive dust emissions.
- The contractor shall ensure that all disturbed unpaved roads and disturbed areas within the Project are watered, with complete coverage of disturbed areas, at least three (3) times daily during dry weather; preferably in the mid-morning, afternoon, and after work is done for the day.
- The contractor shall ensure that traffic speeds on unpaved roads and Project site areas are reduced to 15 miles per hour or less

BACM AQ-2

- Only "Low-Volatile Organic Compounds" paints (no more than 50 gram/liter of VOC) consistent with South Coast Air Quality Management District Rule 1113 shall be used.

1.4 PROJECT DESIGN FEATURES

Energy-saving and sustainable design features and operational programs would be incorporated into facilities developed pursuant to the currently-proposed Project. The Project also incorporates and expresses the following project design features (PDF) and attributes promoting energy efficiency and sustainability. Because these features/attributes are integral to the Project, and/or are regulatory requirements, they are not considered to be mitigation measures.

- Regional vehicle miles traveled (VMT) and associated vehicular-source emissions are reduced by the following Project design features/attributes:
    - Pedestrian connections shall be provided to surrounding areas consistent with the City's General Plan. Providing a pedestrian access network to link areas of the Project site encourages people to walk instead of drive. The Project would provide a pedestrian access network that internally links all uses and connects to all existing or planned external streets and pedestrian facilities contiguous with the project site. The Project would minimize barriers to pedestrian access and interconnectivity.
    - The Project's proposed collocation of varied residential, park, and open spaces within ¼ mile proximity together with supporting amenities would tend to decrease the propensity for vehicle travel for local residents.
    - The Project provides for Below Market Rate (BMR) housing through the construction of senior housing dwelling units. BMR housing encourages building a greater percentage of smaller units that allow a greater number of families to be accommodated on infill and transit-oriented development sites within a given building footprint and height limit. Senior housing tends to have lower levels of auto ownership, allowing buildings to be designed with less parking.

- The project will design building shells and building components, such as windows; roof systems: electrical and lighting systems: and heating, ventilating, and air conditioning systems to meet 2019 Title 24 Standards which expects 30% less energy for non-residential buildings and 53% less energy for residential use due to lighting upgrades.
- To reduce water demands and associated energy use, subsequent development proposals within the Project site would be required to implement a Water Conservation Strategy and demonstrate a minimum 20% reduction in indoor and outdoor water usage when compared to baseline water demand (total expected water demand without implementation of the Water Conservation Strategy)[1].
- The Project is required to comply with SCAQMD Rule 445, which prohibits the use of wood burning stoves and fireplaces in new development

1.5 CONSTRUCTION-SOURCE AND OPERATIONAL-SOURCE AIR POLLUTANT EMISSIONS MITIGATION MEASURES

Project construction-source and operational-source emissions will be less than significant after implementation of regulatory requirements and project design features. Therefore, no mitigation measures are required.

1 Reduction of 20% indoor and outdoor water usage is consistent with the current CalGreen Code performance standards for residential and non-residential land uses. Per CalGreen, the reduction shall be based on the maximum allowable water use per plumbing fixture and fittings as required by the California Building Standards Code.

This page intentionally left blank

2 AIR QUALITY SETTING

This section provides an overview of the existing air quality conditions in the Project area and region.

2.1 SOUTH COAST AIR BASIN

The Project site is located in the South Coast Air Basin (SCAB) within the jurisdiction of SCAQMD (5). The SCAQMD was created by the 1977 Lewis-Presley Air Quality Management Act, which merged four county air pollution control bodies into one regional district. Under the Act, the SCAQMD is responsible for bringing air quality in areas under its jurisdiction into conformity with federal and state air quality standards. As discussed above, the Project site is located within the SCAB, a 6,745-square mile subregion of the SCAQMD, which includes portions of Los Angeles, Riverside, and San Bernardino Counties, and all of Orange County. The larger South Coast district boundary includes 10,743 square miles.

The SCAB is bound by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto Mountains to the north and east. The Los Angeles County portion of the Mojave Desert Air Basin is bound by the San Gabriel Mountains to the south and west, the Los Angeles / Kern County border to the north, and the Los Angeles / San Bernardino County border to the east. The Riverside County portion of the Salton Sea Air Basin is bound by the San Jacinto Mountains in the west and spans eastward up to the Palo Verde Valley.

2.2 REGIONAL CLIMATE

The regional climate has a substantial influence on air quality in the SCAB. In addition, the temperature, wind, humidity, precipitation, and amount of sunshine influence the air quality.

The annual average temperatures throughout the SCAB vary from the low to middle 60s (degrees Fahrenheit). Due to a decreased marine influence, the eastern portion of the SCAB shows greater variability in average annual minimum and maximum temperatures. January is the coldest month throughout the SCAB, with average minimum temperatures of 47°F in downtown Los Angeles and 36°F in San Bernardino. All portions of the SCAB have recorded maximum temperatures above 100°F.

Although the climate of the SCAB can be characterized as semi-arid, the air near the land surface is quite moist on most days because of the presence of a marine layer. This shallow layer of sea air is an important modifier of SCAB climate. Humidity restricts visibility in the SCAB, and the conversion of sulfur dioxide to sulfates is heightened in air with high relative humidity. The marine layer provides an environment for that conversion process, especially during the spring and summer months. The annual average relative humidity within the SCAB is 71 percent along the coast and 59 percent inland. Since the ocean effect is dominant, periods of heavy early morning fog are frequent and low stratus clouds are a characteristic feature. These effects decrease with distance from the coast.

More than 90 percent of the SCAB's rainfall occurs from November through April. The annual average rainfall varies from approximately nine inches in Riverside to fourteen inches in downtown Los Angeles. Monthly and yearly rainfall totals are extremely variable. Summer rainfall usually consists of widely scattered thunderstorms near the coast and slightly heavier shower activity in the eastern portion of the SCAB with frequency being higher near the coast.

Due to its generally clear weather, about three-quarters of available sunshine is received in the SCAB. The remaining one-quarter is absorbed by clouds. The ultraviolet portion of this abundant radiation is a key factor in photochemical reactions. On the shortest day of the year there are approximately 10 hours of possible sunshine, and on the longest day of the year there are approximately 14½ hours of possible sunshine.

The importance of wind to air pollution is considerable. The direction and speed of the wind determines the horizontal dispersion and transport of the air pollutants. During the late autumn to early spring rainy season, the SCAB is subjected to wind flows associated with the traveling storms moving through the region from the northwest. This period also brings five to ten periods of strong, dry offshore winds, locally termed "Santa Anas" each year. During the dry season, which coincides with the months of maximum photochemical smog concentrations, the wind flow is bimodal, typified by a daytime onshore sea breeze and a nighttime offshore drainage wind. Summer wind flows are created by the pressure differences between the relatively cold ocean and the unevenly heated and cooled land surfaces that modify the general northwesterly wind circulation over southern California. Nighttime drainage begins with the radiational cooling of the mountain slopes. Heavy, cool air descends the slopes and flows through the mountain passes and canyons as it follows the lowering terrain toward the ocean. Another characteristic wind regime in the SCAB is the "Catalina Eddy," a low level cyclonic (counterclockwise) flow centered over Santa Catalina Island which results in an offshore flow to the southwest. On most spring and summer days, some indication of an eddy is apparent in coastal sections.

In the SCAB, there are two distinct temperature inversion structures that control vertical mixing of air pollution. During the summer, warm high-pressure descending (subsiding) air is undercut by a shallow layer of cool marine air. The boundary between these two layers of air is a persistent marine subsidence/inversion. This boundary prevents vertical mixing which effectively acts as an impervious lid to pollutants over the entire SCAB. The mixing height for the inversion structure is normally situated 1,000 to 1,500 feet above mean sea level.

A second inversion-type forms in conjunction with the drainage of cool air off the surrounding mountains at night followed by the seaward drift of this pool of cool air. The top of this layer forms a sharp boundary with the warmer air aloft and creates nocturnal radiation inversions. These inversions occur primarily in the winter, when nights are longer and onshore flow is weakest. They are typically only a few hundred feet above mean sea level. These inversions effectively trap pollutants, such as NO_X and CO from vehicles, as the pool of cool air drifts seaward. Winter is therefore a period of high levels of primary pollutants along the coastline.

2.3 WIND PATTERNS AND PROJECT LOCATION

The distinctive climate of the Project area and the SCAB is determined by its terrain and geographical location. The SCAB is located in a coastal plain with connecting broad valleys and low hills, bounded by the Pacific Ocean in the southwest quadrant with high mountains forming the remainder of the perimeter.

Wind patterns across the south coastal region are characterized by westerly and southwesterly on-shore winds during the day and easterly or northeasterly breezes at night. Winds are characteristically light although the speed is somewhat greater during the dry summer months than during the rainy winter season.

2.4 EXISTING AIR QUALITY

Existing air quality is measured at established SCAQMD air quality monitoring stations. Monitored air quality is evaluated and in the context of ambient air quality standards. These standards are the levels of air quality that are considered safe, with an adequate margin of safety, to protect the public health and welfare. National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) currently in effect, as well health effects of each pollutant regulated under these standards are shown in Table 2-1 (6) (7).

The determination of whether a region's air quality is healthful or unhealthful is determined by comparing contaminant levels in ambient air samples to the state and federal standards presented in Table 2-1. The air quality in a region is considered to be in attainment by the state if the measured ambient air pollutant levels for O_3, CO, SO_2, NO_2, PM_{10}, and $PM_{2.5}$ are not equaled or exceeded at any time in any consecutive three-year period; and the federal standards (other than O_3, PM_{10}, $PM_{2.5}$, and those based on annual averages or arithmetic mean) are not exceeded more than once per year. The O_3 standard is attained when the fourth highest eight-hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when 99 percent of the daily concentrations, averaged over three years, are equal to or less than the standard.

TABLE 2-1: AMBIENT AIR QUALITY STANDARDS (1 OF 2)

Ambient Air Quality Standards						
Pollutant	**Averaging Time**	**California Standards [1]**		**National Standards [2]**		
		Concentration [3]	**Method [4]**	**Primary [3,5]**	**Secondary [3,6]**	**Method [7]**
Ozone (O_3)[8]	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m^3)		0.070 ppm (137 µg/m^3)		
Respirable Particulate Matter (PM10)[9]	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		—		
Fine Particulate Matter (PM2.5)[9]	24 Hour	—	—	35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	12.0 µg/m^3	15 µg/m^3	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m^3)	—	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)	—	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	
Nitrogen Dioxide (NO_2)[10]	1 Hour	0.18 ppm (339 µg/m^3)	Gas Phase Chemiluminescence	100 ppb (188 µg/m^3)	—	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)		0.053 ppm (100 µg/m^3)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[11]	1 Hour	0.25 ppm (655 µg/m^3)	Ultraviolet Fluorescence	75 ppb (196 µg/m^3)	—	Ultraviolet Flourescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	—		—	0.5 ppm (1300 µg/m^3)	
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (for certain areas)[11]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)[11]	—	
Lead[12,13]	30 Day Average	1.5 µg/m^3	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m^3 (for certain areas)[12]	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 µg/m^3		
Visibility Reducing Particles[14]	8 Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	**No National Standards**		
Sulfates	24 Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24 Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

See footnotes on next page ...

For more information please call ARB-PIO at (916) 322-2990 — California Air Resources Board (5/4/16)

TABLE 2-1: AMBIENT AIR QUALITY STANDARDS (1 OF 2)

1. California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

2. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.

3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4. Any equivalent measurement method which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

7. Reference method as described by the U.S. EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the U.S. EPA.

8. On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.

9. On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 $\mu g/m^3$ to 12.0 $\mu g/m^3$. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 $\mu g/m^3$, as was the annual secondary standard of 15 $\mu g/m^3$. The existing 24-hour PM10 standards (primary and secondary) of 150 $\mu g/m^3$ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

10. To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

11. On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

    Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

12. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

13. The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 $\mu g/m^3$ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

14. In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

For more information please call ARB-PIO at (916) 322-2990 **California Air Resources Board (5/4/16)**

2.5 REGIONAL AIR QUALITY

The SCAQMD monitors levels of various criteria pollutants at 38 permanent monitoring stations and 5 single-pollutant source Lead (Pb) air monitoring sites throughout the air district (8). In 2015, the federal and state ambient air quality standards (NAAQS and CAAQS) were exceeded on one or more days for ozone, PM_{10}, and $PM_{2.5}$ at most monitoring locations (9). No areas of the SCAB exceeded federal or state standards for NO_2, SO_2, CO, sulfates or lead. See Table 2-2, for attainment designations for the SCAB (10) (11). Appendix 2.1 provides geographic representation of the state and federal attainment status for applicable criteria pollutants within the SCAB.

TABLE 2-2: ATTAINMENT STATUS OF CRITERIA POLLUTANTS IN THE SCAB

Criteria Pollutant	State Designation	Federal Designation
Ozone - 1hour standard	Nonattainment	Nonattainment ("extreme")
Ozone - 8 hour standard	Nonattainment	Nonattainment ("extreme")
PM_{10}	Nonattainment	Attainment (Maintenance)
$PM_{2.5}$	Nonattainment	Nonattainment ("serious")
Carbon Monoxide	Attainment	Attainment (Maintenance)
Nitrogen Dioxide	Attainment	Unclassifiable/Attainment
Sulfur Dioxide	Attainment	Unclassifiable/Attainment
Lead[2]	Attainment	Nonattainment (Partial)

Source: State/Federal designations were taken from http://www.arb.ca.gov/desig/adm/adm.htm
Note: See Appendix 2.1 for a detailed map of State/National Area Designations within the SCAB

2.6 LOCAL AIR QUALITY

Relative to the Project site, the nearest long-term air quality monitoring site for Ozone (O_3), Carbon Monoxide (CO), Particulate matter ≤ 10 microns (PM_{10}), and Particulate matter ≤ 2.5 microns ($PM_{2.5}$) is the Saddleback Valley monitoring station (SRA 19) located approximately 2.05 miles south of the Project site. Relative to the Project site, the nearest long-term air quality monitoring site for Nitrogen Dioxide (NO_2) is the North Coastal Orange County monitoring station, located approximately 14.5 miles west of the Project site in Costa Mesa (SRA 18). It should be noted that the North Coastal Orange County monitoring station was utilized in lieu of the Saddleback Valley monitoring station only in instances where data was not available from the Saddleback Valley monitoring site.

The most recent three (3) years of data available is shown on Table 2-4 and identifies the number of days ambient air quality standards were exceeded for the study area, which is considered to be representative of the local air quality at the Project site. Data for O_3, NO_2, PM_{10}, and $PM_{2.5}$ for 2015 through 2017 was obtained from CARB's iADAM Air Quality Data Statistics (12). Data for CO was obtained from the SCAQMD Air Quality Data Tables (13). It should be noted that the CO data

[2] The Federal nonattainment designation for lead is only applicable towards the Los Angeles County portion of the SCAB.

for 2017 is currently unavailable from both CARB and SCAQMD. Additionally, data for SO_2 has been omitted as attainment is regularly met in the SCAB and few monitoring stations measure SO_2 concentrations.

TABLE 2-3: PROJECT AREA AIR QUALITY MONITORING SUMMARY 2015-2017

POLLUTANT	STANDARD	YEAR		
		2015	2016	2017
Ozone				
Maximum Federal 1-Hour Concentration (ppm)		0.099	0.122	0.103
Maximum Federal 8-Hour Concentration (ppm)		0.088	0.093	0.083
Number of Days Exceeding Federal 1-Hour Standard		2	5	3
Number of Days Exceeding State 1-Hour Standard	> 0.09 ppm	8	13	27
Number of Days Exceeding Federal 8-Hour Standard	> 0.070 ppm	0	0	0
Number of Days Exceeding State 8-Hour Standard	> 0.070 ppm	8	13	25
Carbon Monoxide (CO)				
Maximum 1-Hour Concentration	> 35 ppm	1.4	1.3	--
Maximum 8-Hour Concentration	> 20 ppm	0.7	0.7	--
Nitrogen Dioxide (NO_2)				
Maximum Federal 1-Hour Concentration	> 0.100 ppm	0.052	0.060	0.045
Maximum State 1-Hour Concentration	> 0.18 ppm	0.052	0.059	0.045
Annual Federal Standard Design Value		12	10	--
Annual State Standard Design Value		11	11	11
Number of Days Exceeding Federal 1-Hour Standard	> 0.18 ppm	0	0	0
Number of Days Exceeding State 1-Hour Standard	> 0.18 ppm	0	0	0
Particulate Matter ≤ 10 Microns (PM_{10})				
Maximum Federal 24-Hour Concentration (µg/m^3)	> 150 µg/m^3	49.0	59.0	58.2
Maximum State 24-Hour Concentration (µg/m^3)	> 50 µg/m^3	48.0	--	--
Annual Federal Arithmetic Mean (µg/m^3)		18.0	21.0	18.8
Number of Days Exceeding Federal 24-Hour Standard	> 150 µg/m^3	--	0	0
Particulate Matter ≤ 2.5 Microns ($PM_{2.5}$)				
Maximum Federal 24-Hour Concentration (µg/m^3)	> 35 µg/m^3	31.5	24.7	19.5
Maximum State 24-Hour Concentration (µg/m^3)		31.5	24.7	19.5
Annual Federal Arithmetic Mean (µg/m^3)		7.0	7.3	7.8
Annual State Arithmetic Mean (µg/m^3)		7.1	7.3	--
Number of Samples Exceeding Federal 24-Hour Standard	> 35 µg/m^3	0	0	0

Source: Data for O_3, NO_2, PM_{10}, and $PM_{2.5}$ was obtained from CARB's iADAM. Data for CO was obtained from SCAQMD Air Quality Data Tables.
-- = data not available from ARB or SCAQMD

Criteria pollutants are pollutants that are regulated through the development of human health based and/or environmentally based criteria for setting permissible levels. Criteria pollutants, their typical sources, and effects are identified below:

- Carbon Monoxide (CO): Is a colorless, odorless gas produced by the incomplete combustion of carbon-containing fuels, such as gasoline or wood. CO concentrations tend to be the highest during the winter morning, when little to no wind and surface-based inversions trap the pollutant at ground levels. Because CO is emitted directly from internal combustion engines, unlike ozone, motor vehicles operating at slow speeds are the primary source of CO in the SCAB. The highest ambient CO concentrations are generally found near congested transportation corridors and intersections.
- Sulfur Dioxide (SO_2): Is a colorless, extremely irritating gas or liquid. It enters the atmosphere as a pollutant mainly as a result of burning high sulfur-content fuel oils and coal and from chemical processes occurring at chemical plants and refineries. When SO_2 oxidizes in the atmosphere, it forms sulfates (SO_4). Collectively, these pollutants are referred to as sulfur oxides (SO_X).
- Nitrogen Oxides (Oxides of Nitrogen, or NO_X): Nitrogen oxides (NO_X) consist of nitric oxide (NO), nitrogen dioxide (NO_2) and nitrous oxide (N_2O) and are formed when nitrogen (N_2) combines with oxygen (O_2). Their lifespan in the atmosphere ranges from one to seven days for nitric oxide and nitrogen dioxide, to 170 years for nitrous oxide. Nitrogen oxides are typically created during combustion processes, and are major contributors to smog formation and acid deposition. NO_2 is a criteria air pollutant, and may result in numerous adverse health effects; it absorbs blue light, resulting in a brownish-red cast to the atmosphere and reduced visibility. Of the seven types of nitrogen oxide compounds, NO_2 is the most abundant in the atmosphere. As ambient concentrations of NO_2 are related to traffic density, commuters in heavy traffic may be exposed to higher concentrations of NO_2 than those indicated by regional monitors.
- Ozone (O_3): Is a highly reactive and unstable gas that is formed when volatile organic compounds (VOCs) and nitrogen oxides (NO_X), both byproducts of internal combustion engine exhaust, undergo slow photochemical reactions in the presence of sunlight. Ozone concentrations are generally highest during the summer months when direct sunlight, light wind, and warm temperature conditions are favorable to the formation of this pollutant.
- PM_{10} (Particulate Matter less than 10 microns): A major air pollutant consisting of tiny solid or liquid particles of soot, dust, smoke, fumes, and aerosols. The size of the particles (10 microns or smaller, about 0.0004 inches or less) allows them to easily enter the lungs where they may be deposited, resulting in adverse health effects. PM_{10} also causes visibility reduction and is a criteria air pollutant.
- $PM_{2.5}$ (Particulate Matter less than 2.5 microns): A similar air pollutant consisting of tiny solid or liquid particles which are 2.5 microns or smaller (which is often referred to as fine particles). These particles are formed in the atmosphere from primary gaseous emissions that include sulfates formed from SO_2 release from power plants and industrial facilities and nitrates that are formed from NO_X release from power plants, automobiles and other types of combustion sources. The chemical composition of fine particles highly depends on location, time of year, and weather conditions. $PM_{2.5}$ is a criteria air pollutant.
- Volatile Organic Compounds (VOC): Volatile organic compounds are hydrocarbon compounds (any compound containing various combinations of hydrogen and carbon atoms) that exist in the ambient air. VOCs contribute to the formation of smog through atmospheric photochemical

reactions and/or may be toxic. Compounds of carbon (also known as organic compounds) have different levels of reactivity; that is, they do not react at the same speed or do not form ozone to the same extent when exposed to photochemical processes. VOCs often have an odor, and some examples include gasoline, alcohol, and the solvents used in paints. Exceptions to the VOC designation include: carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate. VOCs are a criteria pollutant since they are a precursor to O_3, which is a criteria pollutant. The SCAQMD uses the terms VOC and ROG (see below) interchangeably.

- Reactive Organic Gases (ROG): Similar to VOC, Reactive Organic Gases (ROG) are also precursors in forming ozone and consist of compounds containing methane, ethane, propane, butane, and longer chain hydrocarbons, which are typically the result of some type of combustion/decomposition process. Smog is formed when ROG and nitrogen oxides react in the presence of sunlight. ROGs are a criteria pollutant since they are a precursor to O_3, which is a criteria pollutant. The SCAQMD uses the terms ROG and VOC (see previous) interchangeably.
- Lead (Pb): Lead is a heavy metal that is highly persistent in the environment. In the past, the primary source of lead in the air was emissions from vehicles burning leaded gasoline. As a result of the removal of lead from gasoline, there have been no violations at any of the SCAQMD's regular air monitoring stations since 1982. Currently, emissions of lead are largely limited to stationary sources such as lead smelters. It should be noted that the Project is not anticipated to generate a quantifiable amount of lead emissions. Lead is a criteria air pollutant.

Health Effects of Air Pollutants

Ozone

Individuals exercising outdoors, children, and people with preexisting lung disease, such as asthma and chronic pulmonary lung disease, are considered to be the most susceptible sub-groups for ozone effects. Short-term exposure (lasting for a few hours) to ozone at levels typically observed in Southern California can result in breathing pattern changes, reduction of breathing capacity, increased susceptibility to infections, inflammation of the lung tissue, and some immunological changes. Elevated ozone levels are associated with increased school absences. In recent years, a correlation between elevated ambient ozone levels and increases in daily hospital admission rates, as well as mortality, has also been reported. An increased risk for asthma has been found in children who participate in multiple sports and live in communities with high ozone levels.

Ozone exposure under exercising conditions is known to increase the severity of the responses described above. Animal studies suggest that exposure to a combination of pollutants that includes ozone may be more toxic than exposure to ozone alone. Although lung volume and resistance changes observed after a single exposure diminish with repeated exposures, biochemical and cellular changes appear to persist, which can lead to subsequent lung structural changes.

Carbon Monoxide

Individuals with a deficient blood supply to the heart are the most susceptible to the adverse effects of CO exposure. The effects observed include earlier onset of chest pain with exercise, and electrocardiograph changes indicative of decreased oxygen supply to the heart. Inhaled CO

has no direct toxic effect on the lungs, but exerts its effect on tissues by interfering with oxygen transport and competing with oxygen to combine with hemoglobin present in the blood to form carboxyhemoglobin (COHb). Hence, conditions with an increased demand for oxygen supply can be adversely affected by exposure to CO. Individuals most at risk include fetuses, patients with diseases involving heart and blood vessels, and patients with chronic hypoxemia (oxygen deficiency) as seen at high altitudes.

Reduction in birth weight and impaired neurobehavioral development have been observed in animals chronically exposed to CO, resulting in COHb levels similar to those observed in smokers. Recent studies have found increased risks for adverse birth outcomes with exposure to elevated CO levels; these include pre-term births and heart abnormalities.

Particulate Matter

A consistent correlation between elevated ambient fine particulate matter (PM_{10} and $PM_{2.5}$) levels and an increase in mortality rates, respiratory infections, number and severity of asthma attacks and the number of hospital admissions has been observed in different parts of the United States and various areas around the world. In recent years, some studies have reported an association between long-term exposure to air pollution dominated by fine particles and increased mortality, reduction in life-span, and an increased mortality from lung cancer.

Daily fluctuations in $PM_{2.5}$ concentration levels have also been related to hospital admissions for acute respiratory conditions in children, to school and kindergarten absences, to a decrease in respiratory lung volumes in normal children, and to increased medication use in children and adults with asthma. Recent studies show lung function growth in children is reduced with long term exposure to particulate matter.

The elderly, people with pre-existing respiratory or cardiovascular disease, and children appear to be more susceptible to the effects of high levels of PM_{10} and $PM_{2.5}$.

Nitrogen Dioxide

Population-based studies suggest that an increase in acute respiratory illness, including infections and respiratory symptoms in children (not infants), is associated with long-term exposure to NO_2 at levels found in homes with gas stoves, which are higher than ambient levels found in Southern California. Increase in resistance to air flow and airway contraction is observed after short-term exposure to NO_2 in healthy subjects. Larger decreases in lung functions are observed in individuals with asthma or chronic obstructive pulmonary disease (e.g., chronic bronchitis, emphysema) than in healthy individuals, indicating a greater susceptibility of these sub-groups.

In animals, exposure to levels of NO_2 considerably higher than ambient concentrations results in increased susceptibility to infections, possibly due to the observed changes in cells involved in maintaining immune functions. The severity of lung tissue damage associated with high levels of ozone exposure increases when animals are exposed to a combination of ozone and NO_2.

Sulfur Dioxide

A few minutes of exposure to low levels of SO_2 can result in airway constriction in some asthmatics, all of whom are sensitive to its effects. In asthmatics, increase in resistance to air flow, as well as reduction in breathing capacity leading to severe breathing difficulties, are observed after acute exposure to SO_2. In contrast, healthy individuals do not exhibit similar acute responses even after exposure to higher concentrations of SO_2.

Animal studies suggest that despite SO_2 being a respiratory irritant, it does not cause substantial lung injury at ambient concentrations. However, very high levels of exposure can cause lung edema (fluid accumulation), lung tissue damage, and sloughing off of cells lining the respiratory tract.

Some population-based studies indicate that the mortality and morbidity effects associated with fine particles show a similar association with ambient SO_2 levels. In these studies, efforts to separate the effects of SO_2 from those of fine particles have not been successful. It is not clear whether the two pollutants act synergistically or one pollutant alone is the predominant factor.

Lead

Fetuses, infants, and children are more sensitive than others to the adverse effects of Pb exposure. Exposure to low levels of Pb can adversely affect the development and function of the central nervous system, leading to learning disorders, distractibility, inability to follow simple commands, and lower intelligence quotient. In adults, increased Pb levels are associated with increased blood pressure.

Pb poisoning can cause anemia, lethargy, seizures, and death; although it appears that there are no direct effects of Pb on the respiratory system. Pb can be stored in the bone from early age environmental exposure, and elevated blood Pb levels can occur due to breakdown of bone tissue during pregnancy, hyperthyroidism (increased secretion of hormones from the thyroid gland) and osteoporosis (breakdown of bony tissue). Fetuses and breast-fed babies can be exposed to higher levels of Pb because of previous environmental Pb exposure of their mothers.

Odors

The science of odor as a health concern is still new. Merely identifying the hundreds of VOCs that cause odors poses a big challenge. Offensive odors can potentially affect human health in several ways. First, odorant compounds can irritate the eye, nose, and throat, which can reduce respiratory volume. Second, studies have shown that the VOCs that cause odors can stimulate sensory nerves to cause neurochemical changes that might influence health, for instance, by compromising the immune system. Finally, unpleasant odors can trigger memories or attitudes linked to unpleasant odors, causing cognitive and emotional effects such as stress.

2.7 REGULATORY BACKGROUND

2.7.1 FEDERAL REGULATIONS

The U.S. EPA is responsible for setting and enforcing the NAAQS for O_3, CO, NO_x, SO_2, PM_{10}, $PM_{2.5}$, and lead (14). The U.S. EPA has jurisdiction over emissions sources that are under the authority of the federal government including aircraft, locomotives, and emissions sources outside state waters (Outer Continental Shelf). The U.S. EPA also establishes emission standards for vehicles sold in states other than California. Automobiles sold in California must meet the stricter emission requirements of the CARB.

The Federal Clean Air Act (CAA) was first enacted in 1955, and has been amended numerous times in subsequent years (1963, 1965, 1967, 1970, 1977, and 1990). The CAA establishes the federal air quality standards, the NAAQS, and specifies future dates for achieving compliance (15). The CAA also mandates that states submit and implement State Implementation Plans (SIPs) for local areas not meeting these standards. These plans must include pollution control measures that demonstrate how the standards will be met.

The 1990 amendments to the CAA that identify specific emission reduction goals for areas not meeting the NAAQS require a demonstration of reasonable further progress toward attainment and incorporate additional sanctions for failure to attain or to meet interim milestones. The sections of the CAA most directly applicable to the development of the Project site include Title I (Non-Attainment Provisions) and Title II (Mobile Source Provisions). Title I provisions were established with the goal of attaining the NAAQS for the following criteria pollutants O_3, NO_2, SO_2, PM_{10}, CO, $PM_{2.5}$, and lead. The NAAQS were amended in July 1997 to include an additional standard for O_3 and to adopt a NAAQS for PM2.5. Table 2-1 (previously presented) provides the NAAQS within the SCAB.

Mobile source emissions are regulated in accordance with Title II provisions. These provisions require the use of cleaner burning gasoline and other cleaner burning fuels such as methanol and natural gas. Automobile manufacturers are also required to reduce tailpipe emissions of hydrocarbons and nitrogen oxides (NO_X). NO_X is a collective term that includes all forms of nitrogen oxides (NO, NO_2, NO_3) which are emitted as byproducts of the combustion process.

2.7.2 CALIFORNIA REGULATIONS

The CARB, which became part of the California EPA in 1991, is responsible for ensuring implementation of the California Clean Air Act (AB 2595), responding to the federal CAA, and for regulating emissions from consumer products and motor vehicles. The California CAA mandates achievement of the maximum degree of emissions reductions possible from vehicular and other mobile sources in order to attain the state ambient air quality standards by the earliest practical date. The CARB established the CAAQS for all pollutants for which the federal government has NAAQS and, in addition, establishes standards for sulfates, visibility, hydrogen sulfide, and vinyl chloride. However, at this time, hydrogen sulfide and vinyl chloride are not measured at any monitoring stations in the SCAB because they are not considered to be a regional air quality problem. Generally, the CAAQS are more stringent than the NAAQS (16) (14).

Local air quality management districts, such as the SCAQMD, regulate air emissions from commercial and light industrial facilities. All basins have been formally designated as attainment or non-attainment for each CAAQS.

Non-attainment areas are required to prepare air quality management plans that include specified emission reduction strategies in an effort to meet clean air goals. These plans are required to include:

- Application of Best Available Retrofit Control Technology to existing sources;
- Developing control programs for area sources (e.g., architectural coatings and solvents) and indirect sources (e.g. motor vehicle use generated by residential and commercial development);
- A District permitting system designed to allow no net increase in emissions from any new or modified permitted sources of emissions;
- Implementing reasonably available transportation control measures and assuring a substantial reduction in growth rate of vehicle trips and miles traveled;
- Significant use of low emissions vehicles by fleet operators;
- Sufficient control strategies to achieve a five percent or more annual reduction in emissions or 15 percent or more in a period of three years for ROGs, NO_X, CO and PM_{10}. However, air basins may use alternative emission reduction strategy that achieves a reduction of less than five percent per year under certain circumstances.

2.7.3 AIR QUALITY MANAGEMENT PLANNING

Currently, the NAAQS and CAAQS are exceeded in most parts of the SCAB. In regards to the NAAQS, the Project region within the SCAB is in nonattainment for ozone (8-hour) and $PM_{2.5}$. For the CAAQS, the Project region within the SCAB is in nonattainment for ozone (1-hour and 8-hour), PM_{10}, and $PM_{2.5}$. In response, the SCAQMD has adopted a series of Air Quality Management Plans (AQMPs) to meet the state and federal ambient air quality standards (17). AQMPs are updated regularly in order to more effectively reduce emissions, accommodate growth, and to minimize any negative fiscal impacts of air pollution control on the economy. A detailed discussion on the AQMP and Project consistency with the AQMP is provided in Section 3.10.

2.8 EXISTING PROJECT SITE AIR QUALITY CONDITIONS

The Project site is currently developed with a wholesale nursery operation. The estimated operation-source emissions for existing conditions are summarized on Table 2-4 for the existing nursery use. Detailed operation model outputs are presented in Appendix 3.4.

TABLE 2-4: EXISTING DEVELOPMENT

Existing Operational Activities	Emissions (pounds per day)					
	VOC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Total Maximum Daily Emissions	**0.89**	**3.21**	**10.53**	**0.04**	**3.16**	**0.87**

This page intentionally left blank

3 PROJECT AIR QUALITY IMPACT

3.1 INTRODUCTION

The Project has been evaluated to determine if it will violate an air quality standard or contribute to an existing or projected air quality violation. Additionally, the Project has been evaluated to determine if it will result in a cumulatively considerable net increase of a criteria pollutant for which the SCAB is in non-attainment under an applicable federal or state ambient air quality standard. The significance of these potential impacts is described in the following section.

3.2 STANDARDS OF SIGNIFICANCE

The criteria used to determine the significance of potential Project-related air quality impacts are taken from the Initial Study Checklist in Appendix G of the State CEQA Guidelines (14 California Code of Regulations §§15000, et seq.). Based on these thresholds, a project would result in a significant impact related to air quality if it would (18):

- Conflict with or obstruct implementation of the applicable air quality plan.
- Violate any air quality standard or contribute to an existing or projected air quality violation.
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions, which exceed quantitative thresholds for ozone precursors).
- Expose sensitive receptors to substantial pollutant concentrations.
- Create objectionable odors affecting a substantial number of people.

The SCAQMD has also developed regional and localized significance thresholds for other regulated pollutants, as summarized at Table 3-1 (19). The SCAQMD's CEQA Air Quality Significance Thresholds (March 2015) indicate that any projects in the SCAB with daily emissions that exceed any of the indicated thresholds should be considered as having an individually and cumulatively significant air quality impact.

TABLE 3-1: MAXIMUM DAILY EMISSIONS THRESHOLDS (1 OF 2)

Pollutant	Construction	Operations
Regional Thresholds		
NO_X	100 lbs/day	55 lbs/day
VOC	75 lbs/day	55 lbs/day
PM_{10}	150 lbs/day	150 lbs/day
$PM_{2.5}$	55 lbs/day	55 lbs/day
SO_X	150 lbs/day	150 lbs/day
CO	550 lbs/day	550 lbs/day
Lead	3 lbs/day	3 lbs/day

TABLE 3-1: MAXIMUM DAILY EMISSIONS THRESHOLDS (2 OF 2)

Pollutant	Construction	Operations
Localized Thresholds		
NO_X	96 lbs/day (Demolition) 150 lbs/day (Grading)	N/A
CO	914 lbs/day (Demolition) 1,626 lbs/day (Grading)	N/A
PM_{10}	14 lbs/day (Demolition) 27 lbs/day (Grading)	N/A
$PM_{2.5}$	5 lbs/day (Demolition) 9 lbs/day (Grading)	N/A

3.3 PROJECT-RELATED SOURCES OF POTENTIAL IMPACT

On October 17, 2017, the SCAQMD in conjunction with the California Air Pollution Control Officers Association (CAPCOA) and other California air districts, released the latest version of the California Emissions Estimator Model™ (CalEEMod™) v2016.3.2. The purpose of this model is to calculate construction-source and operational-source criteria pollutant (NO_X, VOC, PM_{10}, $PM_{2.5}$, SO_X, and CO) and greenhouse gas (GHG) emissions from direct and indirect sources; and quantify applicable air quality and GHG reductions achieved from mitigation measures (20). Accordingly, the latest version of CalEEMod™ has been used for this Project to determine construction and operational air quality emissions. Output from the model runs for both construction and operational activity are provided in Appendix 3.1 to 3.5.

3.4 CONSTRUCTION EMISSIONS

Construction activities associated with the Project will result in emissions of VOCs, NO_X, SO_X, CO, PM_{10}, and $PM_{2.5}$. Construction related emissions are expected from the following construction activities:

- Demolition
- Grading
- Infrastructure
- Building Construction
- Paving
- Architectural Coating

Construction is expected to commence in November 2019 and will last through June 2025. Construction duration is shown on Table 3-2. The construction schedule utilized in the analysis represents a "worst-case" analysis scenario should construction occur any time after the respective dates since emission factors for construction decrease as time passes and the analysis

year increases due to emission regulations becoming more stringent.[3] The duration of construction activity and associated equipment represents a reasonable approximation of the expected construction fleet as required per CEQA guidelines. Site specific construction fleet may vary due to specific project needs at the time of construction. The duration of construction activity was based on information provided by the Project applicant, Toll Brothers. Please refer to specific detailed modeling inputs/outputs contained in Appendix 3.1 of this analysis. A detailed summary of construction equipment assumptions is provided at Table 3-3.

Based on consultation with the Project applicant, the project site is currently developed with a 1,744 square foot (80.22 tons) structure which will be demolished prior to construction. In addition, the project site will reportedly require the demolition of approximately 2,848 tons of asphalt and 1,161 tons of concrete. The total amount of demolished material that is expected for the Project is approximately 4,089.22 tons of debris.

Additionally, based on consultation with the Project applicant, the Project is expected require 150,000 cubic yards of soil export. As per the CalEEMod User's Guide Version 2016.3.2, hauling trips are based on the assumption that a truck can haul 20 tons (16 cubic yards) of material per load and assumes that one haul truck importing material will also have a return trip (21). As such, the Project is expected to generate 18,750 hauling trips in order to import 150,000 cubic yards of soil. It should be noted that dust is typically a major concern during rough grading activities. Because such emissions are not amenable to collection and discharge through a controlled source, they are called "fugitive emissions". Fugitive dust emissions rates vary as a function of many parameters (soil silt, soil moisture, wind speed, area disturbed, number of vehicles, depth of disturbance or excavation, etc.). CalEEMod was utilized to calculate fugitive dust emissions resulting from this phase of activity.

Construction emissions for construction worker vehicles traveling to and from the Project site, as well as vendor trips (construction materials delivered to the Project site) were estimated based on CalEEMod.

TABLE 3-2: CONSTRUCTION DURATION

Phase Name	Days
Demolition	66
Grading	269
Infrastructure	260
Paving	87
Building Construction	1,001
Architectural Coating	1,001

[3] As shown in the CalEEMod User's Guide Version 2016.3.2, Section 4.3 "OFFROAD Equipment" as the analysis year increases, emission factors for the same equipment pieces decrease due to the natural turnover of older equipment being replaced by newer less polluting equipment and new regulatory requirements.

TABLE 3-3: CONSTRUCTION EQUIPMENT ASSUMPTIONS

Activity	Equipment	Number	Hours Per Day
Demolition	Concrete/Industrial Saws	1	8
	Excavators	3	8
	Rubber Tired Dozers	2	8
Grading	Excavators	2	8
	Graders	1	8
	Rubber Tired Dozers	1	8
	Scrapers	2	8
	Tractors/Loaders/Backhoes	2	8
Infrastructure	Rubber Tired Dozers	3	8
	Tractors/Loaders/Backhoes	4	8
Paving	Paving Equipment	2	8
	Rollers	2	8
	Pavers	2	8
Building Construction	Cranes	1	8
	Forklifts	3	8
	Generator Sets	1	8
	Tractors/Loaders/Backhoes	3	8
	Welders	1	8
Architectural Coating	Air Compressors	1	8

3.4.1 CONSTRUCTION EMISSIONS SUMMARY

SCAQMD Rules that are currently applicable during construction activity for this Project include but are not limited to Rule 1113 (Architectural Coatings) (22) and Rule 403 (Fugitive Dust) (23). CalEEMod does not automatically account for Rule 1113 and Rule 403. In order to take credit for Rule 1113, interior and exterior surface areas for residential and non-residential buildings must be manually adjusted. Additionally, CalEEMod does not reflect the Rule 403 requirements. As such, watering must be manually entered. It should be noted that Rule 1113 and Rule 403 are not mitigation as they are standard regulatory requirements.

The estimated maximum daily construction emissions are summarized on Table 3-4. Detailed construction model outputs are presented in Appendix 3.1. Under the assumed scenarios, emissions resulting from the Project construction would not exceed numerical thresholds established by the SCAQMD for emissions of any criteria pollutant.

TABLE 3-4: EMISSIONS SUMMARY OF CONSTRUCTION

Year	Emissions (pounds per day)					
	VOC	**NO_X**	**CO**	**SO_X**	**PM_{10}**	**$PM_{2.5}$**
2019	3.64	37.67	23.02	0.05	3.45	1.96
2020	5.08	69.66	37.66	0.12	12.53	6.09
2021	20.41	90.40	77.76	0.24	19.56	7.68
2022	19.19	79.16	73.84	0.24	15.92	6.06
2023	15.42	38.13	51.12	0.19	13.95	4.38
2024	15.11	36.60	49.17	0.19	13.84	4.28
2025	14.83	35.05	47.48	0.18	13.73	4.17
Maximum Daily Emissions	**20.41**	**90.40**	**77.76**	**0.24**	**19.56**	**7.68**
SCAQMD Regional Threshold	75	100	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

3.5 OPERATIONAL EMISSIONS

Operational activities associated with the proposed Project will result in emissions of VOCs, NO_X, SO_X, CO, PM_{10}, and $PM_{2.5}$. Operational emissions would be expected from the following primary sources:

- Area Source Emissions
- Energy Source Emissions
- Mobile Source Emissions

3.5.1 AREA SOURCE EMISSIONS

Architectural Coatings

Over a period of time the buildings that are part of this Project will be subject to emissions resulting from the evaporation of solvents contained in paints, varnishes, primers, and other surface coatings as part of Project maintenance. The emissions associated with architectural coatings were calculated using the CalEEMod model.

Consumer Products

Consumer products include, but are not limited to detergents, cleaning compounds, polishes, personal care products, and lawn and garden products. Many of these products contain organic compounds which when released in the atmosphere can react to form ozone and other photochemically reactive pollutants. The emissions associated with use of consumer products were calculated based on defaults provided within the CalEEMod model.

Hearths/Fireplaces

The emissions associated with use of hearths/fireplaces were calculated based on assumptions provided in the CalEEMod model. The Project is required to comply with SCAQMD Rule 445, which prohibits the use of wood burning stoves and fireplaces in new development. In order to

account for the requirements of this Rule, the unmitigated CalEEMod model estimates were adjusted to remove wood burning stoves and fireplaces. As the project is required to comply with SCAQMD Rule 445, the removal of wood burning stoves and fireplaces is not considered "mitigation" although it must be identified as such in CalEEMod in order to treat the case appropriately.

Landscape Maintenance Equipment

Landscape maintenance equipment would generate emissions from fuel combustion and evaporation of unburned fuel. Equipment in this category would include lawnmowers, shedders/grinders, blowers, trimmers, chain saws, and hedge trimmers used to maintain the landscaping of the Project. The emissions associated with landscape maintenance equipment were calculated based on assumptions provided in the CalEEMod model.

3.5.2 ENERGY SOURCE EMISSIONS

Combustion Emissions Associated with Natural Gas and Electricity

Electricity and natural gas are used by almost every project. Criteria pollutant emissions are emitted through the generation of electricity and consumption of natural gas. However, because electrical generating facilities for the Project area are located either outside the region (state) or offset through the use of pollution credits (RECLAIM) for generation within the SCAB, criteria pollutant emissions from offsite generation of electricity is generally excluded from the evaluation of significance and only natural gas use is considered. The emissions associated with natural gas use were calculated using the CalEEMod model.

At the time the Project was analyzed, state regulations would require the Project to comply with the 2016 Title 24 standards. Therefore, the CalEEMod default values for Title 24 were used to satisfy the 2016 Title 24. Since the 2016 Title 24 is a regulatory requirement, it would not be considered a design feature.

3.5.3 MOBILE SOURCE EMISSIONS

Vehicles

Project mobile source air quality impacts are dependent on both overall daily vehicle trip generation and the effect of the Project on peak hour traffic volumes and traffic operations in the vicinity of the Project. The Project-related operational air quality impacts are derived primarily from vehicle trips generated by the Project. Trip characteristics available from the report, *Nakase Property Traffic Impact Analysis* (Urban Crossroads, Inc. 2019) were utilized in this analysis (2). The proposed Project is anticipated to generate a total of 8,789 trip-ends per day with 1,983 AM peak hour trips and 1,920 PM peak hour trips

Pedestrian connections would be constructed at selected roads within the Project, providing pedestrian access to the various uses and activity centers within the Project. Facilitating pedestrian access encourages people to walk instead of drive. The Project would not impose barriers to pedestrian access and interconnectivity. Furthermore, the mix of uses within the Area

Plan as proposed by the Project acts to reduce travel distances and regional vehicle miles traveled (VMT) by consolidating trips and reducing requirements for multiple trips.

Fugitive Dust Related to Vehicular Travel

Vehicles traveling on paved roads would be a source of fugitive emissions due to the generation of road dust inclusive of tire wear particulates. The emissions estimates for travel on paved roads were calculated using the CalEEMod model.

3.5.4 OPERATIONAL EMISSIONS SUMMARY

Table 3-5 summarizes the Project's daily regional emissions from on-going operations with implementation of project design features. As previously stated, the Project site is currently developed with an 8,500 square foot nursery. The existing development emissions were subtracted from the Project operational emissions to determine the new emissions from the proposed Project. As shown, the Project will not exceed the thresholds of significance for emissions of any criteria pollutants. As such, additional mitigation is not required as Project operational-source emissions are considered less than significant. Detailed operational model outputs are presented in Appendices 3.2 and 3.4.

TABLE 3-5: SUMMARY OF OPERATIONAL EMISSIONS (1 OF 2)

Operational Activities – Summer Scenario	**Emissions (pounds per day)**					
	VOC	**NO_X**	**CO**	**SO_X**	**PM_{10}**	**$PM_{2.5}$**
Area Source (Residential)	31.74	13.61	69.44	0.09	1.40	1.40
Area Source (Other Uses)	2.26	0.00	0.10	0.00	0.00	0.00
Energy Source (Residential)	0.33	2.79	1.19	0.02	0.23	0.23
Energy Source (Other Uses)	0.02	0.19	0.16	0.00	0.01	0.01
Mobile (Residential)	8.04	28.62	103.75	0.43	44.07	11.98
Mobile (Other Uses)	2.38	8.42	30.11	0.13	12.70	3.45
Total Maximum Daily Emissions	**44.76**	**53.64**	**204.75**	**0.66**	**58.41**	**17.07**
Existing Emissions	***-0.89***	***-3.10***	***-10.53***	***-0.04***	***-3.16***	***-0.87***
Net Max Emissions (Project minus Existing)	***43.87***	***50.54***	***194.22***	***0.63***	***55.25***	***16.20***
SCAQMD Regional Threshold	55	55	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

TABLE 3-5: SUMMARY OF OPERATIONAL EMISSIONS (2 OF 2)

Operational Activities – Winter Scenario	Emissions (pounds per day)					
	VOC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Area Source (Residential)	31.74	13.61	69.44	0.09	1.40	1.40
Area Source (Other Uses)	2.26	0.00	0.10	0.00	0.00	0.00
Energy Source (Residential)	0.33	2.79	1.19	0.02	0.23	0.23
Energy Source (Other Uses)	0.02	0.19	0.16	0.00	0.01	0.01
Mobile (Residential)	7.88	29.31	99.25	0.42	44.07	11.98
Mobile (Other Uses)	2.33	8.62	28.85	0.12	12.71	3.46
Total Maximum Daily Emissions	**44.56**	**54.52**	**198.99**	**0.64**	**58.41**	**17.07**
Existing Emissions	***-0.88***	***-3.21***	***-9.99***	***-0.04***	***-3.16***	***-0.87***
Net Max Emissions (Project minus Existing)	***43.68***	***51.31***	***189.00***	***0.60***	***55.25***	***16.20***
SCAQMD Regional Threshold	55	55	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

3.6 COMPARISON TO THE CURRENTLY APPROVED GENERAL PLAN USE

This section summarizes the Project's emissions impacts in this AQIA as compared to the emissions totals and impacts that would occur based on the currently adopted land use.

The currently adopted land use, as per the City's General Plan, is Business Park. The proposed Project includes the development of 675 single family detached residential homes, 101 senior affordable housing residential units, an elementary school which could accommodate up to 1,000 students, and park/open space uses. As per the *Nakase Property Traffic Impact Analysis* (Urban Crossroads 2018), the currently approved land use generates 14,121 more trip-ends per day than the proposed Project (2).

3.6.1 OPERATIONAL EMISSIONS COMPARISON

Table 3-6 presents a comparison of air quality operational emissions for the proposed project versus the approved land use. Results of the assessment indicate net decreases in VOC, NO_X, CO, SO_X, PM_{10}, $PM_{2.5}$. As such, the proposed Project would result in fewer emissions of NO_X, CO, SO_X, PM_{10}, $PM_{2.5}$ and consequently fewer impacts beyond the impacts that occur with the currently approved land use. It should be noted that comparison to the approved General Plan land use designation has been included for informational purposes only and this information is not used to make any CEQA findings.

TABLE 3-6: OPERATIONAL EMISSIONS COMPARISON (CURRENTLY APPROVED USE VS PROPOSED PROJECT)

Operational Activities- Total Maximum Daily Emissions	Emissions (pounds per day)					
	VOC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Currently Approved General Plan Land Use						
Total Maximum Daily Emissions	73.62	156.96	424.24	1.82	166.26	45.63
Proposed Project						
Total Maximum Daily Emissions	44.66	54.08	201.87	0.65	58.41	15.44
Net Change	-28.96	-102.88	-222.37	-1.16	-107.85	-30.19
New Significant Impacts?	NO	NO	NO	NO	NO	NO

3.7 LOCALIZED SIGNIFICANCE - CONSTRUCTION ACTIVITY

BACKGROUND ON LOCALIZED SIGNIFICANCE THRESHOLDS (LSTS)

The analysis makes use of methodology included in the SCAQMD *Final Localized Significance Threshold Methodology* (Methodology) (19). The SCAQMD has established that impacts to air quality are significant if there is a potential to contribute or cause localized exceedances of the federal and/or state ambient air quality standards (NAAQS/CAAQS). Collectively, these are referred to as Localized Significance Thresholds (LSTs).

The significance of localized emissions impacts depends on whether ambient levels in the vicinity of any given project are above or below State standards. In the case of CO and NO_2, if ambient levels are below the standards, a project is considered to have a significant impact if project emissions result in an exceedance of one or more of these standards. If ambient levels already exceed a state or federal standard, then project emissions are considered significant if they increase ambient concentrations by a measurable amount. This would apply to PM_{10} and $PM_{2.5}$; both of which are non-attainment pollutants.

The SCAQMD established LSTs in response to the SCAQMD Governing Board's Environmental Justice Initiative I-4. LSTs represent the maximum emissions from a project that will not cause or contribute to an exceedance of the most stringent applicable federal or state ambient air quality standard at the nearest residence or sensitive receptor. The SCAQMD states that lead agencies can use the LSTs as another indicator of significance in its air quality impact analyses.

LSTs were developed in response to environmental justice and health concerns raised by the public regarding exposure of individuals to criteria pollutants in local communities. To address the issue of localized significance, the SCAQMD adopted LSTs that show whether a project would cause or contribute to localized air quality impacts and thereby cause or contribute to potential localized adverse health effects. The analysis makes use of methodology included in the SCAQMD *Final Localized Significance Threshold Methodology* (LST Methodology) (24).

EMISSIONS CONSIDERED

SCAQMD's Methodology clearly states that "off-site mobile emissions from the Project should NOT be included in the emissions compared to LSTs (21)." Therefore, for purposes of the

construction LST analysis only emissions included in the CalEEMod "on-site" emissions outputs were considered.

APPLICABILITY OF LSTS FOR THE PROJECT

This project is located in Source Receptor Area (SRA) 19, Saddleback Valley. LSTs apply to carbon monoxide (CO), nitrogen dioxide (NO_2), particulate matter ≤ 10 microns (PM_{10}), and particulate matter ≤ 2.5 microns ($PM_{2.5}$). The SCAQMD produced look-up tables for projects less than or equal to 5 acres in size.

In order to determine the appropriate methodology for determining localized impacts that could occur as a result of Project-related construction, the following process is undertaken:

- The CalEEMod model is utilized to determine the maximum daily on-site emissions that will occur during construction activity.
- The SCAQMD's Fact Sheet for Applying CalEEMod to Localized Significance Thresholds (25) is used to determine the maximum site acreage that is actively disturbed based on the construction equipment fleet and equipment hours as estimated in CalEEMod.
- If the total acreage disturbed is less than or equal to five acres per day, then the SCAQMD's screening look-up tables are utilized to determine if a Project has the potential to result in a significant impact (the SCAQMD recommends that Projects exceeding the screening look-up tables undergo dispersion modeling to determine actual impacts). The look-up tables establish a maximum daily emissions threshold in pounds per day that can be compared to CalEEMod outputs.

MAXIMUM DAILY DISTURBED-ACREAGE

Table 3-7 is used to determine the maximum daily disturbed-acreage for use in determining the applicability of the SCAQMD's LST look-up tables. As shown in Table 3-7, the Project could actively disturb approximately 1.0 acres per day during demolition and approximately 3.0 acres during grading activity.

TABLE 3-7: MAXIMUM DAILY DISTURBED-ACREAGE

Construction Phase	Equipment Type	Equipment Quantity	Acres graded per 8-hour day	Operating Hours per Day	Acres graded per day
Demolition	Rubber Tired Dozers	2	0.5	8	1
Total acres disturbed per day during Demolition					1
Grading	Graders	1	0.5	8	0.5
	Rubber Tired Dozers	1	0.5	8	0.5
	Scrapers	2	1	8	2
Total acres disturbed per day during Grading					3

Sensitive Receptors

Some people are especially sensitive to air pollution and are given special consideration when evaluating air quality impacts from projects. These groups of people include children, the elderly, individuals with pre-existing respiratory or cardiovascular illness, and athletes and others who engage in frequent exercise. Structures that house these persons or places where they gather to exercise are defined as "sensitive receptors"; they are also known to be locations where an individual can remain for 24 hours. Sensitive receivers near the Project site include existing residential homes, hotels, and the existing Serrano Creek trail area, as described below. As shown on Exhibit 3-A, the nearest sensitive receptor is R1, a single-family residence located southeast of the Project site, approximately 197 feet/60.05 meters north of the Project Site.

R1: Located approximately 197 feet north of the Project site, R1 represents existing residential homes north of Bake Parkway.

R2: Location R2 represents existing Staybridge Suites hotel north of the Project site at roughly 264 feet across Bake Parkway.

R3: Location R3 represents existing Extended Stay America hotel southeast of the Project site at approximately 216 feet on Lake Forest Drive.

R4: Location R4 represents existing Serrano Creek trail area adjacent to the southern Project site boundary at approximately 80 feet southeast.

CONSTRUCTION-SOURCE EMISSIONS LST ANALYSIS

Since the total acreage disturbed is less than or equal to five acres per day for both the demolition and grading activities, the SCAQMD's screening look-up tables are utilized in determining impacts. As previously noted, a 60.05-meter receptor distance is utilized to determine the LSTs for emissions of CO, NO_2, PM_{10}, and $PM_{2.5}$.

Table 3-8 identifies the localized impacts at the nearest receptor location in the vicinity of the Project. Without mitigation, emissions would not exceed the applicable thresholds of significance for any criteria pollutants. Outputs from the model runs for construction LSTs are provided in Appendix 3.1.

TABLE 3-8: LOCALIZED SIGNIFICANCE SUMMARY CONSTRUCTION

On-Site Demolition Emissions	**Emissions (pounds per day)**			
	NO_X	**CO**	**PM_{10}**	**$PM_{2.5}$**
Maximum Daily Emissions	**35.78**	**22.06**	**3.12**	**1.87**
SCAQMD Localized Threshold	96	914	14	5
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**
On-Site Grading Emissions	**Emissions (pounds per day)**			
	NO_X	**CO**	**PM_{10}**	**$PM_{2.5}$**
Maximum Daily Emissions	**50.20**	**31.96**	**10.91**	**5.61**
SCAQMD Localized Threshold	150	1,626	27	9
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**

EXHIBIT 3-A: RECEPTOR LOCATIONS

LEGEND:

- Receiver Locations
- Distance from receiver to Project site boundary (in feet)
- 6' Existing Barrier Height (in feet)
- Existing Barrier

3.8 LOCALIZED SIGNIFICANCE – LONG-TERM OPERATIONAL ACTIVITY

The proposed project proposed to construct approximately 675 single family detached residential homes, 101 senior affordable housing residential units, an elementary school which could accommodate up to 1,000 students, and park/open space uses. According to SCAQMD LST methodology, LSTs would apply to the operational phase of a proposed project, if the project includes stationary sources, or attracts mobile sources that may spend long periods queuing and idling at the site (e.g., warehouse or transfer facilities). Although the proposed project does not include such uses, the Project is expected produce periods of mobile queuing and idling at the School use.

Table 3-9 shows the calculated emissions for the Project's operational activities compared with the applicable LSTs. The LST analysis includes on-site sources only; however, the CalEEMod outputs do not separate on-site and off-site emissions from mobile sources. In an effort to establish a maximum potential impact scenario for analytic purposes, the emissions shown on Table 3-8 represent all on-site Project-related stationary (area) sources and five percent (5%) of the Project-related mobile sources. Considering that the trip length used in CalEEMod for the School use is 16.6 miles and the trip length for the residential uses are 14.7 miles, 5% of this trip length would represent an on-site travel distance for each car approximately 0.83 miles/4,382.40 feet and 0.74 miles/3,907.2 feet respectively. As such, the 5% assumption is conservative and would tend to overstate the actual impact. The mobile source emissions also include any potential on-site idling that would occur since CalEEMod calculations are inclusive of on-site idling. Modeling based on these assumptions demonstrates that even within broad encompassing parameters, Project operational-source emissions would not exceed applicable LSTs. As shown below, emissions during operational activity would not exceed the SCAQMD's localized significance thresholds for any criteria pollutant and a less than significant impact would occur.

As previously noted, a 60.05-meter receptor distance is utilized to determine the LSTs for emissions of CO and NO_x, PM_{10}, and $PM_{2.5}$.

TABLE 3-9: LOCALIZED SIGNIFICANCE SUMMARY OF OPERATIONS (PROJECT)

Operational Activity	Emissions (pounds per day)			
	NO_x	CO	PM_{10}	$PM_{2.5}$
Maximum Daily Emissions	**18.47**	**77.44**	**4.48**	**2.41**
SCAQMD Localized Significance Threshold	191	2,235	10	3
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**

Source: CalEEMod localized operational-source emissions are presented in Appendix 3.2.

3.9 CO "HOT SPOT" ANALYSIS

As discussed below, the Project would not result in potentially adverse CO concentrations or "hot spots." Further, detailed modeling of Project-specific carbon monoxide (CO) "hot spots" is not needed to reach this conclusion.

An adverse CO concentration, known as a "hot spot", would occur if an exceedance of the state one-hour standard of 20 ppm or the eight-hour standard of 9 ppm were to occur. At the time of the 1993 Handbook, the SCAB was designated nonattainment under the California AAQS and National AAQS for CO (26).

It has long been recognized that CO hotspots are caused by vehicular emissions, primarily when idling at congested intersections. In response, vehicle emissions standards have become increasingly stringent in the last twenty years. Currently, the allowable CO emissions standard in California is a maximum of 3.4 grams/mile for passenger cars (there are requirements for certain vehicles that are more stringent). With the turnover of older vehicles, introduction of cleaner fuels, and implementation of increasingly sophisticated and efficient emissions control technologies, CO concentration in the SCAB is now designated as attainment, as previously noted in Table 2-2. Also, CO concentrations in the Project vicinity have steadily declined, as indicated by historical emissions data presented previously at Table 2-3.

To establish a more accurate record of baseline CO concentrations affecting the SCAB, a CO "hot spot" analysis was conducted in 2003 for four busy intersections in Los Angeles at the peak morning and afternoon time periods. This "hot spot" analysis did not predict any violation of CO standards, as shown on Table 3-10.

TABLE 3-10: CO MODEL RESULTS

Intersection Location	Carbon Monoxide Concentrations (ppm)		
	Morning 1-hour	Afternoon 1-hour	8-hour
Wilshire-Veteran	4.6	3.5	4.2
Sunset-Highland	4	4.5	3.9
La Cienega-Century	3.7	3.1	5.8
Long Beach-Imperial	3	3.1	9.3

Source: 2003 AQMP

Notes: ppm: parts per million. Federal 1-hour standard is 35 ppm and the deferral 8-hour standard is 9.0 ppm.

Based on the SCAQMD's 2003 AQMP and the 1992 Federal Attainment Plan for Carbon Monoxide (1992 CO Plan), peak carbon monoxide concentrations in the SCAB were a result of unusual meteorological and topographical conditions and not a result of traffic volumes and congestion at a particular intersection. As evidence of this, for example, 8.4 ppm CO concentration measured at the Long Beach Blvd. and Imperial Hwy. intersection (highest CO generating intersection within the "hot spot" analysis), only 0.7 ppm was attributable to the traffic volumes and congestion at this intersection; the remaining 7.7 ppm were due to the ambient air measurements at the time the 2003 AQMP was prepared (26). Therefore, even if the traffic volumes for the proposed Project were double or even triple of the traffic volumes generated at the Long Beach Blvd. and Imperial Hwy. intersection, coupled with the on-going improvements in ambient air quality, the Project would not be capable of resulting in a CO "hot spot" at any study area intersections.

Similar considerations are also employed by other Air Districts when evaluating potential CO concentration impacts. More specifically, the Bay Area Air Quality Management District (BAAQMD) concludes that under existing and future vehicle emission rates, a given project would

have to increase traffic volumes at a single intersection by more than 44,000 vehicles per hour—or 24,000 vehicles per hour where vertical and/or horizontal air does not mix—in order to generate a significant CO impact (27).

Traffic volumes generating the CO concentrations for the "hot spot" analysis are shown on Tables 3-11. The busiest intersection evaluated was that at Wilshire Blvd. and Veteran Ave., which has a daily traffic volume of approximately 100,000 vehicles per day and AM/PM traffic volumes of 8,062 vehicles per hour and 7,719 vehicles per hour respectively (26). The 2003 AQMP estimated that the 1-hour concentration for this intersection was 4.6 ppm; this indicates that, should the daily traffic volume increase four times to 400,000 vehicles per day, CO concentrations (4.6 ppm x 4= 18.4 ppm) would still not likely exceed the most stringent 1-hour CO standard (20.0 ppm).[4] At buildout of the Project, as shown on Exhibit 7-12 and 7-24 of the TIA, the highest average daily trips on a segment of road would be 88,000 daily trips on Bake Parkway between Rockfield Boulevard and the I-5 Northbound Ramp, which is lower than the highest daily traffic volumes at Wilshire Blvd. and Veteran Ave. of 100,000 vehicles per day (2). Additionally, the 2003 AQMP determined that the highest traffic volumes on a segment of road is 8,674 vehicles per hour on La Cienega Boulevard and Century Boulevard. The highest trips on a segment of road for the "Without Portola" and "With Portola" scenarios are 8,350 vehicles per hour and 8,310 vehicles per hour, respectively, on Bake Parkway and Rockfield Boulevard. As such, Project-related traffic volumes are less than the traffic volumes identified in the 2003 AQMP.

The proposed Project considered herein would not produce the volume of traffic required to generate a CO "hot spot" either in the context of the 2003 Los Angeles hot spot study, or based on representative BAAQMD CO threshold considerations, as shown on Tables 3-12 and 3-13. Therefore, CO "hot spots" are not an environmental impact of concern for the proposed Project. Localized air quality impacts related to mobile-source emissions would therefore be less than significant.

TABLE 3-11: TRAFFIC VOLUMES FOR INTERSECTIONS EVALUATED IN AQMP

Intersection Location	Peak Traffic Volumes (vph)				
	Eastbound (AM/PM)	Westbound (AM/PM)	Southbound (AM/PM)	Northbound (AM/PM)	Total (AM/PM)
Wilshire-Veteran	4,954/2,069	1,830/3,317	721/1,400	560/933	8,062/7,719
Sunset-Highland	1,417/1,764	1,342/1,540	2,304/1,832	1,551/2,238	6,614/5,374
La Cienega-Century	2,540/2,243	1,890/2,728	1,384/2,029	821/1,674	6,634/8,674
Long Beach-Imperial	1,217/2,020	1,760/1,400	479/944	756/1,150	4,212/5,514

Source: 2003 AQMP
Notes: vph-vehicles per hour

4 Based on the ratio of the CO standard (20.0 ppm) and the modeled value (4.6 ppm).

TABLE 3-12: PROJECT (WITHOUT PORTOLA) TRAFFIC VOLUMES

Intersection Location	Peak Traffic Volumes (vph)				
	Northbound (AM/PM)	Southbound (AM/PM)	Eastbound (AM/PM)	Westbound (AM/PM)	Total (AM/PM)
El Toro Rd./Portola Pkwy.	960/1,650	1,210/1,640	1,230/3,100	2,600/1,790	6,000/8,180
Bake Pkwy./Trabuco Rd.	2,210/2,610	1,670/1,940	1,700/2,020	2,440/1,070	8,020/7,640
Bake Pkwy./Muirlands Blvd.	3,160/2,950	2,730/2,970	292/1,400	730/420	6,912/7,740
Bake Pkwy./Rockfield Blvd.	4,010/3,370	2,820/3,210	90/600	800/1,170	7,720/8,350

TABLE 3-13: PROJECT (WITH PORTOLA) TRAFFIC VOLUMES

Intersection Location	Peak Traffic Volumes (vph)				
	Northbound (AM/PM)	Southbound (AM/PM)	Eastbound (AM/PM)	Westbound (AM/PM)	Total (AM/PM)
El Toro Rd./Portola Pkwy.	950/1,600	1,190/1,640	1,250/3,110	2,610/1,800	6,000/8,150
Bake Pkwy./Trabuco Rd.	2,190/2,610	1,600/1,930	1,740/1,980	2,430/1,050	7,960/7,570
Bake Pkwy./Muirlands Blvd.	3,170/2,960	2,720/2,930	292/1,400	6,30/430	6,812/7,7720
Bake Pkwy./Rockfield Blvd.	4,020/3,370	2,790/3,170	90/590	780/1,180	7,680/8,310

3.10 AIR QUALITY MANAGEMENT PLANNING

The SCAQMD has jurisdiction over an approximately 10,743 square-mile area consisting of the four-county Basin and the Los Angeles County and Riverside County portions of what use to be referred to as the Southeast Desert Air Basin. In these areas, the SCAQMD is principally responsible for air pollution control, and works directly with the Southern California Association of Governments (SCAG), county transportation commissions, local governments, as well as state and federal agencies to reduce emissions from stationary, mobile, and indirect sources to meet state and federal ambient air quality standards.

Currently, these state and federal air quality standards are exceeded in most parts of the SCAB. In response, the SCAQMD has adopted a series of Air Quality Management Plans (AQMPs) to meet the state and federal ambient air quality standards. AQMPs are updated regularly in order to more effectively reduce emissions, accommodate growth, and to minimize any negative fiscal impacts of air pollution control on the economy.

In March 2017, the AQMD released the Final 2016 AQMP. The 2016 AQMP continues to evaluate current integrated strategies and control measures to meet the NAAQS, as well as, explore new and innovative methods to reach its goals. Some of these approaches include utilizing incentive programs, recognizing existing co-benefit programs from other sectors, and developing a strategy with fair-share reductions at the federal, state, and local levels (28). Similar to the 2012 AQMP, the 2016 AQMP incorporates scientific and technological information and planning assumptions, including the 2016 RTP/SCS and updated emission inventory methodologies for various source categories (29). The Project's consistency with the 2016 AQMP is discussed below.

Criteria for determining consistency with the AQMP are defined in Chapter 12, Section 12.2 and Section 12.3 of the SCAQMD's CEQA Air Quality Handbook (1993) (30). These indicators are discussed below:

- Consistency Criterion No. 1: The proposed Project will not result in an increase in the frequency or severity of existing air quality violations or cause or contribute to new violations, or delay the timely attainment of air quality standards or the interim emissions reductions specified in the AQMP.

Construction Impacts

The violations that Consistency Criterion No. 1 refers to are the CAAQS and NAAQS. CAAQS and NAAQS violations would occur if localized significance thresholds (LSTs) or regional significance thresholds were exceeded. The Project would not exceed the applicable LST thresholds or regional significance thresholds for construction activity. Therefore, the Project would not have the potential to conflict with the AQMP according to this criterion.

Operational Impacts

The Project would not exceed the applicable LST thresholds or regional significance thresholds for operational activity for emissions of any criteria pollutants. Therefore, the Project would not have the potential to conflict with the AQMP according to this criterion

On the basis of the preceding discussion, the Project is determined to be consistent with the first criterion.

- Consistency Criterion No. 2: The Project will not exceed the assumptions in the AQMP based on the years of Project build-out phase.

Overview

The 2016 AQMP demonstrates that the applicable ambient air quality standards can be achieved within the timeframes required under federal law. Growth projections from local general plans adopted by cities in the district are provided to the Southern California Association of Governments (SCAG), which develops regional growth forecasts, which are then used to develop future air quality forecasts for the AQMP. Development consistent with the growth projections in the City of Lake Forest General Plan (referred to as the "General Plan") is considered to be consistent with the AQMP.

Construction Impacts

Peak day emissions generated by construction activities are largely independent of land use assignments, but rather are a function of development scope and maximum area of disturbance. Irrespective of the site's land use designation, development of the site to its maximum potential would likely occur, with disturbance of the entire site occurring during construction activities.

Operational Impacts

The City of Lake Forest General Plan Land Use designation for the site is "Business Park". The Business Park land use designation provides opportunities for a mixture of all uses allowed under

the Commercial, Professional Office, and Light Industrial land use designations (31). Such uses include a variety of retail, professional office, service-oriented business activities, administrative and corporate uses, and light industrial uses. As previously stated, development of the Project consists of approximately 675 single family detached residential homes, 101 senior affordable housing residential units, an elementary school which could accommodate up to 1,000 students, and park/open space uses.

As per the *Nakase Property Trip Generation Evaluation* (Urban Crossroads 2018), the currently adopted general plan land use generates 14,122 more trip-ends per day than the proposed Project (2). As previously indicated in Section 3.6 of this AQIA, the Project will result in a net decrease in NO_X, CO, SO_X, PM_{10}, $PM_{2.5}$. As such, the proposed Project would result in fewer emissions and consequently fewer impacts beyond the impacts that occur with the currently adopted general plan land use designation.

On the basis of the preceding discussion, the Project is determined to be consistent with the second criterion.

AQMP Consistency Conclusion

The Project would not have the potential to cause NAAQS or CAAQS violations. The Project construction-source and operational-source would not exceed the regional or localized significance thresholds as previously indicated. Although the Project would not be consistent with the site land use designations, the proposed Project is expected to generate a net decrease in emissions as compared to the currently adopted land use. The Project is therefore considered to be consistent with the AQMP.

3.11 POTENTIAL IMPACTS TO SENSITIVE RECEPTORS

The potential impact of Project-generated air pollutant emissions at sensitive receptors has also been considered. Sensitive receptors can include uses such as long-term health care facilities, rehabilitation centers, and retirement homes. Residences, schools, playgrounds, child care centers, and athletic facilities can also be considered as sensitive receptors.

Results of the LST analysis indicate that, with application of mitigation, the Project will not exceed the SCAQMD localized significance thresholds during construction. Therefore, sensitive receptors would not be exposed to substantial criteria pollutant concentrations during Project construction.

The proposed Project would not result in a CO "hotspot" as a result of Project related traffic during ongoing operations, nor would the Project result in a significant adverse health impact as discussed in Section 3.8. Thus a less than significant impact to sensitive receptors during operational activity is expected.

3.12 ODORS

The potential for the Project to generate objectionable odors has also been considered. Land uses generally associated with odor complaints include:

- Agricultural uses (livestock and farming)
- Wastewater treatment plants
- Food processing plants
- Chemical plants
- Composting operations
- Refineries
- Landfills
- Dairies
- Fiberglass molding facilities

The Project does not contain land uses typically associated with emitting objectionable odors. Potential odor sources associated with the proposed Project may result from construction equipment exhaust and the application of asphalt and architectural coatings during construction activities and the temporary storage of typical solid waste (refuse) associated with the proposed Project's (long-term operational) uses. Standard construction requirements would minimize odor impacts from construction. The construction odor emissions would be temporary, short-term, and intermittent in nature and would cease upon completion of the respective phase of construction and is thus considered less than significant. It is expected that Project-generated refuse would be stored in covered containers and removed at regular intervals in compliance with the City's solid waste regulations. The proposed Project would also be required to comply with SCAQMD Rule 402 to prevent occurrences of public nuisances. Therefore, odors associated with the proposed Project construction and operations would be less than significant and no mitigation is required.

3.13 CUMULATIVE IMPACTS

Federal standards designated the Project area as an extreme non-attainment area for ozone, attainment for PM_{10}, and non-attainment for $PM_{2.5}$, and lead. State standards designated the Project area as nonattainment for ozone, PM_{10}, $PM_{2.5}$ and attainment for lead.

The AQMD has published a report on how to address cumulative impacts from air pollution: *White Paper on Potential Control Strategies to Address Cumulative Impacts from Air Pollution* (32). In this report the AQMD clearly states (Page D-3):

"…the AQMD uses the same significance thresholds for project specific and cumulative impacts for all environmental topics analyzed in an Environmental Assessment or EIR. The only case where the significance thresholds for project specific and cumulative impacts differ is the Hazard Index (HI) significance threshold for toxic air contaminant (TAC) emissions. The project specific (project increment) significance threshold is HI > 1.0 while the cumulative (facility-wide) is HI > 3.0. It should be noted that the HI is only one of three TAC emission significance thresholds considered (when applicable) in a CEQA analysis. The other two are the maximum individual cancer risk (MICR) and the cancer burden, both of which use the same significance thresholds (MICR of 10 in 1 million and cancer burden of 0.5) for project specific and cumulative impacts.

Projects that exceed the project-specific significance thresholds are considered by the SCAQMD to be cumulatively considerable. This is the reason project-specific and cumulative significance thresholds are the same. Conversely, projects that do not exceed the project-specific thresholds are generally not considered to be cumulatively significant."

Therefore, this analysis assumes that individual projects that do not generate operational or construction emissions that exceed the SCAQMD's recommended daily thresholds for project-specific impacts would also not cause a cumulatively considerable increase in emissions for those pollutants for which the SCAB is in nonattainment, and, therefore, would not be considered to have a significant, adverse air quality impact. Alternatively, individual project-related construction and operational emissions that exceed SCAQMD thresholds for project-specific impacts would be considered cumulatively considerable.

Construction Impacts

The Project-specific evaluation of emissions presented in the preceding analysis demonstrates that Project construction-source air pollutant emissions would not have the potential to exceed the regional thresholds for any criteria pollutant. Therefore, project construction-source emission would be considered less than significant on a project-specific and cumulative basis.

Operational Impacts

Project operational-source emissions would not exceed applicable SCAQMD regional thresholds. Therefore, Project operational-source emissions would be considered less than significant on a project-specific and cumulative basis.

This page intentionally left blank

4 FINDINGS & CONCLUSIONS

CONSTRUCTION-SOURCE EMISSIONS

REGIONAL IMPACTS

For regional emissions, the Project would not exceed the numerical thresholds of significance established by the SCAQMD for emissions of any criteria pollutant. As such, less than significant impact would occur.

LOCALIZED IMPACTS

Project construction-source emissions would not exceed the SCAQMD's localized significance thresholds for any criteria. Therefore, a less than significant impact would occur.

ODORS

Substantial odor-generating sources include land uses such as agricultural activities, feedlots, wastewater treatment facilities, landfills or various heavy industrial uses. The Project does not propose any such uses or activities that would result in potentially significant operational-source odor impacts. Potential sources of operational odors generated by the Project would include disposal of miscellaneous refuse. Moreover, SCAQMD Rule 402 acts to prevent occurrences of odor nuisances (33). Consistent with City requirements, all Project-generated refuse would be stored in covered containers and removed at regular intervals in compliance with solid waste regulations. Potential operational-source odor impacts are therefore considered less-than-significant.

OPERATIONAL-SOURCE EMISSIONS

REGIONAL IMPACTS

For regional emissions, operations with implementation of project design features would not exceed the thresholds of significance for emissions of any criteria pollutants. As such, additional mitigation is not required as Project operational-source emissions are considered less than significant.

Localized Impacts

Project operational-source emissions would not result in or cause a significant localized air quality impact as discussed in the operational LSTs section of this report. The proposed Project would not result in a significant CO "hotspot" as a result of Project related traffic during ongoing operations.

ODORS

Substantial odor-generating sources include land uses such as agricultural activities, feedlots, wastewater treatment facilities, landfills or various heavy industrial uses. The Project does not propose any such uses or activities that would result in potentially significant operational-source

odor impacts. Potential sources of operational odors generated by the Project would include disposal of miscellaneous refuse. Moreover, SCAQMD Rule 402 acts to prevent occurrences of odor nuisances (33). Consistent with City requirements, all Project-generated refuse would be stored in covered containers and removed at regular intervals in compliance with solid waste regulations. Potential operational-source odor impacts are therefore considered less-than-significant.

5 REFERENCES

1. **State of California.** *California Environmental Quality Act, Appendix G.* 2016.
2. **Urban Crossroads, Inc.** *Nakase Property Traffic Impact Analysis.* 2019.
3. **South Coast Air Quality Management District.** RULE 1113. Architectural Coatings. [Online] http://www.aqmd.gov/rules/reg/reg11/r1113.pdf.
4. —. RULE 403. Fugitive Dust. [Online] http://www.aqmd.gov/rules/reg/reg04/r403.pdf.
5. —. Southern California Air Basins. [Online] [Cited: November 13, 2013.] http://www.aqmd.gov/map/mapaqmd1.pdf.
6. **Environmental Protection Agency.** National Ambient Air Quality Standards (NAAQS). [Online] 1990. [Cited: November 13, 2013.] http://www.epa.gov/air/criteria.html.
7. **Air Resources Board.** California Ambient Air Quality Standards (CAAQS). [Online] 2009. [Cited: November 13, 2013.] http://www.arb.ca.gov/research/aaqs/caaqs/caaqs.htm.
8. **South Coast Air Quality Management District.** Annual Air Quality Monitoring Network Plan. [Online] July 2016. http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-monitoring-network-plan/annual-air-quality-monitoring-network-plan-v2.pdf?sfvrsn=2.
9. **Environmental Protection Agency.** Monitor Values Report. [Online] https://www.epa.gov/outdoor-air-quality-data/monitor-values-report.
10. **Air Resources Board.** Air Quality Standards and Area Designations. [Online] 2013. [Cited: September 17, 2014.] http://www.arb.ca.gov/desig/desig.htm.
11. **South Coast Air Quality Management District.** National Ambient Air Qualirt Standards (NAQS) and California Ambient Air Quality Standards (CAAQS) Attainment Status for South Coast Air Basin. *AQMD.* [Online] February 2016. http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/naaqs-caaqs-feb2016.pdf?sfvrsn=2.
12. **California Air Resources Board.** iADAM: Air Quality Data Statistics. *California Air Resources Board.* [Online]
13. **District, South Coast Air Quality Management.** Air Quality Data Tables. [Online] https://www.aqmd.gov/home/air-quality/air-quality-data-studies/historical-data-by-year.
14. **California Air Resources Board.** Ambient Air Quality Standards (AAQS). [Online] 2013. [Cited: April 6, 2015.] http://www.arb.ca.gov/research/aaqs/aaqs2.pdf.
15. **Environmental Protection Agency.** Air Pollution and the Clean Air Act. [Online] [Cited: September 17, 2014.] http://www.epa.gov/air/caa/.
16. **Air Resources Board.** California Ambient Air Quality Standards (CAAQS). [Online] 2009. [Cited: September 17, 2014.] http://www.arb.ca.gov/research/aaqs/caaqs/caaqs.htm.
17. **South Coast Air Quality Management District.** 2012 Air Quality Management Plan (AQMP). [Online] 2012. [Cited: September 17, 2014.] http://www.aqmd.gov/home/library/clean-air-plans/air-quality-mgt-plan/final-2012-air-quality-management-plan.
18. **Professionals, Association of Environmental.** 2016 California Environmental Quality Act (CEQA) Statute and Guidelines. [Online] http://resources.ca.gov/ceqa/docs/2016_CEQA_Statutes_and_Guidelines.pdf.

19. **South Coast Air Quality Management District (SCAQMD).** SCAQMD Air Quality Significance Thresholds. [Online] http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf?sfvrsn=2.
20. **California Air Pollution Control Officers Association (CAPCOA).** California Emissions Estimator Model (CalEEMod). [Online] September 2016. www.caleemod.com.
21. **California Air Pollution Control Officers Association.** California Emissions Estimator Model User's Guide Version 2016.3.2. [Online] 2017. http://www.caleemod.com/.
22. **South Coast Air Quality Management District.** RULE 1113. Architectural Coatings. [Online] http://www.aqmd.gov/docs/default-source/rule-book/reg-xi/r1113.pdf.
23. —. RULE 403. Fugitive Dust. [Online] http://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-403.pdf?sfvrsn=4.
24. **Lake Environmental.** US EPA Models. *Lake Environmental.* [Online] http://www.weblakes.com/download/us_epa.html.
25. **South Coast Air Quality Management District.** Fact Sheet fo Applying CalEEMod to Localized Significance Thresholds. [Online] http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/caleemod-guidance.pdf.
26. —. 2003 Air Quality Management Plan. [Online] 2003. http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2003-air-quality-management-plan/2003-aqmp-appendix-v.pdf.
27. **Bay Area Air Quality Management District.** [Online] http://www.baaqmd.gov/.
28. **South Coast Air Quality Management District.** Final 2016 Air Quality Management Plan (AQMP). [Online] March 2017. http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2016-air-quality-management-plan/final-2016-aqmp/final2016aqmp.pdf?sfvrsn=11.
29. **Southern California Association of Governments.** 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy. [Online] April 2016. http://scagrtpscs.net/Documents/2016/final/f2016RTPSCS.pdf.
30. **South coast Air Quality Management District.** CEQA Air Quality Handbook (1993). [Online] 1993. [Cited: September 17, 2014.] http://www.aqmd.gov/ceqa/oldhdbk.html.
31. **City of Lake Forest.** *City of Lake Forest General Plan Land Use Element.* 2016.
32. **Goss, Tracy A and Kroeger, Amy.** White Paper on Potential Control Strategies to Address Cumulative Impacts from Air Pollution. [Online] South Coast Air Quality Management District, 2003. http://www.aqmd.gov/rules/ciwg/final_white_paper.pdf.
33. **South Coast Air Quality Management District.** RULE 402. Nuisance. [Online] May 7, 1976. [Cited: November 13, 2013.] http://www.aqmd.gov/rules/reg/reg04/r402.pdf.

6 CERTIFICATION

The contents of this air study report represent an accurate depiction of the environmental impacts associated with the proposed Nakase Property Project. The information contained in this air quality impact assessment report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 336-5987.

Haseeb Qureshi
Associate Principal
URBAN CROSSROADS, INC.
260 E. Baker, Suite 200
Costa Mesa, CA 92626
(949) 336-5987
hqureshi@urbanxroads.com

EDUCATION

Master of Science in Environmental Studies
California State University, Fullerton • May, 2010

Bachelor of Arts in Environmental Analysis and Design
University of California, Irvine • June, 2006

PROFESSIONAL AFFILIATIONS

AEP – Association of Environmental Planners
AWMA – Air and Waste Management Association
ASTM – American Society for Testing and Materials

PROFESSIONAL CERTIFICATIONS

Planned Communities and Urban Infill – Urban Land Institute • June, 2011
Indoor Air Quality and Industrial Hygiene – EMSL Analytical • April, 2008
Principles of Ambient Air Monitoring – California Air Resources Board • August, 2007
AB2588 Regulatory Standards – Trinity Consultants • November, 2006
Air Dispersion Modeling – Lakes Environmental • June, 2006

APPENDIX 2.1:

STATE/FEDERAL ATTAINMENT STATUS OF CRITERIA POLLUTANTS

TABLE 2-3

National Ambient Air Quality Standards (NAAQS) Attainment Status - South Coast Air Basin

Criteria Pollutant	Averaging Time	Designation[a]	Attainment Date[b]
Ozone (O_3)	(1979) **1-Hour** (0.12 ppm)[c]	Nonattainment ("extreme")	2/26/2023 (revised deadline)
	(2015) **8-Hour** (0.070 ppm)[d]	Pending – Expect Nonattainment ("extreme")	Pending (beyond 2032)
	(2008) **8-Hour** (0.075 ppm)[d]	Nonattainment ("extreme")	7/20/2032
	(1997) **8-Hour** (0.08 ppm)[d]	Nonattainment ("extreme")	6/15/2024
PM2.5[e]	(2006) **24-Hour** (35 µg/m^3)	Nonattainment ("serious")	12/31/2019
	(2012) **Annual** (12.0 µg/m^3)	Nonattainment ("moderate")	12/31/2021
	(1997) **Annual** (15.0 µg/m^3)	Attainment (final determination pending)	4/5/2015 (attained 2013)
PM10[f]	(1987) **24-hour** (150 µg/m^3)	Attainment (Maintenance)	7/26/2013 (attained)
Lead (Pb)[g]	(2008) **3-Months Rolling** (0.15 µg/m^3)	Nonattainment (Partial) (Attainment determination to be requested)	12/31/2015
CO	(1971) **1-Hour** (35 ppm)	Attainment (Maintenance)	6/11/2007 (attained)
	(1971) **8-Hour** (9 ppm)	Attainment (Maintenance)	6/11/2007 (attained)
NO_2[h]	(2010) **1-Hour** (100 ppb)	Unclassifiable/Attainment	N/A (attained)
	(1971) **Annual** (0.053 ppm)	Attainment (Maintenance)	9/22/1998 (attained)
SO_2[i]	(2010) **1-Hour** (75 ppb)	Designations Pending (expect Unclassifiable/Attainment)	N/A (attained)
	(1971) **24-Hour** (0.14 ppm) (1971) **Annual** (0.03 ppm)	Unclassifiable/Attainment	3/19/1979 (attained)

a) U.S. EPA often only declares Nonattainment areas; everywhere else is listed as Unclassifiable/Attainment or Unclassifiable

b) A design value below the NAAQS for data through the full year or smog season prior to the attainment date is typically required for an attainment demonstration

c) The 1979 1-hour ozone NAAQS (0.12 ppm) was revoked, effective 6/15/05 ; however, the Basin has not attained this standard and therefore has some continuing obligations with respect to the revoked standard; original attainment date was 11/15/2010; the revised attainment date is 2/6/23

d) The 2008 8-hour ozone NAAQS (0.075 ppm) was revised to 0.070 ppm, effective 12/28/15 with classifications and implementation goals to be finalized by 10/1/17; the 1997 8-hour ozone NAAQS (0.08 ppm) was revoked in the 2008 ozone NAAQS implementation rule, effective 4/6/15; there are continuing obligations under the revoked 1997 and revised 2008 ozone NAAQS until they are attained

e) The attainment deadline for the 2006 24-hour PM2.5 NAAQS was 12/31/15 for the former "moderate" classification; U.S.EPA approved reclassification to "serious," effective 2/12/16 with an attainment deadline of 12/31/2019; the 2012 (proposal year) annual PM2.5 NAAQS was revised on 1/15/13, effective 3/18/13, from 15 to 12 µg/m^3; new annual designations were final 1/15/15, effective 4/15/15; on July 25, 2016 U.S. EPA finalized a determination that the Basin attained the 1997 annual (15.0 µg/m^3) and 24-hour PM2.5 (65 µg/m^3) NAAQS, effective August 24, 2016

f) The annual PM10 NAAQS was revoked, effective 12/18/06; the 24-hour PM10 NAAQS deadline was 12/31/2006; the Basin's Attainment Re-designation Request and PM10 Maintenance Plan was approved by U.S. EPA on 6/26/13, effective 7/26/13

g) Partial Nonattainment designation – Los Angeles County portion of the Basin only for near-source monitors; expect to remain in attainment based on current monitoring data; attainment re-designation request pending

h) New 1-hour NO_2 NAAQS became effective 8/2/10, with attainment designations 1/20/12; annual NO_2 NAAQS retained

i) The 1971 annual and 24-hour SO2 NAAQS were revoked, effective 8/23/10; however, these 1971 standards will remain in effect until one year after U.S. EPA promulgates area designations for the 2010 SO2 1-hour NAAQS; final area designations expected by 12/31/20 due to new source-specific monitoring requirements; Basin expected to be in attainment due to ongoing clean data

TABLE 2-4

National Ambient Air Quality Standards (NAAQS) Attainment Status
Coachella Valley Portion of the Salton Sea Air Basin

Criteria Pollutant	Averaging Time	Designation[a]	Attainment Date[b]
Ozone (O_3)	(1979) **1-Hour** (0.12 ppm)[c]	Attainment	11/15/2007 (attained 12/31/2013)
	(2015) **8-Hour** (0.070 ppm)[d]	Pending – Expect Nonattainment (Severe)	Pending
	(2008) **8-Hour** (0.075 ppm)[d]	Nonattainment (Severe-15)	7/20/2027
	(1997) **8-Hour** (0.08 ppm)[d]	Nonattainment (Severe-15)	6/15/2019
PM2.5[e]	(2006) **24-Hour** (35 µg/m^3)	Unclassifiable/Attainment	N/A (attained)
	(2012) **Annual** (12.0 µg/m^3)	Unclassifiable/Attainment	N/A (attained)
	(1997) **Annual** (15.0 µg/m^3)	Unclassifiable/Attainment	N/A (attained)
PM10[f]	(1987) **24-hour** (150 µg/m^3)	Nonattainment ("serious")	12/31/2006
Lead (Pb)	(2008) **3-Months Rolling** (0.15 µg/m^3)	Unclassifiable/Attainment	Unclassifiable/ Attainment
CO	(1971) **1-Hour** (35 ppm)	Unclassifiable/Attainment	N/A (attained)
	(1971) **8-Hour** (9 ppm)	Unclassifiable/Attainment	N/A (attained)
NO_2[g]	(2010) **1-Hour** (100 ppb)	Unclassifiable/Attainment	N/A (attained)
	(1971) **Annual** (0.053 ppm)	Unclassifiable/Attainment	N/A (attained)
SO_2[h]	(2010) **1-Hour** (75 ppb)	Designations Pending	N/A
	(1971) **24-Hour** (0.14 ppm) (1971) **Annual** (0.03 ppm)	Unclassifiable/Attainment	Unclassifiable/ Attainment

a) U.S. EPA often only declares Nonattainment areas; everywhere else is listed as Unclassifiable/Attainment or Unclassifiable

b) A design value below the NAAQS for data through the full year or smog season prior to the attainment date is typically required for an attainment demonstration

c) The 1979 1-hour ozone NAAQS (0.12 ppm) was revoked, effective 6/15/05; the Southeast Desert Modified Air Quality Management Area, including the Coachella Valley, had not timely attained this standard by the 11/15/07 "severe-17" deadline, based on 2005-2007 data; on 8/25/14, U.S. EPA proposed a clean data finding based on 2011–2013 data and a determination of attainment for the former 1-hour ozone NAAQS for the Southeast Desert nonattainment area; this rule was finalized by U.S. EPA on 4/15/15, effective 5/15/15, that included preliminary 2014 data

d) The 2008 8-hour ozone NAAQS (0.075 ppm) was revised to 0.070 ppm, effective 12/28/15 with classifications and implementation goals to be finalized by 10/1/17; the 1997 8-hour ozone NAAQS (0.08 ppm) was revoked in the 2008 ozone NAAQS implementation rule, effective 4/6/15; there are continuing obligations under the 1997 and 2008 ozone NAAQS until they are attained

e) The annual PM2.5 standard was revised on 1/15/13, effective 3/18/13, from 15 to 12 µg/m^3

f) The annual PM10 standard was revoked, effective 12/18/06; the 24-hour PM10 NAAQS attainment deadline was 12/31/2006; the Coachella Valley Attainment Re-designation Request and PM10 Maintenance Plan was postponed by U.S. EPA pending additional monitoring and analysis in the southeastern Coachella Valley

g) New 1-hour NO_2 NAAQS became effective 8/2/10; attainment designations 1/20/12; annual NO_2 NAAQS retained

h) The 1971 Annual and 24-hour SO_2 NAAQS were revoked, effective 8/23/10; however, these 1971 standards will remain in effect until one year after U.S. EPA promulgates area designations for the 2010 SO_2 1-hour standard; final area designations expected by 12/31/2020 with SSAB expected to be designated Unclassifiable/Attainment

The current status of CAAQS attainment for the pollutants with State standards is presented in Table 2-5 for the Basin and the Riverside County portion of the SSAB (Coachella Valley).

TABLE 2-5

California Ambient Air Quality Standards (CAAQS) Attainment Status
South Coast Air Basin and Coachella Valley portion of Salton Sea Air Basin

Pollutant	Averaging Time and Level[b]	Designation[a]	
		South Coast Air Basin	Coachella Valley
Ozone (O_3)	**1-Hour** (0.09 ppm)[c]	Nonattainment	Nonattainment
	8-Hour (0.070 ppm)[d]	Nonattainment	Nonattainment
PM2.5	**Annual** (12.0 µg/m^3)	Nonattainment	Attainment
PM10	**24-Hour** (50 µg/m^3)	Nonattainment	Nonattainment
	Annual (20 µg/m^3)	Nonattainment	Nonattainment
Lead (Pb)	**30-Day Average** (1.5 µg/m^3)	Attainment	Attainment
CO	**1-Hour** (20 ppm)	Attainment	Attainment
	8-Hour (9.0 ppm)	Attainment	Attainment
NO_2	**1-Hour** (0.18 ppm)	Attainment	Attainment
	Annual (0.030 ppm)	Attainment	Attainment
SO_2	**1-Hour** (0.25 ppm)	Attainment	Attainment
	24-Hour (0.04 ppm)	Attainment	Attainment
Sulfates	**24-Hour** (25 µg/m^3)	Attainment	Attainment
H_2S[c]	**1-Hour** (0.03 ppm)	Unclassified	Unclassified [c)]

a) CA State designations shown were updated by CARB in 2016, based on the 2013–2015 3-year period; stated designations are based on a 3-year data period after consideration of outliers and exceptional events; Source: http://www.arb.ca.gov/desig/statedesig.htm#current

b) CA State standards, or CAAQS, for ozone, CO, SO_2, NO_2, PM10 and PM2.5 are values not to be exceeded; lead, sulfates, and H_2S standards are values not to be equaled or exceeded; CAAQS are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations

c) SCAQMD began monitoring H_2S in the southeastern Coachella Valley in November 2013 due to odor events related to the Salton Sea; three full years of data are not yet available for a State designation, but nonattainment is anticipated for the H_2S CAAQS in at least part of the Coachella Valley

The 1979 federal 1-hour ozone standard (0.12 ppm) was revoked by the U.S. EPA and replaced by the 8-hour average ozone standard (0.08 ppm), effective June 15, 2005. However, the Basin and the former Southeast Desert Modified Air Quality Management Area (which included the Coachella Valley) had not attained the 1-hour federal ozone NAAQS by the attainment dates in 2010 and 2007, respectively, and, therefore, had continuing obligations under the former standard. On August 25, 2014, U.S. EPA

This page intentionally left blank

APPENDIX 3.1:

CALEEMOD CONSTRUCTION (UNMITIGATED) EMISSIONS MODEL OUTPUTS

Nakase (Construction - Unmitigated)

Orange County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Elementary School	1,000.00	Student	12.60	83,603.37	0
Other Asphalt Surfaces	19.80	Acre	19.80	862,488.00	0
City Park	6.60	Acre	6.60	287,496.00	0
Retirement Community	101.00	Dwelling Unit	3.90	101,000.00	289
Single Family Housing	675.00	Dwelling Unit	61.40	1,215,000.00	1931

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2025
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Nakase (Construction - Unmitigated) - Orange County, Winter

Project Characteristics -

Land Use - Total Lot Area is 121.8 acres. In order to be consistent with the TIA, 6.6 acres of Park will be analyzed, the remaining 17.5 acres of Open Space will not be analyzed.

Construction Phase - Construction Schedule adjusted as per approval of the Client.

Off-road Equipment - Hours based on an 8-hour workday.

Off-road Equipment - Hours based on an 8-hour workday.

Off-road Equipment -

Off-road Equipment -

Demolition -

Grading -

Architectural Coating -

Vehicle Trips - Operations Run Only.

Woodstoves - Operations Run Only.

Energy Use - Operations Run Only.

Water And Wastewater - Operations Run Only.

Solid Waste - Operations Run Only.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	200.00	66.00
tblConstructionPhase	NumDays	310.00	269.00
tblConstructionPhase	NumDays	220.00	87.00
tblConstructionPhase	NumDays	3,100.00	1,001.00
tblConstructionPhase	NumDays	220.00	1,001.00
tblEnergyUse	LightingElect	2.68	0.00
tblEnergyUse	LightingElect	1,001.10	0.00
tblEnergyUse	LightingElect	1,608.84	0.00
tblEnergyUse	NT24E	1.51	0.00
tblEnergyUse	NT24E	3,172.76	0.00

tblEnergyUse	NT24E	6,155.97	0.00
tblEnergyUse	NT24NG	1.03	0.00
tblEnergyUse	NT24NG	5,516.00	0.00
tblEnergyUse	NT24NG	5,516.00	0.00
tblEnergyUse	T24E	1.89	0.00
tblEnergyUse	T24E	177.01	0.00
tblEnergyUse	T24E	253.73	0.00
tblEnergyUse	T24NG	10.81	0.00
tblEnergyUse	T24NG	7,243.59	0.00
tblEnergyUse	T24NG	20,288.91	0.00
tblFireplaces	FireplaceDayYear	25.00	0.00
tblFireplaces	FireplaceDayYear	25.00	0.00
tblFireplaces	FireplaceHourDay	3.00	0.00
tblFireplaces	FireplaceHourDay	3.00	0.00
tblFireplaces	FireplaceWoodMass	1,019.20	0.00
tblFireplaces	FireplaceWoodMass	1,019.20	0.00
tblFireplaces	NumberGas	85.85	0.00
tblFireplaces	NumberGas	573.75	0.00
tblFireplaces	NumberNoFireplace	10.10	0.00
tblFireplaces	NumberNoFireplace	67.50	0.00
tblFireplaces	NumberWood	5.05	0.00
tblFireplaces	NumberWood	33.75	0.00
tblGrading	MaterialExported	0.00	150,000.00
tblLandUse	LotAcreage	1.92	12.60
tblLandUse	LotAcreage	20.20	3.90
tblLandUse	LotAcreage	219.16	61.40
tblOffRoadEquipment	UsageHours	6.00	8.00

tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblSolidWaste	SolidWasteGenerationRate	0.57	0.00
tblSolidWaste	SolidWasteGenerationRate	182.50	0.00
tblSolidWaste	SolidWasteGenerationRate	46.46	0.00
tblSolidWaste	SolidWasteGenerationRate	791.71	0.00
tblVehicleTrips	CC_TL	8.40	0.00
tblVehicleTrips	CC_TL	8.40	0.00
tblVehicleTrips	CC_TL	8.40	0.00
tblVehicleTrips	CC_TTP	48.00	0.00
tblVehicleTrips	CC_TTP	30.00	0.00
tblVehicleTrips	CNW_TL	6.90	0.00
tblVehicleTrips	CNW_TL	6.90	0.00
tblVehicleTrips	CNW_TL	6.90	0.00
tblVehicleTrips	CNW_TTP	19.00	0.00
tblVehicleTrips	CNW_TTP	5.00	0.00
tblVehicleTrips	CW_TL	16.60	0.00
tblVehicleTrips	CW_TL	16.60	0.00
tblVehicleTrips	CW_TL	16.60	0.00
tblVehicleTrips	CW_TTP	33.00	0.00
tblVehicleTrips	CW_TTP	65.00	0.00
tblVehicleTrips	DV_TP	28.00	0.00
tblVehicleTrips	DV_TP	25.00	0.00
tblVehicleTrips	DV_TP	11.00	0.00
tblVehicleTrips	DV_TP	11.00	0.00
tblVehicleTrips	HO_TL	8.70	0.00
tblVehicleTrips	HO_TL	8.70	0.00

tblVehicleTrips	HO_TTP	40.60	0.00
tblVehicleTrips	HO_TTP	40.60	0.00
tblVehicleTrips	HS_TL	5.90	0.00
tblVehicleTrips	HS_TL	5.90	0.00
tblVehicleTrips	HS_TTP	19.20	0.00
tblVehicleTrips	HS_TTP	19.20	0.00
tblVehicleTrips	HW_TL	14.70	0.00
tblVehicleTrips	HW_TL	14.70	0.00
tblVehicleTrips	HW_TTP	40.20	0.00
tblVehicleTrips	HW_TTP	40.20	0.00
tblVehicleTrips	PB_TP	6.00	0.00
tblVehicleTrips	PB_TP	12.00	0.00
tblVehicleTrips	PB_TP	3.00	0.00
tblVehicleTrips	PB_TP	3.00	0.00
tblVehicleTrips	PR_TP	66.00	0.00
tblVehicleTrips	PR_TP	63.00	0.00
tblVehicleTrips	PR_TP	86.00	0.00
tblVehicleTrips	PR_TP	86.00	0.00
tblVehicleTrips	ST_TR	22.75	0.00
tblVehicleTrips	ST_TR	2.03	0.00
tblVehicleTrips	ST_TR	9.91	0.00
tblVehicleTrips	SU_TR	16.74	0.00
tblVehicleTrips	SU_TR	1.95	0.00
tblVehicleTrips	SU_TR	8.62	0.00
tblVehicleTrips	WD_TR	1.89	0.00
tblVehicleTrips	WD_TR	1.29	0.00
tblVehicleTrips	WD_TR	2.40	0.00

tblVehicleTrips	WD_TR	9.52	0.00
tblWater	IndoorWaterUseRate	2,424,240.00	0.00
tblWater	IndoorWaterUseRate	6,580,556.59	0.00
tblWater	IndoorWaterUseRate	43,978,967.29	0.00
tblWater	OutdoorWaterUseRate	7,863,776.91	0.00
tblWater	OutdoorWaterUseRate	6,233,760.00	0.00
tblWater	OutdoorWaterUseRate	4,148,611.76	0.00
tblWater	OutdoorWaterUseRate	27,725,870.69	0.00
tblWoodstoves	NumberCatalytic	5.05	0.00
tblWoodstoves	NumberCatalytic	33.75	0.00
tblWoodstoves	NumberNoncatalytic	5.05	0.00
tblWoodstoves	NumberNoncatalytic	33.75	0.00
tblWoodstoves	WoodstoveDayYear	25.00	0.00
tblWoodstoves	WoodstoveDayYear	25.00	0.00
tblWoodstoves	WoodstoveWoodMass	999.60	0.00
tblWoodstoves	WoodstoveWoodMass	999.60	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	3.6353	37.6658	23.0159	0.0451	1.6434	1.8031	3.4465	0.2850	1.6775	1.9625	0.0000	4,496.9402	4,496.9402	1.1223	0.0000	4,524.9978
2020	5.0764	69.6581	37.6622	0.1166	10.2893	2.2386	12.5278	4.0260	2.0618	6.0878	0.0000	12,068.4622	12,068.4622	2.5781	0.0000	12,132.9154
2021	20.4054	90.4015	77.7627	0.2411	17.5152	3.3264	19.5586	5.7996	3.0918	7.6817	0.0000	24,416.8812	24,416.8812	2.7402	0.0000	24,485.3869
2022	19.1939	79.1618	73.8395	0.2366	13.2109	2.7085	15.9194	3.5447	2.5193	6.0640	0.0000	23,968.7663	23,968.7663	2.6940	0.0000	24,036.1166
2023	15.4223	38.1325	51.1167	0.1910	13.0096	0.9367	13.9463	3.4913	0.8849	4.3762	0.0000	19,520.7866	19,520.7866	1.4283	0.0000	19,556.4928
2024	15.1107	36.5954	49.1749	0.1867	13.0096	0.8300	13.8396	3.4913	0.7837	4.2750	0.0000	19,099.5318	19,099.5318	1.3977	0.0000	19,134.4752
2025	14.8256	35.0482	47.4779	0.1826	13.0096	0.7243	13.7338	3.4913	0.6836	4.1749	0.0000	18,699.4720	18,699.4720	1.3719	0.0000	18,733.7689
Maximum	**20.4054**	**90.4015**	**77.7627**	**0.2411**	**17.5152**	**3.3264**	**19.5586**	**5.7996**	**3.0918**	**7.6817**	**0.0000**	**24,416.8812**	**24,416.8812**	**2.7402**	**0.0000**	**24,485.3869**

2.1 Overall Construction (Maximum Daily Emission)

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	3.6353	37.6658	23.0159	0.0451	1.6434	1.8031	3.4465	0.2850	1.6775	1.9625	0.0000	4,496.9402	4,496.9402	1.1223	0.0000	4,524.9978
2020	5.0764	69.6581	37.6622	0.1166	10.2893	2.2386	12.5278	4.0260	2.0618	6.0878	0.0000	12,068.4621	12,068.4621	2.5781	0.0000	12,132.9154
2021	20.4054	90.4015	77.7627	0.2411	17.5152	3.3264	19.5586	5.7996	3.0918	7.6817	0.0000	24,416.8812	24,416.8812	2.7402	0.0000	24,485.3869
2022	19.1939	79.1618	73.8395	0.2366	13.2109	2.7085	15.9194	3.5447	2.5193	6.0640	0.0000	23,968.7663	23,968.7663	2.6940	0.0000	24,036.1166
2023	15.4223	38.1325	51.1167	0.1910	13.0096	0.9367	13.9463	3.4913	0.8849	4.3762	0.0000	19,520.7866	19,520.7866	1.4283	0.0000	19,556.4928
2024	15.1107	36.5954	49.1749	0.1867	13.0096	0.8300	13.8396	3.4913	0.7837	4.2750	0.0000	19,099.5318	19,099.5318	1.3977	0.0000	19,134.4752
2025	14.8256	35.0482	47.4779	0.1826	13.0096	0.7243	13.7338	3.4913	0.6836	4.1749	0.0000	18,699.4720	18,699.4720	1.3719	0.0000	18,733.7689
Maximum	**20.4054**	**90.4015**	**77.7627**	**0.2411**	**17.5152**	**3.3264**	**19.5586**	**5.7996**	**3.0918**	**7.6817**	**0.0000**	**24,416.8812**	**24,416.8812**	**2.7402**	**0.0000**	**24,485.3869**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	32.4965	0.7377	64.0649	3.3900e-003		0.3553	0.3553		0.3553	0.3553	0.0000	115.5012	115.5012	0.1110	0.0000	118.2756
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**32.4965**	**0.7377**	**64.0649**	**3.3900e-003**	**0.0000**	**0.3553**	**0.3553**	**0.0000**	**0.3553**	**0.3553**	**0.0000**	**115.5012**	**115.5012**	**0.1110**	**0.0000**	**118.2756**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	32.4965	0.7377	64.0649	3.3900e-003		0.3553	0.3553		0.3553	0.3553	0.0000	115.5012	115.5012	0.1110	0.0000	118.2756
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**32.4965**	**0.7377**	**64.0649**	**3.3900e-003**	**0.0000**	**0.3553**	**0.3553**	**0.0000**	**0.3553**	**0.3553**	**0.0000**	**115.5012**	**115.5012**	**0.1110**	**0.0000**	**118.2756**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	11/1/2019	1/31/2020	5	66	
2	Grading	Grading	2/2/2020	2/11/2021	5	269	
3	Infrastructure	Trenching	2/12/2021	2/10/2022	5	260	
4	Paving	Paving	4/1/2021	7/30/2021	5	87	
5	Building Construction	Building Construction	8/1/2021	6/2/2025	5	1001	
6	Architectural Coating	Architectural Coating	8/1/2021	6/2/2025	5	1001	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 672.5

Acres of Paving: 19.8

Residential Indoor: 2,664,900; Residential Outdoor: 888,300; Non-Residential Indoor: 125,405; Non-Residential Outdoor: 41,802; Striped Parking Area: 51,749 (Architectural Coating – sqft)

OffRoad Equipment

Nakase (Construction - Unmitigated) - Orange County, Winter

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	158	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Grading	Excavators	2	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Infrastructure	Rubber Tired Dozers	3	8.00	247	0.40
Infrastructure	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Architectural Coating	Air Compressors	1	8.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	404.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	18,750.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Infrastructure	7	18.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	834.00	285.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	167.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.3258	0.0000	1.3258	0.2007	0.0000	0.2007			0.0000			0.0000
Off-Road	3.5134	35.7830	22.0600	0.0388		1.7949	1.7949		1.6697	1.6697		3,816.8994	3,816.8994	1.0618		3,843.4451
Total	**3.5134**	**35.7830**	**22.0600**	**0.0388**	**1.3258**	**1.7949**	**3.1207**	**0.2007**	**1.6697**	**1.8704**		**3,816.8994**	**3,816.8994**	**1.0618**		**3,843.4451**

3.2 Demolition - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0522	1.8383	0.4605	4.6800e-003	0.1499	7.1200e-003	0.1570	0.0398	6.8100e-003	0.0466		520.1748	520.1748	0.0565		521.5882
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0697	0.0446	0.4954	1.6000e-003	0.1677	1.1200e-003	0.1688	0.0445	1.0300e-003	0.0455		159.8661	159.8661	3.9400e-003		159.9645
Total	**0.1220**	**1.8828**	**0.9559**	**6.2800e-003**	**0.3175**	**8.2400e-003**	**0.3258**	**0.0843**	**7.8400e-003**	**0.0921**		**680.0408**	**680.0408**	**0.0605**		**681.5527**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.3258	0.0000	1.3258	0.2007	0.0000	0.2007			0.0000			0.0000
Off-Road	3.5134	35.7830	22.0600	0.0388		1.7949	1.7949		1.6697	1.6697	0.0000	3,816.8994	3,816.8994	1.0618		3,843.4451
Total	**3.5134**	**35.7830**	**22.0600**	**0.0388**	**1.3258**	**1.7949**	**3.1207**	**0.2007**	**1.6697**	**1.8704**	**0.0000**	**3,816.8994**	**3,816.8994**	**1.0618**		**3,843.4451**

3.2 Demolition - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0522	1.8383	0.4605	4.6800e-003	0.1499	7.1200e-003	0.1570	0.0398	6.8100e-003	0.0466		520.1748	520.1748	0.0565		521.5882
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0697	0.0446	0.4954	1.6000e-003	0.1677	1.1200e-003	0.1688	0.0445	1.0300e-003	0.0455		159.8661	159.8661	3.9400e-003		159.9645
Total	**0.1220**	**1.8828**	**0.9559**	**6.2800e-003**	**0.3175**	**8.2400e-003**	**0.3258**	**0.0843**	**7.8400e-003**	**0.0921**		**680.0408**	**680.0408**	**0.0605**		**681.5527**

3.2 Demolition - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.3258	0.0000	1.3258	0.2007	0.0000	0.2007			0.0000			0.0000
Off-Road	3.3121	33.2010	21.7532	0.0388		1.6587	1.6587		1.5419	1.5419		3,747.7049	3,747.7049	1.0580		3,774.1536
Total	**3.3121**	**33.2010**	**21.7532**	**0.0388**	**1.3258**	**1.6587**	**2.9845**	**0.2007**	**1.5419**	**1.7426**		**3,747.7049**	**3,747.7049**	**1.0580**		**3,774.1536**

3.2 Demolition - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0474	1.7043	0.4478	4.6100e-003	0.2579	5.5500e-003	0.2634	0.0663	5.3100e-003	0.0716		514.2920	514.2920	0.0554		515.6773
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0651	0.0399	0.4538	1.5500e-003	0.1677	1.1100e-003	0.1688	0.0445	1.0200e-003	0.0455		154.7432	154.7432	3.5300e-003		154.8314
Total	**0.1125**	**1.7442**	**0.9016**	**6.1600e-003**	**0.4255**	**6.6600e-003**	**0.4322**	**0.1108**	**6.3300e-003**	**0.1171**		**669.0351**	**669.0351**	**0.0589**		**670.5088**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.3258	0.0000	1.3258	0.2007	0.0000	0.2007			0.0000			0.0000
Off-Road	3.3121	33.2010	21.7532	0.0388		1.6587	1.6587		1.5419	1.5419	0.0000	3,747.7049	3,747.7049	1.0580		3,774.1536
Total	**3.3121**	**33.2010**	**21.7532**	**0.0388**	**1.3258**	**1.6587**	**2.9845**	**0.2007**	**1.5419**	**1.7426**	**0.0000**	**3,747.7049**	**3,747.7049**	**1.0580**		**3,774.1536**

3.2 Demolition - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0474	1.7043	0.4478	4.6100e-003	0.2579	5.5500e-003	0.2634	0.0663	5.3100e-003	0.0716		514.2920	514.2920	0.0554		515.6773
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0651	0.0399	0.4538	1.5500e-003	0.1677	1.1100e-003	0.1688	0.0445	1.0200e-003	0.0455		154.7432	154.7432	3.5300e-003		154.8314
Total	**0.1125**	**1.7442**	**0.9016**	**6.1600e-003**	**0.4255**	**6.6600e-003**	**0.4322**	**0.1108**	**6.3300e-003**	**0.1171**		**669.0351**	**669.0351**	**0.0589**		**670.5088**

3.3 Grading - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.7364	0.0000	8.7364	3.6061	0.0000	3.6061			0.0000			0.0000
Off-Road	4.4501	50.1975	31.9583	0.0620		2.1739	2.1739		2.0000	2.0000		6,005.8653	6,005.8653	1.9424		6,054.4257
Total	**4.4501**	**50.1975**	**31.9583**	**0.0620**	**8.7364**	**2.1739**	**10.9103**	**3.6061**	**2.0000**	**5.6060**		**6,005.8653**	**6,005.8653**	**1.9424**		**6,054.4257**

3.3 Grading - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.5394	19.4074	5.0988	0.0525	1.3293	0.0632	1.3925	0.3606	0.0605	0.4211		5,856.2727	5,856.2727	0.6310		5,872.0478
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0869	0.0532	0.6051	2.0700e-003	0.2236	1.4800e-003	0.2250	0.0593	1.3600e-003	0.0607		206.3242	206.3242	4.7100e-003		206.4419
Total	**0.6263**	**19.4606**	**5.7039**	**0.0546**	**1.5529**	**0.0647**	**1.6175**	**0.4199**	**0.0618**	**0.4817**		**6,062.5969**	**6,062.5969**	**0.6357**		**6,078.4897**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.7364	0.0000	8.7364	3.6061	0.0000	3.6061			0.0000			0.0000
Off-Road	4.4501	50.1975	31.9583	0.0620		2.1739	2.1739		2.0000	2.0000	0.0000	6,005.8653	6,005.8653	1.9424		6,054.4257
Total	**4.4501**	**50.1975**	**31.9583**	**0.0620**	**8.7364**	**2.1739**	**10.9103**	**3.6061**	**2.0000**	**5.6060**	**0.0000**	**6,005.8653**	**6,005.8653**	**1.9424**		**6,054.4257**

3.3 Grading - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.5394	19.4074	5.0988	0.0525	1.3293	0.0632	1.3925	0.3606	0.0605	0.4211		5,856.2727	5,856.2727	0.6310		5,872.0478
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0869	0.0532	0.6051	2.0700e-003	0.2236	1.4800e-003	0.2250	0.0593	1.3600e-003	0.0607		206.3242	206.3242	4.7100e-003		206.4419
Total	**0.6263**	**19.4606**	**5.7039**	**0.0546**	**1.5529**	**0.0647**	**1.6175**	**0.4199**	**0.0618**	**0.4817**		**6,062.5969**	**6,062.5969**	**0.6357**		**6,078.4897**

3.3 Grading - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.7364	0.0000	8.7364	3.6061	0.0000	3.6061			0.0000			0.0000
Off-Road	4.1912	46.3998	30.8785	0.0620		1.9853	1.9853		1.8265	1.8265		6,007.0434	6,007.0434	1.9428		6,055.6134
Total	**4.1912**	**46.3998**	**30.8785**	**0.0620**	**8.7364**	**1.9853**	**10.7217**	**3.6061**	**1.8265**	**5.4326**		**6,007.0434**	**6,007.0434**	**1.9428**		**6,055.6134**

3.3 Grading - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.5144	17.9287	5.1102	0.0518	8.5552	0.0567	8.6119	2.1343	0.0542	2.1885		5,784.2728	5,784.2728	0.6226		5,799.8366
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0817	0.0480	0.5605	2.0000e-003	0.2236	1.4500e-003	0.2250	0.0593	1.3300e-003	0.0606		199.1664	199.1664	4.2600e-003		199.2731
Total	**0.5961**	**17.9767**	**5.6707**	**0.0538**	**8.7788**	**0.0581**	**8.8369**	**2.1935**	**0.0556**	**2.2491**		**5,983.4392**	**5,983.4392**	**0.6268**		**5,999.1097**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.7364	0.0000	8.7364	3.6061	0.0000	3.6061			0.0000			0.0000
Off-Road	4.1912	46.3998	30.8785	0.0620		1.9853	1.9853		1.8265	1.8265	0.0000	6,007.0434	6,007.0434	1.9428		6,055.6134
Total	**4.1912**	**46.3998**	**30.8785**	**0.0620**	**8.7364**	**1.9853**	**10.7217**	**3.6061**	**1.8265**	**5.4326**	**0.0000**	**6,007.0434**	**6,007.0434**	**1.9428**		**6,055.6134**

3.3 Grading - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.5144	17.9287	5.1102	0.0518	8.5552	0.0567	8.6119	2.1343	0.0542	2.1885		5,784.2728	5,784.2728	0.6226		5,799.8366
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0817	0.0480	0.5605	2.0000e-003	0.2236	1.4500e-003	0.2250	0.0593	1.3300e-003	0.0606		199.1664	199.1664	4.2600e-003		199.2731
Total	**0.5961**	**17.9767**	**5.6707**	**0.0538**	**8.7788**	**0.0581**	**8.8369**	**2.1935**	**0.0556**	**2.2491**		**5,983.4392**	**5,983.4392**	**0.6268**		**5,999.1097**

3.4 Infrastructure - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.8882	40.4971	21.1543	0.0380		2.0445	2.0445		1.8809	1.8809		3,685.6569	3,685.6569	1.1920		3,715.4573
Total	**3.8882**	**40.4971**	**21.1543**	**0.0380**		**2.0445**	**2.0445**		**1.8809**	**1.8809**		**3,685.6569**	**3,685.6569**	**1.1920**		**3,715.4573**

3.4 Infrastructure - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0736	0.0432	0.5045	1.8000e-003	0.2012	1.3000e-003	0.2025	0.0534	1.2000e-003	0.0546		179.2498	179.2498	3.8400e-003		179.3458
Total	**0.0736**	**0.0432**	**0.5045**	**1.8000e-003**	**0.2012**	**1.3000e-003**	**0.2025**	**0.0534**	**1.2000e-003**	**0.0546**		**179.2498**	**179.2498**	**3.8400e-003**		**179.3458**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.8882	40.4971	21.1543	0.0380		2.0445	2.0445		1.8809	1.8809	0.0000	3,685.6569	3,685.6569	1.1920		3,715.4573
Total	**3.8882**	**40.4971**	**21.1543**	**0.0380**		**2.0445**	**2.0445**		**1.8809**	**1.8809**	**0.0000**	**3,685.6569**	**3,685.6569**	**1.1920**		**3,715.4573**

3.4 Infrastructure - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0736	0.0432	0.5045	1.8000e-003	0.2012	1.3000e-003	0.2025	0.0534	1.2000e-003	0.0546		179.2498	179.2498	3.8400e-003		179.3458
Total	**0.0736**	**0.0432**	**0.5045**	**1.8000e-003**	**0.2012**	**1.3000e-003**	**0.2025**	**0.0534**	**1.2000e-003**	**0.0546**		**179.2498**	**179.2498**	**3.8400e-003**		**179.3458**

3.4 Infrastructure - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.1701	33.0835	19.6978	0.0380		1.6126	1.6126		1.4836	1.4836		3,686.0619	3,686.0619	1.1922		3,715.8655
Total	**3.1701**	**33.0835**	**19.6978**	**0.0380**		**1.6126**	**1.6126**		**1.4836**	**1.4836**		**3,686.0619**	**3,686.0619**	**1.1922**		**3,715.8655**

3.4 Infrastructure - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0697	0.0391	0.4701	1.7300e-003	0.2012	1.2800e-003	0.2025	0.0534	1.1800e-003	0.0545		172.6162	172.6162	3.4800e-003		172.7033
Total	**0.0697**	**0.0391**	**0.4701**	**1.7300e-003**	**0.2012**	**1.2800e-003**	**0.2025**	**0.0534**	**1.1800e-003**	**0.0545**		**172.6162**	**172.6162**	**3.4800e-003**		**172.7033**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.1701	33.0835	19.6978	0.0380		1.6126	1.6126		1.4836	1.4836	0.0000	3,686.0619	3,686.0619	1.1922		3,715.8655
Total	**3.1701**	**33.0835**	**19.6978**	**0.0380**		**1.6126**	**1.6126**		**1.4836**	**1.4836**	**0.0000**	**3,686.0619**	**3,686.0619**	**1.1922**		**3,715.8655**

3.4 Infrastructure - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0697	0.0391	0.4701	1.7300e-003	0.2012	1.2800e-003	0.2025	0.0534	1.1800e-003	0.0545		172.6162	172.6162	3.4800e-003		172.7033
Total	**0.0697**	**0.0391**	**0.4701**	**1.7300e-003**	**0.2012**	**1.2800e-003**	**0.2025**	**0.0534**	**1.1800e-003**	**0.0545**		**172.6162**	**172.6162**	**3.4800e-003**		**172.7033**

3.5 Paving - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2556	12.9191	14.6532	0.0228		0.6777	0.6777		0.6235	0.6235		2,207.2109	2,207.2109	0.7139		2,225.0573
Paving	0.5963					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.8518**	**12.9191**	**14.6532**	**0.0228**		**0.6777**	**0.6777**		**0.6235**	**0.6235**		**2,207.2109**	**2,207.2109**	**0.7139**		**2,225.0573**

3.5 Paving - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0613	0.0360	0.4204	1.5000e-003	0.1677	1.0900e-003	0.1688	0.0445	1.0000e-003	0.0455		149.3748	149.3748	3.2000e-003		149.4548
Total	**0.0613**	**0.0360**	**0.4204**	**1.5000e-003**	**0.1677**	**1.0900e-003**	**0.1688**	**0.0445**	**1.0000e-003**	**0.0455**		**149.3748**	**149.3748**	**3.2000e-003**		**149.4548**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2556	12.9191	14.6532	0.0228		0.6777	0.6777		0.6235	0.6235	0.0000	2,207.2109	2,207.2109	0.7139		2,225.0573
Paving	0.5963					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.8518**	**12.9191**	**14.6532**	**0.0228**		**0.6777**	**0.6777**		**0.6235**	**0.6235**	**0.0000**	**2,207.2109**	**2,207.2109**	**0.7139**		**2,225.0573**

3.5 Paving - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0613	0.0360	0.4204	1.5000e-003	0.1677	1.0900e-003	0.1688	0.0445	1.0000e-003	0.0455		149.3748	149.3748	3.2000e-003		149.4548
Total	**0.0613**	**0.0360**	**0.4204**	**1.5000e-003**	**0.1677**	**1.0900e-003**	**0.1688**	**0.0445**	**1.0000e-003**	**0.0455**		**149.3748**	**149.3748**	**3.2000e-003**		**149.4548**

3.6 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.0228	18.7492	17.6706	0.0288		1.0251	1.0251		0.9625	0.9625		2,736.0438	2,736.0438	0.6751		2,752.9212
Total	**2.0228**	**18.7492**	**17.6706**	**0.0288**		**1.0251**	**1.0251**		**0.9625**	**0.9625**		**2,736.0438**	**2,736.0438**	**0.6751**		**2,752.9212**

3.6 Building Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.7983	26.6741	7.9551	0.0686	1.8209	0.0576	1.8785	0.5240	0.0551	0.5791		7,472.3864	7,472.3864	0.6301		7,488.1381
Worker	3.4081	2.0014	23.3744	0.0833	9.3222	0.0603	9.3825	2.4723	0.0556	2.5278		8,305.2405	8,305.2405	0.1778		8,309.6866
Total	**4.2064**	**28.6755**	**31.3294**	**0.1519**	**11.1430**	**0.1180**	**11.2610**	**2.9963**	**0.1107**	**3.1070**		**15,777.6269**	**15,777.6269**	**0.8079**		**15,797.8247**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.0228	18.7492	17.6706	0.0288		1.0251	1.0251		0.9625	0.9625	0.0000	2,736.0438	2,736.0438	0.6751		2,752.9212
Total	**2.0228**	**18.7492**	**17.6706**	**0.0288**		**1.0251**	**1.0251**		**0.9625**	**0.9625**	**0.0000**	**2,736.0438**	**2,736.0438**	**0.6751**		**2,752.9212**

3.6 Building Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.7983	26.6741	7.9551	0.0686	1.8209	0.0576	1.8785	0.5240	0.0551	0.5791		7,472.3864	7,472.3864	0.6301		7,488.1381
Worker	3.4081	2.0014	23.3744	0.0833	9.3222	0.0603	9.3825	2.4723	0.0556	2.5278		8,305.2405	8,305.2405	0.1778		8,309.6866
Total	**4.2064**	**28.6755**	**31.3294**	**0.1519**	**11.1430**	**0.1180**	**11.2610**	**2.9963**	**0.1107**	**3.1070**		**15,777.6269**	**15,777.6269**	**0.8079**		**15,797.8247**

3.6 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8146	16.7670	17.4392	0.0288		0.8645	0.8645		0.8122	0.8122		2,737.1520	2,737.1520	0.6711		2,753.9288
Total	**1.8146**	**16.7670**	**17.4392**	**0.0288**		**0.8645**	**0.8645**		**0.8122**	**0.8122**		**2,737.1520**	**2,737.1520**	**0.6711**		**2,753.9288**

3.6 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.7506	25.2182	7.6703	0.0678	1.8208	0.0502	1.8710	0.5240	0.0480	0.5720		7,398.2947	7,398.2947	0.6092		7,413.5239
Worker	3.2293	1.8130	21.7824	0.0802	9.3222	0.0592	9.3813	2.4723	0.0545	2.5268		7,997.8830	7,997.8830	0.1614		8,001.9178
Total	**3.9799**	**27.0312**	**29.4526**	**0.1480**	**11.1430**	**0.1093**	**11.2523**	**2.9963**	**0.1025**	**3.0987**		**15,396.1777**	**15,396.1777**	**0.7706**		**15,415.4417**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8146	16.7670	17.4392	0.0288		0.8645	0.8645		0.8122	0.8122	0.0000	2,737.1520	2,737.1520	0.6711		2,753.9288
Total	**1.8146**	**16.7670**	**17.4392**	**0.0288**		**0.8645**	**0.8645**		**0.8122**	**0.8122**	**0.0000**	**2,737.1520**	**2,737.1520**	**0.6711**		**2,753.9288**

3.6 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.7506	25.2182	7.6703	0.0678	1.8208	0.0502	1.8710	0.5240	0.0480	0.5720		7,398.2947	7,398.2947	0.6092		7,413.5239
Worker	3.2293	1.8130	21.7824	0.0802	9.3222	0.0592	9.3813	2.4723	0.0545	2.5268		7,997.8830	7,997.8830	0.1614		8,001.9178
Total	**3.9799**	**27.0312**	**29.4526**	**0.1480**	**11.1430**	**0.1093**	**11.2523**	**2.9963**	**0.1025**	**3.0987**		**15,396.1777**	**15,396.1777**	**0.7706**		**15,415.4417**

3.6 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6735	15.4377	17.3101	0.0288		0.7481	0.7481		0.7029	0.7029		2,738.1535	2,738.1535	0.6670		2,754.8288
Total	**1.6735**	**15.4377**	**17.3101**	**0.0288**		**0.7481**	**0.7481**		**0.7029**	**0.7029**		**2,738.1535**	**2,738.1535**	**0.6670**		**2,754.8288**

3.6 Building Construction - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.5716	18.9822	7.0484	0.0656	1.8208	0.0244	1.8452	0.5240	0.0233	0.5473		7,176.5637	7,176.5637	0.5633		7,190.6449
Worker	3.0673	1.6457	20.2821	0.0771	9.3222	0.0582	9.3803	2.4723	0.0535	2.5258		7,690.8008	7,690.8008	0.1463		7,694.4571
Total	**3.6389**	**20.6279**	**27.3305**	**0.1427**	**11.1430**	**0.0826**	**11.2255**	**2.9963**	**0.0769**	**3.0731**		**14,867.3645**	**14,867.3645**	**0.7095**		**14,885.1020**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6735	15.4377	17.3101	0.0288		0.7481	0.7481		0.7029	0.7029	0.0000	2,738.1535	2,738.1535	0.6670		2,754.8288
Total	**1.6735**	**15.4377**	**17.3101**	**0.0288**		**0.7481**	**0.7481**		**0.7029**	**0.7029**	**0.0000**	**2,738.1535**	**2,738.1535**	**0.6670**		**2,754.8288**

3.6 Building Construction - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.5716	18.9822	7.0484	0.0656	1.8208	0.0244	1.8452	0.5240	0.0233	0.5473		7,176.5637	7,176.5637	0.5633		7,190.6449
Worker	3.0673	1.6457	20.2821	0.0771	9.3222	0.0582	9.3803	2.4723	0.0535	2.5258		7,690.8008	7,690.8008	0.1463		7,694.4571
Total	**3.6389**	**20.6279**	**27.3305**	**0.1427**	**11.1430**	**0.0826**	**11.2255**	**2.9963**	**0.0769**	**3.0731**		**14,867.3645**	**14,867.3645**	**0.7095**		**14,885.1020**

3.6 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5670	14.4249	17.2270	0.0288		0.6565	0.6565		0.6166	0.6166		2,738.7124	2,738.7124	0.6635		2,755.3009
Total	**1.5670**	**14.4249**	**17.2270**	**0.0288**		**0.6565**	**0.6565**		**0.6166**	**0.6166**		**2,738.7124**	**2,738.7124**	**0.6635**		**2,755.3009**

3.6 Building Construction - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.5521	18.7470	6.8972	0.0650	1.8208	0.0238	1.8446	0.5240	0.0227	0.5467		7,120.4384	7,120.4384	0.5538		7,134.2839
Worker	2.9248	1.4984	18.8606	0.0740	9.3222	0.0572	9.3793	2.4723	0.0526	2.5249		7,386.1215	7,386.1215	0.1327		7,389.4384
Total	**3.4769**	**20.2453**	**25.7578**	**0.1391**	**11.1429**	**0.0809**	**11.2239**	**2.9962**	**0.0753**	**3.0716**		**14,506.5599**	**14,506.5599**	**0.6865**		**14,523.7223**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5670	14.4249	17.2270	0.0288		0.6565	0.6565		0.6166	0.6166	0.0000	2,738.7123	2,738.7123	0.6635		2,755.3009
Total	**1.5670**	**14.4249**	**17.2270**	**0.0288**		**0.6565**	**0.6565**		**0.6166**	**0.6166**	**0.0000**	**2,738.7123**	**2,738.7123**	**0.6635**		**2,755.3009**

3.6 Building Construction - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.5521	18.7470	6.8972	0.0650	1.8208	0.0238	1.8446	0.5240	0.0227	0.5467		7,120.4384	7,120.4384	0.5538		7,134.2839
Worker	2.9248	1.4984	18.8606	0.0740	9.3222	0.0572	9.3793	2.4723	0.0526	2.5249		7,386.1215	7,386.1215	0.1327		7,389.4384
Total	**3.4769**	**20.2453**	**25.7578**	**0.1391**	**11.1429**	**0.0809**	**11.2239**	**2.9962**	**0.0753**	**3.0716**		**14,506.5599**	**14,506.5599**	**0.6865**		**14,523.7223**

3.6 Building Construction - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4560	13.3663	17.1378	0.0289		0.5647	0.5647		0.5304	0.5304		2,739.5986	2,739.5986	0.6602		2,756.1030
Total	**1.4560**	**13.3663**	**17.1378**	**0.0289**		**0.5647**	**0.5647**		**0.5304**	**0.5304**		**2,739.5986**	**2,739.5986**	**0.6602**		**2,756.1030**

3.6 Building Construction - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.5377	18.5051	6.8102	0.0646	1.8208	0.0232	1.8439	0.5240	0.0221	0.5461		7,077.5287	7,077.5287	0.5457		7,091.1702
Worker	2.8026	1.3742	17.5945	0.0710	9.3222	0.0565	9.3786	2.4723	0.0520	2.5242		7,087.8175	7,087.8175	0.1213		7,090.8496
Total	**3.3404**	**19.8794**	**24.4047**	**0.1356**	**11.1429**	**0.0796**	**11.2225**	**2.9962**	**0.0741**	**3.0703**		**14,165.3462**	**14,165.3462**	**0.6669**		**14,182.0198**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4560	13.3663	17.1378	0.0289		0.5647	0.5647		0.5304	0.5304	0.0000	2,739.5986	2,739.5986	0.6602		2,756.1029
Total	**1.4560**	**13.3663**	**17.1378**	**0.0289**		**0.5647**	**0.5647**		**0.5304**	**0.5304**	**0.0000**	**2,739.5986**	**2,739.5986**	**0.6602**		**2,756.1029**

3.6 Building Construction - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.5377	18.5051	6.8102	0.0646	1.8208	0.0232	1.8439	0.5240	0.0221	0.5461		7,077.5287	7,077.5287	0.5457		7,091.1702
Worker	2.8026	1.3742	17.5945	0.0710	9.3222	0.0565	9.3786	2.4723	0.0520	2.5242		7,087.8175	7,087.8175	0.1213		7,090.8496
Total	**3.3404**	**19.8794**	**24.4047**	**0.1356**	**11.1429**	**0.0796**	**11.2225**	**2.9962**	**0.0741**	**3.0703**		**14,165.3462**	**14,165.3462**	**0.6669**		**14,182.0198**

3.7 Architectural Coating - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	9.2402					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2919	2.0358	2.4234	3.9600e-003		0.1255	0.1255		0.1255	0.1255		375.2641	375.2641	0.0258		375.9079
Total	**9.5320**	**2.0358**	**2.4234**	**3.9600e-003**		**0.1255**	**0.1255**		**0.1255**	**0.1255**		**375.2641**	**375.2641**	**0.0258**		**375.9079**

3.7 Architectural Coating - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.6824	0.4008	4.6805	0.0167	1.8667	0.0121	1.8788	0.4951	0.0111	0.5062		1,663.0398	1,663.0398	0.0356		1,663.9301
Total	**0.6824**	**0.4008**	**4.6805**	**0.0167**	**1.8667**	**0.0121**	**1.8788**	**0.4951**	**0.0111**	**0.5062**		**1,663.0398**	**1,663.0398**	**0.0356**		**1,663.9301**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	9.2402					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2919	2.0358	2.4234	3.9600e-003		0.1255	0.1255		0.1255	0.1255	0.0000	375.2641	375.2641	0.0258		375.9079
Total	**9.5320**	**2.0358**	**2.4234**	**3.9600e-003**		**0.1255**	**0.1255**		**0.1255**	**0.1255**	**0.0000**	**375.2641**	**375.2641**	**0.0258**		**375.9079**

3.7 Architectural Coating - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.6824	0.4008	4.6805	0.0167	1.8667	0.0121	1.8788	0.4951	0.0111	0.5062		1,663.0398	1,663.0398	0.0356		1,663.9301
Total	**0.6824**	**0.4008**	**4.6805**	**0.0167**	**1.8667**	**0.0121**	**1.8788**	**0.4951**	**0.0111**	**0.5062**		**1,663.0398**	**1,663.0398**	**0.0356**		**1,663.9301**

3.7 Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	9.2402					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2727	1.8780	2.4181	3.9600e-003		0.1090	0.1090		0.1090	0.1090		375.2641	375.2641	0.0244		375.8749
Total	**9.5129**	**1.8780**	**2.4181**	**3.9600e-003**		**0.1090**	**0.1090**		**0.1090**	**0.1090**		**375.2641**	**375.2641**	**0.0244**		**375.8749**

3.7 Architectural Coating - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.6466	0.3630	4.3617	0.0161	1.8667	0.0119	1.8785	0.4951	0.0109	0.5060		1,601.4946	1,601.4946	0.0323		1,602.3025
Total	**0.6466**	**0.3630**	**4.3617**	**0.0161**	**1.8667**	**0.0119**	**1.8785**	**0.4951**	**0.0109**	**0.5060**		**1,601.4946**	**1,601.4946**	**0.0323**		**1,602.3025**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	9.2402					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2727	1.8780	2.4181	3.9600e-003		0.1090	0.1090		0.1090	0.1090	0.0000	375.2641	375.2641	0.0244		375.8749
Total	**9.5129**	**1.8780**	**2.4181**	**3.9600e-003**		**0.1090**	**0.1090**		**0.1090**	**0.1090**	**0.0000**	**375.2641**	**375.2641**	**0.0244**		**375.8749**

3.7 Architectural Coating - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.6466	0.3630	4.3617	0.0161	1.8667	0.0119	1.8785	0.4951	0.0109	0.5060		1,601.4946	1,601.4946	0.0323		1,602.3025
Total	**0.6466**	**0.3630**	**4.3617**	**0.0161**	**1.8667**	**0.0119**	**1.8785**	**0.4951**	**0.0109**	**0.5060**		**1,601.4946**	**1,601.4946**	**0.0323**		**1,602.3025**

3.7 Architectural Coating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	9.2402					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2556	1.7373	2.4148	3.9600e-003		0.0944	0.0944		0.0944	0.0944		375.2641	375.2641	0.0225		375.8253
Total	**9.4957**	**1.7373**	**2.4148**	**3.9600e-003**		**0.0944**	**0.0944**		**0.0944**	**0.0944**		**375.2641**	**375.2641**	**0.0225**		**375.8253**

3.7 Architectural Coating - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.6142	0.3295	4.0613	0.0154	1.8667	0.0117	1.8783	0.4951	0.0107	0.5058		1,540.0045	1,540.0045	0.0293		1,540.7366
Total	**0.6142**	**0.3295**	**4.0613**	**0.0154**	**1.8667**	**0.0117**	**1.8783**	**0.4951**	**0.0107**	**0.5058**		**1,540.0045**	**1,540.0045**	**0.0293**		**1,540.7366**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	9.2402					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2556	1.7373	2.4148	3.9600e-003		0.0944	0.0944		0.0944	0.0944	0.0000	375.2641	375.2641	0.0225		375.8253
Total	**9.4957**	**1.7373**	**2.4148**	**3.9600e-003**		**0.0944**	**0.0944**		**0.0944**	**0.0944**	**0.0000**	**375.2641**	**375.2641**	**0.0225**		**375.8253**

3.7 Architectural Coating - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.6142	0.3295	4.0613	0.0154	1.8667	0.0117	1.8783	0.4951	0.0107	0.5058		1,540.0045	1,540.0045	0.0293		1,540.7366
Total	**0.6142**	**0.3295**	**4.0613**	**0.0154**	**1.8667**	**0.0117**	**1.8783**	**0.4951**	**0.0107**	**0.5058**		**1,540.0045**	**1,540.0045**	**0.0293**		**1,540.7366**

3.7 Architectural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	9.2402					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2410	1.6251	2.4135	3.9600e-003		0.0812	0.0812		0.0812	0.0812		375.2641	375.2641	0.0211		375.7923
Total	**9.4812**	**1.6251**	**2.4135**	**3.9600e-003**		**0.0812**	**0.0812**		**0.0812**	**0.0812**		**375.2641**	**375.2641**	**0.0211**		**375.7923**

3.7 Architectural Coating - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.5857	0.3000	3.7766	0.0148	1.8667	0.0114	1.8781	0.4951	0.0105	0.5056		1,478.9955	1,478.9955	0.0266		1,479.6597
Total	**0.5857**	**0.3000**	**3.7766**	**0.0148**	**1.8667**	**0.0114**	**1.8781**	**0.4951**	**0.0105**	**0.5056**		**1,478.9955**	**1,478.9955**	**0.0266**		**1,479.6597**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	9.2402					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2410	1.6251	2.4135	3.9600e-003		0.0812	0.0812		0.0812	0.0812	0.0000	375.2641	375.2641	0.0211		375.7923
Total	**9.4812**	**1.6251**	**2.4135**	**3.9600e-003**		**0.0812**	**0.0812**		**0.0812**	**0.0812**	**0.0000**	**375.2641**	**375.2641**	**0.0211**		**375.7923**

3.7 Architectural Coating - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.5857	0.3000	3.7766	0.0148	1.8667	0.0114	1.8781	0.4951	0.0105	0.5056		1,478.9955	1,478.9955	0.0266		1,479.6597
Total	**0.5857**	**0.3000**	**3.7766**	**0.0148**	**1.8667**	**0.0114**	**1.8781**	**0.4951**	**0.0105**	**0.5056**		**1,478.9955**	**1,478.9955**	**0.0266**		**1,479.6597**

3.7 Architectural Coating - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	9.2402					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2278	1.5273	2.4122	3.9600e-003		0.0687	0.0687		0.0687	0.0687		375.2641	375.2641	0.0205		375.7758
Total	**9.4680**	**1.5273**	**2.4122**	**3.9600e-003**		**0.0687**	**0.0687**		**0.0687**	**0.0687**		**375.2641**	**375.2641**	**0.0205**		**375.7758**

3.7 Architectural Coating - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.5612	0.2752	3.5231	0.0142	1.8667	0.0113	1.8780	0.4951	0.0104	0.5055		1,419.2632	1,419.2632	0.0243		1,419.8704
Total	**0.5612**	**0.2752**	**3.5231**	**0.0142**	**1.8667**	**0.0113**	**1.8780**	**0.4951**	**0.0104**	**0.5055**		**1,419.2632**	**1,419.2632**	**0.0243**		**1,419.8704**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	9.2402					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2278	1.5273	2.4122	3.9600e-003		0.0687	0.0687		0.0687	0.0687	0.0000	375.2641	375.2641	0.0205		375.7758
Total	**9.4680**	**1.5273**	**2.4122**	**3.9600e-003**		**0.0687**	**0.0687**		**0.0687**	**0.0687**	**0.0000**	**375.2641**	**375.2641**	**0.0205**		**375.7758**

3.7 Architectural Coating - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.5612	0.2752	3.5231	0.0142	1.8667	0.0113	1.8780	0.4951	0.0104	0.5055		1,419.2632	1,419.2632	0.0243		1,419.8704
Total	**0.5612**	**0.2752**	**3.5231**	**0.0142**	**1.8667**	**0.0113**	**1.8780**	**0.4951**	**0.0104**	**0.5055**		**1,419.2632**	**1,419.2632**	**0.0243**		**1,419.8704**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	0.00	0.00	0.00		
Elementary School	0.00	0.00	0.00		
Other Asphalt Surfaces	0.00	0.00	0.00		
Retirement Community	0.00	0.00	0.00		
Single Family Housing	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0
Elementary School	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0
Retirement Community	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0
Single Family Housing	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854
Elementary School	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854
Other Asphalt Surfaces	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854
Retirement Community	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854
Single Family Housing	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Elementary School	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Retirement Community	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Elementary School	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Retirement Community	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	32.4965	0.7377	64.0649	3.3900e-003		0.3553	0.3553		0.3553	0.3553	0.0000	115.5012	115.5012	0.1110	0.0000	118.2756
Unmitigated	32.4965	0.7377	64.0649	3.3900e-003		0.3553	0.3553		0.3553	0.3553	0.0000	115.5012	115.5012	0.1110	0.0000	118.2756

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	2.5341					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	28.0325					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.9300	0.7377	64.0649	3.3900e-003		0.3553	0.3553		0.3553	0.3553		115.5012	115.5012	0.1110		118.2756
Total	**32.4965**	**0.7377**	**64.0649**	**3.3900e-003**		**0.3553**	**0.3553**		**0.3553**	**0.3553**	**0.0000**	**115.5012**	**115.5012**	**0.1110**	**0.0000**	**118.2756**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	2.5341					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	28.0325					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.9300	0.7377	64.0649	3.3900e-003		0.3553	0.3553		0.3553	0.3553		115.5012	115.5012	0.1110		118.2756
Total	**32.4965**	**0.7377**	**64.0649**	**3.3900e-003**		**0.3553**	**0.3553**		**0.3553**	**0.3553**	**0.0000**	**115.5012**	**115.5012**	**0.1110**	**0.0000**	**118.2756**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Nakase (Construction - Unmitigated)

Orange County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Elementary School	1,000.00	Student	12.60	83,603.37	0
Other Asphalt Surfaces	19.80	Acre	19.80	862,488.00	0
City Park	6.60	Acre	6.60	287,496.00	0
Retirement Community	101.00	Dwelling Unit	3.90	101,000.00	289
Single Family Housing	675.00	Dwelling Unit	61.40	1,215,000.00	1931

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2025
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Nakase (Construction - Unmitigated) - Orange County, Summer

Project Characteristics -

Land Use - Total Lot Area is 121.8 acres. In order to be consistent with the TIA, 6.6 acres of Park will be analyzed, the remaining 17.5 acres of Open Space will not be analyzed.

Construction Phase - Construction Schedule adjusted as per approval of the Client.

Off-road Equipment - Hours based on an 8-hour workday.

Off-road Equipment - Hours based on an 8-hour workday.

Off-road Equipment -

Off-road Equipment -

Demolition -

Grading -

Architectural Coating -

Vehicle Trips - Operations Run Only.

Woodstoves - Operations Run Only.

Energy Use - Operations Run Only.

Water And Wastewater - Operations Run Only.

Solid Waste - Operations Run Only.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	200.00	66.00
tblConstructionPhase	NumDays	310.00	269.00
tblConstructionPhase	NumDays	220.00	87.00
tblConstructionPhase	NumDays	3,100.00	1,001.00
tblConstructionPhase	NumDays	220.00	1,001.00
tblEnergyUse	LightingElect	2.68	0.00
tblEnergyUse	LightingElect	1,001.10	0.00
tblEnergyUse	LightingElect	1,608.84	0.00
tblEnergyUse	NT24E	1.51	0.00
tblEnergyUse	NT24E	3,172.76	0.00

tblEnergyUse	NT24E	6,155.97	0.00
tblEnergyUse	NT24NG	1.03	0.00
tblEnergyUse	NT24NG	5,516.00	0.00
tblEnergyUse	NT24NG	5,516.00	0.00
tblEnergyUse	T24E	1.89	0.00
tblEnergyUse	T24E	177.01	0.00
tblEnergyUse	T24E	253.73	0.00
tblEnergyUse	T24NG	10.81	0.00
tblEnergyUse	T24NG	7,243.59	0.00
tblEnergyUse	T24NG	20,288.91	0.00
tblFireplaces	FireplaceDayYear	25.00	0.00
tblFireplaces	FireplaceDayYear	25.00	0.00
tblFireplaces	FireplaceHourDay	3.00	0.00
tblFireplaces	FireplaceHourDay	3.00	0.00
tblFireplaces	FireplaceWoodMass	1,019.20	0.00
tblFireplaces	FireplaceWoodMass	1,019.20	0.00
tblFireplaces	NumberGas	85.85	0.00
tblFireplaces	NumberGas	573.75	0.00
tblFireplaces	NumberNoFireplace	10.10	0.00
tblFireplaces	NumberNoFireplace	67.50	0.00
tblFireplaces	NumberWood	5.05	0.00
tblFireplaces	NumberWood	33.75	0.00
tblGrading	MaterialExported	0.00	150,000.00
tblLandUse	LotAcreage	1.92	12.60
tblLandUse	LotAcreage	20.20	3.90
tblLandUse	LotAcreage	219.16	61.40
tblOffRoadEquipment	UsageHours	6.00	8.00

tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblSolidWaste	SolidWasteGenerationRate	0.57	0.00
tblSolidWaste	SolidWasteGenerationRate	182.50	0.00
tblSolidWaste	SolidWasteGenerationRate	46.46	0.00
tblSolidWaste	SolidWasteGenerationRate	791.71	0.00
tblVehicleTrips	CC_TL	8.40	0.00
tblVehicleTrips	CC_TL	8.40	0.00
tblVehicleTrips	CC_TL	8.40	0.00
tblVehicleTrips	CC_TTP	48.00	0.00
tblVehicleTrips	CC_TTP	30.00	0.00
tblVehicleTrips	CNW_TL	6.90	0.00
tblVehicleTrips	CNW_TL	6.90	0.00
tblVehicleTrips	CNW_TL	6.90	0.00
tblVehicleTrips	CNW_TTP	19.00	0.00
tblVehicleTrips	CNW_TTP	5.00	0.00
tblVehicleTrips	CW_TL	16.60	0.00
tblVehicleTrips	CW_TL	16.60	0.00
tblVehicleTrips	CW_TL	16.60	0.00
tblVehicleTrips	CW_TTP	33.00	0.00
tblVehicleTrips	CW_TTP	65.00	0.00
tblVehicleTrips	DV_TP	28.00	0.00
tblVehicleTrips	DV_TP	25.00	0.00
tblVehicleTrips	DV_TP	11.00	0.00
tblVehicleTrips	DV_TP	11.00	0.00
tblVehicleTrips	HO_TL	8.70	0.00
tblVehicleTrips	HO_TL	8.70	0.00

tblVehicleTrips	HO_TTP	40.60	0.00
tblVehicleTrips	HO_TTP	40.60	0.00
tblVehicleTrips	HS_TL	5.90	0.00
tblVehicleTrips	HS_TL	5.90	0.00
tblVehicleTrips	HS_TTP	19.20	0.00
tblVehicleTrips	HS_TTP	19.20	0.00
tblVehicleTrips	HW_TL	14.70	0.00
tblVehicleTrips	HW_TL	14.70	0.00
tblVehicleTrips	HW_TTP	40.20	0.00
tblVehicleTrips	HW_TTP	40.20	0.00
tblVehicleTrips	PB_TP	6.00	0.00
tblVehicleTrips	PB_TP	12.00	0.00
tblVehicleTrips	PB_TP	3.00	0.00
tblVehicleTrips	PB_TP	3.00	0.00
tblVehicleTrips	PR_TP	66.00	0.00
tblVehicleTrips	PR_TP	63.00	0.00
tblVehicleTrips	PR_TP	86.00	0.00
tblVehicleTrips	PR_TP	86.00	0.00
tblVehicleTrips	ST_TR	22.75	0.00
tblVehicleTrips	ST_TR	2.03	0.00
tblVehicleTrips	ST_TR	9.91	0.00
tblVehicleTrips	SU_TR	16.74	0.00
tblVehicleTrips	SU_TR	1.95	0.00
tblVehicleTrips	SU_TR	8.62	0.00
tblVehicleTrips	WD_TR	1.89	0.00
tblVehicleTrips	WD_TR	1.29	0.00
tblVehicleTrips	WD_TR	2.40	0.00

tblVehicleTrips	WD_TR	9.52	0.00
tblWater	IndoorWaterUseRate	2,424,240.00	0.00
tblWater	IndoorWaterUseRate	6,580,556.59	0.00
tblWater	IndoorWaterUseRate	43,978,967.29	0.00
tblWater	OutdoorWaterUseRate	7,863,776.91	0.00
tblWater	OutdoorWaterUseRate	6,233,760.00	0.00
tblWater	OutdoorWaterUseRate	4,148,611.76	0.00
tblWater	OutdoorWaterUseRate	27,725,870.69	0.00
tblWoodstoves	NumberCatalytic	5.05	0.00
tblWoodstoves	NumberCatalytic	33.75	0.00
tblWoodstoves	NumberNoncatalytic	5.05	0.00
tblWoodstoves	NumberNoncatalytic	33.75	0.00
tblWoodstoves	WoodstoveDayYear	25.00	0.00
tblWoodstoves	WoodstoveDayYear	25.00	0.00
tblWoodstoves	WoodstoveWoodMass	999.60	0.00
tblWoodstoves	WoodstoveWoodMass	999.60	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	3.6261	37.6379	23.0301	0.0452	1.6434	1.8030	3.4464	0.2850	1.6774	1.9624	0.0000	4,513.8194	4,513.8194	1.1211	0.0000	4,541.8470
2020	5.0533	69.4120	37.4557	0.1175	10.2893	2.2374	12.5267	4.0260	2.0607	6.0867	0.0000	12,169.9095	12,169.9095	2.5637	0.0000	12,234.0030
2021	19.8814	90.2445	79.4495	0.2486	17.5152	3.3243	19.5576	5.7996	3.0898	7.6807	0.0000	25,179.4094	25,179.4094	2.7232	0.0000	25,247.4885
2022	18.6886	79.0398	75.4431	0.2438	13.2109	2.7067	15.9175	3.5447	2.5175	6.0622	0.0000	24,708.3478	24,708.3478	2.6781	0.0000	24,775.2994
2023	14.9470	38.0649	52.7227	0.1978	13.0096	0.9353	13.9449	3.4913	0.8836	4.3749	0.0000	20,220.5515	20,220.5515	1.4162	0.0000	20,255.9568
2024	14.6471	36.5409	50.6729	0.1933	13.0096	0.8288	13.8384	3.4913	0.7825	4.2738	0.0000	19,776.2352	19,776.2352	1.3862	0.0000	19,810.8901
2025	14.3726	35.0049	48.8712	0.1890	13.0096	0.7232	13.7327	3.4913	0.6825	4.1738	0.0000	19,353.1929	19,353.1929	1.3608	0.0000	19,387.2122
Maximum	**19.8814**	**90.2445**	**79.4495**	**0.2486**	**17.5152**	**3.3243**	**19.5576**	**5.7996**	**3.0898**	**7.6807**	**0.0000**	**25,179.4094**	**25,179.4094**	**2.7232**	**0.0000**	**25,247.4885**

2.1 Overall Construction (Maximum Daily Emission)

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	3.6261	37.6379	23.0301	0.0452	1.6434	1.8030	3.4464	0.2850	1.6774	1.9624	0.0000	4,513.8194	4,513.8194	1.1211	0.0000	4,541.8469
2020	5.0533	69.4120	37.4557	0.1175	10.2893	2.2374	12.5267	4.0260	2.0607	6.0867	0.0000	12,169.9095	12,169.9095	2.5637	0.0000	12,234.0030
2021	19.8814	90.2445	79.4495	0.2486	17.5152	3.3243	19.5576	5.7996	3.0898	7.6807	0.0000	25,179.4094	25,179.4094	2.7232	0.0000	25,247.4885
2022	18.6886	79.0398	75.4431	0.2438	13.2109	2.7067	15.9175	3.5447	2.5175	6.0622	0.0000	24,708.3478	24,708.3478	2.6781	0.0000	24,775.2994
2023	14.9470	38.0649	52.7227	0.1978	13.0096	0.9353	13.9449	3.4913	0.8836	4.3749	0.0000	20,220.5515	20,220.5515	1.4162	0.0000	20,255.9568
2024	14.6471	36.5409	50.6729	0.1933	13.0096	0.8288	13.8384	3.4913	0.7825	4.2738	0.0000	19,776.2352	19,776.2352	1.3862	0.0000	19,810.8901
2025	14.3726	35.0049	48.8712	0.1890	13.0096	0.7232	13.7327	3.4913	0.6825	4.1738	0.0000	19,353.1929	19,353.1929	1.3608	0.0000	19,387.2122
Maximum	**19.8814**	**90.2445**	**79.4495**	**0.2486**	**17.5152**	**3.3243**	**19.5576**	**5.7996**	**3.0898**	**7.6807**	**0.0000**	**25,179.4094**	**25,179.4094**	**2.7232**	**0.0000**	**25,247.4885**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	32.4965	0.7377	64.0649	3.3900e-003		0.3553	0.3553		0.3553	0.3553	0.0000	115.5012	115.5012	0.1110	0.0000	118.2756
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**32.4965**	**0.7377**	**64.0649**	**3.3900e-003**	**0.0000**	**0.3553**	**0.3553**	**0.0000**	**0.3553**	**0.3553**	**0.0000**	**115.5012**	**115.5012**	**0.1110**	**0.0000**	**118.2756**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	32.4965	0.7377	64.0649	3.3900e-003		0.3553	0.3553		0.3553	0.3553	0.0000	115.5012	115.5012	0.1110	0.0000	118.2756
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**32.4965**	**0.7377**	**64.0649**	**3.3900e-003**	**0.0000**	**0.3553**	**0.3553**	**0.0000**	**0.3553**	**0.3553**	**0.0000**	**115.5012**	**115.5012**	**0.1110**	**0.0000**	**118.2756**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	11/1/2019	1/31/2020	5	66	
2	Grading	Grading	2/2/2020	2/11/2021	5	269	
3	Infrastructure	Trenching	2/12/2021	2/10/2022	5	260	
4	Paving	Paving	4/1/2021	7/30/2021	5	87	
5	Building Construction	Building Construction	8/1/2021	6/2/2025	5	1001	
6	Architectural Coating	Architectural Coating	8/1/2021	6/2/2025	5	1001	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 672.5

Acres of Paving: 19.8

Residential Indoor: 2,664,900; Residential Outdoor: 888,300; Non-Residential Indoor: 125,405; Non-Residential Outdoor: 41,802; Striped Parking Area: 51,749 (Architectural Coating – sqft)

OffRoad Equipment

Nakase (Construction - Unmitigated) - Orange County, Summer

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	158	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Grading	Excavators	2	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Infrastructure	Rubber Tired Dozers	3	8.00	247	0.40
Infrastructure	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Architectural Coating	Air Compressors	1	8.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	404.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	18,750.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Infrastructure	7	18.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	834.00	285.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	167.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.3258	0.0000	1.3258	0.2007	0.0000	0.2007			0.0000			0.0000
Off-Road	3.5134	35.7830	22.0600	0.0388		1.7949	1.7949		1.6697	1.6697		3,816.8994	3,816.8994	1.0618		3,843.4451
Total	**3.5134**	**35.7830**	**22.0600**	**0.0388**	**1.3258**	**1.7949**	**3.1207**	**0.2007**	**1.6697**	**1.8704**		**3,816.8994**	**3,816.8994**	**1.0618**		**3,843.4451**

3.2 Demolition - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0509	1.8144	0.4350	4.7500e-003	0.1499	6.9700e-003	0.1568	0.0398	6.6700e-003	0.0465		527.9990	527.9990	0.0551		529.3770
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0618	0.0405	0.5351	1.6900e-003	0.1677	1.1200e-003	0.1688	0.0445	1.0300e-003	0.0455		168.9210	168.9210	4.1500e-003		169.0249
Total	**0.1127**	**1.8550**	**0.9701**	**6.4400e-003**	**0.3175**	**8.0900e-003**	**0.3256**	**0.0843**	**7.7000e-003**	**0.0920**		**696.9200**	**696.9200**	**0.0593**		**698.4019**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.3258	0.0000	1.3258	0.2007	0.0000	0.2007			0.0000			0.0000
Off-Road	3.5134	35.7830	22.0600	0.0388		1.7949	1.7949		1.6697	1.6697	0.0000	3,816.8994	3,816.8994	1.0618		3,843.4451
Total	**3.5134**	**35.7830**	**22.0600**	**0.0388**	**1.3258**	**1.7949**	**3.1207**	**0.2007**	**1.6697**	**1.8704**	**0.0000**	**3,816.8994**	**3,816.8994**	**1.0618**		**3,843.4451**

3.2 Demolition - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0509	1.8144	0.4350	4.7500e-003	0.1499	6.9700e-003	0.1568	0.0398	6.6700e-003	0.0465		527.9990	527.9990	0.0551		529.3770
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0618	0.0405	0.5351	1.6900e-003	0.1677	1.1200e-003	0.1688	0.0445	1.0300e-003	0.0455		168.9210	168.9210	4.1500e-003		169.0249
Total	**0.1127**	**1.8550**	**0.9701**	**6.4400e-003**	**0.3175**	**8.0900e-003**	**0.3256**	**0.0843**	**7.7000e-003**	**0.0920**		**696.9200**	**696.9200**	**0.0593**		**698.4019**

3.2 Demolition - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.3258	0.0000	1.3258	0.2007	0.0000	0.2007			0.0000			0.0000
Off-Road	3.3121	33.2010	21.7532	0.0388		1.6587	1.6587		1.5419	1.5419		3,747.7049	3,747.7049	1.0580		3,774.1536
Total	**3.3121**	**33.2010**	**21.7532**	**0.0388**	**1.3258**	**1.6587**	**2.9845**	**0.2007**	**1.5419**	**1.7426**		**3,747.7049**	**3,747.7049**	**1.0580**		**3,774.1536**

3.2 Demolition - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0462	1.6831	0.4253	4.6900e-003	0.2579	5.4500e-003	0.2633	0.0663	5.2100e-003	0.0715		522.1748	522.1748	0.0541		523.5280
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0576	0.0363	0.4910	1.6400e-003	0.1677	1.1100e-003	0.1688	0.0445	1.0200e-003	0.0455		163.5065	163.5065	3.7300e-003		163.5997
Total	**0.1039**	**1.7195**	**0.9163**	**6.3300e-003**	**0.4255**	**6.5600e-003**	**0.4321**	**0.1108**	**6.2300e-003**	**0.1170**		**685.6814**	**685.6814**	**0.0579**		**687.1277**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.3258	0.0000	1.3258	0.2007	0.0000	0.2007			0.0000			0.0000
Off-Road	3.3121	33.2010	21.7532	0.0388		1.6587	1.6587		1.5419	1.5419	0.0000	3,747.7049	3,747.7049	1.0580		3,774.1536
Total	**3.3121**	**33.2010**	**21.7532**	**0.0388**	**1.3258**	**1.6587**	**2.9845**	**0.2007**	**1.5419**	**1.7426**	**0.0000**	**3,747.7049**	**3,747.7049**	**1.0580**		**3,774.1536**

3.2 Demolition - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0462	1.6831	0.4253	4.6900e-003	0.2579	5.4500e-003	0.2633	0.0663	5.2100e-003	0.0715		522.1748	522.1748	0.0541		523.5280
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0576	0.0363	0.4910	1.6400e-003	0.1677	1.1100e-003	0.1688	0.0445	1.0200e-003	0.0455		163.5065	163.5065	3.7300e-003		163.5997
Total	**0.1039**	**1.7195**	**0.9163**	**6.3300e-003**	**0.4255**	**6.5600e-003**	**0.4321**	**0.1108**	**6.2300e-003**	**0.1170**		**685.6814**	**685.6814**	**0.0579**		**687.1277**

3.3 Grading - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.7364	0.0000	8.7364	3.6061	0.0000	3.6061			0.0000			0.0000
Off-Road	4.4501	50.1975	31.9583	0.0620		2.1739	2.1739		2.0000	2.0000		6,005.8653	6,005.8653	1.9424		6,054.4257
Total	**4.4501**	**50.1975**	**31.9583**	**0.0620**	**8.7364**	**2.1739**	**10.9103**	**3.6061**	**2.0000**	**5.6060**		**6,005.8653**	**6,005.8653**	**1.9424**		**6,054.4257**

3.3 Grading - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.5263	19.1661	4.8428	0.0534	1.3293	0.0621	1.3914	0.3606	0.0594	0.4200		5,946.0355	5,946.0355	0.6164		5,961.4443
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0769	0.0484	0.6547	2.1900e-003	0.2236	1.4800e-003	0.2250	0.0593	1.3600e-003	0.0607		218.0087	218.0087	4.9700e-003		218.1330
Total	**0.6032**	**19.2145**	**5.4974**	**0.0555**	**1.5529**	**0.0635**	**1.6164**	**0.4199**	**0.0607**	**0.4806**		**6,164.0442**	**6,164.0442**	**0.6213**		**6,179.5772**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.7364	0.0000	8.7364	3.6061	0.0000	3.6061			0.0000			0.0000
Off-Road	4.4501	50.1975	31.9583	0.0620		2.1739	2.1739		2.0000	2.0000	0.0000	6,005.8653	6,005.8653	1.9424		6,054.4257
Total	**4.4501**	**50.1975**	**31.9583**	**0.0620**	**8.7364**	**2.1739**	**10.9103**	**3.6061**	**2.0000**	**5.6060**	**0.0000**	**6,005.8653**	**6,005.8653**	**1.9424**		**6,054.4257**

3.3 Grading - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.5263	19.1661	4.8428	0.0534	1.3293	0.0621	1.3914	0.3606	0.0594	0.4200		5,946.0355	5,946.0355	0.6164		5,961.4443
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0769	0.0484	0.6547	2.1900e-003	0.2236	1.4800e-003	0.2250	0.0593	1.3600e-003	0.0607		218.0087	218.0087	4.9700e-003		218.1330
Total	**0.6032**	**19.2145**	**5.4974**	**0.0555**	**1.5529**	**0.0635**	**1.6164**	**0.4199**	**0.0607**	**0.4806**		**6,164.0442**	**6,164.0442**	**0.6213**		**6,179.5772**

3.3 Grading - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.7364	0.0000	8.7364	3.6061	0.0000	3.6061			0.0000			0.0000
Off-Road	4.1912	46.3998	30.8785	0.0620		1.9853	1.9853		1.8265	1.8265		6,007.0434	6,007.0434	1.9428		6,055.6134
Total	**4.1912**	**46.3998**	**30.8785**	**0.0620**	**8.7364**	**1.9853**	**10.7217**	**3.6061**	**1.8265**	**5.4326**		**6,007.0434**	**6,007.0434**	**1.9428**		**6,055.6134**

3.3 Grading - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.5020	17.7194	4.8678	0.0526	8.5552	0.0557	8.6109	2.1343	0.0533	2.1875		5,873.2655	5,873.2655	0.6089		5,888.4888
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0722	0.0437	0.6075	2.1100e-003	0.2236	1.4500e-003	0.2250	0.0593	1.3300e-003	0.0606		210.4388	210.4388	4.5100e-003		210.5515
Total	**0.5742**	**17.7631**	**5.4753**	**0.0547**	**8.7788**	**0.0571**	**8.8359**	**2.1935**	**0.0546**	**2.2481**		**6,083.7044**	**6,083.7044**	**0.6134**		**6,099.0403**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.7364	0.0000	8.7364	3.6061	0.0000	3.6061			0.0000			0.0000
Off-Road	4.1912	46.3998	30.8785	0.0620		1.9853	1.9853		1.8265	1.8265	0.0000	6,007.0434	6,007.0434	1.9428		6,055.6134
Total	**4.1912**	**46.3998**	**30.8785**	**0.0620**	**8.7364**	**1.9853**	**10.7217**	**3.6061**	**1.8265**	**5.4326**	**0.0000**	**6,007.0434**	**6,007.0434**	**1.9428**		**6,055.6134**

3.3 Grading - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.5020	17.7194	4.8678	0.0526	8.5552	0.0557	8.6109	2.1343	0.0533	2.1875		5,873.2655	5,873.2655	0.6089		5,888.4888
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0722	0.0437	0.6075	2.1100e-003	0.2236	1.4500e-003	0.2250	0.0593	1.3300e-003	0.0606		210.4388	210.4388	4.5100e-003		210.5515
Total	**0.5742**	**17.7631**	**5.4753**	**0.0547**	**8.7788**	**0.0571**	**8.8359**	**2.1935**	**0.0546**	**2.2481**		**6,083.7044**	**6,083.7044**	**0.6134**		**6,099.0403**

3.4 Infrastructure - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.8882	40.4971	21.1543	0.0380		2.0445	2.0445		1.8809	1.8809		3,685.6569	3,685.6569	1.1920		3,715.4573
Total	**3.8882**	**40.4971**	**21.1543**	**0.0380**		**2.0445**	**2.0445**		**1.8809**	**1.8809**		**3,685.6569**	**3,685.6569**	**1.1920**		**3,715.4573**

3.4 Infrastructure - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0650	0.0393	0.5467	1.9000e-003	0.2012	1.3000e-003	0.2025	0.0534	1.2000e-003	0.0546		189.3950	189.3950	4.0600e-003		189.4963
Total	**0.0650**	**0.0393**	**0.5467**	**1.9000e-003**	**0.2012**	**1.3000e-003**	**0.2025**	**0.0534**	**1.2000e-003**	**0.0546**		**189.3950**	**189.3950**	**4.0600e-003**		**189.4963**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.8882	40.4971	21.1543	0.0380		2.0445	2.0445		1.8809	1.8809	0.0000	3,685.6569	3,685.6569	1.1920		3,715.4573
Total	**3.8882**	**40.4971**	**21.1543**	**0.0380**		**2.0445**	**2.0445**		**1.8809**	**1.8809**	**0.0000**	**3,685.6569**	**3,685.6569**	**1.1920**		**3,715.4573**

3.4 Infrastructure - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0650	0.0393	0.5467	1.9000e-003	0.2012	1.3000e-003	0.2025	0.0534	1.2000e-003	0.0546		189.3950	189.3950	4.0600e-003		189.4963
Total	**0.0650**	**0.0393**	**0.5467**	**1.9000e-003**	**0.2012**	**1.3000e-003**	**0.2025**	**0.0534**	**1.2000e-003**	**0.0546**		**189.3950**	**189.3950**	**4.0600e-003**		**189.4963**

3.4 Infrastructure - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.1701	33.0835	19.6978	0.0380		1.6126	1.6126		1.4836	1.4836		3,686.0619	3,686.0619	1.1922		3,715.8655
Total	**3.1701**	**33.0835**	**19.6978**	**0.0380**		**1.6126**	**1.6126**		**1.4836**	**1.4836**		**3,686.0619**	**3,686.0619**	**1.1922**		**3,715.8655**

3.4 Infrastructure - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0614	0.0356	0.5103	1.8300e-003	0.2012	1.2800e-003	0.2025	0.0534	1.1800e-003	0.0545		182.3762	182.3762	3.6800e-003		182.4683
Total	**0.0614**	**0.0356**	**0.5103**	**1.8300e-003**	**0.2012**	**1.2800e-003**	**0.2025**	**0.0534**	**1.1800e-003**	**0.0545**		**182.3762**	**182.3762**	**3.6800e-003**		**182.4683**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.1701	33.0835	19.6978	0.0380		1.6126	1.6126		1.4836	1.4836	0.0000	3,686.0619	3,686.0619	1.1922		3,715.8655
Total	**3.1701**	**33.0835**	**19.6978**	**0.0380**		**1.6126**	**1.6126**		**1.4836**	**1.4836**	**0.0000**	**3,686.0619**	**3,686.0619**	**1.1922**		**3,715.8655**

3.4 Infrastructure - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0614	0.0356	0.5103	1.8300e-003	0.2012	1.2800e-003	0.2025	0.0534	1.1800e-003	0.0545		182.3762	182.3762	3.6800e-003		182.4683
Total	**0.0614**	**0.0356**	**0.5103**	**1.8300e-003**	**0.2012**	**1.2800e-003**	**0.2025**	**0.0534**	**1.1800e-003**	**0.0545**		**182.3762**	**182.3762**	**3.6800e-003**		**182.4683**

3.5 Paving - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2556	12.9191	14.6532	0.0228		0.6777	0.6777		0.6235	0.6235		2,207.2109	2,207.2109	0.7139		2,225.0573
Paving	0.5963					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.8518**	**12.9191**	**14.6532**	**0.0228**		**0.6777**	**0.6777**		**0.6235**	**0.6235**		**2,207.2109**	**2,207.2109**	**0.7139**		**2,225.0573**

3.5 Paving - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0541	0.0328	0.4556	1.5800e-003	0.1677	1.0900e-003	0.1688	0.0445	1.0000e-003	0.0455		157.8291	157.8291	3.3800e-003		157.9136
Total	**0.0541**	**0.0328**	**0.4556**	**1.5800e-003**	**0.1677**	**1.0900e-003**	**0.1688**	**0.0445**	**1.0000e-003**	**0.0455**		**157.8291**	**157.8291**	**3.3800e-003**		**157.9136**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2556	12.9191	14.6532	0.0228		0.6777	0.6777		0.6235	0.6235	0.0000	2,207.2109	2,207.2109	0.7139		2,225.0573
Paving	0.5963					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.8518**	**12.9191**	**14.6532**	**0.0228**		**0.6777**	**0.6777**		**0.6235**	**0.6235**	**0.0000**	**2,207.2109**	**2,207.2109**	**0.7139**		**2,225.0573**

3.5 Paving - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0541	0.0328	0.4556	1.5800e-003	0.1677	1.0900e-003	0.1688	0.0445	1.0000e-003	0.0455		157.8291	157.8291	3.3800e-003		157.9136
Total	**0.0541**	**0.0328**	**0.4556**	**1.5800e-003**	**0.1677**	**1.0900e-003**	**0.1688**	**0.0445**	**1.0000e-003**	**0.0455**		**157.8291**	**157.8291**	**3.3800e-003**		**157.9136**

3.6 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.0228	18.7492	17.6706	0.0288		1.0251	1.0251		0.9625	0.9625		2,736.0438	2,736.0438	0.6751		2,752.9212
Total	**2.0228**	**18.7492**	**17.6706**	**0.0288**		**1.0251**	**1.0251**		**0.9625**	**0.9625**		**2,736.0438**	**2,736.0438**	**0.6751**		**2,752.9212**

3.6 Building Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.7605	26.7370	7.2512	0.0703	1.8209	0.0555	1.8764	0.5240	0.0531	0.5771		7,660.5863	7,660.5863	0.6007		7,675.6037
Worker	3.0102	1.8214	25.3310	0.0880	9.3222	0.0603	9.3825	2.4723	0.0556	2.5278		8,775.2992	8,775.2992	0.1879		8,779.9972
Total	**3.7707**	**28.5584**	**32.5822**	**0.1583**	**11.1430**	**0.1159**	**11.2589**	**2.9963**	**0.1087**	**3.1050**		**16,435.8855**	**16,435.8855**	**0.7886**		**16,455.6008**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.0228	18.7492	17.6706	0.0288		1.0251	1.0251		0.9625	0.9625	0.0000	2,736.0438	2,736.0438	0.6751		2,752.9212
Total	**2.0228**	**18.7492**	**17.6706**	**0.0288**		**1.0251**	**1.0251**		**0.9625**	**0.9625**	**0.0000**	**2,736.0438**	**2,736.0438**	**0.6751**		**2,752.9212**

3.6 Building Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.7605	26.7370	7.2512	0.0703	1.8209	0.0555	1.8764	0.5240	0.0531	0.5771		7,660.5863	7,660.5863	0.6007		7,675.6037
Worker	3.0102	1.8214	25.3310	0.0880	9.3222	0.0603	9.3825	2.4723	0.0556	2.5278		8,775.2992	8,775.2992	0.1879		8,779.9972
Total	**3.7707**	**28.5584**	**32.5822**	**0.1583**	**11.1430**	**0.1159**	**11.2589**	**2.9963**	**0.1087**	**3.1050**		**16,435.8855**	**16,435.8855**	**0.7886**		**16,455.6008**

3.6 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8146	16.7670	17.4392	0.0288		0.8645	0.8645		0.8122	0.8122		2,737.1520	2,737.1520	0.6711		2,753.9288
Total	**1.8146**	**16.7670**	**17.4392**	**0.0288**		**0.8645**	**0.8645**		**0.8122**	**0.8122**		**2,737.1520**	**2,737.1520**	**0.6711**		**2,753.9288**

3.6 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.7150	25.2952	7.0016	0.0695	1.8208	0.0483	1.8692	0.5240	0.0462	0.5702		7,585.3494	7,585.3494	0.5819		7,599.8965
Worker	2.8449	1.6501	23.6420	0.0847	9.3222	0.0592	9.3813	2.4723	0.0545	2.5268		8,450.0983	8,450.0983	0.1707		8,454.3650
Total	**3.5599**	**26.9453**	**30.6437**	**0.1542**	**11.1430**	**0.1075**	**11.2505**	**2.9963**	**0.1007**	**3.0969**		**16,035.4477**	**16,035.4477**	**0.7526**		**16,054.2615**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8146	16.7670	17.4392	0.0288		0.8645	0.8645		0.8122	0.8122	0.0000	2,737.1520	2,737.1520	0.6711		2,753.9288
Total	**1.8146**	**16.7670**	**17.4392**	**0.0288**		**0.8645**	**0.8645**		**0.8122**	**0.8122**	**0.0000**	**2,737.1520**	**2,737.1520**	**0.6711**		**2,753.9288**

3.6 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.7150	25.2952	7.0016	0.0695	1.8208	0.0483	1.8692	0.5240	0.0462	0.5702		7,585.3494	7,585.3494	0.5819		7,599.8965
Worker	2.8449	1.6501	23.6420	0.0847	9.3222	0.0592	9.3813	2.4723	0.0545	2.5268		8,450.0983	8,450.0983	0.1707		8,454.3650
Total	**3.5599**	**26.9453**	**30.6437**	**0.1542**	**11.1430**	**0.1075**	**11.2505**	**2.9963**	**0.1007**	**3.0969**		**16,035.4477**	**16,035.4477**	**0.7526**		**16,054.2615**

3.6 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6735	15.4377	17.3101	0.0288		0.7481	0.7481		0.7029	0.7029		2,738.1535	2,738.1535	0.6670		2,754.8288
Total	**1.6735**	**15.4377**	**17.3101**	**0.0288**		**0.7481**	**0.7481**		**0.7029**	**0.7029**		**2,738.1535**	**2,738.1535**	**0.6670**		**2,754.8288**

3.6 Building Construction - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.5442	19.0917	6.5349	0.0672	1.8208	0.0230	1.8438	0.5240	0.0220	0.5459		7,354.8967	7,354.8967	0.5409		7,368.4203
Worker	2.6941	1.4982	22.0481	0.0815	9.3222	0.0582	9.3803	2.4723	0.0535	2.5258		8,125.2406	8,125.2406	0.1548		8,129.1108
Total	**3.2383**	**20.5899**	**28.5830**	**0.1487**	**11.1430**	**0.0811**	**11.2241**	**2.9963**	**0.0755**	**3.0718**		**15,480.1373**	**15,480.1373**	**0.6958**		**15,497.5311**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6735	15.4377	17.3101	0.0288		0.7481	0.7481		0.7029	0.7029	0.0000	2,738.1535	2,738.1535	0.6670		2,754.8288
Total	**1.6735**	**15.4377**	**17.3101**	**0.0288**		**0.7481**	**0.7481**		**0.7029**	**0.7029**	**0.0000**	**2,738.1535**	**2,738.1535**	**0.6670**		**2,754.8288**

3.6 Building Construction - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.5442	19.0917	6.5349	0.0672	1.8208	0.0230	1.8438	0.5240	0.0220	0.5459		7,354.8967	7,354.8967	0.5409		7,368.4203
Worker	2.6941	1.4982	22.0481	0.0815	9.3222	0.0582	9.3803	2.4723	0.0535	2.5258		8,125.2406	8,125.2406	0.1548		8,129.1108
Total	**3.2383**	**20.5899**	**28.5830**	**0.1487**	**11.1430**	**0.0811**	**11.2241**	**2.9963**	**0.0755**	**3.0718**		**15,480.1373**	**15,480.1373**	**0.6958**		**15,497.5311**

3.6 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5670	14.4249	17.2270	0.0288		0.6565	0.6565		0.6166	0.6166		2,738.7124	2,738.7124	0.6635		2,755.3009
Total	**1.5670**	**14.4249**	**17.2270**	**0.0288**		**0.6565**	**0.6565**		**0.6166**	**0.6166**		**2,738.7124**	**2,738.7124**	**0.6635**		**2,755.3009**

3.6 Building Construction - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.5258	18.8534	6.3992	0.0666	1.8208	0.0225	1.8433	0.5240	0.0215	0.5455		7,296.4721	7,296.4721	0.5328		7,309.7923
Worker	2.5604	1.3644	20.5236	0.0782	9.3222	0.0572	9.3793	2.4723	0.0526	2.5249		7,803.2629	7,803.2629	0.1406		7,806.7771
Total	**3.0862**	**20.2177**	**26.9228**	**0.1448**	**11.1429**	**0.0797**	**11.2226**	**2.9962**	**0.0741**	**3.0704**		**15,099.7349**	**15,099.7349**	**0.6734**		**15,116.5694**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5670	14.4249	17.2270	0.0288		0.6565	0.6565		0.6166	0.6166	0.0000	2,738.7123	2,738.7123	0.6635		2,755.3009
Total	**1.5670**	**14.4249**	**17.2270**	**0.0288**		**0.6565**	**0.6565**		**0.6166**	**0.6166**	**0.0000**	**2,738.7123**	**2,738.7123**	**0.6635**		**2,755.3009**

3.6 Building Construction - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.5258	18.8534	6.3992	0.0666	1.8208	0.0225	1.8433	0.5240	0.0215	0.5455		7,296.4721	7,296.4721	0.5328		7,309.7923
Worker	2.5604	1.3644	20.5236	0.0782	9.3222	0.0572	9.3793	2.4723	0.0526	2.5249		7,803.2629	7,803.2629	0.1406		7,806.7771
Total	**3.0862**	**20.2177**	**26.9228**	**0.1448**	**11.1429**	**0.0797**	**11.2226**	**2.9962**	**0.0741**	**3.0704**		**15,099.7349**	**15,099.7349**	**0.6734**		**15,116.5694**

3.6 Building Construction - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4560	13.3663	17.1378	0.0289		0.5647	0.5647		0.5304	0.5304		2,739.5986	2,739.5986	0.6602		2,756.1030
Total	**1.4560**	**13.3663**	**17.1378**	**0.0289**		**0.5647**	**0.5647**		**0.5304**	**0.5304**		**2,739.5986**	**2,739.5986**	**0.6602**		**2,756.1030**

3.6 Building Construction - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.5123	18.6091	6.3253	0.0661	1.8208	0.0220	1.8428	0.5240	0.0211	0.5450		7,251.2473	7,251.2473	0.5258		7,264.3925
Worker	2.4464	1.2515	19.1594	0.0750	9.3222	0.0565	9.3786	2.4723	0.0520	2.5242		7,487.7395	7,487.7395	0.1286		7,490.9538
Total	**2.9587**	**19.8606**	**25.4847**	**0.1411**	**11.1429**	**0.0785**	**11.2214**	**2.9962**	**0.0730**	**3.0693**		**14,738.9867**	**14,738.9867**	**0.6544**		**14,755.3463**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4560	13.3663	17.1378	0.0289		0.5647	0.5647		0.5304	0.5304	0.0000	2,739.5986	2,739.5986	0.6602		2,756.1029
Total	**1.4560**	**13.3663**	**17.1378**	**0.0289**		**0.5647**	**0.5647**		**0.5304**	**0.5304**	**0.0000**	**2,739.5986**	**2,739.5986**	**0.6602**		**2,756.1029**

3.6 Building Construction - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.5123	18.6091	6.3253	0.0661	1.8208	0.0220	1.8428	0.5240	0.0211	0.5450		7,251.2473	7,251.2473	0.5258		7,264.3925
Worker	2.4464	1.2515	19.1594	0.0750	9.3222	0.0565	9.3786	2.4723	0.0520	2.5242		7,487.7395	7,487.7395	0.1286		7,490.9538
Total	**2.9587**	**19.8606**	**25.4847**	**0.1411**	**11.1429**	**0.0785**	**11.2214**	**2.9962**	**0.0730**	**3.0693**		**14,738.9867**	**14,738.9867**	**0.6544**		**14,755.3463**

3.7 Architectural Coating - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	9.2402					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2919	2.0358	2.4234	3.9600e-003		0.1255	0.1255		0.1255	0.1255		375.2641	375.2641	0.0258		375.9079
Total	**9.5320**	**2.0358**	**2.4234**	**3.9600e-003**		**0.1255**	**0.1255**		**0.1255**	**0.1255**		**375.2641**	**375.2641**	**0.0258**		**375.9079**

3.7 Architectural Coating - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.6028	0.3647	5.0723	0.0176	1.8667	0.0121	1.8788	0.4951	0.0111	0.5062		1,757.1642	1,757.1642	0.0376		1,758.1050
Total	**0.6028**	**0.3647**	**5.0723**	**0.0176**	**1.8667**	**0.0121**	**1.8788**	**0.4951**	**0.0111**	**0.5062**		**1,757.1642**	**1,757.1642**	**0.0376**		**1,758.1050**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	9.2402					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2919	2.0358	2.4234	3.9600e-003		0.1255	0.1255		0.1255	0.1255	0.0000	375.2641	375.2641	0.0258		375.9079
Total	**9.5320**	**2.0358**	**2.4234**	**3.9600e-003**		**0.1255**	**0.1255**		**0.1255**	**0.1255**	**0.0000**	**375.2641**	**375.2641**	**0.0258**		**375.9079**

3.7 Architectural Coating - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.6028	0.3647	5.0723	0.0176	1.8667	0.0121	1.8788	0.4951	0.0111	0.5062		1,757.1642	1,757.1642	0.0376		1,758.1050
Total	**0.6028**	**0.3647**	**5.0723**	**0.0176**	**1.8667**	**0.0121**	**1.8788**	**0.4951**	**0.0111**	**0.5062**		**1,757.1642**	**1,757.1642**	**0.0376**		**1,758.1050**

3.7 Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	9.2402					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2727	1.8780	2.4181	3.9600e-003		0.1090	0.1090		0.1090	0.1090		375.2641	375.2641	0.0244		375.8749
Total	**9.5129**	**1.8780**	**2.4181**	**3.9600e-003**		**0.1090**	**0.1090**		**0.1090**	**0.1090**		**375.2641**	**375.2641**	**0.0244**		**375.8749**

3.7 Architectural Coating - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.5697	0.3304	4.7341	0.0170	1.8667	0.0119	1.8785	0.4951	0.0109	0.5060		1,692.0461	1,692.0461	0.0342		1,692.9004
Total	**0.5697**	**0.3304**	**4.7341**	**0.0170**	**1.8667**	**0.0119**	**1.8785**	**0.4951**	**0.0109**	**0.5060**		**1,692.0461**	**1,692.0461**	**0.0342**		**1,692.9004**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	9.2402					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2727	1.8780	2.4181	3.9600e-003		0.1090	0.1090		0.1090	0.1090	0.0000	375.2641	375.2641	0.0244		375.8749
Total	**9.5129**	**1.8780**	**2.4181**	**3.9600e-003**		**0.1090**	**0.1090**		**0.1090**	**0.1090**	**0.0000**	**375.2641**	**375.2641**	**0.0244**		**375.8749**

3.7 Architectural Coating - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.5697	0.3304	4.7341	0.0170	1.8667	0.0119	1.8785	0.4951	0.0109	0.5060		1,692.0461	1,692.0461	0.0342		1,692.9004
Total	**0.5697**	**0.3304**	**4.7341**	**0.0170**	**1.8667**	**0.0119**	**1.8785**	**0.4951**	**0.0109**	**0.5060**		**1,692.0461**	**1,692.0461**	**0.0342**		**1,692.9004**

3.7 Architectural Coating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	9.2402					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2556	1.7373	2.4148	3.9600e-003		0.0944	0.0944		0.0944	0.0944		375.2641	375.2641	0.0225		375.8253
Total	**9.4957**	**1.7373**	**2.4148**	**3.9600e-003**		**0.0944**	**0.0944**		**0.0944**	**0.0944**		**375.2641**	**375.2641**	**0.0225**		**375.8253**

3.7 Architectural Coating - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.5395	0.3000	4.4149	0.0163	1.8667	0.0117	1.8783	0.4951	0.0107	0.5058		1,626.9966	1,626.9966	0.0310		1,627.7716
Total	**0.5395**	**0.3000**	**4.4149**	**0.0163**	**1.8667**	**0.0117**	**1.8783**	**0.4951**	**0.0107**	**0.5058**		**1,626.9966**	**1,626.9966**	**0.0310**		**1,627.7716**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	9.2402					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2556	1.7373	2.4148	3.9600e-003		0.0944	0.0944		0.0944	0.0944	0.0000	375.2641	375.2641	0.0225		375.8253
Total	**9.4957**	**1.7373**	**2.4148**	**3.9600e-003**		**0.0944**	**0.0944**		**0.0944**	**0.0944**	**0.0000**	**375.2641**	**375.2641**	**0.0225**		**375.8253**

3.7 Architectural Coating - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.5395	0.3000	4.4149	0.0163	1.8667	0.0117	1.8783	0.4951	0.0107	0.5058		1,626.9966	1,626.9966	0.0310		1,627.7716
Total	**0.5395**	**0.3000**	**4.4149**	**0.0163**	**1.8667**	**0.0117**	**1.8783**	**0.4951**	**0.0107**	**0.5058**		**1,626.9966**	**1,626.9966**	**0.0310**		**1,627.7716**

3.7 Architectural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	9.2402					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2410	1.6251	2.4135	3.9600e-003		0.0812	0.0812		0.0812	0.0812		375.2641	375.2641	0.0211		375.7923
Total	**9.4812**	**1.6251**	**2.4135**	**3.9600e-003**		**0.0812**	**0.0812**		**0.0812**	**0.0812**		**375.2641**	**375.2641**	**0.0211**		**375.7923**

3.7 Architectural Coating - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.5127	0.2732	4.1096	0.0157	1.8667	0.0114	1.8781	0.4951	0.0105	0.5056		1,562.5239	1,562.5239	0.0282		1,563.2275
Total	**0.5127**	**0.2732**	**4.1096**	**0.0157**	**1.8667**	**0.0114**	**1.8781**	**0.4951**	**0.0105**	**0.5056**		**1,562.5239**	**1,562.5239**	**0.0282**		**1,563.2275**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	9.2402					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2410	1.6251	2.4135	3.9600e-003		0.0812	0.0812		0.0812	0.0812	0.0000	375.2641	375.2641	0.0211		375.7923
Total	**9.4812**	**1.6251**	**2.4135**	**3.9600e-003**		**0.0812**	**0.0812**		**0.0812**	**0.0812**	**0.0000**	**375.2641**	**375.2641**	**0.0211**		**375.7923**

3.7 Architectural Coating - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.5127	0.2732	4.1096	0.0157	1.8667	0.0114	1.8781	0.4951	0.0105	0.5056		1,562.5239	1,562.5239	0.0282		1,563.2275
Total	**0.5127**	**0.2732**	**4.1096**	**0.0157**	**1.8667**	**0.0114**	**1.8781**	**0.4951**	**0.0105**	**0.5056**		**1,562.5239**	**1,562.5239**	**0.0282**		**1,563.2275**

3.7 Architectural Coating - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	9.2402					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2278	1.5273	2.4122	3.9600e-003		0.0687	0.0687		0.0687	0.0687		375.2641	375.2641	0.0205		375.7758
Total	**9.4680**	**1.5273**	**2.4122**	**3.9600e-003**		**0.0687**	**0.0687**		**0.0687**	**0.0687**		**375.2641**	**375.2641**	**0.0205**		**375.7758**

3.7 Architectural Coating - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.4899	0.2506	3.8365	0.0150	1.8667	0.0113	1.8780	0.4951	0.0104	0.5055		1,499.3435	1,499.3435	0.0257		1,499.9871
Total	**0.4899**	**0.2506**	**3.8365**	**0.0150**	**1.8667**	**0.0113**	**1.8780**	**0.4951**	**0.0104**	**0.5055**		**1,499.3435**	**1,499.3435**	**0.0257**		**1,499.9871**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	9.2402					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2278	1.5273	2.4122	3.9600e-003		0.0687	0.0687		0.0687	0.0687	0.0000	375.2641	375.2641	0.0205		375.7758
Total	**9.4680**	**1.5273**	**2.4122**	**3.9600e-003**		**0.0687**	**0.0687**		**0.0687**	**0.0687**	**0.0000**	**375.2641**	**375.2641**	**0.0205**		**375.7758**

3.7 Architectural Coating - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.4899	0.2506	3.8365	0.0150	1.8667	0.0113	1.8780	0.4951	0.0104	0.5055		1,499.3435	1,499.3435	0.0257		1,499.9871
Total	**0.4899**	**0.2506**	**3.8365**	**0.0150**	**1.8667**	**0.0113**	**1.8780**	**0.4951**	**0.0104**	**0.5055**		**1,499.3435**	**1,499.3435**	**0.0257**		**1,499.9871**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	0.00	0.00	0.00		
Elementary School	0.00	0.00	0.00		
Other Asphalt Surfaces	0.00	0.00	0.00		
Retirement Community	0.00	0.00	0.00		
Single Family Housing	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0
Elementary School	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0
Retirement Community	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0
Single Family Housing	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854
Elementary School	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854
Other Asphalt Surfaces	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854
Retirement Community	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854
Single Family Housing	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Elementary School	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Retirement Community	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Elementary School	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Retirement Community	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	32.4965	0.7377	64.0649	3.3900e-003		0.3553	0.3553		0.3553	0.3553	0.0000	115.5012	115.5012	0.1110	0.0000	118.2756
Unmitigated	32.4965	0.7377	64.0649	3.3900e-003		0.3553	0.3553		0.3553	0.3553	0.0000	115.5012	115.5012	0.1110	0.0000	118.2756

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	2.5341					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	28.0325					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.9300	0.7377	64.0649	3.3900e-003		0.3553	0.3553		0.3553	0.3553		115.5012	115.5012	0.1110		118.2756
Total	**32.4965**	**0.7377**	**64.0649**	**3.3900e-003**		**0.3553**	**0.3553**		**0.3553**	**0.3553**	**0.0000**	**115.5012**	**115.5012**	**0.1110**	**0.0000**	**118.2756**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	2.5341					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	28.0325					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.9300	0.7377	64.0649	3.3900e-003		0.3553	0.3553		0.3553	0.3553		115.5012	115.5012	0.1110		118.2756
Total	**32.4965**	**0.7377**	**64.0649**	**3.3900e-003**		**0.3553**	**0.3553**		**0.3553**	**0.3553**	**0.0000**	**115.5012**	**115.5012**	**0.1110**	**0.0000**	**118.2756**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

This page intentionally left blank

APPENDIX 3.2:

CALEEMOD OPERATIONAL (OTHER USES - WITH PROJECT DESIGN FEATURES) EMISSIONS MODEL OUTPUTS

Nakase Other Uses (Operations - w/ Regulatory Measures, PDFs, & MMs)

Orange County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Elementary School	1,000.00	Student	12.60	83,603.37	0
Other Asphalt Surfaces	19.80	Acre	19.80	862,488.00	0
City Park	6.60	Acre	6.60	287,496.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2025
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	430	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Nakase Other Uses (Operations - w/ Regulatory Measures, PDFs, & MMs) - Orange County, Winter

Project Characteristics - CO2 intensity factor represents CO2e intensity factor. The projected 2025 RPS target is derived based on a linear trajectory to reach the 50% project RPS consistent with SB 32 and SB 350.

Land Use - Total Lot Area is 121.8 acres. In order to be consistent with the TIA, 6.6 acres of Park will be analyzed, the remaining 17.5 acres of Open Space will not be analyzed.

Construction Phase - Operations Run Only.

Off-road Equipment - Operations Run Only.

Trips and VMT - Operations Run Only.

Vehicle Trips - Trip Rates based on information provided in the TIA and ITE 10th Edition (2017).

Energy Use -

Mobile Land Use Mitigation -

Water Mitigation -

Energy Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	50.00	1.00
tblLandUse	LotAcreage	1.92	12.60
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	702.44	430
tblVehicleTrips	ST_TR	22.75	23.33
tblVehicleTrips	ST_TR	0.00	1.89
tblVehicleTrips	SU_TR	16.74	23.33
tblVehicleTrips	SU_TR	0.00	1.89
tblVehicleTrips	WD_TR	1.89	23.33
tblVehicleTrips	WD_TR	1.29	1.89

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	2.2633	9.5000e-004	0.1045	1.0000e-005		3.7000e-004	3.7000e-004		3.7000e-004	3.7000e-004		0.2246	0.2246	5.8000e-004		0.2392
Energy	0.0293	0.2659	0.2233	1.6000e-003		0.0202	0.0202		0.0202	0.0202		319.0536	319.0536	6.1200e-003	5.8500e-003	320.9496
Mobile	2.4788	9.3361	32.7321	0.1393	14.7574	0.1006	14.8580	3.9461	0.0933	4.0394		14,197.1612	14,197.1612	0.5578		14,211.1055
Total	**4.7713**	**9.6029**	**33.0600**	**0.1409**	**14.7574**	**0.1212**	**14.8785**	**3.9461**	**0.1138**	**4.0599**		**14,516.4394**	**14,516.4394**	**0.5645**	**5.8500e-003**	**14,532.2944**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	2.2633	9.5000e-004	0.1045	1.0000e-005		3.7000e-004	3.7000e-004		3.7000e-004	3.7000e-004		0.2246	0.2246	5.8000e-004		0.2392
Energy	0.0212	0.1931	0.1622	1.1600e-003		0.0147	0.0147		0.0147	0.0147		231.6642	231.6642	4.4400e-003	4.2500e-003	233.0409
Mobile	2.3295	8.6209	28.8466	0.1199	12.6175	0.0876	12.7051	3.3739	0.0812	3.4551		12,220.7984	12,220.7984	0.4877		12,232.9920
Total	**4.6140**	**8.8149**	**29.1133**	**0.1210**	**12.6175**	**0.1026**	**12.7202**	**3.3739**	**0.0962**	**3.4701**		**12,452.6872**	**12,452.6872**	**0.4928**	**4.2500e-003**	**12,466.2721**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**3.30**	**8.21**	**11.94**	**14.09**	**14.50**	**15.31**	**14.51**	**14.50**	**15.47**	**14.53**	**0.00**	**14.22**	**14.22**	**12.70**	**27.35**	**14.22**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	11/1/2019	11/1/2019	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 19.8

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Excavators	0	8.00	158	0.38
Demolition	Rubber Tired Dozers	0	8.00	247	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.2 Demolition - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Diversity

Integrate Below Market Rate Housing

Improve Pedestrian Network

Provide Traffic Calming Measures

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	2.3295	8.6209	28.8466	0.1199	12.6175	0.0876	12.7051	3.3739	0.0812	3.4551		12,220.7984	12,220.7984	0.4877		12,232.9920
Unmitigated	2.4788	9.3361	32.7321	0.1393	14.7574	0.1006	14.8580	3.9461	0.0933	4.0394		14,197.1612	14,197.1612	0.5578		14,211.1055

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	153.98	153.98	153.98	443,078	378,832
Elementary School	1,890.00	1,890.00	1890.00	6,513,665	5,569,184
Other Asphalt Surfaces	0.00	0.00	0.00		
Total	2,043.98	2,043.98	2,043.98	6,956,743	5,948,016

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	16.60	8.40	6.90	33.00	48.00	19.00	66	28	6
Elementary School	16.60	8.40	6.90	65.00	30.00	5.00	63	25	12
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854
Elementary School	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854
Other Asphalt Surfaces	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Exceed Title 24

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0212	0.1931	0.1622	1.1600e-003		0.0147	0.0147		0.0147	0.0147		231.6642	231.6642	4.4400e-003	4.2500e-003	233.0409
NaturalGas Unmitigated	0.0293	0.2659	0.2233	1.6000e-003		0.0202	0.0202		0.0202	0.0202		319.0536	319.0536	6.1200e-003	5.8500e-003	320.9496

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Elementary School	2711.96	0.0293	0.2659	0.2233	1.6000e-003		0.0202	0.0202		0.0202	0.0202		319.0536	319.0536	6.1200e-003	5.8500e-003	320.9496
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0293**	**0.2659**	**0.2233**	**1.6000e-003**		**0.0202**	**0.0202**		**0.0202**	**0.0202**		**319.0536**	**319.0536**	**6.1200e-003**	**5.8500e-003**	**320.9496**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Elementary School	1.96915	0.0212	0.1931	0.1622	1.1600e-003		0.0147	0.0147		0.0147	0.0147		231.6642	231.6642	4.4400e-003	4.2500e-003	233.0409
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0212**	**0.1931**	**0.1622**	**1.1600e-003**		**0.0147**	**0.0147**		**0.0147**	**0.0147**		**231.6642**	**231.6642**	**4.4400e-003**	**4.2500e-003**	**233.0409**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	2.2633	9.5000e-004	0.1045	1.0000e-005		3.7000e-004	3.7000e-004		3.7000e-004	3.7000e-004		0.2246	0.2246	5.8000e-004		0.2392
Unmitigated	2.2633	9.5000e-004	0.1045	1.0000e-005		3.7000e-004	3.7000e-004		3.7000e-004	3.7000e-004		0.2246	0.2246	5.8000e-004		0.2392

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.2780					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	1.9757					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	9.6200e-003	9.5000e-004	0.1045	1.0000e-005		3.7000e-004	3.7000e-004		3.7000e-004	3.7000e-004		0.2246	0.2246	5.8000e-004		0.2392
Total	**2.2633**	**9.5000e-004**	**0.1045**	**1.0000e-005**		**3.7000e-004**	**3.7000e-004**		**3.7000e-004**	**3.7000e-004**		**0.2246**	**0.2246**	**5.8000e-004**		**0.2392**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.2780					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	1.9757					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	9.6200e-003	9.5000e-004	0.1045	1.0000e-005		3.7000e-004	3.7000e-004		3.7000e-004	3.7000e-004		0.2246	0.2246	5.8000e-004		0.2392
Total	**2.2633**	**9.5000e-004**	**0.1045**	**1.0000e-005**		**3.7000e-004**	**3.7000e-004**		**3.7000e-004**	**3.7000e-004**		**0.2246**	**0.2246**	**5.8000e-004**		**0.2392**

7.0 Water Detail

7.1 Mitigation Measures Water

Apply Water Conservation Strategy

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Nakase Other Uses (Operations - w/ Regulatory Measures, PDFs, & MMs)

Orange County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Elementary School	1,000.00	Student	12.60	83,603.37	0
Other Asphalt Surfaces	19.80	Acre	19.80	862,488.00	0
City Park	6.60	Acre	6.60	287,496.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2025
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	430	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CO2 intensity factor represents CO2e intensity factor. The projected 2025 RPS target is derived based on a linear trajectory to reach the 50% project RPS consistent with SB 32 and SB 350.

Land Use - Total Lot Area is 121.8 acres. In order to be consistent with the TIA, 6.6 acres of Park will be analyzed, the remaining 17.5 acres of Open Space will not be analyzed.

Construction Phase - Operations Run Only.

Off-road Equipment - Operations Run Only.

Trips and VMT - Operations Run Only.

Vehicle Trips - Trip Rates based on information provided in the TIA and ITE 10th Edition (2017).

Energy Use -

Mobile Land Use Mitigation -

Water Mitigation -

Energy Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	50.00	1.00
tblLandUse	LotAcreage	1.92	12.60
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	702.44	430
tblVehicleTrips	ST_TR	22.75	23.33
tblVehicleTrips	ST_TR	0.00	1.89
tblVehicleTrips	SU_TR	16.74	23.33
tblVehicleTrips	SU_TR	0.00	1.89
tblVehicleTrips	WD_TR	1.89	23.33
tblVehicleTrips	WD_TR	1.29	1.89

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	2.2633	9.5000e-004	0.1045	1.0000e-005		3.7000e-004	3.7000e-004		3.7000e-004	3.7000e-004		0.2246	0.2246	5.8000e-004		0.2392
Energy	0.0293	0.2659	0.2233	1.6000e-003		0.0202	0.0202		0.0202	0.0202		319.0536	319.0536	6.1200e-003	5.8500e-003	320.9496
Mobile	2.5268	9.0973	34.3559	0.1457	14.7574	0.1003	14.8577	3.9461	0.0930	4.0391		14,838.1455	14,838.1455	0.5593		14,852.1279
Total	**4.8194**	**9.3641**	**34.6838**	**0.1473**	**14.7574**	**0.1209**	**14.8782**	**3.9461**	**0.1136**	**4.0597**		**15,157.4238**	**15,157.4238**	**0.5660**	**5.8500e-003**	**15,173.3168**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	2.2633	9.5000e-004	0.1045	1.0000e-005		3.7000e-004	3.7000e-004		3.7000e-004	3.7000e-004		0.2246	0.2246	5.8000e-004		0.2392
Energy	0.0212	0.1931	0.1622	1.1600e-003		0.0147	0.0147		0.0147	0.0147		231.6642	231.6642	4.4400e-003	4.2500e-003	233.0409
Mobile	2.3751	8.4241	30.1092	0.1254	12.6175	0.0873	12.7048	3.3739	0.0809	3.4548		12,775.5420	12,775.5420	0.4879		12,787.7389
Total	**4.6596**	**8.6181**	**30.3758**	**0.1266**	**12.6175**	**0.1023**	**12.7199**	**3.3739**	**0.0959**	**3.4699**		**13,007.4308**	**13,007.4308**	**0.4929**	**4.2500e-003**	**13,021.0190**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**3.32**	**7.97**	**12.42**	**14.07**	**14.50**	**15.35**	**14.51**	**14.50**	**15.51**	**14.53**	**0.00**	**14.18**	**14.18**	**12.92**	**27.35**	**14.18**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	11/1/2019	11/1/2019	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 19.8

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Excavators	0	8.00	158	0.38
Demolition	Rubber Tired Dozers	0	8.00	247	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.2 Demolition - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Diversity

Integrate Below Market Rate Housing

Improve Pedestrian Network

Provide Traffic Calming Measures

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	2.3751	8.4241	30.1092	0.1254	12.6175	0.0873	12.7048	3.3739	0.0809	3.4548		12,775.5420	12,775.5420	0.4879		12,787.7389
Unmitigated	2.5268	9.0973	34.3559	0.1457	14.7574	0.1003	14.8577	3.9461	0.0930	4.0391		14,838.1455	14,838.1455	0.5593		14,852.1279

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	153.98	153.98	153.98	443,078	378,832
Elementary School	1,890.00	1,890.00	1890.00	6,513,665	5,569,184
Other Asphalt Surfaces	0.00	0.00	0.00		
Total	2,043.98	2,043.98	2,043.98	6,956,743	5,948,016

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	16.60	8.40	6.90	33.00	48.00	19.00	66	28	6
Elementary School	16.60	8.40	6.90	65.00	30.00	5.00	63	25	12
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854
Elementary School	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854
Other Asphalt Surfaces	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Exceed Title 24

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0212	0.1931	0.1622	1.1600e-003		0.0147	0.0147		0.0147	0.0147		231.6642	231.6642	4.4400e-003	4.2500e-003	233.0409
NaturalGas Unmitigated	0.0293	0.2659	0.2233	1.6000e-003		0.0202	0.0202		0.0202	0.0202		319.0536	319.0536	6.1200e-003	5.8500e-003	320.9496

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Elementary School	2711.96	0.0293	0.2659	0.2233	1.6000e-003		0.0202	0.0202		0.0202	0.0202		319.0536	319.0536	6.1200e-003	5.8500e-003	320.9496
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0293**	**0.2659**	**0.2233**	**1.6000e-003**		**0.0202**	**0.0202**		**0.0202**	**0.0202**		**319.0536**	**319.0536**	**6.1200e-003**	**5.8500e-003**	**320.9496**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Elementary School	1.96915	0.0212	0.1931	0.1622	1.1600e-003		0.0147	0.0147		0.0147	0.0147		231.6642	231.6642	4.4400e-003	4.2500e-003	233.0409
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0212**	**0.1931**	**0.1622**	**1.1600e-003**		**0.0147**	**0.0147**		**0.0147**	**0.0147**		**231.6642**	**231.6642**	**4.4400e-003**	**4.2500e-003**	**233.0409**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	2.2633	9.5000e-004	0.1045	1.0000e-005		3.7000e-004	3.7000e-004		3.7000e-004	3.7000e-004		0.2246	0.2246	5.8000e-004		0.2392
Unmitigated	2.2633	9.5000e-004	0.1045	1.0000e-005		3.7000e-004	3.7000e-004		3.7000e-004	3.7000e-004		0.2246	0.2246	5.8000e-004		0.2392

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.2780					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	1.9757					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	9.6200e-003	9.5000e-004	0.1045	1.0000e-005		3.7000e-004	3.7000e-004		3.7000e-004	3.7000e-004		0.2246	0.2246	5.8000e-004		0.2392
Total	**2.2633**	**9.5000e-004**	**0.1045**	**1.0000e-005**		**3.7000e-004**	**3.7000e-004**		**3.7000e-004**	**3.7000e-004**		**0.2246**	**0.2246**	**5.8000e-004**		**0.2392**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.2780					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	1.9757					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	9.6200e-003	9.5000e-004	0.1045	1.0000e-005		3.7000e-004	3.7000e-004		3.7000e-004	3.7000e-004		0.2246	0.2246	5.8000e-004		0.2392
Total	**2.2633**	**9.5000e-004**	**0.1045**	**1.0000e-005**		**3.7000e-004**	**3.7000e-004**		**3.7000e-004**	**3.7000e-004**		**0.2246**	**0.2246**	**5.8000e-004**		**0.2392**

7.0 Water Detail

7.1 Mitigation Measures Water

Apply Water Conservation Strategy

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

This page intentionally left blank

APPENDIX 3.3:

CALEEMOD OPERATIONAL (RESIDENTIAL USES - WITH PROJECT DESIGN FEATURES) EMISSIONS MODEL OUTPUTS

Nakase Residential Uses (Operations - w Regulatory Measures, PDFs, & MMs)

Orange County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Retirement Community	101.00	Dwelling Unit	3.90	101,000.00	289
Single Family Housing	675.00	Dwelling Unit	61.40	1,215,000.00	1931

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2025
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	430	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Nakase Residential Uses (Operations - w Regulatory Measures, PDFs, & MMs) - Orange County, Winter

Project Characteristics - CO2 intensity factor represents CO2e intensity factor. The projected 2025 RPS target is derived based on a linear trajectory to reach the 50% project RPS consistent with SB 32 and SB 350.

Land Use - Total Lot Area is 121.8 acres. In order to be consistent with the TIA, 6.6 acres of Park will be analyzed, the remaining 17.5 acres of Open Space will not be analyzed.

Construction Phase - Operations Run Only.

Off-road Equipment - Operations Run Only.

Trips and VMT - Operations Run Only.

Vehicle Trips - Trip Rates based on information provided in the TIA and ITE 10th Edition (2017).

Woodstoves - Rule 445

Energy Use -

Mobile Land Use Mitigation -

Water Mitigation -

Energy Mitigation -

Nakase Residential Uses (Operations - w Regulatory Measures, PDFs, & MMs) - Orange County, Winter

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	70.00	1.00
tblFireplaces	NumberGas	85.85	101.00
tblFireplaces	NumberGas	573.75	675.00
tblFireplaces	NumberNoFireplace	10.10	0.00
tblFireplaces	NumberNoFireplace	67.50	0.00
tblFireplaces	NumberWood	5.05	0.00
tblFireplaces	NumberWood	33.75	0.00
tblLandUse	LotAcreage	20.20	3.90
tblLandUse	LotAcreage	219.16	61.40
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	702.44	430
tblVehicleTrips	ST_TR	2.03	3.23
tblVehicleTrips	ST_TR	9.91	9.54
tblVehicleTrips	SU_TR	1.95	3.14
tblVehicleTrips	SU_TR	8.62	8.55
tblVehicleTrips	WD_TR	2.40	3.70
tblVehicleTrips	WD_TR	9.52	9.44
tblWoodstoves	NumberCatalytic	5.05	0.00
tblWoodstoves	NumberCatalytic	33.75	0.00
tblWoodstoves	NumberNoncatalytic	5.05	0.00
tblWoodstoves	NumberNoncatalytic	33.75	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	31.7396	13.6092	69.4380	0.0856		1.3957	1.3957		1.3957	1.3957	0.0000	16,548.2178	16,548.2178	0.4254	0.3013	16,648.6303
Energy	0.5527	4.7232	2.0099	0.0302		0.3819	0.3819		0.3819	0.3819		6,029.6641	6,029.6641	0.1156	0.1105	6,065.4954
Mobile	8.2762	31.1858	109.4636	0.4660	49.3876	0.3365	49.7241	13.2062	0.3119	13.5181		47,505.2718	47,505.2718	1.8657		47,551.9136
Total	**40.5684**	**49.5183**	**180.9114**	**0.5817**	**49.3876**	**2.1140**	**51.5016**	**13.2062**	**2.0895**	**15.2957**	**0.0000**	**70,083.1537**	**70,083.1537**	**2.4066**	**0.4118**	**70,266.0392**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	31.7396	13.6092	69.4380	0.0856		1.3957	1.3957		1.3957	1.3957	0.0000	16,548.2178	16,548.2178	0.4254	0.3013	16,648.6303
Energy	0.3268	2.7927	1.1884	0.0178		0.2258	0.2258		0.2258	0.2258		3,565.1655	3,565.1655	0.0683	0.0654	3,586.3515
Mobile	7.8838	29.3063	99.2522	0.4150	43.7641	0.3023	44.0664	11.7025	0.2802	11.9827		42,311.3000	42,311.3000	1.6816		42,353.3407
Total	**39.9502**	**45.7082**	**169.8786**	**0.5184**	**43.7641**	**1.9237**	**45.6878**	**11.7025**	**1.9017**	**13.6041**	**0.0000**	**62,424.6833**	**62,424.6833**	**2.1753**	**0.3666**	**62,588.3225**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**1.52**	**7.69**	**6.10**	**10.88**	**11.39**	**9.00**	**11.29**	**11.39**	**8.99**	**11.06**	**0.00**	**10.93**	**10.93**	**9.61**	**10.97**	**10.93**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	11/1/2019	11/1/2019	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Excavators	0	8.00	158	0.38
Demolition	Rubber Tired Dozers	0	8.00	247	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.2 Demolition - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Diversity

Integrate Below Market Rate Housing

Improve Pedestrian Network

Provide Traffic Calming Measures

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	7.8838	29.3063	99.2522	0.4150	43.7641	0.3023	44.0664	11.7025	0.2802	11.9827		42,311.3000	42,311.3000	1.6816		42,353.3407
Unmitigated	8.2762	31.1858	109.4636	0.4660	49.3876	0.3365	49.7241	13.2062	0.3119	13.5181		47,505.2718	47,505.2718	1.8657		47,551.9136

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Retirement Community	373.70	326.23	317.14	1,226,206	1,086,584
Single Family Housing	6,372.00	6,439.50	5771.25	21,513,778	19,064,105
Total	6,745.70	6,765.73	6,088.39	22,739,984	20,150,689

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Retirement Community	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Retirement Community	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854
Single Family Housing	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Exceed Title 24

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.3268	2.7927	1.1884	0.0178		0.2258	0.2258		0.2258	0.2258		3,565.1655	3,565.1655	0.0683	0.0654	3,586.3515
NaturalGas Unmitigated	0.5527	4.7232	2.0099	0.0302		0.3819	0.3819		0.3819	0.3819		6,029.6641	6,029.6641	0.1156	0.1105	6,065.4954

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Retirement Community	3530.74	0.0381	0.3254	0.1385	2.0800e-003		0.0263	0.0263		0.0263	0.0263		415.3807	415.3807	7.9600e-003	7.6200e-003	417.8491
Single Family Housing	47721.4	0.5146	4.3979	1.8714	0.0281		0.3556	0.3556		0.3556	0.3556		5,614.2834	5,614.2834	0.1076	0.1029	5,647.6463
Total		**0.5527**	**4.7232**	**2.0099**	**0.0302**		**0.3819**	**0.3819**		**0.3819**	**0.3819**		**6,029.6641**	**6,029.6641**	**0.1156**	**0.1106**	**6,065.4954**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Retirement Community	2.46841	0.0266	0.2275	0.0968	1.4500e-003		0.0184	0.0184		0.0184	0.0184		290.4010	290.4010	5.5700e-003	5.3200e-003	292.1268
Single Family Housing	27.8355	0.3002	2.5652	1.0916	0.0164		0.2074	0.2074		0.2074	0.2074		3,274.7645	3,274.7645	0.0628	0.0600	3,294.2247
Total		**0.3268**	**2.7927**	**1.1884**	**0.0178**		**0.2258**	**0.2258**		**0.2258**	**0.2258**		**3,565.1655**	**3,565.1655**	**0.0683**	**0.0654**	**3,586.3515**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	31.7396	13.6092	69.4380	0.0856		1.3957	1.3957		1.3957	1.3957	0.0000	16,548.2178	16,548.2178	0.4254	0.3013	16,648.6303
Unmitigated	31.7396	13.6092	69.4380	0.0856		1.3957	1.3957		1.3957	1.3957	0.0000	16,548.2178	16,548.2178	0.4254	0.3013	16,648.6303

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	2.2560					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	26.0568					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	1.5064	12.8725	5.4777	0.0822		1.0408	1.0408		1.0408	1.0408	0.0000	16,432.9412	16,432.9412	0.3150	0.3013	16,530.5939
Landscaping	1.9204	0.7368	63.9603	3.3800e-003		0.3549	0.3549		0.3549	0.3549		115.2766	115.2766	0.1104		118.0364
Total	**31.7396**	**13.6092**	**69.4380**	**0.0855**		**1.3957**	**1.3957**		**1.3957**	**1.3957**	**0.0000**	**16,548.2178**	**16,548.2178**	**0.4254**	**0.3013**	**16,648.6303**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	2.2560					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	26.0568					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	1.5064	12.8725	5.4777	0.0822		1.0408	1.0408		1.0408	1.0408	0.0000	16,432.9412	16,432.9412	0.3150	0.3013	16,530.5939
Landscaping	1.9204	0.7368	63.9603	3.3800e-003		0.3549	0.3549		0.3549	0.3549		115.2766	115.2766	0.1104		118.0364
Total	**31.7396**	**13.6092**	**69.4380**	**0.0855**		**1.3957**	**1.3957**		**1.3957**	**1.3957**	**0.0000**	**16,548.2178**	**16,548.2178**	**0.4254**	**0.3013**	**16,648.6303**

7.0 Water Detail

7.1 Mitigation Measures Water

Apply Water Conservation Strategy

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Nakase Residential Uses (Operations - w Regulatory Measures, PDFs, & MMs)

Orange County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Retirement Community	101.00	Dwelling Unit	3.90	101,000.00	289
Single Family Housing	675.00	Dwelling Unit	61.40	1,215,000.00	1931

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2025
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	430	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Nakase Residential Uses (Operations - w Regulatory Measures, PDFs, & MMs) - Orange County, Summer

Project Characteristics - CO2 intensity factor represents CO2e intensity factor. The projected 2025 RPS target is derived based on a linear trajectory to reach the 50% project RPS consistent with SB 32 and SB 350.

Land Use - Total Lot Area is 121.8 acres. In order to be consistent with the TIA, 6.6 acres of Park will be analyzed, the remaining 17.5 acres of Open Space will not be analyzed.

Construction Phase - Operations Run Only.

Off-road Equipment - Operations Run Only.

Trips and VMT - Operations Run Only.

Vehicle Trips - Trip Rates based on information provided in the TIA and ITE 10th Edition (2017).

Woodstoves - Rule 445

Energy Use -

Mobile Land Use Mitigation -

Water Mitigation -

Energy Mitigation -

Nakase Residential Uses (Operations - w Regulatory Measures, PDFs, & MMs) - Orange County, Summer

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	70.00	1.00
tblFireplaces	NumberGas	85.85	101.00
tblFireplaces	NumberGas	573.75	675.00
tblFireplaces	NumberNoFireplace	10.10	0.00
tblFireplaces	NumberNoFireplace	67.50	0.00
tblFireplaces	NumberWood	5.05	0.00
tblFireplaces	NumberWood	33.75	0.00
tblLandUse	LotAcreage	20.20	3.90
tblLandUse	LotAcreage	219.16	61.40
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	702.44	430
tblVehicleTrips	ST_TR	2.03	3.23
tblVehicleTrips	ST_TR	9.91	9.54
tblVehicleTrips	SU_TR	1.95	3.14
tblVehicleTrips	SU_TR	8.62	8.55
tblVehicleTrips	WD_TR	2.40	3.70
tblVehicleTrips	WD_TR	9.52	9.44
tblWoodstoves	NumberCatalytic	5.05	0.00
tblWoodstoves	NumberCatalytic	33.75	0.00
tblWoodstoves	NumberNoncatalytic	5.05	0.00
tblWoodstoves	NumberNoncatalytic	33.75	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	31.7396	13.6092	69.4380	0.0856		1.3957	1.3957		1.3957	1.3957	0.0000	16,548.2178	16,548.2178	0.4254	0.3013	16,648.6303
Energy	0.5527	4.7232	2.0099	0.0302		0.3819	0.3819		0.3819	0.3819		6,029.6641	6,029.6641	0.1156	0.1105	6,065.4954
Mobile	8.4367	30.3861	114.9094	0.4874	49.3876	0.3355	49.7231	13.2062	0.3110	13.5172		49,649.8013	49,649.8013	1.8709		49,696.5731
Total	**40.7290**	**48.7185**	**186.3573**	**0.6031**	**49.3876**	**2.1130**	**51.5007**	**13.2062**	**2.0885**	**15.2947**	**0.0000**	**72,227.6831**	**72,227.6831**	**2.4118**	**0.4118**	**72,410.6987**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	31.7396	13.6092	69.4380	0.0856		1.3957	1.3957		1.3957	1.3957	0.0000	16,548.2178	16,548.2178	0.4254	0.3013	16,648.6303
Energy	0.3268	2.7927	1.1884	0.0178		0.2258	0.2258		0.2258	0.2258		3,565.1655	3,565.1655	0.0683	0.0654	3,586.3515
Mobile	8.0378	28.6169	103.7487	0.4341	43.7641	0.3013	44.0654	11.7025	0.2793	11.9817		44,229.1848	44,229.1848	1.6832		44,271.2644
Total	**40.1042**	**45.0188**	**174.3751**	**0.5375**	**43.7641**	**1.9228**	**45.6868**	**11.7025**	**1.9007**	**13.6032**	**0.0000**	**64,342.5680**	**64,342.5680**	**2.1769**	**0.3666**	**64,506.2462**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**1.53**	**7.59**	**6.43**	**10.88**	**11.39**	**9.01**	**11.29**	**11.39**	**8.99**	**11.06**	**0.00**	**10.92**	**10.92**	**9.74**	**10.97**	**10.92**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	11/1/2019	11/1/2019	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Excavators	0	8.00	158	0.38
Demolition	Rubber Tired Dozers	0	8.00	247	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.2 Demolition - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Diversity

Integrate Below Market Rate Housing

Improve Pedestrian Network

Provide Traffic Calming Measures

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	8.0378	28.6169	103.7487	0.4341	43.7641	0.3013	44.0654	11.7025	0.2793	11.9817		44,229.1848	44,229.1848	1.6832		44,271.2644
Unmitigated	8.4367	30.3861	114.9094	0.4874	49.3876	0.3355	49.7231	13.2062	0.3110	13.5172		49,649.8013	49,649.8013	1.8709		49,696.5731

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Retirement Community	373.70	326.23	317.14	1,226,206	1,086,584
Single Family Housing	6,372.00	6,439.50	5771.25	21,513,778	19,064,105
Total	6,745.70	6,765.73	6,088.39	22,739,984	20,150,689

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Retirement Community	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Retirement Community	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854
Single Family Housing	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Exceed Title 24

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.3268	2.7927	1.1884	0.0178		0.2258	0.2258		0.2258	0.2258		3,565.1655	3,565.1655	0.0683	0.0654	3,586.3515
NaturalGas Unmitigated	0.5527	4.7232	2.0099	0.0302		0.3819	0.3819		0.3819	0.3819		6,029.6641	6,029.6641	0.1156	0.1105	6,065.4954

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Retirement Community	3530.74	0.0381	0.3254	0.1385	2.0800e-003		0.0263	0.0263		0.0263	0.0263		415.3807	415.3807	7.9600e-003	7.6200e-003	417.8491
Single Family Housing	47721.4	0.5146	4.3979	1.8714	0.0281		0.3556	0.3556		0.3556	0.3556		5,614.2834	5,614.2834	0.1076	0.1029	5,647.6463
Total		**0.5527**	**4.7232**	**2.0099**	**0.0302**		**0.3819**	**0.3819**		**0.3819**	**0.3819**		**6,029.6641**	**6,029.6641**	**0.1156**	**0.1106**	**6,065.4954**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Retirement Community	2.46841	0.0266	0.2275	0.0968	1.4500e-003		0.0184	0.0184		0.0184	0.0184		290.4010	290.4010	5.5700e-003	5.3200e-003	292.1268
Single Family Housing	27.8355	0.3002	2.5652	1.0916	0.0164		0.2074	0.2074		0.2074	0.2074		3,274.7645	3,274.7645	0.0628	0.0600	3,294.2247
Total		**0.3268**	**2.7927**	**1.1884**	**0.0178**		**0.2258**	**0.2258**		**0.2258**	**0.2258**		**3,565.1655**	**3,565.1655**	**0.0683**	**0.0654**	**3,586.3515**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	31.7396	13.6092	69.4380	0.0856		1.3957	1.3957		1.3957	1.3957	0.0000	16,548.2178	16,548.2178	0.4254	0.3013	16,648.6303
Unmitigated	31.7396	13.6092	69.4380	0.0856		1.3957	1.3957		1.3957	1.3957	0.0000	16,548.2178	16,548.2178	0.4254	0.3013	16,648.6303

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	2.2560					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	26.0568					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	1.5064	12.8725	5.4777	0.0822		1.0408	1.0408		1.0408	1.0408	0.0000	16,432.9412	16,432.9412	0.3150	0.3013	16,530.5939
Landscaping	1.9204	0.7368	63.9603	3.3800e-003		0.3549	0.3549		0.3549	0.3549		115.2766	115.2766	0.1104		118.0364
Total	**31.7396**	**13.6092**	**69.4380**	**0.0855**		**1.3957**	**1.3957**		**1.3957**	**1.3957**	**0.0000**	**16,548.2178**	**16,548.2178**	**0.4254**	**0.3013**	**16,648.6303**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	2.2560					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	26.0568					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	1.5064	12.8725	5.4777	0.0822		1.0408	1.0408		1.0408	1.0408	0.0000	16,432.9412	16,432.9412	0.3150	0.3013	16,530.5939
Landscaping	1.9204	0.7368	63.9603	3.3800e-003		0.3549	0.3549		0.3549	0.3549		115.2766	115.2766	0.1104		118.0364
Total	**31.7396**	**13.6092**	**69.4380**	**0.0855**		**1.3957**	**1.3957**		**1.3957**	**1.3957**	**0.0000**	**16,548.2178**	**16,548.2178**	**0.4254**	**0.3013**	**16,648.6303**

7.0 Water Detail

7.1 Mitigation Measures Water

Apply Water Conservation Strategy

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

This page intentionally left blank

APPENDIX 3.4:

CALEEMOD OPERATIONAL (EXISTING) EMISSIONS MODEL OUTPUTS

Nakase Existing Nursery (Operations)

Orange County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Manufacturing	8.50	1000sqft	0.20	8,500.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2019
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Existing 8.5 TSF Nursery.

Construction Phase - Operations Run Only.

Off-road Equipment - Operations Run Only.

Trips and VMT - Operations Run Only.

Vehicle Trips - Trip rates for Nursey (Wholesale) was obtained from ITE 10th Edition.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	10.00	1.00
tblConstructionPhase	PhaseEndDate	11/14/2019	11/1/2019
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblVehicleTrips	ST_TR	1.49	29.40
tblVehicleTrips	SU_TR	0.62	26.51
tblVehicleTrips	WD_TR	3.82	39.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.1900	1.0000e-005	8.8000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		1.8600e-003	1.8600e-003	1.0000e-005		1.9900e-003
Energy	5.2500e-003	0.0477	0.0401	2.9000e-004		3.6300e-003	3.6300e-003		3.6300e-003	3.6300e-003		57.2603	57.2603	1.1000e-003	1.0500e-003	57.6005
Mobile	0.6840	3.1660	9.9479	0.0353	3.1135	0.0406	3.1542	0.8326	0.0382	0.8708		3,580.3155	3,580.3155	0.1569		3,584.2373
Total	**0.8792**	**3.2137**	**9.9888**	**0.0356**	**3.1135**	**0.0443**	**3.1578**	**0.8326**	**0.0419**	**0.8745**		**3,637.5776**	**3,637.5776**	**0.1580**	**1.0500e-003**	**3,641.8398**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.1900	1.0000e-005	8.8000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		1.8600e-003	1.8600e-003	1.0000e-005		1.9900e-003
Energy	5.2500e-003	0.0477	0.0401	2.9000e-004		3.6300e-003	3.6300e-003		3.6300e-003	3.6300e-003		57.2603	57.2603	1.1000e-003	1.0500e-003	57.6005
Mobile	0.6840	3.1660	9.9479	0.0353	3.1135	0.0406	3.1542	0.8326	0.0382	0.8708		3,580.3155	3,580.3155	0.1569		3,584.2373
Total	**0.8792**	**3.2137**	**9.9888**	**0.0356**	**3.1135**	**0.0443**	**3.1578**	**0.8326**	**0.0419**	**0.8745**		**3,637.5776**	**3,637.5776**	**0.1580**	**1.0500e-003**	**3,641.8398**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	11/1/2019	11/1/2019	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Tractors/Loaders/Backhoes	0	6.00	97	0.37
Demolition	Rubber Tired Dozers	0	1.00	247	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.2 Demolition - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.6840	3.1660	9.9479	0.0353	3.1135	0.0406	3.1542	0.8326	0.0382	0.8708		3,580.3155	3,580.3155	0.1569		3,584.2373
Unmitigated	0.6840	3.1660	9.9479	0.0353	3.1135	0.0406	3.1542	0.8326	0.0382	0.8708		3,580.3155	3,580.3155	0.1569		3,584.2373

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Manufacturing	331.50	249.90	225.34	1,349,192	1,349,192
Total	331.50	249.90	225.34	1,349,192	1,349,192

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Manufacturing	16.60	8.40	6.90	59.00	28.00	13.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Manufacturing	0.552373	0.044229	0.211123	0.119112	0.017503	0.005797	0.024455	0.015685	0.001637	0.001633	0.004830	0.000583	0.001041

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	5.2500e-003	0.0477	0.0401	2.9000e-004		3.6300e-003	3.6300e-003		3.6300e-003	3.6300e-003		57.2603	57.2603	1.1000e-003	1.0500e-003	57.6005
NaturalGas Unmitigated	5.2500e-003	0.0477	0.0401	2.9000e-004		3.6300e-003	3.6300e-003		3.6300e-003	3.6300e-003		57.2603	57.2603	1.1000e-003	1.0500e-003	57.6005

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Manufacturing	486.712	5.2500e-003	0.0477	0.0401	2.9000e-004		3.6300e-003	3.6300e-003		3.6300e-003	3.6300e-003		57.2603	57.2603	1.1000e-003	1.0500e-003	57.6005
Total		**5.2500e-003**	**0.0477**	**0.0401**	**2.9000e-004**		**3.6300e-003**	**3.6300e-003**		**3.6300e-003**	**3.6300e-003**		**57.2603**	**57.2603**	**1.1000e-003**	**1.0500e-003**	**57.6005**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Manufacturing	0.486712	5.2500e-003	0.0477	0.0401	2.9000e-004		3.6300e-003	3.6300e-003		3.6300e-003	3.6300e-003		57.2603	57.2603	1.1000e-003	1.0500e-003	57.6005
Total		**5.2500e-003**	**0.0477**	**0.0401**	**2.9000e-004**		**3.6300e-003**	**3.6300e-003**		**3.6300e-003**	**3.6300e-003**		**57.2603**	**57.2603**	**1.1000e-003**	**1.0500e-003**	**57.6005**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.1900	1.0000e-005	8.8000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		1.8600e-003	1.8600e-003	1.0000e-005		1.9900e-003
Unmitigated	0.1900	1.0000e-005	8.8000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		1.8600e-003	1.8600e-003	1.0000e-005		1.9900e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0216					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1683					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	8.0000e-005	1.0000e-005	8.8000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		1.8600e-003	1.8600e-003	1.0000e-005		1.9900e-003
Total	**0.1900**	**1.0000e-005**	**8.8000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**1.8600e-003**	**1.8600e-003**	**1.0000e-005**		**1.9900e-003**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0216					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1683					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	8.0000e-005	1.0000e-005	8.8000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		1.8600e-003	1.8600e-003	1.0000e-005		1.9900e-003
Total	**0.1900**	**1.0000e-005**	**8.8000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**1.8600e-003**	**1.8600e-003**	**1.0000e-005**		**1.9900e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Nakase Existing Nursery (Operations)

Orange County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Manufacturing	8.50	1000sqft	0.20	8,500.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2019
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Existing 8.5 TSF Nursery.

Construction Phase - Operations Run Only.

Off-road Equipment - Operations Run Only.

Trips and VMT - Operations Run Only.

Vehicle Trips - Trip rates for Nursey (Wholesale) was obtained from ITE 10th Edition.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	10.00	1.00
tblConstructionPhase	PhaseEndDate	11/14/2019	11/1/2019
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblVehicleTrips	ST_TR	1.49	29.40
tblVehicleTrips	SU_TR	0.62	26.51
tblVehicleTrips	WD_TR	3.82	39.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.1900	1.0000e-005	8.8000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		1.8600e-003	1.8600e-003	1.0000e-005		1.9900e-003
Energy	5.2500e-003	0.0477	0.0401	2.9000e-004		3.6300e-003	3.6300e-003		3.6300e-003	3.6300e-003		57.2603	57.2603	1.1000e-003	1.0500e-003	57.6005
Mobile	0.6937	3.0517	10.4866	0.0370	3.1135	0.0405	3.1540	0.8326	0.0381	0.8707		3,747.8989	3,747.8989	0.1585		3,751.8612
Total	**0.8889**	**3.0994**	**10.5275**	**0.0373**	**3.1135**	**0.0441**	**3.1576**	**0.8326**	**0.0417**	**0.8743**		**3,805.1610**	**3,805.1610**	**0.1596**	**1.0500e-003**	**3,809.4638**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.1900	1.0000e-005	8.8000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		1.8600e-003	1.8600e-003	1.0000e-005		1.9900e-003
Energy	5.2500e-003	0.0477	0.0401	2.9000e-004		3.6300e-003	3.6300e-003		3.6300e-003	3.6300e-003		57.2603	57.2603	1.1000e-003	1.0500e-003	57.6005
Mobile	0.6937	3.0517	10.4866	0.0370	3.1135	0.0405	3.1540	0.8326	0.0381	0.8707		3,747.8989	3,747.8989	0.1585		3,751.8612
Total	**0.8889**	**3.0994**	**10.5275**	**0.0373**	**3.1135**	**0.0441**	**3.1576**	**0.8326**	**0.0417**	**0.8743**		**3,805.1610**	**3,805.1610**	**0.1596**	**1.0500e-003**	**3,809.4638**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	11/1/2019	11/1/2019	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Tractors/Loaders/Backhoes	0	6.00	97	0.37
Demolition	Rubber Tired Dozers	0	1.00	247	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.2 Demolition - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.6937	3.0517	10.4866	0.0370	3.1135	0.0405	3.1540	0.8326	0.0381	0.8707		3,747.8989	3,747.8989	0.1585		3,751.8612
Unmitigated	0.6937	3.0517	10.4866	0.0370	3.1135	0.0405	3.1540	0.8326	0.0381	0.8707		3,747.8989	3,747.8989	0.1585		3,751.8612

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Manufacturing	331.50	249.90	225.34	1,349,192	1,349,192
Total	331.50	249.90	225.34	1,349,192	1,349,192

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Manufacturing	16.60	8.40	6.90	59.00	28.00	13.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Manufacturing	0.552373	0.044229	0.211123	0.119112	0.017503	0.005797	0.024455	0.015685	0.001637	0.001633	0.004830	0.000583	0.001041

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	5.2500e-003	0.0477	0.0401	2.9000e-004		3.6300e-003	3.6300e-003		3.6300e-003	3.6300e-003		57.2603	57.2603	1.1000e-003	1.0500e-003	57.6005
NaturalGas Unmitigated	5.2500e-003	0.0477	0.0401	2.9000e-004		3.6300e-003	3.6300e-003		3.6300e-003	3.6300e-003		57.2603	57.2603	1.1000e-003	1.0500e-003	57.6005

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Manufacturing	486.712	5.2500e-003	0.0477	0.0401	2.9000e-004		3.6300e-003	3.6300e-003		3.6300e-003	3.6300e-003		57.2603	57.2603	1.1000e-003	1.0500e-003	57.6005
Total		**5.2500e-003**	**0.0477**	**0.0401**	**2.9000e-004**		**3.6300e-003**	**3.6300e-003**		**3.6300e-003**	**3.6300e-003**		**57.2603**	**57.2603**	**1.1000e-003**	**1.0500e-003**	**57.6005**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Manufacturing	0.486712	5.2500e-003	0.0477	0.0401	2.9000e-004		3.6300e-003	3.6300e-003		3.6300e-003	3.6300e-003		57.2603	57.2603	1.1000e-003	1.0500e-003	57.6005
Total		**5.2500e-003**	**0.0477**	**0.0401**	**2.9000e-004**		**3.6300e-003**	**3.6300e-003**		**3.6300e-003**	**3.6300e-003**		**57.2603**	**57.2603**	**1.1000e-003**	**1.0500e-003**	**57.6005**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.1900	1.0000e-005	8.8000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		1.8600e-003	1.8600e-003	1.0000e-005		1.9900e-003
Unmitigated	0.1900	1.0000e-005	8.8000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		1.8600e-003	1.8600e-003	1.0000e-005		1.9900e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0216					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1683					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	8.0000e-005	1.0000e-005	8.8000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		1.8600e-003	1.8600e-003	1.0000e-005		1.9900e-003
Total	**0.1900**	**1.0000e-005**	**8.8000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**1.8600e-003**	**1.8600e-003**	**1.0000e-005**		**1.9900e-003**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0216					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1683					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	8.0000e-005	1.0000e-005	8.8000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		1.8600e-003	1.8600e-003	1.0000e-005		1.9900e-003
Total	**0.1900**	**1.0000e-005**	**8.8000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**1.8600e-003**	**1.8600e-003**	**1.0000e-005**		**1.9900e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

This page intentionally left blank

MEMORANDUM

GLENN LUKOS ASSOCIATES
Regulatory Services

PROJECT NUMBER: 0711-09NURS

TO: City of Lake Forest
Community Development Department

FROM: Zack West

DATE: July 10, 2019

SUBJECT: Nakase Property Project, City of Lake Forest, Orange County: Response to LSA and CDFW Comments

---

On August 14, 2018, the California Department of Fish and Wildlife (CDFW) provided the City of Lake Forest (City) with comments on the Notice of Preparation (NOP) of a Draft Environmental Impact Report (DEIR) (SCH# 2018071035) for the Nakase Property Project (Project) located in the City of Lake Forest. LSA Associates reviewed the comment letter and provided the Project Team with a follow-up letter requesting clarification and/or additional information needed for preparation of the biological resources section of the DEIR. On behalf of Toll Brothers, Inc. (Client), this memorandum is being provided to clarify the limits of riparian habitat avoidance associated with the Project and to address Comment Number 12 contained in the August 14, 2018 letter as it pertains to the invasive shot hole borer beetles (ISHBs). Glenn Lukos Associates, Inc. (GLA) understands that the responses contained herein may be used in conjunction with Biological Technical Report (BTR) for the Project that was finalized in March 2019, and no revisions or addendums to the BTR are necessary or required.

Comments from the Project Team and/or CDFW are provided in italics below and are followed by GLA's responses.

1. *Confirm that the black willow forest along the southern boundary of the site is within the project site and not off-site. The GLA report showed that the conservation area was partially on the project site and partially off-site, but the City thought it was all on-site (including the black willow forest).*

Response 1:

A total of 2.17 acres of existing riparian canopy associated with Serrano Creek, (which is comprised of southern black willow forest) is within the Project site along the southern boundary and will be fully avoided and conserved by the Project. No impacts or restoration work, including non-native species removal or installation of native species, will occur within Serrano Creek or its

associated existing riparian habitat, which is comprised by the southern black willow forest (depicted as the avoidance area on Exhibit 3 of the BTR).

2. [CDFW Comment 12]
The Polyphagous and Kuroshio shot hole borers (ISHBs) are invasive ambrosia beetles that introduce fungi and other pathogens into host trees. The adult female (1.8-2.5 mm long) tunnels galleries into the cambium of a wide variety of host trees, where it lays its eggs and propagates the Fusarium fungi species for the express purpose of feeding its young. These fungi cause Fusarium dieback disease which interrupts the transport of water and nutrients in at least 58 reproductive host tree species, with impacts to other host tree species as well. With documented occurrences in Serrano Creek 0.8 mile upstream and approximately 2.06 miles downstream, the spread of invasive shot hole borers (ISHBs) could have significant impacts in local ecosystems. Therefore, with regard to ISHBs, we recommend the draft EIR include the following:
    a. *a thorough discussion of the direct, indirect, and cumulative impacts that could occur from the potential spread of ISHBs as a result of proposed activities in the DEIR;*
    b. *an analysis of the likelihood of the spread of the invasive species' proximity to above referenced activities;*
    c. *figures that depict potentially sensitive or susceptible vegetation communities within the project area, the known occurrences of ISHB within the project area (if any), and ISHB's proximity to above referenced activities; and*
    d. *a mitigation measure or measures within the DEIR that describe Best Management Practices (BMPs) that bring impacts of the project on the spread of ISHB below a level of significance. Examples of such BMPs include:*
        i. *education of onsite workers regarding ISHB and its spread;*
        ii. *reporting sign of ISHB infestation, including sugary exudate ("weeping") on trunks or branches and ISHB entry/exit holes to the Department and UCR's Eskalen Lab;*
        iii. *equipment disinfection;*
        iv. *pruning infected limbs in infested areas where project activities may occur;*
        v. *avoidance and minimization of transport of potential host tree materials;*
        vi. *chipping potential host materials to les than 1 inch and solarization, prior to delivering to a landfill;*
        vii. *chipping potential host material s to less than 1 inch, and solarization, prior to composting onsite;*
        viii. *solarization of cut logs; and/or*
        ix. *burning of potential host tree materials.*

Response 2:

No impacts to Serrano Creek or its associated existing riparian habitat will occur from Project activities. A total of 2.17 acres of existing riparian canopy associated with Serrano Creek, (which is comprised of southern black willow forest) is within the Project site along the southern boundary

and will be fully avoided and conserved by the Project. No direct impacts or restoration work, including non-native species removal or installation of native species, will occur within Serrano Creek or its associated existing riparian habitat (depicted as the avoidance area on Exhibit 3 of the BTR). The complete avoidance and preservation of Serrano Creek and its associated habitat will reduce the potential spread of any invasive species (including ISHBs) from occurring, as no disturbance to existing trees or transportation of tree material would occur. Additionally, Serrano Creek will be placed into a conservation easement or similar legal protection mechanism that will protect the lands in perpetuity. Lands within the conservation easement will be managed in perpetuity by a designated entity that is familiar with ISHBs and the threat it imposes on sensitive habitats.

The following measure will be implemented prior to construction to ensure that any potential spread of ISHB associated with Project activities are reduced below a level of significance:

Diseased Tree Surveys. A Designated Biologist familiar with the signs of ISHB shall survey trees within the Project impact area designated for removal or trimming (which does not include impacts to Serrano Creek or its associated existing riparian canopy) showing signs of disease or insect damage likely to include that caused by ISHBs prior to disturbance. The results of the survey shall be submitted to the City and CDFW at least thirty (30) days prior to commencement of ground-disturbing Project activities. If trees are determined to be infested/infected by ISHBs, a control plan will be prepared and provided to the CDFW. The plan shall include methods of control, removal and appropriate disposal techniques to prevent the spread of ISHBs.

The following measures will also be implemented to reduce potential impacts to Serrano Creek during construction and thus, potential indirect, and cumulative impacts that could occur to Serrano Creek and its associated habitat as a result of proposed activities:

1. The Project impact footprint, including any construction buffer, shall be staked and fenced (e.g., with orange snow fencing, silt fencing or a material that is clearly visible) and the boundary shall be confirmed by a qualified biological monitor prior to ground disturbance. The construction site manager shall ensure that the fencing is maintained for the duration of construction and that any required repairs are completed in a timely manner.
2. For any vegetation clearing or work within 100 feet of Serrano Creek, a biologist will monitor to ensure encroachment into Serrano Creek does not occur.
3. Equipment operators and construction crews will be informed of the importance of the construction limits by the biological monitor prior to any ground disturbance. Construction personnel will strictly limit their activities, vehicle access, equipment access, and construction materials to the limits of disturbance and designated staging areas and routes of travel approved by the biological monitor.
4. Exotic plant species removed during construction will be properly handled to prevent sprouting or regrowth. Construction equipment will be cleaned of mud or other debris that may contain invasive plants and/or seeds and inspected to reduce the potential of spreading noxious weeds before mobilizing to the site and before leaving the site during

the course of construction. The cleaning of equipment will occur at least 300 feet from jurisdictional aquatic features, including Serrano Creek. If the location is closer, it must be approved by the biological monitor.

5. Vegetation will be covered while being transported, and vegetation materials removed from the site will be disposed of in accordance with applicable laws and regulations.
6. All equipment maintenance and staging will occur only in designated areas within the limits of disturbance and at least 200 feet from jurisdictional aquatic features, including Serrano Creek. These designated areas will be clearly marked and located in such a manner as to contain runoff and will be approved by the biological monitor.

The following measures are intended to reduce potential indirect impacts to Serrano Creek post construction:

1. Potential long-term edge effects to Serrano Creek will be minimized through the installation of permanent fencing along the perimeter of the conservation easement and interior trails, if applicable. Permanent signs will be installed along all fencing indicating the purpose and need for the fencing and the restrictions within the Conservation Area. The proposed fencing location will be identified in a Habitat Management Plan (HMP). The maintenance of the fencing and signage will be the responsibility of the Home Owners Association or a long-term land management entity.
2. Landscape plans within common areas of the development shall be reviewed by a qualified botanist, who shall recommend appropriate provisions to prevent invasive plant species from colonizing Serrano Creek. It will be the responsibility of the Home Owners Association to ensure this measure is followed.
3. The portion of Serrano Creek located within the Nakase property will be placed into a conservation easement or similar legal protection mechanism that will protect the lands in perpetuity.
4. Lands within the conservation easement will be managed in perpetuity by a designated entity.

Should you have any questions regarding this memorandum, please contact Zack West at zwest@wetlandpermitting.com or (949) 837-0404 ext. 22, or Lesley Lokovic-Gamber at llokovic@wetlandpermitting.com or 949-837-0404 ext. 44. Thank you.

GLENN LUKOS ASSOCIATES
Regulatory Services

April 24, 2017

Mr. Ben Gold
Toll Brothers, Inc.
725 West Town & Country Road
Suite 200
Orange, California 92868

SUBJECT: Biological/Regulatory Overview for the Approximately 121-Acre Lake Forest Nursery Site, Lake Forest, Orange County, California

Dear Mr. Gold:

Glenn Lukos Associates, Inc. (GLA) visited the above-mentioned property multiple times between July 2016 and April 2017 to determine the presence of potential development constraints.[1] For the purpose of this report, constraints are considered to be sensitive biological and jurisdictional resources that may: 1) require partial or complete avoidance of resources, 2) require permits from one or more regulatory agencies, 3) require mitigation to offset impacts to resources, 4) result in a seasonal delay to development, and/or 5) require additional focused surveys.

Sensitive resources considered for this analysis include special-status species (e.g., Threatened and Endangered, Species of Special Concern, etc.), special-status habitats, nesting birds, waters of the United States (including wetlands) subject to the jurisdiction of the U.S. Army Corps of Engineers (Corps) and the Regional Water Quality Control Board, and waters of the State (including riparian vegetation) subject to the jurisdiction of the California Department of Fish and Wildlife (CDFW). Impacts to special-status species and habitats must be addressed during project review under the California Environmental Quality Act (CEQA). In addition, federally listed species (Threatened or Endangered) are regulated by the U.S. Fish and Wildlife Service (USFWS) pursuant to the Federal Endangered Species Act (ESA). Species listed as Threatened or Endangered by the State of California are regulated by CDFW pursuant to the California Endangered Species Act (CESA). Wildlife that are assigned other designations by CDFW (i.e., Species of Special Concern, Fully-Protected species, etc.), and plants given special status by the California Native Plant Society (CNPS) are not granted additional protection, except that impacts to these species may need to be evaluated pursuant to CEQA.

[1] Please note, the biological constraints analysis will alert the client to potential constraints in development of the property. Additional analysis may be necessary to support any permitting that may be required and/or to satisfy local or lead agency requirements under CEQA. Separate and more detailed surveys may be required for the permitting/approval process, if needed.

29 Orchard ▪ Lake Forest ▪ California 92630-8300
Telephone: (949) 837-0404 Facsimile: (949) 837-5834

1.0 SITE LOCATION AND DESCRIPTION

The approximately 121-acre property (site, property) is located in Lake Forest, Orange County, California [Exhibit 1 – Regional Map]. The property is located approximately 0.1 mile south of State Route 241, immediately southeast of Bake Parkway, immediately southwest of Rancho Parkway, approximately 0.1 mile northwest of Lake Forest Drive, and approximately 0.25 mile northeast of Dimension Drive. It is depicted on the U.S. Geological Survey (USGS) El Toro, California topographic quadrangle (dated 1968 and photorevised in 1982) within an unsectioned portion of Township 6S, Range 8W [Exhibit 2 – Vicinity Map].

Adjacent land uses include residential and commercial to the northwest, commercial to the northeast, Serrano Creek and commercial and light industrial to the southeast, and commercial and light industrial to the southwest.

Exhibit 3 provides an aerial image of the site along with the extent of three potential jurisdictional features on site.

2.0 METHODOLOGY

GLA senior biologist Zack West and regulatory specialist April Nakagawa visited the property on July 27 and 28, 2016 to conduct a site review. Additional follow-up visits were made by Zack West and senior regulatory specialist Thienan Pfeiffer on October 6 and November 17, 2016, and various times during March and April, 2017. Site reconnaissance was conducted in such a manner as to allow inspection of the entire site by direct observation, including the use of binoculars. The property was inspected to determine whether any special-status species, habitats, or potential jurisdictional areas are present on site.

In addition to site reconnaissance, evaluation of the property included a review of the California Natural Diversity Database (CNDDB) for the El Toro quadrangle and surrounding quadrangles,[2] a review of the California Native Plant Society (CNPS) on-line inventory,[3] a soil map review, and review of various documents provided by Toll Brothers, Inc.

---

[2] California Department of Fish and Wildlife. July, 2016. Natural Diversity Database: RareFind 5.
[3] California Native Plant Society. 2016. On-Line Inventory of Rare and Endangered Plants of California (Eighth Edition).

3.0 RESULTS

3.1 Existing Conditions

The site consists of an active commercial nursery operation with an elevation ranging from approximately 670 feet above mean sea level (amsl) to 750 feet amsl, is relatively flat with a single rolling hill, and gently slopes from northeast to southwest. Soils at the site are mapped as Capistrano Sandy Loam, Cieneba Sandy Loam, Cropley Clay, Myford Sandy Loam, Riverwash, and Sorrento Loam by the U.S. Department of Agriculture Natural Resource Conservation Service (NRCS).

Agricultural land uses consisting of an active nursery operation occupy the vast majority of the site. Nursery activities have remained active since 1979, causing a general lack of native vegetation communities on the site, with the exception of a small patch of remnant coastal sage scrub occurring within the southeastern corner of the site and riparian forest located within Serrano Creek along the southeastern boundary of the site. A water quality treatment ditch designed to infiltrate flows prior to leaving the property bisects the site and is routinely maintained free of vegetation. Developed areas consisting of equipment maintenance buildings and nursery offices were also observed at the site.

Plant species detected within the remnant coastal sage scrub include species such as lemonade berry (*Rhus integrifolia*), California sagebrush (*Artemisia californica*), telegraph weed (*Heterotheca grandiflora*), and coast prickly pear (*Opuntia littoralis*). Plant species detected within the riparian forest include a mix of native and non-native species such as Eucalyptus (*Eucalyptus* sp.), coast live oak (*Quercus agrifolia*), western sycamore (*Platanus racemosa*), Fremont cottonwood (*Populus fremontii*), Goodding's black willow (*Salix gooddingii*), mule fat (*Baccharis salicifolia*), toyon (*Heteromeles arbutifolia*), Spanish dagger (*Yucca gloriosa*), and mission prickly-pear (*Opuntia ficus-indica*). The agricultural land use, consisting of the active nursery operation, contains a variety of non-native ornamental plant species, grown in containers for commercial resale.

Animal species observed consist of common avian species, and include common raven (*Corvus corax*), western kingbird (*Tyrannus verticalis*), northern mockingbird (*Mimus polyglottos*), mourning dove (*Zenaida macroura),* California towhee (*Melozone crissalis*), house finch (*Haemorhous mexicanus*), Bewick's wren (*Thryomanes bewickii*), and Say's phoebe (*Sayornis saya*).

The site is located within the County of Orange Central and Coastal Subregion Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP) non-reserve area. As a signatory jurisdiction to the NCCP/HCP, the City of Lake Forest must ensure and verify that

any project that is under their discretionary approval meets the requirements and conditions of the NCCP/HCP.

3.2 Special-Status Plants

Species were considered based on a number of factors, including: 1) species identified by the July 2016 CNDDB as occurring (either currently of historically) on or in the vicinity of the property; and 2) any other species that are known to occur within the vicinity of the property, or for which potentially suitable habitat occurs on site.

No special-status plants were observed on site during the general survey. Forty-six special-status plant species were identified by the CNDDB as occurring within the vicinity of the site. Of these, eight species were determined to have a reasonable potential to occur within the remnant coastal sage scrub and/or associated with Serrano Creek within the site, with a likelihood of occurrence ranging from very low to moderate. These species range in regulatory status and include Malibu Baccharis (*Baccharis malibuensis*; California Rare Plant Rank [CRPR] 1B.1), Allen's pentachaeta (*Pentachaeta aurea* var. *allenii*; CRPR 1B.1), Nuttall's scrub oak (*Quercus dumosa*; CRPR 1B.1),big-leaved crown-beard (*Verbesina dissita*; CRPR 1B.1), intermediate mariposa lily (*Calochortus weeddii* var. *intermedius*; CRPR 1B.2), white rabbit-tobacco (*Pseudognaphalium leucocephalum*; CRPR 2B.2), chaparral ragwort (*Senecio aphanactis*; CRPR 2B.2), and Plummer's mariposa lily (*Calochortus plummerae*; CRPR 4.2).

3.3 Special-Status Animals

Species were considered based on a number of factors, including: 1) species identified by the July 2016 CNDDB as occurring (either currently of historically) on or in the vicinity of the property; and 2) any other special-status species that are known to occur within the vicinity of the property, or for which potentially suitable habitat occurs on site.

No special-status animals were observed on site during the general survey. Fifty-four special-status animal species were identified by CNDDB as occurring within the vicinity of the site. Of these, eighteen species were determined to have a reasonable potential to occur within the site, with a likelihood of occurrence ranging from very low to moderate, and for some of which use of the site is restricted to foraging opportunities. These species range in regulatory status and include least Bell's vireo (*Vireo bellii pusillus*; federally listed as Endangered and state listed as Endangered), coastal California gnatcatcher (*Polioptila californica californica*; federally listed as Threatened; California Species of Special Concern [SSC]), white-tailed kite (*Elanus leucurus*; state Fully Protected [FP]), American peregrine falcon (*Falco peregrinus anatum*; foraging only; FP), pallid bat (*Antrozous pallidus*; foraging only, as long as buildings remain in active use; SSC), coastal whiptail (*Aspidoscelis tigris stejnegeri*; SSC), long-eared owl (*Asio otus*; SSC),

burrowing owl (*Athene cunicularia*; SSC), Mexican longue-tongued bat (*Choeronycteris mexicana*; foraging only, as long as buildings remain in active use; SSC), northern harrier (*Circus cyaneus*; foraging only; SSC), western mastiff bat (*Eumops perotis calfornicus*; foraging only, as long as buildings remain in active use; SSC), yellow-breasted chat (*Icteria virens*; SSC), western red bat (*Lasiurus blossevillii*; SSC), San Diego desert woodrat (*Neotoma lepida intermedia*; SSC), pocketed free-tailed bat (*Nyctinomops femorosaccus*; foraging only, as long as buildings remain in active use; SSC), big free-tailed bat (*Nyctinomops macrotis*; SSC), coast horned lizard (*Phrynosoma blainvillii*; SSC), and yellow warbler (*Setophaga petechia*; SSC).

Species for which the site only provides foraging habitat (American peregrine falcon, pallid bat, Mexican longue-tongued bat, northern harrier, western mastiff bat, and pocketed free-tailed bat) are not expected to pose a constraint to development.

3.4 Special-Status Habitats

A review of the July 2016 CNDDB identified the following special-status habitats as occurring within the vicinity of the property: California walnut woodland, canyon live oak ravine forest, Riversidean alluvial fan sage scrub, Southern California arroyo chub/Santa Ana sucker stream, southern coast live oak riparian forest, southern cottonwood willow riparian forest, southern interior cypress forest, southern mixed riparian forest, southern riparian forest, southern riparian scrub, southern sycamore alder riparian forest, southern willow scrub, and valley needlegrass grassland.

Riparian forest occurs within Serrano Creek along the southeastern site boundary. No additional special-status habits occur within the site.

3.5 Nesting Birds

The property contains vegetation (trees, shrubs, and herbaceous vegetation) with the potential to support nesting birds. Impacts to nesting birds are prohibited under the Migratory Bird Treaty Act and California Fish and Game Code.[4] The presence of vegetation with the potential to support nesting birds may represent a seasonal constraint to development if not removed at the appropriate time of the year. As long as trees, shrubs, and herbaceous vegetation with the potential to support nesting birds are removed outside of the nesting season (September to January), then no further actions are recommended. If vegetation must be removed during the

[4] The MBTA makes it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird listed in 50 C.F.R. Part 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 C.F.R.21). In addition, sections 3505, 3503.5, and 3800 of the California Department of Fish and Game Code prohibit the take, possession, or destruction of birds, their nests or eggs.

nesting season (February 1 through August 31), a nesting bird survey should be conducted prior to any removal to prevent any impacts to active nests. If active nests are identified on site, then adequate buffers should be provided around the nests, as determined by a qualified biologist, until all young have fledged or the nests are no longer active.

3.6 Jurisdictional Waters

Three drainages occur within the site: Serrano Creek occurs along the southeastern boundary of the site, a small unvegetated ephemeral drainage located along the southwestern boundary of the site, and a water quality treatment ditch that bisects the property from northeast to southwest.

The water quality treatment ditch is regularly maintained free of wetland or riparian vegetation and sediment for maximum capacity, on site retention, and treatment of flows.

Each of these three features may be subject to regulation as waters of the United States (WoUS) by the Corps under Section 404 of the federal Clean Water Act (CWA), WoUS/waters of the State (WoS) by the Los Angeles Regional Water Quality Control Board (RWQCB) under Section 401 of the CWA and under the Porter-Cologne Water Quality Control Act (Porter-Cologne), and by CDFW under Section 1602 et Seq. of the California Fish and Game Code (Section 1602).

In addition to the three distinct drainages within the site, dozens of smaller irrigation ditches occur throughout the entire property and drain toward the larger drainages. The irrigation ditches exist for the sole purpose of conveying irrigation runoff and are generally one to three feet in width and do not support any wetland or riparian vegetation. While these irrigation ditches arguably support no beneficial uses, it is possible, although improbable, that they would be regulated as a water of the State under Porter-Cologne.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 Resources Requiring Partial or Complete Avoidance

Although not expected, if plant species listed as state or federally threatened or endangered are present within the site, and/or non-listed special-status plant species are determined to be present and are determined to comprise or contribute to a population that may be considered significant under the CEQA, complete or partial avoidance of these species may be required. The NCCP/HCP affords coverage to many special-status plants; if any covered species was determined to be present on the site, avoidance would not be required.

No avoidance is expected to be required for species for which the site provides only foraging habitat (American peregrine falcon, pallid bat, Mexican longue-tongued bat, northern harrier, western mastiff bat, and pocketed free-tailed bat).

4.2 Resources Requiring Permits

Although the potential is considered low, if coastal California gnatcatchers, least Bell's vireo, or state or federally listed plant species are found to occupy the site, development of areas supporting these species may require take authorization pursuant to Section 7 or 10 of the ESA, and/or an incidental take permit pursuant to Section 2080.1 and/or 2081of CESA. The NCCP/HCP affords coverage to many special-status plants and animals; if any covered species was determined to be present on the site, take coverage would be provided under the NCCP.

Development of any portion of the site determined to be WoUS/WoS under CWA Sections 401 and 404, Porter-Cologne, and 1602 would require a 404 Permit from the Corps, Water Quality Certification from the RWQCB, and a Streambed Alteration Agreement from CDFW. Based on preliminary evaluation, development of the three drainages on site would require these permits.

No permits are expected to be required for species for which the site provides only foraging habitat (American peregrine falcon, pallid bat, Mexican longue-tongued bat, northern harrier, western mastiff bat, and pocketed free-tailed bat).

4.3 Resources Requiring Mitigation

If coastal California gnatcatchers occupy the disturbed coastal sage scrub on site, least Bell's vireo occupy riparian areas located within Serrano Creek, or if state or federally listed plant species occur within the site, development of areas supporting these species may require mitigation under the ESA and/or CESA, as would be determined through the Section 7 or Section 10 consultation process and/or Section 2080.1 or 2081 application process. The NCCP/HCP authorizes payment of an in-lieu fee by non-participating landowners to mitigate impacts to coastal sage scrub, gnatcatchers, and other covered species within identified areas in participating jurisdictions.

No mitigation is expected to be required for species for which the site provides only foraging habitat (American peregrine falcon, pallid bat, Mexican longue-tongued bat, northern harrier, western mastiff bat, and pocketed free-tailed bat).

Compensatory mitigation is generally required for impacts to areas determined to be WoUS/WoS under CWA Sections 401 and 404, Porter-Cologne, and Section 1602. Considering conditions documented within the site, it is anticipated that development of Serrano Creek, the water quality

treatment ditch, and or the unvegetated ephemeral drainage may likely require mitigation, as to be determined during the aquatic permitting process. See maintenance recommendations below.

4.4 Resources Requiring Seasonal Avoidance

Although the potential is considered low, if least Bell's vireo is found to be nesting within riparian vegetation associated with Serrano Creek, an applicable avoidance buffer (generally 500 feet for listed species) should be provided around the nest(s), as determined by a qualified biologist, until all young have fledged or the nests are no longer active.

If coastal California gnatcatchers are found to be nesting within the remnant coastal sage scrub in the southeastern corner of the site, minimization measures pursuant to the NCCP/HCP would be required. These measures include removal of coastal sage scrub outside of the breeding season, surveys for gnatcatchers prior to removal of habitat, etc.

If white-tailed kites are found to be nesting within the large trees found within Serrano Creek, an applicable avoidance buffer should be provided around the nest(s), as determined by a qualified biologist, until all young have fledged or the nests are no longer active.

Although the potential is considered low, if burrowing owls are determined to occupy the site during the burrowing owl breeding season (February 1 through August 31), and are determined to be paired or breeding, avoidance will be required until all young have fledged or until breeding activities have ceased. If breeding burrowing owls are identified on site, then adequate buffers should be provided around the burrows, as determined by a qualified biologist, until the burrows are no longer active. If burrowing owls are found to occupy the site outside of the burrowing owl breeding season, or are found within the breeding season but are not yet paired or breeding, passive exclusion of the non-paired burrowing owls may be required and would require approval of a relocation plan through coordination with CDFW, and may require mitigation, potentially including designation of preserved lands and construction of artificial burrows.

Impacts to colonial bat species are prohibited under the California Fish and Game Code and could potentially be considered significant pursuant to CEQA, depending on the size of the colony. If buildings on site are allowed to become vacant, they could act as potential roosting habitat for colonial bat species identified in 3.3, above. If used as a maternity or winter roost, these features may require avoidance from approximately May to August for a maternity roost or late October to March for a winter roost. It is recommended that buildings on site are sealed or demolished upon becoming vacant, to prevent potential bat colonization.

The presence of vegetation with the potential to support nesting birds may represent a seasonal constraint to development if not removed at the appropriate time of the year. It is recommended

that vegetation with the potential to support nesting birds should be removed from September 1 through January 31, outside of the nesting season.

No seasonal avoidance is expected to be required for species for which the site provides only foraging habitat (American peregrine falcon, pallid bat, Mexican longue-tongued bat, northern harrier, western mastiff bat, and pocketed free-tailed bat).

4.5 Resources Requiring Additional Surveys

A focused rare plant survey is recommended during the appropriate blooming period(s) to determine whether special-status plant species occupy portions of the site such as Serrano Creek and/or the remnant coastal sage scrub.

A focused survey is recommended to determine whether coastal California gnatcatchers occupy the remnant coastal sage scrub on site. If surveys are to occur during the coastal California gnatcatcher breeding season (March 15 through June 30), six (6) surveys shall be conducted at least seven (7) days apart. If surveys are to occur outside of the coastal California gnatcatcher breeding season (July 1 through March 14), nine (9) surveys shall be conducted at least fourteen (14) days apart.

A focused survey is recommended to determine whether least Bell's vireo nest within the portion of Serrano Creek located along the southeastern boundary of the site. This survey is to occur between April 10 and July 31, and include eight (8) survey visits that shall be conducted at least ten (10) days apart.

It is the opinion of GLA based upon the professional judgement of the investigators that the portion of Serrano Creek that occurs along the southeastern boundary of the site does not contain the biological parameters necessary to support southwestern willow flycatcher (*Empidonax traillii extimus)* breeding habitat; however, it is recommended as a prudent measure to conduct a focused survey for this species. This survey is to occur between May 15 and July 17, and include five (5) survey visits that shall be conducted with one (1) survey visit between May 15 and May 31, one (1) survey visit between June 1 and June 21, and three (3) survey visits between June 22 and July 17. The three (3) survey visits between June 22 and July 17 shall be conducted at least five (5) days apart.

A focused burrowing owl survey is recommended during the burrowing owl breeding season survey window (February 15 to July 15) to determine whether breeding burrowing owls occupy the site. Focused burrowing owl surveys consist of four (4) visits with: at least one visit between February 15 and April 15, and three additional visits at least twenty-one (21) days apart, between April 15 and July 15, with at least one visit after June 15.

If vegetation must be removed during the nesting season (February 1 through August 31), a nesting bird survey should be conducted prior to any removal to prevent any impacts to active nests, and if active nests are identified onsite, then adequate buffers should be provided around the nests, as determined by a qualified biologist, until the nests are no longer active.

No additional survey requirements are expected for species for which the site provides only foraging habitat (American peregrine falcon, pallid bat, Mexican longue-tongued bat, northern harrier, western mastiff bat, and pocketed free-tailed bat).

4.6 Discussion

For planning purposes, permanent impacts to Serrano Creek would likely require a mitigation ratio of between 2:1 to 3:1 due to the riparian habitat present within the creek. Based on the lack of riparian habitat and other aquatic resources, permanent impacts to the treatment ditch or the unvegetated ephemeral drainage would likely require mitigation at a 1:1 ratio. However, based on preliminary discussion with the Regional Water Quality Control Board, impacts to waters of the State on a linear foot basis would not require mitigation at a 1:1 basis due to the lack of beneficial resources. All mitigation would be determined during the permitting process and would be made at the discretion of each regulatory agency. These impacts could be mitigated on site through the establishment of a new linear feature through the project site and/or through the enhancement and/or rehabilitation of Serrano Creek (coordination with the land owner would be necessary). Any onsite mitigation area would also likely require implementation of a 5-year Habitat Mitigation and Monitoring Plan, recordation of a legal instrument to conserve the mitigation area as permanent open space, and an endowment to cover long-term management activities.

If you have any questions regarding this report, please call me at (949) 837-0404, ext. 22 or 34, respectively.

Sincerely,

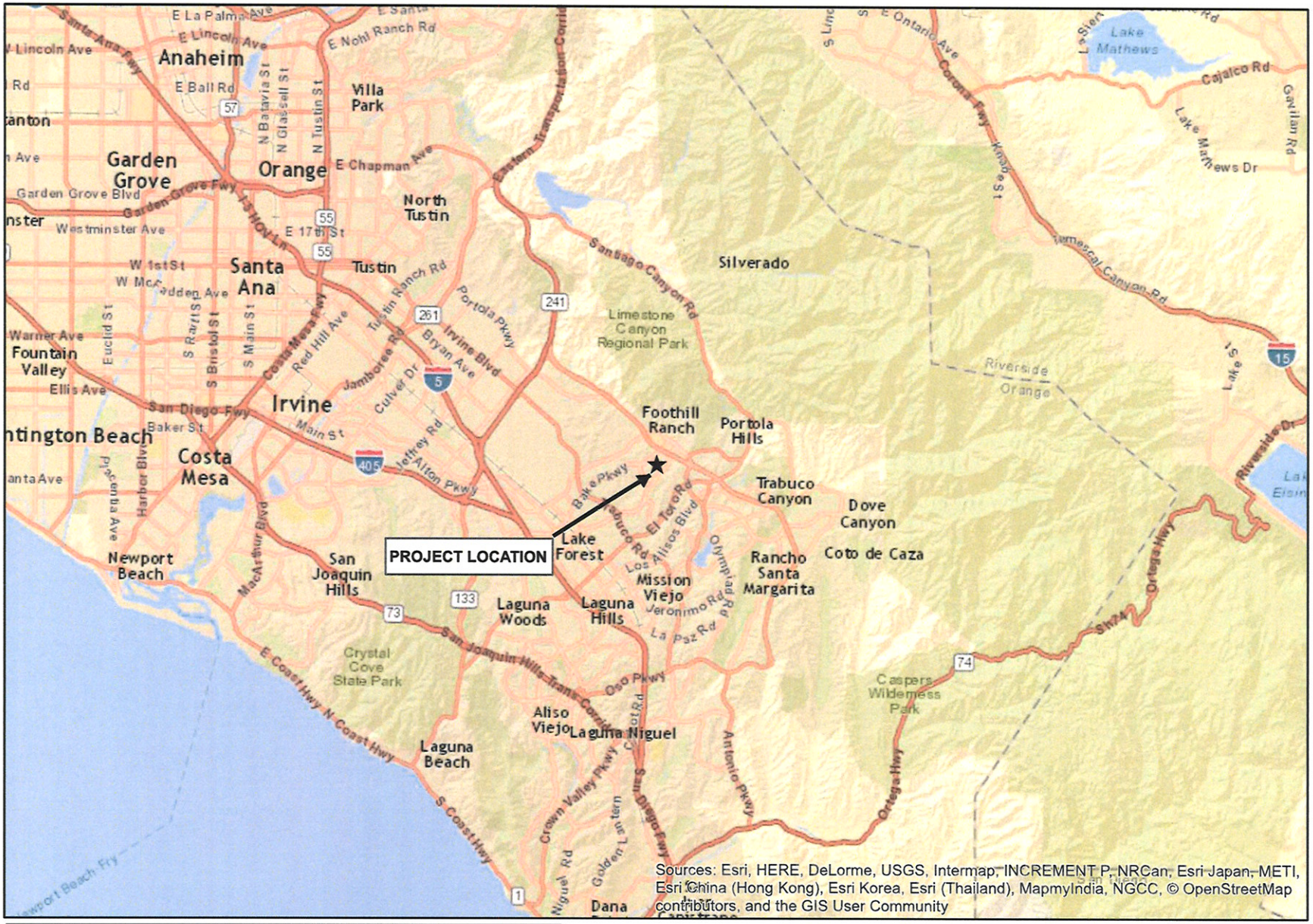
GLENN LUKOS ASSOCIATES, INC.

Zack West
Senior Biologist/Regulatory Specialist

Thienan Pfeiffer
Senior Regulatory Specialist

p:0711-9aconstraints.docx

Source: ESRI World Street Map



N

0 2 4 8 Miles

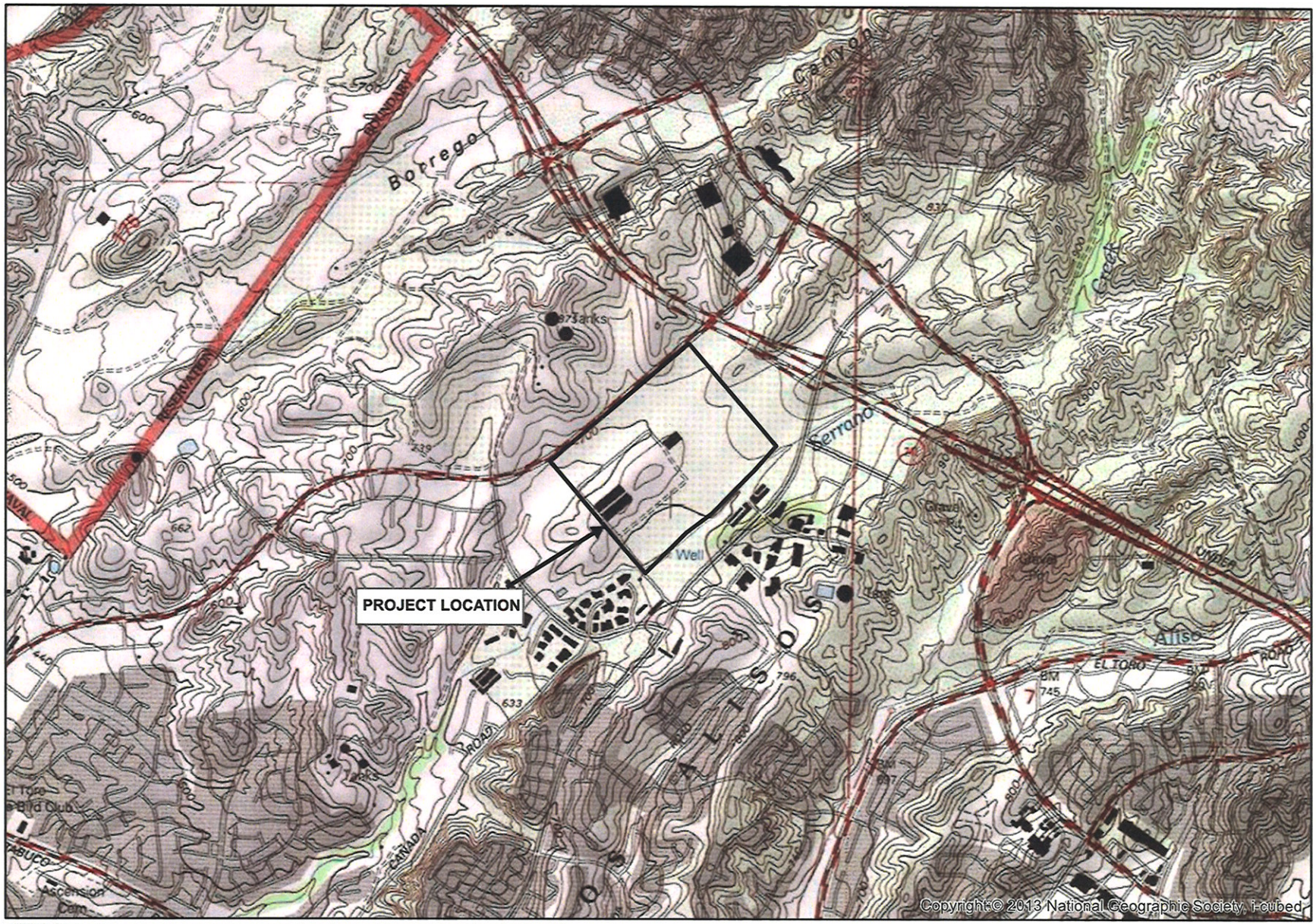
LAKE FOREST NURSERY PROJECT

Regional Map

GLENN LUKOS ASSOCIATES

Exhibit 1

Adapted from USGS El Toro, CA quadrangle



N

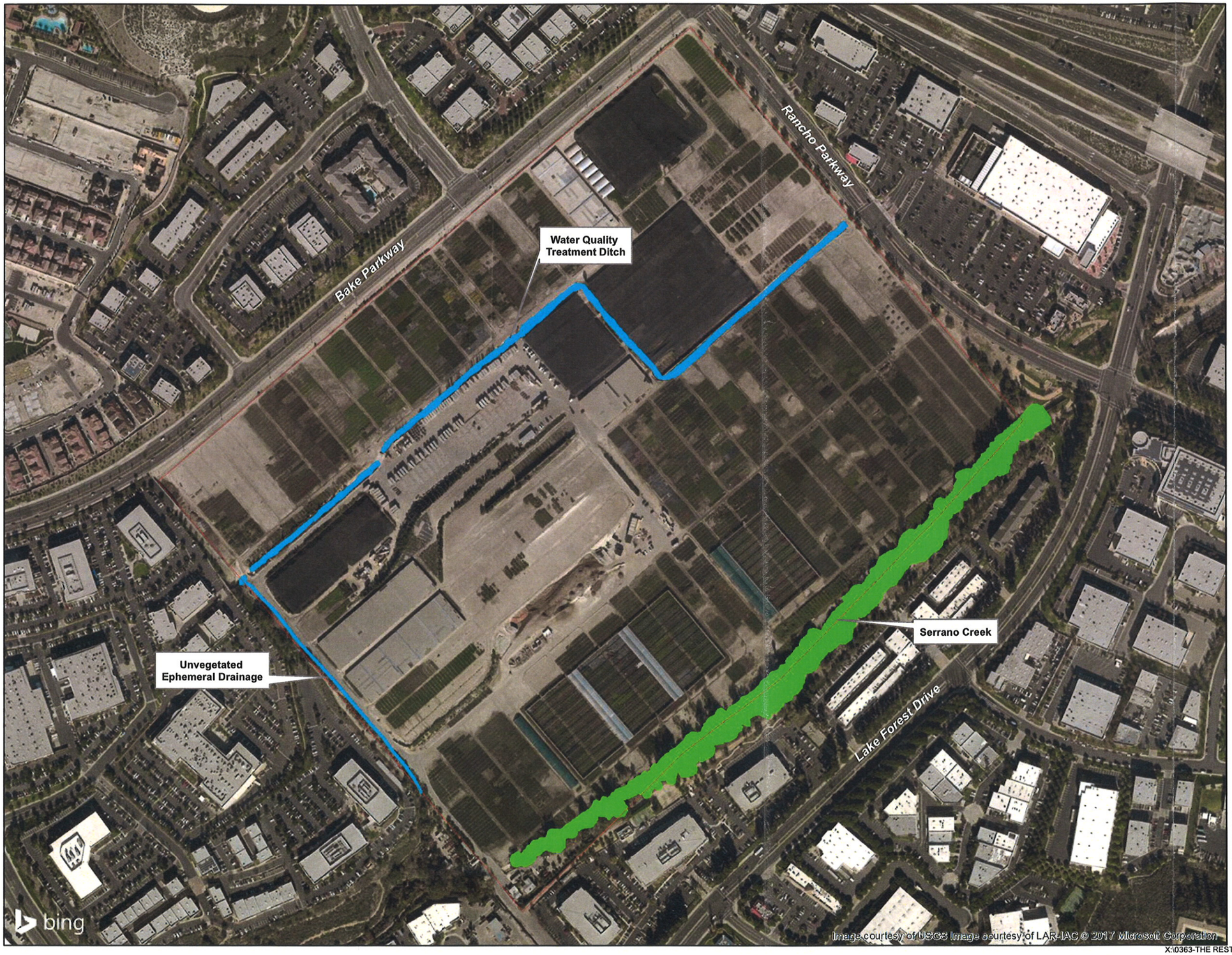
0 1,000 2,000 4,000 Feet

LAKE FOREST NURSERY PROJECT

Vicinity Map

GLENN LUKOS ASSOCIATES

Exhibit 2



Legend

- Parcel Boundary
- Corps/RWQCB Non- Wetland Waters
- CDFW Riparian

N

0 175 350 700

Feet

LAKE FOREST NURSERY PROJECT

Potential Jurisdictional Constraints

GLENN LUKOS ASSOCIATES

Exhibit 3

X:\0363-THE REST\0711-09NURS\711-9GIS\Delineation\REV1\711-09 COnstrraints JD REV1.mxd

Photograph 1: View of the active nursery operation from the southwest corner of the site looking toward the southeast.

Photograph 2: View of Serrano Creek along the southeastern boundary of the site looking toward the southwest.

GLENN LUKOS ASSOCIATES

Exhibit 4

LAKE FOREST NURSERY PROJECT

Site Photographs

Photograph 3: View of Serrano Creek from the southeast corner of the site looking toward the northeast.

Photograph 4: View of Serrano Creek along the central portion of the southeastern boundary of the site looking toward the southwest.

GLENN LUKOS ASSOCIATES

Exhibit 4

LAKE FOREST NURSERY PROJECT

Site Photographs

Photograph 5: View of the southwestern portion of the water quality treatment ditch looking toward the northeast.

Photograph 6: View of the central portion of the water quality treatment ditch looking toward the northeast.

GLENN LUKOS ASSOCIATES

Exhibit 4

LAKE FOREST NURSERY PROJECT

Site Photographs

BIOLOGICAL TECHNICAL REPORT

FOR

NAKASE PROPERTY PROJECT

LOCATED IN THE CITY OF LAKE FOREST, ORANGE COUNTY, CALIFORNIA

Prepared For:

Toll Brothers, Inc.
725 West Town & Country Road
Suite 200
Orange, California 92868
Contact: Peter H. Kim, P. E.
Phone: (714) 347-1300
Fax: (714) 835-9685

Prepared By:

Glenn Lukos Associates, Inc.
29 Orchard
Lake Forest, California 92630
Phone: (949) 837-0404, ext. 22
Report Preparers: Zack West and Tricia Campbell

March 5, 2019

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Background and Scope of Work 1
1.2 Project Location 1
1.3 Project Description 2
1.4 Existing Conditions 2
2.0 METHODOLOGY 2
2.1 Summary of Surveys 3
2.2 Botanical Resources 4
2.2.1 Literature Search 5
2.2.2 Vegetation Mapping 5
2.2.3 Special-Status Plant Species and Habitats Evaluated for the Project Site 5
2.2.4 Botanical Surveys 5
2.3 Wildlife Resources 6
2.3.1 General Surveys 6
2.3.2 Special-Status Animal Species Reviewed 7
2.3.2 Habitat Assessment for Special Status Animal Species 7
2.3.3 Focused Surveys for Special-Status Animals Species 7
2.4 Jurisdictional Delineation 10
3.0 REGULATORY SETTING 10
3.1 State and/or Federally Listed Plants or Animals 11
3.1.1 State of California Endangered Species Act 11
3.1.2 Federal Endangered Species Act 11
3.1.3 State and Federal Take Authorizations for Listed Species 12
3.2 California Environmental Quality Act 12
3.2.1 CEQA Guidelines Section 15380 12
3.2.2 Special-Status Plants, Wildlife and Vegetation Communities Evaluated Under CEQA 13
3.3 Jurisdictional Waters 15
3.3.1 Army Corps of Engineers 15
3.3.2 Regional Water Quality Control Board 19
3.4 California Department of Fish and Wildlife 20

3.5 Central/Coastal Natural Communities Conservation Program/Habitat Conservation Plan 20
4.0 RESULTS 21
4.1 Existing Conditions 21
4.2 Vegetation 21
4.2.1 Maritime Succulent Scrub/Southern Cactus Scrub (Coastal Sage Scrub) .. 22
4.2.2 Southern Black Willow Forest 22
4.2.3 Active Agriculture 22
4.2.4 Bare Ground/Developed 23
4.2 Wildlife 23
4.3 Special-Status Vegetation Communities (Habitats) 23
4.4 Special-Status Plants 24
4.4.1 Special-Status Plants Detected at the Project Site 32
4.5 Special-Status Animals 32
4.5.1 Special-Status Wildlife Species Observed within the Project Site 38
4.5.2 Special-Status Wildlife Species not Observed but with a Potential to Occur at the Project Site 38
4.5.3 Critical Habitat 38
4.6 Raptor Use 39
4.7 Nesting Birds 39
4.8 Soil Mapping 39
4.9 Jurisdictional Delineation 39
4.10 Wildlife Migration/Nurseries 40
5.0 IMPACT ANALYSIS 41
5.1 California Environmental Quality Act (CEQA) 41
5.1.1 Thresholds of Significance 41
5.1.2 Criteria for Determining Significance Pursuant to CEQA 42
5.2 Impacts to Native Vegetation 43
5.3 Impacts to Special-Status Plants 43
5.4 Impacts to Special-Status Animals 43
5.5 Impacts to Critical Habitat 44
5.6 Impacts to Nesting Birds 44
5.7 Impacts to Jurisdictional Waters 45
5.8 Wildlife Migration/Nurseries 46

5.9 Indirect Impacts to Biological Resources 46
5.10 Cumulative Impacts to Biological Resources 47
6.0 MITIGATION/AVOIDANCE MEASURES 49
6.1 Burrowing Owl 49
6.2 Native Nesting Birds 49
6.3 Bats 49
6.4 Serrano Creek 50
6.5 Jurisdictional Waters 52
6.6 Level of Significance after Mitigation 53
8.0 CERTIFICATION 56

TABLES

Table 2-1. Summary of Biological Surveys for the Project Site 4
Table 2-2. Summary of Burrowing Owl Surveys 7
Table 2-3. Summary of Coastal California Gnatcatcher Surveys 8
Table 2-4. Summary of Least Bell's Vireo Surveys 9
Table 2-5. Summary of Southwestern Willow Flycatcher Surveys 9
Table 3-1. CNPS Ranks 1, 2, 3, and 4 and Threat Code Extensions 14
Table 4-1. Summary of Vegetation/Land Use Types for the Project Site 22
Table 4-2. Summary of CNDDB Query – Special Status Habitats 23
Table 4-3. Special-Status Plants Evaluated for the Project Site 24
Table 4-4. Special-Status Wildlife Evaluated for the Project Site 33
Table 4-5. Summary of Corps, CDFW, and Regional Board Jurisdiction on the Project Site 40
Table5-1. Summary of Proposed Impacts to Corps, CDFW, and Regional Board Jurisdiction 44

EXHIBITS

Exhibit 1 Regional Map
Exhibit 2 Vicinity Map
Exhibit 3 Vegetation Map
Exhibit 4 Soils Map
Exhibit 5A Corps Jurisdictional Delineation Map
Exhibit 5B CDFW Jurisdictional Delineation Map
Exhibit 6 Site Photographs

APPENDICES

Appendix A	Floral Compendium
Appendix B	Faunal Compendium

1.0 INTRODUCTION

1.1 Background and Scope of Work

This document provides the results of general biological surveys and focused biological surveys for the approximately 121.8-acre Nakase Property Project, and an additional 2.75 acres of adjacent road and slope improvements, totaling 124.55 acres (the Project) located in the City of Lake Forest, Orange County, California. This report identifies and evaluates impacts to biological resources associated with the proposed Project in the context of the California Environmental Quality Act (CEQA) and State and Federal regulations such as the Endangered Species Act (ESA), Clean Water Act (CWA), and the California Fish and Game Code.

Although this project occurs within the boundaries of the Orange County Central and Coastal Subregion Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP), the project proponent is a non-participating landowner (County of Orange 1996) and will not be addressing impacts to resources through this plan.

The scope of this report includes a discussion of existing conditions for the approximately 124.55-acre Project site, all methods employed regarding the general biological surveys and focused biological surveys, the documentation of botanical and wildlife resources identified (including special-status species), and an analysis of impacts to biological resources. Methods of the study include a review of relevant literature, field surveys, and a Geographical Information System (GIS)-based analysis of vegetation communities. As appropriate, this report is consistent with accepted scientific and technical standards and survey guideline requirements issued by the U.S. Fish and Wildlife Service (USFWS), the California Department of Fish and Wildlife (CDFW), the California Native Plant Society (CNPS), and other applicable agencies/organizations.

The field study focused on a number of primary objectives that would comply with CEQA requirements, including (1) general reconnaissance survey and vegetation mapping; (2) general biological surveys; (3) habitat assessments and focused surveys for special-status plant species; and (4) habitat assessments and focused surveys for special-status wildlife species. Observations of all plant and wildlife species were recorded during the general biological surveys and are included as Appendix A: Floral Compendium and Appendix B: Faunal Compendium.

1.2 Project Location

The Project site comprises approximately 124.55acres in the City of Lake Forest, Orange County, California [Exhibit 1 – Regional Map] and is located within an unsectioned portion of Township 6 South, Range 8 West, of the U.S. Geological Survey (USGS) 7.5” quadrangle map El Toro, California (dated 1968 and photorevised in 1982) [Exhibit 2 – Vicinity Map].

Adjacent land uses include residential and commercial, with Serrano Creek along the southeastern boundary.

1.3 Project Description

The proposed project would be a master planned community of mixed-use development which will incorporate residential (unit count will range from approximately 600-800 units), an elementary school, developed open space in the form of a central park, parkways, trails, a detention basin, medians, affordable senior rental housing, a community clubhouse, and on-site and off-site infrastructural improvements.

The portion of Serrano Creek within the property boundary will be conserved and left in place. An illustration of the 6.57-acre proposed Conservation Area is on [Exhibit 3 – Vegetation Map/Impact Map].

1.4 Existing Conditions

Agricultural land uses consisting of an active nursery operation occupy the vast majority of the site. Nursery activities have remained active since 1979, causing a general lack of native vegetation communities on the site, with the exception of a small patch of remnant coastal sage scrub occurring within the southeastern corner of the site and riparian forest located within Serrano Creek along the southeastern boundary of the site. A water quality treatment ditch designed to infiltrate flows from nursery operations prior to leaving the property bisects the site and is routinely maintained free of vegetation. Developed areas consisting of equipment maintenance buildings and nursery offices were also observed at the site.

2.0 METHODOLOGY

To adequately identify biological resources in accordance with the requirements of CEQA, Glenn Lukos Associates (GLA) assembled biological data consisting of the following main components:

- Delineation of aquatic resources (including wetlands and riparian habitat) subject to the jurisdiction of the U.S. Army Corps of Engineers, Regional Board, and California Department of Fish and Wildlife (CDFW);
- Performance of vegetation mapping for the Project site; and
- Performance of habitat assessments, and site-specific biological surveys (focused surveys), to evaluate the presence/absence of special-status species in accordance with the requirements of CEQA.

The focus of the biological surveys was determined through initial site reconnaissance, a review of the California Natural Diversity Database (CNDDB) [CDFW 2017], CNPS 8th edition online inventory (CNPS 2017), Natural Resource Conservation Service (NRCS) soil data, other pertinent literature, and knowledge of the region. Site-specific general surveys within the Project site were conducted on foot in the proposed development areas for each target plant or animal species identified below.

Vegetation was mapped directly onto a 200-scale (1"=200') aerial photograph following the Habitat Classification System Natural Resources Geographic Information System (GIS) Project (Gray and Bramlet, 1992). All flora and fauna identified on site during vegetation mapping was included in floral and faunal compendia prepared for the Project (Appendices A and B). Vegetation communities not listed under the above-mentioned vegetation classification systems were named based on the dominant plant species present. All vegetation mapping was imported into ArcGIS for acreage analysis.

GLA senior biologist Zack West and regulatory specialist April Nakagawa visited the property on July 27 and 28, 2016 to conduct a general site review. Additional follow-up visits were made by Zack West and senior regulatory specialist Thienan Pfeiffer on October 6 and November 17, 2016, and various times during March and April 2017. Site reconnaissance was conducted in such a manner as to allow inspection of the entire site by direct observation, including the use of binoculars. The property was inspected to determine whether any special-status species, habitats, or potential jurisdictional areas are present on site.

In addition to site reconnaissance, evaluation of the property included a review of the CNDDB for the El Toro quadrangle and surrounding quadrangles,[1] a review of the CNPS on-line inventory,[2] a soil map review, and review of various documents provided by Toll Brothers, Inc.

2.1 Summary of Surveys

GLA conducted biological studies to identify and analyze actual or potential impacts to biological resources associated with development of the Project site. Observations of all plant and wildlife species were recorded during each of the above-mentioned survey efforts [Appendix A: Floral Compendium and Appendix B: Faunal Compendium]. The studies conducted include the following:

- Performance of vegetation mapping;
- Performance of site-specific habitat assessments and biological surveys to evaluate the potential presence/absence of special-status species (or potentially suitable habitat) to the satisfaction of CEQA and federal and state regulations;
- Focused survey for rare plants;
- Focused survey for burrowing owl;
- Focused survey for coastal California gnatcatcher;
- Focused survey for least Bell's vireo;
- Focused survey for southwestern willow flycatcher;
- Delineation of aquatic resources (including wetlands and riparian habitat) potentially subject to the jurisdiction of the U.S. Army Corps of Engineers (Corps), Regional Water Quality Control Board (Regional Board), and CDFW.

Table 2-1 provides a summary list of survey dates, survey types and personnel.

[1] California Department of Fish and Wildlife. July, 2016. Natural Diversity Database: RareFind 5.
[2] California Native Plant Society. 2016. On-Line Inventory of Rare and Endangered Plants of California (Eighth Edition).

Table 2-1. Summary of Biological Surveys for the Project Site.

Survey Type	Survey Dates	Biologists
General Biological Survey	7/27/16, 7/28/16	ZW, AN
Jurisdictional Delineation	4/7/17	ZW
Focused Rare Plant Surveys	4/19/17, 5/22/17	ZW
Focused Burrowing Owl Surveys	1: 3/17/17 3: 5/30/17 2: 4/26/17 4: 7/3/17	JA, KL
Focused Coastal California Gnatcatcher Surveys	1: 3/17/17 4: 4/7/17 2: 3/24/17 5: 4/14/17 3: 3/31/17 6: 4/26/17	JA, KL
Focused Least Bell's Vireo Surveys	1: 4/14/17 5: 5/30/17 2: 4/26/17 6: 6/12/17 3: 5/8/17 7: 6/23/17 4: 5/18/17 8: 7/3/17	KL
Focused Southwestern Willow Flycatcher Surveys	1: 5/20/17 4: 6/25/17 2: 6/1/17 5: 7/5/17 3: 6/15/17	JA

AN = April Nakagawa JA = Jeff Ahrens KL = Kevin Livergood TP=Thienan Pfeiffer ZW = Zack West

Individual plants and wildlife species are evaluated in this report based on their "special-status." For the purpose of this report, plants were considered "special-status" based on one or more of the following criteria:

- Listing through the Federal and/or State Endangered Species Act (ESA); and/or
- Occurrence in the CNPS Rare Plant Inventory (Rank 1A/1B, 2A/2B, 3, or 4).

Wildlife species were considered "special-status" based on one or more of the following criteria:

- Listing through the Federal and/or State ESA; and
- Designation by the State as a Species of Special Concern (SSC) or California Fully Protected (CFP) species.

Vegetation communities and habitats were considered of "special status" based on their occurrence in the CNDDB inventory.

2.2 Botanical Resources

A site-specific survey program was designed to accurately document the botanical resources within the Project site, and consisted of five components: (1) a literature search; (2) preparation of a list of target special-status plant species and sensitive vegetation communities that could

occur within the Project site; (3) general field reconnaissance surveys; (4) vegetation mapping; and (5) habitat assessments and focused surveys for special-status plants.

2.2.1 Literature Search

Prior to conducting fieldwork, pertinent literature on the flora of the region was examined. A thorough archival review was conducted using available literature and other historical records. These resources included the following:

- CNPS *Inventory of Rare and Endangered Plants* for the USGS 7.5' quadrangles: Black Star Canyon, Canada Gobernadora, Corona South, El Toro, Laguna Beach, Orange, San Juan Capistrano, Santiago Peak, and Tustin (online edition, v8-02) (CNPS 2017); and

- CNDDB for the USGS 7.5' quadrangles: Black Star Canyon, Canada Gobernadora, Corona South, El Toro, Laguna Beach, Orange, San Juan Capistrano, Santiago Peak, and Tustin, California.

2.2.2 Vegetation Mapping

Vegetation communities within the Project site were mapped according to the Habitat Classification System Natural Resources GIS Project (Gray and Bramlet, 1992). Plant communities were mapped in the field directly onto a 200-scale (1"=200') aerial photograph. A vegetation map is included as Exhibit 3. Representative site photographs are included as Exhibit 6.

2.2.3 Special-Status Plant Species and Habitats Evaluated for the Project Site

A literature search was conducted to obtain a list of special status plants with the potential to occur within the Project site. The CNDDB was initially consulted to determine well-known occurrences of plants and habitats of special concern in the region. Other sources used to develop a list of target species for the survey program included the CNPS online inventory (2017).

Based on this information, vegetation profiles and a list of target sensitive plant species and habitats that could occur within the Project site were developed and incorporated into a mapping and survey program to achieve the following goals: (1) characterize the vegetation associations and land use; (2) prepare a detailed floristic compendium; (3) identify the potential for any special status plants that may occur within the Project site; and (4) prepare a map showing the distribution of any sensitive botanical resources associated with the Project site, if applicable.

2.2.4 Botanical Surveys

GLA biologist Zack West visited the site on April 19 and May 22, 2017 to conduct general and focused plant surveys. Surveys were conducted in accordance with accepted botanical survey guidelines (CDFG 2009, CNPS 2001, USFWS 2000). As applicable, surveys were conducted at appropriate times based on precipitation and flowering periods. An aerial photograph, a soil

map, and/or a topographic map were used to determine the community types and other physical features that may support sensitive and uncommon taxa or communities within the Project site. Surveys were conducted by following meandering transects within target areas of suitable habitat. All plant species encountered during the field surveys were identified and recorded following the above-referenced guidelines adopted by CNPS (2010) and CDFW by Nelson (1984). A complete list of the plant species observed is provided in Appendix A. Scientific nomenclature and common names used in this report follow Baldwin et al (2012), and Munz (1974).

2.3 Wildlife Resources

Wildlife species were evaluated and detected during field surveys by sight, call, tracks, and scat. Site reconnaissance was conducted in such a manner as to allow inspection of the entire Project site by direct observation, including the use of binoculars. Observations of physical evidence and direct sightings of wildlife were recorded in field notes during the visit. A complete list of wildlife species observed within the Project site is provided in Appendix B. Scientific nomenclature and common names for vertebrate species referred to in this report follow the Complete List of Amphibian, Reptile, Bird, and Mammal Species in California (CDFG 2016), Standard Common and Scientific Names for North American Amphibians, Turtles, Reptiles, and Crocodilians 6th Edition, Collins and Taggert (2009) for amphibians and reptiles, and the American Ornithologists' Union Checklist 7th Edition (2009) and its supplements through 2016 for birds. The methodology (including any applicable survey protocols) utilized to conduct general surveys, habitat assessments, and/or focused surveys for special-status animals are included below.

2.3.1 General Surveys

Birds

During the general biological and reconnaissance survey within the Project site, birds were detected incidentally by direct observation and/or by vocalizations, with identifications recorded in field notes.

Mammals

During general biological and reconnaissance surveys within the Project site, mammals were identified and detected incidentally by direct observations and/or by the presence of diagnostic sign (i.e., tracks, burrows, scat, etc.).

Reptiles and Amphibians

During general biological and reconnaissance surveys within the Project site, reptiles and amphibians were identified incidentally during surveys. Habitats were examined for diagnostic reptile sign, which includes shed skins, scat, tracks, snake prints, and lizard tail drag marks. All reptiles and amphibian species observed, as well as diagnostic sign, were recorded in field notes.

2.3.2 Special-Status Animal Species Reviewed

A literature search was conducted to obtain a list of special-status wildlife species with the potential to occur within the Project site. Species were evaluated based on two factors: 1) species identified by the CNDDB as occurring (either currently or historically) on or in the vicinity of the Project site, and 2) any other special-status animals that are known to occur within the vicinity of the Project site, or for which potentially suitable habitat occurs on the Project site.

2.3.2 Habitat Assessment for Special Status Animal Species

GLA biologists Zack West and April Nakagawa conducted habitat assessments for special-status animal species on July 27 and 28, 2016. An aerial photograph, soil map and/or topographic map were used to determine the community types and other physical features that may support special-status and uncommon taxa within the Project site.

2.3.3 Focused Surveys for Special-Status Animals Species

Burrowing Owl

GLA biologists Jeff Ahrens and Kevin Livergood conducted focused surveys for the burrowing owl (*Athene cunicularia*; BUOW) for all suitable habitat areas within the Project site. Surveys were conducted in accordance with survey guidelines described in the 2012 CDFW Staff Report on Burrowing Owl Mitigation. The guidelines stipulate that four focused survey visits should be conducted between February 15 and July 15, with the first visit occurring between February 15 and April 15. The remaining three visits should be conducted three weeks apart from each other, with at least one visit occurring between June 15 and July 15. Focused surveys were conducted on March 17, April 26, May 30, and July 3, 2017. As recommended by the survey guidelines, the survey visits were conducted between morning civil twilight and 10:00 AM. Weather conditions during the surveys were conducive to a high level of bird activity.

Surveys were conducted by walking meandering transects throughout areas of suitable habitat, primarily rubble piles, culverts, and irrigation pipes located throughout the Project site. All suitable burrows were inspected for diagnostic owl sign (e.g., pellets, prey remains, whitewash, feathers, bones, and/or decoration) to identify potentially occupied burrows. Table 2-2 summarizes the burrowing owl survey visits. The results of the burrowing owl surveys are documented in Section 4.0 of this report.

Table 2-2. Summary of Burrowing Owl Surveys

Survey Date	Biologist	Start/End Time (AM)	Start/End Temperature	Start/End Wind Speed (mph)	Cloud Cover
3/17/17	JA	6:15-7:00	55-56° F	1-2 mph	Clear
4/26/17	KL	6:35-8:00	54-58° F	1-3 mph	Partly Cloudy
5/30/17	KL	6:30-7:45	58-59° F	2-3 mph	Overcast
7/3/17	KL	6:15-7:30	60-62° F	0-2 mph	Overcast

Coastal California Gnatcatcher

GLA biologists Jeff Ahrens (permit TE 052159-5) and Kevin Livergood (permit TE-172638-2) conducted focused surveys for the coastal California gnatcatcher (*Polioptila californica californica*; CAGN) for all suitable habitat areas within the Project site. Surveys were conducted in accordance with the 1997 USFWS survey guidelines, which during the breeding season (March 15 through June 30) require a minimum of six surveys (per survey polygon) with at least one week separating each survey visit. The survey guidelines limit individual biologists to surveying a maximum of 80 acres per day. The Project site contains approximately 0.28 acre of suitable habitat for the gnatcatcher. Therefore, the 0.28-acre survey area of suitable habitat was completed as a single survey polygon. Regardless, biologists recorded birds throughout the entire project area during surveys.

Focused surveys were conducted on March 17, March 24, March 31, April 7, April 14, and April 26, 2017. Pursuant to the survey guidelines, the surveys were conducted between sunrise and 12:00 p.m. Weather conditions during the surveys were conducive to a high level of bird activity. Table 2-3 summarizes the gnatcatcher survey visits. The results of the gnatcatcher surveys are documented in Section 4.0 of this report.

Table 2-3. Summary of Coastal California Gnatcatcher Surveys

Survey Date	Biologist	Start/End Time (AM)	Start/End Temperature	Start/End Wind Speed (mph)	Cloud Cover
3/17/17	JA	6:15-8:00	55-56° F	1-2 mph	Clear
3/24/17	JA	6:05-8:00	49-57° F	0-2 mph	Clear
3/31/17	JA	6:20-7:50	50-51° F	1-3 mph	Clear
4/7/17	JA	9:50-11:05	61-68° F	1-4 mph	Mostly Clear
4/14/17	KL	9:15-10:45	55-63° F	2-4 mph	Clear
4/26/17	KL	8:00-9:00	58-65° F	1-2 mph	Partly Cloudy

Least Bell's Vireo

GLA biologist Kevin Livergood conducted focused surveys for the least Bell's vireo (*Vireo bellii pusillus*; LBV) for all suitable habitat areas within the Project site. Surveys were conducted in accordance with the 2001 USFWS survey guidelines, which stipulate that eight surveys should be conducted between April 10 and July 31, with a minimum of ten days separating each survey visit.

Focused surveys were conducted on April 14, April 26, May 8, May 18, May 30, June 12, June 23, and July 3, 2017. Pursuant to the survey guidelines, the surveys were conducted between sunrise and 11:00 a.m. Weather conditions during the surveys were conducive to a high level of bird activity. Table 2-4 summarizes the vireo survey visits. The results of the vireo surveys are documented in Section 4.0 of this report.

Table 2-4. Summary of Least Bell's Vireo Surveys

Survey Date	Biologist	Start/End Time (AM)	Start/End Temperature	Start/End Wind Speed (mph)	Cloud Cover
4/14/17	KL	7:00-9:15	49-55° F	1-4 mph	Clear
4/26/17	KL	9:00-11:00	65-73° F	2-4 mph	Partly Cloudy
5/8/17	KL	8:00-10:00	53-59° F	2-5 mph	Partly Cloudy
5/18/17	KL	6:20-8:30	51-59° F	2-3 mph	Partly Cloudy
5/30/17	KL	7:45-10:00	59-62° F	2-3 mph	Overcast
6/12/17	KL	8:30-11:00	62-66° F	2-4 mph	Mostly Sunny
6/23/17	KL	8:00-10:00	65-72° F	1-3 mph	Clear
7/3/17	KL	7:30-9:40	62-71° F	2-4 mph	Clear

Southwestern Willow Flycatcher

GLA biologist Jeff Ahrens conducted focused surveys for the southwestern willow flycatcher (*Empidonax traillii extimus*; SWWF) for all suitable habitat areas within the Project site. Surveys were conducted in accordance with the 2010 USFWS survey guidelines[3], which stipulate that five surveys should be conducted between May 15 and July 17, divided into three survey periods. The southwestern willow flycatcher is one of four subspecies of willow flycatcher that occur within southern California, but is the only subspecies that breeds in southern California. The other subspecies may occur in southern California during the first and second surveys periods as they migrate through the area onwards to breeding areas, but will not breed in southern California. Therefore, the presence of the southwestern willow flycatcher is determined by willow flycatchers that remain in southern California during the third survey period.

Focused surveys were conducted on May 20, June 1, June 15, June 25, and July 5, 2017. Pursuant to the survey guidelines, the surveys were conducted between sunrise and 10:00 a.m. Weather conditions during the surveys were conducive to a high level of bird activity. Table 2-5 summarizes the flycatcher survey visits. The results of the flycatcher surveys are documented in Section 4.0 of this report.

Table 2-5. Summary of Southwestern Willow Flycatcher Surveys

Survey Date	Biologist	Start/End Time (AM)	Start/End Temperature	Start/End Wind Speed (mph)	Cloud Cover
5/20/17	JA	5:30-7:50	60-60° F	1-4 mph	Overcast
6/1/17	JA	5:50-8:40	56-61° F	1-2 mph	Overcast
6/15/17	JA	5:45-9:00	61-68° F	1-2 mph	Clear
6/25/17	JA	5:45-8:00	62-67° F	1-3 mph	Partly Cloudy

[3] *A Natural History Summary and Survey Protocol for the Southwestern Willow Flycatcher*, prepared by the USGS.

Survey Date	Biologist	Start/End Time (AM)	Start/End Temperature	Start/End Wind Speed (mph)	Cloud Cover
7/5/17	JA	5:45-7:45	65-69° F	1-2 mph	Partly Cloudy

2.4 Jurisdictional Delineation

A jurisdictional delineation was conducted for the Project site on April 7, 2017 by GLA biologist Zack West. Prior to beginning the field delineation, a 200'-scale color aerial photograph and the previously cited USGS topographic maps were examined to determine the locations of potential areas of Corps/CDFW jurisdiction and the Special Area Management Plan (SAMP) for the San Diego Creek Watershed was reviewed for any Aquatic Resource Integrity Areas mapped within the boundaries of the Project site. Suspected jurisdictional areas were field checked for the presence of definable channels and/or wetland vegetation, soils and hydrology. Potential wetland habitats at the subject site were evaluated using the methodology set forth in the U.S. Army Corps of Engineers 1987 Wetland Delineation Manual[4] (Wetland Manual) and the 2008 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Supplement (Arid West Supplement)[5]. The presence of an Ordinary High Water Mark (OHWM) was determined using the 2008 Field Guide to Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States[6] in conjunction with the Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States.[7] While in the field, the limits of the OHWM, wetlands, and CDFW jurisdiction were recorded using GPS technology and/or on copies of the aerial photography. Other data were recorded onto the appropriate datasheets. The results of the Jurisdictional Delineation are depicted on Exhibit 5A and Exhibit 5B.

3.0 REGULATORY SETTING

The proposed Project is subject to state and federal regulations associated with a number of regulatory programs. These programs often overlap and were developed to protect natural resources, including: state- and federally listed plants and animals; aquatic resources including rivers and creeks, ephemeral streambeds, wetlands, and areas of riparian habitat; other special-

[4] Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1, U.S. Army Engineer Waterways Experimental Station, Vicksburg, Mississippi.

[5] U.S. Army Corps of Engineers. 2008. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Supplement (Version 2.0). Ed. J.S. Wakeley, R.W. Lichvar, and C.V. Noble. ERDC/EL TR-06-16. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

[6] Lichvar, R. W., and S. M. McColley. 2008. A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States. ERDC/CRREL TR-08-12. Hanover, NH: U.S. Army Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory. (http://www.crrel.usace.army.mil/library/technicalreports/ERDC-CRREL-TR-08-12.pdf).

[7] Curtis, Katherine E. and Robert Lichevar. 2010. Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States. ERDC/CRREL TN-10-1. Hanover, NH: U.S. Army Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory.

status species which are not listed as threatened or endangered by the state or federal governments; and other special-status vegetation communities.

3.1 State and/or Federally Listed Plants or Animals

3.1.1 State of California Endangered Species Act

California's Endangered Species Act (CESA) defines an endangered species as "a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease." The State defines a threatened species as "a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that, although not presently threatened with extinction, is likely to become an Endangered species in the foreseeable future in the absence of the special protection and management efforts required by this chapter. Any animal determined by the commission as rare on or before January 1, 1985 is a threatened species." Candidate species are defined as "a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that the commission has formally noticed as being under review by the department for addition to either the list of endangered species or the list of threatened species, or a species for which the commission has published a notice of proposed regulation to add the species to either list." Candidate species may be afforded temporary protection as though they were already listed as threatened or endangered at the discretion of the Fish and Game Commission. Unlike the Federal Endangered Species Act (FESA), CESA does not list invertebrate species.

Article 3, Sections 2080 through 2085, of the CESA addresses the taking of threatened, endangered, or candidate species by stating "No person shall import into this state, export out of this state, or take, possess, purchase, or sell within this state, any species, or any part or product thereof, that the commission determines to be an endangered species or a threatened species, or attempt any of those acts, except as otherwise provided." Under the CESA, "take" is defined as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." Exceptions authorized by the state to allow "take" require permits or memoranda of understanding and can be authorized for endangered species, threatened species, or candidate species for scientific, educational, or management purposes and for take incidental to otherwise lawful activities. Sections 1901 and 1913 of the California Fish and Game Code provide that notification is required prior to disturbance.

3.1.2 Federal Endangered Species Act

The FESA of 1973 defines an endangered species as "any species that is in danger of extinction throughout all or a significant portion of its range." A threatened species is defined as "any species that is likely to become an Endangered species within the foreseeable future throughout all or a significant portion of its range." Under provisions of Section 9(a)(1)(B) of the FESA it is unlawful to "take" any listed species. "Take" is defined in Section 3(18) of FESA: "...harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Further, the USFWS, through regulation, has interpreted the terms "harm" and "harass" to include certain types of habitat modification that result in injury to, or death of

species as forms of "take." These interpretations, however, are generally considered and applied on a case-by-case basis and often vary from species to species. In a case where a property owner seeks permission from a Federal agency for an action that could affect a federally listed plant and animal species, the property owner and agency are required to consult with USFWS. Section 9(a)(2)(b) of the FESA addresses the protections afforded to listed plants.

3.1.3 State and Federal Take Authorizations for Listed Species

Federal or state authorizations of impacts to or incidental take of a listed species by a private individual or other private entity would be granted in one of the following ways:

- Section 7 of the FESA stipulates that any federal action that may affect a species listed as threatened or endangered requires a formal consultation with USFWS to ensure that the action is not likely to jeopardize the continued existence of the listed species or result in destruction or adverse modification of designated critical habitat. 16 U.S.C. 1536(a)(2).
- In 1982, the FESA was amended to give private landowners the ability to develop Habitat Conservation Plans (HCP) pursuant to Section 10(a) of the FESA. Upon development of an HCP, the USFWS can issue incidental take permits for listed species where the HCP specifies at minimum, the following: (1) the level of impact that will result from the taking, (2) steps that will minimize and mitigate the impacts, (3) funding necessary to implement the plan, (4) alternative actions to the taking considered by the applicant and the reasons why such alternatives were not chosen, and (5) such other measures that the Secretary of the Interior may require as being necessary or appropriate for the plan.
- Sections 2090-2097 of the CESA require that the state lead agency consult with CDFW on projects with potential impacts on state-listed species. These provisions also require CDFW to coordinate consultations with USFWS for actions involving federally listed as well as state-listed species. In certain circumstances, Section 2080.1 of the California Fish and Game Code allows CDFW to adopt the federal incidental take statement or the 10(a) permit as its own based on its findings that the federal permit adequately protects the species under state law.

3.2 California Environmental Quality Act

3.2.1 CEQA Guidelines Section 15380

CEQA requires evaluation of a project's impacts on biological resources and provides guidelines and thresholds for use by lead agencies for evaluating the significance of proposed impacts. Sections 5.1.1 and 5.2.2 below set forth these thresholds and guidelines. Furthermore, pursuant to the CEQA Guidelines Section 15380, CEQA provides protection for non-listed species that could potentially meet the criteria for state listing. For plants, CDFW recognizes that plants on Lists 1A, 1B, or 2 of the CNPS *Inventory of Rare and Endangered Plants in California* may meet the criteria for listing and should be considered under CEQA. CDFW also recommends protection of plants, which are regionally important, such as locally rare species, disjunct populations of more common plants, or plants on the CNPS Lists 3 or 4.

3.2.2 Special-Status Plants, Wildlife and Vegetation Communities Evaluated Under CEQA

Federally Designated Special-Status Species

Within recent years, the USFWS instituted changes in the listing status of candidate species. Former C1 (candidate) species are now referred to simply as candidate species and represent the only candidates for listing. Former C2 species (for which the USFWS had insufficient evidence to warrant listing) and C3 species (either extinct, no longer a valid taxon or more abundant than was formerly believed) are no longer considered as candidate species. Therefore, these species are no longer maintained in list form by the USFWS, nor are they formally protected. This term is employed in this document, but carries no official protections. All references to federally protected species in this report (whether listed, proposed for listing, or candidate) include the most current published status or candidate category to which each species has been assigned by USFWS.

For this report the following acronyms are used for federal special-status species:

- FE Federally listed as Endangered
- FT Federally listed as Threatened
- FPE Federally proposed for listing as Endangered
- FPT Federally proposed for listing as Threatened
- FC Federal Candidate Species (former C1 species)
- FSC Federal Species of Concern (former C2 species)

State-Designated Special-Status Species

Some mammals and birds are protected by the state as Fully Protected (SFP) Mammals or Fully Protected Birds, as described in the California Fish and Game Code, Sections 4700 and 3511, respectively. California SSC are designated as vulnerable to extinction due to declining population levels, limited ranges, and/or continuing threats. This list is primarily a working document for the CDFW's CNDDB project. Informally listed taxa are not protected, but warrant consideration in the preparation of biotic assessments. For some species, the CNDDB is only concerned with specific portions of the life history, such as roosts, rookeries, or nest sites.

For this report the following acronyms are used for State special-status species:

- SE State-listed as Endangered
- ST State-listed as Threatened
- SR State-listed as Rare
- SCE State Candidate for listing as Endangered
- SCT State Candidate for listing as Threatened
- SFP State Fully Protected
- SP State Protected
- SSC State Species of Special Concern

California Native Plant Society

The CNPS is a private plant conservation organization dedicated to the monitoring and protection of sensitive species in California. The CNPS's Eighth Edition of the *California Native Plant Society's Inventory of Rare and Endangered Plants of California* separates plants of interest into six ranks. CNPS has compiled an inventory comprised of the information focusing on geographic distribution and qualitative characterization of Rare, Threatened, or Endangered vascular plant species of California. The list serves as the candidate list for listing as threatened and endangered by CDFW. CNPS has developed five categories of rarity that are summarized in Table 3-1.

Table 3-1. CNPS Ranks 1, 2, 3, & 4, and Threat Code Extensions

CNPS Rank	Comments
Rank 1A – Plants Presumed Extirpated in California and Either Rare or Extinct Elsewhere	Thought to be extinct in California based on a lack of observation or detection for many years.
Rank 1B – Plants Rare, Threatened, or Endangered in California and Elsewhere	Species, which are generally rare throughout their range that are also judged to be vulnerable to other threats such as declining habitat.
Rank 2A – Plants presumed Extirpated in California, But Common Elsewhere	Species that are presumed extinct in California but more common outside of California
Rank 2B – Plants Rare, Threatened or Endangered in California, But More Common Elsewhere	Species that are rare in California but more common outside of California
Rank 3 – Plants About Which More Information Is Needed (A Review List)	Species that are thought to be rare or in decline but CNPS lacks the information needed to assign to the appropriate list. In most instances, the extent of surveys for these species is not sufficient to allow CNPS to accurately assess whether these species should be assigned to a specific rank. In addition, many of the Rank 3 species have associated taxonomic problems such that the validity of their current taxonomy is unclear.
Rank 4 – Plants of Limited Distribution (A Watch List)	Species that are currently thought to be limited in distribution or range whose vulnerability or susceptibility to threat is currently low. In some cases, as noted above for Rank 3 species, CNPS lacks survey data to accurately determine status in California. Many species have been placed on Rank 4 in previous editions of the "Inventory" and have been removed as survey data has indicated that the species are more common than previously thought. CNPS recommends that species currently included on this list should be monitored to ensure that future substantial declines are minimized.
Extension	**Comments**
.1 – Seriously endangered in California	Species with over 80% of occurrences threatened and/or have a high degree and immediacy of threat.
.2 – Fairly endangered in California	Species with 20-80% of occurrences threatened.
.3 – Not very endangered in California	Species with <20% of occurrences threatened or with no current threats known.

3.3 Jurisdictional Waters

3.3.1 Army Corps of Engineers

Pursuant to Section 404 of the Clean Water Act, the Corps regulates the discharge of dredged and/or fill material into waters of the United States. The term "waters of the United States" is defined in Corps regulations at 33 CFR Part 328.3(a)[8] as:

> *(1) All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;*
> *(2) All interstate waters including interstate wetlands;*
> *(3) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect foreign commerce including any such waters:*
> *(i) Which are or could be used by interstate or foreign travelers for recreational or other purposes; or*
> *(ii) From which fish or shell fish are or could be taken and sold in interstate or foreign commerce; or*
> *(iii) Which are used or could be used for industrial purpose by industries in interstate commerce...*
> *(4) All impoundments of waters otherwise defined as waters of the United States under the definition;*
> *(5) Tributaries of waters identified in paragraphs (a) (1)-(4) of this section;*
> *(6) The territorial seas;*
> *(7) Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) (1)-(6) of this section.*
> *(8) Waters of the United States do not include prior converted cropland.*[9] *Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with the EPA.*

[8] On October 9, 2015, the U.S. 6th District Circuit Court of Appeals ordered a nationwide stay on the Corps and EPA's definition of waters of the United States under the Clean Water Rule ("Clean Water Rule: Definition of 'Waters of the United States"; Final Rule," 80 Federal Register 124 (29 June, 2015), pp. 37054-37127). As a result, the Corps' regulations that were in effect prior to the August 28, 2015 Clean Water Rule is again in effect until such a time as the Court order is satisfied, if this occurs. In addition, President Trump signed an Executive Order on February 28, 2017 that instructs the EPA and Corps to formally reconsider the Rule, which could lead to a re-write of the law or a complete repeal.

[9] The term "prior converted cropland" is defined in the Corps' Regulatory Guidance Letter 90-7 (dated September 26, 1990) as "wetlands which were both manipulated (drained or otherwise physically altered to remove excess water from the land) and cropped before 23 December 1985, to the extent that they no longer exhibit important wetland values. Specifically, prior converted cropland is inundated for no more than 14 consecutive days during the growing season…." [Emphasis added.]

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 123.11(m) which also meet the criteria of this definition) are not waters of the United States.

In the absence of wetlands, the limits of Corps jurisdiction in non-tidal waters, such as intermittent streams, extend to the OHWM which is defined at 33 CFR 328.3(e) as:

...that line on the shore established by the fluctuation of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

1. Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers, et al.

Pursuant to Article I, Section 8 of the U.S. Constitution, federal regulatory authority extends only to activities that affect interstate commerce. In the early 1980s the Corps interpreted the interstate commerce requirement in a manner that restricted Corps jurisdiction on isolated (intrastate) waters. On September 12, 1985, EPA asserted that Corps jurisdiction extended to isolated waters that are used or could be used by migratory birds or endangered species, and the definition of "waters of the United States" in Corps regulations was modified as quoted above from 33 CFR 328.3(a).

On January 9, 2001, the Supreme Court of the United States issued a ruling on *Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers, et al.* (SWANCC). In this case the Court was asked whether use of an isolated, intrastate pond by migratory birds is a sufficient interstate commerce connection to bring the pond into federal jurisdiction of Section 404 of the Clean Water Act.

The written opinion notes that the court's previous support of the Corps' expansion of jurisdiction beyond navigable waters (*United States v. Riverside Bayview Homes, Inc*.) was for a wetland that abutted a navigable water and that the court did not express any opinion on the question of the authority of the Corps to regulate wetlands that are not adjacent to bodies of open water. The current opinion goes on to state:

In order to rule for the respondents here, we would have to hold that the jurisdiction of the Corps extends to ponds that are not adjacent to open water. We conclude that the text of the statute will not allow this.

Therefore, we believe that the court's opinion goes beyond the migratory bird issue and says that no isolated, intrastate water is subject to the provisions of Section 404(a) of the Clean Water Act (regardless of any interstate commerce connection). However, the Corps and EPA have issued a joint memorandum which states that they are interpreting the ruling to address only the migratory bird issue and leaving the other interstate commerce clause nexuses intact.

2. Rapanos v. United States and Carabell v. United States

On June 5, 2007, the U.S. Environmental Protection Agency (EPA) and Corps issued joint guidance that addresses the scope of jurisdiction pursuant to the Clean Water Act in light of the Supreme Court's decision in the consolidated cases *Rapanos v. United States* and *Carabell v. United States* ("Rapanos"). The chart below was provided in the joint EPA/Corps guidance.

For project sites that include waters other than Traditional Navigable Waters (TNWs) and/or their adjacent wetlands or Relatively Permanent Waters (RPMs) tributary to TNWs and/or their adjacent wetlands as set forth in the chart below, the Corps must apply the significant nexus standard.

For "isolated" waters or wetlands, the joint guidance also requires an evaluation by the Corps and EPA to determine whether other interstate commerce clause nexuses, not addressed in the SWANCC decision are associated with isolated features on project sites for which a jurisdictional determination is being sought from the Corps.

The agencies will assert jurisdiction over the following waters:

- Traditional navigable waters
- Wetlands adjacent to traditional navigable waters
- Non-navigable tributaries of traditional navigable waters that are relatively permanent where the tributaries typically flow year-round or have continuous flow at least seasonally (e.g., typically three months)
- Wetlands that directly abut such tributaries

The agencies will decide jurisdiction over the following waters based on a fact-specific analysis to determine whether they have a significant nexus with a traditional navigable water:

- Non-navigable tributaries that are not relatively permanent
- Wetlands adjacent to non-navigable tributaries that are not relatively permanent
- Wetlands adjacent to but that do not directly abut a relatively permanent non-navigable tributary

The agencies generally will not assert jurisdiction over the following features:

- Swales or erosional features (e.g., gullies, small washes characterized by low volume, infrequent or short duration flow)
- Ditches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water

The agencies will apply the significant nexus standard as follows:

- A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by all wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical and biological integrity of downstream traditional navigable waters
- Significant nexus includes consideration of hydrologic and ecologic factors

3. Wetland Definition Pursuant to Section 404 of the Clean Water Act

The term “wetlands” (a subset of “waters of the United States”) is defined at 33 CFR 328.3(b) as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support...a prevalence of vegetation typically adapted for life in saturated soil conditions." In 1987 the Corps published a manual to guide its field personnel in determining jurisdictional wetland boundaries. The methodology set forth in the 1987 Wetland Delineation Manual and the Arid West Supplement generally require that, in order to be considered a wetland, the vegetation, soils, and hydrology of an area exhibit at least minimal hydric characteristics. While the manual and Supplement provide great detail in methodology and allow for varying special conditions, a wetland should normally meet each of the following three criteria:

- more than 50 percent of the dominant plant species at the site must be typical of wetlands (i.e., rated as facultative or wetter in the Arid West 2016 Regional Wetland Plant List[10] [11];

- soils must exhibit physical and/or chemical characteristics indicative of permanent or periodic saturation (e.g., a gleyed color, or mottles with a matrix of low chroma indicating a relatively consistent fluctuation between aerobic and anaerobic conditions); and

- Whereas the 1987 Manual requires that hydrologic characteristics indicate that the ground is saturated to within 12 inches of the surface for at least five percent of the growing season during a normal rainfall year, the Arid West Supplement does not include a quantitative criteria with the exception for areas with “problematic hydrophytic vegetation”, which require a minimum of 14 days of ponding to be considered a wetland.

4. Regional General Permit 74 and Special Area Management Plan

Regional General Permit 74 (RGP 74) is one part of the permitting frameworks developed for the Corps’ two SAMPs in Orange County, California: the San Diego Creek Watershed SAMP and the San Juan Creek/Western San Mateo Creek Watersheds.

The SAMP permitting frameworks replace the pre-SAMP permitting procedures available in these watersheds prior to the Corps’ formulation and adoption of the SAMPs. The SAMP permitting framework involves the establishment of abbreviated permit processing procedures in the form of this RGP and new Clean Water Act section 404 letter of permission procedures in combination with the use of selected nationwide permits and standard individual permits.

Watershed-specific mitigation policies are also being implemented under both the SAMPs. The SAMP permitting frameworks consider the type of regulated activity, permanency of impacts,

[10] Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. Arid West 2016 Regional Wetland Plant List. Phytoneuron 2016-30: 1-17. Published 28 April 2016.

[11] Note the Corps also publishes a National List of Plant Species that Occur in Wetlands (Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. The National Wetland Plant List: 2016 wetland ratings. Phytoneuron 2016-30: 1-17. Published 28 April 2016.); however, the Regional Wetland Plant List should be used for wetland delineations within the Arid West Region.

and location of proposed activity within the SAMP Watersheds, that is, whether the activity would affect sensitive aquatic resources also identified as aquatic resource integrity areas.

For the San Diego Creek Watershed SAMP, the California Department of Fish and Game established a Watershed Streambed Alteration Agreement (WSAA) Process that will augment streambed alteration agreement (California Fish and Game Code section 1600) processing procedures within the San Diego Creek Watershed, Orange County, California. (SAMP, 2009)

3.3.2 Regional Water Quality Control Board

Section 401 of the Clean Water Act requires any applicant for a Section 404 permit to obtain certification from the State that the discharge (and the operation of the facility being constructed) will comply with the applicable effluent limitation and water quality standards. In California, this 401 certification is obtained from the Regional Water Quality Control Board. The Corps, by law, cannot issue a Section 404 permit until a 401 certification is issued or waived.

Subsequent to the SWANCC decision, the Chief Counsel for the State Water Resources Control Board issued a memorandum that addressed the effects of the SWANCC decision on the Section 401 Water Quality Certification Program. The memorandum states:

> *California's right and duty to evaluate certification requests under section 401 is pendant to (or dependent upon) a valid application for a section 404 permit from the Corps, or another application for a federal license or permit. Thus, if the Corps determines that the water body in question is not subject to regulation under the COE's 404 program, for instance, no application for 401 certification will be required…*
>
> *The SWANCC decision does not affect the Porter Cologne authorities to regulate discharges to isolated, non-navigable waters of the states….*
>
> *Water Code section 13260 requires "any person discharging waste, or proposing to discharge waste, within any region that could affect the waters of the state to file a report of discharge (an application for waste discharge requirements)." (Water Code § 13260(a)(1) (emphasis added).) The term "waters of the state" is defined as "any surface water or groundwater, including saline waters, within the boundaries of the state." (Water Code § 13050(e).) The U.S. Supreme Court's ruling in SWANCC has no bearing on the Porter-Cologne definition. While all waters of the United States that are within the borders of California are also waters of the state, the converse is not true—waters of the United States is a subset of waters of the state. Thus, since Porter-Cologne was enacted California always had and retains authority to regulate discharges of waste into any waters of the state, regardless of whether the COE has concurrent jurisdiction under section 404. The fact that often Regional Boards opted to regulate discharges to, e.g., vernal pools, through the 401 program in lieu of or in addition to issuing waste discharge requirements (or waivers thereof) does not preclude the regions*

from issuing WDRs (or waivers of WDRs) in the absence of a request for 401 certification.…

In this memorandum, the SWRCB's Chief Counsel has made the clear assumption that fill material to be discharged into isolated waters of the United States is to be considered equivalent to "waste" and therefore subject to the authority of the Porter Cologne Water Quality Act.

3.4 California Department of Fish and Wildlife

Pursuant to Division 2, Chapter 6, Sections 1600-1603 of the California Fish and Game Code, the CDFW regulates all diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake, which supports fish or wildlife.

CDFW defines a stream (including creeks and rivers) as "a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life. This includes watercourses having surface or subsurface flow that supports or has supported riparian vegetation." CDFW's definition of "lake" includes "natural lakes or man-made reservoirs." CDFW also defines a stream as "a body of water that flows, or has flowed, over a given course during the historic hydrologic regime, and where the width of its course can reasonably be identified by physical or biological indicators."

It is important to note that the Fish and Game Code defines fish and wildlife to include: all wild animals, birds, plants, fish, amphibians, invertebrates, reptiles, and related ecological communities including the habitat upon which they depend for continued viability (FGC Division 5, Chapter 1, section 45 and Division 2, Chapter 1 section 711.2(a) respectively). Furthermore, Division 2, Chapter 5, Article 6, Section 1600 et seq. of the California Fish and Game Code does not limit jurisdiction to areas defined by specific flow events, seasonal changes in water flow, or presence/absence of vegetation types or communities.

3.5 Central/Coastal Natural Communities Conservation Program/Habitat Conservation Plan

The California Fish and Game Commission voted in favor of pursuing preparation of a Natural Communities Conservation Plan (NCCP), as proposed by pursuing preparation of a NCCP program, as proposed by Assembly Bill ("AB") 2172 (California Fish and Game Code, Sections 2800 et seq.). AB 2172 authorizes the CDFW to enter agreements with any person or local, State, or federal agencies for preparing and implementing NCCPs and for preparing guidelines for developing and implementing NCCPs.

The purpose of the NCCP program is to provide regional or area wide protection and to promote perpetuation of natural wildlife diversity while allowing compatible and appropriate development and growth. The focus of the NCCP program represents a dramatic shift from "individual species" to "habitat" preservation.

The County of Orange (in conjunction with State and federal resource agencies, local jurisdictions/municipalities, utility companies, the Transportation Corridor Agencies, and major

private landowners) prepared the NCCP/Habitat Conservation Plan ("HCP") for the Central/Coastal Subregion (approved on July 10, 1996). The City of Lake Forest is a signatory to the NCCP/HCP. This NCCP/HCP is intended to ensure the long-term survival of the coastal California gnatcatcher and other special status, coastal sage scrub dependent plant and wildlife species, in accordance with State-sanctioned NCCP program guidelines. The Project site is located within the Central/Coastal Subregion of Orange County, California. (OCCCNCCP, 1996) but the project applicant is a non-participating landowner. As such there are no specific requirements of the Plan that applies to this project.

4.0 RESULTS

This section provides the results of general biological surveys, vegetation mapping, habitat assessments and focused surveys for special-status plants and animals (BUOW, CAGN, LBV, SWWF), and a jurisdictional delineation for Waters of the United States (including wetlands) subject to the jurisdiction of the Corps and Regional Board, and streams (including riparian vegetation) and lakes subject to the jurisdiction of CDFW.

4.1 Existing Conditions

The site consists of an active commercial nursery operation with an elevation ranging from approximately 670 feet above mean sea level (amsl) to 750 feet amsl, is relatively flat with a single rolling hill, and gently slopes from northeast to southwest.

Agricultural land uses consisting of an active nursery operation occupy the vast majority of the site. Nursery activities have remained active since 1979, causing a general lack of native vegetation communities on the site, with the exception of a small patch of remnant coastal sage scrub occurring within the southeastern corner of the site and riparian forest located within Serrano Creek along the southeastern boundary of the site. A water quality treatment ditch designed to infiltrate flows prior to leaving the property bisects the site and is routinely maintained free of vegetation. Developed areas consisting of equipment maintenance buildings and nursery offices were also observed at the site.

4.2 Vegetation

During vegetation mapping of the Project site, four different habitat (vegetation) types were identified. Table 4-1 provides a summary of vegetation types/land uses and the corresponding acreage. Detailed descriptions of each vegetation type follow the table. A Vegetation Map is attached as Exhibit 3. Photographs depicting the various vegetation types and land uses are attached as Exhibit 6.

Table 4-1. Summary of Vegetation/Land Use Types for the Project Site

OC Habitat Types[1]	OC Habitat Code**	Acreage
*Maritime Succulent Scrub/Southern Cactus Scrub	3.1.5	0.28
*Southern Black Willow Forest	7.7	2.17
Active Agriculture	14.5	118.66
Bare Ground/Developed	15.0	3.44
Habitat Total		**124.55**

Notes:
**Gray & Bramlet County of Orange Habitat Classification System, 1992
*Coastal sage scrub; special-status vegetation type per Gray & Bramlet.

4.2.1 Maritime Succulent Scrub/Southern Cactus Scrub (Coastal Sage Scrub)

The 0.28 acre of maritime succulent scrub occurs along the southwestern boundary of the property. It appears to be a remnant patch from when lands in the vicinity were covered with natural vegetation including this form of sage scrub. This patch is vegetated with coast prickly pear (*Opuntia littoralis*), lemonade berry (*Rhus integrifolia*), California sagebrush (*Artemisia californica*), and telegraph weed (*Heterotheca grandiflora*). This native scrub is highly degraded at this location due to invasive weedy garden escapees from the nursery operation and is not expected to support wildlife associated with larger stands of sage scrub. A focused survey for CAGN, an obligate sage scrub species that is federally listed as Threatened, was performed only due to the proximity of this patch to Serrano Creek and hence the prospect of a CAGN visiting this area while moving up or downstream to reach existing open space well north and south of the Project site.

4.2.2 Southern Black Willow Forest

Approximately 2.17 acres of riparian forest, best characterized as southern black willow forest[12] was mapped within project site, and is associated with Serrano Creek. This vegetation type consists of a mix of native riparian and non-native plant species and includes Eucalyptus (*Eucalyptus* sp.), coast live oak (*Quercus agrifolia*), western sycamore (*Platanus racemosa*), Fremont cottonwood (*Populus fremontii*), black willow (*Salix gooddingii*), mule fat (*Baccharis salicifolia*), toyon (*Heteromeles arbutifolia*), Spanish dagger (*Yucca gloriosa*), and mission prickly-pear (*Opuntia ficus-indica*).

4.2.3 Active Agriculture

Project site is characterized as active agriculture (nursery stock). The agricultural land use, consisting of the active nursery operation, contains a variety of non-native ornamental plant species, grown in containers for commercial resale.

The two other vegetation types, maritime succulent scrub and southern black willow forest are considered special-status vegetation communities (habitats). Refer to Section 4.3 for a discussion of these.

4.2.4 Bare Ground/Developed

Approximately 3.44 acre of bare ground/developed land occurs between Rancho Parkway and the existing nursery and between Bake Parkway and the existing nursery. This land is outside the nursery property but is proposed for improvements. This area is bare ground, portions of which have been planted with ornamental trees including Peruvian pepper tree and coast live oak.

4.2 Wildlife

Animal species observed consisted of common avian species, and included common raven (*Corvus corax*), western kingbird (*Tyrannus verticalis*), northern mockingbird (*Mimus polyglottos*), mourning dove (*Zenaida macroura),* California towhee (*Melozone crissalis*), house finch (*Haemorhous mexicanus*), Bewick's wren (*Thryomanes bewickii*), and Say's phoebe (*Sayornis saya*).

Two special-status species of wildlife were detected during the 2017 field studies, Willow flycatcher (*Empidonax traillii*) and Yellow warbler (*Setophaga petechia*). Refer to Section 4.5 for further discussion.

4.3 Special-Status Vegetation Communities (Habitats)

The CNDDB identifies the following eight special-status vegetation communities for the 9-quad search, using the El Toro quad with surrounding quadrangle maps (Table 4-2). The CNDDB query is simply used as a guide for what depleted habitats may occur in the region.

Table 4-2. Summary of CNDDB Query - Special Status Habitats

CNDDB Query – Special Status Habitats	Habitat Type	Determination
Valley Needlegrass Grassland	Herbaceous	Absent.
Southern Coast Live Oak Riparian Forest	Riparian	Absent.
Southern Cottonwood Willow Riparian Forest	Riparian	Absent.
Southern Mixed Riparian Forest	Riparian	Southern Black Willow Forest is present. Refer to discussion below.
Canyon Live Oak Ravine Forest	Riparian	Absent.
Southern Sycamore Alder Riparian Woodland	Riparian	Absent.
Southern Riparian Scrub	Riparian	Southern Black Willow Forest is present. Refer to discussion below.
Southern Interior Cypress Forest	Forest	Absent.

None of the CNDDB special status habitats are present on the Project site, as classified. However, Serrano Creek is vegetated with southern black willow forest which is similar to southern mixed riparian forest and southern riparian scrub. In addition, a small patch of remnant maritime succulent scrub is present along the southwestern boundary of the property. Both of these vegetation types can provide valuable habitat to a wide range of species associated with riparian habitats and sage scrub habitats, both of which have declined appreciably over the past several decades in Orange County and coastal southern California.

4.4 Special-Status Plants

No special-status plants were detected at the Project site. Table 4-3 provides a list of special-status plants evaluated for the potential to occur on the Project site through general biological surveys, habitat assessments, and focused surveys. The list of species evaluated was based on the following factors: 1) species identified by the CNDDB and CNPS as occurring (either currently or historically) on or in the vicinity of the Project site, and 2) any other special-status plants that are known to occur within the vicinity of the Project site, or for which potentially suitable habitat occurs within the site.

Table 4-3. Special-Status Plants Evaluated for the Project Site

Status

Federal
FE – Federally Endangered
FT – Federally Threatened
FC – Federal Candidate

State
SE – State Endangered
ST – State Threatened

CNPS
Rank 1A – Plants presumed extirpated in California and either rare or extinct elsewhere.
Rank 1B – Plants rare, threatened, or endangered in California and elsewhere.
Rank 2A – Plants presumed extirpated in California, but common elsewhere.
Rank 2B – Plants rare, threatened, or endangered in California, but more common elsewhere.
Rank 3 – Plants about which more information is needed (a review list).
Rank 4 – Plants of limited distribution (a watch list).

CNPS Threat Code extension
.1 – Seriously endangered in California (over 80% occurrences threatened)
.2 – Fairly endangered in California (20-80% occurrences threatened)
.3 – Not very endangered in California (<20% of occurrences threatened or no current threats known)

Occurrence

- Does not occur – The site does not contain habitat for the species and/or the site does not occur within the geographic range of the species.
- Absent – The site contains suitable habitat for the species, but the species has been confirmed absent through focused surveys.
- Not expected to occur – The species is not expected to occur onsite due to low habitat quality, however absence cannot be ruled out.
- Potential to occur – The species has a potential to occur onsite based on suitable habitat, however its presence/absence could not be confirmed.
- Present – The species was detected onsite incidentally or through focused surveys.

Species Name	Status	Habitat Requirements	Potential for Occurrence
Allen's pentachaeta *Pentachaeta aurea* ssp. *allenii*	Federal: None State: None CNPS: Rank 1B.1	Openings in coastal sage scrub, and valley and foothill grasslands.	Absent. Not detected during focused surveys.
Aphanisma *Aphanisma blitoides*	Federal: None State: None CNPS: Rank 1B.2	Sandy soils in coastal bluff scrub, coastal dunes, and coastal scrub.	Does not occur. Necessary habitat components for species are absent from the project site.
Big-leaved crownbeard *Verbesina dissita*	Federal: FT State: ST CNPS: Rank 1B.1	Southern maritime chaparral, coastal sage scrub	Absent. Not detected during focused surveys.
Braunton's milk-vetch *Astragalus brauntonii*	Federal: FE State: None CNPS: Rank 1B.1	Closed-cone coniferous forest, chaparral, coastal sage scrub, valley and foothill grassland. Usually carbonate soils. Recent burn or disturbed areas.	Does not occur. Necessary habitat components for species are absent from the project site.
Brewer's calandrinia *Calandrinia breweri*	Federal: None State: None CNPS: Rank 4.2	Sandy or loamy soils in disturbed sites and burns. Chaparral, coastal scrub.	Does not occur. Necessary habitat components for species are absent from the project site.
California beardtongue *Penstemon californicus*	Federal: None State: None CNPS: Rank 1B.2	Sandy soils in chaparral, lower montane coniferous forest, and pinyon and juniper woodland.	Does not occur. Necessary habitat components for species are absent from the project site.
California box-thorn *Lycium californicum*	Federal: None State: None CNPS: Rank 4.2	Coastal bluff scrub, coastal scrub.	Does not occur. Necessary habitat components for species are absent from the project site.
California mariposa lily *Calochortus catalinae*	Federal: None State: None CNPS: Rank 4.2	Chaparral, cismontane woodland, coastal scrub, valley and foothill grassland.	Does not occur. Necessary habitat components for species are absent from the project site.
California satintail *Imperata brevifolia*	Federal: None State: None CNPS: Rank 2B.1	Mesic soils in chaparral, coastal scrub, Mojavean desert scrub, meadows and seeps (often alkali), and riparian scrub.	Does not occur. Necessary habitat components for species are absent from the project site.
California mariposa lily *Calochortus catalinae*	Federal: None State: None CNPS: Rank 4.2	Chaparral, cismontane woodland, coastal scrub, valley and foothill grassland.	Does not occur. Necessary habitat components for species are absent from the project site.
Chaparral nolina *Nolina cismontana*	Federal: None State: None CNPS: Rank 1B.2	Chaparral, coastal sage scrub. Occurring on sandstone or gabbro substrates.	Does not occur. Necessary habitat components for species are absent from the project site.

Species Name	Status	Habitat Requirements	Potential for Occurrence
Chaparral ragwort *Senecio aphanactis*	Federal: None State: None CNPS: Rank 2B.2	Chaparral, cismontane woodland, coastal scrub. Sometimes associated with alkaline soils.	Absent. Not detected during focused surveys.
Chaparral rein orchid *Piperia cooperi*	Federal: None State: None CNPS: Rank 4.2	Chaparral, cismontane woodland, valley and foothill grassland.	Does not occur. Necessary habitat components for species are absent from the project site.
Chaparral sand-verbena *Abronia villosa* var. *aurita*	Federal: None State: None CNPS: Rank 1B.1	Sandy soils in chaparral, coastal sage scrub.	Does not occur. Necessary habitat components for species are absent from the project site.
Cleveland's bush monkeyflower *Mimulus clevelandii*	Federal: None State: None CNPS: Rank 4.2	Gabbroic soils, often in disturbed areas, openings, rocky. Chaparral, cismontane woodland, lower montane coniferous forest.	Does not occur. Necessary habitat components for species are absent from the project site.
Cliff malacothrix *Malacothrix saxatilis* var. *saxatilis*	Federal: None State: None CNPS: Rank 4.2	Coastal bluff scrub, coastal scrub.	Does not occur. Necessary habitat components for species are absent from the project site.
Cliff spurge *Euphorbia misera*	Federal: None State: None CNPS: Rank 2B.2	Coastal bluff scrub and coastal sage scrub. Occurring on rocky soils.	Does not occur. Necessary habitat components for species are absent from the project site.
Coulter's goldfields *Lasthenia glabrata* ssp. *coulteri*	Federal: None State: None CNPS: Rank 1B.1	Playas, vernal pools, marshes and swamps (coastal salt).	Does not occur. Necessary habitat components for species are absent from the project site.
Coulter's matilija poppy *Romneya coulteri*	Federal: None State: None CNPS: Rank 4.2	Often in burns in chaparral and coastal scrub.	Does not occur. Necessary habitat components for species are absent from the project site.
Coulter's saltbush *Atriplex coulteri*	Federal: None State: None CNPS: Rank 1B.2	Coastal bluff scrub, coastal dunes, coastal sage scrub, valley and foothill grassland. Occurring on alkaline or clay soils.	Does not occur. Necessary habitat components for species are absent from the project site.
Davidson's saltscale *Atriplex serenana* var. *davidsonii*	Federal: None State: None CNPS: Rank 1B.2	Alkaline soils in coastal sage scrub, coastal bluff scrub.	Does not occur. Necessary habitat components for species are absent from the project site.

Species Name	Status	Habitat Requirements	Potential for Occurrence
Decumbent goldenbush *Isocoma menziesii* var. *decumbens*	Federal: None State: None CNPS: Rank 1B.2	Chaparral, coastal scrub (sandy, often in disturbed areas)	Does not occur. Necessary habitat components for species are absent from the project site.
Estuary seablite *Suaeda esteroa*	Federal: None State: None CNPS: Rank 1B.2	Coastal salt marsh and swamps. Occurring in sandy soils	Does not occur. Necessary habitat components for species are absent from the project site.
Fish's milkwort *Polygala cornuta* var. *fishae*	Federal: None State: None CNPS: Rank 4.3	Chaparral, cismontane woodland, riparian woodland.	Does not occur. Necessary habitat components for species are absent from the project site.
Hall's monardella *Monardella macrantha* ssp. *hallii*	Federal: None State: None CNPS: Rank 1B.3	Occurs on dry slopes and ridges within openings in broadleaved upland forest, chaparral, lower montane coniferous forest, cismontane woodland, and valley and foothill grassland.	Does not occur. Necessary habitat components for species are absent from the project site.
Heart-leaved pitcher sage *Lepechinia cardiophylla*	Federal: None State: None CNPS: Rank 1B.2	Closed-cone coniferous forest, chaparral, and cismontane woodland.	Does not occur. Necessary habitat components for species are absent from the project site.
Intermediate (foothill) mariposa-lily *Calochortus weedii* var. *intermedius*	Federal: None State: None CNPS: Rank 1B.2	Rocky soils in chaparral, coastal sage scrub, valley and foothill grassland.	Absent. Not detected during focused surveys.
Intermediate monardella *Monardella hypoleuca* ssp. *intermedia*	Federal: None State: None CNPS: Rank 1B.3	Usually in the understory of chaparral, cismontane woodland, and lower montane coniferous forest (sometimes)	Does not occur. Necessary habitat components for species are absent from the project site.
Laguna Beach dudleya *Dudleya stolonifera*	Federal: FT State: ST CNPS: Rank 1B.1	Chaparral, cismontane woodland, coastal sage scrub, valley and foothill grassland. Occurring on rocky soils.	Does not occur. Necessary habitat components for species are absent from the project site.
Lewis' evening-primrose *Camissoniopsis lewisii*	Federal: None State: None CNPS: Rank 3	Sandy or clay soils in coastal bluff scrub, cismontane woodland, coastal dunes, coastal scrub, and valley and foothill grassland.	Does not occur. Necessary habitat components for species are absent from the project site.
Long-spined spineflower *Chorizanthe polygonoides* var. *longispina*	Federal: None State: None CNPS: Rank 1B.2	Clay soils in chaparral, coastal sage scrub, meadows and seeps, and valley and foothill grasslands	Does not occur. Necessary habitat components for species are absent from the project site.

Species Name	Status	Habitat Requirements	Potential for Occurrence
Malibu baccharis *Baccharis malibuensis*	Federal: None State: None CNPS: Rank 1B.1	Chaparral, cismontane woodland, coastal sage scrub.	Absent. Not detected during focused surveys.
Many-stemmed dudleya *Dudleya multicaulis*	Federal: None State: None CNPS: Rank 1B.2	Chaparral, coastal sage scrub, valley and foothill grassland. Often occurring in clay soils.	Does not occur. Necessary habitat components for species are absent from the project site.
Mesa horkelia *Horkelia cuneata* var. *puberula*	Federal: None State: None CNPS: Rank 1B.1	Sandy or gravelly soils in chaparral (maritime), cismontane woodland, and coastal scrub.	Does not occur. Necessary habitat components for species are absent from the project site.
Mud nama *Nama stenocarpa*	Federal: None State: None CNPS: Rank 2B.2	Marshes and swamps	Does not occur. Necessary habitat components for species are absent from the project site.
Munz's onion *Allium munzii*	Federal: FE State: ST CNPS: Rank 1B.1	Clay soils in chaparral, coastal sage scrub, and valley and foothill grasslands	Does not occur. Necessary habitat components for species are absent from the project site.
Narrow-petaled rein orchid *Piperia leptopetala*	Federal: None State: None CNPS: Rank 4.3	Cismontane woodland, lower montane coniferous forest, upper montane coniferous forest.	Does not occur. Necessary habitat components for species are absent from the project site.
Nuttall's scrub oak *Quercus dumosa*	Federal: None State: None CNPS: Rank 1B.1	Closed-cone coniferous forest, chaparral, and coastal sage scrub. Occurring on sandy, clay loam soils.	Absent. Not detected during focused surveys.
Ocellated humboldt lily *Lilium humboldtii* ssp. *ocellatum*	Federal: None State: None CNPS: Rank 4.2	Chaparral, cismontane woodland, coastal sage scrub, lower montane coniferous forest, riparian woodland. Occurring in openings.	Does not occur. Necessary habitat components for species are absent from the project site.
Orcutt's pincushion *Chaenactis glabriuscula* var. *orcuttiana*	Federal: None State: None CNPS: Rank 1B.1	Coastal bluff scrub (sandy soils) and coastal dunes.	Does not occur. Necessary habitat components for species are absent from the project site.
Palmer's grapplinghook *Harpagonella palmeri*	Federal: None State: None CNPS: Rank 4.2	Chaparral, coastal sage scrub, valley and foothill grassland. Occurring in clay soils.	Does not occur. Necessary habitat components for species are absent from the project site.
Palomar monkeyflower *Mimulus diffusus*	Federal: None State: None CNPS: Rank 4.3	Sandy or gravelly soils in chaparral, lower montane coniferous forest.	Does not occur. Necessary habitat components for species are absent from the project site.

Species Name	Status	Habitat Requirements	Potential for Occurrence
Paniculate tarplant *Deinandra paniculata*	Federal: None State: None CNPS: Rank 4.2	Usually in vernally mesic, sometimes sandy soils in coastal scrub, valley and foothill grassland, and vernal pools.	Does not occur. Necessary habitat components for species are absent from the project site.
Parish's brittlescale *Atriplex parishii*	Federal: None State: None CNPS: Rank 1B.1	Chenopod scrub, playas, vernal pools.	Does not occur. Necessary habitat components for species are absent from the project site.
Parry's tetracoccus *Tetracoccus dioicus*	Federal: None State: None CNPS: Rank 1B.2	Chaparral and coastal sage scrub.	Does not occur. Necessary habitat components for species are absent from the project site.
Payson's jewelflower *Caulanthus simulans*	Federal: None State: None CNPS: Rank 4.2	Sandy or granitic soils in chaparral and coastal scrub.	Does not occur. Necessary habitat components for species are absent from the project site.
Peninsular spineflower *Chorizanthe leptotheca*	Federal: None State: None CNPS: Rank 4.2	Alluvial fan, granitic. Chaparral, coastal scrub, lower montane coniferous forest.	Does not occur. Necessary habitat components for species are absent from the project site.
Plummer's mariposa lily *Calochortus plummerae*	Federal: None State: None CNPS: Rank 4.2	Granitic, rock soils within chaparral, cismontane woodland, coastal sage scrub, lower montane coniferous forest, valley and foothill grassland.	Absent. Not detected during focused surveys.
Prostrate vernal pool navarretia *Navarretia prostrata*	Federal: None State: None CNPS: Rank 1B.1	Coastal sage scrub, valley and foothill grassland (alkaline), vernal pools. Occurring in mesic soils.	Does not occur. Necessary habitat components for species are absent from the project site.
Robinson's pepper grass *Lepidium virginicum* var. *robinsonii*	Federal: None State: None CNPS: Rank 4.3	Chaparral, coastal sage scrub	Does not occur. Necessary habitat components for species are absent from the project site.
Salt Spring checkerbloom *Sidalcea neomexicana*	Federal: None State: None CNPS: Rank 2B.2	Mesic, alkaline soils in chaparral, coastal sage scrub, lower montane coniferous forest, Mojavean desert scrub, and playas.	Does not occur. Necessary habitat components for species are absent from the project site.
San Bernardino aster *Symphyotrichum defoliatum*	Federal: None State: None CNPS: Rank 1B.2	Cismontane woodland, coastal scrub, lower montane coniferous forest, meadows and seeps, marshes and swamps, valley and foothill grassland (vernally mesic).	Does not occur. Necessary habitat components for species are absent from the project site.

Species Name	Status	Habitat Requirements	Potential for Occurrence
San Fernando Valley spineflower *Chorizanthe parryi* var. *fernandina*	Federal: Candidate State: SE CNPS: Rank 1B.1	Coastal sage scrub, occurring on sandy soils.	Does not occur. Necessary habitat components for species are absent from the project site.
San Miguel savory *Clinopodium chandleri*	Federal: None State: None CNPS: Rank 1B.2	Rocky, gabbroic, or metavolcanic soils in chaparral, cismontane woodland, coastal sage scrub, riparian woodland, valley and foothill grassland.	Does not occur. Necessary habitat components for species are absent from the project site.
Santa Ana River woolly star *Eriastrum densifolium* ssp. *sanctorum*	Federal: FE State: SE CNPS: Rank 1B.1	Alluvial fan sage scrub, chaparral. Occurring on sandy or rocky soils.	Does not occur. Necessary habitat components for species are absent from the project site.
Santa Monica dudleya *Dudleya cymosa* ssp. *ovatifolia*	Federal: FT State: None CNPS: Rank 1B.1	Chaparral, coastal sage scrub. Occurring on volcanic soils.	Does not occur. Necessary habitat components for species are absent from the project site.
Santiago Peak phacelia *Phacelia keckii*	Federal: None State: None CNPS: Rank 1B.3	Closed-cone coniferous forest, chaparral	Does not occur. Necessary habitat components for species are absent from the project site.
Seaside cistanthe *Cistanthe maritima*	Federal: None State: None CNPS: Rank 4.2	Sandy soils in coastal bluff scrub, coastal scrub, and valley and foothill grassland.	Does not occur. Necessary habitat components for species are absent from the project site.
Slender-horned spineflower *Dodecahema leptoceras*	Federal: FE State: SE CNPS: Rank 1B.1	Sandy soils in alluvial scrub, chaparral, cismontane woodland.	Does not occur. Necessary habitat components for species are absent from the project site.
Small-flowered morning-glory *Convolvulus simulans*	Federal: None State: None CNPS: Rank 4.2	Chaparral (openings), coastal sage scrub, valley and foothill grassland. Occurring on clay soils and serpentinite seeps.	Does not occur. Necessary habitat components for species are absent from the project site.
Smooth tarplant *Centromadia pungens* ssp. *laevis*	Federal: None State: None CNPS: Rank 1B.1	Alkaline soils in chenopod scrub, meadows and seeps, playas, riparian woodland, valley and foothill grasslands, disturbed habitats.	Does not occur. Necessary habitat components for species are absent from the project site.
South coast branching phacelia *Phacelia ramosissima* var. *austrolitoralis*	Federal: None State: None CNPS: Rank 3.2	Sandy, sometimes rocky soils in chaparral, coastal dunes, coastal scrub, and marshes and swamps (coastal salt)	Does not occur. Necessary habitat components for species are absent from the project site.

Species Name	Status	Habitat Requirements	Potential for Occurrence
South coast saltscale *Atriplex pacifica*	Federal: None State: None CNPS: Rank 1B.2	Coastal bluff scrub, coastal dunes, coastal sage scrub, playas.	Does not occur. Necessary habitat components for species are absent from the project site.
Southern tarplant *Centromadia parryi* ssp. *australis*	Federal: None State: None CNPS: Rank 1B.1	Disturbed habitats, margins of marshes and swamps, vernally mesic valley and foothill grassland, vernal pools.	Does not occur. Necessary habitat components for species are absent from the project site.
Sticky dudleya *Dudleya viscida*	Federal: None State: None CNPS: Rank 1B.2	Coastal bluff scrub, chaparral, coastal sage scrub. Occurring on rocky soils.	Does not occur. Necessary habitat components for species are absent from the project site.
Summer holly *Comarostaphylis diversifolia* ssp. *diversifolia*	Federal: None State: None CNPS: Rank 1B.2	Chaparral.	Does not occur. Necessary habitat components for species are absent from the project site.
Tecate cypress *Hesperocyparis forbesii*	Federal: None State: None CNPS: Rank 1B.1	Closed-cone coniferous forest, chaparral.	Does not occur. Necessary habitat components for species are absent from the project site.
Thread-leaved brodiaea *Brodiaea filifolia*	Federal: FT State: SE CNPS: Rank 1B.1	Clay soils in chaparral (openings), cismontane woodland, coastal sage scrub, playas, valley and foothill grassland, vernal pools.	Does not occur. Necessary habitat components for species are absent from the project site.
Vernal barley *Hordeum intercedens*	Federal: None State: None CNPS: Rank 3.2	Coastal dunes, coastal sage scrub, valley and foothill grassland (saline flats and depressions), vernal pools.	Does not occur. Necessary habitat components for species are absent from the project site.
Western dichondra *Dichondra occidentalis*	Federal: None State: None CNPS: Rank 4.2	Chaparral, cismontane woodland, coastal scrub, valley and foothill grassland.	Does not occur. Necessary habitat components for species are absent from the project site.
Western spleenwort *Asplenium vespertinum*	Federal: None State: None CNPS: Rank 4.2	Rocky soils in chaparral, cismontane woodland, and coastal scrub.	Does not occur. Necessary habitat components for species are absent from the project site.
White rabbit-tobacco *Pseudognaphalium leucocephalum*	Federal: None State: None CNPS: Rank 2B.2	Sandy or gravelly soils in chaparral, cismontane woodland, coastal scrub, and riparian woodland.	Absent. Not detected during focused surveys.

Species Name	Status	Habitat Requirements	Potential for Occurrence
White-bracted spineflower *Chorizanthe xanti* var. *leucotheca*	Federal: None State: None CNPS: Rank 1B.2	Sandy or gravelly soils in Mojavean desert scrub and pinyon and juniper woodland.	Does not occur. Necessary habitat components for species are absent from the project site.
Woolly chaparral-pea *Pickeringia montana* var. *tomentosa*	Federal: None State: None CNPS: Rank 4.3	Gabbroic, granitic, and clay soils in chaparral.	Does not occur. Necessary habitat components for species are absent from the project site.

4.4.1 Special-Status Plants Detected at the Project Site

Eight species of special-status plants were initially judged to have potential to occur on the Project site, based on a preliminary review of habitat needs and site conditions. A focused plant survey was performed and special-status plant species were confirmed absent from the project site.

4.5 Special-Status Animals

The following special-status animals were detected at the Project site, Willow flycatcher (*Empidonax traillii*) and Yellow warbler (*Setophaga petechia*).

Table 4-4 provides a list of special-status animals evaluated for the Project site through general biological surveys, habitat assessments, and focused surveys. Species were evaluated based on the following factors, including: 1) species identified by the CNDDB as occurring (either currently or historically) on or in the vicinity of the Project site, and 2) any other special-status animals that are known to occur within the vicinity of the Project site, for which potentially suitable habitat occurs on the site.

Table 4-4. Special Status Animals Evaluated for the Project Site

Status

Federal	**State**
FE – Federally Endangered	SE – State Endangered
FT – Federally Threatened	ST – State Threatened
FPT – Federally Proposed Threatened	SC– State Candidate
FC – Federal Candidate	CFP – California Fully-Protected Species
BGEPA– Bald and Golden Eagle Protection Act	SSC – Species of Special Concern

Occurrence

- Absent – The species is absent from the site, either because the site lacks suitable habitat for the species, the site is located outside of the known range of the species, or focused surveys has confirmed the absence of the species.

- Not expected to occur – Absence cannot be ruled out however the species' potential for occurrence is judged less than reasonable and its presence would be rare, if at all.
- Potential to occur – The species has a potential to occur onsite based on suitable habitat, however its presence/absence could not be confirmed.
- Present – The species was detected onsite incidentally or through focused surveys.

Species Name	Status	Habitat Requirements	Occurrence
Invertebrates			
Quino checkerspot butterfly *Euphydryas editha quino*	Federal: FE State: None	Larval and adult phases each have distinct habitat requirements tied to host plant species and topography. Larval host plants include *Plantago erecta* and *Castilleja exserta*. Adults occur on sparsely vegetated rounded hilltops and ridgelines, and are known to disperse through disturbed habitats to reach suitable nectar plants.	Absent. Project site outside species range and does not support habitat needs of the species.
Riverside fairy shrimp *Streptocephalus woottoni*	Federal: FE State: None	Restricted to deep seasonal vernal pools, vernal pool-like ephemeral ponds, and stock ponds.	Absent. Site lacks vernal pools.
San Diego fairy shrimp *Branchinecta sandiegonensis*	Federal: FE State: None	Seasonal vernal pools	Absent. Site lacks vernal pools.
Fish			
Arroyo chub *Gila orcutti*	Federal: None State: SSC	Slow-moving or backwater sections of warm to cool streams with substrates of sand or mud.	Absent. Serrano Creek has ephemeral hydrology and lacks connectivity with perennial streams that may support this species.
Santa Ana speckled dace *Rhinichthys osculus ssp. 3*	Federal: None State: SSC	Occurs in the headwaters of the Santa Ana and San Gabriel Rivers. May be extirpated from the Los Angeles River system. Requires permanent flowing streams with summer water temperatures of 17-20 C. Usually inhabits shallow cobble and gravel riffles.	Absent. Serrano Creek has ephemeral hydrology and lacks connectivity with perennial streams that may support this species.
Southern steelhead - southern California DPS *Oncorhynchus mykiss irideus*	Federal: FE State: SSC	Clear, swift moving streams with gravel for spawning. Federal listing refers to populations from Santa Maria river south to southern extent of range (San Mateo Creek in San Diego county.)	Absent. Serrano Creek has ephemeral hydrology and lacks connectivity with perennial streams that may support this species.

Species Name	Status	Habitat Requirements	Occurrence
Amphibians			
Arroyo toad *Anaxyrus californicus*	Federal: FE State: SSC	Breed, forage, and/or aestivate in aquatic habitats, riparian, coastal sage scrub, oak, and chaparral habitats. Breeding pools must be open and shallow with minimal current, and with a sand or pea gravel substrate overlain with sand or flocculent silt. Adjacent banks with sandy or gravely terraces and very little herbaceous cover for adult and juvenile foraging areas, within a moderate riparian canopy of cottonwood, willow, or oak.	Absent. Lack of suitable habitat onsite.
Coast Range newt *Taricha torosa*	Federal: None State: SSC	Found in wet forests, oak forests, chaparral, and rolling grasslands. In southern California, drier chaparral, oak woodland, and grasslands are used.	Absent. Lack of suitable habitat onsite.
Western spadefoot *Spea hammondii*	Federal: None State: SSC	Seasonal pools in coastal sage scrub, chaparral, and grassland habitats.	Absent. Species confirmed absent in the several small, shallow ponded areas located within the Water Quality Treatment Ditch.
Reptiles			
California glossy snake *Arizona elegans occidentalis*	Federal: None State: SSC	Inhabits arid scrub, rocky washes, grasslands, chaparral.	Absent. Lack of suitable habitat.
California mountain kingsnake (San Diego population) *Lampropeltis zonata (pulchra)*	Federal: None State: SSC	A habitat generalist, found in diverse habitats including coniferous forest, oak-pine woodlands, riparian woodland, chaparral, manzanita, and coastal sage scrub.	Absent. Outside of elevation range.
Coastal whiptail *Aspidoscelis tigris stejnegeri (multiscutatus)*	Federal: None State: SSC	Open, often rocky areas with little vegetation, or sunny microhabitats within shrub or grassland associations.	Not expected to occur. Site lacks live-in habitat.
Coast horned lizard *Phrynosoma blainvillii*	Federal: None State: SSC	Occurs in a variety of vegetation types including coastal sage scrub, chaparral, annual grassland, oak woodland, and riparian woodlands.	Not expected to occur. Site lacks live-in habitat.
Coast patch-nosed snake *Salvadora hexalepis virgultea*	Federal: None State: SSC	Occurs in coastal chaparral, desert scrub, washes, sandy flats, and rocky areas.	Not expected to occur. Site lacks live-in habitat.
Coronado Island skink *Plestiodon skiltonianus interparietalis*	Federal: None State: SSC	Grassland, woodlands, pine forests, chaparral, especially in open sunny areas such as clearings and the edges of creeks and rivers. Prefers rocky areas near streams with lots of vegetation. Also, found in areas away from water.	Absent. Note: Separated into two species. Range no longer overlaps with Orange County.
Red-diamond rattlesnake *Crotalus ruber*	Federal: None State: SSC	Habitats with heavy brush and rock outcrops, including coastal sage scrub and chaparral.	Not expected to occur. Site lacks live-in habitat.

Species Name	Status	Habitat Requirements	Occurrence
Two-striped garter snake *Thamnophis hammondii*	Federal: None State: SSC	Aquatic snake typically associated with wetland habitats such as streams, creeks, and pools.	Not expected to occur given the high level of disturbance to Serrano Creek and limited hydrology of the creek, and the high level of disturbance within the Water Quality Treatment Ditch caused by regular maintenance.
Western pond turtle *Emys marmorata*	Federal: None State: SSC	Slow-moving permanent or intermittent streams, small ponds and lakes, reservoirs, abandoned gravel pits, permanent and ephemeral shallow wetlands, stock ponds, and treatment lagoons. Abundant basking sites and cover necessary, including logs, rocks, submerged vegetation, and undercut banks.	Absent, given the high level of disturbance to Serrano Creek and limited hydrology of the creek, and the high level of disturbance within the Water Quality Treatment Ditch caused by regular maintenance.
Birds			
American peregrine falcon (nesting) *Falco peregrinus anatum*	Federal: Delisted State: Delisted, FP	Breeding habitat consists of high cliffs, tall buildings, and bridges along the coast and inland. Foraging habitat primarily includes open areas near wetlands, marshes, and adjacent urban landscapes.	Absent. No potential for nesting.
Bald eagle (nesting & wintering) *Haliaeetus leucocephalus*	Federal: Delisted State: SE, FP	Primarily in or near seacoasts, rivers, swamps, and large lakes. Perching sites consist of large trees or snags with heavy limbs or broken tops.	Not expected. No potential for nesting and very unlikely to occur during migration/winter.
Burrowing owl (burrow sites & some wintering sites) *Athene cunicularia*	Federal: None State: SSC	Shortgrass prairies, grasslands, lowland scrub, agricultural lands (particularly rangelands), coastal dunes, desert floors, and some artificial, open areas as a year-long resident. Occupies abandoned ground squirrel burrows as well as artificial structures such as culverts and underpasses.	Absent. Not detected during focused surveys.
California black rail *Laterallus jamaicensis coturniculus*	Federal: None State: ST, FP	Nests in high portions of salt marshes, shallow freshwater marshes, wet meadows, and flooded grassy vegetation.	Absent. Lack of marsh habitats.

Species Name	Status	Habitat Requirements	Occurrence
Coastal cactus wren (San Diego & Orange County only) *Campylorhynchus brunneicapillus sandiegensis*	Federal: BCC State: SSC	Occurs almost exclusively in cactus (cholla and prickly pear) dominated coastal sage scrub.	Absent. Not detected during gnatcatcher focused surveys and there is not adequate habitat. The small patch of maritime succulent scrub is not adequate.
Coastal California gnatcatcher *Polioptila californica californica*	Federal: FT State: SSC	Low elevation coastal sage scrub and coastal bluff scrub.	Absent. Not detected during focused surveys.
Golden eagle (nesting & wintering) *Aquila chrysaetos*	Federal: None State: FP	In southern California, occupies grasslands, brushlands, deserts, oak savannas, open coniferous forests, and montane valleys. Nests on rock outcrops and ledges.	Not expected. No nesting potential and very unlikely to occur during migration/winter.
Grasshopper sparrow (nesting) *Ammodramus savannarum*	Federal: None State: SSC	Open grassland and prairies with patches of bare ground.	Absent; lack of grassland habitats.
Least Bell's vireo (nesting) *Vireo bellii pusillus*	Federal: FE State: SE	Dense riparian habitats with a stratified canopy, including southern willow scrub, mule fat scrub, and riparian forest.	Absent. Not detected during focused surveys.
Light-footed Ridgway rail *Rallus longirostris levipes*	Federal: FE State: SE, FP	Marsh vegetation of coastal salt marshes and freshwater wetlands, especially cordgrass habitats.	Absent; lack of marsh habitats.
Long-eared owl (nesting) *Asio otus*	Federal: None State: SSC	Riparian habitats are required by the long-eared owl, but it also uses live-oak thickets and other dense stands of trees.	Not expected to occur. Serrano Creek is too degraded and too close to development for this species.
Northern harrier (nesting) *Circus cyaneus*	Federal: None State: SSC	A variety of habitats, including open wetlands, grasslands, wet pasture, old fields, dry uplands, and croplands.	Absent. No nesting habitat present. The species could occur in a foraging role.
Southwestern willow flycatcher (nesting) *Empidonax traillii extimus*	Federal: FE State: SE	Riparian woodlands along streams and rivers with mature dense thickets of trees and shrubs.	Absent. Not detected during focused surveys.
Tricolored blackbird (nesting colony) *Agelaius tricolor*	Federal: None State: CE	Breeding colonies require nearby water, a suitable nesting substrate, and open-range foraging habitat of natural grassland, woodland, or agricultural cropland.	Absent. Lack of suitable habitat.
White-tailed kite (nesting) *Elanus leucurus*	Federal: None State: FP	Low elevation open grasslands, savannah-like habitats, agricultural areas, wetlands, and oak woodlands. Dense canopies used for nesting and cover.	Absent as a nester during the field studies. Potential to forage on site.

Species Name	Status	Habitat Requirements	Occurrence
Willow flycatcher (nesting) *Empidonax traillii*	Federal: None State: SE	Breeds in moist, shrubby areas, often with standing or running water. Winters in shrubby clearings and early successional growth.	Present. This species was detected during focused surveys in the riparian area of Serrano Creek. However, the subspecies detected was not *E. t. extimus*, but rather other subspecies that only migrate through southern California to breed elsewhere. The state Endangered Species Act does not provide protection to migrant habitat and only *E.t. extimus* is federally listed.
Yellow-breasted chat (nesting) *Icteria virens*	Federal: None State: SSC	Dense, relatively wide riparian woodlands and thickets of willows, vine tangles, and dense brush with well-developed understories.	Not expected to occur; was not detected during focused surveys for LBV and SWWF.
Yellow warbler (nesting) *Setophaga petechia*	Federal: None State: SSC	Breed in lowland and foothill riparian woodlands dominated by cottonwoods, alders, or willows and other small trees and shrubs typical of low, open-canopy riparian woodland. During migration, forages in woodland, forest, and shrub habitats.	Present. This species was detected during focused surveys for LBV and SWWF.
Mammals			
American badger *Taxidea taxus*	Federal: None State: SSC	Most abundant in drier open stages of most scrub, forest, and herbaceous habitats, with friable soils.	Absent. Potential burrows are absent from the site.
Mexican long-tongued bat *Choeronycteris mexicana*	Federal: None State: SSC	Variety of habitats ranging from desert, montane, riparian, to pinyon-juniper habitats. Found roosting in desert canyons, deep caves, mines, or rock crevices. Can use abandoned buildings.	Not expected to occur. No suitable habitat.
Pacific pocket mouse *Perognathus longimembris pacificus*	Federal: FE State: SSC	Fine, alluvial soils along the coastal plain. Scarcely in rocky soils of scrub habitats.	Absent. Lack of suitable habitat.
Pallid bat *Antrozous pallidus*	Federal: None State: SSC	Deserts, grasslands, shrublands, woodlands, and forests. Most common in open, dry habitats with rocky areas for roosting.	Not expected to occur; lack of suitable habitat.
San Diego desert woodrat *Neotoma lepida intermedia*	Federal: None State: SSC	Occurs in a variety of shrub and desert habitats, primarily associated with rock outcrops, boulders, cacti, or areas of dense undergrowth.	Absent. Middens confirmed absent during surveys.

Species Name	Status	Habitat Requirements	Occurrence
Western mastiff bat *Eumops perotis californicus*	Federal: None State: SSC	Occurs in many open, semi-arid to arid habitats, including conifer and deciduous woodlands, coastal scrub, grasslands, and chaparral. Roosts in crevices in cliff faces, high buildings, trees, and tunnels.	Potential to occur.
Western red bat *Lasiurus blossevillii*	Federal: None State: SSC	Prefers riparian areas dominated by walnuts, oaks, willows, cottonwoods, and sycamores where they roost in broad-leafed trees.	Potential to occur.

4.5.1 Special-Status Wildlife Species Observed within the Project Site

Two species of special-status wildlife were detected during the field studies: willow flycatcher, and yellow warbler.

Willow flycatcher
During the focused surveys for southwestern willow flycatcher (*Empidonax traillii extimus*), a willow flycatcher was detected. The subspecies of willow flycatcher detected was confirmed to not be the southwestern willow flycatcher subspecies based on when the individual was observed. The subspecies detected was likely the subspecies *E. t. brewsteri*, which does not breed in southern California but migrates through the area in spring and fall. Only southwestern willow flycatcher is federally listed but all subspecies of willow flycatcher are state listed. However, the state does not protect habitat used by willow flycatchers migrating through and all non-*extimus* willow flycatchers are habitat generalists during migration.

Yellow warbler
This species of warbler is an obligate of riparian vegetation for nesting and was detected in Serrano Creek during the field studies. Yellow warbler is a state Species of Special Concern and may breed in the creek.

4.5.2 Special-Status Wildlife Species not Observed but with a Potential to Occur at the Project Site

Two special-status bats have potential to occur in Serrano Creek: western mastiff bat (*Eumops perotis californicus*) and western red bat (*Lasiurus blossevillii*). Neither species is state or federally listed but both are state Species of Special Concern. These bats, along with several non-special-status bats, have potential to roost and possibly breed in Serrano Creek.

4.5.3 Critical Habitat

The Maritime Succulent Scrub/Southern Cactus Scrub (Coastal Sage Scrub) located at the Project site is not within federally designated Critical Habitat, as it is a small (0.28 acre) remnant patch of this community and is highly disturbed in nature. There is no federally designated Critical Habitat mapped within or adjacent to the Project site. The nearest Critical Habitat (for

CAGN) is located approximately one mile west and approximately one and one-half miles east of the Project site.

4.6 Raptor Use

The Project site provides suitable foraging habitat for several raptor species, including, but not limited to Cooper's hawk (*Accipiter cooperii*), red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), great horned owl (*Bubo virginianus*), barn owl (*Tyto alba*), and the white-tailed kite (*Elanus leucurus*). Cooper's hawk and red-tailed hawk nested in Serrano Creek with no other species nesting on site during the field studies.

4.7 Nesting Birds

The Project site contains trees, shrubs, and ground cover that provide suitable habitat for nesting migratory birds. Impacts to nesting birds are prohibited under the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code.[13]

4.8 Soil Mapping

The Natural Resource Conservation Service (NRCS) identifies the following soil types (series) as occurring (currently or historically) within the Project site [Exhibit 4]: Capistrano Sandy Loam, Cieneba Sandy Loam, Cropley Clay, Myford Sandy Loam, Sorrento Loam, and Riverwash.

4.9 Jurisdictional Delineation

The Project site is within the San Diego Creek SAMP, and contains three drainage features: 1) the Water Quality Treatment Ditch, 2) Serrano Creek, and 3) unvegetated ephemeral Drainage 3. These drainages are ultimately tributary to San Diego Creek, which is tributary to Upper Newport Bay, which is tributary to the Pacific Ocean.

Potential Corps jurisdiction associated with the Project site totals 1.28 acre, none of which consists of jurisdictional wetlands, and a total of 4,971 linear feet of streambed is present. The boundaries of potential Corps jurisdiction are depicted on Exhibit 5A.

Potential Regional Board jurisdiction associated with the Project site totals 1.28 acres, none of which consists of jurisdictional wetlands [Exhibit 5A - Corps/RWQCB Jurisdictional Delineation Map]. A total of 4,971 linear feet of streambed is present. As noted above, the Water Quality Treatment Ditch, Serrano Creek, and Drainage 3 have been determined to be potential Corps jurisdictional waters, subject to regulation pursuant to Section 404 of the CWA and subject to regulation by the Regional Board pursuant to Section 401 of the CWA.

[13] The MBTA makes it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird listed in 50 C.F.R. Part 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 C.F.R.21). In addition, sections 3505, 3503.5, and 3800 of the California Department of Fish and Game Code prohibit the take, possession, or destruction of birds, their nests or eggs.

Potential CDFW jurisdiction associated with the project site totals 4.11 acres, of which 1.94 acres consists of non-riparian streambed and 2.17 acres consists of vegetated riparian habitat. The boundaries of potential CDFW jurisdiction within the project site are depicted on the enclosed jurisdictional delineation map provided as Exhibit 5B.

Table 4-5 below provides a summary of the total area of potential Corps, Regional Board, and CDFW jurisdiction within the Project site.

Table 4-5. Summary of Corps, CDFW, and Regional Board Jurisdiction on the Project Site

		Corps			CDFW			Regional Board	Length (lf)
Drainage Feature	**Resource Type**	**Wetland (acres)**	**Non-wetland Waters (acres)**	**Total (acres)**	**Vegetated Streambed (acres)**	**Unvegetated Streambed (acres)**	**Total (acres)**	**Total (acres)**	**Total (feet)**
Water Quality Treatment Ditch	Intermittent	0.0	0.92	0.92	0.0	1.84	1.84	0.92	3,032
Serrano Creek	Intermittent	0.0	0.29	0.29	2.17	0.03	2.20	0.29	928
Drainage 3	Ephemeral	0.0	0.07	0.07	0.0	0.07	0.07	0.07	1,011
TOTALS:		0.0	1.28	**1.28**	2.17	1.94	**4.11**	**1.28**	**4,971**

The water quality treatment ditch is an intermittent drainage feature which generally bisects the Project site from northeast to southwest. This water quality treatment ditch is regularly maintained in order to remain free of vegetation and sediment for maximum capacity, on-site retention, and treatment of flows.

Serrano Creek is an intermittent drainage which extends along the southeastern boundary of the Project site. Serrano Creek supports a riparian forest which consists of both native and non-native species, including Eucalyptus (*Eucalyptus* sp.), coast live oak (*Quercus agrifolia*), western sycamore (*Platanus racemosa*), Fremont cottonwood (*Populus fremontii*), Goodding's black willow (*Salix gooddingii*), mule fat (*Baccharis salicifolia*), toyon (*Heteromeles arbutifolia*), Spanish dagger (*Yucca gloriosa*), and mission prickly-pear (*Opuntia ficus-indica*).

Drainage 3 is an unvegetated ephemeral drainage feature which is located along the southwestern boundary of the Project site. Drainage 3 drains into the water quality treatment ditch which drains into an off-site portion of Serrano Creek.

4.10 Wildlife Migration/Nurseries

The project does not support wildlife nurseries, but Serrano Creek is expected to provide the necessary structure and vegetation to support animal movement between natural open space well southwest and northeast of the project site. When moving through developed landscapes, wildlife

use vegetated drainages (when having suitable conditions) like Serrano Creek. The movement of individuals between natural open spaces help to support healthy animal populations through genetic diversity.

5.0 IMPACT ANALYSIS

The following discussion examines the potential impacts to plant and wildlife resources that would occur as a result of the proposed project. Impacts (or effects) can occur in two forms, direct and indirect. Direct impacts are considered to be those that involve the loss, modification or disturbance of plant communities, which in turn, directly affect the flora and fauna of those habitats. Direct impacts also include the destruction of individual plants or animals, which may also directly affect regional population numbers of a species or result in the physical isolation of populations thereby reducing genetic diversity and population stability.

Indirect impacts pertain to those impacts that result in a change to the physical environment, but which is not immediately related to a project. Indirect (or secondary) impacts are those that are reasonably foreseeable and caused by a project, but occur at a different time or place. Indirect impacts can occur at the urban/wildland interface of projects, to biological resources located downstream from projects, and other off site areas where the effects of the project may be experienced by plants and wildlife. Examples of indirect impacts include the effects of increases in ambient levels of noise or light; predation by domestic pets; competition with exotic plants and animals; introduction of toxics, including pesticides; and other human disturbances such as hiking, off-road vehicle use, unauthorized dumping, etc. Indirect impacts are often attributed to the subsequent day-to-day activities associated with project build-out, such as increased noise, the use of artificial light sources, and invasive ornamental plantings that may encroach into native areas. Indirect effects may be both short-term and long-term in their duration. These impacts are commonly referred to as "edge effects" and may result in a slow replacement of native plants by non-native invasives, as well as changes in the behavioral patterns of wildlife and reduced wildlife diversity and abundance in habitats adjacent to project sites.

Cumulative impacts refer to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts. A cumulative impact can occur from multiple individual effects from the same project, or from several projects. The cumulative impact from several projects is the change in the environment resulting from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.

5.1 California Environmental Quality Act (CEQA)

5.1.1 Thresholds of Significance

Environmental impacts to biological resources are assessed using impact significance threshold criteria, which reflect the policy statement contained in CEQA, Section 21001(c) of the

California Public Resources Code. Accordingly, the State Legislature has established it to be the policy of the State of California:

> *"Prevent the elimination of fish or wildlife species due to man's activities, ensure that fish and wildlife populations do not drop below self-perpetuating levels, and preserve for future generations representations of all plant and animal communities..."*

Determining whether a project may have a significant effect, or impact, plays a critical role in the CEQA process. According to CEQA, Section 15064.7 (Thresholds of Significance), each public agency is encouraged to develop and adopt (by ordinance, resolution, rule, or regulation) thresholds of significance that the agency uses in the determination of the significance of environmental effects. A threshold of significance is an identifiable quantitative, qualitative or performance level of a particular environmental effect, non-compliance with which means the effect will normally be determined to be significant by the agency and compliance with which means the effect normally will be determined to be less than significant. In the development of thresholds of significance for impacts to biological resources CEQA provides guidance primarily in Section 15065, Mandatory Findings of Significance, and the CEQA Guidelines, Appendix G, Environmental Checklist Form. Section 15065(a) states that a project may have a significant effect where:

> *"The project has the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or wildlife community, reduce the number or restrict the range of an endangered, rare, or threatened species, ..."*

Therefore, for the purpose of this analysis, impacts to biological resources are considered potentially significant (before considering offsetting mitigation measures) if one or more of the following criteria discussed below would result from implementation of the proposed project.

5.1.2 Criteria for Determining Significance Pursuant to CEQA

Appendix G of the 1998 State CEQA guidelines indicate that a project may be deemed to have a significant effect on the environment if the project is likely to:

> *a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.*
>
> *b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.*

c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

5.2 Impacts to Native Vegetation

The proposed Project would permanently remove approximately 0.29 acre of a remnant patch of maritime succulent scrub (coastal sage scrub). Although this vegetation community is a special-status vegetation type, the 0.29-acre patch on the project site is isolated and does not provide the functions and values associated with sage scrub communities. This impact would not be significant under CEQA. No direct impacts to southern black willow forest would occur. Refer to Section 6.0 for details on how this vegetation community would be preserved and protected. The Project would permanently remove 114.09 acres of agriculture and 0.88 acre of bare ground/developed. An additional 4.51 acres of agriculture would be temporarily impacted. Impacts to these two land covers would be a less than significant under CEQA.

5.3 Impacts to Special-Status Plants

No special-status plants are present on the project site, thus no impacts to these resources would occur.

5.4 Impacts to Special-Status Animals

The proposed project would remove 119.77 acres (115.26 acres permanently, 4.51 acres temporarily) of potential foraging habitat for two special-status bats, western red bat and western mastiff bat. The agricultural lands would not provide valuable foraging habitat but could be used to some degree by these species, if present. The number of individuals potentially foraging onsite is judged to be low given the degraded condition of the site. In addition, large blocks of high quality foraging habitat are present within Whiting Ranch Wilderness Park and Limestone Canyon Regional Park, located approximately one mile north of the Project site. Roosting and breeding (nursery) by these species and other non-special-status bats may occur in Serrano Creek but potential roosting habitat is not proposed for removal. The removal of 119.77 acres of low quality potential foraging habitat for bats would be a less than significant impact.

Serrano Creek provides potential nesting habitat for yellow warbler and the species was observed during field studies. The project proposes no removal of potential habitat for this species. No direct impact would occur.

Willow flycatcher was detected as a spring migrant in Serrano Creek. As discussed in Section 4.5.1, the subspecies of willow flycatcher detected was not the southwestern subspecies which is federally listed as Endangered. All subspecies of willow flycatcher are state listed as Endangered, but the state does not provide protection of migrant habitat, thus no potential "take" of willow flycatcher would occur under CESA. The non-southwestern subspecies of willow flycatcher that migrates through southern California in spring and fall does not breed here and during migration are habitat generalists, including use of residential landscaping. As proposed, encroachment into Serrano Creek would not occur. The potential foraging that could occur by these migrants in other parts of the project site that are proposed for impact (nursery agriculture) is not judged important habitat for these subspecies given the broad range of vegetation used by them. Potential impacts to non-southwestern willow flycatchers during migration is less than significant under CEQA.

The proposed Project would result in loss of 119.77 acres (115.26 acres permanently, 4.51 acres temporarily) of foraging habitat that supports several species of raptors. Cooper's hawk and red-tailed hawk both nested in the trees within Serrano Creek during the field studies. There is no proposed direct impacts to Serrano Creek, thus this nesting habitat would remain. The loss of 119.77 acres of nursery lands would not be a significant impact under CEQA. This is based on the degraded quality of the foraging habitat and the low number of individuals potentially affected.

5.5 Impacts to Critical Habitat

The proposed Project will not impact lands designated as Critical Habitat by the USFWS; therefore, the Project would have no impact to Critical Habitat.

5.6 Impacts to Nesting Birds

The project has the potential to impact active native bird nests if vegetation is removed during the nesting season (January 15 to August 31). Impacts to nesting native birds are prohibited by the MBTA and California Fish and Game Code. A project-specific mitigation measure is identified in Section 6.0 of this report to avoid impacts to native nesting birds. Although impacts to native birds are prohibited by MBTA and similar provisions of California Fish and Game Code, impacts to native birds by the proposed project would not be a significant impact under CEQA biologically. The native birds with potential to nest on the project site would be those that are extremely common to the region and highly adapted to human landscapes (e.g. Anna's hummingbird, house finch). The number of individuals potentially affected by the Project would not significantly affect regional, or local populations of such species.

5.7 Impacts to Jurisdictional Waters

Implementation of the proposed project would permanently impact a 0.99-acre (4,078 linear feet of drainage) portion of the existing 1.28 acres (4,971 linear feet) of potential federal Corps jurisdiction; none of which consists of jurisdictional wetlands. Development of the project would remove a 0.99-acre (4,078 linear feet) portion of the existing 1.28 acres (4,971 linear feet) of Regional Board jurisdiction, none of which are wetlands; and for the CDFW jurisdiction on the project site, an estimated 1.91-acre portion of the 1.94 acres of existing unvegetated streambed would be removed. The proposed project will not impact the existing 2.17 acres of vegetated streambed. Refer to Table 5-1 below for a summary of impacts by jurisdiction and feature.

The entirety of each of the Water Quality Treatment Ditch and Drainage 3 would be permanently removed by the Project [Exhibits 5A and 5B]. These features do not support riparian vegetation (herbaceous or woody). These features do not provide habitat to plant or wildlife species beyond what the adjacent uplands provide. Although removal of these features trigger CWA and Fish and Game Code 1602 permitting/authorizations, the removal of these agricultural features would not significantly impact water resources or associated biological resources in the vicinity or at a regional level. The proposed impacts would be less than significant under CEQA.

The proposed project would impact 0.95 acre of agricultural and developed upland areas currently and historically under use by the plant nursery operation that have been mapped under the SAMP as an Aquatic Resource Integrity Area. These areas were part of the nursery operation during the time that the SAMP was developed, are outside of the existing riparian zone associated with Serrano Creek, and are located at elevation 10 or more feet above the bankfull channel of Serrano Creek; therefore, these areas are anticipated to be a mapping error generated from the course level of remote-sensing-based mapping utilized to develop the SAMP. In addition, the entirety of the existing riparian zone associated with Serrano Creek has been avoided by the proposed project; therefore, impacts to the riparian integrity of Serrano Creek would not occur from the development of the proposed project, as the entire riparian zone is being avoided; therefore, proposed impacts to mapped SAMP areas would be less than significant under CEQA.

Table 5-1. Summary of Proposed Impacts to Corps, CDFW, and Regional Board Jurisdiction

		Corps			CDFW			Regional Board	Length
Drainage Feature	**Impact Type**	**Wetland (acres)**	**Non-wetland Waters (acres)**	**Total (acres)**	**Vegetated Streambed (acres)**	**Unvegetated Streambed (acres)**	**Total (acres)**	**Total (acres)**	**Total (linear feet)**
Water Quality Treatment Ditch (Intermittent)	Permanent	0.0	0.92	0.92	0.0	1.84	1.84	0.92	3,032
	Temporary	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Serrano Creek		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0

Drainage Feature	Impact Type	Corps			CDFW			Regional Board	Length
		Wetland (acres)	Non-wetland Waters (acres)	Total (acres)	Vegetated Streambed (acres)	Unvegetated Streambed (acres)	Total (acres)	Total (acres)	Total (linear feet)
(Intermittent)	Permanent								
	Temporary	0.0	0.01	0.01	0.0	0.01	0.01	0.01	35
Drainage 3 (Ephemeral)	Permanent	0.0	0.07	0.07	0.0	0.07	0.07	0.07	1,011
	Temporary	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTALS[1]		**0.0**	**0.99**	**0.99**	**0.0**	**1.91**	**1.91**	**0.99**	**4,078**

[1]-totals may not equal sum of parts due to rounding error.

5.8 Wildlife Migration/Nurseries

There are no wildlife corridors or wildlife nurseries on the project site where development is proposed. Serrano Creek occurs outside the project footprint but is considered a wildlife migration corridor. The creek is an important link between the open space lands well southwest and northeast of the project. Although the creek is in degraded condition, it still supports the necessary attributes needed to support animal movement, namely vegetation for cover and topography to guide animals up and downstream. No direct encroachment is proposed by the project, however the potential for indirect impacts to occur is present and evaluated in Section 5.9.

5.9 Indirect Impacts to Biological Resources

In the context of biological resources, indirect effects are those effects associated with developing areas adjacent to native open space. Potential indirect effects associated with development include water quality impacts associated with drainage into adjacent open space/downstream aquatic resources; dust effects; lighting effects; noise effects; invasive plant species from landscaping; and effects from human entry into adjacent open space, such as recreational activities (including hiking), pets, dumping, etc. Temporary, indirect effects may also occur as a result of construction-related activities.

There would be potential for these indirect effects to occur temporarily during construction and also in the long-term by the proposed development. These potential indirect effects can degrade the existing functions and values of Serrano Creek, and include increased depredation of wildlife from noise and lighting; dissuaded use of Serrano Creek by wildlife from noise and lighting; introduction of non-native invasive plants that outcompete native riparian plant species and thus cause reduced value to native plants and wildlife; and increased mortality to native wildlife from dogs and cats. These impacts can occur to non-special status as well as special-status species (e.g. western red bat, western Mastiff bat, nesting hawks).

Although the portion of Serrano Creek adjacent to the project already demonstrates many of these indirect impacts caused from past development, the proposed project would increase the

severity of such impacts. Serrano Creek is an important connection between natural open space well east and west of the project site. The potential indirect impacts that the project could cause to the southern black willow forest; bats, including special-status species (i.e. western red bat, western Mastiff bat) in the creek; and the existing wildlife corridor, would be a potentially significant impact under CEQA. For bats, the threshold of significance would be if the population of bats potentially impacted is 25 or more individuals with no special status and one individual bat with a special status. The threshold of significance is set at 25 or more individuals for non-special-status bats because the loss of 25 individuals would not pose a significant loss to the regional population of any non-special status species with potential to roost at the Project. Refer to Section 6.0 to address this potential impact.

Potential indirect impacts to yellow warbler would be adverse but not significant. This species has remained common to many riparian habitats and only a small number of individuals would be expected to be potentially affected by the proposed project (two to three pairs).

5.10 Cumulative Impacts to Biological Resources

Cumulative impacts are defined as the direct and indirect effects of a proposed project which, when considered alone, would not be deemed a substantial impact, but when considered in addition to the impacts of related projects in the area, would be considered potentially significant. "Related projects" refers to past, present, and reasonably foreseeable probable future projects, which would have similar impacts to the proposed project.

Native vegetation. Development of the project site would remove permanently 0.29 acre of maritime succulent scrub (coastal sage scrub), as described in Section 5.2. This patch is remnant and due to its very small size and lack of contiguity with other sage scrub, is not judged to provide resource values associated with sage scrub vegetation. The permanent removal of 0.29 acre of maritime succulent scrub would not make a cumulatively considerable contribution to the regional decline of this vegetation community.

Direct impacts to Serrano Creek are not proposed but as identified in Section 5.9, there is potential for significant indirect impacts to occur to this section of creek by the adjacent proposed development. Although this portion of Serrano Creek shows degradation from being adjacent to surrounding development, the potential further decline of the creek by the Project would be a cumulatively considerable contribution to the regional decline of native streambed vegetated with riparian (southern black willow forest) that supports animal movement, nesting raptors, yellow warbler, and potential roosting/nursery habitat for bats. This creek and vegetation is expected to support a degree of wildlife movement/connectivity between the natural open space lands well southwest and northeast of the project site, which needs to be maintained. Refer to Section 6.4 for measures to address this impact.

Raptor Use. The project site is used by nesting Cooper's hawk and red-tailed hawk. Other species of raptors may also use the site for foraging. No direct impact to occupied nesting habitat in Serrano Creek would occur but there is potential for potentially significant indirect impacts to occur to Serrano Creek, which may dissuade raptors from nesting along this stretch of creek. These two species are common to the region and the removal of nesting habitat for these or other

common species of raptors would not make a potentially cumulatively considerable contribution to the regional decline of raptors. The project would remove 119.77 acres of potential raptor foraging habitat through development of the active nursery. Although the nursery may provide foraging habitat for raptors, it is not expected to be valuable, as the lands are actively maintained to minimize use by small mammals (prey for raptors). This loss of 119.77 acres of potential raptor foraging habitat would not make a cumulatively considerable contribution to the regional decline of raptors.

Special-Status Wildlife. Yellow warbler is present in Serrano Creek and likely nests there. This species is strongly tied to riparian habitats for nesting. During migration it can be seen in a wide variety of native and non-native vegetation, including residential landscaping and native upland vegetation. Yellow warbler is a species of Special of Concern. Development of the project would not directly impact yellow warbler, but as identified in Section 5.9 above, the potential indirect impacts to Serrano Creek could be appreciable. However, the number of yellow warbler potentially affected would be limited to approximately two or three pairs, and this species remains a common species to many riparian habitats. The loss of nesting habitat for yellow warbler would not make a cumulatively considerable contribution to the regional decline of this species.

There is potential for bats to roost in Serrano Creek (including western mastiff bat and western red bat). The proposed project would not directly remove potential roosting/nursery habitat but has the potential to cause abandonment of the creek by bats by indirect degradation of habitat. As stated in Section 5.9, this would be judged a significant impact under CEQA if the population of bats potentially impacted is 25 or more individual bats without special status and/or one or more bats with special status. Given the regional decline of bats over the past several decades, this potential indirect impact would make a cumulatively considerable contribution to the regional decline of bats. Refer to Sections 6.3 and 6.4 for measures to address this potential cumulative impact.

Native Nesting Birds. There is potential for native nesting birds to be affected by development of the project. As discussed in Section 5.6, the types of birds potentially affected are common to the region and the number of individuals would be limited given the type of vegetation proposed for removal (agriculture, remnant patch of scrub habitat). Native birds are protected by MBTA and similar provisions under FGC. Based on the types of species and expected limited number of nesting pairs potentially affected and the types of species, development of the project would not make a cumulatively considerable contribution to the regional decline of native nesting birds.

Federal and Status Jurisdictional Waters. The jurisdictional waters proposed for removal are associated with the nursery operations and do not provide the functions and values of natural drainages/streambeds. As such the removal of 0.99 acre of Corps non-wetland waters, 0.99 acre of Regional Board non-wetland waters, and 1.91 acres of unvegetated CDFW streambed would not make a cumulatively considerable contribution to the regional decline of jurisdictional waters.

6.0 MITIGATION/AVOIDANCE MEASURES

The following discussion provides project-specific mitigation, avoidance, and minimization measures for actual or potential impacts to special-status resources.

6.1 Burrowing Owl

This measure is required as part of the CDFG (2012) protocol for burrowing owl. If a focused survey for the species has determined burrowing owl to be absent, a pre-construction survey is required prior to ground disturbance to ensure the species has not moved onto the site between when the survey was performed and commencement of construction.

A qualified biologist will conduct a pre-construction presence/absence survey for burrowing owls within 14 days prior to site disturbance. If burrowing owls are not detected, no further action is necessary.

If burrowing owls are detected during the preconstruction survey visit, the owls will be evicted from the site (when not nesting) following accepted CDFW protocols and as approved by the CDFW to avoid direct take of burrowing owl and compensate for the loss of habitat.

Compensation for the loss of occupied burrowing owl habitat will occur at a 1:1 ratio such that the habitat acreage and number of burrows occupied by burrowing owls impacted are replaced. As required by CDFW (2012) a mitigation management plan will be drafted and submitted to CDFW for approval, and will ensure lands used to compensate for the loss of habitat and burrows occupied by burrowing owls are conserved and managed in perpetuity.

6.2 Native Nesting Birds

This measure is a recommendation to further reduce potential impacts to native nesting birds, as potential impacts to native nesting birds was not judged significant under CEQA. Vegetation clearing should be conducted outside of the nesting season (February 1 through August 31). If avoidance of the nesting season is not feasible, then a qualified biologist shall conduct a nesting bird survey within three days prior to any disturbance of the site, including disking, demolition activities, and grading. If active nests are identified, the biologist shall establish suitable buffers (a minimum of 50 feet for passerines, 250 feet for raptors [including burrowing owls]) around the nests. The buffer areas shall be avoided until the nests are no longer occupied and the juvenile birds can survive independently from the nests. Because potential impacts to nesting birds from development of the site is judged not biologically significant, this measure may be superseded by USFWS and/or CDFW nesting bird measures provided during the streambed/Waters of the U.S. permitting effort.

6.3 Bats

The following measures are intended to reduce potential indirect impacts to bats during construction to a level of less than significant under CEQA:

Bat roosting/nursery exit counts, and acoustic surveys will be performed in Serrano Creek by a qualified bat biologist prior to construction to determine whether Serrano Creek supports a bat nursery and/or roost and by which species. This survey work will occur in late-spring/summer and potentially again in the fall, depending on the results of the summer work. This would be determined by the bat biologist.

If the results of the bat work finds 25 or more individuals composed of non-special-status bat species and/or one or more bats with a special-status, a Bat Management Plan will be developed to ensure mortality to bats does not occur during construction. If it is determined that excluding the bats during non-breeding (generally October through March) is necessary, the plan will provide details both in text and graphically where exclusion devices will need to be placed, the timing for exclusion work, and the timeline and methodology needed to exclude the bats. The plan will be reviewed and approved by CDFW. Once construction is completed, it is anticipated bats will recolonize Serrano Creek. The same measures presented in Section 6.4, below, for ensuring potential indirect effects are avoided/minimized to Serrano Creek, apply for bats.

6.4 Serrano Creek

The follow measures are intended to reduce potential impacts to Serrano Creek during construction and thus, potential indirect effects to wildlife movement and/or roosting bats:

1. The project impact footprint, including any construction buffer, shall be staked and fenced (e.g., with orange snow fencing, silt fencing or a material that is clearly visible) and the boundary shall be confirmed by a qualified biological monitor prior to ground disturbance. The construction site manager shall ensure that the fencing is maintained for the duration of construction and that any required repairs are completed in a timely manner.
2. For any vegetation clearing or work within 100 feet of Serrano Creek, a biologist will monitor to ensure encroachment into Serrano Creek does not occur.
3. Any open trenches shall be covered at the end of each work day in a manner to prevent the entrapment of wildlife, or adequately ramped to provide an animal escape route.
4. Construction will occur between 30 minutes before sunrise and 30 minutes after sunset. No nighttime construction within 200 feet of Serrano Creek will occur.
5. No construction lighting will be placed within 200 feet of Serrano Creek unless a qualified biologist confirms the lighting does not cast into Serrano Creek.
6. Active construction areas will be watered regularly (at least once every two hours) to control dust and thus minimize impacts on vegetation within Serrano Creek.
7. Equipment operators and construction crews will be informed of the importance of the construction limits by the biological monitor prior to any ground disturbance.
8. Construction personnel will strictly limit their activities, vehicles, equipment, and construction materials to the limits of disturbance and designated staging areas and routes of travel approved by the biological monitor.

9. Exotic plant species removed during construction will be properly handled to prevent sprouting or regrowth. Construction equipment will be cleaned of mud or other debris that may contain invasive plants and/or seeds and inspected to reduce the potential of spreading noxious weeds before mobilizing to the site and before leaving the site during the course of construction. The cleaning of equipment will occur at least 300 feet from jurisdictional aquatic features, including Serrano Creek. If the location is closer, it must be approved by the biological monitor.
10. Vegetation will be covered while being transported, and vegetation materials removed from the site will be disposed of in accordance with applicable laws and regulations.
11. All equipment maintenance, staging, and dispensing of fuel, oil, coolant, or any other toxic substances will occur only in designated areas within the limits of disturbance and at least 200 feet from jurisdictional aquatic features, including Serrano Creek. These designated areas will be clearly marked and located in such a manner as to contain runoff and will be approved by the biological monitor.
12. To avoid attracting predators, the project site will be kept clear of trash and debris. All food related trash items will be enclosed in sealed containers and regularly removed from the site.

The following measures are intended to reduce potential indirect impacts to Serrano Creek post construction:

13. Potential long-term edge effects to Serrano Creek (Conservation Area – Exhibit 3) will be minimized through the installation of permanent fencing along the perimeter of the conservation easement and interior trails, if applicable. Permanent signs will be installed along all fencing indicating the purpose and need for the fencing and the restrictions within the Conservation Area. The proposed fencing location will be identified in a Habitat Management Plan (HMP). The maintenance of the fencing and signage will be the responsibility of the Home Owners Association or a long-term land management entity.

14. All lighting along the perimeter of Serrano Creek, particularly street lamps, shall be shielded and oriented in a manner that will prevent spillage or glare into the Creek. This also includes outdoor lighting for those residences abutting Serrano Creek. It will be the responsibility of the Home Owners Association to ensure lighting is maintained at these criteria.

15. Landscape plans within common areas of the development shall be reviewed by a qualified botanist, who shall recommend appropriate provisions to prevent invasive plant species from colonizing Serrano Creek. It will be the responsibility of the Home Owners Association to ensure this measure is followed.

16. Serrano Creek will be placed into a conservation easement or similar legal protection mechanism that will protect the lands in perpetuity.

17. Lands within the conservation easement will be managed in perpetuity by a designated

entity.

6.5 Jurisdictional Waters

The Project would permanently impact a 0.99-acre portion of the 1.28 acres of non-wetland WoUS, a 0.99-acre portion of the 1.28 acres of non-wetland state waters (Regional Board), and a 1.91-acre portion of the 1.94 acres of unvegetated CDFW streambed. None of the 2.17 acres of vegetated streambed would be impacted.

As discussed, these proposed impacts would not be biologically significant under CEQA but would require permits and mitigation through Sections 401 and 404 of the Clean Water Act and DFG Code 1602. The following mitigation measure is recommended to address proposed impacts to these resources:

- To mitigate the loss of Corps, Regional Board, and CDFW jurisdiction, the Project will conserve and protect Serrano Creek in perpetuity through a conservation easement or a similar form of legal mechanism and will create an additional 4.19 acres of riparian vegetation that will be contiguous with, and contribute to, the existing riparian canopy associated with Serrano Creek within the conservation lands.
- A Habitat Mitigation Monitoring Plan (HMMP) shall be prepared that describes the location of establishment, restoration, and/or enhancement, which shall include replanting requirements, success criteria and monitoring following construction. The plan shall be incorporated into the regulatory agencies permit, certification, and agreement required for the project.
- A water pollution and erosion control plan will be developed and implemented in accordance with RWQCB requirements and will ensure that no fluids or sediment from construction reach Serrano Creek and that the built environment meets Section 402 CWA requirements.
- If on-site mitigation options are not feasible, the Project purchase credits from an approved mitigation bank/in-lieu fee program at a minimum of a 1:1 ratio, for a minimum of 1.91 acres of mitigation credits.
- If on-site mitigation options are not feasible and an approved mitigation bank/in-lieu fee program cannot be identified to mitigate the loss of Corps, Regional Board, and CDFW jurisdiction, the Project will enhance, re-establish, or establish Corps, Regional Board, and CDFW jurisdictional areas on off-site conserved lands at a minimum of a 1:1 ratio, for a minimum of 1.91 acre of enhancement, re-establishment, or establishment.
- The project is located within the boundaries of the Special Area Management Plan "SAMP" San Diego Creek Watershed, and impacts to non-riparian agricultural upland areas accounting for 0.95 acre of mapped Aquatic Resource Integrity Area, believed to be misclassified by a mapping error based on current and historic land use conditions, would occur. Impacts to greater than 1/10 of an acre within this mapping unit will need to be developed in coordination with the natural resource agencies.

6.6 Level of Significance after Mitigation

With the implementation of mitigation measures described above in Sections 6.3 and 6.4, potential impacts to wildlife movement and bat roosting (including cumulative impacts) in Serrano Creek would be reduced to less than significant under CEQA. This is accomplished through ensuring that potential indirect effects to these resources during construction are avoided and/or minimized and that the necessary measures are in place for when the development becomes occupied by humans and their pets. The measures for nesting birds (Section 6.2) and jurisdictional waters (Section 6.5) are recommendations to further reduce potential impacts. The burrowing owl measure in Section 6.1 is necessary for compliance with the CDFG (2012) protocol for the species.

7.0 REFERENCES

American Ornithologists' Union (AOU). 2017. Checklist of North American Birds, (58th Supplement) Available at http://checklist.aou.org/taxa/. Accessed June 2013.

Baldwin, B.G., D.H. Goldman, D.J. Keil, R. Patterson, T.J. Rosatti, and D.H. Wilken. 2012. The Jepson Manual: Vascular Plants of California. University of California Press. 1,568 pp.

California Department of Fish and Wildlife. September 2016. Complete List of Amphibian, Reptile, Bird and Mammal Species in California.

California Department of Fish and Wildlife. 2017. Special Animals. State of California Resources Agency, Sacramento, California.

California Department of Fish and Wildlife. 2017. State and Federally Listed Endangered and Threatened Animals of California. State of California Resources Agency. Sacramento, California.

California Department of Fish and Wildlife. 2017. California Natural Diversity Database: RareFind 5. Records of occurrence for U.S.G.S. 7.5- minute Quadrangle maps: El Toro Quadrangle and surrounding quadrangles. California Department of Fish and Wildlife, State of California Resources Agency. Sacramento, California.

[Cal-IPC] California Invasive Plant Council. California Invasive Plant Inventory Database. Website: http://cal-ipc.org/paf/. [accessed 8 May 2017]

California Native Plant Society. 2001. Botanical survey guidelines of the California Native Plant Society. Fremontia 29: 64-65.

California Native Plant Society. 2017. Inventory of Rare and Endangered Plants (online edition, v8-02). Rare Plant Program. California Native Plant Society, Sacramento, CA. Website http://www.rareplants.cnps.org [accessed 15 September 2017]

Collins, Joseph T. and Travis W. Taggart. 2009. Standard Common and Current Scientific Names for North American Amphibians, Turtles, Reptiles, and Crocodilians. Sixth Edition. Publication of The Center For North American Herpetology, Lawrence. iv+44p.

County of Orange. 1996. Final Natural Community Conservation Plan & Habitat Conservation Plan; County of Orange; Central & Coastal Subregion; Parts I & II: NCCP/HCP. July 17, 1996.

Curtis, Katherine E. and Robert Lichvar. 2010. Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United

States. ERDC/CRREL TN-10-1. Hanover, NH: U.S. Army Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory.

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1, U.S. Army Engineer Waterways Experimental Station, Vicksburg, Mississippi.

Garrett, K. and J. Dunn. 1981. Birds of Southern California: Status and Distribution. Los Angeles Audubon Society. 407 pp.

Gray and Bramlet. 1992. Habitat Classification System Natural Resources Geographic Information System (GIS) Project. County of Orange Environmental Management Agency, Santa Ana, California. May 1992.

Holland, R. F. 1986. Preliminary Descriptions of the Terrestrial Natural Communities of California. Nongame-Heritage Program, California Department of Fish and Wildlife.

Lichvar, R. W. 2016. The National Wetland Plant List: 2016 wetland ratings. Phytoneuron 2013-49: 1-241. http://wetland_plants.usace.army.mil/. [accessed 28 July 2017]

Lichvar, R. W., and S. M. McColley. 2008. A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States. ERDC/CRREL TR-08-12. Hanover, NH: U.S. Army Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory. (http://www.crrel.usace.army.mil/library/technicalreports/ERDC-CRREL-TR-08-12.pdf).

Munz, P.A. 1974. A Flora of Southern California. University of California Press. 1,086 pp.

Nelson, J. 1984. Rare plant survey guidelines. In: Inventory of rare and endangered vascular plants of California. J. Smith and R. York (eds.). Special Publication No. 1. California Native Plant Society.

Sawyer, J.O, T. Keeler-Wolf, and J.M. Evens. A Manual of California Vegetation. Second Edition. California Native Plant Society Press. Sacramento, California. 1,300 pp.

Stebbins, R. C. 1954. Amphibians and reptiles of western North America. McGraw-Hill, New York. 536pp.

Stebbins, R.C. 1985. A field guide to western reptiles and amphibians, 2nd ed. Houghton Mifflin Co., Boston, Massachusetts.

[SAMP, 2009] United States Army Corps of Engineers. 2009. A Special Area Management Plan (SAMP) for the San Diego Creek Watershed, Orange County, California. February 2009.

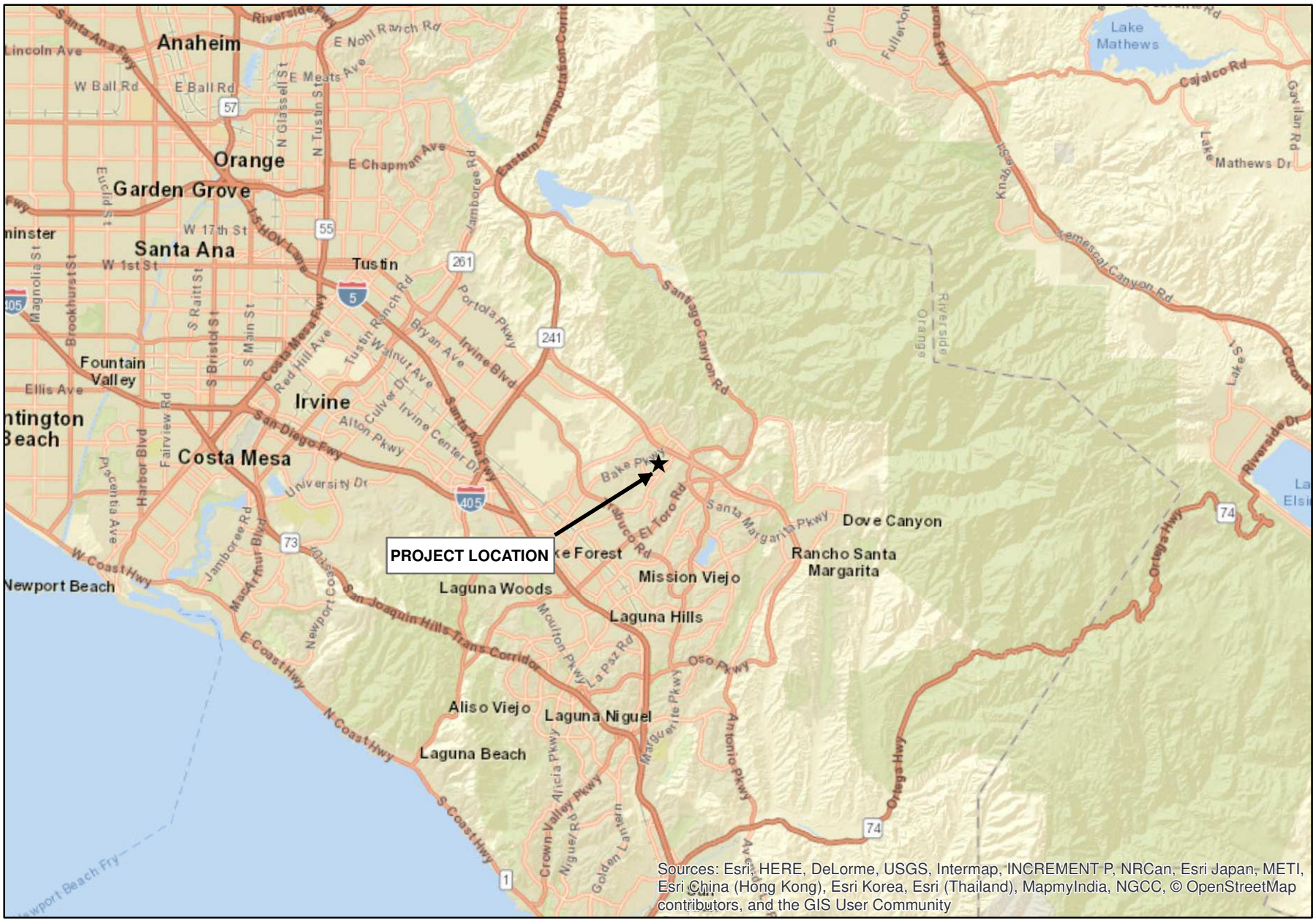
8.0 CERTIFICATION

I hereby certify that the statements furnished above and in the attached exhibits present data and information required for this biological evaluation, and that the facts, statements, and information presented are true and correct to the best of my knowledge and belief.

Signed: Date: March 5, 2019

p:0711-9b.rpt.biotech.docx

EXHIBITS



Source: ESRI World Street Map

N

0 2 4 8 Miles

NAKASE PROPERTY

Regional Map

GLENN LUKOS ASSOCIATES

Exhibit 1

Adapted from USGS El Toro, CA quadrangle

N

0 1,000 2,000 4,000 Feet

NAKASE PROPERTY

Vicinity Map

GLENN LUKOS ASSOCIATES

Exhibit 2

- Project Boundary Boundary
- Conservation Area
- Permanent Impact Limits
- Temporary Impact Limits
- Avoidance Area
- Agriculture
- Bare Ground/Developed
- Maritime Succulent Scrub
- Southern Black Willow Forest

N

0 175 350 700

Feet

1 inch = 350 feet

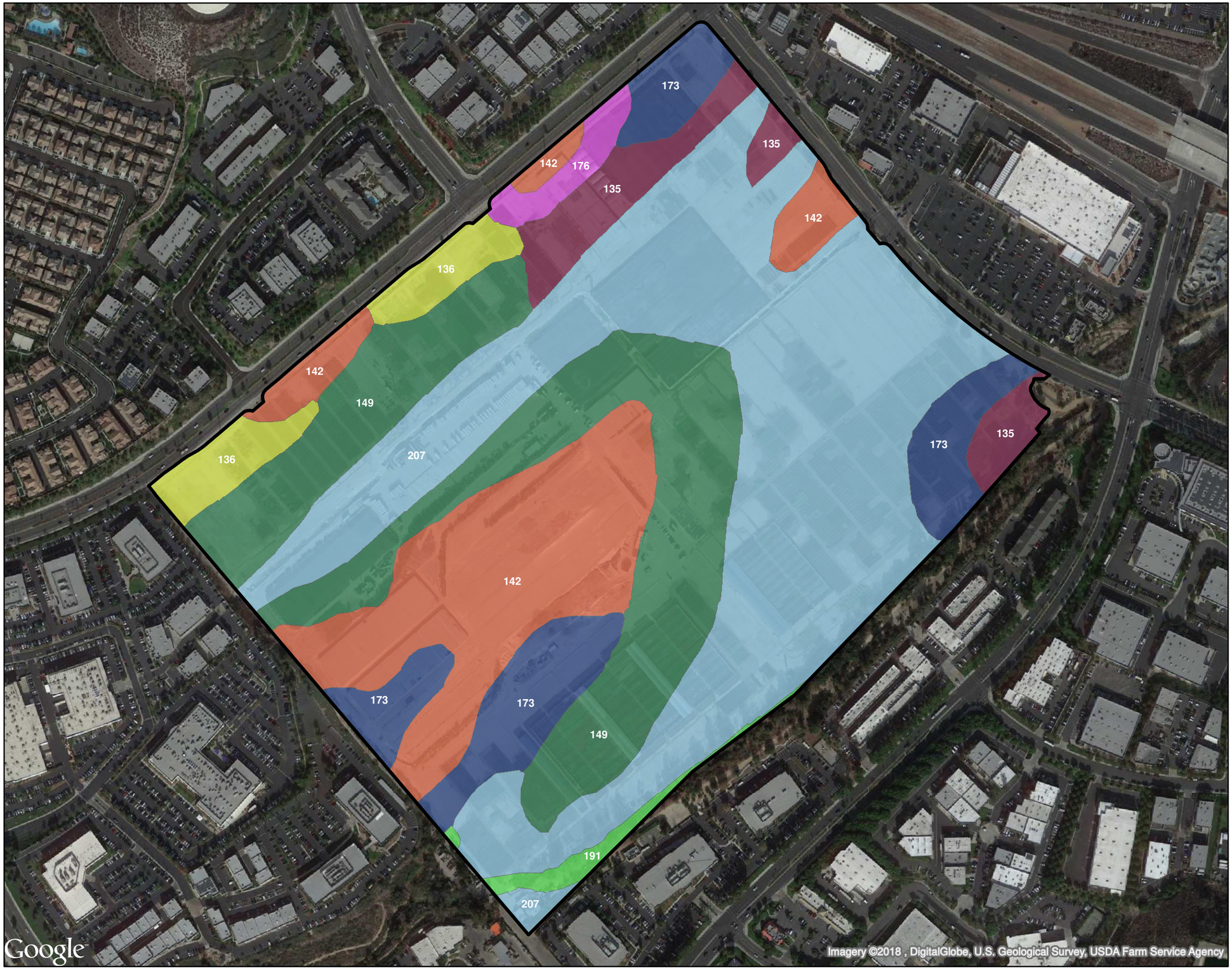
NAKASE PROPERTY

Vegetation Map/Impact Map

GLENN LUKOS ASSOCIATES

Exhibit 3

X:\0363-THE REST\0711-09NURS\711-9GIS\Impacts\711-09 Veg LayoutImpact 03-01-19.mxd



Project Boundary

135 - CAPISTRANO SANDY LOAM,
2 TO 9 PERCENT SLOPES

136 - CAPISTRANO SANDY LOAM,
9 TO 15 PERCENT SLOPES

142 - CIENEBA SANDY LOAM,
30 TO 75 PERCENT SLOPES, ERODED

149 - CROPLEY CLAY,
2 TO 9 PERCENT SLOPES

173 - MYFORD SANDY LOAM,
2 TO 9 PERCENT SLOPES

176 - MYFORD SANDY LOAM,
15 TO 30 PERCENT SLOPES

191 - RIVERWASH

207 - SORRENTO LOAM,
2 TO 9 PERCENT SLOPES

N

0 175 350 700
Feet

1 inch = 350 feet

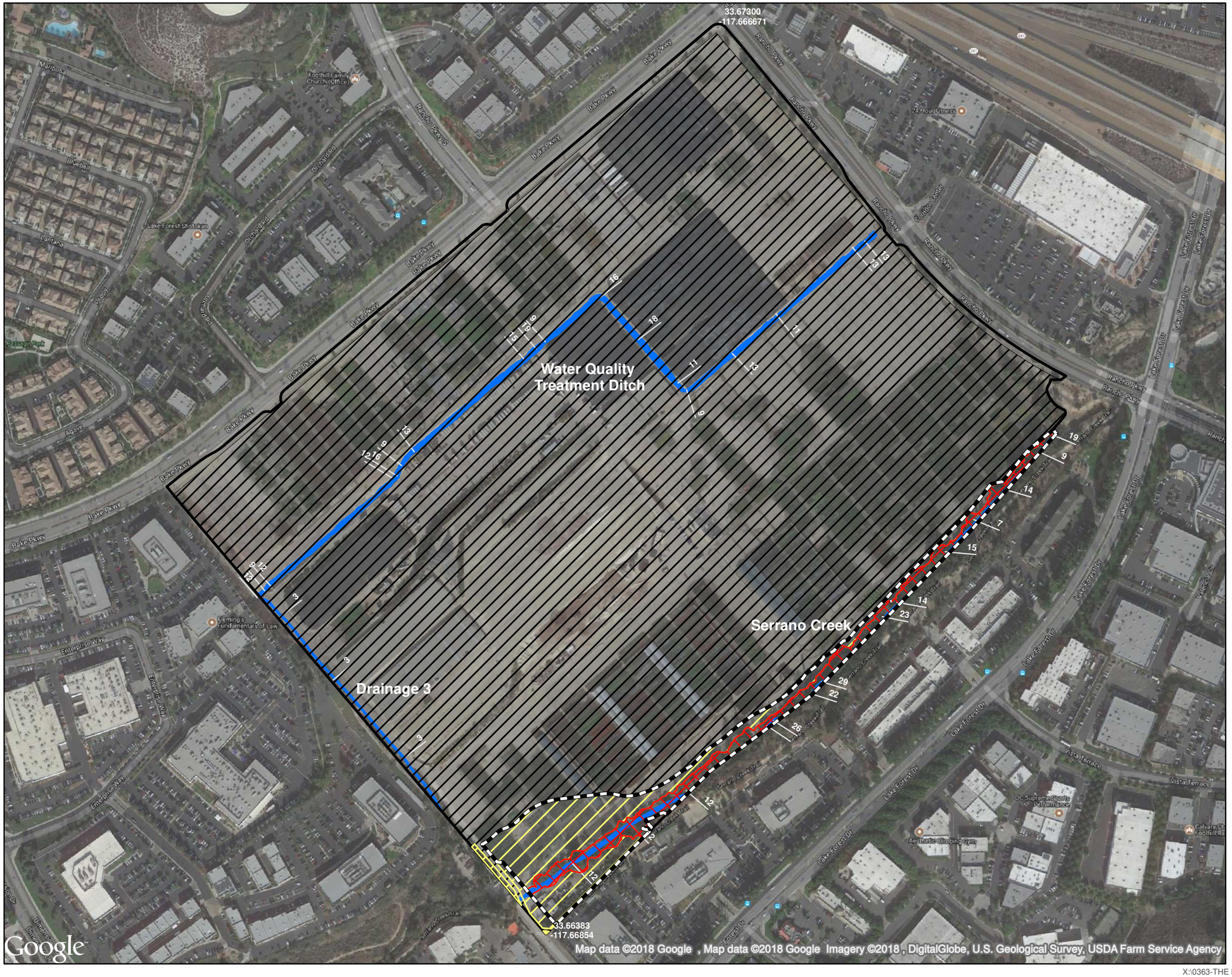
NAKASE PROPERTY

Soils Map

GLENN LUKOS ASSOCIATES

Exhibit 4

X:\0363-THE REST\0711-09NURS\711-9GIS\Soils\711-09SoilsLayout.mxd



Project Boundary

Permanent Impact Limits

Temporary Impact Limits

Conservation Area

Avoidance Area

Corps/RWQCB Non-Wetland Waters

3 Width in Feet

N

0 175 350 700

Feet

1 inch = 350 feet

Coordinate System: State Plane 6 NAD 83
Projection: Lambert Conformal Conic
Datum: NAD83
Map Prepared by: K. Kartunen, GLA
Date Prepared: March 9, 2018

NAKASE PROPERTY

Corps/RWQCB Jurisdictional Delineation/Impact Map

GLENN LUKOS ASSOCIATES

Exhibit 5A

X:\0363-THE REST\0711-09NURS\711-9GIS\Impacts\711-09 Corps REV1LayoutImpactBiotech.mxd

- Property Boundary
- Permanent Impact Limits
- Temporary Impact Limits
- Conservation Area
- Avoidance Area
- CDFW Riparian
- CDFW Unvegetated

N

0 175 350 700

Feet

1 inch = 350 feet

Coordinate System: State Plane 6 NAD 83
Projection: Lambert Conformal Conic
Datum: NAD83
Map Prepared by: K. Kartunen, GLA
Date Prepared: March 9, 2018

NAKASE PROPERTY

CDFW Jurisdictional Delineation/Impact Map

GLENN LUKOS ASSOCIATES

Exhibit 5B

X:\0363-THE REST\0711-09NURS\711-9GIS\Impacts\711-09 CDFW REV1LayoutImpactBiotech.mxd

Photograph 1: View of the active nursery operation from the southwest corner of the site looking toward the southeast.

Photograph 2: View of Serrano Creek along the southeastern boundary of the site looking toward the southwest.

GLENN LUKOS ASSOCIATES

Exhibit 6

NAKASE PROPERTY

Site Photographs

Photograph 3: View of Serrano Creek from the southeast corner of the site looking toward the northeast.

Photograph 4: View of Serrano Creek along the central portion of the southeastern boundary of the site looking toward the southwest.

GLENN LUKOS ASSOCIATES

Exhibit 6

NAKASE PROPERTY

Site Photographs

Photograph 5: View of the southwestern portion of the water quality treatment ditch looking toward the northeast.

Photograph 6: View of the central portion of the water quality treatment ditch looking toward the northeast.

GLENN LUKOS ASSOCIATES

Exhibit 6

NAKASE PROPERTY

Site Photographs

APPENDICES

APPENDIX A	
FLORAL COMPENDIUM	
The floral compendium lists plant species identified on the Site.	
* = non-native species ** = native cultivar	
EUDICOTS	
ADOCACEAE	**Elderberry Family**
Sambucus nigra	black elderberry
AGAVACEAE	**Agave Family**
* *Agave* sp.	agave cultivar
* *Yucca gloriosa*	Spanish dagger
ANACARDIACEAE	**Sumac Family**
Malosma laurina	laurel sumac
Rhus integrifolia	lemonade berry
* *Schinus molle*	Peruvian pepper tree
Toxicodendron diversilobum	poison oak
APIACEAE	**Celery Family**
* *Conium maculatum*	poison hemlock
ARECAEAE	**Palm Tree Family**
* *Phoenix dactylifera*	Date palm
* *Washingtonia robusta*	Mexican fan palm
ASPHODELACEAE	**Aloe Family**
* *Aloe maculata*	Aloe
ASTERACEAE	**Sunflower Family**
Ambrosia acanthicarpa	annual burrweed
Artemisia californica	California sagebrush
Artemisia douglasiana	California mugwort
Baccharis pilularis	coyote brush
Baccharis salicifolia	mulefat
* *Carduus pycnocephalus*	Italian thistle
* *Centaurea melitensis*	tocalote
* *Cirsium vulgare*	bull thistle
Encelia farinosa	desert brittlebush
Erigeron canadensis	horseweed

	Heterotheca grandiflora	telegraph weed
*	*Oncosiphon piluliferum*	stinknet
	Pseudognaphalium californicum	California everlasting
	Senecio sp.	ragwort
*	*Sonchus asper*	spiny sowthistle
	Xanthium sturmarium	rough cocklebur
BORAGINACEAE		**Forget-Me-Not Family**
	Emmenanthe penduliflora	whispering bells
BRASSICACEAE		**Mustard Family**
*	*Brassica nigra*	black mustard
*	*Hirschfeldia incana*	Summer mustard
CACTACEAE		**Cactus Family**
	Cylindropuntia sp.	cholla
*	*Opuntia ficus-indica*	mission cactus
	Opuntia littoralis	coast prickly pear
CHENOPODIACEAE		**Goosefoot Family**
*	*Chenopodium album*	lamb's quarters
CUCURBITACEAE		**Gourd Family**
	Cucurbita palmata	coyote melon
	Marah macrocarpus	wild cucumber
CUPRESSACEAE		**Cypress Family**
**	*Juniperus californica*	California juniper
CYPERACEAE		**Sedge Family**
	Cyperus eragrostis	tall flatsedge
*	*Cyperus involucratus*	umbrella sedge
*	*Cyperus papyrus*	Papyrus
EUPHORBIACEAE		**Spurge Family**
	Croton setiger	doveweed
*	*Euphorbia maculata*	spotted spurge
*	*Ricinus communis*	castor bean
FABACEAE		**Legume Family**
*	*Albizia julibrissin*	silktree
*	*Parkinsonia aculeate*	Mexican palo verde
*	*Senna didymobotrya*	hairy senna

* *Vachellia farensiana*	red acacia
FAGACEAE	**Oak Family**
Quercus agrifolia	coast live oak
GERANIACEAE	**Geranium Family**
* *Erodium cicutarium*	red-stemmed filaree
LAMIACEAE	**Mint Family**
* *Marrubium vulgare*	common horehound
* *Plectranthus montanus*	camphor sunflower
LAURACEAE	**Laurel Family**
* *Persea americana*	avocado
MORACEAE	**Mulberry Family**
***** *Ficus edulis*	fig
* *Ficus pumila*	creeping fig
MYRTACEAE	**Myrtle Family**
***** *Callistemon citrinus*	bottlebrush tree
* *Eucalyptus globulus*	blue gum eucalyptus
OLEACEAE	**Olive Family**
* *Olea europaea*	Olive
ONAGACEAE	**Evening Primrose Family**
Eulobus californicus	California primrose
OXALIDACEAE	**Wood-Sorrel Family**
Oxalis pex-carprae	Bermuda-buttercup oxalis
PLATANACEAE	**Sycamore Family**
Platanus racemosa.	western sycamore
POLYGONACEAE	**Buckwheat Family**
Eriogonum fasciculatum	California buckwheat
ROSACEAE	**Rose Family**
Heteromeles arbutifolia	toyon
* *Prunus persica*	peach
RUTACEAE	**Citrus Family**

* *Citrus* sp.	citrus
SALICAEAE	**Willow Family**
Populus fremontii	Fremont's cottonwood
Salix gooddingii	black willow
Salix laevigata	red willow
Salix lasiolepis	arroyo willow
SOLANACEAE	**Nightshade Family**
* *Nicotiana glauca*	tree tobacco
Datura wrightii	jimsonweed
Solanum douglasii	Douglas' nightshade
TAMARICACEAE	**Tamarisk Family**
* *Tamarix ramosissima*	salt cedar
ULMACEAE	**Elm Family**
* *Ulmus* sp.	elm
URTICACEAE	**Nettle Family**
* *Urtica urens*	dwarf nettle
MONOCOTS	
POACEAE	**Grass Family**
* *Stipa miliacea*	smilo grass

APPENDIX B	
FAUNAL COMPENDIUM	
The faunal compendium lists animal species identified on the Site.	
* = non-native species ** = special-status species	
BIRDS	
ACCIPITERIDAE	**Hawks, Old World Vultures and Harriers**
Accipiter cooperii	Cooper's hawk
Buteo jamaicensis	red-tailed hawk
Buteo lineatus	red-shouldered hawk
AEGITHALIDAE	**Bushtits**
Psaltriparus minimus	bushtit
ALAUDIDAE	**Larks**
Eremophila alpestris actia	California horned lark
APODIDAE	**Swifts**
Aeronautes saxatilis	white-throated swift
ARDEIDAE	**Herons and Egrets**
Ardea herodias	great blue heron
CARDINALIDAE	**Cardinals, Grosbeaks, and Allies**
Pheucticus melanocphalus	black-headed grosbeak
Piranga ludoviciana	western tanager
CATHARTIDAE	**New World Vultures**
Cathartes aura	turkey vulture
CHARADRIIDAE	**Plovers and Relatives**
Charadrius vociferus	killdeer
COLUMBIDAE	**Pigeons and Doves**
* *Columba livia*	rock pigeon
* *Streptopelia decaocto*	Eurasian collared-dove
Zenaida macroura	mourning dove
CORVIDAE	**Jays, Magpies, and Crows**
Aphelocoma californica	California scrub-jay
Corvus barchyrhynchos	American crow
Corvus corax	common raven

EMBERIZIDAE	**Emberizines**
Melospiza melodia	song sparrow
Melozone crissalis	California towhee
Pipilo maculates	spotted towhee
Zonotrichia leucophrys	white-crowned sparrow
ESTERILIDIDAE	**Weaver-finches**
* *Lonchura punculata*	nutmeg mannakin
FALCONIDAE	**Caracas and Falcons**
Falco sparverius	American kestrel
FRINGILLIDAE	**Finches**
Hirundo rustica	barn swallow
Petrochelidon pyrrhonota	cliff swallow
Stelgidopteryx serripennis	northern rough-winged swallow
ICTERIDAE	**Blackbirds**
Icterus bullockii	Bullock's oriole
Icterus cucullatus	hooded oriole
Molothrus ater	brown-headed cowbird
MIMIDAE	**Mockingbirds and Thrashers**
Mimus polyglottos	northern mockingbird
PARLUIDAE	**Wood Warblers and Relatives**
Cardellina pusilla	Wilson's warbler
Geothlypis trichas	common yellowthroat
Oreothlypis celata	orange-crowned warbler
Setophaga coronata	yellow-rumped warbler
** *Setophaga petechial*	yellow warbler
PICIDAE	**Woodpeckers**
Melanerpes formicivorus	acorn woodpecker
Picoides nuttallii	Nuttall's woodpecker
Picoides pubescens	downy woodpecker
PTILOGONATIDAE	**Silky Flycatchers**
Phainopepla nitens	phainopepla
REGULIDAE	**Kinglets**
Regulus calendula	ruby-crowned kinglet

STURNIDAE	**Starlings**
* *Sturnus vulgaris*	European starling
SYLVIIDAE	**Old World Warblers**
Chamaea fasciata	wrentit
TROCHILIDAE	**Hummingbirds**
Calypte anna	Anna's hummingbird
Selasphorus sasin	Allen's hummingbird
TROGLODYTIDAE	**Wrens**
Thryomanes bewickii	Bewick's wren
Troglodytes aedon	house wren
TURDIDAE	**Thrushes**
Sialia mexicana	western bluebird
Turdus migratorius	American robin
TYRANNIDAE	**Tyrant Flycatchers**
Empidonax difficilis	Pacific-slope flycatcher
** *Empidonax traillii*	willow flycatcher
Myiarchus cinerascens	ash-throated flycatcher
Sayornis nigricans	black phoebe
Sayornis saya	Say's phoebe
Tyrannus verticalis	western kingbird
Tyrannus vociferans	Cassin's kingbird
FISH	
POECILIIDAE	**Tooth-carps**
* *Gambusia affinis*	western mosquitofish
AMPHIBIANS	
HYLIDAE	**Treefrogs**
Pseudacris cadaverina	California treefrog
Pseudacris hypochondriaca hypochondriaca	Baja California treefrog
REPTILES	
PHRYNOSOMATIDAE	**Spiny Lizard**
Sceloporus occidentalis longipes	Great Basin fence lizard
Uta stansburiana	common side-blotched lizard
MAMMALS	

LEPORIDAE	**Rabbits and Hares**
Sylvilagus audubonii	desert cottontail
SCIURIDAE	**Squirrel Family**
Spermophilus beecheyi	California Ground Squirrel

May 2019 | EMF Study and Exemption Request

NAKASE ELEMENTARY SCHOOL

Toll Brothers

Prepared for:

Toll Brothers
Contact: Ilan P. Feingold, Sr. Project Manager
715 W. Town & Country Road, Suite 200
Orange, California 92868
714.347.1300

Prepared by:

PlaceWorks
Contact: Steve Bush, PE, Senior Engineer
1625 Shattuck Avenue, Suite 300
Berkeley, California 94709
510.848.3815
info@placeworks.com
www.placeworks.com

PLACEWORKS

Table of Contents

Section **Page**

1. INTRODUCTION 1
1.1 PURPOSE 1
1.2 SCHOOL SITE LOCATION 1
1.3 REGULATORY REQUIREMENTS 1
1.4 REPORT OBJECTIVES 2
2. EMF STUDY 5
2.1 SCHOOL SITE AND POWER LINE LOCATIONS 5
2.2 INTRODUCTION TO EMF 9
2.3 EMF SETBACK EVALUATION 10
2.4 POWER LINE SETBACK EXEMPTION REQUEST 11
2.5 METHODS TO REDUCE EMF EXPOSURE 11
3. SUMMARY AND RECOMMENDATIONS 13
4. REFERENCES 15

APPENDICES

Appendix A. Photo Essay
Appendix B. Supporting Documentation

Table of Contents

List of Figures

Figure **Page**

Figure 1 Site Location 3
Figure 2 Site and Setback Distance 7

1. Introduction

1.1 PURPOSE

This report presents the results of an Electromagnetic Field (EMF) study and documentation to support a California Department of Education (CDE) Power Line Setback Exemption Request for the proposed Nakase Elementary School. The EMF study includes an evaluation of the potential exposure to EMF for students and staff at the school site in accordance with the CDE's Power Line Setback Exemption Guidance Policy (CDE 2006).

1.2 SCHOOL SITE LOCATION

Toll Brother (the project developer) is working to gain approval for construction of an elementary school on 10-acres of the 120.83-acre Nakase Property Area Plan located at 20621 Lake Forest Drive, Lake Forest, California. The project developer will dedicate the elementary school site to the Saddleback Valley Unified School District (SVUSD) following the City of Lake Forest certification of the Nakase Property Area Plan Final Environmental Impact Report, general plan amendment, zone change, development agreement, and subject to SVUSD's environmental review and approval of the school site, California Department of Education's (CDE) final approval, as well as completion and approval of grading and infrastructure plans. The school site would accommodate up to 1,000 students from kindergarten through sixth grade. The Nakase Property Area Plan is bounded by Bake Parkway to the northwest, office buildings to the southwest, Serrano Creek to the southeast, and Rancho Parkway to the east. The proposed elementary school and play fields and active use areas (project site) are in the northeast corner of the Nakase Nursery site (Figure 1).

1.3 REGULATORY REQUIREMENTS

There currently are Southern California Edison (SCE) 66 kilovolt (kV) double circuit overhead transmission lines northwest of the school site located in a 20-foot wide easement along Bake Parkway. However, planned infrastructure improvements for the Nakase Nursery site include undergrounding the overhead power lines along Bake Parkway (City of Lake Forest 2018). The infrastructure improvements would occur prior to construction of the proposed school. Therefore, this study address EMF exposure from underground 66 kV transmission lines.

The existing California Code of Regulations (CCR), Title 5, Section 14010(c) specifies a distance setback requirement of 25 feet from 50 to 130 kV underground power lines for proposed school sites as follows:

> *The property line of the site even if it is a joint use agreement as described in subsection (o) of this section shall be at least the following distance from the edge of respective power line easements*:

- 25 feet for 50-133 kV line (interpreted by CDE up to <200 kV)
- 37.5 feet for 220-230 kV line
- 87.5 feet for 500-550 kV line.

CDE has an interim policy that allows schools within the vicinity of underground lines to apply for variances to this regulation as described in the *Power Line Setback Exemption Guidance Policy* (CDE 2006). However, the setback exemption request is only applicable for new schools that are planning to have *limited activity uses* within the setback zone. Limited activity uses are defined as staff/visitor/joint-use parking, bus and parent drop-off parking, driveways, access roads, sidewalks, fire lanes, and landscaping.

1.4 REPORT OBJECTIVES

To meet the requirements of CCR Title 5 Sections 14010(c) and CDE's policy on transmission lines, this EMF Report is designed to meet the following objectives:

- Determine the encroachment distance of the setback zone onto the proposed school site
- Determine proposed uses at the school within the setback distance
- Recommend design measures for construction of the new school to minimize exposure to EMF

Source: Esri, PlaceWorks, 2019.

Figure 1
Site Location

Site boundary

1. Introduction

This page intentionally left blank.

2. EMF Study

2.1 SCHOOL SITE AND POWER LINE LOCATIONS

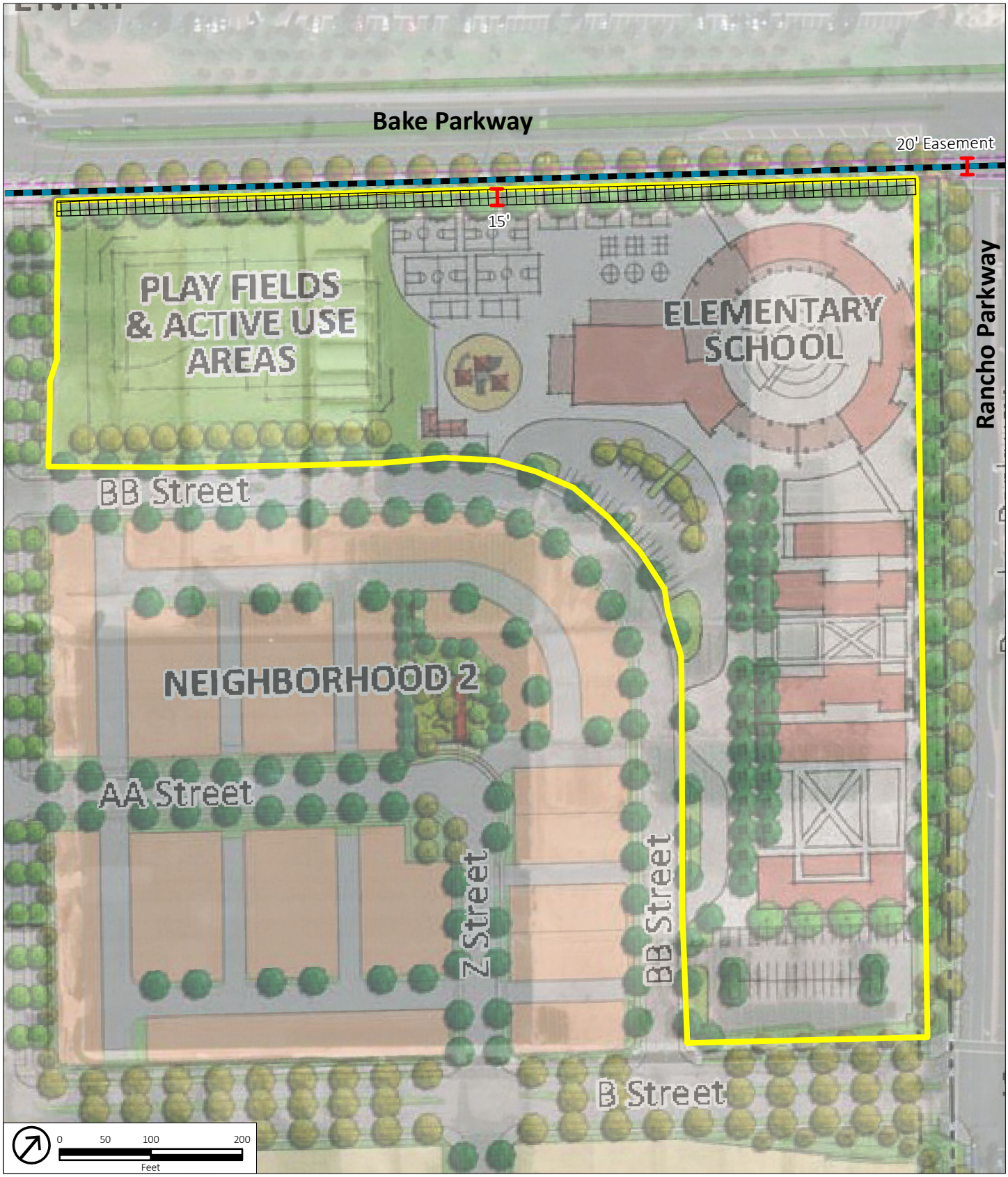
Toll Brothers is working to gain approval for construction elementary school located at the corner of Bake Parkway and Rancho Parkway in Lake Forest, California. There currently are SCE 66 kV double circuit overhead transmission lines that are within a 20-foot wide SCE easement along the south side of Bake Parkway that run parallel to the northwestern boundary of the proposed school site (SCE 2019). The southern edge of the SCE easement is the school's northwestern property line. However, there are plans to underground the power lines prior to the construction of the school site. Underground 66 kV power lines require a 25-foot setback from the edge of the SCE easement.

CDE allows an exemption to measure the setback distance from the centerline of the transmission line instead of the edge of the easement if it can reasonably be assumed that the utility would not place the utility line closer to the school site within the easement. Because the SCE easement is relatively narrow at this location (i.e., 20 feet wide), it is reasonable to assume that the undergrounded transmission lines would be placed in the center of the easement to maximize the space needed by SCE for future maintenance and repairs. Assuming the undergrounded lines are in the center of the SCE easement, the 25-foot setback zone would encroach 15 feet onto the northwestern portion of the school site. The proposed school layout, location of the future underground SCE transmission lines, and setback zone are shown in Figure 2. Photographs of the existing transmission lines and SCE easement near the school site are provided in Appendix A.

The SVUSD is currently considering various layouts for the proposed school site. The CDE Power Line Setback Exemption Guidance Policy requires an EMF study and an exemption request to be prepared for limited activity uses (i.e., landscaping, parking lots, driveways) within any setback zone. According to the current proposed school layout provided by Toll Brothers, it appears the 15-foot setback area within the school site would consist of landscaping (Figure 2), which is a limited activity use and acceptable for a CDE exemption. However, the final proposed school site plan should confirm that hardcourts and a grass playfield are not located within the setback zone. These uses are considered unrestricted uses, and CDE would require preparation of a Field Management Plan for school sites if unrestricted uses (classrooms, athletic fields, and joint-use facilities) are proposed within the setback zone.

2. EMF Study

This page intentionally left blank.



Source: C2 Collaborative Landscape Architecture, 2018; PlaceWorks, 2019.

Overhead 66kV Line
Site Boundary
15-foot Setback

Note: the on-site 15-foot setback is measured from the edge of the SCE easement. The centerline of the transmission line is setback 10-ft from the easement edge, resulting in a total setback of 25 feet from the powerline.

Figure 2
Site and Setback Distance

2. EMF Study

This page intentionally left blank.

2.2 INTRODUCTION TO EMF

Electric and magnetic fields occur both naturally and as a result of human activity. Naturally occurring electric and magnetic fields are caused by the weather and the earth's geomagnetic field. Fields caused by human activity include areas that surround electrical devices, such as power lines, electrical wiring, and appliances.

Electric power flows across transmission systems from generating sources to serve electrical loads within the community. The power flowing through a transmission line is determined by the line's voltage and current. The higher the voltage level, the lower the amount of current needed to deliver the same amount of power. For example, a 115 kV transmission line will transmit 40,000 kilowatts (kW) with 200 amperes (amps) of current, whereas a 230 kV transmission line requires only 100 amps to deliver the same amount of power.

Magnetic fields from power lines are created whenever current flows through power lines at any voltage. The strength of the field is directly dependent on the current in the line. Magnetic field strength is typically measured in milliGauss (mG). Similar to electric fields, magnetic field strength attenuates rapidly with distance from the source. However, unlike electrical fields, magnetic fields are not easily shielded by objects or materials.

Public exposure to EMF is widespread and encompasses a wide range of electronic appliances or equipment, including computers, copy machines, fluorescent lights, hair dryers, televisions, ceiling fans, microwave ovens, refrigerators, digital clocks, washing machines, and dryers. Within urban areas of development, EMF also occurs from ground currents in water pipes and the electric distribution circuits that serve residences or businesses. Power line fields are typically at the front of residential lots where overhead or underground distribution lines are routed. Underground transmission lines typically have higher EMF values directly above the line than overhead transmission lines. However, the EMF values attenuate more quickly with distance from underground lines.

Despite extensive research over the past 20 years, the health risk caused by EMF exposure remains undetermined. Two national research organizations (the National Research Council and the National Institute of Health) have reviewed numerous health risk-related studies and have concluded that there is no strong conclusive evidence that EMF exposure poses a human health risk. However, the California Department of Health Services (CDHS) reached a different conclusion after a comprehensive review of existing studies related to EMF. The CDHS scientists concluded that EMFs *could* cause some degree of increased risk of childhood leukemia, adult brain cancer, Lou Gehrig's Disease, and miscarriage (CDHS 2002). As a result, the CDE has decided to employ the precautionary principle and limit exposure to EMF for students and staff at California schools (CDE 2006). The precautionary principle states that if an action or policy has a suspected risk of causing harm to the public or the environment in the absence of scientific consensus, there is a social responsibility to protect the public from exposure to harm. These protections can be relaxed if further scientific findings emerge that provide sound evidence that no harm will result.

There are no federal standards limiting occupational or residential exposure to EMF. Two states, Florida and New York, have set standards for magnetic fields at the edge of a transmission line right-of-way ranging from 150 mG to 250 mG, depending on the kV of the line. The California Public Utilities Commission (CPUC)

has requirements that utilities use "low-cost or no-cost" mitigation measures for the planning and construction of new or reconstructed transmission facilities (CPUC 2015). The International Commission on Non-Ionizing Radiation Protection (ICNIRP) in conjunction with the World Health Organization (WHO) has published recommended guidelines on electric and magnetic field exposures (NIH 2002). For the general public, the recommended limit is 830 mG. Neither of these organizations has governmental authority nor jurisdiction to enforce these guidelines. However, the guidelines are considered by utilities and regulators when reviewing EMF levels from electric power lines.

Research on ambient magnetic fields in homes and buildings in several western states found average magnetic fields within most rooms to be approximately 1 mG, while in a room with appliances present, the measured values ranged from 9 to 20 mG (CPUC 2003). The magnetic field at a distance of 12 inches from a color TV can range up to 20 mG and the magnetic field at a distance of 12 inches from a microwave oven can be up to 200 mG (NIH 2002).

2.3 EMF SETBACK EVALUATION

The pattern and strength of magnetic fields produced by underground transmission lines depend on the type of construction. Magnetic fields are typically higher for underground cables than overhead transmission lines, because the field source is only a few feet from the ground surface as compared to overhead conductors at the top of a 20 to 40-foot high transmission pole. However, due to the close spacing of underground cables, the magnetic field decreases more rapidly with distance from the source, resulting in a greatly reduced width of exposure to magnetic fields.

Typically to meet CDE requirements, an EMF survey would be conducted to determine EMF measurements at the proposed school site from the current power line configuration. However, since the proposed undergrounding of the power lines would occur prior to school construction, EMF measurements at the time of school occupancy would differ from the current power line configuration. Although an EMF survey was conducted for the overhead 66kV transmission lines, the results are not included as part of this setback evaluation since the EMF values will differ once the lines are undergrounded.

Currently, the 66 kV transmission lines northwest of the school site are located along the centerline of the 20-foot wide SCE easement, approximately 10 feet from the school's property line. For the purposes of this evaluation it is assumed that the future underground power lines would also be located along the centerline of the SCE easement and remain 10 feet from the school's northwestern property line. Therefore, the 25-foot setback zone extends approximately 15 feet onto the school property. According to the proposed school layout, it appears that only landscaping would be located within the 15-foot of the setback zone that extends onto the school property (Figure 2). However, a future site layout plan will need to confirm that unlimited uses, such as hardcourts and athletic fields do not encroach into the 15-foot setback area. If unlimited activity uses extend into the setback zone, an additional EMF study and a Field Management Plan would need to be prepared.

2.4 POWER LINE SETBACK EXEMPTION REQUEST

Pursuant to the CCR Title 5 regulations, the SVUSD is requesting a Power Line Setback Exemption from CDE for Limited Activity Use within the 25-foot setback zone along the northwestern boundary of the proposed school site. The future underground 66 kV transmission lines northwest of the school site are assumed to be 10 feet from the school's property line, along the centerline of the 20-foot wide SCE easement.

CDE has provisions that enable the setback distance to be calculated from the centerline of the transmission line instead of the edge of the easement, if it can reasonably be determined that it is extremely unlikely that new or relocated transmission lines would be placed closer to the school within the easement. It is not likely that the transmission lines would be relocated closer to the future school site as part of the proposed infrastructure improvements for the Nakase Nursery site. Therefore, this criterion has been met and an on-site setback distance of 15 feet is used for this evaluation.

As shown on Figure 2, the preliminary site plan shows an encroachment of approximately 15 feet onto the school site. Therefore, only land uses that meet the definition of Limited Activity Use, described in the CDE *Power Line Setback Exemption Guidance,* are recommended within the 15-foot on-site setback zone. Limited activity uses are defined as staff/visitor/joint-use parking, bus and parent drop-off parking, driveways, access roads, sidewalks, fire lanes, and landscaping.

2.5 METHODS TO REDUCE EMF EXPOSURE

Because only limited activity use is being requested within the 15-foot on-site setback zone, an EMF Field Management Plan is not required. However, SVUSD could incorporate magnetic field reduction strategies into the architectural design of the proposed elementary school to reduce exposure for staff and students to the extent feasible. Potential EMF reduction measures include the following:

- Locate high occupancy areas such as classrooms as far as possible from magnetic field sources
- Locate electrical panels, transformers, mechanical equipment, raceways, etc. as far as possible from occupied areas
- Locate electrical equipment in dedicated spaces that are not normally occupied: equipment rooms, storage rooms, and supply rooms
- Locate the service transformer and main switchboard as close as possible and practical to the main service street connection
- Locate transformers, switchgear, and large panels remote from occupied spaces in outdoors or in parking structures
- Provide barriers, walls, and/or fencing to limit access to electrical equipment, if located outside
- Provide required clearances and work space according to code and utility company requirements
- Transformers shall comply with Department of Energy Policy Act of 2005
- Locate equipment and equipment rooms so they are not adjacent, directly above, or directly below classrooms, offices, libraries, and similar spaces

2. EMF Study

- Disburse power via low occupancy areas
- Use EMF-free or low-EMF electrical wiring, where appropriate
- Design distribution lines to minimize EMF fields with the following options:
  - Place distribution lines underground and shield in steel pipe or steel jacket, if possible
  - Close spacing or bundling of hot and neutral conductors
  - Use of triplex for service drops
- Designs incorporating branch circuits with double neutrals shall be provided with a harmonic content study to substantiate the need for double neutrals
- Avoid routing underground feeders to pass under occupied spaces; where underground feeders have to pass beneath the concrete slab to terminate at a distribution panel inside the building, install conduits 24 inches below finished floor
- If power is brought in overhead, avoid bringing it in adjacent to classrooms or assembly areas
- Locate sub panels away from heavily used spaces
- Minimize currents by using higher voltages whenever practical
- Utilize balanced three-phase systems
- Keep major wiring runs away from heavily used spaces, such as classrooms and assembly areas
- Run sub panel feeder conduits that are heavily loaded in concealed spaces away from seating areas for classrooms and offices
- Keep large electrical loads generated by motors, HVAC equipment, fans, and blowers as far as possible from student and staff occupied areas
- Avoid multiple main electric panels which can create the potential for a current loop, resulting in high EMF levels throughout the occupied building space
- Gas, electric, telephone, cable, and water systems should be located to enter buildings as close together as possible and bonded per the NEC to prevent an objectionable flow of current over the grounding conductors or grounding paths
- Minimize distance between conductors in a circuit
- Use LED lights or electronic ballasts in place of magnetic ballasts for fluorescent lights and mount the ballast in remote locations away from occupied space, where possible

According to the proposed site plan, all classroom and buildings are at least 50 feet from the SCE easement and are therefore outside of the 15-foot on-site setback zone. Placing landscaping or other limited activity uses nearest the power line easement will reduce EMF exposure to students and staff at the proposed school site.

3. Summary and Recommendations

Toll Brothers is working to gain approval for an elementary school on 10-acres of the 120.83-acre Nakase Property Area Plan at 20621 Lake Forest Drive, Lake Forest, California. PlaceWorks was retained by Toll Brothers to perform an EMF study and provide supporting documentation for a Power Line Setback Exemption Request. The findings of the study are summarized below:

- There are Southern California Edison (SCE) 66 kilovolt (kV) double circuit overhead transmission lines northwest of the school site within a 20-foot wide SCE easement along the south side of Bake Parkway.
- The transmission line is approximately 10 feet from the school's northwestern property line along the center line of the SCE easement.
- Planned infrastructure improvements for the Nakase Nursery site include undergrounding the overhead power lines prior to construction of the proposed school.
- Assuming the underground power line would be located along the center line of the SCE easement, the 25-foot setback zone would encroach 15 feet onto the northwestern portion of the school site.
- The SVUSD is requesting that CDE provide an exemption for limited activity use (landscaping, driveways, access roads, sidewalks, fire lane, staff/visitor parking) within the 15-foot setback zone from the 66 kV transmission lines that will be undergrounded prior to the construction of the school site.

Once the 66-kV transmission lines have been undergrounded along Bake Parkway, SVUSD will evaluate the location of the lines with respect to the school site boundaries. If the location of the lines differ from what is presented in this report, an addendum will be prepared and submitted to CDE.

Based upon the information presented in this report, SVUSD is requesting and will comply with the requirements for an exemption for limited activity use within the transmission line setback zone along the SCE easement adjacent to Bake Parkway. By limiting activity within the setback distance from the future underground power lines, the exposure of students and staff to EMF levels at the proposed elementary school will be less than significant.

3. Summary and Recommendations

This page intentionally left blank.

4. References

California Department of Education (CDE). 2006, May. Power Line Setback Exemption Guidance. Prepared by School Facilities Planning Division, CDE.

California Department of Health Services (CDHS). 2002, June. *An Evaluation of the Possible Risks from Electric and Magnetic Fields (EMFs) From Power Lines, Internal Wiring, Electrical Occupations, and Appliances.*

California Public Utilities Commission (CPUC). 2015. *Public Actions Regarding EMF*. Accessed September 1, 2017. http://www.cpuc.ca.gov/environment/emf/actions.htm.

California Public Utilities Commission (CPUC). 2003, July 16. *Draft Environmental Impact Report for the Proposed Jefferson-Martin 230 kV Transmission Line Project*.

City of Lake Forest. 2018, July. *Initial Study for the Nakase Nursery/Toll Brothers Project*. Prepared by LSA.

National Institute of Health (NIH). 2002. *EMF: Electric and Magnetic Fields Associated with the Use of Electric Power*. Prepared by the National Institute of Environmental Health Sciences and sponsored by the EMF RAPID program.

Southern California Edison (SCE). 2019. Correspondence and information provided by Mr. Phil Hung, PE, EMF Program Manager for SCE to Ms. Danielle Clendening, Intern, PlaceWorks. Dated January 29, 2019.

4. References

This page intentionally left blank.

Appendix A. Photo Essay

Appendix

This page intentionally left blank.

PLACEWORKS

PHOTO ESSAY

Client Name: Toll Brothers

Site Location: Nakase Elementary School

Project No.: TBRO-02.0

Photo No:	**Date:**
1	2/8/19

Description:

View looking to the northeast from the northern boundary of the school site. Bake Parkway and the 66 kV double circuit transmission lines are visible in the right-of-way next to the sidewalk.

Photo No:	**Date:**
2	2/8/19

Description:

View looking to the southeast from the northern boundary of the school site. Bake Parkway and the 66 kV double circuit transmission lines are visible in the right-of-way next to the sidewalk.

PLACEWORKS

PHOTO ESSAY

Client Name: Toll Brothers

Site Location: Nakase Elementary School

Project No.: TBRO-02.0

Photo No:	**Date:**
3	2/8/19

Description:

View looking to the northeast from the sidewalk south of Bake Parkway. The 66 kV double circuit transmission lines and the easement are shown. The northern fence line of the school site is along the right side of the photograph.

Photo No:	**Date:**
4	2/8/19

Description:

View looking to the southwest from the 20-foot wide SCE easement south of Bake Parkway. The 66 kV double circuit transmission lines and SCE easement are shown. The northern fence line of the school site is along the left side of the photograph.

Appendix B. Supporting Documentation

Appendix

This page intentionally left blank.

LSA

FIGURE 2.8

N

0 160 320

FEET

SOURCE: C2 Collaborative Landscape Architecture

I:\CLF1801\G\Concept_Landscape_Plan_11x17.cdr (7/11/2018)

Nakase Nursery/Toll Brothers

Conceptual Landscape Plan

THIS MAP WAS PREPARED FOR ORANGE COUNTY ASSESSOR DEPT. PURPOSES ONLY. THE ASSESSOR MAKES NO GUARANTEE AS TO ITS ACCURACY NOR ASSUMES ANY LIABILITY FOR OTHER USES. NOT TO BE REPRODUCED. ALL RIGHTS RESERVED.
© COPYRIGHT ORANGE COUNTY ASSESSOR 2014

09

13

21

22

610-A2

610-51

610-48

610-47

TRACT P.M.

POR. LOT G 1.021 AC. (17)

FOOTHILL TRANSPORTATION CORRIDOR

1.483 AC. (16)

SEE PAGE 4

LOT F

LOT C (6) 2.339 AC.

RANCHO PARKWAY

20-ft wide SCE Easement

339-16

LOT 2 (14) 9.121 AC.

191

SEE PAGE 3

RANCHO (ABAND. STR. Y)

LOT D (11) 6.418 AC.

LANDSCAPE ESMT.

LOT 4 (1) 2.347 AC.

194

331-22

192

PARKWAY

LOT E (1) 1.145 AC.

LOT 14 (1) 2.725 AC.

193

LOT B 2.007 AC. (5)

LOT 13 (2) 1.594 AC.

LOT 12 (3) 1.391 AC.

LOT 11 (4) 1.281 AC.

LOT 5 (15) 3.157 AC

LOT 6

LOT 7 (16) 2.135AC

LOT 8

10' STORM DRAIN ESM'T

NO. 15753 P.M.

SEE PAGE 2

LOT A 0.462AC. (13)

321-42

ORCHARD ROAD

BAKE PARKWAY

10' PVT. STORM DRAIN ESMT.

1" = 300'

JANUARY 2000

TRACT NO. 15753
PARCEL MAP

M.M. 793-09 to 15 inc.
P.M. 321-42, 331-22, 339-16

NOTE - ASSESSOR'S BLOCK & PARCEL NUMBERS SHOWN IN CIRCLES

ASSESSOR'S MAP
BOOK 612 PAGE 19
COUNTY OF ORANGE

Project No.
13362.000.000

September 12, 2016

Mr. Peter Kim
Vice President, Land Development
Toll Brothers, Inc.
725 W. Town & Country Road
Orange, CA 92868

Subject: 20621 Lake Forest Drive
Lake Forest, California

SOIL CHARACTERIZATION ASSESSMENT

Reference: Hillmann; Phase I Environmental Site Assessment, 20621 Lake Forest Drive, Lake Forest, California; August 31, 2016; Project No. P2016.001.311.

Dear Mr. Kim:

We are pleased to submit our soil characterization assessment conducted at 20621 Lake Forest Drive in Lake Forest, California (Site). The purpose of the assessment was to evaluate the extent of possible agrichemical impacts associated with historic farming and orchard land use at the Site.

BACKGROUND

The Site is located behind several commercial buildings on Lake Forest Drive and directly south of the intersection of Bake Road and Rancho Parkway in Lake Forest, California. The current use of the approximately 122.07-acre property consists of temporary and permanent greenhouse structures, office trailers, semi-truck and trailer parking, and open areas. The Property in whole is an active wholesale plant nursery. The site plan is shown on Figure 1.

According to the phase I environmental site assessment (ESA) of the Property by Hillman Consultants, the Property was developed from prior to 1938 through the 1960s with orchards, then developed partially with orchards and the rest with a plant nursery until the early 1980s. All orchards were removed by 1988, and the Property was used primarily as a nursery past that point. During the phase I ESA, the following Recognized Environmental Concerns (RECs) were reported:

- Historical and current applications of pesticide/herbicide/insecticide/fungicide likely occurred at the Property based on historical and current usage. Residual pesticides and related compounds are likely to exist in shallow soils and drainage channels from usage on the Property.

- A 400-gallon diesel steel-wall UST was formerly used at the property and reported as removed from the south corner of the Property in the early 1990s. No closure documentation was available for the Property.

This assessment was performed to evaluate potential impacts from organochlorine pesticide (OCPs) usage prior to 1988, when orchards were present onsite.

FIELD ACTIVITIES

The assessment included sample collection and laboratory analysis. On September 9, 2016, 46 soil samples were collected ranging from depths of approximately 6 to 48 inches below the existing ground surface. Since fill material and gravel exist in areas of the Site, the specific sample depth was determined based on an interpretation of the original orchard elevations. In addition, a terrace cut area was observed with exposed bedrock. As the historical orchard soils were removed from this area, the terrace was not sampled. Sample locations are shown on Figure 2. Details of the sampling program are presented below.

SAMPLING ACTIVITIES

Soil Sampling

The Property was divided into quadrants and samples were recovered from the former orchard using hand-sampling equipment. One to four samples were obtained per quadrant and submitted as a 4:1 composite sample. The number of samples per quadrant was dependent on access and depth of native soil. At each location, the collected soil was placed into 1-inch by 6-inch stainless steel liners. Upon collection, a label was placed on the sample that included a unique sample number, sample location, and time/date collected. The soil samples were placed in an ice-cooled chest and submitted under documented chain-of-custody to SunStar Laboratories, a State-certified laboratory in Lake Forest, California. The soil samples were analyzed for Organochlorine Pesticides (OCPs) (EPA 8081A), lead and arsenic (EPA 6020).

The following quadrants and locations were not sampled for the following reasons:

- Sample S7C was not sampled due to thick fill materials and refusal with the hand auger from underlying concrete fragments.

- Sample S8A was not sampled because no native soils were present within the first 4 feet below the surface.

- Samples S8C and S8D were not sampled because no native soils were present from prior excavation (terrace cut).

- Samples S11A through S11D were not sampled because no native soils were present from prior excavation (terrace cut).

- Samples S13A, S13C, and S13D were not sampled because no native soils were present within the first 4 feet below the surface.

- Samples S14A through S14D were not sampled because no native soils were present from prior excavation (terrace cut).

- Sample S15B was not sampled because no native soils were present within the first 4 feet below the surface.

ANALYTICAL RESULTS

Four-point composite samples were submitted for all samples per quadrant and analyzed for organochlorine pesticides (OCPs). No detectable concentrations of OCPs were reported for the composite samples. One discrete sample per quadrant was submitted for arsenic and lead analysis. Review of the laboratory test results found detectable concentrations of lead and arsenic in each of the seven samples analyzed. Arsenic concentrations ranged from 0.48 mg/Kg to 4.7 mg/Kg, while lead ranged from 2.6 mg/Kg to 8.4 mg/Kg. While the arsenic concentrations exceed the EPA Region Screening Levels[1] (RSLs), the concentrations are within the range of expected background concentrations[3] and therefore, do not pose an environmental concern. Lead concentrations are well below the CAL-EPA Screening Levels for Soil[2]. The laboratory results are presented in their entirety in Appendix A.

DISCUSSION

Review of the laboratory test results found no detectable concentrations of OCPs. The reported lead and arsenic concentrations are within the range of expected background concentrations. Based on the findings of this soil characterization assessment, it is our opinion that the site soils are suitable for future residential development.

According to the phase I ESA report, it was recommended that investigation be performed where the former UST was located in the southern corner of the Property. There is currently no UST closure documentation available for the Property concerning this removal. It is conceivable some localized impacts may exist in this area. A limited subsurface assessment can be performed in the future to verify soils have not been significantly impacted.

---

[1] TPH (Aromatic High) - RSL Residential Soil Table, November 2015.
[2] Lead (Noncancer Endpoint) – DTSC-Recommended Screening Levels for Soil, July 2016.
[3] Arsenic (Background Levels) – G.R. Bradford, et al., Background Concentrations of Trace and Major Elements in California Soils, Kearney Foundation of Soil Science Division of Agriculture and Natural Resources, University of California, March 1996.

If you have any questions regarding this report, please contact us.

Sincerely,

ENGEO Incorporated

Lauren Gordon
lg/sm/mgo/jtb/jf

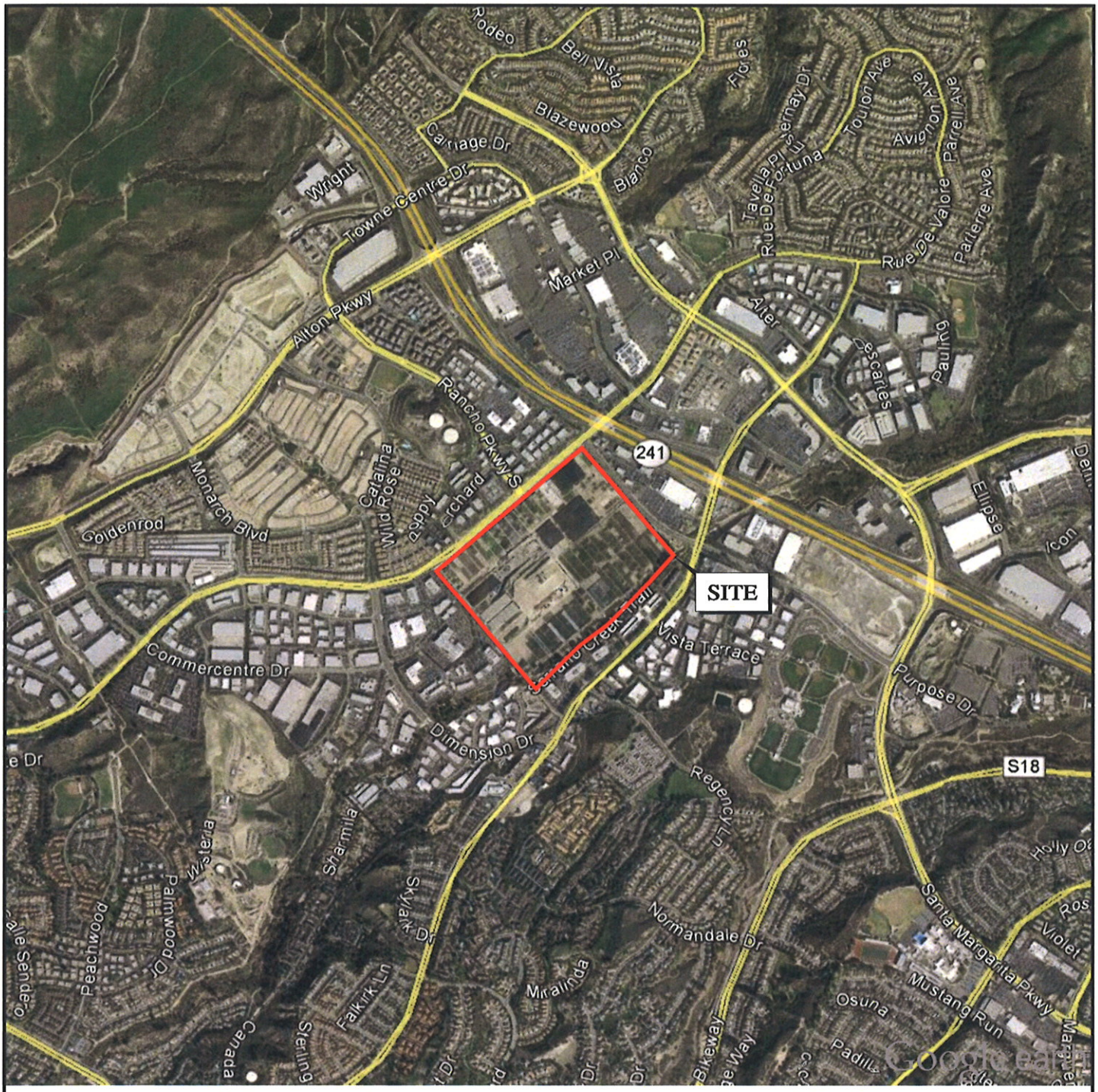
Shawn Munger, CHG

Attachments: Figures 1 and 2
Appendix A – Analytical Report, SunStar Laboratories

FIGURES

Figure 1 – Vicinity Map
Figure 2 – Site Plan

COPYRIGHT © 2016 BY ENGEO INCORPORATED. THIS DOCUMENT MAY NOT BE REPRODUCED IN WHOLE OR IN PART BY ANY MEANS WHATSOEVER, NOR MAY IT BE QUOTED OR EXCERPTED WITHOUT THE EXPRESS WRITTEN CONSENT OF ENGEO INCORPORATED.



N

0 FEET 2000

0 METERS 1000

BASE MAP SOURCE: GOOGLE EARTH MAPPING SERVICE

ENGEO Expect Excellence

VICINITY MAP

20621 LAKE FOREST DRIVE

LAKE FOREST, CALIFORNIA

PROJECT NO.: P2016.001.311		FIGURE NO. 1
SCALE: AS SHOWN		
DRAWN BY: PC	CHECKED BY: MH	

G:\Drafting\DRAFTING2_Dwg_NoProjectNo_Proposal\P2016\P2016001311\P2016011311-1-VicinityMap-LakeForest-0916.dwg Plot Date: 9-12-16 llee

ORIGINAL FIGURE PRINTED IN COLOR

COPYRIGHT © 2017 BY ENGEO INCORPORATED. THIS DOCUMENT MAY NOT BE REPRODUCED IN WHOLE OR IN PART BY ANY MEANS WHATSOEVER, NOR MAY IT BE QUOTED OR EXCERPTED WITHOUT THE EXPRESS WRITTEN CONSENT OF ENGEO INCORPORATED.

N

0 FEET 500

0 METERS 250

EXPLANATION

ALL LOCATIONS ARE APPROXIMATE

D● SAMPLE

BASE MAP SOURCE: GOOGLE EARTH MAPPING SERVICE

ENGEO Expect Excellence

SITE PLAN
20621 LAKE FOREST DRIVE
LAKE FOREST, CALIFORNIA

PROJECT NO.: P2016.001.311
SCALE: AS SHOWN
DRAWN BY: PC CHECKED BY: MH

FIGURE NO. 2

G:\Drafting\DRAFTING2_Dwg_NoProjectNo_Proposal\P2016\P2016001311\P2016011311-2-SitePlan-LakeForestDr- 0916.dwg Plot Date: 9-12-16 llee

ORIGINAL FIGURE PRINTED IN COLOR

APPENDIX A

SUNSTAR LABORATORY

Analytical Report

13362.000.000
September 12, 2016

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

09 September 2016

Matthew Harrell
Engeo
2213 Plaza Dr.
Rocklin, CA 95765

RE: 20621 Lake Forest Dr.,CA

Enclosed are the results of analyses for samples received by the laboratory on 09/08/16 14:50. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Daniel J Chavez

Daniel Chavez
Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
S1-A	T162181-01	Soil	09/08/16 10:35	09/08/16 14:50
S2-A	T162181-05	Soil	09/08/16 11:00	09/08/16 14:50
S3-A	T162181-09	Soil	09/08/16 11:25	09/08/16 14:50
S4-A	T162181-13	Soil	09/08/16 12:15	09/08/16 14:50
S5-A	T162181-17	Soil	09/08/16 14:20	09/08/16 14:50
S6-A	T162181-21	Soil	09/08/16 13:15	09/08/16 14:50
S7-A	T162181-25	Soil	09/08/16 12:20	09/08/16 14:50
COMPOSITE S1-ABCD	T162181-28	Soil	09/08/16 00:00	09/08/16 14:50
COMPOSITE S2-ABCD	T162181-29	Soil	09/08/16 00:00	09/08/16 14:50
COMPOSITE S3-ABCD	T162181-30	Soil	09/08/16 00:00	09/08/16 14:50
COMPOSITE S4-ABCD	T162181-31	Soil	09/08/16 00:00	09/08/16 14:50
COMPOSITE S5-ABCD	T162181-32	Soil	09/08/16 00:00	09/08/16 14:50
COMPOSITE S6-ABCD	T162181-33	Soil	09/08/16 00:00	09/08/16 14:50
COMPOSITE S7-ABD	T162181-34	Soil	09/08/16 00:00	09/08/16 14:50

SunStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

DETECTIONS SUMMARY

Sample ID: S1-A **Laboratory ID:** T162181-01

Analyte	Result	Reporting Limit	Units	Method	Notes
Arsenic	**2.4**	0.23	mg/kg	6020 ICP-MS	
Lead	**5.0**	0.23	mg/kg	6020 ICP-MS	

Sample ID: S2-A **Laboratory ID:** T162181-05

Analyte	Result	Reporting Limit	Units	Method	Notes
Arsenic	**0.98**	0.25	mg/kg	6020 ICP-MS	
Lead	**3.6**	0.25	mg/kg	6020 ICP-MS	

Sample ID: S3-A **Laboratory ID:** T162181-09

Analyte	Result	Reporting Limit	Units	Method	Notes
Arsenic	**1.4**	0.23	mg/kg	6020 ICP-MS	
Lead	**2.6**	0.23	mg/kg	6020 ICP-MS	

Sample ID: S4-A **Laboratory ID:** T162181-13

Analyte	Result	Reporting Limit	Units	Method	Notes
Arsenic	**4.7**	0.25	mg/kg	6020 ICP-MS	
Lead	**4.1**	0.25	mg/kg	6020 ICP-MS	

Sample ID: S5-A **Laboratory ID:** T162181-17

Analyte	Result	Reporting Limit	Units	Method	Notes
Arsenic	**0.48**	0.25	mg/kg	6020 ICP-MS	
Lead	**3.7**	0.25	mg/kg	6020 ICP-MS	

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

Sample ID: S6-A **Laboratory ID:** T162181-21

Analyte	Result	Reporting Limit	Units	Method	Notes
Arsenic	**2.2**	0.23	mg/kg	6020 ICP-MS	
Lead	**8.4**	0.23	mg/kg	6020 ICP-MS	

Sample ID: S7-A **Laboratory ID:** T162181-25

Analyte	Result	Reporting Limit	Units	Method	Notes
Arsenic	**3.1**	0.23	mg/kg	6020 ICP-MS	
Lead	**2.9**	0.23	mg/kg	6020 ICP-MS	

Sample ID: COMPOSITE S1-ABCD **Laboratory ID:** T162181-28

No Results Detected

Sample ID: COMPOSITE S2-ABCD **Laboratory ID:** T162181-29

No Results Detected

Sample ID: COMPOSITE S3-ABCD **Laboratory ID:** T162181-30

No Results Detected

Sample ID: COMPOSITE S4-ABCD **Laboratory ID:** T162181-31

No Results Detected

unStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

Sample ID: COMPOSITE S5-ABCD **Laboratory ID:** T162181-32

No Results Detected

Sample ID: COMPOSITE S6-ABCD **Laboratory ID:** T162181-33

No Results Detected

Sample ID: COMPOSITE S7-ABD **Laboratory ID:** T162181-34

No Results Detected

SunStar Laboratories, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Daniel Chavez, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

S1-A

T162181-01 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
SunStar Laboratories, Inc.									
Metals by EPA 6020 Method									
Arsenic	**2.4**	0.23	mg/kg	1	6090853	09/08/16	09/09/16	6020 ICP-MS	
Lead	**5.0**	0.23	"	"	"	"	"	"	

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

S2-A

T162181-05 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Metals by EPA 6020 Method									
Arsenic	**0.98**	0.25	mg/kg	1	6090853	09/08/16	09/09/16	6020 ICP-MS	
Lead	**3.6**	0.25	"	"	"	"	"	"	

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

S3-A

T162181-09 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Metals by EPA 6020 Method									
Arsenic	**1.4**	0.23	mg/kg	1	6090853	09/08/16	09/09/16	6020 ICP-MS	
Lead	**2.6**	0.23	"	"	"	"	"	"	

SunStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

S4-A

T162181-13 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Metals by EPA 6020 Method									
Arsenic	**4.7**	0.25	mg/kg	1	6090853	09/08/16	09/09/16	6020 ICP-MS	
Lead	**4.1**	0.25	"	"	"	"	"	"	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Daniel Chavez, Project Manager

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

S5-A

T162181-17 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
SunStar Laboratories, Inc.									
Metals by EPA 6020 Method									
Arsenic	**0.48**	0.25	mg/kg	1	6090853	09/08/16	09/09/16	6020 ICP-MS	
Lead	**3.7**	0.25	"	"	"	"	"	"	

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

S6-A

T162181-21 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Metals by EPA 6020 Method									
Arsenic	**2.2**	0.23	mg/kg	1	6090853	09/08/16	09/09/16	6020 ICP-MS	
Lead	**8.4**	0.23	"	"	"	"	"	"	

SunStar Laboratories, Inc.

Daniel J Chavez

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Daniel Chavez, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

S7-A

T162181-25 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Metals by EPA 6020 Method									
Arsenic	**3.1**	0.23	mg/kg	1	6090853	09/08/16	09/09/16	6020 ICP-MS	
Lead	**2.9**	0.23	"	"	"	"	"	"	

SunStar Laboratories, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Daniel Chavez, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

COMPOSITE S1-ABCD

T162181-28 (Soil)

SunStar Laboratories, Inc.

Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
alpha-BHC	ND	5.0	ug/kg	1	6090846	09/08/16	09/09/16	EPA 8081A	
gamma-BHC (Lindane)	ND	5.0	"	"	"	"	"	"	
beta-BHC	ND	5.0	"	"	"	"	"	"	
delta-BHC	ND	5.0	"	"	"	"	"	"	
Heptachlor	ND	5.0	"	"	"	"	"	"	
Aldrin	ND	5.0	"	"	"	"	"	"	
Heptachlor epoxide	ND	5.0	"	"	"	"	"	"	
gamma-Chlordane	ND	5.0	"	"	"	"	"	"	
ha-Chlordane	ND	5.0	"	"	"	"	"	"	
osulfan I	ND	5.0	"	"	"	"	"	"	
4,4'-DDE	ND	5.0	"	"	"	"	"	"	
Dieldrin	ND	5.0	"	"	"	"	"	"	
Endrin	ND	5.0	"	"	"	"	"	"	
4,4'-DDD	ND	5.0	"	"	"	"	"	"	
Endosulfan II	ND	5.0	"	"	"	"	"	"	
4,4'-DDT	ND	5.0	"	"	"	"	"	"	
Endrin aldehyde	ND	5.0	"	"	"	"	"	"	
Endosulfan sulfate	ND	5.0	"	"	"	"	"	"	
Methoxychlor	ND	10	"	"	"	"	"	"	
Endrin ketone	ND	5.0	"	"	"	"	"	"	
Toxaphene	ND	200	"	"	"	"	"	"	
Surrogate: Tetrachloro-meta-xylene		*43.4 %*		*35-140*	"	"	"	"	
Surrogate: Decachlorobiphenyl		*37.2 %*		*35-140*	"	"	"	"	

nStar Laboratories, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Daniel Chavez, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

COMPOSITE S2-ABCD

T162181-29 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Organochlorine Pesticides by EPA Method 8081A									
alpha-BHC	ND	5.0	ug/kg	1	6090846	09/08/16	09/09/16	EPA 8081A	
gamma-BHC (Lindane)	ND	5.0	"	"	"	"	"	"	
beta-BHC	ND	5.0	"	"	"	"	"	"	
delta-BHC	ND	5.0	"	"	"	"	"	"	
Heptachlor	ND	5.0	"	"	"	"	"	"	
Aldrin	ND	5.0	"	"	"	"	"	"	
Heptachlor epoxide	ND	5.0	"	"	"	"	"	"	
gamma-Chlordane	ND	5.0	"	"	"	"	"	"	
ha-Chlordane	ND	5.0	"	"	"	"	"	"	
dosulfan I	ND	5.0	"	"	"	"	"	"	
4,4'-DDE	ND	5.0	"	"	"	"	"	"	
Dieldrin	ND	5.0	"	"	"	"	"	"	
Endrin	ND	5.0	"	"	"	"	"	"	
4,4'-DDD	ND	5.0	"	"	"	"	"	"	
Endosulfan II	ND	5.0	"	"	"	"	"	"	
4,4'-DDT	ND	5.0	"	"	"	"	"	"	
Endrin aldehyde	ND	5.0	"	"	"	"	"	"	
Endosulfan sulfate	ND	5.0	"	"	"	"	"	"	
Methoxychlor	ND	10	"	"	"	"	"	"	
Endrin ketone	ND	5.0	"	"	"	"	"	"	
Toxaphene	ND	200	"	"	"	"	"	"	
Surrogate: Tetrachloro-meta-xylene		*59.4 %*	*35-140*		"	"	"	"	
Surrogate: Decachlorobiphenyl		*52.1 %*	*35-140*		"	"	"	"	

nStar Laboratories, Inc.

Daniel J Chávez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

COMPOSITE S3-ABCD

T162181-30 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Organochlorine Pesticides by EPA Method 8081A									
alpha-BHC	ND	5.0	ug/kg	1	6090846	09/08/16	09/09/16	EPA 8081A	
gamma-BHC (Lindane)	ND	5.0	"	"	"	"	"	"	
beta-BHC	ND	5.0	"	"	"	"	"	"	
delta-BHC	ND	5.0	"	"	"	"	"	"	
Heptachlor	ND	5.0	"	"	"	"	"	"	
Aldrin	ND	5.0	"	"	"	"	"	"	
Heptachlor epoxide	ND	5.0	"	"	"	"	"	"	
gamma-Chlordane	ND	5.0	"	"	"	"	"	"	
ha-Chlordane	ND	5.0	"	"	"	"	"	"	
dosulfan I	ND	5.0	"	"	"	"	"	"	
4,4'-DDE	ND	5.0	"	"	"	"	"	"	
Dieldrin	ND	5.0	"	"	"	"	"	"	
Endrin	ND	5.0	"	"	"	"	"	"	
4,4'-DDD	ND	5.0	"	"	"	"	"	"	
Endosulfan II	ND	5.0	"	"	"	"	"	"	
4,4'-DDT	ND	5.0	"	"	"	"	"	"	
Endrin aldehyde	ND	5.0	"	"	"	"	"	"	
Endosulfan sulfate	ND	5.0	"	"	"	"	"	"	
Methoxychlor	ND	10	"	"	"	"	"	"	
Endrin ketone	ND	5.0	"	"	"	"	"	"	
Toxaphene	ND	200	"	"	"	"	"	"	
Surrogate: Tetrachloro-meta-xylene		*68.8 %*	*35-140*		"	"	"	"	
Surrogate: Decachlorobiphenyl		*54.9 %*	*35-140*		"	"	"	"	

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

COMPOSITE S4-ABCD

T162181-31 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Organochlorine Pesticides by EPA Method 8081A									
alpha-BHC	ND	5.0	ug/kg	1	6090846	09/08/16	09/09/16	EPA 8081A	
gamma-BHC (Lindane)	ND	5.0	"	"	"	"	"	"	
beta-BHC	ND	5.0	"	"	"	"	"	"	
delta-BHC	ND	5.0	"	"	"	"	"	"	
Heptachlor	ND	5.0	"	"	"	"	"	"	
Aldrin	ND	5.0	"	"	"	"	"	"	
Heptachlor epoxide	ND	5.0	"	"	"	"	"	"	
gamma-Chlordane	ND	5.0	"	"	"	"	"	"	
alpha-Chlordane	ND	5.0	"	"	"	"	"	"	
Endosulfan I	ND	5.0	"	"	"	"	"	"	
4,4'-DDE	ND	5.0	"	"	"	"	"	"	
Dieldrin	ND	5.0	"	"	"	"	"	"	
Endrin	ND	5.0	"	"	"	"	"	"	
4,4'-DDD	ND	5.0	"	"	"	"	"	"	
Endosulfan II	ND	5.0	"	"	"	"	"	"	
4,4'-DDT	ND	5.0	"	"	"	"	"	"	
Endrin aldehyde	ND	5.0	"	"	"	"	"	"	
Endosulfan sulfate	ND	5.0	"	"	"	"	"	"	
Methoxychlor	ND	10	"	"	"	"	"	"	
Endrin ketone	ND	5.0	"	"	"	"	"	"	
Toxaphene	ND	200	"	"	"	"	"	"	
Surrogate: Tetrachloro-meta-xylene		*66.8 %*	*35-140*		"	"	"	"	
Surrogate: Decachlorobiphenyl		*55.2 %*	*35-140*		"	"	"	"	

SunStar Laboratories, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Daniel Chavez, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

COMPOSITE S5-ABCD

T162181-32 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
SunStar Laboratories, Inc.									
Organochlorine Pesticides by EPA Method 8081A									
alpha-BHC	ND	5.0	ug/kg	1	6090846	09/08/16	09/09/16	EPA 8081A	
gamma-BHC (Lindane)	ND	5.0	"	"	"	"	"	"	
beta-BHC	ND	5.0	"	"	"	"	"	"	
delta-BHC	ND	5.0	"	"	"	"	"	"	
Heptachlor	ND	5.0	"	"	"	"	"	"	
Aldrin	ND	5.0	"	"	"	"	"	"	
Heptachlor epoxide	ND	5.0	"	"	"	"	"	"	
gamma-Chlordane	ND	5.0	"	"	"	"	"	"	
ha-Chlordane	ND	5.0	"	"	"	"	"	"	
dosulfan I	ND	5.0	"	"	"	"	"	"	
4,4'-DDE	ND	5.0	"	"	"	"	"	"	
Dieldrin	ND	5.0	"	"	"	"	"	"	
Endrin	ND	5.0	"	"	"	"	"	"	
4,4'-DDD	ND	5.0	"	"	"	"	"	"	
Endosulfan II	ND	5.0	"	"	"	"	"	"	
4,4'-DDT	ND	5.0	"	"	"	"	"	"	
Endrin aldehyde	ND	5.0	"	"	"	"	"	"	
Endosulfan sulfate	ND	5.0	"	"	"	"	"	"	
Methoxychlor	ND	10	"	"	"	"	"	"	
Endrin ketone	ND	5.0	"	"	"	"	"	"	
Toxaphene	ND	200	"	"	"	"	"	"	
Surrogate: Tetrachloro-meta-xylene		*49.4 %*	*35-140*		"	"	"	"	
Surrogate: Decachlorobiphenyl		*45.0 %*	*35-140*		"	"	"	"	

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

COMPOSITE S6-ABCD

T162181-33 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Organochlorine Pesticides by EPA Method 8081A									
alpha-BHC	ND	5.0	ug/kg	1	6090846	09/08/16	09/09/16	EPA 8081A	
gamma-BHC (Lindane)	ND	5.0	"	"	"	"	"	"	
beta-BHC	ND	5.0	"	"	"	"	"	"	
delta-BHC	ND	5.0	"	"	"	"	"	"	
Heptachlor	ND	5.0	"	"	"	"	"	"	
Aldrin	ND	5.0	"	"	"	"	"	"	
Heptachlor epoxide	ND	5.0	"	"	"	"	"	"	
gamma-Chlordane	ND	5.0	"	"	"	"	"	"	
ha-Chlordane	ND	5.0	"	"	"	"	"	"	
dosulfan I	ND	5.0	"	"	"	"	"	"	
4,4'-DDE	ND	5.0	"	"	"	"	"	"	
Dieldrin	ND	5.0	"	"	"	"	"	"	
Endrin	ND	5.0	"	"	"	"	"	"	
4,4'-DDD	ND	5.0	"	"	"	"	"	"	
Endosulfan II	ND	5.0	"	"	"	"	"	"	
4,4'-DDT	ND	5.0	"	"	"	"	"	"	
Endrin aldehyde	ND	5.0	"	"	"	"	"	"	
Endosulfan sulfate	ND	5.0	"	"	"	"	"	"	
Methoxychlor	ND	10	"	"	"	"	"	"	
Endrin ketone	ND	5.0	"	"	"	"	"	"	
Toxaphene	ND	200	"	"	"	"	"	"	
Surrogate: Tetrachloro-meta-xylene		*70.3 %*	*35-140*		"	"	"	"	
Surrogate: Decachlorobiphenyl		*56.9 %*	*35-140*		"	"	"	"	

nStar Laboratories, Inc.

Daniel J Chávez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

COMPOSITE S7-ABD

T162181-34 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
SunStar Laboratories, Inc.									
Organochlorine Pesticides by EPA Method 8081A									
alpha-BHC	ND	5.0	ug/kg	1	6090846	09/08/16	09/09/16	EPA 8081A	
gamma-BHC (Lindane)	ND	5.0	"	"	"	"	"	"	
beta-BHC	ND	5.0	"	"	"	"	"	"	
delta-BHC	ND	5.0	"	"	"	"	"	"	
Heptachlor	ND	5.0	"	"	"	"	"	"	
Aldrin	ND	5.0	"	"	"	"	"	"	
Heptachlor epoxide	ND	5.0	"	"	"	"	"	"	
gamma-Chlordane	ND	5.0	"	"	"	"	"	"	
ha-Chlordane	ND	5.0	"	"	"	"	"	"	
dosulfan I	ND	5.0	"	"	"	"	"	"	
4,4'-DDE	ND	5.0	"	"	"	"	"	"	
Dieldrin	ND	5.0	"	"	"	"	"	"	
Endrin	ND	5.0	"	"	"	"	"	"	
4,4'-DDD	ND	5.0	"	"	"	"	"	"	
Endosulfan II	ND	5.0	"	"	"	"	"	"	
4,4'-DDT	ND	5.0	"	"	"	"	"	"	
Endrin aldehyde	ND	5.0	"	"	"	"	"	"	
Endosulfan sulfate	ND	5.0	"	"	"	"	"	"	
Methoxychlor	ND	10	"	"	"	"	"	"	
Endrin ketone	ND	5.0	"	"	"	"	"	"	
Toxaphene	ND	200	"	"	"	"	"	"	
Surrogate: Tetrachloro-meta-xylene		*55.2 %*	*35-140*		"	"	"	"	
Surrogate: Decachlorobiphenyl		*55.4 %*	*35-140*		"	"	"	"	

nStar Laboratories, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Daniel Chavez, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

Metals by EPA 6020 Method - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 6090853 - EPA 3051										
Blank (6090853-BLK1)				Prepared: 09/08/16 Analyzed: 09/09/16						
Arsenic	ND	0.25	mg/kg							
Lead	ND	0.25	"							
LCS (6090853-BS1)				Prepared: 09/08/16 Analyzed: 09/09/16						
Arsenic	10.4	0.25	mg/kg	10.0		104	80-120			
Lead	10.8	0.25	"	10.0		108	80-120			
Matrix Spike (6090853-MS1)	**Source: T162181-01**			Prepared: 09/08/16 Analyzed: 09/09/16						
Arsenic	14.7	0.25	mg/kg	10.0	2.38	124	75-125			
Lead	18.2	0.25	"	10.0	5.05	132	75-125			QM-07
Matrix Spike Dup (6090853-MSD1)	**Source: T162181-01**			Prepared: 09/08/16 Analyzed: 09/09/16						
Arsenic	10.3	0.23	mg/kg	9.09	2.38	86.6	75-125	35.9	20	QR-04
Lead	12.7	0.23	"	9.09	5.05	84.3	75-125	35.6	20	QM-07

SunStar Laboratories, Inc.

Daniel J Chavez

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Daniel Chavez, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

Organochlorine Pesticides by EPA Method 8081A - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 6090846 - EPA 3510C GCMS/ECD										
Blank (6090846-BLK1)				Prepared: 09/08/16 Analyzed: 09/09/16						
alpha-BHC	ND	5.0	ug/kg							
gamma-BHC (Lindane)	ND	5.0	"							
beta-BHC	ND	5.0	"							
delta-BHC	ND	5.0	"							
Heptachlor	ND	5.0	"							
Aldrin	ND	5.0	"							
Heptachlor epoxide	ND	5.0	"							
gamma-Chlordane	ND	5.0	"							
alpha-Chlordane	ND	5.0	"							
osulfan I	ND	5.0	"							
DDE	ND	5.0	"							
Dieldrin	ND	5.0	"							
Endrin	ND	5.0	"							
4,4'-DDD	ND	5.0	"							
Endosulfan II	ND	5.0	"							
4,4'-DDT	ND	5.0	"							
Endrin aldehyde	ND	5.0	"							
Endosulfan sulfate	ND	5.0	"							
Methoxychlor	ND	10	"							
Endrin ketone	ND	5.0	"							
Toxaphene	ND	200	"							
Surrogate: Tetrachloro-meta-xylene	*6.36*		"	*10.0*		*63.6*	*35-140*			
Surrogate: Decachlorobiphenyl	*4.89*		"	*10.0*		*48.9*	*35-140*			
LCS (6090846-BS1)				Prepared: 09/08/16 Analyzed: 09/09/16						
gamma-BHC (Lindane)	23.2	5.0	ug/kg	40.0		58.0	40-120			
Heptachlor	20.5	5.0	"	40.0		51.1	40-120			
Aldrin	17.3	5.0	"	40.0		43.2	40-120			
Dieldrin	18.9	5.0	"	40.0		47.3	40-120			
Endrin	18.6	5.0	"	40.0		46.5	40-120			
4,4'-DDT	21.5	5.0	"	40.0		53.7	33-147			
Surrogate: Tetrachloro-meta-xylene	*6.71*		"	*10.0*		*67.1*	*35-140*			
Surrogate: Decachlorobiphenyl	*5.29*		"	*10.0*		*52.9*	*35-140*			

nStar Laboratories, Inc.

Daniel J Chávez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

Organochlorine Pesticides by EPA Method 8081A - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 6090846 - EPA 3510C GCMS/ECD										
LCS Dup (6090846-BSD1)				Prepared: 09/08/16 Analyzed: 09/09/16						
gamma-BHC (Lindane)	24.5	5.0	ug/kg	40.0		61.3	40-120	5.58	30	
Heptachlor	21.4	5.0	"	40.0		53.4	40-120	4.41	30	
Aldrin	17.9	5.0	"	40.0		44.7	40-120	3.36	30	
Dieldrin	20.3	5.0	"	40.0		50.8	40-120	7.16	30	
Endrin	19.8	5.0	"	40.0		49.4	40-120	6.03	30	
4,4'-DDT	23.2	5.0	"	40.0		58.1	33-147	7.82	30	
Surrogate: Tetrachloro-meta-xylene	*6.98*		*"*	*10.0*		*69.8*	*35-140*			
Surrogate: Decachlorobiphenyl	*5.49*		*"*	*10.0*		*54.9*	*35-140*			

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Daniel Chavez, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

Notes and Definitions

QR-04	The pecent recovery and/or RPD was outside acceptance criteria. Results accepted based upon percent recovery results in duplicate QC sample and the CCV and CCB results.
QM-07	The spike recovery and or RPD was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS recovery.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

nStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
25712 Commercentre Dr
Lake Forest, CA 92630
949-297-5020

Chain of Custody Record

Client: ENGEO
Address: 6 Mo go
Phone: _____ Fax: _____
Project Manager: M. Hamill

Date: 9/8/2016 Page: 1 Of 3
Project Name: 20621 LAKE FOREST DRIVE, CA
Collector: MV/MO/MRH Client Project #: P2016001331
Batch #: T162181 EDF #: _____

Sample ID	Date Sampled	Time	Sample Type	Container Type	8260	8260 + OXY	8260 BTEX, OXY only	8270	8021 BTEX	8015M (gasoline)	8015M (diesel)	8015M Ext./Carbon Chain	~~6010/7000 Title 22 Metals~~	LEAD 6020	ARSENIC 6020	8082 OC PEST	Laboratory ID #	Comments/Preservative	Total # of containers
S1 - A	9/8/2016	10:35	Soil	2 x 6										X	X		01		4
- B		10:53															02		
- C		10:50															03		
- D		10:43															04		
S2 - A		11:00												X	X		05		4
- B		11:20															06		
- C		11:15															07		
- D		11:10															08		
S3 - A		11:25												X	X		09		4
- B		11:35															10		
- C		11:40															11		
- D		11:45															12		
S4 - A		12:15												X	X	X	[illegible]		X
B		12:10															[illegible]	AM	
C		12:05															[illegible]		

Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time
[signature]	9/8/16 17:50	[signature]	9.8.16 14:50
Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time
Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time

Total # of containers: 12
Chain of Custody seals Y/N/NA:
Seals intact? Y/N/NA:
Received good condition/cold: 5.1

Turn around time: 24 hrs

Notes: Mon. morning 8AM
FRI COB

Sample disposal Instructions: Disposal @ $2.00 each ____ Return to client ____ Pickup ____

COC 133697

SunStar Laboratories, Inc.
25712 Commercentre Dr
Lake Forest, CA 92630
949-297-5020

Chain of Custody Record

Client: ENGEO
Address: 6 Morgan
Phone: ____ Fax: ____
Project Manager: M. Harrell

Date: 9/8/2016 Page: 2 Of 3
Project Name: 20621 Lake Forest Dr, CA
Collector: MV/MO/MRH Client Project #: P2016001331
Batch #: ____ EDF #: ____

Sample ID	Date Sampled	Time	Sample Type	Container Type	8260	8260 + OXY	8260 BTEX, OXY only	8270	8021 BTEX	8015M (gasoline)	8015M (diesel)	8015M Ext./Carbon Chain	6010/7000 Title 22 Metals	LEAD 6020	ARSENIC 6020	OC PEST 8082		Laboratory ID #	AM	Comments/Preservative	Total # of containers
S4-A	9/8/2016	12:55	SOIL	2x6										X	X	X		13			4
-B		2:10														X		14			
-C		12:08														X		15			
-D		12:18														X		16			
S5-A		14:20												X	X	X		17			4
-B		13:30														X		18			
-C		13:25														X		19			
-D		14:10														X		20			
S6-A		13:15												X	X	X		21			4
-B		13:10														X		22			
-C		13:05														X		23			
-D		13:20														X		24			

Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time
	9/8/16 14:50		9.8.16 14:50
Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time
Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time

Total # of containers	12
Chain of Custody seals Y/N/NA	
Seals intact? Y/N/NA	
Received good condition/cold	5.1

Turn around time: 24hr.

Notes
Mon. Morning, 8AM
FRI COB

Sample disposal Instructions: Disposal @ $2.00 each ____ Return to client ____ Pickup ____

COC 133698

SunStar Laboratories, Inc.
25712 Commercentre Dr
Lake Forest, CA 92630
949-297-5020

Chain of Custody Record

Client: ENGEO
Address: 6 Morgan
Phone: _____ Fax: _____
Project Manager: Mc Hamell

Date: 9/8/2016 Page: 3 Of 3
Project Name: 20621, Lake Forest Dr, CA
Collector: MV/MO/MRH Client Project #: P2016001311
Batch #: _____ EDF #: _____

Sample ID	Date Sampled	Time	Sample Type	Container Type	8260	8260 + OXY	8260 BTEX, OXY only	8270	8021 BTEX	8015M (gasoline)	8015M (diesel)	8015M Ext./Carbon Chain	6010/7000 Title 22 Metals	LEAD 6020	ARSENIC 6020	OC PEST 8082		Laboratory ID #	AM Comments/Preservative	Total # of containers
S7-A	9/8/2016	12:00	SOIL	2x6										X	X	X	25	~~25~~	3 pt	3
-B	9/8/2016	12:40															26	~~26~~		
-D	9/8/2016	12:25															27	~~27~~		
~~S-B~~																				
Composite S1-ABCD	9/8/16	-														X		28	4:1	
COMPOSITE S2-ABCD	9/8/16	-														X		29	4:1	
COMPOSITE S3-ABCD	9/8/16	-														X		30	4:1	
COMPOSITE S4-ABCD	9/8/16	-														X		31	4:1	
COMPOSITE S5-ABCD	9/8/16	-														X		32	4:1	
COMPOSITE S6-ABCD	9/8/16	-														X		33	4:1	
COMPOSITE S7-ABCD	9/8/16	-														X		34	4:1	

Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time
[signature]	9/8/16 14:50	[signature]	9-8-16 14:50
Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time
Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time

Total # of containers: 3
Chain of Custody seals Y/N/NA:
Seals intact? Y/N/NA:
Received good condition/cold:

Turn around time: 24h

Notes
Mon Morning 8AM
Fri COB

Sample disposal Instructions: Disposal @ $2.00 each ____ Return to client ____ Pickup ____

COC135860

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

SAMPLE RECEIVING REVIEW SHEET

Batch/Work Order #: T16 2181

Client Name: Engeo. Project: 20621 Lake Forest Dr., CA

Delivered by: ☒ Client ☐ SunStar Courier ☐ GSO ☐ FedEx ☐ Other

If Courier, Received by: - Date/Time Courier Received: -

Lab Received by: Sunny Date/Time Lab Received: 9/8/16 14:50

Total number of coolers received: 0

Temperature: Cooler #1	5.3	°C +/- the CF (- 0.2°C) =	5.1	°C corrected temperature
Temperature: Cooler #2		°C +/- the CF (- 0.2°C) =		°C corrected temperature
Temperature: Cooler #3		°C +/- the CF (- 0.2°C) =		°C corrected temperature

Temperature criteria = ≤ 6°C (no frozen containers)	Within criteria?	☒ **Yes** ☐ **No**
If NO:		
Samples received on ice?	☐ Yes	☐ **No → Complete Non-Conformance Sheet**
If on ice, samples received same day collected?	☐ Yes → Acceptable	☐ **No → Complete Non-Conformance Sheet**

Custody seals intact on cooler/sample	☐ Yes	☐ No*	☒ N/A
Sample containers intact	☒ Yes	☐ No*	
Sample labels match Chain of Custody IDs	☒ Yes	☐ No*	
Total number of containers received match COC	☒ Yes	☐ No*	
Proper containers received for analyses requested on COC	☒ Yes	☐ No*	
Proper preservative indicated on COC/containers for analyses requested	☐ Yes	☐ No*	☒ N/A
Complete shipment received in good condition with correct temperatures, containers, labels, volumes preservatives and within method specified holding times	☒ **Yes**	☐ **No***	

* Complete Non-Conformance Receiving Sheet if checked

Cooler/Sample Review - Initials and date: AM 9/8/16

Comments:

(949) 297-5020 ■ www.sunstarlabs.com ■ 25712 Commercentre Drive ■ Lake Forest, CA 92630

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

WORK ORDER

T162181

Client: Engeo | **Project Manager:** Daniel Chavez
Project: 20621 Lake Forest Dr.,CA | **Project Number:** P2016001331

Report To:
Engeo
Matthew Harrell
2213 Plaza Dr.
Rocklin, CA 95765

Date Due: 09/09/16 17:00 (1 day TAT)
Received By: Sunny Lounethone | Date Received: 09/08/16 14:50
Logged In By: Brian Charon | Date Logged In: 09/08/16 15:01

Samples Received at: **5.1°C**
Custody Seals No | Received On Ice Yes
Containers Intact Yes
COC/Labels Agree Yes
Preservation Confirm No

Analysis	Due	TAT	Expires	Comments
T162181-01 S1-A [Soil] Sampled 09/08/16 10:35 (GMT-08:00) Pacific Time (US &				
6020 Metals by ICP-MS	09/09/16 15:00	1	01/06/17 10:35	Pb,As only
T162181-02 S1-B [Soil] Sampled 09/08/16 10:55 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-03 S1-C [Soil] Sampled 09/08/16 10:50 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-04 S1-D [Soil] Sampled 09/08/16 10:43 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-05 S2-A [Soil] Sampled 09/08/16 11:00 (GMT-08:00) Pacific Time (US &				
6020 Metals by ICP-MS	09/09/16 15:00	1	01/06/17 11:00	Pb,As only
T162181-06 S2-B [Soil] Sampled 09/08/16 11:20 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-07 S2-C [Soil] Sampled 09/08/16 11:15 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

WORK ORDER

T162181

Client: Engeo **Project Manager:** Daniel Chavez
Project: 20621 Lake Forest Dr.,CA **Project Number:** P2016001331

Analysis	Due	TAT	Expires	Comments
T162181-08 S2-D [Soil] Sampled 09/08/16 11:10 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-09 S3-A [Soil] Sampled 09/08/16 11:25 (GMT-08:00) Pacific Time (US &				
6020 Metals by ICP-MS	09/09/16 15:00	1	01/06/17 11:25	Pb,As only
T162181-10 S3-B [Soil] Sampled 09/08/16 11:35 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-11 S3-C [Soil] Sampled 09/08/16 11:40 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-12 S3-D [Soil] Sampled 09/08/16 11:45 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-13 S4-A [Soil] Sampled 09/08/16 12:15 (GMT-08:00) Pacific Time (US &				
6020 Metals by ICP-MS	09/09/16 15:00	1	01/06/17 12:15	Pb,As only
T162181-14 S4-B [Soil] Sampled 09/08/16 12:10 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-15 S4-C [Soil] Sampled 09/08/16 12:08 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-16 S4-D [Soil] Sampled 09/08/16 12:18 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-17 S5-A [Soil] Sampled 09/08/16 14:20 (GMT-08:00) Pacific Time (US &				
6020 Metals by ICP-MS	09/09/16 15:00	1	01/06/17 14:20	Pb,As only
T162181-18 S5-B [Soil] Sampled 09/08/16 13:30 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

WORK ORDER

T162181

Client: Engeo **Project Manager:** Daniel Chavez
Project: 20621 Lake Forest Dr.,CA **Project Number:** P2016001331

Analysis	Due	TAT	Expires	Comments
T162181-19 S5-C [Soil] Sampled 09/08/16 13:25 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-20 S5-D [Soil] Sampled 09/08/16 14:10 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-21 S6-A [Soil] Sampled 09/08/16 13:15 (GMT-08:00) Pacific Time (US &				
6020 Metals by ICP-MS	09/09/16 15:00	1	01/06/17 13:15	Pb,As only
T162181-22 S6-B [Soil] Sampled 09/08/16 13:10 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-23 S6-C [Soil] Sampled 09/08/16 13:05 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-24 S6-D [Soil] Sampled 09/08/16 13:20 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-25 S7-A [Soil] Sampled 09/08/16 12:20 (GMT-08:00) Pacific Time (US &				
6020 Metals by ICP-MS	09/09/16 15:00	1	01/06/17 12:20	Pb,As only
T162181-26 S7-B [Soil] Sampled 09/08/16 12:40 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-27 S7-D [Soil] Sampled 09/08/16 12:25 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-28 COMPOSITE S1-ABCD [Soil] Sampled 09/08/16 00:00 (GMT-08:00) Pacific Time (US &				**4:1**
8081 Pesticides	09/09/16 15:00	1	09/22/16 00:00	
T162181-29 COMPOSITE S2-ABCD [Soil] Sampled 09/08/16 00:00 (GMT-08:00) Pacific Time (US &				**4:1**
8081 Pesticides	09/09/16 15:00	1	09/22/16 00:00	

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

WORK ORDER

T162181

Client: Engeo | **Project Manager:** Daniel Chavez
Project: 20621 Lake Forest Dr.,CA | **Project Number:** P2016001331

Analysis	Due	TAT	Expires	Comments
T162181-30 COMPOSITE S3-ABCD [Soil] Sampled 09/08/16 00:00 (GMT-08:00) Pacific Time (US &				**4:1**
8081 Pesticides	09/09/16 15:00	1	09/22/16 00:00	
T162181-31 COMPOSITE S4-ABCD [Soil] Sampled 09/08/16 00:00 (GMT-08:00) Pacific Time (US &				**4:1**
8081 Pesticides	09/09/16 15:00	1	09/22/16 00:00	
T162181-32 COMPOSITE S5-ABCD [Soil] Sampled 09/08/16 00:00 (GMT-08:00) Pacific Time (US &				**4:1**
8081 Pesticides	09/09/16 15:00	1	09/22/16 00:00	
T162181-33 COMPOSITE S6-ABCD [Soil] Sampled 09/08/16 00:00 (GMT-08:00) Pacific Time (US &				**4:1**
8081 Pesticides	09/09/16 15:00	1	09/22/16 00:00	
T162181-34 COMPOSITE S7-ABD [Soil] Sampled 09/08/16 00:00 (GMT-08:00) Pacific Time (US &				**3:1**
81 Pesticides	09/09/16 15:00	1	09/22/16 00:00	

Reviewed By

Date

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

12 September 2016

Matthew Harrell
Engeo
2213 Plaza Dr.
Rocklin, CA 95765

RE: 20621 Lake Forest Dr.,CA

Enclosed are the results of analyses for samples received by the laboratory on 09/08/16 18:00. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Daniel J Chávez

Daniel Chavez
Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
S10-A	T162187-01	Soil	09/08/16 16:45	09/08/16 18:00
S8-B	T162187-05	Soil	09/08/16 16:20	09/08/16 18:00
S9-A	T162187-06	Soil	09/08/16 14:50	09/08/16 18:00
S12-A	T162187-10	Soil	09/08/16 16:00	09/08/16 18:00
S15-A	T162187-14	Soil	09/08/16 15:40	09/08/16 18:00
S13-B	T162187-17	Soil	09/08/16 17:15	09/08/16 18:00
COMP: S10-A,B,C,D	T162187-18	Soil	09/08/16 00:00	09/08/16 18:00
COMP: S9-A,B,C,D	T162187-19	Soil	09/08/16 00:00	09/08/16 18:00
COMP: S12-A,B,C,D	T162187-20	Soil	09/08/16 00:00	09/08/16 18:00
COMP: S15-A,C,D	T162187-21	Soil	09/08/16 00:00	09/08/16 18:00

SunStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

DETECTIONS SUMMARY

Sample ID: S10-A **Laboratory ID:** T162187-01

Analyte	Result	Reporting Limit	Units	Method	Notes
Arsenic	**1.4**	0.25	mg/kg	6020 ICP-MS	
Lead	**5.2**	0.25	mg/kg	6020 ICP-MS	

Sample ID: S8-B **Laboratory ID:** T162187-05

Analyte	Result	Reporting Limit	Units	Method	Notes
Arsenic	**1.2**	0.25	mg/kg	6020 ICP-MS	
Lead	**2.4**	0.25	mg/kg	6020 ICP-MS	

Sample ID: S9-A **Laboratory ID:** T162187-06

Analyte	Result	Reporting Limit	Units	Method	Notes
Arsenic	**0.79**	0.25	mg/kg	6020 ICP-MS	
Lead	**2.0**	0.25	mg/kg	6020 ICP-MS	

Sample ID: S12-A **Laboratory ID:** T162187-10

Analyte	Result	Reporting Limit	Units	Method	Notes
Arsenic	**5.4**	0.25	mg/kg	6020 ICP-MS	
Lead	**4.3**	0.25	mg/kg	6020 ICP-MS	

Sample ID: S15-A **Laboratory ID:** T162187-14

Analyte	Result	Reporting Limit	Units	Method	Notes
Arsenic	**2.2**	0.25	mg/kg	6020 ICP-MS	
Lead	**7.6**	0.25	mg/kg	6020 ICP-MS	

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

Sample ID: S13-B **Laboratory ID:** T162187-17

Analyte	Result	Reporting Limit	Units	Method	Notes
Arsenic	**4.9**	0.25	mg/kg	6020 ICP-MS	
Lead	**3.8**	0.25	mg/kg	6020 ICP-MS	

Sample ID: COMP: S10-A,B,C,D **Laboratory ID:** T162187-18

No Results Detected

Sample ID: COMP: S9-A,B,C,D **Laboratory ID:** T162187-19

No Results Detected

Sample ID: COMP: S12-A,B,C,D **Laboratory ID:** T162187-20

No Results Detected

Sample ID: COMP: S15-A,C,D **Laboratory ID:** T162187-21

No Results Detected

SunStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

S10-A

T162187-01 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
SunStar Laboratories, Inc.									
Metals by EPA 6020 Method									
Arsenic	**1.4**	0.25	mg/kg	1	6090853	09/08/16	09/09/16	6020 ICP-MS	
Lead	**5.2**	0.25	"	"	"	"	"	"	

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

S8-B

T162187-05 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
SunStar Laboratories, Inc.									
Metals by EPA 6020 Method									
Arsenic	**1.2**	0.25	mg/kg	1	6090853	09/08/16	09/09/16	6020 ICP-MS	
Lead	**2.4**	0.25	"	"	"	"	"	"	
Organochlorine Pesticides by EPA Method 8081A									
alpha-BHC	ND	5.0	ug/kg	1	6090905	09/09/16	09/12/16	EPA 8081A	
gamma-BHC (Lindane)	ND	5.0	"	"	"	"	"	"	
beta-BHC	ND	5.0	"	"	"	"	"	"	
delta-BHC	ND	5.0	"	"	"	"	"	"	
Heptachlor	ND	5.0	"	"	"	"	"	"	
Aldrin	ND	5.0	"	"	"	"	"	"	
Heptachlor epoxide	ND	5.0	"	"	"	"	"	"	
gamma-Chlordane	ND	5.0	"	"	"	"	"	"	
alpha-Chlordane	ND	5.0	"	"	"	"	"	"	
Endosulfan I	ND	5.0	"	"	"	"	"	"	
4,4'-DDE	ND	5.0	"	"	"	"	"	"	
Dieldrin	ND	5.0	"	"	"	"	"	"	
Endrin	ND	5.0	"	"	"	"	"	"	
4,4'-DDD	ND	5.0	"	"	"	"	"	"	
Endosulfan II	ND	5.0	"	"	"	"	"	"	
4,4'-DDT	ND	5.0	"	"	"	"	"	"	
Endrin aldehyde	ND	5.0	"	"	"	"	"	"	
Endosulfan sulfate	ND	5.0	"	"	"	"	"	"	
Methoxychlor	ND	10	"	"	"	"	"	"	
Endrin ketone	ND	5.0	"	"	"	"	"	"	
Toxaphene	ND	200	"	"	"	"	"	"	
Surrogate: Tetrachloro-meta-xylene		*63.3 %*	*35-140*		"	"	"	"	
Surrogate: Decachlorobiphenyl		*52.2 %*	*35-140*		"	"	"	"	

SunStar Laboratories, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Daniel Chavez, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

S9-A

T162187-06 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
SunStar Laboratories, Inc.									
Metals by EPA 6020 Method									
Arsenic	**0.79**	0.25	mg/kg	1	6090853	09/08/16	09/09/16	6020 ICP-MS	
Lead	**2.0**	0.25	"	"	"	"	"	"	

SunStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

S12-A

T162187-10 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
SunStar Laboratories, Inc.									
Metals by EPA 6020 Method									
Arsenic	**5.4**	0.25	mg/kg	1	6090853	09/08/16	09/09/16	6020 ICP-MS	
Lead	**4.3**	0.25	"	"	"	"	"	"	

SunStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

S15-A

T162187-14 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
SunStar Laboratories, Inc.									
Metals by EPA 6020 Method									
Arsenic	**2.2**	0.25	mg/kg	1	6090853	09/08/16	09/09/16	6020 ICP-MS	
Lead	**7.6**	0.25	"	"	"	"	"	"	

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

S13-B

T162187-17 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
SunStar Laboratories, Inc.									
Metals by EPA 6020 Method									
Arsenic	**4.9**	0.25	mg/kg	1	6090853	09/08/16	09/09/16	6020 ICP-MS	
Lead	**3.8**	0.25	"	"	"	"	"	"	
Organochlorine Pesticides by EPA Method 8081A									
alpha-BHC	ND	5.0	ug/kg	1	6090905	09/09/16	09/12/16	EPA 8081A	
gamma-BHC (Lindane)	ND	5.0	"	"	"	"	"	"	
beta-BHC	ND	5.0	"	"	"	"	"	"	
delta-BHC	ND	5.0	"	"	"	"	"	"	
Heptachlor	ND	5.0	"	"	"	"	"	"	
rin	ND	5.0	"	"	"	"	"	"	
eptachlor epoxide	ND	5.0	"	"	"	"	"	"	
gamma-Chlordane	ND	5.0	"	"	"	"	"	"	
alpha-Chlordane	ND	5.0	"	"	"	"	"	"	
Endosulfan I	ND	5.0	"	"	"	"	"	"	
4,4'-DDE	ND	5.0	"	"	"	"	"	"	
Dieldrin	ND	5.0	"	"	"	"	"	"	
Endrin	ND	5.0	"	"	"	"	"	"	
4,4'-DDD	ND	5.0	"	"	"	"	"	"	
Endosulfan II	ND	5.0	"	"	"	"	"	"	
4,4'-DDT	ND	5.0	"	"	"	"	"	"	
Endrin aldehyde	ND	5.0	"	"	"	"	"	"	
Endosulfan sulfate	ND	5.0	"	"	"	"	"	"	
Methoxychlor	ND	10	"	"	"	"	"	"	
Endrin ketone	ND	5.0	"	"	"	"	"	"	
Toxaphene	ND	200	"	"	"	"	"	"	
Surrogate: Tetrachloro-meta-xylene		*66.9 %*	*35-140*		"	"	"	"	
Surrogate: Decachlorobiphenyl		*56.4 %*	*35-140*		"	"	"	"	

nStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

COMP: S10-A,B,C,D

T162187-18 (Soil)

SunStar Laboratories, Inc.

Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
alpha-BHC	ND	5.0	ug/kg	1	6090905	09/09/16	09/12/16	EPA 8081A	
gamma-BHC (Lindane)	ND	5.0	"	"	"	"	"	"	
beta-BHC	ND	5.0	"	"	"	"	"	"	
delta-BHC	ND	5.0	"	"	"	"	"	"	
Heptachlor	ND	5.0	"	"	"	"	"	"	
Aldrin	ND	5.0	"	"	"	"	"	"	
Heptachlor epoxide	ND	5.0	"	"	"	"	"	"	
gamma-Chlordane	ND	5.0	"	"	"	"	"	"	
[illegible]ha-Chlordane	ND	5.0	"	"	"	"	"	"	
[illegible]osulfan I	ND	5.0	"	"	"	"	"	"	
4,4'-DDE	ND	5.0	"	"	"	"	"	"	
Dieldrin	ND	5.0	"	"	"	"	"	"	
Endrin	ND	5.0	"	"	"	"	"	"	
4,4'-DDD	ND	5.0	"	"	"	"	"	"	
Endosulfan II	ND	5.0	"	"	"	"	"	"	
4,4'-DDT	ND	5.0	"	"	"	"	"	"	
Endrin aldehyde	ND	5.0	"	"	"	"	"	"	
Endosulfan sulfate	ND	5.0	"	"	"	"	"	"	
Methoxychlor	ND	10	"	"	"	"	"	"	
Endrin ketone	ND	5.0	"	"	"	"	"	"	
Toxaphene	ND	200	"	"	"	"	"	"	
Surrogate: Tetrachloro-meta-xylene		*65.2 %*	*35-140*		"	"	"	"	
Surrogate: Decachlorobiphenyl		*53.3 %*	*35-140*		"	"	"	"	

[illegible]nStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

COMP: S9-A,B,C,D

T162187-19 (Soil)

SunStar Laboratories, Inc.

Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
alpha-BHC	ND	5.0	ug/kg	1	6090905	09/09/16	09/12/16	EPA 8081A	
gamma-BHC (Lindane)	ND	5.0	"	"	"	"	"	"	
beta-BHC	ND	5.0	"	"	"	"	"	"	
delta-BHC	ND	5.0	"	"	"	"	"	"	
Heptachlor	ND	5.0	"	"	"	"	"	"	
Aldrin	ND	5.0	"	"	"	"	"	"	
Heptachlor epoxide	ND	5.0	"	"	"	"	"	"	
gamma-Chlordane	ND	5.0	"	"	"	"	"	"	
[illegible]ha-Chlordane	ND	5.0	"	"	"	"	"	"	
[illegible]osulfan I	ND	5.0	"	"	"	"	"	"	
4,4'-DDE	ND	5.0	"	"	"	"	"	"	
Dieldrin	ND	5.0	"	"	"	"	"	"	
Endrin	ND	5.0	"	"	"	"	"	"	
4,4'-DDD	ND	5.0	"	"	"	"	"	"	
Endosulfan II	ND	5.0	"	"	"	"	"	"	
4,4'-DDT	ND	5.0	"	"	"	"	"	"	
Endrin aldehyde	ND	5.0	"	"	"	"	"	"	
Endosulfan sulfate	ND	5.0	"	"	"	"	"	"	
Methoxychlor	ND	10	"	"	"	"	"	"	
Endrin ketone	ND	5.0	"	"	"	"	"	"	
Toxaphene	ND	200	"	"	"	"	"	"	
Surrogate: Tetrachloro-meta-xylene		*61.2 %*	*35-140*		"	"	"	"	
Surrogate: Decachlorobiphenyl		*51.8 %*	*35-140*		"	"	"	"	

[illegible]nStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

COMP: S12-A,B,C,D

T162187-20 (Soil)

SunStar Laboratories, Inc.

Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
alpha-BHC	ND	5.0	ug/kg	1	6090905	09/09/16	09/12/16	EPA 8081A	
gamma-BHC (Lindane)	ND	5.0	"	"	"	"	"	"	
beta-BHC	ND	5.0	"	"	"	"	"	"	
delta-BHC	ND	5.0	"	"	"	"	"	"	
Heptachlor	ND	5.0	"	"	"	"	"	"	
Aldrin	ND	5.0	"	"	"	"	"	"	
Heptachlor epoxide	ND	5.0	"	"	"	"	"	"	
gamma-Chlordane	ND	5.0	"	"	"	"	"	"	
ha-Chlordane	ND	5.0	"	"	"	"	"	"	
dosulfan I	ND	5.0	"	"	"	"	"	"	
4,4'-DDE	ND	5.0	"	"	"	"	"	"	
Dieldrin	ND	5.0	"	"	"	"	"	"	
Endrin	ND	5.0	"	"	"	"	"	"	
4,4'-DDD	ND	5.0	"	"	"	"	"	"	
Endosulfan II	ND	5.0	"	"	"	"	"	"	
4,4'-DDT	ND	5.0	"	"	"	"	"	"	
Endrin aldehyde	ND	5.0	"	"	"	"	"	"	
Endosulfan sulfate	ND	5.0	"	"	"	"	"	"	
Methoxychlor	ND	10	"	"	"	"	"	"	
Endrin ketone	ND	5.0	"	"	"	"	"	"	
Toxaphene	ND	200	"	"	"	"	"	"	
Surrogate: Tetrachloro-meta-xylene		*60.5 %*		*35-140*	"	"	"	"	
Surrogate: Decachlorobiphenyl		*51.9 %*		*35-140*	"	"	"	"	

nStar Laboratories, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Daniel Chavez, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

COMP: S15-A,C,D

T162187-21 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Organochlorine Pesticides by EPA Method 8081A									
alpha-BHC	ND	5.0	ug/kg	1	6090905	09/09/16	09/12/16	EPA 8081A	
gamma-BHC (Lindane)	ND	5.0	"	"	"	"	"	"	
beta-BHC	ND	5.0	"	"	"	"	"	"	
delta-BHC	ND	5.0	"	"	"	"	"	"	
Heptachlor	ND	5.0	"	"	"	"	"	"	
Aldrin	ND	5.0	"	"	"	"	"	"	
Heptachlor epoxide	ND	5.0	"	"	"	"	"	"	
gamma-Chlordane	ND	5.0	"	"	"	"	"	"	
ha-Chlordane	ND	5.0	"	"	"	"	"	"	
dosulfan I	ND	5.0	"	"	"	"	"	"	
4,4'-DDE	ND	5.0	"	"	"	"	"	"	
Dieldrin	ND	5.0	"	"	"	"	"	"	
Endrin	ND	5.0	"	"	"	"	"	"	
4,4'-DDD	ND	5.0	"	"	"	"	"	"	
Endosulfan II	ND	5.0	"	"	"	"	"	"	
4,4'-DDT	ND	5.0	"	"	"	"	"	"	
Endrin aldehyde	ND	5.0	"	"	"	"	"	"	
Endosulfan sulfate	ND	5.0	"	"	"	"	"	"	
Methoxychlor	ND	10	"	"	"	"	"	"	
Endrin ketone	ND	5.0	"	"	"	"	"	"	
Toxaphene	ND	200	"	"	"	"	"	"	
Surrogate: Tetrachloro-meta-xylene		*49.9 %*	*35-140*		"	"	"	"	
Surrogate: Decachlorobiphenyl		*49.3 %*	*35-140*		"	"	"	"	

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

Metals by EPA 6020 Method - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 6090853 - EPA 3051										
Blank (6090853-BLK1)				Prepared: 09/08/16 Analyzed: 09/09/16						
Arsenic	ND	0.25	mg/kg							
Lead	ND	0.25	"							
LCS (6090853-BS1)				Prepared: 09/08/16 Analyzed: 09/09/16						
Arsenic	10.4	0.25	mg/kg	10.0		104	80-120			
Lead	10.8	0.25	"	10.0		108	80-120			
Matrix Spike (6090853-MS1)	**Source: T162181-01**			Prepared: 09/08/16 Analyzed: 09/09/16						
Arsenic	14.7	0.25	mg/kg	10.0	2.38	124	75-125			
Lead	18.2	0.25	"	10.0	5.05	132	75-125			QM-PS
trix Spike Dup (6090853-MSD1)	**Source: T162181-01**			Prepared: 09/08/16 Analyzed: 09/09/16						
Arsenic	10.3	0.23	mg/kg	9.09	2.38	86.6	75-125	35.9	20	QR-04
Lead	12.7	0.23	"	9.09	5.05	84.3	75-125	35.6	20	QM-PS
Post Spike (6090853-PS1)	**Source: T162181-01**			Prepared: 09/08/16 Analyzed: 09/09/16						
Arsenic	11.7		mg/kg	10.0	2.38	92.8	80-120			
Lead	14.0		"	10.0	5.05	89.4	80-120			

nStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

Organochlorine Pesticides by EPA Method 8081A - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 6090905 - EPA 3550 ECD/GCMS										
Blank (6090905-BLK1)				Prepared: 09/09/16 Analyzed: 09/12/16						
alpha-BHC	ND	5.0	ug/kg							
gamma-BHC (Lindane)	ND	5.0	"							
beta-BHC	ND	5.0	"							
delta-BHC	ND	5.0	"							
Heptachlor	ND	5.0	"							
Aldrin	ND	5.0	"							
Heptachlor epoxide	ND	5.0	"							
gamma-Chlordane	ND	5.0	"							
alpha-Chlordane	ND	5.0	"							
Endosulfan I	ND	5.0	"							
4,4'-DDE	ND	5.0	"							
Dieldrin	ND	5.0	"							
Endrin	ND	5.0	"							
4,4'-DDD	ND	5.0	"							
Endosulfan II	ND	5.0	"							
4,4'-DDT	ND	5.0	"							
Endrin aldehyde	ND	5.0	"							
Endosulfan sulfate	ND	5.0	"							
Methoxychlor	ND	10	"							
Endrin ketone	ND	5.0	"							
Toxaphene	ND	200	"							
Surrogate: Tetrachloro-meta-xylene	*6.00*		"	*10.0*		*60.0*	*35-140*			
Surrogate: Decachlorobiphenyl	*5.03*		"	*10.0*		*50.3*	*35-140*			
LCS (6090905-BS1)				Prepared: 09/09/16 Analyzed: 09/12/16						
gamma-BHC (Lindane)	22.5	5.0	ug/kg	39.6		56.9	40-120			
Heptachlor	24.0	5.0	"	39.6		60.6	40-120			
Aldrin	19.9	5.0	"	39.6		50.3	40-120			
Dieldrin	18.7	5.0	"	39.6		47.2	40-120			
Endrin	18.4	5.0	"	39.6		46.4	40-120			
4,4'-DDT	22.1	5.0	"	39.6		55.8	33-147			
Surrogate: Tetrachloro-meta-xylene	*6.80*		"	*9.90*		*68.7*	*35-140*			
Surrogate: Decachlorobiphenyl	*5.50*		"	*9.90*		*55.5*	*35-140*			

SunStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

Organochlorine Pesticides by EPA Method 8081A - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 6090905 - EPA 3550 ECD/GCMS										
Matrix Spike (6090905-MS1)	**Source: T162187-05**			Prepared: 09/09/16 Analyzed: 09/12/16						
gamma-BHC (Lindane)	22.5	5.0	ug/kg	40.0	ND	56.4	30-120			
Heptachlor	20.3	5.0	"	40.0	ND	50.8	30-120			
Aldrin	18.4	5.0	"	40.0	ND	45.9	30-120			
Dieldrin	18.8	5.0	"	40.0	ND	47.0	30-120			
Endrin	18.4	5.0	"	40.0	ND	46.1	30-120			
4,4'-DDT	22.5	5.0	"	40.0	ND	56.2	30-120			
Surrogate: Tetrachloro-meta-xylene	*6.32*		"	*10.0*		*63.2*	*35-140*			
Surrogate: Decachlorobiphenyl	*5.02*		"	*10.0*		*50.2*	*35-140*			
Matrix Spike Dup (6090905-MSD1)	**Source: T162187-05**			Prepared: 09/09/16 Analyzed: 09/12/16						
gamma-BHC (Lindane)	23.4	5.0	ug/kg	39.2	ND	59.6	30-120	5.55	30	
Heptachlor	20.5	5.0	"	39.2	ND	52.2	30-120	2.75	30	
Aldrin	18.2	5.0	"	39.2	ND	46.5	30-120	1.26	30	
Dieldrin	19.3	5.0	"	39.2	ND	49.2	30-120	4.59	30	
Endrin	18.8	5.0	"	39.2	ND	47.8	30-120	3.76	30	
4,4'-DDT	23.6	5.0	"	39.2	ND	60.1	30-120	6.72	30	
Surrogate: Tetrachloro-meta-xylene	*6.46*		"	*9.80*		*65.9*	*35-140*			
Surrogate: Decachlorobiphenyl	*5.37*		"	*9.80*		*54.8*	*35-140*			

SunStar Laboratories, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Daniel Chavez, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

Notes and Definitions

QR-04	The pecent recovery and/or RPD was outside acceptance criteria. Results accepted based upon percent recovery results in duplicate QC sample and the CCV and CCB results.
QM-PS	The percent recovery and/or RPD are outside acceptance criteria. Results accepted based upon percent recovery results in the post spike and/or serial dilution.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

nStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
25712 Commercentre Dr
Lake Forest, CA 92630
949-297-5020

Chain of Custody Record

Client: ENGEO, INC
Address: 16 Morgan, Suite 162, Irvine CA
Phone: (925) 570-7768 Fax:
Project Manager: Matt Harrell

Date: 09/08/16 Page: 1 Of 2
Project Name: 20621 Lake Forest Dr.
Collector: MHarrell, M. , M. Client Project #: P2016.001.331
Batch #: 776187 EDF #:

Sample ID	Date Sampled	Time	Sample Type	Container Type	8260	8260 + OXY	8260 BTEX, OXY only	8270	8021 BTEX	8015M (gasoline)	8015M (diesel)	8015M Ext./Carbon Chain	6010/7000 Title 22 Metals	Lead, Arsenic (6020)	OCPs (8081)			Laboratory ID #	Comments/Preservative	Total # of containers
S10-A	09/08/16	1645	SOIL	SS Sleeve										X	X			01	ICE	4
S10-B		1650												X	X			02		
S10-C		1705												X	X			03		
S10-D		1700												X	X			04		
~~S8-A~~																				
S8-B		1620												X	X			05		1
~~S8-C~~																				
~~S8-D~~																				
S9-A		1450												X	X			06		4
S9-B		1455												X	X			07		
S9-C		1500												X	X			08		
S9-D		1510												X	X			09		

Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time
Manosa	9/8/2016 18:00		9-8-16 18:00
Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time
Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time

Total # of containers
Chain of Custody seals Y/N/(NA)
Seals intact? Y/N/(NA)
Received good condition/cold 10.1

Turn around time: 24HR

Notes

Sample disposal Instructions: Disposal @ $2.00 each ____ Return to client ____ Pickup ____

COC 133694

Sunstar Laboratories, Inc.

PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

25712 Commercentre Drive, Lake Forest, CA 92630
949-297-5020

Chain of Custody Record

Client: ENGEO, Inc
Address: 6 Morgan, Suite 162, Irvine, CA
Phone: (925) 570-7768 Fax:
Project Manager: Matt Harrell

Date: 09/08/16 Page: 2 Of 2
Project Name: 20021 Lake Forest Dr
Collector: MHarrell, M.V, MO Client Project #: P2016.001, 331
Batch #: T162187 EDF #:

Sample ID	Date Sampled	Time	Sample Type	Container Type	8260	8260 + OXY	8260 BTEX, OXY only	8270	8021 BTEX	8015M (gasoline)	8015M (diesel)	8015M Ext./Carbon Chain	6010/7000 Title 22 Metals	6020 ICP-MS Metals	Lead, Arsenic (6020)	OCPs (8081)		Laboratory ID #	Comments/Preservative	Total # of containers
S12-A	09/08/16	1600	SOIL	SS Sleeve											X	X		10	ICE	4
S12-B		1555																11		
S12-C		1545																12		
S12-D		1550																13		
S15-A		1540													X	X		14		
~~S15-B~~																				
S15-C		1520																15		3
S15-D		1525																16		
S13-B		1715													X	X		17		

Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time
Nawaz	9/8/2016 / 18:00		9-8-16 18:00
Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time
Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time

Total # of containers	
Chain of Custody seals Y/N/NA	N
Seals intact? Y/N/NA	NA
Received good condition/cold	10.1

Turn around time: 24HR

Notes: Composite

Sample disposal Instructions: Disposal @ $2.00 each ____ Return to client ____ Pickup ____

COC 152208

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

SAMPLE RECEIVING REVIEW SHEET

Batch/Work Order #: 762187

Client Name: ENGEO

Project: 20621 LAKE FOREST DR.

Delivered by: ☒ **Client** ☐ **SunStar Courier** ☐ **GSO** ☐ **FedEx** ☐ **Other**

If Courier, Received by: _____ Date/Time Courier Received: _____

Lab Received by: SUNNY Date/Time Lab Received: 9.8.16 / 18:00

Total number of coolers received: 1

Temperature: Cooler #1 10.2	°C +/- the CF (- 0.2°C) = 10.1	°C corrected temperature	
Temperature: Cooler #2	°C +/- the CF (- 0.2°C) =	°C corrected temperature	
Temperature: Cooler #3	°C +/- the CF (- 0.2°C) =	°C corrected temperature	
Temperature criteria = ≤ 6°C (no frozen containers)	Within criteria?	☐ **Yes**	☒ **No**
If NO:			
Samples received on ice?	☒ Yes	☐ **No → Complete Non-Conformance Sheet**	
If on ice, samples received same day collected?	☒ Yes → Acceptable	☐ **No → Complete Non-Conformance Sheet**	

Custody seals intact on cooler/sample	☐ Yes	☐ No*	☒ N/A
Sample containers intact	☒ Yes	☐ No*	
Sample labels match Chain of Custody IDs	☒ Yes	☐ No*	
Total number of containers received match COC	☒ Yes	☐ No*	
Proper containers received for analyses requested on COC	☒ Yes	☐ No*	
Proper preservative indicated on COC/containers for analyses requested	☐ Yes	☐ No*	☒ N/A
Complete shipment received in good condition with correct temperatures, containers, labels, volumes preservatives and within method specified holding times	☒ **Yes**	☐ **No***	

* Complete Non-Conformance Receiving Sheet if checked

Cooler/Sample Review - Initials and date: SA 9.8.16

Comments:

(949) 297-5020 ■ www.sunstarlabs.com ■ 25712 Commercentre Drive ■ Lake Forest, CA 92630

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

WORK ORDER

T162187

Client: Engeo | **Project Manager:** Daniel Chavez
Project: 20621 Lake Forest Dr.,CA | **Project Number:** P2016.001.331

Report To:
Engeo
Matthew Harrell
2213 Plaza Dr.
Rocklin, CA 95765

Date Due:	09/12/16 17:00 (1 day TAT)		
Received By:	Sunny Lounethone	Date Received:	09/08/16 18:00
Logged In By:	Sunny Lounethone	Date Logged In:	09/08/16 18:06

Samples Received at: **10.1°C**

Custody Seals	No	Received On Ice	Yes
Containers Intact	Yes		
COC/Labels Agree	Yes		
Preservation Confirm	No		

Analysis	Due	TAT	Expires	Comments
T162187-01 S10-A [Soil] Sampled 09/08/16 16:45 (GMT-08:00) Pacific Time (US &				
6020 Metals by ICP-MS	09/12/16 15:00	1	01/06/17 16:45	Pb, As only
T162187-02 S10-B [Soil] Sampled 09/08/16 16:50 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162187-03 S10-C [Soil] Sampled 09/08/16 17:05 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162187-04 S10-D [Soil] Sampled 09/08/16 17:00 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162187-05 S8-B [Soil] Sampled 09/08/16 16:20 (GMT-08:00) Pacific Time (US &				
6020 Metals by ICP-MS	09/12/16 15:00	1	01/06/17 16:20	Pb, As only
8081 Pesticides	09/12/16 15:00	1	09/22/16 16:20	
T162187-06 S9-A [Soil] Sampled 09/08/16 14:50 (GMT-08:00) Pacific Time (US &				
6020 Metals by ICP-MS	09/12/16 15:00	1	01/06/17 14:50	Pb, As only
T162187-07 S9-B [Soil] Sampled 09/08/16 14:55 (GMT-08:00) Pacific Time (US				
[NO ANALYSES]				

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

WORK ORDER

T162187

Client: Engeo **Project Manager:** Daniel Chavez
Project: 20621 Lake Forest Dr.,CA **Project Number:** P2016.001.331

Analysis	Due	TAT	Expires	Comments
T162187-08 S9-C [Soil] Sampled 09/08/16 15:00 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162187-09 S9-D [Soil] Sampled 09/08/16 15:10 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162187-10 S12-A [Soil] Sampled 09/08/16 16:00 (GMT-08:00) Pacific Time (US &				
6020 Metals by ICP-MS	09/12/16 15:00	1	01/06/17 16:00	Pb, As only
T162187-11 S12-B [Soil] Sampled 09/08/16 15:55 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162187-12 S12-C [Soil] Sampled 09/08/16 15:45 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162187-13 S12-D [Soil] Sampled 09/08/16 15:50 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162187-14 S15-A [Soil] Sampled 09/08/16 15:40 (GMT-08:00) Pacific Time (US &				
6020 Metals by ICP-MS	09/12/16 15:00	1	01/06/17 15:40	Pb, As only
T162187-15 S15-C [Soil] Sampled 09/08/16 15:20 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162187-16 S15-D [Soil] Sampled 09/08/16 15:25 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162187-17 S13-B [Soil] Sampled 09/08/16 17:15 (GMT-08:00) Pacific Time (US &				
6020 Metals by ICP-MS	09/12/16 15:00	1	01/06/17 17:15	Pb, As only
8081 Pesticides	09/12/16 15:00	1	09/22/16 17:15	
T162187-18 COMP: S10-A,B,C,D [Soil] Sampled 09/08/16 00:00 (GMT-08:00) Pacific Time (US &				**COMPOSITE 4:1**
8081 Pesticides	09/12/16 15:00	1	09/22/16 00:00	

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

WORK ORDER

T162187

Client:	**Engeo**	**Project Manager:**	**Daniel Chavez**
Project:	**20621 Lake Forest Dr.,CA**	**Project Number:**	**P2016.001.331**

Analysis	Due	TAT	Expires	Comments
T162187-19 COMP: S9-A,B,C,D [Soil] Sampled 09/08/16 00:00 (GMT-08:00) Pacific Time (US &				**COMPOSITE 4:1**
8081 Pesticides	09/12/16 15:00	1	09/22/16 00:00	
T162187-20 COMP: S12-A,B,C,D [Soil] Sampled 09/08/16 00:00 (GMT-08:00) Pacific Time (US &				**COMPOSITE 4:1**
8081 Pesticides	09/12/16 15:00	1	09/22/16 00:00	
T162187-21 COMP: S15-A,C,D [Soil] Sampled 09/08/16 00:00 (GMT-08:00) Pacific Time (US &				**COMPOSITE 3:1**
8081 Pesticides	09/12/16 15:00	1	09/22/16 00:00	

Reviewed By

Date

Nakase Project
Fiscal Impact Analysis
City of Lake Forest

Prepared for:
Toll Brothers
Contact: Ilan Feingold, Senior Project Manager
Southern California Division
646-645-5252

Submitted to:
City of Lake Forest, Development Services
Contact: Gayle Ackerman, AICP, Director
949-461-3463

May 31, 2018

SRHA Job # 1337

STANLEY R. HOFFMAN ASSOCIATES
11661 San Vicente Blvd. Suite 306
Los Angeles, California 90049
310.820.2680-*p*, 310.820.8341 *f*
www.stanleyrhoffman.com

CONTENTS

Tables ii
Figures iii

EXECUTIVE SUMMARY iv

CHAPTER 1 INTRODUCTION 1

1.1 Background 1
1.2 Methodology and Assumptions 1
1.3 Overview 3

CHAPTER 2 DEVELOPMENT DESCRIPTIONS 4

2.1 Residential Project 4
2.1.1 Development Description after Buildout: Residential Project 4
2.1.2 Assessed Valuation and Property Tax: Residential Project 7
2.1.3 Sales and Use Tax: Residential Project 10
2.2 Hypothetical Business Park 11
2.2.1 Development Description after Buildout: Hypothetical Business Park 11
2.2.2 Assessed Valuation and Property Tax: Hypothetical Business Park 13
2.2.3 Sales and Use Tax: Hypothetical Business Park 16

CHAPTER 3 FISCAL IMPACTS 19

3.1 Residential Project 19
3.2 Hypothetical Business Park 21

CHAPTER 4 FISCAL FACTORS 23

4.1 General Assumptions 23
4.2 Revenue Factors 24
4.3 Cost Assumptions 29

APPENDIX A HYPOTHETICAL BUSINESS PARK LAND USE ECONOMICS METHODOLOGY 34

A.1 Projected Total Business Park Employment 34
A.2 Projected On-Site Non-Retail Taxable Sales 39
A.3 Estimated Annual Taxable Sales from Business Park Employment 40

APPENDIX B SUPPORTING FISCAL ASSUMPTIONS TABLES 42

APPENDIX C PROJECT REFERENCES 50

TABLES

1 Development Summaries after Buildout v
2 Projected Fiscal Impacts after Buildout v

2-1 Development Description after Buildout: Residential Project 6
2-2 Publicly Maintained Roads: Residential Project 7
2-3 Assessed Valuation and Property Tax after Buildout: Residential Project 9
2-4 Existing Assessed Valuation: Nakase Site 10
2-5 Sales and Use Tax after Buildout: Residential Project 11
2-6 Development Description after Buildout: Hypothetical Business Park 12
2-7 Publicly Maintained Roads: Hypothetical Business Park 13
2-8 Assessed Valuation and Property Tax after Buildout: Hypothetical Business Park 14
2-9 Estimated Average Value per Square Foot: Hypothetical Business Park 15
2-10 Existing Assessed Valuation: Nakase Site 15
2-11 Sales and Use Tax after Buildout: Hypothetical Business Park 17

3-1 Projected Fiscal Impacts after Buildout 19
3-2 Projected Fiscal Impacts after Buildout: Residential Project 20
3-3 Detailed Projected Fiscal Impacts after Buildout: Hypothetical Business Park 22

4-1 Summary of General Assumptions 24
4-2 Summary of Revenue Factor Assumptions, Operating Budget Fiscal Year 2017-18 26
4-3 General Fund Costs and Estimated Overhead Rate, Fiscal Year 2017-18 30
4-4 Summary of Cost Factor Assumptions, Fiscal Year 2017-18 31

A-1 Hypothetical Business Park Total Employment Estimate 35
A-2 2015 Employment by Sector: Nakase Study Area and Lake Forest City 37
A-3 Distribution of Hypothetical Business Park Jobs by Sectors 38
A-4 Hypothetical Business Park Non-Retail Taxable Sales Impact 39
A-5 Average Annual Taxable Expenditures per Office Employee 41

B-1 Estimated Average Household Size for Senior Rental Units 42
B-2 Estimated 2017 City Employment Estimate 42
B-3 Summary of General Fund Revenues, Operating Budget Fiscal Year 2017–18 43
B-4 Summary of Special Fund Revenues, Operating Budget Fiscal Year 2017–18 44
B-5 Current Tax Rate Area (TRA) Allocations: Nakase Project Site 45
B-6 Estimated Increase in Vehicle License Fee (VLF) Property Tax Factor 46
B-7 Estimated Residential Turnover Rate 46
B-8 Calculation of Use Tax Factor 47
B-9 General Fund Net Development Services and Net Public Works-Engineering Costs 48
B-10 Calculation of Public Works Overhead Costs 49

FIGURES

1-1 Local Vicinity Map, Nakase Project Site 2

2-1 Residential Land Use Plan 5
2-2 Illustrative Circulation Plan: Residential Project 8

A-1 Study Area Land Uses 34

EXECUTIVE SUMMARY

The following is a summary of the projected fiscal impacts to the City of Lake Forest General Fund and selected special revenue funds for a proposed residential project on the 122-acre Nakase Nursery site at the southwest corner of the intersection of Bake Parkway and Rancho Parkway. The site's General Plan designation is Business Park. Therefore, the fiscal impacts are projected for both the proposed residential project and a hypothetical business park as an alternative development for the site.

The fiscal analysis is based on analysis of the City of Lake Forest, *Operating Budget, Fiscal Year 2017-18,* discussions with City staff during preparation of previous fiscal studies for the City and information provided by the developer. Projected impacts are presented in constant 2018 dollars with no adjustment for future inflation.

Development Descriptions after buildout

Proposed Residential Project. As shown in Table 1, the Residential Project proposes a total of 776 units, with 675 market rate product types, and a senior affordable community with 101 rental units. After buildout, population for the residential project is estimated at 2,163. Publicly maintained roads are estimated at 3.46 lane miles after buildout. Residential valuation is estimated at about $741.57 million after buildout, and is projected to contribute annually about $782,356 in property tax revenues to the City. Taxable retail sales to the residents of the proposed community are projected to annually generate $331,097 of off-site sales and use tax to the City.

Hypothetical Business Park. This alternative includes an estimated 1,841,720 square feet of business park uses. As shown in Table 1, these uses are projected to generate 1,550 new jobs. Business park valuation is estimated at about $476.47 million after buildout and is projected to add $502,677 of property taxes to the City. Non-retail taxable sales from business park uses and off-site taxable sales from these new business park employees are projected to annually generate about $368,344 in sales and use tax to the City.

Projected Fiscal Impacts after Buildout

As shown in Table 2, a recurring surplus of about $640,731 is projected for the Proposed Residential Project and a recurring surplus of about $540,905 is projected for a Hypothetical Business Park after buildout.

Table 1
Development Summaries after Buildout
Nakase Project Fiscal Impact Analysis, City of Lake Forest
(In Constant 2018 Dollars)

Category	Development Alternatives	
	Proposed Residential	Hypothetical Business Park
Gross Acres		
Residential Acres	65.3	0.0
Business Park	0.0	102.0
Parks and Open Space Acres	28.1	0.0
Roads, Medians and Sidewalk Acres	28.6	20.0
Total Gross Acres	122.0	122.0
Housing Units		
Market Rate Single Family	675	0
Senior Affordable Rental	101	0
Total Housing Units	776	0
Population	2,163	0
Business Park Square Feet	0	1,841,720
Employment	0	1,550
Publicly Maintained Street Lane Miles	3.46	2.67
Assessed Valuation	$741,569,844	$476,470,467
Projected Property Tax and Property Tax VLF to Lake Forest	*$782,356*	*$502,677*
Projected Sales and Use Tax to Lake Forest	$331,097	$368,344

Sources: Stanley R. Hoffman Associates, Inc.
Toll Brothers

Table 2
Projected Fiscal Impacts after Buildout
Nakase Project Fiscal Impact Analysis, City of Lake Forest
(In Constant 2018 Dollars)

Category	Proposed Residential	Hypothetical Business Park	Difference (Residential minus Business Park)
Recurring Revenues	$1,299,463	$937,079	$362,384
minus			
Recurring Costs	$658,732	$396,174	$262,558
equals			
Recurring Surplus	**$640,731**	**$540,905**	**$99,826**
Revenue/Cost Ratio	1.97	2.37	

Source: Stanley R. Hoffman Associates, Inc.

CHAPTER 1
INTRODUCTION

This report presents the projected fiscal impacts to the City of Lake Forest General Fund and selected special revenue funds after buildout for a proposed residential project versus a hypothetical business park.

1.1 Background

The 122-acre Nakase Nursery site is located at the southwest corner of the intersection of Bake Parkway and Rancho Parkway, as shown in Figure 1-1 as the Nakase Ranch. A 776 residential project with market rate products and senior units is proposed for the site. The site's General Plan designation is Business Park. Therefore, the fiscal impacts are projected for both the Proposed Residential Project and a Hypothetical Business Park as an alternative development for the site.

1.2 Methodology and Assumptions

The analyses in this report are based on the following methodology and assumptions from the following sources:

1. The fiscal methodology is the same as the methodology applied in previous fiscal analyses prepared by the consultant for previous City projects; most recently the 2013 *Opportunity Study* and the 2011 *Town Center Residential and Foothill Ranch Village.*
2. Cost and revenue functions pertaining to the City General Fund were derived through an analysis of the City of Lake Forest *Operating Budget, Fiscal Year 2017-18* and previous discussions with City staff.
3. Existing assessed valuation for the project was obtained from the Orange County Assessor tax roll.
4. Property tax allocation factors for the Tax Rate Area (TRA) in which the project is located were obtained from the Orange County Auditor Controller.
5. Land use descriptions, including infrastructure, and new residential valuation for the residential project are based on information provided by the project developer. Non-residential valuation is based on the *Lake Forest/Foothill Ranch/Rancho Santa Margarita Industrial Submarket Report, CoStar* prepared by Waronzoff Associates, February 26, 2018.
6. Employment and taxable sales for the hypothetical business park are estimated based on information from County Assessor parcel data, U. S. Census data and State of California Employment Development Department.
7. Population for the non-senior residential units is estimated based on the citywide average of 2.98 persons per household for the City for January 1, 2017, from the California Department of Finance. Population for the senior units is estimated at 1.50 per unit based on U.S. Census *Public Use Microdata Survey* data.

Figure 1-1
Local Vicinity Map
Nakase Project Fiscal Impact Analysis, City of Lake Forest

Sources: Stanley R. Hoffman Associates, Inc.
Toll Brothers, *Nakase Nursery Area Plan, Draft*, January 2018

8. Projected impacts are presented in constant 2018 dollars with no adjustment for future inflation.

1.3 Overview

Chapter 2 presents the development descriptions for the Residential Project and a Hypothetical Business Park. Chapter 3 includes the projected fiscal impacts of the Residential Project and the Hypothetical Business Park. Revenue and cost factors used in the fiscal analysis are discussed in Chapter 4. Appendix A includes the methodology for developing key economic impact factors and indicators for the hypothetical Business Park Alternative. Appendix B contains the supporting tables for the fiscal assumptions, and Appendix C lists the project references used in the preparation of this report.

CHAPTER 2
DEVELOPMENT DESCRIPTIONS

This chapter presents the detailed land use assumptions, infrastructure requirements, estimated valuation and estimated taxable sales for the Residential Project in Section 2.1 and the Hypothetical Business Park in Section 2.2 for the Nakase site.

2.1 Residential Project

The land use plan for the proposed master planned Residential Project is shown in Figure 2-1.

2.1.1 Development Description after Buildout: Residential Project

Acres. As shown in Panel A of Table 2-1, a total of 122 gross acres are included in the proposed project, with about 65.3 acres planned for residential development, an estimated 28.1 acres of parks and open space, and the remaining 28.6 acres are for roads, medians and sidewalks.

Housing Units. A total of 776 housing units are planned for the proposed Residential Project, as shown in Panel B of Table 2-1. The units include a mix of 675 single family detached units ranging from about 2,020 square feet to 3,300 square feet. In addition, a senior affordable community of 101 rental units is planned, which represents 15 percent of the 675 for-sale products.

Population. Population is estimated 2,163 after buildout of the Nakase Residential Project. Based on the current citywide average household size of 2.98 persons per unit, population for the for-sale single family units is estimated at 2,012 after buildout. Based on U.S. Census *Public Use Microdata Survey* for the area, population for the senior units is projected at 1.50 persons per unit (see Appendix Table B-1), for an estimated population of 152 for the senior community.

Parks and Open Space Acres. Panel C of Table 2-1 presents the detailed uses for the 28.1 acres of park and open space acres for the Residential Project. The proposed park and open space will be maintained by a homeowners' association or a landscape maintenance district.

Publicly Maintained Lane Miles and Signalized Intersections. As shown in Panel D of Table 2-1, total publicly maintained lane miles are estimated at 3.46 by the project engineer. Detailed road segments are included in Table 2-2, and the illustrative circulation plan is presented in Figure 2-2.

As also shown Panel D of in Table 2-1, modifications to 2 existing signalized intersections are assumed at the project entrances: one on Bake Parkway and one on Rancho Parkway.

Figure 2-1
Residential Land Use Plan
Nakase Project Fiscal Impact Analysis, City of Lake Forest

Sources: Stanley R. Hoffman Associates, Inc.
Toll Brothers

Table 2-1
Development Description after Buildout: Residential Project
Nakase Project Fiscal Impact Analysis, City of Lake Forest

Land Uses	Proposed Residential Project
A. Gross Acres	
Residential Product Lots	61.4
Senior Affordable Rental Housing	3.9
Residential Subtotal	65.3
Parks and Open Space Acres	28.1
Roads, Medians and Sidewalk Acres	28.6
Total Gross Acres	122.0
B. New Residential Units and Estimated Population	
Neighborhood 1 (Garden Cluster)	182
Neighborhood 2 (Townhomes)	110
Neighborhood 3 (Cottage Homes)	142
Neighborhood 4 (Traditional Single Family)	145
Neighborhood 5 (Sky Terraces)	96
Subtotal	675
Senior Affordable Housing	101
Total Residential Units	776
Estimated Population	
Neighborhood Units (@ 2.98 persons per unit)	2,012
Senior Affordable Housing (@1.5 persons per unit)	152
Total Estimated Population	2,163
C. Parks and Open Space Acres	
Central Park	4.8
5 Neighborhood Parks	1.8
Open Space	10.4
Street Medians and Parkways	3.2
Water Quality Area	3.9
School Park	4.0
Total Parks and Open Space Acres	28.1
D. Publicly Maintained Roads and Signalized Intersections	
Road Lane Miles	
Bake Parkway (one turn lane)	0.06
Rancho Parkway (one turn lane)	0.06
Collectors	3.34
Total Lane Miles	3.46
Modified Signalized Intersections	
Bake Parkway and A Street	1.0
Rancho Parkway and B Street	1.0
Total Modified Signalized Intersections	2.0

Sources: Stanley R. Hoffman Associates, Inc.
Toll Brothers
Hunsaker & Associates Irvine, Inc.

Table 2-2
Publicly Maintained Roads: Residential Project
Nakase Project Fiscal Impact Analysis, City of Lake Forest

Nakase Proposed Residential Project				
Road Segment	**Lineal Feet**	**Lineal Miles**	**Number of Lanes**	**Lane Miles**
Arterials				
Bake Parkway (turn lane)	310	0.06	1	0.06
Rancho Parkway (turn lane)	310	0.06	1	0.06
Total Arterials	620	0.12		0.12
Collectors				
A Street	990	0.19	4	0.76
B Street	2,247	0.43	4	1.72
C Street	988	0.19	2	0.38
BB Street	1,246	0.24	2	0.48
Total Collectors	5,471	1.05		3.34
Total Lane Miles				**3.46**

Sources: Stanley R. Hoffman Associates, Inc.
Hunsaker & Associates Irvine, Inc.
Toll Brothers, *Nakase Nursery Area Plan, Draft* , January 2018

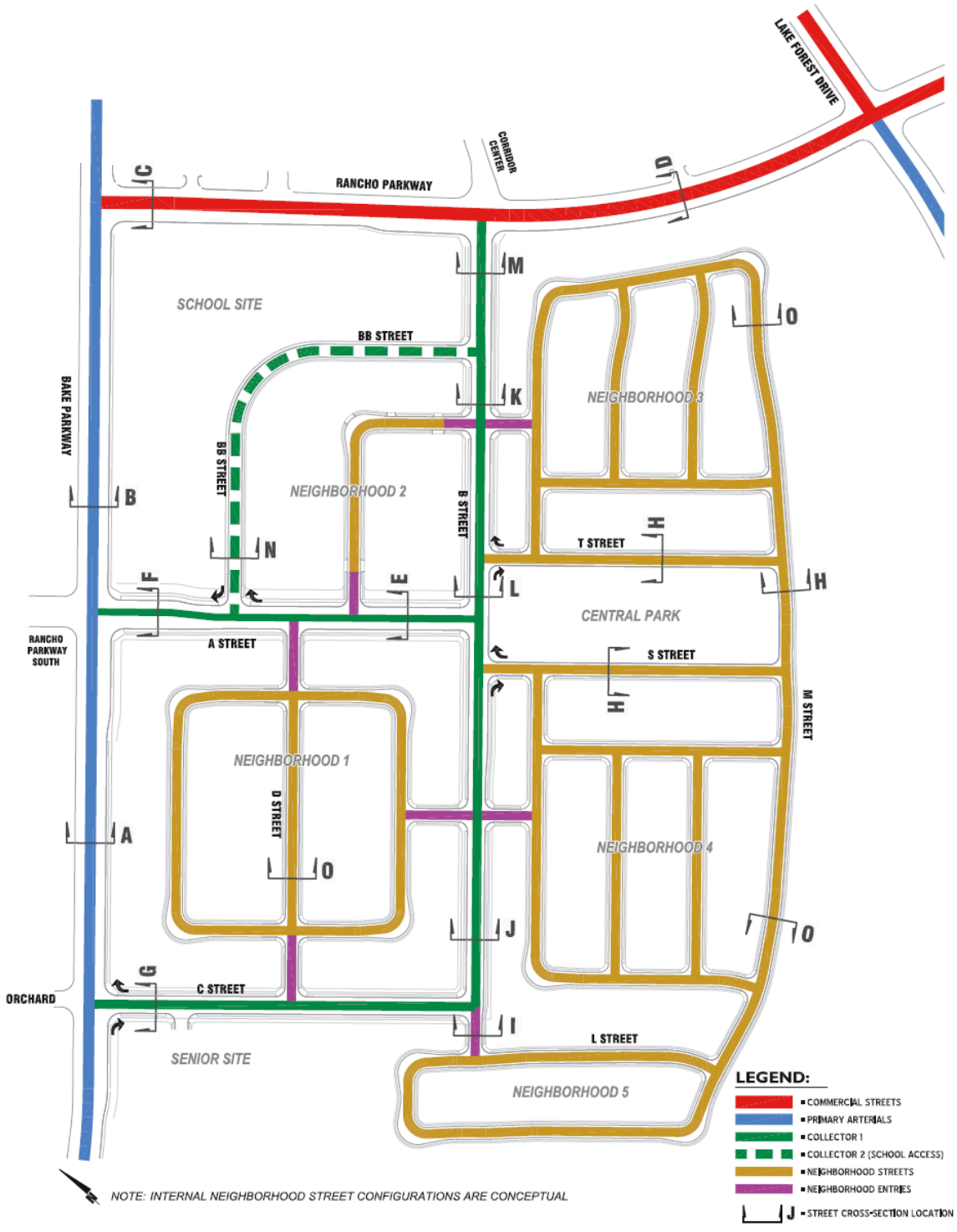
2.1.2 Assessed Valuation and Property Tax: Residential Project

Table 2-3 summarizes the assessed valuation and projected property tax for the Residential Project. Average unit values by unit type are from the project developer.

Net Residential Valuation. As shown in Panel A of Table 2-3, new residential valuation for the Residential Project is estimated at about $743,946,577 after buildout. Existing valuation for the project site is estimated at $2,376,733 based on information from the County assessor files, as shown in Table 2-4. When the existing valuation is subtracted from the estimated new valuation, the net valuation for the Residential Project is estimated at $741,569,844.

Projected Property Tax. Property tax is projected at $396,740 after buildout of the Residential Project, as shown in Panel B of Table 2-3, which represents about 5.35 percent of the $7,415,698 basic one percent property tax levy on the net new valuation. Property tax revenues are based on assessed valuation associated with the proposed development and the City's General Fund allocation according to Tax Rate Area (TRA) 30-007 in which the property is located, as presented in Appendix Table B-5.

Figure 2-2
Illustrative Circulation Plan: Residential Project
Nakase Project Fiscal Impact Analysis, City of Lake Forest



Sources: Stanley R. Hoffman Associates, Inc.
Toll Brothers

Table 2-3
Assessed Valuation and Property Tax after Buildout: Residential Project
Nakase Project Fiscal Impact Analysis, City of Lake Forest
(In Constant 2018 Dollars)

Category		Estimated Price per Unit	Proposed Residential Project
A. NET NEW VALUATION			
Residential Units			
Neighborhood 1 (Garden Cluster)			182
Neighborhood 2 (Townhomes)			110
Neighborhood 3 (Cottage Homes)			142
Neighborhood 4 (Traditional Single Family)			145
Neighborhood 5 (Sky Terraces)			96
Subtotal			675
Senior Affordable Rental Housing			101
Total Residential Units			776
Residential New Valuation		**Estimated Price per Unit**	
Neighborhood 1 (Garden Cluster)		$972,995	$177,085,090
Neighborhood 2 (Townhomes)		$944,995	$103,949,450
Neighborhood 3 (Cottage Homes)		$1,071,995	$152,223,290
Neighborhood 4 (Traditional Single Family)		$1,279,995	$185,599,275
Neighborhood 5 (Sky Terraces)		$1,039,995	$99,839,472
Subtotal			$718,696,577
Senior Affordable Rental Housing [1]		$250,000	$25,250,000
Total Residential Units			$743,946,577
	minus		
Existing Valuation [2]			$2,376,733
	equals		
Net New Valuation			$741,569,844
B. PROJECTED PROPERTY TAX			
Total Net New Property Tax (@ 1% of net new valuation)			$7,415,698
	times		
City General Fund Share of New Property Tax			5.35%
	equals		
Projected New Property Tax			**$396,740**
C. PROJECTED PROPERTY TAX - VLF			
Net New Valuation in Millions			$742
	times		
Property Tax - VLF per $1,000,000 Assessed Valuation			$520
	equals		
Projected Property Tax VLF			**$385,616**

1. The estimated price per unit for the senior affordable rental housing is based on the capitalized value of the average annual rent, as provided by the developer.
2. Existing valuation is presented in Table 2-4.
3. The calculation of property tax - VLF factor of $520 per $1,000,000 is included in Appendix Table B-6.

Sources: Stanley R. Hoffman Associates, Inc.
Toll Brothers

Table 2-4
Existing Assessed Valuation: Nakase Site
Nakase Project Fiscal Impact Analysis, City of Lake Forest
(In Constant 2018 Dollars)

Assessor's Parcel Number	Tax Rate Area	2017-2018 Tax Year Assessed Value	1% Property Tax
612-221-01	30-007	$2,376,733	$23,767

Sources: Stanley R. Hoffman Associates, Inc.
County of Orange, Treasurer-Tax Collector, *2017-18 Secured Property Tax Bill*

Projected Property Tax – Vehicle License Fee (VLF). These revenues are received by the City to offset the State reduction of motor vehicle license fees. The amount received is calculated by the State and increases with the annual growth in assessed valuation citywide. As shown in Panel C of Table 2-3, property tax VLF is projected at $385,616 after buildout of the Residential Project. VLF revenues are projected to increase at $520 per $1.0 million of increase in assessed valuation, as shown in Appendix Table B-6.

2.1.3 Sales and Use Tax: Residential Project

Retail taxable sales are generated by the new residents in the proposed residential development. Residential purchasing power is based on the assumption that residents will generate total retail purchases at 32 percent of household income. Household income is estimated at 24 percent of housing values. The fiscal analysis assumes that the City will capture 50 percent of the retail taxable purchases generated by the new residents. As shown in Panel A of Table 2-5, retail purchases from the new residents that are captured in the City are estimated at about $28.57 million for the Residential Project after buildout.

As shown in Panel B of Table 2-5, annual retail sales and use tax is estimated at $331,097 after buildout of the Residential Project. This estimate is based on estimated sales tax of $285,675 at 1 percent of the captured taxable sales. In addition, the City receives use tax is estimated at about 15.9 percent of sales tax, as shown in Appendix Table B-8. For the projected sales tax of $285,675, use tax is estimated at $45,422.

Table 2-5
Sales and Use Tax after Buildout: Residential Project
Nakase Project Fiscal Impact Analysis, City of Lake Forest
(In Constant 2018 Dollars)

Category	Proposed Residential Project
A. Off-Site Residential Retail Taxable Sales Captured in Lake Forest	
New Residential Valuation	$743,946,577
Household Income (@ 24% of household valuation) [1]	$178,547,178
Retail Taxable Sales (@ 32% of household income) [1]	$57,135,097
Projected Off-Site Retail Taxable Sales Captured in Lake Forest (at 50% capture rate)	$28,567,549
B. Projected Off-Site Residential Retail Sales and Use Tax to Lake Forest	
Sales Tax (@ 1% of captured taxable sales)	$285,675
Use Tax (@ 15.9% of sales tax) [2]	$45,422
Projected Off-Site Residential Retail Sales and Use Tax	**$331,097**

1. Household income is estimated at 24 percent of housing value and residential taxable purchases are estimated at at 32 percent of household income, based on Consumer Expenditure Survey data. The fiscal analysis assumes the City will capture 50 percent of the taxable retail purchases from new households.
2. The calculation of the use tax factor is included in Appendix Table B-8.

Sources: Stanley R. Hoffman Associates, Inc.
Bureau of Labor Statistics, *Consumer Expenditure Survey*

2.2 Hypothetical Business Park

The 122-acre Nakase Nursery site at the southwest corner of the intersection of Bake Parkway and Rancho Parkway is designated as Business Park in the City General Plan. Therefore, the fiscal impacts are also projected for a hypothetical business park development for the site.

2.2.1 Development Description after Buildout: Hypothetical Business Park

Acres. As shown in Panel A of Table 2-6, about 102 acres of the 122-acre project site are assumed for business park buildings. Open space and roads are assumed for the remaining 20 acres.

Building Square Feet. A shown in Panel B of Table 2-6, square feet for the hypothetical business park buildings is estimated at 1,841,720 after buildout, at an average floor area ratio (FAR) of 0.415.

Employment. Employment is estimated by the fiscal consultant at 1,550 after buildout of the Hypothetical Business Park, as shown in Panel B of Table 2-6. Estimated employment associated

Table 2-6
Development Description after Buildout: Hypothetical Business Park
Nakase Project Fiscal Impact Analysis, City of Lake Forest

Land Uses	Hypothetical Business Park
A. Gross Acres [1]	
Business Park Acres	102.0
Open Space and Roads	20.0
Total Gross Acres	122.0
B. Business Park	
Business Park Building Square Feet [1]	1,841,720
Business Park Employment [2]	1,550
C. Publicly Maintained Road Lane Miles and Signalized Intersections [3]	
Road Lane Miles	
Bake Parkway (one turn lane)	0.06
Rancho Parkway (one turn lane)	0.06
Collectors	2.55
Total Lane Miles	2.67
Modified Signalized Intersections	
Bake Parkway and A Street	1.0
Rancho Parkway and B Street	1.0
Total Modified Signalized Intersections	2.0

1. Acres and building square feet are provided by Toll Brothers.
2. Business park employment is estimated based on a local land use and employment analysis and is presented in Appendix A.
3. Road lane miles for the hypothetical business park are included in Table 2-7.

Sources: Stanley R. Hoffman Associates, Inc.
Toll Brothers
Hunsaker & Associates Irvine, Inc.

with the hypothetical Business Park is based on the current employment intensity of comparable business park-related parcels near the project site. This intensity factor, developed on a per acre basis, is then applied to the net developable acres for the Nakase parcel to estimate the total employment at current usage rates. Appendix A presents the methodology for the estimated employment.

Publicly Maintained Lane Miles and Signalized Intersections. As shown in Table 2-7, total publicly maintained lane miles are estimated at 2.67 by the fiscal consultant. This estimate includes the same arterial improvements to Bake Parkway and Rancho Parkway as the proposed Residential Project. Collectors are estimated at 2.55 lane miles based on a factor of 0.025 lane miles per non-residential acre for non-arterial roads that was provided by City Public Works' staff during preparation of the 2013 *Opportunity Study***.**

As also shown Panel D of in Table 2-1, modifications to 2 existing signalized intersections are assumed at the project entrances: one on Bake Parkway and one on Rancho Parkway.

Table 2-7
Publicly Maintained Roads: Hypothetical Business Park
Nakase Project Fiscal Impact Analysis, City of Lake Forest

Hypothetical Business Park				
Road Segment	**Lineal Feet**	**Lineal Miles**	**Number of Lanes**	**Lane Miles**
Arterials [1]				
Bake Parkway (turn lane)	310	0.06	1	0.06
Rancho Parkway (turn lane)	310	0.06	1	0.06
Total Arterials	620	0.12		0.12
Collectors [2]				
102 Acres of Business Park				2.55
Total Lane Miles				**2.67**

1. Arterial improvements for the hypothetical business park are assumed to be the same as the proposed residential project.
2. Estimated collectors are based on a factor of 0.025 lane miles per non-residential acre for non-arterial roads as provided by City Public Works' staff during preparation of other fiscal analyses.

Sources: Stanley R. Hoffman Associates, Inc.
Toll Brothers
Hunsaker & Associates Irvine, Inc.
City of Lake Forest, *Opportunity Study Fiscal Impact Analysis* , September 9, 2013

2.2.2 Assessed Valuation and Property Tax: Hypothetical Business Park

Assessed valuation and projected property tax for the Hypothetical Business Park are presented in Table 2-8.

Net New Valuation. As shown in Panel A of Table 2-8, new valuation for the Hypothetical Business Park is estimated at about $478,847,200 after buildout based on an estimate of $260 per

Table 2-8
Assessed Valuation and Property Tax after Buildout: Hypothetical Business Park
Nakase Project Fiscal Impact Analysis, City of Lake Forest
(In Constant 2018 Dollars)

Category		Hypothetical Business Park
A. NET NEW VALUATION		
Business Park/Light Industrial Square Feet		1,841,720
Business Park New Valuation		
Business Park (at $260 per building square foot) [1]		$478,847,200
	minus	
Existing Valuation [2]		$2,376,733
	equals	
Net New Valuation		$476,470,467
B. PROJECTED PROPERTY TAX		
Total Net New Property Tax (@ 1% of net new valuation)		$4,764,705
	times	
City General Fund Share of New Property Tax		5.35%
	equals	
Projected New Property Tax		**$254,912**
C. PROJECTED PROPERTY TAX - VLF		
Net New Valuation		$476,470,467
	times	
Property Tax - VLF per $1,000,000 Assessed Valuation		$520
	equals	
Projected New Property Tax VLF		**$247,765**

1. The estimated average value is $260 per square foot, as shown in Table 2-9.
2. Existing valuation is presented in Table 2-10.

Sources: Stanley R. Hoffman Associates, Inc.
Toll Brothers

square foot. As shown in Table 2-9, based on sales during 2017 for space built over the 2000 to 2005 period, the weighted average value of business park/industrial space is estimated at $260 per square foot. Existing valuation for the project site is estimated at $2,376,733 based on information

Table 2-9
Estimated Average Value per Square Foot: Hypothetical Business Park
Nakase Project Fiscal Impact Analysis, City of Lake Forest
(In Constant 2018 Dollars)

No.	Property	Year Built	Sale Date	Square Feet	Price	Price per Square Foot [1]
1	19652 Descartes	2000	9/25/2017	19,268	$4,798,000	$249
2	20503 Crescent Bay Drive	2001	7/5/2017	9,125	$2,527,625	$277
3	30400 Esperanza	2001	5/22/2017	9,536	$2,460,500	$258
4	28 Rancho Circle	2004	8/18/2017	9,368	$2,427,998	$259
5	27211 Burbank Street	2001	3/16/2017	9,426	$2,356,500	$250
6	30201 Aventura	2001	5/30/2017	9,784	$2,300,000	$235
7	30398 Esperanza	2001	7/10/2017	9,413	$2,259,500	$240
8	26 Rancho Circle	2003	11/17/2017	4,366	$1,463,000	$335
9	17 Rancho Circle	2004	11/17/2017	4,383	$1,425,000	$325
	Total			84,669	$22,018,123	$260
				Weighted Average Price Per Square Foot		***$260***

1. The average price per square foot is rounded to the nearest whole number.

Sources: Stanley R. Hoffman Associates, Inc.
Waronzof Associates, *Lake Forest/Foothill Ranch/Rancho Santa Margarita Industrial Submarket Report, CoStar* , February 26, 2018

from the County assessor files, as shown in Table 2-10. When the existing valuation is subtracted from the estimated new valuation, the net valuation for the Hypothetical Business Park is estimated at $476,470,467.

Table 2-10
Existing Assessed Valuation: Nakase Site
Nakase Project Fiscal Impact Analysis, City of Lake Forest
(In Constant 2018 Dollars)

Assessor's Parcel Number	Tax Rate Area	2017-2018 Tax Year Assessed Value	1% Property Tax
612-221-01	30-007	$2,376,733	$23,767

Sources: Stanley R. Hoffman Associates, Inc.
County of Orange, Treasurer-Tax Collector, *2017-18 Secured Property Tax Bill*

Projected Property Tax. As shown in Panel B of Table 2-8, property tax is projected at $254,912 after buildout of the Hypothetical Business Park. This represents about 5.35 percent of the $4,764,705 basic one percent property tax levy on the net new valuation. Property tax revenues are based on assessed valuation associated with the proposed development and the City's General Fund allocation, according to Tax Rate Area (TRA) 30-007 in which the property is located, as presented in Appendix Table B-4.

Projected Property Tax – Vehicle License Fee (VLF). Property tax VLF is projected at $247,765 after buildout of the Hypothetical Business Park, as shown in Panel C of Table 2-8. These revenues are received by the City to offset the prior State reduction of motor vehicle license fees. The amount received is calculated by the State and increases with the annual growth in assessed valuation citywide. VLF revenues are projected to increase at $520 per $1.0 million of increase in assessed valuation, as shown in Appendix Table B-5.

2.2.3 Sales and Use Tax: Hypothetical Business Park

Table 2-11 summarizes the estimated sales and use tax captured by the City for the Hypothetical Business Park after buildout. Sales and use tax is estimated for the taxable sales generated by non-retail uses in the business park and for expenditures made by business park employees off-site.

On-Site, Non-Retail Sales and Use Tax. As shown in Panel A of Table 2-11, taxable sales from the 1,841,720 square feet of Hypothetical Business Park activities are estimated at $22,316,280 after buildout. The methodology for the calculation of the estimated non-retail taxable sales is presented in Appendix A.

As shown in Panel A of Table 2-11, annual sales and use tax for the on-site Hypothetical Business Park activities is estimated at $258,646 after buildout. This estimate is based on estimated non-retail sales tax of $223,163 at 1 percent of the captured taxable sales. In addition, the City receives use tax at about 15.9 percent of sales tax, with $35,483 for the projected use tax.

Business Park Employment Sales and Use Tax. The retail taxable sales generated by the new employees of the Hypothetical Business are presented in Panel B of Table 2-11. New employees are estimated to spend an average of $7,633 annually based on the information included in Appendix A from the International Council of Shopping Centers. Off-site taxable sales for the 1,550

Table 2-11
Sales and Use Tax after Buildout: Hypothetical Business Park
Nakase Project Fiscal Impact Analysis, City of Lake Forest
(In Constant 2018 Dollars)

Category	Hypothetical Business Park
A. ON-SITE BUSINESS PARK SALES AND USE TAX	
Business Park/Light Industrial Square Feet	1,841,720
On-Site Business Park Taxable Sales [1]	$22,316,280
Projected On-Site Business Park Sales and Use Tax	
Sales Tax (@ 1% of taxable sales)	$223,163
Use Tax (@ 15.9% of sales tax)	$35,483
Total Projected On-Site Business Park Sales and Use Tax	**$258,646**
B. BUSINESS PARK EMPLOYMENT SALES AND USE TAX	
Business Park Employment Off-Site Taxable Sales Captured in Lake Forest	
Average Annual Business Park Expenditures per Employee [2]	$7,633
times	
Estimated Business Park Employment	1,550
equals	
Business Park Employees Off-Site Taxable Sales	$11,831,150
times	
Estimated Capture Rate of Estimated Business Park Employment Off-Site Taxable Sales [3]	80%
equals	
Projected Employee Taxable Sales Captured in Lake Forest	**$9,464,920**
Projected Employment Retail Sales and Use Tax to Lake Forest	
Sales Tax (@ 1% of captured taxable sales)	$94,649
Use Tax (@ 15.9% of sales tax) [4]	$15,049
Projected Off-Site Employment Retail Sales and Use Tax	**$109,698**

1. The estimated on-site business park taxable sales are presented in Appendix Table A-4.
2. The estimated taxable sales per business park employee is presented in Appendix Table A-5.
3. The City's 80 percent capture rate of off-site taxable sales by employment is the fiscal consultant's estimate based on the assumption that workers generally purchase most of their food and convenience items near their place of work.
4. The calculation of the use tax factor is included in Appendix Table B-8.

Sources: Stanley R. Hoffman Associates, Inc.

employees of the Hypothetical Business Park are estimated at $11,831,150, as shown in Panel B of Table 2-11. The fiscal analysis assumes that the City will capture 80 percent of the retail taxable purchases generated by the new employees, or $9,464,920.

As shown also shown in Panel B of Table 2-11, annual sales and use tax for employment taxable sales made off-site is estimated at $109,698 after buildout. This estimate is based on estimated sales tax of $94,649 at 1 percent of the captured taxable sales of $9,464,920. In addition, the City receives use tax at about 15.9 percent of sales tax, representing $15,049 for the projected sales tax of $94,649.

CHAPTER 3
FISCAL IMPACTS

This chapter presents the fiscal analysis of the Residential Project and the Hypothetical Business Park. Fiscal impacts are projected for the City General Fund based on the City Fiscal Year 2017-18 Budget. Fiscal impacts are projected in constant 2018 dollars.

As shown in Table 3-1, a recurring surplus of about $640,731 is projected for the Proposed Residential Project and a recurring surplus of about $540,905 is projected for a Hypothetical Business Park after buildout.

Table 3-1
Projected Fiscal Impacts after Buildout
Nakase Project Fiscal Impact Analysis, City of Lake Forest
(In Constant 2018 Dollars)

Category	Proposed Residential	Hypothetical Business Park	Difference (Residential minus Business Park)
Recurring Revenues	$1,299,463	$937,079	$362,384
minus			
Recurring Costs	$658,732	$396,174	$262,558
equals			
Recurring Surplus	**$640,731**	**$540,905**	**$99,826**
Revenue/Cost Ratio	1.97	2.37	

Source: Stanley R. Hoffman Associates, Inc.

3.1 Residential Project

The following Table 3-2 presents the projected fiscal impacts to the City General Fund for the Residential Project. A recurring surplus of about $640,731 is projected for the total Residential Project after buildout. The projected surplus is based on recurring revenues of about $1.30 million and projected recurring costs of about $658,732.

Recurring Revenues. As shown in Table 3-2, total annual recurring revenues for the Residential Project are projected at about $1.30 million after buildout. Key General Fund revenues for the total Residential Project after buildout include property tax (30.5 percent of total recurring

Table 3-2
Projected Fiscal Impacts after Buildout: Residential Project
Nakase Project Fiscal Impact Analysis, City of Lake Forest
(In Constant 2018 Dollars)

Category	Proposed Residential Project	
	Amount	Percent of Total
Recurring Revenues		
Property tax	$396,740	30.5%
Property taxes - VLF Backfill	385,616	29.7%
Property transfer tax	16,367	1.3%
Sales and use tax: off-site residential	331,097	25.5%
Franchise fees	39,873	3.1%
Park and recreation fees	20,224	1.6%
Other fees and charges	1,344	0.1%
Fines and forfeitures	7,041	0.5%
Interest on investments	23,966	1.8%
State gasoline tax [1]	44,647	3.4%
Measure M turnback allocation [1]	32,548	2.5%
Total Recurring Revenues	$1,299,463	100.0%
Recurring Costs		
General government	$74,957	11.4%
Police services	296,050	44.9%
Development services	5,299	0.8%
Public works: engineering	14,124	2.1%
Public works: public facilities maintenance	86,282	13.1%
Public works: NPDES	20,765	3.2%
Public works: street maintenance [3]	50,516	7.7%
Public works: signalized intersections	4,300	0.7%
Public works: overhead	6,811	1.0%
Community services	99,628	15.1%
Total Recurring Costs	$658,732	100.0%
Net Recurring Surplus	$640,731	
Revenue/Cost Ratio	1.97	

1. State gasoline tax and Measure M revenues are earmarked for street related services.
2. The project's parks and recreation facilities will be maintained by a homeowner's association and do not represent a cost to the General Fund.
3. Street maintenance costs are projected for publicly maintained streets.

Source: Stanley R. Hoffman Associates, Inc.

revenues), property tax-VLF (29.7 percent of total recurring revenues) and off-site retail sales and use tax (25.5 percent of total recurring revenues). These three revenue sources account for approximately 85.7 percent of total recurring revenues after buildout.

Recurring Costs. Total recurring costs to the General Fund are projected at $658,732 after buildout of the Residential Project, as shown in Table 3-2. The largest projected recurring cost is police protection at about 44.9 percent of total recurring costs. The second largest cost is community services at about 15.1 percent of total projected recurring costs. Maintenance for City public facilities is projected at about 13.1 percent of total recurring costs, and general government services are projected to account for about 11.4 percent of total recurring costs. These four costs account for about 84.5 percent of total recurring costs after buildout.

3.2 Hypothetical Business Park

A recurring surplus of $540,905 is projected for the Hypothetical Business Park after buildout, as shown in Table 3-3. The projected surplus is based on recurring revenues of $937,079 and projected recurring costs of about $396,174.

Recurring Revenues. Total annual recurring revenues for the Hypothetical Business Park are projected at $937,079 after buildout. As shown in Table 3-3, major General Fund revenues for the total Hypothetical Business Park after buildout include on-site non-retail, business park sales and use tax (27.6 percent of total recurring revenues), property tax (27.2 percent of total recurring revenues) and property tax-VLF (26.4 percent of total recurring revenues). These three revenue sources account for approximately 81.02 percent of total recurring revenues after buildout.

Recurring Costs. Total recurring costs are projected at $396,174 after buildout of the Hypothetical Business Park. The largest projected recurring cost is police protection at about 53.5 percent of total recurring costs. The second largest cost is maintenance for public facilities at about 15.6 percent of total recurring costs. General government services are projected to account for about 11.4 percent of total recurring costs. These three costs account for about 80.5 percent of total recurring costs after buildout.

Table 3-3
Detailed Projected Fiscal Impacts after Buildout: Hypothetical Business Park
Nakase Project Fiscal Impact Analysis, City of Lake Forest
(In Constant 2018 Dollars)

Category	Hypothetical Business Park	
	Amount	Percent of Total
Recurring Revenues		
Property tax	$254,912	27.2%
Property taxes - VLF Backfill	247,765	26.4%
Property transfer tax	13,103	1.4%
Sales and use tax: on-site business park	258,646	27.6%
Sales and use tax: off-site employment	109,698	11.7%
Franchise fees	28,573	3.0%
Other fees and charges	963	0.1%
Fines and forfeitures	5,046	0.5%
Interest on investments	18,374	2.0%
Total Recurring Revenues	$937,079	100.0%
Recurring Costs		
General government	$45,080	11.4%
Police services	212,149	53.5%
Development services	3,798	1.0%
Public works: engineering	10,122	2.6%
Public works: public facilities maintenance	61,830	15.6%
Public works: NPDES	14,880	3.8%
Public works: street maintenance	38,982	9.8%
Public works: signalized intersections	4,300	1.1%
Public works: overhead	5,035	1.3%
Total Recurring Costs	$396,174	100.0%
Net Recurring Surplus	$540,905	
Revenue/Cost Ratio	2.37	

Source: Stanley R. Hoffman Associates, Inc.

CHAPTER 4
FISCAL FACTORS

This chapter presents general demographic, employment and fiscal factors used for preparing the Nakase Project fiscal analysis.

4.1 General Assumptions

Table 4-1 provides the general assumptions for this fiscal analysis.

Population

The City's population of 84,931 is based on the California State Department of Finance (DOF) estimates as of January 1, 2017.

Housing Units

The City's housing stock is comprised of an estimated 28,995 housing units, according to State Department of Finance (DOF) estimates as of January 1, 2017.

Persons per Household

The 2017 average persons per household for Lake Forest is estimated at 2.98 persons based on dividing the household population estimate of 84,416 by the 28,300 estimated occupied housing units. Based on the Census 2010 *Public Use Microdata Survey*, the average persons per household for senior rentals is estimated at 1.50, as shown in Appendix Table B-1.

Employment

Based on data from the Southern California Association of Governments (SCAG), *Adopted 2016 Regional Transportation Plan (RTP) Growth Forecast*, the City's 2017 total employment is estimated at 42,550. This estimate represents an interpolation of the 2012 and 2020 SCAG employment estimates for the City, as shown in Appendix Table B-2

Service Population

Several revenues and costs are impacted by both population and employment growth, such as franchise taxes and police costs. Therefore, these fiscal factors are estimated by allocating total budgeted revenues or costs to both population and employment, or the City's service population. As shown in Table 4-1, the service population for Lake Forest is estimated at 127,841 and includes the resident population of 84,931 and the estimated employment of 42,550.

Table 4-1
Summary of General Assumptions
Nakase Project Fiscal Impact Analysis, City of Lake Forest

Assumption	Description
	Population and Housing [1]
84,416	Household Population
515	Group Quarters
84,931	Total Resident Population
28,300	Occupied Housing Units
28,995	Total Housing Units
2.98	Average Household Size, All Units
1.50	Average Household Size, Seniors 55 Years and Over, Rentals
	Employment
42,550	Total Employment [2]
	Service Population [3]
84,931	Total Resident Population
42,550	Total Employment
127,481	Total Service Population

1. Citywide population and housing estimates are for January 1, 2017 as provided by the California Department of Finance (DOF). The average household size of 1.50 for Senior rental housing is based on data from Census 2010, as shown in Appendix Table B-1.
2. The total employment estimate is for 2017 based on an interpolation of the 2012 and 2020 estimates from the Southern California Association of Governments, (SCAG) 2016 Adopted forecast.
3. Service population represents the total resident population plus the total City estimated employment.

Sources: Stanley R. Hoffman Associates, Inc.
State of California, Department of Finance, *E-5 Population and Housing Estimates for Cities, Counties and the State, 2011-2017,* Sacramento, California, May 2017
U.S. Bureau of the Census, *Public Use Microdata Survey (PUMS)* , 2010
Southern California Association of Governments (SCAG), *Adopted 2016 Regional Transportation Plan (RTP) Growth Forecast*

4.2 Revenue Factors

The City's revenue sources are divided into two major sources: General Fund Revenues and Special Fund Revenues. General Fund revenues are allocated among the following seven major categories, as shown in Appendix Table B-2:

1. *Property and Other Taxes* includes property taxes, property tax –vehicle in lieu, property transfer tax, sales and use tax, transient occupancy tax, and franchise fees;
2. *Licenses and Permits* include building permit fees and sign permits;
3. *Revenues from Other Governments* includes excess DMV fees and waste disposal agreement fees;
4. *User Fees and Charges* includes plan check fees, fire plan check fees, planning and zoning fees, massage permit fees, engineering fees, park reservation fees, community event fees, facility rentals, recreation programs and classes fees, sponsorships, passport fees, notary fees, imaging fees, copies and maps;
5. *Fines and Forfeitures* includes motor vehicle code fines and local ordinance violations;
6. *Use of Money and Property* covers revenues from leases and interest from investments; and
7. *Other Revenues* from miscellaneous donations, reimbursements and legal settlements.

Special Fund revenues that are projected in the fiscal analysis include Gas Tax Fund revenues and Measure M2 Fund revenues, as shown in detail in Appendix Table B-4:

1. *Gas Tax Fund* includes revenues primarily derived from State gasoline taxes.
2. *Measure M2 Fund* was established to account for funds "turned back" to cities from the County for street maintenance and/or street improvement purposes.

General Fund Revenue Factors

The revenue factors used in this analysis are summarized in Table 4-2. Certain revenues that are not impacted by the proposed project are not projected as recurring revenues in this analysis. Appendix Table B-3 indicates which of the General Fund revenues are projected as recurring revenues in the fiscal analysis. Also, one-time development fees and permits are subtracted from ongoing development services costs to yield a net cost factor, as will be discussed under the cost factors section of this chapter.

Property tax-related revenues are projected based on based on valuation and sales and use tax revenues are projected based on taxable sales. Other revenue factors are projected primarily on a per service population of 127,841, which includes the sum of the 2017 total population and total employment estimates for the City.

Property Tax. Property tax revenues are based on assessed valuation associated with the proposed development. The basic one percent property tax from the project will be allocated among several jurisdictions, including the City General Fund, Orange County Fire Authority and the Orange County Library District. Allocations to funds are made according to the Tax Rate Area (TRA) in which a property is located. The Orange County Auditor Controller's report for TRA 30-007 for

Table 4-2
Summary of Revenue Factor Assumptions, Operating Budget Fiscal Year 2017-18
Nakase Project Fiscal Impact Analysis, City of Lake Forest
(In Constant 2018 Dollars)

Revenue Source	Operating Budget FY 2017-18	Projection Basis [1]	Revenue Projection Factor
GENERAL FUND			
Property Taxes [2]	$9,727,400	Case Study: Project Valuation	5.35% General Fund allocation of basic 1% levy
Property Taxes - VLF Backfill [3]	$7,415,000	Case Study	$520 per $1,000,000 increase in assessed valuation
Property Transfer Tax	$600,000	Turnover and Valuation	4% of residential assessed valuation 5% of non-residential assessed valuation $0.55 per $1,000 of turnover valuation
Sales and Use Tax	$15,000,000	Taxable Sales	1.0% Sales Tax is 1% of taxable sales 15.9% Use tax is 15.9% of sales tax
Franchise Fees	$2,350,000	Service Population = 127,481	$18.43 per service population
Park and Recreation Fees	$794,100	Total Population = 84,931	$9.35 per capita
Other Fees and Charges [4]	$79,200	Service Population = 127,481	$0.62 per service population
Fines and Forfeitures	$415,000	Service Population = 127,481	$3.26 per service population
Interest on Investments	$726,900	Non-Interest General Fund Projected Recurring Revenues = $36,380,700	2.0% percent of non-interest General Fund projected recurring revenues
GAS TAX FUND [5]			
State Gas Tax: - Section 2103	$336,000	Total Population = 84,931	$3.96 per capita
- Section 2105	$487,700	Total Population = 84,931	$5.74 per capita
- Section 2106	$299,400	Total Population = 84,931	$3.53 per capita
- Section 2107	$630,000	Total Population = 84,931	$7.42 per capita
Total State Gas Tax	$1,753,100	Total Population = 84,931	$20.64 per capita
MEASURE M2 FUND [5]			
Turnback Allocation	$1,278,000	Total Population = 84,931	$15.05 per capita

1. For fiscal factors that are based on both population and employment, the Budget revenue amount is divided by an estimated City service population of 127,841, which represents the City's resident population (84,931) plus the estimated total City employment (42,550). The calculated revenue factor is applied to the project's estimated service population.
2. Property tax allocations are based on current Auditor Controller reports for TRA 30-007, as shown in Appendix Table B-5.
3. The State allocates property taxes in-lieu of VLF based on the change in assessed valuation for the City, as shown in Appendix Table B-6.
4. Other fees and charges includes excess DMV fees, sponsorships, passport fees, notary fees, imaging fees, copying and maps.
5. Gas Tax and Measure M2 funds are earmarked for street-related purposes.

Sources: Stanley R. Hoffman Associates, Inc.
City of Lake Forest, *Operating Budget Fiscal Year 2017-18*

the Nakase Project site is presented in Appendix Table B-5. The City General Fund is estimated to receive 5.35 percent of the basic one percent property tax on the project's assessed valuation.

Property Taxes - Vehicle License Fees (VLF) Backfill. Cities and counties began receiving additional property tax revenue to replace vehicle license fee (VLF) revenue that was lowered when the state reduced the vehicle license tax in 2004. This property tax in lieu of VLF is projected to grow with the change in the citywide gross assessed valuation (AV) of taxable property from the prior year. Property tax in lieu of VLF revenue is allocated in addition to other property tax apportionments. Property tax in lieu of VLF in the City is projected to increase at an average of $520 per million dollars of new AV (see Appendix Table B-6). This factor is based on the change in AV and the change in property tax in lieu of VLF in the City over the past 5 years.

Property Transfer Tax. The County receives property transfer tax revenues on the sale of real property at the rate of $1.10 per $1,000 of transferred value. The City receives 50.0 percent of this amount, or $0.55 per $1,000 of transferred value. As shown in Appendix Table B-7, residential development is assumed to change ownership at an average rate of about 4.0 percent per year, based on the year householder moved survey data from the U.S. Bureau of the Census, *2012-2016 American Community Survey* for the period from the years 2000 to 2016. Non-residential development is assumed to change ownership at an average of 5.0 percent per year based on the 2013 *Opportunities Study Fiscal Impact Analysis* prepared by the fiscal consultant for the City.

Sales and Use Tax. All cities and counties in the State levy a basic one percent (1%) sales tax and have the option to levy additional sales taxes under certain circumstances. In general, sales and use taxes are imposed on the sale or the use of tangible personal property in California. Items excluded from taxation include property purchased for resale, food for home consumption, and prescription medicines.

The California State Board of Equalization (SBOE) collects sales and use tax revenues. The SBOE allocates a portion of these revenues to the appropriate local governments. The local share of sales tax revenues are generally distributed according to the location of the sale rather than residence or business location of the purchaser.

Use Tax. In addition to sales tax revenue, the City receives revenues from use tax, which is levied on shipments into the state and on construction materials for new residential and non-residential

development not allocated to a situs location. Use tax is allocated by the SBOE to counties and cities based on each jurisdiction's proportion of countywide and statewide direct taxable sales. Use tax revenues to Lake Forest are estimated at an additional 15.9 percent of point-of-sale taxable sales. Appendix Table B-8 presents the calculation of the estimated use tax factor.

Franchise Fees. Franchise fees are charged to various entities in exchange for the exclusive right to operate franchises within the City's jurisdiction. As shown in Table 4-2, the City Budget projects $2,350,000 in franchise fees for Fiscal Year (FY) 2017-18. Franchise fees for the Nakase projects are projected at $18.43 per service population based on these budgeted revenues and the combined population and employment estimate of 127,841.

Park and Recreation Fees. These revenues from recreation programs and classes are estimated at $794,100 in the FY 2017-18 Budget. Park and recreation revenues are projected at $9.35 per capita based the City Budget amount and the City's population estimate of 84,931.

Other User Fees and Charges. These revenues from excess DMV fees, sponsorships, passport fees, notary fees, imaging fees, copies and maps are projected at $0.62 per service population based on the City Budget estimate of $79,200 for FY 2017-18, and the City's service population of 127,841.

Fines and Forfeitures. Proposed fines and forfeitures total $415,000 for FY 2017-18 and consist of vehicle code violations and other local ordinance violations of the municipal code. These revenues are projected at $3.26 per service population based on the proposed revenues and the combined City population and employment of 127,841, as shown in Table 4-2.

Interest on Investments. The FY 2017-18 City Budget estimates recurring General Fund interest at $726,900. Based on the this amount and the estimated non-interest recurring revenues of $33,380,700, the fiscal analysis projects interest income at 2.0 percent of the projected recurring General Fund non-interest revenues.

Special Revenue Funds

Gas Tax Fund. Recurring revenues to the City Gas Tax Fund include State gasoline tax and are detailed in Appendix Table B-3. These revenues are earmarked for street maintenance and improvements. State gas tax revenues are projected at the citywide average of $20.64 per capita based on gas tax revenues of $1,753,100 and the City's population estimate of 89,431.

Measure M2 Fund Revenue Factors

As shown in Table 4-2, based on FY 2017-18 Budget Measure M2 Fund Turnback Allocation revenues of $1,278,000 and the City's estimated population, these revenues are projected at $15.05 per capita. Measure M2 revenues are allocated to street maintenance and repair.

4.3 Cost Assumptions

Panel A of Table 4-3 provides a summary of proposed General Fund costs for Fiscal Year 2017-18. Table 4-4 presents the recurring General Fund cost assumptions for the recurring costs projected in this analysis, which include general government, police, development services, public works and community services. City fire protection is not a General Fund cost because it provided by the Orange County Fire Authority which is funded by about 11.34 percent of the basic one percent property tax on the proposed project.

General Government

General government costs are projected based on an analysis of indirect costs relative to direct line costs. Panel B of Table 4-3 presents the general government cost allocation based on information from the FY 2017-18 City Budget. Total indirect costs are estimated at $9,456,300 and direct line department costs total $36,841,000. General Government costs are estimated as 25.67 percent of direct line department costs. City overhead costs are not assumed to increase at a one to one relationship with new population and employment. Therefore, the fiscal analysis projects general government overhead at 12.84 percent, which represents a marginal rate of 50 percent of the average City overhead of 25.67 percent, similar to the methodology used in the 2013 *Opportunities Study Fiscal Impact Analysis* prepared by the fiscal consultant for the City.

Police Services

As shown in Table 4-4, General Fund police costs are budgeted at $17,448,000 and include law enforcement costs and other police costs such as crossing guards and animal control. Police costs are projected at $136.87 per service population based on the department budget of $17,448,000 and the combined City population and employment estimate of 127,841.

Development Services

The Development Services Department includes the Planning Division and the Building and Safety Services Division. Some of the costs for these services are assumed to be covered by one-time

Table 4-3
General Fund Costs and Estimated Overhead Rate, Fiscal Year 2017-18
Nakase Project Fiscal Impact Analysis, City of Lake Forest
(In Constant 2018 Dollars)

PANEL A. GENERAL FUND EXPENDITURES

General Fund Expenditures	Total General Fund Cost	General Government	Non-General Government
City Council	$66,300	$66,300	$0
City Manager	820,800	820,800	0
City Clerk	787,900	787,900	0
Economic Development/Community Preservation	1,243,000	1,243,000	0
City Attorney	1,318,000	1,318,000	0
Finance	3,237,100	3,237,100	0
Management Services	1,983,200	1,983,200	0
Police Services	17,448,000		17,448,000
Development Services	4,192,600		4,192,600
Public Works	11,288,900		11,288,900
Community Services	3,911,500		3,911,500
TOTAL GENERAL FUND	**$46,297,300**	**$9,456,300**	**$36,841,000**

PANEL B. CALCULATION OF GENERAL GOVERNMENT OVERHEAD COSTS

Category	General Government	Non-General Government
Estimated General Government Expenditures	$9,456,300	
divided by		
Estimated Non-General Government Expenditures		$36,841,000
equals		
General Government as percent of Non-General Government Costs	25.67%	
Marginal Increase in General Government Costs Estimated @ 50% [1]	**12.84%**	

1. City overhead costs are not assumed to increase at a one to one relationship with new population and employment growth. Therefore, the fiscal analysis projects general government overhead at 12.84 percent, which represents a marginal rate of 50 percent of the average City overhead of 25.67 percent.

Sources: Stanley R. Hoffman Associates, Inc.
City of Lake Forest, *Operating Budget Fiscal Year 2017-18*

Table 4-4
Summary of Cost Factor Assumptions, Fiscal Year 2017-18
Nakase Project Fiscal Impact Analysis, City of Lake Forest
(In Constant 2018 Dollars)

Cost Category	FY 2017-18 Adopted Budget	FY 2017-18 Net Cost	Projection Basis [1]	Cost Projection Factor
General Government [2]	$9,456,300	$4,728,150	Case Study	12.84% of department costs
Police Services	$17,448,000	$17,448,000	Service Population = 127,481	$136.87 per service population
Development Services [3]	$4,192,600	$311,700	Case Study	$2.45 per service population
Public Works:				
Engineering Division [4]	$2,632,900	$831,900	Service Population = 127,481	$6.53 per service population
Landscape/Building Maintenance Division	$5,084,700	$5,084,700	Service Population = 127,481	$39.89 per service population
NPDES/Water Quality Division	$1,224,300	$1,224,300	Service Population = 127,481	$9.60 per service population
Street Maintenance [5]	$1,762,300	$1,762,300	Case Study	$14,600 per lane mile
Traffic Signals O&M [6]	$470,100	$470,100	Case Study	$4,300 per new signalized intersection $2,150 per modified signalized intersection
Parks and Recreation [7]	$1,455,900	$0	Case Study	not projected
Public Works Overhead [8]	$421,000	$421,000	Case Study	3.87% of General Fund public works' costs
Community Services	$3,911,500	$3,911,500	Total Population = 84,931	$46.06 per capita

1. For fiscal factors that are based on both population and employment, the Budget expenditure amount is divided by an estimated City service population of 127,841, which represents the City's resident population (84,931) plus the estimated total City employment (42,550). The calculated cost factor is applied to the project's estimated service population.
2. General government costs are assumed to increase at a marginal rate of 50 percent, or at 12.84 percent of 25.67 percent, as shown Table 4-3.
3. Net recurring development services costs are projected based on the net costs of $311,700, as shown in Panel A of Appendix Table B-9.
4. Net recurring public works-engineering costs are projected based on net costs of $831,900, as shown in Panel B of Appendix Table B-9.
5. Annual street maintenance costs of $13,600 per lane mile were provided by Public Works staff during the preparation of the 2013 *Opportunity Study* . For this current analysis, the $13,600 from 2013 is increased by the change in the CPI of about 7 percent over the 2013 to 2018 period. The estimated 2018 amount of $14,600 per lane mile is rounded to the nearest 100.
6. Annual traffic signal operations and maintenance (O&M) costs from the City were estimated at $4,000 per new signalized intersection in the 2013 *Opportunities Study* . When the CPI factor of 7 percent is applied, traffic signal O&M is projected at $4,300 per new signalized intersection. Annual O&M costs for modification to an existing signalized intersection are assumed at 50 percent of a new signalized intersection, or at $2,150 per modified signalized intersection.
7. The project's parks and recreation facilities will be maintained by a homeowner's association and do not represent a cost to the General Fund.
8. The calculation of the public works overhead rate is presented in Appendix Table B-10.

Sources: Stanley R. Hoffman Associates, Inc.
City of Lake Forest, *Opportunity Study Fiscal Impact Analysis* , September 9, 2013
City of Lake Forest, *Operating Budget Fiscal Year 2017-18*

building permit fees, plan check fees, planning and zoning fees and other one-time fees collected upon development. As shown in Panel A of Appendix Table B-9, based on budgeted FY 2017-18 General Fund development related expenditures of $4,192,600, minus one-time fees of $3,880,900, net development services costs are estimated at $831,900. Based on these net costs and the City's estimated service population of 127,841, net development services are projected at $2.45 per service population.

Public Works

As shown in Table 4-4, annual projected public works operations and maintenance (O&M) costs include engineering costs, Citywide public landscape/building maintenance, Citywide NPDES/water quality, street maintenance; signalized intersections, sports park/recreation center and public works overhead.

Engineering Division. As shown in Panel B of Appendix Table B-9, based on budgeted FY 2017-18 General Fund expenditures of $2,632,900, minus one-time engineering fees of $1,801,000, net public works-engineering services costs to the City of Lake Forest are estimated at $831,700. Based on these net costs and the City's estimated service population of 127,841, Citywide average engineering costs are projected at $6.53 per service population.

Landscape / Building Maintenance Division. The average Citywide cost for maintenance of public medians, parkways, slopes and municipal services/facilities is projected at $39.89 per service population. As shown in Table 4-4, this cost factor is based on FY 2017-18 budget costs of $5,084,700 and the City's service population estimate of 127,841.

NPDES / Water Quality Division. These costs are projected at $9.60 per service population based on the FY 2017-18 budget of $1,224,300 and the City's estimated service population.

Street Maintenance. Street maintenance costs for public roads were estimated at $13,600 per lane mile by City staff in 2013 during preparation of the *Opportunity Study*. Based on the change in the Consumer Price Index of 1.07 over the 2013 to 2018 period, street maintenance costs are projected at $14,600 per lane mile. These costs include annual operations and maintenance costs for slurry seal/street maintenance; sidewalk repair/maintenance; median/parkway maintenance; street sweeping; and other costs of street lighting, curb repairs and bus shelter maintenance

Traffic Signals Operations and Maintenance (O&M). Annual O&M costs were estimated at $4,000 per new signalized intersection by City Public Works' staff for the 2013 *Opportunity Study*. Based on the change in the Consumer Price Index of 1.07 over the 2013 to 2018 period, O&M costs for new traffic signals are projected at $4,300 per signalized intersection. Annual O&M costs for modifications to an existing signalized intersection are assumed at 50 percent of a new signalized intersection, or at $2,150 per modified signalized intersection.

Parks and Recreation. The proposed park and recreation facilities for the Nakase Project will be maintained through a homeowner's association and do not represent an annual cost to the General Fund.

Public Works Overhead. General Fund public work's overhead costs are projected at 3.87 percent of direct public works costs. As shown in Appendix Table B-10, this calculation is based on General Fund departmental administrative costs of $421,000 and General Fund departmental direct services costs (O&M costs and contract services) of $10,867,900.

Community Services

The Community Services Department provides planning and coordination of community recreation activities and programs for youth, teens, adults, families and seniors. Nature Park and Skatepark programs are also provided by the Community Services Department. Based on Community Services costs in the FY 2017-18 Budget of $3,911,500 and the City population estimate of 84,931, these costs are projected at $46.06 per capita, as shown in Table 4-4.

APPENDIX A
HYPOTHETICAL BUSINESS PARK LAND USE ECONOMICS METHODOLOGY

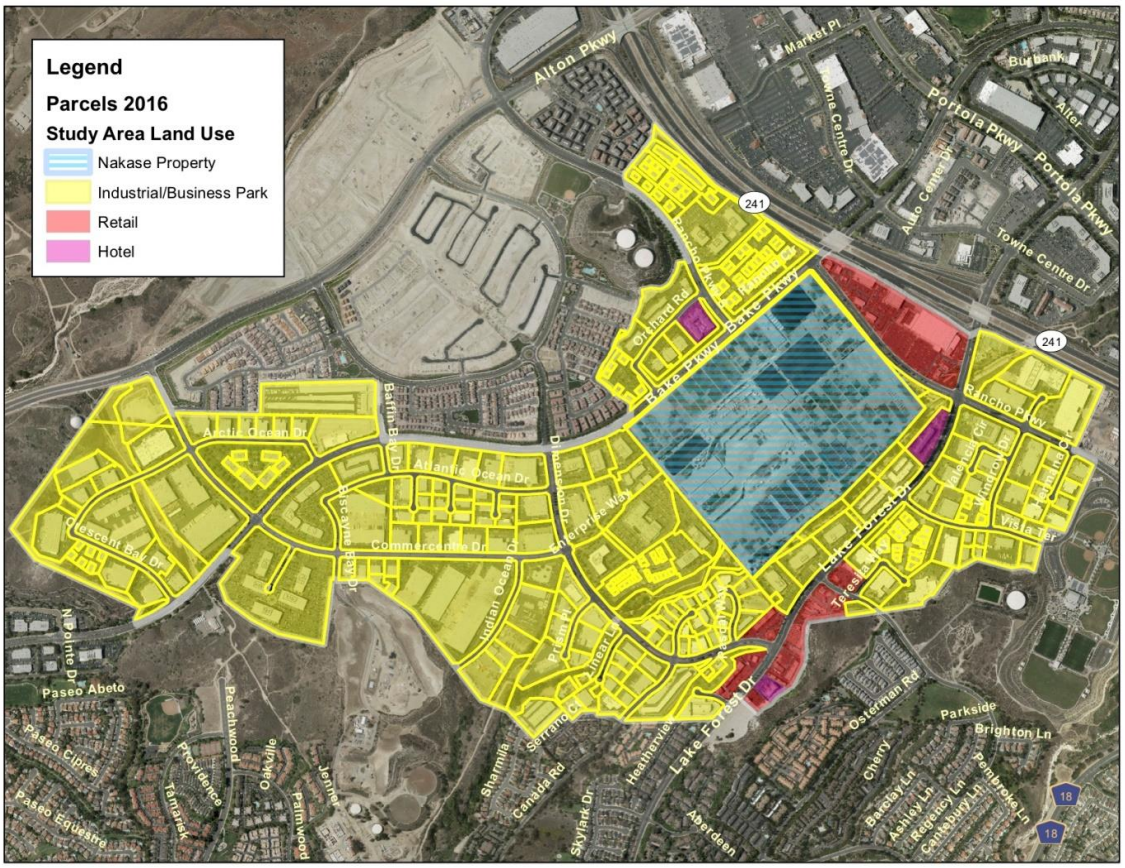
The methodology employed to develop key economic impact factors and indicators for the hypothetical Nakase Project Business Park alternative is described in this appendix section. Indicators and supporting factors have been developed for the following:

- Total Project Business Park Employment;
- Distribution of the Business Park Employment by Industry Sectors;
- Average Wage and Payroll, including breakdown by Industry Sectors;
- Business Park Total Non-Retail Taxable Sales

A.1 Projected Total Business Park Employment

Projected total employment associated with the hypothetical Nakase Business Park (BP) is based on the current employment intensity of comparable business park-related parcels in the project's study area, shown in Figure A-1. This intensity factor, developed on a per acre basis, is then applied to the net developable acres for the Nakase parcel to estimate the total employment at current usage rates.

Figure A-1
Study Area Land Uses
Nakase Project Fiscal Impact Analysis, City of Lake Forest



Source: Stanley R. Hoffman Associates, Inc.

Table A-1
Hypothetical Business Park Total Employment Estimate
Nakase Project Fiscal Impact Analysis, City of Lake Forest

	Study Area Parcels	
	Square Feet	**Acres**
A. STUDY AREA LAND ACRES BY USE CODE [1]		
Agricultural	5,319,270	122.1
Commercial - General	4,559,117	104.7
Commercial - Office	43,559	1.0
Industrial - General	13,280,977	304.9
Industrial - Office	135,850	3.1
Institutional - Vacant	2,535,832	58.2
Residential - Single-Family	50,707	1.2
ROW/UTILITY	1,091,291	25.1
Unknown	9,599	0.2
Vacant Commercial	1,228,778	28.2
Grand Total	**28,254,982**	**648.6**

B. STUDY AREA LAND USE-JOBS UTILIZATION RATE	
Business Park-related Land Use (Net Acres) [2]	413.7
Business Park-related Employment [3]	6,284
Business Park Employment per Net Acre	**15.2**
C. PROJECTED NAKASE EMPLOYMENT AND DEVELOPMENT PROFILE	
Nakase Nursery Gross Acres [4]	122.0
Nakase Nursery Net Acres [4]	102.0
Projected Business Park Employment @ 15.2 jobs per net acre	**1,550**
Nakase Business Park Building Square Foot [4]	1,841,720
Implied Business Park Floor Area Ratio	0.415
Implied Business Park Square Feet per Employee	1,188

1. Obtained from the Orange County Assessor's records.
2. Obtained from the Orange County Assessor's records, Includes the following four land use categories : Industrial-General, Industrial-Office, Commercial-Office and Commercial - General, and excludes associated right of way.
3. Includes jobs in the following NAICS sectors : Manufacturing; Wholesale Trade; Transportation and Warehousing; Information; Finance and Insurance; Real Estate and Rental and Leasing; Professional, Scientific and Technical Services; Management of Companies and Enterprises; Administration & Support, Waste Management and Remediation, as shown in Appendix Table A-2.
4. All information on project development provided by the project proponent.

Sources: Stanley R. Hoffman Associates, Inc.
Toll Brothers
Orange County Assessor's Parcel Data
U.S. Census Bureau, Longitudinal Employer-Household Dynamics (LEHD)

As shown in Table A-1 Panel A, parcels in the Nakase Study Area obtained from the Orange County Assessor's records comprise a total of 648.6 acres, excluding parcels identified as retail and hotel use. Of these, as shown in Panel B, parcels associated with business park-related activities in the Study Area are estimated to add up to a total of 413.7 acres.

Further, as developed and analyzed from detailed employment statistics for 2015 from the Census Longitudinal Employee Household Dynamic (LEHD), as shown in Appendix Table A-2, the Nakase Study Area is estimated to include a total of 6,284 jobs associated with business park-related uses. When compared against the acres for these same activities, as shown in Table A-1 Panel B, an intensity factor of 15.2 jobs per net acre is estimated for these uses in the Study Area.

As shown in Table A-1 Panel C, the total employment for the Nakase BP Alternative is estimated by applying the factor of 15.2 jobs per net acre to the total 102.0 acres of net developable land for the Nakase property, based on information provided by the project proponent. This results in a total of 1,550 jobs for business park-related activities.

The project proponent has estimated a potential total of 1,841,720 square feet of built space for business park activities, which when compared against the net developable land of 102 acres yields an implied floor area ratio (FAR) of 0.415, and when compared against the business park jobs results in about 1,188 square feet per employee, as shown in Table A-1 Panel C.

Distribution of Total Employment by Industry Sectors

Further, as shown in Table A-3, the total estimated 1,550 jobs for the hypothetical Nakase Business Park alternative are distributed by detailed industry sectors, by applying the percent industry composition of the business-park jobs identified for the Study Area, as discussed previously in Appendix Table A-2. Professional, Scientific and Technical Service jobs are shown to comprise the largest jobs category amongst the business park uses at 42 percent, followed by Manufacturing at 26 percent, thus reflecting the area's higher-end technological character.

Average Wage and Payroll

Further, as shown in Table A-3, the average wage for the Business Park alternative jobs is estimated at about $79,600, for a total annual payroll of close to $123.4 million. These numbers are obtained by applying the average wage by industry sector in 2016, as obtained from the California Employment Development Department (EDD), to the sector-wise jobs distribution discussed previously. Professional Scientific and Technical services comprise a total payroll of about $60.0 million at an average wage of about $92,900 per job, while Manufacturing and Wholesale trade, combined, comprise the next largest grouping of total wages at about $33.5 million at an average wage of about $76,400.

Table A-2
2015 Employment by Sector: Nakase Study Area and Lake Forest City
Nakase Project Fiscal Impact Analysis, City of Lake Forest

	Study Area		City Total	
	Jobs [1]	Percent Distribution	Jobs [1]	Percent Distribution
NAICS Sectors				
Agriculture, Forestry, Fishing and Hunting	122	1%	145	0%
Mining, Quarrying, and Oil and Gas Extraction	0	0%	3	0%
Utilities	0	0%	45	0%
Construction	1,606	18%	3,189	8%
Manufacturing	1,631	18%	5,938	14%
Wholesale Trade	676	7%	3,029	7%
Retail Trade	133	1%	3,108	7%
Transportation and Warehousing	27	0%	210	0%
Information	16	0%	324	1%
Finance and Insurance	221	2%	2,899	7%
Real Estate and Rental and Leasing	307	3%	1,268	3%
Professional, Scientific, and Technical Services	2,610	29%	5,579	13%
Management of Companies and Enterprises	370	4%	870	2%
Administration & Support, Waste Management and Remediation	425	5%	4,494	11%
Educational Services	1	0%	1,077	3%
Health Care and Social Assistance	467	5%	4,000	10%
Arts, Entertainment, and Recreation	78	1%	489	1%
Accommodation and Food Services	246	3%	3,739	9%
Other Services (excluding Public Administration)	83	1%	1,535	4%
Public Administration	0	0%	127	0%
Unclassified	0	0%	0	0%
TOTAL	**9,021**	**100%**	**42,067**	**100%**
Business Park-Related Employment				
Manufacturing	1,631	26%	5,938	24%
Wholesale Trade	676	11%	3,029	12%
Transportation and Warehousing	27	0%	210	1%
Information	16	0%	324	1%
Finance and Insurance	221	4%	2,899	12%
Real Estate and Rental and Leasing	307	5%	1,268	5%
Professional, Scientific, and Technical Services	2,610	42%	5,579	23%
Management of Companies and Enterprises	370	6%	870	4%
Administration & Support, Waste Management and Remediation	425	7%	4,494	18%
Business Park Total	**6,284**	**100%**	**24,610**	**100%**

1. Jobs are adjusted for current self-employment rates by industry sector for Orange County, as obtained from the American Community Survey (ACS) - Public Use Microdata Sample (PUMS) for 2016.

Sources: Stanley R. Hoffman Associates, Inc.
U.S. Census Bureau, Longitudinal Employer-Household Dynamics (LEHD), 2015
U.S. Census Bureau, American Community Survey (ACS) 2016 Public Use Microdata Sample (PUMS)

Table A-3
Distribution of Hypothetical Business Park Jobs by Sectors
Nakase Project Fiscal Impact Analysis, City of Lake Forest

Study Area Business Park Employment Distribution by NAICS Sectors [1]	Percent Distribution		
Manufacturing	26%		
Wholesale Trade	11%		
Transportation and Warehousing	0%		
Information	0%		
Finance and Insurance	4%		
Real Estate and Rental and Leasing	5%		
Professional, Scientific, and Technical Services	42%		
Management of Companies and Enterprises	6%		
Administration & Support, Waste Management and Remediation	7%		
Business Park Total	100%		
Projected Hypothetical Nakase Business Park Jobs [2]	**1,550**		
Projected Hypothetical Nakase Business Park Jobs Distribution by Sectors [3]	**Jobs**	**Average Annual Wage [4]**	**Annual Payroll**
Manufacturing	402	$73,424	$29,542,216
Wholesale Trade	167	$83,616	$13,935,496
Transportation and Warehousing	7	$50,440	$333,336
Information	4	$101,088	$406,753
Finance and Insurance	55	$107,224	$5,845,143
Real Estate and Rental and Leasing	76	$74,412	$5,640,343
Professional, Scientific, and Technical Services	644	$92,872	$59,794,630
Management of Companies and Enterprises	91	$42,588	$3,886,557
Administration & Support, Waste Management and Remediation	105	$38,688	$4,060,123
Business Park Total	**1,550**	**$79,642**	**$123,444,597**

1. Obtained from the Census Longitudinal Employee-Household Dynamic (LEHD) by the North American Industrial Classification System (NAICS) industry sector categories, as shown previously in Table A-2.
2. Calculated by Stanley R. Hoffman Associates, Inc., as shown previously in Table A-1.
3. Calculated by applying the study area business park related jobs distribution to the total number of jobs estimated for the hypothetical business park.
4. Obtained from the California Employment Development Department (EDD) by NAICS industry sectors.

Sources: Stanley R. Hoffman Associates, Inc.
U.S. Census Bureau, Longitudinal Employer-Household Dynamics (LEHD)
California Employment Development Department (EDD)

A.2 Projected On-Site Non-Retail Taxable Sales

Taxable sales generated by the non-retail activities projected for the hypothetical Nakase BP comprise additional economic benefits accruing to the City. As show in Table A-4, the taxable sales impact of the project is estimated by developing a city-wide non-retail taxable sales factor of $13,712 per employee in 2015, primarily attributable to business-park activities. This factor is based on the total non-retail taxable sales of $337.5 million for Lake Forest reported by the California State Board of Equalization (SBOE) in 2015 compared against the estimated 24,160 business park-oriented jobs in the City, as shown previously in Appendix Table A-2. A total of about $22.0 million in non-retail taxable sales in 2018 dollars are estimated for this alternative by applying the city-wide factor to the total of 1,550 potential jobs, adjusted for inflation.

Table A-4
Non-Retail Taxable Sales Impact
Hypothetical Nakase Business Park Alternative

Category		Amount
LAKE FOREST 2015 NON-RETAIL TAXABLE SALES		
Lake Forest Non-Retail Taxable Sales in 2015 [1]		$337,460,259
Lake Forest Business Park-Related Employment [2]		24,610
Non-retail Taxable Sales per Business Park Employee (2015 Dollars)		$13,712
NAKASE HYPOTHETICAL BUSINESS PARK USE ESTIMATED TAXABLE SALES		
Nakase Project Estimated Business Park Employment [3]		1,550
	times	
Non-retail Taxable Sales per Business Park Employee (2015 Dollars)		$13,712
	equals	
Nakase Non-Retail Taxable Sales in 2015 in Dollars [4]		$21,253,600
Nakase Non-Retail Taxable Sales in 2018 Dollars		
Annual 2015 CPI		244.63
Annual 2017 CP		256.21
CPI Factor		1.05
Estimated Nakase Non-Retail Taxable Sales in 2018 Dollars		**$22,316,280**

1. Non-retail taxable sales are from the California State Board of Equalization (SBOE).
2. Obtained from the Census Longitudinal Employee-Household Dynamic (LEHD), as shown in Table A-2.
3. Calculated by Stanley R. Hoffman Associates, Inc. as shown previously in Table A-1.
4. Calculated by applying the city-wide non-retail taxable sales per business park employee factor to the total number of jobs for the hypothetical business park.
5. Inflation factor calculated from the annual average BLS All Urban Consumers - Consumer Price Index (CPI) for Los Angeles-Long Beach-Anaheim for 2015 and 2017.

Sources: Stanley R. Hoffman Associates, Inc.
California State Board of Equalization, *Taxable Sales in California (Sales and Use Tax), Calendar Year 2015*
U.S. Census Bureau, Longitudinal Employer-Household Dynamics (LEHD)
California Employment Development Department (EDD)
U.S. Department of Labor, Bureau of Labor Statistics, *Consumer Price Index, Los Angeles-Long Beach-Anaheim, 2015 and 2017*

A.3 Estimated Annual Taxable Sales from Business Park Employment

Estimated annual taxable sales from Business Park employment are projected based on the taxable sales per office employee, as shown in Table A-5. Based on 2011 information from the International Council of Shopping Centers (ICSC), average weekly spending per office employee is estimated at $165.93. Online purchases made at the office, estimated non-taxable drug store purchases and estimated non-taxable grocery store purchases are subtracted from this amount resulting in adjusted weekly spending of $138.77 per employee. Average annual taxable expenditures per employee are calculated by multiplying this adjusted weekly amount by 50 weeks, excluding two weeks for vacation. The estimated 2011 annual taxable expenditures per employee of $6,938.71 are increased by the change in the CPI over the 2011 to 2018 period, resulting in estimated 2018 taxable expenditure of $7,633 per employee

Table A-5
Average Annual Taxable Expenditures per Office Employee
Hypothetical Nakase Business Park Alternative

Spending Category	Total
Average Weekly Office Worker Spending (Urban Areas) in 2011	
Transportation and Online Purchases	*$50.33*
Transportation	$36.37
Online Purchases Made at the Office (Personal)	$13.96
Full-Service Restaurants and Fast Food	*$26.30*
Full-Service Restaurants	$13.45
Fast Food/Deli/Lunch Eateries	$12.85
Goods and Services	*$89.30*
Department Stores	$6.52
Discount Stores	$8.19
Drug Stores	$6.13
Grocery Stores	$15.98
Clothing Stores	$3.25
Shoe Stores	$2.43
Sporting Goods Stores	$2.16
Electronics/Phone/Computer Stores	$4.86
Jewelry Stores	$3.92
Office Supplies/Stationery/Novelty Gifts & Cards	$7.37
Warehouse Club	$7.80
Other Goods (florist, non-food vendors, etc.)	$3.95
Personal Care Shops	$7.83
Personal Services	$3.16
Other Services (not elsewhere classified)	$2.30
Entertainment (sporting, live, concerts, movies)	$3.45
Total Average Weekly Spending per Employee	$165.93
Adjusted Average Weekly Spending per Employee	
Total Average Weekly Spending per Employee	$165.93
minus	
Online Purchases Made at the Office	$13.96
Non-Taxable Drug Stores (@ 38 percent of total drug stores)	$2.33
Non-Taxable Grocery Stores (@ 68 percent of total grocery stores)	$10.87
Total of Removed Weekly Spending	$27.16
equals	
Adjusted Average Weekly Spending per Employee	**$138.77**
Average Annual Taxable Expenditures per Employee (2011 Dollars) [1]	**$6,938.71**
Annual 2011 CPI	231.93
Annual 2017 CP	256.21
CPI Factor	1.10
Average Annual Taxable Expenditures per Employee (2018 Dollars)	**$7,633.00**

1. Average annual expenditures per employee is calculated by multiplying the adjusted average weekly spending of $138.77 sales by 50, excluding two weeks for vacation. The 2011 amount is increased by the change in the CPI of 1.10 over the 2011 to 2018 period, rounded to the nearest whole number.

Sources: Stanley R. Hoffman Associates, Inc.
International Council of Shopping Centers (ICSC)
United States Department of Labor, Bureau of Labor Statistics
U.S. Department of Labor, Bureau of Labor Statistics, *Consumer Price Index, Los Angeles-Long Beach-Anaheim, Annual 2011 and Annual 2017*

APPENDIX B
SUPPORTING FISCAL ASSUMPTIONS TABLES

Table B-1
Estimated Average Household Size for Senior Rental Units
Nakase Project Fiscal Impact Analysis, City of Lake Forest

Category	Age 55 Years and Over [1]		
	Owners	Renters	Total
Population	38,504	10,301	48,805
divided by			
Households	21,383	6,867	28,250
equals			
Persons per Household	**1.80**	**1.50**	**1.73**

1. The information in this table is from the Public Use Microdata Area (PUMA) 05905, in which the City of Lake Forest is located.

Sources: Stanley R. Hoffman Associates, Inc.
U.S. Bureau of the Census, *Public Use Microdata Survey (PUMS)* , 2010

Table B-2
Estimated 2017 City Employment
Nakase Project Fiscal Impact Analysis, City of Lake Forest

	2012 [1]	2020 [1]	Average Annual Growth Rate	2017 Estimate [2]
Lake Forest Employment	39,200	44,700	1.65%	42,550

1. The 2012 and 2020 employment numbers are obtained from the SCAG report cited below.
2. The 2017 estimate as an interpolation of the 2012 to 2020 SCAG growth forecast.

Sources: Stanley R. Hoffman Associates, Inc.
Southern California Association of Governments (SCAG), *Adopted 2016 Regional Transportation Plan (RTP)*

Table B-3
Summary of General Fund Revenues, Operating Budget Fiscal Year 2017-18
Nakase Project Fiscal Impact Analysis, City of Lake Forest

Revenue Category	Total	One-Time Fees and Charges [1]	Recurring Revenues	
			Not Projected in Fiscal Analysis [2]	Projected in Fiscal Analysis
Property and Other Taxes				
Property Taxes - Secured	$8,400,000	$0	$0	$8,400,000
Property Taxes - Unsecured	250,000	0	0	250,000
Property Taxes - Supplemental	200,000	0	0	200,000
Property Taxes - Prior Year	60,000	0	0	60,000
Homeowners' Exemptions	50,000	0	0	50,000
Penalties and Interest	18,000	0	0	18,000
Other Revenues	30,000	0	0	30,000
Property Taxes - Lighting District	719,400	0	0	719,400
Property Taxes - Motor Vehicle In-Lieu Backfill	7,415,000	0	0	7,415,000
Sales and Use Taxes	15,000,000	0	0	15,000,000
Transient Occupancy Taxes	3,600,000	0	3,600,000	0
Real Property Transfer Taxes	600,000	0	0	600,000
Gaming Tax	60,000	0	60,000	0
Franchise Fees	2,350,000	0	0	2,350,000
Subtotal	*$38,752,400*	*$0*	*$3,660,000*	*$35,092,400*
Licenses and Permits				
Building Permit Fees	$2,961,400	$2,961,400	$0	$0
Sign Permits	2,500	2,500	0	0
Subtotal	*$2,963,900*	*$2,963,900*	*$0*	*$0*
Revenues From Other Governments				
Excess DMV Fees	$32,000	$0	$0	$32,000
Waste Disposal Agreement	156,200	0	156,200	0
Subtotal	*$188,200*	$0	*$156,200*	*$32,000*
User Fees & Charges				
Plan Check Fees	$523,000	$523,000	$0	$0
Fire Plan Check Fees	4,000	4,000	0	0
Planning and Zoning Fees	390,000	390,000	0	0
Massage Permit Fees	4,500	4,500	0	0
Engineering Fees	1,801,000	1,801,000	0	0
Park Reservation Fees	17,000	0	0	17,000
Community Events Fees	55,000	0	0	55,000
Facility Rentals	1,000	0	0	1,000
Recreation Programs, Classes and Fees	721,100	0	0	721,100
Sponsorships	3,000	0	0	3,000
Passport Fees	20,000	0	0	20,000
Notary Fees/Imaging Fees, Copies and Maps	24,200	0	0	24,200
Subtotal	*$3,563,800*	*$2,722,500*	*$0*	*$841,300*
Fines and Forfeitures				
Motor Vehicle Code Fines	$290,000	$0	$0	$290,000
Local Ordinance Violations	125,000	0	0	125,000
Subtotal	*$415,000*	*$0*	*$0*	*$415,000*
Use of Money & Property				
Leases	$122,000	$0	$122,000	$0
Interest Income	726,900	0	0	726,900
Subtotal	*$848,900*	*$0*	*$122,000*	*$726,900*
Other Revenues				
State Mandated Claims	$75,000	$0	$75,000	$0
Shop and Dine	20,000	0	20,000	0
Other Revenue	50,000	0	50,000	0
Subtotal	*$145,000*	*$0*	*$145,000*	*$0*
Total General Fund	**$46,877,200**	**$5,686,400**	**$4,083,200**	**$37,107,600**

1. One-time development fees are not projected because they are netted from projected Development Services costs.
2. Certain revenues, such as transient occupancy tax, that are not impacted by the proposed projects are not projected as recurring revenues.

Sources: Stanley R. Hoffman Associates, Inc.
City of Lake Forest, *Operating Budget Fiscal Year 2017-18*

Table B-4
Summary of Special Fund Revenues, Operating Budget Fiscal Year 2017-18
Nakase Project Fiscal Impact Analysis, City of Lake Forest

Revenue Category	Total	Recurring Revenues	
		Not Projected in Fiscal Analysis [1]	Projected in Fiscal Analysis
Gas Tax Fund			
State Gasoline Tax			
- Section 2103	$336,000	$0	$336,000
- Section 2105	487,700	0	487,700
- Section 2106	299,400	0	299,400
- Section 2107	630,000	0	630,000
Subtotal	$1,753,100	$0	$1,753,100
- Section 2107.5 flat amount	7,500	7,500	0
Subtotal	$1,760,600	$7,500	$1,753,100
Loan Repayment	96,000	96,000	0
Road Maintenance Rehab Account	483,900	483,900	0
Interest Income	18,100	18,100	0
Total Gas Tax Fund	***$2,358,600***	***$605,500***	***$1,753,100***
Measure M2 Fund			
Turnback Allocation	$1,278,000	$0	$1,278,000
Interest	11,600	11,600	0
Total Measure M2 Fund	***$1,289,600***	***$11,600***	***$1,278,000***

1. Section 2107.5 gas tax revenues are allocated base on the population size-range of the City. The City currently falls within the population size-range of 50,000 to 99,999. The population of the proposed project will not move the City to a new size range. Therefore, Section 2107.5 gas tax revenues are not projected in the fiscal analysis. Gas Tax Fund loan repayment revenues and road maintenance rehab account revenues are not projected in the fiscal analysis. Interest revenues for these funds are minimal and therefore they are not projected in the fiscal analysis.

Sources: Stanley R. Hoffman Associates, Inc.
City of Lake Forest, *Operating Budget Fiscal Year 2017-18*

Table B-5
Current Tax Rate Area (TRA) Allocations: Nakase Project Site
Nakase Project Fiscal Impact Analysis, City of Lake Forest
(In Constant 2018 Dollars)

Fund Description [1]	Tax Rate Area 30-007
Lake Forest City	0.041856
Lake Forest City (SB1406)	0.011667
City of Lake Forest Total	**0.053523**
Irvine Ranch Water - Los Alisos Water District Area	0.044233
Orange County Fire Authority - General Fund	0.113422
Orange County Transit Authority	0.002832
Saddleback Valley Unified General Fund	0.457402
South Orange County Community College District	0.089331
Orange County Department of Education - General Fund	0.016464
Orange County General Fund	0.033884
Orange County Public Library	0.016825
Orange County Flood Control District	0.019955
Orange County Harbors Beaches and Parks CSA 26	0.015425
Education Revenue Augmentation Fund (ERAF)	0.135077
Orange County Vector Control District	0.001127
Orange County Cemetery Fund - General	0.000502
Total	1.000000

1. The funds in bold face are presented in the fiscal analysis.

Sources: Stanley R. Hoffman Associates, Inc.
Orange County Auditor Controller, *Report AT68AH AT68AH71, Section 99 Factor Report by TRA* , November 15, 2017

Table B-6
Estimated Increase in Vehicle License Fee (VLF) Property Tax Factor
Nakase Project Fiscal Impact Analysis, City of Lake Forest

Fiscal Year Ended	Property Tax In-Lieu of VLF [1]	Assessed Valuation (AV) [2]	VLF per $1,000,000 AV [3]
2012	$5,535,493	$10,750,347,000	$510
2013	$5,620,452	$10,912,307,000	$520
2014	$5,802,719	$11,232,966,000	$520
2015	$6,154,486	$11,921,239,000	$520
2016	$6,543,212	$12,572,393,000	$520
Average			***$520***

1. The property tax in lieu VLF amounts are from the City budget documents cited below.
2. Assessed valuation amounts are from page 131 of the City's 2016 CAFR as cited below.
3. Estimated VLF per $1,000,000 AV is rounded to the nearest tens.

Sources: Stanley R. Hoffman Associates, Inc.
City of Lake Forest, *Operating Budget Fiscal Year 2013-14, Operating Budget Fiscal Year 2014-15, Operating Budget Fiscal Year 2015-16, Operating Budget Fiscal Year 2017-18*
City of Lake Forest, *Comprehensive Annual Financial Report (CAFR), Year Ended June 30, 2016*

Table B-7
Estimated Residential Turnover Rate
Nakase Project Fiscal Impact Analysis, City of Lake Forest

Category	Occupied Housing Units [1]	Percent Turnover
Total Owner Occupied Units: Lake Forest	**27,551**	
Moved in 2015 or later	1,523	
Moved in 2009 to 2014	8,317	
Moved in 2000 to 2009	8,652	
Total Moved 2000 to 2016	18,492	
Annual Turnover Rate: 2000 to 2016 [2]	**1,088**	**4%**

1. The number of occupied housing units and their distribution by year moved in is from the U. S. Census Bureau *American Community Survey* cited below.
2. The annual turnover rate is based on the assumption of seventeen years for the 2000 to 2016 period.

Sources: Stanley R. Hoffman Associates, Inc.
U. S. Census Bureau, *2012-2016 American Community Survey, Report DP04*

Table B-8
Calculation of Use Tax Factor
Nakase Project Fiscal Impact Analysis, City of Lake Forest

City of Lake Forest	Amount
Use Tax	
County Pool	$2,043,674
State Pool	$4,044
Total Use Tax	$2,047,718
divided by	
Point-of-Sale	$12,891,276
equals	
Use Tax Rate [1]	**15.9%**

1. The use tax rate is the County Pool plus the State Pool divided by point-of-sale taxable sales tax.

Source: Stanley R. Hoffman Associates, Inc.
The HdL Companies, *Sales Tax Allocation Totals, Calendar Year 2016*

Table B-9
General Fund Net Development Services and Net Public Works-Engineering Costs
Nakase Project Fiscal Impact Analysis, City of Lake Forest
(In Constant 2018 Dollars)

Category		Amount
A. Net Development Services Costs		
Total General Fund Development Services Costs		$4,192,600
	minus	
One-Time Fees		
Building Permit Fees		$2,961,400
Sign Permits		2,500
Plan Check Fees		523,000
Fire Plan Check Fees		4,000
Planning and Zoning Fees		390,000
Total One-Time Development Related Fees		$3,880,900
	equals	
Recurring Net Development Services Costs		$311,700
	divided by	
City Service Population		127,481
	equals	
Net Development Services Costs per Service Population		**$2.45**
B. Net Public Works-Engineering Division Costs		
Total General Fund Public Works-Engineering Costs		$2,632,900
	minus	
One-Time Fees		
Engineering Fees		$1,801,000
	equals	
Recurring Net Public Works-Engineering Services Costs		$831,900
	divided by	
City Service Population		127,481
	equals	
Net Public Works-Engineering Costs per Service Population		**$6.53**

Sources: Stanley R. Hoffman Associates, Inc.
City of Lake Forest, *Operating Budget Fiscal Year 2017-18*

Table B-10
Calculation of Public Works Overhead Costs
Nakase Project Fiscal Impact Analysis, City of Lake Forest
(In Constant 2018 Dollars)

General Fund Public Works Department	Operating Budget FY 2017-18 General Fund	 Other Funds/Grants	 Total
A. PUBLIC WORKS COSTS			
Administrative Costs			
Administration Division	$421,000	$61,000	$482,000
Direct Services Costs			
Engineering Division	$2,632,900	$0	$2,632,900
Landscape/Building Maintenance Division	5,084,700	0	5,084,700
Street Maintenance/Traffic Management Division	470,100	1,762,300	2,232,400
Sports Park Division	1,455,900	0	1,455,900
NPDES/Water Quality Division	1,224,300	0	1,224,300
Subtotal Direct Services Costs	$10,867,900	$1,823,300	$12,691,200
Total Public Works Costs	$11,288,900	$1,884,300	$13,173,200
B. CALCULATION OF DEPARTMENT OVERHEAD COSTS			
Administrative Costs	$421,000	$61,000	$482,000
divided by			
Direct Services Costs	$10,867,900	$1,823,300	$12,691,200
equals			
Administrative Costs as a percent of Directs Services Costs	**3.87%**	**3.35%**	**3.80%**

Sources: Stanley R. Hoffman Associates, Inc.
City of Lake Forest, *Operating Budget Fiscal Year 2017-18*

APPENDIX C
PROJECT REFERENCES

CITY OF LAKE FOREST
Development Services
Gayle Ackerman, AICP, Director
949-461-3463
Marie Luna, Senior Planner
949-461-3466

TOLL BROTHERS
Rick Nelson, Division President, Southern California Division
925-249-6000
Ilan Feingold, Senior Project Manager, Southern California Division
646-645-5252

URBAN CROSSROADS
John Kain, Principal
949-336-5990

OTHER CONTACTS

Hinderliter de Llamas and Associates
Lloyd de Llamas, President
909-861-4335

Orange County Auditor Controller's Office
ac.ocgov.com

June 2019 | Updated Geologic and Environmental Hazards Assessment Report

NAKASE ELEMENTARY SCHOOL

for Toll Brothers

Prepared for:

Toll Brothers
Contact: Ilan P. Feingold,
Project Manager
715 W. Town & Country Road, Suite 200
Orange, California 92828
714.347.1300

Prepared by:

PlaceWorks
Contact: Michael Watson, PG,
Associate Geologist
2850 Inland Empire Boulevard, Suite B
Ontario, California 91764
909.989.4449
info@placeworks.com
www.placeworks.com

PLACEWORKS

Table of Contents

Section **Page**

1. Introduction 1
   - 1.1 INTRODUCTION 1
   - 1.2 PROJECT LOCATION 1
   - 1.3 PROJECT DESCRIPTION 1
2. Environmental Checklist 7
   - 2.1 STATE STANDARDS FOR SCHOOL FACILITIES 7
3. Environmental Analysis 11
   - 3.1 AIR QUALITY 11
   - 3.2 GEOLOGY AND SOILS 12
   - 3.3 HAZARDS AND HAZARDOUS MATERIALS 13
   - 3.4 HYDROLOGY AND FLOODING 16
   - 3.5 LAND USE AND PLANNING 17
   - 3.6 NOISE 19
   - 3.7 PUBLIC SERVICES 19
   - 3.8 TRANSPORTATION/TRAFFIC 19
   - 3.9 EXEMPTIONS TO SITING STANDARDS 21
4. Conclusions and Recommendations 23
5. References 25
   - 5.1 PRINTED REFERENCES 25
   - 5.2 RECONNAISSANCE 26
   - 5.3 WEBSITES 26
6. List of Preparers 29
   - 6.1 LEAD AGENCY 29
   - 6.2 PLACEWORKS 29

Table of Contents

LIST OF FIGURES

Figure **Page**

Figure 1 Site Location 3
Figure 2 Aerial Photograph 5

1. Introduction

1.1 INTRODUCTION

Toll Brothers is planning to develop a 1,000-student elementary school on 10-acres of the Toll Brothers' 120.83-acre development site. The State of California's standards for school site selection are found in Title 5 of the California Code of Regulations (CCR) Section 14010, and additional codes and regulations applicable to school facilities that are found in the Education, Government and Public Resources Codes (Ed. Code, Gov't Code and PRC, respectively). This study provides an assessment and supporting documentation of State school facility standards applicable to State-funded new school sites.

The California Environmental Quality Act (CEQA) requires lead agencies to address the environmental impacts of a project on the environment. These are separate and distinct from the issues addressed in this study, which deal with a site's ability to provide a safe and healthy environment for the school.

1.2 PROJECT LOCATION

The Toll Brothers' development site is 120.83 acres at 20621 Lake Forest Drive, Lake Forest, California bounded by Bake Parkway on the northwest, office buildings on the southwest, Serrano Creek on the southeast, and Rancho Parkway on the northeast (Figure 1, *Site Location*). The 10 acres for the proposed elementary school and play fields and active use areas (project site) are in the northern corner of the Toll Brothers' parcel (Figure 2, *Aerial Photograph*). Dina El Chammas of PlaceWorks performed a site reconnaissance on February 8, 2019, to confirm the current site conditions. Figure 1, *Site Location*, and Figure 2, *Aerial Photograph*, respectively show the project site from regional and aerial perspectives.

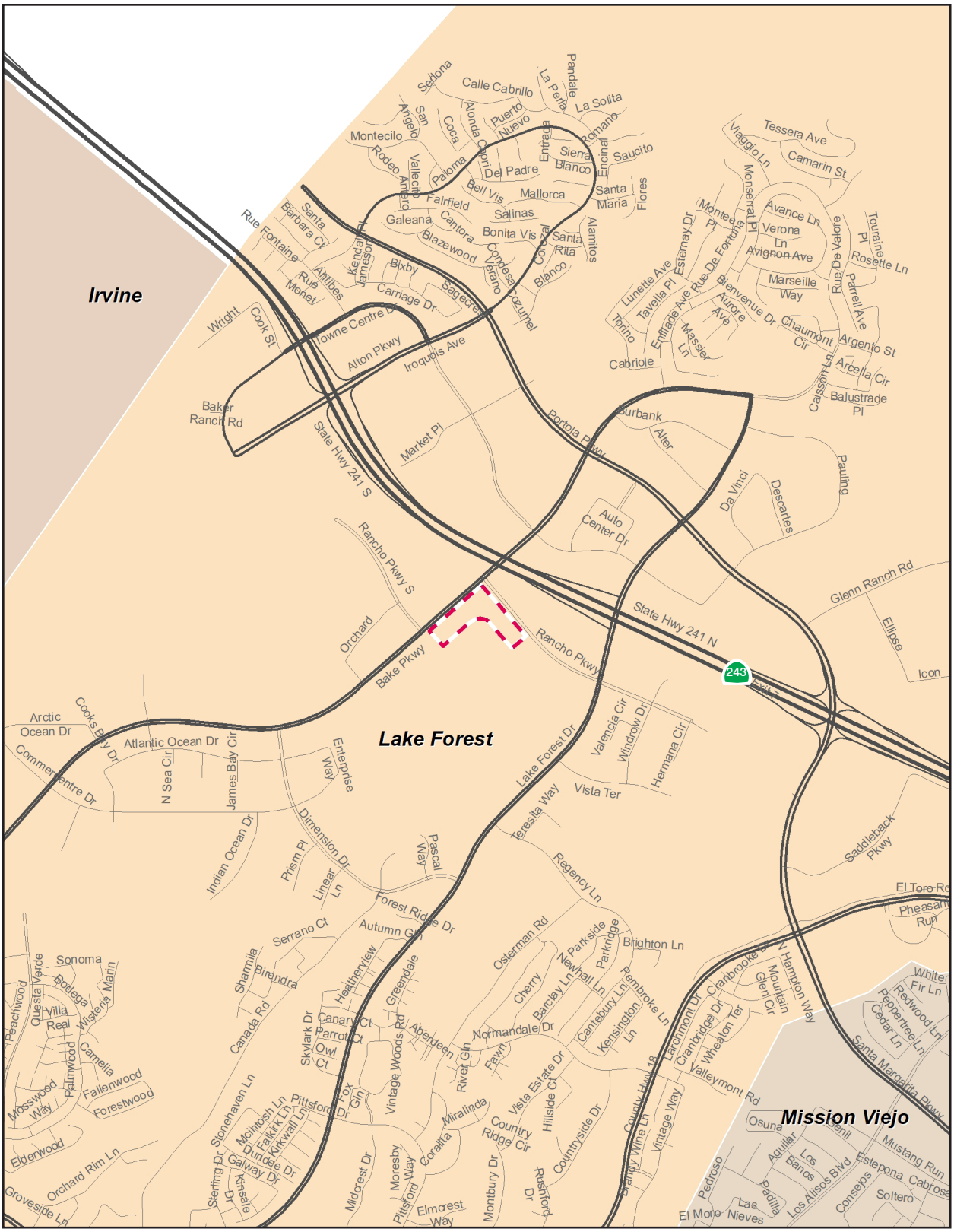
1.3 PROJECT DESCRIPTION

Toll Brothers has agreed to designate 10 acres within the 120.83-acre development for a new 1,000-student elementary school and play fields and active use areas. In April of 2017, PlaceWorks completed a Geologic and Environmental Hazards Assessment (GEHA) for the overall 120.83 Nakase Nursery site. This update to the 2017 GEHA will focus the assessment on the now-designated 10-acre school site in the northern corner of the Nakase Nursery site. This study will be used to determine if there are any "fatal flaws" at this project site.

1. Introduction

This page intentionally left blank.

Figure 1 - Site Location



School Boundary

0 2,000
Scale (Feet)

Source: ESRI, 2019

1. Introduction

This page intentionally left blank.

Figure 2 - Aerial Photograph

School Boundary

0 450
Scale (Feet)

Source: ESRI, 2019

1. Introduction

This page intentionally left blank.

2. Environmental Checklist

2.1 STATE STANDARDS FOR SCHOOL FACILITIES

The State of California's standards for school site selection are found in Title 5 of the California Code of Regulations (CCR) Section 14010 and additional codes and regulations applicable to school facilities are found in the Education, Government and Public Resources Codes. The following checklist provides a list of a questions and code citations related to State-funded school site approvals. The health and safety issues reviewed in the Department of Toxic Substances Control (DTSC) process are addressed under separate cover.

STATE STANDARDS CHECKLIST FOR STATE-FUNDED SCHOOL FACILITIES –
SCHOOL SITE APPROVAL
(Documentation for SFPD 4.0, 4.01-4.03, School Site Approval)

Topic	Code References
Air Quality	
Is the boundary of the proposed school site within 500 feet of the edge of the closest traffic lane of a freeway or busy traffic corridor? If yes, would the project create an air quality health risk due to the placement of the school?	Ed. Code §17213(c)(2)(C); CCR Title 5 §14010(q)
Would the project create an air quality hazard due to the placement of a school within one-quarter mile of: (a) permitted and non-permitted facilities identified by the jurisdictional air quality control board or air pollution control district; (b) freeways and other busy traffic corridors; (c) large agricultural operations; and/or (d) a rail yard, which might reasonably be anticipated to emit hazardous air emissions, or handle hazardous or acutely hazardous material, substances, or waste?	Ed. Code § 17213(b); CCR Title 5 §14010(q)
Geology and Soils	
Does the site contain an active earthquake fault or fault trace, or is the site located within the boundaries of any special studies zone or within an area designated as geologically hazardous in the safety element of the local general plan?	Ed. Code, §17212 and §17212.5; CCR Title 5 §14010(f)
Would the project involve the construction, reconstruction, or relocation of any school building on the trace of a geological fault along which surface rupture can reasonably be expected to occur within the life of the school building?	Ed. Code §17212.5
Would the project involve the construction, reconstruction, or relocation of any school building on a site subject to moderate-to-high liquefaction, landslides, or expansive soils?	CCR, Title 5 §14010(i) School Site Selection and Approval Guide, Appendix H
Are naturally occurring asbestos minerals located at the site?	School Site Selection and Approval Guide, Appendix H
Hazards and Hazardous Materials	
Does the proposed school site contain one or more pipelines, situated underground or aboveground, which carry hazardous substances, acutely hazardous materials, or hazardous wastes, unless the pipeline is a natural gas line that is used only to supply natural gas to that school or neighborhood?	Ed. Code §17213(a)(3)
Is the proposed school site located near an aboveground water or fuel storage tank or within 1,500 feet of an easement of an aboveground or underground pipeline that can pose a safety hazard to the site?	CCR, Title 5 § 14010 (h)

2. Environmental Checklist

STATE STANDARDS CHECKLIST FOR STATE-FUNDED SCHOOL FACILITIES – SCHOOL SITE APPROVAL
(Documentation for SFPD 4.0, 4.01-4.03, School Site Approval)

Topic	Code References
Is the school site in an area designated in a city, county, or city and county general plan for agricultural use and zoned for agricultural production, and if so, do neighboring agricultural uses have the potential to result in any public health and safety issues that may affect the pupils and employees at the school site? *(Does not apply to school sites approved by CDE prior to January 1, 1997.)*	Ed. Code § 17215.5
Is the property line of the proposed school site less than the following distances from the edge of respective power line easements: (1) 100 feet of a 50–133 kV line; (2) 150 feet of a 220–230 kV line; or (3) 350 feet of a 500–550 kV line?	CCR, Title 5 § 14010 (c)
Does the project site contain a current or former hazardous waste disposal site or solid waste disposal site and, if so, have the wastes been removed?	Ed. Code § 17213(a)(1)
Is the project site a hazardous substance release site identified by the state Department of Health Services in a current list adopted pursuant to §25356 for removal or remedial action pursuant to Chapter 6.8 of Division 20 of the Health and Safety Code?	PRC § 21151.8 (a)(1)(B); Ed. Code § 17213(a)(2)
If prepared, has the risk assessment been performed with a focus on children's health posed by a hazardous materials release or threatened release, or the presence of naturally occurring hazardous materials on the schoolsite?	Ed. Code § 17210.1(a)(3)
If a response action is necessary and proposed as part of this project, has it been developed to be protective of children's health, with an ample margin of safety?	Ed. Code § 17210.1(a)(4)
Is the proposed school site situated within 2,000 feet of a significant disposal of hazardous waste?	CCR, Title 5 § 14010 (t)
Is the site within 300 feet of an active oil or natural gas well?	Fire Code § 3406.3.1
Hydrology and Flooding	
Is the project site subject to flooding or dam/tank inundation or street flooding?	Ed. Code § 17212 and 17212.5 CCR, Title 5 § 14010 (g) School Site Selection and Approval Guide, Appendix H
Land Use and Planning	
Would the proposed school conflict with any existing or proposed land uses, such that a potential health or safety risk to students would be created?	Ed. Code § 17213 Gov't. Code § 65402 CCR, Title 5 § 14010 (m)
Are there easements on or adjacent to the site that would restrict access or building placement?	CCR, Title 5 § 14010(r)
Is the school site proportionate in its length to width ratio to accommodate the building layout, parking and playfields that can be safely supervised and does not exceed the allowed passing time to classes for the district?	CCR, Title 5 § 14010(j)
Is the site located within the proposed attendance area to encourage student walking and avoid extensive bussing unless bussing for ethnic diversity?	CCR, Title 5 § 14010(n)
Has the district considered environmental factors of light, wind, noise, aesthetics, and air pollution in its site selection process?	CCR, Title 5 § 14010(q)
Is the site within a designated Farmland Security Zone?	Government Code § 51296.5
Noise	
Is the proposed school site located adjacent to or near a major arterial roadway or freeway whose noise generation may adversely affect the educational program?	CCR, Title 5 § 14010 (e)
Public Services	
Does the site promote joint use of parks, libraries, museums, and other public services?	CCR, Title 5, § 14010 (o)
Is the site conveniently located for public services, including but not limited to fire protection, police protection, public transit and trash disposal wherever feasible?	CCR, Title 5, § 14010 (p)

STATE STANDARDS CHECKLIST FOR STATE-FUNDED SCHOOL FACILITIES –
SCHOOL SITE APPROVAL
(Documentation for SFPD 4.0, 4.01-4.03, School Site Approval)

Topic	Code References
Transportation/Traffic	
Are traffic and pedestrian hazards mitigated per Caltrans' School Area Pedestrian Safety manual?	CCR, Title 5 § 14010 (l)
Is the site easily accessible from arterials and is the minimum peripheral visibility maintained for driveways per Caltrans' Highway Design Manual?	CCR, Title 5 § 14010 (k)
Is the proposed school site within 1,500 feet of a railroad track easement?	CCR, Title 5 § 14010 (d)
Is the proposed school site within two nautical miles, measured by air line, of that point on an airport runway or potential runway included in an airport master plan that is nearest to the site? *(Does not apply to school sites acquired prior to January 1, 1966.)*	Ed. Code § 17215 (a)&(b)

Note: Any documentation related to the California Environmental Quality Act is provided under separate cover.
This checklist is also applicable to property additions to existing school sites.

2. Environmental Checklist

This page intentionally left blank.

3. Environmental Analysis

Section 2.1 provided a checklist of the State of California's health and safety standards for school sites. This section provides documentation and an evaluation of applicable standards, and mitigation measures where appropriate.

3.1 AIR QUALITY

3.1.1 Is the boundary of the proposed school site within 500 feet of the edge of the closest traffic lane of a freeway or busy traffic corridor? If yes, would the project create an air quality health risk due to the placement of the school?

No Significant Hazard. State Route 241 is located about 300 feet northeast of the site (USGS 2015). Additionally, Public Resources Code Section 21151.8(b)(9) and Education Code Section 17213(d)(9) define a "freeway or other busy traffic corridors" as roadways that on an average day have traffic in excess of 50,000 vehicles in a rural area or 100,000 vehicles in an urban area. The project site is within the 500-foot setback from SR-241. According to Albert Grover Associates (2010), the average daily traffic volume on Bake Parkway between Dimension Drive and Orchard Road in 2010 was 34,500 trips. Urban Crossroads (2019) measured the average daily traffic volume on Bake Parkway between Dimension Drive and Orchard Road in 2017 as 29,500 trips, which is lower most likely due to the opening of the Alton Parkway extension north of Trabuco Road. The average daily traffic volume on Lake Forest Drive between Vista Terrace and Regency Lane in 2010 was 21,200 trips (Albert Grover Associates 2010). Urban Crossroads (2019) measured the average daily traffic volume on Lake Forest Drive between Vista Terrace and Regency Lane in 2017 as 22,300 trips. Based on the results of a Health Risk Assessment (PlaceWorks 2019a), hazardous air emissions generated from stationary and mobile sources within a quarter mile radius are not anticipated to pose an actual or potential endangerment to students and staff occupying the future school, and no mitigation measures are necessary.

3.1.2 Would the project create an air quality hazard due to the placement of a school within one-quarter mile of: (a) permitted and non-permitted facilities identified by the jurisdictional air quality control board or air pollution control district; (b) freeways and other busy traffic corridors; (c) large agricultural operations; and/or (d) a rail yard, which might reasonably be anticipated to emit hazardous air emissions, or handle hazardous or acutely hazardous material, substances, or waste?

No Significant Hazard. Based on a review of the South Coast Air Quality Management District's (AQMD) Facility Information Detail (FIND) database, there are three facilities within a quarter mile of the site (AQMD 2019). A Shell gas station located at 26721 Rancho Parkway was identified. Loan Depot located at 26642 Towne Centre Drive was identified for emergency generators and a boiler permit. Rubio's Fresh Mexican Grill #91 located at 26612 Towne Centre Drive was identified for a natural gas charbroiler.

The proposed project site, in the north corner of the project site is within 500-feet of SR-241. Based on a review of Google Earth (2019) and a site reconnaissance (PlaceWorks 2019a), there is currently a nursery on the site, although this nursery would not exist concurrently with the proposed school use. No agricultural uses will exist within a quarter mile of the site when the school is constructed. No rail yards are located within a quarter mile of the site. A Health Risk Assessment report prepared by PlaceWorks (2019a) for the project site concluded that based on a comparison to the carcinogenic and non-carcinogenic thresholds established by OEHHA and SCAQMD, hazardous air emissions generated from the stationary and mobile sources within a quarter-mile radius are not anticipated to pose an actual or potential endangerment to students and staff occupying the project site. No mitigation measures are necessary.

3.2 GEOLOGY AND SOILS

Based on a review of the United States Geological Survey (USGS) 7.5-minute Topographic Series, Lake Forest, California Quadrangle Map (USGS 2015), the property is in the foothills of the Santa Ana Mountains within the northern part of the Peninsular Ranges Geomorphic Province. The Peninsular Ranges Geomorphic Province extends approximately 900 miles southward from the Los Angeles Basin to Baja California, Mexico and is characterized by elongated northwest-trending mountain ranges separated by sediment-floored valleys (Yerkes et al. 1965). The most dominant structural features of the province are the northwest-trending fault zones, most of which die out, merge with, or are terminated by the steep reverse faults at the southern margin of the San Gabriel Mountains within the Transverse Ranges Geomorphic Province north of the site. The property itself sits atop sandy Holocene and late Pleistocene alluvial deposits, and Oso Member sandstone of the early Pliocene and Miocene Capistrano Formation (Morton 2004). Based on NMG Geotechnical (2016), the site has been partially graded.

3.2.1 Does the site contain an active earthquake fault or fault trace, or is the site located within the boundaries of any special studies zone or within an area designated as geologically hazardous in the safety element of the local general plan?

No Significant Hazard. The site is not within or immediately adjacent (i.e., within a few hundred feet) to an Alquist-Priolo Earthquake Fault Zone (California Geological Survey [CGS] 2017). The nearest Alquist-Priolo Earthquake Fault Zone is located approximately 12 miles northeast of the site for the Elsinore Fault. Based on a review of readily-available geologic literature (Morton 2004; CGS 2000a; CGS 2017; Jennings and Bryant 2010) and the Lake Forest General Plan (1994), there are no known active faults or geologically hazardous areas on or immediately adjacent to the site.

3.2.2 Would the project involve the construction, reconstruction, or relocation of any school building on a pressure ridge or the trace of a geological fault along which surface rupture can reasonably be expected to occur within the life of the school building?

No Significant Hazard. The site is not within or immediately adjacent (i.e., within a few hundred feet) to an Alquist-Priolo Earthquake Fault Zone (CGS 2017). The nearest Alquist-Priolo Earthquake Fault Zone is located approximately 12 miles northeast of the site for the Elsinore Fault. Based on a review of readily-available geologic literature (Morton 2004; CGS 2000a; CGS 2017); Jennings and Bryant 2010) and the Lake Forest General Plan (1994), the site is not on a pressure ridge, and there are no known active faults on or

immediately adjacent to the site. On this basis, the potential for tectonic fault rupture at the site is considered negligible.

3.2.3 Would the project involve the construction, reconstruction, or relocation of any school building on a site subject to moderate-to-high liquefaction, landslides, or expansive soils?

No Significant Hazard. Liquefaction refers to loose, saturated sand, or gravel deposits that lose their load-supporting capability when subjected to intense shaking. Liquefaction potential varies based upon three primary

contributing factors: 1) cohesionless, granular soils having relatively low densities (usually of Holocene age); 2) shallow groundwater (generally less than 50 feet); and 3) moderate to high seismic ground shaking.

Based on seismic hazard mapping within CGS (2001), the updated project site is outside of a liquefaction zone. In addition, the project will be evaluated for the potential for liquefaction under the oversight of California Geological Survey [CGS] and Division of the State Architect [DSA]. Therefore, the project will not expose people or the new school buildings to adverse effects associated with liquefaction.

Landsliding is a type of erosion in which masses of earth and rock move down slope as a single unit. Susceptibility of slopes to landslides and other forms of slope failure depend on several factors. These factors are usually present in combination and include steep slopes, condition of rock and soil materials, the presence of water, formational contacts, geologic shear zones, and seismic activity.

The project site and its adjoining properties are relatively level and exhibit no substantial elevation changes or unusual geographic features. Based on seismic hazard mapping within the CGS (2001), the site has no susceptibility to landslides. Therefore, the project will not expose people or the new school buildings to adverse effects associated with landslides.

Expansive soils swell when they become wet and shrink when they dry out, resulting in the potential for cracked building foundations and in some cases, structural distress of the buildings themselves. In each case, minor to severe damage to overlying structures is possible. Based on the alluvial and terrace soils beneath the project, it is possible they could be expansive. CGS and DSA will ensure that the buildings are tested for, and if necessary, sufficiently mitigated for the condition. Therefore, the project will not expose people or the new school buildings to adverse effects associated with expansive soils.

3.2.4 Are naturally occurring asbestos minerals located at the site?

No Significant Hazard. Based on available data, no naturally-occurring serpentine rock or rock formations that may contain a significant quantity of asbestos are located in within 10 miles of the site (CGS 2000b; Van Gosen and Clinkenbeard 2011). The nearest outcrop of serpentine rock is located on Santa Catalina Island offshore and west of the site.

3.3 HAZARDS AND HAZARDOUS MATERIALS

3.3.1 Does the proposed school site contain one or more pipelines, situated underground or aboveground, which carry hazardous substances, acutely hazardous materials, or hazardous

3. Environmental Analysis

wastes, unless the pipeline is a natural gas line that is used only to supply natural gas to that school or neighborhood? Does the proposed school site contain pressurized sewer lines and high pressure water pipelines within 1,500 feet of the proposed site?

No Significant Hazard. There are no chemical pipelines on the site, according to the National Pipeline Mapping System (online mapping database (NPMS 2019). Based on the response from Southern California Gas Company and a review of the Southern California Gas Company Gas Transmission and High-Pressure Distribution Pipeline Interactive Map (Appendix A), there are no high-pressure natural gas pipelines on or within 1,500-feet of the project site. Based on plans provided from Irvine Ranch Water District, there are no pressurized sewer lines within 1,500 feet of the site. Based on plans provided from Irvine Ranch Water District, there are 16 large volume (≥12 inch diameter) pipelines within 1,500 feet of the project site. A Water Pipeline Risk Assessment was performed to address the 16 water pipelines. Based on the worst-case analysis of the water pipelines, the water released from a full-flow rupture of any of the water pipelines would be entirely contained within the confines of the street curbing and would not result in flooding at the school site (PlaceWorks 2019b).

3.3.2 Is the proposed school site located near an aboveground water or fuel storage tank or within 1,500 feet of an easement of an aboveground or underground pipeline that can pose a safety hazard to the site?

Aboveground Water or Fuel Storage Tank

No Significant Hazard. No aboveground fuel storage tanks were identified within a 1,500-foot radius, based on a site reconnaissance (PlaceWorks 2019a), and review of a topographic map (USGS 2015). Two aboveground water tanks are located northwest of the project site (PlaceWorks 2019b). Based on the worst-case analysis of the release of all the water in each tank at maximum storage capacity, the released water would flow away from the proposed school site to the southeast (PlaceWorks 2019b).

Hazardous Substance Pipelines

No Significant Hazard. There are no chemical pipelines within a 1,500-foot radius, according to the National Pipeline Mapping System (online mapping database (NPMS 2019). Based on the response from Southern California Gas Company and a review of the Southern California Gas Company Gas Transmission and High-Pressure Distribution Pipeline Interactive Map (Appendix A), there are no high-pressure natural gas pipelines within a 1,500-foot radius of the project.

Sewer and Water Pipelines

No Significant Hazard. Based on plans provided from Irvine Ranch Water District, 16 high volume water pipelines were identified within 1,500-feet of the project site. A Water Pipeline Risk Assessment concluded that full-flow ruptures from any of the water pipelines would be entirely contained within the confines of street curbing and would not result in flooding at the school site. There are no pressurized sewer lines within 1,500-feet of the project site according to the response from Irvine Ranch Water District.

3.3.3 Is the school site in an area designated in a city, county, or city and county general plan for agricultural use and zoned for agricultural production, and if so, do neighboring agricultural uses have the potential to result in any public health and safety issues that may affect the pupils and employees at the school site? (Does not apply to school sites approved by CDE prior to January 1, 1997.)

No Significant Hazard. Based on a review of the City of Lake Forest Land Use Map, the project site and adjoining land is designated as a business park. According to the City of Lake Forest Zoning Map, the project site and adjoining land is currently zoned as A1 for agricultural production. After implementation of the project, there will be no neighboring agricultural uses. Therefore, there is no potential for any public health and safety issues from neighboring agricultural uses.

3.3.4 Is the property line of the proposed school site less than the following distances from the edge of respective power line easements: (1) 100 feet of a 50–133 kV line; (2) 150 feet of a 220–230 kV line; or (3) 350 feet of a 500–550 kV line?

No Significant Hazard. Based on the response from Southern California Edison, there are 66 kV lines adjoining the site along Bake Parkway. Based on information from Toll Brothers, these 66 kV lines will be undergrounded prior to construction of the school. The setback for a 66 kV underground line is 25 feet. Pursuant to the CCR Title 5 regulations, Toll Brothers is requesting a Power Line Setback Exemption from the California Department of Education for Unlimited Activity Use within the 25-foot setback zone along the northwestern boundary of the proposed school site. An electromagnetic fields (EMF) Field Management Plan has been prepared by PlaceWorks (2019c) to minimize potential causes of elevated EMF levels on the school site within the 25-foot setback zone. The mandatory compliance with the Field Management Plan would reduce the potential hazard from elevated EMF levels to less than significant.

3.3.5 Does the project site contain a current or former hazardous waste disposal site or solid waste disposal site and, if so, have the wastes been removed?

No Significant Hazard. Based on a review of the EnviroStor, GeoTracker and SWIS databases, the project site does not contain a current or former hazardous waste disposal site or solid waste disposal site (DTSC 2017; SWRCB 2019; CalRecycle 2019).

3.3.6 Is the project site a hazardous substance release site identified by the state Department of Health Services in a current list adopted pursuant to §25356 for removal or remedial action pursuant to Chapter 6.8 of Division 20 of the Health and Safety Code?

No Significant Hazard. Based on a review of the EnviroStor and GeoTracker databases, no hazardous substance release sites were identified within the project site (DTSC 2019; SWRCB 2019).

3.3.7 If prepared, has the risk assessment been performed with a focus on children's health posed by a hazardous materials release or threatened release, or the presence of naturally occurring hazardous materials on the school site?

No Significant Hazard. Based on a review of the EnviroStor and GeoTracker databases, no hazardous waste cleanup sites, permitted sites or underground storage tank (UST) sites were identified within the project site

(DTSC 2019; SWRCB 2019). Thus, the project site is not listed on any of the federal, state and local agency databases searched by EnviroStor and GeoTracker, including those identified under Section 65962.5 of the California Government Code. In addition, as stated in Section 3.2.4, there are no naturally-occurring asbestos deposits in the vicinity of the site.

3.3.8 If a response action is necessary and proposed as part of this project, has it been developed to be protective of children's health, with an ample margin of safety?

No Significant Hazard. Based on the information in Section 3.3.3, a response action is not necessary at the site.

3.3.9 Is the proposed school site situated within 2,000 feet of a significant disposal of hazardous waste?

No Significant Hazard. Based on a 2019 review of the EnviroStor and GeoTracker databases, the project is not within 2,000 feet of a significant disposal of hazardous waste (DTSC 2019; SWRCB 2019).

3.3.10 Is the site within 300 feet of an active oil or natural gas well?

No Significant Hazard. Based on a review of the Well Finder database, the project is not within 300 feet of an active oil and natural gas well (DOGGR 2019). According to the online Division of Oil, Gas, and Geothermal Resources GIS, the nearest well to the project site is 1.38 miles to the southwest. DOGGR lists the well status as plugged and abandoned. Morton and Sons abandoned the well on December 6, 1948.

3.4 HYDROLOGY AND FLOODING

3.4.1 Is the project site subject to flooding or tank/dam inundation or street flooding?

No Significant Hazard. According to the FEMA Map Service Center website, the new boundaries of the proposed project are not within a 100-year flood zone. According to the California Office of Emergency Services (2019), the site does not lie within a zone of potential dam inundation.

A seiche is an oscillating surface wave in a restricted or enclosed body of water, generated by ground motion, usually during an earthquake. Seiches are of concern relative to water storage facilities, because inundation from a seiche can occur if the wave overflows a containment wall, such as the wall of a reservoir, water storage tank, dam, or other artificial body of water. As there are no large permanent bodies of water on, or topographically upgradient in the immediate vicinity of the subject site, seiching is not considered to be a potential hazard for the site.

Tsunamis are a type of earthquake-induced flooding produced by large-scale sudden disturbances of the sea floor. Tsunami waves interact with the shallow sea floor bathymetry upon approaching a landmass, resulting in an increase in wave height, and a destructive run-up (wave surge) into low-lying coastal areas. Based on the elevation of the site and the distance from the ocean, the potential for tsunamis at the site is negligible. Project implementation would not expose people or structures to adverse effects associated with flooding or inundation.

3.5 LAND USE AND PLANNING

3.5.1 Would the proposed school conflict with any existing or proposed land uses, such that a potential health or safety risk to students would be created?

No Significant Hazard. Although the existing site is used as a tree nursery, all operations would cease as a result of the project. Properties within a quarter-mile radius of the site are generally zoned for office, commercial and recreational uses. Based on Toll Brothers' plans, the school will be principally surrounded by residential development. Therefore, there is no significant hazard to the project.

3.5.2 Are there easements on or adjacent to the site that would restrict access or building placement?

No Significant Hazard. Based on a review of the assessor's parcel map, no easements are located on the project site. Therefore, there is no significant hazard to the project.

3.5.3 Is the school site proportionate in its length to width ratio to accommodate the building layout, parking and playfields that can be safely supervised and does not exceed the allowed passing time to classes for the district?

No Significant Hazard. Although final plans for the school have not been developed, the school will be developed with footprint proportionality and ease of student access in mind. Therefore, there is no significant hazard to the project.

3.5.4 Has the district considered environmental factors of light, wind, noise, aesthetics, and air pollution in its site selection process?

Light and Wind

No Significant Hazard. The project site would be exposed to standard climate conditions experienced by Lake Forest, which is generally characterized by Mediterranean conditions. Based on a windrose created for the former El Toro Marine Corps Air Station, the predominant wind directions are from the south, the west and the west-northwest (California Air Resources Board 2003). The average wind speed is 3.5 miles per hour, though sustained winds of 19 miles per hour have been recorded (California Air Resources Board 2003) As applicable, operation of the proposed project would consider these environmental conditions. Therefore, project implementation would not expose site occupants to adverse light or wind conditions.

Aesthetics

No Significant Hazard. Project development would not degrade the existing visual character of the site. The project site is in an area with suburban land uses. Development of the proposed project would be consistent with the surrounding land uses. The character and quality of the site would not be incompatible with the nearby structures.

3. Environmental Analysis

Air Pollution

No Significant Hazard. Public Resources Code Section 21151.8 and Education Code Section 17213 prohibit the approval of a project involving acquisition of a school site unless the following occur:

1. Consultation with an air pollution control district or air quality management district indicates that permitted and non-permitted facilities (including, but not limited to, freeways and other busy traffic corridors, large agricultural operations, and railyards, within one-fourth of a mile of the proposed schoolsite that might be reasonably be anticipated to emit hazardous air emissions, or to handle hazardous or extremely hazardous materials, substances, or waste) or significant pollution sources do not exist; or

2. The facilities or other pollution sources exist, but one of the following conditions applies:

   A. The health risks from the facilities or other pollution sources do not and will not constitute an actual or potential endangerment of public health to persons who would attend or be employed at the school.

   B. The governing board finds that corrective measures required under an existing order by another government entity that has jurisdiction over the facilities or other pollution sources will, before the school is occupied, result in the mitigation of all chronic or accidental hazardous air emissions to levels that do not constitute an actual or potential endangerment of public health to persons who would attend or be employed at the proposed school. If the governing board makes this finding, the governing board shall also make a subsequent finding, prior to the occupancy of the school, that the emissions have been mitigated to these levels.

   C. For a school site with a boundary that is within 500 feet of the edge of the closest traffic lane of a freeway or other busy traffic corridor, the governing board of the school district determines, through analysis pursuant to paragraph (2) of subdivision (b) of Section 44360 of the Health and Safety Code, based on appropriate air dispersion modeling, and after considering any potential mitigation measures, that the air quality at the proposed site is such that neither short-term nor long-term exposure poses significant health risks to pupils.

   D. The governing board finds that neither of the conditions set forth in subparagraph (B) or (C) can be met, and the school district is unable to locate an alternative site that is suitable due to a severe shortage of sites that meet the requirements in subdivision (a) of Section 17213. If the governing board makes this finding, the governing board shall adopt a statement of Overriding Considerations pursuant to Section 15093 of Title 14 of the California Code of Regulations.

As stated in Section 3.1.2, there is currently a nursery on the site, although this nursery would not exist concurrently with the proposed school use. The proposed project site, in the north corner of the project site near is within 500-feet of SR-241. No rail yards are located within a quarter mile of the site. A Health Risk Assessment report prepared by PlaceWorks (2019a) for the project site concluded that based on a comparison to the carcinogenic and non-carcinogenic thresholds established by OEHHA and SCAQMD, hazardous air emissions generated from the stationary and mobile sources within a quarter-mile radius are not anticipated to

pose an actual or potential endangerment to students and staff occupying the project site. No mitigation measures are necessary.

3.5.5 Is the site within a designated Farmland Security Zone?

No Significant Hazard. Although the site is eligible for Williamson Act protection by being within Unique Farmland (Division of Land Resource Protection 2014), based on the 2015 Division of Land Resource Protection report, the site is not within a designated Farmland Security Zone.

3.6 NOISE

3.6.1 Is the proposed school site located adjacent to or near a major arterial roadway or freeway whose noise generation may adversely affect the educational program?

No Significant Hazard. The project site is in a developed area of Lake Forest away from busy traffic corridors. Although the site is approximately 300 feet from SR-241 and based on a noise impact analysis for a nearby development, may have noise levels in the 65 decibel range from SR-241, the building materials of the classrooms would dampen the noise coming from the tollway to an acceptable level for instruction (LSA Associates, Inc. 2013). No significant impacts would occur as a result of the proposed project.

3.7 PUBLIC SERVICES

3.7.1 Does the site promote joint use of parks, libraries, museums, and other public services?

No Significant Hazard. The project site could be made available for public use as the scheduling of scholastic purposes allow, in accordance with the Civic Center Act and District policy. No impacts to nearby public facilities and services would occur as a result of the proposed project.

3.7.2 Is the site conveniently located for public services, including but not limited to fire protection, police protection, public transit and trash disposal wherever feasible?

No Significant Hazard. The project site is centrally located within the City of Lake Forest and is surrounded by developed areas. The project site will have regularly scheduled trash collection and access to public transit. The Orange County Sheriff's Department is 1,371-feet to the east of the project site. There is no significant hazard. Orange County Fire Authority Station #54 is 0.62-miles to the northeast of the project site.

3.8 TRANSPORTATION/TRAFFIC

3.8.1 Are traffic and pedestrian hazards mitigated per Caltrans' School Area Pedestrian Safety manual?

No Significant Hazard. Based on existing conditions, the future project is not expected to have any significant traffic or pedestrian hazards to overcome. Future transportation facilities are subject to review and approval by the City of Lake Forest. Furthermore, the School Area Pedestrian Safety Manual will be used as a guide, and decisions related to particular traffic control devices at particular locations shall be made on the basis of an engineering and traffic survey. The school district governing board may request the appropriate city, county, or

state agency to consider the installation of traffic control devices if the engineering and traffic survey determines the request to be justified. Traffic control devices include (Caltrans, 1996):

1. Warning signs and markings.
2. Variable speed limits.
3. Intersection stop signs.
4. Flashing yellow beacons.
5. Traffic signals.
6. Remove visibility obstructions.
7. School Safety Patrol.
8. Adult Crossing Guard.
9. Pedestrian separation structures.
10. Pedestrian walkways along the roadway.
11. Pedestrian walkways separated from the roadway.
12. Parking controls and curb-use zones

3.8.2 Is the site easily accessible from arterials and is the minimum peripheral visibility maintained for driveways per Caltrans' Highway Design Manual?

No Significant Hazard. Based on existing conditions, the future project is not expected to have any significant traffic or pedestrian hazards to overcome. Future transportation facilities are subject to review and approval by the City of Lake Forest.

3.8.3 Is the proposed school site within 1,500 feet of a railroad track easement?

No Significant Hazard. Based on a review of Google Earth, the site is not located within 1,500 feet of a railroad track easement.

3.8.4 Is the proposed school site within two nautical miles, measured by air line, of that point on an airport runway or potential runway included in an airport master plan that is nearest to the site? (Does not apply to school sites acquired prior to January 1, 1966.)

No Significant Hazard. Based on information obtained from the California Department of Transportation, Division of Aeronautics (2019), and a review of area maps and recent aerial photographs, the site is not within two nautical miles of an existing airport or proposed airport runway. The nearest airports are John Wayne Airport located about 9.6 nautical miles to the west, and runway 4/22 at Camp Pendleton located about 15.4 nautical miles to the south. There is no significant hazard from proximity to an airport at the site.

3.9 EXEMPTIONS TO SITING STANDARDS

3.9.1 Is the district seeking any exemptions to the standards found in CCR, Title 5, § 14010(c) through (t)?

No Significant Hazard. Toll Brothers is seeking one exemption to the standards found in CCR, Title 5 § 14010(c) through (t). Toll Brothers is requesting a Power Line Setback Exemption from the California Department of Education for Limited Activity Use within the 25-foot transmission line setback zone along the northwestern boundary of the proposed school site. An electromagnetic fields (EMF) Field Management Plan has been prepared by PlaceWorks (2019c) to minimize potential causes of elevated EMF levels on the school site within the 25-foot setback zone. The mandatory compliance with the Field Management Plan would reduce the potential hazard from elevated EMF levels to less than significant.

3.9.2 If so, has mitigation been identified that demonstrates that the standard may be overridden without compromising a safe and supportive school environment?

No Significant Hazard. This section is not applicable to the project.

3. Environmental Analysis

This page intentionally left blank.

4. Conclusions and Recommendations

Based on the above literature review of geologic and environmental hazards that could potentially be a "fatal flaw" for the site, no known potential geologic or environmental hazards exist at the site that would disqualify the site for the proposed school improvements. The mandatory compliance with the EMF Field Management Plan is required for construction within the 100-foot setback zone along the northwest portion of the proposed school site.

4. Conclusions and Recommendations

This page intentionally left blank.

5. References

5.1 PRINTED REFERENCES

California Department of Transportation (Caltrans), 2014. Public Use Airports, Military Airfields, and Military Bases, January 2014.

California Division of Land Resource Protection, 2014. Orange County Important Farmland 2014, scale 1:100,000.

California Division of Land Resource Protection, 2015. The California Land Conservation Act 2014 Status Report – The Williamson Act, March 2015.

California Geological Survey (CGS), 2000a. Digital Images of Official Maps of Alquist-Priolo Earthquake Fault Zones of California, Southern Region, CD 2000-003.

California Geological Survey (CGS), 2000b. "A General Location Guide for Ultramafic Rocks in California – Areas More Likely to Contain Natural Occurring Asbestos." August 2000.

Jennings, C. W., and W. A. Bryant, 2010. Fault Activity Map of California, California Geological Data Map Series, Map No. 6, scale 1:750,000.

LSA Associates, Inc., 2013. Noise Impact Analysis, Baker Ranch Properties, City of Lake Forest, California, November 2013.

Morton, D. M., 2004. Preliminary Digital Geologic Map of the Santa Ana 30' X 60' Quadrangle, Southern California, Version 2.0, U.S. Geological Survey Open-File Report 99-172, scale 1:100,000.

NMG Geotechnical, Inc., 2016. Project Memorandum: Summary of Geotechnical Issues for Planned Development at Nakase Nursery Property, Lake Forest, California, dated November 18, 2016.

PlaceWorks, 2019a. Health Risk Assessment, Nakase Elementary School for Toll Brothers, dated May 2019.

PlaceWorks, 2019b. Water Pipeline and Tank Safety Hazard Assessment, Nakase Elementary School for Toll Brothers, dated May 2019.

PlaceWorks, 2019c. EMF Study and Field Management Plan, Nakase Elementary School for Toll Brothers, dated May 2019.

United States Geological Survey, 2015. 7.5' Topographic Series, Lake Forest, California Quadrangle Map, scale 1:24,000.

5. References

Van Gosen, B. S., and J. P. Clinkenbeard, 2011. Reported Historic Asbestos Mines, Historic Asbestos Prospects, and Other Natural Occurrences of Asbestos in California, USGS Open-File Report 2011-1188, scale 1:990,000.

Yerkes, R. F., T. H. McCulloch, J. E. Schoellhamer, and J. G. Vedder, 1965. Geology of the Los Angeles Basin, California – An Introduction, United States Geological Survey Professional Paper 420-A.

5.2 RECONNAISSANCE

Site reconnaissance by Dina El Chammas of PlaceWorks on February 8, 2019.

5.3 WEBSITES

Albert Grover Associates, 2010. City of Lake Forest Weekday Average Daily Traffic Volumes Summary, Year 2010, located at http://www.animateddemographics.com/demo/docs/lakeforest/Traffic.pdf.

California Air Resources Board, 2003. Meteorological Wind Roses, Data for the ISCST3 air quality model. https://www.arb.ca.gov/toxics/harp/met/WindRoses.ppt

California Department of Resources, Recycling and Recovery (CalRecycle), 2017. Solid Waste Information System (SWIS) website. https://www2.calrecycle.ca.gov/WhereToRecycle/

California Department of Toxic Substances Control (DTSC), 2019. EnviroStor website. http://www.envirostor.dtsc.ca.gov/public/.

California Department of Transportation, Aeronautics (Caltrans Aviation), 2019. California Aviation Map Viewer
https://caltrans.maps.arcgis.com/apps/webappviewer/index.html?id=32c3cbe24491427d872e2fec173a4b22.

California Division of Oil, Gas and Geothermal Resources (DOGGR), 2019. Well Finder website. https://maps.conservation.ca.gov/doggr/wellfinder/#close/-117.66797/33.66295/14

California Geological Survey (CGS), 2001. State of California Seismic Hazard Zones, Lake Forest Quadrangle (Previously El Toro Quadrangle) Official Map, dated January 17, 2001, located at http://gmw.conservation.ca.gov/SHP/EZRIM/Maps/LAKE_FOREST_EZRIM.pdf

California Geological Survey (CGS), 2006. Seismic Hazard Zone Report for the El Toro 7.5-Minute Quadrangle, Orange County, California, revised January 13, 2006. http://gmw.conservation.ca.gov/SHP/EZRIM/Reports/SHZR/SHZR_047_El_Toro.pdf

California Geological Survey (CGS), 2017. Alquist-Priolo Earthquake Fault Zone maps. http://maps.conservation.ca.gov/cgs/informationwarehouse/index.html?map=regulatorymaps.

5. References

California Office of Emergency Services (OES), 2019. Online Dam Inundation Maps, https://water.ca.gov/Programs/All-Programs/Division-of-Safety-of-Dams/Inundation-Maps

City of Lake Forest, 2017. Figure LU-1, Land Use Map https://www.lakeforestca.gov/DocumentCenter/View/393/General-Plan-Land-Use-Map-PDF?bidId=

City of Lake Forest, 2019. City of Lake Forest – Zoning Map located at https://lakeforestca.maps.arcgis.com/apps/webappviewer/index.html?id=e41ab4d5be98473db858a27a458ea509

Google Earth Pro, 2019.

National Pipeline Mapping System (NPMS), 2019. NPMS Public Map Viewer website, https://www.npms.phmsa.dot.gov/PublicViewer/.

Orange County Transportation Agency (OCTA), 2018. 2018 Traffic Flow Map, Orange County, California, https://www.octa.net/pdf/2018-ADT.pdf.

Southern California Air Quality Management District (AQMD), 2019. Facility Information Detail (FIND) database, https://www.aqmd.gov/nav/FIND/facility-information-detail.

State Water Resources Control Board (SWRCB), 2019. GeoTracker database website, http://geotracker.waterboards.ca.gov/.

5. References

This page intentionally left blank.

6. List of Preparers

6.1 LEAD AGENCY

Toll Brothers
715 W. Town & Country Road, Suite 200
Orange, California 92828
Tel: 714.347.1300

6.2 PLACEWORKS

PlaceWorks
2850 Inland Empire Boulevard, Suite B
Ontario, CA 91764
Tel: 909.989.4449
Fax: 909.989.4447

Michael Watson, PG
Associate Geologist

Dwayne Mears, AICP
Principal

6. List of Preparers

This page intentionally left blank

Appendix A - Agency Records

Appendix

This page intentionally left blank.

LAKE FOREST DR, YORBA LINDA, ORANGE

ATTDSOUTH
EMERGENCY
ATT DAMAGE PREVENTION HOTLINE
510-645-2929
VACUUM
AT&T DAMAGE PREVENT HOTLINE
510-645-2929
DESIGN
SUBSTRUCTURE RECORDS REQUEST
CONSTRUCTION & ENGINEERING, CALL FOR MAILING ADDRESS, CA
510-645-2929

COE01
EMERGENCY
SONIA DEVOLDER-FERNANDEZ
714-350-8627
SONIA.DEVOLDER@OCPW.OCGOV.COM
VACUUM
SONIA FERNANDEZ
2301 N GLASSELL ST, ORANGE, CA 92865
714-955-0208
SONIA.DEVOLDER@OCPW.OCGOV.COM
DESIGN
PENNY LEW
P O BOX 4048, SANTA ANA, CA 927024048
714-647-3990
PENNY.LEW@OCPW.OCGOV.COM

COXRSM
EMERGENCY
RNOC
800-290-6623
VACUUM
DEBORAH BORROEL
949-546-2750
DESIGN
THOMAS ELDRED
29947 AVENIDA DE LAS BANDERAS, RANCHO SANTA MARGARITA, CA 92688
949-546-2754
COXFACILITYINQUIRIES@COX.COM

IRW01
EMERGENCY
ED CORRAL
3512 MICHELSON DRIVE, IRVINE, CA 92618
714-231-5227
CORRAL@IRWD.COM
VACUUM
DAVID CROWE
3512 MICHELSON DRIVE, IRVINE, CA 92618
949-453-5769
CROWE@IRWD.COM
DESIGN
DEVELOPMENT SERVICES
15600 SAND CANYON AVE, IRVINE, CA 926197000

LAKEFOREST
EMERGENCY
MATT REAGAN
25550 COMMERCENTRE DR STE 100, LAKE FOREST, CA 92630
949-371-3235
MREAGAN@LAKEFORESTCA.GOV
VACUUM
MATT REAGAN
25550 COMMERCENTRE DR STE 100, LAKE FOREST, CA 92630
949-371-3235
MREAGAN@LAKEFORESTCA.GOV
DESIGN
DAVID PINA
25550 COMMERCENTRE DR STE 100, LAKE FOREST, CA 92630
949-461-3480
DPINA@LAKEFORESTCA.GOV

LVL3CM
EMERGENCY
TECHNICIAN ON DUTY
877-366-8344
VACUUM
TECH ON DUTY
1025 ELDORADO BLVD, BROOMFIELD, CO 80021
877-366-8344
CABLEPROTECTIONMGMT@CENTURYLINK.COM
DESIGN
AREA REPRESENTATIVE
1025 ELDORADO BLVD, BROOMFIELD, CO 80021
877-366-8344
RELO@CENTURYLINK.COM

MCISOCAL
EMERGENCY
FIBER SECURITY DEPT
800-624-9675

VACUUM
MCI OPERATOR
800-289-3427
DESIGN
DEAN BOYERS
400 INTERNATIONAL PKWY, RICHARDSON, TX 75081
469-886-4238
INVESTIGATIONS@VERIZON.COM

SCG2XK
EMERGENCY
LEAD DISPATCHER
800-603-7060
VACUUM
NO PERMISSION REQUIRED
DESIGN
RYAN LOPEZ
1919 STATE COLLEGE BLVD, ANAHEIM, CA 928066114
714-634-5067
RLOPEZ2@SEMPRAUTILITIES.COM

TCAFO
EMERGENCY
SAM RAD
949-410-6298
SRAD@THETOLLROADS.COM
VACUUM
SAM RAD
125 PACIFICA SUITE 100, IRVINE, CA 926183304
949-754-3481
SRAD@THETOLLROADS.COM
DESIGN
SAM RAD
125 PACIFICA SUITE 100, IRVINE, CA 926183304
949-754-3481
SRAD@THETOLLROADS.COM

TCW01
EMERGENCY
TRAVIS JONES
949-858-0277
VACUUM
Information Not Available
DESIGN
NEIL MCKENNA
32003 DOVE CANYON DR, TRABUCO CANYON, CA 92679
949-858-0277

UQSTSO
AFTER HOURS
Information Not Available
VACUUM
Information Not Available
DESIGN
Information Not Available

USCE04
EMERGENCY
SC EDISON PERSONNEL
800-611-1911

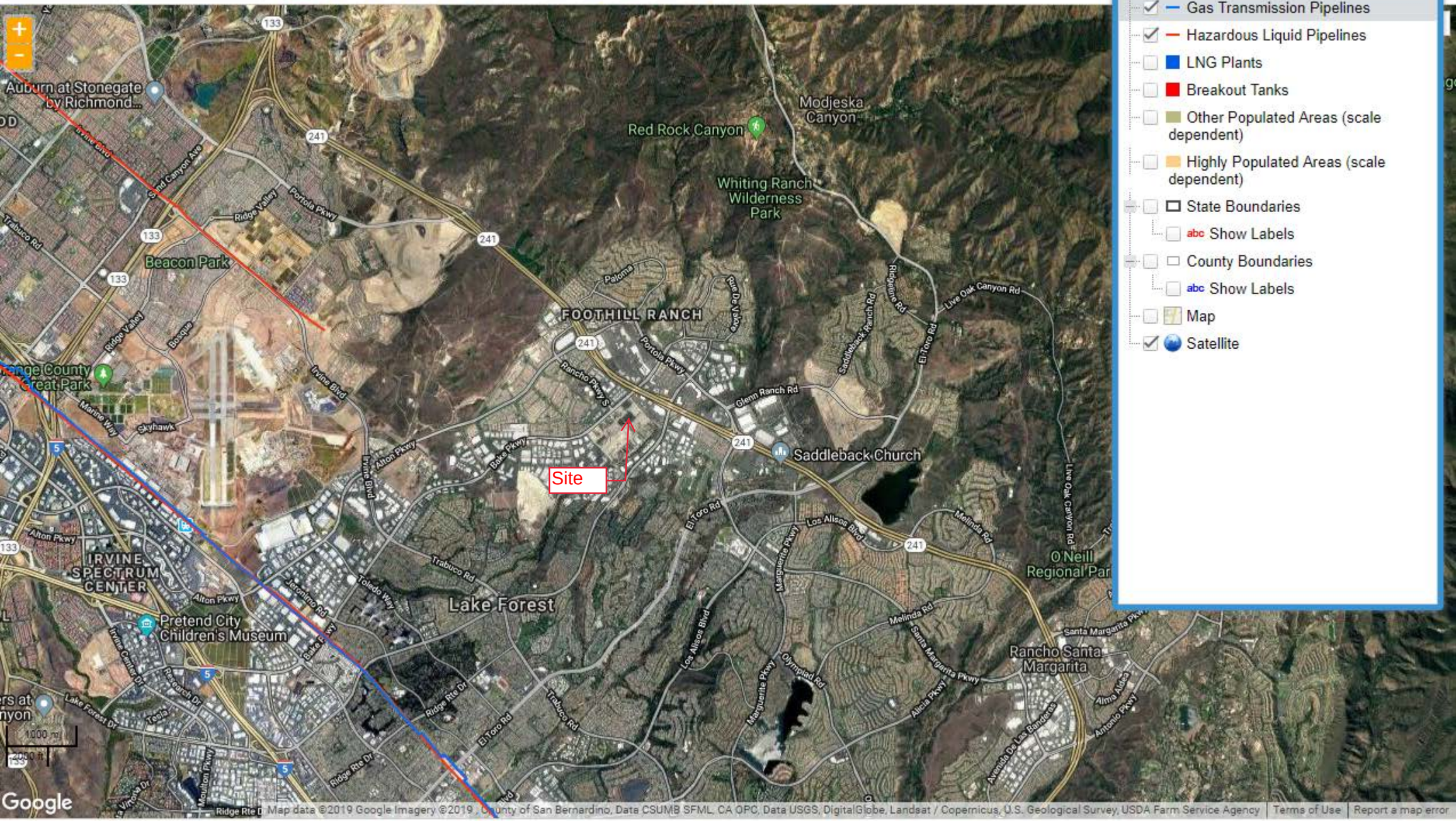
VACUUM
GILBERT ACEVES
14005 S. BENSON AVE, CHINO, CA 91710
909-548-7249
GILBERT.ACEVES@SCE.COM
DESIGN
ENGINEERING
909-503-5565

USCETT84SE
EMERGENCY
TCC
800-655-8844
TCCINBOX@SCE.COM
VACUUM
JACK NEILL
2885 W FOOTHILL BLVD, SAN BERNARDINO, CA 92410
909-873-3263
JACK.NEILL@SCE.COM
DESIGN
GILBERT ACEVES
14005 S BENSON AVE, CHINO, CA 91710
909-329-9445
MAPREQUESTS@SCE.COM

WILCON
EMERGENCY
NOC
1200 S. GRAND AVE., LOS ANGELES, CA 90017
213-542-0100
NOC@WILCON.COM
VACUUM
DAVID RAUB
624 S GRAND AVE #2500, LOS ANGELES, CA 90017
213-550-5240
DRAUB@WILCON.COM
DESIGN
NOC
624 S GRAND AVE #1200, LOS ANGELES, CA 90017
213-542-0100
NOC@WILCON.COM

Public Viewer

Map Layers | Query Tools



Map Layers

- [ ] Accidents (Liquid)
- [ ] Incidents (Gas)
- [x] Gas Transmission Pipelines
- [x] Hazardous Liquid Pipelines
- [ ] LNG Plants
- [ ] Breakout Tanks
- [ ] Other Populated Areas (scale dependent)
- [ ] Highly Populated Areas (scale dependent)
- [ ] State Boundaries
  - [ ] abc Show Labels
- [ ] County Boundaries
  - [ ] abc Show Labels
- [ ] Map
- [x] Satellite

Ready | Zoom Level: 13 of 19 (1:54,168) | 33.666642, -117.758893 | COUNTY : Orange, CA

©USDOT PHMSA. All rights reserved.

SANTA ANA MOUNTAINS COUNTY WATER DISTRICT

PLANS, PROFILES AND DETAILS

FOR CONSTRUCTION OF

WATER TRANSMISSION SYSTEM

ORANGE COUNTY, CALIFORNIA

PROJECT NO. PFL-CALIF-142

APPROVED BY RESOLUTION NO. 10
BY BOARD OF DIRECTORS
SANTA ANA MOUNTAINS COUNTY WATER DISTRICT

Alexander Bowie
ALEXANDER BOWIE, SECRETARY

BOARD OF DIRECTORS

ROY S. HEAD, PRESIDENT

GRADY H. GLENN
LEONARD E. SCHWENDEMAN
FRANK W. WAER
NICHOLAS A. WEST

JUNE 14, 1963

PREPARED BY

J. A. WOOLLEY
CONSULTING ENGINEER
AND ASSOCIATES
308 WEST FIFTH STREET
SANTA ANA, CALIFORNIA

APPROVED:

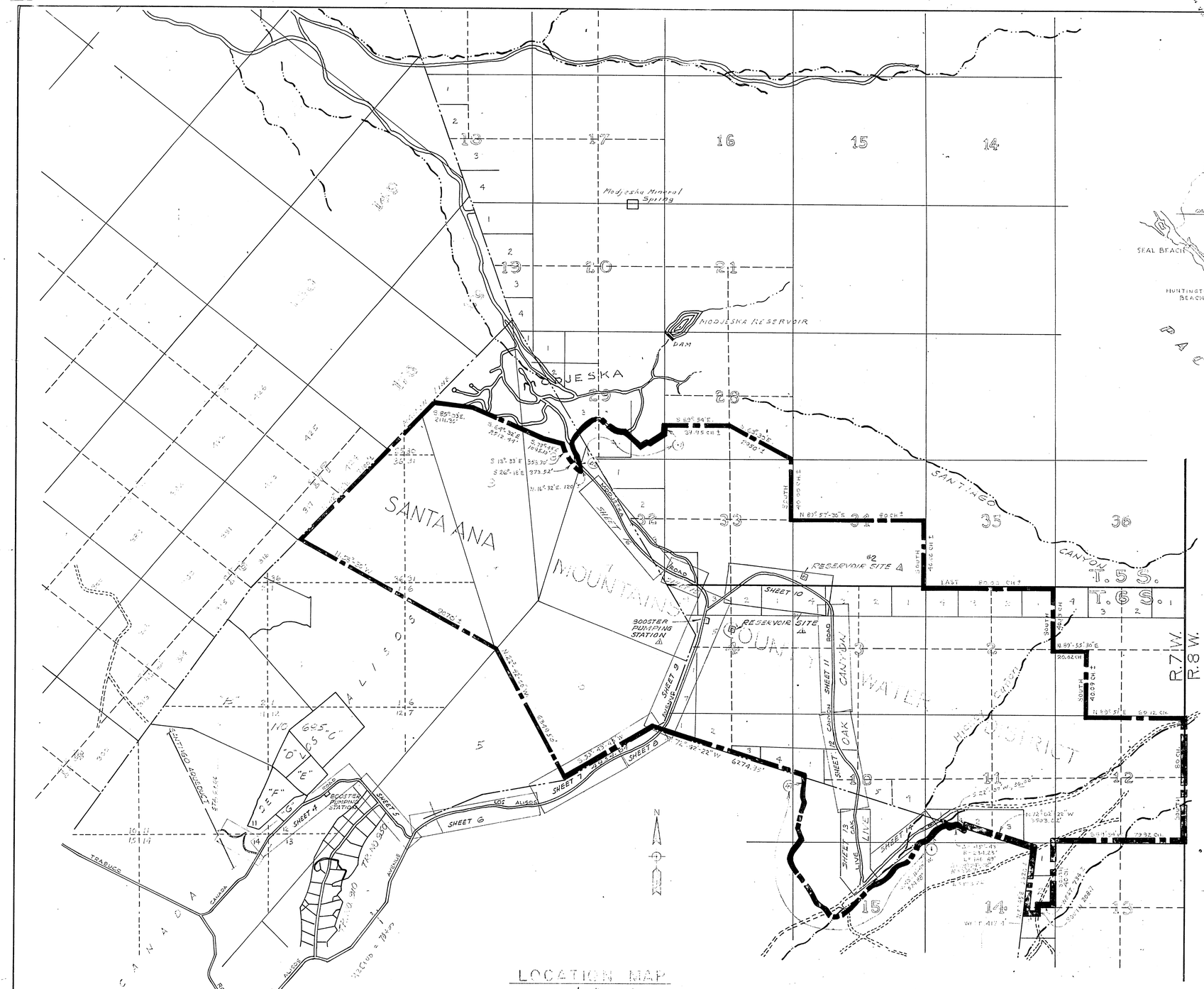
Roy S. Head
ROY S. HEAD PRESIDENT
SANTA ANA MOUNTAINS WATER DISTRICT

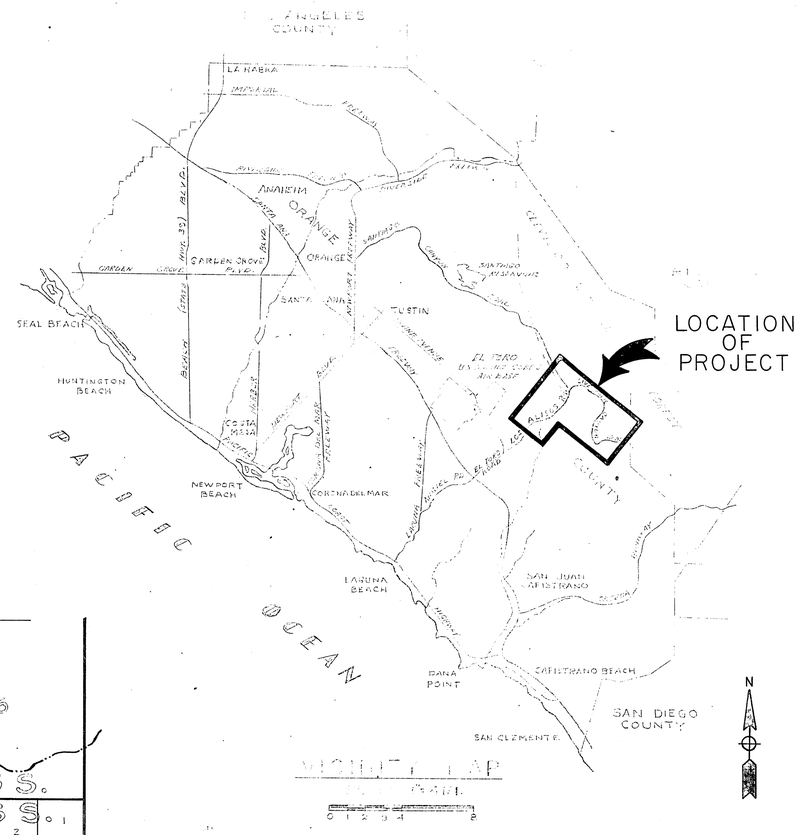
APPROVED:

J. A. Woolley
J. A. WOOLLEY - CONSULTING ENGINEER AND ASSOCIATES

AS BUILT
AUGUST 1964

DRAWER # 20 PLAN 232





LEGEND

SHEET NO.	SHEET TITLE
1	TITLE SHEET
2	VICINITY MAP AND LOCATION MAP
3	PLAN & PROFILE - STA. 0+00 TO STA. 27+33
4	PLAN & PROFILE - STA. 27+33 TO STA. 85+55
5	PLAN & PROFILE - STA. 85+55 TO STA. 115+85
6	PLAN & PROFILE - STA. 115+85 TO STA. 168+00
7	PLAN & PROFILE - STA. 168+00 TO STA. 206+00
8	PLAN & PROFILE - STA. 206+00 TO STA. 228+00
9	PLAN & PROFILE - STA. 228+00 TO STA. 286+00
10	PLAN & PROFILE - STA. 286+00 TO STA. 336+00
11	PLAN & PROFILE - STA. 336+00 TO STA. 382+00
12	PLAN & PROFILE - STA. 382+00 TO STA. 427+00
13	PLAN & PROFILE - STA. 427+00 TO STA. 465+00
14	PLAN & PROFILE - STA. 465+00 TO STA. 509+00
15	PLAN & PROFILE - STA. 0+00 TO STA. 25+00 LINE 12
16	PLAN & PROFILE - STA. 25+00 TO STA. 62+00 LINE 12
17	TYPICAL DETAILS
18	TYPICAL DETAILS
19	BOOSTER STATION NO. 1 & FILTER STATION
20	BOOSTER PUMP HOUSE NO. 1 DETAILS
21	BOOSTER STATION NO. 2 & ELECTRICAL DETAILS
22	RESERVOIR NO. 1
23	RESERVOIR NO. 2

SANTA ANA MOUNTAINS COUNTY WATER DISTRICT

VICINITY MAP AND LOCATION MAP

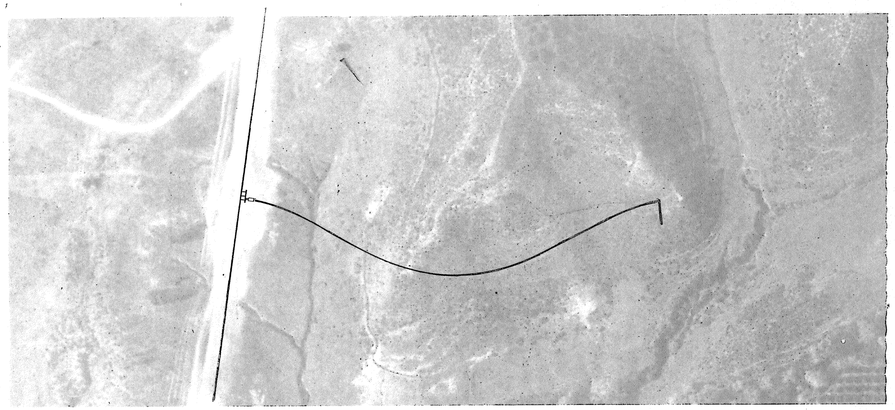
J. A. WOOLLEY
CONSULTING ENGINEER
AND ASSOCIATES
308 WEST FIFTH STREET SANTA ANA, CALIFORNIA

DESIGN AHB	DRAWN G.A.J.	APPROVED BY:	SHEET 2
CHECKED AHB	DATE AUG. 1964		OF 23 SHEETS

DRAWER 6

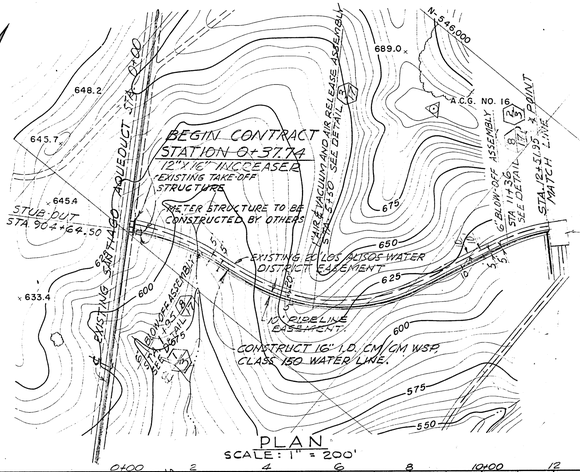
PROJECT NO PRE-EAU 122

AS BUILT AUGUST 1964

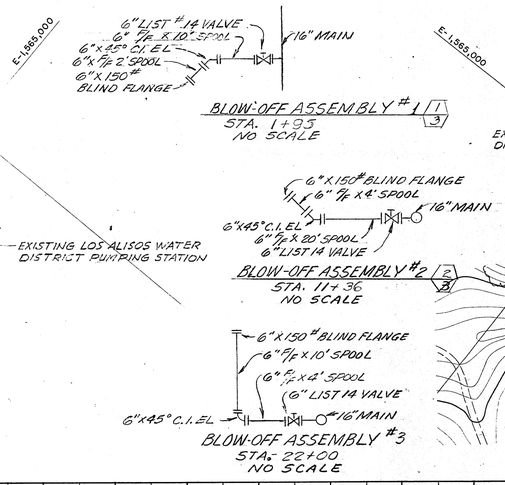


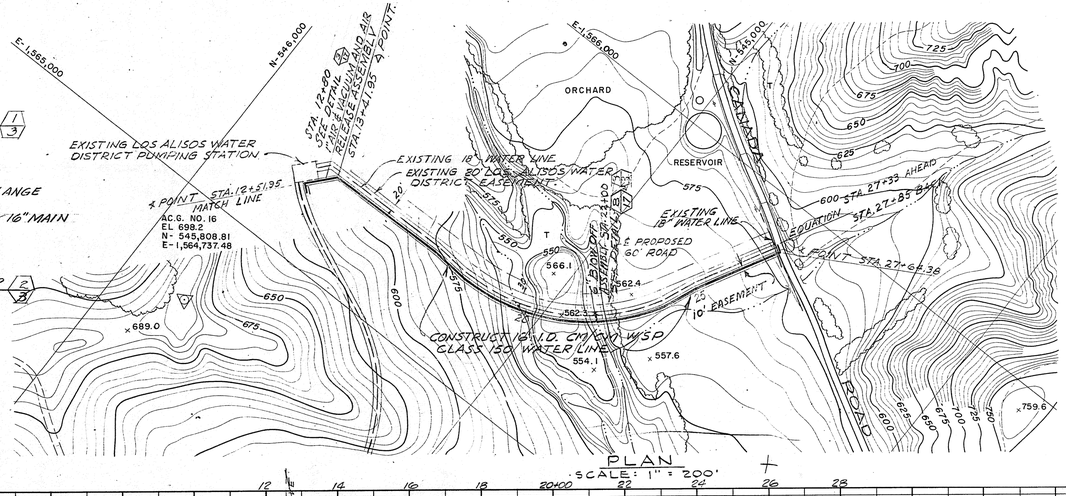
PLAN
SURVEYED
PLOTTED
NOTE BOOK
GRADES CHECKED
BY
DATE
NO
STRUCTURE NOTATIONS

PROFILE
SURVEYED
PLOTTED
NOTE BOOK
GRADES CHECKED
BY
DATE
NO
STRUCTURE NOTATIONS



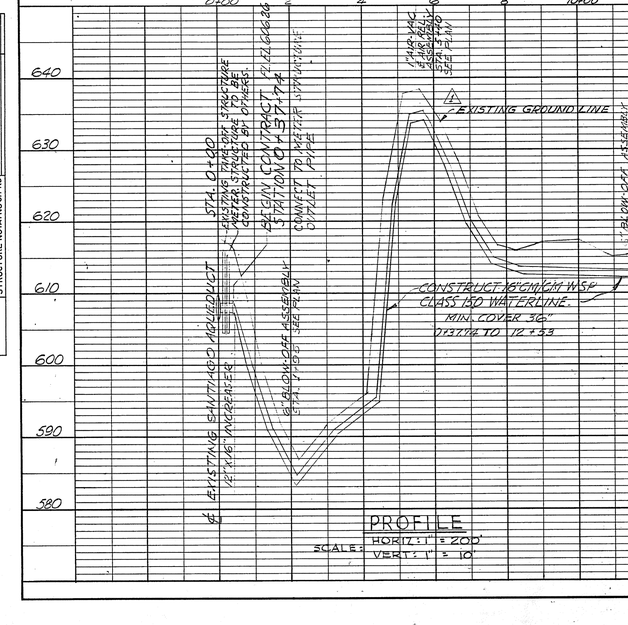
PLAN
SCALE: 1" = 200'



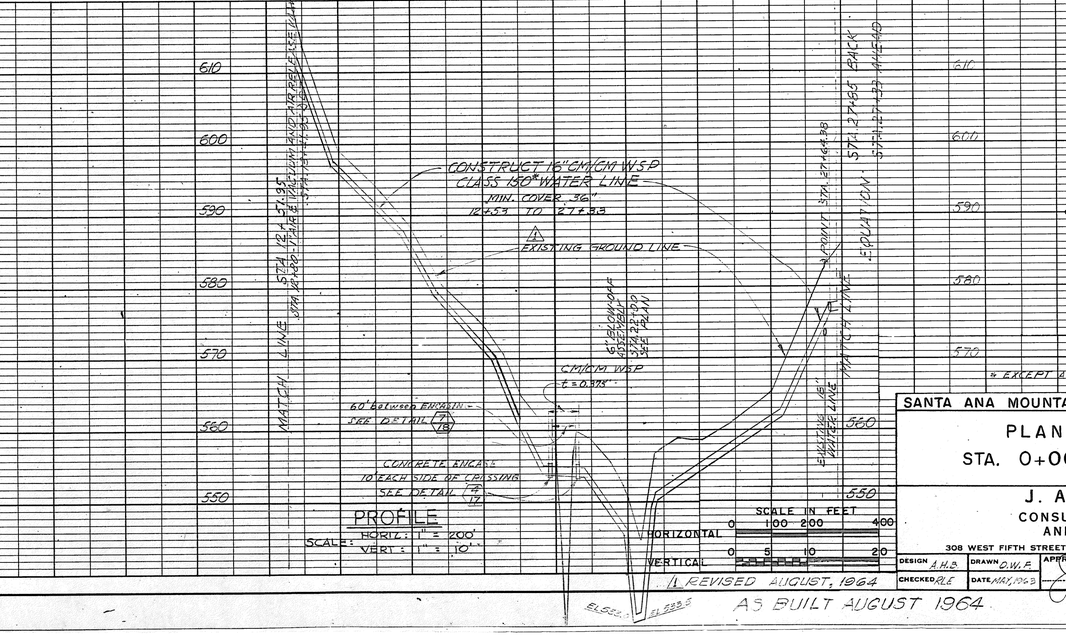


PLAN
SCALE: 1" = 200'

TEMP B.M. ELEV. 605.29
APPROX STA. 12+50
SPIKE IN WLY SIDE PP # 14945556



PROFILE
SCALE: HORIZ: 1" = 200'
VERT: 1" = 10'



PROFILE
SCALE: HORIZ: 1" = 200'
VERT: 1" = 10'

* EXCEPT AS NOTED

SANTA ANA MOUNTAINS COUNTY WATER DISTRICT

PLAN & PROFILE
STA. 0+00 TO STA. 27+33

J. A. WOOLLEY
CONSULTING ENGINEER
AND ASSOCIATES
308 WEST FIFTH STREET — SANTA ANA, CALIFORNIA

SCALE IN FEET
HORIZONTAL 0 100 200 400
VERTICAL 0 5 10 20

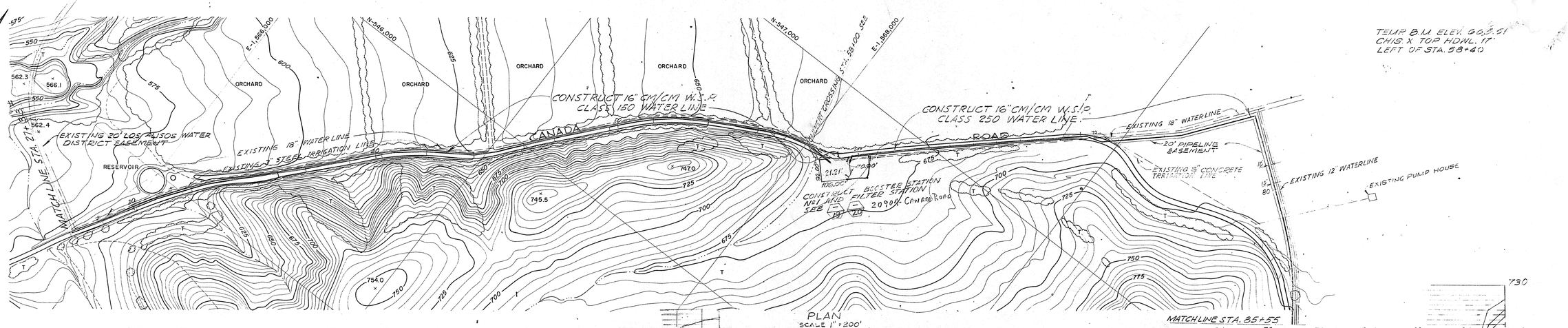
DESIGN A.H.B. | DRAWN O.W.P. | APPROVED BY: | SHEET 3
CHECKED R.L.E. | DATE MAY, 1963 | OF 23 SHEETS

1 REVISED AUGUST, 1964
AS BUILT AUGUST 1964

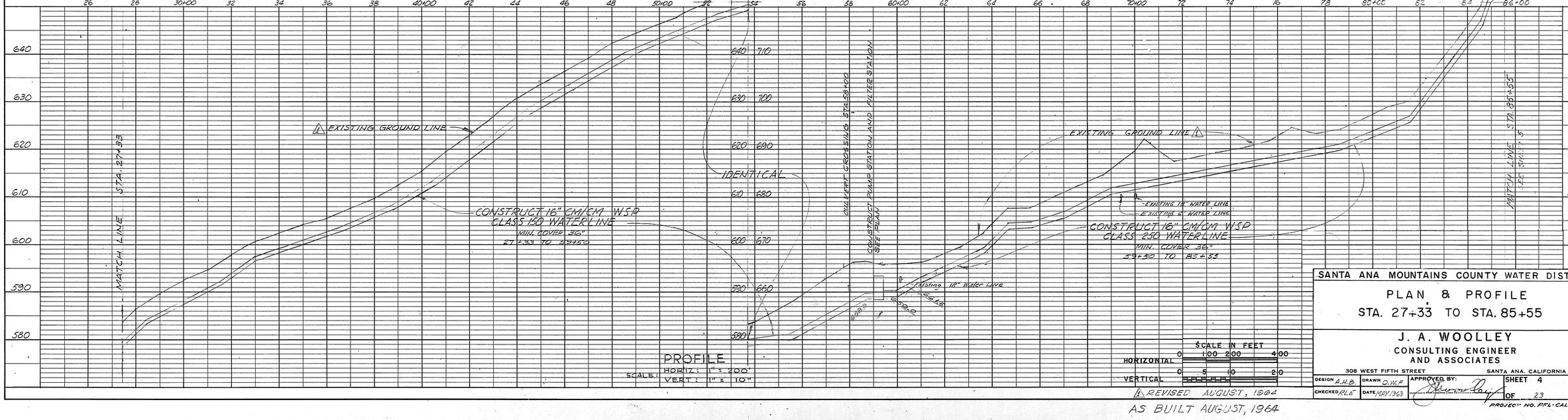
PROJECT NO. PEL-CALIF-142

PLAN	BY	DATE
SURVEYED		
PLOTTED		
NOTE BOOK ALIGNMENT CHECKED		
PAGE NO. RT OF WAY CHECKED		
NO.		

PROFILE	BY	DATE
SURVEYED		
PLOTTED		
NOTE BOOK GRADES CHECKED		
PAGE NO. STRUCTURE NOTATIONS CHD		
NO.		



PLAN
SCALE 1" = 200'



PROFILE
SCALE: HORIZ.: 1" = 200'
VERT.: 1" = 10'

SCALE IN FEET
HORIZONTAL 0 100 200 400
VERTICAL 0 5 10 20

SANTA ANA MOUNTAINS COUNTY WATER DISTRICT

PLAN & PROFILE
STA. 27+33 TO STA. 85+55

J. A. WOOLLEY
CONSULTING ENGINEER AND ASSOCIATES
308 WEST FIFTH STREET SANTA ANA, CALIFORNIA

DESIGN A.H.B. DRAWN O.W.F. APPROVED BY:
CHECKED R.L.S. DATE MAY 1963

SHEET 4 OF 23 SHEETS

DRAWER 61

PROJECT NO. PFL-CALIF-142

⚠ REVISED AUGUST, 1964

AS BUILT AUGUST, 1964

CONSTRUCTION PLANS
FOR THE

ZONE II PHASE IV
WEST TRANSMISSION MAINS
LOS ALISOS WATER DISTRICT
ORANGE COUNTY CALIFORNIA

AUGUST 1979

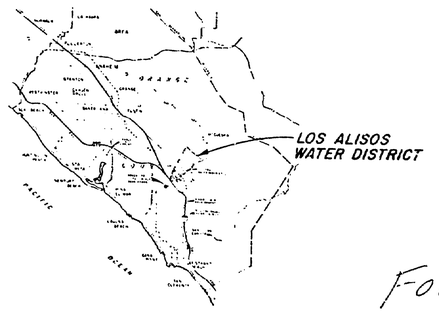
RECEIVED
SEP 10 1980
LOS ALISOS WATER DISTRICT

RECEIVED
SEP 0 1980
LOS ALISOS WATER DISTRICT

1968 WATER BONDS SERIES 3

E. T. Mc Fadden

GENERAL MANAGER L.A.W.D. — E. T. McFADDEN



FOR AS BUILTS
DO NOT REMOVE
FROM THIS OFFICE

R. Patrick Kelly 10/11/79

PROJECT ENGINEER — R. PATRICK KELLY
C.E. 27077

Victor E. Opincar 10/11/79

DISTRICT ENGINEER — VICTOR E. OPINCAR JR.
C.E. 20036

PREPARED IN THE OFFICE
OF

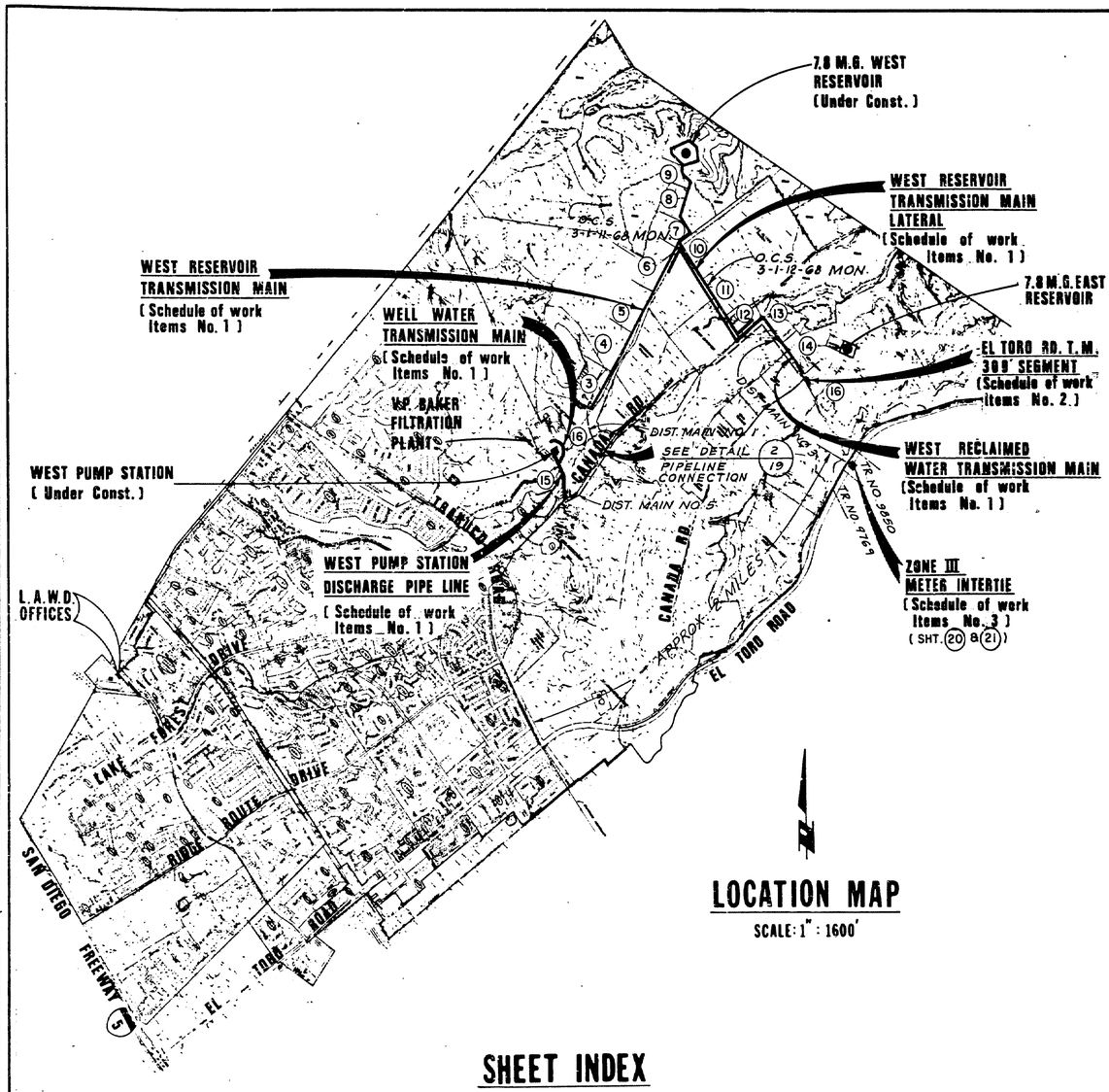
Boyle Engineering Corporation

1501 Quail Street
P O Box 3030
Newport Beach, California 92663

714 752-0505

⚠ ADDENDUM NO. 2 11-2-79
⚠ ADDENDUM NO. 1 10-25-79

D-2053 B-L04-125-06 SHEET 1 OF 23



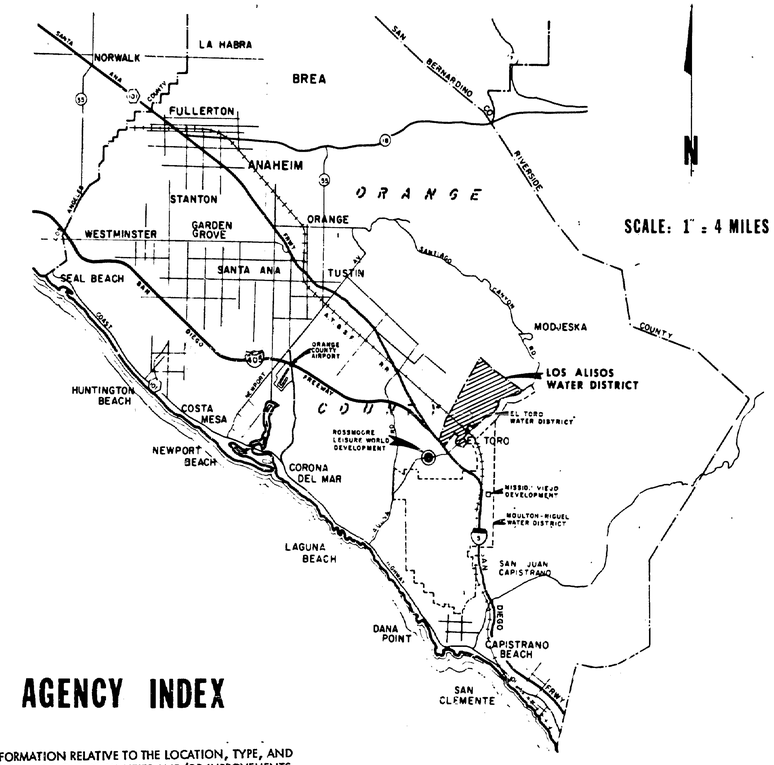
LOCATION MAP

SCALE: 1" = 1600'

LEGEND

THE FOLLOWING SYMBOLS AND ABBREVIATIONS HAVE BEEN USED UNLESS OTHERWISE NOTED

	INSTALL WATER TRANSMISSION MAIN (SIZE AS INDICATED)
—C—	TRAFFIC SIGNAL CONDUIT
—E—	ELECTRICAL CONDUIT
—3" G—	EXISTING GAS LINE (SIZE AS INDICATED)
—8" S—	EXISTING SEWER PIPE (SIZE AS INDICATED)
18" SD	EXISTING STORM DRAIN (SIZE AS INDICATED)
—T—	EXISTING TELEPHONE CABLE / DUCT
—6" W—	EXISTING WATER LINE (SIZE AS INDICATED)
	EXISTING MANHOLE / VAULT
	EXISTING WATER / GAS VALVE
	EXISTING ANCHOR / GUY WIRE
	EXISTING FENCE (TYPE AS INDICATED)
	EXISTING CURB & GUTTER
	EXISTING RAILROAD
	EDGE OF PAVEMENT
	RIGHT OF WAY LINE (R/W)
	CITY BOUNDARY
	SURVEY MONUMENT
	FIRE HYDRANT (F H)
	LIGHT STANDARD (L S)
	POWER POLE / TELEPHONE POLE (P P / T P)
	TRAFFIC CONTROL BOX (T C B)
	WATER METER (W M)
	GAS METER (G M)
A C P	ASBESTOS CEMENT PIPE
ABAN	ABANDONED
A C	ASPHALT CONCRETE
C B	CATCH BASIN
C M P	CORRUGATED METAL PIPE
C O	CLEANOUT
CONC	CONCRETE
DWY	DRIVEWAY
ELEV	ELEVATION
F L	FLOW LINE
F M S	FORCE MAIN SEWER
FUT	FUTURE
HDWL	HEADWALL
H L	SEWER HOUSE LATERAL
INV	INVERT
I P	IRON PIPE
IRR	IRRIGATION WATER LINE
MH	MANHOLE
PVMT	PAVEMENT
R C B	REINFORCED CONCRETE BOX
R C P	REINFORCED CONCRETE PIPE
S	SLOPE IN FEET PER FOOT
SPEC'S	SPECIFICATIONS
STA	STATION
STD	STANDARD
V C P	VITRIFIED CLAY PIPE
W W	WASTE WATER
1/2	DENOTES DETAIL NUMBER / DENOTES SHEET NUMBER
GB	GRADE BREAK



SCALE: 1" = 4 MILES

VICINITY MAP

AGENCY INDEX

ALL INFORMATION RELATIVE TO THE LOCATION, TYPE, AND OPERATIONAL STATUS OF UTILITIES AND/OR IMPROVEMENTS WHICH APPEAR ON THESE PLANS WAS PROVIDED BY THE FOLLOWING RESPECTIVE OWNERS OR AGENCIES:

NAME	ABBREVIATION	TELEPHONE
LOS ALISOS WATER DISTRICT P.O. BOX 595 EL TORO, CA 92630	LAWD	833-0580
SANTA ANA MOUNTAINS COUNTY WATER DISTRICT STAR ROUTE 1048 ORANGE, CA 92667	SAMCWD	586-0723
ENVIRONMENTAL MANAGEMENT AGENCY 400 CIVIC CENTER DRIVE WEST SANTA ANA, CA 92701	EMA	834-3456
PACIFIC TELEPHONE AND TELEGRAPH COMPANY 23331 EL TORO ROAD, ROOM 204 EL TORO, CA 92630	PT & T	645-8752
SOUTHERN CALIFORNIA EDISON COMPANY 22641 CANADA ROAD EL TORO, CA 92630	SCE	835-3833
SOUTHERN CALIFORNIA GAS COMPANY 1919 SOUTH STATE COLLEGE BLVD. ANAHEIM, CA 92805	SCG	634-0211
UNDERGROUND SERVICE ALERT	USA	1-800-422-4133**

**NOTIFY 48 HOURS PRIOR TO EXCAVATION

BENCHMARK

STAMPING 3E-61-71 ALUMINUM CAP 1971 ELEVATION 444.561

ABOUT 1 MILE NORTHWEST ALONG TRABUCO ROAD, FROM THE INTERSECTION OF EL TORO ROAD AND ABOUT 0.2 OF A MILE NORTHWEST ALONG TRABUCO, FROM THE INTERSECTION OF CANADA ROAD, TO A CONCRETE BRIDGE OVERCROSSING OF SERRANO CREEK; 16 FEET NORTHEAST OF THE CENTERLINE OF TRABUCO, SET IN THE TOP OF THE NORTHEAST END OF CONCRETE RETAINING WALL OF BRIDGE LEVEL WITH THE ROAD.

BASIS OF BEARINGS

THE BEARING BETWEEN ORANGE COUNTY SURVEY MONUMENTS: 3-1-11-68 and 3-2-12-68, BEING NORTH 56° 36' 39" WEST.
PER 9-1-71 DATUM.

SHEET INDEX

	SHEET NO.	DESCRIPTION
	1	TITLE
	2	INDEX & VICINITY MAP
	3	WEST RESERVOIR TRANSMISSION MAIN - PLAN & PROFILE
	4	WEST RESERVOIR TRANSMISSION MAIN - PLAN & PROFILE
	5	WEST RESERVOIR TRANSMISSION MAIN - PLAN & PROFILE
	6	WEST RESERVOIR TRANSMISSION MAIN & WEST RECLAIMED WATER TRANSMISSION MAIN - PLAN & PROFILE
	7	WEST RESERVOIR TRANSMISSION MAIN - PLAN & PROFILE
SCHEDULE OF WORK ITEMS NO. 1	8	WEST RESERVOIR TRANSMISSION MAIN - PLAN & PROFILE
	9	WEST RESERVOIR TRANSMISSION MAIN - PLAN & PROFILE
	10	WEST RESERVOIR T.M. LATERAL & WEST RECLAIMED WATER T.M. - PLAN & PROFILE
	11	WEST RESERVOIR T.M. LATERAL & WEST RECLAIMED WATER T.M. - PLAN & PROFILE
	12	WEST RESERVOIR T.M. LATERAL & WEST RECLAIMED WATER T.M. - PLAN & PROFILE
	13	WEST RECLAIMED WATER TRANSMISSION MAIN - PLAN & PROFILE
	14	WEST RECLAIMED WATER TRANSMISSION MAIN - PLAN & PROFILE
	15	WEST PUMP STATION DISCHARGE LINE - PLAN & PROFILE
SCHEDULE OF WORK ITEMS NO. 1 & 2	16	WELL WATER TRANSMISSION MAIN - EL TORO RD. 30" SEGMENT - PLAN & PROFILE
	17	DETAILS
	18	DETAILS
	19	DETAILS
	20	DETAILS
SCHEDULE OF WORK ITEMS NO. 3	21	ZONE III METER INTERTIE
	22	ZONE III METER INTERTIE
⚠ SCH. ITEMS NO. 1	23	DETAILS

LOS ALISOS WATER DISTRICT
ORANGE COUNTY CALIFORNIA

WEST TRANSMISSION MAINS
LOCATION AND VICINITY MAP

REV	DATE	DESCRIPTION	APP
⚠	10/24/79	ADDENDUM NO. 1 REVISION	P.R.K.

DESIGN R.P.K. DRAWN J.C. CHECKED R.P.K.
Boyle Engineering Corporation consulting engineers / architects
DATE AUG. 1979 FB X-43 B-L04-125-06 D-2053
SHEET NO. 2 OF 23 SHEETS

CONSTRUCT 18" CLASS 200 A.C.P. WEST RESERVOIR T.M.

BID ITEM NO. 1

GROUND SURFACE AT ℄ OF WEST RES. PIPELINE

FINISH GRADE @ ℄ OF WEST RES. PIPELINE BY DISTRICT GRADING CONTRACTOR (2)

S= -0.0331

S= +0.0150

S= +0.0048

PIPE INVERT

IDENTICAL

P.I. STA. 1+29.65
INV. ELEV. 581.00
CONNECT TO EXIST. 18" PIPELINE

℄ PT. ℄ P.I. STA. 2+98.81
INV. ELEV. 563.53

P.I. STA. 3+00.00
INV. ELEV. 563.52

℄ PT. STA. 3+48.81
INV. ELEV. 559.78

T.R.C.P. CULVERT

℄ PT. ℄ P.I. STA. 4+00.00
INV. ELEV. 570.00

CONSTRUCT 18" CLASS 150 A.C.P. WEST RESERVOIR T.M.

BID ITEM NO. 2

FINISH GRADE @ ℄ OF WEST RES. PIPELINE BY DISTRICT GRADING CONTRACTOR (2)

GROUND SURFACE AT ℄ OF WEST RES. PIPELINE

S= +0.0500

S= +0.0550

PIPE INVERT

S= +0.1250

S= +0.1000

IDENTICAL

℄ PT. ℄ P.I. STA. 5+69.00
INV. ELEV. 591.29

B.C. STA. 5+98.12
INV. ELEV. 594.78

P.I. STA. 6+00.00
INV. ELEV. 595.00

P.I. STA. 7+00.00
INV. ELEV. 605.00

E.C. STA. 7+41.12
INV. ELEV. 607.26

P.I. STA. 9+00.00
INV. ELEV. 616.00

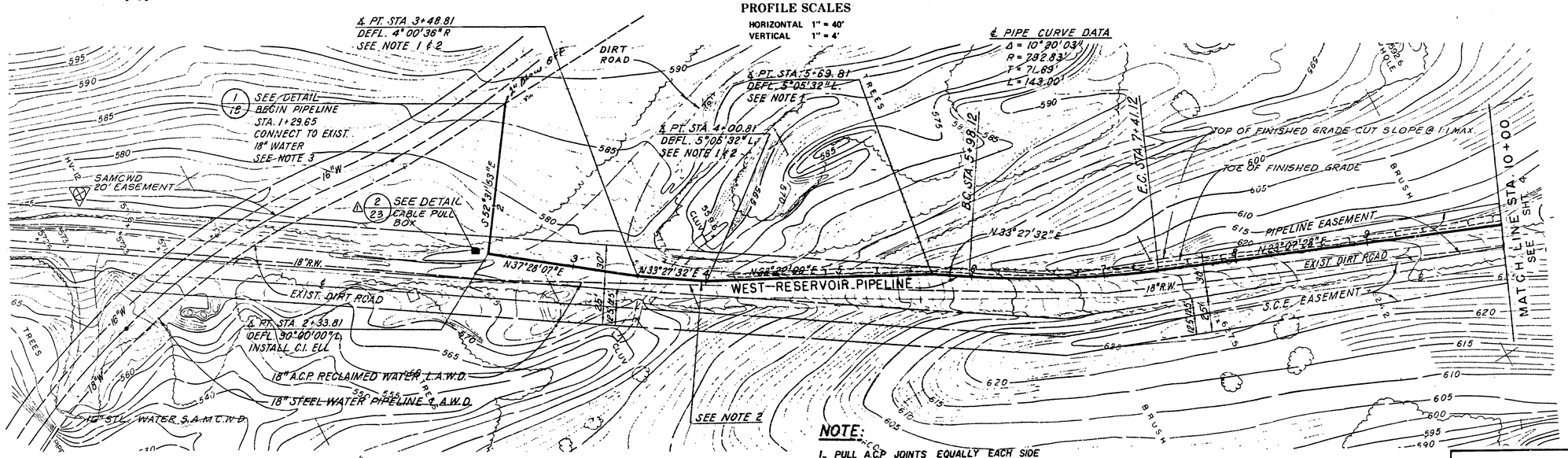
P.I. STA. 10+00.00
INV. ELEV. 621.00

ELEVATIONS

0+00 1+00 2+00 3+00 4+00 5+00 6+00 7+00 8+00 9+00 10+00

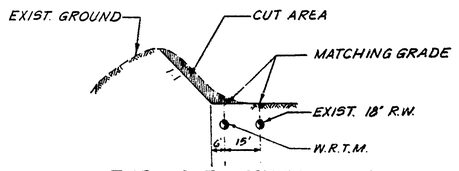
PROFILE SCALES

HORIZONTAL 1" = 40'
VERTICAL 1" = 4'



NOTE:

1. PULL A.C.P. JOINTS EQUALLY EACH SIDE TO MEET ALIGNMENT. USE 13'-0" LENGTHS A.C.P.
2. A MINIMUM OF 5' WILL BE MAINTAINED BETWEEN WEST RESERVOIR PIPELINE AND EXISTING RECLAIMED WATER LINE. CONTRACTOR WILL CONFIRM LOCATION OF EXIST. PIPELINE.
3. CONTRACTOR SHALL POTHOLE AND VERIFY EXIST. 18" PIPELINE LOCATION AND INVERT BEFORE CONST. AS NOTED IN THE SPECIFICATIONS SECTION 3, PART II, OF SPECIAL PROVISIONS.



TYP. CUT SECTION (N.T.S.) (2)

PLAN SCALE: 1" = 40'

LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

WEST TRANSMISSION MAINS
WEST RESERVOIR TRANSMISSION MAIN
PLAN & PROFILE

REV	DATE	DESCRIPTION	APP
(2)	11-2-79	ADDENDUM NO. 2 REVISION	R.P.K.
(1)	10/25	ADDENDUM NO. 1 REVISION	R.P.K.

DESIGN D.M. | DRAWN J.C. | CHECKED R.P.K | DATE AUG. 1979 | F.B. X-43 | B-L04-125-06 | D-2053

Boyle Engineering Corporation
consulting engineers / architects

SHEET NO. 3 of 23 SHEETS

CONSTRUCT 18" CLASS 150 A.C.P. WEST RESERVOIR T.M.

BID ITEM NO. 2

ELEVATIONS

650
640
630

GROUND SURFACE AT ℄ OF WEST RES. PIPELINE

FINISH GRADE @ ℄ OF WEST RES. PIPELINE BY DISTRICT GRADING CONTRACTOR

S = +0.0200
S = +0.0500
S = +0.0300
S = +0.0020
S = +0.0100
S = +0.0300

PIPE INVERT

P.I. STA. 12+00.00
INV. ELEV. 627.00

P.I. STA. 13+00.00
INV. ELEV. 628.00

B.C. STA. 13+04.21
INV. ELEV. 628.01

E.C. STA. 13+84.22
INV. ELEV. 628.17

P.I. STA. 18+00.00
INV. ELEV. 629.00

P.I. STA. 19+00.00
INV. ELEV. 638.00

P.I. STA. 20+00.00
INV. ELEV. 657.00

P.I. STA. 21+00.00
INV. ELEV. 659.00

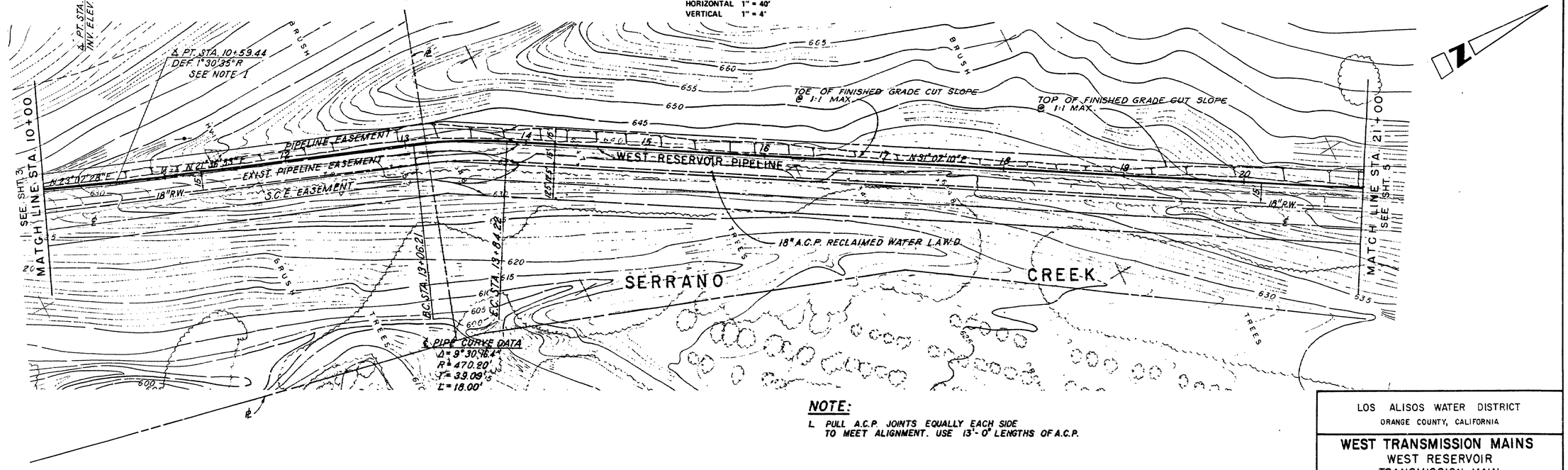
10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00 19+00 20+00 21+00

P.I. STA. 10+00.00
INV. ELEV. 621.00

℄ PT. STA. 10+59.44
INV. ELEV. 622.78

PROFILE SCALES

HORIZONTAL 1" = 40'
VERTICAL 1" = 4'



NOTE:

1. PULL A.C.P. JOINTS EQUALLY EACH SIDE TO MEET ALIGNMENT. USE 13'-0" LENGTHS OF A.C.P.

PLAN SCALE: 1" = 40'

LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

WEST TRANSMISSION MAINS
WEST RESERVOIR
TRANSMISSION MAIN
PLAN & PROFILE

NO.	DATE	DESCRIPTION	APP
1	11-2-79	ADDENDUM NO. 2 REVISION	R.P.K.

DESIGN D.W.
DRAWN J.C.
CHECKED R.P.K.
DATE AUG. 1979
FILE X-43
B-L04-125-06
D-2053
Boyle Engineering Corporation
consulting engineers / architects
SHEET NO. 4
OF 23 SHEETS

CONSTRUCT 18" CLASS 150 A.C.P. WEST RESERVOIR T.M.

BID ITEM NO. 2

ELEVATIONS

660
650
640

FINISH GRADE @ ℄ OF WEST RES. PIPELINE BY DISTRICT GRADING CONTRACTOR

GROUND SURFACE AT ℄ OF WEST RES. PIPELINE

S = +0.0050
S = +0.0100
S = +0.0180
S = +0.0520

℄ PIPE INVERT

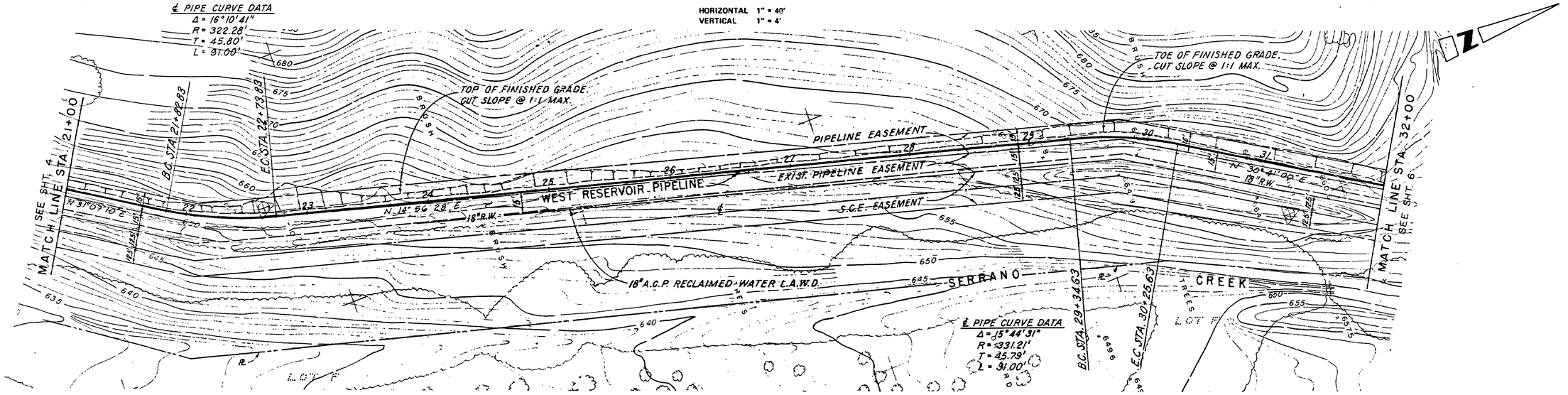
P.I. STA 21+00 INV. EL. 639.00
B.C. STA 21+82.83 INV. ELEV. 641.65
E.C. STA 22+73.83 INV. ELEV. 644.56
P.I. STA 23+00 INV. ELEV. 645.4
P.I. STA 26+00 INV. ELEV. 649.00
P.I. STA 27+00 INV. ELEV. 651.00
B.C. STA 29+34.63 INV. ELEV. 656.77
E.C. STA 30+25.63 INV. ELEV. 657.63
P.I. STA 32+00.00 INV. ELEV. 653.51

21+00 22+00 23+00 24+00 25+00 26+00 27+00 28+00 29+00 30+00 31+00 32+00

PROFILE SCALES

HORIZONTAL 1" = 40'
VERTICAL 1" = 4'

℄ PIPE CURVE DATA
Δ = 16°10'41"
R = 322.28'
T = 45.80'
L = 91.00'



PLAN SCALE: 1" = 40'

LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

WEST TRANSMISSION MAINS
WEST RESERVOIR
TRANSMISSION MAIN
PLAN & PROFILE

REV	DATE	DESCRIPTION	APP
1	11-2-79	ADDENDUM NO. 2 REVISION	R.P.K.

DESIGN D.M.
DRAWN J.C.
CHECKED R.P.K.
DATE AUG. 1979
F.B. X-43
Boyle Engineering Corporation
consulting engineers / architects
B-L04-125-06
D-2053
SHEET NO. 5 OF 23 SHEETS

CONSTRUCT 18" CLASS 150 ACP WEST RESERVOIR T. M.
BID ITEM NO. 2

CONSTRUCT 12" CLASS 150 ACP
WEST RECLAIMED T. M.
BID ITEM NO. 5

8" RECLAIMED WATER

ELEVATIONS

670
660
650

GROUND SURFACE AT ℄ OF WEST RES. PIPELINE

△ FINISH GRADE @ ℄ OF WEST RES PIPELINE BY DISTRICT GRADING CONTRACTOR

S=+0.0040
S=+0.0250
S=+0.0110
S=+0.0060
S=+0.0100
S=+0.0160
S=+0.0050

PIPE INVERTS
RECLAIMED WATER PIPELINE INVERT
WEST RESERVOIR PIPELINE INVERT
℄ PIPE INVERT

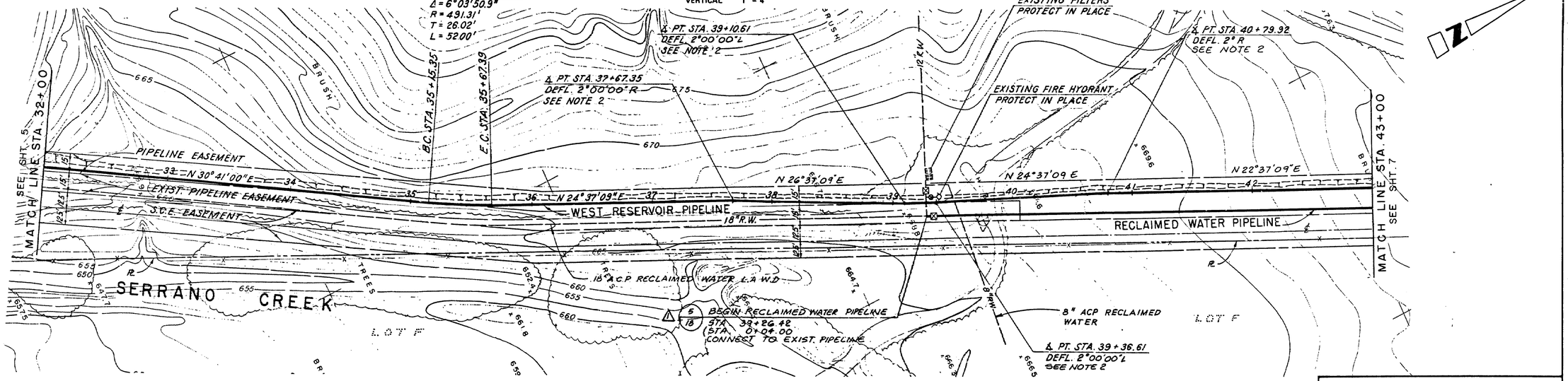
P.I. STA. 32+00.00 INV. ELEV. 653.56
P.I. STA. 33+00.00
P.I. STA. 35+00.00 INV. ELEV. 657.20
B.C. STA. 35+15.35 INV. ELEV. 657.35
E.C. STA. 35+67.00 INV. ELEV. 657.87
℄ PT. STA. 37+67.35 INV. ELEV. 658.87
P.I. STA. 39+00.00 INV. ELEV. 662.20
℄ PT. STA. 39+10.61 INV. ELEV. 662.25
(STA. 0+04.00 CONNECT RECLAIMED WATER PIPELINE) (INV. ELEV. 662.20)
℄ PT. STA. 39+36.61 INV. ELEV. 662.38
P.I. STA. 40+00.00 INV. ELEV. 662.70
℄ PT. STA. 40+77.92 INV. ELEV. 662.56
P.I. STA. 41+00.00 INV. ELEV. 662.80
(P.I. STA. 2+27.50.00) (INV. ELEV. 664.00)
STA. 41+50.00 INV. ELEV. 664.00
(P.I. STA. 3+71.50) (INV. ELEV. 667.40)
P.I. STA. 43+00.00 INV. ELEV. 667.40

32+00 33+00 34+00 35+00 36+00 37+00 38+00 39+00 40+00 41+00 42+00 43+00

PROFILE SCALES

HORIZONTAL 1" = 40'
VERTICAL 1" = 4'

℄ PIPE CURVE DATA
Δ = 6°03'50.9"
R = 491.31'
T = 26.02'
L = 52.00'



NOTE:

1. RECLAIMED WATER TRANSMISSION MAIN STATIONING IN PARENTHESIS THIS PAGE.
2. PULL A.C.P. JOINTS EQUALLY EACH SIDE TO MEET ALIGNMENT.
3. CONTRACTOR SHALL POTHOLE AND VERIFY EXIST. 18" PIPELINE LOCATION & INVERT BEFORE CONSTRUCTION AS NOTED IN THE SPECIFICATIONS SECTION 3, PART II OF SPECIAL PROVISIONS.

PLAN SCALE: 1" = 40'

LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

WEST TRANSMISSION MAINS
WEST RESERVOIR T. M.
WEST RECLAIMED WATER T. M.
PLAN & PROFILE.

REV	DATE	DESCRIPTION	APP
2	11-2-79	ADDENDUM NO. 2 REVISION	R.P.K.
1	10/24/79	ADDENDUM NO. 1 REVISION	R.P.K.

DESIGN D.M. DRAWN J.C. CHECKED R.P.K. DATE AUG. 1979 F.B. X-43

Boyle Engineering Corporation
consulting engineers / architects

B-L04-125-06 D-2053

SHEET NO. 6 OF 23 SHEETS

CONSTRUCT 18" CLASS 150 ACP WEST RESERVOIR T. M.
BID ITEM NO. 2

CONSTRUCT 12" CLASS 150 ACP
WEST RECLAIMED T.M.
BID ITEM NO. 5

ELEVATIONS

GROUND SURFACE AT ℄ OF WEST RESERVOIR PIPELINE

℄ FENCE

SHEET 10

S = + 0.0270

S = + 0.0000

S = + 0.0293

WEST RESERVOIR PIPELINE INVERT

RECLAIMED WATER PIPELINE INVERT

P.I. STA. 43+00.00
INV. ELEV. 667.40

P.I. STA. 44+50.00
INV. ELEV. 669.56

P.I. STA. 45+00.00
INV. ELEV. 672.80

EXIT P.I. STA. 7+04.21
INV. ELEV. 670.37

SEE SHEET 10 FOR PROFILE

4 PT. STA. 46+36.67
INV. ELEV. 672.34

4 PT. STA. 46+72.67
INV. ELEV. 672.47

4 PT. STA. 46+85.02
INV. ELEV. 672.71

P.I. STA. 47+00.00
INV. ELEV. 673.00

4 PT. EQUATIONS
4 PT. STA. 47+30.33 (AHEAD)
STA. 47+50.33 (BACK)
INV. ELEV. 675.27

IDENTICAL

STA. 48+00.00
ELEV. 675.93

P.I. STA. 48+50.00
INV. ELEV. 677.39

S = + 0.0293

S = + 0.0964

PIPE INVERT

GROUND SURFACE @ ℄ OF WEST RESERVOIR PIPELINE

S = + 0.0880

S = + 0.0804

PIPE INVERT

S = + 0.1000

IDENTICAL

P.I. STA. 50+00.00
INV. ELEV. 692.00

P.I. STA. 51+00.00
INV. ELEV. 702.20

P.I. STA. 52+00.00
INV. ELEV. 710.40

STA. 53+00.00
INV. ELEV. 720.20

43+00 44+00 45+00 46+00 47+00 48+00 49+00 50+00 51+00 52+00 53+00

PROFILE SCALES
HORIZONTAL 1" = 40'
VERTICAL 1" = 4'

4/17 SEE DETAIL
4 PT. STA. 46+36.67
DEFL. 35°00'00"
INSTALL 90° C.I. ELL
PULL JOINTS EA. SIDE

4/17 SEE DETAIL
4 PT. STA. (7+04.21)
DEFL. 95°00'00"
INSTALL 90° C.I. ELL
PULL JOINTS EA. SIDE
SEE SHT. 10

SEE NOTE 3

3/18 SEE DETAIL
4 PT. STA. 46+73.67
DEFL. 90°00'00"
INSTALL C.I. TEE AND B.V.'S

2/23 SEE DETAIL
CABLE PULL BOX

4/17 SEE DETAIL
4 PT. STA. 46+85.02
DEFL. 20°03'28" R.T.S.
INSTALL 22½° C.I. BEND
PULL JOINTS EACH SIDE

MATCH LINE STA. 49+00

IDENTICAL

3/18 SEE DETAIL
EQUATION
4 PT. STATION 47+30.33 (AHEAD)
= 4 PT. STA. 47+77.46 (BACK)
DEFL. 90°00'09" L
INSTALL 90° C.I. TEE AND B.V.

L.A.W.D. EASEMENT

2" BLOW OFF OUT OF TAPPED PLUG

MATCH LINE STA. 43+00
SEE SHT. 6

PIPELINE EASEMENT

44 N 24°37'09" E 45 46

WEST RESERVOIR PIPELINE

RECLAIMED WATER PIPELINE

S.C.E. EASEMENT

S 60°22'51" E

PP3478186

N 29°37'09" E

15' PIPELINE EASEMENT

LOT LINES

LOT D

LOT C

TRACT

675 685 695

BEGIN LATERAL PIPELINE STATIONING

SEE SHEET 10

MATCH LINE STA. 49+00

WEST RESERVOIR PIPELINE

50 51 52

S 40°19'32" E PIPELINE EASEMENT

MATCH LINE STA. 53+00
SEE SHEET 8

BRUSH

NOTES:

1 - RECLAIMED WATER TRANSMISSION MAIN PIPELINE STATIONING IN PARENTHESIS THIS PAGE.

2 - PULL ACP JOINTS EQUALLY EACH SIDE TO MEET ALIGNMENT. USE 13'-0" LENGTHS OF ACP.

3 - REMOVE & RESTORE FENCE TO ORIGINAL CONDITION TO ACCOMMODATE PIPELINE CONSTRUCTION.

PLAN SCALE: 1" = 40'

REV	DATE	DESCRIPTION	APP
Δ	10/25	ADDENDUM NO. 1 REVISION	R.P.K.

LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

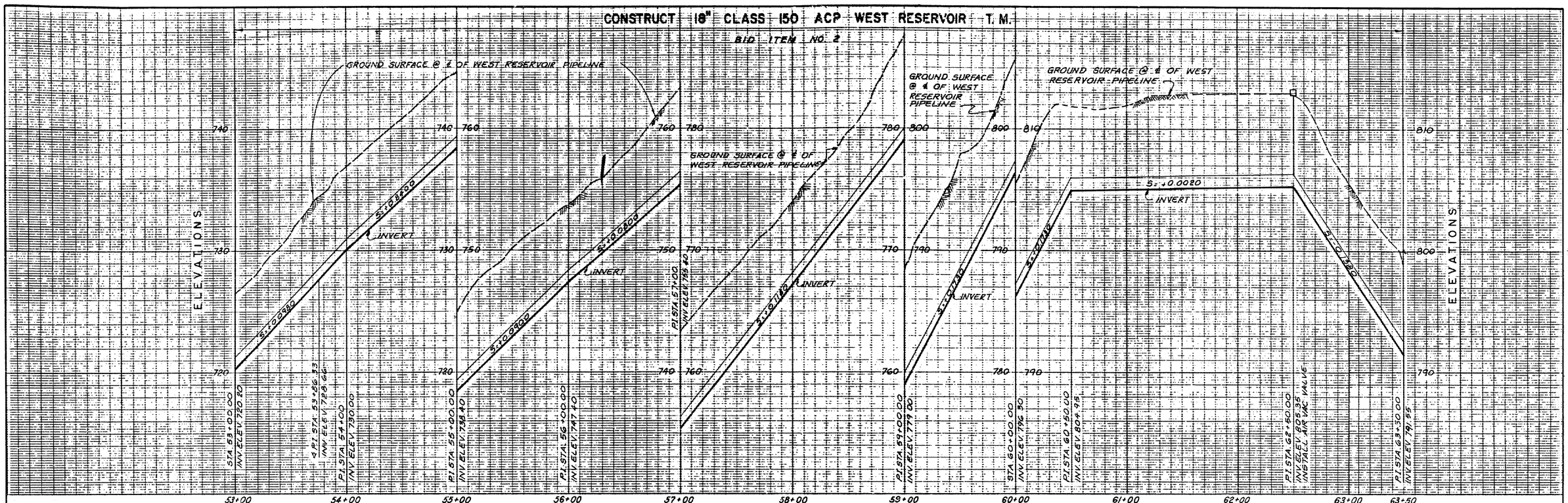
WEST TRANSMISSION MAINS
WEST RESERVOIR T.M.
WEST RECLAIMED WATER T.M.
PLAN & PROFILE

Boyle Engineering Corporation
consulting engineers / architects

DESIGN D.M.
DRAWN J.C.
CHECKED R.P.K.
DATE AUG. 1979
F.B. X-43
8-L04-125-06
D-2053
SHEET NO 7 OF 23 SHEETS

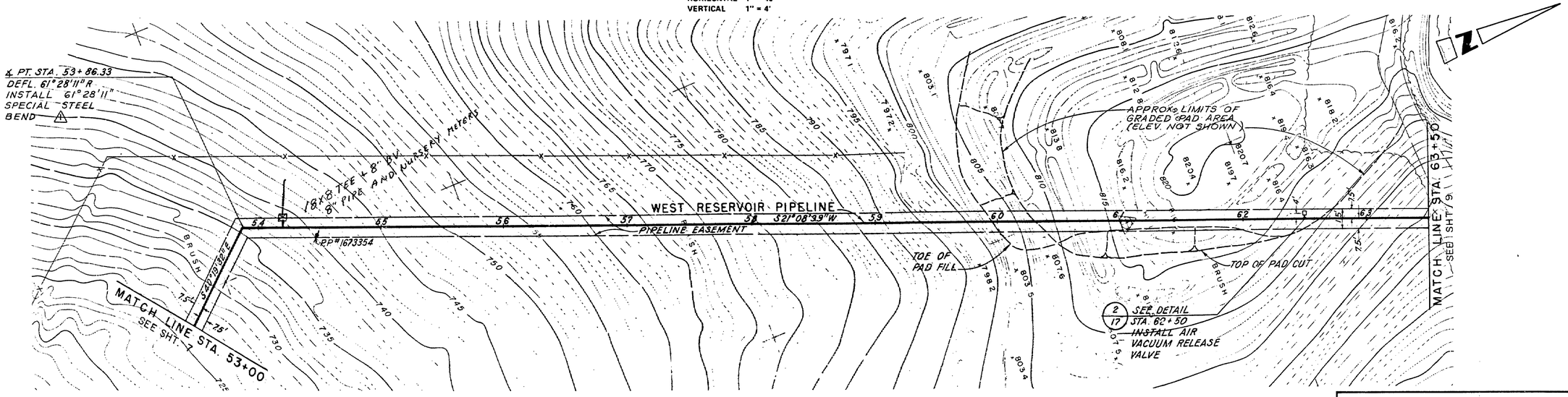
CONSTRUCT 18" CLASS 150 ACP WEST RESERVOIR T. M.

BID ITEM NO. 2



PROFILE SCALES

HORIZONTAL 1" = 40'
VERTICAL 1" = 4'



PLAN SCALE: 1" = 40'

LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

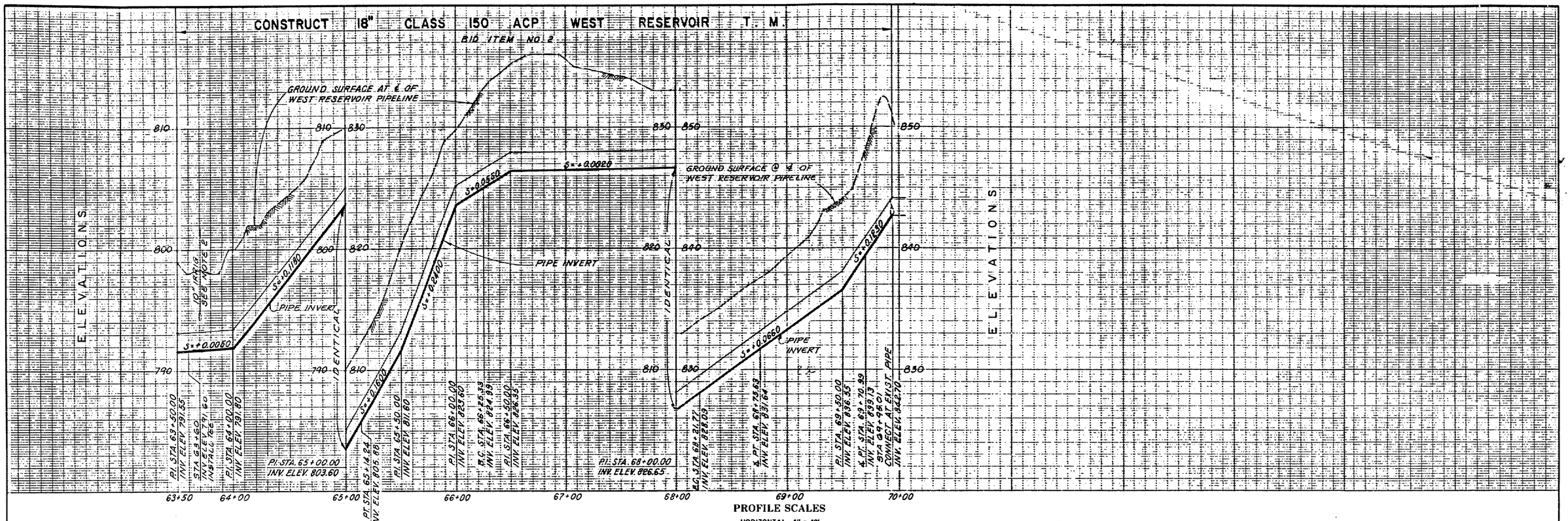
WEST TRANSMISSION MAINS
WEST RESERVOIR
TRANSMISSION MAIN
PLAN & PROFILE

REV	DATE	DESCRIPTION	APP
1	10/24/79	ADDENDUM NO. 1 REVISION	R.P.K.

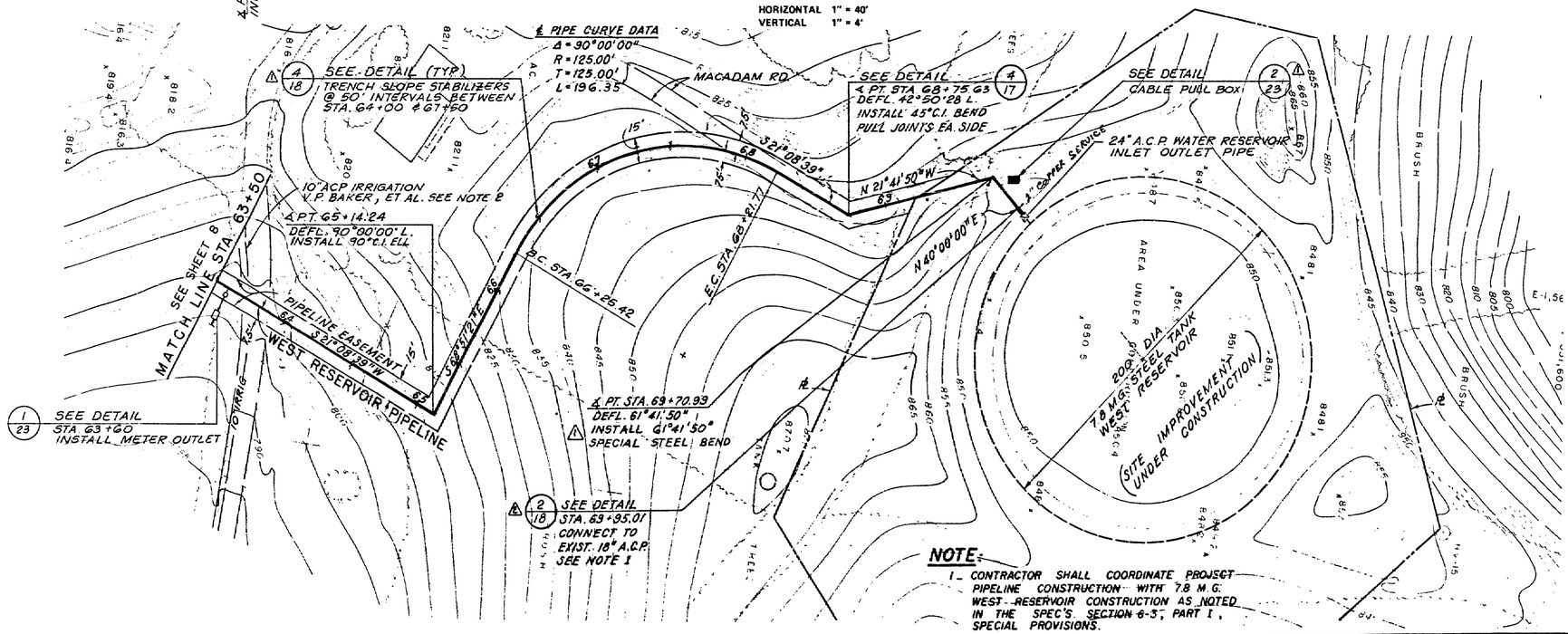
DESIGN D.M.
DRAWN J.C.
CHECKED R.P.K.
DATE AUG. 1979
P & X-43
Boyle Engineering Corporation
consulting engineers / architects
B-L04-125-06
D-2053
SHEET NO. 8 OF 23 SHEETS

CONSTRUCT 18" CLASS 150 ACP WEST RESERVOIR T. M.

BID ITEM NO. 2



PROFILE SCALES
HORIZONTAL 1" = 40'
VERTICAL 1" = 4'



PLAN SCALE: 1" = 40'

NOTE:

1. CONTRACTOR SHALL COORDINATE PROJECT PIPELINE CONSTRUCTION WITH 7.8 M.G. WEST RESERVOIR CONSTRUCTION AS NOTED IN THE SPEC'S SECTION 6-3, PART I, SPECIAL PROVISIONS.
2. CONTRACTOR SHALL POTHOLE AND VERIFY EXIST. 10" IRRIG. PIPELINE LOCATION AND INVERT BEFORE CONSTRUCTION.

REV	DATE	DESCRIPTION	APP
2	11-2-79	ADDENDUM NO. 2 REVISION	R.P.K.
1	10-24-79	ADDENDUM NO. 1 REVISION	RPK

LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

WEST TRANSMISSION MAINS
WEST RESERVOIR TRANSMISSION MAIN
PLAN & PROFILE

Boyle Engineering Corporation
consulting engineers : architects

DESIGN D.M.
DRAWN J.C.
CHECKED R.P.K.
DATE AUG. '79
R & X-43
B-L04-125-06
D-2053
SHEET NO. 9
OF 23 SHEETS

12" CLASS 150 ACP RECLAIMED WATER T.M.
BID ITEM NO. 5

12" CLASS 150 ACP WEST RESERVOIR T.M. LATERAL
BID ITEM NO. 3

ELEVATIONS

PIPE INVERTS

FINISHED GROUND SURFACE AT ℄ OF RECLAIMED WATER PIPELINE

ORIGINAL GROUND SURFACE ℄

FINISHED GROUND SURFACE @ RECLAIMED WATER PIPELINE ℄

TO BE GRADED BY OTHERS

ORIGINAL GROUND SURFACE

R.W.T.M. INVERT

IDENTICAL

PIPE INVERT

PROFILE SCALES
HORIZONTAL 1" = 40'
VERTICAL 1" = 4'

SEE SHEET 8

(STA. 148+36.18)

ORCHARD

SEE DETAIL 2/17
STA. 8+00
INST. AIR VACUUM RELEASE VALVE

LATERAL PIPELINE

PIPELINE EASEMENT

CONTACT LINE

R/W

LOT C
TRACT NO. 695
(NAKASI LOS ALISOS RANCH)

S 40° 19' 23" E

S 51° 37' 53" E

SEE DETAIL 4/17
(4 PT. STA. 15+96.79)
(4 PT. STA. 154+83.36)
DEFL. 11° 18' 36" R.
INSTALL 11¼° C.I. BEND
PULL JTS. EA. SIDE

TOP OF VARIABLE CUT SLOPE BY DISTRICT GRADING CONTRACTOR

TOE OF VARIABLE CUT SLOPE BY DISTRICT GRADING CONTRACTOR.

MATCH LINE (STATION 17+50) SEE SHT. 11

STA. 7+04.21
RECLAIMED WATER PIPELINE SEE SHT. 7

LOT LINE

RECLAIMED WATER PIPELINE

SEE DETAIL 4/17
STA. 7+46.47
DEFL. 20°03'28" R
INSTALL 22½° C.I. BEND
PULL JTS. EA. SIDE

S.C.E. 25' EASEMENT

PIPELINE EASEMENT

SEE SHEET 7

STA. 12+85 ELEV. 679.00 BY PRICE & ASSOC.

STA. 13+40 ELEV. 684.00 BY PRICE & ASSOC.

STA. 14+31 ELEV. 692.00 BY PRICE & ASSOC.

STA. 15+26 ELEV. 705.00 BY PRICE & ASSOC.

STA. 16+31 ELEV. 714.00 BY PRICE & ASSOC.

STA. 16+93 ELEV. 720.00 BY PRICE & ASSOC.

STA. 17+39 ELEV. 725.00 BY PRICE & ASSOC.

SEE DETAIL 4/17
(4 PT. STA. 14+94.81)
(4 PT. STA. 153+81.38)
DEFL. 11° 18' 36" L.
INSTALL 11¼° C.I. BEND
PULL JTS. EA. SIDE

CUT SECTION ⚠
N.T.S.

FILL SECTION ⚠
N.T.S.

PLAN SCALE: 1" = 40' ⚠

NOTES:

1. WEST RESERVOIR TRANSMISSIONS MAIN LATERAL PIPELINE STATIONING SHOWN IN PARENTHESIS THIS PAGE.
2. CONTRACTOR SHALL COORDINATE PROJECT PIPELINE CONSTRUCTION WITH GRADING OPERATIONS ON NAKASI LOS ALISOS RANCH AS NOTED IN THE SPECIFICATIONS SECTION 6-3, PART 1, SPECIAL PROVISIONS.
3. GRADING ELEVATION ON PLAN & PROFILE FROM STA. 12+57 TO STA. 17+50 BY PRICE & ASSOC. 10/5/78. FOR NAKASE BROS. WHOLESALE NURSERIES.

REV	DATE	DESCRIPTION	APP
⚠	1/7/79	ADDENDUM NO 2 REVISIONS	R.P.K
⚠	10/24	ADDENDUM NO.1 REVISIONS	R.P.K

LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

WEST TRANSMISSION MAINS
WEST RESERVOIR T.M. LATERAL
WEST RECLAIMED WATER T.M.
PLAN & PROFILE

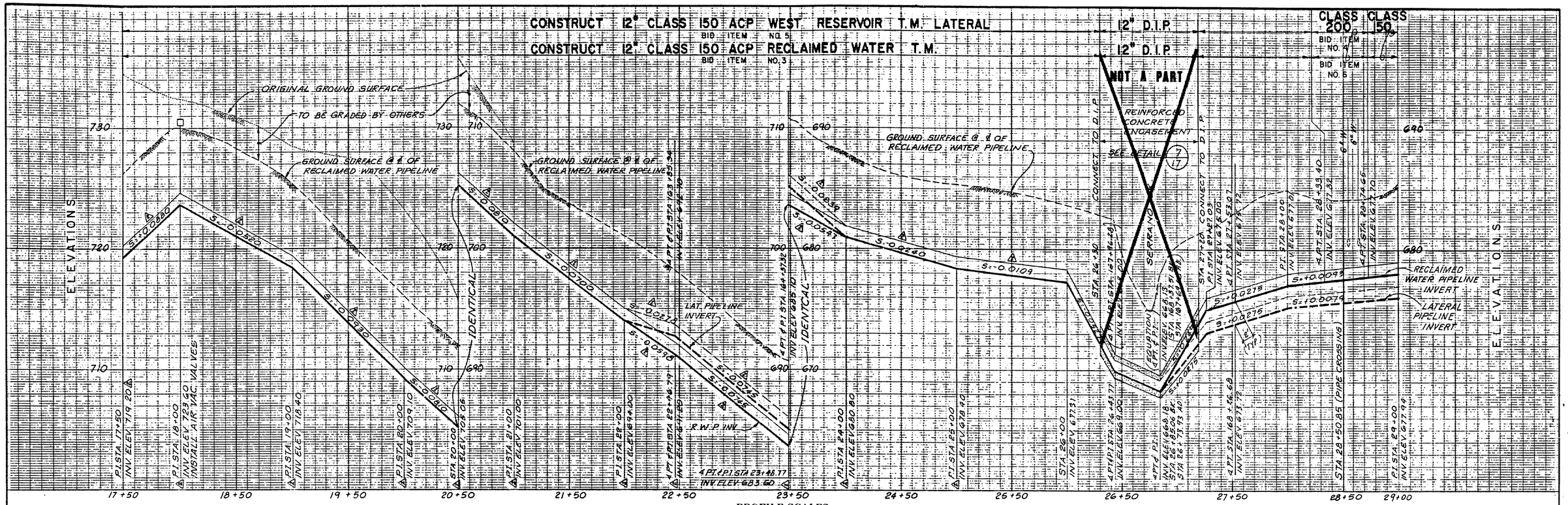
DESIGN H.W.
DRAWN J.C.
CHECKED R.P.K.
DATE AUG. 1979
FILE # X-43
B-L04-125-06
D-2053

Boyle Engineering Corporation
consulting engineers / architects

SHEET NO 10 OF 23 SHEETS

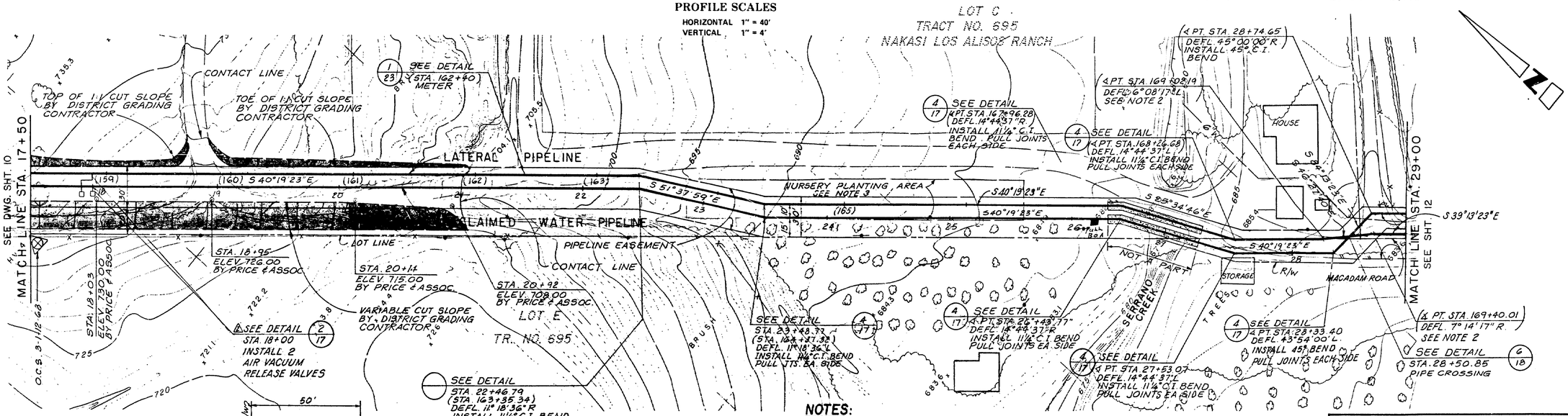
CONSTRUCT 12" CLASS 150 ACP WEST RESERVOIR T.M. LATERAL
BID ITEM NO. 5
CONSTRUCT 12" CLASS 150 ACP RECLAIMED WATER T.M.
BID ITEM NO. 3

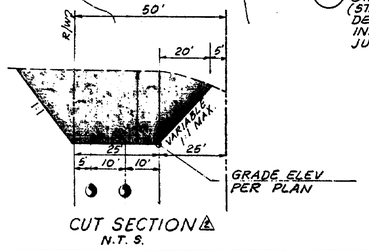
12" D.I.P. CLASS 200 — BID ITEM NO. 7
12" D.I.P. CLASS 150 — BID ITEM NO. 6



PROFILE SCALES

HORIZONTAL 1" = 40'
VERTICAL 1" = 4'





CUT SECTION ⚠
N.T.S.

PLAN SCALE: 1" = 40'

NOTES:

1. WEST RESERVOIR T. M. LATERAL STATIONING PIPELINE IN PARENTHESIS THIS PAGE.
2. PULL ACP JOINTS EQUALLY EACH SIDE TO MEET ALIGNMENT. USE 13'-0" LENGTHS OF ACP.
3. CONTRACTOR SHALL COORDINATE PROJECT PIPELINE CONSTRUCTION WITH GRADING AND NURSERY OPERATIONS AS NOTED IN THE SPECIFICATIONS SECTIONS 6-3, PART 1 SPECIAL PROVISIONS
4. GRADING ELEVATION ON PLAN & PROFILE FROM STA. 17+50 TO STA. 21+00 BY PRICE & ASSOC. 10/5/78. FOR NAKASE BROS. WHOLESALE NURSERIES.

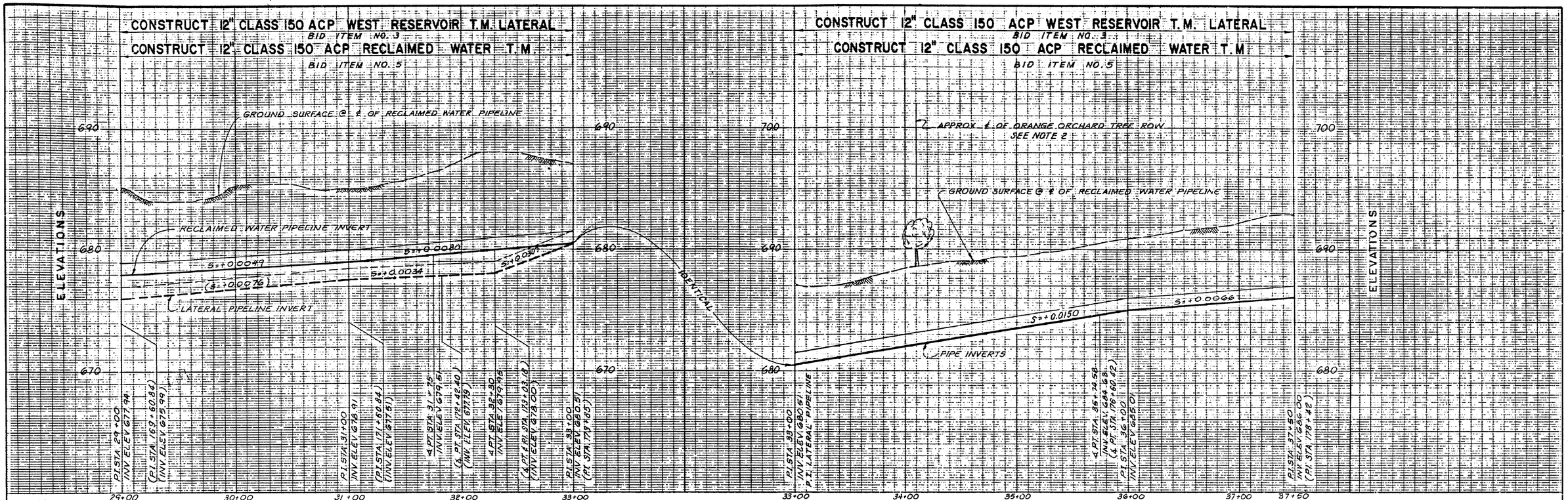
REV	DATE	DESCRIPTION	APP
⚠	11/7/79	ADDENDUM NO.2 REV.	R.P.K.
⚠	10/24/79	ADDENDUM NO.1 REV.	R.P.K.

LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

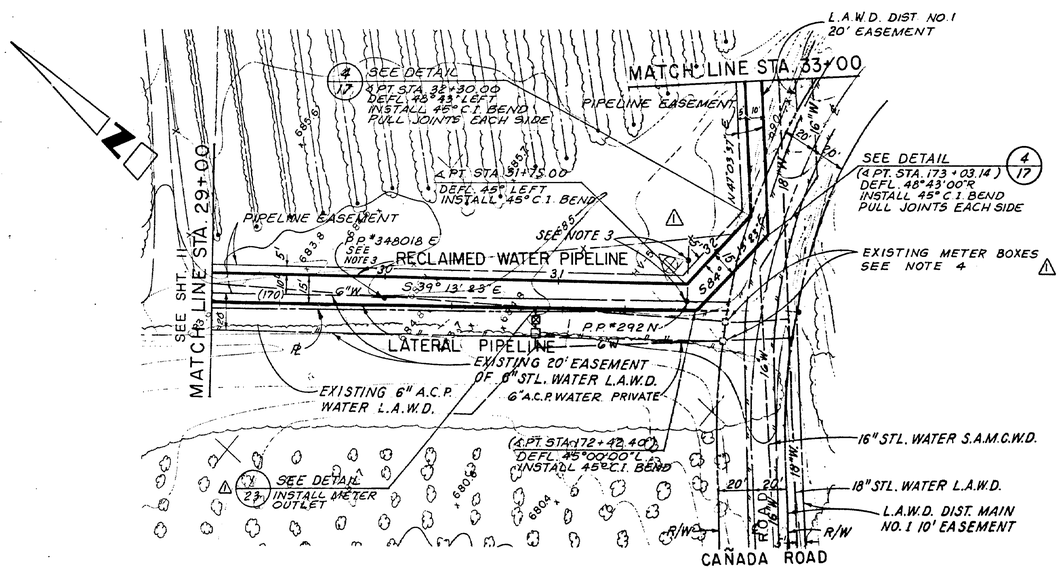
WEST TRANSMISSION MAINS
WEST RESERVOIR T. M. LATERAL
WEST RECLAIMED WATER T. M.
PLAN & PROFILE

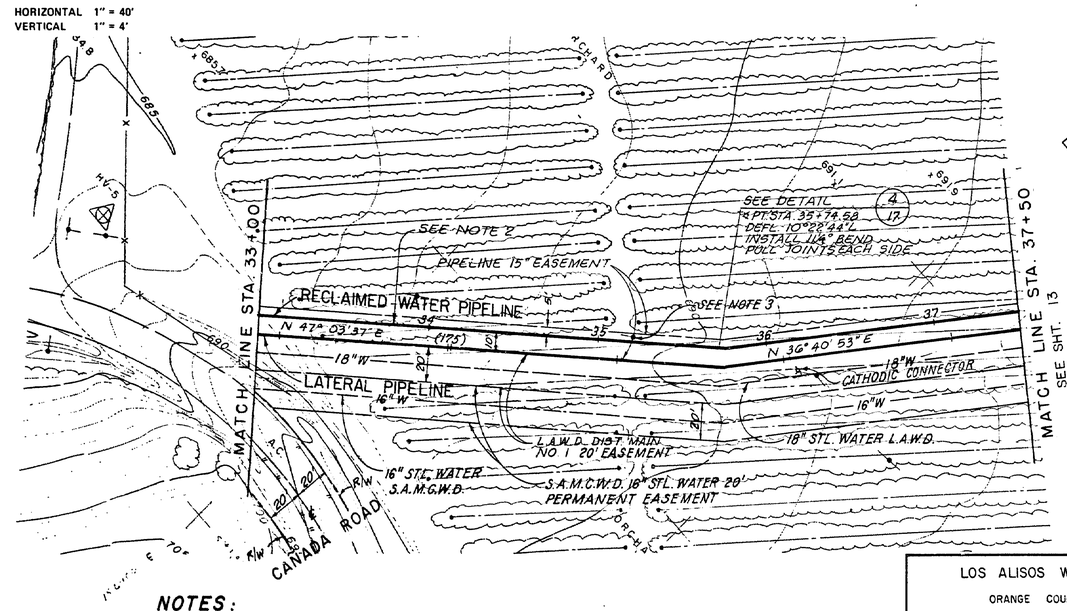
DESIGN H.W.
DRAWN J.C.
CHECKED R.P.K.
DATE AUG. 1979
F & X-43
B-L04-125-06
D-2053
Boyle Engineering Corporation
consulting engineers / architects
SHEET NO. 11
OF 23 SHEETS

CONSTRUCT 12" CLASS 150 ACP WEST RESERVOIR T.M. LATERAL
BID ITEM NO. 3
CONSTRUCT 12" CLASS 150 ACP RECLAIMED WATER T.M
BID ITEM NO. 5



PROFILE SCALES
HORIZONTAL 1" = 40'
VERTICAL 1" = 4'





NOTES:

1. WEST RESERVOIR TRANSMISSION MAIN LATERAL PIPELINE STATIONING IN PARENTHESIS THIS PAGE
2. CONTRACTOR SHALL BE REWARDED TO PROTECT ORANGE TREES WITHIN 5 FEET EACH SIDE OF TRENCH. SEE SPECIFICATIONS SECTION 7-5, PART 1, SPECIAL PROVISIONS
3. CONTRACTOR SHALL CONTACT SCE. AREA PLANNER FOR PROTECTION OF POWER POLE PER SECTION 7-6, PART 1, SPECIAL PROVISIONS.
4. SALVAGE TWO EXIST. 6" IRRIGATION WATER METERS TO L.A.W.D. AFTER WEST RESERVOIR T.M. LATERAL IS COMPLETE. COORDINATE AND GIVE 48 HR. NOTICE TO L.A.W.D.

PLAN SCALE: 1" = 40'

REV	DATE	DESCRIPTION	APP
1	12/20/79	REVISION CATHODIC CONNECTOR	D.M.
1	1/24/79	ADDENDUM NO. 1 REVISION	R.P.K

LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

WEST TRANSMISSION MAINS
WEST RESERVOIR T.M. LATERAL
WEST RECLAIMED WATER T.M.
PLAN & PROFILE

DESIGN H.W. | DRAWN J.C. | CHECKED R.P.K | DATE AUG. 1979 | F.B. X-43 | B-L04-125-06 | D-2053

Boyle Engineering Corporation
consulting engineers / architects

SHEET NO. 12 OF 23 SHEETS

CONST. 12" CL. 150 ACP WEST RESERVOIR T.M. LATERAL

BID ITEM NO. 3

CONSTRUCT 12" CLASS 150 ACP RECLAIMED WATER T.M.

BID ITEM NO. 5

EXIST. ORCHARD - TREES 20'± O.C. SEE NOTE 2.

EXIST. TREES (TYP.)

GROUND SURFACE @ ℄ OF RECLAIMED WATER PIPELINE

PIPE INVERTS

S=+0.0190

S=+0.0178 Δ

S=+0.0100 Δ

S=+0.0010 Δ

S=+0.0810

S=+0.0102

ELEVATIONS 700 690 680

P.I. STA. 37+50 INV. ELEV. 686.00 (P.I. STA. 178+42)

P.I. STA. 38+50 INV. ELEV. 681.00 (P.I. STA. 179+42)

P.I. STA. 38+90 INV. ELEV. 679.00 (P.I. STA. 179+82)

(4 PT. STA. 180+18.57) (INV. ELEV. 681.78)

(STA. 180+28.57) (INV. ELEV. 687.88)

Δ P.I. 4 PT. STA. 39+54.38 INV. ELEV. 690.24

12" W. L.A.W.D.

Δ 4 PT. STA. 39+84.38 INV. ELEV. 690.27

Δ 4 PT. STA. 40+05.58 INV. ELEV. 690.29

Δ P.I. STA. 42+00 INV. EL. 690.48

Δ P.I. STA. 43+00 INV. ELEV. 691.48

P.I. STA. 44+00 INV. ELEV. 693.20

B.C. STA. 44+43.40 INV. ELEV. 694.02

P.I. STA. 46+00 INV. ELEV. 697.01

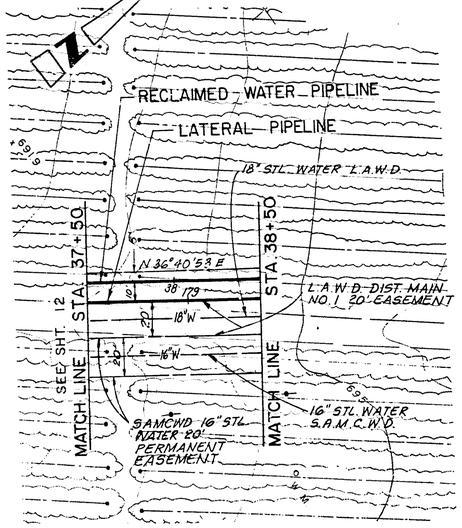
P.I. STA. 46+50 INV. ELEV. 703.01

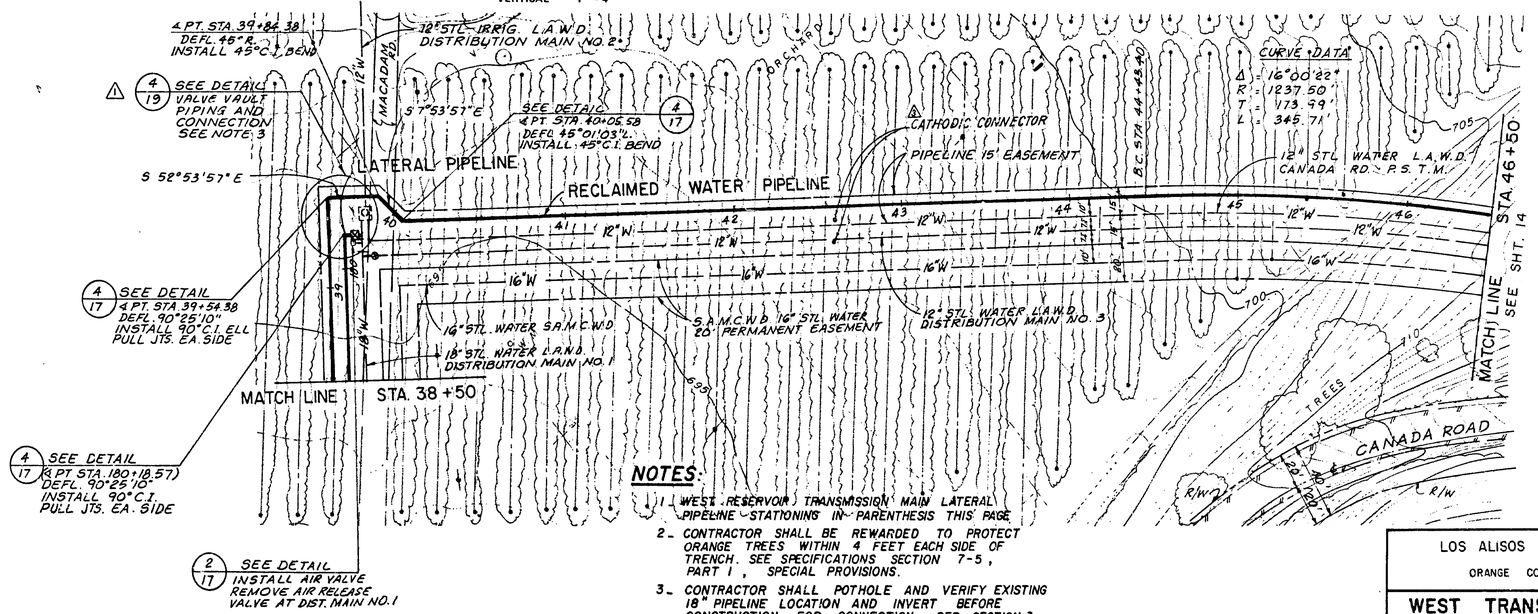
37+50 38+50 38+50 39+00 40+00 41+00 42+00 43+00 44+00 45+00 46+00 46+50

PROFILE SCALES

HORIZONTAL 1" = 40'

VERTICAL 1" = 4'





NOTES:

1. WEST RESERVOIR TRANSMISSION MAIN LATERAL PIPELINE STATIONING IN PARENTHESIS THIS PAGE.
2. CONTRACTOR SHALL BE REWARDED TO PROTECT ORANGE TREES WITHIN 4 FEET EACH SIDE OF TRENCH. SEE SPECIFICATIONS SECTION 7-5, PART I, SPECIAL PROVISIONS.
3. CONTRACTOR SHALL POTHOLE AND VERIFY EXISTING 18" PIPELINE LOCATION AND INVERT BEFORE CONSTRUCTION FOR CONNECTION. PER SECTION 3, PART II, SPECIAL PROVISIONS.

PLAN SCALE: 1" = 40'

LOS ALISOS WATER DISTRICT

ORANGE COUNTY, CALIFORNIA

WEST TRANSMISSION MAINS

WEST RESERVOIR T.M. LATERAL

WEST RECLAIMED WATER T.M.

PLAN & PROFILE

REV	DATE	DESCRIPTION	APP
3	11/20/79	REVISION CATHODIC CONNECTORS	D.M.
2	11/6/79	REVISED FOR LAKE FOREST PROP.	RPK
1	10/24/79	ADDENDUM NO. 1 REVISION	RPK

DESIGN H.W. DRAWN J.C. CHECKED R.P.K.

Boyle Engineering Corporation consulting engineers / architects

DATE AUG. 1979 FILE X-43 B-L04-125-06 D-2053

SHEET NO 13 OF 23 SHEETS

CONSTRUCT 12" CLASS 150 A.C.P. RECLAIMED WATER T.M.

BID ITEM NO. 5

ELEVATIONS

GROUND SURFACE AT ℄ OF RECLAIMED WATER PIPELINE

PIPE INVERT

S=+0.0047

S=+0.0450

S=+0.0660

S=+0.0730

S=+0.0498

P.I. STA. 46+50 INV. ELEV. 703.01

P.I. STA. 48+00 INV. ELEV. 712.72

E.C. STA. 47+89.10 INV. ELEV. 712.05

℄ PT STA. 49+67.46 INV. ELEV. 719.56

P.I. STA. 50+00 INV. ELEV. 719.99

P.I. STA. 52+00 INV. ELEV. 727.99

℄ PT. STA. 52+47.14 INV. ELEV. 731.43

℄ PT. STA. 53+79.14 INV. ELEV. 741.04

P.I. STA. 54+00 INV. ELEV. 741.59

P.I. STA. 55+69.43 INV. ELEV. 769.43

P.I. STA. 55+76.13 INV. ELEV. 772.13

IDENTICAL

46+50 47+00 48+00 49+00 50+00 51+00 52+00 53+00 54+00 55+00

PROFILE SCALES
HORIZONTAL 1" = 40'
VERTICAL 1" = 4'

℄ PT STA 49+14.43 (2)
DEFL 45° L
INSTALL 45° CI BEND

℄ PT STA 49+67.46 (1)
DEFL 45° R
INSTALL 45° CI BEND

℄ PT. STA. 52+47.14
DEFL. 3° 05' 21" L
SEE NOTE 1.

℄ PT. STA. 53+77.14
DEFL. 3° 05' 21" R
SEE NOTE 1.

DIST. MAIN NO. 3 LATERAL
12" STL. WATER L.A.W.D.

EL TORO RD. T.M.
24" ACP WATER L.A.W.D.

℄ PIPE CURVE DATA
Δ = 16° 00' 22"
R = 1237.5
T = 173.99'
L = 345.71'

E.C. STA. 47+89.10
C.N.E.L. 65 N 8° 44' 15" E

CULVERT

PIPELINE EASEMENT

RECLAIMED WATER PIPELINE

S 36° 54' 38" E

S 39° 59' 53" E

L.A.W.D. 15' EASEMENT

12" STL. WATER L.A.W.D.

L.A.W.D. CANADA ROAD PUMP STATION

EDGE OF PAVEMENT

L.A.W.D. EASEMENT

SEE DETAIL 3/19
STA. 54+67.84
CONNECT TO 12" C.M.L.S.P.
SEE NOTE 6

SEE DETAIL 2/23
CABLE BULL BOX

CONNECTED 36" LINE TO CULVERT

THIS PLATFORM DISCONNECTED

8" STL. WATER L.A.W.D. TO BE REMOVED AND RELOCATED

MATCH LINE STA. 46+50
SEE SHT. 13

CANADA ROAD

S.A.M.C.W.D. 16" STL. WATER 20' PERMANENT EASEMENT

R/W

16" W

12" W

8" W

ROAD

12" STL. WATER L.A.W.D. DISTRIBUTION MAIN NO. 3

16" STL. WATER S.A.M.C.W.D.

8" STL. WATER L.A.W.D. DISTRIBUTION MAIN NO. 4

SEE DETAIL 3/20
PIPE CONNECTIONS

12" STL. L.A.W.D. DISTRIBUTION MAIN NO. 3

POLE

NOTES:
1) PULL A.C.P. JOINTS EQUALLY EACH SIDE TO MEET ALIGNMENT USE 13'-0" LENGTHS A.C.P.
2) CONTRACTOR SHALL POT HOLE AND VERIFY EXISTING 12" PIPELINE LOCATION AND INVERT BEFORE CONSTRUCTION FOR CONNECTION.

PLAN SCALE: 1" = 40'

LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

WEST TRANSMISSION MAINS
WEST RECLAIMED WATER T.M.
PLAN & PROFILE

REV	DATE	DESCRIPTION	APP
2	11/16/79	REVISED FOR LAKE FOREST PROP.	R.P.K
1	10/24/79	ADDENDUM NO. 1 REVISION	R.P.K

DESIGN M.D. DRAWN J.C. CHECKED R.P.K.
Boyle Engineering Corporation, consulting engineers / architects
DATE AUG. 1979 F.B. X-43 B-L04-125-06 D-2053
SHEET NO. 14 OF 23 SHEETS

CONST. 20" A.C.P. - CLASS 200
BID ITEM NO. 7

20" D.I.P.

CONST. 20" A.C.P. - CLASS 200
BID ITEM NO. 7

NOT A PART

GROUND LINE SURFACE @ ℄ OF WEST PUMP STATION

IDENTICAL POINTS

PIPE INVERT

CONNECT TO D.I.P. STA. 19+60

CONNECT TO D.I.P. STA. 20+60

LAND & RECLAIMED WATER

NOTE # CONTRACTOR SHALL POTHOLE AND VERIFY EXIST. PIPE LOCATION & ELEV.

P.I. STA. 15+12.00
DEF. 45° RIGHT

P.I. STA. 15+57.86
DEF. 45° RIGHT

P.I. STA. 21+09.30
DEF. 22°30' RIGHT
INSTALL 22 ½°
C.I. BEND

P.I. STA. 23+16.26
DEF. 22°30' RIGHT
INSTALL 22 ½°
C.I. BEND

P.I. STA. 25+80.00 LEFT
DEF. 60°20'36"
INSTALL 60°20'36"
SPECIAL STEEL BEND

PROFILE SCALES
HORIZONTAL 1" = 40'
VERTICAL 1" = 8'

STA. 15+32
BEGIN CONSTRUCTION
REMOVE PLUG
& THRUST BLOCK
(SEE NOTE 2)

STA. 15+00.00
BEGIN DISCHARGE LINE

ZONE II, PHASE IV,
WEST PUMPING STATION
(CONST. BY OTHERS)

SERRANO CREEK

CONSTRUCT 20" (PIPELINE)

P.I. STA. 16+91.83
DEF. 45° LEFT

BLOW-OFF (VALVE BOX)

PERMANENT EASEMENT LINE

EXIST. DRAIN

PR W/RECTIFIER

GUY WIRE PP#479602E

O/H ELEC.

ABAN. FRAME HOUSE

20" A.C.P. (BY OTHERS)

METER VAULT (BY OTHERS)

10'x10' RIPRAP V-NOTCH DITCH (CONST. BY OTHERS)

MERCURY SAVINGS & LOAN

LAKE FOREST PROPERTIES

8" A.C.P. WELL WATER

18" A.C.P. RECLAIMED WATER

PROPOSED ACCESS ROAD
PROPOSED GRADING
(CONST. BY OTHERS)

4" STL. WATER L.A.W.D.
24" CLASS 150 C.C.P. WATER L.A.W.D.
24" S.C.C.P. WATER S.A.C.

PP#479601E

4" IRRIGATION LINE ABAN.

L.A.W.D. R/W

PP#239831E GUY WIRE

PROPOSED 66" AQUEDUCT PARALLEL (CONST. BY OTHERS)

CANADA ROAD

SEE DETAIL 1/19
STA. 25+88
CONNECT TO EXIST. PIPE
SEE NOTE 1

EDGE OF PAVEMENT

VALVE BOX
16" AIR VACUM CANISTER
21" C.M.L.C.S.P. WATER L.A.W.D.
24" S.C.C.P. WATER S.A.C.

NOTES:
1. CONTRACTOR SHALL POTHOLE AND VERIFY LOCATION OF EXIST. PIPE. LOCATION & INV. ELEV.
2. CONTRACTOR IS TO COORDINATE OTHER CONSTRUCTION IN AREA WITH OTHER CONTRACTORS AS NOTED IN THE SPEC'S. SECTION 6-3, PART 1, SPECIAL PROVISIONS.

PLAN SCALE: 1"=40'

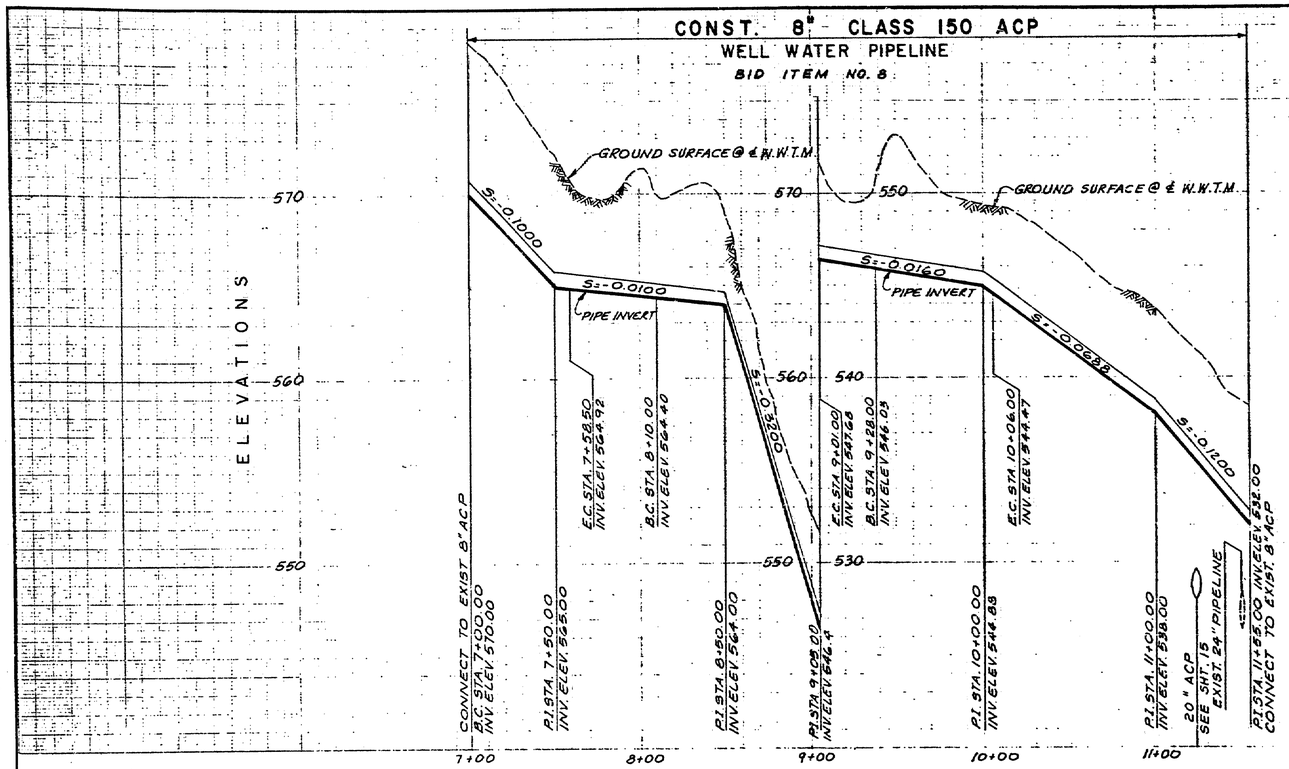
LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

WEST TRANSMISSION MAINS
WEST PUMP STATION
20" DISCHARGE LINE
PLAN & PROFILE

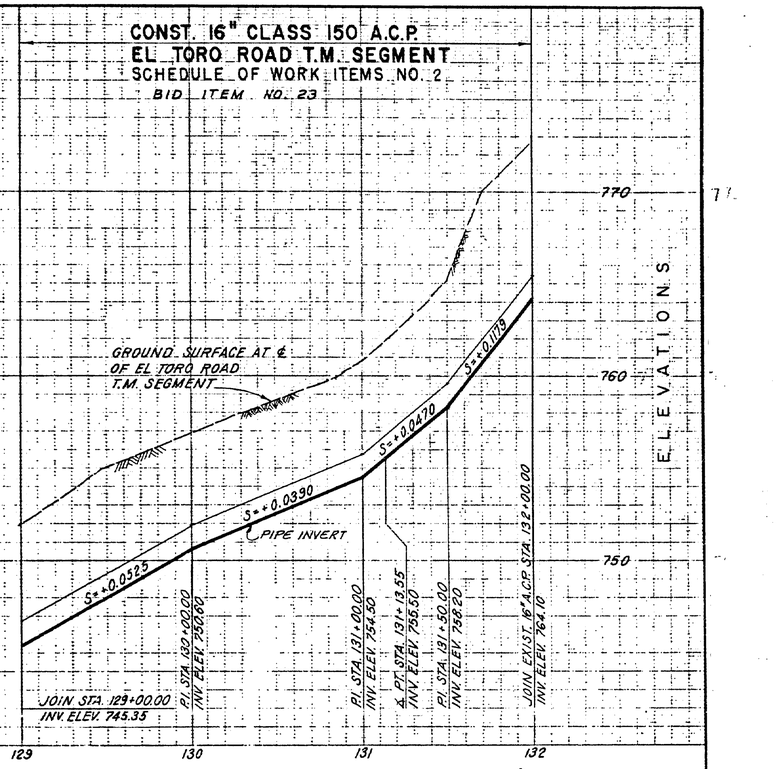
NO.	DATE	DESCRIPTION	APP.
1	10/24/79	ADDENDUM NO. 1 REVISION	RPK

DESIGN G.B. DRAWN J.C. CHECKED R.P.K.
Boyle Engineering Corporation
consulting engineers | architects
DATE AUG. 1979 | J.O. X-43 | 8-L04-125-06 | D-2053
SHEET NO. 15 OF 23 SHEETS

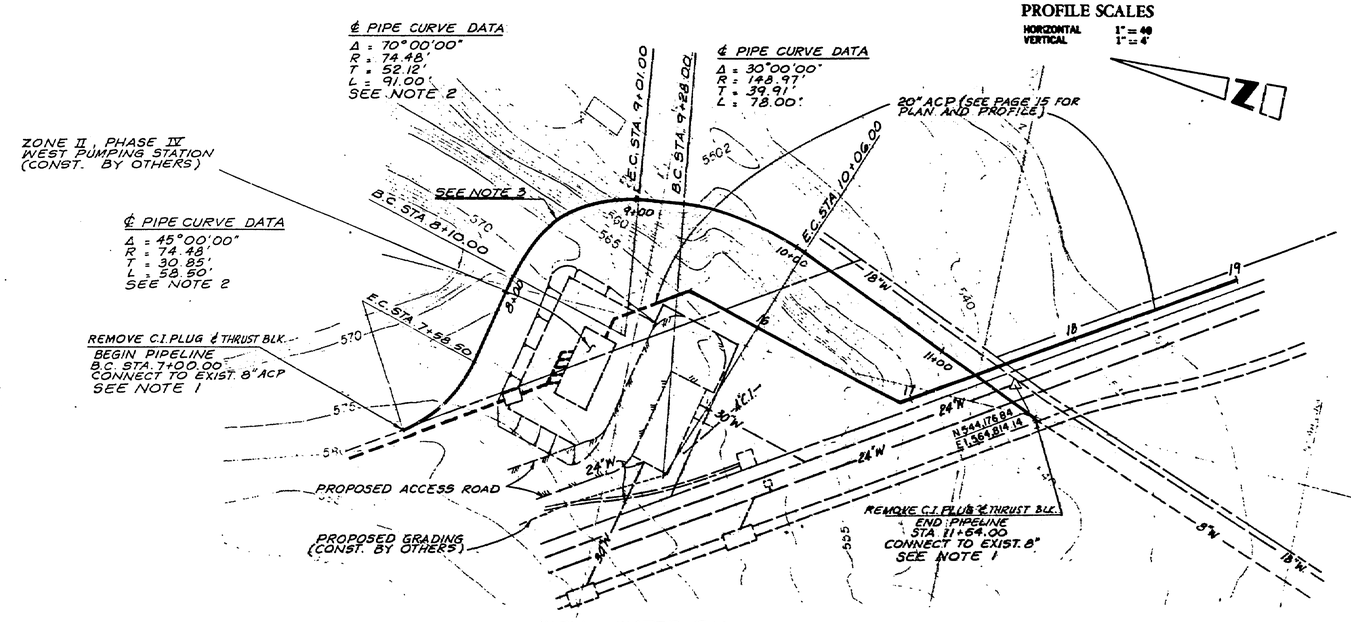
CONST. 8" CLASS 150 ACP
WELL WATER PIPELINE
BID ITEM NO. 8



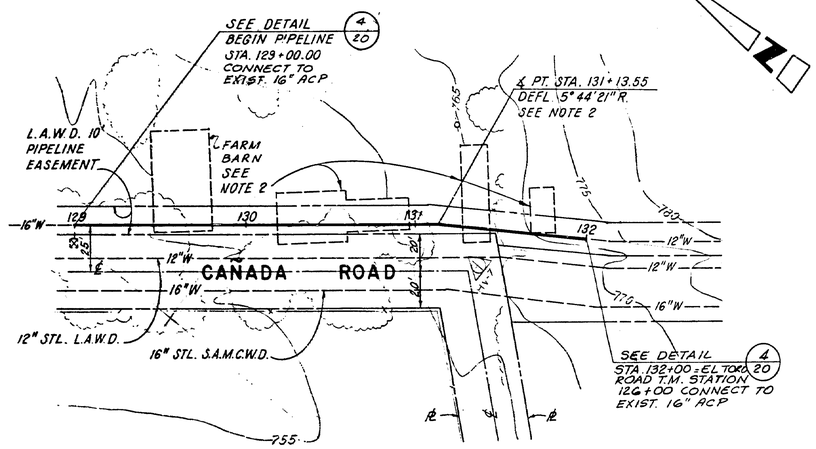
CONST. 16" CLASS 150 A.C.P.
EL TORO ROAD T.M. SEGMENT
SCHEDULE OF WORK ITEMS NO. 2
BID ITEM NO. 23



PROFILE SCALES
HORIZONTAL 1" = 40
VERTICAL 1" = 4'



WELL WATER T.M.
PLAN ⚠
SCHEDULE OF WORK ITEMS NO. 1



EL TORO ROAD T.M. 300' SEGMENT
PLAN ⚠
SCHEDULE OF WORK ITEMS NO. 2

NOTES:
1. CONTRACTOR SHALL POT HOLE AND VERIFY EXIST. 8" PIPELINE LOCATION AND INVERT BEFORE CONST. AS NOTED IN THE SPECIFICATIONS SECTION G-3 PART 1 OF SPECIAL CONDITIONS.
2. USE 6½ LENGHT A.C.P. BELLED AT JOB SITE
3. TEST PRESSURE AT 100 PSI

PLAN SCALE: 1"=40'

NOTE:
1. PULL ACP JOINTS EQUALLY EACH SIDE TO MEET ALIGNMENT USE 13'-0" LENGHTS ACP.
2. WOODEN FRAME FARM BARNS WILL BE REMOVED BY OTHERS BEFORE SCHEDULE NO. 2 IS AWARDED.

NO.	DATE	DESCRIPTION	APP
⚠	10/24/79	ADDENDUM NO. 1 REVISIONS	RPK

LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

WELL WATER TRANSMISSION MAIN
EL TORO ROAD T.M. SEGMENT
PLAN & PROFILE

DESIGN D.M. | DRAWN J.C. | CHECKED R.P.K. | DATE AUG. 1979 | SCALE H: X-43 | B-L04-125-06 | D-2053

Boyle Engineering Corporation
consulting engineers / architects

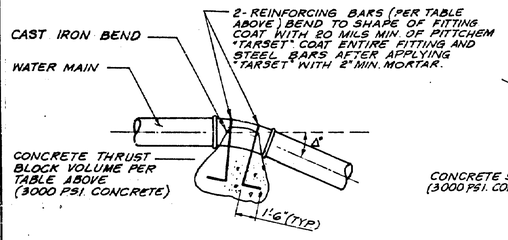
SHEET NO. 16 of 23 SHEETS

TABLE IS BASED UPON 2000 PSF ALLOWABLE SOIL BEARING

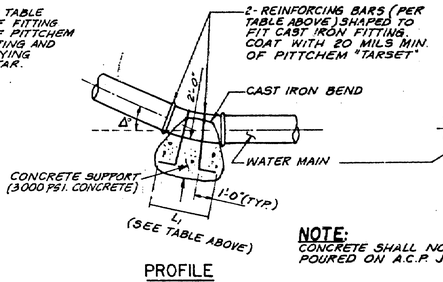
THRUST BLOCK DIMENSIONS

PIPE SIZE	0° TO 11¼°				11¼° TO 22½°				22½° TO 45°				45° TO 90°				DEAD ENDS & TEES			PIPE SIZE
CLASS 150	HORIZ. $L_1 \times L_2$	VERT C.Y. A.C.P.	VERT C.Y. C.C.P.	VERT. REBAR	HORIZ. $L_1 \times L_2$	VERT C.Y. A.C.P.	VERT C.Y. C.C.P.	VERT REBAR	HORIZ. $L_1 \times L_2$	VERT C.Y. A.C.P.	VERT C.Y. C.C.P.	VERT REBAR	HORIZ. $L_1 \times L_2$	VERT C.Y. A.C.P.	VERT C.Y. C.C.P.	VERT REBAR	HORIZ. $L_1 \times L_2$	VERT C.Y. A.C.P.	VERT C.Y. C.C.P.	CLASS 150
12	1.5 × 2	1.5	—	#6	2'×3'	3.0	—	#6	3'×4'	5.9	—	#6	4.5×5	10.8	—	#8	4×4	7.6	—	12"
18	2×3	3.1	—	#6	3'×4	6.1	—	#6	5'×5'	11.9	—	#10	8'×5.5'	22.0	—	#11	6'×5.5	15.6	—	18"
20	2.5×3	3.8	—	#6	4'×4'	7.5	—	#8	5'×6'	14.7	—	#10	9'×6'	27.2	—	#14	6.5×6	19.2	—	20"
CLASS 200																				CLASS 200
18	2.5×3	3.8	—	#6	4×4	7.5	—	#8	5×6	14.7	—	#10	9'×6'	27.2	—	#14	6.5×6'	19.2	—	18"

NOTE: CAST IRON FITTINGS:
CAST IRON FITTINGS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE SPECIFICATION. THE GASKET SEAT IN THE BELL SHALL BE MACHINE MADE RATHER THAN CAST. THE MANUFACTURER SHALL FURNISH THE DISTRICT WITH CERTIFICATIONS PRIOR TO INSTALLATION THAT THE TOLERANCES OF THE GROOVE SHALL MEET THE TOLERANCES OF THE PIPE.

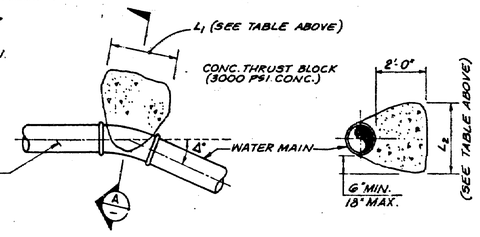


PROFILE
TYPICAL VERTICAL THRUST BLOCK



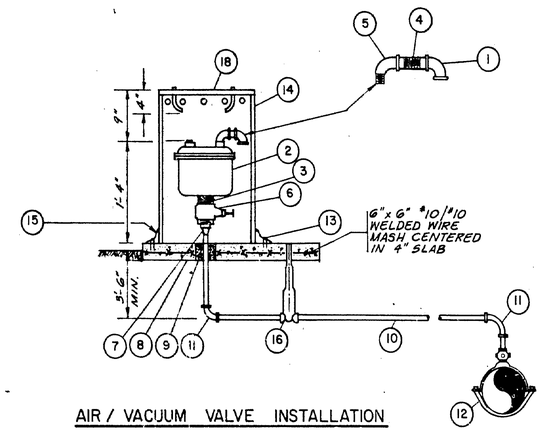
PROFILE
TYPICAL VERTICAL SUPPORT

NOTE:
CONCRETE SHALL NOT BE POURED ON A.C.P. JOINTS



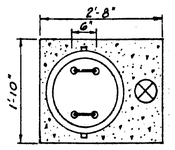
PLAN SECTION A

TYPICAL HORIZONTAL THRUST BLOCK



AIR / VACUUM VALVE INSTALLATION

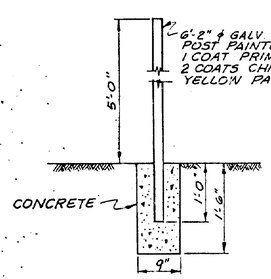
DETAIL 2
N.T.S.



PLAN

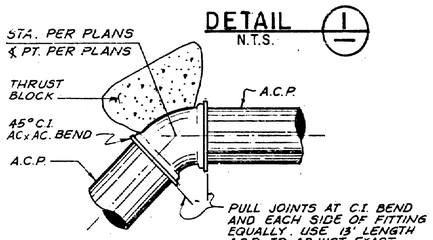
MATERIAL LIST	
NO.	DESCRIPTIONS
1	90° ELL. (SCREEN)
2	2" COMB. AIR & VACUUM RELEASE VALVE APCO 145C OR APPRV'D. EQ.
3	SHORT NIPPLE
4	2½" LONG NIPPLE
5	90° STREET ELL.
6	MUELLER NO. H-10914 OR CRANE NO. 622 OR APPRV'D. EQ. GATE VA. W/BRONZE HAND WHEEL
7	MUELLER NO. H-15425 OR JONES NO. J-1531 OR APPRV'D. EQ. COPPER TO IRON PIPE FITTING.
8	36"x30" CONCRETE BASE
9	4" ϕ HOLE PACKED PEA GRAVEL
10	TYPE "K" COPPER
11	LONG TURN BEND
12	SERVICE CLAMP SMITH-BLAIR OR APPRV'D. EQ.
13	EMBED EYE BOLT (2 EA.)
14	16"x.8 GA. STEEL PIPE DOUBLE DIPPED AND GALVANIZED
15	HASP
16	MUELLER H-10314
17	MUELLER NO. H-15204
18	18" ϕ .8 GA. STL. ℄ DOUBLE DIPPED GALV.

TYPICAL THRUST BLOCKS



℄ PT. MARKER

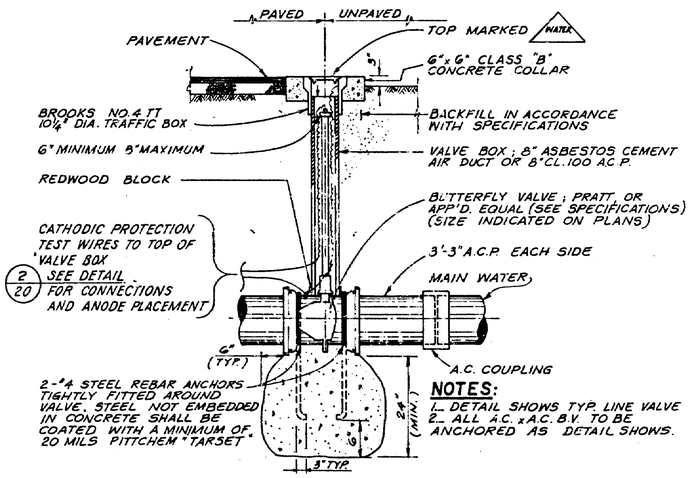
DETAIL 3
N.T.S.



DETAIL 1
N.T.S.

NOTE:
DIRECTION OF BEND IS FOR REPRESENTATION ONLY

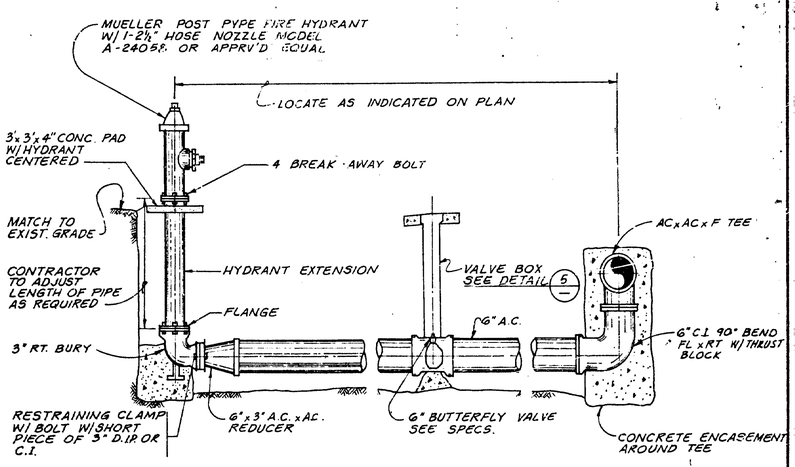
DETAIL 4
N.T.S.



NOTES:
1. DETAIL SHOWS TYP. LINE VALVE
2. ALL A.C. x A.C. B.V. TO BE ANCHORED AS DETAIL SHOWS.

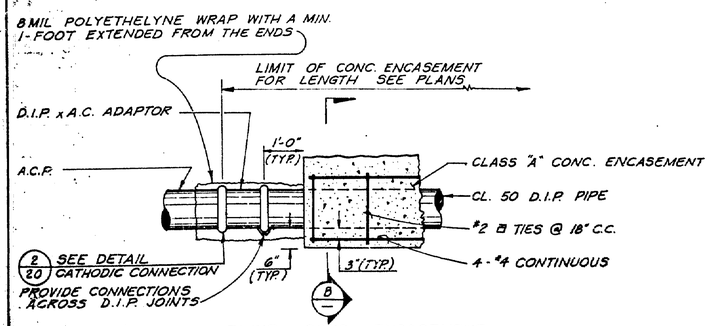
VALVE BOX AND SUPPORT

DETAIL 5
N.T.S.



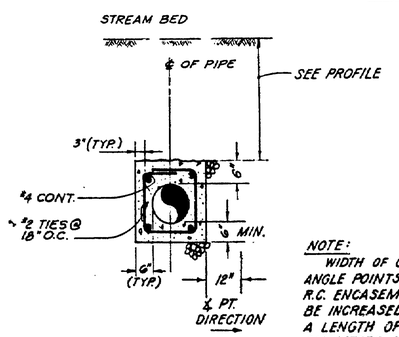
STANDARD BLOWOFF VALVE

DETAIL 6
N.T.S.



PIPELINE CONC. ENCASEMENT

DETAIL 7
N.T.S.



NOTE:
WIDTH OF CONCRETE AT ANGLE POINTS WITHIN THE R.C. ENCASEMENT SHALL BE INCREASED 12" FOR A LENGTH OF 4 PIPE DIAMETERS EACH SIDE OF ANGLE POINT.

SECTION 8
N.T.S.

GENERAL NOTE:
1. ALL BURIED FERROUS FITTINGS AND VALVES SHALL BE WRAPPED WITH 8 MIL. POLYETHELYNE WRAP A MINIMUM 1-FOOT TO BE EXTENDED FROM THE ENDS OF THE FITTINGS;

LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

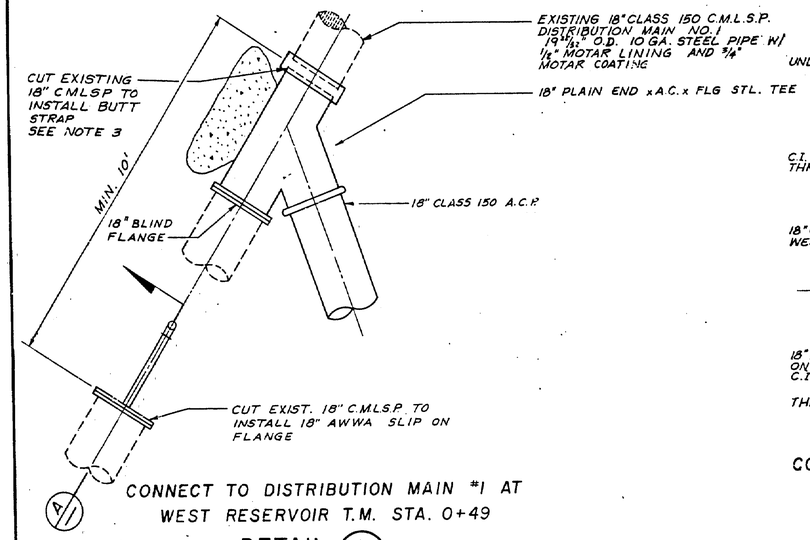
WEST TRANSMISSION MAINS
DETAILS

REV	DATE	DESCRIPTION	APP.

DESIGN R.P.K. | DRAWN J.C. | CHECKED V.E.O. | DATE AUG. 1979 | P.R. X-45 | B-L04-125-06 | D-2053

Boyle Engineering Corporation
consulting engineers / architects

SHEET NO. 17 OF 23 SHEETS

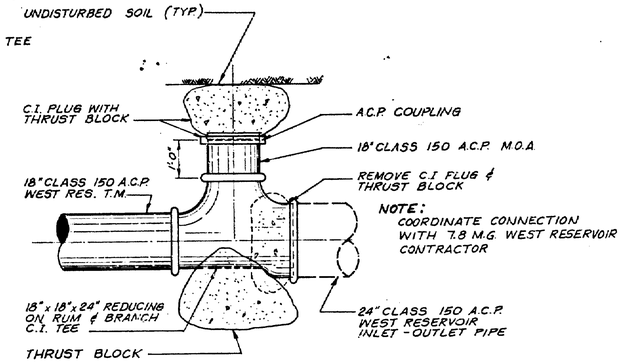


CONNECT TO DISTRIBUTION MAIN #1 AT WEST RESERVOIR T.M. STA. 0+49

DETAIL 1 / N.T.S. / —

BID ITEM NO. 10

NOTE: SEE DETAIL 2/13 FOR CONNECTION OF DIST. MAIN NO. 1 TO NO. 5 EASTERLY OF SERRANO CREEK IN CANADA ROAD

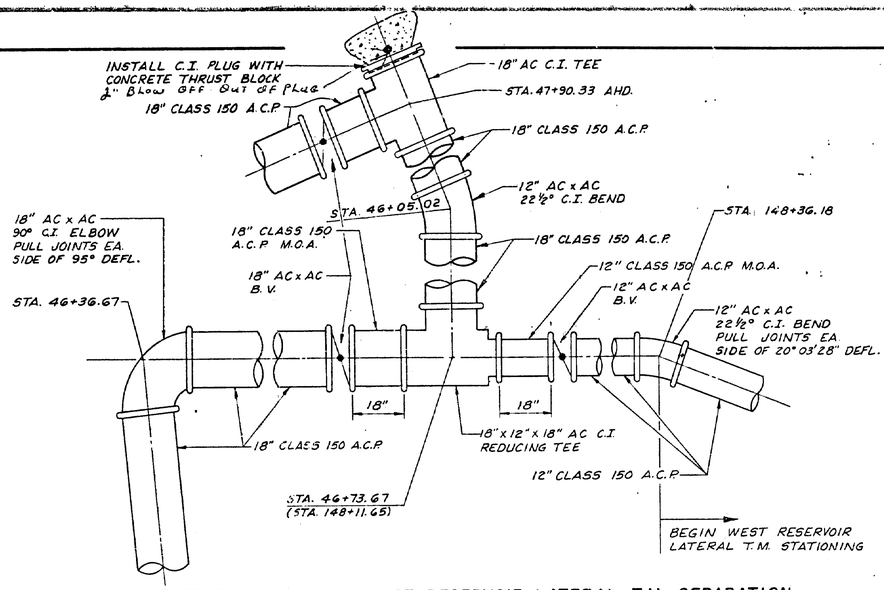


CONNECTION TO 7.8 M.G. WEST RESERVOIR AT WEST RESERVOIR T.M. STA. 65+95.01

DETAIL 2 / N.T.S. / —

BID ITEM NO. 11

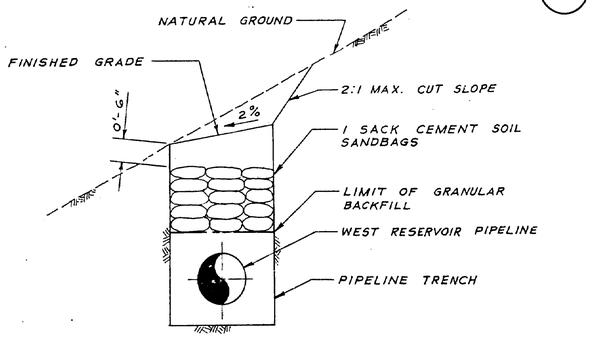
NOTE: EXACT LOCATION OF BLOWOFF HYDRANT PER L.A.W.D.



WEST RESERVOIR T.M. & WEST RESERVOIR LATERAL T.M. SEPARATION

DETAIL 3 / N.T.S. / —

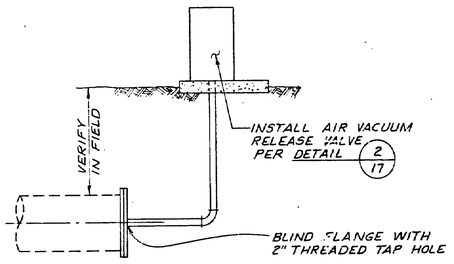
AS PART OF BID ITEM NO. 2

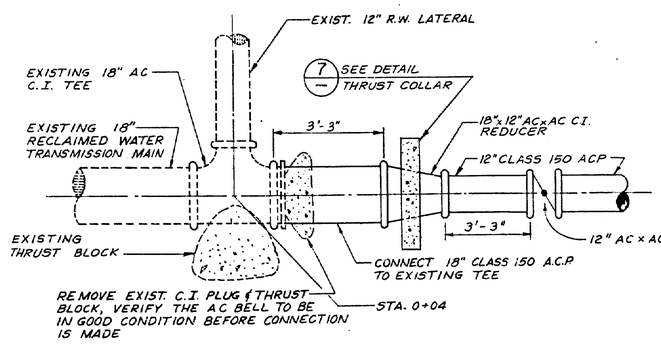


SECTION A

TRENCH SLOPE STABILIZERS

DETAIL 4 / N.T.S. / —



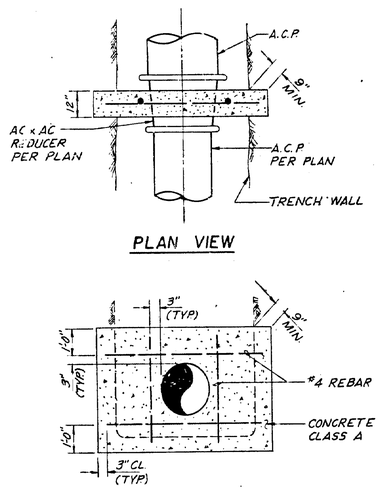


CONNECTION TO 18" RECLAIMED WATER T.M. AT WEST RECLAIMED WATER T.M. STA. 0+04.00

DETAIL 5 / N.T.S. / — ⚠

BID ITEM NO. 13

DETAIL 6 / N.T.S. / —



DETAIL 7 / N.T.S. / —

GENERAL NOTES:

1) ALL FERROUS FITTINGS SHALL BE WRAPPED WITH 8 MILLS POLYETHELINE. WRAP A MIN. OF 1 FOOT BEYOND THE ENDS OF THE FITTINGS.
2) L.A.W.D. IS TO BE NOTIFIED 48 HOURS IN ADVANCE OF ALL CONNECTIONS
3) CONTRACTOR SHALL SUBMIT SHOP DRAWINGS PER SECTION 7, SPECIAL CONDITIONS OF THE SPECIFICATIONS
4)

LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

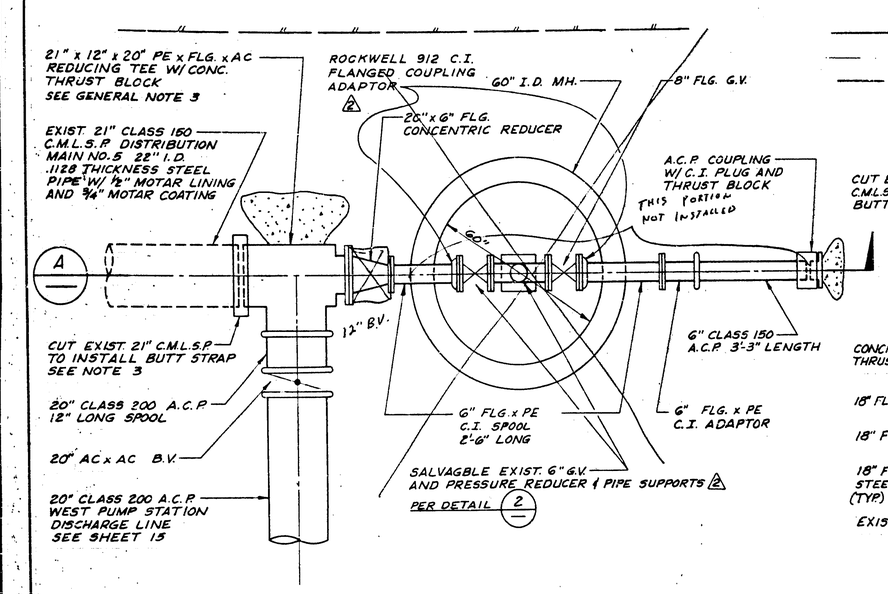
WEST TRANSMISSION MAINS
DETAILS

MK.	DATE	DESCRIPTION	APP.
⚠	10/24/79	ADDENDUM NO. 1 REVISIONS	R.P.K.

DESIGN R.P.K. · DRAWN R.S. · CHECKED V.E.O. · DATE AUG. 1979 · F.B. X-45 · B-L04-125-06 · D-2053

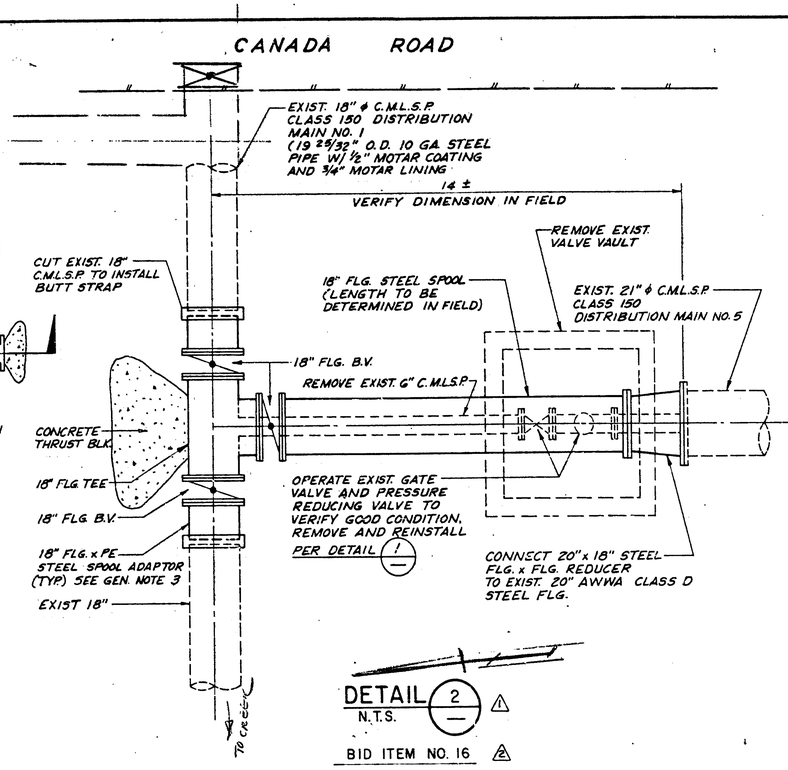
Boyle Engineering Corporation
consulting engineers / architects

SHEET NO. 18 OF 23 SHEETS



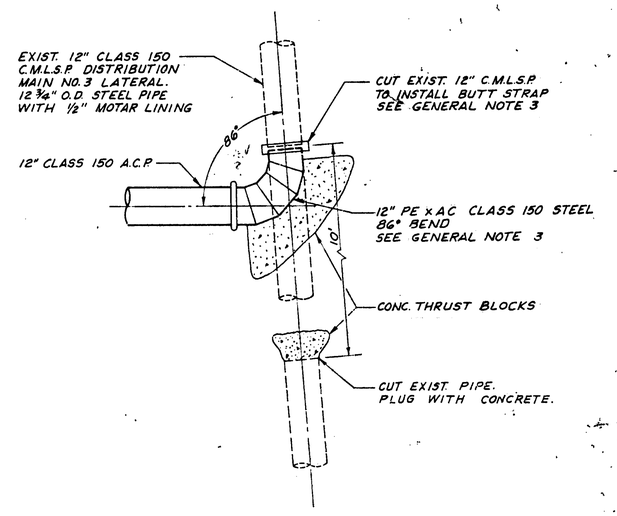
DETAIL 1 N.T.S. ⚠

BID ITEM NO. 15



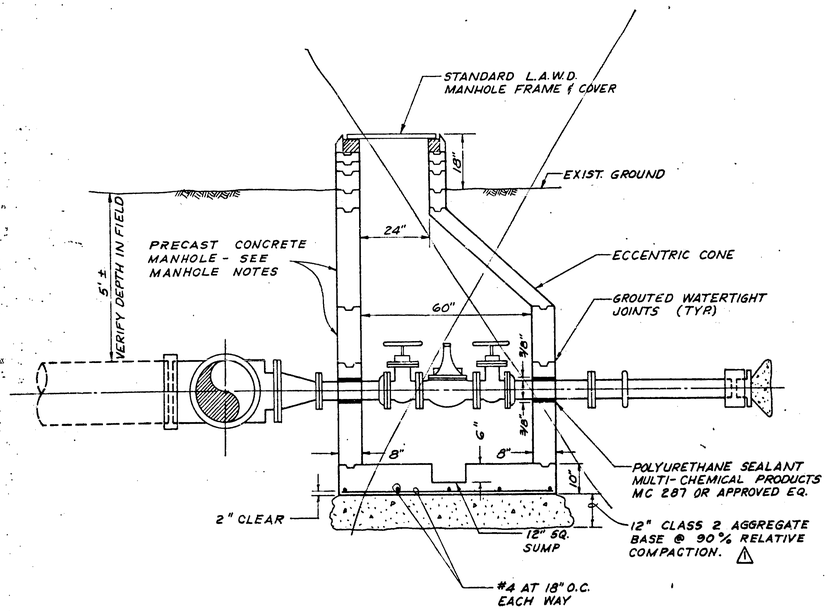
DETAIL 2 N.T.S. ⚠

BID ITEM NO. 16 ⚠2



DETAIL 3 N.T.S. ⚠

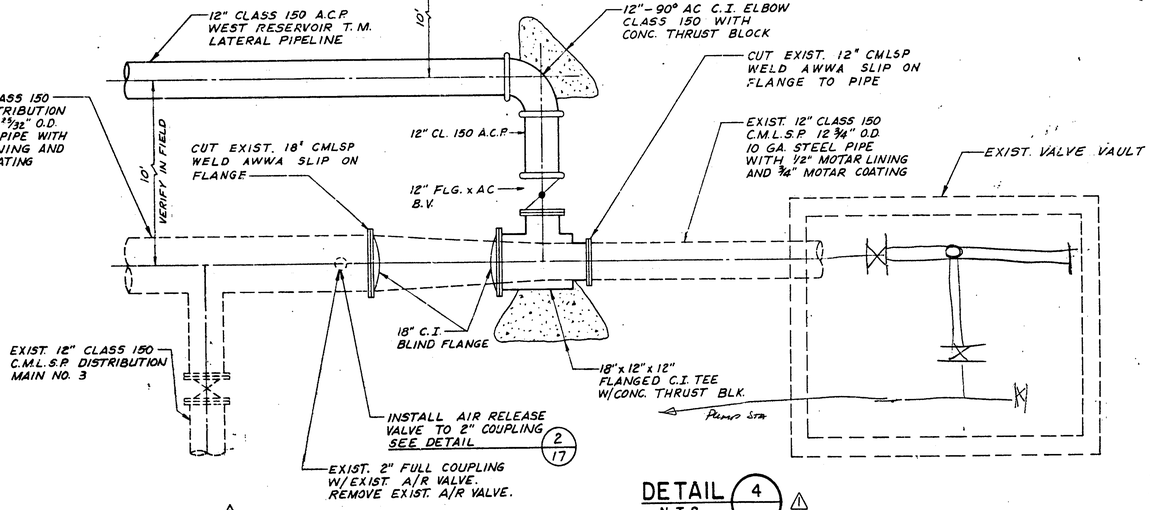
BID ITEM NO. 14



SECTION A N.T.S. ⚠

MANHOLE NOTES

1) CONCRETE RINGS, CONES AND SECTIONS SHALL BE AS MANUFACTURED BY ASSOCIATED CONCRETE PRODUCTS OF APPROVED EQUAL.
2) 24" SIZE MANHOLE FRAME AND COVER SHALL BE AS MANUFACTURED BY E.B. MORITZ FOUNDRY, MODEL NO.'S M-1254 OR APPROVED EQUAL. 36" SIZE SHALL BE E.B MORITZ FOUNDRY MODEL NO. M-3644 OR APPROVED EQUAL AND BOTH SIZES AS MODIFIED PER DETAILS THIS SHEET.
3) HOOPS OF #4 WIRE SHALL BE CAST INTO ALL SHAFT SECTIONS FOR SAFETY OF HANDLING.



DETAIL 4 N.T.S. ⚠

BID ITEM NO. 12

GENERAL NOTES

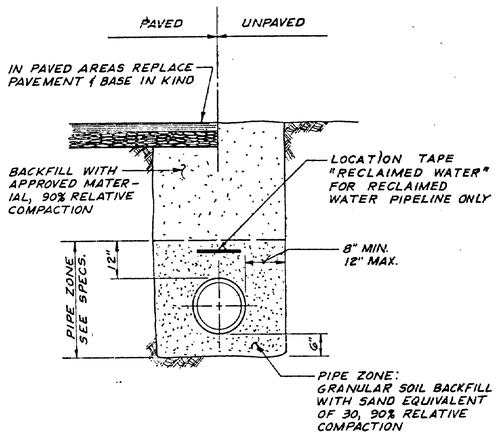
1) ALL FERROUS FITTINGS SHALL BE WRAPPED WITH 8 MILS. POLYETHYLINE. WRAP A MIN. OF 1 FOOT BEYOND THE ENDS OF THE FITTINGS.
2) L.A.W.D. IS TO BE NOTIFIED 48 HOURS IN ADVANCE OF ALL CONNECTIONS.
3) CONTRACTOR SHALL SUBMIT SHOP DRAWINGS PER SECTION 7, SPECIAL CONDITIONS OF THE SPECIFICATIONS.

REV.	DATE	DESCRIPTION	APP.
2	11/5/79	ADDENDUM NO. 2 REVISIONS	RPK
1	10/24/79	ADDENDUM NO. 1 REVISIONS	RPK

LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

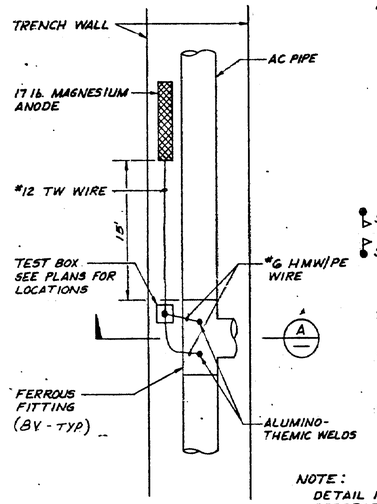
WEST TRANSMISSION MAINS
DETAILS

DESIGN R.P.K. DRAWN J.C. CHECKED V.E.O.
Boyle Engineering Corporation consulting engineers / architects
DATE AUG 1979 F.B. X-45 8-L04-125-06 D-2053
SHEET NO. 19 of 23 SHEETS



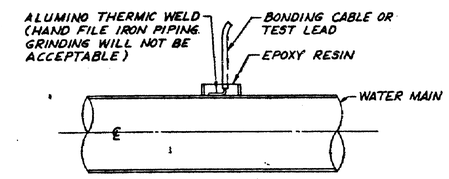
TYPICAL TRENCH SECTION

DETAIL 1 N.T.S.



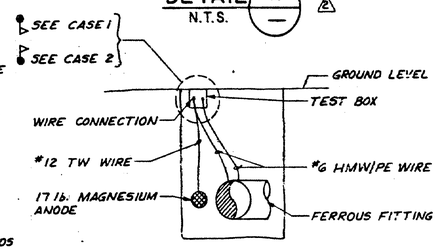
NOTE: DETAIL IS REPRESENTATIONAL ONLY

DETAIL 2 N.T.S.



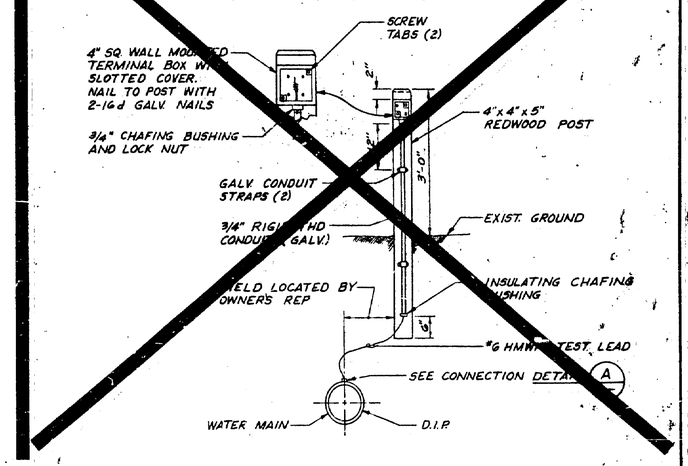
TYPICAL CATHODIC PROTECTION CABLE CONNECTION

DETAIL A N.T.S. ⚠2



SECTION A N.T.S.

NOT A PART



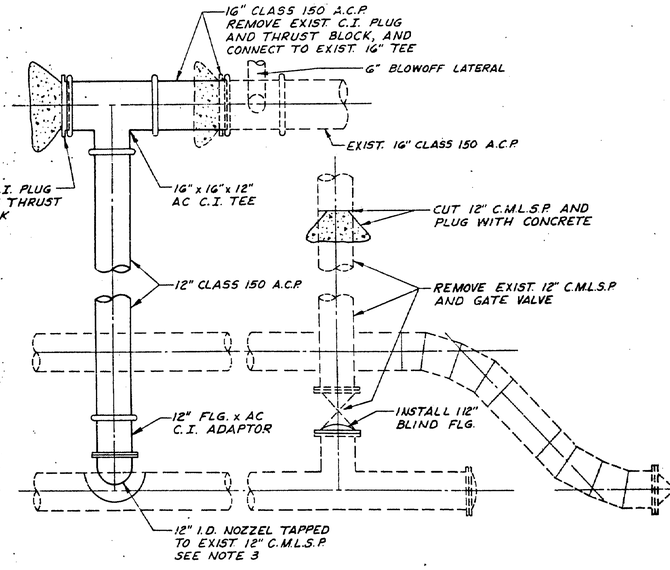
SEE DETAIL 5/17

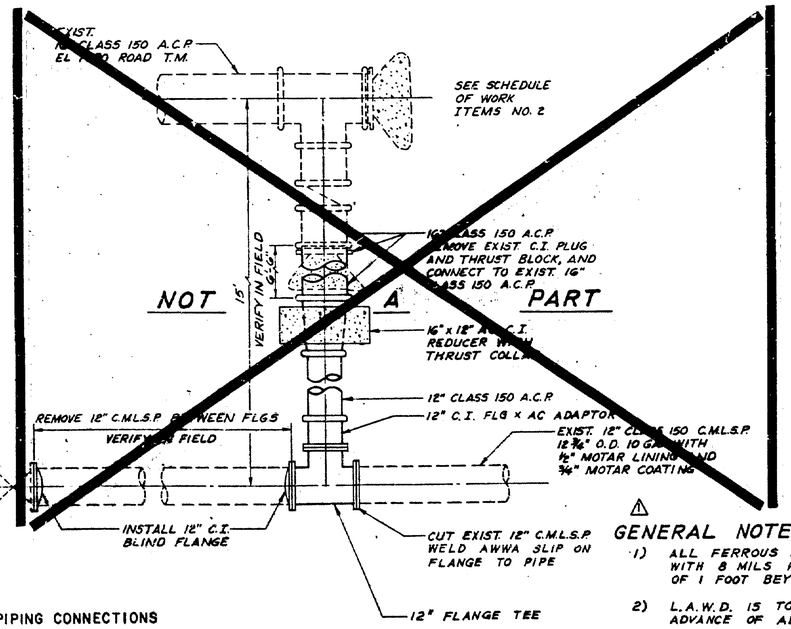
TYPICAL INSTALLATION AT VALVES

CASE 1

TYPICAL INSTALLATION AT D.I.P. ENCASEMENT

CASE 2



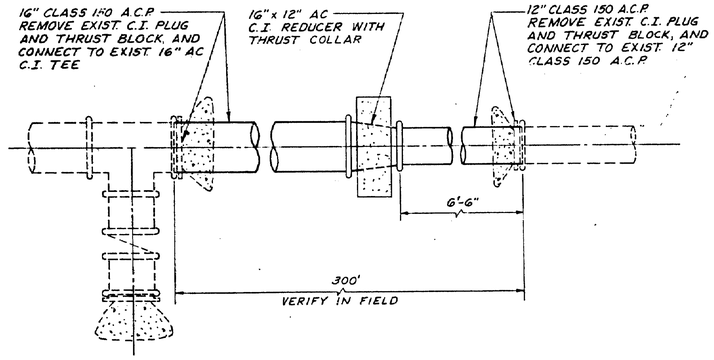


NOT A PART

CAÑADA ROAD PIPING CONNECTIONS

DETAIL 3 N.T.S. ⚠1

BID ITEM NO. 16 ⚠2



DETAIL 4 N.T.S.

SCHEDULE OF WORK ITEMS NO. 2

BID ITEM NO. 23

GENERAL NOTES:

1) ALL FERROUS FITTINGS SHALL BE WRAPPED WITH 8 MILS POLYETHYLINE. WRAP A MIN. OF 1 FOOT BEYOND THE ENDS OF THE FITTINGS.
2) L.A.W.D. IS TO BE NOTIFIED 48 HOURS IN ADVANCE OF ALL CONNECTIONS.
3) CONTRACTOR SHALL SUBMIT SHOP DRAWINGS PER SECTION 7, SPECIAL CONDITIONS OF THE SPECIFICATIONS.

LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

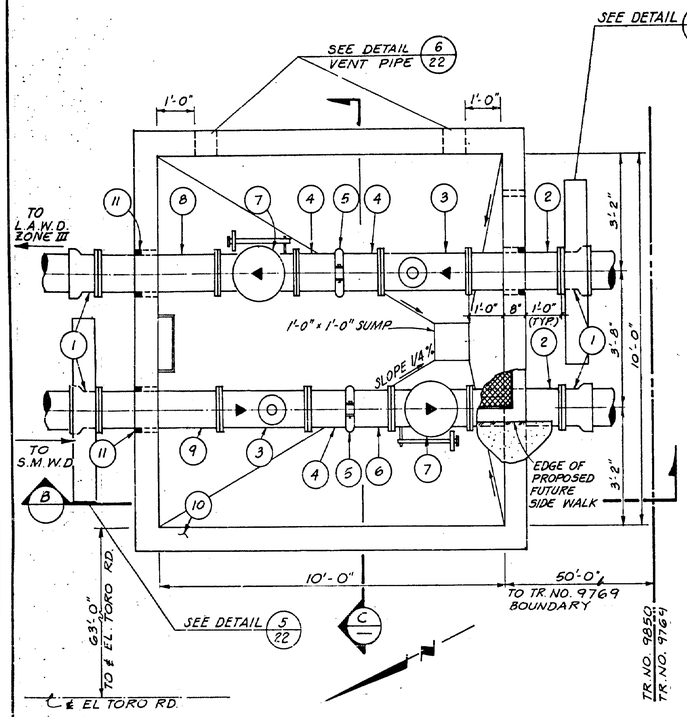
WEST TRANSMISSION MAINS
DETAILS

REV	DATE	DESCRIPTION	APP
⚠1	11/5/79	ADDENDUM NO. 2 REVISIONS	RPK
⚠2	10/24/79	ADDENDUM NO. 1 REVISIONS	RPK

DESIGN R.P.K. DRAWN R.S. CHECKED V.E.G. DATE AUG. 1979 FILE X-43 B-L04-125-06 D-2053

Boyle Engineering Corporation
consulting engineers / architects

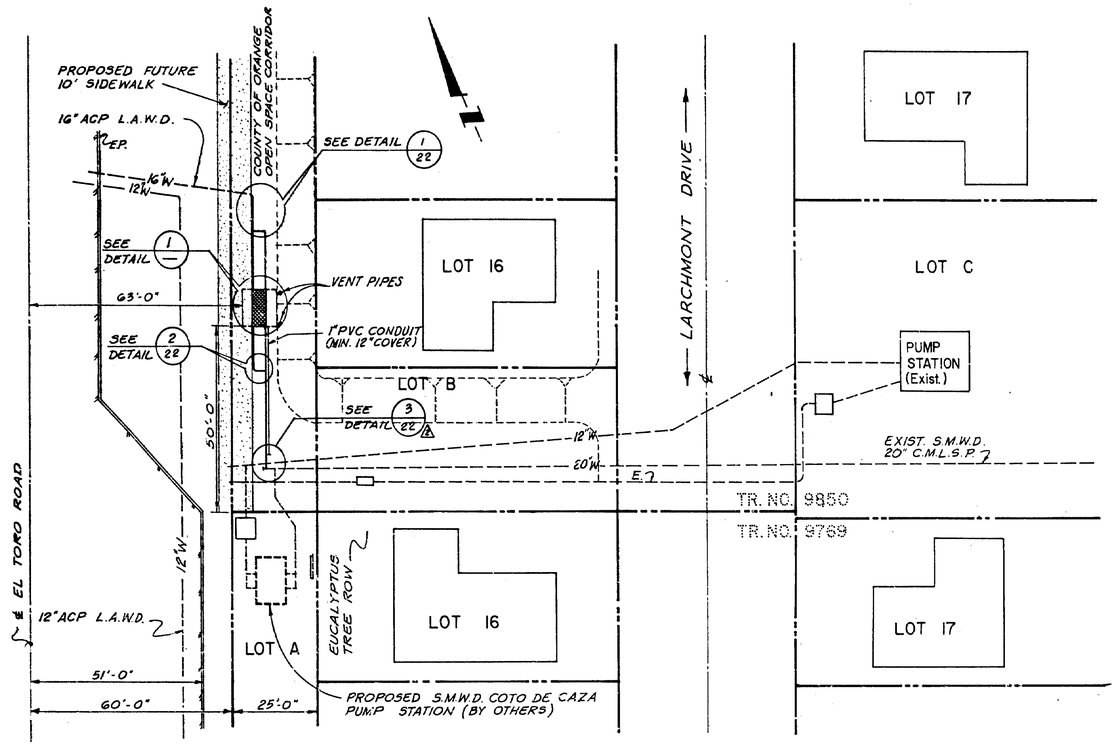
SHEET NO. 20 OF 23 SHEETS



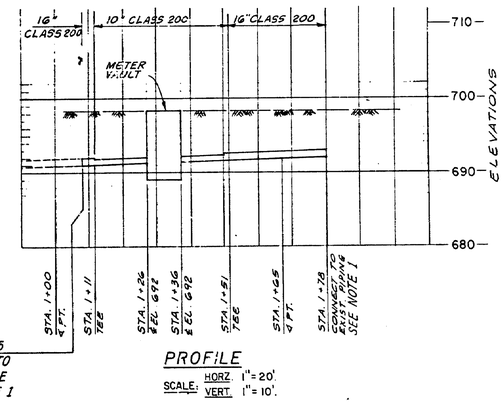
METER VAULT PLAN

DETAIL 1 / —
1/2" = 1'-0"

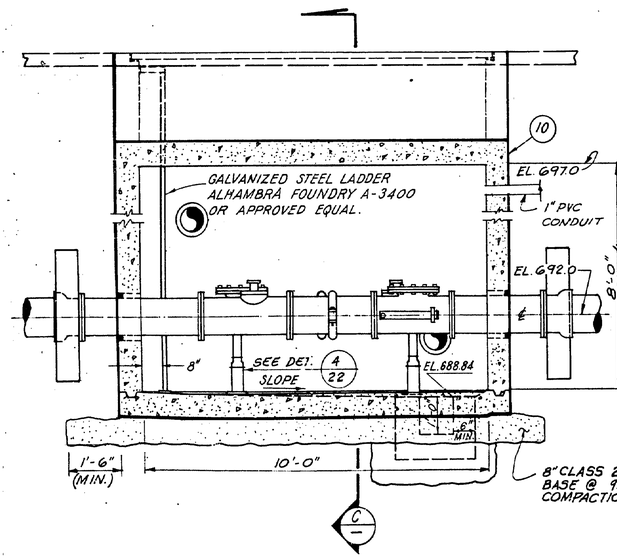
PIPING MATERIAL SCHEDULE		
ITEM	SIZE	DESCRIPTION
1	12"	FLANGED X AC CAST IRON REDUCER
2	12"	2'-8" LONG FLANGED CAST IRON SPOOL.
3	12"	"MUESCO" FST-20 WATER METER WITH 125# STANDARD FLANGES, 250 PSI METER HEAD WORKING PRESSURE RATING AND PIT 1 TRANSMITTING HEAD.
4	12"	FLANGE x GROOVED END CAST IRON SPOOL 1'-6" LONG.
5	12"	VICTAULIC COUPLING STYLE 31 OR APPROVED EQUAL.
6	12"	FLANGE X GROOVED END CAST IRON SPOOL 1'-6" LONG.
7	12"	"APCO" SWING CHECK VALVE MODEL 6012 WITH WEIGHTED LEVER ONLY.
8	12"	4'-0" LONG FLANGED CAST IRON SPOOL.
9	12"	3'-6" LONG FLANGED CAST IRON SPOOL.
C	10' X 10'	PRECAST "QUICKSET" PANEL VAULT WITH 8'-0" INSIDE VAULT HEIGHT AND CENTERED OPENING FOR 3' X 10' CAST-IN-PLACE NECKING.
11	---	"LINK-SEAL" WALL PENETRATION SEAL SYSTEM.
12	3' X 10'	"BILCO" TYPE J-AL SINGLE LEAF ALUMINUM DOOR WITH 10' HINGE (SPECIAL SIZE) AND RECESSED PADLOCK.



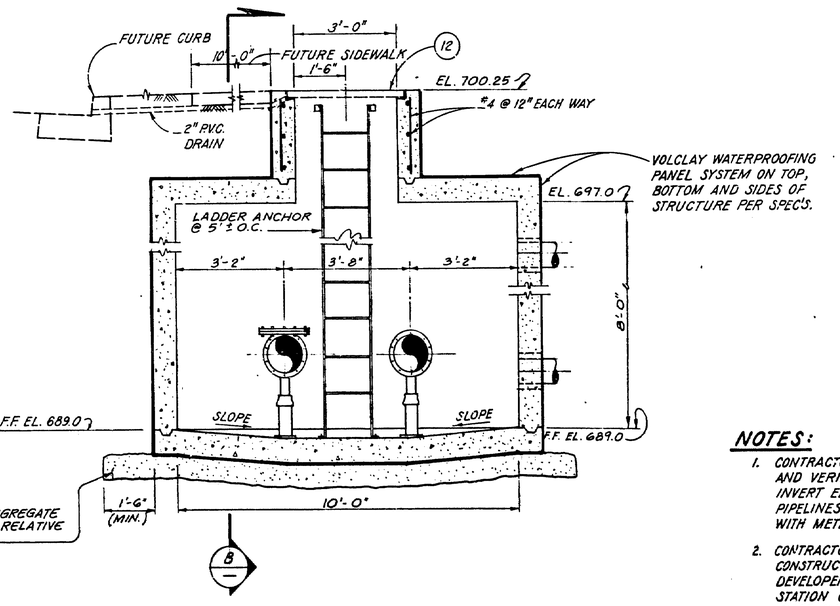
SITE PLAN
SCALE: 1" = 20'



PROFILE
SCALE: HORZ 1" = 20'
VERT 1" = 10'.



SECTION B / —
1/2" = 1'-0"



SECTION C / —
1/2" = 1'-0"

NOTES:

1. CONTRACTOR SHALL POTHOLE AND VERIFY LOCATION AND INVERT ELEVATION OF EXIST. PIPELINES BEFORE PROCEEDING WITH METER VAULT CONSTRUCTION.
2. CONTRACTOR SHALL COORDINATE CONSTRUCTION WITH TR. NO. 9850 DEVELOPERS AND S.M.W.D. PUMP STATION CONTRACTOR. (EL TORO ROAD IMPROVEMENTS, 20" CONNECTION ETC.)
3. ALL CAST IRON FITTINGS AND VALVES SHALL BE WRAPPED IN POLYETHYLENE IN ACCORDANCE TO A.W.W.A. C105.

REV	DATE	DESCRIPTION	APP
2	11/8/79	S.M.W.D. REVISION	R.P.
1	10/22/79	ADDENDUM NO.1 REVISION	R.P.K.

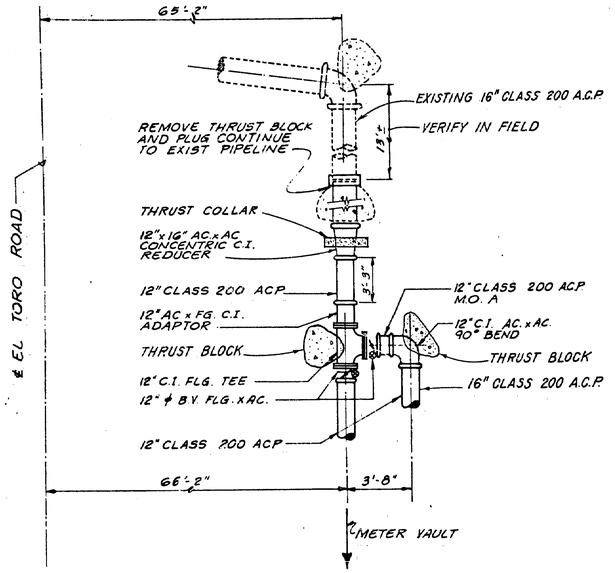
LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

SANTA MARGARITA WATER DISTRICT
ZONE III METER INTERTIE

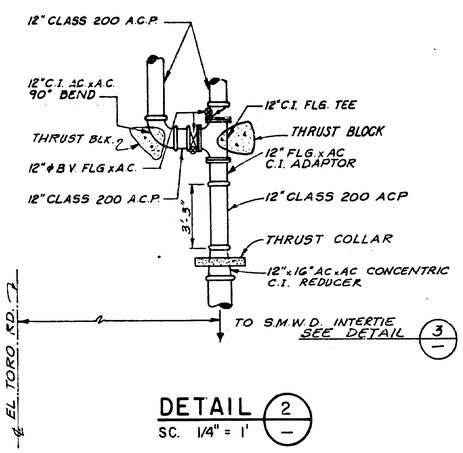
DESIGN R.P.K. | DRAWN S.V.H., J.C. | CHECKED V.E.O. | DATE AUG. 1979 | F.B. X-43 | B-L04-125-06 | D-2053

Boyle Engineering Corporation
consulting engineers / architects

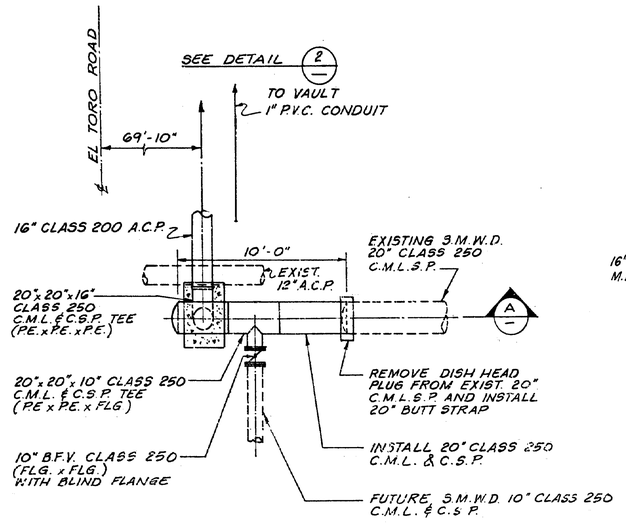
SHEET NO. 21 OF 23 SHEETS



DETAIL 1
SC. = 1/4" = 1'.

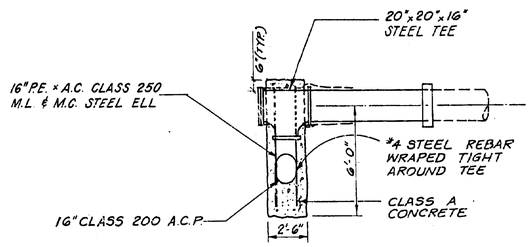


DETAIL 2
SC. 1/4" = 1'



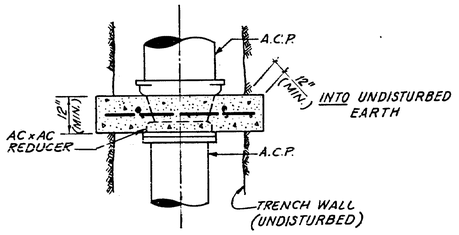
CONNECTION TO S.M.W.D. PLAN A

DETAIL 3
SC. 1/4" = 1'

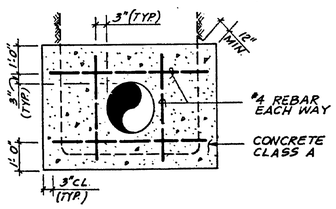


CONNECTION TO S.M.W.D.

SECTION A
SC. = 1/4" = 1'



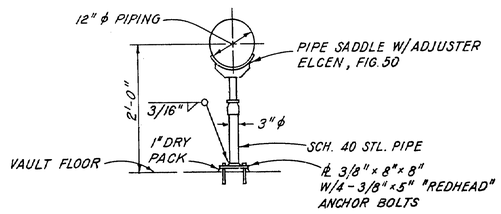
PLAN VIEW



SECTION

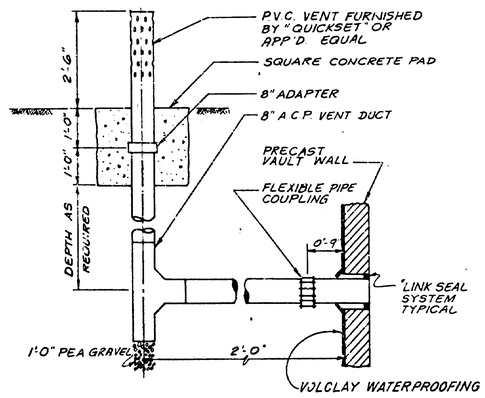
REDUCER THRUST COLLAR

DETAIL 5
SC. 1/2" = 1'.



PIPE SUPPORT

DETAIL 4
N.T.S.



NOTE: TWO VENTS REQUIRED ONE ℄ LOCATED 1'-0" ABOVE FLOOR THE OTHER ℄ LOCATED 1'-0" BELOW TOP SLAB

VENT PIPE

DETAIL 6
SC 1/2" = 1'

LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

SANTA MARGARITA WATER DISTRICT
ZONE III METER INTERTIE

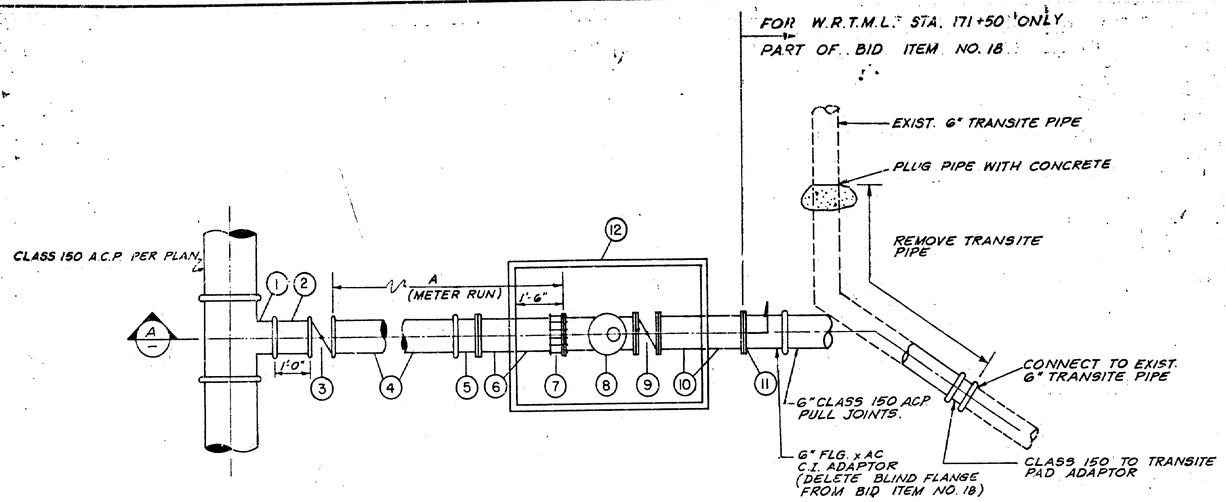
NO.	DATE	DESCRIPTION	APP.
2	11/8/79	S.M.W.D REVISION	K.P
1	10/22/79	ADDENDUM NO.1 REVISION	R.P.K.

DESIGN R.P.K. DRAWN S.W.H., J.C. CHECKED V.E.O. DATE OCT. 1979 I.D. X-43

South Engineering Corporation
consulting engineers / architects

B-L04-125-06 | D - 2053

SHEET NO. 22 OF 23 SHEETS



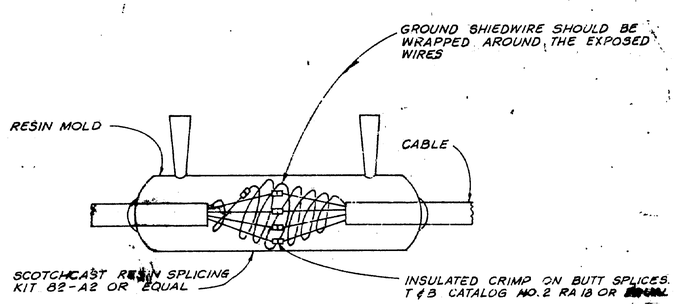
PLAN

METER VAULT MATERIALS LIST	
ITEM	DESCRIPTION
1	AC X AC X AC C.I. TEE
2	A.C.P., N.O.A., CLASS 150
3	BUTTERFLY VALVE, AC X AC, SEE TYP. DETAIL 5, SHT. 17
4	A.C.P., CLASS 150
5	AC X FLG. C.I. ADAPTOR
6	FLG. x F.F. C.I. SPOOL
7	FLANGED COUPLING ADAPTOR, "ROCKWELL" 1072 OR APPROVED EQUAL
8	FLANGED METER, MACHOMETER MCO 350 - 150
9	BUTTERFLY VALVE, FLANGED, WAFER OR APPROV. EQUAL, PROVIDE HAND WHEEL
10	FLG. C.I. SPOOL, 3'-0" LONG
11	BLIND FLANGE
12	PRECAST CONCRETE VAULT WITH GALVANIZED COVER, TYCO #1324 OR APPROVED EQUAL

CONSTRUCTION NOTES:
(1) DIMENSIONS NOT CALLED OUT ARE FOR LEGEND ONLY.
(2) PIPE DIAMETER TO MATCH METER SIZE.

LEGEND				
	PIPELINE STATION	C.I. TEE	METER SIZE	A MINIMUM
BID ITEM NO. 17	W.R.T.M. STA. 63+60	18"x18"x10"	10"	8'-4"
BID ITEM NO. 18	W.R.T.M.L. STA. 162+40	12"x12"x8"	8"	6'-8"
BID ITEM NO. 19	W.R.T.M.L. STA. 171+50	12"x12"x6" *	6"	5'-0"

* PROVIDED BY DISTRICT SEE PLAN

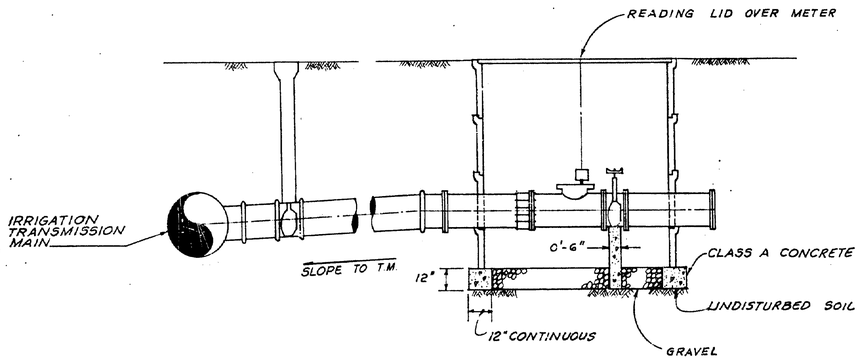


DIRECT BURIAL COMMUNICATIONS CABLE INLINE SPLICING

DETAIL 3 N.T.S.

TELEMETRY CABLE NOTES:

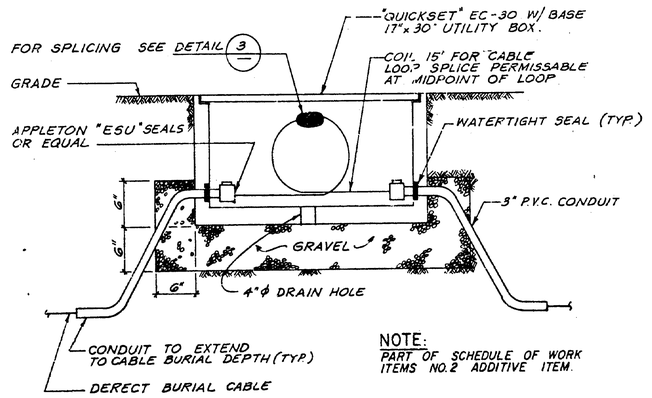
1. 12 PAIR CONDUCTOR CABLE BETWEEN CABLE PULL BOX NO. 1 AT WEST RESERVOIR PIPELINE STA. 2+30 AND CABLE PULL BOX NO. 2 AT WEST RESERVOIR PIPELINE STA. 46+30.
2. 6 PAIR CONDUCTOR CABLE BETWEEN CABLE PULL BOX NO. 2 AT WEST RESERVOIR PIPELINE STA. 46+30 AND CABLE PULL BOX NO. 3 AT WEST RESERVOIR PIPELINE STA. 69+71.
3. 6 PAIR CONDUCTOR CABLE BETWEEN CABLE PULL BOX NO. 2 AT RECLAIMED WATER PIPELINE STA. 7+00 (W.R.T.M. STA. 7+00), AND CABLE PULL BOX NO. 4 AT RECLAIMED WATER PIPELINE STA. 54+67.



SECTION 4

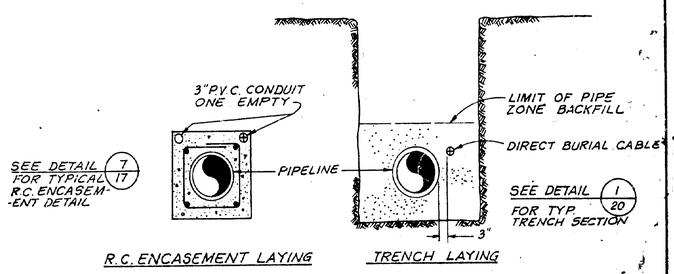
IRRIGATION METER VAULT

DETAIL 1 N.T.S.



DERECT BURIAL COMMUNICATIONS CABLE PULL BOX

DETAIL PULL BOX 2 N.T.S.



DIRECT BURIAL CABLE PLACEMENT

DETAIL 4 N.T.S.

LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

WEST TRANSMISSION MAINS
DETAILS ⚠

REV	DATE	DESCRIPTION	APR.
⚠	10/25	ADDENDUM NO. 1 REVISION	R.P.K.

DESIGN R.P.K. DRAWN J.C. CHECKED V.E.O DATE AUG. 1979 P.R. X-43

Boyle Engineering Corporation consulting engineers / architects

B-L04-125-06 D - 2053

SHEET NO. 23 OF 23 SHEETS

CAPITAL IMPROVEMENT PLANS FOR LAKE FOREST ZONE 2 WEST RESERVOIR DEBRIS BASIN & OVERFLOW PIPE REALIGNMENT

IRWD CODE 5790

PROJECT 11666 (4132)

GENERAL NOTES:

1. STATIONING REFERS TO PIPE STATIONING. DISTANCES SHOWN IN PROFILE AND IN THE ESTIMATED QUANTITIES ARE HORIZONTAL DISTANCES. PIPELINE SLOPES SHOWN ON PROFILE SECTIONS REPRESENT SLOPE OF PIPE BASED ON PIPELINE HORIZONTAL LENGTHS.
2. LOOSE EXCAVATED MATERIAL SHALL NOT BE PLACED OR STORED IN WATERWAYS OR STORM DRAIN CHANNELS. ALL EXCESS EXCAVATED SOIL AND MATERIALS SHALL BE REMOVED AND DISPOSED OF IN A PROPER AND LEGAL MANNER BY THE CONTRACTOR.
3. ALL DISTURBED SURFACE AREAS SHALL BE SHAPED TO FACILITATE DRAINAGE & AVOID PONDING AND RESTORED TO NEAR NATURAL OR PRE-CONSTRUCTION CONDITIONS.
4. INFORMATION ON EXISTING UTILITIES AND OTHER SUB-STRUCTURES WAS OBTAINED FROM THE APPROPRIATE AGENCIES. EXISTING UTILITIES SHALL BE MAINTAINED IN PLACE BY THE CONTRACTOR, UNLESS OTHERWISE NOTED ON THE PLANS. UNLESS OTHERWISE DIMENSIONED, LOCATIONS OF EXISTING UTILITIES AND SUB-STRUCTURES SHOWN ON THE DRAWINGS ARE APPROXIMATE ONLY. THE CONTRACTOR SHALL POTHOLE AND VERIFY EXACT LOCATIONS, ELEVATIONS AND DIMENSIONS IN THE FIELD PRIOR TO CONSTRUCTION IN THE AREA OF THE SPECIFIC SUB-STRUCTURES AND AT ALL CONNECTION POINTS. THE CONTRACTOR SHALL FIELD VERIFY LOCATION OF ALL WET AND DRY UTILITY SERVICES CROSSED AND PROTECT THEM IN PLACE. TRAFFIC SIGNAL CONDUIT AND LOOPS ARE SHOWN ON THE PLANS WHERE DETAIL PLANS ARE AVAILABLE. HOWEVER, THE PLANS DO NOT REFLECT ALL OF THE TRAFFIC SIGNAL CONDUITS AND LOOPS. THE CONTRACTOR SHALL FIELD VERIFY LOCATION OF ALL TRAFFIC SIGNAL LOOPS, CONDUITS AND WIRING AND PROTECT THEM IN PLACE OR REPLACE THEM PER THE PROJECT MANUAL.
5. ADEQUATE TRAFFIC AND SAFETY MEASURES SHALL BE MAINTAINED BY THE PROPER SCHEDULING OF FACILITY INSTALLATION, PAVEMENT RECONSTRUCTION, APPROVED TRAFFIC CONTROL DEVICES, AND IN ACCORDANCE WITH SECURED OR PROVIDED PERMITS. TRAFFIC CONTROL WITHIN THE CITY OF IRVINE AND CITY OF LAKE FOREST SHALL BE IN ACCORDANCE WITH THE RESPECTIVE CITY REQUIREMENTS.
6. CONTRACTOR SHALL REPLACE ALL EXISTING REFLECTION MARKERS DISTURBED ALONG THE ALIGNMENT PER THE STANDARDS OF THE AGENCY HAVING JURISDICTION. ALL THE EXISTING STREET LIGHTING INSTALLATIONS SHALL BE PROTECTED IN PLACE. DISRUPTED OR DAMAGED STREET LIGHTING SYSTEMS SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE AGENCY HAVING JURISDICTION OVER THE AREA. DAMAGED STREET LIGHT CONDUIT OR CABLE SHALL BE REPLACED FROM POLE TO POLE.
7. ALL APPROACHES TO PRIVATE AND PUBLIC DRIVEWAYS AND INTERSECTING STREETS SHALL BE KEPT OPEN TO TRAFFIC AT ALL TIMES. CONTRACTOR SHALL INFORM ALL PROPERTY OWNERS OR BUSINESSES A MINIMUM OF 48 HOURS PRIOR TO PERFORMING ANY CONSTRUCTION WHICH WILL IMPEDE THE NORMAL ACCESS THROUGH THEIR DRIVEWAYS.
8. ACTUAL FIELD CONDITIONS MAY VARY FROM THOSE SHOWN ON PLAN AND PROFILE DRAWINGS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ACTUAL ABOVE GROUND AND UNDERGROUND CONDITIONS PRIOR TO START OF CONSTRUCTION.
9. PRIOR TO ORDERING CLOSURE PIECES THE CONTRACTOR SHALL VERIFY THE OUTSIDE DIAMETER OF THE EXISTING PIPE.
10. CONTRACTOR SHALL SUBMIT TRAFFIC CONTROL PLANS FOP CITY OF IRVINE APPROVAL PRIOR TO CONSTRUCTION.

IRWD DOMESTIC WATER NOTES:

A. ALL WATER SYSTEM WORK SHALL CONFORM TO THE DISTRICT'S "PROCEDURAL GUIDELINES AND GENERAL DESIGN REQUIREMENTS" AND "CONSTRUCTION MANUAL", AS LAST REVISED.

B. A PRE-CONSTRUCTION CONFERENCE OF REPRESENTATIVES FROM AFFECTED UTILITIES, AGENCIES AND THE CONTRACTOR SHALL BE HELD ON THE JOB SITE (OR A LOCATION APPROVED BY THE DISTRICT) AT LEAST FORTY-EIGHT (48) HOURS PRIOR TO START OF WORK.

C. THE DISTRICT ENGINEERING OFFICE SHALL BE CALLED FOR INSPECTION FORTY-EIGHT (48) HOURS BEFORE START OF WORK AT (949) 453-5615 OR (949) 453-5300.

D. THE PROPOSED WATER SYSTEM IS TO BE STAKED AT A MINIMUM 50-FOOT STATIONING IF THERE ARE NO EXISTING CURBS.

E. WATER METERS SHALL NOT BE LOCATED WITHIN A DRIVEWAY OR SIDEWALK. ALL WATER SERVICE LATERALS SHALL BE CONSTRUCTED PERPENDICULAR TO THE WATER MAIN WITHOUT BENDS OR ANGLES FROM THE CONNECTION POINT ON THE MAIN.

F. ALL MAIN LINE VALVES SHALL BE MAINTAINED SO AS TO BE ACCESSIBLE DURING TRACT DEVELOPMENT AND CONSTRUCTION. ALL VALVE STEM TOPS HAVING OVER 60-INCHES OF COVER REQUIRE AN EXTENSION MEETING DISTRICT STANDARDS.

G. IN RESIDENTIAL STREETS, THE TOP OF THE PIPE, 10-INCHES AND SMALLER, SHALL BE A MINIMUM OF 42-INCHES BELOW THE FINISHED STREET SURFACE AND 48-INCHES BELOW FINISHED STREET SURFACE FOR ALL PIPE 12-INCHES IN DIAMETER AND LARGER.

H. ALL FIRE HYDRANTS SHALL BE SET WITH THE BOTTOM FLANGE 4-INCHES ABOVE THE CONCRETE PAD OR SIDEWALK USING ONE SCORED-SPOOL AS INDICATED IN THE CONSTRUCTION MANUAL AND SHALL BE LOCATED A MINIMUM OF 3 FEET FROM THE ECR OR BCR AT INTERSECTION.

I. ALL WATER MAINS 4-INCHES THROUGH 12-INCHES SHALL BE AWWA C-900 (DR-14) AND AWWA C-905 (DR-18) FOR WATER MAINS LARGER THAN 12-INCHES, UNLESS OTHERWISE APPROVED BY THE DISTRICT.

J. NO "HOT-TAPS" OR OTHER TIE-IN CONNECTIONS SHALL BE MADE TO EXISTING DISTRICT WATER MAINS PRIOR TO CONDUCTING AND PASSING AN APPROVED PRESSURE TEST AND A BACTERIOLOGICAL TEST ON THE NEW WATER DISTRIBUTION SYSTEM.

K. TAPPING SLEEVES, WHERE CALLED FOR ON THE PLANS, SHALL BE PRESSURE TESTED IN AN APPROVED MANNER IN THE FIELD, IN THE PRESENCE OF THE DISTRICT REPRESENTATIVE, PRIOR TO TAPPING THE MAIN LINE. TAPPING OF THE MAIN LINE SHALL NOT PROCEED UNLESS A DISTRICT REPRESENTATIVE IS PRESENT. SIZE ON SIZE TAPS OF WATER MAINS ARE NOT ALLOWED.

L. WHERE METERS AND METER BOXES ARE LOCATED WITHIN SLOPES, THE ANGLE METER STOPS SHALL BE LOCATED SUCH THAT THE METERS AND BOXES ARE PARALLEL AND FLUSH, WITH THE FINISHED SURFACE. WHEREVER THE SURROUNDING GRADE EXCEEDS EIGHT (8%) PERCENT, OR IN THE OPINION OF THE DISTRICT REPRESENTATIVE, THE ADJACENT SLOPE IS TOO GREAT, A SMALL RETAINING WALL, CLEAR OF THE METER BOX, SHALL BE CONSTRUCTED TO THE SATISFACTION OF THE DISTRICT REPRESENTATIVE.

M. CURB FACES SHALL BE INSCRIBED WITH THE LETTER "W" INDICATING LOCATIONS OF ALL DOMESTIC WATER SERVICES. LETTER INSCRIPTION SHALL BE MADE USING A 4-INCH POWER TOOL WHEEL GRINDER.

N. INDIVIDUAL PRESSURE REGULATORS ARE REQUIRED BY THE UNIFORM PLUMBING CODE IF AVERAGE STATIC PRESSURE IN THE MAIN IS 80 PSI OR MORE.

O. CURBS SHALL BE INSCRIBED WITH TIE DOWNS FOR ALL VALVE LOCATIONS. LETTER INSCRIPTIONS SHALL BE MADE USING A 4-INCH POWER TOOL WHEEL GRINDER.

P. THE CONTRACTOR SHALL EXPOSE ALL POINTS OF CONNECTION TO THE EXISTING DOMESTIC WATER SYSTEM FOR VERIFICATION OF HORIZONTAL AND VERTICAL LOCATION BEFORE CONSTRUCTION.

Q. FINAL INSPECTION FOR WATERLINES MUST INCLUDE WATER SAMPLES THAT WILL BE TESTED FOR THE PRESENCE OF BACTERIA, CONDUCTIVITY, TURBIDITY AND ODOR. THE TURBIDITY MUST BE LESS THAN 2.5 NTU AND THE ODOR MUST BE LESS THAT 1.0 TON, NOT TO INCLUDE CHLORINE ODOR, TO BE ACCEPTABLE. TWO (2) CONSECUTIVE "PASSING" SAMPLES ARE REQUIRED FOR ACCEPTANCE.

R. THE CONTRACTOR WORKING ON IRWD WATERLINES MUST HAVE A C-34 LICENSE ISSUED BY THE STATE CONTRACTOR'S LICENSE BOARD OR CLASS "A" GENERAL CONTRACTORS LICENSE (WITH SPECIAL APPROVAL OF THE DISTRICT, BASED UPON ACTUAL WATER AND SEWER PIPELINE CONSTRUCTION EXPERIENCE.)

S. CONTRACTOR SHALL OBTAIN AND SHOW PROOF OF A CONSTRUCTION DEWATERING PERMIT FROM THE STATE OF CALIFORNIA, REGIONAL WATER QUALITY CONTROL BOARD PRIOR TO THE START OF CONSTRUCTION.

T. ALL BUTTERFLY VALVES 12-INCHES IN DIAMETER AND LARGER SHALL BE FLANGED AND SHALL BE BI-DIRECTIONALLY TESTED WITH THE OPERATOR INSTALLED IN ACCORDANCE WITH THE DISTRICT'S REQUIREMENTS OUTLINED IN THE CONSTRUCTION MANUAL.

LEGEND OF ABBREVIATIONS

C&G	CURB AND GUTTER
CL	CLASS
DIA.	DIAMETER
D.I.	DUCTILE IRON
DWG	DRAWING
E	EASTING
EX. / EXIST.	EXISTING
FE	FLANGED END
FM	FORCE MAIN
FS	FINISHED SURFACE
HD	HOT DIPPED
INV	INVERT
MIN.	MINIMUM
N	NORTH/NORTHING
N.T.S.	NOT TO SCALE
PR.	PROPOSED
PVC	POLYVINYL CHLORIDE
PO	PUSH-ON
RW	RECYCLED WATER
R/W	RIGHT OF WAY
RWGV	RESILIENT WEDGE GATE VALVE
SCH	SCHEDULE
SPEC.	SPECIFICATION
STA	STATION
STD.	STANDARD
SS	SANITARY SEWER
SD	STORM DRAIN
TELE	TELEPHONE
TYP.	TYPICAL
W	WEST
W/	WITH
WT	WATER

LEGEND OF SYMBOLS

- CENTERLINE
- RIGHT-OF-WAY
- SS — EXISTING SEWER LINE (SIZE PER PLAN)
- W — EXISTING WATER LINE (SIZE PER PLAN)
- RW — EXISTING RECLAIMED WATER LINE (SIZE PER PLAN)
- STORM DRAIN
- SEWER MANHOLE
- PROPOSED UTILITY LINE (CURRENT SHEET)
- SS — PROPOSED SEWER LINE
- W — PROPOSED WATER LINE
- RW — PROPOSED RECLAIMED WATER LINE
- CATHODIC TEST STATION
- BLOW-OFF / FLUSH-OUT
- AIR/VACUUM VALVE
- WATER VALVE
- FIRE HYDRANT

UTILITY AND AGENCY INDEX

IRWD (WATER OPERATIONS SUPERVISOR)	(949) 453-5674
IRWD (WATER OPERATIONS MANAGER)	(949) 453-5745
IRWD (COLLECTION SYSTEM MANAGER)	(949) 453-5815
IRWD (INSPECTOR)	(949) 453-5615
IRWD (ENGINEERING)	(949) 453-5300
COUNTY OF ORANGE	(714) 834-5707
SOUTHERN CALIFORNIA GAS CO.	(714) 634-3117
PACIFIC BELL	(714) 259-4449
SOUTHERN CALIFORNIA EDISON CO.	(714) 973-5449
COMCAST CABLE VISION	(714) 338-2000
COX COMMUNICATIONS	(949) 546-4622
UNDERGROUND SERVICE ALERT	(800) 227-2600
CITY OF LAKE FOREST	(949) 461-3480

BENCH MARK:

3JJ-20-90 ELEV: 729.494
DATUM: NGVD 29, 1995 O.C.S. ADJUSTMENT

3 3/4" OCS ALUMINUM BENCHMARK DISK STAMPED "3JJ-20-90", SET IN THE NORTHEAST CORNER OF AN 11FT. BY 4FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE NORTHEAST CORNER OF THE INTERSECTION OF LAKE FOREST DRIVE & VISTA TERRACE, 47FT. EASTERLY OF THE CENTERLINE OF LAKE FOREST DR. & 50FT. NORTHERLY OF THE CENTERLINE OF VISTA TERRACE. MONUMENT IS SET LEVEL WITH THE SIDEWALK

BASIS OF BEARINGS:

THE BEARINGS SHOWN HEREON ARE BASED ON THE GRID BEARING "N 28°10'54" E" BETWEEN O.C.S. HORIZONTAL CONTROL STATION GPS NO. 6733 AND GPS NO. 6734 PER RECORDS ON FILE IN THE OFFICE OF THE ORANGE COUNTY SURVEYOR.

SHEET INDEX

SHEET No.	DRAWING No.	DESCRIPTION
1	T1	TITLE SHEET
2	W1	TANK OVERFLOW PIPE PLAN & PROFILE, DETAILS

NOTICE TO CONTRACTOR

PURSUANT TO ASSEMBLY BILL 3019, NO EXCAVATION PERMIT IS VALID UNLESS THE FOLLOWING IS PERFORMED:

1. UNDERGROUND SERVICES ALERT HAS BEEN CONTACTED AND HAS PROVIDED INQUIRY I.D. # _____
2. THE UNDERSIGNED AGREES TO CONTACT AND OBTAIN AN INQUIRY I.D.# FROM UNDERGROUND SERVICES ALERT (800) 227-2600 AT LEAST TWO (2) WORKING DAYS PRIOR TO THE COMMENCEMENT OF EXCAVATION.

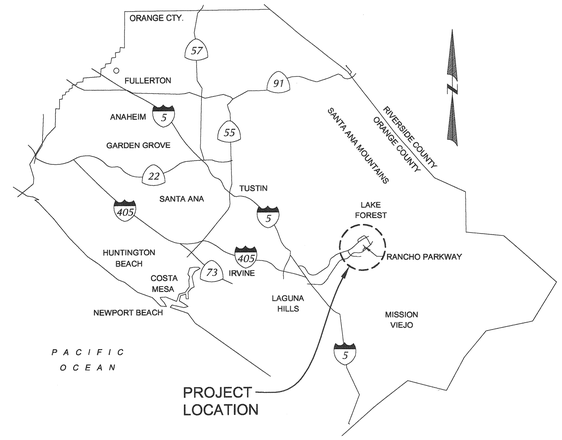
SIGNED _____ DATE _____

APPROVED:

IRVINE RANCH WATER DISTRICT
EXECUTIVE DIRECTOR OF ENGINEERING AND PLANNING

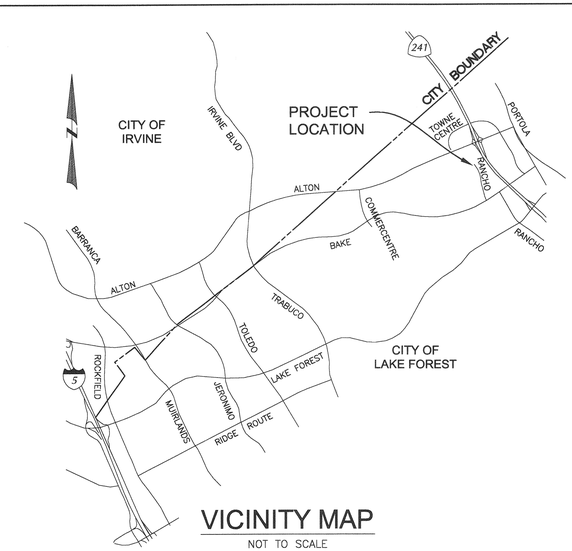
Kevin L Burton 11/28/12

KEVIN BURTON R.M.E. 28832 DATE



LOCATION MAP

NOT TO SCALE



VICINITY MAP

NOT TO SCALE

NO.	QUANTITIES DESCRIPTION	QTY.	UNITS
	ROUGH GRADING		
(4)	CONSTRUCT DOWNDRAIN PER O.C.P.W. STD. 1321 & DETAIL ON SHEET 2	213	LF
(11)	CONSTRUCT CONCRETE INTERCEPTOR DRAIN PER O.C.P.W. STD. 1332 & DETAIL ON SHEET 2	328	EA
(13)	INSTALL RIP-RAP PER DETAIL ON SHEET 2	4	EA
(15)	REMOVE EXIST. STORM DRAIN PIPE	86	LF
(17)	REMOVE EXIST. RIP-RAP	1	LS
(31)	*CONST. 3" A.C. OVER 6" A.B. WITH SEALCOAT (SEE NOTE BELOW)	230	SF
(32)	CONST. CHAIN LINK FENCE AND GATES PER APWA STD. PLAN 600-3	379	LF
(34)	CONST. REINFORCED CONCRETE COLLAR PER O.C.P.W. STD. 1317	1	EA
(35)	CONST. CONCRETE PIPE SLOPE ANCHOR PER IRWD STD. S-8	4	EA
(36)	INSTALL 18" R.C.P. (D-LOAD PER PROFILE) W/BEDDING PER O.C.P.W. STD 1319	141	LF
(37)	CONST. JUNCTION STR. TYPE I PER O.C.P.W. STD. 1310	1	EA

*PAVEMENT SECTION IS PRELIMINARY. FINAL SECTION TO BE DETERMINED BY SOILS ENGINEER.

IRWD CODE 5790

No.	DATE	REVISIONS	APPROVED

DESIGNED: EAG
DRAWN: EAG
CHECKED: EAM

HUNSAKER & ASSOCIATES
IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes ▪ Irvine, CA 92618 ▪ PH: (949) 583-1010 ▪ FX: (949) 583-0759

IRVINE RANCH WATER DISTRICT

EDWARD A. MANDICH RCE 59089 PROJECT MANAGER 11-27-12 DATE
EDWARD A. GOMEZ RCE 36493 PROJECT ENGINEER 11-27-12 DATE
PROJECT ENGINEER 11/28/12 DATE

REGISTERED PROFESSIONAL ENGINEER EDWARD A. MANDICH No. 59089 CIVIL STATE OF CALIFORNIA

IRVINE RANCH WATER DISTRICT
BAKER RANCH

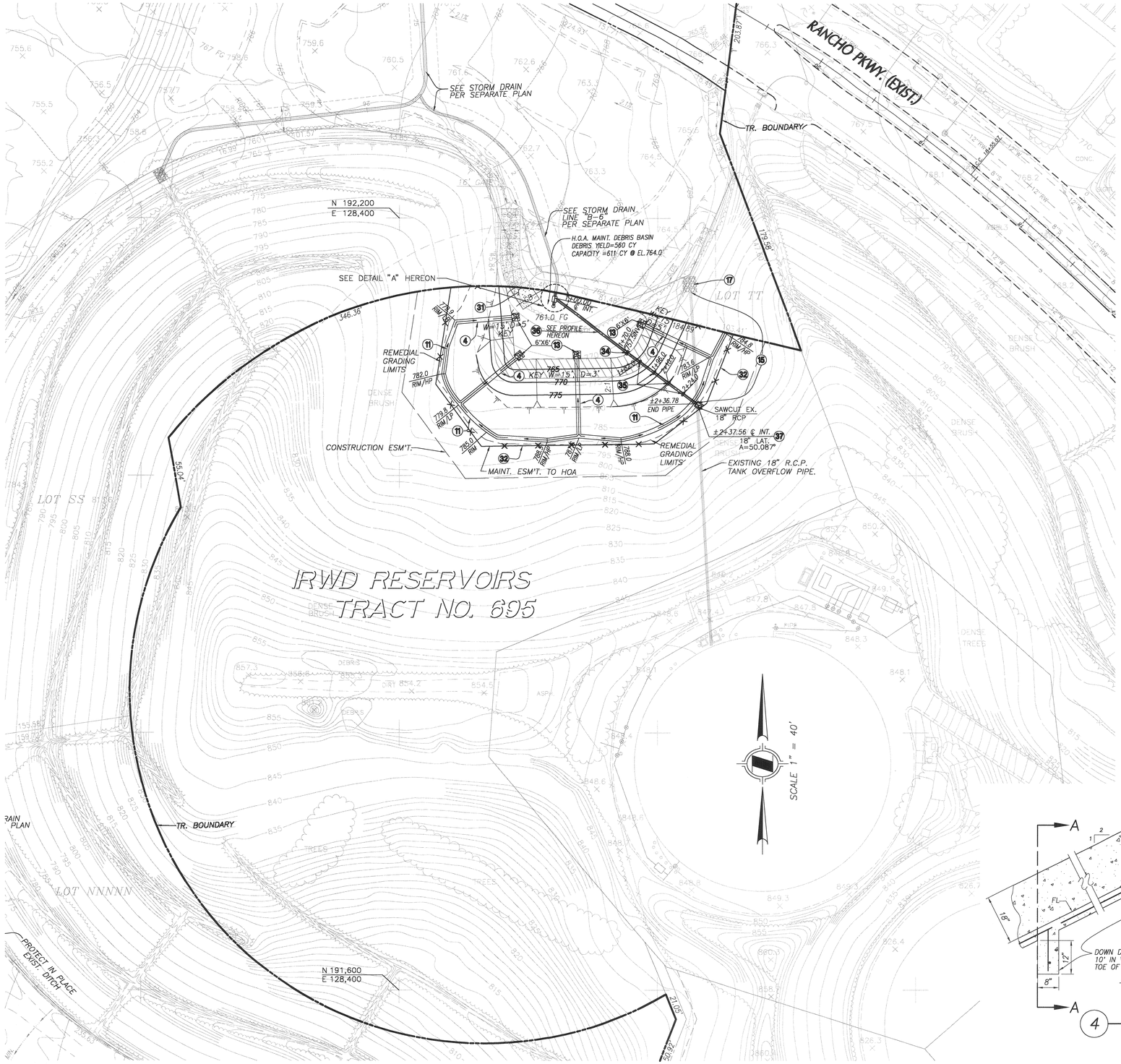
CAPITAL IMPROVEMENT PLANS FOR
LAKE FOREST ZONE 2 WEST RESERVOIR DEBRIS BASIN & OVERFLOW PIPE REALIGNMENT
PROJECT (11666) 4132

TITLE SHEET

DRAWING T1
SHEET 1 OF 2

W.O. 0061-425 OVERFLOW PIPE REALIGNMENT
DOC: 70308
BIN:
ROOM:

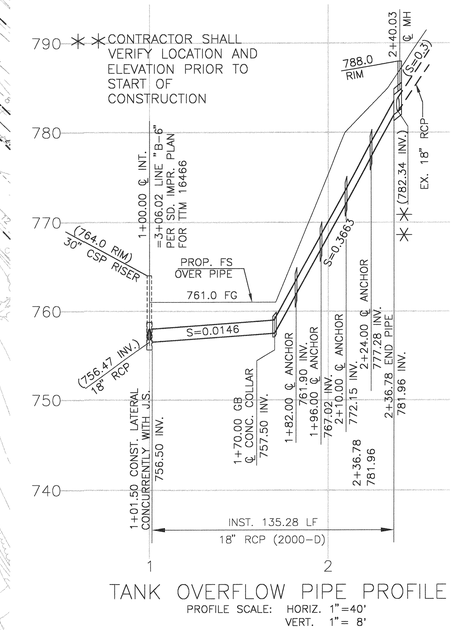
PLOTTED BY: dien DATE: Nov. 16, 2012 TIME: 01:55 PM
F:\0418\Engineering\SA_Phase 1\IRWD Overflow Realignment\IRWD_ Sheet01.dwg



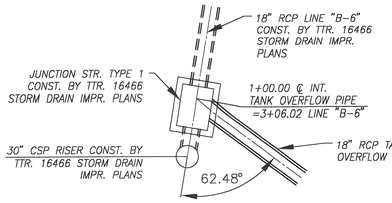
CONSTRUCTION NOTES

- (4) CONSTRUCT DOWNDRAIN PER O.C.P.W. STD. 1321 & DETAIL HEREON
- (11) CONSTRUCT CONCRETE INTERCEPTOR DRAIN PER O.C.P.W. STD. 1332 & DETAIL HEREON
- (13) INSTALL RIP-RAP PER DETAIL HEREON
- (15) REMOVE EXIST. STORM DRAIN PIPE
- (17) REMOVE EXIST. RIP-RAP
- (31) *CONST. 3" A.C. OVER 6" A.B. WITH SEALCOAT (SEE NOTE BELOW)
- (32) CONST. CHAIN LINK FENCE AND GATES PER APWA STD. PLAN 600-3
- (34) CONST. REINFORCED CONCRETE COLLAR PER O.C.P.W. STD. 1317
- (35) CONST. CONCRETE PIPE SLOPE ANCHOR PER IRWD STD. S-8
- (36) INSTALL 18" R.C.P. (D-LOAD PER PROFILE) W/BEDDING PER O.C.P.W. STD 1319
- (37) CONST. JUNCTION STR. TYPE I PER O.C.P.W. STD. 1310

*PAVEMENT SECTION IS PRELIMINARY. FINAL SECTION TO BE DETERMINED BY SOILS ENGINEER AND APPROVED BY CITY

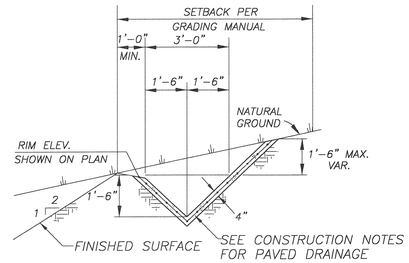


TANK OVERFLOW PIPE PROFILE
PROFILE SCALE: HORIZ. 1"=40'
VERT. 1"= 8'



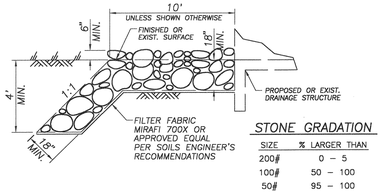
DETAIL "A"

N.T.S.



(11) INTERCEPTOR DRAIN

NTS

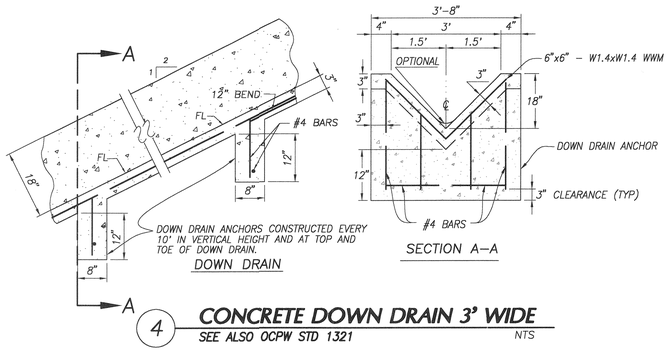


STONE GRADATION

SIZE	% LARGER THAN
200#	0 – 5
100#	50 – 100
50#	95 – 100

(13) RIP-RAP DETAIL

NTS



(4) CONCRETE DOWN DRAIN 3' WIDE

SEE ALSO OCPW STD 1321 NTS

CONSTRUCTION NOTES FOR PAVED DRAINAGE DEVICES

1. APPROVED MATERIAL FOR CONSTRUCTION OF DEVICE IS EITHER 3" CONC. W/ NO. 4 BARS LONGITUDINAL 24" O.C. WITH NO. 4 TIE BARS 48" O.C. OR 3" GUNITE W/ 6"X 6"– W 1.4 X W 1.4 W.W.F. (WELDED WIRE FABRIC) OR APPROVED EQUAL.
2. INSPECTION OF GRADED SWALE IS REQUIRED PRIOR TO INSTALLATION OF PAVING.
3. GROUND SHALL BE PRE-WET TO THE SATISFACTION OF THE BUILDING OFFICIAL OR ENGINEER PRIOR TO PLACEMENT OF CONCRETE.
4. PAVED DEVICE SHALL BE CURED WITH A MOISTURE LOSS RETARDANT.
5. PUMPCRETE IS AN ACCEPTABLE SUBSTITUTE FOR GUNITE & MAY BE INSTALLED WITH 6"X 6" W 1.4 X W 1.4 WELDED WIRE MESH (W.W.M.).
6. CONCRETE SHALL HAVE A MINIMUM ULTIMATE COMPRESSION STRENGTH AT 28 DAYS OF 2500 P.S.I. CONCRETE MAY BE PNEUMATICALLY PLACED AND SHALL CONFORM TO SECTION 2621 OF THE UNIFORM BUILDING CODE.
7. ANCHORS SHALL BE CONSTRUCTED IN ACCORDANCE WITH O.C.P.W. STANDARD PLAN 1321 (SHEET 2) WHEN SLOPE EQUALS OR EXCEEDS 2:1.
8. GROUTED RIP-RAP SHALL BE A MIN. 12" ROCK WITH MIN. 6" EMBEDMENT IN P.C.C. OR GUNITE.

40 20 0 40 80
GRAPHIC SCALE: 1"=40'

IRWD CODE 5790

No.	DATE	REVISIONS	APPROVED

DESIGNED: EAG
DRAWN: EAG
CHECKED: EAM

HUNSAKER & ASSOCIATES
IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes ▪ Irvine, CA 92618 ▪ PH: (949) 583-1010 ▪ FX: (949) 583-0759

IRVINE RANCH WATER DISTRICT 995

EDWARD A. MANDICH RCE 59089 — PROJECT MANAGER — 11-27-12 DATE
EDWARD A. GOMEZ RCE 36493 — PROJECT ENGINEER — 11-27-12 DATE
WM CLK — PROJECT ENGINEER — 11/27/12 DATE

REGISTERED PROFESSIONAL ENGINEER EDWARD A. MANDICH No. 59089 CIVIL STATE OF CALIFORNIA

IRVINE RANCH WATER DISTRICT
BAKER RANCH

CAPITAL IMPROVEMENT PLANS FOR
LAKE FOREST ZONE 2 WEST RESERVOIR DEBRIS BASIN & OVERFLOW PIPE REALIGNMENT
PROJECT (11666) 4132

DRAWING W1
SHEET 2 OF 2

PLOTTED BY: dien DATE: Nov. 06, 2012 TIME: 09:42 AM
F:\0418\Engineering\SA_Phase 1\IRWD Overflow Realignment\IRWD_Sheet02.dwg

W.O. 0061-425 OVERFLOW PIPE REALIGNMENT
DOC: 70308
BIN:
ROOM:

CONSTRUCTION PLANS
FOR THE
ZONE B 7.8 MG
RECLAIMED WATER RESERVOIR

LOS ALISOS WATER DISTRICT

ORANGE COUNTY, CALIFORNIA

DECEMBER 1986

BOARD OF DIRECTORS

GEORGE D. STRINGER - PRESIDENT
WILLIAM F. TRITT, HARRY C. JOHNSON
SANDRA G. BAUER, ALWIN V. DIERKER

SHEET INDEX

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	VICINITY AND LOCATION MAP
3	GRADING AND PLOT PLAN
4	INLET/OUTLET PIPE PLAN AND PROFILE
5	CURB & GUTTER, GRADING SECTION
6	MISCELLANEOUS DETAILS
7	MISCELLANEOUS DETAILS
8	MISCELLANEOUS DETAILS
9	CATHODIC PROTECTION & MISCELLANEOUS DETAILS
10	FILL SITE

RECEIVED
FEB 9 1987
Los Alisos Water District

E.T. McFadden Jr 1/5/87
E.T. McFADDEN DATE
GENERAL MANAGER
LOS ALISOS WATER DISTRICT

PREPARED IN THE OFFICE

OF

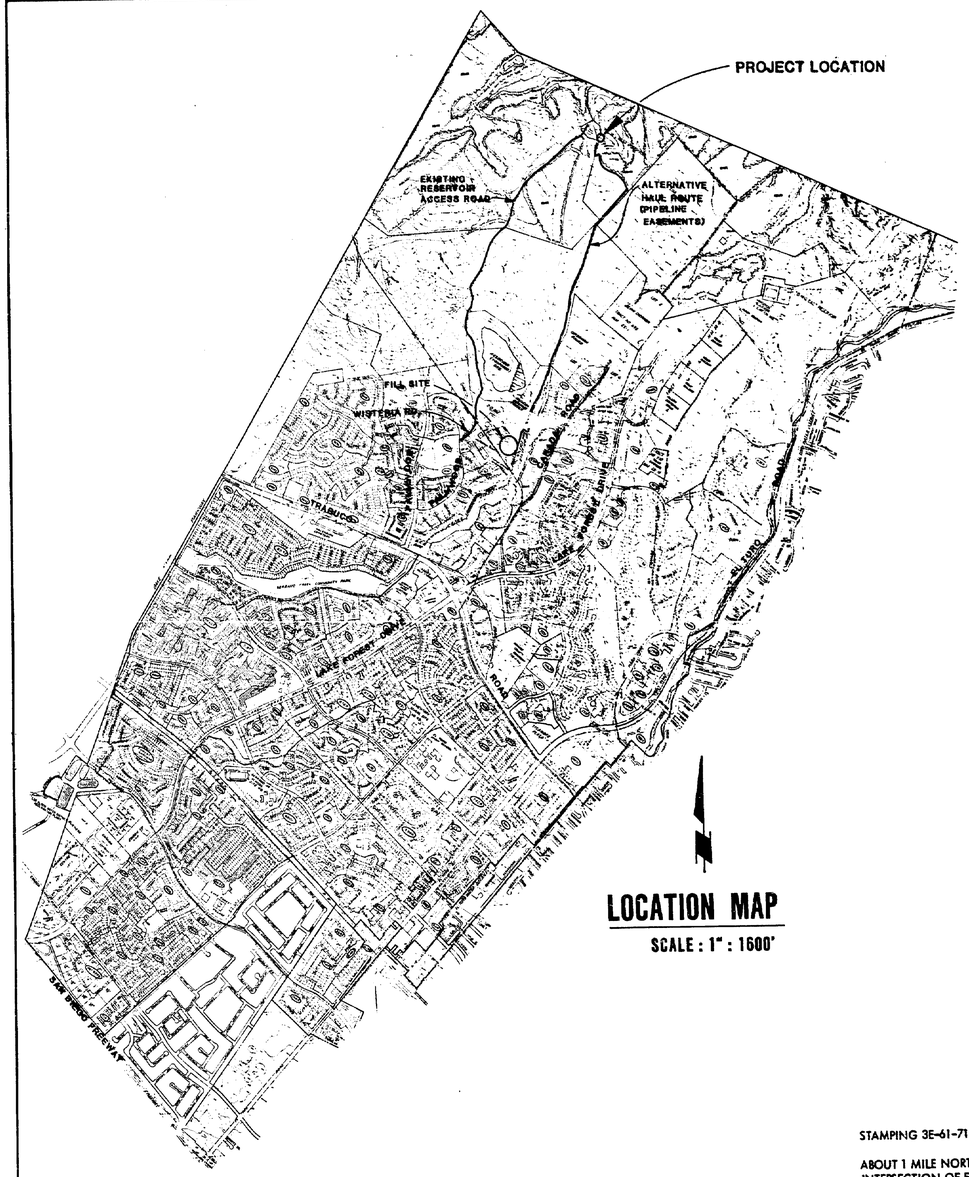
Boyle Engineering Corporation
1501 Quail Street
P.O. Box 3030
Newport Beach, California 92658-9020
714/476-3300

REGISTERED PROFESSIONAL ENGINEER
HARVEY R. GOBAS
C-026533
EXP. 03/31/88
CIVIL
STATE OF CALIFORNIA

Harvey R. Gobas 12/31/86
HARVEY R. GOBAS RGE 26533 DATE
PROJECT MANAGER

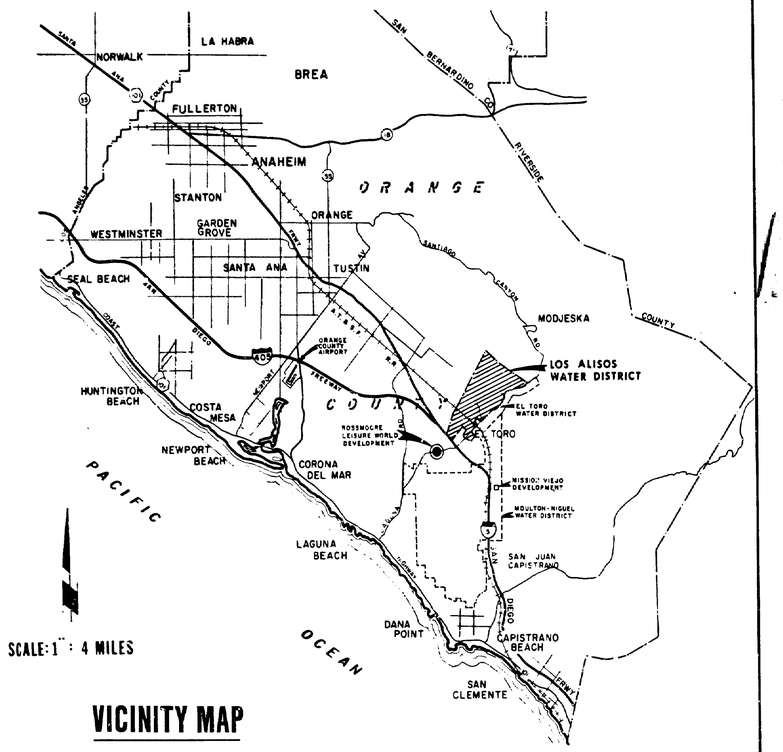
REGISTERED PROFESSIONAL ENGINEER
LORI ANN GARCIA
No C 040700
Expires 03/31/87
CIVIL
STATE OF CALIFORNIA

Lori A. Garcia 1/5/87
LORI A. GARCIA RGE 40700 DATE
PROJECT ENGINEER



LOCATION MAP

SCALE : 1" : 1600'



VICINITY MAP

BENCHMARK

STAMPING 3E-61-71 ALUMINUM CAP 1971 ELEVATION 444.561

ABOUT 1 MILE NORTHWEST ALONG TRABUCO ROAD, FROM THE INTERSECTION OF EL TORO ROAD AND ABOUT 0.2 OF A MILE NORTHWEST ALONG TRABUCO, FROM THE INTERSECTION OF CANADA ROAD, TO A CONCRETE BRIDGE OVERCROSSING OF SERRANO CREEK; 16 FEET NORTHEAST OF THE CENTER LINE OF TRABUCO, SET IN THE TOP OF THE NORTHEAST END OF CONCRETE RETAINING WALL OF BRIDGE LEVEL WITH THE ROAD.

BASIS OF BEARINGS

THE BEARING BETWEEN ORANGE COUNTY SURVEY MONUMENTS 3-1-11-68 AND 3-2-12-68 BEGIN N.56°36'39"W.

LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

ZONE B 7.8 MG
RECLAIMED WATER RESERVOIR

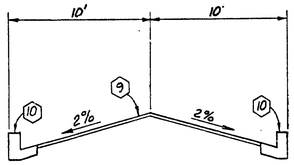
REV	DATE	DESCRIPTION	APP

DESIGN L.G.
DRAWN D.B
CHECKED H.U.
DATE DEC. 1986
F.B.
Boyle Engineering Corporation
consulting engineers / architects
OC-L0426012 D2309
SHEET NO. 2 OF 10 SHEETS

EXCAVATION AND FILL QUANTITIES

THESE QUANTITIES ARE APPROXIMATE AND MAY VARY DEPENDING ON ACTUAL FIELD CONDITIONS.

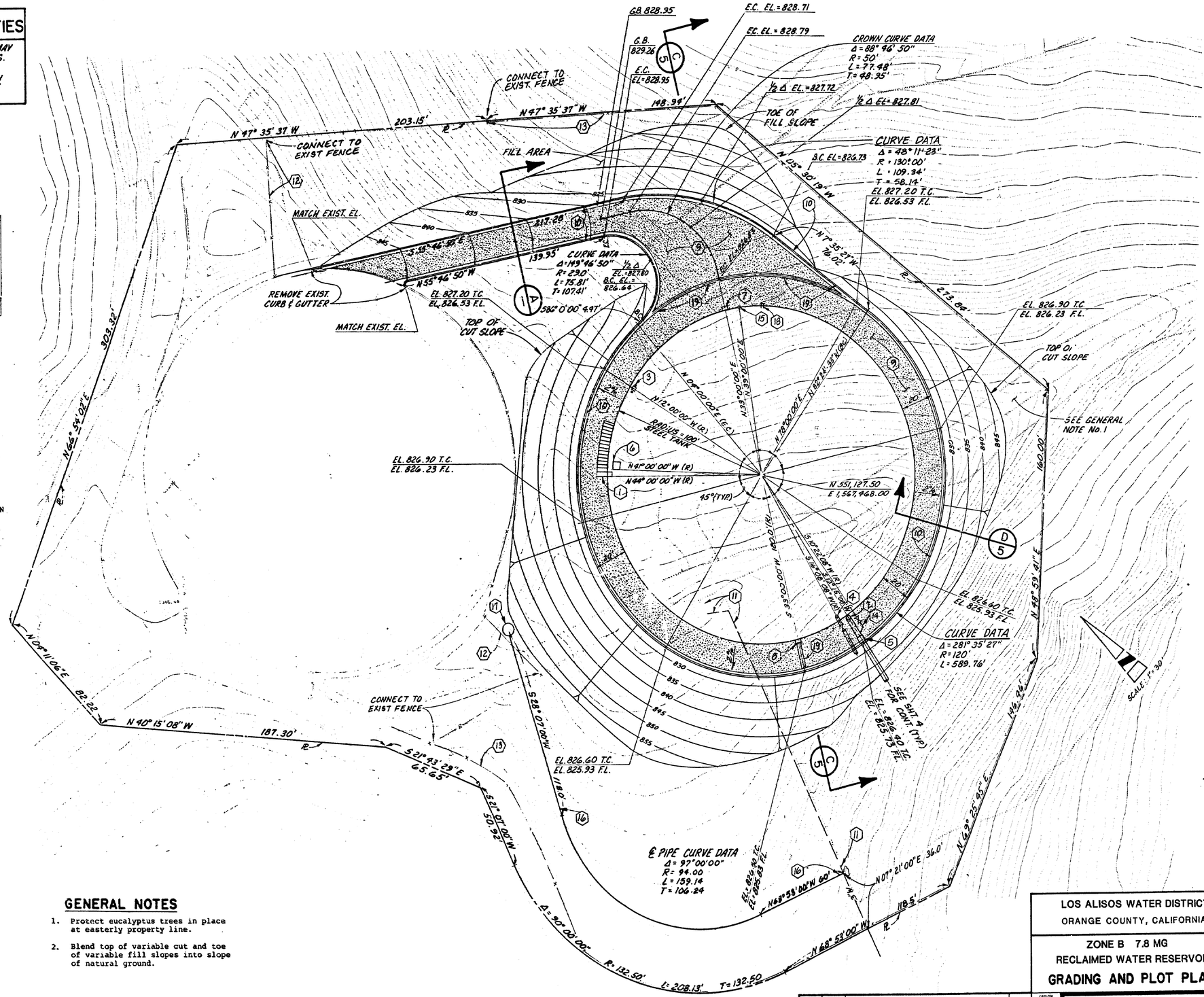
RESERVOIR SITE EXCAVATION..... 62,000cy
FILL AREA..... 2,100cy



SECTION A
N.T.S.

CONSTRUCTION NOTES

1. SPIRAL STAIRS AND PLATFORM. SEE DETAILS SHEET 7
2. OVERFLOW AND DRAIN. SEE DETAIL 1 SHEET 8.
3. LIQUID LEVEL INDICATOR. SEE DETAIL 1 SHEET 7.
4. 12" DIA. INLET-OUTLET PIPE. SEE SHEET 4 FOR PLAN AND PROFILE.
5. GRATE INLET CATCH BASIN. SEE DETAIL 3 SHEET 8.
6. ROOF HATCH AND CENTERLINE OF INSIDE LADDER SEE DETAIL 2 SHEET 6.
7. 36" DIA. MANHOLE. SEE DETAIL 1 SHEET 6.
8. 24" DIA. MANHOLE. SEE DETAIL 1 SHEET 6.
9. 3" A.C. PAVEMENT OVER NATIVE.
10. CURB AND GUTTER. SEE SECTION A SHEET 5.
11. REMOVE EXISTING PVC WATER LINE AND TANK.
12. TEMPORARY 6' CHAINLINK FENCE.
13. 6' CHAINLINK FENCE.
14. 8" DIA. TANK DRAIN. SEE DETAIL 2 SHEETS.
15. CONTROL AND POTENTIAL TEST BOX AND $CuSO_4$ TEST STATIONS.
16. 4" CL. 150 PVC WATER LINE.
17. RYAN-HERCO ROUND-FLAT BOTTOM FIBERGLASS TANK SIZE NO. 7800-108 AND 7801-108 COVER SECTION. SEE 8/5
18. 1" CORP STOP JONES J-50 OR APPROVED EQUAL IN OVERSIZE HALF COUPLING AND INSULATION BUSHING WELDED TO SIDE OF TANK. LOCATION OF CORP STOP TO BE DETERMINED BY DISTRICT AT TIME OF ERECTION OF TANK.
19. CROSS GUTTER. SEE DETAIL 1 SHEET 5.



GENERAL NOTES

1. Protect eucalyptus trees in place at easterly property line.
2. Blend top of variable cut and toe of variable fill slopes into slope of natural ground.

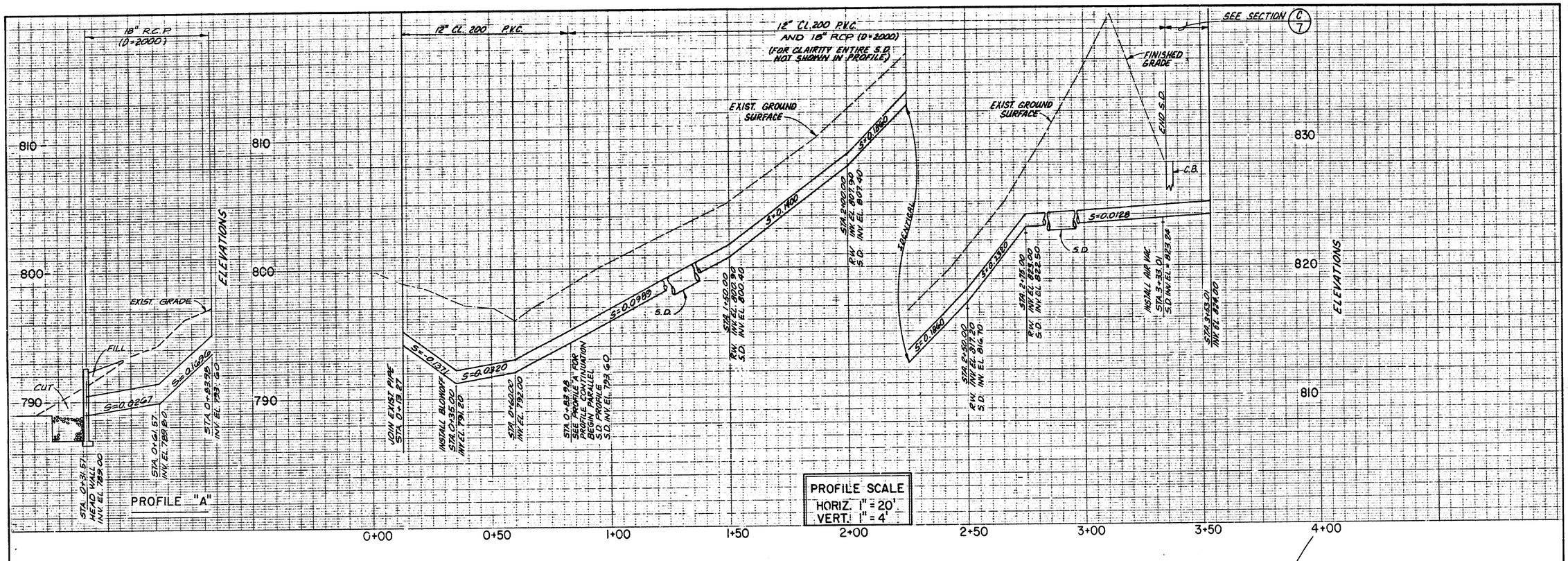
LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

ZONE B 7.8 MG
RECLAIMED WATER RESERVOIR
GRADING AND PLOT PLAN

REV	DATE	DESCRIPTION	APP
1	1-87	ADDENDUM No. 1	H.R.G.

DESIGN L.G. | DRAWN D.G.B. | CHECKED H.U. | DATE AUG. 1986 | OC L04 260 12 | D-2309 | SHEET NO. 3 OF 10 SHEETS

Boyle Engineering Corporation
consulting engineers / architects



CURVE DATA

	Δ	R	L	T
A	107°59'46"	22.50'	42.41'	30.97'

LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

ZONE B 7.8 MG
RECLAIMED WATER RESERVOIR
INLET/OUTLET
PIPE PLAN AND PROFILE

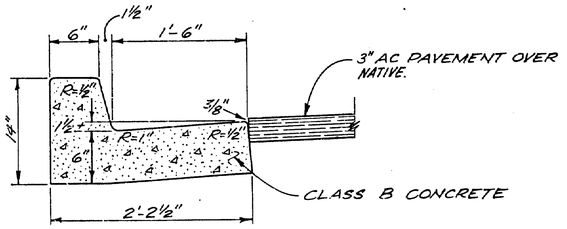
REV.	DATE	DESCRIPTION	APP.
1	1-87	ADDENDUM No.1	H.R.G.

DESIGN L.G. DRAWN D.G.B. CHECKED H.U. DATE AUG. 1986

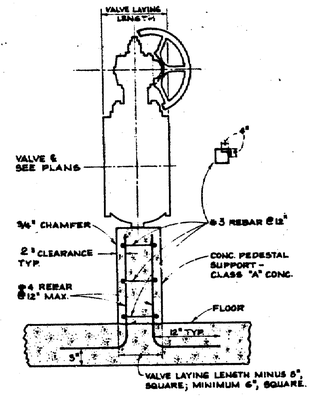
Boyle Engineering Corporation
consulting engineers / architects

O.C.-L04-2602 D-2309

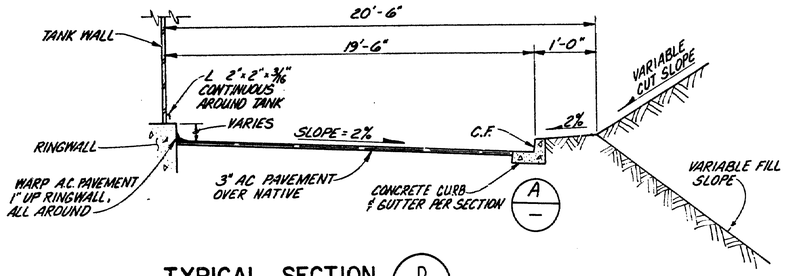
SHEET NO. 4 OF 10 SHEETS



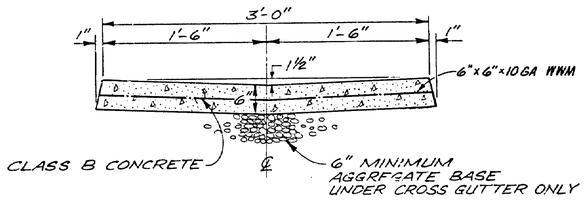
SECTION A
NOT TO SCALE



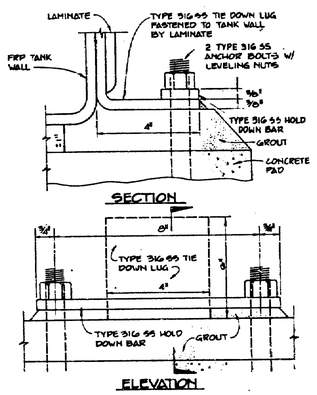
VALVE SUPPORT DETAIL B
N.T.S.



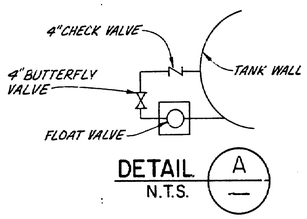
TYPICAL SECTION D
NOT TO SCALE



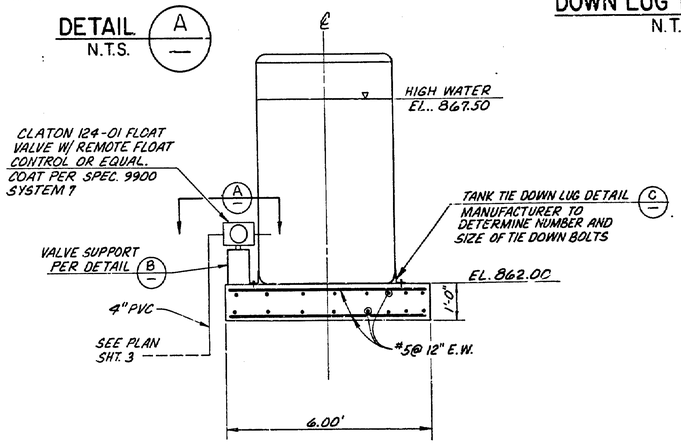
DETAIL I
NOT TO SCALE



FRP TANK TIE DOWN LUG DETAIL C
N.T.S.

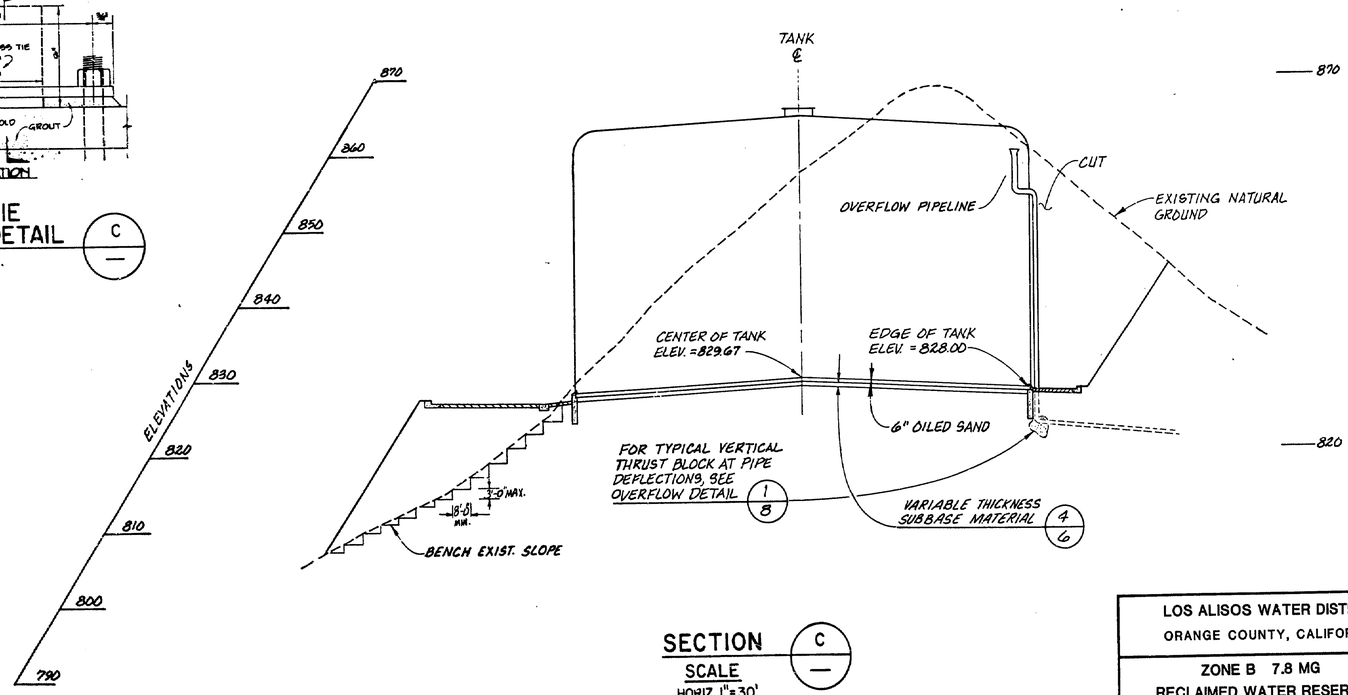


DETAIL A
N.T.S.



NOTE: TANK SHALL BE PAINTED PER SPEC. 9900 SYSTEM 41.

SECTION B
N.T.S.



SECTION C
SCALE
HORIZ. 1"=30'
VERT. 1"=10'

LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

ZONE B 7.8 MG
RECLAIMED WATER RESERVOIR
ACCESS/SERVICE ROAD, CURB & GUTTER AND GRADING SECTIONS

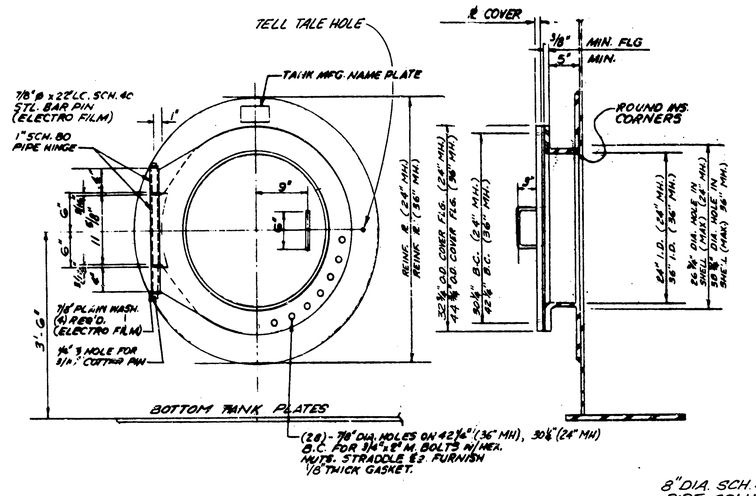
REV	DATE	DESCRIPTION	APP.
1	1-87	ADDENDUM NO. 1	H.R.G.

DESIGN L.G. | DRAWN D.G.B. | CHECKED H.U. | DATE AUG. 1986 | P.R.

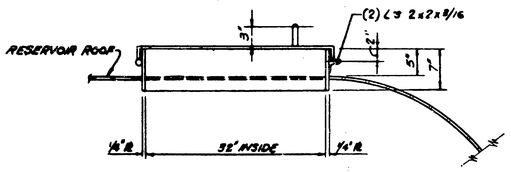
Boyle Engineering Corporation
consulting engineers / architects

OC-L04-260-12 | D-2309

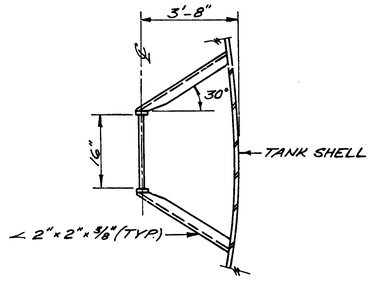
SHEET NO. 5 OF 10 SHEETS



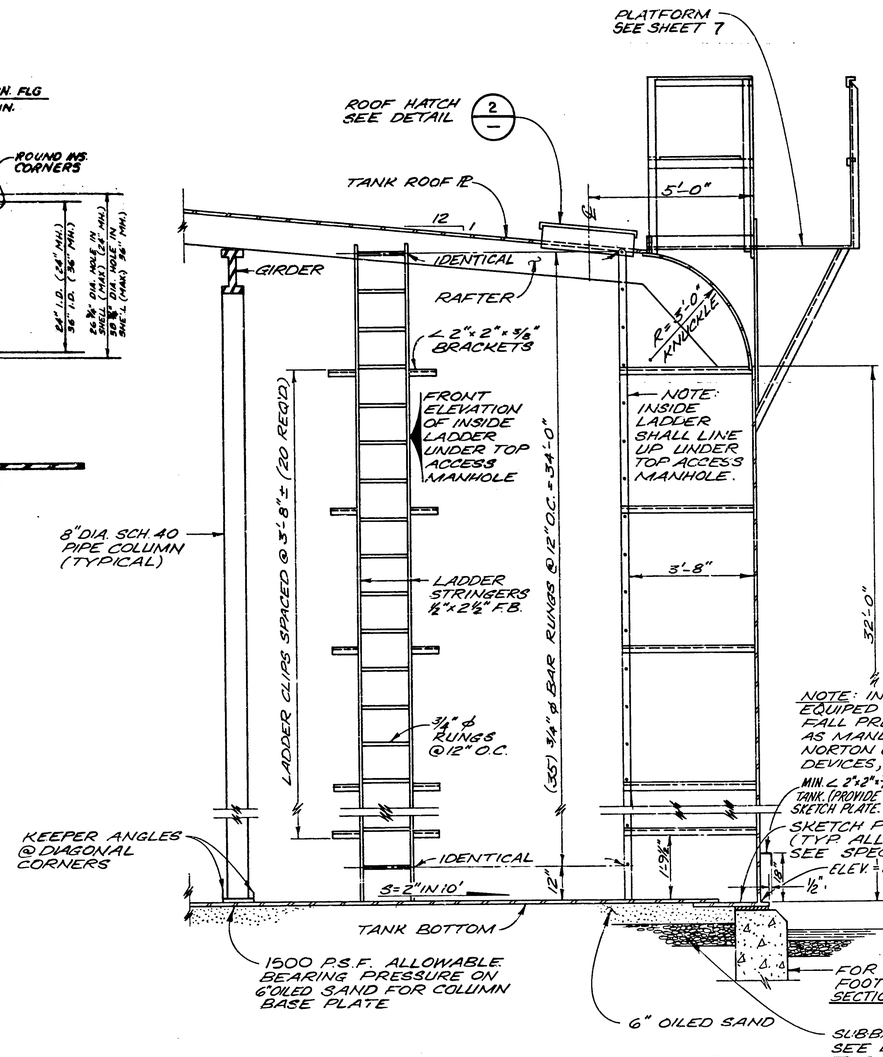
24" & 36" I.D. MANHOLE DETAIL (1/—)
NOT TO SCALE



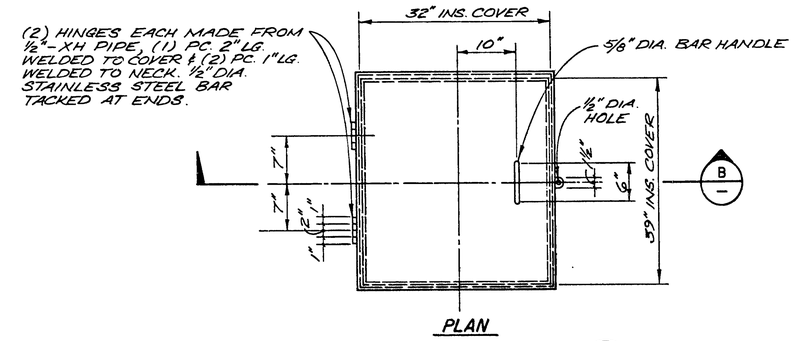
ROOF HATCH SECTION (B/—)
NOT TO SCALE



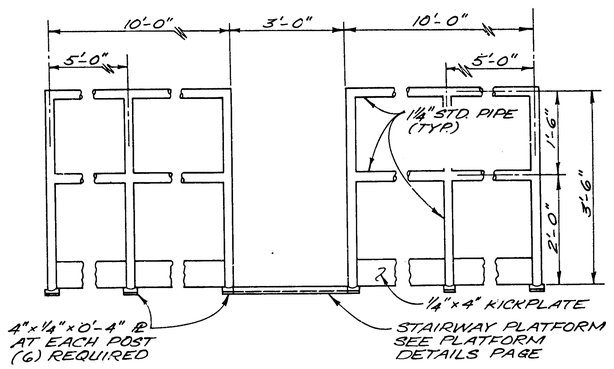
INTERIOR LADDER PLAN (3/—)
NOT TO SCALE



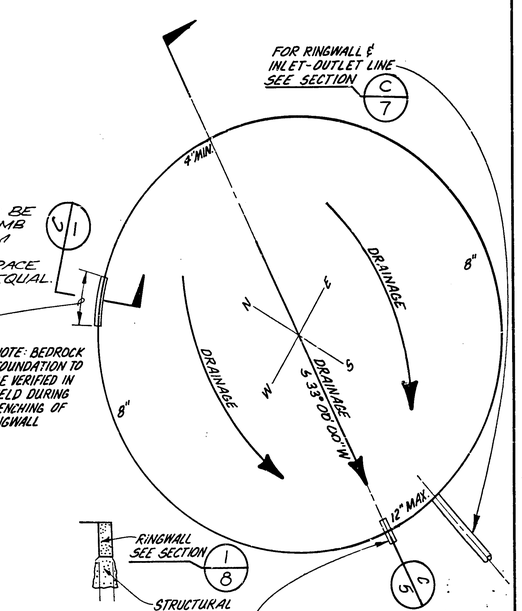
INSIDE LADDER AND TANK SECTION (A/—)
NOT TO SCALE



ROOF HATCH DETAIL (2/—)
NOT TO SCALE



GUARD RAIL DETAIL (5/—)
NOT TO SCALE



DRAINAGE PLAN (4/—)
NOT TO SCALE

LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

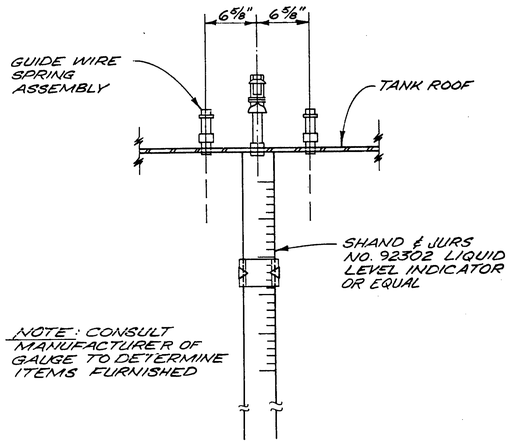
ZONE B 7.8 MG
RECLAIMED WATER RESERVOIR
MISCELLANEOUS DETAILS

REV	DATE	DESCRIPTION	APP

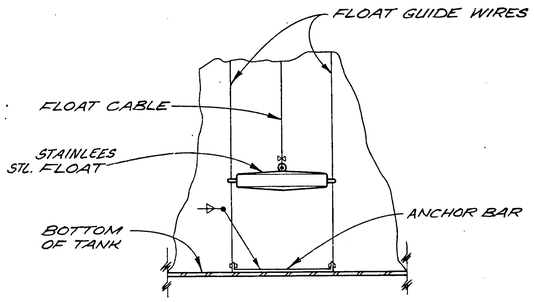
DESIGN L.G. | DRAWN D.G.B | CHECKED H.U. | DATE AUG. 1986 | P.E.

Boyle Engineering Corporation
consulting engineers / architects

OC-L04-260-12 | D-2309 | SHEET NO. 6 | OF 10 SHEETS



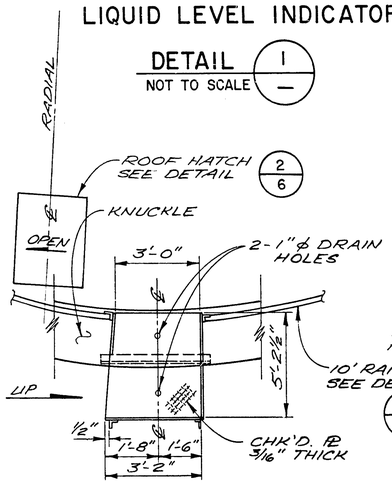
NOTE: CONSULT MANUFACTURER OF GAUGE TO DETERMINE ITEMS FURNISHED



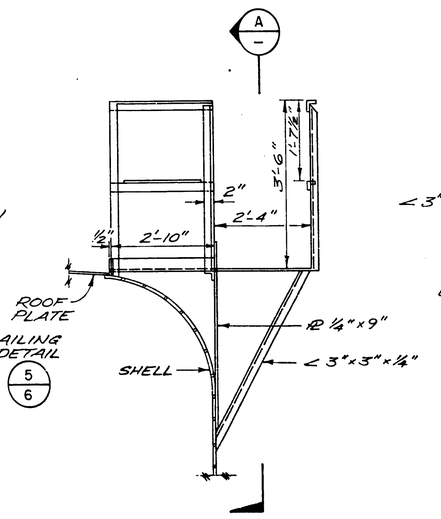
SECTION & ELEVATION

LIQUID LEVEL INDICATOR

DETAIL 1 — NOT TO SCALE

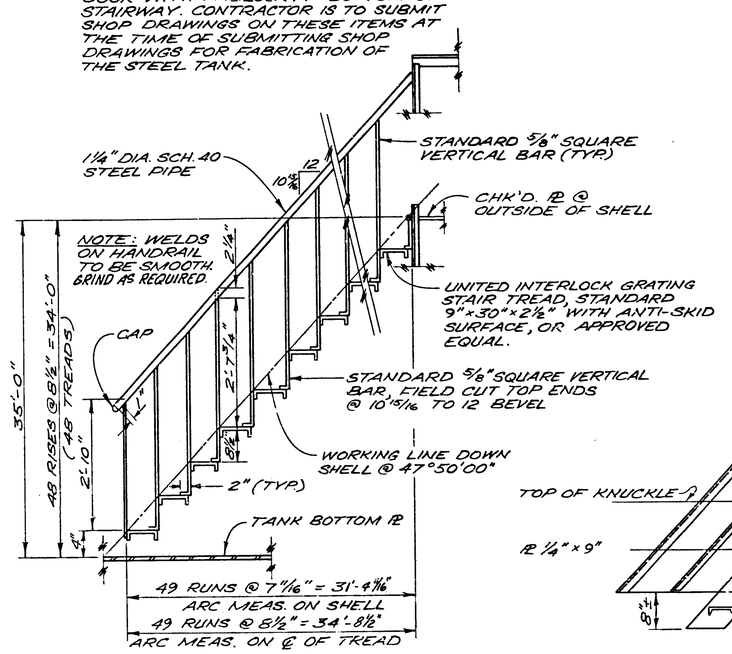


PLAN VIEW
N.T.S.



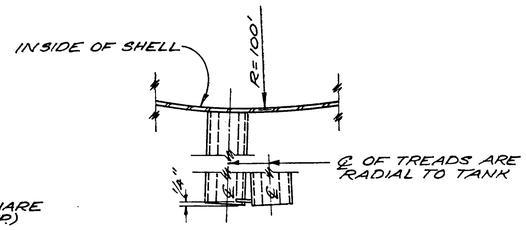
LEFT SIDE VIEW
N.T.S.

NOTE: CAGE TO BE PROVIDED AROUND ENTIRE LENGTH OF SPIRAL STAIRWAY. CAGE IS TO HAVE TIGHT MESH SCREENING AND DOOR WITH PADLOCK AT BOTTOM OF STAIRWAY. CONTRACTOR IS TO SUBMIT SHOP DRAWINGS ON THESE ITEMS AT THE TIME OF SUBMITTING SHOP DRAWINGS FOR FABRICATION OF THE STEEL TANK.

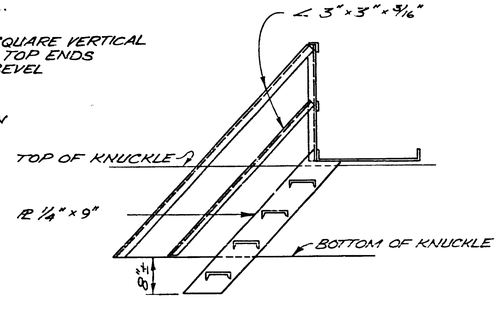


ELEVATION VIEW
N.T.S.

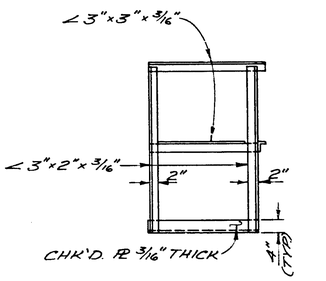
SPIRAL STAIRWAY



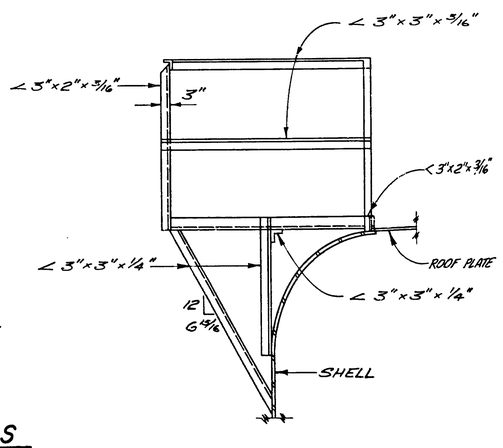
PARTIAL PLAN
N.T.S.



SECTION A
N.T.S.

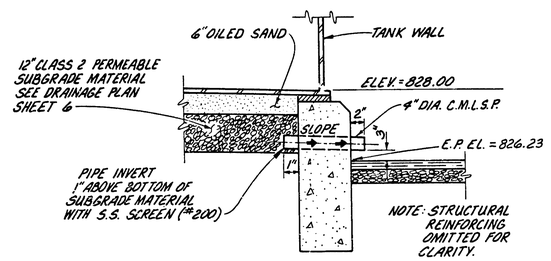


ELEVATION VIEW
N.T.S.

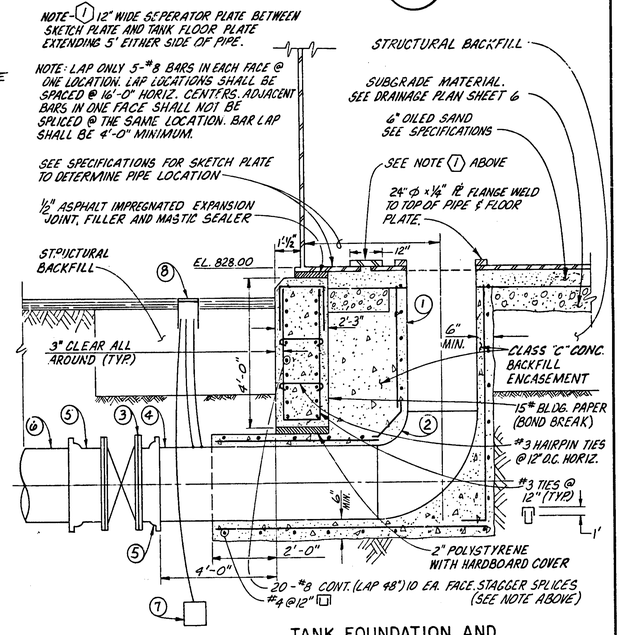


RIGHT SIDE VIEW
N.T.S.

PLATFORM DETAILS



SECTION B
N.T.S.



TANK FOUNDATION AND INLET - OUTLET LINE SECTION C
N.T.S.

MATERIAL LIST

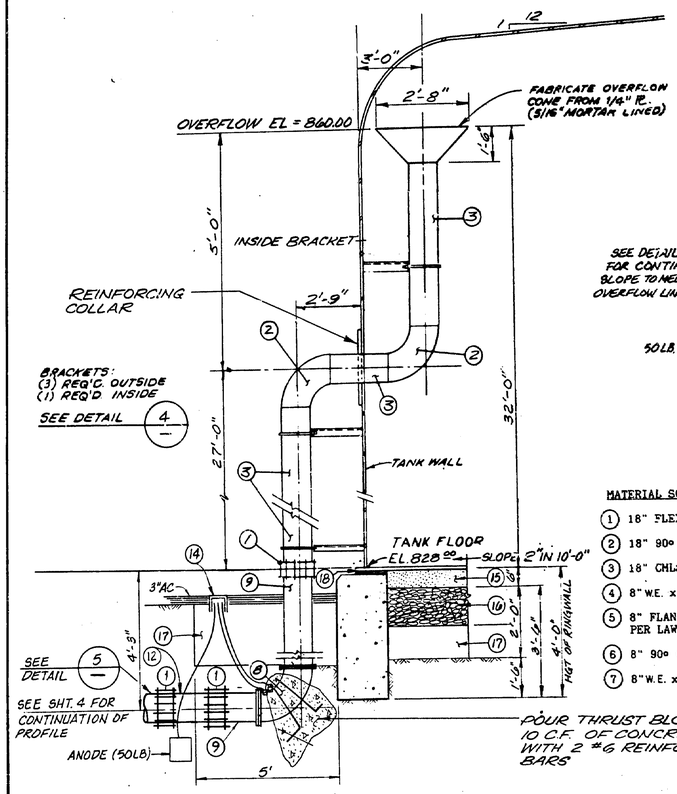
1. 12" DIA CMLSP (WE x PE)
2. 12" DIA CMLSP - 90° BEND
3. 12" CL 150 FLANGED BUTTERFLY VALVE
4. 12" DIA. CMLCSP (WE x PE)
5. 12" DIA. FLANGED COUPLING ADAPTOR
6. 12" DIA. CL. 200 PVC
7. PLACE 50 LB ANODE MINIMUM DISTANCE OF 8 FT. FROM PIPE
8. CP TEST STATION PER LAND STD DWG W-18
9. 12" DIA CMLCSP (WE x PE)
10. 12" FLEXIBLE PIPE COUPLING.

LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

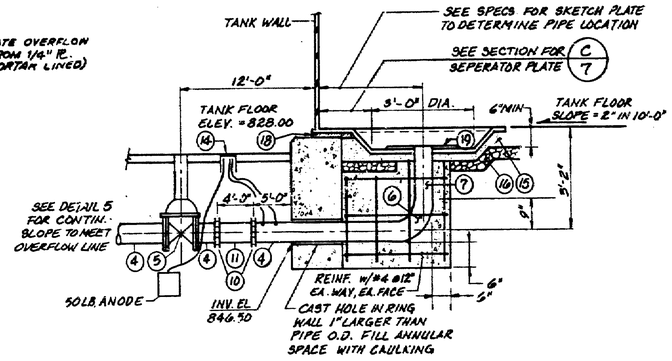
ZONE B 7.8 MG
RECLAIMED WATER RESERVOIR
MISCELLANEOUS DETAILS

REV	DATE	DESCRIPTION	APP
1	1-87	ADDENDUM No. 1	H.R.G.

DESIGN L.G. | DRAWN D.G.B. | CHECKED H.U.
Boyle Engineering Corporation — consulting engineers / architects
DATE AUG. 1986 | 0C-L04-260-12 | D-2309
SHEET NO. 7 OF 10 SHEETS



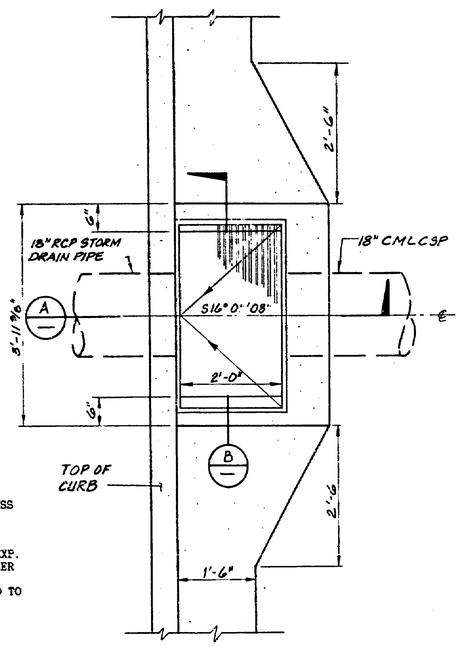
FOUNDATION AND OVERFLOW DETAIL (1) — NOT TO SCALE



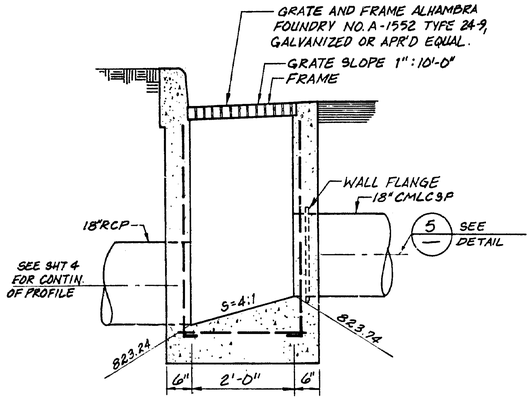
TANK DRAIN DETAIL (2) — NOT TO SCALE

MATERIAL SCHEDULE

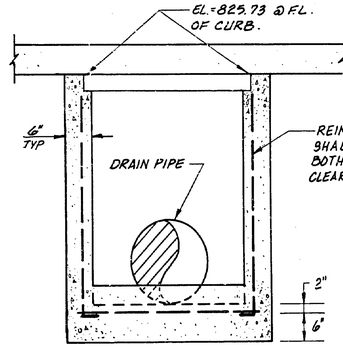
1. 18" FLEXIBLE PIPE COUPLING
2. 18" 90° ELBOW (CMLSP)
3. 18" CMLSP
4. 8" W.E. x P.E. CMLCSP
5. 8" FLANGED BUTTERFLY VALVE PER LAWD STD. DWG. W-6 & W-8
6. 8" 90° CMLSP ELBOW
7. 8" W.E. x P.E. CMLSP
8. 18" FLANGED x FLANGED 90° CMLCSP ELBOW
9. 18" P.E. x F. CMLCSP
10. 8" FLEXIBLE PIPE COUPLING
11. 8" P.E. x P.E. CMLCSP
12. 18" P.E. x P.E., CMLCSP
13. (NOT USED)
14. C.P. TEST STATION PER LAWD STD. DWG. W-18
15. 6" OILED SAND CUSHION
16. SUBBASE MATERIAL SEE DETAIL 4 SHT 6 FOR THICKNESS
17. STRUCTURAL BACKFILL
18. 1/2" ASPHALT IMPREGNATED EXP. JT. FILLER AND MASTIC SEALER
19. 24" x 1/4" PLATE FLG. WELD TO BOTT. & PIPE



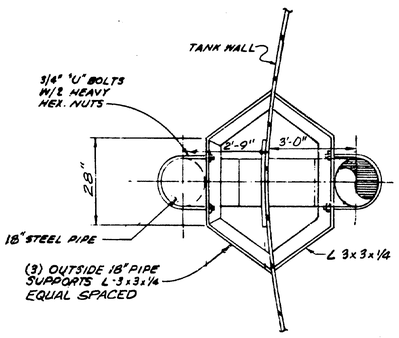
DETAIL (3) — NOT TO SCALE



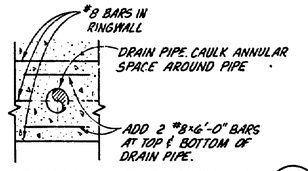
SECTION (A) — NOT TO SCALE



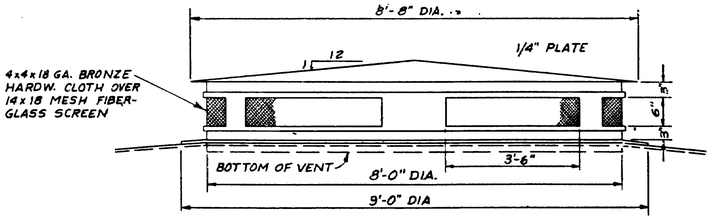
SECTION (B) — NOT TO SCALE



BRACKET DETAIL (4) — NOT TO SCALE



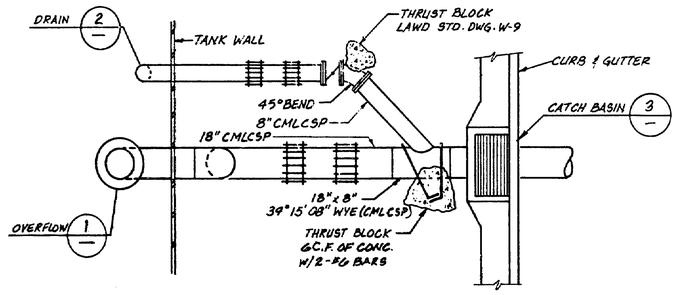
SECTION OF RINGWALL (C) — NOT TO SCALE



STANDARD ROOF VENT — NOT TO SCALE

NOTE:

1. PROVIDE 6 VENT OPENINGS - EACH 3'-6"x6" AND EQUALLY SPACED.
2. SCREEN SHALL NOT BE INSTALLED BEFORE TANK PAINTING IS COMPLETE.
3. INSTALL INSULATIVE SLEEVE AND GASKETS IF DISSIMILAR METALS TOUCH. BETWEEN TANK ROOF AND VENT



DETAIL (5) — NOT TO SCALE

LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

ZONE B 7.8 MG
RECLAIMED WATER RESERVOIR

SECTIONS & DETAILS

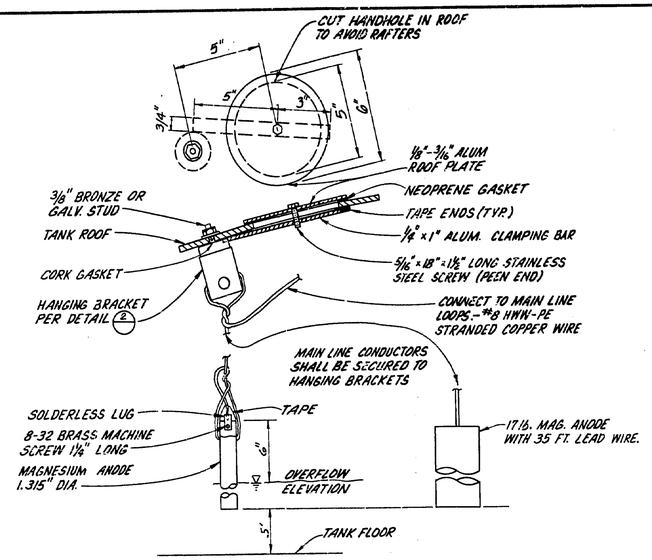
REV	DATE	DESCRIPTION	APP
1	1-87	ADDENDUM No. 1	H.R.G.

DESIGN L.G. | DRAWN D.G.B. | CHECKED H.U. | DATE DEC. 1986

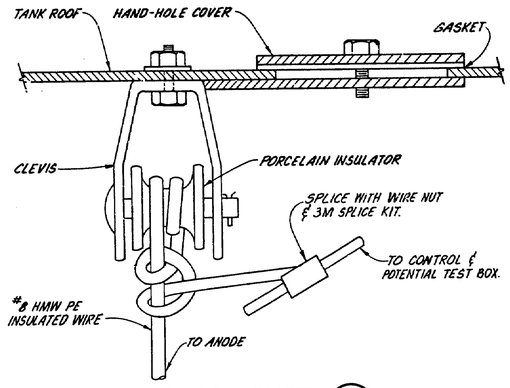
Boyle Engineering Corporation
consulting engineers / architects

OC L04 26012 | D-2309

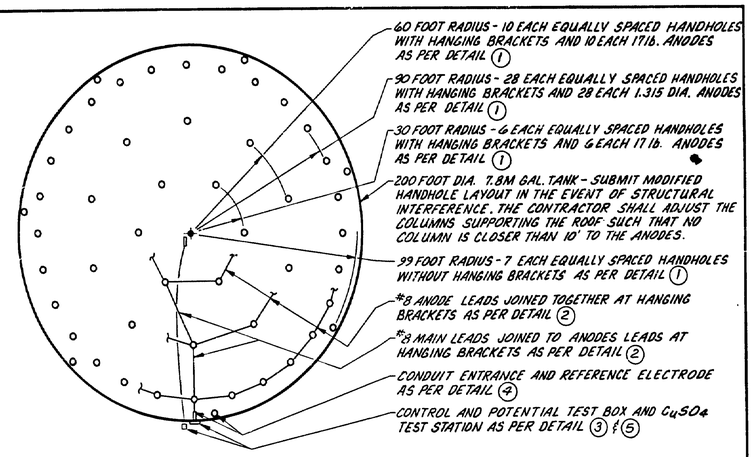
SHEET NO. 8 OF 10 SHEETS



TYPICAL ANODE DETAIL 1
N.T.S.



TYPICAL ANODE HANGER 2
SCALE: 1/2" = 1.0'



ANODE HANDHOLE AND TEST HOLE TYPICAL LOCATION VIEW
PLAN VIEW
N.T.S.

TEST BOX MATERIALS LIST

1 10 OHM 225 WATT MINIMUM RHEOSTAT WITH KNOB

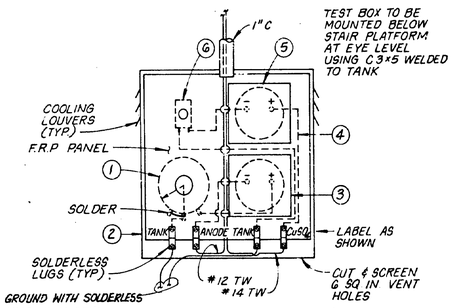
2 NEMA 3R BOX WITH HINGED COVER AND LOCK HASP

3 D.C. 0-5 AMPERE METER

4 #18 VINYL INS. WIRE WITH CRIMPED AND SOLDERED CONNECTORS

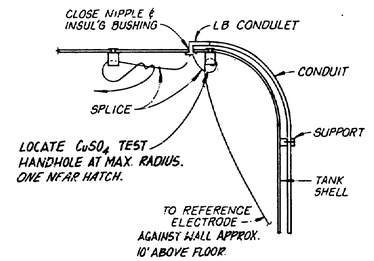
5 POTENTIAL TEST METER WITH 0-2 VOLT SCALE MARKED "DC VOLTS TO $CUSO_4$ REF"

6 PUSHBUTTON SWITCH SPST-N.O.

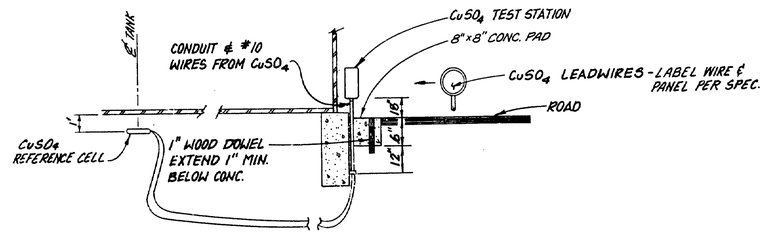


CONTROL AND POTENTIAL TEST BOX DETAIL 3
N.T.S.

T-2



CONDUIT ENTRANCE DETAIL 4
N.T.S.



CuSO4 TEST STATION DETAIL 5
N.T.S.

TEST BOX MATERIALS LIST

1 10 OHM 225 WATT MINIMUM RHEOSTAT WITH KNOB

2 NEMA 3R BOX WITH HINGED COVER AND LOCK HASP

3 D.C. 0-5 AMPERE METER

4 #18 VINYL INS. WIRE WITH CRIMPED AND SOLDERED CONNECTORS

5 POTENTIAL TEST METER WITH 0-2 VOLT SCALE MARKED "DC VOLTS TO $CUSO_4$ REF"

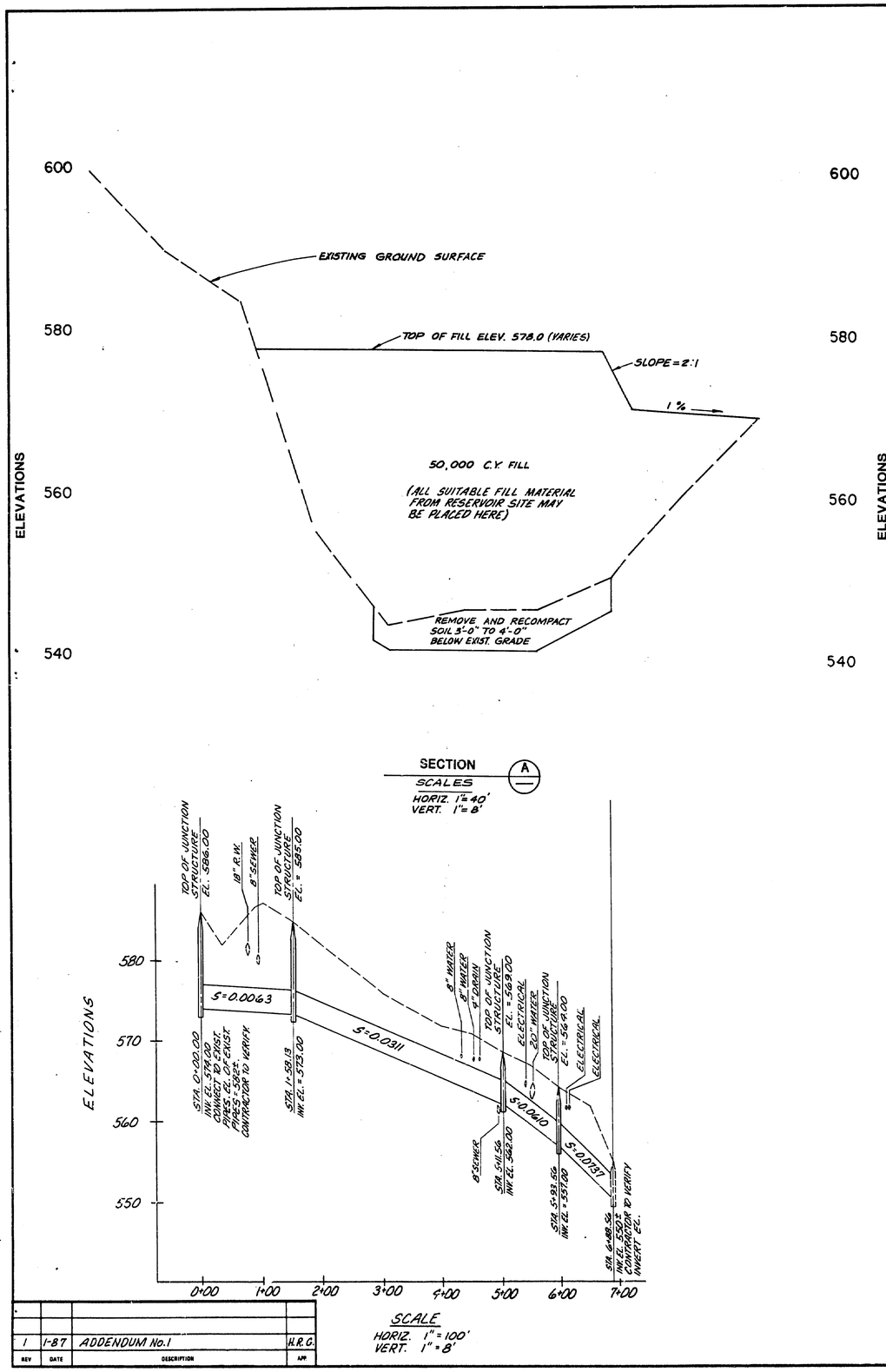
6 PUSHBUTTON SWITCH SPST-N.O.

LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

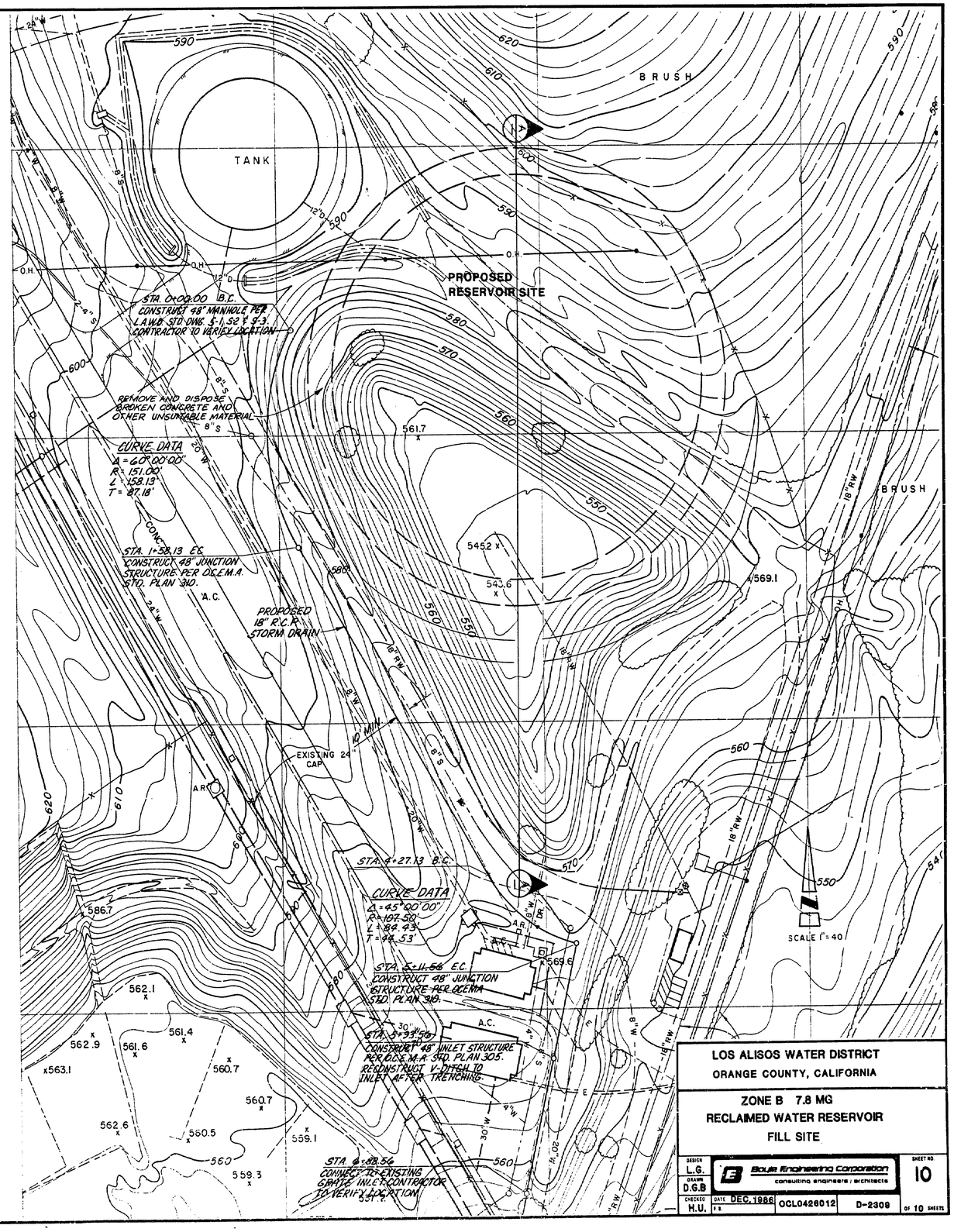
ZONE B 7.8 MG
RECLAIMED WATER RESERVOIR
CATHODIC PROTECTION DETAILS

REV	DATE	DESCRIPTION	APP

DESIGN T.D.
DRAWN D.G.B.
CHECKED H.U.
Boyle Engineering Corporation
consulting engineers / architects
DATE DEC. 1986
OC L04 260 12
D-2309
SHEET NO. 9
OF 10 SHEETS



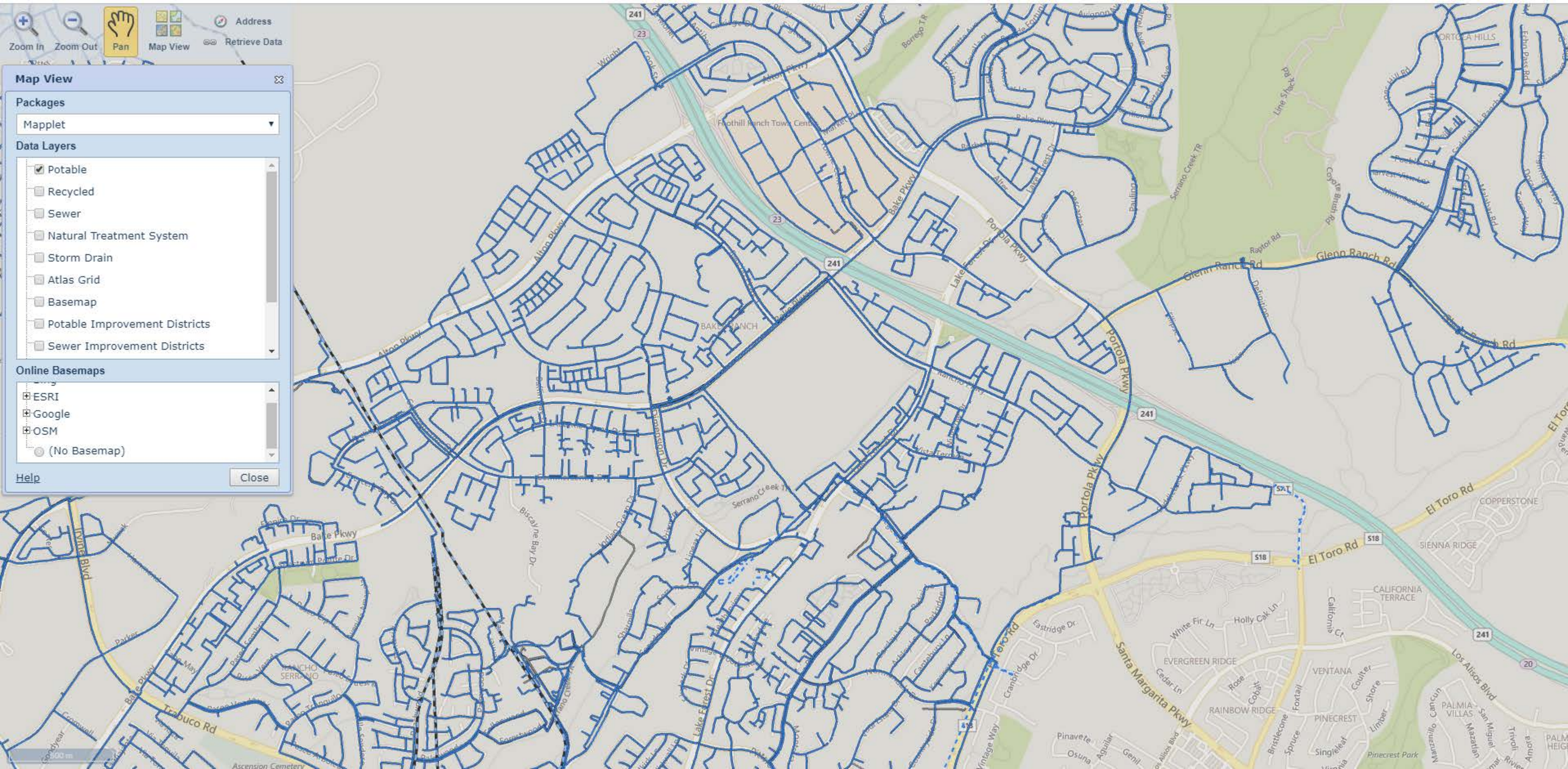
REV	DATE	DESCRIPTION	APP
1	1-87	ADDENDUM No.1	H.R.G.

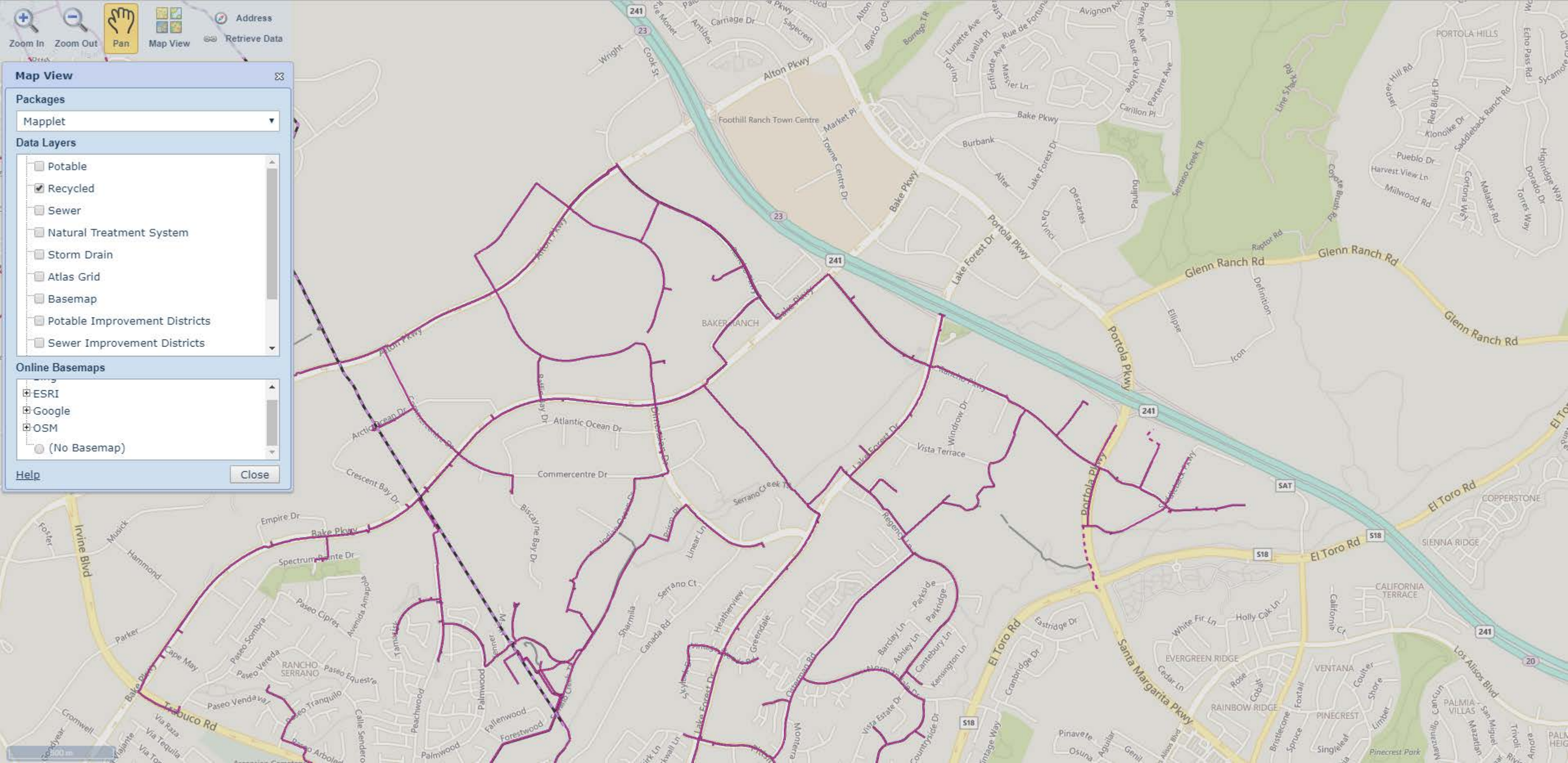


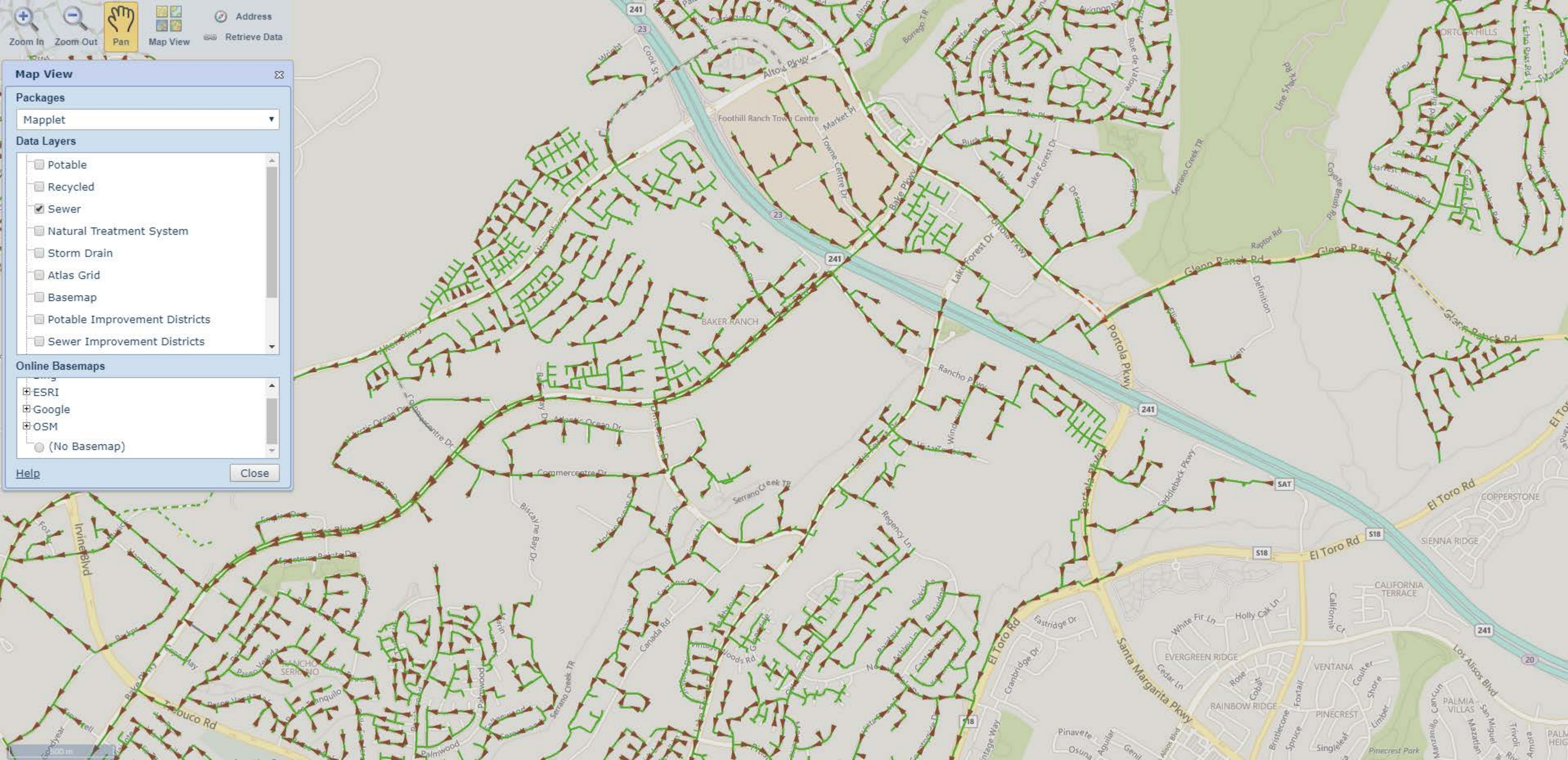
LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

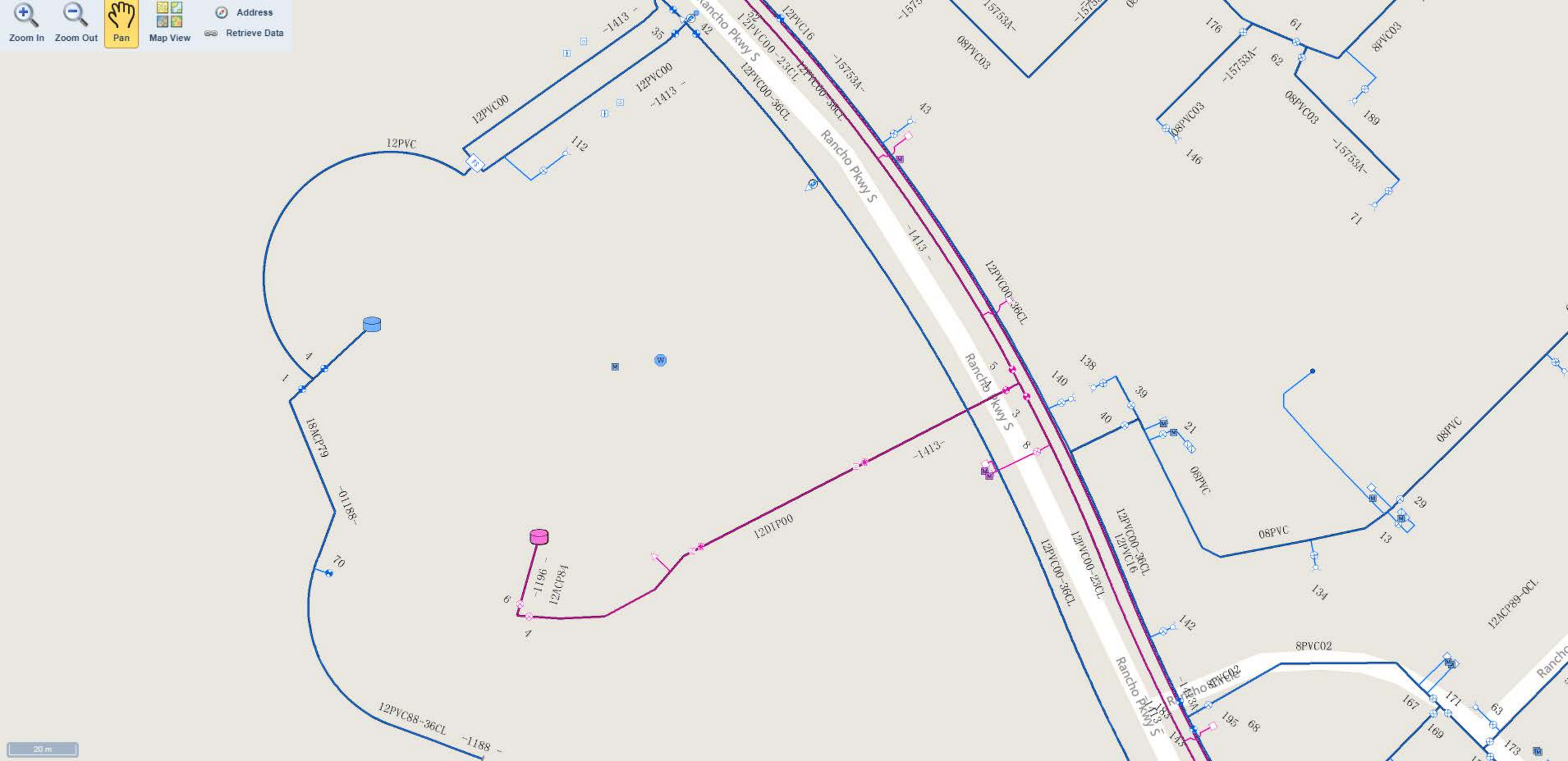
ZONE B 7.8 MG
RECLAIMED WATER RESERVOIR
FILL SITE

DESIGN			SHEET NO.
L.G.	Boyle Engineering Corporation		10
DRAWN	consulting engineers / architects		
D.G.B.			
CHECKED	DATE DEC. 1986	OCL0426012 D-2309	OF 10 SHEETS
H.U.	P.E.		


Zoom In
Zoom Out
Pan
Map View
Address
Retrieve Data
Map View
Packages
Mapplet
Data Layers
Potable
Recycled
Sewer
Natural Treatment System
Storm Drain
Atlas Grid
Basemap
Potable Improvement Districts
Sewer Improvement Districts
Online Basemaps
ESRI
Google
OSM
(No Basemap)
Help
Close
Foothill Ranch Town Center
Portola Hills
Glenn Ranch Rd
El Toro Rd
Portola Pkwy
Santa Margarita Pkwy
Los Alisos Blvd
Irvine Blvd
Trabuco Rd
Bake Pkwy
Alton Pkwy
Lake Forest Dr
Serrano Creek Trl
Copperstone
Sienna Ridge
California Terrace
Evergreen Ridge
Ventana
Rainbow Ridge
Pinecrest
Palmia Villas
Pinecrest Park
Ascension Cemetery


Zoom In
Zoom Out
Pan
Map View
Address
Retrieve Data
Map View
Packages
Mapplet
Data Layers
Potable
Recycled
Sewer
Natural Treatment System
Storm Drain
Atlas Grid
Basemap
Potable Improvement Districts
Sewer Improvement Districts
Online Basemaps
ESRI
Google
OSM
(No Basemap)
Help
Close
Alton Pkwy
Foothill Ranch Town Centre
Bake Pkwy
Lake Forest Dr
Portola Pkwy
Glenn Ranch Rd
El Toro Rd
Santa Margarita Pkwy
Los Alisos Blvd
Irvine Blvd
Trabuco Rd
Commercentre Dr
Atlantic Ocean Dr
Vista Terrace
BAKE RANCH
RANCHO SERRANO
PORTOLA HILLS
COPPERSTONE
SIENNA RIDGE
CALIFORNIA TERRACE
EVERGREEN RIDGE
VENTANA
RAINBOW RIDGE
PINECREST
PALMIA - VILLAS
241
23
SAT
S18
20


Zoom In
Zoom Out
Pan
Map View
Address
Retrieve Data
Map View
Packages
Mapplet
Data Layers
Potable
Recycled
Sewer
Natural Treatment System
Storm Drain
Atlas Grid
Basemap
Potable Improvement Districts
Sewer Improvement Districts
Online Basemaps
ESRI
Google
OSM
(No Basemap)
Help
Close
Foothill Ranch Town Centre
BAKER RANCH
Portola Pkwy
El Toro Rd
Glenn Ranch Rd
Lake Forest Dr
Alton Pkwy
Bake Pkwy
Commercentre Dr
Serrano Creek TR
Biscayne Bay Dr
Canada Rd
Regency Ln
Trabuco Rd
Irvine Blvd
Santa Margarita Pkwy
Los Alisos Blvd
COPPERSTONE
SIENNA RIDGE
CALIFORNIA TERRACE
EVERGREEN RIDGE
RAINBOW RIDGE
VENTANA
PINECREST
PALMIA VILLAS
241
23
S18
SAT
20


Zoom In
Zoom Out
Pan
Map View
Address
Retrieve Data
Rancho Pkwy S
12PVC00
12PVC00-36CL
12PVC00-23CL
12PVC16
12PVC
12DIP00
18ACP79
12ACP84
12PVC88-36CL
08PVC
08PVC03
8PVC02
8PVC03
12ACP89-0CL
-1413-
-1188-
-1196-
-15753A-
20 m

From:	Eric Akiyoshi
To:	Danielle Clendening
Subject:	RE: Fwd: Pipeline Information Request for Proposed School Site in Lake Forest, CA
Date:	Monday, March 11, 2019 3:55:21 PM

Danielle

Thank you for checking back. Here are some thoughts on the remaining questions.

Leak History - IRWD has owned and operating these tanks since January 2001. Neither the Lake Forest Zone "II" West, nor the Zone "B" West tanks have had any leaks during this time frame. Additionally, IRWD is not aware of any leaks prior to taking responsibility for the tanks.
Inspection Frequency - IRWD inspects its facilities on a weekly basis and monitors continuously with automated data acquisition. Tanks are typically inspected via underwater camera and SCUBA inspections approximately every 2 years.
Is there a seismic shutoff valve - IRWD has automated data acquisition and manual isolation valves for each of these tanks.

Regards

Eric Akiyoshi, P.E.
Principal Engineer
Planning and Technical Services
Irvine Ranch Water District
15600 Sand Canyon Avenue, Irvine, California 92618
Mailing: PO Box 57000, Irvine, California 92619-7000
(949) 453-5552 office (714) 222-5149 cell
Email: akiyoshi@irwd.com

>>> Danielle Clendening <dbclendening@placeworks.com> 10:53 AM 3/11/2019 >>>
Hi Eric,

Is there any update about questions 6-9 regarding the two water tanks?

Thank you for your assistance,

Danielle

From: Eric Akiyoshi <AKIYOSHI@irwd.com>
Sent: Tuesday, January 29, 2019 11:35 AM
To: Danielle Clendening <dbclendening@placeworks.com>
Subject: Re: Fwd: Pipeline Information Request for Proposed School Site in Lake Forest, CA

Danielle

Thank you for your e-mail. With regards to your facilities request. You can do the research on IRWD's online GIS Map and Records tool located here:
https://www.irwd.com/doing-business/gis-map-and-records

Regarding the two tanks you identified, items 1-6 have been filled in. Items 6-9 will need to be researched and we anticipate getting back to you within 5-7 business days.

Lake Forest Zone "II" West Reservoir
Tank Capacity: 7.8 million gallons
ID: Lake Forest Zone "II" West Reservoir

Height: approximately 35 ft
Material: Steel
Year of Construction: 1978
Water Level of the Tank: High Water Level = 883 ft

Lake Forest Zone "B" West Reservoir
Tank Capacity: 7.8 million gallons
ID: Lake Forest Zone "B" West Reservoir
Height: approximately 35 ft
Material: Steel
Year of Construction: 1984
Water Level of the Tank: High Water Level = 867 ft

If you have questions, feel free to contact me.

Eric Akiyoshi, P.E.
Principal Engineer
Planning and Technical Services
Irvine Ranch Water District
15600 Sand Canyon Avenue, Irvine, California 92618
Mailing: PO Box 57000, Irvine, California 92619-7000
(949) 453-5552 office (714) 222-5149 cell
Email: akiyoshi@irwd.com

>>> Danielle Clendening <dbclendening@placeworks.com> 1/28/2019 3:36 PM >>>
Good afternoon,

Saddleback Valley Unified School District, in compliance with CCR Title V Section 14010 (h), has contracted the services of PlaceWorks to conduct a safety hazard assessment related to water pipelines that are 12-inches in diameter or greater and pressurized sewer lines located within a 1,500-foot radius of a proposed elementary school site in Lake Forest, Orange County, CA. The proposed school site is located in the northeast corner of the intersection of Bake Parkway and Rancho Parkway. I have attached a pdf of a map showing the exact location of the site outlined in yellow and an approximately 1,500-foot radius marked around the site in red.

This email is requesting information about any water pipelines 12-inches in diameter or greater and any pressurized sewer pipelines operated by Irvine Ranch Water District located within a 1,500-foot radius of the site. If there are no water or sewer lines that meet those specifications within the radius of the site, could I get a response stating such for the school district's safety hazard report.

Additionally, there appear to be two aboveground water storage tanks within 1,500 feet of the proposed school site. For the purposes of the District's safety hazard assessment we require the following information for each tank:

1. Tank Capacity:
2. ID:
3. Height:
4. Material:

5. Year of Construction:
6. Water Level of the Tank:
7. Leak History:
8. Inspection Frequency:
9. Is there a seismic shutoff valve:

If this not the correct email to be sending such a request, could you please help direct this inquiry to the proper division.

Thank you so much for your help, please contact me if you have any questions or need more information!

DANIELLE CLENDENING
Intern

PLACEWORKS <!--[if !vml]--><!--[endif]-->

2850 Inland Empire Boulevard, Suite B | Ontario, California 91764
909.989.4449 | dbclendening@placeworks.com | placeworks.com

Mike Campisi
Pipeline Planning Assistant

9400 Oakdale Ave
Chatsworth, CA 91311

Tel: 213-231-6081

February 27, 2019

Danielle Clendening
PLACEWORKS
2850 Inland Empire Boulevard, Suite B
Ontario, California 91764
dbclendening@placeworks.com

Subject: **Bake Parkway and Rancho Parkway**
Lake Forest,CA

DCF: **0241-19NC193**

The Transmission Department of SoCalGas does not operate any facilities within 1500 feet of the address stated above. However, the Distribution Department of SoCalGas may maintain and operate facilities within that location.

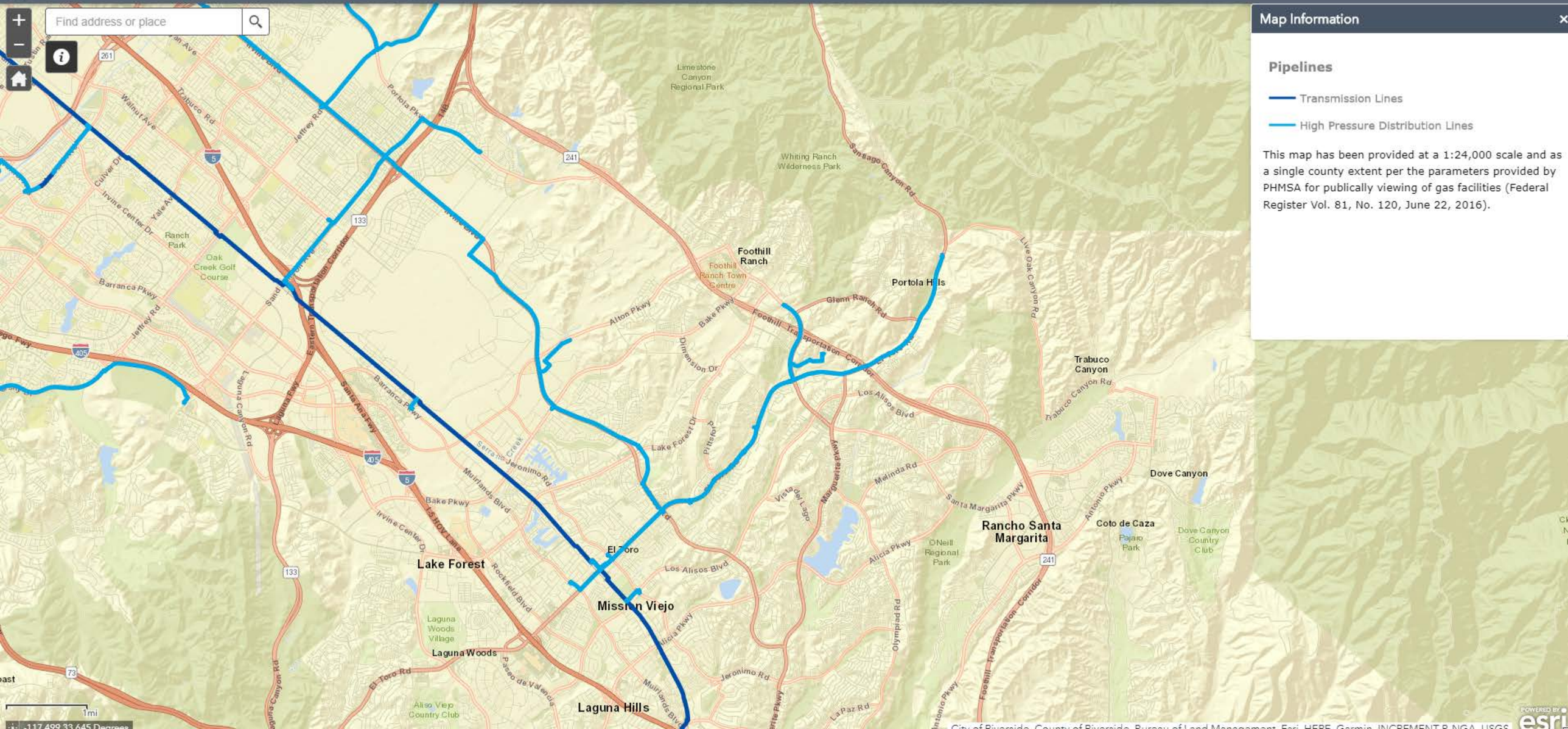
To assure no conflict with the Distribution's pipeline system, please e-mail them at:

AtlasRequests/WillServeAnaheim@semprautilities.com

Sincerely,

Mike Campisi
Pipeline Planning Assistant
SoCalGas Transmission Technical Services
SoCalGasTransmissionUtilityRequest@semprautilities.com

Gas Transmission Pipeline Interactive Map - Orange



SOUTHERN CALIFORNIA EDISON
An EDISON INTERNATIONAL℠ Company

Phil Hung, P.E.
EMF Program Manager
6040 N. Irwindale Ave
Irwindale CA 91702
Phone: (626) 633-3415
E-mail: phil.hung@sce.com

SCE Voltage Identification Report of Proposed or Existing School Site

Request Received: **01/28/2019** Received By: **Phil Hung**

Requesting Entity: __ School ____District __**X**__Consultant ___ School Representative:

Danielle Clendening
dbclendening@placeworks.com
The Planning Center
2850 Inland Empire Boulevard, Suite B
Ontario, California 91764
(909) 989-4449

Nature of Request: Voltage ID ___**X**___ Msmt. Req. _____ Information _____

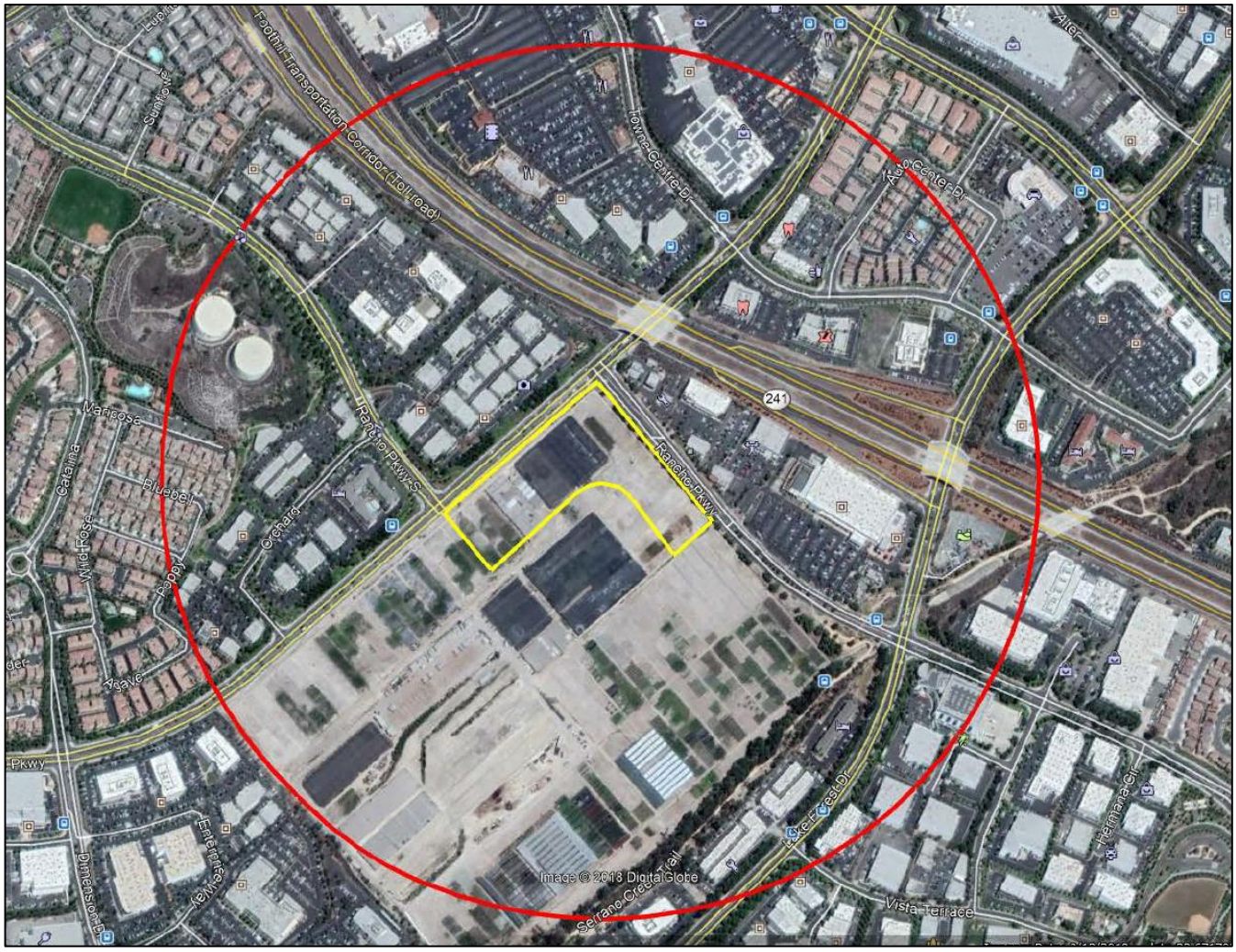
Other: _____

Site Name:	**Lake Forest Bake Parkway/Rancho Parkway**
Site Address:	**A parcel on the south-west corner of Bake Parkway and Rancho Parkway**
City:	**Lake Forest, CA 92610**
County:	**Orange**
Cross Streets:	**Bake Parkway/Rancho Parkway**

Client: **Saddleback Valley Unified School District**
25631 Peter A. Hartman Way
Mission Viejo, CA 92691

Photo(s):

Aerial View



Street View

Looking Northeast on Bake Parkway

Date of Site Visit: **01/29/2019 (Bing Maps)**
Support Action(s) Taken: **SCE system database lookup**

SCE Facilities Identified Within California Code of Regulations (CCR) Title 5 Prescribed Distances:

- **There are 66 kV double circuits on Bake Parkway immediately adjacent to the proposed site.**
- **There are no new power lines above 50 kV in the area since the previous voltage identification report of 2017**
- **The area adjacent to Bake Parkway should be designated as non-populated area such as parking lot or storage area in order to meet the Title 5 setback requirement.**

Date(s) responded to Requestor:
01/29/19: Acknowledged, (E-mail)
01/29/19: Supplied Information (E-mail)

Nakase Property

GREENHOUSE GAS ANALYSIS

CITY OF LAKE FOREST

PREPARED BY:

Haseeb Qureshi, MES
hqureshi@urbanxroads.com
(949) 336-5987

Alyssa Tamase
atamase@urbanxroads.com
(949) 336-5988

July 30, 2019 (Revised)
July 9, 2019
MAY 13, 2019

TABLE OF CONTENTS

TABLE OF CONTENTS **1**
APPENDICES **2**
LIST OF EXHIBITS **2**
LIST OF TABLES **2**
LIST OF ABBREVIATED TERMS **3**
EXECUTIVE SUMMARY **1**
Summary of Findings 1
1 INTRODUCTION **2**
1.1 Site Location 2
1.2 Project Description 2
1.3 Regulatory Requirements 2
1.4 Project Design Features 6
1.5 Construction and Operational-Source Mitigation Measures 7
2 BACKGROUND **10**
2.1 Introduction to Global Climate Change 10
2.2 Greenhouse Gas Emissions Inventories 10
2.3 Global Climate Change Defined 11
2.4 Greenhouse Gases 12
2.5 Effects of Climate Change in California 15
2.6 Human Health Effects 17
2.7 Regulatory Setting 19
2.8 Discussion on Establishment of Significance Thresholds 40
3 PROJECT GREENHOUSE GAS EMISSIONS **42**
3.1 Introduction 42
3.2 California Emissions Estimator Model™ Employed to Estimate GHG Emissions 42
3.3 Construction and Operational Life-Cycle Analysis 42
3.4 Construction Emissions 42
3.5 Operational Emissions 43
3.7 Existing Project Site 44
3.8 Emissions Summary 45
3.9 Greenhouse Gas Emissions Findings and Recommendations 46
4 REFERENCES **54**
5 CERTIFICATION **57**

APPENDICES

APPENDIX 3.1: CALEEMOD CONSTRUCTION ANNUAL EMISSIONS MODEL OUTPUTS
APPENDIX 3.2: CALEEMOD OPERATIONAL (OTHER USES - WITH PROJECT DESIGN FEATURES) ANNUAL EMISSIONS MODEL OUTPUTS
APPENDIX 3.3: CALEEMOD OPERATIONAL (RESIDENTIAL USES - WITH PROJECT DESIGN FEATURES) ANNUAL EMISSIONS MODEL OUTPUTS
APPENDIX 3.4: CALEEMOD OPERATIONAL (EXISTING) ANNUAL EMISSIONS MODEL OUTPUTS

LIST OF EXHIBITS

EXHIBIT 1-A: LOCATION MAP 4
EXHIBIT 1-B: SITE PLAN 5
EXHIBIT 2-A: SUMMARY OF PROJECTED GLOBAL WARMING IMPACT 18

LIST OF TABLES

TABLE ES-1: SUMMARY OF CEQA SIGNIFICANCE FINDINGS 1
TABLE 2-1: TOP GHG PRODUCER COUNTRIES AND THE EUROPEAN UNION 11
TABLE 2-2: GLOBAL WARMING POTENTIAL AND ATMOSPHERIC LIFETIME OF SELECT GHGS 15
TABLE 3-1: EXISTING CONDITIONS GREENHOUSE GAS EMISSIONS 45
TABLE 3-2: 2025 PROJECT GREENHOUSE GAS EMISSIONS 45
TABLE 3-3: 2030 PROJECT GREENHOUSE GAS EMISSIONS 46
TABLE 3-5: SCOPING PLAN CONSISTENCY SUMMARY 49

LIST OF ABBREVIATED TERMS

(1)	Reference
AFUE	Annual Fuel Utilization Efficiency
ARB	California Air Resources Board
AQIA	Air Quality Impact Analysis
CAA	Federal Clean Air Act
CalEEMod	California Emissions Estimator Model
CalEPA	California Environmental Protection Agency
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resource Board
CAT	Climate Action Team
CBSC	California Building Standards Commission
CEC	California Energy Commission
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFC	Chlorofluorocarbons
CFR	Code of Federal Regulations
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
CPUC	California Public Utilities Commission
CRRC	Cool Roof Rating Council
EPA	Environmental Protection Agency
EPS	Emission Performance Standard
GCC	Global Climate Change
GHGA	Greenhouse Gas Analysis
GWP	Global Warming Potential
HERS	Home Energy Rating System
HFC	Hydrofluorocarbons
HVAC	Heating, Ventilation, and Air Conditioning
HSPF	Heating Seasonal Performance Factor
LCA	Life-Cycle Analysis
MMs	Mitigation Measures
$MMTCO_2e$	Million Metric Ton of Carbon Dioxide Equivalent
$MTCO_2e$	Metric Ton of Carbon Dioxide Equivalent
N_20	Nitrogen Dioxide

NIOSH	National Institute for Occupational Safety and Health
NO_x	Oxides of Nitrogen
PFC	Perfluorocarbons
PM_{10}	Particulate Matter 10 microns in diameter or less
$PM_{2.5}$	Particulate Matter 2.5 microns in diameter or less
PPM	Parts Per Million
Project	Nakase Property
QII	Quality Insultation Installation
RTP	Regional Transportation Plan
SB	Senate Bill
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SEER	Seasonal Energy Efficiency Ration
SHGC	Solar Heath Gain Coefficient
UNFCCC	United Nations' Framework Convention on Climate Change
VOC	Volatile Organic Compounds

This page intentionally left blank

EXECUTIVE SUMMARY

SUMMARY OF FINDINGS

The results of this *Nakase Property Greenhouse Gas Analysis* are summarized below based on the GHG Impact Criteria 1 and 2. Table ES-1 shows the findings of significance for potential greenhouse gas impacts under CEQA before and after any required mitigation measures described below.

TABLE ES-1: SUMMARY OF CEQA SIGNIFICANCE FINDINGS

Analysis	Report Section	Significance Findings	
		Unmitigated	Mitigated
Direct or Indirect GHG Emissions Impact (Criteria 1)	3.0	*Potentially Significant*	*Significant and Unavoidable*
Consistency with Applicable Plan or Policies (Criteria 2)	3.0	*Potentially Significant*	*Significant and Unavoidable*

1 INTRODUCTION

This report presents the results of the greenhouse gas analysis (GHGA) prepared by Urban Crossroads, Inc., for the proposed Nakase Property Project ("Project"). The purpose of this GHGA is to evaluate Project-related construction and operational emissions and determine the level of greenhouse gas (GHG) impacts as a result of constructing and operating the proposed Project.

1.1 SITE LOCATION

The proposed Project is located east of Bake Parkway and south of Rancho Parkway in the City of Lake Forest, as shown on Exhibit 1-A. The Project site is currently occupied by the Nakase Brothers Wholesale Nursery. State Route 241 (SR-241) is located roughly 325 feet north of the Project site boundaries. Existing residential uses are located west of the Project site, and office and commercial uses are located north, south, east, and west of the Project site. The Serrano Creek Trail runs adjacent to the southern Project site boundaries.

1.2 PROJECT DESCRIPTION

The proposed Project consists of 675 single-family dwelling units, 101 senior affordable residential units, an elementary school with athletic/sports fields which could accommodate up to 1,000 students, and park/open space uses. The proposed residences would predominantly consist of single-family detached units. Any single-family attached units would be located in Neighborhoods 2 and 5, as shown on Exhibit 1-B. Construction is expected to commence in November 2019 and will last through June 2025. The Project's Opening Year for analytical purposes is 2025.

According to the *Traffic Impact Analysis*, the proposed Project is anticipated to generate a total of approximately 8,789 trip-ends per day on a typical weekday. The Project trips will be 14,122 fewer trips per day, with 1,377 fewer vehicles per hour during the AM peak hour and 1,442 fewer vehicles per hour during the PM peak hour, in comparison to the approved General Plan designation of business park land use for the site (1). It should be noted that comparison to the approved General Plan land use designation has been included for informational purposes only and this information is not used to make any CEQA findings.

The Project site is currently operating as Nakase Brothers Wholesale Nursery, an agricultural wholesale plant nursery. The Project site is currently generating traffic and consequently emissions associated with its ongoing operations. Notwithstanding, as a conservative measure, no "credit" has been taken for the existing use since specific operational characteristics are unknown and since the existing use does not generate a substantial amount of traffic.

1.3 REGULATORY REQUIREMENTS

The Project would be required to comply with all mandates imposed by the State of California and the South Coast Air Quality Management District aimed at the reduction of air quality

emissions. Those that are applicable to the Project and that would assist in the reduction of greenhouse gas emissions are:

- Global Warming Solutions Act of 2006 (AB32) (2)
- Regional GHG Emissions Reduction Targets/Sustainable Communities Strategies (SB 375) (3)
- Pavely Fuel Efficiency Standards (AB1493). Establishes fuel efficiency ratings for new vehicles (4).
- Title 24 California Code of Regulations (California Building Code). Establishes energy efficiency requirements for new construction (5).

EXHIBIT 1-A: LOCATION MAP

EXHIBIT 1-B: SITE PLAN

- The site design of each non-residential building shall be designed to incorporate electric vehicle charging stations and carpool parking spaces for employees in accordance with the mandatory requirements of CalGreen.
- Title 20 California Code of Regulations (Appliance Energy Efficiency Standards). Establishes energy efficiency requirements for appliances (6).
- Title 17 California Code of Regulations (Low Carbon Fuel Standard). Requires carbon content of fuel sold in California to be 10% less by 2020 (7).
- California Water Conservation in Landscaping Act of 2006 (AB1881). Requires local agencies to adopt the Department of Water Resources updated Water Efficient Landscape Ordinance or equivalent by January 1, 2010 to ensure efficient landscapes in new development and reduced water waste in existing landscapes (8).
- Statewide Retail Provider Emissions Performance Standards (SB 1368). Requires energy generators to achieve performance standards for GHG emissions (9).
- Renewable Portfolio Standards (SB 1078). Requires electric corporations to increase the amount of energy obtained from eligible renewable energy resources to 20 percent by 2010 and 33 percent by 2020 (10).

Promulgated regulations that will affect the Project's emissions are accounted for in the Project's GHG calculations provided in this report. In particular, the Pavley Standards, Low Carbon Fuel Standards, and Renewable Portfolio Standards (RPS) will be in effect for the AB 32 target year of 2020, and therefore are accounted for in the Project's emission calculations.

1.4 PROJECT DESIGN FEATURES

Energy-saving and sustainable design features and operational programs would be incorporated into facilities developed pursuant to the currently-proposed Project. The Project also incorporates and expresses the following project design features (PDF) and attributes promoting energy efficiency and sustainability. Because these features/attributes are integral to the Project, and/or are regulatory requirements, they are not considered to be mitigation measures.

- Regional vehicle miles traveled (VMT) and associated vehicular-source emissions are reduced by the following Project design features/attributes:
    - Pedestrian connections shall be provided to surrounding areas consistent with the City's General Plan. Providing a pedestrian access network to link areas of the Project site encourages people to walk instead of drive. The Project would provide a pedestrian access network that internally links all uses and connects to all existing or planned external streets and pedestrian facilities contiguous with the project site. The Project would minimize barriers to pedestrian access and interconnectivity.
    - The Project's proposed collocation of varied residential, park, and open spaces within ¼ mile proximity together with supporting amenities would tend to decrease the propensity for vehicle travel for local residents.
    - The Project provides for Below Market Rate (BMR) housing through the construction of senior housing dwelling units. BMR housing encourages building a greater percentage of smaller units that allow a greater number of families to be accommodated on infill and transit-oriented development sites within a given building footprint and height limit.

Senior housing tends to have lower levels of auto ownership, allowing buildings to be designed with less parking.

- The project will design building shells and building components, such as windows; roof systems: electrical and lighting systems: and heating, ventilating, and air conditioning systems to meet 2019 Title 24 Standards which expects 30% less energy for non-residential buildings and 53% less energy for residential use due to lighting upgrades.
- To reduce water demands and associated energy use, subsequent development proposals within the Project site would be required to implement a Water Conservation Strategy and demonstrate a minimum 20% reduction in indoor and outdoor water usage when compared to baseline water demand (total expected water demand without implementation of the Water Conservation Strategy)[1].
- The Project is required to comply with SCAQMD Rule 445, which prohibits the use of wood burning stoves and fireplaces in new development
- Increased insultation values in walls and attic spaces.
- Installation of high-efficiency windows and doors.
- Installation of heating, ventilation, and air conditioning (HVAC) systems with a high Seasonal Energy Efficiency Ratio (SEER).
- Specified use of Energy Star appliances.
- Installation of water-efficient plumbing fixtures.
- Installation of tankless water heater systems.
- Installation of light-emitting diode (LED) technology within homes.
- Use of recycled water for common area landscape irrigation.
- Use of drought-tolerant plants in landscape design.
- Installation of water-efficient irrigation systems with smart sensor controls.
- Erosion, sedimentation, and site water control facilitated through the implementation of storm water management practices, bio swales, and bioretention basins.
- Installation of a 240-volt circuit in each home to allow easy installation of electric vehicle (EV) charging.

1.5 CONSTRUCTION AND OPERATIONAL-SOURCE MITIGATION MEASURES

No feasible mitigation measures exist that would reduce these emissions to levels that are less-than-significant. Project GHG emissions exceedances of applicable service populations thresholds are therefore considered significant and unavoidable. Moreover, more than 73 percent of all mobile-source emissions in 2025 and 66 percent of all mobile-source emissions in 2030 (by weight) would be generated by Project mobile sources (traffic). Neither the Project Applicant nor the Lead Agency (City of Lake Forest) can substantively or materially affect reductions in Project mobile-source emissions beyond the regulatory requirements and project design features identified herein. Additionally, even if mitigation were applied to reduce all other sources to the

1 Reduction of 20% indoor and outdoor water usage is consistent with the current CalGreen Code performance standards for residential and non-residential land uses. Per CalGreen, the reduction shall be based on the maximum allowable water use per plumbing fixture and fittings as required by the California Building Standards Code.

maximum extent possible, the Project mobile-source emissions alone would still exceed the threshold of significance. As such, no feasible mitigation measures beyond the regulatory requirements and project design features would reduce project-related emissions to levels that are less-than-significant.

This page intentionally left blank

2 BACKGROUND

2.1 INTRODUCTION TO GLOBAL CLIMATE CHANGE

Global Climate Change (GCC) is defined as the change in average meteorological conditions on the earth with respect to temperature, precipitation, and storms. GCC is currently one of the most controversial environmental issues in the United States, and much debate exists within the scientific community about whether or not GCC is occurring naturally or as a result of human activity. Some data suggests that GCC has occurred in the past over the course of thousands or millions of years. These historical changes to the earth's climate have occurred naturally without human influence, as in the case of an ice age. However, many scientists believe that the climate shift taking place since the industrial revolution (1900) is occurring at a quicker rate and magnitude than in the past. Scientific evidence suggests that GCC is the result of increased concentrations of greenhouse gases in the earth's atmosphere, including carbon dioxide, methane, nitrous oxide, and fluorinated gases. Many scientists believe that this increased rate of climate change is the result of greenhouse gases resulting from human activity and industrialization over the past 200 years.

An individual project like the proposed Project evaluated in this GHGA cannot generate enough greenhouse gas emissions to affect a discernible change in global climate. However, the proposed Project may participate in the potential for GCC by its incremental contribution of greenhouse gases combined with the cumulative increase of all other sources of greenhouse gases, which when taken together constitute potential influences on GCC. Because these changes may have serious environmental consequences, Section 3.0 will evaluate the potential for the proposed Project to have a significant effect upon the environment as a result of its potential contribution to the greenhouse effect.

2.2 GREENHOUSE GAS EMISSIONS INVENTORIES

Global

Worldwide anthropogenic (human) GHG emissions are tracked by the Intergovernmental Panel on Climate Change for industrialized nations (referred to as Annex I) and developing nations (referred to as Non-Annex I). Human GHG emissions data for Annex I nations are available through 2016. For the Year 2016, the sum of these emissions totaled approximately 28,747,554 Gg $CO2e^2$ (11) (12). The GHG emissions in more recent years may differ from the inventories presented in Table 2-1; however, the data is representative of currently available inventory data.

2 The global emissions are the sum of Annex I and non-Annex I countries, without counting Land-Use, Land-Use Change and Forestry (LULUCF). For countries without 2016 data, the UNFCCC data for the most recent year were used. United Nations Framework Convention on Climate Change, "Annex I Parties – GHG total without LULUCF," The most recent GHG emissions for China were taken in 2012, while the most recent GHG emissions for India were taken in 2010.

United States

As noted in Table 2-1, the United States, as a single country, was the number two producer of GHG emissions in 2016. The primary greenhouse gas emitted by human activities in the United States was CO_2, representing approximately 81.6 percent of total greenhouse gas emissions. Carbon dioxide from fossil fuel combustion, the largest source of US greenhouse gas emissions, accounted for approximately 93.5 percent of the GHG emissions (13).

TABLE 2-1: TOP GHG PRODUCER COUNTRIES AND THE EUROPEAN UNION [3]

Emitting Countries	GHG Emissions (Gg CO_2e)
China	11,895,765
United States	6,511,302
European Union (28 member countries)	4,291,252
India	2,643,817
Russian Federation	2,100,850
Japan	1,304,568
Total	**28,747,554**

State of California

CARB compiles GHG inventories for the State of California. Based upon the 2018 GHG inventory data (i.e., the latest year for which data are available) for the 2000-2016 greenhouse gas emissions inventory, California emitted 429.4 $MMTCO_2e$ including emissions resulting from imported electrical power in 2015 (14).

2.3 GLOBAL CLIMATE CHANGE DEFINED

GCC refers to the change in average meteorological conditions on the earth with respect to temperature, wind patterns, precipitation and storms. Global temperatures are regulated by naturally occurring atmospheric gases such as water vapor, CO_2 (carbon dioxide), N_2O (nitrous oxide), CH_4 (methane), hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride. These particular gases are important due to their residence time (duration they stay) in the atmosphere, which ranges from 10 years to more than 100 years. These gases allow solar radiation into the earth's atmosphere, but prevent radioactive heat from escaping, thus warming the earth's atmosphere. GCC can occur naturally as it has in the past with the previous ice ages.

Gases that trap heat in the atmosphere are often referred to as greenhouse gases. Greenhouse gases are released into the atmosphere by both natural and anthropogenic (human) activity. Without the natural greenhouse gas effect, the earth's average temperature would be approximately 61° Fahrenheit (F) cooler than it is currently. The cumulative accumulation of

[3] Used http://unfccc.int data for Annex I countries. Consulted the CAIT Climate Data Explorer in http://www.wri.org site to reference Non-Annex I countries such as China and India.

these gases in the earth's atmosphere is considered to be the cause for the observed increase in the earth's temperature.

Although California's rate of growth of greenhouse gas emissions is slowing, the state is still a substantial contributor to the U.S. emissions inventory total. In 2004, California is estimated to have produced 492 million gross metric tons of CO_2e greenhouse gas emissions. Despite a population increase of 16 percent between 1990 and 2004, California has significantly slowed the rate of growth of greenhouse gas emissions due to the implementation of energy efficiency programs as well as adoption of strict emission controls (15).

2.4 GREENHOUSE GASES

For the purposes of this analysis, emissions of carbon dioxide, methane, and nitrous oxide were evaluated (see Table 3-4 later in this report) because these gasses are the primary contributors to GCC from development projects. Although there are other substances such as fluorinated gases that also contribute to GCC, these fluorinated gases were not evaluated as their sources are not well-defined and do not contain accepted emissions factors or methodology to accurately calculate these gases.

Water Vapor: Water vapor (H_20) is the most abundant, important, and variable greenhouse gas in the atmosphere. Water vapor is not considered a pollutant; in the atmosphere it maintains a climate necessary for life. Changes in its concentration are primarily considered to be a result of climate feedbacks related to the warming of the atmosphere rather than a direct result of industrialization. A climate feedback is an indirect, or secondary, change, either positive or negative, that occurs within the climate system in response to a forcing mechanism. The feedback loop in which water is involved is critically important to projecting future climate change.

As the temperature of the atmosphere rises, more water is evaporated from ground storage (rivers, oceans, reservoirs, soil). Because the air is warmer, the relative humidity can be higher (in essence, the air is able to 'hold' more water when it is warmer), leading to more water vapor in the atmosphere. As a GHG, the higher concentration of water vapor is then able to absorb more thermal indirect energy radiated from the Earth, thus further warming the atmosphere. The warmer atmosphere can then hold more water vapor and so on and so on. This is referred to as a "positive feedback loop." The extent to which this positive feedback loop will continue is unknown as there are also dynamics that hold the positive feedback loop in check. As an example, when water vapor increases in the atmosphere, more of it will eventually also condense into clouds, which are more able to reflect incoming solar radiation (thus allowing less energy to reach the earth's surface and heat it up).

There are no human health effects from water vapor itself; however, when some pollutants come in contact with water vapor, they can dissolve and the water vapor can then act as a pollutant-carrying agent. The main source of water vapor is evaporation from the oceans (approximately 85 percent). Other sources include: evaporation from other water bodies, sublimation (change from solid to gas) from sea ice and snow, and transpiration from plant leaves.

Carbon Dioxide: Carbon dioxide (CO_2) is an odorless and colorless GHG. Outdoor levels of carbon dioxide are not high enough to result in negative health effects. Carbon dioxide is emitted from natural and manmade sources. Natural sources include: the decomposition of dead organic matter; respiration of bacteria, plants, animals and fungus; evaporation from oceans; and volcanic outgassing. Anthropogenic sources include: the burning of coal, oil, natural gas, and wood. Carbon dioxide is naturally removed from the air by photosynthesis, dissolution into ocean water, transfer to soils and ice caps, and chemical weathering of carbonate rocks (16).

Since the industrial revolution began in the mid-1700s, the sort of human activity that increases GHG emissions has increased dramatically in scale and distribution. Data from the past 50 years suggests a corollary increase in levels and concentrations. As an example, prior to the industrial revolution, CO_2 concentrations were fairly stable at 280 parts per million (ppm). Today, they are around 370 ppm, an increase of more than 30 percent. Left unchecked, the concentration of carbon dioxide in the atmosphere is projected to increase to a minimum of 540 ppm by 2100 as a direct result of anthropogenic sources (17).

Methane: Methane (CH_4) is an extremely effective absorber of radiation, though its atmospheric concentration is less than carbon dioxide and its lifetime in the atmosphere is brief (10-12 years), compared to other GHGs. No health effects are known to occur from exposure to methane.

Methane has both natural and anthropogenic sources. It is released as part of the biological processes in low oxygen environments, such as in swamplands or in rice production (at the roots of the plants). Over the last 50 years, human activities such as growing rice, raising cattle, using natural gas, and mining coal have added to the atmospheric concentration of methane. Other anthropocentric sources include fossil-fuel combustion and biomass burning.

Nitrous Oxide: Nitrous oxide (N_2O), also known as laughing gas, is a colorless greenhouse gas. Nitrous oxide can cause dizziness, euphoria, and sometimes slight hallucinations. In small doses, it is considered harmless. However, in some cases, heavy and extended use can cause Olney's Lesions (brain damage) (18).

Concentrations of nitrous oxide also began to rise at the beginning of the industrial revolution. In 1998, the global concentration was 314 parts per billion (ppb). Nitrous oxide is produced by microbial processes in soil and water, including those reactions which occur in fertilizer containing nitrogen. In addition to agricultural sources, some industrial processes (fossil fuel-fired power plants, nylon production, nitric acid production, and vehicle emissions) also contribute to its atmospheric load. It is used as an aerosol spray propellant, i.e., in whipped cream bottles. It is also used in potato chip bags to keep chips fresh. It is used in rocket engines and in race cars. Nitrous oxide can be transported into the stratosphere, be deposited on the earth's surface, and be converted to other compounds by chemical reaction

Chlorofluorocarbons: Chlorofluorocarbons (CFCs) are gases formed synthetically by replacing all hydrogen atoms in methane or ethane (C_2H_6) with chlorine and/or fluorine atoms. CFCs are nontoxic, nonflammable, insoluble and chemically unreactive in the troposphere (the level of air at the earth's surface). CFCs are no longer being used; therefore, it is not likely that health effects would be experienced. Nonetheless, in confined indoor locations, working with CFC-113 or other

CFCs is thought to result in death by cardiac arrhythmia (heart frequency too high or too low) or asphyxiation.

CFCs have no natural source, but were first synthesized in 1928. They were used for refrigerants, aerosol propellants and cleaning solvents. Due to the discovery that they are able to destroy stratospheric ozone, a global effort to halt their production was undertaken and was extremely successful, so much so that levels of the major CFCs are now remaining steady or declining. However, their long atmospheric lifetimes mean that some of the CFCs will remain in the atmosphere for over 100 years.

Hydrofluorocarbons: Hydrofluorocarbons (HFCs) are synthetic, man-made chemicals that are used as a substitute for CFCs. Out of all the greenhouse gases, they are one of three groups with the highest global warming potential. The HFCs with the largest measured atmospheric abundances are (in order), HFC-23 (CHF_3), HFC-134a (CF_3CH_2F), and HFC-152a (CH_3CHF_2). Prior to 1990, the only significant emissions were of HFC-23. HFC-134a emissions are increasing due to its use as a refrigerant. The U.S. EPA estimates that concentrations of HFC-23 and HFC-134a are now about 10 parts per trillion (ppt) each; and that concentrations of HFC-152a are about 1 ppt (19). No health effects are known to result from exposure to HFCs, which are manmade for applications such as automobile air conditioners and refrigerants.

Perfluorocarbons: Perfluorocarbons (PFCs) have stable molecular structures and do not break down through chemical processes in the lower atmosphere. High-energy ultraviolet rays, which occur about 60 kilometers above earth's surface, are able to destroy the compounds. Because of this, PFCs have very long lifetimes, between 10,000 and 50,000 years. Two common PFCs are tetrafluoromethane (CF_4) and hexafluoroethane (C_2F_6). The U.S. EPA estimates that concentrations of CF_4 in the atmosphere are over 70 ppt.

No health effects are known to result from exposure to PFCs. The two main sources of PFCs are primary aluminum production and semiconductor manufacture.

Sulfur Hexafluoride: Sulfur hexafluoride (SF_6) is an inorganic, odorless, colorless, nontoxic, nonflammable gas. It also has the highest global warming potential (GWP) of any gas evaluated (23,900). The U.S. EPA indicates that concentrations in the 1990s were about 4 ppt. In high concentrations in confined areas, the gas presents the hazard of suffocation because it displaces the oxygen needed for breathing.

Sulfur hexafluoride is used for insulation in electric power transmission and distribution equipment, in the magnesium industry, in semiconductor manufacturing, and as a tracer gas for leak detection.

Greenhouse gases have varying GWP values; GWP values represent the potential of a gas to trap heat in the atmosphere. Carbon dioxide is utilized as the reference gas for GWP, and thus has a GWP of 1.

The atmospheric lifetime and GWP of selected greenhouse gases are summarized at Table 2-2. As shown in the table below, GWP for the Second Assessment Report (SAR), the Intergovernmental Panel on Climate Change (IPCC)'s scientific and socio-economic assessment

on climate change, range from 1 for carbon dioxide to 23,900 for sulfur hexafluoride and GWP for the IPCC's 4th Assessment Report (AR4) range from 1 for carbon dioxide to 22,800 for sulfur hexafluoride.

TABLE 2-2: GLOBAL WARMING POTENTIAL AND ATMOSPHERIC LIFETIME OF SELECT GHGS

Gas	Atmospheric Lifetime (years)	Global Warming Potential (100-year time horizon)	
		Second Assessment Report (SAR)	4th Assessment Report (AR4)
Carbon Dioxide	50-200	1	1
Methane	12 ± 3	21	25
Nitrous Oxide	114	310	298
HFC-23	270	11,700	14,800
HFC-134a	14	1,300	1,430
HFC-152a	1.4	140	124
Sulfur Hexafluoride (SF_6)	3,200	23,900	22,800

Source: Table 2.14 of the IPCC Fourth Assessment Report, 2007

2.5 EFFECTS OF CLIMATE CHANGE IN CALIFORNIA

Public Health

Higher temperatures may increase the frequency, duration, and intensity of conditions conducive to air pollution formation. For example, days with weather conducive to ozone formation could increase from 25 to 35 percent under the lower warming range (3-5.5°F) to 75 to 85 percent under the medium warming range (5.5-8°F). In addition, if global background ozone levels increase as predicted in some scenarios, it may become impossible to meet local air quality standards. Air quality could be further compromised by increases in wildfires, which emit fine particulate matter that can travel long distances, depending on wind conditions. The Climate Scenarios report indicates that large wildfires could become up to 55 percent more frequent if GHG emissions are not significantly reduced.

In addition, under the higher warming range scenario (8-10.5°F), there could be up to 100 more days per year with temperatures above 90°F in Los Angeles and 95°F in Sacramento by 2100. This is a large increase over historical patterns and approximately twice the increase projected if temperatures remain within or below the lower warming range. Rising temperatures could increase the risk of death from dehydration, heat stroke/exhaustion, heart attack, stroke, and respiratory distress caused by extreme heat.

Water Resources

A vast network of man-made reservoirs and aqueducts captures and transports water throughout the state from northern California rivers and the Colorado River. The current distribution system relies on Sierra Nevada snowpack to supply water during the dry spring and summer months.

Rising temperatures, potentially compounded by decreases in precipitation, could severely reduce spring snowpack, increasing the risk of summer water shortages.

If temperatures continue to increase, more precipitation could fall as rain instead of snow, and the snow that does fall could melt earlier, reducing the Sierra Nevada spring snowpack by as much as 70 to 90 percent. Under the lower warming range scenario, snowpack losses could be only half as large as those possible if temperatures were to rise to the higher warming range. How much snowpack could be lost depends in part on future precipitation patterns, the projections for which remain uncertain. However, even under the wetter climate projections, the loss of snowpack could pose challenges to water managers and hamper hydropower generation. It could also adversely affect winter tourism. Under the lower warming range, the ski season at lower elevations could be reduced by as much as a month. If temperatures reach the higher warming range and precipitation declines, there might be many years with insufficient snow for skiing and snowboarding.

The State's water supplies are also at risk from rising sea levels. An influx of saltwater could degrade California's estuaries, wetlands, and groundwater aquifers. Saltwater intrusion caused by rising sea levels is a major threat to the quality and reliability of water within the southern edge of the Sacramento/San Joaquin River Delta – a major fresh water supply.

Agriculture

Increased temperatures could cause widespread changes to the agriculture industry reducing the quantity and quality of agricultural products statewide. First, California farmers could possibly lose as much as 25 percent of the water supply they need. Although higher CO_2 levels can stimulate plant production and increase plant water-use efficiency, California's farmers could face greater water demand for crops and a less reliable water supply as temperatures rise. Crop growth and development could change, as could the intensity and frequency of pest and disease outbreaks. Rising temperatures could aggravate O_3 pollution, which makes plants more susceptible to disease and pests and interferes with plant growth.

Plant growth tends to be slow at low temperatures, increasing with rising temperatures up to a threshold. However, faster growth can result in less-than-optimal development for many crops, so rising temperatures could worsen the quantity and quality of yield for a number of California's agricultural products. Products likely to be most affected include wine grapes, fruits and nuts.

In addition, continued global climate change could shift the ranges of existing invasive plants and weeds and alter competition patterns with native plants. Range expansion could occur in many species while range contractions may be less likely in rapidly evolving species with significant populations already established. Should range contractions occur, new or different weed species could fill the emerging gaps. Continued global climate change could alter the abundance and types of many pests, lengthen pests' breeding season, and increase pathogen growth rates.

Forests and Landscapes

Global climate change has the potential to intensify the current threat to forests and landscapes by increasing the risk of wildfire and altering the distribution and character of natural vegetation.

If temperatures rise into the medium warming range, the risk of large wildfires in California could increase by as much as 55 percent, which is almost twice the increase expected if temperatures stay in the lower warming range. However, since wildfire risk is determined by a combination of factors, including precipitation, winds, temperature, and landscape and vegetation conditions, future risks will not be uniform throughout the state. In contrast, wildfires in northern California could increase by up to 90 percent due to decreased precipitation.

Moreover, continued global climate change has the potential to alter natural ecosystems and biological diversity within the state. For example, alpine and subalpine ecosystems could decline by as much as 60 to 80 percent by the end of the century as a result of increasing temperatures. The productivity of the state's forests has the potential to decrease as a result of global climate change.

Rising Sea Levels

Rising sea levels, more intense coastal storms, and warmer water temperatures could increasingly threaten the state's coastal regions. Under the higher warming range scenario, sea level is anticipated to rise 22 to 35 inches by 2100. Elevations of this magnitude would inundate low-lying coastal areas with salt water, accelerate coastal erosion, threaten vital levees and inland water systems, and disrupt wetlands and natural habitats. Under the lower warming range scenario, sea level could rise 12-14 inches.

2.6 HUMAN HEALTH EFFECTS

The potential health effects related directly to the emissions of carbon dioxide, methane, and nitrous oxide as they relate to development projects such as the proposed Project are still being debated in the scientific community. Their cumulative effects to global climate change have the potential to cause adverse effects to human health. Increases in Earth's ambient temperatures would result in more intense heat waves, causing more heat-related deaths. Scientists also purport that higher ambient temperatures would increase disease survival rates and result in more widespread disease. Climate change will likely cause shifts in weather patterns, potentially resulting in devastating droughts and food shortages in some areas (20). Exhibit 2-A presents the potential impacts of global warming.

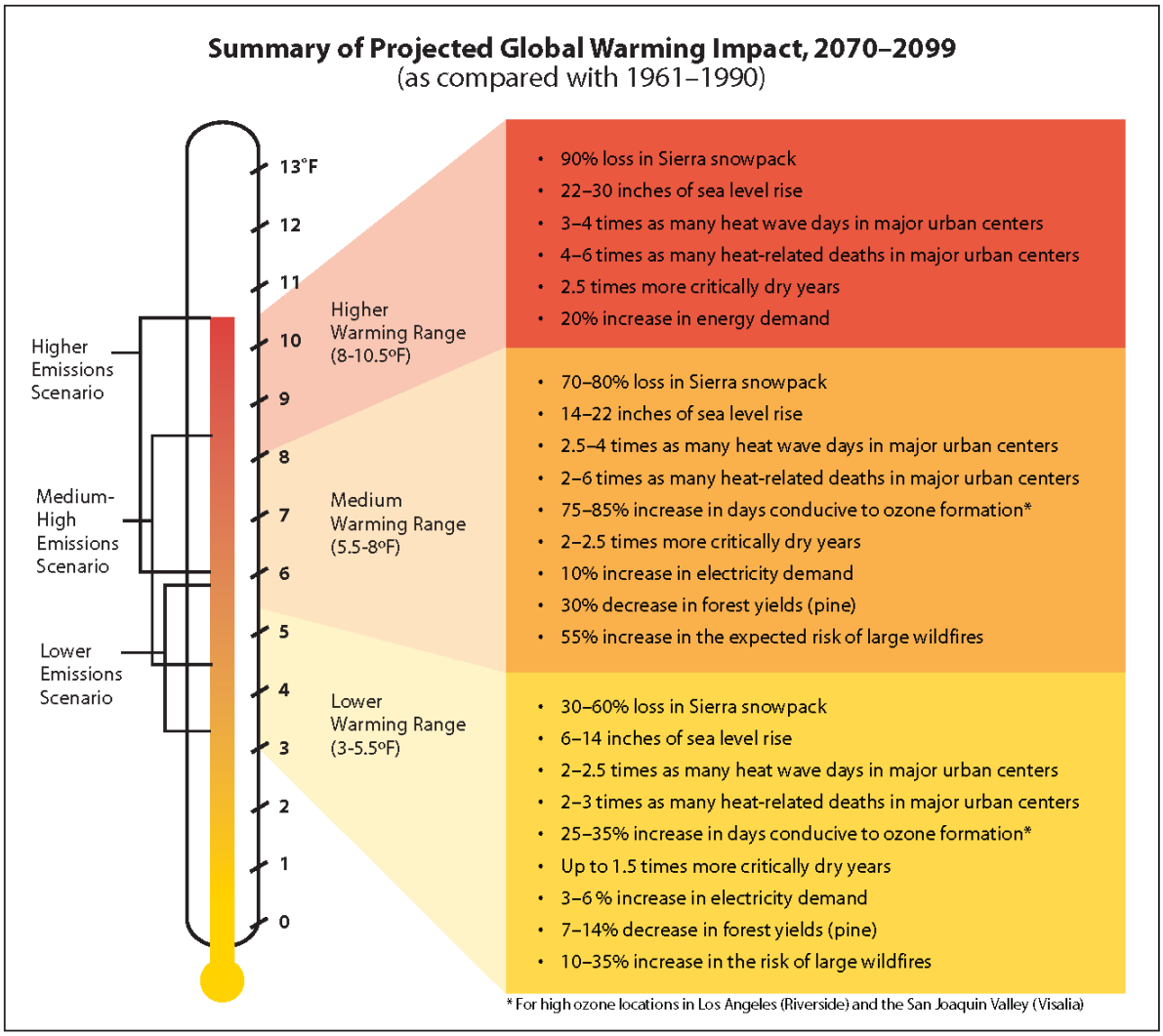
Specific health effects associated with directly emitted GHG emissions are as follows:

Water Vapor: There are no known direct health effects related to water vapor at this time. It should be noted however that when some pollutants react with water vapor, the reaction forms a transport mechanism for some of these pollutants to enter the human body through water vapor.

Carbon Dioxide: According to the National Institute for Occupational Safety and Health (NIOSH) high concentrations of carbon dioxide can result in health effects such as: headaches, dizziness, restlessness, difficulty breathing, sweating, increased heart rate, increased cardiac output, increased blood pressure, coma, asphyxia, and/or convulsions. It should be noted that current concentrations of carbon dioxide in the earth's atmosphere are estimated to be approximately 370 parts per million (ppm), the actual reference exposure level (level at which adverse health

effects typically occur) is at exposure levels of 5,000 ppm averaged over 10 hours in a 40-hour workweek and short-term reference exposure levels of 30,000 ppm averaged over a 15 minute period (21).

EXHIBIT 2-A: SUMMARY OF PROJECTED GLOBAL WARMING IMPACT



Methane: Methane is extremely reactive with oxidizers, halogens, and other halogen-containing compounds. Methane is also an asphyxiant and may displace oxygen in an enclosed space (22).

Nitrous Oxide: Nitrous Oxide is often referred to as laughing gas; it is a colorless greenhouse gas. The health effects associated with exposure to elevated concentrations of nitrous oxide include dizziness, euphoria, slight hallucinations, and in extreme cases of elevated concentrations nitrous oxide can also cause brain damage (22).

Fluorinated Gases: High concentrations of fluorinated gases can also result in adverse health effects such as asphyxiation, dizziness, headache, cardiovascular disease, cardiac disorders, and in extreme cases, increased mortality (21).

Aerosols: The health effects of aerosols are similar to that of other fine particulate matter. Thus aerosols can cause elevated respiratory and cardiovascular diseases as well as increased mortality (23).

2.7 REGULATORY SETTING

INTERNATIONAL

Climate change is a global issue involving GHG emissions from all around the world; therefore, countries such as the ones discussed below have made an effort to reduce GHGs.

Intergovernmental Panel on Climate Change. In 1988, the United Nations and the World Meteorological Organization established the Intergovernmental Panel on Climate Change to assess the scientific, technical and socioeconomic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts, and options for adaptation and mitigation.

United Nations Framework Convention on Climate Change (Convention). On March 21, 1994, the U.S. joined a number of countries around the world in signing the Convention. Under the Convention, governments gather and share information on GHG emissions, national policies, and best practices; launch national strategies for addressing GHG emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries; and cooperate in preparing for adaptation to the impacts of climate change.

International Climate Change Treaties. The Kyoto Protocol is an international agreement linked to the Convention. The major feature of the Kyoto Protocol is that it sets binding targets for 37 industrialized countries and the European community for reducing GHG emissions at an average of five percent against 1990 levels over the five-year period 2008–2012. The Convention (as discussed above) encouraged industrialized countries to stabilize emissions; however, the Protocol commits them to do so. Developed countries have contributed more emissions over the last 150 years; therefore, the Protocol places a heavier burden on developed nations under the principle of "common but differentiated responsibilities."

In 2001, President George W. Bush indicated that he would not submit the treaty to the U.S. Senate for ratification, which effectively ended American involvement in the Kyoto Protocol. In December 2009, international leaders met in Copenhagen to address the future of international climate change commitments post-Kyoto. No binding agreement was reached in Copenhagen; however, the Committee identified the long-term goal of limiting the maximum global average temperature increase to no more than 2°C above pre-industrial levels, subject to a review in 2015. The UN Climate Change Committee held additional meetings in Durban, South Africa in November 2011; Doha, Qatar in November 2012; and Warsaw, Poland in November 2013. The meetings are gradually gaining consensus among participants on individual climate change issues.

On September 23, 2014 more than 100 Heads of State and Government and leaders from the private sector and civil society met at the Climate Summit in New York hosted by the United Nations. At the Summit, heads of government, business and civil society announced actions in

areas that would have the greatest impact on reducing emissions, including climate finance, energy, transport, industry, agriculture, cities, forests, and building resilience.

Parties to the U.N. Framework Convention on Climate Change (UNFCCC) reached a landmark agreement on December 12, 2015 in Paris, charting a fundamentally new course in the two-decade-old global climate effort. Culminating a four-year negotiating round, the new treaty ends the strict differentiation between developed and developing countries that characterized earlier efforts, replacing it with a common framework that commits all countries to put forward their best efforts and to strengthen them in the years ahead. This includes, for the first time, requirements that all parties report regularly on their emissions and implementation efforts, and undergo international review.

The agreement and a companion decision by parties were the key outcomes of the conference, known as the 21st session of the UNFCCC Conference of the Parties, or COP 21. Together, the Paris Agreement and the accompanying COP decision:

- Reaffirm the goal of limiting global temperature increase well below 2 degrees Celsius, while urging efforts to limit the increase to 1.5 degrees;
- Establish binding commitments by all parties to make "nationally determined contributions" (NDCs), and to pursue domestic measures aimed at achieving them;
- Commit all countries to report regularly on their emissions and "progress made in implementing and achieving" their NDCs, and to undergo international review;
- Commit all countries to submit new NDCs every five years, with the clear expectation that they will "represent a progression" beyond previous ones;
- Reaffirm the binding obligations of developed countries under the UNFCCC to support the efforts of developing countries, while for the first time encouraging voluntary contributions by developing countries too;
- Extend the current goal of mobilizing $100 billion a year in support by 2020 through 2025, with a new, higher goal to be set for the period after 2025;
- Extend a mechanism to address "loss and damage" resulting from climate change, which explicitly will not "involve or provide a basis for any liability or compensation;"
- Require parties engaging in international emissions trading to avoid "double counting;" and
- Call for a new mechanism, similar to the Clean Development Mechanism under the Kyoto Protocol, enabling emission reductions in one country to be counted toward another country's NDC (C2ES 2015a) (24).

NATIONAL

Prior to the last decade, there have been no concrete federal regulations of GHGs or major planning for climate change adaptation. The following are actions regarding the federal government, GHGs, and fuel efficiency.

GHG Endangerment. In *Massachusetts v. Environmental Protection Agency* 549 U.S. 497 (2007), decided on April 2, 2007, the Supreme Court found that four GHGs, including carbon dioxide, are air pollutants subject to regulation under Section 202(a)(1) of the Clean Air Act. The Court held that the EPA Administrator must determine whether emissions of GHGs from new motor vehicles

cause or contribute to air pollution, which may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision. On December 7, 2009, the EPA Administrator signed two distinct findings regarding GHGs under section 202(a) of the Clean Air Act:

- Endangerment Finding: The Administrator finds that the current and projected concentrations of the six key well-mixed GHGs—carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride—in the atmosphere threaten the public health and welfare of current and future generations.
- Cause or Contribute Finding: The Administrator finds that the combined emissions of these well-mixed GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution, which threatens public health and welfare.

These findings do not impose requirements on industry or other entities. However, this was a prerequisite for implementing GHG emissions standards for vehicles, as discussed in the section "Clean Vehicles" below. After a lengthy legal challenge, the U.S. Supreme Court declined to review an Appeals Court ruling that upheld the EPA Administrator's findings (25).

Clean Vehicles. Congress first passed the Corporate Average Fuel Economy law in 1975 to increase the fuel economy of cars and light duty trucks. The law has become more stringent over time. On May 19, 2009, President Obama put in motion a new national policy to increase fuel economy for all new cars and trucks sold in the U.S. On April 1, 2010, the EPA and the Department of Transportation's National Highway Safety Administration announced a joint final rule establishing a national program that would reduce GHG emissions and improve fuel economy for new cars and trucks sold in the U.S.

The first phase of the national program applies to passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012 through 2016. They require these vehicles to meet an estimated combined average emissions level of 250 grams of carbon dioxide per mile, equivalent to 35.5 miles per gallon if the automobile industry were to meet this carbon dioxide level solely through fuel economy improvements. Together, these standards would cut carbon dioxide emissions by an estimated 960 million metric tons and 1.8 billion barrels of oil over the lifetime of the vehicles sold under the program (model years 2012–2016). The EPA and the National Highway Safety Administration issued final rules on a second-phase joint rulemaking establishing national standards for light-duty vehicles for model years 2017 through 2025 in August 2012 (EPA 2012c). The new standards for model years 2017 through 2025 apply to passenger cars, light-duty trucks, and medium duty passenger vehicles. The final standards are projected to result in an average industry fleetwide level of 163 grams/mile of carbon dioxide (CO_2) in model year 2025, which is equivalent to 54.5 miles per gallon (mpg) if achieved exclusively through fuel economy improvements.

The EPA and the U.S. Department of Transportation issued final rules for the first national standards to reduce GHG emissions and improve fuel efficiency of heavy-duty trucks and buses on September 15, 2011, effective November 14, 2011. For combination tractors, the agencies are proposing engine and vehicle standards that begin in the 2014 model year and achieve up to

a 20 percent reduction in carbon dioxide emissions and fuel consumption by the 2018 model year. For heavy-duty pickup trucks and vans, the agencies are proposing separate gasoline and diesel truck standards, which phase in starting in the 2014 model year and achieve up to a 10-percent reduction for gasoline vehicles and a 15 percent reduction for diesel vehicles by the 2018 model year (12 and 17 percent respectively if accounting for air conditioning leakage). Lastly, for vocational vehicles, the engine and vehicle standards would achieve up to a 10 percent reduction in fuel consumption and carbon dioxide emissions from the 2014 to 2018 model years.

Mandatory Reporting of GHGs. The Consolidated Appropriations Act of 2008, passed in December 2007, requires the establishment of mandatory GHG reporting requirements. On September 22, 2009, the EPA issued the Final Mandatory Reporting of GHGs Rule, which became effective January 1, 2010. The rule requires reporting of GHG emissions from large sources and suppliers in the U.S., and is intended to collect accurate and timely emissions data to inform future policy decisions. Under the rule, suppliers of fossil fuels or industrial GHGs, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons or more per year of GHG emissions are required to submit annual reports to the EPA.

New Source Review. The EPA issued a final rule on May 13, 2010, that establishes thresholds for GHGs that define when permits under the New Source Review Prevention of Significant Deterioration and Title V Operating Permit programs are required for new and existing industrial facilities. This final rule "tailors" the requirements of these Clean Air Act permitting programs to limit which facilities will be required to obtain Prevention of Significant Deterioration and Title V permits. In the preamble to the revisions to the Federal Code of Regulations, the EPA states:

> This rulemaking is necessary because without it the Prevention of Significant Deterioration and Title V requirements would apply, as of January 2, 2011, at the 100 or 250 tons per year levels provided under the Clean Air Act, greatly increasing the number of required permits, imposing undue costs on small sources, overwhelming the resources of permitting authorities, and severely impairing the functioning of the programs. EPA is relieving these resource burdens by phasing in the applicability of these programs to GHG sources, starting with the largest GHG emitters. This rule establishes two initial steps of the phase-in. The rule also commits the agency to take certain actions on future steps addressing smaller sources, but excludes certain smaller sources from Prevention of Significant Deterioration and Title V permitting for GHG emissions until at least April 30, 2016.

The EPA estimates that facilities responsible for nearly 70 percent of the national GHG emissions from stationary sources will be subject to permitting requirements under this rule. This includes the nation's largest GHG emitters—power plants, refineries, and cement production facilities.

Standards of Performance for GHG Emissions for New Stationary Sources: Electric Utility Generating Units. As required by a settlement agreement, the EPA proposed new performance standards for emissions of carbon dioxide for new, affected, fossil fuel-fired electric utility generating units on March 27, 2012. New sources greater than 25 megawatts would be required to meet an output based standard of 1,000 pounds of carbon dioxide per megawatt-hour, based on the performance of widely used natural gas combined cycle technology. It

should be noted that on February 9, 2016 the U.S. Supreme Court issued a stay of this regulation pending litigation. Additionally, the current EPA Administrator has also signed a measure to repeal the Clean Power Plan, including the CO2 standards.

Cap and Trade. Cap and trade refers to a policy tool where emissions are limited to a certain amount and can be traded, or provides flexibility on how the emitter can comply. Successful examples in the U.S. include the Acid Rain Program and the NO_x Budget Trading Program and Clean Air Interstate Rule in the northeast. There is no federal GHG cap and trade program currently; however, some states have joined to create initiatives to provide a mechanism for cap and trade.

The Regional GHG Initiative is an effort to reduce GHGs among the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont. Each state caps carbon dioxide emissions from power plants, auctions carbon dioxide emission allowances, and invests the proceeds in strategic energy programs that further reduce emissions, save consumers money, create jobs, and build a clean energy economy. The Initiative began in 2008.

The Western Climate Initiative partner jurisdictions have developed a comprehensive initiative to reduce regional GHG emissions to 15 percent below 2005 levels by 2020. The partners were originally California, British Columbia, Manitoba, Ontario, and Quebec. However, Manitoba and Ontario are not currently participating. California linked with Quebec's cap and trade system January 1, 2014, and joint offset auctions took place in 2015 (C2ES 2015).

SmartWay Program. The SmartWay Program is a public-private initiative between the EPA, large and small trucking companies, rail carriers, logistics companies, commercial manufacturers, retailers, and other federal and state agencies. Its purpose is to improve fuel efficiency and the environmental performance (reduction of both GHG emissions and air pollution) of the goods movement supply chains. SmartWay is comprised of four components (EPA 2014):

1. SmartWay Transport Partnership: A partnership in which freight carriers and shippers commit to benchmark operations, track fuel consumption, and improve performance annually.
2. SmartWay Technology Program: A testing, verification, and designation program to help freight companies identify equipment, technologies, and strategies that save fuel and lower emissions.
3. SmartWay Vehicles: A program that ranks light-duty cars and small trucks and identifies superior environmental performers with the SmartWay logo.
4. SmartWay International Interests: Guidance and resources for countries seeking to develop freight sustainability programs modeled after SmartWay.

SmartWay effectively refers to requirements geared towards reducing fuel consumption. Most large trucking fleets driving newer vehicles are compliant with SmartWay design requirements. Moreover, over time, all heavy-duty trucks will have to comply with the ARB GHG Regulation that is designed with the SmartWay Program in mind, to reduce GHG emissions by making them more fuel-efficient. For instance, in 2015, 53 foot or longer dry vans or refrigerated trailers equipped with a combination of SmartWay-verified low-rolling resistance tires and SmartWay-verified

aerodynamic devices would obtain a total of 10 percent or more fuel savings over traditional trailers.

Through the SmartWay Technology Program, the EPA has evaluated the fuel saving benefits of various devices through grants, cooperative agreements, emissions and fuel economy testing, demonstration projects and technical literature review. As a result, the EPA has determined the following types of technologies provide fuel saving and/or emission reducing benefits when used properly in their designed applications, and has verified certain products:

- Idle reduction technologies – less idling of the engine when it is not needed would reduce fuel consumption.
- Aerodynamic technologies minimize drag and improve airflow over the entire tractor-trailer vehicle. Aerodynamic technologies include gap fairings that reduce turbulence between the tractor and trailer, side skirts that minimize wind under the trailer, and rear fairings that reduce turbulence and pressure drop at the rear of the trailer.
- Low rolling resistance tires can roll longer without slowing down, thereby reducing the amount of fuel used. Rolling resistance (or rolling friction or rolling drag) is the force resisting the motion when a tire rolls on a surface. The wheel will eventually slow down because of this resistance.
- Retrofit technologies include things such as diesel particulate filters, emissions upgrades (to a higher tier), etc., which would reduce emissions.
- Federal excise tax exemptions.

CALIFORNIA

Legislative Actions to Reduce GHGs

The State of California legislature has enacted a series of bills that constitute the most aggressive program to reduce GHGs of any state in the nation. Some legislation such as the landmark Assembly Bill (AB 32) California Global Warming Solutions Act of 2006 was specifically enacted to address GHG emissions. Other legislation such as Title 24 and Title 20 energy standards were originally adopted for other purposes such as energy and water conservation, but also provide GHG reductions. This section describes the major provisions of the legislation.

AB 32. The California State Legislature enacted AB 32, which requires that GHGs emitted in California be reduced to 1990 levels by the year 2020. "GHGs" as defined under AB 32 include carbon dioxide, methane, N_2O, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Since AB 32 was enacted, a seventh chemical, nitrogen trifluoride, has also been added to the list of GHGs. The California Air Resources Board (ARB) is the state agency charged with monitoring and regulating sources of GHGs. AB 32 states the following:

> Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and

an increase in the incidences of infectious diseases, asthma, and other human health-related problems.

ARB approved the 1990 GHG emissions level of 427 $MMTCO_2e$ on December 6, 2007 (ARB 2007). Therefore, emissions generated in California in 2020 are required to be equal to or less than 427 $MMTCO_2e$. Emissions in 2020 in a "business as usual" (BAU) scenario were estimated to be 596 $MMTCO_2e$, which do not account for reductions from AB 32 regulations (ARB 2008). At that level, a 28.4 percent reduction was required to achieve the 427 million $MTCO_2e$ 1990 inventory. In October 2010, ARB prepared an updated 2020 forecast to account for the recession and slower forecasted growth. The forecasted inventory without the benefits of adopted regulation is now estimated at 545 million $MTCO_2e$. Therefore, under the updated forecast, a 21.7 percent reduction from BAU is required to achieve 1990 levels (ARB 2010).

PROGRESS IN ACHIEVING AB 32 TARGETS AND REMAINING REDUCTIONS REQUIRED

The State has made steady progress in implementing AB 32 and achieving targets included in Executive Order S-3-05. The progress is shown in updated emission inventories prepared by ARB for 2000 through 2012 (ARB 2014a). The State has achieved the Executive Order S-3-05 target for 2010 of reducing GHG emissions to 2000 levels. As shown below, the 2010 emission inventory achieved this target.

- 1990: 427 million $MTCO_2e$ (AB 32 2020 target)
- 2000: 463 million $MTCO_2e$ (an average 8 percent reduction needed to achieve 1990 base)
- 2010: 450 million $MTCO_2e$ (an average 5 percent reduction needed to achieve 1990 base)

ARB has also made substantial progress in achieving its goal of achieving 1990 emissions levels by 2020. As described earlier in this section, ARB revised the 2020 BAU inventory forecast to account for new lower growth projections, which resulted in a new lower reduction from BAU to achieve the 1990 base. The previous reduction from 2020 BAU needed to achieve 1990 levels was 28.4 percent and the latest reduction from 2020 BAU is 21.7 percent.

- 2020: 545 million $MTCO_2e$ BAU (an average 21.7 percent reduction from BAU needed to achieve 1990 base)

ARB Scoping Plan. ARB's Climate Change Scoping Plan (Scoping Plan) contains measures designed to reduce the State's emissions to 1990 levels by the year 2020 to comply with AB 32 (ARB 2008). The Scoping Plan identifies recommended measures for multiple GHG emission sectors and the associated emission reductions needed to achieve the year 2020 emissions target—each sector has a different emission reduction target. Most of the measures target the transportation and electricity sectors. As stated in the Scoping Plan, the key elements of the strategy for achieving the 2020 GHG target include:

- Expanding and strengthening existing energy efficiency programs as well as building and appliance standards;
- Achieving a statewide renewables energy mix of 33 percent;
- Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system;

- Establishing targets for transportation-related GHG emissions for regions throughout California and pursuing policies and incentives to achieve those targets;
- Adopting and implementing measures pursuant to existing State laws and policies, including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard; and
- Creating targeted fees, including a public goods charge on water use, fees on high global warming potential gases, and a fee to fund the administrative costs of the State's long-term commitment to AB 32 implementation.

The ARB approved the First Update to the Scoping Plan (Update) on May 22, 2014. The Update identifies the next steps for California's climate change strategy. The Update shows how California continues on its path to meet the near-term 2020 GHG limit, but also sets a path toward long-term, deep GHG emission reductions. The report establishes a broad framework for continued emission reductions beyond 2020, on the path to 80 percent below 1990 levels by 2050. The Update identifies progress made to meet the near-term objectives of AB 32 and defines California's climate change priorities and activities Climate for the next several years. The Update does not set new targets for the State, but describes a path that would achieve the long term 2050 goal of Executive Order S-05-03 for emissions to decline to 80 percent below 1990 levels by 2050 (ARB 2014).

Forecasting the amount of emissions that would occur in 2020 if no actions are taken was necessary to assess the amount of reductions California must achieve to return to the 1990 emissions level by 2020 as required by AB 32. The no-action scenario is known as "business-as-usual" or BAU. The ARB originally defined the BAU scenario as emissions in the absence of any GHG emission reduction measures discussed in the Scoping Plan.

As part of CEQA compliance for the Scoping Plan, ARB prepared a Supplemental Functional Equivalent Document (FED) in 2011. The FED included an updated 2020 BAU emissions inventory projection based on current economic forecasts (i.e., as influenced by the economic downturn) and emission reduction measures already in place, replacing its prior 2020 BAU emissions inventory. ARB staff derived the updated emissions estimates by projecting emissions growth, by sector, from the state's average emissions from 2006–2008. The new BAU estimate includes emission reductions for the million-solar-roofs program, the AB 1493 (Pavley I) motor vehicle GHG emission standards, and the Low Carbon Fuels Standard. In addition, ARB factored into the 2020 BAU inventory emissions reductions associated with 33 percent Renewable Energy Portfolio Standard (RPS) for electricity generation. The updated BAU estimate of 507 $MMTCO_2e$ by 2020 requires a reduction of 80 $MMTCO_2e$, or a 16 percent reduction below the estimated BAU levels to return to 1990 levels (i.e., 427 $MMTCO_2e$) by 2020.

In order to provide a BAU reduction that is consistent with the original definition in the Scoping Plan and with threshold definitions used in thresholds adopted by lead agencies for CEQA purposes and many climate action plans, the updated inventory without regulations was also included in the Supplemental FED. The ARB 2020 BAU projection for GHG emissions in California was originally estimated to be 596 $MMTCO_2e$. The updated ARB 2020 BAU projection in the Supplemental FED is 545 $MMTCO_2e$. Considering the updated BAU estimate of 545 $MMTCO_2e$ by 2020, ARB estimates a 21.7 percent reduction below the estimated statewide BAU levels is

necessary to return to 1990 emission levels (i.e., 427 $MMTCO_2e$) by 2020, instead of the approximate 28.4 percent BAU reduction previously reported under the original Climate Change Scoping Plan (2008).

2017 Climate Change Scoping Plan Update

In November 2017, ARB released the final 2017 Scoping Plan Update, which identifies the State's post-2020 reduction strategy. The 2017 Scoping Plan Update reflects the 2030 target of a 40 percent reduction below 1990 levels, set by Executive Order B-30-15 and codified by Senate Bill 32 (SB 32). Key programs that the proposed Second Update builds upon include the Cap-and-Trade Regulation, the Low Carbon Fuel Standard, and much cleaner cars, trucks and freight movement, utilizing cleaner, renewable energy, and strategies to reduce methane emissions from agricultural and other wastes.

The 2017 Scoping Plan establishes a new emissions limit of 260 $MMTCO_2e$ for the year 2030, which corresponds to a 40 percent decrease in 1990 levels by 2030.

California's climate strategy will require contributions from all sectors of the economy, including the land base, and will include enhanced focus on zero- and near-zero-emission (ZE/NZE) vehicle technologies; continued investment in renewables, including solar roofs, wind, and other distributed generation; greater use of low carbon fuels; integrated land conservation and development strategies; coordinated efforts to reduce emissions of short-lived climate pollutants (methane, black carbon, and fluorinated gases); and an increased focus on integrated land use planning to support livable, transit-connected communities and conservation of agricultural and other lands. Requirements for direct GHG reductions at refineries will further support air quality co-benefits in neighborhoods, including in disadvantaged communities historically located adjacent to these large stationary sources, as well as efforts with California's local air pollution control and air quality management districts (air districts) to tighten emission limits on a broad spectrum of industrial sources. Major elements of the 2017 Scoping Plan framework include:

- Implementing and/or increasing the standards of the Mobile Source Strategy, which include increasing ZEV buses and trucks.
- Low Carbon Fuel Standard (LCFS), with an increased stringency (18 percent by 2030).
- Implementing SB 350, which expands the Renewables Portfolio Standard (RPS) to 50 percent RPS and doubles energy efficiency savings by 2030.
- California Sustainable Freight Action Plan, which improves freight system efficiency, utilizes near-zero emissions technology, and deployment of ZEV trucks.
- Implementing the proposed Short-Lived Climate Pollutant Strategy (SLPS), which focuses on reducing methane and hydroflurocarbon emissions by 40 percent and anthropogenic black carbon emissions by 50 percent by year 2030.
- Continued implementation of SB 375.
- Post-2020 Cap-and-Trade Program that includes declining caps.
- 20 percent reduction in GHG emissions from refineries by 2030.
- Development of a Natural and Working Lands Action Plan to secure California's land base as a net carbon sink.

In addition to the statewide strategies listed above, the 2017 Scoping Plan also identifies local governments as essential partners in achieving the State's long-term GHG reduction goals and identifies local actions to reduce GHG emissions. As part of the recommended actions, CARB recommends that local governments achieve a community-wide goal to achieve emissions of no more than 6 $MTCO_2e$ or less per capita by 2030 and 2 $MTCO_2e$ or less per capita by 2050. For CEQA projects, CARB states that lead agencies may develop evidenced-based bright-line numeric thresholds—consistent with the Scoping Plan and the State's long-term GHG goals—and projects with emissions over that amount may be required to incorporate on-site design features and mitigation measures that avoid or minimize project emissions to the degree feasible; or, a performance-based metric using a climate action plan or other plan to reduce GHG emissions is appropriate.

According to research conducted by the Lawrence Berkeley National Laboratory and supported by ARB, California, under its existing and proposed GHG reduction policies, is on track to meet the 2020 reduction targets under AB 32 and could achieve the 2030 goals under SB 32. The research utilized a new, validated model known as the California LBNL GHG Analysis of Policies Spreadsheet (CALGAPS), which simulates GHG and criteria pollutant emissions in California from 2010 to 2050 in accordance to existing and future GHG-reducing policies. The CALGAPS model showed that GHG emissions through 2020 could range from 317 to 415 $MTCO_2e$ per year, "indicating that existing state policies will likely allow California to meet its target [of 2020 levels under AB 32]." CALGAPS also showed that by 2030, emissions could range from 211 to 428 $MTCO_2e$ per year, indicating that "even if all modeled policies are not implemented, reductions could be sufficient to reduce emissions 40 percent below the 1990 level [of SB 32]." CALGAPS analyzed emissions through 2050 even though it did not generally account for policies that might be put in place after 2030. Though the research indicated that the emissions would not meet the State's 80 percent reduction goal by 2050, various combinations of policies could allow California's cumulative emissions to remain very low through 2050 (26) (27).

Senate Bill 32. On September 8, 2016, Governor Jerry Brown signed the Senate Bill (SB) 32 and its companion bill, Assembly Bill (AB) 197. SB 32 requires the state to reduce statewide GHG emissions to 40 percent below 1990 levels by 2030, a reduction target that was first introduced in Executive Order B-30-15. The new legislation builds upon the AB 32 goal of 1990 levels by 2020 and provides an intermediate goal to achieving S-3-05, which sets a statewide GHG reduction target of 80 percent below 1990 levels by 2050. AB 197 creates a legislative committee to oversee regulators to ensure that ARB is not only respond to the Governor, but also the Legislature (28) (29).

Cap and Trade Program. The Scoping Plan identifies a Cap-and-Trade Program as one of the key strategies for California to reduce GHG emissions. According to ARB, a cap-and-trade program will help put California on the path to meet its goal of reducing GHG emissions to 1990 levels by the year 2020 and ultimately achieving an 80 percent reduction from 1990 levels by 2050. Under cap-and-trade, an overall limit on GHG emissions from capped sectors is established, and facilities subject to the cap will be able to trade permits to emit GHGs within the overall limit.

ARB adopted a California Cap-and-Trade Program pursuant to its authority under AB 32. See 17 California Code of Regulations (CCR) §§ 95800 to 96023. The Cap-and-Trade Program is designed

to reduce GHG emissions from major sources (deemed "covered entities") by setting a firm cap on statewide GHG emissions and employing market mechanisms to achieve AB 32's emission-reduction mandate of returning to 1990 levels of emissions by 2020. The statewide cap for GHG emissions from the capped sectors (e.g., electricity generation, petroleum refining, and cement production) commenced in 2013 and will decline over time, achieving GHG emission reductions throughout the program's duration.

Covered entities that emit more than 25.000 $MTCO_2e$ per year must comply with the Cap-and-Trade Program. Triggering of the 25.000 $MTCO_2e$ per year "inclusion threshold" is measured against a subset of emissions reported and verified under the California Regulation for the Mandatory Reporting of GHG Emissions (Mandatory Reporting Rule or "MRR").

Under the Cap-and-Trade Program, ARB issues allowances equal to the total amount of allowable emissions over a given compliance period and distributes these to regulated entities. Covered entities are allocated free allowances in whole or part (if eligible), and may buy allowances at auction, purchase allowances from others, or purchase offset credits. Each covered entity with a compliance obligation is required to surrender "compliance instruments" (30) for each $MTCO_2e$ of GHG they emit. There also are requirements to surrender compliance instruments covering 30 percent of the prior year's compliance obligation by November of each year. For example, in November 2014, a covered entity was required to submit compliance instruments to cover 30 percent of its 2013 GHG emissions.

The Cap-and-Trade Program provides a firm cap, ensuring that the 2020 statewide emission limit will not be exceeded. An inherent feature of the Cap-and-Trade program is that it does not guarantee GHG emissions reductions in any discrete location or by any particular source. Rather, GHG emissions reductions are only guaranteed on an accumulative basis. As summarized by ARB in the First Update:

> The Cap-and-Trade Regulation gives companies the flexibility to trade allowances with others or take steps to cost-effectively reduce emissions at their own facilities. Companies that emit more have to turn in more allowances or other compliance instruments. Companies that can cut their GHG emissions have to turn in fewer allowances. But as the cap declines, aggregate emissions must be reduced. In other words, a covered entity theoretically could increase its GHG emissions every year and still comply with the Cap-and-Trade Program if there is a reduction in GHG emissions from other covered entities. Such a focus on aggregate GHG emissions is considered appropriate because climate change is a global phenomenon, and the effects of GHG emissions are considered cumulative (ARB 2014).

The Cap-and-Trade Program works with other direct regulatory measures and provides an economic incentive to reduce emissions. If California's direct regulatory measures reduce GHG emissions more than expected, then the Cap-and-Trade Program will be responsible for relatively fewer emissions reductions. If California's direct regulatory measures reduce GHG emissions less than expected, then the Cap-and-Trade Program will be responsible for relatively more emissions

reductions. Thus. the Cap-and-Trade Program assures that California will meet its 2020 GHG emissions reduction mandate:

> The Cap-and-Trade Program establishes an overall limit on GHG emissions from most of the California economy—the "capped sectors." Within the capped sectors, some of the reductions are being accomplished through direct regulations, such as improved building and appliance efficiency standards, the [Low Carbon Fuel Standard] LCFS, and the 33 percent [Renewables Portfolio Standard] RPS. Whatever additional reductions are needed to bring emissions within the cap is accomplished through price incentives posed by emissions allowance prices. Together, direct regulation and price incentives assure that emissions are brought down cost-effectively to the level of the overall cap. The Cap-and-Trade Regulation provides assurance that California's 2020 limit will be met because the regulation sets a firm limit on 85 percent of California's GHG emissions. In sum, the Cap-and-Trade Program will achieve aggregate, rather than site specific or project-level, GHG emissions reductions. Also, due to the regulatory architecture adopted by ARB in AB 32, the reductions attributed to the Cap-and-Trade Program can change over time depending on the State's emissions forecasts and the effectiveness of direct regulatory measures (ARB 2014).

As of January 1, 2015, the Cap-and-Trade Program covered approximately 85 percent of California's GHG emissions. The Cap-and-Trade Program covers the GHG emissions associated with electricity consumed in California, whether generated in-state or imported. Accordingly, GHG emissions associated with CEQA projects' electricity usage are covered by the Cap-and-Trade Program.

The Cap-and-Trade Program also covers fuel suppliers (natural gas and propane fuel providers and transportation fuel providers) to address emissions from such fuels and from combustion of other fossil fuels not directly covered at large sources in the Program's first compliance period. While the Cap-and-Trade Program technically covered fuel suppliers as early as 2012, they did not have a compliance obligation (i.e., they were not fully regulated) until 2015. The Cap-and-Trade Program covers the GHG emissions associated with the combustion of transportation fuels in California, whether refined in-state or imported. The point of regulation for transportation fuels is when they are "supplied" (i.e., delivered into commerce). Accordingly, as with stationary source GHG emissions and GHG emissions attributable to electricity use, virtually all, if not all, of GHG emissions from CEQA projects associated with vehicle-miles traveled (VMT) are covered by the Cap-and-Trade Program (ARB 2015) (30).

In addition, the Scoping Plan differentiates between "capped" and "uncapped" strategies. "Capped" strategies are subject to the proposed cap-and-trade program. The Scoping Plan states that the inclusion of these emissions within the Program will help ensure that the year 2020 emission targets are met despite some degree of uncertainty in the emission reduction estimates for any individual measure. Implementation of the capped strategies is calculated to achieve a sufficient amount of reductions by 2020 to achieve the emission target contained in AB 32. "Uncapped" strategies that will not be subject to the cap-and-trade emissions caps and

requirements are provided as a margin of safety by accounting for additional GHG emission reductions.[4]

SB 375 - the Sustainable Communities and Climate Protection Act of 2008. Passing the Senate on August 30, 2008, Senate Bill (SB) 375 was signed by the Governor on September 30, 2008. According to SB 375, the transportation sector is the largest contributor of GHG emissions, which emits over 40 percent of the total GHG emissions in California. SB 375 states, "Without improved land use and transportation policy, California will not be able to achieve the goals of AB 32." SB 375 does the following: it (1) requires metropolitan planning organizations to include sustainable community strategies in their regional transportation plans for reducing GHG emissions, (2) aligns planning for transportation and housing, and (3) creates specified incentives for the implementation of the strategies.

Concerning CEQA, SB 375, as codified in Public Resources Code Section 21159.28, states that CEQA findings for certain projects are not required to reference, describe, or discuss (1) growth inducing impacts, or (2) any project-specific or cumulative impacts from cars and light-duty truck trips generated by the project on global warming or the regional transportation network, if the project:

1. Is in an area with an approved sustainable communities strategy or an alternative planning strategy that the ARB accepts as achieving the GHG emission reduction targets.
2. Is consistent with that strategy (in designation, density, building intensity, and applicable policies).
3. Incorporates the mitigation measures required by an applicable prior environmental document.

AB 1493 Pavley Regulations and Fuel Efficiency Standards. California AB 1493, enacted on July 22, 2002, required ARB to develop and adopt regulations that reduce GHGs emitted by passenger vehicles and light duty trucks. Implementation of the regulation was delayed by lawsuits filed by automakers and by the EPA's denial of an implementation waiver. The EPA subsequently granted the requested waiver in 2009, which was upheld by the U.S. District Court for the District of Columbia in 2011.

The standards phase in during the 2009 through 2016 model years. When fully phased in, the near-term (2009–2012) standards will result in about a 22 percent reduction compared with the 2002 fleet, and the mid-term (2013–2016) standards will result in about a 30 percent reduction. Several technologies stand out as providing significant reductions in emissions at favorable costs. These include discrete variable valve lift or camless valve actuation to optimize valve operation rather than relying on fixed valve timing and lift as has historically been done; turbocharging to boost power and allow for engine downsizing; improved multi-speed transmissions; and

[4] On March 17, 2011, the San Francisco Superior Court issued a final decision in *Association of Irritated Residents v. California Air Resources Board* (Case No. CPF-09-509562). While the Court upheld the validity of the ARB Scoping Plan for the implementation of AB 32, the Court enjoined ARB from further rulemaking under AB 32 until ARB amends its CEQA environmental review of the Scoping Plan to address the flaws identified by the Court. On May 23, 2011, ARB filed an appeal. On June 24, 2011, the Court of Appeal granted ARB's petition staying the trail court's order pending consideration of the appeal. In the interest of informed decision-making, on June 13, 2011, ARB released the expanded alternatives analysis in a draft Supplement to the AB 32 Scoping Plan Functional Equivalent Document. The ARB Board approved the Scoping Plan and the CEQA document on August 24, 2011.

improved air conditioning systems that operate optimally, leak less, and/or use an alternative refrigerant.

The second phase of the implementation for the Pavley bill was incorporated into Amendments to the Low-Emission Vehicle Program referred to as LEV III or the Advanced Clean Cars program. The Advanced Clean Car program combines the control of smog-causing pollutants and GHG emissions into a single coordinated package of requirements for model years 2017 through 2025. The regulation will reduce GHGs from new cars by 34 percent from 2016 levels by 2025. The new rules will clean up gasoline and diesel-powered cars, and deliver increasing numbers of zero-emission technologies, such as full battery electric cars, newly emerging plug-in hybrid electric vehicles and hydrogen fuel cell cars. The package will also ensure adequate fueling infrastructure is available for the increasing numbers of hydrogen fuel cell vehicles planned for deployment in California.

SB 350— Clean Energy and Pollution Reduction Act of 2015. In October 2015, the legislature approved and the Governor signed SB 350, which reaffirms California's commitment to reducing its GHG emissions and addressing climate change. Key provisions include an increase in the renewables portfolio standard (RPS), higher energy efficiency requirements for buildings, initial strategies towards a regional electricity grid, and improved infrastructure for electric vehicle charging stations. Provisions for a 50 percent reduction in the use of petroleum statewide were removed from the Bill because of opposition and concern that it would prevent the Bill's passage. Specifically, SB 350 requires the following to reduce statewide GHG emissions:

- Increase the amount of electricity procured from renewable energy sources from 33 percent to 50 percent by 2030, with interim targets of 40 percent by 2024, and 25 percent by 2027.
- Double the energy efficiency in existing buildings by 2030. This target will be achieved through the California Public Utility Commission (CPUC), the California Energy Commission (CEC), and local publicly-owned utilities.
- Reorganize the Independent System Operator (ISO) to develop more regional electrify transmission markets and to improve accessibility in these markets, which will facilitate the growth of renewable energy markets in the western United States (California Leginfo 2015).

EXECUTIVE ORDERS RELATED TO GHG EMISSIONS

California's Executive Branch has taken several actions to reduce GHGs through the use of Executive Orders. Although not regulatory, they set the tone for the state and guide the actions of state agencies.

Executive Order S-3-05. Former California Governor Arnold Schwarzenegger announced on June 1, 2005, through Executive Order S-3-05, the following reduction targets for GHG emissions:

- By 2010, reduce GHG emissions to 2000 levels.
- By 2020, reduce GHG emissions to 1990 levels.
- By 2050, reduce GHG emissions to 80 percent below 1990 levels.

The 2050 reduction goal represents what some scientists believe is necessary to reach levels that will stabilize the climate. The 2020 goal was established to be a mid-term target. Because this is

an executive order, the goals are not legally enforceable for local governments or the private sector.

Executive Order S-01-07 – Low Carbon Fuel Standard. The Governor signed Executive Order S-01-07 on January 18, 2007. The order mandates that a statewide goal shall be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020. In particular, the Executive Order established a Low Carbon Fuel Standard and directed the Secretary for Environmental Protection to coordinate the actions of the California Energy Commission, the ARB, the University of California, and other agencies to develop and propose protocols for measuring the "life-cycle carbon intensity" of transportation fuels. This analysis supporting development of the protocols was included in the State Implementation Plan for alternative fuels (State Alternative Fuels Plan adopted by California Energy Commission on December 24, 2007) and was submitted to ARB for consideration as an "early action" item under AB 32. The ARB adopted the Low Carbon Fuel Standard on April 23, 2009.

The Low Carbon Fuel Standard was challenged in the U.S. District Court in Fresno in 2011. The court's ruling issued on December 29, 2011, included a preliminary injunction against ARB's implementation of the rule. The Ninth Circuit Court of Appeals stayed the injunction on April 23, 2012, pending final ruling on appeal, allowing ARB to continue to implement and enforce the regulation. The Ninth Circuit Court's decision, filed September 18, 2013, vacated the preliminary injunction. In essence, the court held that Low Carbon Fuel Standards adopted by ARB were not in conflict with federal law. On August 8, 2013, the Fifth District Court of Appeal (California) ruled ARB failed to comply with CEQA and the Administrative Procedure Act (APA) when adopting regulations for Low Carbon Fuel Standards. In a partially published opinion, the Court of Appeal reversed the trial court's judgment and directed issuance of a writ of mandate setting aside Resolution 09-31 and two executive orders of ARB approving Low Carbon Fuel Standards (LCFS) regulations promulgated to reduce GHG emissions. However, the court tailored its remedy to protect the public interest by allowing the LCFS regulations to remain operative while ARB complies with the procedural requirements it failed to satisfy.

To address the Court ruling, ARB was required to bring a new LCFS regulation to tits Board for consideration in February 2015. The proposed LCFS regulation was required to contain revisions to the 2010 LCFS as well as new provisions designed to foster investments in the production of the low-carbon intensity (low-CI) fuels, offer additional flexibility to regulated parties, update critical technical information, simplify and streamline program operations, and enhance enforcement. The second public hearing was held on September 24 and September 25, 2015, where the LCFS Regulation was adopted. The Final Rulemaking Package adopting the regulation was filed with Office of Administrative Law (OAL) on October 2, 2015. OAL had until November 16, 2015 to make a determination (ARB 2015d).

Executive Order S-13-08. Executive Order S-13-08 states that "climate change in California during the next century is expected to shift precipitation patterns, accelerate sea level rise and increase temperatures, thereby posing a serious threat to California's economy, to the health and welfare of its population and to its natural resources." Pursuant to the requirements in the Order, the 2009 California Climate Adaptation Strategy (California Natural Resources Agency 2009) was adopted, which is the ". . . first statewide, multi-sector, region-specific, and

information-based climate change adaptation strategy in the United States." Objectives include analyzing risks of climate change in California, identifying and exploring strategies to adapt to climate change, and specifying a direction for future research.

Executive Order B-30-15. On April 29, 2015, Governor Edmund G. Brown Jr. issued an executive order to establish a California GHG reduction target of 40 percent below 1990 levels by 2030. The Governor's executive order aligns California's GHG reduction targets with those of leading international governments ahead of the United Nations Climate Change Conference in Paris late 2015. The Order sets a new interim statewide GHG emission reduction target to reduce GHG emissions to 40 percent below 1990 levels by 2030 in order to ensure California meets its target of reducing GHG emissions to 80 percent below 1990 levels by 2050 and directs ARB to update the Climate Change Scoping Plan to express the 2030 target in terms of million metric tons of CO_2 equivalent ($MMCO_2e$). The Order also requires the state's climate adaptation plan to be updated every three years, and for the State to continue its climate change research program, among other provisions. As with Executive Order S-3-05, this Order is not legally enforceable for local governments and the private sector. Legislation that would update AB 32 to make post 2020 targets and requirements a mandate is in process in the State Legislature.

Executive Order B-55-18 and SB 100. Executive Order B-55-18 and SB 100. SB 100 and Executive Order B-55-18 were signed by Governor Brown on September 10, 2018. Under the existing RPS, 25 percent of retail sales are required to be from renewable sources by December 31, 2016, 33 percent by December 31, 2020, 40 percent by December 31, 2024, 45 percent by December 31, 2027, and 50 percent by December 31, 2030. SB 100 raises California's RPS requirement to 50 percent renewable resources target by December 31, 2026, and to achieve a 60 percent target by December 31, 2030. SB 100 also requires that retail sellers and local publicly owned electric utilities procure a minimum quantity of electricity products from eligible renewable energy resources so that the total kilowatt hours of those products sold to their retail end-use customers achieve 44 percent of retail sales by December 31, 2024, 52 percent by December 31, 2027, and 60 percent by December 31, 2030. In addition to targets under AB 32 and SB32, Executive Order B-55-18 establishes a carbon neutrality goal for the state of California by 2045; and sets a goal to maintain net negative emissions thereafter. The Executive Order directs the California Natural Resources Agency, CalEPA, the Department of Food and Agriculture, and CARB to include sequestration targets in the Natural and Working Lands Climate Change Implementation Plan consistent with the carbon neutrality goal.

CALIFORNIA REGULATIONS AND BUILDING CODES

California has a long history of adopting regulations to improve energy efficiency in new and remodeled buildings. These regulations have kept California's energy consumption relatively flat even with rapid population growth.

Title 20 Appliance Efficiency Standards. California Code of Regulations, Title 20: Division 2, Chapter 4, Article 4, Sections 1601-1608: Appliance Efficiency Regulations regulates the sale of appliances in California. The Appliance Efficiency Regulations include standards for both federally regulated appliances and non-federally regulated appliances. 23 categories of appliances are included in the scope of these regulations. The standards within these regulations

apply to appliances that are sold or offered for sale in California, except those sold wholesale in California for final retail sale outside the state and those designed and sold exclusively for use in recreational vehicles or other mobile equipment (CEC 2012).

Title 24 Energy Efficiency Standards and California Green Building Standards. California Code of Regulations Title 24 Part 6: California's Energy Efficiency Standards for Residential and Nonresidential Buildings, was first adopted in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficient technologies and methods. Energy efficient buildings require less electricity; therefore, increased energy efficiency reduces fossil fuel consumption and decreases GHG emissions. The newest 2016 version of Title 24 was adopted by the California Energy Commission (CEC) and became effective on January 1, 2017.

The CEC indicates that the 2016 Title 24 standards will reduce energy consumption by 5 percent for nonresidential buildings above that achieved by the 2013 Title 24 (CEC 2015).

California Code of Regulations, Title 24, Part 11: California Green Building Standards Code (CALGreen) is a comprehensive and uniform regulatory code for all residential, commercial, and school buildings that went in effect on January 1, 2011, and is administered by the California Building Standards Commission. CALGreen is updated on a regular basis, with the most recent update consisting of the 2016 California Green Building Code Standards that became effective January 1, 2017. Local jurisdictions are permitted to adopt more stringent requirements, as state law provides methods for local enhancements. CALGreen recognizes that many jurisdictions have developed existing construction and demolition ordinances, and defers to them as the ruling guidance provided they establish a minimum 50 percent diversion requirement. The code also provides exemptions for areas not served by construction and demolition recycling infrastructure. The State Building Code provides the minimum standard that buildings must meet in order to be certified for occupancy, which is generally enforced by the local building official. CALGreen requires:

- Short-term bicycle parking. If a commercial project is anticipated to generate visitor traffic, provide permanently anchored bicycle racks within 200 feet of the visitors' entrance, readily visible to passers-by, for 5 percent of visitor motorized vehicle parking capacity, with a minimum of one two-bike capacity rack (5.106.4.1.1).
- Long-term bicycle parking. For new buildings with 10 or more tenant-occupants, provide secure bicycle parking for 5 percent of tenant-occupied motorized vehicle parking capacity, with a minimum of one space (5.106.4.1.2).
- Designated parking. Provide designated parking in commercial projects for any combination of low-emitting, fuel-efficient and carpool/van pool vehicles as shown in Table 5.106.5.2 (5.106.5.2).
- Recycling by Occupants. Provide readily accessible areas that serve the entire building and are identified for the depositing, storage and collection of nonhazardous materials for recycling (5.410.1).
- Construction waste. A minimum 65 percent diversion of construction and demolition waste from landfills, increasing voluntarily to 80 percent for new homes and commercial projects (5.408.1, A5.408.3.1 [nonresidential], A5.408.3.1 [residential]). All (100 percent) of trees, stumps, rocks and associated vegetation and soils resulting from land clearing shall be reused or recycled (5.408.3).

- Wastewater reduction. Each building shall reduce the generation of wastewater by one of the following methods:
    - The installation of water-conserving fixtures (5.303.3) or
    - Using nonpotable water systems (5.303.4).
- Water use savings. 20 percent mandatory reduction of indoor water use with voluntary goal standards for 30, 35 and 40 percent reductions (5.303.2, A5303.2.3 [nonresidential]).
- Water meters. Separate water meters for buildings in excess of 50,000 square feet or buildings projected to consume more than 1,000 gallons per day (5.303.1).
- Irrigation efficiency. Moisture-sensing irrigation systems for larger landscaped areas (5.304.3).
- Materials pollution control. Low-pollutant emitting interior finish materials such as paints, carpet, vinyl flooring, and particleboard (5.404).
- Building commissioning. Mandatory inspections of energy systems (i.e., heat furnace, air conditioner, mechanical equipment) for nonresidential buildings over 10,000 square feet to ensure that all are working at their maximum capacity according to their design efficiencies (5.410.2)..

Model Water Efficient Landscape Ordinance. The Model Water Efficient Landscape Ordinance (Ordinance) was required by AB 1881, the Water Conservation Act. The bill required local agencies to adopt a local landscape ordinance at least as effective in conserving water as the Model Ordinance by January 1, 2010. Reductions in water use of 20 percent consistent with (SBX-7-7) 2020 mandate are expected upon compliance with the ordinance. Governor Brown's Drought Executive Order of April 1, 2015 (EO B-29-15) directed Department of Water Resources (DWR) to update the Ordinance through expedited regulation. The California Water Commission approved the revised Ordinance on July 15, 2015 effective December 15, 2015. New development projects that include landscape areas of 500 square feet or more are subject to the Ordinance. The update requires:

- More efficient irrigation systems;
- Incentives for graywater usage;
- Improvements in on-site stormwater capture;
- Limiting the portion of landscapes that can be planted with high water use plants; and
- Reporting requirements for local agencies.

ARB Refrigerant Management Program. ARB adopted a regulation in 2009 to reduce refrigerant GHG emissions from stationary sources through refrigerant leak detection and monitoring, leak repair, system retirement and retrofitting, reporting and recordkeeping, and proper refrigerant cylinder use, sale, and disposal. The regulation is set forth in sections 95380 to 95398 of Title 17, California Code of Regulations. The rules implementing the regulation establish a limit on statewide GHG emissions from stationary facilities with refrigeration systems with more than 50 pounds of a high GWP refrigerant. The refrigerant management program is designed to (1) reduce emissions of high-GWP GHG refrigerants from leaky stationary, non-residential refrigeration equipment; (2) reduce emissions from the installation and servicing of refrigeration and air-conditioning appliances using high-GWP refrigerants; and (3) verify GHG emission reductions.

Tractor-Trailer GHG Regulation. The tractors and trailers subject to this regulation must either use EPA SmartWay certified tractors and trailers, or retrofit their existing fleet with SmartWay verified technologies. The regulation applies primarily to owners of 53-foot or longer box-type trailers, including both dry-van and refrigerated-van trailers, and owners of the heavy-duty tractors that pull them on California highways. These owners are responsible for replacing or retrofitting their affected vehicles with compliant aerodynamic technologies and low rolling resistance tires. Sleeper cab tractors model year 2011 and later must be SmartWay certified. All other tractors must use SmartWay verified low rolling resistance tires. There are also requirements for trailers to have low rolling resistance tires and aerodynamic devices.

Phase I and 2 Heavy-Duty Vehicle GHG Standards. ARB has adopted a new regulation for greenhouse gas (GHG) emissions from heavy-duty trucks and engines sold in California. It establishes GHG emission limits on truck and engine manufacturers and harmonizes with the U.S. EPA rule for new trucks and engines nationally. Existing heavy-duty vehicle regulations in California include engine criteria emission standards, tractor-trailer GHG requirements to implement SmartWay strategies (i.e., the Heavy-Duty Tractor-Trailer Greenhouse Gas Regulation), and in-use fleet retrofit requirements such as the Truck and Bus Regulation. In September 2011, the U.S. EPA adopted their new rule for heavy-duty trucks and engines. The U.S. EPA rule has compliance requirements for new compression and spark ignition engines, as well as trucks from Class 2b through Class 8. Compliance requirements begin with model year (MY) 2014 with stringency levels increasing through MY 2018. The rule organizes truck compliance into three groupings, which include a) heavy-duty pickups and vans; b) vocational vehicles; and c) combination tractors. The U.S. EPA rule does not regulate trailers.

ARB staff has worked jointly with the U.S. Environmental Protection Agency (U.S. EPA) and the National Highway Traffic Safety Administration (NHTSA) on the next phase of federal greenhouse gas (GHG) emission standards for medium- and heavy-duty vehicles, called federal Phase 2. The federal Phase 2 standards were built on the improvements in engine and vehicle efficiency required by the Phase 1 emission standards and represent a significant opportunity to achieve further GHG reductions for 2018 and later model year heavy-duty vehicles, including trailers.

U.S. EPA and NHTSA issued a Notice of Proposed Rulemaking for Phase 2 in June 2015, and published the final rule in October 2016. ARB staff plans to bring a proposed California Phase 2 program before the Board in early 2018. ARB staff remains committed to a strong national program which will support California's GHG reduction commitments.

SB 97 and the CEQA Guidelines Update. Passed in August 2007, SB 97 added Section 21083.05 to the Public Resources Code. The code states "(a) On or before July 1, 2009, the Office of Planning and Research shall prepare, develop, and transmit to the Resources Agency guidelines for the mitigation of GHG emissions or the effects of GHG emissions as required by this division, including, but not limited to, effects associated with transportation or energy consumption. (b) On or before January 1, 2010, the Resources Agency shall certify and adopt guidelines prepared and developed by the Office of Planning and Research pursuant to subdivision (a)." Section 21097 was also added to the Public Resources Code. It provided CEQA protection until January 1, 2010 for transportation projects funded by the Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006 or projects funded by the Disaster Preparedness and Flood

Prevention Bond Act of 2006, in stating that the failure to analyze adequately the effects of GHGs would not violate CEQA.

On April 13, 2009, the Office of Planning and Research submitted to the Secretary for Natural Resources its recommended amendments to the CEQA Guidelines for addressing GHG emissions. On July 3, 2009, the Natural Resources Agency commenced the Administrative Procedure Act rulemaking process for certifying and adopting these amendments pursuant to Public Resources Code section 21083.05. Following a 55-day public comment period and two public hearings, the Natural Resources Agency proposed revisions to the text of the proposed Guidelines amendments. The Natural Resources Agency transmitted the adopted amendments and the entire rulemaking file to the Office of Administrative Law on December 31, 2009. On February 16, 2010, the Office of Administrative Law approved the Amendments, and filed them with the Secretary of State for inclusion in the California Code of Regulations. The Amendments became effective on March 18, 2010.

The CEQA Amendments provide guidance to public agencies regarding the analysis and mitigation of the effects of GHG emissions in CEQA documents. The CEQA Amendments fit within the existing CEQA framework by amending existing CEQA Guidelines to reference climate change.

A new section, CEQA Guidelines Section 15064.4, was added to assist agencies in determining the significance of GHG emissions. The new section allows agencies the discretion to determine whether a quantitative or qualitative analysis is best for a particular project. However, little guidance is offered on the crucial next step in this assessment process—how to determine whether the project's estimated GHG emissions are significant or cumulatively considerable.

Also amended were CEQA Guidelines Sections 15126.4 and 15130, which address mitigation measures and cumulative impacts, respectively. GHG mitigation measures are referenced in general terms, but no specific measures are championed. The revision to the cumulative impact discussion requirement (Section 15130) simply directs agencies to analyze GHG emissions in an EIR when a project's incremental contribution of emissions may be cumulatively considerable, however it does not answer the question of when emissions are cumulatively considerable.

Section 15183.5 permits programmatic GHG analysis and later project-specific tiering, as well as the preparation of GHG Reduction Plans. Compliance with such plans can support a determination that a project's cumulative effect is not cumulatively considerable, according to Section 15183.5(b).

In addition, the amendments revised Appendix F of the CEQA Guidelines, which focuses on Energy Conservation. The sample environmental checklist in Appendix G was amended to include GHG questions.

REGIONAL

The project is within the Southern California Air Basin (SoCAB), which is under the jurisdiction of the SCAQMD.

South Coast Air Quality Management District

SCAQMD is the agency responsible for air quality planning and regulation in the SoCAB. The SCAQMD addresses the impacts to climate change of projects subject to SCAQMD permit as a lead agency if they are the only agency having discretionary approval for the project and acts as a responsible agency when a land use agency must also approve discretionary permits for the project. The SCAQMD acts as an expert commenting agency for impacts to air quality. This expertise carries over to GHG emissions, so the agency helps local land use agencies through the development of models and emission thresholds that can be used to address GHG emissions.

In 2008, SCAQMD formed a Working Group to identify GHG emissions thresholds for land use projects that could be used by local lead agencies in the SoCAB. The Working Group developed several different options that are contained in the SCAQMD Draft Guidance Document – Interim CEQA GHG Significance Threshold, that could be applied by lead agencies. The working group has not provided additional guidance since release of the interim guidance in 2008. The SCAQMD Board has not approved the thresholds; however, the Guidance Document provides substantial evidence supporting the approaches to significance of GHG emissions that can be considered by the lead agency in adopting its own threshold. The current interim thresholds consist of the following tiered approach:

- Tier 1 consists of evaluating whether or not the project qualifies for any applicable exemption under CEQA.
- Tier 2 consists of determining whether the project is consistent with a GHG reduction plan. If a project is consistent with a qualifying local GHG reduction plan, it does not have significant GHG emissions.
- Tier 3 consists of screening values, which the lead agency can choose, but must be consistent with all projects within its jurisdiction. A project's construction emissions are averaged over 30 years and are added to the project's operational emissions. If a project's emissions are below one of the following screening thresholds, then the project is less than significant:
    - Residential and Commercial land use: 3,000 $MTCO_2e$ per year
    - Based on land use type: residential: 3,500 $MTCO_2e$ per year; commercial: 1,400 $MTCO_2e$ per year; or mixed use: 3,000 $MTCO_2e$ per year
- Tier 4 has the following options:
    - Option 1: Reduce BAU emissions by a certain percentage; this percentage is currently undefined.
    - Option 2: Early implementation of applicable AB 32 Scoping Plan measures
    - Option 3, 2020 target for service populations (SP), which includes residents and employees: 4.8 $MTCO_2e$/SP/year for projects and 6.6 $MTCO_2e$/SP/year for plans;
    - Option 3, 2035 target: 3.0 $MTCO_2e$/SP/year for projects and 4.1 $MTCO_2e$/SP/year for plans
- Tier 5 involves mitigation offsets to achieve target significance threshold.

The SCAQMD's interim thresholds used the Executive Order S-3-05 year 2050 goal as the basis for the Tier 3 screening level. Achieving the Executive Order's objective would contribute to

worldwide efforts to cap carbon dioxide concentrations at 450 ppm, thus stabilizing global climate.

SCAQMD only has authority over GHG emissions from development projects that include air quality permits. At this time, it is unknown if the project would include stationary sources of emissions subject to SCAQMD permits. Notwithstanding, if the Project requires a stationary permit, it would be subject to the applicable SCAQMD regulations.

SCAQMD Regulation XXVII, adopted in 2009 includes the following rules:

- Rule 2700 defines terms and post global warming potentials.
- Rule 2701, SoCal Climate Solutions Exchange, establishes a voluntary program to encourage, quantify, and certify voluntary, high quality certified GHG emission reductions in the SCAQMD.
- Rule 2702, GHG Reduction Program created a program to produce GHG emission reductions within the SCAQMD. The SCAQMD will fund projects through contracts in response to requests for proposals or purchase reductions from other parties.

2.8 DISCUSSION ON ESTABLISHMENT OF SIGNIFICANCE THRESHOLDS

The SCAQMD defines the service population as the total residents and employees associated with a project. The origin of the service population is based on CARB's 2008 Scoping Plan. The Scoping Plan identified that based on the GHG emissions inventories for the state, the people of California generate approximately 14 tons of GHG emissions per capita and would need to reduce annual emissions to approximately 10 tons per capita in order to meet the GHG reduction target of AB 32. Because people who live in California generally work in California, the service population metric did not include employees. As CEQA significance thresholds were being determined by air districts, the air districts considered applying this efficiency metric to their air district boundaries. Consistent with methodology provided by the Regional Targets Advisory Committee (RTAC) as part of the SB 375 target setting discussions, the definition of service population was amended to include employees in addition to residents. This is because the transportation sector is the primary source of project-related GHG emissions; and unlike the state as a whole, people who work in one county/air district may not live in the same county/ air district boundary. Also, people who live in a county/air district boundary would also have other trip ends such as school, parks, and retail uses. As such, the air district/county boundary as a whole did not take into account other users within the site.

Relevant to the proposed Project, the SCAQMD Tier 4 Option 3 is to utilize an efficiency target. The SCAQMD has proposed targets for project-level and plan-level analysis. At the September 2010 working group meeting the SCAQMD recommended a project-level efficiency target of 4.8 MT CO_2e per service population (SP) as a 2020 target.

The calculations behind this option are based on the same inventory calculated by CARB. The 4.8 metric ton per service population target is based on the same statewide 2020 GHG inventory in the CARB Scoping Plan, i.e., 295,530,000 MT CO_2e/yr. To derive the project level service population of 4.8 metric ton, SCAQMD took the 2020 statewide GHG reduction target for land use only (295,530,000 MTCO_2e/yr) and divided it by the total 2020 statewide population plus the total statewide employment for land use only (44,135,923 + 17,064,489) (i.e., (295,530,000 MT

CO_2e/yr)/(44,135,923 + 17,064,489) = 4.8 MT CO_2e/yr). Thus, SCAQMD's threshold is another metric for assessing compliance with AB 32, just based on using numbers attributable to certain sectors and trying to break down the analysis to a finer grain based on a per person methodology associated with land use-related sectors.

This approach is a widely accepted screening threshold used by numerous cities in the South Coast Air Basin and is based on the South Coast Air Quality Management District (SCAQMD) staff's proposed GHG screening threshold for stationary source emissions for non-industrial projects, as described in the SCAQMD's *Interim CEQA GHG Significance Threshold for Stationary Sources, Rules and Plans* ("SCAQMD Interim GHG Threshold"). The SCAQMD Interim GHG Threshold identifies a screening threshold to determine whether additional analysis is required (31). As noted by the SCAQMD:

> "…the…screening level for stationary sources is based on an emission capture rate of 90 percent for all new or modified projects...the policy objective of [SCAQMD's] recommended interim GHG significance threshold proposal is to achieve an emission capture rate of 90 percent of all new or modified stationary source projects. A GHG significance threshold based on a 90 percent emission capture rate may be more appropriate to address the long-term adverse impacts associated with global climate change because most projects will be required to implement GHG reduction measures. Further, a 90 percent emission capture rate sets the emission threshold low enough to capture a substantial fraction of future stationary source projects that will be constructed to accommodate future statewide population and economic growth, while setting the emission threshold high enough to exclude small projects that will in aggregate contribute a relatively small fraction of the cumulative statewide GHG emissions. This assertion is based on the fact that [SCAQMD] staff estimates that these GHG emissions would account for slightly less than one percent of future 2050 statewide GHG emissions target (85 [$MMTCO_2e$/yr]). In addition, these small projects may be subject to future applicable GHG control regulations that would further reduce their overall future contribution to the statewide GHG inventory. Finally, these small sources are already subject to [Best Available Control Technology] (BACT) for criteria pollutants and are more likely to be single-permit facilities, so they are more likely to have few opportunities readily available to reduce GHG emissions from other parts of their facility." (31)

Although the SCAQMD's draft significance criteria have not been adopted, the City has determined that the SCAQMD's project level efficiency threshold methodology can be used to set an appropriate significance criterion by which to determine whether the project emits a significant amount of GHG. As previously noted the 2017 Scoping Plan identifies a reduction target of 40% below 2020 levels by 2030. As such, the appropriate reduction target for 2030 would be 2.88 MT CO_2e/yr. For analysis purposes herein, the SP threshold for the Project's buildout year of 2025 was calculated by linear interpolation between the 2020 target of 4.8 MT CO_2e/yr and the 2030 target of 2.88 MT CO_2e/yr. As such, the target for the Project's buildout year of 2025 is 3.84 MT CO_2e/yr.

3 PROJECT GREENHOUSE GAS EMISSIONS

3.1 INTRODUCTION

The Project has been evaluated to determine if it will result in a significant greenhouse gas impact. The significance of these potential impacts is described in the following section.

3.2 CALIFORNIA EMISSIONS ESTIMATOR MODEL™ EMPLOYED TO ESTIMATE GHG EMISSIONS

On October 17, 2017, the SCAQMD in conjunction with the California Air Pollution Control Officers Association (CAPCOA) and other California air districts, released the latest version of the California Emissions Estimator Model™ (CalEEMod™) v2016.3.2. The purpose of this model is to calculate construction-source and operational-source criteria pollutant (VOCs, NO_x, SO_x, CO, PM_{10}, and $PM_{2.5}$) and greenhouse gas (GHG) emissions from direct and indirect sources; and quantify applicable air quality and GHG reductions achieved from mitigation measures (32). Accordingly, the latest version of CalEEMod™ has been used for this Project to determine construction and operational air quality emissions. Output from the model runs for both construction and operational activity are provided in Appendix 3.1 through 3.4. The CalEEMod model includes GHG emissions from the following source categories: construction, area, energy, mobile, waste, water.

3.3 CONSTRUCTION AND OPERATIONAL LIFE-CYCLE ANALYSIS

A full life-cycle analysis (LCA) for construction and operational activity is not included in this analysis due to the lack of consensus guidance on LCA methodology at this time. Life-cycle analysis (i.e., assessing economy-wide GHG emissions from the processes in manufacturing and transporting all raw materials used in the project development, infrastructure and on-going operations) depends on emission factors or econometric factors that are not well established for all processes. At this time a LCA would be extremely speculative and thus has not been prepared.

Additionally, the SCAQMD recommends analyzing direct and indirect project GHG emissions generated within California and not life-cycle emissions because the life-cycle effects from a project could occur outside of California, might not be very well understood or documented, and would be challenging to mitigate (33). Additionally, the science to calculate life cycle emissions is not yet established or well defined, therefore SCAQMD has not recommended, and is not requiring, life-cycle emissions analysis.

3.4 CONSTRUCTION EMISSIONS

Construction activities associated with the proposed Project will result in emissions of CO_2 and CH_4 from construction activities.

The report *Nakase Property Air Quality Impact Analysis Report*, Urban Crossroads, Inc. (2019) contains detailed information regarding construction activity (34).

For construction phase Project emissions, GHGs are quantified and amortized over the life of the Project. To amortize the emissions over the life of the Project, the SCAQMD recommends calculating the total greenhouse gas emissions for the construction activities, dividing it by a 30-year project life then adding that number to the annual operational phase GHG emissions (35). As such, construction emissions were amortized over a 30-year period and added to the annual operational phase GHG emissions.

3.5 OPERATIONAL EMISSIONS

Operational activities associated with the proposed Project will result in emissions of CO_2, CH_4, and N_2O from the following primary sources:

- Area Source Emissions
- Energy Source Emissions
- Mobile Source Emissions
- Solid Waste
- Water Supply, Treatment and Distribution
- On-Site Equipment Emissions

3.5.1 AREA SOURCE EMISSIONS

Landscape Maintenance Equipment

Landscape maintenance equipment would generate emissions from fuel combustion and evaporation of unburned fuel. Equipment in this category would include lawnmowers, shedders/grinders, blowers, trimmers, chain saws, and hedge trimmers used to maintain the landscaping of the Project. The emissions associated with landscape maintenance equipment were calculated based on assumptions provided in the CalEEMod model.

3.5.2 ENERGY SOURCE EMISSIONS

Combustion Emissions Associated with Natural Gas and Electricity

GHGs are emitted from buildings as a result of activities for which electricity and natural gas are typically used as energy sources. Combustion of any type of fuel emits CO_2 and other GHGs directly into the atmosphere; these emissions are considered direct emissions associated with a building. GHGs are also emitted during the generation of electricity from fossil fuels; these emissions are considered to be indirect emissions. Unless otherwise noted, CalEEMod™ default parameters were used.

3.5.3 MOBILE SOURCE EMISSIONS

Vehicles

Project mobile source air quality impacts are dependent on both overall daily vehicle trip generation and the effect of the Project on peak hour traffic volumes and traffic operations in the vicinity of the Project. The Project-related operational air quality impacts are derived

primarily from vehicle trips generated by the Project. Trip characteristics available from the report, *Nakase Property Traffic Impact Analysis* (Urban Crossroads, Inc. 2018) were utilized in this analysis (1). The proposed Project is anticipated to generate a total of 8,789 trip-ends per day with 1,983 AM peak hour trips and 1,920 PM peak hour trips

Pedestrian connections would be constructed at selected roads within the Project, providing pedestrian access to the various uses and activity centers within the Project. Facilitating pedestrian access encourages people to walk instead of drive. The Project would not impose barriers to pedestrian access and interconnectivity. Furthermore, the mix of uses within the Area Plan as proposed by the Project acts to reduce travel distances and regional vehicle miles traveled (VMT) by consolidating trips and reducing requirements for multiple trips.

3.5.4 SOLID WASTE

Residential and educational land uses would result in the generation and disposal of solid waste. A large percentage of this waste would be diverted from landfills by a variety of means, such as reducing the amount of waste generated, recycling, and/or composting. The remainder of the waste not diverted would be disposed of at a landfill. GHG emissions from landfills are associated with the anaerobic breakdown of material. GHG emissions associated with the disposal of solid waste associated with the Project were calculated using CalEEMod default parameters.

3.5.5 WATER SUPPLY, TREATMENT AND DISTRIBUTION

Indirect GHG emissions result from the production of electricity used to convey, treat and distribute water and wastewater. The amount of electricity required to convey, treat and distribute water depends on the volume of water as well as the sources of the water. Unless otherwise noted, CalEEMod™ default parameters were used.

3.5.6 SERVICE POPULATION CALCULATION

As previously noted, Service Population is defined as the total number of residents plus employees associated with a project. In order to calculate the Service Population for the Project, an estimate of persons per household and number of employees at the school will be needed. Based on the City of Lake Forest's 2013-2021 Housing Element, average household size was 2.95 persons per household (36). Additionally, the school is estimated to have 60 employees. As such, the Service Population used for this analysis is 2,349 (2.95 persons per household x 776 residential units + 60 employees).

3.7 EXISTING PROJECT SITE

The Project site is currently developed with wholesale nursery operation. The estimated greenhouse emissions for existing conditions are summarized on Table 3-1 for the existing nursery use. Detailed model outputs are presented in Appendix 3.4.

TABLE 3-1: EXISTING CONDITIONS GREENHOUSE GAS EMISSIONS

Emission Source	Emissions (metric tons per year)			
	CO_2	CH_4	N_2O	Total CO_2E
Existing Development	593.12	0.22	0.00	599.10
Total CO_2E (All Sources)	**599.10**			

3.8 EMISSIONS SUMMARY

Emissions With Regulatory Requirements and Project Design Features

As previously stated, the Project site is currently developed with an 8,500 square foot nursery. The existing development emissions were subtracted from the Project greenhouse gas emissions to determine the new emissions from the proposed Project. As summarized in Table 3-2, the Project would result in 4.91 $MTCO_2e$ per service population per year in 2025.

TABLE 3-2: 2025 PROJECT GREENHOUSE GAS EMISSIONS

Emission Source	Emissions (metric tons per year)			
	CO_2	CH_4	N_2O	Total CO_2E
Annual construction-related emissions amortized over 30 years	372.21	0.04	0.00	373.19
Area (Other Uses)	0.03	7.00e-05	0.00	0.03
Area (Residential)	199.42	0.02	3.42e-03	200.84
Energy (Other Uses)	128.25	0.01	1.96e-03	129.01
Energy (Residential)	1,712.09	0.09	0.03	1,722.16
Mobile (Other Uses)	2,042.38	0.08	0.00	2,044.38
Mobile (Residential)	6,906.23	0.27	0.00	6,912.99
Waste (Other Uses)	37.16	2.20	0.00	92.07
Waste (Residential)	170.14	10.06	0.00	421.52
Water Usage (Other Uses)	29.98	0.07	1.90E-03	32.18
Water Usage (Residential)	170.81	1.33	0.03	213.96
Total CO_2E (All Sources)	**12,142.31**			
Existing Emissions	***-599.10***			
Net CO_2E (Project minus Existing)	***11,543***			
Service Population	**2,349**			
Total CO_2E / Service Population	**4.91**			
2025 Service Population Threshold	**3.84**			
Threshold Exceeded?	**YES**			

As summarized in Table 3-3, the Project would result in 4.42 $MTCO_2e$ per service population per year in 2030.

TABLE 3-3: 2030 PROJECT GREENHOUSE GAS EMISSIONS

Emission Source	Emissions (metric tons per year)			
	CO_2	CH_4	N_2O	Total CO_2E
Annual construction-related emissions amortized over 30 years	372.21	0.04	0.00	373.19
Area (Other Uses)	0.03	7.00e-05	0.00	0.03
Area (Residential)	199.42	0.02	3.42e-03	200.84
Energy (Other Uses)	115.19	0.01	1.96e-03	115.94
Energy (Residential)	1,549.03	0.09	0.03	1,559.10
Mobile (Other Uses)	1,822.25	0.07	0.00	1,823.97
Mobile (Residential)	6,161.18	0.23	0.00	6,167.00
Waste (Other Uses)	37.16	2.20	0.00	92.07
Waste (Residential)	170.14	10.06	0.00	421.52
Water Usage (Other Uses)	25.71	0.07	1.90e-03	27.91
Water Usage (Residential)	147.85	1.33	0.03	191.00
Total CO_2E (All Sources)	**10,972.55**			
Existing Emissions	***-599.10***			
Net CO_2E (Project minus Existing)	***10,373***			
Service Population	**2,349**			
Total CO_2E / Service Population	**4.42**			
2030 Service Population Threshold	**2.88**			
Threshold Exceeded?	**YES**			

3.9 GREENHOUSE GAS EMISSIONS FINDINGS AND RECOMMENDATIONS

GHG Impact #1: The Project would have a significant effect on the environment if its direct and indirect GHG emissions would exceed the project-level efficiency-based target of 3.84 $MTCO_2e$ per service population (SP) in 2025 or 2.88 $MTCO_2e$ per SP in 2030.

LEVEL OF SIGNIFICANCE WITH REGULATORY REQUIREMENTS AND PROJECT DESIGN FEATURES

The Project would result in 4.91 $MTCO_2e$ per service population per year in 2025 after implementation of regulatory requirements, project design features, and mitigation measures as summarized in Table 3-2 (presented previously). As such, the Project total GHG emissions would exceed the screening threshold of 3.84 $MTCO_2e$ per year per service population. Thus, project-

related emissions would have a potential significant direct or indirect impact on GHG and climate change.

The Project would result in 4.42 $MTCO_2e$ per service population per year in 2030 after implementation of regulatory requirements, project design features, and mitigation measures as summarized in Table 3-3 (presented previously). As such, the Project total GHG emissions would exceed the screening threshold of 2.88 $MTCO_2e$ per year per service population. Thus, project-related emissions would have a potential significant direct or indirect impact on GHG and climate change.

LEVEL OF SIGNIFICANCE AFTER MITIGATION

No feasible mitigation measures exist that would reduce these emissions to levels that are less-than-significant. Project GHG emissions exceedances of applicable service populations thresholds are therefore considered significant and unavoidable. Moreover, more than 73 percent of all mobile-source emissions in 2025 and 66 percent of all mobile-source emissions in 2030 (by weight) would be generated by Project mobile sources (traffic). Neither the Project Applicant nor the Lead Agency (City of Lake Forest) can substantively or materially affect reductions in Project mobile-source emissions beyond the regulatory requirements and project design features identified herein. Additionally, even if mitigation were applied to reduce all other sources to the maximum extent possible, the Project mobile-source emissions alone would still exceed the threshold of significance. As such, no feasible mitigation measures beyond the regulatory requirements and project design features would reduce project-related emissions to levels that are less-than-significant and therefore impacts would still be significant and unavoidable.

GHG Impact #2: The Project would not conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases.

The Project's consistency with AB 32 and SB 32 are discussed below.

Scoping Plan

ARB's *Scoping Plan* identifies strategies to reduce California's greenhouse gas emissions in support of AB32 which requires the State to reduce its GHG emissions to 1990 levels by 2020. Many of the strategies identified in the Scoping Plan are not applicable at the project level, such as long-term technological improvements to reduce emissions from vehicles. Some measures are applicable and supported by the project, such as energy efficiency. Finally, while some measures are not directly applicable, the project would not conflict with their implementation. Reduction measures are grouped into 18 action categories, as follows:

1. **California Cap-and-Trade Program Linked to Western Climate Initiative Partner Jurisdictions.** Implement a broad-based California cap-and-trade program to provide a firm limit on emissions. Link the California cap–and-trade program with other Western Climate Initiative Partner programs to create a regional market system to achieve greater environmental and economic

benefits for California.[5] Ensure California's program meets all applicable AB 32 requirements for market-based mechanisms.

2. **California Light-Duty Vehicle Greenhouse Gas Standards.** Implement adopted Pavley standards and planned second phase of the program. Align zero-emission vehicle, alternative and renewable fuel and vehicle technology programs with long-term climate change goals.
3. **Energy Efficiency.** Maximize energy efficiency building and appliance standards, and pursue additional efficiency efforts including new technologies, and new policy and implementation mechanisms. Pursue comparable investment in energy efficiency from all retail providers of electricity in California (including both investor-owned and publicly owned utilities).
4. **Renewables Portfolio Standards.** Achieve 33 percent renewable energy mix statewide.
5. **Low Carbon Fuel Standard.** Develop and adopt the Low Carbon Fuel Standard.
6. **Regional Transportation-Related Greenhouse Gas Targets.** Develop regional greenhouse gas emissions reduction targets for passenger vehicles.
7. **Vehicle Efficiency Measures.** Implement light-duty vehicle efficiency measures.
8. **Goods Movement.** Implement adopted regulations for the use of shore power for ships at berth. Improve efficiency in goods movement activities.
9. **Million Solar Roofs Program.** Install 3,000 megawatts of solar-electric capacity under California's existing solar programs.
10. **Medium- and Heavy-Duty Vehicles.** Adopt medium- (MD) and heavy-duty (HD) vehicle efficiencies. Aerodynamic efficiency measures for HD trucks pulling trailers 53-feet or longer that include improvements in trailer aerodynamics and use of rolling resistance tires were adopted in 2008 and went into effect in 2010.[6] Future, yet to be determined improvements, includes hybridization of MD and HD trucks.
11. **Industrial Emissions.** Require assessment of large industrial sources to determine whether individual sources within a facility can cost-effectively reduce greenhouse gas emissions and provide other pollution reduction co-benefits. Reduce greenhouse gas emissions from fugitive emissions from oil and gas extraction and gas transmission. Adopt and implement regulations to control fugitive methane emissions and reduce flaring at refineries.
12. **High Speed Rail.** Support implementation of a high speed rail system.
13. **Green Building Strategy.** Expand the use of green building practices to reduce the carbon footprint of California's new and existing inventory of buildings.
14. **High Global Warming Potential Gases.** Adopt measures to reduce high warming global potential gases.
15. **Recycling and Waste.** Reduce methane emissions at landfills. Increase waste diversion, composting and other beneficial uses of organic materials, and mandate commercial recycling. Move toward zero-waste.
16. **Sustainable Forests.** Preserve forest sequestration and encourage the use of forest biomass for sustainable energy generation. The 2020 target for carbon sequestration is 5 million MTCO2E/YR.
17. **Water.** Continue efficiency programs and use cleaner energy sources to move and treat water.

[5] California Air Resources Board. California GHG Emissions – Forecast (2002-2020). October 2010
[6] California Air Resources Board. Scoping Plan Measures Implementation Timeline. October 2010

18. **Agriculture.** In the near-term, encourage investment in manure digesters and at the five-year Scoping Plan update determine if the program should be made mandatory by 2020.

Table 3-5 summarizes the project's consistency with the State Scoping Plan. As summarized, the project will not conflict with any of the provisions of the Scoping Plan and in fact supports seven of the action categories through energy efficiency, water conservation, recycling, and landscaping.

TABLE 3-5: SCOPING PLAN CONSISTENCY SUMMARY

Action	Supporting Measures[7]	Consistency
Cap-and-Trade Program	--	Not Applicable. These programs involve capping emissions from electricity generation, industrial facilities, and broad scoped fuels.
Light-Duty Vehicle Standards	T-1	Not Applicable. This is a statewide measure establishing vehicle emissions standards.
Energy Efficiency	E-1	Consistent. The project will include a variety of building, water, and solid waste efficiencies consistent with 2016 CALGREEN requirements.
	E-2	
	CR-1	
	CR-2	
Renewables Portfolio Standard	E-3	Not Applicable. Establishes the minimum statewide renewable energy mix.
Low Carbon Fuel Standard	T-2	Not Applicable. Establishes reduced carbon intensity of transportation fuels.
Regional Transportation-Related Greenhouse Gas Targets	T-3	Not Applicable. This is a statewide measure and is not within the purview of this Project.
Vehicle Efficiency Measures	T-4	Not Applicable. Identifies measures such as minimum tire-fuel efficiency, lower friction oil, and reduction in air conditioning use.
Goods Movement	T-5	Not applicable. Identifies measures to improve goods movement efficiencies such as advanced combustion strategies, friction reduction, waste heat recovery, and electrification of accessories. While these measures are yet to be implemented and will be voluntary, the proposed Project would not interfere with their implementation.
	T-6	
Million Solar Roofs (MSR) Program	E-4	Consistent. The MSR program sets a goal for use of solar systems throughout the state as a whole. While the project currently does not include solar energy generation, the Project's roof structures will be designed to support solar panels in the future, appropriate to their architectural design.

[7] Supporting measures can be found at the following link: http://www.arb.ca.gov/cc/scopingplan/2013_update/appendix_b.pdf

Action	Supporting Measures[7]	Consistency
Medium- & Heavy-Duty Vehicles	T-7	Not applicable. MD and HD trucks and trailers are subject to aerodynamic and hybridization requirements as established by ARB; no feature of the project would interfere with implementation of these requirements and programs.
	T-8	
Industrial Emissions	I-1	Not Applicable. These measures are applicable to large industrial facilities (> 500,000 $MTCO_2E$/YR) and other intensive uses such as refineries.
	I-2	
	I-3	
	I-4	
	I-5	
High Speed Rail	T-9	Not Applicable. Supports increased mobility choice.
Green Building Strategy	GB-1	Consistent. The project will include a variety of building, water, and solid waste efficiencies consistent with 2016 CALGREEN requirements.
High Global Warming Potential Gases	H-1	Not Applicable. The proposed Project is not a substantial source of high GWP emissions and will comply with any future changes in air conditioning, fire protection suppressant, and other requirements.
	H-2	
	H-3	
	H-4	
	H-5	
	H-6	
	H-7	
Recycling and Waste	RW-1	Consistent. The project will be required to recycle a minimum of 50 percent from construction and operational activities per State and City requirements.
	RW-2	
	RW-3	
Sustainable Forests	F-1	Consistent. The project will increase carbon sequestration by increasing on-site trees per the project landscaping plan.
Water	W-1	Consistent. The project will include use of low-flow fixtures and efficient landscaping per State requirements.
	W-2	
	W-3	
	W-4	
	W-5	
	W-6	
Agriculture	A-1	Not Applicable. The project is not an agricultural use.

SB 32

At the state level, Executive Orders S-3-05 and B-30-15 are orders from the State's Executive Branch for the purpose of reducing GHG emissions. The goal of Executive Order S-3-05 is to reduce GHG emissions to 1990 levels by 2020 was codified by the Legislature as the 2006 Global Warming Solutions Act (AB 32). The Project, as analyzed above, is consistent with AB 32. Therefore, the Project does not conflict with this component of Executive Order S-3-05. The Executive Orders also establish goals to reduce GHG emissions to 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050. However, studies have shown that, in order to meet the 2030 and 2050 targets, aggressive technologies in the transportation and energy

sectors, including electrification and the decarbonization of fuel, will be required. In its Climate Change Scoping Plan, ARB acknowledged that the "measures needed to meet the 2050 are too far in the future to define in detail." In the First Scoping Plan Update, however, ARB generally described the type of activities required to achieve the 2050 target: "energy demand reduction through efficiency and activity changes; largescale electrification of on-road vehicles, buildings, and industrial machinery; decarbonizing electricity and fuel supplies; and rapid market penetration of efficiency and clean energy technologies that requires significant efforts to deploy and scale markets for the cleanest technologies immediately."

Unlike the 2020 and 2030 reduction targets of AB 32 and SB 32, respectively the 2050 target of Executive Order S-3-05 has not been codified. Accordingly, the 2050 reduction target has not been the subject of any analysis by CARB. For example, CARB has not prepared an update to the aforementioned Scoping Plan that provides guidance to local agencies as to how they may seek to contribute to the achievement of the 2050 reduction target.

In 2017, the California Supreme Court examined the need to use the Executive Order S-3-05 2050 reduction target in Cleveland National Forest Foundation v. San Diego Association of Governments (2017) 3 Cal.5th 497 (Cleveland National). The case arose from SANDAG's adoption of its 2050 Regional Transportation Plan, which included its Sustainable Communities Strategy, as required by SB 375 (discussed above). On review, the Supreme Court held that SANDAG did not violate CEQA by not considering the Executive Order S-3-05 2050 reduction target.

As explained above, the 2050 reduction target of Executive Order S-3-05 has not been codified, unlike the 2020 and 2030 reduction targets of AB 32 and SB 32, respectively. Accordingly, the 2050 reduction target has not been the subject of any analysis by CARB. For example, CARB has not prepared an update to the aforementioned Scoping Plan that provides guidance to local agencies as to how they may seek to contribute to the achievement of the 2050 reduction target.

Further, the Project is much smaller in size and scope in comparison to the Regional Transportation Plan examined in Cleveland National. In that case, the California Supreme Court held that SANDAG did not violate CEQA by not considering the Executive Order S-3-05 2050 reduction target. Accordingly, there is no information presently available to assess the Project's consistency with regard to the 2050 target of Executive Order S-3-05.

The 2017 Scoping Plan builds on the 2008 Scoping Plan in order to achieve the 40 percent reduction from 1990 levels by 2030. Major elements of the 2017 Scoping Plan framework that will achieve the GHG reductions include:

- Implementing and/or increasing the standards of the Mobile Source Strategy, which include increasing ZEV buses and trucks. When adopted, this measure would apply to all buses accessing the Project site, this may include existing buses or new buses purchased by the project proponent could be eligible for incentives that expedite the Project's implementation of ZEVs.
- Low Carbon Fuel Standard (LCFS), with an increased stringency (18 percent by 2030). When adopted, this measure would apply to all fuel purchased and used by the Project in the state.
- Implementing SB 350, which expands the Renewables Portfolio Standard (RPS) to 50 percent RPS and doubles energy efficiency savings by 2030. When adopted, this measure would apply when electricity is provided to the Project by a utility company.

- California Sustainable Freight Action Plan, which improves freight system efficiency, utilizes near-zero emissions technology, and deployment of ZEV trucks. The Project is not required to comply with the California Sustainable Freight Action Plan and would therefore not conflict with this measure.
- Implementing the proposed Short-Lived Climate Pollutant Strategy (SLPS), which focuses on reducing methane and hydroflurocarbon emissions by 40 percent and anthropogenic black carbon emissions by 50 percent by year 2030. When adopted, the Project would be required to comply with this measure and reduce SLPS accordingly if it were to emit any methane or hydroflurocarbon emissions during any activities on-site.
- Continued implementation of SB 375. The Project is not within the purview of SB 375 and would therefore not conflict with this measure.
- Post-2020 Cap-and-Trade Program that includes declining caps. The Project is not required to comply with the Cap-and-Trade Program and would therefore not conflict with this measure.
- 20 percent reduction in GHG emissions from refineries by 2030. The Project may be required to comply with this measure if it were to utilize any fuel from refineries.
- Development of a Natural and Working Lands Action Plan to secure California's land base as a net carbon sink. This is a statewide measure that would not apply to the Project.

As shown above, the Project would not conflict with any of the 2017 Scoping Plan elements as any regulations adopted would apply directly or indirectly to the Project. Notwithstanding, because the Project exceeds the applicable service population thresholds and consequently has the potential to result in a cumulatively considerable impact with respect to GHG emissions, a significant and unavoidable finding with respect to this criterion is also identified.

This page intentionally left blank

4 REFERENCES

1. **Urban Crossroads, Inc.** *Nakase Property Traffic Impact Analysis.* 2019.
2. **Air Resources Board.** Assembly Bill 32: Global Warming Solutions Act. [Online] 2006. [Cited: November 13, 2013.] http://www.arb.ca.gov/cc/ab32/ab32.htm.
3. —. Sustainable Communities. [Online] 2008. [Cited: November 13, 2013.] http://www.arb.ca.gov/cc/sb375/sb375.htm.
4. —. Clean Car Standards - Pavley, Assembly Bill 1493. [Online] September 24, 2009. [Cited: November 13, 2013.] http://www.arb.ca.gov/cc/ccms/ccms.htm.
5. **Building Standards Commission.** California Building Standards Code (Title 24, California Code of Regulations). [Online] http://www.bsc.ca.gov/codes.aspx.
6. **California Energy Commission.** California Code of Regulations, TITLE 20, Division 2. [Online] September 3, 2013. [Cited: November 13, 2013.] http://www.energy.ca.gov/reports/title20/index.html.
7. **Air Resources Board.** Title 17 - California Code of Regulation. [Online] 2010. [Cited: November 13, 2013.] http://www.arb.ca.gov/regs/regs-17.htm.
8. **Department of Water Resources.** Updated Model Water Efficient Landscape Ordinance AB 1881. [Online] 2006. [Cited: November 13, 2013.] http://www.water.ca.gov/wateruseefficiency/landscapeordinance/updatedOrd_history.cfm.
9. **California Energy Commission.** SB 1368 Emission Performance Standards. [Online] September 29, 2006. [Cited: November 13, 2013.] http://www.energy.ca.gov/emission_standards/.
10. —. Renewables Portfolio Standard (RPS) . [Online] 2002. [Cited: November 13, 2013.] http://www.energy.ca.gov/portfolio/.
11. **United Nations.** GHG Profiles - Annex I. [Online] http://di.unfccc.int/ghg_profile_annex1.
12. —. GHG Profiles - Non-Annex I. [Online] http://di.unfccc.int/ghg_profile_non_annex1.
13. **Environmental Protection Agency.** Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2016. [Online] 2018. https://www.epa.gov/sites/production/files/2018-01/documents/2018_complete_report.pdf.
14. **Air Resources Board.** California Greenhouse Gas Emission Inventory -2016 Edition. [Online] June 17, 2016. http://www.arb.ca.gov/cc/inventory/data/data.htm.
15. **World Resources Institute.** Climate Analysis Indicator Tool (CAIT). [Online] http://cait.wri.org.
16. *The Carbon Cycle and Climate Change.* **Bennington, Bret J.** 1, s.l. : Brooks/Cole. ISBN 1 3: 978-0-495-73855-8.
17. *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report.* **International Panel on Climate Change.** 4, 2007.
18. *Occupational Safety and Health Guideline for Nitrous Oxide.* **U.S. Department of Labor.**
19. **Environmental Protection Agency.** Overview of Greenhouse Gases. [Online] [Cited: September 17, 2014.] http://www.epa.gov/highgwp/scientific.html.
20. **American Lung Association.** Climate Change. [Online] 2013. [Cited: November 13, 2013.] http://www.lung.org/associations/states/california/advocacy/climate-change/.

21. **The National Institute for Occupational Safety and Health.** [Online] [Cited: November 13, 2013.] http://www.cdc.gov/niosh/.

22. **Occupational Health and Safety Administration.** [Online] [Cited: November 13, 2013.] https://www.osha.gov/.

23. **Hardin, Mary and Kahn, Ralph.** Aerosols & Climate Change. *Earth Observatory.* [Online] http://earthobservatory.nasa.gov/Features/Aerosols/.

24. **Center for Climate and Energy Solutions (C2ES).** Outcomes of the U.N. Climate Change Conference. *Center for Climate and Energy Solutions (C2ES).* [Online] 2015a. [Cited: April 19, 2016.] http://www.c2es.org/international/negotiations/cop21-paris/summary.

25. **Agency, United States Environmental Protection.** Endangerment and Cause or Contribute Findings for Greenhouse Gases under the Section 202(a) of the Clean Air Act. *United States Environmental Protection Agency.* [Online] https://www.epa.gov/ghgemissions/endangerment-and-cause-or-contribute-findings-greenhouse-gases-under-section-202a-clean.

26. **Lawrence Berkeley National Laboratory.** California's Policies Can Significantly Cut Greenhouse Gas Emissions through 2030. *Lawrence Berkeley National Laboratory.* [Online] January 22, 2015. http://newscenter.lbl.gov/2015/01/22/californias-policies-can-significantly-cut-greenhouse-gas-emissions-2030/.

27. **Ernest Orlando Lawrence Berkeley National Laboratory.** Modeling California policy impacts on greenhouse gas emissions. [Online] 2015. https://eetd.lbl.gov/sites/all/files/lbnl-7008e.pdf.

28. **California Legislative Information.** Senate Bill No. 32. [Online] September 8, 2016. https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB32.

29. **Policy Matters Journal: A Student Publication from the Goldman School of Public Policy.** New California Emissions Targets Spell Next Step in the State's Fight against Climate Change. [Online] September 1, 2016. http://www.policymattersjournal.org/sb32.html.

30. **California Air Resources Board (ARB).** Cap and Trade Overview. *California Air Resources Board.* [Online] [Cited: May 10, 2016.] http://www.arb.ca.gov/cc/capandtrade/guidance/cap_trade_overview.pdf. .

31. **South Coast Air Quality Management District.** Interim CEQA GHG Significance Threshold for Stationary Sources, Rules and Plans. [Online] http://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook/ghg-significance-thresholds.

32. **California Air Pollution Control Officers Association (CAPCOA).** California Emissions Estimator Model (CalEEMod). [Online] September 2016. www.caleemod.com.

33. *Minutes for the GHG CEQA Significance.* **South Coast Air Quality Managment District.** 2008.

34. **Urban Crossroads, Inc.** *Nakase Property Air Quality Impact Analysis Report.* 2019.

35. **South Coast Air Quality Management District.** *Greenhouse Gas CEQA Significance Threshold Stakeholder Working Group #13.* [Powerpoint] Diamond Bar : s.n., 2009.

36. **City of Lake Forest.** *City of Lake Forest 2013-2021 Housing Element.*

This page intentionally left blank

5 CERTIFICATION

The contents of this GHGA represent an accurate depiction of the greenhouse gas impacts associated with the proposed Nakase Property Project. The information contained in this greenhouse gas report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 336-5987.

Haseeb Qureshi
Associate Principal
URBAN CROSSROADS, INC.
260 E. Baker, Suite 200
Costa Mesa, CA 92626
(949) 336-5987
hqureshi@urbanxroads.com

EDUCATION

Master of Science in Environmental Studies
California State University, Fullerton • May, 2010

Bachelor of Arts in Environmental Analysis and Design
University of California, Irvine • June, 2006

PROFESSIONAL AFFILIATIONS

AEP – Association of Environmental Planners
AWMA – Air and Waste Management Association
ASTM – American Society for Testing and Materials

PROFESSIONAL CERTIFICATIONS

Environmental Site Assessment – American Society for Testing and Materials • June, 2013
Planned Communities and Urban Infill – Urban Land Institute • June, 2011
Indoor Air Quality and Industrial Hygiene – EMSL Analytical • April, 2008
Principles of Ambient Air Monitoring – California Air Resources Board • August, 2007
AB2588 Regulatory Standards – Trinity Consultants • November, 2006
Air Dispersion Modeling – Lakes Environmental • June, 2006

This page intentionally left blank

APPENDIX 3.1:

CALEEMOD CONSTRUCTION ANNUAL EMISSIONS MODEL OUTPUTS

Nakase (Construction - Unmitigated)

Orange County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Elementary School	1,000.00	Student	12.60	83,603.37	0
Other Asphalt Surfaces	19.80	Acre	19.80	862,488.00	0
City Park	6.60	Acre	6.60	287,496.00	0
Retirement Community	101.00	Dwelling Unit	3.90	101,000.00	289
Single Family Housing	675.00	Dwelling Unit	61.40	1,215,000.00	1931

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2025
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Total Lot Area is 121.8 acres. In order to be consistent with the TIA, 6.6 acres of Park will be analyzed, the remaining 17.5 acres of Open Space will not be analyzed.

Construction Phase - Construction Schedule adjusted as per approval of the Client.

Off-road Equipment - Hours based on an 8-hour workday.

Off-road Equipment - Hours based on an 8-hour workday.

Off-road Equipment -

Off-road Equipment -

Demolition -

Grading -

Architectural Coating -

Vehicle Trips - Construction Run Only.

Woodstoves - Construction Run Only.

Energy Use - Construction Run Only.

Water And Wastewater - Construction Run Only.

Solid Waste - Construction Run Only.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	200.00	66.00
tblConstructionPhase	NumDays	310.00	269.00
tblConstructionPhase	NumDays	220.00	87.00
tblConstructionPhase	NumDays	3,100.00	1,001.00
tblConstructionPhase	NumDays	220.00	1,001.00
tblEnergyUse	LightingElect	2.68	0.00
tblEnergyUse	LightingElect	1,001.10	0.00
tblEnergyUse	LightingElect	1,608.84	0.00
tblEnergyUse	NT24E	1.51	0.00
tblEnergyUse	NT24E	3,172.76	0.00

tblEnergyUse	NT24E	6,155.97	0.00
tblEnergyUse	NT24NG	1.03	0.00
tblEnergyUse	NT24NG	5,516.00	0.00
tblEnergyUse	NT24NG	5,516.00	0.00
tblEnergyUse	T24E	1.89	0.00
tblEnergyUse	T24E	177.01	0.00
tblEnergyUse	T24E	253.73	0.00
tblEnergyUse	T24NG	10.81	0.00
tblEnergyUse	T24NG	7,243.59	0.00
tblEnergyUse	T24NG	20,288.91	0.00
tblFireplaces	FireplaceDayYear	25.00	0.00
tblFireplaces	FireplaceDayYear	25.00	0.00
tblFireplaces	FireplaceHourDay	3.00	0.00
tblFireplaces	FireplaceHourDay	3.00	0.00
tblFireplaces	FireplaceWoodMass	1,019.20	0.00
tblFireplaces	FireplaceWoodMass	1,019.20	0.00
tblFireplaces	NumberGas	85.85	0.00
tblFireplaces	NumberGas	573.75	0.00
tblFireplaces	NumberNoFireplace	10.10	0.00
tblFireplaces	NumberNoFireplace	67.50	0.00
tblFireplaces	NumberWood	5.05	0.00
tblFireplaces	NumberWood	33.75	0.00
tblGrading	MaterialExported	0.00	150,000.00
tblLandUse	LotAcreage	1.92	12.60
tblLandUse	LotAcreage	20.20	3.90
tblLandUse	LotAcreage	219.16	61.40
tblOffRoadEquipment	UsageHours	6.00	8.00

tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblSolidWaste	SolidWasteGenerationRate	0.57	0.00
tblSolidWaste	SolidWasteGenerationRate	182.50	0.00
tblSolidWaste	SolidWasteGenerationRate	46.46	0.00
tblSolidWaste	SolidWasteGenerationRate	791.71	0.00
tblVehicleTrips	CC_TL	8.40	0.00
tblVehicleTrips	CC_TL	8.40	0.00
tblVehicleTrips	CC_TL	8.40	0.00
tblVehicleTrips	CC_TTP	48.00	0.00
tblVehicleTrips	CC_TTP	30.00	0.00
tblVehicleTrips	CNW_TL	6.90	0.00
tblVehicleTrips	CNW_TL	6.90	0.00
tblVehicleTrips	CNW_TL	6.90	0.00
tblVehicleTrips	CNW_TTP	19.00	0.00
tblVehicleTrips	CNW_TTP	5.00	0.00
tblVehicleTrips	CW_TL	16.60	0.00
tblVehicleTrips	CW_TL	16.60	0.00
tblVehicleTrips	CW_TL	16.60	0.00
tblVehicleTrips	CW_TTP	33.00	0.00
tblVehicleTrips	CW_TTP	65.00	0.00
tblVehicleTrips	DV_TP	28.00	0.00
tblVehicleTrips	DV_TP	25.00	0.00
tblVehicleTrips	DV_TP	11.00	0.00
tblVehicleTrips	DV_TP	11.00	0.00
tblVehicleTrips	HO_TL	8.70	0.00
tblVehicleTrips	HO_TL	8.70	0.00

tblVehicleTrips	HO_TTP	40.60	0.00
tblVehicleTrips	HO_TTP	40.60	0.00
tblVehicleTrips	HS_TL	5.90	0.00
tblVehicleTrips	HS_TL	5.90	0.00
tblVehicleTrips	HS_TTP	19.20	0.00
tblVehicleTrips	HS_TTP	19.20	0.00
tblVehicleTrips	HW_TL	14.70	0.00
tblVehicleTrips	HW_TL	14.70	0.00
tblVehicleTrips	HW_TTP	40.20	0.00
tblVehicleTrips	HW_TTP	40.20	0.00
tblVehicleTrips	PB_TP	6.00	0.00
tblVehicleTrips	PB_TP	12.00	0.00
tblVehicleTrips	PB_TP	3.00	0.00
tblVehicleTrips	PB_TP	3.00	0.00
tblVehicleTrips	PR_TP	66.00	0.00
tblVehicleTrips	PR_TP	63.00	0.00
tblVehicleTrips	PR_TP	86.00	0.00
tblVehicleTrips	PR_TP	86.00	0.00
tblVehicleTrips	ST_TR	22.75	0.00
tblVehicleTrips	ST_TR	2.03	0.00
tblVehicleTrips	ST_TR	9.91	0.00
tblVehicleTrips	SU_TR	16.74	0.00
tblVehicleTrips	SU_TR	1.95	0.00
tblVehicleTrips	SU_TR	8.62	0.00
tblVehicleTrips	WD_TR	1.89	0.00
tblVehicleTrips	WD_TR	1.29	0.00
tblVehicleTrips	WD_TR	2.40	0.00

tblVehicleTrips	WD_TR	9.52	0.00
tblWater	IndoorWaterUseRate	2,424,240.00	0.00
tblWater	IndoorWaterUseRate	6,580,556.59	0.00
tblWater	IndoorWaterUseRate	43,978,967.29	0.00
tblWater	OutdoorWaterUseRate	7,863,776.91	0.00
tblWater	OutdoorWaterUseRate	6,233,760.00	0.00
tblWater	OutdoorWaterUseRate	4,148,611.76	0.00
tblWater	OutdoorWaterUseRate	27,725,870.69	0.00
tblWoodstoves	NumberCatalytic	5.05	0.00
tblWoodstoves	NumberCatalytic	33.75	0.00
tblWoodstoves	NumberNoncatalytic	5.05	0.00
tblWoodstoves	NumberNoncatalytic	33.75	0.00
tblWoodstoves	WoodstoveDayYear	25.00	0.00
tblWoodstoves	WoodstoveDayYear	25.00	0.00
tblWoodstoves	WoodstoveWoodMass	999.60	0.00
tblWoodstoves	WoodstoveWoodMass	999.60	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.0780	0.8106	0.4948	9.7000e-004	0.0352	0.0388	0.0740	6.1000e-003	0.0361	0.0422	0.0000	87.8466	87.8466	0.0219	0.0000	88.3935
2020	0.6440	8.7712	4.7458	0.0145	1.2873	0.2866	1.5739	0.4884	0.2641	0.7525	0.0000	1,360.4609	1,360.4609	0.2902	0.0000	1,367.7170
2021	1.4912	8.9891	6.8110	0.0186	1.3175	0.3668	1.6844	0.3186	0.3392	0.6579	0.0000	1,700.7254	1,700.7254	0.2649	0.0000	1,707.3472
2022	2.0655	6.5305	7.3136	0.0265	1.6647	0.1656	1.8302	0.4474	0.1559	0.6033	0.0000	2,452.5093	2,452.5093	0.1910	0.0000	2,457.2842
2023	1.9521	5.0014	6.6955	0.0251	1.6618	0.1217	1.7835	0.4466	0.1149	0.5616	0.0000	2,330.9433	2,330.9433	0.1673	0.0000	2,335.1259
2024	1.9279	4.8368	6.4885	0.0248	1.6746	0.1086	1.7832	0.4501	0.1026	0.5526	0.0000	2,297.9870	2,297.9870	0.1650	0.0000	2,302.1126
2025	0.7871	1.9273	2.6053	0.0101	0.6967	0.0394	0.7361	0.1872	0.0372	0.2245	0.0000	935.9113	935.9113	0.0674	0.0000	937.5962
Maximum	**2.0655**	**8.9891**	**7.3136**	**0.0265**	**1.6746**	**0.3668**	**1.8302**	**0.4884**	**0.3392**	**0.7525**	**0.0000**	**2,452.5093**	**2,452.5093**	**0.2902**	**0.0000**	**2,457.2842**

2.1 Overall Construction

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.0780	0.8106	0.4948	9.7000e-004	0.0352	0.0388	0.0740	6.1000e-003	0.0361	0.0422	0.0000	87.8465	87.8465	0.0219	0.0000	88.3934
2020	0.6440	8.7711	4.7458	0.0145	1.2873	0.2866	1.5739	0.4884	0.2641	0.7525	0.0000	1,360.4601	1,360.4601	0.2902	0.0000	1,367.7162
2021	1.4912	8.9891	6.8110	0.0186	1.3175	0.3668	1.6844	0.3186	0.3392	0.6579	0.0000	1,700.7246	1,700.7246	0.2649	0.0000	1,707.3464
2022	2.0655	6.5305	7.3136	0.0265	1.6647	0.1656	1.8302	0.4474	0.1559	0.6033	0.0000	2,452.5088	2,452.5088	0.1910	0.0000	2,457.2837
2023	1.9521	5.0014	6.6955	0.0251	1.6618	0.1217	1.7835	0.4466	0.1149	0.5616	0.0000	2,330.9428	2,330.9428	0.1673	0.0000	2,335.1254
2024	1.9279	4.8368	6.4885	0.0248	1.6746	0.1086	1.7832	0.4501	0.1026	0.5526	0.0000	2,297.9866	2,297.9866	0.1650	0.0000	2,302.1121
2025	0.7871	1.9273	2.6053	0.0101	0.6967	0.0394	0.7361	0.1872	0.0372	0.2245	0.0000	935.9111	935.9111	0.0674	0.0000	937.5960
Maximum	**2.0655**	**8.9891**	**7.3136**	**0.0265**	**1.6746**	**0.3668**	**1.8302**	**0.4884**	**0.3392**	**0.7525**	**0.0000**	**2,452.5088**	**2,452.5088**	**0.2902**	**0.0000**	**2,457.2837**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**11-1-2019**	**1-31-2020**	1.3246	1.3246
2	**2-1-2020**	**4-30-2020**	2.3726	2.3726
3	**5-1-2020**	**7-31-2020**	2.4467	2.4467
4	**8-1-2020**	**10-31-2020**	2.4497	2.4497

5	**11-1-2020**	**1-31-2021**	2.3939	2.3939
6	**2-1-2021**	**4-30-2021**	1.6705	1.6705
7	**5-1-2021**	**7-31-2021**	1.9447	1.9447
8	**8-1-2021**	**10-31-2021**	3.6260	3.6260
9	**11-1-2021**	**1-31-2022**	3.5029	3.5029
10	**2-1-2022**	**4-30-2022**	2.0938	2.0938
11	**5-1-2022**	**7-31-2022**	2.0167	2.0167
12	**8-1-2022**	**10-31-2022**	2.0235	2.0235
13	**11-1-2022**	**1-31-2023**	1.9435	1.9435
14	**2-1-2023**	**4-30-2023**	1.6965	1.6965
15	**5-1-2023**	**7-31-2023**	1.7418	1.7418
16	**8-1-2023**	**10-31-2023**	1.7478	1.7478
17	**11-1-2023**	**1-31-2024**	1.7392	1.7392
18	**2-1-2024**	**4-30-2024**	1.6564	1.6564
19	**5-1-2024**	**7-31-2024**	1.6819	1.6819
20	**8-1-2024**	**10-31-2024**	1.6876	1.6876
21	**11-1-2024**	**1-31-2025**	1.6786	1.6786
22	**2-1-2025**	**4-30-2025**	1.5800	1.5800
23	**5-1-2025**	**7-31-2025**	0.5819	0.5819
		Highest	3.6260	3.6260

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	5.8196	0.0922	8.0081	4.2000e-004		0.0444	0.0444		0.0444	0.0444	0.0000	13.0976	13.0976	0.0126	0.0000	13.4122
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**5.8196**	**0.0922**	**8.0081**	**4.2000e-004**	**0.0000**	**0.0444**	**0.0444**	**0.0000**	**0.0444**	**0.0444**	**0.0000**	**13.0976**	**13.0976**	**0.0126**	**0.0000**	**13.4122**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	5.8196	0.0922	8.0081	4.2000e-004		0.0444	0.0444		0.0444	0.0444	0.0000	13.0976	13.0976	0.0126	0.0000	13.4122
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**5.8196**	**0.0922**	**8.0081**	**4.2000e-004**	**0.0000**	**0.0444**	**0.0444**	**0.0000**	**0.0444**	**0.0444**	**0.0000**	**13.0976**	**13.0976**	**0.0126**	**0.0000**	**13.4122**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Nakase (Construction - Unmitigated) - Orange County, Annual

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	11/1/2019	1/31/2020	5	66	
2	Grading	Grading	2/2/2020	2/11/2021	5	269	
3	Infrastructure	Trenching	2/12/2021	2/10/2022	5	260	
4	Paving	Paving	4/1/2021	7/30/2021	5	87	
5	Building Construction	Building Construction	8/1/2021	6/2/2025	5	1001	
6	Architectural Coating	Architectural Coating	8/1/2021	6/2/2025	5	1001	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 672.5

Acres of Paving: 19.8

Residential Indoor: 2,664,900; Residential Outdoor: 888,300; Non-Residential Indoor: 125,405; Non-Residential Outdoor: 41,802; Striped Parking Area: 51,749 (Architectural Coating – sqft)

OffRoad Equipment

Nakase (Construction - Unmitigated) - Orange County, Annual

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	158	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Grading	Excavators	2	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Infrastructure	Rubber Tired Dozers	3	8.00	247	0.40
Infrastructure	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Architectural Coating	Air Compressors	1	8.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	404.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	18,750.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Infrastructure	7	18.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	834.00	285.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	167.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0285	0.0000	0.0285	4.3200e-003	0.0000	4.3200e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0755	0.7693	0.4743	8.3000e-004		0.0386	0.0386		0.0359	0.0359	0.0000	74.4466	74.4466	0.0207	0.0000	74.9644
Total	**0.0755**	**0.7693**	**0.4743**	**8.3000e-004**	**0.0285**	**0.0386**	**0.0671**	**4.3200e-003**	**0.0359**	**0.0402**	**0.0000**	**74.4466**	**74.4466**	**0.0207**	**0.0000**	**74.9644**

3.2 Demolition - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.1100e-003	0.0403	9.5900e-003	1.0000e-004	3.1700e-003	1.5000e-004	3.3200e-003	8.4000e-004	1.4000e-004	9.9000e-004	0.0000	10.2343	10.2343	1.0900e-003	0.0000	10.2614
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3500e-003	9.8000e-004	0.0109	4.0000e-005	3.5400e-003	2.0000e-005	3.5600e-003	9.4000e-004	2.0000e-005	9.6000e-004	0.0000	3.1657	3.1657	8.0000e-005	0.0000	3.1677
Total	**2.4600e-003**	**0.0413**	**0.0205**	**1.4000e-004**	**6.7100e-003**	**1.7000e-004**	**6.8800e-003**	**1.7800e-003**	**1.6000e-004**	**1.9500e-003**	**0.0000**	**13.4000**	**13.4000**	**1.1700e-003**	**0.0000**	**13.4291**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0285	0.0000	0.0285	4.3200e-003	0.0000	4.3200e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0755	0.7693	0.4743	8.3000e-004		0.0386	0.0386		0.0359	0.0359	0.0000	74.4465	74.4465	0.0207	0.0000	74.9643
Total	**0.0755**	**0.7693**	**0.4743**	**8.3000e-004**	**0.0285**	**0.0386**	**0.0671**	**4.3200e-003**	**0.0359**	**0.0402**	**0.0000**	**74.4465**	**74.4465**	**0.0207**	**0.0000**	**74.9643**

3.2 Demolition - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.1100e-003	0.0403	9.5900e-003	1.0000e-004	3.1700e-003	1.5000e-004	3.3200e-003	8.4000e-004	1.4000e-004	9.9000e-004	0.0000	10.2343	10.2343	1.0900e-003	0.0000	10.2614
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3500e-003	9.8000e-004	0.0109	4.0000e-005	3.5400e-003	2.0000e-005	3.5600e-003	9.4000e-004	2.0000e-005	9.6000e-004	0.0000	3.1657	3.1657	8.0000e-005	0.0000	3.1677
Total	**2.4600e-003**	**0.0413**	**0.0205**	**1.4000e-004**	**6.7100e-003**	**1.7000e-004**	**6.8800e-003**	**1.7800e-003**	**1.6000e-004**	**1.9500e-003**	**0.0000**	**13.4000**	**13.4000**	**1.1700e-003**	**0.0000**	**13.4291**

3.2 Demolition - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0153	0.0000	0.0153	2.3100e-003	0.0000	2.3100e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0381	0.3818	0.2502	4.5000e-004		0.0191	0.0191		0.0177	0.0177	0.0000	39.0984	39.0984	0.0110	0.0000	39.3743
Total	**0.0381**	**0.3818**	**0.2502**	**4.5000e-004**	**0.0153**	**0.0191**	**0.0343**	**2.3100e-003**	**0.0177**	**0.0200**	**0.0000**	**39.0984**	**39.0984**	**0.0110**	**0.0000**	**39.3743**

3.2 Demolition - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.4000e-004	0.0200	5.0000e-003	5.0000e-005	2.9100e-003	6.0000e-005	2.9700e-003	7.5000e-004	6.0000e-005	8.1000e-004	0.0000	5.4131	5.4131	5.7000e-004	0.0000	5.4274
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.7000e-004	4.7000e-004	5.3500e-003	2.0000e-005	1.8900e-003	1.0000e-005	1.9100e-003	5.0000e-004	1.0000e-005	5.1000e-004	0.0000	1.6390	1.6390	4.0000e-005	0.0000	1.6400
Total	**1.2100e-003**	**0.0205**	**0.0104**	**7.0000e-005**	**4.8000e-003**	**7.0000e-005**	**4.8800e-003**	**1.2500e-003**	**7.0000e-005**	**1.3200e-003**	**0.0000**	**7.0521**	**7.0521**	**6.1000e-004**	**0.0000**	**7.0673**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0153	0.0000	0.0153	2.3100e-003	0.0000	2.3100e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0381	0.3818	0.2502	4.5000e-004		0.0191	0.0191		0.0177	0.0177	0.0000	39.0984	39.0984	0.0110	0.0000	39.3743
Total	**0.0381**	**0.3818**	**0.2502**	**4.5000e-004**	**0.0153**	**0.0191**	**0.0343**	**2.3100e-003**	**0.0177**	**0.0200**	**0.0000**	**39.0984**	**39.0984**	**0.0110**	**0.0000**	**39.3743**

3.2 Demolition - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.4000e-004	0.0200	5.0000e-003	5.0000e-005	2.9100e-003	6.0000e-005	2.9700e-003	7.5000e-004	6.0000e-005	8.1000e-004	0.0000	5.4131	5.4131	5.7000e-004	0.0000	5.4274
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.7000e-004	4.7000e-004	5.3500e-003	2.0000e-005	1.8900e-003	1.0000e-005	1.9100e-003	5.0000e-004	1.0000e-005	5.1000e-004	0.0000	1.6390	1.6390	4.0000e-005	0.0000	1.6400
Total	**1.2100e-003**	**0.0205**	**0.0104**	**7.0000e-005**	**4.8000e-003**	**7.0000e-005**	**4.8800e-003**	**1.2500e-003**	**7.0000e-005**	**1.3200e-003**	**0.0000**	**7.0521**	**7.0521**	**6.1000e-004**	**0.0000**	**7.0673**

3.3 Grading - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.0847	0.0000	1.0847	0.4354	0.0000	0.4354	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.5318	5.9986	3.8190	7.4100e-003		0.2598	0.2598		0.2390	0.2390	0.0000	651.0873	651.0873	0.2106	0.0000	656.3517
Total	**0.5318**	**5.9986**	**3.8190**	**7.4100e-003**	**1.0847**	**0.2598**	**1.3445**	**0.4354**	**0.2390**	**0.6744**	**0.0000**	**651.0873**	**651.0873**	**0.2106**	**0.0000**	**656.3517**

3.3 Grading - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0636	2.3638	0.5922	6.3300e-003	0.1563	7.4700e-003	0.1638	0.0425	7.1500e-003	0.0496	0.0000	640.5142	640.5142	0.0675	0.0000	642.2019
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.3200e-003	6.5300e-003	0.0741	2.5000e-004	0.0262	1.8000e-004	0.0264	6.9700e-003	1.6000e-004	7.1300e-003	0.0000	22.7088	22.7088	5.2000e-004	0.0000	22.7218
Total	**0.0729**	**2.3703**	**0.6663**	**6.5800e-003**	**0.1826**	**7.6500e-003**	**0.1902**	**0.0494**	**7.3100e-003**	**0.0568**	**0.0000**	**663.2230**	**663.2230**	**0.0680**	**0.0000**	**664.9237**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.0847	0.0000	1.0847	0.4354	0.0000	0.4354	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.5318	5.9986	3.8190	7.4100e-003		0.2598	0.2598		0.2390	0.2390	0.0000	651.0865	651.0865	0.2106	0.0000	656.3509
Total	**0.5318**	**5.9986**	**3.8190**	**7.4100e-003**	**1.0847**	**0.2598**	**1.3445**	**0.4354**	**0.2390**	**0.6744**	**0.0000**	**651.0865**	**651.0865**	**0.2106**	**0.0000**	**656.3509**

3.3 Grading - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0636	2.3638	0.5922	6.3300e-003	0.1563	7.4700e-003	0.1638	0.0425	7.1500e-003	0.0496	0.0000	640.5142	640.5142	0.0675	0.0000	642.2019
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.3200e-003	6.5300e-003	0.0741	2.5000e-004	0.0262	1.8000e-004	0.0264	6.9700e-003	1.6000e-004	7.1300e-003	0.0000	22.7088	22.7088	5.2000e-004	0.0000	22.7218
Total	**0.0729**	**2.3703**	**0.6663**	**6.5800e-003**	**0.1826**	**7.6500e-003**	**0.1902**	**0.0494**	**7.3100e-003**	**0.0568**	**0.0000**	**663.2230**	**663.2230**	**0.0680**	**0.0000**	**664.9237**

3.3 Grading - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.4554	0.0000	0.4554	0.0894	0.0000	0.0894	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0629	0.6960	0.4632	9.3000e-004		0.0298	0.0298		0.0274	0.0274	0.0000	81.7425	81.7425	0.0264	0.0000	82.4034
Total	**0.0629**	**0.6960**	**0.4632**	**9.3000e-004**	**0.4554**	**0.0298**	**0.4852**	**0.0894**	**0.0274**	**0.1168**	**0.0000**	**81.7425**	**81.7425**	**0.0264**	**0.0000**	**82.4034**

3.3 Grading - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	7.6100e-003	0.2741	0.0746	7.8000e-004	0.1258	8.4000e-004	0.1266	0.0314	8.1000e-004	0.0322	0.0000	79.4134	79.4134	8.3700e-003	0.0000	79.6226
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.1000e-003	7.4000e-004	8.6200e-003	3.0000e-005	3.2900e-003	2.0000e-005	3.3200e-003	8.7000e-004	2.0000e-005	8.9000e-004	0.0000	2.7516	2.7516	6.0000e-005	0.0000	2.7530
Total	**8.7100e-003**	**0.2748**	**0.0832**	**8.1000e-004**	**0.1291**	**8.6000e-004**	**0.1299**	**0.0323**	**8.3000e-004**	**0.0331**	**0.0000**	**82.1650**	**82.1650**	**8.4300e-003**	**0.0000**	**82.3756**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.4554	0.0000	0.4554	0.0894	0.0000	0.0894	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0629	0.6960	0.4632	9.3000e-004		0.0298	0.0298		0.0274	0.0274	0.0000	81.7424	81.7424	0.0264	0.0000	82.4033
Total	**0.0629**	**0.6960**	**0.4632**	**9.3000e-004**	**0.4554**	**0.0298**	**0.4852**	**0.0894**	**0.0274**	**0.1168**	**0.0000**	**81.7424**	**81.7424**	**0.0264**	**0.0000**	**82.4033**

3.3 Grading - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	7.6100e-003	0.2741	0.0746	7.8000e-004	0.1258	8.4000e-004	0.1266	0.0314	8.1000e-004	0.0322	0.0000	79.4134	79.4134	8.3700e-003	0.0000	79.6226
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.1000e-003	7.4000e-004	8.6200e-003	3.0000e-005	3.2900e-003	2.0000e-005	3.3200e-003	8.7000e-004	2.0000e-005	8.9000e-004	0.0000	2.7516	2.7516	6.0000e-005	0.0000	2.7530
Total	**8.7100e-003**	**0.2748**	**0.0832**	**8.1000e-004**	**0.1291**	**8.6000e-004**	**0.1299**	**0.0323**	**8.3000e-004**	**0.0331**	**0.0000**	**82.1650**	**82.1650**	**8.4300e-003**	**0.0000**	**82.3756**

3.4 Infrastructure - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.4491	4.6774	2.4433	4.3900e-003		0.2361	0.2361		0.2172	0.2172	0.0000	386.1825	386.1825	0.1249	0.0000	389.3050
Total	**0.4491**	**4.6774**	**2.4433**	**4.3900e-003**		**0.2361**	**0.2361**		**0.2172**	**0.2172**	**0.0000**	**386.1825**	**386.1825**	**0.1249**	**0.0000**	**389.3050**

3.4 Infrastructure - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.6200e-003	5.1200e-003	0.0597	2.1000e-004	0.0228	1.5000e-004	0.0230	6.0600e-003	1.4000e-004	6.2000e-003	0.0000	19.0684	19.0684	4.1000e-004	0.0000	19.0786
Total	**7.6200e-003**	**5.1200e-003**	**0.0597**	**2.1000e-004**	**0.0228**	**1.5000e-004**	**0.0230**	**6.0600e-003**	**1.4000e-004**	**6.2000e-003**	**0.0000**	**19.0684**	**19.0684**	**4.1000e-004**	**0.0000**	**19.0786**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.4491	4.6774	2.4433	4.3900e-003		0.2361	0.2361		0.2172	0.2172	0.0000	386.1821	386.1821	0.1249	0.0000	389.3046
Total	**0.4491**	**4.6774**	**2.4433**	**4.3900e-003**		**0.2361**	**0.2361**		**0.2172**	**0.2172**	**0.0000**	**386.1821**	**386.1821**	**0.1249**	**0.0000**	**389.3046**

3.4 Infrastructure - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.6200e-003	5.1200e-003	0.0597	2.1000e-004	0.0228	1.5000e-004	0.0230	6.0600e-003	1.4000e-004	6.2000e-003	0.0000	19.0684	19.0684	4.1000e-004	0.0000	19.0786
Total	**7.6200e-003**	**5.1200e-003**	**0.0597**	**2.1000e-004**	**0.0228**	**1.5000e-004**	**0.0230**	**6.0600e-003**	**1.4000e-004**	**6.2000e-003**	**0.0000**	**19.0684**	**19.0684**	**4.1000e-004**	**0.0000**	**19.0786**

3.4 Infrastructure - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0460	0.4797	0.2856	5.5000e-004		0.0234	0.0234		0.0215	0.0215	0.0000	48.4871	48.4871	0.0157	0.0000	48.8792
Total	**0.0460**	**0.4797**	**0.2856**	**5.5000e-004**		**0.0234**	**0.0234**		**0.0215**	**0.0215**	**0.0000**	**48.4871**	**48.4871**	**0.0157**	**0.0000**	**48.8792**

3.4 Infrastructure - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.0000e-004	5.8000e-004	6.9900e-003	3.0000e-005	2.8700e-003	2.0000e-005	2.8800e-003	7.6000e-004	2.0000e-005	7.8000e-004	0.0000	2.3052	2.3052	5.0000e-005	0.0000	2.3064
Total	**9.0000e-004**	**5.8000e-004**	**6.9900e-003**	**3.0000e-005**	**2.8700e-003**	**2.0000e-005**	**2.8800e-003**	**7.6000e-004**	**2.0000e-005**	**7.8000e-004**	**0.0000**	**2.3052**	**2.3052**	**5.0000e-005**	**0.0000**	**2.3064**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0460	0.4797	0.2856	5.5000e-004		0.0234	0.0234		0.0215	0.0215	0.0000	48.4871	48.4871	0.0157	0.0000	48.8791
Total	**0.0460**	**0.4797**	**0.2856**	**5.5000e-004**		**0.0234**	**0.0234**		**0.0215**	**0.0215**	**0.0000**	**48.4871**	**48.4871**	**0.0157**	**0.0000**	**48.8791**

3.4 Infrastructure - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.0000e-004	5.8000e-004	6.9900e-003	3.0000e-005	2.8700e-003	2.0000e-005	2.8800e-003	7.6000e-004	2.0000e-005	7.8000e-004	0.0000	2.3052	2.3052	5.0000e-005	0.0000	2.3064
Total	**9.0000e-004**	**5.8000e-004**	**6.9900e-003**	**3.0000e-005**	**2.8700e-003**	**2.0000e-005**	**2.8800e-003**	**7.6000e-004**	**2.0000e-005**	**7.8000e-004**	**0.0000**	**2.3052**	**2.3052**	**5.0000e-005**	**0.0000**	**2.3064**

3.5 Paving - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0546	0.5620	0.6374	9.9000e-004		0.0295	0.0295		0.0271	0.0271	0.0000	87.1021	87.1021	0.0282	0.0000	87.8064
Paving	0.0259					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0806**	**0.5620**	**0.6374**	**9.9000e-004**		**0.0295**	**0.0295**		**0.0271**	**0.0271**	**0.0000**	**87.1021**	**87.1021**	**0.0282**	**0.0000**	**87.8064**

3.5 Paving - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.3900e-003	1.6100e-003	0.0187	7.0000e-005	7.1600e-003	5.0000e-005	7.2100e-003	1.9000e-003	4.0000e-005	1.9500e-003	0.0000	5.9847	5.9847	1.3000e-004	0.0000	5.9879
Total	**2.3900e-003**	**1.6100e-003**	**0.0187**	**7.0000e-005**	**7.1600e-003**	**5.0000e-005**	**7.2100e-003**	**1.9000e-003**	**4.0000e-005**	**1.9500e-003**	**0.0000**	**5.9847**	**5.9847**	**1.3000e-004**	**0.0000**	**5.9879**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0546	0.5620	0.6374	9.9000e-004		0.0295	0.0295		0.0271	0.0271	0.0000	87.1020	87.1020	0.0282	0.0000	87.8063
Paving	0.0259					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0806**	**0.5620**	**0.6374**	**9.9000e-004**		**0.0295**	**0.0295**		**0.0271**	**0.0271**	**0.0000**	**87.1020**	**87.1020**	**0.0282**	**0.0000**	**87.8063**

3.5 Paving - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.3900e-003	1.6100e-003	0.0187	7.0000e-005	7.1600e-003	5.0000e-005	7.2100e-003	1.9000e-003	4.0000e-005	1.9500e-003	0.0000	5.9847	5.9847	1.3000e-004	0.0000	5.9879
Total	**2.3900e-003**	**1.6100e-003**	**0.0187**	**7.0000e-005**	**7.1600e-003**	**5.0000e-005**	**7.2100e-003**	**1.9000e-003**	**4.0000e-005**	**1.9500e-003**	**0.0000**	**5.9847**	**5.9847**	**1.3000e-004**	**0.0000**	**5.9879**

3.6 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1113	1.0312	0.9719	1.5800e-003		0.0564	0.0564		0.0529	0.0529	0.0000	136.5153	136.5153	0.0337	0.0000	137.3575
Total	**0.1113**	**1.0312**	**0.9719**	**1.5800e-003**		**0.0564**	**0.0564**		**0.0529**	**0.0529**	**0.0000**	**136.5153**	**136.5153**	**0.0337**	**0.0000**	**137.3575**

3.6 Building Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0427	1.4934	0.4186	3.8300e-003	0.0987	3.1000e-003	0.1018	0.0285	2.9700e-003	0.0314	0.0000	378.2824	378.2824	0.0306	0.0000	379.0479
Worker	0.1681	0.1130	1.3177	4.6500e-003	0.5036	3.3200e-003	0.5069	0.1337	3.0600e-003	0.1368	0.0000	420.7148	420.7148	9.0100e-003	0.0000	420.9401
Total	**0.2108**	**1.6064**	**1.7364**	**8.4800e-003**	**0.6022**	**6.4200e-003**	**0.6087**	**0.1622**	**6.0300e-003**	**0.1682**	**0.0000**	**798.9972**	**798.9972**	**0.0396**	**0.0000**	**799.9880**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1113	1.0312	0.9719	1.5800e-003		0.0564	0.0564		0.0529	0.0529	0.0000	136.5152	136.5152	0.0337	0.0000	137.3573
Total	**0.1113**	**1.0312**	**0.9719**	**1.5800e-003**		**0.0564**	**0.0564**		**0.0529**	**0.0529**	**0.0000**	**136.5152**	**136.5152**	**0.0337**	**0.0000**	**137.3573**

3.6 Building Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0427	1.4934	0.4186	3.8300e-003	0.0987	3.1000e-003	0.1018	0.0285	2.9700e-003	0.0314	0.0000	378.2824	378.2824	0.0306	0.0000	379.0479
Worker	0.1681	0.1130	1.3177	4.6500e-003	0.5036	3.3200e-003	0.5069	0.1337	3.0600e-003	0.1368	0.0000	420.7148	420.7148	9.0100e-003	0.0000	420.9401
Total	**0.2108**	**1.6064**	**1.7364**	**8.4800e-003**	**0.6022**	**6.4200e-003**	**0.6087**	**0.1622**	**6.0300e-003**	**0.1682**	**0.0000**	**798.9972**	**798.9972**	**0.0396**	**0.0000**	**799.9880**

3.6 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2359	2.1797	2.2671	3.7500e-003		0.1124	0.1124		0.1056	0.1056	0.0000	322.8033	322.8033	0.0791	0.0000	324.7819
Total	**0.2359**	**2.1797**	**2.2671**	**3.7500e-003**		**0.1124**	**0.1124**		**0.1056**	**0.1056**	**0.0000**	**322.8033**	**322.8033**	**0.0791**	**0.0000**	**324.7819**

3.6 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0950	3.3360	0.9546	8.9400e-003	0.2332	6.3800e-003	0.2396	0.0673	6.1000e-003	0.0734	0.0000	885.3057	885.3057	0.0701	0.0000	887.0568
Worker	0.3759	0.2419	2.9036	0.0106	1.1902	7.6900e-003	1.1979	0.3161	7.0800e-003	0.3232	0.0000	957.6016	957.6016	0.0193	0.0000	958.0848
Total	**0.4708**	**3.5779**	**3.8582**	**0.0195**	**1.4235**	**0.0141**	**1.4375**	**0.3833**	**0.0132**	**0.3965**	**0.0000**	**1,842.9073**	**1,842.9073**	**0.0894**	**0.0000**	**1,845.1416**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2359	2.1797	2.2671	3.7500e-003		0.1124	0.1124		0.1056	0.1056	0.0000	322.8029	322.8029	0.0791	0.0000	324.7815
Total	**0.2359**	**2.1797**	**2.2671**	**3.7500e-003**		**0.1124**	**0.1124**		**0.1056**	**0.1056**	**0.0000**	**322.8029**	**322.8029**	**0.0791**	**0.0000**	**324.7815**

3.6 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0950	3.3360	0.9546	8.9400e-003	0.2332	6.3800e-003	0.2396	0.0673	6.1000e-003	0.0734	0.0000	885.3057	885.3057	0.0701	0.0000	887.0568
Worker	0.3759	0.2419	2.9036	0.0106	1.1902	7.6900e-003	1.1979	0.3161	7.0800e-003	0.3232	0.0000	957.6016	957.6016	0.0193	0.0000	958.0848
Total	**0.4708**	**3.5779**	**3.8582**	**0.0195**	**1.4235**	**0.0141**	**1.4375**	**0.3833**	**0.0132**	**0.3965**	**0.0000**	**1,842.9073**	**1,842.9073**	**0.0894**	**0.0000**	**1,845.1416**

3.6 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2176	2.0069	2.2503	3.7500e-003		0.0973	0.0973		0.0914	0.0914	0.0000	322.9214	322.9214	0.0787	0.0000	324.8880
Total	**0.2176**	**2.0069**	**2.2503**	**3.7500e-003**		**0.0973**	**0.0973**		**0.0914**	**0.0914**	**0.0000**	**322.9214**	**322.9214**	**0.0787**	**0.0000**	**324.8880**

3.6 Building Construction - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0723	2.5050	0.8852	8.6500e-003	0.2332	3.0600e-003	0.2363	0.0673	2.9300e-003	0.0702	0.0000	858.5595	858.5595	0.0650	0.0000	860.1836
Worker	0.3564	0.2197	2.7045	0.0102	1.1902	7.5600e-003	1.1978	0.3161	6.9600e-003	0.3230	0.0000	920.8209	920.8209	0.0175	0.0000	921.2589
Total	**0.4287**	**2.7246**	**3.5897**	**0.0188**	**1.4235**	**0.0106**	**1.4341**	**0.3833**	**9.8900e-003**	**0.3932**	**0.0000**	**1,779.3804**	**1,779.3804**	**0.0825**	**0.0000**	**1,781.4425**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2176	2.0069	2.2503	3.7500e-003		0.0973	0.0973		0.0914	0.0914	0.0000	322.9211	322.9211	0.0787	0.0000	324.8876
Total	**0.2176**	**2.0069**	**2.2503**	**3.7500e-003**		**0.0973**	**0.0973**		**0.0914**	**0.0914**	**0.0000**	**322.9211**	**322.9211**	**0.0787**	**0.0000**	**324.8876**

3.6 Building Construction - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0723	2.5050	0.8852	8.6500e-003	0.2332	3.0600e-003	0.2363	0.0673	2.9300e-003	0.0702	0.0000	858.5595	858.5595	0.0650	0.0000	860.1836
Worker	0.3564	0.2197	2.7045	0.0102	1.1902	7.5600e-003	1.1978	0.3161	6.9600e-003	0.3230	0.0000	920.8209	920.8209	0.0175	0.0000	921.2589
Total	**0.4287**	**2.7246**	**3.5897**	**0.0188**	**1.4235**	**0.0106**	**1.4341**	**0.3833**	**9.8900e-003**	**0.3932**	**0.0000**	**1,779.3804**	**1,779.3804**	**0.0825**	**0.0000**	**1,781.4425**

3.6 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2053	1.8897	2.2567	3.7800e-003		0.0860	0.0860		0.0808	0.0808	0.0000	325.4719	325.4719	0.0789	0.0000	327.4433
Total	**0.2053**	**1.8897**	**2.2567**	**3.7800e-003**		**0.0860**	**0.0860**		**0.0808**	**0.0808**	**0.0000**	**325.4719**	**325.4719**	**0.0789**	**0.0000**	**327.4433**

3.6 Building Construction - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0704	2.4924	0.8731	8.6400e-003	0.2350	3.0200e-003	0.2380	0.0678	2.8800e-003	0.0707	0.0000	858.3353	858.3353	0.0644	0.0000	859.9461
Worker	0.3418	0.2016	2.5349	9.8400e-003	1.1994	7.4900e-003	1.2069	0.3185	6.8900e-003	0.3254	0.0000	891.1411	891.1411	0.0160	0.0000	891.5415
Total	**0.4122**	**2.6939**	**3.4080**	**0.0185**	**1.4344**	**0.0105**	**1.4449**	**0.3863**	**9.7700e-003**	**0.3961**	**0.0000**	**1,749.4764**	**1,749.4764**	**0.0805**	**0.0000**	**1,751.4876**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2053	1.8897	2.2567	3.7800e-003		0.0860	0.0860		0.0808	0.0808	0.0000	325.4715	325.4715	0.0789	0.0000	327.4429
Total	**0.2053**	**1.8897**	**2.2567**	**3.7800e-003**		**0.0860**	**0.0860**		**0.0808**	**0.0808**	**0.0000**	**325.4715**	**325.4715**	**0.0789**	**0.0000**	**327.4429**

3.6 Building Construction - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0704	2.4924	0.8731	8.6400e-003	0.2350	3.0200e-003	0.2380	0.0678	2.8800e-003	0.0707	0.0000	858.3353	858.3353	0.0644	0.0000	859.9461
Worker	0.3418	0.2016	2.5349	9.8400e-003	1.1994	7.4900e-003	1.2069	0.3185	6.8900e-003	0.3254	0.0000	891.1411	891.1411	0.0160	0.0000	891.5415
Total	**0.4122**	**2.6939**	**3.4080**	**0.0185**	**1.4344**	**0.0105**	**1.4449**	**0.3863**	**9.7700e-003**	**0.3961**	**0.0000**	**1,749.4764**	**1,749.4764**	**0.0805**	**0.0000**	**1,751.4876**

3.6 Building Construction - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0794	0.7285	0.9340	1.5700e-003		0.0308	0.0308		0.0289	0.0289	0.0000	135.4501	135.4501	0.0326	0.0000	136.2661
Total	**0.0794**	**0.7285**	**0.9340**	**1.5700e-003**		**0.0308**	**0.0308**		**0.0289**	**0.0289**	**0.0000**	**135.4501**	**135.4501**	**0.0326**	**0.0000**	**136.2661**

3.6 Building Construction - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0285	1.0233	0.3588	3.5700e-003	0.0978	1.2300e-003	0.0990	0.0282	1.1700e-003	0.0294	0.0000	354.9058	354.9058	0.0264	0.0000	355.5666
Worker	0.1360	0.0769	0.9840	3.9300e-003	0.4990	3.0800e-003	0.5021	0.1325	2.8300e-003	0.1353	0.0000	355.7638	355.7638	6.0900e-003	0.0000	355.9161
Total	**0.1646**	**1.1002**	**1.3428**	**7.5000e-003**	**0.5968**	**4.3100e-003**	**0.6011**	**0.1607**	**4.0000e-003**	**0.1647**	**0.0000**	**710.6695**	**710.6695**	**0.0325**	**0.0000**	**711.4827**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0794	0.7285	0.9340	1.5700e-003		0.0308	0.0308		0.0289	0.0289	0.0000	135.4499	135.4499	0.0326	0.0000	136.2659
Total	**0.0794**	**0.7285**	**0.9340**	**1.5700e-003**		**0.0308**	**0.0308**		**0.0289**	**0.0289**	**0.0000**	**135.4499**	**135.4499**	**0.0326**	**0.0000**	**136.2659**

3.6 Building Construction - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0285	1.0233	0.3588	3.5700e-003	0.0978	1.2300e-003	0.0990	0.0282	1.1700e-003	0.0294	0.0000	354.9058	354.9058	0.0264	0.0000	355.5666
Worker	0.1360	0.0769	0.9840	3.9300e-003	0.4990	3.0800e-003	0.5021	0.1325	2.8300e-003	0.1353	0.0000	355.7638	355.7638	6.0900e-003	0.0000	355.9161
Total	**0.1646**	**1.1002**	**1.3428**	**7.5000e-003**	**0.5968**	**4.3100e-003**	**0.6011**	**0.1607**	**4.0000e-003**	**0.1647**	**0.0000**	**710.6695**	**710.6695**	**0.0325**	**0.0000**	**711.4827**

3.7 Architectural Coating - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.5082					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0161	0.1120	0.1333	2.2000e-004		6.9000e-003	6.9000e-003		6.9000e-003	6.9000e-003	0.0000	18.7239	18.7239	1.2800e-003	0.0000	18.7560
Total	**0.5243**	**0.1120**	**0.1333**	**2.2000e-004**		**6.9000e-003**	**6.9000e-003**		**6.9000e-003**	**6.9000e-003**	**0.0000**	**18.7239**	**18.7239**	**1.2800e-003**	**0.0000**	**18.7560**

3.7 Architectural Coating - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0337	0.0226	0.2639	9.3000e-004	0.1008	6.6000e-004	0.1015	0.0268	6.1000e-004	0.0274	0.0000	84.2439	84.2439	1.8000e-003	0.0000	84.2890
Total	**0.0337**	**0.0226**	**0.2639**	**9.3000e-004**	**0.1008**	**6.6000e-004**	**0.1015**	**0.0268**	**6.1000e-004**	**0.0274**	**0.0000**	**84.2439**	**84.2439**	**1.8000e-003**	**0.0000**	**84.2890**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.5082					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0161	0.1120	0.1333	2.2000e-004		6.9000e-003	6.9000e-003		6.9000e-003	6.9000e-003	0.0000	18.7238	18.7238	1.2800e-003	0.0000	18.7560
Total	**0.5243**	**0.1120**	**0.1333**	**2.2000e-004**		**6.9000e-003**	**6.9000e-003**		**6.9000e-003**	**6.9000e-003**	**0.0000**	**18.7238**	**18.7238**	**1.2800e-003**	**0.0000**	**18.7560**

3.7 Architectural Coating - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0337	0.0226	0.2639	9.3000e-004	0.1008	6.6000e-004	0.1015	0.0268	6.1000e-004	0.0274	0.0000	84.2439	84.2439	1.8000e-003	0.0000	84.2890
Total	**0.0337**	**0.0226**	**0.2639**	**9.3000e-004**	**0.1008**	**6.6000e-004**	**0.1015**	**0.0268**	**6.1000e-004**	**0.0274**	**0.0000**	**84.2439**	**84.2439**	**1.8000e-003**	**0.0000**	**84.2890**

3.7 Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.2012					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0355	0.2441	0.3144	5.2000e-004		0.0142	0.0142		0.0142	0.0142	0.0000	44.2564	44.2564	2.8800e-003	0.0000	44.3284
Total	**1.2367**	**0.2441**	**0.3144**	**5.2000e-004**		**0.0142**	**0.0142**		**0.0142**	**0.0142**	**0.0000**	**44.2564**	**44.2564**	**2.8800e-003**	**0.0000**	**44.3284**

3.7 Architectural Coating - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0753	0.0485	0.5814	2.1200e-003	0.2383	1.5400e-003	0.2399	0.0633	1.4200e-003	0.0647	0.0000	191.7500	191.7500	3.8700e-003	0.0000	191.8467
Total	**0.0753**	**0.0485**	**0.5814**	**2.1200e-003**	**0.2383**	**1.5400e-003**	**0.2399**	**0.0633**	**1.4200e-003**	**0.0647**	**0.0000**	**191.7500**	**191.7500**	**3.8700e-003**	**0.0000**	**191.8467**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.2012					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0355	0.2441	0.3144	5.2000e-004		0.0142	0.0142		0.0142	0.0142	0.0000	44.2564	44.2564	2.8800e-003	0.0000	44.3284
Total	**1.2367**	**0.2441**	**0.3144**	**5.2000e-004**		**0.0142**	**0.0142**		**0.0142**	**0.0142**	**0.0000**	**44.2564**	**44.2564**	**2.8800e-003**	**0.0000**	**44.3284**

3.7 Architectural Coating - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0753	0.0485	0.5814	2.1200e-003	0.2383	1.5400e-003	0.2399	0.0633	1.4200e-003	0.0647	0.0000	191.7500	191.7500	3.8700e-003	0.0000	191.8467
Total	**0.0753**	**0.0485**	**0.5814**	**2.1200e-003**	**0.2383**	**1.5400e-003**	**0.2399**	**0.0633**	**1.4200e-003**	**0.0647**	**0.0000**	**191.7500**	**191.7500**	**3.8700e-003**	**0.0000**	**191.8467**

3.7 Architectural Coating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.2012					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0332	0.2259	0.3139	5.2000e-004		0.0123	0.0123		0.0123	0.0123	0.0000	44.2564	44.2564	2.6500e-003	0.0000	44.3226
Total	**1.2344**	**0.2259**	**0.3139**	**5.2000e-004**		**0.0123**	**0.0123**		**0.0123**	**0.0123**	**0.0000**	**44.2564**	**44.2564**	**2.6500e-003**	**0.0000**	**44.3226**

3.7 Architectural Coating - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0714	0.0440	0.5416	2.0400e-003	0.2383	1.5100e-003	0.2399	0.0633	1.3900e-003	0.0647	0.0000	184.3850	184.3850	3.5100e-003	0.0000	184.4727
Total	**0.0714**	**0.0440**	**0.5416**	**2.0400e-003**	**0.2383**	**1.5100e-003**	**0.2399**	**0.0633**	**1.3900e-003**	**0.0647**	**0.0000**	**184.3850**	**184.3850**	**3.5100e-003**	**0.0000**	**184.4727**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.2012					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0332	0.2259	0.3139	5.2000e-004		0.0123	0.0123		0.0123	0.0123	0.0000	44.2564	44.2564	2.6500e-003	0.0000	44.3225
Total	**1.2344**	**0.2259**	**0.3139**	**5.2000e-004**		**0.0123**	**0.0123**		**0.0123**	**0.0123**	**0.0000**	**44.2564**	**44.2564**	**2.6500e-003**	**0.0000**	**44.3225**

3.7 Architectural Coating - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0714	0.0440	0.5416	2.0400e-003	0.2383	1.5100e-003	0.2399	0.0633	1.3900e-003	0.0647	0.0000	184.3850	184.3850	3.5100e-003	0.0000	184.4727
Total	**0.0714**	**0.0440**	**0.5416**	**2.0400e-003**	**0.2383**	**1.5100e-003**	**0.2399**	**0.0633**	**1.3900e-003**	**0.0647**	**0.0000**	**184.3850**	**184.3850**	**3.5100e-003**	**0.0000**	**184.4727**

3.7 Architectural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.2105					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0316	0.2129	0.3162	5.2000e-004		0.0106	0.0106		0.0106	0.0106	0.0000	44.5968	44.5968	2.5100e-003	0.0000	44.6596
Total	**1.2420**	**0.2129**	**0.3162**	**5.2000e-004**		**0.0106**	**0.0106**		**0.0106**	**0.0106**	**0.0000**	**44.5968**	**44.5968**	**2.5100e-003**	**0.0000**	**44.6596**

3.7 Architectural Coating - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0684	0.0404	0.5076	1.9700e-003	0.2402	1.5000e-003	0.2417	0.0638	1.3800e-003	0.0652	0.0000	178.4419	178.4419	3.2100e-003	0.0000	178.5221
Total	**0.0684**	**0.0404**	**0.5076**	**1.9700e-003**	**0.2402**	**1.5000e-003**	**0.2417**	**0.0638**	**1.3800e-003**	**0.0652**	**0.0000**	**178.4419**	**178.4419**	**3.2100e-003**	**0.0000**	**178.5221**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.2105					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0316	0.2129	0.3162	5.2000e-004		0.0106	0.0106		0.0106	0.0106	0.0000	44.5968	44.5968	2.5100e-003	0.0000	44.6596
Total	**1.2420**	**0.2129**	**0.3162**	**5.2000e-004**		**0.0106**	**0.0106**		**0.0106**	**0.0106**	**0.0000**	**44.5968**	**44.5968**	**2.5100e-003**	**0.0000**	**44.6596**

3.7 Architectural Coating - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0684	0.0404	0.5076	1.9700e-003	0.2402	1.5000e-003	0.2417	0.0638	1.3800e-003	0.0652	0.0000	178.4419	178.4419	3.2100e-003	0.0000	178.5221
Total	**0.0684**	**0.0404**	**0.5076**	**1.9700e-003**	**0.2402**	**1.5000e-003**	**0.2417**	**0.0638**	**1.3800e-003**	**0.0652**	**0.0000**	**178.4419**	**178.4419**	**3.2100e-003**	**0.0000**	**178.5221**

3.7 Architectural Coating - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.5036					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0124	0.0832	0.1315	2.2000e-004		3.7400e-003	3.7400e-003		3.7400e-003	3.7400e-003	0.0000	18.5536	18.5536	1.0100e-003	0.0000	18.5790
Total	**0.5160**	**0.0832**	**0.1315**	**2.2000e-004**		**3.7400e-003**	**3.7400e-003**		**3.7400e-003**	**3.7400e-003**	**0.0000**	**18.5536**	**18.5536**	**1.0100e-003**	**0.0000**	**18.5790**

3.7 Architectural Coating - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0272	0.0154	0.1970	7.9000e-004	0.0999	6.2000e-004	0.1005	0.0265	5.7000e-004	0.0271	0.0000	71.2381	71.2381	1.2200e-003	0.0000	71.2686
Total	**0.0272**	**0.0154**	**0.1970**	**7.9000e-004**	**0.0999**	**6.2000e-004**	**0.1005**	**0.0265**	**5.7000e-004**	**0.0271**	**0.0000**	**71.2381**	**71.2381**	**1.2200e-003**	**0.0000**	**71.2686**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.5036					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0124	0.0832	0.1315	2.2000e-004		3.7400e-003	3.7400e-003		3.7400e-003	3.7400e-003	0.0000	18.5536	18.5536	1.0100e-003	0.0000	18.5789
Total	**0.5160**	**0.0832**	**0.1315**	**2.2000e-004**		**3.7400e-003**	**3.7400e-003**		**3.7400e-003**	**3.7400e-003**	**0.0000**	**18.5536**	**18.5536**	**1.0100e-003**	**0.0000**	**18.5789**

3.7 Architectural Coating - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0272	0.0154	0.1970	7.9000e-004	0.0999	6.2000e-004	0.1005	0.0265	5.7000e-004	0.0271	0.0000	71.2381	71.2381	1.2200e-003	0.0000	71.2686
Total	**0.0272**	**0.0154**	**0.1970**	**7.9000e-004**	**0.0999**	**6.2000e-004**	**0.1005**	**0.0265**	**5.7000e-004**	**0.0271**	**0.0000**	**71.2381**	**71.2381**	**1.2200e-003**	**0.0000**	**71.2686**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	0.00	0.00	0.00		
Elementary School	0.00	0.00	0.00		
Other Asphalt Surfaces	0.00	0.00	0.00		
Retirement Community	0.00	0.00	0.00		
Single Family Housing	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0
Elementary School	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0
Retirement Community	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0
Single Family Housing	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854
Elementary School	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854
Other Asphalt Surfaces	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854
Retirement Community	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854
Single Family Housing	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Elementary School	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Retirement Community	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Elementary School	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Retirement Community	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Elementary School	0	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Retirement Community	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Elementary School	0	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Retirement Community	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	5.8196	0.0922	8.0081	4.2000e-004		0.0444	0.0444		0.0444	0.0444	0.0000	13.0976	13.0976	0.0126	0.0000	13.4122
Unmitigated	5.8196	0.0922	8.0081	4.2000e-004		0.0444	0.0444		0.0444	0.0444	0.0000	13.0976	13.0976	0.0126	0.0000	13.4122

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.4625					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	5.1159					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.2413	0.0922	8.0081	4.2000e-004		0.0444	0.0444		0.0444	0.0444	0.0000	13.0976	13.0976	0.0126	0.0000	13.4122
Total	**5.8196**	**0.0922**	**8.0081**	**4.2000e-004**		**0.0444**	**0.0444**		**0.0444**	**0.0444**	**0.0000**	**13.0976**	**13.0976**	**0.0126**	**0.0000**	**13.4122**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.4625					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	5.1159					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.2413	0.0922	8.0081	4.2000e-004		0.0444	0.0444		0.0444	0.0444	0.0000	13.0976	13.0976	0.0126	0.0000	13.4122
Total	**5.8196**	**0.0922**	**8.0081**	**4.2000e-004**		**0.0444**	**0.0444**		**0.0444**	**0.0444**	**0.0000**	**13.0976**	**13.0976**	**0.0126**	**0.0000**	**13.4122**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 0	0.0000	0.0000	0.0000	0.0000
Elementary School	0 / 0	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Retirement Community	0 / 0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 0	0.0000	0.0000	0.0000	0.0000
Elementary School	0 / 0	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Retirement Community	0 / 0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Elementary School	0	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Retirement Community	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Elementary School	0	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Retirement Community	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

This page intentionally left blank

APPENDIX 3.2:

CALEEMOD OPERATIONAL (OTHER USES - WITH PROJECT DESIGN FEATURES) ANNUAL EMISSIONS MODEL OUTPUTS

Nakase Other Uses (Operations - w/ Regulatory Measures, PDFs, & MMs)

Orange County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Elementary School	1,000.00	Student	12.60	83,603.37	0
Other Asphalt Surfaces	19.80	Acre	19.80	862,488.00	0
City Park	6.60	Acre	6.60	287,496.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2025
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	430	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CO2 intensity factor represents CO2e intensity factor. The projected 2025 RPS target is derived based on a linear trajectory to reach the 50% project RPS consistent with SB 32 and SB 350.

Land Use - Total Lot Area is 121.8 acres. In order to be consistent with the TIA, 6.6 acres of Park will be analyzed, the remaining 17.5 acres of Open Space will not be analyzed.

Construction Phase - Operations Run Only.

Off-road Equipment - Operations Run Only.

Trips and VMT - Operations Run Only.

Vehicle Trips - Trip Rates based on information provided in the TIA and ITE 10th Edition (2017).

Energy Use -

Mobile Land Use Mitigation -

Water Mitigation -

Energy Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	50.00	1.00
tblLandUse	LotAcreage	1.92	12.60
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	702.44	430
tblVehicleTrips	ST_TR	22.75	23.33
tblVehicleTrips	ST_TR	0.00	1.89
tblVehicleTrips	SU_TR	16.74	23.33
tblVehicleTrips	SU_TR	0.00	1.89
tblVehicleTrips	WD_TR	1.89	23.33
tblVehicleTrips	WD_TR	1.29	1.89

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Nakase Other Uses (Operations - w/ Regulatory Measures, PDFs, & MMs) - Orange County, Annual

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
		Highest		

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.4125	1.2000e-004	0.0131	0.0000		5.0000e-005	5.0000e-005		5.0000e-005	5.0000e-005	0.0000	0.0255	0.0255	7.0000e-005	0.0000	0.0271
Energy	5.3400e-003	0.0485	0.0408	2.9000e-004		3.6900e-003	3.6900e-003		3.6900e-003	3.6900e-003	0.0000	151.9658	151.9658	7.7000e-003	2.3500e-003	152.8591
Mobile	0.4383	1.7257	6.0428	0.0257	2.6386	0.0183	2.6569	0.7066	0.0169	0.7235	0.0000	2,372.1363	2,372.1363	0.0919	0.0000	2,374.4328
Waste						0.0000	0.0000		0.0000	0.0000	37.1616	0.0000	37.1616	2.1962	0.0000	92.0662
Water						0.0000	0.0000		0.0000	0.0000	0.7691	36.7054	37.4745	0.0815	2.3800e-003	40.2197
Total	**0.8561**	**1.7743**	**6.0966**	**0.0260**	**2.6386**	**0.0220**	**2.6606**	**0.7066**	**0.0207**	**0.7273**	**37.9307**	**2,560.8330**	**2,598.7637**	**2.3773**	**4.7300e-003**	**2,659.6049**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.4125	1.2000e-004	0.0131	0.0000		5.0000e-005	5.0000e-005		5.0000e-005	5.0000e-005	0.0000	0.0255	0.0255	7.0000e-005	0.0000	0.0271
Energy	3.8800e-003	0.0352	0.0296	2.1000e-004		2.6800e-003	2.6800e-003		2.6800e-003	2.6800e-003	0.0000	128.2518	128.2518	6.8000e-003	1.9600e-003	129.0051
Mobile	0.4109	1.5926	5.3180	0.0221	2.2560	0.0159	2.2719	0.6041	0.0147	0.6189	0.0000	2,042.3775	2,042.3775	0.0803	0.0000	2,044.3837
Waste						0.0000	0.0000		0.0000	0.0000	37.1616	0.0000	37.1616	2.1962	0.0000	92.0662
Water						0.0000	0.0000		0.0000	0.0000	0.6153	29.3643	29.9796	0.0652	1.9000e-003	32.1758
Total	**0.8273**	**1.6280**	**5.3607**	**0.0223**	**2.2560**	**0.0186**	**2.2746**	**0.6041**	**0.0175**	**0.6216**	**37.7768**	**2,200.0191**	**2,237.7959**	**2.3485**	**3.8600e-003**	**2,297.6578**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**3.36**	**8.25**	**12.07**	**14.07**	**14.50**	**15.33**	**14.51**	**14.50**	**15.49**	**14.53**	**0.41**	**14.09**	**13.89**	**1.21**	**18.39**	**13.61**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	11/1/2019	11/1/2019	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 19.8

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Excavators	0	8.00	158	0.38
Demolition	Rubber Tired Dozers	0	8.00	247	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Demolition - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Diversity

Integrate Below Market Rate Housing

Improve Pedestrian Network

Provide Traffic Calming Measures

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.4109	1.5926	5.3180	0.0221	2.2560	0.0159	2.2719	0.6041	0.0147	0.6189	0.0000	2,042.3775	2,042.3775	0.0803	0.0000	2,044.3837
Unmitigated	0.4383	1.7257	6.0428	0.0257	2.6386	0.0183	2.6569	0.7066	0.0169	0.7235	0.0000	2,372.1363	2,372.1363	0.0919	0.0000	2,374.4328

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	153.98	153.98	153.98	443,078	378,832
Elementary School	1,890.00	1,890.00	1890.00	6,513,665	5,569,184
Other Asphalt Surfaces	0.00	0.00	0.00		
Total	2,043.98	2,043.98	2,043.98	6,956,743	5,948,016

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	16.60	8.40	6.90	33.00	48.00	19.00	66	28	6
Elementary School	16.60	8.40	6.90	65.00	30.00	5.00	63	25	12
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854
Elementary School	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854
Other Asphalt Surfaces	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Exceed Title 24

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	89.8972	89.8972	6.0600e-003	1.2500e-003	90.4225
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	99.1429	99.1429	6.6900e-003	1.3800e-003	99.7223
NaturalGas Mitigated	3.8800e-003	0.0352	0.0296	2.1000e-004		2.6800e-003	2.6800e-003		2.6800e-003	2.6800e-003	0.0000	38.3546	38.3546	7.4000e-004	7.0000e-004	38.5825
NaturalGas Unmitigated	5.3400e-003	0.0485	0.0408	2.9000e-004		3.6900e-003	3.6900e-003		3.6900e-003	3.6900e-003	0.0000	52.8229	52.8229	1.0100e-003	9.7000e-004	53.1368

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Elementary School	989864	5.3400e-003	0.0485	0.0408	2.9000e-004		3.6900e-003	3.6900e-003		3.6900e-003	3.6900e-003	0.0000	52.8229	52.8229	1.0100e-003	9.7000e-004	53.1368
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**5.3400e-003**	**0.0485**	**0.0408**	**2.9000e-004**		**3.6900e-003**	**3.6900e-003**		**3.6900e-003**	**3.6900e-003**	**0.0000**	**52.8229**	**52.8229**	**1.0100e-003**	**9.7000e-004**	**53.1368**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Elementary School	718738	3.8800e-003	0.0352	0.0296	2.1000e-004		2.6800e-003	2.6800e-003		2.6800e-003	2.6800e-003	0.0000	38.3546	38.3546	7.4000e-004	7.0000e-004	38.5825
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**3.8800e-003**	**0.0352**	**0.0296**	**2.1000e-004**		**2.6800e-003**	**2.6800e-003**		**2.6800e-003**	**2.6800e-003**	**0.0000**	**38.3546**	**38.3546**	**7.4000e-004**	**7.0000e-004**	**38.5825**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Elementary School	508308	99.1429	6.6900e-003	1.3800e-003	99.7223
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**99.1429**	**6.6900e-003**	**1.3800e-003**	**99.7223**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Elementary School	460905	89.8972	6.0600e-003	1.2500e-003	90.4225
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**89.8972**	**6.0600e-003**	**1.2500e-003**	**90.4225**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.4125	1.2000e-004	0.0131	0.0000		5.0000e-005	5.0000e-005		5.0000e-005	5.0000e-005	0.0000	0.0255	0.0255	7.0000e-005	0.0000	0.0271
Unmitigated	0.4125	1.2000e-004	0.0131	0.0000		5.0000e-005	5.0000e-005		5.0000e-005	5.0000e-005	0.0000	0.0255	0.0255	7.0000e-005	0.0000	0.0271

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0507					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.3606					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.2000e-003	1.2000e-004	0.0131	0.0000		5.0000e-005	5.0000e-005		5.0000e-005	5.0000e-005	0.0000	0.0255	0.0255	7.0000e-005	0.0000	0.0271
Total	**0.4125**	**1.2000e-004**	**0.0131**	**0.0000**		**5.0000e-005**	**5.0000e-005**		**5.0000e-005**	**5.0000e-005**	**0.0000**	**0.0255**	**0.0255**	**7.0000e-005**	**0.0000**	**0.0271**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0507					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.3606					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.2000e-003	1.2000e-004	0.0131	0.0000		5.0000e-005	5.0000e-005		5.0000e-005	5.0000e-005	0.0000	0.0255	0.0255	7.0000e-005	0.0000	0.0271
Total	**0.4125**	**1.2000e-004**	**0.0131**	**0.0000**		**5.0000e-005**	**5.0000e-005**		**5.0000e-005**	**5.0000e-005**	**0.0000**	**0.0255**	**0.0255**	**7.0000e-005**	**0.0000**	**0.0271**

7.0 Water Detail

7.1 Mitigation Measures Water

Apply Water Conservation Strategy

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	29.9796	0.0652	1.9000e-003	32.1758
Unmitigated	37.4745	0.0815	2.3800e-003	40.2197

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 7.86378	17.0404	1.1500e-003	2.4000e-004	17.1400
Elementary School	2.42424 / 6.23376	20.4341	0.0803	2.1400e-003	23.0797
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**37.4745**	**0.0815**	**2.3800e-003**	**40.2197**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 6.29102	13.6323	9.2000e-004	1.9000e-004	13.7120
Elementary School	1.93939 / 4.98701	16.3473	0.0643	1.7100e-003	18.4638
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**29.9796**	**0.0652**	**1.9000e-003**	**32.1758**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	37.1616	2.1962	0.0000	92.0662
Unmitigated	37.1616	2.1962	0.0000	92.0662

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	0.57	0.1157	6.8400e-003	0.0000	0.2867
Elementary School	182.5	37.0459	2.1894	0.0000	91.7795
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**37.1616**	**2.1962**	**0.0000**	**92.0662**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	0.57	0.1157	6.8400e-003	0.0000	0.2867
Elementary School	182.5	37.0459	2.1894	0.0000	91.7795
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**37.1616**	**2.1962**	**0.0000**	**92.0662**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Nakase Other Uses (2030 Operations - w/ Regulatory Regulations, PDFs, & MMs)

Orange County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Elementary School	1,000.00	Student	12.60	83,603.37	0
Other Asphalt Surfaces	19.80	Acre	19.80	862,488.00	0
City Park	6.60	Acre	6.60	287,496.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2030
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	367.5	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CO2 intensity factor represents CO2e intensity factor. Intensity factor presented here is 50% projected RPS for 2030 consistent with SB 32 and SB 350

Land Use - Total Lot Area is 121.8 acres. In order to be consistent with the TIA, 6.6 acres of Park will be analyzed, the remaining 17.5 acres of Open Space will not be analyzed.

Construction Phase - Operations Run Only.

Off-road Equipment - Operations Run Only.

Trips and VMT - Operations Run Only.

Vehicle Trips - Trip Rates based on information provided in the TIA and ITE 10th Edition (2017)

Mobile Land Use Mitigation -

Energy Mitigation -

Water Mitigation -

Energy Use -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	50.00	1.00
tblLandUse	LotAcreage	1.92	12.60
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	702.44	367.5
tblVehicleTrips	ST_TR	22.75	23.33
tblVehicleTrips	ST_TR	0.00	1.89
tblVehicleTrips	SU_TR	16.74	23.33
tblVehicleTrips	SU_TR	0.00	1.89
tblVehicleTrips	WD_TR	1.89	23.33
tblVehicleTrips	WD_TR	1.29	1.89

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
		Highest		

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.4125	1.2000e-004	0.0130	0.0000		5.0000e-005	5.0000e-005		5.0000e-005	5.0000e-005	0.0000	0.0255	0.0255	7.0000e-005	0.0000	0.0271
Energy	5.3400e-003	0.0485	0.0408	2.9000e-004		3.6900e-003	3.6900e-003		3.6900e-003	3.6900e-003	0.0000	137.5555	137.5555	7.7000e-003	2.3500e-003	138.4488
Mobile	0.3577	1.5194	4.8511	0.0228	2.6389	0.0138	2.6527	0.7067	0.0128	0.7195	0.0000	2,115.5747	2,115.5747	0.0792	0.0000	2,117.5540
Waste						0.0000	0.0000		0.0000	0.0000	37.1616	0.0000	37.1616	2.1962	0.0000	92.0662
Water						0.0000	0.0000		0.0000	0.0000	0.7691	31.3703	32.1394	0.0815	2.3800e-003	34.8846
Total	**0.7755**	**1.5680**	**4.9049**	**0.0231**	**2.6389**	**0.0176**	**2.6564**	**0.7067**	**0.0165**	**0.7232**	**37.9307**	**2,284.5260**	**2,322.4567**	**2.3646**	**4.7300e-003**	**2,382.9807**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.4125	1.2000e-004	0.0130	0.0000		5.0000e-005	5.0000e-005		5.0000e-005	5.0000e-005	0.0000	0.0255	0.0255	7.0000e-005	0.0000	0.0271
Energy	3.8800e-003	0.0352	0.0296	2.1000e-004		2.6800e-003	2.6800e-003		2.6800e-003	2.6800e-003	0.0000	115.1853	115.1853	6.8000e-003	1.9600e-003	115.9386
Mobile	0.3342	1.4164	4.2640	0.0196	2.2563	0.0120	2.2683	0.6042	0.0112	0.6154	0.0000	1,822.2483	1,822.2483	0.0691	0.0000	1,823.9748
Waste						0.0000	0.0000		0.0000	0.0000	37.1616	0.0000	37.1616	2.1962	0.0000	92.0662
Water						0.0000	0.0000		0.0000	0.0000	0.6153	25.0963	25.7115	0.0652	1.9000e-003	27.9077
Total	**0.7506**	**1.4518**	**4.3067**	**0.0198**	**2.2563**	**0.0148**	**2.2710**	**0.6042**	**0.0139**	**0.6181**	**37.7768**	**1,962.5553**	**2,000.3322**	**2.3373**	**3.8600e-003**	**2,059.9144**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**3.22**	**7.41**	**12.20**	**14.08**	**14.50**	**15.90**	**14.51**	**14.50**	**16.02**	**14.54**	**0.41**	**14.09**	**13.87**	**1.15**	**18.39**	**13.56**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	11/1/2019	11/1/2019	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 19.8

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Excavators	0	8.00	158	0.38
Demolition	Rubber Tired Dozers	0	8.00	247	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Demolition - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Diversity

Integrate Below Market Rate Housing

Improve Pedestrian Network

Provide Traffic Calming Measures

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.3342	1.4164	4.2640	0.0196	2.2563	0.0120	2.2683	0.6042	0.0112	0.6154	0.0000	1,822.2483	1,822.2483	0.0691	0.0000	1,823.9748
Unmitigated	0.3577	1.5194	4.8511	0.0228	2.6389	0.0138	2.6527	0.7067	0.0128	0.7195	0.0000	2,115.5747	2,115.5747	0.0792	0.0000	2,117.5540

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	153.98	153.98	153.98	443,078	378,832
Elementary School	1,890.00	1,890.00	1890.00	6,513,665	5,569,184
Other Asphalt Surfaces	0.00	0.00	0.00		
Total	2,043.98	2,043.98	2,043.98	6,956,743	5,948,016

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	16.60	8.40	6.90	33.00	48.00	19.00	66	28	6
Elementary School	16.60	8.40	6.90	65.00	30.00	5.00	63	25	12
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.570129	0.042389	0.209362	0.103383	0.012827	0.005771	0.026890	0.019547	0.001873	0.001437	0.004989	0.000625	0.000777
Elementary School	0.570129	0.042389	0.209362	0.103383	0.012827	0.005771	0.026890	0.019547	0.001873	0.001437	0.004989	0.000625	0.000777
Other Asphalt Surfaces	0.570129	0.042389	0.209362	0.103383	0.012827	0.005771	0.026890	0.019547	0.001873	0.001437	0.004989	0.000625	0.000777

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Exceed Title 24

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	76.8307	76.8307	6.0600e-003	1.2500e-003	77.3561
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	84.7326	84.7326	6.6900e-003	1.3800e-003	85.3120
NaturalGas Mitigated	3.8800e-003	0.0352	0.0296	2.1000e-004		2.6800e-003	2.6800e-003		2.6800e-003	2.6800e-003	0.0000	38.3546	38.3546	7.4000e-004	7.0000e-004	38.5825
NaturalGas Unmitigated	5.3400e-003	0.0485	0.0408	2.9000e-004		3.6900e-003	3.6900e-003		3.6900e-003	3.6900e-003	0.0000	52.8229	52.8229	1.0100e-003	9.7000e-004	53.1368

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Elementary School	989864	5.3400e-003	0.0485	0.0408	2.9000e-004		3.6900e-003	3.6900e-003		3.6900e-003	3.6900e-003	0.0000	52.8229	52.8229	1.0100e-003	9.7000e-004	53.1368
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**5.3400e-003**	**0.0485**	**0.0408**	**2.9000e-004**		**3.6900e-003**	**3.6900e-003**		**3.6900e-003**	**3.6900e-003**	**0.0000**	**52.8229**	**52.8229**	**1.0100e-003**	**9.7000e-004**	**53.1368**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Elementary School	718738	3.8800e-003	0.0352	0.0296	2.1000e-004		2.6800e-003	2.6800e-003		2.6800e-003	2.6800e-003	0.0000	38.3546	38.3546	7.4000e-004	7.0000e-004	38.5825
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**3.8800e-003**	**0.0352**	**0.0296**	**2.1000e-004**		**2.6800e-003**	**2.6800e-003**		**2.6800e-003**	**2.6800e-003**	**0.0000**	**38.3546**	**38.3546**	**7.4000e-004**	**7.0000e-004**	**38.5825**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Elementary School	508308	84.7326	6.6900e-003	1.3800e-003	85.3120
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**84.7326**	**6.6900e-003**	**1.3800e-003**	**85.3120**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Elementary School	460905	76.8307	6.0600e-003	1.2500e-003	77.3561
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**76.8307**	**6.0600e-003**	**1.2500e-003**	**77.3561**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.4125	1.2000e-004	0.0130	0.0000		5.0000e-005	5.0000e-005		5.0000e-005	5.0000e-005	0.0000	0.0255	0.0255	7.0000e-005	0.0000	0.0271
Unmitigated	0.4125	1.2000e-004	0.0130	0.0000		5.0000e-005	5.0000e-005		5.0000e-005	5.0000e-005	0.0000	0.0255	0.0255	7.0000e-005	0.0000	0.0271

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0507					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.3606					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.1900e-003	1.2000e-004	0.0130	0.0000		5.0000e-005	5.0000e-005		5.0000e-005	5.0000e-005	0.0000	0.0255	0.0255	7.0000e-005	0.0000	0.0271
Total	**0.4125**	**1.2000e-004**	**0.0130**	**0.0000**		**5.0000e-005**	**5.0000e-005**		**5.0000e-005**	**5.0000e-005**	**0.0000**	**0.0255**	**0.0255**	**7.0000e-005**	**0.0000**	**0.0271**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0507					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.3606					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.1900e-003	1.2000e-004	0.0130	0.0000		5.0000e-005	5.0000e-005		5.0000e-005	5.0000e-005	0.0000	0.0255	0.0255	7.0000e-005	0.0000	0.0271
Total	**0.4125**	**1.2000e-004**	**0.0130**	**0.0000**		**5.0000e-005**	**5.0000e-005**		**5.0000e-005**	**5.0000e-005**	**0.0000**	**0.0255**	**0.0255**	**7.0000e-005**	**0.0000**	**0.0271**

7.0 Water Detail

7.1 Mitigation Measures Water

Apply Water Conservation Strategy

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	25.7115	0.0652	1.9000e-003	27.9077
Unmitigated	32.1394	0.0815	2.3800e-003	34.8846

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 7.86378	14.5636	1.1500e-003	2.4000e-004	14.6632
Elementary School	2.42424 / 6.23376	17.5758	0.0803	2.1400e-003	20.2214
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**32.1394**	**0.0815**	**2.3800e-003**	**34.8846**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 6.29102	11.6509	9.2000e-004	1.9000e-004	11.7305
Elementary School	1.93939 / 4.98701	14.0607	0.0643	1.7100e-003	16.1772
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**25.7115**	**0.0652**	**1.9000e-003**	**27.9077**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	37.1616	2.1962	0.0000	92.0662
Unmitigated	37.1616	2.1962	0.0000	92.0662

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	0.57	0.1157	6.8400e-003	0.0000	0.2867
Elementary School	182.5	37.0459	2.1894	0.0000	91.7795
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**37.1616**	**2.1962**	**0.0000**	**92.0662**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	0.57	0.1157	6.8400e-003	0.0000	0.2867
Elementary School	182.5	37.0459	2.1894	0.0000	91.7795
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**37.1616**	**2.1962**	**0.0000**	**92.0662**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

This page intentionally left blank

APPENDIX 3.3:

CALEEMOD OPERATIONAL (RESIDENTIAL USES - WITH PROJECT DESIGN FEATURES) ANNUAL EMISSIONS MODEL OUTPUTS

Nakase Residential Uses (Operations - w Regulatory Measures, PDFs, & MMs)

Orange County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Retirement Community	101.00	Dwelling Unit	3.90	101,000.00	289
Single Family Housing	675.00	Dwelling Unit	61.40	1,215,000.00	1931

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2025
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	430	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Nakase Residential Uses (Operations - w Regulatory Measures, PDFs, & MMs) - Orange County, Annual

Project Characteristics - CO2 intensity factor represents CO2e intensity factor. The projected 2025 RPS target is derived based on a linear trajectory to reach the 50% project RPS consistent with SB 32 and SB 350.

Land Use - Total Lot Area is 121.8 acres. In order to be consistent with the TIA, 6.6 acres of Park will be analyzed, the remaining 17.5 acres of Open Space will not be analyzed.

Construction Phase - Operations Run Only.

Off-road Equipment - Operations Run Only.

Trips and VMT - Operations Run Only.

Vehicle Trips - Trip Rates based on information provided in the TIA and ITE 10th Edition (2017).

Woodstoves - Rule 445

Energy Use -

Mobile Land Use Mitigation -

Water Mitigation -

Energy Mitigation -

Nakase Residential Uses (Operations - w Regulatory Measures, PDFs, & MMs) - Orange County, Annual

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	70.00	1.00
tblFireplaces	NumberGas	85.85	101.00
tblFireplaces	NumberGas	573.75	675.00
tblFireplaces	NumberNoFireplace	10.10	0.00
tblFireplaces	NumberNoFireplace	67.50	0.00
tblFireplaces	NumberWood	5.05	0.00
tblFireplaces	NumberWood	33.75	0.00
tblLandUse	LotAcreage	20.20	3.90
tblLandUse	LotAcreage	219.16	61.40
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	702.44	430
tblVehicleTrips	ST_TR	2.03	3.23
tblVehicleTrips	ST_TR	9.91	9.54
tblVehicleTrips	SU_TR	1.95	3.14
tblVehicleTrips	SU_TR	8.62	8.55
tblVehicleTrips	WD_TR	2.40	3.70
tblVehicleTrips	WD_TR	9.52	9.44
tblWoodstoves	NumberCatalytic	5.05	0.00
tblWoodstoves	NumberCatalytic	33.75	0.00
tblWoodstoves	NumberNoncatalytic	5.05	0.00
tblWoodstoves	NumberNoncatalytic	33.75	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
		Highest		

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	5.4260	0.2530	8.0635	1.4500e-003		0.0574	0.0574		0.0574	0.0574	0.0000	199.4186	199.4186	0.0161	3.4200e-003	200.8389
Energy	0.1009	0.8620	0.3668	5.5000e-003		0.0697	0.0697		0.0697	0.0697	0.0000	2,139.6709	2,139.6709	0.0961	0.0342	2,152.2737
Mobile	1.4293	5.6303	19.7388	0.0839	8.6249	0.0596	8.6846	2.3097	0.0553	2.3650	0.0000	7,752.6887	7,752.6887	0.3001	0.0000	7,760.1914
Waste						0.0000	0.0000		0.0000	0.0000	170.1409	0.0000	170.1409	10.0550	0.0000	421.5170
Water						0.0000	0.0000		0.0000	0.0000	16.0402	197.4752	213.5154	1.6608	0.0417	267.4489
Total	**6.9561**	**6.7452**	**28.1692**	**0.0908**	**8.6249**	**0.1867**	**8.8117**	**2.3097**	**0.1824**	**2.4920**	**186.1811**	**10,289.2534**	**10,475.4345**	**12.1282**	**0.0793**	**10,802.2698**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	5.4260	0.2530	8.0635	1.4500e-003		0.0574	0.0574		0.0574	0.0574	0.0000	199.4186	199.4186	0.0161	3.4200e-003	200.8389
Energy	0.0596	0.5097	0.2169	3.2500e-003		0.0412	0.0412		0.0412	0.0412	0.0000	1,712.0928	1,712.0928	0.0870	0.0265	1,722.1567
Mobile	1.3591	5.2888	17.8785	0.0747	7.6429	0.0536	7.6964	2.0467	0.0497	2.0964	0.0000	6,906.2334	6,906.2334	0.2703	0.0000	6,912.9909
Waste						0.0000	0.0000		0.0000	0.0000	170.1409	0.0000	170.1409	10.0550	0.0000	421.5170
Water						0.0000	0.0000		0.0000	0.0000	12.8322	157.9802	170.8123	1.3286	0.0333	213.9591
Total	**6.8447**	**6.0515**	**26.1589**	**0.0794**	**7.6429**	**0.1522**	**7.7950**	**2.0467**	**0.1482**	**2.1949**	**182.9731**	**8,975.7249**	**9,158.6980**	**11.7570**	**0.0632**	**9,471.4625**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**1.60**	**10.29**	**7.14**	**12.57**	**11.39**	**18.51**	**11.54**	**11.39**	**18.71**	**11.92**	**1.72**	**12.77**	**12.57**	**3.06**	**20.30**	**12.32**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	11/1/2019	11/1/2019	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Excavators	0	8.00	158	0.38
Demolition	Rubber Tired Dozers	0	8.00	247	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Demolition - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Diversity

Integrate Below Market Rate Housing

Improve Pedestrian Network

Provide Traffic Calming Measures

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	1.3591	5.2888	17.8785	0.0747	7.6429	0.0536	7.6964	2.0467	0.0497	2.0964	0.0000	6,906.2334	6,906.2334	0.2703	0.0000	6,912.9909
Unmitigated	1.4293	5.6303	19.7388	0.0839	8.6249	0.0596	8.6846	2.3097	0.0553	2.3650	0.0000	7,752.6887	7,752.6887	0.3001	0.0000	7,760.1914

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Retirement Community	373.70	326.23	317.14	1,226,206	1,086,584
Single Family Housing	6,372.00	6,439.50	5771.25	21,513,778	19,064,105
Total	6,745.70	6,765.73	6,088.39	22,739,984	20,150,689

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Retirement Community	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Retirement Community	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854
Single Family Housing	0.566758	0.042765	0.209365	0.107075	0.014132	0.005761	0.026332	0.018095	0.001807	0.001489	0.004961	0.000606	0.000854

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Exceed Title 24

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	1,121.8397	1,121.8397	0.0757	0.0157	1,128.3960
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	1,141.3924	1,141.3924	0.0770	0.0159	1,148.0629
NaturalGas Mitigated	0.0596	0.5097	0.2169	3.2500e-003		0.0412	0.0412		0.0412	0.0412	0.0000	590.2531	590.2531	0.0113	0.0108	593.7607
NaturalGas Unmitigated	0.1009	0.8620	0.3668	5.5000e-003		0.0697	0.0697		0.0697	0.0697	0.0000	998.2785	998.2785	0.0191	0.0183	1,004.2108

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Retirement Community	1.28872e+006	6.9500e-003	0.0594	0.0253	3.8000e-004		4.8000e-003	4.8000e-003		4.8000e-003	4.8000e-003	0.0000	68.7709	68.7709	1.3200e-003	1.2600e-003	69.1796
Single Family Housing	1.74183e+007	0.0939	0.8026	0.3415	5.1200e-003		0.0649	0.0649		0.0649	0.0649	0.0000	929.5076	929.5076	0.0178	0.0170	935.0312
Total		**0.1009**	**0.8620**	**0.3668**	**5.5000e-003**		**0.0697**	**0.0697**		**0.0697**	**0.0697**	**0.0000**	**998.2785**	**998.2785**	**0.0191**	**0.0183**	**1,004.2108**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Retirement Community	900969	4.8600e-003	0.0415	0.0177	2.6000e-004		3.3600e-003	3.3600e-003		3.3600e-003	3.3600e-003	0.0000	48.0792	48.0792	9.2000e-004	8.8000e-004	48.3649
Single Family Housing	1.016e+007	0.0548	0.4682	0.1992	2.9900e-003		0.0379	0.0379		0.0379	0.0379	0.0000	542.1740	542.1740	0.0104	9.9400e-003	545.3959
Total		**0.0596**	**0.5097**	**0.2169**	**3.2500e-003**		**0.0412**	**0.0412**		**0.0412**	**0.0412**	**0.0000**	**590.2531**	**590.2531**	**0.0113**	**0.0108**	**593.7607**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Retirement Community	439438	85.7100	5.7800e-003	1.2000e-003	86.2109
Single Family Housing	5.41251e+006	1,055.6824	0.0712	0.0147	1,061.8520
Total		**1,141.3924**	**0.0770**	**0.0159**	**1,148.0629**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Retirement Community	429963	83.8619	5.6600e-003	1.1700e-003	84.3520
Single Family Housing	5.32174e+006	1,037.9778	0.0700	0.0145	1,044.0439
Total		**1,121.8397**	**0.0757**	**0.0157**	**1,128.3959**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	5.4260	0.2530	8.0635	1.4500e-003		0.0574	0.0574		0.0574	0.0574	0.0000	199.4186	199.4186	0.0161	3.4200e-003	200.8389
Unmitigated	5.4260	0.2530	8.0635	1.4500e-003		0.0574	0.0574		0.0574	0.0574	0.0000	199.4186	199.4186	0.0161	3.4200e-003	200.8389

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.4117					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	4.7554					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0188	0.1609	0.0685	1.0300e-003		0.0130	0.0130		0.0130	0.0130	0.0000	186.3464	186.3464	3.5700e-003	3.4200e-003	187.4538
Landscaping	0.2401	0.0921	7.9950	4.2000e-004		0.0444	0.0444		0.0444	0.0444	0.0000	13.0721	13.0721	0.0125	0.0000	13.3851
Total	**5.4260**	**0.2530**	**8.0635**	**1.4500e-003**		**0.0574**	**0.0574**		**0.0574**	**0.0574**	**0.0000**	**199.4186**	**199.4186**	**0.0161**	**3.4200e-003**	**200.8389**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.4117					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	4.7554					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0188	0.1609	0.0685	1.0300e-003		0.0130	0.0130		0.0130	0.0130	0.0000	186.3464	186.3464	3.5700e-003	3.4200e-003	187.4538
Landscaping	0.2401	0.0921	7.9950	4.2000e-004		0.0444	0.0444		0.0444	0.0444	0.0000	13.0721	13.0721	0.0125	0.0000	13.3851
Total	**5.4260**	**0.2530**	**8.0635**	**1.4500e-003**		**0.0574**	**0.0574**		**0.0574**	**0.0574**	**0.0000**	**199.4186**	**199.4186**	**0.0161**	**3.4200e-003**	**200.8389**

7.0 Water Detail

7.1 Mitigation Measures Water

Apply Water Conservation Strategy

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	170.8123	1.3286	0.0333	213.9591
Unmitigated	213.5154	1.6608	0.0417	267.4489

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Retirement Community	6.58056 / 4.14861	27.7900	0.2162	5.4200e-003	34.8097
Single Family Housing	43.979 / 27.7259	185.7254	1.4446	0.0362	232.6392
Total		**213.5154**	**1.6608**	**0.0417**	**267.4489**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Retirement Community	5.26445 / 3.31889	22.2320	0.1729	4.3400e-003	27.8478
Single Family Housing	35.1832 / 22.1807	148.5803	1.1557	0.0290	186.1114
Total		**170.8123**	**1.3286**	**0.0333**	**213.9592**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	170.1409	10.0550	0.0000	421.5170
Unmitigated	170.1409	10.0550	0.0000	421.5170

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Retirement Community	46.46	9.4310	0.5574	0.0000	23.3648
Single Family Housing	791.71	160.7100	9.4977	0.0000	398.1522
Total		**170.1409**	**10.0550**	**0.0000**	**421.5170**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Retirement Community	46.46	9.4310	0.5574	0.0000	23.3648
Single Family Housing	791.71	160.7100	9.4977	0.0000	398.1522
Total		**170.1409**	**10.0550**	**0.0000**	**421.5170**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Nakase Residential Uses (2030 Operations - w/ Regulatory Requirements, PDFs, & MMs)

Orange County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Retirement Community	101.00	Dwelling Unit	3.90	101,000.00	289
Single Family Housing	675.00	Dwelling Unit	61.40	1,215,000.00	1931

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2030
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	367.5	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CO2 intensity factor represents CO2e intensity factor. Intensity factor presented here is 50% projected RPS for 2030 consistent with SB 32 and SB 350

Land Use - Total Lot Area is 121.8 acres. In order to be consistent with the TIA, 6.6 acres of Park will be analyzed, the remaining 17.5 acres of Open Space will not be analyzed.

Construction Phase - Operations Run Only.

Off-road Equipment - Operations Run Only.

Trips and VMT - Operations Run Only.

Vehicle Trips - Trip Rates based on information provided in the TIA and ITE 10th Edition (2017)

Woodstoves - Rule 445

Mobile Land Use Mitigation -

Energy Mitigation -

Water Mitigation -

Nakase Residential Uses (2030 Operations - w/ Regulatory Requirements, PDFs, & MMs) - Orange County, Annual

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	70.00	1.00
tblFireplaces	NumberGas	85.85	101.00
tblFireplaces	NumberGas	573.75	675.00
tblFireplaces	NumberNoFireplace	10.10	0.00
tblFireplaces	NumberNoFireplace	67.50	0.00
tblFireplaces	NumberWood	5.05	0.00
tblFireplaces	NumberWood	33.75	0.00
tblLandUse	LotAcreage	20.20	3.90
tblLandUse	LotAcreage	219.16	61.40
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	702.44	367.5
tblVehicleTrips	ST_TR	2.03	3.23
tblVehicleTrips	ST_TR	9.91	9.54
tblVehicleTrips	SU_TR	1.95	3.14
tblVehicleTrips	SU_TR	8.62	8.55
tblVehicleTrips	WD_TR	2.40	3.70
tblVehicleTrips	WD_TR	9.52	9.44
tblWoodstoves	NumberCatalytic	5.05	0.00
tblWoodstoves	NumberCatalytic	33.75	0.00
tblWoodstoves	NumberNoncatalytic	5.05	0.00
tblWoodstoves	NumberNoncatalytic	33.75	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
		Highest		

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	5.4247	0.2529	8.0500	1.4500e-003		0.0574	0.0574		0.0574	0.0574	0.0000	199.4186	199.4186	0.0160	3.4200e-003	200.8373
Energy	0.1009	0.8620	0.3668	5.5000e-003		0.0697	0.0697		0.0697	0.0697	0.0000	1,973.7709	1,973.7709	0.0961	0.0342	1,986.3736
Mobile	1.1667	4.9560	15.8466	0.0745	8.6259	0.0451	8.6710	2.3099	0.0418	2.3518	0.0000	6,914.1174	6,914.1174	0.2587	0.0000	6,920.5840
Waste						0.0000	0.0000		0.0000	0.0000	170.1409	0.0000	170.1409	10.0550	0.0000	421.5170
Water						0.0000	0.0000		0.0000	0.0000	16.0402	168.7724	184.8126	1.6608	0.0417	238.7461
Total	**6.6922**	**6.0709**	**24.2633**	**0.0814**	**8.6259**	**0.1722**	**8.7981**	**2.3099**	**0.1689**	**2.4789**	**186.1811**	**9,256.0792**	**9,442.2603**	**12.0867**	**0.0793**	**9,768.0581**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	5.4247	0.2529	8.0500	1.4500e-003		0.0574	0.0574		0.0574	0.0574	0.0000	199.4186	199.4186	0.0160	3.4200e-003	200.8373
Energy	0.0596	0.5097	0.2169	3.2500e-003		0.0412	0.0412		0.0412	0.0412	0.0000	1,549.0347	1,549.0347	0.0870	0.0265	1,559.0986
Mobile	1.1063	4.6917	14.3397	0.0664	7.6437	0.0406	7.6843	2.0469	0.0376	2.0845	0.0000	6,161.1799	6,161.1799	0.2327	0.0000	6,166.9978
Waste						0.0000	0.0000		0.0000	0.0000	170.1409	0.0000	170.1409	10.0550	0.0000	421.5170
Water						0.0000	0.0000		0.0000	0.0000	12.8322	135.0179	147.8501	1.3286	0.0333	190.9969
Total	**6.5906**	**5.4543**	**22.6066**	**0.0711**	**7.6437**	**0.1392**	**7.7829**	**2.0469**	**0.1362**	**2.1831**	**182.9731**	**8,044.6511**	**8,227.6242**	**11.7194**	**0.0632**	**8,539.4476**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**1.52**	**10.16**	**6.83**	**12.74**	**11.39**	**19.19**	**11.54**	**11.39**	**19.36**	**11.93**	**1.72**	**13.09**	**12.86**	**3.04**	**20.30**	**12.58**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	11/1/2019	11/1/2019	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Excavators	0	8.00	158	0.38
Demolition	Rubber Tired Dozers	0	8.00	247	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Demolition - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Diversity

Integrate Below Market Rate Housing

Improve Pedestrian Network

Provide Traffic Calming Measures

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	1.1063	4.6917	14.3397	0.0664	7.6437	0.0406	7.6843	2.0469	0.0376	2.0845	0.0000	6,161.1799	6,161.1799	0.2327	0.0000	6,166.9978
Unmitigated	1.1667	4.9560	15.8466	0.0745	8.6259	0.0451	8.6710	2.3099	0.0418	2.3518	0.0000	6,914.1174	6,914.1174	0.2587	0.0000	6,920.5840

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Retirement Community	373.70	326.23	317.14	1,226,206	1,086,584
Single Family Housing	6,372.00	6,439.50	5771.25	21,513,778	19,064,105
Total	6,745.70	6,765.73	6,088.39	22,739,984	20,150,689

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Retirement Community	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Retirement Community	0.570129	0.042389	0.209362	0.103383	0.012827	0.005771	0.026890	0.019547	0.001873	0.001437	0.004989	0.000625	0.000777
Single Family Housing	0.570129	0.042389	0.209362	0.103383	0.012827	0.005771	0.026890	0.019547	0.001873	0.001437	0.004989	0.000625	0.000777

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Exceed Title 24

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	958.7816	958.7816	0.0757	0.0157	965.3379
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	975.4924	975.4924	0.0770	0.0159	982.1629
NaturalGas Mitigated	0.0596	0.5097	0.2169	3.2500e-003		0.0412	0.0412		0.0412	0.0412	0.0000	590.2531	590.2531	0.0113	0.0108	593.7607
NaturalGas Unmitigated	0.1009	0.8620	0.3668	5.5000e-003		0.0697	0.0697		0.0697	0.0697	0.0000	998.2785	998.2785	0.0191	0.0183	1,004.2108

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Retirement Community	1.28872e+006	6.9500e-003	0.0594	0.0253	3.8000e-004		4.8000e-003	4.8000e-003		4.8000e-003	4.8000e-003	0.0000	68.7709	68.7709	1.3200e-003	1.2600e-003	69.1796
Single Family Housing	1.74183e+007	0.0939	0.8026	0.3415	5.1200e-003		0.0649	0.0649		0.0649	0.0649	0.0000	929.5076	929.5076	0.0178	0.0170	935.0312
Total		**0.1009**	**0.8620**	**0.3668**	**5.5000e-003**		**0.0697**	**0.0697**		**0.0697**	**0.0697**	**0.0000**	**998.2785**	**998.2785**	**0.0191**	**0.0183**	**1,004.2108**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Retirement Community	900969	4.8600e-003	0.0415	0.0177	2.6000e-004		3.3600e-003	3.3600e-003		3.3600e-003	3.3600e-003	0.0000	48.0792	48.0792	9.2000e-004	8.8000e-004	48.3649
Single Family Housing	1.016e+007	0.0548	0.4682	0.1992	2.9900e-003		0.0379	0.0379		0.0379	0.0379	0.0000	542.1740	542.1740	0.0104	9.9400e-003	545.3959
Total		**0.0596**	**0.5097**	**0.2169**	**3.2500e-003**		**0.0412**	**0.0412**		**0.0412**	**0.0412**	**0.0000**	**590.2531**	**590.2531**	**0.0113**	**0.0108**	**593.7607**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Retirement Community	439438	73.2522	5.7800e-003	1.2000e-003	73.7531
Single Family Housing	5.41251e+006	902.2402	0.0712	0.0147	908.4098
Total		**975.4924**	**0.0770**	**0.0159**	**982.1629**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Retirement Community	429963	71.6727	5.6600e-003	1.1700e-003	72.1628
Single Family Housing	5.32174e+006	887.1089	0.0700	0.0145	893.1751
Total		**958.7816**	**0.0757**	**0.0157**	**965.3379**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	5.4247	0.2529	8.0500	1.4500e-003		0.0574	0.0574		0.0574	0.0574	0.0000	199.4186	199.4186	0.0160	3.4200e-003	200.8373
Unmitigated	5.4247	0.2529	8.0500	1.4500e-003		0.0574	0.0574		0.0574	0.0574	0.0000	199.4186	199.4186	0.0160	3.4200e-003	200.8373

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.4117					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	4.7554					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0188	0.1609	0.0685	1.0300e-003		0.0130	0.0130		0.0130	0.0130	0.0000	186.3464	186.3464	3.5700e-003	3.4200e-003	187.4538
Landscaping	0.2387	0.0920	7.9815	4.2000e-004		0.0444	0.0444		0.0444	0.0444	0.0000	13.0721	13.0721	0.0125	0.0000	13.3835
Total	**5.4247**	**0.2529**	**8.0499**	**1.4500e-003**		**0.0574**	**0.0574**		**0.0574**	**0.0574**	**0.0000**	**199.4186**	**199.4186**	**0.0160**	**3.4200e-003**	**200.8373**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.4117					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	4.7554					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0188	0.1609	0.0685	1.0300e-003		0.0130	0.0130		0.0130	0.0130	0.0000	186.3464	186.3464	3.5700e-003	3.4200e-003	187.4538
Landscaping	0.2387	0.0920	7.9815	4.2000e-004		0.0444	0.0444		0.0444	0.0444	0.0000	13.0721	13.0721	0.0125	0.0000	13.3835
Total	**5.4247**	**0.2529**	**8.0499**	**1.4500e-003**		**0.0574**	**0.0574**		**0.0574**	**0.0574**	**0.0000**	**199.4186**	**199.4186**	**0.0160**	**3.4200e-003**	**200.8373**

7.0 Water Detail

7.1 Mitigation Measures Water

Apply Water Conservation Strategy

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	147.8501	1.3286	0.0333	190.9969
Unmitigated	184.8126	1.6608	0.0417	238.7461

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Retirement Community	6.58056 / 4.14861	24.0542	0.2162	5.4200e-003	31.0739
Single Family Housing	43.979 / 27.7259	160.7584	1.4446	0.0362	207.6722
Total		**184.8126**	**1.6608**	**0.0417**	**238.7461**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Retirement Community	5.26445 / 3.31889	19.2434	0.1729	4.3400e-003	24.8591
Single Family Housing	35.1832 / 22.1807	128.6067	1.1557	0.0290	166.1378
Total		**147.8501**	**1.3286**	**0.0333**	**190.9969**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	170.1409	10.0550	0.0000	421.5170
Unmitigated	170.1409	10.0550	0.0000	421.5170

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Retirement Community	46.46	9.4310	0.5574	0.0000	23.3648
Single Family Housing	791.71	160.7100	9.4977	0.0000	398.1522
Total		**170.1409**	**10.0550**	**0.0000**	**421.5170**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Retirement Community	46.46	9.4310	0.5574	0.0000	23.3648
Single Family Housing	791.71	160.7100	9.4977	0.0000	398.1522
Total		**170.1409**	**10.0550**	**0.0000**	**421.5170**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

This page intentionally left blank

APPENDIX 3.4:

CALEEMOD OPERATIONAL (EXISTING) ANNUAL EMISSIONS MODEL OUTPUTS

Nakase Existing Nursery (Operations)

Orange County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Manufacturing	8.50	1000sqft	0.20	8,500.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2019
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Existing 8.5 TSF Nursery.

Construction Phase - Operations Run Only.

Off-road Equipment - Operations Run Only.

Trips and VMT - Operations Run Only.

Vehicle Trips - Trip rates for Nursey (Wholesale) was obtained from ITE 10th Edition.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	10.00	1.00
tblConstructionPhase	PhaseEndDate	11/14/2019	11/1/2019
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblVehicleTrips	ST_TR	1.49	29.40
tblVehicleTrips	SU_TR	0.62	26.51
tblVehicleTrips	WD_TR	3.82	39.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
		Highest		

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0347	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.3000e-004
Energy	9.6000e-004	8.7100e-003	7.3200e-003	5.0000e-005		6.6000e-004	6.6000e-004		6.6000e-004	6.6000e-004	0.0000	32.3651	32.3651	1.1300e-003	3.7000e-004	32.5033
Mobile	0.1116	0.5393	1.6901	5.9800e-003	0.5116	6.7700e-003	0.5184	0.1370	6.3700e-003	0.1434	0.0000	549.8397	549.8397	0.0238	0.0000	550.4347
Waste						0.0000	0.0000		0.0000	0.0000	2.1395	0.0000	2.1395	0.1264	0.0000	5.3006
Water						0.0000	0.0000		0.0000	0.0000	0.6236	8.1549	8.7785	0.0644	1.5800e-003	10.8596
Total	**0.1472**	**0.5481**	**1.6975**	**6.0300e-003**	**0.5116**	**7.4300e-003**	**0.5191**	**0.1370**	**7.0300e-003**	**0.1441**	**2.7631**	**590.3599**	**593.1230**	**0.2158**	**1.9500e-003**	**599.0984**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0347	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.3000e-004
Energy	9.6000e-004	8.7100e-003	7.3200e-003	5.0000e-005		6.6000e-004	6.6000e-004		6.6000e-004	6.6000e-004	0.0000	32.3651	32.3651	1.1300e-003	3.7000e-004	32.5033
Mobile	0.1116	0.5393	1.6901	5.9800e-003	0.5116	6.7700e-003	0.5184	0.1370	6.3700e-003	0.1434	0.0000	549.8397	549.8397	0.0238	0.0000	550.4347
Waste						0.0000	0.0000		0.0000	0.0000	2.1395	0.0000	2.1395	0.1264	0.0000	5.3006
Water						0.0000	0.0000		0.0000	0.0000	0.6236	8.1549	8.7785	0.0644	1.5800e-003	10.8596
Total	**0.1472**	**0.5481**	**1.6975**	**6.0300e-003**	**0.5116**	**7.4300e-003**	**0.5191**	**0.1370**	**7.0300e-003**	**0.1441**	**2.7631**	**590.3599**	**593.1230**	**0.2158**	**1.9500e-003**	**599.0984**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	11/1/2019	11/1/2019	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Tractors/Loaders/Backhoes	0	6.00	97	0.37
Demolition	Rubber Tired Dozers	0	1.00	247	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Demolition - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.1116	0.5393	1.6901	5.9800e-003	0.5116	6.7700e-003	0.5184	0.1370	6.3700e-003	0.1434	0.0000	549.8397	549.8397	0.0238	0.0000	550.4347
Unmitigated	0.1116	0.5393	1.6901	5.9800e-003	0.5116	6.7700e-003	0.5184	0.1370	6.3700e-003	0.1434	0.0000	549.8397	549.8397	0.0238	0.0000	550.4347

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Manufacturing	331.50	249.90	225.34	1,349,192	1,349,192
Total	331.50	249.90	225.34	1,349,192	1,349,192

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Manufacturing	16.60	8.40	6.90	59.00	28.00	13.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Manufacturing	0.552373	0.044229	0.211123	0.119112	0.017503	0.005797	0.024455	0.015685	0.001637	0.001633	0.004830	0.000583	0.001041

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	22.8850	22.8850	9.4000e-004	2.0000e-004	22.9669
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	22.8850	22.8850	9.4000e-004	2.0000e-004	22.9669
NaturalGas Mitigated	9.6000e-004	8.7100e-003	7.3200e-003	5.0000e-005		6.6000e-004	6.6000e-004		6.6000e-004	6.6000e-004	0.0000	9.4801	9.4801	1.8000e-004	1.7000e-004	9.5364
NaturalGas Unmitigated	9.6000e-004	8.7100e-003	7.3200e-003	5.0000e-005		6.6000e-004	6.6000e-004		6.6000e-004	6.6000e-004	0.0000	9.4801	9.4801	1.8000e-004	1.7000e-004	9.5364

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Manufacturing	177650	9.6000e-004	8.7100e-003	7.3200e-003	5.0000e-005		6.6000e-004	6.6000e-004		6.6000e-004	6.6000e-004	0.0000	9.4801	9.4801	1.8000e-004	1.7000e-004	9.5364
Total		**9.6000e-004**	**8.7100e-003**	**7.3200e-003**	**5.0000e-005**		**6.6000e-004**	**6.6000e-004**		**6.6000e-004**	**6.6000e-004**	**0.0000**	**9.4801**	**9.4801**	**1.8000e-004**	**1.7000e-004**	**9.5364**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Manufacturing	177650	9.6000e-004	8.7100e-003	7.3200e-003	5.0000e-005		6.6000e-004	6.6000e-004		6.6000e-004	6.6000e-004	0.0000	9.4801	9.4801	1.8000e-004	1.7000e-004	9.5364
Total		**9.6000e-004**	**8.7100e-003**	**7.3200e-003**	**5.0000e-005**		**6.6000e-004**	**6.6000e-004**		**6.6000e-004**	**6.6000e-004**	**0.0000**	**9.4801**	**9.4801**	**1.8000e-004**	**1.7000e-004**	**9.5364**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Manufacturing	71825	22.8850	9.4000e-004	2.0000e-004	22.9669
Total		**22.8850**	**9.4000e-004**	**2.0000e-004**	**22.9669**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Manufacturing	71825	22.8850	9.4000e-004	2.0000e-004	22.9669
Total		**22.8850**	**9.4000e-004**	**2.0000e-004**	**22.9669**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0347	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.3000e-004
Unmitigated	0.0347	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.3000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	3.9400e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0307					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.3000e-004
Total	**0.0347**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	3.9400e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0307					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.1000e-004	2.1000e-004	0.0000	0.0000	2.3000e-004
Total	**0.0347**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.1000e-004**	**2.1000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	8.7785	0.0644	1.5800e-003	10.8596
Unmitigated	8.7785	0.0644	1.5800e-003	10.8596

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Manufacturing	1.96563 / 0	8.7785	0.0644	1.5800e-003	10.8596
Total		**8.7785**	**0.0644**	**1.5800e-003**	**10.8596**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Manufacturing	1.96563 / 0	8.7785	0.0644	1.5800e-003	10.8596
Total		**8.7785**	**0.0644**	**1.5800e-003**	**10.8596**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	2.1395	0.1264	0.0000	5.3006
Unmitigated	2.1395	0.1264	0.0000	5.3006

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Manufacturing	10.54	2.1395	0.1264	0.0000	5.3006
Total		**2.1395**	**0.1264**	**0.0000**	**5.3006**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Manufacturing	10.54	2.1395	0.1264	0.0000	5.3006
Total		**2.1395**	**0.1264**	**0.0000**	**5.3006**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

This page intentionally left blank

May 2019 | Health Risk Assessment

NAKASE ELEMENTARY SCHOOL

Toll Brothers

Prepared for:

Toll Brothers
Contact: Ilan P. Feingold, Sr. Project Manager
715 W. Town & Country Road, Suite 200
Orange, California 92868
714.347.1300

Prepared by:

PlaceWorks
Contact: Steve Bush, PE, Senior Engineer
3 MacArthur Place, Suite 1100
Santa Ana, California 92707
714.966.9220
info@placeworks.com
www.placeworks.com

PLACEWORKS

Table of Contents

Section **Page**

1. INTRODUCTION 1
2. PROJECT DESCRIPTION 3
3. SOURCE IDENTIFICATION 7
4. EMISSIONS INVENTORY 11
4.1 ON-ROAD MOBILE SOURCES 11
4.2 STATIONARY SOURCES 12
5. AIR DISPERSION MODELING 13
6. RISK CHARACTERIZATIONS 15
6.1 CARCINOGENIC CHEMICAL RISK 15
6.2 NON-CARCINOGENIC HAZARDS 16
6.3 CRITERIA AIR POLLUTANTS 17
6.4 ACCIDENTAL RELEASES 19
7. CONCLUSIONS 21
8. REFERENCES 23

APPENDICES

Appendix A. Stationary Emission Sources
Appendix B. Graphical Representation of Emitting Sources
Appendix C. Emission Rate Calculations
Appendix D. Air Dispersion Model Output
Appendix E. Risk Calculations

Table of Contents

List of Figures

Figure		Page
Figure 1	Site Location	5
Figure 2	Emission Sources	9

List of Tables

Table		Page
Table 1	Emission Sources	7
Table 2	Vehicle Fleet Mix	11
Table 3	Compounds Emitted from Mobile Sources	12
Table 4	Compounds Emitted from Stationary Sources	12
Table 5	California Ambient Air Quality Standards	17
Table 6	Localized Significance Thresholds	18
Table 7	Saddleback Valley Monitoring Station Summary	18
Table 8	Health Risk Assessment Results	21

1. Introduction

Toll Brother (the project developer) is working to gain approval for construction of an elementary school on 10-acres of the 120.83-acre Nakase Property Area Plan located at 20621 Lake Forest Drive, Lake Forest, California. The school site would accommodate up to 1,000 students from kindergarten through sixth grade. The proposed elementary school and play fields and active use areas (project site) are in the northeast corner of the Nakase Nursery site.

Regulations pertaining to the siting of new schools or modernization of existing schools in California require compliance with the California Code of Regulations (CCR) Title 5 standards. For new schools, Title 5 studies must demonstrate that facilities with the potential to emit hazardous air pollutants within a quarter-mile radius of the school site will not constitute an actual or potential public health risk to students and staff that will attend the school. This health risk assessment (HRA) included conducting the following tasks:

- Emissions were evaluated associated with vehicles and trucks traveling on State Route (SR-241), which is approximately 300 feet northeast of the school site boundary. Because the school is within 500 feet of the edge of a freeway traffic lane or busy traffic corridor, criteria air pollutants as well as toxic air contaminants (TACs) were also evaluated to determine if air quality at the proposed site poses a short-term or long-term exposure risk to students and staff.
- Facilities within a quarter-mile (1,320-foot) radius of the proposed site were identified and evaluated that might reasonably emit hazardous or acutely hazardous air emissions.
- Air dispersion modeling, using the AERMOD computer model, was conducted to quantify maximum ground-level concentrations for receptors at the project site. Meteorological data from the nearest South Coast Air Quality Management District (SCAQMD) station with similar meteorological conditions were used to represent local weather conditions and prevailing winds.
- Cancer and non-cancer risks to students and staff attending the school site were determined, based on the results of the AERMOD modeling. The assessment considered exposure through the inhalation pathway. Cancer Potency Factors (CPFs) were used to determine carcinogenic risk and Recommended Exposure Limits (RELs) were used to determine non-carcinogenic risk.
- A health risk assessment report has been prepared that compares the calculated risks with thresholds established by the SCAQMD and Office of Environmental Health Hazard Assessment (OEHHA).

The HRA and dispersion modeling methodologies used in the preparation of this report included all relevant and appropriate procedures developed by the US Environmental Protection Agency (USEPA, 2005) and OEHHA (2015). These methodologies and assumptions were used to ensure that the assessment effectively quantified school-based impacts associated with emission sources. It should be noted that these health impacts were based on conservative (i.e., health protective) assumptions. The USEPA and OEHHA note that conservative assumptions used in a risk assessment are intended to ensure that the estimated risks do not underestimate the actual risks (USEPA, 2005; OEHHA, 2015). Therefore, the estimated risks do not

1. Introduction

necessarily represent actual risks experienced by populations at or near a site. The use of conservative assumptions tends to produce upper-bound estimates of risk and usually overestimate exposures.

For this school-based risk assessment, the following conservative assumptions were used:

- It was assumed that maximum exposed receptor (both students and staff) stood outside at the site for 8 hours per weekday (8:00 AM to 4:00 PM, Monday to Friday), 180 days per year for 7 years (kindergarten to 6th grade students) or 250 days per year for 25 years (staff). In reality, students and staff are exposed to outdoor pollutant concentration levels only during breaks, lunch, and PE class and are exposed to reduced indoor pollutant concentrations for the remaining school hours. This would result in lower estimated risk values.
- The calculated risk for children from 2-16 years is multiplied by a factor of 3 to account for early life exposure and uncertainty in child versus adult exposure impacts (OEHHA, 2015).

Thus, the estimated risks in this HRA are conservative.

2. Project Description

The Toll Brothers' development site is located in the north-central portion of the City of Lake Forest in Orange County, California. The 120.83-acre site is currently operating as the Nakase Brothers Wholesale Nurseries, an agricultural wholesale plant nursery. The areas surrounding the property consist of a mix of land uses, including commercial, office, open space, industrial, and residential. The nursery is bounded on the northwest by Bake Parkway, on the northeast by Rancho Parkway, on the southeast by Serrano Creek Trail, and on the southwest by commercial, industrial, and office uses. Although not immediately adjacent to the property, single-family and multifamily residential uses exist to the northwest, northeast, and to the south. SR-241 is approximately 300 feet to the northeast.

Toll Brothers is working to gain approval for an elementary school on 10-acres of the development site. The proposed elementary school and play fields and active use areas (project site) are in the northeast corner of the Nakase Property Area Plan.

The project site and vicinity are depicted in Figure 1.

2. Project Description

This page intentionally left blank.

Figure 1 - Site Location

Source: ESRI, 2019

2. Project Description

This page intentionally left blank.

3. Source Identification

The health risk assessment evaluated the impact of potential long-term (chronic) exposure to air toxic emissions generated by vehicles traveling along SR-241 (between mile posts 21.802 and 23.418). Due to the proximity of the project site to SR-241, potential long-term (chronic) exposure to air toxic emissions and short-term (acute) health impacts were evaluated from exposures to criteria pollutants (particulate matter, carbon monoxide, and nitrogen dioxide).

Additionally, properties within a quarter-mile radius (1,320 feet) were surveyed using the SCAQMD Facility Information Detail (FIND) database and aerial photography to identify facilities that have the potential to generate hazardous and acutely hazardous air emissions. Additionally, information obtained through the SCAQMD FIND database was reviewed to assist in the identification of potential emission sources.

A summary of the emissions sources evaluated during this assessment is provided below in Table 1. Appendix A contains a summary of all emission sources surveyed and interviewed.

Table 1 Emission Sources

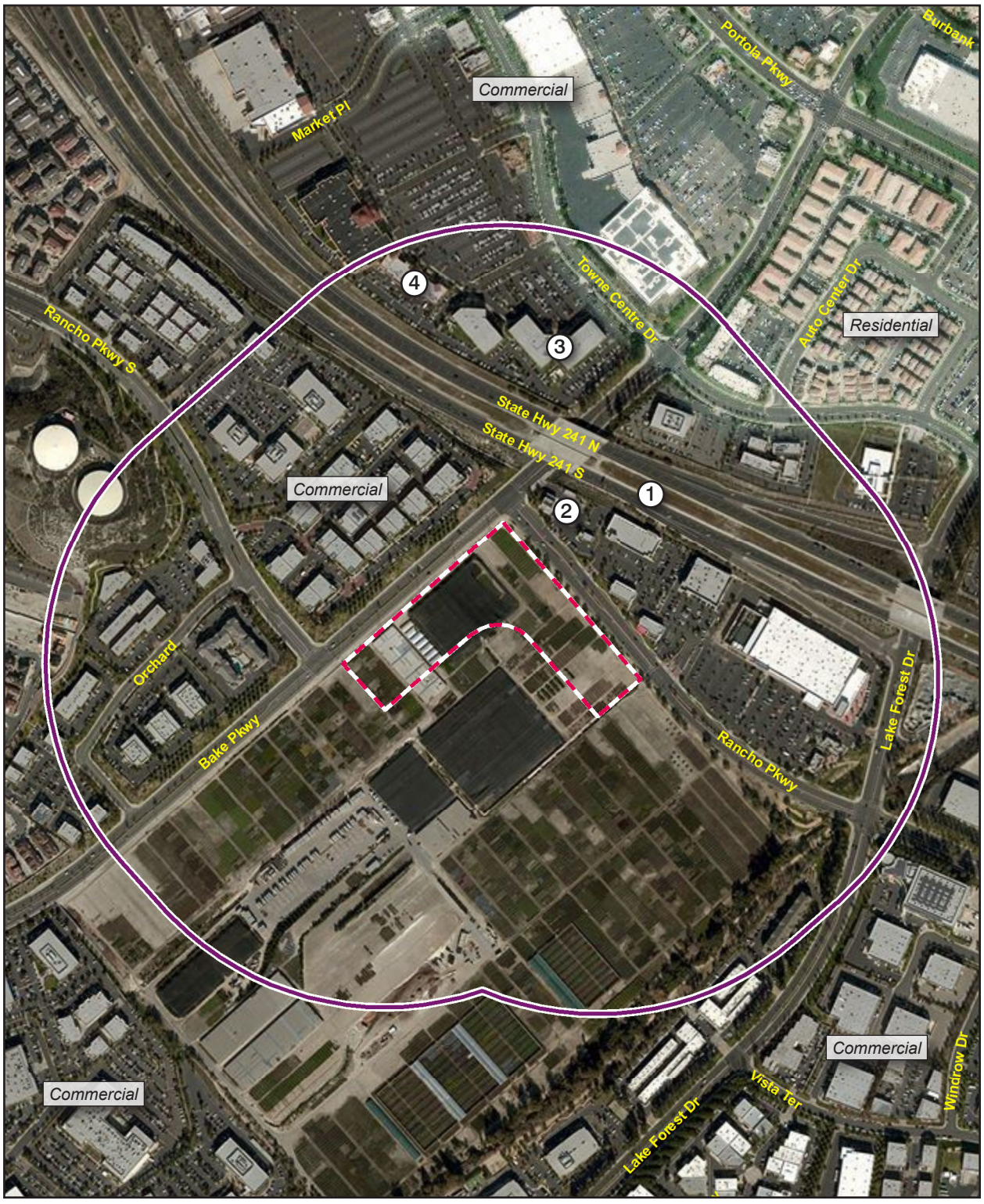
Source	Address
State Route 241	Mile Posts 21.802-23.418
Shell Station	26721 Rancho Parkway, Lake Forest, CA 92630
Loan Depot	26672, 26642, and 26632 Towne Centre Drive, Foothill Ranch, CA 92610
Rubios Fresh Mexican Grill #91	26612 Towne Centre Drive, Foothill Ranch, CA 92610

The project site and evaluated emission sources are depicted in Figure 2.

3. Source Identification

This page intentionally left blank.

Figure 2 - Emission Sources



Source: ESRI, 2019

3. Source Identification

This page intentionally left blank.

4. Emissions Inventory

4.1 ON-ROAD MOBILE SOURCES

Vehicle emissions contribute significantly to localized concentrations of air contaminants. Typically, emissions generated from these sources depend on vehicle mix, the percentage of heavy-duty diesel trucks, the rate at which pollutants are generated during the course of travel, and the number of vehicles traveling along the roadway network.

The peak hourly traffic for the section of SR-241 nearest the school site was obtained from the California Department of Transportation, Traffic Branch (Caltrans). To determine variances in hourly traffic volumes, the assessment used data available through the Caltrans Performance Measurement System (Caltrans PeMS, 2019). The truck percentage for each evaluated roadway segment was used to estimate the number of diesel trucks traveling on the roadway. Table 2 lists the identified peak hourly traffic volumes and diesel truck percentage considered in the assessment.

Table 2 Vehicle Fleet Mix

Roadway	Peak Hourly Vehicle Traffic (vehicles per hour)	Truck Percentage
SR-241 (Mile Posts 21.802-23.418)	4,600	7.6

Source: Caltrans, 2019.

Additionally, for purposes of this analysis a one percent annual increase in traffic is assumed. CARB has developed the EMFAC2017 emission factor model to account for the emission standards representative of the California fleet. EMFAC2017 was used to identify pollutant emission rates for total organic gases (TOG), diesel particulate matter (DPM), carbon monoxide (CO) and nitrogen dioxide (NO_2) at the project build out year of 2024. The PM_{10} emission factor for diesel-fueled vehicles was used as the surrogate for DPM (CARB, 2017). The TOG speciation profile provided by the Bay Area Air Quality Management District (2012) was used to quantify the toxic air contaminants (TACs) associated with the TOG fraction.

For particulate matter (PM_{10}), emissions were quantified as the sum of re-entrainment of paved roadway dust and tailpipe emissions. The predictive emission equation developed by the USEPA (2011) was used to generate the entrained dust source strength.

A list of emitted compounds for the mobile-source category is presented in Table 3.

4. Emissions Inventory

Table 3 Compounds Emitted from Mobile Sources

Source	Contaminant
SR-241 (gasoline vehicles and diesel trucks)	Diesel Particulate Matter (DPM) Total Organic Gases (TOG), toxic air contaminant species: Acetaldehyde, Acrolein, Benzene, 1,3-Butadiene, Ethyl Benzene, Formaldehyde, Hexane, Methanol, Methyl Ethyl Ketone, Naphthalene, Propylene, Styrene, Toluene, Xylenes Particulate Matter (PM_{10}) Carbon Monoxide Nitrogen Dioxide

Note: EMFAC2017 generates emission factors for nitrogen oxides (NOx). NOx to NO2 conversion rate was 0.015 for SR-241, derived from a report entitled Final Localized Significance Threshold Methodology (SCAQMD, 2008).

4.2 STATIONARY SOURCES

Contaminant release information and associated chemical species were identified through a review of available documentation for each source referenced in Section 3. To the degree practical, all contaminant emissions generated from each source location were considered in the analysis. The limiting factor for the inclusion of a compound was the availability of published exposure factors and other toxicity data enabling risks to be quantified and, where appropriate, target organs identified. The compounds emitted from each stationary source are listed in Table 4.

Table 4 Compounds Emitted from Stationary Sources

Source	Contaminant
Shell Station – gasoline dispensing	Benzene
Loan Depot – generator and boiler	Diesel Particulate Matter (DPM), Acetaldehyde, Acrolein, Ammonia, Benzene, Ethylbenzene, Formaldehyde, n-Hexane, Naphthalene, Toluene, Xylenes
Rubios Fresh Mexican Grill – charbroiler	Acetaldehyde, Benzene, Formaldehyde, Naphthalene, Polycyclic Aromatic Hydrocarbons (PAHs), Propionaldehyde, Styrene, Toluene

Appendix B contains a graphical representation of each emitting source. Appendix C presents the emission rate calculations for each source considered in the assessment.

5. Air Dispersion Modeling

To assess the impact of emitted compounds on individuals who may work and/or attend classes at the proposed school facility, air quality modeling using the AERMOD atmospheric dispersion model was performed. The model is a steady state Gaussian plume model and is recommended by SCAQMD for estimating ground level impacts from point and fugitive sources in simple and complex terrain.

The model requires additional input parameters, including chemical emission data and local meteorology. Meteorological (met) data provided by SCAQMD for the Mission Viejo met station (2011 - 2014, 2016) was used to represent local weather conditions and prevailing winds. According to the data from the Mission Viejo met station, the prevailing wind direction in the area of the project site is to the northeast. The wind rose is provided in Appendix C.

The modeling analysis also considered the spatial distribution and elevation of each emitting source in relation to the sensitive receptors. To accommodate the model's Cartesian grid format, direction-dependent calculations were obtained by identifying the Universal Transverse Mercator (UTM) coordinates for source and receptor locations. In addition, digital elevation model (DEM) data for the area were obtained and included in AERMOD to account for complex terrain.

For all modeling runs, a unit emission rate of 1 gram per second (g/s) was used. The unit emission rates were divided between the volume sources for SR-241. Two sets of volume sources were created for SR-241. One set representing the motor vehicles traveling along SR-241 was used to characterize emissions of TOG and criteria air pollutants. For this set of sources, a release height of 0.60 meter was used (CARB, 2000). The second set of sources representing truck traffic was used to characterize emissions of DPM. For this run, a release height of 4.15 meters was used (CARB, 2000). The model's by hour/day (HRDOW) scalar option was invoked to predict concentrations from variable hourly emissions from vehicular traffic.

The maximum AERMOD concentrations from the output files were then multiplied by the emission rates calculated in Appendix C to obtain the maximum ground-level concentrations at the maximum exposed receptor (MER). The air dispersion model output is presented in Appendix D. The calculated MER concentrations used in the HRA are provided in Appendix E. The annual average concentrations from the model run were used to determine cancer risk and chronic non-cancer risk, and the maximum one-hour concentrations were used to determine acute non-cancer risk. Additionally, CARB's Hotspots Analysis and Reporting Program (HARP2), Risk Assessment Standalone Tool was used to determine the 8-hour chronic non-cancer risk; the program determines the 8-hour non-cancer risk from the annual average concentrations (CARB, 2019).

5. Air Dispersion Modeling

This page intentionally left blank.

6. Risk Characterizations

6.1 CARCINOGENIC CHEMICAL RISK

Carcinogenic compounds are not considered to have threshold levels (i.e., dose levels below which there are no risks). Any exposure, therefore, will have some associated risk. The SCAQMD has established a maximum incremental cancer risk of 10 in a million ($1x10^{-5}$) for CEQA projects and the OEHHA also sets a typical risk management level as 10 in a million (OEHHA, 2015).

Health risks associated with exposure to carcinogenic compounds can be defined in terms of the probability of developing cancer as a result of exposure to a chemical at a given concentration. The cancer risk probability is determined by multiplying the chemical's annual concentration by its cancer potency factor (CPF), a measure of the carcinogenic potential of a chemical when a dose is received through the inhalation pathway. It is an upper-limit estimate of the probability of contracting cancer as a result of continuous exposure to an ambient concentration of one microgram per cubic meter ($\mu g/m^3$), averaged over a lifetime of 70 years.

Recent guidance from OEHHA recommends a refinement to the standard point estimate approach with the use of age-specific breathing rates and age sensitivity factors (ASFs) to assess risk for susceptible subpopulations such as children. For the inhalation pathway, the procedure requires the incorporation of several discrete variates to effectively quantify dose for each age group. Once determined, contaminant dose is multiplied by the cancer potency factor in units of inverse dose expressed in milligrams per kilogram per day $(mg/kg/day)^{-1}$ to derive the cancer risk estimate. Therefore, to accommodate the unique exposures associated with the proposed school population, the following dose algorithm was used.

$$\text{Dose}_{\text{AIR,per age group}} = \left(C_{air} \times EF \times \left[\frac{BR}{BW}\right] \times A \times CF\right)$$

Where:

$Dose_{AIR}$	=	dose by inhalation (mg/kg-day), per age group
C_{air}	=	concentration of contaminant in air ($\mu g/m^3$)
EF	=	exposure frequency (number of days /365 days)
BR/BW	=	daily breathing rate normalized to body weight (L/kg-day)
A	=	inhalation absorption factor (default = 1)
CF	=	conversion factor ($1x10^{-6}$, µg to mg, L to m^3)

The inhalation absorption factor (A) is a unitless factor that is only used if the cancer potency factor included a correction for absorption across the lung. For this assessment, the default value of 1 was used. To represent the unique characteristics of the school population, the assessment employed the USEPA's guidance to develop viable dose estimates based on reasonable maximum exposure, defined as the "highest exposure that

is reasonably expected to occur" for a given receptor population. Lifetime risk values for the student population were adjusted to account for an exposure of 180 days per year for 7 years (kindergarten through 6th grade). In addition, the calculated risk for students is multiplied by an ASF weighting factor of 3 (for children ages 2 to 16) to account for early life sensitivity to pollutant exposures (OEHHA, 2015). To assess staff-related risk, exposures were adjusted to account for an employment period of 250 days per year for 25 years. This timeline is considered appropriate for potential workplace exposures established by OEHHA.

To calculate the overall cancer risk, the risk for each appropriate age group is calculated per the following equation:

$$\text{Cancer Risk}_{\text{AIR}} = \text{Dose}_{\text{AIR}} \times \text{CPF} \times \text{ASF} \times \frac{\text{ED}}{AT}$$

Where:

Dose_{AIR}	=	dose by inhalation (mg/kg-day), per age group
CPF	=	cancer potency factor, chemical-specific $(\text{mg/kg-day})^{-1}$
ASF	=	age sensitivity factor, per age group
ED	=	exposure duration (years)
AT	=	averaging time period over which exposure duration is averaged (always 70 years)

The CPFs used in the assessment were obtained from OEHHA guidance. The cancer risk is calculated separately for the students and staff, because of age differences in sensitivity to carcinogens and age differences in intake rates. The final step converts the cancer risk in scientific notation to a whole number that expresses the cancer risk in "chances per million" by multiplying the cancer risk by a factor of $1x10^6$ (i.e., 1 million).

CARB's HARP2 Risk Assessment Standalone Tool was used to calculate the cancer risk values (CARB, 2019). The determined cancer risks attributed to each chemical exposure and summation of those risks are presented in Appendix E.

6.2 NON-CARCINOGENIC HAZARDS

An evaluation was conducted for the potential non-cancer effects of chronic and acute chemical exposures. Adverse health effects are evaluated by comparing the annual receptor level ground level concentration of each chemical compound with the appropriate Reference Exposure Level (REL). Available RELs promulgated by OEHHA were considered in the assessment.

The hazard index approach was used to quantify non-carcinogenic impacts. The hazard index assumes that chronic and acute sub-threshold exposures adversely affect a specific organ or organ system (toxicological endpoint). For each discrete chemical exposure, target organs presented in regulatory guidance were used. To calculate the hazard index, each chemical concentration or dose is divided by the appropriate toxicity value. The ratios are summed for compounds affecting the same toxicological endpoint. A health hazard is presumed to exist where the total equals or exceeds one.

CARB's HARP2 Risk Assessment Standalone Tool was used to calculate the chronic, 8-hour, and acute (1-hour) health risk values (CARB, 2019), and the determined hazard indices are provided in Appendix E.

6.3 CRITERIA AIR POLLUTANTS

The State of California has promulgated ambient air quality standards for various pollutants. These standards were established to safeguard the public's health and welfare with specific emphasis on protecting those individuals susceptible to respiratory distress, such as asthmatics, the young, the elderly, and those with existing conditions that may be affected by increased pollutant concentrations. A list of criteria air pollutants considered in the assessment and their associated air quality standards are presented in Table 5.

Table 5 California Ambient Air Quality Standards

Pollutant	Standard	Health Effects
Carbon Monoxide (CO)	>9.0 ppm (8 hr avg.) >20.0 ppm (1 hr avg.)	1) Aggravation of angina pectoris and other aspects of coronary heart disease. 2) Decreased exercise tolerance in persons with peripheral vascular disease and lung disease. 3) Impairment of central nervous system functions. 4) Possible increased risk to fetuses.
Nitrogen Dioxide (NO_2)	≥0.030 ppm (annual avg.) ≥0.18 ppm (1 hr avg.)	1) Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups. 2) Risk to public health implied by pulmonary and extra-pulmonary biochemical and cellular changes and pulmonary structural changes.
Particulates (PM_{10})	>50 μg/m^3 (24 hr avg.) >20 μg/m^3 (annual avg.)	1) Excess deaths from short-term exposures and the exacerbation of symptoms in sensitive individuals with respiratory disease. 2) Excess seasonal declines in pulmonary function especially in children.

Notes: ppm: parts per million; μg/m^3: micrograms per cubic meter
Source: California Code of Regulations, Title 17, Section 70200.

Pollutant emissions are considered to have a significant effect on the environment if they result in concentrations that create either a violation of an ambient air quality standard, contribute to an existing air quality violation, or expose sensitive receptors to significant pollutant concentrations. Should ambient air quality already exceed existing standards, SCAQMD has established significance criteria that identify incremental air concentrations for selected pollutants. According to SCAQMD's Localized Significance Threshold (LST) Methodology (2008), SCAQMD considers sensitive receptors to include residences, hospitals, or convalescent facilities where it is possible that an individual could be present for 24 hours per day. For school-based receptors, LSTs for 24-hour ambient air quality standards would not apply. However, LSTs for commercial receptors would apply for the annual average and shorter averaging periods, such as 1-hour and 8-hour averages, since a commercial (i.e., worker) receptor durations are typically no more than 8 hours and are more applicable to school-based receptors.

Table 6 outlines the significance thresholds considered for sites that are within an air basin where criteria pollutants exceed air quality standards.

6. Risk Characterizations

Table 6 Localized Significance Thresholds

Pollutant	Averaging Time	Significance Criteria
Carbon Monoxide (CO)	8 Hours 1 Hour	Project contributes to exceedance of 9.0 ppm Project contributes to exceedance of 20 ppm
Nitrogen Dioxide (NO_2)	Annual 1 Hour	Project contributes to exceedance of 0.03 ppm Project contributes to exceedance of 0.18 ppm
Particulates (PM_{10})	Annual	Project causes an incremental increase of 1.0 $\mu g/m^3$

Notes: ppm: parts per million; $\mu g/m^3$: micrograms per cubic meter
Source: SCAQMD, 2015. SCAQMD Air Quality Significance Thresholds accessed online at http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook.

The nearest active air quality monitoring station to the project site is the Saddleback Valley Monitoring Station. Background concentrations are based on the highest observed value for the most recent three-year period. NO_2 data was not collected for the Saddleback Valley Monitoring Station. Therefore, NO_2 data from the nearest monitoring station with available data (North Coastal Orange County Monitoring Station) were used for the analysis. A summary of the monitoring station data is presented in Table 7.

Table 7 Saddleback Valley Monitoring Station Summary

	Year				
Pollutant/Averaging Time	2017	2016	2015	Maximum	CAAQS
Carbon Monoxide (CO)					
1-Hour	1.4	1.3	1.4	1.4	20
8-Hour	0.9	0.7	0.7	0.9	9
Nitrogen Dioxide (NO_2)					
1-Hour	0.0453	0.0598	0.0524	0.0598	0.18
Annual	0.0079	0.0101	0.0116	0.0116	0.030
Particulates (PM_{10})					
Annual	18.4	21.0	19.0	21.0	20

Note: Coarse Particulates (PM_{10}) are expressed in micrograms per cubic meter ($\mu g/m3$). All others are expressed in parts per million (ppm).
Source: SCAQMD, 2019. Historical Data by Year, https://www.aqmd.gov/home/air-quality/air-quality-data-studies/historical-data-by-year.

For carbon monoxide (CO) and nitrogen dioxide (NO_2), background concentrations are below the current air quality standards. Therefore, impacts are considered to be significant when pollutant concentrations, added to existing background levels, result in an exceedance of the CAAQS.

For particulate emissions, maximum background concentrations in the vicinity of the site exceed the California Ambient Air Quality Standard (CAAQS) for the annual average PM_{10} concentrations. Additionally, the project site is within a non-attainment area for PM_{10} (CARB, 2017). As a result, SCAQMD defines a significant impact as PM_{10} concentrations that exceed the specified localized significance threshold (LST) of 1.0 $\mu g/m^3$ for annually averaged concentrations.

Appendix E, Table E5, presents the criteria air pollutant ground level concentrations at the project site determined using AERMOD.

6.4 ACCIDENTAL RELEASES

Under the auspices of the California Accidental Release Prevention (CalARP) Program, a Risk Management Plan (RMP) is required to be conducted pursuant to the provisions of the federal Accidental Release Prevention program (Title 40, Code of Federal Regulations, Part 68) Article 2, Chapter 6.95 of the Health and Safety Code. The RMP is only required should a stationary source use more than a threshold quantity of a regulated hazardous substance, and includes a risk assessment of accidental releases.

A review of the available information collected during the source identification process (e.g., regulatory records review and interviews with business owner/operators) did not reveal the presence of any CalARP program facilities within 0.25 mile of the proposed site (The Right-to-Know Network, 2019).

6. Risk Characterizations

This page intentionally left blank.

7. Conclusions

The results of the health risk assessment are provided in Table 8. The excess cancer risk was calculated to be 0.05 per million for adult school staff and 0.08 per million for students. In comparison to the threshold level of 10 in a million, carcinogenic risks are well below the significance threshold value for both school staff and students. For non-carcinogenic effects, the chronic hazard index identified for each toxicological endpoint totaled less than one for both school staff and students. Therefore, chronic non-carcinogenic hazards are below the significance threshold. Additionally, the acute 1-hour and 8-hour non-carcinogenic hazards were also below the significance thresholds.

Table 8 Health Risk Assessment Results

Source	Cancer Risk (per million)		Chronic Hazard Index	Acute (1-Hour) Hazard Index	8-Hour Hazard Index
	Staff Exposure	Student Exposure			
All Sources	0.05	0.08	0.001	0.002	0.001
SCAQMD Threshold	10	10	1.0	1.0	1.0
Exceeds Threshold	**No**	**No**	**No**	**No**	**No**

A comparison of the current air quality standards with the results of the modeling analysis for SR-241 vehicle emissions is provided below:

- For carbon monoxide (CO), the maximum one-hour concentration of 0.01 ppm and the maximum eight-hour concentration of 0.002 ppm, when added to existing background levels, do not exceed the CAAQS.

- For nitrogen dioxide (NO_2), maximum one-hour and annual concentrations of 1×10^{-4} ppm and 3×10^{-6} ppm were calculated, respectively. These concentrations, when added to existing background levels, do not exceed the CAAQS.

- For PM_{10}, an annual average concentration of 0.04 micrograms per cubic meter ($\mu g/m^3$) was predicted. The annual average concentration does not exceed the SCAQMD significance threshold of 1.0 $\mu g/m^3$.

Based on a comparison to the carcinogenic and non-carcinogenic thresholds established by OEHHA and SCAQMD, hazardous air emissions generated from the stationary and mobile sources within a quarter-mile radius are not anticipated to pose an actual or potential endangerment to students and staff occupying the project site and no mitigation measures are required.

7. Conclusions

This page intentionally left blank.

8. References

Bay Area Air Quality Management District (BAAQMD). 2012, May. *Recommended Methods for Screening and Modeling Local Risks and Hazards.* Version 3.0.

California Air Resources Board (CARB). 2019. Hotspots Analysis and Report Program (HARP2), Risk Assessment Standalone Tool (RAST), Version 19044.

———. 2017. *EMFAC2017 - Calculating Emission Inventories for Vehicles in California.*

———. 2017. Area Designations Maps/State and National. https://www.arb.ca.gov/desig/adm/adm.htm.

———. 2000. *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles.*

California Department of Transportation (Caltrans). 2019. Performance Measurement System (PeMS), accessed on January 25, 2019 at http://pems.dot.ca.gov.

_____. 2017. Traffic Data Branch, accessed on February 4, 2019 at http://www.dot.ca.gov/trafficops/census/.

Office of Environmental Health Hazard Assessment (OEHHA). 2015, February. *Air Toxics Hot Spots Program Guidance Manual for the Preparation of Health Risk Assessments.*

The Right-to-Know Network. 2019. The Right-to-Know Network, hosted by the Houston Chronicle, accessed on February 12, 2019 at http://www.rtk.net/rmp/search.php.

South Coast Air Quality Management District (SCAQMD). 2019. Historical Data By Year, accessed on February 12, 2019 at https://www.aqmd.gov/home/air-quality/air-quality-data-studies/historical-data-by-year.

———. 2015. Air Quality Significance Thresholds, accessed on February 20, 2019 at http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/.

———. 2011-2014, 2016. *Data Set for Mission Viejo Meteorological Station.*

———. 2008. *Final Localized Significance Threshold Methodology.* Revised July 2008.

United States Environmental Protection Agency (USEPA). 2011. Technology Transfer Network, Clearinghouse for Inventories and Emission Factors. *Compilation of Air Pollutant Emission Factors*, accessed on October 30, 2018 at https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emission-factors.

———. 2005. *Guideline on Air Quality Models* (Revised). EPA-450/2-78-027R.

8. References

This page intentionally left blank.

Appendix A. Stationary Emission Sources

Table A - Stationary Emission Sources
Nakase Elementary School
Health Risk Assessment

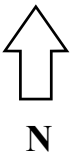
No.	FACILITY	AQMD ID	ADDRESS		CITY	ZIP	NOTES
2	Shell Station	122537	26721	Rancho Parkway	Lake Forest	92630	Gas dispensing
3	Loan Depot	156082	26672, 26642, 26632	Towne Centre Drive	Foothill Ranch	92610	Boiler/Emergency Generator
4	Rubio's Fresh Mexican Grill #91	120573	26612	Towne Centre Drive	Foothill Ranch	92610	Natural Gas Charbroiler
Omitted Facilities							
	Wonderware	171963	26541	Rancho Parkway South	Lake Forest	92630	No equipment; de minimis emissions
	Invensys	138330	26561	Rancho Parkway South	Lake Forest	92630	No equipment; de minimis emissions
	Triconex	171964	26521	Rancho Parkway South	Lake Forest	92630	No equipment; de minimis emissions

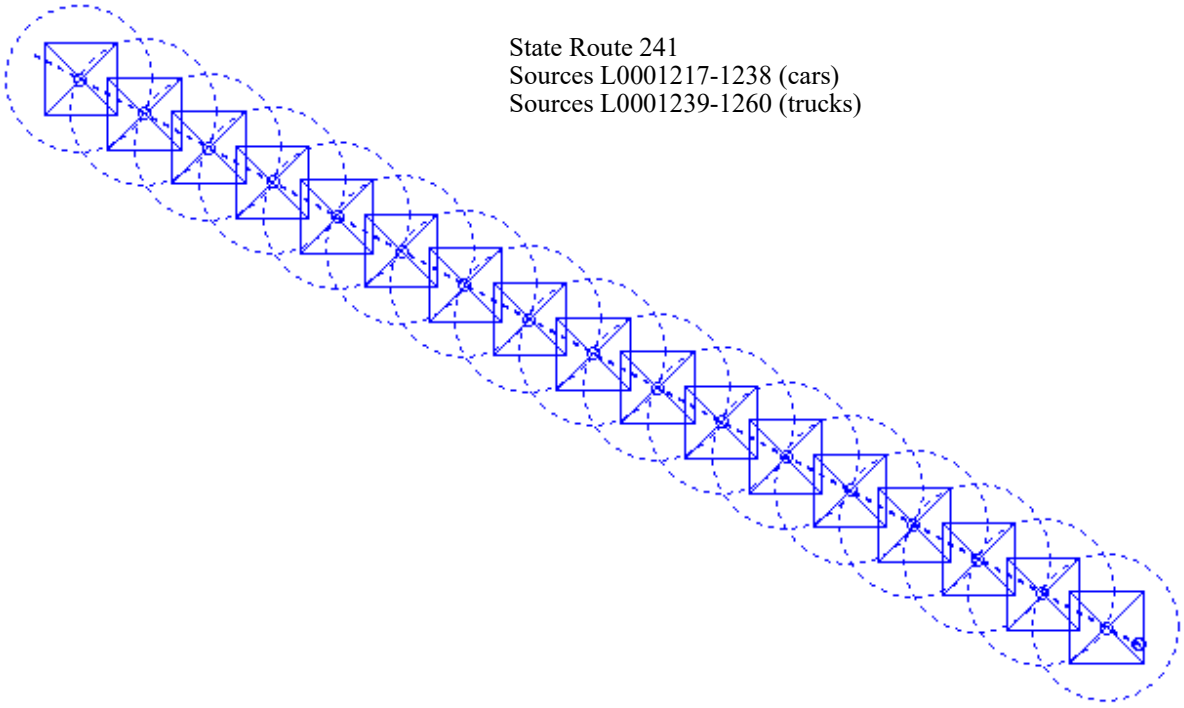
Appendix B. Graphical Representation of Emitting Sources

Appendix

This page intentionally left blank.

Source 1
State Route 241
Mile Post 21.802 to 23.418
Sources L0001217-1238 (cars)
Sources L0001239-1260 (trucks)

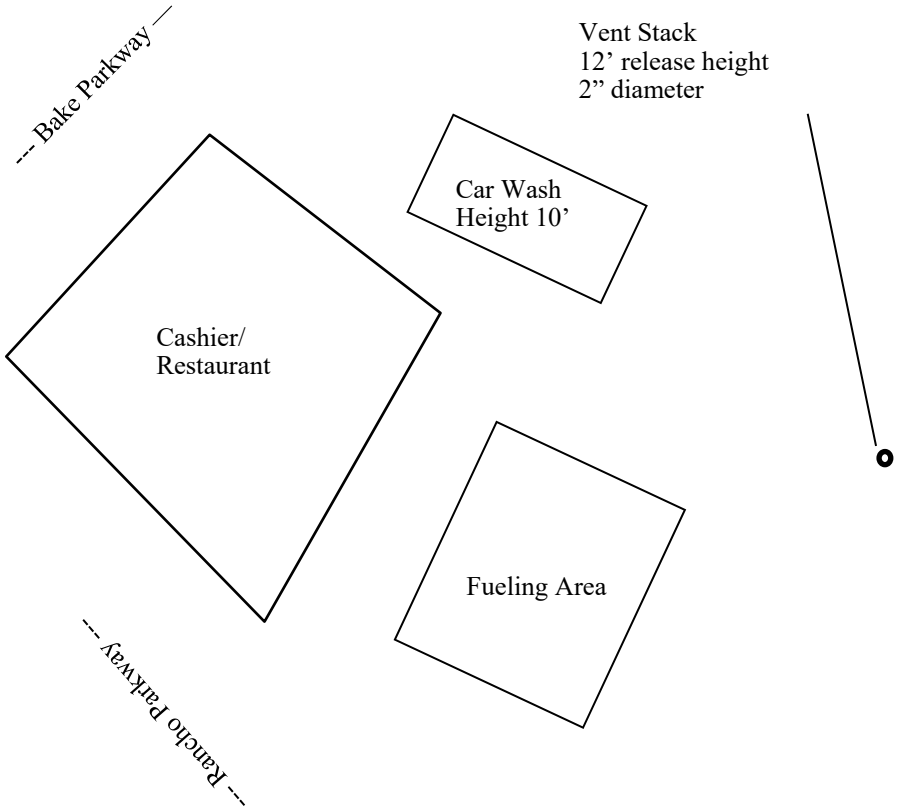




- Release height of 4.15 m is based upon California Air Resources Board's "Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles" (2000). Release of 0.6 m used for gasoline-fueled vehicles.

Source 2
Shell Station
26721 Rancho Parkway
Lake Forest CA 92630
24 hours per day, 7 days per week

Chemical and Use Rate
Gasoline Dispensing: 8,000 gallons per day

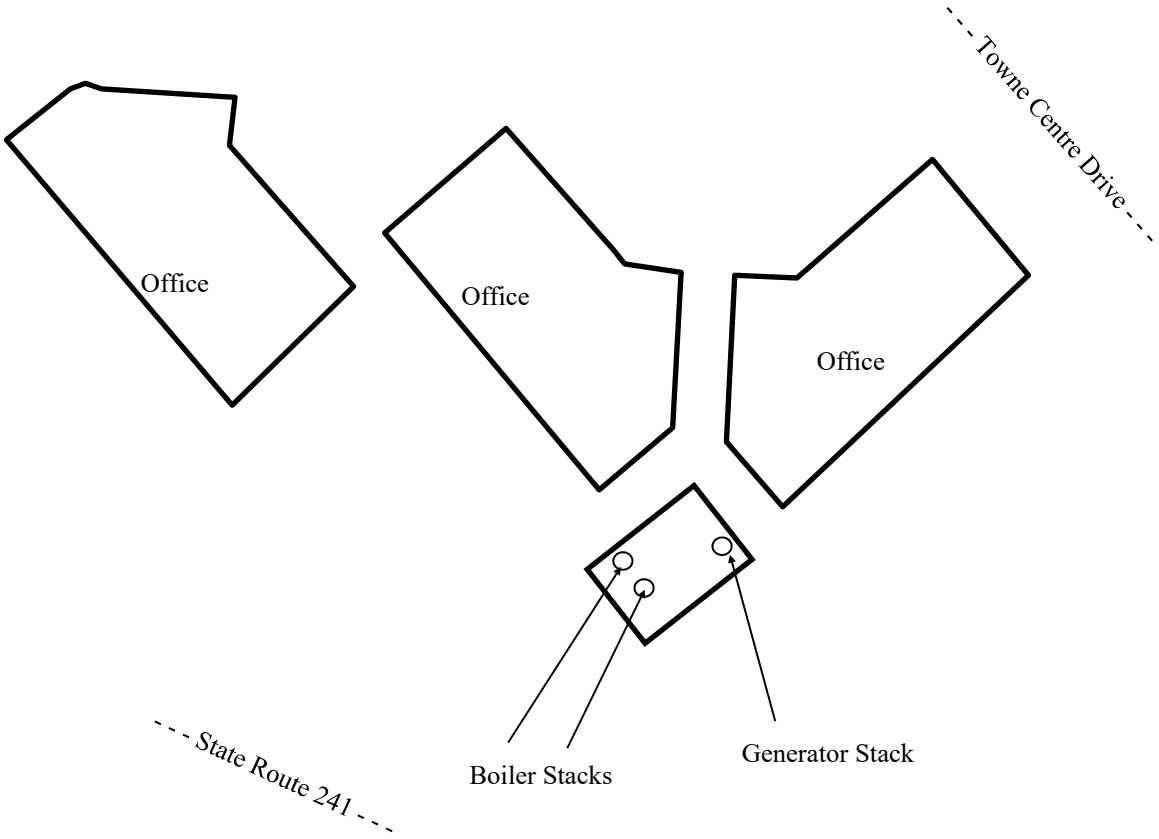


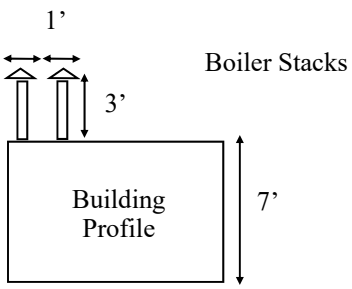
- Fueling area is based upon California Air Pollution Control Officers Association (CAPCOA) *Gasoline Service Station Industrywide Risk Assessment Guidelines* (1998). Volume source parameters: 4 m height; 13 m x 13 m area
- Volume Source Modeling (Refueling and hose permeation): Source height of 4 m, release height of 1 m, and δz of 0.93 m are based upon CAPCOA guidance (1998).
– Volume Source Modeling (Spillage): Source height of 4 m, release height of 0 m, and δz of 1.86 m are based upon based upon CAPCOA guidance (1998).
– Point Source Modeling (Transfer and Pressure Driven Losses): Stack parameters based upon CAPCOA guidance (1998).

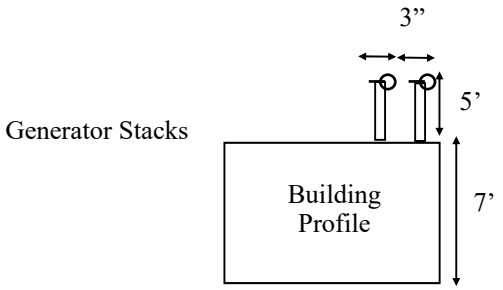
Source 3
Loan Depot
26672, 26642, and 26632 Towne Center Plaza
Foothill Ranch, CA 92610
Monday - Friday: 9:00 AM - 5:00 PM

N

Chemical and Use Rate
Natural Gas Boilers (2): 1,999,000 BTU per hour
Emergency Generator: 2,220 brake horsepower, tested no more than 20 hours per year

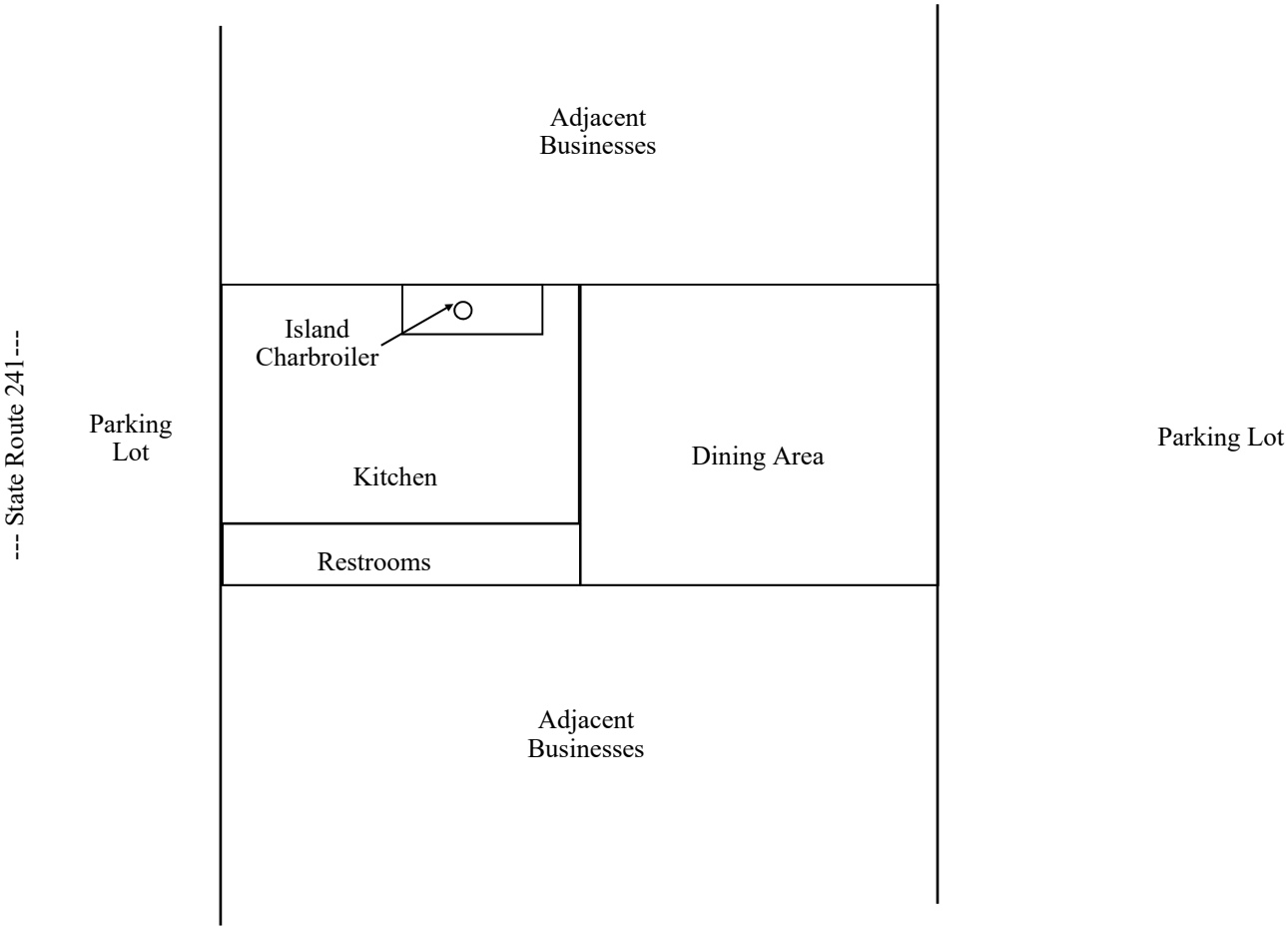


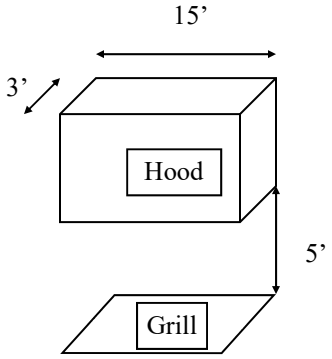


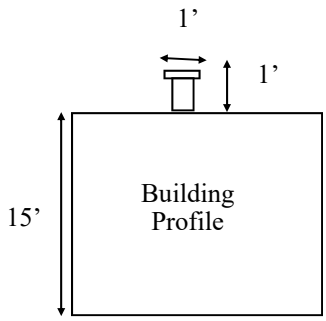


Source 4
Rubio's Mexican Grill
26612 Towne Center Drive,
Foothill Ranch 92610
Monday-Friday: 10:30 AM - 9:00 PM
Saturday-Sunday: 11:00AM - 9:00PM

Chemical and Use Rate
Charbroiler, under-fired: 20 pounds per day of meat cooked;
20 pounds per day of skinless poultry cooked; 15 pounds per day of seafood cooked.







Appendix C. Emission Rate Calculations

Vehicle Mix Worksheet

Table A: Traffic Volumes

Route	Mile Post	Traffic Data Year	Peak Hour Traffic (veh/hr)[1]	Truck Percentage (%)[2]	Annual Increase in Traffic (%)	School Buildout Year[3]
State Route 241	21.802-23.418	2017	4,600	7.6%	1.0%	2024

Sources:

1. Caltrans, Traffic Data Branch (2018). Website: http://www.dot.ca.gov/trafficops/census/.
2. Caltrans, PEMS (2018). Website: http://pems.dot.ca.gov/.
3. Buildout year of 2024 was chosen as a conservative estimate. Actual buildout year is unknown.

Table B: Highway Parameters

Link/Segment	Link length (m)	Width of roadway (m)	Source Separation (m)	Roadway Configuration	Mile Post	Speed
State Route 241	962	44.0	44.0	At-Grade	21.802-23.418	55 mph

Table C: Segment Volumes

Link/Segment	Period Length (years)	Hourly All Vehicles	Hourly TOG Vehicles	Hourly Diesel Vehicles[4]
2024[1]	1	**4,932**	**4,559**	373
2025[1]	5	4,981	4,605	377
2030[1]	5	5,235	4,839	396
2035[1]	5	5,502	5,086	416
2040[1]	9	5,783	5,346	437
25-year weighted average[2]	25	5,423	**5,013**	**410**
7-year weighted average[3]	7	5,010	**4,632**	**379**

1 Increases in Peak Hourly Traffic based on annual traffic increase based on projected vehicle mile traveled (VMT) growth rate of 1% per year from 2024 to 2048 (CARB, EMFAC2017).

2 Represents the 25-year (staff) weighted average traffic volumes, accounting for annual increases in projected traffic.

3 Represents the 7-year (K-6th grade students) weighted average traffic volumes, accounting for annual increases in projected traffic.

4 Truck percentage of 7.6%, from CalTrans PEMS (2018), used to represent the diesel vehicle traffic along roadway segment.

On-Road Mobile Sources
Emission Rate Computation

TOG and DPM Emission Rates

Emission Rate = EF x VPH x L

EF = emission factor (g/mi)
VPH = Peak Hour Volume (vehicles per hour)

L = Link Length (m)		962
Conversion Factors	m/mi	1609.3
	sec/hr	3600

1 **State Route 241**
Mile Post 21.802-23.418

1a Gasoline Vehicles

Long-Term Hazards

TOG EF (g/mi) - 2024	0.0206
VPH - 25-year, gasoline fueled vehicles	5,013
TOG Emission Rate (g/s) - Staff	**1.72E-02**

TOG EF (g/mi) - 2024	0.0206
VPH - 7-year, gasoline fueled vehicles	4,632
TOG Emission Rate (g/s) - Students	**1.59E-02**

Acute Hazards

TOG EF (g/mi) - 2024	0.0206
VPH - 1-hour, gasoline fueled vehicles	4,559
TOG Emission Rate (g/s) - 1-hour	**1.56E-02**

1b Diesel Vehicles

DPM EF (g/mi) - 2024	0.0129
VPH - 25-year, diesel fueled vehicles	410
DPM Emission Rate (g/s) - Staff	**8.80E-04**

DPM EF (g/mi) - 2024	0.0129
VPH - 7-year, diesel fueled vehicles	379
DPM Emission Rate (g/s) - Students	**8.13E-04**

On-Road Mobile Souces
Emission Rate Computation

Particulate (PM_{10}) Emissions

PM_{10} Vehicular Emission Factor (g/mi)	0.0535

Source: EMFAC2017 emission factor for all vehicles in Orange County at buildout year (2024). Includes running emissions (RUNEX), brake wear (PMBW) and tire wear (PMTW) emission rates.

PM_{10} Reentrainment Emission Factor = $k * (sL)^{0.91} * (W)^{1.02} * (1 - P/4N)$

k = particle size multiplier (g/VMT)	1.00
sL = roadway specific silt loading (g/m^2)	0.02
W = average weight of vehicles on road (tons)	2.4
P = number of days >0.01 in of precipitation (LA County)	34
N = number of days in averaging period	365

PM_{10} Reentrainment EF (g/VMT)	0.06785

Source: CARB, 2014. Miscellaneous Process Methodology 7.9, Entrained Road Travel, Paved Road Dust.

1 State Route 241

Mile Post 21.802-23.418

Emission Rate = EF x VPH x L

EF = emission factor (vehicle or reentrained dust)		
VPH = Peak Hour Volume (vehicles per hour)		4,932
L = Link Length (m)		962
Conversion Factors	m/mi	1,609.3
	sec/hr	3,600

Peak Hour Emission Rates

Vehicular Emission Rate (g/s)	4.38E-02
Reentrainment Emission Rate (g/s)	5.56E-02
PM_{10} Peak Hour Emission Rate Total (g/s)	**9.93E-02**

On-Road Mobile Sources
Emission Rate Computation

CO and NOx Emissions

Emission Rate = EF x VPH x L

EF = emission factor (g/mi)

VPH = Peak Hour Volume (vehicles per hour)

L = Link Length (m)		962
Conversion Factors	m/mi	1,609.3
	sec/hr	3,600

1 State Route 241

Mile Post 21.802-23.418

Carbon Monoxide

CO EF (g/mi) - 2020	0.5666
VPH - 2020	4,932
CO Peak Hour Emission Rate (g/s) - 2020	**4.64E-01**

Nitrogen Oxides

NOx EF (g/mi) - 2020	0.1135
VPH - 2020	4,932
NOx Peak Hour Emission Rate (g/s) - 2020	**9.30E-02**

Source: EMFAC2017 emission factor for all vehicles in Orange County at buildout year (2024).

Initial Sigma Computation

Vertical Sigma Calculations - At-Grade or Above Grade Roadway

Initial Horizontal Dispersion Parameter (Sigma Y)
SY = (source separation distance)/2.15

Initial Vertical Dispersion Parameter (Sigma Z)
$SZ = (1.8 + 0.11(TR)) \times (60/30)^{0.2}$
TR = W2/U

Where:
W2 = traveled way half width (m)
U = average wind speed (m/s)

1 State Route 241

Width of Traveled Way (m)	44.0
Average Wind Speed (m/s)	1.98
Source Separation Distance (m)	44.0

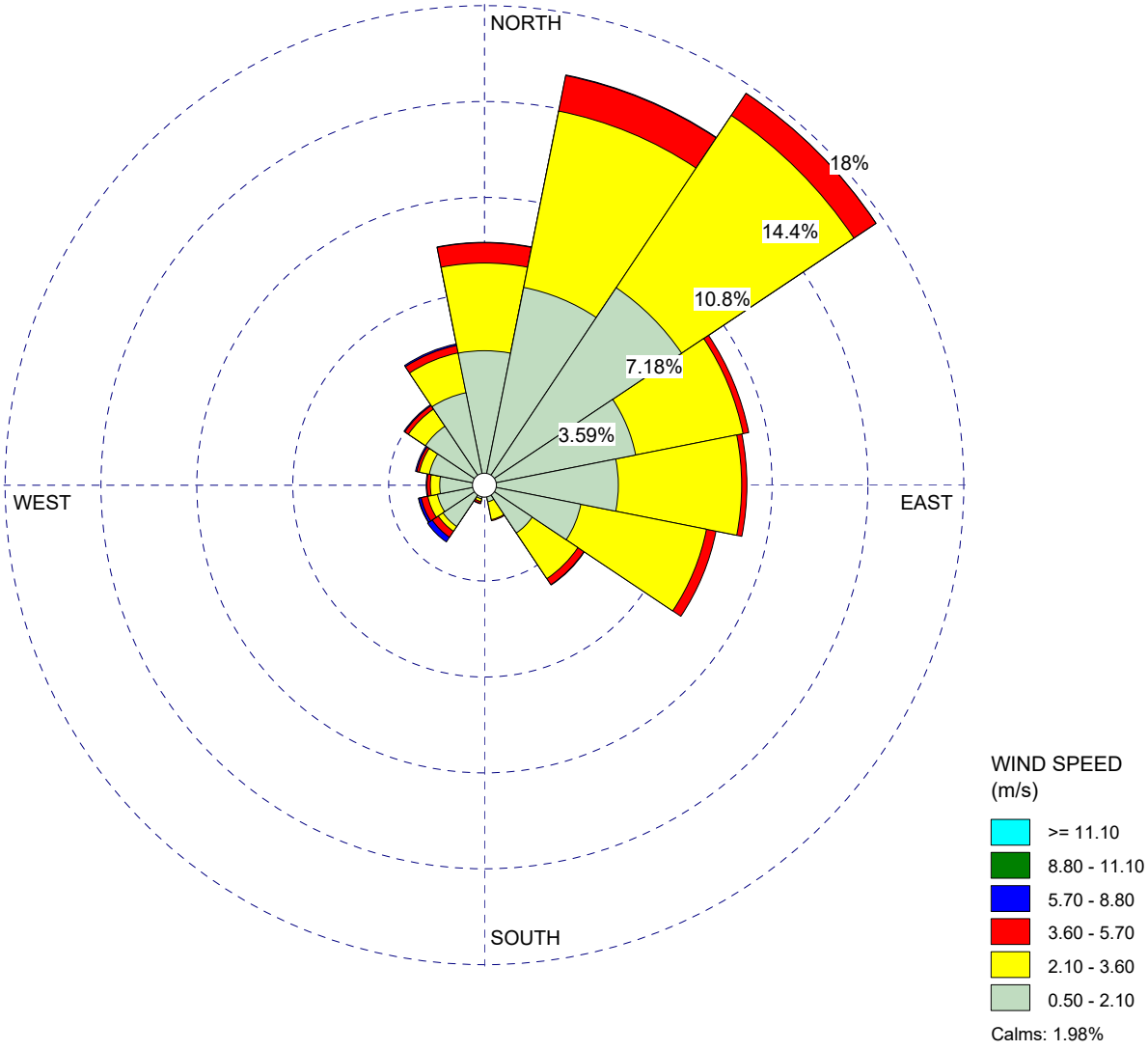
SY = **20.47**
SZ = **3.47**

WIND ROSE PLOT:

Mission Viejo Meteorological Station
2011-2014, 2016

DISPLAY:

Wind Speed
Flow Vector (blowing to)



COMMENTS: School Hours 8AM-4PM	DATA PERIOD: **Start Date: 1/1/2011 - 08:00** **End Date: 12/31/2016 - 15:00**	COMPANY NAME:	
		MODELER:	
	CALM WINDS: **1.98%**	TOTAL COUNT: **14441 hrs.**	
	AVG. WIND SPEED: **1.98 m/s**	DATE: **3/7/2019**	PROJECT NO.: **TBRO-02.0**

Variable Emissions Worksheet
Caltrans PeMS Data

Caltrans PeMS VMT Aggregates - 7/1/2018 - 09/30/2018: SR-241							Normalizing Factors HROFDAY Scalars [1]		
	All Vehicles - Daily VMT			Trucks - Daily VMT					
Hour	Southbound	Northbound	Total VMT	Eastbound	Westbound	Total VMT	Hour	Vehicles	Trucks
0	9	278	287	0	0	0	1	0.134	0.000
1	4	273	277	0	0	0	2	0.129	0.000
2	1	271	272	0	0	0	3	0.127	0.000
3	2	279	281	0	0	0	4	0.131	0.000
4	12	347	359	0	0	0	5	0.167	0.002
5	58	568	626	9	0	10	6	0.292	0.059
6	208	1,069	1,278	50	2	52	7	0.596	0.321
7	355	1,790	2,145	87	8	95	8	1.000	0.588
8	350	1,649	1,998	81	6	86	9	0.932	0.533
9	253	1,139	1,392	61	1	62	10	0.649	0.383
10	204	904	1,108	52	1	54	11	0.517	0.330
11	206	850	1,055	58	1	59	12	0.492	0.364
12	212	821	1,033	69	1	70	13	0.482	0.434
13	250	824	1,075	84	1	85	14	0.501	0.525
14	317	868	1,185	103	2	105	15	0.553	0.647
15	408	898	1,305	127	3	130	16	0.609	0.801
16	517	917	1,433	143	4	146	17	0.668	0.902
17	597	975	1,572	158	4	162	**18**	**0.733**	**1.000**
18	442	804	1,246	118	3	121	19	0.581	0.746
19	240	610	850	56	1	58	20	0.396	0.355
20	145	486	631	29	0	29	21	0.294	0.181
21	84	412	496	18	0	18	22	0.231	0.109
22	57	346	403	10	0	10	23	0.188	0.064
23	29	299	327	2	0	2	24	0.153	0.013
Max	597	1,790	2,145	158	8	162			

[1] School Hours: 8:00 AM - 4:00 PM (Hour 9-16)

Number of Days - PeMS Data
63.0

Truck Percentage Check	7.56%
Caltrans	3.80%

Report Description

Report	Aggregates>Time Series
Report link	***http://pems.dot.ca.gov/?report_form=1&dnode=VDS&content=loops&statio***
Report generated	01/25/2019 15:09
PeMS version	caltrans_pems-18.0.0

Report Parameters

Parameter	Value
Quantity	Vehicle Miles Traveled (VMT)
Data	54,429 Lane Points
Data Quality	29.2% Observed
Segment Type	VDS
Segment Name	Mainline VDS 1209568 - N OF ALTON
start date	07/02/2018 00:00:00
end date	09/30/2018 23:59:59
Day of Week	Mo,Tu,We,Th,Fr
Granularity	hour

Report Parameters

Parameter	Value
Quantity	Vehicle Miles Traveled (VMT)
Data	54,429 Lane Points
Data Quality	0% Observed
Segment Type	VDS
Segment Name	Mainline VDS 1209614 - UPPER OSO
start date	07/01/2018 00:00:00
end date	09/30/2018 23:59:59
Day of Week	Mo,Tu,We,Th,Fr
Granularity	hour

EMISSION FACTOR CALCULATIONS
EMFAC 2017

EMFAC2017 (v1.0.2) Emission Rates
Region Type: County
Region: ORANGE
Calendar Year: 2024
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW

Speed (mph)

55

TOTAL EMISSION RATES (g/mi)

	TOG	DPM	PM10	CO	NOx
Gas	**0.0206**				
DSL		**0.0129**			
NG					
Total	0.0215		0.0535	0.5666	0.1135

		Fleet Mix Percentage	VMT (Mi/day)	TOG (g/mi)	TOG Weighted	DPM (g/mi)	DPM Weighted	PM10 (g/mi)	PM10 Weighted	CO (g/mi)	CO Weighted	NOx (g/mi)	NOx Weighted
HHDT	GAS		122	0.4201	51	0.0009	0	0.09864	12	22.147	2712	3.1371	384
HHDT	DSL	0.229	117501	0.0162	1903	0.02336	2744	0.10510	12349	0.0971	11411	1.3307	156359
HHDT	NG		0	0	0	0	0	0.09774	0	0	0	0	0
LDA	GAS		3273411	0.0067	21950	0.00097	3189	0.04572	149674	0.4442	1454193	0.0246	80680
LDA	DSL	0.069	35225	0.007	246	0.00368	130	0.04843	1706	0.1023	3604	0.0363	1277
LDT1	GAS		352332	0.0177	6243	0.00126	442	0.04601	16209	0.7394	260525	0.0627	22106
LDT1	DSL	0.000	62	0.1431	9	0.09987	6	0.14462	9	0.8523	53	0.8598	53
LDT2	GAS		1096552	0.0116	12755	0.00099	1081	0.04574	50152	0.5881	644875	0.0467	51240
LDT2	DSL	0.017	8976	0.0086	77	0.00352	32	0.04827	433	0.0693	622	0.0261	234
LHDT1	GAS		113624	0.022	2500	0.00083	94	0.08927	10143	0.4368	49632	0.1311	14893
LHDT1	DSL	0.179	91754	0.0485	4450	0.01085	995	0.09529	8743	0.2548	23380	1.1758	107886
LHDT2	GAS		19639	0.0142	279	0.00074	14	0.10192	2002	0.2912	5719	0.1337	2626
LHDT2	DSL	0.069	35352	0.044	1556	0.01213	429	0.10931	3864	0.2252	7962	0.9783	34584
MCY	GAS		28103	2.1453	60290	0.00163	46	0.01739	489	16.446	462177	1.0897	30623
MDV	GAS		711166	0.0152	10844	0.00101	719	0.04576	32544	0.6661	473705	0.0612	43538
MDV	DSL	0.039	19885	0.0062	124	0.00308	61	0.04783	951	0.1036	2061	0.0315	627
MH	GAS		6169	0.039	240	0.00089	5	0.14723	908	0.8327	5137	0.2458	1516
MH	DSL	0.006	2876	0.0481	138	0.08687	250	0.22921	659	0.2056	591	2.9906	8602
MHDT	GAS		35164	0.0286	1007	0.00066	23	0.14300	5028	0.5649	19863	0.1976	6949
MHDT	DSL	0.381	195556	0.0065	1276	0.00949	1856	0.15183	29691	0.0353	6894	0.5975	116840
OBUS	GAS		4187	0.0453	190	0.00069	3	0.14303	599	0.876	3668	0.307	1286
OBUS	DSL	0.010	4882	0.0096	47	0.01481	72	0.15715	767	0.0567	277	0.8751	4272
SBUS	GAS		1052	0.0528	56	0.00065	1	0.75745	797	1.0923	1149	0.4547	478
SBUS	DSL	0.003	1707	0.0597	102	0.04022	69	0.79302	1354	0.1762	301	6.6952	11431
UBUS	GAS		274	0.0118	3	0.00068	0	0.00068	0	0.2065	57	0.1837	50
UBUS	DSL	0.000	0	0	0	0	0	0.14235	0	0	0	0	0
UBUS	NG		1182	4.2268	4998	0.00119	1	0.10156	120	40.248	47588	0.3054	361
Gas Total			5641796		116409		5619		268557		3383412		256371
DSL Total		1.00	513775		9928		6643		60527		57155		442165
NG Total			1182		4998		1		120		47588		361

Note: Total Emission Rate (g/mi)=Sum of Weighted Emission Rates(g/day)/Sum of VMTs(mi/day)

Source 2
Shell Station
26721 Rancho Parkway
Lake Forest, California 92630

Operation: Gasoline/Diesel Dispensing

	hours	days	weeks
Temporal Profile:	24	7	52
	0	0	0

Materials: (1)

Unleaded Gasoline	240,000	gal/mo

Emission Factor: (2)

Phase II Fueling Non-ORVR	0.42	lbs VOC/1,000 gal
Phase II Fueling ORVR	0.021	lbs VOC/1,000 gal
Phase I Bulk Transfer Losses	0.15	lbs VOC/1,000 gal
Pressure Driven Losses	0.024	lbs VOC/1,000 gal
Phase II Fueling - Spillage	0.24	lbs VOC/1,000 gal
Hose Permeation (2017)	0.009	lbs VOC/1,000 gal

Volume Source Emissions (3)

Refueling (4)	0.13	lbs VOC/1,000 gal
Refueling Emissions	4.41E-02	lbs/hr
	5.56E-03	**g/s**
Spillage (5)	0.24	lbs VOC/1,000 gal
Spillage Emissions	7.91E-02	lbs/hr
	9.97E-03	**g/s**

Point Source Emissions (6)

Transfer and Pressure Losses (7)	0.17	lbs VOC/1,000 gal
Transfer and Pressure Emissior	5.74E-02	lbs/hr
	7.23E-03	**g/s**

(1) Gasoline dispensed amount based on estimate from manager of 8,000 gallons/day of gasoline.

(2) Emission factors is based upon CARB's Revised Emission Factors for Gasoline Marketing Operations at California Gasoline Dispensing Facilities (CARB, 2013). TAC speciation: 0.3% benzene for transfer, pressure losses and refueling emissions; 1% benzene for spillage California Air Pollution Control Officers Assocation (CAPCOA) Gasoline Service Station Industrywide Risk Assessment Guidelines (CAPCOA, 1998).

(3) Volume sources modeled as 4 m high, 13 m long and 13 m wide (CAPCOA, 1998).

(4) Refueling emission include fueling non-ORVR and ORVR vehicles (74% of vehicles; CARB, 2013) and hose permeation (2017 emission rate). Release height 1 m (CAPCOA, 1998).

(5) Release height 0 m for spillage (CAPCOA, 1998).

(6) Point sources modeled as vertical stack with release height 12 feet, diameter 2 inches, temperature 60F, and exit velocity 0.01 m/s (CAPCOA, 1998).

(7) Transfer and pressure driven loss emissions modeling as a single vent pipe (CAPCOA, 1998).

Source 3a
Loan Depot
26632, 26642, and 26672 Towne Centre Drive
Foothill Ranch, California 92610

Operation: Natural Gas Combustion - Boilers

	hours	days	weeks
Temporal Profile:	16	5	52
	0	0	0

Equipment Rating: (1)

Boilers: BTU/Hour	1,999,000
Boilers: Number	2

Emissions:	Emission Factors: (2) lb/mmcf gas	lb/mmbtu	Compound Emissions	Adjusted Wt Fraction
Acetaldehyde	4.30E-03	4.22E-06	1.69E-05	2.37E-04
Acrolein	2.70E-03	2.65E-06	1.06E-05	1.49E-04
Ammonia	1.80E+01	1.76E-02	7.06E-02	9.94E-01
Benzene	8.00E-03	7.84E-06	3.14E-05	4.42E-04
Ethylbenzene	9.50E-03	9.31E-06	3.72E-05	5.25E-04
Formaldehyde	1.70E-02	1.67E-05	6.66E-05	9.39E-04
n-Hexane	6.30E-03	6.18E-06	2.47E-05	3.48E-04
Naphthalene	3.00E-04	2.94E-07	1.18E-06	1.66E-05
Toluene	3.66E-02	3.59E-05	1.43E-04	2.02E-03
Xylene	2.72E-02	2.67E-05	1.07E-04	1.50E-03
Total			7.10E-02	lb/hr
			8.94E-03	g/s
			4.47E-03	**g/s/stack**

Point Source Specifications (vertical release with rain cap):

Stack Temperature	400	F	2 Stacks
Stack Flowrate	1,664	cfm	
Stack Diameter	1.0	ft	
Stack Height	10	ft	

(1) Assumed equipment rating based on <2 MMBTU/hr SCAQMD requirement. Owner not cooperative with request for equipment
(2) Emission factors (pounds per million standard cubic feet of fuel burned) and btu/scf conversion (1,020 btu/scf) based upon SCAQMD Supplemental Instruction - Reporting Procedures for AB2588 Facilities (2014). Appendix B, Table B-1: Default Emission Factors for Natural Gas Combustion (< 10 MMBTU/HR).

Source 3b
Loan Depot
26632, 26642, and 26672 Towne Centre Drive
Foothill Ranch, California 92610

Operation: Emergency Diesel Generator

Generator Testing Profile:	hours (O&M) [1]	School in Session hours	days	weeks
	20	8	5	36

Scalar for School Hour: 0.014

Equipment Specifications:

Equipment Used (#)	1
Brake Horsepower (bhp)	2,220
PM10 Emission Factor (g/bhp-hr) [2]	0.14
Load Factor (% / 100)	1

Emissions: **0.086 g/s**

Point Source Specifications (vertical release, hinged cap): [2]

Stack Flowrate	9,600	acfm
Stack Temperature	744	K
Stack Diameter	3.0	in
Stack Height	12.0	ft

(1) Generator testing profile from SCAQMD Permit No. G38879. Permit specifies no more than 20 hours in any one year is allowed for maintanance and testing.

(2) Generator PM exhaust parameters for Cummins KTA50-G9.

Source 4
Rubios Mexican Grill
26612 Towne Centre Drive
Foothill Ranch, California 92610

Operation: Charbroiler, under-fired

Temporal Profile:	hours	days	weeks
	10.5	5	52
	10	2	52

Average Pounds of Meat: (1)

Meat	140	lbs/week
Poultry	140	lbs/week
Seafood	105	lbs/week

Emission Factors: (1)

ROG Emission Rate, Meat	3.94	lbs/1000 lbs meat
ROG Emission Rate, Poultry	0.40	lbs/1000 lbs meat
ROG Emission Rate, Seafood	0.38	lbs/1000 lbs meat

Emissions:

ROG Emissions, Meat	0.55	lbs/week
	7.61E-03	lbs/hr
ROG Emissions, Poultry	0.06	lbs/week
	7.72E-04	lbs/hr
ROG Emissions, Seafood	0.04	lbs/week
	5.50E-04	lbs/hr
Total	8.93E-03	lbs/hr
	1.13E-03	**g/s**

Speciation: (2)

		Compound Wt Fraction	Compound Emissions
ROG Emissions	Acetaldehyde	0.087	9.79E-05
	Benzene	0.150	1.68E-04
	Formaldehyde	0.120	1.35E-04
	Naphthalene	0.006	6.53E-06
	PAHs, total	0.017	1.90E-05
	Propionaldehyde	0.023	2.64E-05
	Styrene	0.057	6.39E-05
	Toluene	0.059	6.67E-05
	Other (NOS)	0.48	5.42E-04
	Total	1.00	1.13E-03

Point Source Specifications (vertical release with rain cap):

Stack Temperature	330	K
Stack Flowrate	9,000	cfm
Stack Diameter	1.0	ft
Stack Height	16.0	ft

Note: ROG = reactive organic gases
(1) Average pounds of meat, poultry, and seafood estimated by onsite manager. Emission rates are based upon *Methods for Developing a National Emission Inventory* for Commercial Cooking Processes (E.H. Pechan and Associates, Inc. for USEPA, 2003).
(2) Speciation information based upon *National Emissions Inventory for Commercial Cooking* (Roe, et. al., E.H. Penchan & Associates, Inc. for USEPA, 2004).

Appendix D. Air Dispersion Model Output

Appendix

This page intentionally left blank.

Results Summary

Nakase Elementary School
Lake Forest, CA

Concentration - Source Group: BSTCK 3a - Boiler Stacks

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
1-HR	1ST	27.60686	ug/m^3	438187.23	3726090.37	225.15	0.00	236.48	11/29/2016, 16
PERIOD		0.65080	ug/m^3	438187.23	3726090.37	225.15	0.00	236.48	

Concentration - Source Group: CARS 1 - SR-241 Cars

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
1-HR	1ST	14.33058	ug/m^3	438187.23	3726090.37	225.15	0.00	236.48	2/18/2013, 9
8-HR	1ST	4.46842	ug/m^3	438187.23	3726090.37	225.15	0.00	236.48	11/22/2013, 16
PERIOD		0.40830	ug/m^3	438187.23	3726090.37	225.15	0.00	236.48	

Concentration - Source Group: FUEL 2 - Gas Refueling

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
1-HR	1ST	306.45458	ug/m^3	438217.23	3726060.37	222.72	0.00	236.43	3/4/2014, 9
PERIOD		9.32933	ug/m^3	438227.23	3726050.37	222.81	0.00	236.33	

Results Summary

Nakase Elementary School
Lake Forest, CA

Concentration - Source Group: GSTCK 3b - Generator Stack

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
PERIOD		0.00172	ug/m^3	438187.23	3726090.37	225.15	0.00	236.48	

Concentration - Source Group: RBSTCK 4 - Charbroiler Stack

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
1-HR	1ST	18.00055	ug/m^3	438187.23	3726090.37	225.15	0.00	236.48	10/27/2016, 16
PERIOD		0.25528	ug/m^3	438187.23	3726090.37	225.15	0.00	236.48	

Concentration - Source Group: SPILL 2 - Gas Spillage

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
1-HR	1ST	330.84234	ug/m^3	438217.23	3726060.37	222.72	0.00	236.43	3/4/2014, 9
PERIOD		9.46461	ug/m^3	438227.23	3726050.37	222.81	0.00	236.33	

Concentration - Source Group: STCK 2 - Gas Venting

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
1-HR	1ST	189.88164	ug/m^3	438217.23	3726060.37	222.72	0.00	236.43	3/4/2014, 9
PERIOD		4.92190	ug/m^3	438237.23	3726040.37	222.90	0.00	236.28	

Results Summary

Nakase Elementary School
Lake Forest, CA

Concentration - Source Group: TRUCKS 1 - SR-241 Trucks

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
PERIOD		0.34106	ug/m^3	438187.23	3726090.37	225.15	0.00	236.48	

Model Output
Unit Emission Rates (1 g/s)

```
*** AERMOD - VERSION  18081 ***   *** Nakase Elementary School                                   ***        03/06/19
*** AERMET - VERSION  16216 ***   *** Lake Forest, CA                                            ***        14:15:41
                                                                                                            PAGE   1
*** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN  ADJ_U*

                                        ***     MODEL SETUP OPTIONS SUMMARY       ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

**Model Is Setup For Calculation of Average CONCentration Values.

  --  DEPOSITION LOGIC  --
**NO GAS DEPOSITION Data Provided.
**NO PARTICLE DEPOSITION Data Provided.
**Model Uses NO DRY DEPLETION.  DRYDPLT  =  F
**Model Uses NO WET DEPLETION.  WETDPLT  =  F

**Model Uses URBAN Dispersion Algorithm for the SBL for    51 Source(s),
  for Total of    1 Urban Area(s):
  Urban Population =   3010232.0 ;  Urban Roughness Length =  1.000 m

**Model Uses Regulatory DEFAULT Options:
        1. Stack-tip Downwash.
        2. Model Accounts for ELEVated Terrain Effects.
        3. Use Calms Processing Routine.
        4. Use Missing Data Processing Routine.
        5. No Exponential Decay.
        6. Urban Roughness Length of 1.0 Meter Assumed.

**Other Options Specified:
        ADJ_U*   - Use ADJ_U* option for SBL in AERMET
        TEMP_Sub - Meteorological data includes TEMP substitutions

**Model Assumes No FLAGPOLE Receptor Heights.

**The User Specified a Pollutant Type of:  OTHER

**Model Calculates  2 Short Term Average(s) of:   1-HR   8-HR
    and Calculates PERIOD Averages

**This Run Includes:     51 Source(s);       9 Source Group(s); and     525 Receptor(s)

               with:      5 POINT(s), including
                          3 POINTCAP(s) and      0 POINTHOR(s)
                and:     46 VOLUME source(s)
                and:      0 AREA type source(s)
                and:      0 LINE source(s)
                and:      0 OPENPIT source(s)
                and:      0 BUOYANT LINE source(s) with      0 line(s)


**Model Set To Continue RUNning After the Setup Testing.
```

Model Output
Unit Emission Rates (1 g/s)

```
**The AERMET Input Meteorological Data Version Date:  16216

**Output Options Selected:
         Model Outputs Tables of PERIOD Averages by Receptor
         Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
         Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)
         Model Outputs Separate Summary File of High Ranked Values (SUMMFILE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and Missing Hours

**Misc. Inputs:  Base Elev. for Pot. Temp. Profile (m MSL) =   170.00 ;  Decay Coef. =    0.000     ;  Rot. Angle =     0.0
                 Emission Units = GRAMS/SEC                              ;  Emission Rate Unit Factor =   0.10000E+07
                 Output Units   = MICROGRAMS/M**3

**Approximate Storage Requirements of Model =      4.0 MB of RAM.

**Input Runstream File:          aermod.inp
**Output Print File:             aermod.out

**Detailed Error/Message File:   Nakse ES.err
**File for Summary of Results:   Nakse ES.sum
```

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** POINT SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	STACK HEIGHT (METERS)	STACK TEMP. (DEG.K)	STACK EXIT VEL. (M/SEC)	STACK DIAMETER (METERS)	BLDG EXISTS	URBAN SOURCE	CAP/ HOR	EMIS RATE SCALAR VARY BY
STCK	0	0.10000E+01	438308.5	3726114.2	227.9	3.66	288.71	0.01	0.05	NO	YES	NO	HRDOW
RBSTCK	0	0.10000E+01	438074.9	3726424.1	237.2	4.88	330.00	58.21	0.31	YES	YES	CAP	HRDOW
BSTCK1	0	0.50000E+00	438260.5	3726289.5	235.5	3.05	477.59	10.76	0.31	YES	YES	CAP	HRDOW
BSTCK2	0	0.50000E+00	438261.3	3726288.2	235.4	3.05	477.59	10.76	0.31	YES	YES	CAP	HRDOW
GSTCK	0	0.10000E+01	438280.1	3726293.2	235.7	3.66	744.00	993.49	0.08	YES	YES	NO	HRDOW

*** VOLUME SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	INIT. SY (METERS)	INIT. SZ (METERS)	URBAN SOURCE	EMISSION RATE SCALAR VARY BY
L0001217	0	0.45455E-01	438744.6	3725953.9	232.3	0.60	20.47	3.47	YES	HRDOW
L0001218	0	0.45455E-01	438706.2	3725975.5	238.5	0.60	20.47	3.47	YES	HRDOW
L0001219	0	0.45455E-01	438667.9	3725997.0	238.0	0.60	20.47	3.47	YES	HRDOW
L0001220	0	0.45455E-01	438629.5	3726018.6	237.8	0.60	20.47	3.47	YES	HRDOW
L0001221	0	0.45455E-01	438591.1	3726040.1	237.5	0.60	20.47	3.47	YES	HRDOW
L0001222	0	0.45455E-01	438552.8	3726061.7	237.3	0.60	20.47	3.47	YES	HRDOW
L0001223	0	0.45455E-01	438514.4	3726083.2	237.1	0.60	20.47	3.47	YES	HRDOW
L0001224	0	0.45455E-01	438476.1	3726104.8	237.0	0.60	20.47	3.47	YES	HRDOW
L0001225	0	0.45455E-01	438437.7	3726126.3	236.8	0.60	20.47	3.47	YES	HRDOW
L0001226	0	0.45455E-01	438399.3	3726147.9	236.7	0.60	20.47	3.47	YES	HRDOW
L0001227	0	0.45455E-01	438361.0	3726169.4	236.6	0.60	20.47	3.47	YES	HRDOW
L0001228	0	0.45455E-01	438322.6	3726191.0	236.2	0.60	20.47	3.47	YES	HRDOW
L0001229	0	0.45455E-01	438284.3	3726212.5	232.6	0.60	20.47	3.47	YES	HRDOW
L0001230	0	0.45455E-01	438245.9	3726234.1	235.9	0.60	20.47	3.47	YES	HRDOW
L0001231	0	0.45455E-01	438207.5	3726255.6	235.6	0.60	20.47	3.47	YES	HRDOW
L0001232	0	0.45455E-01	438169.2	3726277.2	235.2	0.60	20.47	3.47	YES	HRDOW
L0001233	0	0.45455E-01	438130.8	3726298.7	234.8	0.60	20.47	3.47	YES	HRDOW
L0001234	0	0.45455E-01	438092.5	3726320.3	234.4	0.60	20.47	3.47	YES	HRDOW
L0001235	0	0.45455E-01	438054.1	3726341.8	234.0	0.60	20.47	3.47	YES	HRDOW
L0001236	0	0.45455E-01	438015.7	3726363.4	233.6	0.60	20.47	3.47	YES	HRDOW
L0001237	0	0.45455E-01	437977.4	3726384.9	233.1	0.60	20.47	3.47	YES	HRDOW
L0001238	0	0.45455E-01	437939.0	3726406.5	232.3	0.60	20.47	3.47	YES	HRDOW

Model Output
Unit Emission Rates (1 g/s)

L0001239	0	0.45455E-01	438744.6	3725953.9	232.3	4.15	20.47	3.47	YES	HRDOW
L0001240	0	0.45455E-01	438706.2	3725975.5	238.5	4.15	20.47	3.47	YES	HRDOW
L0001241	0	0.45455E-01	438667.9	3725997.0	238.0	4.15	20.47	3.47	YES	HRDOW
L0001242	0	0.45455E-01	438629.5	3726018.6	237.8	4.15	20.47	3.47	YES	HRDOW
L0001243	0	0.45455E-01	438591.1	3726040.1	237.5	4.15	20.47	3.47	YES	HRDOW
L0001244	0	0.45455E-01	438552.8	3726061.7	237.3	4.15	20.47	3.47	YES	HRDOW
L0001245	0	0.45455E-01	438514.4	3726083.2	237.1	4.15	20.47	3.47	YES	HRDOW
L0001246	0	0.45455E-01	438476.1	3726104.8	237.0	4.15	20.47	3.47	YES	HRDOW
L0001247	0	0.45455E-01	438437.7	3726126.3	236.8	4.15	20.47	3.47	YES	HRDOW
L0001248	0	0.45455E-01	438399.3	3726147.9	236.7	4.15	20.47	3.47	YES	HRDOW
L0001249	0	0.45455E-01	438361.0	3726169.4	236.6	4.15	20.47	3.47	YES	HRDOW
L0001250	0	0.45455E-01	438322.6	3726191.0	236.2	4.15	20.47	3.47	YES	HRDOW
L0001251	0	0.45455E-01	438284.3	3726212.5	232.6	4.15	20.47	3.47	YES	HRDOW
L0001252	0	0.45455E-01	438245.9	3726234.1	235.9	4.15	20.47	3.47	YES	HRDOW
L0001253	0	0.45455E-01	438207.5	3726255.6	235.6	4.15	20.47	3.47	YES	HRDOW
L0001254	0	0.45455E-01	438169.2	3726277.2	235.2	4.15	20.47	3.47	YES	HRDOW
L0001255	0	0.45455E-01	438130.8	3726298.7	234.8	4.15	20.47	3.47	YES	HRDOW
L0001256	0	0.45455E-01	438092.5	3726320.3	234.4	4.15	20.47	3.47	YES	HRDOW
L0001257	0	0.45455E-01	438054.1	3726341.8	234.0	4.15	20.47	3.47	YES	HRDOW
L0001258	0	0.45455E-01	438015.7	3726363.4	233.6	4.15	20.47	3.47	YES	HRDOW
L0001259	0	0.45455E-01	437977.4	3726384.9	233.1	4.15	20.47	3.47	YES	HRDOW
L0001260	0	0.45455E-01	437939.0	3726406.5	232.3	4.15	20.47	3.47	YES	HRDOW
SPILL	0	0.10000E+01	438285.1	3726104.5	227.4	0.00	3.02	1.86	YES	HRDOW
FUEL	0	0.10000E+01	438285.1	3726104.5	227.4	1.00	3.02	1.86	YES	HRDOW

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** SOURCE IDs DEFINING SOURCE GROUPS ***

SRCGROUP ID	SOURCE IDs
CARS	L0001217 , L0001218 , L0001219 , L0001220 , L0001221 , L0001222 , L0001223 , L0001224 , L0001225 , L0001226 , L0001227 , L0001228 , L0001229 , L0001230 , L0001231 , L0001232 , L0001233 , L0001234 , L0001235 , L0001236 , L0001237 , L0001238 ,
FUEL	FUEL ,
SPILL	SPILL ,
STCK	STCK ,
TRUCKS	L0001239 , L0001240 , L0001241 , L0001242 , L0001243 , L0001244 , L0001245 , L0001246 , L0001247 , L0001248 , L0001249 , L0001250 , L0001251 , L0001252 , L0001253 , L0001254 , L0001255 , L0001256 , L0001257 , L0001258 , L0001259 , L0001260 ,
GSTCK	GSTCK ,
RBSTCK	RBSTCK ,
BSTCK	BSTCK1 , BSTCK2 ,
ALL	L0001217 , L0001218 , L0001219 , L0001220 , L0001221 , L0001222 , L0001223 , L0001224 , L0001225 , L0001226 , L0001227 , L0001228 , L0001229 , L0001230 , L0001231 , L0001232 , L0001233 , L0001234 , L0001235 , L0001236 , L0001237 , L0001238 , L0001239 , L0001240 , L0001241 , L0001242 , L0001243 , L0001244 , L0001245 , L0001246 , L0001247 , L0001248 , L0001249 , L0001250 , L0001251 , L0001252 , L0001253 , L0001254 , L0001255 , L0001256 , L0001257 , L0001258 , L0001259 , L0001260 , SPILL , FUEL , STCK , RBSTCK , BSTCK1 , BSTCK2 , GSTCK ,

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** SOURCE IDs DEFINED AS URBAN SOURCES ***

URBAN ID	URBAN POP	SOURCE IDs
	3010232.	L0001217 , L0001218 , L0001219 , L0001220 , L0001221 , L0001222 , L0001223 , L0001224 ,
		L0001225 , L0001226 , L0001227 , L0001228 , L0001229 , L0001230 , L0001231 , L0001232 ,
		L0001233 , L0001234 , L0001235 , L0001236 , L0001237 , L0001238 , L0001239 , L0001240 ,
		L0001241 , L0001242 , L0001243 , L0001244 , L0001245 , L0001246 , L0001247 , L0001248 ,
		L0001249 , L0001250 , L0001251 , L0001252 , L0001253 , L0001254 , L0001255 , L0001256 ,
		L0001257 , L0001258 , L0001259 , L0001260 , SPILL , FUEL , STCK , RBSTCK ,
		BSTCK1 , BSTCK2 , GSTCK ,

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** DIRECTION SPECIFIC BUILDING DIMENSIONS ***

SOURCE ID: RBSTCK

IFV	BH	BW	BL	XADJ	YADJ	IFV	BH	BW	BL	XADJ	YADJ
1	4.6,	95.7,	67.1,	-33.9,	-3.5,	2	4.6,	97.3,	54.5,	-26.6,	-3.4,
3	4.6,	96.0,	41.7,	-19.9,	-3.1,	4	4.6,	95.6,	38.6,	-18.9,	-3.1,
5	4.6,	97.3,	48.4,	-21.9,	-3.2,	6	4.6,	96.0,	61.9,	-28.0,	-3.2,
7	4.6,	91.8,	74.0,	-33.8,	-3.1,	8	4.6,	85.7,	83.8,	-38.5,	-2.4,
9	4.6,	77.6,	91.1,	-42.1,	-1.4,	10	4.6,	67.1,	95.7,	-44.3,	-0.4,
11	4.6,	54.5,	97.3,	-45.3,	0.7,	12	4.6,	41.7,	96.0,	-44.8,	1.0,
13	4.6,	38.6,	95.6,	-44.7,	0.4,	14	4.6,	48.4,	97.3,	-45.5,	2.3,
15	4.6,	61.9,	96.0,	-44.8,	2.9,	16	4.6,	74.0,	91.8,	-42.8,	3.2,
17	4.6,	83.8,	85.7,	-40.5,	3.4,	18	4.6,	91.1,	77.6,	-37.4,	3.5,
19	4.6,	95.7,	67.1,	-33.2,	3.5,	20	4.6,	97.3,	54.5,	-27.9,	3.4,
21	4.6,	96.0,	41.7,	-21.9,	3.1,	22	4.6,	95.6,	38.6,	-19.8,	3.1,
23	4.6,	97.3,	48.4,	-26.5,	3.2,	24	4.6,	96.0,	61.9,	-33.9,	3.2,
25	4.6,	91.8,	74.0,	-40.2,	3.1,	26	4.6,	85.7,	83.8,	-45.3,	2.4,
27	4.6,	77.6,	91.1,	-49.1,	1.4,	28	4.6,	67.1,	95.7,	-51.3,	0.4,
29	4.6,	54.5,	97.3,	-52.0,	-0.7,	30	4.6,	41.7,	96.0,	-51.1,	-1.0,
31	4.6,	38.6,	95.6,	-50.9,	-0.4,	32	4.6,	48.4,	97.3,	-51.8,	-2.3,
33	4.6,	61.9,	96.0,	-51.2,	-2.9,	34	4.6,	74.0,	91.8,	-49.0,	-3.2,
35	4.6,	83.8,	85.7,	-45.3,	-3.4,	36	4.6,	91.1,	77.6,	-40.2,	-3.5,

SOURCE ID: BSTCK1

IFV	BH	BW	BL	XADJ	YADJ	IFV	BH	BW	BL	XADJ	YADJ
1	2.1,	22.4,	23.4,	-8.8,	-9.7,	2	2.1,	21.0,	23.4,	-7.2,	-9.1,
3	2.1,	19.0,	22.7,	-5.5,	-8.1,	4	2.1,	16.4,	21.3,	-3.5,	-6.9,
5	2.1,	13.8,	19.5,	-1.5,	-5.3,	6	2.1,	16.6,	21.0,	-1.1,	-3.7,
7	2.1,	19.3,	22.4,	-1.3,	-2.1,	8	2.1,	21.3,	23.1,	-1.4,	-0.4,
9	2.1,	22.7,	23.1,	-1.4,	1.2,	10	2.1,	23.4,	22.4,	-1.5,	2.9,
11	2.1,	23.4,	21.0,	-1.4,	4.5,	12	2.1,	22.7,	19.0,	-1.4,	5.9,
13	2.1,	21.3,	16.4,	-1.3,	7.1,	14	2.1,	19.5,	13.8,	-1.6,	8.3,
15	2.1,	21.0,	16.6,	-4.6,	9.4,	16	2.1,	22.4,	19.3,	-7.5,	9.9,
17	2.1,	23.1,	21.3,	-10.2,	10.2,	18	2.1,	23.1,	22.7,	-12.6,	10.1,
19	2.1,	22.4,	23.4,	-14.6,	9.7,	20	2.1,	21.0,	23.4,	-16.2,	9.1,
21	2.1,	19.0,	22.7,	-17.2,	8.1,	22	2.1,	16.4,	21.3,	-17.7,	6.9,
23	2.1,	13.8,	19.5,	-18.0,	5.3,	24	2.1,	16.6,	21.0,	-19.9,	3.7,
25	2.1,	19.3,	22.4,	-21.1,	2.1,	26	2.1,	21.3,	23.1,	-21.7,	0.4,
27	2.1,	22.7,	23.1,	-21.7,	-1.2,	28	2.1,	23.4,	22.4,	-20.9,	-2.9,
29	2.1,	23.4,	21.0,	-19.6,	-4.5,	30	2.1,	22.7,	19.0,	-17.6,	-5.9,
31	2.1,	21.3,	16.4,	-15.2,	-7.1,	32	2.1,	19.5,	13.8,	-12.2,	-8.3,
33	2.1,	21.0,	16.6,	-12.0,	-9.4,	34	2.1,	22.4,	19.3,	-11.7,	-9.9,
35	2.1,	23.1,	21.3,	-11.1,	-10.2,	36	2.1,	23.1,	22.7,	-10.1,	-10.1,

Model Output
Unit Emission Rates (1 g/s)

SOURCE ID: BSTCK2

IFV	BH	BW	BL	XADJ	YADJ	IFV	BH	BW	BL	XADJ	YADJ
1	2.1,	22.4,	23.4,	-7.6,	-8.7,	2	2.1,	21.0,	23.4,	-6.3,	-7.9,
3	2.1,	19.0,	22.7,	-4.7,	-6.8,	4	2.1,	16.4,	21.3,	-3.0,	-5.5,
5	2.1,	13.8,	19.5,	-1.2,	-3.8,	6	2.1,	16.6,	21.0,	-1.1,	-2.2,
7	2.1,	19.3,	22.4,	-1.6,	-0.6,	8	2.1,	21.3,	23.1,	-1.9,	1.0,
9	2.1,	22.7,	23.1,	-2.2,	2.6,	10	2.1,	23.4,	22.4,	-2.5,	4.0,
11	2.1,	23.4,	21.0,	-2.6,	5.4,	12	2.1,	22.7,	19.0,	-2.7,	6.6,
13	2.1,	21.3,	16.4,	-2.7,	7.6,	14	2.1,	19.5,	13.8,	-3.1,	8.5,
15	2.1,	21.0,	16.6,	-6.1,	9.4,	16	2.1,	22.4,	19.3,	-9.0,	9.6,
17	2.1,	23.1,	21.3,	-11.7,	9.6,	18	2.1,	23.1,	22.7,	-13.9,	9.3,
19	2.1,	22.4,	23.4,	-15.8,	8.7,	20	2.1,	21.0,	23.4,	-17.1,	7.9,
21	2.1,	19.0,	22.7,	-17.9,	6.8,	22	2.1,	16.4,	21.3,	-18.2,	5.5,
23	2.1,	13.8,	19.5,	-18.3,	3.8,	24	2.1,	16.6,	21.0,	-19.9,	2.2,
25	2.1,	19.3,	22.4,	-20.8,	0.6,	26	2.1,	21.3,	23.1,	-21.2,	-1.0,
27	2.1,	22.7,	23.1,	-20.9,	-2.6,	28	2.1,	23.4,	22.4,	-19.9,	-4.0,
29	2.1,	23.4,	21.0,	-18.4,	-5.4,	30	2.1,	22.7,	19.0,	-16.3,	-6.6,
31	2.1,	21.3,	16.4,	-13.7,	-7.6,	32	2.1,	19.5,	13.8,	-10.7,	-8.5,
33	2.1,	21.0,	16.6,	-10.5,	-9.4,	34	2.1,	22.4,	19.3,	-10.2,	-9.6,
35	2.1,	23.1,	21.3,	-9.7,	-9.6,	36	2.1,	23.1,	22.7,	-8.8,	-9.3,

SOURCE ID: GSTCK

IFV	BH	BW	BL	XADJ	YADJ	IFV	BH	BW	BL	XADJ	YADJ
1	2.1,	22.4,	23.4,	-15.8,	8.9,	2	2.1,	21.0,	23.4,	-17.4,	8.1,
3	2.1,	19.0,	22.7,	-18.4,	7.0,	4	2.1,	16.4,	21.3,	-18.9,	5.7,
5	2.1,	13.8,	19.5,	-18.8,	4.4,	6	2.1,	16.6,	21.0,	-19.9,	2.9,
7	2.1,	19.3,	22.4,	-20.9,	1.1,	8	2.1,	21.3,	23.1,	-21.3,	-0.7,
9	2.1,	22.7,	23.1,	-21.0,	-2.4,	10	2.1,	23.4,	22.4,	-20.1,	-4.1,
11	2.1,	23.4,	21.0,	-18.6,	-5.7,	12	2.1,	22.7,	19.0,	-16.5,	-7.1,
13	2.1,	21.3,	16.4,	-13.9,	-8.3,	14	2.1,	19.5,	13.8,	-11.3,	-9.1,
15	2.1,	21.0,	16.6,	-11.2,	-9.4,	16	2.1,	22.4,	19.3,	-10.8,	-9.7,
17	2.1,	23.1,	21.3,	-10.0,	-9.7,	18	2.1,	23.1,	22.7,	-8.9,	-9.5,
19	2.1,	22.4,	23.4,	-7.6,	-8.9,	20	2.1,	21.0,	23.4,	-6.0,	-8.1,
21	2.1,	19.0,	22.7,	-4.2,	-7.0,	22	2.1,	16.4,	21.3,	-2.4,	-5.7,
23	2.1,	13.8,	19.5,	-0.7,	-4.4,	24	2.1,	16.6,	21.0,	-1.1,	-2.9,
25	2.1,	19.3,	22.4,	-1.5,	-1.1,	26	2.1,	21.3,	23.1,	-1.8,	0.7,
27	2.1,	22.7,	23.1,	-2.1,	2.4,	28	2.1,	23.4,	22.4,	-2.3,	4.1,
29	2.1,	23.4,	21.0,	-2.5,	5.7,	30	2.1,	22.7,	19.0,	-2.5,	7.1,
31	2.1,	21.3,	16.4,	-2.5,	8.3,	32	2.1,	19.5,	13.8,	-2.4,	9.1,
33	2.1,	21.0,	16.6,	-5.4,	9.4,	34	2.1,	22.4,	19.3,	-8.5,	9.7,
35	2.1,	23.1,	21.3,	-11.3,	9.7,	36	2.1,	23.1,	22.7,	-13.8,	9.5,

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

* SOURCE EMISSION RATE SCALARS WHICH VARY DIURNALLY AND BY DAY OF WEEK (HRDOW) *

SOURCE ID = L0001217 through L0001238 ; SOURCE TYPE = VOLUME :

HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR
DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.9320E+00	10	.6490E+00	11	.5170E+00	12	.4920E+00	13	.4820E+00	14	.5010E+00	15	.5530E+00	16	.6090E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SUNDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

* SOURCE EMISSION RATE SCALARS WHICH VARY DIURNALLY AND BY DAY OF WEEK (HRDOW) *

SOURCE ID = L0001239 through L0001260 ; SOURCE TYPE = VOLUME :

HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR
DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.5330E+00	10	.3830E+00	11	.3300E+00	12	.3640E+00	13	.4340E+00	14	.5250E+00	15	.6470E+00	16	.8010E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SUNDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

* SOURCE EMISSION RATE SCALARS WHICH VARY DIURNALLY AND BY DAY OF WEEK (HRDOW) *

SOURCE ID = SPILL ; SOURCE TYPE = VOLUME :

HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR
DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.1000E+01	10	.1000E+01	11	.1000E+01	12	.1000E+01	13	.1000E+01	14	.1000E+01	15	.1000E+01	16	.1000E+01
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SUNDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00

SOURCE ID = FUEL ; SOURCE TYPE = VOLUME :

HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR
DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.1000E+01	10	.1000E+01	11	.1000E+01	12	.1000E+01	13	.1000E+01	14	.1000E+01	15	.1000E+01	16	.1000E+01
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SUNDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

* SOURCE EMISSION RATE SCALARS WHICH VARY DIURNALLY AND BY DAY OF WEEK (HRDOW) *

SOURCE ID = STCK ; SOURCE TYPE = POINT :

HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR
DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.1000E+01	10	.1000E+01	11	.1000E+01	12	.1000E+01	13	.1000E+01	14	.1000E+01	15	.1000E+01	16	.1000E+01
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SUNDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00

SOURCE ID = RBSTCK ; SOURCE TYPE = POINTCAP :

HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR
DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.1000E+01	10	.1000E+01	11	.1000E+01	12	.1000E+01	13	.1000E+01	14	.1000E+01	15	.1000E+01	16	.1000E+01
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SUNDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

* SOURCE EMISSION RATE SCALARS WHICH VARY DIURNALLY AND BY DAY OF WEEK (HRDOW) *

SOURCE ID = BSTCK1 ; SOURCE TYPE = POINTCAP :

HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR
DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.1000E+01	10	.1000E+01	11	.1000E+01	12	.1000E+01	13	.1000E+01	14	.1000E+01	15	.1000E+01	16	.1000E+01
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SUNDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00

SOURCE ID = BSTCK2 ; SOURCE TYPE = POINTCAP :

HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR
DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.1000E+01	10	.1000E+01	11	.1000E+01	12	.1000E+01	13	.1000E+01	14	.1000E+01	15	.1000E+01	16	.1000E+01
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SUNDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

* SOURCE EMISSION RATE SCALARS WHICH VARY DIURNALLY AND BY DAY OF WEEK (HRDOW) *

SOURCE ID = GSTCK ; SOURCE TYPE = POINT :

HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR
DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.9500E-02	10	.9500E-02	11	.9500E-02	12	.9500E-02	13	.9500E-02	14	.9500E-02	15	.9500E-02	16	.9500E-02
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SUNDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00

```
*** AERMOD - VERSION  18081 ***   *** Nakase Elementary School                                                    ***        03/06/19
*** AERMET - VERSION  16216 ***   *** Lake Forest, CA                                                             ***        14:15:41
                                                                                                                             PAGE  65
*** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN  ADJ_U*

                                            *** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
                                                              (1=YES; 0=NO)

          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1

              NOTE:  METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.


                                   *** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
                                                           (METERS/SEC)

                                               1.54,   3.09,   5.14,   8.23,  10.80,
```

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

Surface file: S:\TBRO-02.0\HRA\D - Air Dispersion Model Output\met data\MSVJ_v9.SFC Met Version: 16216
Profile file: S:\TBRO-02.0\HRA\D - Air Dispersion Model Output\met data\MSVJ_v9.PFL
Surface format: FREE
Profile format: FREE
Surface station no.: 93184 Upper air station no.: 3190
Name: UNKNOWN Name: UNKNOWN
Year: 2011 Year: 2011

First 24 hours of scalar data

YR	MO	DY	JDY	HR	H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS	WD	HT	REF TA	HT
11	01	01	1	01	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	1.30	54.	9.1	999.0	-9.0
11	01	01	1	02	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	0.90	190.	9.1	999.0	-9.0
11	01	01	1	03	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	0.90	133.	9.1	999.0	-9.0
11	01	01	1	04	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	999.00	999.	-9.0	999.0	-9.0
11	01	01	1	05	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	999.00	999.	-9.0	999.0	-9.0
11	01	01	1	06	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	0.90	151.	9.1	999.0	-9.0
11	01	01	1	07	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	0.90	42.	9.1	999.0	-9.0
11	01	01	1	08	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	0.53	0.90	28.	9.1	999.0	-9.0
11	01	01	1	09	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	0.31	0.90	95.	9.1	999.0	-9.0
11	01	01	1	10	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	0.24	0.90	211.	9.1	999.0	-9.0
11	01	01	1	11	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	0.21	1.30	258.	9.1	999.0	-9.0
11	01	01	1	12	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	0.20	1.30	268.	9.1	999.0	-9.0
11	01	01	1	13	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	0.20	1.30	220.	9.1	999.0	-9.0
11	01	01	1	14	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	0.21	1.30	247.	9.1	999.0	-9.0
11	01	01	1	15	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	0.25	1.30	249.	9.1	999.0	-9.0
11	01	01	1	16	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	0.33	2.20	209.	9.1	999.0	-9.0
11	01	01	1	17	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	0.61	1.30	196.	9.1	999.0	-9.0
11	01	01	1	18	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	0.90	132.	9.1	999.0	-9.0
11	01	01	1	19	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	0.90	91.	9.1	999.0	-9.0
11	01	01	1	20	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	0.90	67.	9.1	999.0	-9.0
11	01	01	1	21	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	0.90	72.	9.1	999.0	-9.0
11	01	01	1	22	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	0.90	65.	9.1	999.0	-9.0
11	01	01	1	23	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	0.90	61.	9.1	999.0	-9.0
11	01	01	1	24	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	0.90	41.	9.1	999.0	-9.0

First hour of profile data

YR	MO	DY	HR	HEIGHT	F	WDIR	WSPD	AMB_TMP	sigmaA	sigmaW	sigmaV
11	01	01	01	5.5	0	-999.	-99.00	-999.0	99.0	-99.00	-99.00
11	01	01	01	9.1	1	54.	1.30	-999.0	99.0	-99.00	-99.00

F indicates top of profile (=1) or below (=0)

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** THE SUMMARY OF MAXIMUM PERIOD (43848 HRS) RESULTS ***

** CONC OF OTHER IN MICROGRAMS/M**3 **

GROUP ID		AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)					OF TYPE	NETWORK GRID-ID
CARS	1ST HIGHEST VALUE IS	0.40830 AT	438187.23,	3726090.37,	225.15,	236.48,	0.00)	DC	
	2ND HIGHEST VALUE IS	0.39183 AT	438197.23,	3726080.37,	223.02,	236.62,	0.00)	DC	
	3RD HIGHEST VALUE IS	0.37789 AT	438207.23,	3726070.37,	222.85,	236.48,	0.00)	DC	
	4TH HIGHEST VALUE IS	0.37238 AT	438187.23,	3726080.37,	222.98,	236.62,	0.00)	DC	
	5TH HIGHEST VALUE IS	0.36465 AT	438217.23,	3726060.37,	222.72,	236.43,	0.00)	DC	
	6TH HIGHEST VALUE IS	0.35955 AT	438197.23,	3726070.37,	222.78,	236.48,	0.00)	DC	
	7TH HIGHEST VALUE IS	0.35505 AT	438177.23,	3726080.37,	224.13,	236.43,	0.00)	DC	
	8TH HIGHEST VALUE IS	0.35221 AT	438227.23,	3726050.37,	222.81,	236.33,	0.00)	DC	
	9TH HIGHEST VALUE IS	0.34735 AT	438207.23,	3726060.37,	222.62,	236.43,	0.00)	DC	
	10TH HIGHEST VALUE IS	0.34241 AT	438187.23,	3726070.37,	222.71,	236.48,	0.00)	DC	
FUEL	1ST HIGHEST VALUE IS	9.32933 AT	438227.23,	3726050.37,	222.81,	236.33,	0.00)	DC	
	2ND HIGHEST VALUE IS	9.07404 AT	438237.23,	3726040.37,	222.90,	236.28,	0.00)	DC	
	3RD HIGHEST VALUE IS	8.89386 AT	438217.23,	3726060.37,	222.72,	236.43,	0.00)	DC	
	4TH HIGHEST VALUE IS	8.23202 AT	438247.23,	3726030.37,	223.22,	227.13,	0.00)	DC	
	5TH HIGHEST VALUE IS	7.93858 AT	438207.23,	3726070.37,	222.85,	236.48,	0.00)	DC	
	6TH HIGHEST VALUE IS	7.57798 AT	438227.23,	3726040.37,	222.43,	236.28,	0.00)	DC	
	7TH HIGHEST VALUE IS	7.52288 AT	438217.23,	3726050.37,	222.43,	236.33,	0.00)	DC	
	8TH HIGHEST VALUE IS	7.15674 AT	438237.23,	3726030.37,	222.32,	236.28,	0.00)	DC	
	9TH HIGHEST VALUE IS	7.02131 AT	438207.23,	3726060.37,	222.62,	236.43,	0.00)	DC	
	10TH HIGHEST VALUE IS	6.73892 AT	438197.23,	3726080.37,	223.02,	236.62,	0.00)	DC	
SPILL	1ST HIGHEST VALUE IS	9.46461 AT	438227.23,	3726050.37,	222.81,	236.33,	0.00)	DC	
	2ND HIGHEST VALUE IS	9.19948 AT	438237.23,	3726040.37,	222.90,	236.28,	0.00)	DC	
	3RD HIGHEST VALUE IS	9.01838 AT	438217.23,	3726060.37,	222.72,	236.43,	0.00)	DC	
	4TH HIGHEST VALUE IS	8.32788 AT	438247.23,	3726030.37,	223.22,	227.13,	0.00)	DC	
	5TH HIGHEST VALUE IS	8.03356 AT	438207.23,	3726070.37,	222.85,	236.48,	0.00)	DC	
	6TH HIGHEST VALUE IS	7.68042 AT	438227.23,	3726040.37,	222.43,	236.28,	0.00)	DC	
	7TH HIGHEST VALUE IS	7.62506 AT	438217.23,	3726050.37,	222.43,	236.33,	0.00)	DC	
	8TH HIGHEST VALUE IS	7.24624 AT	438237.23,	3726030.37,	222.32,	236.28,	0.00)	DC	
	9TH HIGHEST VALUE IS	7.10706 AT	438207.23,	3726060.37,	222.62,	236.43,	0.00)	DC	
	10TH HIGHEST VALUE IS	6.80159 AT	438197.23,	3726080.37,	223.02,	236.62,	0.00)	DC	
STCK	1ST HIGHEST VALUE IS	4.92190 AT	438237.23,	3726040.37,	222.90,	236.28,	0.00)	DC	
	2ND HIGHEST VALUE IS	4.86154 AT	438227.23,	3726050.37,	222.81,	236.33,	0.00)	DC	
	3RD HIGHEST VALUE IS	4.76507 AT	438247.23,	3726030.37,	223.22,	227.13,	0.00)	DC	
	4TH HIGHEST VALUE IS	4.59348 AT	438217.23,	3726060.37,	222.72,	236.43,	0.00)	DC	

Model Output
Unit Emission Rates (1 g/s)

	5TH HIGHEST VALUE IS	4.19647	AT (	438227.23,	3726040.37,	222.43,	236.28,	0.00)	DC
	6TH HIGHEST VALUE IS	4.18204	AT (	438207.23,	3726070.37,	222.85,	236.48,	0.00)	DC
	7TH HIGHEST VALUE IS	4.14954	AT (	438237.23,	3726030.37,	222.32,	236.28,	0.00)	DC
	8TH HIGHEST VALUE IS	4.07317	AT (	438217.23,	3726050.37,	222.43,	236.33,	0.00)	DC
	9TH HIGHEST VALUE IS	3.94964	AT (	438247.23,	3726020.37,	222.43,	227.24,	0.00)	DC
	10TH HIGHEST VALUE IS	3.81187	AT (	438207.23,	3726060.37,	222.62,	236.43,	0.00)	DC
TRUCKS	1ST HIGHEST VALUE IS	0.34106	AT (	438187.23,	3726090.37,	225.15,	236.48,	0.00)	DC
	2ND HIGHEST VALUE IS	0.32663	AT (	438197.23,	3726080.37,	223.02,	236.62,	0.00)	DC
	3RD HIGHEST VALUE IS	0.31529	AT (	438207.23,	3726070.37,	222.85,	236.48,	0.00)	DC
	4TH HIGHEST VALUE IS	0.31046	AT (	438187.23,	3726080.37,	222.98,	236.62,	0.00)	DC
	5TH HIGHEST VALUE IS	0.30452	AT (	438217.23,	3726060.37,	222.72,	236.43,	0.00)	DC
	6TH HIGHEST VALUE IS	0.30002	AT (	438197.23,	3726070.37,	222.78,	236.48,	0.00)	DC
	7TH HIGHEST VALUE IS	0.29649	AT (	438177.23,	3726080.37,	224.13,	236.43,	0.00)	DC
	8TH HIGHEST VALUE IS	0.29446	AT (	438227.23,	3726050.37,	222.81,	236.33,	0.00)	DC
	9TH HIGHEST VALUE IS	0.29007	AT (	438207.23,	3726060.37,	222.62,	236.43,	0.00)	DC
	10TH HIGHEST VALUE IS	0.28570	AT (	438187.23,	3726070.37,	222.71,	236.48,	0.00)	DC
GSTCK	1ST HIGHEST VALUE IS	0.00172	AT (	438187.23,	3726090.37,	225.15,	236.48,	0.00)	DC
	2ND HIGHEST VALUE IS	0.00164	AT (	438197.23,	3726080.37,	223.02,	236.62,	0.00)	DC
	3RD HIGHEST VALUE IS	0.00163	AT (	438187.23,	3726080.37,	222.98,	236.62,	0.00)	DC
	4TH HIGHEST VALUE IS	0.00162	AT (	438177.23,	3726080.37,	224.13,	236.43,	0.00)	DC
	5TH HIGHEST VALUE IS	0.00159	AT (	438207.23,	3726070.37,	222.85,	236.48,	0.00)	DC
	6TH HIGHEST VALUE IS	0.00157	AT (	438197.23,	3726070.37,	222.78,	236.48,	0.00)	DC
	7TH HIGHEST VALUE IS	0.00156	AT (	438187.23,	3726070.37,	222.71,	236.48,	0.00)	DC
	8TH HIGHEST VALUE IS	0.00154	AT (	438177.23,	3726070.37,	222.70,	236.48,	0.00)	DC
	9TH HIGHEST VALUE IS	0.00154	AT (	438217.23,	3726060.37,	222.72,	236.43,	0.00)	DC
	10TH HIGHEST VALUE IS	0.00153	AT (	438167.23,	3726070.37,	223.77,	234.36,	0.00)	DC
RBSTCK	1ST HIGHEST VALUE IS	0.25528	AT (	438187.23,	3726090.37,	225.15,	236.48,	0.00)	DC
	2ND HIGHEST VALUE IS	0.23861	AT (	438177.23,	3726080.37,	224.13,	236.43,	0.00)	DC
	3RD HIGHEST VALUE IS	0.23743	AT (	438187.23,	3726080.37,	222.98,	236.62,	0.00)	DC
	4TH HIGHEST VALUE IS	0.23706	AT (	438197.23,	3726080.37,	223.02,	236.62,	0.00)	DC
	5TH HIGHEST VALUE IS	0.22359	AT (	438167.23,	3726070.37,	223.77,	234.36,	0.00)	DC
	6TH HIGHEST VALUE IS	0.22286	AT (	438177.23,	3726070.37,	222.70,	236.48,	0.00)	DC
	7TH HIGHEST VALUE IS	0.22275	AT (	438187.23,	3726070.37,	222.71,	236.48,	0.00)	DC
	8TH HIGHEST VALUE IS	0.22252	AT (	438197.23,	3726070.37,	222.78,	236.48,	0.00)	DC
	9TH HIGHEST VALUE IS	0.22210	AT (	438207.23,	3726070.37,	222.85,	236.48,	0.00)	DC
	10TH HIGHEST VALUE IS	0.20967	AT (	438157.23,	3726060.37,	223.46,	234.36,	0.00)	DC
BSTCK	1ST HIGHEST VALUE IS	0.65080	AT (	438187.23,	3726090.37,	225.15,	236.48,	0.00)	DC
	2ND HIGHEST VALUE IS	0.60062	AT (	438197.23,	3726080.37,	223.02,	236.62,	0.00)	DC
	3RD HIGHEST VALUE IS	0.58494	AT (	438187.23,	3726080.37,	222.98,	236.62,	0.00)	DC
	4TH HIGHEST VALUE IS	0.57283	AT (	438177.23,	3726080.37,	224.13,	236.43,	0.00)	DC
	5TH HIGHEST VALUE IS	0.56046	AT (	438207.23,	3726070.37,	222.85,	236.48,	0.00)	DC
	6TH HIGHEST VALUE IS	0.54802	AT (	438197.23,	3726070.37,	222.78,	236.48,	0.00)	DC
	7TH HIGHEST VALUE IS	0.53463	AT (	438187.23,	3726070.37,	222.71,	236.48,	0.00)	DC
	8TH HIGHEST VALUE IS	0.52203	AT (	438217.23,	3726060.37,	222.72,	236.43,	0.00)	DC
	9TH HIGHEST VALUE IS	0.52059	AT (	438177.23,	3726070.37,	222.70,	236.48,	0.00)	DC
	10TH HIGHEST VALUE IS	0.51219	AT (	438207.23,	3726060.37,	222.62,	236.43,	0.00)	DC

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** THE SUMMARY OF MAXIMUM PERIOD (43848 HRS) RESULTS ***

** CONC OF OTHER IN MICROGRAMS/M**3 **

GROUP ID	AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
ALL	1ST HIGHEST VALUE IS	24.98606 AT (438227.23, 3726050.37, 222.81, 236.33, 0.00)	DC	
	2ND HIGHEST VALUE IS	24.45954 AT (438237.23, 3726040.37, 222.90, 236.28, 0.00)	DC	
	3RD HIGHEST VALUE IS	23.90693 AT (438217.23, 3726060.37, 222.72, 236.43, 0.00)	DC	
	4TH HIGHEST VALUE IS	22.52768 AT (438247.23, 3726030.37, 223.22, 227.13, 0.00)	DC	
	5TH HIGHEST VALUE IS	21.63151 AT (438207.23, 3726070.37, 222.85, 236.48, 0.00)	DC	
	6TH HIGHEST VALUE IS	20.68331 AT (438227.23, 3726040.37, 222.43, 236.28, 0.00)	DC	
	7TH HIGHEST VALUE IS	20.51297 AT (438217.23, 3726050.37, 222.43, 236.33, 0.00)	DC	
	8TH HIGHEST VALUE IS	19.72072 AT (438237.23, 3726030.37, 222.32, 236.28, 0.00)	DC	
	9TH HIGHEST VALUE IS	19.30027 AT (438207.23, 3726060.37, 222.62, 236.43, 0.00)	DC	
	10TH HIGHEST VALUE IS	18.79416 AT (438197.23, 3726080.37, 223.02, 236.62, 0.00)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** THE SUMMARY OF HIGHEST 1-HR RESULTS ***

** CONC OF OTHER IN MICROGRAMS/M**3 **

GROUP ID		AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
CARS	HIGH 1ST HIGH VALUE IS	14.33058	ON 13021809:	AT (438187.23, 3726090.37, 225.15, 236.48, 0.00)	DC	
FUEL	HIGH 1ST HIGH VALUE IS	306.45458	ON 14030409:	AT (438217.23, 3726060.37, 222.72, 236.43, 0.00)	DC	
SPILL	HIGH 1ST HIGH VALUE IS	330.84234	ON 14030409:	AT (438217.23, 3726060.37, 222.72, 236.43, 0.00)	DC	
STCK	HIGH 1ST HIGH VALUE IS	189.88164	ON 14030409:	AT (438217.23, 3726060.37, 222.72, 236.43, 0.00)	DC	
TRUCKS	HIGH 1ST HIGH VALUE IS	14.90849	ON 14120216:	AT (438187.23, 3726090.37, 225.15, 236.48, 0.00)	DC	
GSTCK	HIGH 1ST HIGH VALUE IS	0.06954	ON 16110210:	AT (438187.23, 3726090.37, 225.15, 236.48, 0.00)	DC	
RBSTCK	HIGH 1ST HIGH VALUE IS	18.00055	ON 16102716:	AT (438187.23, 3726090.37, 225.15, 236.48, 0.00)	DC	
BSTCK	HIGH 1ST HIGH VALUE IS	27.60686	ON 16112916:	AT (438187.23, 3726090.37, 225.15, 236.48, 0.00)	DC	
ALL	HIGH 1ST HIGH VALUE IS	846.22935	ON 14030409:	AT (438217.23, 3726060.37, 222.72, 236.43, 0.00)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** THE SUMMARY OF HIGHEST 8-HR RESULTS ***

** CONC OF OTHER IN MICROGRAMS/M**3 **

GROUP ID		AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
CARS	HIGH 1ST HIGH VALUE IS	4.46842	ON 13112216:	AT (438187.23, 3726090.37, 225.15, 236.48, 0.00)	DC	
FUEL	HIGH 1ST HIGH VALUE IS	133.66776	ON 13112216:	AT (438227.23, 3726050.37, 222.81, 236.33, 0.00)	DC	
SPILL	HIGH 1ST HIGH VALUE IS	134.93255	ON 13112216:	AT (438227.23, 3726050.37, 222.81, 236.33, 0.00)	DC	
STCK	HIGH 1ST HIGH VALUE IS	90.28745	ON 13112216:	AT (438237.23, 3726040.37, 222.90, 236.28, 0.00)	DC	
TRUCKS	HIGH 1ST HIGH VALUE IS	4.36387	ON 13112216:	AT (438187.23, 3726090.37, 225.15, 236.48, 0.00)	DC	
GSTCK	HIGH 1ST HIGH VALUE IS	0.04407	ON 16120216:	AT (438127.23, 3726040.37, 223.56, 233.46, 0.00)	DC	
RBSTCK	HIGH 1ST HIGH VALUE IS	7.48234	ON 16102816:	AT (438187.23, 3726090.37, 225.15, 236.48, 0.00)	DC	
BSTCK	HIGH 1ST HIGH VALUE IS	13.08332	ON 16110216:	AT (438187.23, 3726090.37, 225.15, 236.48, 0.00)	DC	
ALL	HIGH 1ST HIGH VALUE IS	368.79714	ON 13112216:	AT (438227.23, 3726050.37, 222.81, 236.33, 0.00)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** Message Summary : AERMOD Model Execution ***

 --------- Summary of Total Messages --------

A Total of   0 Fatal Error Message(s)
A Total of   6 Warning Message(s)
A Total of   868 Informational Message(s)

A Total of   43848 Hours Were Processed

A Total of   15 Calm Hours Identified

A Total of   853 Missing Hours Identified (1.95 Percent)

   ******** FATAL ERROR MESSAGES ********
              *** NONE ***

   ********   WARNING MESSAGES   ********
SO W320   177   PPARM: Input Parameter May Be Out-of-Range for Parameter   VS
SO W320   180   PPARM: Input Parameter May Be Out-of-Range for Parameter   VS
ME W186   1048   MEOPEN: THRESH_1MIN 1-min ASOS wind speed threshold used   0.50
ME W187   1048   MEOPEN: ADJ_U* Option for Stable Low Winds used in AERMET
MX W450   35065   CHKDAT: Record Out of Sequence in Meteorological File at: 16010101
MX W450   35065   CHKDAT: Record Out of Sequence in Meteorological File at: 1 year gap

   ****
   *** AERMOD Finishes Successfully ***
   ****

Appendix E. Risk Calculations

Appendix

This page intentionally left blank.

Table E1a
MER Concentration Worksheet
Toxic Air Contaminants - Mobile Sources

Source No. (a)	Source (b)	Contaminant (c)	Weight Fraction (d)	Emission Rates[1] **Annual Avg** (g/s) (e)	AERMOD Output[2] **Annual Avg** ($\mu g/m^3$) (f)	Annual Average MER Concentration ($\mu g/m^3$) (g)	Emission Rates[1] **1-Hour** (g/s) (h)	AERMOD Output[2] **1-Hour** ($\mu g/m^3$) (i)	Acute (1-Hour) MER Concentration ($\mu g/m^3$) (j)
Staff Scenario									
1	SR-241 Trucks (DPM)	Diesel Particulate	1.00E+00	8.80E-04	0.341	0.00030	n/a		
	SR-241 Cars (TOG)	Acetaldehyde	2.80E-03	1.72E-02	0.408	0.00002	1.56E-02	14.33	0.0006
		Acrolein	1.30E-03			0.00001			0.0003
		Benzene	2.83E-02			0.00020			0.0063
		1,3-Butadiene	5.50E-03			0.00004			0.0012
		Ethyl benzene	1.17E-02			0.00008			0.0026
		Formaldehyde	1.58E-02			0.00011			0.0035
		Hexane	3.14E-02			0.00022			0.0070
		Methanol	1.20E-03			0.00001			0.0003
		Methyl Ethyl Ketone	2.00E-04			0.000001			0.00004
		Naphthalene	5.00E-04			0.000004			0.0001
		Propylene	3.06E-02			0.00021			0.0068
		Styrene	1.20E-03			0.00001			0.0003
		Toluene	7.46E-02			0.00052			0.0167
		Xylenes	5.38E-02			0.00038			0.0120
Student Scenario									
1	SR-241 Trucks (DPM)	Diesel Particulate	1.00E+00	8.13E-04	0.341	0.00028	n/a		
	SR-241 Cars (TOG)	Acetaldehyde	2.80E-03	1.59E-02	0.408	0.00002	1.56E-02	14.33	0.0006
		Acrolein	1.30E-03			0.00001			0.0003
		Benzene	2.83E-02			0.00018			0.0063
		1,3-Butadiene	5.50E-03			0.00004			0.0012
		Ethylbenzene	1.17E-02			0.00008			0.0026
		Formaldehyde	1.58E-02			0.00010			0.0035
		Hexane	3.14E-02			0.00020			0.0070
		Methanol	1.20E-03			0.00001			0.0003
		Methyl Ethyl Ketone	2.00E-04			0.000001			0.00004
		Naphthalene	5.00E-04			0.000003			0.0001
		Propylene	3.06E-02			0.00020			0.0068
		Styrene	1.20E-03			0.00001			0.0003
		Toluene	7.46E-02			0.00048			0.0167
		Xylenes	5.38E-02			0.00035			0.0120
Note: Maximum Exposed Receptor (MER)						For Cancer/Chronic Calculation			For Acute Calculation

[1] Emission Rates, per source, from Source Emissions Inventories (Appendix C).

[2] AERMOD Output (Appendix D) at the maximum exposed receptor (MER) are based on unit emission rates for emission sources (1 g/s per source).

Table E1b
MER Concentration Worksheet
Toxic Air Contaminants - Stationary Sources

Source No.	Source	Contaminant	Weight Fraction	Emission Rates[1] **Annual Avg** (g/s)	AERMOD Output[2] **Annual Avg** ($\mu g/m^3$)	Annual Average MER Concentration ($\mu g/m^3$)	AERMOD Output[2] **1-Hour** ($\mu g/m^3$)	Acute (1-Hour) MER Concentration ($\mu g/m^3$)
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
Staff and Student Scenarios								
2	Shell Station (gas refueling)	Benzene	3.00E-03	5.56E-03	9.33	1.55E-04	306.5	5.11E-03
	(spillage)	Benzene	1.00E-02	9.97E-03	9.46	9.44E-04	330.8	3.30E-02
	(venting)	Benzene	3.00E-03	7.23E-03	4.92	1.07E-04	189.9	4.12E-03
3	Loan Depot (generator)	Diesel Particulat	1.00E+00	8.63E-02	0.002	1.48E-04	n/a	
	(boiler)	Acetaldehyde	2.37E-04	4.47E-03	0.65	6.91E-07	27.6	2.93E-05
		Acrolein	1.49E-04			6.91E-07		1.84E-05
		Ammonia	9.94E-01			4.34E-07		1.23E-01
		Benzene	4.42E-04			2.89E-03		5.45E-05
		Ethylbenzene	5.25E-04			1.29E-06		6.48E-05
		Formaldehyde	9.39E-04			1.53E-06		1.16E-04
		n-Hexane	3.48E-04			2.73E-06		4.29E-05
		Naphthalene	1.66E-05			1.01E-06		2.05E-06
		Toluene	2.02E-03			4.82E-08		2.50E-04
		Xylene	1.50E-03			5.88E-06		1.85E-04
4	Rubious Mexican Grill	Acetaldehyde	8.70E-02	1.13E-03	0.26	2.50E-05	18.0	1.76E-03
		Benzene	1.50E-01			4.30E-05		3.03E-03
		Formaldehyde	1.20E-01			3.44E-05		2.43E-03
		Naphthalene	5.81E-03			1.67E-06		1.18E-04
		PAHs, total	1.69E-02			4.84E-06		3.41E-04
		Styrene	5.68E-02			1.63E-05		1.15E-03
		Toluene	5.92E-02			1.70E-05		1.20E-03
		Propionaldehyde	2.35E-02			6.75E-06		4.76E-04
Note: Maximum Exposed Receptor (MER)						For Cancer/Chronic Calculation		For Acute Calculation

[1] Emission Rates, per source, from Source Emissions Inventories (Appendix C).

[2] AERMOD Output (Appendix D) at the maximum exposed receptor (MER) are based on unit emission rates for emission sources (1 g/s per source).

Table E2
HARP2 Results for Cancer Risk and Chronic Hazards
School Scenario

No.	Source	Contaminant	**Carcinogenic Risks**		Chronic Non-Cancer Risks [2] - Toxicological Endpoints*											
			Staff	**Students**	CV	CNS	IMMUN	KIDNEY	GILV	REPRO	RESP	SKIN	EYE	BONE	ENDO	**BLOOD**
			per million	per million												
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)
1	SR-241 Trucks (DPM)	Diesel Particulate	1.9E-02	2.7E-02							6.00E-05					
	SR-241 Cars (TOG)	Acetaldehyde	1.1E-05	1.6E-05							1.43E-07					
		Acrolein									2.86E-05					
		Benzene	1.1E-03	1.6E-03												6.67E-05
		1,3-Butadiene	1.4E-03	1.9E-03						2.00E-05						
		Ethylbenzene	3.9E-05	5.7E-05				4.00E-08	4.00E-08	4.00E-08					4.00E-08	
		Formaldehyde	1.3E-04	1.9E-04							1.22E-05					
		Hexane				3.14E-08										
		Methanol								2.50E-09						
		Methyl Ethyl Ketone														
		Naphthalene	2.7E-05	3.4E-05							4.44E-07					
		Propylene									7.00E-08					
		Styrene				1.11E-08										
		Toluene				1.73E-06				1.73E-06	1.73E-06					
		Xylenes				5.43E-07					5.43E-07		5.43E-07			
2	Shell Station (gas	Benzene	8.7E-04	1.4E-03												5.18E-05
	(spillage)	Benzene	5.3E-03	8.2E-03												3.15E-04
	(venting)	Benzene	6.0E-04	9.3E-04												3.56E-05
3	Loan Depot (generator)	Diesel Particulate	9.2E-03	1.4E-02							2.97E-05					
	(boiler)	Acetaldehyde	3.9E-07	6.0E-07							4.94E-09					
		Acrolein									1.97E-06					
		Ammonia									2.17E-09					
		Benzene	1.6E-02	2.5E-02												9.64E-04
		Ethylbenzene	6.3E-07					6.43E-10	6.43E-10	6.43E-10					6.43E-10	
		Formaldehyde	1.8E-06	2.8E-06							1.70E-07					
		n-Hexane				3.90E-10										
		Naphthalene	6.8E-06	1.1E-05							1.12E-07					
		Toluene				1.61E-10				1.61E-10	1.61E-10					
		Xylene				8.40E-09					8.40E-09		8.40E-09			
4	Rubious Mexican Grill	Acetaldehyde	1.4E-05	2.2E-05							1.79E-07					
	(charbroiler)	Benzene	2.4E-04	3.7E-04												1.43E-05
		Formaldehyde	4.1E-05	6.3E-05							3.83E-06					
		Naphthalene	1.1E-05	1.7E-05							1.85E-07					
		PAHs, total														
		Styrene				1.81E-08										
		Toluene				5.67E-08				5.67E-08	5.67E-08					
		Propionaldehyde														
		Total - All Sources	**0.05**	**0.08**	0.00E+00	2.40E-06	0.00E+00	4.06E-08	4.06E-08	2.18E-05	1.40E-04	0.00E+00	5.51E-07	0.00E+00	4.06E-08	**1.45E-03**

Note: Health risks calculated using HARP2, Risk Assessment Standalone Tool, version 19044 (CARB, 2019).

Total Cancer Risk	**Staff**	**0.05**	per million
Total Cancer Risk	**Students**	**0.08**	per million
Maximum Chronic Hazard Index		**1.45E-03**	**RESP**

	Staff	Students	
	16 < 70 years	2 < 16 years	age bin
Dose Exposure Factors:	250	180	exposure frequency (days/year)
	230	520	8-hour inhalation rate (L/kg-8 hours) [1]
	1	1	inhalation absorption factor
Risk Calculation Factors:	1	3	age sensitivity factor
	25	7	exposure duration (years)
	70	70	averaging time (years)

* Key to Toxicological Endpoints

CV	Cardiovascular System
CNS	Central Nervous System
IMMUN	Immune System
KIDN	Kidneys
GILV	Gastrointestinal Tract and Liver/Alimentary Tract
RESP	Respiratory System
REPRO	Reproductive System
SKIN	Skin irritation and/or other effects
EYE	Eye irritation and/or other effects
BONE	Bones and Teeth
ENDO	Endocrine System
BLOOD	Hematological System

[1] 8-hour inhalation rate taken as the 95th percentile breathing rates for Moderate Intensity Activities (OEHHA, 2015).

[2] Staff Scenario emission rates produced higher chronic hazard indices, compared to Student Scenario emission rates.

Table E3
HARP2 Results for Acute Hazards

Source No. (a)	Source (b)	Contaminant (c)	Acute Non-Cancer Risks - Toxicological Endpoints*											
			CV (d)	CNS (e)	IMMUN (f)	KIDNEY (g)	GILV (h)	**REPRO** (i)	RESP (j)	SKIN (k)	EYE (l)	BONE (m)	ENDO (n)	BLOOD (o)
1	SR-241 Trucks (DPM) SR-241 Cars (TOG)	Diesel Particulate												
		Acetaldehyde							1.33E-06		1.33E-06			
		Acrolein							1.16E-04		1.16E-04			
		Benzene			2.35E-04			2.35E-04						2.35E-04
		1,3-Butadiene						1.87E-06						
		Ethylbenzene												
		Formaldehyde									6.43E-05			
		Hexane												
		Methanol		9.59E-09										
		Methyl Ethyl Ketone							3.44E-09		3.44E-09			
		Naphthalene												
		Propylene												
		Styrene						1.28E-08	1.28E-08		1.28E-08			
		Toluene		4.51E-07				4.51E-07	4.51E-07		4.51E-07			
		Xylenes		5.47E-07					5.47E-07		5.47E-07			
2	Shell Station (gas (spillage)	Benzene			1.89E-04			1.89E-04						1.89E-04
	(venting)	Benzene			1.22E-03			1.22E-03						1.22E-03
		Benzene			1.52E-04			1.52E-04						1.52E-04
3	Loan Depot (generator) (boiler)	Diesel Particulate												
		Acetaldehyde							6.24E-08		6.24E-08			
		Acrolein							7.36E-06		7.36E-06			
		Ammonia							3.83E-05		3.83E-05			
		Benzene			2.02E-06			2.02E-06						2.02E-06
		Ethylbenzene												
		Formaldehyde									2.11E-06			
		n-Hexane												
		Naphthalene												
		Toluene		6.74E-09				6.74E-09	6.74E-09		6.74E-09			
		Xylene		8.43E-09					8.43E-09		8.43E-09			
4	Rubious Mexican Grill (charbroiler)	Acetaldehyde							3.75E-06		3.75E-06			
		Benzene			1.12E-04			1.12E-04						1.12E-04
		Formaldehyde									4.42E-05			
		Naphthalene												
		PAHs, total												
		Styrene						5.47E-08	5.47E-08		5.47E-08			
		Toluene		3.24E-08				3.24E-08	3.24E-08		3.24E-08			
		Propionaldehyde												
	Total - All Sources			1.06E-06	1.91E-03			1.91E-03	1.68E-04		2.79E-04			1.91E-03

Note: Staff and Student scenarios produce the same acute (1-hour) hazard indices.

Note: Health risks calculated using HARP2, Risk Assessment Standalone Tool, version 19044 (CARB, 2019).

Maximum Acute Hazard Index 1.91E-03 Repro

* Key to Toxicological Endpoints

CV	Cardiovascular System	RESP	Respiratory System
CNS	Central Nervous System	SKIN	Skin irritation and/or other effects
IMMUN	Immune System	EYE	Eye irritation and/or other effects
KIDN	Kidneys	BONE	Bones and Teeth
GILV	Gastrointestinal Tract and Liver/Alimentary Tract	ENDO	Endocrine System
REPRO	Reproductive System	BLOOD	Hematological System

Table E4
HARP2 Results for 8-Hour Hazards

Source No. (a)	Source (b)	Contaminant (c)	8-Hour Non-Cancer Risks - Toxicological Endpoints*											
			CV (d)	CNS (e)	IMMUN (f)	KIDNEY (g)	GILV (h)	REPRO (i)	RESP (j)	SKIN (k)	EYE (l)	BONE (m)	ENDO (n)	**BLOOD** (o)
1	SR-241 Trucks (DPM) SR-241 Cars (TOG)	Diesel Particulate Acetaldehyde Acrolein Benzene 1,3-Butadiene Ethylbenzene Formaldehyde Hexane Methanol Methyl Ethyl Ketone Naphthalene Propylene Styrene Toluene Xylenes						 4.44E-06	 6.67E-08 1.43E-05 1.22E-05					 6.67E-05
2	Shell Station (gas (spillage) (venting)	Benzene Benzene Benzene												5.18E-05 3.15E-04 3.56E-05
3	Loan Depot (generator) (boiler)	Diesel Particulate Acetaldehyde Acrolein Ammonia Benzene Ethylbenzene Formaldehyde n-Hexane Naphthalene Toluene Xylene							 2.30E-09 9.87E-07 1.70E-07					 9.64E-04
4	Rubious Mexican Grill (charbroiler)	Acetaldehyde Benzene Formaldehyde Naphthalene PAHs, total Styrene Toluene Propionaldehyde							8.33E-08 3.83E-06					1.43E-05
		Total - All Sources						4.44E-06	3.16E-05					1.45E-03

Note: Staff Scenario emission rates produced higher 8-hour chronic hazard indices, compared to Student Scenario emission rates.

Note: Health risks calculated using HARP2, Risk Assessment Standalone Tool, version 19044 (CARB, 2019).

Maximum 8-Hour Hazard Index 1.45E-03 Blood

* Key to Toxicological Endpoints

CV	Cardiovascular System	RESP	Respiratory System
CNS	Central Nervous System	SKIN	Skin irritation and/or other effects
IMMUN	Immune System	EYE	Eye irritation and/or other effects
KIDN	Kidneys	BONE	Bones and Teeth
GILV	Gastrointestinal Tract and Liver/Alimentary Tract	ENDO	Endocrine System
REPRO	Reproductive System	BLOOD	Hematological System

Table E5
Mobile Source Pollutant Concentration Worksheet
Criteria Air Pollutants

Criteria Air Pollutants						
Pollutant (a)	Source (b)	Emission Rates [1] (g/s) (c)	AERMOD Output [2] ($\mu g/m^3$) (d)	Mass GLC ($\mu g/m^3$) (e)	AERMOD Output [2] ($\mu g/m^3$) (f)	Mass GLC ($\mu g/m^3$) (g)
PM_{10}			Annual Average			
	SR-241	9.93E-02	0.41	**0.04**		
	LST Threshold ($\mu g/m^3$)			1.0		
	Exceeds Threshold?			**No**		
CO			Max 1-hour		Max 8-hour	
	SR-241	4.64E-01	14.3	6.65E+00	4.5	2.08E+00
	SR-241 (ppm) [3]			**0.01**		**0.002**
	Background Level (ppm)			1.4		0.9
	Total (ppm)			**1.4**		**0.9**
	CAAQS Threshold (ppm)			20.0		9.0
	Exceeds Threshold?			**No**		**No**
NOx			Max 1-hour		Annual Average	
	SR-241	9.30E-02	14.3	1.33E+00	0.41	3.80E-02
	SR-241 (ppm) [4]			7.08E-04		2.02E-05
NO_2	SR-241 (ppm) [5]			1.06E-04		3.03E-06
	Background Level (ppm)			0.060		0.012
	Total (ppm)			**0.060**		**0.012**
	CAAQS Threshold (ppm)			0.18		0.030
	Exceeds Threshold?			**No**		**No**

[1] Emission Rates from Source Emissions Inventory (Appendix A).

[2] AERMOD Output based on unit emission rates for roadway segments (1 g/s).

[3] CO conversion factor of 8.733E-04 ppm per $\mu g/m^3$ was used to convert concentrations.

[4] NOx conversion factor of 5.3157E-04 ppm per $\mu g/m^3$ was used to convert concentrations.

[5] NOx to NO_2 conversion rate was derived from a report entitled Final Localized Significance Threshold Methodology (SCAQMD, 2008)

Mobile Source	Distance from Roadway to Project Site (m)	NO_X to NO_2 Conversion Factor
SR-241	310	0.1503

May 2019 | Health Risk Assessment

NAKASE ELEMENTARY SCHOOL

Toll Brothers

Prepared for:

Toll Brothers
Contact: Ilan P. Feingold, Sr. Project Manager
715 W. Town & Country Road, Suite 200
Orange, California 92868
714.347.1300

Prepared by:

PlaceWorks
Contact: Steve Bush, PE, Senior Engineer
3 MacArthur Place, Suite 1100
Santa Ana, California 92707
714.966.9220
info@placeworks.com
www.placeworks.com

PLACEWORKS

Table of Contents

Section **Page**

1. INTRODUCTION 1
2. PROJECT DESCRIPTION 3
3. SOURCE IDENTIFICATION 7
4. EMISSIONS INVENTORY 11
4.1 ON-ROAD MOBILE SOURCES 11
4.2 STATIONARY SOURCES 12
5. AIR DISPERSION MODELING 13
6. RISK CHARACTERIZATIONS 15
6.1 CARCINOGENIC CHEMICAL RISK 15
6.2 NON-CARCINOGENIC HAZARDS 16
6.3 CRITERIA AIR POLLUTANTS 17
6.4 ACCIDENTAL RELEASES 19
7. CONCLUSIONS 21
8. REFERENCES 23

APPENDICES

Appendix A. Stationary Emission Sources
Appendix B. Graphical Representation of Emitting Sources
Appendix C. Emission Rate Calculations
Appendix D. Air Dispersion Model Output
Appendix E. Risk Calculations

Table of Contents

List of Figures

Figure		Page
Figure 1	Site Location	5
Figure 2	Emission Sources	9

List of Tables

Table		Page
Table 1	Emission Sources	7
Table 2	Vehicle Fleet Mix	11
Table 3	Compounds Emitted from Mobile Sources	12
Table 4	Compounds Emitted from Stationary Sources	12
Table 5	California Ambient Air Quality Standards	17
Table 6	Localized Significance Thresholds	18
Table 7	Saddleback Valley Monitoring Station Summary	18
Table 8	Health Risk Assessment Results	21

1. Introduction

Toll Brother (the project developer) is working to gain approval for construction of an elementary school on 10-acres of the 120.83-acre Nakase Property Area Plan located at 20621 Lake Forest Drive, Lake Forest, California. The school site would accommodate up to 1,000 students from kindergarten through sixth grade. The proposed elementary school and play fields and active use areas (project site) are in the northeast corner of the Nakase Nursery site.

Regulations pertaining to the siting of new schools or modernization of existing schools in California require compliance with the California Code of Regulations (CCR) Title 5 standards. For new schools, Title 5 studies must demonstrate that facilities with the potential to emit hazardous air pollutants within a quarter-mile radius of the school site will not constitute an actual or potential public health risk to students and staff that will attend the school. This health risk assessment (HRA) included conducting the following tasks:

- Emissions were evaluated associated with vehicles and trucks traveling on State Route (SR-241), which is approximately 300 feet northeast of the school site boundary. Because the school is within 500 feet of the edge of a freeway traffic lane or busy traffic corridor, criteria air pollutants as well as toxic air contaminants (TACs) were also evaluated to determine if air quality at the proposed site poses a short-term or long-term exposure risk to students and staff.
- Facilities within a quarter-mile (1,320-foot) radius of the proposed site were identified and evaluated that might reasonably emit hazardous or acutely hazardous air emissions.
- Air dispersion modeling, using the AERMOD computer model, was conducted to quantify maximum ground-level concentrations for receptors at the project site. Meteorological data from the nearest South Coast Air Quality Management District (SCAQMD) station with similar meteorological conditions were used to represent local weather conditions and prevailing winds.
- Cancer and non-cancer risks to students and staff attending the school site were determined, based on the results of the AERMOD modeling. The assessment considered exposure through the inhalation pathway. Cancer Potency Factors (CPFs) were used to determine carcinogenic risk and Recommended Exposure Limits (RELs) were used to determine non-carcinogenic risk.
- A health risk assessment report has been prepared that compares the calculated risks with thresholds established by the SCAQMD and Office of Environmental Health Hazard Assessment (OEHHA).

The HRA and dispersion modeling methodologies used in the preparation of this report included all relevant and appropriate procedures developed by the US Environmental Protection Agency (USEPA, 2005) and OEHHA (2015). These methodologies and assumptions were used to ensure that the assessment effectively quantified school-based impacts associated with emission sources. It should be noted that these health impacts were based on conservative (i.e., health protective) assumptions. The USEPA and OEHHA note that conservative assumptions used in a risk assessment are intended to ensure that the estimated risks do not underestimate the actual risks (USEPA, 2005; OEHHA, 2015). Therefore, the estimated risks do not

1. Introduction

necessarily represent actual risks experienced by populations at or near a site. The use of conservative assumptions tends to produce upper-bound estimates of risk and usually overestimate exposures.

For this school-based risk assessment, the following conservative assumptions were used:

- It was assumed that maximum exposed receptor (both students and staff) stood outside at the site for 8 hours per weekday (8:00 AM to 4:00 PM, Monday to Friday), 180 days per year for 7 years (kindergarten to 6th grade students) or 250 days per year for 25 years (staff). In reality, students and staff are exposed to outdoor pollutant concentration levels only during breaks, lunch, and PE class and are exposed to reduced indoor pollutant concentrations for the remaining school hours. This would result in lower estimated risk values.
- The calculated risk for children from 2-16 years is multiplied by a factor of 3 to account for early life exposure and uncertainty in child versus adult exposure impacts (OEHHA, 2015).

Thus, the estimated risks in this HRA are conservative.

2. Project Description

The Toll Brothers' development site is located in the north-central portion of the City of Lake Forest in Orange County, California. The 120.83-acre site is currently operating as the Nakase Brothers Wholesale Nurseries, an agricultural wholesale plant nursery. The areas surrounding the property consist of a mix of land uses, including commercial, office, open space, industrial, and residential. The nursery is bounded on the northwest by Bake Parkway, on the northeast by Rancho Parkway, on the southeast by Serrano Creek Trail, and on the southwest by commercial, industrial, and office uses. Although not immediately adjacent to the property, single-family and multifamily residential uses exist to the northwest, northeast, and to the south. SR-241 is approximately 300 feet to the northeast.

Toll Brothers is working to gain approval for an elementary school on 10-acres of the development site. The proposed elementary school and play fields and active use areas (project site) are in the northeast corner of the Nakase Property Area Plan.

The project site and vicinity are depicted in Figure 1.

2. Project Description

This page intentionally left blank.

Figure 1 - Site Location

Source: ESRI, 2019

2. Project Description

This page intentionally left blank.

3. Source Identification

The health risk assessment evaluated the impact of potential long-term (chronic) exposure to air toxic emissions generated by vehicles traveling along SR-241 (between mile posts 21.802 and 23.418). Due to the proximity of the project site to SR-241, potential long-term (chronic) exposure to air toxic emissions and short-term (acute) health impacts were evaluated from exposures to criteria pollutants (particulate matter, carbon monoxide, and nitrogen dioxide).

Additionally, properties within a quarter-mile radius (1,320 feet) were surveyed using the SCAQMD Facility Information Detail (FIND) database and aerial photography to identify facilities that have the potential to generate hazardous and acutely hazardous air emissions. Additionally, information obtained through the SCAQMD FIND database was reviewed to assist in the identification of potential emission sources.

A summary of the emissions sources evaluated during this assessment is provided below in Table 1. Appendix A contains a summary of all emission sources surveyed and interviewed.

Table 1 Emission Sources

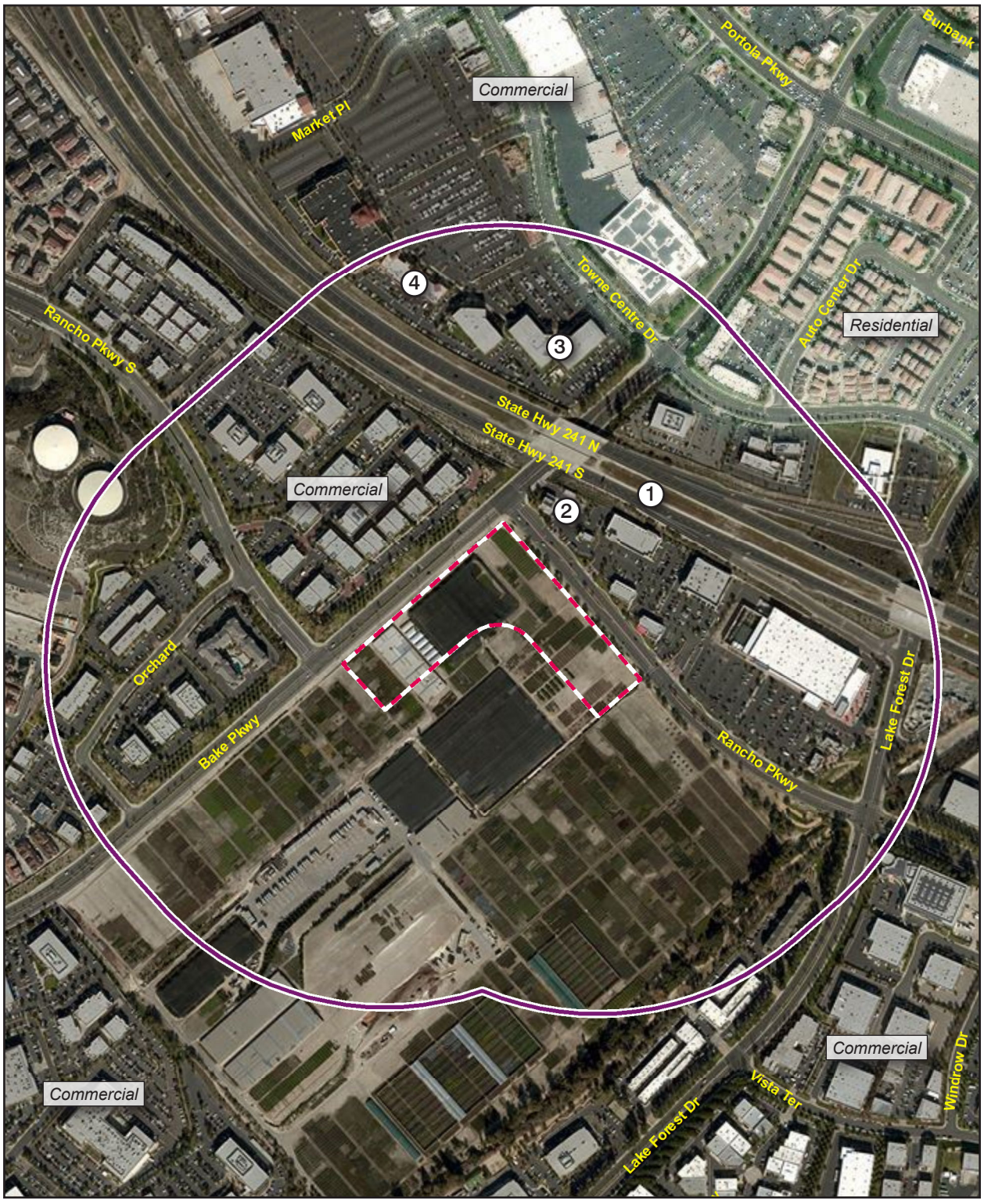
Source	Address
State Route 241	Mile Posts 21.802-23.418
Shell Station	26721 Rancho Parkway, Lake Forest, CA 92630
Loan Depot	26672, 26642, and 26632 Towne Centre Drive, Foothill Ranch, CA 92610
Rubios Fresh Mexican Grill #91	26612 Towne Centre Drive, Foothill Ranch, CA 92610

The project site and evaluated emission sources are depicted in Figure 2.

3. Source Identification

This page intentionally left blank.

Figure 2 - Emission Sources



Source: ESRI, 2019

3. Source Identification

This page intentionally left blank.

4. Emissions Inventory

4.1 ON-ROAD MOBILE SOURCES

Vehicle emissions contribute significantly to localized concentrations of air contaminants. Typically, emissions generated from these sources depend on vehicle mix, the percentage of heavy-duty diesel trucks, the rate at which pollutants are generated during the course of travel, and the number of vehicles traveling along the roadway network.

The peak hourly traffic for the section of SR-241 nearest the school site was obtained from the California Department of Transportation, Traffic Branch (Caltrans). To determine variances in hourly traffic volumes, the assessment used data available through the Caltrans Performance Measurement System (Caltrans PeMS, 2019). The truck percentage for each evaluated roadway segment was used to estimate the number of diesel trucks traveling on the roadway. Table 2 lists the identified peak hourly traffic volumes and diesel truck percentage considered in the assessment.

Table 2 Vehicle Fleet Mix

Roadway	Peak Hourly Vehicle Traffic (vehicles per hour)	Truck Percentage
SR-241 (Mile Posts 21.802-23.418)	4,600	7.6

Source: Caltrans, 2019.

Additionally, for purposes of this analysis a one percent annual increase in traffic is assumed. CARB has developed the EMFAC2017 emission factor model to account for the emission standards representative of the California fleet. EMFAC2017 was used to identify pollutant emission rates for total organic gases (TOG), diesel particulate matter (DPM), carbon monoxide (CO) and nitrogen dioxide (NO_2) at the project build out year of 2024. The PM_{10} emission factor for diesel-fueled vehicles was used as the surrogate for DPM (CARB, 2017). The TOG speciation profile provided by the Bay Area Air Quality Management District (2012) was used to quantify the toxic air contaminants (TACs) associated with the TOG fraction.

For particulate matter (PM_{10}), emissions were quantified as the sum of re-entrainment of paved roadway dust and tailpipe emissions. The predictive emission equation developed by the USEPA (2011) was used to generate the entrained dust source strength.

A list of emitted compounds for the mobile-source category is presented in Table 3.

4. Emissions Inventory

Table 3 Compounds Emitted from Mobile Sources

Source	Contaminant
SR-241 (gasoline vehicles and diesel trucks)	Diesel Particulate Matter (DPM) Total Organic Gases (TOG), toxic air contaminant species: Acetaldehyde, Acrolein, Benzene, 1,3-Butadiene, Ethyl Benzene, Formaldehyde, Hexane, Methanol, Methyl Ethyl Ketone, Naphthalene, Propylene, Styrene, Toluene, Xylenes Particulate Matter (PM_{10}) Carbon Monoxide Nitrogen Dioxide

Note: EMFAC2017 generates emission factors for nitrogen oxides (NOx). NOx to NO2 conversion rate was 0.015 for SR-241, derived from a report entitled Final Localized Significance Threshold Methodology (SCAQMD, 2008).

4.2 STATIONARY SOURCES

Contaminant release information and associated chemical species were identified through a review of available documentation for each source referenced in Section 3. To the degree practical, all contaminant emissions generated from each source location were considered in the analysis. The limiting factor for the inclusion of a compound was the availability of published exposure factors and other toxicity data enabling risks to be quantified and, where appropriate, target organs identified. The compounds emitted from each stationary source are listed in Table 4.

Table 4 Compounds Emitted from Stationary Sources

Source	Contaminant
Shell Station – gasoline dispensing	Benzene
Loan Depot – generator and boiler	Diesel Particulate Matter (DPM), Acetaldehyde, Acrolein, Ammonia, Benzene, Ethylbenzene, Formaldehyde, n-Hexane, Naphthalene, Toluene, Xylenes
Rubios Fresh Mexican Grill – charbroiler	Acetaldehyde, Benzene, Formaldehyde, Naphthalene, Polycyclic Aromatic Hydrocarbons (PAHs), Propionaldehyde, Styrene, Toluene

Appendix B contains a graphical representation of each emitting source. Appendix C presents the emission rate calculations for each source considered in the assessment.

5. Air Dispersion Modeling

To assess the impact of emitted compounds on individuals who may work and/or attend classes at the proposed school facility, air quality modeling using the AERMOD atmospheric dispersion model was performed. The model is a steady state Gaussian plume model and is recommended by SCAQMD for estimating ground level impacts from point and fugitive sources in simple and complex terrain.

The model requires additional input parameters, including chemical emission data and local meteorology. Meteorological (met) data provided by SCAQMD for the Mission Viejo met station (2011 - 2014, 2016) was used to represent local weather conditions and prevailing winds. According to the data from the Mission Viejo met station, the prevailing wind direction in the area of the project site is to the northeast. The wind rose is provided in Appendix C.

The modeling analysis also considered the spatial distribution and elevation of each emitting source in relation to the sensitive receptors. To accommodate the model's Cartesian grid format, direction-dependent calculations were obtained by identifying the Universal Transverse Mercator (UTM) coordinates for source and receptor locations. In addition, digital elevation model (DEM) data for the area were obtained and included in AERMOD to account for complex terrain.

For all modeling runs, a unit emission rate of 1 gram per second (g/s) was used. The unit emission rates were divided between the volume sources for SR-241. Two sets of volume sources were created for SR-241. One set representing the motor vehicles traveling along SR-241 was used to characterize emissions of TOG and criteria air pollutants. For this set of sources, a release height of 0.60 meter was used (CARB, 2000). The second set of sources representing truck traffic was used to characterize emissions of DPM. For this run, a release height of 4.15 meters was used (CARB, 2000). The model's by hour/day (HRDOW) scalar option was invoked to predict concentrations from variable hourly emissions from vehicular traffic.

The maximum AERMOD concentrations from the output files were then multiplied by the emission rates calculated in Appendix C to obtain the maximum ground-level concentrations at the maximum exposed receptor (MER). The air dispersion model output is presented in Appendix D. The calculated MER concentrations used in the HRA are provided in Appendix E. The annual average concentrations from the model run were used to determine cancer risk and chronic non-cancer risk, and the maximum one-hour concentrations were used to determine acute non-cancer risk. Additionally, CARB's Hotspots Analysis and Reporting Program (HARP2), Risk Assessment Standalone Tool was used to determine the 8-hour chronic non-cancer risk; the program determines the 8-hour non-cancer risk from the annual average concentrations (CARB, 2019).

5. Air Dispersion Modeling

This page intentionally left blank.

6. Risk Characterizations

6.1 CARCINOGENIC CHEMICAL RISK

Carcinogenic compounds are not considered to have threshold levels (i.e., dose levels below which there are no risks). Any exposure, therefore, will have some associated risk. The SCAQMD has established a maximum incremental cancer risk of 10 in a million ($1x10^{-5}$) for CEQA projects and the OEHHA also sets a typical risk management level as 10 in a million (OEHHA, 2015).

Health risks associated with exposure to carcinogenic compounds can be defined in terms of the probability of developing cancer as a result of exposure to a chemical at a given concentration. The cancer risk probability is determined by multiplying the chemical's annual concentration by its cancer potency factor (CPF), a measure of the carcinogenic potential of a chemical when a dose is received through the inhalation pathway. It is an upper-limit estimate of the probability of contracting cancer as a result of continuous exposure to an ambient concentration of one microgram per cubic meter ($\mu g/m^3$), averaged over a lifetime of 70 years.

Recent guidance from OEHHA recommends a refinement to the standard point estimate approach with the use of age-specific breathing rates and age sensitivity factors (ASFs) to assess risk for susceptible subpopulations such as children. For the inhalation pathway, the procedure requires the incorporation of several discrete variates to effectively quantify dose for each age group. Once determined, contaminant dose is multiplied by the cancer potency factor in units of inverse dose expressed in milligrams per kilogram per day $(mg/kg/day)^{-1}$ to derive the cancer risk estimate. Therefore, to accommodate the unique exposures associated with the proposed school population, the following dose algorithm was used.

$$\text{Dose}_{\text{AIR,per age group}} = \left(C_{air} \times EF \times \left[\frac{BR}{BW}\right] \times A \times CF\right)$$

Where:

$Dose_{AIR}$	=	dose by inhalation (mg/kg-day), per age group
C_{air}	=	concentration of contaminant in air ($\mu g/m^3$)
EF	=	exposure frequency (number of days /365 days)
BR/BW	=	daily breathing rate normalized to body weight (L/kg-day)
A	=	inhalation absorption factor (default = 1)
CF	=	conversion factor ($1x10^{-6}$, µg to mg, L to m^3)

The inhalation absorption factor (A) is a unitless factor that is only used if the cancer potency factor included a correction for absorption across the lung. For this assessment, the default value of 1 was used. To represent the unique characteristics of the school population, the assessment employed the USEPA's guidance to develop viable dose estimates based on reasonable maximum exposure, defined as the "highest exposure that

is reasonably expected to occur" for a given receptor population. Lifetime risk values for the student population were adjusted to account for an exposure of 180 days per year for 7 years (kindergarten through 6th grade). In addition, the calculated risk for students is multiplied by an ASF weighting factor of 3 (for children ages 2 to 16) to account for early life sensitivity to pollutant exposures (OEHHA, 2015). To assess staff-related risk, exposures were adjusted to account for an employment period of 250 days per year for 25 years. This timeline is considered appropriate for potential workplace exposures established by OEHHA.

To calculate the overall cancer risk, the risk for each appropriate age group is calculated per the following equation:

$$\text{Cancer Risk}_{\text{AIR}} = \text{Dose}_{\text{AIR}} \times \text{CPF} \times \text{ASF} \times \frac{\text{ED}}{AT}$$

Where:

Dose_{AIR}	=	dose by inhalation (mg/kg-day), per age group
CPF	=	cancer potency factor, chemical-specific $(\text{mg/kg-day})^{-1}$
ASF	=	age sensitivity factor, per age group
ED	=	exposure duration (years)
AT	=	averaging time period over which exposure duration is averaged (always 70 years)

The CPFs used in the assessment were obtained from OEHHA guidance. The cancer risk is calculated separately for the students and staff, because of age differences in sensitivity to carcinogens and age differences in intake rates. The final step converts the cancer risk in scientific notation to a whole number that expresses the cancer risk in "chances per million" by multiplying the cancer risk by a factor of $1x10^6$ (i.e., 1 million).

CARB's HARP2 Risk Assessment Standalone Tool was used to calculate the cancer risk values (CARB, 2019). The determined cancer risks attributed to each chemical exposure and summation of those risks are presented in Appendix E.

6.2 NON-CARCINOGENIC HAZARDS

An evaluation was conducted for the potential non-cancer effects of chronic and acute chemical exposures. Adverse health effects are evaluated by comparing the annual receptor level ground level concentration of each chemical compound with the appropriate Reference Exposure Level (REL). Available RELs promulgated by OEHHA were considered in the assessment.

The hazard index approach was used to quantify non-carcinogenic impacts. The hazard index assumes that chronic and acute sub-threshold exposures adversely affect a specific organ or organ system (toxicological endpoint). For each discrete chemical exposure, target organs presented in regulatory guidance were used. To calculate the hazard index, each chemical concentration or dose is divided by the appropriate toxicity value. The ratios are summed for compounds affecting the same toxicological endpoint. A health hazard is presumed to exist where the total equals or exceeds one.

CARB's HARP2 Risk Assessment Standalone Tool was used to calculate the chronic, 8-hour, and acute (1-hour) health risk values (CARB, 2019), and the determined hazard indices are provided in Appendix E.

6.3 CRITERIA AIR POLLUTANTS

The State of California has promulgated ambient air quality standards for various pollutants. These standards were established to safeguard the public's health and welfare with specific emphasis on protecting those individuals susceptible to respiratory distress, such as asthmatics, the young, the elderly, and those with existing conditions that may be affected by increased pollutant concentrations. A list of criteria air pollutants considered in the assessment and their associated air quality standards are presented in Table 5.

Table 5 California Ambient Air Quality Standards

Pollutant	Standard	Health Effects
Carbon Monoxide (CO)	>9.0 ppm (8 hr avg.) >20.0 ppm (1 hr avg.)	1) Aggravation of angina pectoris and other aspects of coronary heart disease. 2) Decreased exercise tolerance in persons with peripheral vascular disease and lung disease. 3) Impairment of central nervous system functions. 4) Possible increased risk to fetuses.
Nitrogen Dioxide (NO_2)	≥0.030 ppm (annual avg.) ≥0.18 ppm (1 hr avg.)	1) Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups. 2) Risk to public health implied by pulmonary and extra-pulmonary biochemical and cellular changes and pulmonary structural changes.
Particulates (PM_{10})	>50 μg/m^3 (24 hr avg.) >20 μg/m^3 (annual avg.)	1) Excess deaths from short-term exposures and the exacerbation of symptoms in sensitive individuals with respiratory disease. 2) Excess seasonal declines in pulmonary function especially in children.

Notes: ppm: parts per million; μg/m^3: micrograms per cubic meter
Source: California Code of Regulations, Title 17, Section 70200.

Pollutant emissions are considered to have a significant effect on the environment if they result in concentrations that create either a violation of an ambient air quality standard, contribute to an existing air quality violation, or expose sensitive receptors to significant pollutant concentrations. Should ambient air quality already exceed existing standards, SCAQMD has established significance criteria that identify incremental air concentrations for selected pollutants. According to SCAQMD's Localized Significance Threshold (LST) Methodology (2008), SCAQMD considers sensitive receptors to include residences, hospitals, or convalescent facilities where it is possible that an individual could be present for 24 hours per day. For school-based receptors, LSTs for 24-hour ambient air quality standards would not apply. However, LSTs for commercial receptors would apply for the annual average and shorter averaging periods, such as 1-hour and 8-hour averages, since a commercial (i.e., worker) receptor durations are typically no more than 8 hours and are more applicable to school-based receptors.

Table 6 outlines the significance thresholds considered for sites that are within an air basin where criteria pollutants exceed air quality standards.

6. Risk Characterizations

Table 6 Localized Significance Thresholds

Pollutant	Averaging Time	Significance Criteria
Carbon Monoxide (CO)	8 Hours 1 Hour	Project contributes to exceedance of 9.0 ppm Project contributes to exceedance of 20 ppm
Nitrogen Dioxide (NO_2)	Annual 1 Hour	Project contributes to exceedance of 0.03 ppm Project contributes to exceedance of 0.18 ppm
Particulates (PM_{10})	Annual	Project causes an incremental increase of 1.0 $\mu g/m^3$

Notes: ppm: parts per million; $\mu g/m^3$: micrograms per cubic meter
Source: SCAQMD, 2015. SCAQMD Air Quality Significance Thresholds accessed online at http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook.

The nearest active air quality monitoring station to the project site is the Saddleback Valley Monitoring Station. Background concentrations are based on the highest observed value for the most recent three-year period. NO_2 data was not collected for the Saddleback Valley Monitoring Station. Therefore, NO_2 data from the nearest monitoring station with available data (North Coastal Orange County Monitoring Station) were used for the analysis. A summary of the monitoring station data is presented in Table 7.

Table 7 Saddleback Valley Monitoring Station Summary

	Year				
Pollutant/Averaging Time	2017	2016	2015	Maximum	CAAQS
Carbon Monoxide (CO)					
1-Hour	1.4	1.3	1.4	1.4	20
8-Hour	0.9	0.7	0.7	0.9	9
Nitrogen Dioxide (NO_2)					
1-Hour	0.0453	0.0598	0.0524	0.0598	0.18
Annual	0.0079	0.0101	0.0116	0.0116	0.030
Particulates (PM_{10})					
Annual	18.4	21.0	19.0	21.0	20

Note: Coarse Particulates (PM_{10}) are expressed in micrograms per cubic meter ($\mu g/m3$). All others are expressed in parts per million (ppm).
Source: SCAQMD, 2019. Historical Data by Year, https://www.aqmd.gov/home/air-quality/air-quality-data-studies/historical-data-by-year.

For carbon monoxide (CO) and nitrogen dioxide (NO_2), background concentrations are below the current air quality standards. Therefore, impacts are considered to be significant when pollutant concentrations, added to existing background levels, result in an exceedance of the CAAQS.

For particulate emissions, maximum background concentrations in the vicinity of the site exceed the California Ambient Air Quality Standard (CAAQS) for the annual average PM_{10} concentrations. Additionally, the project site is within a non-attainment area for PM_{10} (CARB, 2017). As a result, SCAQMD defines a significant impact as PM_{10} concentrations that exceed the specified localized significance threshold (LST) of 1.0 $\mu g/m^3$ for annually averaged concentrations.

Appendix E, Table E5, presents the criteria air pollutant ground level concentrations at the project site determined using AERMOD.

6.4 ACCIDENTAL RELEASES

Under the auspices of the California Accidental Release Prevention (CalARP) Program, a Risk Management Plan (RMP) is required to be conducted pursuant to the provisions of the federal Accidental Release Prevention program (Title 40, Code of Federal Regulations, Part 68) Article 2, Chapter 6.95 of the Health and Safety Code. The RMP is only required should a stationary source use more than a threshold quantity of a regulated hazardous substance, and includes a risk assessment of accidental releases.

A review of the available information collected during the source identification process (e.g., regulatory records review and interviews with business owner/operators) did not reveal the presence of any CalARP program facilities within 0.25 mile of the proposed site (The Right-to-Know Network, 2019).

6. Risk Characterizations

This page intentionally left blank.

7. Conclusions

The results of the health risk assessment are provided in Table 8. The excess cancer risk was calculated to be 0.05 per million for adult school staff and 0.08 per million for students. In comparison to the threshold level of 10 in a million, carcinogenic risks are well below the significance threshold value for both school staff and students. For non-carcinogenic effects, the chronic hazard index identified for each toxicological endpoint totaled less than one for both school staff and students. Therefore, chronic non-carcinogenic hazards are below the significance threshold. Additionally, the acute 1-hour and 8-hour non-carcinogenic hazards were also below the significance thresholds.

Table 8 Health Risk Assessment Results

Source	Cancer Risk (per million)		Chronic Hazard Index	Acute (1-Hour) Hazard Index	8-Hour Hazard Index
	Staff Exposure	Student Exposure			
All Sources	0.05	0.08	0.001	0.002	0.001
SCAQMD Threshold	10	10	1.0	1.0	1.0
Exceeds Threshold	**No**	**No**	**No**	**No**	**No**

A comparison of the current air quality standards with the results of the modeling analysis for SR-241 vehicle emissions is provided below:

- For carbon monoxide (CO), the maximum one-hour concentration of 0.01 ppm and the maximum eight-hour concentration of 0.002 ppm, when added to existing background levels, do not exceed the CAAQS.

- For nitrogen dioxide (NO_2), maximum one-hour and annual concentrations of 1×10^{-4} ppm and 3×10^{-6} ppm were calculated, respectively. These concentrations, when added to existing background levels, do not exceed the CAAQS.

- For PM_{10}, an annual average concentration of 0.04 micrograms per cubic meter ($\mu g/m^3$) was predicted. The annual average concentration does not exceed the SCAQMD significance threshold of 1.0 $\mu g/m^3$.

Based on a comparison to the carcinogenic and non-carcinogenic thresholds established by OEHHA and SCAQMD, hazardous air emissions generated from the stationary and mobile sources within a quarter-mile radius are not anticipated to pose an actual or potential endangerment to students and staff occupying the project site and no mitigation measures are required.

7. Conclusions

This page intentionally left blank.

8. References

Bay Area Air Quality Management District (BAAQMD). 2012, May. *Recommended Methods for Screening and Modeling Local Risks and Hazards.* Version 3.0.

California Air Resources Board (CARB). 2019. Hotspots Analysis and Report Program (HARP2), Risk Assessment Standalone Tool (RAST), Version 19044.

———. 2017. *EMFAC2017 - Calculating Emission Inventories for Vehicles in California.*

———. 2017. Area Designations Maps/State and National. https://www.arb.ca.gov/desig/adm/adm.htm.

———. 2000. *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles.*

California Department of Transportation (Caltrans). 2019. Performance Measurement System (PeMS), accessed on January 25, 2019 at http://pems.dot.ca.gov.

_____. 2017. Traffic Data Branch, accessed on February 4, 2019 at http://www.dot.ca.gov/trafficops/census/.

Office of Environmental Health Hazard Assessment (OEHHA). 2015, February. *Air Toxics Hot Spots Program Guidance Manual for the Preparation of Health Risk Assessments.*

The Right-to-Know Network. 2019. The Right-to-Know Network, hosted by the Houston Chronicle, accessed on February 12, 2019 at http://www.rtk.net/rmp/search.php.

South Coast Air Quality Management District (SCAQMD). 2019. Historical Data By Year, accessed on February 12, 2019 at https://www.aqmd.gov/home/air-quality/air-quality-data-studies/historical-data-by-year.

———. 2015. Air Quality Significance Thresholds, accessed on February 20, 2019 at http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/.

———. 2011-2014, 2016. *Data Set for Mission Viejo Meteorological Station.*

———. 2008. *Final Localized Significance Threshold Methodology.* Revised July 2008.

United States Environmental Protection Agency (USEPA). 2011. Technology Transfer Network, Clearinghouse for Inventories and Emission Factors. *Compilation of Air Pollutant Emission Factors*, accessed on October 30, 2018 at https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emission-factors.

———. 2005. *Guideline on Air Quality Models* (Revised). EPA-450/2-78-027R.

8. References

This page intentionally left blank.

Appendix A. Stationary Emission Sources

Table A - Stationary Emission Sources
Nakase Elementary School
Health Risk Assessment

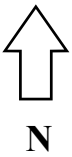
No.	FACILITY	AQMD ID	ADDRESS		CITY	ZIP	NOTES
2	Shell Station	122537	26721	Rancho Parkway	Lake Forest	92630	Gas dispensing
3	Loan Depot	156082	26672, 26642, 26632	Towne Centre Drive	Foothill Ranch	92610	Boiler/Emergency Generator
4	Rubio's Fresh Mexican Grill #91	120573	26612	Towne Centre Drive	Foothill Ranch	92610	Natural Gas Charbroiler
Omitted Facilities							
	Wonderware	171963	26541	Rancho Parkway South	Lake Forest	92630	No equipment; de minimis emissions
	Invensys	138330	26561	Rancho Parkway South	Lake Forest	92630	No equipment; de minimis emissions
	Triconex	171964	26521	Rancho Parkway South	Lake Forest	92630	No equipment; de minimis emissions

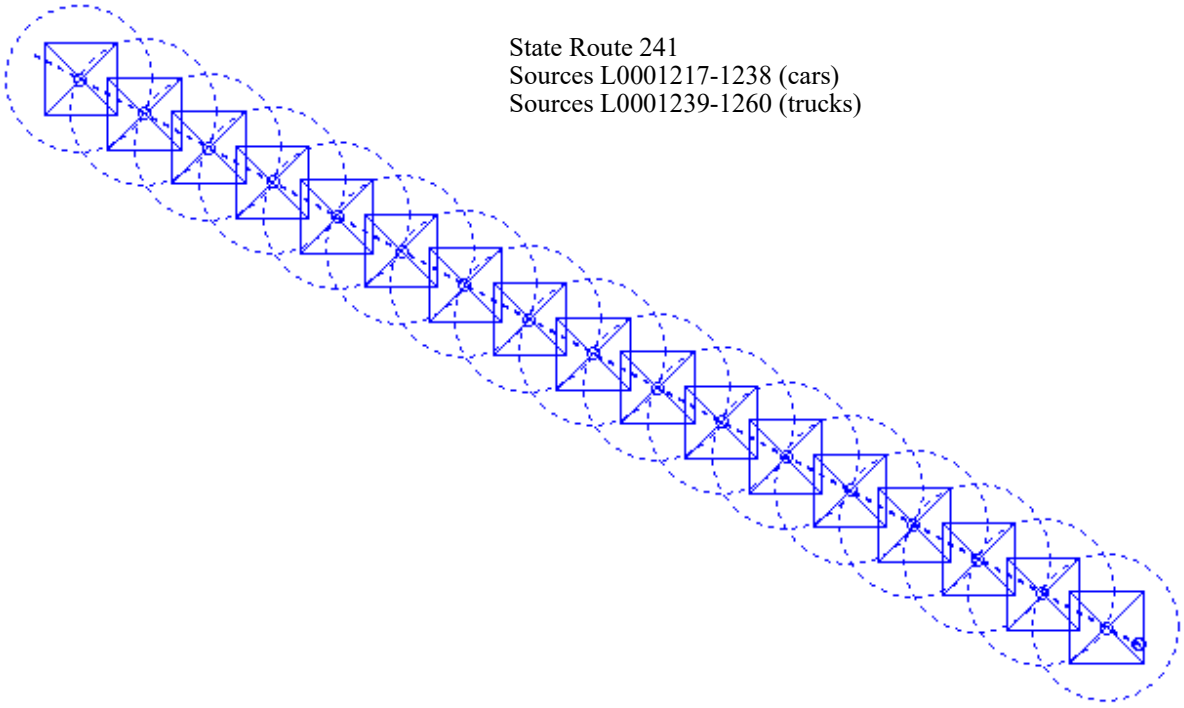
Appendix B. Graphical Representation of Emitting Sources

Appendix

This page intentionally left blank.

Source 1
State Route 241
Mile Post 21.802 to 23.418
Sources L0001217-1238 (cars)
Sources L0001239-1260 (trucks)

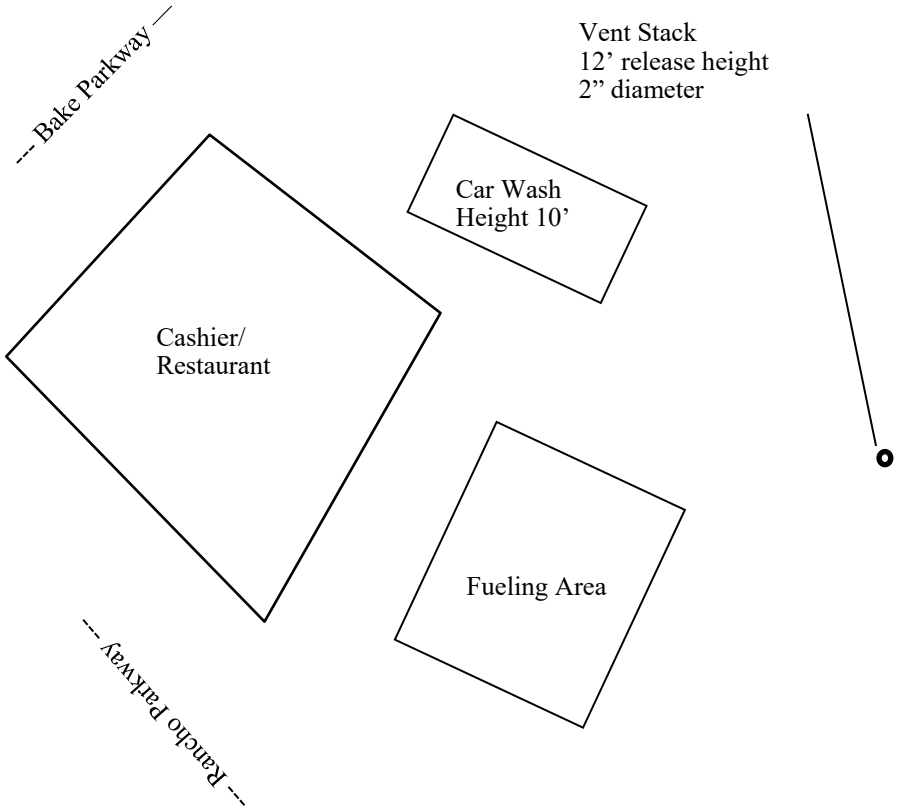




- Release height of 4.15 m is based upon California Air Resources Board's "Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles" (2000). Release of 0.6 m used for gasoline-fueled vehicles.

Source 2
Shell Station
26721 Rancho Parkway
Lake Forest CA 92630
24 hours per day, 7 days per week

Chemical and Use Rate
Gasoline Dispensing: 8,000 gallons per day

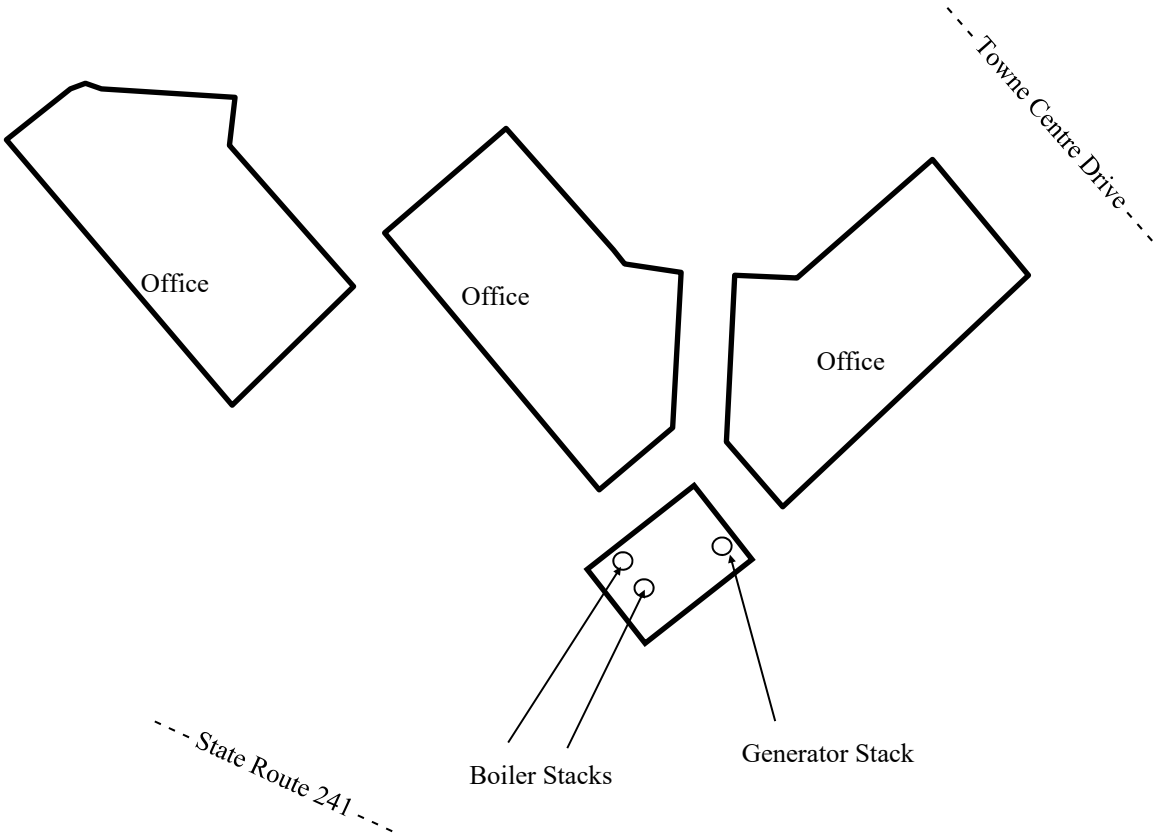


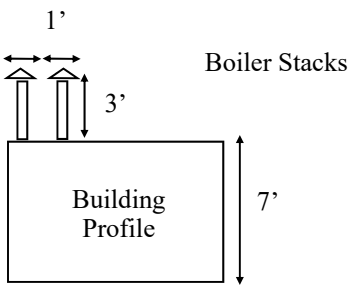
- Fueling area is based upon California Air Pollution Control Officers Association (CAPCOA) *Gasoline Service Station Industrywide Risk Assessment Guidelines* (1998). Volume source parameters: 4 m height; 13 m x 13 m area
- Volume Source Modeling (Refueling and hose permeation): Source height of 4 m, release height of 1 m, and δz of 0.93 m are based upon CAPCOA guidance (1998).
– Volume Source Modeling (Spillage): Source height of 4 m, release height of 0 m, and δz of 1.86 m are based upon based upon CAPCOA guidance (1998).
– Point Source Modeling (Transfer and Pressure Driven Losses): Stack parameters based upon CAPCOA guidance (1998).

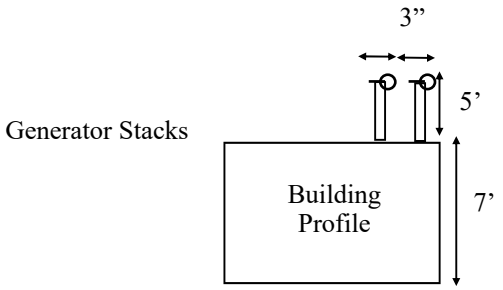
Source 3
Loan Depot
26672, 26642, and 26632 Towne Center Plaza
Foothill Ranch, CA 92610
Monday - Friday: 9:00 AM - 5:00 PM

N

Chemical and Use Rate
Natural Gas Boilers (2): 1,999,000 BTU per hour
Emergency Generator: 2,220 brake horsepower, tested no more than 20 hours per year

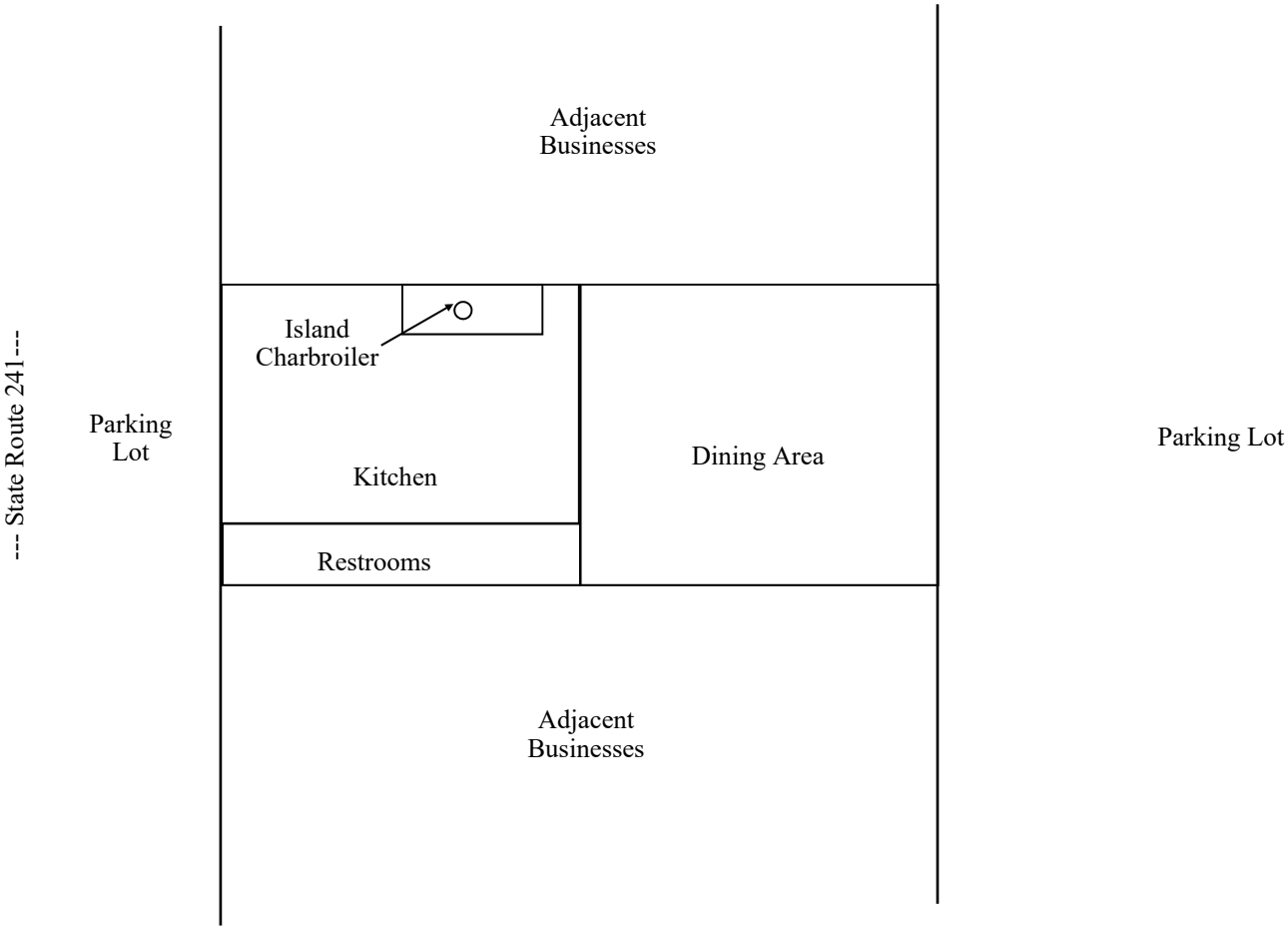


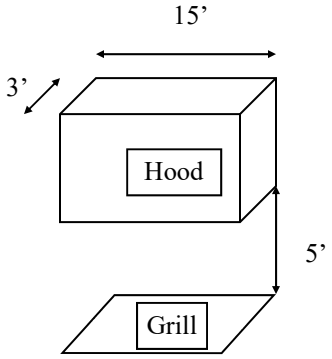


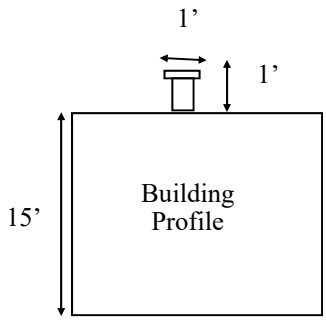


Source 4
Rubio's Mexican Grill
26612 Towne Center Drive,
Foothill Ranch 92610
Monday-Friday: 10:30 AM - 9:00 PM
Saturday-Sunday: 11:00AM - 9:00PM

Chemical and Use Rate
Charbroiler, under-fired: 20 pounds per day of meat cooked;
20 pounds per day of skinless poultry cooked; 15 pounds per day of seafood cooked.







Appendix C. Emission Rate Calculations

Vehicle Mix Worksheet

Table A: Traffic Volumes

Route	Mile Post	Traffic Data Year	Peak Hour Traffic (veh/hr)[1]	Truck Percentage (%)[2]	Annual Increase in Traffic (%)	School Buildout Year[3]
State Route 241	21.802-23.418	2017	4,600	7.6%	1.0%	2024

Sources:

1. Caltrans, Traffic Data Branch (2018). Website: http://www.dot.ca.gov/trafficops/census/.
2. Caltrans, PEMS (2018). Website: http://pems.dot.ca.gov/.
3. Buildout year of 2024 was chosen as a conservative estimate. Actual buildout year is unknown.

Table B: Highway Parameters

Link/Segment	Link length (m)	Width of roadway (m)	Source Separation (m)	Roadway Configuration	Mile Post	Speed
State Route 241	962	44.0	44.0	At-Grade	21.802-23.418	55 mph

Table C: Segment Volumes

Link/Segment	Period Length (years)	Hourly All Vehicles	Hourly TOG Vehicles	Hourly Diesel Vehicles[4]
2024[1]	1	**4,932**	**4,559**	373
2025[1]	5	4,981	4,605	377
2030[1]	5	5,235	4,839	396
2035[1]	5	5,502	5,086	416
2040[1]	9	5,783	5,346	437
25-year weighted average[2]	25	5,423	**5,013**	**410**
7-year weighted average[3]	7	5,010	**4,632**	**379**

1 Increases in Peak Hourly Traffic based on annual traffic increase based on projected vehicle mile traveled (VMT) growth rate of 1% per year from 2024 to 2048 (CARB, EMFAC2017).

2 Represents the 25-year (staff) weighted average traffic volumes, accounting for annual increases in projected traffic.

3 Represents the 7-year (K-6th grade students) weighted average traffic volumes, accounting for annual increases in projected traffic.

4 Truck percentage of 7.6%, from CalTrans PEMS (2018), used to represent the diesel vehicle traffic along roadway segment.

On-Road Mobile Sources
Emission Rate Computation

TOG and DPM Emission Rates

Emission Rate = EF x VPH x L

EF = emission factor (g/mi)
VPH = Peak Hour Volume (vehicles per hour)

L = Link Length (m)		962
Conversion Factors	m/mi	1609.3
	sec/hr	3600

1 **State Route 241**
Mile Post 21.802-23.418

1a Gasoline Vehicles

Long-Term Hazards

TOG EF (g/mi) - 2024	0.0206
VPH - 25-year, gasoline fueled vehicles	5,013
TOG Emission Rate (g/s) - Staff	**1.72E-02**

TOG EF (g/mi) - 2024	0.0206
VPH - 7-year, gasoline fueled vehicles	4,632
TOG Emission Rate (g/s) - Students	**1.59E-02**

Acute Hazards

TOG EF (g/mi) - 2024	0.0206
VPH - 1-hour, gasoline fueled vehicles	4,559
TOG Emission Rate (g/s) - 1-hour	**1.56E-02**

1b Diesel Vehicles

DPM EF (g/mi) - 2024	0.0129
VPH - 25-year, diesel fueled vehicles	410
DPM Emission Rate (g/s) - Staff	**8.80E-04**

DPM EF (g/mi) - 2024	0.0129
VPH - 7-year, diesel fueled vehicles	379
DPM Emission Rate (g/s) - Students	**8.13E-04**

On-Road Mobile Souces
Emission Rate Computation

Particulate (PM_{10}) Emissions

PM_{10} Vehicular Emission Factor (g/mi)	0.0535

Source: EMFAC2017 emission factor for all vehicles in Orange County at buildout year (2024). Includes running emissions (RUNEX), brake wear (PMBW) and tire wear (PMTW) emission rates.

PM_{10} Reentrainment Emission Factor = $k * (sL)^{0.91} * (W)^{1.02} * (1 - P/4N)$

k = particle size multiplier (g/VMT)	1.00
sL = roadway specific silt loading (g/m^2)	0.02
W = average weight of vehicles on road (tons)	2.4
P = number of days >0.01 in of precipitation (LA County)	34
N = number of days in averaging period	365

PM_{10} Reentrainment EF (g/VMT)	0.06785

Source: CARB, 2014. Miscellaneous Process Methodology 7.9, Entrained Road Travel, Paved Road Dust.

1 State Route 241

Mile Post 21.802-23.418

Emission Rate = EF x VPH x L

EF = emission factor (vehicle or reentrained dust)		
VPH = Peak Hour Volume (vehicles per hour)		4,932
L = Link Length (m)		962
Conversion Factors	m/mi	1,609.3
	sec/hr	3,600

Peak Hour Emission Rates

Vehicular Emission Rate (g/s)	4.38E-02
Reentrainment Emission Rate (g/s)	5.56E-02
PM_{10} Peak Hour Emission Rate Total (g/s)	**9.93E-02**

On-Road Mobile Sources
Emission Rate Computation

CO and NOx Emissions

Emission Rate = EF x VPH x L

EF = emission factor (g/mi)

VPH = Peak Hour Volume (vehicles per hour)

L = Link Length (m)		962
Conversion Factors	m/mi	1,609.3
	sec/hr	3,600

1 State Route 241

Mile Post 21.802-23.418

Carbon Monoxide

CO EF (g/mi) - 2020	0.5666
VPH - 2020	4,932
CO Peak Hour Emission Rate (g/s) - 2020	**4.64E-01**

Nitrogen Oxides

NOx EF (g/mi) - 2020	0.1135
VPH - 2020	4,932
NOx Peak Hour Emission Rate (g/s) - 2020	**9.30E-02**

Source: EMFAC2017 emission factor for all vehicles in Orange County at buildout year (2024).

Initial Sigma Computation

Vertical Sigma Calculations - At-Grade or Above Grade Roadway

Initial Horizontal Dispersion Parameter (Sigma Y)
SY = (source separation distance)/2.15

Initial Vertical Dispersion Parameter (Sigma Z)
$SZ = (1.8 + 0.11(TR)) \times (60/30)^{0.2}$
TR = W2/U

Where:
W2 = traveled way half width (m)
U = average wind speed (m/s)

1 State Route 241

Width of Traveled Way (m)	44.0
Average Wind Speed (m/s)	1.98
Source Separation Distance (m)	44.0

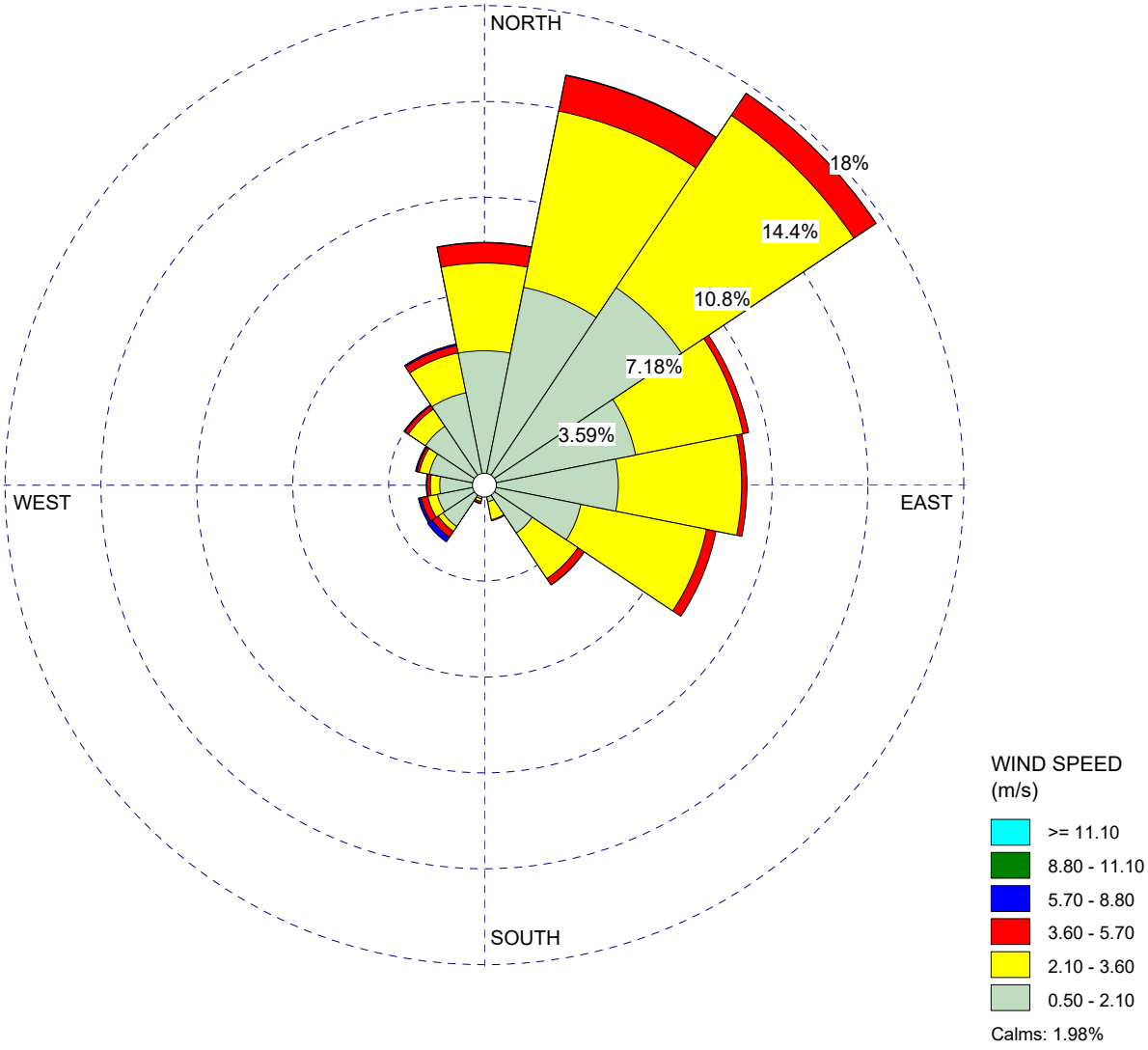
SY = **20.47**
SZ = **3.47**

WIND ROSE PLOT:

Mission Viejo Meteorological Station
2011-2014, 2016

DISPLAY:

Wind Speed
Flow Vector (blowing to)



COMMENTS: School Hours 8AM-4PM	DATA PERIOD: **Start Date: 1/1/2011 - 08:00** **End Date: 12/31/2016 - 15:00**	COMPANY NAME:	
		MODELER:	
	CALM WINDS: **1.98%**	TOTAL COUNT: **14441 hrs.**	
	AVG. WIND SPEED: **1.98 m/s**	DATE: **3/7/2019**	PROJECT NO.: **TBRO-02.0**

Variable Emissions Worksheet
Caltrans PeMS Data

Caltrans PeMS VMT Aggregates - 7/1/2018 - 09/30/2018: SR-241							Normalizing Factors HROFDAY Scalars [1]		
	All Vehicles - Daily VMT			Trucks - Daily VMT					
Hour	Southbound	Northbound	Total VMT	Eastbound	Westbound	Total VMT	Hour	Vehicles	Trucks
0	9	278	287	0	0	0	1	0.134	0.000
1	4	273	277	0	0	0	2	0.129	0.000
2	1	271	272	0	0	0	3	0.127	0.000
3	2	279	281	0	0	0	4	0.131	0.000
4	12	347	359	0	0	0	5	0.167	0.002
5	58	568	626	9	0	10	6	0.292	0.059
6	208	1,069	1,278	50	2	52	7	0.596	0.321
7	355	1,790	2,145	87	8	95	8	1.000	0.588
8	350	1,649	1,998	81	6	86	9	0.932	0.533
9	253	1,139	1,392	61	1	62	10	0.649	0.383
10	204	904	1,108	52	1	54	11	0.517	0.330
11	206	850	1,055	58	1	59	12	0.492	0.364
12	212	821	1,033	69	1	70	13	0.482	0.434
13	250	824	1,075	84	1	85	14	0.501	0.525
14	317	868	1,185	103	2	105	15	0.553	0.647
15	408	898	1,305	127	3	130	16	0.609	0.801
16	517	917	1,433	143	4	146	17	0.668	0.902
17	597	975	1,572	158	4	162	**18**	**0.733**	**1.000**
18	442	804	1,246	118	3	121	19	0.581	0.746
19	240	610	850	56	1	58	20	0.396	0.355
20	145	486	631	29	0	29	21	0.294	0.181
21	84	412	496	18	0	18	22	0.231	0.109
22	57	346	403	10	0	10	23	0.188	0.064
23	29	299	327	2	0	2	24	0.153	0.013
Max	597	1,790	2,145	158	8	162			

[1] School Hours: 8:00 AM - 4:00 PM (Hour 9-16)

Number of Days - PeMS Data
63.0

Truck Percentage Check	7.56%
Caltrans	3.80%

Report Description

Report	Aggregates>Time Series
Report link	***http://pems.dot.ca.gov/?report_form=1&dnode=VDS&content=loops&statio***
Report generated	01/25/2019 15:09
PeMS version	caltrans_pems-18.0.0

Report Parameters

Parameter	Value
Quantity	Vehicle Miles Traveled (VMT)
Data	54,429 Lane Points
Data Quality	29.2% Observed
Segment Type	VDS
Segment Name	Mainline VDS 1209568 - N OF ALTON
start date	07/02/2018 00:00:00
end date	09/30/2018 23:59:59
Day of Week	Mo,Tu,We,Th,Fr
Granularity	hour

Report Parameters

Parameter	Value
Quantity	Vehicle Miles Traveled (VMT)
Data	54,429 Lane Points
Data Quality	0% Observed
Segment Type	VDS
Segment Name	Mainline VDS 1209614 - UPPER OSO
start date	07/01/2018 00:00:00
end date	09/30/2018 23:59:59
Day of Week	Mo,Tu,We,Th,Fr
Granularity	hour

EMISSION FACTOR CALCULATIONS
EMFAC 2017

EMFAC2017 (v1.0.2) Emission Rates
Region Type: County
Region: ORANGE
Calendar Year: 2024
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW

Speed (mph)

55

TOTAL EMISSION RATES (g/mi)

	TOG	DPM	PM10	CO	NOx
Gas	**0.0206**				
DSL		**0.0129**			
NG					
Total	0.0215		0.0535	0.5666	0.1135

		Fleet Mix Percentage	VMT (Mi/day)	TOG (g/mi)	TOG Weighted	DPM (g/mi)	DPM Weighted	PM10 (g/mi)	PM10 Weighted	CO (g/mi)	CO Weighted	NOx (g/mi)	NOx Weighted
HHDT	GAS		122	0.4201	51	0.0009	0	0.09864	12	22.147	2712	3.1371	384
HHDT	DSL	0.229	117501	0.0162	1903	0.02336	2744	0.10510	12349	0.0971	11411	1.3307	156359
HHDT	NG		0	0	0	0	0	0.09774	0	0	0	0	0
LDA	GAS		3273411	0.0067	21950	0.00097	3189	0.04572	149674	0.4442	1454193	0.0246	80680
LDA	DSL	0.069	35225	0.007	246	0.00368	130	0.04843	1706	0.1023	3604	0.0363	1277
LDT1	GAS		352332	0.0177	6243	0.00126	442	0.04601	16209	0.7394	260525	0.0627	22106
LDT1	DSL	0.000	62	0.1431	9	0.09987	6	0.14462	9	0.8523	53	0.8598	53
LDT2	GAS		1096552	0.0116	12755	0.00099	1081	0.04574	50152	0.5881	644875	0.0467	51240
LDT2	DSL	0.017	8976	0.0086	77	0.00352	32	0.04827	433	0.0693	622	0.0261	234
LHDT1	GAS		113624	0.022	2500	0.00083	94	0.08927	10143	0.4368	49632	0.1311	14893
LHDT1	DSL	0.179	91754	0.0485	4450	0.01085	995	0.09529	8743	0.2548	23380	1.1758	107886
LHDT2	GAS		19639	0.0142	279	0.00074	14	0.10192	2002	0.2912	5719	0.1337	2626
LHDT2	DSL	0.069	35352	0.044	1556	0.01213	429	0.10931	3864	0.2252	7962	0.9783	34584
MCY	GAS		28103	2.1453	60290	0.00163	46	0.01739	489	16.446	462177	1.0897	30623
MDV	GAS		711166	0.0152	10844	0.00101	719	0.04576	32544	0.6661	473705	0.0612	43538
MDV	DSL	0.039	19885	0.0062	124	0.00308	61	0.04783	951	0.1036	2061	0.0315	627
MH	GAS		6169	0.039	240	0.00089	5	0.14723	908	0.8327	5137	0.2458	1516
MH	DSL	0.006	2876	0.0481	138	0.08687	250	0.22921	659	0.2056	591	2.9906	8602
MHDT	GAS		35164	0.0286	1007	0.00066	23	0.14300	5028	0.5649	19863	0.1976	6949
MHDT	DSL	0.381	195556	0.0065	1276	0.00949	1856	0.15183	29691	0.0353	6894	0.5975	116840
OBUS	GAS		4187	0.0453	190	0.00069	3	0.14303	599	0.876	3668	0.307	1286
OBUS	DSL	0.010	4882	0.0096	47	0.01481	72	0.15715	767	0.0567	277	0.8751	4272
SBUS	GAS		1052	0.0528	56	0.00065	1	0.75745	797	1.0923	1149	0.4547	478
SBUS	DSL	0.003	1707	0.0597	102	0.04022	69	0.79302	1354	0.1762	301	6.6952	11431
UBUS	GAS		274	0.0118	3	0.00068	0	0.00068	0	0.2065	57	0.1837	50
UBUS	DSL	0.000	0	0	0	0	0	0.14235	0	0	0	0	0
UBUS	NG		1182	4.2268	4998	0.00119	1	0.10156	120	40.248	47588	0.3054	361
Gas Total			5641796		116409		5619		268557		3383412		256371
DSL Total		1.00	513775		9928		6643		60527		57155		442165
NG Total			1182		4998		1		120		47588		361

Note: Total Emission Rate (g/mi)=Sum of Weighted Emission Rates(g/day)/Sum of VMTs(mi/day)

Source 2
Shell Station
26721 Rancho Parkway
Lake Forest, California 92630

Operation: Gasoline/Diesel Dispensing

	hours	days	weeks
Temporal Profile:	24	7	52
	0	0	0

Materials: (1)

Unleaded Gasoline	240,000	gal/mo

Emission Factor: (2)

Phase II Fueling Non-ORVR	0.42	lbs VOC/1,000 gal
Phase II Fueling ORVR	0.021	lbs VOC/1,000 gal
Phase I Bulk Transfer Losses	0.15	lbs VOC/1,000 gal
Pressure Driven Losses	0.024	lbs VOC/1,000 gal
Phase II Fueling - Spillage	0.24	lbs VOC/1,000 gal
Hose Permeation (2017)	0.009	lbs VOC/1,000 gal

Volume Source Emissions (3)

Refueling (4)	0.13	lbs VOC/1,000 gal
Refueling Emissions	4.41E-02	lbs/hr
	5.56E-03	**g/s**
Spillage (5)	0.24	lbs VOC/1,000 gal
Spillage Emissions	7.91E-02	lbs/hr
	9.97E-03	**g/s**

Point Source Emissions (6)

Transfer and Pressure Losses (7)	0.17	lbs VOC/1,000 gal
Transfer and Pressure Emissior	5.74E-02	lbs/hr
	7.23E-03	**g/s**

(1) Gasoline dispensed amount based on estimate from manager of 8,000 gallons/day of gasoline.

(2) Emission factors is based upon CARB's Revised Emission Factors for Gasoline Marketing Operations at California Gasoline Dispensing Facilities (CARB, 2013). TAC speciation: 0.3% benzene for transfer, pressure losses and refueling emissions; 1% benzene for spillage California Air Pollution Control Officers Assocation (CAPCOA) Gasoline Service Station Industrywide Risk Assessment Guidelines (CAPCOA, 1998).

(3) Volume sources modeled as 4 m high, 13 m long and 13 m wide (CAPCOA, 1998).

(4) Refueling emission include fueling non-ORVR and ORVR vehicles (74% of vehicles; CARB, 2013) and hose permeation (2017 emission rate). Release height 1 m (CAPCOA, 1998).

(5) Release height 0 m for spillage (CAPCOA, 1998).

(6) Point sources modeled as vertical stack with release height 12 feet, diameter 2 inches, temperature 60F, and exit velocity 0.01 m/s (CAPCOA, 1998).

(7) Transfer and pressure driven loss emissions modeling as a single vent pipe (CAPCOA, 1998).

Source 3a
Loan Depot
26632, 26642, and 26672 Towne Centre Drive
Foothill Ranch, California 92610

Operation: Natural Gas Combustion - Boilers

	hours	days	weeks
Temporal Profile:	16	5	52
	0	0	0

Equipment Rating: (1)

Boilers: BTU/Hour	1,999,000
Boilers: Number	2

Emissions:	Emission Factors: (2) lb/mmcf gas	lb/mmbtu	Compound Emissions	Adjusted Wt Fraction
Acetaldehyde	4.30E-03	4.22E-06	1.69E-05	2.37E-04
Acrolein	2.70E-03	2.65E-06	1.06E-05	1.49E-04
Ammonia	1.80E+01	1.76E-02	7.06E-02	9.94E-01
Benzene	8.00E-03	7.84E-06	3.14E-05	4.42E-04
Ethylbenzene	9.50E-03	9.31E-06	3.72E-05	5.25E-04
Formaldehyde	1.70E-02	1.67E-05	6.66E-05	9.39E-04
n-Hexane	6.30E-03	6.18E-06	2.47E-05	3.48E-04
Naphthalene	3.00E-04	2.94E-07	1.18E-06	1.66E-05
Toluene	3.66E-02	3.59E-05	1.43E-04	2.02E-03
Xylene	2.72E-02	2.67E-05	1.07E-04	1.50E-03
Total			7.10E-02	lb/hr
			8.94E-03	g/s
			4.47E-03	**g/s/stack**

Point Source Specifications (vertical release with rain cap):

Stack Temperature	400	F	2 Stacks
Stack Flowrate	1,664	cfm	
Stack Diameter	1.0	ft	
Stack Height	10	ft	

(1) Assumed equipment rating based on <2 MMBTU/hr SCAQMD requirement. Owner not cooperative with request for equipment
(2) Emission factors (pounds per million standard cubic feet of fuel burned) and btu/scf conversion (1,020 btu/scf) based upon SCAQMD Supplemental Instruction - Reporting Procedures for AB2588 Facilities (2014). Appendix B, Table B-1: Default Emission Factors for Natural Gas Combustion (< 10 MMBTU/HR).

Source 3b
Loan Depot
26632, 26642, and 26672 Towne Centre Drive
Foothill Ranch, California 92610

Operation: Emergency Diesel Generator

Generator Testing Profile:	hours (O&M) [1]	School in Session hours	days	weeks
	20	8	5	36

Scalar for School Hour: 0.014

Equipment Specifications:

Equipment Used (#)	1
Brake Horsepower (bhp)	2,220
PM10 Emission Factor (g/bhp-hr) [2]	0.14
Load Factor (% / 100)	1

Emissions: **0.086 g/s**

Point Source Specifications (vertical release, hinged cap): [2]

Stack Flowrate	9,600	acfm
Stack Temperature	744	K
Stack Diameter	3.0	in
Stack Height	12.0	ft

(1) Generator testing profile from SCAQMD Permit No. G38879. Permit specifies no more than 20 hours in any one year is allowed for maintanance and testing.

(2) Generator PM exhaust parameters for Cummins KTA50-G9.

Source 4
Rubios Mexican Grill
26612 Towne Centre Drive
Foothill Ranch, California 92610

Operation: Charbroiler, under-fired

Temporal Profile:	hours	days	weeks
	10.5	5	52
	10	2	52

Average Pounds of Meat: (1)

Meat	140	lbs/week
Poultry	140	lbs/week
Seafood	105	lbs/week

Emission Factors: (1)

ROG Emission Rate, Meat	3.94	lbs/1000 lbs meat
ROG Emission Rate, Poultry	0.40	lbs/1000 lbs meat
ROG Emission Rate, Seafood	0.38	lbs/1000 lbs meat

Emissions:

ROG Emissions, Meat	0.55	lbs/week
	7.61E-03	lbs/hr
ROG Emissions, Poultry	0.06	lbs/week
	7.72E-04	lbs/hr
ROG Emissions, Seafood	0.04	lbs/week
	5.50E-04	lbs/hr
Total	8.93E-03	lbs/hr
	1.13E-03	**g/s**

Speciation: (2)

		Compound Wt Fraction	Compound Emissions
ROG Emissions	Acetaldehyde	0.087	9.79E-05
	Benzene	0.150	1.68E-04
	Formaldehyde	0.120	1.35E-04
	Naphthalene	0.006	6.53E-06
	PAHs, total	0.017	1.90E-05
	Propionaldehyde	0.023	2.64E-05
	Styrene	0.057	6.39E-05
	Toluene	0.059	6.67E-05
	Other (NOS)	0.48	5.42E-04
	Total	1.00	1.13E-03

Point Source Specifications (vertical release with rain cap):

Stack Temperature	330	K
Stack Flowrate	9,000	cfm
Stack Diameter	1.0	ft
Stack Height	16.0	ft

Note: ROG = reactive organic gases
(1) Average pounds of meat, poultry, and seafood estimated by onsite manager. Emission rates are based upon *Methods for Developing a National Emission Inventory* for Commercial Cooking Processes (E.H. Pechan and Associates, Inc. for USEPA, 2003).
(2) Speciation information based upon *National Emissions Inventory for Commercial Cooking* (Roe, et. al., E.H. Penchan & Associates, Inc. for USEPA, 2004).

Appendix D. Air Dispersion Model Output

Appendix

This page intentionally left blank.

Results Summary

Nakase Elementary School
Lake Forest, CA

Concentration - Source Group: BSTCK 3a - Boiler Stacks

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
1-HR	1ST	27.60686	ug/m^3	438187.23	3726090.37	225.15	0.00	236.48	11/29/2016, 16
PERIOD		0.65080	ug/m^3	438187.23	3726090.37	225.15	0.00	236.48	

Concentration - Source Group: CARS 1 - SR-241 Cars

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
1-HR	1ST	14.33058	ug/m^3	438187.23	3726090.37	225.15	0.00	236.48	2/18/2013, 9
8-HR	1ST	4.46842	ug/m^3	438187.23	3726090.37	225.15	0.00	236.48	11/22/2013, 16
PERIOD		0.40830	ug/m^3	438187.23	3726090.37	225.15	0.00	236.48	

Concentration - Source Group: FUEL 2 - Gas Refueling

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
1-HR	1ST	306.45458	ug/m^3	438217.23	3726060.37	222.72	0.00	236.43	3/4/2014, 9
PERIOD		9.32933	ug/m^3	438227.23	3726050.37	222.81	0.00	236.33	

Results Summary

Nakase Elementary School
Lake Forest, CA

Concentration - Source Group: GSTCK 3b - Generator Stack

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
PERIOD		0.00172	ug/m^3	438187.23	3726090.37	225.15	0.00	236.48	

Concentration - Source Group: RBSTCK 4 - Charbroiler Stack

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
1-HR	1ST	18.00055	ug/m^3	438187.23	3726090.37	225.15	0.00	236.48	10/27/2016, 16
PERIOD		0.25528	ug/m^3	438187.23	3726090.37	225.15	0.00	236.48	

Concentration - Source Group: SPILL 2 - Gas Spillage

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
1-HR	1ST	330.84234	ug/m^3	438217.23	3726060.37	222.72	0.00	236.43	3/4/2014, 9
PERIOD		9.46461	ug/m^3	438227.23	3726050.37	222.81	0.00	236.33	

Concentration - Source Group: STCK 2 - Gas Venting

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
1-HR	1ST	189.88164	ug/m^3	438217.23	3726060.37	222.72	0.00	236.43	3/4/2014, 9
PERIOD		4.92190	ug/m^3	438237.23	3726040.37	222.90	0.00	236.28	

Results Summary

Nakase Elementary School
Lake Forest, CA

Concentration - Source Group: TRUCKS 1 - SR-241 Trucks

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
PERIOD		0.34106	ug/m^3	438187.23	3726090.37	225.15	0.00	236.48	

Model Output
Unit Emission Rates (1 g/s)

```
*** AERMOD - VERSION  18081 ***   *** Nakase Elementary School                                   ***        03/06/19
*** AERMET - VERSION  16216 ***   *** Lake Forest, CA                                            ***        14:15:41
                                                                                                            PAGE   1
*** MODELOPTs:    RegDFAULT  CONC  ELEV  URBAN  ADJ_U*

                                        ***     MODEL SETUP OPTIONS SUMMARY       ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

**Model Is Setup For Calculation of Average CONCentration Values.

  --  DEPOSITION LOGIC  --
**NO GAS DEPOSITION Data Provided.
**NO PARTICLE DEPOSITION Data Provided.
**Model Uses NO DRY DEPLETION.  DRYDPLT  =  F
**Model Uses NO WET DEPLETION.  WETDPLT  =  F

**Model Uses URBAN Dispersion Algorithm for the SBL for    51 Source(s),
  for Total of    1 Urban Area(s):
  Urban Population =   3010232.0 ;  Urban Roughness Length =  1.000 m

**Model Uses Regulatory DEFAULT Options:
        1. Stack-tip Downwash.
        2. Model Accounts for ELEVated Terrain Effects.
        3. Use Calms Processing Routine.
        4. Use Missing Data Processing Routine.
        5. No Exponential Decay.
        6. Urban Roughness Length of 1.0 Meter Assumed.

**Other Options Specified:
        ADJ_U*   - Use ADJ_U* option for SBL in AERMET
        TEMP_Sub - Meteorological data includes TEMP substitutions

**Model Assumes No FLAGPOLE Receptor Heights.

**The User Specified a Pollutant Type of:  OTHER

**Model Calculates  2 Short Term Average(s) of:   1-HR   8-HR
    and Calculates PERIOD Averages

**This Run Includes:     51 Source(s);       9 Source Group(s); and     525 Receptor(s)

               with:      5 POINT(s), including
                          3 POINTCAP(s) and      0 POINTHOR(s)
                and:     46 VOLUME source(s)
                and:      0 AREA type source(s)
                and:      0 LINE source(s)
                and:      0 OPENPIT source(s)
                and:      0 BUOYANT LINE source(s) with      0 line(s)


**Model Set To Continue RUNning After the Setup Testing.
```

Model Output
Unit Emission Rates (1 g/s)

```
**The AERMET Input Meteorological Data Version Date:  16216

**Output Options Selected:
         Model Outputs Tables of PERIOD Averages by Receptor
         Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
         Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)
         Model Outputs Separate Summary File of High Ranked Values (SUMMFILE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and Missing Hours

**Misc. Inputs:  Base Elev. for Pot. Temp. Profile (m MSL) =   170.00 ;  Decay Coef. =    0.000     ;  Rot. Angle =     0.0
                 Emission Units = GRAMS/SEC                              ;  Emission Rate Unit Factor =   0.10000E+07
                 Output Units   = MICROGRAMS/M**3

**Approximate Storage Requirements of Model =      4.0 MB of RAM.

**Input Runstream File:          aermod.inp
**Output Print File:             aermod.out

**Detailed Error/Message File:   Nakse ES.err
**File for Summary of Results:   Nakse ES.sum
```

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** POINT SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	STACK HEIGHT (METERS)	STACK TEMP. (DEG.K)	STACK EXIT VEL. (M/SEC)	STACK DIAMETER (METERS)	BLDG EXISTS	URBAN SOURCE	CAP/ HOR	EMIS RATE SCALAR VARY BY
STCK	0	0.10000E+01	438308.5	3726114.2	227.9	3.66	288.71	0.01	0.05	NO	YES	NO	HRDOW
RBSTCK	0	0.10000E+01	438074.9	3726424.1	237.2	4.88	330.00	58.21	0.31	YES	YES	CAP	HRDOW
BSTCK1	0	0.50000E+00	438260.5	3726289.5	235.5	3.05	477.59	10.76	0.31	YES	YES	CAP	HRDOW
BSTCK2	0	0.50000E+00	438261.3	3726288.2	235.4	3.05	477.59	10.76	0.31	YES	YES	CAP	HRDOW
GSTCK	0	0.10000E+01	438280.1	3726293.2	235.7	3.66	744.00	993.49	0.08	YES	YES	NO	HRDOW

*** VOLUME SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	INIT. SY (METERS)	INIT. SZ (METERS)	URBAN SOURCE	EMISSION RATE SCALAR VARY BY
L0001217	0	0.45455E-01	438744.6	3725953.9	232.3	0.60	20.47	3.47	YES	HRDOW
L0001218	0	0.45455E-01	438706.2	3725975.5	238.5	0.60	20.47	3.47	YES	HRDOW
L0001219	0	0.45455E-01	438667.9	3725997.0	238.0	0.60	20.47	3.47	YES	HRDOW
L0001220	0	0.45455E-01	438629.5	3726018.6	237.8	0.60	20.47	3.47	YES	HRDOW
L0001221	0	0.45455E-01	438591.1	3726040.1	237.5	0.60	20.47	3.47	YES	HRDOW
L0001222	0	0.45455E-01	438552.8	3726061.7	237.3	0.60	20.47	3.47	YES	HRDOW
L0001223	0	0.45455E-01	438514.4	3726083.2	237.1	0.60	20.47	3.47	YES	HRDOW
L0001224	0	0.45455E-01	438476.1	3726104.8	237.0	0.60	20.47	3.47	YES	HRDOW
L0001225	0	0.45455E-01	438437.7	3726126.3	236.8	0.60	20.47	3.47	YES	HRDOW
L0001226	0	0.45455E-01	438399.3	3726147.9	236.7	0.60	20.47	3.47	YES	HRDOW
L0001227	0	0.45455E-01	438361.0	3726169.4	236.6	0.60	20.47	3.47	YES	HRDOW
L0001228	0	0.45455E-01	438322.6	3726191.0	236.2	0.60	20.47	3.47	YES	HRDOW
L0001229	0	0.45455E-01	438284.3	3726212.5	232.6	0.60	20.47	3.47	YES	HRDOW
L0001230	0	0.45455E-01	438245.9	3726234.1	235.9	0.60	20.47	3.47	YES	HRDOW
L0001231	0	0.45455E-01	438207.5	3726255.6	235.6	0.60	20.47	3.47	YES	HRDOW
L0001232	0	0.45455E-01	438169.2	3726277.2	235.2	0.60	20.47	3.47	YES	HRDOW
L0001233	0	0.45455E-01	438130.8	3726298.7	234.8	0.60	20.47	3.47	YES	HRDOW
L0001234	0	0.45455E-01	438092.5	3726320.3	234.4	0.60	20.47	3.47	YES	HRDOW
L0001235	0	0.45455E-01	438054.1	3726341.8	234.0	0.60	20.47	3.47	YES	HRDOW
L0001236	0	0.45455E-01	438015.7	3726363.4	233.6	0.60	20.47	3.47	YES	HRDOW
L0001237	0	0.45455E-01	437977.4	3726384.9	233.1	0.60	20.47	3.47	YES	HRDOW
L0001238	0	0.45455E-01	437939.0	3726406.5	232.3	0.60	20.47	3.47	YES	HRDOW

Model Output
Unit Emission Rates (1 g/s)

L0001239	0	0.45455E-01	438744.6	3725953.9	232.3	4.15	20.47	3.47	YES	HRDOW
L0001240	0	0.45455E-01	438706.2	3725975.5	238.5	4.15	20.47	3.47	YES	HRDOW
L0001241	0	0.45455E-01	438667.9	3725997.0	238.0	4.15	20.47	3.47	YES	HRDOW
L0001242	0	0.45455E-01	438629.5	3726018.6	237.8	4.15	20.47	3.47	YES	HRDOW
L0001243	0	0.45455E-01	438591.1	3726040.1	237.5	4.15	20.47	3.47	YES	HRDOW
L0001244	0	0.45455E-01	438552.8	3726061.7	237.3	4.15	20.47	3.47	YES	HRDOW
L0001245	0	0.45455E-01	438514.4	3726083.2	237.1	4.15	20.47	3.47	YES	HRDOW
L0001246	0	0.45455E-01	438476.1	3726104.8	237.0	4.15	20.47	3.47	YES	HRDOW
L0001247	0	0.45455E-01	438437.7	3726126.3	236.8	4.15	20.47	3.47	YES	HRDOW
L0001248	0	0.45455E-01	438399.3	3726147.9	236.7	4.15	20.47	3.47	YES	HRDOW
L0001249	0	0.45455E-01	438361.0	3726169.4	236.6	4.15	20.47	3.47	YES	HRDOW
L0001250	0	0.45455E-01	438322.6	3726191.0	236.2	4.15	20.47	3.47	YES	HRDOW
L0001251	0	0.45455E-01	438284.3	3726212.5	232.6	4.15	20.47	3.47	YES	HRDOW
L0001252	0	0.45455E-01	438245.9	3726234.1	235.9	4.15	20.47	3.47	YES	HRDOW
L0001253	0	0.45455E-01	438207.5	3726255.6	235.6	4.15	20.47	3.47	YES	HRDOW
L0001254	0	0.45455E-01	438169.2	3726277.2	235.2	4.15	20.47	3.47	YES	HRDOW
L0001255	0	0.45455E-01	438130.8	3726298.7	234.8	4.15	20.47	3.47	YES	HRDOW
L0001256	0	0.45455E-01	438092.5	3726320.3	234.4	4.15	20.47	3.47	YES	HRDOW
L0001257	0	0.45455E-01	438054.1	3726341.8	234.0	4.15	20.47	3.47	YES	HRDOW
L0001258	0	0.45455E-01	438015.7	3726363.4	233.6	4.15	20.47	3.47	YES	HRDOW
L0001259	0	0.45455E-01	437977.4	3726384.9	233.1	4.15	20.47	3.47	YES	HRDOW
L0001260	0	0.45455E-01	437939.0	3726406.5	232.3	4.15	20.47	3.47	YES	HRDOW
SPILL	0	0.10000E+01	438285.1	3726104.5	227.4	0.00	3.02	1.86	YES	HRDOW
FUEL	0	0.10000E+01	438285.1	3726104.5	227.4	1.00	3.02	1.86	YES	HRDOW

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** SOURCE IDs DEFINING SOURCE GROUPS ***

SRCGROUP ID	SOURCE IDs
CARS	L0001217 , L0001218 , L0001219 , L0001220 , L0001221 , L0001222 , L0001223 , L0001224 , L0001225 , L0001226 , L0001227 , L0001228 , L0001229 , L0001230 , L0001231 , L0001232 , L0001233 , L0001234 , L0001235 , L0001236 , L0001237 , L0001238 ,
FUEL	FUEL ,
SPILL	SPILL ,
STCK	STCK ,
TRUCKS	L0001239 , L0001240 , L0001241 , L0001242 , L0001243 , L0001244 , L0001245 , L0001246 , L0001247 , L0001248 , L0001249 , L0001250 , L0001251 , L0001252 , L0001253 , L0001254 , L0001255 , L0001256 , L0001257 , L0001258 , L0001259 , L0001260 ,
GSTCK	GSTCK ,
RBSTCK	RBSTCK ,
BSTCK	BSTCK1 , BSTCK2 ,
ALL	L0001217 , L0001218 , L0001219 , L0001220 , L0001221 , L0001222 , L0001223 , L0001224 , L0001225 , L0001226 , L0001227 , L0001228 , L0001229 , L0001230 , L0001231 , L0001232 , L0001233 , L0001234 , L0001235 , L0001236 , L0001237 , L0001238 , L0001239 , L0001240 , L0001241 , L0001242 , L0001243 , L0001244 , L0001245 , L0001246 , L0001247 , L0001248 , L0001249 , L0001250 , L0001251 , L0001252 , L0001253 , L0001254 , L0001255 , L0001256 , L0001257 , L0001258 , L0001259 , L0001260 , SPILL , FUEL , STCK , RBSTCK , BSTCK1 , BSTCK2 , GSTCK ,

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** SOURCE IDs DEFINED AS URBAN SOURCES ***

URBAN ID	URBAN POP	SOURCE IDs
	3010232.	L0001217 , L0001218 , L0001219 , L0001220 , L0001221 , L0001222 , L0001223 , L0001224 ,
		L0001225 , L0001226 , L0001227 , L0001228 , L0001229 , L0001230 , L0001231 , L0001232 ,
		L0001233 , L0001234 , L0001235 , L0001236 , L0001237 , L0001238 , L0001239 , L0001240 ,
		L0001241 , L0001242 , L0001243 , L0001244 , L0001245 , L0001246 , L0001247 , L0001248 ,
		L0001249 , L0001250 , L0001251 , L0001252 , L0001253 , L0001254 , L0001255 , L0001256 ,
		L0001257 , L0001258 , L0001259 , L0001260 , SPILL , FUEL , STCK , RBSTCK ,
		BSTCK1 , BSTCK2 , GSTCK ,

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** DIRECTION SPECIFIC BUILDING DIMENSIONS ***

SOURCE ID: RBSTCK

IFV	BH	BW	BL	XADJ	YADJ	IFV	BH	BW	BL	XADJ	YADJ
1	4.6,	95.7,	67.1,	-33.9,	-3.5,	2	4.6,	97.3,	54.5,	-26.6,	-3.4,
3	4.6,	96.0,	41.7,	-19.9,	-3.1,	4	4.6,	95.6,	38.6,	-18.9,	-3.1,
5	4.6,	97.3,	48.4,	-21.9,	-3.2,	6	4.6,	96.0,	61.9,	-28.0,	-3.2,
7	4.6,	91.8,	74.0,	-33.8,	-3.1,	8	4.6,	85.7,	83.8,	-38.5,	-2.4,
9	4.6,	77.6,	91.1,	-42.1,	-1.4,	10	4.6,	67.1,	95.7,	-44.3,	-0.4,
11	4.6,	54.5,	97.3,	-45.3,	0.7,	12	4.6,	41.7,	96.0,	-44.8,	1.0,
13	4.6,	38.6,	95.6,	-44.7,	0.4,	14	4.6,	48.4,	97.3,	-45.5,	2.3,
15	4.6,	61.9,	96.0,	-44.8,	2.9,	16	4.6,	74.0,	91.8,	-42.8,	3.2,
17	4.6,	83.8,	85.7,	-40.5,	3.4,	18	4.6,	91.1,	77.6,	-37.4,	3.5,
19	4.6,	95.7,	67.1,	-33.2,	3.5,	20	4.6,	97.3,	54.5,	-27.9,	3.4,
21	4.6,	96.0,	41.7,	-21.9,	3.1,	22	4.6,	95.6,	38.6,	-19.8,	3.1,
23	4.6,	97.3,	48.4,	-26.5,	3.2,	24	4.6,	96.0,	61.9,	-33.9,	3.2,
25	4.6,	91.8,	74.0,	-40.2,	3.1,	26	4.6,	85.7,	83.8,	-45.3,	2.4,
27	4.6,	77.6,	91.1,	-49.1,	1.4,	28	4.6,	67.1,	95.7,	-51.3,	0.4,
29	4.6,	54.5,	97.3,	-52.0,	-0.7,	30	4.6,	41.7,	96.0,	-51.1,	-1.0,
31	4.6,	38.6,	95.6,	-50.9,	-0.4,	32	4.6,	48.4,	97.3,	-51.8,	-2.3,
33	4.6,	61.9,	96.0,	-51.2,	-2.9,	34	4.6,	74.0,	91.8,	-49.0,	-3.2,
35	4.6,	83.8,	85.7,	-45.3,	-3.4,	36	4.6,	91.1,	77.6,	-40.2,	-3.5,

SOURCE ID: BSTCK1

IFV	BH	BW	BL	XADJ	YADJ	IFV	BH	BW	BL	XADJ	YADJ
1	2.1,	22.4,	23.4,	-8.8,	-9.7,	2	2.1,	21.0,	23.4,	-7.2,	-9.1,
3	2.1,	19.0,	22.7,	-5.5,	-8.1,	4	2.1,	16.4,	21.3,	-3.5,	-6.9,
5	2.1,	13.8,	19.5,	-1.5,	-5.3,	6	2.1,	16.6,	21.0,	-1.1,	-3.7,
7	2.1,	19.3,	22.4,	-1.3,	-2.1,	8	2.1,	21.3,	23.1,	-1.4,	-0.4,
9	2.1,	22.7,	23.1,	-1.4,	1.2,	10	2.1,	23.4,	22.4,	-1.5,	2.9,
11	2.1,	23.4,	21.0,	-1.4,	4.5,	12	2.1,	22.7,	19.0,	-1.4,	5.9,
13	2.1,	21.3,	16.4,	-1.3,	7.1,	14	2.1,	19.5,	13.8,	-1.6,	8.3,
15	2.1,	21.0,	16.6,	-4.6,	9.4,	16	2.1,	22.4,	19.3,	-7.5,	9.9,
17	2.1,	23.1,	21.3,	-10.2,	10.2,	18	2.1,	23.1,	22.7,	-12.6,	10.1,
19	2.1,	22.4,	23.4,	-14.6,	9.7,	20	2.1,	21.0,	23.4,	-16.2,	9.1,
21	2.1,	19.0,	22.7,	-17.2,	8.1,	22	2.1,	16.4,	21.3,	-17.7,	6.9,
23	2.1,	13.8,	19.5,	-18.0,	5.3,	24	2.1,	16.6,	21.0,	-19.9,	3.7,
25	2.1,	19.3,	22.4,	-21.1,	2.1,	26	2.1,	21.3,	23.1,	-21.7,	0.4,
27	2.1,	22.7,	23.1,	-21.7,	-1.2,	28	2.1,	23.4,	22.4,	-20.9,	-2.9,
29	2.1,	23.4,	21.0,	-19.6,	-4.5,	30	2.1,	22.7,	19.0,	-17.6,	-5.9,
31	2.1,	21.3,	16.4,	-15.2,	-7.1,	32	2.1,	19.5,	13.8,	-12.2,	-8.3,
33	2.1,	21.0,	16.6,	-12.0,	-9.4,	34	2.1,	22.4,	19.3,	-11.7,	-9.9,
35	2.1,	23.1,	21.3,	-11.1,	-10.2,	36	2.1,	23.1,	22.7,	-10.1,	-10.1,

Model Output
Unit Emission Rates (1 g/s)

SOURCE ID: BSTCK2

IFV	BH	BW	BL	XADJ	YADJ	IFV	BH	BW	BL	XADJ	YADJ
1	2.1,	22.4,	23.4,	-7.6,	-8.7,	2	2.1,	21.0,	23.4,	-6.3,	-7.9,
3	2.1,	19.0,	22.7,	-4.7,	-6.8,	4	2.1,	16.4,	21.3,	-3.0,	-5.5,
5	2.1,	13.8,	19.5,	-1.2,	-3.8,	6	2.1,	16.6,	21.0,	-1.1,	-2.2,
7	2.1,	19.3,	22.4,	-1.6,	-0.6,	8	2.1,	21.3,	23.1,	-1.9,	1.0,
9	2.1,	22.7,	23.1,	-2.2,	2.6,	10	2.1,	23.4,	22.4,	-2.5,	4.0,
11	2.1,	23.4,	21.0,	-2.6,	5.4,	12	2.1,	22.7,	19.0,	-2.7,	6.6,
13	2.1,	21.3,	16.4,	-2.7,	7.6,	14	2.1,	19.5,	13.8,	-3.1,	8.5,
15	2.1,	21.0,	16.6,	-6.1,	9.4,	16	2.1,	22.4,	19.3,	-9.0,	9.6,
17	2.1,	23.1,	21.3,	-11.7,	9.6,	18	2.1,	23.1,	22.7,	-13.9,	9.3,
19	2.1,	22.4,	23.4,	-15.8,	8.7,	20	2.1,	21.0,	23.4,	-17.1,	7.9,
21	2.1,	19.0,	22.7,	-17.9,	6.8,	22	2.1,	16.4,	21.3,	-18.2,	5.5,
23	2.1,	13.8,	19.5,	-18.3,	3.8,	24	2.1,	16.6,	21.0,	-19.9,	2.2,
25	2.1,	19.3,	22.4,	-20.8,	0.6,	26	2.1,	21.3,	23.1,	-21.2,	-1.0,
27	2.1,	22.7,	23.1,	-20.9,	-2.6,	28	2.1,	23.4,	22.4,	-19.9,	-4.0,
29	2.1,	23.4,	21.0,	-18.4,	-5.4,	30	2.1,	22.7,	19.0,	-16.3,	-6.6,
31	2.1,	21.3,	16.4,	-13.7,	-7.6,	32	2.1,	19.5,	13.8,	-10.7,	-8.5,
33	2.1,	21.0,	16.6,	-10.5,	-9.4,	34	2.1,	22.4,	19.3,	-10.2,	-9.6,
35	2.1,	23.1,	21.3,	-9.7,	-9.6,	36	2.1,	23.1,	22.7,	-8.8,	-9.3,

SOURCE ID: GSTCK

IFV	BH	BW	BL	XADJ	YADJ	IFV	BH	BW	BL	XADJ	YADJ
1	2.1,	22.4,	23.4,	-15.8,	8.9,	2	2.1,	21.0,	23.4,	-17.4,	8.1,
3	2.1,	19.0,	22.7,	-18.4,	7.0,	4	2.1,	16.4,	21.3,	-18.9,	5.7,
5	2.1,	13.8,	19.5,	-18.8,	4.4,	6	2.1,	16.6,	21.0,	-19.9,	2.9,
7	2.1,	19.3,	22.4,	-20.9,	1.1,	8	2.1,	21.3,	23.1,	-21.3,	-0.7,
9	2.1,	22.7,	23.1,	-21.0,	-2.4,	10	2.1,	23.4,	22.4,	-20.1,	-4.1,
11	2.1,	23.4,	21.0,	-18.6,	-5.7,	12	2.1,	22.7,	19.0,	-16.5,	-7.1,
13	2.1,	21.3,	16.4,	-13.9,	-8.3,	14	2.1,	19.5,	13.8,	-11.3,	-9.1,
15	2.1,	21.0,	16.6,	-11.2,	-9.4,	16	2.1,	22.4,	19.3,	-10.8,	-9.7,
17	2.1,	23.1,	21.3,	-10.0,	-9.7,	18	2.1,	23.1,	22.7,	-8.9,	-9.5,
19	2.1,	22.4,	23.4,	-7.6,	-8.9,	20	2.1,	21.0,	23.4,	-6.0,	-8.1,
21	2.1,	19.0,	22.7,	-4.2,	-7.0,	22	2.1,	16.4,	21.3,	-2.4,	-5.7,
23	2.1,	13.8,	19.5,	-0.7,	-4.4,	24	2.1,	16.6,	21.0,	-1.1,	-2.9,
25	2.1,	19.3,	22.4,	-1.5,	-1.1,	26	2.1,	21.3,	23.1,	-1.8,	0.7,
27	2.1,	22.7,	23.1,	-2.1,	2.4,	28	2.1,	23.4,	22.4,	-2.3,	4.1,
29	2.1,	23.4,	21.0,	-2.5,	5.7,	30	2.1,	22.7,	19.0,	-2.5,	7.1,
31	2.1,	21.3,	16.4,	-2.5,	8.3,	32	2.1,	19.5,	13.8,	-2.4,	9.1,
33	2.1,	21.0,	16.6,	-5.4,	9.4,	34	2.1,	22.4,	19.3,	-8.5,	9.7,
35	2.1,	23.1,	21.3,	-11.3,	9.7,	36	2.1,	23.1,	22.7,	-13.8,	9.5,

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

* SOURCE EMISSION RATE SCALARS WHICH VARY DIURNALLY AND BY DAY OF WEEK (HRDOW) *

SOURCE ID = L0001217 through L0001238 ; SOURCE TYPE = VOLUME :

HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR
DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.9320E+00	10	.6490E+00	11	.5170E+00	12	.4920E+00	13	.4820E+00	14	.5010E+00	15	.5530E+00	16	.6090E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SUNDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

* SOURCE EMISSION RATE SCALARS WHICH VARY DIURNALLY AND BY DAY OF WEEK (HRDOW) *

SOURCE ID = L0001239 through L0001260 ; SOURCE TYPE = VOLUME :

HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR
DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.5330E+00	10	.3830E+00	11	.3300E+00	12	.3640E+00	13	.4340E+00	14	.5250E+00	15	.6470E+00	16	.8010E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SUNDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

* SOURCE EMISSION RATE SCALARS WHICH VARY DIURNALLY AND BY DAY OF WEEK (HRDOW) *

SOURCE ID = SPILL ; SOURCE TYPE = VOLUME :

HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR
DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.1000E+01	10	.1000E+01	11	.1000E+01	12	.1000E+01	13	.1000E+01	14	.1000E+01	15	.1000E+01	16	.1000E+01
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SUNDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00

SOURCE ID = FUEL ; SOURCE TYPE = VOLUME :

HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR
DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.1000E+01	10	.1000E+01	11	.1000E+01	12	.1000E+01	13	.1000E+01	14	.1000E+01	15	.1000E+01	16	.1000E+01
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SUNDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

* SOURCE EMISSION RATE SCALARS WHICH VARY DIURNALLY AND BY DAY OF WEEK (HRDOW) *

SOURCE ID = STCK ; SOURCE TYPE = POINT :

HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR
DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.1000E+01	10	.1000E+01	11	.1000E+01	12	.1000E+01	13	.1000E+01	14	.1000E+01	15	.1000E+01	16	.1000E+01
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SUNDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00

SOURCE ID = RBSTCK ; SOURCE TYPE = POINTCAP :

HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR
DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.1000E+01	10	.1000E+01	11	.1000E+01	12	.1000E+01	13	.1000E+01	14	.1000E+01	15	.1000E+01	16	.1000E+01
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SUNDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

* SOURCE EMISSION RATE SCALARS WHICH VARY DIURNALLY AND BY DAY OF WEEK (HRDOW) *

SOURCE ID = BSTCK1 ; SOURCE TYPE = POINTCAP :

HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR
DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.1000E+01	10	.1000E+01	11	.1000E+01	12	.1000E+01	13	.1000E+01	14	.1000E+01	15	.1000E+01	16	.1000E+01
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SUNDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00

SOURCE ID = BSTCK2 ; SOURCE TYPE = POINTCAP :

HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR
DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.1000E+01	10	.1000E+01	11	.1000E+01	12	.1000E+01	13	.1000E+01	14	.1000E+01	15	.1000E+01	16	.1000E+01
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SUNDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

* SOURCE EMISSION RATE SCALARS WHICH VARY DIURNALLY AND BY DAY OF WEEK (HRDOW) *

SOURCE ID = GSTCK ; SOURCE TYPE = POINT :

HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR	HOUR	SCALAR
DAY OF WEEK = WEEKDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.9500E-02	10	.9500E-02	11	.9500E-02	12	.9500E-02	13	.9500E-02	14	.9500E-02	15	.9500E-02	16	.9500E-02
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SATURDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00
DAY OF WEEK = SUNDAY															
1	.0000E+00	2	.0000E+00	3	.0000E+00	4	.0000E+00	5	.0000E+00	6	.0000E+00	7	.0000E+00	8	.0000E+00
9	.0000E+00	10	.0000E+00	11	.0000E+00	12	.0000E+00	13	.0000E+00	14	.0000E+00	15	.0000E+00	16	.0000E+00
17	.0000E+00	18	.0000E+00	19	.0000E+00	20	.0000E+00	21	.0000E+00	22	.0000E+00	23	.0000E+00	24	.0000E+00

Model Output
Unit Emission Rates (1 g/s)


```
                                               *** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
                                                                  (1=YES; 0=NO)

          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1

              NOTE:  METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.


                                    *** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
                                                              (METERS/SEC)

                                                 1.54,   3.09,   5.14,   8.23,  10.80,
```

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

Surface file: S:\TBRO-02.0\HRA\D - Air Dispersion Model Output\met data\MSVJ_v9.SFC Met Version: 16216
Profile file: S:\TBRO-02.0\HRA\D - Air Dispersion Model Output\met data\MSVJ_v9.PFL
Surface format: FREE
Profile format: FREE
Surface station no.: 93184 Upper air station no.: 3190
Name: UNKNOWN Name: UNKNOWN
Year: 2011 Year: 2011

First 24 hours of scalar data

YR	MO	DY	JDY	HR	H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS	WD	HT	REF TA	HT
11	01	01	1	01	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	1.30	54.	9.1	999.0	-9.0
11	01	01	1	02	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	0.90	190.	9.1	999.0	-9.0
11	01	01	1	03	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	0.90	133.	9.1	999.0	-9.0
11	01	01	1	04	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	999.00	999.	-9.0	999.0	-9.0
11	01	01	1	05	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	999.00	999.	-9.0	999.0	-9.0
11	01	01	1	06	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	0.90	151.	9.1	999.0	-9.0
11	01	01	1	07	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	0.90	42.	9.1	999.0	-9.0
11	01	01	1	08	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	0.53	0.90	28.	9.1	999.0	-9.0
11	01	01	1	09	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	0.31	0.90	95.	9.1	999.0	-9.0
11	01	01	1	10	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	0.24	0.90	211.	9.1	999.0	-9.0
11	01	01	1	11	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	0.21	1.30	258.	9.1	999.0	-9.0
11	01	01	1	12	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	0.20	1.30	268.	9.1	999.0	-9.0
11	01	01	1	13	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	0.20	1.30	220.	9.1	999.0	-9.0
11	01	01	1	14	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	0.21	1.30	247.	9.1	999.0	-9.0
11	01	01	1	15	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	0.25	1.30	249.	9.1	999.0	-9.0
11	01	01	1	16	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	0.33	2.20	209.	9.1	999.0	-9.0
11	01	01	1	17	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	0.61	1.30	196.	9.1	999.0	-9.0
11	01	01	1	18	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	0.90	132.	9.1	999.0	-9.0
11	01	01	1	19	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	0.90	91.	9.1	999.0	-9.0
11	01	01	1	20	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	0.90	67.	9.1	999.0	-9.0
11	01	01	1	21	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	0.90	72.	9.1	999.0	-9.0
11	01	01	1	22	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	0.90	65.	9.1	999.0	-9.0
11	01	01	1	23	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	0.90	61.	9.1	999.0	-9.0
11	01	01	1	24	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.29	2.80	1.00	0.90	41.	9.1	999.0	-9.0

First hour of profile data

YR	MO	DY	HR	HEIGHT	F	WDIR	WSPD	AMB_TMP	sigmaA	sigmaW	sigmaV
11	01	01	01	5.5	0	-999.	-99.00	-999.0	99.0	-99.00	-99.00
11	01	01	01	9.1	1	54.	1.30	-999.0	99.0	-99.00	-99.00

F indicates top of profile (=1) or below (=0)

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** THE SUMMARY OF MAXIMUM PERIOD (43848 HRS) RESULTS ***

** CONC OF OTHER IN MICROGRAMS/M**3 **

GROUP ID		AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)					OF TYPE	NETWORK GRID-ID
CARS	1ST HIGHEST VALUE IS	0.40830 AT	438187.23,	3726090.37,	225.15,	236.48,	0.00)	DC	
	2ND HIGHEST VALUE IS	0.39183 AT	438197.23,	3726080.37,	223.02,	236.62,	0.00)	DC	
	3RD HIGHEST VALUE IS	0.37789 AT	438207.23,	3726070.37,	222.85,	236.48,	0.00)	DC	
	4TH HIGHEST VALUE IS	0.37238 AT	438187.23,	3726080.37,	222.98,	236.62,	0.00)	DC	
	5TH HIGHEST VALUE IS	0.36465 AT	438217.23,	3726060.37,	222.72,	236.43,	0.00)	DC	
	6TH HIGHEST VALUE IS	0.35955 AT	438197.23,	3726070.37,	222.78,	236.48,	0.00)	DC	
	7TH HIGHEST VALUE IS	0.35505 AT	438177.23,	3726080.37,	224.13,	236.43,	0.00)	DC	
	8TH HIGHEST VALUE IS	0.35221 AT	438227.23,	3726050.37,	222.81,	236.33,	0.00)	DC	
	9TH HIGHEST VALUE IS	0.34735 AT	438207.23,	3726060.37,	222.62,	236.43,	0.00)	DC	
	10TH HIGHEST VALUE IS	0.34241 AT	438187.23,	3726070.37,	222.71,	236.48,	0.00)	DC	
FUEL	1ST HIGHEST VALUE IS	9.32933 AT	438227.23,	3726050.37,	222.81,	236.33,	0.00)	DC	
	2ND HIGHEST VALUE IS	9.07404 AT	438237.23,	3726040.37,	222.90,	236.28,	0.00)	DC	
	3RD HIGHEST VALUE IS	8.89386 AT	438217.23,	3726060.37,	222.72,	236.43,	0.00)	DC	
	4TH HIGHEST VALUE IS	8.23202 AT	438247.23,	3726030.37,	223.22,	227.13,	0.00)	DC	
	5TH HIGHEST VALUE IS	7.93858 AT	438207.23,	3726070.37,	222.85,	236.48,	0.00)	DC	
	6TH HIGHEST VALUE IS	7.57798 AT	438227.23,	3726040.37,	222.43,	236.28,	0.00)	DC	
	7TH HIGHEST VALUE IS	7.52288 AT	438217.23,	3726050.37,	222.43,	236.33,	0.00)	DC	
	8TH HIGHEST VALUE IS	7.15674 AT	438237.23,	3726030.37,	222.32,	236.28,	0.00)	DC	
	9TH HIGHEST VALUE IS	7.02131 AT	438207.23,	3726060.37,	222.62,	236.43,	0.00)	DC	
	10TH HIGHEST VALUE IS	6.73892 AT	438197.23,	3726080.37,	223.02,	236.62,	0.00)	DC	
SPILL	1ST HIGHEST VALUE IS	9.46461 AT	438227.23,	3726050.37,	222.81,	236.33,	0.00)	DC	
	2ND HIGHEST VALUE IS	9.19948 AT	438237.23,	3726040.37,	222.90,	236.28,	0.00)	DC	
	3RD HIGHEST VALUE IS	9.01838 AT	438217.23,	3726060.37,	222.72,	236.43,	0.00)	DC	
	4TH HIGHEST VALUE IS	8.32788 AT	438247.23,	3726030.37,	223.22,	227.13,	0.00)	DC	
	5TH HIGHEST VALUE IS	8.03356 AT	438207.23,	3726070.37,	222.85,	236.48,	0.00)	DC	
	6TH HIGHEST VALUE IS	7.68042 AT	438227.23,	3726040.37,	222.43,	236.28,	0.00)	DC	
	7TH HIGHEST VALUE IS	7.62506 AT	438217.23,	3726050.37,	222.43,	236.33,	0.00)	DC	
	8TH HIGHEST VALUE IS	7.24624 AT	438237.23,	3726030.37,	222.32,	236.28,	0.00)	DC	
	9TH HIGHEST VALUE IS	7.10706 AT	438207.23,	3726060.37,	222.62,	236.43,	0.00)	DC	
	10TH HIGHEST VALUE IS	6.80159 AT	438197.23,	3726080.37,	223.02,	236.62,	0.00)	DC	
STCK	1ST HIGHEST VALUE IS	4.92190 AT	438237.23,	3726040.37,	222.90,	236.28,	0.00)	DC	
	2ND HIGHEST VALUE IS	4.86154 AT	438227.23,	3726050.37,	222.81,	236.33,	0.00)	DC	
	3RD HIGHEST VALUE IS	4.76507 AT	438247.23,	3726030.37,	223.22,	227.13,	0.00)	DC	
	4TH HIGHEST VALUE IS	4.59348 AT	438217.23,	3726060.37,	222.72,	236.43,	0.00)	DC	

Model Output
Unit Emission Rates (1 g/s)

	5TH HIGHEST VALUE IS	4.19647	AT (	438227.23,	3726040.37,	222.43,	236.28,	0.00)	DC
	6TH HIGHEST VALUE IS	4.18204	AT (	438207.23,	3726070.37,	222.85,	236.48,	0.00)	DC
	7TH HIGHEST VALUE IS	4.14954	AT (	438237.23,	3726030.37,	222.32,	236.28,	0.00)	DC
	8TH HIGHEST VALUE IS	4.07317	AT (	438217.23,	3726050.37,	222.43,	236.33,	0.00)	DC
	9TH HIGHEST VALUE IS	3.94964	AT (	438247.23,	3726020.37,	222.43,	227.24,	0.00)	DC
	10TH HIGHEST VALUE IS	3.81187	AT (	438207.23,	3726060.37,	222.62,	236.43,	0.00)	DC
TRUCKS	1ST HIGHEST VALUE IS	0.34106	AT (	438187.23,	3726090.37,	225.15,	236.48,	0.00)	DC
	2ND HIGHEST VALUE IS	0.32663	AT (	438197.23,	3726080.37,	223.02,	236.62,	0.00)	DC
	3RD HIGHEST VALUE IS	0.31529	AT (	438207.23,	3726070.37,	222.85,	236.48,	0.00)	DC
	4TH HIGHEST VALUE IS	0.31046	AT (	438187.23,	3726080.37,	222.98,	236.62,	0.00)	DC
	5TH HIGHEST VALUE IS	0.30452	AT (	438217.23,	3726060.37,	222.72,	236.43,	0.00)	DC
	6TH HIGHEST VALUE IS	0.30002	AT (	438197.23,	3726070.37,	222.78,	236.48,	0.00)	DC
	7TH HIGHEST VALUE IS	0.29649	AT (	438177.23,	3726080.37,	224.13,	236.43,	0.00)	DC
	8TH HIGHEST VALUE IS	0.29446	AT (	438227.23,	3726050.37,	222.81,	236.33,	0.00)	DC
	9TH HIGHEST VALUE IS	0.29007	AT (	438207.23,	3726060.37,	222.62,	236.43,	0.00)	DC
	10TH HIGHEST VALUE IS	0.28570	AT (	438187.23,	3726070.37,	222.71,	236.48,	0.00)	DC
GSTCK	1ST HIGHEST VALUE IS	0.00172	AT (	438187.23,	3726090.37,	225.15,	236.48,	0.00)	DC
	2ND HIGHEST VALUE IS	0.00164	AT (	438197.23,	3726080.37,	223.02,	236.62,	0.00)	DC
	3RD HIGHEST VALUE IS	0.00163	AT (	438187.23,	3726080.37,	222.98,	236.62,	0.00)	DC
	4TH HIGHEST VALUE IS	0.00162	AT (	438177.23,	3726080.37,	224.13,	236.43,	0.00)	DC
	5TH HIGHEST VALUE IS	0.00159	AT (	438207.23,	3726070.37,	222.85,	236.48,	0.00)	DC
	6TH HIGHEST VALUE IS	0.00157	AT (	438197.23,	3726070.37,	222.78,	236.48,	0.00)	DC
	7TH HIGHEST VALUE IS	0.00156	AT (	438187.23,	3726070.37,	222.71,	236.48,	0.00)	DC
	8TH HIGHEST VALUE IS	0.00154	AT (	438177.23,	3726070.37,	222.70,	236.48,	0.00)	DC
	9TH HIGHEST VALUE IS	0.00154	AT (	438217.23,	3726060.37,	222.72,	236.43,	0.00)	DC
	10TH HIGHEST VALUE IS	0.00153	AT (	438167.23,	3726070.37,	223.77,	234.36,	0.00)	DC
RBSTCK	1ST HIGHEST VALUE IS	0.25528	AT (	438187.23,	3726090.37,	225.15,	236.48,	0.00)	DC
	2ND HIGHEST VALUE IS	0.23861	AT (	438177.23,	3726080.37,	224.13,	236.43,	0.00)	DC
	3RD HIGHEST VALUE IS	0.23743	AT (	438187.23,	3726080.37,	222.98,	236.62,	0.00)	DC
	4TH HIGHEST VALUE IS	0.23706	AT (	438197.23,	3726080.37,	223.02,	236.62,	0.00)	DC
	5TH HIGHEST VALUE IS	0.22359	AT (	438167.23,	3726070.37,	223.77,	234.36,	0.00)	DC
	6TH HIGHEST VALUE IS	0.22286	AT (	438177.23,	3726070.37,	222.70,	236.48,	0.00)	DC
	7TH HIGHEST VALUE IS	0.22275	AT (	438187.23,	3726070.37,	222.71,	236.48,	0.00)	DC
	8TH HIGHEST VALUE IS	0.22252	AT (	438197.23,	3726070.37,	222.78,	236.48,	0.00)	DC
	9TH HIGHEST VALUE IS	0.22210	AT (	438207.23,	3726070.37,	222.85,	236.48,	0.00)	DC
	10TH HIGHEST VALUE IS	0.20967	AT (	438157.23,	3726060.37,	223.46,	234.36,	0.00)	DC
BSTCK	1ST HIGHEST VALUE IS	0.65080	AT (	438187.23,	3726090.37,	225.15,	236.48,	0.00)	DC
	2ND HIGHEST VALUE IS	0.60062	AT (	438197.23,	3726080.37,	223.02,	236.62,	0.00)	DC
	3RD HIGHEST VALUE IS	0.58494	AT (	438187.23,	3726080.37,	222.98,	236.62,	0.00)	DC
	4TH HIGHEST VALUE IS	0.57283	AT (	438177.23,	3726080.37,	224.13,	236.43,	0.00)	DC
	5TH HIGHEST VALUE IS	0.56046	AT (	438207.23,	3726070.37,	222.85,	236.48,	0.00)	DC
	6TH HIGHEST VALUE IS	0.54802	AT (	438197.23,	3726070.37,	222.78,	236.48,	0.00)	DC
	7TH HIGHEST VALUE IS	0.53463	AT (	438187.23,	3726070.37,	222.71,	236.48,	0.00)	DC
	8TH HIGHEST VALUE IS	0.52203	AT (	438217.23,	3726060.37,	222.72,	236.43,	0.00)	DC
	9TH HIGHEST VALUE IS	0.52059	AT (	438177.23,	3726070.37,	222.70,	236.48,	0.00)	DC
	10TH HIGHEST VALUE IS	0.51219	AT (	438207.23,	3726060.37,	222.62,	236.43,	0.00)	DC

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** THE SUMMARY OF MAXIMUM PERIOD (43848 HRS) RESULTS ***

** CONC OF OTHER IN MICROGRAMS/M**3 **

GROUP ID	AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
ALL	1ST HIGHEST VALUE IS	24.98606 AT (438227.23, 3726050.37, 222.81, 236.33, 0.00)	DC	
	2ND HIGHEST VALUE IS	24.45954 AT (438237.23, 3726040.37, 222.90, 236.28, 0.00)	DC	
	3RD HIGHEST VALUE IS	23.90693 AT (438217.23, 3726060.37, 222.72, 236.43, 0.00)	DC	
	4TH HIGHEST VALUE IS	22.52768 AT (438247.23, 3726030.37, 223.22, 227.13, 0.00)	DC	
	5TH HIGHEST VALUE IS	21.63151 AT (438207.23, 3726070.37, 222.85, 236.48, 0.00)	DC	
	6TH HIGHEST VALUE IS	20.68331 AT (438227.23, 3726040.37, 222.43, 236.28, 0.00)	DC	
	7TH HIGHEST VALUE IS	20.51297 AT (438217.23, 3726050.37, 222.43, 236.33, 0.00)	DC	
	8TH HIGHEST VALUE IS	19.72072 AT (438237.23, 3726030.37, 222.32, 236.28, 0.00)	DC	
	9TH HIGHEST VALUE IS	19.30027 AT (438207.23, 3726060.37, 222.62, 236.43, 0.00)	DC	
	10TH HIGHEST VALUE IS	18.79416 AT (438197.23, 3726080.37, 223.02, 236.62, 0.00)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** THE SUMMARY OF HIGHEST 1-HR RESULTS ***

** CONC OF OTHER IN MICROGRAMS/M**3 **

GROUP ID		AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
CARS	HIGH 1ST HIGH VALUE IS	14.33058	ON 13021809:	AT (438187.23, 3726090.37, 225.15, 236.48, 0.00)	DC	
FUEL	HIGH 1ST HIGH VALUE IS	306.45458	ON 14030409:	AT (438217.23, 3726060.37, 222.72, 236.43, 0.00)	DC	
SPILL	HIGH 1ST HIGH VALUE IS	330.84234	ON 14030409:	AT (438217.23, 3726060.37, 222.72, 236.43, 0.00)	DC	
STCK	HIGH 1ST HIGH VALUE IS	189.88164	ON 14030409:	AT (438217.23, 3726060.37, 222.72, 236.43, 0.00)	DC	
TRUCKS	HIGH 1ST HIGH VALUE IS	14.90849	ON 14120216:	AT (438187.23, 3726090.37, 225.15, 236.48, 0.00)	DC	
GSTCK	HIGH 1ST HIGH VALUE IS	0.06954	ON 16110210:	AT (438187.23, 3726090.37, 225.15, 236.48, 0.00)	DC	
RBSTCK	HIGH 1ST HIGH VALUE IS	18.00055	ON 16102716:	AT (438187.23, 3726090.37, 225.15, 236.48, 0.00)	DC	
BSTCK	HIGH 1ST HIGH VALUE IS	27.60686	ON 16112916:	AT (438187.23, 3726090.37, 225.15, 236.48, 0.00)	DC	
ALL	HIGH 1ST HIGH VALUE IS	846.22935	ON 14030409:	AT (438217.23, 3726060.37, 222.72, 236.43, 0.00)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** THE SUMMARY OF HIGHEST 8-HR RESULTS ***

** CONC OF OTHER IN MICROGRAMS/M**3 **

GROUP ID		AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
CARS	HIGH 1ST HIGH VALUE IS	4.46842	ON 13112216:	AT (438187.23, 3726090.37, 225.15, 236.48, 0.00)	DC	
FUEL	HIGH 1ST HIGH VALUE IS	133.66776	ON 13112216:	AT (438227.23, 3726050.37, 222.81, 236.33, 0.00)	DC	
SPILL	HIGH 1ST HIGH VALUE IS	134.93255	ON 13112216:	AT (438227.23, 3726050.37, 222.81, 236.33, 0.00)	DC	
STCK	HIGH 1ST HIGH VALUE IS	90.28745	ON 13112216:	AT (438237.23, 3726040.37, 222.90, 236.28, 0.00)	DC	
TRUCKS	HIGH 1ST HIGH VALUE IS	4.36387	ON 13112216:	AT (438187.23, 3726090.37, 225.15, 236.48, 0.00)	DC	
GSTCK	HIGH 1ST HIGH VALUE IS	0.04407	ON 16120216:	AT (438127.23, 3726040.37, 223.56, 233.46, 0.00)	DC	
RBSTCK	HIGH 1ST HIGH VALUE IS	7.48234	ON 16102816:	AT (438187.23, 3726090.37, 225.15, 236.48, 0.00)	DC	
BSTCK	HIGH 1ST HIGH VALUE IS	13.08332	ON 16110216:	AT (438187.23, 3726090.37, 225.15, 236.48, 0.00)	DC	
ALL	HIGH 1ST HIGH VALUE IS	368.79714	ON 13112216:	AT (438227.23, 3726050.37, 222.81, 236.33, 0.00)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

Model Output
Unit Emission Rates (1 g/s)

*** MODELOPTs: RegDFAULT CONC ELEV URBAN ADJ_U*

*** Message Summary : AERMOD Model Execution ***

 --------- Summary of Total Messages --------

A Total of   0 Fatal Error Message(s)
A Total of   6 Warning Message(s)
A Total of   868 Informational Message(s)

A Total of   43848 Hours Were Processed

A Total of   15 Calm Hours Identified

A Total of   853 Missing Hours Identified (1.95 Percent)

   ******** FATAL ERROR MESSAGES ********
              *** NONE ***

   ********   WARNING MESSAGES   ********
SO W320   177   PPARM: Input Parameter May Be Out-of-Range for Parameter   VS
SO W320   180   PPARM: Input Parameter May Be Out-of-Range for Parameter   VS
ME W186   1048   MEOPEN: THRESH_1MIN 1-min ASOS wind speed threshold used   0.50
ME W187   1048   MEOPEN: ADJ_U* Option for Stable Low Winds used in AERMET
MX W450   35065   CHKDAT: Record Out of Sequence in Meteorological File at: 16010101
MX W450   35065   CHKDAT: Record Out of Sequence in Meteorological File at: 1 year gap

   ****
   *** AERMOD Finishes Successfully ***
   ****

Appendix E. Risk Calculations

Appendix

This page intentionally left blank.

Table E1a
MER Concentration Worksheet
Toxic Air Contaminants - Mobile Sources

Source No. (a)	Source (b)	Contaminant (c)	Weight Fraction (d)	Emission Rates[1] **Annual Avg** (g/s) (e)	AERMOD Output[2] **Annual Avg** ($\mu g/m^3$) (f)	Annual Average MER Concentration ($\mu g/m^3$) (g)	Emission Rates[1] **1-Hour** (g/s) (h)	AERMOD Output[2] **1-Hour** ($\mu g/m^3$) (i)	Acute (1-Hour) MER Concentration ($\mu g/m^3$) (j)
Staff Scenario									
1	SR-241 Trucks (DPM)	Diesel Particulate	1.00E+00	8.80E-04	0.341	0.00030	n/a		
	SR-241 Cars (TOG)	Acetaldehyde	2.80E-03	1.72E-02	0.408	0.00002	1.56E-02	14.33	0.0006
		Acrolein	1.30E-03			0.00001			0.0003
		Benzene	2.83E-02			0.00020			0.0063
		1,3-Butadiene	5.50E-03			0.00004			0.0012
		Ethyl benzene	1.17E-02			0.00008			0.0026
		Formaldehyde	1.58E-02			0.00011			0.0035
		Hexane	3.14E-02			0.00022			0.0070
		Methanol	1.20E-03			0.00001			0.0003
		Methyl Ethyl Ketone	2.00E-04			0.000001			0.00004
		Naphthalene	5.00E-04			0.000004			0.0001
		Propylene	3.06E-02			0.00021			0.0068
		Styrene	1.20E-03			0.00001			0.0003
		Toluene	7.46E-02			0.00052			0.0167
		Xylenes	5.38E-02			0.00038			0.0120
Student Scenario									
1	SR-241 Trucks (DPM)	Diesel Particulate	1.00E+00	8.13E-04	0.341	0.00028	n/a		
	SR-241 Cars (TOG)	Acetaldehyde	2.80E-03	1.59E-02	0.408	0.00002	1.56E-02	14.33	0.0006
		Acrolein	1.30E-03			0.00001			0.0003
		Benzene	2.83E-02			0.00018			0.0063
		1,3-Butadiene	5.50E-03			0.00004			0.0012
		Ethylbenzene	1.17E-02			0.00008			0.0026
		Formaldehyde	1.58E-02			0.00010			0.0035
		Hexane	3.14E-02			0.00020			0.0070
		Methanol	1.20E-03			0.00001			0.0003
		Methyl Ethyl Ketone	2.00E-04			0.000001			0.00004
		Naphthalene	5.00E-04			0.000003			0.0001
		Propylene	3.06E-02			0.00020			0.0068
		Styrene	1.20E-03			0.00001			0.0003
		Toluene	7.46E-02			0.00048			0.0167
		Xylenes	5.38E-02			0.00035			0.0120
Note: Maximum Exposed Receptor (MER)						For Cancer/Chronic Calculation			For Acute Calculation

[1] Emission Rates, per source, from Source Emissions Inventories (Appendix C).

[2] AERMOD Output (Appendix D) at the maximum exposed receptor (MER) are based on unit emission rates for emission sources (1 g/s per source).

Table E1b
MER Concentration Worksheet
Toxic Air Contaminants - Stationary Sources

Source No.	Source	Contaminant	Weight Fraction	Emission Rates[1] **Annual Avg** (g/s)	AERMOD Output[2] **Annual Avg** ($\mu g/m^3$)	Annual Average MER Concentration ($\mu g/m^3$)	AERMOD Output[2] **1-Hour** ($\mu g/m^3$)	Acute (1-Hour) MER Concentration ($\mu g/m^3$)
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
Staff and Student Scenarios								
2	Shell Station (gas refueling)	Benzene	3.00E-03	5.56E-03	9.33	1.55E-04	306.5	5.11E-03
	(spillage)	Benzene	1.00E-02	9.97E-03	9.46	9.44E-04	330.8	3.30E-02
	(venting)	Benzene	3.00E-03	7.23E-03	4.92	1.07E-04	189.9	4.12E-03
3	Loan Depot (generator)	Diesel Particulat	1.00E+00	8.63E-02	0.002	1.48E-04	n/a	
	(boiler)	Acetaldehyde	2.37E-04	4.47E-03	0.65	6.91E-07	27.6	2.93E-05
		Acrolein	1.49E-04			6.91E-07		1.84E-05
		Ammonia	9.94E-01			4.34E-07		1.23E-01
		Benzene	4.42E-04			2.89E-03		5.45E-05
		Ethylbenzene	5.25E-04			1.29E-06		6.48E-05
		Formaldehyde	9.39E-04			1.53E-06		1.16E-04
		n-Hexane	3.48E-04			2.73E-06		4.29E-05
		Naphthalene	1.66E-05			1.01E-06		2.05E-06
		Toluene	2.02E-03			4.82E-08		2.50E-04
		Xylene	1.50E-03			5.88E-06		1.85E-04
4	Rubious Mexican Grill	Acetaldehyde	8.70E-02	1.13E-03	0.26	2.50E-05	18.0	1.76E-03
		Benzene	1.50E-01			4.30E-05		3.03E-03
		Formaldehyde	1.20E-01			3.44E-05		2.43E-03
		Naphthalene	5.81E-03			1.67E-06		1.18E-04
		PAHs, total	1.69E-02			4.84E-06		3.41E-04
		Styrene	5.68E-02			1.63E-05		1.15E-03
		Toluene	5.92E-02			1.70E-05		1.20E-03
		Propionaldehyde	2.35E-02			6.75E-06		4.76E-04
Note: Maximum Exposed Receptor (MER)						For Cancer/Chronic Calculation		For Acute Calculation

[1] Emission Rates, per source, from Source Emissions Inventories (Appendix C).

[2] AERMOD Output (Appendix D) at the maximum exposed receptor (MER) are based on unit emission rates for emission sources (1 g/s per source).

Table E2
HARP2 Results for Cancer Risk and Chronic Hazards
School Scenario

No.	Source	Contaminant	**Carcinogenic Risks**		Chronic Non-Cancer Risks [2] - Toxicological Endpoints*											
			Staff	**Students**	CV	CNS	IMMUN	KIDNEY	GILV	REPRO	RESP	SKIN	EYE	BONE	ENDO	**BLOOD**
			per million	per million												
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)
1	SR-241 Trucks (DPM)	Diesel Particulate	1.9E-02	2.7E-02							6.00E-05					
	SR-241 Cars (TOG)	Acetaldehyde	1.1E-05	1.6E-05							1.43E-07					
		Acrolein									2.86E-05					
		Benzene	1.1E-03	1.6E-03												6.67E-05
		1,3-Butadiene	1.4E-03	1.9E-03						2.00E-05						
		Ethylbenzene	3.9E-05	5.7E-05				4.00E-08	4.00E-08	4.00E-08					4.00E-08	
		Formaldehyde	1.3E-04	1.9E-04							1.22E-05					
		Hexane				3.14E-08										
		Methanol								2.50E-09						
		Methyl Ethyl Ketone														
		Naphthalene	2.7E-05	3.4E-05							4.44E-07					
		Propylene									7.00E-08					
		Styrene				1.11E-08										
		Toluene				1.73E-06				1.73E-06	1.73E-06					
		Xylenes				5.43E-07					5.43E-07		5.43E-07			
2	Shell Station (gas	Benzene	8.7E-04	1.4E-03												5.18E-05
	(spillage)	Benzene	5.3E-03	8.2E-03												3.15E-04
	(venting)	Benzene	6.0E-04	9.3E-04												3.56E-05
3	Loan Depot (generator)	Diesel Particulate	9.2E-03	1.4E-02							2.97E-05					
	(boiler)	Acetaldehyde	3.9E-07	6.0E-07							4.94E-09					
		Acrolein									1.97E-06					
		Ammonia									2.17E-09					
		Benzene	1.6E-02	2.5E-02												9.64E-04
		Ethylbenzene	6.3E-07					6.43E-10	6.43E-10	6.43E-10					6.43E-10	
		Formaldehyde	1.8E-06	2.8E-06							1.70E-07					
		n-Hexane				3.90E-10										
		Naphthalene	6.8E-06	1.1E-05							1.12E-07					
		Toluene				1.61E-10				1.61E-10	1.61E-10					
		Xylene				8.40E-09					8.40E-09		8.40E-09			
4	Rubious Mexican Grill	Acetaldehyde	1.4E-05	2.2E-05							1.79E-07					
	(charbroiler)	Benzene	2.4E-04	3.7E-04												1.43E-05
		Formaldehyde	4.1E-05	6.3E-05							3.83E-06					
		Naphthalene	1.1E-05	1.7E-05							1.85E-07					
		PAHs, total														
		Styrene				1.81E-08										
		Toluene				5.67E-08				5.67E-08	5.67E-08					
		Propionaldehyde														
		Total - All Sources	**0.05**	**0.08**	0.00E+00	2.40E-06	0.00E+00	4.06E-08	4.06E-08	2.18E-05	1.40E-04	0.00E+00	5.51E-07	0.00E+00	4.06E-08	**1.45E-03**

Note: Health risks calculated using HARP2, Risk Assessment Standalone Tool, version 19044 (CARB, 2019).

Total Cancer Risk	**Staff**	**0.05**	per million
Total Cancer Risk	**Students**	**0.08**	per million
Maximum Chronic Hazard Index		**1.45E-03**	**RESP**

	Staff	Students	
	16 < 70 years	2 < 16 years	age bin
Dose Exposure Factors:	250	180	exposure frequency (days/year)
	230	520	8-hour inhalation rate (L/kg-8 hours) [1]
	1	1	inhalation absorption factor
Risk Calculation Factors:	1	3	age sensitivity factor
	25	7	exposure duration (years)
	70	70	averaging time (years)

* Key to Toxicological Endpoints

CV	Cardiovascular System
CNS	Central Nervous System
IMMUN	Immune System
KIDN	Kidneys
GILV	Gastrointestinal Tract and Liver/Alimentary Tract
RESP	Respiratory System
REPRO	Reproductive System
SKIN	Skin irritation and/or other effects
EYE	Eye irritation and/or other effects
BONE	Bones and Teeth
ENDO	Endocrine System
BLOOD	Hematological System

[1] 8-hour inhalation rate taken as the 95th percentile breathing rates for Moderate Intensity Activities (OEHHA, 2015).

[2] Staff Scenario emission rates produced higher chronic hazard indices, compared to Student Scenario emission rates.

Table E3
HARP2 Results for Acute Hazards

Source No. (a)	Source (b)	Contaminant (c)	Acute Non-Cancer Risks - Toxicological Endpoints*											
			CV (d)	CNS (e)	IMMUN (f)	KIDNEY (g)	GILV (h)	**REPRO** (i)	RESP (j)	SKIN (k)	EYE (l)	BONE (m)	ENDO (n)	BLOOD (o)
1	SR-241 Trucks (DPM) SR-241 Cars (TOG)	Diesel Particulate												
		Acetaldehyde							1.33E-06		1.33E-06			
		Acrolein							1.16E-04		1.16E-04			
		Benzene			2.35E-04			2.35E-04						2.35E-04
		1,3-Butadiene						1.87E-06						
		Ethylbenzene												
		Formaldehyde									6.43E-05			
		Hexane												
		Methanol		9.59E-09										
		Methyl Ethyl Ketone							3.44E-09		3.44E-09			
		Naphthalene												
		Propylene												
		Styrene						1.28E-08	1.28E-08		1.28E-08			
		Toluene		4.51E-07				4.51E-07	4.51E-07		4.51E-07			
		Xylenes		5.47E-07					5.47E-07		5.47E-07			
2	Shell Station (gas (spillage)	Benzene			1.89E-04			1.89E-04						1.89E-04
	(venting)	Benzene			1.22E-03			1.22E-03						1.22E-03
		Benzene			1.52E-04			1.52E-04						1.52E-04
3	Loan Depot (generator) (boiler)	Diesel Particulate												
		Acetaldehyde							6.24E-08		6.24E-08			
		Acrolein							7.36E-06		7.36E-06			
		Ammonia							3.83E-05		3.83E-05			
		Benzene			2.02E-06			2.02E-06						2.02E-06
		Ethylbenzene												
		Formaldehyde									2.11E-06			
		n-Hexane												
		Naphthalene												
		Toluene		6.74E-09				6.74E-09	6.74E-09		6.74E-09			
		Xylene		8.43E-09					8.43E-09		8.43E-09			
4	Rubious Mexican Grill (charbroiler)	Acetaldehyde							3.75E-06		3.75E-06			
		Benzene			1.12E-04			1.12E-04						1.12E-04
		Formaldehyde									4.42E-05			
		Naphthalene												
		PAHs, total												
		Styrene						5.47E-08	5.47E-08		5.47E-08			
		Toluene		3.24E-08				3.24E-08	3.24E-08		3.24E-08			
		Propionaldehyde												
	Total - All Sources			1.06E-06	1.91E-03			1.91E-03	1.68E-04		2.79E-04			1.91E-03

Note: Staff and Student scenarios produce the same acute (1-hour) hazard indices.

Note: Health risks calculated using HARP2, Risk Assessment Standalone Tool, version 19044 (CARB, 2019).

Maximum Acute Hazard Index 1.91E-03 Repro

* Key to Toxicological Endpoints

CV	Cardiovascular System	RESP	Respiratory System
CNS	Central Nervous System	SKIN	Skin irritation and/or other effects
IMMUN	Immune System	EYE	Eye irritation and/or other effects
KIDN	Kidneys	BONE	Bones and Teeth
GILV	Gastrointestinal Tract and Liver/Alimentary Tract	ENDO	Endocrine System
REPRO	Reproductive System	BLOOD	Hematological System

Table E4
HARP2 Results for 8-Hour Hazards

Source No. (a)	Source (b)	Contaminant (c)	8-Hour Non-Cancer Risks - Toxicological Endpoints*											
			CV (d)	CNS (e)	IMMUN (f)	KIDNEY (g)	GILV (h)	REPRO (i)	RESP (j)	SKIN (k)	EYE (l)	BONE (m)	ENDO (n)	**BLOOD** (o)
1	SR-241 Trucks (DPM) SR-241 Cars (TOG)	Diesel Particulate Acetaldehyde Acrolein Benzene 1,3-Butadiene Ethylbenzene Formaldehyde Hexane Methanol Methyl Ethyl Ketone Naphthalene Propylene Styrene Toluene Xylenes						 4.44E-06	 6.67E-08 1.43E-05 1.22E-05					 6.67E-05
2	Shell Station (gas (spillage) (venting)	Benzene Benzene Benzene												5.18E-05 3.15E-04 3.56E-05
3	Loan Depot (generator) (boiler)	Diesel Particulate Acetaldehyde Acrolein Ammonia Benzene Ethylbenzene Formaldehyde n-Hexane Naphthalene Toluene Xylene							 2.30E-09 9.87E-07 1.70E-07					 9.64E-04
4	Rubious Mexican Grill (charbroiler)	Acetaldehyde Benzene Formaldehyde Naphthalene PAHs, total Styrene Toluene Propionaldehyde							8.33E-08 3.83E-06					1.43E-05
		Total - All Sources						4.44E-06	3.16E-05					1.45E-03

Note: Staff Scenario emission rates produced higher 8-hour chronic hazard indices, compared to Student Scenario emission rates.

Note: Health risks calculated using HARP2, Risk Assessment Standalone Tool, version 19044 (CARB, 2019).

Maximum 8-Hour Hazard Index 1.45E-03 Blood

* Key to Toxicological Endpoints

CV	Cardiovascular System	RESP	Respiratory System
CNS	Central Nervous System	SKIN	Skin irritation and/or other effects
IMMUN	Immune System	EYE	Eye irritation and/or other effects
KIDN	Kidneys	BONE	Bones and Teeth
GILV	Gastrointestinal Tract and Liver/Alimentary Tract	ENDO	Endocrine System
REPRO	Reproductive System	BLOOD	Hematological System

Table E5
Mobile Source Pollutant Concentration Worksheet
Criteria Air Pollutants

Criteria Air Pollutants						
Pollutant (a)	Source (b)	Emission Rates [1] (g/s) (c)	AERMOD Output [2] ($\mu g/m^3$) (d)	Mass GLC ($\mu g/m^3$) (e)	AERMOD Output [2] ($\mu g/m^3$) (f)	Mass GLC ($\mu g/m^3$) (g)
PM_{10}			Annual Average			
	SR-241	9.93E-02	0.41	**0.04**		
	LST Threshold ($\mu g/m^3$)			1.0		
	Exceeds Threshold?			**No**		
CO			Max 1-hour		Max 8-hour	
	SR-241	4.64E-01	14.3	6.65E+00	4.5	2.08E+00
	SR-241 (ppm) [3]			**0.01**		**0.002**
	Background Level (ppm)			1.4		0.9
	Total (ppm)			**1.4**		**0.9**
	CAAQS Threshold (ppm)			20.0		9.0
	Exceeds Threshold?			**No**		**No**
NOx			Max 1-hour		Annual Average	
	SR-241	9.30E-02	14.3	1.33E+00	0.41	3.80E-02
	SR-241 (ppm) [4]			7.08E-04		2.02E-05
NO_2	SR-241 (ppm) [5]			1.06E-04		3.03E-06
	Background Level (ppm)			0.060		0.012
	Total (ppm)			**0.060**		**0.012**
	CAAQS Threshold (ppm)			0.18		0.030
	Exceeds Threshold?			**No**		**No**

[1] Emission Rates from Source Emissions Inventory (Appendix A).

[2] AERMOD Output based on unit emission rates for roadway segments (1 g/s).

[3] CO conversion factor of 8.733E-04 ppm per $\mu g/m^3$ was used to convert concentrations.

[4] NOx conversion factor of 5.3157E-04 ppm per $\mu g/m^3$ was used to convert concentrations.

[5] NOx to NO_2 conversion rate was derived from a report entitled Final Localized Significance Threshold Methodology (SCAQMD, 2008)

Mobile Source	Distance from Roadway to Project Site (m)	NO_X to NO_2 Conversion Factor
SR-241	310	0.1503

Nakase Property
Lake Forest, California

Historical Resource Evaluation Report

Prepared by:

CONSULTING
GPA

December 2018

G P A

TABLE OF CONTENTS

EXECUTIVE SUMMARY **1**

1. INTRODUCTION **1**
1.1 Purpose and Qualifications 1
1.2 Methodology 2

2. REGULATORY FRAMEWORK **3**
2.1 National Register of Historic Places 3
2.2 California Register of Historical Resources 4

3. ENVIRONMENTAL SETTING **7**
3.1 History and Description of the Property and Vicinity 7
3.2 Evaluation of Potential Historical Resources 11

4. CONCLUSION **17**

5. SOURCES **18**

APPENDIX A – Résumés

APPENDIX B – Historic Aerials

APPENDIX C – Chain of Title

APPENDIX D – Department of Parks and Recreation Inventory Forms

APPENDIX E – CHRIS Records Search Results

EXECUTIVE SUMMARY

The purpose of this report was to determine if the proposed Nakase Property project (the Project) in the City of Lake Forest would impact any historical resources for purposes of review under the California Environmental Quality Act (CEQA). The Project located within the block bounded by Bake Parkway to the northwest, Rancho Parkway to the northeast, Lake Forest Drive to the southeast, and Dimension Drive to the southwest and is comprised of one parcel of land (APN 612-221-01) with the primary address 20621 Lake Forest Drive (the Property). Historically, the Property was used primarily for agriculture production. From the late 1920s through the early 1970s, the Property was developed with orchards. In the late 1970s to early 1980s, the Property was redeveloped as a commercial plant nursery by the Nakase Brothers, which continues operation today.

The proposed Project would involve the development of a residential community on the Property and would result in the removal of all of the existing improvements, which include a residential building constructed circa 1931 and multiple structures used for nursery operations. The Property is not currently listed under any national or state landmark or historic district programs. Additionally, a records search prepared by the South Central Coastal Information Center did not indicate any prior evaluations of the Property as a potential historical resource.

As such, GPA Consulting (GPA) was retained to complete this Historical Resource Evaluation Report (HRER) as part of the environmental review of the Project in compliance with the California Environmental Quality Act (CEQA). The Property was evaluated in this report using the National Register of Historic Places and California Register of Historical Resources. Although archaeological sites may be considered historical resources, this report was limited to historical resources that are part of the built environment. After careful research and evaluation, GPA concluded that the Property does not appear to be individually eligible for listing in the National Register of Historic Places or California Register of Historical Resources due to lack of significance and integrity. Therefore, the Property is not a historical resource as defined by CEQA. The recommended California Historical Resource Status Code for the Property is 6Z, ineligible for designation at the national, state, and local levels through survey evaluation. As the Project would have no impact on historical resources, no further study is recommended or required.

1. INTRODUCTION

1.1 Purpose and Qualifications

The purpose of this report is to determine whether or not a proposed project (Project) would impact historical resources. The Project consists of one parcel located at 20621 Lake Forest Drive in the City of Lake Forest, also identified as APN 612-221-01 (the Property). The Property is 121.08 acres of land that was first cultivated as part of a larger orchard operation as early as 1927. It is currently occupied by the Nakase Brothers Wholesale Nursery (Nakase Bros.) The Project would result in the development of the Property and would remove all the existing improvements, which includes multiple temporary structures used for nursery operations, as well as the removal of a single-family residence and detached garage that that were constructed circa 1931.

Figure 1. the Property (GPA Consulting)

GPA Consulting (GPA) was retained to identify and evaluate potential historical resources on the Property in compliance with the California Environmental Quality Act (CEQA). Audrey von Ahrens, Architectural Historian II, and Teresa Grimes, Principal Architectural Historian at GPA were responsible for the preparation of this report. They fulfill the qualifications for historic preservation professionals outlined in Title 36 of the Code of Federal Regulations, Part 61. Their résumés are attached.

1.2 Methodology

In preparing this report, GPA performed the following tasks:

1. Researched the Property to confirm that it is not currently listed as a landmark or part of a historic district under national, state, or local programs and that it has not been previously identified or evaluated as a historical resource. The City of Lake Forest does not have a historic preservation ordinance or local criteria for the designation of landmarks. Research involved a records search at the South Central Coastal Information Center at California State University, Fullerton. The records search revealed no previously recorded historical resources on the Property. In addition, there are no known historical resources in the immediate vicinity of the Property.

2. Conducted a field inspection of the Property to ascertain the physical condition of the buildings, structures, and features thereon. Digital photographs were taken during this field inspection.

3. Concluded during the field inspection and through additional research that only two buildings on the Property are older than 50 years of age, a residence and garage. Therefore, the buildings were evaluated individually as a potential historical resource under national and state criteria according to National Park Service and State Office of Historic Preservation standards.

4. Obtained and reviewed existing information provided by the client such as aerial photographs and title reports for the Property. Dates of construction and subsequent alterations were determined by the aerial photographs, as well as additional sources, such as the field inspection and historic maps.

5. Researched the Property and surrounding area at local libraries and archives to establish the general history and context, including a review of the relevant databases, newspapers, directories, books, and newspaper articles.

6. Reviewed and analyzed ordinances, statutes, regulations, bulletins, and technical materials relating to federal and state historic preservation designations, and assessment processes and programs to evaluate the significance and integrity of the Property as a potential historical resource. As stated above, the City of Lake Forest does not have a historic preservation ordinance or local criteria for the designation of landmarks.

2. REGULATORY FRAMEWORK

Generally, a lead agency must consider a property a historical resource under CEQA if it is eligible for listing in the California Register of Historical Resources (California Register). The California Register is modeled after the National Register of Historic Places (National Register). Furthermore, a property is presumed to be historically significant if it is listed in a local register of historical resources or has been identified as historically significant in a historic resources survey (provided certain criteria and requirements are satisfied) unless a preponderance of evidence demonstrates that the property is not historically or culturally significant.[1] Because the City of Lake Forest does not have a historic preservation ordinance or local criteria for the designation of landmarks, only the National Register and California Register programs are discussed below.

2.1 National Register of Historic Places

The National Register is "an authoritative guide to be used by federal, state, and local governments, private groups, and citizens to identify the nation's cultural resources and to indicate what properties should be considered for protection from destruction or impairment."[2]

Criteria

To be eligible for listing in the National Register, a property must be at least 50 years of age (unless the property is of "exceptional importance") and possess significance in American history and culture, architecture, or archaeology. A property of potential significance must meet one or more of the following four established criteria: [3]

A. Associated with events that have made a significant contribution to the broad patterns of our history; or

B. Associated with the lives of persons significant in our past; or

C. Embody the distinctive characteristics of a type, period, or method of construction or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. Yield, or may be likely to yield, information important in prehistory or history.

Context

To be eligible for listing in the National Register, a property must be significant within a historic context. *National Register Bulletin #15* states that the significance of a historic property can be judged only when it is evaluated within its historic context. Historic contexts are "those patterns, themes, or trends in history by which a specific...property or site is understood and its meaning...is made clear."[4] A property must represent an important aspect of the area's history or prehistory and possess the requisite integrity to qualify for the National Register.

---

[1] Public Resources Code §5024.1 and 14 California Code of Regulations §4850 & §15064.5(a)(2).
[2] Title 36 Code of Federal Regulations Part 60.2.
[3] Title 36 Code of Federal Regulations Part 60.4.
[4] *National Register Bulletin #15: How to Apply the National Register Criteria for Evaluation* (Washington D.C.: National Park Service, Department of the Interior, 1997), 7-8.

Integrity

In addition to possessing significance within a historic context, to be eligible for listing in the National Register a property must have integrity. Integrity is defined in *National Register Bulletin #15* as "the ability of a property to convey its significance."[5] Within the concept of integrity, the National Register recognizes the following seven aspects or qualities that in various combinations define integrity: feeling, association, workmanship, location, design, setting, and materials. Integrity is based on significance: why, where, and when a property is important. Thus, the significance of the property must be fully established before the integrity is analyzed.

2.2 California Register of Historical Resources

In 1992, Governor Wilson signed Assembly Bill 2881 into law establishing the California Register. The California Register is an authoritative guide used by state and local agencies, private groups, and citizens to identify historical resources and to indicate what properties are to be protected, to the extent prudent and feasible, from substantial adverse impacts.[6]

The California Register consists of properties that are listed automatically as well as those that must be nominated through an application and public hearing process. The California Register automatically includes the following:

- California properties listed in the National Register and those formally Determined Eligible for the National Register;
- State Historical Landmarks from No. 0770 onward; and
- Those California Points of Historical Interest that have been evaluated by the State Office of Historic Preservation (SOHP) and have been recommended to the State Historical Resources Commission for inclusion on the California Register.[7]

Criteria and Integrity

For those properties not automatically listed, the criteria for eligibility of listing in the California Register are based upon National Register criteria, but are identified as 1-4 instead of A-D. To be eligible for listing in the California Register, a property generally must be at least 50 years of age and must possess significance at the local, state, or national level, under one or more of the following four criteria:

1. It is associated with events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States; or
2. It is associated with the lives of persons important to local, California, or national history; or
3. It embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values; or

[5] *National Register Bulletin #15*, 44-45.
[6] Public Resources Code §5024.1 (a).
[7] Public Resources Code §5024.1 (d).

4. It has yielded, or has the potential to yield, information important in the prehistory or history of the local area, California, or the nation.

Properties eligible for listing in the California Register may include buildings, sites, structures, objects, and historic districts. A property less than 50 years of age may be eligible if it can be demonstrated that sufficient time has passed to understand its historical importance. While the enabling legislation for the California Register is less rigorous with regard to the issue of integrity, there is the expectation that properties reflect their appearance during their period of significance.[8]

The California Register may also include properties identified during historic resource surveys. However, the survey must meet all of the following criteria:[9]

1. The survey has been or will be included in the State Historic Resources Inventory;
2. The survey and the survey documentation were prepared in accordance with office [SOHP] procedures and requirements;
3. The resource is evaluated and determined by the office [SOHP] to have a significance rating of Category 1 to 5 on a DPR Form 523; and
4. If the survey is five or more years old at the time of its nomination for inclusion in the California Register, the survey is updated to identify historical resources that have become eligible or ineligible due to changed circumstances or further documentation and those that have been demolished or altered in a manner that substantially diminishes the significance of the resource.

SOHP Survey Methodology

The evaluation instructions and classification system prescribed by the SOHP in its *Instructions for Recording Historical Resources* provide a Status Code for use in classifying potential historical resources. In 2003, the Status Codes were revised to address the California Register. These Status Codes are used statewide in the preparation of historical resource surveys and evaluation reports. The first code is a number that indicates the general category of evaluation. The second code is a letter that indicates whether the property is separately eligible (S), eligible as part of a district (D), or both (B). There is sometimes a third code that describes some of the circumstances or conditions of the evaluation. The general evaluation categories are as follows:

1. Listed in the National Register or the California Register.
2. Determined eligible for listing in the National Register or the California Register.
3. Appears eligible for listing in the National Register or the California Register through survey evaluation.
4. Appears eligible for listing in the National Register or the California Register through other evaluation.
5. Recognized as historically significant by local government.

[8] Public Resources Code Section 4852.
[9] Public Resources Code Section 5024.1.

6. Not eligible for listing or designation as specified.
7. Not evaluated or needs re-evaluation.

The specific Status Codes referred to in this report are as follows:

6Z Found ineligible for National Register, California Register, or local designation through survey evaluation.

3. ENVIRONMENTAL SETTING

3.1 History and Description of the Property and Vicinity

The Property is located in the block bounded by Bake Parkway to the northwest, Rancho Parkway to the northeast, Lake Forest Drive to the southeast, and Dimension Drive to the southwest. The immediate surrounding consists of suburban land-uses, including auto-oriented commercial, office, industrial and single-family residential developments, predominantly constructed in the 1990s and 2000s. Prior to 1990, the immediate vicinity remained largely undeveloped, and predominately consisted of orchards. The historic town of El Toro was located about four miles to the south of the Property. Like most of Orange County region, El Toro started out as an agricultural community.

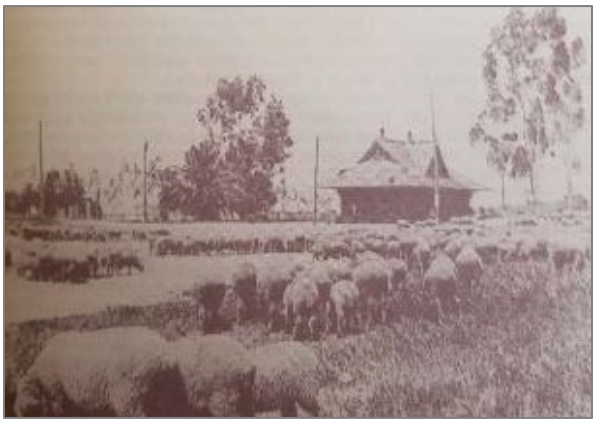


Figure 2. El Toro Depot c.1900 ("Saddleback Valley," 165)

Through a Mexican Land Grant in 1846, Don Jose Serrano settled the area, originally called Rancho Cañada de Los Alisos (the Valley of the Sycamores) but known at the time as El Toro.[10] In 1850, California became the 31st state in the union. As a result of the Land Act of 1851 and a two-year drought in the 1860s, the original rancheros went into foreclosure and the land holdings were sold, oftentimes to migrants from the eastern states. In 1884, the greater part of Serrano's Rancho Cañada de Los Alisos was sold to Dwight Whiting. Whiting succeeded in bringing the San Bernardino and San Diego Railway Company to the area.[11] He first leased the land for cattle and dry-farming.[12]

The community of El Toro began to develop, surrounded by the ranches. Near the end of the boom of the 80s, in 1887, the firm of Cook, Gardner, and Victor platted a small town called Aliso City.[13] However, it was too little too late and the majority of the lots were purchased by Whiting who is credited with developing the town. Originally named Aliso City, the town was renamed El Toro in 1888 when the Post Office Department declined to accept the proposed name, Aliso, because of its similarity to Alviso.[14] The town of El Toro consisted of a school, a Catholic church, an Episcopal church, general store, post-office and homes laid out along an orthogonal street

[10] The origin of the name "El Toro" is uncertain, however, many resources suggest it is was named after the bull(s) that roamed the area; "About Lake Forest," City of Lake Forest, accessed October 9, 2018, https://www.lakeforestca.gov/414/About-Lake-Forest; Erwin G. Gudde, *California Place Names: The Origin and Etymology of Current Geographical Names*, ed. William Bright (Berkley and Los Angeles, CA: University of California Press, 1998), 8, 397.

[11] Clara Mason Fox, *A History of El Toro,* (El Toro: Prepared for the El Toro Women's Club, n.d.), 39.

[12] Joe Osterman, "Saddleback Valley: El Toro, Mission Viejo, Laguna Hills, Laguna Niguel," in *A Hundred Years of Yesterdays: A Centennial History of The People of Orange County and Their Communities,* ed. Esther R. Cramer, Keith A. Dixon, Diann Marsh, Phil Brigandi, and Clarice A. Blamer, (Santa Ana, CA: The Orange County Centennial, Inc., 1988), 166.

[13] Pamela Hallan-Gibson, *The Golden Promise: An Illustrated History of Orange County*, (Northridge, CA: Windsor Publications, 1986), 116.

[14] Gudde, 397.

grid. Homes were also built among the orchards outside of the town, and farther out on the ranches were the homes of the leasehold farmers.[15]

Early crops included grapes, walnuts and, apricots, which was one of the most successful boom crops in El Toro.[16] After years of grazing animals and dry farming, new water well-drilling techniques became available in the World War I era and gave way to citrus planting.[17] Smaller properties were purchased, adjoined, and solidly planted with citrus. Orchards and irrigation systems stabilized the land usage in the vicinity until the mid-1960s, with El Toro remaining as the small town that serviced the larger agricultural area.

After World War II, the El Toro Marine Base facilitated the area's development as residential, commercial and industrial growth began to replace the acres of citrus and other agricultural products. The area immediately surrounding old El Toro was the first to be developed and by the 1980s, little of the original town remained as the area exploded with development. North of the town, the orchards remained largely undeveloped until the early 1990s when development began spreading from the south. On December 20, 1991, the city was incorporated under its new name, Lake Forest, which was derived from two man-made lakes and a "forest" of eucalyptus trees that were planted by Dwight Whiting in the early 1900s.[18] By the mid-2000s, almost all of the remaining land was developed with suburban commercial, residential and office uses.

The Property

Description

The Property is a rectangular parcel containing 121.08 acres of agricultural land, operated as the Nakase Brothers Wholesale Nursery. Existing improvements on the property include multiple temporary structures used for nursery operations, irrigation infrastructure, and a residential building with a detached garage, constructed circa 1931.

Figure 3

Figure 4

Nakase Bros. Nursery, view looking north from entrance (left) and view looking west toward parking lot and office near the center of the property (right) (GPA, October 03, 2018)

[15] Osterman, 167.
[16] Hallan-Gibson, 149.
[17] Osterman, 167.
[18] "About Lake Forest."

A paved driveway provides access to the property from Lake Forest Drive at the southern corner. From this approach, the driveway passes the residence, located near the entrance to the nursery, oriented toward Lake Forest Drive at the southern corner. The driveway continues northward, following the southwest property line about halfway up before it takes a 90 degree turn, continuing northwest. The driveway terminates at a surface parking area near the center of the nursery where the main office is located in a modular trailer complex. Multiple trailers are stored on the surface parking lot for packing and shipping.

The rest of the property is dedicated to nursery land with scattered temporary structures used for nursery operations. There are generally three different types of shade structures. The first have long, low rectangular massings and are metal frame structures with flat roofs, entirely clad in corrugated metal with packed earth floor. The second type are pipe-framed greenhouses with either flat or curved roofs and are clad in fabric with operable shades around the perimeter walls. The third type are the simplest structures and have concrete or packed earth floors with metal posts that support draped shade fabric.

Figure 5

Figure 6

Nakase Bros. Nursery shade structures, view looking east from driveway (left) and view looking west from parking lot near the center of the property (right) (GPA, October 03, 2018)

Additional improvements on the nursery include an irrigation canal toward the northern portion, and an improved creek along the southern property line. Both of these irrigation systems traverse the property on a northeast-southwest trajectory and terminate at each end of the property where they enter underground concrete pipes. A chicken wire fence surrounds the entire perimeter of the property.

History

The Property is identified as Lot 'C' of Tract No. 695. The property was part of the Whiting Company holdings prior to 1927. It is unclear exactly when the land was first cultivated, however it was utilized for orchards by the 1930s. An historic aerial from 1931 depicts the property as having orchards and woodlands with a small house depicted on the south corner (see Figure 7).

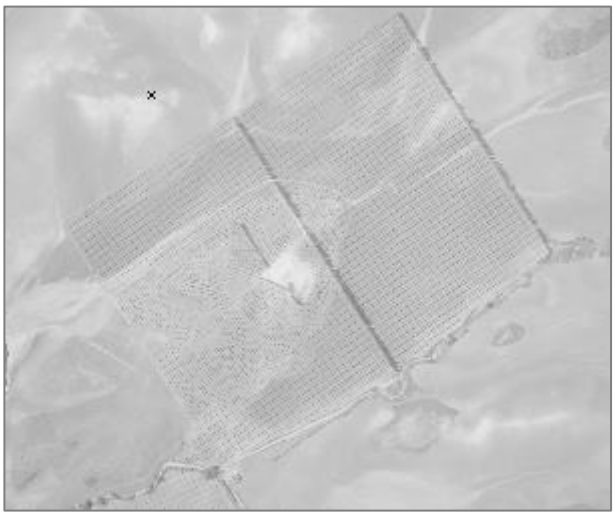


Figure 7. 1931 aerial photograph showing orchards on the Property with the existing residence and garage (UCSB)

In 1927, the Whiting Company property was sold to the First National Bank of Santa Ana. Ten years later, in 1936, a series of back-and-forth transactions occurred between the First National Bank of Santa Ana and a group of investors from Santa Ana within a few months. This same back-and-forth transaction occurred once again in 1951 (see Appendix C). Additional chain of title records reveal that multiple other transactions occurred in 1932, involving the Orange County Title Co., and in 1936, involving all of the aforementioned parties.[19] Many of these additional transactions appear to have involved mineral rights, while others are less clear.

Real estate advertisements in the Santa Ana Register in the 1920s provide some evidence regarding the history of the property prior to the title records, which only date back to 1927. An advertisement for an adjacent property, called Valley View Ranch, refers to the subject property as the Jerome-Browning-Crookshank Ranch. The advertisement also confirms that by 1926, water wells had been developed on the property, and suggests that it had already been converted from a ranch to an orchard at the time.[20] An advertisement from 1928 refers to the subject property as "the big tract developed in the past three or four years by the Los Alisos Ranch company, composed of a group of Santa Ana men."[21] The article also confirms that the Jerome brothers were formerly identified with the development of the property, but had sold their interests. As with many of the properties in the El Toro Foothills, the original ranch property had been planted with orange trees by the late 1920s.[22] Through the 1970s, the property was owned by a group of investors while the orchard was operated by men employed by the syndicate.

[19] Orange County Archives.
[20] "Come in With Us and Help Plant 500 Acres Valencias in the FROSTLESS El Toro Foothills," *Santa Ana Register,* March 11, 1926, 11.
[21] "Whiting Ranch Acreage Sold to Local Men," *Santa Ana Register,* December 1, 1928, 2.
[22] "New Water Well is Secured on Property Near El Toro," *Santa Ana Register,* March 30, 1929, 4.

Figure 8. 1977 aerial photograph showing orchard when purchased by Nakase brothers (UCSB)

Figure 9. 1983 aerial photograph showing conversion of orchard to Nakase Bros. Nursery (UCSB)

Historic Aerials from 1952 and 1967 indicate that there was a shift in the orchard operation with the lower, southwest portion of the Property being cleared of citrus trees by 1967, continuing through 1972. In 1977, the Property was sold to the Nakase Brothers as agricultural land with citrus trees extant on all but the southwest portion. By 1983, almost all of the citrus trees appear to have been removed and replaced by the Nakase Brothers Wholesale Nursery, with only a narrow strip remaining along the northwest property line (see Figures 8 and 9).

3.2 Evaluation of Potential Historical Resources

The significance of a property must be evaluated within its historic context(s). Historic contexts are those patterns or trends in history by which a specific property is understood. As the orchard is gone, the Property as a whole could not be potentially eligible in the context of agricultural development. The Nakase Brothers Wholesale Nursery was not established until after 1977, and none of the existing structures on the Property associated with the nursery use were constructed before 1983. However, to be eligible for listing in the National Register, a property must be at least 50 years of age (unless the property is of "exceptional importance").[23] Since the current use is not older than 50 years of age, and research did not produce any evidence to suggest that it may be of exceptional importance, the Property as a whole was not evaluated as a potential historical resource in the context of commercial plant nursery development. Furthermore, no information was found to suggest that the Nakase family had any earlier associations with the Property. Thus, the Property is not closely associated with the longer history of the Japanese-American community in Orange County.

There are two buildings located on the Property that are over 50 years of age. They are pictured, described, and evaluated below as a potential historical resource under each applicable criterion for the national and state registers.

[23] Title 36 Code of Federal Regulations Part 60.4.

Residence and Detached Garage

The single-family residence and garage are located at the southern corner of the Property. The residence is oriented to the southeast toward Lake Forest Drive. The garage is oriented to the northwest toward the driveway. The exact date of construction is unknown; however, the single-family residence and detached garage appear in a historic aerial from 1931.

The one-story residence is 'L'-shaped in plan with the foot if the 'L', or shorter elevation, projecting to the northeast. The building has a cross-gabled roof clad in composition shingles. All elevations, except for a portion of the primary elevation, are clad in stucco and have shallow, boxed eaves. The primary elevation is clad in board and batten siding within an elevated porch entryway. The front porch is sheltered beneath the overhanging eave of the side-gabled roof. The eave is open with exposed rafter tails and is supported with simple, square, wood porch supports. The porch has a concrete floor and is accessed by a non-original concrete walkway that wraps around from the rear elevation. The main entrance is centered within the porch and consists of a simple, wood door with horizontally divided lights. The door is flanked by a large, brick chimney (northeast) and group of two windows.

Fenestration is asymmetrical and primarily consists of wood, double-hung-sash windows of various sizes with horizontally divided lights, and simple wood sills. There is one tri-partite window on the southwest elevation with one, large, fixed center window and side casements, each with horizontally divided lights. A secondary entrance is located north of the tripartite window, consisting of a non-original wood slab door with double-hung sash vision light. The door is elevated with non-original concrete steps and sheltered by a wood awning with asphalt shingles.

Figure 10

Figure 11

Single-family residence, view looking north (left) and view looking south (right) (GPA, October 03, 2018)

Another secondary entrance is located near the center of the northwest elevation on the southwest facing wall of the north wing. The door appears original, though likely relocated within a non-original opening, and consists of a wood door with nine divided lights above wood crossbuck paneling.

Figure 12

Figure 13

Single-family residence, view looking east (left) and detached garage, view looking south (right) (GPA, October 03, 2018)

The detached garage is rectangular in plan with a side-gabled roof. The roof is clad in composition shingles and has shallow, boxed eaves. The exterior is clad in stucco. The primary entry is located on the north elevation, offset to the west, and consists of a wood garage door. A secondary entry is located on the north end of the east elevation and consists of a wood slab door. To its south is one wood, double-hung-sash window. There is only one opening centered on the south elevation, which consists of board and batten double-doors. There are no openings on the west elevation.

Because no building permits were found for the Property, the dates of alterations are unknown. However, alterations observed from the field inspection include the non-original stucco cladding, the composition shingle roofs, and the addition of the north wing of the residence. According to historic aerials, the addition was constructed between 1949 and 1952. The rest of the windows on the building were likely replaced at this time. The brick chimney on the primary elevation also appears to be non-original.

National Register of Historic Places

Criterion A

To be eligible for Criterion A, a property must be associated with events that have made a significant contribution to the broad patterns of our history. The context considered in this evaluation is the development of citriculture in Orange County. The potential period of significance identified is circa 1931 to 1977, the date that the orchard was sold and converted to a commercial plant nursery.

The exact date of construction is unknown, however, the single-family residence and detached garage at 20621 Lake Forest Drive are associated with a former ranch property, converted to an orchard circa 1927 in the El Toro Foothills, about three miles north of the historic town of El Toro, known today as the City of Lake Forest. Research suggest that the Property may have been a ranch prior to 1927, known as the Jerome-Browning-Crookshank Ranch and, along with many of the other agricultural properties in the area, was leased from the Whiting Company for livestock and dry-farming. Consistent with historical agricultural development trends in the area, as water became more plentiful with new well-drilling techniques, the Property was converted to an orchard. Owned by a Santa Ana-based syndicate, the Property remained an orchard until 1977. The residence was most likely occupied by the manager of the orchard who was employed by the syndicate.

The orchard was substantially altered between 1977 and 1983 when the Property was sold to the present-day Nakase Brothers Wholesale Nursery, removing the acres of planted citrus trees. A small pond that was present in the central portion of the Property was filled and paved over with a surface parking area, and shade structures were erected throughout the Property for commercial plant nursery development activities. Up until 1983, the residence was surrounded by mature trees at the south corner of the Property, and adjacent agriculture fields to the south. By 1988, the adjacent fields were flattened in preparation for development and a large surface parking lot located immediately adjacent the residence. By 1990, Lake Forest Drive was paved as a four-lane parkway, and commercial development constructed immediately adjacent the residence.

After the conversion of the orchard to nursery, research suggests that the residence and garage were used instead as a field house and mechanic shop, as they are still used today. Because the broad and immediate setting has been so significantly altered, the residence and detached garage no longer reflect an association with the orchard, nor do they retain their original use or association with an agricultural property.

Therefore, the Property does not appear to be eligible within the development of citriculture in Orange County.

Criterion B

To be eligible for listing in the National Register under Criterion B, a property must be associated with the lives of persons significant in our past.

As discussed in Section 3.1 above, the Property has been associated with various landowners, investors, and tenant farmers. Although some of the early investors of the ranch and orchard may have been historic personages, research revealed that none of these individuals were closely associated with the Property. Other properties, such as their places of residence or places of business in Santa Ana, would be better examples of significant properties associated with these individuals.

Research did not reveal any information as to who occupied the residence while the Property was utilized as an orchard. Research revealed that frequent tenant turnover was common in the area amongst leasehold farmers. Because of the lack of information available, it does not appear that any individual of historical importance occupied or was closely associated with the Property.

Therefore, the Property does not appear to be eligible under Criterion B.

Criterion C

To be eligible for listing under Criterion C, a property must embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master, possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction.

The residence and garage are vernacular and without a distinctive style. The absence of a distinctive architectural style is typical for small, rural residences constructed at this time. There is minimal to no ornament or distinguishing aesthetic features. It most closely resembles typical board and batten bungalows constructed in the area at this time. Because it is not particularly

unique, and has been substantially altered, the residence is not a distinguished example of a style or property type.

As with the original date of construction, the architect and builder are unknown. No building permit records were available for the Property. Additionally, newspaper archive research did not yield any further information about who the architect or builder might have been. The lack of information available suggests that the residence and garage were not designed or constructed by a master, or anyone recognized as unique in the field of architecture.

The last two aspects of Criterion C do not apply to the residence and garage. The possession of high artistic values refers to a property's articulation of a particular concept of design so fully that it expresses an aesthetic ideal.[24] A property eligible under this aspect of Criterion C would need to possess ornamentation and detail to lend it high artistic value, which the buildings dos not possess. Nor does the Property represent a significant and distinguishable entity whose components lack individual distinction, which generally applies to historic districts.

Therefore, the Property does not appear to be eligible under Criterion C.

Criterion D

Criterion D generally applies to archaeological resources and this report only pertains to historical resources that are part of the built environment. This criterion may apply to a built resource in instances where a resource may contain important information about such topics as construction techniques or human activity. In any case, the resource must be the principal source of information. This is unlikely to be true for the residence and garage. Therefore, they do not appear to be significant under Criterion D.

Integrity

To be eligible for listing in the National Register, properties must retain their physical integrity from the period in which they gained significance. In the case of architecturally significant properties, the period of significance is normally the date of construction. For historically significant properties, the period of significance is usually measured by the length of the associations. As the Property is not significant under any of the National Register criteria, it has no period of significance. Nevertheless, the Property was analyzed against the seven aspects of integrity: location, design, setting, materials, workmanship, feeling, and association. While some factors of integrity are more important than others depending on the property, a majority of the seven recognized factors should be retained.

The residence and garage have not been moved, so they retain integrity of location. Between 1977 and 1983, the orchard was converted to a nursery and many of the mature trees that had surrounded the buildings were removed to make way for a paved driveway through the Property, therefore changing their immediate setting. The surrounding setting has been affected by later construction in the vicinity, which replaced adjacent agriculture fields with a four-lane parkway, and commercial development with large surface parking lots. Therefore, the Property does not retain its integrity of setting. In addition, the buildings no longer retain integrity of feeling or association, as the Property no longer feels like a residence and garage associated with an operating, rural orchard. Other than some board and batten cladding on the residence few of

[24] *National Register Bulletin #15*, 20.

the original building materials remain. Thus, the buildings do not retain integrity of materials and workmanship. The buildings retain integrity of design as the height, massing, roof configurations, and fenestration patterns remain.

Therefore, the Property has been substantially altered such that it no longer retains overall integrity, nor does it appear to be significant for its association with events or trends under Criterion A, with an individual under Criterion B, or an architectural style, type, or method of construction under Criterion C. Therefore, it is ineligible for listing in the National Register.

California Register of Historical Resources

The California Register criteria for eligibility mirror those of the National Register. Therefore, the Property is ineligible for listing in the California Register for the same reasons outlined above.

4. CONCLUSION

The Property is not designated or listed under any national, or state programs, nor has it been identified as eligible for designation in any previous historic resource surveys. As stated in Section 2 of this report (page 3), Lake Forest does not have a historic preservation ordinance or local criteria for the designation of landmarks. GPA evaluated the Property to determine if it would be potentially eligible for listing as a historical resource as part of the environmental review of the proposed Project in compliance with CEQA.

Based on our review, GPA concludes that the Property as a whole and the single-family residence and detached garage specifically do not appear to be eligible for listing in the National or California Registers, due to a lack of significance and integrity. The recommended Status Code for the Property is 6Z, ineligible for designation at the national, state, and local levels through survey evaluation. In conclusion, the Property does not appear to be a historical resource subject to CEQA. As the Project would have no impact on historical resources, no further study is recommended or required, and no mitigation measures are proposed.

5. SOURCES

Codes

California Code of Regulations, California Office of Administrative Law, State of California Government.

Code of Federal Regulations, Title 36: Parks, Forests, and Public Property. Office of the Federal Register, National Archives and Records Administration, United States Government.

National Register Bulletins

National Register Bulletin #15: How to Apply the National Register Criteria for Evaluation. Washington D.C.: National Park Service, 2002.

National Register Bulletin #16: How to Complete the National Register Registration Form. Washington D.C.: National Park Service, 1997.

National Register Bulletin #18: How to Evaluate and Nominate Designed Historic Landscapes. Washington, D.C.: National Park Service, 1987.

National Register Bulletin #32: Guidelines for Evaluating and Documenting Properties Associated with Significant Persons. Washington, D.C.: National Park Service, publication date unknown.

Primary Sources

Ancestry.com. United States Federal Census, various dates. Accessed October 12, 2018. https://www.ancestry.com

City of Santa Ana directories, various dates.

Orange County Archives entitlement records, various dates.

Santa Ana Register, various dates.

Books, Contexts, and Surveys

"Asian Reflections on the American Landscape: Identification and Interpreting Asian Heritage." US Department of the Interior, National Park Service, Cultural Resources. Accessed October 10, 2018. https://home1.nps.gov/heritageinitiatives/pubs/Asianisms.pdf.

City of Lake Forest. "About Lake Forest." Accessed October 9, 2018, https://www.lakeforestca.gov/414/About-Lake-Forest.

Fox, Clara Mason. *A History of El Toro*. El Toro: Prepared for the El Toro Women's Club, N.D.

Gudde, Erwin G. *California Place Names: The Origin and Etymology of Current Geographical Names*. Ed. William Bright. Berkley and Los Angeles, CA: University of California Press, 1998.

Hallan-Gibson, Pamela. *The Golden Promise: An Illustrated History of Orange County*. Northridge, CA: Windsor Publications, 1986.

Higgs, Robert. "The Wealth of Japanese Tenant Farmers in California, 1909." *Agricultural History* 53, no. 2 (1979): 488-93. http://www.jstor.org/stable/3742423.

Hillman Consulting. *Phase I Environmental Site Assessment: 20621 Lake Forest Drive, Lake Forest, California 92630*. Lake Forest, California: Prepared for Toll Brothers, July 13, 2018.

LSA Associates, Inc. *Initial Study: Nakase Nursery/Toll Brothers Project*. Lake Forest, California: Prepared for the City of Lake Forest Development Services Department, July, 2018.

OrangeCounty.net. "Lake Forest, California History." Accessed October 16, 2018. https://orangecounty.net/cities/LakeForest_history.html.

Osterman, Joe. "Saddleback Valley: El Toro, Mission Viejo, Laguna Hills, Laguna Niguel." In *A Hundred Years of Yesterdays: A Centennial History of The People of Orange County and Their Communities*. Ed. Esther R. Cramer, Keith A. Dixon, Diann Marsh, Phil Brigandi, and Clarice A. Blamer, 164-168. Santa Ana, CA: The Orange County Centennial, Inc., 1988.

Poli, Adon. *Japanese Farm Holdings on the Pacific Coast*. Berkely, CA: Prepared for US Department of Agriculture, Bureau of Agricultural Economics, December 1944. Accessed October 12, 2018. https://archive.org/details/ldpd_11359716_000/page/1.

Waugh, Isami Arifuku, Alex Yamato, and Raymond Y. Okamura. "The Japanese in California." In *Five Views: An Ethnic Historic Site Survey of California.* California Department of Parks and Recreation, Office of Historic Preservation. Accessed October 10, 2018. https://www.nps.gov/parkhistory/online_books/5views/5views4.htm.

Appendix A - Résumés

TERESA GRIMES is a Principal Architectural Historian at GPA. She has over 25 years of experience in the field of historic preservation in the private, public, and non-profit sectors. Teresa is widely recognized as an expert in the identification and evaluation of historical resources having successfully prepared dozens of landmark and historic district applications for a wide variety of property types. Her many projects have included historic context statements for Riverside, Calabasas, Glendale, and Carmel-by-the-Sea, and historic resource surveys in Riverside, Whittier, Calabasas, Pasadena, Whittier, and Los Angeles. Teresa has also completed numerous environmental compliance documents involving major landmarks; examples include the United Artist Theater, Cinerama Dome, Dodger Stadium, Los Angeles Sports Arena, Beverly Hills Post Office, and Baldwin Hills Shopping Center.

Educational Background:

- M.A., Architecture, University of California, Los Angeles, 1992
- B.A., Political Science, University of California, Los Angeles, 1986

Professional Experience:

- GPA Consulting, Principal Architectural Historian, 2009-Present
- Christopher A. Joseph & Associates, Senior Architectural Historian, 2006-2009
- Teresa Grimes/Historic Preservation, Principal, 1999-2005, 1993-1994, 1991-1992
- Historic Resources Group, Project Manager/Architectural Historian, 1994-1998
- Getty Conservation Institute, Research Associate, 1992-1993
- Los Angeles Conservancy, Preservation Officer, 1988-1991

Qualifications:

- Meets the Secretary of the Interior's Professional Qualifications Standards for history and architectural history pursuant to the Code of Federal Regulations, 36 CFR Part 61, Appendix A.

Professional Activities:

- Pasadena Heritage Board Member, 2008-2012
- Highland Park Heritage Trust, Board Member, 1996-1998
- West Hollywood Cultural Heritage Advisory Board, 1990-1994

Selected Projects:

- Los Angeles County Museum of Art Master Plan, CEQA Historical Resource Report, 2017
- Vine/Afton/DeLongpre, Los Angeles CEQA Historical Resource Report, 2017
- Times Mirror Square, Los Angeles, CEQA Historical Resource Report, 2017
- 222 W. 2nd Street, Los Angeles CEQA Historical Resource Report, 2017
- 913 S. Figueroa, Los Angeles, CEQA Historical Resource Report, 2017
- Figueroa & Flower, Los Angeles, CEQA Historical Resource Report, 2017
- 1129 E. 5th Street, Los Angeles, CEQA Historical Resource Report, 2017
- Olympic & Hill, Los Angeles, CEQA Historical Resource Report, 2017
- City of Hope Master Plan, Duarte, CEQA Historical Resource Report, 2015-2016
- Farmers Insurance Building, Los Angeles, CEQA Historical Resource Report, 2015-2016
- John Anson Ford Theatres, Los Angeles County, CEQA Historical Resource Report, 2011-2015
- LA Biomed Master Plan, Torrance, CEQA Historical Resource Report, 2013-2014
- May Company, Laurel Plaza, Los Angeles, CEQA Historical Resource Report, 2014
- United Artist Theater, Los Angeles, CEQA Historical Resource Report, 2011-2013
- Claremont Graduate University Master Plan, CEQA Historical Resource Report, 2013
- Hillcrest Motors Building, Hollywood, CEQA Historical Resource Report, 2013
- Max Factor Building, Hollywood, CEQA Historical Resource Report, 2012
- Claremont McKenna College Master Plan, CEQA Historical Resource Report, 2008

AUDREY VON AHRENS is an Architectural Historian II at GPA. She has been involved in the field of historic preservation since 2013. Audrey graduated from the University of Pennsylvania with a Master of Science degree in Historic Preservation and City Planning where she focused her studies on preservation planning and community economic development. She has since worked in private historic preservation consulting in California. Audrey joined GPA in 2017 and her experience has included the preparation of environmental compliance documents in accordance with the California Environmental Quality Act and Section 106 of the National Historic Preservation Act; historic context statements; Secretary of the Interior's Standards analysis; large-scale historic resource surveys; and evaluations of eligibility for a wide variety of projects and property types throughout Southern California. Audrey is also experienced in coordinating with property owners and local governments in the preparation and review of Mills Act applications and the inspection and reporting of properties applying for or with existing Mills Act contracts.

Educational Background:

- M.S., Historic Preservation, University of Pennsylvania, 2016
- Master of City Planning, University of Pennsylvania, 2016
- B.A., Architectural Studies, University of Pittsburgh, 2013
- B.A., Urban Studies, University of Pittsburgh, 2013

Professional Experience:

- GPA Consulting, Architectural Historian II, 2017-Present
- Heritage Consulting, Inc., Intern, 2015-2016
- Tacony Community Development Corp., Intern, 2014
- Pittsburgh History & Landmarks Foundation, Intern, 2013
- City of Pittsburgh Planning Department, Intern, 2012

Qualifications:

- Meets the Secretary of the Interior's Professional Qualifications Standards for history and architectural history pursuant to the Code of Federal Regulations, 36 CFR Part 61, Appendix A.

Professional Activities:

- Downtown Los Angeles Neighborhood Council Planning and Land Use Committee, Public Seat, 2018-Present

Selected Projects:

- Long Beach Historic District Design Guidelines, Ongoing
- Los Angeles Mills Act Program, Pre-contract Services, 2018
- Laguna Beach Mills Act Program, Application Reports, 2017 - 2018
- Broadway Federal Midtown Branch, Los Angeles, Character-Defining Features Analysis and CEQA Historical Resource Report, 2018
- Westlake 619, Los Angeles, CEQA Historical Resource Report, 2018
- CF Braun & Company Plant, Alhambra, CEQA Historical Resource Report, 2018
- High Speed Rail, Burbank to Los Angeles Project Section, CEQA/NEPA Historical Resource Report, 2017-2018
- Golden Avenue Bridge, Placentia, Replacement Project, Section 106 Historical Resources Evaluation Report, 2017
- Los Angeles Mills Act Program, Inspection Reports, 2017
- 91/605, Los Angeles County, Improvement Project, Section 106 Historical Resources Evaluation Report, 2017
- Vine/Afton/DeLongpre, Los Angeles CEQA Historical Resource Report, 2017
- Hollywood Roosevelt, Los Angeles, Preservation Plan, 2017
- Farmers & Merchants Bank Building, Los Angeles, Preservation Plan, 2017
- African American History, Los Angeles Citywide Historic Context Statement, 2017
- Casa de Rosas, Los Angeles, Federal Tax Credit Application Part 1, 2017

Appendix B – Historic Aerials

EDR Aerial Photo Decade Package

08/17/16

Site Name:

20621 Lake Forest
20621 Lake Forest
Lake Forest, CA 92630
EDR Inquiry # 4702716.9

Client Name:

Hillmann Environmental Co.
1745 W Orangewood Avenue
Orange, CA 92868-0000
Contact: Kristine Savona

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

Search Results:

Year	Scale	Details	Source
2012	1"=500'	Flight Year: 2012	USDA/NAIP
2010	1"=500'	Flight Year: 2010	USDA/NAIP
2009	1"=500'	Flight Year: 2009	USDA/NAIP
2005	1"=500'	Flight Year: 2005	USDA/NAIP
1994	1"=500'	Acquisition Date: June 01, 1994	USGS/DOQQ
1990	1"=500'	Flight Date: August 29, 1990	USDA
1988	1"=500'	Flight Date: September 13, 1988	USDA
1972	1"=500'	Flight Date: October 30, 1972	USGS
1967	1"=500'	Flight Date: May 07, 1967	USGS
1952	1"=500'	Flight Date: December 12, 1952	USDA
1949	1"=500'	Flight Date: May 05, 1949	USDA
1946	1"=500'	Flight Date: December 29, 1946	USGS
1938	1"=500'	Flight Date: June 14, 1938	USDA

When delivered electronically by EDR, the aerial photo images included with this report are for ONE TIME USE ONLY. Further reproduction of these aerial photo images is prohibited without permission from EDR. For more information contact your EDR Account Executive.

Disclaimer - Copyright and Trademark Notice

This Report contains certain information obtained from a variety of public and other sources reasonably available to Environmental Data Resources, Inc. It cannot be concluded from this Report that coverage information for the target and surrounding properties does not exist from other sources. NO WARRANTY EXPRESSED OR IMPLIED, IS MADE WHATSOEVER IN CONNECTION WITH THIS REPORT. ENVIRONMENTAL DATA RESOURCES, INC. SPECIFICALLY DISCLAIMS THE MAKING OF ANY SUCH WARRANTIES, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE. ALL RISK IS ASSUMED BY THE USER. IN NO EVENT SHALL ENVIRONMENTAL DATA RESOURCES, INC. BE LIABLE TO ANYONE, WHETHER ARISING OUT OF ERRORS OR OMISSIONS, NEGLIGENCE, ACCIDENT OR ANY OTHER CAUSE, FOR ANY LOSS OF DAMAGE, INCLUDING, WITHOUT LIMITATION, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES. ANY LIABILITY ON THE PART OF ENVIRONMENTAL DATA RESOURCES, INC. IS STRICTLY LIMITED TO A REFUND OF THE AMOUNT PAID FOR THIS REPORT. Purchaser accepts this Report "AS IS". Any analyses, estimates, ratings, environmental risk levels or risk codes provided in this Report are provided for illustrative purposes only, and are not intended to provide, nor should they be interpreted as providing any facts regarding, or prediction or forecast of, any environmental risk for any property. Only a Phase I Environmental Site Assessment performed by an environmental professional can provide information regarding the environmental risk for any property. Additionally, the information provided in this Report is not to be construed as legal advice.

Copyright 2016 by Environmental Data Resources, Inc. All rights reserved. Reproduction in any media or format, in whole or in part, of any report or map of Environmental Data Resources, Inc., or its affiliates, is prohibited without prior written permission.

EDR and its logos (including Sanborn and Sanborn Map) are trademarks of Environmental Data Resources, Inc. or its affiliates. All other trademarks used herein are the property of their respective owners.

INQUIRY #: 4702716.9
YEAR: 2012
= 500'
N
EDR

INQUIRY #: 4702716.9

YEAR: 2010

= 500'

N

EDR

INQUIRY #: 4702716.9
YEAR: 2009
= 500'
N
EDR

INQUIRY #: 4702716.9
YEAR: 2005
= 500'
N
EDR

INQUIRY #: 4702716.9
YEAR: 1994
= 500'
N
EDR

INQUIRY #: 4702716.9
YEAR: 1990
= 500'
N
EDR

INQUIRY #: 4702716.9

YEAR: 1988

= 500'

N

EDR

INQUIRY #: 4702716.9
YEAR: 1972
= 500'
N
EDR

INQUIRY #: 4702716.9
YEAR: 1967
= 500'
N
EDR

INQUIRY #: 4702716.9
YEAR: 1952
= 500'
N
EDR

INQUIRY #: 4702716.9
YEAR: 1949
= 500'
N
EDR

INQUIRY #: 4702716.9
YEAR: 1946
= 500'
N
EDR

INQUIRY #: 4702716.9
YEAR: 1938
= 500'
N
EDR

Appendix C – Chain of Title

CHAIN OF TITLE SUMMARY			
	Grantor(s)	Grantee(s)	Date
Grant Deed	The Whiting Company	First National Bank of Santa Ana	08/29/1927
Grant Deed	The First National Bank of Santa Ana	J.P. Baumgartner J. Lamont McFadden Maydell McFadden E.T. McFadden Florence B. McFadden Walter L. West Lois T. West T.E. Stephenson Cora Stephenson Herbert W. Walker Ethel A. Walker Chas F. Heil	01/03/1936
Grant Deed	J.P. Baumgartner J. Lamont McFadden Maydell McFadden E.T. McFadden Florence B. McFadden Walter L. West Lois T. West T.E. Stephenson Cora Stephenson Herbert W. Walker Ethel A. Walker Chas F. Heil	First National Bank of Santa Ana	03/19/1936
Grant Deed	The First National Bank of Santa Ana	E.T. McFadden Florence B. McFadden J. Lamont McFadden Maydell McFadden Walter L. West Lois T. West Ethel A. Walker Charles F. Heil Elizabeth H. Monegan Helen Berry Walters Terry E. Stephenson	04/26/1951
Grant Deed	E.T. McFadden Florence B. McFadden J. Lamont McFadden Maydell McFadden Walter L. West Lois T. West Ethel A. Walker Charles F. Heil Elizabeth H. Monegan Helen Berry Walters Terry E. Stephenson	First National Bank of Santa Ana	04/30/1951
Grant Deed	Lloyds Bank California (successor in interest to the First National Bank of Santa Ana)	Nakase Brothers	09/23/1977
Grant Deed	Nakase Brothers	Steven M. Nakase Gary S. Nakase Tadashi D. Nakase	05/09/2016

Appendix D – Department of Parks and Recreation Inventory Forms

State of California - The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

PRIMARY RECORD

Primary #
HRI #
Trinomial
NRHP Status Code 6Z

Other Listings
Review Code | Reviewer | Date

Page 1 **of** 6 ***Resource Name or #:** (Assigned by recorder) 20621 Lake Forest Drive
P1. Other Identifier: None

*P2. **Location:** ☐ **Not for Publication** ☑ **Unrestricted**
*a. **County** Orange County **and** (P2c, P2e, and P2b or P2d. Attach a Location Map as necessary.)
*b. **USGS 7.5' Quad** _____ **Date** _____ **T** __; **R** ___; __ ☐ **of** __ ☐ **of Sec** __; _____**B.M.**
c. Address 20621 Lake Forest Drive City Lake Forest Zip 92630
d. UTM: (Give more than one for large and/or linear resources) Zone ___, _____ mE/ _____ mN
e. Other Locational Data: (e.g., parcel #, directions to resource, elevation, decimal degrees, etc., as appropriate)
APN: 612-221-01

***P3a. Description:** (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries)

The single-family residence and garage are located at the southern corner of a rectangular parcel containing 121.08 acres of agricultural land. The exact date of construction is unknown; however, the single-family residence and detached garage appear in a historic aerial from 1931.

(see continuation sheet)

***P3b. Resource Attributes:** (List attributes and codes) (HP2) Single family property, (HP4) Ancillary Building

P5a. Photograph or Drawing (Photograph required for buildings, structures, and objects.)

***P4. Resources Present:** ☑ Building ☐ Structure ☐ Object ☐ Site ☐ District ☐ Element of District ☐ Other (Isolates, etc.)
P5b. Description of Photo: (view, date, accession #) View looking northwest, taken 10/04/2018
***P6. Date Constructed/Age and Source:** ☑ Historic ☐ Prehistoric ☐ Both
c.1931; Source: UCSB
***P7. Owner and Address:**
Nakase, Tadashi D
9441 Krepp Dr.
Huntington Beach, CA 92646-2708
***P8. Recorded by:** (Name, affiliation, and address)
Audrey von Ahrens
GPA Consulting
617 S. Olive Street, Suite 910
Los Angeles, CA 90014
***P9. Date Recorded:** 10/31/2018
***P10. Survey Type:** (Describe)
Intensive
***P11. Report Citation:** (Cite survey report and other sources, or enter "none.")

GPA Consulting, "Historical Resources Evaluation Report for Nakase Property, Lake Forest, California," October 2018

***Attachments:** ☐ NONE ☐ Location Map ☑ Continuation Sheet ☐ Building, Structure, and Object Record
☐ Archaeological Record ☐ District Record ☐ Linear Feature Record ☐ Milling Station Record ☐ Rock Art Record
☐ Artifact Record ☐ Photograph Record ☐ Other (List): _____

BUILDING, STRUCTURE, AND OBJECT RECORD

***Resource Name or #** (Assigned by recorder) 20621 Lake Forest Drive ***NRHP Status Code** 6Z
Page 2 **of** 6

B1. Historic Name: none B2.
Common Name: none
B3. Original Use: Single family residence and detached garage B4. Present Use: Field house and mechanic shop
***B5. Architectural Style:** no style
***B6. Construction History:** (Construction date, alterations, and date of alterations)

Residence and garage constructed circa 1931; north wing addition to residence constructed circa 1949-1952 with window replacement; application of stucco cladding, composition shingles, replacement of brick chimney completed at unknown date.

***B7. Moved?** ☑No ☐Yes ☐Unknown **Date:** **Original Location:**
***B8. Related Features:** None

B9a. Architect: unknown b. Builder: unknown
***B10. Significance: Theme** Agriculture/Architecture **Area** Los Angeles
Period of Significance c. 1931-1977 **Property Type** Single family residence and garage **Applicable Criteria** N/A
(Discuss importance in terms of historical or architectural context as defined by theme, period, and geographic scope. Also address integrity.)

The building was evaluated for potential listing in the National Register of Historic Places, and California Register of Historical Resources.

(see continuation sheet)

B11. Additional Resource Attributes: (List attributes and codes) (HP2) Single family property, (HP4) Ancillary Building
***B12. References:**

See report for full bibliography.

B13. Remarks:

None

***B14. Evaluator:** Audrey von Ahrens
***Date of Evaluation:** October 2018

(This space reserved for official comments.)

P3a. Description (cont.)

The one-story residence is 'L'-shaped in plan with the foot if the 'L', or shorter elevation, projecting to the northeast. The building has a cross-gabled roof clad in composition shingles. All elevations, except for a portion of the primary elevation, are clad in stucco and have shallow, boxed eaves. The primary elevation is clad in board and batten siding within an elevated porch entryway. The front porch is sheltered beneath the overhanging eave of the side-gabled roof. The eave is open with exposed rafter tails and is supported with simple, square, wood porch supports. The porch has a concrete floor and is accessed by a non-original concrete walkway that wraps around from the rear elevation. The main entrance is centered within the porch and consists of a simple, wood door with horizontally divided lights. The door is flanked by a large, brick chimney (northeast) and group of two windows.

Fenestration is asymmetrical and primarily consists of wood, double-hung-sash windows of various sizes with horizontally divided lights, and simple wood sills. There is one tri-partite window on the southwest elevation with one, large, fixed center window and side casements, each with horizontally divided lights. A secondary entrance is located north of the tripartite window, consisting of a non-original wood slab door with double-hung sash vision light. The door is elevated with non-original concrete steps and sheltered by a wood awning with asphalt shingles.

Another secondary entrance is located near the center of the northwest elevation on the southwest facing wall of the north wing. The door appears original, though likely relocated within a non-original opening, and consists of a wood door with nine divided lights above wood crossbuck paneling.

The detached garage is rectangular in plan with a side-gabled roof. The roof is clad in composition shingles and has shallow, boxed eaves. The exterior is clad in stucco. The primary entry is located on the north elevation, offset to the west, and consists of a wood garage door. A secondary entry is located on the north end of the east elevation and consists of a wood slab door. To its south is one wood, double-hung-sash window. There is only one opening centered on the south elevation, which consists of board and batten double-doors. There are no openings on the west elevation.

Because no building permits were found for the property, the dates of alterations are unknown. However, alterations observed from the site visit include the non-original stucco cladding, the composition shingle roofs, and the addition of the north wing of the residence. According to historic aerials, the addition was constructed between 1949 and 1952. The rest of the windows on the building were likely replaced at this time. The brick chimney on the primary elevation also appears to be non-original.

B10. Significance (cont.)

National Register of Historic Places

Criterion A

To be eligible for Criterion A, a property must be associated with events that have made a significant contribution to the broad patterns of our history. The context considered in this evaluation is the development of citriculture in Orange County. The potential period of significance identified is circa 1931 to 1977, the date that the orchard was sold and converted to a commercial plant nursery.

The exact date of construction is unknown, however, the single-family residence and detached garage at 20621 Lake Forest Drive are associated with a former ranch property, converted to an orchard circa 1927 in the El Toro Foothills, about three miles north of the historic town of El Toro, known today as the City of Lake Forest. Research suggest that the property may have been a ranch prior to 1927, known as the Jerome-Browning-Crookshank Ranch and, along with many of the other agricultural properties in the area, was leased from the Whiting Company for livestock and dry-farming. Consistent with historical agricultural development trends in the area, as water became more plentiful with new well-drilling techniques, the property was converted to an orchard. Owned by a Santa Ana-based syndicate, the property remained an orchard until 1977. The residence was most likely occupied by the manager of the orchard who was employed by the syndicate.

The orchard was substantially altered between 1977 and 1983 when the property was sold to the present-day Nakase Brothers Wholesale Nursery, removing the acres of planted citrus trees. A small pond that was present in the central portion of the property was filled and paved over with a surface parking area, and shade structures were erected throughout the property for commercial plant nursery development activities. Up until 1983, the residence was surrounded by mature trees at the south corner of the property, and adjacent agriculture fields to the south. By 1988, the adjacent fields were flattened in preparation for development and a large surface parking lot located immediately adjacent the residence. By 1990, Lake Forest Drive was paved as a four-lane parkway, and commercial development constructed immediately adjacent the residence.

After the conversion of the orchard to nursery, research suggests that the residence and garage were used instead as a field house and mechanic shop, as they are still used today. Because the broad and immediate setting has been so significantly altered, the residence and detached garage no longer reflect an association with the orchard, nor do they retain their original use or association with an agricultural property.

Therefore, the property does not appear to be eligible within the development of citriculture in Orange County.

Criterion B

To be eligible for listing in the National Register under Criterion B, a property must be associated with the lives of persons significant in our past.

As discussed in Section 3.1 above, the property has been associated with various landowners, investors, and tenant farmers. Although some of the early investors of the ranch and orchard may have been historic personages, research revealed that none of these individuals were closely associated with the property. Other properties, such as their places of residence or places of business in Santa Ana, would be better examples of significant properties associated with these individuals.

Research did not reveal any information as to who occupied the residence while the property was utilized as an orchard. Research revealed that frequent tenant turnover was common in the area amongst leasehold farmers. Because of the lack of information available, it does not appear that any individual of historical importance occupied or was closely associated with the property.

Therefore, the property does not appear to be eligible under Criterion B.

Criterion C

To be eligible for listing under Criterion C, a property must embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master, possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction.

The residence and garage are vernacular and without a distinctive style. The absence of a distinctive architectural style is typical for small, rural residences constructed at this time. There is minimal to no ornament or distinguishing aesthetic features. It most closely resembles typical board and batten bungalows constructed in the area at this time. Because it is not particularly unique, and has been substantially altered, the residence is not a distinguished example of a style or property type.

As with the original date of construction, the architect and builder are unknown. No building permit records were available for the property. Additionally, newspaper archive research did not yield any further information about who the architect or builder might have been. The lack of information available suggests that the residence and garage were not designed or constructed by a master, or anyone recognized as unique in the field of architecture.

The last two aspects of Criterion C do not apply to the residence and garage. The possession of high artistic values refers to a property's articulation of a particular concept of design so fully that it expresses an aesthetic ideal. A property eligible under this aspect of Criterion C would need to possess ornamentation and detail to lend it high artistic value, which the buildings dos not possess. Nor does the property represent a significant and distinguishable entity whose components lack individual distinction, which generally applies to historic districts.

Therefore, the property does not appear to be eligible under Criterion C.

Criterion D

Criterion D generally applies to archaeological resources and this report only pertains to historical resources that are part of the built environment. This criterion may apply to a built resource in instances where a resource may contain important information about such topics as construction techniques or human activity. In any case, the resource must be the principal source of information. This is unlikely to be true for the residence and garage. Therefore, they do not appear to be significant under Criterion D.

Integrity

To be eligible for listing in the National Register, properties must retain their physical integrity from the period in which they gained significance. In the case of architecturally significant properties, the period of significance is normally the date of construction. For historically significant properties, the period of significance is usually measured by the length of the associations. As the subject property is not significant under any of the National Register criteria, it has no period of significance. Nevertheless, the property was analyzed against the seven aspects of integrity: location, design, setting, materials, workmanship, feeling, and association. While some factors of integrity are more important than others depending on the property, a majority of the seven recognized factors should be retained.

The residence and garage have not been moved, so the retains integrity of location. Between 1977 and 1983, the orchard was converted to a nursery and many of the mature trees that had surrounded the buildings were removed to make way for a paved driveway through the property, therefore changing their immediate setting. The surrounding setting has been affected by later construction in the vicinity, which replaced adjacent agriculture fields with a four-lane parkway, and commercial development with large surface parking lots. Therefore, the property does not retain its integrity of setting. In addition, the buildings no longer retain integrity of feeling or association, as the property no longer feels like a residence and garage associated with an operating, rural orchard. Other than some board and batten cladding on the residence few of the original building materials remain. Thus, the buildings do not retain integrity of materials and workmanship. The buildings retain integrity of design as the height, massing, roof configurations, and fenestration patterns remain.

Therefore, property has been substantially altered such that it no longer retains overall integrity, nor does it appear to be significant for its association with events or trends under Criterion A, with an individual under Criterion B, or an architectural style, type, or method of construction under Criterion C. Therefore, it is ineligible for listing in the National Register.

California Register of Historical Resources

The California Register criteria for eligibility mirror those of the National Register. Therefore, the property is ineligible for listing in the California Register for the same reasons outlined above.

Conclusion

The property as a whole and the single-family residence and detached garage specifically do not appear to be eligible for listing in the National or California Registers, due to a lack of significance and integrity. The recommended Status Code for the property is 6Z, ineligible for designation at the national, state, and local levels through survey evaluation.

Appendix E – CHRIS Records Search Results

South Central Coastal Information Center
California State University, Fullerton
Department of Anthropology MH-426
800 North State College Boulevard
Fullerton, CA 92834-6846
657.278.5395 / FAX 657.278.5542
sccic@fullerton.edu
California Historical Resources Information System
Orange, Los Angeles, and Ventura Counties

10/31/2018 Records Search File No.: 19544.5506

Audrey von Ahrens
GPA Consulting
617 S Olive St. Suite 910
Los Angeles, CA 90014

Re: Record Search Results for the Nakase Brothers Wholesale Nursery

The South Central Coastal Information Center received your records search request for the project area referenced above, located on the El Toro, CA USGS 7.5' quadrangle. The following reflects the results of the records search for the project area:

As indicated on the data request form, the locations of non-archaeological resources are provided in the following format: ☐ custom GIS maps ☐ shape files ☐ hand-drawn maps ☒ no map

Non-archaeological resources within project area: 0	None
Resources listed in the OHP Historic Properties Directory within project area: 0	None
Reports within project area: 0	None

Resource Database Printout (list):	☐ enclosed	☒ not requested	☐ nothing listed
Resource Database Printout (details):	☐ enclosed	☒ not requested	☐ nothing listed
Resource Digital Database (spreadsheet):	☐ enclosed	☐ not requested	☒ nothing listed
Report Database Printout (list):	☐ enclosed	☒ not requested	☐ nothing listed
Report Database Printout (details):	☐ enclosed	☒ not requested	☐ nothing listed
Report Digital Database (spreadsheet):	☐ enclosed	☐ not requested	☒ nothing listed
Resource Record Copies:	☐ enclosed	☐ not requested	☒ nothing listed
Report Copies:	☐ enclosed	☐ not requested	☒ nothing listed
OHP Historic Properties Directory:	☐ enclosed	☐ not requested	☒ nothing listed
Archaeological Determinations of Eligibility:	☐ enclosed	☒ not requested	☐ nothing listed
Los Angeles Historic-Cultural Monuments	☐ enclosed	☒ not requested	☐ nothing listed
Historical Maps:	☐ enclosed	☒ not requested	☐ nothing listed
Ethnographic Information:	☒ not available at SCCIC		

Historical Literature: ☒ not available at SCCIC
GLO and/or Rancho Plat Maps: ☒ not available at SCCIC
Caltrans Bridge Survey: ☒ not available at SCCIC; please go to http://www.dot.ca.gov/hq/structur/strmaint/historic.htm
Shipwreck Inventory: ☒ not available at SCCIC; please go to http://shipwrecks.slc.ca.gov/ShipwrecksDatabase/Shipwrecks_Database.asp
Soil Survey Maps: (see below) ☒ not available at SCCIC; please go to http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

Please forward a copy of any resulting reports from this project to the office as soon as possible. Due to the sensitive nature of archaeological site location data, we ask that you do not include resource location maps and resource location descriptions in your report if the report is for public distribution. If you have any questions regarding the results presented herein, please contact the office at the phone number listed above.

The provision of CHRIS Data via this records search response does not in any way constitute public disclosure of records otherwise exempt from disclosure under the California Public Records Act or any other law, including, but not limited to, records related to archeological site information maintained by or on behalf of, or in the possession of, the State of California, Department of Parks and Recreation, State Historic Preservation Officer, Office of Historic Preservation, or the State Historical Resources Commission.

Due to processing delays and other factors, not all of the historical resource reports and resource records that have been submitted to the Office of Historic Preservation are available via this records search. Additional information may be available through the federal, state, and local agencies that produced or paid for historical resource management work in the search area. Additionally, Native American tribes have historical resource information not in the CHRIS Inventory, and you should contact the California Native American Heritage Commission for information on local/regional tribal contacts.

Should you require any additional information for the above referenced project, reference the record search number listed above when making inquiries. Requests made after initial invoicing will result in the preparation of a separate invoice.

Thank you for using the California Historical Resources Information System,

For Isabela Kott
GIS Technician/Staff Researcher

Enclosures:

(X) Invoice #19554.5506

June 2019

PRELIMINARY HYDROLOGY ANALYSIS

"Nakase Property"

Vesting Tentative Tract Map No. 18142

City of Lake Forest | County of Orange

Prepared For:

Toll Brothers
AMERICA'S LUXURY HOME BUILDER

725 Town & Country Road
Suite 200
Orange, CA 92868

Phone: (714) 347-1300

Prepared By:

HUNSAKER & ASSOCIATES IRVINE, INC.
Three Hughes, Irvine, CA 92618 | 949.583.1010

WO#: 1443-135X HydroAnalVTTM18142NakasePrpty

June 2019

PRELIMINARY HYDROLOGY ANALYSIS

"Nakase Property"

Vesting Tentative Tract Map No. 18142

City of Lake Forest | County of Orange

HUNSAKER & ASSOCIATES IRVINE, INC.

PRELIMINARY HYDROLOGY ANALYSIS

" Nakase Property"

Vesting Tentative Tract Map No. 18142

City of Lake Forest | County of Orange

HUNSAKER & ASSOCIATES IRVINE, INC.

June 2019

PRELIMINARY HYDROLOGY STUDY

For

Nakase Property
Vesting Tentative Tract Map No. 18142

City of Lake Forest
County of Orange

PREPARED BY:

HUNSAKER & ASSOCIATES IRVINE, INC.
3 Hughes, Irvine, California 92618

Prepared under the supervision of:

Mohammed Rowther, P.E. **R.C.E. 37127** **Exp. 06/30/19**

TABLE OF CONTENTS

SECTION TITLE

1 INTRODUCTION 1

1. Background / Purpose 2
2. Methodology 2
3. Existing Conditions 4
4. Proposed Conditions 7
5. Conclusion 8

2 EXISTING CONDITION HYDROLOGY 10

- **2-Year, 25-Year & 100-Year Storm Hydrology Calculations**
  (Onsite Hydrology Area "A" without Offsite Runoffs)
  (Onsite Hydrology Area "B")
  (Offsite Hydrology at Rancho Parkway 84" RCP Inlet (F19-P07))
  (Onsite Hydrology Area "A" with Offsite Runoffs)

2.1 Hydrology Maps – Existing Condition (Exhibits 2, 2A, 2B, 4 & 6)

3 PROPOSED CONDITION HYDROLOGY 11

- **2-Year, 25-Year & 100-Year Storm Hydrology Calculations**
  (Onsite Hydrology Area "A" with Offsite Runoffs, without Detention)
  (Onsite Hydrology Area "A" with Offsite Runoffs, with Detention)

3.1 Hydrology Map – Proposed Condition (Exhibits 3 & 5)

4 FLOOD ROUTING CALCULATIONS 12

- Area-Averaged Loss Rate and Low Loss Fraction Estimations
- Storage Volume Versus Depth and Outflow Calculations
- Detention Basin Routing

5 APPENDIX 13

- As-Built Storm Drain Plans
- Existing F19S02-713, F19P06 & F19P07 – Hydraulic
- Serrano Creek Facility No. F19, Drainage Area, Land Use and Soil Groups Map

SECTION 1

INTRODUCTION

INTRODUCTION

1. Background/Purpose

This hydrology study has been prepared by Hunsaker and Associates Irvine, Inc. (H&A) for Vesting Tentative Tract Map (VTTM) No. 18142 (The Project). The Project is a community residential development consisting of approximately 122 acres of land located centrally within the northern portion of the City of Lake Forest, County of Orange as shown in Exhibit 1 - Vicinity Map. The site is bounded to the north by Rancho Parkway and an existing shopping center ("Corridor Center") beyond; to the east by Serrano Creek, business centers and Lake Forest Drive beyond; to the south by business centers and Enterprise Way beyond; and to the west by Bake Parkway and business centers beyond. Current address for the site is 20621 Lake Forest Drive. The Project is currently undeveloped and is known as Nakase Property. Toll Bothers is planning to develop this site with a maximum of 675 single-family homes, 101 senior affordable housing residential units, an elementary school that can accommodate up to 1,000 students, park/open space uses, and supporting infrastructure.

The Project lies in an approximately 227.9-acre watershed tributary to County of Orange Flood Control District's 84 inch RCP storm drain (F19-P07) in Rancho Parkway. This storm drain was built in 1999 (Parcel Map No. 99-103) with a design capacity of 621 cubic feet per second (cfs) per storm drain plans, Drawing No. 1007, included in the Appendix Section for reference.

The purpose of this study is to evaluate on-site and off-site hydrology for existing (pre-project) and proposed (post-project) conditions, for 100-year, 25-year and 2-year return frequency storm events.

2. Methodology

This hydrology study has been prepared in conformance with procedures and criteria outlined in Orange County Hydrology Manual, dated October 1996, Addendum 1. Calculations to determine peak flow rates, and volumes, at critical flow concentration points (nodes) throughout the project site were performed using the

Advanced Engineering Software (A.E.S.) computer program for Orange County. The results of the hydrologic calculations will be used for the sizing of the required on-site and off-site storm drains, on-site detention basins, and appurtenant drainage structures.

PROJECT SITE

SCALE: 1" = 2500'

DRAWN BY: HTC DATE: 06/29/2018 W.O.: 1443-135X	PREPARED BY: HUNSAKER & ASSOCIATES IRVINE, INC. PLANNING ▪ ENGINEERING ▪ SURVEYING Three Hughes, Irvine, CA 92618 ▪ PH: (949) 583-1010 ▪ FX: (949) 583-0759	PREPARED FOR: **TOLL BROTHERS, INC.** 725 W. TOWN & COUNTRY ROAD, SUITE 200 ORANGE, CA 92686 (714) 347-1300	"NAKASE PROPERTY" VESTING TENTATIVE TRACT MAP NO. 18142 SOUTH OF BAKE PARKWAY & RANCHO PARKWAY CITY OF LAKE FOREST, CA	EXHIBIT 1 PRELIMINARY HYDROLOGY VICINITY MAP

DATE: Jun. 29, 2018 04:00:46 PM FILE: F:\0894\Engineering\SY_Hydrology\REPORT\PWQMP_VIC Nakase.dwg

3. Existing Conditions

In the pre-project condition, onsite drainage is divided into two drainage:

Drainage "A" consists of the western portion of site (approximately 76.6 acres) and drains southwesterly via sheet flow to a channelized onsite natural and partly paved drainage system. This flows to an existing 10.5' x 10.5' reinforced concrete box (RCB) storm drain (OCFCD Facility No. F19-P07) and ultimately to (OCFCD Facility No. F19-S02). This drainage confluences with Serrano Creek approximately 0.6 miles to the southeast. See Exhibit 6. Run-on to Drainage "A" consists of offsite areas to the north (approximately 227.9 acres) that discharge into the site via an existing 84" RCP (OCFCD Facility No. F19-P07) in Rancho Parkway at node 24.

Drainage "B" consists of the eastern portion of the site (approximately 43.4 acres) and drains easterly via sheet flow to Serrano Creek (OCFCD Facility No. F19). This facility is located at the eastern edge of the property limits. There is no offsite run-on to Drainage "B".

There is an additional 2 acres that is within the boundary of this site. This 2 acres is the actual portion of natural Serrano Creek along the easterly edge of the property. Serrano Creek itself does not drain into the site. The flows within Serrano Creek are not impacted by this development.

Therefore, the site total acreage is 122 acres.

The total drainage area "A", with the offsite run-on drainage area tributary to the existing 10.5' x 10.5' RCB (F19-P07), is approximately 304.5 acres and produces a 100-year peak discharge of 671.2 cfs.

Onsite drainage area "B" is tributary to the existing 84" RCP (F19) at node 15 located at the southeast corner of the site, with a 100-year peak discharge of 84.2 cfs.

The total drainage area tributary to the existing 84 inch RCP (F19), at the southeast corner of the site, is approximately 1,281 acres, with a 100-year peak discharge of 2,350 cfs per the Orange County Hydrology Study for Serrano Creek dated 2014.

Once leaving the Nakase site, all runoff is then conveyed southeasterly prior to

discharging to San Diego Creek (Reach 1), San Diego Creek (Reach 2), Newport Bay (Upper and Lower) and the Pacific Ocean.

The hydrology analysis for the onsite drainage areas “A”, “B”, and offsite run-on drainage area are shown in *Exhibits 2, 2A & 2B Hydrology Map (Existing Condition)*. The results are summarized in Table 3-1.

Table 3-1 Existing Hydrology Study Summary

Location (Node)	Area (acres)	2-Year (cfs)	25-Year (cfs)	100-Year (cfs)
Offsite Area @ Rancho Pkwy Node 24.1	227.9	200.1	475.9	621.0
Area "A" with offsite Area @ Node 61	304.5	208.6	508.7	671.2
Area "B" @ Node 15	43.4	19.6	62.2	84.2

4. Proposed Conditions

Toll Brothers is planning to develop this area with approximately 675 single-family detached homes, 101 senior affordable housing residential units, an elementary school that can accommodate up to 1,000 students, park/open spaces uses, and supporting infrastructure.

Offsite run-on through the site, via the existing 84" RCP (F19-P07) at Rancho Parkway, will be connected to a proposed 84" RCP on-site storm drain system in "B" Street.

The flows in "B" Street continue traveling south in an 84" RCP. On-site runoffs are accepted by this system. Approximately 900' downstream, a diversion structure will be designed for a flow-by of 100.0 cfs at node 56.3. Another diversion structure will be constructed in "S" Street with a flow-by of 10.0 cfs at node 35.2. The excess runoffs from both of the diversion structures will overflow into a proposed underground detention basin in the Central Park Area at node 35.1. See flood routing analysis in Section 4 for details.

In the proposed condition, Drainage Area A and a majority portion of Drainage Area B have been combined for a total of 111.9 acres, not including any of the site run-on. This onsite area generates 272 cfs. This flow, when combined with the 621 cfs from 84" RCP (OCFCD's Facility No. F19-P07) generates a total flow of 893 cfs. The total unmitigated flow of 893 cfs is reduced to 454 cfs via the proposed onsite underground detention facility.

The remaining 7.3 acres of Drainage Area B generates 14 cfs, which continues to drain to natural streambed Serrano Creek.

The total project development mitigated flow rate leaving the site is 468 cfs.

The proposed underground detention basin outlet at node 35 is designed with orifices and a weir to regulate outflows to ensure that there are no hydromodification impacts to downstream Serrano Creek. The regulated outflows continue traveling south in "B" and "C" Streets within a proposed closed conduit. This system will accept on-site runoffs. The flows continue and eventually connect to the existing 10.5'x10.5' RCB (F19-P07) and ultimately to the existing storm drain (OCFCD Facility No.

F19-S02). This facility confluences with Serrano Creek approximately 0.6 miles to the southeast. See storm drain layout as shown in *Exhibit 3 – Hydrology Map (Proposed Condition*) for details; see *Exhibit 4 – Tributary Area to F19-P07 (Existing Condition); Exhibit 5 – Tributary Area to F19-P07 (Proposed Condition)* and *Exhibit 6 – Serrano Creek Confluence with F19-S02.*

The hydrology analysis results for the proposed condition with no detention is presented in Table 4-1.

Table 4-1 Proposed Hydrology Study Summary (No Detention)

Location (Node)	Area (acres)	2-Year (cfs)	25-Year (cfs)	100-Year (cfs)
Offsite Area @ Rancho Pkwy Node 24.1	227.9	200.1	475.9	621.0
Area "A" with offsite Area and diverted Area "B" @ Node 61	339.8	284.8	683.5	892.6

5. Conclusion

The hydrology analysis results for the proposed condition with detention is presented in Table 5-1. Based on this analysis, the Project will not exceed the existing peak discharge for 2-year, 25-year, or 100-year frequency storm events and will reduce flooding conditions in the downstream storm drain facilities and on private property as compared to existing conditions. Thus, the Project will have no significant hydraulic effect.

Table 5-1 Proposed Hydrology Study Summary (With Detention)

Location (Node)	Area (acres)	2-Year (cfs)	25-Year (cfs)	100-Year (cfs)
Existing Condition Area "A" @ Node 61	304.5	208.6	508.7	671.2
Proposed Condition Area "A" @ Node 61	339.8	202.2	369.0	453.9

The results of flood routing analysis for off-site and on-site are presented in Tables 5-2, 5-3 and 5-4, on the following page.

Table 5-2. Onsite & Offsite Area "A" Flood Volume Summary at Node 61

(Exist. 10.5'x10.5' RCB - F19-P07)

Storm Frequency (yr)	Location & Node No.	Existing Condition				Proposed Condition (With Detention)					
		Area (ac)	Q (cfs)	Tc (min)	Volume (ac-ft)	Area (ac)	Q (cfs)	Tc (min)	Volume (ac-ft)	$Q_{Decrease}$ (cfs)	$Q_{Reduction}$ (%)
2	Exit at Exist. 10.5'x10.5' RCB (F19-P07) Node 61	304.45	208.6	27.74	27.52	339.75	202.16	23.43	36.29	6.44	3.09
25		304.45	508.7	23.90	77.74	339.75	369.01	20.80	93.07	139.69	27.46
100		304.45	671.2	22.88	112.17	339.75	453.85	20.07	127.47	217.35	32.38

Table 5-3. Onsite Area "B" Flood Volume Summary at Node 15

(Exist. 84" RCP - F19)

Storm Frequency (yr)	Location & Node No.	Existing Condition				Proposed Condition (With Detention)					
		Area (ac)	Q (cfs)	Tc (min)	Volume (ac-ft)	Area (ac)	$Q_{Prorate}$ (cfs)	Tc (min)	Volume (ac-ft)	$Q_{Decrease}$ (cfs)	$Q_{Reduction}$ (%)
2	Exit at Exist. 84" RCP (F19) Node 15	43.4	19.6	33.75	1.06	7.3	3.3	33.75	0.15	16.30	83.16
25		43.4	62.2	27.28	7.81	7.3	10.5	27.28	1.14	51.70	83.12
100		43.4	84.2	25.93	14.87	7.3	14.2	25.93	2.31	70.00	83.14

Table 5-4. 100-Year Total Site Flood Volume Summary (Area "A" + Area "B")

(Exist. 10.5'x10.5' RCB - F19-P07 and Exist. 84" RCP - F19)

Storm Frequency (yr)	Location & Node No.	Existing Condition				Proposed Condition (With Detention)					
		∑Area (ac)	∑Q (cfs)	Tc (min)	∑Volume (ac-ft)	∑Area (ac)	∑Q (cfs)	Tc (min)	∑Volume (ac-ft)	$\sum Q_{Decrease}$ (cfs)	$\sum Q_{Reduction}$ (%)
2	Exit at Exist. 10.5'x10.5' RCB (F19-P07) Node 61	347.85	228.2	N/A	28.58	347.05	205.46	N/A	36.44	22.74	9.96
25		347.85	570.9	N/A	85.55	347.05	379.51	N/A	94.21	191.39	33.52
100		347.85	755.4	N/A	127.04	347.05	468.05	N/A	129.78	287.35	38.04

SECTION 2

EXISTING CONDITION HYDROLOGY

- 2-Year Storm Hydrology Calculations
- 25-Year Storm Hydrology Calculations
- 100-Year Storm Hydrology Calculations
- Hydrology Maps Existing Condition (Exhibits 2, 2A, 2B, 5 & 6)

```
 ************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY IN CITY OF LAKE FOREST                             *
* ONSITE AREA "A" EXISTING CONDITION @ 2-YEAR STORM                       *
* W.O. #1443-136X                                                         *
 ************************************************************************

  FILE NAME: EX02-A.DAT
  TIME/DATE OF STUDY: 17:08 06/26/2018
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE     10.10 TO NODE     21.10 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    743.00  DOWNSTREAM(FEET) =    731.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.160
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.299
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.41      0.30     1.000    46   13.16
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.24      0.20     1.000    67   13.16
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.61
  TOTAL AREA(ACRES) =      0.65   PEAK FLOW RATE(CFS) =      0.61

************************************************************************
  FLOW PROCESS FROM NODE     21.10 TO NODE     22.10 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    731.00  DOWNSTREAM(FEET) =    725.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.0196
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.120
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        1.19      0.30     1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.78      0.20     1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.37
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.20
  AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   3.88
  Tc(MIN.) =   17.04
  SUBAREA AREA(ACRES) =     1.97       SUBAREA RUNOFF(CFS) =    1.52
  EFFECTIVE AREA(ACRES) =      2.62     AREA-AVERAGED Fm(INCH/HR) =   0.26
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        2.6         PEAK FLOW RATE(CFS) =       2.03

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.14   FLOW VELOCITY(FEET/SEC.) =   1.39
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     22.10 =     580.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     22.10 TO NODE     23.10 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    725.50  DOWNSTREAM(FEET) =    720.00
```

Onsite Hydrology Area "A"

2-Year Storm Existing Condition

```
 CHANNEL LENGTH THRU SUBAREA(FEET) =   415.00   CHANNEL SLOPE =  0.0133
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.964
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        1.80      0.30     1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        0.15      0.20     1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.62
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.36
 AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   5.10
 Tc(MIN.) =   22.14
 SUBAREA AREA(ACRES) =     1.95       SUBAREA RUNOFF(CFS) =    1.18
 EFFECTIVE AREA(ACRES) =      4.57     AREA-AVERAGED Fm(INCH/HR) =   0.27
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        4.6         PEAK FLOW RATE(CFS) =       2.84

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.20   FLOW VELOCITY(FEET/SEC.) =   1.40
 LONGEST FLOWPATH FROM NODE     10.10 TO NODE     23.10 =     995.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.10 TO NODE     24.20 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    720.00  DOWNSTREAM(FEET) =    709.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   670.00   CHANNEL SLOPE =  0.0164
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.847
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B       10.16      0.30     1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"               C        0.80      0.25     1.000    59
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        1.80      0.20     1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.10
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.01
 AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   5.56
 Tc(MIN.) =   27.70
 SUBAREA AREA(ACRES) =    12.76       SUBAREA RUNOFF(CFS) =    6.48
 EFFECTIVE AREA(ACRES) =     17.33     AREA-AVERAGED Fm(INCH/HR) =   0.28
 AREA-AVERAGED Fp(INCH/HR) =   0.28  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       17.3         PEAK FLOW RATE(CFS) =       8.84

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.36   FLOW VELOCITY(FEET/SEC.) =   2.28
 LONGEST FLOWPATH FROM NODE     10.10 TO NODE     24.20 =    1665.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.20 TO NODE     25.10 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    709.00  DOWNSTREAM(FEET) =    704.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   480.00   CHANNEL SLOPE =  0.0104
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.791
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B       14.00      0.30     1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"               C        0.90      0.25     1.000    59
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        4.04      0.20     1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.24
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.29
 AVERAGE FLOW DEPTH(FEET) =   0.52   TRAVEL TIME(MIN.) =   3.50
 Tc(MIN.) =   31.19
 SUBAREA AREA(ACRES) =    18.94       SUBAREA RUNOFF(CFS) =    8.78
 EFFECTIVE AREA(ACRES) =     36.27     AREA-AVERAGED Fm(INCH/HR) =   0.28
 AREA-AVERAGED Fp(INCH/HR) =   0.28  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       36.3         PEAK FLOW RATE(CFS) =      16.75

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.60   FLOW VELOCITY(FEET/SEC.) =   2.49
 LONGEST FLOWPATH FROM NODE     10.10 TO NODE     25.10 =    2145.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.10 TO NODE     26.10 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    704.00  DOWNSTREAM(FEET) =    684.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   975.00   CHANNEL SLOPE =  0.0200
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.728
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        8.10      0.30     1.000    46
```

Onsite Hydrology Area "A"

2-Year Storm Existing Condition

```
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        4.10      0.25     1.000    59
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        9.40      0.20     1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      21.44
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.34
  AVERAGE FLOW DEPTH(FEET) =   0.58   TRAVEL TIME(MIN.) =   4.86
  Tc(MIN.) =   36.05
  SUBAREA AREA(ACRES) =    21.60       SUBAREA RUNOFF(CFS) =    9.36
  EFFECTIVE AREA(ACRES) =     57.87     AREA-AVERAGED Fm(INCH/HR) =   0.27
  AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       57.9          PEAK FLOW RATE(CFS) =      24.05

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.61   FLOW VELOCITY(FEET/SEC.) =   3.49
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     26.10 =    3120.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     26.10 TO NODE     61.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    684.50  DOWNSTREAM(FEET) =    675.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   660.00   CHANNEL SLOPE =  0.0141
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.692
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        6.00      0.30     1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        6.10      0.25     1.000    59
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        6.58      0.20     1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      27.78
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.26
  AVERAGE FLOW DEPTH(FEET) =   0.74   TRAVEL TIME(MIN.) =   3.38
  Tc(MIN.) =   39.43
  SUBAREA AREA(ACRES) =    18.68       SUBAREA RUNOFF(CFS) =    7.45
  EFFECTIVE AREA(ACRES) =     76.55     AREA-AVERAGED Fm(INCH/HR) =   0.26
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       76.5          PEAK FLOW RATE(CFS) =      29.60

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.77   FLOW VELOCITY(FEET/SEC.) =   3.34
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     61.00 =    3780.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       76.5  TC(MIN.) =     39.43
  EFFECTIVE AREA(ACRES) =     76.55  AREA-AVERAGED Fm(INCH/HR)=  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =      29.60
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Onsite Hydrology Area "A"

2-Year Storm Existing Condition

```
 ************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                           Analysis prepared by:

                           HUNSAKER & ASSOCIATES
                                Irvine,Inc
                        Planning * Engineering * Surveying
                 Three Hughes * Irvine, California 92618 * (949)583-1010

  ************************* DESCRIPTION OF STUDY *************************
 * Hydrology Study for Nakase Nursery                                   *
 * City of Lake Forest                                                  *
 * Existing Condition - 2-year Storm                                    *
  ************************************************************************

   FILE NAME: LFE-2.DAT
   TIME/DATE OF STUDY: 13:47 10/27/2017
 ========================================================================
   USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
 ========================================================================
                      --*TIME-OF-CONCENTRATION MODEL*--

   USER SPECIFIED STORM EVENT(YEAR) =    2.00
   SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
   SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
   *DATA BANK RAINFALL USED*
   *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

   *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
      HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
      WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
 NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
 ===  =====  =========  =================  ======  ===== ====== ===== =======
   1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 FEET
        as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
     2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
   *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
    OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
   *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

 ************************************************************************
   FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
 ------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ========================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
   ELEVATION DATA: UPSTREAM(FEET) =    743.00  DOWNSTREAM(FEET) =    730.00
   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.951
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.311
   SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
   NATURAL FAIR COVER
   "OPEN BRUSH"               B        0.49      0.30     1.000    46   12.95
   NATURAL FAIR COVER
   "OPEN BRUSH"               D        0.09      0.20     1.000    67   12.95
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =      0.54
   TOTAL AREA(ACRES) =      0.58   PEAK FLOW RATE(CFS) =      0.54

 ************************************************************************
   FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  51
 ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    730.00  DOWNSTREAM(FEET) =    724.50
   CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.0196
   CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.114
   SUBAREA LOSS RATE DATA(AMC  I ):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   NATURAL FAIR COVER
   "OPEN BRUSH"               B        0.81      0.30     1.000    46
   NATURAL FAIR COVER
   "OPEN BRUSH"               D        0.60      0.20     1.000    67
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.08
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.10
   AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   4.24
   Tc(MIN.) =   17.19
   SUBAREA AREA(ACRES) =     1.41     SUBAREA RUNOFF(CFS) =    1.09
   EFFECTIVE AREA(ACRES) =      1.99     AREA-AVERAGED Fm(INCH/HR) =   0.27
   AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        2.0         PEAK FLOW RATE(CFS) =       1.52

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   1.25
   LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     580.00 FEET.

 ************************************************************************
   FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  51
 ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    724.50  DOWNSTREAM(FEET) =    717.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   410.00   CHANNEL SLOPE =  0.0183
   CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
```

Onsite Hydrology at Existing 84” Node 15, Area B
(F19) Serrano Creek, Q_{100}=2350 cfs

2-Year Storm Existing Condition

```
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.974
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        2.26      0.30     1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        1.05      0.20     1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.57
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.51
 AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   4.53
 Tc(MIN.) =   21.72
 SUBAREA AREA(ACRES) =     3.31       SUBAREA RUNOFF(CFS) =    2.10
 EFFECTIVE AREA(ACRES) =      5.30     AREA-AVERAGED Fm(INCH/HR) =   0.27
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        5.3         PEAK FLOW RATE(CFS) =       3.37

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.20   FLOW VELOCITY(FEET/SEC.) =   1.66
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =     990.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    717.00  DOWNSTREAM(FEET) =    711.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   505.00   CHANNEL SLOPE =  0.0115
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.873
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        7.09      0.30     1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"               C        2.28      0.25     1.000    59
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        2.74      0.20     1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.69
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.84
 AVERAGE FLOW DEPTH(FEET) =   0.34   TRAVEL TIME(MIN.) =   4.58
 Tc(MIN.) =   26.30
 SUBAREA AREA(ACRES) =    12.11       SUBAREA RUNOFF(CFS) =    6.59
 EFFECTIVE AREA(ACRES) =     17.41     AREA-AVERAGED Fm(INCH/HR) =   0.27
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       17.4         PEAK FLOW RATE(CFS) =       9.48

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.42   FLOW VELOCITY(FEET/SEC.) =   2.10
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     14.00 =    1495.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    711.20  DOWNSTREAM(FEET) =    685.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1330.00   CHANNEL SLOPE =  0.0197
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   4.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.757
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        8.80      0.30     1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"               C        5.39      0.25     1.000    59
 NATURAL FAIR COVER
 "OPEN BRUSH"               D       11.80      0.20     1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.51
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.98
 AVERAGE FLOW DEPTH(FEET) =   0.48   TRAVEL TIME(MIN.) =   7.45
 Tc(MIN.) =   33.75
 SUBAREA AREA(ACRES) =    25.99       SUBAREA RUNOFF(CFS) =   11.98
 EFFECTIVE AREA(ACRES) =     43.40     AREA-AVERAGED Fm(INCH/HR) =   0.25
 AREA-AVERAGED Fp(INCH/HR) =   0.25  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       43.4         PEAK FLOW RATE(CFS) =      19.64

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.55   FLOW VELOCITY(FEET/SEC.) =   3.24
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =    2825.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       43.4  TC(MIN.) =     33.75
 EFFECTIVE AREA(ACRES) =      43.40  AREA-AVERAGED Fm(INCH/HR)=  0.25
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =      19.64
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

Onsite Hydrology at Existing 84” Node 15, Area B
(F19) Serrano Creek, Q_{100}=2350 cfs
2-Year Storm Existing Condition

```
 ************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                      Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY IN CITY OF LAKE FOREST                           *
* OFFSITE EXISTING CONDITION @ 2-YEAR STORM                             *
* W.O. #1443-136X                                                       *
 ************************************************************************

  FILE NAME: NAKASE02.DAT
  TIME/DATE OF STUDY: 14:01 07/19/2017
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1099.00  DOWNSTREAM(FEET) =   1091.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.370
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.684
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.78      0.25      0.600    50    8.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      1.08
  TOTAL AREA(ACRES) =      0.78   PEAK FLOW RATE(CFS) =      1.08

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1091.20  DOWNSTREAM ELEVATION(FEET) = 1089.40
  STREET LENGTH(FEET) =    90.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.69
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    9.52
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.89
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.87
  STREET FLOW TRAVEL TIME(MIN.) =   0.52   Tc(MIN.) =    8.89
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.627
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.38      0.25      0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    3.22
  EFFECTIVE AREA(ACRES) =      3.16    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =       4.25

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.55
  FLOW VELOCITY(FEET/SEC.) =  3.24   DEPTH*VELOCITY(FT*FT/SEC.) =   1.09
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) = 1089.40  DOWNSTREAM ELEVATION(FEET) = 1067.00
  STREET LENGTH(FEET) =   513.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.61
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =   10.13
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.45
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.38
  STREET FLOW TRAVEL TIME(MIN.) =   1.92   Tc(MIN.) =   10.81
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.454
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.34      0.25     0.100    50
  PUBLIC PARK                C        0.25      0.25     0.850    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.418
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    0.72
  EFFECTIVE AREA(ACRES) =      3.75    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =       4.48

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =  10.03
  FLOW VELOCITY(FEET/SEC.) =  4.40   DEPTH*VELOCITY(FT*FT/SEC.) =   1.36
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     903.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.81
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.454
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.35      0.25     0.100    50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.49      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.333
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    1.04
  EFFECTIVE AREA(ACRES) =      4.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.6       PEAK FLOW RATE(CFS) =       5.52

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1067.00  DOWNSTREAM(FEET) =  1062.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.46
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.52
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   10.97
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1003.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.97
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.442
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.09      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.09      SUBAREA RUNOFF(CFS) =    2.48
  EFFECTIVE AREA(ACRES) =      6.68   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        6.7       PEAK FLOW RATE(CFS) =       7.94

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1062.00  DOWNSTREAM(FEET) =  1022.40
  FLOW LENGTH(FEET) =   701.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.08
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.94
  PIPE TRAVEL TIME(MIN.) =   0.97    Tc(MIN.) =   11.94
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1704.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.94
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.374
```

```
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.18      0.30      0.100    36
  COMMERCIAL                  C        0.46      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.64      SUBAREA RUNOFF(CFS) =     0.78
  EFFECTIVE AREA(ACRES) =      7.32   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        7.3       PEAK FLOW RATE(CFS) =       8.31

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.40  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.10
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.31
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   12.26
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.26
  RAINFALL INTENSITY(INCH/HR) =   1.35
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       7.32
  TOTAL STREAM AREA(ACRES) =       7.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.31

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   305.00
  ELEVATION DATA: UPSTREAM(FEET) =   1046.00  DOWNSTREAM(FEET) =   1042.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.129
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.847
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  C        1.00      0.25      0.100    50    7.13
  RESIDENTIAL
  ".4 DWELLING/ACRE"          C        0.50      0.25      0.900    50   11.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
  SUBAREA RUNOFF(CFS) =      2.37
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      2.37

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1042.00  DOWNSTREAM ELEVATION(FEET) = 1036.00
  STREET LENGTH(FEET) =   373.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.52
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    9.21
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.57
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.76
  STREET FLOW TRAVEL TIME(MIN.) =   2.42   Tc(MIN.) =    9.55
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.562
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        3.31      0.25      0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     3.31      SUBAREA RUNOFF(CFS) =     4.28
  EFFECTIVE AREA(ACRES) =      4.81    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =        4.8       PEAK FLOW RATE(CFS) =       6.26

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =  10.64
  FLOW VELOCITY(FEET/SEC.) =  2.77   DEPTH*VELOCITY(FT*FT/SEC.) =   0.88
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     678.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1036.00  DOWNSTREAM ELEVATION(FEET) = 1026.00
```

```
 STREET LENGTH(FEET) =   463.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.61
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.32
   HALFSTREET FLOOD WIDTH(FEET) =   10.84
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.25
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.05
 STREET FLOW TRAVEL TIME(MIN.) =   2.37   Tc(MIN.) =   11.92
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.375
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        2.40      0.25     0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    2.70
 EFFECTIVE AREA(ACRES) =      7.21    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =       8.16

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  11.25
 FLOW VELOCITY(FEET/SEC.) =  3.26   DEPTH*VELOCITY(FT*FT/SEC.) =   1.08
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1141.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.92
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.375
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.16      0.30     0.500    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        2.22      0.25     0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    2.67
 EFFECTIVE AREA(ACRES) =      9.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =        9.6       PEAK FLOW RATE(CFS) =      10.83

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1026.00  DOWNSTREAM(FEET) =  1022.00
 FLOW LENGTH(FEET) =   395.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.84
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.83
 PIPE TRAVEL TIME(MIN.) =   0.96    Tc(MIN.) =   12.88
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1536.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.88
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.315
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.07      0.30     0.500    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        4.06      0.25     0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    4.13      SUBAREA RUNOFF(CFS) =    4.42
 EFFECTIVE AREA(ACRES) =     13.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
 TOTAL AREA(ACRES) =       13.7       PEAK FLOW RATE(CFS) =      14.73

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1022.00  DOWNSTREAM(FEET) =  1020.00
 FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.68
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      14.73
 PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   13.13
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1663.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.13
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.301
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
```

```
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.55      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.06      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     2.61      SUBAREA RUNOFF(CFS) =     2.75
  EFFECTIVE AREA(ACRES) =     16.33   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      17.31

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1020.00  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.10
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.31
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   13.57
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    1799.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.57
  RAINFALL INTENSITY(INCH/HR) =   1.28
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =      16.33
  TOTAL STREAM AREA(ACRES) =      16.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      17.31

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        8.31   12.26    1.353  0.25( 0.11) 0.45       7.3       1.00
      2       17.31   13.57    1.276  0.25( 0.12) 0.49      16.3       8.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       24.98   12.26    1.353  0.25( 0.12) 0.48      22.1       1.00
      2       25.10   13.57    1.276  0.25( 0.12) 0.48      23.6       8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      25.10    Tc(MIN.) =    13.57
  EFFECTIVE AREA(ACRES) =      23.65   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       23.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1019.50  DOWNSTREAM(FEET) =  1014.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.30
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.10
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   13.77
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.10 =    2014.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.77
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.266
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.15      0.30     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.15      SUBAREA RUNOFF(CFS) =     0.17
  EFFECTIVE AREA(ACRES) =     23.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       23.8       PEAK FLOW RATE(CFS) =      25.10
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.77
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.266
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.16      0.30     0.100    36
  COMMERCIAL                 C        1.44      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     1.79
  EFFECTIVE AREA(ACRES) =     25.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       25.4       PEAK FLOW RATE(CFS) =      26.34
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1014.00  DOWNSTREAM(FEET) =   971.40
  FLOW LENGTH(FEET) =   863.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.38
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.34
  PIPE TRAVEL TIME(MIN.) =   0.93    Tc(MIN.) =   14.70
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    2877.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.70
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.219
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.82      0.30     0.100    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.77      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.294
  SUBAREA AREA(ACRES) =    1.59      SUBAREA RUNOFF(CFS) =    1.64
  EFFECTIVE AREA(ACRES) =     26.99   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       27.0       PEAK FLOW RATE(CFS) =      26.91

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   971.40  DOWNSTREAM(FEET) =   969.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.71
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.91
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   14.74
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    2917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.74
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.217
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        2.46      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C       10.48      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   12.94      SUBAREA RUNOFF(CFS) =   12.66
  EFFECTIVE AREA(ACRES) =     39.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       39.9       PEAK FLOW RATE(CFS) =      39.52

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       40.28   13.43    1.284  0.25( 0.12) 0.46      38.3       1.00
      2       39.52   14.74    1.217  0.25( 0.12) 0.46      39.9       8.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      40.28  Tc(MIN.) =   13.43
  AREA-AVERAGED Fm(INCH/HR) =  0.12  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.46  EFFECTIVE AREA(ACRES) =      38.35

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   969.00  DOWNSTREAM(FEET) =   954.00
  FLOW LENGTH(FEET) =   416.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.79
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      40.28
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   13.90
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    3333.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.90
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.259
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.77      0.25     0.100    50
  PUBLIC PARK                C        0.43      0.25     0.850    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.369
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    1.26
  EFFECTIVE AREA(ACRES) =     39.55   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       41.1       PEAK FLOW RATE(CFS) =      40.68

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
```

```
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   954.00  DOWNSTREAM(FEET) =   952.80
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.41
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      40.68
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   14.11
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    3453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   14.11
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.248
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.88      0.30     0.400    36
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        7.02      0.25     0.400    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    7.90      SUBAREA RUNOFF(CFS) =    8.15
  EFFECTIVE AREA(ACRES) =     47.45   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       49.0       PEAK FLOW RATE(CFS) =      48.43

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.10 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   952.80  DOWNSTREAM(FEET) =   929.00
  FLOW LENGTH(FEET) =   636.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.05
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      48.43
  PIPE TRAVEL TIME(MIN.) =   0.66    Tc(MIN.) =   14.77
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.10 =    4089.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     17.10 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   14.77
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.216
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.68      0.30     0.500    36
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"        C        0.89      0.25     0.600    50
  COMMERCIAL                  C        1.86      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.309
  SUBAREA AREA(ACRES) =    3.43      SUBAREA RUNOFF(CFS) =    3.50
  EFFECTIVE AREA(ACRES) =     50.88   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       52.5       PEAK FLOW RATE(CFS) =      50.55

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     18.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   929.00  DOWNSTREAM(FEET) =   926.30
  FLOW LENGTH(FEET) =   122.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.29
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      50.55
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   14.92
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     18.00 =    4211.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   14.92
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.209
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS                B       24.46      0.30     0.350    36
  CONDOMINIUMS                C        7.92      0.25     0.350    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =   32.38      SUBAREA RUNOFF(CFS) =   32.28
  EFFECTIVE AREA(ACRES) =     83.26   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       84.8       PEAK FLOW RATE(CFS) =      82.51

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   926.30  DOWNSTREAM(FEET) =   922.70
  FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.62
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      82.51
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   15.12
```

```
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     19.00 =    4384.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.12
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.199
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        1.62      0.30     0.400    36
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       C        6.09      0.25     0.400    50
 COMMERCIAL                  B        2.90      0.30     0.100    36
 COMMERCIAL                  C        3.15      0.25     0.100    50
 NATURAL POOR COVER
 "GRASS"                     B        0.76      0.30     1.000    61
 NATURAL POOR COVER
 "GRASS"                     C        0.39      0.25     1.000    72
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
 SUBAREA AREA(ACRES) =   14.91      SUBAREA RUNOFF(CFS) =   14.93
 EFFECTIVE AREA(ACRES) =     98.17   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.39
 TOTAL AREA(ACRES) =       99.8       PEAK FLOW RATE(CFS) =      96.76

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   922.70  DOWNSTREAM(FEET) =   815.60
 FLOW LENGTH(FEET) =  1580.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  23.49
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      96.76
 PIPE TRAVEL TIME(MIN.) =   1.12    Tc(MIN.) =   16.24
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     20.00 =    5964.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.24
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.151
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B       19.45      0.30     0.100    36
 COMMERCIAL                  C       16.92      0.25     0.100    50
 COMMERCIAL                  D        0.11      0.20     0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =   36.48      SUBAREA RUNOFF(CFS) =   36.89
 EFFECTIVE AREA(ACRES) =    134.65   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =      136.2       PEAK FLOW RATE(CFS) =     129.38

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   815.60  DOWNSTREAM(FEET) =   799.50
 FLOW LENGTH(FEET) =   449.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.15
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     129.38
 PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   16.61
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6413.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.61
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.136
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        2.38      0.30     0.100    36
 COMMERCIAL                  C        0.87      0.25     0.100    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    3.24
 EFFECTIVE AREA(ACRES) =    137.90   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =      139.5       PEAK FLOW RATE(CFS) =     130.82

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.61
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.136
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        4.10      0.30     0.100    36
 COMMERCIAL                  C        1.54      0.25     0.100    50
 COMMERCIAL                  D        2.08      0.20     0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    7.72      SUBAREA RUNOFF(CFS) =    7.71
 EFFECTIVE AREA(ACRES) =    145.62   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.30
 TOTAL AREA(ACRES) =      147.2       PEAK FLOW RATE(CFS) =     138.54
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   799.50  DOWNSTREAM(FEET) =   765.50
  FLOW LENGTH(FEET) =  1056.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.31
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     138.54
  PIPE TRAVEL TIME(MIN.) =   0.91    Tc(MIN.) =   17.52
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     22.00 =    7469.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.52
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.102
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.06      0.30     0.100    36
  COMMERCIAL                 C        1.74      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    3.80      SUBAREA RUNOFF(CFS) =    3.67
  EFFECTIVE AREA(ACRES) =    149.42   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      151.0       PEAK FLOW RATE(CFS) =     138.54
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.52
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.102
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.23      0.30     0.100    36
  COMMERCIAL                 D        5.07      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    5.30      SUBAREA RUNOFF(CFS) =    5.16
  EFFECTIVE AREA(ACRES) =    154.72   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =      156.3       PEAK FLOW RATE(CFS) =     142.87

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   765.50  DOWNSTREAM(FEET) =   755.00
  FLOW LENGTH(FEET) =   465.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  34.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.99
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     142.87
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   17.98
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     23.00 =    7934.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.98
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.086
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        9.15      0.30     0.100    36
  COMMERCIAL                 C       10.79      0.25     0.100    50
  COMMERCIAL                 D        1.81      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   21.75      SUBAREA RUNOFF(CFS) =   20.73
  EFFECTIVE AREA(ACRES) =    176.47   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =      178.1       PEAK FLOW RATE(CFS) =     161.36

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.98
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.086
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        7.47      0.30     0.100    36
  COMMERCIAL                 C        0.40      0.25     0.100    50
  COMMERCIAL                 D       17.76      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   25.63      SUBAREA RUNOFF(CFS) =   24.52
  EFFECTIVE AREA(ACRES) =    202.10   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      203.7       PEAK FLOW RATE(CFS) =     185.88

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   755.00  DOWNSTREAM(FEET) =   736.00
  FLOW LENGTH(FEET) =  1257.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  39.4 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.79
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     185.88
  PIPE TRAVEL TIME(MIN.) =   1.33    Tc(MIN.) =   19.31
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.00 =    9191.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.31
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.042
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B       16.13      0.30     0.100    36
  COMMERCIAL                 C        3.87      0.25     0.100    50
  COMMERCIAL                 D        4.22      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   24.22      SUBAREA RUNOFF(CFS) =   22.12
  EFFECTIVE AREA(ACRES) =    226.32   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      227.9       PEAK FLOW RATE(CFS) =     200.10
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      227.9  TC(MIN.) =     19.31
  EFFECTIVE AREA(ACRES) =    226.32  AREA-AVERAGED Fm(INCH/HR)=  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap = 0.226
  PEAK FLOW RATE(CFS)   =     200.10

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      200.10   19.31    1.042  0.27( 0.06) 0.23     226.3       1.00
      2      193.37   20.64    1.003  0.27( 0.06) 0.23     227.9       8.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY IN CITY OF LAKE FOREST                             *
* OFFSITE & ONSITE EXISTING CONDITION @ 2-YEAR STORM                      *
* W.O. #1443-136X                                                         *
 ************************************************************************

  FILE NAME: EXIST02.DAT
  TIME/DATE OF STUDY: 17:05 10/05/2017
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1099.00  DOWNSTREAM(FEET) =   1091.20
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.370
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.684
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.78      0.25     0.600    50    8.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      1.08
  TOTAL AREA(ACRES) =      0.78   PEAK FLOW RATE(CFS) =      1.08

************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 1091.20  DOWNSTREAM ELEVATION(FEET) = 1089.40
  STREET LENGTH(FEET) =    90.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.69
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    9.52
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.89
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.87
  STREET FLOW TRAVEL TIME(MIN.) =   0.52   Tc(MIN.) =    8.89
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.627
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.38      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    3.22
  EFFECTIVE AREA(ACRES) =      3.16    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =       4.25

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.55
  FLOW VELOCITY(FEET/SEC.) =  3.24   DEPTH*VELOCITY(FT*FT/SEC.) =   1.09
```

```
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     390.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1089.40  DOWNSTREAM ELEVATION(FEET) = 1067.00
 STREET LENGTH(FEET) =   513.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.61
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.31
   HALFSTREET FLOOD WIDTH(FEET) =   10.13
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.45
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.38
 STREET FLOW TRAVEL TIME(MIN.) =   1.92   Tc(MIN.) =   10.81
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.454
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                C        0.34      0.25     0.100    50
 PUBLIC PARK               C        0.25      0.25     0.850    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.418
 SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    0.72
 EFFECTIVE AREA(ACRES) =      3.75    AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.51
 TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =       4.48

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =  10.03
 FLOW VELOCITY(FEET/SEC.) =  4.40   DEPTH*VELOCITY(FT*FT/SEC.) =   1.36
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     903.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.81
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.454
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                C        0.35      0.25     0.100    50
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"      C        0.49      0.25     0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.333
 SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    1.04
 EFFECTIVE AREA(ACRES) =      4.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =       5.52

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1067.00  DOWNSTREAM(FEET) =  1062.00
 FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.46
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.52
 PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   10.97
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1003.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.97
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.442
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"      C        2.09      0.25     0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.09      SUBAREA RUNOFF(CFS) =    2.48
 EFFECTIVE AREA(ACRES) =      6.68   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =        6.7        PEAK FLOW RATE(CFS) =       7.94

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1062.00  DOWNSTREAM(FEET) =  1022.40
 FLOW LENGTH(FEET) =   701.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.08
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.94
  PIPE TRAVEL TIME(MIN.) =   0.97    Tc(MIN.) =   11.94
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1704.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.94
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.374
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.18      0.30      0.100    36
  COMMERCIAL                 C        0.46      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.64      SUBAREA RUNOFF(CFS) =     0.78
  EFFECTIVE AREA(ACRES) =      7.32   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        7.3       PEAK FLOW RATE(CFS) =       8.31

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.40  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.10
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.31
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   12.26
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.26
  RAINFALL INTENSITY(INCH/HR) =   1.35
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       7.32
  TOTAL STREAM AREA(ACRES) =       7.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.31

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   305.00
  ELEVATION DATA: UPSTREAM(FEET) =   1046.00  DOWNSTREAM(FEET) =   1042.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.129
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.847
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 C        1.00      0.25      0.100    50    7.13
  RESIDENTIAL
  ".4 DWELLING/ACRE"         C        0.50      0.25      0.900    50   11.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
  SUBAREA RUNOFF(CFS) =      2.37
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      2.37

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1042.00  DOWNSTREAM ELEVATION(FEET) = 1036.00
  STREET LENGTH(FEET) =   373.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.52
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    9.21
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.57
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.76
  STREET FLOW TRAVEL TIME(MIN.) =   2.42   Tc(MIN.) =    9.55
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.562
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        3.31      0.25      0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
```

```
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    3.31      SUBAREA RUNOFF(CFS) =    4.28
 EFFECTIVE AREA(ACRES) =      4.81    AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =        4.8        PEAK FLOW RATE(CFS) =       6.26

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =  10.64
 FLOW VELOCITY(FEET/SEC.) =  2.77   DEPTH*VELOCITY(FT*FT/SEC.) =   0.88
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     678.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1036.00  DOWNSTREAM ELEVATION(FEET) = 1026.00
 STREET LENGTH(FEET) =   463.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.61
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.32
   HALFSTREET FLOOD WIDTH(FEET) =   10.84
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.25
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.05
 STREET FLOW TRAVEL TIME(MIN.) =   2.37   Tc(MIN.) =   11.92
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.375
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        2.40      0.25      0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    2.70
 EFFECTIVE AREA(ACRES) =      7.21    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =       8.16

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  11.25
 FLOW VELOCITY(FEET/SEC.) =  3.26   DEPTH*VELOCITY(FT*FT/SEC.) =   1.08
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1141.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.92
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.375
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.16      0.30      0.500    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        2.22      0.25      0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    2.67
 EFFECTIVE AREA(ACRES) =      9.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =        9.6        PEAK FLOW RATE(CFS) =      10.83

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1026.00  DOWNSTREAM(FEET) =  1022.00
 FLOW LENGTH(FEET) =   395.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.84
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.83
 PIPE TRAVEL TIME(MIN.) =   0.96    Tc(MIN.) =   12.88
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1536.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.88
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.315
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.07      0.30      0.500    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        4.06      0.25      0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    4.13      SUBAREA RUNOFF(CFS) =    4.42
 EFFECTIVE AREA(ACRES) =     13.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
 TOTAL AREA(ACRES) =       13.7       PEAK FLOW RATE(CFS) =      14.73
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.00  DOWNSTREAM(FEET) =  1020.00
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.68
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.73
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   13.13
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.13
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.301
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.55      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        2.06      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.61      SUBAREA RUNOFF(CFS) =    2.75
  EFFECTIVE AREA(ACRES) =     16.33   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      17.31

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1020.00  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.10
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.31
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   13.57
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    1799.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.57
  RAINFALL INTENSITY(INCH/HR) =   1.28
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =      16.33
  TOTAL STREAM AREA(ACRES) =      16.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      17.31

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        8.31   12.26    1.353  0.25( 0.11) 0.45       7.3        1.00
      2       17.31   13.57    1.276  0.25( 0.12) 0.49      16.3        8.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       24.98   12.26    1.353  0.25( 0.12) 0.48      22.1        1.00
      2       25.10   13.57    1.276  0.25( 0.12) 0.48      23.6        8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      25.10    Tc(MIN.) =    13.57
  EFFECTIVE AREA(ACRES) =      23.65   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       23.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1019.50  DOWNSTREAM(FEET) =  1014.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.30
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.10
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   13.77
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.10 =    2014.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.77
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.266
```

```
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.15      0.30      0.100    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.15      SUBAREA RUNOFF(CFS) =     0.17
 EFFECTIVE AREA(ACRES) =     23.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =       23.8       PEAK FLOW RATE(CFS) =      25.10
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.77
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.266
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.16      0.30      0.100    36
 COMMERCIAL                  C        1.44      0.25      0.100    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     1.79
 EFFECTIVE AREA(ACRES) =     25.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
 TOTAL AREA(ACRES) =       25.4       PEAK FLOW RATE(CFS) =      26.34

****************************************************************************
 FLOW PROCESS FROM NODE      7.10 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1014.00  DOWNSTREAM(FEET) =   971.40
 FLOW LENGTH(FEET) =   863.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.38
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      26.34
 PIPE TRAVEL TIME(MIN.) =   0.93    Tc(MIN.) =   14.70
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    2877.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.70
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.219
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.82      0.30      0.100    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C        0.77      0.25      0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.294
 SUBAREA AREA(ACRES) =     1.59      SUBAREA RUNOFF(CFS) =     1.64
 EFFECTIVE AREA(ACRES) =     26.99   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
 TOTAL AREA(ACRES) =       27.0       PEAK FLOW RATE(CFS) =      26.91

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   971.40  DOWNSTREAM(FEET) =   969.00
 FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.71
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      26.91
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   14.74
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    2917.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.74
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.217
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        2.46      0.30      0.500    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C       10.48      0.25      0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    12.94      SUBAREA RUNOFF(CFS) =    12.66
 EFFECTIVE AREA(ACRES) =     39.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =       39.9       PEAK FLOW RATE(CFS) =      39.52

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       40.28   13.43    1.284  0.25( 0.12) 0.46      38.3       1.00
     2       39.52   14.74    1.217  0.25( 0.12) 0.46      39.9       8.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      40.28  Tc(MIN.) =   13.43
 AREA-AVERAGED Fm(INCH/HR) =  0.12  AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.46  EFFECTIVE AREA(ACRES) =      38.35
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   969.00  DOWNSTREAM(FEET) =   954.00
  FLOW LENGTH(FEET) =   416.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.79
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      40.28
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   13.90
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    3333.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.90
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.259
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                C        0.77      0.25     0.100    50
  PUBLIC PARK               C        0.43      0.25     0.850    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.369
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    1.26
  EFFECTIVE AREA(ACRES) =     39.55   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       41.1       PEAK FLOW RATE(CFS) =      40.68

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   954.00  DOWNSTREAM(FEET) =   952.80
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.41
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      40.68
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   14.11
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    3453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.11
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.248
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.88      0.30     0.400    36
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        7.02      0.25     0.400    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    7.90      SUBAREA RUNOFF(CFS) =    8.15
  EFFECTIVE AREA(ACRES) =     47.45   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       49.0       PEAK FLOW RATE(CFS) =      48.43

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   952.80  DOWNSTREAM(FEET) =   929.00
  FLOW LENGTH(FEET) =   636.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.05
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      48.43
  PIPE TRAVEL TIME(MIN.) =   0.66    Tc(MIN.) =   14.77
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.10 =    4089.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     17.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.77
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.216
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.68      0.30     0.500    36
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.89      0.25     0.600    50
  COMMERCIAL                 C        1.86      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.309
  SUBAREA AREA(ACRES) =    3.43      SUBAREA RUNOFF(CFS) =    3.50
  EFFECTIVE AREA(ACRES) =     50.88   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       52.5       PEAK FLOW RATE(CFS) =      50.55

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   929.00  DOWNSTREAM(FEET) =   926.30
  FLOW LENGTH(FEET) =   122.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.29
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      50.55
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   14.92
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     18.00 =    4211.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   14.92
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.209
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS               B       24.46      0.30     0.350    36
  CONDOMINIUMS               C        7.92      0.25     0.350    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =   32.38      SUBAREA RUNOFF(CFS) =   32.28
  EFFECTIVE AREA(ACRES) =     83.26   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       84.8       PEAK FLOW RATE(CFS) =      82.51

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   926.30  DOWNSTREAM(FEET) =   922.70
  FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.62
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      82.51
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   15.12
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     19.00 =    4384.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   15.12
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.199
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        1.62      0.30     0.400    36
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        6.09      0.25     0.400    50
  COMMERCIAL                 B        2.90      0.30     0.100    36
  COMMERCIAL                 C        3.15      0.25     0.100    50
  NATURAL POOR COVER
  "GRASS"                    B        0.76      0.30     1.000    61
  NATURAL POOR COVER
  "GRASS"                    C        0.39      0.25     1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
  SUBAREA AREA(ACRES) =   14.91      SUBAREA RUNOFF(CFS) =   14.93
  EFFECTIVE AREA(ACRES) =     98.17   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =       99.8       PEAK FLOW RATE(CFS) =      96.76

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   922.70  DOWNSTREAM(FEET) =   815.60
  FLOW LENGTH(FEET) =  1580.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.49
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      96.76
  PIPE TRAVEL TIME(MIN.) =   1.12    Tc(MIN.) =   16.24
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     20.00 =    5964.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   16.24
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.151
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B       19.45      0.30     0.100    36
  COMMERCIAL                 C       16.92      0.25     0.100    50
  COMMERCIAL                 D        0.11      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   36.48      SUBAREA RUNOFF(CFS) =   36.89
  EFFECTIVE AREA(ACRES) =    134.65   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      136.2       PEAK FLOW RATE(CFS) =     129.38

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   815.60  DOWNSTREAM(FEET) =   799.50
  FLOW LENGTH(FEET) =   449.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.15
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     129.38
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   16.61
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6413.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.136
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.38      0.30     0.100    36
  COMMERCIAL                 C        0.87      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    3.24
  EFFECTIVE AREA(ACRES) =    137.90   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      139.5       PEAK FLOW RATE(CFS) =     130.82

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.136
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        4.10      0.30     0.100    36
  COMMERCIAL                 C        1.54      0.25     0.100    50
  COMMERCIAL                 D        2.08      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    7.72      SUBAREA RUNOFF(CFS) =    7.71
  EFFECTIVE AREA(ACRES) =    145.62   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      147.2       PEAK FLOW RATE(CFS) =     138.54

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   799.50  DOWNSTREAM(FEET) =   765.50
  FLOW LENGTH(FEET) =  1056.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.31
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     138.54
  PIPE TRAVEL TIME(MIN.) =   0.91    Tc(MIN.) =   17.52
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     22.00 =    7469.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.52
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.102
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.06      0.30     0.100    36
  COMMERCIAL                 C        1.74      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    3.80      SUBAREA RUNOFF(CFS) =    3.67
  EFFECTIVE AREA(ACRES) =    149.42   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      151.0       PEAK FLOW RATE(CFS) =     138.54
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.52
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.102
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.23      0.30     0.100    36
  COMMERCIAL                 D        5.07      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    5.30      SUBAREA RUNOFF(CFS) =    5.16
  EFFECTIVE AREA(ACRES) =    154.72   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =      156.3       PEAK FLOW RATE(CFS) =     142.87

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   765.50  DOWNSTREAM(FEET) =   755.00
  FLOW LENGTH(FEET) =   465.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  34.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.99
```

```
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     142.87
 PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   17.98
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     23.00 =    7934.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.98
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.086
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        9.15      0.30      0.100    36
 COMMERCIAL                 C       10.79      0.25      0.100    50
 COMMERCIAL                 D        1.81      0.20      0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =   21.75      SUBAREA RUNOFF(CFS) =   20.73
 EFFECTIVE AREA(ACRES) =    176.47   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.26
 TOTAL AREA(ACRES) =      178.1       PEAK FLOW RATE(CFS) =     161.36

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.98
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.086
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        7.47      0.30      0.100    36
 COMMERCIAL                 C        0.40      0.25      0.100    50
 COMMERCIAL                 D       17.76      0.20      0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =   25.63      SUBAREA RUNOFF(CFS) =   24.52
 EFFECTIVE AREA(ACRES) =    202.10   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.24
 TOTAL AREA(ACRES) =      203.7       PEAK FLOW RATE(CFS) =     185.88

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   755.00  DOWNSTREAM(FEET) =   736.00
 FLOW LENGTH(FEET) =  1257.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  39.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.79
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     185.88
 PIPE TRAVEL TIME(MIN.) =   1.33    Tc(MIN.) =   19.31
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.00 =    9191.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.31
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.042
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B       16.13      0.30      0.100    36
 COMMERCIAL                 C        3.87      0.25      0.100    50
 COMMERCIAL                 D        4.22      0.20      0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =   24.22      SUBAREA RUNOFF(CFS) =   22.12
 EFFECTIVE AREA(ACRES) =    226.32   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
 TOTAL AREA(ACRES) =      227.9       PEAK FLOW RATE(CFS) =     200.10

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     24.10 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   718.60  DOWNSTREAM(FEET) =   718.20
 FLOW LENGTH(FEET) =   110.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  84.0 INCH PIPE IS  44.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.71
 GIVEN PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     200.10
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   19.49
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.10 =    9301.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.10 TO NODE     24.20 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    718.20  DOWNSTREAM(FEET) =    709.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   898.00   CHANNEL SLOPE =  0.0102
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     200.10
 FLOW VELOCITY(FEET/SEC.) =   5.45   FLOW DEPTH(FEET) =   2.46
 TRAVEL TIME(MIN.) =   2.74   Tc(MIN.) =   22.24
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.20 =   10199.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.20 TO NODE     24.20 IS CODE =   1
```

```
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   22.24
  RAINFALL INTENSITY(INCH/HR) =   0.96
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.23
  EFFECTIVE STREAM AREA(ACRES) =     226.32
  TOTAL STREAM AREA(ACRES) =     227.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     200.10

****************************************************************************
  FLOW PROCESS FROM NODE     10.10 TO NODE     21.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    743.00  DOWNSTREAM(FEET) =    731.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.160
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.299
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        0.41      0.30     1.000    46   13.16
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.24      0.20     1.000    67   13.16
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.61
  TOTAL AREA(ACRES) =      0.65   PEAK FLOW RATE(CFS) =      0.61

****************************************************************************
  FLOW PROCESS FROM NODE     21.10 TO NODE     22.10 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    731.00  DOWNSTREAM(FEET) =    725.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.0196
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.120
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        1.19      0.30     1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.78      0.20     1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.37
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.20
  AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   3.88
  Tc(MIN.) =   17.04
  SUBAREA AREA(ACRES) =     1.97     SUBAREA RUNOFF(CFS) =    1.52
  EFFECTIVE AREA(ACRES) =      2.62     AREA-AVERAGED Fm(INCH/HR) =   0.26
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        2.6          PEAK FLOW RATE(CFS) =       2.03

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.14   FLOW VELOCITY(FEET/SEC.) =   1.39
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     22.10 =     580.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.10 TO NODE     23.10 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    725.50  DOWNSTREAM(FEET) =    720.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   415.00   CHANNEL SLOPE =  0.0133
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.964
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        1.80      0.30     1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.15      0.20     1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.62
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.36
  AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   5.10
  Tc(MIN.) =   22.14
  SUBAREA AREA(ACRES) =     1.95     SUBAREA RUNOFF(CFS) =    1.18
  EFFECTIVE AREA(ACRES) =      4.57     AREA-AVERAGED Fm(INCH/HR) =   0.27
  AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        4.6          PEAK FLOW RATE(CFS) =       2.84

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.20   FLOW VELOCITY(FEET/SEC.) =   1.40
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     23.10 =     995.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.10 TO NODE     24.20 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    720.00  DOWNSTREAM(FEET) =    709.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   670.00   CHANNEL SLOPE =  0.0164
```

```
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.847
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B       10.16      0.30     1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.80      0.25     1.000    59
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.80      0.20     1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.10
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.01
 AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   5.56
 Tc(MIN.) =   27.70
 SUBAREA AREA(ACRES) =    12.76       SUBAREA RUNOFF(CFS) =    6.48
 EFFECTIVE AREA(ACRES) =     17.33     AREA-AVERAGED Fm(INCH/HR) =   0.28
 AREA-AVERAGED Fp(INCH/HR) =   0.28  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       17.3          PEAK FLOW RATE(CFS) =       8.84

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.36   FLOW VELOCITY(FEET/SEC.) =   2.28
 LONGEST FLOWPATH FROM NODE     10.10 TO NODE     24.20 =    1665.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.20 TO NODE     24.20 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   27.70
 RAINFALL INTENSITY(INCH/HR) =   0.85
 AREA-AVERAGED Fm(INCH/HR) =  0.28
 AREA-AVERAGED Fp(INCH/HR) =  0.28
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      17.33
 TOTAL STREAM AREA(ACRES) =      17.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.84

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      200.10   22.24    0.961  0.27( 0.06) 0.23     226.3       1.00
     1      193.37   23.60    0.929  0.27( 0.06) 0.23     227.9       8.00
     2        8.84   27.70    0.847  0.28( 0.28) 1.00      17.3      10.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      208.62   22.24    0.961  0.27( 0.07) 0.27     240.2       1.00
     2      201.99   23.60    0.929  0.27( 0.07) 0.28     242.7       8.00
     3      184.04   27.70    0.847  0.27( 0.08) 0.28     245.2      10.10

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     208.62    Tc(MIN.) =    22.24
 EFFECTIVE AREA(ACRES) =     240.23   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
 TOTAL AREA(ACRES) =      245.2
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.20 =   10199.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.20 TO NODE     25.10 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    709.00  DOWNSTREAM(FEET) =    704.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   480.00   CHANNEL SLOPE =  0.0104
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.927
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B       14.00      0.30     1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.90      0.25     1.000    59
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        4.04      0.20     1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     214.17
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.60
 AVERAGE FLOW DEPTH(FEET) =   2.54   TRAVEL TIME(MIN.) =   1.43
 Tc(MIN.) =   23.67
 SUBAREA AREA(ACRES) =    18.94       SUBAREA RUNOFF(CFS) =   11.10
 EFFECTIVE AREA(ACRES) =    259.17     AREA-AVERAGED Fm(INCH/HR) =   0.09
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   0.32
 TOTAL AREA(ACRES) =      264.2          PEAK FLOW RATE(CFS) =     208.62
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  2.51   FLOW VELOCITY(FEET/SEC.) =   5.55
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     25.10 =   10679.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.10 TO NODE     26.10 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    704.00  DOWNSTREAM(FEET) =    684.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   975.00   CHANNEL SLOPE =  0.0200
```

```
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.879
 SUBAREA LOSS RATE DATA(AMC   I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        8.10      0.30     1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        4.10      0.25     1.000    59
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        9.40      0.20     1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     214.77
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.06
 AVERAGE FLOW DEPTH(FEET) =   2.13   TRAVEL TIME(MIN.) =   2.30
 Tc(MIN.) =   25.97
 SUBAREA AREA(ACRES) =    21.60       SUBAREA RUNOFF(CFS) =   12.29
 EFFECTIVE AREA(ACRES) =    280.77     AREA-AVERAGED Fm(INCH/HR) =   0.10
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   0.38
 TOTAL AREA(ACRES) =      285.8         PEAK FLOW RATE(CFS) =     208.62
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  2.10   FLOW VELOCITY(FEET/SEC.) =   6.99
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     26.10 =   11654.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     26.10 TO NODE     61.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    684.50  DOWNSTREAM(FEET) =    675.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   660.00   CHANNEL SLOPE =  0.0141
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.847
 SUBAREA LOSS RATE DATA(AMC   I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        6.00      0.30     1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        6.10      0.25     1.000    59
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        6.58      0.20     1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     213.65
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.23
 AVERAGE FLOW DEPTH(FEET) =   2.34   TRAVEL TIME(MIN.) =   1.77
 Tc(MIN.) =   27.74
 SUBAREA AREA(ACRES) =    18.68       SUBAREA RUNOFF(CFS) =   10.06
 EFFECTIVE AREA(ACRES) =    299.45     AREA-AVERAGED Fm(INCH/HR) =   0.11
 AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   0.42
 TOTAL AREA(ACRES) =      304.5         PEAK FLOW RATE(CFS) =     208.62
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  2.31   FLOW VELOCITY(FEET/SEC.) =   6.18
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     61.00 =   12314.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =      304.5  TC(MIN.) =     27.74
 EFFECTIVE AREA(ACRES) =    299.45  AREA-AVERAGED Fm(INCH/HR)=  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap = 0.415
 PEAK FLOW RATE(CFS)   =     208.62

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      208.62   27.74    0.847  0.26( 0.11) 0.42     299.5       1.00
     2      201.99   29.15    0.823  0.26( 0.11) 0.42     301.9       8.00
     3      184.04   33.40    0.761  0.26( 0.11) 0.42     304.5      10.10
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY IN CITY OF LAKE FOREST                           *
* ONSITE AREA "A" EXISTING CONDITION @ 25-YEAR STORM                    *
* W.O. #1443-136X                                                       *
 ************************************************************************

  FILE NAME: EX25-A.DAT
  TIME/DATE OF STUDY: 17:53 06/26/2018
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE     10.10 TO NODE     21.10 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    743.00  DOWNSTREAM(FEET) =    731.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.160
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.789
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.41      0.30     1.000    66   13.16
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.24      0.20     1.000    83   13.16
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.48
  TOTAL AREA(ACRES) =      0.65   PEAK FLOW RATE(CFS) =      1.48

************************************************************************
  FLOW PROCESS FROM NODE     21.10 TO NODE     22.10 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    731.00  DOWNSTREAM(FEET) =    725.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.0196
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.507
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        1.19      0.30     1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.78      0.20     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.48
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.71
  AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =   2.73
  Tc(MIN.) =   15.89
  SUBAREA AREA(ACRES) =     1.97       SUBAREA RUNOFF(CFS) =    3.98
  EFFECTIVE AREA(ACRES) =      2.62     AREA-AVERAGED Fm(INCH/HR) =   0.26
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        2.6         PEAK FLOW RATE(CFS) =       5.30

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   1.98
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     22.10 =     580.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     22.10 TO NODE     23.10 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    725.50  DOWNSTREAM(FEET) =    720.00
```

Onsite Hydrology Area "A"

25-Year Storm Existing Condition

```
 CHANNEL LENGTH THRU SUBAREA(FEET) =   415.00   CHANNEL SLOPE =  0.0133
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.240
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        1.80      0.30     1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.15      0.20     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.01
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.97
 AVERAGE FLOW DEPTH(FEET) =   0.33   TRAVEL TIME(MIN.) =   3.50
 Tc(MIN.) =   19.39
 SUBAREA AREA(ACRES) =     1.95       SUBAREA RUNOFF(CFS) =    3.42
 EFFECTIVE AREA(ACRES) =      4.57     AREA-AVERAGED Fm(INCH/HR) =   0.27
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        4.6         PEAK FLOW RATE(CFS) =       8.08

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.36   FLOW VELOCITY(FEET/SEC.) =   2.07
 LONGEST FLOWPATH FROM NODE     10.10 TO NODE     23.10 =     995.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.10 TO NODE     24.20 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    720.00  DOWNSTREAM(FEET) =    709.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   670.00   CHANNEL SLOPE =  0.0164
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.025
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B       10.16      0.30     1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.80      0.25     1.000    77
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.80      0.20     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      18.11
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.95
 AVERAGE FLOW DEPTH(FEET) =   0.55   TRAVEL TIME(MIN.) =   3.78
 Tc(MIN.) =   23.17
 SUBAREA AREA(ACRES) =    12.76       SUBAREA RUNOFF(CFS) =   20.01
 EFFECTIVE AREA(ACRES) =     17.33     AREA-AVERAGED Fm(INCH/HR) =   0.28
 AREA-AVERAGED Fp(INCH/HR) =   0.28  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       17.3         PEAK FLOW RATE(CFS) =      27.21

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.70   FLOW VELOCITY(FEET/SEC.) =   3.41
 LONGEST FLOWPATH FROM NODE     10.10 TO NODE     24.20 =    1665.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.20 TO NODE     25.10 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    709.00  DOWNSTREAM(FEET) =    704.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   480.00   CHANNEL SLOPE =  0.0104
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  1.916
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B       14.00      0.30     1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.90      0.25     1.000    77
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        4.04      0.20     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      41.19
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.36
 AVERAGE FLOW DEPTH(FEET) =   1.02   TRAVEL TIME(MIN.) =   2.38
 Tc(MIN.) =   25.55
 SUBAREA AREA(ACRES) =    18.94       SUBAREA RUNOFF(CFS) =   27.95
 EFFECTIVE AREA(ACRES) =     36.27     AREA-AVERAGED Fm(INCH/HR) =   0.28
 AREA-AVERAGED Fp(INCH/HR) =   0.28  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       36.3         PEAK FLOW RATE(CFS) =      53.46

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.18   FLOW VELOCITY(FEET/SEC.) =   3.67
 LONGEST FLOWPATH FROM NODE     10.10 TO NODE     25.10 =    2145.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.10 TO NODE     26.10 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    704.00  DOWNSTREAM(FEET) =    684.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   975.00   CHANNEL SLOPE =  0.0200
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  1.790
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        8.10      0.30     1.000    66
```

Onsite Hydrology Area "A"

25-Year Storm Existing Condition

```
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        4.10      0.25     1.000    77
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        9.40      0.20     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      68.46
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.96
  AVERAGE FLOW DEPTH(FEET) =   1.13   TRAVEL TIME(MIN.) =   3.28
  Tc(MIN.) =   28.82
  SUBAREA AREA(ACRES) =    21.60       SUBAREA RUNOFF(CFS) =   29.99
  EFFECTIVE AREA(ACRES) =     57.87     AREA-AVERAGED Fm(INCH/HR) =   0.27
  AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       57.9          PEAK FLOW RATE(CFS) =      79.32

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.23   FLOW VELOCITY(FEET/SEC.) =   5.20
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     26.10 =    3120.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     26.10 TO NODE     61.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    684.50  DOWNSTREAM(FEET) =    675.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   660.00   CHANNEL SLOPE =  0.0141
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  1.714
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        6.00      0.30     1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        6.10      0.25     1.000    77
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        6.58      0.20     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      91.65
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.83
  AVERAGE FLOW DEPTH(FEET) =   1.47   TRAVEL TIME(MIN.) =   2.28
  Tc(MIN.) =   31.10
  SUBAREA AREA(ACRES) =    18.68       SUBAREA RUNOFF(CFS) =   24.64
  EFFECTIVE AREA(ACRES) =     76.55     AREA-AVERAGED Fm(INCH/HR) =   0.26
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       76.5          PEAK FLOW RATE(CFS) =     100.04

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.54   FLOW VELOCITY(FEET/SEC.) =   4.97
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     61.00 =    3780.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       76.5  TC(MIN.) =     31.10
  EFFECTIVE AREA(ACRES) =     76.55  AREA-AVERAGED Fm(INCH/HR)=  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =     100.04
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Onsite Hydrology Area "A"

25-Year Storm Existing Condition

```
 ------------------------------------------------------------------------
 ************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                            Analysis prepared by:

                            HUNSAKER & ASSOCIATES
                                 Irvine,Inc
                        Planning * Engineering * Surveying
                Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* Hydrology Study for Nakase Nursery                                    *
* City of Lake Forest                                                   *
* Existing Condition - 25-year Storm                                    *
 ************************************************************************

  FILE NAME: LFE-25.DAT
  TIME/DATE OF STUDY: 13:48 10/27/2017
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    743.00  DOWNSTREAM(FEET) =    730.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.951
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.815
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.49      0.30     1.000    66   12.95
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.09      0.20     1.000    83   12.95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.32
  TOTAL AREA(ACRES) =      0.58   PEAK FLOW RATE(CFS) =      1.32

************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    730.00  DOWNSTREAM(FEET) =    724.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.0196
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.502
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.81      0.30     1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.60      0.20     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.75
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.56
  AVERAGE FLOW DEPTH(FEET) =   0.17   TRAVEL TIME(MIN.) =   3.00
  Tc(MIN.) =   15.95
  SUBAREA AREA(ACRES) =     1.41     SUBAREA RUNOFF(CFS) =     2.85
  EFFECTIVE AREA(ACRES) =      1.99     AREA-AVERAGED Fm(INCH/HR) =   0.27
  AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      2.0      PEAK FLOW RATE(CFS) =      4.01

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.21   FLOW VELOCITY(FEET/SEC.) =   1.82
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     580.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    724.50  DOWNSTREAM(FEET) =    717.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   410.00   CHANNEL SLOPE =  0.0183
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
```

Onsite Hydrology at Existing 84” Node 15, Area B
(F19) Serrano Creek, Q_{100}=2350 cfs

25-Year Storm Existing Condition

```
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.260
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        2.26      0.30     1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        1.05      0.20     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.98
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.18
 AVERAGE FLOW DEPTH(FEET) =   0.30   TRAVEL TIME(MIN.) =   3.14
 Tc(MIN.) =   19.09
 SUBAREA AREA(ACRES) =     3.31       SUBAREA RUNOFF(CFS) =    5.93
 EFFECTIVE AREA(ACRES) =      5.30     AREA-AVERAGED Fm(INCH/HR) =   0.27
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        5.3         PEAK FLOW RATE(CFS) =       9.51

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.36   FLOW VELOCITY(FEET/SEC.) =   2.44
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =     990.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    717.00  DOWNSTREAM(FEET) =    711.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   505.00   CHANNEL SLOPE =  0.0115
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.075
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        7.09      0.30     1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"               C        2.28      0.25     1.000    77
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        2.74      0.20     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      19.37
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.70
 AVERAGE FLOW DEPTH(FEET) =   0.64   TRAVEL TIME(MIN.) =   3.12
 Tc(MIN.) =   22.20
 SUBAREA AREA(ACRES) =    12.11       SUBAREA RUNOFF(CFS) =   19.69
 EFFECTIVE AREA(ACRES) =     17.41     AREA-AVERAGED Fm(INCH/HR) =   0.27
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       17.4         PEAK FLOW RATE(CFS) =      28.31

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.80   FLOW VELOCITY(FEET/SEC.) =   3.07
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     14.00 =    1495.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    711.20  DOWNSTREAM(FEET) =    685.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1330.00   CHANNEL SLOPE =  0.0197
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   4.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  1.846
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        8.80      0.30     1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"               C        5.39      0.25     1.000    77
 NATURAL FAIR COVER
 "OPEN BRUSH"               D       11.80      0.20     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      47.09
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.36
 AVERAGE FLOW DEPTH(FEET) =   0.91   TRAVEL TIME(MIN.) =   5.08
 Tc(MIN.) =   27.28
 SUBAREA AREA(ACRES) =    25.99       SUBAREA RUNOFF(CFS) =   37.47
 EFFECTIVE AREA(ACRES) =     43.40     AREA-AVERAGED Fm(INCH/HR) =   0.25
 AREA-AVERAGED Fp(INCH/HR) =   0.25  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       43.4         PEAK FLOW RATE(CFS) =      62.21

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.07   FLOW VELOCITY(FEET/SEC.) =   4.78
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =    2825.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       43.4  TC(MIN.) =     27.28
 EFFECTIVE AREA(ACRES) =      43.40  AREA-AVERAGED Fm(INCH/HR)=  0.25
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =      62.21
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

Onsite Hydrology at Existing 84” Node 15, Area B
(F19) Serrano Creek, Q_{100}=2350 cfs
25-Year Storm Existing Condition

```
 ************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                      Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY IN CITY OF LAKE FOREST                           *
* OFFSITE EXISTING CONDITION @ 25-YEAR STORM                            *
* W.O. #1443-136X                                                       *
 ************************************************************************

  FILE NAME: NAKASE25.DAT
  TIME/DATE OF STUDY: 14:13 07/19/2017
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1099.00  DOWNSTREAM(FEET) =   1091.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.370
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.603
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.78      0.25      0.600    69    8.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      2.42
  TOTAL AREA(ACRES) =      0.78   PEAK FLOW RATE(CFS) =      2.42

************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 1091.20  DOWNSTREAM ELEVATION(FEET) = 1089.40
  STREET LENGTH(FEET) =    90.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.04
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   13.38
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.52
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.30
  STREET FLOW TRAVEL TIME(MIN.) =   0.43   Tc(MIN.) =    8.80
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.503
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.38      0.25      0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    7.24
  EFFECTIVE AREA(ACRES) =      3.16    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =       9.59

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  16.12
  FLOW VELOCITY(FEET/SEC.) =  3.93   DEPTH*VELOCITY(FT*FT/SEC.) =   1.64
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     390.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) = 1089.40  DOWNSTREAM ELEVATION(FEET) = 1067.00
  STREET LENGTH(FEET) =   513.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.41
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   14.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.35
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.06
  STREET FLOW TRAVEL TIME(MIN.) =   1.60   Tc(MIN.) =   10.39
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.188
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        0.34      0.25     0.100    69
  PUBLIC PARK                 C        0.25      0.25     0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.418
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    1.64
  EFFECTIVE AREA(ACRES) =      3.75    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =      10.33

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  14.19
  FLOW VELOCITY(FEET/SEC.) =  5.38   DEPTH*VELOCITY(FT*FT/SEC.) =   2.06
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     903.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.39
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.188
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        0.35      0.25     0.100    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.49      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.333
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    2.35
  EFFECTIVE AREA(ACRES) =      4.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.6       PEAK FLOW RATE(CFS) =      12.68

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1067.00  DOWNSTREAM(FEET) =  1062.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.02
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.68
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   10.52
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1003.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.52
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.166
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        2.09      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.09      SUBAREA RUNOFF(CFS) =    5.72
  EFFECTIVE AREA(ACRES) =      6.68   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        6.7       PEAK FLOW RATE(CFS) =      18.31

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1062.00  DOWNSTREAM(FEET) =  1022.40
  FLOW LENGTH(FEET) =   701.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.79
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.31
  PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   11.31
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1704.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.31
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.039
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.18      0.30      0.100    56
  COMMERCIAL                  C        0.46      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.64      SUBAREA RUNOFF(CFS) =    1.74
  EFFECTIVE AREA(ACRES) =      7.32   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        7.3       PEAK FLOW RATE(CFS) =      19.28

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.40  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.72
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.28
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   11.58
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.58
  RAINFALL INTENSITY(INCH/HR) =   3.00
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       7.32
  TOTAL STREAM AREA(ACRES) =       7.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      19.28

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   305.00
  ELEVATION DATA: UPSTREAM(FEET) =   1046.00  DOWNSTREAM(FEET) =   1042.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.129
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.946
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  C        1.00      0.25      0.100    69    7.13
  RESIDENTIAL
  ".4 DWELLING/ACRE"          C        0.50      0.25      0.900    69   11.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
  SUBAREA RUNOFF(CFS) =      5.20
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      5.20

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1042.00  DOWNSTREAM ELEVATION(FEET) = 1036.00
  STREET LENGTH(FEET) =   373.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.13
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   13.07
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.08
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.12
  STREET FLOW TRAVEL TIME(MIN.) =   2.02   Tc(MIN.) =    9.15
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.426
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        3.31      0.25      0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.31      SUBAREA RUNOFF(CFS) =    9.83
  EFFECTIVE AREA(ACRES) =      4.81    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =        4.8         PEAK FLOW RATE(CFS) =      14.34

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  15.00
  FLOW VELOCITY(FEET/SEC.) =  3.36   DEPTH*VELOCITY(FT*FT/SEC.) =   1.34
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     678.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1036.00  DOWNSTREAM ELEVATION(FEET) = 1026.00
  STREET LENGTH(FEET) =   463.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00
```

```
  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.52
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   15.31
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.96
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.59
  STREET FLOW TRAVEL TIME(MIN.) =   1.95   Tc(MIN.) =   11.10
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.072
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.40      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    6.36
  EFFECTIVE AREA(ACRES) =      7.21    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =      19.16

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  15.92
  FLOW VELOCITY(FEET/SEC.) =  4.02   DEPTH*VELOCITY(FT*FT/SEC.) =   1.66
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1141.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.10
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.072
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.16      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.22      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    6.31
  EFFECTIVE AREA(ACRES) =      9.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        9.6       PEAK FLOW RATE(CFS) =      25.47

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1026.00  DOWNSTREAM(FEET) =  1022.00
  FLOW LENGTH(FEET) =   395.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.36
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.47
  PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   11.89
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1536.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.89
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.955
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.07      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        4.06      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    4.13      SUBAREA RUNOFF(CFS) =   10.52
  EFFECTIVE AREA(ACRES) =     13.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       13.7       PEAK FLOW RATE(CFS) =      34.98

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.00  DOWNSTREAM(FEET) =  1020.00
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.55
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      34.98
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   12.09
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.927
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
```

```
  "5-7 DWELLINGS/ACRE"       B        0.55      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.06      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     2.61      SUBAREA RUNOFF(CFS) =     6.57
  EFFECTIVE AREA(ACRES) =     16.33   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      41.21

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1020.00  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.45
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.21
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   12.44
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    1799.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.44
  RAINFALL INTENSITY(INCH/HR) =   2.88
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =      16.33
  TOTAL STREAM AREA(ACRES) =      16.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      41.21

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       19.28   11.58    2.999  0.25( 0.11) 0.45       7.3       1.00
      2       41.21   12.44    2.880  0.25( 0.12) 0.49      16.3       8.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       59.29   11.58    2.999  0.25( 0.12) 0.48      22.5       1.00
      2       59.69   12.44    2.880  0.25( 0.12) 0.48      23.6       8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      59.69    Tc(MIN.) =    12.44
  EFFECTIVE AREA(ACRES) =      23.65   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       23.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1019.50  DOWNSTREAM(FEET) =  1014.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.64
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      59.69
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   12.59
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.10 =    2014.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.59
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.860
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.15      0.30      0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.15      SUBAREA RUNOFF(CFS) =     0.38
  EFFECTIVE AREA(ACRES) =     23.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       23.8       PEAK FLOW RATE(CFS) =      59.69
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.59
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.860
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.16      0.30      0.100    56
  COMMERCIAL                  C        1.44      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     4.08
  EFFECTIVE AREA(ACRES) =     25.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       25.4       PEAK FLOW RATE(CFS) =      62.78

****************************************************************************
```

```
 FLOW PROCESS FROM NODE      7.10 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1014.00  DOWNSTREAM(FEET) =   971.40
 FLOW LENGTH(FEET) =   863.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.70
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      62.78
 PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =   13.36
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    2877.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.36
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.765
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.82      0.30     0.100    56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C        0.77      0.25     0.500    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.294
 SUBAREA AREA(ACRES) =    1.59      SUBAREA RUNOFF(CFS) =    3.85
 EFFECTIVE AREA(ACRES) =     26.99   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
 TOTAL AREA(ACRES) =       27.0       PEAK FLOW RATE(CFS) =      64.47

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   971.40  DOWNSTREAM(FEET) =   969.00
 FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.47
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      64.47
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   13.40
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    2917.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.40
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.761
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        2.46      0.30     0.500    56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C       10.48      0.25     0.500    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =   12.94      SUBAREA RUNOFF(CFS) =   30.65
 EFFECTIVE AREA(ACRES) =     39.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =       39.9       PEAK FLOW RATE(CFS) =      95.02

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       96.03   12.54    2.867  0.25( 0.12) 0.46      38.8       1.00
     2       95.02   13.40    2.761  0.25( 0.12) 0.46      39.9       8.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      96.03  Tc(MIN.) =   12.54
 AREA-AVERAGED Fm(INCH/HR) =  0.12  AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.46  EFFECTIVE AREA(ACRES) =      38.80

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   969.00  DOWNSTREAM(FEET) =   954.00
 FLOW LENGTH(FEET) =   416.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.88
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      96.03
 PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   12.90
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    3333.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.90
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.821
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        0.77      0.25     0.100    69
 PUBLIC PARK                 C        0.43      0.25     0.850    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.369
 SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    2.95
 EFFECTIVE AREA(ACRES) =     40.00   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =       41.1       PEAK FLOW RATE(CFS) =      97.36

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   954.00  DOWNSTREAM(FEET) =   952.80
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  31.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.66
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      97.36
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   13.07
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    3453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   13.07
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.800
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.88      0.30     0.400    56
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        7.02      0.25     0.400    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    7.90      SUBAREA RUNOFF(CFS) =   19.18
  EFFECTIVE AREA(ACRES) =     47.90   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       49.0       PEAK FLOW RATE(CFS) =     115.78

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   952.80  DOWNSTREAM(FEET) =   929.00
  FLOW LENGTH(FEET) =   636.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.70
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     115.78
  PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =   13.61
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.10 =    4089.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     17.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   13.61
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.736
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.68      0.30     0.500    56
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"        C        0.89      0.25     0.600    69
  COMMERCIAL                  C        1.86      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.309
  SUBAREA AREA(ACRES) =    3.43      SUBAREA RUNOFF(CFS) =    8.19
  EFFECTIVE AREA(ACRES) =     51.33   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       52.5       PEAK FLOW RATE(CFS) =     121.25

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   929.00  DOWNSTREAM(FEET) =   926.30
  FLOW LENGTH(FEET) =   122.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.58
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     121.25
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   13.74
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     18.00 =    4211.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   13.74
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.723
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS                B       24.46      0.30     0.350    56
  CONDOMINIUMS                C        7.92      0.25     0.350    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =   32.38      SUBAREA RUNOFF(CFS) =   76.41
  EFFECTIVE AREA(ACRES) =     83.71   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       84.8       PEAK FLOW RATE(CFS) =     197.02

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   926.30  DOWNSTREAM(FEET) =   922.70
  FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  36.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.29
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     197.02
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   13.89
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     19.00 =    4384.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.89
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.705
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        1.62      0.30     0.400    56
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        6.09      0.25     0.400    69
  COMMERCIAL                  B        2.90      0.30     0.100    56
  COMMERCIAL                  C        3.15      0.25     0.100    69
  NATURAL POOR COVER
  "GRASS"                     B        0.76      0.30     1.000    78
  NATURAL POOR COVER
  "GRASS"                     C        0.39      0.25     1.000    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
  SUBAREA AREA(ACRES) =   14.91      SUBAREA RUNOFF(CFS) =   35.13
  EFFECTIVE AREA(ACRES) =     98.62   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =       99.8       PEAK FLOW RATE(CFS) =     230.83

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   922.70  DOWNSTREAM(FEET) =   815.60
  FLOW LENGTH(FEET) =  1580.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.33
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     230.83
  PIPE TRAVEL TIME(MIN.) =   0.90    Tc(MIN.) =   14.79
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     20.00 =    5964.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.79
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.611
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B       19.45      0.30     0.100    56
  COMMERCIAL                  C       16.92      0.25     0.100    69
  COMMERCIAL                  D        0.11      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   36.48      SUBAREA RUNOFF(CFS) =   84.81
  EFFECTIVE AREA(ACRES) =    135.10   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      136.2       PEAK FLOW RATE(CFS) =     307.28

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   815.60  DOWNSTREAM(FEET) =   799.50
  FLOW LENGTH(FEET) =   449.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  38.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.02
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     307.28
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   15.09
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6413.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.581
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        2.38      0.30     0.100    56
  COMMERCIAL                  C        0.87      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    7.47
  EFFECTIVE AREA(ACRES) =    138.35   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      139.5       PEAK FLOW RATE(CFS) =     311.17

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.581
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        4.10      0.30     0.100    56
  COMMERCIAL                  C        1.54      0.25     0.100    69
  COMMERCIAL                  D        2.08      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    7.72      SUBAREA RUNOFF(CFS) =   17.75
  EFFECTIVE AREA(ACRES) =    146.07   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      147.2       PEAK FLOW RATE(CFS) =     328.93

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   799.50  DOWNSTREAM(FEET) =   765.50
  FLOW LENGTH(FEET) =  1056.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  43.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.99
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     328.93
  PIPE TRAVEL TIME(MIN.) =   0.73    Tc(MIN.) =   15.82
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     22.00 =    7469.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.82
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.513
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.06      0.30      0.100    56
  COMMERCIAL                 C        1.74      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    3.80      SUBAREA RUNOFF(CFS) =    8.50
  EFFECTIVE AREA(ACRES) =    149.87   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      151.0       PEAK FLOW RATE(CFS) =     328.93
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.82
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.513
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.23      0.30      0.100    56
  COMMERCIAL                 D        5.07      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    5.30      SUBAREA RUNOFF(CFS) =   11.89
  EFFECTIVE AREA(ACRES) =    155.17   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      156.3       PEAK FLOW RATE(CFS) =     340.32

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   765.50  DOWNSTREAM(FEET) =   755.00
  FLOW LENGTH(FEET) =   465.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  45.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.44
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     340.32
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =   16.18
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     23.00 =    7934.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.18
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.481
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        9.15      0.30      0.100    56
  COMMERCIAL                 C       10.79      0.25      0.100    69
  COMMERCIAL                 D        1.81      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   21.75      SUBAREA RUNOFF(CFS) =   48.05
  EFFECTIVE AREA(ACRES) =    176.92   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =      178.1       PEAK FLOW RATE(CFS) =     383.91

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.18
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.481
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        7.47      0.30      0.100    56
  COMMERCIAL                 C        0.40      0.25      0.100    69
  COMMERCIAL                 D       17.76      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   25.63      SUBAREA RUNOFF(CFS) =   56.70
  EFFECTIVE AREA(ACRES) =    202.55   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      203.7       PEAK FLOW RATE(CFS) =     440.61

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   755.00  DOWNSTREAM(FEET) =   736.00
  FLOW LENGTH(FEET) =  1257.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  69.0 INCH PIPE IS  56.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.36
  ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =     440.61
  PIPE TRAVEL TIME(MIN.) =   1.08    Tc(MIN.) =   17.27
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.00 =    9191.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.27
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.392
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B       16.13      0.30     0.100    56
  COMMERCIAL                  C        3.87      0.25     0.100    69
  COMMERCIAL                  D        4.22      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   24.22      SUBAREA RUNOFF(CFS) =   51.54
  EFFECTIVE AREA(ACRES) =    226.77   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      227.9       PEAK FLOW RATE(CFS) =     475.88
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      227.9  TC(MIN.) =     17.27
  EFFECTIVE AREA(ACRES) =    226.77  AREA-AVERAGED Fm(INCH/HR)=  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap = 0.227
  PEAK FLOW RATE(CFS)   =     475.88

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      475.88   17.27    2.392  0.27( 0.06) 0.23     226.8       1.00
      2      464.42   18.16    2.325  0.27( 0.06) 0.23     227.9       8.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
 ------------------------------------------------------------------------
 ************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                            Analysis prepared by:

                            HUNSAKER & ASSOCIATES
                                 Irvine,Inc
                        Planning * Engineering * Surveying
             Three Hughes * Irvine, California 92618 * (949)583-1010

  ************************* DESCRIPTION OF STUDY *************************
 * NAKASE RANCH NURSERY IN CITY OF LAKE FOREST                           *
 * OFFSITE & ONSITE EXISTING CONDITION @ 25-YEAR STORM                   *
 * W.O. #1443-136X                                                       *
  ************************************************************************

   FILE NAME: EXIST25.DAT
   TIME/DATE OF STUDY: 17:26 10/05/2017
 ========================================================================
   USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
 ========================================================================
                      --*TIME-OF-CONCENTRATION MODEL*--

   USER SPECIFIED STORM EVENT(YEAR) =   25.00
   SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
   SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
   *DATA BANK RAINFALL USED*
   *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

   *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
      HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
      WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
 NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
 ===  =====  =========  ================  ======  ===== ====== ===== =======
   1   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.125 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 FEET
        as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
     2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
   *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
    OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
   *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

 ************************************************************************
   FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
 ------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ========================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
   ELEVATION DATA: UPSTREAM(FEET) =   1099.00  DOWNSTREAM(FEET) =   1091.20
   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.370
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.603
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
   RESIDENTIAL
   "3-4 DWELLINGS/ACRE"       C        0.78      0.25      0.600    69    8.37
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
   SUBAREA RUNOFF(CFS) =      2.42
   TOTAL AREA(ACRES) =      0.78   PEAK FLOW RATE(CFS) =      2.42

 ************************************************************************
   FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
 ------------------------------------------------------------------------
   >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
 ========================================================================
   UPSTREAM ELEVATION(FEET) = 1091.20  DOWNSTREAM ELEVATION(FEET) = 1089.40
   STREET LENGTH(FEET) =    90.00   CURB HEIGHT(INCHES) =  6.0
   STREET HALFWIDTH(FEET) = 18.00

   DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
   INSIDE STREET CROSSFALL(DECIMAL) =  0.018
   OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

   SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
   STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
   Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
   Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

     **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.04
     STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
     STREET FLOW DEPTH(FEET) =  0.37
     HALFSTREET FLOOD WIDTH(FEET) =   13.38
     AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.52
     PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.30
   STREET FLOW TRAVEL TIME(MIN.) =   0.43   Tc(MIN.) =    8.80
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.503
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       C        2.38      0.25      0.500    69
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
   SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    7.24
   EFFECTIVE AREA(ACRES) =      3.16    AREA-AVERAGED Fm(INCH/HR) =  0.13
   AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.52
   TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =       9.59

   END OF SUBAREA STREET FLOW HYDRAULICS:
   DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  16.12
   FLOW VELOCITY(FEET/SEC.) =  3.93   DEPTH*VELOCITY(FT*FT/SEC.) =   1.64
   LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     390.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1089.40  DOWNSTREAM ELEVATION(FEET) = 1067.00
  STREET LENGTH(FEET) =   513.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.41
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   14.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.35
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.06
  STREET FLOW TRAVEL TIME(MIN.) =   1.60   Tc(MIN.) =   10.39
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.188
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                C        0.34      0.25     0.100    69
  PUBLIC PARK               C        0.25      0.25     0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.418
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    1.64
  EFFECTIVE AREA(ACRES) =      3.75    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =      10.33

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  14.19
  FLOW VELOCITY(FEET/SEC.) =  5.38   DEPTH*VELOCITY(FT*FT/SEC.) =   2.06
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     903.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.39
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.188
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                C        0.35      0.25     0.100    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"      C        0.49      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.333
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    2.35
  EFFECTIVE AREA(ACRES) =      4.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.6       PEAK FLOW RATE(CFS) =      12.68

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1067.00  DOWNSTREAM(FEET) =  1062.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.02
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.68
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   10.52
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1003.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.52
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.166
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"      C        2.09      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.09      SUBAREA RUNOFF(CFS) =    5.72
  EFFECTIVE AREA(ACRES) =      6.68   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        6.7       PEAK FLOW RATE(CFS) =      18.31

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1062.00  DOWNSTREAM(FEET) =  1022.40
  FLOW LENGTH(FEET) =   701.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.79
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.31
  PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   11.31
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1704.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.31
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.039
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.18      0.30      0.100    56
  COMMERCIAL                 C        0.46      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.64      SUBAREA RUNOFF(CFS) =    1.74
  EFFECTIVE AREA(ACRES) =      7.32   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        7.3       PEAK FLOW RATE(CFS) =      19.28

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.40  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.72
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.28
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   11.58
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.58
  RAINFALL INTENSITY(INCH/HR) =   3.00
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       7.32
  TOTAL STREAM AREA(ACRES) =       7.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      19.28

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   305.00
  ELEVATION DATA: UPSTREAM(FEET) =   1046.00  DOWNSTREAM(FEET) =   1042.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.129
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.946
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 C        1.00      0.25      0.100    69    7.13
  RESIDENTIAL
  ".4 DWELLING/ACRE"         C        0.50      0.25      0.900    69   11.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
  SUBAREA RUNOFF(CFS) =      5.20
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      5.20

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1042.00  DOWNSTREAM ELEVATION(FEET) = 1036.00
  STREET LENGTH(FEET) =   373.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.13
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   13.07
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.08
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.12
  STREET FLOW TRAVEL TIME(MIN.) =   2.02   Tc(MIN.) =    9.15
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.426
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        3.31      0.25      0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.31      SUBAREA RUNOFF(CFS) =    9.83
  EFFECTIVE AREA(ACRES) =      4.81    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =        4.8       PEAK FLOW RATE(CFS) =      14.34

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  15.00
```

```
  FLOW VELOCITY(FEET/SEC.) =  3.36   DEPTH*VELOCITY(FT*FT/SEC.) =   1.34
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     678.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1036.00  DOWNSTREAM ELEVATION(FEET) = 1026.00
  STREET LENGTH(FEET) =   463.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.52
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   15.31
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.96
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.59
  STREET FLOW TRAVEL TIME(MIN.) =   1.95   Tc(MIN.) =   11.10
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.072
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.40      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    6.36
  EFFECTIVE AREA(ACRES) =      7.21    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =      19.16

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  15.92
  FLOW VELOCITY(FEET/SEC.) =  4.02   DEPTH*VELOCITY(FT*FT/SEC.) =   1.66
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1141.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.10
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.072
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.16      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.22      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    6.31
  EFFECTIVE AREA(ACRES) =      9.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        9.6        PEAK FLOW RATE(CFS) =      25.47

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1026.00  DOWNSTREAM(FEET) =  1022.00
  FLOW LENGTH(FEET) =   395.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.36
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.47
  PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   11.89
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1536.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.89
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.955
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.07      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        4.06      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    4.13      SUBAREA RUNOFF(CFS) =   10.52
  EFFECTIVE AREA(ACRES) =     13.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       13.7       PEAK FLOW RATE(CFS) =      34.98

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.00  DOWNSTREAM(FEET) =  1020.00
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.55
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      34.98
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   12.09
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.927
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.55      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.06      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.61      SUBAREA RUNOFF(CFS) =    6.57
  EFFECTIVE AREA(ACRES) =     16.33   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      41.21

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1020.00  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.45
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.21
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   12.44
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    1799.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.44
  RAINFALL INTENSITY(INCH/HR) =   2.88
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =      16.33
  TOTAL STREAM AREA(ACRES) =      16.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      41.21

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       19.28   11.58    2.999  0.25( 0.11) 0.45       7.3       1.00
      2       41.21   12.44    2.880  0.25( 0.12) 0.49      16.3       8.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       59.29   11.58    2.999  0.25( 0.12) 0.48      22.5       1.00
      2       59.69   12.44    2.880  0.25( 0.12) 0.48      23.6       8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      59.69    Tc(MIN.) =    12.44
  EFFECTIVE AREA(ACRES) =      23.65   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       23.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1019.50  DOWNSTREAM(FEET) =  1014.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.64
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      59.69
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   12.59
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.10 =    2014.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.59
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.860
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.15      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.38
  EFFECTIVE AREA(ACRES) =     23.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       23.8       PEAK FLOW RATE(CFS) =      59.69
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.59
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.860
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.16      0.30     0.100    56
  COMMERCIAL                  C        1.44      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     4.08
  EFFECTIVE AREA(ACRES) =     25.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       25.4       PEAK FLOW RATE(CFS) =      62.78

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1014.00  DOWNSTREAM(FEET) =   971.40
  FLOW LENGTH(FEET) =   863.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.70
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      62.78
  PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =   13.36
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    2877.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.36
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.765
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.82      0.30     0.100    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.77      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.294
  SUBAREA AREA(ACRES) =     1.59      SUBAREA RUNOFF(CFS) =     3.85
  EFFECTIVE AREA(ACRES) =     26.99   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       27.0       PEAK FLOW RATE(CFS) =      64.47

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   971.40  DOWNSTREAM(FEET) =   969.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.47
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      64.47
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   13.40
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    2917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.40
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.761
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        2.46      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C       10.48      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   12.94      SUBAREA RUNOFF(CFS) =   30.65
  EFFECTIVE AREA(ACRES) =     39.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       39.9       PEAK FLOW RATE(CFS) =      95.02

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       96.03   12.54    2.867  0.25( 0.12) 0.46      38.8       1.00
      2       95.02   13.40    2.761  0.25( 0.12) 0.46      39.9       8.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      96.03  Tc(MIN.) =   12.54
  AREA-AVERAGED Fm(INCH/HR) =  0.12  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.46  EFFECTIVE AREA(ACRES) =      38.80

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   969.00  DOWNSTREAM(FEET) =   954.00
  FLOW LENGTH(FEET) =   416.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.88
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      96.03
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   12.90
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    3333.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.90
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.821
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.77      0.25      0.100    69
  PUBLIC PARK                C        0.43      0.25      0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.369
  SUBAREA AREA(ACRES) =     1.20      SUBAREA RUNOFF(CFS) =     2.95
  EFFECTIVE AREA(ACRES) =     40.00   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       41.1       PEAK FLOW RATE(CFS) =      97.36

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   954.00  DOWNSTREAM(FEET) =   952.80
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  31.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.66
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      97.36
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   13.07
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    3453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.07
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.800
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.88      0.30      0.400    56
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        7.02      0.25      0.400    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =     7.90      SUBAREA RUNOFF(CFS) =    19.18
  EFFECTIVE AREA(ACRES) =     47.90   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       49.0       PEAK FLOW RATE(CFS) =     115.78

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   952.80  DOWNSTREAM(FEET) =   929.00
  FLOW LENGTH(FEET) =   636.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.70
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     115.78
  PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =   13.61
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.10 =    4089.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     17.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.61
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.736
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.68      0.30      0.500    56
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.89      0.25      0.600    69
  COMMERCIAL                 C        1.86      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.309
  SUBAREA AREA(ACRES) =     3.43      SUBAREA RUNOFF(CFS) =     8.19
  EFFECTIVE AREA(ACRES) =     51.33   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       52.5       PEAK FLOW RATE(CFS) =     121.25

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   929.00  DOWNSTREAM(FEET) =   926.30
  FLOW LENGTH(FEET) =   122.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.58
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     121.25
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   13.74
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     18.00 =    4211.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.74
```

```
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.723
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS                B       24.46      0.30     0.350    56
 CONDOMINIUMS                C        7.92      0.25     0.350    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA AREA(ACRES) =   32.38      SUBAREA RUNOFF(CFS) =   76.41
 EFFECTIVE AREA(ACRES) =     83.71   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =       84.8       PEAK FLOW RATE(CFS) =     197.02

****************************************************************************
 FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   926.30  DOWNSTREAM(FEET) =   922.70
 FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  36.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.29
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     197.02
 PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   13.89
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     19.00 =    4384.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.89
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.705
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        1.62      0.30     0.400    56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       C        6.09      0.25     0.400    69
 COMMERCIAL                  B        2.90      0.30     0.100    56
 COMMERCIAL                  C        3.15      0.25     0.100    69
 NATURAL POOR COVER
 "GRASS"                     B        0.76      0.30     1.000    78
 NATURAL POOR COVER
 "GRASS"                     C        0.39      0.25     1.000    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
 SUBAREA AREA(ACRES) =   14.91      SUBAREA RUNOFF(CFS) =   35.13
 EFFECTIVE AREA(ACRES) =     98.62   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.39
 TOTAL AREA(ACRES) =       99.8       PEAK FLOW RATE(CFS) =     230.83

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   922.70  DOWNSTREAM(FEET) =   815.60
 FLOW LENGTH(FEET) =  1580.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  29.33
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     230.83
 PIPE TRAVEL TIME(MIN.) =   0.90    Tc(MIN.) =   14.79
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     20.00 =    5964.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.79
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.611
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B       19.45      0.30     0.100    56
 COMMERCIAL                  C       16.92      0.25     0.100    69
 COMMERCIAL                  D        0.11      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =   36.48      SUBAREA RUNOFF(CFS) =   84.81
 EFFECTIVE AREA(ACRES) =    135.10   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =      136.2       PEAK FLOW RATE(CFS) =     307.28

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   815.60  DOWNSTREAM(FEET) =   799.50
 FLOW LENGTH(FEET) =   449.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  38.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  25.02
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     307.28
 PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   15.09
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6413.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.09
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.581
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL               B        2.38      0.30     0.100    56
  COMMERCIAL               C        0.87      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     3.25      SUBAREA RUNOFF(CFS) =     7.47
  EFFECTIVE AREA(ACRES) =    138.35   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      139.5       PEAK FLOW RATE(CFS) =     311.17

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.581
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL               B        4.10      0.30     0.100    56
  COMMERCIAL               C        1.54      0.25     0.100    69
  COMMERCIAL               D        2.08      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     7.72      SUBAREA RUNOFF(CFS) =    17.75
  EFFECTIVE AREA(ACRES) =    146.07   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      147.2       PEAK FLOW RATE(CFS) =     328.93

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   799.50  DOWNSTREAM(FEET) =   765.50
  FLOW LENGTH(FEET) =  1056.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  43.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.99
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     328.93
  PIPE TRAVEL TIME(MIN.) =   0.73    Tc(MIN.) =   15.82
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     22.00 =    7469.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.82
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.513
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL               B        2.06      0.30     0.100    56
  COMMERCIAL               C        1.74      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     3.80      SUBAREA RUNOFF(CFS) =     8.50
  EFFECTIVE AREA(ACRES) =    149.87   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      151.0       PEAK FLOW RATE(CFS) =     328.93
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.82
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.513
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL               B        0.23      0.30     0.100    56
  COMMERCIAL               D        5.07      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     5.30      SUBAREA RUNOFF(CFS) =    11.89
  EFFECTIVE AREA(ACRES) =    155.17   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      156.3       PEAK FLOW RATE(CFS) =     340.32

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   765.50  DOWNSTREAM(FEET) =   755.00
  FLOW LENGTH(FEET) =   465.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  45.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.44
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     340.32
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =   16.18
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     23.00 =    7934.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.18
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.481
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL               B        9.15      0.30     0.100    56
  COMMERCIAL               C       10.79      0.25     0.100    69
  COMMERCIAL               D        1.81      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
  SUBAREA AREA(ACRES) =   21.75      SUBAREA RUNOFF(CFS) =   48.05
  EFFECTIVE AREA(ACRES) =    176.92   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =      178.1       PEAK FLOW RATE(CFS) =     383.91

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.18
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.481
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        7.47      0.30      0.100    56
  COMMERCIAL                 C        0.40      0.25      0.100    69
  COMMERCIAL                 D       17.76      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   25.63      SUBAREA RUNOFF(CFS) =   56.70
  EFFECTIVE AREA(ACRES) =    202.55   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      203.7       PEAK FLOW RATE(CFS) =     440.61

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   755.00  DOWNSTREAM(FEET) =   736.00
  FLOW LENGTH(FEET) =  1257.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  69.0 INCH PIPE IS  56.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.36
  ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     440.61
  PIPE TRAVEL TIME(MIN.) =   1.08    Tc(MIN.) =   17.27
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.00 =    9191.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.27
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.392
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B       16.13      0.30      0.100    56
  COMMERCIAL                 C        3.87      0.25      0.100    69
  COMMERCIAL                 D        4.22      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   24.22      SUBAREA RUNOFF(CFS) =   51.54
  EFFECTIVE AREA(ACRES) =    226.77   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      227.9       PEAK FLOW RATE(CFS) =     475.88

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.10 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   718.60  DOWNSTREAM(FEET) =   718.20
  FLOW LENGTH(FEET) =   110.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.50
  (PIPE FLOW VELOCITY CORRESPONDING TO FULL PIPE CAPACITY FLOW)
  GIVEN PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     475.88
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   17.46
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.10 =    9301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.10 TO NODE     24.20 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    718.20  DOWNSTREAM(FEET) =    709.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   898.00   CHANNEL SLOPE =  0.0102
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     475.88
  FLOW VELOCITY(FEET/SEC.) =   6.95   FLOW DEPTH(FEET) =   3.86
  TRAVEL TIME(MIN.) =   2.15   Tc(MIN.) =   19.61
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.20 =   10199.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.20 TO NODE     24.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.61
  RAINFALL INTENSITY(INCH/HR) =   2.23
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.23
  EFFECTIVE STREAM AREA(ACRES) =     226.77
  TOTAL STREAM AREA(ACRES) =     227.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     475.88

****************************************************************************
  FLOW PROCESS FROM NODE     10.10 TO NODE     21.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
```

```
  ELEVATION DATA: UPSTREAM(FEET) =    743.00  DOWNSTREAM(FEET) =    731.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.160
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.789
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        0.41      0.30     1.000    66   13.16
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.24      0.20     1.000    83   13.16
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.48
  TOTAL AREA(ACRES) =      0.65   PEAK FLOW RATE(CFS) =      1.48

****************************************************************************
  FLOW PROCESS FROM NODE     21.10 TO NODE     22.10 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    731.00  DOWNSTREAM(FEET) =    725.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.0196
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.507
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        1.19      0.30     1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.78      0.20     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.48
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.71
  AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =   2.73
  Tc(MIN.) =   15.89
  SUBAREA AREA(ACRES) =     1.97       SUBAREA RUNOFF(CFS) =    3.98
  EFFECTIVE AREA(ACRES) =      2.62     AREA-AVERAGED Fm(INCH/HR) =   0.26
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        2.6         PEAK FLOW RATE(CFS) =       5.30

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   1.98
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     22.10 =     580.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.10 TO NODE     23.10 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    725.50  DOWNSTREAM(FEET) =    720.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   415.00   CHANNEL SLOPE =  0.0133
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.240
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        1.80      0.30     1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.15      0.20     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.01
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.97
  AVERAGE FLOW DEPTH(FEET) =   0.33   TRAVEL TIME(MIN.) =   3.50
  Tc(MIN.) =   19.39
  SUBAREA AREA(ACRES) =     1.95       SUBAREA RUNOFF(CFS) =    3.42
  EFFECTIVE AREA(ACRES) =      4.57     AREA-AVERAGED Fm(INCH/HR) =   0.27
  AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        4.6         PEAK FLOW RATE(CFS) =       8.08

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.36   FLOW VELOCITY(FEET/SEC.) =   2.07
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     23.10 =     995.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.10 TO NODE     24.20 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    720.00  DOWNSTREAM(FEET) =    709.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   670.00   CHANNEL SLOPE =  0.0164
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.025
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B       10.16      0.30     1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.80      0.25     1.000    77
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        1.80      0.20     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      18.11
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.95
  AVERAGE FLOW DEPTH(FEET) =   0.55   TRAVEL TIME(MIN.) =   3.78
  Tc(MIN.) =   23.17
  SUBAREA AREA(ACRES) =    12.76       SUBAREA RUNOFF(CFS) =   20.01
  EFFECTIVE AREA(ACRES) =     17.33     AREA-AVERAGED Fm(INCH/HR) =   0.28
  AREA-AVERAGED Fp(INCH/HR) =   0.28  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       17.3         PEAK FLOW RATE(CFS) =      27.21
```

```
 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.70   FLOW VELOCITY(FEET/SEC.) =   3.41
 LONGEST FLOWPATH FROM NODE     10.10 TO NODE     24.20 =    1665.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.20 TO NODE     24.20 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   23.17
 RAINFALL INTENSITY(INCH/HR) =   2.03
 AREA-AVERAGED Fm(INCH/HR) =  0.28
 AREA-AVERAGED Fp(INCH/HR) =  0.28
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      17.33
 TOTAL STREAM AREA(ACRES) =      17.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      27.21

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      475.88   19.61    2.225  0.27( 0.06) 0.23     226.8       1.00
     1      464.42   20.52    2.169  0.27( 0.06) 0.23     227.9       8.00
     2       27.21   23.17    2.025  0.28( 0.28) 1.00      17.3      10.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      501.55   19.61    2.225  0.27( 0.07) 0.27     241.4       1.00
     2      490.51   20.52    2.169  0.27( 0.07) 0.28     243.2       8.00
     3      459.88   23.17    2.025  0.27( 0.08) 0.28     245.2      10.10

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     501.55    Tc(MIN.) =    19.61
 EFFECTIVE AREA(ACRES) =     241.44   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
 TOTAL AREA(ACRES) =      245.2
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.20 =   10199.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.20 TO NODE     25.10 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    709.00  DOWNSTREAM(FEET) =    704.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   480.00   CHANNEL SLOPE =  0.0104
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.157
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B       14.00      0.30     1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"               C        0.90      0.25     1.000    77
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        4.04      0.20     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     517.58
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.15
 AVERAGE FLOW DEPTH(FEET) =   4.02   TRAVEL TIME(MIN.) =   1.12
 Tc(MIN.) =   20.73
 SUBAREA AREA(ACRES) =    18.94       SUBAREA RUNOFF(CFS) =   32.05
 EFFECTIVE AREA(ACRES) =    260.38     AREA-AVERAGED Fm(INCH/HR) =   0.09
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   0.33
 TOTAL AREA(ACRES) =      264.2         PEAK FLOW RATE(CFS) =     501.55
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  3.95   FLOW VELOCITY(FEET/SEC.) =   7.10
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     25.10 =   10679.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.10 TO NODE     26.10 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    704.00  DOWNSTREAM(FEET) =    684.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   975.00   CHANNEL SLOPE =  0.0200
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.058
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        8.10      0.30     1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"               C        4.10      0.25     1.000    77
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        9.40      0.20     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     519.16
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.07
 AVERAGE FLOW DEPTH(FEET) =   3.41   TRAVEL TIME(MIN.) =   1.79
 Tc(MIN.) =   22.53
 SUBAREA AREA(ACRES) =    21.60       SUBAREA RUNOFF(CFS) =   35.20
 EFFECTIVE AREA(ACRES) =    281.98     AREA-AVERAGED Fm(INCH/HR) =   0.10
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   0.38
 TOTAL AREA(ACRES) =      285.8         PEAK FLOW RATE(CFS) =     501.55
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
  DEPTH(FEET) =  3.34   FLOW VELOCITY(FEET/SEC.) =   8.99
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     26.10 =   11654.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     26.10 TO NODE     61.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    684.50  DOWNSTREAM(FEET) =    675.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   660.00   CHANNEL SLOPE =  0.0141
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  1.990
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        6.00      0.30     1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"               C        6.10      0.25     1.000    77
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        6.58      0.20     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     516.19
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.98
  AVERAGE FLOW DEPTH(FEET) =   3.71   TRAVEL TIME(MIN.) =   1.38
  Tc(MIN.) =   23.90
  SUBAREA AREA(ACRES) =    18.68       SUBAREA RUNOFF(CFS) =   29.27
  EFFECTIVE AREA(ACRES) =    300.66     AREA-AVERAGED Fm(INCH/HR) =   0.11
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   0.42
  TOTAL AREA(ACRES) =      304.5         PEAK FLOW RATE(CFS) =     508.72

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  3.69   FLOW VELOCITY(FEET/SEC.) =   7.94
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     61.00 =   12314.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      304.5  TC(MIN.) =     23.90
  EFFECTIVE AREA(ACRES) =    300.66  AREA-AVERAGED Fm(INCH/HR)=  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap = 0.417
  PEAK FLOW RATE(CFS)   =     508.72

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      508.72   23.90    1.990  0.26( 0.11) 0.42     300.7       1.00
      2      500.04   24.84    1.947  0.26( 0.11) 0.42     302.5       8.00
      3      472.48   27.56    1.836  0.26( 0.11) 0.42     304.5      10.10
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
 ************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                      Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY IN CITY OF LAKE FOREST                             *
* ONSITE AREA "A" EXISTING CONDITION @ 100-YEAR STORM                     *
* W.O. #1443-136X                                                         *
 *************************************************************************

  FILE NAME: EX100-A.DAT
  TIME/DATE OF STUDY: 18:25 06/19/2018
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE     10.10 TO NODE     21.10 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    743.00  DOWNSTREAM(FEET) =    731.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.160
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.554
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.41      0.30     1.000    84   13.16
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.24      0.20     1.000    96   13.16
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.93
  TOTAL AREA(ACRES) =      0.65   PEAK FLOW RATE(CFS) =      1.93

************************************************************************
  FLOW PROCESS FROM NODE     21.10 TO NODE     22.10 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    731.00  DOWNSTREAM(FEET) =    725.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.0196
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.218
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        1.19      0.30     1.000    84
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.78      0.20     1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.55
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.88
  AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   2.48
  Tc(MIN.) =   15.64
  SUBAREA AREA(ACRES) =     1.97       SUBAREA RUNOFF(CFS) =    5.24
  EFFECTIVE AREA(ACRES) =      2.62     AREA-AVERAGED Fm(INCH/HR) =   0.26
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       2.6         PEAK FLOW RATE(CFS) =       6.97

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.29   FLOW VELOCITY(FEET/SEC.) =   2.23
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     22.10 =     580.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     22.10 TO NODE     23.10 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    725.50  DOWNSTREAM(FEET) =    720.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   415.00   CHANNEL SLOPE =  0.0133
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.895
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
```

```
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        1.80      0.30     1.000    84
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.15      0.20     1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.26
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.18
  AVERAGE FLOW DEPTH(FEET) =   0.39   TRAVEL TIME(MIN.) =   3.17
  Tc(MIN.) =   18.82
  SUBAREA AREA(ACRES) =     1.95       SUBAREA RUNOFF(CFS) =    4.57
  EFFECTIVE AREA(ACRES) =      4.57     AREA-AVERAGED Fm(INCH/HR) =   0.27
  AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        4.6         PEAK FLOW RATE(CFS) =      10.78

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.43   FLOW VELOCITY(FEET/SEC.) =   2.30
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     23.10 =     995.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.10 TO NODE     24.20 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    720.00  DOWNSTREAM(FEET) =    709.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   670.00   CHANNEL SLOPE =  0.0164
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.633
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B       10.16      0.30     1.000    84
  NATURAL FAIR COVER
  "OPEN BRUSH"               C        0.80      0.25     1.000    92
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        1.80      0.20     1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      24.30
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.29
  AVERAGE FLOW DEPTH(FEET) =   0.65   TRAVEL TIME(MIN.) =   3.39
  Tc(MIN.) =   22.21
  SUBAREA AREA(ACRES) =    12.76       SUBAREA RUNOFF(CFS) =   26.99
  EFFECTIVE AREA(ACRES) =     17.33     AREA-AVERAGED Fm(INCH/HR) =   0.28
  AREA-AVERAGED Fp(INCH/HR) =   0.28  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       17.3          PEAK FLOW RATE(CFS) =      36.69

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.83   FLOW VELOCITY(FEET/SEC.) =   3.77
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     24.20 =    1665.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.20 TO NODE     25.10 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    709.00  DOWNSTREAM(FEET) =    704.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   480.00   CHANNEL SLOPE =  0.0104
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.497
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B       14.00      0.30     1.000    84
  NATURAL FAIR COVER
  "OPEN BRUSH"               C        0.90      0.25     1.000    92
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        4.04      0.20     1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      55.62
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.73
  AVERAGE FLOW DEPTH(FEET) =   1.20   TRAVEL TIME(MIN.) =   2.15
  Tc(MIN.) =   24.36
  SUBAREA AREA(ACRES) =    18.94       SUBAREA RUNOFF(CFS) =   37.86
  EFFECTIVE AREA(ACRES) =     36.27     AREA-AVERAGED Fm(INCH/HR) =   0.28
  AREA-AVERAGED Fp(INCH/HR) =   0.28  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       36.3          PEAK FLOW RATE(CFS) =      72.43

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.40   FLOW VELOCITY(FEET/SEC.) =   4.05
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     25.10 =    2145.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     25.10 TO NODE     26.10 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    704.00  DOWNSTREAM(FEET) =    684.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   975.00   CHANNEL SLOPE =  0.0200
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.338
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        8.10      0.30     1.000    84
  NATURAL FAIR COVER
  "OPEN BRUSH"               C        4.10      0.25     1.000    92
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        9.40      0.20     1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      92.76
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.47
  AVERAGE FLOW DEPTH(FEET) =   1.34   TRAVEL TIME(MIN.) =   2.97
  Tc(MIN.) =   27.33
  SUBAREA AREA(ACRES) =    21.60       SUBAREA RUNOFF(CFS) =   40.65
  EFFECTIVE AREA(ACRES) =     57.87     AREA-AVERAGED Fm(INCH/HR) =   0.27
```

```
  AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       57.9          PEAK FLOW RATE(CFS) =     107.88

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.46   FLOW VELOCITY(FEET/SEC.) =   5.72
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     26.10 =    3120.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     26.10 TO NODE     61.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    684.50  DOWNSTREAM(FEET) =    675.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   660.00   CHANNEL SLOPE =  0.0141
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.242
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        6.00      0.30     1.000    84
  NATURAL FAIR COVER
  "OPEN BRUSH"               C        6.10      0.25     1.000    92
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        6.58      0.20     1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     124.64
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.30
  AVERAGE FLOW DEPTH(FEET) =   1.74   TRAVEL TIME(MIN.) =   2.07
  Tc(MIN.) =   29.40
  SUBAREA AREA(ACRES) =    18.68       SUBAREA RUNOFF(CFS) =   33.52
  EFFECTIVE AREA(ACRES) =     76.55     AREA-AVERAGED Fm(INCH/HR) =   0.26
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       76.5          PEAK FLOW RATE(CFS) =     136.40

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.83   FLOW VELOCITY(FEET/SEC.) =   5.46
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     61.00 =    3780.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       76.5  TC(MIN.) =     29.40
  EFFECTIVE AREA(ACRES) =     76.55  AREA-AVERAGED Fm(INCH/HR)=  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =     136.40
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
 ************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                      Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* Hydrology Study for Nakase Nursery                                    *
* City of Lake Forest                                                   *
* Existing Condition - 100-year Storm                                   *
 ************************************************************************

  FILE NAME: LFE-100.DAT
  TIME/DATE OF STUDY: 13:48 10/27/2017
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    743.00  DOWNSTREAM(FEET) =    730.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.951
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.586
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"              B        0.49      0.30     1.000    84   12.95
  NATURAL FAIR COVER
  "OPEN BRUSH"              D        0.09      0.20     1.000    96   12.95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.72
  TOTAL AREA(ACRES) =      0.58   PEAK FLOW RATE(CFS) =      1.72

************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    730.00  DOWNSTREAM(FEET) =    724.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.0196
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.217
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"              B        0.81      0.30     1.000    84
  NATURAL FAIR COVER
  "OPEN BRUSH"              D        0.60      0.20     1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.60
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.72
  AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =   2.71
  Tc(MIN.) =   15.66
  SUBAREA AREA(ACRES) =     1.41     SUBAREA RUNOFF(CFS) =     3.76
  EFFECTIVE AREA(ACRES) =     1.99     AREA-AVERAGED Fm(INCH/HR) =   0.27
  AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      2.0      PEAK FLOW RATE(CFS) =      5.29

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   1.98
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     580.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    724.50  DOWNSTREAM(FEET) =    717.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   410.00   CHANNEL SLOPE =  0.0183
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
```

Onsite Hydrology at Existing 84” Node 15, Area B
(F19) Serrano Creek, Q_{100}=2350 cfs

100-Year Storm Existing Condition

```
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.921
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        2.26      0.30     1.000    84
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.05      0.20     1.000    96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.25
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.39
 AVERAGE FLOW DEPTH(FEET) =   0.36   TRAVEL TIME(MIN.) =   2.86
 Tc(MIN.) =   18.52
 SUBAREA AREA(ACRES) =     3.31       SUBAREA RUNOFF(CFS) =    7.90
 EFFECTIVE AREA(ACRES) =      5.30     AREA-AVERAGED Fm(INCH/HR) =   0.27
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        5.3         PEAK FLOW RATE(CFS) =      12.66

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.43   FLOW VELOCITY(FEET/SEC.) =   2.70
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =     990.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    717.00  DOWNSTREAM(FEET) =    711.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   505.00   CHANNEL SLOPE =  0.0115
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.694
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        7.09      0.30     1.000    84
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        2.28      0.25     1.000    92
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        2.74      0.20     1.000    96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      25.90
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.99
 AVERAGE FLOW DEPTH(FEET) =   0.75   TRAVEL TIME(MIN.) =   2.81
 Tc(MIN.) =   21.34
 SUBAREA AREA(ACRES) =    12.11       SUBAREA RUNOFF(CFS) =   26.44
 EFFECTIVE AREA(ACRES) =     17.41     AREA-AVERAGED Fm(INCH/HR) =   0.27
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       17.4         PEAK FLOW RATE(CFS) =      38.02

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.94   FLOW VELOCITY(FEET/SEC.) =   3.40
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     14.00 =    1495.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    711.20  DOWNSTREAM(FEET) =    685.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1330.00   CHANNEL SLOPE =  0.0197
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   4.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.409
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        8.80      0.30     1.000    84
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        5.39      0.25     1.000    92
 NATURAL FAIR COVER
 "OPEN BRUSH"                D       11.80      0.20     1.000    96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      63.38
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.82
 AVERAGE FLOW DEPTH(FEET) =   1.08   TRAVEL TIME(MIN.) =   4.60
 Tc(MIN.) =   25.93
 SUBAREA AREA(ACRES) =    25.99       SUBAREA RUNOFF(CFS) =   50.64
 EFFECTIVE AREA(ACRES) =     43.40     AREA-AVERAGED Fm(INCH/HR) =   0.25
 AREA-AVERAGED Fp(INCH/HR) =   0.25  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       43.4         PEAK FLOW RATE(CFS) =      84.19

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.27   FLOW VELOCITY(FEET/SEC.) =   5.28
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =    2825.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       43.4  TC(MIN.) =     25.93
 EFFECTIVE AREA(ACRES) =      43.40  AREA-AVERAGED Fm(INCH/HR)=  0.25
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =      84.19
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

Onsite Hydrology at Existing 84” Node 15, Area B
(F19) Serrano Creek, Q_{100}=2350 cfs
100-Year Storm Existing Condition

```
 ************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY IN CITY OF LAKE FOREST                           *
* OFFSITE EXISTING CONDITION @ 100-YEAR STORM                           *
* W.O. #1443-136X                                                       *
 ************************************************************************

  FILE NAME: NAKASE99.DAT
  TIME/DATE OF STUDY: 14:46 07/19/2017
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1099.00  DOWNSTREAM(FEET) =   1091.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.370
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.605
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.78      0.25      0.600    86    8.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      3.13
  TOTAL AREA(ACRES) =      0.78   PEAK FLOW RATE(CFS) =      3.13

************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 1091.20  DOWNSTREAM ELEVATION(FEET) = 1089.40
  STREET LENGTH(FEET) =    90.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.80
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   14.90
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.71
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.47
  STREET FLOW TRAVEL TIME(MIN.) =   0.40   Tc(MIN.) =    8.78
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.483
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.38      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    9.33
  EFFECTIVE AREA(ACRES) =      3.16    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =      12.38

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  17.85
  FLOW VELOCITY(FEET/SEC.) =  4.17   DEPTH*VELOCITY(FT*FT/SEC.) =   1.87
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     390.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  62
```

```
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) = 1089.40  DOWNSTREAM ELEVATION(FEET) = 1067.00
  STREET LENGTH(FEET) =   513.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.44
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.41
    HALFSTREET FLOOD WIDTH(FEET) =   15.82
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.71
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.35
  STREET FLOW TRAVEL TIME(MIN.) =   1.50   Tc(MIN.) =   10.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.095
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.34      0.25     0.100    86
  PUBLIC PARK                C        0.25      0.25     0.850    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.418
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    2.12
  EFFECTIVE AREA(ACRES) =      3.75    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =      13.39

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  15.82
  FLOW VELOCITY(FEET/SEC.) =  5.69   DEPTH*VELOCITY(FT*FT/SEC.) =   2.34
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     903.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.095
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.35      0.25     0.100    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.49      0.25     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.333
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    3.03
  EFFECTIVE AREA(ACRES) =      4.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =      16.43

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1067.00  DOWNSTREAM(FEET) =  1062.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.79
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.43
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   10.39
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1003.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.39
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.068
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.09      0.25     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.09      SUBAREA RUNOFF(CFS) =    7.42
  EFFECTIVE AREA(ACRES) =      6.68   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        6.7        PEAK FLOW RATE(CFS) =      23.73

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1062.00  DOWNSTREAM(FEET) =  1022.40
  FLOW LENGTH(FEET) =   701.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.89
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.73
  PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =   11.13
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1704.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
  MAINLINE Tc(MIN.) =   11.13
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.912
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.18      0.30     0.100    76
  COMMERCIAL                 C        0.46      0.25     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.64      SUBAREA RUNOFF(CFS) =    2.24
  EFFECTIVE AREA(ACRES) =      7.32   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        7.3       PEAK FLOW RATE(CFS) =      25.03

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.40  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.49
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.03
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   11.38
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.38
  RAINFALL INTENSITY(INCH/HR) =   3.86
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       7.32
  TOTAL STREAM AREA(ACRES) =       7.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      25.03

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   305.00
  ELEVATION DATA: UPSTREAM(FEET) =   1046.00  DOWNSTREAM(FEET) =   1042.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.129
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.049
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 C        1.00      0.25     0.100    86    7.13
  RESIDENTIAL
  ".4 DWELLING/ACRE"         C        0.50      0.25     0.900    86   11.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
  SUBAREA RUNOFF(CFS) =      6.69
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      6.69

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1042.00  DOWNSTREAM ELEVATION(FEET) = 1036.00
  STREET LENGTH(FEET) =   373.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.09
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   14.50
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.28
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.27
  STREET FLOW TRAVEL TIME(MIN.) =   1.90   Tc(MIN.) =    9.03
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.411
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        3.31      0.25     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.31      SUBAREA RUNOFF(CFS) =   12.77
  EFFECTIVE AREA(ACRES) =      4.81    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =        4.8        PEAK FLOW RATE(CFS) =      18.60

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  16.63
  FLOW VELOCITY(FEET/SEC.) =  3.59   DEPTH*VELOCITY(FT*FT/SEC.) =   1.53
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     678.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) = 1036.00  DOWNSTREAM ELEVATION(FEET) = 1026.00
  STREET LENGTH(FEET) =   463.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      22.75
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.43
    HALFSTREET FLOOD WIDTH(FEET) =   17.04
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.19
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.82
  STREET FLOW TRAVEL TIME(MIN.) =   1.84   Tc(MIN.) =   10.87
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.966
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.40      0.25     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    8.30
  EFFECTIVE AREA(ACRES) =      7.21    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =        7.2         PEAK FLOW RATE(CFS) =      24.97

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  17.64
  FLOW VELOCITY(FEET/SEC.) =  4.30   DEPTH*VELOCITY(FT*FT/SEC.) =   1.91
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1141.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.87
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.966
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.16      0.30     0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.22      0.25     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    8.22
  EFFECTIVE AREA(ACRES) =      9.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        9.6       PEAK FLOW RATE(CFS) =      33.19

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1026.00  DOWNSTREAM(FEET) =  1022.00
  FLOW LENGTH(FEET) =   395.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.95
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      33.19
  PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =   11.60
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1536.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.60
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.820
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.07      0.30     0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        4.06      0.25     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    4.13      SUBAREA RUNOFF(CFS) =   13.73
  EFFECTIVE AREA(ACRES) =     13.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       13.7       PEAK FLOW RATE(CFS) =      45.66

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.00  DOWNSTREAM(FEET) =  1020.00
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.30
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      45.66
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   11.79
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
================================================================================
  MAINLINE Tc(MIN.) =   11.79
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.785
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.55      0.30     0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        2.06      0.25     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.61      SUBAREA RUNOFF(CFS) =    8.59
  EFFECTIVE AREA(ACRES) =     16.33   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      53.82

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1020.00  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.83
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      53.82
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   12.12
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    1799.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.12
  RAINFALL INTENSITY(INCH/HR) =   3.73
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =      16.33
  TOTAL STREAM AREA(ACRES) =      16.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      53.82

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       25.03   11.38    3.863  0.25( 0.11) 0.45       7.3       1.00
      2       53.82   12.12    3.725  0.25( 0.12) 0.49      16.3       8.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       77.47   11.38    3.863  0.25( 0.12) 0.48      22.6       1.00
      2       77.93   12.12    3.725  0.25( 0.12) 0.48      23.6       8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      77.93    Tc(MIN.) =    12.12
  EFFECTIVE AREA(ACRES) =      23.65   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       23.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1019.50  DOWNSTREAM(FEET) =  1014.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.77
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      77.93
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   12.27
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.10 =    2014.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.700
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.15      0.30     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.50
  EFFECTIVE AREA(ACRES) =     23.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       23.8       PEAK FLOW RATE(CFS) =      77.93
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.700
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.16      0.30     0.100    76
```

```
  COMMERCIAL                 C        1.44      0.25     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     5.29
  EFFECTIVE AREA(ACRES) =     25.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       25.4       PEAK FLOW RATE(CFS) =      81.99

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1014.00  DOWNSTREAM(FEET) =   971.40
  FLOW LENGTH(FEET) =   863.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.04
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      81.99
  PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =   12.98
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    2877.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.98
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.581
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                   B        0.82      0.30     0.100    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"         C        0.77      0.25     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.294
  SUBAREA AREA(ACRES) =     1.59      SUBAREA RUNOFF(CFS) =     5.02
  EFFECTIVE AREA(ACRES) =     26.99   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       27.0       PEAK FLOW RATE(CFS) =      84.29

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   971.40  DOWNSTREAM(FEET) =   969.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.92
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      84.29
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   13.01
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    2917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.01
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.577
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"         B        2.46      0.30     0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"         C       10.48      0.25     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   12.94      SUBAREA RUNOFF(CFS) =   40.14
  EFFECTIVE AREA(ACRES) =     39.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       39.9       PEAK FLOW RATE(CFS) =     124.32

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      125.50   12.27    3.699  0.25( 0.12) 0.46      38.9       1.00
      2      124.32   13.01    3.577  0.25( 0.12) 0.46      39.9       8.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =     125.50  Tc(MIN.) =   12.27
  AREA-AVERAGED Fm(INCH/HR) =  0.12  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.46  EFFECTIVE AREA(ACRES) =      38.93

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   969.00  DOWNSTREAM(FEET) =   954.00
  FLOW LENGTH(FEET) =   416.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.10
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     125.50
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   12.61
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    3333.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.61
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.641
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                   C        0.77      0.25     0.100    86
  PUBLIC PARK                  C        0.43      0.25     0.850    86
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.369
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    3.83
  EFFECTIVE AREA(ACRES) =     40.13   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       41.1       PEAK FLOW RATE(CFS) =     127.29

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   954.00  DOWNSTREAM(FEET) =   952.80
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.32
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     127.29
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   12.78
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    3453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.78
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.614
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.88      0.30     0.400    76
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        7.02      0.25     0.400    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    7.90      SUBAREA RUNOFF(CFS) =   24.97
  EFFECTIVE AREA(ACRES) =     48.03   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       49.0       PEAK FLOW RATE(CFS) =     151.30

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   952.80  DOWNSTREAM(FEET) =   929.00
  FLOW LENGTH(FEET) =   636.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.82
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     151.30
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   13.29
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.10 =    4089.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     17.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.29
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.534
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.68      0.30     0.500    76
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"        C        0.89      0.25     0.600    86
  COMMERCIAL                  C        1.86      0.25     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.309
  SUBAREA AREA(ACRES) =    3.43      SUBAREA RUNOFF(CFS) =   10.66
  EFFECTIVE AREA(ACRES) =     51.46   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       52.5       PEAK FLOW RATE(CFS) =     158.50

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   929.00  DOWNSTREAM(FEET) =   926.30
  FLOW LENGTH(FEET) =   122.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  34.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.55
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     158.50
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   13.40
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     18.00 =    4211.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.40
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.517
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS                B       24.46      0.30     0.350    76
  CONDOMINIUMS                C        7.92      0.25     0.350    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =   32.38      SUBAREA RUNOFF(CFS) =   99.55
  EFFECTIVE AREA(ACRES) =     83.84   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       84.8       PEAK FLOW RATE(CFS) =     257.24

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
```

```
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   926.30  DOWNSTREAM(FEET) =   922.70
  FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  42.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.26
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     257.24
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   13.55
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     19.00 =    4384.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.55
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.494
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        1.62      0.30     0.400    76
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        6.09      0.25     0.400    86
  COMMERCIAL                  B        2.90      0.30     0.100    76
  COMMERCIAL                  C        3.15      0.25     0.100    86
  NATURAL POOR COVER
  "GRASS"                     B        0.76      0.30     1.000    93
  NATURAL POOR COVER
  "GRASS"                     C        0.39      0.25     1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
  SUBAREA AREA(ACRES) =   14.91      SUBAREA RUNOFF(CFS) =   45.73
  EFFECTIVE AREA(ACRES) =     98.75   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =       99.8       PEAK FLOW RATE(CFS) =     301.28

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   922.70  DOWNSTREAM(FEET) =   815.60
  FLOW LENGTH(FEET) =  1580.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  34.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  31.69
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     301.28
  PIPE TRAVEL TIME(MIN.) =   0.83    Tc(MIN.) =   14.38
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     20.00 =    5964.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.38
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.377
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B       19.45      0.30     0.100    76
  COMMERCIAL                  C       16.92      0.25     0.100    86
  COMMERCIAL                  D        0.11      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   36.48      SUBAREA RUNOFF(CFS) =  109.98
  EFFECTIVE AREA(ACRES) =    135.23   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      136.2       PEAK FLOW RATE(CFS) =     400.84

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   815.60  DOWNSTREAM(FEET) =   799.50
  FLOW LENGTH(FEET) =   449.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  45.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.25
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     400.84
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   14.67
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6413.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.340
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        2.38      0.30     0.100    76
  COMMERCIAL                  C        0.87      0.25     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    9.68
  EFFECTIVE AREA(ACRES) =    138.48   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      139.5       PEAK FLOW RATE(CFS) =     405.93

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.340
```

```
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        4.10      0.30      0.100    76
  COMMERCIAL                 C        1.54      0.25      0.100    86
  COMMERCIAL                 D        2.08      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    7.72      SUBAREA RUNOFF(CFS) =   23.02
  EFFECTIVE AREA(ACRES) =    146.20   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      147.2       PEAK FLOW RATE(CFS) =     428.95

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   799.50  DOWNSTREAM(FEET) =   765.50
  FLOW LENGTH(FEET) =  1056.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  47.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.72
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     428.95
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   15.35
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     22.00 =    7469.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.35
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.253
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.06      0.30      0.100    76
  COMMERCIAL                 C        1.74      0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    3.80      SUBAREA RUNOFF(CFS) =   11.03
  EFFECTIVE AREA(ACRES) =    150.00   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      151.0       PEAK FLOW RATE(CFS) =     428.95
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.35
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.253
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.23      0.30      0.100    76
  COMMERCIAL                 D        5.07      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    5.30      SUBAREA RUNOFF(CFS) =   15.42
  EFFECTIVE AREA(ACRES) =    155.30   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      156.3       PEAK FLOW RATE(CFS) =     444.07

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   765.50  DOWNSTREAM(FEET) =   755.00
  FLOW LENGTH(FEET) =   465.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  50.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.88
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     444.07
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   15.69
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     23.00 =    7934.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.213
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        9.15      0.30      0.100    76
  COMMERCIAL                 C       10.79      0.25      0.100    86
  COMMERCIAL                 D        1.81      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   21.75      SUBAREA RUNOFF(CFS) =   62.37
  EFFECTIVE AREA(ACRES) =    177.05   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =      178.1       PEAK FLOW RATE(CFS) =     500.79

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.213
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        7.47      0.30      0.100    76
  COMMERCIAL                 C        0.40      0.25      0.100    86
  COMMERCIAL                 D       17.76      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   25.63      SUBAREA RUNOFF(CFS) =   73.58
  EFFECTIVE AREA(ACRES) =    202.68   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      203.7       PEAK FLOW RATE(CFS) =     574.38

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   755.00  DOWNSTREAM(FEET) =   736.00
  FLOW LENGTH(FEET) =  1257.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  78.0 INCH PIPE IS  60.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.95
  ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     574.38
  PIPE TRAVEL TIME(MIN.) =   1.00    Tc(MIN.) =   16.69
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.00 =    9191.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.101
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B       16.13      0.30     0.100    76
  COMMERCIAL                  C        3.87      0.25     0.100    86
  COMMERCIAL                  D        4.22      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   24.22      SUBAREA RUNOFF(CFS) =   67.00
  EFFECTIVE AREA(ACRES) =    226.90   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      227.9       PEAK FLOW RATE(CFS) =     621.00
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      227.9  TC(MIN.) =     16.69
  EFFECTIVE AREA(ACRES) =    226.90  AREA-AVERAGED Fm(INCH/HR)=  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap = 0.227
  PEAK FLOW RATE(CFS)   =     621.00

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      621.00   16.69    3.101  0.27( 0.06) 0.23     226.9       1.00
      2      607.40   17.46    3.022  0.27( 0.06) 0.23     227.9       8.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
 ************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY IN CITY OF LAKE FOREST                             *
* OFFSITE & ONSITE EXISTING CONDITION @ 100-YEAR STORM                    *
* W.O. #1443-136X                                                         *
 ************************************************************************

  FILE NAME: EXIST100.DAT
  TIME/DATE OF STUDY: 20:10 10/05/2017
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1099.00  DOWNSTREAM(FEET) =   1091.20
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.370
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.605
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.78      0.25      0.600    86    8.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      3.13
  TOTAL AREA(ACRES) =      0.78   PEAK FLOW RATE(CFS) =      3.13

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1091.20  DOWNSTREAM ELEVATION(FEET) = 1089.40
  STREET LENGTH(FEET) =    90.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.80
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   14.90
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.71
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.47
  STREET FLOW TRAVEL TIME(MIN.) =   0.40   Tc(MIN.) =    8.78
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.483
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.38      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    9.33
  EFFECTIVE AREA(ACRES) =      3.16    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =      12.38

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  17.85
  FLOW VELOCITY(FEET/SEC.) =  4.17   DEPTH*VELOCITY(FT*FT/SEC.) =   1.87
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     390.00 FEET.
```

Offsite Hydrology at Rancho Parkway (F19-P07)
Confluences with Onsite at Existing 10.5’ x 10.5’ RCB (F19S02)

100-Year Storm Existing Condition

```
****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1089.40  DOWNSTREAM ELEVATION(FEET) = 1067.00
  STREET LENGTH(FEET) =   513.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.44
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.41
    HALFSTREET FLOOD WIDTH(FEET) =   15.82
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.71
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.35
  STREET FLOW TRAVEL TIME(MIN.) =   1.50   Tc(MIN.) =   10.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.095
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.34      0.25     0.100    86
  PUBLIC PARK                C        0.25      0.25     0.850    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.418
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    2.12
  EFFECTIVE AREA(ACRES) =      3.75    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =      13.39

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  15.82
  FLOW VELOCITY(FEET/SEC.) =  5.69   DEPTH*VELOCITY(FT*FT/SEC.) =   2.34
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     903.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.095
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.35      0.25     0.100    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.49      0.25     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.333
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    3.03
  EFFECTIVE AREA(ACRES) =      4.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =      16.43

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1067.00  DOWNSTREAM(FEET) =  1062.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.79
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.43
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   10.39
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1003.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.39
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.068
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.09      0.25     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.09      SUBAREA RUNOFF(CFS) =    7.42
  EFFECTIVE AREA(ACRES) =      6.68   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        6.7        PEAK FLOW RATE(CFS) =      23.73

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1062.00  DOWNSTREAM(FEET) =  1022.40
  FLOW LENGTH(FEET) =   701.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.89
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.73
  PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =   11.13
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1704.00 FEET.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.13
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.912
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                B        0.18      0.30     0.100    76
 COMMERCIAL                C        0.46      0.25     0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.64      SUBAREA RUNOFF(CFS) =    2.24
 EFFECTIVE AREA(ACRES) =      7.32   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
 TOTAL AREA(ACRES) =        7.3       PEAK FLOW RATE(CFS) =      25.03

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1022.40  DOWNSTREAM(FEET) =  1019.50
 FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.49
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      25.03
 PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   11.38
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   11.38
 RAINFALL INTENSITY(INCH/HR) =   3.86
 AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.45
 EFFECTIVE STREAM AREA(ACRES) =       7.32
 TOTAL STREAM AREA(ACRES) =       7.32
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      25.03

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   305.00
 ELEVATION DATA: UPSTREAM(FEET) =   1046.00  DOWNSTREAM(FEET) =   1042.00
 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.129
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.049
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                C        1.00      0.25     0.100    86    7.13
 RESIDENTIAL
 ".4 DWELLING/ACRE"        C        0.50      0.25     0.900    86   11.42
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
 SUBAREA RUNOFF(CFS) =      6.69
 TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      6.69

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1042.00  DOWNSTREAM ELEVATION(FEET) = 1036.00
 STREET LENGTH(FEET) =   373.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.09
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.39
   HALFSTREET FLOOD WIDTH(FEET) =   14.50
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.28
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.27
 STREET FLOW TRAVEL TIME(MIN.) =   1.90   Tc(MIN.) =    9.03
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.411
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"      C        3.31      0.25     0.500    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    3.31      SUBAREA RUNOFF(CFS) =   12.77
 EFFECTIVE AREA(ACRES) =      4.81    AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =        4.8       PEAK FLOW RATE(CFS) =      18.60

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  16.63
 FLOW VELOCITY(FEET/SEC.) =  3.59   DEPTH*VELOCITY(FT*FT/SEC.) =   1.53
```

```
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     678.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1036.00  DOWNSTREAM ELEVATION(FEET) = 1026.00
 STREET LENGTH(FEET) =   463.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      22.75
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.43
   HALFSTREET FLOOD WIDTH(FEET) =   17.04
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.19
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.82
 STREET FLOW TRAVEL TIME(MIN.) =   1.84   Tc(MIN.) =   10.87
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.966
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        2.40      0.25     0.500    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    8.30
 EFFECTIVE AREA(ACRES) =      7.21    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =      24.97

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  17.64
 FLOW VELOCITY(FEET/SEC.) =  4.30   DEPTH*VELOCITY(FT*FT/SEC.) =   1.91
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1141.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.87
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.966
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.16      0.30     0.500    76
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        2.22      0.25     0.500    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    8.22
 EFFECTIVE AREA(ACRES) =      9.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =        9.6        PEAK FLOW RATE(CFS) =      33.19

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1026.00  DOWNSTREAM(FEET) =  1022.00
 FLOW LENGTH(FEET) =   395.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.95
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      33.19
 PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =   11.60
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1536.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.60
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.820
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.07      0.30     0.500    76
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        4.06      0.25     0.500    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    4.13      SUBAREA RUNOFF(CFS) =   13.73
 EFFECTIVE AREA(ACRES) =     13.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
 TOTAL AREA(ACRES) =       13.7       PEAK FLOW RATE(CFS) =      45.66

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1022.00  DOWNSTREAM(FEET) =  1020.00
 FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.30
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =      45.66
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   11.79
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.79
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.785
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.55      0.30     0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.06      0.25     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     2.61      SUBAREA RUNOFF(CFS) =     8.59
  EFFECTIVE AREA(ACRES) =     16.33   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      53.82

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1020.00  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.83
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      53.82
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   12.12
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    1799.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.12
  RAINFALL INTENSITY(INCH/HR) =   3.73
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =      16.33
  TOTAL STREAM AREA(ACRES) =      16.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      53.82

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       25.03   11.38    3.863  0.25( 0.11) 0.45       7.3        1.00
      2       53.82   12.12    3.725  0.25( 0.12) 0.49      16.3        8.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       77.47   11.38    3.863  0.25( 0.12) 0.48      22.6        1.00
      2       77.93   12.12    3.725  0.25( 0.12) 0.48      23.6        8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      77.93    Tc(MIN.) =    12.12
  EFFECTIVE AREA(ACRES) =      23.65   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       23.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1019.50  DOWNSTREAM(FEET) =  1014.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.77
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      77.93
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   12.27
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.10 =    2014.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.700
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.15      0.30     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.15      SUBAREA RUNOFF(CFS) =     0.50
  EFFECTIVE AREA(ACRES) =     23.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       23.8       PEAK FLOW RATE(CFS) =      77.93
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
```

```
 FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.27
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.700
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.16      0.30     0.100    76
 COMMERCIAL                 C        1.44      0.25     0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    1.60      SUBAREA RUNOFF(CFS) =    5.29
 EFFECTIVE AREA(ACRES) =     25.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
 TOTAL AREA(ACRES) =       25.4       PEAK FLOW RATE(CFS) =      81.99

****************************************************************************
 FLOW PROCESS FROM NODE      7.10 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1014.00  DOWNSTREAM(FEET) =   971.40
 FLOW LENGTH(FEET) =   863.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.04
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      81.99
 PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =   12.98
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    2877.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.98
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.581
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.82      0.30     0.100    76
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        0.77      0.25     0.500    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.294
 SUBAREA AREA(ACRES) =    1.59      SUBAREA RUNOFF(CFS) =    5.02
 EFFECTIVE AREA(ACRES) =     26.99   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
 TOTAL AREA(ACRES) =       27.0       PEAK FLOW RATE(CFS) =      84.29

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   971.40  DOWNSTREAM(FEET) =   969.00
 FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  21.92
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      84.29
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   13.01
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    2917.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.01
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.577
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        2.46      0.30     0.500    76
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C       10.48      0.25     0.500    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =   12.94      SUBAREA RUNOFF(CFS) =   40.14
 EFFECTIVE AREA(ACRES) =     39.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =       39.9       PEAK FLOW RATE(CFS) =     124.32

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      125.50   12.27    3.699  0.25( 0.12) 0.46      38.9       1.00
     2      124.32   13.01    3.577  0.25( 0.12) 0.46      39.9       8.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =     125.50  Tc(MIN.) =   12.27
 AREA-AVERAGED Fm(INCH/HR) =  0.12  AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.46  EFFECTIVE AREA(ACRES) =      38.93

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   969.00  DOWNSTREAM(FEET) =   954.00
 FLOW LENGTH(FEET) =   416.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.10
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     125.50
 PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   12.61
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    3333.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.61
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.641
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        0.77      0.25      0.100    86
  PUBLIC PARK                 C        0.43      0.25      0.850    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.369
  SUBAREA AREA(ACRES) =     1.20      SUBAREA RUNOFF(CFS) =     3.83
  EFFECTIVE AREA(ACRES) =     40.13   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       41.1       PEAK FLOW RATE(CFS) =     127.29

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   954.00  DOWNSTREAM(FEET) =   952.80
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.32
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     127.29
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   12.78
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    3453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.78
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.614
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.88      0.30      0.400    76
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        7.02      0.25      0.400    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =     7.90      SUBAREA RUNOFF(CFS) =    24.97
  EFFECTIVE AREA(ACRES) =     48.03   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       49.0       PEAK FLOW RATE(CFS) =     151.30

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   952.80  DOWNSTREAM(FEET) =   929.00
  FLOW LENGTH(FEET) =   636.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.82
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     151.30
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   13.29
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.10 =    4089.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     17.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.29
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.534
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.68      0.30      0.500    76
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"        C        0.89      0.25      0.600    86
  COMMERCIAL                  C        1.86      0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.309
  SUBAREA AREA(ACRES) =     3.43      SUBAREA RUNOFF(CFS) =    10.66
  EFFECTIVE AREA(ACRES) =     51.46   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       52.5       PEAK FLOW RATE(CFS) =     158.50

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   929.00  DOWNSTREAM(FEET) =   926.30
  FLOW LENGTH(FEET) =   122.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  34.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.55
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     158.50
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   13.40
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     18.00 =    4211.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.40
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.517
```

```
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS                B       24.46      0.30      0.350    76
 CONDOMINIUMS                C        7.92      0.25      0.350    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA AREA(ACRES) =   32.38      SUBAREA RUNOFF(CFS) =   99.55
 EFFECTIVE AREA(ACRES) =     83.84   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =       84.8       PEAK FLOW RATE(CFS) =     257.24

****************************************************************************
 FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   926.30  DOWNSTREAM(FEET) =   922.70
 FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  42.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.26
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     257.24
 PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   13.55
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     19.00 =    4384.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.55
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.494
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        1.62      0.30      0.400    76
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       C        6.09      0.25      0.400    86
 COMMERCIAL                  B        2.90      0.30      0.100    76
 COMMERCIAL                  C        3.15      0.25      0.100    86
 NATURAL POOR COVER
 "GRASS"                     B        0.76      0.30      1.000    93
 NATURAL POOR COVER
 "GRASS"                     C        0.39      0.25      1.000    97
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
 SUBAREA AREA(ACRES) =   14.91      SUBAREA RUNOFF(CFS) =   45.73
 EFFECTIVE AREA(ACRES) =     98.75   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.39
 TOTAL AREA(ACRES) =       99.8       PEAK FLOW RATE(CFS) =     301.28

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   922.70  DOWNSTREAM(FEET) =   815.60
 FLOW LENGTH(FEET) =  1580.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  34.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  31.69
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     301.28
 PIPE TRAVEL TIME(MIN.) =   0.83    Tc(MIN.) =   14.38
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     20.00 =    5964.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.38
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.377
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B       19.45      0.30      0.100    76
 COMMERCIAL                  C       16.92      0.25      0.100    86
 COMMERCIAL                  D        0.11      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =   36.48      SUBAREA RUNOFF(CFS) =  109.98
 EFFECTIVE AREA(ACRES) =    135.23   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =      136.2       PEAK FLOW RATE(CFS) =     400.84

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   815.60  DOWNSTREAM(FEET) =   799.50
 FLOW LENGTH(FEET) =   449.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  45.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  26.25
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     400.84
 PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   14.67
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6413.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.67
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.340
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  COMMERCIAL                  B        2.38      0.30     0.100    76
  COMMERCIAL                  C        0.87      0.25     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     3.25      SUBAREA RUNOFF(CFS) =     9.68
  EFFECTIVE AREA(ACRES) =    138.48   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      139.5       PEAK FLOW RATE(CFS) =     405.93

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.340
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        4.10      0.30     0.100    76
  COMMERCIAL                  C        1.54      0.25     0.100    86
  COMMERCIAL                  D        2.08      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     7.72      SUBAREA RUNOFF(CFS) =    23.02
  EFFECTIVE AREA(ACRES) =    146.20   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      147.2       PEAK FLOW RATE(CFS) =     428.95

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   799.50  DOWNSTREAM(FEET) =   765.50
  FLOW LENGTH(FEET) =  1056.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  47.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.72
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     428.95
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   15.35
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     22.00 =    7469.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.35
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.253
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        2.06      0.30     0.100    76
  COMMERCIAL                  C        1.74      0.25     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     3.80      SUBAREA RUNOFF(CFS) =    11.03
  EFFECTIVE AREA(ACRES) =    150.00   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      151.0       PEAK FLOW RATE(CFS) =     428.95
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.35
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.253
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.23      0.30     0.100    76
  COMMERCIAL                  D        5.07      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     5.30      SUBAREA RUNOFF(CFS) =    15.42
  EFFECTIVE AREA(ACRES) =    155.30   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      156.3       PEAK FLOW RATE(CFS) =     444.07

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   765.50  DOWNSTREAM(FEET) =   755.00
  FLOW LENGTH(FEET) =   465.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  50.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.88
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     444.07
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   15.69
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     23.00 =    7934.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.213
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        9.15      0.30     0.100    76
  COMMERCIAL                  C       10.79      0.25     0.100    86
  COMMERCIAL                  D        1.81      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    21.75      SUBAREA RUNOFF(CFS) =    62.37
```

```
  EFFECTIVE AREA(ACRES) =    177.05   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =      178.1       PEAK FLOW RATE(CFS) =     500.79

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.213
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        7.47      0.30      0.100    76
  COMMERCIAL                 C        0.40      0.25      0.100    86
  COMMERCIAL                 D       17.76      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   25.63      SUBAREA RUNOFF(CFS) =   73.58
  EFFECTIVE AREA(ACRES) =    202.68   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      203.7       PEAK FLOW RATE(CFS) =     574.38

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   755.00  DOWNSTREAM(FEET) =   736.00
  FLOW LENGTH(FEET) =  1257.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  78.0 INCH PIPE IS  60.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.95
  ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     574.38
  PIPE TRAVEL TIME(MIN.) =   1.00    Tc(MIN.) =   16.69
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.00 =    9191.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.101
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B       16.13      0.30      0.100    76
  COMMERCIAL                 C        3.87      0.25      0.100    86
  COMMERCIAL                 D        4.22      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   24.22      SUBAREA RUNOFF(CFS) =   67.00
  EFFECTIVE AREA(ACRES) =    226.90   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      227.9       PEAK FLOW RATE(CFS) =     621.00

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.10 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   718.60  DOWNSTREAM(FEET) =   718.20
  FLOW LENGTH(FEET) =   110.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.50
  (PIPE FLOW VELOCITY CORRESPONDING TO FULL PIPE CAPACITY FLOW)
  GIVEN PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     621.00
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   16.88
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.10 =    9301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.10 TO NODE     24.20 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    718.20  DOWNSTREAM(FEET) =    709.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   898.00   CHANNEL SLOPE =  0.0102
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     621.00
  FLOW VELOCITY(FEET/SEC.) =   7.46   FLOW DEPTH(FEET) =   4.42
  TRAVEL TIME(MIN.) =   2.01   Tc(MIN.) =   18.89
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.20 =   10199.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.20 TO NODE     24.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.89
  RAINFALL INTENSITY(INCH/HR) =   2.89
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.23
  EFFECTIVE STREAM AREA(ACRES) =     226.90
  TOTAL STREAM AREA(ACRES) =     227.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     621.00

****************************************************************************
  FLOW PROCESS FROM NODE     10.10 TO NODE     21.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    743.00  DOWNSTREAM(FEET) =    731.00
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.160
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.554
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        0.41      0.30     1.000    84   13.16
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.24      0.20     1.000    96   13.16
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.93
  TOTAL AREA(ACRES) =      0.65   PEAK FLOW RATE(CFS) =      1.93

****************************************************************************
  FLOW PROCESS FROM NODE     21.10 TO NODE     22.10 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    731.00  DOWNSTREAM(FEET) =    725.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.0196
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.218
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        1.19      0.30     1.000    84
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.78      0.20     1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.55
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.88
  AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   2.48
  Tc(MIN.) =   15.64
  SUBAREA AREA(ACRES) =     1.97       SUBAREA RUNOFF(CFS) =    5.24
  EFFECTIVE AREA(ACRES) =      2.62     AREA-AVERAGED Fm(INCH/HR) =   0.26
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        2.6          PEAK FLOW RATE(CFS) =       6.97

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.29   FLOW VELOCITY(FEET/SEC.) =   2.23
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     22.10 =     580.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.10 TO NODE     23.10 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    725.50  DOWNSTREAM(FEET) =    720.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   415.00   CHANNEL SLOPE =  0.0133
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.895
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        1.80      0.30     1.000    84
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.15      0.20     1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.26
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.18
  AVERAGE FLOW DEPTH(FEET) =   0.39   TRAVEL TIME(MIN.) =   3.17
  Tc(MIN.) =   18.82
  SUBAREA AREA(ACRES) =     1.95       SUBAREA RUNOFF(CFS) =    4.57
  EFFECTIVE AREA(ACRES) =      4.57     AREA-AVERAGED Fm(INCH/HR) =   0.27
  AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        4.6          PEAK FLOW RATE(CFS) =      10.78

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.43   FLOW VELOCITY(FEET/SEC.) =   2.30
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     23.10 =     995.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.10 TO NODE     24.20 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    720.00  DOWNSTREAM(FEET) =    709.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   670.00   CHANNEL SLOPE =  0.0164
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.633
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B       10.16      0.30     1.000    84
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.80      0.25     1.000    92
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        1.80      0.20     1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      24.30
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.29
  AVERAGE FLOW DEPTH(FEET) =   0.65   TRAVEL TIME(MIN.) =   3.39
  Tc(MIN.) =   22.21
  SUBAREA AREA(ACRES) =    12.76       SUBAREA RUNOFF(CFS) =   26.99
  EFFECTIVE AREA(ACRES) =     17.33     AREA-AVERAGED Fm(INCH/HR) =   0.28
  AREA-AVERAGED Fp(INCH/HR) =   0.28  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       17.3          PEAK FLOW RATE(CFS) =      36.69

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
 DEPTH(FEET) =  0.83   FLOW VELOCITY(FEET/SEC.) =   3.77
 LONGEST FLOWPATH FROM NODE     10.10 TO NODE     24.20 =    1665.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.20 TO NODE     24.20 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   22.21
 RAINFALL INTENSITY(INCH/HR) =   2.63
 AREA-AVERAGED Fm(INCH/HR) =  0.28
 AREA-AVERAGED Fp(INCH/HR) =  0.28
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      17.33
 TOTAL STREAM AREA(ACRES) =      17.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      36.69

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      621.00   18.89    2.889  0.27( 0.06) 0.23     226.9       1.00
     1      607.40   19.67    2.822  0.27( 0.06) 0.23     227.9       8.00
     2       36.69   22.21    2.633  0.28( 0.28) 1.00      17.3      10.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      655.59   18.89    2.889  0.27( 0.07) 0.27     241.6       1.00
     2      642.52   19.67    2.822  0.27( 0.07) 0.28     243.2       8.00
     3      602.40   22.21    2.633  0.27( 0.08) 0.28     245.2      10.10

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     655.59    Tc(MIN.) =    18.89
 EFFECTIVE AREA(ACRES) =     241.64   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
 TOTAL AREA(ACRES) =      245.2
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.20 =   10199.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.20 TO NODE     25.10 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    709.00  DOWNSTREAM(FEET) =    704.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   480.00   CHANNEL SLOPE =  0.0104
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.801
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B       14.00      0.30     1.000    84
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.90      0.25     1.000    92
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        4.04      0.20     1.000    96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     677.12
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.69
 AVERAGE FLOW DEPTH(FEET) =   4.59   TRAVEL TIME(MIN.) =   1.04
 Tc(MIN.) =   19.93
 SUBAREA AREA(ACRES) =    18.94       SUBAREA RUNOFF(CFS) =   43.04
 EFFECTIVE AREA(ACRES) =    260.58     AREA-AVERAGED Fm(INCH/HR) =   0.09
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   0.33
 TOTAL AREA(ACRES) =      264.2         PEAK FLOW RATE(CFS) =     655.59
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  4.52   FLOW VELOCITY(FEET/SEC.) =   7.62
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     25.10 =   10679.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.10 TO NODE     26.10 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    704.00  DOWNSTREAM(FEET) =    684.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   975.00   CHANNEL SLOPE =  0.0200
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.676
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        8.10      0.30     1.000    84
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        4.10      0.25     1.000    92
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        9.40      0.20     1.000    96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     679.20
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.77
 AVERAGE FLOW DEPTH(FEET) =   3.90   TRAVEL TIME(MIN.) =   1.66
 Tc(MIN.) =   21.59
 SUBAREA AREA(ACRES) =    21.60       SUBAREA RUNOFF(CFS) =   47.21
 EFFECTIVE AREA(ACRES) =    282.18     AREA-AVERAGED Fm(INCH/HR) =   0.10
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   0.38
 TOTAL AREA(ACRES) =      285.8         PEAK FLOW RATE(CFS) =     655.59
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  3.83   FLOW VELOCITY(FEET/SEC.) =   9.68
```

```
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     26.10 =   11654.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     26.10 TO NODE     61.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    684.50  DOWNSTREAM(FEET) =    675.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   660.00   CHANNEL SLOPE =  0.0141
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.589
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        6.00      0.30     1.000    84
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        6.10      0.25     1.000    92
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        6.58      0.20     1.000    96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     675.27
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.58
 AVERAGE FLOW DEPTH(FEET) =   4.25   TRAVEL TIME(MIN.) =   1.28
 Tc(MIN.) =   22.88
 SUBAREA AREA(ACRES) =    18.68       SUBAREA RUNOFF(CFS) =   39.34
 EFFECTIVE AREA(ACRES) =    300.86     AREA-AVERAGED Fm(INCH/HR) =   0.11
 AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   0.42
 TOTAL AREA(ACRES) =      304.5          PEAK FLOW RATE(CFS) =     671.23

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  4.24   FLOW VELOCITY(FEET/SEC.) =   8.57
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     61.00 =   12314.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =      304.5  TC(MIN.) =     22.88
 EFFECTIVE AREA(ACRES) =    300.86  AREA-AVERAGED Fm(INCH/HR)=  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap = 0.417
 PEAK FLOW RATE(CFS)   =     671.23

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      671.23   22.88    2.589  0.26( 0.11) 0.42     300.9       1.00
     2      660.90   23.68    2.538  0.26( 0.11) 0.42     302.5       8.00
     3      624.49   26.29    2.390  0.26( 0.11) 0.42     304.5      10.10
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

EXIST. DBL 12'X8' RCB
(F19) SERRANO CREEK
Q100=2,100 CFS

RANCHO PARKWAY

EXISTING 84"RCP
F19–P07

Q_2 =200.1cfs
Q_{25} =475.9cfs
Q_{100}=621.0cfs
t=16.7, EL=718.6
Area=227.90 acres

L=110'

24

24.1

Q_2 = 0.6cfs
Q_{25} = 1.5cfs
Q_{100} = 1.9cfs
t=13.2, EL=731.0
Area=0.65 acre

A 0.65

L=300'

10

10.1

21.1

Q_2 = 0.5cfs
Q_{25} = 1.3cfs
Q_{100} = 1.7cfs
t=13.0, EL=730.0
Area=0.58 acre

B 0.58

L=300'

11

Q_2 =200.1cfs
Q_{25} =475.9cfs
Q_{100}=621.0cfs
t=16.7, EL=718.2
Area=227.90 acres

A 1.97

L=280'

B 1.41

L=280'

22.1

12

Q_2 = 2.0cfs
Q_{25} = 5.3cfs
Q_{100} = 7.0cfs
t=15.6, EL=725.5
Area=2.62 acres

Q_2 = 1.5cfs
Q_{25} = 4.0cfs
Q_{100} = 5.3cfs
t=15.7, EL=724.5
Area=1.99 acre

L=898'

Existing Earth Channel

A 12.76

L=415'

A 1.95

L=410'

B 3.31

Q_2 = 2.8cfs
Q_{25} = 8.1cfs
Q_{100} =10.8cfs
t=18.8, EL=720.0
Area=4.57 acres

L=670'

23.1

13

Q_2 = 3.4cfs
Q_{25} = 9.5cfs
Q_{100}=12.7cfs
t=18.5, EL=717.0
Area=5.30 acre

BAKE PARKWAY

A 18.94

Q_2 =208.6cfs
Q_{25} =501.6cfs
Q_{100}=655.6cfs
t=18.9, EL=709.0
Area=245.23 acres

Existing Earth Channel

Q_2 =208.6cfs
Q_{25} =501.6cfs
Q_{100}=655.6cfs
t=19.9, EL=704.0
Area=264.17 acres

24.2

25.1

L=480'

Q_2 = 8.8cfs
Q_{25} =27.2cfs
Q_{100} =36.7cfs
t=22.2, EL=709.0
Area=17.33 acres

RANCHO PARKWAY S.

Q_2 =11.1cfs
Q_{25} =32.1cfs
Q_{100} =43.0cfs
t=19.9, EL=704.0
Area=18.94 acres

B 12.11

L=505'

14

Q_2 = 9.5cfs
Q_{25} =28.3cfs
Q_{100} =38.0cfs
t=21.3, EL=711.2
Area=17.41 acres

SERRANO CREEK

A 21.60

Existing Earth Channel

L=975'

Q_2 =208.6cfs
Q_{25} =501.6cfs
Q_{100}=655.6cfs
t=21.6, EL=684.5
Area=285.77 acres

Q_2 =12.3cfs
Q_{25} =35.2cfs
Q_{100}=47.2cfs
t=21.6, EL=684.5
Area=21.60 acres

26.1

B 25.99

L=1,330'

ORCHARD

EXISTING 90" PIPE
Q25=808 CFS

Existing Earth Channel

L=660'

Q_2 =10.1cfs
Q_{25} =29.3cfs
Q_{100}=39.3cfs
t=22.9, EL=675.2
Area=18.68 acres

A 18.68

Q_2 =208.6cfs
Q_{25} =508.7cfs
Q_{100}=671.2cfs
t=22.9, EL=684.5
Area=304.45 acres

61

15

EXIST. 84" PIPE

EXISTING 90" PIPE (F19–P06)
Q25=808 CFS

EXISTING 10.5'X10.5' RCB (F19–P07)
Q100=729.2 CFS

(F19) SERRANO CREEK
Q100=2350 CFS
TOTAL AREA=1281 ACRES

Q_2 =19.6cfs
Q_{25} =62.2cfs
Q_{100} =84.2cfs
t=25.9
Total Area=43.40 acres

EXISTING 10.5'X10.5' RCB (F19–S02)
Q100=1916 CFS

EXISTING 10.5'X10.5' RCB (F19–P07)
Q100=1747.3 CFS

LEGEND

- MAJOR DRAINAGE BOUNDARY
- MINOR DRAINAGE BOUNDARY
- 100 — NODE NUMBER
- A / 1.0 — AREA DESIGNATION / AREA ACREAGE (IN ACRES)
- Q_{100}=8.0cfs, t=15.0 — PEAK FLOW RATE / TIME OF CONCENTRATION
- TQ_{100}=10.0cfs, t=15.0 — PEAK CONFLUENCE FLOW RATE / TIME OF CONCENTRATION
- A — SOIL GROUP

1" = 100'

100 50 0 100 300

MAP DATE IDENTIFIER
DATE OF LATEST CHANGE TO THIS MAP
10/06/17 BY: HTC
DATE OF THIS PLOT
06/29/18

EXHIBIT 2

HYDROLOGY MAP
NAKASE RANCH NURSERY
EXISTING CONIDITION
CITY OF LAKE FOREST

PREPARED FOR:
TOLL BROTHERS, INC.
725 W. TOWN & COUNTRY
ROAD, SUITE 200
ORANGE, CA 92686

PREPARED BY:
HUNSAKER & ASSOCIATES
IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes ▪ Irvine, CA 92618 ▪ PH: (949) 583-1010 ▪ FX: (949) 583-0759

PLOTTED BY: Ha To Chau DATE: Jun. 29, 2018 06:09:29 PM FILE: F:\0894\Engineering\SY_Hydrology\Onsite\Hydrology – Existing with offsite.dwg

WO: 1443-136X
HYDROLOGY MAP FOR NAKASE NURSERY

LEGEND

- MAJOR DRAINAGE BOUNDARY
- MINOR DRAINAGE BOUNDARY
- NODE NUMBER
- AREA DESIGNATION / AREA ACREAGE (IN ACRES)
- PEAK FLOW RATE / TIME OF CONCENTRATION
- PEAK CONFLUENCE FLOW RATE / TIME OF CONCENTRATION
- PROPOSED STORM DRAIN
- SOIL GROUP

PREPARED FOR:

TOLL BROTHERS, INC.
725 W. TOWN & COUNTRY ROAD, SUITE 200
ORANGE, CA 92686

PREPARED BY:

HUNSAKER & ASSOCIATES IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes ▪ Irvine, CA 92618 ▪ PH: (949) 583-1010 ▪ FX: (949) 583-0759

1" = 100'

100 50 0 100 300

MAP DATE IDENTIFIER
DATE OF LATEST CHANGE TO THIS MAP 07/07/17 BY: HTC
DATE OF THIS PLOT 10/22/18

EXHIBIT 2A

HYDROLOGY MAP VTM 18142 (OFFSITE) (EXISTING CONDITION)

CITY OF LAKE FOREST

WO: 1443-136x
HYDROLOGY MAP FOR NAKASE NURSERY

PLOTTED BY: Ha To Chau DATE: Oct. 22, 2018 03:38:00 PM FILE: F:\0894\Engineering\SY_Hydrology\Off Site\Hydrology - Offsite.dwg

LEGEND

- MAJOR DRAINAGE BOUNDARY
- MINOR DRAINAGE BOUNDARY
- NODE NUMBER
- AREA DESIGNATION / AREA ACREAGE (IN ACRES)
- PEAK FLOW RATE / TIME OF CONCENTRATION
- PEAK CONFLUENCE FLOW RATE / TIME OF CONCENTRATION
- PROPOSED STORM DRAIN
- SOIL GROUP

PREPARED FOR:

TOLL BROTHERS, INC.
725 W. TOWN & COUNTRY ROAD, SUITE 200
ORANGE, CA 92686

PREPARED BY:

HUNSAKER & ASSOCIATES
IRVINE, INC.
PLANNING • ENGINEERING • SURVEYING
Three Hughes • Irvine, CA 92618 • PH: (949) 583-1010 • FX: (949) 583-0759

1"=100'

100 50 0 100 300

MAP DATE IDENTIFIER
07/07/17 BH-MD
10/02/18

EXHIBIT 2B

HYDROLOGY MAP
VTM 18142 (OFFSITE)
(EXISTING CONDITION)

CITY OF LAKE FOREST

MD-17422 - MAP
HYDROLOGY MAP FOR MAKAS NURSERY

PLOTTED BY: Ha To Chau DATE: Oct. 22, 2018 03:37:15 PM FILE: F:\08941\Engineering\SH_Hydrology\Off Site\Hydrology – Offsite.dwg

SCALE: 1" =400'

AREA OFFSITE
$A_{OFFSITE}$=227.9 Acres

Q_{100}= 621.0 cfs
A_{100}= 227.9 acres

EXISTING 84"RCP
F19–P07

RANCHO PKWY N.

EXISTING PROJECT BOUNDARY (EPB)
A_{EPB}= 122 acres

PROPOSED ONSITE DRAINAGE BOUNDARY (PODB)
A_{PODB}= 111.7 acres

Area A
A_A=76.6 Acres

Existing Earth Channel

EXISTING PROJECT BOUNDARY (EPB)
A_{EPB}= 122 acres

SERRANO CREEK
Q_{100}=2150 cfs

Existing Onsite Area A with Offsite Area
$A_A+A_{OFFSITE}$=76.6+227.9=304.5 Acres

Existing Earth Channel

Area B
A_B=43.4 Ac.

RANCHO PKWY S.

PROPOSED ONSITE DRAINAGE BOUNDARY (PODB)
A_{PODB}= 111.9 acres

EXISTING ONSITE AREA "A" DRAINAGE BOUNDARY
A_A= 76.6 acres (Shaded Area)

EXISTING ONSITE AREA "B" DRAINAGE BOUNDARY
A_B= 43.4 acres (Tributary to Serrano Creek)

BAKE PARKWAY

Existing Earth Channel

Existing Onsite Area Tributary to Serrano Creek (F19)= 46.9 acres

Existing Onsite Area Tributary to Serrano Creek (F19)= 3.1 acres

ORCHARD

EXISTING PROJECT BOUNDARY (EPB)
A_{EPB}= 122 acres

EXISTING PROJECT BOUNDARY (EPB)
A_{EPB}= 122 acres

$Q_{100EXIST}$= 84.2 cfs
$A_{100EXIST}$= 43.4 acres

Existing Earth Channel

$Q_{100EXIST}$= 671.2 cfs
$A_{100EXIST}$= 304.5 acres

EXIST. 84" PIPE

EXISTING 90" RCP (F19–P06)
Q_{25}=808 cfs

EXISTING 10.5'X10.5' RCB (F19–P07)
Q_{100}=729.2 cfs

SERRANO CREEK (F19)
Q_{100} =2350 cfs
$AREA_{TOTAL}$=1281 acres

EXISTING 10.5'X10.5' RCB (F19–S02)
Q_{100}=1916 cfs

EXISTING 10.5'X10.5' RCB (F19–P07)
Q_{100}=1747.3 cfs

LEGEND

- EXISTING ONSITE DRAINAGE BOUNDARY
- PROPOSED ONSITE DRAINAGE BOUNDARY (PODP)
- OFFSITE DRAINAGE BOUNDARY
- EXISTING PROJECT BOUNDARY (EPB)

PREPARED FOR:

TOLL BROTHERS, INC.
725 W. TOWN & COUNTRY ROAD, SUITE 200
ORANGE, CA 92686

PREPARED BY:

HUNSAKER & ASSOCIATES IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes ▪ Irvine, CA 92618 ▪ PH: (949) 583-1010 ▪ FX: (949) 583-0759

EXHIBIT 4
TRIBUTARY AREA TO F19-P07
VTM 18142
(EXISTING CONDITION)
CITY OF LAKE FOREST

PLOTTED BY: Ha To Chau DATE: Jun. 06, 2019 11:11:28 AM FILE: F:\0894\Engineering\SY_Hydrology\Onsite\Exhibit 4 – Existing with offsite_Existing Project Boundary and Existing Drainage Boundaries.dwg

SECTION 3

PROPOSED CONDITION HYDROLOGY
(With and Without Detention)

- 2-Year Storm Hydrology Calculations
- 25-Year Storm Hydrology Calculations
- 100-Year Storm Hydrology Calculations
- Hydrology Maps Proposed Condition (Exhibits 3 & 5)

```
************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY IN CITY OF LAKE FOREST                           *
* OFFSITE & ONSITE PROPOSED CONDITION @ 2-YEAR STORM                    *
* W.O. #1443-136X                                                       *
 ************************************************************************

  FILE NAME: PROP_02.DAT
  TIME/DATE OF STUDY: 10:57 06/10/2019
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  2   20.0     15.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1099.00  DOWNSTREAM(FEET) =   1091.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.370
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.684
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.78      0.25      0.600    50    8.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      1.08
  TOTAL AREA(ACRES) =      0.78   PEAK FLOW RATE(CFS) =      1.08

************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 1091.20  DOWNSTREAM ELEVATION(FEET) = 1089.40
  STREET LENGTH(FEET) =    90.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.69
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    9.52
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.89
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.87
  STREET FLOW TRAVEL TIME(MIN.) =   0.52   Tc(MIN.) =    8.89
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.627
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.38      0.25      0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    3.22
  EFFECTIVE AREA(ACRES) =      3.16    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =       4.25

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.55
```

Onsite Hydrology Area “A”

With Upstream Offsite Runoffs via 84” RCP Inlet at Rancho Parkway (F19-P07) Node 24.1 and Outlet at Downstream of Existing 10.5’ x 10.5’ RCB (F19-P07) Node 61, ***without Detention***

2-Year Storm Proposed Condition

```
  FLOW VELOCITY(FEET/SEC.) =  3.24   DEPTH*VELOCITY(FT*FT/SEC.) =   1.09
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1089.40  DOWNSTREAM ELEVATION(FEET) = 1067.00
  STREET LENGTH(FEET) =   513.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.61
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =   10.13
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.45
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.38
  STREET FLOW TRAVEL TIME(MIN.) =   1.92   Tc(MIN.) =   10.81
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.454
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                C        0.34      0.25     0.100    50
  PUBLIC PARK               C        0.25      0.25     0.850    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.418
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    0.72
  EFFECTIVE AREA(ACRES) =      3.75    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =       4.48

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =  10.03
  FLOW VELOCITY(FEET/SEC.) =  4.40   DEPTH*VELOCITY(FT*FT/SEC.) =   1.36
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     903.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.81
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.454
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                C        0.35      0.25     0.100    50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"      C        0.49      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.333
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    1.04
  EFFECTIVE AREA(ACRES) =      4.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =       5.52

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1067.00  DOWNSTREAM(FEET) =  1062.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.46
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.52
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   10.97
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1003.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.97
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.442
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"      C        2.09      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.09      SUBAREA RUNOFF(CFS) =    2.48
  EFFECTIVE AREA(ACRES) =      6.68   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        6.7        PEAK FLOW RATE(CFS) =       7.94

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1062.00  DOWNSTREAM(FEET) =  1022.40
  FLOW LENGTH(FEET) =   701.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.2 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.08
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.94
  PIPE TRAVEL TIME(MIN.) =   0.97    Tc(MIN.) =   11.94
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1704.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.94
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.374
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.18      0.30     0.100    36
  COMMERCIAL                 C        0.46      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.64      SUBAREA RUNOFF(CFS) =     0.78
  EFFECTIVE AREA(ACRES) =      7.32   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        7.3       PEAK FLOW RATE(CFS) =       8.31

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.40  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.10
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.31
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   12.26
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.26
  RAINFALL INTENSITY(INCH/HR) =   1.35
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       7.32
  TOTAL STREAM AREA(ACRES) =       7.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.31

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   305.00
  ELEVATION DATA: UPSTREAM(FEET) =   1046.00  DOWNSTREAM(FEET) =   1042.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.129
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.847
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 C        1.00      0.25     0.100    50    7.13
  RESIDENTIAL
  ".4 DWELLING/ACRE"         C        0.50      0.25     0.900    50   11.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
  SUBAREA RUNOFF(CFS) =      2.37
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      2.37

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1042.00  DOWNSTREAM ELEVATION(FEET) = 1036.00
  STREET LENGTH(FEET) =   373.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.52
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    9.21
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.57
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.76
  STREET FLOW TRAVEL TIME(MIN.) =   2.42   Tc(MIN.) =    9.55
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.562
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        3.31      0.25     0.500    50
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.31      SUBAREA RUNOFF(CFS) =    4.28
  EFFECTIVE AREA(ACRES) =      4.81    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =        4.8        PEAK FLOW RATE(CFS) =       6.26

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =  10.64
  FLOW VELOCITY(FEET/SEC.) =  2.77   DEPTH*VELOCITY(FT*FT/SEC.) =   0.88
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     678.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1036.00  DOWNSTREAM ELEVATION(FEET) = 1026.00
  STREET LENGTH(FEET) =   463.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.61
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =   10.84
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.25
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.05
  STREET FLOW TRAVEL TIME(MIN.) =   2.37   Tc(MIN.) =   11.92
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.375
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.40      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    2.70
  EFFECTIVE AREA(ACRES) =      7.21    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =       8.16

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  11.25
  FLOW VELOCITY(FEET/SEC.) =  3.26   DEPTH*VELOCITY(FT*FT/SEC.) =   1.08
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1141.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.92
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.375
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.16      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.22      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    2.67
  EFFECTIVE AREA(ACRES) =      9.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        9.6        PEAK FLOW RATE(CFS) =      10.83

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1026.00  DOWNSTREAM(FEET) =  1022.00
  FLOW LENGTH(FEET) =   395.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.84
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.83
  PIPE TRAVEL TIME(MIN.) =   0.96    Tc(MIN.) =   12.88
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1536.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.88
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.315
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.07      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        4.06      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    4.13      SUBAREA RUNOFF(CFS) =    4.42
  EFFECTIVE AREA(ACRES) =     13.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       13.7       PEAK FLOW RATE(CFS) =      14.73
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.00  DOWNSTREAM(FEET) =  1020.00
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.68
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.73
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   13.13
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.13
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.301
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.55      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        2.06      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.61      SUBAREA RUNOFF(CFS) =    2.75
  EFFECTIVE AREA(ACRES) =     16.33   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      17.31

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1020.00  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.10
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.31
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   13.57
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    1799.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.57
  RAINFALL INTENSITY(INCH/HR) =   1.28
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =      16.33
  TOTAL STREAM AREA(ACRES) =      16.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      17.31

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        8.31   12.26    1.353  0.25( 0.11) 0.45       7.3       1.00
      2       17.31   13.57    1.276  0.25( 0.12) 0.49      16.3       8.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       24.98   12.26    1.353  0.25( 0.12) 0.48      22.1       1.00
      2       25.10   13.57    1.276  0.25( 0.12) 0.48      23.6       8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      25.10    Tc(MIN.) =    13.57
  EFFECTIVE AREA(ACRES) =      23.65   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       23.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1019.50  DOWNSTREAM(FEET) =  1014.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.30
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.10
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   13.77
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.10 =    2014.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.77
```

```
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.266
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.15      0.30     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.15      SUBAREA RUNOFF(CFS) =     0.17
  EFFECTIVE AREA(ACRES) =     23.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       23.8       PEAK FLOW RATE(CFS) =      25.10
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.77
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.266
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.16      0.30     0.100    36
  COMMERCIAL                 C        1.44      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     1.79
  EFFECTIVE AREA(ACRES) =     25.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       25.4       PEAK FLOW RATE(CFS) =      26.34

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1014.00  DOWNSTREAM(FEET) =   971.40
  FLOW LENGTH(FEET) =   863.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.38
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.34
  PIPE TRAVEL TIME(MIN.) =   0.93    Tc(MIN.) =   14.70
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    2877.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.70
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.219
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.82      0.30     0.100    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.77      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.294
  SUBAREA AREA(ACRES) =     1.59      SUBAREA RUNOFF(CFS) =     1.64
  EFFECTIVE AREA(ACRES) =     26.99   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       27.0       PEAK FLOW RATE(CFS) =      26.91

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   971.40  DOWNSTREAM(FEET) =   969.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.71
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.91
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   14.74
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    2917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.74
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.217
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        2.46      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C       10.48      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   12.94      SUBAREA RUNOFF(CFS) =    12.66
  EFFECTIVE AREA(ACRES) =     39.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       39.9       PEAK FLOW RATE(CFS) =      39.52

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       40.28   13.43    1.284  0.25( 0.12) 0.46      38.3       1.00
      2       39.52   14.74    1.217  0.25( 0.12) 0.46      39.9       8.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      40.28  Tc(MIN.) =   13.43
  AREA-AVERAGED Fm(INCH/HR) =  0.12  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.46  EFFECTIVE AREA(ACRES) =      38.35
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   969.00  DOWNSTREAM(FEET) =   954.00
  FLOW LENGTH(FEET) =   416.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.79
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      40.28
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   13.90
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    3333.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.90
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.259
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.77      0.25      0.100    50
  PUBLIC PARK                C        0.43      0.25      0.850    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.369
  SUBAREA AREA(ACRES) =     1.20      SUBAREA RUNOFF(CFS) =     1.26
  EFFECTIVE AREA(ACRES) =     39.55   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       41.1       PEAK FLOW RATE(CFS) =      40.68

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   954.00  DOWNSTREAM(FEET) =   952.80
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.41
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      40.68
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   14.11
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    3453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.11
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.248
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.88      0.30      0.400    36
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        7.02      0.25      0.400    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =     7.90      SUBAREA RUNOFF(CFS) =     8.15
  EFFECTIVE AREA(ACRES) =     47.45   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       49.0       PEAK FLOW RATE(CFS) =      48.43

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   952.80  DOWNSTREAM(FEET) =   929.00
  FLOW LENGTH(FEET) =   636.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.05
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      48.43
  PIPE TRAVEL TIME(MIN.) =   0.66    Tc(MIN.) =   14.77
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.10 =    4089.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     17.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.77
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.216
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.68      0.30      0.500    36
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.89      0.25      0.600    50
  COMMERCIAL                 C        1.86      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.309
  SUBAREA AREA(ACRES) =     3.43      SUBAREA RUNOFF(CFS) =     3.50
  EFFECTIVE AREA(ACRES) =     50.88   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       52.5       PEAK FLOW RATE(CFS) =      50.55

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   929.00  DOWNSTREAM(FEET) =   926.30
  FLOW LENGTH(FEET) =   122.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.29
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      50.55
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   14.92
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     18.00 =    4211.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   14.92
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.209
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS               B       24.46      0.30     0.350    36
  CONDOMINIUMS               C        7.92      0.25     0.350    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =   32.38      SUBAREA RUNOFF(CFS) =   32.28
  EFFECTIVE AREA(ACRES) =     83.26   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       84.8       PEAK FLOW RATE(CFS) =      82.51

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   926.30  DOWNSTREAM(FEET) =   922.70
  FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.62
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      82.51
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   15.12
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     19.00 =    4384.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   15.12
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.199
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        1.62      0.30     0.400    36
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        6.09      0.25     0.400    50
  COMMERCIAL                 B        2.90      0.30     0.100    36
  COMMERCIAL                 C        3.15      0.25     0.100    50
  NATURAL POOR COVER
  "GRASS"                    B        0.76      0.30     1.000    61
  NATURAL POOR COVER
  "GRASS"                    C        0.39      0.25     1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
  SUBAREA AREA(ACRES) =   14.91      SUBAREA RUNOFF(CFS) =   14.93
  EFFECTIVE AREA(ACRES) =     98.17   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =       99.8       PEAK FLOW RATE(CFS) =      96.76

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   922.70  DOWNSTREAM(FEET) =   815.60
  FLOW LENGTH(FEET) =  1580.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.49
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      96.76
  PIPE TRAVEL TIME(MIN.) =   1.12    Tc(MIN.) =   16.24
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     20.00 =    5964.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   16.24
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.151
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B       19.45      0.30     0.100    36
  COMMERCIAL                 C       16.92      0.25     0.100    50
  COMMERCIAL                 D        0.11      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   36.48      SUBAREA RUNOFF(CFS) =   36.89
  EFFECTIVE AREA(ACRES) =    134.65   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      136.2       PEAK FLOW RATE(CFS) =     129.38

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   815.60  DOWNSTREAM(FEET) =   799.50
  FLOW LENGTH(FEET) =   449.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.15
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     129.38
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   16.61
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6413.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.136
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.38      0.30      0.100    36
  COMMERCIAL                 C        0.87      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     3.25      SUBAREA RUNOFF(CFS) =     3.24
  EFFECTIVE AREA(ACRES) =    137.90   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      139.5       PEAK FLOW RATE(CFS) =     130.82

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.136
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        4.10      0.30      0.100    36
  COMMERCIAL                 C        1.54      0.25      0.100    50
  COMMERCIAL                 D        2.08      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     7.72      SUBAREA RUNOFF(CFS) =     7.71
  EFFECTIVE AREA(ACRES) =    145.62   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      147.2       PEAK FLOW RATE(CFS) =     138.54

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   799.50  DOWNSTREAM(FEET) =   765.50
  FLOW LENGTH(FEET) =  1056.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.31
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     138.54
  PIPE TRAVEL TIME(MIN.) =   0.91    Tc(MIN.) =   17.52
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     22.00 =    7469.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.52
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.102
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.06      0.30      0.100    36
  COMMERCIAL                 C        1.74      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     3.80      SUBAREA RUNOFF(CFS) =     3.67
  EFFECTIVE AREA(ACRES) =    149.42   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      151.0       PEAK FLOW RATE(CFS) =     138.54
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.52
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.102
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.23      0.30      0.100    36
  COMMERCIAL                 D        5.07      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     5.30      SUBAREA RUNOFF(CFS) =     5.16
  EFFECTIVE AREA(ACRES) =    154.72   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =      156.3       PEAK FLOW RATE(CFS) =     142.87

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   765.50  DOWNSTREAM(FEET) =   755.00
  FLOW LENGTH(FEET) =   465.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  34.3 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.99
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     142.87
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   17.98
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     23.00 =    7934.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.98
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.086
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        9.15      0.30      0.100    36
  COMMERCIAL                 C       10.79      0.25      0.100    50
  COMMERCIAL                 D        1.81      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   21.75      SUBAREA RUNOFF(CFS) =   20.73
  EFFECTIVE AREA(ACRES) =    176.47   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =      178.1       PEAK FLOW RATE(CFS) =     161.36

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.98
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.086
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        7.47      0.30      0.100    36
  COMMERCIAL                 C        0.40      0.25      0.100    50
  COMMERCIAL                 D       17.76      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   25.63      SUBAREA RUNOFF(CFS) =   24.52
  EFFECTIVE AREA(ACRES) =    202.10   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      203.7       PEAK FLOW RATE(CFS) =     185.88

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   755.00  DOWNSTREAM(FEET) =   736.00
  FLOW LENGTH(FEET) =  1257.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  39.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.79
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     185.88
  PIPE TRAVEL TIME(MIN.) =   1.33    Tc(MIN.) =   19.31
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.00 =    9191.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.31
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.042
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B       16.13      0.30      0.100    36
  COMMERCIAL                 C        3.87      0.25      0.100    50
  COMMERCIAL                 D        4.22      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   24.22      SUBAREA RUNOFF(CFS) =   22.12
  EFFECTIVE AREA(ACRES) =    226.32   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      227.9       PEAK FLOW RATE(CFS) =     200.10

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     30.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   736.00  DOWNSTREAM(FEET) =   720.00
  FLOW LENGTH(FEET) =   212.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  29.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.46
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     200.10
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   19.43
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.10 =    9403.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.10 TO NODE     30.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   720.00  DOWNSTREAM(FEET) =   716.00
  FLOW LENGTH(FEET) =   156.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.69
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     200.10
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   19.56
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    9559.00 FEET.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   19.56
 RAINFALL INTENSITY(INCH/HR) =   1.03
 AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.27
 AREA-AVERAGED Ap =  0.23
 EFFECTIVE STREAM AREA(ACRES) =     226.32
 TOTAL STREAM AREA(ACRES) =     227.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     200.10

****************************************************************************
 FLOW PROCESS FROM NODE     30.20 TO NODE     30.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =    740.00  DOWNSTREAM(FEET) =    726.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.494
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.144
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  B        0.42      0.30      0.100    36    5.49
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      0.80
 TOTAL AREA(ACRES) =      0.42   PEAK FLOW RATE(CFS) =      0.80

****************************************************************************
 FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    5.49
 RAINFALL INTENSITY(INCH/HR) =   2.14
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.42
 TOTAL STREAM AREA(ACRES) =       0.42
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.80

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      200.10   19.56    1.035  0.27( 0.06) 0.23     226.3       1.00
     1      193.37   20.89    0.996  0.27( 0.06) 0.23     227.9       8.00
     2        0.80    5.49    2.144  0.30( 0.03) 0.10       0.4      30.20

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      121.02    5.49    2.144  0.27( 0.06) 0.23      64.0      30.20
     2      200.48   19.56    1.035  0.27( 0.06) 0.23     226.7       1.00
     3      193.74   20.89    0.996  0.27( 0.06) 0.23     228.3       8.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     200.48    Tc(MIN.) =    19.56
 EFFECTIVE AREA(ACRES) =     226.74   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
 TOTAL AREA(ACRES) =      228.3
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    9559.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     30.00 TO NODE     33.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   716.00  DOWNSTREAM(FEET) =   714.30
 FLOW LENGTH(FEET) =   210.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  44.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.82
 ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     200.48
 PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   19.83
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     33.00 =    9769.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.83
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.027
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.35      0.30      0.100    36
 COMMERCIAL                  B        0.62      0.30      0.100    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.97      SUBAREA RUNOFF(CFS) =    0.87
 EFFECTIVE AREA(ACRES) =    227.71   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
 TOTAL AREA(ACRES) =      229.3       PEAK FLOW RATE(CFS) =     200.48
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.30  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =   420.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  42.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.24
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     200.48
  PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =   20.32
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     38.00 TO NODE     39.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    730.50  DOWNSTREAM(FEET) =    726.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.427
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.573
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.80      0.30     0.500    36    9.43
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.42      0.20     0.500    57    9.43
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.58
  TOTAL AREA(ACRES) =      1.22   PEAK FLOW RATE(CFS) =      1.58

****************************************************************************
  FLOW PROCESS FROM NODE     39.00 TO NODE     40.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  726.20  DOWNSTREAM ELEVATION(FEET) =  719.50
  STREET LENGTH(FEET) =   711.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL) =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.74
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =   11.25
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.19
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.72
  STREET FLOW TRAVEL TIME(MIN.) =   5.41   Tc(MIN.) =   14.84
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.212
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        2.40      0.30     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    2.29
  EFFECTIVE AREA(ACRES) =      3.62    AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =       3.48

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  12.46
  FLOW VELOCITY(FEET/SEC.) =  2.31   DEPTH*VELOCITY(FT*FT/SEC.) =   0.81
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.00 =    1041.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.84
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.212
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.93      0.30     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.93      SUBAREA RUNOFF(CFS) =    0.89
  EFFECTIVE AREA(ACRES) =      4.55   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =       4.37

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   719.50  DOWNSTREAM(FEET) =   718.40
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.03
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.37
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   14.97
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.10 =    1096.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.10 TO NODE     40.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   14.97
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.206
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.19      0.30     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.18
  EFFECTIVE AREA(ACRES) =      4.74   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.7       PEAK FLOW RATE(CFS) =       4.52

****************************************************************************
  FLOW PROCESS FROM NODE     40.10 TO NODE     40.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   718.40  DOWNSTREAM(FEET) =   717.00
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.75
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.52
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   15.09
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.20 =    1151.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     40.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   15.09
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.201
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.22      0.30     0.850    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.45      0.30     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.615
  SUBAREA AREA(ACRES) =    0.67      SUBAREA RUNOFF(CFS) =    0.61
  EFFECTIVE AREA(ACRES) =      5.41   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =       5.11

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     40.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   15.09
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.201
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.34      0.30     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.34      SUBAREA RUNOFF(CFS) =    0.32
  EFFECTIVE AREA(ACRES) =      5.75   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =       5.44

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     41.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   717.00  DOWNSTREAM(FEET) =   713.40
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.79
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.44
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   15.31
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.00 =    1266.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.31
  RAINFALL INTENSITY(INCH/HR) =   1.19
  AREA-AVERAGED Fm(INCH/HR) =  0.15
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.51
  EFFECTIVE STREAM AREA(ACRES) =       5.75
  TOTAL STREAM AREA(ACRES) =       5.75
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.44

****************************************************************************
  FLOW PROCESS FROM NODE     41.20 TO NODE     41.30 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    728.20  DOWNSTREAM(FEET) =    723.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.184
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.597
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.02      0.30     0.500    36    9.18
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.61      0.20     0.500    57    9.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.85
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      0.85

****************************************************************************
  FLOW PROCESS FROM NODE     41.30 TO NODE     41.40 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  723.30  DOWNSTREAM ELEVATION(FEET) =  718.00
  STREET LENGTH(FEET) =   323.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.33
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    7.18
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.29
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.59
  STREET FLOW TRAVEL TIME(MIN.) =   2.36   Tc(MIN.) =   11.54
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.401
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.72      0.30     0.400    36
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.11      0.20     0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.83      SUBAREA RUNOFF(CFS) =    0.96
  EFFECTIVE AREA(ACRES) =      1.46    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       1.70

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   8.10
  FLOW VELOCITY(FEET/SEC.) =  2.40   DEPTH*VELOCITY(FT*FT/SEC.) =   0.66
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.40 =     653.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.40 TO NODE     41.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.54
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.401
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        1.24      0.30     0.400    36
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.03      0.20     0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.27      SUBAREA RUNOFF(CFS) =    1.46
  EFFECTIVE AREA(ACRES) =      2.73   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =        2.7        PEAK FLOW RATE(CFS) =       3.16

****************************************************************************
  FLOW PROCESS FROM NODE     41.40 TO NODE     41.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   718.00  DOWNSTREAM(FEET) =   717.00
  FLOW LENGTH(FEET) =    62.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.96
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.16
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   11.71
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.50 =     715.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     41.50 TO NODE     41.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.71
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.389
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.09      0.30      0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.11
  EFFECTIVE AREA(ACRES) =      2.82   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        2.8       PEAK FLOW RATE(CFS) =       3.24

****************************************************************************
  FLOW PROCESS FROM NODE     41.50 TO NODE     41.51 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   717.00  DOWNSTREAM(FEET) =   715.50
  FLOW LENGTH(FEET) =   154.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.99
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.24
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   12.23
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.51 =     869.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.51 TO NODE     41.51 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.23
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.355
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.44      0.30      0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.44      SUBAREA RUNOFF(CFS) =    1.56
  EFFECTIVE AREA(ACRES) =      4.26   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =        4.3       PEAK FLOW RATE(CFS) =       4.72

****************************************************************************
  FLOW PROCESS FROM NODE     41.51 TO NODE     41.60 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   715.50  DOWNSTREAM(FEET) =   714.90
  FLOW LENGTH(FEET) =    59.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.60
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.72
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   12.40
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.60 =     928.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.60 TO NODE     41.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.40
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.344
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.06      0.30      0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.06      SUBAREA RUNOFF(CFS) =    1.14
  EFFECTIVE AREA(ACRES) =      5.32   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        5.3       PEAK FLOW RATE(CFS) =       5.82

****************************************************************************
  FLOW PROCESS FROM NODE     41.60 TO NODE     41.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.40
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.344
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.47      0.30      0.400    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.47      SUBAREA RUNOFF(CFS) =    0.52
  EFFECTIVE AREA(ACRES) =      5.79   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =       6.33

****************************************************************************
  FLOW PROCESS FROM NODE     41.60 TO NODE     41.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.90  DOWNSTREAM(FEET) =   713.40
  FLOW LENGTH(FEET) =   148.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.01
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        6.33
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   12.81
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.00 =    1076.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.81
  RAINFALL INTENSITY(INCH/HR) =   1.32
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       5.79
  TOTAL STREAM AREA(ACRES) =       5.79
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.33

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        5.44   15.31    1.191  0.29( 0.15) 0.51       5.8      38.00
      2        6.33   12.81    1.319  0.29( 0.13) 0.45       5.8      41.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       11.44   12.81    1.319  0.29( 0.14) 0.48      10.6      41.20
      2       11.09   15.31    1.191  0.29( 0.14) 0.48      11.5      38.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      11.44    Tc(MIN.) =    12.81
  EFFECTIVE AREA(ACRES) =      10.60   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       11.5
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.00 =    1266.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.80 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.40  DOWNSTREAM(FEET) =   712.60
  FLOW LENGTH(FEET) =    83.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.78
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.44
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   13.02
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.80 =    1349.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.02
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.307
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.27      0.30      0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.13      0.20      0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    0.42
  EFFECTIVE AREA(ACRES) =     11.00   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       11.9       PEAK FLOW RATE(CFS) =      11.57

****************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.02
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.307
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.21      0.30      0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.01      0.20      0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.22      SUBAREA RUNOFF(CFS) =    0.23
  EFFECTIVE AREA(ACRES) =     11.22   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       12.2       PEAK FLOW RATE(CFS) =      11.80

****************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.90 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.60  DOWNSTREAM(FEET) =   711.80
  FLOW LENGTH(FEET) =    77.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.03
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.80
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   13.20
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.90 =    1426.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.20
  RAINFALL INTENSITY(INCH/HR) =   1.30
  AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.48
  EFFECTIVE STREAM AREA(ACRES) =      11.22
  TOTAL STREAM AREA(ACRES) =      12.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      11.80

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    77.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  SUBAREA LOSS RATE DATA(AMC   I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.06      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.12
  TOTAL AREA(ACRES) =      0.06   PEAK FLOW RATE(CFS) =      0.12

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.00
  RAINFALL INTENSITY(INCH/HR) =   2.26
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.06
  TOTAL STREAM AREA(ACRES) =       0.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.12

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  7700.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  SUBAREA LOSS RATE DATA(AMC   I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.06      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.12
  TOTAL AREA(ACRES) =      0.06   PEAK FLOW RATE(CFS) =      0.12

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.00
  RAINFALL INTENSITY(INCH/HR) =   2.26
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.06
  TOTAL STREAM AREA(ACRES) =       0.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.12

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       11.80   13.20    1.297  0.29( 0.14) 0.48       11.2       41.20
      1       11.41   15.70    1.174  0.29( 0.14) 0.48       12.2       38.00
      2        0.12    5.00    2.264  0.20( 0.10) 0.50        0.1       41.90
      3        0.12    5.00    2.264  0.20( 0.10) 0.50        0.1       41.90

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        8.44    5.00    2.264  0.29( 0.14) 0.48        4.4       41.90
```

```
     2        8.44    5.00    2.264  0.29( 0.14) 0.48       4.4      41.90
     3       11.93   13.20    1.297  0.29( 0.14) 0.48      11.3      41.20
     4       11.52   15.70    1.174  0.29( 0.14) 0.48      12.3      38.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      11.93    Tc(MIN.) =    13.20
  EFFECTIVE AREA(ACRES) =      11.34   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       12.3
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     41.90 =    7700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     46.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   711.80  DOWNSTREAM(FEET) =   710.50
  FLOW LENGTH(FEET) =   132.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.89
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.93
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   13.52
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     46.00 =    7832.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     46.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.52
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.279
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.21      0.30      0.100    36
  COMMERCIAL                 D        0.29      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.50      SUBAREA RUNOFF(CFS) =     0.56
  EFFECTIVE AREA(ACRES) =     11.84   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       12.8       PEAK FLOW RATE(CFS) =      12.21

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.50  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =    68.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.05
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.21
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   13.68
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     34.00 =    7900.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        8.99    5.53    2.138  0.29( 0.13) 0.44       4.9      41.90
      2        8.99    5.53    2.138  0.29( 0.13) 0.44       4.9      41.90
      3       12.21   13.68    1.270  0.29( 0.13) 0.46      11.8      41.20
      4       11.80   16.18    1.154  0.29( 0.13) 0.47      12.8      38.00
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     34.00 =    7900.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      121.02    6.36    1.971  0.27( 0.06) 0.22      65.0      30.20
      2      200.48   20.32    1.012  0.27( 0.06) 0.23     227.7       1.00
      3      193.74   21.66    0.976  0.27( 0.06) 0.23     229.3       8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      123.22    5.53    2.138  0.27( 0.06) 0.24      61.3      41.90
      2      123.22    5.53    2.138  0.27( 0.06) 0.24      61.3      41.90
      3      130.35    6.36    1.971  0.27( 0.06) 0.24      70.6      30.20
      4      174.88   13.68    1.270  0.27( 0.07) 0.24     162.1      41.20
      5      188.70   16.18    1.154  0.27( 0.06) 0.24     192.2      38.00
      6      210.64   20.32    1.012  0.27( 0.06) 0.24     240.5       1.00
      7      203.48   21.66    0.976  0.27( 0.06) 0.24     242.1       8.00
    TOTAL AREA(ACRES) =       242.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      210.64  Tc(MIN.) =   20.322
  EFFECTIVE AREA(ACRES) =    240.49  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      242.1
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     56.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   703.70
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.01
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     210.64
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   20.40
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   20.40
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.010
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.23      0.30     0.100    36
  COMMERCIAL                  D        0.51      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.74      SUBAREA RUNOFF(CFS) =    0.66
  EFFECTIVE AREA(ACRES) =    241.23   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      242.8       PEAK FLOW RATE(CFS) =     210.64
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
================================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     32.20 TO NODE     32.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    745.00  DOWNSTREAM(FEET) =    742.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.917
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.739
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  B        0.11      0.30     0.100    36    7.92
  COMMERCIAL                  C        0.26      0.25     0.100    50    7.92
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.57
  TOTAL AREA(ACRES) =      0.37   PEAK FLOW RATE(CFS) =      0.57

****************************************************************************
  FLOW PROCESS FROM NODE     32.10 TO NODE     32.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  742.00  DOWNSTREAM ELEVATION(FEET) =  740.00
  STREET LENGTH(FEET) =    96.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.66
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.21
    HALFSTREET FLOOD WIDTH(FEET) =    4.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.30
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.48
  STREET FLOW TRAVEL TIME(MIN.) =   0.70   Tc(MIN.) =    8.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.657
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.06      0.30     0.100    36
  COMMERCIAL                  C        0.06      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.12      SUBAREA RUNOFF(CFS) =    0.18
  EFFECTIVE AREA(ACRES) =      0.49    AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       0.72

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.21   HALFSTREET FLOOD WIDTH(FEET) =   4.62
  FLOW VELOCITY(FEET/SEC.) =  2.30   DEPTH*VELOCITY(FT*FT/SEC.) =   0.49
  LONGEST FLOWPATH FROM NODE     32.20 TO NODE     32.00 =     426.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    724.60  DOWNSTREAM(FEET) =    723.00
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.167
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.359
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  SCHOOL                     B        0.33      0.30      0.600    36   12.17
  SCHOOL                     C        0.85      0.25      0.600    50   12.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      1.27
  TOTAL AREA(ACRES) =      1.18   PEAK FLOW RATE(CFS) =      1.27

****************************************************************************
  FLOW PROCESS FROM NODE     52.00 TO NODE     53.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  723.00  DOWNSTREAM ELEVATION(FEET) =  719.00
  STREET LENGTH(FEET) =   412.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.77
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =   11.25
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.22
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.73
  STREET FLOW TRAVEL TIME(MIN.) =   3.10   Tc(MIN.) =   15.26
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.193
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  SCHOOL                     B        2.48      0.30      0.600    36
  SCHOOL                     C        0.77      0.25      0.600    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    2.98
  EFFECTIVE AREA(ACRES) =      4.43    AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        4.4        PEAK FLOW RATE(CFS) =       4.08

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  13.28
  FLOW VELOCITY(FEET/SEC.) =  2.41   DEPTH*VELOCITY(FT*FT/SEC.) =   0.88
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     53.00 =     742.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     53.00 TO NODE     54.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  719.00  DOWNSTREAM ELEVATION(FEET) =  712.50
  STREET LENGTH(FEET) =   633.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.02
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   14.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.58
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.99
  STREET FLOW TRAVEL TIME(MIN.) =   4.09   Tc(MIN.) =   19.35
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.041
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  SCHOOL                     B        2.42      0.30      0.600    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    2.42      SUBAREA RUNOFF(CFS) =    1.88
  EFFECTIVE AREA(ACRES) =      6.85    AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        6.9        PEAK FLOW RATE(CFS) =       5.35

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  14.60
  FLOW VELOCITY(FEET/SEC.) =  2.65   DEPTH*VELOCITY(FT*FT/SEC.) =   1.03
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     54.00 =    1375.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.35
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.041
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.32      0.30      0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.32      SUBAREA RUNOFF(CFS) =     0.29
  EFFECTIVE AREA(ACRES) =      7.17   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.58
  TOTAL AREA(ACRES) =        7.2       PEAK FLOW RATE(CFS) =       5.64

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.35
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.041
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  SCHOOL                     B        2.40      0.30      0.600    36
  SCHOOL                     C        0.07      0.25      0.600    50
  SCHOOL                     D        2.82      0.20      0.600    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =     5.29      SUBAREA RUNOFF(CFS) =     4.25
  EFFECTIVE AREA(ACRES) =     12.46   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.59
  TOTAL AREA(ACRES) =       12.5       PEAK FLOW RATE(CFS) =       9.90

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.35
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.041
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.78      0.30      0.100    36
  COMMERCIAL                 C        0.03      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.81      SUBAREA RUNOFF(CFS) =     0.74
  EFFECTIVE AREA(ACRES) =     13.27   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =       13.3       PEAK FLOW RATE(CFS) =      10.63

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.50  DOWNSTREAM(FEET) =   712.30
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.44
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.63
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   19.45
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     55.00 =    1409.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.45
  RAINFALL INTENSITY(INCH/HR) =   1.04
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =      13.27
  TOTAL STREAM AREA(ACRES) =      13.27
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.63

****************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.10 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    34.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.13      0.30      0.100    36
  COMMERCIAL                 D        0.14      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.54
  TOTAL AREA(ACRES) =      0.27   PEAK FLOW RATE(CFS) =      0.54

****************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.24      0.30      0.100    36
  COMMERCIAL                 D        0.01      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.25      SUBAREA RUNOFF(CFS) =     0.50
  EFFECTIVE AREA(ACRES) =      0.52   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
```

```
 TOTAL AREA(ACRES) =        0.5       PEAK FLOW RATE(CFS) =       1.05

****************************************************************************
 FLOW PROCESS FROM NODE     55.10 TO NODE     55.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   713.00  DOWNSTREAM(FEET) =   712.30
 FLOW LENGTH(FEET) =   275.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.24
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.05
 PIPE TRAVEL TIME(MIN.) =   2.04    Tc(MIN.) =    7.04
 LONGEST FLOWPATH FROM NODE     55.10 TO NODE     55.00 =     309.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.04
 RAINFALL INTENSITY(INCH/HR) =   1.86
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.27
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.52
 TOTAL STREAM AREA(ACRES) =       0.52
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.05

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       10.63   19.45    1.038  0.27( 0.15) 0.56      13.3      51.00
     2        1.05    7.04    1.860  0.27( 0.03) 0.10       0.5      55.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        8.46    7.04    1.860  0.27( 0.14) 0.51       5.3      55.10
     2       11.21   19.45    1.038  0.27( 0.15) 0.54      13.8      51.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      11.21    Tc(MIN.) =    19.45
 EFFECTIVE AREA(ACRES) =      13.79   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.54
 TOTAL AREA(ACRES) =       13.8
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     55.00 =    1409.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     55.00 TO NODE     56.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   712.30  DOWNSTREAM(FEET) =   711.00
 FLOW LENGTH(FEET) =   165.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.21
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.21
 PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   19.90
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.00 =    1574.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.00 TO NODE     56.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.90
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.025
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.49      0.30      0.100    36
 COMMERCIAL                  D        0.04      0.20      0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.53      SUBAREA RUNOFF(CFS) =    0.47
 EFFECTIVE AREA(ACRES) =     14.32   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =       14.3       PEAK FLOW RATE(CFS) =      11.38

****************************************************************************
 FLOW PROCESS FROM NODE     56.00 TO NODE     56.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   711.00  DOWNSTREAM(FEET) =   710.10
 FLOW LENGTH(FEET) =   172.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.40
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.38
 PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   20.43
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     56.11 TO NODE     56.12 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    720.80  DOWNSTREAM(FEET) =    717.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.438
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.676
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.91      0.30     0.200    36    8.44
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      1.32
  TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      1.32

****************************************************************************
  FLOW PROCESS FROM NODE     56.12 TO NODE     56.13 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  717.80  DOWNSTREAM ELEVATION(FEET) =  713.60
  STREET LENGTH(FEET) =   486.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.30
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =   10.64
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.03
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.65
  STREET FLOW TRAVEL TIME(MIN.) =   3.99   Tc(MIN.) =   12.43
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.342
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        1.68      0.30     0.200    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    1.68      SUBAREA RUNOFF(CFS) =    1.94
  EFFECTIVE AREA(ACRES) =      2.59    AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       2.6        PEAK FLOW RATE(CFS) =       2.99

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.96
  FLOW VELOCITY(FEET/SEC.) =  2.14   DEPTH*VELOCITY(FT*FT/SEC.) =   0.73
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.13 =     816.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.43
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.342
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        2.11      0.30     0.200    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    2.11      SUBAREA RUNOFF(CFS) =    2.44
  EFFECTIVE AREA(ACRES) =      4.70   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       4.7        PEAK FLOW RATE(CFS) =       5.42

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.43
  RAINFALL INTENSITY(INCH/HR) =   1.34
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =       4.70
  TOTAL STREAM AREA(ACRES) =       4.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.42

****************************************************************************
  FLOW PROCESS FROM NODE     56.14 TO NODE     56.15 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    719.20  DOWNSTREAM(FEET) =    715.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.182
```

```
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.706
SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE"       B        0.84      0.30     0.200    36    8.18
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
SUBAREA RUNOFF(CFS) =      1.24
TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      1.24

****************************************************************************
FLOW PROCESS FROM NODE     56.15 TO NODE     56.13 IS CODE =  62
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) =  715.70  DOWNSTREAM ELEVATION(FEET) =  713.60
STREET LENGTH(FEET) =   200.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.018
OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.60
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.28
  HALFSTREET FLOOD WIDTH(FEET) =    8.71
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.01
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.57
STREET FLOW TRAVEL TIME(MIN.) =   1.66   Tc(MIN.) =    9.84
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.535
SUBAREA LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"       B        0.54      0.30     0.200    36
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
SUBAREA AREA(ACRES) =    0.54      SUBAREA RUNOFF(CFS) =    0.72
EFFECTIVE AREA(ACRES) =      1.38    AREA-AVERAGED Fm(INCH/HR) =  0.06
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       1.83

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   9.21
FLOW VELOCITY(FEET/SEC.) =  2.08   DEPTH*VELOCITY(FT*FT/SEC.) =   0.61
LONGEST FLOWPATH FROM NODE     56.14 TO NODE     56.13 =     530.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =    9.84
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.535
SUBAREA LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"       B        0.70      0.30     0.200    36
RESIDENTIAL
"11+ DWELLINGS/ACRE"       D        0.52      0.20     0.200    57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
SUBAREA AREA(ACRES) =    1.22      SUBAREA RUNOFF(CFS) =    1.63
EFFECTIVE AREA(ACRES) =      2.60   AREA-AVERAGED Fm(INCH/HR) =  0.06
AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.20
TOTAL AREA(ACRES) =        2.6        PEAK FLOW RATE(CFS) =       3.46

****************************************************************************
FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =    9.84
RAINFALL INTENSITY(INCH/HR) =   1.53
AREA-AVERAGED Fm(INCH/HR) =  0.06
AREA-AVERAGED Fp(INCH/HR) =  0.28
AREA-AVERAGED Ap =  0.20
EFFECTIVE STREAM AREA(ACRES) =       2.60
TOTAL STREAM AREA(ACRES) =       2.60
PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.46

** CONFLUENCE DATA **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1        5.42   12.43    1.342  0.30( 0.06) 0.20       4.7      56.11
    2        3.46    9.84    1.535  0.28( 0.06) 0.20       2.6      56.14

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1        8.40    9.84    1.535  0.29( 0.06) 0.20       6.3      56.14
    2        8.43   12.43    1.342  0.29( 0.06) 0.20       7.3      56.11

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =       8.43    Tc(MIN.) =    12.43
EFFECTIVE AREA(ACRES) =       7.30   AREA-AVERAGED Fm(INCH/HR) =  0.06
AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
```

```
  TOTAL AREA(ACRES) =        7.3
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.13 =     816.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.16 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.60  DOWNSTREAM(FEET) =   712.50
  FLOW LENGTH(FEET) =    94.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.75
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.43
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   12.66
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.16 =     910.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.16 TO NODE     56.16 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.66
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.328
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.46      0.30     0.200    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.46      SUBAREA RUNOFF(CFS) =    0.53
  EFFECTIVE AREA(ACRES) =      7.76   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =       8.87

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        8.89   10.07    1.514  0.29( 0.06) 0.20       6.8      56.14
      2        8.87   12.66    1.328  0.29( 0.06) 0.20       7.8      56.11
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =       8.89  Tc(MIN.) =   10.07
  AREA-AVERAGED Fm(INCH/HR) =  0.06  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.20  EFFECTIVE AREA(ACRES) =       6.78

****************************************************************************
  FLOW PROCESS FROM NODE     56.16 TO NODE     56.16 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.07
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.514
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.05      0.30     0.200    36
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        0.41      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.46      SUBAREA RUNOFF(CFS) =    0.61
  EFFECTIVE AREA(ACRES) =      7.24   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        8.2       PEAK FLOW RATE(CFS) =       9.50

****************************************************************************
  FLOW PROCESS FROM NODE     56.16 TO NODE     56.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.50  DOWNSTREAM(FEET) =   710.10
  FLOW LENGTH(FEET) =    38.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.19
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.50
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   10.12
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.10 =     948.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        9.50   10.12    1.510  0.29( 0.06) 0.20       7.2      56.14
      2        9.40   12.71    1.325  0.29( 0.06) 0.20       8.2      56.11
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.10 =     948.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        8.75    8.10    1.717  0.27( 0.13) 0.48       5.9      55.10
      2       11.38   20.43    1.009  0.27( 0.14) 0.52      14.3      51.00
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       17.43    8.10    1.717  0.28( 0.09) 0.34      11.6      55.10
      2       18.68   10.12    1.510  0.28( 0.09) 0.34      14.5      56.14
      3       19.13   12.71    1.325  0.28( 0.10) 0.35      17.2      56.11
      4       18.43   20.43    1.009  0.27( 0.11) 0.41      22.5      51.00
    TOTAL AREA(ACRES) =        22.5
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       19.13  Tc(MIN.) =   12.706
  EFFECTIVE AREA(ACRES) =     17.24  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.34
  TOTAL AREA(ACRES) =       22.5
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     56.10 TO NODE     56.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.10  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.76
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.13
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   12.81
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.20 =    1790.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.20 TO NODE     56.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.81
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.319
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.39      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.39      SUBAREA RUNOFF(CFS) =     0.46
  EFFECTIVE AREA(ACRES) =     17.63   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =       22.9       PEAK FLOW RATE(CFS) =      19.41

****************************************************************************
  FLOW PROCESS FROM NODE     56.20 TO NODE     56.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   703.70
  FLOW LENGTH(FEET) =   290.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.24
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.41
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   13.29
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.30 =    2080.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM        Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       17.46    8.69    1.648  0.27( 0.09) 0.33       12.0       55.10
      2       18.86   10.70    1.462  0.27( 0.09) 0.34       14.9       56.14
      3       19.41   13.29    1.292  0.27( 0.10) 0.35       17.6       56.11
      4       18.50   21.01    0.993  0.27( 0.11) 0.40       22.9       51.00
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.30 =    2080.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM        Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      123.22    5.61    2.119  0.27( 0.06) 0.24       62.0       41.90
      2      123.22    5.61    2.119  0.27( 0.06) 0.24       62.0       41.90
      3      130.35    6.45    1.957  0.27( 0.06) 0.24       71.3       30.20
      4      176.08   13.76    1.266  0.27( 0.06) 0.24      162.9       41.20
      5      188.70   16.26    1.151  0.27( 0.06) 0.24      192.9       38.00
      6      210.64   20.40    1.010  0.27( 0.06) 0.24      241.2        1.00
      7      203.48   21.74    0.974  0.27( 0.06) 0.24      242.8        8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM        Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      137.90    5.61    2.119  0.27( 0.07) 0.25       69.8       41.90
      2      137.90    5.61    2.119  0.27( 0.07) 0.25       69.8       41.90
      3      145.87    6.45    1.957  0.27( 0.07) 0.25       80.2       30.20
      4      161.84    8.69    1.648  0.27( 0.07) 0.25      111.4       55.10
      5      175.84   10.70    1.462  0.27( 0.07) 0.25      139.5       56.14
      6      192.54   13.29    1.292  0.27( 0.07) 0.25      174.6       56.11
      7      195.43   13.76    1.266  0.27( 0.07) 0.25      180.8       41.20
      8      207.76   16.26    1.151  0.27( 0.07) 0.25      212.6       38.00
      9      229.21   20.40    1.010  0.27( 0.07) 0.25      263.7        1.00
     10      225.86   21.01    0.993  0.27( 0.07) 0.25      264.9       51.00
     11      221.58   21.74    0.974  0.27( 0.07) 0.25      265.7        8.00
    TOTAL AREA(ACRES) =       265.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      229.21  Tc(MIN.) =   20.395
  EFFECTIVE AREA(ACRES) =    263.74  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =      265.7
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     35.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   703.70  DOWNSTREAM(FEET) =   703.00
  FLOW LENGTH(FEET) =    74.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  46.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.93
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     229.21
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   20.48
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    729.10  DOWNSTREAM(FEET) =    723.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.849
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.631
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.39      0.30     0.500    36    8.85
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.52      0.20     0.500    57    8.85
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.24
  TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      1.24

****************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     44.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  723.20  DOWNSTREAM ELEVATION(FEET) =  714.50
  STREET LENGTH(FEET) =   493.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.91
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    7.39
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.39
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.63
  STREET FLOW TRAVEL TIME(MIN.) =   3.43   Tc(MIN.) =   12.28
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.351
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        2.25      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.79      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.04      SUBAREA RUNOFF(CFS) =    3.32
  EFFECTIVE AREA(ACRES) =      3.95    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.9        PEAK FLOW RATE(CFS) =       4.33

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   8.91
  FLOW VELOCITY(FEET/SEC.) =  2.61   DEPTH*VELOCITY(FT*FT/SEC.) =   0.75
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     44.00 =     823.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     44.00 TO NODE     45.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.50  DOWNSTREAM(FEET) =   713.50
  FLOW LENGTH(FEET) =    33.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.16
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.33
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   12.35
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.20 =     856.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     45.20 TO NODE     45.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.35
  RAINFALL INTENSITY(INCH/HR) =   1.35
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       3.95
  TOTAL STREAM AREA(ACRES) =       3.95
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.33

****************************************************************************
  FLOW PROCESS FROM NODE     45.00 TO NODE     45.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    721.00  DOWNSTREAM(FEET) =    717.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.195
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.596
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.58      0.30     0.400    36    9.20
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.06      0.20     0.400    57    9.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      0.85
  TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      0.85

****************************************************************************
  FLOW PROCESS FROM NODE     45.10 TO NODE     45.20 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  717.00  DOWNSTREAM ELEVATION(FEET) =  714.00
  STREET LENGTH(FEET) =   318.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.31
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    8.10
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.86
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.51
  STREET FLOW TRAVEL TIME(MIN.) =   2.85   Tc(MIN.) =   12.05
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.366
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.82      0.30     0.400    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.82      SUBAREA RUNOFF(CFS) =    0.92
  EFFECTIVE AREA(ACRES) =      1.46    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       1.64

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   9.01
  FLOW VELOCITY(FEET/SEC.) =  1.94   DEPTH*VELOCITY(FT*FT/SEC.) =   0.56
  LONGEST FLOWPATH FROM NODE     45.00 TO NODE     45.20 =     648.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     45.20 TO NODE     45.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.05
  RAINFALL INTENSITY(INCH/HR) =   1.37
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.40
  EFFECTIVE STREAM AREA(ACRES) =       1.46
  TOTAL STREAM AREA(ACRES) =       1.46
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.64

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        4.33   12.35    1.347  0.27( 0.13) 0.50       3.9      42.00
      2        1.64   12.05    1.366  0.30( 0.12) 0.40       1.5      45.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
```

```
 STREAM        Q      Tc   Intensity   Fp(Fm)     Ap      Ae      HEADWATER
 NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
    1         5.93   12.05    1.366  0.27( 0.13) 0.47       5.3       45.00
    2         5.94   12.35    1.347  0.27( 0.13) 0.47       5.4       42.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       5.94    Tc(MIN.) =    12.35
 EFFECTIVE AREA(ACRES) =       5.41   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =         5.4
 LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.20 =     856.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     45.20 TO NODE     45.30 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   713.50  DOWNSTREAM(FEET) =   711.90
 FLOW LENGTH(FEET) =   157.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.93
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.94
 PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   12.79
 LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.30 =    1013.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     45.30 TO NODE     45.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.79
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.320
 SUBAREA LOSS RATE DATA(AMC   I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        0.66      0.30      0.400    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.66      SUBAREA RUNOFF(CFS) =     0.71
 EFFECTIVE AREA(ACRES) =      6.07   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =         6.1       PEAK FLOW RATE(CFS) =       6.51

****************************************************************************
 FLOW PROCESS FROM NODE     45.30 TO NODE     45.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.79
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.320
 SUBAREA LOSS RATE DATA(AMC   I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                 B        1.89      0.30      0.850    36
 COMMERCIAL                  D        0.04      0.20      0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.834
 SUBAREA AREA(ACRES) =     1.93      SUBAREA RUNOFF(CFS) =     1.86
 EFFECTIVE AREA(ACRES) =      8.00   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.55
 TOTAL AREA(ACRES) =         8.0       PEAK FLOW RATE(CFS) =       8.37

 ** PEAK FLOW RATE TABLE **
  STREAM        Q      Tc   Intensity   Fp(Fm)     Ap      Ae      HEADWATER
  NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1         8.40   12.49    1.339  0.28( 0.16) 0.55       7.9       45.00
     2         8.37   12.79    1.320  0.28( 0.16) 0.55       8.0       42.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =       8.40  Tc(MIN.) =   12.49
 AREA-AVERAGED Fm(INCH/HR) =  0.16  AREA-AVERAGED Fp(INCH/HR) =  0.28
 AREA-AVERAGED Ap =  0.55  EFFECTIVE AREA(ACRES) =       7.90

****************************************************************************
 FLOW PROCESS FROM NODE     45.30 TO NODE     47.20 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   711.90  DOWNSTREAM(FEET) =   710.80
 FLOW LENGTH(FEET) =   106.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.42
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.40
 PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =   12.76
 LONGEST FLOWPATH FROM NODE     42.00 TO NODE     47.20 =    1119.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.20 TO NODE     47.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.76
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.322
 SUBAREA LOSS RATE DATA(AMC   I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.13      0.30      0.100    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.13      SUBAREA RUNOFF(CFS) =     0.15
 EFFECTIVE AREA(ACRES) =      8.03   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.55
 TOTAL AREA(ACRES) =         8.1       PEAK FLOW RATE(CFS) =       8.43

****************************************************************************
 FLOW PROCESS FROM NODE     47.20 TO NODE     35.20 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.80  DOWNSTREAM(FEET) =   703.90
  FLOW LENGTH(FEET) =   695.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.31
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.43
  PIPE TRAVEL TIME(MIN.) =   1.84    Tc(MIN.) =   14.60
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     35.20 =    1814.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.20 TO NODE     35.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.60
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.224
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 B        1.02      0.30     0.850    36
  PUBLIC PARK                 C        0.05      0.25     0.850    50
  PUBLIC PARK                 D        2.20      0.20     0.850    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    3.27      SUBAREA RUNOFF(CFS) =    3.02
  EFFECTIVE AREA(ACRES) =     11.30   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.64
  TOTAL AREA(ACRES) =       11.4       PEAK FLOW RATE(CFS) =      10.74

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       10.74   14.60    1.224  0.26( 0.17) 0.64      11.3      45.00
      2       10.69   14.90    1.209  0.26( 0.17) 0.63      11.4      42.00
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     35.10 =    1814.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      137.90    5.71    2.098  0.27( 0.07) 0.25      69.8      41.90
      2      137.90    5.71    2.098  0.27( 0.07) 0.25      69.8      41.90
      3      145.87    6.54    1.940  0.27( 0.07) 0.25      80.2      30.20
      4      161.84    8.78    1.638  0.27( 0.07) 0.25     111.4      55.10
      5      175.84   10.80    1.455  0.27( 0.07) 0.25     139.5      56.14
      6      192.54   13.38    1.287  0.27( 0.07) 0.25     174.6      56.11
      7      195.43   13.85    1.261  0.27( 0.07) 0.25     180.8      41.20
      8      207.76   16.35    1.147  0.27( 0.07) 0.25     212.6      38.00
      9      229.21   20.48    1.008  0.27( 0.07) 0.25     263.7       1.00
     10      225.86   21.10    0.991  0.27( 0.07) 0.25     264.9      51.00
     11      221.58   21.83    0.972  0.27( 0.07) 0.25     265.7       8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      145.58    5.71    2.098  0.27( 0.07) 0.27      74.2      41.90
      2      145.58    5.71    2.098  0.27( 0.07) 0.27      74.2      41.90
      3      153.94    6.54    1.940  0.27( 0.07) 0.27      85.3      30.20
      4      170.84    8.78    1.638  0.27( 0.07) 0.27     118.2      55.10
      5      185.52   10.80    1.455  0.27( 0.07) 0.27     147.8      56.14
      6      202.97   13.38    1.287  0.27( 0.07) 0.27     184.9      56.11
      7      205.99   13.85    1.261  0.27( 0.07) 0.27     191.5      41.20
      8      209.89   14.60    1.224  0.27( 0.07) 0.27     201.7      45.00
      9      211.33   14.90    1.209  0.27( 0.07) 0.27     205.6      42.00
     10      217.81   16.35    1.147  0.27( 0.07) 0.27     224.0      38.00
     11      237.83   20.48    1.008  0.27( 0.07) 0.27     275.1       1.00
     12      234.30   21.10    0.991  0.27( 0.07) 0.27     276.3      51.00
     13      229.83   21.83    0.972  0.27( 0.07) 0.27     277.1       8.00
    TOTAL AREA(ACRES) =       277.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      237.83  Tc(MIN.) =   20.484
  EFFECTIVE AREA(ACRES) =    275.14  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      277.1
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =   695.70
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  55.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.21
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     237.83
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   20.61
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     36.00 =   10453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
  MAINLINE Tc(MIN.) =   20.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.004
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        0.16      0.25     0.100    50
  COMMERCIAL                  D        0.29      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.45      SUBAREA RUNOFF(CFS) =    0.40
  EFFECTIVE AREA(ACRES) =    275.59   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      277.6       PEAK FLOW RATE(CFS) =     237.83
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     37.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.70  DOWNSTREAM(FEET) =   695.40
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  55.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.21
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     237.83
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   20.73
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.00 =   10528.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.00 TO NODE     37.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.40  DOWNSTREAM(FEET) =   694.00
  FLOW LENGTH(FEET) =   355.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  55.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.15
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     237.83
  PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =   21.31
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.10 =   10883.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.31
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.985
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        0.68      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.68      SUBAREA RUNOFF(CFS) =    0.59
  EFFECTIVE AREA(ACRES) =    276.27   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      278.3       PEAK FLOW RATE(CFS) =     237.83
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.31
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.985
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        0.46      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.46      SUBAREA RUNOFF(CFS) =    0.40
  EFFECTIVE AREA(ACRES) =    276.73   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      278.7       PEAK FLOW RATE(CFS) =     237.83
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.00  DOWNSTREAM(FEET) =   693.80
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  52.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.72
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     237.83
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   21.36
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     37.60 TO NODE     37.70 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    718.50  DOWNSTREAM(FEET) =    714.40
```

```
 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.517
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.564
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.13      0.30     0.500    36    9.52
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.51      0.20     0.500    57    9.52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA RUNOFF(CFS) =      0.84
 TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      0.84

****************************************************************************
 FLOW PROCESS FROM NODE     37.70 TO NODE     37.80 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  714.40  DOWNSTREAM ELEVATION(FEET) =  710.60
 STREET LENGTH(FEET) =   349.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.18
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.26
   HALFSTREET FLOOD WIDTH(FEET) =    7.49
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.90
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.50
 STREET FLOW TRAVEL TIME(MIN.) =   3.06   Tc(MIN.) =   12.58
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.333
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        0.15      0.25     0.500    50
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.47      0.20     0.500    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.62      SUBAREA RUNOFF(CFS) =    0.68
 EFFECTIVE AREA(ACRES) =      1.26    AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =       1.39

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   8.10
 FLOW VELOCITY(FEET/SEC.) =  1.97   DEPTH*VELOCITY(FT*FT/SEC.) =   0.54
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.80 =     679.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.80 TO NODE     37.90 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   710.60  DOWNSTREAM(FEET) =   709.80
 FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.41
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.39
 PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   12.81
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.90 =     739.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.90 TO NODE     37.90 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.81
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.319
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        0.21      0.25     0.500    50
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.93      0.20     0.500    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    1.14      SUBAREA RUNOFF(CFS) =    1.25
 EFFECTIVE AREA(ACRES) =      2.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        2.4       PEAK FLOW RATE(CFS) =       2.62

****************************************************************************
 FLOW PROCESS FROM NODE     37.90 TO NODE     37.50 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   708.00
 FLOW LENGTH(FEET) =   221.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.41
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.62
```

```
  PIPE TRAVEL TIME(MIN.) =   0.83    Tc(MIN.) =   13.64
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.50 =     960.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.50 TO NODE     37.50 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.64
  RAINFALL INTENSITY(INCH/HR) =   1.27
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       2.40
  TOTAL STREAM AREA(ACRES) =       2.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.62

****************************************************************************
  FLOW PROCESS FROM NODE     37.30 TO NODE     37.40 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    713.10  DOWNSTREAM(FEET) =    709.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.880
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.531
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.70      0.25     0.500    50    9.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.89
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      0.89

****************************************************************************
  FLOW PROCESS FROM NODE     37.40 TO NODE     37.50 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  709.70  DOWNSTREAM ELEVATION(FEET) =  708.10
  STREET LENGTH(FEET) =   124.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.08
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    6.88
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.99
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.50
  STREET FLOW TRAVEL TIME(MIN.) =   1.04   Tc(MIN.) =   10.92
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.446
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.33      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.33      SUBAREA RUNOFF(CFS) =    0.39
  EFFECTIVE AREA(ACRES) =      1.03    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.0        PEAK FLOW RATE(CFS) =       1.22

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   7.29
  FLOW VELOCITY(FEET/SEC.) =  2.06   DEPTH*VELOCITY(FT*FT/SEC.) =   0.53
  LONGEST FLOWPATH FROM NODE     37.30 TO NODE     37.50 =     454.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.50 TO NODE     37.50 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.92
  RAINFALL INTENSITY(INCH/HR) =   1.45
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       1.03
  TOTAL STREAM AREA(ACRES) =       1.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.22

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        2.62   13.64    1.272  0.21( 0.11) 0.50       2.4      37.60
      2        1.22   10.92    1.446  0.25( 0.12) 0.50       1.0      37.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
```

```
 STREAM        Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1         3.63   10.92    1.446  0.23( 0.11) 0.50       3.0      37.30
    2         3.68   13.64    1.272  0.22( 0.11) 0.50       3.4      37.60

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.68    Tc(MIN.) =    13.64
  EFFECTIVE AREA(ACRES) =       3.43   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.4
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.50 =     960.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.50 TO NODE     37.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   708.00  DOWNSTREAM(FEET) =   693.80
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.67
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.68
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   13.80
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.20 =    1080.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
 STREAM        Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1         3.63   11.08    1.434  0.23( 0.11) 0.50       3.0      37.30
    2         3.68   13.80    1.264  0.22( 0.11) 0.50       3.4      37.60
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.20 =    1080.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM        Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1       145.58    6.70    1.914  0.27( 0.07) 0.27      75.8      41.90
    2       145.58    6.70    1.914  0.27( 0.07) 0.27      75.8      41.90
    3       153.94    7.53    1.789  0.27( 0.07) 0.27      86.9      30.20
    4       170.84    9.74    1.544  0.27( 0.07) 0.27     119.8      55.10
    5       185.52   11.73    1.388  0.27( 0.07) 0.27     149.4      56.14
    6       202.97   14.28    1.239  0.27( 0.07) 0.27     186.5      56.11
    7       205.99   14.75    1.216  0.27( 0.07) 0.27     193.1      41.20
    8       209.89   15.50    1.182  0.27( 0.07) 0.27     203.3      45.00
    9       211.33   15.80    1.169  0.27( 0.07) 0.27     207.2      42.00
   10       217.81   17.25    1.112  0.27( 0.07) 0.27     225.6      38.00
   11       237.83   21.36    0.984  0.27( 0.07) 0.27     276.7       1.00
   12       234.30   21.98    0.968  0.27( 0.07) 0.27     277.9      51.00
   13       229.83   22.71    0.950  0.27( 0.07) 0.27     278.7       8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

  ** PEAK FLOW RATE TABLE **
 STREAM        Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1       148.58    6.70    1.914  0.27( 0.07) 0.27      77.6      41.90
    2       148.58    6.70    1.914  0.27( 0.07) 0.27      77.6      41.90
    3       157.08    7.53    1.789  0.27( 0.07) 0.27      88.9      30.20
    4       174.30    9.74    1.544  0.27( 0.07) 0.27     122.4      55.10
    5       184.34   11.08    1.434  0.27( 0.07) 0.28     142.7      37.30
    6       189.17   11.73    1.388  0.27( 0.07) 0.28     152.5      56.14
    7       203.34   13.80    1.264  0.27( 0.07) 0.28     182.9      37.60
    8       206.58   14.28    1.239  0.27( 0.07) 0.28     190.0      56.11
    9       209.52   14.75    1.216  0.27( 0.07) 0.28     196.5      41.20
   10       213.31   15.50    1.182  0.27( 0.07) 0.28     206.7      45.00
   11       214.71   15.80    1.169  0.27( 0.07) 0.28     210.6      42.00
   12       221.01   17.25    1.112  0.27( 0.07) 0.27     229.0      38.00
   13       240.62   21.36    0.984  0.27( 0.07) 0.27     280.2       1.00
   14       237.04   21.98    0.968  0.27( 0.07) 0.27     281.3      51.00
   15       232.51   22.71    0.950  0.27( 0.07) 0.27     282.2       8.00
  TOTAL AREA(ACRES) =       282.2

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      240.62  Tc(MIN.) =   21.360
  EFFECTIVE AREA(ACRES) =    280.16  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      282.2
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     37.20 TO NODE     47.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.80  DOWNSTREAM(FEET) =   691.30
  FLOW LENGTH(FEET) =   487.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  69.0 INCH PIPE IS  53.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.25
  ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     240.62
  PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =   22.08
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     47.31 TO NODE     47.32 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    718.50  DOWNSTREAM(FEET) =    712.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.679
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.649
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.63      0.30      0.500    36    8.68
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.85
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      0.85

****************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.32 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.68
  RAINFALL INTENSITY(INCH/HR) =   1.65
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.63
  TOTAL STREAM AREA(ACRES) =       0.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.85

****************************************************************************
  FLOW PROCESS FROM NODE     47.33 TO NODE     47.32 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   282.00
  ELEVATION DATA: UPSTREAM(FEET) =    715.00  DOWNSTREAM(FEET) =    712.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.219
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.593
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.86      0.30      0.500    36    9.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.12
  TOTAL AREA(ACRES) =      0.86   PEAK FLOW RATE(CFS) =      1.12

****************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.32 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.22
  RAINFALL INTENSITY(INCH/HR) =   1.59
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.86
  TOTAL STREAM AREA(ACRES) =       0.86
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.12

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        0.85    8.68    1.649  0.30( 0.15) 0.50       0.6      47.31
      2        1.12    9.22    1.593  0.30( 0.15) 0.50       0.9      47.33

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        1.94    8.68    1.649  0.30( 0.15) 0.50       1.4      47.31
      2        1.94    9.22    1.593  0.30( 0.15) 0.50       1.5      47.33

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       1.94    Tc(MIN.) =     8.68
  EFFECTIVE AREA(ACRES) =       1.44   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.5
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.32 =     330.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.34 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.00  DOWNSTREAM(FEET) =   698.50
  FLOW LENGTH(FEET) =   102.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.38
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =       1.94
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =    9.18
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.34 =     432.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.34 TO NODE     47.34 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.18
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.597
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.38      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.06      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.44      SUBAREA RUNOFF(CFS) =    0.58
  EFFECTIVE AREA(ACRES) =      1.88   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.9       PEAK FLOW RATE(CFS) =       2.45

****************************************************************************
  FLOW PROCESS FROM NODE     47.34 TO NODE     47.35 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   698.50  DOWNSTREAM(FEET) =   697.50
  FLOW LENGTH(FEET) =   194.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.66
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.45
  PIPE TRAVEL TIME(MIN.) =   0.88    Tc(MIN.) =   10.06
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.35 =     626.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.06
  RAINFALL INTENSITY(INCH/HR) =   1.52
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       1.88
  TOTAL STREAM AREA(ACRES) =       1.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.45

****************************************************************************
  FLOW PROCESS FROM NODE     47.36 TO NODE     47.35 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   275.00
  ELEVATION DATA: UPSTREAM(FEET) =    713.50  DOWNSTREAM(FEET) =    711.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.418
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.574
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.72      0.30     0.500    36    9.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.92
  TOTAL AREA(ACRES) =      0.72   PEAK FLOW RATE(CFS) =      0.92

****************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.42
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.574
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.66      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.12      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.78      SUBAREA RUNOFF(CFS) =    1.00
  EFFECTIVE AREA(ACRES) =      1.50   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.5       PEAK FLOW RATE(CFS) =       1.93

****************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.42
  RAINFALL INTENSITY(INCH/HR) =   1.57
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29
```

```
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       1.50
 TOTAL STREAM AREA(ACRES) =       1.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.93

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        2.45   10.06    1.515  0.30( 0.15) 0.50       1.9      47.31
     1        2.43   10.61    1.470  0.30( 0.15) 0.50       1.9      47.33
     2        1.93    9.42    1.574  0.29( 0.15) 0.50       1.5      47.36

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        4.32    9.42    1.574  0.29( 0.15) 0.50       3.3      47.36
     2        4.30   10.06    1.515  0.29( 0.15) 0.50       3.4      47.31
     3        4.21   10.61    1.470  0.29( 0.15) 0.50       3.4      47.33

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       4.32    Tc(MIN.) =     9.42
 EFFECTIVE AREA(ACRES) =       3.26   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        3.4
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.35 =     626.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.35 TO NODE     47.37 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   697.60  DOWNSTREAM(FEET) =   696.00
 FLOW LENGTH(FEET) =   293.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.33
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.32
 PIPE TRAVEL TIME(MIN.) =   1.13    Tc(MIN.) =   10.54
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.37 =     919.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.37 TO NODE     47.37 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.54
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.475
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.67      0.30     0.500    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.12      0.20     0.500    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.79      SUBAREA RUNOFF(CFS) =    0.95
 EFFECTIVE AREA(ACRES) =      4.05   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        4.2       PEAK FLOW RATE(CFS) =       4.84

****************************************************************************
 FLOW PROCESS FROM NODE     47.37 TO NODE     47.37 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.54
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.475
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.09      0.30     0.500    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.60      0.20     0.500    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.69      SUBAREA RUNOFF(CFS) =    0.85
 EFFECTIVE AREA(ACRES) =      4.74   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        4.9       PEAK FLOW RATE(CFS) =       5.69

****************************************************************************
 FLOW PROCESS FROM NODE     47.37 TO NODE     47.30 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =   695.20
 FLOW LENGTH(FEET) =   158.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.46
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.69
 PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =   11.14
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.30 =    1077.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.30 TO NODE     47.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.14
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.430
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.28      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    0.34
  EFFECTIVE AREA(ACRES) =      5.02   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        5.2       PEAK FLOW RATE(CFS) =       5.83

****************************************************************************
  FLOW PROCESS FROM NODE     47.30 TO NODE     47.40 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.20  DOWNSTREAM(FEET) =   694.60
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.38
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.83
  PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =   11.61
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.40 =    1202.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.40 TO NODE     47.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.396
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.19      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.22
  EFFECTIVE AREA(ACRES) =      5.21   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =       5.90

****************************************************************************
  FLOW PROCESS FROM NODE     47.40 TO NODE     47.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.60  DOWNSTREAM(FEET) =   694.40
  FLOW LENGTH(FEET) =    41.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.42
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.90
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   11.76
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.50 =    1243.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.50 TO NODE     47.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.76
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.385
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.05      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.45      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.50      SUBAREA RUNOFF(CFS) =    1.73
  EFFECTIVE AREA(ACRES) =      6.71   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        6.9       PEAK FLOW RATE(CFS) =       7.58

****************************************************************************
  FLOW PROCESS FROM NODE     47.50 TO NODE     47.60 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.40  DOWNSTREAM(FEET) =   693.50
  FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.80
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.58
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =   12.39
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.60 =    1423.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.60 TO NODE     47.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.39
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.345
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.55      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.55      SUBAREA RUNOFF(CFS) =    1.74
  EFFECTIVE AREA(ACRES) =      8.26   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        8.4       PEAK FLOW RATE(CFS) =       9.08
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     47.60 TO NODE     47.70 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.50  DOWNSTREAM(FEET) =   693.30
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.96
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.08
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   12.52
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.70 =    1463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.70 TO NODE     47.70 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.52
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.336
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.04      0.25     0.500    50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.57      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.61      SUBAREA RUNOFF(CFS) =    1.79
  EFFECTIVE AREA(ACRES) =      9.87   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       10.0       PEAK FLOW RATE(CFS) =      10.81

****************************************************************************
  FLOW PROCESS FROM NODE     47.70 TO NODE     47.80 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.30  DOWNSTREAM(FEET) =   692.50
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.12
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.81
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   13.08
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.80 =    1633.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.80 TO NODE     47.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.08
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.304
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.60      0.25     0.500    50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.94      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.54      SUBAREA RUNOFF(CFS) =    1.65
  EFFECTIVE AREA(ACRES) =     11.41   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       11.6       PEAK FLOW RATE(CFS) =      12.17

****************************************************************************
  FLOW PROCESS FROM NODE     47.80 TO NODE     47.90 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.50  DOWNSTREAM(FEET) =   692.30
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  17.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.82
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.17
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   13.16
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.90 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.90 TO NODE     47.90 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.16
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.299
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        1.43      0.25     0.500    50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.14      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.57      SUBAREA RUNOFF(CFS) =    1.66
  EFFECTIVE AREA(ACRES) =     12.98   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =      13.78

****************************************************************************
  FLOW PROCESS FROM NODE     47.90 TO NODE     47.91 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.30  DOWNSTREAM(FEET) =   692.10
  FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.24
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.78
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   13.30
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.91 =    1707.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.91 TO NODE     47.91 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.30
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.291
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        1.89      0.25     0.500    50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        1.30      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     3.19      SUBAREA RUNOFF(CFS) =     3.38
  EFFECTIVE AREA(ACRES) =     16.17   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      17.06

****************************************************************************
  FLOW PROCESS FROM NODE     47.91 TO NODE     47.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.10  DOWNSTREAM(FEET) =   691.30
  FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.73
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.06
  PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =   13.79
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.00 =    1874.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       17.06   13.79    1.265  0.24( 0.12) 0.50      16.2      47.36
      2       16.67   14.45    1.231  0.24( 0.12) 0.50      16.3      47.31
      3       16.31   15.01    1.205  0.24( 0.12) 0.50      16.3      47.33
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.00 =    1874.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      148.58    7.51    1.792  0.27( 0.07) 0.27      77.6      41.90
      2      148.58    7.51    1.792  0.27( 0.07) 0.27      77.6      41.90
      3      157.08    8.33    1.689  0.27( 0.07) 0.27      88.9      30.20
      4      174.30   10.53    1.476  0.27( 0.07) 0.27     122.4      55.10
      5      184.34   11.84    1.380  0.27( 0.07) 0.28     142.7      37.30
      6      189.17   12.49    1.338  0.27( 0.07) 0.28     152.5      56.14
      7      203.34   14.55    1.226  0.27( 0.07) 0.28     182.9      37.60
      8      206.58   15.03    1.204  0.27( 0.07) 0.28     190.0      56.11
      9      209.52   15.50    1.183  0.27( 0.07) 0.28     196.5      41.20
     10      213.31   16.25    1.151  0.27( 0.07) 0.28     206.7      45.00
     11      214.71   16.55    1.139  0.27( 0.07) 0.28     210.6      42.00
     12      221.01   17.99    1.086  0.27( 0.07) 0.27     229.0      38.00
     13      240.62   22.08    0.965  0.27( 0.07) 0.27     280.2       1.00
     14      237.04   22.70    0.950  0.27( 0.07) 0.27     281.3      51.00
     15      232.51   23.43    0.933  0.27( 0.07) 0.27     282.2       8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      162.15    7.51    1.792  0.26( 0.08) 0.30      86.4      41.90
      2      162.15    7.51    1.792  0.26( 0.08) 0.30      86.4      41.90
      3      171.20    8.33    1.689  0.26( 0.08) 0.30      98.7      30.20
      4      189.74   10.53    1.476  0.26( 0.08) 0.30     134.8      55.10
      5      200.47   11.84    1.380  0.26( 0.08) 0.30     156.6      37.30
      6      205.62   12.49    1.338  0.26( 0.08) 0.30     167.1      56.14
      7      215.18   13.79    1.265  0.26( 0.08) 0.30     187.9      47.36
      8      219.34   14.45    1.231  0.26( 0.08) 0.29     197.7      47.31
      9      219.95   14.55    1.226  0.26( 0.08) 0.29     199.2      37.60
     10      222.74   15.01    1.205  0.26( 0.08) 0.29     206.0      47.33
     11      222.87   15.03    1.204  0.26( 0.08) 0.29     206.3      56.11
     12      225.50   15.50    1.183  0.26( 0.08) 0.29     212.9      41.20
     13      228.82   16.25    1.151  0.26( 0.08) 0.29     223.0      45.00
     14      230.03   16.55    1.139  0.26( 0.08) 0.29     227.0      42.00
     15      235.53   17.99    1.086  0.26( 0.08) 0.29     245.4      38.00
     16      253.33   22.08    0.965  0.26( 0.07) 0.28     296.5       1.00
     17      249.52   22.70    0.950  0.26( 0.07) 0.28     297.6      51.00
     18      244.74   23.43    0.933  0.26( 0.07) 0.28     298.5       8.00
   TOTAL AREA(ACRES) =       298.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      253.33  Tc(MIN.) =   22.082
  EFFECTIVE AREA(ACRES) =    296.50  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =      298.5
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     48.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   691.30  DOWNSTREAM(FEET) =   691.10
  FLOW LENGTH(FEET) =    61.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  75.0 INCH PIPE IS  60.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.53
  ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     253.33
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   22.19
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     48.60 TO NODE     48.61 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    712.40  DOWNSTREAM(FEET) =    707.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.660
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.652
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.05      0.30     0.400    36    8.66
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        0.02      0.25     0.400    50    8.66
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.69      0.20     0.400    57    8.66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      1.07
  TOTAL AREA(ACRES) =      0.76   PEAK FLOW RATE(CFS) =      1.07

****************************************************************************
  FLOW PROCESS FROM NODE     48.61 TO NODE     48.70 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  707.00  DOWNSTREAM ELEVATION(FEET) =  698.80
  STREET LENGTH(FEET) =   346.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.53
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    6.98
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.75
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.70
  STREET FLOW TRAVEL TIME(MIN.) =   2.10   Tc(MIN.) =   10.76
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.458
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        0.46      0.25     0.400    50
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.28      0.20     0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.74      SUBAREA RUNOFF(CFS) =    0.91
  EFFECTIVE AREA(ACRES) =      1.50    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       1.85

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   7.69
  FLOW VELOCITY(FEET/SEC.) =  2.85   DEPTH*VELOCITY(FT*FT/SEC.) =   0.76
  LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.70 =     676.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.70 TO NODE     48.70 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.76
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.458
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.59      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
  SUBAREA AREA(ACRES) =     0.59      SUBAREA RUNOFF(CFS) =     0.76
  EFFECTIVE AREA(ACRES) =      2.09   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.32
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       2.61

****************************************************************************
  FLOW PROCESS FROM NODE     48.71 TO NODE     48.71 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.76
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.458
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.09      0.30     0.400    36
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.47      0.25     0.400    50
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.80      0.20     0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =     1.36      SUBAREA RUNOFF(CFS) =     1.68
  EFFECTIVE AREA(ACRES) =      3.45   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =        3.4       PEAK FLOW RATE(CFS) =       4.29

****************************************************************************
  FLOW PROCESS FROM NODE     48.70 TO NODE     48.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   698.80  DOWNSTREAM(FEET) =   691.10
  FLOW LENGTH(FEET) =   119.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.68
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.29
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   10.94
  LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.00 =     795.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        4.29   10.94    1.444  0.22( 0.08) 0.35       3.4      48.60
  LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.00 =     795.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      162.15    7.63    1.776  0.26( 0.08) 0.30      86.4      41.90
      2      162.15    7.63    1.776  0.26( 0.08) 0.30      86.4      41.90
      3      171.20    8.44    1.676  0.26( 0.08) 0.30      98.7      30.20
      4      189.74   10.64    1.467  0.26( 0.08) 0.30     134.8      55.10
      5      200.47   11.96    1.372  0.26( 0.08) 0.30     156.6      37.30
      6      205.62   12.61    1.331  0.26( 0.08) 0.30     167.1      56.14
      7      215.18   13.90    1.259  0.26( 0.08) 0.30     187.9      47.36
      8      219.34   14.56    1.226  0.26( 0.08) 0.29     197.7      47.31
      9      219.95   14.65    1.221  0.26( 0.08) 0.29     199.2      37.60
     10      222.74   15.12    1.200  0.26( 0.08) 0.29     206.0      47.33
     11      222.87   15.14    1.199  0.26( 0.08) 0.29     206.3      56.11
     12      225.50   15.61    1.178  0.26( 0.08) 0.29     212.9      41.20
     13      228.82   16.36    1.146  0.26( 0.08) 0.29     223.0      45.00
     14      230.03   16.66    1.135  0.26( 0.08) 0.29     227.0      42.00
     15      235.53   18.09    1.082  0.26( 0.08) 0.29     245.4      38.00
     16      253.33   22.19    0.962  0.26( 0.07) 0.28     296.5       1.00
     17      249.52   22.81    0.947  0.26( 0.07) 0.28     297.6      51.00
     18      244.74   23.54    0.930  0.26( 0.07) 0.28     298.5       8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      165.87    7.63    1.776  0.26( 0.08) 0.30      88.8      41.90
      2      165.87    7.63    1.776  0.26( 0.08) 0.30      88.8      41.90
      3      175.07    8.44    1.676  0.26( 0.08) 0.30     101.3      30.20
      4      193.98   10.64    1.467  0.26( 0.08) 0.30     138.1      55.10
      5      196.48   10.94    1.444  0.26( 0.08) 0.30     143.2      48.60
      6      204.54   11.96    1.372  0.26( 0.08) 0.30     160.0      37.30
      7      209.56   12.61    1.331  0.26( 0.08) 0.30     170.6      56.14
      8      218.88   13.90    1.259  0.26( 0.08) 0.30     191.3      47.36
      9      222.94   14.56    1.226  0.26( 0.08) 0.30     201.2      47.31
     10      223.53   14.65    1.221  0.26( 0.08) 0.30     202.6      37.60
     11      226.26   15.12    1.200  0.26( 0.08) 0.29     209.4      47.33
     12      226.39   15.14    1.199  0.26( 0.08) 0.29     209.8      56.11
     13      228.95   15.61    1.178  0.26( 0.08) 0.29     216.3      41.20
     14      232.17   16.36    1.146  0.26( 0.08) 0.29     226.5      45.00
     15      233.35   16.66    1.135  0.26( 0.08) 0.29     230.4      42.00
     16      238.68   18.09    1.082  0.26( 0.08) 0.29     248.8      38.00
     17      256.11   22.19    0.962  0.26( 0.07) 0.28     299.9       1.00
     18      252.25   22.81    0.947  0.26( 0.07) 0.28     301.1      51.00
     19      247.41   23.54    0.930  0.26( 0.07) 0.28     302.0       8.00
    TOTAL AREA(ACRES) =       302.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      256.11  Tc(MIN.) =   22.188
  EFFECTIVE AREA(ACRES) =    299.95  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =      302.0
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  12
```

```
------------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
==============================================================================

******************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     49.00 IS CODE =  31
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   691.10  DOWNSTREAM(FEET) =   689.20
  FLOW LENGTH(FEET) =   384.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  53.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.32
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     256.11
  PIPE TRAVEL TIME(MIN.) =   0.57    Tc(MIN.) =   22.75
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     49.00 =   11849.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   22.75
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.949
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.31      0.30      0.100    36
  COMMERCIAL                 C        0.90      0.25      0.100    50
  COMMERCIAL                 D        0.12      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     1.33      SUBAREA RUNOFF(CFS) =     1.10
  EFFECTIVE AREA(ACRES) =    301.28   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =      303.3       PEAK FLOW RATE(CFS) =     256.11
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

******************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =   1
------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   22.75
  RAINFALL INTENSITY(INCH/HR) =   0.95
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.28
  EFFECTIVE STREAM AREA(ACRES) =     301.28
  TOTAL STREAM AREA(ACRES) =     303.28
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     256.11

******************************************************************************
  FLOW PROCESS FROM NODE     61.30 TO NODE     61.20 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    707.30  DOWNSTREAM(FEET) =    704.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.383
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.683
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  APARTMENTS                 B        0.53      0.30      0.200    36    8.38
  APARTMENTS                 D        0.77      0.20      0.200    57    8.38
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      1.91
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      1.91

******************************************************************************
  FLOW PROCESS FROM NODE     61.20 TO NODE     61.10 IS CODE =  91
------------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
==============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    704.20
  DOWNSTREAM NODE ELEVATION(FEET) =    703.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   119.00
  "V" GUTTER WIDTH(FEET) =   1.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.10000
  MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.613
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        1.30      0.30      0.200    36
  APARTMENTS                 D        0.25      0.20      0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.00
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.08
  AVERAGE FLOW DEPTH(FEET) =   0.32   FLOOD WIDTH(FEET) =    6.21
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.64   Tc(MIN.) =    9.03
  SUBAREA AREA(ACRES) =    1.55       SUBAREA RUNOFF(CFS) =    2.17
  EFFECTIVE AREA(ACRES) =    2.85     AREA-AVERAGED Fm(INCH/HR) =   0.05
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   0.20
  TOTAL AREA(ACRES) =        2.8         PEAK FLOW RATE(CFS) =       4.00

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.36   FLOOD WIDTH(FEET) =    6.93
  FLOW VELOCITY(FEET/SEC.) =   3.31   DEPTH*VELOCITY(FT*FT/SEC) =   1.18
  LONGEST FLOWPATH FROM NODE     61.30 TO NODE     61.10 =     449.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     61.10 TO NODE     49.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  703.00  DOWNSTREAM ELEVATION(FEET) =  699.50
  STREET LENGTH(FEET) =   380.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.49
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   13.88
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.42
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.92
  STREET FLOW TRAVEL TIME(MIN.) =   2.61   Tc(MIN.) =   11.64
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.394
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.26      0.30     0.100    36
  COMMERCIAL                 C        0.25      0.25     0.100    50
  COMMERCIAL                 D        0.29      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    0.99
  EFFECTIVE AREA(ACRES) =      3.65    AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =       4.43

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  13.76
  FLOW VELOCITY(FEET/SEC.) =  2.43   DEPTH*VELOCITY(FT*FT/SEC.) =   0.91
  LONGEST FLOWPATH FROM NODE     61.30 TO NODE     49.00 =     829.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.64
  RAINFALL INTENSITY(INCH/HR) =   1.39
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.18
  EFFECTIVE STREAM AREA(ACRES) =       3.65
  TOTAL STREAM AREA(ACRES) =       3.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.43

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1      165.87    8.27    1.696  0.26( 0.08) 0.30      90.1      41.90
      1      165.87    8.27    1.696  0.26( 0.08) 0.30      90.1      41.90
      1      175.07    9.06    1.609  0.26( 0.08) 0.30     102.7      30.20
      1      193.98   11.26    1.421  0.26( 0.08) 0.29     139.4      55.10
      1      196.48   11.56    1.399  0.26( 0.08) 0.29     144.5      48.60
      1      204.54   12.56    1.334  0.26( 0.08) 0.29     161.3      37.30
      1      209.56   13.20    1.297  0.26( 0.08) 0.29     171.9      56.14
      1      218.88   14.49    1.229  0.26( 0.08) 0.29     192.6      47.36
      1      222.94   15.15    1.198  0.26( 0.08) 0.29     202.5      47.31
      1      223.53   15.25    1.194  0.26( 0.08) 0.29     204.0      37.60
      1      226.26   15.70    1.174  0.26( 0.08) 0.29     210.8      47.33
      1      226.39   15.72    1.173  0.26( 0.08) 0.29     211.1      56.11
      1      228.95   16.19    1.153  0.26( 0.08) 0.29     217.7      41.20
      1      232.17   16.94    1.124  0.26( 0.08) 0.29     227.8      45.00
      1      233.35   17.24    1.112  0.26( 0.08) 0.29     231.8      42.00
      1      238.68   18.67    1.063  0.26( 0.08) 0.29     250.2      38.00
      1      256.11   22.75    0.949  0.26( 0.07) 0.28     301.3       1.00
      1      252.25   23.38    0.934  0.26( 0.07) 0.28     302.4      51.00
      1      247.41   24.11    0.917  0.26( 0.07) 0.28     303.3       8.00
      2        4.43   11.64    1.394  0.26( 0.05) 0.18       3.6      61.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1      169.72    8.27    1.696  0.26( 0.08) 0.29      92.7      41.90
      2      169.72    8.27    1.696  0.26( 0.08) 0.29      92.7      41.90
      3      179.07    9.06    1.609  0.26( 0.08) 0.29     105.5      30.20
      4      198.34   11.26    1.421  0.26( 0.08) 0.29     143.0      55.10
      5      200.89   11.56    1.399  0.26( 0.08) 0.29     148.1      48.60
      6      201.56   11.64    1.394  0.26( 0.08) 0.29     149.5      61.30
      7      208.77   12.56    1.334  0.26( 0.08) 0.29     165.0      37.30
      8      213.66   13.20    1.297  0.26( 0.08) 0.29     175.6      56.14
      9      222.77   14.49    1.229  0.26( 0.08) 0.29     196.3      47.36
     10      226.72   15.15    1.198  0.26( 0.08) 0.29     206.2      47.31
     11      227.30   15.25    1.194  0.26( 0.08) 0.29     207.6      37.60
     12      229.96   15.70    1.174  0.26( 0.08) 0.29     214.4      47.33
     13      230.09   15.72    1.173  0.26( 0.08) 0.29     214.7      56.11
     14      232.59   16.19    1.153  0.26( 0.08) 0.29     221.3      41.20
     15      235.71   16.94    1.124  0.26( 0.08) 0.29     231.5      45.00
     16      236.85   17.24    1.112  0.26( 0.08) 0.29     235.4      42.00
     17      242.02   18.67    1.063  0.26( 0.08) 0.29     253.8      38.00
     18      259.07   22.75    0.949  0.26( 0.07) 0.28     304.9       1.00
     19      255.17   23.38    0.934  0.26( 0.07) 0.28     306.1      51.00
     20      250.27   24.11    0.917  0.26( 0.07) 0.28     306.9       8.00
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     259.07    Tc(MIN.) =    22.75
  EFFECTIVE AREA(ACRES) =     304.93   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =      306.9
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     49.00 =   11849.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     50.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   689.20  DOWNSTREAM(FEET) =   688.90
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  69.0 INCH PIPE IS  55.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.52
  ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     259.07
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   22.83
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     57.10 TO NODE     57.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    714.00  DOWNSTREAM(FEET) =    711.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.278
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.695
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.42      0.30      0.100    36    8.28
  COMMERCIAL                 D        0.08      0.20      0.100    57    8.28
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.75
  TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      0.75

****************************************************************************
  FLOW PROCESS FROM NODE     57.20 TO NODE     57.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  711.60  DOWNSTREAM ELEVATION(FEET) =  709.00
  STREET LENGTH(FEET) =   130.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.83
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =    5.15
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.31
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.51
  STREET FLOW TRAVEL TIME(MIN.) =   0.94   Tc(MIN.) =    9.21
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.594
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.11      0.30      0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.11      SUBAREA RUNOFF(CFS) =    0.15
  EFFECTIVE AREA(ACRES) =      0.61    AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       0.86

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   5.36
  FLOW VELOCITY(FEET/SEC.) =  2.28   DEPTH*VELOCITY(FT*FT/SEC.) =   0.51
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     57.00 =     460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.21
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.594
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.29      0.30      0.100    36
  COMMERCIAL                 C        0.02      0.25      0.100    50
  COMMERCIAL                 D        0.34      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.65      SUBAREA RUNOFF(CFS) =    0.92
  EFFECTIVE AREA(ACRES) =      1.26   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
```

```
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       1.78

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.21
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.594
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.33      0.30     0.200    36
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.56      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.89      SUBAREA RUNOFF(CFS) =    1.24
  EFFECTIVE AREA(ACRES) =      2.15   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.14
  TOTAL AREA(ACRES) =        2.2       PEAK FLOW RATE(CFS) =       3.02

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.21
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.594
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.34      0.30     0.200    36
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.53      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.87      SUBAREA RUNOFF(CFS) =    1.21
  EFFECTIVE AREA(ACRES) =      3.02   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =        3.0       PEAK FLOW RATE(CFS) =       4.23

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     58.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.00  DOWNSTREAM(FEET) =   702.50
  FLOW LENGTH(FEET) =   633.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH)  INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.46
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.23
  PIPE TRAVEL TIME(MIN.) =   1.93    Tc(MIN.) =   11.15
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     58.00 =    1093.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.15
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.429
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        1.93      0.30     0.200    36
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.46      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    2.39      SUBAREA RUNOFF(CFS) =    2.95
  EFFECTIVE AREA(ACRES) =      5.41   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =       6.73

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.15
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.429
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        1.60      0.30     0.200    36
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.76      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    2.36      SUBAREA RUNOFF(CFS) =    2.92
  EFFECTIVE AREA(ACRES) =      7.77   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =       9.65

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   702.50  DOWNSTREAM(FEET) =   700.00
  FLOW LENGTH(FEET) =    67.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH)  INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.0 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.90
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.65
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.25
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     58.10 =    1160.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     58.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.25
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.421
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        1.94      0.30     0.200    36
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        C        0.82      0.25     0.200    50
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        4.28      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     7.04      SUBAREA RUNOFF(CFS) =     8.71
  EFFECTIVE AREA(ACRES) =     14.81   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       14.8       PEAK FLOW RATE(CFS) =      18.31

****************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     58.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.25
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.421
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        C        3.80      0.25     0.200    50
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        2.64      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     6.44      SUBAREA RUNOFF(CFS) =     7.97
  EFFECTIVE AREA(ACRES) =     21.25   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       21.2       PEAK FLOW RATE(CFS) =      26.28

****************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     59.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   700.00  DOWNSTREAM(FEET) =   699.50
  FLOW LENGTH(FEET) =   139.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.71
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.28
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   11.65
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.00 =    1299.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.65
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.393
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.44      0.30     0.100    36
  COMMERCIAL                  D        0.18      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.62      SUBAREA RUNOFF(CFS) =     0.76
  EFFECTIVE AREA(ACRES) =     21.87   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       21.9       PEAK FLOW RATE(CFS) =      26.50

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.50  DOWNSTREAM(FEET) =   699.10
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.45
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.50
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   11.78
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.10 =    1355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     59.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.78
  RAINFALL INTENSITY(INCH/HR) =   1.38
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  0.19
  EFFECTIVE STREAM AREA(ACRES) =      21.87
```

```
  TOTAL STREAM AREA(ACRES) =      21.87
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      26.50

****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     50.10 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    83.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.01      0.30      0.100    36
  COMMERCIAL                 C        0.06      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.14
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.14

****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     50.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.08      0.30      0.100    36
  COMMERCIAL                 C        0.01      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.09      SUBAREA RUNOFF(CFS) =     0.18
  EFFECTIVE AREA(ACRES) =      0.16   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.2       PEAK FLOW RATE(CFS) =       0.32

****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     59.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.00  DOWNSTREAM(FEET) =   699.10
  FLOW LENGTH(FEET) =   481.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.75
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.32
  PIPE TRAVEL TIME(MIN.) =   2.14    Tc(MIN.) =    7.14
  LONGEST FLOWPATH FROM NODE     50.10 TO NODE     59.10 =     564.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     59.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.14
  RAINFALL INTENSITY(INCH/HR) =   1.85
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.28
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.16
  TOTAL STREAM AREA(ACRES) =       0.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.32

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       26.50   11.78    1.384  0.24( 0.05) 0.19      21.9      57.10
      2        0.32    7.14    1.845  0.28( 0.03) 0.10       0.2      50.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       21.91    7.14    1.845  0.24( 0.05) 0.19      13.4      50.10
      2       26.74   11.78    1.384  0.24( 0.05) 0.19      22.0      57.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      26.74    Tc(MIN.) =    11.78
  EFFECTIVE AREA(ACRES) =      22.03   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       22.0
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.10 =    1355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     50.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.10  DOWNSTREAM(FEET) =   688.90
  FLOW LENGTH(FEET) =    28.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  33.03
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.74
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.79
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     50.00 =    1383.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       21.91    7.15    1.843  0.24( 0.05) 0.19      13.4      50.10
      2       26.74   11.79    1.383  0.24( 0.05) 0.19      22.0      57.10
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     50.00 =    1383.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      169.72    8.36    1.686  0.26( 0.08) 0.29      92.7      41.90
      2      169.72    8.36    1.686  0.26( 0.08) 0.29      92.7      41.90
      3      179.07    9.15    1.600  0.26( 0.08) 0.29     105.5      30.20
      4      198.34   11.34    1.415  0.26( 0.08) 0.29     143.0      55.10
      5      200.89   11.64    1.393  0.26( 0.08) 0.29     148.1      48.60
      6      201.56   11.72    1.388  0.26( 0.08) 0.29     149.5      61.30
      7      208.77   12.64    1.329  0.26( 0.08) 0.29     165.0      37.30
      8      213.66   13.29    1.292  0.26( 0.08) 0.29     175.6      56.14
      9      222.77   14.58    1.225  0.26( 0.08) 0.29     196.3      47.36
     10      226.72   15.24    1.194  0.26( 0.08) 0.29     206.2      47.31
     11      227.30   15.33    1.190  0.26( 0.08) 0.29     207.6      37.60
     12      229.96   15.78    1.170  0.26( 0.08) 0.29     214.4      47.33
     13      230.09   15.81    1.169  0.26( 0.08) 0.29     214.7      56.11
     14      232.59   16.27    1.150  0.26( 0.08) 0.29     221.3      41.20
     15      235.71   17.02    1.121  0.26( 0.08) 0.29     231.5      45.00
     16      236.85   17.32    1.109  0.26( 0.08) 0.29     235.4      42.00
     17      242.02   18.75    1.060  0.26( 0.08) 0.29     253.8      38.00
     18      259.07   22.83    0.947  0.26( 0.07) 0.28     304.9       1.00
     19      255.17   23.47    0.932  0.26( 0.07) 0.28     306.1      51.00
     20      250.27   24.20    0.916  0.26( 0.07) 0.28     306.9       8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      181.38    7.15    1.843  0.26( 0.07) 0.28      92.8      50.10
      2      192.88    8.36    1.686  0.26( 0.07) 0.28     108.4      41.90
      3      192.88    8.36    1.686  0.26( 0.07) 0.28     108.4      41.90
      4      203.06    9.15    1.600  0.26( 0.07) 0.28     122.6      30.20
      5      224.61   11.34    1.415  0.26( 0.07) 0.28     164.2      55.10
      6      227.47   11.64    1.393  0.26( 0.07) 0.28     169.9      48.60
      7      228.23   11.72    1.388  0.26( 0.07) 0.28     171.4      61.30
      8      228.84   11.79    1.383  0.26( 0.07) 0.28     172.7      57.10
      9      234.42   12.64    1.329  0.26( 0.07) 0.28     187.0      37.30
     10      238.57   13.29    1.292  0.26( 0.07) 0.28     197.6      56.14
     11      246.33   14.58    1.225  0.26( 0.07) 0.28     218.3      47.36
     12      249.67   15.24    1.194  0.26( 0.07) 0.28     228.2      47.31
     13      250.17   15.33    1.190  0.26( 0.07) 0.28     229.7      37.60
     14      252.44   15.78    1.170  0.26( 0.07) 0.28     236.4      47.33
     15      252.55   15.81    1.169  0.26( 0.07) 0.28     236.8      56.11
     16      254.65   16.27    1.150  0.26( 0.07) 0.28     243.3      41.20
     17      257.19   17.02    1.121  0.26( 0.07) 0.28     253.5      45.00
     18      258.11   17.32    1.109  0.26( 0.07) 0.28     257.4      42.00
     19      262.29   18.75    1.060  0.26( 0.07) 0.28     275.8      38.00
     20      277.07   22.83    0.947  0.26( 0.07) 0.27     327.0       1.00
     21      272.88   23.47    0.932  0.26( 0.07) 0.28     328.1      51.00
     22      267.66   24.20    0.916  0.26( 0.07) 0.28     329.0       8.00
    TOTAL AREA(ACRES) =       329.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      277.07  Tc(MIN.) =   22.835
  EFFECTIVE AREA(ACRES) =    326.96  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      329.0
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   688.90  DOWNSTREAM(FEET) =   675.00
  FLOW LENGTH(FEET) =   437.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  40.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.94
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     277.07
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   23.15
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     61.00 =   12342.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   23.15
  RAINFALL INTENSITY(INCH/HR) =   0.94
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.27
  EFFECTIVE STREAM AREA(ACRES) =     326.96
  TOTAL STREAM AREA(ACRES) =     328.96
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     277.07

****************************************************************************
  FLOW PROCESS FROM NODE     48.10 TO NODE     48.20 IS CODE =  21
----------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    712.40  DOWNSTREAM(FEET) =    709.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.947
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.525
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.15      0.30     0.400    36    9.95
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.34      0.20     0.400    57    9.95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      0.63
  TOTAL AREA(ACRES) =      0.49   PEAK FLOW RATE(CFS) =      0.63

********************************************************************************
  FLOW PROCESS FROM NODE     48.20 TO NODE     48.30 IS CODE =  62
--------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  709.70  DOWNSTREAM ELEVATION(FEET) =  703.80
  STREET LENGTH(FEET) =   500.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.32
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.69
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.04
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.54
  STREET FLOW TRAVEL TIME(MIN.) =   4.09   Tc(MIN.) =   14.03
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.252
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        0.64      0.25     0.400    50
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.68      0.20     0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.32      SUBAREA RUNOFF(CFS) =    1.38
  EFFECTIVE AREA(ACRES) =      1.81    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        1.8        PEAK FLOW RATE(CFS) =       1.89

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   9.11
  FLOW VELOCITY(FEET/SEC.) =  2.19   DEPTH*VELOCITY(FT*FT/SEC.) =   0.64
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.30 =     830.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     48.30 TO NODE     48.40 IS CODE =  62
--------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  703.80  DOWNSTREAM ELEVATION(FEET) =  700.20
  STREET LENGTH(FEET) =   522.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.61
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   11.86
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.90
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.65
  STREET FLOW TRAVEL TIME(MIN.) =   4.58   Tc(MIN.) =   18.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.064
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        0.93      0.25     0.400    50
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.71      0.20     0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.64      SUBAREA RUNOFF(CFS) =    1.44
  EFFECTIVE AREA(ACRES) =      3.45    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        3.4        PEAK FLOW RATE(CFS) =       3.02

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  12.57
  FLOW VELOCITY(FEET/SEC.) =  1.97   DEPTH*VELOCITY(FT*FT/SEC.) =   0.70
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.40 =    1352.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     48.40 TO NODE     48.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.064
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        0.44      0.25      0.400    50
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.46      0.20      0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =     0.90      SUBAREA RUNOFF(CFS) =     0.79
  EFFECTIVE AREA(ACRES) =      4.35   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        4.3       PEAK FLOW RATE(CFS) =       3.81

****************************************************************************
  FLOW PROCESS FROM NODE     48.40 TO NODE     48.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   700.20  DOWNSTREAM(FEET) =   699.80
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.07
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.81
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   18.94
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.50 =    1432.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.50 TO NODE     48.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.94
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.054
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.16      0.30      0.400    36
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        1.49      0.25      0.400    50
  PUBLIC PARK                 C        0.26      0.25      0.850    50
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.88      0.20      0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.442
  SUBAREA AREA(ACRES) =     2.79      SUBAREA RUNOFF(CFS) =     2.38
  EFFECTIVE AREA(ACRES) =      7.14   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =        7.1       PEAK FLOW RATE(CFS) =       6.15

****************************************************************************
  FLOW PROCESS FROM NODE     48.50 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.80  DOWNSTREAM(FEET) =   675.00
  FLOW LENGTH(FEET) =   425.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.40
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.15
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =   19.56
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     61.00 =    1857.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.56
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.035
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 B        1.98      0.30      0.850    36
  PUBLIC PARK                 D        1.67      0.20      0.850    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =     3.65      SUBAREA RUNOFF(CFS) =     2.69
  EFFECTIVE AREA(ACRES) =     10.79   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =       10.8       PEAK FLOW RATE(CFS) =       8.72

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.56
  RAINFALL INTENSITY(INCH/HR) =   1.03
  AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =      10.79
  TOTAL STREAM AREA(ACRES) =      10.79
```

PEAK FLOW RATE(CFS) AT CONFLUENCE = 8.72

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	181.38	7.50	1.794	0.26(0.07)	0.28	92.8	50.10
1	192.88	8.70	1.647	0.26(0.07)	0.28	108.4	41.90
1	192.88	8.70	1.647	0.26(0.07)	0.28	108.4	41.90
1	203.06	9.50	1.566	0.26(0.07)	0.28	122.6	30.20
1	224.61	11.67	1.391	0.26(0.07)	0.28	164.2	55.10
1	227.47	11.97	1.371	0.26(0.07)	0.28	169.9	48.60
1	228.23	12.06	1.366	0.26(0.07)	0.28	171.4	61.30
1	228.84	12.12	1.361	0.26(0.07)	0.28	172.7	57.10
1	234.42	12.97	1.310	0.26(0.07)	0.28	187.0	37.30
1	238.57	13.62	1.274	0.26(0.07)	0.28	197.6	56.14
1	246.33	14.90	1.210	0.26(0.07)	0.28	218.3	47.36
1	249.67	15.56	1.180	0.26(0.07)	0.28	228.2	47.31
1	250.17	15.65	1.176	0.26(0.07)	0.28	229.7	37.60
1	252.44	16.10	1.157	0.26(0.07)	0.28	236.4	47.33
1	252.55	16.13	1.156	0.26(0.07)	0.28	236.8	56.11
1	254.65	16.59	1.137	0.26(0.07)	0.28	243.3	41.20
1	257.19	17.34	1.109	0.26(0.07)	0.28	253.5	45.00
1	258.11	17.64	1.098	0.26(0.07)	0.28	257.4	42.00
1	262.29	19.07	1.050	0.26(0.07)	0.28	275.8	38.00
1	277.07	23.15	0.939	0.26(0.07)	0.27	327.0	1.00
1	272.88	23.78	0.925	0.26(0.07)	0.28	328.1	51.00
1	267.66	24.51	0.909	0.26(0.07)	0.28	329.0	8.00
2	8.72	19.56	1.035	0.24(0.14)	0.56	10.8	48.10

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	187.55	7.50	1.794	0.26(0.07)	0.29	96.9	50.10
2	199.40	8.70	1.647	0.26(0.07)	0.29	113.2	41.90
3	199.40	8.70	1.647	0.26(0.07)	0.29	113.2	41.90
4	209.80	9.50	1.566	0.26(0.07)	0.29	127.9	30.20
5	231.88	11.67	1.391	0.26(0.07)	0.29	170.6	55.10
6	234.81	11.97	1.371	0.26(0.07)	0.29	176.5	48.60
7	235.58	12.06	1.366	0.26(0.07)	0.29	178.1	61.30
8	236.21	12.12	1.361	0.26(0.07)	0.29	179.4	57.10
9	241.97	12.97	1.310	0.26(0.08)	0.29	194.2	37.30
10	246.25	13.62	1.274	0.26(0.08)	0.29	205.1	56.14
11	254.27	14.90	1.210	0.26(0.08)	0.29	226.5	47.36
12	257.73	15.56	1.180	0.26(0.08)	0.29	236.8	47.31
13	258.24	15.65	1.176	0.26(0.08)	0.29	238.3	37.60
14	260.59	16.10	1.157	0.26(0.08)	0.29	245.3	47.33
15	260.70	16.13	1.156	0.26(0.08)	0.29	245.7	56.11
16	262.89	16.59	1.137	0.26(0.08)	0.29	252.5	41.20
17	265.56	17.34	1.109	0.26(0.08)	0.29	263.1	45.00
18	266.52	17.64	1.098	0.26(0.08)	0.29	267.2	42.00
19	270.93	19.07	1.050	0.26(0.08)	0.29	286.4	38.00
20	272.78	19.56	1.035	0.26(0.08)	0.29	292.8	48.10
21	284.87	23.15	0.939	0.26(0.07)	0.28	337.7	1.00
22	280.53	23.78	0.925	0.26(0.07)	0.28	338.9	51.00
23	275.15	24.51	0.909	0.26(0.07)	0.29	339.8	8.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 284.87 Tc(MIN.) = 23.15
EFFECTIVE AREA(ACRES) = 337.75 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 339.8
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 61.00 = 12342.00 FEET.

==========

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 339.8 TC(MIN.) = 23.15
EFFECTIVE AREA(ACRES) = 337.75 AREA-AVERAGED Fm(INCH/HR)= 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.284
PEAK FLOW RATE(CFS) = 284.87

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	187.55	7.50	1.794	0.26(0.07)	0.29	96.9	50.10
2	199.40	8.70	1.647	0.26(0.07)	0.29	113.2	41.90
3	199.40	8.70	1.647	0.26(0.07)	0.29	113.2	41.90
4	209.80	9.50	1.566	0.26(0.07)	0.29	127.9	30.20
5	231.88	11.67	1.391	0.26(0.07)	0.29	170.6	55.10
6	234.81	11.97	1.371	0.26(0.07)	0.29	176.5	48.60
7	235.58	12.06	1.366	0.26(0.07)	0.29	178.1	61.30
8	236.21	12.12	1.361	0.26(0.07)	0.29	179.4	57.10
9	241.97	12.97	1.310	0.26(0.08)	0.29	194.2	37.30
10	246.25	13.62	1.274	0.26(0.08)	0.29	205.1	56.14
11	254.27	14.90	1.210	0.26(0.08)	0.29	226.5	47.36
12	257.73	15.56	1.180	0.26(0.08)	0.29	236.8	47.31
13	258.24	15.65	1.176	0.26(0.08)	0.29	238.3	37.60
14	260.59	16.10	1.157	0.26(0.08)	0.29	245.3	47.33
15	260.70	16.13	1.156	0.26(0.08)	0.29	245.7	56.11
16	262.89	16.59	1.137	0.26(0.08)	0.29	252.5	41.20
17	265.56	17.34	1.109	0.26(0.08)	0.29	263.1	45.00
18	266.52	17.64	1.098	0.26(0.08)	0.29	267.2	42.00
19	270.93	19.07	1.050	0.26(0.08)	0.29	286.4	38.00
20	272.78	19.56	1.035	0.26(0.08)	0.29	292.8	48.10
21	284.87	23.15	0.939	0.26(0.07)	0.28	337.7	1.00
22	280.53	23.78	0.925	0.26(0.07)	0.28	338.9	51.00
23	275.15	24.51	0.909	0.26(0.07)	0.29	339.8	8.00

==========

END OF RATIONAL METHOD ANALYSIS

```
______________________________________________________________________________
******************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                           Analysis prepared by:

                           HUNSAKER & ASSOCIATES
                                Irvine,Inc
                      Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY IN CITY OF LAKE FOREST                           *
* OFFSITE & ONSITE PROPOSED CONDITION @ 25-YEAR STORM                   *
* W.O. #1443-136X                                                       *
 ************************************************************************

  FILE NAME: PROP_25.DAT
  TIME/DATE OF STUDY: 10:53 06/10/2019
==============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  2   20.0     15.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

******************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1099.00  DOWNSTREAM(FEET) =   1091.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.370
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.603
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.78      0.25      0.600    69    8.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      2.42
  TOTAL AREA(ACRES) =      0.78   PEAK FLOW RATE(CFS) =      2.42

******************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) = 1091.20  DOWNSTREAM ELEVATION(FEET) = 1089.40
  STREET LENGTH(FEET) =    90.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.04
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   13.38
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.52
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.30
  STREET FLOW TRAVEL TIME(MIN.) =   0.43   Tc(MIN.) =    8.80
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.503
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.38      0.25      0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    7.24
  EFFECTIVE AREA(ACRES) =      3.16    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =       9.59

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  16.12
```

```
  FLOW VELOCITY(FEET/SEC.) =  3.93   DEPTH*VELOCITY(FT*FT/SEC.) =   1.64
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1089.40  DOWNSTREAM ELEVATION(FEET) = 1067.00
  STREET LENGTH(FEET) =   513.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.41
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   14.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.35
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.06
  STREET FLOW TRAVEL TIME(MIN.) =   1.60   Tc(MIN.) =   10.39
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.188
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                C        0.34      0.25     0.100    69
  PUBLIC PARK               C        0.25      0.25     0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.418
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    1.64
  EFFECTIVE AREA(ACRES) =      3.75    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =      10.33

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  14.19
  FLOW VELOCITY(FEET/SEC.) =  5.38   DEPTH*VELOCITY(FT*FT/SEC.) =   2.06
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     903.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.39
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.188
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                C        0.35      0.25     0.100    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"      C        0.49      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.333
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    2.35
  EFFECTIVE AREA(ACRES) =      4.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =      12.68

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1067.00  DOWNSTREAM(FEET) =  1062.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.02
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.68
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   10.52
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1003.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.52
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.166
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"      C        2.09      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.09      SUBAREA RUNOFF(CFS) =    5.72
  EFFECTIVE AREA(ACRES) =      6.68   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        6.7        PEAK FLOW RATE(CFS) =      18.31

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1062.00  DOWNSTREAM(FEET) =  1022.40
  FLOW LENGTH(FEET) =   701.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.79
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.31
  PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   11.31
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1704.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.31
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.039
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.18      0.30      0.100    56
  COMMERCIAL                 C        0.46      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.64      SUBAREA RUNOFF(CFS) =    1.74
  EFFECTIVE AREA(ACRES) =      7.32   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        7.3       PEAK FLOW RATE(CFS) =      19.28

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.40  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.72
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.28
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   11.58
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.58
  RAINFALL INTENSITY(INCH/HR) =   3.00
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       7.32
  TOTAL STREAM AREA(ACRES) =       7.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      19.28

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   305.00
  ELEVATION DATA: UPSTREAM(FEET) =   1046.00  DOWNSTREAM(FEET) =   1042.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.129
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.946
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 C        1.00      0.25      0.100    69    7.13
  RESIDENTIAL
  ".4 DWELLING/ACRE"         C        0.50      0.25      0.900    69   11.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
  SUBAREA RUNOFF(CFS) =      5.20
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      5.20

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1042.00  DOWNSTREAM ELEVATION(FEET) = 1036.00
  STREET LENGTH(FEET) =   373.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.13
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   13.07
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.08
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.12
  STREET FLOW TRAVEL TIME(MIN.) =   2.02   Tc(MIN.) =    9.15
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.426
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        3.31      0.25      0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
```

```
  SUBAREA AREA(ACRES) =     3.31      SUBAREA RUNOFF(CFS) =     9.83
  EFFECTIVE AREA(ACRES) =      4.81    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =        4.8        PEAK FLOW RATE(CFS) =      14.34

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  15.00
  FLOW VELOCITY(FEET/SEC.) =  3.36   DEPTH*VELOCITY(FT*FT/SEC.) =   1.34
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     678.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1036.00  DOWNSTREAM ELEVATION(FEET) = 1026.00
  STREET LENGTH(FEET) =   463.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.52
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   15.31
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.96
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.59
  STREET FLOW TRAVEL TIME(MIN.) =   1.95   Tc(MIN.) =   11.10
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.072
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.40      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     2.40      SUBAREA RUNOFF(CFS) =     6.36
  EFFECTIVE AREA(ACRES) =      7.21    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =      19.16

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  15.92
  FLOW VELOCITY(FEET/SEC.) =  4.02   DEPTH*VELOCITY(FT*FT/SEC.) =   1.66
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1141.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.10
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.072
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.16      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.22      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     2.38      SUBAREA RUNOFF(CFS) =     6.31
  EFFECTIVE AREA(ACRES) =      9.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        9.6        PEAK FLOW RATE(CFS) =      25.47

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1026.00  DOWNSTREAM(FEET) =  1022.00
  FLOW LENGTH(FEET) =   395.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.36
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.47
  PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   11.89
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1536.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.89
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.955
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.07      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        4.06      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     4.13      SUBAREA RUNOFF(CFS) =    10.52
  EFFECTIVE AREA(ACRES) =     13.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       13.7        PEAK FLOW RATE(CFS) =      34.98

****************************************************************************
```

```
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.00  DOWNSTREAM(FEET) =  1020.00
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.55
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      34.98
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   12.09
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.927
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.55      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        2.06      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     2.61      SUBAREA RUNOFF(CFS) =     6.57
  EFFECTIVE AREA(ACRES) =     16.33   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      41.21

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1020.00  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.45
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.21
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   12.44
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    1799.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.44
  RAINFALL INTENSITY(INCH/HR) =   2.88
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =      16.33
  TOTAL STREAM AREA(ACRES) =      16.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      41.21

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       19.28   11.58    2.999  0.25( 0.11) 0.45       7.3       1.00
      2       41.21   12.44    2.880  0.25( 0.12) 0.49      16.3       8.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       59.29   11.58    2.999  0.25( 0.12) 0.48      22.5       1.00
      2       59.69   12.44    2.880  0.25( 0.12) 0.48      23.6       8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      59.69    Tc(MIN.) =    12.44
  EFFECTIVE AREA(ACRES) =      23.65   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       23.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1019.50  DOWNSTREAM(FEET) =  1014.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.64
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      59.69
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   12.59
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.10 =    2014.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.59
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.860
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.15      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.15      SUBAREA RUNOFF(CFS) =     0.38
  EFFECTIVE AREA(ACRES) =     23.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       23.8       PEAK FLOW RATE(CFS) =      59.69
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.59
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.860
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.16      0.30     0.100    56
  COMMERCIAL                  C        1.44      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     4.08
  EFFECTIVE AREA(ACRES) =     25.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       25.4       PEAK FLOW RATE(CFS) =      62.78

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1014.00  DOWNSTREAM(FEET) =   971.40
  FLOW LENGTH(FEET) =   863.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.70
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      62.78
  PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =   13.36
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    2877.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.36
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.765
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.82      0.30     0.100    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.77      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.294
  SUBAREA AREA(ACRES) =     1.59      SUBAREA RUNOFF(CFS) =     3.85
  EFFECTIVE AREA(ACRES) =     26.99   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       27.0       PEAK FLOW RATE(CFS) =      64.47

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   971.40  DOWNSTREAM(FEET) =   969.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.47
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      64.47
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   13.40
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    2917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.40
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.761
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        2.46      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C       10.48      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   12.94      SUBAREA RUNOFF(CFS) =    30.65
  EFFECTIVE AREA(ACRES) =     39.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       39.9       PEAK FLOW RATE(CFS) =      95.02

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       96.03   12.54    2.867  0.25( 0.12) 0.46      38.8       1.00
      2       95.02   13.40    2.761  0.25( 0.12) 0.46      39.9       8.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      96.03  Tc(MIN.) =   12.54
  AREA-AVERAGED Fm(INCH/HR) =  0.12  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.46  EFFECTIVE AREA(ACRES) =      38.80

****************************************************************************
```

```
  FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   969.00  DOWNSTREAM(FEET) =   954.00
  FLOW LENGTH(FEET) =   416.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.88
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      96.03
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   12.90
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    3333.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.90
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.821
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.77      0.25     0.100    69
  PUBLIC PARK                C        0.43      0.25     0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.369
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    2.95
  EFFECTIVE AREA(ACRES) =     40.00   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       41.1       PEAK FLOW RATE(CFS) =      97.36

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   954.00  DOWNSTREAM(FEET) =   952.80
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  31.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.66
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      97.36
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   13.07
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    3453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.07
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.800
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.88      0.30     0.400    56
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        7.02      0.25     0.400    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    7.90      SUBAREA RUNOFF(CFS) =   19.18
  EFFECTIVE AREA(ACRES) =     47.90   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       49.0       PEAK FLOW RATE(CFS) =     115.78

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   952.80  DOWNSTREAM(FEET) =   929.00
  FLOW LENGTH(FEET) =   636.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.70
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     115.78
  PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =   13.61
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.10 =    4089.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     17.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.61
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.736
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.68      0.30     0.500    56
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.89      0.25     0.600    69
  COMMERCIAL                 C        1.86      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.309
  SUBAREA AREA(ACRES) =    3.43      SUBAREA RUNOFF(CFS) =    8.19
  EFFECTIVE AREA(ACRES) =     51.33   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       52.5       PEAK FLOW RATE(CFS) =     121.25

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =   929.00  DOWNSTREAM(FEET) =   926.30
 FLOW LENGTH(FEET) =   122.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.58
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     121.25
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   13.74
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     18.00 =    4211.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.74
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.723
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS                B       24.46      0.30      0.350    56
 CONDOMINIUMS                C        7.92      0.25      0.350    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA AREA(ACRES) =   32.38      SUBAREA RUNOFF(CFS) =   76.41
 EFFECTIVE AREA(ACRES) =     83.71   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =       84.8       PEAK FLOW RATE(CFS) =     197.02

****************************************************************************
 FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   926.30  DOWNSTREAM(FEET) =   922.70
 FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  36.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.29
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     197.02
 PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   13.89
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     19.00 =    4384.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.89
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.705
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        1.62      0.30      0.400    56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       C        6.09      0.25      0.400    69
 COMMERCIAL                  B        2.90      0.30      0.100    56
 COMMERCIAL                  C        3.15      0.25      0.100    69
 NATURAL POOR COVER
 "GRASS"                     B        0.76      0.30      1.000    78
 NATURAL POOR COVER
 "GRASS"                     C        0.39      0.25      1.000    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
 SUBAREA AREA(ACRES) =   14.91      SUBAREA RUNOFF(CFS) =   35.13
 EFFECTIVE AREA(ACRES) =     98.62   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.39
 TOTAL AREA(ACRES) =       99.8       PEAK FLOW RATE(CFS) =     230.83

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   922.70  DOWNSTREAM(FEET) =   815.60
 FLOW LENGTH(FEET) =  1580.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  29.33
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     230.83
 PIPE TRAVEL TIME(MIN.) =   0.90    Tc(MIN.) =   14.79
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     20.00 =    5964.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.79
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.611
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B       19.45      0.30      0.100    56
 COMMERCIAL                  C       16.92      0.25      0.100    69
 COMMERCIAL                  D        0.11      0.20      0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =   36.48      SUBAREA RUNOFF(CFS) =   84.81
 EFFECTIVE AREA(ACRES) =    135.10   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =      136.2       PEAK FLOW RATE(CFS) =     307.28

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   815.60  DOWNSTREAM(FEET) =   799.50
```

```
  FLOW LENGTH(FEET) =   449.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  38.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.02
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     307.28
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   15.09
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6413.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.581
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.38      0.30      0.100    56
  COMMERCIAL                 C        0.87      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     3.25      SUBAREA RUNOFF(CFS) =     7.47
  EFFECTIVE AREA(ACRES) =    138.35   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      139.5       PEAK FLOW RATE(CFS) =     311.17

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.581
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        4.10      0.30      0.100    56
  COMMERCIAL                 C        1.54      0.25      0.100    69
  COMMERCIAL                 D        2.08      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     7.72      SUBAREA RUNOFF(CFS) =    17.75
  EFFECTIVE AREA(ACRES) =    146.07   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      147.2       PEAK FLOW RATE(CFS) =     328.93

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   799.50  DOWNSTREAM(FEET) =   765.50
  FLOW LENGTH(FEET) =  1056.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  43.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.99
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     328.93
  PIPE TRAVEL TIME(MIN.) =   0.73    Tc(MIN.) =   15.82
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     22.00 =    7469.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.82
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.513
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.06      0.30      0.100    56
  COMMERCIAL                 C        1.74      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     3.80      SUBAREA RUNOFF(CFS) =     8.50
  EFFECTIVE AREA(ACRES) =    149.87   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      151.0       PEAK FLOW RATE(CFS) =     328.93
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.82
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.513
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.23      0.30      0.100    56
  COMMERCIAL                 D        5.07      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     5.30      SUBAREA RUNOFF(CFS) =    11.89
  EFFECTIVE AREA(ACRES) =    155.17   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      156.3       PEAK FLOW RATE(CFS) =     340.32

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   765.50  DOWNSTREAM(FEET) =   755.00
  FLOW LENGTH(FEET) =   465.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  45.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.44
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =     340.32
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =   16.18
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     23.00 =    7934.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.18
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.481
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        9.15      0.30     0.100    56
  COMMERCIAL                  C       10.79      0.25     0.100    69
  COMMERCIAL                  D        1.81      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   21.75      SUBAREA RUNOFF(CFS) =   48.05
  EFFECTIVE AREA(ACRES) =    176.92   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =      178.1       PEAK FLOW RATE(CFS) =     383.91

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.18
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.481
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        7.47      0.30     0.100    56
  COMMERCIAL                  C        0.40      0.25     0.100    69
  COMMERCIAL                  D       17.76      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   25.63      SUBAREA RUNOFF(CFS) =   56.70
  EFFECTIVE AREA(ACRES) =    202.55   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      203.7       PEAK FLOW RATE(CFS) =     440.61

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   755.00  DOWNSTREAM(FEET) =   736.00
  FLOW LENGTH(FEET) =  1257.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  69.0 INCH PIPE IS  56.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.36
  ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     440.61
  PIPE TRAVEL TIME(MIN.) =   1.08    Tc(MIN.) =   17.27
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.00 =    9191.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.27
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.392
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B       16.13      0.30     0.100    56
  COMMERCIAL                  C        3.87      0.25     0.100    69
  COMMERCIAL                  D        4.22      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   24.22      SUBAREA RUNOFF(CFS) =   51.54
  EFFECTIVE AREA(ACRES) =    226.77   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      227.9       PEAK FLOW RATE(CFS) =     475.88

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     30.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   736.00  DOWNSTREAM(FEET) =   720.00
  FLOW LENGTH(FEET) =   212.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  41.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  36.60
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     475.88
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   17.36
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.10 =    9403.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.10 TO NODE     30.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   720.00  DOWNSTREAM(FEET) =   716.00
  FLOW LENGTH(FEET) =   156.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  50.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  24.40
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     475.88
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   17.47
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    9559.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   17.47
  RAINFALL INTENSITY(INCH/HR) =   2.38
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.23
  EFFECTIVE STREAM AREA(ACRES) =     226.77
  TOTAL STREAM AREA(ACRES) =     227.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     475.88

********************************************************************************
  FLOW PROCESS FROM NODE     30.20 TO NODE     30.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    740.00  DOWNSTREAM(FEET) =    726.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.494
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.573
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  B        0.42      0.30      0.100    56    5.49
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.72
  TOTAL AREA(ACRES) =      0.42   PEAK FLOW RATE(CFS) =      1.72

********************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.49
  RAINFALL INTENSITY(INCH/HR) =   4.57
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.42
  TOTAL STREAM AREA(ACRES) =       0.42
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.72

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      475.88   17.47    2.376  0.27( 0.06) 0.23     226.8       1.00
      1      464.42   18.36    2.310  0.27( 0.06) 0.23     227.9       8.00
      2        1.72    5.49    4.573  0.30( 0.03) 0.10       0.4      30.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      293.36    5.49    4.573  0.27( 0.06) 0.23      71.7      30.20
      2      476.76   17.47    2.376  0.27( 0.06) 0.23     227.2       1.00
      3      465.28   18.36    2.310  0.27( 0.06) 0.23     228.3       8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     476.76    Tc(MIN.) =    17.47
  EFFECTIVE AREA(ACRES) =     227.19   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      228.3
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    9559.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     33.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   716.00  DOWNSTREAM(FEET) =   714.30
  FLOW LENGTH(FEET) =   210.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  81.0 INCH PIPE IS  63.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.75
  ESTIMATED PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     476.76
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   17.69
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     33.00 =    9769.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   17.69
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.359
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.35      0.30      0.100    56
  COMMERCIAL                  B        0.62      0.30      0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.97      SUBAREA RUNOFF(CFS) =    2.03
  EFFECTIVE AREA(ACRES) =    228.16   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      229.3       PEAK FLOW RATE(CFS) =     476.76
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

********************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  31
```

```
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.30  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =   420.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  78.0 INCH PIPE IS  59.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.61
  ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     476.76
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   18.09
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     38.00 TO NODE     39.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    730.50  DOWNSTREAM(FEET) =    726.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.427
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.369
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.80      0.30     0.500    56    9.43
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.42      0.20     0.500    75    9.43
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      3.55
  TOTAL AREA(ACRES) =      1.22   PEAK FLOW RATE(CFS) =      3.55

****************************************************************************
  FLOW PROCESS FROM NODE     39.00 TO NODE     40.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  726.20  DOWNSTREAM ELEVATION(FEET) =  719.50
  STREET LENGTH(FEET) =   711.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018
  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.33
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.41
    HALFSTREET FLOOD WIDTH(FEET) =   15.92
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.65
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.10
  STREET FLOW TRAVEL TIME(MIN.) =   4.46   Tc(MIN.) =   13.89
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.705
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        2.40      0.30     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    5.52
  EFFECTIVE AREA(ACRES) =      3.62    AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =       8.34

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  17.75
  FLOW VELOCITY(FEET/SEC.) =  2.85   DEPTH*VELOCITY(FT*FT/SEC.) =   1.27
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.00 =    1041.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.89
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.705
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.93      0.30     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.93      SUBAREA RUNOFF(CFS) =    2.14
  EFFECTIVE AREA(ACRES) =      4.55   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =      10.48

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   719.50  DOWNSTREAM(FEET) =   718.40
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.74
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.48
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   14.00
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.10 =    1096.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.10 TO NODE     40.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.694
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.19      0.30     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.43
  EFFECTIVE AREA(ACRES) =      4.74   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.7       PEAK FLOW RATE(CFS) =      10.87

****************************************************************************
  FLOW PROCESS FROM NODE     40.10 TO NODE     40.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   718.40  DOWNSTREAM(FEET) =   717.00
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.68
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.87
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   14.09
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.20 =    1151.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     40.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.684
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.22      0.30     0.850    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.45      0.30     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.615
  SUBAREA AREA(ACRES) =    0.67      SUBAREA RUNOFF(CFS) =    1.51
  EFFECTIVE AREA(ACRES) =      5.41   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =      12.33

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     40.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.684
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.34      0.30     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.34      SUBAREA RUNOFF(CFS) =    0.78
  EFFECTIVE AREA(ACRES) =      5.75   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      13.11

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     41.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   717.00  DOWNSTREAM(FEET) =   713.40
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.93
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.11
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   14.27
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.00 =    1266.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.27
  RAINFALL INTENSITY(INCH/HR) =   2.66
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.51
  EFFECTIVE STREAM AREA(ACRES) =       5.75
  TOTAL STREAM AREA(ACRES) =       5.75
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      13.11
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     41.20 TO NODE     41.30 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    728.20  DOWNSTREAM(FEET) =    723.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.184
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.419
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.02      0.30     0.500    56    9.18
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.61      0.20     0.500    75    9.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.88
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      1.88

****************************************************************************
  FLOW PROCESS FROM NODE     41.30 TO NODE     41.40 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  723.30  DOWNSTREAM ELEVATION(FEET) =  718.00
  STREET LENGTH(FEET) =   323.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.98
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =   10.43
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.73
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.86
  STREET FLOW TRAVEL TIME(MIN.) =   1.97   Tc(MIN.) =   11.16
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.063
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.72      0.30     0.400    56
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.11      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.83      SUBAREA RUNOFF(CFS) =    2.20
  EFFECTIVE AREA(ACRES) =      1.46    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       3.88

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.65
  FLOW VELOCITY(FEET/SEC.) =  2.91   DEPTH*VELOCITY(FT*FT/SEC.) =   0.98
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.40 =     653.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.40 TO NODE     41.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.16
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.063
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        1.24      0.30     0.400    56
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.03      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.27      SUBAREA RUNOFF(CFS) =    3.36
  EFFECTIVE AREA(ACRES) =      2.73   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =        2.7        PEAK FLOW RATE(CFS) =       7.25

****************************************************************************
  FLOW PROCESS FROM NODE     41.40 TO NODE     41.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   718.00  DOWNSTREAM(FEET) =   717.00
  FLOW LENGTH(FEET) =    62.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.40
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.25
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   11.29
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.50 =     715.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.50 TO NODE     41.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==========================================================================
  MAINLINE Tc(MIN.) =   11.29
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.041
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.09      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.24
  EFFECTIVE AREA(ACRES) =      2.82   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        2.8       PEAK FLOW RATE(CFS) =       7.44

**************************************************************************
  FLOW PROCESS FROM NODE     41.50 TO NODE     41.51 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   717.00  DOWNSTREAM(FEET) =   715.50
  FLOW LENGTH(FEET) =   154.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.12
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.44
  PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =   11.71
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.51 =     869.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     41.51 TO NODE     41.51 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   11.71
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.979
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.44      0.30     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.44      SUBAREA RUNOFF(CFS) =    3.67
  EFFECTIVE AREA(ACRES) =      4.26   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =        4.3       PEAK FLOW RATE(CFS) =      10.95

**************************************************************************
  FLOW PROCESS FROM NODE     41.51 TO NODE     41.60 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   715.50  DOWNSTREAM(FEET) =   714.90
  FLOW LENGTH(FEET) =    59.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.86
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.95
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   11.86
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.60 =     928.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     41.60 TO NODE     41.60 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   11.86
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.959
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.06      0.30     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.06      SUBAREA RUNOFF(CFS) =    2.68
  EFFECTIVE AREA(ACRES) =      5.32   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        5.3       PEAK FLOW RATE(CFS) =      13.55

**************************************************************************
  FLOW PROCESS FROM NODE     41.60 TO NODE     41.60 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   11.86
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.959
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.47      0.30     0.400    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.47      SUBAREA RUNOFF(CFS) =    1.20
  EFFECTIVE AREA(ACRES) =      5.79   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      14.75

**************************************************************************
  FLOW PROCESS FROM NODE     41.60 TO NODE     41.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.90  DOWNSTREAM(FEET) =   713.40
  FLOW LENGTH(FEET) =   148.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.17
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =      14.75
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   12.20
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.00 =    1076.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.20
  RAINFALL INTENSITY(INCH/HR) =   2.91
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       5.79
  TOTAL STREAM AREA(ACRES) =       5.79
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      14.75

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       13.11   14.27    2.665  0.29( 0.15) 0.51       5.8      38.00
      2       14.75   12.20    2.911  0.29( 0.13) 0.45       5.8      41.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       27.06   12.20    2.911  0.29( 0.14) 0.48      10.7      41.20
      2       26.55   14.27    2.665  0.29( 0.14) 0.48      11.5      38.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      27.06    Tc(MIN.) =    12.20
  EFFECTIVE AREA(ACRES) =      10.71   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       11.5
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.00 =    1266.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.80 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.40  DOWNSTREAM(FEET) =   712.60
  FLOW LENGTH(FEET) =    83.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.25
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.06
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   12.37
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.80 =    1349.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.37
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.889
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.27      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.13      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    0.99
  EFFECTIVE AREA(ACRES) =     11.11   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       11.9       PEAK FLOW RATE(CFS) =      27.50

****************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.37
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.889
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.21      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.01      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.22      SUBAREA RUNOFF(CFS) =    0.54
  EFFECTIVE AREA(ACRES) =     11.33   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       12.2       PEAK FLOW RATE(CFS) =      28.04

****************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.90 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.60  DOWNSTREAM(FEET) =   711.80
  FLOW LENGTH(FEET) =    77.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.56
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.04
```

```
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   12.52
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.90 =    1426.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.52
  RAINFALL INTENSITY(INCH/HR) =   2.87
  AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.48
  EFFECTIVE STREAM AREA(ACRES) =      11.33
  TOTAL STREAM AREA(ACRES) =      12.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      28.04

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    77.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.06      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.26
  TOTAL AREA(ACRES) =      0.06   PEAK FLOW RATE(CFS) =      0.26

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.00
  RAINFALL INTENSITY(INCH/HR) =   4.82
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.06
  TOTAL STREAM AREA(ACRES) =       0.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.26

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  7700.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.06      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.26
  TOTAL AREA(ACRES) =      0.06   PEAK FLOW RATE(CFS) =      0.26

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.00
  RAINFALL INTENSITY(INCH/HR) =   4.82
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.06
  TOTAL STREAM AREA(ACRES) =       0.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.26

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       28.04   12.52    2.869  0.29( 0.14) 0.48      11.3      41.20
      1       27.45   14.58    2.632  0.29( 0.14) 0.48      12.2      38.00
      2        0.26    5.00    4.824  0.20( 0.10) 0.50       0.1      41.90
      3        0.26    5.00    4.824  0.20( 0.10) 0.50       0.1      41.90

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       19.72    5.00    4.824  0.29( 0.14) 0.48       4.6      41.90
      2       19.72    5.00    4.824  0.29( 0.14) 0.48       4.6      41.90
      3       28.34   12.52    2.869  0.29( 0.14) 0.48      11.4      41.20
      4       27.72   14.58    2.632  0.29( 0.14) 0.48      12.3      38.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      28.34    Tc(MIN.) =    12.52
  EFFECTIVE AREA(ACRES) =      11.45   AREA-AVERAGED Fm(INCH/HR) =  0.14
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       12.3
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     41.90 =    7700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     46.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   711.80  DOWNSTREAM(FEET) =   710.50
  FLOW LENGTH(FEET) =   132.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.36
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.34
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   12.78
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     46.00 =    7832.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     46.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.78
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.836
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                B        0.21      0.30     0.100    56
  COMMERCIAL                D        0.29      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    1.27
  EFFECTIVE AREA(ACRES) =    11.95   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       12.8       PEAK FLOW RATE(CFS) =      29.06

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.50  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =    68.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.54
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      29.06
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   12.92
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     34.00 =    7900.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       21.05    5.43    4.604  0.29( 0.13) 0.44       5.1       41.90
      2       21.05    5.43    4.604  0.29( 0.13) 0.44       5.1       41.90
      3       29.06   12.92    2.819  0.29( 0.13) 0.46      11.9       41.20
      4       28.42   14.98    2.592  0.29( 0.13) 0.47      12.8       38.00
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     34.00 =    7900.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      293.36    6.19    4.275  0.27( 0.06) 0.22      72.7       30.20
      2      476.76   18.09    2.330  0.27( 0.06) 0.23     228.2        1.00
      3      465.28   18.98    2.267  0.27( 0.06) 0.23     229.3        8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      298.48    5.43    4.604  0.27( 0.06) 0.24      68.9       41.90
      2      298.48    5.43    4.604  0.27( 0.06) 0.24      68.9       41.90
      3      315.23    6.19    4.275  0.27( 0.06) 0.24      78.5       30.20
      4      426.08   12.92    2.819  0.27( 0.06) 0.24     172.5       41.20
      5      457.26   14.98    2.592  0.27( 0.06) 0.24     200.3       38.00
      6      502.15   18.09    2.330  0.27( 0.06) 0.24     240.9        1.00
      7      489.94   18.98    2.267  0.27( 0.06) 0.24     242.1        8.00
    TOTAL AREA(ACRES) =       242.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      502.15  Tc(MIN.) =   18.090
  EFFECTIVE AREA(ACRES) =    240.94  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      242.1
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================


****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     56.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   703.70
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  43.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  32.71
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =     502.15
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   18.15
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.15
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.325
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.23      0.30      0.100    56
  COMMERCIAL                 D        0.51      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.74      SUBAREA RUNOFF(CFS) =     1.53
  EFFECTIVE AREA(ACRES) =    241.68   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      242.8       PEAK FLOW RATE(CFS) =      502.15
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     32.20 TO NODE     32.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    745.00  DOWNSTREAM(FEET) =    742.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.917
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.719
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.11      0.30      0.100    56    7.92
  COMMERCIAL                 C        0.26      0.25      0.100    69    7.92
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.23
  TOTAL AREA(ACRES) =      0.37   PEAK FLOW RATE(CFS) =      1.23

****************************************************************************
  FLOW PROCESS FROM NODE     32.10 TO NODE     32.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  742.00  DOWNSTREAM ELEVATION(FEET) =  740.00
  STREET LENGTH(FEET) =    96.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.42
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    6.90
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.59
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.66
  STREET FLOW TRAVEL TIME(MIN.) =   0.62   Tc(MIN.) =    8.54
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.564
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.06      0.30      0.100    56
  COMMERCIAL                 C        0.06      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.12      SUBAREA RUNOFF(CFS) =     0.38
  EFFECTIVE AREA(ACRES) =      0.49    AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       1.56

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   7.26
  FLOW VELOCITY(FEET/SEC.) =  2.63   DEPTH*VELOCITY(FT*FT/SEC.) =   0.68
  LONGEST FLOWPATH FROM NODE     32.20 TO NODE     32.00 =     426.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    724.60  DOWNSTREAM(FEET) =    723.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.167
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.916
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  SCHOOL                     B        0.33      0.30      0.600    56   12.17
```

```
  SCHOOL                     C        0.85      0.25     0.600    69   12.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      2.93
  TOTAL AREA(ACRES) =      1.18   PEAK FLOW RATE(CFS) =      2.93

****************************************************************************
  FLOW PROCESS FROM NODE     52.00 TO NODE     53.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  723.00  DOWNSTREAM ELEVATION(FEET) =  719.00
  STREET LENGTH(FEET) =   412.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.51
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.42
    HALFSTREET FLOOD WIDTH(FEET) =   16.02
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.70
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.12
  STREET FLOW TRAVEL TIME(MIN.) =   2.54   Tc(MIN.) =   14.71
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.619
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  SCHOOL                     B        2.48      0.30     0.600    56
  SCHOOL                     C        0.77      0.25     0.600    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    7.15
  EFFECTIVE AREA(ACRES) =      4.43    AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        4.4        PEAK FLOW RATE(CFS) =       9.77

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  2.91   DEPTH*VELOCITY(FT*FT/SEC.) =   1.31
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     53.00 =     742.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     53.00 TO NODE     54.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  719.00  DOWNSTREAM ELEVATION(FEET) =  712.50
  STREET LENGTH(FEET) =   633.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.10
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.45   FLOOD WIDTH(FEET) =   18.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    3.00
    SPLIT DEPTH(FEET) =    0.34   SPLIT FLOOD WIDTH(FEET) =   11.65
    SPLIT FLOW(CFS) =    3.07   SPLIT VELOCITY(FEET/SEC.) =    2.30
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   18.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.00
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.35
  STREET FLOW TRAVEL TIME(MIN.) =   3.52   Tc(MIN.) =   18.23
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.319
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  SCHOOL                     B        2.42      0.30     0.600    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    2.42      SUBAREA RUNOFF(CFS) =    4.66
  EFFECTIVE AREA(ACRES) =      6.85    AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        6.9        PEAK FLOW RATE(CFS) =      13.23

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  3.00   DEPTH*VELOCITY(FT*FT/SEC.) =   1.35
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     54.00 =    1375.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.23
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.319
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.32      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.32      SUBAREA RUNOFF(CFS) =    0.66
```

```
  EFFECTIVE AREA(ACRES) =      7.17   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.58
  TOTAL AREA(ACRES) =        7.2       PEAK FLOW RATE(CFS) =      13.89

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.23
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.319
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  SCHOOL                     B        2.40      0.30     0.600    56
  SCHOOL                     C        0.07      0.25     0.600    69
  SCHOOL                     D        2.82      0.20     0.600    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    5.29      SUBAREA RUNOFF(CFS) =   10.34
  EFFECTIVE AREA(ACRES) =     12.46   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.59
  TOTAL AREA(ACRES) =       12.5       PEAK FLOW RATE(CFS) =      24.23

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.23
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.319
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.78      0.30     0.100    56
  COMMERCIAL                 C        0.03      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.81      SUBAREA RUNOFF(CFS) =    1.67
  EFFECTIVE AREA(ACRES) =     13.27   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =       13.3       PEAK FLOW RATE(CFS) =      25.90

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.50  DOWNSTREAM(FEET) =   712.30
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.85
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.90
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   18.31
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     55.00 =    1409.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.31
  RAINFALL INTENSITY(INCH/HR) =   2.31
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =      13.27
  TOTAL STREAM AREA(ACRES) =      13.27
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      25.90

****************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.10 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    34.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.13      0.30     0.100    56
  COMMERCIAL                 D        0.14      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.17
  TOTAL AREA(ACRES) =      0.27   PEAK FLOW RATE(CFS) =      1.17

****************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.24      0.30     0.100    56
  COMMERCIAL                 D        0.01      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    1.08
  EFFECTIVE AREA(ACRES) =      0.52   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.5       PEAK FLOW RATE(CFS) =       2.24
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.00  DOWNSTREAM(FEET) =   712.30
  FLOW LENGTH(FEET) =   275.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.76
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.24
  PIPE TRAVEL TIME(MIN.) =   1.66    Tc(MIN.) =    6.66
  LONGEST FLOWPATH FROM NODE     55.10 TO NODE     55.00 =     309.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.66
  RAINFALL INTENSITY(INCH/HR) =   4.10
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.52
  TOTAL STREAM AREA(ACRES) =       0.52
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.24

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       25.90   18.31    2.313  0.27( 0.15) 0.56      13.3      51.00
      2        2.24    6.66    4.101  0.27( 0.03) 0.10       0.5      55.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       19.45    6.66    4.101  0.27( 0.14) 0.51       5.3      55.10
      2       27.16   18.31    2.313  0.27( 0.15) 0.54      13.8      51.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      27.16    Tc(MIN.) =    18.31
  EFFECTIVE AREA(ACRES) =      13.79   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.54
  TOTAL AREA(ACRES) =       13.8
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     55.00 =    1409.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     56.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.30  DOWNSTREAM(FEET) =   711.00
  FLOW LENGTH(FEET) =   165.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.79
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.16
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   18.67
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.00 =    1574.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.00 TO NODE     56.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.67
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.289
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.49      0.30      0.100    56
  COMMERCIAL                 D        0.04      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.53      SUBAREA RUNOFF(CFS) =    1.08
  EFFECTIVE AREA(ACRES) =     14.32   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =       14.3       PEAK FLOW RATE(CFS) =      27.67

****************************************************************************
  FLOW PROCESS FROM NODE     56.00 TO NODE     56.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   711.00  DOWNSTREAM(FEET) =   710.10
  FLOW LENGTH(FEET) =   172.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  24.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.54
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.67
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   19.11
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     56.11 TO NODE     56.12 IS CODE =  21
```

```
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    720.80  DOWNSTREAM(FEET) =    717.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.438
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.587
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.91      0.30     0.200    56    8.44
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      2.89
  TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      2.89

******************************************************************************
  FLOW PROCESS FROM NODE     56.12 TO NODE     56.13 IS CODE =  62
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =  717.80  DOWNSTREAM ELEVATION(FEET) =  713.60
  STREET LENGTH(FEET) =   486.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.10
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   14.80
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.45
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.97
  STREET FLOW TRAVEL TIME(MIN.) =   3.30   Tc(MIN.) =   11.74
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.976
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        1.68      0.30     0.200    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    1.68      SUBAREA RUNOFF(CFS) =    4.41
  EFFECTIVE AREA(ACRES) =      2.59    AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        2.6        PEAK FLOW RATE(CFS) =       6.80

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  16.63
  FLOW VELOCITY(FEET/SEC.) =  2.62   DEPTH*VELOCITY(FT*FT/SEC.) =   1.12
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.13 =     816.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   11.74
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.976
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        2.11      0.30     0.200    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    2.11      SUBAREA RUNOFF(CFS) =    5.54
  EFFECTIVE AREA(ACRES) =      4.70   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        4.7        PEAK FLOW RATE(CFS) =      12.33

******************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =   1
------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.74
  RAINFALL INTENSITY(INCH/HR) =   2.98
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =       4.70
  TOTAL STREAM AREA(ACRES) =       4.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.33

******************************************************************************
  FLOW PROCESS FROM NODE     56.14 TO NODE     56.15 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    719.20  DOWNSTREAM(FEET) =    715.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.182
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.650
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE"        B        0.84      0.30      0.200    56    8.18
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
SUBAREA RUNOFF(CFS) =      2.71
TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      2.71

****************************************************************************
FLOW PROCESS FROM NODE     56.15 TO NODE     56.13 IS CODE =  62
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) =  715.70  DOWNSTREAM ELEVATION(FEET) =  713.60
STREET LENGTH(FEET) =   200.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.018
OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.51
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.35
  HALFSTREET FLOOD WIDTH(FEET) =   12.26
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.40
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.84
STREET FLOW TRAVEL TIME(MIN.) =   1.39   Tc(MIN.) =    9.57
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.340
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"        B        0.54      0.30      0.200    56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
SUBAREA AREA(ACRES) =     0.54      SUBAREA RUNOFF(CFS) =     1.59
EFFECTIVE AREA(ACRES) =      1.38    AREA-AVERAGED Fm(INCH/HR) =  0.06
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       4.07

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  12.97
FLOW VELOCITY(FEET/SEC.) =  2.51   DEPTH*VELOCITY(FT*FT/SEC.) =   0.91
LONGEST FLOWPATH FROM NODE     56.14 TO NODE     56.13 =     530.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =    9.57
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.340
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"        B        0.70      0.30      0.200    56
RESIDENTIAL
"11+ DWELLINGS/ACRE"        D        0.52      0.20      0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
SUBAREA AREA(ACRES) =    1.22      SUBAREA RUNOFF(CFS) =    3.61
EFFECTIVE AREA(ACRES) =      2.60   AREA-AVERAGED Fm(INCH/HR) =  0.06
AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.20
TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =       7.69

****************************************************************************
FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =    9.57
RAINFALL INTENSITY(INCH/HR) =   3.34
AREA-AVERAGED Fm(INCH/HR) =  0.06
AREA-AVERAGED Fp(INCH/HR) =  0.28
AREA-AVERAGED Ap =  0.20
EFFECTIVE STREAM AREA(ACRES) =       2.60
TOTAL STREAM AREA(ACRES) =       2.60
PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.69

** CONFLUENCE DATA **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1       12.33   11.74    2.976  0.30( 0.06) 0.20       4.7      56.11
    2        7.69    9.57    3.340  0.28( 0.06) 0.20       2.6      56.14

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1       19.00    9.57    3.340  0.29( 0.06) 0.20       6.4      56.14
    2       19.17   11.74    2.976  0.29( 0.06) 0.20       7.3      56.11

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      19.17    Tc(MIN.) =    11.74
EFFECTIVE AREA(ACRES) =       7.30   AREA-AVERAGED Fm(INCH/HR) =  0.06
AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
TOTAL AREA(ACRES) =        7.3
LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.13 =     816.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.16 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.60  DOWNSTREAM(FEET) =   712.50
  FLOW LENGTH(FEET) =    94.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.25
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.17
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   11.93
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.16 =     910.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.16 TO NODE     56.16 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.93
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.949
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.46      0.30     0.200    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     0.46      SUBAREA RUNOFF(CFS) =     1.20
  EFFECTIVE AREA(ACRES) =      7.76   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =      20.19

****************************************************************************
  FLOW PROCESS FROM NODE     56.16 TO NODE     56.16 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.93
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.949
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.05      0.30     0.200    56
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        0.41      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     0.46      SUBAREA RUNOFF(CFS) =     1.20
  EFFECTIVE AREA(ACRES) =      8.22   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        8.2       PEAK FLOW RATE(CFS) =      21.39

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       21.48    9.76    3.303  0.29( 0.06) 0.20       7.4       56.14
      2       21.39   11.93    2.949  0.29( 0.06) 0.20       8.2       56.11
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      21.48  Tc(MIN.) =    9.76
  AREA-AVERAGED Fm(INCH/HR) =  0.06  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.20  EFFECTIVE AREA(ACRES) =       7.35

****************************************************************************
  FLOW PROCESS FROM NODE     56.16 TO NODE     56.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.50  DOWNSTREAM(FEET) =   710.10
  FLOW LENGTH(FEET) =    38.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.93
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.48
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    9.80
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.10 =     948.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       21.48    9.80    3.296  0.29( 0.06) 0.20       7.4       56.14
      2       21.39   11.97    2.943  0.29( 0.06) 0.20       8.2       56.11
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.10 =     948.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       20.33    7.51    3.831  0.27( 0.13) 0.48       5.9       55.10
      2       27.67   19.11    2.259  0.27( 0.14) 0.52      14.3       51.00
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       39.52    7.51    3.831  0.28( 0.09) 0.34      11.5       55.10
      2       43.26    9.80    3.296  0.28( 0.09) 0.34      14.9       56.14
      3       44.54   11.97    2.943  0.28( 0.10) 0.35      17.3       56.11
      4       43.98   19.11    2.259  0.27( 0.11) 0.41      22.5       51.00
    TOTAL AREA(ACRES) =        22.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       44.54  Tc(MIN.) =   11.968
```

```
  EFFECTIVE AREA(ACRES) =     17.34  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.34
  TOTAL AREA(ACRES) =       22.5
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     56.10 TO NODE     56.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.10  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.30
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      44.54
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   12.06
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.20 =    1790.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.20 TO NODE     56.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.06
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.931
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.39      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.39      SUBAREA RUNOFF(CFS) =     1.02
  EFFECTIVE AREA(ACRES) =     17.73   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =       22.9       PEAK FLOW RATE(CFS) =      45.24

****************************************************************************
  FLOW PROCESS FROM NODE     56.20 TO NODE     56.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   703.70
  FLOW LENGTH(FEET) =   290.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.78
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      45.24
  PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =   12.43
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.30 =    2080.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1       39.77    8.00    3.696  0.27( 0.09) 0.33       11.9       55.10
      2       43.82   10.27    3.210  0.27( 0.09) 0.34       15.3       56.14
      3       45.24   12.43    2.880  0.27( 0.10) 0.35       17.7       56.11
      4       44.23   19.57    2.228  0.27( 0.11) 0.40       22.9       51.00
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.30 =    2080.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1      298.48    5.50    4.572  0.27( 0.06) 0.24       69.7       41.90
      2      298.48    5.50    4.572  0.27( 0.06) 0.24       69.7       41.90
      3      315.23    6.25    4.250  0.27( 0.06) 0.24       79.3       30.20
      4      428.30   12.98    2.811  0.27( 0.06) 0.24      173.3       41.20
      5      457.26   15.04    2.586  0.27( 0.06) 0.24      201.1       38.00
      6      502.15   18.15    2.325  0.27( 0.06) 0.24      241.7        1.00
      7      489.94   19.04    2.263  0.27( 0.06) 0.24      242.8        8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1      332.44    5.50    4.572  0.27( 0.07) 0.25       77.8       41.90
      2      332.44    5.50    4.572  0.27( 0.07) 0.25       77.8       41.90
      3      351.08    6.25    4.250  0.27( 0.07) 0.25       88.6       30.20
      4      384.40    8.00    3.696  0.27( 0.07) 0.25      115.6       55.10
      5      426.58   10.27    3.210  0.27( 0.07) 0.25      150.7       56.14
      6      464.41   12.43    2.880  0.27( 0.07) 0.25      183.4       56.11
      7      473.46   12.98    2.811  0.27( 0.07) 0.25      191.4       41.20
      8      502.14   15.04    2.586  0.27( 0.07) 0.25      220.7       38.00
      9      546.58   18.15    2.325  0.27( 0.07) 0.25      263.6        1.00
     10      534.24   19.04    2.263  0.27( 0.07) 0.25      265.4        8.00
     11      526.36   19.57    2.228  0.27( 0.07) 0.25      265.7       51.00
    TOTAL AREA(ACRES) =       265.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      546.58  Tc(MIN.) =   18.148
  EFFECTIVE AREA(ACRES) =    263.57  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =      265.7
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  12
----------------------------------------------------------------------------
```

```
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     35.10 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   703.70  DOWNSTREAM(FEET) =   703.00
  FLOW LENGTH(FEET) =    74.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  84.0 INCH PIPE IS  63.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.39
  ESTIMATED PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     546.58
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   18.22
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  10
--------------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    729.10  DOWNSTREAM(FEET) =    723.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.849
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.492
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.39      0.30     0.500    56    8.85
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.52      0.20     0.500    75    8.85
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.76
  TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      2.76

********************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     44.00 IS CODE =  62
--------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  723.20  DOWNSTREAM ELEVATION(FEET) =  714.50
  STREET LENGTH(FEET) =   493.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.66
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =   10.74
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.90
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.93
  STREET FLOW TRAVEL TIME(MIN.) =   2.84   Tc(MIN.) =   11.69
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.983
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        2.25      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.79      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.04      SUBAREA RUNOFF(CFS) =    7.79
  EFFECTIVE AREA(ACRES) =      3.95    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.9        PEAK FLOW RATE(CFS) =      10.13

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  12.77
  FLOW VELOCITY(FEET/SEC.) =  3.21   DEPTH*VELOCITY(FT*FT/SEC.) =   1.15
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     44.00 =     823.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     44.00 TO NODE     45.20 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.50  DOWNSTREAM(FEET) =   713.50
  FLOW LENGTH(FEET) =    33.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.20
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.13
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   11.74
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.20 =     856.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     45.20 TO NODE     45.20 IS CODE =   1
```

```
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.74
  RAINFALL INTENSITY(INCH/HR) =   2.98
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       3.95
  TOTAL STREAM AREA(ACRES) =       3.95
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.13

************************************************************************
  FLOW PROCESS FROM NODE     45.00 TO NODE     45.10 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    721.00  DOWNSTREAM(FEET) =    717.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.195
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.417
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.58      0.30     0.400    56    9.20
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.06      0.20     0.400    75    9.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      1.90
  TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      1.90

************************************************************************
  FLOW PROCESS FROM NODE     45.10 TO NODE     45.20 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) =  717.00  DOWNSTREAM ELEVATION(FEET) =  714.00
  STREET LENGTH(FEET) =   318.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.96
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.34
  HALFSTREET FLOOD WIDTH(FEET) =   11.65
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.22
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.75
STREET FLOW TRAVEL TIME(MIN.) =   2.38   Tc(MIN.) =   11.58
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.999
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"8-10 DWELLINGS/ACRE"      B        0.82      0.30     0.400    56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
SUBAREA AREA(ACRES) =    0.82      SUBAREA RUNOFF(CFS) =    2.12
EFFECTIVE AREA(ACRES) =      1.46    AREA-AVERAGED Fm(INCH/HR) =  0.12
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.40
TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       3.79

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  12.87
FLOW VELOCITY(FEET/SEC.) =  2.37   DEPTH*VELOCITY(FT*FT/SEC.) =   0.85
LONGEST FLOWPATH FROM NODE     45.00 TO NODE     45.20 =     648.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     45.20 TO NODE     45.20 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.58
  RAINFALL INTENSITY(INCH/HR) =   3.00
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.40
  EFFECTIVE STREAM AREA(ACRES) =       1.46
  TOTAL STREAM AREA(ACRES) =       1.46
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.79

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       10.13   11.74    2.976  0.27( 0.13) 0.50       3.9      42.00
      2        3.79   11.58    2.999  0.30( 0.12) 0.40       1.5      45.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       13.86   11.58    2.999  0.27( 0.13) 0.47       5.4      45.00
```

```
     2       13.89   11.74    2.976  0.27( 0.13) 0.47       5.4      42.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      13.89    Tc(MIN.) =    11.74
  EFFECTIVE AREA(ACRES) =       5.41   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =        5.4
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.20 =     856.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     45.20 TO NODE     45.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.50  DOWNSTREAM(FEET) =   711.90
  FLOW LENGTH(FEET) =   157.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.15
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.89
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   12.11
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.30 =    1013.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     45.30 TO NODE     45.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.11
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.924
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.66      0.30      0.400    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =     0.66      SUBAREA RUNOFF(CFS) =     1.67
  EFFECTIVE AREA(ACRES) =      6.07   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =        6.1       PEAK FLOW RATE(CFS) =      15.28

****************************************************************************
  FLOW PROCESS FROM NODE     45.30 TO NODE     45.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.11
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.924
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 B        1.89      0.30      0.850    56
  COMMERCIAL                  D        0.04      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.834
  SUBAREA AREA(ACRES) =     1.93      SUBAREA RUNOFF(CFS) =     4.65
  EFFECTIVE AREA(ACRES) =      8.00   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =        8.0       PEAK FLOW RATE(CFS) =      19.92

  ** PEAK FLOW RATE TABLE **
   STREAM       Q       Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       19.94   11.94    2.947  0.28( 0.16) 0.55       7.9       45.00
      2       19.92   12.11    2.924  0.28( 0.16) 0.55       8.0       42.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      19.94  Tc(MIN.) =   11.94
  AREA-AVERAGED Fm(INCH/HR) =  0.16  AREA-AVERAGED Fp(INCH/HR) =  0.28
  AREA-AVERAGED Ap =  0.55  EFFECTIVE AREA(ACRES) =       7.95

****************************************************************************
  FLOW PROCESS FROM NODE     45.30 TO NODE     47.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   711.90  DOWNSTREAM(FEET) =   710.80
  FLOW LENGTH(FEET) =   106.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.89
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.94
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   12.17
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     47.20 =    1119.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.20 TO NODE     47.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.17
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.916
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.13      0.30      0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.13      SUBAREA RUNOFF(CFS) =     0.34
  EFFECTIVE AREA(ACRES) =      8.08   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =        8.1       PEAK FLOW RATE(CFS) =      20.06

****************************************************************************
  FLOW PROCESS FROM NODE     47.20 TO NODE     35.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.80  DOWNSTREAM(FEET) =   703.90
```

```
  FLOW LENGTH(FEET) =   695.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.74
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.06
  PIPE TRAVEL TIME(MIN.) =   1.50    Tc(MIN.) =   13.67
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     35.20 =    1814.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.20 TO NODE     35.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.67
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.730
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK               B        1.02      0.30     0.850    56
  PUBLIC PARK               C        0.05      0.25     0.850    69
  PUBLIC PARK               D        2.20      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    3.27      SUBAREA RUNOFF(CFS) =    7.46
  EFFECTIVE AREA(ACRES) =     11.35   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.63
  TOTAL AREA(ACRES) =       11.4       PEAK FLOW RATE(CFS) =      26.17

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       26.17   13.67    2.730  0.26( 0.17) 0.63      11.3      45.00
      2       26.11   13.83    2.712  0.26( 0.17) 0.63      11.4      42.00
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     35.10 =    1814.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      332.44    5.58    4.534  0.27( 0.07) 0.25      77.8      41.90
      2      332.44    5.58    4.534  0.27( 0.07) 0.25      77.8      41.90
      3      351.08    6.33    4.219  0.27( 0.07) 0.25      88.6      30.20
      4      384.40    8.08    3.676  0.27( 0.07) 0.25     115.6      55.10
      5      426.58   10.35    3.196  0.27( 0.07) 0.25     150.7      56.14
      6      464.41   12.51    2.871  0.27( 0.07) 0.25     183.4      56.11
      7      473.46   13.05    2.802  0.27( 0.07) 0.25     191.4      41.20
      8      502.14   15.11    2.579  0.27( 0.07) 0.25     220.7      38.00
      9      546.58   18.22    2.320  0.27( 0.07) 0.25     263.6       1.00
     10      534.24   19.11    2.258  0.27( 0.07) 0.25     265.4       8.00
     11      526.36   19.65    2.223  0.27( 0.07) 0.25     265.7      51.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      350.64    5.58    4.534  0.27( 0.07) 0.27      82.5      41.90
      2      350.64    5.58    4.534  0.27( 0.07) 0.27      82.5      41.90
      3      370.26    6.33    4.219  0.27( 0.07) 0.27      93.8      30.20
      4      405.59    8.08    3.676  0.27( 0.07) 0.27     122.3      55.10
      5      449.99   10.35    3.196  0.27( 0.07) 0.27     159.3      56.14
      6      489.67   12.51    2.871  0.27( 0.07) 0.27     193.8      56.11
      7      499.16   13.05    2.802  0.27( 0.07) 0.27     202.2      41.20
      8      508.17   13.67    2.730  0.27( 0.07) 0.27     211.5      45.00
      9      510.34   13.83    2.712  0.27( 0.07) 0.27     213.8      42.00
     10      526.88   15.11    2.579  0.27( 0.07) 0.27     232.1      38.00
     11      568.67   18.22    2.320  0.27( 0.07) 0.27     275.0       1.00
     12      555.69   19.11    2.258  0.27( 0.07) 0.27     276.8       8.00
     13      547.45   19.65    2.223  0.27( 0.07) 0.27     277.1      51.00
    TOTAL AREA(ACRES) =       277.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      568.67  Tc(MIN.) =   18.219
  EFFECTIVE AREA(ACRES) =    274.97  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      277.1
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =   695.70
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 102.0 INCH PIPE IS  74.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.80
  ESTIMATED PIPE DIAMETER(INCH) = 102.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     568.67
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   18.32
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     36.00 =   10453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.32
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.313
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL               C        0.16      0.25      0.100    69
  COMMERCIAL               D        0.29      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.45      SUBAREA RUNOFF(CFS) =    0.93
  EFFECTIVE AREA(ACRES) =    275.42   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      277.6       PEAK FLOW RATE(CFS) =     568.67
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     37.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.70  DOWNSTREAM(FEET) =   695.40
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 102.0 INCH PIPE IS  74.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.80
  ESTIMATED PIPE DIAMETER(INCH) = 102.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     568.67
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   18.41
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.00 =   10528.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.00 TO NODE     37.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.40  DOWNSTREAM(FEET) =   694.00
  FLOW LENGTH(FEET) =   355.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 102.0 INCH PIPE IS  75.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.72
  ESTIMATED PIPE DIAMETER(INCH) = 102.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     568.67
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   18.88
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.10 =   10883.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.88
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.274
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL               C        0.68      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.68      SUBAREA RUNOFF(CFS) =    1.38
  EFFECTIVE AREA(ACRES) =    276.10   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      278.3       PEAK FLOW RATE(CFS) =     568.67
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.88
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.274
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL               C        0.46      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.46      SUBAREA RUNOFF(CFS) =    0.93
  EFFECTIVE AREA(ACRES) =    276.56   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      278.7       PEAK FLOW RATE(CFS) =     568.67
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.00  DOWNSTREAM(FEET) =   693.80
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  93.0 INCH PIPE IS  71.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.69
  ESTIMATED PIPE DIAMETER(INCH) =  93.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     568.67
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   18.92
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     37.60 TO NODE     37.70 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    718.50  DOWNSTREAM(FEET) =    714.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.517
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.351
```

```
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        0.13      0.30     0.500    56    9.52
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        D        0.51      0.20     0.500    75    9.52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA RUNOFF(CFS) =      1.87
 TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      1.87

****************************************************************************
 FLOW PROCESS FROM NODE     37.70 TO NODE     37.80 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  714.40  DOWNSTREAM ELEVATION(FEET) =  710.60
 STREET LENGTH(FEET) =   349.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.65
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.32
   HALFSTREET FLOOD WIDTH(FEET) =   10.84
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.27
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.73
 STREET FLOW TRAVEL TIME(MIN.) =   2.56   Tc(MIN.) =   12.08
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.928
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C        0.15      0.25     0.500    69
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        D        0.47      0.20     0.500    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.62      SUBAREA RUNOFF(CFS) =    1.57
 EFFECTIVE AREA(ACRES) =      1.26    AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =       3.20

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.65
 FLOW VELOCITY(FEET/SEC.) =  2.40   DEPTH*VELOCITY(FT*FT/SEC.) =   0.81
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.80 =     679.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.80 TO NODE     37.90 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   710.60  DOWNSTREAM(FEET) =   709.80
 FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.57
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.20
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   12.26
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.90 =     739.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.90 TO NODE     37.90 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.26
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.904
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C        0.21      0.25     0.500    69
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        D        0.93      0.20     0.500    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    1.14      SUBAREA RUNOFF(CFS) =    2.87
 EFFECTIVE AREA(ACRES) =      2.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        2.4       PEAK FLOW RATE(CFS) =       6.04

****************************************************************************
 FLOW PROCESS FROM NODE     37.90 TO NODE     37.50 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   708.00
 FLOW LENGTH(FEET) =   221.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.46
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.04
 PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   12.93
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.50 =     960.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.50 TO NODE     37.50 IS CODE =   1
```

```
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.93
  RAINFALL INTENSITY(INCH/HR) =   2.82
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       2.40
  TOTAL STREAM AREA(ACRES) =       2.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.04

****************************************************************************
  FLOW PROCESS FROM NODE     37.30 TO NODE     37.40 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    713.10  DOWNSTREAM(FEET) =    709.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.880
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.281
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.70      0.25      0.500    69    9.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.99
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      1.99

****************************************************************************
  FLOW PROCESS FROM NODE     37.40 TO NODE     37.50 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  709.70  DOWNSTREAM ELEVATION(FEET) =  708.10
  STREET LENGTH(FEET) =   124.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.43
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =   10.03
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.39
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.74
  STREET FLOW TRAVEL TIME(MIN.) =   0.86   Tc(MIN.) =   10.74
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.129
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.33      0.25      0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.33      SUBAREA RUNOFF(CFS) =    0.89
  EFFECTIVE AREA(ACRES) =      1.03    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.0        PEAK FLOW RATE(CFS) =       2.78

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =  10.64
  FLOW VELOCITY(FEET/SEC.) =  2.46   DEPTH*VELOCITY(FT*FT/SEC.) =   0.79
  LONGEST FLOWPATH FROM NODE     37.30 TO NODE     37.50 =     454.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.50 TO NODE     37.50 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.74
  RAINFALL INTENSITY(INCH/HR) =   3.13
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       1.03
  TOTAL STREAM AREA(ACRES) =       1.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.78

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        6.04   12.93    2.817  0.21( 0.11) 0.50       2.4      37.60
      2        2.78   10.74    3.129  0.25( 0.12) 0.50       1.0      37.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        8.38   10.74    3.129  0.23( 0.11) 0.50       3.0      37.30
      2        8.54   12.93    2.817  0.22( 0.11) 0.50       3.4      37.60
```

```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       8.54    Tc(MIN.) =    12.93
 EFFECTIVE AREA(ACRES) =       3.43   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        3.4
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.50 =     960.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.50 TO NODE     37.20 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   708.00  DOWNSTREAM(FEET) =   693.80
 FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.11
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.54
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   13.06
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.20 =    1080.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        8.38   10.87    3.108  0.23( 0.11) 0.50       3.0      37.30
     2        8.54   13.06    2.802  0.22( 0.11) 0.50       3.4      37.60
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.20 =    1080.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      350.64    6.37    4.206  0.27( 0.07) 0.27      84.1      41.90
     2      350.64    6.37    4.206  0.27( 0.07) 0.27      84.1      41.90
     3      370.26    7.12    3.948  0.27( 0.07) 0.27      95.4      30.20
     4      405.59    8.85    3.491  0.27( 0.07) 0.27     123.9      55.10
     5      449.99   11.10    3.072  0.27( 0.07) 0.27     160.9      56.14
     6      489.67   13.25    2.779  0.27( 0.07) 0.27     195.4      56.11
     7      499.16   13.79    2.717  0.27( 0.07) 0.27     203.8      41.20
     8      508.17   14.39    2.652  0.27( 0.07) 0.27     213.1      45.00
     9      510.34   14.55    2.635  0.27( 0.07) 0.27     215.4      42.00
    10      526.88   15.83    2.512  0.27( 0.07) 0.27     233.7      38.00
    11      568.67   18.92    2.271  0.27( 0.07) 0.27     276.6       1.00
    12      555.69   19.82    2.212  0.27( 0.07) 0.27     278.3       8.00
    13      547.45   20.35    2.179  0.27( 0.07) 0.27     278.7      51.00
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      357.35    6.37    4.206  0.27( 0.07) 0.27      85.8      41.90
     2      357.35    6.37    4.206  0.27( 0.07) 0.27      85.8      41.90
     3      377.29    7.12    3.948  0.27( 0.07) 0.27      97.4      30.20
     4      413.28    8.85    3.491  0.27( 0.07) 0.27     126.4      55.10
     5      453.84   10.87    3.108  0.27( 0.07) 0.27     160.1      37.30
     6      458.38   11.10    3.072  0.27( 0.07) 0.27     163.9      56.14
     7      494.76   13.06    2.802  0.27( 0.07) 0.27     195.8      37.60
     8      498.14   13.25    2.779  0.27( 0.07) 0.27     198.8      56.11
     9      507.42   13.79    2.717  0.27( 0.07) 0.27     207.2      41.20
    10      516.23   14.39    2.652  0.27( 0.07) 0.27     216.5      45.00
    11      518.35   14.55    2.635  0.27( 0.07) 0.27     218.8      42.00
    12      534.50   15.83    2.512  0.27( 0.07) 0.27     237.1      38.00
    13      575.52   18.92    2.271  0.27( 0.07) 0.27     280.0       1.00
    14      562.36   19.82    2.212  0.27( 0.07) 0.27     281.8       8.00
    15      554.01   20.35    2.179  0.27( 0.07) 0.27     282.2      51.00
  TOTAL AREA(ACRES) =       282.2

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      575.52  Tc(MIN.) =   18.918
 EFFECTIVE AREA(ACRES) =    279.99  AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
 TOTAL AREA(ACRES) =      282.2
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     37.20 TO NODE     47.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   693.80  DOWNSTREAM(FEET) =   691.30
 FLOW LENGTH(FEET) =   487.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  96.0 INCH PIPE IS  73.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.01
 ESTIMATED PIPE DIAMETER(INCH) =  96.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     575.52
 PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =   19.50
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     47.31 TO NODE     47.32 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    718.50  DOWNSTREAM(FEET) =    712.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.679
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.530
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.63      0.30     0.500    56    8.68
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.92
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      1.92

********************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.32 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.68
  RAINFALL INTENSITY(INCH/HR) =   3.53
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.63
  TOTAL STREAM AREA(ACRES) =       0.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.92

********************************************************************************
  FLOW PROCESS FROM NODE     47.33 TO NODE     47.32 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   282.00
  ELEVATION DATA: UPSTREAM(FEET) =    715.00  DOWNSTREAM(FEET) =    712.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.219
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.412
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.86      0.30     0.500    56    9.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.52
  TOTAL AREA(ACRES) =      0.86   PEAK FLOW RATE(CFS) =      2.52

********************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.32 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.22
  RAINFALL INTENSITY(INCH/HR) =   3.41
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.86
  TOTAL STREAM AREA(ACRES) =       0.86
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.52

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        1.92    8.68    3.530  0.30( 0.15) 0.50       0.6      47.31
      2        2.52    9.22    3.412  0.30( 0.15) 0.50       0.9      47.33

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        4.38    8.68    3.530  0.30( 0.15) 0.50       1.4      47.31
      2        4.37    9.22    3.412  0.30( 0.15) 0.50       1.5      47.33

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       4.38    Tc(MIN.) =     8.68
  EFFECTIVE AREA(ACRES) =       1.44   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.5
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.32 =     330.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.34 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.00  DOWNSTREAM(FEET) =   698.50
  FLOW LENGTH(FEET) =   102.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.17
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.38
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =    9.09
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.34 =     432.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     47.34 TO NODE     47.34 IS CODE =  81
```

```
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =    9.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.440
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.38      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.06      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.44      SUBAREA RUNOFF(CFS) =    1.31
  EFFECTIVE AREA(ACRES) =      1.88   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.9       PEAK FLOW RATE(CFS) =       5.57

************************************************************************
  FLOW PROCESS FROM NODE     47.34 TO NODE     47.35 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   698.50  DOWNSTREAM(FEET) =   697.50
  FLOW LENGTH(FEET) =   194.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.47
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.57
  PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =    9.81
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.35 =     626.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.81
  RAINFALL INTENSITY(INCH/HR) =   3.29
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       1.88
  TOTAL STREAM AREA(ACRES) =       1.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.57

************************************************************************
  FLOW PROCESS FROM NODE     47.36 TO NODE     47.35 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   275.00
  ELEVATION DATA: UPSTREAM(FEET) =    713.50  DOWNSTREAM(FEET) =    711.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.418
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.371
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.72      0.30     0.500    56    9.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =       2.09
  TOTAL AREA(ACRES) =       0.72   PEAK FLOW RATE(CFS) =       2.09

************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =    9.42
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.371
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.66      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.12      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.78      SUBAREA RUNOFF(CFS) =    2.27
  EFFECTIVE AREA(ACRES) =      1.50   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.5       PEAK FLOW RATE(CFS) =       4.35

************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.42
  RAINFALL INTENSITY(INCH/HR) =   3.37
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       1.50
  TOTAL STREAM AREA(ACRES) =       1.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.35

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
```

```
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1        5.57    9.81    3.294  0.30( 0.15) 0.50       1.9      47.31
    1        5.53   10.35    3.196  0.30( 0.15) 0.50       1.9      47.33
    2        4.35    9.42    3.371  0.29( 0.15) 0.50       1.5      47.36

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1        9.83    9.42    3.371  0.29( 0.15) 0.50       3.3      47.36
    2        9.82    9.81    3.294  0.29( 0.15) 0.50       3.4      47.31
    3        9.64   10.35    3.196  0.29( 0.15) 0.50       3.4      47.33

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       9.83    Tc(MIN.) =     9.42
 EFFECTIVE AREA(ACRES) =       3.30   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        3.4
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.35 =     626.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.35 TO NODE     47.37 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   697.60  DOWNSTREAM(FEET) =   696.00
 FLOW LENGTH(FEET) =   293.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.21
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       9.83
 PIPE TRAVEL TIME(MIN.) =   0.94    Tc(MIN.) =   10.35
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.37 =     919.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.37 TO NODE     47.37 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.35
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.195
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.67      0.30     0.500    56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.12      0.20     0.500    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.79      SUBAREA RUNOFF(CFS) =    2.17
 EFFECTIVE AREA(ACRES) =      4.09   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        4.2       PEAK FLOW RATE(CFS) =      11.23

****************************************************************************
 FLOW PROCESS FROM NODE     47.37 TO NODE     47.37 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.35
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.195
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.09      0.30     0.500    56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.60      0.20     0.500    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.69      SUBAREA RUNOFF(CFS) =    1.92
 EFFECTIVE AREA(ACRES) =      4.78   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        4.9       PEAK FLOW RATE(CFS) =      13.15

****************************************************************************
 FLOW PROCESS FROM NODE     47.37 TO NODE     47.30 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =   695.20
 FLOW LENGTH(FEET) =   158.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.47
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      13.15
 PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =   10.84
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.30 =    1077.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.30 TO NODE     47.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.84
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.114
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.28      0.20     0.500    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    0.76
 EFFECTIVE AREA(ACRES) =      5.06   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        5.2       PEAK FLOW RATE(CFS) =      13.56
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     47.30 TO NODE     47.40 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.20  DOWNSTREAM(FEET) =   694.60
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.36
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.56
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =   11.22
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.40 =    1202.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.40 TO NODE     47.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.22
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.052
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.19      0.20      0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.50
  EFFECTIVE AREA(ACRES) =      5.25   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =      13.79

****************************************************************************
  FLOW PROCESS FROM NODE     47.40 TO NODE     47.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.60  DOWNSTREAM(FEET) =   694.40
  FLOW LENGTH(FEET) =    41.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.41
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.79
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   11.35
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.50 =    1243.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.50 TO NODE     47.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.35
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.033
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.05      0.30      0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        1.45      0.20      0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.50      SUBAREA RUNOFF(CFS) =    3.96
  EFFECTIVE AREA(ACRES) =      6.75   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        6.9       PEAK FLOW RATE(CFS) =      17.65

****************************************************************************
  FLOW PROCESS FROM NODE     47.50 TO NODE     47.60 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.40  DOWNSTREAM(FEET) =   693.50
  FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.86
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.65
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   11.86
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.60 =    1423.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.60 TO NODE     47.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.86
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.958
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        1.55      0.20      0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.55      SUBAREA RUNOFF(CFS) =    3.99
  EFFECTIVE AREA(ACRES) =      8.30   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        8.4       PEAK FLOW RATE(CFS) =      21.18

****************************************************************************
  FLOW PROCESS FROM NODE     47.60 TO NODE     47.70 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.50  DOWNSTREAM(FEET) =   693.30
```

```
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.18
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.18
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   11.97
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.70 =    1463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.70 TO NODE     47.70 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.97
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.943
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.04      0.25     0.500    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.57      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.61      SUBAREA RUNOFF(CFS) =    4.12
  EFFECTIVE AREA(ACRES) =      9.91   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       10.0       PEAK FLOW RATE(CFS) =      25.19

****************************************************************************
  FLOW PROCESS FROM NODE     47.70 TO NODE     47.80 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.30  DOWNSTREAM(FEET) =   692.50
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.19
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.19
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   12.43
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.80 =    1633.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.80 TO NODE     47.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.43
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.881
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.60      0.25     0.500    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.94      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.54      SUBAREA RUNOFF(CFS) =    3.84
  EFFECTIVE AREA(ACRES) =     11.45   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       11.6       PEAK FLOW RATE(CFS) =      28.48

****************************************************************************
  FLOW PROCESS FROM NODE     47.80 TO NODE     47.90 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.50  DOWNSTREAM(FEET) =   692.30
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.32
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.48
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   12.50
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.90 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.90 TO NODE     47.90 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.872
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        1.43      0.25     0.500    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.14      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.57      SUBAREA RUNOFF(CFS) =    3.88
  EFFECTIVE AREA(ACRES) =     13.02   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =      32.27

****************************************************************************
  FLOW PROCESS FROM NODE     47.90 TO NODE     47.91 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.30  DOWNSTREAM(FEET) =   692.10
  FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  25.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.48
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =      32.27
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   12.61
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.91 =    1707.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.91 TO NODE     47.91 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.61
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.858
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        1.89      0.25     0.500    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        1.30      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     3.19      SUBAREA RUNOFF(CFS) =     7.87
  EFFECTIVE AREA(ACRES) =     16.21   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      39.98

****************************************************************************
  FLOW PROCESS FROM NODE     47.91 TO NODE     47.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.10  DOWNSTREAM(FEET) =   691.30
  FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.02
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      39.98
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   13.01
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.00 =    1874.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       39.98   13.01    2.808  0.24( 0.12) 0.50      16.2      47.36
      2       39.44   13.40    2.761  0.24( 0.12) 0.50      16.3      47.31
      3       38.59   13.95    2.698  0.24( 0.12) 0.50      16.3      47.33
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.00 =    1874.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      357.35    7.02    3.981  0.27( 0.07) 0.27      85.8      41.90
      2      357.35    7.02    3.981  0.27( 0.07) 0.27      85.8      41.90
      3      377.29    7.77    3.759  0.27( 0.07) 0.27      97.4      30.20
      4      413.28    9.48    3.358  0.27( 0.07) 0.27     126.4      55.10
      5      453.84   11.49    3.012  0.27( 0.07) 0.27     160.1      37.30
      6      458.38   11.72    2.979  0.27( 0.07) 0.27     163.9      56.14
      7      494.76   13.66    2.731  0.27( 0.07) 0.27     195.8      37.60
      8      498.14   13.85    2.710  0.27( 0.07) 0.27     198.8      56.11
      9      507.42   14.39    2.652  0.27( 0.07) 0.27     207.2      41.20
     10      516.23   14.99    2.591  0.27( 0.07) 0.27     216.5      45.00
     11      518.35   15.15    2.575  0.27( 0.07) 0.27     218.8      42.00
     12      534.50   16.43    2.460  0.27( 0.07) 0.27     237.1      38.00
     13      575.52   19.50    2.233  0.27( 0.07) 0.27     280.0       1.00
     14      562.36   20.41    2.176  0.27( 0.07) 0.27     281.8       8.00
     15      554.01   20.94    2.144  0.27( 0.07) 0.27     282.2      51.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      388.33    7.02    3.981  0.26( 0.08) 0.29      94.6      41.90
      2      388.33    7.02    3.981  0.26( 0.08) 0.29      94.6      41.90
      3      409.61    7.77    3.759  0.26( 0.08) 0.29     107.1      30.20
      4      448.39    9.48    3.358  0.26( 0.08) 0.29     138.2      55.10
      5      491.83   11.49    3.012  0.26( 0.08) 0.29     174.4      37.30
      6      496.68   11.72    2.979  0.26( 0.08) 0.29     178.5      56.14
      7      522.47   13.01    2.808  0.26( 0.08) 0.29     201.3      47.36
      8      529.30   13.40    2.761  0.26( 0.08) 0.29     207.8      47.31
      9      533.79   13.66    2.731  0.26( 0.08) 0.29     212.1      37.60
     10      536.89   13.85    2.710  0.26( 0.08) 0.29     215.1      56.11
     11      538.54   13.95    2.698  0.26( 0.08) 0.29     216.8      47.33
     12      545.32   14.39    2.652  0.26( 0.08) 0.29     223.6      41.20
     13      553.22   14.99    2.591  0.26( 0.08) 0.29     232.8      45.00
     14      555.11   15.15    2.575  0.26( 0.08) 0.29     235.2      42.00
     15      569.53   16.43    2.460  0.26( 0.08) 0.29     253.5      38.00
     16      607.15   19.50    2.233  0.26( 0.07) 0.28     296.3       1.00
     17      593.14   20.41    2.176  0.26( 0.07) 0.28     298.1       8.00
     18      584.32   20.94    2.144  0.26( 0.07) 0.28     298.5      51.00
    TOTAL AREA(ACRES) =       298.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      607.15  Tc(MIN.) =   19.498
  EFFECTIVE AREA(ACRES) =    296.33  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =      298.5
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     48.00 IS CODE =  31
```

```
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   691.30  DOWNSTREAM(FEET) =   691.10
  FLOW LENGTH(FEET) =    61.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 108.0 INCH PIPE IS  79.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.06
  ESTIMATED PIPE DIAMETER(INCH) = 108.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     607.15
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   19.58
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     48.60 TO NODE     48.61 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    712.40  DOWNSTREAM(FEET) =    707.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.660
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.535
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.05      0.30     0.400    56    8.66
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        0.02      0.25     0.400    69    8.66
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.69      0.20     0.400    75    8.66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      2.36
  TOTAL AREA(ACRES) =      0.76   PEAK FLOW RATE(CFS) =      2.36

****************************************************************************
  FLOW PROCESS FROM NODE     48.61 TO NODE     48.70 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  707.00  DOWNSTREAM ELEVATION(FEET) =  698.80
  STREET LENGTH(FEET) =   346.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.39
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =   10.13
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.27
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.01
  STREET FLOW TRAVEL TIME(MIN.) =   1.76   Tc(MIN.) =   10.42
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.183
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        0.46      0.25     0.400    69
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.28      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.74      SUBAREA RUNOFF(CFS) =    2.06
  EFFECTIVE AREA(ACRES) =      1.50    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       4.18

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  11.14
  FLOW VELOCITY(FEET/SEC.) =  3.40   DEPTH*VELOCITY(FT*FT/SEC.) =   1.12
  LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.70 =     676.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.70 TO NODE     48.70 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.42
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.183
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        0.59      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    1.68
  EFFECTIVE AREA(ACRES) =      2.09   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.32
  TOTAL AREA(ACRES) =        2.1        PEAK FLOW RATE(CFS) =       5.86

****************************************************************************
  FLOW PROCESS FROM NODE     48.71 TO NODE     48.71 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   10.42
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.183
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.09      0.30     0.400    56
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        0.47      0.25     0.400    69
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.80      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =     1.36      SUBAREA RUNOFF(CFS) =     3.79
  EFFECTIVE AREA(ACRES) =      3.45   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =        3.4       PEAK FLOW RATE(CFS) =       9.64

********************************************************************************
  FLOW PROCESS FROM NODE     48.70 TO NODE     48.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   698.80  DOWNSTREAM(FEET) =   691.10
  FLOW LENGTH(FEET) =   119.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.36
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.64
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   10.57
  LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.00 =     795.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  11
--------------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
================================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        9.64   10.57    3.157  0.22( 0.08) 0.35       3.4      48.60
  LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.00 =     795.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      388.33    7.12    3.951  0.26( 0.08) 0.29      94.6      41.90
      2      388.33    7.12    3.951  0.26( 0.08) 0.29      94.6      41.90
      3      409.61    7.86    3.733  0.26( 0.08) 0.29     107.1      30.20
      4      448.39    9.58    3.339  0.26( 0.08) 0.29     138.2      55.10
      5      491.83   11.58    2.999  0.26( 0.08) 0.29     174.4      37.30
      6      496.68   11.80    2.966  0.26( 0.08) 0.29     178.5      56.14
      7      522.47   13.09    2.797  0.26( 0.08) 0.29     201.3      47.36
      8      529.30   13.49    2.751  0.26( 0.08) 0.29     207.8      47.31
      9      533.79   13.75    2.721  0.26( 0.08) 0.29     212.1      37.60
     10      536.89   13.94    2.700  0.26( 0.08) 0.29     215.1      56.11
     11      538.54   14.04    2.689  0.26( 0.08) 0.29     216.8      47.33
     12      545.32   14.48    2.643  0.26( 0.08) 0.29     223.6      41.20
     13      553.22   15.08    2.582  0.26( 0.08) 0.29     232.8      45.00
     14      555.11   15.24    2.567  0.26( 0.08) 0.29     235.2      42.00
     15      569.53   16.51    2.453  0.26( 0.08) 0.29     253.5      38.00
     16      607.15   19.58    2.227  0.26( 0.07) 0.28     296.3       1.00
     17      593.14   20.49    2.171  0.26( 0.07) 0.28     298.1       8.00
     18      584.32   21.03    2.140  0.26( 0.07) 0.28     298.5      51.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      396.49    7.12    3.951  0.26( 0.08) 0.29      96.9      41.90
      2      396.49    7.12    3.951  0.26( 0.08) 0.29      96.9      41.90
      3      418.13    7.86    3.733  0.26( 0.08) 0.29     109.7      30.20
      4      457.64    9.58    3.339  0.26( 0.08) 0.29     141.3      55.10
      5      479.64   10.57    3.157  0.26( 0.08) 0.29     159.7      48.60
      6      500.98   11.58    2.999  0.26( 0.08) 0.29     177.9      37.30
      7      505.73   11.80    2.966  0.26( 0.08) 0.29     182.0      56.14
      8      530.99   13.09    2.797  0.26( 0.08) 0.29     204.7      47.36
      9      537.67   13.49    2.751  0.26( 0.08) 0.29     211.3      47.31
     10      542.07   13.75    2.721  0.26( 0.08) 0.29     215.6      37.60
     11      545.10   13.94    2.700  0.26( 0.08) 0.29     218.6      56.11
     12      546.71   14.04    2.689  0.26( 0.08) 0.29     220.2      47.33
     13      553.35   14.48    2.643  0.26( 0.08) 0.29     227.0      41.20
     14      561.06   15.08    2.582  0.26( 0.08) 0.29     236.3      45.00
     15      562.90   15.24    2.567  0.26( 0.08) 0.29     238.6      42.00
     16      576.97   16.51    2.453  0.26( 0.08) 0.29     256.9      38.00
     17      613.88   19.58    2.227  0.26( 0.07) 0.28     299.8       1.00
     18      599.70   20.49    2.171  0.26( 0.07) 0.28     301.6       8.00
     19      590.78   21.03    2.140  0.26( 0.07) 0.28     302.0      51.00
    TOTAL AREA(ACRES) =       302.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      613.88  Tc(MIN.) =   19.582
  EFFECTIVE AREA(ACRES) =    299.78  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =      302.0
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  12
--------------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     49.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   691.10  DOWNSTREAM(FEET) =   689.20
  FLOW LENGTH(FEET) =   384.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 102.0 INCH PIPE IS  72.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.17
  ESTIMATED PIPE DIAMETER(INCH) = 102.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     613.88
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =   20.03
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     49.00 =   11849.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   20.03
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.199
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.31      0.30     0.100    56
  COMMERCIAL                 C        0.90      0.25     0.100    69
  COMMERCIAL                 D        0.12      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.33      SUBAREA RUNOFF(CFS) =    2.60
  EFFECTIVE AREA(ACRES) =    301.11   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =      303.3       PEAK FLOW RATE(CFS) =     613.88
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   20.03
  RAINFALL INTENSITY(INCH/HR) =   2.20
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.28
  EFFECTIVE STREAM AREA(ACRES) =     301.11
  TOTAL STREAM AREA(ACRES) =     303.28
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     613.88

****************************************************************************
  FLOW PROCESS FROM NODE     61.30 TO NODE     61.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    707.30  DOWNSTREAM(FEET) =    704.20
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.383
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.601
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  APARTMENTS                 B        0.53      0.30     0.200    56    8.38
  APARTMENTS                 D        0.77      0.20     0.200    75    8.38
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      4.16
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      4.16

****************************************************************************
  FLOW PROCESS FROM NODE     61.20 TO NODE     61.10 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
================================================================================
  UPSTREAM NODE ELEVATION(FEET) =    704.20
  DOWNSTREAM NODE ELEVATION(FEET) =    703.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   119.00
  "V" GUTTER WIDTH(FEET) =   1.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.10000
  MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.477
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        1.30      0.30     0.200    56
  APARTMENTS                 D        0.25      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      6.54
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.71
  AVERAGE FLOW DEPTH(FEET) =   0.43   FLOOD WIDTH(FEET) =    8.37
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.53   Tc(MIN.) =    8.92
  SUBAREA AREA(ACRES) =    1.55       SUBAREA RUNOFF(CFS) =    4.77
  EFFECTIVE AREA(ACRES) =    2.85     AREA-AVERAGED Fm(INCH/HR) =   0.05
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   0.20
  TOTAL AREA(ACRES) =        2.8         PEAK FLOW RATE(CFS) =       8.78

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.48   FLOOD WIDTH(FEET) =    9.37
  FLOW VELOCITY(FEET/SEC.) =   3.98   DEPTH*VELOCITY(FT*FT/SEC) =   1.91
  LONGEST FLOWPATH FROM NODE     61.30 TO NODE     61.10 =     449.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.10 TO NODE     49.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  703.00  DOWNSTREAM ELEVATION(FEET) =  699.50
  STREET LENGTH(FEET) =   380.00   CURB HEIGHT(INCHES) =  6.0
```

```
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.88
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.47
   HALFSTREET FLOOD WIDTH(FEET) =   18.97
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.94
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.38
 STREET FLOW TRAVEL TIME(MIN.) =   2.15   Tc(MIN.) =   11.07
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.076
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.26      0.30     0.100    56
 COMMERCIAL                 C        0.25      0.25     0.100    69
 COMMERCIAL                 D        0.29      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    2.20
 EFFECTIVE AREA(ACRES) =      3.65    AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
 TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =       9.95

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.47   HALFSTREET FLOOD WIDTH(FEET) =  19.03
 FLOW VELOCITY(FEET/SEC.) =  2.94   DEPTH*VELOCITY(FT*FT/SEC.) =   1.39
 LONGEST FLOWPATH FROM NODE     61.30 TO NODE     49.00 =     829.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   11.07
 RAINFALL INTENSITY(INCH/HR) =   3.08
 AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.26
 AREA-AVERAGED Ap =  0.18
 EFFECTIVE STREAM AREA(ACRES) =       3.65
 TOTAL STREAM AREA(ACRES) =       3.65
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.95

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1      396.49    7.62    3.799  0.26( 0.08) 0.29      98.2      41.90
    1      396.49    7.62    3.799  0.26( 0.08) 0.29      98.2      41.90
    1      418.13    8.37    3.603  0.26( 0.08) 0.29     111.0      30.20
    1      457.64   10.07    3.245  0.26( 0.08) 0.29     142.7      55.10
    1      479.64   11.06    3.078  0.26( 0.08) 0.29     161.0      48.60
    1      500.98   12.06    2.930  0.26( 0.08) 0.29     179.2      37.30
    1      505.73   12.29    2.900  0.26( 0.08) 0.29     183.3      56.14
    1      530.99   13.57    2.742  0.26( 0.08) 0.29     206.1      47.36
    1      537.67   13.96    2.697  0.26( 0.08) 0.29     212.6      47.31
    1      542.07   14.22    2.669  0.26( 0.08) 0.29     216.9      37.60
    1      545.10   14.41    2.650  0.26( 0.08) 0.29     219.9      56.11
    1      546.71   14.52    2.639  0.26( 0.08) 0.29     221.6      47.33
    1      553.35   14.95    2.595  0.26( 0.08) 0.29     228.4      41.20
    1      561.06   15.55    2.538  0.26( 0.08) 0.29     237.6      45.00
    1      562.90   15.71    2.524  0.26( 0.08) 0.29     239.9      42.00
    1      576.97   16.98    2.415  0.26( 0.08) 0.29     258.2      38.00
    1      613.88   20.03    2.199  0.26( 0.07) 0.28     301.1       1.00
    1      599.70   20.95    2.144  0.26( 0.07) 0.28     302.9       8.00
    1      590.78   21.49    2.113  0.26( 0.07) 0.28     303.3      51.00
    2        9.95   11.07    3.076  0.26( 0.05) 0.18       3.6      61.30

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1      404.98    7.62    3.799  0.26( 0.08) 0.29     100.8      41.90
    2      404.98    7.62    3.799  0.26( 0.08) 0.29     100.8      41.90
    3      426.96    8.37    3.603  0.26( 0.08) 0.29     113.8      30.20
    4      467.20   10.07    3.245  0.26( 0.08) 0.29     146.0      55.10
    5      489.58   11.06    3.078  0.26( 0.08) 0.29     164.7      48.60
    6      489.89   11.07    3.076  0.26( 0.08) 0.29     164.9      61.30
    7      510.45   12.06    2.930  0.26( 0.08) 0.29     182.9      37.30
    8      515.10   12.29    2.900  0.26( 0.08) 0.29     187.0      56.14
    9      539.84   13.57    2.742  0.26( 0.08) 0.29     209.7      47.36
   10      546.38   13.96    2.697  0.26( 0.08) 0.29     216.2      47.31
   11      550.68   14.22    2.669  0.26( 0.08) 0.29     220.5      37.60
   12      553.65   14.41    2.650  0.26( 0.08) 0.29     223.6      56.11
   13      555.23   14.52    2.639  0.26( 0.08) 0.29     225.2      47.33
   14      561.72   14.95    2.595  0.26( 0.08) 0.29     232.0      41.20
   15      569.25   15.55    2.538  0.26( 0.08) 0.29     241.3      45.00
   16      571.04   15.71    2.524  0.26( 0.08) 0.29     243.6      42.00
   17      584.75   16.98    2.415  0.26( 0.08) 0.29     261.9      38.00
   18      620.95   20.03    2.199  0.26( 0.07) 0.28     304.8       1.00
   19      606.58   20.95    2.144  0.26( 0.07) 0.28     306.5       8.00
   20      597.57   21.49    2.113  0.26( 0.07) 0.28     306.9      51.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     620.95    Tc(MIN.) =    20.03
EFFECTIVE AREA(ACRES) =     304.76   AREA-AVERAGED Fm(INCH/HR) =  0.07
AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
TOTAL AREA(ACRES) =      306.9
LONGEST FLOWPATH FROM NODE      1.00 TO NODE     49.00 =   11849.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     50.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   689.20  DOWNSTREAM(FEET) =   688.90
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  96.0 INCH PIPE IS  77.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.36
  ESTIMATED PIPE DIAMETER(INCH) =  96.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     620.95
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   20.10
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     57.10 TO NODE     57.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    714.00  DOWNSTREAM(FEET) =    711.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.278
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.626
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.42      0.30      0.100    56    8.28
  COMMERCIAL                 D        0.08      0.20      0.100    75    8.28
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.62
  TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      1.62

****************************************************************************
  FLOW PROCESS FROM NODE     57.20 TO NODE     57.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  711.60  DOWNSTREAM ELEVATION(FEET) =  709.00
  STREET LENGTH(FEET) =   130.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018
  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.79
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.89
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.64
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.71
  STREET FLOW TRAVEL TIME(MIN.) =   0.82   Tc(MIN.) =    9.10
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.437
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.11      0.30      0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.11      SUBAREA RUNOFF(CFS) =    0.34
  EFFECTIVE AREA(ACRES) =      0.61    AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.6        PEAK FLOW RATE(CFS) =       1.87

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   8.00
  FLOW VELOCITY(FEET/SEC.) =  2.71   DEPTH*VELOCITY(FT*FT/SEC.) =   0.74
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     57.00 =     460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.10
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.437
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.29      0.30      0.100    56
  COMMERCIAL                 C        0.02      0.25      0.100    69
  COMMERCIAL                 D        0.34      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.65      SUBAREA RUNOFF(CFS) =    2.00
  EFFECTIVE AREA(ACRES) =      1.26   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       3.87

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.10
```

```
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.437
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        B        0.33      0.30     0.200    56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        D        0.56      0.20     0.200    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    0.89      SUBAREA RUNOFF(CFS) =    2.72
 EFFECTIVE AREA(ACRES) =      2.15   AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.14
 TOTAL AREA(ACRES) =        2.2       PEAK FLOW RATE(CFS) =       6.58

****************************************************************************
 FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.10
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.437
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        B        0.34      0.30     0.200    56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        D        0.53      0.20     0.200    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    0.87      SUBAREA RUNOFF(CFS) =    2.65
 EFFECTIVE AREA(ACRES) =      3.02   AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.16
 TOTAL AREA(ACRES) =        3.0       PEAK FLOW RATE(CFS) =       9.24

****************************************************************************
 FLOW PROCESS FROM NODE     57.00 TO NODE     58.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   709.00  DOWNSTREAM(FEET) =   702.50
 FLOW LENGTH(FEET) =   633.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.48
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       9.24
 PIPE TRAVEL TIME(MIN.) =   1.63    Tc(MIN.) =   10.73
 LONGEST FLOWPATH FROM NODE     57.10 TO NODE     58.00 =    1093.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.73
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.132
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        B        1.93      0.30     0.200    56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        D        0.46      0.20     0.200    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    2.39      SUBAREA RUNOFF(CFS) =    6.62
 EFFECTIVE AREA(ACRES) =      5.41   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
 TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =      15.02

****************************************************************************
 FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.73
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.132
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        B        1.60      0.30     0.200    56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        D        0.76      0.20     0.200    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    2.36      SUBAREA RUNOFF(CFS) =    6.54
 EFFECTIVE AREA(ACRES) =      7.77   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
 TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =      21.56

****************************************************************************
 FLOW PROCESS FROM NODE     58.00 TO NODE     58.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   702.50  DOWNSTREAM(FEET) =   700.00
 FLOW LENGTH(FEET) =    67.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.22
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      21.56
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   10.81
 LONGEST FLOWPATH FROM NODE     57.10 TO NODE     58.10 =    1160.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     58.10 TO NODE     58.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
================================================================================
  MAINLINE Tc(MIN.) =   10.81
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.118
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        1.94      0.30     0.200    56
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        C        0.82      0.25     0.200    69
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        4.28      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     7.04      SUBAREA RUNOFF(CFS) =    19.46
  EFFECTIVE AREA(ACRES) =     14.81   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       14.8       PEAK FLOW RATE(CFS) =      40.92

********************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     58.10 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   10.81
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.118
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        C        3.80      0.25     0.200    69
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        2.64      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     6.44      SUBAREA RUNOFF(CFS) =    17.80
  EFFECTIVE AREA(ACRES) =     21.25   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       21.2       PEAK FLOW RATE(CFS) =      58.72

********************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     59.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   700.00  DOWNSTREAM(FEET) =   699.50
  FLOW LENGTH(FEET) =   139.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  32.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.00
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      58.72
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   11.14
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.00 =    1299.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   11.14
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.065
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.44      0.30     0.100    56
  COMMERCIAL                  D        0.18      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.62      SUBAREA RUNOFF(CFS) =     1.70
  EFFECTIVE AREA(ACRES) =     21.87   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       21.9       PEAK FLOW RATE(CFS) =      59.41

********************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.10 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.50  DOWNSTREAM(FEET) =   699.10
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.03
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      59.41
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.25
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.10 =    1355.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     59.10 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.25
  RAINFALL INTENSITY(INCH/HR) =   3.05
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  0.19
  EFFECTIVE STREAM AREA(ACRES) =      21.87
  TOTAL STREAM AREA(ACRES) =      21.87
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      59.41

********************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     50.10 IS CODE =  22
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    83.00
```

```
  USER SPECIFIED Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.01      0.30     0.100    56
  COMMERCIAL                 C        0.06      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.30
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.30

****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     50.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.08      0.30     0.100    56
  COMMERCIAL                 C        0.01      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.39
  EFFECTIVE AREA(ACRES) =      0.16   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.2       PEAK FLOW RATE(CFS) =       0.69

****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     59.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.00  DOWNSTREAM(FEET) =   699.10
  FLOW LENGTH(FEET) =   481.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.70
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.69
  PIPE TRAVEL TIME(MIN.) =   1.71    Tc(MIN.) =    6.71
  LONGEST FLOWPATH FROM NODE     50.10 TO NODE     59.10 =     564.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     59.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.71
  RAINFALL INTENSITY(INCH/HR) =   4.09
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.28
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.16
  TOTAL STREAM AREA(ACRES) =       0.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.69

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       59.41   11.25    3.049  0.24( 0.05) 0.19      21.9      57.10
      2        0.69    6.71    4.085  0.28( 0.03) 0.10       0.2      50.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       48.35    6.71    4.085  0.24( 0.05) 0.19      13.2      50.10
      2       59.92   11.25    3.049  0.24( 0.05) 0.19      22.0      57.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      59.92    Tc(MIN.) =    11.25
  EFFECTIVE AREA(ACRES) =      22.03   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       22.0
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.10 =    1355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     50.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.10  DOWNSTREAM(FEET) =   688.90
  FLOW LENGTH(FEET) =    28.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  38.80
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      59.92
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.26
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     50.00 =    1383.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       48.35    6.72    4.081  0.24( 0.05) 0.19      13.2      50.10
      2       59.92   11.26    3.047  0.24( 0.05) 0.19      22.0      57.10
```

```
LONGEST FLOWPATH FROM NODE     57.10 TO NODE     50.00 =    1383.00 FEET.

** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1      404.98    7.70    3.779  0.26( 0.08) 0.29     100.8      41.90
    2      404.98    7.70    3.779  0.26( 0.08) 0.29     100.8      41.90
    3      426.96    8.44    3.586  0.26( 0.08) 0.29     113.8      30.20
    4      467.20   10.14    3.233  0.26( 0.08) 0.29     146.0      55.10
    5      489.58   11.13    3.068  0.26( 0.08) 0.29     164.7      48.60
    6      489.89   11.14    3.065  0.26( 0.08) 0.29     164.9      61.30
    7      510.45   12.13    2.921  0.26( 0.08) 0.29     182.9      37.30
    8      515.10   12.36    2.891  0.26( 0.08) 0.29     187.0      56.14
    9      539.84   13.63    2.734  0.26( 0.08) 0.29     209.7      47.36
   10      546.38   14.03    2.690  0.26( 0.08) 0.29     216.2      47.31
   11      550.68   14.29    2.662  0.26( 0.08) 0.29     220.5      37.60
   12      553.65   14.48    2.643  0.26( 0.08) 0.29     223.6      56.11
   13      555.23   14.58    2.632  0.26( 0.08) 0.29     225.2      47.33
   14      561.72   15.02    2.588  0.26( 0.08) 0.29     232.0      41.20
   15      569.25   15.61    2.532  0.26( 0.08) 0.29     241.3      45.00
   16      571.04   15.77    2.518  0.26( 0.08) 0.29     243.6      42.00
   17      584.75   17.04    2.410  0.26( 0.08) 0.29     261.9      38.00
   18      620.95   20.10    2.195  0.26( 0.07) 0.28     304.8       1.00
   19      606.58   21.02    2.140  0.26( 0.07) 0.28     306.5       8.00
   20      597.57   21.55    2.110  0.26( 0.07) 0.28     306.9      51.00
LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1      430.74    6.72    4.081  0.26( 0.07) 0.28     101.2      50.10
    2      455.82    7.70    3.779  0.26( 0.07) 0.28     115.9      41.90
    3      455.82    7.70    3.779  0.26( 0.07) 0.28     115.9      41.90
    4      479.70    8.44    3.586  0.26( 0.07) 0.28     130.3      30.20
    5      524.27   10.14    3.233  0.26( 0.07) 0.28     165.8      55.10
    6      549.17   11.13    3.068  0.26( 0.07) 0.28     186.4      48.60
    7      549.51   11.14    3.065  0.26( 0.07) 0.28     186.7      61.30
    8      552.27   11.26    3.047  0.26( 0.07) 0.28     189.1      57.10
    9      567.86   12.13    2.921  0.26( 0.07) 0.28     204.9      37.30
   10      571.90   12.36    2.891  0.26( 0.07) 0.28     209.0      56.14
   11      593.51   13.63    2.734  0.26( 0.07) 0.28     231.7      47.36
   12      599.17   14.03    2.690  0.26( 0.07) 0.28     238.3      47.31
   13      602.92   14.29    2.662  0.26( 0.07) 0.28     242.6      37.60
   14      605.50   14.48    2.643  0.26( 0.07) 0.28     245.6      56.11
   15      606.86   14.58    2.632  0.26( 0.07) 0.28     247.2      47.33
   16      612.49   15.02    2.588  0.26( 0.07) 0.28     254.0      41.20
   17      618.89   15.61    2.532  0.26( 0.07) 0.28     263.3      45.00
   18      620.39   15.77    2.518  0.26( 0.07) 0.28     265.6      42.00
   19      631.94   17.04    2.410  0.26( 0.07) 0.28     283.9      38.00
   20      663.86   20.10    2.195  0.26( 0.07) 0.27     326.8       1.00
   21      648.39   21.02    2.140  0.26( 0.07) 0.28     328.6       8.00
   22      638.77   21.55    2.110  0.26( 0.07) 0.28     329.0      51.00
  TOTAL AREA(ACRES) =       329.0

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      663.86  Tc(MIN.) =   20.099
  EFFECTIVE AREA(ACRES) =    326.79  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      329.0
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   688.90  DOWNSTREAM(FEET) =   675.00
  FLOW LENGTH(FEET) =   437.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  54.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  28.77
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     663.86
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   20.35
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     61.00 =   12342.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   20.35
  RAINFALL INTENSITY(INCH/HR) =   2.18
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.27
  EFFECTIVE STREAM AREA(ACRES) =     326.79
  TOTAL STREAM AREA(ACRES) =     328.96
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     663.86

****************************************************************************
  FLOW PROCESS FROM NODE     48.10 TO NODE     48.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    712.40  DOWNSTREAM(FEET) =    709.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.947
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.268
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
```

```
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.15      0.30     0.400    56    9.95
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.34      0.20     0.400    75    9.95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      1.40
  TOTAL AREA(ACRES) =      0.49   PEAK FLOW RATE(CFS) =      1.40

****************************************************************************
  FLOW PROCESS FROM NODE     48.20 TO NODE     48.30 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  709.70  DOWNSTREAM ELEVATION(FEET) =  703.80
  STREET LENGTH(FEET) =   500.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.99
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =   11.14
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.43
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.80
  STREET FLOW TRAVEL TIME(MIN.) =   3.42   Tc(MIN.) =   13.37
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.764
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.64      0.25     0.400    69
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.68      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.32      SUBAREA RUNOFF(CFS) =    3.18
  EFFECTIVE AREA(ACRES) =      1.81    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        1.8        PEAK FLOW RATE(CFS) =       4.36

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  13.07
  FLOW VELOCITY(FEET/SEC.) =  2.64   DEPTH*VELOCITY(FT*FT/SEC.) =   0.96
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.30 =     830.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.30 TO NODE     48.40 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  703.80  DOWNSTREAM ELEVATION(FEET) =  700.20
  STREET LENGTH(FEET) =   522.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.07
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.43
    HALFSTREET FLOOD WIDTH(FEET) =   16.63
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.34
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.00
  STREET FLOW TRAVEL TIME(MIN.) =   3.71   Tc(MIN.) =   17.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.406
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.93      0.25     0.400    69
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.71      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.64      SUBAREA RUNOFF(CFS) =    3.42
  EFFECTIVE AREA(ACRES) =      3.45    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        3.4        PEAK FLOW RATE(CFS) =       7.19

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  17.85
  FLOW VELOCITY(FEET/SEC.) =  2.42   DEPTH*VELOCITY(FT*FT/SEC.) =   1.09
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.40 =    1352.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.40 TO NODE     48.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.406
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.44      0.25     0.400    69
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.46      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    1.88
  EFFECTIVE AREA(ACRES) =      4.35   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        4.3       PEAK FLOW RATE(CFS) =       9.07

****************************************************************************
  FLOW PROCESS FROM NODE     48.40 TO NODE     48.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   700.20  DOWNSTREAM(FEET) =   699.80
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.96
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.07
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   17.35
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.50 =    1432.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.50 TO NODE     48.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.35
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.385
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.16      0.30     0.400    56
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        1.49      0.25     0.400    69
  PUBLIC PARK                C        0.26      0.25     0.850    69
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.88      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.442
  SUBAREA AREA(ACRES) =    2.79      SUBAREA RUNOFF(CFS) =    5.72
  EFFECTIVE AREA(ACRES) =      7.14   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =        7.1       PEAK FLOW RATE(CFS) =      14.71

****************************************************************************
  FLOW PROCESS FROM NODE     48.50 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.80  DOWNSTREAM(FEET) =   675.00
  FLOW LENGTH(FEET) =   425.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.30
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.71
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =   17.85
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     61.00 =    1857.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.85
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.347
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        1.98      0.30     0.850    56
  PUBLIC PARK                D        1.67      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    3.65      SUBAREA RUNOFF(CFS) =    7.00
  EFFECTIVE AREA(ACRES) =     10.79   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =       10.8       PEAK FLOW RATE(CFS) =      21.47

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   17.85
  RAINFALL INTENSITY(INCH/HR) =   2.35
  AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =     10.79
  TOTAL STREAM AREA(ACRES) =     10.79
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      21.47

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      430.74    7.00    3.986  0.26( 0.07) 0.28     101.2      50.10
      1      455.82    7.97    3.704  0.26( 0.07) 0.28     115.9      41.90
      1      455.82    7.97    3.704  0.26( 0.07) 0.28     115.9      41.90
      1      479.70    8.72    3.521  0.26( 0.07) 0.28     130.3      30.20
      1      524.27   10.41    3.185  0.26( 0.07) 0.28     165.8      55.10
      1      549.17   11.39    3.027  0.26( 0.07) 0.28     186.4      48.60
      1      549.51   11.41    3.024  0.26( 0.07) 0.28     186.7      61.30
```

1	552.27	11.52	3.007	0.26(0.07)	0.28	189.1	57.10
1	567.86	12.40	2.885	0.26(0.07)	0.28	204.9	37.30
1	571.90	12.62	2.857	0.26(0.07)	0.28	209.0	56.14
1	593.51	13.90	2.705	0.26(0.07)	0.28	231.7	47.36
1	599.17	14.29	2.662	0.26(0.07)	0.28	238.3	47.31
1	602.92	14.55	2.635	0.26(0.07)	0.28	242.6	37.60
1	605.50	14.74	2.616	0.26(0.07)	0.28	245.6	56.11
1	606.86	14.84	2.606	0.26(0.07)	0.28	247.2	47.33
1	612.49	15.28	2.563	0.26(0.07)	0.28	254.0	41.20
1	618.89	15.87	2.509	0.26(0.07)	0.28	263.3	45.00
1	620.39	16.03	2.495	0.26(0.07)	0.28	265.6	42.00
1	631.94	17.30	2.389	0.26(0.07)	0.28	283.9	38.00
1	663.86	20.35	2.179	0.26(0.07)	0.27	326.8	1.00
1	648.39	21.27	2.125	0.26(0.07)	0.28	328.6	8.00
1	638.77	21.81	2.095	0.26(0.07)	0.28	329.0	51.00
2	21.47	17.85	2.347	0.24(0.14)	0.56	10.8	48.10

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	445.40	7.00	3.986	0.26(0.07)	0.29	105.4	50.10
2	471.29	7.97	3.704	0.26(0.07)	0.29	120.7	41.90
3	471.29	7.97	3.704	0.26(0.07)	0.29	120.7	41.90
4	495.76	8.72	3.521	0.26(0.07)	0.29	135.6	30.20
5	541.53	10.41	3.185	0.26(0.07)	0.29	172.1	55.10
6	567.08	11.39	3.027	0.26(0.07)	0.29	193.3	48.60
7	567.43	11.41	3.024	0.26(0.07)	0.29	193.6	61.30
8	570.26	11.52	3.007	0.26(0.07)	0.29	196.1	57.10
9	586.40	12.40	2.885	0.26(0.07)	0.29	212.4	37.30
10	590.57	12.62	2.857	0.26(0.08)	0.29	216.6	56.14
11	612.92	13.90	2.705	0.26(0.08)	0.29	240.1	47.36
12	618.81	14.29	2.662	0.26(0.08)	0.29	246.9	47.31
13	622.70	14.55	2.635	0.26(0.08)	0.29	251.4	37.60
14	625.38	14.74	2.616	0.26(0.08)	0.29	254.5	56.11
15	626.79	14.84	2.606	0.26(0.08)	0.29	256.2	47.33
16	632.65	15.28	2.563	0.26(0.08)	0.29	263.3	41.20
17	639.37	15.87	2.509	0.26(0.08)	0.29	272.9	45.00
18	640.95	16.03	2.495	0.26(0.08)	0.29	275.3	42.00
19	653.14	17.30	2.389	0.26(0.08)	0.29	294.4	38.00
20	659.14	17.85	2.347	0.26(0.08)	0.29	302.4	48.10
21	683.69	20.35	2.179	0.26(0.07)	0.28	337.6	1.00
22	667.70	21.27	2.125	0.26(0.07)	0.28	339.4	8.00
23	657.79	21.81	2.095	0.26(0.07)	0.29	339.8	51.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 683.69 Tc(MIN.) = 20.35
EFFECTIVE AREA(ACRES) = 337.58 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 339.8
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 61.00 = 12342.00 FEET.

==========

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 339.8 TC(MIN.) = 20.35
EFFECTIVE AREA(ACRES) = 337.58 AREA-AVERAGED Fm(INCH/HR)= 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.284
PEAK FLOW RATE(CFS) = 683.69

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	445.40	7.00	3.986	0.26(0.07)	0.29	105.4	50.10
2	471.29	7.97	3.704	0.26(0.07)	0.29	120.7	41.90
3	471.29	7.97	3.704	0.26(0.07)	0.29	120.7	41.90
4	495.76	8.72	3.521	0.26(0.07)	0.29	135.6	30.20
5	541.53	10.41	3.185	0.26(0.07)	0.29	172.1	55.10
6	567.08	11.39	3.027	0.26(0.07)	0.29	193.3	48.60
7	567.43	11.41	3.024	0.26(0.07)	0.29	193.6	61.30
8	570.26	11.52	3.007	0.26(0.07)	0.29	196.1	57.10
9	586.40	12.40	2.885	0.26(0.07)	0.29	212.4	37.30
10	590.57	12.62	2.857	0.26(0.08)	0.29	216.6	56.14
11	612.92	13.90	2.705	0.26(0.08)	0.29	240.1	47.36
12	618.81	14.29	2.662	0.26(0.08)	0.29	246.9	47.31
13	622.70	14.55	2.635	0.26(0.08)	0.29	251.4	37.60
14	625.38	14.74	2.616	0.26(0.08)	0.29	254.5	56.11
15	626.79	14.84	2.606	0.26(0.08)	0.29	256.2	47.33
16	632.65	15.28	2.563	0.26(0.08)	0.29	263.3	41.20
17	639.37	15.87	2.509	0.26(0.08)	0.29	272.9	45.00
18	640.95	16.03	2.495	0.26(0.08)	0.29	275.3	42.00
19	653.14	17.30	2.389	0.26(0.08)	0.29	294.4	38.00
20	659.14	17.85	2.347	0.26(0.08)	0.29	302.4	48.10
21	683.69	20.35	2.179	0.26(0.07)	0.28	337.6	1.00
22	667.70	21.27	2.125	0.26(0.07)	0.28	339.4	8.00
23	657.79	21.81	2.095	0.26(0.07)	0.29	339.8	51.00

==========

END OF RATIONAL METHOD ANALYSIS

```
 ************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY IN CITY OF LAKE FOREST                           *
* OFFSITE & ONSITE PROPOSED CONDITION @ 100-YEAR STORM                  *
* W.O. #1443-136X                                                       *
 ************************************************************************

  FILE NAME: PROP_100.DAT
  TIME/DATE OF STUDY: 10:47 06/10/2019
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  2   20.0     15.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1099.00  DOWNSTREAM(FEET) =   1091.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.370
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.605
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.78      0.25     0.600    86    8.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      3.13
  TOTAL AREA(ACRES) =      0.78   PEAK FLOW RATE(CFS) =      3.13

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1091.20  DOWNSTREAM ELEVATION(FEET) = 1089.40
  STREET LENGTH(FEET) =    90.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.80
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   14.90
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.71
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.47
  STREET FLOW TRAVEL TIME(MIN.) =   0.40   Tc(MIN.) =    8.78
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.483
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.38      0.25     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    9.33
  EFFECTIVE AREA(ACRES) =      3.16    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =      12.38
```

Onsite Hydrology Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1 and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61, ***without Detention***

100-Year Storm Proposed Condition

```
  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  17.85
  FLOW VELOCITY(FEET/SEC.) =  4.17   DEPTH*VELOCITY(FT*FT/SEC.) =   1.87
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1089.40  DOWNSTREAM ELEVATION(FEET) = 1067.00
  STREET LENGTH(FEET) =   513.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.44
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.41
    HALFSTREET FLOOD WIDTH(FEET) =   15.82
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.71
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.35
  STREET FLOW TRAVEL TIME(MIN.) =   1.50   Tc(MIN.) =   10.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.095
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.34      0.25      0.100    86
  PUBLIC PARK                C        0.25      0.25      0.850    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.418
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    2.12
  EFFECTIVE AREA(ACRES) =      3.75    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =      13.39

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  15.82
  FLOW VELOCITY(FEET/SEC.) =  5.69   DEPTH*VELOCITY(FT*FT/SEC.) =   2.34
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     903.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.095
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.35      0.25      0.100    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.49      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.333
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    3.03
  EFFECTIVE AREA(ACRES) =      4.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =      16.43

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1067.00  DOWNSTREAM(FEET) =  1062.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.79
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.43
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   10.39
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1003.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.39
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.068
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.09      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.09      SUBAREA RUNOFF(CFS) =    7.42
  EFFECTIVE AREA(ACRES) =      6.68   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        6.7        PEAK FLOW RATE(CFS) =      23.73

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1062.00  DOWNSTREAM(FEET) =  1022.40
```

```
  FLOW LENGTH(FEET) =   701.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.89
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.73
  PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =   11.13
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1704.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.13
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.912
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.18      0.30      0.100    76
  COMMERCIAL                  C        0.46      0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.64      SUBAREA RUNOFF(CFS) =     2.24
  EFFECTIVE AREA(ACRES) =      7.32   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        7.3       PEAK FLOW RATE(CFS) =      25.03

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.40  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.49
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.03
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   11.38
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.38
  RAINFALL INTENSITY(INCH/HR) =   3.86
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       7.32
  TOTAL STREAM AREA(ACRES) =       7.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      25.03

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   305.00
  ELEVATION DATA: UPSTREAM(FEET) =   1046.00  DOWNSTREAM(FEET) =   1042.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.129
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.049
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  C        1.00      0.25      0.100    86    7.13
  RESIDENTIAL
  ".4 DWELLING/ACRE"          C        0.50      0.25      0.900    86   11.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
  SUBAREA RUNOFF(CFS) =      6.69
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      6.69

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1042.00  DOWNSTREAM ELEVATION(FEET) = 1036.00
  STREET LENGTH(FEET) =   373.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.09
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   14.50
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.28
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.27
  STREET FLOW TRAVEL TIME(MIN.) =   1.90   Tc(MIN.) =    9.03
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.411
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
```

```
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        3.31      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.31      SUBAREA RUNOFF(CFS) =   12.77
  EFFECTIVE AREA(ACRES) =      4.81    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =        4.8        PEAK FLOW RATE(CFS) =      18.60

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  16.63
  FLOW VELOCITY(FEET/SEC.) =  3.59   DEPTH*VELOCITY(FT*FT/SEC.) =   1.53
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     678.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1036.00  DOWNSTREAM ELEVATION(FEET) = 1026.00
  STREET LENGTH(FEET) =   463.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      22.75
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.43
    HALFSTREET FLOOD WIDTH(FEET) =   17.04
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.19
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.82
  STREET FLOW TRAVEL TIME(MIN.) =   1.84   Tc(MIN.) =   10.87
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.966
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.40      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    8.30
  EFFECTIVE AREA(ACRES) =      7.21    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =      24.97

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  17.64
  FLOW VELOCITY(FEET/SEC.) =  4.30   DEPTH*VELOCITY(FT*FT/SEC.) =   1.91
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1141.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.87
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.966
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.16      0.30      0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.22      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    8.22
  EFFECTIVE AREA(ACRES) =      9.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        9.6        PEAK FLOW RATE(CFS) =      33.19

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1026.00  DOWNSTREAM(FEET) =  1022.00
  FLOW LENGTH(FEET) =   395.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.95
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      33.19
  PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =   11.60
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1536.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.60
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.820
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.07      0.30      0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        4.06      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     4.13      SUBAREA RUNOFF(CFS) =   13.73
  EFFECTIVE AREA(ACRES) =     13.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       13.7       PEAK FLOW RATE(CFS) =      45.66

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.00  DOWNSTREAM(FEET) =  1020.00
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.30
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      45.66
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   11.79
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.79
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.785
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.55      0.30      0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.06      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     2.61      SUBAREA RUNOFF(CFS) =     8.59
  EFFECTIVE AREA(ACRES) =     16.33   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      53.82

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1020.00  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.83
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      53.82
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   12.12
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    1799.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.12
  RAINFALL INTENSITY(INCH/HR) =   3.73
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =      16.33
  TOTAL STREAM AREA(ACRES) =      16.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      53.82

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       25.03   11.38    3.863  0.25( 0.11) 0.45       7.3       1.00
      2       53.82   12.12    3.725  0.25( 0.12) 0.49      16.3       8.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       77.47   11.38    3.863  0.25( 0.12) 0.48      22.6       1.00
      2       77.93   12.12    3.725  0.25( 0.12) 0.48      23.6       8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      77.93    Tc(MIN.) =    12.12
  EFFECTIVE AREA(ACRES) =      23.65   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       23.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1019.50  DOWNSTREAM(FEET) =  1014.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.77
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      77.93
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   12.27
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.10 =    2014.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.700
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.15      0.30      0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.50
  EFFECTIVE AREA(ACRES) =     23.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       23.8       PEAK FLOW RATE(CFS) =      77.93
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.700
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.16      0.30      0.100    76
  COMMERCIAL                 C        1.44      0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.60      SUBAREA RUNOFF(CFS) =    5.29
  EFFECTIVE AREA(ACRES) =     25.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       25.4       PEAK FLOW RATE(CFS) =      81.99

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1014.00  DOWNSTREAM(FEET) =   971.40
  FLOW LENGTH(FEET) =   863.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.04
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      81.99
  PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =   12.98
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    2877.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.98
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.581
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.82      0.30      0.100    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.77      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.294
  SUBAREA AREA(ACRES) =    1.59      SUBAREA RUNOFF(CFS) =    5.02
  EFFECTIVE AREA(ACRES) =     26.99   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       27.0       PEAK FLOW RATE(CFS) =      84.29

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   971.40  DOWNSTREAM(FEET) =   969.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.92
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      84.29
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   13.01
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    2917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.01
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.577
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        2.46      0.30      0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C       10.48      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   12.94      SUBAREA RUNOFF(CFS) =   40.14
  EFFECTIVE AREA(ACRES) =     39.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       39.9       PEAK FLOW RATE(CFS) =     124.32
```

```
 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      125.50   12.27    3.699  0.25( 0.12) 0.46      38.9       1.00
     2      124.32   13.01    3.577  0.25( 0.12) 0.46      39.9       8.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =     125.50  Tc(MIN.) =   12.27
 AREA-AVERAGED Fm(INCH/HR) =  0.12  AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.46  EFFECTIVE AREA(ACRES) =      38.93

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   969.00  DOWNSTREAM(FEET) =   954.00
 FLOW LENGTH(FEET) =   416.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.10
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     125.50
 PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   12.61
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    3333.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.61
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.641
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C        0.77      0.25     0.100    86
 PUBLIC PARK                C        0.43      0.25     0.850    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.369
 SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    3.83
 EFFECTIVE AREA(ACRES) =     40.13   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =       41.1       PEAK FLOW RATE(CFS) =     127.29

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   954.00  DOWNSTREAM(FEET) =   952.80
 FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.32
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     127.29
 PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   12.78
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    3453.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.78
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.614
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      B        0.88      0.30     0.400    76
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      C        7.02      0.25     0.400    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =    7.90      SUBAREA RUNOFF(CFS) =   24.97
 EFFECTIVE AREA(ACRES) =     48.03   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
 TOTAL AREA(ACRES) =       49.0       PEAK FLOW RATE(CFS) =     151.30

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     17.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   952.80  DOWNSTREAM(FEET) =   929.00
 FLOW LENGTH(FEET) =   636.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.82
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     151.30
 PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   13.29
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.10 =    4089.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     17.10 TO NODE     17.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.29
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.534
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.68      0.30     0.500    76
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE"       C        0.89      0.25     0.600    86
 COMMERCIAL                 C        1.86      0.25     0.100    86
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.309
  SUBAREA AREA(ACRES) =    3.43      SUBAREA RUNOFF(CFS) =   10.66
  EFFECTIVE AREA(ACRES) =     51.46   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       52.5       PEAK FLOW RATE(CFS) =     158.50

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   929.00  DOWNSTREAM(FEET) =   926.30
  FLOW LENGTH(FEET) =   122.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  34.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.55
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     158.50
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   13.40
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     18.00 =    4211.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.40
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.517
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS                B       24.46      0.30      0.350    76
  CONDOMINIUMS                C        7.92      0.25      0.350    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =   32.38      SUBAREA RUNOFF(CFS) =   99.55
  EFFECTIVE AREA(ACRES) =     83.84   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       84.8       PEAK FLOW RATE(CFS) =     257.24

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   926.30  DOWNSTREAM(FEET) =   922.70
  FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  42.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.26
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     257.24
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   13.55
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     19.00 =    4384.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.55
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.494
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        1.62      0.30      0.400    76
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        6.09      0.25      0.400    86
  COMMERCIAL                  B        2.90      0.30      0.100    76
  COMMERCIAL                  C        3.15      0.25      0.100    86
  NATURAL POOR COVER
  "GRASS"                     B        0.76      0.30      1.000    93
  NATURAL POOR COVER
  "GRASS"                     C        0.39      0.25      1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
  SUBAREA AREA(ACRES) =   14.91      SUBAREA RUNOFF(CFS) =   45.73
  EFFECTIVE AREA(ACRES) =     98.75   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =       99.8       PEAK FLOW RATE(CFS) =     301.28

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   922.70  DOWNSTREAM(FEET) =   815.60
  FLOW LENGTH(FEET) =  1580.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  34.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  31.69
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     301.28
  PIPE TRAVEL TIME(MIN.) =   0.83    Tc(MIN.) =   14.38
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     20.00 =    5964.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.38
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.377
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B       19.45      0.30      0.100    76
  COMMERCIAL                  C       16.92      0.25      0.100    86
```

```
  COMMERCIAL                D        0.11      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    36.48      SUBAREA RUNOFF(CFS) =  109.98
  EFFECTIVE AREA(ACRES) =    135.23   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      136.2       PEAK FLOW RATE(CFS) =     400.84

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   815.60  DOWNSTREAM(FEET) =   799.50
  FLOW LENGTH(FEET) =   449.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  45.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.25
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     400.84
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   14.67
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6413.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.340
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.38      0.30     0.100    76
  COMMERCIAL                 C        0.87      0.25     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     3.25      SUBAREA RUNOFF(CFS) =    9.68
  EFFECTIVE AREA(ACRES) =    138.48   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      139.5       PEAK FLOW RATE(CFS) =     405.93

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.340
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        4.10      0.30     0.100    76
  COMMERCIAL                 C        1.54      0.25     0.100    86
  COMMERCIAL                 D        2.08      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     7.72      SUBAREA RUNOFF(CFS) =   23.02
  EFFECTIVE AREA(ACRES) =    146.20   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      147.2       PEAK FLOW RATE(CFS) =     428.95

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   799.50  DOWNSTREAM(FEET) =   765.50
  FLOW LENGTH(FEET) =  1056.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  47.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.72
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     428.95
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   15.35
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     22.00 =    7469.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.35
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.253
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.06      0.30     0.100    76
  COMMERCIAL                 C        1.74      0.25     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     3.80      SUBAREA RUNOFF(CFS) =   11.03
  EFFECTIVE AREA(ACRES) =    150.00   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      151.0       PEAK FLOW RATE(CFS) =     428.95
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.35
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.253
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.23      0.30     0.100    76
  COMMERCIAL                 D        5.07      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     5.30      SUBAREA RUNOFF(CFS) =   15.42
  EFFECTIVE AREA(ACRES) =    155.30   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      156.3       PEAK FLOW RATE(CFS) =     444.07

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   765.50  DOWNSTREAM(FEET) =   755.00
  FLOW LENGTH(FEET) =   465.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  50.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.88
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     444.07
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   15.69
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     23.00 =    7934.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.213
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        9.15      0.30      0.100    76
  COMMERCIAL                 C       10.79      0.25      0.100    86
  COMMERCIAL                 D        1.81      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   21.75      SUBAREA RUNOFF(CFS) =   62.37
  EFFECTIVE AREA(ACRES) =    177.05   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =      178.1       PEAK FLOW RATE(CFS) =     500.79

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.213
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        7.47      0.30      0.100    76
  COMMERCIAL                 C        0.40      0.25      0.100    86
  COMMERCIAL                 D       17.76      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   25.63      SUBAREA RUNOFF(CFS) =   73.58
  EFFECTIVE AREA(ACRES) =    202.68   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      203.7       PEAK FLOW RATE(CFS) =     574.38

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   755.00  DOWNSTREAM(FEET) =   736.00
  FLOW LENGTH(FEET) =  1257.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  78.0 INCH PIPE IS  60.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.95
  ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     574.38
  PIPE TRAVEL TIME(MIN.) =   1.00    Tc(MIN.) =   16.69
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.00 =    9191.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.101
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B       16.13      0.30      0.100    76
  COMMERCIAL                 C        3.87      0.25      0.100    86
  COMMERCIAL                 D        4.22      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   24.22      SUBAREA RUNOFF(CFS) =   67.00
  EFFECTIVE AREA(ACRES) =    226.90   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      227.9       PEAK FLOW RATE(CFS) =     621.00

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     30.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   736.00  DOWNSTREAM(FEET) =   720.00
  FLOW LENGTH(FEET) =   212.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  45.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  39.20
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     621.00
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   16.78
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.10 =    9403.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     30.10 TO NODE     30.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   720.00  DOWNSTREAM(FEET) =   716.00
  FLOW LENGTH(FEET) =   156.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  56.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.92
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     621.00
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   16.88
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    9559.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.88
  RAINFALL INTENSITY(INCH/HR) =   3.08
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.23
  EFFECTIVE STREAM AREA(ACRES) =     226.90
  TOTAL STREAM AREA(ACRES) =     227.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     621.00

****************************************************************************
  FLOW PROCESS FROM NODE     30.20 TO NODE     30.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    740.00  DOWNSTREAM(FEET) =    726.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.494
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.862
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  B        0.42      0.30      0.100    76    5.49
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.20
  TOTAL AREA(ACRES) =      0.42   PEAK FLOW RATE(CFS) =      2.20

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.49
  RAINFALL INTENSITY(INCH/HR) =   5.86
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.42
  TOTAL STREAM AREA(ACRES) =       0.42
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.20

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      621.00   16.88    3.081  0.27( 0.06) 0.23      226.9        1.00
      1      607.40   17.65    3.003  0.27( 0.06) 0.23      227.9        8.00
      2        2.20    5.49    5.862  0.30( 0.03) 0.10        0.4       30.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      390.38    5.49    5.862  0.27( 0.06) 0.23       74.3       30.20
      2      622.15   16.88    3.081  0.27( 0.06) 0.23      227.3        1.00
      3      608.52   17.65    3.003  0.27( 0.06) 0.23      228.3        8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     622.15    Tc(MIN.) =    16.88
  EFFECTIVE AREA(ACRES) =     227.32   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      228.3
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    9559.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     33.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   716.00  DOWNSTREAM(FEET) =   714.30
  FLOW LENGTH(FEET) =   210.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  90.0 INCH PIPE IS  70.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.88
  ESTIMATED PIPE DIAMETER(INCH) =  90.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     622.15
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   17.09
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     33.00 =    9769.00 FEET.

****************************************************************************
```

```
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.09
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.060
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.35      0.30     0.100    76
  COMMERCIAL                 B        0.62      0.30     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.97      SUBAREA RUNOFF(CFS) =     2.64
  EFFECTIVE AREA(ACRES) =    228.29   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      229.3       PEAK FLOW RATE(CFS) =     622.15
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.30  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =   420.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  84.0 INCH PIPE IS  68.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.58
  ESTIMATED PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     622.15
  PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =   17.47
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     38.00 TO NODE     39.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    730.50  DOWNSTREAM(FEET) =    726.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.427
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.302
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.80      0.30     0.500    76    9.43
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.42      0.20     0.500    91    9.43
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      4.58
  TOTAL AREA(ACRES) =      1.22   PEAK FLOW RATE(CFS) =      4.58

****************************************************************************
  FLOW PROCESS FROM NODE     39.00 TO NODE     40.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  726.20  DOWNSTREAM ELEVATION(FEET) =  719.50
  STREET LENGTH(FEET) =   711.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.19
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.44
    HALFSTREET FLOOD WIDTH(FEET) =   17.64
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.82
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.26
  STREET FLOW TRAVEL TIME(MIN.) =   4.20   Tc(MIN.) =   13.62
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.484
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        2.40      0.30     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     2.40      SUBAREA RUNOFF(CFS) =     7.20
  EFFECTIVE AREA(ACRES) =      3.62    AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.6       PEAK FLOW RATE(CFS) =      10.88

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  2.87   DEPTH*VELOCITY(FT*FT/SEC.) =   1.29
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.00 =    1041.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  81
```

```
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   13.62
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.484
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.93      0.30      0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.93      SUBAREA RUNOFF(CFS) =    2.79
  EFFECTIVE AREA(ACRES) =      4.55   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.6       PEAK FLOW RATE(CFS) =      13.67

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   719.50  DOWNSTREAM(FEET) =   718.40
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.09
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.67
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   13.73
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.10 =    1096.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.10 TO NODE     40.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   13.73
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.469
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.19      0.30      0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.57
  EFFECTIVE AREA(ACRES) =      4.74   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.7       PEAK FLOW RATE(CFS) =      14.18

****************************************************************************
  FLOW PROCESS FROM NODE     40.10 TO NODE     40.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   718.40  DOWNSTREAM(FEET) =   717.00
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.17
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.18
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   13.82
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.20 =    1151.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     40.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   13.82
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.456
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.22      0.30      0.850    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.45      0.30      0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.615
  SUBAREA AREA(ACRES) =    0.67      SUBAREA RUNOFF(CFS) =    1.97
  EFFECTIVE AREA(ACRES) =      5.41   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =      16.10

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     40.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   13.82
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.456
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.34      0.30      0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.34      SUBAREA RUNOFF(CFS) =    1.01
  EFFECTIVE AREA(ACRES) =      5.75   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      17.11

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     41.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   717.00  DOWNSTREAM(FEET) =   713.40
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.37
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.11
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   13.98
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.00 =    1266.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.98
  RAINFALL INTENSITY(INCH/HR) =   3.43
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.51
  EFFECTIVE STREAM AREA(ACRES) =       5.75
  TOTAL STREAM AREA(ACRES) =       5.75
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      17.11

****************************************************************************
  FLOW PROCESS FROM NODE     41.20 TO NODE     41.30 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    728.20  DOWNSTREAM(FEET) =    723.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.184
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.367
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.02      0.30     0.500    76    9.18
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.61      0.20     0.500    91    9.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.42
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      2.42

****************************************************************************
  FLOW PROCESS FROM NODE     41.30 TO NODE     41.40 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  723.30  DOWNSTREAM ELEVATION(FEET) =  718.00
  STREET LENGTH(FEET) =   323.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.85
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   11.55
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.93
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.98
  STREET FLOW TRAVEL TIME(MIN.) =   1.84   Tc(MIN.) =   11.02
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.934
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.72      0.30     0.400    76
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.11      0.20     0.400    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.83      SUBAREA RUNOFF(CFS) =    2.85
  EFFECTIVE AREA(ACRES) =      1.46    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       5.03

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  12.97
  FLOW VELOCITY(FEET/SEC.) =  3.10   DEPTH*VELOCITY(FT*FT/SEC.) =   1.12
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.40 =     653.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.40 TO NODE     41.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   11.02
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.934
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        1.24      0.30     0.400    76
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.03      0.20     0.400    91
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.27      SUBAREA RUNOFF(CFS) =    4.36
  EFFECTIVE AREA(ACRES) =      2.73   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =        2.7       PEAK FLOW RATE(CFS) =       9.39

****************************************************************************
  FLOW PROCESS FROM NODE     41.40 TO NODE     41.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   718.00  DOWNSTREAM(FEET) =   717.00
  FLOW LENGTH(FEET) =    62.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.84
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.39
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   11.15
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.50 =     715.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.50 TO NODE     41.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.15
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.907
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.09      0.30      0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.31
  EFFECTIVE AREA(ACRES) =      2.82   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        2.8       PEAK FLOW RATE(CFS) =       9.64

****************************************************************************
  FLOW PROCESS FROM NODE     41.50 TO NODE     41.51 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   717.00  DOWNSTREAM(FEET) =   715.50
  FLOW LENGTH(FEET) =   154.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.35
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.64
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   11.56
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.51 =     869.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.51 TO NODE     41.51 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.56
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.828
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.44      0.30      0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.44      SUBAREA RUNOFF(CFS) =    4.77
  EFFECTIVE AREA(ACRES) =      4.26   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =        4.3       PEAK FLOW RATE(CFS) =      14.20

****************************************************************************
  FLOW PROCESS FROM NODE     41.51 TO NODE     41.60 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   715.50  DOWNSTREAM(FEET) =   714.90
  FLOW LENGTH(FEET) =    59.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.16
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.20
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   11.69
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.60 =     928.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.60 TO NODE     41.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.803
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.06      0.30      0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.06      SUBAREA RUNOFF(CFS) =    3.48
  EFFECTIVE AREA(ACRES) =      5.32   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        5.3       PEAK FLOW RATE(CFS) =      17.59

****************************************************************************
  FLOW PROCESS FROM NODE     41.60 TO NODE     41.60 IS CODE =  81
```

```
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   11.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.803
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.47      0.30      0.400    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.47      SUBAREA RUNOFF(CFS) =    1.56
  EFFECTIVE AREA(ACRES) =      5.79   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      19.15

******************************************************************************
  FLOW PROCESS FROM NODE     41.60 TO NODE     41.00 IS CODE =  31
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.90  DOWNSTREAM(FEET) =   713.40
  FLOW LENGTH(FEET) =   148.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.77
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.15
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   12.01
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.00 =    1076.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =   1
------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.01
  RAINFALL INTENSITY(INCH/HR) =   3.74
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       5.79
  TOTAL STREAM AREA(ACRES) =       5.79
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      19.15

  ** CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       17.11   13.98    3.432  0.29( 0.15) 0.51       5.8      38.00
      2       19.15   12.01    3.745  0.29( 0.13) 0.45       5.8      41.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       35.24   12.01    3.745  0.29( 0.14) 0.48      10.7      41.20
      2       34.60   13.98    3.432  0.29( 0.14) 0.48      11.5      38.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      35.24    Tc(MIN.) =    12.01
  EFFECTIVE AREA(ACRES) =      10.73   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       11.5
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.00 =    1266.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.80 IS CODE =  31
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.40  DOWNSTREAM(FEET) =   712.60
  FLOW LENGTH(FEET) =    83.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.83
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      35.24
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   12.17
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.80 =    1349.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.80 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   12.17
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.717
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.27      0.30      0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.13      0.20      0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.29
  EFFECTIVE AREA(ACRES) =     11.13   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       11.9       PEAK FLOW RATE(CFS) =      35.84

******************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.80 IS CODE =  81
------------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   12.17
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.717
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.21      0.30     0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.01      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.22      SUBAREA RUNOFF(CFS) =    0.71
  EFFECTIVE AREA(ACRES) =     11.35   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       12.2       PEAK FLOW RATE(CFS) =      36.55

********************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.90 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.60  DOWNSTREAM(FEET) =   711.80
  FLOW LENGTH(FEET) =    77.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.17
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      36.55
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   12.31
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.90 =    1426.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.31
  RAINFALL INTENSITY(INCH/HR) =   3.69
  AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.48
  EFFECTIVE STREAM AREA(ACRES) =      11.35
  TOTAL STREAM AREA(ACRES) =      12.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      36.55

********************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =  22
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    77.00
  USER SPECIFIED Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.06      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =      0.06   PEAK FLOW RATE(CFS) =      0.33

********************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.00
  RAINFALL INTENSITY(INCH/HR) =   6.19
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.06
  TOTAL STREAM AREA(ACRES) =       0.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.33

********************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =  22
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  7700.00
  USER SPECIFIED Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.06      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =      0.06   PEAK FLOW RATE(CFS) =      0.33

********************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  3
```

```
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =    5.00
 RAINFALL INTENSITY(INCH/HR) =   6.19
 AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       0.06
 TOTAL STREAM AREA(ACRES) =       0.06
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.33

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       36.55   12.31    3.693  0.29( 0.14) 0.48      11.3      41.20
     1       35.80   14.28    3.391  0.29( 0.14) 0.48      12.2      38.00
     2        0.33    5.00    6.187  0.20( 0.10) 0.50       0.1      41.90
     3        0.33    5.00    6.187  0.20( 0.10) 0.50       0.1      41.90

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       25.93    5.00    6.187  0.29( 0.14) 0.48       4.7      41.90
     2       25.93    5.00    6.187  0.29( 0.14) 0.48       4.7      41.90
     3       36.94   12.31    3.693  0.29( 0.14) 0.48      11.5      41.20
     4       36.15   14.28    3.391  0.29( 0.14) 0.48      12.3      38.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      36.94    Tc(MIN.) =    12.31
 EFFECTIVE AREA(ACRES) =      11.47   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =       12.3
 LONGEST FLOWPATH FROM NODE     41.90 TO NODE     41.90 =    7700.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     41.90 TO NODE     46.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   711.80  DOWNSTREAM(FEET) =   710.50
 FLOW LENGTH(FEET) =   132.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.96
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      36.94
 PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   12.55
 LONGEST FLOWPATH FROM NODE     41.90 TO NODE     46.00 =    7832.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     46.00 TO NODE     46.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.55
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.651
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.21      0.30      0.100    76
 COMMERCIAL                 D        0.29      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    1.63
 EFFECTIVE AREA(ACRES) =     11.97   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =       12.8       PEAK FLOW RATE(CFS) =      37.89

****************************************************************************
 FLOW PROCESS FROM NODE     46.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   710.50  DOWNSTREAM(FEET) =   709.80
 FLOW LENGTH(FEET) =    68.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.16
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      37.89
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   12.68
 LONGEST FLOWPATH FROM NODE     41.90 TO NODE     34.00 =    7900.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       27.68    5.40    5.921  0.29( 0.13) 0.44       5.2      41.90
     2       27.68    5.40    5.921  0.29( 0.13) 0.44       5.2      41.90
     3       37.89   12.68    3.631  0.29( 0.13) 0.46      12.0      41.20
     4       37.08   14.65    3.342  0.29( 0.13) 0.47      12.8      38.00
 LONGEST FLOWPATH FROM NODE     41.90 TO NODE     34.00 =    7900.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      390.38    6.15    5.497  0.27( 0.06) 0.22      75.2      30.20
     2      622.15   17.47    3.022  0.27( 0.06) 0.23     228.3       1.00
     3      608.52   18.24    2.948  0.27( 0.06) 0.23     229.3       8.00
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
```

```
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1      397.30    5.40    5.921  0.27( 0.06) 0.24      71.3      41.90
    2      397.30    5.40    5.921  0.27( 0.06) 0.24      71.3      41.90
    3      419.10    6.15    5.497  0.27( 0.06) 0.24      81.2      30.20
    4      561.99   12.68    3.631  0.27( 0.06) 0.24     175.5      41.20
    5      601.60   14.65    3.342  0.27( 0.06) 0.24     203.0      38.00
    6      655.53   17.47    3.022  0.27( 0.06) 0.24     241.1       1.00
    7      641.04   18.24    2.948  0.27( 0.06) 0.24     242.1       8.00
  TOTAL AREA(ACRES) =       242.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      655.53  Tc(MIN.) =   17.465
  EFFECTIVE AREA(ACRES) =    241.07  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      242.1
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     56.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   703.70
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  48.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  34.92
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     655.53
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   17.52
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.52
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.016
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)   (DECIMAL)  CN
  COMMERCIAL                 B        0.23      0.30      0.100    76
  COMMERCIAL                 D        0.51      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.74      SUBAREA RUNOFF(CFS) =    1.99
  EFFECTIVE AREA(ACRES) =    241.81   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      242.8       PEAK FLOW RATE(CFS) =     655.53
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     32.20 TO NODE     32.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    745.00  DOWNSTREAM(FEET) =    742.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.917
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.755
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)   (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.11      0.30      0.100    76    7.92
  COMMERCIAL                 C        0.26      0.25      0.100    86    7.92
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.57
  TOTAL AREA(ACRES) =      0.37   PEAK FLOW RATE(CFS) =      1.57

****************************************************************************
  FLOW PROCESS FROM NODE     32.10 TO NODE     32.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  742.00  DOWNSTREAM ELEVATION(FEET) =  740.00
  STREET LENGTH(FEET) =    96.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.82
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.84
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.70
```

```
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.73
  STREET FLOW TRAVEL TIME(MIN.) =   0.59   Tc(MIN.) =    8.51
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.562
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.06      0.30     0.100    76
  COMMERCIAL                  C        0.06      0.25     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.12      SUBAREA RUNOFF(CFS) =    0.49
  EFFECTIVE AREA(ACRES) =      0.49    AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       2.00

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   8.19
  FLOW VELOCITY(FEET/SEC.) =  2.76   DEPTH*VELOCITY(FT*FT/SEC.) =   0.76
  LONGEST FLOWPATH FROM NODE     32.20 TO NODE     32.00 =     426.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    724.60  DOWNSTREAM(FEET) =    723.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.167
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.717
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  SCHOOL                      B        0.33      0.30     0.600    76   12.17
  SCHOOL                      C        0.85      0.25     0.600    86   12.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      3.78
  TOTAL AREA(ACRES) =      1.18   PEAK FLOW RATE(CFS) =      3.78

****************************************************************************
  FLOW PROCESS FROM NODE     52.00 TO NODE     53.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  723.00  DOWNSTREAM ELEVATION(FEET) =  719.00
  STREET LENGTH(FEET) =   412.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018
  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.44
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   17.75
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.88
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.28
  STREET FLOW TRAVEL TIME(MIN.) =   2.39   Tc(MIN.) =   14.55
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.354
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  SCHOOL                      B        2.48      0.30     0.600    76
  SCHOOL                      C        0.77      0.25     0.600    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    9.31
  EFFECTIVE AREA(ACRES) =      4.43    AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        4.4        PEAK FLOW RATE(CFS) =      12.70

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  2.91   DEPTH*VELOCITY(FT*FT/SEC.) =   1.31
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     53.00 =     742.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     53.00 TO NODE     54.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  719.00  DOWNSTREAM ELEVATION(FEET) =  712.50
  STREET LENGTH(FEET) =   633.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.73
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.45   FLOOD WIDTH(FEET) =   18.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    3.00
    SPLIT DEPTH(FEET) =    0.42   SPLIT FLOOD WIDTH(FEET) =   16.02
```

```
    SPLIT FLOW(CFS) =    6.70   SPLIT VELOCITY(FEET/SEC.) =    2.78
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   18.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.00
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.35
  STREET FLOW TRAVEL TIME(MIN.) =   3.52   Tc(MIN.) =   18.08
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.963
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  SCHOOL                     B        2.42      0.30     0.600    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    2.42      SUBAREA RUNOFF(CFS) =    6.06
  EFFECTIVE AREA(ACRES) =      6.85    AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        6.9        PEAK FLOW RATE(CFS) =      17.20

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  3.00   DEPTH*VELOCITY(FT*FT/SEC.) =   1.35
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     54.00 =    1375.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.08
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.963
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.32      0.30     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.32      SUBAREA RUNOFF(CFS) =    0.84
  EFFECTIVE AREA(ACRES) =      7.17   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.58
  TOTAL AREA(ACRES) =        7.2       PEAK FLOW RATE(CFS) =      18.04

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.08
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.963
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  SCHOOL                     B        2.40      0.30     0.600    76
  SCHOOL                     C        0.07      0.25     0.600    86
  SCHOOL                     D        2.82      0.20     0.600    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    5.29      SUBAREA RUNOFF(CFS) =   13.40
  EFFECTIVE AREA(ACRES) =     12.46   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.59
  TOTAL AREA(ACRES) =       12.5       PEAK FLOW RATE(CFS) =      31.45

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.08
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.963
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.78      0.30     0.100    76
  COMMERCIAL                 C        0.03      0.25     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.81      SUBAREA RUNOFF(CFS) =    2.14
  EFFECTIVE AREA(ACRES) =     13.27   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =       13.3       PEAK FLOW RATE(CFS) =      33.58

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.50  DOWNSTREAM(FEET) =   712.30
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.30
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      33.58
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   18.15
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     55.00 =    1409.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.15
  RAINFALL INTENSITY(INCH/HR) =   2.96
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =      13.27
  TOTAL STREAM AREA(ACRES) =      13.27
```

```
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      33.58

****************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.10 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    34.00
  USER SPECIFIED Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.13      0.30     0.100    76
  COMMERCIAL                 D        0.14      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.50
  TOTAL AREA(ACRES) =      0.27   PEAK FLOW RATE(CFS) =      1.50

****************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.24      0.30     0.100    76
  COMMERCIAL                 D        0.01      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    1.39
  EFFECTIVE AREA(ACRES) =      0.52   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.5       PEAK FLOW RATE(CFS) =       2.88

****************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.00  DOWNSTREAM(FEET) =   712.30
  FLOW LENGTH(FEET) =   275.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.94
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.88
  PIPE TRAVEL TIME(MIN.) =   1.56    Tc(MIN.) =    6.56
  LONGEST FLOWPATH FROM NODE     55.10 TO NODE     55.00 =     309.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.56
  RAINFALL INTENSITY(INCH/HR) =   5.30
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.52
  TOTAL STREAM AREA(ACRES) =       0.52
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.88

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       33.58   18.15    2.955  0.27( 0.15) 0.56      13.3      51.00
      2        2.88    6.56    5.297  0.27( 0.03) 0.10       0.5      55.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       25.14    6.56    5.297  0.27( 0.14) 0.51       5.3      55.10
      2       35.19   18.15    2.955  0.27( 0.15) 0.54      13.8      51.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      35.19    Tc(MIN.) =    18.15
  EFFECTIVE AREA(ACRES) =      13.79   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.54
  TOTAL AREA(ACRES) =       13.8
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     55.00 =    1409.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     56.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.30  DOWNSTREAM(FEET) =   711.00
  FLOW LENGTH(FEET) =   165.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.31
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      35.19
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   18.48
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.00 =    1574.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     56.00 TO NODE     56.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.48
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.925
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.49      0.30      0.100    76
  COMMERCIAL                 D        0.04      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.53      SUBAREA RUNOFF(CFS) =     1.38
  EFFECTIVE AREA(ACRES) =     14.32   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =       14.3       PEAK FLOW RATE(CFS) =      35.87

****************************************************************************
  FLOW PROCESS FROM NODE     56.00 TO NODE     56.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   711.00  DOWNSTREAM(FEET) =   710.10
  FLOW LENGTH(FEET) =   172.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  26.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.97
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      35.87
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   18.90
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     56.11 TO NODE     56.12 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    720.80  DOWNSTREAM(FEET) =    717.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.438
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.584
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.91      0.30      0.200    76    8.44
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      3.71
  TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      3.71

****************************************************************************
  FLOW PROCESS FROM NODE     56.12 TO NODE     56.13 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  717.80  DOWNSTREAM ELEVATION(FEET) =  713.60
  STREET LENGTH(FEET) =   486.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.56
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.42
    HALFSTREET FLOOD WIDTH(FEET) =   16.43
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.59
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.10
  STREET FLOW TRAVEL TIME(MIN.) =   3.12   Tc(MIN.) =   11.56
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.828
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        1.68      0.30      0.200    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     1.68      SUBAREA RUNOFF(CFS) =     5.70
  EFFECTIVE AREA(ACRES) =      2.59    AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        2.6        PEAK FLOW RATE(CFS) =       8.78

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  2.75   DEPTH*VELOCITY(FT*FT/SEC.) =   1.24
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.13 =     816.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==========================================================================
  MAINLINE Tc(MIN.) =   11.56
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.828
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        2.11      0.30     0.200    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    2.11      SUBAREA RUNOFF(CFS) =    7.16
  EFFECTIVE AREA(ACRES) =      4.70   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        4.7       PEAK FLOW RATE(CFS) =      15.94

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.56
  RAINFALL INTENSITY(INCH/HR) =   3.83
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =       4.70
  TOTAL STREAM AREA(ACRES) =       4.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      15.94

****************************************************************************
  FLOW PROCESS FROM NODE     56.14 TO NODE     56.15 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    719.20  DOWNSTREAM(FEET) =    715.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.182
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.666
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.84      0.30     0.200    76    8.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      3.48
  TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      3.48

****************************************************************************
  FLOW PROCESS FROM NODE     56.15 TO NODE     56.13 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  715.70  DOWNSTREAM ELEVATION(FEET) =  713.60
  STREET LENGTH(FEET) =   200.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.51
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   13.58
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.55
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.95
  STREET FLOW TRAVEL TIME(MIN.) =   1.31   Tc(MIN.) =    9.49
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.286
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.54      0.30     0.200    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.54      SUBAREA RUNOFF(CFS) =    2.05
  EFFECTIVE AREA(ACRES) =      1.38    AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       5.25

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  14.39
  FLOW VELOCITY(FEET/SEC.) =  2.66   DEPTH*VELOCITY(FT*FT/SEC.) =   1.03
  LONGEST FLOWPATH FROM NODE     56.14 TO NODE     56.13 =     530.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.49
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.286
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.70      0.30     0.200    76
  RESIDENTIAL
```

```
  "11+ DWELLINGS/ACRE"       D        0.52      0.20     0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    1.22      SUBAREA RUNOFF(CFS) =    4.65
  EFFECTIVE AREA(ACRES) =      2.60   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =       9.90

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.49
  RAINFALL INTENSITY(INCH/HR) =   4.29
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.28
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =       2.60
  TOTAL STREAM AREA(ACRES) =       2.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.90

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       15.94   11.56    3.828  0.30( 0.06) 0.20       4.7      56.11
      2        9.90    9.49    4.286  0.28( 0.06) 0.20       2.6      56.14

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       24.57    9.49    4.286  0.29( 0.06) 0.20       6.5      56.14
      2       24.76   11.56    3.828  0.29( 0.06) 0.20       7.3      56.11

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      24.76    Tc(MIN.) =    11.56
  EFFECTIVE AREA(ACRES) =       7.30   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        7.3
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.13 =     816.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.16 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.60  DOWNSTREAM(FEET) =   712.50
  FLOW LENGTH(FEET) =    94.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.84
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.76
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   11.74
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.16 =     910.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.16 TO NODE     56.16 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.74
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.795
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.46      0.30     0.200    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.46      SUBAREA RUNOFF(CFS) =    1.55
  EFFECTIVE AREA(ACRES) =      7.76   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =      26.09

****************************************************************************
  FLOW PROCESS FROM NODE     56.16 TO NODE     56.16 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.74
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.795
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.05      0.30     0.200    76
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.41      0.20     0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.46      SUBAREA RUNOFF(CFS) =    1.55
  EFFECTIVE AREA(ACRES) =      8.22   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        8.2       PEAK FLOW RATE(CFS) =      27.64

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       27.78    9.67    4.241  0.29( 0.06) 0.20       7.4      56.14
      2       27.64   11.74    3.795  0.29( 0.06) 0.20       8.2      56.11
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      27.78  Tc(MIN.) =    9.67
  AREA-AVERAGED Fm(INCH/HR) =  0.06  AREA-AVERAGED Fp(INCH/HR) =  0.29
```

```
 AREA-AVERAGED Ap =  0.20  EFFECTIVE AREA(ACRES) =       7.38

****************************************************************************
 FLOW PROCESS FROM NODE     56.16 TO NODE     56.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   712.50  DOWNSTREAM(FEET) =   710.10
 FLOW LENGTH(FEET) =    38.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.17
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      27.78
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    9.70
 LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.10 =     948.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       27.78    9.70    4.232  0.29( 0.06) 0.20       7.4      56.14
     2       27.64   11.77    3.788  0.29( 0.06) 0.20       8.2      56.11
 LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.10 =     948.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       26.32    7.37    4.956  0.27( 0.13) 0.48       5.8      55.10
     2       35.87   18.90    2.888  0.27( 0.14) 0.52      14.3      51.00
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       51.07    7.37    4.956  0.28( 0.09) 0.34      11.4      55.10
     2       56.04    9.70    4.232  0.28( 0.09) 0.34      14.9      56.14
     3       57.62   11.77    3.788  0.28( 0.10) 0.35      17.3      56.11
     4       56.85   18.90    2.888  0.27( 0.11) 0.41      22.5      51.00
   TOTAL AREA(ACRES) =        22.5

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       57.62  Tc(MIN.) =   11.774
 EFFECTIVE AREA(ACRES) =     17.30  AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.34
 TOTAL AREA(ACRES) =       22.5
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     56.10 TO NODE     56.20 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   710.10  DOWNSTREAM(FEET) =   709.80
 FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.81
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      57.62
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   11.86
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.20 =    1790.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.20 TO NODE     56.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.86
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.772
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        0.39      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.39      SUBAREA RUNOFF(CFS) =    1.32
 EFFECTIVE AREA(ACRES) =     17.69   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =       22.9       PEAK FLOW RATE(CFS) =      58.55

****************************************************************************
 FLOW PROCESS FROM NODE     56.20 TO NODE     56.30 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   703.70
 FLOW LENGTH(FEET) =   290.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.62
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      58.55
 PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   12.21
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.30 =    2080.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  11
----------------------------------------------------------------------------
```

```
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
================================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM        Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1       51.45    7.82    4.787  0.27( 0.09) 0.33      11.8      55.10
      2       56.82   10.14    4.125  0.27( 0.09) 0.34      15.3      56.14
      3       58.55   12.21    3.709  0.27( 0.10) 0.35      17.7      56.11
      4       57.20   19.34    2.851  0.27( 0.11) 0.40      22.9      51.00
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.30 =    2080.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM        Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1      397.30    5.46    5.882  0.27( 0.06) 0.24      72.1      41.90
      2      397.30    5.46    5.882  0.27( 0.06) 0.24      72.1      41.90
      3      419.10    6.21    5.465  0.27( 0.06) 0.24      81.9      30.20
      4      564.14   12.73    3.621  0.27( 0.06) 0.24     176.3      41.20
      5      601.60   14.71    3.334  0.27( 0.06) 0.24     203.8      38.00
      6      655.53   17.52    3.016  0.27( 0.06) 0.24     241.8       1.00
      7      641.04   18.29    2.942  0.27( 0.06) 0.24     242.8       8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM        Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1      441.59    5.46    5.882  0.27( 0.07) 0.25      80.3      41.90
      2      441.59    5.46    5.882  0.27( 0.07) 0.25      80.3      41.90
      3      465.84    6.21    5.465  0.27( 0.07) 0.25      91.3      30.20
      4      506.43    7.82    4.787  0.27( 0.07) 0.25     117.1      55.10
      5      563.35   10.14    4.125  0.27( 0.07) 0.25     154.1      56.14
      6      611.06   12.21    3.709  0.27( 0.07) 0.25     186.4      56.11
      7      622.59   12.73    3.621  0.27( 0.07) 0.25     194.3      41.20
      8      659.67   14.71    3.334  0.27( 0.07) 0.25     223.3      38.00
      9      713.07   17.52    3.016  0.27( 0.07) 0.25     263.4       1.00
     10      698.44   18.29    2.942  0.27( 0.07) 0.25     265.0       8.00
     11      677.80   19.34    2.851  0.27( 0.07) 0.25     265.7      51.00
    TOTAL AREA(ACRES) =      265.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     713.07  Tc(MIN.) =   17.520
  EFFECTIVE AREA(ACRES) =    263.40  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =     265.7
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     35.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   703.70  DOWNSTREAM(FEET) =   703.00
  FLOW LENGTH(FEET) =    74.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  93.0 INCH PIPE IS  70.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.60
  ESTIMATED PIPE DIAMETER(INCH) =  93.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     713.07
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   17.59
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    729.10  DOWNSTREAM(FEET) =    723.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.849
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.461
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.39      0.30      0.500    76    8.85
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.52      0.20      0.500    91    8.85
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      3.55
  TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      3.55

****************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     44.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  723.20  DOWNSTREAM ELEVATION(FEET) =  714.50
  STREET LENGTH(FEET) =   493.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
```

```
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.63
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.34
   HALFSTREET FLOOD WIDTH(FEET) =   11.96
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.09
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.06
 STREET FLOW TRAVEL TIME(MIN.) =   2.66   Tc(MIN.) =   11.51
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.837
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        2.25      0.30     0.500    76
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.79      0.20     0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    3.04      SUBAREA RUNOFF(CFS) =   10.12
 EFFECTIVE AREA(ACRES) =      3.95    AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        3.9        PEAK FLOW RATE(CFS) =      13.17

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  14.29
 FLOW VELOCITY(FEET/SEC.) =  3.39   DEPTH*VELOCITY(FT*FT/SEC.) =   1.30
 LONGEST FLOWPATH FROM NODE     42.00 TO NODE     44.00 =     823.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     44.00 TO NODE     45.20 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   714.50  DOWNSTREAM(FEET) =   713.50
 FLOW LENGTH(FEET) =    33.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.80
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      13.17
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   11.56
 LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.20 =     856.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     45.20 TO NODE     45.20 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2

 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   11.56
 RAINFALL INTENSITY(INCH/HR) =   3.83
 AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.27
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       3.95
 TOTAL STREAM AREA(ACRES) =       3.95
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      13.17

****************************************************************************
 FLOW PROCESS FROM NODE     45.00 TO NODE     45.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    721.00  DOWNSTREAM(FEET) =    717.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.195
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.364
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      B        0.58      0.30     0.400    76    9.20
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      D        0.06      0.20     0.400    91    9.20
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA RUNOFF(CFS) =      2.45
 TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      2.45

****************************************************************************
 FLOW PROCESS FROM NODE     45.10 TO NODE     45.20 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  717.00  DOWNSTREAM ELEVATION(FEET) =  714.00
 STREET LENGTH(FEET) =   318.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.83
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
```

```
   STREET FLOW DEPTH(FEET) =  0.36
   HALFSTREET FLOOD WIDTH(FEET) =   12.97
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.36
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.85
 STREET FLOW TRAVEL TIME(MIN.) =   2.25   Tc(MIN.) =   11.44
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.850
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      B        0.82      0.30     0.400    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =    0.82      SUBAREA RUNOFF(CFS) =    2.75
 EFFECTIVE AREA(ACRES) =      1.46    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       4.90

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  14.39
 FLOW VELOCITY(FEET/SEC.) =  2.49   DEPTH*VELOCITY(FT*FT/SEC.) =   0.96
 LONGEST FLOWPATH FROM NODE     45.00 TO NODE     45.20 =     648.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     45.20 TO NODE     45.20 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   11.44
 RAINFALL INTENSITY(INCH/HR) =   3.85
 AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.40
 EFFECTIVE STREAM AREA(ACRES) =       1.46
 TOTAL STREAM AREA(ACRES) =       1.46
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.90

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       13.17   11.56    3.828  0.27( 0.13) 0.50       3.9      42.00
     2        4.90   11.44    3.850  0.30( 0.12) 0.40       1.5      45.00

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       18.02   11.44    3.850  0.27( 0.13) 0.47       5.4      45.00
     2       18.04   11.56    3.828  0.27( 0.13) 0.47       5.4      42.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      18.04    Tc(MIN.) =    11.56
 EFFECTIVE AREA(ACRES) =       5.41   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        5.4
 LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.20 =     856.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     45.20 TO NODE     45.30 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   713.50  DOWNSTREAM(FEET) =   711.90
 FLOW LENGTH(FEET) =   157.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.72
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      18.04
 PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   11.90
 LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.30 =    1013.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     45.30 TO NODE     45.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.90
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.765
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      B        0.66      0.30     0.400    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =    0.66      SUBAREA RUNOFF(CFS) =    2.16
 EFFECTIVE AREA(ACRES) =      6.07   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        6.1        PEAK FLOW RATE(CFS) =      19.87

****************************************************************************
 FLOW PROCESS FROM NODE     45.30 TO NODE     45.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.90
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.765
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK               B        1.89      0.30     0.850    76
 COMMERCIAL                D        0.04      0.20     0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.834
```

```
  SUBAREA AREA(ACRES) =    1.93      SUBAREA RUNOFF(CFS) =    6.10
  EFFECTIVE AREA(ACRES) =      8.00   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =        8.0       PEAK FLOW RATE(CFS) =      25.97

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       25.99   11.78    3.786  0.28( 0.16) 0.55       8.0       45.00
      2       25.97   11.90    3.765  0.28( 0.16) 0.55       8.0       42.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      25.99  Tc(MIN.) =   11.78
  AREA-AVERAGED Fm(INCH/HR) =  0.16  AREA-AVERAGED Fp(INCH/HR) =  0.28
  AREA-AVERAGED Ap =  0.55  EFFECTIVE AREA(ACRES) =       7.96

****************************************************************************
  FLOW PROCESS FROM NODE     45.30 TO NODE     47.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   711.90  DOWNSTREAM(FEET) =   710.80
  FLOW LENGTH(FEET) =   106.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.48
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.99
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   11.99
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     47.20 =    1119.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.20 TO NODE     47.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.99
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.748
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.13      0.30      0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.13      SUBAREA RUNOFF(CFS) =    0.44
  EFFECTIVE AREA(ACRES) =      8.09   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =        8.1       PEAK FLOW RATE(CFS) =      26.16

****************************************************************************
  FLOW PROCESS FROM NODE     47.20 TO NODE     35.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.80  DOWNSTREAM(FEET) =   703.90
  FLOW LENGTH(FEET) =   695.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.33
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.16
  PIPE TRAVEL TIME(MIN.) =   1.39    Tc(MIN.) =   13.38
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     35.20 =    1814.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.20 TO NODE     35.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.38
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.520
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        1.02      0.30      0.850    76
  PUBLIC PARK                C        0.05      0.25      0.850    86
  PUBLIC PARK                D        2.20      0.20      0.850    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    3.27      SUBAREA RUNOFF(CFS) =    9.78
  EFFECTIVE AREA(ACRES) =     11.36   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.63
  TOTAL AREA(ACRES) =       11.4       PEAK FLOW RATE(CFS) =      34.27

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       34.27   13.38    3.520  0.26( 0.17) 0.63      11.4       45.00
      2       34.21   13.50    3.502  0.26( 0.17) 0.63      11.4       42.00
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     35.10 =    1814.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      441.59    5.54    5.837  0.27( 0.07) 0.25      80.3       41.90
      2      441.59    5.54    5.837  0.27( 0.07) 0.25      80.3       41.90
      3      465.84    6.28    5.428  0.27( 0.07) 0.25      91.3       30.20
      4      506.43    7.90    4.762  0.27( 0.07) 0.25     117.1       55.10
      5      563.35   10.21    4.109  0.27( 0.07) 0.25     154.1       56.14
      6      611.06   12.28    3.697  0.27( 0.07) 0.25     186.4       56.11
      7      622.59   12.80    3.610  0.27( 0.07) 0.25     194.3       41.20
      8      659.67   14.77    3.326  0.27( 0.07) 0.25     223.3       38.00
      9      713.07   17.59    3.010  0.27( 0.07) 0.25     263.4        1.00
     10      698.44   18.36    2.936  0.27( 0.07) 0.25     265.0        8.00
     11      677.80   19.40    2.845  0.27( 0.07) 0.25     265.7       51.00
```

```
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      465.57    5.54    5.837  0.27( 0.07) 0.27      85.0      41.90
     2      465.57    5.54    5.837  0.27( 0.07) 0.27      85.0      41.90
     3      491.09    6.28    5.428  0.27( 0.07) 0.27      96.6      30.20
     4      534.14    7.90    4.762  0.27( 0.07) 0.27     123.8      55.10
     5      594.10   10.21    4.109  0.27( 0.07) 0.27     162.8      56.14
     6      644.17   12.28    3.697  0.27( 0.07) 0.27     196.8      56.11
     7      656.26   12.80    3.610  0.27( 0.07) 0.27     205.2      41.20
     8      667.75   13.38    3.520  0.27( 0.07) 0.27     214.2      45.00
     9      669.89   13.50    3.502  0.27( 0.07) 0.27     215.9      42.00
    10      692.07   14.77    3.326  0.27( 0.07) 0.27     234.7      38.00
    11      742.23   17.59    3.010  0.27( 0.07) 0.27     274.8       1.00
    12      726.84   18.36    2.936  0.27( 0.07) 0.27     276.4       8.00
    13      705.27   19.40    2.845  0.27( 0.07) 0.27     277.1      51.00
   TOTAL AREA(ACRES) =       277.1

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      742.23  Tc(MIN.) =   17.586
 EFFECTIVE AREA(ACRES) =    274.80  AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
 TOTAL AREA(ACRES) =      277.1
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =   695.70
 FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN 108.0 INCH PIPE IS  87.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.42
 ESTIMATED PIPE DIAMETER(INCH) = 108.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     742.23
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   17.68
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     36.00 =   10453.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.68
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.001
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C        0.16      0.25      0.100    86
 COMMERCIAL                 D        0.29      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.45      SUBAREA RUNOFF(CFS) =    1.21
 EFFECTIVE AREA(ACRES) =    275.25   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
 TOTAL AREA(ACRES) =      277.6       PEAK FLOW RATE(CFS) =     742.23
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE     36.00 TO NODE     37.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   695.70  DOWNSTREAM(FEET) =   695.40
 FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN 108.0 INCH PIPE IS  87.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.42
 ESTIMATED PIPE DIAMETER(INCH) = 108.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     742.23
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   17.77
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.00 =   10528.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.00 TO NODE     37.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   695.40  DOWNSTREAM(FEET) =   694.00
 FLOW LENGTH(FEET) =   355.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN 108.0 INCH PIPE IS  88.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.33
 ESTIMATED PIPE DIAMETER(INCH) = 108.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     742.23
 PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   18.22
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.10 =   10883.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.10 TO NODE     37.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.22
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.950
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C        0.68      0.25      0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.68      SUBAREA RUNOFF(CFS) =     1.79
  EFFECTIVE AREA(ACRES) =    275.93   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      278.3       PEAK FLOW RATE(CFS) =     742.23
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.22
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.950
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.46      0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.46      SUBAREA RUNOFF(CFS) =     1.21
  EFFECTIVE AREA(ACRES) =    276.39   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      278.7       PEAK FLOW RATE(CFS) =     742.23
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.00  DOWNSTREAM(FEET) =   693.80
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 102.0 INCH PIPE IS  79.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.65
  ESTIMATED PIPE DIAMETER(INCH) = 102.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     742.23
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   18.25
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     37.60 TO NODE     37.70 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    718.50  DOWNSTREAM(FEET) =    714.40
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.517
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.279
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.13      0.30      0.500    76    9.52
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.51      0.20      0.500    91    9.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.40
  TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      2.40

****************************************************************************
  FLOW PROCESS FROM NODE     37.70 TO NODE     37.80 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  714.40  DOWNSTREAM ELEVATION(FEET) =  710.60
  STREET LENGTH(FEET) =   349.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.42
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   12.06
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.41
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.83
  STREET FLOW TRAVEL TIME(MIN.) =   2.41   Tc(MIN.) =   11.93
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.759
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.15      0.25      0.500    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.47      0.20      0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     0.62      SUBAREA RUNOFF(CFS) =     2.04
  EFFECTIVE AREA(ACRES) =      1.26    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.50
```

```
  TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =       4.14

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  12.97
  FLOW VELOCITY(FEET/SEC.) =  2.55   DEPTH*VELOCITY(FT*FT/SEC.) =   0.92
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.80 =     679.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.80 TO NODE     37.90 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.60  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.97
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.14
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   12.10
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.90 =     739.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.90 TO NODE     37.90 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.10
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.729
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.21      0.25     0.500    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.93      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.14      SUBAREA RUNOFF(CFS) =    3.72
  EFFECTIVE AREA(ACRES) =      2.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        2.4       PEAK FLOW RATE(CFS) =       7.83

****************************************************************************
  FLOW PROCESS FROM NODE     37.90 TO NODE     37.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   708.00
  FLOW LENGTH(FEET) =   221.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.73
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.83
  PIPE TRAVEL TIME(MIN.) =   0.64    Tc(MIN.) =   12.74
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.50 =     960.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.50 TO NODE     37.50 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.74
  RAINFALL INTENSITY(INCH/HR) =   3.62
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       2.40
  TOTAL STREAM AREA(ACRES) =       2.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.83

****************************************************************************
  FLOW PROCESS FROM NODE     37.30 TO NODE     37.40 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    713.10  DOWNSTREAM(FEET) =    709.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.880
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.188
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.70      0.25     0.500    86    9.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.56
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      2.56

****************************************************************************
  FLOW PROCESS FROM NODE     37.40 TO NODE     37.50 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  709.70  DOWNSTREAM ELEVATION(FEET) =  708.10
  STREET LENGTH(FEET) =   124.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018
```

```
 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.14
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.33
   HALFSTREET FLOOD WIDTH(FEET) =   11.14
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.55
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.84
 STREET FLOW TRAVEL TIME(MIN.) =   0.81   Tc(MIN.) =   10.69
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.003
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        0.33      0.25     0.500    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.33      SUBAREA RUNOFF(CFS) =    1.15
 EFFECTIVE AREA(ACRES) =      1.03    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        1.0        PEAK FLOW RATE(CFS) =       3.59

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.86
 FLOW VELOCITY(FEET/SEC.) =  2.61   DEPTH*VELOCITY(FT*FT/SEC.) =   0.89
 LONGEST FLOWPATH FROM NODE     37.30 TO NODE     37.50 =     454.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.50 TO NODE     37.50 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   10.69
 RAINFALL INTENSITY(INCH/HR) =   4.00
 AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       1.03
 TOTAL STREAM AREA(ACRES) =       1.03
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.59

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        7.83   12.74    3.620  0.21( 0.11) 0.50       2.4      37.60
     2        3.59   10.69    4.003  0.25( 0.12) 0.50       1.0      37.30

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       10.88   10.69    4.003  0.23( 0.11) 0.50       3.0      37.30
     2       11.07   12.74    3.620  0.22( 0.11) 0.50       3.4      37.60

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      11.07    Tc(MIN.) =    12.74
 EFFECTIVE AREA(ACRES) =       3.43   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        3.4
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.50 =     960.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.50 TO NODE     37.20 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   708.00  DOWNSTREAM(FEET) =   693.80
 FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.30
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.07
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   12.85
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.20 =    1080.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       10.88   10.81    3.978  0.23( 0.11) 0.50       3.0      37.30
     2       11.07   12.85    3.602  0.22( 0.11) 0.50       3.4      37.60
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.20 =    1080.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      465.57    6.27    5.432  0.27( 0.07) 0.27      86.6      41.90
     2      465.57    6.27    5.432  0.27( 0.07) 0.27      86.6      41.90
     3      491.09    7.02    5.094  0.27( 0.07) 0.27      98.2      30.20
     4      534.14    8.62    4.530  0.27( 0.07) 0.27     125.4      55.10
     5      594.10   10.91    3.957  0.27( 0.07) 0.27     164.4      56.14
     6      644.17   12.96    3.585  0.27( 0.07) 0.27     198.4      56.11
     7      656.26   13.48    3.505  0.27( 0.07) 0.27     206.8      41.20
     8      667.75   14.05    3.422  0.27( 0.07) 0.27     215.8      45.00
```

```
     9      669.89   14.17    3.406  0.27( 0.07) 0.27     217.5      42.00
    10      692.07   15.44    3.242  0.27( 0.07) 0.27     236.3      38.00
    11      742.23   18.25    2.946  0.27( 0.07) 0.27     276.4       1.00
    12      726.84   19.03    2.877  0.27( 0.07) 0.27     278.0       8.00
    13      705.27   20.07    2.790  0.27( 0.07) 0.27     278.7      51.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      474.26    6.27    5.432  0.27( 0.07) 0.27      88.4      41.90
      2      474.26    6.27    5.432  0.27( 0.07) 0.27      88.4      41.90
      3      500.19    7.02    5.094  0.27( 0.07) 0.27     100.2      30.20
      4      544.05    8.62    4.530  0.27( 0.07) 0.27     127.8      55.10
      5      602.30   10.81    3.978  0.27( 0.07) 0.27     165.7      37.30
      6      604.99   10.91    3.957  0.27( 0.07) 0.27     167.4      56.14
      7      652.75   12.85    3.602  0.27( 0.07) 0.27     200.1      37.60
      8      655.18   12.96    3.585  0.27( 0.07) 0.27     201.8      56.11
      9      667.02   13.48    3.505  0.27( 0.07) 0.27     210.2      41.20
     10      678.25   14.05    3.422  0.27( 0.07) 0.27     219.2      45.00
     11      680.34   14.17    3.406  0.27( 0.07) 0.27     221.0      42.00
     12      702.00   15.44    3.242  0.27( 0.07) 0.27     239.7      38.00
     13      751.21   18.25    2.946  0.27( 0.07) 0.27     279.8       1.00
     14      735.61   19.03    2.877  0.27( 0.07) 0.27     281.4       8.00
     15      713.76   20.07    2.790  0.27( 0.07) 0.27     282.2      51.00
    TOTAL AREA(ACRES) =       282.2

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      751.21  Tc(MIN.) =   18.253
  EFFECTIVE AREA(ACRES) =    279.82  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      282.2
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     37.20 TO NODE     47.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.80  DOWNSTREAM(FEET) =   691.30
  FLOW LENGTH(FEET) =   487.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 108.0 INCH PIPE IS  79.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.06
  ESTIMATED PIPE DIAMETER(INCH) = 108.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     751.21
  PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =   18.79
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     47.31 TO NODE     47.32 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    718.50  DOWNSTREAM(FEET) =    712.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.679
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.511
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.63      0.30     0.500    76    8.68
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.47
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      2.47

****************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.32 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.68
  RAINFALL INTENSITY(INCH/HR) =   4.51
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.63
  TOTAL STREAM AREA(ACRES) =       0.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.47

****************************************************************************
  FLOW PROCESS FROM NODE     47.33 TO NODE     47.32 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   282.00
  ELEVATION DATA: UPSTREAM(FEET) =    715.00  DOWNSTREAM(FEET) =    712.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.219
```

```
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.358
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        0.86      0.30      0.500    76    9.22
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA RUNOFF(CFS) =      3.26
 TOTAL AREA(ACRES) =      0.86   PEAK FLOW RATE(CFS) =      3.26

****************************************************************************
 FLOW PROCESS FROM NODE     47.32 TO NODE     47.32 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.22
 RAINFALL INTENSITY(INCH/HR) =   4.36
 AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       0.86
 TOTAL STREAM AREA(ACRES) =       0.86
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.26

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        2.47    8.68    4.511  0.30( 0.15) 0.50       0.6      47.31
     2        3.26    9.22    4.358  0.30( 0.15) 0.50       0.9      47.33

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        5.65    8.68    4.511  0.30( 0.15) 0.50       1.4      47.31
     2        5.64    9.22    4.358  0.30( 0.15) 0.50       1.5      47.33

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       5.65    Tc(MIN.) =     8.68
 EFFECTIVE AREA(ACRES) =       1.44   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =       1.5
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.32 =     330.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.32 TO NODE     47.34 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   699.00  DOWNSTREAM(FEET) =   698.50
 FLOW LENGTH(FEET) =   102.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.40
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.65
 PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =    9.07
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.34 =     432.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.34 TO NODE     47.34 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.07
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.400
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        0.38      0.30      0.500    76
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        D        0.06      0.20      0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.44      SUBAREA RUNOFF(CFS) =    1.69
 EFFECTIVE AREA(ACRES) =      1.88   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        1.9       PEAK FLOW RATE(CFS) =       7.19

****************************************************************************
 FLOW PROCESS FROM NODE     47.34 TO NODE     47.35 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   698.50  DOWNSTREAM(FEET) =   697.50
 FLOW LENGTH(FEET) =   194.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.80
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.19
 PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =    9.74
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.35 =     626.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.74
 RAINFALL INTENSITY(INCH/HR) =   4.22
```

```
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       1.88
  TOTAL STREAM AREA(ACRES) =       1.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.19

****************************************************************************
  FLOW PROCESS FROM NODE     47.36 TO NODE     47.35 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   275.00
  ELEVATION DATA: UPSTREAM(FEET) =    713.50  DOWNSTREAM(FEET) =    711.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.418
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.305
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.72      0.30      0.500    76    9.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.69
  TOTAL AREA(ACRES) =      0.72   PEAK FLOW RATE(CFS) =      2.69

****************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.42
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.305
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.66      0.30      0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.12      0.20      0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.78      SUBAREA RUNOFF(CFS) =    2.92
  EFFECTIVE AREA(ACRES) =      1.50   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.5       PEAK FLOW RATE(CFS) =       5.61

****************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.42
  RAINFALL INTENSITY(INCH/HR) =   4.30
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       1.50
  TOTAL STREAM AREA(ACRES) =       1.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.61

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        7.19    9.74    4.223  0.30( 0.15) 0.50       1.9      47.31
      1        7.14   10.31    4.088  0.30( 0.15) 0.50       1.9      47.33
      2        5.61    9.42    4.305  0.29( 0.15) 0.50       1.5      47.36

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       12.71    9.42    4.305  0.29( 0.15) 0.50       3.3      47.36
      2       12.70    9.74    4.223  0.29( 0.15) 0.50       3.4      47.31
      3       12.46   10.31    4.088  0.29( 0.15) 0.50       3.4      47.33

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      12.71    Tc(MIN.) =     9.42
  EFFECTIVE AREA(ACRES) =       3.32   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.4
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.35 =     626.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.37 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   697.60  DOWNSTREAM(FEET) =   696.00
  FLOW LENGTH(FEET) =   293.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.61
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.71
  PIPE TRAVEL TIME(MIN.) =   0.87    Tc(MIN.) =   10.29
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.37 =     919.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.37 TO NODE     47.37 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==========================================================================
  MAINLINE Tc(MIN.) =   10.29
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.092
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.67      0.30     0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.12      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.79      SUBAREA RUNOFF(CFS) =    2.81
  EFFECTIVE AREA(ACRES) =      4.11   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.2       PEAK FLOW RATE(CFS) =      14.59

**************************************************************************
  FLOW PROCESS FROM NODE     47.37 TO NODE     47.37 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   10.29
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.092
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.09      0.30     0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.60      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.69      SUBAREA RUNOFF(CFS) =    2.47
  EFFECTIVE AREA(ACRES) =      4.80   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.9       PEAK FLOW RATE(CFS) =      17.06

**************************************************************************
  FLOW PROCESS FROM NODE     47.37 TO NODE     47.30 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =   695.20
  FLOW LENGTH(FEET) =   158.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.86
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.06
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =   10.74
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.30 =    1077.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     47.30 TO NODE     47.30 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   10.74
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.993
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.28      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    0.98
  EFFECTIVE AREA(ACRES) =      5.08   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        5.2       PEAK FLOW RATE(CFS) =      17.62

**************************************************************************
  FLOW PROCESS FROM NODE     47.30 TO NODE     47.40 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.20  DOWNSTREAM(FEET) =   694.60
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.76
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.62
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =   11.10
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.40 =    1202.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     47.40 TO NODE     47.40 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   11.10
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.918
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.19      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.65
  EFFECTIVE AREA(ACRES) =      5.27   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =      17.93

**************************************************************************
  FLOW PROCESS FROM NODE     47.40 TO NODE     47.50 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.60  DOWNSTREAM(FEET) =   694.40
  FLOW LENGTH(FEET) =    41.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.82
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.93
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   11.22
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.50 =    1243.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.50 TO NODE     47.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   11.22
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.894
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.05      0.30     0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.45      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.50      SUBAREA RUNOFF(CFS) =    5.12
  EFFECTIVE AREA(ACRES) =      6.77   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        6.9       PEAK FLOW RATE(CFS) =      22.93

****************************************************************************
  FLOW PROCESS FROM NODE     47.50 TO NODE     47.60 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.40  DOWNSTREAM(FEET) =   693.50
  FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.27
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      22.93
  PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =   11.70
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.60 =    1423.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.60 TO NODE     47.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   11.70
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.802
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.55      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.55      SUBAREA RUNOFF(CFS) =    5.16
  EFFECTIVE AREA(ACRES) =      8.32   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        8.4       PEAK FLOW RATE(CFS) =      27.54

****************************************************************************
  FLOW PROCESS FROM NODE     47.60 TO NODE     47.70 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.50  DOWNSTREAM(FEET) =   693.30
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  21.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.60
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.54
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.80
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.70 =    1463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.70 TO NODE     47.70 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   11.80
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.784
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.04      0.25     0.500    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.57      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.61      SUBAREA RUNOFF(CFS) =    5.34
  EFFECTIVE AREA(ACRES) =      9.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       10.0       PEAK FLOW RATE(CFS) =      32.73

****************************************************************************
  FLOW PROCESS FROM NODE     47.70 TO NODE     47.80 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.30  DOWNSTREAM(FEET) =   692.50
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  25.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.59
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      32.73
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   12.23
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.80 =    1633.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.80 TO NODE     47.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.23
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.707
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.60      0.25     0.500    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.94      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.54      SUBAREA RUNOFF(CFS) =    4.99
  EFFECTIVE AREA(ACRES) =     11.47   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       11.6       PEAK FLOW RATE(CFS) =      37.03

****************************************************************************
  FLOW PROCESS FROM NODE     47.80 TO NODE     47.90 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.50  DOWNSTREAM(FEET) =   692.30
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.81
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      37.03
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   12.29
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.90 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.90 TO NODE     47.90 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.29
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.696
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        1.43      0.25     0.500    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.14      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.57      SUBAREA RUNOFF(CFS) =    5.05
  EFFECTIVE AREA(ACRES) =     13.04   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =      41.97

****************************************************************************
  FLOW PROCESS FROM NODE     47.90 TO NODE     47.91 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.30  DOWNSTREAM(FEET) =   692.10
  FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  29.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.88
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.97
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   12.40
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.91 =    1707.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.91 TO NODE     47.91 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.40
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.677
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        1.89      0.25     0.500    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.30      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.19      SUBAREA RUNOFF(CFS) =   10.23
  EFFECTIVE AREA(ACRES) =     16.23   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      51.98

****************************************************************************
  FLOW PROCESS FROM NODE     47.91 TO NODE     47.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.10  DOWNSTREAM(FEET) =   691.30
  FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  30.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.44
```

```
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      51.98
 PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   12.77
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.00 =    1874.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       51.98   12.77    3.615  0.24( 0.12) 0.50      16.2      47.36
     2       51.38   13.10    3.563  0.24( 0.12) 0.50      16.3      47.31
     3       50.20   13.67    3.476  0.24( 0.12) 0.50      16.3      47.33
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.00 =    1874.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      474.26    6.89    5.148  0.27( 0.07) 0.27      88.4      41.90
     2      474.26    6.89    5.148  0.27( 0.07) 0.27      88.4      41.90
     3      500.19    7.62    4.859  0.27( 0.07) 0.27     100.2      30.20
     4      544.05    9.21    4.361  0.27( 0.07) 0.27     127.8      55.10
     5      602.30   11.38    3.861  0.27( 0.07) 0.27     165.7      37.30
     6      604.99   11.49    3.842  0.27( 0.07) 0.27     167.4      56.14
     7      652.75   13.41    3.515  0.27( 0.07) 0.27     200.1      37.60
     8      655.18   13.52    3.500  0.27( 0.07) 0.27     201.8      56.11
     9      667.02   14.04    3.425  0.27( 0.07) 0.27     210.2      41.20
    10      678.25   14.61    3.347  0.27( 0.07) 0.27     219.2      45.00
    11      680.34   14.73    3.332  0.27( 0.07) 0.27     221.0      42.00
    12      702.00   16.00    3.177  0.27( 0.07) 0.27     239.7      38.00
    13      751.21   18.79    2.898  0.27( 0.07) 0.27     279.8       1.00
    14      735.61   19.57    2.831  0.27( 0.07) 0.27     281.4       8.00
    15      713.76   20.63    2.747  0.27( 0.07) 0.27     282.2      51.00
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      514.60    6.89    5.148  0.26( 0.08) 0.29      97.1      41.90
     2      514.60    6.89    5.148  0.26( 0.08) 0.29      97.1      41.90
     3      542.26    7.62    4.859  0.26( 0.08) 0.29     109.9      30.20
     4      589.52    9.21    4.361  0.26( 0.08) 0.29     139.5      55.10
     5      651.90   11.38    3.861  0.26( 0.08) 0.29     180.1      37.30
     6      654.77   11.49    3.842  0.26( 0.08) 0.29     182.0      56.14
     7      688.78   12.77    3.615  0.26( 0.08) 0.29     205.4      47.36
     8      696.28   13.10    3.563  0.26( 0.08) 0.29     211.0      47.31
     9      703.48   13.41    3.515  0.26( 0.08) 0.29     216.4      37.60
    10      705.71   13.52    3.500  0.26( 0.08) 0.29     218.1      56.11
    11      709.00   13.67    3.476  0.26( 0.08) 0.29     220.7      47.33
    12      716.45   14.04    3.425  0.26( 0.08) 0.29     226.6      41.20
    13      726.52   14.61    3.347  0.26( 0.08) 0.29     235.6      45.00
    14      728.38   14.73    3.332  0.26( 0.08) 0.29     237.3      42.00
    15      747.73   16.00    3.177  0.26( 0.08) 0.29     256.0      38.00
    16      792.76   18.79    2.898  0.26( 0.07) 0.28     296.2       1.00
    17      776.17   19.57    2.831  0.26( 0.07) 0.28     297.7       8.00
    18      753.06   20.63    2.747  0.26( 0.07) 0.28     298.5      51.00
  TOTAL AREA(ACRES) =      298.5

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      792.76  Tc(MIN.) =   18.791
 EFFECTIVE AREA(ACRES) =    296.16  AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      298.5
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     47.00 TO NODE     48.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   691.30  DOWNSTREAM(FEET) =   691.10
 FLOW LENGTH(FEET) =    61.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN 120.0 INCH PIPE IS  87.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.91
 ESTIMATED PIPE DIAMETER(INCH) = 120.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     792.76
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   18.87
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     48.60 TO NODE     48.61 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    712.40  DOWNSTREAM(FEET) =    707.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.660
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.517
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
```

```
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.05      0.30     0.400    76    8.66
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.02      0.25     0.400    86    8.66
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.69      0.20     0.400    91    8.66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      3.03
  TOTAL AREA(ACRES) =      0.76   PEAK FLOW RATE(CFS) =      3.03

****************************************************************************
  FLOW PROCESS FROM NODE     48.61 TO NODE     48.70 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  707.00  DOWNSTREAM ELEVATION(FEET) =  698.80
  STREET LENGTH(FEET) =   346.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.36
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =   11.35
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.43
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.14
  STREET FLOW TRAVEL TIME(MIN.) =   1.68   Tc(MIN.) =   10.34
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.081
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.46      0.25     0.400    86
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.28      0.20     0.400    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.74      SUBAREA RUNOFF(CFS) =    2.66
  EFFECTIVE AREA(ACRES) =      1.50    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       5.39

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  12.36
  FLOW VELOCITY(FEET/SEC.) =  3.63   DEPTH*VELOCITY(FT*FT/SEC.) =   1.27
  LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.70 =     676.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.70 TO NODE     48.70 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.34
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.081
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.59      0.25     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    2.15
  EFFECTIVE AREA(ACRES) =      2.09   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.32
  TOTAL AREA(ACRES) =        2.1        PEAK FLOW RATE(CFS) =       7.54

****************************************************************************
  FLOW PROCESS FROM NODE     48.71 TO NODE     48.71 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.34
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.081
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.09      0.30     0.400    76
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.47      0.25     0.400    86
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.80      0.20     0.400    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.36      SUBAREA RUNOFF(CFS) =    4.88
  EFFECTIVE AREA(ACRES) =      3.45   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =        3.4        PEAK FLOW RATE(CFS) =      12.43

****************************************************************************
  FLOW PROCESS FROM NODE     48.70 TO NODE     48.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   698.80  DOWNSTREAM(FEET) =   691.10
  FLOW LENGTH(FEET) =   119.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.27
```

```
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.43
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   10.48
 LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.00 =     795.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       12.43   10.48    4.049  0.22( 0.08) 0.35       3.4      48.60
 LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.00 =     795.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      514.60    6.98    5.111  0.26( 0.08) 0.29      97.1      41.90
     2      514.60    6.98    5.111  0.26( 0.08) 0.29      97.1      41.90
     3      542.26    7.71    4.827  0.26( 0.08) 0.29     109.9      30.20
     4      589.52    9.29    4.338  0.26( 0.08) 0.29     139.5      55.10
     5      651.90   11.47    3.845  0.26( 0.08) 0.29     180.1      37.30
     6      654.77   11.57    3.826  0.26( 0.08) 0.29     182.0      56.14
     7      688.78   12.85    3.602  0.26( 0.08) 0.29     205.4      47.36
     8      696.28   13.18    3.551  0.26( 0.08) 0.29     211.0      47.31
     9      703.48   13.50    3.503  0.26( 0.08) 0.29     216.4      37.60
    10      705.71   13.60    3.488  0.26( 0.08) 0.29     218.1      56.11
    11      709.00   13.76    3.465  0.26( 0.08) 0.29     220.7      47.33
    12      716.45   14.12    3.414  0.26( 0.08) 0.29     226.6      41.20
    13      726.52   14.69    3.336  0.26( 0.08) 0.29     235.6      45.00
    14      728.38   14.81    3.321  0.26( 0.08) 0.29     237.3      42.00
    15      747.73   16.08    3.168  0.26( 0.08) 0.29     256.0      38.00
    16      792.76   18.87    2.891  0.26( 0.07) 0.28     296.2       1.00
    17      776.17   19.65    2.824  0.26( 0.07) 0.28     297.7       8.00
    18      753.06   20.71    2.741  0.26( 0.07) 0.28     298.5      51.00
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      525.10    6.98    5.111  0.26( 0.08) 0.29      99.4      41.90
     2      525.10    6.98    5.111  0.26( 0.08) 0.29      99.4      41.90
     3      553.20    7.71    4.827  0.26( 0.08) 0.29     112.4      30.20
     4      601.34    9.29    4.338  0.26( 0.08) 0.29     142.5      55.10
     5      635.95   10.48    4.049  0.26( 0.08) 0.29     165.1      48.60
     6      663.69   11.47    3.845  0.26( 0.08) 0.29     183.6      37.30
     7      666.50   11.57    3.826  0.26( 0.08) 0.29     185.5      56.14
     8      699.81   12.85    3.602  0.26( 0.08) 0.29     208.9      47.36
     9      707.15   13.18    3.551  0.26( 0.08) 0.29     214.5      47.31
    10      714.20   13.50    3.503  0.26( 0.08) 0.29     219.9      37.60
    11      716.38   13.60    3.488  0.26( 0.08) 0.29     221.6      56.11
    12      719.60   13.76    3.465  0.26( 0.08) 0.29     224.2      47.33
    13      726.89   14.12    3.414  0.26( 0.08) 0.29     230.0      41.20
    14      736.71   14.69    3.336  0.26( 0.08) 0.29     239.0      45.00
    15      738.53   14.81    3.321  0.26( 0.08) 0.29     240.8      42.00
    16      757.40   16.08    3.168  0.26( 0.08) 0.29     259.5      38.00
    17      801.57   18.87    2.891  0.26( 0.07) 0.28     299.6       1.00
    18      784.76   19.65    2.824  0.26( 0.07) 0.28     301.2       8.00
    19      761.39   20.71    2.741  0.26( 0.07) 0.28     302.0      51.00
  TOTAL AREA(ACRES) =       302.0

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      801.57  Tc(MIN.) =   18.870
 EFFECTIVE AREA(ACRES) =    299.61  AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      302.0
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     48.00 TO NODE     49.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   691.10  DOWNSTREAM(FEET) =   689.20
 FLOW LENGTH(FEET) =   384.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN 108.0 INCH PIPE IS  85.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.92
 ESTIMATED PIPE DIAMETER(INCH) = 108.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     801.57
 PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   19.30
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     49.00 =   11849.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.30
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.854
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.31      0.30      0.100    76
 COMMERCIAL                  C        0.90      0.25      0.100    86
 COMMERCIAL                  D        0.12      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    1.33      SUBAREA RUNOFF(CFS) =    3.39
 EFFECTIVE AREA(ACRES) =    300.94   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
```

```
  TOTAL AREA(ACRES) =      303.3       PEAK FLOW RATE(CFS) =     801.57
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.30
  RAINFALL INTENSITY(INCH/HR) =   2.85
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.28
  EFFECTIVE STREAM AREA(ACRES) =     300.94
  TOTAL STREAM AREA(ACRES) =     303.28
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     801.57

****************************************************************************
  FLOW PROCESS FROM NODE     61.30 TO NODE     61.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    707.30  DOWNSTREAM(FEET) =    704.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.383
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.602
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  APARTMENTS                  B        0.53      0.30     0.200    76    8.38
  APARTMENTS                  D        0.77      0.20     0.200    91    8.38
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      5.33
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      5.33

****************************************************************************
  FLOW PROCESS FROM NODE     61.20 TO NODE     61.10 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    704.20
  DOWNSTREAM NODE ELEVATION(FEET) =    703.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   119.00
  "V" GUTTER WIDTH(FEET) =   1.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.10000
  MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.450
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                  B        1.30      0.30     0.200    76
  APARTMENTS                  D        0.25      0.20     0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      8.39
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.92
  AVERAGE FLOW DEPTH(FEET) =   0.47   FLOOD WIDTH(FEET) =    9.23
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.51   Tc(MIN.) =    8.89
  SUBAREA AREA(ACRES) =    1.55       SUBAREA RUNOFF(CFS) =    6.13
  EFFECTIVE AREA(ACRES) =    2.85     AREA-AVERAGED Fm(INCH/HR) =   0.05
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   0.20
  TOTAL AREA(ACRES) =        2.8          PEAK FLOW RATE(CFS) =      11.28

        ==>>ERROR:FLOW EXCEEDS CAPACITY OF CHANNEL WITH
            NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM ALLOWABLE DEPTH.
            AS AN APPROXIMATION, TRAVEL TIME CALCULATIONS ARE BASED
            ON FLOW DEPTH EQUAL TO THE SPECIFIED MAXIMUM ALLOWABLE DEPTH.


  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.50   FLOOD WIDTH(FEET) =    9.80
  FLOW VELOCITY(FEET/SEC.) =   4.68   DEPTH*VELOCITY(FT*FT/SEC) =   2.34
  LONGEST FLOWPATH FROM NODE     61.30 TO NODE     61.10 =     449.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.10 TO NODE     49.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  703.00  DOWNSTREAM ELEVATION(FEET) =  699.50
  STREET LENGTH(FEET) =   380.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.69
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.49   FLOOD WIDTH(FEET) =   20.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    3.04
    SPLIT DEPTH(FEET) =    0.28   SPLIT FLOOD WIDTH(FEET) =    8.25
    SPLIT FLOW(CFS) =    1.36   SPLIT VELOCITY(FEET/SEC.) =    1.86
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.49
    HALFSTREET FLOOD WIDTH(FEET) =   20.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.04
```

```
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.49
 STREET FLOW TRAVEL TIME(MIN.) =   2.08   Tc(MIN.) =   10.97
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.945
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.26      0.30     0.100    76
 COMMERCIAL                  C        0.25      0.25     0.100    86
 COMMERCIAL                  D        0.29      0.20     0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    2.82
 EFFECTIVE AREA(ACRES) =      3.65    AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
 TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =      12.80

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  20.00
 FLOW VELOCITY(FEET/SEC.) =  3.04   DEPTH*VELOCITY(FT*FT/SEC.) =   1.49
 LONGEST FLOWPATH FROM NODE     61.30 TO NODE     49.00 =     829.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   10.97
 RAINFALL INTENSITY(INCH/HR) =   3.94
 AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.26
 AREA-AVERAGED Ap =  0.18
 EFFECTIVE STREAM AREA(ACRES) =       3.65
 TOTAL STREAM AREA(ACRES) =       3.65
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.80

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1      525.10    7.45    4.922  0.26( 0.08) 0.29      100.8      41.90
     1      525.10    7.45    4.922  0.26( 0.08) 0.29      100.8      41.90
     1      553.20    8.18    4.665  0.26( 0.08) 0.29      113.8      30.20
     1      601.34    9.76    4.219  0.26( 0.08) 0.29      143.9      55.10
     1      635.95   10.93    3.953  0.26( 0.08) 0.29      166.4      48.60
     1      663.69   11.92    3.762  0.26( 0.08) 0.29      184.9      37.30
     1      666.50   12.02    3.744  0.26( 0.08) 0.29      186.8      56.14
     1      699.81   13.30    3.533  0.26( 0.08) 0.29      210.2      47.36
     1      707.15   13.62    3.484  0.26( 0.08) 0.29      215.8      47.31
     1      714.20   13.94    3.438  0.26( 0.08) 0.29      221.2      37.60
     1      716.38   14.03    3.426  0.26( 0.08) 0.29      222.9      56.11
     1      719.60   14.19    3.404  0.26( 0.08) 0.29      225.5      47.33
     1      726.89   14.55    3.355  0.26( 0.08) 0.29      231.3      41.20
     1      736.71   15.13    3.281  0.26( 0.08) 0.29      240.3      45.00
     1      738.53   15.24    3.267  0.26( 0.08) 0.29      242.1      42.00
     1      757.40   16.51    3.121  0.26( 0.08) 0.29      260.8      38.00
     1      801.57   19.30    2.854  0.26( 0.07) 0.28      300.9       1.00
     1      784.76   20.08    2.790  0.26( 0.07) 0.28      302.5       8.00
     1      761.39   21.14    2.709  0.26( 0.07) 0.28      303.3      51.00
     2       12.80   10.97    3.945  0.26( 0.05) 0.18        3.6      61.30

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1      535.98    7.45    4.922  0.26( 0.08) 0.29      103.2      41.90
     2      535.98    7.45    4.922  0.26( 0.08) 0.29      103.2      41.90
     3      564.52    8.18    4.665  0.26( 0.08) 0.29      116.5      30.20
     4      613.53    9.76    4.219  0.26( 0.08) 0.29      147.1      55.10
     5      648.73   10.93    3.953  0.26( 0.08) 0.29      170.1      48.60
     6      649.92   10.97    3.945  0.26( 0.08) 0.29      170.9      61.30
     7      675.89   11.92    3.762  0.26( 0.08) 0.29      188.6      37.30
     8      678.65   12.02    3.744  0.26( 0.08) 0.29      190.5      56.14
     9      711.26   13.30    3.533  0.26( 0.08) 0.29      213.9      47.36
    10      718.44   13.62    3.484  0.26( 0.08) 0.29      219.5      47.31
    11      725.34   13.94    3.438  0.26( 0.08) 0.29      224.9      37.60
    12      727.48   14.03    3.426  0.26( 0.08) 0.29      226.6      56.11
    13      730.63   14.19    3.404  0.26( 0.08) 0.29      229.2      47.33
    14      737.76   14.55    3.355  0.26( 0.08) 0.29      235.0      41.20
    15      747.34   15.13    3.281  0.26( 0.08) 0.29      244.0      45.00
    16      749.11   15.24    3.267  0.26( 0.08) 0.29      245.7      42.00
    17      767.50   16.51    3.121  0.26( 0.08) 0.29      264.5      38.00
    18      810.79   19.30    2.854  0.26( 0.07) 0.28      304.6       1.00
    19      793.77   20.08    2.790  0.26( 0.07) 0.28      306.2       8.00
    20      770.13   21.14    2.709  0.26( 0.07) 0.28      306.9      51.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     810.79    Tc(MIN.) =    19.30
 EFFECTIVE AREA(ACRES) =     304.59   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      306.9
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     49.00 =   11849.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     49.00 TO NODE     50.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   689.20  DOWNSTREAM(FEET) =   688.90
 FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN 108.0 INCH PIPE IS  82.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.49
 ESTIMATED PIPE DIAMETER(INCH) = 108.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     810.79
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   19.36
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     57.10 TO NODE     57.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    714.00  DOWNSTREAM(FEET) =    711.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.278
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.635
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.42      0.30      0.100    76    8.28
  COMMERCIAL                 D        0.08      0.20      0.100    91    8.28
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.07
  TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      2.07

****************************************************************************
  FLOW PROCESS FROM NODE     57.20 TO NODE     57.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  711.60  DOWNSTREAM ELEVATION(FEET) =  709.00
  STREET LENGTH(FEET) =   130.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.29
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    8.81
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.81
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.81
  STREET FLOW TRAVEL TIME(MIN.) =   0.77   Tc(MIN.) =    9.05
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.405
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.11      0.30      0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.11      SUBAREA RUNOFF(CFS) =     0.43
  EFFECTIVE AREA(ACRES) =      0.61    AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.6        PEAK FLOW RATE(CFS) =       2.40

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   9.01
  FLOW VELOCITY(FEET/SEC.) =  2.84   DEPTH*VELOCITY(FT*FT/SEC.) =   0.82
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     57.00 =     460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.05
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.405
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.29      0.30      0.100    76
  COMMERCIAL                 C        0.02      0.25      0.100    86
  COMMERCIAL                 D        0.34      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.65      SUBAREA RUNOFF(CFS) =     2.56
  EFFECTIVE AREA(ACRES) =      1.26   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =       4.96

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.05
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.405
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.33      0.30      0.200    76
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.56      0.20      0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     0.89      SUBAREA RUNOFF(CFS) =     3.49
  EFFECTIVE AREA(ACRES) =      2.15   AREA-AVERAGED Fm(INCH/HR) =  0.04
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.14
  TOTAL AREA(ACRES) =        2.2       PEAK FLOW RATE(CFS) =       8.45

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.05
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.405
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.34      0.30     0.200    76
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.53      0.20     0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.87      SUBAREA RUNOFF(CFS) =    3.41
  EFFECTIVE AREA(ACRES) =      3.02   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =        3.0       PEAK FLOW RATE(CFS) =      11.87

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     58.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.00  DOWNSTREAM(FEET) =   702.50
  FLOW LENGTH(FEET) =   633.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.00
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.87
  PIPE TRAVEL TIME(MIN.) =   1.51    Tc(MIN.) =   10.55
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     58.00 =    1093.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.55
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.033
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        1.93      0.30     0.200    76
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.46      0.20     0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    2.39      SUBAREA RUNOFF(CFS) =    8.55
  EFFECTIVE AREA(ACRES) =      5.41   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =      19.41

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.55
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.033
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        1.60      0.30     0.200    76
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.76      0.20     0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    2.36      SUBAREA RUNOFF(CFS) =    8.45
  EFFECTIVE AREA(ACRES) =      7.77   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =      27.86

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   702.50  DOWNSTREAM(FEET) =   700.00
  FLOW LENGTH(FEET) =    67.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.75
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.86
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   10.64
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     58.10 =    1160.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     58.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.64
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.015
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        1.94      0.30     0.200    76
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       C        0.82      0.25     0.200    86
```

```
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        4.28      0.20      0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     7.04      SUBAREA RUNOFF(CFS) =   25.14
  EFFECTIVE AREA(ACRES) =     14.81   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       14.8       PEAK FLOW RATE(CFS) =      52.88

****************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     58.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.64
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.015
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       C        3.80      0.25      0.200    86
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        2.64      0.20      0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     6.44      SUBAREA RUNOFF(CFS) =   23.00
  EFFECTIVE AREA(ACRES) =     21.25   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       21.2       PEAK FLOW RATE(CFS) =      75.88

****************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     59.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   700.00  DOWNSTREAM(FEET) =   699.50
  FLOW LENGTH(FEET) =   139.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.39
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      75.88
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =   10.95
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.00 =    1299.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.95
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.949
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.44      0.30      0.100    76
  COMMERCIAL                 D        0.18      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.62      SUBAREA RUNOFF(CFS) =    2.19
  EFFECTIVE AREA(ACRES) =     21.87   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       21.9       PEAK FLOW RATE(CFS) =      76.80

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.50  DOWNSTREAM(FEET) =   699.10
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.54
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      76.80
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.05
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.10 =    1355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     59.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.05
  RAINFALL INTENSITY(INCH/HR) =   3.93
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  0.19
  EFFECTIVE STREAM AREA(ACRES) =      21.87
  TOTAL STREAM AREA(ACRES) =      21.87
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      76.80

****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     50.10 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    83.00
  USER SPECIFIED Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.01      0.30      0.100    76
  COMMERCIAL                 C        0.06      0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.39
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.39

****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     50.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.08      0.30      0.100    76
  COMMERCIAL                 C        0.01      0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.50
  EFFECTIVE AREA(ACRES) =      0.16   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.2       PEAK FLOW RATE(CFS) =       0.89

****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     59.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.00  DOWNSTREAM(FEET) =   699.10
  FLOW LENGTH(FEET) =   481.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.05
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.89
  PIPE TRAVEL TIME(MIN.) =   1.59    Tc(MIN.) =    6.59
  LONGEST FLOWPATH FROM NODE     50.10 TO NODE     59.10 =     564.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     59.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.59
  RAINFALL INTENSITY(INCH/HR) =   5.28
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.28
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.16
  TOTAL STREAM AREA(ACRES) =       0.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.89

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       76.80   11.05    3.929  0.24( 0.05) 0.19      21.9      57.10
      2        0.89    6.59    5.283  0.28( 0.03) 0.10       0.2      50.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       62.67    6.59    5.283  0.24( 0.05) 0.19      13.2      50.10
      2       77.46   11.05    3.929  0.24( 0.05) 0.19      22.0      57.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      77.46    Tc(MIN.) =    11.05
  EFFECTIVE AREA(ACRES) =      22.03   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       22.0
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.10 =    1355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     50.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.10  DOWNSTREAM(FEET) =   688.90
  FLOW LENGTH(FEET) =    28.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  42.37
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      77.46
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.06
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     50.00 =    1383.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       62.67    6.60    5.278  0.24( 0.05) 0.19      13.2      50.10
      2       77.46   11.06    3.926  0.24( 0.05) 0.19      22.0      57.10
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     50.00 =    1383.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      535.98    7.52    4.897  0.26( 0.08) 0.29     103.2      41.90
```

```
    2      535.98    7.52    4.897  0.26( 0.08) 0.29     103.2      41.90
    3      564.52    8.25    4.644  0.26( 0.08) 0.29     116.5      30.20
    4      613.53    9.82    4.203  0.26( 0.08) 0.29     147.1      55.10
    5      648.73   10.99    3.940  0.26( 0.08) 0.29     170.1      48.60
    6      649.92   11.03    3.932  0.26( 0.08) 0.29     170.9      61.30
    7      675.89   11.98    3.751  0.26( 0.08) 0.29     188.6      37.30
    8      678.65   12.08    3.732  0.26( 0.08) 0.29     190.5      56.14
    9      711.26   13.36    3.523  0.26( 0.08) 0.29     213.9      47.36
   10      718.44   13.69    3.475  0.26( 0.08) 0.29     219.5      47.31
   11      725.34   14.00    3.429  0.26( 0.08) 0.29     224.9      37.60
   12      727.48   14.09    3.417  0.26( 0.08) 0.29     226.6      56.11
   13      730.63   14.25    3.395  0.26( 0.08) 0.29     229.2      47.33
   14      737.76   14.61    3.347  0.26( 0.08) 0.29     235.0      41.20
   15      747.34   15.19    3.274  0.26( 0.08) 0.29     244.0      45.00
   16      749.11   15.30    3.259  0.26( 0.08) 0.29     245.7      42.00
   17      767.50   16.57    3.114  0.26( 0.08) 0.29     264.5      38.00
   18      810.79   19.36    2.849  0.26( 0.07) 0.28     304.6       1.00
   19      793.77   20.14    2.785  0.26( 0.07) 0.28     306.2       8.00
   20      770.13   21.20    2.704  0.26( 0.07) 0.28     306.9      51.00
LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
    1      570.11    6.60    5.278  0.26( 0.07) 0.28     103.8      50.10
    2      601.70    7.52    4.897  0.26( 0.07) 0.28     118.3      41.90
    3      601.70    7.52    4.897  0.26( 0.07) 0.28     118.3      41.90
    4      632.66    8.25    4.644  0.26( 0.07) 0.28     132.9      30.20
    5      686.88    9.82    4.203  0.26( 0.07) 0.28     166.7      55.10
    6      725.97   10.99    3.940  0.26( 0.07) 0.28     192.0      48.60
    7      727.30   11.03    3.932  0.26( 0.07) 0.28     192.8      61.30
    8      728.10   11.06    3.926  0.26( 0.07) 0.28     193.4      57.10
    9      749.85   11.98    3.751  0.26( 0.07) 0.28     210.6      37.30
   10      752.23   12.08    3.732  0.26( 0.07) 0.28     212.5      56.14
   11      780.68   13.36    3.523  0.26( 0.07) 0.28     235.9      47.36
   12      786.88   13.69    3.475  0.26( 0.07) 0.28     241.5      47.31
   13      792.89   14.00    3.429  0.26( 0.07) 0.28     246.9      37.60
   14      794.77   14.09    3.417  0.26( 0.07) 0.28     248.6      56.11
   15      797.48   14.25    3.395  0.26( 0.07) 0.28     251.2      47.33
   16      803.65   14.61    3.347  0.26( 0.07) 0.28     257.0      41.20
   17      811.77   15.19    3.274  0.26( 0.07) 0.28     266.0      45.00
   18      813.25   15.30    3.259  0.26( 0.07) 0.28     267.8      42.00
   19      828.74   16.57    3.114  0.26( 0.07) 0.28     286.5      38.00
   20      866.73   19.36    2.849  0.26( 0.07) 0.27     326.6       1.00
   21      848.44   20.14    2.785  0.26( 0.07) 0.28     328.2       8.00
   22      823.20   21.20    2.704  0.26( 0.07) 0.28     329.0      51.00
  TOTAL AREA(ACRES) =       329.0

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      866.73  Tc(MIN.) =   19.359
EFFECTIVE AREA(ACRES) =    326.62  AREA-AVERAGED Fm(INCH/HR) =  0.07
AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.27
TOTAL AREA(ACRES) =      329.0
LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   688.90  DOWNSTREAM(FEET) =   675.00
  FLOW LENGTH(FEET) =   437.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  78.0 INCH PIPE IS  62.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  30.47
  ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     866.73
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   19.60
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     61.00 =   12342.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.60
  RAINFALL INTENSITY(INCH/HR) =   2.83
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.27
  EFFECTIVE STREAM AREA(ACRES) =     326.62
  TOTAL STREAM AREA(ACRES) =     328.96
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     866.73

****************************************************************************
  FLOW PROCESS FROM NODE     48.10 TO NODE     48.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    712.40  DOWNSTREAM(FEET) =    709.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.947
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.172
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.15      0.30      0.400    76    9.95
  RESIDENTIAL
```

Onsite Hydrology Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1 and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61, ***without Detention***

100-Year Storm Proposed Condition

```
  "8-10 DWELLINGS/ACRE"      D        0.34      0.20     0.400    91     9.95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      1.80
  TOTAL AREA(ACRES) =      0.49   PEAK FLOW RATE(CFS) =      1.80

****************************************************************************
  FLOW PROCESS FROM NODE     48.20 TO NODE     48.30 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  709.70  DOWNSTREAM ELEVATION(FEET) =  703.80
  STREET LENGTH(FEET) =   500.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.86
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   12.46
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.56
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.90
  STREET FLOW TRAVEL TIME(MIN.) =   3.25   Tc(MIN.) =   13.20
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.547
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.64      0.25     0.400    86
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.68      0.20     0.400    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.32      SUBAREA RUNOFF(CFS) =    4.11
  EFFECTIVE AREA(ACRES) =      1.81    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        1.8        PEAK FLOW RATE(CFS) =       5.63

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  14.50
  FLOW VELOCITY(FEET/SEC.) =  2.82   DEPTH*VELOCITY(FT*FT/SEC.) =   1.10
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.30 =     830.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.30 TO NODE     48.40 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  703.80  DOWNSTREAM ELEVATION(FEET) =  700.20
  STREET LENGTH(FEET) =   522.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.85
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.45   FLOOD WIDTH(FEET) =   18.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    2.45
    SPLIT DEPTH(FEET) =    0.22   SPLIT FLOOD WIDTH(FEET) =    4.95
    SPLIT FLOW(CFS) =    0.45   SPLIT VELOCITY(FEET/SEC.) =    1.33
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   18.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.45
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.11
  STREET FLOW TRAVEL TIME(MIN.) =   3.54   Tc(MIN.) =   16.75
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.095
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.93      0.25     0.400    86
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.71      0.20     0.400    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.64      SUBAREA RUNOFF(CFS) =    4.43
  EFFECTIVE AREA(ACRES) =      3.45    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        3.4        PEAK FLOW RATE(CFS) =       9.33

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  2.45   DEPTH*VELOCITY(FT*FT/SEC.) =   1.11
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.40 =    1352.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.40 TO NODE     48.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.75
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.095
```

```
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        0.44      0.25      0.400    86
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.46      0.20      0.400    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =     0.90      SUBAREA RUNOFF(CFS) =     2.43
  EFFECTIVE AREA(ACRES) =      4.35   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =         4.3       PEAK FLOW RATE(CFS) =      11.76

****************************************************************************
  FLOW PROCESS FROM NODE     48.40 TO NODE     48.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   700.20  DOWNSTREAM(FEET) =   699.80
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.33
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.76
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   17.00
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.50 =    1432.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.50 TO NODE     48.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.069
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.16      0.30      0.400    76
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        1.49      0.25      0.400    86
  PUBLIC PARK                 C        0.26      0.25      0.850    86
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.88      0.20      0.400    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.442
  SUBAREA AREA(ACRES) =     2.79      SUBAREA RUNOFF(CFS) =     7.44
  EFFECTIVE AREA(ACRES) =      7.14   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =         7.1       PEAK FLOW RATE(CFS) =      19.10

****************************************************************************
  FLOW PROCESS FROM NODE     48.50 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.80  DOWNSTREAM(FEET) =   675.00
  FLOW LENGTH(FEET) =   425.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.11
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.10
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   17.46
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     61.00 =    1857.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.46
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.022
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 B        1.98      0.30      0.850    76
  PUBLIC PARK                 D        1.67      0.20      0.850    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =     3.65      SUBAREA RUNOFF(CFS) =     9.22
  EFFECTIVE AREA(ACRES) =     10.79   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =       10.8       PEAK FLOW RATE(CFS) =      28.02

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   17.46
  RAINFALL INTENSITY(INCH/HR) =   3.02
  AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =      10.79
  TOTAL STREAM AREA(ACRES) =      10.79
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      28.02

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      570.11    6.86    5.162  0.26( 0.07) 0.28     103.8      50.10
      1      601.70    7.78    4.802  0.26( 0.07) 0.28     118.3      41.90
      1      601.70    7.78    4.802  0.26( 0.07) 0.28     118.3      41.90
```

1	632.66	8.51	4.562	0.26(0.07)	0.28	132.9	30.20
1	686.88	10.07	4.142	0.26(0.07)	0.28	166.7	55.10
1	725.97	11.24	3.890	0.26(0.07)	0.28	192.0	48.60
1	727.30	11.28	3.882	0.26(0.07)	0.28	192.8	61.30
1	728.10	11.30	3.877	0.26(0.07)	0.28	193.4	57.10
1	749.85	12.22	3.707	0.26(0.07)	0.28	210.6	37.30
1	752.23	12.33	3.690	0.26(0.07)	0.28	212.5	56.14
1	780.68	13.61	3.487	0.26(0.07)	0.28	235.9	47.36
1	786.88	13.93	3.440	0.26(0.07)	0.28	241.5	47.31
1	792.89	14.25	3.396	0.26(0.07)	0.28	246.9	37.60
1	794.77	14.34	3.383	0.26(0.07)	0.28	248.6	56.11
1	797.48	14.50	3.362	0.26(0.07)	0.28	251.2	47.33
1	803.65	14.85	3.316	0.26(0.07)	0.28	257.0	41.20
1	811.77	15.43	3.244	0.26(0.07)	0.28	266.0	45.00
1	813.25	15.54	3.231	0.26(0.07)	0.28	267.8	42.00
1	828.74	16.81	3.088	0.26(0.07)	0.28	286.5	38.00
1	866.73	19.60	2.829	0.26(0.07)	0.27	326.6	1.00
1	848.44	20.38	2.766	0.26(0.07)	0.28	328.2	8.00
1	823.20	21.44	2.687	0.26(0.07)	0.28	329.0	51.00
2	28.02	17.46	3.022	0.24(0.14)	0.56	10.8	48.10

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	589.28	6.86	5.162	0.26(0.07)	0.29	108.0	50.10
2	621.89	7.78	4.802	0.26(0.07)	0.29	123.1	41.90
3	621.89	7.78	4.802	0.26(0.07)	0.29	123.1	41.90
4	653.60	8.51	4.562	0.26(0.07)	0.29	138.2	30.20
5	709.32	10.07	4.142	0.26(0.07)	0.29	172.9	55.10
6	749.42	11.24	3.890	0.26(0.07)	0.29	198.9	48.60
7	750.78	11.28	3.882	0.26(0.07)	0.29	199.8	61.30
8	751.61	11.30	3.877	0.26(0.07)	0.29	200.4	57.10
9	774.12	12.22	3.707	0.26(0.07)	0.29	218.1	37.30
10	776.58	12.33	3.690	0.26(0.07)	0.29	220.1	56.14
11	806.02	13.61	3.487	0.26(0.08)	0.29	244.3	47.36
12	812.47	13.93	3.440	0.26(0.08)	0.29	250.1	47.31
13	818.70	14.25	3.396	0.26(0.08)	0.29	255.7	37.60
14	820.66	14.34	3.383	0.26(0.08)	0.29	257.5	56.11
15	823.48	14.50	3.362	0.26(0.08)	0.29	260.1	47.33
16	829.90	14.85	3.316	0.26(0.08)	0.29	266.2	41.20
17	838.43	15.43	3.244	0.26(0.08)	0.29	275.5	45.00
18	839.99	15.54	3.231	0.26(0.08)	0.29	277.4	42.00
19	856.34	16.81	3.088	0.26(0.08)	0.29	296.9	38.00
20	865.66	17.46	3.022	0.26(0.07)	0.29	306.7	48.10
21	892.87	19.60	2.829	0.26(0.07)	0.28	337.4	1.00
22	873.97	20.38	2.766	0.26(0.07)	0.28	339.0	8.00
23	847.96	21.44	2.687	0.26(0.07)	0.29	339.8	51.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 892.87 Tc(MIN.) = 19.60
EFFECTIVE AREA(ACRES) = 337.41 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.28

TOTAL AREA(ACRES) = 339.8
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 61.00 = 12342.00 FEET.

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 339.8 TC(MIN.) = 19.60
EFFECTIVE AREA(ACRES) = 337.41 AREA-AVERAGED Fm(INCH/HR)= 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.283
PEAK FLOW RATE(CFS) = 892.87

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	589.28	6.86	5.162	0.26(0.07)	0.29	108.0	50.10
2	621.89	7.78	4.802	0.26(0.07)	0.29	123.1	41.90
3	621.89	7.78	4.802	0.26(0.07)	0.29	123.1	41.90
4	653.60	8.51	4.562	0.26(0.07)	0.29	138.2	30.20
5	709.32	10.07	4.142	0.26(0.07)	0.29	172.9	55.10
6	749.42	11.24	3.890	0.26(0.07)	0.29	198.9	48.60
7	750.78	11.28	3.882	0.26(0.07)	0.29	199.8	61.30
8	751.61	11.30	3.877	0.26(0.07)	0.29	200.4	57.10
9	774.12	12.22	3.707	0.26(0.07)	0.29	218.1	37.30
10	776.58	12.33	3.690	0.26(0.07)	0.29	220.1	56.14
11	806.02	13.61	3.487	0.26(0.08)	0.29	244.3	47.36
12	812.47	13.93	3.440	0.26(0.08)	0.29	250.1	47.31
13	818.70	14.25	3.396	0.26(0.08)	0.29	255.7	37.60
14	820.66	14.34	3.383	0.26(0.08)	0.29	257.5	56.11
15	823.48	14.50	3.362	0.26(0.08)	0.29	260.1	47.33
16	829.90	14.85	3.316	0.26(0.08)	0.29	266.2	41.20
17	838.43	15.43	3.244	0.26(0.08)	0.29	275.5	45.00
18	839.99	15.54	3.231	0.26(0.08)	0.29	277.4	42.00
19	856.34	16.81	3.088	0.26(0.08)	0.29	296.9	38.00
20	865.66	17.46	3.022	0.26(0.07)	0.29	306.7	48.10
21	892.87	19.60	2.829	0.26(0.07)	0.28	337.4	1.00
22	873.97	20.38	2.766	0.26(0.07)	0.28	339.0	8.00
23	847.96	21.44	2.687	0.26(0.07)	0.29	339.8	51.00

END OF RATIONAL METHOD ANALYSIS

Onsite Hydrology Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1 and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61, ***without Detention***

100-Year Storm Proposed Condition

```
************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                     Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                *
* OFFSITE & ONSITE PROP. CONDITION @ 2-YEAR STORM WITH DETENTION NODE 35   *
* W.O. #1443-136X, 3.1% REDUCTION                                      *
 ************************************************************************

  FILE NAME: DET_02.DAT
  TIME/DATE OF STUDY: 10:38 06/10/2019
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   18.0      13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  2   20.0      15.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1099.00  DOWNSTREAM(FEET) =   1091.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.370
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.684
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.78      0.25      0.600    50    8.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      1.08
  TOTAL AREA(ACRES) =      0.78   PEAK FLOW RATE(CFS) =      1.08

************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 1091.20  DOWNSTREAM ELEVATION(FEET) = 1089.40
  STREET LENGTH(FEET) =    90.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.69
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    9.52
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.89
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.87
  STREET FLOW TRAVEL TIME(MIN.) =   0.52   Tc(MIN.) =    8.89
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.627
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.38      0.25      0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    3.22
  EFFECTIVE AREA(ACRES) =      3.16    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.52
```

Onsite Hydrology Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1 and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61, ***with Detention @ Node 35***

3.1% Reduction

2-Year Storm Proposed Condition

```
  TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =       4.25

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.55
  FLOW VELOCITY(FEET/SEC.) =  3.24   DEPTH*VELOCITY(FT*FT/SEC.) =   1.09
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1089.40  DOWNSTREAM ELEVATION(FEET) = 1067.00
  STREET LENGTH(FEET) =   513.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.61
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =   10.13
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.45
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.38
  STREET FLOW TRAVEL TIME(MIN.) =   1.92   Tc(MIN.) =   10.81
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.454
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.34      0.25     0.100    50
  PUBLIC PARK                C        0.25      0.25     0.850    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.418
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    0.72
  EFFECTIVE AREA(ACRES) =      3.75    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =       4.48

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =  10.03
  FLOW VELOCITY(FEET/SEC.) =  4.40   DEPTH*VELOCITY(FT*FT/SEC.) =   1.36
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     903.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.81
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.454
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.35      0.25     0.100    50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.49      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.333
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    1.04
  EFFECTIVE AREA(ACRES) =      4.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =       5.52

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1067.00  DOWNSTREAM(FEET) =  1062.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.46
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.52
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   10.97
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1003.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.97
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.442
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.09      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.09      SUBAREA RUNOFF(CFS) =    2.48
  EFFECTIVE AREA(ACRES) =      6.68   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        6.7        PEAK FLOW RATE(CFS) =       7.94

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1062.00  DOWNSTREAM(FEET) =  1022.40
  FLOW LENGTH(FEET) =   701.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.08
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.94
  PIPE TRAVEL TIME(MIN.) =   0.97    Tc(MIN.) =   11.94
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1704.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.94
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.374
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.18      0.30      0.100    36
  COMMERCIAL                  C        0.46      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.64      SUBAREA RUNOFF(CFS) =     0.78
  EFFECTIVE AREA(ACRES) =      7.32   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        7.3       PEAK FLOW RATE(CFS) =       8.31

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.40  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.10
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.31
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   12.26
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.26
  RAINFALL INTENSITY(INCH/HR) =   1.35
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       7.32
  TOTAL STREAM AREA(ACRES) =       7.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.31

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   305.00
  ELEVATION DATA: UPSTREAM(FEET) =   1046.00  DOWNSTREAM(FEET) =   1042.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.129
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.847
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  C        1.00      0.25      0.100    50    7.13
  RESIDENTIAL
  ".4 DWELLING/ACRE"          C        0.50      0.25      0.900    50   11.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
  SUBAREA RUNOFF(CFS) =      2.37
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      2.37

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1042.00  DOWNSTREAM ELEVATION(FEET) = 1036.00
  STREET LENGTH(FEET) =   373.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.52
```

```
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.29
   HALFSTREET FLOOD WIDTH(FEET) =    9.21
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.57
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.76
 STREET FLOW TRAVEL TIME(MIN.) =   2.42   Tc(MIN.) =    9.55
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.562
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        3.31      0.25     0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    3.31      SUBAREA RUNOFF(CFS) =    4.28
 EFFECTIVE AREA(ACRES) =      4.81    AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =        4.8        PEAK FLOW RATE(CFS) =       6.26

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =  10.64
 FLOW VELOCITY(FEET/SEC.) =  2.77   DEPTH*VELOCITY(FT*FT/SEC.) =   0.88
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     678.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1036.00  DOWNSTREAM ELEVATION(FEET) = 1026.00
 STREET LENGTH(FEET) =   463.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.61
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.32
   HALFSTREET FLOOD WIDTH(FEET) =   10.84
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.25
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.05
 STREET FLOW TRAVEL TIME(MIN.) =   2.37   Tc(MIN.) =   11.92
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.375
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        2.40      0.25     0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    2.70
 EFFECTIVE AREA(ACRES) =      7.21    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =       8.16

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  11.25
 FLOW VELOCITY(FEET/SEC.) =  3.26   DEPTH*VELOCITY(FT*FT/SEC.) =   1.08
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1141.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.92
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.375
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.16      0.30     0.500    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        2.22      0.25     0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    2.67
 EFFECTIVE AREA(ACRES) =      9.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =        9.6        PEAK FLOW RATE(CFS) =      10.83

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1026.00  DOWNSTREAM(FEET) =  1022.00
 FLOW LENGTH(FEET) =   395.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.84
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.83
 PIPE TRAVEL TIME(MIN.) =   0.96    Tc(MIN.) =   12.88
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1536.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
================================================================================
  MAINLINE Tc(MIN.) =   12.88
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.315
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.07      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        4.06      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     4.13      SUBAREA RUNOFF(CFS) =     4.42
  EFFECTIVE AREA(ACRES) =     13.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       13.7       PEAK FLOW RATE(CFS) =      14.73

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.00  DOWNSTREAM(FEET) =  1020.00
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.68
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.73
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   13.13
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.13
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.301
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.55      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        2.06      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     2.61      SUBAREA RUNOFF(CFS) =     2.75
  EFFECTIVE AREA(ACRES) =     16.33   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      17.31

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1020.00  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.10
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.31
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   13.57
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    1799.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.57
  RAINFALL INTENSITY(INCH/HR) =   1.28
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =      16.33
  TOTAL STREAM AREA(ACRES) =      16.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      17.31

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
      1        8.31   12.26    1.353  0.25( 0.11) 0.45       7.3        1.00
      2       17.31   13.57    1.276  0.25( 0.12) 0.49      16.3        8.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
      1       24.98   12.26    1.353  0.25( 0.12) 0.48      22.1        1.00
      2       25.10   13.57    1.276  0.25( 0.12) 0.48      23.6        8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      25.10    Tc(MIN.) =    13.57
  EFFECTIVE AREA(ACRES) =      23.65   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       23.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1019.50  DOWNSTREAM(FEET) =  1014.00
 FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.30
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      25.10
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   13.77
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.10 =    2014.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.77
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.266
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.15      0.30      0.100    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.15      SUBAREA RUNOFF(CFS) =     0.17
 EFFECTIVE AREA(ACRES) =     23.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =       23.8       PEAK FLOW RATE(CFS) =      25.10
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.77
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.266
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.16      0.30      0.100    36
 COMMERCIAL                  C        1.44      0.25      0.100    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     1.79
 EFFECTIVE AREA(ACRES) =     25.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
 TOTAL AREA(ACRES) =       25.4       PEAK FLOW RATE(CFS) =      26.34

****************************************************************************
 FLOW PROCESS FROM NODE      7.10 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1014.00  DOWNSTREAM(FEET) =   971.40
 FLOW LENGTH(FEET) =   863.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.38
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      26.34
 PIPE TRAVEL TIME(MIN.) =   0.93    Tc(MIN.) =   14.70
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    2877.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.70
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.219
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.82      0.30      0.100    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C        0.77      0.25      0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.294
 SUBAREA AREA(ACRES) =     1.59      SUBAREA RUNOFF(CFS) =     1.64
 EFFECTIVE AREA(ACRES) =     26.99   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
 TOTAL AREA(ACRES) =       27.0       PEAK FLOW RATE(CFS) =      26.91

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   971.40  DOWNSTREAM(FEET) =   969.00
 FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.71
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      26.91
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   14.74
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    2917.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.74
```

```
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.217
SUBAREA LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"        B        2.46      0.30      0.500    36
RESIDENTIAL
"5-7 DWELLINGS/ACRE"        C       10.48      0.25      0.500    50
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
SUBAREA AREA(ACRES) =   12.94      SUBAREA RUNOFF(CFS) =   12.66
EFFECTIVE AREA(ACRES) =     39.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
TOTAL AREA(ACRES) =       39.9       PEAK FLOW RATE(CFS) =      39.52

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1       40.28   13.43    1.284  0.25( 0.12) 0.46      38.3       1.00
    2       39.52   14.74    1.217  0.25( 0.12) 0.46      39.9       8.00
NEW PEAK FLOW DATA ARE:
PEAK FLOW RATE(CFS) =      40.28  Tc(MIN.) =   13.43
AREA-AVERAGED Fm(INCH/HR) =  0.12  AREA-AVERAGED Fp(INCH/HR) =  0.25
AREA-AVERAGED Ap =  0.46  EFFECTIVE AREA(ACRES) =      38.35

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   969.00  DOWNSTREAM(FEET) =   954.00
  FLOW LENGTH(FEET) =   416.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.79
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      40.28
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   13.90
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    3333.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.90
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.259
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        0.77      0.25      0.100    50
  PUBLIC PARK                 C        0.43      0.25      0.850    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.369
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    1.26
  EFFECTIVE AREA(ACRES) =     39.55   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       41.1       PEAK FLOW RATE(CFS) =      40.68

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   954.00  DOWNSTREAM(FEET) =   952.80
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.41
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      40.68
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   14.11
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    3453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.11
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.248
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.88      0.30      0.400    36
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        7.02      0.25      0.400    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    7.90      SUBAREA RUNOFF(CFS) =    8.15
  EFFECTIVE AREA(ACRES) =     47.45   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       49.0       PEAK FLOW RATE(CFS) =      48.43

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   952.80  DOWNSTREAM(FEET) =   929.00
  FLOW LENGTH(FEET) =   636.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.05
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      48.43
  PIPE TRAVEL TIME(MIN.) =   0.66    Tc(MIN.) =   14.77
```

```
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.10 =    4089.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     17.10 TO NODE     17.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.77
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.216
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        0.68      0.30      0.500    36
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE"        C        0.89      0.25      0.600    50
 COMMERCIAL                  C        1.86      0.25      0.100    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.309
 SUBAREA AREA(ACRES) =    3.43      SUBAREA RUNOFF(CFS) =    3.50
 EFFECTIVE AREA(ACRES) =     50.88   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.44
 TOTAL AREA(ACRES) =       52.5       PEAK FLOW RATE(CFS) =      50.55

****************************************************************************
 FLOW PROCESS FROM NODE     17.10 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   929.00  DOWNSTREAM(FEET) =   926.30
 FLOW LENGTH(FEET) =   122.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.29
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      50.55
 PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   14.92
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     18.00 =    4211.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.92
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.209
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS                B       24.46      0.30      0.350    36
 CONDOMINIUMS                C        7.92      0.25      0.350    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA AREA(ACRES) =   32.38      SUBAREA RUNOFF(CFS) =   32.28
 EFFECTIVE AREA(ACRES) =     83.26   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =       84.8       PEAK FLOW RATE(CFS) =      82.51

****************************************************************************
 FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   926.30  DOWNSTREAM(FEET) =   922.70
 FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.62
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      82.51
 PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   15.12
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     19.00 =    4384.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.12
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.199
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        1.62      0.30      0.400    36
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       C        6.09      0.25      0.400    50
 COMMERCIAL                  B        2.90      0.30      0.100    36
 COMMERCIAL                  C        3.15      0.25      0.100    50
 NATURAL POOR COVER
 "GRASS"                     B        0.76      0.30      1.000    61
 NATURAL POOR COVER
 "GRASS"                     C        0.39      0.25      1.000    72
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
 SUBAREA AREA(ACRES) =   14.91      SUBAREA RUNOFF(CFS) =   14.93
 EFFECTIVE AREA(ACRES) =     98.17   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.39
 TOTAL AREA(ACRES) =       99.8       PEAK FLOW RATE(CFS) =      96.76

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   922.70  DOWNSTREAM(FEET) =   815.60
 FLOW LENGTH(FEET) =  1580.00   MANNING'S N =  0.013
```

```
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  23.49
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      96.76
 PIPE TRAVEL TIME(MIN.) =   1.12    Tc(MIN.) =   16.24
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     20.00 =    5964.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.24
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.151
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B       19.45      0.30     0.100    36
 COMMERCIAL                 C       16.92      0.25     0.100    50
 COMMERCIAL                 D        0.11      0.20     0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =   36.48      SUBAREA RUNOFF(CFS) =   36.89
 EFFECTIVE AREA(ACRES) =    134.65   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =      136.2       PEAK FLOW RATE(CFS) =     129.38

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   815.60  DOWNSTREAM(FEET) =   799.50
 FLOW LENGTH(FEET) =   449.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.15
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     129.38
 PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   16.61
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6413.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.61
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.136
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        2.38      0.30     0.100    36
 COMMERCIAL                 C        0.87      0.25     0.100    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    3.24
 EFFECTIVE AREA(ACRES) =    137.90   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =      139.5       PEAK FLOW RATE(CFS) =     130.82

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.61
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.136
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        4.10      0.30     0.100    36
 COMMERCIAL                 C        1.54      0.25     0.100    50
 COMMERCIAL                 D        2.08      0.20     0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    7.72      SUBAREA RUNOFF(CFS) =    7.71
 EFFECTIVE AREA(ACRES) =    145.62   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.30
 TOTAL AREA(ACRES) =      147.2       PEAK FLOW RATE(CFS) =     138.54

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   799.50  DOWNSTREAM(FEET) =   765.50
 FLOW LENGTH(FEET) =  1056.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.31
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     138.54
 PIPE TRAVEL TIME(MIN.) =   0.91    Tc(MIN.) =   17.52
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     22.00 =    7469.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.52
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.102
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        2.06      0.30     0.100    36
 COMMERCIAL                 C        1.74      0.25     0.100    50
```

```
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     3.80      SUBAREA RUNOFF(CFS) =     3.67
 EFFECTIVE AREA(ACRES) =    149.42   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
 TOTAL AREA(ACRES) =      151.0       PEAK FLOW RATE(CFS) =     138.54
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.52
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.102
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.23      0.30      0.100    36
 COMMERCIAL                 D        5.07      0.20      0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     5.30      SUBAREA RUNOFF(CFS) =     5.16
 EFFECTIVE AREA(ACRES) =    154.72   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      156.3       PEAK FLOW RATE(CFS) =     142.87

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   765.50  DOWNSTREAM(FEET) =   755.00
 FLOW LENGTH(FEET) =   465.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  34.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.99
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     142.87
 PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   17.98
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     23.00 =    7934.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.98
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.086
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        9.15      0.30      0.100    36
 COMMERCIAL                 C       10.79      0.25      0.100    50
 COMMERCIAL                 D        1.81      0.20      0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    21.75      SUBAREA RUNOFF(CFS) =    20.73
 EFFECTIVE AREA(ACRES) =    176.47   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.26
 TOTAL AREA(ACRES) =      178.1       PEAK FLOW RATE(CFS) =     161.36

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.98
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.086
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        7.47      0.30      0.100    36
 COMMERCIAL                 C        0.40      0.25      0.100    50
 COMMERCIAL                 D       17.76      0.20      0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =   25.63      SUBAREA RUNOFF(CFS) =   24.52
 EFFECTIVE AREA(ACRES) =    202.10   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.24
 TOTAL AREA(ACRES) =      203.7       PEAK FLOW RATE(CFS) =     185.88

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   755.00  DOWNSTREAM(FEET) =   736.00
 FLOW LENGTH(FEET) =  1257.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  39.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.79
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     185.88
 PIPE TRAVEL TIME(MIN.) =   1.33    Tc(MIN.) =   19.31
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.00 =    9191.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.31
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.042
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B       16.13      0.30      0.100    36
```

```
  COMMERCIAL                C        3.87      0.25      0.100    50
  COMMERCIAL                D        4.22      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   24.22      SUBAREA RUNOFF(CFS) =   22.12
  EFFECTIVE AREA(ACRES) =    226.32   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      227.9       PEAK FLOW RATE(CFS) =     200.10

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     30.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   736.00  DOWNSTREAM(FEET) =   720.00
  FLOW LENGTH(FEET) =   212.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  29.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.46
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     200.10
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   19.43
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.10 =    9403.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.10 TO NODE     30.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   720.00  DOWNSTREAM(FEET) =   716.00
  FLOW LENGTH(FEET) =   156.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.69
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     200.10
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   19.56
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    9559.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.56
  RAINFALL INTENSITY(INCH/HR) =   1.03
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.23
  EFFECTIVE STREAM AREA(ACRES) =     226.32
  TOTAL STREAM AREA(ACRES) =     227.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     200.10

****************************************************************************
  FLOW PROCESS FROM NODE     30.20 TO NODE     30.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    740.00  DOWNSTREAM(FEET) =    726.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.494
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.144
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.42      0.30      0.100    36    5.49
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.42   PEAK FLOW RATE(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.49
  RAINFALL INTENSITY(INCH/HR) =   2.14
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.42
  TOTAL STREAM AREA(ACRES) =       0.42
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.80

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      200.10   19.56    1.035  0.27( 0.06) 0.23     226.3       1.00
      1      193.37   20.89    0.996  0.27( 0.06) 0.23     227.9       8.00
      2        0.80    5.49    2.144  0.30( 0.03) 0.10       0.4      30.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      121.02    5.49    2.144  0.27( 0.06) 0.23      64.0      30.20
      2      200.48   19.56    1.035  0.27( 0.06) 0.23     226.7       1.00
```

```
     3      193.74   20.89    0.996  0.27( 0.06) 0.23     228.3       8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     200.48    Tc(MIN.) =    19.56
  EFFECTIVE AREA(ACRES) =     226.74   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      228.3
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    9559.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     33.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   716.00  DOWNSTREAM(FEET) =   714.30
  FLOW LENGTH(FEET) =   210.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  44.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.82
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     200.48
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   19.83
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     33.00 =    9769.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.83
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.027
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.35      0.30      0.100    36
  COMMERCIAL                 B        0.62      0.30      0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.97      SUBAREA RUNOFF(CFS) =     0.87
  EFFECTIVE AREA(ACRES) =    227.71   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      229.3       PEAK FLOW RATE(CFS) =     200.48
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.30  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =   420.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  42.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.24
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     200.48
  PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =   20.32
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     38.00 TO NODE     39.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    730.50  DOWNSTREAM(FEET) =    726.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.427
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.573
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.80      0.30      0.500    36    9.43
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.42      0.20      0.500    57    9.43
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.58
  TOTAL AREA(ACRES) =      1.22   PEAK FLOW RATE(CFS) =      1.58

****************************************************************************
  FLOW PROCESS FROM NODE     39.00 TO NODE     40.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  726.20  DOWNSTREAM ELEVATION(FEET) =  719.50
  STREET LENGTH(FEET) =   711.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200
```

```
   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.74
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.33
   HALFSTREET FLOOD WIDTH(FEET) =   11.25
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.19
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.72
 STREET FLOW TRAVEL TIME(MIN.) =   5.41   Tc(MIN.) =   14.84
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.212
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        2.40      0.30     0.500    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    2.29
 EFFECTIVE AREA(ACRES) =      3.62    AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =       3.48

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  12.46
 FLOW VELOCITY(FEET/SEC.) =  2.31   DEPTH*VELOCITY(FT*FT/SEC.) =   0.81
 LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.00 =    1041.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.84
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.212
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.93      0.30     0.500    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.93      SUBAREA RUNOFF(CFS) =    0.89
 EFFECTIVE AREA(ACRES) =      4.55   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        4.6       PEAK FLOW RATE(CFS) =       4.37

****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE     40.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   719.50  DOWNSTREAM(FEET) =   718.40
 FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.03
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.37
 PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   14.97
 LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.10 =    1096.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     40.10 TO NODE     40.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.97
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.206
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.19      0.30     0.500    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.18
 EFFECTIVE AREA(ACRES) =      4.74   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        4.7       PEAK FLOW RATE(CFS) =       4.52

****************************************************************************
 FLOW PROCESS FROM NODE     40.10 TO NODE     40.20 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   718.40  DOWNSTREAM(FEET) =   717.00
 FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.75
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.52
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   15.09
 LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.20 =    1151.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     40.20 TO NODE     40.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.09
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.201
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.22      0.30     0.850    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.45      0.30     0.500    36
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.615
  SUBAREA AREA(ACRES) =     0.67      SUBAREA RUNOFF(CFS) =     0.61
  EFFECTIVE AREA(ACRES) =      5.41   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =       5.11

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     40.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.09
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.201
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.34      0.30     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     0.34      SUBAREA RUNOFF(CFS) =     0.32
  EFFECTIVE AREA(ACRES) =      5.75   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =       5.44

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     41.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   717.00  DOWNSTREAM(FEET) =   713.40
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.79
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.44
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   15.31
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.00 =    1266.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.31
  RAINFALL INTENSITY(INCH/HR) =   1.19
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.51
  EFFECTIVE STREAM AREA(ACRES) =       5.75
  TOTAL STREAM AREA(ACRES) =       5.75
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.44

****************************************************************************
  FLOW PROCESS FROM NODE     41.20 TO NODE     41.30 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    728.20  DOWNSTREAM(FEET) =    723.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.184
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.597
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.02      0.30     0.500    36    9.18
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.61      0.20     0.500    57    9.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.85
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      0.85

****************************************************************************
  FLOW PROCESS FROM NODE     41.30 TO NODE     41.40 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  723.30  DOWNSTREAM ELEVATION(FEET) =  718.00
  STREET LENGTH(FEET) =   323.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.33
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    7.18
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.29
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.59
  STREET FLOW TRAVEL TIME(MIN.) =   2.36   Tc(MIN.) =   11.54
```

```
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.401
SUBAREA LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"8-10 DWELLINGS/ACRE"       B        0.72      0.30     0.400    36
RESIDENTIAL
"8-10 DWELLINGS/ACRE"       D        0.11      0.20     0.400    57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
SUBAREA AREA(ACRES) =    0.83      SUBAREA RUNOFF(CFS) =    0.96
EFFECTIVE AREA(ACRES) =      1.46    AREA-AVERAGED Fm(INCH/HR) =  0.11
AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       1.70

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   8.10
FLOW VELOCITY(FEET/SEC.) =  2.40   DEPTH*VELOCITY(FT*FT/SEC.) =   0.66
LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.40 =     653.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     41.40 TO NODE     41.40 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   11.54
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.401
SUBAREA LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"8-10 DWELLINGS/ACRE"       B        1.24      0.30     0.400    36
RESIDENTIAL
"8-10 DWELLINGS/ACRE"       D        0.03      0.20     0.400    57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
SUBAREA AREA(ACRES) =    1.27      SUBAREA RUNOFF(CFS) =    1.46
EFFECTIVE AREA(ACRES) =      2.73   AREA-AVERAGED Fm(INCH/HR) =  0.11
AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.42
TOTAL AREA(ACRES) =        2.7        PEAK FLOW RATE(CFS) =       3.16

****************************************************************************
FLOW PROCESS FROM NODE     41.40 TO NODE     41.50 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   718.00  DOWNSTREAM(FEET) =   717.00
FLOW LENGTH(FEET) =    62.00   MANNING'S N =  0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   5.96
ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       3.16
PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   11.71
LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.50 =     715.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     41.50 TO NODE     41.50 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   11.71
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.389
SUBAREA LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  B        0.09      0.30     0.100    36
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.11
EFFECTIVE AREA(ACRES) =      2.82   AREA-AVERAGED Fm(INCH/HR) =  0.11
AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.41
TOTAL AREA(ACRES) =        2.8        PEAK FLOW RATE(CFS) =       3.24

****************************************************************************
FLOW PROCESS FROM NODE     41.50 TO NODE     41.51 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   717.00  DOWNSTREAM(FEET) =   715.50
FLOW LENGTH(FEET) =   154.00   MANNING'S N =  0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   4.99
ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       3.24
PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   12.23
LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.51 =     869.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     41.51 TO NODE     41.51 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   12.23
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.355
SUBAREA LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"        B        1.44      0.30     0.500    36
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
SUBAREA AREA(ACRES) =    1.44      SUBAREA RUNOFF(CFS) =    1.56
EFFECTIVE AREA(ACRES) =      4.26   AREA-AVERAGED Fm(INCH/HR) =  0.12
AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.44
```

```
 TOTAL AREA(ACRES) =        4.3       PEAK FLOW RATE(CFS) =       4.72

****************************************************************************
 FLOW PROCESS FROM NODE     41.51 TO NODE     41.60 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   715.50  DOWNSTREAM(FEET) =   714.90
 FLOW LENGTH(FEET) =    59.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.60
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.72
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   12.40
 LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.60 =     928.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     41.60 TO NODE     41.60 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.40
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.344
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        1.06      0.30      0.500    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =     1.06      SUBAREA RUNOFF(CFS) =     1.14
 EFFECTIVE AREA(ACRES) =      5.32   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.45
 TOTAL AREA(ACRES) =        5.3       PEAK FLOW RATE(CFS) =       5.82

****************************************************************************
 FLOW PROCESS FROM NODE     41.60 TO NODE     41.60 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.40
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.344
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        0.47      0.30      0.400    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.47      SUBAREA RUNOFF(CFS) =     0.52
 EFFECTIVE AREA(ACRES) =      5.79   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.45
 TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =       6.33

****************************************************************************
 FLOW PROCESS FROM NODE     41.60 TO NODE     41.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   714.90  DOWNSTREAM(FEET) =   713.40
 FLOW LENGTH(FEET) =   148.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.01
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.33
 PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   12.81
 LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.00 =    1076.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   12.81
 RAINFALL INTENSITY(INCH/HR) =   1.32
 AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.29
 AREA-AVERAGED Ap =  0.45
 EFFECTIVE STREAM AREA(ACRES) =       5.79
 TOTAL STREAM AREA(ACRES) =       5.79
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.33

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        5.44   15.31    1.191  0.29( 0.15) 0.51       5.8      38.00
     2        6.33   12.81    1.319  0.29( 0.13) 0.45       5.8      41.20

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       11.44   12.81    1.319  0.29( 0.14) 0.48      10.6      41.20
     2       11.09   15.31    1.191  0.29( 0.14) 0.48      11.5      38.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      11.44    Tc(MIN.) =    12.81
 EFFECTIVE AREA(ACRES) =      10.60   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =       11.5
```

```
 LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.00 =    1266.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     41.00 TO NODE     41.80 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   713.40  DOWNSTREAM(FEET) =   712.60
 FLOW LENGTH(FEET) =    83.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.78
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.44
 PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   13.02
 LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.80 =    1349.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     41.80 TO NODE     41.80 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.02
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.307
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.27      0.30     0.500    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.13      0.20     0.500    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    0.42
 EFFECTIVE AREA(ACRES) =    11.00   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =      11.9       PEAK FLOW RATE(CFS) =      11.57

****************************************************************************
 FLOW PROCESS FROM NODE     41.80 TO NODE     41.80 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.02
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.307
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.21      0.30     0.500    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.01      0.20     0.500    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.22      SUBAREA RUNOFF(CFS) =    0.23
 EFFECTIVE AREA(ACRES) =    11.22   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =      12.2       PEAK FLOW RATE(CFS) =      11.80

****************************************************************************
 FLOW PROCESS FROM NODE     41.80 TO NODE     41.90 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   712.60  DOWNSTREAM(FEET) =   711.80
 FLOW LENGTH(FEET) =    77.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.03
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.80
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   13.20
 LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.90 =    1426.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   13.20
 RAINFALL INTENSITY(INCH/HR) =   1.30
 AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.29
 AREA-AVERAGED Ap =  0.48
 EFFECTIVE STREAM AREA(ACRES) =      11.22
 TOTAL STREAM AREA(ACRES) =      12.16
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      11.80

****************************************************************************
 FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =  22
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    77.00
 USER SPECIFIED Tc(MIN.) =    5.000
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.06      0.20     0.500    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA RUNOFF(CFS) =      0.12
 TOTAL AREA(ACRES) =      0.06   PEAK FLOW RATE(CFS) =      0.12
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.00
  RAINFALL INTENSITY(INCH/HR) =   2.26
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.06
  TOTAL STREAM AREA(ACRES) =       0.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.12

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  7700.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.06      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.12
  TOTAL AREA(ACRES) =      0.06   PEAK FLOW RATE(CFS) =      0.12

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.00
  RAINFALL INTENSITY(INCH/HR) =   2.26
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.06
  TOTAL STREAM AREA(ACRES) =       0.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.12

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1       11.80   13.20    1.297  0.29( 0.14) 0.48       11.2       41.20
      1       11.41   15.70    1.174  0.29( 0.14) 0.48       12.2       38.00
      2        0.12    5.00    2.264  0.20( 0.10) 0.50        0.1       41.90
      3        0.12    5.00    2.264  0.20( 0.10) 0.50        0.1       41.90

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1        8.44    5.00    2.264  0.29( 0.14) 0.48        4.4       41.90
      2        8.44    5.00    2.264  0.29( 0.14) 0.48        4.4       41.90
      3       11.93   13.20    1.297  0.29( 0.14) 0.48       11.3       41.20
      4       11.52   15.70    1.174  0.29( 0.14) 0.48       12.3       38.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      11.93    Tc(MIN.) =    13.20
  EFFECTIVE AREA(ACRES) =      11.34   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =      12.3
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     41.90 =    7700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     46.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   711.80  DOWNSTREAM(FEET) =   710.50
  FLOW LENGTH(FEET) =   132.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.89
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.93
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   13.52
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     46.00 =    7832.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     46.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.52
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.279
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.21      0.30     0.100    36
  COMMERCIAL                  D        0.29      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
  SUBAREA AREA(ACRES) =     0.50      SUBAREA RUNOFF(CFS) =     0.56
  EFFECTIVE AREA(ACRES) =     11.84   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       12.8       PEAK FLOW RATE(CFS) =      12.21

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.50  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =    68.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.05
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.21
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   13.68
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     34.00 =    7900.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        8.99    5.53    2.138  0.29( 0.13) 0.44       4.9      41.90
      2        8.99    5.53    2.138  0.29( 0.13) 0.44       4.9      41.90
      3       12.21   13.68    1.270  0.29( 0.13) 0.46      11.8      41.20
      4       11.80   16.18    1.154  0.29( 0.13) 0.47      12.8      38.00
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     34.00 =    7900.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      121.02    6.36    1.971  0.27( 0.06) 0.22      65.0      30.20
      2      200.48   20.32    1.012  0.27( 0.06) 0.23     227.7       1.00
      3      193.74   21.66    0.976  0.27( 0.06) 0.23     229.3       8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      123.22    5.53    2.138  0.27( 0.06) 0.24      61.3      41.90
      2      123.22    5.53    2.138  0.27( 0.06) 0.24      61.3      41.90
      3      130.35    6.36    1.971  0.27( 0.06) 0.24      70.6      30.20
      4      174.88   13.68    1.270  0.27( 0.07) 0.24     162.1      41.20
      5      188.70   16.18    1.154  0.27( 0.06) 0.24     192.2      38.00
      6      210.64   20.32    1.012  0.27( 0.06) 0.24     240.5       1.00
      7      203.48   21.66    0.976  0.27( 0.06) 0.24     242.1       8.00
    TOTAL AREA(ACRES) =       242.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      210.64  Tc(MIN.) =   20.322
  EFFECTIVE AREA(ACRES) =    240.49  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      242.1
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     56.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   703.70
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.01
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     210.64
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   20.40
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.40
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.010
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.23      0.30      0.100    36
  COMMERCIAL                  D        0.51      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.74      SUBAREA RUNOFF(CFS) =     0.66
  EFFECTIVE AREA(ACRES) =    241.23   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      242.8       PEAK FLOW RATE(CFS) =     210.64
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================
```

```
******************************************************************************
  FLOW PROCESS FROM NODE     32.20 TO NODE     32.10 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    745.00  DOWNSTREAM(FEET) =    742.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.917
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.739
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.11      0.30      0.100    36    7.92
  COMMERCIAL                 C        0.26      0.25      0.100    50    7.92
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.57
  TOTAL AREA(ACRES) =      0.37   PEAK FLOW RATE(CFS) =      0.57

******************************************************************************
  FLOW PROCESS FROM NODE     32.10 TO NODE     32.00 IS CODE =  62
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =  742.00  DOWNSTREAM ELEVATION(FEET) =  740.00
  STREET LENGTH(FEET) =    96.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.66
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.21
    HALFSTREET FLOOD WIDTH(FEET) =    4.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.30
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.48
  STREET FLOW TRAVEL TIME(MIN.) =   0.70   Tc(MIN.) =    8.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.657
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.06      0.30      0.100    36
  COMMERCIAL                 C        0.06      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.12      SUBAREA RUNOFF(CFS) =    0.18
  EFFECTIVE AREA(ACRES) =      0.49    AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       0.72

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.21   HALFSTREET FLOOD WIDTH(FEET) =   4.62
  FLOW VELOCITY(FEET/SEC.) =  2.30   DEPTH*VELOCITY(FT*FT/SEC.) =   0.49
  LONGEST FLOWPATH FROM NODE     32.20 TO NODE     32.00 =     426.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    724.60  DOWNSTREAM(FEET) =    723.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.167
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.359
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  SCHOOL                     B        0.33      0.30      0.600    36   12.17
  SCHOOL                     C        0.85      0.25      0.600    50   12.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      1.27
  TOTAL AREA(ACRES) =      1.18   PEAK FLOW RATE(CFS) =      1.27

******************************************************************************
  FLOW PROCESS FROM NODE     52.00 TO NODE     53.00 IS CODE =  62
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =  723.00  DOWNSTREAM ELEVATION(FEET) =  719.00
  STREET LENGTH(FEET) =   412.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200
```

```
   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.77
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.33
   HALFSTREET FLOOD WIDTH(FEET) =   11.25
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.22
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.73
 STREET FLOW TRAVEL TIME(MIN.) =   3.10   Tc(MIN.) =   15.26
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.193
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 SCHOOL                     B        2.48      0.30     0.600    36
 SCHOOL                     C        0.77      0.25     0.600    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    2.98
 EFFECTIVE AREA(ACRES) =      4.43    AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.60
 TOTAL AREA(ACRES) =        4.4        PEAK FLOW RATE(CFS) =       4.08

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  13.28
 FLOW VELOCITY(FEET/SEC.) =  2.41   DEPTH*VELOCITY(FT*FT/SEC.) =   0.88
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     53.00 =     742.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     53.00 TO NODE     54.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  719.00  DOWNSTREAM ELEVATION(FEET) =  712.50
 STREET LENGTH(FEET) =   633.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.02
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.38
   HALFSTREET FLOOD WIDTH(FEET) =   14.29
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.58
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.99
 STREET FLOW TRAVEL TIME(MIN.) =   4.09   Tc(MIN.) =   19.35
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.041
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 SCHOOL                     B        2.42      0.30     0.600    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA AREA(ACRES) =    2.42      SUBAREA RUNOFF(CFS) =    1.88
 EFFECTIVE AREA(ACRES) =      6.85    AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.60
 TOTAL AREA(ACRES) =        6.9        PEAK FLOW RATE(CFS) =       5.35

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  14.60
 FLOW VELOCITY(FEET/SEC.) =  2.65   DEPTH*VELOCITY(FT*FT/SEC.) =   1.03
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     54.00 =    1375.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.35
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.041
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.32      0.30     0.100    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.32      SUBAREA RUNOFF(CFS) =    0.29
 EFFECTIVE AREA(ACRES) =      7.17   AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.58
 TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =       5.64

****************************************************************************
 FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.35
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.041
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 SCHOOL                     B        2.40      0.30     0.600    36
 SCHOOL                     C        0.07      0.25     0.600    50
 SCHOOL                     D        2.82      0.20     0.600    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA AREA(ACRES) =    5.29      SUBAREA RUNOFF(CFS) =    4.25
 EFFECTIVE AREA(ACRES) =     12.46   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.59
 TOTAL AREA(ACRES) =       12.5       PEAK FLOW RATE(CFS) =       9.90

****************************************************************************
 FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
```

```
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   19.35
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.041
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.78      0.30      0.100    36
  COMMERCIAL                  C        0.03      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.81      SUBAREA RUNOFF(CFS) =    0.74
  EFFECTIVE AREA(ACRES) =     13.27   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =       13.3       PEAK FLOW RATE(CFS) =      10.63

********************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.50  DOWNSTREAM(FEET) =   712.30
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.44
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.63
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   19.45
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     55.00 =    1409.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.45
  RAINFALL INTENSITY(INCH/HR) =   1.04
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =      13.27
  TOTAL STREAM AREA(ACRES) =      13.27
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.63

********************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.10 IS CODE =  22
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    34.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.13      0.30      0.100    36
  COMMERCIAL                  D        0.14      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.54
  TOTAL AREA(ACRES) =      0.27   PEAK FLOW RATE(CFS) =      0.54

********************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.10 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =    5.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.24      0.30      0.100    36
  COMMERCIAL                  D        0.01      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    0.50
  EFFECTIVE AREA(ACRES) =      0.52   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.5       PEAK FLOW RATE(CFS) =       1.05

********************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.00  DOWNSTREAM(FEET) =   712.30
  FLOW LENGTH(FEET) =   275.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.24
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.05
  PIPE TRAVEL TIME(MIN.) =   2.04    Tc(MIN.) =    7.04
  LONGEST FLOWPATH FROM NODE     55.10 TO NODE     55.00 =     309.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
```

```
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.04
 RAINFALL INTENSITY(INCH/HR) =   1.86
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.27
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.52
 TOTAL STREAM AREA(ACRES) =       0.52
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.05

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       10.63   19.45    1.038  0.27( 0.15) 0.56      13.3      51.00
     2        1.05    7.04    1.860  0.27( 0.03) 0.10       0.5      55.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        8.46    7.04    1.860  0.27( 0.14) 0.51       5.3      55.10
     2       11.21   19.45    1.038  0.27( 0.15) 0.54      13.8      51.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      11.21    Tc(MIN.) =    19.45
 EFFECTIVE AREA(ACRES) =      13.79   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.54
 TOTAL AREA(ACRES) =       13.8
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     55.00 =    1409.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     55.00 TO NODE     56.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   712.30  DOWNSTREAM(FEET) =   711.00
 FLOW LENGTH(FEET) =   165.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.21
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.21
 PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   19.90
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.00 =    1574.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.00 TO NODE     56.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.90
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.025
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.49      0.30      0.100    36
 COMMERCIAL                  D        0.04      0.20      0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.53      SUBAREA RUNOFF(CFS) =    0.47
 EFFECTIVE AREA(ACRES) =     14.32   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =       14.3       PEAK FLOW RATE(CFS) =      11.38

****************************************************************************
 FLOW PROCESS FROM NODE     56.00 TO NODE     56.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   711.00  DOWNSTREAM(FEET) =   710.10
 FLOW LENGTH(FEET) =   172.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.40
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.38
 PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   20.43
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     56.11 TO NODE     56.12 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    720.80  DOWNSTREAM(FEET) =    717.80

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.438
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.676
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        B        0.91      0.30      0.200    36    8.44
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA RUNOFF(CFS) =      1.32
```

```
  TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      1.32

****************************************************************************
  FLOW PROCESS FROM NODE     56.12 TO NODE     56.13 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  717.80  DOWNSTREAM ELEVATION(FEET) =  713.60
  STREET LENGTH(FEET) =   486.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.30
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =   10.64
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.03
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.65
  STREET FLOW TRAVEL TIME(MIN.) =   3.99   Tc(MIN.) =   12.43
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.342
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        1.68      0.30     0.200    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     1.68      SUBAREA RUNOFF(CFS) =     1.94
  EFFECTIVE AREA(ACRES) =      2.59    AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        2.6        PEAK FLOW RATE(CFS) =       2.99

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.96
  FLOW VELOCITY(FEET/SEC.) =  2.14   DEPTH*VELOCITY(FT*FT/SEC.) =   0.73
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.13 =     816.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.43
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.342
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        2.11      0.30     0.200    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     2.11      SUBAREA RUNOFF(CFS) =     2.44
  EFFECTIVE AREA(ACRES) =      4.70   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        4.7       PEAK FLOW RATE(CFS) =       5.42

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.43
  RAINFALL INTENSITY(INCH/HR) =   1.34
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =       4.70
  TOTAL STREAM AREA(ACRES) =       4.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.42

****************************************************************************
  FLOW PROCESS FROM NODE     56.14 TO NODE     56.15 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    719.20  DOWNSTREAM(FEET) =    715.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.182
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.706
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.84      0.30     0.200    36    8.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      1.24
  TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      1.24

****************************************************************************
  FLOW PROCESS FROM NODE     56.15 TO NODE     56.13 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
```

```
==========================================================================
  UPSTREAM ELEVATION(FEET) =  715.70  DOWNSTREAM ELEVATION(FEET) =  713.60
  STREET LENGTH(FEET) =   200.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.60
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    8.71
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.01
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.57
  STREET FLOW TRAVEL TIME(MIN.) =   1.66   Tc(MIN.) =    9.84
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.535
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.54      0.30     0.200    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.54      SUBAREA RUNOFF(CFS) =    0.72
  EFFECTIVE AREA(ACRES) =      1.38    AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       1.83

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   9.21
  FLOW VELOCITY(FEET/SEC.) =  2.08   DEPTH*VELOCITY(FT*FT/SEC.) =   0.61
  LONGEST FLOWPATH FROM NODE     56.14 TO NODE     56.13 =     530.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.84
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.535
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.70      0.30     0.200    36
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.52      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    1.22      SUBAREA RUNOFF(CFS) =    1.63
  EFFECTIVE AREA(ACRES) =      2.60   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        2.6        PEAK FLOW RATE(CFS) =       3.46

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.84
  RAINFALL INTENSITY(INCH/HR) =   1.53
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.28
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =       2.60
  TOTAL STREAM AREA(ACRES) =       2.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.46

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        5.42   12.43    1.342  0.30( 0.06) 0.20       4.7      56.11
      2        3.46    9.84    1.535  0.28( 0.06) 0.20       2.6      56.14

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        8.40    9.84    1.535  0.29( 0.06) 0.20       6.3      56.14
      2        8.43   12.43    1.342  0.29( 0.06) 0.20       7.3      56.11

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       8.43    Tc(MIN.) =    12.43
  EFFECTIVE AREA(ACRES) =       7.30   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        7.3
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.13 =     816.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.16 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.60  DOWNSTREAM(FEET) =   712.50
  FLOW LENGTH(FEET) =    94.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.0 INCHES
```

```
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.75
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.43
 PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   12.66
 LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.16 =     910.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.16 TO NODE     56.16 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.66
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.328
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        B        0.46      0.30      0.200    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =     0.46      SUBAREA RUNOFF(CFS) =     0.53
 EFFECTIVE AREA(ACRES) =      7.76   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =       8.87

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1        8.89   10.07    1.514  0.29( 0.06) 0.20       6.8       56.14
     2        8.87   12.66    1.328  0.29( 0.06) 0.20       7.8       56.11
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =       8.89  Tc(MIN.) =   10.07
 AREA-AVERAGED Fm(INCH/HR) =  0.06  AREA-AVERAGED Fp(INCH/HR) =  0.29
 AREA-AVERAGED Ap =  0.20  EFFECTIVE AREA(ACRES) =       6.78

****************************************************************************
 FLOW PROCESS FROM NODE     56.16 TO NODE     56.16 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.07
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.514
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        B        0.05      0.30      0.200    36
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        D        0.41      0.20      0.200    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =     0.46      SUBAREA RUNOFF(CFS) =     0.61
 EFFECTIVE AREA(ACRES) =      7.24   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        8.2       PEAK FLOW RATE(CFS) =       9.50

****************************************************************************
 FLOW PROCESS FROM NODE     56.16 TO NODE     56.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   712.50  DOWNSTREAM(FEET) =   710.10
 FLOW LENGTH(FEET) =    38.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.19
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       9.50
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   10.12
 LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.10 =     948.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1        9.50   10.12    1.510  0.29( 0.06) 0.20       7.2       56.14
     2        9.40   12.71    1.325  0.29( 0.06) 0.20       8.2       56.11
 LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.10 =     948.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1        8.75    8.10    1.717  0.27( 0.13) 0.48       5.9       55.10
     2       11.38   20.43    1.009  0.27( 0.14) 0.52      14.3       51.00
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1       17.43    8.10    1.717  0.28( 0.09) 0.34      11.6       55.10
     2       18.68   10.12    1.510  0.28( 0.09) 0.34      14.5       56.14
     3       19.13   12.71    1.325  0.28( 0.10) 0.35      17.2       56.11
     4       18.43   20.43    1.009  0.27( 0.11) 0.41      22.5       51.00
   TOTAL AREA(ACRES) =        22.5

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       19.13  Tc(MIN.) =   12.706
 EFFECTIVE AREA(ACRES) =     17.24  AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.34
 TOTAL AREA(ACRES) =       22.5
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     56.10 TO NODE     56.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.10  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.76
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.13
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   12.81
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.20 =    1790.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.20 TO NODE     56.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.81
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.319
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.39      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.39      SUBAREA RUNOFF(CFS) =     0.46
  EFFECTIVE AREA(ACRES) =     17.63   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =       22.9       PEAK FLOW RATE(CFS) =      19.41

****************************************************************************
  FLOW PROCESS FROM NODE     56.20 TO NODE     56.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   703.70
  FLOW LENGTH(FEET) =   290.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.24
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.41
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   13.29
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.30 =    2080.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1       17.46    8.69    1.648  0.27( 0.09) 0.33       12.0       55.10
      2       18.86   10.70    1.462  0.27( 0.09) 0.34       14.9       56.14
      3       19.41   13.29    1.292  0.27( 0.10) 0.35       17.6       56.11
      4       18.50   21.01    0.993  0.27( 0.11) 0.40       22.9       51.00
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.30 =    2080.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      123.22    5.61    2.119  0.27( 0.06) 0.24       62.0       41.90
      2      123.22    5.61    2.119  0.27( 0.06) 0.24       62.0       41.90
      3      130.35    6.45    1.957  0.27( 0.06) 0.24       71.3       30.20
      4      176.08   13.76    1.266  0.27( 0.06) 0.24      162.9       41.20
      5      188.70   16.26    1.151  0.27( 0.06) 0.24      192.9       38.00
      6      210.64   20.40    1.010  0.27( 0.06) 0.24      241.2        1.00
      7      203.48   21.74    0.974  0.27( 0.06) 0.24      242.8        8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      137.90    5.61    2.119  0.27( 0.07) 0.25       69.8       41.90
      2      137.90    5.61    2.119  0.27( 0.07) 0.25       69.8       41.90
      3      145.87    6.45    1.957  0.27( 0.07) 0.25       80.2       30.20
      4      161.84    8.69    1.648  0.27( 0.07) 0.25      111.4       55.10
      5      175.84   10.70    1.462  0.27( 0.07) 0.25      139.5       56.14
      6      192.54   13.29    1.292  0.27( 0.07) 0.25      174.6       56.11
      7      195.43   13.76    1.266  0.27( 0.07) 0.25      180.8       41.20
      8      207.76   16.26    1.151  0.27( 0.07) 0.25      212.6       38.00
      9      229.21   20.40    1.010  0.27( 0.07) 0.25      263.7        1.00
     10      225.86   21.01    0.993  0.27( 0.07) 0.25      264.9       51.00
     11      221.58   21.74    0.974  0.27( 0.07) 0.25      265.7        8.00
    TOTAL AREA(ACRES) =       265.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      229.21  Tc(MIN.) =   20.395
  EFFECTIVE AREA(ACRES) =    263.74  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =      265.7
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
```

```
==========================================================================

**************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     35.10 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   703.70  DOWNSTREAM(FEET) =   703.00
  FLOW LENGTH(FEET) =    74.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  46.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.93
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     229.21
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   20.48
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  10
--------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
==========================================================================

**************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    729.10  DOWNSTREAM(FEET) =    723.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.849
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.631
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.39      0.30     0.500    36    8.85
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.52      0.20     0.500    57    8.85
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.24
  TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      1.24

**************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     44.00 IS CODE =  62
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  723.20  DOWNSTREAM ELEVATION(FEET) =  714.50
  STREET LENGTH(FEET) =   493.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.91
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    7.39
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.39
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.63
  STREET FLOW TRAVEL TIME(MIN.) =   3.43   Tc(MIN.) =   12.28
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.351
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        2.25      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.79      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.04      SUBAREA RUNOFF(CFS) =    3.32
  EFFECTIVE AREA(ACRES) =      3.95    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.9        PEAK FLOW RATE(CFS) =       4.33

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   8.91
  FLOW VELOCITY(FEET/SEC.) =  2.61   DEPTH*VELOCITY(FT*FT/SEC.) =   0.75
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     44.00 =     823.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     44.00 TO NODE     45.20 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.50  DOWNSTREAM(FEET) =   713.50
  FLOW LENGTH(FEET) =    33.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.16
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.33
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   12.35
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.20 =     856.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     45.20 TO NODE     45.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.35
  RAINFALL INTENSITY(INCH/HR) =   1.35
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       3.95
  TOTAL STREAM AREA(ACRES) =       3.95
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.33

****************************************************************************
  FLOW PROCESS FROM NODE     45.00 TO NODE     45.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    721.00  DOWNSTREAM(FEET) =    717.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.195
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.596
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.58      0.30      0.400    36    9.20
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.06      0.20      0.400    57    9.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      0.85
  TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      0.85

****************************************************************************
  FLOW PROCESS FROM NODE     45.10 TO NODE     45.20 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  717.00  DOWNSTREAM ELEVATION(FEET) =  714.00
  STREET LENGTH(FEET) =   318.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018
  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.31
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    8.10
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.86
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.51
  STREET FLOW TRAVEL TIME(MIN.) =   2.85   Tc(MIN.) =   12.05
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.366
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.82      0.30      0.400    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.82      SUBAREA RUNOFF(CFS) =    0.92
  EFFECTIVE AREA(ACRES) =      1.46    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       1.64

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   9.01
  FLOW VELOCITY(FEET/SEC.) =  1.94   DEPTH*VELOCITY(FT*FT/SEC.) =   0.56
  LONGEST FLOWPATH FROM NODE     45.00 TO NODE     45.20 =     648.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     45.20 TO NODE     45.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.05
  RAINFALL INTENSITY(INCH/HR) =   1.37
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.40
  EFFECTIVE STREAM AREA(ACRES) =       1.46
  TOTAL STREAM AREA(ACRES) =       1.46
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.64

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1        4.33   12.35    1.347  0.27( 0.13) 0.50       3.9       42.00
      2        1.64   12.05    1.366  0.30( 0.12) 0.40       1.5       45.00
```

```
 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        5.93   12.05    1.366  0.27( 0.13) 0.47       5.3       45.00
     2        5.94   12.35    1.347  0.27( 0.13) 0.47       5.4       42.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       5.94    Tc(MIN.) =    12.35
 EFFECTIVE AREA(ACRES) =       5.41   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        5.4
 LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.20 =     856.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     45.20 TO NODE     45.30 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   713.50  DOWNSTREAM(FEET) =   711.90
 FLOW LENGTH(FEET) =   157.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.93
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.94
 PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   12.79
 LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.30 =    1013.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     45.30 TO NODE     45.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.79
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.320
 SUBAREA LOSS RATE DATA(AMC   I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        0.66      0.30      0.400    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.66      SUBAREA RUNOFF(CFS) =     0.71
 EFFECTIVE AREA(ACRES) =      6.07   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        6.1       PEAK FLOW RATE(CFS) =       6.51

****************************************************************************
 FLOW PROCESS FROM NODE     45.30 TO NODE     45.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.79
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.320
 SUBAREA LOSS RATE DATA(AMC   I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                 B        1.89      0.30      0.850    36
 COMMERCIAL                  D        0.04      0.20      0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.834
 SUBAREA AREA(ACRES) =     1.93      SUBAREA RUNOFF(CFS) =     1.86
 EFFECTIVE AREA(ACRES) =      8.00   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.55
 TOTAL AREA(ACRES) =        8.0       PEAK FLOW RATE(CFS) =       8.37

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        8.40   12.49    1.339  0.28( 0.16) 0.55       7.9       45.00
     2        8.37   12.79    1.320  0.28( 0.16) 0.55       8.0       42.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =       8.40  Tc(MIN.) =   12.49
 AREA-AVERAGED Fm(INCH/HR) =  0.16  AREA-AVERAGED Fp(INCH/HR) =  0.28
 AREA-AVERAGED Ap =  0.55  EFFECTIVE AREA(ACRES) =       7.90

****************************************************************************
 FLOW PROCESS FROM NODE     45.30 TO NODE     47.20 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   711.90  DOWNSTREAM(FEET) =   710.80
 FLOW LENGTH(FEET) =   106.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.42
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.40
 PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =   12.76
 LONGEST FLOWPATH FROM NODE     42.00 TO NODE     47.20 =    1119.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.20 TO NODE     47.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.76
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.322
 SUBAREA LOSS RATE DATA(AMC   I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.13      0.30      0.100    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
  SUBAREA AREA(ACRES) =     0.13      SUBAREA RUNOFF(CFS) =     0.15
  EFFECTIVE AREA(ACRES) =      8.03   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =        8.1       PEAK FLOW RATE(CFS) =       8.43

****************************************************************************
  FLOW PROCESS FROM NODE     47.20 TO NODE     35.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.80  DOWNSTREAM(FEET) =   703.90
  FLOW LENGTH(FEET) =   695.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.31
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.43
  PIPE TRAVEL TIME(MIN.) =   1.84    Tc(MIN.) =   14.60
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     35.20 =    1814.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.20 TO NODE     35.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.60
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.224
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 B        1.02      0.30     0.850    36
  PUBLIC PARK                 C        0.05      0.25     0.850    50
  PUBLIC PARK                 D        2.20      0.20     0.850    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =     3.27      SUBAREA RUNOFF(CFS) =     3.02
  EFFECTIVE AREA(ACRES) =     11.30   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.64
  TOTAL AREA(ACRES) =       11.4       PEAK FLOW RATE(CFS) =      10.74

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM        Q       Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1       10.74   14.60     1.224  0.26( 0.17) 0.64       11.3       45.00
      2       10.69   14.90     1.209  0.26( 0.17) 0.63       11.4       42.00
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     35.10 =    1814.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM        Q       Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      137.90    5.71     2.098  0.27( 0.07) 0.25       69.8       41.90
      2      137.90    5.71     2.098  0.27( 0.07) 0.25       69.8       41.90
      3      145.87    6.54     1.940  0.27( 0.07) 0.25       80.2       30.20
      4      161.84    8.78     1.638  0.27( 0.07) 0.25      111.4       55.10
      5      175.84   10.80     1.455  0.27( 0.07) 0.25      139.5       56.14
      6      192.54   13.38     1.287  0.27( 0.07) 0.25      174.6       56.11
      7      195.43   13.85     1.261  0.27( 0.07) 0.25      180.8       41.20
      8      207.76   16.35     1.147  0.27( 0.07) 0.25      212.6       38.00
      9      229.21   20.48     1.008  0.27( 0.07) 0.25      263.7        1.00
     10      225.86   21.10     0.991  0.27( 0.07) 0.25      264.9       51.00
     11      221.58   21.83     0.972  0.27( 0.07) 0.25      265.7        8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM        Q       Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      145.58    5.71     2.098  0.27( 0.07) 0.27       74.2       41.90
      2      145.58    5.71     2.098  0.27( 0.07) 0.27       74.2       41.90
      3      153.94    6.54     1.940  0.27( 0.07) 0.27       85.3       30.20
      4      170.84    8.78     1.638  0.27( 0.07) 0.27      118.2       55.10
      5      185.52   10.80     1.455  0.27( 0.07) 0.27      147.8       56.14
      6      202.97   13.38     1.287  0.27( 0.07) 0.27      184.9       56.11
      7      205.99   13.85     1.261  0.27( 0.07) 0.27      191.5       41.20
      8      209.89   14.60     1.224  0.27( 0.07) 0.27      201.7       45.00
      9      211.33   14.90     1.209  0.27( 0.07) 0.27      205.6       42.00
     10      217.81   16.35     1.147  0.27( 0.07) 0.27      224.0       38.00
     11      237.83   20.48     1.008  0.27( 0.07) 0.27      275.1        1.00
     12      234.30   21.10     0.991  0.27( 0.07) 0.27      276.3       51.00
     13      229.83   21.83     0.972  0.27( 0.07) 0.27      277.1        8.00
    TOTAL AREA(ACRES) =       277.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      237.83  Tc(MIN.) =   20.484
  EFFECTIVE AREA(ACRES) =    275.14  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      277.1
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   20.48   RAINFALL INTENSITY(INCH/HR) =  1.01
  EFFECTIVE AREA(ACRES) =   179.79
```

```
  TOTAL AREA(ACRES) =   277.14        PEAK FLOW RATE(CFS) =    155.41
  AREA-AVERAGED Fm(INCH/HR) =   0.07  AREA-AVERAGED Fp(INCH/HR) =   0.27
  AREA-AVERAGED Ap =  0.27
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =   695.70
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  48.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.07
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     155.41
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   20.62
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     36.00 =   10453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.62
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.004
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.16      0.25      0.100    50
  COMMERCIAL                 D        0.29      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.45      SUBAREA RUNOFF(CFS) =    0.40
  EFFECTIVE AREA(ACRES) =    180.24   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      277.6       PEAK FLOW RATE(CFS) =     155.41
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     37.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.70  DOWNSTREAM(FEET) =   695.40
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  48.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.07
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     155.41
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   20.76
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.00 =   10528.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.00 TO NODE     37.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.40  DOWNSTREAM(FEET) =   694.00
  FLOW LENGTH(FEET) =   355.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  63.0 INCH PIPE IS  45.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.21
  ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     155.41
  PIPE TRAVEL TIME(MIN.) =   0.64    Tc(MIN.) =   21.40
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.10 =   10883.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.40
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.983
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.68      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.68      SUBAREA RUNOFF(CFS) =    0.59
  EFFECTIVE AREA(ACRES) =    180.92   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      278.3       PEAK FLOW RATE(CFS) =     155.41
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.40
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.983
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.46      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.46      SUBAREA RUNOFF(CFS) =    0.40
  EFFECTIVE AREA(ACRES) =    181.38   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      278.7       PEAK FLOW RATE(CFS) =     155.41
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.00  DOWNSTREAM(FEET) =   693.80
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  43.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.60
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     155.41
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   21.45
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     37.60 TO NODE     37.70 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    718.50  DOWNSTREAM(FEET) =    714.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.517
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.564
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.13      0.30     0.500    36    9.52
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.51      0.20     0.500    57    9.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.84
  TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      0.84

****************************************************************************
  FLOW PROCESS FROM NODE     37.70 TO NODE     37.80 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  714.40  DOWNSTREAM ELEVATION(FEET) =  710.60
  STREET LENGTH(FEET) =   349.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.18
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    7.49
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.90
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.50
  STREET FLOW TRAVEL TIME(MIN.) =   3.06   Tc(MIN.) =   12.58
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.333
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.15      0.25     0.500    50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.47      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.62      SUBAREA RUNOFF(CFS) =    0.68
  EFFECTIVE AREA(ACRES) =      1.26    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =       1.39

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   8.10
  FLOW VELOCITY(FEET/SEC.) =  1.97   DEPTH*VELOCITY(FT*FT/SEC.) =   0.54
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.80 =     679.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.80 TO NODE     37.90 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.60  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.41
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.39
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   12.81
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.90 =     739.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     37.90 TO NODE     37.90 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.81
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.319
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.21      0.25     0.500    50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.93      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.14      SUBAREA RUNOFF(CFS) =    1.25
  EFFECTIVE AREA(ACRES) =      2.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        2.4       PEAK FLOW RATE(CFS) =       2.62

****************************************************************************
  FLOW PROCESS FROM NODE     37.90 TO NODE     37.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   708.00
  FLOW LENGTH(FEET) =   221.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.41
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.62
  PIPE TRAVEL TIME(MIN.) =   0.83    Tc(MIN.) =   13.64
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.50 =     960.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.50 TO NODE     37.50 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.64
  RAINFALL INTENSITY(INCH/HR) =   1.27
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       2.40
  TOTAL STREAM AREA(ACRES) =       2.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.62

****************************************************************************
  FLOW PROCESS FROM NODE     37.30 TO NODE     37.40 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    713.10  DOWNSTREAM(FEET) =    709.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.880
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.531
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.70      0.25     0.500    50    9.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.89
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      0.89

****************************************************************************
  FLOW PROCESS FROM NODE     37.40 TO NODE     37.50 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  709.70  DOWNSTREAM ELEVATION(FEET) =  708.10
  STREET LENGTH(FEET) =   124.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.08
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    6.88
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.99
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.50
  STREET FLOW TRAVEL TIME(MIN.) =   1.04   Tc(MIN.) =   10.92
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.446
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.33      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
```

```
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =     0.33      SUBAREA RUNOFF(CFS) =     0.39
 EFFECTIVE AREA(ACRES) =      1.03    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        1.0        PEAK FLOW RATE(CFS) =       1.22

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   7.29
 FLOW VELOCITY(FEET/SEC.) =  2.06   DEPTH*VELOCITY(FT*FT/SEC.) =   0.53
 LONGEST FLOWPATH FROM NODE     37.30 TO NODE     37.50 =     454.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.50 TO NODE     37.50 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   10.92
 RAINFALL INTENSITY(INCH/HR) =   1.45
 AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       1.03
 TOTAL STREAM AREA(ACRES) =       1.03
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.22

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        2.62   13.64    1.272  0.21( 0.11) 0.50       2.4      37.60
     2        1.22   10.92    1.446  0.25( 0.12) 0.50       1.0      37.30

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        3.63   10.92    1.446  0.23( 0.11) 0.50       3.0      37.30
     2        3.68   13.64    1.272  0.22( 0.11) 0.50       3.4      37.60

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       3.68    Tc(MIN.) =    13.64
 EFFECTIVE AREA(ACRES) =       3.43   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =       3.4
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.50 =     960.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.50 TO NODE     37.20 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   708.00  DOWNSTREAM(FEET) =   693.80
 FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.67
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.68
 PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   13.80
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.20 =    1080.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        3.63   11.08    1.434  0.23( 0.11) 0.50       3.0      37.30
     2        3.68   13.80    1.264  0.22( 0.11) 0.50       3.4      37.60
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.20 =    1080.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      155.41   21.45    0.981  0.27( 0.07) 0.27     181.4       1.00
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      123.86   11.08    1.434  0.27( 0.07) 0.28      96.6      37.30
     2      134.76   13.80    1.264  0.27( 0.07) 0.28     120.1      37.60
     3      158.19   21.45    0.981  0.27( 0.07) 0.27     184.8       1.00
   TOTAL AREA(ACRES) =       282.2

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      158.19  Tc(MIN.) =   21.451
 EFFECTIVE AREA(ACRES) =    184.81  AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
 TOTAL AREA(ACRES) =      282.2
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     37.20 TO NODE     47.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.80  DOWNSTREAM(FEET) =   691.30
  FLOW LENGTH(FEET) =   487.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  44.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.19
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     158.19
  PIPE TRAVEL TIME(MIN.) =   0.80    Tc(MIN.) =   22.25
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     47.31 TO NODE     47.32 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    718.50  DOWNSTREAM(FEET) =    712.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.679
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.649
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.63      0.30      0.500    36    8.68
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.85
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      0.85

****************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.32 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.68
  RAINFALL INTENSITY(INCH/HR) =   1.65
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.63
  TOTAL STREAM AREA(ACRES) =       0.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.85

****************************************************************************
  FLOW PROCESS FROM NODE     47.33 TO NODE     47.32 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   282.00
  ELEVATION DATA: UPSTREAM(FEET) =    715.00  DOWNSTREAM(FEET) =    712.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.219
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.593
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.86      0.30      0.500    36    9.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.12
  TOTAL AREA(ACRES) =      0.86   PEAK FLOW RATE(CFS) =      1.12

****************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.32 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.22
  RAINFALL INTENSITY(INCH/HR) =   1.59
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.86
  TOTAL STREAM AREA(ACRES) =       0.86
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.12

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        0.85    8.68    1.649  0.30( 0.15) 0.50       0.6      47.31
      2        1.12    9.22    1.593  0.30( 0.15) 0.50       0.9      47.33

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
```

```
     1        1.94    8.68    1.649  0.30( 0.15) 0.50       1.4      47.31
     2        1.94    9.22    1.593  0.30( 0.15) 0.50       1.5      47.33

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       1.94    Tc(MIN.) =     8.68
  EFFECTIVE AREA(ACRES) =       1.44   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =         1.5
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.32 =     330.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.34 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.00  DOWNSTREAM(FEET) =   698.50
  FLOW LENGTH(FEET) =   102.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.38
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.94
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =    9.18
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.34 =     432.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.34 TO NODE     47.34 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.18
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.597
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.38      0.30      0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.06      0.20      0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     0.44      SUBAREA RUNOFF(CFS) =     0.58
  EFFECTIVE AREA(ACRES) =      1.88   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.9       PEAK FLOW RATE(CFS) =       2.45

****************************************************************************
  FLOW PROCESS FROM NODE     47.34 TO NODE     47.35 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   698.50  DOWNSTREAM(FEET) =   697.50
  FLOW LENGTH(FEET) =   194.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.66
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.45
  PIPE TRAVEL TIME(MIN.) =   0.88    Tc(MIN.) =   10.06
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.35 =     626.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.06
  RAINFALL INTENSITY(INCH/HR) =   1.52
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       1.88
  TOTAL STREAM AREA(ACRES) =       1.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.45

****************************************************************************
  FLOW PROCESS FROM NODE     47.36 TO NODE     47.35 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   275.00
  ELEVATION DATA: UPSTREAM(FEET) =    713.50  DOWNSTREAM(FEET) =    711.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.418
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.574
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.72      0.30      0.500    36    9.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.92
  TOTAL AREA(ACRES) =      0.72   PEAK FLOW RATE(CFS) =      0.92

****************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.42
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.574
```

```
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        0.66      0.30      0.500    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        D        0.12      0.20      0.500    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =     0.78      SUBAREA RUNOFF(CFS) =     1.00
 EFFECTIVE AREA(ACRES) =      1.50   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        1.5       PEAK FLOW RATE(CFS) =       1.93

****************************************************************************
 FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.42
 RAINFALL INTENSITY(INCH/HR) =   1.57
 AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       1.50
 TOTAL STREAM AREA(ACRES) =       1.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.93

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        2.45   10.06    1.515  0.30( 0.15) 0.50       1.9      47.31
     1        2.43   10.61    1.470  0.30( 0.15) 0.50       1.9      47.33
     2        1.93    9.42    1.574  0.29( 0.15) 0.50       1.5      47.36

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        4.32    9.42    1.574  0.29( 0.15) 0.50       3.3      47.36
     2        4.30   10.06    1.515  0.29( 0.15) 0.50       3.4      47.31
     3        4.21   10.61    1.470  0.29( 0.15) 0.50       3.4      47.33

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       4.32    Tc(MIN.) =     9.42
 EFFECTIVE AREA(ACRES) =       3.26   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        3.4
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.35 =     626.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.35 TO NODE     47.37 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   697.60  DOWNSTREAM(FEET) =   696.00
 FLOW LENGTH(FEET) =   293.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.33
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.32
 PIPE TRAVEL TIME(MIN.) =   1.13    Tc(MIN.) =   10.54
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.37 =     919.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.37 TO NODE     47.37 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.54
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.475
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        0.67      0.30      0.500    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        D        0.12      0.20      0.500    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =     0.79      SUBAREA RUNOFF(CFS) =     0.95
 EFFECTIVE AREA(ACRES) =      4.05   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        4.2       PEAK FLOW RATE(CFS) =       4.84

****************************************************************************
 FLOW PROCESS FROM NODE     47.37 TO NODE     47.37 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.54
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.475
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        0.09      0.30      0.500    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        D        0.60      0.20      0.500    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
```

```
  SUBAREA AREA(ACRES) =     0.69      SUBAREA RUNOFF(CFS) =     0.85
  EFFECTIVE AREA(ACRES) =      4.74   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.9       PEAK FLOW RATE(CFS) =       5.69

****************************************************************************
  FLOW PROCESS FROM NODE     47.37 TO NODE     47.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =   695.20
  FLOW LENGTH(FEET) =   158.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.46
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.69
  PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =   11.14
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.30 =    1077.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.30 TO NODE     47.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.14
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.430
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.28      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     0.28      SUBAREA RUNOFF(CFS) =     0.34
  EFFECTIVE AREA(ACRES) =      5.02   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        5.2       PEAK FLOW RATE(CFS) =       5.83

****************************************************************************
  FLOW PROCESS FROM NODE     47.30 TO NODE     47.40 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.20  DOWNSTREAM(FEET) =   694.60
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.38
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.83
  PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =   11.61
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.40 =    1202.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.40 TO NODE     47.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.396
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.19      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     0.19      SUBAREA RUNOFF(CFS) =     0.22
  EFFECTIVE AREA(ACRES) =      5.21   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =       5.90

****************************************************************************
  FLOW PROCESS FROM NODE     47.40 TO NODE     47.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.60  DOWNSTREAM(FEET) =   694.40
  FLOW LENGTH(FEET) =    41.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.42
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.90
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   11.76
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.50 =    1243.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.50 TO NODE     47.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.76
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.385
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.05      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.45      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     1.50      SUBAREA RUNOFF(CFS) =     1.73
  EFFECTIVE AREA(ACRES) =      6.71   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        6.9       PEAK FLOW RATE(CFS) =       7.58
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     47.50 TO NODE     47.60 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.40  DOWNSTREAM(FEET) =   693.50
  FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.80
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.58
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =   12.39
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.60 =    1423.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.60 TO NODE     47.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.39
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.345
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        1.55      0.20      0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.55      SUBAREA RUNOFF(CFS) =    1.74
  EFFECTIVE AREA(ACRES) =      8.26   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        8.4       PEAK FLOW RATE(CFS) =       9.08

****************************************************************************
  FLOW PROCESS FROM NODE     47.60 TO NODE     47.70 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.50  DOWNSTREAM(FEET) =   693.30
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.96
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.08
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   12.52
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.70 =    1463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.70 TO NODE     47.70 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.52
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.336
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.04      0.25      0.500    50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        1.57      0.20      0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.61      SUBAREA RUNOFF(CFS) =    1.79
  EFFECTIVE AREA(ACRES) =      9.87   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       10.0       PEAK FLOW RATE(CFS) =      10.81

****************************************************************************
  FLOW PROCESS FROM NODE     47.70 TO NODE     47.80 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.30  DOWNSTREAM(FEET) =   692.50
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.12
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.81
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   13.08
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.80 =    1633.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.80 TO NODE     47.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.08
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.304
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.60      0.25      0.500    50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.94      0.20      0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.54      SUBAREA RUNOFF(CFS) =    1.65
  EFFECTIVE AREA(ACRES) =     11.41   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       11.6       PEAK FLOW RATE(CFS) =      12.17

****************************************************************************
```

```
  FLOW PROCESS FROM NODE     47.80 TO NODE     47.90 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.50  DOWNSTREAM(FEET) =   692.30
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  17.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.82
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.17
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   13.16
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.90 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.90 TO NODE     47.90 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.16
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.299
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        1.43      0.25      0.500    50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.14      0.20      0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     1.57      SUBAREA RUNOFF(CFS) =     1.66
  EFFECTIVE AREA(ACRES) =     12.98   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =      13.78

****************************************************************************
  FLOW PROCESS FROM NODE     47.90 TO NODE     47.91 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.30  DOWNSTREAM(FEET) =   692.10
  FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.24
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.78
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   13.30
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.91 =    1707.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.91 TO NODE     47.91 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.30
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.291
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        1.89      0.25      0.500    50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        1.30      0.20      0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     3.19      SUBAREA RUNOFF(CFS) =     3.38
  EFFECTIVE AREA(ACRES) =     16.17   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      17.06

****************************************************************************
  FLOW PROCESS FROM NODE     47.91 TO NODE     47.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.10  DOWNSTREAM(FEET) =   691.30
  FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.73
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.06
  PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =   13.79
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.00 =    1874.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       17.06   13.79    1.265  0.24( 0.12) 0.50      16.2      47.36
      2       16.67   14.45    1.231  0.24( 0.12) 0.50      16.3      47.31
      3       16.31   15.01    1.205  0.24( 0.12) 0.50      16.3      47.33
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.00 =    1874.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      123.86   11.93    1.374  0.27( 0.07) 0.28      96.6      37.30
      2      134.76   14.62    1.223  0.27( 0.07) 0.28     120.1      37.60
      3      158.19   22.25    0.961  0.27( 0.07) 0.27     184.8       1.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.
```

```
 ** PEAK FLOW RATE TABLE **
  STREAM       Q       Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1      140.03   11.93     1.374  0.26( 0.08) 0.30     110.6      37.30
     2      148.45   13.79     1.265  0.26( 0.08) 0.30     129.0      47.36
     3      150.72   14.45     1.231  0.26( 0.08) 0.30     134.8      47.31
     4      151.32   14.62     1.223  0.26( 0.08) 0.30     136.4      37.60
     5      152.25   15.01     1.205  0.26( 0.08) 0.30     139.7      47.33
     6      170.84   22.25     0.961  0.26( 0.08) 0.29     201.1       1.00
    TOTAL AREA(ACRES) =       298.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      170.84  Tc(MIN.) =   22.248
  EFFECTIVE AREA(ACRES) =    201.15  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      298.5
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     48.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   691.30  DOWNSTREAM(FEET) =   691.10
  FLOW LENGTH(FEET) =    61.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  50.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.73
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     170.84
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   22.36
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     48.60 TO NODE     48.61 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    712.40  DOWNSTREAM(FEET) =    707.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.660
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.652
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.05      0.30      0.400    36    8.66
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        0.02      0.25      0.400    50    8.66
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.69      0.20      0.400    57    8.66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      1.07
  TOTAL AREA(ACRES) =      0.76   PEAK FLOW RATE(CFS) =      1.07

****************************************************************************
  FLOW PROCESS FROM NODE     48.61 TO NODE     48.70 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  707.00  DOWNSTREAM ELEVATION(FEET) =  698.80
  STREET LENGTH(FEET) =   346.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.53
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    6.98
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.75
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.70
  STREET FLOW TRAVEL TIME(MIN.) =   2.10   Tc(MIN.) =   10.76
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.458
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        0.46      0.25      0.400    50
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.28      0.20      0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.74      SUBAREA RUNOFF(CFS) =    0.91
```

```
  EFFECTIVE AREA(ACRES) =      1.50    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       1.85

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   7.69
  FLOW VELOCITY(FEET/SEC.) =  2.85   DEPTH*VELOCITY(FT*FT/SEC.) =   0.76
  LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.70 =     676.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.70 TO NODE     48.70 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.76
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.458
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C         0.59      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.59      SUBAREA RUNOFF(CFS) =     0.76
  EFFECTIVE AREA(ACRES) =      2.09   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.32
  TOTAL AREA(ACRES) =        2.1         PEAK FLOW RATE(CFS) =       2.61

****************************************************************************
  FLOW PROCESS FROM NODE     48.71 TO NODE     48.71 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.76
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.458
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B         0.09      0.30      0.400    36
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C         0.47      0.25      0.400    50
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D         0.80      0.20      0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =     1.36      SUBAREA RUNOFF(CFS) =     1.68
  EFFECTIVE AREA(ACRES) =      3.45   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =        3.4         PEAK FLOW RATE(CFS) =       4.29

****************************************************************************
  FLOW PROCESS FROM NODE     48.70 TO NODE     48.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   698.80  DOWNSTREAM(FEET) =   691.10
  FLOW LENGTH(FEET) =   119.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.68
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.29
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   10.94
  LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.00 =     795.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        4.29   10.94    1.444  0.22( 0.08) 0.35       3.4      48.60
  LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.00 =     795.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      140.03   12.05    1.366  0.26( 0.08) 0.30     110.6      37.30
      2      148.45   13.91    1.258  0.26( 0.08) 0.30     129.0      47.36
      3      150.72   14.57    1.225  0.26( 0.08) 0.30     134.8      47.31
      4      151.32   14.74    1.217  0.26( 0.08) 0.30     136.4      37.60
      5      152.25   15.13    1.199  0.26( 0.08) 0.30     139.7      47.33
      6      170.84   22.36    0.958  0.26( 0.08) 0.29     201.1       1.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      139.13   10.94    1.444  0.26( 0.08) 0.31     103.9      48.60
      2      144.07   12.05    1.366  0.26( 0.08) 0.31     114.0      37.30
      3      152.15   13.91    1.258  0.26( 0.08) 0.30     132.4      47.36
      4      154.32   14.57    1.225  0.26( 0.08) 0.30     138.3      47.31
      5      154.89   14.74    1.217  0.26( 0.08) 0.30     139.8      37.60
      6      155.77   15.13    1.199  0.26( 0.08) 0.30     143.1      47.33
      7      173.60   22.36    0.958  0.26( 0.08) 0.29     204.6       1.00
    TOTAL AREA(ACRES) =       302.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      173.60  Tc(MIN.) =   22.364
  EFFECTIVE AREA(ACRES) =    204.60  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      302.0
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     49.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   691.10  DOWNSTREAM(FEET) =   689.20
  FLOW LENGTH(FEET) =   384.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  49.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.09
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     173.60
  PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =   23.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     49.00 =   11849.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.943
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.31      0.30      0.100    36
  COMMERCIAL                 C        0.90      0.25      0.100    50
  COMMERCIAL                 D        0.12      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     1.33      SUBAREA RUNOFF(CFS) =     1.10
  EFFECTIVE AREA(ACRES) =    205.93   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      303.3       PEAK FLOW RATE(CFS) =     173.60
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   23.00
  RAINFALL INTENSITY(INCH/HR) =   0.94
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.29
  EFFECTIVE STREAM AREA(ACRES) =     205.93
  TOTAL STREAM AREA(ACRES) =     303.28
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     173.60

****************************************************************************
  FLOW PROCESS FROM NODE     61.30 TO NODE     61.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    707.30  DOWNSTREAM(FEET) =    704.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.383
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.683
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  APARTMENTS                 B        0.53      0.30      0.200    36    8.38
  APARTMENTS                 D        0.77      0.20      0.200    57    8.38
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      1.91
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      1.91

****************************************************************************
  FLOW PROCESS FROM NODE     61.20 TO NODE     61.10 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    704.20
  DOWNSTREAM NODE ELEVATION(FEET) =    703.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   119.00
  "V" GUTTER WIDTH(FEET) =   1.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.10000
  MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.613
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        1.30      0.30      0.200    36
  APARTMENTS                 D        0.25      0.20      0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.00
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.08
  AVERAGE FLOW DEPTH(FEET) =   0.32   FLOOD WIDTH(FEET) =    6.21
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.64   Tc(MIN.) =    9.03
  SUBAREA AREA(ACRES) =    1.55      SUBAREA RUNOFF(CFS) =    2.17
  EFFECTIVE AREA(ACRES) =    2.85    AREA-AVERAGED Fm(INCH/HR) =   0.05
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   0.20
  TOTAL AREA(ACRES) =        2.8       PEAK FLOW RATE(CFS) =       4.00
```

Onsite Hydrology Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1 and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61, ***with Detention @ Node 35***

3.1% Reduction

2-Year Storm Proposed Condition

```
  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.36   FLOOD WIDTH(FEET) =    6.93
  FLOW VELOCITY(FEET/SEC.) =   3.31   DEPTH*VELOCITY(FT*FT/SEC) =   1.18
  LONGEST FLOWPATH FROM NODE     61.30 TO NODE     61.10 =     449.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.10 TO NODE     49.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  703.00  DOWNSTREAM ELEVATION(FEET) =  699.50
  STREET LENGTH(FEET) =   380.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.49
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   13.88
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.42
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.92
  STREET FLOW TRAVEL TIME(MIN.) =   2.61   Tc(MIN.) =   11.64
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.394
  SUBAREA LOSS RATE DATA(AMC   I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.26      0.30      0.100    36
  COMMERCIAL                 C        0.25      0.25      0.100    50
  COMMERCIAL                 D        0.29      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    0.99
  EFFECTIVE AREA(ACRES) =      3.65    AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =       4.43

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  13.76
  FLOW VELOCITY(FEET/SEC.) =  2.43   DEPTH*VELOCITY(FT*FT/SEC.) =   0.91
  LONGEST FLOWPATH FROM NODE     61.30 TO NODE     49.00 =     829.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.64
  RAINFALL INTENSITY(INCH/HR) =   1.39
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.18
  EFFECTIVE STREAM AREA(ACRES) =       3.65
  TOTAL STREAM AREA(ACRES) =       3.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.43

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      139.13   11.60    1.396  0.26( 0.08) 0.30      105.2       48.60
      1      144.07   12.71    1.325  0.26( 0.08) 0.30      115.4       37.30
      1      152.15   14.55    1.226  0.26( 0.08) 0.30      133.8       47.36
      1      154.32   15.21    1.195  0.26( 0.08) 0.30      139.6       47.31
      1      154.89   15.38    1.188  0.26( 0.08) 0.30      141.2       37.60
      1      155.77   15.77    1.171  0.26( 0.08) 0.30      144.5       47.33
      1      173.60   23.00    0.943  0.26( 0.08) 0.29      205.9        1.00
      2        4.43   11.64    1.394  0.26( 0.05) 0.18        3.6       61.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      143.55   11.60    1.396  0.26( 0.08) 0.30      108.8       48.60
      2      143.72   11.64    1.394  0.26( 0.08) 0.30      109.2       61.30
      3      148.27   12.71    1.325  0.26( 0.08) 0.30      119.0       37.30
      4      156.03   14.55    1.226  0.26( 0.08) 0.30      137.4       47.36
      5      158.09   15.21    1.195  0.26( 0.08) 0.30      143.3       47.31
      6      158.64   15.38    1.188  0.26( 0.08) 0.30      144.8       37.60
      7      159.46   15.77    1.171  0.26( 0.08) 0.30      148.1       47.33
      8      176.55   23.00    0.943  0.26( 0.08) 0.29      209.6        1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     176.55    Tc(MIN.) =    23.00
  EFFECTIVE AREA(ACRES) =     209.58   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      306.9
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     49.00 =   11849.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     50.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   689.20  DOWNSTREAM(FEET) =   688.90
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  47.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.50
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     176.55
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   23.09
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     57.10 TO NODE     57.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    714.00  DOWNSTREAM(FEET) =    711.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.278
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.695
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  B        0.42      0.30      0.100    36    8.28
  COMMERCIAL                  D        0.08      0.20      0.100    57    8.28
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.75
  TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      0.75

****************************************************************************
  FLOW PROCESS FROM NODE     57.20 TO NODE     57.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  711.60  DOWNSTREAM ELEVATION(FEET) =  709.00
  STREET LENGTH(FEET) =   130.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.83
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =    5.15
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.31
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.51
  STREET FLOW TRAVEL TIME(MIN.) =   0.94   Tc(MIN.) =    9.21
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.594
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.11      0.30      0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.11      SUBAREA RUNOFF(CFS) =    0.15
  EFFECTIVE AREA(ACRES) =      0.61    AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       0.86

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   5.36
  FLOW VELOCITY(FEET/SEC.) =  2.28   DEPTH*VELOCITY(FT*FT/SEC.) =   0.51
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     57.00 =     460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.21
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.594
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.29      0.30      0.100    36
  COMMERCIAL                  C        0.02      0.25      0.100    50
  COMMERCIAL                  D        0.34      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.65      SUBAREA RUNOFF(CFS) =    0.92
  EFFECTIVE AREA(ACRES) =      1.26   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       1.78

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.21
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.594
  SUBAREA LOSS RATE DATA(AMC  I ):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.33      0.30      0.200    36
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        0.56      0.20      0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     0.89      SUBAREA RUNOFF(CFS) =     1.24
  EFFECTIVE AREA(ACRES) =      2.15   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.14
  TOTAL AREA(ACRES) =        2.2       PEAK FLOW RATE(CFS) =       3.02

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.21
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.594
  SUBAREA LOSS RATE DATA(AMC   I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.34      0.30      0.200    36
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        0.53      0.20      0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     0.87      SUBAREA RUNOFF(CFS) =     1.21
  EFFECTIVE AREA(ACRES) =      3.02   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =        3.0       PEAK FLOW RATE(CFS) =       4.23

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     58.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.00  DOWNSTREAM(FEET) =   702.50
  FLOW LENGTH(FEET) =   633.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.46
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.23
  PIPE TRAVEL TIME(MIN.) =   1.93    Tc(MIN.) =   11.15
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     58.00 =    1093.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.15
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.429
  SUBAREA LOSS RATE DATA(AMC   I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        1.93      0.30      0.200    36
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        0.46      0.20      0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     2.39      SUBAREA RUNOFF(CFS) =     2.95
  EFFECTIVE AREA(ACRES) =      5.41   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =       6.73

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.15
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.429
  SUBAREA LOSS RATE DATA(AMC   I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        1.60      0.30      0.200    36
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        0.76      0.20      0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     2.36      SUBAREA RUNOFF(CFS) =     2.92
  EFFECTIVE AREA(ACRES) =      7.77   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =       9.65

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   702.50  DOWNSTREAM(FEET) =   700.00
  FLOW LENGTH(FEET) =    67.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.90
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.65
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.25
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     58.10 =    1160.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     58.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.25
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.421
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        1.94      0.30     0.200    36
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       C        0.82      0.25     0.200    50
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        4.28      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     7.04      SUBAREA RUNOFF(CFS) =     8.71
  EFFECTIVE AREA(ACRES) =     14.81   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       14.8       PEAK FLOW RATE(CFS) =      18.31

****************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     58.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.25
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.421
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       C        3.80      0.25     0.200    50
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        2.64      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     6.44      SUBAREA RUNOFF(CFS) =     7.97
  EFFECTIVE AREA(ACRES) =     21.25   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       21.2       PEAK FLOW RATE(CFS) =      26.28

****************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     59.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   700.00  DOWNSTREAM(FEET) =   699.50
  FLOW LENGTH(FEET) =   139.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.71
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.28
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   11.65
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.00 =    1299.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.65
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.393
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.44      0.30     0.100    36
  COMMERCIAL                 D        0.18      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.62      SUBAREA RUNOFF(CFS) =     0.76
  EFFECTIVE AREA(ACRES) =     21.87   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       21.9       PEAK FLOW RATE(CFS) =      26.50

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.50  DOWNSTREAM(FEET) =   699.10
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.45
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.50
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   11.78
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.10 =    1355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     59.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.78
  RAINFALL INTENSITY(INCH/HR) =   1.38
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  0.19
  EFFECTIVE STREAM AREA(ACRES) =      21.87
  TOTAL STREAM AREA(ACRES) =      21.87
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      26.50
```

Onsite Hydrology Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1 and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61, ***with Detention @ Node 35***

3.1% Reduction

2-Year Storm Proposed Condition

```
****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     50.10 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    83.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.01      0.30     0.100    36
  COMMERCIAL                 C        0.06      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.14
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.14

****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     50.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.08      0.30     0.100    36
  COMMERCIAL                 C        0.01      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.18
  EFFECTIVE AREA(ACRES) =      0.16   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.2       PEAK FLOW RATE(CFS) =       0.32

****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     59.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.00  DOWNSTREAM(FEET) =   699.10
  FLOW LENGTH(FEET) =   481.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.75
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.32
  PIPE TRAVEL TIME(MIN.) =   2.14    Tc(MIN.) =    7.14
  LONGEST FLOWPATH FROM NODE     50.10 TO NODE     59.10 =     564.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     59.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.14
  RAINFALL INTENSITY(INCH/HR) =   1.85
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.28
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.16
  TOTAL STREAM AREA(ACRES) =       0.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.32

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       26.50   11.78    1.384  0.24( 0.05) 0.19      21.9      57.10
      2        0.32    7.14    1.845  0.28( 0.03) 0.10       0.2      50.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       21.91    7.14    1.845  0.24( 0.05) 0.19      13.4      50.10
      2       26.74   11.78    1.384  0.24( 0.05) 0.19      22.0      57.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      26.74    Tc(MIN.) =    11.78
  EFFECTIVE AREA(ACRES) =      22.03   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       22.0
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.10 =    1355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     50.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.10  DOWNSTREAM(FEET) =   688.90
  FLOW LENGTH(FEET) =    28.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  33.03
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.74
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.79
```

```
 LONGEST FLOWPATH FROM NODE     57.10 TO NODE     50.00 =    1383.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       21.91    7.15    1.843  0.24( 0.05) 0.19      13.4       50.10
     2       26.74   11.79    1.383  0.24( 0.05) 0.19      22.0       57.10
 LONGEST FLOWPATH FROM NODE     57.10 TO NODE     50.00 =    1383.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      143.55   11.70    1.390  0.26( 0.08) 0.30     108.8       48.60
     2      143.72   11.73    1.387  0.26( 0.08) 0.30     109.2       61.30
     3      148.27   12.80    1.320  0.26( 0.08) 0.30     119.0       37.30
     4      156.03   14.64    1.222  0.26( 0.08) 0.30     137.4       47.36
     5      158.09   15.30    1.191  0.26( 0.08) 0.30     143.3       47.31
     6      158.64   15.47    1.184  0.26( 0.08) 0.30     144.8       37.60
     7      159.46   15.86    1.167  0.26( 0.08) 0.30     148.1       47.33
     8      176.55   23.09    0.941  0.26( 0.08) 0.29     209.6        1.00
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      140.02    7.15    1.843  0.26( 0.07) 0.28      80.0       50.10
     2      170.18   11.70    1.390  0.26( 0.07) 0.28     130.7       48.60
     3      170.39   11.73    1.387  0.26( 0.07) 0.28     131.1       61.30
     4      170.72   11.79    1.383  0.26( 0.07) 0.28     131.8       57.10
     5      173.74   12.80    1.320  0.26( 0.07) 0.28     141.0       37.30
     6      179.53   14.64    1.222  0.26( 0.07) 0.28     159.5       47.36
     7      180.99   15.30    1.191  0.26( 0.07) 0.28     165.3       47.31
     8      181.38   15.47    1.184  0.26( 0.07) 0.28     166.9       37.60
     9      181.87   15.86    1.167  0.26( 0.07) 0.28     170.2       47.33
    10      194.43   23.09    0.941  0.26( 0.07) 0.28     231.6        1.00
   TOTAL AREA(ACRES) =      329.0

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     194.43  Tc(MIN.) =   23.087
 EFFECTIVE AREA(ACRES) =   231.61  AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =     329.0
 LONGEST FLOWPATH FROM NODE     1.00 TO NODE     50.00 =   11905.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     50.00 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   688.90  DOWNSTREAM(FEET) =   675.00
 FLOW LENGTH(FEET) =   437.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  35.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  21.08
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     194.43
 PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   23.43
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     61.00 =   12342.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   23.43
 RAINFALL INTENSITY(INCH/HR) =   0.93
 AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.26
 AREA-AVERAGED Ap =  0.28
 EFFECTIVE STREAM AREA(ACRES) =     231.61
 TOTAL STREAM AREA(ACRES) =     328.96
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     194.43

****************************************************************************
 FLOW PROCESS FROM NODE     48.10 TO NODE     48.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    712.40  DOWNSTREAM(FEET) =    709.70

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.947
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.525
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        0.15      0.30      0.400    36    9.95
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        0.34      0.20      0.400    57    9.95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
```

```
  SUBAREA RUNOFF(CFS) =      0.63
  TOTAL AREA(ACRES) =      0.49   PEAK FLOW RATE(CFS) =      0.63

****************************************************************************
  FLOW PROCESS FROM NODE     48.20 TO NODE     48.30 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  709.70  DOWNSTREAM ELEVATION(FEET) =  703.80
  STREET LENGTH(FEET) =   500.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.32
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.69
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.04
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.54
  STREET FLOW TRAVEL TIME(MIN.) =   4.09   Tc(MIN.) =   14.03
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.252
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.64      0.25     0.400    50
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.68      0.20     0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.32      SUBAREA RUNOFF(CFS) =    1.38
  EFFECTIVE AREA(ACRES) =      1.81    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        1.8        PEAK FLOW RATE(CFS) =       1.89

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   9.11
  FLOW VELOCITY(FEET/SEC.) =  2.19   DEPTH*VELOCITY(FT*FT/SEC.) =   0.64
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.30 =     830.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.30 TO NODE     48.40 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  703.80  DOWNSTREAM ELEVATION(FEET) =  700.20
  STREET LENGTH(FEET) =   522.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.61
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   11.86
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.90
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.65
  STREET FLOW TRAVEL TIME(MIN.) =   4.58   Tc(MIN.) =   18.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.064
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.93      0.25     0.400    50
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.71      0.20     0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.64      SUBAREA RUNOFF(CFS) =    1.44
  EFFECTIVE AREA(ACRES) =      3.45    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        3.4        PEAK FLOW RATE(CFS) =       3.02

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  12.57
  FLOW VELOCITY(FEET/SEC.) =  1.97   DEPTH*VELOCITY(FT*FT/SEC.) =   0.70
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.40 =    1352.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.40 TO NODE     48.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.064
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.44      0.25     0.400    50
  RESIDENTIAL
```

```
  "8-10 DWELLINGS/ACRE"      D        0.46      0.20     0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =     0.90      SUBAREA RUNOFF(CFS) =     0.79
  EFFECTIVE AREA(ACRES) =      4.35   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        4.3       PEAK FLOW RATE(CFS) =       3.81

****************************************************************************
  FLOW PROCESS FROM NODE     48.40 TO NODE     48.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   700.20  DOWNSTREAM(FEET) =   699.80
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.07
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.81
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   18.94
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.50 =    1432.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.50 TO NODE     48.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.94
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.054
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.16      0.30     0.400    36
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        1.49      0.25     0.400    50
  PUBLIC PARK                C        0.26      0.25     0.850    50
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.88      0.20     0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.442
  SUBAREA AREA(ACRES) =     2.79      SUBAREA RUNOFF(CFS) =     2.38
  EFFECTIVE AREA(ACRES) =      7.14   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =        7.1       PEAK FLOW RATE(CFS) =       6.15

****************************************************************************
  FLOW PROCESS FROM NODE     48.50 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.80  DOWNSTREAM(FEET) =   675.00
  FLOW LENGTH(FEET) =   425.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.40
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.15
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =   19.56
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     61.00 =    1857.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.56
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.035
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        1.98      0.30     0.850    36
  PUBLIC PARK                D        1.67      0.20     0.850    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =     3.65      SUBAREA RUNOFF(CFS) =     2.69
  EFFECTIVE AREA(ACRES) =     10.79   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =       10.8       PEAK FLOW RATE(CFS) =       8.72

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.56
  RAINFALL INTENSITY(INCH/HR) =   1.03
  AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =     10.79
  TOTAL STREAM AREA(ACRES) =     10.79
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.72

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      140.02    7.52    1.791  0.26( 0.07) 0.28      80.0      50.10
      1      170.18   12.06    1.366  0.26( 0.07) 0.28     130.7      48.60
      1      170.39   12.08    1.364  0.26( 0.07) 0.28     131.1      61.30
      1      170.72   12.14    1.360  0.26( 0.07) 0.28     131.8      57.10
      1      173.74   13.15    1.299  0.26( 0.07) 0.28     141.0      37.30
```

```
     1      179.53   14.99    1.205  0.26( 0.07) 0.28      159.5       47.36
     1      180.99   15.65    1.176  0.26( 0.07) 0.28      165.3       47.31
     1      181.38   15.82    1.169  0.26( 0.07) 0.28      166.9       37.60
     1      181.87   16.21    1.153  0.26( 0.07) 0.28      170.2       47.33
     1      194.43   23.43    0.933  0.26( 0.07) 0.28      231.6        1.00
     2        8.72   19.56    1.035  0.24( 0.14) 0.56       10.8       48.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      146.19    7.52    1.791  0.26( 0.08) 0.29       84.1       50.10
      2      177.54   12.06    1.366  0.26( 0.08) 0.29      137.3       48.60
      3      177.75   12.08    1.364  0.26( 0.08) 0.29      137.8       61.30
      4      178.09   12.14    1.360  0.26( 0.08) 0.29      138.5       57.10
      5      181.33   13.15    1.299  0.26( 0.08) 0.30      148.3       37.30
      6      187.48   14.99    1.205  0.26( 0.08) 0.30      167.7       47.36
      7      189.06   15.65    1.176  0.26( 0.08) 0.30      173.9       47.31
      8      189.48   15.82    1.169  0.26( 0.08) 0.30      175.6       37.60
      9      190.04   16.21    1.153  0.26( 0.08) 0.30      179.1       47.33
     10      196.43   19.56    1.035  0.26( 0.08) 0.30      209.5       48.10
     11      202.16   23.43    0.933  0.26( 0.08) 0.29      242.4        1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     202.16    Tc(MIN.) =    23.43
  EFFECTIVE AREA(ACRES) =     242.40   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      339.8
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     61.00 =   12342.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      339.8  TC(MIN.) =     23.43
  EFFECTIVE AREA(ACRES) =    242.40  AREA-AVERAGED Fm(INCH/HR)=  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap = 0.292
  PEAK FLOW RATE(CFS)   =     202.16

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      146.19    7.52    1.791  0.26( 0.08) 0.29       84.1       50.10
      2      177.54   12.06    1.366  0.26( 0.08) 0.29      137.3       48.60
      3      177.75   12.08    1.364  0.26( 0.08) 0.29      137.8       61.30
      4      178.09   12.14    1.360  0.26( 0.08) 0.29      138.5       57.10
      5      181.33   13.15    1.299  0.26( 0.08) 0.30      148.3       37.30
      6      187.48   14.99    1.205  0.26( 0.08) 0.30      167.7       47.36
      7      189.06   15.65    1.176  0.26( 0.08) 0.30      173.9       47.31
      8      189.48   15.82    1.169  0.26( 0.08) 0.30      175.6       37.60
      9      190.04   16.21    1.153  0.26( 0.08) 0.30      179.1       47.33
     10      196.43   19.56    1.035  0.26( 0.08) 0.30      209.5       48.10
     11      202.16   23.43    0.933  0.26( 0.08) 0.29      242.4        1.00
============================================================================
============================================================================
```

END OF RATIONAL METHOD ANALYSIS

```
************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                *
* OFFSITE & ONSITE PROP CONDITION @ 25-YEAR STORM WITH DETENTION NODE 35   *
* W.O. #1443-136X, 27.5% REDUCTION                                     *
 ************************************************************************

  FILE NAME: DET_25.DAT
  TIME/DATE OF STUDY: 10:33 06/10/2019
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   18.0      13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  2   20.0      15.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1099.00  DOWNSTREAM(FEET) =   1091.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.370
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.603
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.78      0.25      0.600    69    8.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      2.42
  TOTAL AREA(ACRES) =      0.78   PEAK FLOW RATE(CFS) =      2.42

************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 1091.20  DOWNSTREAM ELEVATION(FEET) = 1089.40
  STREET LENGTH(FEET) =    90.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.04
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   13.38
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.52
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.30
  STREET FLOW TRAVEL TIME(MIN.) =   0.43   Tc(MIN.) =    8.80
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.503
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.38      0.25      0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    7.24
  EFFECTIVE AREA(ACRES) =      3.16    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.52
```

Onsite Hydrology Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1 and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61, ***with Detention @ Node 35***

27.5% Reduction

25-Year Storm Proposed Condition

```
  TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =       9.59

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  16.12
  FLOW VELOCITY(FEET/SEC.) =  3.93   DEPTH*VELOCITY(FT*FT/SEC.) =   1.64
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1089.40  DOWNSTREAM ELEVATION(FEET) = 1067.00
  STREET LENGTH(FEET) =   513.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.41
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   14.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.35
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.06
  STREET FLOW TRAVEL TIME(MIN.) =   1.60   Tc(MIN.) =   10.39
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.188
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.34      0.25     0.100    69
  PUBLIC PARK                C        0.25      0.25     0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.418
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    1.64
  EFFECTIVE AREA(ACRES) =      3.75    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =      10.33

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  14.19
  FLOW VELOCITY(FEET/SEC.) =  5.38   DEPTH*VELOCITY(FT*FT/SEC.) =   2.06
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     903.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.39
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.188
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.35      0.25     0.100    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.49      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.333
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    2.35
  EFFECTIVE AREA(ACRES) =      4.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =      12.68

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1067.00  DOWNSTREAM(FEET) =  1062.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.02
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.68
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   10.52
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1003.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.52
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.166
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.09      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.09      SUBAREA RUNOFF(CFS) =    5.72
  EFFECTIVE AREA(ACRES) =      6.68   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        6.7        PEAK FLOW RATE(CFS) =      18.31

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1062.00  DOWNSTREAM(FEET) =  1022.40
  FLOW LENGTH(FEET) =   701.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.79
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.31
  PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   11.31
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1704.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.31
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.039
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.18      0.30      0.100    56
  COMMERCIAL                 C        0.46      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.64      SUBAREA RUNOFF(CFS) =    1.74
  EFFECTIVE AREA(ACRES) =      7.32   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        7.3       PEAK FLOW RATE(CFS) =      19.28

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.40  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.72
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.28
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   11.58
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.58
  RAINFALL INTENSITY(INCH/HR) =   3.00
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       7.32
  TOTAL STREAM AREA(ACRES) =       7.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      19.28

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   305.00
  ELEVATION DATA: UPSTREAM(FEET) =   1046.00  DOWNSTREAM(FEET) =   1042.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.129
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.946
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 C        1.00      0.25      0.100    69    7.13
  RESIDENTIAL
  ".4 DWELLING/ACRE"         C        0.50      0.25      0.900    69   11.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
  SUBAREA RUNOFF(CFS) =      5.20
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      5.20

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1042.00  DOWNSTREAM ELEVATION(FEET) = 1036.00
  STREET LENGTH(FEET) =   373.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.13
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
```

```
   HALFSTREET FLOOD WIDTH(FEET) =   13.07
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.08
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.12
 STREET FLOW TRAVEL TIME(MIN.) =   2.02   Tc(MIN.) =    9.15
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.426
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C        3.31      0.25     0.500    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    3.31      SUBAREA RUNOFF(CFS) =    9.83
 EFFECTIVE AREA(ACRES) =      4.81    AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =        4.8        PEAK FLOW RATE(CFS) =      14.34

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  15.00
 FLOW VELOCITY(FEET/SEC.) =  3.36   DEPTH*VELOCITY(FT*FT/SEC.) =   1.34
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     678.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1036.00  DOWNSTREAM ELEVATION(FEET) = 1026.00
 STREET LENGTH(FEET) =   463.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.52
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.40
   HALFSTREET FLOOD WIDTH(FEET) =   15.31
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.96
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.59
 STREET FLOW TRAVEL TIME(MIN.) =   1.95   Tc(MIN.) =   11.10
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.072
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C        2.40      0.25     0.500    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    6.36
 EFFECTIVE AREA(ACRES) =      7.21    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =      19.16

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  15.92
 FLOW VELOCITY(FEET/SEC.) =  4.02   DEPTH*VELOCITY(FT*FT/SEC.) =   1.66
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1141.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.10
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.072
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        0.16      0.30     0.500    56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C        2.22      0.25     0.500    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    6.31
 EFFECTIVE AREA(ACRES) =      9.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =        9.6        PEAK FLOW RATE(CFS) =      25.47

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1026.00  DOWNSTREAM(FEET) =  1022.00
 FLOW LENGTH(FEET) =   395.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.36
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      25.47
 PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   11.89
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1536.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.89
```

```
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.955
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.07      0.30      0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        4.06      0.25      0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     4.13      SUBAREA RUNOFF(CFS) =   10.52
  EFFECTIVE AREA(ACRES) =     13.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       13.7       PEAK FLOW RATE(CFS) =      34.98

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.00  DOWNSTREAM(FEET) =  1020.00
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.55
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      34.98
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   12.09
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.927
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.55      0.30      0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        2.06      0.25      0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     2.61      SUBAREA RUNOFF(CFS) =    6.57
  EFFECTIVE AREA(ACRES) =     16.33   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      41.21

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1020.00  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.45
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.21
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   12.44
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    1799.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.44
  RAINFALL INTENSITY(INCH/HR) =   2.88
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =      16.33
  TOTAL STREAM AREA(ACRES) =      16.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      41.21

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       19.28   11.58    2.999  0.25( 0.11) 0.45       7.3       1.00
      2       41.21   12.44    2.880  0.25( 0.12) 0.49      16.3       8.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       59.29   11.58    2.999  0.25( 0.12) 0.48      22.5       1.00
      2       59.69   12.44    2.880  0.25( 0.12) 0.48      23.6       8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      59.69    Tc(MIN.) =    12.44
  EFFECTIVE AREA(ACRES) =      23.65   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       23.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.10 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1019.50  DOWNSTREAM(FEET) =  1014.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.64
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      59.69
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   12.59
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.10 =    2014.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   12.59
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.860
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.15      0.30      0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.15      SUBAREA RUNOFF(CFS) =     0.38
  EFFECTIVE AREA(ACRES) =     23.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       23.8       PEAK FLOW RATE(CFS) =      59.69
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   12.59
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.860
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.16      0.30      0.100    56
  COMMERCIAL                  C        1.44      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     4.08
  EFFECTIVE AREA(ACRES) =     25.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       25.4       PEAK FLOW RATE(CFS) =      62.78

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1014.00  DOWNSTREAM(FEET) =   971.40
  FLOW LENGTH(FEET) =   863.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.70
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      62.78
  PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =   13.36
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    2877.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   13.36
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.765
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.82      0.30      0.100    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.77      0.25      0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.294
  SUBAREA AREA(ACRES) =     1.59      SUBAREA RUNOFF(CFS) =     3.85
  EFFECTIVE AREA(ACRES) =     26.99   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       27.0       PEAK FLOW RATE(CFS) =      64.47

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   971.40  DOWNSTREAM(FEET) =   969.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.47
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      64.47
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   13.40
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    2917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   13.40
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.761
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"        B        2.46      0.30      0.500    56
RESIDENTIAL
"5-7 DWELLINGS/ACRE"        C       10.48      0.25      0.500    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
SUBAREA AREA(ACRES) =   12.94      SUBAREA RUNOFF(CFS) =   30.65
EFFECTIVE AREA(ACRES) =     39.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
TOTAL AREA(ACRES) =       39.9       PEAK FLOW RATE(CFS) =      95.02

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
    1       96.03   12.54    2.867  0.25( 0.12) 0.46      38.8        1.00
    2       95.02   13.40    2.761  0.25( 0.12) 0.46      39.9        8.00
NEW PEAK FLOW DATA ARE:
PEAK FLOW RATE(CFS) =      96.03  Tc(MIN.) =   12.54
AREA-AVERAGED Fm(INCH/HR) =  0.12  AREA-AVERAGED Fp(INCH/HR) =  0.25
AREA-AVERAGED Ap =  0.46  EFFECTIVE AREA(ACRES) =      38.80

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   969.00  DOWNSTREAM(FEET) =   954.00
 FLOW LENGTH(FEET) =   416.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.88
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      96.03
 PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   12.90
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    3333.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.90
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.821
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        0.77      0.25      0.100    69
 PUBLIC PARK                 C        0.43      0.25      0.850    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.369
 SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    2.95
 EFFECTIVE AREA(ACRES) =     40.00   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =       41.1       PEAK FLOW RATE(CFS) =      97.36

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   954.00  DOWNSTREAM(FEET) =   952.80
 FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  31.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.66
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      97.36
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   13.07
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    3453.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.07
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.800
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        0.88      0.30      0.400    56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       C        7.02      0.25      0.400    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =    7.90      SUBAREA RUNOFF(CFS) =   19.18
 EFFECTIVE AREA(ACRES) =     47.90   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
 TOTAL AREA(ACRES) =       49.0       PEAK FLOW RATE(CFS) =     115.78

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     17.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   952.80  DOWNSTREAM(FEET) =   929.00
 FLOW LENGTH(FEET) =   636.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.70
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     115.78
 PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =   13.61
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.10 =    4089.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     17.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.61
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.736
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.68      0.30      0.500    56
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"        C        0.89      0.25      0.600    69
  COMMERCIAL                  C        1.86      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.309
  SUBAREA AREA(ACRES) =     3.43      SUBAREA RUNOFF(CFS) =     8.19
  EFFECTIVE AREA(ACRES) =     51.33   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       52.5       PEAK FLOW RATE(CFS) =     121.25

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   929.00  DOWNSTREAM(FEET) =   926.30
  FLOW LENGTH(FEET) =   122.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.58
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     121.25
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   13.74
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     18.00 =    4211.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.74
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.723
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS                B       24.46      0.30      0.350    56
  CONDOMINIUMS                C        7.92      0.25      0.350    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =   32.38      SUBAREA RUNOFF(CFS) =    76.41
  EFFECTIVE AREA(ACRES) =     83.71   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       84.8       PEAK FLOW RATE(CFS) =     197.02

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   926.30  DOWNSTREAM(FEET) =   922.70
  FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  36.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.29
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     197.02
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   13.89
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     19.00 =    4384.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.89
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.705
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        1.62      0.30      0.400    56
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        6.09      0.25      0.400    69
  COMMERCIAL                  B        2.90      0.30      0.100    56
  COMMERCIAL                  C        3.15      0.25      0.100    69
  NATURAL POOR COVER
  "GRASS"                     B        0.76      0.30      1.000    78
  NATURAL POOR COVER
  "GRASS"                     C        0.39      0.25      1.000    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
  SUBAREA AREA(ACRES) =   14.91      SUBAREA RUNOFF(CFS) =    35.13
  EFFECTIVE AREA(ACRES) =     98.62   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =       99.8       PEAK FLOW RATE(CFS) =     230.83

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   922.70  DOWNSTREAM(FEET) =   815.60
  FLOW LENGTH(FEET) =  1580.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.33
```

```
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     230.83
 PIPE TRAVEL TIME(MIN.) =   0.90    Tc(MIN.) =   14.79
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     20.00 =    5964.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.79
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.611
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B       19.45      0.30      0.100    56
 COMMERCIAL                  C       16.92      0.25      0.100    69
 COMMERCIAL                  D        0.11      0.20      0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =   36.48      SUBAREA RUNOFF(CFS) =   84.81
 EFFECTIVE AREA(ACRES) =    135.10   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =      136.2       PEAK FLOW RATE(CFS) =     307.28

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   815.60  DOWNSTREAM(FEET) =   799.50
 FLOW LENGTH(FEET) =   449.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  38.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  25.02
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     307.28
 PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   15.09
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6413.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.09
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.581
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        2.38      0.30      0.100    56
 COMMERCIAL                  C        0.87      0.25      0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    7.47
 EFFECTIVE AREA(ACRES) =    138.35   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =      139.5       PEAK FLOW RATE(CFS) =     311.17

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.09
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.581
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        4.10      0.30      0.100    56
 COMMERCIAL                  C        1.54      0.25      0.100    69
 COMMERCIAL                  D        2.08      0.20      0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    7.72      SUBAREA RUNOFF(CFS) =   17.75
 EFFECTIVE AREA(ACRES) =    146.07   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.30
 TOTAL AREA(ACRES) =      147.2       PEAK FLOW RATE(CFS) =     328.93

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   799.50  DOWNSTREAM(FEET) =   765.50
 FLOW LENGTH(FEET) =  1056.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  43.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  23.99
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     328.93
 PIPE TRAVEL TIME(MIN.) =   0.73    Tc(MIN.) =   15.82
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     22.00 =    7469.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.82
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.513
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        2.06      0.30      0.100    56
 COMMERCIAL                  C        1.74      0.25      0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
  SUBAREA AREA(ACRES) =     3.80      SUBAREA RUNOFF(CFS) =     8.50
  EFFECTIVE AREA(ACRES) =    149.87   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      151.0       PEAK FLOW RATE(CFS) =     328.93
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.82
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.513
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.23      0.30      0.100    56
  COMMERCIAL                 D        5.07      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     5.30      SUBAREA RUNOFF(CFS) =    11.89
  EFFECTIVE AREA(ACRES) =    155.17   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      156.3       PEAK FLOW RATE(CFS) =     340.32

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   765.50  DOWNSTREAM(FEET) =   755.00
  FLOW LENGTH(FEET) =   465.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  45.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.44
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     340.32
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =   16.18
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     23.00 =    7934.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.18
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.481
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        9.15      0.30      0.100    56
  COMMERCIAL                 C       10.79      0.25      0.100    69
  COMMERCIAL                 D        1.81      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    21.75      SUBAREA RUNOFF(CFS) =    48.05
  EFFECTIVE AREA(ACRES) =    176.92   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =      178.1       PEAK FLOW RATE(CFS) =     383.91

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.18
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.481
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        7.47      0.30      0.100    56
  COMMERCIAL                 C        0.40      0.25      0.100    69
  COMMERCIAL                 D       17.76      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   25.63      SUBAREA RUNOFF(CFS) =    56.70
  EFFECTIVE AREA(ACRES) =    202.55   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      203.7       PEAK FLOW RATE(CFS) =     440.61

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   755.00  DOWNSTREAM(FEET) =   736.00
  FLOW LENGTH(FEET) =  1257.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  69.0 INCH PIPE IS  56.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.36
  ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     440.61
  PIPE TRAVEL TIME(MIN.) =   1.08    Tc(MIN.) =   17.27
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.00 =    9191.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.27
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.392
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B       16.13      0.30      0.100    56
  COMMERCIAL                 C        3.87      0.25      0.100    69
  COMMERCIAL                 D        4.22      0.20      0.100    75
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   24.22      SUBAREA RUNOFF(CFS) =   51.54
  EFFECTIVE AREA(ACRES) =    226.77   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      227.9       PEAK FLOW RATE(CFS) =     475.88

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     30.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   736.00  DOWNSTREAM(FEET) =   720.00
  FLOW LENGTH(FEET) =   212.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  41.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  36.60
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     475.88
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   17.36
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.10 =    9403.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.10 TO NODE     30.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   720.00  DOWNSTREAM(FEET) =   716.00
  FLOW LENGTH(FEET) =   156.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  50.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  24.40
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     475.88
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   17.47
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    9559.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   17.47
  RAINFALL INTENSITY(INCH/HR) =   2.38
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.23
  EFFECTIVE STREAM AREA(ACRES) =     226.77
  TOTAL STREAM AREA(ACRES) =     227.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     475.88

****************************************************************************
  FLOW PROCESS FROM NODE     30.20 TO NODE     30.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    740.00  DOWNSTREAM(FEET) =    726.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.494
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.573
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  B        0.42      0.30      0.100    56    5.49
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.72
  TOTAL AREA(ACRES) =      0.42   PEAK FLOW RATE(CFS) =      1.72

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.49
  RAINFALL INTENSITY(INCH/HR) =   4.57
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.42
  TOTAL STREAM AREA(ACRES) =       0.42
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.72

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      475.88   17.47    2.376  0.27( 0.06) 0.23     226.8       1.00
      1      464.42   18.36    2.310  0.27( 0.06) 0.23     227.9       8.00
      2        1.72    5.49    4.573  0.30( 0.03) 0.10       0.4      30.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      293.36    5.49    4.573  0.27( 0.06) 0.23      71.7      30.20
      2      476.76   17.47    2.376  0.27( 0.06) 0.23     227.2       1.00
      3      465.28   18.36    2.310  0.27( 0.06) 0.23     228.3       8.00
```

```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     476.76    Tc(MIN.) =    17.47
 EFFECTIVE AREA(ACRES) =     227.19   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
 TOTAL AREA(ACRES) =      228.3
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    9559.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     30.00 TO NODE     33.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   716.00  DOWNSTREAM(FEET) =   714.30
 FLOW LENGTH(FEET) =   210.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  81.0 INCH PIPE IS  63.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.75
 ESTIMATED PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     476.76
 PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   17.69
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     33.00 =    9769.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.69
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.359
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.35      0.30      0.100    56
 COMMERCIAL                 B        0.62      0.30      0.100    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.97      SUBAREA RUNOFF(CFS) =     2.03
 EFFECTIVE AREA(ACRES) =    228.16   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
 TOTAL AREA(ACRES) =      229.3       PEAK FLOW RATE(CFS) =     476.76
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   714.30  DOWNSTREAM(FEET) =   709.80
 FLOW LENGTH(FEET) =   420.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  78.0 INCH PIPE IS  59.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.61
 ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     476.76
 PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   18.09
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     38.00 TO NODE     39.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    730.50  DOWNSTREAM(FEET) =    726.20

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.427
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.369
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.80      0.30      0.500    56    9.43
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.42      0.20      0.500    75    9.43
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA RUNOFF(CFS) =      3.55
 TOTAL AREA(ACRES) =      1.22   PEAK FLOW RATE(CFS) =      3.55

****************************************************************************
 FLOW PROCESS FROM NODE     39.00 TO NODE     40.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  726.20  DOWNSTREAM ELEVATION(FEET) =  719.50
 STREET LENGTH(FEET) =   711.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.33
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
```

```
   STREET FLOW DEPTH(FEET) =  0.41
   HALFSTREET FLOOD WIDTH(FEET) =   15.92
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.65
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.10
 STREET FLOW TRAVEL TIME(MIN.) =   4.46   Tc(MIN.) =   13.89
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.705
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        2.40      0.30     0.500    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    5.52
 EFFECTIVE AREA(ACRES) =      3.62    AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =       8.34

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  17.75
 FLOW VELOCITY(FEET/SEC.) =  2.85   DEPTH*VELOCITY(FT*FT/SEC.) =   1.27
 LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.00 =    1041.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.89
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.705
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.93      0.30     0.500    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.93      SUBAREA RUNOFF(CFS) =    2.14
 EFFECTIVE AREA(ACRES) =      4.55   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =      10.48

****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE     40.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   719.50  DOWNSTREAM(FEET) =   718.40
 FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.74
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.48
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   14.00
 LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.10 =    1096.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     40.10 TO NODE     40.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.694
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.19      0.30     0.500    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.43
 EFFECTIVE AREA(ACRES) =      4.74   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        4.7        PEAK FLOW RATE(CFS) =      10.87

****************************************************************************
 FLOW PROCESS FROM NODE     40.10 TO NODE     40.20 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   718.40  DOWNSTREAM(FEET) =   717.00
 FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.68
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.87
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   14.09
 LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.20 =    1151.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     40.20 TO NODE     40.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.09
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.684
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.22      0.30     0.850    56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.45      0.30     0.500    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.615
 SUBAREA AREA(ACRES) =    0.67      SUBAREA RUNOFF(CFS) =    1.51
 EFFECTIVE AREA(ACRES) =      5.41   AREA-AVERAGED Fm(INCH/HR) =  0.15
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =      12.33

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     40.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.684
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.34      0.30     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     0.34      SUBAREA RUNOFF(CFS) =     0.78
  EFFECTIVE AREA(ACRES) =      5.75   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      13.11

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     41.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   717.00  DOWNSTREAM(FEET) =   713.40
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.93
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.11
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   14.27
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.00 =    1266.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.27
  RAINFALL INTENSITY(INCH/HR) =   2.66
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.51
  EFFECTIVE STREAM AREA(ACRES) =       5.75
  TOTAL STREAM AREA(ACRES) =       5.75
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      13.11

****************************************************************************
  FLOW PROCESS FROM NODE     41.20 TO NODE     41.30 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    728.20  DOWNSTREAM(FEET) =    723.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.184
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.419
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.02      0.30     0.500    56    9.18
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.61      0.20     0.500    75    9.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.88
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      1.88

****************************************************************************
  FLOW PROCESS FROM NODE     41.30 TO NODE     41.40 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  723.30  DOWNSTREAM ELEVATION(FEET) =  718.00
  STREET LENGTH(FEET) =   323.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.98
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =   10.43
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.73
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.86
  STREET FLOW TRAVEL TIME(MIN.) =   1.97   Tc(MIN.) =   11.16
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.063
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
```

```
  "8-10 DWELLINGS/ACRE"      B        0.72      0.30     0.400    56
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.11      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.83      SUBAREA RUNOFF(CFS) =    2.20
  EFFECTIVE AREA(ACRES) =      1.46    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       3.88

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.65
  FLOW VELOCITY(FEET/SEC.) =  2.91   DEPTH*VELOCITY(FT*FT/SEC.) =   0.98
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.40 =     653.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.40 TO NODE     41.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.16
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.063
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        1.24      0.30     0.400    56
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.03      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.27      SUBAREA RUNOFF(CFS) =    3.36
  EFFECTIVE AREA(ACRES) =      2.73   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =        2.7       PEAK FLOW RATE(CFS) =       7.25

****************************************************************************
  FLOW PROCESS FROM NODE     41.40 TO NODE     41.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   718.00  DOWNSTREAM(FEET) =   717.00
  FLOW LENGTH(FEET) =    62.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH)  INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.40
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.25
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   11.29
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.50 =     715.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.50 TO NODE     41.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.29
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.041
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.09      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.24
  EFFECTIVE AREA(ACRES) =      2.82   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        2.8       PEAK FLOW RATE(CFS) =       7.44

****************************************************************************
  FLOW PROCESS FROM NODE     41.50 TO NODE     41.51 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   717.00  DOWNSTREAM(FEET) =   715.50
  FLOW LENGTH(FEET) =   154.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.12
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.44
  PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =   11.71
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.51 =     869.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.51 TO NODE     41.51 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.71
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.979
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.44      0.30     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.44      SUBAREA RUNOFF(CFS) =    3.67
  EFFECTIVE AREA(ACRES) =      4.26   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =        4.3       PEAK FLOW RATE(CFS) =      10.95

****************************************************************************
  FLOW PROCESS FROM NODE     41.51 TO NODE     41.60 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   715.50  DOWNSTREAM(FEET) =   714.90
  FLOW LENGTH(FEET) =    59.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.86
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.95
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   11.86
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.60 =     928.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.60 TO NODE     41.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   11.86
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.959
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        1.06      0.30     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     1.06      SUBAREA RUNOFF(CFS) =     2.68
  EFFECTIVE AREA(ACRES) =      5.32   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        5.3       PEAK FLOW RATE(CFS) =      13.55

****************************************************************************
  FLOW PROCESS FROM NODE     41.60 TO NODE     41.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   11.86
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.959
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.47      0.30     0.400    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =     0.47      SUBAREA RUNOFF(CFS) =     1.20
  EFFECTIVE AREA(ACRES) =      5.79   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      14.75

****************************************************************************
  FLOW PROCESS FROM NODE     41.60 TO NODE     41.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.90  DOWNSTREAM(FEET) =   713.40
  FLOW LENGTH(FEET) =   148.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.17
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.75
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   12.20
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.00 =    1076.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.20
  RAINFALL INTENSITY(INCH/HR) =   2.91
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       5.79
  TOTAL STREAM AREA(ACRES) =       5.79
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      14.75

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
      1       13.11   14.27    2.665  0.29( 0.15) 0.51       5.8       38.00
      2       14.75   12.20    2.911  0.29( 0.13) 0.45       5.8       41.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
      1       27.06   12.20    2.911  0.29( 0.14) 0.48      10.7       41.20
      2       26.55   14.27    2.665  0.29( 0.14) 0.48      11.5       38.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      27.06    Tc(MIN.) =    12.20
  EFFECTIVE AREA(ACRES) =      10.71   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       11.5
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.00 =    1266.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.80 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.40  DOWNSTREAM(FEET) =   712.60
  FLOW LENGTH(FEET) =    83.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.25
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.06
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   12.37
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.80 =    1349.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   12.37
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.889
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.27      0.30      0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.13      0.20      0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     0.40      SUBAREA RUNOFF(CFS) =     0.99
  EFFECTIVE AREA(ACRES) =     11.11   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       11.9       PEAK FLOW RATE(CFS) =      27.50

****************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   12.37
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.889
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.21      0.30      0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.01      0.20      0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     0.22      SUBAREA RUNOFF(CFS) =     0.54
  EFFECTIVE AREA(ACRES) =     11.33   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       12.2       PEAK FLOW RATE(CFS) =      28.04

****************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.90 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.60  DOWNSTREAM(FEET) =   711.80
  FLOW LENGTH(FEET) =    77.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.56
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.04
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   12.52
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.90 =    1426.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.52
  RAINFALL INTENSITY(INCH/HR) =   2.87
  AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.48
  EFFECTIVE STREAM AREA(ACRES) =      11.33
  TOTAL STREAM AREA(ACRES) =      12.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      28.04

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    77.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.06      0.20      0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.26
  TOTAL AREA(ACRES) =      0.06   PEAK FLOW RATE(CFS) =      0.26

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  3
```

```
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.00
  RAINFALL INTENSITY(INCH/HR) =   4.82
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.06
  TOTAL STREAM AREA(ACRES) =       0.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.26

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  7700.00
  USER SPECIFIED Tc(MIN.) =    5.000
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.06      0.20      0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.26
  TOTAL AREA(ACRES) =      0.06   PEAK FLOW RATE(CFS) =      0.26

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.00
  RAINFALL INTENSITY(INCH/HR) =   4.82
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.06
  TOTAL STREAM AREA(ACRES) =       0.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.26

  ** CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1       28.04   12.52     2.869  0.29( 0.14) 0.48      11.3       41.20
      1       27.45   14.58     2.632  0.29( 0.14) 0.48      12.2       38.00
      2        0.26    5.00     4.824  0.20( 0.10) 0.50       0.1       41.90
      3        0.26    5.00     4.824  0.20( 0.10) 0.50       0.1       41.90

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1       19.72    5.00     4.824  0.29( 0.14) 0.48       4.6       41.90
      2       19.72    5.00     4.824  0.29( 0.14) 0.48       4.6       41.90
      3       28.34   12.52     2.869  0.29( 0.14) 0.48      11.4       41.20
      4       27.72   14.58     2.632  0.29( 0.14) 0.48      12.3       38.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      28.34    Tc(MIN.) =    12.52
  EFFECTIVE AREA(ACRES) =      11.45   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =      12.3
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     41.90 =    7700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     46.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   711.80  DOWNSTREAM(FEET) =   710.50
  FLOW LENGTH(FEET) =   132.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.36
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.34
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   12.78
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     46.00 =    7832.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     46.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.78
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.836
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.21      0.30      0.100    56
  COMMERCIAL                  D        0.29      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    1.27
  EFFECTIVE AREA(ACRES) =     11.95   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       12.8       PEAK FLOW RATE(CFS) =      29.06

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     34.00 IS CODE =  31
```

```
------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   710.50  DOWNSTREAM(FEET) =   709.80
 FLOW LENGTH(FEET) =    68.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.54
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      29.06
 PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   12.92
 LONGEST FLOWPATH FROM NODE     41.90 TO NODE     34.00 =    7900.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       21.05    5.43    4.604  0.29( 0.13) 0.44       5.1      41.90
     2       21.05    5.43    4.604  0.29( 0.13) 0.44       5.1      41.90
     3       29.06   12.92    2.819  0.29( 0.13) 0.46      11.9      41.20
     4       28.42   14.98    2.592  0.29( 0.13) 0.47      12.8      38.00
 LONGEST FLOWPATH FROM NODE     41.90 TO NODE     34.00 =    7900.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      293.36    6.19    4.275  0.27( 0.06) 0.22      72.7      30.20
     2      476.76   18.09    2.330  0.27( 0.06) 0.23     228.2       1.00
     3      465.28   18.98    2.267  0.27( 0.06) 0.23     229.3       8.00
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      298.48    5.43    4.604  0.27( 0.06) 0.24      68.9      41.90
     2      298.48    5.43    4.604  0.27( 0.06) 0.24      68.9      41.90
     3      315.23    6.19    4.275  0.27( 0.06) 0.24      78.5      30.20
     4      426.08   12.92    2.819  0.27( 0.06) 0.24     172.5      41.20
     5      457.26   14.98    2.592  0.27( 0.06) 0.24     200.3      38.00
     6      502.15   18.09    2.330  0.27( 0.06) 0.24     240.9       1.00
     7      489.94   18.98    2.267  0.27( 0.06) 0.24     242.1       8.00
   TOTAL AREA(ACRES) =      242.1

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      502.15  Tc(MIN.) =   18.090
 EFFECTIVE AREA(ACRES) =    240.94  AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.24
 TOTAL AREA(ACRES) =      242.1
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     34.00 TO NODE     56.30 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   703.70
 FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  43.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  32.71
 ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     502.15
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   18.15
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.15
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.325
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                B        0.23      0.30      0.100    56
 COMMERCIAL                D        0.51      0.20      0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.74      SUBAREA RUNOFF(CFS) =    1.53
 EFFECTIVE AREA(ACRES) =    241.68   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.24
 TOTAL AREA(ACRES) =      242.8       PEAK FLOW RATE(CFS) =     502.15
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     32.20 TO NODE     32.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    745.00  DOWNSTREAM(FEET) =    742.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.917
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.719
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  B        0.11      0.30     0.100    56    7.92
 COMMERCIAL                  C        0.26      0.25     0.100    69    7.92
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      1.23
 TOTAL AREA(ACRES) =      0.37   PEAK FLOW RATE(CFS) =      1.23

****************************************************************************
 FLOW PROCESS FROM NODE     32.10 TO NODE     32.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  742.00  DOWNSTREAM ELEVATION(FEET) =  740.00
 STREET LENGTH(FEET) =    96.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.42
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.25
   HALFSTREET FLOOD WIDTH(FEET) =    6.90
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.59
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.66
 STREET FLOW TRAVEL TIME(MIN.) =   0.62   Tc(MIN.) =    8.54
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.564
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.06      0.30     0.100    56
 COMMERCIAL                  C        0.06      0.25     0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.12      SUBAREA RUNOFF(CFS) =    0.38
 EFFECTIVE AREA(ACRES) =      0.49    AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       1.56

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   7.26
 FLOW VELOCITY(FEET/SEC.) =  2.63   DEPTH*VELOCITY(FT*FT/SEC.) =   0.68
 LONGEST FLOWPATH FROM NODE     32.20 TO NODE     32.00 =     426.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    724.60  DOWNSTREAM(FEET) =    723.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.167
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.916
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 SCHOOL                      B        0.33      0.30     0.600    56   12.17
 SCHOOL                      C        0.85      0.25     0.600    69   12.17
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA RUNOFF(CFS) =      2.93
 TOTAL AREA(ACRES) =      1.18   PEAK FLOW RATE(CFS) =      2.93

****************************************************************************
 FLOW PROCESS FROM NODE     52.00 TO NODE     53.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  723.00  DOWNSTREAM ELEVATION(FEET) =  719.00
 STREET LENGTH(FEET) =   412.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.51
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.42
   HALFSTREET FLOOD WIDTH(FEET) =   16.02
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.70
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.12
 STREET FLOW TRAVEL TIME(MIN.) =   2.54   Tc(MIN.) =   14.71
```

```
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.619
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 SCHOOL                      B        2.48      0.30     0.600    56
 SCHOOL                      C        0.77      0.25     0.600    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    7.15
 EFFECTIVE AREA(ACRES) =      4.43    AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.60
 TOTAL AREA(ACRES) =        4.4        PEAK FLOW RATE(CFS) =       9.77

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
 FLOW VELOCITY(FEET/SEC.) =  2.91   DEPTH*VELOCITY(FT*FT/SEC.) =   1.31
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     53.00 =     742.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     53.00 TO NODE     54.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  719.00  DOWNSTREAM ELEVATION(FEET) =  712.50
 STREET LENGTH(FEET) =   633.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.10
   ***STREET FLOW SPLITS OVER STREET-CROWN***
   FULL DEPTH(FEET) =    0.45   FLOOD WIDTH(FEET) =   18.00
   FULL HALF-STREET VELOCITY(FEET/SEC.) =    3.00
   SPLIT DEPTH(FEET) =    0.34   SPLIT FLOOD WIDTH(FEET) =   11.65
   SPLIT FLOW(CFS) =    3.07   SPLIT VELOCITY(FEET/SEC.) =    2.30
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.45
   HALFSTREET FLOOD WIDTH(FEET) =   18.00
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.00
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.35
 STREET FLOW TRAVEL TIME(MIN.) =   3.52   Tc(MIN.) =   18.23
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.319
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 SCHOOL                      B        2.42      0.30     0.600    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA AREA(ACRES) =    2.42      SUBAREA RUNOFF(CFS) =    4.66
 EFFECTIVE AREA(ACRES) =      6.85    AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.60
 TOTAL AREA(ACRES) =        6.9        PEAK FLOW RATE(CFS) =      13.23

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
 FLOW VELOCITY(FEET/SEC.) =  3.00   DEPTH*VELOCITY(FT*FT/SEC.) =   1.35
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     54.00 =    1375.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.23
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.319
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.32      0.30     0.100    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.32      SUBAREA RUNOFF(CFS) =    0.66
 EFFECTIVE AREA(ACRES) =      7.17   AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.58
 TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =      13.89

****************************************************************************
 FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.23
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.319
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 SCHOOL                      B        2.40      0.30     0.600    56
 SCHOOL                      C        0.07      0.25     0.600    69
 SCHOOL                      D        2.82      0.20     0.600    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA AREA(ACRES) =    5.29      SUBAREA RUNOFF(CFS) =   10.34
 EFFECTIVE AREA(ACRES) =     12.46   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.59
 TOTAL AREA(ACRES) =       12.5       PEAK FLOW RATE(CFS) =      24.23

****************************************************************************
 FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==========================================================================
  MAINLINE Tc(MIN.) =   18.23
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.319
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.78      0.30      0.100    56
  COMMERCIAL                 C        0.03      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.81      SUBAREA RUNOFF(CFS) =     1.67
  EFFECTIVE AREA(ACRES) =    13.27   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =       13.3       PEAK FLOW RATE(CFS) =      25.90

**************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.50  DOWNSTREAM(FEET) =   712.30
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.85
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.90
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   18.31
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     55.00 =    1409.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =   1
--------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.31
  RAINFALL INTENSITY(INCH/HR) =   2.31
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =      13.27
  TOTAL STREAM AREA(ACRES) =      13.27
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      25.90

**************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.10 IS CODE =  22
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    34.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.13      0.30      0.100    56
  COMMERCIAL                 D        0.14      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.17
  TOTAL AREA(ACRES) =      0.27   PEAK FLOW RATE(CFS) =      1.17

**************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.10 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =    5.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.24      0.30      0.100    56
  COMMERCIAL                 D        0.01      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.25      SUBAREA RUNOFF(CFS) =     1.08
  EFFECTIVE AREA(ACRES) =      0.52   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.5       PEAK FLOW RATE(CFS) =       2.24

**************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.00  DOWNSTREAM(FEET) =   712.30
  FLOW LENGTH(FEET) =   275.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.76
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.24
  PIPE TRAVEL TIME(MIN.) =   1.66    Tc(MIN.) =    6.66
  LONGEST FLOWPATH FROM NODE     55.10 TO NODE     55.00 =     309.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =   1
--------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
```

```
 TIME OF CONCENTRATION(MIN.) =    6.66
 RAINFALL INTENSITY(INCH/HR) =   4.10
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.27
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.52
 TOTAL STREAM AREA(ACRES) =       0.52
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.24

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       25.90   18.31    2.313  0.27( 0.15) 0.56      13.3      51.00
     2        2.24    6.66    4.101  0.27( 0.03) 0.10       0.5      55.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       19.45    6.66    4.101  0.27( 0.14) 0.51       5.3      55.10
     2       27.16   18.31    2.313  0.27( 0.15) 0.54      13.8      51.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      27.16    Tc(MIN.) =    18.31
 EFFECTIVE AREA(ACRES) =      13.79   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.54
 TOTAL AREA(ACRES) =       13.8
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     55.00 =    1409.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     55.00 TO NODE     56.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   712.30  DOWNSTREAM(FEET) =   711.00
 FLOW LENGTH(FEET) =   165.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.79
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      27.16
 PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   18.67
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.00 =    1574.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.00 TO NODE     56.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.67
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.289
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.49      0.30      0.100    56
 COMMERCIAL                 D        0.04      0.20      0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.53      SUBAREA RUNOFF(CFS) =     1.08
 EFFECTIVE AREA(ACRES) =     14.32   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =       14.3       PEAK FLOW RATE(CFS) =      27.67

****************************************************************************
 FLOW PROCESS FROM NODE     56.00 TO NODE     56.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   711.00  DOWNSTREAM(FEET) =   710.10
 FLOW LENGTH(FEET) =   172.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  24.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.54
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      27.67
 PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   19.11
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     56.11 TO NODE     56.12 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    720.80  DOWNSTREAM(FEET) =    717.80

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.438
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.587
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       B        0.91      0.30      0.200    56    8.44
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA RUNOFF(CFS) =      2.89
 TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      2.89
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     56.12 TO NODE     56.13 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  717.80  DOWNSTREAM ELEVATION(FEET) =  713.60
  STREET LENGTH(FEET) =   486.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.10
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   14.80
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.45
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.97
  STREET FLOW TRAVEL TIME(MIN.) =   3.30   Tc(MIN.) =   11.74
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.976
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        1.68      0.30     0.200    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    1.68      SUBAREA RUNOFF(CFS) =    4.41
  EFFECTIVE AREA(ACRES) =      2.59    AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        2.6        PEAK FLOW RATE(CFS) =       6.80

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  16.63
  FLOW VELOCITY(FEET/SEC.) =  2.62   DEPTH*VELOCITY(FT*FT/SEC.) =   1.12
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.13 =     816.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.74
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.976
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        2.11      0.30     0.200    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    2.11      SUBAREA RUNOFF(CFS) =    5.54
  EFFECTIVE AREA(ACRES) =      4.70   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        4.7       PEAK FLOW RATE(CFS) =      12.33

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.74
  RAINFALL INTENSITY(INCH/HR) =   2.98
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =       4.70
  TOTAL STREAM AREA(ACRES) =       4.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.33

****************************************************************************
  FLOW PROCESS FROM NODE     56.14 TO NODE     56.15 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    719.20  DOWNSTREAM(FEET) =    715.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.182
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.650
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.84      0.30     0.200    56    8.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      2.71
  TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      2.71

****************************************************************************
  FLOW PROCESS FROM NODE     56.15 TO NODE     56.13 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  715.70  DOWNSTREAM ELEVATION(FEET) =  713.60
```

```
 STREET LENGTH(FEET) =   200.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.51
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.35
   HALFSTREET FLOOD WIDTH(FEET) =   12.26
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.40
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.84
 STREET FLOW TRAVEL TIME(MIN.) =   1.39   Tc(MIN.) =    9.57
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.340
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       B        0.54      0.30     0.200    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    0.54      SUBAREA RUNOFF(CFS) =    1.59
 EFFECTIVE AREA(ACRES) =      1.38    AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       4.07

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  12.97
 FLOW VELOCITY(FEET/SEC.) =  2.51   DEPTH*VELOCITY(FT*FT/SEC.) =   0.91
 LONGEST FLOWPATH FROM NODE     56.14 TO NODE     56.13 =     530.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.57
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.340
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       B        0.70      0.30     0.200    56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       D        0.52      0.20     0.200    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    1.22      SUBAREA RUNOFF(CFS) =    3.61
 EFFECTIVE AREA(ACRES) =      2.60   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        2.6        PEAK FLOW RATE(CFS) =       7.69

****************************************************************************
 FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.57
 RAINFALL INTENSITY(INCH/HR) =   3.34
 AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.28
 AREA-AVERAGED Ap =  0.20
 EFFECTIVE STREAM AREA(ACRES) =       2.60
 TOTAL STREAM AREA(ACRES) =       2.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.69

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       12.33   11.74    2.976  0.30( 0.06) 0.20       4.7      56.11
     2        7.69    9.57    3.340  0.28( 0.06) 0.20       2.6      56.14

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       19.00    9.57    3.340  0.29( 0.06) 0.20       6.4      56.14
     2       19.17   11.74    2.976  0.29( 0.06) 0.20       7.3      56.11

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      19.17    Tc(MIN.) =    11.74
 EFFECTIVE AREA(ACRES) =       7.30   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        7.3
 LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.13 =     816.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.13 TO NODE     56.16 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   713.60  DOWNSTREAM(FEET) =   712.50
 FLOW LENGTH(FEET) =    94.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.25
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
```

```
 PIPE-FLOW(CFS) =      19.17
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   11.93
 LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.16 =     910.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.16 TO NODE     56.16 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.93
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.949
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       B        0.46      0.30     0.200    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =     0.46      SUBAREA RUNOFF(CFS) =     1.20
 EFFECTIVE AREA(ACRES) =      7.76   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =      20.19

****************************************************************************
 FLOW PROCESS FROM NODE     56.16 TO NODE     56.16 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.93
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.949
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       B        0.05      0.30     0.200    56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       D        0.41      0.20     0.200    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =     0.46      SUBAREA RUNOFF(CFS) =     1.20
 EFFECTIVE AREA(ACRES) =      8.22   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        8.2       PEAK FLOW RATE(CFS) =      21.39

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       21.48    9.76    3.303  0.29( 0.06) 0.20       7.4       56.14
     2       21.39   11.93    2.949  0.29( 0.06) 0.20       8.2       56.11
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      21.48  Tc(MIN.) =    9.76
 AREA-AVERAGED Fm(INCH/HR) =  0.06  AREA-AVERAGED Fp(INCH/HR) =  0.29
 AREA-AVERAGED Ap =  0.20  EFFECTIVE AREA(ACRES) =       7.35

****************************************************************************
 FLOW PROCESS FROM NODE     56.16 TO NODE     56.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   712.50  DOWNSTREAM(FEET) =   710.10
 FLOW LENGTH(FEET) =    38.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.93
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      21.48
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    9.80
 LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.10 =     948.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       21.48    9.80    3.296  0.29( 0.06) 0.20       7.4       56.14
     2       21.39   11.97    2.943  0.29( 0.06) 0.20       8.2       56.11
 LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.10 =     948.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       20.33    7.51    3.831  0.27( 0.13) 0.48       5.9       55.10
     2       27.67   19.11    2.259  0.27( 0.14) 0.52      14.3       51.00
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       39.52    7.51    3.831  0.28( 0.09) 0.34      11.5       55.10
     2       43.26    9.80    3.296  0.28( 0.09) 0.34      14.9       56.14
     3       44.54   11.97    2.943  0.28( 0.10) 0.35      17.3       56.11
     4       43.98   19.11    2.259  0.27( 0.11) 0.41      22.5       51.00
   TOTAL AREA(ACRES) =        22.5

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       44.54  Tc(MIN.) =   11.968
 EFFECTIVE AREA(ACRES) =     17.34  AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.34
 TOTAL AREA(ACRES) =       22.5
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  12
----------------------------------------------------------------------------
```

```
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE     56.10 TO NODE     56.20 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.10  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.30
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      44.54
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   12.06
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.20 =    1790.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     56.20 TO NODE     56.20 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   12.06
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.931
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.39      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.39      SUBAREA RUNOFF(CFS) =    1.02
  EFFECTIVE AREA(ACRES) =     17.73   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =       22.9       PEAK FLOW RATE(CFS) =      45.24

********************************************************************************
  FLOW PROCESS FROM NODE     56.20 TO NODE     56.30 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   703.70
  FLOW LENGTH(FEET) =   290.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.78
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      45.24
  PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =   12.43
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.30 =    2080.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  11
--------------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
================================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM        Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1        39.77    8.00    3.696  0.27( 0.09) 0.33       11.9       55.10
      2        43.82   10.27    3.210  0.27( 0.09) 0.34       15.3       56.14
      3        45.24   12.43    2.880  0.27( 0.10) 0.35       17.7       56.11
      4        44.23   19.57    2.228  0.27( 0.11) 0.40       22.9       51.00
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.30 =    2080.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM        Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      298.48    5.50    4.572  0.27( 0.06) 0.24       69.7       41.90
      2      298.48    5.50    4.572  0.27( 0.06) 0.24       69.7       41.90
      3      315.23    6.25    4.250  0.27( 0.06) 0.24       79.3       30.20
      4      428.30   12.98    2.811  0.27( 0.06) 0.24      173.3       41.20
      5      457.26   15.04    2.586  0.27( 0.06) 0.24      201.1       38.00
      6      502.15   18.15    2.325  0.27( 0.06) 0.24      241.7        1.00
      7      489.94   19.04    2.263  0.27( 0.06) 0.24      242.8        8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM        Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      332.44    5.50    4.572  0.27( 0.07) 0.25       77.8       41.90
      2      332.44    5.50    4.572  0.27( 0.07) 0.25       77.8       41.90
      3      351.08    6.25    4.250  0.27( 0.07) 0.25       88.6       30.20
      4      384.40    8.00    3.696  0.27( 0.07) 0.25      115.6       55.10
      5      426.58   10.27    3.210  0.27( 0.07) 0.25      150.7       56.14
      6      464.41   12.43    2.880  0.27( 0.07) 0.25      183.4       56.11
      7      473.46   12.98    2.811  0.27( 0.07) 0.25      191.4       41.20
      8      502.14   15.04    2.586  0.27( 0.07) 0.25      220.7       38.00
      9      546.58   18.15    2.325  0.27( 0.07) 0.25      263.6        1.00
     10      534.24   19.04    2.263  0.27( 0.07) 0.25      265.4        8.00
     11      526.36   19.57    2.228  0.27( 0.07) 0.25      265.7       51.00
    TOTAL AREA(ACRES) =       265.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      546.58  Tc(MIN.) =   18.148
  EFFECTIVE AREA(ACRES) =    263.57  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =      265.7
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  12
--------------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
================================================================================

********************************************************************************
```

```
  FLOW PROCESS FROM NODE     56.30 TO NODE     35.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   703.70  DOWNSTREAM(FEET) =   703.00
  FLOW LENGTH(FEET) =    74.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  84.0 INCH PIPE IS  63.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.39
  ESTIMATED PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     546.58
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   18.22
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    729.10  DOWNSTREAM(FEET) =    723.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.849
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.492
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.39      0.30     0.500    56    8.85
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.52      0.20     0.500    75    8.85
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.76
  TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      2.76

****************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     44.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  723.20  DOWNSTREAM ELEVATION(FEET) =  714.50
  STREET LENGTH(FEET) =   493.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00
  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.66
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =   10.74
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.90
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.93
  STREET FLOW TRAVEL TIME(MIN.) =   2.84   Tc(MIN.) =   11.69
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.983
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        2.25      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.79      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.04      SUBAREA RUNOFF(CFS) =    7.79
  EFFECTIVE AREA(ACRES) =      3.95    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.9         PEAK FLOW RATE(CFS) =      10.13

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  12.77
  FLOW VELOCITY(FEET/SEC.) =  3.21   DEPTH*VELOCITY(FT*FT/SEC.) =   1.15
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     44.00 =     823.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     44.00 TO NODE     45.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.50  DOWNSTREAM(FEET) =   713.50
  FLOW LENGTH(FEET) =    33.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.20
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.13
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   11.74
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.20 =     856.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     45.20 TO NODE     45.20 IS CODE =   1
```

```
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.74
  RAINFALL INTENSITY(INCH/HR) =   2.98
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       3.95
  TOTAL STREAM AREA(ACRES) =       3.95
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.13

************************************************************************
  FLOW PROCESS FROM NODE     45.00 TO NODE     45.10 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    721.00  DOWNSTREAM(FEET) =    717.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.195
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.417
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.58      0.30     0.400    56    9.20
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.06      0.20     0.400    75    9.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      1.90
  TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      1.90

************************************************************************
  FLOW PROCESS FROM NODE     45.10 TO NODE     45.20 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) =  717.00  DOWNSTREAM ELEVATION(FEET) =  714.00
  STREET LENGTH(FEET) =   318.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.96
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   11.65
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.22
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.75
  STREET FLOW TRAVEL TIME(MIN.) =   2.38   Tc(MIN.) =   11.58
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.999
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.82      0.30     0.400    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =     0.82      SUBAREA RUNOFF(CFS) =     2.12
  EFFECTIVE AREA(ACRES) =      1.46    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       3.79

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  12.87
  FLOW VELOCITY(FEET/SEC.) =  2.37   DEPTH*VELOCITY(FT*FT/SEC.) =   0.85
  LONGEST FLOWPATH FROM NODE     45.00 TO NODE     45.20 =     648.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     45.20 TO NODE     45.20 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.58
  RAINFALL INTENSITY(INCH/HR) =   3.00
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.40
  EFFECTIVE STREAM AREA(ACRES) =       1.46
  TOTAL STREAM AREA(ACRES) =       1.46
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.79

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       10.13   11.74    2.976  0.27( 0.13) 0.50       3.9       42.00
      2        3.79   11.58    2.999  0.30( 0.12) 0.40       1.5       45.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
```

```
 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       13.86   11.58    2.999  0.27( 0.13) 0.47       5.4       45.00
     2       13.89   11.74    2.976  0.27( 0.13) 0.47       5.4       42.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      13.89    Tc(MIN.) =    11.74
 EFFECTIVE AREA(ACRES) =       5.41   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        5.4
 LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.20 =     856.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     45.20 TO NODE     45.30 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   713.50  DOWNSTREAM(FEET) =   711.90
 FLOW LENGTH(FEET) =   157.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.15
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      13.89
 PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   12.11
 LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.30 =    1013.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     45.30 TO NODE     45.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.11
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.924
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      B        0.66      0.30     0.400    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.66      SUBAREA RUNOFF(CFS) =     1.67
 EFFECTIVE AREA(ACRES) =      6.07   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        6.1       PEAK FLOW RATE(CFS) =      15.28

****************************************************************************
 FLOW PROCESS FROM NODE     45.30 TO NODE     45.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.11
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.924
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        1.89      0.30     0.850    56
 COMMERCIAL                 D        0.04      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.834
 SUBAREA AREA(ACRES) =     1.93      SUBAREA RUNOFF(CFS) =     4.65
 EFFECTIVE AREA(ACRES) =      8.00   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.55
 TOTAL AREA(ACRES) =        8.0       PEAK FLOW RATE(CFS) =      19.92

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       19.94   11.94    2.947  0.28( 0.16) 0.55       7.9       45.00
     2       19.92   12.11    2.924  0.28( 0.16) 0.55       8.0       42.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      19.94  Tc(MIN.) =   11.94
 AREA-AVERAGED Fm(INCH/HR) =  0.16  AREA-AVERAGED Fp(INCH/HR) =  0.28
 AREA-AVERAGED Ap =  0.55  EFFECTIVE AREA(ACRES) =       7.95

****************************************************************************
 FLOW PROCESS FROM NODE     45.30 TO NODE     47.20 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   711.90  DOWNSTREAM(FEET) =   710.80
 FLOW LENGTH(FEET) =   106.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.89
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      19.94
 PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   12.17
 LONGEST FLOWPATH FROM NODE     42.00 TO NODE     47.20 =    1119.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.20 TO NODE     47.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.17
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.916
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.13      0.30     0.100    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.13      SUBAREA RUNOFF(CFS) =     0.34
 EFFECTIVE AREA(ACRES) =      8.08   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.55
 TOTAL AREA(ACRES) =        8.1       PEAK FLOW RATE(CFS) =      20.06
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     47.20 TO NODE     35.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.80  DOWNSTREAM(FEET) =   703.90
  FLOW LENGTH(FEET) =   695.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.74
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.06
  PIPE TRAVEL TIME(MIN.) =   1.50    Tc(MIN.) =   13.67
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     35.20 =    1814.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.20 TO NODE     35.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.67
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.730
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 B        1.02      0.30     0.850    56
  PUBLIC PARK                 C        0.05      0.25     0.850    69
  PUBLIC PARK                 D        2.20      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    3.27      SUBAREA RUNOFF(CFS) =    7.46
  EFFECTIVE AREA(ACRES) =     11.35   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.63
  TOTAL AREA(ACRES) =       11.4       PEAK FLOW RATE(CFS) =      26.17

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       26.17   13.67    2.730  0.26( 0.17) 0.63      11.3      45.00
      2       26.11   13.83    2.712  0.26( 0.17) 0.63      11.4      42.00
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     35.10 =    1814.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      332.44    5.58    4.534  0.27( 0.07) 0.25      77.8      41.90
      2      332.44    5.58    4.534  0.27( 0.07) 0.25      77.8      41.90
      3      351.08    6.33    4.219  0.27( 0.07) 0.25      88.6      30.20
      4      384.40    8.08    3.676  0.27( 0.07) 0.25     115.6      55.10
      5      426.58   10.35    3.196  0.27( 0.07) 0.25     150.7      56.14
      6      464.41   12.51    2.871  0.27( 0.07) 0.25     183.4      56.11
      7      473.46   13.05    2.802  0.27( 0.07) 0.25     191.4      41.20
      8      502.14   15.11    2.579  0.27( 0.07) 0.25     220.7      38.00
      9      546.58   18.22    2.320  0.27( 0.07) 0.25     263.6       1.00
     10      534.24   19.11    2.258  0.27( 0.07) 0.25     265.4       8.00
     11      526.36   19.65    2.223  0.27( 0.07) 0.25     265.7      51.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      350.64    5.58    4.534  0.27( 0.07) 0.27      82.5      41.90
      2      350.64    5.58    4.534  0.27( 0.07) 0.27      82.5      41.90
      3      370.26    6.33    4.219  0.27( 0.07) 0.27      93.8      30.20
      4      405.59    8.08    3.676  0.27( 0.07) 0.27     122.3      55.10
      5      449.99   10.35    3.196  0.27( 0.07) 0.27     159.3      56.14
      6      489.67   12.51    2.871  0.27( 0.07) 0.27     193.8      56.11
      7      499.16   13.05    2.802  0.27( 0.07) 0.27     202.2      41.20
      8      508.17   13.67    2.730  0.27( 0.07) 0.27     211.5      45.00
      9      510.34   13.83    2.712  0.27( 0.07) 0.27     213.8      42.00
     10      526.88   15.11    2.579  0.27( 0.07) 0.27     232.1      38.00
     11      568.67   18.22    2.320  0.27( 0.07) 0.27     275.0       1.00
     12      555.69   19.11    2.258  0.27( 0.07) 0.27     276.8       8.00
     13      547.45   19.65    2.223  0.27( 0.07) 0.27     277.1      51.00
    TOTAL AREA(ACRES) =       277.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      568.67  Tc(MIN.) =   18.219
  EFFECTIVE AREA(ACRES) =    274.97  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      277.1
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   18.22   RAINFALL INTENSITY(INCH/HR) =  2.32
  EFFECTIVE AREA(ACRES) =   123.39
  TOTAL AREA(ACRES) =   277.14        PEAK FLOW RATE(CFS) =    255.18
  AREA-AVERAGED Fm(INCH/HR) =   0.07  AREA-AVERAGED Fp(INCH/HR) =   0.27
  AREA-AVERAGED Ap =  0.27
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
```

```
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =   695.70
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  75.0 INCH PIPE IS  55.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.45
  ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     255.18
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   18.34
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     36.00 =   10453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.34
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.312
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.16      0.25      0.100    69
  COMMERCIAL                 D        0.29      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.45      SUBAREA RUNOFF(CFS) =    0.93
  EFFECTIVE AREA(ACRES) =    123.84   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      277.6       PEAK FLOW RATE(CFS) =     255.18
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     37.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.70  DOWNSTREAM(FEET) =   695.40
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  75.0 INCH PIPE IS  55.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.45
  ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     255.18
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   18.46
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.00 =   10528.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.00 TO NODE     37.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.40  DOWNSTREAM(FEET) =   694.00
  FLOW LENGTH(FEET) =   355.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  75.0 INCH PIPE IS  56.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.39
  ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     255.18
  PIPE TRAVEL TIME(MIN.) =   0.57    Tc(MIN.) =   19.03
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.10 =   10883.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.03
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.68      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.68      SUBAREA RUNOFF(CFS) =    1.37
  EFFECTIVE AREA(ACRES) =    124.52   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      278.3       PEAK FLOW RATE(CFS) =     255.18
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.03
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.46      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.46      SUBAREA RUNOFF(CFS) =    0.93
  EFFECTIVE AREA(ACRES) =    124.98   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      278.7       PEAK FLOW RATE(CFS) =     255.18
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.20 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.00  DOWNSTREAM(FEET) =   693.80
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  69.0 INCH PIPE IS  52.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.03
  ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     255.18
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   19.08
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     37.60 TO NODE     37.70 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    718.50  DOWNSTREAM(FEET) =    714.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.517
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.351
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.13      0.30     0.500    56    9.52
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.51      0.20     0.500    75    9.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.87
  TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      1.87

****************************************************************************
  FLOW PROCESS FROM NODE     37.70 TO NODE     37.80 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  714.40  DOWNSTREAM ELEVATION(FEET) =  710.60
  STREET LENGTH(FEET) =   349.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.65
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =   10.84
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.27
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.73
  STREET FLOW TRAVEL TIME(MIN.) =   2.56   Tc(MIN.) =   12.08
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.928
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.15      0.25     0.500    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.47      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.62      SUBAREA RUNOFF(CFS) =    1.57
  EFFECTIVE AREA(ACRES) =      1.26    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =       3.20

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.65
  FLOW VELOCITY(FEET/SEC.) =  2.40   DEPTH*VELOCITY(FT*FT/SEC.) =   0.81
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.80 =     679.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.80 TO NODE     37.90 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.60  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.57
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.20
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   12.26
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.90 =     739.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.90 TO NODE     37.90 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
================================================================================
  MAINLINE Tc(MIN.) =   12.26
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.904
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.21      0.25      0.500    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.93      0.20      0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.14      SUBAREA RUNOFF(CFS) =    2.87
  EFFECTIVE AREA(ACRES) =      2.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        2.4       PEAK FLOW RATE(CFS) =       6.04

********************************************************************************
  FLOW PROCESS FROM NODE     37.90 TO NODE     37.50 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   708.00
  FLOW LENGTH(FEET) =   221.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.46
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.04
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   12.93
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.50 =     960.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     37.50 TO NODE     37.50 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.93
  RAINFALL INTENSITY(INCH/HR) =   2.82
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       2.40
  TOTAL STREAM AREA(ACRES) =       2.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.04

********************************************************************************
  FLOW PROCESS FROM NODE     37.30 TO NODE     37.40 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    713.10  DOWNSTREAM(FEET) =    709.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.880
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.281
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.70      0.25      0.500    69    9.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.99
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      1.99

********************************************************************************
  FLOW PROCESS FROM NODE     37.40 TO NODE     37.50 IS CODE =  62
--------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  709.70  DOWNSTREAM ELEVATION(FEET) =  708.10
  STREET LENGTH(FEET) =   124.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.43
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =   10.03
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.39
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.74
  STREET FLOW TRAVEL TIME(MIN.) =   0.86   Tc(MIN.) =   10.74
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.129
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.33      0.25      0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.33      SUBAREA RUNOFF(CFS) =    0.89
  EFFECTIVE AREA(ACRES) =      1.03    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.0       PEAK FLOW RATE(CFS) =       2.78
```

```
  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =  10.64
  FLOW VELOCITY(FEET/SEC.) =  2.46   DEPTH*VELOCITY(FT*FT/SEC.) =   0.79
  LONGEST FLOWPATH FROM NODE     37.30 TO NODE     37.50 =     454.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.50 TO NODE     37.50 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.74
  RAINFALL INTENSITY(INCH/HR) =   3.13
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       1.03
  TOTAL STREAM AREA(ACRES) =       1.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.78

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        6.04   12.93    2.817  0.21( 0.11) 0.50       2.4      37.60
      2        2.78   10.74    3.129  0.25( 0.12) 0.50       1.0      37.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        8.38   10.74    3.129  0.23( 0.11) 0.50       3.0      37.30
      2        8.54   12.93    2.817  0.22( 0.11) 0.50       3.4      37.60

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       8.54    Tc(MIN.) =    12.93
  EFFECTIVE AREA(ACRES) =       3.43   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       3.4
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.50 =     960.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.50 TO NODE     37.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   708.00  DOWNSTREAM(FEET) =   693.80
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.11
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.54
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   13.06
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.20 =    1080.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        8.38   10.87    3.108  0.23( 0.11) 0.50       3.0      37.30
      2        8.54   13.06    2.802  0.22( 0.11) 0.50       3.4      37.60
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.20 =    1080.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      255.18   19.08    2.261  0.27( 0.07) 0.27     125.0       1.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      210.09   10.87    3.108  0.27( 0.07) 0.28      74.2      37.30
      2      226.40   13.06    2.802  0.27( 0.07) 0.28      89.0      37.60
      3      262.00   19.08    2.261  0.27( 0.07) 0.27     128.4       1.00
    TOTAL AREA(ACRES) =       282.2

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      262.00  Tc(MIN.) =   19.076
  EFFECTIVE AREA(ACRES) =    128.41  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      282.2
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     37.20 TO NODE     47.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.80  DOWNSTREAM(FEET) =   691.30
```

```
  FLOW LENGTH(FEET) =   487.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  53.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.54
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     262.00
  PIPE TRAVEL TIME(MIN.) =   0.70    Tc(MIN.) =   19.78
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     47.31 TO NODE     47.32 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    718.50  DOWNSTREAM(FEET) =    712.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.679
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.530
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.63      0.30     0.500    56    8.68
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.92
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      1.92

****************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.32 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.68
  RAINFALL INTENSITY(INCH/HR) =   3.53
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.63
  TOTAL STREAM AREA(ACRES) =       0.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.92

****************************************************************************
  FLOW PROCESS FROM NODE     47.33 TO NODE     47.32 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   282.00
  ELEVATION DATA: UPSTREAM(FEET) =    715.00  DOWNSTREAM(FEET) =    712.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.219
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.412
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.86      0.30     0.500    56    9.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.52
  TOTAL AREA(ACRES) =      0.86   PEAK FLOW RATE(CFS) =      2.52

****************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.32 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.22
  RAINFALL INTENSITY(INCH/HR) =   3.41
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.86
  TOTAL STREAM AREA(ACRES) =       0.86
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.52

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        1.92    8.68    3.530  0.30( 0.15) 0.50       0.6      47.31
      2        2.52    9.22    3.412  0.30( 0.15) 0.50       0.9      47.33

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        4.38    8.68    3.530  0.30( 0.15) 0.50       1.4      47.31
      2        4.37    9.22    3.412  0.30( 0.15) 0.50       1.5      47.33

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       4.38    Tc(MIN.) =     8.68
```

```
  EFFECTIVE AREA(ACRES) =       1.44   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.5
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.32 =     330.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.34 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.00  DOWNSTREAM(FEET) =   698.50
  FLOW LENGTH(FEET) =   102.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.17
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.38
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =    9.09
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.34 =     432.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.34 TO NODE     47.34 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.440
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.38      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.06      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.44      SUBAREA RUNOFF(CFS) =    1.31
  EFFECTIVE AREA(ACRES) =      1.88   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.9       PEAK FLOW RATE(CFS) =       5.57

****************************************************************************
  FLOW PROCESS FROM NODE     47.34 TO NODE     47.35 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   698.50  DOWNSTREAM(FEET) =   697.50
  FLOW LENGTH(FEET) =   194.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.47
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.57
  PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =    9.81
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.35 =     626.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.81
  RAINFALL INTENSITY(INCH/HR) =   3.29
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       1.88
  TOTAL STREAM AREA(ACRES) =       1.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.57

****************************************************************************
  FLOW PROCESS FROM NODE     47.36 TO NODE     47.35 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   275.00
  ELEVATION DATA: UPSTREAM(FEET) =    713.50  DOWNSTREAM(FEET) =    711.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.418
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.371
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.72      0.30     0.500    56    9.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.09
  TOTAL AREA(ACRES) =      0.72   PEAK FLOW RATE(CFS) =      2.09

****************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.42
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.371
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.66      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.12      0.20     0.500    75
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.78      SUBAREA RUNOFF(CFS) =    2.27
  EFFECTIVE AREA(ACRES) =      1.50   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.5       PEAK FLOW RATE(CFS) =       4.35

****************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.42
  RAINFALL INTENSITY(INCH/HR) =   3.37
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       1.50
  TOTAL STREAM AREA(ACRES) =       1.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.35

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        5.57    9.81    3.294  0.30( 0.15) 0.50       1.9      47.31
      1        5.53   10.35    3.196  0.30( 0.15) 0.50       1.9      47.33
      2        4.35    9.42    3.371  0.29( 0.15) 0.50       1.5      47.36

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        9.83    9.42    3.371  0.29( 0.15) 0.50       3.3      47.36
      2        9.82    9.81    3.294  0.29( 0.15) 0.50       3.4      47.31
      3        9.64   10.35    3.196  0.29( 0.15) 0.50       3.4      47.33

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       9.83    Tc(MIN.) =     9.42
  EFFECTIVE AREA(ACRES) =       3.30   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.4
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.35 =     626.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.37 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   697.60  DOWNSTREAM(FEET) =   696.00
  FLOW LENGTH(FEET) =   293.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.21
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.83
  PIPE TRAVEL TIME(MIN.) =   0.94    Tc(MIN.) =   10.35
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.37 =     919.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.37 TO NODE     47.37 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.35
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.195
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.67      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.12      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.79      SUBAREA RUNOFF(CFS) =    2.17
  EFFECTIVE AREA(ACRES) =      4.09   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.2       PEAK FLOW RATE(CFS) =      11.23

****************************************************************************
  FLOW PROCESS FROM NODE     47.37 TO NODE     47.37 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.35
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.195
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.09      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.60      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.69      SUBAREA RUNOFF(CFS) =    1.92
  EFFECTIVE AREA(ACRES) =      4.78   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.9       PEAK FLOW RATE(CFS) =      13.15

****************************************************************************
  FLOW PROCESS FROM NODE     47.37 TO NODE     47.30 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =   695.20
  FLOW LENGTH(FEET) =   158.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.47
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.15
  PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =   10.84
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.30 =    1077.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.30 TO NODE     47.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.84
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.114
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.28      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    0.76
  EFFECTIVE AREA(ACRES) =      5.06   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        5.2       PEAK FLOW RATE(CFS) =      13.56

****************************************************************************
  FLOW PROCESS FROM NODE     47.30 TO NODE     47.40 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.20  DOWNSTREAM(FEET) =   694.60
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.36
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.56
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =   11.22
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.40 =    1202.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.40 TO NODE     47.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.22
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.052
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.19      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.50
  EFFECTIVE AREA(ACRES) =      5.25   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =      13.79

****************************************************************************
  FLOW PROCESS FROM NODE     47.40 TO NODE     47.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.60  DOWNSTREAM(FEET) =   694.40
  FLOW LENGTH(FEET) =    41.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.41
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.79
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   11.35
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.50 =    1243.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.50 TO NODE     47.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.35
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.033
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.05      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.45      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.50      SUBAREA RUNOFF(CFS) =    3.96
  EFFECTIVE AREA(ACRES) =      6.75   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        6.9       PEAK FLOW RATE(CFS) =      17.65

****************************************************************************
  FLOW PROCESS FROM NODE     47.50 TO NODE     47.60 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.40  DOWNSTREAM(FEET) =   693.50
```

```
  FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.86
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.65
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   11.86
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.60 =    1423.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.60 TO NODE     47.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.86
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.958
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        1.55      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     1.55      SUBAREA RUNOFF(CFS) =     3.99
  EFFECTIVE AREA(ACRES) =      8.30   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        8.4       PEAK FLOW RATE(CFS) =      21.18

****************************************************************************
  FLOW PROCESS FROM NODE     47.60 TO NODE     47.70 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.50  DOWNSTREAM(FEET) =   693.30
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.18
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.18
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   11.97
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.70 =    1463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.70 TO NODE     47.70 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.97
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.943
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.04      0.25     0.500    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        1.57      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     1.61      SUBAREA RUNOFF(CFS) =     4.12
  EFFECTIVE AREA(ACRES) =      9.91   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       10.0       PEAK FLOW RATE(CFS) =      25.19

****************************************************************************
  FLOW PROCESS FROM NODE     47.70 TO NODE     47.80 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.30  DOWNSTREAM(FEET) =   692.50
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.19
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.19
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   12.43
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.80 =    1633.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.80 TO NODE     47.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.43
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.881
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.60      0.25     0.500    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.94      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     1.54      SUBAREA RUNOFF(CFS) =     3.84
  EFFECTIVE AREA(ACRES) =     11.45   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       11.6       PEAK FLOW RATE(CFS) =      28.48

****************************************************************************
  FLOW PROCESS FROM NODE     47.80 TO NODE     47.90 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.50  DOWNSTREAM(FEET) =   692.30
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.2 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.32
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.48
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   12.50
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.90 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.90 TO NODE     47.90 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.872
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        1.43      0.25     0.500    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.14      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     1.57      SUBAREA RUNOFF(CFS) =     3.88
  EFFECTIVE AREA(ACRES) =     13.02   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =      32.27

****************************************************************************
  FLOW PROCESS FROM NODE     47.90 TO NODE     47.91 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.30  DOWNSTREAM(FEET) =   692.10
  FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  25.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.48
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      32.27
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   12.61
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.91 =    1707.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.91 TO NODE     47.91 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.61
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.858
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        1.89      0.25     0.500    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        1.30      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     3.19      SUBAREA RUNOFF(CFS) =     7.87
  EFFECTIVE AREA(ACRES) =     16.21   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      39.98

****************************************************************************
  FLOW PROCESS FROM NODE     47.91 TO NODE     47.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.10  DOWNSTREAM(FEET) =   691.30
  FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.02
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      39.98
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   13.01
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.00 =    1874.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1       39.98   13.01    2.808  0.24( 0.12) 0.50       16.2       47.36
      2       39.44   13.40    2.761  0.24( 0.12) 0.50       16.3       47.31
      3       38.59   13.95    2.698  0.24( 0.12) 0.50       16.3       47.33
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.00 =    1874.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      210.09   11.61    2.994  0.27( 0.07) 0.28       74.2       37.30
      2      226.40   13.80    2.715  0.27( 0.07) 0.28       89.0       37.60
      3      262.00   19.78    2.215  0.27( 0.07) 0.27      128.4        1.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      248.25   11.61    2.994  0.26( 0.08) 0.31       88.7       37.30
      2      260.45   13.01    2.808  0.26( 0.08) 0.31       99.8       47.36
      3      262.85   13.40    2.761  0.26( 0.08) 0.31      102.6       47.31
      4      265.23   13.80    2.715  0.26( 0.08) 0.31      105.3       37.60
      5      265.91   13.95    2.698  0.26( 0.08) 0.31      106.3       47.33
```

```
      6      293.36   19.78    2.215  0.26( 0.08) 0.30     144.7       1.00
    TOTAL AREA(ACRES) =       298.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      293.36  Tc(MIN.) =   19.779
  EFFECTIVE AREA(ACRES) =    144.75  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      298.5
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     48.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   691.30  DOWNSTREAM(FEET) =   691.10
  FLOW LENGTH(FEET) =    61.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  81.0 INCH PIPE IS  61.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.00
  ESTIMATED PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     293.36
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   19.88
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     48.60 TO NODE     48.61 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    712.40  DOWNSTREAM(FEET) =    707.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.660
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.535
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.05      0.30     0.400    56    8.66
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.02      0.25     0.400    69    8.66
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.69      0.20     0.400    75    8.66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      2.36
  TOTAL AREA(ACRES) =      0.76   PEAK FLOW RATE(CFS) =      2.36

****************************************************************************
  FLOW PROCESS FROM NODE     48.61 TO NODE     48.70 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  707.00  DOWNSTREAM ELEVATION(FEET) =  698.80
  STREET LENGTH(FEET) =   346.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.39
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =   10.13
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.27
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.01
  STREET FLOW TRAVEL TIME(MIN.) =   1.76   Tc(MIN.) =   10.42
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.183
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.46      0.25     0.400    69
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.28      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.74      SUBAREA RUNOFF(CFS) =    2.06
  EFFECTIVE AREA(ACRES) =      1.50    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       4.18

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  11.14
  FLOW VELOCITY(FEET/SEC.) =  3.40   DEPTH*VELOCITY(FT*FT/SEC.) =   1.12
  LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.70 =     676.00 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     48.70 TO NODE     48.70 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.42
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.183
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C        0.59      0.25      0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.59      SUBAREA RUNOFF(CFS) =     1.68
 EFFECTIVE AREA(ACRES) =      2.09   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.32
 TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       5.86

****************************************************************************
 FLOW PROCESS FROM NODE     48.71 TO NODE     48.71 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.42
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.183
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      B        0.09      0.30      0.400    56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      C        0.47      0.25      0.400    69
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      D        0.80      0.20      0.400    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     1.36      SUBAREA RUNOFF(CFS) =     3.79
 EFFECTIVE AREA(ACRES) =      3.45   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =        3.4       PEAK FLOW RATE(CFS) =       9.64

****************************************************************************
 FLOW PROCESS FROM NODE     48.70 TO NODE     48.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   698.80  DOWNSTREAM(FEET) =   691.10
 FLOW LENGTH(FEET) =   119.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.36
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       9.64
 PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   10.57
 LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.00 =     795.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        9.64   10.57    3.157  0.22( 0.08) 0.35       3.4       48.60
 LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.00 =     795.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      248.25   11.72    2.978  0.26( 0.08) 0.31      88.7       37.30
     2      260.45   13.11    2.795  0.26( 0.08) 0.31      99.8       47.36
     3      262.85   13.51    2.749  0.26( 0.08) 0.31     102.6       47.31
     4      265.23   13.90    2.704  0.26( 0.08) 0.31     105.3       37.60
     5      265.91   14.06    2.687  0.26( 0.08) 0.31     106.3       47.33
     6      293.36   19.88    2.208  0.26( 0.08) 0.30     144.7        1.00
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      247.40   10.57    3.157  0.26( 0.08) 0.32      83.5       48.60
     2      257.33   11.72    2.978  0.26( 0.08) 0.31      92.2       37.30
     3      268.96   13.11    2.795  0.26( 0.08) 0.31     103.3       47.36
     4      271.22   13.51    2.749  0.26( 0.08) 0.31     106.0       47.31
     5      273.45   13.90    2.704  0.26( 0.08) 0.31     108.8       37.60
     6      274.08   14.06    2.687  0.26( 0.08) 0.31     109.8       47.33
     7      300.03   19.88    2.208  0.26( 0.08) 0.30     148.2        1.00
   TOTAL AREA(ACRES) =       302.0

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      300.03  Tc(MIN.) =   19.881
 EFFECTIVE AREA(ACRES) =    148.20  AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.30
 TOTAL AREA(ACRES) =      302.0
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     48.00 TO NODE     49.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   691.10  DOWNSTREAM(FEET) =   689.20
  FLOW LENGTH(FEET) =   384.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  75.0 INCH PIPE IS  58.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.69
  ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     300.03
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   20.43
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     49.00 =   11849.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.43
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.175
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.31      0.30      0.100    56
  COMMERCIAL                  C        0.90      0.25      0.100    69
  COMMERCIAL                  D        0.12      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.33      SUBAREA RUNOFF(CFS) =    2.57
  EFFECTIVE AREA(ACRES) =    149.53   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      303.3       PEAK FLOW RATE(CFS) =     300.03
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   20.43
  RAINFALL INTENSITY(INCH/HR) =   2.17
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.30
  EFFECTIVE STREAM AREA(ACRES) =     149.53
  TOTAL STREAM AREA(ACRES) =     303.28
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     300.03

****************************************************************************
  FLOW PROCESS FROM NODE     61.30 TO NODE     61.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    707.30  DOWNSTREAM(FEET) =    704.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.383
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.601
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  APARTMENTS                  B        0.53      0.30      0.200    56    8.38
  APARTMENTS                  D        0.77      0.20      0.200    75    8.38
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      4.16
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      4.16

****************************************************************************
  FLOW PROCESS FROM NODE     61.20 TO NODE     61.10 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    704.20
  DOWNSTREAM NODE ELEVATION(FEET) =    703.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   119.00
  "V" GUTTER WIDTH(FEET) =   1.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.10000
  MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.477
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                  B        1.30      0.30      0.200    56
  APARTMENTS                  D        0.25      0.20      0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      6.54
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.71
  AVERAGE FLOW DEPTH(FEET) =   0.43   FLOOD WIDTH(FEET) =    8.37
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.53   Tc(MIN.) =    8.92
  SUBAREA AREA(ACRES) =    1.55      SUBAREA RUNOFF(CFS) =    4.77
  EFFECTIVE AREA(ACRES) =    2.85     AREA-AVERAGED Fm(INCH/HR) =   0.05
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   0.20
  TOTAL AREA(ACRES) =        2.8         PEAK FLOW RATE(CFS) =       8.78

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.48   FLOOD WIDTH(FEET) =    9.37
  FLOW VELOCITY(FEET/SEC.) =   3.98   DEPTH*VELOCITY(FT*FT/SEC) =   1.91
  LONGEST FLOWPATH FROM NODE     61.30 TO NODE     61.10 =     449.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.10 TO NODE     49.00 IS CODE =  62
```

Onsite Hydrology Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1 and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61, ***with Detention @ Node 35***

27.5% Reduction

25-Year Storm Proposed Condition

```
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) =  703.00  DOWNSTREAM ELEVATION(FEET) =  699.50
  STREET LENGTH(FEET) =   380.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.88
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.47
    HALFSTREET FLOOD WIDTH(FEET) =   18.97
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.94
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.38
  STREET FLOW TRAVEL TIME(MIN.) =   2.15   Tc(MIN.) =   11.07
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.076
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.26      0.30      0.100    56
  COMMERCIAL                 C        0.25      0.25      0.100    69
  COMMERCIAL                 D        0.29      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    2.20
  EFFECTIVE AREA(ACRES) =      3.65    AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =       9.95

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.47   HALFSTREET FLOOD WIDTH(FEET) =  19.03
  FLOW VELOCITY(FEET/SEC.) =  2.94   DEPTH*VELOCITY(FT*FT/SEC.) =   1.39
  LONGEST FLOWPATH FROM NODE     61.30 TO NODE     49.00 =     829.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.07
  RAINFALL INTENSITY(INCH/HR) =   3.08
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.18
  EFFECTIVE STREAM AREA(ACRES) =       3.65
  TOTAL STREAM AREA(ACRES) =       3.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.95

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1      247.40   11.15    3.064  0.26( 0.08) 0.31      84.8      48.60
      1      257.33   12.29    2.900  0.26( 0.08) 0.31      93.5      37.30
      1      268.96   13.67    2.730  0.26( 0.08) 0.31     104.6      47.36
      1      271.22   14.07    2.686  0.26( 0.08) 0.31     107.4      47.31
      1      273.45   14.47    2.644  0.26( 0.08) 0.31     110.1      37.60
      1      274.08   14.62    2.628  0.26( 0.08) 0.31     111.1      47.33
      1      300.03   20.43    2.175  0.26( 0.08) 0.30     149.5       1.00
      2        9.95   11.07    3.076  0.26( 0.05) 0.18       3.6      61.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1      256.62   11.07    3.076  0.26( 0.08) 0.31      87.9      61.30
      2      257.31   11.15    3.064  0.26( 0.08) 0.31      88.4      48.60
      3      266.71   12.29    2.900  0.26( 0.08) 0.31      97.1      37.30
      4      277.77   13.67    2.730  0.26( 0.08) 0.31     108.3      47.36
      5      279.89   14.07    2.686  0.26( 0.08) 0.31     111.0      47.31
      6      281.98   14.47    2.644  0.26( 0.08) 0.31     113.7      37.60
      7      282.56   14.62    2.628  0.26( 0.08) 0.31     114.8      47.33
      8      307.02   20.43    2.175  0.26( 0.08) 0.30     153.2       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     307.02    Tc(MIN.) =    20.43
  EFFECTIVE AREA(ACRES) =     153.18   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      306.9
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     49.00 =   11849.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     50.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   689.20  DOWNSTREAM(FEET) =   688.90
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  75.0 INCH PIPE IS  57.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.15
  ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     307.02
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   20.51
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     57.10 TO NODE     57.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    714.00  DOWNSTREAM(FEET) =    711.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.278
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.626
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  B        0.42      0.30      0.100    56    8.28
  COMMERCIAL                  D        0.08      0.20      0.100    75    8.28
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.62
  TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      1.62

****************************************************************************
  FLOW PROCESS FROM NODE     57.20 TO NODE     57.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  711.60  DOWNSTREAM ELEVATION(FEET) =  709.00
  STREET LENGTH(FEET) =   130.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.79
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.89
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.64
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.71
    STREET FLOW TRAVEL TIME(MIN.) =   0.82   Tc(MIN.) =    9.10
    *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.437
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
         LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
    COMMERCIAL                  B        0.11      0.30      0.100    56
    SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
    SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
    SUBAREA AREA(ACRES) =    0.11      SUBAREA RUNOFF(CFS) =    0.34
    EFFECTIVE AREA(ACRES) =      0.61    AREA-AVERAGED Fm(INCH/HR) =  0.03
    AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.10
    TOTAL AREA(ACRES) =        0.6        PEAK FLOW RATE(CFS) =       1.87

    END OF SUBAREA STREET FLOW HYDRAULICS:
    DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   8.00
    FLOW VELOCITY(FEET/SEC.) =  2.71   DEPTH*VELOCITY(FT*FT/SEC.) =   0.74
    LONGEST FLOWPATH FROM NODE     57.10 TO NODE     57.00 =     460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.10
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.437
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.29      0.30      0.100    56
  COMMERCIAL                  C        0.02      0.25      0.100    69
  COMMERCIAL                  D        0.34      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.65      SUBAREA RUNOFF(CFS) =    2.00
  EFFECTIVE AREA(ACRES) =      1.26   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       3.87

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.10
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.437
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.33      0.30      0.200    56
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        0.56      0.20      0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
```

```
  SUBAREA AREA(ACRES) =    0.89      SUBAREA RUNOFF(CFS) =    2.72
  EFFECTIVE AREA(ACRES) =      2.15   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.14
  TOTAL AREA(ACRES) =        2.2       PEAK FLOW RATE(CFS) =       6.58

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.10
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.437
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.34      0.30     0.200    56
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.53      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.87      SUBAREA RUNOFF(CFS) =    2.65
  EFFECTIVE AREA(ACRES) =      3.02   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =        3.0       PEAK FLOW RATE(CFS) =       9.24

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     58.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.00  DOWNSTREAM(FEET) =   702.50
  FLOW LENGTH(FEET) =   633.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.48
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.24
  PIPE TRAVEL TIME(MIN.) =   1.63    Tc(MIN.) =   10.73
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     58.00 =    1093.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.73
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.132
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        1.93      0.30     0.200    56
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.46      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    2.39      SUBAREA RUNOFF(CFS) =    6.62
  EFFECTIVE AREA(ACRES) =      5.41   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =      15.02

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.73
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.132
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        1.60      0.30     0.200    56
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.76      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    2.36      SUBAREA RUNOFF(CFS) =    6.54
  EFFECTIVE AREA(ACRES) =      7.77   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =      21.56

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   702.50  DOWNSTREAM(FEET) =   700.00
  FLOW LENGTH(FEET) =    67.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.22
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.56
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   10.81
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     58.10 =    1160.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     58.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.81
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.118
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        1.94      0.30     0.200    56
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       C        0.82      0.25     0.200    69
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        4.28      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    7.04      SUBAREA RUNOFF(CFS) =   19.46
  EFFECTIVE AREA(ACRES) =     14.81   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       14.8       PEAK FLOW RATE(CFS) =      40.92

****************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     58.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.81
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.118
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       C        3.80      0.25     0.200    69
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        2.64      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    6.44      SUBAREA RUNOFF(CFS) =   17.80
  EFFECTIVE AREA(ACRES) =     21.25   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       21.2       PEAK FLOW RATE(CFS) =      58.72

****************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     59.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   700.00  DOWNSTREAM(FEET) =   699.50
  FLOW LENGTH(FEET) =   139.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  32.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.00
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      58.72
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   11.14
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.00 =    1299.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.14
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.065
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.44      0.30     0.100    56
  COMMERCIAL                 D        0.18      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.62      SUBAREA RUNOFF(CFS) =    1.70
  EFFECTIVE AREA(ACRES) =     21.87   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       21.9       PEAK FLOW RATE(CFS) =      59.41

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.50  DOWNSTREAM(FEET) =   699.10
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.03
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      59.41
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.25
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.10 =    1355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     59.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.25
  RAINFALL INTENSITY(INCH/HR) =   3.05
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  0.19
  EFFECTIVE STREAM AREA(ACRES) =      21.87
  TOTAL STREAM AREA(ACRES) =      21.87
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      59.41

****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     50.10 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    83.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
```

```
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.01      0.30      0.100    56
  COMMERCIAL                  C        0.06      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.30
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.30

****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     50.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.08      0.30      0.100    56
  COMMERCIAL                  C        0.01      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.39
  EFFECTIVE AREA(ACRES) =      0.16   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.2       PEAK FLOW RATE(CFS) =       0.69

****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     59.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.00  DOWNSTREAM(FEET) =   699.10
  FLOW LENGTH(FEET) =   481.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.70
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.69
  PIPE TRAVEL TIME(MIN.) =   1.71    Tc(MIN.) =    6.71
  LONGEST FLOWPATH FROM NODE     50.10 TO NODE     59.10 =     564.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     59.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.71
  RAINFALL INTENSITY(INCH/HR) =   4.09
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.28
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.16
  TOTAL STREAM AREA(ACRES) =       0.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.69

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       59.41   11.25    3.049  0.24( 0.05) 0.19      21.9      57.10
      2        0.69    6.71    4.085  0.28( 0.03) 0.10       0.2      50.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       48.35    6.71    4.085  0.24( 0.05) 0.19      13.2      50.10
      2       59.92   11.25    3.049  0.24( 0.05) 0.19      22.0      57.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      59.92    Tc(MIN.) =    11.25
  EFFECTIVE AREA(ACRES) =      22.03   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       22.0
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.10 =    1355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     50.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.10  DOWNSTREAM(FEET) =   688.90
  FLOW LENGTH(FEET) =    28.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  38.80
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      59.92
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.26
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     50.00 =    1383.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
```

```
    1       48.35    6.72    4.081  0.24( 0.05) 0.19      13.2      50.10
    2       59.92   11.26    3.047  0.24( 0.05) 0.19      22.0      57.10
LONGEST FLOWPATH FROM NODE     57.10 TO NODE     50.00 =    1383.00 FEET.

** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM        Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
 NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1      256.62   11.15    3.063  0.26( 0.08) 0.31      87.9      61.30
    2      257.31   11.23    3.051  0.26( 0.08) 0.31      88.4      48.60
    3      266.71   12.37    2.889  0.26( 0.08) 0.31      97.1      37.30
    4      277.77   13.75    2.721  0.26( 0.08) 0.31     108.3      47.36
    5      279.89   14.15    2.678  0.26( 0.08) 0.31     111.0      47.31
    6      281.98   14.54    2.636  0.26( 0.08) 0.31     113.7      37.60
    7      282.56   14.70    2.620  0.26( 0.08) 0.31     114.8      47.33
    8      307.02   20.51    2.170  0.26( 0.08) 0.30     153.2       1.00
LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

** PEAK FLOW RATE TABLE **
 STREAM        Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
 NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1      255.66    6.72    4.081  0.26( 0.07) 0.28      66.1      50.10
    2      316.27   11.15    3.063  0.26( 0.07) 0.28     109.7      61.30
    3      317.16   11.23    3.051  0.26( 0.07) 0.28     110.4      48.60
    4      317.46   11.26    3.047  0.26( 0.07) 0.28     110.7      57.10
    5      323.48   12.37    2.889  0.26( 0.07) 0.29     119.2      37.30
    6      331.18   13.75    2.721  0.26( 0.07) 0.29     130.3      47.36
    7      332.43   14.15    2.678  0.26( 0.07) 0.29     133.0      47.31
    8      333.69   14.54    2.636  0.26( 0.07) 0.29     135.8      37.60
    9      333.96   14.70    2.620  0.26( 0.07) 0.29     136.8      47.33
   10      349.43   20.51    2.170  0.26( 0.07) 0.28     175.2       1.00
  TOTAL AREA(ACRES) =      329.0

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     349.43  Tc(MIN.) =   20.505
 EFFECTIVE AREA(ACRES) =    175.21  AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      329.0
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     50.00 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   688.90  DOWNSTREAM(FEET) =   675.00
 FLOW LENGTH(FEET) =   437.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  42.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  24.57
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     349.43
 PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   20.80
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     61.00 =   12342.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   20.80
 RAINFALL INTENSITY(INCH/HR) =   2.15
 AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.26
 AREA-AVERAGED Ap =  0.28
 EFFECTIVE STREAM AREA(ACRES) =     175.21
 TOTAL STREAM AREA(ACRES) =     328.96
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     349.43

****************************************************************************
 FLOW PROCESS FROM NODE     48.10 TO NODE     48.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    712.40  DOWNSTREAM(FEET) =    709.70

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.947
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.268
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        0.15      0.30      0.400    56    9.95
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        0.34      0.20      0.400    75    9.95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA RUNOFF(CFS) =      1.40
 TOTAL AREA(ACRES) =      0.49   PEAK FLOW RATE(CFS) =      1.40

****************************************************************************
 FLOW PROCESS FROM NODE     48.20 TO NODE     48.30 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  709.70  DOWNSTREAM ELEVATION(FEET) =  703.80
 STREET LENGTH(FEET) =   500.00   CURB HEIGHT(INCHES) =  6.0
```

```
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.99
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.33
   HALFSTREET FLOOD WIDTH(FEET) =   11.14
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.43
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.80
 STREET FLOW TRAVEL TIME(MIN.) =   3.42   Tc(MIN.) =   13.37
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.764
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       C        0.64      0.25     0.400    69
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        0.68      0.20     0.400    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =    1.32      SUBAREA RUNOFF(CFS) =    3.18
 EFFECTIVE AREA(ACRES) =      1.81    AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =        1.8        PEAK FLOW RATE(CFS) =       4.36

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  13.07
 FLOW VELOCITY(FEET/SEC.) =  2.64   DEPTH*VELOCITY(FT*FT/SEC.) =   0.96
 LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.30 =     830.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     48.30 TO NODE     48.40 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  703.80  DOWNSTREAM ELEVATION(FEET) =  700.20
 STREET LENGTH(FEET) =   522.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.07
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.43
   HALFSTREET FLOOD WIDTH(FEET) =   16.63
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.34
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.00
 STREET FLOW TRAVEL TIME(MIN.) =   3.71   Tc(MIN.) =   17.09
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.406
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       C        0.93      0.25     0.400    69
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        0.71      0.20     0.400    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =    1.64      SUBAREA RUNOFF(CFS) =    3.42
 EFFECTIVE AREA(ACRES) =      3.45    AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =        3.4        PEAK FLOW RATE(CFS) =       7.19

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  17.85
 FLOW VELOCITY(FEET/SEC.) =  2.42   DEPTH*VELOCITY(FT*FT/SEC.) =   1.09
 LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.40 =    1352.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     48.40 TO NODE     48.40 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.09
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.406
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       C        0.44      0.25     0.400    69
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        0.46      0.20     0.400    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    1.88
 EFFECTIVE AREA(ACRES) =      4.35   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =        4.3        PEAK FLOW RATE(CFS) =       9.07

****************************************************************************
 FLOW PROCESS FROM NODE     48.40 TO NODE     48.50 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   700.20  DOWNSTREAM(FEET) =   699.80
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.96
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.07
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   17.35
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.50 =    1432.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.50 TO NODE     48.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.35
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.385
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.16      0.30     0.400    56
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        1.49      0.25     0.400    69
  PUBLIC PARK                 C        0.26      0.25     0.850    69
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.88      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.442
  SUBAREA AREA(ACRES) =    2.79      SUBAREA RUNOFF(CFS) =    5.72
  EFFECTIVE AREA(ACRES) =      7.14   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =        7.1       PEAK FLOW RATE(CFS) =      14.71

****************************************************************************
  FLOW PROCESS FROM NODE     48.50 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.80  DOWNSTREAM(FEET) =   675.00
  FLOW LENGTH(FEET) =   425.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH)  INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.30
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.71
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =   17.85
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     61.00 =    1857.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.85
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.347
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 B        1.98      0.30     0.850    56
  PUBLIC PARK                 D        1.67      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    3.65      SUBAREA RUNOFF(CFS) =    7.00
  EFFECTIVE AREA(ACRES) =     10.79   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =       10.8       PEAK FLOW RATE(CFS) =      21.47

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   17.85
  RAINFALL INTENSITY(INCH/HR) =   2.35
  AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =      10.79
  TOTAL STREAM AREA(ACRES) =      10.79
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      21.47

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      255.66    7.04    3.975  0.26( 0.07) 0.28      66.1       50.10
      1      316.27   11.46    3.017  0.26( 0.07) 0.28     109.7       61.30
      1      317.16   11.54    3.005  0.26( 0.07) 0.28     110.4       48.60
      1      317.46   11.56    3.001  0.26( 0.07) 0.28     110.7       57.10
      1      323.48   12.67    2.850  0.26( 0.07) 0.29     119.2       37.30
      1      331.18   14.06    2.687  0.26( 0.07) 0.29     130.3       47.36
      1      332.43   14.45    2.645  0.26( 0.07) 0.29     133.0       47.31
      1      333.69   14.84    2.606  0.26( 0.07) 0.29     135.8       37.60
      1      333.96   15.00    2.590  0.26( 0.07) 0.29     136.8       47.33
      1      349.43   20.80    2.153  0.26( 0.07) 0.28     175.2        1.00
      2       21.47   17.85    2.347  0.24( 0.14) 0.56      10.8       48.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
```

NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)		(ACRES)	NODE
1	270.35	7.04	3.975	0.25(0.08)	0.30	70.4	50.10
2	334.22	11.46	3.017	0.25(0.08)	0.30	116.6	61.30
3	335.16	11.54	3.005	0.25(0.08)	0.30	117.4	48.60
4	335.47	11.56	3.001	0.25(0.08)	0.30	117.7	57.10
5	342.18	12.67	2.850	0.25(0.08)	0.30	126.8	37.30
6	350.68	14.06	2.687	0.25(0.08)	0.30	138.8	47.36
7	352.15	14.45	2.645	0.25(0.08)	0.30	141.8	47.31
8	353.62	14.84	2.606	0.25(0.08)	0.30	144.7	37.60
9	353.97	15.00	2.590	0.26(0.08)	0.30	145.9	47.33
10	363.03	17.85	2.347	0.26(0.08)	0.30	166.5	48.10
11	369.01	20.80	2.153	0.26(0.08)	0.30	186.0	1.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 369.01 Tc(MIN.) = 20.80
EFFECTIVE AREA(ACRES) = 186.00 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.30
TOTAL AREA(ACRES) = 339.8
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 61.00 = 12342.00 FEET.

==========

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 339.8 TC(MIN.) = 20.80
EFFECTIVE AREA(ACRES) = 186.00 AREA-AVERAGED Fm(INCH/HR)= 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.299
PEAK FLOW RATE(CFS) = 369.01

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)		Ap (ACRES)	Ae	HEADWATER NODE
1	270.35	7.04	3.975	0.25(0.08)	0.30	70.4		50.10
2	334.22	11.46	3.017	0.25(0.08)	0.30	116.6		61.30
3	335.16	11.54	3.005	0.25(0.08)	0.30	117.4		48.60
4	335.47	11.56	3.001	0.25(0.08)	0.30	117.7		57.10
5	342.18	12.67	2.850	0.25(0.08)	0.30	126.8		37.30
6	350.68	14.06	2.687	0.25(0.08)	0.30	138.8		47.36
7	352.15	14.45	2.645	0.25(0.08)	0.30	141.8		47.31
8	353.62	14.84	2.606	0.25(0.08)	0.30	144.7		37.60
9	353.97	15.00	2.590	0.26(0.08)	0.30	145.9		47.33
10	363.03	17.85	2.347	0.26(0.08)	0.30	166.5		48.10
11	369.01	20.80	2.153	0.26(0.08)	0.30	186.0		1.00

==========

==========

END OF RATIONAL METHOD ANALYSIS

```
******************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                *
* OFFSITE & ONSITE PROP. CONDITION @ 100-YEAR STORM WITH DETENTION NODE 35 *
* W.O. #1443-136X, 32.4% REDUCTION                                     *
 ************************************************************************

  FILE NAME: DET_100.DAT
  TIME/DATE OF STUDY: 10:18 06/10/2019
==============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   18.0      13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  2   20.0      15.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

******************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1099.00  DOWNSTREAM(FEET) =   1091.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.370
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.605
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.78      0.25      0.600    86    8.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      3.13
  TOTAL AREA(ACRES) =      0.78   PEAK FLOW RATE(CFS) =      3.13

******************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) = 1091.20  DOWNSTREAM ELEVATION(FEET) = 1089.40
  STREET LENGTH(FEET) =    90.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.80
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   14.90
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.71
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.47
  STREET FLOW TRAVEL TIME(MIN.) =   0.40   Tc(MIN.) =    8.78
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.483
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.38      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    9.33
  EFFECTIVE AREA(ACRES) =      3.16    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.52
```

Onsite Hydrology Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1 and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61, ***with Detention @ Node 35***

32.4% Reduction

100-Year Storm Proposed Condition

```
  TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =      12.38

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  17.85
  FLOW VELOCITY(FEET/SEC.) =  4.17   DEPTH*VELOCITY(FT*FT/SEC.) =   1.87
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1089.40  DOWNSTREAM ELEVATION(FEET) = 1067.00
  STREET LENGTH(FEET) =   513.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.44
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.41
    HALFSTREET FLOOD WIDTH(FEET) =   15.82
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.71
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.35
  STREET FLOW TRAVEL TIME(MIN.) =   1.50   Tc(MIN.) =   10.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.095
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.34      0.25      0.100    86
  PUBLIC PARK                C        0.25      0.25      0.850    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.418
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    2.12
  EFFECTIVE AREA(ACRES) =      3.75    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =      13.39

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  15.82
  FLOW VELOCITY(FEET/SEC.) =  5.69   DEPTH*VELOCITY(FT*FT/SEC.) =   2.34
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     903.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.095
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.35      0.25      0.100    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.49      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.333
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    3.03
  EFFECTIVE AREA(ACRES) =      4.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =      16.43

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1067.00  DOWNSTREAM(FEET) =  1062.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.79
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.43
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   10.39
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1003.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.39
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.068
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.09      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.09      SUBAREA RUNOFF(CFS) =    7.42
  EFFECTIVE AREA(ACRES) =      6.68   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        6.7        PEAK FLOW RATE(CFS) =      23.73

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1062.00  DOWNSTREAM(FEET) =  1022.40
  FLOW LENGTH(FEET) =   701.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.89
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.73
  PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =   11.13
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1704.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.13
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.912
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.18      0.30      0.100    76
  COMMERCIAL                  C        0.46      0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.64      SUBAREA RUNOFF(CFS) =    2.24
  EFFECTIVE AREA(ACRES) =      7.32   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        7.3       PEAK FLOW RATE(CFS) =      25.03

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.40  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.49
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.03
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   11.38
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.38
  RAINFALL INTENSITY(INCH/HR) =   3.86
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       7.32
  TOTAL STREAM AREA(ACRES) =       7.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      25.03

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   305.00
  ELEVATION DATA: UPSTREAM(FEET) =   1046.00  DOWNSTREAM(FEET) =   1042.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.129
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.049
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  C        1.00      0.25      0.100    86    7.13
  RESIDENTIAL
  ".4 DWELLING/ACRE"          C        0.50      0.25      0.900    86   11.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
  SUBAREA RUNOFF(CFS) =      6.69
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      6.69

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1042.00  DOWNSTREAM ELEVATION(FEET) = 1036.00
  STREET LENGTH(FEET) =   373.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL) =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.09
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   14.50
```

```
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.28
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.27
 STREET FLOW TRAVEL TIME(MIN.) =   1.90   Tc(MIN.) =    9.03
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.411
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        3.31      0.25     0.500    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    3.31      SUBAREA RUNOFF(CFS) =   12.77
 EFFECTIVE AREA(ACRES) =      4.81    AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =        4.8        PEAK FLOW RATE(CFS) =      18.60

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  16.63
 FLOW VELOCITY(FEET/SEC.) =  3.59   DEPTH*VELOCITY(FT*FT/SEC.) =   1.53
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     678.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1036.00  DOWNSTREAM ELEVATION(FEET) = 1026.00
 STREET LENGTH(FEET) =   463.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      22.75
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.43
   HALFSTREET FLOOD WIDTH(FEET) =   17.04
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.19
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.82
 STREET FLOW TRAVEL TIME(MIN.) =   1.84   Tc(MIN.) =   10.87
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.966
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        2.40      0.25     0.500    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    8.30
 EFFECTIVE AREA(ACRES) =      7.21    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =      24.97

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  17.64
 FLOW VELOCITY(FEET/SEC.) =  4.30   DEPTH*VELOCITY(FT*FT/SEC.) =   1.91
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1141.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.87
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.966
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.16      0.30     0.500    76
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        2.22      0.25     0.500    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    8.22
 EFFECTIVE AREA(ACRES) =      9.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =        9.6        PEAK FLOW RATE(CFS) =      33.19

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1026.00  DOWNSTREAM(FEET) =  1022.00
 FLOW LENGTH(FEET) =   395.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.95
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      33.19
 PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =   11.60
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1536.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.60
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.820
```

```
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.07      0.30      0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        4.06      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     4.13      SUBAREA RUNOFF(CFS) =   13.73
  EFFECTIVE AREA(ACRES) =     13.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       13.7       PEAK FLOW RATE(CFS) =      45.66

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.00  DOWNSTREAM(FEET) =  1020.00
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.30
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      45.66
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   11.79
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.79
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.785
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.55      0.30      0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        2.06      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     2.61      SUBAREA RUNOFF(CFS) =    8.59
  EFFECTIVE AREA(ACRES) =     16.33   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      53.82

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1020.00  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.83
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      53.82
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   12.12
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    1799.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.12
  RAINFALL INTENSITY(INCH/HR) =   3.73
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =      16.33
  TOTAL STREAM AREA(ACRES) =      16.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      53.82

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       25.03   11.38    3.863  0.25( 0.11) 0.45       7.3       1.00
      2       53.82   12.12    3.725  0.25( 0.12) 0.49      16.3       8.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       77.47   11.38    3.863  0.25( 0.12) 0.48      22.6       1.00
      2       77.93   12.12    3.725  0.25( 0.12) 0.48      23.6       8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      77.93    Tc(MIN.) =    12.12
  EFFECTIVE AREA(ACRES) =      23.65   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =      23.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1019.50  DOWNSTREAM(FEET) =  1014.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.77
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      77.93
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   12.27
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.10 =    2014.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   12.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.700
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.15      0.30      0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.15      SUBAREA RUNOFF(CFS) =     0.50
  EFFECTIVE AREA(ACRES) =     23.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       23.8       PEAK FLOW RATE(CFS) =      77.93
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   12.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.700
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.16      0.30      0.100    76
  COMMERCIAL                  C        1.44      0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     5.29
  EFFECTIVE AREA(ACRES) =     25.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       25.4       PEAK FLOW RATE(CFS) =      81.99

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1014.00  DOWNSTREAM(FEET) =   971.40
  FLOW LENGTH(FEET) =   863.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.04
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      81.99
  PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =   12.98
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    2877.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   12.98
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.581
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.82      0.30      0.100    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.77      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.294
  SUBAREA AREA(ACRES) =     1.59      SUBAREA RUNOFF(CFS) =     5.02
  EFFECTIVE AREA(ACRES) =     26.99   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       27.0       PEAK FLOW RATE(CFS) =      84.29

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   971.40  DOWNSTREAM(FEET) =   969.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.92
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      84.29
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   13.01
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    2917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   13.01
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.577
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
```

```
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        2.46      0.30      0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C       10.48      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   12.94      SUBAREA RUNOFF(CFS) =   40.14
  EFFECTIVE AREA(ACRES) =     39.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       39.9       PEAK FLOW RATE(CFS) =     124.32

  ** PEAK FLOW RATE TABLE **
   STREAM       Q       Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      125.50   12.27    3.699  0.25( 0.12) 0.46      38.9       1.00
      2      124.32   13.01    3.577  0.25( 0.12) 0.46      39.9       8.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =     125.50  Tc(MIN.) =   12.27
  AREA-AVERAGED Fm(INCH/HR) =  0.12  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.46  EFFECTIVE AREA(ACRES) =      38.93

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   969.00  DOWNSTREAM(FEET) =   954.00
  FLOW LENGTH(FEET) =   416.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.10
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     125.50
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   12.61
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    3333.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.61
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.641
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        0.77      0.25      0.100    86
  PUBLIC PARK                 C        0.43      0.25      0.850    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.369
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    3.83
  EFFECTIVE AREA(ACRES) =     40.13   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       41.1       PEAK FLOW RATE(CFS) =     127.29

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   954.00  DOWNSTREAM(FEET) =   952.80
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.32
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     127.29
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   12.78
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    3453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.78
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.614
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.88      0.30      0.400    76
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        7.02      0.25      0.400    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    7.90      SUBAREA RUNOFF(CFS) =   24.97
  EFFECTIVE AREA(ACRES) =     48.03   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       49.0       PEAK FLOW RATE(CFS) =     151.30

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   952.80  DOWNSTREAM(FEET) =   929.00
  FLOW LENGTH(FEET) =   636.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.82
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     151.30
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   13.29
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.10 =    4089.00 FEET.

****************************************************************************
```

```
  FLOW PROCESS FROM NODE     17.10 TO NODE     17.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.29
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.534
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.68      0.30      0.500    76
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.89      0.25      0.600    86
  COMMERCIAL                 C        1.86      0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.309
  SUBAREA AREA(ACRES) =    3.43      SUBAREA RUNOFF(CFS) =   10.66
  EFFECTIVE AREA(ACRES) =     51.46   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       52.5       PEAK FLOW RATE(CFS) =     158.50

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   929.00  DOWNSTREAM(FEET) =   926.30
  FLOW LENGTH(FEET) =   122.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  34.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.55
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     158.50
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   13.40
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     18.00 =    4211.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.40
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.517
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS               B       24.46      0.30      0.350    76
  CONDOMINIUMS               C        7.92      0.25      0.350    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =   32.38      SUBAREA RUNOFF(CFS) =   99.55
  EFFECTIVE AREA(ACRES) =     83.84   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       84.8       PEAK FLOW RATE(CFS) =     257.24

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   926.30  DOWNSTREAM(FEET) =   922.70
  FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  42.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.26
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     257.24
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   13.55
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     19.00 =    4384.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.55
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.494
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        1.62      0.30      0.400    76
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        6.09      0.25      0.400    86
  COMMERCIAL                 B        2.90      0.30      0.100    76
  COMMERCIAL                 C        3.15      0.25      0.100    86
  NATURAL POOR COVER
  "GRASS"                    B        0.76      0.30      1.000    93
  NATURAL POOR COVER
  "GRASS"                    C        0.39      0.25      1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
  SUBAREA AREA(ACRES) =   14.91      SUBAREA RUNOFF(CFS) =   45.73
  EFFECTIVE AREA(ACRES) =     98.75   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =       99.8       PEAK FLOW RATE(CFS) =     301.28

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   922.70  DOWNSTREAM(FEET) =   815.60
  FLOW LENGTH(FEET) =  1580.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  34.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  31.69
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =     301.28
  PIPE TRAVEL TIME(MIN.) =   0.83    Tc(MIN.) =   14.38
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     20.00 =    5964.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.38
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.377
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B       19.45      0.30      0.100    76
  COMMERCIAL                 C       16.92      0.25      0.100    86
  COMMERCIAL                 D        0.11      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   36.48      SUBAREA RUNOFF(CFS) =  109.98
  EFFECTIVE AREA(ACRES) =    135.23   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      136.2       PEAK FLOW RATE(CFS) =     400.84

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   815.60  DOWNSTREAM(FEET) =   799.50
  FLOW LENGTH(FEET) =   449.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  45.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.25
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     400.84
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   14.67
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6413.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.340
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.38      0.30      0.100    76
  COMMERCIAL                 C        0.87      0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    9.68
  EFFECTIVE AREA(ACRES) =    138.48   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      139.5       PEAK FLOW RATE(CFS) =     405.93

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.340
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        4.10      0.30      0.100    76
  COMMERCIAL                 C        1.54      0.25      0.100    86
  COMMERCIAL                 D        2.08      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    7.72      SUBAREA RUNOFF(CFS) =   23.02
  EFFECTIVE AREA(ACRES) =    146.20   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      147.2       PEAK FLOW RATE(CFS) =     428.95

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   799.50  DOWNSTREAM(FEET) =   765.50
  FLOW LENGTH(FEET) =  1056.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  47.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.72
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     428.95
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   15.35
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     22.00 =    7469.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.35
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.253
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.06      0.30      0.100    76
  COMMERCIAL                 C        1.74      0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    3.80      SUBAREA RUNOFF(CFS) =   11.03
```

```
  EFFECTIVE AREA(ACRES) =    150.00   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      151.0       PEAK FLOW RATE(CFS) =     428.95
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.35
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.253
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.23      0.30      0.100    76
  COMMERCIAL                 D        5.07      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    5.30      SUBAREA RUNOFF(CFS) =   15.42
  EFFECTIVE AREA(ACRES) =    155.30   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      156.3       PEAK FLOW RATE(CFS) =     444.07

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   765.50  DOWNSTREAM(FEET) =   755.00
  FLOW LENGTH(FEET) =   465.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  50.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.88
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     444.07
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   15.69
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     23.00 =    7934.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.213
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        9.15      0.30      0.100    76
  COMMERCIAL                 C       10.79      0.25      0.100    86
  COMMERCIAL                 D        1.81      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   21.75      SUBAREA RUNOFF(CFS) =   62.37
  EFFECTIVE AREA(ACRES) =    177.05   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =      178.1       PEAK FLOW RATE(CFS) =     500.79

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.213
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        7.47      0.30      0.100    76
  COMMERCIAL                 C        0.40      0.25      0.100    86
  COMMERCIAL                 D       17.76      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   25.63      SUBAREA RUNOFF(CFS) =   73.58
  EFFECTIVE AREA(ACRES) =    202.68   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      203.7       PEAK FLOW RATE(CFS) =     574.38

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   755.00  DOWNSTREAM(FEET) =   736.00
  FLOW LENGTH(FEET) =  1257.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  78.0 INCH PIPE IS  60.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.95
  ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     574.38
  PIPE TRAVEL TIME(MIN.) =   1.00    Tc(MIN.) =   16.69
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.00 =    9191.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.101
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B       16.13      0.30      0.100    76
  COMMERCIAL                 C        3.87      0.25      0.100    86
  COMMERCIAL                 D        4.22      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   24.22      SUBAREA RUNOFF(CFS) =   67.00
  EFFECTIVE AREA(ACRES) =    226.90   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      227.9       PEAK FLOW RATE(CFS) =     621.00

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     30.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   736.00  DOWNSTREAM(FEET) =   720.00
  FLOW LENGTH(FEET) =   212.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  45.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  39.20
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     621.00
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   16.78
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.10 =    9403.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.10 TO NODE     30.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   720.00  DOWNSTREAM(FEET) =   716.00
  FLOW LENGTH(FEET) =   156.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  56.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.92
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     621.00
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   16.88
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    9559.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.88
  RAINFALL INTENSITY(INCH/HR) =   3.08
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.23
  EFFECTIVE STREAM AREA(ACRES) =     226.90
  TOTAL STREAM AREA(ACRES) =     227.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     621.00

****************************************************************************
  FLOW PROCESS FROM NODE     30.20 TO NODE     30.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    740.00  DOWNSTREAM(FEET) =    726.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.494
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.862
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  B        0.42      0.30      0.100    76    5.49
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.20
  TOTAL AREA(ACRES) =      0.42   PEAK FLOW RATE(CFS) =      2.20

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.49
  RAINFALL INTENSITY(INCH/HR) =   5.86
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.42
  TOTAL STREAM AREA(ACRES) =       0.42
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.20

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      621.00   16.88    3.081  0.27( 0.06) 0.23     226.9       1.00
      1      607.40   17.65    3.003  0.27( 0.06) 0.23     227.9       8.00
      2        2.20    5.49    5.862  0.30( 0.03) 0.10       0.4      30.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      390.38    5.49    5.862  0.27( 0.06) 0.23      74.3      30.20
      2      622.15   16.88    3.081  0.27( 0.06) 0.23     227.3       1.00
      3      608.52   17.65    3.003  0.27( 0.06) 0.23     228.3       8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
  PEAK FLOW RATE(CFS) =     622.15    Tc(MIN.) =    16.88
  EFFECTIVE AREA(ACRES) =     227.32   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      228.3
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    9559.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     33.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   716.00  DOWNSTREAM(FEET) =   714.30
  FLOW LENGTH(FEET) =   210.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  90.0 INCH PIPE IS  70.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.88
  ESTIMATED PIPE DIAMETER(INCH) =  90.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     622.15
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   17.09
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     33.00 =    9769.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.09
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.060
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.35      0.30      0.100    76
  COMMERCIAL                  B        0.62      0.30      0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.97      SUBAREA RUNOFF(CFS) =    2.64
  EFFECTIVE AREA(ACRES) =    228.29   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      229.3       PEAK FLOW RATE(CFS) =     622.15
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.30  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =   420.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  84.0 INCH PIPE IS  68.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.58
  ESTIMATED PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     622.15
  PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =   17.47
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     38.00 TO NODE     39.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    730.50  DOWNSTREAM(FEET) =    726.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.427
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.302
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.80      0.30      0.500    76    9.43
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.42      0.20      0.500    91    9.43
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      4.58
  TOTAL AREA(ACRES) =      1.22   PEAK FLOW RATE(CFS) =      4.58

****************************************************************************
  FLOW PROCESS FROM NODE     39.00 TO NODE     40.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  726.20  DOWNSTREAM ELEVATION(FEET) =  719.50
  STREET LENGTH(FEET) =   711.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.19
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.44
```

```
   HALFSTREET FLOOD WIDTH(FEET) =   17.64
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.82
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.26
  STREET FLOW TRAVEL TIME(MIN.) =   4.20   Tc(MIN.) =   13.62
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.484
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        2.40      0.30     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    7.20
  EFFECTIVE AREA(ACRES) =      3.62    AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =      10.88

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  2.87   DEPTH*VELOCITY(FT*FT/SEC.) =   1.29
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.00 =    1041.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.62
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.484
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.93      0.30     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.93      SUBAREA RUNOFF(CFS) =    2.79
  EFFECTIVE AREA(ACRES) =      4.55   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =      13.67

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   719.50  DOWNSTREAM(FEET) =   718.40
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.09
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.67
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   13.73
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.10 =    1096.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.10 TO NODE     40.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.73
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.469
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.19      0.30     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.57
  EFFECTIVE AREA(ACRES) =      4.74   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.7        PEAK FLOW RATE(CFS) =      14.18

****************************************************************************
  FLOW PROCESS FROM NODE     40.10 TO NODE     40.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   718.40  DOWNSTREAM(FEET) =   717.00
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.17
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.18
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   13.82
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.20 =    1151.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     40.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.82
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.456
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.22      0.30     0.850    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.45      0.30     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.615
  SUBAREA AREA(ACRES) =    0.67      SUBAREA RUNOFF(CFS) =    1.97
  EFFECTIVE AREA(ACRES) =      5.41   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.51
```

```
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =      16.10

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     40.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.82
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.456
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)   (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.34      0.30      0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.34      SUBAREA RUNOFF(CFS) =    1.01
  EFFECTIVE AREA(ACRES) =      5.75   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      17.11

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     41.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   717.00  DOWNSTREAM(FEET) =   713.40
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.37
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.11
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   13.98
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.00 =    1266.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.98
  RAINFALL INTENSITY(INCH/HR) =   3.43
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.51
  EFFECTIVE STREAM AREA(ACRES) =       5.75
  TOTAL STREAM AREA(ACRES) =       5.75
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      17.11

****************************************************************************
  FLOW PROCESS FROM NODE     41.20 TO NODE     41.30 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    728.20  DOWNSTREAM(FEET) =    723.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.184
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.367
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)   (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.02      0.30      0.500    76    9.18
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.61      0.20      0.500    91    9.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.42
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      2.42

****************************************************************************
  FLOW PROCESS FROM NODE     41.30 TO NODE     41.40 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  723.30  DOWNSTREAM ELEVATION(FEET) =  718.00
  STREET LENGTH(FEET) =   323.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.85
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   11.55
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.93
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.98
  STREET FLOW TRAVEL TIME(MIN.) =   1.84   Tc(MIN.) =   11.02
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.934
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)   (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.72      0.30      0.400    76
```

```
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.11      0.20     0.400    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.83      SUBAREA RUNOFF(CFS) =    2.85
  EFFECTIVE AREA(ACRES) =      1.46    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       5.03

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  12.97
  FLOW VELOCITY(FEET/SEC.) =  3.10   DEPTH*VELOCITY(FT*FT/SEC.) =   1.12
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.40 =     653.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.40 TO NODE     41.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.02
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.934
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        1.24      0.30     0.400    76
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.03      0.20     0.400    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.27      SUBAREA RUNOFF(CFS) =    4.36
  EFFECTIVE AREA(ACRES) =      2.73    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =        2.7        PEAK FLOW RATE(CFS) =       9.39

****************************************************************************
  FLOW PROCESS FROM NODE     41.40 TO NODE     41.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   718.00  DOWNSTREAM(FEET) =   717.00
  FLOW LENGTH(FEET) =    62.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.84
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.39
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   11.15
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.50 =     715.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.50 TO NODE     41.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.15
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.907
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.09      0.30     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.31
  EFFECTIVE AREA(ACRES) =      2.82   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        2.8        PEAK FLOW RATE(CFS) =       9.64

****************************************************************************
  FLOW PROCESS FROM NODE     41.50 TO NODE     41.51 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   717.00  DOWNSTREAM(FEET) =   715.50
  FLOW LENGTH(FEET) =   154.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.35
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.64
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   11.56
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.51 =     869.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.51 TO NODE     41.51 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.56
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.828
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.44      0.30     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.44      SUBAREA RUNOFF(CFS) =    4.77
  EFFECTIVE AREA(ACRES) =      4.26   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =        4.3        PEAK FLOW RATE(CFS) =      14.20

****************************************************************************
  FLOW PROCESS FROM NODE     41.51 TO NODE     41.60 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =   715.50  DOWNSTREAM(FEET) =   714.90
 FLOW LENGTH(FEET) =    59.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.16
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      14.20
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   11.69
 LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.60 =     928.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     41.60 TO NODE     41.60 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.69
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.803
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        1.06      0.30      0.500    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =     1.06      SUBAREA RUNOFF(CFS) =     3.48
 EFFECTIVE AREA(ACRES) =      5.32   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.45
 TOTAL AREA(ACRES) =        5.3       PEAK FLOW RATE(CFS) =      17.59

****************************************************************************
 FLOW PROCESS FROM NODE     41.60 TO NODE     41.60 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.69
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.803
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        0.47      0.30      0.400    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.47      SUBAREA RUNOFF(CFS) =     1.56
 EFFECTIVE AREA(ACRES) =      5.79   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.45
 TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      19.15

****************************************************************************
 FLOW PROCESS FROM NODE     41.60 TO NODE     41.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   714.90  DOWNSTREAM(FEET) =   713.40
 FLOW LENGTH(FEET) =   148.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.77
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      19.15
 PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   12.01
 LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.00 =    1076.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   12.01
 RAINFALL INTENSITY(INCH/HR) =   3.74
 AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.29
 AREA-AVERAGED Ap =  0.45
 EFFECTIVE STREAM AREA(ACRES) =       5.79
 TOTAL STREAM AREA(ACRES) =       5.79
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      19.15

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1       17.11   13.98    3.432  0.29( 0.15) 0.51        5.8       38.00
     2       19.15   12.01    3.745  0.29( 0.13) 0.45        5.8       41.20

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1       35.24   12.01    3.745  0.29( 0.14) 0.48       10.7       41.20
     2       34.60   13.98    3.432  0.29( 0.14) 0.48       11.5       38.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      35.24    Tc(MIN.) =    12.01
 EFFECTIVE AREA(ACRES) =      10.73   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =       11.5
 LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.00 =    1266.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     41.00 TO NODE     41.80 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   713.40  DOWNSTREAM(FEET) =   712.60
```

```
  FLOW LENGTH(FEET) =    83.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.83
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      35.24
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   12.17
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.80 =    1349.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.17
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.717
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.27      0.30      0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.13      0.20      0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.29
  EFFECTIVE AREA(ACRES) =    11.13   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =      11.9       PEAK FLOW RATE(CFS) =      35.84

****************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.17
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.717
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.21      0.30      0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.01      0.20      0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.22      SUBAREA RUNOFF(CFS) =    0.71
  EFFECTIVE AREA(ACRES) =    11.35   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =      12.2       PEAK FLOW RATE(CFS) =      36.55

****************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.90 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.60  DOWNSTREAM(FEET) =   711.80
  FLOW LENGTH(FEET) =    77.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.17
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      36.55
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   12.31
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.90 =    1426.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.31
  RAINFALL INTENSITY(INCH/HR) =   3.69
  AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.48
  EFFECTIVE STREAM AREA(ACRES) =      11.35
  TOTAL STREAM AREA(ACRES) =      12.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      36.55

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    77.00
  USER SPECIFIED Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.06      0.20      0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =      0.06   PEAK FLOW RATE(CFS) =      0.33

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.00
```

```
 RAINFALL INTENSITY(INCH/HR) =   6.19
 AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       0.06
 TOTAL STREAM AREA(ACRES) =       0.06
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.33

****************************************************************************
 FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =  22
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =  7700.00
 USER SPECIFIED Tc(MIN.) =    5.000
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        D        0.06      0.20      0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA RUNOFF(CFS) =      0.33
 TOTAL AREA(ACRES) =      0.06   PEAK FLOW RATE(CFS) =      0.33

****************************************************************************
 FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =    5.00
 RAINFALL INTENSITY(INCH/HR) =   6.19
 AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       0.06
 TOTAL STREAM AREA(ACRES) =       0.06
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.33

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       36.55   12.31    3.693  0.29( 0.14) 0.48      11.3      41.20
     1       35.80   14.28    3.391  0.29( 0.14) 0.48      12.2      38.00
     2        0.33    5.00    6.187  0.20( 0.10) 0.50       0.1      41.90
     3        0.33    5.00    6.187  0.20( 0.10) 0.50       0.1      41.90

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       25.93    5.00    6.187  0.29( 0.14) 0.48       4.7      41.90
     2       25.93    5.00    6.187  0.29( 0.14) 0.48       4.7      41.90
     3       36.94   12.31    3.693  0.29( 0.14) 0.48      11.5      41.20
     4       36.15   14.28    3.391  0.29( 0.14) 0.48      12.3      38.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      36.94    Tc(MIN.) =    12.31
 EFFECTIVE AREA(ACRES) =      11.47   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =      12.3
 LONGEST FLOWPATH FROM NODE     41.90 TO NODE     41.90 =    7700.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     41.90 TO NODE     46.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   711.80  DOWNSTREAM(FEET) =   710.50
 FLOW LENGTH(FEET) =   132.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.96
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      36.94
 PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   12.55
 LONGEST FLOWPATH FROM NODE     41.90 TO NODE     46.00 =    7832.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     46.00 TO NODE     46.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.55
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.651
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.21      0.30      0.100    76
 COMMERCIAL                 D        0.29      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    1.63
 EFFECTIVE AREA(ACRES) =     11.97   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =      12.8       PEAK FLOW RATE(CFS) =      37.89

****************************************************************************
 FLOW PROCESS FROM NODE     46.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.50  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =    68.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.16
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      37.89
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   12.68
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     34.00 =    7900.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       27.68    5.40    5.921  0.29( 0.13) 0.44       5.2      41.90
      2       27.68    5.40    5.921  0.29( 0.13) 0.44       5.2      41.90
      3       37.89   12.68    3.631  0.29( 0.13) 0.46      12.0      41.20
      4       37.08   14.65    3.342  0.29( 0.13) 0.47      12.8      38.00
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     34.00 =    7900.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      390.38    6.15    5.497  0.27( 0.06) 0.22      75.2      30.20
      2      622.15   17.47    3.022  0.27( 0.06) 0.23     228.3       1.00
      3      608.52   18.24    2.948  0.27( 0.06) 0.23     229.3       8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      397.30    5.40    5.921  0.27( 0.06) 0.24      71.3      41.90
      2      397.30    5.40    5.921  0.27( 0.06) 0.24      71.3      41.90
      3      419.10    6.15    5.497  0.27( 0.06) 0.24      81.2      30.20
      4      561.99   12.68    3.631  0.27( 0.06) 0.24     175.5      41.20
      5      601.60   14.65    3.342  0.27( 0.06) 0.24     203.0      38.00
      6      655.53   17.47    3.022  0.27( 0.06) 0.24     241.1       1.00
      7      641.04   18.24    2.948  0.27( 0.06) 0.24     242.1       8.00
    TOTAL AREA(ACRES) =       242.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      655.53  Tc(MIN.) =   17.465
  EFFECTIVE AREA(ACRES) =    241.07  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      242.1
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     56.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   703.70
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  48.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  34.92
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     655.53
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   17.52
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.52
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.016
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.23      0.30      0.100    76
  COMMERCIAL                  D        0.51      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.74      SUBAREA RUNOFF(CFS) =    1.99
  EFFECTIVE AREA(ACRES) =    241.81   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      242.8       PEAK FLOW RATE(CFS) =     655.53
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     32.20 TO NODE     32.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    745.00  DOWNSTREAM(FEET) =    742.00
```

```
 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.917
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.755
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  B        0.11      0.30      0.100    76    7.92
 COMMERCIAL                  C        0.26      0.25      0.100    86    7.92
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      1.57
 TOTAL AREA(ACRES) =      0.37   PEAK FLOW RATE(CFS) =      1.57

****************************************************************************
 FLOW PROCESS FROM NODE     32.10 TO NODE     32.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  742.00  DOWNSTREAM ELEVATION(FEET) =  740.00
 STREET LENGTH(FEET) =    96.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.82
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.27
   HALFSTREET FLOOD WIDTH(FEET) =    7.84
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.70
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.73
 STREET FLOW TRAVEL TIME(MIN.) =   0.59   Tc(MIN.) =    8.51
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.562
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.06      0.30      0.100    76
 COMMERCIAL                  C        0.06      0.25      0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.12      SUBAREA RUNOFF(CFS) =    0.49
 EFFECTIVE AREA(ACRES) =      0.49    AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       2.00

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   8.19
 FLOW VELOCITY(FEET/SEC.) =  2.76   DEPTH*VELOCITY(FT*FT/SEC.) =   0.76
 LONGEST FLOWPATH FROM NODE     32.20 TO NODE     32.00 =     426.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    724.60  DOWNSTREAM(FEET) =    723.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.167
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.717
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 SCHOOL                      B        0.33      0.30      0.600    76   12.17
 SCHOOL                      C        0.85      0.25      0.600    86   12.17
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA RUNOFF(CFS) =      3.78
 TOTAL AREA(ACRES) =      1.18   PEAK FLOW RATE(CFS) =      3.78

****************************************************************************
 FLOW PROCESS FROM NODE     52.00 TO NODE     53.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  723.00  DOWNSTREAM ELEVATION(FEET) =  719.00
 STREET LENGTH(FEET) =   412.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.44
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.45
   HALFSTREET FLOOD WIDTH(FEET) =   17.75
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.88
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.28
 STREET FLOW TRAVEL TIME(MIN.) =   2.39   Tc(MIN.) =   14.55
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.354
 SUBAREA LOSS RATE DATA(AMC III):
```

```
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
SCHOOL                      B        2.48      0.30      0.600    76
SCHOOL                      C        0.77      0.25      0.600    86
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    9.31
EFFECTIVE AREA(ACRES) =      4.43    AREA-AVERAGED Fm(INCH/HR) =  0.17
AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.60
TOTAL AREA(ACRES) =        4.4        PEAK FLOW RATE(CFS) =      12.70

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
FLOW VELOCITY(FEET/SEC.) =  2.91   DEPTH*VELOCITY(FT*FT/SEC.) =   1.31
LONGEST FLOWPATH FROM NODE     51.00 TO NODE     53.00 =     742.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     53.00 TO NODE     54.00 IS CODE =  62
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) =  719.00  DOWNSTREAM ELEVATION(FEET) =  712.50
STREET LENGTH(FEET) =   633.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.018
OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.73
  ***STREET FLOW SPLITS OVER STREET-CROWN***
  FULL DEPTH(FEET) =    0.45   FLOOD WIDTH(FEET) =   18.00
  FULL HALF-STREET VELOCITY(FEET/SEC.) =    3.00
  SPLIT DEPTH(FEET) =    0.42   SPLIT FLOOD WIDTH(FEET) =   16.02
  SPLIT FLOW(CFS) =    6.70   SPLIT VELOCITY(FEET/SEC.) =    2.78
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.45
  HALFSTREET FLOOD WIDTH(FEET) =   18.00
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.00
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.35
STREET FLOW TRAVEL TIME(MIN.) =   3.52   Tc(MIN.) =   18.08
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.963
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
SCHOOL                      B        2.42      0.30      0.600    76
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
SUBAREA AREA(ACRES) =    2.42      SUBAREA RUNOFF(CFS) =    6.06
EFFECTIVE AREA(ACRES) =      6.85    AREA-AVERAGED Fm(INCH/HR) =  0.17
AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.60
TOTAL AREA(ACRES) =        6.9        PEAK FLOW RATE(CFS) =      17.20

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
FLOW VELOCITY(FEET/SEC.) =  3.00   DEPTH*VELOCITY(FT*FT/SEC.) =   1.35
LONGEST FLOWPATH FROM NODE     51.00 TO NODE     54.00 =    1375.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   18.08
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.963
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  B        0.32      0.30      0.100    76
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
SUBAREA AREA(ACRES) =    0.32      SUBAREA RUNOFF(CFS) =    0.84
EFFECTIVE AREA(ACRES) =      7.17   AREA-AVERAGED Fm(INCH/HR) =  0.17
AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.58
TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =      18.04

****************************************************************************
FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   18.08
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.963
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
SCHOOL                      B        2.40      0.30      0.600    76
SCHOOL                      C        0.07      0.25      0.600    86
SCHOOL                      D        2.82      0.20      0.600    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
SUBAREA AREA(ACRES) =    5.29      SUBAREA RUNOFF(CFS) =   13.40
EFFECTIVE AREA(ACRES) =     12.46   AREA-AVERAGED Fm(INCH/HR) =  0.16
AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.59
TOTAL AREA(ACRES) =       12.5       PEAK FLOW RATE(CFS) =      31.45

****************************************************************************
FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   18.08
```

```
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.963
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.78      0.30      0.100    76
 COMMERCIAL                  C        0.03      0.25      0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.81      SUBAREA RUNOFF(CFS) =    2.14
 EFFECTIVE AREA(ACRES) =     13.27   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.56
 TOTAL AREA(ACRES) =       13.3       PEAK FLOW RATE(CFS) =      33.58

****************************************************************************
 FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   712.50  DOWNSTREAM(FEET) =   712.30
 FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.30
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      33.58
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   18.15
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     55.00 =    1409.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   18.15
 RAINFALL INTENSITY(INCH/HR) =   2.96
 AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.27
 AREA-AVERAGED Ap =  0.56
 EFFECTIVE STREAM AREA(ACRES) =      13.27
 TOTAL STREAM AREA(ACRES) =      13.27
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      33.58

****************************************************************************
 FLOW PROCESS FROM NODE     55.10 TO NODE     55.10 IS CODE =  22
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    34.00
 USER SPECIFIED Tc(MIN.) =    5.000
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.13      0.30      0.100    76
 COMMERCIAL                  D        0.14      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      1.50
 TOTAL AREA(ACRES) =      0.27   PEAK FLOW RATE(CFS) =      1.50

****************************************************************************
 FLOW PROCESS FROM NODE     55.10 TO NODE     55.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    5.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.24      0.30      0.100    76
 COMMERCIAL                  D        0.01      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    1.39
 EFFECTIVE AREA(ACRES) =      0.52   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        0.5       PEAK FLOW RATE(CFS) =       2.88

****************************************************************************
 FLOW PROCESS FROM NODE     55.10 TO NODE     55.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   713.00  DOWNSTREAM(FEET) =   712.30
 FLOW LENGTH(FEET) =   275.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.94
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.88
 PIPE TRAVEL TIME(MIN.) =   1.56    Tc(MIN.) =    6.56
 LONGEST FLOWPATH FROM NODE     55.10 TO NODE     55.00 =     309.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.56
 RAINFALL INTENSITY(INCH/HR) =   5.30
```

```
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.27
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.52
 TOTAL STREAM AREA(ACRES) =       0.52
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.88

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       33.58   18.15    2.955  0.27( 0.15) 0.56      13.3      51.00
     2        2.88    6.56    5.297  0.27( 0.03) 0.10       0.5      55.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       25.14    6.56    5.297  0.27( 0.14) 0.51       5.3      55.10
     2       35.19   18.15    2.955  0.27( 0.15) 0.54      13.8      51.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      35.19    Tc(MIN.) =    18.15
 EFFECTIVE AREA(ACRES) =      13.79   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.54
 TOTAL AREA(ACRES) =       13.8
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     55.00 =    1409.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     55.00 TO NODE     56.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   712.30  DOWNSTREAM(FEET) =   711.00
 FLOW LENGTH(FEET) =   165.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.31
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      35.19
 PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   18.48
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.00 =    1574.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.00 TO NODE     56.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.48
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.925
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.49      0.30      0.100    76
 COMMERCIAL                 D        0.04      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.53      SUBAREA RUNOFF(CFS) =    1.38
 EFFECTIVE AREA(ACRES) =     14.32   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =       14.3       PEAK FLOW RATE(CFS) =      35.87

****************************************************************************
 FLOW PROCESS FROM NODE     56.00 TO NODE     56.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   711.00  DOWNSTREAM(FEET) =   710.10
 FLOW LENGTH(FEET) =   172.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  26.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.97
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      35.87
 PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   18.90
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     56.11 TO NODE     56.12 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    720.80  DOWNSTREAM(FEET) =    717.80

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.438
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.584
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       B        0.91      0.30      0.200    76    8.44
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA RUNOFF(CFS) =      3.71
 TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      3.71

****************************************************************************
 FLOW PROCESS FROM NODE     56.12 TO NODE     56.13 IS CODE =  62
```

```
--------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  717.80  DOWNSTREAM ELEVATION(FEET) =  713.60
  STREET LENGTH(FEET) =   486.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.56
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.42
    HALFSTREET FLOOD WIDTH(FEET) =   16.43
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.59
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.10
  STREET FLOW TRAVEL TIME(MIN.) =   3.12   Tc(MIN.) =   11.56
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.828
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        1.68      0.30      0.200    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     1.68      SUBAREA RUNOFF(CFS) =     5.70
  EFFECTIVE AREA(ACRES) =      2.59    AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        2.6        PEAK FLOW RATE(CFS) =       8.78

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  2.75   DEPTH*VELOCITY(FT*FT/SEC.) =   1.24
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.13 =     816.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.56
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.828
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        2.11      0.30      0.200    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     2.11      SUBAREA RUNOFF(CFS) =     7.16
  EFFECTIVE AREA(ACRES) =      4.70   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        4.7        PEAK FLOW RATE(CFS) =      15.94

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.56
  RAINFALL INTENSITY(INCH/HR) =   3.83
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =       4.70
  TOTAL STREAM AREA(ACRES) =       4.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      15.94

****************************************************************************
  FLOW PROCESS FROM NODE     56.14 TO NODE     56.15 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    719.20  DOWNSTREAM(FEET) =    715.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.182
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.666
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.84      0.30      0.200    76    8.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      3.48
  TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      3.48

****************************************************************************
  FLOW PROCESS FROM NODE     56.15 TO NODE     56.13 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  715.70  DOWNSTREAM ELEVATION(FEET) =  713.60
  STREET LENGTH(FEET) =   200.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00
```

```
 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.51
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.37
   HALFSTREET FLOOD WIDTH(FEET) =   13.58
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.55
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.95
 STREET FLOW TRAVEL TIME(MIN.) =   1.31   Tc(MIN.) =    9.49
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.286
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       B        0.54      0.30     0.200    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    0.54      SUBAREA RUNOFF(CFS) =    2.05
 EFFECTIVE AREA(ACRES) =      1.38    AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       5.25

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  14.39
 FLOW VELOCITY(FEET/SEC.) =  2.66   DEPTH*VELOCITY(FT*FT/SEC.) =   1.03
 LONGEST FLOWPATH FROM NODE     56.14 TO NODE     56.13 =     530.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.49
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.286
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       B        0.70      0.30     0.200    76
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       D        0.52      0.20     0.200    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    1.22      SUBAREA RUNOFF(CFS) =    4.65
 EFFECTIVE AREA(ACRES) =      2.60   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =       9.90

****************************************************************************
 FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.49
 RAINFALL INTENSITY(INCH/HR) =   4.29
 AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.28
 AREA-AVERAGED Ap =  0.20
 EFFECTIVE STREAM AREA(ACRES) =       2.60
 TOTAL STREAM AREA(ACRES) =       2.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.90

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       15.94   11.56    3.828  0.30( 0.06) 0.20       4.7      56.11
     2        9.90    9.49    4.286  0.28( 0.06) 0.20       2.6      56.14

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       24.57    9.49    4.286  0.29( 0.06) 0.20       6.5      56.14
     2       24.76   11.56    3.828  0.29( 0.06) 0.20       7.3      56.11

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      24.76    Tc(MIN.) =    11.56
 EFFECTIVE AREA(ACRES) =       7.30   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        7.3
 LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.13 =     816.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.13 TO NODE     56.16 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   713.60  DOWNSTREAM(FEET) =   712.50
 FLOW LENGTH(FEET) =    94.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.84
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      24.76
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   11.74
```

```
 LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.16 =     910.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.16 TO NODE     56.16 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.74
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.795
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        B        0.46      0.30      0.200    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =     0.46      SUBAREA RUNOFF(CFS) =     1.55
 EFFECTIVE AREA(ACRES) =      7.76   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =      26.09

****************************************************************************
 FLOW PROCESS FROM NODE     56.16 TO NODE     56.16 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.74
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.795
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        B        0.05      0.30      0.200    76
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        D        0.41      0.20      0.200    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =     0.46      SUBAREA RUNOFF(CFS) =     1.55
 EFFECTIVE AREA(ACRES) =      8.22   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        8.2       PEAK FLOW RATE(CFS) =      27.64

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       27.78    9.67    4.241  0.29( 0.06) 0.20       7.4      56.14
     2       27.64   11.74    3.795  0.29( 0.06) 0.20       8.2      56.11
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      27.78  Tc(MIN.) =    9.67
 AREA-AVERAGED Fm(INCH/HR) =  0.06  AREA-AVERAGED Fp(INCH/HR) =  0.29
 AREA-AVERAGED Ap =  0.20  EFFECTIVE AREA(ACRES) =       7.38

****************************************************************************
 FLOW PROCESS FROM NODE     56.16 TO NODE     56.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   712.50  DOWNSTREAM(FEET) =   710.10
 FLOW LENGTH(FEET) =    38.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.17
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      27.78
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    9.70
 LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.10 =     948.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       27.78    9.70    4.232  0.29( 0.06) 0.20       7.4      56.14
     2       27.64   11.77    3.788  0.29( 0.06) 0.20       8.2      56.11
 LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.10 =     948.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       26.32    7.37    4.956  0.27( 0.13) 0.48       5.8      55.10
     2       35.87   18.90    2.888  0.27( 0.14) 0.52      14.3      51.00
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       51.07    7.37    4.956  0.28( 0.09) 0.34      11.4      55.10
     2       56.04    9.70    4.232  0.28( 0.09) 0.34      14.9      56.14
     3       57.62   11.77    3.788  0.28( 0.10) 0.35      17.3      56.11
     4       56.85   18.90    2.888  0.27( 0.11) 0.41      22.5      51.00
   TOTAL AREA(ACRES) =        22.5

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       57.62  Tc(MIN.) =   11.774
 EFFECTIVE AREA(ACRES) =     17.30  AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.34
 TOTAL AREA(ACRES) =       22.5
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     56.10 TO NODE     56.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.10  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.81
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      57.62
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   11.86
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.20 =    1790.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.20 TO NODE     56.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.86
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.772
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.39      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.39      SUBAREA RUNOFF(CFS) =    1.32
  EFFECTIVE AREA(ACRES) =     17.69   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =       22.9       PEAK FLOW RATE(CFS) =      58.55

****************************************************************************
  FLOW PROCESS FROM NODE     56.20 TO NODE     56.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   703.70
  FLOW LENGTH(FEET) =   290.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.62
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      58.55
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   12.21
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.30 =    2080.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM        Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1       51.45    7.82    4.787  0.27( 0.09) 0.33       11.8       55.10
      2       56.82   10.14    4.125  0.27( 0.09) 0.34       15.3       56.14
      3       58.55   12.21    3.709  0.27( 0.10) 0.35       17.7       56.11
      4       57.20   19.34    2.851  0.27( 0.11) 0.40       22.9       51.00
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.30 =    2080.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM        Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      397.30    5.46    5.882  0.27( 0.06) 0.24       72.1       41.90
      2      397.30    5.46    5.882  0.27( 0.06) 0.24       72.1       41.90
      3      419.10    6.21    5.465  0.27( 0.06) 0.24       81.9       30.20
      4      564.14   12.73    3.621  0.27( 0.06) 0.24      176.3       41.20
      5      601.60   14.71    3.334  0.27( 0.06) 0.24      203.8       38.00
      6      655.53   17.52    3.016  0.27( 0.06) 0.24      241.8        1.00
      7      641.04   18.29    2.942  0.27( 0.06) 0.24      242.8        8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM        Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      441.59    5.46    5.882  0.27( 0.07) 0.25       80.3       41.90
      2      441.59    5.46    5.882  0.27( 0.07) 0.25       80.3       41.90
      3      465.84    6.21    5.465  0.27( 0.07) 0.25       91.3       30.20
      4      506.43    7.82    4.787  0.27( 0.07) 0.25      117.1       55.10
      5      563.35   10.14    4.125  0.27( 0.07) 0.25      154.1       56.14
      6      611.06   12.21    3.709  0.27( 0.07) 0.25      186.4       56.11
      7      622.59   12.73    3.621  0.27( 0.07) 0.25      194.3       41.20
      8      659.67   14.71    3.334  0.27( 0.07) 0.25      223.3       38.00
      9      713.07   17.52    3.016  0.27( 0.07) 0.25      263.4        1.00
     10      698.44   18.29    2.942  0.27( 0.07) 0.25      265.0        8.00
     11      677.80   19.34    2.851  0.27( 0.07) 0.25      265.7       51.00
    TOTAL AREA(ACRES) =       265.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      713.07  Tc(MIN.) =   17.520
  EFFECTIVE AREA(ACRES) =    263.40  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =      265.7
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     35.10 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   703.70  DOWNSTREAM(FEET) =   703.00
  FLOW LENGTH(FEET) =    74.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  93.0 INCH PIPE IS  70.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.60
  ESTIMATED PIPE DIAMETER(INCH) =  93.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     713.07
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   17.59
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    729.10  DOWNSTREAM(FEET) =    723.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.849
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.461
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.39      0.30     0.500    76    8.85
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.52      0.20     0.500    91    8.85
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      3.55
  TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      3.55

****************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     44.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  723.20  DOWNSTREAM ELEVATION(FEET) =  714.50
  STREET LENGTH(FEET) =   493.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.63
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   11.96
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.09
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.06
  STREET FLOW TRAVEL TIME(MIN.) =   2.66   Tc(MIN.) =   11.51
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.837
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        2.25      0.30     0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.79      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.04      SUBAREA RUNOFF(CFS) =   10.12
  EFFECTIVE AREA(ACRES) =      3.95    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =      3.9         PEAK FLOW RATE(CFS) =      13.17

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  14.29
  FLOW VELOCITY(FEET/SEC.) =  3.39   DEPTH*VELOCITY(FT*FT/SEC.) =   1.30
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     44.00 =     823.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     44.00 TO NODE     45.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.50  DOWNSTREAM(FEET) =   713.50
  FLOW LENGTH(FEET) =    33.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.80
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.17
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   11.56
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.20 =     856.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     45.20 TO NODE     45.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
```

```
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.56
  RAINFALL INTENSITY(INCH/HR) =   3.83
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       3.95
  TOTAL STREAM AREA(ACRES) =       3.95
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      13.17

****************************************************************************
  FLOW PROCESS FROM NODE     45.00 TO NODE     45.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    721.00  DOWNSTREAM(FEET) =    717.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.195
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.364
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.58      0.30      0.400    76    9.20
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.06      0.20      0.400    91    9.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      2.45
  TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      2.45

****************************************************************************
  FLOW PROCESS FROM NODE     45.10 TO NODE     45.20 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  717.00  DOWNSTREAM ELEVATION(FEET) =  714.00
  STREET LENGTH(FEET) =   318.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.83
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.36
  HALFSTREET FLOOD WIDTH(FEET) =   12.97
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.36
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.85
 STREET FLOW TRAVEL TIME(MIN.) =   2.25   Tc(MIN.) =   11.44
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.850
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        0.82      0.30      0.400    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.82      SUBAREA RUNOFF(CFS) =     2.75
 EFFECTIVE AREA(ACRES) =      1.46    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       4.90

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  14.39
 FLOW VELOCITY(FEET/SEC.) =  2.49   DEPTH*VELOCITY(FT*FT/SEC.) =   0.96
 LONGEST FLOWPATH FROM NODE     45.00 TO NODE     45.20 =     648.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     45.20 TO NODE     45.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.44
  RAINFALL INTENSITY(INCH/HR) =   3.85
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.40
  EFFECTIVE STREAM AREA(ACRES) =       1.46
  TOTAL STREAM AREA(ACRES) =       1.46
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.90

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       13.17   11.56    3.828  0.27( 0.13) 0.50       3.9      42.00
      2        4.90   11.44    3.850  0.30( 0.12) 0.40       1.5      45.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
```

```
     1       18.02   11.44    3.850  0.27( 0.13) 0.47       5.4      45.00
     2       18.04   11.56    3.828  0.27( 0.13) 0.47       5.4      42.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      18.04    Tc(MIN.) =    11.56
  EFFECTIVE AREA(ACRES) =       5.41   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =         5.4
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.20 =     856.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     45.20 TO NODE     45.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.50  DOWNSTREAM(FEET) =   711.90
  FLOW LENGTH(FEET) =   157.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.72
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.04
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   11.90
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.30 =    1013.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     45.30 TO NODE     45.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.90
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.765
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.66      0.30      0.400    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.66      SUBAREA RUNOFF(CFS) =    2.16
  EFFECTIVE AREA(ACRES) =      6.07   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =         6.1       PEAK FLOW RATE(CFS) =      19.87

****************************************************************************
  FLOW PROCESS FROM NODE     45.30 TO NODE     45.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.90
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.765
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        1.89      0.30      0.850    76
  COMMERCIAL                 D        0.04      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.834
  SUBAREA AREA(ACRES) =    1.93      SUBAREA RUNOFF(CFS) =    6.10
  EFFECTIVE AREA(ACRES) =      8.00   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =         8.0       PEAK FLOW RATE(CFS) =      25.97

  ** PEAK FLOW RATE TABLE **
   STREAM       Q       Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1       25.99   11.78    3.786  0.28( 0.16) 0.55        8.0       45.00
      2       25.97   11.90    3.765  0.28( 0.16) 0.55        8.0       42.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      25.99  Tc(MIN.) =   11.78
  AREA-AVERAGED Fm(INCH/HR) =  0.16  AREA-AVERAGED Fp(INCH/HR) =  0.28
  AREA-AVERAGED Ap =  0.55  EFFECTIVE AREA(ACRES) =       7.96

****************************************************************************
  FLOW PROCESS FROM NODE     45.30 TO NODE     47.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   711.90  DOWNSTREAM(FEET) =   710.80
  FLOW LENGTH(FEET) =   106.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.48
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.99
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   11.99
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     47.20 =    1119.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.20 TO NODE     47.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.99
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.748
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.13      0.30      0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.13      SUBAREA RUNOFF(CFS) =    0.44
  EFFECTIVE AREA(ACRES) =      8.09   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =         8.1       PEAK FLOW RATE(CFS) =      26.16

****************************************************************************
  FLOW PROCESS FROM NODE     47.20 TO NODE     35.20 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.80  DOWNSTREAM(FEET) =   703.90
  FLOW LENGTH(FEET) =   695.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.33
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.16
  PIPE TRAVEL TIME(MIN.) =   1.39    Tc(MIN.) =   13.38
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     35.20 =    1814.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.20 TO NODE     35.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.38
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.520
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        1.02      0.30      0.850    76
  PUBLIC PARK                C        0.05      0.25      0.850    86
  PUBLIC PARK                D        2.20      0.20      0.850    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    3.27      SUBAREA RUNOFF(CFS) =    9.78
  EFFECTIVE AREA(ACRES) =     11.36   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.63
  TOTAL AREA(ACRES) =       11.4       PEAK FLOW RATE(CFS) =      34.27

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       34.27   13.38    3.520  0.26( 0.17) 0.63      11.4      45.00
      2       34.21   13.50    3.502  0.26( 0.17) 0.63      11.4      42.00
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     35.10 =    1814.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      441.59    5.54    5.837  0.27( 0.07) 0.25      80.3      41.90
      2      441.59    5.54    5.837  0.27( 0.07) 0.25      80.3      41.90
      3      465.84    6.28    5.428  0.27( 0.07) 0.25      91.3      30.20
      4      506.43    7.90    4.762  0.27( 0.07) 0.25     117.1      55.10
      5      563.35   10.21    4.109  0.27( 0.07) 0.25     154.1      56.14
      6      611.06   12.28    3.697  0.27( 0.07) 0.25     186.4      56.11
      7      622.59   12.80    3.610  0.27( 0.07) 0.25     194.3      41.20
      8      659.67   14.77    3.326  0.27( 0.07) 0.25     223.3      38.00
      9      713.07   17.59    3.010  0.27( 0.07) 0.25     263.4       1.00
     10      698.44   18.36    2.936  0.27( 0.07) 0.25     265.0       8.00
     11      677.80   19.40    2.845  0.27( 0.07) 0.25     265.7      51.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       465.57    5.54    5.837  0.27( 0.07) 0.27      85.0      41.90
      2       465.57    5.54    5.837  0.27( 0.07) 0.27      85.0      41.90
      3       491.09    6.28    5.428  0.27( 0.07) 0.27      96.6      30.20
      4       534.14    7.90    4.762  0.27( 0.07) 0.27     123.8      55.10
      5       594.10   10.21    4.109  0.27( 0.07) 0.27     162.8      56.14
      6       644.17   12.28    3.697  0.27( 0.07) 0.27     196.8      56.11
      7       656.26   12.80    3.610  0.27( 0.07) 0.27     205.2      41.20
      8       667.75   13.38    3.520  0.27( 0.07) 0.27     214.2      45.00
      9       669.89   13.50    3.502  0.27( 0.07) 0.27     215.9      42.00
     10       692.07   14.77    3.326  0.27( 0.07) 0.27     234.7      38.00
     11       742.23   17.59    3.010  0.27( 0.07) 0.27     274.8       1.00
     12       726.84   18.36    2.936  0.27( 0.07) 0.27     276.4       8.00
     13       705.27   19.40    2.845  0.27( 0.07) 0.27     277.1      51.00
    TOTAL AREA(ACRES) =       277.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      742.23  Tc(MIN.) =   17.586
  EFFECTIVE AREA(ACRES) =    274.80  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      277.1
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   17.59   RAINFALL INTENSITY(INCH/HR) =  3.01
  EFFECTIVE AREA(ACRES) =   112.90
  TOTAL AREA(ACRES) =   277.14        PEAK FLOW RATE(CFS) =    304.95
  AREA-AVERAGED Fm(INCH/HR) =   0.07  AREA-AVERAGED Fp(INCH/HR) =   0.27
  AREA-AVERAGED Ap =  0.27
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =   695.70
 FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  78.0 INCH PIPE IS  61.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.80
 ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     304.95
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   17.71
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     36.00 =   10453.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.71
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.998
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        0.16      0.25      0.100    86
 COMMERCIAL                  D        0.29      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.45      SUBAREA RUNOFF(CFS) =     1.21
 EFFECTIVE AREA(ACRES) =    113.35   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
 TOTAL AREA(ACRES) =      277.6       PEAK FLOW RATE(CFS) =     304.95
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE     36.00 TO NODE     37.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   695.70  DOWNSTREAM(FEET) =   695.40
 FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  78.0 INCH PIPE IS  61.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.80
 ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     304.95
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   17.82
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.00 =   10528.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.00 TO NODE     37.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   695.40  DOWNSTREAM(FEET) =   694.00
 FLOW LENGTH(FEET) =   355.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  78.0 INCH PIPE IS  62.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.73
 ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     304.95
 PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   18.37
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.10 =   10883.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.10 TO NODE     37.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.37
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.935
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        0.68      0.25      0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.68      SUBAREA RUNOFF(CFS) =     1.78
 EFFECTIVE AREA(ACRES) =    114.03   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
 TOTAL AREA(ACRES) =      278.3       PEAK FLOW RATE(CFS) =     304.95
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE     37.10 TO NODE     37.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.37
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.935
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        0.46      0.25      0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.46      SUBAREA RUNOFF(CFS) =     1.20
 EFFECTIVE AREA(ACRES) =    114.49   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
 TOTAL AREA(ACRES) =      278.7       PEAK FLOW RATE(CFS) =     304.95
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE     37.10 TO NODE     37.20 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =   694.00  DOWNSTREAM(FEET) =   693.80
 FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  72.0 INCH PIPE IS  58.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.42
 ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     304.95
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   18.42
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     37.60 TO NODE     37.70 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    718.50  DOWNSTREAM(FEET) =    714.40

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.517
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.279
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        0.13      0.30     0.500    76    9.52
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        D        0.51      0.20     0.500    91    9.52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA RUNOFF(CFS) =      2.40
 TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      2.40

****************************************************************************
 FLOW PROCESS FROM NODE     37.70 TO NODE     37.80 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  714.40  DOWNSTREAM ELEVATION(FEET) =  710.60
 STREET LENGTH(FEET) =   349.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.42
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.34
   HALFSTREET FLOOD WIDTH(FEET) =   12.06
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.41
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.83
 STREET FLOW TRAVEL TIME(MIN.) =   2.41   Tc(MIN.) =   11.93
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.759
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C        0.15      0.25     0.500    86
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        D        0.47      0.20     0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =     0.62      SUBAREA RUNOFF(CFS) =     2.04
 EFFECTIVE AREA(ACRES) =      1.26    AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =       4.14

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  12.97
 FLOW VELOCITY(FEET/SEC.) =  2.55   DEPTH*VELOCITY(FT*FT/SEC.) =   0.92
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.80 =     679.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.80 TO NODE     37.90 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   710.60  DOWNSTREAM(FEET) =   709.80
 FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.97
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.14
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   12.10
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.90 =     739.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.90 TO NODE     37.90 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.10
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.729
```

```
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C        0.21      0.25      0.500    86
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        D        0.93      0.20      0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =     1.14      SUBAREA RUNOFF(CFS) =     3.72
 EFFECTIVE AREA(ACRES) =      2.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        2.4       PEAK FLOW RATE(CFS) =       7.83

****************************************************************************
 FLOW PROCESS FROM NODE     37.90 TO NODE     37.50 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   708.00
 FLOW LENGTH(FEET) =   221.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.73
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.83
 PIPE TRAVEL TIME(MIN.) =   0.64    Tc(MIN.) =   12.74
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.50 =     960.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.50 TO NODE     37.50 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   12.74
 RAINFALL INTENSITY(INCH/HR) =   3.62
 AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.21
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       2.40
 TOTAL STREAM AREA(ACRES) =       2.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.83

****************************************************************************
 FLOW PROCESS FROM NODE     37.30 TO NODE     37.40 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    713.10  DOWNSTREAM(FEET) =    709.70
 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.880
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.188
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C        0.70      0.25      0.500    86    9.88
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA RUNOFF(CFS) =      2.56
 TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      2.56

****************************************************************************
 FLOW PROCESS FROM NODE     37.40 TO NODE     37.50 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  709.70  DOWNSTREAM ELEVATION(FEET) =  708.10
 STREET LENGTH(FEET) =   124.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.14
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.33
   HALFSTREET FLOOD WIDTH(FEET) =   11.14
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.55
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.84
 STREET FLOW TRAVEL TIME(MIN.) =   0.81   Tc(MIN.) =   10.69
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.003
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C        0.33      0.25      0.500    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.33      SUBAREA RUNOFF(CFS) =    1.15
 EFFECTIVE AREA(ACRES) =      1.03    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        1.0       PEAK FLOW RATE(CFS) =       3.59

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.86
```

```
 FLOW VELOCITY(FEET/SEC.) =  2.61   DEPTH*VELOCITY(FT*FT/SEC.) =   0.89
 LONGEST FLOWPATH FROM NODE     37.30 TO NODE     37.50 =     454.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.50 TO NODE     37.50 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   10.69
 RAINFALL INTENSITY(INCH/HR) =   4.00
 AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       1.03
 TOTAL STREAM AREA(ACRES) =       1.03
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.59

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        7.83   12.74    3.620  0.21( 0.11) 0.50       2.4      37.60
     2        3.59   10.69    4.003  0.25( 0.12) 0.50       1.0      37.30

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       10.88   10.69    4.003  0.23( 0.11) 0.50       3.0      37.30
     2       11.07   12.74    3.620  0.22( 0.11) 0.50       3.4      37.60

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      11.07    Tc(MIN.) =    12.74
 EFFECTIVE AREA(ACRES) =       3.43   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        3.4
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.50 =     960.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.50 TO NODE     37.20 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   708.00  DOWNSTREAM(FEET) =   693.80
 FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.30
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.07
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   12.85
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.20 =    1080.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       10.88   10.81    3.978  0.23( 0.11) 0.50       3.0      37.30
     2       11.07   12.85    3.602  0.22( 0.11) 0.50       3.4      37.60
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.20 =    1080.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      304.95   18.42    2.931  0.27( 0.07) 0.27     114.5       1.00
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      255.35   10.81    3.978  0.27( 0.07) 0.28      70.2      37.30
     2      273.84   12.85    3.602  0.27( 0.07) 0.28      83.3      37.60
     3      313.89   18.42    2.931  0.27( 0.07) 0.27     117.9       1.00
   TOTAL AREA(ACRES) =       282.2

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      313.89  Tc(MIN.) =   18.419
 EFFECTIVE AREA(ACRES) =    117.92  AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
 TOTAL AREA(ACRES) =      282.2
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     37.20 TO NODE     47.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   693.80  DOWNSTREAM(FEET) =   691.30
 FLOW LENGTH(FEET) =   487.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  75.0 INCH PIPE IS  60.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.92
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     313.89
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   19.10
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     47.31 TO NODE     47.32 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    718.50  DOWNSTREAM(FEET) =    712.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.679
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.511
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.63      0.30      0.500    76    8.68
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.47
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      2.47

****************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.32 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.68
  RAINFALL INTENSITY(INCH/HR) =   4.51
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.63
  TOTAL STREAM AREA(ACRES) =       0.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.47

****************************************************************************
  FLOW PROCESS FROM NODE     47.33 TO NODE     47.32 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   282.00
  ELEVATION DATA: UPSTREAM(FEET) =    715.00  DOWNSTREAM(FEET) =    712.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.219
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.358
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.86      0.30      0.500    76    9.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      3.26
  TOTAL AREA(ACRES) =      0.86   PEAK FLOW RATE(CFS) =      3.26

****************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.32 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.22
  RAINFALL INTENSITY(INCH/HR) =   4.36
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.86
  TOTAL STREAM AREA(ACRES) =       0.86
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.26

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        2.47    8.68    4.511  0.30( 0.15) 0.50       0.6      47.31
      2        3.26    9.22    4.358  0.30( 0.15) 0.50       0.9      47.33

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        5.65    8.68    4.511  0.30( 0.15) 0.50       1.4      47.31
      2        5.64    9.22    4.358  0.30( 0.15) 0.50       1.5      47.33

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.65    Tc(MIN.) =     8.68
  EFFECTIVE AREA(ACRES) =       1.44   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.5
```

```
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.32 =     330.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.32 TO NODE     47.34 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   699.00  DOWNSTREAM(FEET) =   698.50
 FLOW LENGTH(FEET) =   102.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.40
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.65
 PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =    9.07
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.34 =     432.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.34 TO NODE     47.34 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.07
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.400
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.38      0.30     0.500    76
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.06      0.20     0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.44      SUBAREA RUNOFF(CFS) =    1.69
 EFFECTIVE AREA(ACRES) =      1.88   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        1.9       PEAK FLOW RATE(CFS) =       7.19

****************************************************************************
 FLOW PROCESS FROM NODE     47.34 TO NODE     47.35 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   698.50  DOWNSTREAM(FEET) =   697.50
 FLOW LENGTH(FEET) =   194.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.80
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.19
 PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =    9.74
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.35 =     626.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.74
 RAINFALL INTENSITY(INCH/HR) =   4.22
 AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       1.88
 TOTAL STREAM AREA(ACRES) =       1.93
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.19

****************************************************************************
 FLOW PROCESS FROM NODE     47.36 TO NODE     47.35 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   275.00
 ELEVATION DATA: UPSTREAM(FEET) =    713.50  DOWNSTREAM(FEET) =    711.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.418
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.305
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.72      0.30     0.500    76    9.42
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA RUNOFF(CFS) =      2.69
 TOTAL AREA(ACRES) =      0.72   PEAK FLOW RATE(CFS) =      2.69

****************************************************************************
 FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.42
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.305
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.66      0.30     0.500    76
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.12      0.20     0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.78      SUBAREA RUNOFF(CFS) =    2.92
```

```
 EFFECTIVE AREA(ACRES) =      1.50   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        1.5       PEAK FLOW RATE(CFS) =       5.61

****************************************************************************
 FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.42
 RAINFALL INTENSITY(INCH/HR) =   4.30
 AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       1.50
 TOTAL STREAM AREA(ACRES) =       1.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.61

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        7.19    9.74    4.223  0.30( 0.15) 0.50       1.9      47.31
     1        7.14   10.31    4.088  0.30( 0.15) 0.50       1.9      47.33
     2        5.61    9.42    4.305  0.29( 0.15) 0.50       1.5      47.36

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       12.71    9.42    4.305  0.29( 0.15) 0.50       3.3      47.36
     2       12.70    9.74    4.223  0.29( 0.15) 0.50       3.4      47.31
     3       12.46   10.31    4.088  0.29( 0.15) 0.50       3.4      47.33

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      12.71    Tc(MIN.) =     9.42
 EFFECTIVE AREA(ACRES) =       3.32   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        3.4
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.35 =     626.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.35 TO NODE     47.37 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   697.60  DOWNSTREAM(FEET) =   696.00
 FLOW LENGTH(FEET) =   293.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.61
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.71
 PIPE TRAVEL TIME(MIN.) =   0.87    Tc(MIN.) =   10.29
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.37 =     919.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.37 TO NODE     47.37 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.29
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.092
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        0.67      0.30      0.500    76
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        D        0.12      0.20      0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =     0.79      SUBAREA RUNOFF(CFS) =     2.81
 EFFECTIVE AREA(ACRES) =      4.11   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        4.2       PEAK FLOW RATE(CFS) =      14.59

****************************************************************************
 FLOW PROCESS FROM NODE     47.37 TO NODE     47.37 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.29
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.092
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        0.09      0.30      0.500    76
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        D        0.60      0.20      0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =     0.69      SUBAREA RUNOFF(CFS) =     2.47
 EFFECTIVE AREA(ACRES) =      4.80   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        4.9       PEAK FLOW RATE(CFS) =      17.06

****************************************************************************
 FLOW PROCESS FROM NODE     47.37 TO NODE     47.30 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =   695.20
 FLOW LENGTH(FEET) =   158.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.86
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      17.06
 PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =   10.74
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.30 =    1077.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.30 TO NODE     47.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.74
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.993
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.28      0.20     0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    0.98
 EFFECTIVE AREA(ACRES) =      5.08   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        5.2       PEAK FLOW RATE(CFS) =      17.62

****************************************************************************
 FLOW PROCESS FROM NODE     47.30 TO NODE     47.40 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   695.20  DOWNSTREAM(FEET) =   694.60
 FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.76
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      17.62
 PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =   11.10
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.40 =    1202.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.40 TO NODE     47.40 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.10
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.918
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.19      0.20     0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.65
 EFFECTIVE AREA(ACRES) =      5.27   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =      17.93

****************************************************************************
 FLOW PROCESS FROM NODE     47.40 TO NODE     47.50 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   694.60  DOWNSTREAM(FEET) =   694.40
 FLOW LENGTH(FEET) =    41.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.82
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      17.93
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   11.22
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.50 =    1243.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.50 TO NODE     47.50 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.22
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.894
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.05      0.30     0.500    76
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        1.45      0.20     0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    1.50      SUBAREA RUNOFF(CFS) =    5.12
 EFFECTIVE AREA(ACRES) =      6.77   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        6.9       PEAK FLOW RATE(CFS) =      22.93

****************************************************************************
 FLOW PROCESS FROM NODE     47.50 TO NODE     47.60 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   694.40  DOWNSTREAM(FEET) =   693.50
 FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.27
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      22.93
  PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =   11.70
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.60 =    1423.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.60 TO NODE     47.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.70
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.802
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.55      0.20      0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     1.55      SUBAREA RUNOFF(CFS) =     5.16
  EFFECTIVE AREA(ACRES) =      8.32   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        8.4       PEAK FLOW RATE(CFS) =      27.54

****************************************************************************
  FLOW PROCESS FROM NODE     47.60 TO NODE     47.70 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.50  DOWNSTREAM(FEET) =   693.30
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  21.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.60
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.54
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.80
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.70 =    1463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.70 TO NODE     47.70 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.80
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.784
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.04      0.25      0.500    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.57      0.20      0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     1.61      SUBAREA RUNOFF(CFS) =     5.34
  EFFECTIVE AREA(ACRES) =      9.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       10.0       PEAK FLOW RATE(CFS) =      32.73

****************************************************************************
  FLOW PROCESS FROM NODE     47.70 TO NODE     47.80 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.30  DOWNSTREAM(FEET) =   692.50
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  25.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.59
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      32.73
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   12.23
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.80 =    1633.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.80 TO NODE     47.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.23
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.707
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.60      0.25      0.500    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.94      0.20      0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     1.54      SUBAREA RUNOFF(CFS) =     4.99
  EFFECTIVE AREA(ACRES) =     11.47   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       11.6       PEAK FLOW RATE(CFS) =      37.03

****************************************************************************
  FLOW PROCESS FROM NODE     47.80 TO NODE     47.90 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.50  DOWNSTREAM(FEET) =   692.30
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.81
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      37.03
```

```
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   12.29
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.90 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.90 TO NODE     47.90 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.29
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.696
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        1.43      0.25      0.500    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.14      0.20      0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     1.57      SUBAREA RUNOFF(CFS) =     5.05
  EFFECTIVE AREA(ACRES) =     13.04   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =      41.97

****************************************************************************
  FLOW PROCESS FROM NODE     47.90 TO NODE     47.91 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.30  DOWNSTREAM(FEET) =   692.10
  FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  29.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.88
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.97
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   12.40
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.91 =    1707.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.91 TO NODE     47.91 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.40
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.677
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        1.89      0.25      0.500    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        1.30      0.20      0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     3.19      SUBAREA RUNOFF(CFS) =    10.23
  EFFECTIVE AREA(ACRES) =     16.23   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      51.98

****************************************************************************
  FLOW PROCESS FROM NODE     47.91 TO NODE     47.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.10  DOWNSTREAM(FEET) =   691.30
  FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  30.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.44
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      51.98
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   12.77
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.00 =    1874.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       51.98   12.77    3.615  0.24( 0.12) 0.50      16.2       47.36
      2       51.38   13.10    3.563  0.24( 0.12) 0.50      16.3       47.31
      3       50.20   13.67    3.476  0.24( 0.12) 0.50      16.3       47.33
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.00 =    1874.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      255.35   11.53    3.834  0.27( 0.07) 0.28      70.2       37.30
      2      273.84   13.56    3.494  0.27( 0.07) 0.28      83.3       37.60
      3      313.89   19.10    2.871  0.27( 0.07) 0.27     117.9        1.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      305.20   11.53    3.834  0.26( 0.08) 0.32      84.9       37.30
      2      318.67   12.77    3.615  0.26( 0.08) 0.32      94.5       47.36
      3      321.04   13.10    3.563  0.26( 0.08) 0.31      96.7       47.31
      4      324.28   13.56    3.494  0.26( 0.08) 0.31      99.7       37.60
      5      324.90   13.67    3.476  0.26( 0.08) 0.31     100.4       47.33
      6      355.04   19.10    2.871  0.26( 0.08) 0.30     134.3        1.00
    TOTAL AREA(ACRES) =       298.5
```

```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      355.04  Tc(MIN.) =   19.099
 EFFECTIVE AREA(ACRES) =    134.26  AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.30
 TOTAL AREA(ACRES) =      298.5
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     47.00 TO NODE     48.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   691.30  DOWNSTREAM(FEET) =   691.10
 FLOW LENGTH(FEET) =    61.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  87.0 INCH PIPE IS  66.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.49
 ESTIMATED PIPE DIAMETER(INCH) =  87.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     355.04
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   19.20
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     48.60 TO NODE     48.61 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    712.40  DOWNSTREAM(FEET) =    707.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.660
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.517
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      B        0.05      0.30      0.400    76    8.66
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      C        0.02      0.25      0.400    86    8.66
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      D        0.69      0.20      0.400    91    8.66
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA RUNOFF(CFS) =      3.03
 TOTAL AREA(ACRES) =      0.76   PEAK FLOW RATE(CFS) =      3.03

****************************************************************************
 FLOW PROCESS FROM NODE     48.61 TO NODE     48.70 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  707.00  DOWNSTREAM ELEVATION(FEET) =  698.80
 STREET LENGTH(FEET) =   346.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.36
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.33
   HALFSTREET FLOOD WIDTH(FEET) =   11.35
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.43
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.14
 STREET FLOW TRAVEL TIME(MIN.) =   1.68   Tc(MIN.) =   10.34
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.081
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      C        0.46      0.25      0.400    86
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      D        0.28      0.20      0.400    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =    0.74      SUBAREA RUNOFF(CFS) =    2.66
 EFFECTIVE AREA(ACRES) =      1.50    AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       5.39

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  12.36
 FLOW VELOCITY(FEET/SEC.) =  3.63   DEPTH*VELOCITY(FT*FT/SEC.) =   1.27
 LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.70 =     676.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     48.70 TO NODE     48.70 IS CODE =  81
```

```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.34
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.081
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.59      0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.59      SUBAREA RUNOFF(CFS) =     2.15
  EFFECTIVE AREA(ACRES) =      2.09   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.32
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       7.54

****************************************************************************
  FLOW PROCESS FROM NODE     48.71 TO NODE     48.71 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.34
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.081
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.09      0.30      0.400    76
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.47      0.25      0.400    86
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.80      0.20      0.400    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =     1.36      SUBAREA RUNOFF(CFS) =     4.88
  EFFECTIVE AREA(ACRES) =      3.45   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =        3.4       PEAK FLOW RATE(CFS) =      12.43

****************************************************************************
  FLOW PROCESS FROM NODE     48.70 TO NODE     48.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   698.80  DOWNSTREAM(FEET) =   691.10
  FLOW LENGTH(FEET) =   119.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.27
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.43
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   10.48
  LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.00 =     795.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       12.43   10.48    4.049  0.22( 0.08) 0.35       3.4      48.60
  LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.00 =     795.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      305.20   11.63    3.815  0.26( 0.08) 0.32      84.9      37.30
      2      318.67   12.87    3.599  0.26( 0.08) 0.32      94.5      47.36
      3      321.04   13.20    3.548  0.26( 0.08) 0.31      96.7      47.31
      4      324.28   13.65    3.479  0.26( 0.08) 0.31      99.7      37.60
      5      324.90   13.77    3.462  0.26( 0.08) 0.31     100.4      47.33
      6      355.04   19.20    2.862  0.26( 0.08) 0.30     134.3       1.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      304.73   10.48    4.049  0.26( 0.08) 0.32      79.9      48.60
      2      316.90   11.63    3.815  0.26( 0.08) 0.32      88.3      37.30
      3      329.69   12.87    3.599  0.26( 0.08) 0.32      97.9      47.36
      4      331.90   13.20    3.548  0.26( 0.08) 0.32     100.1      47.31
      5      334.93   13.65    3.479  0.26( 0.08) 0.31     103.1      37.60
      6      335.49   13.77    3.462  0.26( 0.08) 0.31     103.9      47.33
      7      363.75   19.20    2.862  0.26( 0.08) 0.30     137.7       1.00
    TOTAL AREA(ACRES) =       302.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      363.75  Tc(MIN.) =   19.196
  EFFECTIVE AREA(ACRES) =    137.71  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      302.0
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     49.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   691.10  DOWNSTREAM(FEET) =   689.20
  FLOW LENGTH(FEET) =   384.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  81.0 INCH PIPE IS  62.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.29
  ESTIMATED PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     363.75
  PIPE TRAVEL TIME(MIN.) =   0.52    Tc(MIN.) =   19.72
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     49.00 =   11849.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   19.72
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.819
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.31      0.30      0.100    76
  COMMERCIAL                  C        0.90      0.25      0.100    86
  COMMERCIAL                  D        0.12      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.33      SUBAREA RUNOFF(CFS) =    3.34
  EFFECTIVE AREA(ACRES) =    139.04   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      303.3       PEAK FLOW RATE(CFS) =     363.75
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.72
  RAINFALL INTENSITY(INCH/HR) =   2.82
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.30
  EFFECTIVE STREAM AREA(ACRES) =     139.04
  TOTAL STREAM AREA(ACRES) =     303.28
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     363.75

****************************************************************************
  FLOW PROCESS FROM NODE     61.30 TO NODE     61.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    707.30  DOWNSTREAM(FEET) =    704.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.383
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.602
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  APARTMENTS                  B        0.53      0.30      0.200    76    8.38
  APARTMENTS                  D        0.77      0.20      0.200    91    8.38
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      5.33
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      5.33

****************************************************************************
  FLOW PROCESS FROM NODE     61.20 TO NODE     61.10 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
==========================================================================
  UPSTREAM NODE ELEVATION(FEET) =    704.20
  DOWNSTREAM NODE ELEVATION(FEET) =    703.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   119.00
  "V" GUTTER WIDTH(FEET) =   1.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.10000
  MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.450
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                  B        1.30      0.30      0.200    76
  APARTMENTS                  D        0.25      0.20      0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      8.39
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.92
  AVERAGE FLOW DEPTH(FEET) =   0.47   FLOOD WIDTH(FEET) =    9.23
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.51   Tc(MIN.) =    8.89
  SUBAREA AREA(ACRES) =    1.55      SUBAREA RUNOFF(CFS) =    6.13
  EFFECTIVE AREA(ACRES) =    2.85     AREA-AVERAGED Fm(INCH/HR) =   0.05
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   0.20
  TOTAL AREA(ACRES) =        2.8         PEAK FLOW RATE(CFS) =      11.28

        ==>>ERROR:FLOW EXCEEDS CAPACITY OF CHANNEL WITH
            NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM ALLOWABLE DEPTH.
            AS AN APPROXIMATION, TRAVEL TIME CALCULATIONS ARE BASED
            ON FLOW DEPTH EQUAL TO THE SPECIFIED MAXIMUM ALLOWABLE DEPTH.


  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.50   FLOOD WIDTH(FEET) =    9.80
  FLOW VELOCITY(FEET/SEC.) =   4.68   DEPTH*VELOCITY(FT*FT/SEC) =   2.34
  LONGEST FLOWPATH FROM NODE     61.30 TO NODE     61.10 =     449.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     61.10 TO NODE     49.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  703.00  DOWNSTREAM ELEVATION(FEET) =  699.50
  STREET LENGTH(FEET) =   380.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.69
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.49   FLOOD WIDTH(FEET) =   20.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    3.04
    SPLIT DEPTH(FEET) =    0.28   SPLIT FLOOD WIDTH(FEET) =    8.25
    SPLIT FLOW(CFS) =    1.36   SPLIT VELOCITY(FEET/SEC.) =    1.86
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.49
    HALFSTREET FLOOD WIDTH(FEET) =   20.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.04
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.49
  STREET FLOW TRAVEL TIME(MIN.) =   2.08   Tc(MIN.) =   10.97
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.945
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.26      0.30      0.100    76
  COMMERCIAL                 C        0.25      0.25      0.100    86
  COMMERCIAL                 D        0.29      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    2.82
  EFFECTIVE AREA(ACRES) =      3.65    AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =      12.80

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  20.00
  FLOW VELOCITY(FEET/SEC.) =  3.04   DEPTH*VELOCITY(FT*FT/SEC.) =   1.49
  LONGEST FLOWPATH FROM NODE     61.30 TO NODE     49.00 =     829.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.97
  RAINFALL INTENSITY(INCH/HR) =   3.94
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.18
  EFFECTIVE STREAM AREA(ACRES) =       3.65
  TOTAL STREAM AREA(ACRES) =       3.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.80

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      304.73   11.02    3.933  0.26( 0.08) 0.31      81.3      48.60
      1      316.90   12.16    3.718  0.26( 0.08) 0.31      89.6      37.30
      1      329.69   13.40    3.517  0.26( 0.08) 0.31      99.3      47.36
      1      331.90   13.73    3.468  0.26( 0.08) 0.31     101.4      47.31
      1      334.93   14.19    3.404  0.26( 0.08) 0.31     104.4      37.60
      1      335.49   14.31    3.388  0.26( 0.08) 0.31     105.2      47.33
      1      363.75   19.72    2.819  0.26( 0.08) 0.30     139.0       1.00
      2       12.80   10.97    3.945  0.26( 0.05) 0.18       3.6      61.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      316.89   10.97    3.945  0.26( 0.08) 0.31      84.5      61.30
      2      317.50   11.02    3.933  0.26( 0.08) 0.31      84.9      48.60
      3      328.96   12.16    3.718  0.26( 0.08) 0.31      93.3      37.30
      4      341.08   13.40    3.517  0.26( 0.08) 0.31     102.9      47.36
      5      343.14   13.73    3.468  0.26( 0.08) 0.31     105.1      47.31
      6      345.95   14.19    3.404  0.26( 0.08) 0.31     108.1      37.60
      7      346.46   14.31    3.388  0.26( 0.08) 0.31     108.8      47.33
      8      372.86   19.72    2.819  0.26( 0.08) 0.30     142.7       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     372.86    Tc(MIN.) =    19.72
  EFFECTIVE AREA(ACRES) =     142.69   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      306.9
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     49.00 =   11849.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     50.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   689.20  DOWNSTREAM(FEET) =   688.90
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  81.0 INCH PIPE IS  61.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.77
  ESTIMATED PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     372.86
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   19.79
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     57.10 TO NODE     57.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    714.00  DOWNSTREAM(FEET) =    711.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.278
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.635
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  B        0.42      0.30      0.100    76    8.28
  COMMERCIAL                  D        0.08      0.20      0.100    91    8.28
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.07
  TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      2.07

****************************************************************************
  FLOW PROCESS FROM NODE     57.20 TO NODE     57.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  711.60  DOWNSTREAM ELEVATION(FEET) =  709.00
  STREET LENGTH(FEET) =   130.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.29
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    8.81
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.81
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.81
  STREET FLOW TRAVEL TIME(MIN.) =   0.77   Tc(MIN.) =    9.05
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.405
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.11      0.30      0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.11      SUBAREA RUNOFF(CFS) =    0.43
  EFFECTIVE AREA(ACRES) =      0.61    AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       2.40

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   9.01
  FLOW VELOCITY(FEET/SEC.) =  2.84   DEPTH*VELOCITY(FT*FT/SEC.) =   0.82
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     57.00 =     460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.05
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.405
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.29      0.30      0.100    76
  COMMERCIAL                  C        0.02      0.25      0.100    86
  COMMERCIAL                  D        0.34      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.65      SUBAREA RUNOFF(CFS) =    2.56
  EFFECTIVE AREA(ACRES) =      1.26   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       4.96

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.05
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.405
  SUBAREA LOSS RATE DATA(AMC III):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.33      0.30      0.200    76
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        0.56      0.20      0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     0.89      SUBAREA RUNOFF(CFS) =     3.49
  EFFECTIVE AREA(ACRES) =      2.15   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.14
  TOTAL AREA(ACRES) =        2.2       PEAK FLOW RATE(CFS) =       8.45

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.05
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.405
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.34      0.30      0.200    76
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        0.53      0.20      0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     0.87      SUBAREA RUNOFF(CFS) =     3.41
  EFFECTIVE AREA(ACRES) =      3.02   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =        3.0       PEAK FLOW RATE(CFS) =      11.87

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     58.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.00  DOWNSTREAM(FEET) =   702.50
  FLOW LENGTH(FEET) =   633.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.00
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.87
  PIPE TRAVEL TIME(MIN.) =   1.51    Tc(MIN.) =   10.55
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     58.00 =    1093.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.55
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.033
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        1.93      0.30      0.200    76
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        0.46      0.20      0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     2.39      SUBAREA RUNOFF(CFS) =     8.55
  EFFECTIVE AREA(ACRES) =      5.41   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =      19.41

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.55
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.033
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        1.60      0.30      0.200    76
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        0.76      0.20      0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     2.36      SUBAREA RUNOFF(CFS) =     8.45
  EFFECTIVE AREA(ACRES) =      7.77   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =      27.86

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   702.50  DOWNSTREAM(FEET) =   700.00
  FLOW LENGTH(FEET) =    67.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.75
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.86
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   10.64
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     58.10 =    1160.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     58.10 IS CODE =  81
```

```
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   10.64
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.015
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        1.94      0.30      0.200    76
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        C        0.82      0.25      0.200    86
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        4.28      0.20      0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     7.04      SUBAREA RUNOFF(CFS) =   25.14
  EFFECTIVE AREA(ACRES) =     14.81   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       14.8       PEAK FLOW RATE(CFS) =      52.88

************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     58.10 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   10.64
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.015
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        C        3.80      0.25      0.200    86
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        2.64      0.20      0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     6.44      SUBAREA RUNOFF(CFS) =   23.00
  EFFECTIVE AREA(ACRES) =     21.25   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       21.2       PEAK FLOW RATE(CFS) =      75.88

************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     59.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   700.00  DOWNSTREAM(FEET) =   699.50
  FLOW LENGTH(FEET) =   139.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.39
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      75.88
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =   10.95
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.00 =    1299.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   10.95
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.949
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.44      0.30      0.100    76
  COMMERCIAL                  D        0.18      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.62      SUBAREA RUNOFF(CFS) =    2.19
  EFFECTIVE AREA(ACRES) =     21.87   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       21.9       PEAK FLOW RATE(CFS) =      76.80

************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.10 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.50  DOWNSTREAM(FEET) =   699.10
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.54
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      76.80
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.05
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.10 =    1355.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     59.10 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.05
  RAINFALL INTENSITY(INCH/HR) =   3.93
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  0.19
  EFFECTIVE STREAM AREA(ACRES) =      21.87
  TOTAL STREAM AREA(ACRES) =      21.87
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      76.80

************************************************************************
```

```
 FLOW PROCESS FROM NODE     50.10 TO NODE     50.10 IS CODE =  22
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    83.00
 USER SPECIFIED Tc(MIN.) =    5.000
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.01      0.30      0.100    76
 COMMERCIAL                  C        0.06      0.25      0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      0.39
 TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.39

****************************************************************************
 FLOW PROCESS FROM NODE     50.10 TO NODE     50.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    5.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.08      0.30      0.100    76
 COMMERCIAL                  C        0.01      0.25      0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.50
 EFFECTIVE AREA(ACRES) =      0.16   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        0.2       PEAK FLOW RATE(CFS) =       0.89

****************************************************************************
 FLOW PROCESS FROM NODE     50.10 TO NODE     59.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   713.00  DOWNSTREAM(FEET) =   699.10
 FLOW LENGTH(FEET) =   481.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.05
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.89
 PIPE TRAVEL TIME(MIN.) =   1.59    Tc(MIN.) =    6.59
 LONGEST FLOWPATH FROM NODE     50.10 TO NODE     59.10 =     564.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     59.10 TO NODE     59.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.59
 RAINFALL INTENSITY(INCH/HR) =   5.28
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.28
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.16
 TOTAL STREAM AREA(ACRES) =       0.16
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.89

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       76.80   11.05     3.929  0.24( 0.05) 0.19      21.9      57.10
     2        0.89    6.59     5.283  0.28( 0.03) 0.10       0.2      50.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       62.67    6.59     5.283  0.24( 0.05) 0.19      13.2      50.10
     2       77.46   11.05     3.929  0.24( 0.05) 0.19      22.0      57.10

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      77.46    Tc(MIN.) =    11.05
 EFFECTIVE AREA(ACRES) =      22.03   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
 TOTAL AREA(ACRES) =      22.0
 LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.10 =    1355.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     59.10 TO NODE     50.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   699.10  DOWNSTREAM(FEET) =   688.90
 FLOW LENGTH(FEET) =    28.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  42.37
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      77.46
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.06
 LONGEST FLOWPATH FROM NODE     57.10 TO NODE     50.00 =    1383.00 FEET.

****************************************************************************
```

```
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       62.67    6.60    5.278  0.24( 0.05) 0.19      13.2      50.10
      2       77.46   11.06    3.926  0.24( 0.05) 0.19      22.0      57.10
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     50.00 =    1383.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      316.89   11.05    3.929  0.26( 0.08) 0.31      84.5      61.30
      2      317.50   11.10    3.917  0.26( 0.08) 0.31      84.9      48.60
      3      328.96   12.24    3.705  0.26( 0.08) 0.31      93.3      37.30
      4      341.08   13.48    3.505  0.26( 0.08) 0.31     102.9      47.36
      5      343.14   13.80    3.458  0.26( 0.08) 0.31     105.1      47.31
      6      345.95   14.26    3.394  0.26( 0.08) 0.31     108.1      37.60
      7      346.46   14.38    3.377  0.26( 0.08) 0.31     108.8      47.33
      8      372.86   19.79    2.813  0.26( 0.08) 0.30     142.7       1.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      318.32    6.60    5.278  0.25( 0.07) 0.28      63.7      50.10
      2      394.31   11.05    3.929  0.25( 0.07) 0.28     106.5      61.30
      3      394.49   11.06    3.926  0.25( 0.07) 0.28     106.6      57.10
      4      394.78   11.10    3.917  0.25( 0.07) 0.28     106.9      48.60
      5      401.99   12.24    3.705  0.26( 0.07) 0.29     115.3      37.30
      6      410.14   13.48    3.505  0.26( 0.07) 0.29     124.9      47.36
      7      411.25   13.80    3.458  0.26( 0.07) 0.29     127.1      47.31
      8      412.78   14.26    3.394  0.26( 0.07) 0.29     130.1      37.60
      9      412.97   14.38    3.377  0.26( 0.07) 0.29     130.9      47.33
     10      428.09   19.79    2.813  0.26( 0.07) 0.28     164.7       1.00
    TOTAL AREA(ACRES) =       329.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      428.09  Tc(MIN.) =   19.790
  EFFECTIVE AREA(ACRES) =    164.72  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =      329.0
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
```

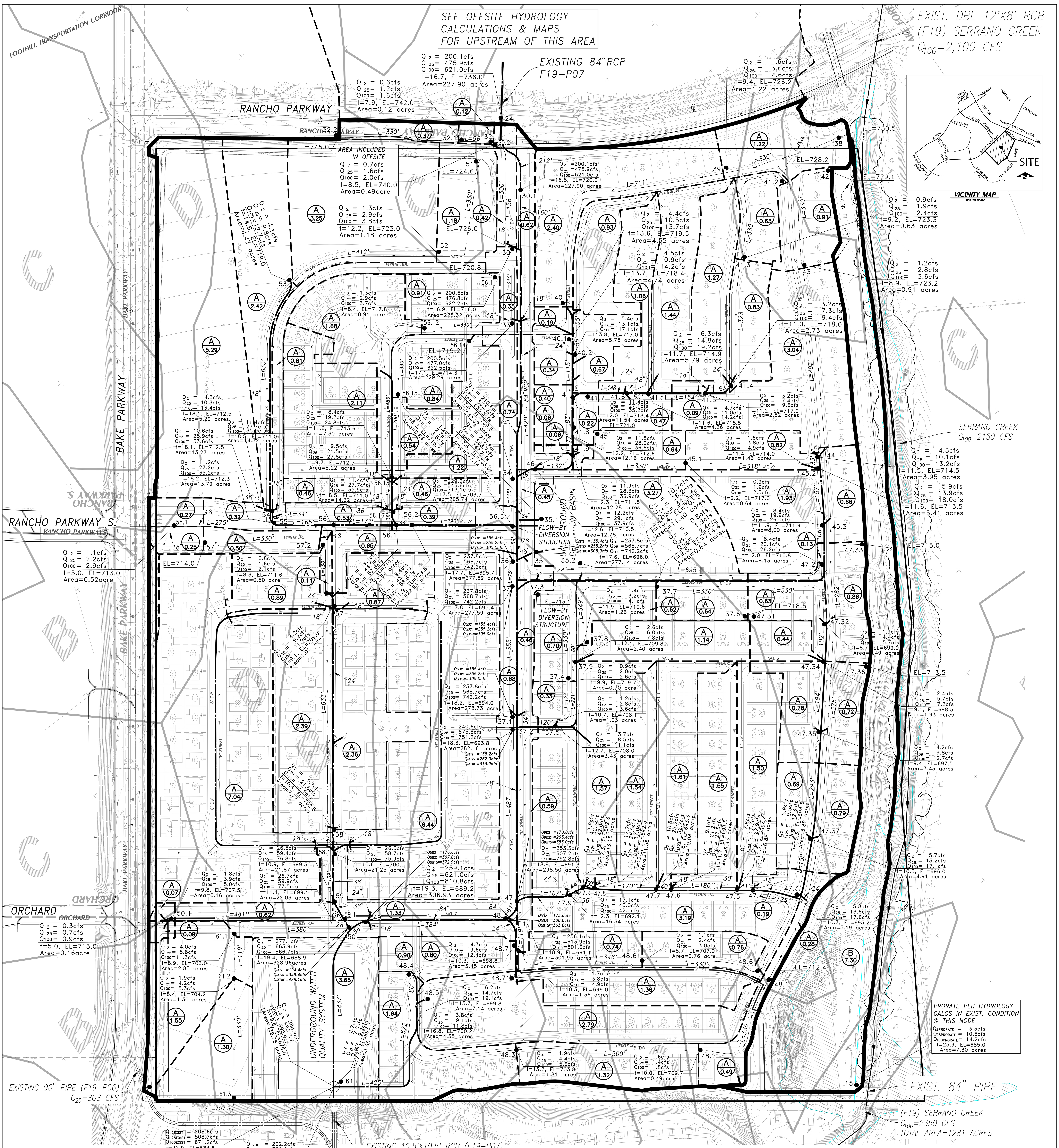
```
  FLOW PROCESS FROM NODE     50.00 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   688.90  DOWNSTREAM(FEET) =   675.00
  FLOW LENGTH(FEET) =   437.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  47.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.57
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     428.09
  PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =   20.07
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     61.00 =   12342.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   20.07
  RAINFALL INTENSITY(INCH/HR) =   2.79
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.28
  EFFECTIVE STREAM AREA(ACRES) =     164.72
  TOTAL STREAM AREA(ACRES) =     328.96
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     428.09

****************************************************************************
  FLOW PROCESS FROM NODE     48.10 TO NODE     48.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    712.40  DOWNSTREAM(FEET) =    709.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.947
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.172
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.15      0.30      0.400    76    9.95
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.34      0.20      0.400    91    9.95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      1.80
  TOTAL AREA(ACRES) =      0.49   PEAK FLOW RATE(CFS) =      1.80
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     48.20 TO NODE     48.30 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  709.70  DOWNSTREAM ELEVATION(FEET) =  703.80
  STREET LENGTH(FEET) =   500.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.86
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   12.46
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.56
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.90
  STREET FLOW TRAVEL TIME(MIN.) =   3.25   Tc(MIN.) =   13.20
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.547
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.64      0.25     0.400    86
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.68      0.20     0.400    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.32      SUBAREA RUNOFF(CFS) =    4.11
  EFFECTIVE AREA(ACRES) =      1.81    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        1.8        PEAK FLOW RATE(CFS) =       5.63

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  14.50
  FLOW VELOCITY(FEET/SEC.) =  2.82   DEPTH*VELOCITY(FT*FT/SEC.) =   1.10
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.30 =     830.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.30 TO NODE     48.40 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  703.80  DOWNSTREAM ELEVATION(FEET) =  700.20
  STREET LENGTH(FEET) =   522.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.85
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.45   FLOOD WIDTH(FEET) =   18.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    2.45
    SPLIT DEPTH(FEET) =    0.22   SPLIT FLOOD WIDTH(FEET) =    4.95
    SPLIT FLOW(CFS) =    0.45   SPLIT VELOCITY(FEET/SEC.) =    1.33
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   18.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.45
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.11
  STREET FLOW TRAVEL TIME(MIN.) =   3.54   Tc(MIN.) =   16.75
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.095
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.93      0.25     0.400    86
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.71      0.20     0.400    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.64      SUBAREA RUNOFF(CFS) =    4.43
  EFFECTIVE AREA(ACRES) =      3.45    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        3.4        PEAK FLOW RATE(CFS) =       9.33

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  2.45   DEPTH*VELOCITY(FT*FT/SEC.) =   1.11
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.40 =    1352.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.40 TO NODE     48.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.75
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.095
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
```

```
"8-10 DWELLINGS/ACRE"      C        0.44      0.25      0.400    86
RESIDENTIAL
"8-10 DWELLINGS/ACRE"      D        0.46      0.20      0.400    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    2.43
EFFECTIVE AREA(ACRES) =      4.35   AREA-AVERAGED Fm(INCH/HR) =  0.09
AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
TOTAL AREA(ACRES) =        4.3       PEAK FLOW RATE(CFS) =      11.76

****************************************************************************
FLOW PROCESS FROM NODE     48.40 TO NODE     48.50 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   700.20  DOWNSTREAM(FEET) =   699.80
FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   5.33
ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      11.76
PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   17.00
LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.50 =    1432.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     48.50 TO NODE     48.50 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   17.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.069
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"8-10 DWELLINGS/ACRE"      B        0.16      0.30      0.400    76
RESIDENTIAL
"8-10 DWELLINGS/ACRE"      C        1.49      0.25      0.400    86
PUBLIC PARK                C        0.26      0.25      0.850    86
RESIDENTIAL
"8-10 DWELLINGS/ACRE"      D        0.88      0.20      0.400    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.442
SUBAREA AREA(ACRES) =    2.79      SUBAREA RUNOFF(CFS) =    7.44
EFFECTIVE AREA(ACRES) =      7.14   AREA-AVERAGED Fm(INCH/HR) =  0.10
AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.42
TOTAL AREA(ACRES) =        7.1       PEAK FLOW RATE(CFS) =      19.10

****************************************************************************
FLOW PROCESS FROM NODE     48.50 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   699.80  DOWNSTREAM(FEET) =   675.00
FLOW LENGTH(FEET) =   425.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  15.11
ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      19.10
PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   17.46
LONGEST FLOWPATH FROM NODE     48.10 TO NODE     61.00 =    1857.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   17.46
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.022
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
PUBLIC PARK                B        1.98      0.30      0.850    76
PUBLIC PARK                D        1.67      0.20      0.850    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
SUBAREA AREA(ACRES) =    3.65      SUBAREA RUNOFF(CFS) =    9.22
EFFECTIVE AREA(ACRES) =     10.79   AREA-AVERAGED Fm(INCH/HR) =  0.14
AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.56
TOTAL AREA(ACRES) =       10.8       PEAK FLOW RATE(CFS) =      28.02

****************************************************************************
FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =   17.46
RAINFALL INTENSITY(INCH/HR) =   3.02
AREA-AVERAGED Fm(INCH/HR) =  0.14
AREA-AVERAGED Fp(INCH/HR) =  0.24
AREA-AVERAGED Ap =  0.56
EFFECTIVE STREAM AREA(ACRES) =     10.79
TOTAL STREAM AREA(ACRES) =     10.79
PEAK FLOW RATE(CFS) AT CONFLUENCE =      28.02

** CONFLUENCE DATA **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1      318.32    6.90    5.143  0.25( 0.07) 0.28      63.7      50.10
    1      394.31   11.33    3.872  0.25( 0.07) 0.28     106.5      61.30
    1      394.49   11.35    3.869  0.25( 0.07) 0.28     106.6      57.10
    1      394.78   11.39    3.861  0.25( 0.07) 0.28     106.9      48.60
    1      401.99   12.53    3.656  0.26( 0.07) 0.29     115.3      37.30
```

```
     1      410.14   13.76    3.463  0.26( 0.07) 0.29      124.9       47.36
     1      411.25   14.09    3.417  0.26( 0.07) 0.29      127.1       47.31
     1      412.78   14.55    3.355  0.26( 0.07) 0.29      130.1       37.60
     1      412.97   14.67    3.340  0.26( 0.07) 0.29      130.9       47.33
     1      428.09   20.07    2.790  0.26( 0.07) 0.28      164.7        1.00
     2       28.02   17.46    3.022  0.24( 0.14) 0.56       10.8       48.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      337.54    6.90    5.143  0.25( 0.08) 0.30       67.9       50.10
      2      417.84   11.33    3.872  0.25( 0.08) 0.30      113.5       61.30
      3      418.03   11.35    3.869  0.25( 0.08) 0.30      113.6       57.10
      4      418.36   11.39    3.861  0.25( 0.08) 0.30      114.0       48.60
      5      426.50   12.53    3.656  0.25( 0.08) 0.30      123.1       37.30
      6      435.60   13.76    3.463  0.25( 0.08) 0.31      133.5       47.36
      7      436.95   14.09    3.417  0.25( 0.08) 0.31      135.8       47.31
      8      438.81   14.55    3.355  0.25( 0.08) 0.31      139.1       37.60
      9      439.09   14.67    3.340  0.25( 0.08) 0.31      139.9       47.33
     10      448.80   17.46    3.022  0.26( 0.08) 0.30      159.2       48.10
     11      453.85   20.07    2.790  0.26( 0.08) 0.30      175.5        1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     453.85    Tc(MIN.) =    20.07
  EFFECTIVE AREA(ACRES) =     175.51   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      339.8
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     61.00 =   12342.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      339.8  TC(MIN.) =     20.07
  EFFECTIVE AREA(ACRES) =    175.51  AREA-AVERAGED Fm(INCH/HR)=  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap = 0.301
  PEAK FLOW RATE(CFS)   =     453.85

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      337.54    6.90    5.143  0.25( 0.08) 0.30       67.9       50.10
      2      417.84   11.33    3.872  0.25( 0.08) 0.30      113.5       61.30
      3      418.03   11.35    3.869  0.25( 0.08) 0.30      113.6       57.10
      4      418.36   11.39    3.861  0.25( 0.08) 0.30      114.0       48.60
      5      426.50   12.53    3.656  0.25( 0.08) 0.30      123.1       37.30
      6      435.60   13.76    3.463  0.25( 0.08) 0.31      133.5       47.36
      7      436.95   14.09    3.417  0.25( 0.08) 0.31      135.8       47.31
      8      438.81   14.55    3.355  0.25( 0.08) 0.31      139.1       37.60
      9      439.09   14.67    3.340  0.25( 0.08) 0.31      139.9       47.33
     10      448.80   17.46    3.022  0.26( 0.08) 0.30      159.2       48.10
     11      453.85   20.07    2.790  0.26( 0.08) 0.30      175.5        1.00
============================================================================
============================================================================
```

END OF RATIONAL METHOD ANALYSIS



LEGEND

- MAJOR DRAINAGE BOUNDARY
- MINOR DRAINAGE BOUNDARY
- NODE NUMBER
- AREA DESIGNATION / AREA ACREAGE (IN ACRES)
- PEAK FLOW RATE / TIME OF CONCENTRATION
- PEAK CONFLUENCE FLOW RATE / TIME OF CONCENTRATION
- PROPOSED STORM DRAIN
- SOIL GROUP

PREPARED FOR:

TOLL BROTHERS, INC.
725 W. TOWN & COUNTRY ROAD, SUITE 200
ORANGE, CA 92686

PREPARED BY:

HUNSAKER & ASSOCIATES IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes ▪ Irvine, CA 92618 ▪ PH: (949) 583-1010 ▪ FX: (949) 583-0759

SCALE: 1" = 100'

100 50 0 100 300

MAP DATE IDENTIFIER
DATE OF LATEST CHANGE TO THIS MAP: 06/05/19 BY: HTC
DATE OF THIS PLOT: 06/10/19

EXHIBIT 3
HYDROLOGY MAP VTM 18142 (PROPOSED CONDITION)

CITY OF LAKE FOREST

WO: 1443-136X HYDROLOGY MAP FOR NAKASE NURSERY

PLOTTED BY: Ha To Chau DATE: Jun. 10, 2019 12:43:56 PM FILE: F:\0894\Engineering\SY_Hydrology\Onsite\Exhibit 3 – Hydrology – Proposed with Offsite-06-10-2019.dwg

SCALE: 1" =400'

AREA OFFSITE
$A_{OFFSITE}$=227.9 acres

Q_{100}= 621.0 cfs
A_{100}= 227.9 acres

EXISTING 84"RCP
F19–P07

RANCHO PKWY N.

EXISTING PROJECT BOUNDARY (EPB)
A_{EPB}= 122 acres

EXISTING PROJECT BOUNDARY (EPB)
A_{EPB}= 122 acres

PROPOSED ONSITE DRAINAGE BOUNDARY (PODB)
A_{PODB}= 111.7 acres (Shaded Area)

SERRANO CREEK
Q_{100}=2150 cfs

Proposed Onsite Area with Offsite Area
$A_{PODB}+A_{OFFSITE}$=111.7+227.9=339.6 acres

FLOWBY DIVERSION STRUCTURE

RANCHO PKWY S.

EXISTING ONSITE AREA "A" DRAINAGE BOUNDARY (76.6 acres)

UNDERGROUND DETENTION BASIN

FLOWBY DIVERSION STRUCTURE

EXISTING ONSITE AREA "B" DRAINAGE BOUNDARY (43.4 acres)

BAKE PARKWAY

Proposed Onsite Area Tributary to Serrano Creek (F19)= 10.4 acres

Proposed Onsite Area Tributary to Serrano Creek (F19)= 7.3 acres

EXISTING PROJECT BOUNDARY (EPB)
A_{EPB}= 122 acres

Proposed Onsite Area Tributary to Serrano Creek (F19)= 3.1 acres

EXISTING PROJECT BOUNDARY (EPB)
A_{EPB}= 122 acres

ORCHARD

UNDERGROUND WATER QUALITY SYSTEM

$Q_{100PROP}$= 892.6 cfs
$A_{100PROP}$= 339.6 acres

$Q_{100PRORATE}$= 14.2 cfs
$A_{100PRORATE}$= 7.3 acres

EXIST. 84" PIPE

EXISTING 90" RCP (F19–P06)
Q_{25}=808 cfs

EXISTING 10.5'X10.5' RCB (F19–P07)
Q_{100}=729.2 cfs

EXISTING 10.5'X10.5' RCB (F19–S02)
Q_{100}=1916 cfs

EXISTING 10.5'X10.5' RCB (F19–P07)
Q_{100}=1747.3 cfs

(F19) SERRANO CREEK
Q_{100} =2350 cfs
$AREA_{TOTAL}$=1281 acres

LEGEND

- EXISTING ONSITE DRAINAGE BOUNDARY
- PROPOSED ONSITE DRAINAGE BOUNDARY (PODP)
- OFFSITE DRAINAGE BOUNDARY
- EXISTING PROJECT BOUNDARY (EPB)
- PROPOSED STORM DRAIN

PREPARED FOR:

TOLL BROTHERS, INC.
725 W. TOWN & COUNTRY ROAD, SUITE 200
ORANGE, CA 92686

PREPARED BY:

HUNSAKER & ASSOCIATES IRVINE, INC.
PLANNING • ENGINEERING • SURVEYING
Three Hughes • Irvine, CA 92618 • PH: (949) 583-1010 • FX: (949) 583-0759

EXHIBIT 5

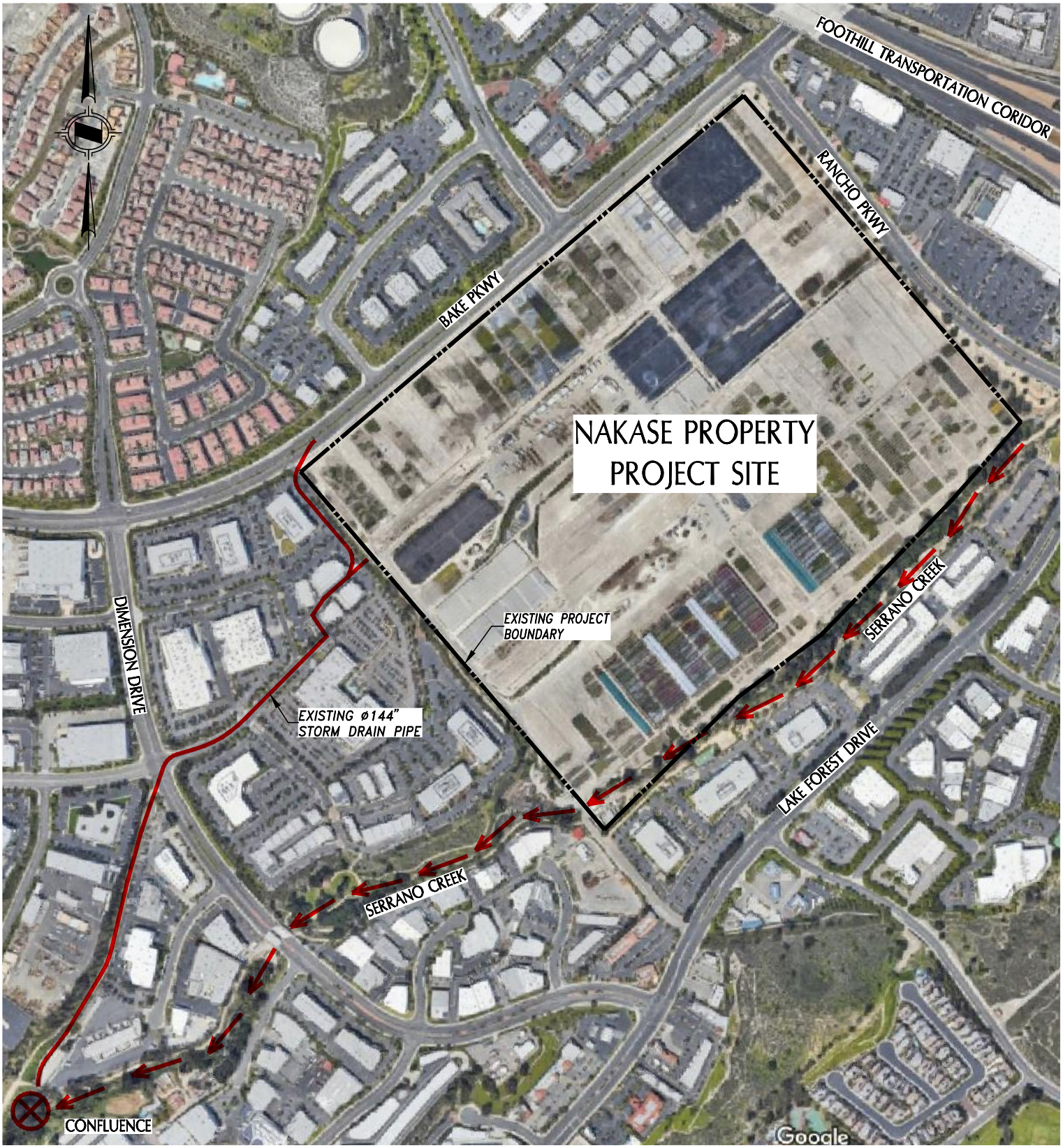
TRIBUTARY AREA TO F19-P07
VTM 18142

(PROPOSED CONDITION)

CITY OF LAKE FOREST

PLOTTED BY: Ha To Chau DATE: Jun. 06, 2019 11:12:49 AM FILE: F:\0894\Engineering\SY_Hydrology\Onsite\Exhibit 5 – Proposed with offsite_Proposed Drainage Boundary–06–05–2019.dwg

SCALE: 1" =600'



PREPARED FOR:

TOLL BROTHERS, INC.
725 W. TOWN & COUNTRY
ROAD, SUITE 200
ORANGE, CA 92686

PREPARED BY:

HUNSAKER & ASSOCIATES
IRVINE, INC.
PLANNING ENGINEERING SURVEYING
Three Hughes Irvine, CA 92618 PH: (949) 583-1010 FX: (949) 583-0759

EXHIBIT 6
SERRANO CREEK CONFLUENCE WITH F19-S02
(EXISTING CONDITION)
CITY OF LAKE FOREST

PLOTTED BY: Ha To Chau DATE: Jun. 06, 2019 03:19:30 PM FILE: F:\0894\Engineering\SY_Hydrology\Hydrology – Existing–SD.dwg

SECTION 4

FLOOD ROUTING CALCULATIONS

- Area-Averaged Loss Rate and Low Loss Fraction Estimations
- Storage Volume Versus Depth and Outflow Calculation
- Detention Basin Routing

```
 ************************************************************************
           NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                             Analysis prepared by:

                             HUNSAKER & ASSOCIATES
                                   Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   2-YEAR STORM AT NODE 24, OFF-SITE AREA TO RANCHO PKWY @ 84" RCP (F19-P07)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC I:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     2.05 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1         1.67       60.00       69.(AMC II)     0.250       0.356
          2        30.26       50.00       69.(AMC II)     0.250       0.445
          3        45.50       10.00       69.(AMC II)     0.250       0.801
          4         0.68       85.00       69.(AMC II)     0.250       0.134
          5        65.18       10.00       56.(AMC II)     0.300       0.801
          6         0.50       90.00       69.(AMC II)     0.250       0.089
          7         3.92       50.00       56.(AMC II)     0.300       0.445
          8         2.50       40.00       56.(AMC II)     0.300       0.534
          9        13.11       40.00       69.(AMC II)     0.250       0.534
         10        24.46       35.00       56.(AMC II)     0.300       0.578
         11         7.92       35.00       69.(AMC II)     0.250       0.578
         12         0.76      100.00       78.(AMC II)     0.300       0.041
         13         0.39      100.00       86.(AMC II)     0.250       0.153
         14        31.05       10.00       75.(AMC II)     0.200       0.803

     TOTAL AREA (Acres) =    227.90

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.061

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.313
 ========================================================================
```

```
 ************************************************************************
           NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                             Analysis prepared by:

                             HUNSAKER & ASSOCIATES
                                   Irvine,Inc
                         Planning * Engineering * Surveying
                  Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   25-YEAR STORM AT NODE 24, OFF-SITE AREA TO RANCHO PKWY @ 84" RCP (F19-P07)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC II:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     4.49 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1         1.67       60.00            69.       0.250       0.592
          2        30.26       50.00            69.       0.250       0.651
          3        45.50       10.00            69.       0.250       0.888
          4         0.68       85.00            69.       0.250       0.444
          5        65.18       10.00            56.       0.300       0.870
          6         0.50       90.00            69.       0.250       0.415
          7         3.92       50.00            56.       0.300       0.562
          8         2.50       40.00            56.       0.300       0.639
          9        13.11       40.00            69.       0.250       0.711
         10        24.46       35.00            56.       0.300       0.677
         11         7.92       35.00            69.       0.250       0.740
         12         0.76      100.00            78.       0.300       0.509
         13         0.39      100.00            86.       0.250       0.667
         14        31.05       10.00            75.       0.200       0.898

     TOTAL AREA (Acres) =    227.90

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.061

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.199
 ========================================================================
```

```
 ************************************************************************
           NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                             Analysis prepared by:

                             HUNSAKER & ASSOCIATES
                                   Irvine,Inc
                         Planning * Engineering * Surveying
                  Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   100-YEAR STORM AT NODE 24, OFF-SITE AREA TO RANCHO PKWY @ 84" RCP (F19-P07)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     5.63 (inches)
```

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	1.67	60.00	69.(AMC II)	0.250	0.816
2	30.26	50.00	69.(AMC II)	0.250	0.839
3	45.50	10.00	69.(AMC II)	0.250	0.934
4	0.68	85.00	69.(AMC II)	0.250	0.756
5	65.18	10.00	56.(AMC II)	0.300	0.916
6	0.50	90.00	69.(AMC II)	0.250	0.745
7	3.92	50.00	56.(AMC II)	0.300	0.751
8	2.50	40.00	56.(AMC II)	0.300	0.792
9	13.11	40.00	69.(AMC II)	0.250	0.863
10	24.46	35.00	56.(AMC II)	0.300	0.813
11	7.92	35.00	69.(AMC II)	0.250	0.875
12	0.76	100.00	78.(AMC II)	0.300	0.856
13	0.39	100.00	86.(AMC II)	0.250	0.937
14	31.05	10.00	75.(AMC II)	0.200	0.944

```
     TOTAL AREA (Acres) =    227.90

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.061

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.108
 ========================================================================
```

```
 ************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ************************************************************************
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   2-YEAR STORM AT NODE 61, OFF-SITE/ON-SITE AREAS @ 10.5'X10.5'RCB (F19-P07)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC I:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     2.05 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1         1.67       60.00       69.(AMC II)     0.250       0.356
          2        30.26       50.00       69.(AMC II)     0.250       0.445
          3        45.50       10.00       69.(AMC II)     0.250       0.801
          4         0.68       85.00       69.(AMC II)     0.250       0.134
          5        65.18       10.00       56.(AMC II)     0.300       0.801
          6         0.50       90.00       69.(AMC II)     0.250       0.089
          7         3.92       50.00       56.(AMC II)     0.300       0.445
          8         2.50       40.00       56.(AMC II)     0.300       0.534
          9        13.11       40.00       69.(AMC II)     0.250       0.534
         10        24.46       35.00       56.(AMC II)     0.300       0.578
         11         7.92       35.00       69.(AMC II)     0.250       0.578
         12         0.76      100.00       78.(AMC II)     0.300       0.041
         13         0.39      100.00       86.(AMC II)     0.250       0.153
         14        31.05       10.00       75.(AMC II)     0.200       0.803
         15        41.66      100.00       66.(AMC II)     0.300       0.000
         16        22.99      100.00       83.(AMC II)     0.200       0.092
         17        11.90      100.00       77.(AMC II)     0.250       0.028

     TOTAL AREA (Acres) =    304.45

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.111

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.477
 ========================================================================
```

```
 ************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                 Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   25-YEAR STORM AT NODE 61, OFF-SITE/ON-SITE AREAS @ 10.5'X10.5'RCB (F19-P07)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC II:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     4.49 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1         1.67       60.00            69.       0.250       0.592
          2        30.26       50.00            69.       0.250       0.651
          3        45.50       10.00            69.       0.250       0.888
          4         0.68       85.00            69.       0.250       0.444
          5        65.18       10.00            56.       0.300       0.870
          6         0.50       90.00            69.       0.250       0.415
          7         3.92       50.00            56.       0.300       0.562
          8         2.50       40.00            56.       0.300       0.639
          9        13.11       40.00            69.       0.250       0.711
         10        24.46       35.00            56.       0.300       0.677
         11         7.92       35.00            69.       0.250       0.740
         12         0.76      100.00            78.       0.300       0.509
         13         0.39      100.00            86.       0.250       0.667
         14        31.05       10.00            75.       0.200       0.898
         15        41.66      100.00            66.       0.300       0.310
         16        22.99      100.00            83.       0.200       0.605
         17        11.90      100.00            77.       0.250       0.491

     TOTAL AREA (Acres) =    304.45

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.111

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.294
 ========================================================================
```

```
 ************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ************************************************************************
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   100-YEAR STORM AT NODE 61, OFF-SITE/ON-SITE AREAS @ 10.5'X10.5'RCB (F19-P07)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     5.63 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1         1.67       60.00       69.(AMC II)     0.250       0.816
          2        30.26       50.00       69.(AMC II)     0.250       0.839
          3        45.50       10.00       69.(AMC II)     0.250       0.934
          4         0.68       85.00       69.(AMC II)     0.250       0.756
          5        65.18       10.00       56.(AMC II)     0.300       0.916
          6         0.50       90.00       69.(AMC II)     0.250       0.745
          7         3.92       50.00       56.(AMC II)     0.300       0.751
          8         2.50       40.00       56.(AMC II)     0.300       0.792
          9        13.11       40.00       69.(AMC II)     0.250       0.863
         10        24.46       35.00       56.(AMC II)     0.300       0.813
         11         7.92       35.00       69.(AMC II)     0.250       0.875
         12         0.76      100.00       78.(AMC II)     0.300       0.856
         13         0.39      100.00       86.(AMC II)     0.250       0.937
         14        31.05       10.00       75.(AMC II)     0.200       0.944
         15        41.66      100.00       66.(AMC II)     0.300       0.684
         16        22.99      100.00       83.(AMC II)     0.200       0.916
         17        11.90      100.00       77.(AMC II)     0.250       0.836

     TOTAL AREA (Acres) =    304.45

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.111

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.137
 ========================================================================
```

```
 ************************************************************************
           NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                     AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   2-YEAR STORM AT NODE 61, ON-SITE TOTAL AREA "A" TO EX. EARTHEN CHANNEL
   THEN TO EXISTING 10.5'X10.5'RCB (F19-P07)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC I:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     2.05 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1         41.66      100.00       66.(AMC II)     0.300       0.000
          2         22.99      100.00       83.(AMC II)     0.200       0.092
          3         11.90      100.00       77.(AMC II)     0.250       0.028

     TOTAL AREA (Acres) =     76.55

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.262

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.968
 ========================================================================
```

```
 ************************************************************************
           NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   25-YEAR STORM AT NODE 61, ON-SITE TOTAL AREA "A" TO EX. EARTHEN CHANNEL
   THEN TO EXISTING 10.5'X10.5'RCB (F19-P07)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC II:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     4.49 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1         41.66      100.00            66.       0.300       0.310
          2         22.99      100.00            83.       0.200       0.605
          3         11.90      100.00            77.       0.250       0.491

     TOTAL AREA (Acres) =     76.55

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.262

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.574
 ========================================================================
```

```
 ************************************************************************
           NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                     AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   100-YEAR STORM AT NODE 61, ON-SITE TOTAL AREA "A" TO EX. EARTHEN CHANNEL
   THEN TO EXISTING 10.5'X10.5'RCB (F19-P07)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     5.63 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1         41.66      100.00       66.(AMC II)     0.300       0.684
          2         22.99      100.00       83.(AMC II)     0.200       0.916
          3         11.90      100.00       77.(AMC II)     0.250       0.836

     TOTAL AREA (Acres) =     76.55

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.262

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.223
 ========================================================================
```

```
 ************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   2-YEAR STORM AT NODE 15, ON-SITE AREA "B" EXISTING CONDITION @ 84" RCP (F19)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC I:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     2.05 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1         19.45      100.00       66.(AMC II)     0.300       0.000
          2         16.28      100.00       83.(AMC II)     0.200       0.092
          3          7.67      100.00       77.(AMC II)     0.250       0.028

     TOTAL AREA (Acres) =     43.40

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.254

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.960
 ========================================================================
```

```
 ************************************************************************
           NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                     AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   25-YEAR STORM AT NODE 15, ON-SITE AREA "B" EXISTING CONDITION @ 84" RCP (F19)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC II:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     4.49 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1         19.45      100.00            66.       0.300       0.310
          2         16.28      100.00            83.       0.200       0.605
          3          7.67      100.00            77.       0.250       0.491

     TOTAL AREA (Acres) =     43.40

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.254

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.548
 ========================================================================
```

```
 ************************************************************************
           NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                             Analysis prepared by:

                             HUNSAKER & ASSOCIATES
                                   Irvine,Inc
                         Planning * Engineering * Surveying
                  Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   100-YEAR STORM AT NODE 15, ON-SITE AREA "B" EXISTING CONDITION @ 84" RCP (F19)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     5.63 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1         19.45      100.00       66.(AMC II)     0.300       0.684
          2         16.28      100.00       83.(AMC II)     0.200       0.916
          3          7.67      100.00       77.(AMC II)     0.250       0.836

     TOTAL AREA (Acres) =     43.40

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.254

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.202
 ========================================================================
```

```
 ************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ************************************************************************
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   2-YEAR STORM AT NODE 56.3, AREA TRIBUTARY TO DETENTION BASIN IN CENTRAL PARK
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC I:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     2.05 (inches)
```

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	3.36	60.00	69.(AMC II)	0.250	0.356
2	30.26	50.00	69.(AMC II)	0.250	0.445
3	45.53	10.00	69.(AMC II)	0.250	0.801
4	0.68	85.00	69.(AMC II)	0.250	0.134
5	69.06	10.00	56.(AMC II)	0.300	0.801
6	0.50	90.00	69.(AMC II)	0.250	0.089
7	12.03	50.00	56.(AMC II)	0.300	0.445
8	4.93	40.00	56.(AMC II)	0.300	0.534
9	13.11	40.00	69.(AMC II)	0.250	0.534
10	24.46	35.00	56.(AMC II)	0.300	0.578
11	7.92	35.00	69.(AMC II)	0.250	0.578
12	0.76	100.00	78.(AMC II)	0.300	0.041
13	0.39	100.00	86.(AMC II)	0.250	0.153
14	32.43	10.00	75.(AMC II)	0.200	0.803
15	1.29	50.00	75.(AMC II)	0.200	0.454
16	0.22	85.00	56.(AMC II)	0.300	0.133
17	7.63	60.00	56.(AMC II)	0.300	0.356
18	2.82	60.00	75.(AMC II)	0.200	0.366
19	7.29	20.00	56.(AMC II)	0.300	0.712
20	0.93	20.00	75.(AMC II)	0.200	0.715
21	0.14	40.00	75.(AMC II)	0.200	0.541

```
     TOTAL AREA (Acres) =    265.74

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.068

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.335
 ========================================================================
```

```
 ************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ************************************************************************
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   25-YEAR STORM AT NODE 56.3, AREA TRIBUTARY TO DETENTION BASIN IN CENTRAL PARK
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC II:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     4.49 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1         3.36       60.00            69.       0.250       0.592
          2        30.26       50.00            69.       0.250       0.651
          3        45.53       10.00            69.       0.250       0.888
          4         0.68       85.00            69.       0.250       0.444
          5        69.06       10.00            56.       0.300       0.870
          6         0.50       90.00            69.       0.250       0.415
          7        12.03       50.00            56.       0.300       0.562
          8         4.93       40.00            56.       0.300       0.639
          9        13.11       40.00            69.       0.250       0.711
         10        24.46       35.00            56.       0.300       0.677
         11         7.92       35.00            69.       0.250       0.740
         12         0.76      100.00            78.       0.300       0.509
         13         0.39      100.00            86.       0.250       0.667
         14        32.43       10.00            75.       0.200       0.898
         15         1.29       50.00            75.       0.200       0.701
         16         0.22       85.00            56.       0.300       0.292
         17         7.63       60.00            56.       0.300       0.485
         18         2.82       60.00            75.       0.200       0.652
         19         7.29       20.00            56.       0.300       0.793
         20         0.93       20.00            75.       0.200       0.849
         21         0.14       40.00            75.       0.200       0.750

     TOTAL AREA (Acres) =    265.74

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.068

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.220
 ========================================================================
```

```
 ************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ************************************************************************
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   100-YEAR STORM AT NODE 56.3, AREA TRIBUTARY TO DETENTION BASIN IN CENTRAL PARK
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     5.63 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1         3.36       60.00       69.(AMC II)     0.250       0.816
          2        30.26       50.00       69.(AMC II)     0.250       0.839
          3        45.53       10.00       69.(AMC II)     0.250       0.934
          4         0.68       85.00       69.(AMC II)     0.250       0.756
          5        69.06       10.00       56.(AMC II)     0.300       0.916
          6         0.50       90.00       69.(AMC II)     0.250       0.745
          7        12.03       50.00       56.(AMC II)     0.300       0.751
          8         4.93       40.00       56.(AMC II)     0.300       0.792
          9        13.11       40.00       69.(AMC II)     0.250       0.863
         10        24.46       35.00       56.(AMC II)     0.300       0.813
         11         7.92       35.00       69.(AMC II)     0.250       0.875
         12         0.76      100.00       78.(AMC II)     0.300       0.856
         13         0.39      100.00       86.(AMC II)     0.250       0.937
         14        32.43       10.00       75.(AMC II)     0.200       0.944
         15         1.29       50.00       75.(AMC II)     0.200       0.887
         16         0.22       85.00       56.(AMC II)     0.300       0.606
         17         7.63       60.00       56.(AMC II)     0.300       0.710
         18         2.82       60.00       75.(AMC II)     0.200       0.873
         19         7.29       20.00       56.(AMC II)     0.300       0.875
         20         0.93       20.00       75.(AMC II)     0.200       0.929
         21         0.14       40.00       75.(AMC II)     0.200       0.901

     TOTAL AREA (Acres) =    265.74

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.068

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.119
 ========================================================================
```

```
 ************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ************************************************************************
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   2-YEAR STORM AT NODE 35.2, AREA TRIBUTARY TO DETENTION BASIN IN CENTRAL PARK
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC I:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     2.05 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1          0.05       85.00       69.(AMC II)     0.250       0.134
          2          0.13       10.00       56.(AMC II)     0.300       0.801
          3          2.64       50.00       56.(AMC II)     0.300       0.445
          4          2.06       40.00       56.(AMC II)     0.300       0.534
          5          0.04       10.00       75.(AMC II)     0.200       0.803
          6          1.31       50.00       75.(AMC II)     0.200       0.454
          7          2.91       85.00       56.(AMC II)     0.300       0.133
          8          0.06       40.00       75.(AMC II)     0.200       0.541
          9          2.20       85.00       75.(AMC II)     0.200       0.148

     TOTAL AREA (Acres) =     11.40

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.168

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.670
 ========================================================================
```

```
 ************************************************************************
           NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                     AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   25-YEAR STORM AT NODE 35.2, AREA TRIBUTARY TO DETENTION BASIN IN CENTRAL PARK
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC II:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     4.49 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1          0.05       85.00            69.       0.250       0.444
          2          0.13       10.00            56.       0.300       0.870
          3          2.64       50.00            56.       0.300       0.562
          4          2.06       40.00            56.       0.300       0.639
          5          0.04       10.00            75.       0.200       0.898
          6          1.31       50.00            75.       0.200       0.701
          7          2.91       85.00            56.       0.300       0.292
          8          0.06       40.00            75.       0.200       0.750
          9          2.20       85.00            75.       0.200       0.529

     TOTAL AREA (Acres) =     11.40

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.168

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.478
 ========================================================================
```

```
 ************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   100-YEAR STORM AT NODE 35.2, AREA TRIBUTARY TO DETENTION BASIN IN CENTRAL PARK
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     5.63 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1          0.05       85.00       69.(AMC II)     0.250       0.756
          2          0.13       10.00       56.(AMC II)     0.300       0.916
          3          2.64       50.00       56.(AMC II)     0.300       0.751
          4          2.06       40.00       56.(AMC II)     0.300       0.792
          5          0.04       10.00       75.(AMC II)     0.200       0.944
          6          1.31       50.00       75.(AMC II)     0.200       0.887
          7          2.91       85.00       56.(AMC II)     0.300       0.606
          8          0.06       40.00       75.(AMC II)     0.200       0.901
          9          2.20       85.00       75.(AMC II)     0.200       0.837

     TOTAL AREA (Acres) =     11.40

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.168

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.243
 ========================================================================
```

```
 ************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   2-YEAR STORM AT NODE 61, ON-SITE WITH OFF-SITE AREA "A" 10.5'X10.5'RCB (F19-P07)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC I:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     2.05 (inches)
```

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	3.36	60.00	69.(AMC II)	0.250	0.356
2	25.81	50.00	69.(AMC II)	0.250	0.445
3	45.53	10.00	69.(AMC II)	0.250	0.801
4	0.68	85.00	69.(AMC II)	0.250	0.134
5	69.06	10.00	56.(AMC II)	0.300	0.801
6	0.50	90.00	69.(AMC II)	0.250	0.089
7	11.58	50.00	56.(AMC II)	0.300	0.445
8	5.38	40.00	56.(AMC II)	0.300	0.534
9	17.56	40.00	69.(AMC II)	0.250	0.534
10	24.46	35.00	56.(AMC II)	0.300	0.578
11	7.92	35.00	69.(AMC II)	0.250	0.578
12	0.76	100.00	78.(AMC II)	0.300	0.041
13	0.39	100.00	86.(AMC II)	0.250	0.153
14	32.43	10.00	75.(AMC II)	0.200	0.803
15	1.29	50.00	75.(AMC II)	0.200	0.454
16	0.22	85.00	56.(AMC II)	0.300	0.133
17	7.63	60.00	56.(AMC II)	0.300	0.356
18	2.82	60.00	75.(AMC II)	0.200	0.366
19	7.29	20.00	56.(AMC II)	0.300	0.712
20	0.93	20.00	75.(AMC II)	0.200	0.715
21	4.98	40.00	75.(AMC II)	0.200	0.541
22	2.64	50.00	56.(AMC II)	0.300	0.445
23	1.31	50.00	75.(AMC II)	0.200	0.454
24	2.06	40.00	56.(AMC II)	0.300	0.534
25	0.06	40.00	75.(AMC II)	0.200	0.541
26	2.91	85.00	56.(AMC II)	0.300	0.133
27	0.04	10.00	75.(AMC II)	0.200	0.803
28	0.13	10.00	56.(AMC II)	0.300	0.801
29	0.05	85.00	69.(AMC II)	0.250	0.134
30	2.20	85.00	75.(AMC II)	0.200	0.148
31	2.54	10.00	69.(AMC II)	0.250	0.801
32	1.30	10.00	75.(AMC II)	0.200	0.803
33	4.49	50.00	56.(AMC II)	0.300	0.445
34	8.12	50.00	75.(AMC II)	0.200	0.454

35	9.22	50.00	69.(AMC II)	0.250	0.445
36	8.05	20.00	56.(AMC II)	0.300	0.712
37	6.12	20.00	69.(AMC II)	0.250	0.712
38	12.52	20.00	75.(AMC II)	0.200	0.715
39	1.92	10.00	56.(AMC II)	0.300	0.801
40	1.79	85.00	56.(AMC II)	0.300	0.133
41	1.70	85.00	75.(AMC II)	0.200	0.148

TOTAL AREA (Acres) = 339.75

AREA-AVERAGED LOSS RATE, $\bar{F}m$ (in./hr.) = 0.074

AREA-AVERAGED LOW LOSS FRACTION, $\bar{Y}$ = 0.360

==========

```
 ************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   25-YEAR STORM AT NODE 61, ON-SITE WITH OFF-SITE AREA "A" 10.5'X10.5'RCB (F19-P07)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC II:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     4.49 (inches)
```

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	3.36	60.00	69.	0.250	0.592
2	25.81	50.00	69.	0.250	0.651
3	45.53	10.00	69.	0.250	0.888
4	0.68	85.00	69.	0.250	0.444
5	69.06	10.00	56.	0.300	0.870
6	0.50	90.00	69.	0.250	0.415
7	11.58	50.00	56.	0.300	0.562
8	5.38	40.00	56.	0.300	0.639
9	17.56	40.00	69.	0.250	0.711
10	24.46	35.00	56.	0.300	0.677
11	7.92	35.00	69.	0.250	0.740
12	0.76	100.00	78.	0.300	0.509
13	0.39	100.00	86.	0.250	0.667
14	32.43	10.00	75.	0.200	0.898
15	1.29	50.00	75.	0.200	0.701
16	0.22	85.00	56.	0.300	0.292
17	7.63	60.00	56.	0.300	0.485
18	2.82	60.00	75.	0.200	0.652
19	7.29	20.00	56.	0.300	0.793
20	0.93	20.00	75.	0.200	0.849
21	4.98	40.00	75.	0.200	0.750
22	2.64	50.00	56.	0.300	0.562
23	1.31	50.00	75.	0.200	0.701
24	2.06	40.00	56.	0.300	0.639
25	0.06	40.00	75.	0.200	0.750
26	2.91	85.00	56.	0.300	0.292
27	0.04	10.00	75.	0.200	0.898
28	0.13	10.00	56.	0.300	0.870
29	0.05	85.00	69.	0.250	0.444
30	2.20	85.00	75.	0.200	0.529
31	2.54	10.00	69.	0.250	0.888
32	1.30	10.00	75.	0.200	0.898
33	4.49	50.00	56.	0.300	0.562
34	8.12	50.00	75.	0.200	0.701

35	9.22	50.00	69.	0.250	0.651
36	8.05	20.00	56.	0.300	0.793
37	6.12	20.00	69.	0.250	0.829
38	12.52	20.00	75.	0.200	0.849
39	1.92	10.00	56.	0.300	0.870
40	1.79	85.00	56.	0.300	0.292
41	1.70	85.00	75.	0.200	0.529

TOTAL AREA (Acres) = 339.75

AREA-AVERAGED LOSS RATE, $\bar{F}m$ (in./hr.) = 0.074

AREA-AVERAGED LOW LOSS FRACTION, $\bar{Y}$ = 0.235

==========

```
 ************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   100-YEAR STORM AT NODE 61, ON-SITE WITH OFF-SITE AREA "A" 10.5'X10.5'RCB (F19-P07)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     5.63 (inches)
```

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	3.36	60.00	69.(AMC II)	0.250	0.816
2	25.81	50.00	69.(AMC II)	0.250	0.839
3	45.53	10.00	69.(AMC II)	0.250	0.934
4	0.68	85.00	69.(AMC II)	0.250	0.756
5	69.06	10.00	56.(AMC II)	0.300	0.916
6	0.50	90.00	69.(AMC II)	0.250	0.745
7	11.58	50.00	56.(AMC II)	0.300	0.751
8	5.38	40.00	56.(AMC II)	0.300	0.792
9	17.56	40.00	69.(AMC II)	0.250	0.863
10	24.46	35.00	56.(AMC II)	0.300	0.813
11	7.92	35.00	69.(AMC II)	0.250	0.875
12	0.76	100.00	78.(AMC II)	0.300	0.856
13	0.39	100.00	86.(AMC II)	0.250	0.937
14	32.43	10.00	75.(AMC II)	0.200	0.944
15	1.29	50.00	75.(AMC II)	0.200	0.887
16	0.22	85.00	56.(AMC II)	0.300	0.606
17	7.63	60.00	56.(AMC II)	0.300	0.710
18	2.82	60.00	75.(AMC II)	0.200	0.873
19	7.29	20.00	56.(AMC II)	0.300	0.875
20	0.93	20.00	75.(AMC II)	0.200	0.929
21	4.98	40.00	75.(AMC II)	0.200	0.901
22	2.64	50.00	56.(AMC II)	0.300	0.751
23	1.31	50.00	75.(AMC II)	0.200	0.887
24	2.06	40.00	56.(AMC II)	0.300	0.792
25	0.06	40.00	75.(AMC II)	0.200	0.901
26	2.91	85.00	56.(AMC II)	0.300	0.606
27	0.04	10.00	75.(AMC II)	0.200	0.944
28	0.13	10.00	56.(AMC II)	0.300	0.916
29	0.05	85.00	69.(AMC II)	0.250	0.756
30	2.20	85.00	75.(AMC II)	0.200	0.837
31	2.54	10.00	69.(AMC II)	0.250	0.934
32	1.30	10.00	75.(AMC II)	0.200	0.944
33	4.49	50.00	56.(AMC II)	0.300	0.751
34	8.12	50.00	75.(AMC II)	0.200	0.887

35	9.22	50.00	69.(AMC II)	0.250	0.839
36	8.05	20.00	56.(AMC II)	0.300	0.875
37	6.12	20.00	69.(AMC II)	0.250	0.910
38	12.52	20.00	75.(AMC II)	0.200	0.929
39	1.92	10.00	56.(AMC II)	0.300	0.916
40	1.79	85.00	56.(AMC II)	0.300	0.606
41	1.70	85.00	75.(AMC II)	0.200	0.837

TOTAL AREA (Acres) = 339.75

AREA-AVERAGED LOSS RATE, $\bar{F}m$ (in./hr.) = 0.074

AREA-AVERAGED LOW LOSS FRACTION, $\bar{Y}$ = 0.124

==========

OUTFLOW VS DEPTH CALCULATIONS

		HOLES	HOLES	HOLES	HOLES	HOLES	HOLES	HOLES	HOLES	WEIR		
No. of Holes	→	20	1	1	1	2	0	0	0	1	←	No. of Weir
		HOLE C	HOLE C	HOLE C	HOLE C	HOLE C	HOLE C	HOLE C	HOLE C	WEIR C		
Discharge Coefficient	→	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	3.09	←	Weir Coefficient
		HOLE FL	HOLE FL	HOLE FL	HOLE FL	HOLE FL	HOLE FL	HOLE FL	HOLE FL	DIST TO WEIR		
Distance of Holes from Basin Bottom (in)	→	0	18	36	54	72	120	72	0	144	←	Distance of Top of Riser Pipe from Basin Bottom (in)
		HOLE R	HOLE R	HOLE R	HOLE R	HOLE R	HOLE R	HOLE R	HOLE R	WEIR LENGTH FT		
Hole Radius (in)	→	5.00	2.00	2.00	2.00	6	6	0	0	71.000	←	Riser Pipe Perimeter (ft) =PI*D, 96" Riser Pipe
		CEN EL	CEN EL	CEN EL	CEN EL	CEN EL	CEN EL	CEN EL	CEN EL	WEIR ELEV		
Hole Centerline Elev (ft)	→	696.4167	697.6667	699.1667	700.6667	702.5	706.5	702	696	708.0	←	Top of Riser Elevation (ft)

ELEV	DEPTH	OUTFLOW								AREA		
696.00	0	0								0	←	(sq-ft)
696.50	0.5	15.16	15.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
697.00	1	40.12	40.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
697.50	1.5	54.67	54.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
698.00	2	66.33	66.09	0.24	0.00	0.00	0.00	0.00	0.00	0.00		
698.50	2.5	76.19	75.81	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
699.00	3	84.90	84.42	0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
699.50	3.5	93.04	92.23	0.57	0.24	0.00	0.00	0.00	0.00	0.00	0.00	
700.00	4	100.45	99.42	0.64	0.38	0.00	0.00	0.00	0.00	0.00	0.00	
700.50	4.5	107.33	106.14	0.71	0.49	0.00	0.00	0.00	0.00	0.00	0.00	
701.00	5	114.02	112.45	0.77	0.57	0.24	0.00	0.00	0.00	0.00	0.00	
701.50	5.5	120.27	118.42	0.82	0.64	0.38	0.00	0.00	0.00	0.00	0.00	
702.00	6	126.17	124.11	0.87	0.71	0.49	0.00	0.00	0.00	0.00	0.00	
703.00	7	142.55	134.76	0.97	0.82	0.64	5.35	0.00	0.00	0.00	0.00	0.00
704.00	8	156.65	144.64	1.06	0.92	0.77	9.26	0.00	0.00	0.00	0.00	0.00
705.00	9	168.87	153.88	1.14	1.01	0.87	11.96	0.00	0.00	0.00	0.00	0.00
706.00	10	180.03	162.60	1.21	1.10	0.97	14.15	0.00	0.00	0.00	0.00	0.00
707.00	11	190.43	170.87	1.28	1.18	1.06	16.04	0.00	0.00	0.00	0.00	0.00
708.00	12	200.23	178.76	1.35	1.25	1.14	17.74	0.00	0.00	0.00	0.00	0.00
709.00	13	428.93	186.32	1.41	1.32	1.21	19.28	0.00	0.00	0.00	219.39	0.00
710.00	14	838.96	193.58	1.48	1.38	1.28	20.71	0.00	0.00	0.00	620.53	0.00

↑ [Σ FLOWS (HOLES+RISER)]

(OUTFLOW THROUGH HOLES)

↑ (FLOW OVER TOP OF RISER)

Note:

1. Orifice outflow is based on:
   $Q=CA(2gH)^{0.5}$
   where:
   C = Coefficient, 0.6 used here
   A = Orifice Area
   H = Headwater

2. Weir flow is based on:
   $Q=CLH^{1.5}$
   where:
   C = Coefficient, 2.8 used here
   L = Weir Length, Riser Pipe Perimeter was used here
   H = Headwater

W.O. #1443-136X, NAKASE'S NURSERY IN CITY OF LAKE FOREST
10/11/2017
PROPOSED BASINS AT NODES 35 AND 61
With 20 @ 10", 1 @ 4", 1 @ 4", 1 @ 4" and 2 @ 12" Diameter Orifices
at 696.42, 697.67, 699.17, 700.67 & 702.50 Center Hole Elevation Respectively.

STORAGE CAPACITY CALCULATION

Elevation (ft)	Contour Interval (ft)	Accumulate Depth (ft)	Area (sqft)	Area (acre)	Mean Area (acre)	Volume (ac.ft)	$Volume_{ACCUMULATE}$ (ac.ft)	$Volume_{ACCUMULATE}$ (cuyd)	Qout (cfs)
696.00			44100	1.01					0.00
	0.50				1.01	0.51	0.51	816.67	15.16
696.50		0.50	44100	1.01					
	0.50				1.01	0.51	1.01	1633.33	40.12
697.00		1.00	44100	1.01					
	0.50				1.01	0.51	1.52	2450.00	54.67
697.50		1.50	44100	1.01					
	0.50				1.01	0.51	2.02	3266.67	66.33
698.00		2.00	44100	1.01					
	0.50				1.01	0.51	2.53	4083.33	76.19
698.50		2.50	44100	1.01					
	0.50				1.01	0.51	3.04	4900.00	84.90
699.00		3.00	44100	1.01					
	0.50				1.01	0.51	3.54	5716.67	93.04
699.50		3.50	44100	1.01					
	0.50				1.01	0.51	4.05	6533.33	100.45
700.00		4.00	44100	1.01					
	0.50				1.01	0.51	4.56	7350.00	107.33
700.50		4.50	44100	1.01					
	0.50				1.01	0.51	5.06	8166.67	114.02
701.00		5.00	44100	1.01					
	0.50				1.01	0.51	5.57	8983.33	120.27
701.50		5.50	44100	1.01					
	0.50				1.01	0.51	6.07	9800.00	126.17
702.00		6.00	44100	1.01					
	1.00				1.01	1.01	7.09	11433.33	142.55
703.00		7.00	44100	1.01					
	1.00				1.01	1.01	8.10	13066.67	156.65
704.00		8.00	44100	1.01					
	1.00				1.01	1.01	9.11	14700.00	168.87
705.00		9.00	44100	1.01					
	1.00				1.01	1.01	10.12	16333.33	180.03
706.00		10.00	44100	1.01					
	1.00				1.01	1.01	11.14	17966.67	190.43
707.00		11.00	44100	1.01					
	1.00				1.01	1.01	12.15	19600.00	200.23
708.00	71' WEIR	12.00	44100	1.01					
	1.00				1.01	1.01	13.16	21233.33	428.93
709.00		13.00	44100	1.01					
	1.00				1.01	1.01	14.17	22866.67	838.96
710.00		14.00	44100	1.01					

```
*******************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
         (c) Copyright 1989-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                      Planning * Engineering * Surveying
              Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                   *
* 2-YEAR STORM EXISTING CONDITION OFFSITE RUN-ON AT RANCHO PARKWAY NODE 24 *
* W.O. #1443-136X                                                         *
 *************************************************************************

  FILE NAME: FL-02X.DAT
  TIME/DATE OF STUDY: 14:38 11/07/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


*******************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE     24.00 IS CODE = 1.2
-------------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
===============================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =  227.90
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.061
    LOW LOSS FRACTION = 0.313
    TIME OF CONCENTRATION(MIN.) = 19.31
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =   2
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.53
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  0.89
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.22
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  2.05

-------------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =    25.77
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =    13.17

-------------------------------------------------------------------------------

===============================================================================

                      2 4 - H O U R    S T O R M
                   R U N O F F    H Y D R O G R A P H

===============================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
-------------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       49.9      99.9     149.8     199.8
-------------------------------------------------------------------------------
  14.000      8.6550     17.62  .  Q      .  V      .         .         .
  14.017      8.6793     17.67  .  Q      .  V      .         .         .
  14.033      8.7037     17.71  .  Q      .  V      .         .         .
  14.050      8.7282     17.76  .  Q      .  V      .         .         .
  14.067      8.7527     17.80  .  Q      .  V      .         .         .
  14.083      8.7773     17.89  .  Q      .  V      .         .         .
  14.100      8.8022     18.03  .  Q      .  V      .         .         .
  14.117      8.8272     18.18  .  Q      .  V      .         .         .
  14.133      8.8525     18.33  .  Q      .  V      .         .         .
  14.150      8.8779     18.48  .  Q      .  V      .         .         .
  14.167      8.9036     18.63  .  Q      .  V      .         .         .
  14.183      8.9295     18.78  .  Q      .  V      .         .         .
  14.200      8.9556     18.93  .  Q      .  V      .         .         .
  14.217      8.9818     19.08  .  Q      .  V      .         .         .
  14.233      9.0083     19.23  .  Q      .  V      .         .         .
  14.250      9.0350     19.38  .  Q      .   V     .         .         .
  14.267      9.0619     19.53  .  Q      .   V     .         .         .
  14.283      9.0890     19.68  .  Q      .   V     .         .         .
  14.300      9.1163     19.83  .  Q      .   V     .         .         .
  14.317      9.1439     19.98  .   Q     .   V     .         .         .
  14.333      9.1716     20.13  .   Q     .   V     .         .         .
  14.350      9.1995     20.28  .   Q     .   V     .         .         .
  14.367      9.2277     20.43  .   Q     .   V     .         .         .
  14.383      9.2560     20.58  .   Q     .   V     .         .         .
  14.400      9.2845     20.71  .   Q     .   V     .         .         .
  14.417      9.3132     20.80  .   Q     .   V     .         .         .
  14.433      9.3419     20.87  .   Q     .   V     .         .         .
  14.450      9.3708     20.94  .   Q     .   V     .         .         .
  14.467      9.3997     21.02  .   Q     .   V     .         .         .
  14.483      9.4288     21.09  .   Q     .   V     .         .         .
  14.500      9.4579     21.16  .   Q     .   V     .         .         .
  14.517      9.4872     21.24  .   Q     .   V     .         .         .
  14.533      9.5165     21.31  .   Q     .   V     .         .         .
  14.550      9.5460     21.38  .   Q     .   V     .         .         .
  14.567      9.5755     21.46  .   Q     .   V     .         .         .
  14.583      9.6052     21.53  .   Q     .   V     .         .         .
  14.600      9.6349     21.60  .   Q     .   V     .         .         .
  14.617      9.6648     21.68  .   Q     .    V    .         .         .
  14.633      9.6948     21.75  .   Q     .    V    .         .         .
  14.650      9.7248     21.82  .   Q     .    V    .         .         .
  14.667      9.7550     21.90  .   Q     .    V    .         .         .
```

Offsite Area Flood Routing

Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24

2-Year Storm Existing Condition

14.683	9.7852	21.97	.	Q	.	V	.	.	.	
14.700	9.8156	22.04	.	Q	.	V	.	.	.	
14.717	9.8461	22.12	.	Q	.	V	.	.	.	
14.733	9.8768	22.29	.	Q	.	V	.	.	.	
14.750	9.9078	22.49	.	Q	.	V	.	.	.	
14.767	9.9390	22.70	.	Q	.	V	.	.	.	
14.783	9.9706	22.90	.	Q	.	V	.	.	.	
14.800	10.0024	23.11	.	Q	.	V	.	.	.	
14.817	10.0345	23.31	.	Q	.	V	.	.	.	
14.833	10.0669	23.52	.	Q	.	V	.	.	.	
14.850	10.0996	23.72	.	Q	.	V	.	.	.	
14.867	10.1325	23.93	.	Q	.	V	.	.	.	
14.883	10.1658	24.13	.	Q	.	V	.	.	.	
14.900	10.1993	24.34	.	Q	.	V	.	.	.	
14.917	10.2331	24.54	.	Q	.	V	.	.	.	
14.933	10.2672	24.75	.	Q	.	V	.	.	.	
14.950	10.3015	24.95	.	Q	.	V	.	.	.	
14.967	10.3362	25.16	.	Q	.	V	.	.	.	
14.983	10.3711	25.36	.	Q	.	V	.	.	.	
15.000	10.4063	25.56	.	Q	.	V	.	.	.	
15.017	10.4418	25.77	.	Q	.	V	.	.	.	
15.033	10.4776	25.97	.	Q	.	V	.	.	.	
15.050	10.5137	26.17	.	Q	.	V	.	.	.	
15.067	10.5500	26.36	.	Q	.	V	.	.	.	
15.083	10.5865	26.55	.	Q	.	V	.	.	.	
15.100	10.6234	26.74	.	Q	.	V	.	.	.	
15.117	10.6605	26.93	.	Q	.	V	.	.	.	
15.133	10.6978	27.12	.	Q	.	V	.	.	.	
15.150	10.7354	27.30	.	Q	.	V	.	.	.	
15.167	10.7733	27.49	.	Q	.	V	.	.	.	
15.183	10.8114	27.68	.	Q	.	V	.	.	.	
15.200	10.8498	27.87	.	Q	.	V	.	.	.	
15.217	10.8885	28.06	.	Q	.	V	.	.	.	
15.233	10.9274	28.25	.	Q	.	V	.	.	.	
15.250	10.9665	28.44	.	Q	.	V	.	.	.	
15.267	11.0060	28.63	.	Q	.	V	.	.	.	
15.283	11.0457	28.82	.	Q	.	V	.	.	.	
15.300	11.0856	29.00	.	Q	.	V	.	.	.	
15.317	11.1258	29.19	.	Q	.	V	.	.	.	
15.333	11.1663	29.38	.	Q	.	V	.	.	.	
15.350	11.2070	29.57	.	Q	.	V	.	.	.	
15.367	11.2481	29.81	.	Q	.	V	.	.	.	
15.383	11.2897	30.22	.	Q	.	V	.	.	.	
15.400	11.3319	30.65	.	Q	.	V	.	.	.	
15.417	11.3747	31.08	.	Q	.	V	.	.	.	
15.433	11.4181	31.51	.	Q	.	V	.	.	.	
15.450	11.4621	31.94	.	Q	.	V	.	.	.	
15.467	11.5067	32.37	.	Q	.	V	.	.	.	
15.483	11.5519	32.79	.	Q	.	V	.	.	.	
15.500	11.5976	33.22	.	Q	.	V	.	.	.	
15.517	11.6440	33.65	.	Q	.	V	.	.	.	
15.533	11.6909	34.08	.	Q	.	V	.	.	.	
15.550	11.7385	34.51	.	Q	.	V	.	.	.	
15.567	11.7866	34.94	.	Q	.	V	.	.	.	
15.583	11.8353	35.37	.	Q	.	V	.	.	.	
15.600	11.8846	35.80	.	Q	.	V	.	.	.	
15.617	11.9345	36.23	.	Q	.	V	.	.	.	
15.633	11.9850	36.66	.	Q	.	V	.	.	.	
15.650	12.0361	37.09	.	Q	.	V	.	.	.	
15.667	12.0878	37.52	.	Q	.	V	.	.	.	
15.683	12.1401	37.98	.	Q	.	V	.	.	.	
15.700	12.1936	38.85	.	Q	.	V	.	.	.	
15.717	12.2485	39.87	.	Q	.	V	.	.	.	
15.733	12.3049	40.89	.	Q	.	V	.	.	.	
15.750	12.3626	41.90	.	Q	.	V	.	.	.	
15.767	12.4217	42.92	.	Q	.	V	.	.	.	
15.783	12.4822	43.94	.	Q	.	V	.	.	.	
15.800	12.5441	44.95	.	Q	.	V	.	.	.	
15.817	12.6075	45.97	.	Q	.	V	.	.	.	
15.833	12.6722	46.99	.	Q	.	V	.	.	.	
15.850	12.7383	48.00	.	Q	.	V	.	.	.	
15.867	12.8058	49.02	.	Q	.	V	.	.	.	
15.883	12.8747	50.04	.	Q	.	V	.	.	.	
15.900	12.9451	51.05	.	Q	.	V	.	.	.	
15.917	13.0168	52.07	.	Q	.	V	.	.	.	
15.933	13.0899	53.08	.	Q	.	V	.	.	.	
15.950	13.1644	54.10	.	Q	.	V	.	.	.	
15.967	13.2403	55.12	.	Q	.	V	.	.	.	
15.983	13.3176	56.13	.	Q	.	V	.	.	.	
16.000	13.3964	57.15	.	Q	.	V	.	.	.	
16.017	13.4809	61.34	.	Q	.	V	.	.	.	
16.033	13.5755	68.70	.	Q	.	V	.	.	.	
16.050	13.6802	76.06	.	Q	.	V	.	.	.	
16.067	13.7951	83.42	.	Q	.	V	.	.	.	
16.083	13.9202	90.78	.	Q	.	V	.	.	.	
16.100	14.0554	98.14	.	Q	.	V	.	.	.	
16.117	14.2007	105.50	.	Q	.	V	.	.	.	
16.133	14.3561	112.86	.	Q	.	V	.	.	.	
16.150	14.5217	120.22	.	Q	.	V	.	.	.	
16.167	14.6974	127.58	.	Q	.	V	.	.	.	
16.183	14.8833	134.93	.	Q	.	V	.	.	.	
16.200	15.0793	142.29	.	Q	.	V	.	.	.	
16.217	15.2854	149.65	.	Q	.	V	.	.	.	
16.233	15.5017	157.01	.	Q	.	V	.	.	.	
16.250	15.7281	164.37	.	Q	.	V	.	.	.	
16.267	15.9647	171.73	.	Q	.	V	.	.	.	
16.283	16.2113	179.09	.	Q	.	V	.	.	.	
16.300	16.4682	186.45	.	Q	.	V	.	.	.	
16.317	16.7351	193.81	.	Q	.	V	.	.	.	
16.333	17.0103	199.77	.	Q	.	V	.	.	.	
16.350	17.2715	189.62	.	Q	.	V	.	.	.	
16.367	17.5209	181.09	.	Q	.	V	.	.	.	
16.383	17.7586	172.56	.	Q	.	V	.	.	.	
16.400	17.9845	164.02	.	Q	.	V	.	.	.	
16.417	18.1987	155.49	.	Q	.	V	.	.	.	
16.433	18.4011	146.96	.	Q	.	V	.	.	.	
16.450	18.5918	138.43	.	Q	.	V	.	.	.	
16.467	18.7707	129.89	.	Q	.	V	.	.	.	
16.483	18.9379	121.36	.	Q	.	V	.	.	.	
16.500	19.0933	112.83	.	Q	.	V	.	.	.	
16.517	19.2369	104.30	.	Q	.	V	.	.	.	
16.533	19.3688	95.77	.	Q	.	V	.	.	.	
16.550	19.4890	87.23	.	Q	.	V	.	.	.	
16.567	19.5974	78.70	.	Q	.	V	.	.	.	
16.583	19.6941	70.17	.	Q	.	V	.	.	.	
16.600	19.7790	61.64	.	Q	.	V	.	.	.	

Offsite Area Flood Routing

Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24

2-Year Storm Existing Condition

16.617	19.8521	53.11	.		Q	.	V	.		
16.633	19.9135	44.57	.		Q	.	V	.		
16.650	19.9639	36.62	.		Q	.	V	.		
16.667	20.0115	34.51	.	Q	.	.	.V	.		
16.683	20.0582	33.93	.	Q	.	.	.V	.		
16.700	20.1042	33.36	.	Q	.	.	.V	.		
16.717	20.1493	32.78	.	Q	.	.	.V	.		
16.733	20.1937	32.20	.	Q	.	.	.V	.		
16.750	20.2372	31.63	.	Q	.	.	.V	.		
16.767	20.2800	31.05	.	Q	.	.	.V	.		
16.783	20.3220	30.47	.	Q	.	.	.V	.		
16.800	20.3632	29.90	.	Q	.	.	.V	.		
16.817	20.4035	29.32	.	Q	.	.	.V	.		
16.833	20.4431	28.74	.	Q	.	.	.V	.		
16.850	20.4819	28.17	.	Q	.	.	.V	.		
16.867	20.5199	27.59	.	Q	.	.	.V	.		
16.883	20.5571	27.01	.	Q	.	.	.V	.		
16.900	20.5935	26.44	.	Q	.	.	.V	.		
16.917	20.6292	25.86	.	Q	.	.	. V	.		
16.933	20.6640	25.28	.	Q	.	.	. V	.		
16.950	20.6980	24.70	.	Q	.	.	. V	.		
16.967	20.7313	24.13	.	Q	.	.	. V	.		
16.983	20.7639	23.74	.	Q	.	.	. V	.		
17.000	20.7963	23.49	.	Q	.	.	. V	.		
17.017	20.8283	23.24	.	Q	.	.	. V	.		
17.033	20.8600	22.99	.	Q	.	.	. V	.		
17.050	20.8913	22.74	.	Q	.	.	. V	.		
17.067	20.9223	22.49	.	Q	.	.	. V	.		
17.083	20.9529	22.24	.	Q	.	.	. V	.		
17.100	20.9832	21.99	.	Q	.	.	. V	.		
17.117	21.0131	21.74	.	Q	.	.	. V	.		
17.133	21.0427	21.49	.	Q	.	.	. V	.		
17.150	21.0720	21.24	.	Q	.	.	. V	.		
17.167	21.1009	20.99	.	Q	.	.	. V	.		
17.183	21.1295	20.74	.	Q	.	.	. V	.		
17.200	21.1577	20.49	.	Q	.	.	. V	.		
17.217	21.1856	20.24	.	Q	.	.	. V	.		
17.233	21.2131	19.99	.	Q	.	.	. V	.		
17.250	21.2403	19.74	.	Q	.	.	. V	.		
17.267	21.2672	19.49	.	Q	.	.	. V	.		
17.283	21.2937	19.24	.	Q	.	.	. V	.		
17.300	21.3199	19.02	.	Q	.	.	. V	.		
17.317	21.3459	18.87	.	Q	.	.	. V	.		
17.333	21.3717	18.73	.	Q	.	.	. V	.		
17.350	21.3973	18.58	.	Q	.	.	. V	.		
17.367	21.4226	18.43	.	Q	.	.	. V	.		
17.383	21.4478	18.28	.	Q	.	.	. V	.		
17.400	21.4728	18.14	.	Q	.	.	. V	.		
17.417	21.4976	17.99	.	Q	.	.	. V	.		
17.433	21.5222	17.84	.	Q	.	.	. V	.		
17.450	21.5465	17.69	.	Q	.	.	. V	.		
17.467	21.5707	17.55	.	Q	.	.	. V	.		
17.483	21.5947	17.40	.	Q	.	.	. V	.		
17.500	21.6184	17.25	.	Q	.	.	. V	.		
17.517	21.6420	17.11	.	Q	.	.	. V	.		
17.533	21.6654	16.96	.	Q	.	.	. V	.		
17.550	21.6885	16.81	.	Q	.	.	. V	.		
17.567	21.7115	16.66	.	Q	.	.	. V	.		
17.583	21.7342	16.52	.	Q	.	.	. V	.		
17.600	21.7568	16.37	.	Q	.	.	. V	.		
17.617	21.7791	16.23	.	Q	.	.	. V	.		
17.633	21.8013	16.13	.	Q	.	.	. V	.		
17.650	21.8234	16.03	.	Q	.	.	. V	.		
17.667	21.8454	15.94	.	Q	.	.	. V	.		
17.683	21.8672	15.85	.	Q	.	.	. V	.		
17.700	21.8889	15.75	.	Q	.	.	. V	.		
17.717	21.9105	15.66	.	Q	.	.	. V	.		
17.733	21.9319	15.57	.	Q	.	.	. V	.		
17.750	21.9532	15.47	.	Q	.	.	. V	.		
17.767	21.9744	15.38	.	Q	.	.	. V	.		
17.783	21.9955	15.29	.	Q	.	.	. V	.		
17.800	22.0164	15.20	.	Q	.	.	. V	.		
17.817	22.0372	15.10	.	Q	.	.	. V	.		
17.833	22.0579	15.01	.	Q	.	.	. V	.		
17.850	22.0784	14.92	.	Q	.	.	. V	.		
17.867	22.0988	14.82	.	Q	.	.	. V	.		
17.883	22.1191	14.73	.	Q	.	.	. V	.		
17.900	22.1393	14.64	.	Q	.	.	. V	.		
17.917	22.1593	14.55	.	Q	.	.	. V	.		
17.933	22.1792	14.45	.	Q	.	.	. V	.		
17.950	22.1990	14.35	.	Q	.	.	. V	.		
17.967	22.2186	14.24	.	Q	.	.	. V	.		
17.983	22.2381	14.13	.	Q	.	.	. V	.		
18.000	22.2574	14.01	.	Q	.	.	. V	.		

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	880.0
20%	275.0
30%	180.0
40%	150.0
50%	125.0
60%	105.0
70%	75.0
80%	50.0
90%	25.0

END OF FLOODSCx ROUTING ANALYSIS

```
**************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
        (c) Copyright 1989-2016 Advanced Engineering Software (aes)
            Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                        Analysis prepared by:

                        HUNSAKER & ASSOCIATES
                              Irvine,Inc
                    Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                  *
* 25-YEAR STORM EXISTING CONDITION OFFSITE RUN-ON AT RANCHO PARKWAY NODE 24*
* W.O. #1443-136X                                                        *
 **************************************************************************

  FILE NAME: FL-25X.DAT
  TIME/DATE OF STUDY: 14:36 11/07/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE     24.00 IS CODE = 1.2
--------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
==========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =  227.90
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.061
    LOW LOSS FRACTION = 0.199
    TIME OF CONCENTRATION(MIN.) = 17.27
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =  25
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.87
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.15
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.94
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  2.71
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  4.49

--------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =    64.53
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =    20.75

--------------------------------------------------------------------------

==========================================================================

                    2 4 - H O U R    S T O R M
                  R U N O F F    H Y D R O G R A P H

==========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
--------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.      118.9     237.7     356.6     475.4
--------------------------------------------------------------------------
  14.000     22.3090     48.75  .   Q     .  V      .         .         .
  14.017     22.3764     48.88  .   Q     .  V      .         .         .
  14.033     22.4439     49.00  .   Q     .  V      .         .         .
  14.050     22.5115     49.13  .   Q     .  V      .         .         .
  14.067     22.5794     49.25  .   Q     .  V      .         .         .
  14.083     22.6474     49.38  .   Q     .   V     .         .         .
  14.100     22.7156     49.51  .   Q     .   V     .         .         .
  14.117     22.7840     49.63  .   Q     .   V     .         .         .
  14.133     22.8525     49.76  .   Q     .   V     .         .         .
  14.150     22.9212     49.88  .   Q     .   V     .         .         .
  14.167     22.9901     50.01  .   Q     .   V     .         .         .
  14.183     23.0591     50.14  .   Q     .   V     .         .         .
  14.200     23.1284     50.26  .   Q     .   V     .         .         .
  14.217     23.1978     50.39  .   Q     .   V     .         .         .
  14.233     23.2674     50.51  .   Q     .   V     .         .         .
  14.250     23.3371     50.64  .   Q     .   V     .         .         .
  14.267     23.4070     50.76  .   Q     .   V     .         .         .
  14.283     23.4772     50.94  .   Q     .   V     .         .         .
  14.300     23.5479     51.32  .   Q     .   V     .         .         .
  14.317     23.6191     51.72  .   Q     .   V     .         .         .
  14.333     23.6909     52.12  .   Q     .   V     .         .         .
  14.350     23.7633     52.52  .   Q     .   V     .         .         .
  14.367     23.8362     52.92  .   Q     .   V     .         .         .
  14.383     23.9096     53.32  .   Q     .   V     .         .         .
  14.400     23.9836     53.72  .   Q     .   V     .         .         .
  14.417     24.0581     54.12  .   Q     .   V     .         .         .
  14.433     24.1332     54.52  .   Q     .   V     .         .         .
  14.450     24.2089     54.92  .   Q     .    V    .         .         .
  14.467     24.2851     55.32  .   Q     .    V    .         .         .
  14.483     24.3618     55.72  .   Q     .    V    .         .         .
  14.500     24.4391     56.12  .   Q     .    V    .         .         .
  14.517     24.5170     56.52  .   Q     .    V    .         .         .
  14.533     24.5954     56.92  .   Q     .    V    .         .         .
  14.550     24.6743     57.32  .   Q     .    V    .         .         .
  14.567     24.7538     57.71  .   Q     .    V    .         .         .
  14.583     24.8337     58.01  .   Q     .    V    .         .         .
  14.600     24.9140     58.29  .   Q     .    V    .         .         .
  14.617     24.9946     58.56  .   Q     .    V    .         .         .
  14.633     25.0757     58.84  .   Q     .    V    .         .         .
  14.650     25.1571     59.12  .   Q     .    V    .         .         .
  14.667     25.2389     59.39  .   Q     .    V    .         .         .
```

Offsite Area Flood Routing

Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24

25-Year Storm Existing Condition

14.683	25.3211	59.67	. Q . V . . .
14.700	25.4037	59.94	. Q . V . . .
14.717	25.4866	60.22	. Q . V . . .
14.733	25.5700	60.50	. Q . V . . .
14.750	25.6537	60.77	. Q . V . . .
14.767	25.7378	61.05	. Q . V . . .
14.783	25.8222	61.33	. Q . V . . .
14.800	25.9071	61.60	. Q . V . . .
14.817	25.9923	61.88	. Q . V . . .
14.833	26.0779	62.16	. Q . V . . .
14.850	26.1639	62.43	. Q . V . . .
14.867	26.2507	63.00	. Q . V . . .
14.883	26.3385	63.76	. Q . V . . .
14.900	26.4274	64.53	. Q . V . . .
14.917	26.5174	65.30	. Q . V . . .
14.933	26.6084	66.07	. Q . V . . .
14.950	26.7005	66.84	. Q . V . . .
14.967	26.7936	67.61	. Q . V . . .
14.983	26.8878	68.38	. Q . V . . .
15.000	26.9830	69.15	. Q . V . . .
15.017	27.0793	69.92	. Q . V . . .
15.033	27.1767	70.69	. Q . V . . .
15.050	27.2751	71.46	. Q . V . . .
15.067	27.3746	72.23	. Q . V . . .
15.083	27.4752	73.00	. Q . V . . .
15.100	27.5768	73.77	. Q . V . . .
15.117	27.6795	74.54	. Q . V . . .
15.133	27.7832	75.31	. Q . V . . .
15.150	27.8879	76.01	. Q . V . . .
15.167	27.9934	76.59	. Q . V . . .
15.183	28.0997	77.16	. Q . V . . .
15.200	28.2067	77.73	. Q . V . . .
15.217	28.3146	78.30	. Q . V . . .
15.233	28.4232	78.87	. Q . V . . .
15.250	28.5326	79.44	. Q . V . . .
15.267	28.6428	80.01	. Q . V . . .
15.283	28.7538	80.58	. Q . V . . .
15.300	28.8656	81.15	. Q . V . . .
15.317	28.9782	81.72	. Q . V . . .
15.333	29.0915	82.29	. Q . V . . .
15.350	29.2057	82.86	. Q . V . . .
15.367	29.3206	83.43	. Q . V . . .
15.383	29.4363	84.00	. Q . V . . .
15.400	29.5528	84.57	. Q . V . . .
15.417	29.6701	85.14	. Q . V . . .
15.433	29.7882	85.78	. Q . V . . .
15.450	29.9078	86.78	. Q . V . . .
15.467	30.0287	87.83	. Q . V . . .
15.483	30.1512	88.88	. Q . V . . .
15.500	30.2750	89.93	. Q . V . . .
15.517	30.4004	90.98	. Q . V . . .
15.533	30.5271	92.03	. Q . V . . .
15.550	30.6553	93.08	. Q . V. . .
15.567	30.7850	94.13	. Q . V. . .
15.583	30.9161	95.18	. Q . V. . .
15.600	31.0486	96.23	. Q . V. . .
15.617	31.1826	97.28	. Q . V. . .
15.633	31.3181	98.33	. Q . V. . .
15.650	31.4550	99.38	. Q . V. . .
15.667	31.5933	100.43	. Q . V. . .
15.683	31.7331	101.48	. Q . V. . .
15.700	31.8743	102.53	. Q . V. . .
15.717	32.0171	103.65	. Q . V. . .
15.733	32.1632	106.13	. Q . V. . .
15.750	32.3136	109.14	. Q. V . . .
15.767	32.4680	112.14	. Q. V . . .
15.783	32.6266	115.15	. Q. V . . .
15.800	32.7894	118.15	. Q. V . . .
15.817	32.9563	121.15	. Q V . . .
15.833	33.1273	124.16	. Q V . . .
15.850	33.3024	127.16	. Q V . . .
15.867	33.4817	130.17	. Q V . . .
15.883	33.6652	133.17	. .Q V . . .
15.900	33.8527	136.18	. .Q V . . .
15.917	34.0444	139.18	. .Q .V . . .
15.933	34.2403	142.18	. .Q .V . . .
15.950	34.4403	145.19	. . Q .V . . .
15.967	34.6444	148.19	. . Q .V . . .
15.983	34.8526	151.20	. . Q .V . . .
16.000	35.0650	154.20	. . Q .V . . .
16.017	35.2923	164.96	. . Q .V . . .
16.033	35.5450	183.47	. . Q . V . . .
16.050	35.8232	201.99	. . Q . V . . .
16.067	36.1269	220.50	. . Q . V . . .
16.083	36.4561	239.01	. . Q V . . .
16.100	36.8108	257.52	. . .QV . . .
16.117	37.1911	276.04	. . . Q . . .
16.133	37.5968	294.55	. . . VQ . . .
16.150	38.0280	313.06	. . . V Q . . .
16.167	38.4847	331.57	. . . V Q . . .
16.183	38.9669	350.09	. . . V Q. . .
16.200	39.4746	368.60	. . . V .Q . . .
16.217	40.0078	387.11	. . . V . Q . . .
16.233	40.5666	405.63	. . . V . Q . . .
16.250	41.1508	424.14	. . . V . Q . . .
16.267	41.7605	442.65	. . . V . Q . . .
16.283	42.3957	461.16	. . . V . Q . . .
16.300	43.0505	475.42	. . . V . Q . . .
16.317	43.6677	448.07	. . . V . Q . . .
16.333	44.2543	425.83	. . . V . Q . . .
16.350	44.8102	403.59	. . . V . Q . . .
16.367	45.3354	381.35	. . . V . Q . . .
16.383	45.8301	359.11	. . . V Q . . .
16.400	46.2941	336.87	. . . Q . . .
16.417	46.7275	314.63	. . . Q V . . .
16.433	47.1302	292.40	. . . Q V. . .
16.450	47.5023	270.16	. . . Q V. . .
16.467	47.8438	247.92	. . . Q V. . .
16.483	48.1547	225.68	. . . Q . V. . .
16.500	48.4349	203.44	. . . Q . V . . .
16.517	48.6845	181.20	. . Q . V . . .
16.533	48.9034	158.96	. . Q . V . . .
16.550	49.0917	136.72	. .Q . V . . .
16.567	49.2494	114.48	. Q. . V . . .
16.583	49.3795	94.46	. Q . V . . .
16.600	49.5036	90.08	. Q . V . . .

Offsite Area Flood Routing

Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24

25-Year Storm Existing Condition

```
16.617     49.6259     88.75   .      Q  .         .         V         .
16.633     49.7463     87.42   .      Q  .         .         V         .
16.650     49.8649     86.09   .      Q  .         .         V         .
16.667     49.9816     84.76   .      Q  .         .         V         .
16.683     50.0965     83.44   .      Q  .         .         .V        .
16.700     50.2096     82.11   .     Q   .         .         .V        .
16.717     50.3209     80.78   .     Q   .         .         .V        .
16.733     50.4303     79.45   .     Q   .         .         .V        .
16.750     50.5379     78.12   .     Q   .         .         .V        .
16.767     50.6437     76.79   .     Q   .         .         .V        .
16.783     50.7477     75.46   .     Q   .         .         .V        .
16.800     50.8498     74.14   .     Q   .         .         .V        .
16.817     50.9501     72.81   .     Q   .         .         .V        .
16.833     51.0485     71.48   .     Q   .         .         .V        .
16.850     51.1451     70.15   .    Q    .         .         .V        .
16.867     51.2400     68.83   .    Q    .         .         .V        .
16.883     51.3334     67.83   .    Q    .         .         .V        .
16.900     51.4256     66.98   .    Q    .         .         .V        .
16.917     51.5167     66.13   .    Q    .         .         .V        .
16.933     51.6067     65.29   .    Q    .         .         .V        .
16.950     51.6954     64.44   .    Q    .         .         . V       .
16.967     51.7830     63.59   .    Q    .         .         . V       .
16.983     51.8694     62.75   .    Q    .         .         . V       .
17.000     51.9547     61.90   .    Q    .         .         . V       .
17.017     52.0388     61.05   .    Q    .         .         . V       .
17.033     52.1217     60.21   .    Q    .         .         . V       .
17.050     52.2035     59.36   .   Q     .         .         . V       .
17.067     52.2841     58.51   .   Q     .         .         . V       .
17.083     52.3635     57.67   .   Q     .         .         . V       .
17.100     52.4418     56.82   .   Q     .         .         . V       .
17.117     52.5189     55.97   .   Q     .         .         . V       .
17.133     52.5948     55.13   .   Q     .         .         . V       .
17.150     52.6696     54.28   .   Q     .         .         . V       .
17.167     52.7434     53.62   .   Q     .         .         . V       .
17.183     52.8167     53.20   .   Q     .         .         . V       .
17.200     52.8894     52.79   .   Q     .         .         . V       .
17.217     52.9616     52.37   .   Q     .         .         . V       .
17.233     53.0331     51.96   .   Q     .         .         . V       .
17.250     53.1041     51.55   .   Q     .         .         . V       .
17.267     53.1746     51.13   .   Q     .         .         . V       .
17.283     53.2444     50.72   .   Q     .         .         .  V      .
17.300     53.3137     50.30   .   Q     .         .         .  V      .
17.317     53.3824     49.89   .   Q     .         .         .  V      .
17.333     53.4506     49.48   .   Q     .         .         .  V      .
17.350     53.5182     49.06   .   Q     .         .         .  V      .
17.367     53.5852     48.65   .   Q     .         .         .  V      .
17.383     53.6516     48.24   .   Q     .         .         .  V      .
17.400     53.7175     47.82   .   Q     .         .         .  V      .
17.417     53.7828     47.41   .  Q      .         .         .  V      .
17.433     53.8475     46.99   .  Q      .         .         .  V      .
17.450     53.9117     46.61   .  Q      .         .         .  V      .
17.467     53.9755     46.32   .  Q      .         .         .  V      .
17.483     54.0389     46.03   .  Q      .         .         .  V      .
17.500     54.1019     45.75   .  Q      .         .         .  V      .
17.517     54.1645     45.46   .  Q      .         .         .  V      .
17.533     54.2268     45.18   .  Q      .         .         .  V      .
17.550     54.2886     44.89   .  Q      .         .         .  V      .
17.567     54.3500     44.61   .  Q      .         .         .  V      .
17.583     54.4111     44.32   .  Q      .         .         .  V      .
17.600     54.4717     44.04   .  Q      .         .         .  V      .
17.617     54.5320     43.75   .  Q      .         .         .  V      .
17.633     54.5919     43.47   .  Q      .         .         .  V      .
17.650     54.6514     43.18   .  Q      .         .         .  V      .
17.667     54.7104     42.90   .  Q      .         .         .  V      .
17.683     54.7691     42.61   .  Q      .         .         .  V      .
17.700     54.8274     42.33   .  Q      .         .         .  V      .
17.717     54.8853     42.04   .  Q      .         .         .   V     .
17.733     54.9429     41.76   .  Q      .         .         .   V     .
17.750     55.0001     41.54   .  Q      .         .         .   V     .
17.767     55.0570     41.33   .  Q      .         .         .   V     .
17.783     55.1136     41.11   .  Q      .         .         .   V     .
17.800     55.1700     40.90   .  Q      .         .         .   V     .
17.817     55.2260     40.69   .  Q      .         .         .   V     .
17.833     55.2818     40.48   .  Q      .         .         .   V     .
17.850     55.3372     40.27   .  Q      .         .         .   V     .
17.867     55.3924     40.06   .  Q      .         .         .   V     .
17.883     55.4473     39.84   .  Q      .         .         .   V     .
17.900     55.5019     39.63   .  Q      .         .         .   V     .
17.917     55.5562     39.42   .  Q      .         .         .   V     .
17.933     55.6102     39.21   .  Q      .         .         .   V     .
17.950     55.6639     39.00   .  Q      .         .         .   V     .
17.967     55.7174     38.79   .  Q      .         .         .   V     .
17.983     55.7705     38.58   .  Q      .         .         .   V     .
18.000     55.8233     38.36   .  Q      .         .         .   V     .
--------------------------------------------------------------------------------
    TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
    (Note: 100% of Peak Flow Rate estimate assumed to have
    an instantaneous time duration)

    Percentile of Estimated                  Duration
        Peak Flow Rate                       (minutes)
    =======================                  =========
               0%                             1081.0
              10%                             1050.0
              20%                              300.0
              30%                              180.0
              40%                              140.0
              50%                              120.0
              60%                               95.0
              70%                               70.0
              80%                               50.0
              90%                               20.0
 ============================================================================

   END OF FLOODSCx ROUTING ANALYSIS
```

```
******************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
         (c) Copyright 1989-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                      Planning * Engineering * Surveying
               Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                    *
* 100-YEAR STORM EXIST. CONDITION OFFSITE RUN-ON AT RANCHO PARKWAY NODE 24 *
* W.O. #1443-136X                                                          *
 **************************************************************************

  FILE NAME: FL-100X.DAT
  TIME/DATE OF STUDY: 14:40 11/07/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


******************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE     24.00 IS CODE = 1.2
------------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
==============================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =  227.90
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.061
    LOW LOSS FRACTION = 0.108
    TIME OF CONCENTRATION(MIN.) = 16.69
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.52
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.09
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.45
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.43
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.36
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.63

------------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =    86.98
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =    19.95

------------------------------------------------------------------------------

==============================================================================

                      2 4 - H O U R    S T O R M
                   R U N O F F    H Y D R O G R A P H

==============================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
------------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.      154.6     309.2     463.7     618.3
------------------------------------------------------------------------------
  14.000     31.1788     65.76  .   Q     .   V     .         .         .
  14.017     31.2699     66.09  .   Q     .   V     .         .         .
  14.033     31.3614     66.42  .   Q     .   V     .         .         .
  14.050     31.4533     66.75  .   Q     .   V     .         .         .
  14.067     31.5456     67.04  .   Q     .   V     .         .         .
  14.083     31.6383     67.26  .   Q     .   V     .         .         .
  14.100     31.7312     67.48  .   Q     .   V     .         .         .
  14.117     31.8245     67.69  .   Q     .   V     .         .         .
  14.133     31.9180     67.91  .   Q     .   V     .         .         .
  14.150     32.0118     68.13  .   Q     .   V     .         .         .
  14.167     32.1060     68.34  .   Q     .   V     .         .         .
  14.183     32.2004     68.56  .   Q     .   V     .         .         .
  14.200     32.2952     68.78  .   Q     .   V     .         .         .
  14.217     32.3902     68.99  .   Q     .   V     .         .         .
  14.233     32.4855     69.21  .   Q     .   V     .         .         .
  14.250     32.5811     69.43  .   Q     .   V     .         .         .
  14.267     32.6771     69.64  .   Q     .    V    .         .         .
  14.283     32.7733     69.86  .   Q     .    V    .         .         .
  14.300     32.8698     70.08  .   Q     .   V     .         .         .
  14.317     32.9666     70.29  .   Q     .   V     .         .         .
  14.333     33.0638     70.51  .   Q     .   V     .         .         .
  14.350     33.1614     70.91  .   Q     .   V     .         .         .
  14.367     33.2598     71.42  .   Q     .   V     .         .         .
  14.383     33.3589     71.93  .   Q     .   V     .         .         .
  14.400     33.4587     72.43  .   Q     .   V     .         .         .
  14.417     33.5591     72.94  .   Q     .   V     .         .         .
  14.433     33.6603     73.45  .   Q     .   V     .         .         .
  14.450     33.7622     73.96  .   Q     .   V     .         .         .
  14.467     33.8647     74.46  .   Q     .   V     .         .         .
  14.483     33.9680     74.97  .   Q     .   V     .         .         .
  14.500     34.0720     75.48  .   Q     .   V     .         .         .
  14.517     34.1766     75.99  .   Q     .   V     .         .         .
  14.533     34.2820     76.49  .   Q     .   V     .         .         .
  14.550     34.3880     77.00  .   Q     .   V     .         .         .
  14.567     34.4948     77.51  .    Q    .   V     .         .         .
  14.583     34.6023     78.01  .    Q    .   V     .         .         .
  14.600     34.7104     78.52  .    Q    .   V     .         .         .
  14.617     34.8192     79.01  .    Q    .    V    .         .         .
  14.633     34.9286     79.36  .    Q    .    V    .         .         .
  14.650     35.0383     79.69  .    Q    .   V     .         .         .
  14.667     35.1485     80.01  .    Q    .    V    .         .         .
```

Offsite Area Flood Routing

Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24

100-Year Storm Existing Condition

14.683	35.2592	80.34	.	Q	.	V	.	.	.
14.700	35.3703	80.67	.	Q	.	V	.	.	.
14.717	35.4819	80.99	.	Q	.	V	.	.	.
14.733	35.5939	81.32	.	Q	.	V	.	.	.
14.750	35.7063	81.64	.	Q	.	V	.	.	.
14.767	35.8192	81.97	.	Q	.	V	.	.	.
14.783	35.9326	82.29	.	Q	.	V	.	.	.
14.800	36.0464	82.62	.	Q	.	V	.	.	.
14.817	36.1606	82.94	.	Q	.	V	.	.	.
14.833	36.2753	83.27	.	Q	.	V	.	.	.
14.850	36.3905	83.60	.	Q	.	V	.	.	.
14.867	36.5061	83.92	.	Q	.	V	.	.	.
14.883	36.6221	84.25	.	Q	.	V	.	.	.
14.900	36.7388	84.74	.	Q	.	V	.	.	.
14.917	36.8568	85.63	.	Q	.	V	.	.	.
14.933	36.9760	86.54	.	Q	.	V	.	.	.
14.950	37.0964	87.45	.	Q	.	V	.	.	.
14.967	37.2181	88.35	.	Q	.	V	.	.	.
14.983	37.3411	89.26	.	Q	.	V	.	.	.
15.000	37.4653	90.17	.	Q	.	V	.	.	.
15.017	37.5907	91.08	.	Q	.	V	.	.	.
15.033	37.7174	91.98	.	Q	.	V	.	.	.
15.050	37.8454	92.89	.	Q	.	V	.	.	.
15.067	37.9746	93.80	.	Q	.	V	.	.	.
15.083	38.1050	94.71	.	Q	.	V	.	.	.
15.100	38.2367	95.61	.	Q	.	V	.	.	.
15.117	38.3697	96.52	.	Q	.	V	.	.	.
15.133	38.5039	97.43	.	Q	.	V	.	.	.
15.150	38.6393	98.34	.	Q	.	V	.	.	.
15.167	38.7760	99.24	.	Q	.	V	.	.	.
15.183	38.9138	100.05	.	Q	.	V	.	.	.
15.200	39.0526	100.78	.	Q	.	V	.	.	.
15.217	39.1925	101.51	.	Q	.	V	.	.	.
15.233	39.3333	102.23	.	Q	.	V	.	.	.
15.250	39.4751	102.96	.	Q	.	V	.	.	.
15.267	39.6179	103.69	.	Q	.	V	.	.	.
15.283	39.7618	104.42	.	Q	.	V	.	.	.
15.300	39.9066	105.15	.	Q	.	V	.	.	.
15.317	40.0524	105.88	.	Q	.	V	.	.	.
15.333	40.1993	106.60	.	Q	.	V	.	.	.
15.350	40.3471	107.33	.	Q	.	V	.	.	.
15.367	40.4960	108.06	.	Q	.	V	.	.	.
15.383	40.6458	108.79	.	Q	.	V	.	.	.
15.400	40.7967	109.52	.	Q	.	V	.	.	.
15.417	40.9485	110.25	.	Q	.	V	.	.	.
15.433	41.1014	110.97	.	Q	.	V	.	.	.
15.450	41.2553	111.77	.	Q	.	V	.	.	.
15.467	41.4114	113.28	.	Q	.	V.	.	.	.
15.483	41.5697	114.98	.	Q	.	V.	.	.	.
15.500	41.7304	116.67	.	Q	.	V.	.	.	.
15.517	41.8935	118.37	.	Q	.	V.	.	.	.
15.533	42.0588	120.06	.	Q	.	V.	.	.	.
15.550	42.2266	121.75	.	Q	.	V.	.	.	.
15.567	42.3966	123.45	.	Q	.	V.	.	.	.
15.583	42.5690	125.14	.	Q	.	V.	.	.	.
15.600	42.7437	126.84	.	Q	.	V.	.	.	.
15.617	42.9207	128.53	.	Q	.	V.	.	.	.
15.633	43.1001	130.23	.	Q	.	V.	.	.	.
15.650	43.2818	131.92	.	Q	.	V.	.	.	.
15.667	43.4659	133.62	.	Q	.	V.	.	.	.
15.683	43.6522	135.31	.	Q	.	V	.	.	.
15.700	43.8410	137.01	.	Q	.	V	.	.	.
15.717	44.0320	138.70	.	Q	.	V	.	.	.
15.733	44.2259	140.80	.	Q.	.	V	.	.	.
15.750	44.4244	144.10	.	Q.	.	V	.	.	.
15.767	44.6275	147.48	.	Q.	.	V	.	.	.
15.783	44.8353	150.86	.	Q.	.	V	.	.	.
15.800	45.0478	154.24	.	Q.	.	V	.	.	.
15.817	45.2649	157.62	.	Q	.	V	.	.	.
15.833	45.4867	161.00	.	Q	.	V	.	.	.
15.850	45.7131	164.38	.	Q	.	.V	.	.	.
15.867	45.9442	167.76	.	Q	.	.V	.	.	.
15.883	46.1799	171.14	.	.Q	.	.V	.	.	.
15.900	46.4203	174.52	.	.Q	.	.V	.	.	.
15.917	46.6653	177.90	.	.Q	.	.V	.	.	.
15.933	46.9150	181.28	.	.Q	.	.V	.	.	.
15.950	47.1694	184.66	.	.Q	.	.V	.	.	.
15.967	47.4284	188.04	.	. Q	.	.V	.	.	.
15.983	47.6921	191.42	.	. Q	.	.V	.	.	.
16.000	47.9604	194.80	.	. Q	.	. V	.	.	.
16.017	48.2484	209.13	.	. Q	.	. V	.	.	.
16.033	48.5713	234.41	.	. Q	.	. V	.	.	.
16.050	48.9290	259.68	.	. Q	.	. V	.	.	.
16.067	49.3215	284.96	.	. Q	.	. V	.	.	.
16.083	49.7488	310.23	.	. Q	.	V	.	.	.
16.100	50.2109	335.51	.	. Q	.	V	.	.	.
16.117	50.7079	360.78	.	.	.	Q	.	.	.
16.133	51.2396	386.05	.	.	.	VQ	.	.	.
16.150	51.8062	411.33	.	.	.	V	Q	.	.
16.167	52.4076	436.60	.	.	.	V	Q	.	.
16.183	53.0438	461.88	.	.	.	V	Q.	.	.
16.200	53.7148	487.15	.	.	.	V	.Q	.	.
16.217	54.4206	512.43	.	.	.	V	. Q	.	.
16.233	55.1612	537.70	.	.	.	V	. Q	.	.
16.250	55.9367	562.97	.	.	.	V	. Q	.	.
16.267	56.7469	588.25	.	.	.	V	. Q	.	.
16.283	57.5986	618.32	.	.	.	V	. Q	.	.
16.300	58.4170	594.10	.	.	.	V	. Q	.	.
16.317	59.1941	564.20	.	.	.	V	. Q	.	.
16.333	59.9300	534.30	.	.	.	V	. Q	.	.
16.350	60.6248	504.39	.	.	.	V	. Q	.	.
16.367	61.2784	474.49	.	.	.	V Q	.	.	.
16.383	61.8907	444.59	.	.	.	Q	.	.	.
16.400	62.4619	414.69	.	.	.	Q V	.	.	.
16.417	62.9920	384.79	.	.	.	Q	V	.	.
16.433	63.4808	354.88	.	.	. Q	.	V.	.	.
16.450	63.9284	324.98	.	.	.Q	.	V.	.	.
16.467	64.3348	295.08	.	.	Q.	.	V.	.	.
16.483	64.7001	265.18	.	.	Q	.	V.	.	.
16.500	65.0242	235.27	.	.	Q	.	V.	.	.
16.517	65.3071	205.37	.	. Q	.	.	V	.	.
16.533	65.5487	175.47	.	.Q	.	.	V	.	.
16.550	65.7493	145.57	.	Q.	.	.	V	.	.
16.567	65.9160	121.09	.	Q	.	.	V	.	.
16.583	66.0777	117.37	.	Q	.	.	V	.	.
16.600	66.2370	115.68	.	Q	.	.	V	.	.

16.617	66.3941	114.00	.	Q	.	.	V	.		
16.633	66.5488	112.32	.	Q	.	.	V	.		
16.650	66.7012	110.64	.	Q	.	.	V	.		
16.667	66.8512	108.95	.	Q	.	.	V	.		
16.683	66.9990	107.27	.	Q	.	.	V	.		
16.700	67.1444	105.59	.	Q	.	.	V	.		
16.717	67.2876	103.90	.	Q	.	.	V	.		
16.733	67.4284	102.22	.	Q	.	.	.V	.		
16.750	67.5668	100.54	.	Q	.	.	.V	.		
16.767	67.7030	98.85	.	Q	.	.	.V	.		
16.783	67.8368	97.17	.	Q	.	.	.V	.		
16.800	67.9684	95.49	.	Q	.	.	.V	.		
16.817	68.0976	93.81	.	Q	.	.	.V	.		
16.833	68.2245	92.12	.	Q	.	.	.V	.		
16.850	68.3494	90.74	.	Q	.	.	.V	.		
16.867	68.4730	89.74	.	Q	.	.	.V	.		
16.883	68.5953	88.74	.	Q	.	.	.V	.		
16.900	68.7161	87.74	.	Q	.	.	.V	.		
16.917	68.8356	86.75	.	Q	.	.	.V	.		
16.933	68.9537	85.75	.	Q	.	.	.V	.		
16.950	69.0705	84.75	.	Q	.	.	.V	.		
16.967	69.1858	83.75	.	Q	.	.	.V	.		
16.983	69.2998	82.76	.	Q	.	.	.V	.		
17.000	69.4124	81.76	.	Q	.	.	.V	.		
17.017	69.5237	80.76	.	Q	.	.	.V	.		
17.033	69.6336	79.77	.	Q	.	.	. V	.		
17.050	69.7421	78.77	.	Q	.	.	. V	.		
17.067	69.8492	77.77	.	Q	.	.	. V	.		
17.083	69.9549	76.77	.	Q	.	.	. V	.		
17.100	70.0593	75.78	.	Q	.	.	. V	.		
17.117	70.1623	74.79	.	Q	.	.	. V	.		
17.133	70.2643	74.06	.	Q	.	.	. V	.		
17.150	70.3655	73.43	.	Q	.	.	. V	.		
17.167	70.4658	72.80	.	Q	.	.	. V	.		
17.183	70.5652	72.18	.	Q	.	.	. V	.		
17.200	70.6637	71.55	.	Q	.	.	. V	.		
17.217	70.7614	70.92	.	Q	.	.	. V	.		
17.233	70.8582	70.30	.	Q	.	.	. V	.		
17.250	70.9542	69.67	.	Q	.	.	. V	.		
17.267	71.0493	69.04	.	Q	.	.	. V	.		
17.283	71.1435	68.42	.	Q	.	.	. V	.		
17.300	71.2369	67.79	.	Q	.	.	. V	.		
17.317	71.3294	67.16	.	Q	.	.	. V	.		
17.333	71.4211	66.54	.	Q	.	.	. V	.		
17.350	71.5119	65.91	.	Q	.	.	. V	.		
17.367	71.6018	65.28	.	Q	.	.	. V	.		
17.383	71.6908	64.66	.	Q	.	.	. V	.		
17.400	71.7791	64.06	.	Q	.	.	. V	.		
17.417	71.8667	63.62	.	Q	.	.	. V	.		
17.433	71.9538	63.21	.	Q	.	.	. V	.		
17.450	72.0403	62.79	.	Q	.	.	. V	.		
17.467	72.1262	62.38	.	Q	.	.	. V	.		
17.483	72.2115	61.96	.	Q	.	.	. V	.		
17.500	72.2963	61.55	.	Q	.	.	. V	.		
17.517	72.3805	61.13	.	Q	.	.	. V	.		
17.533	72.4641	60.71	.	Q	.	.	. V	.		
17.550	72.5472	60.30	.	Q	.	.	. V	.		
17.567	72.6297	59.88	.	Q	.	.	. V	.		
17.583	72.7116	59.47	.	Q	.	.	. V	.		
17.600	72.7929	59.05	.	Q	.	.	. V	.		
17.617	72.8737	58.64	.	Q	.	.	. V	.		
17.633	72.9539	58.22	.	Q	.	.	. V	.		
17.650	73.0335	57.80	.	Q	.	.	. V	.		
17.667	73.1125	57.39	.	Q	.	.	. V	.		
17.683	73.1911	57.01	.	Q	.	.	. V	.		
17.700	73.2692	56.70	.	Q	.	.	. V	.		
17.717	73.3469	56.40	.	Q	.	.	. V	.		
17.733	73.4241	56.09	.	Q	.	.	. V	.		
17.750	73.5009	55.78	.	Q	.	.	. V	.		
17.767	73.5774	55.47	.	Q	.	.	. V	.		
17.783	73.6533	55.16	.	Q	.	.	. V	.		
17.800	73.7289	54.86	.	Q	.	.	. V	.		
17.817	73.8040	54.55	.	Q	.	.	. V	.		
17.833	73.8787	54.24	.	Q	.	.	. V	.		
17.850	73.9530	53.93	.	Q	.	.	. V	.		
17.867	74.0269	53.63	.	Q	.	.	. V	.		
17.883	74.1003	53.32	.	Q	.	.	. V	.		
17.900	74.1733	53.01	.	Q	.	.	. V	.		
17.917	74.2459	52.70	.	Q	.	.	. V	.		
17.933	74.3181	52.39	.	Q	.	.	. V	.		
17.950	74.3898	52.08	.	Q	.	.	. V	.		
17.967	74.4610	51.66	.	Q	.	.	. V	.		
17.983	74.5315	51.17	.	Q	.	.	. V	.		
18.000	74.6013	50.67	.	Q	.	.	. V	.		

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	1081.0
20%	295.0
30%	170.0
40%	135.0
50%	115.0
60%	90.0
70%	70.0
80%	45.0
90%	25.0

END OF FLOODSCx ROUTING ANALYSIS

```
************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
         (c) Copyright 1989-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                         Analysis prepared by:

                         HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                  *
* 2-YEAR STORM PROP. CONDITION FLOWBY AT NODES 56.3 & 35.2               *
* W.O. #1443-136X                                                        *
 ************************************************************************

  FILE NAME: 18142-02.DAT
  TIME/DATE OF STUDY: 18:19 10/16/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE = 1.2
------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =  265.74
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.068
    LOW LOSS FRACTION = 0.335
    TIME OF CONCENTRATION(MIN.) = 20.40
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =   2
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.53
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  0.89
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.22
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  2.05

------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =    29.24
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =    16.16

------------------------------------------------------------------------

========================================================================

                      2 4 - H O U R    S T O R M
                   R U N O F F    H Y D R O G R A P H

========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       55.9     111.7     167.6     223.5
------------------------------------------------------------------------
  14.000      9.7431     19.81  .  Q     .  V      .         .         .
  14.017      9.7706     19.96  .  Q     .  V      .         .         .
  14.033      9.7983     20.11  .  Q     .  V      .         .         .
  14.050      9.8262     20.26  .  Q     .  V      .         .         .
  14.067      9.8544     20.41  .  Q     .  V      .         .         .
  14.083      9.8827     20.56  .  Q     .  V      .         .         .
  14.100      9.9112     20.71  .  Q     .  V      .         .         .
  14.117      9.9399     20.86  .  Q     .  V      .         .         .
  14.133      9.9689     21.01  .  Q     .  V      .         .         .
  14.150      9.9980     21.16  .  Q     .  V      .         .         .
  14.167     10.0274     21.31  .  Q     .  V      .         .         .
  14.183     10.0569     21.46  .  Q     .  V      .         .         .
  14.200     10.0867     21.61  .  Q     .  V      .         .         .
  14.217     10.1167     21.76  .  Q     .  V      .         .         .
  14.233     10.1468     21.91  .  Q     .  V      .         .         .
  14.250     10.1772     22.05  .  Q     .  V      .         .         .
  14.267     10.2078     22.20  .  Q     .  V      .         .         .
  14.283     10.2386     22.35  .   Q    .   V     .         .         .
  14.300     10.2696     22.50  .   Q    .   V     .         .         .
  14.317     10.3007     22.62  .   Q    .   V     .         .         .
  14.333     10.3320     22.70  .   Q    .   V     .         .         .
  14.350     10.3634     22.79  .   Q    .   V     .         .         .
  14.367     10.3949     22.87  .   Q    .   V     .         .         .
  14.383     10.4265     22.95  .   Q    .   V     .         .         .
  14.400     10.4582     23.04  .   Q    .   V     .         .         .
  14.417     10.4901     23.12  .   Q    .   V     .         .         .
  14.433     10.5220     23.20  .   Q    .   V     .         .         .
  14.450     10.5541     23.28  .   Q    .   V     .         .         .
  14.467     10.5863     23.37  .   Q    .   V     .         .         .
  14.483     10.6186     23.45  .   Q    .   V     .         .         .
  14.500     10.6510     23.53  .   Q    .   V     .         .         .
  14.517     10.6835     23.62  .   Q    .   V     .         .         .
  14.533     10.7162     23.70  .   Q    .   V     .         .         .
  14.550     10.7489     23.78  .   Q    .   V     .         .         .
  14.567     10.7818     23.87  .   Q    .   V     .         .         .
  14.583     10.8148     23.95  .   Q    .   V     .         .         .
  14.600     10.8479     24.03  .   Q    .   V     .         .         .
```

Onsite Flood Routing Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1

with Flowby Detention @ Node 56.3 (100cfs) & Node 35.2 (10cfs), User input for total flowby @ Rational Node 35

2-Year Storm Proposed Condition

14.617	10.8811	24.12	. Q . V . . .
14.633	10.9145	24.20	. Q . V . . .
14.650	10.9479	24.30	. Q . V . . .
14.667	10.9817	24.50	. Q . V . . .
14.683	11.0157	24.72	. Q . V . . .
14.700	11.0501	24.93	. Q . V . . .
14.717	11.0847	25.14	. Q . V . . .
14.733	11.1196	25.35	. Q . V . . .
14.750	11.1548	25.57	. Q . V . . .
14.767	11.1904	25.78	. Q . V . . .
14.783	11.2262	25.99	. Q . V . . .
14.800	11.2623	26.21	. Q . V . . .
14.817	11.2986	26.42	. Q . V . . .
14.833	11.3353	26.63	. Q . V . . .
14.850	11.3723	26.84	. Q . V . . .
14.867	11.4096	27.06	. Q . V . . .
14.883	11.4471	27.27	. Q . V . . .
14.900	11.4850	27.48	. Q . V . . .
14.917	11.5231	27.69	. Q . V . . .
14.933	11.5616	27.91	. Q . V . . .
14.950	11.6003	28.12	. Q . V . . .
14.967	11.6393	28.33	. Q . V . . .
14.983	11.6786	28.54	. Q . V . . .
15.000	11.7182	28.72	. Q . V . . .
15.017	11.7580	28.88	. Q . V . . .
15.033	11.7980	29.03	. Q . V . . .
15.050	11.8382	29.19	. Q . V . . .
15.067	11.8786	29.35	. Q . V . . .
15.083	11.9192	29.51	. Q . V . . .
15.100	11.9601	29.67	. Q . V . . .
15.117	12.0012	29.82	. Q . V . . .
15.133	12.0425	29.98	. Q . V . . .
15.150	12.0840	30.14	. Q . V . . .
15.167	12.1257	30.30	. Q . V . . .
15.183	12.1677	30.45	. Q . V . . .
15.200	12.2098	30.61	. Q . V . . .
15.217	12.2522	30.77	. Q . V . . .
15.233	12.2948	30.93	. Q . V . . .
15.250	12.3376	31.08	. Q . V . . .
15.267	12.3807	31.24	. Q . V . . .
15.283	12.4239	31.40	. Q . V . . .
15.300	12.4674	31.56	. Q . V . . .
15.317	12.5111	31.72	. Q . V . . .
15.333	12.5551	31.97	. Q . V . . .
15.350	12.5998	32.42	. Q . V . . .
15.367	12.6451	32.89	. Q . V . . .
15.383	12.6910	33.35	. Q . V . . .
15.400	12.7376	33.81	. Q . V . . .
15.417	12.7848	34.28	. Q . V . . .
15.433	12.8326	34.74	. Q . V . . .
15.450	12.8811	35.20	. Q . V . . .
15.467	12.9303	35.67	. Q . V . . .
15.483	12.9800	36.13	. Q . V . . .
15.500	13.0304	36.59	. Q . V . . .
15.517	13.0815	37.06	. Q . V . . .
15.533	13.1331	37.52	. Q . V . . .
15.550	13.1855	37.98	. Q . V . . .
15.567	13.2384	38.45	. Q . V . . .
15.583	13.2920	38.91	. Q . V . . .
15.600	13.3462	39.37	. Q . V . . .
15.617	13.4011	39.83	. Q . V . . .
15.633	13.4566	40.30	. Q . V . . .
15.650	13.5128	40.76	. Q . V . . .
15.667	13.5696	41.27	. Q . V . . .
15.683	13.6278	42.22	. Q . V . . .
15.700	13.6874	43.27	. Q . V . . .
15.717	13.7484	44.33	. Q . V . . .
15.733	13.8109	45.39	. Q . V . . .
15.750	13.8749	46.44	. Q . V . . .
15.767	13.9403	47.50	. Q . V. . .
15.783	14.0072	48.56	. Q . V. . .
15.800	14.0756	49.61	. Q . V. . .
15.817	14.1454	50.67	. Q. V. . .
15.833	14.2166	51.73	. Q. V. . .
15.850	14.2893	52.78	. Q. V. . .
15.867	14.3635	53.84	. Q. V. . .
15.883	14.4391	54.90	. Q. V. . .
15.900	14.5161	55.95	. Q V. . .
15.917	14.5947	57.01	. Q V. . .
15.933	14.6747	58.07	. Q V . .
15.950	14.7561	59.12	. Q V . .
15.967	14.8390	60.18	. Q V . .
15.983	14.9233	61.23	. Q V . .
16.000	15.0091	62.29	. .Q V . .
16.017	15.1011	66.76	. .Q V . .
16.033	15.2039	74.64	. . Q V . .
16.050	15.3175	82.51	. . Q V . .
16.067	15.4420	90.39	. . Q .V . .
16.083	15.5774	98.27	. . Q .V . .
16.100	15.7236	106.15	. . Q .V . .
16.117	15.8807	114.02	. . QV . .
16.133	16.0486	121.90	. . .Q . .
16.150	16.2273	129.78	. . . VQ . .
16.167	16.4169	137.66	. . . V Q . .
16.183	16.6174	145.53	. . . V Q . .
16.200	16.8287	153.41	. . . V Q . .
16.217	17.0509	161.29	. . . V Q . .
16.233	17.2839	169.17	. . . V Q .
16.250	17.5278	177.05	. . . V .Q .
16.267	17.7825	184.92	. . . V . Q .
16.283	18.0480	192.80	. . . V . Q .
16.300	18.3245	200.68	. . . V . Q .
16.317	18.6117	208.56	. . . V . Q .
16.333	18.9098	216.43	. . . V . Q .
16.350	19.2177	223.48	. . . V . Q
16.367	19.5117	213.46	. . . V . Q .
16.383	19.7932	204.39	. . . V . Q .
16.400	20.0622	195.31	. . . V . Q .
16.417	20.3188	186.24	. . . V . Q .
16.433	20.5628	177.17	. . . V .Q .
16.450	20.7943	168.10	. . . V Q .
16.467	21.0134	159.02	. . . Q . .

16.483	21.2199	149.95	. . . . Q V. .
16.500	21.4140	140.88	. . . . Q V. .
16.517	21.5955	131.81	. . . Q . V. .
16.533	21.7646	122.73	. . . .Q . V. .
16.550	21.9211	113.66	. . . Q . V. .
16.567	22.0652	104.59	. . . Q . . V .
16.583	22.1968	95.52	. . . Q . . V .
16.600	22.3158	86.44	. . . Q . . V .
16.617	22.4224	77.37	. . Q . . . V .
16.633	22.5165	68.30	. . Q . . . V .
16.650	22.5981	59.23	. . Q . . . V .
16.667	22.6672	50.15	. . Q . . . .V .
16.683	22.7240	41.27	. . Q . . . .V .
16.700	22.7764	38.02	. . Q . . . .V .
16.717	22.8279	37.42	. . Q . . . .V .
16.733	22.8786	36.82	. . Q . . . .V .
16.750	22.9285	36.22	. . Q . . . .V .
16.767	22.9776	35.62	. . Q . . . .V .
16.783	23.0258	35.02	. . Q . . . .V .
16.800	23.0732	34.42	. . Q . . . .V .
16.817	23.1198	33.81	. . Q . . . .V .
16.833	23.1656	33.21	. . Q . . . .V .
16.850	23.2105	32.61	. . Q . . . .V .
16.867	23.2546	32.01	. . Q . . . .V .
16.883	23.2978	31.41	. . Q . . . .V .
16.900	23.3403	30.81	. . Q . . . .V .
16.917	23.3819	30.21	. . Q . . . .V .
16.933	23.4226	29.61	. . Q . . . . V .
16.950	23.4626	29.00	. . Q . . . . V .
16.967	23.5017	28.40	. . Q . . . . V .
16.983	23.5400	27.80	. . Q . . . . V .
17.000	23.5775	27.20	. . Q . . . . V .
17.017	23.6141	26.60	. . Q . . . . V .
17.033	23.6501	26.11	. . Q . . . . V .
17.050	23.6856	25.83	. . Q . . . . V .
17.067	23.7208	25.56	. . Q . . . . V .
17.083	23.7557	25.28	. . Q . . . . V .
17.100	23.7901	25.01	. . Q . . . . V .
17.117	23.8242	24.74	. . Q . . . . V .
17.133	23.8579	24.47	. . Q . . . . V .
17.150	23.8912	24.19	. . Q . . . . V .
17.167	23.9242	23.92	. . Q . . . . V .
17.183	23.9568	23.65	. . Q . . . . V .
17.200	23.9890	23.38	. . Q . . . . V .
17.217	24.0208	23.10	. . Q . . . . V .
17.233	24.0522	22.83	. . Q . . . . V .
17.250	24.0833	22.56	. . Q . . . . V .
17.267	24.1140	22.29	. Q . . . . V .
17.283	24.1443	22.02	. Q . . . . V .
17.300	24.1743	21.74	. Q . . . . V .
17.317	24.2038	21.47	. Q . . . . V .
17.333	24.2330	21.20	. Q . . . . V .
17.350	24.2619	20.93	. Q . . . . V .
17.367	24.2903	20.67	. Q . . . . V .
17.383	24.3186	20.50	. Q . . . . V .
17.400	24.3466	20.36	. Q . . . . V .
17.417	24.3745	20.22	. Q . . . . V .
17.433	24.4021	20.08	. Q . . . . V .
17.450	24.4296	19.94	. Q . . . . V .
17.467	24.4569	19.80	. Q . . . . V .
17.483	24.4840	19.66	. Q . . . . V .
17.500	24.5108	19.52	. Q . . . . V .
17.517	24.5375	19.38	. Q . . . . V .
17.533	24.5640	19.24	. Q . . . . V .
17.550	24.5903	19.10	. Q . . . . V .
17.567	24.6164	18.96	. Q . . . . V .
17.583	24.6424	18.81	. Q . . . . V .
17.600	24.6681	18.67	. Q . . . . V .
17.617	24.6936	18.53	. Q . . . . V .
17.633	24.7189	18.39	. Q . . . . V .
17.650	24.7441	18.25	. Q . . . . V .
17.667	24.7690	18.11	. Q . . . . V .
17.683	24.7938	17.97	. Q . . . . V .
17.700	24.8183	17.83	. Q . . . . V .
17.717	24.8427	17.71	. Q . . . . V .
17.733	24.8670	17.62	. Q . . . . V .
17.750	24.8911	17.52	. Q . . . . V .
17.767	24.9151	17.42	. Q . . . . V .
17.783	24.9390	17.33	. Q . . . . V .
17.800	24.9627	17.23	. Q . . . . V .
17.817	24.9863	17.13	. Q . . . . V .
17.833	25.0098	17.04	. Q . . . . V .
17.850	25.0331	16.94	. Q . . . . V .
17.867	25.0563	16.84	. Q . . . . V .
17.883	25.0794	16.75	. Q . . . . V .
17.900	25.1023	16.65	. Q . . . . V .
17.917	25.1251	16.56	. Q . . . . V .
17.933	25.1478	16.46	. Q . . . . V .
17.950	25.1704	16.36	. Q . . . . V .
17.967	25.1928	16.27	. Q . . . . V .
17.983	25.2150	16.17	. Q . . . . V .
18.000	25.2372	16.07	. Q . . . . V .

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	895.0
20%	285.0
30%	185.0
40%	160.0
50%	135.0
60%	105.0
70%	80.0
80%	50.0
90%	25.0

```
**************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     35.10 IS CODE =   2
--------------------------------------------------------------------------
  >>>>>FLOWBY STRUCTURE ROUTING MODEL APPLIED TO STREAM #1<<<<<
==========================================================================


        MODEL STREAM NUMBER 1 FLOWING PAST A FLOWBY STRUCTURE:
        FLOWRATES IN STREAM # 1 WHICH ARE GREATER THAN
           100.0 CFS ARE ASSUMED TO BE EXCESS FLOWS.
        FLOW EXCESS IS ASSUMED TO BE ADDED TO STREAM NUMBER 3


              INFLOW              INFLOW
            (STREAM 3)          (STREAM 1)
                |                   |
                |                   |
                |    flow excess    |
                |<------------------* <=flowby structure
                |                   | (maximum flowby Q =    100.0 cfs)
                |                   |
                |                   |
                |                   |
                V                   V
              STREAM 3            STREAM 1
          + FLOW EXCESS            FLOWBY



        FLOWBY BASIN MODELING RESULTS:

         MODEL         INFLOW     INFLOW    OUTFLOW    FLOWBY
          TIME     (STREAM 3) (STREAM 1) (STREAM 3) (STREAM 1)
         (HRS)          (CFS)      (CFS)      (CFS)      (CFS)
         14.000         0.00      19.81       0.00      19.81
         14.017         0.00      19.96       0.00      19.96
         14.033         0.00      20.11       0.00      20.11
         14.050         0.00      20.26       0.00      20.26
         14.067         0.00      20.41       0.00      20.41
         14.083         0.00      20.56       0.00      20.56
         14.100         0.00      20.71       0.00      20.71
         14.117         0.00      20.86       0.00      20.86
         14.133         0.00      21.01       0.00      21.01
         14.150         0.00      21.16       0.00      21.16
         14.167         0.00      21.31       0.00      21.31
         14.183         0.00      21.46       0.00      21.46
         14.200         0.00      21.61       0.00      21.61
         14.217         0.00      21.76       0.00      21.76
         14.233         0.00      21.91       0.00      21.91
         14.250         0.00      22.05       0.00      22.05
         14.267         0.00      22.20       0.00      22.20
         14.283         0.00      22.35       0.00      22.35
         14.300         0.00      22.50       0.00      22.50
         14.317         0.00      22.62       0.00      22.62
         14.333         0.00      22.70       0.00      22.70
         14.350         0.00      22.79       0.00      22.79
         14.367         0.00      22.87       0.00      22.87
         14.383         0.00      22.95       0.00      22.95
         14.400         0.00      23.04       0.00      23.04
         14.417         0.00      23.12       0.00      23.12
         14.433         0.00      23.20       0.00      23.20
         14.450         0.00      23.28       0.00      23.28
         14.467         0.00      23.37       0.00      23.37
         14.483         0.00      23.45       0.00      23.45
         14.500         0.00      23.53       0.00      23.53
         14.517         0.00      23.62       0.00      23.62
         14.533         0.00      23.70       0.00      23.70
         14.550         0.00      23.78       0.00      23.78
         14.567         0.00      23.87       0.00      23.87
         14.583         0.00      23.95       0.00      23.95
         14.600         0.00      24.03       0.00      24.03
         14.617         0.00      24.12       0.00      24.12
         14.633         0.00      24.20       0.00      24.20
         14.650         0.00      24.30       0.00      24.30
         14.667         0.00      24.50       0.00      24.50
         14.683         0.00      24.72       0.00      24.72
         14.700         0.00      24.93       0.00      24.93
         14.717         0.00      25.14       0.00      25.14
         14.733         0.00      25.35       0.00      25.35
         14.750         0.00      25.57       0.00      25.57
         14.767         0.00      25.78       0.00      25.78
         14.783         0.00      25.99       0.00      25.99
         14.800         0.00      26.21       0.00      26.21
         14.817         0.00      26.42       0.00      26.42
         14.833         0.00      26.63       0.00      26.63
         14.850         0.00      26.84       0.00      26.84
         14.867         0.00      27.06       0.00      27.06
         14.883         0.00      27.27       0.00      27.27
         14.900         0.00      27.48       0.00      27.48
         14.917         0.00      27.69       0.00      27.69
         14.933         0.00      27.91       0.00      27.91
         14.950         0.00      28.12       0.00      28.12
         14.967         0.00      28.33       0.00      28.33
         14.983         0.00      28.54       0.00      28.54
         15.000         0.00      28.72       0.00      28.72
         15.017         0.00      28.88       0.00      28.88
         15.033         0.00      29.03       0.00      29.03
         15.050         0.00      29.19       0.00      29.19
         15.067         0.00      29.35       0.00      29.35
         15.083         0.00      29.51       0.00      29.51
         15.100         0.00      29.67       0.00      29.67
         15.117         0.00      29.82       0.00      29.82
         15.133         0.00      29.98       0.00      29.98
         15.150         0.00      30.14       0.00      30.14
         15.167         0.00      30.30       0.00      30.30
         15.183         0.00      30.45       0.00      30.45
         15.200         0.00      30.61       0.00      30.61
         15.217         0.00      30.77       0.00      30.77
         15.233         0.00      30.93       0.00      30.93
         15.250         0.00      31.08       0.00      31.08
         15.267         0.00      31.24       0.00      31.24
```

15.283	0.00	31.40	0.00	31.40
15.300	0.00	31.56	0.00	31.56
15.317	0.00	31.72	0.00	31.72
15.333	0.00	31.97	0.00	31.97
15.350	0.00	32.42	0.00	32.42
15.367	0.00	32.89	0.00	32.89
15.383	0.00	33.35	0.00	33.35
15.400	0.00	33.81	0.00	33.81
15.417	0.00	34.28	0.00	34.28
15.433	0.00	34.74	0.00	34.74
15.450	0.00	35.20	0.00	35.20
15.467	0.00	35.67	0.00	35.67
15.483	0.00	36.13	0.00	36.13
15.500	0.00	36.59	0.00	36.59
15.517	0.00	37.06	0.00	37.06
15.533	0.00	37.52	0.00	37.52
15.550	0.00	37.98	0.00	37.98
15.567	0.00	38.45	0.00	38.45
15.583	0.00	38.91	0.00	38.91
15.600	0.00	39.37	0.00	39.37
15.617	0.00	39.83	0.00	39.83
15.633	0.00	40.30	0.00	40.30
15.650	0.00	40.76	0.00	40.76
15.667	0.00	41.27	0.00	41.27
15.683	0.00	42.22	0.00	42.22
15.700	0.00	43.27	0.00	43.27
15.717	0.00	44.33	0.00	44.33
15.733	0.00	45.39	0.00	45.39
15.750	0.00	46.44	0.00	46.44
15.767	0.00	47.50	0.00	47.50
15.783	0.00	48.56	0.00	48.56
15.800	0.00	49.61	0.00	49.61
15.817	0.00	50.67	0.00	50.67
15.833	0.00	51.73	0.00	51.73
15.850	0.00	52.78	0.00	52.78
15.867	0.00	53.84	0.00	53.84
15.883	0.00	54.90	0.00	54.90
15.900	0.00	55.95	0.00	55.95
15.917	0.00	57.01	0.00	57.01
15.933	0.00	58.07	0.00	58.07
15.950	0.00	59.12	0.00	59.12
15.967	0.00	60.18	0.00	60.18
15.983	0.00	61.23	0.00	61.23
16.000	0.00	62.29	0.00	62.29
16.017	0.00	66.76	0.00	66.76
16.033	0.00	74.64	0.00	74.64
16.050	0.00	82.51	0.00	82.51
16.067	0.00	90.39	0.00	90.39
16.083	0.00	98.27	0.00	98.27
16.100	0.00	106.15	6.15	100.00
16.117	0.00	114.02	14.02	100.00
16.133	0.00	121.90	21.90	100.00
16.150	0.00	129.78	29.78	100.00
16.167	0.00	137.66	37.66	100.00
16.183	0.00	145.53	45.53	100.00
16.200	0.00	153.41	53.41	100.00
16.217	0.00	161.29	61.29	100.00
16.233	0.00	169.17	69.17	100.00
16.250	0.00	177.05	77.05	100.00
16.267	0.00	184.92	84.92	100.00
16.283	0.00	192.80	92.80	100.00
16.300	0.00	200.68	100.68	100.00
16.317	0.00	208.56	108.56	100.00
16.333	0.00	216.43	116.43	100.00
16.350	0.00	223.48	123.48	100.00
16.367	0.00	213.46	113.46	100.00
16.383	0.00	204.39	104.39	100.00
16.400	0.00	195.31	95.31	100.00
16.417	0.00	186.24	86.24	100.00
16.433	0.00	177.17	77.17	100.00
16.450	0.00	168.10	68.10	100.00
16.467	0.00	159.02	59.02	100.00
16.483	0.00	149.95	49.95	100.00
16.500	0.00	140.88	40.88	100.00
16.517	0.00	131.81	31.81	100.00
16.533	0.00	122.73	22.73	100.00
16.550	0.00	113.66	13.66	100.00
16.567	0.00	104.59	4.59	100.00
16.583	0.00	95.52	0.00	95.52
16.600	0.00	86.44	0.00	86.44
16.617	0.00	77.37	0.00	77.37
16.633	0.00	68.30	0.00	68.30
16.650	0.00	59.23	0.00	59.23
16.667	0.00	50.15	0.00	50.15
16.683	0.00	41.27	0.00	41.27
16.700	0.00	38.02	0.00	38.02
16.717	0.00	37.42	0.00	37.42
16.733	0.00	36.82	0.00	36.82
16.750	0.00	36.22	0.00	36.22
16.767	0.00	35.62	0.00	35.62
16.783	0.00	35.02	0.00	35.02
16.800	0.00	34.42	0.00	34.42
16.817	0.00	33.81	0.00	33.81
16.833	0.00	33.21	0.00	33.21
16.850	0.00	32.61	0.00	32.61
16.867	0.00	32.01	0.00	32.01
16.883	0.00	31.41	0.00	31.41
16.900	0.00	30.81	0.00	30.81
16.917	0.00	30.21	0.00	30.21
16.933	0.00	29.61	0.00	29.61
16.950	0.00	29.00	0.00	29.00
16.967	0.00	28.40	0.00	28.40
16.983	0.00	27.80	0.00	27.80
17.000	0.00	27.20	0.00	27.20
17.017	0.00	26.60	0.00	26.60
17.033	0.00	26.11	0.00	26.11
17.050	0.00	25.83	0.00	25.83
17.067	0.00	25.56	0.00	25.56
17.083	0.00	25.28	0.00	25.28
17.100	0.00	25.01	0.00	25.01
17.117	0.00	24.74	0.00	24.74
17.133	0.00	24.47	0.00	24.47

17.150	0.00	24.19	0.00	24.19
17.167	0.00	23.92	0.00	23.92
17.183	0.00	23.65	0.00	23.65
17.200	0.00	23.38	0.00	23.38
17.217	0.00	23.10	0.00	23.10
17.233	0.00	22.83	0.00	22.83
17.250	0.00	22.56	0.00	22.56
17.267	0.00	22.29	0.00	22.29
17.283	0.00	22.02	0.00	22.02
17.300	0.00	21.74	0.00	21.74
17.317	0.00	21.47	0.00	21.47
17.333	0.00	21.20	0.00	21.20
17.350	0.00	20.93	0.00	20.93
17.367	0.00	20.67	0.00	20.67
17.383	0.00	20.50	0.00	20.50
17.400	0.00	20.36	0.00	20.36
17.417	0.00	20.22	0.00	20.22
17.433	0.00	20.08	0.00	20.08
17.450	0.00	19.94	0.00	19.94
17.467	0.00	19.80	0.00	19.80
17.483	0.00	19.66	0.00	19.66
17.500	0.00	19.52	0.00	19.52
17.517	0.00	19.38	0.00	19.38
17.533	0.00	19.24	0.00	19.24
17.550	0.00	19.10	0.00	19.10
17.567	0.00	18.96	0.00	18.96
17.583	0.00	18.81	0.00	18.81
17.600	0.00	18.67	0.00	18.67
17.617	0.00	18.53	0.00	18.53
17.633	0.00	18.39	0.00	18.39
17.650	0.00	18.25	0.00	18.25
17.667	0.00	18.11	0.00	18.11
17.683	0.00	17.97	0.00	17.97
17.700	0.00	17.83	0.00	17.83
17.717	0.00	17.71	0.00	17.71
17.733	0.00	17.62	0.00	17.62
17.750	0.00	17.52	0.00	17.52
17.767	0.00	17.42	0.00	17.42
17.783	0.00	17.33	0.00	17.33
17.800	0.00	17.23	0.00	17.23
17.817	0.00	17.13	0.00	17.13
17.833	0.00	17.04	0.00	17.04
17.850	0.00	16.94	0.00	16.94
17.867	0.00	16.84	0.00	16.84
17.883	0.00	16.75	0.00	16.75
17.900	0.00	16.65	0.00	16.65
17.917	0.00	16.56	0.00	16.56
17.933	0.00	16.46	0.00	16.46
17.950	0.00	16.36	0.00	16.36
17.967	0.00	16.27	0.00	16.27
17.983	0.00	16.17	0.00	16.17
18.000	0.00	16.07	0.00	16.07

****

FLOW PROCESS FROM NODE 56.30 TO NODE 36.00 IS CODE = 11

>>>>>VIEW STREAM NUMBER 1 HYDROGRAPH<<<<<

==========

STREAM HYDROGRAPH IN ONE-MINUTE UNIT INTERVALS(CFS)

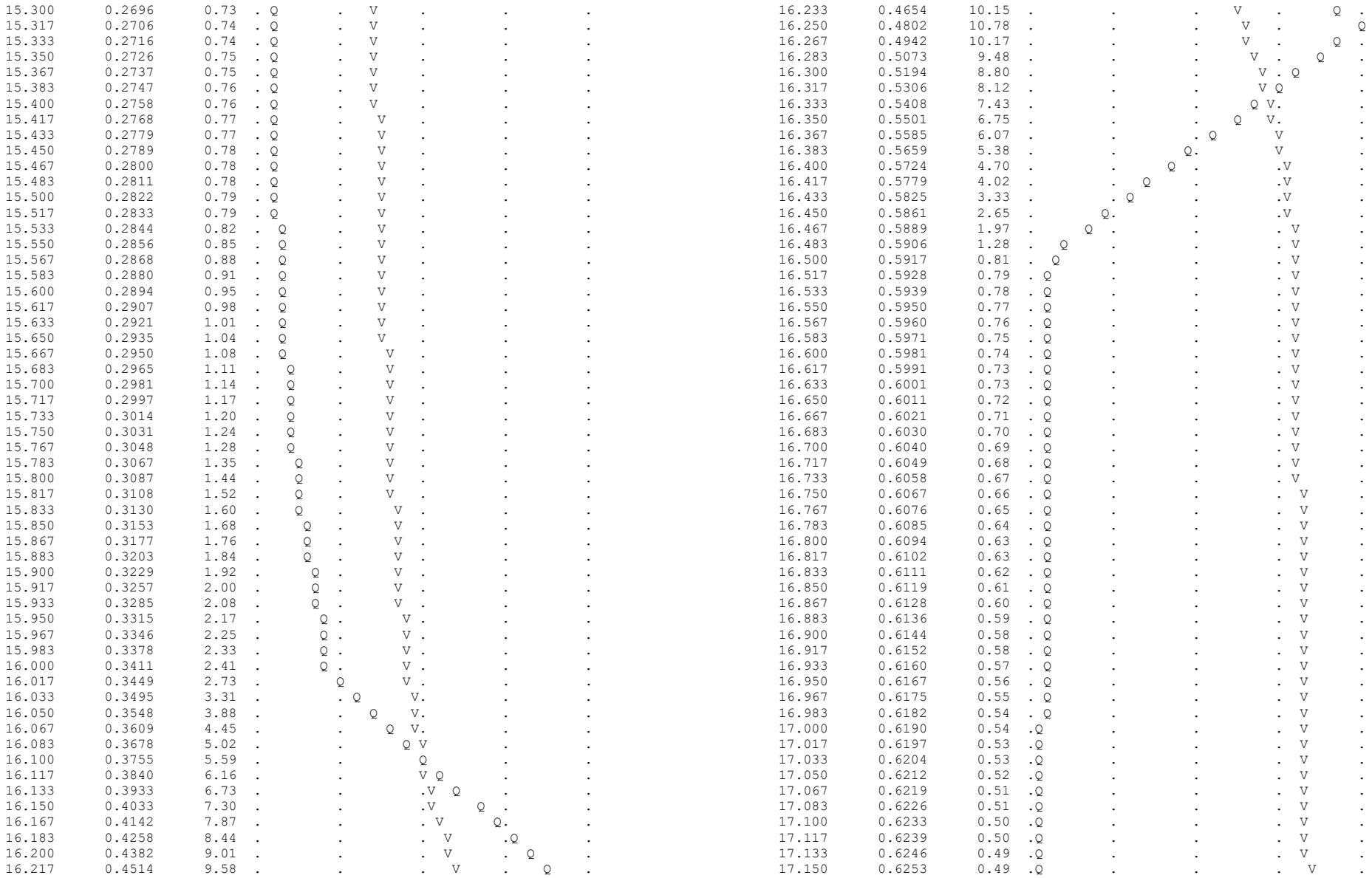
(Notes: Time indicated is at END of Each Unit Intervals.
Peak 5-minute rainfall intensity is modeled as
a constant value for entire 5-minute period.)

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	50.0	100.0	150.0	200.0
14.000	9.7431	19.81	. Q	. V	.	.	.
14.017	9.7706	19.96	. Q	. V	.	.	.
14.033	9.7983	20.11	. Q	. V	.	.	.
14.050	9.8262	20.26	. Q	. V	.	.	.
14.067	9.8544	20.41	. Q	. V	.	.	.
14.083	9.8827	20.56	. Q	. V	.	.	.
14.100	9.9112	20.71	. Q	. V	.	.	.
14.117	9.9399	20.86	. Q	. V	.	.	.
14.133	9.9689	21.01	. Q	. V	.	.	.
14.150	9.9980	21.16	. Q	. V	.	.	.
14.167	10.0274	21.31	. Q	. V	.	.	.
14.183	10.0569	21.46	. Q	. V	.	.	.
14.200	10.0867	21.61	. Q	. V	.	.	.
14.217	10.1167	21.76	. Q	. V	.	.	.
14.233	10.1468	21.91	. Q	. V	.	.	.
14.250	10.1772	22.05	. Q	. V	.	.	.
14.267	10.2078	22.20	. Q	. V	.	.	.
14.283	10.2386	22.35	. Q	. V	.	.	.
14.300	10.2696	22.50	. Q	. V	.	.	.
14.317	10.3007	22.62	. Q	. V	.	.	.
14.333	10.3320	22.70	. Q	. V	.	.	.
14.350	10.3634	22.79	. Q	. V	.	.	.
14.367	10.3949	22.87	. Q	. V	.	.	.
14.383	10.4265	22.95	. Q	. V	.	.	.
14.400	10.4582	23.04	. Q	. V	.	.	.
14.417	10.4901	23.12	. Q	. V	.	.	.
14.433	10.5220	23.20	. Q	. V	.	.	.
14.450	10.5541	23.28	. Q	. V	.	.	.
14.467	10.5863	23.37	. Q	. V	.	.	.
14.483	10.6186	23.45	. Q	. V	.	.	.
14.500	10.6510	23.53	. Q	. V	.	.	.
14.517	10.6835	23.62	. Q	. V	.	.	.
14.533	10.7162	23.70	. Q	. V	.	.	.
14.550	10.7489	23.78	. Q	. V	.	.	.
14.567	10.7818	23.87	. Q	. V	.	.	.
14.583	10.8148	23.95	. Q	. V	.	.	.
14.600	10.8479	24.03	. Q	. V	.	.	.
14.617	10.8811	24.12	. Q	. V	.	.	.
14.633	10.9145	24.20	. Q	. V	.	.	.
14.650	10.9479	24.30	. Q	. V	.	.	.
14.667	10.9817	24.50	. Q	. V	.	.	.
14.683	11.0157	24.72	. Q	. V	.	.	.
14.700	11.0501	24.93	. Q	. V	.	.	.
14.717	11.0847	25.14	. Q	. V	.	.	.
14.733	11.1196	25.35	. Q	. V	.	.	.

```
14.750   11.1548    25.57 .    Q    .     V   .         .         .
14.767   11.1904    25.78 .    Q    .     V   .         .         .
14.783   11.2262    25.99 .    Q    .     V   .         .         .
14.800   11.2623    26.21 .    Q    .     V   .         .         .
14.817   11.2986    26.42 .    Q    .     V   .         .         .
14.833   11.3353    26.63 .    Q    .     V   .         .         .
14.850   11.3723    26.84 .    Q    .      V  .         .         .
14.867   11.4096    27.06 .    Q    .      V  .         .         .
14.883   11.4471    27.27 .    Q    .      V  .         .         .
14.900   11.4850    27.48 .    Q    .      V  .         .         .
14.917   11.5231    27.69 .    Q    .      V  .         .         .
14.933   11.5616    27.91 .    Q    .      V  .         .         .
14.950   11.6003    28.12 .    Q    .      V  .         .         .
14.967   11.6393    28.33 .    Q    .      V  .         .         .
14.983   11.6786    28.54 .    Q    .      V  .         .         .
15.000   11.7182    28.72 .    Q    .      V  .         .         .
15.017   11.7580    28.88 .    Q    .      V  .         .         .
15.033   11.7980    29.03 .    Q    .      V  .         .         .
15.050   11.8382    29.19 .    Q    .      V  .         .         .
15.067   11.8786    29.35 .    Q    .      V  .         .         .
15.083   11.9192    29.51 .    Q    .      V  .         .         .
15.100   11.9601    29.67 .    Q    .      V  .         .         .
15.117   12.0012    29.82 .    Q    .      V  .         .         .
15.133   12.0425    29.98 .    Q    .       V .         .         .
15.150   12.0840    30.14 .     Q   .       V .         .         .
15.167   12.1257    30.30 .     Q   .       V .         .         .
15.183   12.1677    30.45 .     Q   .       V .         .         .
15.200   12.2098    30.61 .     Q   .       V .         .         .
15.217   12.2522    30.77 .     Q   .       V .         .         .
15.233   12.2948    30.93 .     Q   .       V .         .         .
15.250   12.3376    31.08 .     Q   .       V .         .         .
15.267   12.3807    31.24 .     Q   .       V .         .         .
15.283   12.4239    31.40 .     Q   .       V .         .         .
15.300   12.4674    31.56 .     Q   .       V .         .         .
15.317   12.5111    31.72 .     Q   .       V .         .         .
15.333   12.5551    31.97 .     Q   .       V .         .         .
15.350   12.5998    32.42 .     Q   .       V .         .         .
15.367   12.6451    32.89 .     Q   .       V .         .         .
15.383   12.6910    33.35 .     Q   .       V .         .         .
15.400   12.7376    33.81 .     Q   .        V.         .         .
15.417   12.7848    34.28 .     Q   .        V.         .         .
15.433   12.8326    34.74 .     Q   .        V.         .         .
15.450   12.8811    35.20 .      Q  .        V.         .         .
15.467   12.9303    35.67 .      Q  .        V.         .         .
15.483   12.9800    36.13 .      Q  .        V.         .         .
15.500   13.0304    36.59 .      Q  .        V.         .         .
15.517   13.0815    37.06 .      Q  .        V.         .         .
15.533   13.1331    37.52 .      Q  .        V.         .         .
15.550   13.1855    37.98 .      Q  .        V.         .         .
15.567   13.2384    38.45 .      Q  .        V.         .         .
15.583   13.2920    38.91 .      Q  .        V.         .         .
15.600   13.3462    39.37 .      Q  .        V.         .         .
15.617   13.4011    39.83 .      Q  .         V         .         .
15.633   13.4566    40.30 .       Q .         V         .         .
15.650   13.5128    40.76 .       Q .         V         .         .
15.667   13.5696    41.27 .       Q .         V         .         .
15.683   13.6278    42.22 .       Q .         V         .         .
15.700   13.6874    43.27 .       Q .         V         .         .
15.717   13.7484    44.33 .       Q .         V         .         .
15.733   13.8109    45.39 .        Q.         V         .         .
15.750   13.8749    46.44 .        Q.         V         .         .
15.767   13.9403    47.50 .        Q.         V         .         .
15.783   14.0072    48.56 .        Q.         V         .         .
15.800   14.0756    49.61 .        Q.         .V        .         .
15.817   14.1454    50.67 .         Q         .V        .         .
15.833   14.2166    51.73 .         Q         .V        .         .
15.850   14.2893    52.78 .         Q         .V        .         .
15.867   14.3635    53.84 .         Q         .V        .         .
15.883   14.4391    54.90 .         Q         .V        .         .
15.900   14.5161    55.95 .         .Q        .V        .         .
15.917   14.5947    57.01 .         .Q        .V        .         .
15.933   14.6747    58.07 .         .Q        .V        .         .
15.950   14.7561    59.12 .         .Q        . V       .         .
15.967   14.8390    60.18 .         . Q       . V       .         .
15.983   14.9233    61.23 .         . Q       . V       .         .
16.000   15.0091    62.29 .         . Q       . V       .         .
16.017   15.1011    66.76 .         .  Q      . V       .         .
16.033   15.2039    74.64 .         .   Q     . V       .         .
16.050   15.3175    82.51 .         .     Q   . V       .         .
16.067   15.4420    90.39 .         .       Q .  V      .         .
16.083   15.5774    98.27 .         .        Q.  V      .         .
16.100   15.7151   100.00 .         .         Q  V      .         .
16.117   15.8529   100.00 .         .         Q  V      .         .
16.133   15.9906   100.00 .         .         Q  V      .         .
16.150   16.1284   100.00 .         .         Q   V     .         .
16.167   16.2661   100.00 .         .         Q   V     .         .
16.183   16.4038   100.00 .         .         Q   V     .         .
16.200   16.5416   100.00 .         .         Q   V     .         .
16.217   16.6793   100.00 .         .         Q   V     .         .
16.233   16.8171   100.00 .         .         Q    V    .         .
16.250   16.9548   100.00 .         .         Q    V    .         .
16.267   17.0926   100.00 .         .         Q    V    .         .
16.283   17.2303   100.00 .         .         Q    V    .         .
16.300   17.3680   100.00 .         .         Q    V    .         .
16.317   17.5058   100.00 .         .         Q     V   .         .
16.333   17.6435   100.00 .         .         Q     V   .         .
16.350   17.7813   100.00 .         .         Q     V   .         .
16.367   17.9190   100.00 .         .         Q     V   .         .
16.383   18.0567   100.00 .         .         Q      V  .         .
16.400   18.1945   100.00 .         .         Q      V  .         .
16.417   18.3322   100.00 .         .         Q      V  .         .
16.433   18.4700   100.00 .         .         Q      V  .         .
16.450   18.6077   100.00 .         .         Q      V  .         .
16.467   18.7454   100.00 .         .         Q       V .         .
16.483   18.8832   100.00 .         .         Q       V .         .
16.500   19.0209   100.00 .         .         Q       V .         .
16.517   19.1587   100.00 .         .         Q       V .         .
16.533   19.2964   100.00 .         .         Q       V .         .
16.550   19.4342   100.00 .         .         Q        V.         .
16.567   19.5719   100.00 .         .         Q        V.         .
16.583   19.7035    95.52 .         .        Q.        V.         .
16.600   19.8225    86.44 .         .      Q .        V.         .
```

```
16.617     19.9291     77.37  .         .    Q    .        V.         .
16.633     20.0232     68.30  .         .  Q      .        V.         .
16.650     20.1048     59.23  .         .Q        .         V         .
16.667     20.1738     50.15  .         Q         .         V         .
16.683     20.2307     41.27  .       Q .         .         V         .
16.700     20.2831     38.02  .      Q  .         .         V         .
16.717     20.3346     37.42  .      Q  .         .         V         .
16.733     20.3853     36.82  .      Q  .         .         V         .
16.750     20.4352     36.22  .      Q  .         .         V         .
16.767     20.4843     35.62  .      Q  .         .         V         .
16.783     20.5325     35.02  .      Q  .         .         V         .
16.800     20.5799     34.42  .     Q   .         .         V         .
16.817     20.6265     33.81  .     Q   .         .         V         .
16.833     20.6722     33.21  .     Q   .         .         V         .
16.850     20.7172     32.61  .     Q   .         .         V         .
16.867     20.7613     32.01  .     Q   .         .         .V        .
16.883     20.8045     31.41  .     Q   .         .         .V        .
16.900     20.8470     30.81  .     Q   .         .         .V        .
16.917     20.8886     30.21  .     Q   .         .         .V        .
16.933     20.9293     29.61  .    Q    .         .         .V        .
16.950     20.9693     29.00  .    Q    .         .         .V        .
16.967     21.0084     28.40  .    Q    .         .         .V        .
16.983     21.0467     27.80  .    Q    .         .         .V        .
17.000     21.0842     27.20  .    Q    .         .         .V        .
17.017     21.1208     26.60  .    Q    .         .         .V        .
17.033     21.1568     26.11  .    Q    .         .         .V        .
17.050     21.1923     25.83  .    Q    .         .         .V        .
17.067     21.2275     25.56  .    Q    .         .         .V        .
17.083     21.2624     25.28  .    Q    .         .         .V        .
17.100     21.2968     25.01  .    Q    .         .         .V        .
17.117     21.3309     24.74  .   Q     .         .         .V        .
17.133     21.3646     24.47  .   Q     .         .         .V        .
17.150     21.3979     24.19  .   Q     .         .         . V       .
17.167     21.4309     23.92  .   Q     .         .         . V       .
17.183     21.4634     23.65  .   Q     .         .         . V       .
17.200     21.4956     23.38  .   Q     .         .         . V       .
17.217     21.5275     23.10  .   Q     .         .         . V       .
17.233     21.5589     22.83  .   Q     .         .         . V       .
17.250     21.5900     22.56  .   Q     .         .         . V       .
17.267     21.6207     22.29  .   Q     .         .         . V       .
17.283     21.6510     22.02  .   Q     .         .         . V       .
17.300     21.6810     21.74  .   Q     .         .         . V       .
17.317     21.7105     21.47  .   Q     .         .         . V       .
17.333     21.7397     21.20  .   Q     .         .         . V       .
17.350     21.7686     20.93  .   Q     .         .         . V       .
17.367     21.7970     20.67  .   Q     .         .         . V       .
17.383     21.8253     20.50  .   Q     .         .         . V       .
17.400     21.8533     20.36  .   Q     .         .         . V       .
17.417     21.8812     20.22  .   Q     .         .         . V       .
17.433     21.9088     20.08  .   Q     .         .         . V       .
17.450     21.9363     19.94  .  Q      .         .         . V       .
17.467     21.9636     19.80  .  Q      .         .         . V       .
17.483     21.9906     19.66  .  Q      .         .         . V       .
17.500     22.0175     19.52  .  Q      .         .         . V       .
17.517     22.0442     19.38  .  Q      .         .         . V       .
17.533     22.0707     19.24  .  Q      .         .         .  V      .
17.550     22.0970     19.10  .  Q      .         .         .  V      .
17.567     22.1231     18.96  .  Q      .         .         .  V      .
17.583     22.1490     18.81  .  Q      .         .         .  V      .
17.600     22.1748     18.67  .  Q      .         .         .  V      .
17.617     22.2003     18.53  .  Q      .         .         .  V      .
17.633     22.2256     18.39  .  Q      .         .         .  V      .
17.650     22.2508     18.25  .  Q      .         .         .  V      .
17.667     22.2757     18.11  .  Q      .         .         .  V      .
17.683     22.3005     17.97  .  Q      .         .         .  V      .
17.700     22.3250     17.83  .  Q      .         .         .  V      .
17.717     22.3494     17.71  .  Q      .         .         .  V      .
17.733     22.3737     17.62  .  Q      .         .         .  V      .
17.750     22.3978     17.52  .  Q      .         .         .  V      .
17.767     22.4218     17.42  .  Q      .         .         .  V      .
17.783     22.4457     17.33  .  Q      .         .         .  V      .
17.800     22.4694     17.23  .  Q      .         .         .  V      .
17.817     22.4930     17.13  .  Q      .         .         .  V      .
17.833     22.5165     17.04  .  Q      .         .         .  V      .
17.850     22.5398     16.94  .  Q      .         .         .  V      .
17.867     22.5630     16.84  .  Q      .         .         .  V      .
17.883     22.5861     16.75  .  Q      .         .         .  V      .
17.900     22.6090     16.65  .  Q      .         .         .  V      .
17.917     22.6318     16.56  .  Q      .         .         .  V      .
17.933     22.6545     16.46  .  Q      .         .         .  V      .
17.950     22.6770     16.36  .  Q      .         .         .  V      .
17.967     22.6994     16.27  .  Q      .         .         .  V      .
17.983     22.7217     16.17  .  Q      .         .         .  V      .
18.000     22.7439     16.07  .  Q      .         .         .   V     .
--------------------------------------------------------------------------------
    TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
    (Note: 100% of Peak Flow Rate estimate assumed to have
    an instantaneous time duration)

    Percentile of Estimated                 Duration
        Peak Flow Rate                      (minutes)
    =======================                 =========
               0%                              1081.0
              10%                              1081.0
              20%                              1025.0
              30%                               535.0
              40%                               320.0
              50%                               260.0
              60%                               205.0
              70%                               180.0
              80%                               170.0
              90%                               160.0


 ****************************************************************************
  FLOW PROCESS FROM NODE     35.20 TO NODE     35.20 IS CODE = 1.2
 ----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
 ============================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #2)
```

```
   RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
   TOTAL CATCHMENT AREA(ACRES) =   11.40
   SOIL-LOSS RATE, Fm,(INCH/HR) =  0.168
   LOW LOSS FRACTION = 0.670
   TIME OF CONCENTRATION(MIN.) = 14.60
   SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
   ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
   RETURN FREQUENCY(YEARS) =   2
      5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
     30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
      1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.53
      3-HOUR   POINT RAINFALL VALUE(INCHES) =  0.89
      6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.22
     24-HOUR   POINT RAINFALL VALUE(INCHES) =  2.05

--------------------------------------------------------------------------------
   TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.74
   TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     1.21

--------------------------------------------------------------------------------

================================================================================

                    2 4 - H O U R    S T O R M
                 R U N O F F    H Y D R O G R A P H

================================================================================
            HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
       (Notes: Time indicated is at END of Each Unit Intervals.
               Peak 5-minute rainfall intensity is modeled as
               a constant value for entire 5-minute period.)
--------------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.        2.7       5.4       8.1       10.8
--------------------------------------------------------------------------------
  14.000      0.2099      0.43  .Q        .V        .         .         .
  14.017      0.2105      0.43  .Q        .V        .         .         .
  14.033      0.2111      0.43  .Q        .V        .         .         .
  14.050      0.2117      0.43  .Q        .V        .         .         .
  14.067      0.2123      0.44  .Q        .V        .         .         .
  14.083      0.2129      0.44  .Q        .V        .         .         .
  14.100      0.2135      0.44  .Q        .V        .         .         .
  14.117      0.2141      0.45  .Q        .V        .         .         .
  14.133      0.2147      0.45  .Q        .V        .         .         .
  14.150      0.2154      0.46  .Q        .V        .         .         .
  14.167      0.2160      0.46  .Q        .V        .         .         .
  14.183      0.2166      0.46  .Q        .V        .         .         .
  14.200      0.2173      0.47  .Q        .V        .         .         .
  14.217      0.2179      0.47  .Q        .V        .         .         .
  14.233      0.2186      0.48  .Q        .V        .         .         .
  14.250      0.2192      0.48  .Q        .V        .         .         .
  14.267      0.2199      0.48  .Q        .V        .         .         .
  14.283      0.2206      0.49  .Q        .V        .         .         .
  14.300      0.2213      0.49  .Q        . V       .         .         .
  14.317      0.2219      0.49  .Q        . V       .         .         .
  14.333      0.2226      0.49  .Q        . V       .         .         .
  14.350      0.2233      0.50  .Q        . V       .         .         .
  14.367      0.2240      0.50  .Q        . V       .         .         .
  14.383      0.2247      0.50  .Q        . V       .         .         .
  14.400      0.2254      0.50  .Q        . V       .         .         .
  14.417      0.2261      0.50  .Q        . V       .         .         .
  14.433      0.2267      0.50  .Q        . V       .         .         .
  14.450      0.2274      0.51  .Q        . V       .         .         .
  14.467      0.2281      0.51  .Q        . V       .         .         .
  14.483      0.2288      0.51  .Q        . V       .         .         .
  14.500      0.2296      0.51  .Q        . V       .         .         .
  14.517      0.2303      0.51  .Q        . V       .         .         .
  14.533      0.2310      0.51  .Q        . V       .         .         .
  14.550      0.2317      0.52  .Q        . V       .         .         .
  14.567      0.2324      0.52  .Q        . V       .         .         .
  14.583      0.2331      0.52  .Q        . V       .         .         .
  14.600      0.2338      0.53  .Q        . V       .         .         .
  14.617      0.2346      0.53  .Q        . V       .         .         .
  14.633      0.2353      0.54  .Q        . V       .         .         .
  14.650      0.2361      0.54  . Q       . V       .         .         .
  14.667      0.2368      0.55  . Q       . V       .         .         .
  14.683      0.2376      0.55  . Q       . V       .         .         .
  14.700      0.2383      0.55  . Q       . V       .         .         .
  14.717      0.2391      0.56  . Q       .  V      .         .         .
  14.733      0.2399      0.56  . Q       .  V      .         .         .
  14.750      0.2407      0.57  . Q       .  V      .         .         .
  14.767      0.2414      0.57  . Q       .  V      .         .         .
  14.783      0.2422      0.57  . Q       .  V      .         .         .
  14.800      0.2430      0.58  . Q       .  V      .         .         .
  14.817      0.2438      0.58  . Q       .  V      .         .         .
  14.833      0.2446      0.58  . Q       .  V      .         .         .
  14.850      0.2454      0.59  . Q       .  V      .         .         .
  14.867      0.2463      0.59  . Q       .  V      .         .         .
  14.883      0.2471      0.59  . Q       .  V      .         .         .
  14.900      0.2479      0.59  . Q       .  V      .         .         .
  14.917      0.2487      0.60  . Q       .  V      .         .         .
  14.933      0.2495      0.60  . Q       .  V      .         .         .
  14.950      0.2504      0.60  . Q       .  V      .         .         .
  14.967      0.2512      0.61  . Q       .  V      .         .         .
  14.983      0.2520      0.61  . Q       .  V      .         .         .
  15.000      0.2529      0.61  . Q       .  V      .         .         .
  15.017      0.2537      0.61  . Q       .  V      .         .         .
  15.033      0.2546      0.62  . Q       .  V      .         .         .
  15.050      0.2554      0.62  . Q       .  V      .         .         .
  15.067      0.2563      0.63  . Q       .  V      .         .         .
  15.083      0.2572      0.64  . Q       .  V      .         .         .
  15.100      0.2581      0.65  . Q       .   V     .         .         .
  15.117      0.2590      0.65  . Q       .   V     .         .         .
  15.133      0.2599      0.66  . Q       .   V     .         .         .
  15.150      0.2608      0.67  . Q       .   V     .         .         .
  15.167      0.2617      0.68  . Q       .   V     .         .         .
  15.183      0.2627      0.68  . Q       .   V     .         .         .
  15.200      0.2636      0.69  . Q       .   V     .         .         .
  15.217      0.2646      0.70  . Q       .   V     .         .         .
  15.233      0.2656      0.71  . Q       .   V     .         .         .
  15.250      0.2666      0.71  . Q       .   V     .         .         .
  15.267      0.2675      0.72  . Q       .   V     .         .         .
  15.283      0.2686      0.73  . Q       .   V     .         .         .
```



Onsite Flood Routing Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1

with Flowby Detention @ Node 56.3 (100cfs) & Node 35.2 (10cfs), User input for total flowby @ Rational Node 35

2-Year Storm Proposed Condition

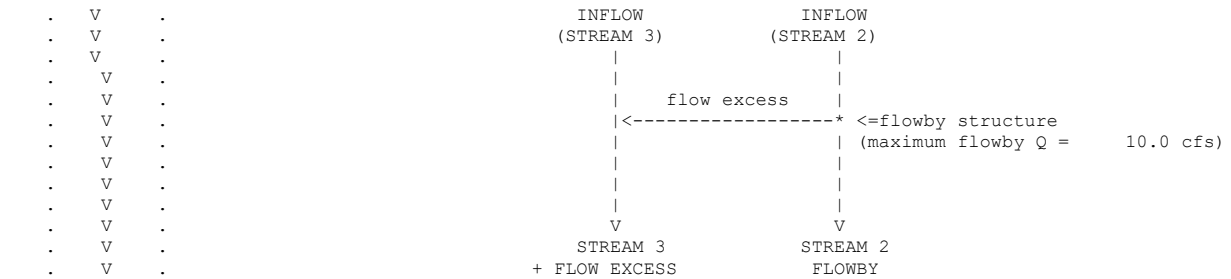
17.167	0.6259	0.48	.Q	.	.	.	V	.
17.183	0.6266	0.47	.Q	.	.	.	V	.
17.200	0.6272	0.47	.Q	.	.	.	V	.
17.217	0.6279	0.46	.Q	.	.	.	V	.
17.233	0.6285	0.46	.Q	.	.	.	V	.
17.250	0.6291	0.45	.Q	.	.	.	V	.
17.267	0.6298	0.45	.Q	.	.	.	V	.
17.283	0.6304	0.45	.Q	.	.	.	V	.
17.300	0.6310	0.44	.Q	.	.	.	V	.
17.317	0.6316	0.44	.Q	.	.	.	V	.
17.333	0.6322	0.43	.Q	.	.	.	V	.
17.350	0.6328	0.43	.Q	.	.	.	V	.
17.367	0.6334	0.43	.Q	.	.	.	V	.
17.383	0.6339	0.42	.Q	.	.	.	V	.
17.400	0.6345	0.42	.Q	.	.	.	V	.
17.417	0.6351	0.42	.Q	.	.	.	V	.
17.433	0.6357	0.41	.Q	.	.	.	V	.
17.450	0.6362	0.41	.Q	.	.	.	V	.
17.467	0.6368	0.40	.Q	.	.	.	V	.
17.483	0.6373	0.40	.Q	.	.	.	V	.
17.500	0.6379	0.40	.Q	.	.	.	V	.
17.517	0.6384	0.40	.Q	.	.	.	V	.
17.533	0.6390	0.39	.Q	.	.	.	V	.
17.550	0.6395	0.39	.Q	.	.	.	V	.
17.567	0.6400	0.39	.Q	.	.	.	V	.
17.583	0.6406	0.39	.Q	.	.	.	V	.
17.600	0.6411	0.38	.Q	.	.	.	V	.
17.617	0.6416	0.38	.Q	.	.	.	V	.
17.633	0.6421	0.38	.Q	.	.	.	V	.
17.650	0.6427	0.38	.Q	.	.	.	V	.
17.667	0.6432	0.37	.Q	.	.	.	V	.
17.683	0.6437	0.37	.Q	.	.	.	V	.
17.700	0.6442	0.37	.Q	.	.	.	V	.
17.717	0.6447	0.37	.Q	.	.	.	V	.
17.733	0.6452	0.36	.Q	.	.	.	V	.
17.750	0.6457	0.36	.Q	.	.	.	V	.
17.767	0.6462	0.36	.Q	.	.	.	V	.
17.783	0.6467	0.36	.Q	.	.	.	V	.
17.800	0.6472	0.36	.Q	.	.	.	V	.
17.817	0.6477	0.35	.Q	.	.	.	V	.
17.833	0.6482	0.35	.Q	.	.	.	V	.
17.850	0.6486	0.35	.Q	.	.	.	V	.
17.867	0.6491	0.35	.Q	.	.	.	V	.
17.883	0.6496	0.35	.Q	.	.	.	V	.
17.900	0.6501	0.34	.Q	.	.	.	V	.
17.917	0.6505	0.34	.Q	.	.	.	V	.
17.933	0.6510	0.34	.Q	.	.	.	V	.
17.950	0.6515	0.34	.Q	.	.	.	V	.
17.967	0.6519	0.34	.Q	.	.	.	V	.
17.983	0.6524	0.33	.Q	.	.	.	V	.
18.000	0.6528	0.33	.Q	.	.	.	V	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	245.0
20%	155.0
30%	125.0
40%	105.0
50%	85.0
60%	70.0
70%	50.0
80%	35.0
90%	15.0

```
**************************************************************************
  FLOW PROCESS FROM NODE     35.20 TO NODE     35.00 IS CODE =   2
--------------------------------------------------------------------------
  >>>>>FLOWBY STRUCTURE ROUTING MODEL APPLIED TO STREAM #2<<<<<
==========================================================================
```

MODEL STREAM NUMBER 2 FLOWING PAST A FLOWBY STRUCTURE:
FLOWRATES IN STREAM # 2 WHICH ARE GREATER THAN
10.0 CFS ARE ASSUMED TO BE EXCESS FLOWS.
FLOW EXCESS IS ASSUMED TO BE ADDED TO STREAM NUMBER 3



FLOWBY BASIN MODELING RESULTS:

MODEL TIME (HRS)	INFLOW (STREAM 3) (CFS)	INFLOW (STREAM 2) (CFS)	OUTFLOW (STREAM 3) (CFS)	FLOWBY (STREAM 2) (CFS)
14.000	0.00	0.43	0.00	0.43
14.017	0.00	0.43	0.00	0.43
14.033	0.00	0.43	0.00	0.43
14.050	0.00	0.43	0.00	0.43
14.067	0.00	0.44	0.00	0.44
14.083	0.00	0.44	0.00	0.44

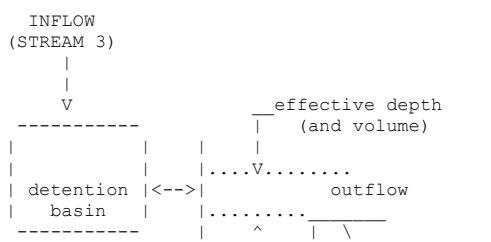
14.100	0.00	0.44	0.00	0.44
14.117	0.00	0.45	0.00	0.45
14.133	0.00	0.45	0.00	0.45
14.150	0.00	0.46	0.00	0.46
14.167	0.00	0.46	0.00	0.46
14.183	0.00	0.46	0.00	0.46
14.200	0.00	0.47	0.00	0.47
14.217	0.00	0.47	0.00	0.47
14.233	0.00	0.48	0.00	0.48
14.250	0.00	0.48	0.00	0.48
14.267	0.00	0.48	0.00	0.48
14.283	0.00	0.49	0.00	0.49
14.300	0.00	0.49	0.00	0.49
14.317	0.00	0.49	0.00	0.49
14.333	0.00	0.49	0.00	0.49
14.350	0.00	0.50	0.00	0.50
14.367	0.00	0.50	0.00	0.50
14.383	0.00	0.50	0.00	0.50
14.400	0.00	0.50	0.00	0.50
14.417	0.00	0.50	0.00	0.50
14.433	0.00	0.50	0.00	0.50
14.450	0.00	0.51	0.00	0.51
14.467	0.00	0.51	0.00	0.51
14.483	0.00	0.51	0.00	0.51
14.500	0.00	0.51	0.00	0.51
14.517	0.00	0.51	0.00	0.51
14.533	0.00	0.51	0.00	0.51
14.550	0.00	0.52	0.00	0.52
14.567	0.00	0.52	0.00	0.52
14.583	0.00	0.52	0.00	0.52
14.600	0.00	0.53	0.00	0.53
14.617	0.00	0.53	0.00	0.53
14.633	0.00	0.54	0.00	0.54
14.650	0.00	0.54	0.00	0.54
14.667	0.00	0.55	0.00	0.55
14.683	0.00	0.55	0.00	0.55
14.700	0.00	0.55	0.00	0.55
14.717	0.00	0.56	0.00	0.56
14.733	0.00	0.56	0.00	0.56
14.750	0.00	0.57	0.00	0.57
14.767	0.00	0.57	0.00	0.57
14.783	0.00	0.57	0.00	0.57
14.800	0.00	0.58	0.00	0.58
14.817	0.00	0.58	0.00	0.58
14.833	0.00	0.58	0.00	0.58
14.850	0.00	0.59	0.00	0.59
14.867	0.00	0.59	0.00	0.59
14.883	0.00	0.59	0.00	0.59
14.900	0.00	0.59	0.00	0.59
14.917	0.00	0.60	0.00	0.60
14.933	0.00	0.60	0.00	0.60
14.950	0.00	0.60	0.00	0.60
14.967	0.00	0.61	0.00	0.61
14.983	0.00	0.61	0.00	0.61
15.000	0.00	0.61	0.00	0.61
15.017	0.00	0.61	0.00	0.61
15.033	0.00	0.62	0.00	0.62
15.050	0.00	0.62	0.00	0.62
15.067	0.00	0.63	0.00	0.63
15.083	0.00	0.64	0.00	0.64
15.100	0.00	0.65	0.00	0.65
15.117	0.00	0.65	0.00	0.65
15.133	0.00	0.66	0.00	0.66
15.150	0.00	0.67	0.00	0.67
15.167	0.00	0.68	0.00	0.68
15.183	0.00	0.68	0.00	0.68
15.200	0.00	0.69	0.00	0.69
15.217	0.00	0.70	0.00	0.70
15.233	0.00	0.71	0.00	0.71
15.250	0.00	0.71	0.00	0.71
15.267	0.00	0.72	0.00	0.72
15.283	0.00	0.73	0.00	0.73
15.300	0.00	0.73	0.00	0.73
15.317	0.00	0.74	0.00	0.74
15.333	0.00	0.74	0.00	0.74
15.350	0.00	0.75	0.00	0.75
15.367	0.00	0.75	0.00	0.75
15.383	0.00	0.76	0.00	0.76
15.400	0.00	0.76	0.00	0.76
15.417	0.00	0.77	0.00	0.77
15.433	0.00	0.77	0.00	0.77
15.450	0.00	0.78	0.00	0.78
15.467	0.00	0.78	0.00	0.78
15.483	0.00	0.78	0.00	0.78
15.500	0.00	0.79	0.00	0.79
15.517	0.00	0.79	0.00	0.79
15.533	0.00	0.82	0.00	0.82
15.550	0.00	0.85	0.00	0.85
15.567	0.00	0.88	0.00	0.88
15.583	0.00	0.91	0.00	0.91
15.600	0.00	0.95	0.00	0.95
15.617	0.00	0.98	0.00	0.98
15.633	0.00	1.01	0.00	1.01
15.650	0.00	1.04	0.00	1.04
15.667	0.00	1.08	0.00	1.08
15.683	0.00	1.11	0.00	1.11
15.700	0.00	1.14	0.00	1.14
15.717	0.00	1.17	0.00	1.17
15.733	0.00	1.20	0.00	1.20
15.750	0.00	1.24	0.00	1.24
15.767	0.00	1.28	0.00	1.28
15.783	0.00	1.35	0.00	1.35
15.800	0.00	1.44	0.00	1.44
15.817	0.00	1.52	0.00	1.52
15.833	0.00	1.60	0.00	1.60
15.850	0.00	1.68	0.00	1.68
15.867	0.00	1.76	0.00	1.76
15.883	0.00	1.84	0.00	1.84
15.900	0.00	1.92	0.00	1.92
15.917	0.00	2.00	0.00	2.00
15.933	0.00	2.08	0.00	2.08
15.950	0.00	2.17	0.00	2.17

15.967	0.00	2.25	0.00	2.25
15.983	0.00	2.33	0.00	2.33
16.000	0.00	2.41	0.00	2.41
16.017	0.00	2.73	0.00	2.73
16.033	0.00	3.31	0.00	3.31
16.050	0.00	3.88	0.00	3.88
16.067	0.00	4.45	0.00	4.45
16.083	0.00	5.02	0.00	5.02
16.100	6.15	5.59	6.15	5.59
16.117	14.02	6.16	14.02	6.16
16.133	21.90	6.73	21.90	6.73
16.150	29.78	7.30	29.78	7.30
16.167	37.66	7.87	37.66	7.87
16.183	45.53	8.44	45.53	8.44
16.200	53.41	9.01	53.41	9.01
16.217	61.29	9.58	61.29	9.58
16.233	69.17	10.15	69.32	10.00
16.250	77.05	10.78	77.83	10.00
16.267	84.92	10.17	85.09	10.00
16.283	92.80	9.48	92.80	9.48
16.300	100.68	8.80	100.68	8.80
16.317	108.56	8.12	108.56	8.12
16.333	116.43	7.43	116.43	7.43
16.350	123.48	6.75	123.48	6.75
16.367	113.46	6.07	113.46	6.07
16.383	104.39	5.38	104.39	5.38
16.400	95.31	4.70	95.31	4.70
16.417	86.24	4.02	86.24	4.02
16.433	77.17	3.33	77.17	3.33
16.450	68.10	2.65	68.10	2.65
16.467	59.02	1.97	59.02	1.97
16.483	49.95	1.28	49.95	1.28
16.500	40.88	0.81	40.88	0.81
16.517	31.81	0.79	31.81	0.79
16.533	22.73	0.78	22.73	0.78
16.550	13.66	0.77	13.66	0.77
16.567	4.59	0.76	4.59	0.76
16.583	0.00	0.75	0.00	0.75
16.600	0.00	0.74	0.00	0.74
16.617	0.00	0.73	0.00	0.73
16.633	0.00	0.73	0.00	0.73
16.650	0.00	0.72	0.00	0.72
16.667	0.00	0.71	0.00	0.71
16.683	0.00	0.70	0.00	0.70
16.700	0.00	0.69	0.00	0.69
16.717	0.00	0.68	0.00	0.68
16.733	0.00	0.67	0.00	0.67
16.750	0.00	0.66	0.00	0.66
16.767	0.00	0.65	0.00	0.65
16.783	0.00	0.64	0.00	0.64
16.800	0.00	0.63	0.00	0.63
16.817	0.00	0.63	0.00	0.63
16.833	0.00	0.62	0.00	0.62
16.850	0.00	0.61	0.00	0.61
16.867	0.00	0.60	0.00	0.60
16.883	0.00	0.59	0.00	0.59
16.900	0.00	0.58	0.00	0.58
16.917	0.00	0.58	0.00	0.58
16.933	0.00	0.57	0.00	0.57
16.950	0.00	0.56	0.00	0.56
16.967	0.00	0.55	0.00	0.55
16.983	0.00	0.54	0.00	0.54
17.000	0.00	0.54	0.00	0.54
17.017	0.00	0.53	0.00	0.53
17.033	0.00	0.53	0.00	0.53
17.050	0.00	0.52	0.00	0.52
17.067	0.00	0.51	0.00	0.51
17.083	0.00	0.51	0.00	0.51
17.100	0.00	0.50	0.00	0.50
17.117	0.00	0.50	0.00	0.50
17.133	0.00	0.49	0.00	0.49
17.150	0.00	0.49	0.00	0.49
17.167	0.00	0.48	0.00	0.48
17.183	0.00	0.47	0.00	0.47
17.200	0.00	0.47	0.00	0.47
17.217	0.00	0.46	0.00	0.46
17.233	0.00	0.46	0.00	0.46
17.250	0.00	0.45	0.00	0.45
17.267	0.00	0.45	0.00	0.45
17.283	0.00	0.45	0.00	0.45
17.300	0.00	0.44	0.00	0.44
17.317	0.00	0.44	0.00	0.44
17.333	0.00	0.43	0.00	0.43
17.350	0.00	0.43	0.00	0.43
17.367	0.00	0.43	0.00	0.43
17.383	0.00	0.42	0.00	0.42
17.400	0.00	0.42	0.00	0.42
17.417	0.00	0.42	0.00	0.42
17.433	0.00	0.41	0.00	0.41
17.450	0.00	0.41	0.00	0.41
17.467	0.00	0.40	0.00	0.40
17.483	0.00	0.40	0.00	0.40
17.500	0.00	0.40	0.00	0.40
17.517	0.00	0.40	0.00	0.40
17.533	0.00	0.39	0.00	0.39
17.550	0.00	0.39	0.00	0.39
17.567	0.00	0.39	0.00	0.39
17.583	0.00	0.39	0.00	0.39
17.600	0.00	0.38	0.00	0.38
17.617	0.00	0.38	0.00	0.38
17.633	0.00	0.38	0.00	0.38
17.650	0.00	0.38	0.00	0.38
17.667	0.00	0.37	0.00	0.37
17.683	0.00	0.37	0.00	0.37
17.700	0.00	0.37	0.00	0.37
17.717	0.00	0.37	0.00	0.37
17.733	0.00	0.36	0.00	0.36
17.750	0.00	0.36	0.00	0.36
17.767	0.00	0.36	0.00	0.36
17.783	0.00	0.36	0.00	0.36
17.800	0.00	0.36	0.00	0.36
17.817	0.00	0.35	0.00	0.35

17.833	0.00	0.35	0.00	0.35
17.850	0.00	0.35	0.00	0.35
17.867	0.00	0.35	0.00	0.35
17.883	0.00	0.35	0.00	0.35
17.900	0.00	0.34	0.00	0.34
17.917	0.00	0.34	0.00	0.34
17.933	0.00	0.34	0.00	0.34
17.950	0.00	0.34	0.00	0.34
17.967	0.00	0.34	0.00	0.34
17.983	0.00	0.33	0.00	0.33
18.000	0.00	0.33	0.00	0.33

****
FLOW PROCESS FROM NODE 35.00 TO NODE 35.00 IS CODE = 3.2

>>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #3<<<<<
==========



ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 3
THROUGH A FLOW-THROUGH DETENTION BASIN
SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
DEAD STORAGE(AF) = 0.000
SPECIFIED DEAD STORAGE(AF) FILLED = 0.000
SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET = 0.000
DETENTION BASIN CONSTANT LOSS RATE(CFS) = 0.00

BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

INTERVAL NUMBER	DEPTH (FT)	OUTFLOW (CFS)	STORAGE (AF)
1	0.00	0.00	0.000
2	0.50	15.16	0.510
3	1.00	40.12	1.010
4	1.50	54.67	1.520
5	2.00	66.33	2.020
6	2.50	76.19	2.530
7	3.00	84.90	3.040
8	3.50	93.04	3.540
9	4.00	100.45	4.050
10	4.50	107.33	4.560
11	5.00	114.02	5.060
12	5.50	120.27	5.570
13	6.00	126.17	6.070
14	7.00	142.55	7.090
15	8.00	156.65	8.100
16	9.00	168.87	9.110
17	10.00	180.03	10.120
18	11.00	190.43	11.140
19	12.00	200.23	12.150
20	13.00	428.93	13.160
21	14.00	838.96	14.170

==========
MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
16.017	0.000	0.00	0.00	0.00	0.0	0.000
16.033	0.000	0.00	0.00	0.00	0.0	0.000
16.050	0.000	0.00	0.00	0.00	0.0	0.000
16.067	0.000	0.00	0.00	0.00	0.0	0.000
16.083	0.000	0.00	0.00	0.00	0.0	0.000
16.100	0.000	6.15	0.00	0.01	0.1	0.008
16.117	0.000	14.02	0.00	0.03	0.5	0.027
16.133	0.000	21.90	0.00	0.05	1.2	0.055
16.150	0.000	29.78	0.00	0.09	2.2	0.093
16.167	0.000	37.66	0.00	0.14	3.5	0.140
16.183	0.000	45.53	0.00	0.19	5.0	0.196
16.200	0.000	53.41	0.00	0.26	6.8	0.260
16.217	0.000	61.29	0.00	0.33	8.8	0.333
16.233	0.000	69.32	0.00	0.40	11.1	0.413
16.250	0.000	77.83	0.00	0.49	13.6	0.501
16.267	0.000	85.09	0.00	0.59	17.2	0.595
16.283	0.000	92.80	0.00	0.68	21.8	0.693
16.300	0.000	100.68	0.00	0.78	26.8	0.794
16.317	0.000	108.56	0.00	0.89	32.0	0.900
16.333	0.000	116.43	0.00	1.00	37.3	1.009
16.350	0.000	123.48	0.00	1.11	41.7	1.122
16.367	0.000	113.46	0.00	1.20	44.7	1.216
16.383	0.000	104.39	0.00	1.28	47.1	1.295
16.400	0.000	95.31	0.00	1.34	49.2	1.359
16.417	0.000	86.24	0.00	1.39	50.8	1.408
16.433	0.000	77.17	0.00	1.42	52.0	1.442
16.450	0.000	68.10	0.00	1.44	52.8	1.463
16.467	0.000	59.02	0.00	1.45	53.2	1.472
16.483	0.000	49.95	0.00	1.45	53.2	1.467
16.500	0.000	40.88	0.00	1.43	52.9	1.450

16.517	0.000	31.81	0.00	1.40	52.3	1.422
16.533	0.000	22.73	0.00	1.37	51.3	1.383
16.550	0.000	13.66	0.00	1.32	50.0	1.333
16.567	0.000	4.59	0.00	1.26	48.5	1.272
16.583	0.000	0.00	0.00	1.19	46.7	1.208
16.600	0.000	0.00	0.00	1.13	44.9	1.146
16.617	0.000	0.00	0.00	1.08	43.2	1.087
16.633	0.000	0.00	0.00	1.02	41.5	1.030
16.650	0.000	0.00	0.00	0.97	39.5	0.975
16.667	0.000	0.00	0.00	0.91	37.1	0.924
16.683	0.000	0.00	0.00	0.87	34.6	0.876
16.700	0.000	0.00	0.00	0.82	32.3	0.832
16.717	0.000	0.00	0.00	0.78	30.2	0.790
16.733	0.000	0.00	0.00	0.74	28.2	0.751
16.750	0.000	0.00	0.00	0.71	26.3	0.715
16.767	0.000	0.00	0.00	0.67	24.6	0.681
16.783	0.000	0.00	0.00	0.64	22.9	0.650
16.800	0.000	0.00	0.00	0.61	21.4	0.620
16.817	0.000	0.00	0.00	0.58	20.0	0.593
16.833	0.000	0.00	0.00	0.56	18.7	0.567
16.850	0.000	0.00	0.00	0.53	17.4	0.543
16.867	0.000	0.00	0.00	0.51	16.3	0.521
16.883	0.000	0.00	0.00	0.49	15.3	0.500
16.900	0.000	0.00	0.00	0.47	14.6	0.480
16.917	0.000	0.00	0.00	0.45	14.0	0.460
16.933	0.000	0.00	0.00	0.43	13.4	0.442
16.950	0.000	0.00	0.00	0.42	12.9	0.424
16.967	0.000	0.00	0.00	0.40	12.4	0.407
16.983	0.000	0.00	0.00	0.38	11.9	0.391
17.000	0.000	0.00	0.00	0.37	11.4	0.375
17.017	0.000	0.00	0.00	0.35	10.9	0.360
17.033	0.000	0.00	0.00	0.34	10.5	0.346
17.050	0.000	0.00	0.00	0.33	10.1	0.332
17.067	0.000	0.00	0.00	0.31	9.7	0.318
17.083	0.000	0.00	0.00	0.30	9.3	0.306
17.100	0.000	0.00	0.00	0.29	8.9	0.293
17.117	0.000	0.00	0.00	0.28	8.5	0.282
17.133	0.000	0.00	0.00	0.27	8.2	0.270
17.150	0.000	0.00	0.00	0.25	7.9	0.259
17.167	0.000	0.00	0.00	0.24	7.6	0.249
17.183	0.000	0.00	0.00	0.23	7.3	0.239
17.200	0.000	0.00	0.00	0.22	7.0	0.229
17.217	0.000	0.00	0.00	0.22	6.7	0.220
17.233	0.000	0.00	0.00	0.21	6.4	0.211
17.250	0.000	0.00	0.00	0.20	6.2	0.203
17.267	0.000	0.00	0.00	0.19	5.9	0.195
17.283	0.000	0.00	0.00	0.18	5.7	0.187
17.300	0.000	0.00	0.00	0.18	5.4	0.180
17.317	0.000	0.00	0.00	0.17	5.2	0.172
17.333	0.000	0.00	0.00	0.16	5.0	0.165
17.350	0.000	0.00	0.00	0.16	4.8	0.159
17.367	0.000	0.00	0.00	0.15	4.6	0.152
17.383	0.000	0.00	0.00	0.14	4.4	0.146
17.400	0.000	0.00	0.00	0.14	4.3	0.140
17.417	0.000	0.00	0.00	0.13	4.1	0.135
17.433	0.000	0.00	0.00	0.13	3.9	0.129
17.450	0.000	0.00	0.00	0.12	3.8	0.124
17.467	0.000	0.00	0.00	0.12	3.6	0.119
17.483	0.000	0.00	0.00	0.11	3.5	0.114
17.500	0.000	0.00	0.00	0.11	3.3	0.110
17.517	0.000	0.00	0.00	0.10	3.2	0.105
17.533	0.000	0.00	0.00	0.10	3.1	0.101
17.550	0.000	0.00	0.00	0.10	2.9	0.097
17.567	0.000	0.00	0.00	0.09	2.8	0.093
17.583	0.000	0.00	0.00	0.09	2.7	0.089
17.600	0.000	0.00	0.00	0.08	2.6	0.086
17.617	0.000	0.00	0.00	0.08	2.5	0.082
17.633	0.000	0.00	0.00	0.08	2.4	0.079
17.650	0.000	0.00	0.00	0.07	2.3	0.076
17.667	0.000	0.00	0.00	0.07	2.2	0.073
17.683	0.000	0.00	0.00	0.07	2.1	0.070
17.700	0.000	0.00	0.00	0.07	2.0	0.067
17.717	0.000	0.00	0.00	0.06	2.0	0.064
17.733	0.000	0.00	0.00	0.06	1.9	0.062
17.750	0.000	0.00	0.00	0.06	1.8	0.059
17.767	0.000	0.00	0.00	0.06	1.7	0.057
17.783	0.000	0.00	0.00	0.05	1.7	0.055
17.800	0.000	0.00	0.00	0.05	1.6	0.053
17.817	0.000	0.00	0.00	0.05	1.5	0.050
17.833	0.000	0.00	0.00	0.05	1.5	0.048
17.850	0.000	0.00	0.00	0.05	1.4	0.046
17.867	0.000	0.00	0.00	0.04	1.4	0.045
17.883	0.000	0.00	0.00	0.04	1.3	0.043
17.900	0.000	0.00	0.00	0.04	1.2	0.041
17.917	0.000	0.00	0.00	0.04	1.2	0.039
17.933	0.000	0.00	0.00	0.04	1.1	0.038
17.950	0.000	0.00	0.00	0.04	1.1	0.036
17.967	0.000	0.00	0.00	0.03	1.1	0.035
17.983	0.000	0.00	0.00	0.03	1.0	0.033
18.000	0.000	0.00	0.00	0.03	1.0	0.032
18.017	0.000	0.00	0.00	0.03	0.9	0.031
18.033	0.000	0.00	0.00	0.03	0.9	0.030
18.050	0.000	0.00	0.00	0.03	0.9	0.028
18.067	0.000	0.00	0.00	0.03	0.8	0.027
18.083	0.000	0.00	0.00	0.03	0.8	0.026
18.100	0.000	0.00	0.00	0.02	0.8	0.025
18.117	0.000	0.00	0.00	0.02	0.7	0.024
18.133	0.000	0.00	0.00	0.02	0.7	0.023
18.150	0.000	0.00	0.00	0.02	0.7	0.022
18.167	0.000	0.00	0.00	0.02	0.6	0.021
18.183	0.000	0.00	0.00	0.02	0.6	0.020
18.200	0.000	0.00	0.00	0.02	0.6	0.020
18.217	0.000	0.00	0.00	0.02	0.6	0.019
18.233	0.000	0.00	0.00	0.02	0.5	0.018
18.250	0.000	0.00	0.00	0.02	0.5	0.017
18.267	0.000	0.00	0.00	0.02	0.5	0.017
18.283	0.000	0.00	0.00	0.02	0.5	0.016
18.300	0.000	0.00	0.00	0.02	0.5	0.015
18.317	0.000	0.00	0.00	0.01	0.4	0.015
18.333	0.000	0.00	0.00	0.01	0.4	0.014
18.350	0.000	0.00	0.00	0.01	0.4	0.014
18.367	0.000	0.00	0.00	0.01	0.4	0.013

18.383	0.000	0.00	0.00	0.01	0.4	0.013
18.400	0.000	0.00	0.00	0.01	0.4	0.012
18.417	0.000	0.00	0.00	0.01	0.4	0.012
18.433	0.000	0.00	0.00	0.01	0.3	0.011
18.450	0.000	0.00	0.00	0.01	0.3	0.011
18.467	0.000	0.00	0.00	0.01	0.3	0.010
18.483	0.000	0.00	0.00	0.01	0.3	0.010
18.500	0.000	0.00	0.00	0.01	0.3	0.009
18.517	0.000	0.00	0.00	0.01	0.3	0.009
18.533	0.000	0.00	0.00	0.01	0.3	0.009
18.550	0.000	0.00	0.00	0.01	0.3	0.008
18.567	0.000	0.00	0.00	0.01	0.2	0.008
18.583	0.000	0.00	0.00	0.01	0.2	0.008
18.600	0.000	0.00	0.00	0.01	0.2	0.007
18.617	0.000	0.00	0.00	0.01	0.2	0.007
18.633	0.000	0.00	0.00	0.01	0.2	0.007
18.650	0.000	0.00	0.00	0.01	0.2	0.007
18.667	0.000	0.00	0.00	0.01	0.2	0.006
18.683	0.000	0.00	0.00	0.01	0.2	0.006
18.700	0.000	0.00	0.00	0.01	0.2	0.006
18.717	0.000	0.00	0.00	0.01	0.2	0.006
18.733	0.000	0.00	0.00	0.01	0.2	0.005
18.750	0.000	0.00	0.00	0.00	0.2	0.005
18.767	0.000	0.00	0.00	0.00	0.1	0.005
18.783	0.000	0.00	0.00	0.00	0.1	0.005
18.800	0.000	0.00	0.00	0.00	0.1	0.005
18.817	0.000	0.00	0.00	0.00	0.1	0.004
18.833	0.000	0.00	0.00	0.00	0.1	0.004
18.850	0.000	0.00	0.00	0.00	0.1	0.004
18.867	0.000	0.00	0.00	0.00	0.1	0.004
18.883	0.000	0.00	0.00	0.00	0.1	0.004
18.900	0.000	0.00	0.00	0.00	0.1	0.004
18.917	0.000	0.00	0.00	0.00	0.1	0.003
18.933	0.000	0.00	0.00	0.00	0.1	0.003
18.950	0.000	0.00	0.00	0.00	0.1	0.003
18.967	0.000	0.00	0.00	0.00	0.1	0.003
18.983	0.000	0.00	0.00	0.00	0.1	0.003
19.000	0.000	0.00	0.00	0.00	0.1	0.003
19.017	0.000	0.00	0.00	0.00	0.1	0.003
19.033	0.000	0.00	0.00	0.00	0.1	0.003
19.050	0.000	0.00	0.00	0.00	0.1	0.002
19.067	0.000	0.00	0.00	0.00	0.1	0.002
19.083	0.000	0.00	0.00	0.00	0.1	0.002
19.100	0.000	0.00	0.00	0.00	0.1	0.002
19.117	0.000	0.00	0.00	0.00	0.1	0.002
19.133	0.000	0.00	0.00	0.00	0.1	0.002
19.150	0.000	0.00	0.00	0.00	0.1	0.002
19.167	0.000	0.00	0.00	0.00	0.1	0.002
19.183	0.000	0.00	0.00	0.00	0.1	0.002
19.200	0.000	0.00	0.00	0.00	0.1	0.002
19.217	0.000	0.00	0.00	0.00	0.0	0.002
19.233	0.000	0.00	0.00	0.00	0.0	0.002
19.250	0.000	0.00	0.00	0.00	0.0	0.001
19.267	0.000	0.00	0.00	0.00	0.0	0.001
19.283	0.000	0.00	0.00	0.00	0.0	0.001
19.300	0.000	0.00	0.00	0.00	0.0	0.001
19.317	0.000	0.00	0.00	0.00	0.0	0.001
19.333	0.000	0.00	0.00	0.00	0.0	0.001
19.350	0.000	0.00	0.00	0.00	0.0	0.001
19.367	0.000	0.00	0.00	0.00	0.0	0.001
19.383	0.000	0.00	0.00	0.00	0.0	0.001
19.400	0.000	0.00	0.00	0.00	0.0	0.001
19.417	0.000	0.00	0.00	0.00	0.0	0.001
19.433	0.000	0.00	0.00	0.00	0.0	0.001
19.450	0.000	0.00	0.00	0.00	0.0	0.001
19.467	0.000	0.00	0.00	0.00	0.0	0.001
19.483	0.000	0.00	0.00	0.00	0.0	0.001
19.500	0.000	0.00	0.00	0.00	0.0	0.001
19.517	0.000	0.00	0.00	0.00	0.0	0.001
19.533	0.000	0.00	0.00	0.00	0.0	0.001
19.550	0.000	0.00	0.00	0.00	0.0	0.001
19.567	0.000	0.00	0.00	0.00	0.0	0.001
19.583	0.000	0.00	0.00	0.00	0.0	0.001
19.600	0.000	0.00	0.00	0.00	0.0	0.001
19.617	0.000	0.00	0.00	0.00	0.0	0.001
19.633	0.000	0.00	0.00	0.00	0.0	0.001
19.650	0.000	0.00	0.00	0.00	0.0	0.001
19.667	0.000	0.00	0.00	0.00	0.0	0.001
19.683	0.000	0.00	0.00	0.00	0.0	0.001
19.700	0.000	0.00	0.00	0.00	0.0	0.000

```
--------------------------------------------------------------------------------
  PROCESS SUMMARY OF STORAGE:
    INFLOW  VOLUME =      2.495 AF
    BASIN  STORAGE =      0.000 AF (WITH      0.000 AF INITIALLY FILLED)
    OUTFLOW VOLUME =      2.495 AF
    LOSS    VOLUME =      0.000 AF


********************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     35.20 IS CODE =   7
--------------------------------------------------------------------------------
  >>>>>STREAM NUMBER 1 ADDED TO STREAM NUMBER 2<<<<<
================================================================================


********************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  11
--------------------------------------------------------------------------------
  >>>>>VIEW STREAM NUMBER 2 HYDROGRAPH<<<<<
================================================================================

           STREAM HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
       (Notes: Time indicated is at END of Each Unit Intervals.
               Peak 5-minute rainfall intensity is modeled as
               a constant value for entire 5-minute period.)
--------------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       50.0     100.0     150.0     200.0
--------------------------------------------------------------------------------
  14.000      9.9530     20.25  .   Q     .   V     .         .         .
  14.017      9.9811     20.40  .   Q     .   V     .         .         .
  14.033     10.0094     20.55  .   Q     .   V     .         .         .
  14.050     10.0379     20.70  .   Q     .   V     .         .         .
```

```
 14.067    10.0666    20.85  .  Q      .  V      .         .         .
 14.083    10.0956    21.00  .  Q      .  V      .         .         .
 14.100    10.1247    21.15  .  Q      .  V      .         .         .
 14.117    10.1541    21.31  .  Q      .  V      .         .         .
 14.133    10.1836    21.46  .  Q      .  V      .         .         .
 14.150    10.2134    21.61  .  Q      .  V      .         .         .
 14.167    10.2434    21.77  .  Q      .  V      .         .         .
 14.183    10.2736    21.92  .  Q      .  V      .         .         .
 14.200    10.3040    22.07  .  Q      .  V      .         .         .
 14.217    10.3346    22.23  .  Q      .   V     .         .         .
 14.233    10.3654    22.38  .  Q      .   V     .         .         .
 14.250    10.3965    22.53  .  Q      .   V     .         .         .
 14.267    10.4277    22.69  .  Q      .   V     .         .         .
 14.283    10.4592    22.84  .  Q      .   V     .         .         .
 14.300    10.4908    22.99  .  Q      .   V     .         .         .
 14.317    10.5227    23.11  .  Q      .   V     .         .         .
 14.333    10.5546    23.20  .  Q      .   V     .         .         .
 14.350    10.5867    23.28  .  Q      .   V     .         .         .
 14.367    10.6189    23.37  .  Q      .   V     .         .         .
 14.383    10.6512    23.45  .  Q      .   V     .         .         .
 14.400    10.6836    23.54  .  Q      .   V     .         .         .
 14.417    10.7161    23.62  .  Q      .   V     .         .         .
 14.433    10.7488    23.71  .  Q      .   V     .         .         .
 14.450    10.7816    23.79  .  Q      .   V     .         .         .
 14.467    10.8144    23.88  .  Q      .   V     .         .         .
 14.483    10.8475    23.96  .  Q      .   V     .         .         .
 14.500    10.8806    24.05  .  Q      .   V     .         .         .
 14.517    10.9138    24.13  .  Q      .   V     .         .         .
 14.533    10.9472    24.21  .  Q      .   V     .         .         .
 14.550    10.9806    24.30  .  Q      .   V     .         .         .
 14.567    11.0142    24.39  .  Q      .    V    .         .         .
 14.583    11.0479    24.47  .  Q      .    V    .         .         .
 14.600    11.0818    24.56  .  Q      .    V    .         .         .
 14.617    11.1157    24.65  .  Q      .    V    .         .         .
 14.633    11.1498    24.74  .  Q      .    V    .         .         .
 14.650    11.1840    24.84  .  Q      .    V    .         .         .
 14.667    11.2185    25.05  .   Q     .    V    .         .         .
 14.683    11.2533    25.27  .   Q     .    V    .         .         .
 14.700    11.2884    25.48  .   Q     .    V    .         .         .
 14.717    11.3238    25.70  .   Q     .    V    .         .         .
 14.733    11.3595    25.92  .   Q     .    V    .         .         .
 14.750    11.3955    26.13  .   Q     .    V    .         .         .
 14.767    11.4318    26.35  .   Q     .    V    .         .         .
 14.783    11.4684    26.57  .   Q     .    V    .         .         .
 14.800    11.5053    26.78  .   Q     .    V    .         .         .
 14.817    11.5425    27.00  .   Q     .    V    .         .         .
 14.833    11.5800    27.21  .   Q     .    V    .         .         .
 14.850    11.6178    27.43  .   Q     .    V    .         .         .
 14.867    11.6558    27.64  .   Q     .    V    .         .         .
 14.883    11.6942    27.86  .   Q     .     V   .         .         .
 14.900    11.7329    28.08  .   Q     .     V   .         .         .
 14.917    11.7718    28.29  .   Q     .     V   .         .         .
 14.933    11.8111    28.51  .   Q     .     V   .         .         .
 14.950    11.8507    28.72  .   Q     .     V   .         .         .
 14.967    11.8905    28.94  .   Q     .     V   .         .         .
 14.983    11.9307    29.15  .   Q     .     V   .         .         .
 15.000    11.9711    29.33  .  Q     .     V  .         .         .
 15.017    12.0117    29.49  .  Q     .     V  .         .         .
 15.033    12.0525    29.65  .  Q     .     V  .         .         .
 15.050    12.0936    29.82  .  Q     .     V  .         .         .
 15.067    12.1349    29.98  .  Q     .     V  .         .         .
 15.083    12.1764    30.15  .   Q    .     V  .         .         .
 15.100    12.2182    30.31  .   Q    .     V  .         .         .
 15.117    12.2602    30.48  .   Q    .     V  .         .         .
 15.133    12.3024    30.64  .   Q    .     V  .         .         .
 15.150    12.3448    30.81  .   Q    .     V  .         .         .
 15.167    12.3875    30.97  .   Q    .      V .         .         .
 15.183    12.4304    31.14  .   Q    .      V .         .         .
 15.200    12.4735    31.30  .   Q    .      V .         .         .
 15.217    12.5168    31.47  .   Q    .      V .         .         .
 15.233    12.5604    31.63  .   Q    .      V .         .         .
 15.250    12.6042    31.80  .   Q    .      V .         .         .
 15.267    12.6482    31.96  .   Q    .      V .         .         .
 15.283    12.6925    32.13  .   Q    .      V .         .         .
 15.300    12.7369    32.29  .   Q    .      V .         .         .
 15.317    12.7816    32.45  .   Q    .      V .         .         .
 15.333    12.8267    32.71  .   Q    .      V .         .         .
 15.350    12.8724    33.17  .   Q    .      V .         .         .
 15.367    12.9187    33.64  .   Q    .      V .         .         .
 15.383    12.9657    34.11  .   Q    .      V .         .         .
 15.400    13.0133    34.58  .   Q    .      V .         .         .
 15.417    13.0616    35.04  .    Q   .       V.         .         .
 15.433    13.1105    35.51  .    Q   .       V.         .         .
 15.450    13.1601    35.98  .    Q   .       V.         .         .
 15.467    13.2103    36.45  .    Q   .       V.         .         .
 15.483    13.2611    36.91  .    Q   .       V.         .         .
 15.500    13.3126    37.38  .    Q   .       V.         .         .
 15.517    13.3647    37.85  .    Q   .       V.         .         .
 15.533    13.4175    38.34  .    Q   .       V.         .         .
 15.550    13.4710    38.83  .    Q   .       V.         .         .
 15.567    13.5252    39.33  .    Q   .       V.         .         .
 15.583    13.5801    39.82  .    Q   .       V.         .         .
 15.600    13.6356    40.32  .     Q .       V.         .         .
 15.617    13.6918    40.81  .     Q .       V.         .         .
 15.633    13.7487    41.31  .     Q .        V         .         .
 15.650    13.8063    41.80  .     Q .        V         .         .
 15.667    13.8646    42.35  .     Q .        V         .         .
 15.683    13.9243    43.33  .     Q .        V         .         .
 15.700    13.9855    44.41  .     Q .        V         .         .
 15.717    14.0482    45.50  .      Q.        V         .         .
 15.733    14.1123    46.59  .      Q.        V         .         .
 15.750    14.1780    47.68  .      Q.        V         .         .
 15.767    14.2452    48.78  .      Q.        V         .         .
 15.783    14.3139    49.91  .      Q.        V         .         .
 15.800    14.3843    51.05  .       Q        V         .         .
 15.817    14.4561    52.19  .       Q        .V        .         .
 15.833    14.5296    53.32  .       Q        .V        .         .
 15.850    14.6046    54.46  .       Q        .V        .         .
 15.867    14.6812    55.60  .       .Q       .V        .         .
 15.883    14.7593    56.74  .       .Q       .V        .         .
 15.900    14.8391    57.87  .       .Q       .V        .         .
 15.917    14.9203    59.01  .       .Q       .V        .         .
```

15.933	15.0032	60.15	. . Q .V . .
15.950	15.0876	61.29	. . Q .V . .
15.967	15.1736	62.43	. . Q . V . .
15.983	15.2611	63.56	. . Q . V . .
16.000	15.3503	64.70	. . Q . V . .
16.017	15.4460	69.49	. . Q . V . .
16.033	15.5533	77.94	. . Q . V . .
16.050	15.6723	86.39	. . Q . V . .
16.067	15.8030	94.84	. . Q . V . .
16.083	15.9452	103.29	. . Q V . .
16.100	16.0907	105.59	. . .Q V . .
16.117	16.2369	106.16	. . .Q V . .
16.133	16.3839	106.73	. . .Q V . .
16.150	16.5317	107.30	. . .Q V . .
16.167	16.6803	107.87	. . .Q V . .
16.183	16.8297	108.44	. . .Q V . .
16.200	16.9798	109.01	. . .Q V . .
16.217	17.1308	109.58	. . .Q V . .
16.233	17.2823	110.00	. . . Q V . .
16.250	17.4338	110.00	. . . Q V . .
16.267	17.5853	110.00	. . . Q V . .
16.283	17.7361	109.48	. . .Q V . .
16.300	17.8860	108.80	. . .Q V . .
16.317	18.0349	108.12	. . .Q V . .
16.333	18.1829	107.43	. . .Q V . .
16.350	18.3299	106.75	. . .Q V . .
16.367	18.4760	106.07	. . .Q V . .
16.383	18.6211	105.38	. . .Q V . .
16.400	18.7654	104.70	. . Q V . .
16.417	18.9086	104.02	. . Q V . .
16.433	19.0510	103.33	. . Q V . .
16.450	19.1924	102.65	. . Q V . .
16.467	19.3328	101.97	. . Q V . .
16.483	19.4723	101.28	. . Q V . .
16.500	19.6112	100.81	. . Q V . .
16.517	19.7500	100.79	. . Q V . .
16.533	19.8888	100.78	. . Q V . .
16.550	20.0276	100.77	. . Q V. .
16.567	20.1664	100.76	. . Q V. .
16.583	20.2990	96.27	. . Q. V. .
16.600	20.4191	87.19	. . Q . V. .
16.617	20.5267	78.11	. . Q . V. .
16.633	20.6218	69.02	. . Q . V .
16.650	20.7043	59.94	. .Q . V .
16.667	20.7744	50.86	. .Q . V .
16.683	20.8322	41.97	. Q . . V .
16.700	20.8855	38.71	. Q . . V .
16.717	20.9380	38.10	. Q . . V .
16.733	20.9896	37.49	. Q . . V .
16.750	21.0404	36.88	. Q . . V .
16.767	21.0904	36.27	. Q . . V .
16.783	21.1395	35.66	. Q . . V .
16.800	21.1878	35.05	. Q . . V .
16.817	21.2352	34.44	. Q . . V .
16.833	21.2818	33.83	. Q . . V .
16.850	21.3276	33.22	. Q . . .V .

16.867	21.3725	32.61	. Q . . .V .
16.883	21.4166	32.00	. Q . . .V .
16.900	21.4598	31.39	. Q . . .V .
16.917	21.5022	30.78	. Q . . .V .
16.933	21.5438	30.17	. Q . . .V .
16.950	21.5845	29.56	. Q . . .V .
16.967	21.6244	28.95	. Q . . .V .
16.983	21.6634	28.34	. Q . . .V .
17.000	21.7017	27.74	. Q . . .V .
17.017	21.7390	27.13	. Q . . .V .
17.033	21.7757	26.63	. Q . . .V .
17.050	21.8120	26.35	. Q . . .V .
17.067	21.8479	26.07	. Q . . .V .
17.083	21.8834	25.79	. Q . . .V .
17.100	21.9186	25.51	. Q . . .V .
17.117	21.9533	25.24	. Q . . .V .
17.133	21.9877	24.96	. Q . . . V .
17.150	22.0217	24.68	. Q . . . V .
17.167	22.0553	24.40	. Q . . . V .
17.183	22.0885	24.12	. Q . . . V .
17.200	22.1214	23.85	. Q . . . V .
17.217	22.1539	23.57	. Q . . . V .
17.233	22.1859	23.29	. Q . . . V .
17.250	22.2176	23.01	. Q . . . V .
17.267	22.2490	22.74	. Q . . . V .
17.283	22.2799	22.46	. Q . . . V .
17.300	22.3104	22.19	. Q . . . V .
17.317	22.3406	21.91	. Q . . . V .
17.333	22.3704	21.63	. Q . . . V .
17.350	22.3998	21.36	. Q . . . V .
17.367	22.4289	21.09	. Q . . . V .
17.383	22.4577	20.93	. Q . . . V .
17.400	22.4863	20.78	. Q . . . V .
17.417	22.5148	20.64	. Q . . . V .
17.433	22.5430	20.49	. Q . . . V .
17.450	22.5710	20.35	. Q . . . V .
17.467	22.5988	20.20	. Q . . . V .
17.483	22.6265	20.06	. Q . . . V .
17.500	22.6539	19.92	. Q . . . V .
17.517	22.6812	19.77	. Q . . . V .
17.533	22.7082	19.63	. Q . . . V .
17.550	22.7350	19.49	. Q . . . V .
17.567	22.7617	19.34	. Q . . . V .
17.583	22.7881	19.20	. Q . . . V .
17.600	22.8144	19.06	. Q . . . V .
17.617	22.8404	18.91	. Q . . . V .
17.633	22.8663	18.77	. Q . . . V .
17.650	22.8919	18.63	. Q . . . V .
17.667	22.9174	18.48	. Q . . . V .
17.683	22.9427	18.34	. Q . . . V .
17.700	22.9677	18.20	. Q . . . V .
17.717	22.9926	18.08	. Q . . . V .
17.733	23.0174	17.98	. Q . . . V .
17.750	23.0420	17.88	. Q . . . V .
17.767	23.0665	17.78	. Q . . . V .
17.783	23.0909	17.68	. Q . . . V .

```
  17.800     23.1151     17.59  .  Q      .         .         .  V      .
  17.817     23.1392     17.49  .  Q      .         .         .  V      .
  17.833     23.1631     17.39  .  Q      .         .         .  V      .
  17.850     23.1870     17.29  .  Q      .         .         .  V      .
  17.867     23.2106     17.19  .  Q      .         .         .  V      .
  17.883     23.2342     17.09  .  Q      .         .         .  V      .
  17.900     23.2576     17.00  .  Q      .         .         .  V      .
  17.917     23.2809     16.90  .  Q      .         .         .  V      .
  17.933     23.3040     16.80  .  Q      .         .         .  V      .
  17.950     23.3270     16.70  .  Q      .         .         .  V      .
  17.967     23.3499     16.60  .  Q      .         .         .  V      .
  17.983     23.3726     16.50  .  Q      .         .         .   V     .
  18.000     23.3952     16.40  .  Q      .         .         .   V     .
--------------------------------------------------------------------------------
    TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
    (Note: 100% of Peak Flow Rate estimate assumed to have
    an instantaneous time duration)

    Percentile of Estimated                Duration
        Peak Flow Rate                     (minutes)
    ======================                 =========
               0%                           1081.0
              10%                           1081.0
              20%                            935.0
              30%                            455.0
              40%                            295.0
              50%                            240.0
              60%                            190.0
              70%                            180.0
              80%                            160.0
              90%                            150.0


********************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =   7
--------------------------------------------------------------------------------
  >>>>>STREAM NUMBER 2 ADDED TO STREAM NUMBER 3<<<<<
================================================================================


********************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  11
--------------------------------------------------------------------------------
  >>>>>VIEW STREAM NUMBER 3 HYDROGRAPH<<<<<
================================================================================

            STREAM HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
         (Notes: Time indicated is at END of Each Unit Intervals.
                 Peak 5-minute rainfall intensity is modeled as
                 a constant value for entire 5-minute period.)
--------------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)    Q(CFS) 0.       50.0     100.0     150.0     200.0
--------------------------------------------------------------------------------
  14.000      9.9530     20.25  .   Q     .  V      .         .         .
  14.017      9.9811     20.40  .   Q     .  V      .         .         .
  14.033     10.0094     20.55  .   Q     .  V      .         .         .
  14.050     10.0379     20.70  .   Q     .  V      .         .         .
  14.067     10.0666     20.85  .   Q     .  V      .         .         .
  14.083     10.0956     21.00  .   Q     .  V      .         .         .
  14.100     10.1247     21.15  .   Q     .  V      .         .         .
  14.117     10.1541     21.31  .   Q     .  V      .         .         .
  14.133     10.1836     21.46  .   Q     .  V      .         .         .
  14.150     10.2134     21.61  .   Q     .  V      .         .         .
  14.167     10.2434     21.77  .   Q     .  V      .         .         .
  14.183     10.2736     21.92  .   Q     .  V      .         .         .
  14.200     10.3040     22.07  .   Q     .  V      .         .         .
  14.217     10.3346     22.23  .   Q     .  V      .         .         .
  14.233     10.3654     22.38  .   Q     .  V      .         .         .
  14.250     10.3965     22.53  .   Q     .  V      .         .         .
  14.267     10.4277     22.69  .   Q     .  V      .         .         .
  14.283     10.4592     22.84  .   Q     .  V      .         .         .
  14.300     10.4908     22.99  .   Q     .  V      .         .         .
  14.317     10.5227     23.11  .   Q     .   V     .         .         .
  14.333     10.5546     23.20  .   Q     .   V     .         .         .
  14.350     10.5867     23.28  .   Q     .  V      .         .         .
  14.367     10.6189     23.37  .   Q     .  V      .         .         .
  14.383     10.6512     23.45  .   Q     .  V      .         .         .
  14.400     10.6836     23.54  .   Q     .  V      .         .         .
  14.417     10.7161     23.62  .   Q     .  V      .         .         .
  14.433     10.7488     23.71  .   Q     .  V      .         .         .
  14.450     10.7816     23.79  .   Q     .  V      .         .         .
  14.467     10.8144     23.88  .   Q     .  V      .         .         .
  14.483     10.8475     23.96  .   Q     .  V      .         .         .
  14.500     10.8806     24.05  .   Q     .  V      .         .         .
  14.517     10.9138     24.13  .   Q     .  V      .         .         .
  14.533     10.9472     24.21  .   Q     .  V      .         .         .
  14.550     10.9806     24.30  .   Q     .  V      .         .         .
  14.567     11.0142     24.39  .   Q     .  V      .         .         .
  14.583     11.0479     24.47  .   Q     .  V      .         .         .
  14.600     11.0818     24.56  .   Q     .  V      .         .         .
  14.617     11.1157     24.65  .   Q     .  V      .         .         .
  14.633     11.1498     24.74  .   Q     .  V      .         .         .
  14.650     11.1840     24.84  .   Q     .  V      .         .         .
  14.667     11.2185     25.05  .    Q    .  V      .         .         .
  14.683     11.2533     25.27  .    Q    .   V     .         .         .
  14.700     11.2884     25.48  .    Q    .  V      .         .         .
  14.717     11.3238     25.70  .    Q    .  V      .         .         .
  14.733     11.3595     25.92  .    Q    .  V      .         .         .
  14.750     11.3955     26.13  .    Q    .  V      .         .         .
  14.767     11.4318     26.35  .    Q    .  V      .         .         .
  14.783     11.4684     26.57  .    Q    .  V      .         .         .
  14.800     11.5053     26.78  .    Q    .  V      .         .         .
  14.817     11.5425     27.00  .    Q    .  V      .         .         .
  14.833     11.5800     27.21  .    Q    .  V      .         .         .
  14.850     11.6178     27.43  .    Q    .  V      .         .         .
  14.867     11.6558     27.64  .    Q    .  V      .         .         .
  14.883     11.6942     27.86  .    Q    .  V      .         .         .
  14.900     11.7329     28.08  .    Q    .  V      .         .         .
  14.917     11.7718     28.29  .    Q    .  V      .         .         .
  14.933     11.8111     28.51  .    Q    .  V      .         .         .
  14.950     11.8507     28.72  .    Q    .  V      .         .         .
  14.967     11.8905     28.94  .    Q    .  V      .         .         .
```

14.983	11.9307	29.15	. Q . V . . .
15.000	11.9711	29.33	. Q . V . . .
15.017	12.0117	29.49	. Q . V . . .
15.033	12.0525	29.65	. Q . V . . .
15.050	12.0936	29.82	. Q . V . . .
15.067	12.1349	29.98	. Q . V . . .
15.083	12.1764	30.15	. Q . V . . .
15.100	12.2182	30.31	. Q . V . . .
15.117	12.2602	30.48	. Q . V . . .
15.133	12.3024	30.64	. Q . V . . .
15.150	12.3448	30.81	. Q . V . . .
15.167	12.3875	30.97	. Q . V . . .
15.183	12.4304	31.14	. Q . V . . .
15.200	12.4735	31.30	. Q . V . . .
15.217	12.5168	31.47	. Q . V . . .
15.233	12.5604	31.63	. Q . V . . .
15.250	12.6042	31.80	. Q . V . . .
15.267	12.6482	31.96	. Q . V . . .
15.283	12.6925	32.13	. Q . V . . .
15.300	12.7369	32.29	. Q . V . . .
15.317	12.7816	32.45	. Q . V . . .
15.333	12.8267	32.71	. Q . V . . .
15.350	12.8724	33.17	. Q . V . . .
15.367	12.9187	33.64	. Q . V . . .
15.383	12.9657	34.11	. Q . V . . .
15.400	13.0133	34.58	. Q . V . . .
15.417	13.0616	35.04	. Q . V . . .
15.433	13.1105	35.51	. Q . V . . .
15.450	13.1601	35.98	. Q . V . . .
15.467	13.2103	36.45	. Q . V . . .
15.483	13.2611	36.91	. Q . V . . .
15.500	13.3126	37.38	. Q . V . . .
15.517	13.3647	37.85	. Q . V . . .
15.533	13.4175	38.34	. Q . V . . .
15.550	13.4710	38.83	. Q . V . . .
15.567	13.5252	39.33	. Q . V . . .
15.583	13.5801	39.82	. Q . V . . .
15.600	13.6356	40.32	. Q . V . . .
15.617	13.6918	40.81	. Q . V . . .
15.633	13.7487	41.31	. Q . V . . .
15.650	13.8063	41.80	. Q . V . . .
15.667	13.8646	42.35	. Q . V . . .
15.683	13.9243	43.33	. Q . V . . .
15.700	13.9855	44.41	. Q . V . . .
15.717	14.0482	45.50	. Q. V . . .
15.733	14.1123	46.59	. Q. V . . .
15.750	14.1780	47.68	. Q. V . . .
15.767	14.2452	48.78	. Q. V. . .
15.783	14.3139	49.91	. Q. V. . .
15.800	14.3843	51.05	. Q V. . .
15.817	14.4561	52.19	. Q V. . .
15.833	14.5296	53.32	. Q V. . .
15.850	14.6046	54.46	. Q V. . .
15.867	14.6812	55.60	. .Q V. . .
15.883	14.7593	56.74	. .Q V. . .
15.900	14.8391	57.87	. .Q V. . .
15.917	14.9203	59.01	. .Q V. . .
15.933	15.0032	60.15	. . Q V . .
15.950	15.0876	61.29	. . Q V . .
15.967	15.1736	62.43	. . Q V . .
15.983	15.2611	63.56	. . Q V . .
16.000	15.3503	64.70	. . Q V . .
16.017	15.4460	69.49	. . Q V . .
16.033	15.5533	77.94	. . Q V . .
16.050	15.6723	86.39	. . Q V . .
16.067	15.8030	94.84	. . Q .V . .
16.083	15.9452	103.29	. . QV . .
16.100	16.0908	105.71	. . .Q . .
16.117	16.2378	106.68	. . .Q . .
16.133	16.3865	107.95	. . .Q . .
16.150	16.5373	109.51	. . .QV . .
16.167	16.6907	111.35	. . . Q . .
16.183	16.8470	113.45	. . . Q . .
16.200	17.0065	115.80	. . . VQ . .
16.217	17.1695	118.40	. . . VQ . .
16.233	17.3363	121.08	. . . VQ . .
16.250	17.5066	123.59	. . . VQ . .
16.267	17.6817	127.16	. . . V Q . .
16.283	17.8626	131.33	. . . V Q . .
16.300	18.0494	135.62	. . . V Q . .
16.317	18.2424	140.11	. . . V Q . .
16.333	18.4418	144.78	. . . V Q . .
16.350	18.6463	148.43	. . . V Q. .
16.367	18.8539	150.72	. . . V Q .
16.383	19.0639	152.51	. . . V Q .
16.400	19.2759	153.86	. . . V Q .
16.417	19.4891	154.78	. . . V Q .
16.433	19.7030	155.29	. . . V .Q .
16.450	19.9170	155.41	. . . V .Q .
16.467	20.1307	155.14	. . . V .Q .
16.483	20.3435	154.51	. . . V Q .
16.500	20.5553	153.74	. . . V Q .
16.517	20.7661	153.07	. . . V Q .
16.533	20.9756	152.10	. . . V Q .
16.550	21.1834	150.82	. . . V Q .
16.567	21.3889	149.23	. . . VQ. .
16.583	21.5858	142.96	. . . Q . .
16.600	21.7678	132.08	. . . Q V. .
16.617	21.9348	121.26	. . . Q V. .
16.633	22.0870	110.52	. . . Q V. .
16.650	22.2240	99.47	. . Q. V. .
16.667	22.3452	87.96	. . Q . V. .
16.683	22.4507	76.60	. . Q . V. .
16.700	22.5486	71.05	. . Q . V .
16.717	22.6426	68.29	. . Q . V .
16.733	22.7331	65.67	. . Q . V .
16.750	22.8201	63.19	. . Q . V .
16.767	22.9039	60.83	. . Q . V .
16.783	22.9846	58.58	. .Q . V .
16.800	23.0624	56.45	. .Q . V .
16.817	23.1373	54.42	. Q . V .
16.833	23.2096	52.48	. Q . V .

```
16.850    23.2793    50.63  .         Q         .         .V        .
16.867    23.3466    48.86  .        Q.         .         .V        .
16.883    23.4118    47.28  .        Q.         .         .V        .
16.900    23.4751    45.95  .        Q.         .         .V        .
16.917    23.5367    44.75  .       Q .         .         .V        .
16.933    23.5967    43.58  .       Q .         .         .V        .
16.950    23.6552    42.44  .       Q .         .         .V        .
16.967    23.7121    41.31  .       Q .         .         .V        .
16.983    23.7675    40.20  .       Q .         .         .V        .
17.000    23.8213    39.12  .      Q  .         .         .V        .
17.017    23.8738    38.06  .      Q  .         .         .V        .
17.033    23.9249    37.12  .      Q  .         .         .V        .
17.050    23.9751    36.42  .      Q  .         .         .V        .
17.067    24.0243    35.73  .      Q  .         .         . V       .
17.083    24.0726    35.07  .      Q  .         .         . V       .
17.100    24.1200    34.42  .     Q   .         .         . V       .
17.117    24.1665    33.78  .     Q   .         .         . V       .
17.133    24.2122    33.16  .     Q   .         .         . V       .
17.150    24.2570    32.55  .     Q   .         .         . V       .
17.167    24.3011    31.96  .     Q   .         .         . V       .
17.183    24.3443    31.38  .     Q   .         .         . V       .
17.200    24.3867    30.81  .     Q   .         .         . V       .
17.217    24.4284    30.25  .     Q   .         .         . V       .
17.233    24.4693    29.71  .    Q    .         .         . V       .
17.250    24.5095    29.17  .    Q    .         .         . V       .
17.267    24.5490    28.65  .    Q    .         .         . V       .
17.283    24.5877    28.14  .    Q    .         .         . V       .
17.300    24.6258    27.63  .    Q    .         .         . V       .
17.317    24.6632    27.14  .    Q    .         .         . V       .
17.333    24.6999    26.65  .    Q    .         .         . V       .
17.350    24.7359    26.17  .    Q    .         .         .  V      .
17.367    24.7713    25.72  .    Q    .         .         .  V      .
17.383    24.8063    25.36  .    Q    .         .         .  V      .
17.400    24.8408    25.04  .    Q    .         .         .  V      .
17.417    24.8748    24.73  .   Q     .         .         .  V      .
17.433    24.9085    24.42  .   Q     .         .         .  V      .
17.450    24.9417    24.12  .   Q     .         .         .  V      .
17.467    24.9745    23.82  .   Q     .         .         .  V      .
17.483    25.0069    23.53  .   Q     .         .         .  V      .
17.500    25.0389    23.25  .   Q     .         .         .  V      .
17.517    25.0706    22.97  .   Q     .         .         .  V      .
17.533    25.1018    22.70  .   Q     .         .         .  V      .
17.550    25.1327    22.43  .   Q     .         .         .  V      .
17.567    25.1633    22.17  .   Q     .         .         .  V      .
17.583    25.1935    21.92  .   Q     .         .         .  V      .
17.600    25.2233    21.66  .   Q     .         .         .  V      .
17.617    25.2528    21.42  .   Q     .         .         .  V      .
17.633    25.2820    21.17  .   Q     .         .         .  V      .
17.650    25.3108    20.93  .   Q     .         .         .  V      .
17.667    25.3393    20.70  .   Q     .         .         .  V      .
17.683    25.3675    20.47  .   Q     .         .         .  V      .
17.700    25.3954    20.24  .   Q     .         .         .  V      .
17.717    25.4230    20.04  .   Q     .         .         .  V      .
17.733    25.4503    19.86  .  Q      .         .         .  V      .
17.750    25.4774    19.68  .  Q      .         .         .  V      .
17.767    25.5043    19.51  .  Q      .         .         .   V     .
17.783    25.5310    19.35  .  Q      .         .         .   V     .
17.800    25.5574    19.18  .  Q      .         .         .   V     .
17.817    25.5836    19.02  .  Q      .         .         .   V     .
17.833    25.6096    18.86  .  Q      .         .         .   V     .
17.850    25.6353    18.70  .  Q      .         .         .   V     .
17.867    25.6609    18.55  .  Q      .         .         .   V     .
17.883    25.6862    18.39  .  Q      .         .         .   V     .
17.900    25.7113    18.24  .  Q      .         .         .   V     .
17.917    25.7363    18.09  .  Q      .         .         .   V     .
17.933    25.7610    17.95  .  Q      .         .         .   V     .
17.950    25.7855    17.80  .  Q      .         .         .   V     .
17.967    25.8098    17.66  .  Q      .         .         .   V     .
17.983    25.8340    17.52  .  Q      .         .         .   V     .
18.000    25.8579    17.38  .  Q      .         .         .   V     .
```

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	1081.0
20%	605.0
30%	345.0
40%	240.0
50%	195.0
60%	180.0
70%	150.0
80%	105.0
90%	85.0

END OF FLOODSCx ROUTING ANALYSIS

```
************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
         (c) Copyright 1989-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                         Analysis prepared by:

                         HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                  *
* 25-YEAR STORM PROP. CONDITION FLOWBY AT NODES 56.3 & 35.2              *
* W.O. #1443-136X                                                        *
 ************************************************************************

  FILE NAME: 18142-25.DAT
  TIME/DATE OF STUDY: 18:22 10/16/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE = 1.2
------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =  265.74
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.068
    LOW LOSS FRACTION = 0.220
    TIME OF CONCENTRATION(MIN.) = 18.15
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =  25
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.87
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.15
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.94
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  2.71
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  4.49

------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =    73.83
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =    25.60

------------------------------------------------------------------------

========================================================================

                      2 4 - H O U R    S T O R M
                   R U N O F F    H Y D R O G R A P H

========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.      134.2     268.5     402.7     536.9
------------------------------------------------------------------------
  14.000     25.1582     54.84  .   Q     .  V      .         .         .
  14.017     25.2339     54.98  .   Q     .  V      .         .         .
  14.033     25.3098     55.12  .   Q     .  V      .         .         .
  14.050     25.3860     55.27  .   Q     .  V      .         .         .
  14.067     25.4623     55.41  .   Q     .  V      .         .         .
  14.083     25.5388     55.55  .   Q     .  V      .         .         .
  14.100     25.6155     55.70  .   Q     .  V      .         .         .
  14.117     25.6924     55.84  .   Q     .  V      .         .         .
  14.133     25.7695     55.98  .   Q     .  V      .         .         .
  14.150     25.8468     56.13  .   Q     .   V     .         .         .
  14.167     25.9244     56.27  .   Q     .   V     .         .         .
  14.183     26.0021     56.41  .   Q     .   V     .         .         .
  14.200     26.0801     56.65  .   Q     .   V     .         .         .
  14.217     26.1587     57.04  .   Q     .   V     .         .         .
  14.233     26.2378     57.43  .   Q     .   V     .         .         .
  14.250     26.3174     57.82  .   Q     .   V     .         .         .
  14.267     26.3976     58.21  .   Q     .   V     .         .         .
  14.283     26.4783     58.61  .   Q     .   V     .         .         .
  14.300     26.5596     59.00  .   Q     .   V     .         .         .
  14.317     26.6414     59.39  .   Q     .   V     .         .         .
  14.333     26.7237     59.78  .   Q     .   V     .         .         .
  14.350     26.8066     60.17  .   Q     .   V     .         .         .
  14.367     26.8900     60.56  .   Q     .   V     .         .         .
  14.383     26.9740     60.95  .   Q     .   V     .         .         .
  14.400     27.0585     61.34  .   Q     .   V     .         .         .
  14.417     27.1435     61.73  .   Q     .   V     .         .         .
  14.433     27.2291     62.12  .   Q     .   V     .         .         .
  14.450     27.3152     62.51  .   Q     .   V     .         .         .
  14.467     27.4018     62.90  .   Q     .   V     .         .         .
  14.483     27.4890     63.29  .   Q     .   V     .         .         .
  14.500     27.5767     63.66  .   Q     .   V     .         .         .
  14.517     27.6648     63.96  .   Q     .   V     .         .         .
  14.533     27.7533     64.26  .   Q     .    V    .         .         .
  14.550     27.8422     64.56  .   Q     .    V    .         .         .
  14.567     27.9315     64.86  .   Q     .    V    .         .         .
  14.583     28.0213     65.16  .   Q     .    V    .         .         .
  14.600     28.1115     65.46  .   Q     .    V    .         .         .
```

Onsite Flood Routing Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1

with Flowby Detention @ Node 56.3 (100cfs) & Node 35.2 (10cfs), User input for total flowby @ Rational Node 35

25-Year Storm Proposed Condition

14.617	28.2020	65.75	. Q . V . . .
14.633	28.2930	66.05	. Q . V . . .
14.650	28.3844	66.35	. Q . V . . .
14.667	28.4762	66.65	. Q . V . . .
14.683	28.5684	66.95	. Q . V . . .
14.700	28.6611	67.25	. Q . V . . .
14.717	28.7541	67.55	. Q . V . . .
14.733	28.8476	67.85	. Q . V . . .
14.750	28.9414	68.15	. Q . V . . .
14.767	29.0357	68.44	. Q . V . . .
14.783	29.1304	68.74	. Q . V . . .
14.800	29.2256	69.14	. Q . V . . .
14.817	29.3219	69.92	. Q . V . . .
14.833	29.4194	70.76	. Q . V . . .
14.850	29.5180	71.59	. Q . V . . .
14.867	29.6177	72.42	. Q . V . . .
14.883	29.7186	73.25	. Q . V . . .
14.900	29.8207	74.08	. Q . V . . .
14.917	29.9239	74.92	. Q . V . . .
14.933	30.0282	75.75	. Q . V . . .
14.950	30.1337	76.58	. Q . V . . .
14.967	30.2403	77.41	. Q . V . . .
14.983	30.3481	78.24	. Q . V . . .
15.000	30.4570	79.08	. Q . V . . .
15.017	30.5671	79.91	. Q . V . . .
15.033	30.6783	80.74	. Q . V . . .
15.050	30.7907	81.57	. Q . V . . .
15.067	30.9042	82.41	. Q . V . . .
15.083	31.0188	83.24	. Q . V . . .
15.100	31.1346	84.05	. Q . V . . .
15.117	31.2513	84.70	. Q . V . . .
15.133	31.3688	85.31	. Q . V . . .
15.150	31.4871	85.93	. Q . V . . .
15.167	31.6063	86.55	. Q . V . . .
15.183	31.7264	87.16	. Q . V . . .
15.200	31.8473	87.78	. Q . V . . .
15.217	31.9691	88.40	. Q . V . . .
15.233	32.0917	89.01	. Q . V . . .
15.250	32.2151	89.63	. Q . V . . .
15.267	32.3395	90.25	. Q . V . . .
15.283	32.4646	90.86	. Q . V . . .
15.300	32.5906	91.48	. Q . V . . .
15.317	32.7175	92.10	. Q . V . . .
15.333	32.8452	92.71	. Q . V . . .
15.350	32.9737	93.33	. Q . V . . .
15.367	33.1031	93.95	. Q . V . . .
15.383	33.2334	94.56	. Q . V . . .
15.400	33.3645	95.20	. Q . V . . .
15.417	33.4970	96.19	. Q . V . . .
15.433	33.6311	97.30	. Q . V . . .
15.450	33.7666	98.41	. Q . V . . .
15.467	33.9037	99.51	. Q . V . . .
15.483	34.0423	100.62	. Q . V . . .
15.500	34.1824	101.73	. Q . V . . .
15.517	34.3241	102.84	. Q . V . . .
15.533	34.4672	103.95	. Q . V . . .
15.550	34.6119	105.06	. Q . V . . .
15.567	34.7582	106.17	. Q . V . . .
15.583	34.9059	107.27	. Q . V . . .
15.600	35.0552	108.38	. Q . V . . .
15.617	35.2060	109.49	. Q . V. . .
15.633	35.3584	110.60	. Q . V. . .
15.650	35.5122	111.71	. Q . V. . .
15.667	35.6676	112.82	. Q . V. . .
15.683	35.8246	113.92	. Q . V. . .
15.700	35.9830	115.06	. Q . V. . .
15.717	36.1449	117.49	. Q . V. . .
15.733	36.3111	120.68	. Q . V. . .
15.750	36.4817	123.87	. Q. V. . .
15.767	36.6567	127.06	. Q. V. . .
15.783	36.8361	130.25	. Q. V. . .
15.800	37.0199	133.44	. Q. V . .
15.817	37.2081	136.63	. Q V . .
15.833	37.4007	139.82	. Q V . .
15.850	37.5977	143.00	. Q V . .
15.867	37.7990	146.19	. Q V . .
15.883	38.0048	149.38	. .Q V . .
15.900	38.2150	152.57	. .Q V . .
15.917	38.4295	155.76	. .Q V . .
15.933	38.6484	158.95	. .Q V . .
15.950	38.8718	162.14	. . Q .V . .
15.967	39.0995	165.33	. . Q .V . .
15.983	39.3316	168.52	. . Q .V . .
16.000	39.5681	171.71	. . Q .V . .
16.017	39.8206	183.32	. . Q .V . .
16.033	40.1007	203.36	. . Q .V . .
16.050	40.4085	223.39	. . Q .V . .
16.067	40.7438	243.43	. . Q . V . .
16.083	41.1067	263.47	. . Q. V . .
16.100	41.4972	283.50	. . .QV . .
16.117	41.9153	303.54	. . . Q . .
16.133	42.3610	323.58	. . . V Q . .
16.150	42.8343	343.61	. . . V Q . .
16.167	43.3352	363.65	. . . V Q . .
16.183	43.8637	383.69	. . . V Q . .
16.200	44.4197	403.72	. . . V Q .
16.217	45.0034	423.76	. . . V .Q .
16.233	45.6147	443.80	. . . V . Q .
16.250	46.2536	463.83	. . . V . Q .
16.267	46.9201	483.87	. . . V . Q .
16.283	47.6142	503.91	. . . V . Q .
16.300	48.3359	523.94	. . . V . Q.
16.317	49.0754	536.93	. . . V . Q
16.333	49.7707	504.74	. . . V . Q .
16.350	50.4331	480.94	. . . V . Q .
16.367	51.0628	457.14	. . . V . Q .
16.383	51.6597	433.33	. . . V . Q .
16.400	52.2238	409.53	. . . V Q .
16.417	52.7551	385.73	. . . Q .
16.433	53.2536	361.92	. . . Q V .
16.450	53.7193	338.12	. . . Q V. .
16.467	54.1522	314.31	. . . Q V. .

16.483	54.5524	290.51	. . .Q V. .
16.500	54.9198	266.70	. . Q. V. .
16.517	55.2543	242.90	. . Q . V. .
16.533	55.5561	219.10	. . Q . V .
16.550	55.8251	195.29	. . Q . V .
16.567	56.0613	171.49	. . Q . V .
16.583	56.2647	147.68	. .Q . V .
16.600	56.4354	123.88	. Q. . V .
16.617	56.5808	105.57	. Q . . V .
16.633	56.7226	102.99	. Q . . V .
16.650	56.8623	101.38	. Q . . V .
16.667	56.9997	99.77	. Q . . V .
16.683	57.1349	98.15	. Q . . V .
16.700	57.2679	96.54	. Q . . .V .
16.717	57.3986	94.93	. Q . . .V .
16.733	57.5272	93.32	. Q . . .V .
16.750	57.6535	91.71	. Q . . .V .
16.767	57.7776	90.09	. Q . . .V .
16.783	57.8995	88.48	. Q . . .V .
16.800	58.0191	86.87	. Q . . .V .
16.817	58.1366	85.26	. Q . . .V .
16.833	58.2518	83.64	. Q . . .V .
16.850	58.3648	82.03	. Q . . .V .
16.867	58.4755	80.42	. Q . . .V .
16.883	58.5841	78.81	. Q . . .V .
16.900	58.6904	77.20	. Q . . .V .
16.917	58.7947	75.69	. Q . . .V .
16.933	58.8976	74.71	. Q . . .V .
16.950	58.9992	73.80	. Q . . .V .
16.967	59.0996	72.89	. Q . . . V .
16.983	59.1988	71.98	. Q . . . V .
17.000	59.2967	71.07	. Q . . . V .
17.017	59.3933	70.16	. Q . . . V .
17.033	59.4887	69.25	. Q . . . V .
17.050	59.5828	68.34	. Q . . . V .
17.067	59.6757	67.42	. Q . . . V .
17.083	59.7673	66.51	. Q . . . V .
17.100	59.8577	65.60	. Q . . . V .
17.117	59.9468	64.69	. Q . . . V .
17.133	60.0346	63.78	. Q . . . V .
17.150	60.1212	62.87	. Q . . . V .
17.167	60.2066	61.96	. Q . . . V .
17.183	60.2906	61.05	. Q . . . V .
17.200	60.3735	60.14	. Q . . . V .
17.217	60.4551	59.27	. Q . . . V .
17.233	60.5360	58.77	. Q . . . V .
17.250	60.6164	58.35	. Q . . . V .
17.267	60.6962	57.94	. Q . . . V .
17.283	60.7755	57.52	. Q . . . V .
17.300	60.8541	57.11	. Q . . . V .
17.317	60.9322	56.69	. Q . . . . V .
17.333	61.0097	56.28	. Q . . . . V .
17.350	61.0867	55.86	. Q . . . . V .
17.367	61.1630	55.45	. Q . . . . V .
17.383	61.2389	55.03	. Q . . . . V .
17.400	61.3141	54.62	. Q . . . . V .
17.417	61.3888	54.21	. Q . . . . V .
17.433	61.4628	53.79	. Q . . . . V .
17.450	61.5364	53.38	. Q . . . . V .
17.467	61.6093	52.96	. Q . . . . V .
17.483	61.6817	52.55	. Q . . . . V .
17.500	61.7535	52.13	. Q . . . . V .
17.517	61.8247	51.72	. Q . . . . V .
17.533	61.8955	51.39	. Q . . . . V .
17.550	61.9659	51.09	. Q . . . . V .
17.567	62.0359	50.79	. Q . . . . V .
17.583	62.1054	50.49	. Q . . . . V .
17.600	62.1745	50.19	. Q . . . . V .
17.617	62.2433	49.89	. Q . . . . V .
17.633	62.3116	49.59	. Q . . . . V .
17.650	62.3795	49.29	. Q . . . . V .
17.667	62.4469	48.99	. Q . . . . V .
17.683	62.5140	48.69	. Q . . . . V .
17.700	62.5807	48.39	. Q . . . . V .
17.717	62.6469	48.09	. Q . . . . V .
17.733	62.7127	47.79	. Q . . . . V .
17.750	62.7782	47.49	. Q . . . . . V .
17.767	62.8432	47.19	. Q . . . . . V .
17.783	62.9077	46.89	. Q . . . . . V .
17.800	62.9719	46.59	. Q . . . . . V .
17.817	63.0357	46.29	. Q . . . . . V .
17.833	63.0991	46.04	. Q . . . . . V .
17.850	63.1622	45.82	. Q . . . . . V .
17.867	63.2250	45.59	. Q . . . . . V .
17.883	63.2875	45.37	. Q . . . . . V .
17.900	63.3497	45.15	. Q . . . . . V .
17.917	63.4116	44.92	. Q . . . . . V .
17.933	63.4731	44.70	. Q . . . . . V .
17.950	63.5344	44.48	. Q . . . . . V .
17.967	63.5954	44.26	. Q . . . . . V .
17.983	63.6560	44.03	. Q . . . . . V .
18.000	63.7164	43.81	. Q . . . . . V .

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	1070.0
20%	305.0
30%	190.0
40%	150.0
50%	120.0
60%	100.0
70%	75.0
80%	50.0
90%	25.0

```
****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     35.10 IS CODE =   2
----------------------------------------------------------------------------
  >>>>>FLOWBY STRUCTURE ROUTING MODEL APPLIED TO STREAM #1<<<<<
============================================================================

        MODEL STREAM NUMBER 1 FLOWING PAST A FLOWBY STRUCTURE:
        FLOWRATES IN STREAM # 1 WHICH ARE GREATER THAN
           100.0 CFS ARE ASSUMED TO BE EXCESS FLOWS.
        FLOW EXCESS IS ASSUMED TO BE ADDED TO STREAM NUMBER 3


              INFLOW              INFLOW
             (STREAM 3)          (STREAM 1)
                 |                   |
                 |                   |
                 |    flow excess    |
                 |<------------------* <=flowby structure
                 |                   | (maximum flowby Q =    100.0 cfs)
                 |                   |
                 |                   |
                 |                   |
                 V                   V
               STREAM 3            STREAM 1
           + FLOW EXCESS            FLOWBY



        FLOWBY BASIN MODELING RESULTS:

         MODEL        INFLOW    INFLOW   OUTFLOW    FLOWBY
          TIME    (STREAM 3) (STREAM 1) (STREAM 3) (STREAM 1)
         (HRS)         (CFS)     (CFS)     (CFS)     (CFS)
        14.000         0.00     54.84      0.00     54.84
        14.017         0.00     54.98      0.00     54.98
        14.033         0.00     55.12      0.00     55.12
        14.050         0.00     55.27      0.00     55.27
        14.067         0.00     55.41      0.00     55.41
        14.083         0.00     55.55      0.00     55.55
        14.100         0.00     55.70      0.00     55.70
        14.117         0.00     55.84      0.00     55.84
        14.133         0.00     55.98      0.00     55.98
        14.150         0.00     56.13      0.00     56.13
        14.167         0.00     56.27      0.00     56.27
        14.183         0.00     56.41      0.00     56.41
        14.200         0.00     56.65      0.00     56.65
        14.217         0.00     57.04      0.00     57.04
        14.233         0.00     57.43      0.00     57.43
        14.250         0.00     57.82      0.00     57.82
        14.267         0.00     58.21      0.00     58.21
        14.283         0.00     58.61      0.00     58.61
        14.300         0.00     59.00      0.00     59.00
        14.317         0.00     59.39      0.00     59.39
        14.333         0.00     59.78      0.00     59.78
        14.350         0.00     60.17      0.00     60.17
        14.367         0.00     60.56      0.00     60.56
        14.383         0.00     60.95      0.00     60.95
        14.400         0.00     61.34      0.00     61.34
        14.417         0.00     61.73      0.00     61.73
        14.433         0.00     62.12      0.00     62.12
        14.450         0.00     62.51      0.00     62.51
        14.467         0.00     62.90      0.00     62.90
        14.483         0.00     63.29      0.00     63.29
        14.500         0.00     63.66      0.00     63.66
        14.517         0.00     63.96      0.00     63.96
        14.533         0.00     64.26      0.00     64.26
        14.550         0.00     64.56      0.00     64.56
        14.567         0.00     64.86      0.00     64.86
        14.583         0.00     65.16      0.00     65.16
        14.600         0.00     65.46      0.00     65.46
        14.617         0.00     65.75      0.00     65.75
        14.633         0.00     66.05      0.00     66.05
        14.650         0.00     66.35      0.00     66.35
        14.667         0.00     66.65      0.00     66.65
        14.683         0.00     66.95      0.00     66.95
        14.700         0.00     67.25      0.00     67.25
        14.717         0.00     67.55      0.00     67.55
        14.733         0.00     67.85      0.00     67.85
        14.750         0.00     68.15      0.00     68.15
        14.767         0.00     68.44      0.00     68.44
        14.783         0.00     68.74      0.00     68.74
        14.800         0.00     69.14      0.00     69.14
        14.817         0.00     69.92      0.00     69.92
        14.833         0.00     70.76      0.00     70.76
        14.850         0.00     71.59      0.00     71.59
        14.867         0.00     72.42      0.00     72.42
        14.883         0.00     73.25      0.00     73.25
        14.900         0.00     74.08      0.00     74.08
        14.917         0.00     74.92      0.00     74.92
        14.933         0.00     75.75      0.00     75.75
        14.950         0.00     76.58      0.00     76.58
        14.967         0.00     77.41      0.00     77.41
        14.983         0.00     78.24      0.00     78.24
        15.000         0.00     79.08      0.00     79.08
        15.017         0.00     79.91      0.00     79.91
        15.033         0.00     80.74      0.00     80.74
        15.050         0.00     81.57      0.00     81.57
        15.067         0.00     82.41      0.00     82.41
        15.083         0.00     83.24      0.00     83.24
        15.100         0.00     84.05      0.00     84.05
        15.117         0.00     84.70      0.00     84.70
        15.133         0.00     85.31      0.00     85.31
        15.150         0.00     85.93      0.00     85.93
        15.167         0.00     86.55      0.00     86.55
        15.183         0.00     87.16      0.00     87.16
        15.200         0.00     87.78      0.00     87.78
        15.217         0.00     88.40      0.00     88.40
        15.233         0.00     89.01      0.00     89.01
        15.250         0.00     89.63      0.00     89.63
        15.267         0.00     90.25      0.00     90.25
```

15.283	0.00	90.86	0.00	90.86
15.300	0.00	91.48	0.00	91.48
15.317	0.00	92.10	0.00	92.10
15.333	0.00	92.71	0.00	92.71
15.350	0.00	93.33	0.00	93.33
15.367	0.00	93.95	0.00	93.95
15.383	0.00	94.56	0.00	94.56
15.400	0.00	95.20	0.00	95.20
15.417	0.00	96.19	0.00	96.19
15.433	0.00	97.30	0.00	97.30
15.450	0.00	98.41	0.00	98.41
15.467	0.00	99.51	0.00	99.51
15.483	0.00	100.62	0.62	100.00
15.500	0.00	101.73	1.73	100.00
15.517	0.00	102.84	2.84	100.00
15.533	0.00	103.95	3.95	100.00
15.550	0.00	105.06	5.06	100.00
15.567	0.00	106.17	6.17	100.00
15.583	0.00	107.27	7.27	100.00
15.600	0.00	108.38	8.38	100.00
15.617	0.00	109.49	9.49	100.00
15.633	0.00	110.60	10.60	100.00
15.650	0.00	111.71	11.71	100.00
15.667	0.00	112.82	12.82	100.00
15.683	0.00	113.92	13.92	100.00
15.700	0.00	115.06	15.06	100.00
15.717	0.00	117.49	17.49	100.00
15.733	0.00	120.68	20.68	100.00
15.750	0.00	123.87	23.87	100.00
15.767	0.00	127.06	27.06	100.00
15.783	0.00	130.25	30.25	100.00
15.800	0.00	133.44	33.44	100.00
15.817	0.00	136.63	36.63	100.00
15.833	0.00	139.82	39.82	100.00
15.850	0.00	143.00	43.00	100.00
15.867	0.00	146.19	46.19	100.00
15.883	0.00	149.38	49.38	100.00
15.900	0.00	152.57	52.57	100.00
15.917	0.00	155.76	55.76	100.00
15.933	0.00	158.95	58.95	100.00
15.950	0.00	162.14	62.14	100.00
15.967	0.00	165.33	65.33	100.00
15.983	0.00	168.52	68.52	100.00
16.000	0.00	171.71	71.71	100.00
16.017	0.00	183.32	83.32	100.00
16.033	0.00	203.36	103.36	100.00
16.050	0.00	223.39	123.39	100.00
16.067	0.00	243.43	143.43	100.00
16.083	0.00	263.47	163.47	100.00
16.100	0.00	283.50	183.50	100.00
16.117	0.00	303.54	203.54	100.00
16.133	0.00	323.58	223.58	100.00
16.150	0.00	343.61	243.61	100.00
16.167	0.00	363.65	263.65	100.00
16.183	0.00	383.69	283.69	100.00
16.200	0.00	403.72	303.72	100.00
16.217	0.00	423.76	323.76	100.00
16.233	0.00	443.80	343.80	100.00
16.250	0.00	463.83	363.83	100.00
16.267	0.00	483.87	383.87	100.00
16.283	0.00	503.91	403.91	100.00
16.300	0.00	523.94	423.94	100.00
16.317	0.00	536.93	436.93	100.00
16.333	0.00	504.74	404.74	100.00
16.350	0.00	480.94	380.94	100.00
16.367	0.00	457.14	357.14	100.00
16.383	0.00	433.33	333.33	100.00
16.400	0.00	409.53	309.53	100.00
16.417	0.00	385.73	285.73	100.00
16.433	0.00	361.92	261.92	100.00
16.450	0.00	338.12	238.12	100.00
16.467	0.00	314.31	214.31	100.00
16.483	0.00	290.51	190.51	100.00
16.500	0.00	266.70	166.70	100.00
16.517	0.00	242.90	142.90	100.00
16.533	0.00	219.10	119.10	100.00
16.550	0.00	195.29	95.29	100.00
16.567	0.00	171.49	71.49	100.00
16.583	0.00	147.68	47.68	100.00
16.600	0.00	123.88	23.88	100.00
16.617	0.00	105.57	5.57	100.00
16.633	0.00	102.99	2.99	100.00
16.650	0.00	101.38	1.38	100.00
16.667	0.00	99.77	0.00	99.77
16.683	0.00	98.15	0.00	98.15
16.700	0.00	96.54	0.00	96.54
16.717	0.00	94.93	0.00	94.93
16.733	0.00	93.32	0.00	93.32
16.750	0.00	91.71	0.00	91.71
16.767	0.00	90.09	0.00	90.09
16.783	0.00	88.48	0.00	88.48
16.800	0.00	86.87	0.00	86.87
16.817	0.00	85.26	0.00	85.26
16.833	0.00	83.64	0.00	83.64
16.850	0.00	82.03	0.00	82.03
16.867	0.00	80.42	0.00	80.42
16.883	0.00	78.81	0.00	78.81
16.900	0.00	77.20	0.00	77.20
16.917	0.00	75.69	0.00	75.69
16.933	0.00	74.71	0.00	74.71
16.950	0.00	73.80	0.00	73.80
16.967	0.00	72.89	0.00	72.89
16.983	0.00	71.98	0.00	71.98
17.000	0.00	71.07	0.00	71.07
17.017	0.00	70.16	0.00	70.16
17.033	0.00	69.25	0.00	69.25
17.050	0.00	68.34	0.00	68.34
17.067	0.00	67.42	0.00	67.42
17.083	0.00	66.51	0.00	66.51
17.100	0.00	65.60	0.00	65.60
17.117	0.00	64.69	0.00	64.69
17.133	0.00	63.78	0.00	63.78

17.150	0.00	62.87	0.00	62.87
17.167	0.00	61.96	0.00	61.96
17.183	0.00	61.05	0.00	61.05
17.200	0.00	60.14	0.00	60.14
17.217	0.00	59.27	0.00	59.27
17.233	0.00	58.77	0.00	58.77
17.250	0.00	58.35	0.00	58.35
17.267	0.00	57.94	0.00	57.94
17.283	0.00	57.52	0.00	57.52
17.300	0.00	57.11	0.00	57.11
17.317	0.00	56.69	0.00	56.69
17.333	0.00	56.28	0.00	56.28
17.350	0.00	55.86	0.00	55.86
17.367	0.00	55.45	0.00	55.45
17.383	0.00	55.03	0.00	55.03
17.400	0.00	54.62	0.00	54.62
17.417	0.00	54.21	0.00	54.21
17.433	0.00	53.79	0.00	53.79
17.450	0.00	53.38	0.00	53.38
17.467	0.00	52.96	0.00	52.96
17.483	0.00	52.55	0.00	52.55
17.500	0.00	52.13	0.00	52.13
17.517	0.00	51.72	0.00	51.72
17.533	0.00	51.39	0.00	51.39
17.550	0.00	51.09	0.00	51.09
17.567	0.00	50.79	0.00	50.79
17.583	0.00	50.49	0.00	50.49
17.600	0.00	50.19	0.00	50.19
17.617	0.00	49.89	0.00	49.89
17.633	0.00	49.59	0.00	49.59
17.650	0.00	49.29	0.00	49.29
17.667	0.00	48.99	0.00	48.99
17.683	0.00	48.69	0.00	48.69
17.700	0.00	48.39	0.00	48.39
17.717	0.00	48.09	0.00	48.09
17.733	0.00	47.79	0.00	47.79
17.750	0.00	47.49	0.00	47.49
17.767	0.00	47.19	0.00	47.19
17.783	0.00	46.89	0.00	46.89
17.800	0.00	46.59	0.00	46.59
17.817	0.00	46.29	0.00	46.29
17.833	0.00	46.04	0.00	46.04
17.850	0.00	45.82	0.00	45.82
17.867	0.00	45.59	0.00	45.59
17.883	0.00	45.37	0.00	45.37
17.900	0.00	45.15	0.00	45.15
17.917	0.00	44.92	0.00	44.92
17.933	0.00	44.70	0.00	44.70
17.950	0.00	44.48	0.00	44.48
17.967	0.00	44.26	0.00	44.26
17.983	0.00	44.03	0.00	44.03
18.000	0.00	43.81	0.00	43.81

****

FLOW PROCESS FROM NODE 56.30 TO NODE 36.00 IS CODE = 11

>>>>>VIEW STREAM NUMBER 1 HYDROGRAPH<<<<<

==========

STREAM HYDROGRAPH IN ONE-MINUTE UNIT INTERVALS(CFS)

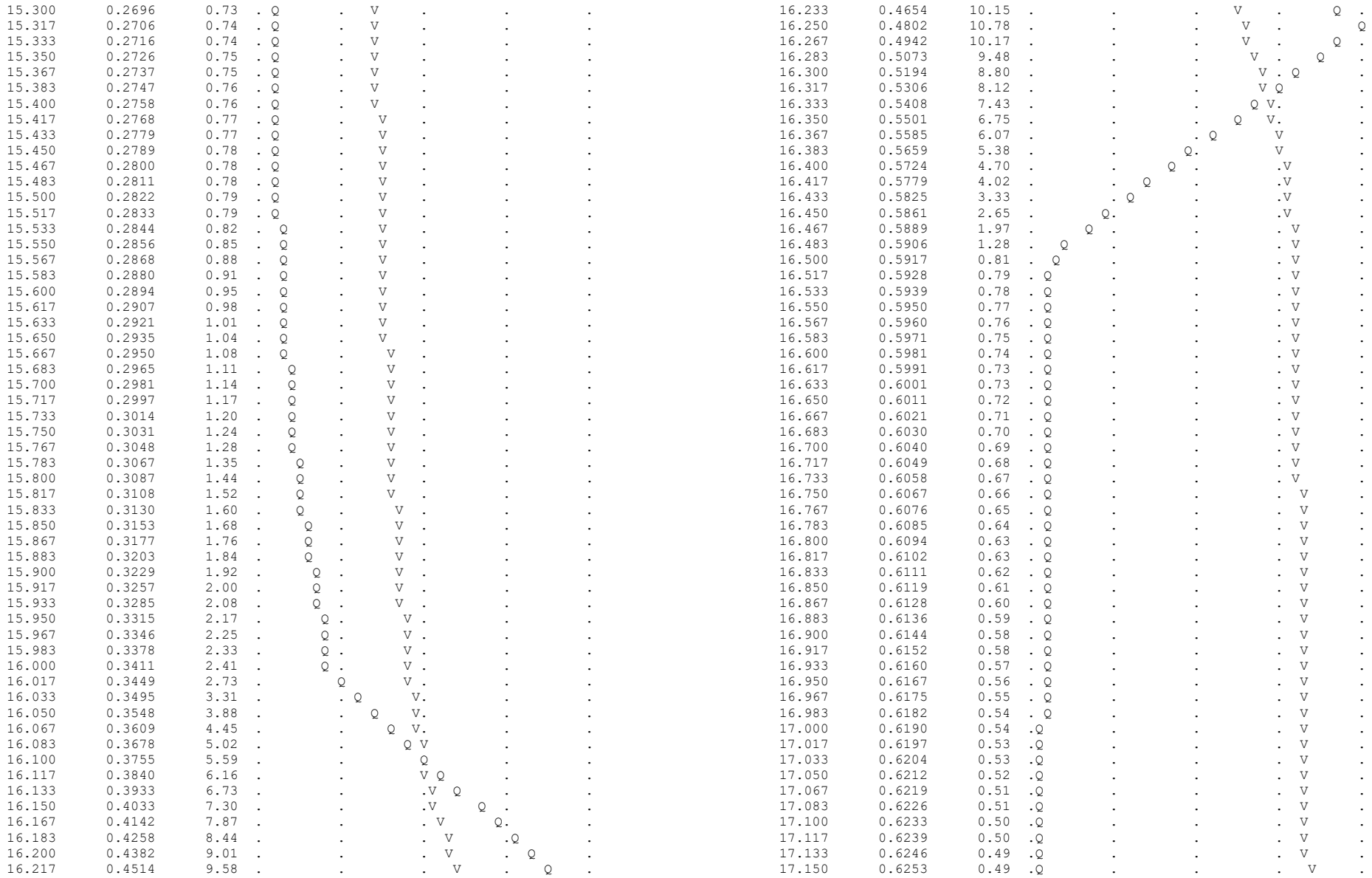
(Notes: Time indicated is at END of Each Unit Intervals.
Peak 5-minute rainfall intensity is modeled as
a constant value for entire 5-minute period.)

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	50.0	100.0	150.0	200.0
14.000	25.1582	54.84	.	Q	V	.	.
14.017	25.2339	54.98	.	Q	V	.	.
14.033	25.3098	55.12	.	.Q	V	.	.
14.050	25.3860	55.27	.	.Q	V	.	.
14.067	25.4623	55.41	.	.Q	V	.	.
14.083	25.5388	55.55	.	.Q	V	.	.
14.100	25.6155	55.70	.	.Q	V	.	.
14.117	25.6924	55.84	.	.Q	V	.	.
14.133	25.7695	55.98	.	.Q	V	.	.
14.150	25.8468	56.13	.	.Q	V	.	.
14.167	25.9244	56.27	.	.Q	V	.	.
14.183	26.0021	56.41	.	.Q	V	.	.
14.200	26.0801	56.65	.	.Q	V	.	.
14.217	26.1587	57.04	.	.Q	V	.	.
14.233	26.2378	57.43	.	.Q	V	.	.
14.250	26.3174	57.82	.	.Q	V	.	.
14.267	26.3976	58.21	.	.Q	V	.	.
14.283	26.4783	58.61	.	.Q	V	.	.
14.300	26.5596	59.00	.	.Q	V	.	.
14.317	26.6414	59.39	.	.Q	V	.	.
14.333	26.7237	59.78	.	.Q	V	.	.
14.350	26.8066	60.17	.	. Q	V	.	.
14.367	26.8900	60.56	.	. Q	V	.	.
14.383	26.9740	60.95	.	. Q	V	.	.
14.400	27.0585	61.34	.	. Q	V	.	.
14.417	27.1435	61.73	.	. Q	V	.	.
14.433	27.2291	62.12	.	. Q	V	.	.
14.450	27.3152	62.51	.	. Q	V	.	.
14.467	27.4018	62.90	.	. Q	V	.	.
14.483	27.4890	63.29	.	. Q	V	.	.
14.500	27.5767	63.66	.	. Q	V	.	.
14.517	27.6648	63.96	.	. Q	V	.	.
14.533	27.7533	64.26	.	. Q	V	.	.
14.550	27.8422	64.56	.	. Q	V	.	.
14.567	27.9315	64.86	.	. Q	V	.	.
14.583	28.0213	65.16	.	. Q	V	.	.
14.600	28.1115	65.46	.	. Q	V	.	.
14.617	28.2020	65.75	.	. Q	V	.	.
14.633	28.2930	66.05	.	. Q	V	.	.
14.650	28.3844	66.35	.	. Q	V	.	.
14.667	28.4762	66.65	.	. Q	V	.	.
14.683	28.5684	66.95	.	. Q	V	.	.
14.700	28.6611	67.25	.	. Q	V	.	.
14.717	28.7541	67.55	.	. Q	V	.	.
14.733	28.8476	67.85	.	. Q	V	.	.

14.750	28.9414	68.15	. . Q V. . .
14.767	29.0357	68.44	. . Q V. . .
14.783	29.1304	68.74	. . Q V. . .
14.800	29.2256	69.14	. . Q V. . .
14.817	29.3219	69.92	. . Q V. . .
14.833	29.4194	70.76	. . Q V. . .
14.850	29.5180	71.59	. . Q V. . .
14.867	29.6177	72.42	. . Q V. . .
14.883	29.7186	73.25	. . Q V. . .
14.900	29.8207	74.08	. . Q V. . .
14.917	29.9239	74.92	. . Q V. . .
14.933	30.0282	75.75	. . Q V. . .
14.950	30.1337	76.58	. . Q V. . .
14.967	30.2403	77.41	. . Q V. . .
14.983	30.3481	78.24	. . Q V . .
15.000	30.4570	79.08	. . Q V . .
15.017	30.5671	79.91	. . Q V . .
15.033	30.6783	80.74	. . Q V . .
15.050	30.7907	81.57	. . Q V . .
15.067	30.9042	82.41	. . Q V . .
15.083	31.0188	83.24	. . Q V . .
15.100	31.1346	84.05	. . Q V . .
15.117	31.2513	84.70	. . Q V . .
15.133	31.3688	85.31	. . Q V . .
15.150	31.4871	85.93	. . Q V . .
15.167	31.6063	86.55	. . Q V . .
15.183	31.7264	87.16	. . Q V . .
15.200	31.8473	87.78	. . Q .V . .
15.217	31.9691	88.40	. . Q .V . .
15.233	32.0917	89.01	. . Q .V . .
15.250	32.2151	89.63	. . Q .V . .
15.267	32.3395	90.25	. . Q .V . .
15.283	32.4646	90.86	. . Q .V . .
15.300	32.5906	91.48	. . Q .V . .
15.317	32.7175	92.10	. . Q .V . .
15.333	32.8452	92.71	. . Q .V . .
15.350	32.9737	93.33	. . Q .V . .
15.367	33.1031	93.95	. . Q .V . .
15.383	33.2334	94.56	. . Q .V . .
15.400	33.3645	95.20	. . Q. V . .
15.417	33.4970	96.19	. . Q. V . .
15.433	33.6311	97.30	. . Q. V . .
15.450	33.7666	98.41	. . Q. V . .
15.467	33.9037	99.51	. . Q. V . .
15.483	34.0414	100.00	. . Q V . .
15.500	34.1792	100.00	. . Q V . .
15.517	34.3169	100.00	. . Q V . .
15.533	34.4546	100.00	. . Q V . .
15.550	34.5924	100.00	. . Q V . .
15.567	34.7301	100.00	. . Q V . .
15.583	34.8679	100.00	. . Q V . .
15.600	35.0056	100.00	. . Q V . .
15.617	35.1433	100.00	. . Q V . .
15.633	35.2811	100.00	. . Q V . .
15.650	35.4188	100.00	. . Q V . .
15.667	35.5566	100.00	. . Q V . .
15.683	35.6943	100.00	. . Q V . .
15.700	35.8320	100.00	. . Q V . .
15.717	35.9698	100.00	. . Q V . .
15.733	36.1075	100.00	. . Q V . .
15.750	36.2453	100.00	. . Q V . .
15.767	36.3830	100.00	. . Q V . .
15.783	36.5208	100.00	. . Q V . .
15.800	36.6585	100.00	. . Q V . .
15.817	36.7962	100.00	. . Q V . .
15.833	36.9340	100.00	. . Q V . .
15.850	37.0717	100.00	. . Q V . .
15.867	37.2095	100.00	. . Q V . .
15.883	37.3472	100.00	. . Q V . .
15.900	37.4849	100.00	. . Q V . .
15.917	37.6227	100.00	. . Q V . .
15.933	37.7604	100.00	. . Q V . .
15.950	37.8982	100.00	. . Q V . .
15.967	38.0359	100.00	. . Q V . .
15.983	38.1736	100.00	. . Q V . .
16.000	38.3114	100.00	. . Q V . .
16.017	38.4491	100.00	. . Q V . .
16.033	38.5869	100.00	. . Q V . .
16.050	38.7246	100.00	. . Q V . .
16.067	38.8624	100.00	. . Q V . .
16.083	39.0001	100.00	. . Q V . .
16.100	39.1378	100.00	. . Q V . .
16.117	39.2756	100.00	. . Q V . .
16.133	39.4133	100.00	. . Q V . .
16.150	39.5511	100.00	. . Q V . .
16.167	39.6888	100.00	. . Q V . .
16.183	39.8265	100.00	. . Q V . .
16.200	39.9643	100.00	. . Q V . .
16.217	40.1020	100.00	. . Q V . .
16.233	40.2398	100.00	. . Q V . .
16.250	40.3775	100.00	. . Q V . .
16.267	40.5152	100.00	. . Q V . .
16.283	40.6530	100.00	. . Q V . .
16.300	40.7907	100.00	. . Q V . .
16.317	40.9285	100.00	. . Q V . .
16.333	41.0662	100.00	. . Q V . .
16.350	41.2039	100.00	. . Q V . .
16.367	41.3417	100.00	. . Q V . .
16.383	41.4794	100.00	. . Q V . .
16.400	41.6172	100.00	. . Q V . .
16.417	41.7549	100.00	. . Q V . .
16.433	41.8927	100.00	. . Q V . .
16.450	42.0304	100.00	. . Q V . .
16.467	42.1681	100.00	. . Q V . .
16.483	42.3059	100.00	. . Q V . .
16.500	42.4436	100.00	. . Q V . .
16.517	42.5814	100.00	. . Q V . .
16.533	42.7191	100.00	. . Q V . .
16.550	42.8568	100.00	. . Q V . .
16.567	42.9946	100.00	. . Q V . .
16.583	43.1323	100.00	. . Q V . .
16.600	43.2701	100.00	. . Q V . .

```
16.617    43.4078   100.00  .         .         Q       V .         .
16.633    43.5455   100.00  .         .         Q       V .         .
16.650    43.6833   100.00  .         .         Q       V .         .
16.667    43.8207    99.77  .         .        Q.       V .         .
16.683    43.9559    98.15  .         .        Q.       V .         .
16.700    44.0889    96.54  .         .        Q.        V.         .
16.717    44.2196    94.93  .         .       Q .        V.         .
16.733    44.3482    93.32  .         .       Q .        V.         .
16.750    44.4745    91.71  .         .       Q .        V.         .
16.767    44.5986    90.09  .         .       Q .        V.         .
16.783    44.7205    88.48  .         .      Q  .        V.         .
16.800    44.8401    86.87  .         .      Q  .        V.         .
16.817    44.9576    85.26  .         .      Q  .        V.         .
16.833    45.0728    83.64  .         .     Q   .        V.         .
16.850    45.1858    82.03  .         .     Q   .        V.         .
16.867    45.2965    80.42  .         .     Q   .        V.         .
16.883    45.4051    78.81  .         .    Q    .        V.         .
16.900    45.5114    77.20  .         .    Q    .         V         .
16.917    45.6157    75.69  .         .    Q    .         V         .
16.933    45.7186    74.71  .         .   Q     .         V         .
16.950    45.8202    73.80  .         .   Q     .         V         .
16.967    45.9206    72.89  .         .   Q     .         V         .
16.983    46.0198    71.98  .         .   Q     .         V         .
17.000    46.1177    71.07  .         .   Q     .         V         .
17.017    46.2143    70.16  .         .   Q     .         V         .
17.033    46.3097    69.25  .         .  Q      .         V         .
17.050    46.4038    68.34  .         .  Q      .         V         .
17.067    46.4967    67.42  .         .  Q      .         V         .
17.083    46.5883    66.51  .         .  Q      .         V         .
17.100    46.6787    65.60  .         .  Q      .         V         .
17.117    46.7678    64.69  .         . Q       .         V         .
17.133    46.8556    63.78  .         . Q       .         V         .
17.150    46.9422    62.87  .         . Q       .         V         .
17.167    47.0276    61.96  .         . Q       .         .V        .
17.183    47.1116    61.05  .         . Q       .         .V        .
17.200    47.1945    60.14  .         . Q       .         .V        .
17.217    47.2761    59.27  .         .Q        .         .V        .
17.233    47.3571    58.77  .         .Q        .         .V        .
17.250    47.4374    58.35  .         .Q        .         .V        .
17.267    47.5172    57.94  .         .Q        .         .V        .
17.283    47.5965    57.52  .         .Q        .         .V        .
17.300    47.6751    57.11  .         .Q        .         .V        .
17.317    47.7532    56.69  .         .Q        .         .V        .
17.333    47.8307    56.28  .         .Q        .         .V        .
17.350    47.9077    55.86  .         .Q        .         .V        .
17.367    47.9841    55.45  .         .Q        .         .V        .
17.383    48.0599    55.03  .         .Q        .         .V        .
17.400    48.1351    54.62  .         Q         .         .V        .
17.417    48.2098    54.21  .         Q         .         .V        .
17.433    48.2838    53.79  .         Q         .         .V        .
17.450    48.3574    53.38  .         Q         .         .V        .
17.467    48.4303    52.96  .         Q         .         .V        .
17.483    48.5027    52.55  .         Q         .         .V        .
17.500    48.5745    52.13  .         Q         .         . V       .
17.517    48.6457    51.72  .         Q         .         . V       .
17.533    48.7165    51.39  .         Q         .         . V       .
17.550    48.7869    51.09  .         Q         .         . V       .
17.567    48.8569    50.79  .         Q         .         . V       .
17.583    48.9264    50.49  .         Q         .         . V       .
17.600    48.9955    50.19  .         Q         .         . V       .
17.617    49.0643    49.89  .        Q.         .         . V       .
17.633    49.1326    49.59  .        Q.         .         . V       .
17.650    49.2005    49.29  .        Q.         .         . V       .
17.667    49.2680    48.99  .        Q.         .         . V       .
17.683    49.3350    48.69  .        Q.         .         . V       .
17.700    49.4017    48.39  .        Q.         .         . V       .
17.717    49.4679    48.09  .        Q.         .         . V       .
17.733    49.5337    47.79  .        Q.         .         . V       .
17.750    49.5992    47.49  .        Q.         .         . V       .
17.767    49.6642    47.19  .        Q.         .         . V       .
17.783    49.7287    46.89  .        Q.         .         . V       .
17.800    49.7929    46.59  .        Q.         .         . V       .
17.817    49.8567    46.29  .        Q.         .         . V       .
17.833    49.9201    46.04  .        Q.         .         . V       .
17.850    49.9832    45.82  .        Q.         .         . V       .
17.867    50.0460    45.59  .        Q.         .         .  V      .
17.883    50.1085    45.37  .        Q.         .         .  V      .
17.900    50.1707    45.15  .        Q.         .         .  V      .
17.917    50.2326    44.92  .       Q .         .         .  V      .
17.933    50.2941    44.70  .       Q .         .         .  V      .
17.950    50.3554    44.48  .       Q .         .         .  V      .
17.967    50.4164    44.26  .       Q .         .         .  V      .
17.983    50.4770    44.03  .       Q .         .         .  V      .
18.000    50.5374    43.81  .       Q .         .         .  V      .
--------------------------------------------------------------------------------
  TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
  (Note: 100% of Peak Flow Rate estimate assumed to have
  an instantaneous time duration)

  Percentile of Estimated          Duration
      Peak Flow Rate               (minutes)
  =======================          =========
            0%                      1081.0
           10%                      1081.0
           20%                      1081.0
           30%                      1081.0
           40%                      1081.0
           50%                      1081.0
           60%                       860.0
           70%                       660.0
           80%                       555.0
           90%                       455.0

********************************************************************************
  FLOW PROCESS FROM NODE     35.20 TO NODE     35.20 IS CODE = 1.2
--------------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
================================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #2)
```

```
   RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
   TOTAL CATCHMENT AREA(ACRES) =   11.40
   SOIL-LOSS RATE, Fm,(INCH/HR) =  0.168
   LOW LOSS FRACTION = 0.670
   TIME OF CONCENTRATION(MIN.) = 14.60
   SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
   ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
   RETURN FREQUENCY(YEARS) =   2
      5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
     30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
      1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.53
      3-HOUR   POINT RAINFALL VALUE(INCHES) =  0.89
      6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.22
     24-HOUR   POINT RAINFALL VALUE(INCHES) =  2.05

--------------------------------------------------------------------------------
   TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.74
   TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     1.21

--------------------------------------------------------------------------------

================================================================================

                    2 4 - H O U R    S T O R M
                 R U N O F F    H Y D R O G R A P H

================================================================================
            HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
       (Notes: Time indicated is at END of Each Unit Intervals.
               Peak 5-minute rainfall intensity is modeled as
               a constant value for entire 5-minute period.)
--------------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.        2.7       5.4       8.1       10.8
--------------------------------------------------------------------------------
  14.000      0.2099      0.43  .Q        .V        .         .         .
  14.017      0.2105      0.43  .Q        .V        .         .         .
  14.033      0.2111      0.43  .Q        .V        .         .         .
  14.050      0.2117      0.43  .Q        .V        .         .         .
  14.067      0.2123      0.44  .Q        .V        .         .         .
  14.083      0.2129      0.44  .Q        .V        .         .         .
  14.100      0.2135      0.44  .Q        .V        .         .         .
  14.117      0.2141      0.45  .Q        .V        .         .         .
  14.133      0.2147      0.45  .Q        .V        .         .         .
  14.150      0.2154      0.46  .Q        .V        .         .         .
  14.167      0.2160      0.46  .Q        .V        .         .         .
  14.183      0.2166      0.46  .Q        .V        .         .         .
  14.200      0.2173      0.47  .Q        .V        .         .         .
  14.217      0.2179      0.47  .Q        .V        .         .         .
  14.233      0.2186      0.48  .Q        .V        .         .         .
  14.250      0.2192      0.48  .Q        .V        .         .         .
  14.267      0.2199      0.48  .Q        .V        .         .         .
  14.283      0.2206      0.49  .Q        .V        .         .         .
  14.300      0.2213      0.49  .Q        . V       .         .         .
  14.317      0.2219      0.49  .Q        . V       .         .         .
  14.333      0.2226      0.49  .Q        . V       .         .         .
  14.350      0.2233      0.50  .Q        . V       .         .         .
  14.367      0.2240      0.50  .Q        . V       .         .         .
  14.383      0.2247      0.50  .Q        . V       .         .         .
  14.400      0.2254      0.50  .Q        . V       .         .         .
  14.417      0.2261      0.50  .Q        . V       .         .         .
  14.433      0.2267      0.50  .Q        . V       .         .         .
  14.450      0.2274      0.51  .Q        . V       .         .         .
  14.467      0.2281      0.51  .Q        . V       .         .         .
  14.483      0.2288      0.51  .Q        . V       .         .         .
  14.500      0.2296      0.51  .Q        . V       .         .         .
  14.517      0.2303      0.51  .Q        . V       .         .         .
  14.533      0.2310      0.51  .Q        . V       .         .         .
  14.550      0.2317      0.52  .Q        . V       .         .         .
  14.567      0.2324      0.52  .Q        . V       .         .         .
  14.583      0.2331      0.52  .Q        . V       .         .         .
  14.600      0.2338      0.53  .Q        . V       .         .         .
  14.617      0.2346      0.53  .Q        . V       .         .         .
  14.633      0.2353      0.54  .Q        . V       .         .         .
  14.650      0.2361      0.54  . Q       . V       .         .         .
  14.667      0.2368      0.55  . Q       . V       .         .         .
  14.683      0.2376      0.55  . Q       . V       .         .         .
  14.700      0.2383      0.55  . Q       . V       .         .         .
  14.717      0.2391      0.56  . Q       .  V      .         .         .
  14.733      0.2399      0.56  . Q       .  V      .         .         .
  14.750      0.2407      0.57  . Q       .  V      .         .         .
  14.767      0.2414      0.57  . Q       .  V      .         .         .
  14.783      0.2422      0.57  . Q       .  V      .         .         .
  14.800      0.2430      0.58  . Q       .  V      .         .         .
  14.817      0.2438      0.58  . Q       .  V      .         .         .
  14.833      0.2446      0.58  . Q       .  V      .         .         .
  14.850      0.2454      0.59  . Q       .  V      .         .         .
  14.867      0.2463      0.59  . Q       .  V      .         .         .
  14.883      0.2471      0.59  . Q       .  V      .         .         .
  14.900      0.2479      0.59  . Q       .  V      .         .         .
  14.917      0.2487      0.60  . Q       .  V      .         .         .
  14.933      0.2495      0.60  . Q       .  V      .         .         .
  14.950      0.2504      0.60  . Q       .  V      .         .         .
  14.967      0.2512      0.61  . Q       .  V      .         .         .
  14.983      0.2520      0.61  . Q       .  V      .         .         .
  15.000      0.2529      0.61  . Q       .  V      .         .         .
  15.017      0.2537      0.61  . Q       .  V      .         .         .
  15.033      0.2546      0.62  . Q       .  V      .         .         .
  15.050      0.2554      0.62  . Q       .  V      .         .         .
  15.067      0.2563      0.63  . Q       .  V      .         .         .
  15.083      0.2572      0.64  . Q       .  V      .         .         .
  15.100      0.2581      0.65  . Q       .   V     .         .         .
  15.117      0.2590      0.65  . Q       .   V     .         .         .
  15.133      0.2599      0.66  . Q       .   V     .         .         .
  15.150      0.2608      0.67  . Q       .   V     .         .         .
  15.167      0.2617      0.68  . Q       .   V     .         .         .
  15.183      0.2627      0.68  . Q       .   V     .         .         .
  15.200      0.2636      0.69  . Q       .   V     .         .         .
  15.217      0.2646      0.70  . Q       .   V     .         .         .
  15.233      0.2656      0.71  . Q       .   V     .         .         .
  15.250      0.2666      0.71  . Q       .   V     .         .         .
  15.267      0.2675      0.72  . Q       .   V     .         .         .
  15.283      0.2686      0.73  . Q       .   V     .         .         .
```



Onsite Flood Routing Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1

with Flowby Detention @ Node 56.3 (100cfs) & Node 35.2 (10cfs), User input for total flowby @ Rational Node 35

25-Year Storm Proposed Condition

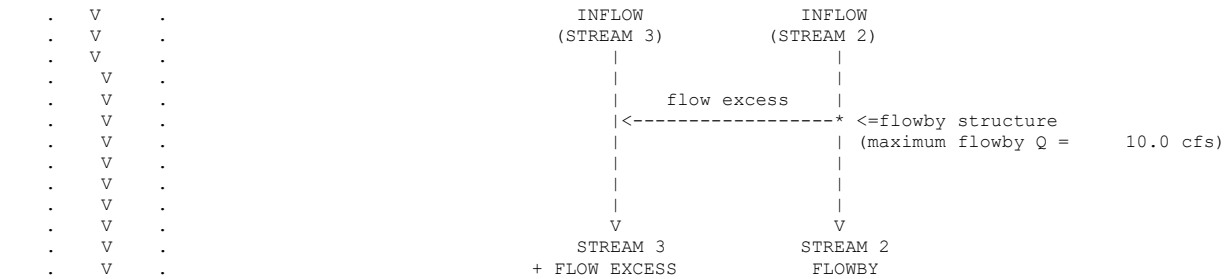
17.167	0.6259	0.48	.Q	.	.	.	V	.
17.183	0.6266	0.47	.Q	.	.	.	V	.
17.200	0.6272	0.47	.Q	.	.	.	V	.
17.217	0.6279	0.46	.Q	.	.	.	V	.
17.233	0.6285	0.46	.Q	.	.	.	V	.
17.250	0.6291	0.45	.Q	.	.	.	V	.
17.267	0.6298	0.45	.Q	.	.	.	V	.
17.283	0.6304	0.45	.Q	.	.	.	V	.
17.300	0.6310	0.44	.Q	.	.	.	V	.
17.317	0.6316	0.44	.Q	.	.	.	V	.
17.333	0.6322	0.43	.Q	.	.	.	V	.
17.350	0.6328	0.43	.Q	.	.	.	V	.
17.367	0.6334	0.43	.Q	.	.	.	V	.
17.383	0.6339	0.42	.Q	.	.	.	V	.
17.400	0.6345	0.42	.Q	.	.	.	V	.
17.417	0.6351	0.42	.Q	.	.	.	V	.
17.433	0.6357	0.41	.Q	.	.	.	V	.
17.450	0.6362	0.41	.Q	.	.	.	V	.
17.467	0.6368	0.40	.Q	.	.	.	V	.
17.483	0.6373	0.40	.Q	.	.	.	V	.
17.500	0.6379	0.40	.Q	.	.	.	V	.
17.517	0.6384	0.40	.Q	.	.	.	V	.
17.533	0.6390	0.39	.Q	.	.	.	V	.
17.550	0.6395	0.39	.Q	.	.	.	V	.
17.567	0.6400	0.39	.Q	.	.	.	V	.
17.583	0.6406	0.39	.Q	.	.	.	V	.
17.600	0.6411	0.38	.Q	.	.	.	V	.
17.617	0.6416	0.38	.Q	.	.	.	V	.
17.633	0.6421	0.38	.Q	.	.	.	V	.
17.650	0.6427	0.38	.Q	.	.	.	V	.
17.667	0.6432	0.37	.Q	.	.	.	V	.
17.683	0.6437	0.37	.Q	.	.	.	V	.
17.700	0.6442	0.37	.Q	.	.	.	V	.
17.717	0.6447	0.37	.Q	.	.	.	V	.
17.733	0.6452	0.36	.Q	.	.	.	V	.
17.750	0.6457	0.36	.Q	.	.	.	V	.
17.767	0.6462	0.36	.Q	.	.	.	V	.
17.783	0.6467	0.36	.Q	.	.	.	V	.
17.800	0.6472	0.36	.Q	.	.	.	V	.
17.817	0.6477	0.35	.Q	.	.	.	V	.
17.833	0.6482	0.35	.Q	.	.	.	V	.
17.850	0.6486	0.35	.Q	.	.	.	V	.
17.867	0.6491	0.35	.Q	.	.	.	V	.
17.883	0.6496	0.35	.Q	.	.	.	V	.
17.900	0.6501	0.34	.Q	.	.	.	V	.
17.917	0.6505	0.34	.Q	.	.	.	V	.
17.933	0.6510	0.34	.Q	.	.	.	V	.
17.950	0.6515	0.34	.Q	.	.	.	V	.
17.967	0.6519	0.34	.Q	.	.	.	V	.
17.983	0.6524	0.33	.Q	.	.	.	V	.
18.000	0.6528	0.33	.Q	.	.	.	V	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	245.0
20%	155.0
30%	125.0
40%	105.0
50%	85.0
60%	70.0
70%	50.0
80%	35.0
90%	15.0

```
**************************************************************************
  FLOW PROCESS FROM NODE     35.20 TO NODE     35.00 IS CODE =   2
--------------------------------------------------------------------------
  >>>>>FLOWBY STRUCTURE ROUTING MODEL APPLIED TO STREAM #2<<<<<
==========================================================================
```

MODEL STREAM NUMBER 2 FLOWING PAST A FLOWBY STRUCTURE:
FLOWRATES IN STREAM # 2 WHICH ARE GREATER THAN
10.0 CFS ARE ASSUMED TO BE EXCESS FLOWS.
FLOW EXCESS IS ASSUMED TO BE ADDED TO STREAM NUMBER 3



FLOWBY BASIN MODELING RESULTS:

MODEL TIME (HRS)	INFLOW (STREAM 3) (CFS)	INFLOW (STREAM 2) (CFS)	OUTFLOW (STREAM 3) (CFS)	FLOWBY (STREAM 2) (CFS)
14.000	0.00	0.43	0.00	0.43
14.017	0.00	0.43	0.00	0.43
14.033	0.00	0.43	0.00	0.43
14.050	0.00	0.43	0.00	0.43
14.067	0.00	0.44	0.00	0.44
14.083	0.00	0.44	0.00	0.44

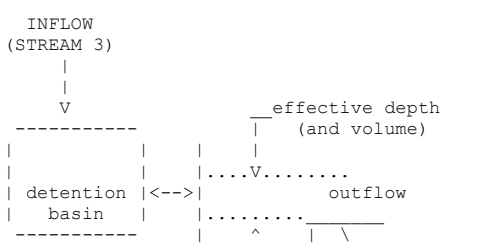
14.100	0.00	0.44	0.00	0.44
14.117	0.00	0.45	0.00	0.45
14.133	0.00	0.45	0.00	0.45
14.150	0.00	0.46	0.00	0.46
14.167	0.00	0.46	0.00	0.46
14.183	0.00	0.46	0.00	0.46
14.200	0.00	0.47	0.00	0.47
14.217	0.00	0.47	0.00	0.47
14.233	0.00	0.48	0.00	0.48
14.250	0.00	0.48	0.00	0.48
14.267	0.00	0.48	0.00	0.48
14.283	0.00	0.49	0.00	0.49
14.300	0.00	0.49	0.00	0.49
14.317	0.00	0.49	0.00	0.49
14.333	0.00	0.49	0.00	0.49
14.350	0.00	0.50	0.00	0.50
14.367	0.00	0.50	0.00	0.50
14.383	0.00	0.50	0.00	0.50
14.400	0.00	0.50	0.00	0.50
14.417	0.00	0.50	0.00	0.50
14.433	0.00	0.50	0.00	0.50
14.450	0.00	0.51	0.00	0.51
14.467	0.00	0.51	0.00	0.51
14.483	0.00	0.51	0.00	0.51
14.500	0.00	0.51	0.00	0.51
14.517	0.00	0.51	0.00	0.51
14.533	0.00	0.51	0.00	0.51
14.550	0.00	0.52	0.00	0.52
14.567	0.00	0.52	0.00	0.52
14.583	0.00	0.52	0.00	0.52
14.600	0.00	0.53	0.00	0.53
14.617	0.00	0.53	0.00	0.53
14.633	0.00	0.54	0.00	0.54
14.650	0.00	0.54	0.00	0.54
14.667	0.00	0.55	0.00	0.55
14.683	0.00	0.55	0.00	0.55
14.700	0.00	0.55	0.00	0.55
14.717	0.00	0.56	0.00	0.56
14.733	0.00	0.56	0.00	0.56
14.750	0.00	0.57	0.00	0.57
14.767	0.00	0.57	0.00	0.57
14.783	0.00	0.57	0.00	0.57
14.800	0.00	0.58	0.00	0.58
14.817	0.00	0.58	0.00	0.58
14.833	0.00	0.58	0.00	0.58
14.850	0.00	0.59	0.00	0.59
14.867	0.00	0.59	0.00	0.59
14.883	0.00	0.59	0.00	0.59
14.900	0.00	0.59	0.00	0.59
14.917	0.00	0.60	0.00	0.60
14.933	0.00	0.60	0.00	0.60
14.950	0.00	0.60	0.00	0.60
14.967	0.00	0.61	0.00	0.61
14.983	0.00	0.61	0.00	0.61
15.000	0.00	0.61	0.00	0.61
15.017	0.00	0.61	0.00	0.61
15.033	0.00	0.62	0.00	0.62
15.050	0.00	0.62	0.00	0.62
15.067	0.00	0.63	0.00	0.63
15.083	0.00	0.64	0.00	0.64
15.100	0.00	0.65	0.00	0.65
15.117	0.00	0.65	0.00	0.65
15.133	0.00	0.66	0.00	0.66
15.150	0.00	0.67	0.00	0.67
15.167	0.00	0.68	0.00	0.68
15.183	0.00	0.68	0.00	0.68
15.200	0.00	0.69	0.00	0.69
15.217	0.00	0.70	0.00	0.70
15.233	0.00	0.71	0.00	0.71
15.250	0.00	0.71	0.00	0.71
15.267	0.00	0.72	0.00	0.72
15.283	0.00	0.73	0.00	0.73
15.300	0.00	0.73	0.00	0.73
15.317	0.00	0.74	0.00	0.74
15.333	0.00	0.74	0.00	0.74
15.350	0.00	0.75	0.00	0.75
15.367	0.00	0.75	0.00	0.75
15.383	0.00	0.76	0.00	0.76
15.400	0.00	0.76	0.00	0.76
15.417	0.00	0.77	0.00	0.77
15.433	0.00	0.77	0.00	0.77
15.450	0.00	0.78	0.00	0.78
15.467	0.00	0.78	0.00	0.78
15.483	0.62	0.78	0.62	0.78
15.500	1.73	0.79	1.73	0.79
15.517	2.84	0.79	2.84	0.79
15.533	3.95	0.82	3.95	0.82
15.550	5.06	0.85	5.06	0.85
15.567	6.17	0.88	6.17	0.88
15.583	7.27	0.91	7.27	0.91
15.600	8.38	0.95	8.38	0.95
15.617	9.49	0.98	9.49	0.98
15.633	10.60	1.01	10.60	1.01
15.650	11.71	1.04	11.71	1.04
15.667	12.82	1.08	12.82	1.08
15.683	13.92	1.11	13.92	1.11
15.700	15.06	1.14	15.06	1.14
15.717	17.49	1.17	17.49	1.17
15.733	20.68	1.20	20.68	1.20
15.750	23.87	1.24	23.87	1.24
15.767	27.06	1.28	27.06	1.28
15.783	30.25	1.35	30.25	1.35
15.800	33.44	1.44	33.44	1.44
15.817	36.63	1.52	36.63	1.52
15.833	39.82	1.60	39.82	1.60
15.850	43.00	1.68	43.00	1.68
15.867	46.19	1.76	46.19	1.76
15.883	49.38	1.84	49.38	1.84
15.900	52.57	1.92	52.57	1.92
15.917	55.76	2.00	55.76	2.00
15.933	58.95	2.08	58.95	2.08
15.950	62.14	2.17	62.14	2.17

15.967	65.33	2.25	65.33	2.25
15.983	68.52	2.33	68.52	2.33
16.000	71.71	2.41	71.71	2.41
16.017	83.32	2.73	83.32	2.73
16.033	103.36	3.31	103.36	3.31
16.050	123.39	3.88	123.39	3.88
16.067	143.43	4.45	143.43	4.45
16.083	163.47	5.02	163.47	5.02
16.100	183.50	5.59	183.50	5.59
16.117	203.54	6.16	203.54	6.16
16.133	223.58	6.73	223.58	6.73
16.150	243.61	7.30	243.61	7.30
16.167	263.65	7.87	263.65	7.87
16.183	283.69	8.44	283.69	8.44
16.200	303.72	9.01	303.72	9.01
16.217	323.76	9.58	323.76	9.58
16.233	343.80	10.15	343.95	10.00
16.250	363.83	10.78	364.61	10.00
16.267	383.87	10.17	384.04	10.00
16.283	403.91	9.48	403.91	9.48
16.300	423.94	8.80	423.94	8.80
16.317	436.93	8.12	436.93	8.12
16.333	404.74	7.43	404.74	7.43
16.350	380.94	6.75	380.94	6.75
16.367	357.14	6.07	357.14	6.07
16.383	333.33	5.38	333.33	5.38
16.400	309.53	4.70	309.53	4.70
16.417	285.73	4.02	285.73	4.02
16.433	261.92	3.33	261.92	3.33
16.450	238.12	2.65	238.12	2.65
16.467	214.31	1.97	214.31	1.97
16.483	190.51	1.28	190.51	1.28
16.500	166.70	0.81	166.70	0.81
16.517	142.90	0.79	142.90	0.79
16.533	119.10	0.78	119.10	0.78
16.550	95.29	0.77	95.29	0.77
16.567	71.49	0.76	71.49	0.76
16.583	47.68	0.75	47.68	0.75
16.600	23.88	0.74	23.88	0.74
16.617	5.57	0.73	5.57	0.73
16.633	2.99	0.73	2.99	0.73
16.650	1.38	0.72	1.38	0.72
16.667	0.00	0.71	0.00	0.71
16.683	0.00	0.70	0.00	0.70
16.700	0.00	0.69	0.00	0.69
16.717	0.00	0.68	0.00	0.68
16.733	0.00	0.67	0.00	0.67
16.750	0.00	0.66	0.00	0.66
16.767	0.00	0.65	0.00	0.65
16.783	0.00	0.64	0.00	0.64
16.800	0.00	0.63	0.00	0.63
16.817	0.00	0.63	0.00	0.63
16.833	0.00	0.62	0.00	0.62
16.850	0.00	0.61	0.00	0.61
16.867	0.00	0.60	0.00	0.60
16.883	0.00	0.59	0.00	0.59
16.900	0.00	0.58	0.00	0.58
16.917	0.00	0.58	0.00	0.58
16.933	0.00	0.57	0.00	0.57
16.950	0.00	0.56	0.00	0.56
16.967	0.00	0.55	0.00	0.55
16.983	0.00	0.54	0.00	0.54
17.000	0.00	0.54	0.00	0.54
17.017	0.00	0.53	0.00	0.53
17.033	0.00	0.53	0.00	0.53
17.050	0.00	0.52	0.00	0.52
17.067	0.00	0.51	0.00	0.51
17.083	0.00	0.51	0.00	0.51
17.100	0.00	0.50	0.00	0.50
17.117	0.00	0.50	0.00	0.50
17.133	0.00	0.49	0.00	0.49
17.150	0.00	0.49	0.00	0.49
17.167	0.00	0.48	0.00	0.48
17.183	0.00	0.47	0.00	0.47
17.200	0.00	0.47	0.00	0.47
17.217	0.00	0.46	0.00	0.46
17.233	0.00	0.46	0.00	0.46
17.250	0.00	0.45	0.00	0.45
17.267	0.00	0.45	0.00	0.45
17.283	0.00	0.45	0.00	0.45
17.300	0.00	0.44	0.00	0.44
17.317	0.00	0.44	0.00	0.44
17.333	0.00	0.43	0.00	0.43
17.350	0.00	0.43	0.00	0.43
17.367	0.00	0.43	0.00	0.43
17.383	0.00	0.42	0.00	0.42
17.400	0.00	0.42	0.00	0.42
17.417	0.00	0.42	0.00	0.42
17.433	0.00	0.41	0.00	0.41
17.450	0.00	0.41	0.00	0.41
17.467	0.00	0.40	0.00	0.40
17.483	0.00	0.40	0.00	0.40
17.500	0.00	0.40	0.00	0.40
17.517	0.00	0.40	0.00	0.40
17.533	0.00	0.39	0.00	0.39
17.550	0.00	0.39	0.00	0.39
17.567	0.00	0.39	0.00	0.39
17.583	0.00	0.39	0.00	0.39
17.600	0.00	0.38	0.00	0.38
17.617	0.00	0.38	0.00	0.38
17.633	0.00	0.38	0.00	0.38
17.650	0.00	0.38	0.00	0.38
17.667	0.00	0.37	0.00	0.37
17.683	0.00	0.37	0.00	0.37
17.700	0.00	0.37	0.00	0.37
17.717	0.00	0.37	0.00	0.37
17.733	0.00	0.36	0.00	0.36
17.750	0.00	0.36	0.00	0.36
17.767	0.00	0.36	0.00	0.36
17.783	0.00	0.36	0.00	0.36
17.800	0.00	0.36	0.00	0.36
17.817	0.00	0.35	0.00	0.35

17.833	0.00	0.35	0.00	0.35
17.850	0.00	0.35	0.00	0.35
17.867	0.00	0.35	0.00	0.35
17.883	0.00	0.35	0.00	0.35
17.900	0.00	0.34	0.00	0.34
17.917	0.00	0.34	0.00	0.34
17.933	0.00	0.34	0.00	0.34
17.950	0.00	0.34	0.00	0.34
17.967	0.00	0.34	0.00	0.34
17.983	0.00	0.33	0.00	0.33
18.000	0.00	0.33	0.00	0.33

****
FLOW PROCESS FROM NODE 35.00 TO NODE 35.00 IS CODE = 3.2

>>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #3<<<<<
==========



ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 3
THROUGH A FLOW-THROUGH DETENTION BASIN
SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
DEAD STORAGE(AF) = 0.000
SPECIFIED DEAD STORAGE(AF) FILLED = 0.000
SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET = 0.000
DETENTION BASIN CONSTANT LOSS RATE(CFS) = 0.00

BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

INTERVAL NUMBER	DEPTH (FT)	OUTFLOW (CFS)	STORAGE (AF)
1	0.00	0.00	0.000
2	0.50	15.16	0.510
3	1.00	40.12	1.010
4	1.50	54.67	1.520
5	2.00	66.33	2.020
6	2.50	76.19	2.530
7	3.00	84.90	3.040
8	3.50	93.04	3.540
9	4.00	100.45	4.050
10	4.50	107.33	4.560
11	5.00	114.02	5.060
12	5.50	120.27	5.570
13	6.00	126.17	6.070
14	7.00	142.55	7.090
15	8.00	156.65	8.100
16	9.00	168.87	9.110
17	10.00	180.03	10.120
18	11.00	190.43	11.140
19	12.00	200.23	12.150
20	13.00	428.93	13.160
21	14.00	838.96	14.170

==========
MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
15.417	0.000	0.00	0.00	0.00	0.0	0.000
15.433	0.000	0.00	0.00	0.00	0.0	0.000
15.450	0.000	0.00	0.00	0.00	0.0	0.000
15.467	0.000	0.00	0.00	0.00	0.0	0.000
15.483	0.000	0.62	0.00	0.00	0.0	0.001
15.500	0.000	1.73	0.00	0.00	0.1	0.003
15.517	0.000	2.84	0.00	0.01	0.1	0.007
15.533	0.000	3.95	0.00	0.01	0.3	0.012
15.550	0.000	5.06	0.00	0.02	0.4	0.018
15.567	0.000	6.17	0.00	0.03	0.7	0.026
15.583	0.000	7.27	0.00	0.03	0.9	0.035
15.600	0.000	8.38	0.00	0.04	1.2	0.045
15.617	0.000	9.49	0.00	0.05	1.5	0.056
15.633	0.000	10.60	0.00	0.07	1.8	0.068
15.650	0.000	11.71	0.00	0.08	2.2	0.081
15.667	0.000	12.82	0.00	0.09	2.6	0.095
15.683	0.000	13.92	0.00	0.11	3.0	0.110
15.700	0.000	15.06	0.00	0.12	3.5	0.126
15.717	0.000	17.49	0.00	0.14	4.0	0.144
15.733	0.000	20.68	0.00	0.16	4.6	0.166
15.750	0.000	23.87	0.00	0.19	5.3	0.192
15.767	0.000	27.06	0.00	0.22	6.1	0.221
15.783	0.000	30.25	0.00	0.25	7.0	0.253
15.800	0.000	33.44	0.00	0.28	8.0	0.288
15.817	0.000	36.63	0.00	0.32	9.1	0.326
15.833	0.000	39.82	0.00	0.36	10.3	0.366
15.850	0.000	43.00	0.00	0.40	11.5	0.410
15.867	0.000	46.19	0.00	0.45	12.9	0.456
15.883	0.000	49.38	0.00	0.49	14.3	0.504
15.900	0.000	52.57	0.00	0.54	16.2	0.554

15.917	0.000	55.76	0.00	0.60	18.6	0.605
15.933	0.000	58.95	0.00	0.65	21.2	0.657
15.950	0.000	62.14	0.00	0.70	23.8	0.710
15.967	0.000	65.33	0.00	0.75	26.5	0.763
15.983	0.000	68.52	0.00	0.81	29.2	0.818
16.000	0.000	71.71	0.00	0.86	31.9	0.873
16.017	0.000	83.32	0.00	0.93	34.9	0.939
16.033	0.000	103.36	0.00	1.02	38.6	1.028
16.050	0.000	123.39	0.00	1.13	42.2	1.140
16.067	0.000	143.43	0.00	1.26	45.8	1.275
16.083	0.000	163.47	0.00	1.41	49.9	1.431
16.100	0.000	183.50	0.00	1.59	54.4	1.609
16.117	0.000	203.54	0.00	1.79	59.1	1.808
16.133	0.000	223.58	0.00	2.01	63.9	2.028
16.150	0.000	243.61	0.00	2.24	68.8	2.269
16.167	0.000	263.65	0.00	2.50	73.7	2.530
16.183	0.000	283.69	0.00	2.78	78.6	2.813
16.200	0.000	303.72	0.00	3.08	83.6	3.116
16.217	0.000	323.76	0.00	3.40	88.8	3.440
16.233	0.000	343.95	0.00	3.74	94.0	3.784
16.250	0.000	364.61	0.00	4.10	99.2	4.150
16.267	0.000	384.04	0.00	4.48	104.4	4.535
16.283	0.000	403.91	0.00	4.88	109.7	4.940
16.300	0.000	423.94	0.00	5.30	115.1	5.365
16.317	0.000	436.93	0.00	5.73	120.4	5.801
16.333	0.000	404.74	0.00	6.11	125.5	6.186
16.350	0.000	380.94	0.00	6.45	130.8	6.531
16.367	0.000	357.14	0.00	6.75	136.0	6.835
16.383	0.000	333.33	0.00	7.01	140.6	7.101
16.400	0.000	309.53	0.00	7.24	144.3	7.328
16.417	0.000	285.73	0.00	7.42	147.2	7.519
16.433	0.000	261.92	0.00	7.58	149.6	7.674
16.450	0.000	238.12	0.00	7.70	151.5	7.793
16.467	0.000	214.31	0.00	7.78	153.0	7.878
16.483	0.000	190.51	0.00	7.83	153.9	7.928
16.500	0.000	166.70	0.00	7.85	154.4	7.945
16.517	0.000	142.90	0.00	7.83	154.4	7.929
16.533	0.000	119.10	0.00	7.78	153.9	7.881
16.550	0.000	95.29	0.00	7.70	153.0	7.802
16.567	0.000	71.49	0.00	7.60	151.7	7.691
16.583	0.000	47.68	0.00	7.46	150.0	7.550
16.600	0.000	23.88	0.00	7.29	147.8	7.380
16.617	0.000	5.57	0.00	7.10	145.2	7.187
16.633	0.000	2.99	0.00	6.91	142.5	6.995
16.650	0.000	1.38	0.00	6.72	139.5	6.805
16.667	0.000	0.00	0.00	6.54	136.5	6.617
16.683	0.000	0.00	0.00	6.36	133.5	6.433
16.700	0.000	0.00	0.00	6.18	130.6	6.253
16.717	0.000	0.00	0.00	6.01	127.7	6.077
16.733	0.000	0.00	0.00	5.83	125.3	5.905
16.750	0.000	0.00	0.00	5.67	123.2	5.735
16.767	0.000	0.00	0.00	5.50	121.2	5.568
16.783	0.000	0.00	0.00	5.34	119.2	5.404
16.800	0.000	0.00	0.00	5.18	117.2	5.242
16.817	0.000	0.00	0.00	5.02	115.3	5.084
16.833	0.000	0.00	0.00	4.87	113.3	4.927
16.850	0.000	0.00	0.00	4.71	111.2	4.774
16.867	0.000	0.00	0.00	4.56	109.2	4.624
16.883	0.000	0.00	0.00	4.42	107.2	4.476
16.900	0.000	0.00	0.00	4.28	105.2	4.331
16.917	0.000	0.00	0.00	4.14	103.3	4.189
16.933	0.000	0.00	0.00	4.00	101.4	4.049
16.950	0.000	0.00	0.00	3.87	99.4	3.912
16.967	0.000	0.00	0.00	3.73	97.5	3.778
16.983	0.000	0.00	0.00	3.60	95.5	3.647
17.000	0.000	0.00	0.00	3.48	93.6	3.518
17.017	0.000	0.00	0.00	3.35	91.6	3.391
17.033	0.000	0.00	0.00	3.23	89.6	3.268
17.050	0.000	0.00	0.00	3.11	87.6	3.147
17.067	0.000	0.00	0.00	2.99	85.7	3.029
17.083	0.000	0.00	0.00	2.88	83.7	2.914
17.100	0.000	0.00	0.00	2.77	81.8	2.801
17.117	0.000	0.00	0.00	2.66	79.9	2.691
17.133	0.000	0.00	0.00	2.55	78.0	2.584
17.150	0.000	0.00	0.00	2.45	76.2	2.479
17.167	0.000	0.00	0.00	2.35	74.2	2.377
17.183	0.000	0.00	0.00	2.25	72.3	2.277
17.200	0.000	0.00	0.00	2.16	70.4	2.180
17.217	0.000	0.00	0.00	2.06	68.5	2.086
17.233	0.000	0.00	0.00	1.97	66.7	1.994
17.250	0.000	0.00	0.00	1.88	64.7	1.905
17.267	0.000	0.00	0.00	1.80	62.6	1.819
17.283	0.000	0.00	0.00	1.72	60.7	1.735
17.300	0.000	0.00	0.00	1.63	58.7	1.654
17.317	0.000	0.00	0.00	1.56	56.9	1.576
17.333	0.000	0.00	0.00	1.48	55.0	1.500
17.350	0.000	0.00	0.00	1.41	53.1	1.427
17.367	0.000	0.00	0.00	1.34	51.0	1.357
17.383	0.000	0.00	0.00	1.27	49.0	1.289
17.400	0.000	0.00	0.00	1.21	47.2	1.224
17.417	0.000	0.00	0.00	1.15	45.3	1.162
17.433	0.000	0.00	0.00	1.09	43.6	1.102
17.450	0.000	0.00	0.00	1.03	41.9	1.044
17.467	0.000	0.00	0.00	0.98	40.1	0.989
17.483	0.000	0.00	0.00	0.93	37.8	0.937
17.500	0.000	0.00	0.00	0.88	35.2	0.888
17.517	0.000	0.00	0.00	0.83	32.9	0.843
17.533	0.000	0.00	0.00	0.79	30.7	0.800
17.550	0.000	0.00	0.00	0.75	28.7	0.761
17.567	0.000	0.00	0.00	0.71	26.8	0.724
17.583	0.000	0.00	0.00	0.68	25.0	0.690
17.600	0.000	0.00	0.00	0.65	23.3	0.658
17.617	0.000	0.00	0.00	0.62	21.8	0.628
17.633	0.000	0.00	0.00	0.59	20.3	0.600
17.650	0.000	0.00	0.00	0.56	19.0	0.573
17.667	0.000	0.00	0.00	0.54	17.7	0.549
17.683	0.000	0.00	0.00	0.52	16.5	0.526
17.700	0.000	0.00	0.00	0.50	15.5	0.505
17.717	0.000	0.00	0.00	0.48	14.7	0.485
17.733	0.000	0.00	0.00	0.46	14.1	0.465
17.750	0.000	0.00	0.00	0.44	13.6	0.447
17.767	0.000	0.00	0.00	0.42	13.0	0.429

17.783	0.000	0.00	0.00	0.40	12.5	0.411
17.800	0.000	0.00	0.00	0.39	12.0	0.395
17.817	0.000	0.00	0.00	0.37	11.5	0.379
17.833	0.000	0.00	0.00	0.36	11.0	0.364
17.850	0.000	0.00	0.00	0.34	10.6	0.349
17.867	0.000	0.00	0.00	0.33	10.2	0.335
17.883	0.000	0.00	0.00	0.32	9.8	0.322
17.900	0.000	0.00	0.00	0.30	9.4	0.309
17.917	0.000	0.00	0.00	0.29	9.0	0.296
17.933	0.000	0.00	0.00	0.28	8.6	0.285
17.950	0.000	0.00	0.00	0.27	8.3	0.273
17.967	0.000	0.00	0.00	0.26	8.0	0.262
17.983	0.000	0.00	0.00	0.25	7.6	0.252
18.000	0.000	0.00	0.00	0.24	7.3	0.242
18.017	0.000	0.00	0.00	0.23	7.0	0.232
18.033	0.000	0.00	0.00	0.22	6.8	0.223
18.050	0.000	0.00	0.00	0.21	6.5	0.214
18.067	0.000	0.00	0.00	0.20	6.2	0.205
18.083	0.000	0.00	0.00	0.19	6.0	0.197
18.100	0.000	0.00	0.00	0.19	5.7	0.189
18.117	0.000	0.00	0.00	0.18	5.5	0.181
18.133	0.000	0.00	0.00	0.17	5.3	0.174
18.150	0.000	0.00	0.00	0.16	5.1	0.167
18.167	0.000	0.00	0.00	0.16	4.9	0.160
18.183	0.000	0.00	0.00	0.15	4.7	0.154
18.200	0.000	0.00	0.00	0.14	4.5	0.148
18.217	0.000	0.00	0.00	0.14	4.3	0.142
18.233	0.000	0.00	0.00	0.13	4.1	0.136
18.250	0.000	0.00	0.00	0.13	4.0	0.131
18.267	0.000	0.00	0.00	0.12	3.8	0.125
18.283	0.000	0.00	0.00	0.12	3.7	0.120
18.300	0.000	0.00	0.00	0.11	3.5	0.116
18.317	0.000	0.00	0.00	0.11	3.4	0.111
18.333	0.000	0.00	0.00	0.10	3.2	0.107
18.350	0.000	0.00	0.00	0.10	3.1	0.102
18.367	0.000	0.00	0.00	0.10	3.0	0.098
18.383	0.000	0.00	0.00	0.09	2.9	0.094
18.400	0.000	0.00	0.00	0.09	2.7	0.090
18.417	0.000	0.00	0.00	0.09	2.6	0.087
18.433	0.000	0.00	0.00	0.08	2.5	0.083
18.450	0.000	0.00	0.00	0.08	2.4	0.080
18.467	0.000	0.00	0.00	0.08	2.3	0.077
18.483	0.000	0.00	0.00	0.07	2.2	0.074
18.500	0.000	0.00	0.00	0.07	2.1	0.071
18.517	0.000	0.00	0.00	0.07	2.1	0.068
18.533	0.000	0.00	0.00	0.06	2.0	0.065
18.550	0.000	0.00	0.00	0.06	1.9	0.063
18.567	0.000	0.00	0.00	0.06	1.8	0.060
18.583	0.000	0.00	0.00	0.06	1.7	0.058
18.600	0.000	0.00	0.00	0.05	1.7	0.055
18.617	0.000	0.00	0.00	0.05	1.6	0.053
18.633	0.000	0.00	0.00	0.05	1.5	0.051
18.650	0.000	0.00	0.00	0.05	1.5	0.049
18.667	0.000	0.00	0.00	0.05	1.4	0.047
18.683	0.000	0.00	0.00	0.04	1.4	0.045
18.700	0.000	0.00	0.00	0.04	1.3	0.043
18.717	0.000	0.00	0.00	0.04	1.3	0.042
18.733	0.000	0.00	0.00	0.04	1.2	0.040
18.750	0.000	0.00	0.00	0.04	1.2	0.038
18.767	0.000	0.00	0.00	0.04	1.1	0.037
18.783	0.000	0.00	0.00	0.03	1.1	0.035
18.800	0.000	0.00	0.00	0.03	1.0	0.034
18.817	0.000	0.00	0.00	0.03	1.0	0.032
18.833	0.000	0.00	0.00	0.03	0.9	0.031
18.850	0.000	0.00	0.00	0.03	0.9	0.030
18.867	0.000	0.00	0.00	0.03	0.9	0.029
18.883	0.000	0.00	0.00	0.03	0.8	0.028
18.900	0.000	0.00	0.00	0.03	0.8	0.026
18.917	0.000	0.00	0.00	0.02	0.8	0.025
18.933	0.000	0.00	0.00	0.02	0.7	0.024
18.950	0.000	0.00	0.00	0.02	0.7	0.023
18.967	0.000	0.00	0.00	0.02	0.7	0.022
18.983	0.000	0.00	0.00	0.02	0.7	0.022
19.000	0.000	0.00	0.00	0.02	0.6	0.021
19.017	0.000	0.00	0.00	0.02	0.6	0.020
19.033	0.000	0.00	0.00	0.02	0.6	0.019
19.050	0.000	0.00	0.00	0.02	0.6	0.018
19.067	0.000	0.00	0.00	0.02	0.5	0.018
19.083	0.000	0.00	0.00	0.02	0.5	0.017
19.100	0.000	0.00	0.00	0.02	0.5	0.016
19.117	0.000	0.00	0.00	0.02	0.5	0.016
19.133	0.000	0.00	0.00	0.01	0.5	0.015
19.150	0.000	0.00	0.00	0.01	0.4	0.014
19.167	0.000	0.00	0.00	0.01	0.4	0.014
19.183	0.000	0.00	0.00	0.01	0.4	0.013
19.200	0.000	0.00	0.00	0.01	0.4	0.013
19.217	0.000	0.00	0.00	0.01	0.4	0.012
19.233	0.000	0.00	0.00	0.01	0.4	0.012
19.250	0.000	0.00	0.00	0.01	0.3	0.011
19.267	0.000	0.00	0.00	0.01	0.3	0.011
19.283	0.000	0.00	0.00	0.01	0.3	0.010
19.300	0.000	0.00	0.00	0.01	0.3	0.010
19.317	0.000	0.00	0.00	0.01	0.3	0.010
19.333	0.000	0.00	0.00	0.01	0.3	0.009
19.350	0.000	0.00	0.00	0.01	0.3	0.009
19.367	0.000	0.00	0.00	0.01	0.3	0.008
19.383	0.000	0.00	0.00	0.01	0.2	0.008
19.400	0.000	0.00	0.00	0.01	0.2	0.008
19.417	0.000	0.00	0.00	0.01	0.2	0.007
19.433	0.000	0.00	0.00	0.01	0.2	0.007
19.450	0.000	0.00	0.00	0.01	0.2	0.007
19.467	0.000	0.00	0.00	0.01	0.2	0.007
19.483	0.000	0.00	0.00	0.01	0.2	0.006
19.500	0.000	0.00	0.00	0.01	0.2	0.006
19.517	0.000	0.00	0.00	0.01	0.2	0.006
19.533	0.000	0.00	0.00	0.01	0.2	0.006
19.550	0.000	0.00	0.00	0.01	0.2	0.005
19.567	0.000	0.00	0.00	0.01	0.2	0.005
19.583	0.000	0.00	0.00	0.00	0.1	0.005
19.600	0.000	0.00	0.00	0.00	0.1	0.005
19.617	0.000	0.00	0.00	0.00	0.1	0.005
19.633	0.000	0.00	0.00	0.00	0.1	0.004

19.650	0.000	0.00	0.00	0.00	0.1	0.004
19.667	0.000	0.00	0.00	0.00	0.1	0.004
19.683	0.000	0.00	0.00	0.00	0.1	0.004
19.700	0.000	0.00	0.00	0.00	0.1	0.004
19.717	0.000	0.00	0.00	0.00	0.1	0.004
19.733	0.000	0.00	0.00	0.00	0.1	0.003
19.750	0.000	0.00	0.00	0.00	0.1	0.003
19.767	0.000	0.00	0.00	0.00	0.1	0.003
19.783	0.000	0.00	0.00	0.00	0.1	0.003
19.800	0.000	0.00	0.00	0.00	0.1	0.003
19.817	0.000	0.00	0.00	0.00	0.1	0.003
19.833	0.000	0.00	0.00	0.00	0.1	0.003
19.850	0.000	0.00	0.00	0.00	0.1	0.003
19.867	0.000	0.00	0.00	0.00	0.1	0.002
19.883	0.000	0.00	0.00	0.00	0.1	0.002
19.900	0.000	0.00	0.00	0.00	0.1	0.002
19.917	0.000	0.00	0.00	0.00	0.1	0.002
19.933	0.000	0.00	0.00	0.00	0.1	0.002
19.950	0.000	0.00	0.00	0.00	0.1	0.002
19.967	0.000	0.00	0.00	0.00	0.1	0.002
19.983	0.000	0.00	0.00	0.00	0.1	0.002
20.000	0.000	0.00	0.00	0.00	0.1	0.002
20.017	0.000	0.00	0.00	0.00	0.1	0.002
20.033	0.000	0.00	0.00	0.00	0.0	0.002
20.050	0.000	0.00	0.00	0.00	0.0	0.002
20.067	0.000	0.00	0.00	0.00	0.0	0.002
20.083	0.000	0.00	0.00	0.00	0.0	0.001
20.100	0.000	0.00	0.00	0.00	0.0	0.001
20.117	0.000	0.00	0.00	0.00	0.0	0.001
20.133	0.000	0.00	0.00	0.00	0.0	0.001
20.150	0.000	0.00	0.00	0.00	0.0	0.001
20.167	0.000	0.00	0.00	0.00	0.0	0.001
20.183	0.000	0.00	0.00	0.00	0.0	0.001
20.200	0.000	0.00	0.00	0.00	0.0	0.001
20.217	0.000	0.00	0.00	0.00	0.0	0.001
20.233	0.000	0.00	0.00	0.00	0.0	0.001
20.250	0.000	0.00	0.00	0.00	0.0	0.001
20.267	0.000	0.00	0.00	0.00	0.0	0.001
20.283	0.000	0.00	0.00	0.00	0.0	0.001
20.300	0.000	0.00	0.00	0.00	0.0	0.001
20.317	0.000	0.00	0.00	0.00	0.0	0.001
20.333	0.000	0.00	0.00	0.00	0.0	0.001
20.350	0.000	0.00	0.00	0.00	0.0	0.001
20.367	0.000	0.00	0.00	0.00	0.0	0.001
20.383	0.000	0.00	0.00	0.00	0.0	0.001
20.400	0.000	0.00	0.00	0.00	0.0	0.001
20.417	0.000	0.00	0.00	0.00	0.0	0.001
20.433	0.000	0.00	0.00	0.00	0.0	0.001
20.450	0.000	0.00	0.00	0.00	0.0	0.001
20.467	0.000	0.00	0.00	0.00	0.0	0.001
20.483	0.000	0.00	0.00	0.00	0.0	0.001
20.500	0.000	0.00	0.00	0.00	0.0	0.001
20.517	0.000	0.00	0.00	0.00	0.0	0.000
20.533	0.000	0.00	0.00	0.00	0.0	0.000
20.550	0.000	0.00	0.00	0.00	0.0	0.000
20.567	0.000	0.00	0.00	0.00	0.0	0.000
20.583	0.000	0.00	0.00	0.00	0.0	0.000
20.600	0.000	0.00	0.00	0.00	0.0	0.000

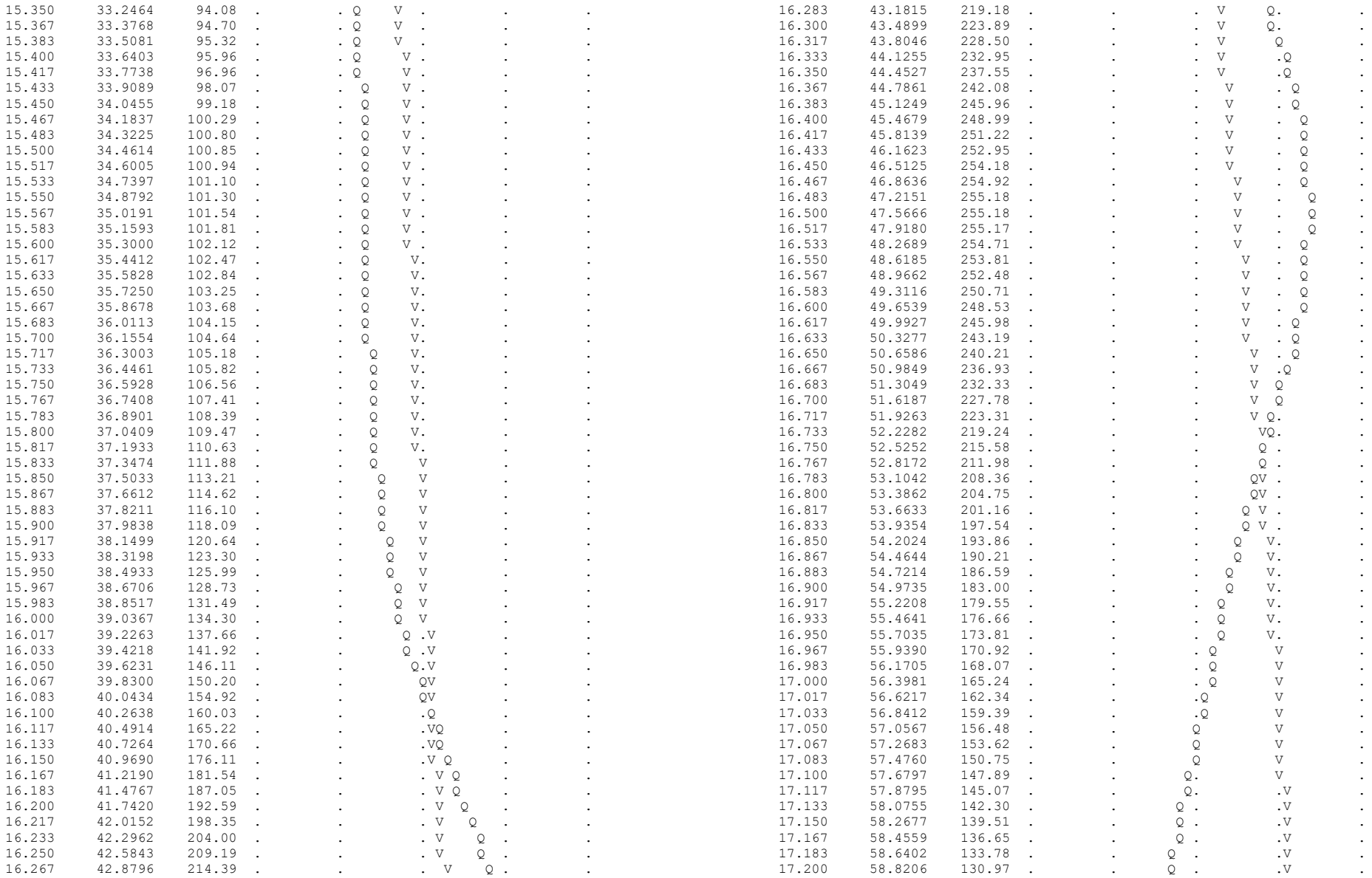
```
--------------------------------------------------------------------------------
  PROCESS SUMMARY OF STORAGE:
    INFLOW  VOLUME =     13.181 AF
    BASIN  STORAGE =      0.000 AF (WITH      0.000 AF INITIALLY FILLED)
    OUTFLOW VOLUME =     13.181 AF
    LOSS    VOLUME =      0.000 AF


********************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     35.20 IS CODE =   7
--------------------------------------------------------------------------------
  >>>>>STREAM NUMBER 1 ADDED TO STREAM NUMBER 2<<<<<
================================================================================


********************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  11
--------------------------------------------------------------------------------
  >>>>>VIEW STREAM NUMBER 2 HYDROGRAPH<<<<<
================================================================================

           STREAM HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
--------------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)    Q(CFS) 0.       50.0     100.0     150.0     200.0
--------------------------------------------------------------------------------
  14.000     25.3681     55.27  .         .Q    V   .         .         .
  14.017     25.4444     55.41  .         .Q    V   .         .         .
  14.033     25.5209     55.56  .         .Q    V   .         .         .
  14.050     25.5976     55.70  .         .Q    V   .         .         .
  14.067     25.6746     55.84  .         .Q    V   .         .         .
  14.083     25.7517     55.99  .         .Q    V   .         .         .
  14.100     25.8290     56.14  .         .Q    V   .         .         .
  14.117     25.9065     56.29  .         .Q    V   .         .         .
  14.133     25.9843     56.43  .         .Q    V   .         .         .
  14.150     26.0622     56.58  .         .Q    V   .         .         .
  14.167     26.1403     56.73  .         .Q     V  .         .         .
  14.183     26.2187     56.88  .         .Q     V  .         .         .
  14.200     26.2974     57.12  .         .Q     V  .         .         .
  14.217     26.3766     57.51  .         .Q     V  .         .         .
  14.233     26.4563     57.91  .         .Q     V  .         .         .
  14.250     26.5366     58.30  .         .Q     V  .         .         .
  14.267     26.6175     58.70  .         .Q     V  .         .         .
  14.283     26.6989     59.09  .         .Q     V  .         .         .
  14.300     26.7808     59.49  .         .Q     V  .         .         .
  14.317     26.8633     59.88  .         .Q     V  .         .         .
  14.333     26.9463     60.27  .         . Q    V  .         .         .
  14.350     27.0299     60.66  .         . Q    V  .         .         .
  14.367     27.1140     61.06  .         . Q    V  .         .         .
  14.383     27.1986     61.45  .         . Q    V  .         .         .
  14.400     27.2838     61.84  .         . Q    V  .         .         .
  14.417     27.3695     62.23  .         . Q    V  .         .         .
```

```
14.433   27.4558   62.63  .        . Q    V  .         .         .
14.450   27.5426   63.02  .        . Q    V  .         .         .
14.467   27.6299   63.41  .        . Q     V .         .         .
14.483   27.7178   63.80  .        . Q     V .         .         .
14.500   27.8062   64.17  .        . Q     V .         .         .
14.517   27.8950   64.47  .        . Q     V .         .         .
14.533   27.9842   64.77  .        . Q     V .         .         .
14.550   28.0739   65.08  .        .  Q    V .         .         .
14.567   28.1639   65.38  .        .  Q    V .         .         .
14.583   28.2544   65.68  .        .  Q    V .         .         .
14.600   28.3453   65.98  .        .  Q    V .         .         .
14.617   28.4366   66.29  .        .  Q    V .         .         .
14.633   28.5283   66.59  .        .  Q    V .         .         .
14.650   28.6205   66.89  .        .  Q    V .         .         .
14.667   28.7130   67.20  .        .  Q    V .         .         .
14.683   28.8060   67.50  .        .  Q    V .         .         .
14.700   28.8994   67.80  .        .  Q    V .         .         .
14.717   28.9932   68.11  .        .  Q    V .         .         .
14.733   29.0874   68.41  .        .  Q    V .         .         .
14.750   29.1821   68.71  .        .  Q     V.         .         .
14.767   29.2771   69.02  .        .  Q     V.         .         .
14.783   29.3726   69.32  .        .  Q     V.         .         .
14.800   29.4686   69.71  .        .  Q     V.         .         .
14.817   29.5658   70.50  .        .   Q    V.         .         .
14.833   29.6640   71.34  .        .   Q    V.         .         .
14.850   29.7634   72.17  .        .   Q    V.         .         .
14.867   29.8640   73.01  .        .   Q    V.         .         .
14.883   29.9657   73.84  .        .   Q    V.         .         .
14.900   30.0686   74.68  .        .   Q    V.         .         .
14.917   30.1726   75.51  .        .    Q   V.         .         .
14.933   30.2778   76.35  .        .    Q   V.         .         .
14.950   30.3841   77.18  .        .    Q   V.         .         .
14.967   30.4915   78.02  .        .    Q   V.         .         .
14.983   30.6001   78.85  .        .    Q   V.         .         .
15.000   30.7099   79.69  .        .    Q    V         .         .
15.017   30.8208   80.52  .        .     Q   V         .         .
15.033   30.9329   81.36  .        .     Q   V         .         .
15.050   31.0461   82.20  .        .     Q   V         .         .
15.067   31.1605   83.04  .        .     Q   V         .         .
15.083   31.2760   83.88  .        .     Q   V         .         .
15.100   31.3927   84.69  .        .     Q   V         .         .
15.117   31.5102   85.35  .        .      Q  V         .         .
15.133   31.6287   85.98  .        .      Q  V         .         .
15.150   31.7479   86.60  .        .      Q  V         .         .
15.167   31.8681   87.22  .        .      Q  V         .         .
15.183   31.9891   87.85  .        .      Q  V         .         .
15.200   32.1109   88.47  .        .      Q  V         .         .
15.217   32.2337   89.10  .        .      Q  .V        .         .
15.233   32.3573   89.72  .        .      Q  .V        .         .
15.250   32.4817   90.35  .        .       Q .V        .         .
15.267   32.6070   90.97  .        .       Q .V        .         .
15.283   32.7332   91.59  .        .       Q .V        .         .
15.300   32.8602   92.21  .        .       Q .V        .         .
15.317   32.9880   92.84  .        .       Q .V        .         .
15.333   33.1168   93.46  .        .       Q .V        .         .
15.350   33.2464   94.08  .        .       Q .V        .         .
15.367   33.3768   94.70  .        .      Q .V         .         .
15.383   33.5081   95.32  .        .       Q.V         .         .
15.400   33.6403   95.96  .        .       Q.V         .         .
15.417   33.7738   96.96  .        .       Q. V        .         .
15.433   33.9089   98.07  .        .       Q. V        .         .
15.450   34.0455   99.18  .        .       Q. V        .         .
15.467   34.1837  100.29  .        .        Q V        .         .
15.483   34.3225  100.78  .        .        Q V        .         .
15.500   34.4613  100.79  .        .        Q V        .         .
15.517   34.6002  100.79  .        .        Q V        .         .
15.533   34.7390  100.82  .        .        Q V        .         .
15.550   34.8779  100.85  .        .        Q V        .         .
15.567   35.0169  100.88  .        .        Q V        .         .
15.583   35.1559  100.91  .        .        Q V        .         .
15.600   35.2949  100.95  .        .        Q V        .         .
15.617   35.4340  100.98  .        .        Q  V       .         .
15.633   35.5732  101.01  .        .        Q  V       .         .
15.650   35.7123  101.04  .        .        Q  V       .         .
15.667   35.8516  101.08  .        .        Q  V       .         .
15.683   35.9908  101.11  .        .        Q  V       .         .
15.700   36.1301  101.14  .        .        Q  V       .         .
15.717   36.2695  101.17  .        .        Q  V       .         .
15.733   36.4089  101.20  .        .        Q  V       .         .
15.750   36.5483  101.24  .        .        Q  V       .         .
15.767   36.6878  101.28  .        .        Q  V       .         .
15.783   36.8274  101.35  .        .        Q  V       .         .
15.800   36.9672  101.44  .        .        Q   V      .         .
15.817   37.1070  101.52  .        .        Q   V      .         .
15.833   37.2469  101.60  .        .        Q   V      .         .
15.850   37.3870  101.68  .        .        Q   V      .         .
15.867   37.5272  101.76  .        .        Q   V      .         .
15.883   37.6674  101.84  .        .        Q   V      .         .
15.900   37.8078  101.92  .        .        Q   V      .         .
15.917   37.9483  102.00  .        .        Q   V      .         .
15.933   38.0889  102.08  .        .        Q   V      .         .
15.950   38.2297  102.17  .        .        Q   V      .         .
15.967   38.3705  102.25  .        .        Q    V     .         .
15.983   38.5114  102.33  .        .        Q    V     .         .
16.000   38.6525  102.41  .        .        Q    V     .         .
16.017   38.7940  102.73  .        .        Q    V     .         .
16.033   38.9363  103.31  .        .        Q    V     .         .
16.050   39.0794  103.88  .        .        Q    V     .         .
16.067   39.2233  104.45  .        .        Q    V     .         .
16.083   39.3679  105.02  .        .        .Q   V     .         .
16.100   39.5134  105.59  .        .        .Q   V     .         .
16.117   39.6596  106.16  .        .        .Q   V     .         .
16.133   39.8066  106.73  .        .        .Q   V     .         .
16.150   39.9544  107.30  .        .        .Q    V    .         .
16.167   40.1030  107.87  .        .        .Q    V    .         .
16.183   40.2523  108.44  .        .        .Q    V    .         .
16.200   40.4025  109.01  .        .        .Q    V    .         .
16.217   40.5534  109.58  .        .        .Q    V    .         .
16.233   40.7049  110.00  .        .        . Q   V    .         .
16.250   40.8565  110.00  .        .        . Q   V    .         .
16.267   41.0080  110.00  .        .        . Q   V    .         .
16.283   41.1588  109.48  .        .        .Q    V    .         .
```

```
16.300     41.3086    108.80  .         .         .Q    V   .         .
16.317     41.4576    108.12  .         .         .Q     V  .         .
16.333     41.6055    107.43  .         .         .Q     V  .         .
16.350     41.7526    106.75  .         .         .Q     V  .         .
16.367     41.8987    106.07  .         .         .Q     V  .         .
16.383     42.0438    105.38  .         .         .Q     V  .         .
16.400     42.1880    104.70  .         .         Q      V  .         .
16.417     42.3313    104.02  .         .         Q      V  .         .
16.433     42.4736    103.33  .         .         Q      V  .         .
16.450     42.6150    102.65  .         .         Q      V  .         .
16.467     42.7555    101.97  .         .         Q      V  .         .
16.483     42.8950    101.28  .         .         Q      V  .         .
16.500     43.0339    100.81  .         .         Q       V .         .
16.517     43.1727    100.79  .         .         Q       V .         .
16.533     43.3115    100.78  .         .         Q       V .         .
16.550     43.4503    100.77  .         .         Q       V .         .
16.567     43.5891    100.76  .         .         Q       V .         .
16.583     43.7279    100.75  .         .         Q       V .         .
16.600     43.8666    100.74  .         .         Q       V .         .
16.617     44.0054    100.73  .         .         Q       V .         .
16.633     44.1441    100.73  .         .         Q       V .         .
16.650     44.2829    100.72  .         .         Q       V .         .
16.667     44.4213    100.47  .         .         Q       V .         .
16.683     44.5574     98.85  .         .        Q.        V.         .
16.700     44.6913     97.23  .         .        Q.        V.         .
16.717     44.8230     95.61  .         .        Q.        V.         .
16.733     44.9525     93.99  .         .       Q .        V.         .
16.750     45.0797     92.36  .         .       Q .        V.         .
16.767     45.2047     90.74  .         .       Q .        V.         .
16.783     45.3275     89.12  .         .      Q  .        V.         .
16.800     45.4480     87.50  .         .      Q  .        V.         .
16.817     45.5663     85.88  .         .      Q  .        V.         .
16.833     45.6824     84.26  .         .     Q   .        V.         .
16.850     45.7962     82.64  .         .     Q   .        V.         .
16.867     45.9078     81.02  .         .     Q   .        V.         .
16.883     46.0171     79.40  .         .    Q    .        V.         .
16.900     46.1243     77.78  .         .    Q    .         V         .
16.917     46.2293     76.27  .         .    Q    .         V         .
16.933     46.3330     75.28  .         .    Q    .         V         .
16.950     46.4355     74.36  .         .   Q     .         V         .
16.967     46.5366     73.44  .         .   Q     .         V         .
16.983     46.6365     72.52  .         .   Q     .         V         .
17.000     46.7351     71.61  .         .   Q     .         V         .
17.017     46.8325     70.69  .         .   Q     .         V         .
17.033     46.9286     69.77  .         .  Q      .         V         .
17.050     47.0234     68.86  .         .  Q      .         V         .
17.067     47.1170     67.94  .         .  Q      .         V         .
17.083     47.2093     67.02  .         .  Q      .         V         .
17.100     47.3004     66.11  .         .  Q      .         V         .
17.117     47.3902     65.19  .         .  Q      .         V         .
17.133     47.4787     64.27  .         . Q       .         V         .
17.150     47.5660     63.35  .         . Q       .         V         .
17.167     47.6520     62.44  .         . Q       .         .V        .
17.183     47.7367     61.52  .         . Q       .         .V        .
17.200     47.8202     60.60  .         . Q       .         .V        .
17.217     47.9025     59.73  .         .Q        .         .V        .
17.233     47.9840     59.22  .         .Q        .         .V        .
17.250     48.0650     58.80  .         .Q        .         .V        .
17.267     48.1455     58.39  .         .Q        .         .V        .
17.283     48.2253     57.97  .         .Q        .         .V        .
17.300     48.3046     57.55  .         .Q        .         .V        .
17.317     48.3833     57.13  .         .Q        .         .V        .
17.333     48.4614     56.71  .         .Q        .         .V        .
17.350     48.5389     56.29  .         .Q        .         .V        .
17.367     48.6159     55.88  .         .Q        .         .V        .
17.383     48.6923     55.46  .         .Q        .         .V        .
17.400     48.7681     55.04  .         .Q        .         .V        .
17.417     48.8433     54.62  .         Q         .         .V        .
17.433     48.9180     54.20  .         Q         .         .V        .
17.450     48.9921     53.78  .         Q         .         .V        .
17.467     49.0656     53.37  .         Q         .         .V        .
17.483     49.1385     52.95  .         Q         .         . V       .
17.500     49.2109     52.53  .         Q         .         . V       .
17.517     49.2826     52.12  .         Q         .         . V       .
17.533     49.3540     51.78  .         Q         .         . V       .
17.550     49.4249     51.48  .         Q         .         . V       .
17.567     49.4954     51.18  .         Q         .         . V       .
17.583     49.5655     50.88  .         Q         .         . V       .
17.600     49.6351     50.57  .         Q         .         . V       .
17.617     49.7044     50.27  .         Q         .         . V       .
17.633     49.7732     49.97  .        Q.         .         . V       .
17.650     49.8416     49.67  .        Q.         .         . V       .
17.667     49.9096     49.36  .        Q.         .         . V       .
17.683     49.9772     49.06  .        Q.         .         . V       .
17.700     50.0443     48.76  .        Q.         .         . V       .
17.717     50.1111     48.46  .        Q.         .         . V       .
17.733     50.1774     48.16  .        Q.         .         . V       .
17.750     50.2433     47.85  .        Q.         .         . V       .
17.767     50.3088     47.55  .        Q.         .         . V       .
17.783     50.3739     47.25  .        Q.         .         . V       .
17.800     50.4386     46.95  .        Q.         .         . V       .
17.817     50.5028     46.65  .        Q.         .         . V       .
17.833     50.5667     46.39  .        Q.         .         . V       .
17.850     50.6303     46.17  .        Q.         .         . V       .
17.867     50.6936     45.94  .        Q.         .         .  V      .
17.883     50.7566     45.72  .        Q.         .         .  V      .
17.900     50.8192     45.49  .        Q.         .         .  V      .
17.917     50.8816     45.27  .        Q.         .         .  V      .
17.933     50.9436     45.04  .        Q.         .         .  V      .
17.950     51.0054     44.82  .       Q .         .         .  V      .
17.967     51.0668     44.59  .       Q .         .         .  V      .
17.983     51.1279     44.37  .       Q .         .         .  V      .
18.000     51.1887     44.14  .       Q .         .         .  V      .
--------------------------------------------------------------------------------
    TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
    (Note: 100% of Peak Flow Rate estimate assumed to have
    an instantaneous time duration)

    Percentile of Estimated                 Duration
        Peak Flow Rate                      (minutes)
    =======================                 =========
              0%                              1081.0
```

10%	1081.0
20%	1081.0
30%	1081.0
40%	1081.0
50%	1030.0
60%	750.0
70%	590.0
80%	480.0
90%	370.0

```
****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>STREAM NUMBER 2 ADDED TO STREAM NUMBER 3<<<<<
============================================================================


****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>VIEW STREAM NUMBER 3 HYDROGRAPH<<<<<
============================================================================

           STREAM HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
       (Notes: Time indicated is at END of Each Unit Intervals.
               Peak 5-minute rainfall intensity is modeled as
               a constant value for entire 5-minute period.)
----------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       75.0     150.0     225.0     300.0
----------------------------------------------------------------------------
  14.000     25.3681     55.27  .      Q  .  V      .         .         .
  14.017     25.4444     55.41  .      Q  .  V      .         .         .
  14.033     25.5209     55.56  .      Q  .  V      .         .         .
  14.050     25.5976     55.70  .      Q  .  V      .         .         .
  14.067     25.6746     55.84  .      Q  .  V      .         .         .
  14.083     25.7517     55.99  .      Q  .  V      .         .         .
  14.100     25.8290     56.14  .      Q  .  V      .         .         .
  14.117     25.9065     56.29  .      Q  .  V      .         .         .
  14.133     25.9843     56.43  .      Q  .  V      .         .         .
  14.150     26.0622     56.58  .      Q  .  V      .         .         .
  14.167     26.1403     56.73  .      Q  .   V     .         .         .
  14.183     26.2187     56.88  .      Q  .   V     .         .         .
  14.200     26.2974     57.12  .      Q  .   V     .         .         .
  14.217     26.3766     57.51  .      Q  .   V     .         .         .
  14.233     26.4563     57.91  .      Q  .   V     .         .         .
  14.250     26.5366     58.30  .      Q  .   V     .         .         .
  14.267     26.6175     58.70  .      Q  .   V     .         .         .
  14.283     26.6989     59.09  .      Q  .   V     .         .         .
  14.300     26.7808     59.49  .      Q  .   V     .         .         .
  14.317     26.8633     59.88  .      Q  .   V     .         .         .
  14.333     26.9463     60.27  .       Q .   V     .         .         .
  14.350     27.0299     60.66  .       Q .   V     .         .         .
  14.367     27.1140     61.06  .       Q .   V     .         .         .
  14.383     27.1986     61.45  .       Q .   V     .         .         .
  14.400     27.2838     61.84  .       Q .   V     .         .         .
  14.417     27.3695     62.23  .       Q .   V     .         .         .
  14.433     27.4558     62.63  .       Q .   V     .         .         .
  14.450     27.5426     63.02  .       Q .   V     .         .         .
  14.467     27.6299     63.41  .       Q .   V     .         .         .
  14.483     27.7178     63.80  .       Q .   V     .         .         .
  14.500     27.8062     64.17  .       Q .   V     .         .         .
  14.517     27.8950     64.47  .       Q .   V     .         .         .
  14.533     27.9842     64.77  .       Q .    V    .         .         .
  14.550     28.0739     65.08  .       Q .    V    .         .         .
  14.567     28.1639     65.38  .       Q .    V    .         .         .
  14.583     28.2544     65.68  .       Q .    V    .         .         .
  14.600     28.3453     65.98  .       Q .    V    .         .         .
  14.617     28.4366     66.29  .       Q .    V    .         .         .
  14.633     28.5283     66.59  .       Q .    V    .         .         .
  14.650     28.6205     66.89  .       Q .    V    .         .         .
  14.667     28.7130     67.20  .       Q .    V    .         .         .
  14.683     28.8060     67.50  .       Q.     V    .         .         .
  14.700     28.8994     67.80  .       Q.     V    .         .         .
  14.717     28.9932     68.11  .       Q.     V    .         .         .
  14.733     29.0874     68.41  .       Q.     V    .         .         .
  14.750     29.1821     68.71  .       Q.     V    .         .         .
  14.767     29.2771     69.02  .       Q.     V    .         .         .
  14.783     29.3726     69.32  .       Q.     V    .         .         .
  14.800     29.4686     69.71  .       Q.     V    .         .         .
  14.817     29.5658     70.50  .       Q.     V    .         .         .
  14.833     29.6640     71.34  .       Q.     V    .         .         .
  14.850     29.7634     72.17  .       Q.     V    .         .         .
  14.867     29.8640     73.01  .       Q.      V   .         .         .
  14.883     29.9657     73.84  .       Q.      V   .         .         .
  14.900     30.0686     74.68  .       Q.      V   .         .         .
  14.917     30.1726     75.51  .        Q      V   .         .         .
  14.933     30.2778     76.35  .        Q      V   .         .         .
  14.950     30.3841     77.18  .        Q      V   .         .         .
  14.967     30.4915     78.02  .        Q      V   .         .         .
  14.983     30.6001     78.85  .        Q      V   .         .         .
  15.000     30.7099     79.69  .        Q      V   .         .         .
  15.017     30.8208     80.52  .        Q      V   .         .         .
  15.033     30.9329     81.36  .        Q      V   .         .         .
  15.050     31.0461     82.20  .        Q      V   .         .         .
  15.067     31.1605     83.04  .        .Q     V   .         .         .
  15.083     31.2760     83.88  .        .Q     V   .         .         .
  15.100     31.3927     84.69  .        .Q     V   .         .         .
  15.117     31.5102     85.35  .        .Q     V   .         .         .
  15.133     31.6287     85.98  .        .Q     V   .         .         .
  15.150     31.7479     86.60  .        .Q      V  .         .         .
  15.167     31.8681     87.22  .        .Q      V  .         .         .
  15.183     31.9891     87.85  .        .Q      V  .         .         .
  15.200     32.1109     88.47  .        .Q      V  .         .         .
  15.217     32.2337     89.10  .        .Q      V  .         .         .
  15.233     32.3573     89.72  .        .Q      V  .         .         .
  15.250     32.4817     90.35  .         . Q    V  .         .         .
  15.267     32.6070     90.97  .         . Q    V  .         .         .
  15.283     32.7332     91.59  .         . Q    V  .         .         .
  15.300     32.8602     92.21  .         . Q    V  .         .         .
  15.317     32.9880     92.84  .         . Q    V  .         .         .
  15.333     33.1168     93.46  .         . Q    V  .         .         .
```



Onsite Flood Routing Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1

with Flowby Detention @ Node 56.3 (100cfs) & Node 35.2 (10cfs), User input for total flowby @ Rational Node 35

25-Year Storm Proposed Condition

17.217	58.9972	128.24	. . Q . .V .
17.233	59.1706	125.88	. . Q . .V .
17.250	59.3407	123.49	. . Q . .V .
17.267	59.5074	121.02	. . Q . .V .
17.283	59.6708	118.63	. . Q . . V .
17.300	59.8310	116.29	. . Q . . V .
17.317	59.9880	114.01	. . Q . . V .
17.333	60.1419	111.75	. . Q . . V .
17.350	60.2926	109.35	. . Q . . V .
17.367	60.4398	106.89	. . Q . . V .
17.383	60.5837	104.50	. . Q . . V .
17.400	60.7245	102.19	. . Q . . V .
17.417	60.8622	99.96	. . Q . . V .
17.433	60.9969	97.79	. . Q . . V .
17.450	61.1287	95.69	. . Q . . V .
17.467	61.2574	93.44	. . Q . . V .
17.483	61.3823	90.71	. . Q . . V .
17.500	61.5032	87.78	. .Q . . V .
17.517	61.6204	85.02	. .Q . . V .
17.533	61.7340	82.50	. .Q . . V .
17.550	61.8444	80.16	. Q . . V .
17.567	61.9518	77.95	. Q . . V .
17.583	62.0563	75.87	. Q . . V .
17.600	62.1581	73.90	. Q. . . V .
17.617	62.2573	72.05	. Q. . . V .
17.633	62.3541	70.30	. Q. . . V .
17.650	62.4487	68.65	. Q. . . V .
17.667	62.5411	67.08	. Q . . . V .
17.683	62.6315	65.60	. Q . . . V .
17.700	62.7200	64.25	. Q . . . V .
17.717	62.8070	63.16	. Q . . . V .
17.733	62.8927	62.27	. Q . . . V .
17.750	62.9773	61.40	. Q . . . V .
17.767	63.0607	60.56	. Q . . . V .
17.783	63.1430	59.73	. Q . . . V .
17.800	63.2242	58.93	. Q . . . V .
17.817	63.3043	58.15	. Q . . . V .
17.833	63.3834	57.43	. Q . . . V .
17.850	63.4616	56.76	. Q . . . V .
17.867	63.5389	56.11	. Q . . . V .
17.883	63.6153	55.48	. Q . . . V .
17.900	63.6909	54.87	. Q . . . V .
17.917	63.7656	54.26	. Q . . . V .
17.933	63.8395	53.68	. Q . . . V .
17.950	63.9127	53.11	. Q . . . V .
17.967	63.9851	52.55	. Q . . . V .
17.983	64.0567	52.00	. Q . . . V .
18.000	64.1276	51.47	. Q . . . V .

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	1081.0
20%	1081.0
30%	790.0
40%	545.0
50%	380.0
60%	300.0
70%	230.0
80%	170.0
90%	110.0

END OF FLOODSCx ROUTING ANALYSIS

```
************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
         (c) Copyright 1989-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                      Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                  *
* 100-YEAR STORM PROP. CONDITION FLOWBY AT NODES 56.3 & 35.2             *
* W.O. #1443-136X                                                        *
 ************************************************************************

  FILE NAME: 18142-99.DAT
  TIME/DATE OF STUDY: 18:27 10/16/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE = 1.2
------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =  265.74
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.068
    LOW LOSS FRACTION = 0.119
    TIME OF CONCENTRATION(MIN.) = 17.52
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.52
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.09
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.45
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.43
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.36
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.63

------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =   100.47
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =    24.20

------------------------------------------------------------------------

========================================================================

                      2 4 - H O U R    S T O R M
                   R U N O F F    H Y D R O G R A P H

========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.      174.7     349.3     524.0     698.7
------------------------------------------------------------------------
  14.000     35.8548     75.63  .   Q     .   V     .         .         .
  14.017     35.9593     75.85  .   Q     .   V     .         .         .
  14.033     36.0640     76.07  .   Q     .   V     .         .         .
  14.050     36.1691     76.29  .   Q     .   V     .         .         .
  14.067     36.2745     76.51  .   Q     .   V     .         .         .
  14.083     36.3802     76.73  .   Q     .   V     .         .         .
  14.100     36.4862     76.95  .   Q     .   V     .         .         .
  14.117     36.5925     77.17  .   Q     .   V     .         .         .
  14.133     36.6991     77.39  .   Q     .   V     .         .         .
  14.150     36.8060     77.61  .   Q     .   V     .         .         .
  14.167     36.9132     77.83  .   Q     .   V     .         .         .
  14.183     37.0207     78.05  .   Q     .   V     .         .         .
  14.200     37.1285     78.27  .   Q     .   V     .         .         .
  14.217     37.2366     78.49  .   Q     .   V     .         .         .
  14.233     37.3450     78.71  .   Q     .   V     .         .         .
  14.250     37.4537     78.93  .   Q     .   V     .         .         .
  14.267     37.5630     79.35  .   Q     .   V     .         .         .
  14.283     37.6731     79.91  .   Q     .   V     .         .         .
  14.300     37.7839     80.46  .   Q     .    V    .         .         .
  14.317     37.8955     81.02  .   Q     .    V    .         .         .
  14.333     38.0079     81.57  .   Q     .   V     .         .         .
  14.350     38.1210     82.13  .   Q     .   V     .         .         .
  14.367     38.2349     82.68  .   Q     .   V     .         .         .
  14.383     38.3495     83.24  .   Q     .   V     .         .         .
  14.400     38.4650     83.79  .   Q     .   V     .         .         .
  14.417     38.5811     84.35  .   Q     .   V     .         .         .
  14.433     38.6981     84.90  .   Q     .   V     .         .         .
  14.450     38.8158     85.46  .   Q     .   V     .         .         .
  14.467     38.9343     86.01  .   Q     .   V     .         .         .
  14.483     39.0535     86.57  .   Q     .   V     .         .         .
  14.500     39.1735     87.12  .   Q     .   V     .         .         .
  14.517     39.2943     87.68  .    Q    .   V     .         .         .
  14.533     39.4158     88.23  .    Q    .   V     .         .         .
  14.550     39.5381     88.75  .    Q    .   V     .         .         .
  14.567     39.6608     89.11  .    Q    .   V     .         .         .
  14.583     39.7840     89.46  .    Q    .   V     .         .         .
  14.600     39.9077     89.81  .    Q    .   V     .         .         .
```

14.617	40.0319	90.16	. Q . V . . .
14.633	40.1566	90.51	. Q . V . . .
14.650	40.2817	90.85	. Q . V . . .
14.667	40.4074	91.20	. Q . V . . .
14.683	40.5335	91.55	. Q . V . . .
14.700	40.6600	91.90	. Q . V . . .
14.717	40.7871	92.25	. Q . V . . .
14.733	40.9146	92.59	. Q . V . . .
14.750	41.0427	92.94	. Q . V . . .
14.767	41.1712	93.29	. Q . V . . .
14.783	41.3001	93.64	. Q . V . . .
14.800	41.4296	93.99	. Q . V . . .
14.817	41.5595	94.34	. Q . V . . .
14.833	41.6900	94.69	. Q . V . . .
14.850	41.8214	95.39	. Q . V . . .
14.867	41.9541	96.36	. Q . V . . .
14.883	42.0882	97.33	. Q . V . . .
14.900	42.2236	98.30	. Q . V . . .
14.917	42.3603	99.27	. Q . V . . .
14.933	42.4984	100.24	. Q . V . . .
14.950	42.6378	101.21	. Q . V . . .
14.967	42.7785	102.19	. Q . V . . .
14.983	42.9206	103.16	. Q . V . . .
15.000	43.0641	104.13	. Q . V . . .
15.017	43.2088	105.10	. Q . V . . .
15.033	43.3549	106.07	. Q . V . . .
15.050	43.5023	107.04	. Q . V . . .
15.067	43.6511	108.01	. Q . V . . .
15.083	43.8012	108.98	. Q . V . . .
15.100	43.9527	109.95	. Q . V . . .
15.117	44.1055	110.92	. Q . V . . .
15.133	44.2595	111.85	. Q . V . . .
15.150	44.4147	112.63	. Q . V . . .
15.167	44.5708	113.38	. Q . V . . .
15.183	44.7280	114.13	. Q . V . . .
15.200	44.8863	114.88	. Q . V . . .
15.217	45.0456	115.63	. Q . V . . .
15.233	45.2059	116.38	. Q . V . . .
15.250	45.3672	117.14	. Q . V . . .
15.267	45.5296	117.89	. Q . V . . .
15.283	45.6930	118.64	. Q . V . . .
15.300	45.8575	119.39	. Q . V . . .
15.317	46.0229	120.14	. Q . V . . .
15.333	46.1895	120.89	. Q . V . . .
15.350	46.3570	121.65	. Q . V . . .
15.367	46.5256	122.40	. Q . V . . .
15.383	46.6952	123.15	. Q . V . . .
15.400	46.8659	123.90	. Q . V . . .
15.417	47.0376	124.65	. Q . V . . .
15.433	47.2111	125.97	. Q . V . . .
15.450	47.3871	127.78	. Q . V . . .
15.467	47.5656	129.59	. Q . V . . .
15.483	47.7466	131.39	. Q . V. . .
15.500	47.9300	133.20	. Q . V. . .
15.517	48.1160	135.01	. Q . V. . .
15.533	48.3045	136.81	. Q . V. . .
15.550	48.4954	138.62	. Q . V. . .
15.567	48.6888	140.43	. Q . V. . .
15.583	48.8847	142.23	. Q . V. . .
15.600	49.0831	144.04	. Q . V. . .
15.617	49.2840	145.85	. Q . V. . .
15.633	49.4874	147.65	. Q . V. . .
15.650	49.6933	149.46	. Q . V. . .
15.667	49.9016	151.27	. Q . V. . .
15.683	50.1124	153.07	. Q . V. . .
15.700	50.3258	154.88	. Q . V . .
15.717	50.5419	156.93	. Q . V . .
15.733	50.7628	160.37	. Q. V . .
15.750	50.9888	164.02	. Q. V . .
15.767	51.2197	167.66	. Q. V . .
15.783	51.4557	171.31	. Q. V . .
15.800	51.6966	174.96	. Q V . .
15.817	51.9427	178.60	. Q V . .
15.833	52.1937	182.25	. Q V . .
15.850	52.4497	185.90	. Q V . .
15.867	52.7108	189.54	. Q V . .
15.883	52.9769	193.19	. .Q .V . .
15.900	53.2481	196.84	. .Q .V . .
15.917	53.5242	200.48	. .Q .V . .
15.933	53.8054	204.13	. .Q .V . .
15.950	54.0916	207.78	. .Q .V . .
15.967	54.3828	211.42	. . Q .V . .
15.983	54.6790	215.07	. . Q .V . .
16.000	54.9803	218.72	. . Q .V . .
16.017	55.3028	234.18	. . Q . V . .
16.033	55.6630	261.47	. . Q . V . .
16.050	56.0608	288.76	. . Q . V . .
16.067	56.4961	316.05	. . Q . V . .
16.083	56.9690	343.35	. . Q. V . .
16.100	57.4795	370.63	. . .QV . .
16.117	58.0276	397.92	. . . QV . .
16.133	58.6133	425.21	. . . VQ . .
16.150	59.2366	452.50	. . . V Q . .
16.167	59.8975	479.79	. . . V Q . .
16.183	60.5959	507.08	. . . V Q. .
16.200	61.3320	534.37	. . . V Q .
16.217	62.1056	561.66	. . . V . Q .
16.233	62.9169	588.95	. . . V . Q .
16.250	63.7657	616.24	. . . V . Q .
16.267	64.6521	643.53	. . . V . Q .
16.283	65.5761	670.82	. . . V . Q .
16.300	66.5384	698.66	. . . V . Q
16.317	67.4575	667.22	. . . V . Q .
16.333	68.3323	635.14	. . . V . Q .
16.350	69.1630	603.06	. . . V . Q .
16.367	69.9495	570.99	. . . V . Q .
16.383	70.6918	538.91	. . . V Q .
16.400	71.3899	506.83	. . . VQ. .
16.417	72.0438	474.76	. . . QV . .
16.433	72.6536	442.68	. . . Q V . .
16.450	73.2191	410.60	. . . Q V. .
16.467	73.7405	378.52	. . .Q V. .

```
16.483     74.2177    346.45  .         .        Q.        V.         .
16.500     74.6507    314.37  .         .      Q  .        V.         .
16.517     75.0396    282.29  .         .     Q   .        V.         .
16.533     75.3842    250.22  .         .   Q     .         V         .
16.550     75.6847    218.14  .         . Q       .         V         .
16.567     75.9409    186.06  .         Q         .         V         .
16.583     76.1530    153.98  .       Q .         .         V         .
16.600     76.3401    135.78  .      Q  .         .         V         .
16.617     76.5244    133.80  .      Q  .         .         V         .
16.633     76.7060    131.84  .      Q  .         .         V         .
16.650     76.8849    129.88  .      Q  .         .         V         .
16.667     77.0611    127.92  .      Q  .         .         V         .
16.683     77.2346    125.96  .      Q  .         .         V         .
16.700     77.4054    124.00  .      Q  .         .         V         .
16.717     77.5735    122.04  .     Q   .         .         V         .
16.733     77.7389    120.08  .     Q   .         .         V         .
16.750     77.9016    118.12  .     Q   .         .         .V        .
16.767     78.0615    116.16  .     Q   .         .         .V        .
16.783     78.2188    114.20  .     Q   .         .         .V        .
16.800     78.3735    112.24  .     Q   .         .         .V        .
16.817     78.5254    110.28  .     Q   .         .         .V        .
16.833     78.6746    108.32  .     Q   .         .         .V        .
16.850     78.8211    106.36  .     Q   .         .         .V        .
16.867     78.9649    104.40  .    Q    .         .         .V        .
16.883     79.1061    102.53  .    Q    .         .         .V        .
16.900     79.2456    101.32  .    Q    .         .         .V        .
16.917     79.3837    100.25  .    Q    .         .         .V        .
16.933     79.5203     99.19  .    Q    .         .         .V        .
16.950     79.6555     98.12  .    Q    .         .         .V        .
16.967     79.7892     97.06  .    Q    .         .         .V        .
16.983     79.9214     95.99  .    Q    .         .         .V        .
17.000     80.0521     94.92  .    Q    .         .         .V        .
17.017     80.1814     93.86  .    Q    .         .         .V        .
17.033     80.3092     92.79  .    Q    .         .         .V        .
17.050     80.4356     91.72  .    Q    .         .         . V       .
17.067     80.5604     90.66  .    Q    .         .         . V       .
17.083     80.6839     89.59  .    Q    .         .         . V       .
17.100     80.8058     88.53  .    Q    .         .         . V       .
17.117     80.9263     87.46  .    Q    .         .         . V       .
17.133     81.0453     86.39  .   Q     .         .         . V       .
17.150     81.1628     85.33  .   Q     .         .         . V       .
17.167     81.2789     84.26  .   Q     .         .         . V       .
17.183     81.3937     83.36  .   Q     .         .         . V       .
17.200     81.5076     82.69  .   Q     .         .         . V       .
17.217     81.6206     82.02  .   Q     .         .         . V       .
17.233     81.7326     81.35  .   Q     .         .         . V       .
17.250     81.8437     80.68  .   Q     .         .         . V       .
17.267     81.9539     80.01  .   Q     .         .         . V       .
17.283     82.0632     79.34  .   Q     .         .         . V       .
17.300     82.1716     78.67  .   Q     .         .         . V       .
17.317     82.2790     78.00  .   Q     .         .         . V       .
17.333     82.3855     77.33  .   Q     .         .         . V       .
17.350     82.4911     76.66  .   Q     .         .         . V       .
17.367     82.5958     75.98  .   Q     .         .         . V       .
17.383     82.6995     75.31  .   Q     .         .         . V       .
17.400     82.8023     74.64  .   Q     .         .         . V       .
```

```
17.417     82.9042     73.97  .   Q     .         .         .  V      .
17.433     83.0052     73.30  .   Q     .         .         .  V      .
17.450     83.1052     72.63  .   Q     .         .         .  V      .
17.467     83.2044     71.98  .   Q     .         .         .  V      .
17.483     83.3028     71.49  .   Q     .         .         .  V      .
17.500     83.4007     71.05  .   Q     .         .         .  V      .
17.517     83.4980     70.60  .   Q     .         .         .  V      .
17.533     83.5946     70.16  .   Q     .         .         .  V      .
17.550     83.6906     69.72  .  Q      .         .         .  V      .
17.567     83.7860     69.27  .  Q      .         .         .  V      .
17.583     83.8808     68.83  .  Q      .         .         .  V      .
17.600     83.9750     68.38  .  Q      .         .         .  V      .
17.617     84.0686     67.94  .  Q      .         .         .  V      .
17.633     84.1616     67.49  .  Q      .         .         .  V      .
17.650     84.2539     67.05  .  Q      .         .         .  V      .
17.667     84.3457     66.60  .  Q      .         .         .  V      .
17.683     84.4368     66.16  .  Q      .         .         .  V      .
17.700     84.5273     65.72  .  Q      .         .         .  V      .
17.717     84.6172     65.27  .  Q      .         .         .  V      .
17.733     84.7065     64.83  .  Q      .         .         .  V      .
17.750     84.7952     64.38  .  Q      .         .         .  V      .
17.767     84.8833     63.98  .  Q      .         .         .  V      .
17.783     84.9710     63.65  .  Q      .         .         .  V      .
17.800     85.0582     63.32  .  Q      .         .         .  V      .
17.817     85.1450     62.99  .  Q      .         .         .  V      .
17.833     85.2313     62.67  .  Q      .         .         .  V      .
17.850     85.3172     62.34  .  Q      .         .         .  V      .
17.867     85.4026     62.01  .  Q      .         .         .  V      .
17.883     85.4875     61.68  .  Q      .         .         .   V     .
17.900     85.5720     61.35  .  Q      .         .         .   V     .
17.917     85.6561     61.02  .  Q      .         .         .   V     .
17.933     85.7397     60.69  .  Q      .         .         .   V     .
17.950     85.8228     60.36  .  Q      .         .         .   V     .
17.967     85.9055     60.03  .  Q      .         .         .   V     .
17.983     85.9878     59.70  .  Q      .         .         .   V     .
18.000     86.0695     59.37  .  Q      .         .         .   V     .
--------------------------------------------------------------------------------
```

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	1081.0
20%	310.0
30%	180.0
40%	145.0
50%	115.0
60%	95.0
70%	70.0
80%	50.0
90%	25.0

```
**************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     35.10 IS CODE =   2
--------------------------------------------------------------------------
  >>>>>FLOWBY STRUCTURE ROUTING MODEL APPLIED TO STREAM #1<<<<<
==========================================================================


        MODEL STREAM NUMBER 1 FLOWING PAST A FLOWBY STRUCTURE:
        FLOWRATES IN STREAM # 1 WHICH ARE GREATER THAN
           100.0 CFS ARE ASSUMED TO BE EXCESS FLOWS.
        FLOW EXCESS IS ASSUMED TO BE ADDED TO STREAM NUMBER 3


              INFLOW              INFLOW
             (STREAM 3)          (STREAM 1)
                 |                   |
                 |                   |
                 |    flow excess    |
                 |<------------------* <=flowby structure
                 |                   | (maximum flowby Q =    100.0 cfs)
                 |                   |
                 |                   |
                 |                   |
                 V                   V
               STREAM 3            STREAM 1
           + FLOW EXCESS            FLOWBY



        FLOWBY BASIN MODELING RESULTS:

         MODEL        INFLOW    INFLOW   OUTFLOW    FLOWBY
          TIME    (STREAM 3) (STREAM 1) (STREAM 3) (STREAM 1)
         (HRS)         (CFS)     (CFS)     (CFS)     (CFS)
         14.000         0.00     75.63      0.00     75.63
         14.017         0.00     75.85      0.00     75.85
         14.033         0.00     76.07      0.00     76.07
         14.050         0.00     76.29      0.00     76.29
         14.067         0.00     76.51      0.00     76.51
         14.083         0.00     76.73      0.00     76.73
         14.100         0.00     76.95      0.00     76.95
         14.117         0.00     77.17      0.00     77.17
         14.133         0.00     77.39      0.00     77.39
         14.150         0.00     77.61      0.00     77.61
         14.167         0.00     77.83      0.00     77.83
         14.183         0.00     78.05      0.00     78.05
         14.200         0.00     78.27      0.00     78.27
         14.217         0.00     78.49      0.00     78.49
         14.233         0.00     78.71      0.00     78.71
         14.250         0.00     78.93      0.00     78.93
         14.267         0.00     79.35      0.00     79.35
         14.283         0.00     79.91      0.00     79.91
         14.300         0.00     80.46      0.00     80.46
         14.317         0.00     81.02      0.00     81.02
         14.333         0.00     81.57      0.00     81.57
         14.350         0.00     82.13      0.00     82.13
         14.367         0.00     82.68      0.00     82.68
         14.383         0.00     83.24      0.00     83.24
         14.400         0.00     83.79      0.00     83.79
         14.417         0.00     84.35      0.00     84.35
         14.433         0.00     84.90      0.00     84.90
         14.450         0.00     85.46      0.00     85.46
         14.467         0.00     86.01      0.00     86.01
         14.483         0.00     86.57      0.00     86.57
         14.500         0.00     87.12      0.00     87.12
         14.517         0.00     87.68      0.00     87.68
         14.533         0.00     88.23      0.00     88.23
         14.550         0.00     88.75      0.00     88.75
         14.567         0.00     89.11      0.00     89.11
         14.583         0.00     89.46      0.00     89.46
         14.600         0.00     89.81      0.00     89.81
         14.617         0.00     90.16      0.00     90.16
         14.633         0.00     90.51      0.00     90.51
         14.650         0.00     90.85      0.00     90.85
         14.667         0.00     91.20      0.00     91.20
         14.683         0.00     91.55      0.00     91.55
         14.700         0.00     91.90      0.00     91.90
         14.717         0.00     92.25      0.00     92.25
         14.733         0.00     92.59      0.00     92.59
         14.750         0.00     92.94      0.00     92.94
         14.767         0.00     93.29      0.00     93.29
         14.783         0.00     93.64      0.00     93.64
         14.800         0.00     93.99      0.00     93.99
         14.817         0.00     94.34      0.00     94.34
         14.833         0.00     94.69      0.00     94.69
         14.850         0.00     95.39      0.00     95.39
         14.867         0.00     96.36      0.00     96.36
         14.883         0.00     97.33      0.00     97.33
         14.900         0.00     98.30      0.00     98.30
         14.917         0.00     99.27      0.00     99.27
         14.933         0.00    100.24      0.24    100.00
         14.950         0.00    101.21      1.21    100.00
         14.967         0.00    102.19      2.19    100.00
         14.983         0.00    103.16      3.16    100.00
         15.000         0.00    104.13      4.13    100.00
         15.017         0.00    105.10      5.10    100.00
         15.033         0.00    106.07      6.07    100.00
         15.050         0.00    107.04      7.04    100.00
         15.067         0.00    108.01      8.01    100.00
         15.083         0.00    108.98      8.98    100.00
         15.100         0.00    109.95      9.95    100.00
         15.117         0.00    110.92     10.92    100.00
         15.133         0.00    111.85     11.85    100.00
         15.150         0.00    112.63     12.63    100.00
         15.167         0.00    113.38     13.38    100.00
         15.183         0.00    114.13     14.13    100.00
         15.200         0.00    114.88     14.88    100.00
         15.217         0.00    115.63     15.63    100.00
         15.233         0.00    116.38     16.38    100.00
         15.250         0.00    117.14     17.14    100.00
         15.267         0.00    117.89     17.89    100.00
```

15.283	0.00	118.64	18.64	100.00
15.300	0.00	119.39	19.39	100.00
15.317	0.00	120.14	20.14	100.00
15.333	0.00	120.89	20.89	100.00
15.350	0.00	121.65	21.65	100.00
15.367	0.00	122.40	22.40	100.00
15.383	0.00	123.15	23.15	100.00
15.400	0.00	123.90	23.90	100.00
15.417	0.00	124.65	24.65	100.00
15.433	0.00	125.97	25.97	100.00
15.450	0.00	127.78	27.78	100.00
15.467	0.00	129.59	29.59	100.00
15.483	0.00	131.39	31.39	100.00
15.500	0.00	133.20	33.20	100.00
15.517	0.00	135.01	35.01	100.00
15.533	0.00	136.81	36.81	100.00
15.550	0.00	138.62	38.62	100.00
15.567	0.00	140.43	40.43	100.00
15.583	0.00	142.23	42.23	100.00
15.600	0.00	144.04	44.04	100.00
15.617	0.00	145.85	45.85	100.00
15.633	0.00	147.65	47.65	100.00
15.650	0.00	149.46	49.46	100.00
15.667	0.00	151.27	51.27	100.00
15.683	0.00	153.07	53.07	100.00
15.700	0.00	154.88	54.88	100.00
15.717	0.00	156.93	56.93	100.00
15.733	0.00	160.37	60.37	100.00
15.750	0.00	164.02	64.02	100.00
15.767	0.00	167.66	67.66	100.00
15.783	0.00	171.31	71.31	100.00
15.800	0.00	174.96	74.96	100.00
15.817	0.00	178.60	78.60	100.00
15.833	0.00	182.25	82.25	100.00
15.850	0.00	185.90	85.90	100.00
15.867	0.00	189.54	89.54	100.00
15.883	0.00	193.19	93.19	100.00
15.900	0.00	196.84	96.84	100.00
15.917	0.00	200.48	100.48	100.00
15.933	0.00	204.13	104.13	100.00
15.950	0.00	207.78	107.78	100.00
15.967	0.00	211.42	111.42	100.00
15.983	0.00	215.07	115.07	100.00
16.000	0.00	218.72	118.72	100.00
16.017	0.00	234.18	134.18	100.00
16.033	0.00	261.47	161.47	100.00
16.050	0.00	288.76	188.76	100.00
16.067	0.00	316.05	216.05	100.00
16.083	0.00	343.35	243.35	100.00
16.100	0.00	370.63	270.63	100.00
16.117	0.00	397.92	297.92	100.00
16.133	0.00	425.21	325.21	100.00
16.150	0.00	452.50	352.50	100.00
16.167	0.00	479.79	379.79	100.00
16.183	0.00	507.08	407.08	100.00
16.200	0.00	534.37	434.37	100.00
16.217	0.00	561.66	461.66	100.00
16.233	0.00	588.95	488.95	100.00
16.250	0.00	616.24	516.24	100.00
16.267	0.00	643.53	543.53	100.00
16.283	0.00	670.82	570.82	100.00
16.300	0.00	698.66	598.66	100.00
16.317	0.00	667.22	567.22	100.00
16.333	0.00	635.14	535.14	100.00
16.350	0.00	603.06	503.06	100.00
16.367	0.00	570.99	470.99	100.00
16.383	0.00	538.91	438.91	100.00
16.400	0.00	506.83	406.83	100.00
16.417	0.00	474.76	374.76	100.00
16.433	0.00	442.68	342.68	100.00
16.450	0.00	410.60	310.60	100.00
16.467	0.00	378.52	278.52	100.00
16.483	0.00	346.45	246.45	100.00
16.500	0.00	314.37	214.37	100.00
16.517	0.00	282.29	182.29	100.00
16.533	0.00	250.22	150.22	100.00
16.550	0.00	218.14	118.14	100.00
16.567	0.00	186.06	86.06	100.00
16.583	0.00	153.98	53.98	100.00
16.600	0.00	135.78	35.78	100.00
16.617	0.00	133.80	33.80	100.00
16.633	0.00	131.84	31.84	100.00
16.650	0.00	129.88	29.88	100.00
16.667	0.00	127.92	27.92	100.00
16.683	0.00	125.96	25.96	100.00
16.700	0.00	124.00	24.00	100.00
16.717	0.00	122.04	22.04	100.00
16.733	0.00	120.08	20.08	100.00
16.750	0.00	118.12	18.12	100.00
16.767	0.00	116.16	16.16	100.00
16.783	0.00	114.20	14.20	100.00
16.800	0.00	112.24	12.24	100.00
16.817	0.00	110.28	10.28	100.00
16.833	0.00	108.32	8.32	100.00
16.850	0.00	106.36	6.36	100.00
16.867	0.00	104.40	4.40	100.00
16.883	0.00	102.53	2.53	100.00
16.900	0.00	101.32	1.32	100.00
16.917	0.00	100.25	0.25	100.00
16.933	0.00	99.19	0.00	99.19
16.950	0.00	98.12	0.00	98.12
16.967	0.00	97.06	0.00	97.06
16.983	0.00	95.99	0.00	95.99
17.000	0.00	94.92	0.00	94.92
17.017	0.00	93.86	0.00	93.86
17.033	0.00	92.79	0.00	92.79
17.050	0.00	91.72	0.00	91.72
17.067	0.00	90.66	0.00	90.66
17.083	0.00	89.59	0.00	89.59
17.100	0.00	88.53	0.00	88.53
17.117	0.00	87.46	0.00	87.46
17.133	0.00	86.39	0.00	86.39

17.150	0.00	85.33	0.00	85.33
17.167	0.00	84.26	0.00	84.26
17.183	0.00	83.36	0.00	83.36
17.200	0.00	82.69	0.00	82.69
17.217	0.00	82.02	0.00	82.02
17.233	0.00	81.35	0.00	81.35
17.250	0.00	80.68	0.00	80.68
17.267	0.00	80.01	0.00	80.01
17.283	0.00	79.34	0.00	79.34
17.300	0.00	78.67	0.00	78.67
17.317	0.00	78.00	0.00	78.00
17.333	0.00	77.33	0.00	77.33
17.350	0.00	76.66	0.00	76.66
17.367	0.00	75.98	0.00	75.98
17.383	0.00	75.31	0.00	75.31
17.400	0.00	74.64	0.00	74.64
17.417	0.00	73.97	0.00	73.97
17.433	0.00	73.30	0.00	73.30
17.450	0.00	72.63	0.00	72.63
17.467	0.00	71.98	0.00	71.98
17.483	0.00	71.49	0.00	71.49
17.500	0.00	71.05	0.00	71.05
17.517	0.00	70.60	0.00	70.60
17.533	0.00	70.16	0.00	70.16
17.550	0.00	69.72	0.00	69.72
17.567	0.00	69.27	0.00	69.27
17.583	0.00	68.83	0.00	68.83
17.600	0.00	68.38	0.00	68.38
17.617	0.00	67.94	0.00	67.94
17.633	0.00	67.49	0.00	67.49
17.650	0.00	67.05	0.00	67.05
17.667	0.00	66.60	0.00	66.60
17.683	0.00	66.16	0.00	66.16
17.700	0.00	65.72	0.00	65.72
17.717	0.00	65.27	0.00	65.27
17.733	0.00	64.83	0.00	64.83
17.750	0.00	64.38	0.00	64.38
17.767	0.00	63.98	0.00	63.98
17.783	0.00	63.65	0.00	63.65
17.800	0.00	63.32	0.00	63.32
17.817	0.00	62.99	0.00	62.99
17.833	0.00	62.67	0.00	62.67
17.850	0.00	62.34	0.00	62.34
17.867	0.00	62.01	0.00	62.01
17.883	0.00	61.68	0.00	61.68
17.900	0.00	61.35	0.00	61.35
17.917	0.00	61.02	0.00	61.02
17.933	0.00	60.69	0.00	60.69
17.950	0.00	60.36	0.00	60.36
17.967	0.00	60.03	0.00	60.03
17.983	0.00	59.70	0.00	59.70
18.000	0.00	59.37	0.00	59.37

****

FLOW PROCESS FROM NODE 56.30 TO NODE 36.00 IS CODE = 11

>>>>>VIEW STREAM NUMBER 1 HYDROGRAPH<<<<<

==========

STREAM HYDROGRAPH IN ONE-MINUTE UNIT INTERVALS(CFS)

(Notes: Time indicated is at END of Each Unit Intervals.
Peak 5-minute rainfall intensity is modeled as
a constant value for entire 5-minute period.)

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	50.0	100.0	150.0	200.0
14.000	35.8548	75.63	.	.	Q V .	.	.
14.017	35.9593	75.85	.	.	Q V .	.	.
14.033	36.0640	76.07	.	.	Q V .	.	.
14.050	36.1691	76.29	.	.	Q V .	.	.
14.067	36.2745	76.51	.	.	Q V .	.	.
14.083	36.3802	76.73	.	.	Q V .	.	.
14.100	36.4862	76.95	.	.	Q V .	.	.
14.117	36.5925	77.17	.	.	Q V .	.	.
14.133	36.6991	77.39	.	.	Q V .	.	.
14.150	36.8060	77.61	.	.	Q V .	.	.
14.167	36.9132	77.83	.	.	Q V .	.	.
14.183	37.0207	78.05	.	.	Q V .	.	.
14.200	37.1285	78.27	.	.	Q V .	.	.
14.217	37.2366	78.49	.	.	Q V .	.	.
14.233	37.3450	78.71	.	.	Q V .	.	.
14.250	37.4537	78.93	.	.	Q V .	.	.
14.267	37.5630	79.35	.	.	Q V .	.	.
14.283	37.6731	79.91	.	.	Q V .	.	.
14.300	37.7839	80.46	.	.	Q V .	.	.
14.317	37.8955	81.02	.	.	Q V .	.	.
14.333	38.0079	81.57	.	.	Q V.	.	.
14.350	38.1210	82.13	.	.	Q V.	.	.
14.367	38.2349	82.68	.	.	Q V.	.	.
14.383	38.3495	83.24	.	.	Q V.	.	.
14.400	38.4650	83.79	.	.	Q V.	.	.
14.417	38.5811	84.35	.	.	Q V.	.	.
14.433	38.6981	84.90	.	.	Q V.	.	.
14.450	38.8158	85.46	.	.	Q V.	.	.
14.467	38.9343	86.01	.	.	Q V.	.	.
14.483	39.0535	86.57	.	.	Q V.	.	.
14.500	39.1735	87.12	.	.	Q V.	.	.
14.517	39.2943	87.68	.	.	Q V.	.	.
14.533	39.4158	88.23	.	.	Q V.	.	.
14.550	39.5381	88.75	.	.	Q V.	.	.
14.567	39.6608	89.11	.	.	Q V.	.	.
14.583	39.7840	89.46	.	.	Q V.	.	.
14.600	39.9077	89.81	.	.	Q V.	.	.
14.617	40.0319	90.16	.	.	Q V	.	.
14.633	40.1566	90.51	.	.	Q V	.	.
14.650	40.2817	90.85	.	.	Q V	.	.
14.667	40.4074	91.20	.	.	Q V	.	.
14.683	40.5335	91.55	.	.	Q V	.	.
14.700	40.6600	91.90	.	.	Q V	.	.
14.717	40.7871	92.25	.	.	Q V	.	.
14.733	40.9146	92.59	.	.	Q V	.	.

14.750	41.0427	92.94	. . Q V . .
14.767	41.1712	93.29	. . Q V . .
14.783	41.3001	93.64	. . Q V . .
14.800	41.4296	93.99	. . Q V . .
14.817	41.5595	94.34	. . Q V . .
14.833	41.6900	94.69	. . Q V . .
14.850	41.8214	95.39	. . QV . .
14.867	41.9541	96.36	. . QV . .
14.883	42.0882	97.33	. . Q.V . .
14.900	42.2236	98.30	. . Q.V . .
14.917	42.3603	99.27	. . Q.V . .
14.933	42.4980	100.00	. . QV . .
14.950	42.6358	100.00	. . QV . .
14.967	42.7735	100.00	. . QV . .
14.983	42.9113	100.00	. . QV . .
15.000	43.0490	100.00	. . QV . .
15.017	43.1867	100.00	. . QV . .
15.033	43.3245	100.00	. . QV . .
15.050	43.4622	100.00	. . QV . .
15.067	43.6000	100.00	. . QV . .
15.083	43.7377	100.00	. . QV . .
15.100	43.8755	100.00	. . QV . .
15.117	44.0132	100.00	. . Q V . .
15.133	44.1509	100.00	. . Q V . .
15.150	44.2887	100.00	. . Q V . .
15.167	44.4264	100.00	. . Q V . .
15.183	44.5642	100.00	. . Q V . .
15.200	44.7019	100.00	. . Q V . .
15.217	44.8396	100.00	. . Q V . .
15.233	44.9774	100.00	. . Q V . .
15.250	45.1151	100.00	. . Q V . .
15.267	45.2529	100.00	. . Q V . .
15.283	45.3906	100.00	. . Q V . .
15.300	45.5283	100.00	. . Q V . .
15.317	45.6661	100.00	. . Q V . .
15.333	45.8038	100.00	. . Q V . .
15.350	45.9416	100.00	. . Q V . .
15.367	46.0793	100.00	. . Q V . .
15.383	46.2171	100.00	. . Q V . .
15.400	46.3548	100.00	. . Q V . .
15.417	46.4925	100.00	. . Q V . .
15.433	46.6303	100.00	. . Q V . .
15.450	46.7680	100.00	. . Q V . .
15.467	46.9058	100.00	. . Q V . .
15.483	47.0435	100.00	. . Q V . .
15.500	47.1812	100.00	. . Q V . .
15.517	47.3190	100.00	. . Q V . .
15.533	47.4567	100.00	. . Q V . .
15.550	47.5945	100.00	. . Q V . .
15.567	47.7322	100.00	. . Q V . .
15.583	47.8699	100.00	. . Q V . .
15.600	48.0077	100.00	. . Q V . .
15.617	48.1454	100.00	. . Q V . .
15.633	48.2832	100.00	. . Q V . .
15.650	48.4209	100.00	. . Q V . .
15.667	48.5587	100.00	. . Q V . .
15.683	48.6964	100.00	. . Q V . .
15.700	48.8341	100.00	. . Q V . .
15.717	48.9719	100.00	. . Q V . .
15.733	49.1096	100.00	. . Q V . .
15.750	49.2474	100.00	. . Q V . .
15.767	49.3851	100.00	. . Q V . .
15.783	49.5228	100.00	. . Q V . .
15.800	49.6606	100.00	. . Q V . .
15.817	49.7983	100.00	. . Q V . .
15.833	49.9361	100.00	. . Q V . .
15.850	50.0738	100.00	. . Q V . .
15.867	50.2115	100.00	. . Q V . .
15.883	50.3493	100.00	. . Q V . .
15.900	50.4870	100.00	. . Q V . .
15.917	50.6248	100.00	. . Q V . .
15.933	50.7625	100.00	. . Q V . .
15.950	50.9002	100.00	. . Q V . .
15.967	51.0380	100.00	. . Q V . .
15.983	51.1757	100.00	. . Q V . .
16.000	51.3135	100.00	. . Q V . .
16.017	51.4512	100.00	. . Q V . .
16.033	51.5890	100.00	. . Q V . .
16.050	51.7267	100.00	. . Q V . .
16.067	51.8644	100.00	. . Q V . .
16.083	52.0022	100.00	. . Q V . .
16.100	52.1399	100.00	. . Q V . .
16.117	52.2777	100.00	. . Q V . .
16.133	52.4154	100.00	. . Q V . .
16.150	52.5531	100.00	. . Q V . .
16.167	52.6909	100.00	. . Q V . .
16.183	52.8286	100.00	. . Q V . .
16.200	52.9664	100.00	. . Q V . .
16.217	53.1041	100.00	. . Q V . .
16.233	53.2418	100.00	. . Q V . .
16.250	53.3796	100.00	. . Q V . .
16.267	53.5173	100.00	. . Q V . .
16.283	53.6551	100.00	. . Q V . .
16.300	53.7928	100.00	. . Q V . .
16.317	53.9306	100.00	. . Q V . .
16.333	54.0683	100.00	. . Q V . .
16.350	54.2060	100.00	. . Q V . .
16.367	54.3438	100.00	. . Q V . .
16.383	54.4815	100.00	. . Q V . .
16.400	54.6193	100.00	. . Q V . .
16.417	54.7570	100.00	. . Q V . .
16.433	54.8947	100.00	. . Q V . .
16.450	55.0325	100.00	. . Q V . .
16.467	55.1702	100.00	. . Q V . .
16.483	55.3080	100.00	. . Q V . .
16.500	55.4457	100.00	. . Q V . .
16.517	55.5834	100.00	. . Q V . .
16.533	55.7212	100.00	. . Q V . .
16.550	55.8589	100.00	. . Q V . .
16.567	55.9967	100.00	. . Q V . .
16.583	56.1344	100.00	. . Q V . .
16.600	56.2722	100.00	. . Q V . .

```
16.617     56.4099    100.00  .         .         Q       V .         .
16.633     56.5476    100.00  .         .         Q       V .         .
16.650     56.6854    100.00  .         .         Q       V .         .
16.667     56.8231    100.00  .         .         Q       V .         .
16.683     56.9609    100.00  .         .         Q       V .         .
16.700     57.0986    100.00  .         .         Q       V .         .
16.717     57.2363    100.00  .         .         Q       V .         .
16.733     57.3741    100.00  .         .         Q       V .         .
16.750     57.5118    100.00  .         .         Q       V .         .
16.767     57.6496    100.00  .         .         Q       V .         .
16.783     57.7873    100.00  .         .         Q       V .         .
16.800     57.9250    100.00  .         .         Q       V .         .
16.817     58.0628    100.00  .         .         Q        V.         .
16.833     58.2005    100.00  .         .         Q        V.         .
16.850     58.3383    100.00  .         .         Q        V.         .
16.867     58.4760    100.00  .         .         Q        V.         .
16.883     58.6138    100.00  .         .         Q        V.         .
16.900     58.7515    100.00  .         .         Q        V.         .
16.917     58.8892    100.00  .         .         Q        V.         .
16.933     59.0259     99.19  .         .        Q.        V.         .
16.950     59.1610     98.12  .         .        Q.        V.         .
16.967     59.2947     97.06  .         .        Q.        V.         .
16.983     59.4269     95.99  .         .        Q.        V.         .
17.000     59.5577     94.92  .         .       Q .        V.         .
17.017     59.6869     93.86  .         .       Q .        V.         .
17.033     59.8148     92.79  .         .       Q .        V.         .
17.050     59.9411     91.72  .         .       Q .        V.         .
17.067     60.0660     90.66  .         .       Q .         V         .
17.083     60.1894     89.59  .         .      Q  .         V         .
17.100     60.3113     88.53  .         .      Q  .         V         .
17.117     60.4318     87.46  .         .      Q  .         V         .
17.133     60.5508     86.39  .         .      Q  .         V         .
17.150     60.6683     85.33  .         .      Q  .         V         .
17.167     60.7844     84.26  .         .     Q   .         V         .
17.183     60.8992     83.36  .         .     Q   .         V         .
17.200     61.0131     82.69  .         .     Q   .         V         .
17.217     61.1261     82.02  .         .     Q   .         V         .
17.233     61.2381     81.35  .         .     Q   .         V         .
17.250     61.3493     80.68  .         .     Q   .         V         .
17.267     61.4595     80.01  .         .     Q   .         V         .
17.283     61.5687     79.34  .         .    Q    .         V         .
17.300     61.6771     78.67  .         .    Q    .         V         .
17.317     61.7845     78.00  .         .    Q    .         V         .
17.333     61.8910     77.33  .         .    Q    .         V         .
17.350     61.9966     76.66  .         .    Q    .         .V        .
17.367     62.1013     75.98  .         .    Q    .         .V        .
17.383     62.2050     75.31  .         .    Q    .         .V        .
17.400     62.3078     74.64  .         .   Q     .         .V        .
17.417     62.4097     73.97  .         .   Q     .         .V        .
17.433     62.5107     73.30  .         .   Q     .         .V        .
17.450     62.6107     72.63  .         .   Q     .         .V        .
17.467     62.7099     71.98  .         .   Q     .         .V        .
17.483     62.8084     71.49  .         .   Q     .         .V        .
17.500     62.9062     71.05  .         .   Q     .         .V        .
17.517     63.0035     70.60  .         .   Q     .         .V        .
17.533     63.1001     70.16  .         .   Q     .         .V        .
17.550     63.1961     69.72  .         .   Q     .         .V        .
17.567     63.2916     69.27  .         .   Q     .         .V        .
17.583     63.3864     68.83  .         .   Q     .         .V        .
17.600     63.4805     68.38  .         .   Q     .         .V        .
17.617     63.5741     67.94  .         .   Q     .         .V        .
17.633     63.6671     67.49  .         .   Q     .         .V        .
17.650     63.7594     67.05  .         .   Q     .         .V        .
17.667     63.8512     66.60  .         .   Q     .         .V        .
17.683     63.9423     66.16  .         .   Q     .         .V        .
17.700     64.0328     65.72  .         .   Q     .         . V       .
17.717     64.1227     65.27  .         .   Q     .         . V       .
17.733     64.2120     64.83  .         . Q       .         . V       .
17.750     64.3007     64.38  .         . Q       .         . V       .
17.767     64.3888     63.98  .         . Q       .         . V       .
17.783     64.4765     63.65  .         . Q       .         . V       .
17.800     64.5637     63.32  .         . Q       .         . V       .
17.817     64.6505     62.99  .         . Q       .         . V       .
17.833     64.7368     62.67  .         . Q       .         . V       .
17.850     64.8227     62.34  .         . Q       .         . V       .
17.867     64.9081     62.01  .         . Q       .         . V       .
17.883     64.9931     61.68  .         . Q       .         . V       .
17.900     65.0776     61.35  .         . Q       .         . V       .
17.917     65.1616     61.02  .         . Q       .         . V       .
17.933     65.2452     60.69  .         . Q       .         . V       .
17.950     65.3284     60.36  .         . Q       .         . V       .
17.967     65.4110     60.03  .         . Q       .         . V       .
17.983     65.4933     59.70  .         .Q        .         . V       .
18.000     65.5751     59.37  .         .Q        .         . V       .
```

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	1081.0
20%	1081.0
30%	1081.0
40%	1081.0
50%	1081.0
60%	1081.0
70%	1081.0
80%	895.0
90%	740.0

```
****************************************************************************
  FLOW PROCESS FROM NODE     35.20 TO NODE     35.20 IS CODE = 1.2
----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
============================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #2)
```

```
   RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
   TOTAL CATCHMENT AREA(ACRES) =   11.40
   SOIL-LOSS RATE, Fm,(INCH/HR) =  0.168
   LOW LOSS FRACTION = 0.243
   TIME OF CONCENTRATION(MIN.) = 13.38
   SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
   ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
   RETURN FREQUENCY(YEARS) = 100
      5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.52
     30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.09
      1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.45
      3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.43
      6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.36
     24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.63

--------------------------------------------------------------------------------
   TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     3.78
   TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     1.57

--------------------------------------------------------------------------------

================================================================================

                    2 4 - H O U R    S T O R M
                 R U N O F F    H Y D R O G R A P H

================================================================================
            HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
       (Notes: Time indicated is at END of Each Unit Intervals.
               Peak 5-minute rainfall intensity is modeled as
               a constant value for entire 5-minute period.)
--------------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.        8.6      17.1      25.7      34.2
--------------------------------------------------------------------------------
  14.000      1.3337      2.82  .  Q      .   V     .         .         .
  14.017      1.3376      2.83  .  Q      .   V     .         .         .
  14.033      1.3415      2.84  .  Q      .   V     .         .         .
  14.050      1.3454      2.85  .  Q      .   V     .         .         .
  14.067      1.3493      2.86  .  Q      .   V     .         .         .
  14.083      1.3533      2.87  .  Q      .   V     .         .         .
  14.100      1.3573      2.88  .  Q      .   V     .         .         .
  14.117      1.3612      2.89  .  Q      .   V     .         .         .
  14.133      1.3652      2.90  .  Q      .   V     .         .         .
  14.150      1.3692      2.90  .  Q      .   V     .         .         .
  14.167      1.3732      2.91  .  Q      .   V     .         .         .
  14.183      1.3773      2.92  .  Q      .   V     .         .         .
  14.200      1.3813      2.93  .  Q      .   V     .         .         .
  14.217      1.3854      2.94  .  Q      .   V     .         .         .
  14.233      1.3894      2.95  .  Q      .   V     .         .         .
  14.250      1.3935      2.97  .  Q      .   V     .         .         .
  14.267      1.3976      2.99  .  Q      .   V     .         .         .
  14.283      1.4018      3.01  .  Q      .   V     .         .         .
  14.300      1.4060      3.04  .  Q      .   V     .         .         .
  14.317      1.4102      3.06  .  Q      .   V     .         .         .
  14.333      1.4144      3.08  .  Q      .   V     .         .         .
  14.350      1.4187      3.10  .  Q      .    V    .         .         .
  14.367      1.4230      3.12  .  Q      .    V    .         .         .
  14.383      1.4273      3.14  .  Q      .    V    .         .         .
  14.400      1.4316      3.16  .  Q      .    V    .         .         .
  14.417      1.4360      3.18  .  Q      .    V    .         .         .
  14.433      1.4404      3.20  .  Q      .    V    .         .         .
  14.450      1.4449      3.22  .  Q      .    V    .         .         .
  14.467      1.4493      3.23  .  Q      .    V    .         .         .
  14.483      1.4538      3.24  .  Q      .    V    .         .         .
  14.500      1.4582      3.25  .  Q      .    V    .         .         .
  14.517      1.4627      3.26  .  Q      .    V    .         .         .
  14.533      1.4672      3.28  .  Q      .    V    .         .         .
  14.550      1.4718      3.29  .  Q      .    V    .         .         .
  14.567      1.4763      3.30  .  Q      .    V    .         .         .
  14.583      1.4809      3.31  .  Q      .    V    .         .         .
  14.600      1.4855      3.32  .  Q      .    V    .         .         .
  14.617      1.4900      3.33  .  Q      .    V    .         .         .
  14.633      1.4947      3.35  .  Q      .    V    .         .         .
  14.650      1.4993      3.36  .  Q      .    V    .         .         .
  14.667      1.5039      3.37  .  Q      .    V    .         .         .
  14.683      1.5086      3.40  .  Q      .    V    .         .         .
  14.700      1.5133      3.43  .   Q     .    V    .         .         .
  14.717      1.5181      3.46  .   Q     .    V    .         .         .
  14.733      1.5229      3.49  .   Q     .    V    .         .         .
  14.750      1.5277      3.52  .   Q     .    V    .         .         .
  14.767      1.5326      3.55  .   Q     .    V    .         .         .
  14.783      1.5375      3.58  .   Q     .    V    .         .         .
  14.800      1.5425      3.61  .   Q     .    V    .         .         .
  14.817      1.5475      3.64  .   Q     .    V    .         .         .
  14.833      1.5526      3.67  .   Q     .    V    .         .         .
  14.850      1.5576      3.70  .   Q     .    V    .         .         .
  14.867      1.5628      3.73  .   Q     .    V    .         .         .
  14.883      1.5679      3.76  .   Q     .    V    .         .         .
  14.900      1.5732      3.78  .   Q     .    V    .         .         .
  14.917      1.5784      3.80  .   Q     .    V    .         .         .
  14.933      1.5837      3.82  .   Q     .    V    .         .         .
  14.950      1.5889      3.84  .   Q     .    V    .         .         .
  14.967      1.5943      3.86  .   Q     .    V    .         .         .
  14.983      1.5996      3.88  .   Q     .    V    .         .         .
  15.000      1.6050      3.90  .   Q     .     V   .         .         .
  15.017      1.6104      3.92  .   Q     .     V   .         .         .
  15.033      1.6158      3.94  .   Q     .     V   .         .         .
  15.050      1.6212      3.96  .   Q     .     V   .         .         .
  15.067      1.6267      3.97  .   Q     .     V   .         .         .
  15.083      1.6322      3.99  .   Q     .     V   .         .         .
  15.100      1.6377      4.01  .   Q     .     V   .         .         .
  15.117      1.6433      4.04  .   Q     .     V   .         .         .
  15.133      1.6489      4.09  .   Q     .     V   .         .         .
  15.150      1.6546      4.14  .   Q     .     V   .         .         .
  15.167      1.6604      4.20  .   Q     .     V   .         .         .
  15.183      1.6663      4.25  .   Q     .     V   .         .         .
  15.200      1.6722      4.30  .    Q    .     V   .         .         .
  15.217      1.6782      4.36  .    Q    .     V   .         .         .
  15.233      1.6843      4.41  .    Q    .     V   .         .         .
  15.250      1.6904      4.47  .    Q    .     V   .         .         .
  15.267      1.6966      4.52  .    Q    .     V   .         .         .
  15.283      1.7029      4.57  .    Q    .      V  .         .         .
```

15.300	1.7093	4.63	Q V
15.317	1.7158	4.68	Q V
15.333	1.7223	4.74	Q V
15.350	1.7289	4.77	Q V
15.367	1.7354	4.78	Q V
15.383	1.7421	4.80	Q V
15.400	1.7487	4.81	Q V
15.417	1.7553	4.83	Q V
15.433	1.7620	4.85	Q V
15.450	1.7687	4.86	Q V
15.467	1.7754	4.88	Q V
15.483	1.7822	4.90	Q V
15.500	1.7889	4.91	Q V
15.517	1.7957	4.93	Q V
15.533	1.8025	4.94	Q V
15.550	1.8094	4.96	Q V
15.567	1.8163	5.02	Q V
15.583	1.8234	5.16	Q V
15.600	1.8307	5.31	Q V
15.617	1.8382	5.46	Q V
15.633	1.8459	5.61	Q V
15.650	1.8539	5.76	Q V
15.667	1.8620	5.91	Q V
15.683	1.8704	6.06	Q V
15.700	1.8789	6.21	Q V
15.717	1.8877	6.36	Q V
15.733	1.8966	6.51	Q V
15.750	1.9058	6.66	Q V
15.767	1.9152	6.81	Q V
15.783	1.9248	6.96	Q V
15.800	1.9347	7.19	Q V
15.817	1.9449	7.43	Q V
15.833	1.9555	7.67	Q V
15.850	1.9664	7.91	Q V
15.867	1.9776	8.15	Q V
15.883	1.9891	8.39	Q .V
15.900	2.0010	8.63	Q .V
15.917	2.0132	8.87	Q .V
15.933	2.0258	9.11	Q .V
15.950	2.0387	9.35	Q .V
15.967	2.0519	9.59	.Q .V
15.983	2.0654	9.83	.Q .V
16.000	2.0793	10.07	.Q . V
16.017	2.0945	11.08	. Q . V
16.033	2.1123	12.88	. Q . V
16.050	2.1325	14.67	. Q . V
16.067	2.1552	16.47	. Q. V
16.083	2.1803	18.26	.Q V
16.100	2.2080	20.06	. Q
16.117	2.2381	21.85	. V Q
16.133	2.2706	23.65	. V Q
16.150	2.3057	25.44	. V Q.
16.167	2.3432	27.24	. V .Q
16.183	2.3832	29.03	. V . Q
16.200	2.4257	30.83	. V . Q
16.217	2.4706	32.62	. V . Q
16.233	2.5177	34.20	. V . Q
16.250	2.5615	31.79	. V . Q .
16.267	2.6023	29.64	. V . Q .
16.283	2.6402	27.48	. V . Q .
16.300	2.6751	25.33	. VQ. .
16.317	2.7070	23.18	. QV . .
16.333	2.7359	21.02	. Q V . .
16.350	2.7619	18.87	. Q V. .
16.367	2.7850	16.71	. Q. V. .
16.383	2.8050	14.56	. Q . V. .
16.400	2.8221	12.41	. Q . V. .
16.417	2.8362	10.25	.Q . V .
16.433	2.8474	8.10	Q. . V .
16.450	2.8557	6.01	Q . . V .
16.467	2.8630	5.33	Q . . V .
16.483	2.8702	5.25	Q . . V .
16.500	2.8774	5.17	Q . . V .
16.517	2.8844	5.10	Q . . V .
16.533	2.8913	5.02	Q . . V .
16.550	2.8981	4.94	Q . . V .
16.567	2.9048	4.86	Q . . V .
16.583	2.9114	4.79	Q . . V .
16.600	2.9179	4.71	Q . . V .
16.617	2.9243	4.63	Q . . V .
16.633	2.9305	4.56	Q . . .V .
16.650	2.9367	4.48	Q . . .V .
16.667	2.9428	4.40	Q . . .V .
16.683	2.9487	4.33	Q . . .V .
16.700	2.9546	4.27	Q . . .V .
16.717	2.9604	4.21	Q . . .V .
16.733	2.9661	4.15	Q . . .V .
16.750	2.9718	4.09	Q . . .V .
16.767	2.9773	4.03	Q . . .V .
16.783	2.9828	3.97	Q . . .V .
16.800	2.9882	3.91	Q . . .V .
16.817	2.9935	3.85	Q . . .V .
16.833	2.9987	3.80	Q . . .V .
16.850	3.0039	3.74	Q . . .V .
16.867	3.0089	3.68	Q . . .V .
16.883	3.0139	3.62	Q . . .V .
16.900	3.0188	3.56	Q . . .V .
16.917	3.0237	3.52	Q . . . V .
16.933	3.0285	3.49	Q . . . V .
16.950	3.0332	3.45	Q . . . V .
16.967	3.0379	3.41	Q . . . V .
16.983	3.0426	3.38	Q . . . V .
17.000	3.0472	3.34	Q . . . V .
17.017	3.0517	3.31	Q . . . V .
17.033	3.0562	3.27	Q . . . V .
17.050	3.0607	3.23	Q . . . V .
17.067	3.0651	3.20	Q . . . V .
17.083	3.0694	3.16	Q . . . V .
17.100	3.0737	3.13	Q . . . V .
17.117	3.0780	3.09	Q . . . V .
17.133	3.0822	3.06	Q . . . V .
17.150	3.0864	3.03	Q . . . V .

```
 17.167      3.0905      3.01  .  Q      .         .         . V       .
 17.183      3.0946      2.98  .  Q      .         .         . V       .
 17.200      3.0987      2.96  .  Q      .         .         . V       .
 17.217      3.1027      2.93  .  Q      .         .         . V       .
 17.233      3.1067      2.90  .  Q      .         .         . V       .
 17.250      3.1107      2.88  .  Q      .         .         . V       .
 17.267      3.1146      2.85  .  Q      .         .         . V       .
 17.283      3.1185      2.83  .  Q      .         .         .  V      .
 17.300      3.1224      2.80  .  Q      .         .         .  V      .
 17.317      3.1262      2.77  .  Q      .         .         .  V      .
 17.333      3.1300      2.75  .  Q      .         .         .  V      .
 17.350      3.1337      2.72  .  Q      .         .         .  V      .
 17.367      3.1375      2.71  .  Q      .         .         .  V      .
 17.383      3.1412      2.69  .  Q      .         .         .  V      .
 17.400      3.1448      2.67  .  Q      .         .         .  V      .
 17.417      3.1485      2.65  .  Q      .         .         .  V      .
 17.433      3.1521      2.63  .  Q      .         .         .  V      .
 17.450      3.1557      2.61  .  Q      .         .         .  V      .
 17.467      3.1593      2.60  .  Q      .         .         .  V      .
 17.483      3.1628      2.58  .  Q      .         .         .  V      .
 17.500      3.1664      2.56  . Q       .         .         .  V      .
 17.517      3.1699      2.54  . Q       .         .         .  V      .
 17.533      3.1733      2.52  . Q       .         .         .  V      .
 17.550      3.1768      2.50  . Q       .         .         .  V      .
 17.567      3.1802      2.49  . Q       .         .         .  V      .
 17.583      3.1836      2.47  . Q       .         .         .  V      .
 17.600      3.1870      2.46  . Q       .         .         .  V      .
 17.617      3.1904      2.44  . Q       .         .         .  V      .
 17.633      3.1937      2.43  . Q       .         .         .  V      .
 17.650      3.1970      2.41  . Q       .         .         .  V      .
 17.667      3.2003      2.40  . Q       .         .         .  V      .
 17.683      3.2036      2.38  . Q       .         .         .  V      .
 17.700      3.2069      2.37  . Q       .         .         .  V      .
 17.717      3.2101      2.36  . Q       .         .         .   V     .
 17.733      3.2134      2.34  . Q       .         .         .   V     .
 17.750      3.2166      2.33  . Q       .         .         .   V     .
 17.767      3.2198      2.31  . Q       .         .         .   V     .
 17.783      3.2229      2.30  . Q       .         .         .   V     .
 17.800      3.2261      2.29  . Q       .         .         .   V     .
 17.817      3.2292      2.27  . Q       .         .         .   V     .
 17.833      3.2323      2.26  . Q       .         .         .   V     .
 17.850      3.2354      2.25  . Q       .         .         .   V     .
 17.867      3.2385      2.24  . Q       .         .         .   V     .
 17.883      3.2416      2.23  . Q       .         .         .   V     .
 17.900      3.2446      2.22  . Q       .         .         .   V     .
 17.917      3.2477      2.21  . Q       .         .         .   V     .
 17.933      3.2507      2.19  . Q       .         .         .   V     .
 17.950      3.2537      2.18  . Q       .         .         .   V     .
 17.967      3.2567      2.17  . Q       .         .         .   V     .
 17.983      3.2597      2.16  . Q       .         .         .   V     .
 18.000      3.2626      2.15  . Q       .         .         .   V     .
--------------------------------------------------------------------------------
   TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
   (Note: 100% of Peak Flow Rate estimate assumed to have
   an instantaneous time duration)
```

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	680.0
20%	200.0
30%	120.0
40%	105.0
50%	85.0
60%	70.0
70%	50.0
80%	35.0
90%	20.0

```
********************************************************************************
  FLOW PROCESS FROM NODE     35.20 TO NODE     35.00 IS CODE =   2
--------------------------------------------------------------------------------
  >>>>>FLOWBY STRUCTURE ROUTING MODEL APPLIED TO STREAM #2<<<<<
================================================================================

        MODEL STREAM NUMBER 2 FLOWING PAST A FLOWBY STRUCTURE:
        FLOWRATES IN STREAM # 2 WHICH ARE GREATER THAN
            10.0 CFS ARE ASSUMED TO BE EXCESS FLOWS.
        FLOW EXCESS IS ASSUMED TO BE ADDED TO STREAM NUMBER 3


              INFLOW              INFLOW
            (STREAM 3)          (STREAM 2)
                |                   |
                |                   |
                |    flow excess    |
                |<------------------* <=flowby structure
                |                   | (maximum flowby Q =     10.0 cfs)
                |                   |
                |                   |
                |                   |
                V                   V
             STREAM 3            STREAM 2
          + FLOW EXCESS           FLOWBY



        FLOWBY BASIN MODELING RESULTS:

         MODEL        INFLOW    INFLOW   OUTFLOW    FLOWBY
          TIME    (STREAM 3) (STREAM 2) (STREAM 3) (STREAM 2)
         (HRS)         (CFS)     (CFS)     (CFS)     (CFS)
        14.000          0.00      2.82      0.00      2.82
        14.017          0.00      2.83      0.00      2.83
        14.033          0.00      2.84      0.00      2.84
        14.050          0.00      2.85      0.00      2.85
        14.067          0.00      2.86      0.00      2.86
        14.083          0.00      2.87      0.00      2.87
```

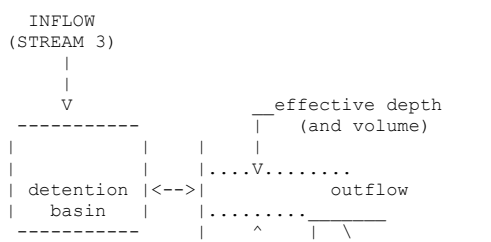
14.100	0.00	2.88	0.00	2.88
14.117	0.00	2.89	0.00	2.89
14.133	0.00	2.90	0.00	2.90
14.150	0.00	2.90	0.00	2.90
14.167	0.00	2.91	0.00	2.91
14.183	0.00	2.92	0.00	2.92
14.200	0.00	2.93	0.00	2.93
14.217	0.00	2.94	0.00	2.94
14.233	0.00	2.95	0.00	2.95
14.250	0.00	2.97	0.00	2.97
14.267	0.00	2.99	0.00	2.99
14.283	0.00	3.01	0.00	3.01
14.300	0.00	3.04	0.00	3.04
14.317	0.00	3.06	0.00	3.06
14.333	0.00	3.08	0.00	3.08
14.350	0.00	3.10	0.00	3.10
14.367	0.00	3.12	0.00	3.12
14.383	0.00	3.14	0.00	3.14
14.400	0.00	3.16	0.00	3.16
14.417	0.00	3.18	0.00	3.18
14.433	0.00	3.20	0.00	3.20
14.450	0.00	3.22	0.00	3.22
14.467	0.00	3.23	0.00	3.23
14.483	0.00	3.24	0.00	3.24
14.500	0.00	3.25	0.00	3.25
14.517	0.00	3.26	0.00	3.26
14.533	0.00	3.28	0.00	3.28
14.550	0.00	3.29	0.00	3.29
14.567	0.00	3.30	0.00	3.30
14.583	0.00	3.31	0.00	3.31
14.600	0.00	3.32	0.00	3.32
14.617	0.00	3.33	0.00	3.33
14.633	0.00	3.35	0.00	3.35
14.650	0.00	3.36	0.00	3.36
14.667	0.00	3.37	0.00	3.37
14.683	0.00	3.40	0.00	3.40
14.700	0.00	3.43	0.00	3.43
14.717	0.00	3.46	0.00	3.46
14.733	0.00	3.49	0.00	3.49
14.750	0.00	3.52	0.00	3.52
14.767	0.00	3.55	0.00	3.55
14.783	0.00	3.58	0.00	3.58
14.800	0.00	3.61	0.00	3.61
14.817	0.00	3.64	0.00	3.64
14.833	0.00	3.67	0.00	3.67
14.850	0.00	3.70	0.00	3.70
14.867	0.00	3.73	0.00	3.73
14.883	0.00	3.76	0.00	3.76
14.900	0.00	3.78	0.00	3.78
14.917	0.00	3.80	0.00	3.80
14.933	0.24	3.82	0.24	3.82
14.950	1.21	3.84	1.21	3.84
14.967	2.19	3.86	2.19	3.86
14.983	3.16	3.88	3.16	3.88
15.000	4.13	3.90	4.13	3.90
15.017	5.10	3.92	5.10	3.92
15.033	6.07	3.94	6.07	3.94
15.050	7.04	3.96	7.04	3.96
15.067	8.01	3.97	8.01	3.97
15.083	8.98	3.99	8.98	3.99
15.100	9.95	4.01	9.95	4.01
15.117	10.92	4.04	10.92	4.04
15.133	11.85	4.09	11.85	4.09
15.150	12.63	4.14	12.63	4.14
15.167	13.38	4.20	13.38	4.20
15.183	14.13	4.25	14.13	4.25
15.200	14.88	4.30	14.88	4.30
15.217	15.63	4.36	15.63	4.36
15.233	16.38	4.41	16.38	4.41
15.250	17.14	4.47	17.14	4.47
15.267	17.89	4.52	17.89	4.52
15.283	18.64	4.57	18.64	4.57
15.300	19.39	4.63	19.39	4.63
15.317	20.14	4.68	20.14	4.68
15.333	20.89	4.74	20.89	4.74
15.350	21.65	4.77	21.65	4.77
15.367	22.40	4.78	22.40	4.78
15.383	23.15	4.80	23.15	4.80
15.400	23.90	4.81	23.90	4.81
15.417	24.65	4.83	24.65	4.83
15.433	25.97	4.85	25.97	4.85
15.450	27.78	4.86	27.78	4.86
15.467	29.59	4.88	29.59	4.88
15.483	31.39	4.90	31.39	4.90
15.500	33.20	4.91	33.20	4.91
15.517	35.01	4.93	35.01	4.93
15.533	36.81	4.94	36.81	4.94
15.550	38.62	4.96	38.62	4.96
15.567	40.43	5.02	40.43	5.02
15.583	42.23	5.16	42.23	5.16
15.600	44.04	5.31	44.04	5.31
15.617	45.85	5.46	45.85	5.46
15.633	47.65	5.61	47.65	5.61
15.650	49.46	5.76	49.46	5.76
15.667	51.27	5.91	51.27	5.91
15.683	53.07	6.06	53.07	6.06
15.700	54.88	6.21	54.88	6.21
15.717	56.93	6.36	56.93	6.36
15.733	60.37	6.51	60.37	6.51
15.750	64.02	6.66	64.02	6.66
15.767	67.66	6.81	67.66	6.81
15.783	71.31	6.96	71.31	6.96
15.800	74.96	7.19	74.96	7.19
15.817	78.60	7.43	78.60	7.43
15.833	82.25	7.67	82.25	7.67
15.850	85.90	7.91	85.90	7.91
15.867	89.54	8.15	89.54	8.15
15.883	93.19	8.39	93.19	8.39
15.900	96.84	8.63	96.84	8.63
15.917	100.48	8.87	100.48	8.87
15.933	104.13	9.11	104.13	9.11
15.950	107.78	9.35	107.78	9.35

15.967	111.42	9.59	111.42	9.59
15.983	115.07	9.83	115.07	9.83
16.000	118.72	10.07	118.78	10.00
16.017	134.18	11.08	135.27	10.00
16.033	161.47	12.88	164.35	10.00
16.050	188.76	14.67	193.44	10.00
16.067	216.05	16.47	222.52	10.00
16.083	243.35	18.26	251.61	10.00
16.100	270.63	20.06	280.69	10.00
16.117	297.92	21.85	309.78	10.00
16.133	325.21	23.65	338.86	10.00
16.150	352.50	25.44	367.95	10.00
16.167	379.79	27.24	397.03	10.00
16.183	407.08	29.03	426.12	10.00
16.200	434.37	30.83	455.20	10.00
16.217	461.66	32.62	484.29	10.00
16.233	488.95	34.20	513.16	10.00
16.250	516.24	31.79	538.03	10.00
16.267	543.53	29.64	563.17	10.00
16.283	570.82	27.48	588.30	10.00
16.300	598.66	25.33	613.99	10.00
16.317	567.22	23.18	580.40	10.00
16.333	535.14	21.02	546.16	10.00
16.350	503.06	18.87	511.93	10.00
16.367	470.99	16.71	477.70	10.00
16.383	438.91	14.56	443.47	10.00
16.400	406.83	12.41	409.24	10.00
16.417	374.76	10.25	375.01	10.00
16.433	342.68	8.10	342.68	8.10
16.450	310.60	6.01	310.60	6.01
16.467	278.52	5.33	278.52	5.33
16.483	246.45	5.25	246.45	5.25
16.500	214.37	5.17	214.37	5.17
16.517	182.29	5.10	182.29	5.10
16.533	150.22	5.02	150.22	5.02
16.550	118.14	4.94	118.14	4.94
16.567	86.06	4.86	86.06	4.86
16.583	53.98	4.79	53.98	4.79
16.600	35.78	4.71	35.78	4.71
16.617	33.80	4.63	33.80	4.63
16.633	31.84	4.56	31.84	4.56
16.650	29.88	4.48	29.88	4.48
16.667	27.92	4.40	27.92	4.40
16.683	25.96	4.33	25.96	4.33
16.700	24.00	4.27	24.00	4.27
16.717	22.04	4.21	22.04	4.21
16.733	20.08	4.15	20.08	4.15
16.750	18.12	4.09	18.12	4.09
16.767	16.16	4.03	16.16	4.03
16.783	14.20	3.97	14.20	3.97
16.800	12.24	3.91	12.24	3.91
16.817	10.28	3.85	10.28	3.85
16.833	8.32	3.80	8.32	3.80
16.850	6.36	3.74	6.36	3.74
16.867	4.40	3.68	4.40	3.68
16.883	2.53	3.62	2.53	3.62
16.900	1.32	3.56	1.32	3.56
16.917	0.25	3.52	0.25	3.52
16.933	0.00	3.49	0.00	3.49
16.950	0.00	3.45	0.00	3.45
16.967	0.00	3.41	0.00	3.41
16.983	0.00	3.38	0.00	3.38
17.000	0.00	3.34	0.00	3.34
17.017	0.00	3.31	0.00	3.31
17.033	0.00	3.27	0.00	3.27
17.050	0.00	3.23	0.00	3.23
17.067	0.00	3.20	0.00	3.20
17.083	0.00	3.16	0.00	3.16
17.100	0.00	3.13	0.00	3.13
17.117	0.00	3.09	0.00	3.09
17.133	0.00	3.06	0.00	3.06
17.150	0.00	3.03	0.00	3.03
17.167	0.00	3.01	0.00	3.01
17.183	0.00	2.98	0.00	2.98
17.200	0.00	2.96	0.00	2.96
17.217	0.00	2.93	0.00	2.93
17.233	0.00	2.90	0.00	2.90
17.250	0.00	2.88	0.00	2.88
17.267	0.00	2.85	0.00	2.85
17.283	0.00	2.83	0.00	2.83
17.300	0.00	2.80	0.00	2.80
17.317	0.00	2.77	0.00	2.77
17.333	0.00	2.75	0.00	2.75
17.350	0.00	2.72	0.00	2.72
17.367	0.00	2.71	0.00	2.71
17.383	0.00	2.69	0.00	2.69
17.400	0.00	2.67	0.00	2.67
17.417	0.00	2.65	0.00	2.65
17.433	0.00	2.63	0.00	2.63
17.450	0.00	2.61	0.00	2.61
17.467	0.00	2.60	0.00	2.60
17.483	0.00	2.58	0.00	2.58
17.500	0.00	2.56	0.00	2.56
17.517	0.00	2.54	0.00	2.54
17.533	0.00	2.52	0.00	2.52
17.550	0.00	2.50	0.00	2.50
17.567	0.00	2.49	0.00	2.49
17.583	0.00	2.47	0.00	2.47
17.600	0.00	2.46	0.00	2.46
17.617	0.00	2.44	0.00	2.44
17.633	0.00	2.43	0.00	2.43
17.650	0.00	2.41	0.00	2.41
17.667	0.00	2.40	0.00	2.40
17.683	0.00	2.38	0.00	2.38
17.700	0.00	2.37	0.00	2.37
17.717	0.00	2.36	0.00	2.36
17.733	0.00	2.34	0.00	2.34
17.750	0.00	2.33	0.00	2.33
17.767	0.00	2.31	0.00	2.31
17.783	0.00	2.30	0.00	2.30
17.800	0.00	2.29	0.00	2.29
17.817	0.00	2.27	0.00	2.27

17.833	0.00	2.26	0.00	2.26
17.850	0.00	2.25	0.00	2.25
17.867	0.00	2.24	0.00	2.24
17.883	0.00	2.23	0.00	2.23
17.900	0.00	2.22	0.00	2.22
17.917	0.00	2.21	0.00	2.21
17.933	0.00	2.19	0.00	2.19
17.950	0.00	2.18	0.00	2.18
17.967	0.00	2.17	0.00	2.17
17.983	0.00	2.16	0.00	2.16
18.000	0.00	2.15	0.00	2.15

****
FLOW PROCESS FROM NODE 35.00 TO NODE 35.00 IS CODE = 3.2

>>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #3<<<<<
==========



ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 3
THROUGH A FLOW-THROUGH DETENTION BASIN
SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
DEAD STORAGE(AF) = 0.000
SPECIFIED DEAD STORAGE(AF) FILLED = 0.000
SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET = 0.000
DETENTION BASIN CONSTANT LOSS RATE(CFS) = 0.00

BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

INTERVAL NUMBER	DEPTH (FT)	OUTFLOW (CFS)	STORAGE (AF)
1	0.00	0.00	0.000
2	0.50	15.16	0.510
3	1.00	40.12	1.010
4	1.50	54.67	1.520
5	2.00	66.33	2.020
6	2.50	76.19	2.530
7	3.00	84.90	3.040
8	3.50	93.04	3.540
9	4.00	100.45	4.050
10	4.50	107.33	4.560
11	5.00	114.02	5.060
12	5.50	120.27	5.570
13	6.00	126.17	6.070
14	7.00	142.55	7.090
15	8.00	156.65	8.100
16	9.00	168.87	9.110
17	10.00	180.03	10.120
18	11.00	190.43	11.140
19	12.00	200.23	12.150
20	13.00	428.93	13.160
21	14.00	838.96	14.170

==========
MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
14.917	0.000	0.00	0.00	0.00	0.0	0.000
14.933	0.000	0.24	0.00	0.00	0.0	0.000
14.950	0.000	1.21	0.00	0.00	0.0	0.002
14.967	0.000	2.19	0.00	0.00	0.1	0.005
14.983	0.000	3.16	0.00	0.01	0.2	0.009
15.000	0.000	4.13	0.00	0.01	0.3	0.014
15.017	0.000	5.10	0.00	0.02	0.5	0.020
15.033	0.000	6.07	0.00	0.03	0.7	0.028
15.050	0.000	7.04	0.00	0.04	1.0	0.036
15.067	0.000	8.01	0.00	0.04	1.2	0.046
15.083	0.000	8.98	0.00	0.05	1.5	0.056
15.100	0.000	9.95	0.00	0.07	1.8	0.067
15.117	0.000	10.92	0.00	0.08	2.2	0.079
15.133	0.000	11.85	0.00	0.09	2.5	0.092
15.150	0.000	12.63	0.00	0.10	2.9	0.105
15.167	0.000	13.38	0.00	0.12	3.3	0.119
15.183	0.000	14.13	0.00	0.13	3.8	0.133
15.200	0.000	14.88	0.00	0.15	4.2	0.148
15.217	0.000	15.63	0.00	0.16	4.6	0.163
15.233	0.000	16.38	0.00	0.18	5.1	0.179
15.250	0.000	17.14	0.00	0.19	5.6	0.195
15.267	0.000	17.89	0.00	0.21	6.0	0.211
15.283	0.000	18.64	0.00	0.22	6.5	0.228
15.300	0.000	19.39	0.00	0.24	7.0	0.245
15.317	0.000	20.14	0.00	0.26	7.5	0.262
15.333	0.000	20.89	0.00	0.27	8.1	0.280
15.350	0.000	21.65	0.00	0.29	8.6	0.298
15.367	0.000	22.40	0.00	0.31	9.1	0.316
15.383	0.000	23.15	0.00	0.33	9.7	0.335
15.400	0.000	23.90	0.00	0.35	10.2	0.354

15.417	0.000	24.65	0.00	0.37	10.8	0.373
15.433	0.000	25.97	0.00	0.39	11.4	0.393
15.450	0.000	27.78	0.00	0.41	12.0	0.414
15.467	0.000	29.59	0.00	0.43	12.7	0.438
15.483	0.000	31.39	0.00	0.45	13.4	0.463
15.500	0.000	33.20	0.00	0.48	14.1	0.489
15.517	0.000	35.01	0.00	0.51	15.0	0.516
15.533	0.000	36.81	0.00	0.53	16.2	0.545
15.550	0.000	38.62	0.00	0.56	17.6	0.574
15.567	0.000	40.43	0.00	0.59	19.1	0.603
15.583	0.000	42.23	0.00	0.62	20.6	0.633
15.600	0.000	44.04	0.00	0.65	22.1	0.663
15.617	0.000	45.85	0.00	0.68	23.6	0.694
15.633	0.000	47.65	0.00	0.71	25.1	0.725
15.650	0.000	49.46	0.00	0.75	26.7	0.756
15.667	0.000	51.27	0.00	0.78	28.2	0.788
15.683	0.000	53.07	0.00	0.81	29.8	0.820
15.700	0.000	54.88	0.00	0.84	31.4	0.852
15.717	0.000	56.93	0.00	0.88	33.1	0.885
15.733	0.000	60.37	0.00	0.91	34.8	0.920
15.750	0.000	64.02	0.00	0.95	36.6	0.958
15.767	0.000	67.66	0.00	0.99	38.5	0.998
15.783	0.000	71.31	0.00	1.03	40.3	1.041
15.800	0.000	74.96	0.00	1.08	41.7	1.087
15.817	0.000	78.60	0.00	1.12	43.0	1.136
15.833	0.000	82.25	0.00	1.17	44.5	1.188
15.850	0.000	85.90	0.00	1.23	46.0	1.243
15.867	0.000	89.54	0.00	1.29	47.6	1.301
15.883	0.000	93.19	0.00	1.34	49.3	1.361
15.900	0.000	96.84	0.00	1.41	51.0	1.424
15.917	0.000	100.48	0.00	1.47	52.9	1.490
15.933	0.000	104.13	0.00	1.54	54.7	1.558
15.950	0.000	107.78	0.00	1.61	56.4	1.629
15.967	0.000	111.42	0.00	1.68	58.1	1.702
15.983	0.000	115.07	0.00	1.76	59.8	1.778
16.000	0.000	118.78	0.00	1.84	61.6	1.857
16.017	0.000	135.27	0.00	1.94	63.7	1.956
16.033	0.000	164.35	0.00	2.07	66.3	2.091
16.050	0.000	193.44	0.00	2.24	69.4	2.262
16.067	0.000	222.52	0.00	2.44	73.0	2.468
16.083	0.000	251.61	0.00	2.67	77.1	2.708
16.100	0.000	280.69	0.00	2.94	81.6	2.982
16.117	0.000	309.78	0.00	3.25	86.4	3.290
16.133	0.000	338.86	0.00	3.59	91.7	3.631
16.150	0.000	367.95	0.00	3.95	97.1	4.004
16.167	0.000	397.03	0.00	4.35	102.5	4.409
16.183	0.000	426.12	0.00	4.79	108.2	4.847
16.200	0.000	455.20	0.00	5.25	114.2	5.317
16.217	0.000	484.29	0.00	5.75	120.2	5.818
16.233	0.000	513.16	0.00	6.27	126.9	6.350
16.250	0.000	538.03	0.00	6.82	135.1	6.905
16.267	0.000	563.17	0.00	7.39	143.8	7.483
16.283	0.000	588.30	0.00	7.98	152.2	8.084
16.300	0.000	613.99	0.00	8.60	160.2	8.709
16.317	0.000	580.40	0.00	9.17	167.4	9.278
16.333	0.000	546.16	0.00	9.67	173.6	9.791
16.350	0.000	511.93	0.00	10.13	178.9	10.250
16.367	0.000	477.70	0.00	10.52	183.4	10.655
16.383	0.000	443.47	0.00	10.87	187.3	11.008
16.400	0.000	409.24	0.00	11.17	190.6	11.309
16.417	0.000	375.01	0.00	11.42	193.3	11.559
16.433	0.000	342.68	0.00	11.62	195.5	11.762
16.450	0.000	310.60	0.00	11.77	197.2	11.918
16.467	0.000	278.52	0.00	11.88	198.5	12.028
16.483	0.000	246.45	0.00	11.94	199.4	12.093
16.500	0.000	214.37	0.00	11.96	199.8	12.113
16.517	0.000	182.29	0.00	11.94	199.8	12.089
16.533	0.000	150.22	0.00	11.87	199.3	12.022
16.550	0.000	118.14	0.00	11.76	198.4	11.911
16.567	0.000	86.06	0.00	11.61	197.2	11.758
16.583	0.000	53.98	0.00	11.42	195.5	11.563
16.600	0.000	35.78	0.00	11.20	193.5	11.346
16.617	0.000	33.80	0.00	10.99	191.4	11.129
16.633	0.000	31.84	0.00	10.78	189.2	10.912
16.650	0.000	29.88	0.00	10.56	187.0	10.696
16.667	0.000	27.92	0.00	10.35	184.8	10.480
16.683	0.000	25.96	0.00	10.14	182.6	10.264
16.700	0.000	24.00	0.00	9.93	180.4	10.048
16.717	0.000	22.04	0.00	9.72	178.1	9.834
16.733	0.000	20.08	0.00	9.50	175.7	9.619
16.750	0.000	18.12	0.00	9.29	173.3	9.405
16.767	0.000	16.16	0.00	9.08	171.0	9.192
16.783	0.000	14.20	0.00	8.87	168.5	8.980
16.800	0.000	12.24	0.00	8.66	166.0	8.768
16.817	0.000	10.28	0.00	8.45	163.5	8.557
16.833	0.000	8.32	0.00	8.24	160.9	8.347
16.850	0.000	6.36	0.00	8.04	158.4	8.137
16.867	0.000	4.40	0.00	7.83	155.7	7.929
16.883	0.000	2.53	0.00	7.63	152.8	7.722
16.900	0.000	1.32	0.00	7.42	149.9	7.517
16.917	0.000	0.25	0.00	7.22	147.1	7.315
16.933	0.000	0.00	0.00	7.03	144.3	7.116
16.950	0.000	0.00	0.00	6.83	141.4	6.921
16.967	0.000	0.00	0.00	6.65	138.3	6.731
16.983	0.000	0.00	0.00	6.47	135.3	6.545
17.000	0.000	0.00	0.00	6.29	132.3	6.362
17.017	0.000	0.00	0.00	6.11	129.4	6.184
17.033	0.000	0.00	0.00	5.94	126.7	6.009
17.050	0.000	0.00	0.00	5.77	124.4	5.838
17.067	0.000	0.00	0.00	5.60	122.4	5.669
17.083	0.000	0.00	0.00	5.43	120.4	5.503
17.100	0.000	0.00	0.00	5.27	118.5	5.340
17.117	0.000	0.00	0.00	5.12	116.5	5.180
17.133	0.000	0.00	0.00	4.96	114.5	5.022
17.150	0.000	0.00	0.00	4.81	112.5	4.867
17.167	0.000	0.00	0.00	4.66	110.4	4.715
17.183	0.000	0.00	0.00	4.51	108.4	4.566
17.200	0.000	0.00	0.00	4.36	106.4	4.419
17.217	0.000	0.00	0.00	4.22	104.5	4.275
17.233	0.000	0.00	0.00	4.08	102.5	4.134
17.250	0.000	0.00	0.00	3.95	100.6	3.996
17.267	0.000	0.00	0.00	3.81	98.7	3.860

17.283	0.000	0.00	0.00	3.68	96.7	3.726
17.300	0.000	0.00	0.00	3.55	94.8	3.596
17.317	0.000	0.00	0.00	3.43	92.9	3.468
17.333	0.000	0.00	0.00	3.30	90.8	3.343
17.350	0.000	0.00	0.00	3.18	88.8	3.220
17.367	0.000	0.00	0.00	3.06	86.9	3.101
17.383	0.000	0.00	0.00	2.94	84.9	2.984
17.400	0.000	0.00	0.00	2.83	83.0	2.870
17.417	0.000	0.00	0.00	2.72	81.0	2.758
17.433	0.000	0.00	0.00	2.62	79.2	2.649
17.450	0.000	0.00	0.00	2.51	77.3	2.542
17.467	0.000	0.00	0.00	2.41	75.4	2.439
17.483	0.000	0.00	0.00	2.31	73.4	2.337
17.500	0.000	0.00	0.00	2.21	71.5	2.239
17.517	0.000	0.00	0.00	2.12	69.6	2.143
17.533	0.000	0.00	0.00	2.03	67.8	2.050
17.550	0.000	0.00	0.00	1.94	65.9	1.959
17.567	0.000	0.00	0.00	1.85	63.9	1.871
17.583	0.000	0.00	0.00	1.77	61.9	1.786
17.600	0.000	0.00	0.00	1.68	59.9	1.703
17.617	0.000	0.00	0.00	1.60	58.0	1.623
17.633	0.000	0.00	0.00	1.53	56.2	1.546
17.650	0.000	0.00	0.00	1.45	54.3	1.471
17.667	0.000	0.00	0.00	1.38	52.2	1.399
17.683	0.000	0.00	0.00	1.31	50.2	1.330
17.700	0.000	0.00	0.00	1.25	48.3	1.263
17.717	0.000	0.00	0.00	1.19	46.4	1.199
17.733	0.000	0.00	0.00	1.13	44.6	1.138
17.750	0.000	0.00	0.00	1.07	42.9	1.079
17.767	0.000	0.00	0.00	1.01	41.3	1.022
17.783	0.000	0.00	0.00	0.96	39.2	0.968
17.800	0.000	0.00	0.00	0.91	36.8	0.917
17.817	0.000	0.00	0.00	0.86	34.3	0.870
17.833	0.000	0.00	0.00	0.82	32.0	0.826
17.850	0.000	0.00	0.00	0.77	29.9	0.785
17.867	0.000	0.00	0.00	0.74	27.9	0.746
17.883	0.000	0.00	0.00	0.70	26.1	0.710
17.900	0.000	0.00	0.00	0.67	24.3	0.677
17.917	0.000	0.00	0.00	0.64	22.7	0.646
17.933	0.000	0.00	0.00	0.61	21.2	0.616
17.950	0.000	0.00	0.00	0.58	19.8	0.589
17.967	0.000	0.00	0.00	0.55	18.5	0.564
17.983	0.000	0.00	0.00	0.53	17.2	0.540
18.000	0.000	0.00	0.00	0.51	16.1	0.518
18.017	0.000	0.00	0.00	0.49	15.2	0.497
18.033	0.000	0.00	0.00	0.47	14.5	0.477
18.050	0.000	0.00	0.00	0.45	13.9	0.458
18.067	0.000	0.00	0.00	0.43	13.3	0.439
18.083	0.000	0.00	0.00	0.41	12.8	0.422
18.100	0.000	0.00	0.00	0.40	12.3	0.405
18.117	0.000	0.00	0.00	0.38	11.8	0.389
18.133	0.000	0.00	0.00	0.37	11.3	0.373
18.150	0.000	0.00	0.00	0.35	10.9	0.358
18.167	0.000	0.00	0.00	0.34	10.4	0.344
18.183	0.000	0.00	0.00	0.32	10.0	0.330
18.200	0.000	0.00	0.00	0.31	9.6	0.317
18.217	0.000	0.00	0.00	0.30	9.2	0.304
18.233	0.000	0.00	0.00	0.29	8.9	0.292
18.250	0.000	0.00	0.00	0.27	8.5	0.280
18.267	0.000	0.00	0.00	0.26	8.2	0.269
18.283	0.000	0.00	0.00	0.25	7.8	0.258
18.300	0.000	0.00	0.00	0.24	7.5	0.248
18.317	0.000	0.00	0.00	0.23	7.2	0.238
18.333	0.000	0.00	0.00	0.22	6.9	0.228
18.350	0.000	0.00	0.00	0.21	6.6	0.219
18.367	0.000	0.00	0.00	0.21	6.4	0.210
18.383	0.000	0.00	0.00	0.20	6.1	0.202
18.400	0.000	0.00	0.00	0.19	5.9	0.194
18.417	0.000	0.00	0.00	0.18	5.6	0.186
18.433	0.000	0.00	0.00	0.17	5.4	0.178
18.450	0.000	0.00	0.00	0.17	5.2	0.171
18.467	0.000	0.00	0.00	0.16	5.0	0.164
18.483	0.000	0.00	0.00	0.15	4.8	0.158
18.500	0.000	0.00	0.00	0.15	4.6	0.152
18.517	0.000	0.00	0.00	0.14	4.4	0.145
18.533	0.000	0.00	0.00	0.14	4.2	0.140
18.550	0.000	0.00	0.00	0.13	4.1	0.134
18.567	0.000	0.00	0.00	0.13	3.9	0.129
18.583	0.000	0.00	0.00	0.12	3.7	0.123
18.600	0.000	0.00	0.00	0.12	3.6	0.119
18.617	0.000	0.00	0.00	0.11	3.5	0.114
18.633	0.000	0.00	0.00	0.11	3.3	0.109
18.650	0.000	0.00	0.00	0.10	3.2	0.105
18.667	0.000	0.00	0.00	0.10	3.1	0.101
18.683	0.000	0.00	0.00	0.09	2.9	0.097
18.700	0.000	0.00	0.00	0.09	2.8	0.093
18.717	0.000	0.00	0.00	0.09	2.7	0.089
18.733	0.000	0.00	0.00	0.08	2.6	0.085
18.750	0.000	0.00	0.00	0.08	2.5	0.082
18.767	0.000	0.00	0.00	0.08	2.4	0.079
18.783	0.000	0.00	0.00	0.07	2.3	0.076
18.800	0.000	0.00	0.00	0.07	2.2	0.073
18.817	0.000	0.00	0.00	0.07	2.1	0.070
18.833	0.000	0.00	0.00	0.07	2.0	0.067
18.850	0.000	0.00	0.00	0.06	1.9	0.064
18.867	0.000	0.00	0.00	0.06	1.9	0.062
18.883	0.000	0.00	0.00	0.06	1.8	0.059
18.900	0.000	0.00	0.00	0.06	1.7	0.057
18.917	0.000	0.00	0.00	0.05	1.7	0.054
18.933	0.000	0.00	0.00	0.05	1.6	0.052
18.950	0.000	0.00	0.00	0.05	1.5	0.050
18.967	0.000	0.00	0.00	0.05	1.5	0.048
18.983	0.000	0.00	0.00	0.05	1.4	0.046
19.000	0.000	0.00	0.00	0.04	1.3	0.044
19.017	0.000	0.00	0.00	0.04	1.3	0.043
19.033	0.000	0.00	0.00	0.04	1.2	0.041
19.050	0.000	0.00	0.00	0.04	1.2	0.039
19.067	0.000	0.00	0.00	0.04	1.1	0.038
19.083	0.000	0.00	0.00	0.04	1.1	0.036
19.100	0.000	0.00	0.00	0.03	1.1	0.035
19.117	0.000	0.00	0.00	0.03	1.0	0.033
19.133	0.000	0.00	0.00	0.03	1.0	0.032

19.150	0.000	0.00	0.00	0.03	0.9	0.031
19.167	0.000	0.00	0.00	0.03	0.9	0.029
19.183	0.000	0.00	0.00	0.03	0.9	0.028
19.200	0.000	0.00	0.00	0.03	0.8	0.027
19.217	0.000	0.00	0.00	0.03	0.8	0.026
19.233	0.000	0.00	0.00	0.02	0.8	0.025
19.250	0.000	0.00	0.00	0.02	0.7	0.024
19.267	0.000	0.00	0.00	0.02	0.7	0.023
19.283	0.000	0.00	0.00	0.02	0.7	0.022
19.300	0.000	0.00	0.00	0.02	0.6	0.021
19.317	0.000	0.00	0.00	0.02	0.6	0.020
19.333	0.000	0.00	0.00	0.02	0.6	0.020
19.350	0.000	0.00	0.00	0.02	0.6	0.019
19.367	0.000	0.00	0.00	0.02	0.5	0.018
19.383	0.000	0.00	0.00	0.02	0.5	0.017
19.400	0.000	0.00	0.00	0.02	0.5	0.017
19.417	0.000	0.00	0.00	0.02	0.5	0.016
19.433	0.000	0.00	0.00	0.01	0.5	0.015
19.450	0.000	0.00	0.00	0.01	0.4	0.015
19.467	0.000	0.00	0.00	0.01	0.4	0.014
19.483	0.000	0.00	0.00	0.01	0.4	0.014
19.500	0.000	0.00	0.00	0.01	0.4	0.013
19.517	0.000	0.00	0.00	0.01	0.4	0.012
19.533	0.000	0.00	0.00	0.01	0.4	0.012
19.550	0.000	0.00	0.00	0.01	0.3	0.011
19.567	0.000	0.00	0.00	0.01	0.3	0.011
19.583	0.000	0.00	0.00	0.01	0.3	0.011
19.600	0.000	0.00	0.00	0.01	0.3	0.010
19.617	0.000	0.00	0.00	0.01	0.3	0.010
19.633	0.000	0.00	0.00	0.01	0.3	0.009
19.650	0.000	0.00	0.00	0.01	0.3	0.009
19.667	0.000	0.00	0.00	0.01	0.3	0.009
19.683	0.000	0.00	0.00	0.01	0.3	0.008
19.700	0.000	0.00	0.00	0.01	0.2	0.008
19.717	0.000	0.00	0.00	0.01	0.2	0.008
19.733	0.000	0.00	0.00	0.01	0.2	0.007
19.750	0.000	0.00	0.00	0.01	0.2	0.007
19.767	0.000	0.00	0.00	0.01	0.2	0.007
19.783	0.000	0.00	0.00	0.01	0.2	0.006
19.800	0.000	0.00	0.00	0.01	0.2	0.006
19.817	0.000	0.00	0.00	0.01	0.2	0.006
19.833	0.000	0.00	0.00	0.01	0.2	0.006
19.850	0.000	0.00	0.00	0.01	0.2	0.005
19.867	0.000	0.00	0.00	0.01	0.2	0.005
19.883	0.000	0.00	0.00	0.00	0.2	0.005
19.900	0.000	0.00	0.00	0.00	0.1	0.005
19.917	0.000	0.00	0.00	0.00	0.1	0.005
19.933	0.000	0.00	0.00	0.00	0.1	0.004
19.950	0.000	0.00	0.00	0.00	0.1	0.004
19.967	0.000	0.00	0.00	0.00	0.1	0.004
19.983	0.000	0.00	0.00	0.00	0.1	0.004
20.000	0.000	0.00	0.00	0.00	0.1	0.004
20.017	0.000	0.00	0.00	0.00	0.1	0.004
20.033	0.000	0.00	0.00	0.00	0.1	0.004
20.050	0.000	0.00	0.00	0.00	0.1	0.003
20.067	0.000	0.00	0.00	0.00	0.1	0.003
20.083	0.000	0.00	0.00	0.00	0.1	0.003
20.100	0.000	0.00	0.00	0.00	0.1	0.003
20.117	0.000	0.00	0.00	0.00	0.1	0.003
20.133	0.000	0.00	0.00	0.00	0.1	0.003
20.150	0.000	0.00	0.00	0.00	0.1	0.003
20.167	0.000	0.00	0.00	0.00	0.1	0.003
20.183	0.000	0.00	0.00	0.00	0.1	0.002
20.200	0.000	0.00	0.00	0.00	0.1	0.002
20.217	0.000	0.00	0.00	0.00	0.1	0.002
20.233	0.000	0.00	0.00	0.00	0.1	0.002
20.250	0.000	0.00	0.00	0.00	0.1	0.002
20.267	0.000	0.00	0.00	0.00	0.1	0.002
20.283	0.000	0.00	0.00	0.00	0.1	0.002
20.300	0.000	0.00	0.00	0.00	0.1	0.002
20.317	0.000	0.00	0.00	0.00	0.1	0.002
20.333	0.000	0.00	0.00	0.00	0.1	0.002
20.350	0.000	0.00	0.00	0.00	0.0	0.002
20.367	0.000	0.00	0.00	0.00	0.0	0.002
20.383	0.000	0.00	0.00	0.00	0.0	0.001
20.400	0.000	0.00	0.00	0.00	0.0	0.001
20.417	0.000	0.00	0.00	0.00	0.0	0.001
20.433	0.000	0.00	0.00	0.00	0.0	0.001
20.450	0.000	0.00	0.00	0.00	0.0	0.001
20.467	0.000	0.00	0.00	0.00	0.0	0.001
20.483	0.000	0.00	0.00	0.00	0.0	0.001
20.500	0.000	0.00	0.00	0.00	0.0	0.001
20.517	0.000	0.00	0.00	0.00	0.0	0.001
20.533	0.000	0.00	0.00	0.00	0.0	0.001
20.550	0.000	0.00	0.00	0.00	0.0	0.001
20.567	0.000	0.00	0.00	0.00	0.0	0.001
20.583	0.000	0.00	0.00	0.00	0.0	0.001
20.600	0.000	0.00	0.00	0.00	0.0	0.001
20.617	0.000	0.00	0.00	0.00	0.0	0.001
20.633	0.000	0.00	0.00	0.00	0.0	0.001
20.650	0.000	0.00	0.00	0.00	0.0	0.001
20.667	0.000	0.00	0.00	0.00	0.0	0.001
20.683	0.000	0.00	0.00	0.00	0.0	0.001
20.700	0.000	0.00	0.00	0.00	0.0	0.001
20.717	0.000	0.00	0.00	0.00	0.0	0.001
20.733	0.000	0.00	0.00	0.00	0.0	0.001
20.750	0.000	0.00	0.00	0.00	0.0	0.001
20.767	0.000	0.00	0.00	0.00	0.0	0.001
20.783	0.000	0.00	0.00	0.00	0.0	0.001
20.800	0.000	0.00	0.00	0.00	0.0	0.001
20.817	0.000	0.00	0.00	0.00	0.0	0.001
20.833	0.000	0.00	0.00	0.00	0.0	0.000
20.850	0.000	0.00	0.00	0.00	0.0	0.000
20.867	0.000	0.00	0.00	0.00	0.0	0.000
20.883	0.000	0.00	0.00	0.00	0.0	0.000
20.900	0.000	0.00	0.00	0.00	0.0	0.000

PROCESS SUMMARY OF STORAGE:

INFLOW VOLUME = 20.907 AF

BASIN STORAGE = 0.000 AF (WITH 0.000 AF INITIALLY FILLED)

OUTFLOW VOLUME = 20.907 AF

LOSS VOLUME = 0.000 AF

```
**************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     35.20 IS CODE =   7
--------------------------------------------------------------------------
  >>>>>STREAM NUMBER 1 ADDED TO STREAM NUMBER 2<<<<<
==========================================================================


**************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  11
--------------------------------------------------------------------------
  >>>>>VIEW STREAM NUMBER 2 HYDROGRAPH<<<<<
==========================================================================

           STREAM HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
--------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       50.0     100.0     150.0     200.0
--------------------------------------------------------------------------
  14.000     37.1884     78.46  .         .    Q V  .         .         .
  14.017     37.2968     78.68  .         .    Q V  .         .         .
  14.033     37.4055     78.91  .         .    Q V  .         .         .
  14.050     37.5145     79.14  .         .    Q  V .         .         .
  14.067     37.6238     79.37  .         .    Q  V .         .         .
  14.083     37.7335     79.60  .         .    Q  V .         .         .
  14.100     37.8434     79.83  .         .    Q  V .         .         .
  14.117     37.9537     80.06  .         .     Q V .         .         .
  14.133     38.0643     80.28  .         .     Q V .         .         .
  14.150     38.1752     80.51  .         .     Q V .         .         .
  14.167     38.2864     80.74  .         .     Q V .         .         .
  14.183     38.3979     80.97  .         .     Q V .         .         .
  14.200     38.5098     81.20  .         .     Q V .         .         .
  14.217     38.6219     81.43  .         .     Q V .         .         .
  14.233     38.7344     81.66  .         .     Q V .         .         .
  14.250     38.8472     81.90  .         .     Q V .         .         .
  14.267     38.9607     82.35  .         .     Q V .         .         .
  14.283     39.0749     82.92  .         .     Q V .         .         .
  14.300     39.1899     83.50  .         .     Q V .         .         .
  14.317     39.3057     84.07  .         .     Q V .         .         .
  14.333     39.4223     84.65  .         .     Q V .         .         .
  14.350     39.5397     85.22  .         .      QV .         .         .
  14.367     39.6579     85.80  .         .      Q V.         .         .
  14.383     39.7768     86.37  .         .      Q V.         .         .
  14.400     39.8966     86.95  .         .      Q V.         .         .
  14.417     40.0172     87.52  .         .      Q V.         .         .
  14.433     40.1385     88.10  .         .      Q V.         .         .
  14.450     40.2606     88.67  .         .      Q V.         .         .
  14.467     40.3836     89.24  .         .      Q V.         .         .
  14.483     40.5073     89.81  .         .      Q V.         .         .
  14.500     40.6317     90.37  .         .       QV.         .         .
  14.517     40.7570     90.94  .         .       QV.         .         .
  14.533     40.8831     91.51  .         .       QV.         .         .
  14.550     41.0098     92.04  .         .       QV.         .         .
  14.567     41.1371     92.41  .         .       QV.         .         .
  14.583     41.2649     92.77  .         .       QV.         .         .
  14.600     41.3932     93.13  .         .       QV.         .         .
  14.617     41.5220     93.49  .         .       QV.         .         .
  14.633     41.6512     93.85  .         .       QV.         .         .
  14.650     41.7810     94.21  .         .       Q V         .         .
  14.667     41.9113     94.57  .         .       Q V         .         .
  14.683     42.0420     94.95  .         .       Q V         .         .
  14.700     42.1733     95.32  .         .        QV         .         .
  14.717     42.3052     95.70  .         .        QV         .         .
  14.733     42.4375     96.08  .         .        QV         .         .
  14.750     42.5704     96.46  .         .        QV         .         .
  14.767     42.7038     96.84  .         .        QV         .         .
  14.783     42.8377     97.21  .         .        QV         .         .
  14.800     42.9721     97.59  .         .        QV         .         .
  14.817     43.1070     97.97  .         .        QV         .         .
  14.833     43.2425     98.35  .         .        QV         .         .
  14.850     43.3790     99.09  .         .        QV         .         .
  14.867     43.5168    100.09  .         .         Q         .         .
  14.883     43.6561    101.09  .         .         Q         .         .
  14.900     43.7967    102.08  .         .         QV        .         .
  14.917     43.9387    103.07  .         .         QV        .         .
  14.933     44.0817    103.82  .         .         QV        .         .
  14.950     44.2247    103.84  .         .         QV        .         .
  14.967     44.3678    103.86  .         .         QV        .         .
  14.983     44.5108    103.88  .         .         QV        .         .
  15.000     44.6540    103.90  .         .         QV        .         .
  15.017     44.7971    103.92  .         .         QV        .         .
  15.033     44.9403    103.94  .         .         QV        .         .
  15.050     45.0834    103.96  .         .         QV        .         .
  15.067     45.2267    103.97  .         .         QV        .         .
  15.083     45.3699    103.99  .         .         QV        .         .
  15.100     45.5132    104.01  .         .         QV        .         .
  15.117     45.6565    104.04  .         .         QV        .         .
  15.133     45.7998    104.09  .         .         QV        .         .
  15.150     45.9433    104.14  .         .         Q V       .         .
  15.167     46.0868    104.20  .         .         Q V       .         .
  15.183     46.2304    104.25  .         .         Q V       .         .
  15.200     46.3741    104.30  .         .         Q V       .         .
  15.217     46.5178    104.36  .         .         Q V       .         .
  15.233     46.6616    104.41  .         .         Q V       .         .
  15.250     46.8055    104.47  .         .         Q V       .         .
  15.267     46.9495    104.52  .         .         Q V       .         .
  15.283     47.0935    104.57  .         .         Q V       .         .
  15.300     47.2376    104.63  .         .         Q V       .         .
  15.317     47.3818    104.68  .         .         Q V       .         .
  15.333     47.5261    104.74  .         .         Q V       .         .
  15.350     47.6704    104.77  .         .         Q V       .         .
  15.367     47.8147    104.78  .         .         Q V       .         .
  15.383     47.9591    104.80  .         .         Q  V      .         .
  15.400     48.1035    104.81  .         .         Q  V      .         .
  15.417     48.2478    104.83  .         .         Q  V      .         .
  15.433     48.3923    104.85  .         .         Q  V      .         .
  15.450     48.5367    104.86  .         .         Q  V      .         .
  15.467     48.6812    104.88  .         .         Q  V      .         .
  15.483     48.8257    104.90  .         .         Q  V      .         .
```

15.500	48.9702	104.91	.	.	Q	V	.	.		16.433	57.3294	108.10	.	.	.Q	V	.	.	
15.517	49.1147	104.93	.	.	Q	V	.	.		16.450	57.4754	106.01	.	.	.Q	V	.	.	
15.533	49.2592	104.94	.	.	Q	V	.	.		16.467	57.6205	105.33	.	.	.Q	V	.	.	
15.550	49.4038	104.96	.	.	Q	V	.	.		16.483	57.7655	105.25	.	.	.Q	V	.	.	
15.567	49.5485	105.02	.	.	.Q	V	.	.		16.500	57.9104	105.17	.	.	.Q	V	.	.	
15.583	49.6933	105.16	.	.	.Q	V	.	.		16.517	58.0551	105.10	.	.	.Q	V	.	.	
15.600	49.8384	105.31	.	.	.Q	V	.	.		16.533	58.1998	105.02	.	.	.Q	V	.	.	
15.617	49.9836	105.46	.	.	.Q	V	.	.		16.550	58.3443	104.94	.	.	Q	V	.	.	
15.633	50.1291	105.61	.	.	.Q	V	.	.		16.567	58.4888	104.86	.	.	Q	V	.	.	
15.650	50.2748	105.76	.	.	.Q	V	.	.		16.583	58.6331	104.79	.	.	Q	V	.	.	
15.667	50.4207	105.91	.	.	.Q	V	.	.		16.600	58.7773	104.71	.	.	Q	V	.	.	
15.683	50.5667	106.06	.	.	.Q	V	.	.		16.617	58.9214	104.63	.	.	Q	V	.	.	
15.700	50.7130	106.21	.	.	.Q	V	.	.		16.633	59.0655	104.56	.	.	Q	V	.	.	
15.717	50.8595	106.36	.	.	.Q	V	.	.		16.650	59.2094	104.48	.	.	Q	V	.	.	
15.733	51.0062	106.51	.	.	.Q	V	.	.		16.667	59.3532	104.40	.	.	Q	V	.	.	
15.750	51.1532	106.66	.	.	.Q	V	.	.		16.683	59.4969	104.33	.	.	Q	V	.	.	
15.767	51.3003	106.81	.	.	.Q	V	.	.		16.700	59.6405	104.27	.	.	Q	V	.	.	
15.783	51.4476	106.96	.	.	.Q	V	.	.		16.717	59.7840	104.21	.	.	Q	V	.	.	
15.800	51.5952	107.19	.	.	.Q	V	.	.		16.733	59.9275	104.15	.	.	Q	V	.	.	
15.817	51.7432	107.43	.	.	.Q	V	.	.		16.750	60.0709	104.09	.	.	Q	V	.	.	
15.833	51.8915	107.67	.	.	.Q	V	.	.		16.767	60.2142	104.03	.	.	Q	V	.	.	
15.850	52.0402	107.91	.	.	.Q	V	.	.		16.783	60.3574	103.97	.	.	Q	V	.	.	
15.867	52.1891	108.15	.	.	.Q	V	.	.		16.800	60.5005	103.91	.	.	Q	V.	.	.	
15.883	52.3384	108.39	.	.	.Q	V	.	.		16.817	60.6436	103.85	.	.	Q	V.	.	.	
15.900	52.4880	108.63	.	.	.Q	V	.	.		16.833	60.7865	103.80	.	.	Q	V.	.	.	
15.917	52.6380	108.87	.	.	.Q	V	.	.		16.850	60.9294	103.74	.	.	Q	V.	.	.	
15.933	52.7883	109.11	.	.	.Q	V	.	.		16.867	61.0722	103.68	.	.	Q	V.	.	.	
15.950	52.9389	109.35	.	.	.Q	V	.	.		16.883	61.2150	103.62	.	.	Q	V.	.	.	
15.967	53.0898	109.59	.	.	.Q	V	.	.		16.900	61.3576	103.56	.	.	Q	V.	.	.	
15.983	53.2411	109.83	.	.	.Q	V	.	.		16.917	61.5002	103.52	.	.	Q	V.	.	.	
16.000	53.3926	110.00	.	.	.Q	V	.	.		16.933	61.6416	102.67	.	.	Q	V.	.	.	
16.017	53.5441	110.00	.	.	.Q	V	.	.		16.950	61.7815	101.57	.	.	Q	V.	.	.	
16.033	53.6957	110.00	.	.	.Q	V	.	.		16.967	61.9199	100.47	.	.	Q	V.	.	.	
16.050	53.8472	110.00	.	.	.Q	V	.	.		16.983	62.0568	99.37	.	.	Q.	V.	.	.	
16.067	53.9987	110.00	.	.	.Q	V	.	.		17.000	62.1921	98.26	.	.	Q.	V.	.	.	
16.083	54.1502	110.00	.	.	.Q	V	.	.		17.017	62.3260	97.16	.	.	Q.	V.	.	.	
16.100	54.3017	110.00	.	.	.Q	V	.	.		17.033	62.4583	96.06	.	.	Q.	V.	.	.	
16.117	54.4532	110.00	.	.	.Q	V	.	.		17.050	62.5891	94.96	.	.	Q.	V	.	.	
16.133	54.6048	110.00	.	.	.Q	V	.	.		17.067	62.7183	93.86	.	.	Q.	V	.	.	
16.150	54.7563	110.00	.	.	.Q	V	.	.		17.083	62.8461	92.75	.	.	Q.	V	.	.	
16.167	54.9078	110.00	.	.	.Q	V	.	.		17.100	62.9724	91.65	.	.	Q.	V	.	.	
16.183	55.0593	110.00	.	.	.Q	V	.	.		17.117	63.0971	90.55	.	.	Q.	V	.	.	
16.200	55.2108	110.00	.	.	.Q	V	.	.		17.133	63.2203	89.45	.	.	Q.	V	.	.	
16.217	55.3623	110.00	.	.	.Q	V	.	.		17.150	63.3420	88.36	.	.	Q.	V	.	.	
16.233	55.5139	110.00	.	.	.Q	V	.	.		17.167	63.4622	87.27	.	.	Q.	V	.	.	
16.250	55.6654	110.00	.	.	.Q	V	.	.		17.183	63.5811	86.34	.	.	Q.	V	.	.	
16.267	55.8169	110.00	.	.	.Q	V	.	.		17.200	63.6991	85.65	.	.	Q.	V	.	.	
16.283	55.9684	110.00	.	.	.Q	V	.	.		17.217	63.8161	84.95	.	.	Q.	V	.	.	
16.300	56.1199	110.00	.	.	.Q	V	.	.		17.233	63.9322	84.25	.	.	Q.	V	.	.	
16.317	56.2714	110.00	.	.	.Q	V	.	.		17.250	64.0473	83.56	.	.	Q.	V	.	.	
16.333	56.4229	110.00	.	.	.Q	V	.	.		17.267	64.1614	82.86	.	.	Q.	V	.	.	
16.350	56.5745	110.00	.	.	.Q	V	.	.		17.283	64.2746	82.16	.	.	Q.	V	.	.	
16.367	56.7260	110.00	.	.	.Q	V	.	.		17.300	64.3868	81.47	.	.	Q.	V	.	.	
16.383	56.8775	110.00	.	.	.Q	V	.	.		17.317	64.4980	80.77	.	.	Q.	V	.	.	
16.400	57.0290	110.00	.	.	.Q	V	.	.		17.333	64.6083	80.07	.	.	Q.	.V	.	.	
16.417	57.1805	110.00	.	.	.Q	V	.	.		17.350	64.7177	79.38	.	.	Q.	.V	.	.	

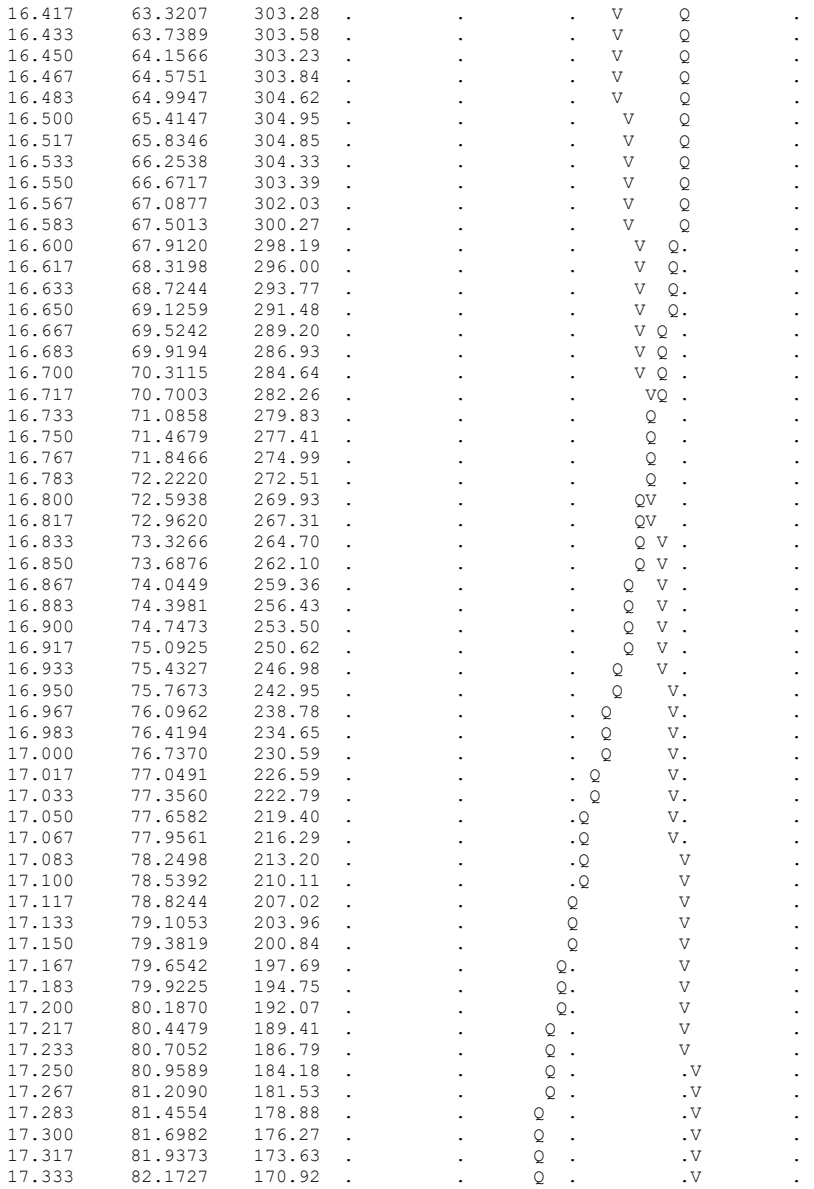
17.367	64.8261	78.69	.	.	Q	.	.V	.
17.383	64.9335	78.00	.	.	Q	.	.V	.
17.400	65.0400	77.31	.	.	Q	.	.V	.
17.417	65.1455	76.62	.	.	Q	.	.V	.
17.433	65.2501	75.93	.	.	Q	.	.V	.
17.450	65.3538	75.24	.	.	Q	.	.V	.
17.467	65.4565	74.57	.	.	Q	.	.V	.
17.483	65.5585	74.07	.	.	Q	.	.V	.
17.500	65.6599	73.61	.	.	Q	.	.V	.
17.517	65.7607	73.14	.	.	Q	.	.V	.
17.533	65.8608	72.68	.	.	Q	.	.V	.
17.550	65.9602	72.22	.	.	Q	.	.V	.
17.567	66.0591	71.76	.	.	Q	.	.V	.
17.583	66.1573	71.30	.	.	Q	.	.V	.
17.600	66.2549	70.84	.	.	Q	.	.V	.
17.617	66.3518	70.38	.	.	Q	.	.V	.
17.633	66.4481	69.92	.	.	Q	.	.V	.
17.650	66.5438	69.46	.	.	Q	.	.V	.
17.667	66.6388	69.00	.	.	Q	.	.V	.
17.683	66.7333	68.55	.	.	Q	.	. V	.
17.700	66.8270	68.09	.	.	Q	.	. V	.
17.717	66.9202	67.63	.	.	Q	.	. V	.
17.733	67.0127	67.17	.	.	Q	.	. V	.
17.750	67.1046	66.71	.	.	Q	.	. V	.
17.767	67.1959	66.30	.	.	Q	.	. V	.
17.783	67.2868	65.95	.	.	Q	.	. V	.
17.800	67.3771	65.61	.	.	Q	.	. V	.
17.817	67.4670	65.27	.	.	Q	.	. V	.
17.833	67.5565	64.93	.	.	Q	.	. V	.
17.850	67.6454	64.59	.	.	Q	.	. V	.
17.867	67.7339	64.25	.	.	Q	.	. V	.
17.883	67.8220	63.91	.	.	Q	.	. V	.
17.900	67.9095	63.57	.	.	Q	.	. V	.
17.917	67.9966	63.23	.	.	Q	.	. V	.
17.933	68.0832	62.88	.	.	Q	.	. V	.
17.950	68.1694	62.54	.	.	Q	.	. V	.
17.967	68.2550	62.20	.	.	Q	.	. V	.
17.983	68.3403	61.86	.	.	Q	.	. V	.
18.000	68.4250	61.52	.	.	Q	.	. V	.

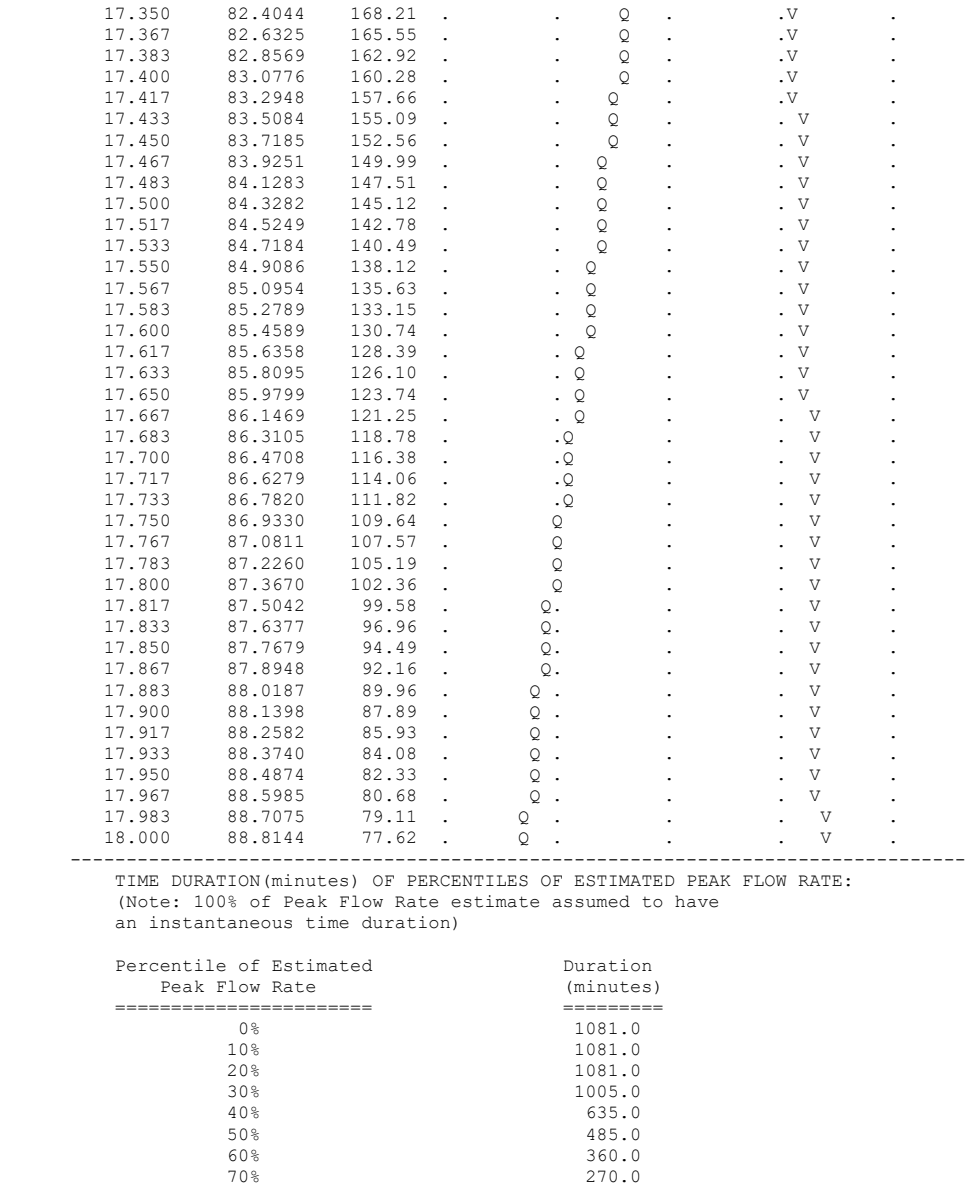
TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	1081.0
20%	1081.0
30%	1081.0
40%	1081.0
50%	1081.0
60%	1081.0
70%	1045.0
80%	820.0
90%	645.0

```
****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>STREAM NUMBER 2 ADDED TO STREAM NUMBER 3<<<<<
============================================================================


****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>VIEW STREAM NUMBER 3 HYDROGRAPH<<<<<
============================================================================

           STREAM HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
       (Notes: Time indicated is at END of Each Unit Intervals.
               Peak 5-minute rainfall intensity is modeled as
               a constant value for entire 5-minute period.)
----------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)    Q(CFS) 0.      100.0     200.0     300.0     400.0
----------------------------------------------------------------------------
  14.000     37.1884     78.46  .      Q  .   V     .         .         .
  14.017     37.2968     78.68  .      Q  .   V     .         .         .
  14.033     37.4055     78.91  .      Q  .   V     .         .         .
  14.050     37.5145     79.14  .      Q  .   V     .         .         .
  14.067     37.6238     79.37  .      Q  .   V     .         .         .
  14.083     37.7335     79.60  .      Q  .   V     .         .         .
  14.100     37.8434     79.83  .      Q  .   V     .         .         .
  14.117     37.9537     80.06  .       Q .   V     .         .         .
  14.133     38.0643     80.28  .       Q .   V     .         .         .
  14.150     38.1752     80.51  .       Q .   V     .         .         .
  14.167     38.2864     80.74  .       Q .   V     .         .         .
  14.183     38.3979     80.97  .       Q .   V     .         .         .
  14.200     38.5098     81.20  .       Q .   V     .         .         .
  14.217     38.6219     81.43  .       Q .   V     .         .         .
  14.233     38.7344     81.66  .       Q .   V     .         .         .
  14.250     38.8472     81.90  .       Q .   V     .         .         .
  14.267     38.9607     82.35  .       Q .   V     .         .         .
  14.283     39.0749     82.92  .       Q .   V     .         .         .
  14.300     39.1899     83.50  .       Q .    V    .         .         .
  14.317     39.3057     84.07  .       Q .    V    .         .         .
  14.333     39.4223     84.65  .       Q .    V    .         .         .
  14.350     39.5397     85.22  .       Q .    V    .         .         .
  14.367     39.6579     85.80  .       Q .    V    .         .         .
  14.383     39.7768     86.37  .       Q .    V    .         .         .
  14.400     39.8966     86.95  .       Q .    V    .         .         .
  14.417     40.0172     87.52  .       Q .    V    .         .         .
  14.433     40.1385     88.10  .       Q .    V    .         .         .
  14.450     40.2606     88.67  .       Q .    V    .         .         .
  14.467     40.3836     89.24  .       Q .    V    .         .         .
  14.483     40.5073     89.81  .       Q .    V    .         .         .
  14.500     40.6317     90.37  .        Q.    V    .         .         .
  14.517     40.7570     90.94  .        Q.    V    .         .         .
  14.533     40.8831     91.51  .        Q.    V    .         .         .
```

```
14.550   41.0098    92.04  .        Q.    V    .         .         .
14.567   41.1371    92.41  .        Q.    V    .         .         .
14.583   41.2649    92.77  .        Q.    V    .         .         .
14.600   41.3932    93.13  .        Q.    V    .         .         .
14.617   41.5220    93.49  .        Q.    V    .         .         .
14.633   41.6512    93.85  .        Q.    V    .         .         .
14.650   41.7810    94.21  .        Q.     V   .         .         .
14.667   41.9113    94.57  .        Q.     V   .         .         .
14.683   42.0420    94.95  .        Q.     V   .         .         .
14.700   42.1733    95.32  .        Q.     V   .         .         .
14.717   42.3052    95.70  .        Q.     V   .         .         .
14.733   42.4375    96.08  .        Q.     V   .         .         .
14.750   42.5704    96.46  .        Q.     V   .         .         .
14.767   42.7038    96.84  .        Q.     V   .         .         .
14.783   42.8377    97.21  .        Q.     V   .         .         .
14.800   42.9721    97.59  .        Q.     V   .         .         .
14.817   43.1070    97.97  .        Q.     V   .         .         .
14.833   43.2425    98.35  .        Q.     V   .         .         .
14.850   43.3790    99.09  .        Q.     V   .         .         .
14.867   43.5168   100.09  .         Q     V   .         .         .
14.883   43.6561   101.09  .         Q     V   .         .         .
14.900   43.7967   102.08  .         Q     V   .         .         .
14.917   43.9387   103.07  .         Q     V   .         .         .
14.933   44.0817   103.82  .         Q     V   .         .         .
14.950   44.2248   103.87  .         Q     V   .         .         .
14.967   44.3680   103.96  .         Q      V  .         .         .
14.983   44.5113   104.08  .         Q      V  .         .         .
15.000   44.6549   104.24  .         Q      V  .         .         .
15.017   44.7987   104.43  .         Q      V  .         .         .
15.033   44.9429   104.65  .         Q      V  .         .         .
15.050   45.0874   104.91  .         Q      V  .         .         .
15.067   45.2323   105.19  .         Q      V  .         .         .
15.083   45.3776   105.50  .         Q      V  .         .         .
15.100   45.5234   105.84  .         Q      V  .         .         .
15.117   45.6697   106.21  .         Q      V  .         .         .
15.133   45.8165   106.63  .         Q      V  .         .         .
15.150   45.9640   107.07  .         Q      V  .         .         .
15.167   46.1121   107.53  .         Q      V  .         .         .
15.183   46.2609   108.00  .         Q      V  .         .         .
15.200   46.4103   108.49  .         Q      V  .         .         .
15.217   46.5605   108.99  .         Q      V  .         .         .
15.233   46.7113   109.50  .         Q      V  .         .         .
15.250   46.8628   110.02  .         .Q     V  .         .         .
15.267   47.0151   110.55  .         .Q      V .         .         .
15.283   47.1681   111.10  .         .Q      V .         .         .
15.300   47.3219   111.65  .         .Q      V .         .         .
15.317   47.4765   112.22  .         .Q      V .         .         .
15.333   47.6318   112.79  .         .Q      V .         .         .
15.350   47.7880   113.35  .         .Q      V .         .         .
15.367   47.9449   113.91  .         .Q      V .         .         .
15.383   48.1025   114.47  .         .Q      V .         .         .
15.400   48.2610   115.04  .         .Q      V .         .         .
15.417   48.4203   115.62  .         .Q      V .         .         .
15.433   48.5804   116.22  .         .Q      V .         .         .
15.450   48.7413   116.86  .         .Q      V .         .         .
15.467   48.9032   117.55  .         .Q      V .         .         .
15.483   49.0661   118.28  .         .Q      V .         .         .
15.500   49.2301   119.05  .         .Q      V .         .         .
15.517   49.3953   119.93  .         .Q      V .         .         .
15.533   49.5622   121.13  .         . Q      V.         .         .
15.550   49.7310   122.58  .         . Q      V.         .         .
15.567   49.9019   124.09  .         . Q      V.         .         .
15.583   50.0751   125.72  .         . Q      V.         .         .
15.600   50.2505   127.37  .         . Q      V.         .         .
15.617   50.4283   129.04  .         . Q      V.         .         .
15.633   50.6083   130.73  .         .  Q     V.         .         .
15.650   50.7908   132.44  .         .  Q     V.         .         .
15.667   50.9755   134.16  .         .  Q     V.         .         .
15.683   51.1627   135.90  .         .  Q     V.         .         .
15.700   51.3523   137.65  .         .  Q     V.         .         .
15.717   51.5444   139.43  .         .  Q     V.         .         .
15.733   51.7390   141.28  .         .   Q    V.         .         .
15.750   51.9363   143.25  .         .   Q    V.         .         .
15.767   52.1365   145.35  .         .   Q     V         .         .
15.783   52.3393   147.24  .         .   Q     V         .         .
15.800   52.5443   148.85  .         .   Q     V         .         .
15.817   52.7516   150.44  .         .    Q    V         .         .
15.833   52.9611   152.12  .         .    Q    V         .         .
15.850   53.1731   153.89  .         .    Q    V         .         .
15.867   53.3876   155.74  .         .    Q    V         .         .
15.883   53.6048   157.67  .         .    Q    V         .         .
15.900   53.8247   159.67  .         .    Q    V         .         .
15.917   54.0475   161.74  .         .     Q   V         .         .
15.933   54.2731   163.79  .         .     Q   V         .         .
15.950   54.5014   165.73  .         .     Q   V         .         .
15.967   54.7323   167.65  .         .     Q   .V        .         .
15.983   54.9659   169.64  .         .     Q   .V        .         .
16.000   55.2023   171.62  .         .      Q  .V        .         .
16.017   55.4416   173.68  .         .      Q  .V        .         .
16.033   55.6844   176.27  .         .      Q  .V        .         .
16.050   55.9314   179.35  .         .      Q  .V        .         .
16.067   56.1835   183.00  .         .       Q .V        .         .
16.083   56.4412   187.11  .         .       Q .V        .         .
16.100   56.7051   191.57  .         .        Q.V        .         .
16.117   56.9756   196.44  .         .        Q.V        .         .
16.133   57.2534   201.66  .         .         QV        .         .
16.150   57.5386   207.07  .         .         Q V       .         .
16.167   57.8314   212.54  .         .         .QV       .         .
16.183   58.1320   218.23  .         .         .QV       .         .
16.200   58.4408   224.17  .         .         . Q       .         .
16.217   58.7578   230.18  .         .         . VQ      .         .
16.233   59.0842   236.94  .         .         . VQ      .         .
16.250   59.4218   245.13  .         .         . V Q     .         .
16.267   59.7714   253.81  .         .         . V  Q    .         .
16.283   60.1326   262.23  .         .         .  V  Q   .         .
16.300   60.5048   270.22  .         .         .  V   Q  .         .
16.317   60.8869   277.37  .         .         .  V   Q  .         .
16.333   61.2774   283.56  .         .         .  V    Q .         .
16.350   61.6753   288.87  .         .         .  V    Q .         .
16.367   62.0795   293.42  .         .         .  V     Q.         .
16.383   62.4890   297.28  .         .         .  V     Q.         .
16.400   62.9030   300.58  .         .         .   V     Q         .
```





TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	1081.0
20%	1081.0
30%	1005.0
40%	635.0
50%	485.0
60%	360.0
70%	270.0

```
            80%                             210.0
            90%                             140.0
================================================================================

  END OF FLOODSCx ROUTING ANALYSIS
```

```
************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
          (c) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                     Planning * Engineering * Surveying
              Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                 *
* 2-YEAR STORM PROPOSED CONDITION WITH OFFSITE RUN-ON (COMBINE TO 1 AREA)  *
* W.O. #1443-136X. NO DETENTION                                         *
 ************************************************************************

  FILE NAME: FLD-02DC.DAT
  TIME/DATE OF STUDY: 11:38 06/10/2019

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE     61.00 IS CODE = 1.2
------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =  339.75
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.074
    LOW LOSS FRACTION = 0.360
    TIME OF CONCENTRATION(MIN.) = 23.43
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =   2
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.53
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  0.89
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.22
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  2.05

------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =    36.29
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =    21.75

------------------------------------------------------------------------

========================================================================

                        2 4 - H O U R    S T O R M
                     R U N O F F    H Y D R O G R A P H

========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       65.0     130.0     195.0     260.0
------------------------------------------------------------------------
  14.000     11.9135     24.62  .  Q     .  V     .         .         .
  14.017     11.9476     24.74  .  Q     .  V     .         .         .
  14.033     11.9818     24.85  .  Q     .  V     .         .         .
  14.050     12.0162     24.97  .  Q     .  V     .         .         .
  14.067     12.0508     25.08  .  Q     .  V     .         .         .
  14.083     12.0855     25.18  .  Q     .  V     .         .         .
  14.100     12.1203     25.29  .  Q     .  V     .         .         .
  14.117     12.1553     25.39  .  Q     .  V     .         .         .
  14.133     12.1904     25.50  .  Q     .  V     .         .         .
  14.150     12.2257     25.60  .  Q     .  V     .         .         .
  14.167     12.2611     25.70  .  Q     .  V     .         .         .
  14.183     12.2966     25.81  .  Q     .  V     .         .         .
  14.200     12.3323     25.91  .  Q     .  V     .         .         .
  14.217     12.3681     26.02  .   Q    .  V     .         .         .
  14.233     12.4041     26.12  .   Q    .  V     .         .         .
  14.250     12.4402     26.22  .   Q    .  V     .         .         .
  14.267     12.4765     26.33  .   Q    .  V     .         .         .
  14.283     12.5129     26.43  .   Q    .  V     .         .         .
  14.300     12.5495     26.54  .   Q    .  V     .         .         .
  14.317     12.5861     26.64  .   Q    .  V     .         .         .
  14.333     12.6230     26.74  .   Q    .  V     .         .         .
  14.350     12.6600     26.85  .   Q    .  V     .         .         .
  14.367     12.6971     26.95  .   Q    .  V     .         .         .
  14.383     12.7344     27.06  .   Q    .   V    .         .         .
  14.400     12.7718     27.16  .   Q    .   V    .         .         .
  14.417     12.8093     27.26  .   Q    .   V    .         .         .
  14.433     12.8470     27.37  .   Q    .   V    .         .         .
  14.450     12.8849     27.50  .   Q    .   V    .         .         .
  14.467     12.9231     27.72  .   Q    .   V    .         .         .
  14.483     12.9616     27.95  .   Q    .   V    .         .         .
  14.500     13.0004     28.17  .   Q    .   V    .         .         .
  14.517     13.0395     28.40  .   Q    .   V    .         .         .
  14.533     13.0789     28.62  .   Q    .   V    .         .         .
  14.550     13.1187     28.85  .   Q    .   V    .         .         .
  14.567     13.1587     29.07  .   Q    .   V    .         .         .
  14.583     13.1991     29.30  .   Q    .   V    .         .         .
  14.600     13.2397     29.52  .   Q    .   V    .         .         .
  14.617     13.2807     29.75  .   Q    .   V    .         .         .
  14.633     13.3220     29.97  .   Q    .   V    .         .         .
  14.650     13.3636     30.20  .   Q    .   V    .         .         .
  14.667     13.4055     30.42  .   Q    .   V    .         .         .
```

Onsite Flood Routing Area “A”

With Upstream Offsite Runoffs via 84” RCP Inlet at Rancho Parkway (F19-P07) Node 24.1
and Outlet at Downstream of Existing 10.5’ x 10.5’ RCB (F19-P07) Node 61, ***with no Detention @ Node 56.3 & Node 35.2***

2-Year Storm Proposed Condition

14.683	13.4477	30.65	. Q . V . . .
14.700	13.4902	30.87	. Q . V . . .
14.717	13.5330	31.10	. Q . V . . .
14.733	13.5762	31.32	. Q . V . . .
14.750	13.6196	31.55	. Q . V . . .
14.767	13.6634	31.77	. Q . V . . .
14.783	13.7075	31.99	. Q . V . . .
14.800	13.7519	32.22	. Q . V . . .
14.817	13.7965	32.44	. Q . V . . .
14.833	13.8415	32.67	. Q . V . . .
14.850	13.8868	32.84	. Q . V . . .
14.867	13.9322	33.00	. Q . V . . .
14.883	13.9779	33.15	. Q . V . . .
14.900	14.0238	33.31	. Q . V . . .
14.917	14.0699	33.47	. Q . V . . .
14.933	14.1162	33.63	. Q . V . . .
14.950	14.1627	33.78	. Q . V . . .
14.967	14.2095	33.94	. Q . V . . .
14.983	14.2564	34.10	. Q . V . . .
15.000	14.3036	34.25	. Q . V . . .
15.017	14.3510	34.41	. Q . V . . .
15.033	14.3986	34.57	. Q . V . . .
15.050	14.4465	34.72	. Q . V . . .
15.067	14.4945	34.88	. Q . V . . .
15.083	14.5428	35.04	. Q . V . . .
15.100	14.5912	35.20	. Q . V . . .
15.117	14.6399	35.35	. Q . V . . .
15.133	14.6889	35.51	. Q . V . . .
15.150	14.7380	35.67	. Q . V . . .
15.167	14.7873	35.82	. Q . V . . .
15.183	14.8369	35.98	. Q . V . . .
15.200	14.8867	36.14	. Q . V . . .
15.217	14.9366	36.29	. Q . V . . .
15.233	14.9871	36.60	. Q . V . . .
15.250	15.0382	37.14	. Q . V . . .
15.267	15.0901	37.68	. Q . V . . .
15.283	15.1428	38.23	. Q . V . . .
15.300	15.1962	38.77	. Q . V . . .
15.317	15.2503	39.32	. Q . V . . .
15.333	15.3052	39.86	. Q . V . . .
15.350	15.3609	40.41	. Q . V . . .
15.367	15.4173	40.96	. Q . V . . .
15.383	15.4745	41.50	. Q . V . . .
15.400	15.5324	42.05	. Q . V . . .
15.417	15.5911	42.59	. Q . V . . .
15.433	15.6505	43.14	. Q . V . . .
15.450	15.7107	43.68	. Q . V . . .
15.467	15.7716	44.23	. Q . V . . .
15.483	15.8333	44.78	. Q . V . . .
15.500	15.8957	45.32	. Q . V . . .
15.517	15.9589	45.87	. Q . V . . .
15.533	16.0228	46.41	. Q . V . . .
15.550	16.0875	46.96	. Q . V . . .
15.567	16.1529	47.50	. Q . V . . .
15.583	16.2191	48.05	. Q . V . . .
15.600	16.2860	48.59	. Q . V . . .
15.617	16.3538	49.17	. Q . V . . .
15.633	16.4226	50.01	. Q . V . . .
15.650	16.4928	50.90	. Q . V . . .
15.667	16.5641	51.80	. Q . V . . .
15.683	16.6367	52.69	. Q . V . . .
15.700	16.7105	53.58	. Q . V . . .
15.717	16.7855	54.48	. Q . V . . .
15.733	16.8618	55.37	. Q . V . . .
15.750	16.9393	56.26	. Q . V . . .
15.767	17.0180	57.16	. Q . V . . .
15.783	17.0980	58.05	. Q . V . . .
15.800	17.1792	58.94	. Q. V . . .
15.817	17.2616	59.84	. Q. V. . .
15.833	17.3452	60.73	. Q. V. . .
15.850	17.4301	61.62	. Q. V. . .
15.867	17.5162	62.52	. Q. V. . .
15.883	17.6036	63.41	. Q. V. . .
15.900	17.6921	64.30	. Q. V. . .
15.917	17.7819	65.20	. Q V. . .
15.933	17.8730	66.09	. Q V. . .
15.950	17.9652	66.98	. Q V. . .
15.967	18.0587	67.88	. Q V. . .
15.983	18.1535	68.77	. Q V . .
16.000	18.2494	69.66	. Q V . .
16.017	18.3516	74.16	. .Q V . .
16.033	18.4649	82.27	. . Q V . .
16.050	18.5894	90.37	. . Q V . .
16.067	18.7250	98.48	. . Q V . .
16.083	18.8718	106.59	. . Q V . .
16.100	19.0298	114.69	. . Q V . .
16.117	19.1989	122.80	. . Q .V . .
16.133	19.3792	130.90	. . QV . .
16.150	19.5707	139.01	. . .Q . .
16.167	19.7733	147.11	. . .VQ . .
16.183	19.9871	155.22	. . . VQ . .
16.200	20.2121	163.32	. . . V Q . .
16.217	20.4482	171.43	. . . V Q . .
16.233	20.6955	179.53	. . . V Q . .
16.250	20.9540	187.64	. . . V Q . .
16.267	21.2236	195.74	. . . V Q .
16.283	21.5044	203.85	. . . V .Q .
16.300	21.7963	211.95	. . . V . Q .
16.317	22.0994	220.06	. . . V . Q .
16.333	22.4137	228.16	. . . V . Q .
16.350	22.7391	236.27	. . . V . Q .
16.367	23.0757	244.37	. . . V . Q .
16.383	23.4235	252.48	. . . V . Q .
16.400	23.7817	260.02	. . . V . Q
16.417	24.1261	250.08	. . . V . Q .
16.433	24.4578	240.79	. . . V . Q .
16.450	24.7767	231.50	. . . V . Q .
16.467	25.0827	222.21	. . . V . Q .
16.483	25.3760	212.92	. . . V . Q .
16.500	25.6565	203.63	. . . V .Q .
16.517	25.9242	194.35	. . . VQ. .
16.533	26.1791	185.06	. . . Q . .
16.550	26.4212	175.77	. . . Q V. .
16.567	26.6505	166.48	. . . Q V. .
16.583	26.8670	157.19	. . . Q V. .
16.600	27.0707	147.90	. . . Q V. .

```
 16.617     27.2617    138.61  .         .         .Q        V         .
 16.633     27.4398    129.32  .         .        Q.         V         .
 16.650     27.6052    120.04  .         .       Q .         V         .
 16.667     27.7577    110.75  .         .      Q  .         V         .
 16.683     27.8974    101.46  .         .    Q    .         V         .
 16.700     28.0244     92.17  .         .   Q     .         V         .
 16.717     28.1386     82.88  .         . Q       .         .V        .
 16.733     28.2399     73.59  .         .Q        .         .V        .
 16.750     28.3285     64.30  .        Q.         .         .V        .
 16.767     28.4043     55.02  .       Q .         .         .V        .
 16.783     28.4674     45.81  .      Q  .         .         .V        .
 16.800     28.5253     42.04  .     Q   .         .         .V        .
 16.817     28.5825     41.51  .     Q   .         .         .V        .
 16.833     28.6389     40.98  .     Q   .         .         .V        .
 16.850     28.6946     40.45  .     Q   .         .         .V        .
 16.867     28.7496     39.92  .     Q   .         .         .V        .
 16.883     28.8039     39.39  .     Q   .         .         .V        .
 16.900     28.8574     38.86  .    Q    .         .         .V        .
 16.917     28.9102     38.33  .    Q    .         .         .V        .
 16.933     28.9623     37.80  .    Q    .         .         .V        .
 16.950     29.0136     37.27  .    Q    .         .         .V        .
 16.967     29.0642     36.73  .    Q    .         .         . V       .
 16.983     29.1141     36.20  .    Q    .         .         . V       .
 17.000     29.1632     35.67  .    Q    .         .         . V       .
 17.017     29.2116     35.14  .    Q    .         .         . V       .
 17.033     29.2593     34.61  .    Q    .         .         . V       .
 17.050     29.3062     34.08  .    Q    .         .         . V       .
 17.067     29.3524     33.55  .    Q    .         .         . V       .
 17.083     29.3979     33.02  .    Q    .         .         . V       .
 17.100     29.4427     32.49  .   Q     .         .         . V       .
 17.117     29.4867     31.96  .   Q     .         .         . V       .
 17.133     29.5300     31.43  .   Q     .         .         . V       .
 17.150     29.5725     30.89  .   Q     .         .         . V       .
 17.167     29.6143     30.36  .   Q     .         .         . V       .
 17.183     29.6555     29.90  .   Q     .         .         . V       .
 17.200     29.6963     29.61  .   Q     .         .         . V       .
 17.217     29.7367     29.34  .   Q     .         .         . V       .
 17.233     29.7768     29.07  .   Q     .         .         . V       .
 17.250     29.8164     28.79  .   Q     .         .         . V       .
 17.267     29.8557     28.52  .   Q     .         .         . V       .
 17.283     29.8946     28.25  .   Q     .         .         . V       .
 17.300     29.9331     27.97  .   Q     .         .         . V       .
 17.317     29.9713     27.70  .   Q     .         .         .  V      .
 17.333     30.0091     27.43  .   Q     .         .         .  V      .
 17.350     30.0465     27.15  .   Q     .         .         .  V      .
 17.367     30.0835     26.88  .   Q     .         .         .  V      .
 17.383     30.1201     26.61  .   Q     .         .         .  V      .
 17.400     30.1564     26.33  .   Q     .         .         .  V      .
 17.417     30.1923     26.06  .   Q     .         .         .  V      .
 17.433     30.2278     25.79  .  Q      .         .         .  V      .
 17.450     30.2630     25.51  .  Q      .         .         .  V      .
 17.467     30.2977     25.24  .  Q      .         .         .  V      .
 17.483     30.3321     24.97  .  Q      .         .         .  V      .
 17.500     30.3661     24.69  .  Q      .         .         .  V      .
 17.517     30.3998     24.42  .  Q      .         .         .  V      .
 17.533     30.4330     24.15  .  Q      .         .         .  V      .
 17.550     30.4659     23.87  .  Q      .         .         .  V      .
 17.567     30.4984     23.60  .  Q      .         .         .  V      .
 17.583     30.5307     23.43  .  Q      .         .         .  V      .
 17.600     30.5628     23.29  .  Q      .         .         .  V      .
 17.617     30.5946     23.15  .  Q      .         .         .  V      .
 17.633     30.6263     23.01  .  Q      .         .         .  V      .
 17.650     30.6578     22.87  .  Q      .         .         .  V      .
 17.667     30.6892     22.73  .  Q      .         .         .  V      .
 17.683     30.7203     22.59  .  Q      .         .         .  V      .
 17.700     30.7512     22.45  .  Q      .         .         .  V      .
 17.717     30.7819     22.31  .  Q      .         .         .  V      .
 17.733     30.8125     22.17  .  Q      .         .         .  V      .
 17.750     30.8428     22.03  .  Q      .         .         .  V      .
 17.767     30.8730     21.89  .  Q      .         .         .   V     .
 17.783     30.9029     21.75  .  Q      .         .         .   V     .
 17.800     30.9327     21.61  .  Q      .         .         .   V     .
 17.817     30.9623     21.47  .  Q      .         .         .   V     .
 17.833     30.9917     21.33  .  Q      .         .         .   V     .
 17.850     31.0209     21.19  .  Q      .         .         .   V     .
 17.867     31.0499     21.05  .  Q      .         .         .   V     .
 17.883     31.0787     20.91  .  Q      .         .         .   V     .
 17.900     31.1073     20.77  .  Q      .         .         .   V     .
 17.917     31.1357     20.64  .  Q      .         .         .   V     .
 17.933     31.1639     20.50  .  Q      .         .         .   V     .
 17.950     31.1920     20.36  .  Q      .         .         .   V     .
 17.967     31.2198     20.20  .  Q      .         .         .   V     .
 17.983     31.2474     20.02  .  Q      .         .         .   V     .
 18.000     31.2747     19.84  .  Q      .         .         .   V     .
--------------------------------------------------------------------------------
   TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
   (Note: 100% of Peak Flow Rate estimate assumed to have
   an instantaneous time duration)

   Percentile of Estimated                 Duration
       Peak Flow Rate                      (minutes)
   =======================                 =========
              0%                             1081.0
             10%                              965.0
             20%                              330.0
             30%                              210.0
             40%                              180.0
             50%                              150.0
             60%                              120.0
             70%                               90.0
             80%                               60.0
             90%                               30.0
 ============================================================================

  END OF FLOODSCx ROUTING ANALYSIS
```

```
**************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
          (c) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                     Planning * Engineering * Surveying
              Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                  *
* 25-YEAR STORM PROPOSED CONDITION WITH OFFSITE RUN-ON (COMBINE TO 1 AREA) *
* W.O. #1443-136X. NO DETENTION                                          *
 **************************************************************************

  FILE NAME: FLD-25DC.DAT
  TIME/DATE OF STUDY: 11:36 06/10/2019

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE     61.00 IS CODE = 1.2
--------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
==========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =  339.75
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.074
    LOW LOSS FRACTION = 0.235
    TIME OF CONCENTRATION(MIN.) = 20.80
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =  25
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.87
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.15
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.94
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  2.71
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  4.49

--------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =    93.07
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =    34.05

--------------------------------------------------------------------------

==========================================================================

                        2 4 - H O U R    S T O R M
                     R U N O F F    H Y D R O G R A P H

==========================================================================
              HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
--------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.      158.0     316.0     474.0     632.1
--------------------------------------------------------------------------
  14.000     31.3139     67.47  .   Q      .  V      .         .         .
  14.017     31.4073     67.81  .   Q      .  V      .         .         .
  14.033     31.5012     68.14  .   Q      .  V      .         .         .
  14.050     31.5955     68.48  .   Q      .  V      .         .         .
  14.067     31.6903     68.82  .   Q      .  V      .         .         .
  14.083     31.7856     69.16  .   Q      .  V      .         .         .
  14.100     31.8813     69.50  .   Q      .  V      .         .         .
  14.117     31.9775     69.83  .   Q      .  V      .         .         .
  14.133     32.0741     70.17  .   Q      .  V      .         .         .
  14.150     32.1712     70.51  .   Q      .  V      .         .         .
  14.167     32.2688     70.85  .   Q      .  V      .         .         .
  14.183     32.3669     71.18  .   Q      .  V      .         .         .
  14.200     32.4654     71.52  .   Q      .  V      .         .         .
  14.217     32.5644     71.86  .   Q      .  V      .         .         .
  14.233     32.6638     72.20  .   Q      .   V     .         .         .
  14.250     32.7637     72.54  .   Q      .   V     .         .         .
  14.267     32.8641     72.87  .   Q      .   V     .         .         .
  14.283     32.9649     73.18  .   Q      .   V     .         .         .
  14.300     33.0661     73.46  .   Q      .   V     .         .         .
  14.317     33.1677     73.74  .   Q      .   V     .         .         .
  14.333     33.2696     74.02  .   Q      .   V     .         .         .
  14.350     33.3720     74.30  .   Q      .   V     .         .         .
  14.367     33.4747     74.59  .   Q      .   V     .         .         .
  14.383     33.5778     74.87  .   Q      .   V     .         .         .
  14.400     33.6813     75.15  .   Q      .   V     .         .         .
  14.417     33.7852     75.43  .   Q      .   V     .         .         .
  14.433     33.8895     75.71  .   Q      .   V     .         .         .
  14.450     33.9942     75.99  .   Q      .   V     .         .         .
  14.467     34.0992     76.27  .   Q      .   V     .         .         .
  14.483     34.2047     76.55  .   Q      .   V     .         .         .
  14.500     34.3105     76.83  .   Q      .   V     .         .         .
  14.517     34.4167     77.11  .   Q      .   V     .         .         .
  14.533     34.5233     77.39  .   Q      .   V     .         .         .
  14.550     34.6303     77.67  .   Q      .   V     .         .         .
  14.567     34.7377     77.95  .   Q      .   V     .         .         .
  14.583     34.8455     78.24  .   Q      .   V     .         .         .
  14.600     34.9536     78.52  .   Q      .    V    .         .         .
  14.617     35.0622     78.81  .   Q      .    V    .         .         .
  14.633     35.1716     79.49  .    Q     .    V    .         .         .
```

Onsite Flood Routing Area “A”

With Upstream Offsite Runoffs via 84” RCP Inlet at Rancho Parkway (F19-P07) Node 24.1
and Outlet at Downstream of Existing 10.5’ x 10.5’ RCB (F19-P07) Node 61, ***with no Detention @ Node 56.3 & Node 35.2***

25-Year Storm Proposed Condition

14.650	35.2823	80.35	. Q . V . . .
14.667	35.3942	81.21	. Q . V . . .
14.683	35.5072	82.08	. Q . V . . .
14.700	35.6215	82.94	. Q . V . . .
14.717	35.7369	83.81	. Q . V . . .
14.733	35.8535	84.67	. Q . V . . .
14.750	35.9714	85.54	. Q . V . . .
14.767	36.0904	86.40	. Q . V . . .
14.783	36.2106	87.26	. Q . V . . .
14.800	36.3320	88.13	. Q . V . . .
14.817	36.4545	88.99	. Q . V . . .
14.833	36.5783	89.86	. Q . V . . .
14.850	36.7033	90.72	. Q . V . . .
14.867	36.8294	91.58	. Q . V . . .
14.883	36.9567	92.45	. Q . V . . .
14.900	37.0853	93.31	. Q . V . . .
14.917	37.2150	94.18	. Q . V . . .
14.933	37.3459	95.04	. Q . V . . .
14.950	37.4780	95.91	. Q . V . . .
14.967	37.6113	96.75	. Q . V . . .
14.983	37.7455	97.43	. Q . V . . .
15.000	37.8806	98.07	. Q . V . . .
15.017	38.0165	98.71	. Q . V . . .
15.033	38.1534	99.35	. Q . V . . .
15.050	38.2911	99.99	. Q . V . . .
15.067	38.4297	100.63	. Q . V . . .
15.083	38.5692	101.28	. Q . V . . .
15.100	38.7096	101.92	. Q . V . . .
15.117	38.8509	102.56	. Q . V . . .
15.133	38.9930	103.20	. Q . V . . .
15.150	39.1360	103.84	. Q . V . . .
15.167	39.2799	104.48	. Q . V . . .
15.183	39.4247	105.12	. Q . V . . .
15.200	39.5704	105.76	. Q . V . . .
15.217	39.7170	106.40	. Q . V . . .
15.233	39.8644	107.04	. Q . V . . .
15.250	40.0127	107.68	. Q . V . . .
15.267	40.1619	108.32	. Q . V . . .
15.283	40.3120	108.96	. Q . V . . .
15.300	40.4630	109.60	. Q . V . . .
15.317	40.6150	110.35	. Q . V . . .
15.333	40.7686	111.52	. Q . V . . .
15.350	40.9239	112.74	. Q . V . . .
15.367	41.0808	113.96	. Q . V . . .
15.383	41.2395	115.17	. Q . V . . .
15.400	41.3998	116.39	. Q . V . . .
15.417	41.5618	117.61	. Q . V . . .
15.433	41.7255	118.83	. Q . V . . .
15.450	41.8908	120.05	. Q . V . . .
15.467	42.0579	121.27	. Q . V . . .
15.483	42.2266	122.49	. Q . V . . .
15.500	42.3970	123.71	. Q . V . . .
15.517	42.5690	124.93	. Q . V . . .
15.533	42.7428	126.15	. Q . V . . .
15.550	42.9182	127.36	. Q . V . . .
15.567	43.0954	128.58	. Q . V . . .
15.583	43.2741	129.80	. Q . V . . .
15.600	43.4546	131.02	. Q . V . . .
15.617	43.6368	132.24	. Q . V . . .
15.633	43.8206	133.46	. Q . V . . .
15.650	44.0061	134.68	. Q . V . . .
15.667	44.1941	136.47	. Q . V . . .
15.683	44.3861	139.44	. Q . V. . .
15.700	44.5823	142.44	. Q. V. . .
15.717	44.7827	145.44	. Q. V. . .
15.733	44.9871	148.44	. Q. V. . .
15.750	45.1957	151.45	. Q. V. . .
15.767	45.4085	154.45	. Q. V. . .
15.783	45.6254	157.45	. Q. V. . .
15.800	45.8464	160.46	. Q V. . .
15.817	46.0715	163.46	. Q V. . .
15.833	46.3008	166.46	. Q V. . .
15.850	46.5342	169.47	. Q V. . .
15.867	46.7718	172.47	. Q V . .
15.883	47.0135	175.47	. .Q V . .
15.900	47.2593	178.48	. .Q V . .
15.917	47.5093	181.48	. .Q V . .
15.933	47.7634	184.48	. .Q V . .
15.950	48.0216	187.48	. .Q V . .
15.967	48.2840	190.49	. . Q V . .
15.983	48.5505	193.49	. . Q V . .
16.000	48.8212	196.49	. . Q V . .
16.017	49.1083	208.43	. . Q .V . .
16.033	49.4241	229.30	. . Q .V . .
16.050	49.7687	250.17	. . Q .V . .
16.067	50.1420	271.03	. . Q .V . .
16.083	50.5441	291.90	. . Q .V . .
16.100	50.9749	312.77	. . Q.V . .
16.117	51.4345	333.64	. . .QV . .
16.133	51.9228	354.51	. . . Q . .
16.150	52.4398	375.38	. . . VQ . .
16.167	52.9856	396.24	. . . V Q . .
16.183	53.5601	417.11	. . . V Q . .
16.200	54.1634	437.98	. . . V Q . .
16.217	54.7954	458.85	. . . V Q. .
16.233	55.4562	479.72	. . . V Q .
16.250	56.1457	500.59	. . . V .Q .
16.267	56.8640	521.45	. . . V . Q .
16.283	57.6110	542.32	. . . V . Q .
16.300	58.3867	563.19	. . . V . Q .
16.317	59.1912	584.06	. . . V . Q .
16.333	60.0244	604.93	. . . V . Q .
16.350	60.8950	632.06	. . . V . Q
16.367	61.7423	615.13	. . . V . Q .
16.383	62.5563	590.94	. . . V . Q .
16.400	63.3369	566.76	. . . V . Q .
16.417	64.0843	542.58	. . . V . Q .
16.433	64.7983	518.39	. . . V . Q .
16.450	65.4791	494.21	. . . V .Q .
16.467	66.1265	470.02	. . . VQ. .
16.483	66.7406	445.84	. . . Q . .
16.500	67.3214	421.66	. . . Q V . .
16.517	67.8689	397.47	. . . Q V. .
16.533	68.3830	373.29	. . . Q V. .

Onsite Flood Routing Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1

and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61, ***with no Detention @ Node 56.3 & Node 35.2***

25-Year Storm Proposed Condition

16.550	68.8639	349.11	. . . Q V. .
16.567	69.3114	324.92	. . Q V. .
16.583	69.7257	300.74	. . Q. V. .
16.600	70.1066	276.55	. . Q . V .
16.617	70.4542	252.37	. . Q . V .
16.633	70.7685	228.19	. . Q . V .
16.650	71.0495	204.00	. . Q . V .
16.667	71.2972	179.82	. .Q . V .
16.683	71.5116	155.64	. Q. . V .
16.700	71.6951	133.23	. Q . . V .
16.717	71.8703	127.21	. Q . . V .
16.733	72.0427	125.18	. Q . . V .
16.750	72.2124	123.15	. Q . . .V .
16.767	72.3792	121.12	. Q . . .V .
16.783	72.5432	119.09	. Q . . .V .
16.800	72.7045	117.06	. Q . . .V .
16.817	72.8629	115.03	. Q . . .V .
16.833	73.0185	113.00	. Q . . .V .
16.850	73.1714	110.97	. Q . . .V .
16.867	73.3214	108.94	. Q . . .V .
16.883	73.4687	106.91	. Q . . .V .
16.900	73.6131	104.88	. Q . . .V .
16.917	73.7548	102.85	. Q . . .V .
16.933	73.8937	100.82	. Q . . .V .
16.950	74.0297	98.79	. Q . . .V .
16.967	74.1630	96.75	. Q . . .V .
16.983	74.2935	94.72	. Q . . .V .
17.000	74.4212	92.69	. Q . . .V .
17.017	74.5461	90.66	. Q . . . V .
17.033	74.6681	88.63	. Q . . . V .
17.050	74.7877	86.82	. Q . . . V .
17.067	74.9060	85.89	. Q . . . V .
17.083	75.0232	85.06	. Q . . . V .
17.100	75.1392	84.23	. Q . . . V .
17.117	75.2541	83.40	. Q . . . V .
17.133	75.3678	82.57	. Q . . . V .
17.150	75.4804	81.74	. Q . . . V .
17.167	75.5919	80.91	. Q . . . V .
17.183	75.7022	80.08	. Q . . . V .
17.200	75.8113	79.25	. Q . . . V .
17.217	75.9193	78.42	. Q . . . V .
17.233	76.0262	77.59	. Q . . . V .
17.250	76.1319	76.76	. Q . . . V .
17.267	76.2365	75.93	. Q . . . V .
17.283	76.3400	75.10	. Q . . . V .
17.300	76.4423	74.27	. Q . . . V .
17.317	76.5434	73.44	. Q . . . V .
17.333	76.6434	72.60	. Q . . . V .
17.350	76.7423	71.77	. Q . . . V .
17.367	76.8400	70.94	. Q . . . V .
17.383	76.9366	70.11	. Q . . . V .
17.400	77.0322	69.41	. Q . . . V .
17.417	77.1272	68.96	. Q . . . V .
17.433	77.2215	68.51	. Q . . . V .
17.450	77.3153	68.07	. Q . . . V .
17.467	77.4084	67.63	. Q . . . V .
17.483	77.5010	67.18	. Q . . . V .
17.500	77.5929	66.74	. Q . . . V .
17.517	77.6842	66.30	. Q . . . V .
17.533	77.7749	65.85	. Q . . . V .
17.550	77.8650	65.41	. Q . . . V .
17.567	77.9545	64.97	. Q . . . V .
17.583	78.0434	64.52	. Q . . . V .
17.600	78.1316	64.08	. Q . . . V .
17.617	78.2193	63.64	. Q . . . V .
17.633	78.3063	63.19	. Q . . . V .
17.650	78.3928	62.75	. Q . . . V .
17.667	78.4786	62.31	. Q . . . V .
17.683	78.5638	61.86	. Q . . . V .
17.700	78.6484	61.42	. Q . . . V .
17.717	78.7324	60.98	. Q . . . V .
17.733	78.8158	60.53	. Q . . . V .
17.750	78.8986	60.16	. Q . . . V .
17.767	78.9811	59.85	. Q . . . V .
17.783	79.0631	59.55	. Q . . . V .
17.800	79.1447	59.24	. Q . . . V .
17.817	79.2259	58.94	. Q . . . V .
17.833	79.3066	58.63	. Q . . . V .
17.850	79.3870	58.32	. Q . . . V .
17.867	79.4669	58.02	. Q . . . V .
17.883	79.5464	57.71	. Q . . . V .
17.900	79.6255	57.41	. Q . . . V .
17.917	79.7041	57.10	. Q . . . V .
17.933	79.7823	56.80	. Q . . . V .
17.950	79.8602	56.49	. Q . . . V .
17.967	79.9375	56.18	. Q . . . V .
17.983	80.0145	55.88	. Q . . . V .
18.000	80.0911	55.57	. Q . . . V .

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	1081.0
20%	355.0
30%	210.0
40%	165.0
50%	140.0
60%	110.0
70%	85.0
80%	55.0
90%	25.0

END OF FLOODSCx ROUTING ANALYSIS

```
**************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
          (c) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                     Planning * Engineering * Surveying
              Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                  *
* 100-YEAR STORM PROPOSED CONDITION WITH OFFSITE RUN-ON (COMBINE TO 1 AREA *
* W.O. #1443-136X. NO DETENTION                                          *
 **************************************************************************

  FILE NAME: FLD-99DC.DAT
  TIME/DATE OF STUDY: 11:31 06/10/2019

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE     61.00 IS CODE = 1.2
--------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
==========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =  339.75
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.074
    LOW LOSS FRACTION = 0.124
    TIME OF CONCENTRATION(MIN.) = 20.07
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.52
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.09
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.45
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.43
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.36
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.63

--------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =   127.47
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =    31.93

--------------------------------------------------------------------------

==========================================================================

                        2 4 - H O U R    S T O R M
                      R U N O F F    H Y D R O G R A P H

==========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
--------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.      205.3     410.7     616.0     821.3
--------------------------------------------------------------------------
  14.000     45.3846    93.31  .   Q     .   V     .         .         .
  14.017     45.5138    93.83  .   Q     .   V     .         .         .
  14.033     45.6438    94.41  .   Q     .   V     .         .         .
  14.050     45.7747    94.99  .   Q     .   V     .         .         .
  14.067     45.9063    95.57  .   Q     .   V     .         .         .
  14.083     46.0388    96.15  .   Q     .   V     .         .         .
  14.100     46.1720    96.73  .   Q     .   V     .         .         .
  14.117     46.3060    97.31  .   Q     .   V     .         .         .
  14.133     46.4409    97.89  .   Q     .   V     .         .         .
  14.150     46.5765    98.47  .   Q     .   V     .         .         .
  14.167     46.7129    99.05  .   Q     .   V     .         .         .
  14.183     46.8502    99.63  .   Q     .   V     .         .         .
  14.200     46.9882   100.21  .   Q     .   V     .         .         .
  14.217     47.1270   100.79  .   Q     .   V     .         .         .
  14.233     47.2667   101.37  .   Q     .   V     .         .         .
  14.250     47.4071   101.95  .   Q     .   V     .         .         .
  14.267     47.5483   102.54  .   Q     .   V     .         .         .
  14.283     47.6904   103.12  .    Q    .   V     .         .         .
  14.300     47.8332   103.70  .    Q    .    V    .         .         .
  14.317     47.9768   104.28  .    Q    .    V    .         .         .
  14.333     48.1213   104.84  .    Q    .    V    .         .         .
  14.350     48.2662   105.25  .    Q    .    V    .         .         .
  14.367     48.4117   105.61  .    Q    .    V    .         .         .
  14.383     48.5577   105.97  .    Q    .    V    .         .         .
  14.400     48.7041   106.33  .    Q    .    V    .         .         .
  14.417     48.8511   106.69  .    Q    .    V    .         .         .
  14.433     48.9985   107.05  .    Q    .    V    .         .         .
  14.450     49.1465   107.41  .    Q    .    V    .         .         .
  14.467     49.2949   107.77  .    Q    .    V    .         .         .
  14.483     49.4439   108.13  .    Q    .    V    .         .         .
  14.500     49.5933   108.49  .    Q    .    V    .         .         .
  14.517     49.7432   108.85  .    Q    .    V    .         .         .
  14.533     49.8937   109.21  .    Q    .    V    .         .         .
  14.550     50.0446   109.57  .    Q    .    V    .         .         .
  14.567     50.1960   109.93  .    Q    .    V    .         .         .
  14.583     50.3480   110.29  .    Q    .    V    .         .         .
  14.600     50.5004   110.65  .    Q    .    V    .         .         .
  14.617     50.6533   111.02  .    Q    .    V    .         .         .
  14.633     50.8067   111.38  .    Q    .    V    .         .         .
  14.650     50.9606   111.74  .    Q    .    V    .         .         .
  14.667     51.1150   112.12  .    Q    .     V   .         .         .
```

Onsite Flood Routing Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1
and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61, ***with no Detention @ Node 56.3 & Node 35.2***

100-Year Storm Proposed Condition

14.683	51.2706	112.96	. Q . V . . .
14.700	51.4276	113.96	. Q . V . . .
14.717	51.5859	114.96	. Q . V . . .
14.733	51.7457	115.96	. Q . V . . .
14.750	51.9068	116.97	. Q . V . . .
14.767	52.0693	117.97	. Q . V . . .
14.783	52.2331	118.97	. Q . V . . .
14.800	52.3984	119.97	. Q . V . . .
14.817	52.5650	120.97	. Q . V . . .
14.833	52.7330	121.98	. Q . V . . .
14.850	52.9024	122.98	. Q . V . . .
14.867	53.0732	123.98	. Q . V . . .
14.883	53.2453	124.98	. Q . V . . .
14.900	53.4189	125.98	. Q . V . . .
14.917	53.5938	126.99	. Q . V . . .
14.933	53.7701	127.99	. Q . V . . .
14.950	53.9477	128.99	. Q . V . . .
14.967	54.1268	129.99	. Q . V . . .
14.983	54.3072	130.99	. Q . V . . .
15.000	54.4890	131.99	. Q . V . . .
15.017	54.6720	132.81	. Q . V . . .
15.033	54.8559	133.56	. Q . V . . .
15.050	55.0409	134.30	. Q . V . . .
15.067	55.2269	135.05	. Q . V . . .
15.083	55.4140	135.79	. Q . V . . .
15.100	55.6020	136.53	. Q . V . . .
15.117	55.7911	137.28	. Q . V . . .
15.133	55.9812	138.02	. Q . V . . .
15.150	56.1724	138.76	. Q . V . . .
15.167	56.3645	139.51	. Q . V . . .
15.183	56.5577	140.25	. Q . V . . .
15.200	56.7519	141.00	. Q . V . . .
15.217	56.9472	141.74	. Q . V . . .
15.233	57.1434	142.48	. Q . V . . .
15.250	57.3407	143.23	. Q . V . . .
15.267	57.5390	143.97	. Q . V . . .
15.283	57.7383	144.71	. Q . V . . .
15.300	57.9387	145.46	. Q . V . . .
15.317	58.1401	146.20	. Q . V . . .
15.333	58.3425	146.96	. Q . V . . .
15.350	58.5468	148.31	. Q . V . . .
15.367	58.7534	150.03	. Q . V . . .
15.383	58.9625	151.75	. Q . V . . .
15.400	59.1739	153.47	. Q . V . . .
15.417	59.3876	155.19	. Q . V . . .
15.433	59.6038	156.91	. Q . V . . .
15.450	59.8223	158.63	. Q . V . . .
15.467	60.0431	160.35	. Q . V . . .
15.483	60.2664	162.07	. Q . V . . .
15.500	60.4920	163.79	. Q . V . . .
15.517	60.7200	165.51	. Q . V. . .
15.533	60.9503	167.23	. Q . V. . .
15.550	61.1830	168.95	. Q . V. . .
15.567	61.4181	170.67	. Q . V. . .
15.583	61.6556	172.39	. Q . V. . .
15.600	61.8954	174.11	. Q . V. . .
15.617	62.1376	175.83	. Q . V. . .
15.633	62.3821	177.55	. Q . V. . .

15.650	62.6291	179.27	. Q . V. . .
15.667	62.8784	180.99	. Q . V. . .
15.683	63.1316	183.86	. Q . V. . .
15.700	63.3900	187.59	. Q. V. . .
15.717	63.6535	191.33	. Q. V. . .
15.733	63.9222	195.07	. Q. V . .
15.750	64.1961	198.80	. Q. V . .
15.767	64.4750	202.54	. Q. V . .
15.783	64.7592	206.28	. Q V . .
15.800	65.0484	210.01	. Q V . .
15.817	65.3429	213.75	. Q V . .
15.833	65.6424	217.48	. Q V . .
15.850	65.9471	221.22	. Q V . .
15.867	66.2570	224.96	. Q V . .
15.883	66.5720	228.69	. .Q V . .
15.900	66.8922	232.43	. .Q V . .
15.917	67.2175	236.17	. .Q .V . .
15.933	67.5479	239.90	. .Q .V . .
15.950	67.8835	243.64	. .Q .V . .
15.967	68.2242	247.37	. . Q .V . .
15.983	68.5701	251.11	. . Q .V . .
16.000	68.9211	254.85	. . Q .V . .
16.017	69.2941	270.78	. . Q .V . .
16.033	69.7058	298.91	. . Q .V . .
16.050	70.1563	327.05	. . Q . V . .
16.067	70.6455	355.18	. . Q . V . .
16.083	71.1735	383.31	. . Q . V . .
16.100	71.7402	411.45	. . Q V . .
16.117	72.3457	439.58	. . .QV . .
16.133	72.9900	467.71	. . . Q . .
16.150	73.6729	495.84	. . . VQ . .
16.167	74.3947	523.97	. . . V Q . .
16.183	75.1551	552.11	. . . V Q . .
16.200	75.9544	580.24	. . . V Q . .
16.217	76.7923	608.37	. . . V Q. .
16.233	77.6691	636.51	. . . V Q .
16.250	78.5845	664.64	. . . V . Q .
16.267	79.5388	692.77	. . . V . Q .
16.283	80.5318	720.90	. . . V . Q .
16.300	81.5635	749.03	. . . V . Q .
16.317	82.6340	777.17	. . . V . Q .
16.333	83.7432	805.30	. . . V . Q.
16.350	84.8745	821.33	. . . V . Q
16.367	85.9419	774.90	. . . V . Q .
16.383	86.9645	742.42	. . . V . Q .
16.400	87.9424	709.95	. . . V . Q .
16.417	88.8755	677.47	. . . V . Q .
16.433	89.7640	645.00	. . . V .Q .
16.450	90.6077	612.53	. . . VQ. .
16.467	91.4066	580.05	. . . Q . .
16.483	92.1609	547.58	. . . Q V . .
16.500	92.8704	515.10	. . . Q V. .
16.517	93.5352	482.63	. . . Q V. .
16.533	94.1552	450.16	. . .Q V. .
16.550	94.7305	417.68	. . Q V. .
16.567	95.2611	385.21	. . Q . V. .
16.583	95.7470	352.73	. . Q . V .
16.600	96.1881	320.26	. . Q . V .

```
16.617     96.5845    287.79  .         .   Q     .         V         .
16.633     96.9362    255.31  .         . Q       .         V         .
16.650     97.2431    222.84  .         Q         .         V         .
16.667     97.5053    190.37  .        Q.         .         V         .
16.683     97.7381    169.00  .       Q .         .         V         .
16.700     97.9672    166.29  .       Q .         .         V         .
16.717     98.1929    163.87  .      Q  .         .         V         .
16.733     98.4153    161.45  .      Q  .         .         V         .
16.750     98.6343    159.04  .      Q  .         .         V         .
16.767     98.8501    156.62  .      Q  .         .         .V        .
16.783     99.0625    154.20  .      Q  .         .         .V        .
16.800     99.2715    151.78  .      Q  .         .         .V        .
16.817     99.4773    149.36  .      Q  .         .         .V        .
16.833     99.6797    146.94  .      Q  .         .         .V        .
16.850     99.8787    144.52  .      Q  .         .         .V        .
16.867    100.0745    142.10  .     Q   .         .         .V        .
16.883    100.2669    139.69  .     Q   .         .         .V        .
16.900    100.4559    137.27  .     Q   .         .         .V        .
16.917    100.6417    134.85  .     Q   .         .         .V        .
16.933    100.8241    132.43  .     Q   .         .         .V        .
16.950    101.0032    130.01  .     Q   .         .         .V        .
16.967    101.1789    127.59  .     Q   .         .         .V        .
16.983    101.3513    125.17  .     Q   .         .         .V        .
17.000    101.5204    122.76  .    Q    .         .         .V        .
17.017    101.6867    120.74  .    Q    .         .         .V        .
17.033    101.8514    119.58  .    Q    .         .         .V        .
17.050    102.0146    118.46  .    Q    .         .         . V       .
17.067    102.1762    117.33  .    Q    .         .         . V       .
17.083    102.3363    116.20  .    Q    .         .         . V       .
17.100    102.4948    115.07  .    Q    .         .         . V       .
17.117    102.6517    113.95  .    Q    .         .         . V       .
17.133    102.8071    112.82  .    Q    .         .         . V       .
17.150    102.9610    111.69  .    Q    .         .         . V       .
17.167    103.1133    110.56  .    Q    .         .         . V       .
17.183    103.2640    109.44  .    Q    .         .         . V       .
17.200    103.4132    108.31  .    Q    .         .         . V       .
17.217    103.5608    107.18  .    Q    .         .         . V       .
17.233    103.7069    106.05  .    Q    .         .         . V       .
17.250    103.8514    104.93  .    Q    .         .         . V       .
17.267    103.9944    103.80  .    Q    .         .         . V       .
17.283    104.1358    102.67  .    Q    .         .         . V       .
17.300    104.2757    101.54  .   Q     .         .         . V       .
17.317    104.4140    100.42  .   Q     .         .         . V       .
17.333    104.5507     99.29  .   Q     .         .         . V       .
17.350    104.6861     98.28  .   Q     .         .         . V       .
17.367    104.8205     97.59  .   Q     .         .         . V       .
17.383    104.9540     96.93  .   Q     .         .         . V       .
17.400    105.0866     96.26  .   Q     .         .         . V       .
17.417    105.2183     95.59  .   Q     .         .         .  V      .
17.433    105.3491     94.92  .   Q     .         .         .  V      .
17.450    105.4789     94.26  .   Q     .         .         .  V      .
17.467    105.6078     93.59  .   Q     .         .         .  V      .
17.483    105.7358     92.92  .   Q     .         .         .  V      .
17.500    105.8629     92.26  .   Q     .         .         .  V      .
17.517    105.9890     91.59  .   Q     .         .         .  V      .
17.533    106.1143     90.92  .   Q     .         .         .  V      .
17.550    106.2386     90.25  .   Q     .         .         .  V      .
17.567    106.3620     89.59  .   Q     .         .         .  V      .
17.583    106.4844     88.92  .   Q     .         .         .  V      .
17.600    106.6060     88.25  .   Q     .         .         .  V      .
17.617    106.7266     87.58  .   Q     .         .         .  V      .
17.633    106.8464     86.92  .   Q     .         .         .  V      .
17.650    106.9652     86.25  .   Q     .         .         .  V      .
17.667    107.0830     85.58  .   Q     .         .         .  V      .
17.683    107.2001     84.96  .   Q     .         .         .  V      .
17.700    107.3164     84.49  .   Q     .         .         .  V      .
17.717    107.4322     84.03  .   Q     .         .         .  V      .
17.733    107.5473     83.57  .   Q     .         .         .  V      .
17.750    107.6618     83.11  .   Q     .         .         .  V      .
17.767    107.7756     82.65  .   Q     .         .         .  V      .
17.783    107.8888     82.19  .   Q     .         .         .  V      .
17.800    108.0014     81.73  .  Q      .         .         .  V      .
17.817    108.1133     81.28  .  Q      .         .         .  V      .
17.833    108.2247     80.82  .  Q      .         .         .  V      .
17.850    108.3354     80.36  .  Q      .         .         .  V      .
17.867    108.4454     79.90  .  Q      .         .         .   V     .
17.883    108.5548     79.44  .  Q      .         .         .   V     .
17.900    108.6636     78.98  .  Q      .         .         .   V     .
17.917    108.7718     78.52  .  Q      .         .         .   V     .
17.933    108.8793     78.06  .  Q      .         .         .   V     .
17.950    108.9862     77.61  .  Q      .         .         .   V     .
17.967    109.0925     77.15  .  Q      .         .         .   V     .
17.983    109.1981     76.69  .  Q      .         .         .   V     .
18.000    109.3031     76.23  .  Q      .         .         .   V     .
--------------------------------------------------------------------------------
    TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
    (Note: 100% of Peak Flow Rate estimate assumed to have
    an instantaneous time duration)

    Percentile of Estimated                 Duration
        Peak Flow Rate                      (minutes)
    =======================                 =========
               0%                             1081.0
              10%                             1081.0
              20%                              360.0
              30%                              205.0
              40%                              160.0
              50%                              140.0
              60%                              110.0
              70%                               85.0
              80%                               55.0
              90%                               30.0
 ============================================================================

   END OF FLOODSCx ROUTING ANALYSIS
```

```
**************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
         (c) Copyright 1989-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                         Analysis prepared by:

                         HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                  *
* 2-YEAR STORM EXISTING CONDITION AREA "B" AT NODE 15                    *
* W.O. #1443-136X                                                        *
 **************************************************************************

  FILE NAME: ON02X15.DAT
  TIME/DATE OF STUDY: 09:00 10/29/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


**************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     15.00 IS CODE = 1.2
--------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
==========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =   43.40
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.254
    LOW LOSS FRACTION = 0.960
    TIME OF CONCENTRATION(MIN.) = 33.75
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =   2
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.53
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  0.89
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.22
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  2.05

--------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     1.06
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     6.36

--------------------------------------------------------------------------

==========================================================================

                      2 4 - H O U R    S T O R M
                   R U N O F F    H Y D R O G R A P H

==========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
--------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.        4.8       9.6       14.4      19.2
--------------------------------------------------------------------------
  14.000      0.0590      0.19  Q V       .         .         .         .
  14.017      0.0593      0.19  Q V       .         .         .         .
  14.033      0.0596      0.19  Q V       .         .         .         .
  14.050      0.0598      0.19  Q V       .         .         .         .
  14.067      0.0601      0.19  Q V       .         .         .         .
  14.083      0.0604      0.20  Q V       .         .         .         .
  14.100      0.0606      0.20  Q V       .         .         .         .
  14.117      0.0609      0.20  Q V       .         .         .         .
  14.133      0.0612      0.20  Q V       .         .         .         .
  14.150      0.0615      0.20  Q V       .         .         .         .
  14.167      0.0617      0.20  Q V       .         .         .         .
  14.183      0.0620      0.20  Q V       .         .         .         .
  14.200      0.0623      0.20  Q V       .         .         .         .
  14.217      0.0626      0.20  Q V       .         .         .         .
  14.233      0.0629      0.20  Q V       .         .         .         .
  14.250      0.0631      0.21  Q V       .         .         .         .
  14.267      0.0634      0.21  Q V       .         .         .         .
  14.283      0.0637      0.21  Q V       .         .         .         .
  14.300      0.0640      0.21  Q V       .         .         .         .
  14.317      0.0643      0.21  Q V       .         .         .         .
  14.333      0.0646      0.21  Q V       .         .         .         .
  14.350      0.0649      0.21  Q V       .         .         .         .
  14.367      0.0652      0.21  Q V       .         .         .         .
  14.383      0.0655      0.21  Q V       .         .         .         .
  14.400      0.0657      0.21  Q V       .         .         .         .
  14.417      0.0660      0.22  Q V       .         .         .         .
  14.433      0.0663      0.22  Q V       .         .         .         .
  14.450      0.0666      0.22  Q V       .         .         .         .
  14.467      0.0669      0.22  Q V       .         .         .         .
  14.483      0.0672      0.22  Q V       .         .         .         .
  14.500      0.0675      0.22  Q V       .         .         .         .
  14.517      0.0678      0.22  Q V       .         .         .         .
  14.533      0.0682      0.22  Q V       .         .         .         .
  14.550      0.0685      0.22  Q V       .         .         .         .
  14.567      0.0688      0.22  Q V       .         .         .         .
  14.583      0.0691      0.22  Q V       .         .         .         .
  14.600      0.0694      0.22  Q V       .         .         .         .
  14.617      0.0697      0.23  Q V       .         .         .         .
  14.633      0.0700      0.23  Q V       .         .         .         .
  14.650      0.0703      0.23  Q V       .         .         .         .
  14.667      0.0706      0.23  Q V       .         .         .         .
```

14.683	0.0709	0.23	Q	V	.	.	.	.
14.700	0.0713	0.23	Q	V	.	.	.	.
14.717	0.0716	0.23	Q	V	.	.	.	.
14.733	0.0719	0.23	Q	V	.	.	.	.
14.750	0.0722	0.23	Q	V	.	.	.	.
14.767	0.0725	0.23	Q	V	.	.	.	.
14.783	0.0729	0.23	Q	V	.	.	.	.
14.800	0.0732	0.24	Q	V	.	.	.	.
14.817	0.0735	0.24	Q	V	.	.	.	.
14.833	0.0738	0.24	Q	V	.	.	.	.
14.850	0.0742	0.24	Q	V	.	.	.	.
14.867	0.0745	0.24	Q	V	.	.	.	.
14.883	0.0748	0.24	Q	V	.	.	.	.
14.900	0.0752	0.24	Q	V	.	.	.	.
14.917	0.0755	0.24	Q	V	.	.	.	.
14.933	0.0758	0.25	Q	V	.	.	.	.
14.950	0.0762	0.25	Q	V	.	.	.	.
14.967	0.0765	0.25	Q	V	.	.	.	.
14.983	0.0769	0.26	Q	V	.	.	.	.
15.000	0.0772	0.26	Q	V	.	.	.	.
15.017	0.0776	0.26	Q	V	.	.	.	.
15.033	0.0780	0.26	Q	V	.	.	.	.
15.050	0.0783	0.27	Q	V	.	.	.	.
15.067	0.0787	0.27	Q	V	.	.	.	.
15.083	0.0791	0.27	Q	V	.	.	.	.
15.100	0.0795	0.27	Q	V	.	.	.	.
15.117	0.0798	0.28	Q	V	.	.	.	.
15.133	0.0802	0.28	Q	V	.	.	.	.
15.150	0.0806	0.28	Q	V	.	.	.	.
15.167	0.0810	0.28	Q	V	.	.	.	.
15.183	0.0814	0.29	Q	V	.	.	.	.
15.200	0.0818	0.29	Q	V	.	.	.	.
15.217	0.0822	0.29	Q	V	.	.	.	.
15.233	0.0826	0.29	Q	V	.	.	.	.
15.250	0.0830	0.30	Q	V	.	.	.	.
15.267	0.0834	0.30	Q	V	.	.	.	.
15.283	0.0838	0.30	Q	V	.	.	.	.
15.300	0.0843	0.31	Q	V	.	.	.	.
15.317	0.0847	0.31	Q	V	.	.	.	.
15.333	0.0851	0.31	Q	V	.	.	.	.
15.350	0.0855	0.31	Q	V	.	.	.	.
15.367	0.0860	0.32	Q	V	.	.	.	.
15.383	0.0864	0.32	Q	V	.	.	.	.
15.400	0.0869	0.32	Q	V	.	.	.	.
15.417	0.0873	0.32	Q	V	.	.	.	.
15.433	0.0877	0.33	Q	V	.	.	.	.
15.450	0.0882	0.33	Q	V	.	.	.	.
15.467	0.0887	0.33	Q	V	.	.	.	.
15.483	0.0891	0.33	Q	V	.	.	.	.
15.500	0.0896	0.33	Q	V	.	.	.	.
15.517	0.0900	0.34	Q	V	.	.	.	.
15.533	0.0905	0.34	Q	V	.	.	.	.
15.550	0.0910	0.34	Q	V	.	.	.	.
15.567	0.0914	0.34	Q	V	.	.	.	.
15.583	0.0919	0.34	Q	V	.	.	.	.
15.600	0.0924	0.35	Q	V	.	.	.	.
15.617	0.0929	0.35	Q	V	.	.	.	.
15.633	0.0933	0.35	Q	V	.	.	.	.
15.650	0.0938	0.35	Q	V	.	.	.	.
15.667	0.0943	0.35	Q	V	.	.	.	.
15.683	0.0948	0.35	Q	V	.	.	.	.
15.700	0.0953	0.36	Q	V	.	.	.	.
15.717	0.0958	0.36	Q	V	.	.	.	.
15.733	0.0963	0.36	Q	V	.	.	.	.
15.750	0.0968	0.36	Q	V	.	.	.	.
15.767	0.0973	0.36	Q	V	.	.	.	.
15.783	0.0978	0.37	Q	V	.	.	.	.
15.800	0.0983	0.37	Q	V	.	.	.	.
15.817	0.0988	0.37	Q	V	.	.	.	.
15.833	0.0993	0.37	Q	V	.	.	.	.
15.850	0.0998	0.37	Q	V	.	.	.	.
15.867	0.1003	0.38	Q	V	.	.	.	.
15.883	0.1009	0.38	Q	V	.	.	.	.
15.900	0.1014	0.38	Q	V	.	.	.	.
15.917	0.1019	0.38	Q	V	.	.	.	.
15.933	0.1024	0.38	Q	V	.	.	.	.
15.950	0.1030	0.38	Q	V	.	.	.	.
15.967	0.1035	0.39	Q	V	.	.	.	.
15.983	0.1040	0.39	Q	V	.	.	.	.
16.000	0.1046	0.39	Q	V	.	.	.	.
16.017	0.1055	0.67	.Q	V	.	.	.	.
16.033	0.1072	1.23	. Q	V	.	.	.	.
16.050	0.1096	1.79	.	QV	.	.	.	.
16.067	0.1129	2.34	.	Q	.	.	.	.
16.083	0.1169	2.90	.	V Q	.	.	.	.
16.100	0.1216	3.46	.	V	Q .	.	.	.
16.117	0.1272	4.02	.	V	Q .	.	.	.
16.133	0.1335	4.57	.	V	Q.	.	.	.
16.150	0.1405	5.13	.	V	Q	.	.	.
16.167	0.1484	5.69	.	V	.Q	.	.	.
16.183	0.1570	6.25	.	V	. Q	.	.	.
16.200	0.1663	6.81	.	V	. Q	.	.	.
16.217	0.1765	7.36	.	V	. Q	.	.	.
16.233	0.1874	7.92	.	V	. Q	.	.	.
16.250	0.1991	8.48	.	V	. Q	.	.	.
16.267	0.2115	9.04	.	V	. Q	.	.	.
16.283	0.2247	9.59	.	V	. Q.	.	.	.
16.300	0.2387	10.15	.	V.	.Q	.	.	.
16.317	0.2535	10.71	.	V.	. Q	.	.	.
16.333	0.2690	11.27	.	V	. Q	.	.	.
16.350	0.2853	11.82	.	V	. Q	.	.	.
16.367	0.3023	12.38	.	.V	. Q	.	.	.
16.383	0.3202	12.94	.	. V	. Q	.	.	.
16.400	0.3388	13.50	.	. V	. Q	.	.	.
16.417	0.3581	14.06	.	. V	. Q.	.	.	.
16.433	0.3782	14.61	.	. V	. Q	.	.	.
16.450	0.3991	15.17	.	. V	. .Q	.	.	.
16.467	0.4208	15.73	.	. V	. . Q	.	.	.
16.483	0.4432	16.29	.	. V	. . Q	.	.	.
16.500	0.4664	16.84	.	. V	. . Q	.	.	.
16.517	0.4904	17.40	.	. V	. . Q	.	.	.
16.533	0.5152	17.96	.	. V.	. . Q	.	.	.
16.550	0.5407	18.52	.	. V	. . Q	.	.	.
16.567	0.5671	19.22	.	. .V	. . Q	.	.	.
16.583	0.5930	18.79	.	. . V	. . Q.	.	.	.
16.600	0.6181	18.23	.	. . V	. . Q	.	.	.

Onsite Flood Routing Area "B" @ Node 15

Drainage Area "B" Tributary to Existing 84" RCP (F19) Serrano Creek

2-Year Storm Existing Condition

16.617	0.6425	17.67	. . . V . Q .
16.633	0.6660	17.11	. . . V . Q .
16.650	0.6888	16.55	. . . V . Q .
16.667	0.7109	15.99	. . . V . Q .
16.683	0.7321	15.43	. . . V . Q .
16.700	0.7526	14.87	. . . V Q .
16.717	0.7723	14.30	. . . Q. .
16.733	0.7912	13.74	. . . QV. .
16.750	0.8094	13.18	. . . Q V .
16.767	0.8268	12.62	. . . Q .V .
16.783	0.8434	12.06	. . . Q .V .
16.800	0.8592	11.50	. . Q . V .
16.817	0.8743	10.94	. . Q . V .
16.833	0.8886	10.38	. .Q . V .
16.850	0.9021	9.81	. . Q . V .
16.867	0.9148	9.25	. . Q. . V .
16.883	0.9268	8.69	. . Q . . V .
16.900	0.9380	8.13	. . Q . . V .
16.917	0.9484	7.57	. . Q . . V .
16.933	0.9581	7.01	. . Q . . V .
16.950	0.9670	6.45	. . Q . . V .
16.967	0.9751	5.89	. . Q . . V .
16.983	0.9824	5.32	. .Q . . V .
17.000	0.9890	4.76	. Q. . . V .
17.017	0.9948	4.20	. Q . . . V .
17.033	0.9998	3.64	. Q . . . V .
17.050	1.0040	3.08	. Q . . . V .
17.067	1.0075	2.52	. Q . . . V .
17.083	1.0102	1.96	. Q . . . V .
17.100	1.0121	1.40	. Q . . . V .
17.117	1.0132	0.84	.Q . . . V .
17.133	1.0137	0.34	Q . . . V .
17.150	1.0141	0.27	Q . . . V .
17.167	1.0145	0.27	Q . . . V .
17.183	1.0148	0.27	Q . . . V .
17.200	1.0152	0.26	Q . . . V .
17.217	1.0156	0.26	Q . . . V .
17.233	1.0159	0.26	Q . . . V .
17.250	1.0163	0.26	Q . . . V .
17.267	1.0166	0.25	Q . . . V .
17.283	1.0170	0.25	Q . . . V .
17.300	1.0173	0.25	Q . . . V .
17.317	1.0176	0.25	Q . . . V .
17.333	1.0180	0.24	Q . . . V .
17.350	1.0183	0.24	Q . . . V .
17.367	1.0186	0.24	Q . . . V .
17.383	1.0190	0.24	Q . . . V .
17.400	1.0193	0.23	Q . . . V .
17.417	1.0196	0.23	Q . . . V .
17.433	1.0199	0.23	Q . . . V .
17.450	1.0202	0.23	Q . . . V .
17.467	1.0205	0.22	Q . . . V .
17.483	1.0209	0.22	Q . . . V .
17.500	1.0212	0.22	Q . . . V .
17.517	1.0215	0.22	Q . . . V .
17.533	1.0217	0.21	Q . . . V .
17.550	1.0220	0.21	Q . . . V .
17.567	1.0223	0.21	Q . . . V .
17.583	1.0226	0.21	Q . . . V .
17.600	1.0229	0.20	Q . . . V .
17.617	1.0232	0.20	Q . . . V .
17.633	1.0234	0.20	Q . . . V .
17.650	1.0237	0.20	Q . . . V .
17.667	1.0240	0.19	Q . . . V .
17.683	1.0242	0.19	Q . . . V .
17.700	1.0245	0.19	Q . . . V .
17.717	1.0248	0.19	Q . . . V .
17.733	1.0250	0.19	Q . . . V .
17.750	1.0253	0.19	Q . . . V .
17.767	1.0255	0.19	Q . . . V .
17.783	1.0258	0.18	Q . . . V .
17.800	1.0260	0.18	Q . . . V .
17.817	1.0263	0.18	Q . . . V .
17.833	1.0265	0.18	Q . . . V .
17.850	1.0268	0.18	Q . . . V .
17.867	1.0270	0.18	Q . . . V .
17.883	1.0273	0.18	Q . . . V .
17.900	1.0275	0.18	Q . . . V .
17.917	1.0278	0.18	Q . . . V .
17.933	1.0280	0.17	Q . . . V .
17.950	1.0282	0.17	Q . . . V .
17.967	1.0285	0.17	Q . . . V .
17.983	1.0287	0.17	Q . . . V .
18.000	1.0289	0.17	Q . . . V .

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	310.0
20%	275.0
30%	240.0
40%	205.0
50%	170.0
60%	135.0
70%	105.0
80%	70.0
90%	35.0

END OF FLOODSCx ROUTING ANALYSIS

Onsite Flood Routing Area "B" @ Node 15

Drainage Area "B" Tributary to Existing 84" RCP (F19) Serrano Creek

2-Year Storm Existing Condition

```
**************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
         (c) Copyright 1989-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                         Analysis prepared by:

                         HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                  *
* 25-YEAR STORM EXISTING CONDITION AREA "B" AT NODE 15                   *
* W.O. #1443-136X                                                        *
 **************************************************************************

  FILE NAME: ON25X15.DAT
  TIME/DATE OF STUDY: 09:02 10/29/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


**************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     15.00 IS CODE = 1.2
--------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
==========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =   43.40
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.254
    LOW LOSS FRACTION = 0.548
    TIME OF CONCENTRATION(MIN.) = 27.28
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =  25
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.87
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.15
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.94
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  2.71
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  4.49

--------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     7.81
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     8.43

--------------------------------------------------------------------------

==========================================================================

                      2 4 - H O U R    S T O R M
                   R U N O F F    H Y D R O G R A P H

==========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
--------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       15.5      30.9      46.4      61.8
--------------------------------------------------------------------------
  14.000      2.3200      5.02  .  Q      .V        .         .         .
  14.017      2.3269      5.03  .  Q      .V        .         .         .
  14.033      2.3338      5.04  .  Q      .V        .         .         .
  14.050      2.3408      5.06  .  Q      .V        .         .         .
  14.067      2.3478      5.07  .  Q      . V       .         .         .
  14.083      2.3548      5.08  .  Q      . V       .         .         .
  14.100      2.3618      5.09  .  Q      . V       .         .         .
  14.117      2.3688      5.10  .  Q      . V       .         .         .
  14.133      2.3759      5.12  .  Q      . V       .         .         .
  14.150      2.3829      5.13  .  Q      . V       .         .         .
  14.167      2.3900      5.14  .  Q      . V       .         .         .
  14.183      2.3971      5.15  .  Q      . V       .         .         .
  14.200      2.4042      5.17  .  Q      . V       .         .         .
  14.217      2.4114      5.20  .  Q      . V       .         .         .
  14.233      2.4186      5.24  .  Q      . V       .         .         .
  14.250      2.4259      5.27  .  Q      . V       .         .         .
  14.267      2.4332      5.30  .  Q      . V       .         .         .
  14.283      2.4405      5.33  .  Q      . V       .         .         .
  14.300      2.4479      5.36  .  Q      . V       .         .         .
  14.317      2.4553      5.39  .  Q      . V       .         .         .
  14.333      2.4628      5.42  .  Q      . V       .         .         .
  14.350      2.4703      5.45  .  Q      . V       .         .         .
  14.367      2.4778      5.48  .  Q      . V       .         .         .
  14.383      2.4854      5.51  .  Q      . V       .         .         .
  14.400      2.4930      5.54  .  Q      . V       .         .         .
  14.417      2.5007      5.57  .  Q      . V       .         .         .
  14.433      2.5084      5.60  .  Q      . V       .         .         .
  14.450      2.5162      5.63  .  Q      . V       .         .         .
  14.467      2.5240      5.66  .  Q      . V       .         .         .
  14.483      2.5318      5.69  .  Q      . V       .         .         .
  14.500      2.5397      5.72  .  Q      .  V      .         .         .
  14.517      2.5476      5.75  .  Q      .  V      .         .         .
  14.533      2.5556      5.78  .  Q      .  V      .         .         .
  14.550      2.5636      5.81  .  Q      .  V      .         .         .
  14.567      2.5716      5.84  .  Q      .  V      .         .         .
  14.583      2.5797      5.87  .  Q      .  V      .         .         .
  14.600      2.5878      5.90  .  Q      .  V      .         .         .
  14.617      2.5960      5.93  .  Q      .  V      .         .         .
  14.633      2.6042      5.96  .  Q      .  V      .         .         .
  14.650      2.6125      5.99  .  Q      .  V      .         .         .
  14.667      2.6208      6.02  .  Q      .  V      .         .         .
```

Onsite Flood Routing Area "B" @ Node 15

Drainage Area "B" Tributary to Existing 84" RCP (F19) Serrano Creek

25-Year Storm Existing Condition

14.683	2.6291	6.04	. Q . V . . .
14.700	2.6375	6.07	. Q . V . . .
14.717	2.6458	6.09	. Q . V . . .
14.733	2.6543	6.12	. Q . V . . .
14.750	2.6627	6.14	. Q . V . . .
14.767	2.6712	6.16	. Q . V . . .
14.783	2.6797	6.19	. Q . V . . .
14.800	2.6883	6.21	. Q . V . . .
14.817	2.6969	6.24	. Q . V . . .
14.833	2.7055	6.26	. Q . V . . .
14.850	2.7142	6.29	. Q . V . . .
14.867	2.7229	6.31	. Q . V . . .
14.883	2.7316	6.34	. Q . V . . .
14.900	2.7404	6.36	. Q . V . . .
14.917	2.7492	6.38	. Q . V . . .
14.933	2.7580	6.41	. Q . V . . .
14.950	2.7668	6.43	. Q . V . . .
14.967	2.7757	6.46	. Q . V . . .
14.983	2.7847	6.48	. Q . V . . .
15.000	2.7936	6.51	. Q . V . . .
15.017	2.8026	6.53	. Q . V . . .
15.033	2.8117	6.56	. Q . V . . .
15.050	2.8207	6.58	. Q . V . . .
15.067	2.8298	6.60	. Q . V . . .
15.083	2.8389	6.63	. Q . V . . .
15.100	2.8481	6.67	. Q . V . . .
15.117	2.8574	6.76	. Q . V . . .
15.133	2.8669	6.87	. Q . V . . .
15.150	2.8765	6.97	. Q . V . . .
15.167	2.8863	7.08	. Q . V . . .
15.183	2.8962	7.18	. Q . V . . .
15.200	2.9062	7.29	. Q . V . . .
15.217	2.9164	7.39	. Q . V . . .
15.233	2.9267	7.50	. Q . V . . .
15.250	2.9372	7.60	. Q . V . . .
15.267	2.9478	7.71	. Q . V . . .
15.283	2.9586	7.81	. Q . V . . .
15.300	2.9695	7.92	. Q . V . . .
15.317	2.9805	8.02	. Q . V . . .
15.333	2.9917	8.13	. Q . V . . .
15.350	3.0031	8.23	. Q . V . . .
15.367	3.0146	8.34	. Q . V . . .
15.383	3.0262	8.44	. Q . V . . .
15.400	3.0380	8.55	. Q . V . . .
15.417	3.0499	8.65	. Q . V . . .
15.433	3.0619	8.76	. Q . V . . .
15.450	3.0742	8.86	. Q . V . . .
15.467	3.0865	8.97	. Q . V . . .
15.483	3.0990	9.08	. Q . V . . .
15.500	3.1117	9.18	. Q . V . . .
15.517	3.1244	9.29	. Q . V . . .
15.533	3.1374	9.39	. Q . V . . .
15.550	3.1505	9.50	. Q . V . . .
15.567	3.1637	9.63	. Q . V . . .
15.583	3.1772	9.77	. Q . V . . .
15.600	3.1909	9.92	. Q . V . . .
15.617	3.2047	10.06	. Q . V . . .
15.633	3.2188	10.21	. Q . V . . .
15.650	3.2330	10.35	. Q . V . . .
15.667	3.2475	10.49	. Q . V . . .
15.683	3.2621	10.64	. Q . V . . .
15.700	3.2770	10.78	. Q . V . . .
15.717	3.2920	10.93	. Q . V . . .
15.733	3.3073	11.07	. Q . V . . .
15.750	3.3227	11.21	. Q . V . . .
15.767	3.3384	11.36	. Q . V . . .
15.783	3.3542	11.50	. Q . V . . .
15.800	3.3703	11.64	. Q . V . . .
15.817	3.3865	11.79	. Q . V . . .
15.833	3.4029	11.93	. Q . V . . .
15.850	3.4196	12.08	. Q . V . . .
15.867	3.4364	12.22	. Q . V . . .
15.883	3.4534	12.36	. Q . V . . .
15.900	3.4707	12.51	. Q . V . . .
15.917	3.4881	12.65	. Q . V . . .
15.933	3.5057	12.80	. Q . V . . .
15.950	3.5235	12.94	. Q . V . . .
15.967	3.5415	13.08	. Q . V . . .
15.983	3.5598	13.23	. Q . V . . .
16.000	3.5782	13.37	. Q . V . . .
16.017	3.5979	14.33	. Q. V . . .
16.033	3.6201	16.10	. Q V . . .
16.050	3.6447	17.87	. Q V . . .
16.067	3.6718	19.65	. Q V . . .
16.083	3.7013	21.42	. Q V . . .
16.100	3.7332	23.19	. Q V. . . .
16.117	3.7676	24.97	. Q V. . . .
16.133	3.8044	26.74	. Q V. . . .
16.150	3.8437	28.51	. QV. . . .
16.167	3.8854	30.28	. Q. . . .
16.183	3.9296	32.06	. Q . . .
16.200	3.9762	33.83	. VQ . . .
16.217	4.0252	35.60	. V Q . . .
16.233	4.0767	37.37	. V Q . . .
16.250	4.1306	39.15	. .V Q . . .
16.267	4.1870	40.92	. .V Q . . .
16.283	4.2458	42.69	. .V Q . . .
16.300	4.3070	44.46	. . V Q . . .
16.317	4.3707	46.24	. . V Q. . . .
16.333	4.4368	48.01	. . V .Q . . .
16.350	4.5054	49.78	. . V . Q . . .
16.367	4.5764	51.56	. . V . Q . . .
16.383	4.6499	53.33	. . V . Q . . .
16.400	4.7258	55.10	. . V . Q . . .
16.417	4.8041	56.87	. . V . Q . . .
16.433	4.8849	58.65	. . V . Q . . .
16.450	4.9681	60.42	. . V . Q. . .
16.467	5.0532	61.80	. . V . Q . .
16.483	5.1350	59.38	. . V . Q . . .
16.500	5.2141	57.39	. . V . Q . . .
16.517	5.2904	55.40	. . V . Q . . .
16.533	5.3640	53.42	. . V . Q . . .
16.550	5.4348	51.43	. . V . Q . . .
16.567	5.5029	49.44	. . V . Q . . .
16.583	5.5683	47.46	. . V Q . . .
16.600	5.6309	45.47	. . VQ. . . .

Onsite Flood Routing Area "B" @ Node 15

Drainage Area "B" Tributary to Existing 84" RCP (F19) Serrano Creek

25-Year Storm Existing Condition

```
16.617      5.6908     43.48  .         .         .       QV.         .
16.633      5.7480     41.49  .         .         .     Q  V.         .
16.650      5.8024     39.51  .         .         .    Q   V.         .
16.667      5.8541     37.52  .         .         .   Q    V.         .
16.683      5.9030     35.53  .         .         . Q       V         .
16.700      5.9492     33.55  .         .         .Q        V         .
16.717      5.9927     31.56  .         .         Q         V         .
16.733      6.0334     29.57  .         .        Q.         V         .
16.750      6.0714     27.59  .         .      Q  .         .V        .
16.767      6.1067     25.60  .         .     Q   .         .V        .
16.783      6.1392     23.61  .         .    Q    .         .V        .
16.800      6.1690     21.63  .         .  Q      .         .V        .
16.817      6.1960     19.64  .         . Q       .         .V        .
16.833      6.2204     17.65  .         .Q        .         .V        .
16.850      6.2419     15.66  .         Q         .         .V        .
16.867      6.2608     13.68  .       Q .         .         . V       .
16.883      6.2769     11.69  .      Q  .         .         . V       .
16.900      6.2902      9.70  .     Q   .         .         . V       .
16.917      6.3011      7.90  .    Q    .         .         . V       .
16.933      6.3115      7.52  .   Q     .         .         . V       .
16.950      6.3217      7.45  .   Q     .         .         . V       .
16.967      6.3319      7.37  .   Q     .         .         . V       .
16.983      6.3419      7.30  .   Q     .         .         . V       .
17.000      6.3519      7.22  .   Q     .         .         . V       .
17.017      6.3617      7.14  .   Q     .         .         . V       .
17.033      6.3715      7.07  .   Q     .         .         . V       .
17.050      6.3811      6.99  .   Q     .         .         . V       .
17.067      6.3906      6.91  .   Q     .         .         . V       .
17.083      6.4000      6.84  .   Q     .         .         . V       .
17.100      6.4093      6.76  .   Q     .         .         . V       .
17.117      6.4185      6.68  .   Q     .         .         . V       .
17.133      6.4276      6.61  .   Q     .         .         . V       .
17.150      6.4366      6.53  .   Q     .         .         . V       .
17.167      6.4455      6.45  .   Q     .         .         .  V      .
17.183      6.4543      6.38  .   Q     .         .         .  V      .
17.200      6.4630      6.30  .   Q     .         .         .  V      .
17.217      6.4716      6.22  .   Q     .         .         .  V      .
17.233      6.4800      6.15  .  Q      .         .         .  V      .
17.250      6.4884      6.07  .  Q      .         .         .  V      .
17.267      6.4967      6.00  .  Q      .         .         .  V      .
17.283      6.5048      5.92  .  Q      .         .         .  V      .
17.300      6.5129      5.84  .  Q      .         .         .  V      .
17.317      6.5208      5.77  .  Q      .         .         .  V      .
17.333      6.5286      5.69  .  Q      .         .         .  V      .
17.350      6.5364      5.61  .  Q      .         .         .  V      .
17.367      6.5440      5.54  .  Q      .         .         .  V      .
17.383      6.5515      5.49  .  Q      .         .         .  V      .
17.400      6.5591      5.45  .  Q      .         .         .  V      .
17.417      6.5665      5.42  .  Q      .         .         .  V      .
17.433      6.5739      5.38  .  Q      .         .         .  V      .
17.450      6.5813      5.35  .  Q      .         .         .  V      .
17.467      6.5886      5.31  .  Q      .         .         .  V      .
17.483      6.5959      5.28  .  Q      .         .         .  V      .
17.500      6.6031      5.24  .  Q      .         .         .  V      .
17.517      6.6103      5.21  .  Q      .         .         .  V      .
17.533      6.6174      5.17  .  Q      .         .         .  V      .
17.550      6.6245      5.14  .  Q      .         .         .  V      .
17.567      6.6315      5.10  .  Q      .         .         .  V      .
17.583      6.6385      5.07  .  Q      .         .         .   V     .
17.600      6.6454      5.03  .  Q      .         .         .   V     .
17.617      6.6523      5.00  .  Q      .         .         .   V     .
17.633      6.6592      4.96  .  Q      .         .         .   V     .
17.650      6.6660      4.93  .  Q      .         .         .   V     .
17.667      6.6727      4.90  .  Q      .         .         .   V     .
17.683      6.6794      4.86  .  Q      .         .         .   V     .
17.700      6.6860      4.83  .  Q      .         .         .   V     .
17.717      6.6926      4.79  .  Q      .         .         .   V     .
17.733      6.6992      4.76  .  Q      .         .         .   V     .
17.750      6.7057      4.72  .  Q      .         .         .   V     .
17.767      6.7121      4.69  .  Q      .         .         .   V     .
17.783      6.7186      4.65  .  Q      .         .         .   V     .
17.800      6.7249      4.62  . Q       .         .         .   V     .
17.817      6.7312      4.58  . Q       .         .         .   V     .
17.833      6.7375      4.55  . Q       .         .         .   V     .
17.850      6.7437      4.53  . Q       .         .         .   V     .
17.867      6.7499      4.51  . Q       .         .         .   V     .
17.883      6.7561      4.49  . Q       .         .         .   V     .
17.900      6.7623      4.46  . Q       .         .         .   V     .
17.917      6.7684      4.44  . Q       .         .         .   V     .
17.933      6.7745      4.42  . Q       .         .         .   V     .
17.950      6.7805      4.40  . Q       .         .         .   V     .
17.967      6.7866      4.37  . Q       .         .         .   V     .
17.983      6.7926      4.35  . Q       .         .         .   V     .
18.000      6.7985      4.33  . Q       .         .         .   V     .
--------------------------------------------------------------------------------
   TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
   (Note: 100% of Peak Flow Rate estimate assumed to have
   an instantaneous time duration)

   Percentile of Estimated                Duration
       Peak Flow Rate                     (minutes)
   =======================                =========
             0%                            1081.0
            10%                             735.0
            20%                             300.0
            30%                             230.0
            40%                             200.0
            50%                             165.0
            60%                             135.0
            70%                             100.0
            80%                              70.0
            90%                              30.0
============================================================================

  END OF FLOODSCx ROUTING ANALYSIS
```

Onsite Flood Routing Area "B" @ Node 15

Drainage Area "B" Tributary to Existing 84" RCP (F19) Serrano Creek

25-Year Storm Existing Condition

```
************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
         (c) Copyright 1989-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                         Analysis prepared by:

                         HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                  *
* 100-YEAR STORM EXISTING CONDITION AREA "B" AT NODE 15                  *
* W.O. #1443-136X                                                        *
 ************************************************************************

  FILE NAME: ON100X15.DAT
  TIME/DATE OF STUDY: 09:05 10/29/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     15.00 IS CODE = 1.2
------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =   43.40
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.254
    LOW LOSS FRACTION = 0.202
    TIME OF CONCENTRATION(MIN.) = 25.93
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.52
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.09
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.45
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.43
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.36
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.63

------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =    14.87
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     5.50

------------------------------------------------------------------------

========================================================================

                    2 4 - H O U R    S T O R M
                  R U N O F F    H Y D R O G R A P H

========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       20.7      41.4      62.1      82.8
------------------------------------------------------------------------
  14.000      5.1946     10.86  .    Q    .  V      .         .         .
  14.017      5.2096     10.89  .    Q    .   V     .         .         .
  14.033      5.2246     10.92  .    Q    .   V     .         .         .
  14.050      5.2397     10.94  .    Q    .   V     .         .         .
  14.067      5.2548     10.97  .    Q    .   V     .         .         .
  14.083      5.2699     11.00  .    Q    .   V     .         .         .
  14.100      5.2851     11.03  .    Q    .   V     .         .         .
  14.117      5.3004     11.06  .    Q    .   V     .         .         .
  14.133      5.3156     11.09  .    Q    .   V     .         .         .
  14.150      5.3309     11.11  .    Q    .   V     .         .         .
  14.167      5.3463     11.14  .    Q    .   V     .         .         .
  14.183      5.3617     11.17  .    Q    .   V     .         .         .
  14.200      5.3771     11.20  .    Q    .   V     .         .         .
  14.217      5.3926     11.23  .    Q    .   V     .         .         .
  14.233      5.4081     11.26  .    Q    .   V     .         .         .
  14.250      5.4236     11.28  .    Q    .   V     .         .         .
  14.267      5.4392     11.31  .    Q    .   V     .         .         .
  14.283      5.4548     11.35  .    Q    .   V     .         .         .
  14.300      5.4706     11.43  .    Q    .   V     .         .         .
  14.317      5.4864     11.51  .    Q    .   V     .         .         .
  14.333      5.5024     11.60  .    Q    .   V     .         .         .
  14.350      5.5185     11.68  .    Q    .   V     .         .         .
  14.367      5.5347     11.76  .    Q    .   V     .         .         .
  14.383      5.5510     11.84  .    Q    .   V     .         .         .
  14.400      5.5674     11.92  .    Q    .   V     .         .         .
  14.417      5.5839     12.00  .    Q    .    V    .         .         .
  14.433      5.6006     12.08  .    Q    .    V    .         .         .
  14.450      5.6173     12.16  .    Q    .    V    .         .         .
  14.467      5.6342     12.24  .    Q    .    V    .         .         .
  14.483      5.6512     12.33  .    Q    .    V    .         .         .
  14.500      5.6683     12.41  .    Q    .    V    .         .         .
  14.517      5.6855     12.49  .     Q   .    V    .         .         .
  14.533      5.7028     12.57  .     Q   .    V    .         .         .
  14.550      5.7202     12.65  .     Q   .    V    .         .         .
  14.567      5.7378     12.73  .     Q   .    V    .         .         .
  14.583      5.7554     12.81  .     Q   .    V    .         .         .
  14.600      5.7732     12.89  .     Q   .    V    .         .         .
  14.617      5.7910     12.98  .     Q   .    V    .         .         .
  14.633      5.8090     13.06  .     Q   .    V    .         .         .
  14.650      5.8271     13.14  .     Q   .    V    .         .         .
  14.667      5.8453     13.22  .     Q   .    V    .         .         .
```

Onsite Flood Routing Area "B" @ Node 15

Drainage Area "B" Tributary to Existing 84" RCP (F19) Serrano Creek

100-Year Storm Existing Condition

14.683	5.8636	13.30	.	Q	.	V	.	.	.
14.700	5.8821	13.38	.	Q	.	V	.	.	.
14.717	5.9006	13.46	.	Q	.	V	.	.	.
14.733	5.9192	13.51	.	Q	.	V	.	.	.
14.750	5.9379	13.57	.	Q	.	V	.	.	.
14.767	5.9567	13.63	.	Q	.	V	.	.	.
14.783	5.9756	13.69	.	Q	.	V	.	.	.
14.800	5.9945	13.75	.	Q	.	V	.	.	.
14.817	6.0135	13.81	.	Q	.	V	.	.	.
14.833	6.0326	13.87	.	Q	.	V	.	.	.
14.850	6.0518	13.92	.	Q	.	V	.	.	.
14.867	6.0711	13.98	.	Q	.	V	.	.	.
14.883	6.0904	14.04	.	Q	.	V	.	.	.
14.900	6.1098	14.10	.	Q	.	V	.	.	.
14.917	6.1293	14.16	.	Q	.	V	.	.	.
14.933	6.1489	14.22	.	Q	.	V	.	.	.
14.950	6.1686	14.28	.	Q	.	V	.	.	.
14.967	6.1883	14.33	.	Q	.	V	.	.	.
14.983	6.2081	14.39	.	Q	.	V	.	.	.
15.000	6.2280	14.45	.	Q	.	V	.	.	.
15.017	6.2480	14.51	.	Q	.	V	.	.	.
15.033	6.2681	14.57	.	Q	.	V	.	.	.
15.050	6.2882	14.63	.	Q	.	V	.	.	.
15.067	6.3085	14.68	.	Q	.	V	.	.	.
15.083	6.3288	14.74	.	Q	.	V	.	.	.
15.100	6.3491	14.80	.	Q	.	V	.	.	.
15.117	6.3696	14.86	.	Q	.	V	.	.	.
15.133	6.3902	14.92	.	Q	.	V	.	.	.
15.150	6.4109	15.02	.	Q	.	V	.	.	.
15.167	6.4318	15.20	.	Q	.	V	.	.	.
15.183	6.4530	15.38	.	Q	.	V	.	.	.
15.200	6.4744	15.57	.	Q	.	V	.	.	.
15.217	6.4961	15.75	.	Q	.	V	.	.	.
15.233	6.5181	15.93	.	Q	.	V	.	.	.
15.250	6.5403	16.11	.	Q	.	V	.	.	.
15.267	6.5627	16.29	.	Q	.	V	.	.	.
15.283	6.5854	16.47	.	Q	.	V	.	.	.
15.300	6.6083	16.66	.	Q	.	V	.	.	.
15.317	6.6315	16.84	.	Q	.	V	.	.	.
15.333	6.6550	17.02	.	Q	.	V	.	.	.
15.350	6.6787	17.20	.	Q	.	V	.	.	.
15.367	6.7026	17.38	.	Q	.	V	.	.	.
15.383	6.7268	17.57	.	Q	.	V	.	.	.
15.400	6.7512	17.75	.	Q	.	V	.	.	.
15.417	6.7759	17.93	.	Q	.	V	.	.	.
15.433	6.8009	18.11	.	Q	.	V	.	.	.
15.450	6.8261	18.29	.	Q	.	V	.	.	.
15.467	6.8515	18.47	.	Q	.	V	.	.	.
15.483	6.8772	18.66	.	Q.		V	.	.	.
15.500	6.9032	18.84	.	Q.		V	.	.	.
15.517	6.9294	19.02	.	Q.		V	.	.	.
15.533	6.9558	19.20	.	Q.		V	.	.	.
15.550	6.9825	19.38	.	Q.		V	.	.	.
15.567	7.0095	19.56	.	Q.		V	.	.	.
15.583	7.0367	19.75	.	Q.		V	.	.	.
15.600	7.0641	19.93	.	Q.		V.		.	.
15.617	7.0918	20.12	.	Q.		V.		.	.
15.633	7.1198	20.30	.	Q.		V.		.	.
15.650	7.1480	20.49	.	Q.		V.		.	.
15.667	7.1765	20.67	.	Q.		V.		.	.
15.683	7.2052	20.86	.	Q		V.		.	.
15.700	7.2342	21.04	.	Q		V.		.	.
15.717	7.2634	21.23	.	Q		V.		.	.
15.733	7.2929	21.41	.	Q		V.		.	.
15.750	7.3227	21.60	.	Q		V.		.	.
15.767	7.3527	21.78	.	Q		V.		.	.
15.783	7.3829	21.97	.	Q		V.		.	.
15.800	7.4135	22.15	.	Q		V.		.	.
15.817	7.4442	22.34	.	Q		V		.	.
15.833	7.4752	22.52	.	Q		V		.	.
15.850	7.5065	22.71	.	Q		V		.	.
15.867	7.5381	22.89	.	.Q		V		.	.
15.883	7.5698	23.08	.	.Q		V		.	.
15.900	7.6019	23.26	.	.Q		V		.	.
15.917	7.6342	23.45	.	.Q		V		.	.
15.933	7.6667	23.63	.	.Q		V		.	.
15.950	7.6996	23.82	.	.Q		V		.	.
15.967	7.7326	24.00	.	.Q		V		.	.
15.983	7.7659	24.19	.	.Q		V		.	.
16.000	7.7995	24.37	.	.Q		V		.	.
16.017	7.8348	25.59	.	. Q		.V		.	.
16.033	7.8731	27.84	.	. Q		.V		.	.
16.050	7.9146	30.09	.	. Q		.V		.	.
16.067	7.9591	32.35	.	. Q		.V		.	.
16.083	8.0068	34.60	.	. Q		.V		.	.
16.100	8.0575	36.85	.	. Q		.V		.	.
16.117	8.1114	39.10	.	. Q		.V		.	.
16.133	8.1683	41.35	.	. Q		.V		.	.
16.150	8.2284	43.60	.	.		.QV		.	.
16.167	8.2915	45.85	.	.		. Q		.	.
16.183	8.3578	48.10	.	.		. VQ		.	.
16.200	8.4272	50.35	.	.		. V Q		.	.
16.217	8.4996	52.61	.	.		. V Q		.	.
16.233	8.5752	54.86	.	.		. V Q		.	.
16.250	8.6538	57.11	.	.		. V Q		.	.
16.267	8.7356	59.36	.	.		. V Q		.	.
16.283	8.8205	61.61	.	.		. V Q.		.	.
16.300	8.9084	63.86	.	.		. V Q		.	.
16.317	8.9995	66.11	.	.		. V .Q		.	.
16.333	9.0936	68.36	.	.		. V . Q		.	.
16.350	9.1909	70.61	.	.		. V . Q		.	.
16.367	9.2913	72.86	.	.		. V . Q		.	.
16.383	9.3947	75.12	.	.		. V . Q		.	.
16.400	9.5013	77.37	.	.		. V . Q		.	.
16.417	9.6110	79.62	.	.		. V . Q		.	.
16.433	9.7251	82.84	.	.		. V . Q		.	.
16.450	9.8372	81.39	.	.		. V . Q.		.	.
16.467	9.9458	78.86	.	.		. V . Q		.	.
16.483	10.0509	76.32	.	.		. V . Q		.	.
16.500	10.1526	73.79	.	.		. V . Q		.	.
16.517	10.2507	71.25	.	.		. V . Q		.	.
16.533	10.3454	68.72	.	.		. V . Q		.	.
16.550	10.4365	66.18	.	.		. V .Q		.	.
16.567	10.5242	63.65	.	.		. V Q		.	.
16.583	10.6084	61.11	.	.		. VQ.		.	.
16.600	10.6891	58.58	.	.		. Q .		.	.

Onsite Flood Routing Area "B" @ Node 15

Drainage Area "B" Tributary to Existing 84" RCP (F19) Serrano Creek

100-Year Storm Existing Condition

```
16.617     10.7662     56.04  .          .          .       QV .          .
16.633     10.8399     53.51  .          .          .     Q   V.          .
16.650     10.9102     50.97  .          .          .   Q     V.          .
16.667     10.9769     48.44  .          .          . Q       V.          .
16.683     11.0401     45.90  .          .          .Q        V.          .
16.700     11.0998     43.37  .          .          Q         V.          .
16.717     11.1561     40.83  .          .        Q.          V           .
16.733     11.2088     38.30  .          .      Q   .          V           .
16.750     11.2581     35.76  .          .    Q     .          V           .
16.767     11.3039     33.23  .          .  Q       .          V           .
16.783     11.3461     30.69  .          .Q         .          V           .
16.800     11.3849     28.16  .          Q          .          V           .
16.817     11.4202     25.62  .          Q          .          V           .
16.833     11.4520     23.09  .          Q          .          V           .
16.850     11.4803     20.55  .        Q.           .          V           .
16.867     11.5052     18.04  .        Q .          .          V           .
16.883     11.5286     16.99  .        Q .          .          .V          .
16.900     11.5517     16.80  .        Q .          .          .V          .
16.917     11.5746     16.62  .        Q .          .          .V          .
16.933     11.5972     16.43  .      Q   .          .          .V          .
16.950     11.6196     16.24  .      Q   .          .          .V          .
16.967     11.6417     16.06  .      Q   .          .          .V          .
16.983     11.6636     15.87  .      Q   .          .          .V          .
17.000     11.6852     15.69  .      Q   .          .          .V          .
17.017     11.7066     15.50  .      Q   .          .          .V          .
17.033     11.7277     15.32  .      Q   .          .          .V          .
17.050     11.7485     15.13  .      Q   .          .          .V          .
17.067     11.7691     14.95  .      Q   .          .          .V          .
17.083     11.7894     14.76  .      Q   .          .          .V          .
17.100     11.8095     14.57  .      Q   .          .          .V          .
17.117     11.8293     14.39  .    Q     .          .          .V          .
17.133     11.8489     14.20  .    Q     .          .          .V          .
17.150     11.8682     14.02  .    Q     .          .          .V          .
17.167     11.8872     13.83  .    Q     .          .          .V          .
17.183     11.9060     13.65  .    Q     .          .          . V         .
17.200     11.9246     13.46  .    Q     .          .          . V         .
17.217     11.9428     13.27  .    Q     .          .          . V         .
17.233     11.9609     13.09  .    Q     .          .          . V         .
17.250     11.9786     12.90  .    Q     .          .          . V         .
17.267     11.9962     12.72  .    Q     .          .          . V         .
17.283     12.0134     12.53  .    Q     .          .          . V         .
17.300     12.0304     12.35  .  Q       .          .          . V         .
17.317     12.0473     12.23  .  Q       .          .          . V         .
17.333     12.0640     12.14  .  Q       .          .          . V         .
17.350     12.0806     12.05  .  Q       .          .          . V         .
17.367     12.0971     11.96  .  Q       .          .          . V         .
17.383     12.1134     11.87  .  Q       .          .          . V         .
17.400     12.1297     11.79  .  Q       .          .          . V         .
17.417     12.1458     11.70  .  Q       .          .          . V         .
17.433     12.1618     11.61  .  Q       .          .          . V         .
17.450     12.1776     11.52  .  Q       .          .          . V         .
17.467     12.1934     11.43  .  Q       .          .          . V         .
17.483     12.2090     11.34  .  Q       .          .          . V         .
17.500     12.2245     11.25  .  Q       .          .          . V         .
17.517     12.2399     11.16  .  Q       .          .          . V         .
17.533     12.2552     11.08  .  Q       .          .          . V         .
17.550     12.2703     10.99  .  Q       .          .          .  V        .
17.567     12.2853     10.90  .  Q       .          .          .  V        .
17.583     12.3002     10.81  .  Q       .          .          .  V        .
17.600     12.3150     10.72  .  Q       .          .          .  V        .
17.617     12.3296     10.63  .  Q       .          .          .  V        .
17.633     12.3441     10.54  .  Q       .          .          .  V        .
17.650     12.3585     10.45  .  Q       .          .          .  V        .
17.667     12.3728     10.37  .  Q       .          .          .  V        .
17.683     12.3870     10.28  .  Q       .          .          .  V        .
17.700     12.4010     10.19  .  Q       .          .          .  V        .
17.717     12.4149     10.10  .  Q       .          .          .  V        .
17.733     12.4287     10.01  .  Q       .          .          .  V        .
17.750     12.4424      9.95  .  Q       .          .          .  V        .
17.767     12.4560      9.90  .  Q       .          .          .  V        .
17.783     12.4696      9.85  .  Q       .          .          .  V        .
17.800     12.4831      9.79  .  Q       .          .          .  V        .
17.817     12.4965      9.74  .  Q       .          .          .  V        .
17.833     12.5098      9.69  .  Q       .          .          .  V        .
17.850     12.5231      9.64  .  Q       .          .          .  V        .
17.867     12.5363      9.58  .  Q       .          .          .  V        .
17.883     12.5494      9.53  .  Q       .          .          .  V        .
17.900     12.5625      9.48  .  Q       .          .          .  V        .
17.917     12.5755      9.43  .  Q       .          .          .  V        .
17.933     12.5884      9.37  .  Q       .          .          .  V        .
17.950     12.6012      9.32  .  Q       .          .          .  V        .
17.967     12.6140      9.27  .  Q       .          .          .  V        .
17.983     12.6267      9.22  .  Q       .          .          .  V        .
18.000     12.6393      9.16  .  Q       .          .          .   V       .
```

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	1081.0
20%	490.0
30%	245.0
40%	210.0
50%	170.0
60%	140.0
70%	105.0
80%	65.0
90%	35.0

END OF FLOODSCx ROUTING ANALYSIS

Onsite Flood Routing Area "B" @ Node 15

Drainage Area "B" Tributary to Existing 84" RCP (F19) Serrano Creek

100-Year Storm Existing Condition

```
**************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
         (c) Copyright 1989-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                         Analysis prepared by:

                         HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                  *
* 25-YEAR STORM EXISTING CONDITION AREA "B" AT NODE 15                   *
* W.O. #1443-136X                                                        *
 **************************************************************************

  FILE NAME: ON25X15.DAT
  TIME/DATE OF STUDY: 09:02 10/29/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


**************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     15.00 IS CODE = 1.2
--------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
==========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =   43.40
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.254
    LOW LOSS FRACTION = 0.548
    TIME OF CONCENTRATION(MIN.) = 27.28
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =  25
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.87
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.15
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.94
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  2.71
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  4.49

--------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     7.81
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     8.43

--------------------------------------------------------------------------

==========================================================================

                      2 4 - H O U R    S T O R M
                   R U N O F F    H Y D R O G R A P H

==========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
--------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       15.5      30.9      46.4      61.8
--------------------------------------------------------------------------
  14.000      2.3200      5.02  .  Q      .V        .         .         .
  14.017      2.3269      5.03  .  Q      .V        .         .         .
  14.033      2.3338      5.04  .  Q      .V        .         .         .
  14.050      2.3408      5.06  .  Q      .V        .         .         .
  14.067      2.3478      5.07  .  Q      . V       .         .         .
  14.083      2.3548      5.08  .  Q      . V       .         .         .
  14.100      2.3618      5.09  .  Q      . V       .         .         .
  14.117      2.3688      5.10  .  Q      . V       .         .         .
  14.133      2.3759      5.12  .  Q      . V       .         .         .
  14.150      2.3829      5.13  .  Q      . V       .         .         .
  14.167      2.3900      5.14  .  Q      . V       .         .         .
  14.183      2.3971      5.15  .  Q      . V       .         .         .
  14.200      2.4042      5.17  .  Q      . V       .         .         .
  14.217      2.4114      5.20  .  Q      . V       .         .         .
  14.233      2.4186      5.24  .  Q      . V       .         .         .
  14.250      2.4259      5.27  .  Q      . V       .         .         .
  14.267      2.4332      5.30  .  Q      . V       .         .         .
  14.283      2.4405      5.33  .  Q      . V       .         .         .
  14.300      2.4479      5.36  .  Q      . V       .         .         .
  14.317      2.4553      5.39  .  Q      . V       .         .         .
  14.333      2.4628      5.42  .  Q      . V       .         .         .
  14.350      2.4703      5.45  .  Q      . V       .         .         .
  14.367      2.4778      5.48  .  Q      . V       .         .         .
  14.383      2.4854      5.51  .  Q      . V       .         .         .
  14.400      2.4930      5.54  .  Q      . V       .         .         .
  14.417      2.5007      5.57  .  Q      . V       .         .         .
  14.433      2.5084      5.60  .  Q      . V       .         .         .
  14.450      2.5162      5.63  .  Q      . V       .         .         .
  14.467      2.5240      5.66  .  Q      . V       .         .         .
  14.483      2.5318      5.69  .  Q      . V       .         .         .
  14.500      2.5397      5.72  .  Q      .  V      .         .         .
  14.517      2.5476      5.75  .  Q      .  V      .         .         .
  14.533      2.5556      5.78  .  Q      .  V      .         .         .
  14.550      2.5636      5.81  .  Q      .  V      .         .         .
  14.567      2.5716      5.84  .  Q      .  V      .         .         .
  14.583      2.5797      5.87  .  Q      .  V      .         .         .
  14.600      2.5878      5.90  .  Q      .  V      .         .         .
  14.617      2.5960      5.93  .  Q      .  V      .         .         .
  14.633      2.6042      5.96  .  Q      .  V      .         .         .
  14.650      2.6125      5.99  .  Q      .  V      .         .         .
  14.667      2.6208      6.02  .  Q      .  V      .         .         .
```

Onsite Flood Routing Area "B" @ Node 15

Drainage Area "B" Tributary to Existing 84" RCP (F19) Serrano Creek

25-Year Storm Existing Condition

14.683	2.6291	6.04	. Q . V . . .
14.700	2.6375	6.07	. Q . V . . .
14.717	2.6458	6.09	. Q . V . . .
14.733	2.6543	6.12	. Q . V . . .
14.750	2.6627	6.14	. Q . V . . .
14.767	2.6712	6.16	. Q . V . . .
14.783	2.6797	6.19	. Q . V . . .
14.800	2.6883	6.21	. Q . V . . .
14.817	2.6969	6.24	. Q . V . . .
14.833	2.7055	6.26	. Q . V . . .
14.850	2.7142	6.29	. Q . V . . .
14.867	2.7229	6.31	. Q . V . . .
14.883	2.7316	6.34	. Q . V . . .
14.900	2.7404	6.36	. Q . V . . .
14.917	2.7492	6.38	. Q . V . . .
14.933	2.7580	6.41	. Q . V . . .
14.950	2.7668	6.43	. Q . V . . .
14.967	2.7757	6.46	. Q . V . . .
14.983	2.7847	6.48	. Q . V . . .
15.000	2.7936	6.51	. Q . V . . .
15.017	2.8026	6.53	. Q . V . . .
15.033	2.8117	6.56	. Q . V . . .
15.050	2.8207	6.58	. Q . V . . .
15.067	2.8298	6.60	. Q . V . . .
15.083	2.8389	6.63	. Q . V . . .
15.100	2.8481	6.67	. Q . V . . .
15.117	2.8574	6.76	. Q . V . . .
15.133	2.8669	6.87	. Q . V . . .
15.150	2.8765	6.97	. Q . V . . .
15.167	2.8863	7.08	. Q . V . . .
15.183	2.8962	7.18	. Q . V . . .
15.200	2.9062	7.29	. Q . V . . .
15.217	2.9164	7.39	. Q . V . . .
15.233	2.9267	7.50	. Q . V . . .
15.250	2.9372	7.60	. Q . V . . .
15.267	2.9478	7.71	. Q . V . . .
15.283	2.9586	7.81	. Q . V . . .
15.300	2.9695	7.92	. Q . V . . .
15.317	2.9805	8.02	. Q . V . . .
15.333	2.9917	8.13	. Q . V . . .
15.350	3.0031	8.23	. Q . V . . .
15.367	3.0146	8.34	. Q . V . . .
15.383	3.0262	8.44	. Q . V . . .
15.400	3.0380	8.55	. Q . V . . .
15.417	3.0499	8.65	. Q . V . . .
15.433	3.0619	8.76	. Q . V . . .
15.450	3.0742	8.86	. Q . V . . .
15.467	3.0865	8.97	. Q . V . . .
15.483	3.0990	9.08	. Q . V . . .
15.500	3.1117	9.18	. Q . V . . .
15.517	3.1244	9.29	. Q . V . . .
15.533	3.1374	9.39	. Q . V . . .
15.550	3.1505	9.50	. Q . V . . .
15.567	3.1637	9.63	. Q . V . . .
15.583	3.1772	9.77	. Q . V . . .
15.600	3.1909	9.92	. Q . V . . .
15.617	3.2047	10.06	. Q . V . . .
15.633	3.2188	10.21	. Q . V . . .
15.650	3.2330	10.35	. Q . V . . .
15.667	3.2475	10.49	. Q . V . . .
15.683	3.2621	10.64	. Q . V . . .
15.700	3.2770	10.78	. Q . V . . .
15.717	3.2920	10.93	. Q . V . . .
15.733	3.3073	11.07	. Q . V . . .
15.750	3.3227	11.21	. Q . V . . .
15.767	3.3384	11.36	. Q . V . . .
15.783	3.3542	11.50	. Q . V . . .
15.800	3.3703	11.64	. Q . V . . .
15.817	3.3865	11.79	. Q . V . . .
15.833	3.4029	11.93	. Q . V . . .
15.850	3.4196	12.08	. Q . V . . .
15.867	3.4364	12.22	. Q . V . . .
15.883	3.4534	12.36	. Q . V . . .
15.900	3.4707	12.51	. Q . V . . .
15.917	3.4881	12.65	. Q . V . . .
15.933	3.5057	12.80	. Q . V . . .
15.950	3.5235	12.94	. Q . V . . .
15.967	3.5415	13.08	. Q . V . . .
15.983	3.5598	13.23	. Q . V . . .
16.000	3.5782	13.37	. Q . V . . .
16.017	3.5979	14.33	. Q. V . . .
16.033	3.6201	16.10	. Q V . . .
16.050	3.6447	17.87	. Q V . . .
16.067	3.6718	19.65	. Q V . . .
16.083	3.7013	21.42	. Q V . . .
16.100	3.7332	23.19	. Q V. . . .
16.117	3.7676	24.97	. Q V. . . .
16.133	3.8044	26.74	. Q V. . . .
16.150	3.8437	28.51	. QV. . . .
16.167	3.8854	30.28	. Q. . . .
16.183	3.9296	32.06	. Q . . .
16.200	3.9762	33.83	. VQ . . .
16.217	4.0252	35.60	. V Q . . .
16.233	4.0767	37.37	. V Q . . .
16.250	4.1306	39.15	. .V Q . . .
16.267	4.1870	40.92	. .V Q . . .
16.283	4.2458	42.69	. .V Q . . .
16.300	4.3070	44.46	. . V Q . . .
16.317	4.3707	46.24	. . V Q. . . .
16.333	4.4368	48.01	. . V .Q . . .
16.350	4.5054	49.78	. . V . Q . . .
16.367	4.5764	51.56	. . V . Q . . .
16.383	4.6499	53.33	. . V . Q . . .
16.400	4.7258	55.10	. . V . Q . . .
16.417	4.8041	56.87	. . V . Q . . .
16.433	4.8849	58.65	. . V . Q . . .
16.450	4.9681	60.42	. . V . Q. . .
16.467	5.0532	61.80	. . V . Q . .
16.483	5.1350	59.38	. . V . Q . . .
16.500	5.2141	57.39	. . V . Q . . .
16.517	5.2904	55.40	. . V . Q . . .
16.533	5.3640	53.42	. . V . Q . . .
16.550	5.4348	51.43	. . V . Q . . .
16.567	5.5029	49.44	. . V . Q . . .
16.583	5.5683	47.46	. . V Q . . .
16.600	5.6309	45.47	. . VQ. . . .

Onsite Flood Routing Area "B" @ Node 15

Drainage Area "B" Tributary to Existing 84" RCP (F19) Serrano Creek

25-Year Storm Existing Condition

```
 16.617      5.6908     43.48  .         .         .       QV.         .
 16.633      5.7480     41.49  .         .         .     Q  V.         .
 16.650      5.8024     39.51  .         .         .    Q   V.         .
 16.667      5.8541     37.52  .         .         .   Q    V.         .
 16.683      5.9030     35.53  .         .         . Q       V         .
 16.700      5.9492     33.55  .         .         .Q        V         .
 16.717      5.9927     31.56  .         .         Q         V         .
 16.733      6.0334     29.57  .         .        Q.         V         .
 16.750      6.0714     27.59  .         .      Q  .         .V        .
 16.767      6.1067     25.60  .         .     Q   .         .V        .
 16.783      6.1392     23.61  .         .    Q    .         .V        .
 16.800      6.1690     21.63  .         .  Q      .         .V        .
 16.817      6.1960     19.64  .         . Q       .         .V        .
 16.833      6.2204     17.65  .         .Q        .         .V        .
 16.850      6.2419     15.66  .         Q         .         .V        .
 16.867      6.2608     13.68  .       Q .         .         . V       .
 16.883      6.2769     11.69  .      Q  .         .         . V       .
 16.900      6.2902      9.70  .     Q   .         .         . V       .
 16.917      6.3011      7.90  .    Q    .         .         . V       .
 16.933      6.3115      7.52  .   Q     .         .         . V       .
 16.950      6.3217      7.45  .   Q     .         .         . V       .
 16.967      6.3319      7.37  .   Q     .         .         . V       .
 16.983      6.3419      7.30  .   Q     .         .         . V       .
 17.000      6.3519      7.22  .   Q     .         .         . V       .
 17.017      6.3617      7.14  .   Q     .         .         . V       .
 17.033      6.3715      7.07  .   Q     .         .         . V       .
 17.050      6.3811      6.99  .   Q     .         .         . V       .
 17.067      6.3906      6.91  .   Q     .         .         . V       .
 17.083      6.4000      6.84  .   Q     .         .         . V       .
 17.100      6.4093      6.76  .   Q     .         .         . V       .
 17.117      6.4185      6.68  .   Q     .         .         . V       .
 17.133      6.4276      6.61  .   Q     .         .         . V       .
 17.150      6.4366      6.53  .   Q     .         .         . V       .
 17.167      6.4455      6.45  .   Q     .         .         .  V      .
 17.183      6.4543      6.38  .   Q     .         .         .  V      .
 17.200      6.4630      6.30  .   Q     .         .         .  V      .
 17.217      6.4716      6.22  .   Q     .         .         .  V      .
 17.233      6.4800      6.15  .  Q      .         .         .  V      .
 17.250      6.4884      6.07  .  Q      .         .         .  V      .
 17.267      6.4967      6.00  .  Q      .         .         .  V      .
 17.283      6.5048      5.92  .  Q      .         .         .  V      .
 17.300      6.5129      5.84  .  Q      .         .         .  V      .
 17.317      6.5208      5.77  .  Q      .         .         .  V      .
 17.333      6.5286      5.69  .  Q      .         .         .  V      .
 17.350      6.5364      5.61  .  Q      .         .         .  V      .
 17.367      6.5440      5.54  .  Q      .         .         .  V      .
 17.383      6.5515      5.49  .  Q      .         .         .  V      .
 17.400      6.5591      5.45  .  Q      .         .         .  V      .
 17.417      6.5665      5.42  .  Q      .         .         .  V      .
 17.433      6.5739      5.38  .  Q      .         .         .  V      .
 17.450      6.5813      5.35  .  Q      .         .         .  V      .
 17.467      6.5886      5.31  .  Q      .         .         .  V      .
 17.483      6.5959      5.28  .  Q      .         .         .  V      .
 17.500      6.6031      5.24  .  Q      .         .         .  V      .
 17.517      6.6103      5.21  .  Q      .         .         .  V      .
 17.533      6.6174      5.17  .  Q      .         .         .  V      .
 17.550      6.6245      5.14  .  Q      .         .         .  V      .
 17.567      6.6315      5.10  .  Q      .         .         .  V      .
 17.583      6.6385      5.07  .  Q      .         .         .   V     .
 17.600      6.6454      5.03  .  Q      .         .         .   V     .
 17.617      6.6523      5.00  .  Q      .         .         .   V     .
 17.633      6.6592      4.96  .  Q      .         .         .   V     .
 17.650      6.6660      4.93  .  Q      .         .         .   V     .
 17.667      6.6727      4.90  .  Q      .         .         .   V     .
 17.683      6.6794      4.86  .  Q      .         .         .   V     .
 17.700      6.6860      4.83  .  Q      .         .         .   V     .
 17.717      6.6926      4.79  .  Q      .         .         .   V     .
 17.733      6.6992      4.76  .  Q      .         .         .   V     .
 17.750      6.7057      4.72  .  Q      .         .         .   V     .
 17.767      6.7121      4.69  .  Q      .         .         .   V     .
 17.783      6.7186      4.65  .  Q      .         .         .   V     .
 17.800      6.7249      4.62  . Q       .         .         .   V     .
 17.817      6.7312      4.58  . Q       .         .         .   V     .
 17.833      6.7375      4.55  . Q       .         .         .   V     .
 17.850      6.7437      4.53  . Q       .         .         .   V     .
 17.867      6.7499      4.51  . Q       .         .         .   V     .
 17.883      6.7561      4.49  . Q       .         .         .   V     .
 17.900      6.7623      4.46  . Q       .         .         .   V     .
 17.917      6.7684      4.44  . Q       .         .         .   V     .
 17.933      6.7745      4.42  . Q       .         .         .   V     .
 17.950      6.7805      4.40  . Q       .         .         .   V     .
 17.967      6.7866      4.37  . Q       .         .         .   V     .
 17.983      6.7926      4.35  . Q       .         .         .   V     .
 18.000      6.7985      4.33  . Q       .         .         .   V     .
--------------------------------------------------------------------------------
    TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
    (Note: 100% of Peak Flow Rate estimate assumed to have
    an instantaneous time duration)

    Percentile of Estimated                 Duration
        Peak Flow Rate                      (minutes)
    =======================                 =========
               0%                            1081.0
              10%                             735.0
              20%                             300.0
              30%                             230.0
              40%                             200.0
              50%                             165.0
              60%                             135.0
              70%                             100.0
              80%                              70.0
              90%                              30.0
============================================================================

   END OF FLOODSCx ROUTING ANALYSIS
```

```
************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
         (c) Copyright 1989-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                         Analysis prepared by:

                         HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                  *
* 100-YEAR STORM EXISTING CONDITION AREA "B" AT NODE 15                  *
* W.O. #1443-136X                                                        *
 ************************************************************************

  FILE NAME: ON100X15.DAT
  TIME/DATE OF STUDY: 09:05 10/29/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     15.00 IS CODE = 1.2
------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =   43.40
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.254
    LOW LOSS FRACTION = 0.202
    TIME OF CONCENTRATION(MIN.) = 25.93
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.52
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.09
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.45
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.43
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.36
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.63

------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =    14.87
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     5.50

------------------------------------------------------------------------

========================================================================

                    2 4 - H O U R    S T O R M
                  R U N O F F    H Y D R O G R A P H

========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       20.7      41.4      62.1      82.8
------------------------------------------------------------------------
  14.000      5.1946     10.86  .    Q    .  V      .         .         .
  14.017      5.2096     10.89  .    Q    .   V     .         .         .
  14.033      5.2246     10.92  .    Q    .   V     .         .         .
  14.050      5.2397     10.94  .    Q    .   V     .         .         .
  14.067      5.2548     10.97  .    Q    .   V     .         .         .
  14.083      5.2699     11.00  .    Q    .   V     .         .         .
  14.100      5.2851     11.03  .    Q    .   V     .         .         .
  14.117      5.3004     11.06  .    Q    .   V     .         .         .
  14.133      5.3156     11.09  .    Q    .   V     .         .         .
  14.150      5.3309     11.11  .    Q    .   V     .         .         .
  14.167      5.3463     11.14  .    Q    .   V     .         .         .
  14.183      5.3617     11.17  .    Q    .   V     .         .         .
  14.200      5.3771     11.20  .    Q    .   V     .         .         .
  14.217      5.3926     11.23  .    Q    .   V     .         .         .
  14.233      5.4081     11.26  .    Q    .   V     .         .         .
  14.250      5.4236     11.28  .    Q    .   V     .         .         .
  14.267      5.4392     11.31  .    Q    .   V     .         .         .
  14.283      5.4548     11.35  .    Q    .   V     .         .         .
  14.300      5.4706     11.43  .    Q    .   V     .         .         .
  14.317      5.4864     11.51  .    Q    .   V     .         .         .
  14.333      5.5024     11.60  .    Q    .   V     .         .         .
  14.350      5.5185     11.68  .    Q    .   V     .         .         .
  14.367      5.5347     11.76  .    Q    .   V     .         .         .
  14.383      5.5510     11.84  .    Q    .   V     .         .         .
  14.400      5.5674     11.92  .    Q    .   V     .         .         .
  14.417      5.5839     12.00  .    Q    .    V    .         .         .
  14.433      5.6006     12.08  .    Q    .    V    .         .         .
  14.450      5.6173     12.16  .    Q    .    V    .         .         .
  14.467      5.6342     12.24  .    Q    .    V    .         .         .
  14.483      5.6512     12.33  .    Q    .    V    .         .         .
  14.500      5.6683     12.41  .    Q    .    V    .         .         .
  14.517      5.6855     12.49  .     Q   .    V    .         .         .
  14.533      5.7028     12.57  .     Q   .    V    .         .         .
  14.550      5.7202     12.65  .     Q   .    V    .         .         .
  14.567      5.7378     12.73  .     Q   .    V    .         .         .
  14.583      5.7554     12.81  .     Q   .    V    .         .         .
  14.600      5.7732     12.89  .     Q   .    V    .         .         .
  14.617      5.7910     12.98  .     Q   .    V    .         .         .
  14.633      5.8090     13.06  .     Q   .    V    .         .         .
  14.650      5.8271     13.14  .     Q   .    V    .         .         .
  14.667      5.8453     13.22  .     Q   .    V    .         .         .
```

Onsite Flood Routing Area "B" @ Node 15

Drainage Area "B" Tributary to Existing 84" RCP (F19) Serrano Creek

100-Year Storm Existing Condition

14.683	5.8636	13.30	.	Q	.	V	.	.	.
14.700	5.8821	13.38	.	Q	.	V	.	.	.
14.717	5.9006	13.46	.	Q	.	V	.	.	.
14.733	5.9192	13.51	.	Q	.	V	.	.	.
14.750	5.9379	13.57	.	Q	.	V	.	.	.
14.767	5.9567	13.63	.	Q	.	V	.	.	.
14.783	5.9756	13.69	.	Q	.	V	.	.	.
14.800	5.9945	13.75	.	Q	.	V	.	.	.
14.817	6.0135	13.81	.	Q	.	V	.	.	.
14.833	6.0326	13.87	.	Q	.	V	.	.	.
14.850	6.0518	13.92	.	Q	.	V	.	.	.
14.867	6.0711	13.98	.	Q	.	V	.	.	.
14.883	6.0904	14.04	.	Q	.	V	.	.	.
14.900	6.1098	14.10	.	Q	.	V	.	.	.
14.917	6.1293	14.16	.	Q	.	V	.	.	.
14.933	6.1489	14.22	.	Q	.	V	.	.	.
14.950	6.1686	14.28	.	Q	.	V	.	.	.
14.967	6.1883	14.33	.	Q	.	V	.	.	.
14.983	6.2081	14.39	.	Q	.	V	.	.	.
15.000	6.2280	14.45	.	Q	.	V	.	.	.
15.017	6.2480	14.51	.	Q	.	V	.	.	.
15.033	6.2681	14.57	.	Q	.	V	.	.	.
15.050	6.2882	14.63	.	Q	.	V	.	.	.
15.067	6.3085	14.68	.	Q	.	V	.	.	.
15.083	6.3288	14.74	.	Q	.	V	.	.	.
15.100	6.3491	14.80	.	Q	.	V	.	.	.
15.117	6.3696	14.86	.	Q	.	V	.	.	.
15.133	6.3902	14.92	.	Q	.	V	.	.	.
15.150	6.4109	15.02	.	Q	.	V	.	.	.
15.167	6.4318	15.20	.	Q	.	V	.	.	.
15.183	6.4530	15.38	.	Q	.	V	.	.	.
15.200	6.4744	15.57	.	Q	.	V	.	.	.
15.217	6.4961	15.75	.	Q	.	V	.	.	.
15.233	6.5181	15.93	.	Q	.	V	.	.	.
15.250	6.5403	16.11	.	Q	.	V	.	.	.
15.267	6.5627	16.29	.	Q	.	V	.	.	.
15.283	6.5854	16.47	.	Q	.	V	.	.	.
15.300	6.6083	16.66	.	Q	.	V	.	.	.
15.317	6.6315	16.84	.	Q	.	V	.	.	.
15.333	6.6550	17.02	.	Q	.	V	.	.	.
15.350	6.6787	17.20	.	Q	.	V	.	.	.
15.367	6.7026	17.38	.	Q	.	V	.	.	.
15.383	6.7268	17.57	.	Q	.	V	.	.	.
15.400	6.7512	17.75	.	Q	.	V	.	.	.
15.417	6.7759	17.93	.	Q	.	V	.	.	.
15.433	6.8009	18.11	.	Q	.	V	.	.	.
15.450	6.8261	18.29	.	Q	.	V	.	.	.
15.467	6.8515	18.47	.	Q	.	V	.	.	.
15.483	6.8772	18.66	.	Q.		V	.	.	.
15.500	6.9032	18.84	.	Q.		V	.	.	.
15.517	6.9294	19.02	.	Q.		V	.	.	.
15.533	6.9558	19.20	.	Q.		V	.	.	.
15.550	6.9825	19.38	.	Q.		V	.	.	.
15.567	7.0095	19.56	.	Q.		V	.	.	.
15.583	7.0367	19.75	.	Q.		V	.	.	.
15.600	7.0641	19.93	.	Q.		V.		.	.
15.617	7.0918	20.12	.	Q.		V.		.	.
15.633	7.1198	20.30	.	Q.		V.		.	.
15.650	7.1480	20.49	.	Q.		V.		.	.
15.667	7.1765	20.67	.	Q.		V.		.	.
15.683	7.2052	20.86	.	Q		V.		.	.
15.700	7.2342	21.04	.	Q		V.		.	.
15.717	7.2634	21.23	.	Q		V.		.	.
15.733	7.2929	21.41	.	Q		V.		.	.
15.750	7.3227	21.60	.	Q		V.		.	.
15.767	7.3527	21.78	.	Q		V.		.	.
15.783	7.3829	21.97	.	Q		V.		.	.
15.800	7.4135	22.15	.	Q		V.		.	.
15.817	7.4442	22.34	.	Q		V		.	.
15.833	7.4752	22.52	.	Q		V		.	.
15.850	7.5065	22.71	.	Q		V		.	.
15.867	7.5381	22.89	.	.Q		V		.	.
15.883	7.5698	23.08	.	.Q		V		.	.
15.900	7.6019	23.26	.	.Q		V		.	.
15.917	7.6342	23.45	.	.Q		V		.	.
15.933	7.6667	23.63	.	.Q		V		.	.
15.950	7.6996	23.82	.	.Q		V		.	.
15.967	7.7326	24.00	.	.Q		V		.	.
15.983	7.7659	24.19	.	.Q		V		.	.
16.000	7.7995	24.37	.	.Q		V		.	.
16.017	7.8348	25.59	.	. Q		.V		.	.
16.033	7.8731	27.84	.	. Q		.V		.	.
16.050	7.9146	30.09	.	. Q		.V		.	.
16.067	7.9591	32.35	.	. Q		.V		.	.
16.083	8.0068	34.60	.	. Q		.V		.	.
16.100	8.0575	36.85	.	. Q		.V		.	.
16.117	8.1114	39.10	.	. Q		.V		.	.
16.133	8.1683	41.35	.	. Q		.V		.	.
16.150	8.2284	43.60	.	.		.QV		.	.
16.167	8.2915	45.85	.	.		. Q		.	.
16.183	8.3578	48.10	.	.		. VQ		.	.
16.200	8.4272	50.35	.	.		. V Q		.	.
16.217	8.4996	52.61	.	.		. V Q		.	.
16.233	8.5752	54.86	.	.		. V Q		.	.
16.250	8.6538	57.11	.	.		. V Q		.	.
16.267	8.7356	59.36	.	.		. V Q		.	.
16.283	8.8205	61.61	.	.		. V Q.		.	.
16.300	8.9084	63.86	.	.		. V Q		.	.
16.317	8.9995	66.11	.	.		. V .Q		.	.
16.333	9.0936	68.36	.	.		. V . Q		.	.
16.350	9.1909	70.61	.	.		. V . Q		.	.
16.367	9.2913	72.86	.	.		. V . Q		.	.
16.383	9.3947	75.12	.	.		. V . Q		.	.
16.400	9.5013	77.37	.	.		. V . Q		.	.
16.417	9.6110	79.62	.	.		. V . Q		.	.
16.433	9.7251	82.84	.	.		. V . Q		.	.
16.450	9.8372	81.39	.	.		. V . Q.		.	.
16.467	9.9458	78.86	.	.		. V . Q		.	.
16.483	10.0509	76.32	.	.		. V . Q		.	.
16.500	10.1526	73.79	.	.		. V . Q		.	.
16.517	10.2507	71.25	.	.		. V . Q		.	.
16.533	10.3454	68.72	.	.		. V . Q		.	.
16.550	10.4365	66.18	.	.		. V .Q		.	.
16.567	10.5242	63.65	.	.		. V Q		.	.
16.583	10.6084	61.11	.	.		. VQ.		.	.
16.600	10.6891	58.58	.	.		. Q .		.	.

Onsite Flood Routing Area "B" @ Node 15

Drainage Area "B" Tributary to Existing 84" RCP (F19) Serrano Creek

100-Year Storm Existing Condition

```
16.617     10.7662     56.04  .          .          .       QV .          .
16.633     10.8399     53.51  .          .          .     Q   V.          .
16.650     10.9102     50.97  .          .          .   Q     V.          .
16.667     10.9769     48.44  .          .          . Q       V.          .
16.683     11.0401     45.90  .          .          .Q        V.          .
16.700     11.0998     43.37  .          .          Q         V.          .
16.717     11.1561     40.83  .          .        Q.          V           .
16.733     11.2088     38.30  .          .      Q   .          V           .
16.750     11.2581     35.76  .          .    Q     .          V           .
16.767     11.3039     33.23  .          .  Q       .          V           .
16.783     11.3461     30.69  .          .Q         .          V           .
16.800     11.3849     28.16  .          Q          .          V           .
16.817     11.4202     25.62  .          Q          .          V           .
16.833     11.4520     23.09  .          Q          .          V           .
16.850     11.4803     20.55  .        Q.           .          V           .
16.867     11.5052     18.04  .        Q .          .          V           .
16.883     11.5286     16.99  .        Q .          .          .V          .
16.900     11.5517     16.80  .        Q .          .          .V          .
16.917     11.5746     16.62  .        Q .          .          .V          .
16.933     11.5972     16.43  .      Q   .          .          .V          .
16.950     11.6196     16.24  .      Q   .          .          .V          .
16.967     11.6417     16.06  .      Q   .          .          .V          .
16.983     11.6636     15.87  .      Q   .          .          .V          .
17.000     11.6852     15.69  .      Q   .          .          .V          .
17.017     11.7066     15.50  .      Q   .          .          .V          .
17.033     11.7277     15.32  .      Q   .          .          .V          .
17.050     11.7485     15.13  .      Q   .          .          .V          .
17.067     11.7691     14.95  .      Q   .          .          .V          .
17.083     11.7894     14.76  .      Q   .          .          .V          .
17.100     11.8095     14.57  .      Q   .          .          .V          .
17.117     11.8293     14.39  .    Q     .          .          .V          .
17.133     11.8489     14.20  .    Q     .          .          .V          .
17.150     11.8682     14.02  .    Q     .          .          .V          .
17.167     11.8872     13.83  .    Q     .          .          .V          .
17.183     11.9060     13.65  .    Q     .          .          . V         .
17.200     11.9246     13.46  .    Q     .          .          . V         .
17.217     11.9428     13.27  .    Q     .          .          . V         .
17.233     11.9609     13.09  .    Q     .          .          . V         .
17.250     11.9786     12.90  .    Q     .          .          . V         .
17.267     11.9962     12.72  .    Q     .          .          . V         .
17.283     12.0134     12.53  .    Q     .          .          . V         .
17.300     12.0304     12.35  .  Q       .          .          . V         .
17.317     12.0473     12.23  .  Q       .          .          . V         .
17.333     12.0640     12.14  .  Q       .          .          . V         .
17.350     12.0806     12.05  .  Q       .          .          . V         .
17.367     12.0971     11.96  .  Q       .          .          . V         .
17.383     12.1134     11.87  .  Q       .          .          . V         .
17.400     12.1297     11.79  .  Q       .          .          . V         .
17.417     12.1458     11.70  .  Q       .          .          . V         .
17.433     12.1618     11.61  .  Q       .          .          . V         .
17.450     12.1776     11.52  .  Q       .          .          . V         .
17.467     12.1934     11.43  .  Q       .          .          . V         .
17.483     12.2090     11.34  .  Q       .          .          . V         .
17.500     12.2245     11.25  .  Q       .          .          . V         .
17.517     12.2399     11.16  .  Q       .          .          . V         .
17.533     12.2552     11.08  .  Q       .          .          . V         .
17.550     12.2703     10.99  .  Q       .          .          .  V        .
17.567     12.2853     10.90  .  Q       .          .          .  V        .
17.583     12.3002     10.81  .  Q       .          .          .  V        .
17.600     12.3150     10.72  .  Q       .          .          .  V        .
17.617     12.3296     10.63  .  Q       .          .          .  V        .
17.633     12.3441     10.54  .  Q       .          .          .  V        .
17.650     12.3585     10.45  .  Q       .          .          .  V        .
17.667     12.3728     10.37  .  Q       .          .          .  V        .
17.683     12.3870     10.28  .  Q       .          .          .  V        .
17.700     12.4010     10.19  .  Q       .          .          .  V        .
17.717     12.4149     10.10  .  Q       .          .          .  V        .
17.733     12.4287     10.01  .  Q       .          .          .  V        .
17.750     12.4424      9.95  .  Q       .          .          .  V        .
17.767     12.4560      9.90  .  Q       .          .          .  V        .
17.783     12.4696      9.85  .  Q       .          .          .  V        .
17.800     12.4831      9.79  .  Q       .          .          .  V        .
17.817     12.4965      9.74  .  Q       .          .          .  V        .
17.833     12.5098      9.69  .  Q       .          .          .  V        .
17.850     12.5231      9.64  .  Q       .          .          .  V        .
17.867     12.5363      9.58  .  Q       .          .          .  V        .
17.883     12.5494      9.53  .  Q       .          .          .  V        .
17.900     12.5625      9.48  .  Q       .          .          .  V        .
17.917     12.5755      9.43  .  Q       .          .          .  V        .
17.933     12.5884      9.37  .  Q       .          .          .  V        .
17.950     12.6012      9.32  .  Q       .          .          .  V        .
17.967     12.6140      9.27  .  Q       .          .          .  V        .
17.983     12.6267      9.22  .  Q       .          .          .  V        .
18.000     12.6393      9.16  .  Q       .          .          .   V       .
```

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	1081.0
20%	490.0
30%	245.0
40%	210.0
50%	170.0
60%	140.0
70%	105.0
80%	65.0
90%	35.0

END OF FLOODSCx ROUTING ANALYSIS

Onsite Flood Routing Area "B" @ Node 15

Drainage Area "B" Tributary to Existing 84" RCP (F19) Serrano Creek

100-Year Storm Existing Condition

```
**************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
         (c) Copyright 1989-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                      Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                  *
* 2-YEAR STORM PROPOSED CONDITION AREA "B" AT NODE 15                    *
* W.O. #1443-136X                                                        *
 **************************************************************************

  FILE NAME: ON02P15.DAT
  TIME/DATE OF STUDY: 09:33 10/29/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


**************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE = 1.2
--------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
==========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    7.30
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.283
    LOW LOSS FRACTION = 0.986
    TIME OF CONCENTRATION(MIN.) = 33.75
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =   2
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.53
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  0.89
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.22
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  2.05

--------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.15
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     1.10

--------------------------------------------------------------------------

==========================================================================

                      2 4 - H O U R    S T O R M
                   R U N O F F    H Y D R O G R A P H

==========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
--------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.        0.8       1.5       2.3       3.0
--------------------------------------------------------------------------
  14.000      0.0001      0.01  Q         .         .         .         .
  14.017      0.0001      0.01  Q         .         .         .         .
  14.033      0.0001      0.01  Q         .         .         .         .
  14.050      0.0001      0.01  Q         .         .         .         .
  14.067      0.0001      0.01  Q         .         .         .         .
  14.083      0.0001      0.01  Q         .         .         .         .
  14.100      0.0001      0.01  Q         .         .         .         .
  14.117      0.0001      0.01  Q         .         .         .         .
  14.133      0.0001      0.01  Q         .         .         .         .
  14.150      0.0001      0.01  Q         .         .         .         .
  14.167      0.0002      0.01  Q         .         .         .         .
  14.183      0.0002      0.01  Q         .         .         .         .
  14.200      0.0002      0.01  Q         .         .         .         .
  14.217      0.0002      0.01  Q         .         .         .         .
  14.233      0.0002      0.01  Q         .         .         .         .
  14.250      0.0002      0.01  Q         .         .         .         .
  14.267      0.0002      0.01  Q         .         .         .         .
  14.283      0.0003      0.01  Q         .         .         .         .
  14.300      0.0003      0.01  Q         .         .         .         .
  14.317      0.0003      0.01  Q         .         .         .         .
  14.333      0.0003      0.01  Q         .         .         .         .
  14.350      0.0003      0.01  Q         .         .         .         .
  14.367      0.0003      0.01  Q         .         .         .         .
  14.383      0.0004      0.01  Q         .         .         .         .
  14.400      0.0004      0.01  Q         .         .         .         .
  14.417      0.0004      0.01  Q         .         .         .         .
  14.433      0.0004      0.01  Q         .         .         .         .
  14.450      0.0004      0.01  Q         .         .         .         .
  14.467      0.0004      0.01  Q         .         .         .         .
  14.483      0.0005      0.01  Q         .         .         .         .
  14.500      0.0005      0.01  Q         .         .         .         .
  14.517      0.0005      0.01  Q         .         .         .         .
  14.533      0.0005      0.01  Q         .         .         .         .
  14.550      0.0005      0.01  Q         .         .         .         .
  14.567      0.0006      0.01  Q         .         .         .         .
  14.583      0.0006      0.01  Q         .         .         .         .
  14.600      0.0006      0.01  Q         .         .         .         .
```

Onsite Flood Routing Area "B" @ Node 15

With Most of Drainage Area "B" in Existing Condition Diverting to Area "A" and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61

2-Year Storm Proposed Condition

```
14.617    0.0006    0.01  Q        .        .        .        .
14.633    0.0006    0.01  Q        .        .        .        .
14.650    0.0006    0.01  Q        .        .        .        .
14.667    0.0007    0.01  Q        .        .        .        .
14.683    0.0007    0.01  Q        .        .        .        .
14.700    0.0007    0.01  Q        .        .        .        .
14.717    0.0007    0.01  Q        .        .        .        .
14.733    0.0007    0.01  Q        .        .        .        .
14.750    0.0008    0.01  Q        .        .        .        .
14.767    0.0008    0.01  Q        .        .        .        .
14.783    0.0008    0.01  Q        .        .        .        .
14.800    0.0008    0.01  Q        .        .        .        .
14.817    0.0008    0.01  Q        .        .        .        .
14.833    0.0009    0.01  Q        .        .        .        .
14.850    0.0009    0.01  Q        .        .        .        .
14.867    0.0009    0.01  Q        .        .        .        .
14.883    0.0009    0.01  Q        .        .        .        .
14.900    0.0009    0.01  Q        .        .        .        .
14.917    0.0010    0.01  Q        .        .        .        .
14.933    0.0010    0.01  Q        .        .        .        .
14.950    0.0010    0.01  Q        .        .        .        .
14.967    0.0010    0.01  Q        .        .        .        .
14.983    0.0010    0.02  Q        .        .        .        .
15.000    0.0011    0.02  Q        .        .        .        .
15.017    0.0011    0.02  Q        .        .        .        .
15.033    0.0011    0.02  Q        .        .        .        .
15.050    0.0011    0.02  Q        .        .        .        .
15.067    0.0011    0.02  Q        .        .        .        .
15.083    0.0012    0.02  Q        .        .        .        .
15.100    0.0012    0.02  Q        .        .        .        .
15.117    0.0012    0.02  Q        .        .        .        .
15.133    0.0012    0.02  Q        .        .        .        .
15.150    0.0013    0.02  Q        .        .        .        .
15.167    0.0013    0.02  Q        .        .        .        .
15.183    0.0013    0.02  Q        .        .        .        .
15.200    0.0013    0.02  Q        .        .        .        .
15.217    0.0013    0.02  Q        .        .        .        .
15.233    0.0014    0.02  Q        .        .        .        .
15.250    0.0014    0.02  Q        .        .        .        .
15.267    0.0014    0.02  Q        .        .        .        .
15.283    0.0014    0.02  Q        .        .        .        .
15.300    0.0015    0.02  Q        .        .        .        .
15.317    0.0015    0.02  Q        .        .        .        .
15.333    0.0015    0.02  Q        .        .        .        .
15.350    0.0015    0.02  Q        .        .        .        .
15.367    0.0016    0.02  Q        .        .        .        .
15.383    0.0016    0.02  Q        .        .        .        .
15.400    0.0016    0.02  Q        .        .        .        .
15.417    0.0016    0.02  Q        .        .        .        .
15.433    0.0017    0.02  Q        .        .        .        .
15.450    0.0017    0.02  Q        .        .        .        .
15.467    0.0017    0.02  Q        .        .        .        .
15.483    0.0018    0.02  Q        .        .        .        .
15.500    0.0018    0.02  Q        .        .        .        .
15.517    0.0018    0.02  Q        .        .        .        .
15.533    0.0018    0.02  Q        .        .        .        .
15.550    0.0019    0.02  Q        .        .        .        .
15.567    0.0019    0.02  Q        .        .        .        .
15.583    0.0019    0.02  Q        .        .        .        .
15.600    0.0019    0.02  Q        .        .        .        .
15.617    0.0020    0.02  Q        .        .        .        .
15.633    0.0020    0.02  Q        .        .        .        .
15.650    0.0020    0.02  Q        .        .        .        .
15.667    0.0021    0.02  Q        .        .        .        .
15.683    0.0021    0.02  Q        .        .        .        .
15.700    0.0021    0.02  Q        .        .        .        .
15.717    0.0021    0.02  Q        .        .        .        .
15.733    0.0022    0.02  Q        .        .        .        .
15.750    0.0022    0.02  Q        .        .        .        .
15.767    0.0022    0.02  Q        .        .        .        .
15.783    0.0023    0.02  Q        .        .        .        .
15.800    0.0023    0.02  Q        .        .        .        .
15.817    0.0023    0.02  Q        .        .        .        .
15.833    0.0024    0.02  Q        .        .        .        .
15.850    0.0024    0.02  Q        .        .        .        .
15.867    0.0024    0.02  Q        .        .        .        .
15.883    0.0024    0.02  Q        .        .        .        .
15.900    0.0025    0.02  Q        .        .        .        .
15.917    0.0025    0.02  Q        .        .        .        .
15.933    0.0025    0.02  Q        .        .        .        .
15.950    0.0026    0.02  Q        .        .        .        .
15.967    0.0026    0.02  Q        .        .        .        .
15.983    0.0026    0.02  Q        .        .        .        .
16.000    0.0027    0.02  Q        .        .        .        .
16.017    0.0028    0.07  Q        .        .        .        .
16.033    0.0030    0.16  V Q      .        .        .        .
16.050    0.0033    0.25  V  Q     .        .        .        .
16.067    0.0038    0.34  .V  Q    .        .        .        .
16.083    0.0044    0.43  .V   Q   .        .        .        .
16.100    0.0051    0.51  .V    Q  .        .        .        .
16.117    0.0059    0.60  .V     Q .        .        .        .
16.133    0.0069    0.69  .V      Q.        .        .        .
16.150    0.0079    0.78  . V      Q        .        .        .
16.167    0.0091    0.87  . V       .Q      .        .        .
16.183    0.0105    0.96  . V       . Q     .        .        .
16.200    0.0119    1.05  .  V      .  Q    .        .        .
16.217    0.0135    1.14  .  V      .    Q  .        .        .
16.233    0.0152    1.23  .   V     .     Q .        .        .
16.250    0.0170    1.32  .   V     .      Q.        .        .
16.267    0.0189    1.41  .    V    .       Q        .        .
16.283    0.0210    1.50  .    V    .       Q.       .        .
16.300    0.0232    1.59  .     V   .        Q       .        .
16.317    0.0255    1.68  .      V  .        . Q     .        .
16.333    0.0279    1.77  .      V  .        .  Q    .        .
16.350    0.0305    1.86  .       V .        .   Q   .        .
16.367    0.0332    1.95  .        V.        .    Q  .        .
16.383    0.0360    2.04  .        V.        .     Q .        .
16.400    0.0389    2.12  .         V        .      Q.        .
16.417    0.0420    2.21  .         .V       .       Q        .
16.433    0.0451    2.30  .         . V      .       .Q       .
16.450    0.0484    2.39  .         .  V     .       . Q      .
16.467    0.0518    2.48  .         .   V    .       .  Q     .
```

Onsite Flood Routing Area "B" @ Node 15

With Most of Drainage Area "B" in Existing Condition Diverting to Area "A" and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61

2-Year Storm Proposed Condition

```
  16.483      0.0554      2.57  .         .    V    .         .  Q      .
  16.500      0.0591      2.66  .         .     V   .         .    Q    .
  16.517      0.0628      2.75  .         .      V  .         .     Q   .
  16.533      0.0668      2.84  .         .       V .         .      Q  .
  16.550      0.0708      2.93  .         .        V.         .       Q .
  16.567      0.0750      3.04  .         .         V         .        Q
  16.583      0.0791      2.97  .         .         .V        .         Q.
  16.600      0.0830      2.88  .         .         . V       .       Q  .
  16.617      0.0869      2.80  .         .         .  V      .      Q   .
  16.633      0.0906      2.71  .         .         .   V     .     Q    .
  16.650      0.0942      2.62  .         .         .    V    .    Q     .
  16.667      0.0977      2.53  .         .         .     V   .  Q       .
  16.683      0.1011      2.44  .         .         .      V  . Q        .
  16.700      0.1043      2.35  .         .         .       V Q          .
  16.717      0.1074      2.26  .         .         .        Q.          .
  16.733      0.1104      2.17  .         .         .       Q V          .
  16.750      0.1133      2.08  .         .         .      Q  .V         .
  16.767      0.1160      1.99  .         .         .     Q   .V         .
  16.783      0.1186      1.90  .         .         .   Q     . V        .
  16.800      0.1211      1.81  .         .         .  Q      .  V       .
  16.817      0.1235      1.72  .         .         . Q       .  V       .
  16.833      0.1257      1.63  .         .         .Q        .   V      .
  16.850      0.1278      1.54  .         .        Q          .    V     .
  16.867      0.1298      1.45  .         .       Q.          .    V     .
  16.883      0.1317      1.36  .         .      Q  .         .     V    .
  16.900      0.1335      1.27  .         .     Q   .         .     V    .
  16.917      0.1351      1.18  .         .    Q    .         .      V   .
  16.933      0.1366      1.09  .         .   Q     .         .      V   .
  16.950      0.1380      1.00  .         .  Q      .         .      V   .
  16.967      0.1392      0.91  .         . Q       .         .       V  .
  16.983      0.1404      0.82  .         Q         .         .       V  .
  17.000      0.1414      0.73  .        Q.         .         .       V  .
  17.017      0.1423      0.64  .       Q .         .         .        V.
  17.033      0.1430      0.55  .      Q  .         .         .        V.
  17.050      0.1437      0.46  .     Q   .         .         .        V.
  17.067      0.1442      0.37  .   Q     .         .         .        V.
  17.083      0.1446      0.29  .  Q      .         .         .        V.
  17.100      0.1448      0.20  . Q       .         .         .        V.
  17.117      0.1450      0.11  .Q        .         .         .        V.
  17.133      0.1450      0.03  Q         .         .         .        V.
  17.150      0.1450      0.02  Q         .         .         .        V.
  17.167      0.1451      0.02  Q         .         .         .        V.
  17.183      0.1451      0.01  Q         .         .         .        V.
  17.200      0.1451      0.01  Q         .         .         .        V.
  17.217      0.1451      0.01  Q         .         .         .        V.
  17.233      0.1451      0.01  Q         .         .         .        V.
  17.250      0.1452      0.01  Q         .         .         .        V.
  17.267      0.1452      0.01  Q         .         .         .        V.
  17.283      0.1452      0.01  Q         .         .         .        V.
  17.300      0.1452      0.01  Q         .         .         .        V.
  17.317      0.1452      0.01  Q         .         .         .        V.
  17.333      0.1452      0.01  Q         .         .         .        V.
  17.350      0.1452      0.01  Q         .         .         .        V.
--------------------------------------------------------------------------------
    TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
    (Note: 100% of Peak Flow Rate estimate assumed to have
    an instantaneous time duration)

    Percentile of Estimated          Duration
        Peak Flow Rate               (minutes)
    ======================           =========
               0%                     1041.0
              10%                      305.0
              20%                      270.0
              30%                      240.0
              40%                      205.0
              50%                      170.0
              60%                      135.0
              70%                      100.0
              80%                       70.0
              90%                       35.0
================================================================================

    END OF FLOODSCx ROUTING ANALYSIS
```

Onsite Flood Routing Area "B" @ Node 15

With Most of Drainage Area "B" in Existing Condition Diverting to Area "A" and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61

2-Year Storm Proposed Condition

```
************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
          (c) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                      Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                 *
* 25-YEAR STORM PROPOSED CONDITION AREA "B" AT NODE 15                  *
* W.O. #1443-136X                                                       *
 ************************************************************************

  FILE NAME: ON25P15.DAT
  TIME/DATE OF STUDY: 09:35 10/29/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE = 1.2
------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    7.30
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.283
    LOW LOSS FRACTION = 0.639
    TIME OF CONCENTRATION(MIN.) = 27.28
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =  25
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.87
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.15
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.94
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  2.71
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  4.49

------------------------------------------------------------------------
   TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     1.14
   TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     1.60

------------------------------------------------------------------------

========================================================================

                      2 4 - H O U R    S T O R M
                   R U N O F F    H Y D R O G R A P H

========================================================================
              HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       2.6       5.1       7.7      10.2
------------------------------------------------------------------------
  14.000      0.3117      0.67  . Q       V         .         .         .
  14.017      0.3126      0.68  . Q       .V        .         .         .
  14.033      0.3135      0.68  . Q       .V        .         .         .
  14.050      0.3145      0.68  . Q       .V        .         .         .
  14.067      0.3154      0.68  . Q       .V        .         .         .
  14.083      0.3163      0.68  . Q       .V        .         .         .
  14.100      0.3173      0.68  . Q       .V        .         .         .
  14.117      0.3182      0.69  . Q       .V        .         .         .
  14.133      0.3192      0.69  . Q       .V        .         .         .
  14.150      0.3201      0.69  . Q       .V        .         .         .
  14.167      0.3211      0.69  . Q       .V        .         .         .
  14.183      0.3220      0.69  . Q       .V        .         .         .
  14.200      0.3230      0.70  . Q       .V        .         .         .
  14.217      0.3239      0.70  . Q       .V        .         .         .
  14.233      0.3249      0.70  . Q       .V        .         .         .
  14.250      0.3259      0.71  . Q       .V        .         .         .
  14.267      0.3269      0.71  . Q       .V        .         .         .
  14.283      0.3279      0.72  . Q       .V        .         .         .
  14.300      0.3288      0.72  . Q       .V        .         .         .
  14.317      0.3298      0.72  . Q       .V        .         .         .
  14.333      0.3308      0.73  . Q       .V        .         .         .
  14.350      0.3319      0.73  . Q       .V        .         .         .
  14.367      0.3329      0.74  . Q       .V        .         .         .
  14.383      0.3339      0.74  . Q       .V        .         .         .
  14.400      0.3349      0.74  . Q       .V        .         .         .
  14.417      0.3359      0.75  . Q       .V        .         .         .
  14.433      0.3370      0.75  . Q       .V        .         .         .
  14.450      0.3380      0.76  . Q       .V        .         .         .
  14.467      0.3391      0.76  . Q       .V        .         .         .
  14.483      0.3401      0.76  . Q       .V        .         .         .
  14.500      0.3412      0.77  .  Q      . V       .         .         .
  14.517      0.3422      0.77  .  Q      . V       .         .         .
  14.533      0.3433      0.78  .  Q      . V       .         .         .
  14.550      0.3444      0.78  .  Q      . V       .         .         .
  14.567      0.3455      0.78  .  Q      . V       .         .         .
  14.583      0.3466      0.79  .  Q      . V       .         .         .
  14.600      0.3476      0.79  .  Q      . V       .         .         .
  14.617      0.3487      0.80  .  Q      . V       .         .         .
  14.633      0.3499      0.80  .  Q      . V       .         .         .
```

Onsite Flood Routing Area "B" @ Node 15

With Most of Drainage Area "B" in Existing Condition Diverting to Area "A" and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61

25-Year Storm Proposed Condition

14.650	0.3510	0.81	. Q . V . . .
14.667	0.3521	0.81	. Q . V . . .
14.683	0.3532	0.81	. Q . V . . .
14.700	0.3543	0.81	. Q . V . . .
14.717	0.3554	0.82	. Q . V . . .
14.733	0.3566	0.82	. Q . V . . .
14.750	0.3577	0.82	. Q . V . . .
14.767	0.3588	0.83	. Q . V . . .
14.783	0.3600	0.83	. Q . V . . .
14.800	0.3611	0.83	. Q . V . . .
14.817	0.3623	0.84	. Q . V . . .
14.833	0.3635	0.84	. Q . V . . .
14.850	0.3646	0.84	. Q . V . . .
14.867	0.3658	0.85	. Q . V . . .
14.883	0.3670	0.85	. Q . V . . .
14.900	0.3681	0.85	. Q . V . . .
14.917	0.3693	0.86	. Q . V . . .
14.933	0.3705	0.86	. Q . V . . .
14.950	0.3717	0.86	. Q . V . . .
14.967	0.3729	0.87	. Q . V . . .
14.983	0.3741	0.87	. Q . V . . .
15.000	0.3753	0.87	. Q . V . . .
15.017	0.3765	0.88	. Q . V . . .
15.033	0.3777	0.88	. Q . V . . .
15.050	0.3789	0.88	. Q . V . . .
15.067	0.3802	0.89	. Q . V . . .
15.083	0.3814	0.89	. Q . V . . .
15.100	0.3826	0.90	. Q . V . . .
15.117	0.3839	0.91	. Q . V . . .
15.133	0.3852	0.93	. Q . V . . .
15.150	0.3865	0.95	. Q . V . . .
15.167	0.3878	0.97	. Q . V . . .
15.183	0.3892	0.99	. Q . V . . .
15.200	0.3906	1.01	. Q . V . . .
15.217	0.3920	1.03	. Q . V . . .
15.233	0.3934	1.05	. Q . V . . .
15.250	0.3949	1.07	. Q . V . . .
15.267	0.3964	1.08	. Q . V . . .
15.283	0.3979	1.10	. Q . V . . .
15.300	0.3994	1.12	. Q . V . . .
15.317	0.4010	1.14	. Q . V . . .
15.333	0.4026	1.16	. Q . V . . .
15.350	0.4042	1.18	. Q . V . . .
15.367	0.4059	1.20	. Q . V . . .
15.383	0.4076	1.22	. Q . V . . .
15.400	0.4093	1.24	. Q . V . . .
15.417	0.4110	1.25	. Q . V . . .
15.433	0.4127	1.27	. Q . V . . .
15.450	0.4145	1.29	. Q . V . . .
15.467	0.4163	1.31	. Q . V . . .
15.483	0.4182	1.33	. Q . V . . .
15.500	0.4200	1.35	. Q . V . . .
15.517	0.4219	1.37	. Q . V . . .
15.533	0.4238	1.39	. Q . V . . .
15.550	0.4258	1.41	. Q . V . . .
15.567	0.4277	1.43	. Q . V . . .
15.583	0.4297	1.45	. Q . V . . .
15.600	0.4318	1.48	. Q . V . . .
15.617	0.4338	1.50	. Q . V . . .
15.633	0.4359	1.53	. Q . V . . .
15.650	0.4381	1.55	. Q . V . . .
15.667	0.4402	1.57	. Q . V . . .
15.683	0.4424	1.60	. Q . V . . .
15.700	0.4447	1.62	. Q . V . . .
15.717	0.4469	1.65	. Q . V . . .
15.733	0.4492	1.67	. Q . V . . .
15.750	0.4516	1.70	. Q . V . . .
15.767	0.4540	1.72	. Q . V . . .
15.783	0.4564	1.74	. Q . V . . .
15.800	0.4588	1.77	. Q . V . . .
15.817	0.4613	1.79	. Q . V . . .
15.833	0.4638	1.82	. Q . V . . .
15.850	0.4663	1.84	. Q . V . . .
15.867	0.4689	1.86	. Q . V . . .
15.883	0.4715	1.89	. Q . V . . .
15.900	0.4741	1.91	. Q . V . . .
15.917	0.4768	1.94	. Q . V . . .
15.933	0.4795	1.96	. Q . V . . .
15.950	0.4822	1.99	. Q . V . . .
15.967	0.4850	2.01	. Q . V . . .
15.983	0.4878	2.03	. Q . V . . .
16.000	0.4906	2.06	. Q . V . . .
16.017	0.4937	2.22	. Q . V . . .
16.033	0.4971	2.52	. Q. V . . .
16.050	0.5010	2.82	. .Q V . . .
16.067	0.5053	3.11	. . Q V . . .
16.083	0.5100	3.41	. . Q V . . .
16.100	0.5151	3.71	. . Q V . . .
16.117	0.5206	4.01	. . Q V . . .
16.133	0.5266	4.31	. . Q V . . .
16.150	0.5329	4.61	. . Q . . .
16.167	0.5397	4.90	. . Q. . . .
16.183	0.5468	5.20	. . VQ . . .
16.200	0.5544	5.50	. . V.Q . . .
16.217	0.5624	5.80	. . V. Q . . .
16.233	0.5708	6.10	. . V Q . . .
16.250	0.5796	6.39	. . V Q . . .
16.267	0.5888	6.69	. . V Q . . .
16.283	0.5984	6.99	. . .V Q . . .
16.300	0.6085	7.29	. . .V Q . . .
16.317	0.6189	7.59	. . .V Q. . .
16.333	0.6298	7.88	. . . V Q . .
16.350	0.6411	8.18	. . . V . Q . .
16.367	0.6528	8.48	. . . V . Q . .
16.383	0.6648	8.78	. . . V . Q . .
16.400	0.6773	9.08	. . . V . Q . .
16.417	0.6903	9.38	. . . V . Q . .
16.433	0.7036	9.67	. . . V . Q . .
16.450	0.7173	9.97	. . . V . Q. .
16.467	0.7314	10.20	. . . V . Q .
16.483	0.7449	9.79	. . . V . Q . .
16.500	0.7579	9.46	. . . V . Q . .
16.517	0.7705	9.12	. . . V . Q . .
16.533	0.7826	8.78	. . . V . Q . .

Onsite Flood Routing Area "B" @ Node 15

With Most of Drainage Area "B" in Existing Condition Diverting to Area "A" and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61

25-Year Storm Proposed Condition

```
16.550      0.7942      8.45  .          .          .       V   .  Q       .
16.567      0.8054      8.11  .          .          .        V .Q         .
16.583      0.8161      7.77  .          .          .        V Q          .
16.600      0.8263      7.44  .          .          .         Q.          .
16.617      0.8361      7.10  .          .          .       Q V.          .
16.633      0.8454      6.76  .          .          .     Q   V.          .
16.650      0.8543      6.43  .          .          .   Q     V           .
16.667      0.8627      6.09  .          .          . Q       V           .
16.683      0.8706      5.75  .          .          .Q        V           .
16.700      0.8780      5.42  .          .         .Q         V           .
16.717      0.8850      5.08  .          .        Q.          .V          .
16.733      0.8916      4.74  .          .      Q .           .V          .
16.750      0.8976      4.41  .          .     Q  .           .V          .
16.767      0.9033      4.07  .          .   Q    .           .V          .
16.783      0.9084      3.73  .          .  Q     .           . V         .
16.800      0.9131      3.40  .          .Q       .           . V         .
16.817      0.9173      3.06  .         .Q        .           . V         .
16.833      0.9210      2.72  .         Q         .           . V         .
16.850      0.9243      2.39  .        Q.         .           . V         .
16.867      0.9272      2.05  .       Q .         .           . V         .
16.883      0.9295      1.71  .     Q   .         .           . V         .
16.900      0.9314      1.38  .   Q     .         .           . V         .
16.917      0.9329      1.07  .  Q      .         .           . V         .
16.933      0.9343      1.01  . Q       .         .           . V         .
16.950      0.9357      1.00  . Q       .         .           . V         .
16.967      0.9370      0.99  . Q       .         .           .  V        .
16.983      0.9384      0.98  . Q       .         .           .  V        .
17.000      0.9397      0.97  . Q       .         .           .  V        .
17.017      0.9410      0.96  . Q       .         .           .  V        .
17.033      0.9423      0.95  . Q       .         .           .  V        .
17.050      0.9436      0.94  . Q       .         .           .  V        .
17.067      0.9449      0.93  . Q       .         .           .  V        .
17.083      0.9462      0.92  . Q       .         .           .  V        .
17.100      0.9474      0.91  . Q       .         .           .  V        .
17.117      0.9487      0.90  . Q       .         .           .  V        .
17.133      0.9499      0.89  . Q       .         .           .  V        .
17.150      0.9511      0.88  . Q       .         .           .  V        .
17.167      0.9523      0.87  . Q       .         .           .  V        .
17.183      0.9535      0.86  . Q       .         .           .  V        .
17.200      0.9546      0.85  . Q       .         .           .  V        .
17.217      0.9558      0.84  . Q       .         .           .  V        .
17.233      0.9569      0.83  . Q       .         .           .  V        .
17.250      0.9581      0.82  . Q       .         .           .  V        .
17.267      0.9592      0.81  . Q       .         .           .  V        .
17.283      0.9603      0.80  . Q       .         .           .  V        .
17.300      0.9613      0.78  . Q       .         .           .  V        .
17.317      0.9624      0.77  . Q       .         .           .  V        .
17.333      0.9635      0.76  .Q        .         .           .  V        .
17.350      0.9645      0.75  .Q        .         .           .  V        .
17.367      0.9655      0.74  .Q        .         .           .   V       .
17.383      0.9665      0.74  .Q        .         .           .   V       .
17.400      0.9675      0.73  .Q        .         .           .   V       .
17.417      0.9685      0.73  .Q        .         .           .   V       .
17.433      0.9695      0.72  .Q        .         .           .   V       .
17.450      0.9705      0.72  .Q        .         .           .   V       .
17.467      0.9715      0.71  .Q        .         .           .   V       .
17.483      0.9725      0.71  .Q        .         .           .   V       .
17.500      0.9735      0.70  .Q        .         .           .   V       .
17.517      0.9744      0.70  .Q        .         .           .   V       .
17.533      0.9754      0.70  .Q        .         .           .   V       .
17.550      0.9763      0.69  .Q        .         .           .   V       .
17.567      0.9773      0.69  .Q        .         .           .   V       .
17.583      0.9782      0.68  .Q        .         .           .   V       .
17.600      0.9791      0.68  .Q        .         .           .   V       .
17.617      0.9801      0.67  .Q        .         .           .   V       .
17.633      0.9810      0.67  .Q        .         .           .   V       .
17.650      0.9819      0.66  .Q        .         .           .   V       .
17.667      0.9828      0.66  .Q        .         .           .   V       .
17.683      0.9837      0.65  .Q        .         .           .   V       .
17.700      0.9846      0.65  .Q        .         .           .   V       .
17.717      0.9855      0.64  .Q        .         .           .   V       .
17.733      0.9864      0.64  .Q        .         .           .   V       .
17.750      0.9872      0.63  .Q        .         .           .   V       .
17.767      0.9881      0.63  .Q        .         .           .   V       .
17.783      0.9890      0.62  .Q        .         .           .   V       .
17.800      0.9898      0.62  .Q        .         .           .   V       .
17.817      0.9907      0.62  .Q        .         .           .   V       .
17.833      0.9915      0.61  .Q        .         .           .   V       .
17.850      0.9924      0.61  .Q        .         .           .   V       .
17.867      0.9932      0.61  .Q        .         .           .    V      .
17.883      0.9940      0.60  .Q        .         .           .    V      .
17.900      0.9948      0.60  .Q        .         .           .    V      .
17.917      0.9957      0.60  .Q        .         .           .    V      .
17.933      0.9965      0.59  .Q        .         .           .    V      .
17.950      0.9973      0.59  .Q        .         .           .    V      .
17.967      0.9981      0.59  .Q        .         .           .    V      .
17.983      0.9989      0.58  .Q        .         .           .    V      .
18.000      0.9997      0.58  .Q        .         .           .    V      .
```

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	515.0
20%	265.0
30%	225.0
40%	190.0
50%	160.0
60%	125.0
70%	95.0
80%	65.0
90%	30.0

END OF FLOODSCx ROUTING ANALYSIS

Onsite Flood Routing Area "B" @ Node 15

With Most of Drainage Area "B" in Existing Condition Diverting to Area "A" and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61

25-Year Storm Proposed Condition

```
************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
          (c) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                      Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                 *
* 100-YEAR STORM PROPOSED CONDITION AREA "B" AT NODE 15                 *
* W.O. #1443-136X                                                       *
 ************************************************************************

  FILE NAME: ON100P15.DAT
  TIME/DATE OF STUDY: 09:36 10/29/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE = 1.2
------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    7.30
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.283
    LOW LOSS FRACTION = 0.275
    TIME OF CONCENTRATION(MIN.) = 25.93
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.52
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.09
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.45
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.43
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.36
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.63

------------------------------------------------------------------------
   TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     2.31
   TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     1.11

------------------------------------------------------------------------

========================================================================

                        2 4 - H O U R    S T O R M
                     R U N O F F    H Y D R O G R A P H

========================================================================
              HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       3.4      6.9      10.3     13.7
------------------------------------------------------------------------
  14.000      0.7938      1.66  .   Q     .  V     .        .        .
  14.017      0.7961      1.66  .   Q     .  V     .        .        .
  14.033      0.7984      1.67  .   Q     .  V     .        .        .
  14.050      0.8007      1.67  .   Q     .  V     .        .        .
  14.067      0.8030      1.68  .   Q     .  V     .        .        .
  14.083      0.8053      1.68  .   Q     .  V     .        .        .
  14.100      0.8077      1.69  .   Q     .  V     .        .        .
  14.117      0.8100      1.69  .   Q     .   V    .        .        .
  14.133      0.8123      1.69  .   Q     .   V    .        .        .
  14.150      0.8147      1.70  .   Q     .   V    .        .        .
  14.167      0.8170      1.70  .   Q     .   V    .        .        .
  14.183      0.8193      1.71  .   Q     .   V    .        .        .
  14.200      0.8217      1.71  .   Q     .   V    .        .        .
  14.217      0.8241      1.72  .   Q     .   V    .        .        .
  14.233      0.8264      1.72  .    Q    .   V    .        .        .
  14.250      0.8288      1.72  .    Q    .   V    .        .        .
  14.267      0.8312      1.73  .    Q    .   V    .        .        .
  14.283      0.8336      1.74  .    Q    .   V    .        .        .
  14.300      0.8360      1.75  .    Q    .   V    .        .        .
  14.317      0.8384      1.76  .    Q    .   V    .        .        .
  14.333      0.8409      1.77  .    Q    .   V    .        .        .
  14.350      0.8433      1.78  .    Q    .   V    .        .        .
  14.367      0.8458      1.80  .    Q    .   V    .        .        .
  14.383      0.8483      1.81  .    Q    .   V    .        .        .
  14.400      0.8508      1.82  .    Q    .   V    .        .        .
  14.417      0.8533      1.83  .    Q    .   V    .        .        .
  14.433      0.8559      1.85  .    Q    .   V    .        .        .
  14.450      0.8584      1.86  .    Q    .   V    .        .        .
  14.467      0.8610      1.87  .    Q    .   V    .        .        .
  14.483      0.8636      1.88  .    Q    .   V    .        .        .
  14.500      0.8662      1.90  .    Q    .   V    .        .        .
  14.517      0.8688      1.91  .    Q    .    V   .        .        .
  14.533      0.8715      1.92  .    Q    .    V   .        .        .
  14.550      0.8741      1.93  .    Q    .    V   .        .        .
  14.567      0.8768      1.95  .    Q    .    V   .        .        .
  14.583      0.8795      1.96  .    Q    .    V   .        .        .
  14.600      0.8822      1.97  .    Q    .    V   .        .        .
  14.617      0.8850      1.98  .    Q    .    V   .        .        .
  14.633      0.8877      2.00  .    Q    .    V   .        .        .
```

Onsite Flood Routing Area "B" @ Node 15

With Most of Drainage Area "B" in Existing Condition Diverting to Area "A" and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61

100-Year Storm Proposed Condition

14.650	0.8905	2.01	.	Q	.	V	.	.	.	.
14.667	0.8933	2.02	.	Q	.	V	.	.	.	.
14.683	0.8961	2.03	.	Q	.	V	.	.	.	.
14.700	0.8989	2.04	.	Q	.	V	.	.	.	.
14.717	0.9017	2.06	.	Q	.	V	.	.	.	.
14.733	0.9046	2.07	.	Q	.	V	.	.	.	.
14.750	0.9074	2.07	.	Q	.	V	.	.	.	.
14.767	0.9103	2.08	.	Q	.	V	.	.	.	.
14.783	0.9132	2.09	.	Q	.	V	.	.	.	.
14.800	0.9161	2.10	.	Q	.	V	.	.	.	.
14.817	0.9190	2.11	.	Q	.	V	.	.	.	.
14.833	0.9219	2.12	.	Q	.	V	.	.	.	.
14.850	0.9248	2.13	.	Q	.	V	.	.	.	.
14.867	0.9278	2.14	.	Q	.	V	.	.	.	.
14.883	0.9307	2.15	.	Q	.	V	.	.	.	.
14.900	0.9337	2.15	.	Q	.	V	.	.	.	.
14.917	0.9367	2.16	.	Q	.	V	.	.	.	.
14.933	0.9396	2.17	.	Q	.	V	.	.	.	.
14.950	0.9427	2.18	.	Q	.	V	.	.	.	.
14.967	0.9457	2.19	.	Q	.	V	.	.	.	.
14.983	0.9487	2.20	.	Q	.	V	.	.	.	.
15.000	0.9517	2.21	.	Q	.	V	.	.	.	.
15.017	0.9548	2.22	.	Q	.	V	.	.	.	.
15.033	0.9579	2.23	.	Q	.	V	.	.	.	.
15.050	0.9609	2.24	.	Q	.	V	.	.	.	.
15.067	0.9640	2.24	.	Q	.	V	.	.	.	.
15.083	0.9671	2.25	.	Q	.	V	.	.	.	.
15.100	0.9703	2.26	.	Q	.	V	.	.	.	.
15.117	0.9734	2.27	.	Q	.	V	.	.	.	.
15.133	0.9765	2.28	.	Q	.	V	.	.	.	.
15.150	0.9797	2.30	.	Q	.	V	.	.	.	.
15.167	0.9829	2.32	.	Q	.	V	.	.	.	.
15.183	0.9861	2.35	.	Q	.	V	.	.	.	.
15.200	0.9894	2.38	.	Q	.	V	.	.	.	.
15.217	0.9927	2.41	.	Q	.	V	.	.	.	.
15.233	0.9961	2.43	.	Q	.	V	.	.	.	.
15.250	0.9995	2.46	.	Q	.	V	.	.	.	.
15.267	1.0029	2.49	.	Q	.	V	.	.	.	.
15.283	1.0064	2.52	.	Q	.	V	.	.	.	.
15.300	1.0099	2.55	.	Q	.	V	.	.	.	.
15.317	1.0134	2.57	.	Q	.	V	.	.	.	.
15.333	1.0170	2.60	.	Q	.	V	.	.	.	.
15.350	1.0206	2.63	.	Q	.	V	.	.	.	.
15.367	1.0243	2.66	.	Q	.	V	.	.	.	.
15.383	1.0280	2.68	.	Q	.	V	.	.	.	.
15.400	1.0317	2.71	.	Q	.	V	.	.	.	.
15.417	1.0355	2.74	.	Q	.	V	.	.	.	.
15.433	1.0393	2.77	.	Q	.	V	.	.	.	.
15.450	1.0431	2.80	.	Q	.	V	.	.	.	.
15.467	1.0470	2.82	.	Q	.	V	.	.	.	.
15.483	1.0509	2.85	.	Q	.	V	.	.	.	.
15.500	1.0549	2.88	.	Q	.	V	.	.	.	.
15.517	1.0589	2.91	.	Q	.	V	.	.	.	.
15.533	1.0630	2.93	.	Q	.	V	.	.	.	.
15.550	1.0670	2.96	.	Q	.	V	.	.	.	.
15.567	1.0712	2.99	.	Q	.	V	.	.	.	.
15.583	1.0753	3.02	.	Q	.	V	.	.	.	.
15.600	1.0795	3.05	.	Q	.	V	.	.	.	.
15.617	1.0837	3.07	.	Q	.	V	.	.	.	.
15.633	1.0880	3.10	.	Q	.	V	.	.	.	.
15.650	1.0923	3.13	.	Q	.	V	.	.	.	.
15.667	1.0967	3.16	.	Q	.	V	.	.	.	.
15.683	1.1011	3.19	.	Q	.	V	.	.	.	.
15.700	1.1055	3.22	.	Q	.	V	.	.	.	.
15.717	1.1100	3.24	.	Q	.	V	.	.	.	.
15.733	1.1145	3.27	.	Q	.	V	.	.	.	.
15.750	1.1190	3.30	.	Q	.	V	.	.	.	.
15.767	1.1236	3.33	.	Q	.	V	.	.	.	.
15.783	1.1282	3.36	.	Q	.	V	.	.	.	.
15.800	1.1329	3.39	.	Q	.	V	.	.	.	.
15.817	1.1376	3.41	.	Q	.	V	.	.	.	.
15.833	1.1423	3.44	.	Q	.	V	.	.	.	.
15.850	1.1471	3.47	.	Q	.	V	.	.	.	.
15.867	1.1519	3.50	.	Q	.	V	.	.	.	.
15.883	1.1568	3.53	.	Q	.	V	.	.	.	.
15.900	1.1617	3.56	.	Q	.	V	.	.	.	.
15.917	1.1666	3.58	.	Q	.	V	.	.	.	.
15.933	1.1716	3.61	.	Q	.	V	.	.	.	.
15.950	1.1766	3.64	.	Q	.	V	.	.	.	.
15.967	1.1817	3.67	.	Q	.	V	.	.	.	.
15.983	1.1868	3.70	.	Q	.	V	.	.	.	.
16.000	1.1919	3.72	.	Q	.	V	.	.	.	.
16.017	1.1973	3.93	.	.Q	.	V	.	.	.	.
16.033	1.2033	4.32	.	. Q	.	V	.	.	.	.
16.050	1.2097	4.70	.	. Q	.	V	.	.	.	.
16.067	1.2167	5.09	.	. Q	.	.V	.	.	.	.
16.083	1.2243	5.48	.	. Q	.	.V	.	.	.	.
16.100	1.2324	5.86	.	. Q	.	.V	.	.	.	.
16.117	1.2410	6.25	.	. Q	.	.V	.	.	.	.
16.133	1.2501	6.63	.	. Q	.	.V	.	.	.	.
16.150	1.2598	7.02	.	. Q	.	V	.	.	.	.
16.167	1.2700	7.40	.	. Q	.	.	.	.	.	.
16.183	1.2807	7.79	.	. Q	.	.	.	.	.	.
16.200	1.2919	8.18	.	. Q	.	V	.	.	.	.
16.217	1.3037	8.56	.	. Q	.	V	.	.	.	.
16.233	1.3161	8.95	.	. Q	.	V	.	.	.	.
16.250	1.3289	9.33	.	. Q	.	V	.	.	.	.
16.267	1.3423	9.72	.	. Q	.	V	.	.	.	.
16.283	1.3562	10.10	.	. Q	.	V	.	.	.	.
16.300	1.3707	10.49	.	. Q	.	V	.	.	.	.
16.317	1.3857	10.88	.	. Q	.	V	.	.	.	.
16.333	1.4012	11.26	.	. Q	.	V	.	.	.	.
16.350	1.4172	11.65	.	. Q	.	V	.	.	.	.
16.367	1.4338	12.03	.	. Q	.	V	.	.	.	.
16.383	1.4509	12.42	.	. Q	.	V	.	.	.	.
16.400	1.4685	12.81	.	. Q	.	V	.	.	.	.
16.417	1.4867	13.19	.	. Q	.	V	.	.	.	.
16.433	1.5056	13.74	.	. Q	.	V	.	.	.	.
16.450	1.5242	13.50	.	. Q	.	V	.	.	.	.
16.467	1.5422	13.07	.	. Q	.	V	.	.	.	.
16.483	1.5596	12.64	.	. Q	.	V	.	.	.	.
16.500	1.5765	12.21	.	. Q	.	V	.	.	.	.
16.517	1.5927	11.78	.	. Q	.	V	.	.	.	.
16.533	1.6083	11.35	.	. Q	.	V	.	.	.	.

Onsite Flood Routing Area "B" @ Node 15

With Most of Drainage Area "B" in Existing Condition Diverting to Area "A" and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61

100-Year Storm Proposed Condition

```
16.550      1.6234     10.92  .          .          .        V .Q        .
16.567      1.6378     10.49  .          .          .        V Q         .
16.583      1.6517     10.06  .          .          .        VQ.         .
16.600      1.6650      9.64  .          .          .        Q .         .
16.617      1.6776      9.21  .          .          .      Q  V.         .
16.633      1.6897      8.78  .          .          .    Q    V.         .
16.650      1.7012      8.35  .          .          .  Q      V.         .
16.667      1.7121      7.92  .          .          .Q       V.         .
16.683      1.7225      7.49  .          .        .Q         V.         .
16.700      1.7322      7.06  .          .        Q          V.         .
16.717      1.7413      6.63  .          .      Q.           V          .
16.733      1.7499      6.20  .          .    Q .            V          .
16.750      1.7578      5.77  .          .  Q   .            V          .
16.767      1.7652      5.34  .          .Q     .            V          .
16.783      1.7719      4.91  .          . Q    .            V          .
16.800      1.7781      4.49  .          .  Q   .            V          .
16.817      1.7837      4.06  .          .Q     .            V          .
16.833      1.7887      3.63  .          Q      .            V          .
16.850      1.7931      3.20  .        Q.       .            .V         .
16.867      1.7969      2.77  .          Q .    .            .V         .
16.883      1.8005      2.60  .       Q  .      .            .V         .
16.900      1.8040      2.57  .       Q  .      .            .V         .
16.917      1.8075      2.54  .       Q  .      .            .V         .
16.933      1.8110      2.51  .       Q  .      .            .V         .
16.950      1.8144      2.48  .       Q  .      .            .V         .
16.967      1.8178      2.45  .       Q  .      .            .V         .
16.983      1.8211      2.43  .       Q  .      .            .V         .
17.000      1.8244      2.40  .     Q    .      .            .V         .
17.017      1.8277      2.37  .     Q    .      .            .V         .
17.033      1.8309      2.34  .     Q    .      .            .V         .
17.050      1.8341      2.31  .     Q    .      .            .V         .
17.067      1.8372      2.28  .     Q    .      .            .V         .
17.083      1.8404      2.26  .     Q    .      .            .V         .
17.100      1.8434      2.23  .     Q    .      .            .V         .
17.117      1.8464      2.20  .     Q    .      .            .V         .
17.133      1.8494      2.17  .     Q    .      .            . V        .
17.150      1.8524      2.14  .     Q    .      .            . V        .
17.167      1.8553      2.11  .     Q    .      .            . V        .
17.183      1.8582      2.09  .     Q    .      .            . V        .
17.200      1.8610      2.06  .   Q      .      .            . V        .
17.217      1.8638      2.03  .   Q      .      .            . V        .
17.233      1.8666      2.00  .   Q      .      .            . V        .
17.250      1.8693      1.97  .   Q      .      .            . V        .
17.267      1.8719      1.94  .   Q      .      .            . V        .
17.283      1.8746      1.92  .   Q      .      .            . V        .
17.300      1.8772      1.89  .   Q      .      .            . V        .
17.317      1.8798      1.87  .   Q      .      .            . V        .
17.333      1.8823      1.86  .   Q      .      .            . V        .
17.350      1.8849      1.84  .   Q      .      .            . V        .
17.367      1.8874      1.83  .   Q      .      .            . V        .
17.383      1.8899      1.81  .   Q      .      .            . V        .
17.400      1.8924      1.80  .   Q      .      .            . V        .
17.417      1.8948      1.79  .   Q      .      .            . V        .
17.433      1.8973      1.77  .   Q      .      .            . V        .
17.450      1.8997      1.76  .   Q      .      .            . V        .
17.467      1.9021      1.75  .   Q      .      .            . V        .
17.483      1.9045      1.73  .   Q      .      .            . V        .
17.500      1.9068      1.72  .    Q     .      .            . V        .
17.517      1.9092      1.71  .   Q      .      .            . V        .
17.533      1.9115      1.69  .   Q      .      .            . V        .
17.550      1.9138      1.68  .   Q      .      .            . V        .
17.567      1.9161      1.67  .   Q      .      .            . V        .
17.583      1.9184      1.65  .   Q      .      .            . V        .
17.600      1.9207      1.64  .   Q      .      .            . V        .
17.617      1.9229      1.62  .   Q      .      .            . V        .
17.633      1.9251      1.61  .   Q      .      .            . V        .
17.650      1.9273      1.60  .   Q      .      .            . V        .
17.667      1.9295      1.58  .   Q      .      .            . V        .
17.683      1.9317      1.57  .   Q      .      .            . V        .
17.700      1.9338      1.56  .   Q      .      .            . V        .
17.717      1.9359      1.54  .   Q      .      .            . V        .
17.733      1.9380      1.53  .   Q      .      .            . V        .
17.750      1.9401      1.52  .   Q      .      .            . V        .
17.767      1.9422      1.51  .   Q      .      .            . V        .
17.783      1.9443      1.50  .   Q      .      .            . V        .
17.800      1.9464      1.50  .   Q      .      .            . V        .
17.817      1.9484      1.49  .   Q      .      .            . V        .
17.833      1.9504      1.48  .   Q      .      .            . V        .
17.850      1.9525      1.47  .   Q      .      .            . V        .
17.867      1.9545      1.46  .   Q      .      .            . V        .
17.883      1.9565      1.46  .   Q      .      .            . V        .
17.900      1.9585      1.45  .   Q      .      .            . V        .
17.917      1.9605      1.44  .   Q      .      .            . V        .
17.933      1.9624      1.43  .   Q      .      .            . V        .
17.950      1.9644      1.42  .   Q      .      .            .  V       .
17.967      1.9664      1.42  .   Q      .      .            .  V       .
17.983      1.9683      1.41  .   Q      .      .            .  V       .
18.000      1.9702      1.40  .   Q      .      .            .  V       .
```

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	1081.0
20%	435.0
30%	235.0
40%	200.0
50%	170.0
60%	135.0
70%	105.0
80%	65.0
90%	35.0

END OF FLOODSCx ROUTING ANALYSIS

Onsite Flood Routing Area "B" @ Node 15

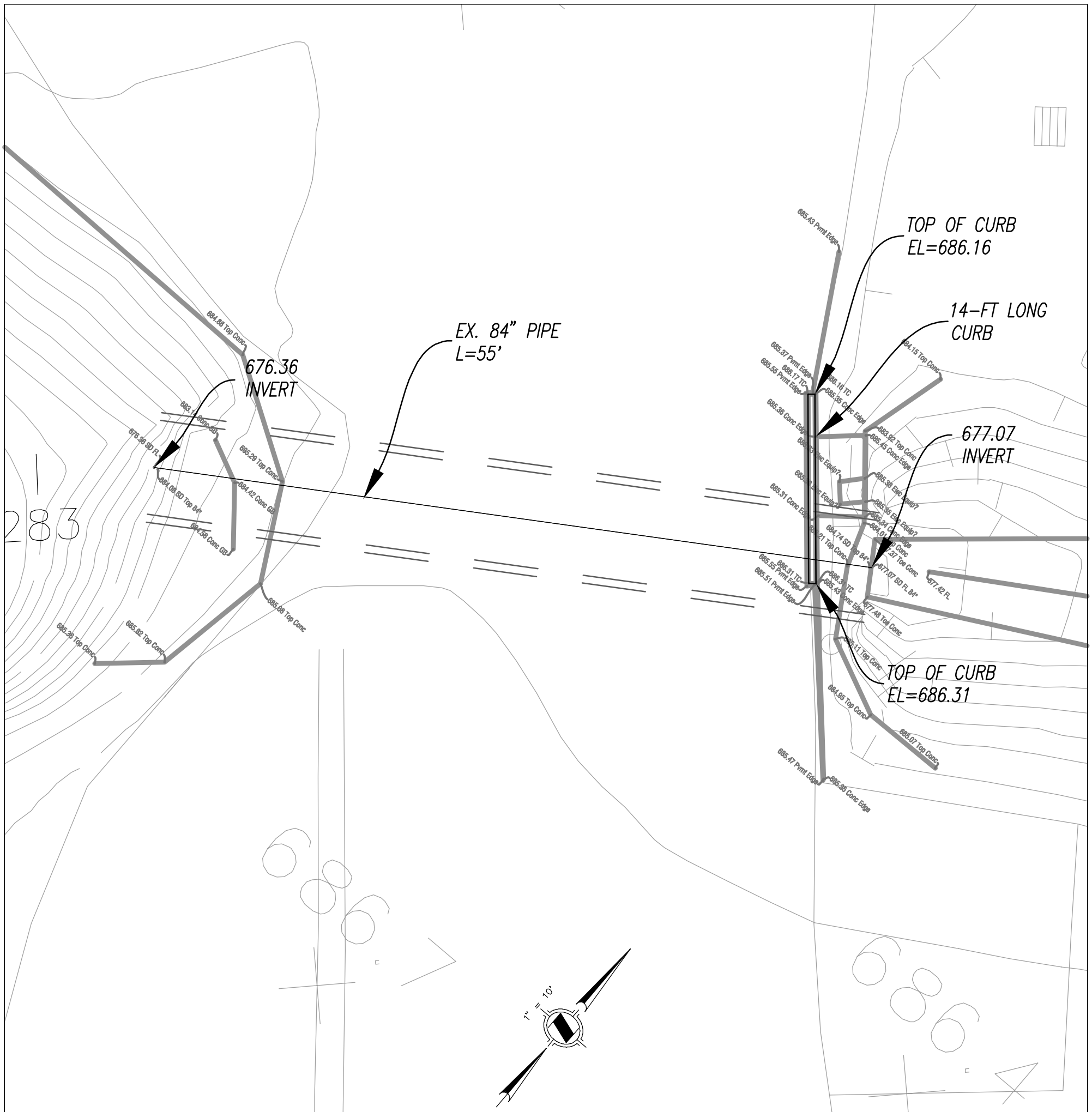
With Most of Drainage Area "B" in Existing Condition Diverting to Area "A" and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61

100-Year Storm Proposed Condition

SECTION 5

APPENDIX

- As-Built Storm Drain Plans
- Existing F19S02-713, F19P06 & F19P07 – Hydraulic
- Serrano Creek Facility No. F19, Drainage Area, Land Use and Soil Groups Map



10 5 0 10

GRAPHIC SCALE 1"=10'

REGISTERED PROFESSIONAL ENGINEER
JIANHUA GUAN
No. 64519
Exp.06/30/19
CIVIL
STATE OF CALIFORNIA

DATUM: NAVD 88

SURVEY SKETCH
EXISTING 84" PIPE AT STATION 283+50
FOR SERRANO CREEK LOMR
CITY OF LAKE FOREST, COUNTY OF ORANGE

WO: 1443-136x

PLOTTED BY: Ha To Chau DATE: Oct. 26, 2017 03:41:00 PM FILE: F:\0894\Engineering\SY_Channel\LOMR\84 inch Pipe.dwg

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

SANTA ANA, CALIFORNIA

E. SCHNEIDER, DIRECTOR

PLANS FOR CONSTRUCTION OF

THAT PORTION OF

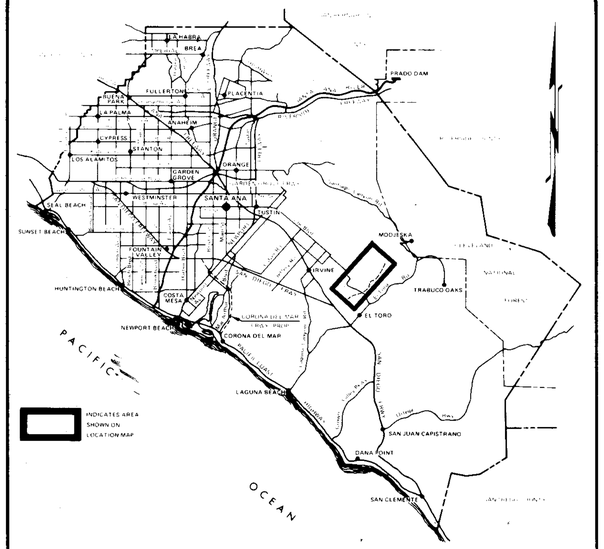
FACILITY NO. F19S02

FOR

TRACTS 13344 AND 13179

FROM STA. 22+26.00 TO STA. 38+42.85 △3

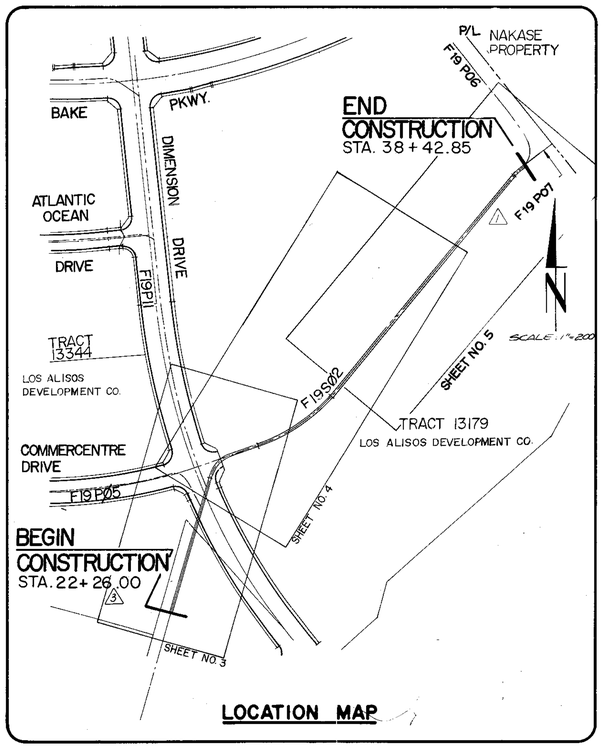
BONDED WITH TRACT 13179 △



VICINITY MAP

1 0 5 10

SCALE IN MILES



LOCATION MAP

INDEX OF SHEETS

SHEET	DESCRIPTION
1	TITLE SHEET
△3 2A	CONSTRUCTION AND GENERAL NOTES ESTIMATED QUANTITIES SETTLEMENT JOINTS AND DETAILS
	PLAN AND PROFILE
3A	STA 22+26.00 TO STA 28+00.72 △
4A	STA 28+00.00 TO STA 33+00.00 △
5A	STA 33+00.00 TO STA 38+42.85 △2
6A	STRUCTURAL DETAILS △
7.	LATERAL PROFILES & DETAILS △

UTILITY	PHONE NO.
LOS ALISOS WATER DISTRICT	(714) 830-0508
SOUTHERN CALIFORNIA GAS COMPANY	(714) 634-0251
SOUTHERN CALIFORNIA EDISON	(714) 973-5642
PACIFIC BELL COMPANY	(714) 422-4133
(UNDERGROUND ALERT)	(800) 422-4133

BENCH MARK:

GO ONE MILE NE ON THE NEW EL TORO RD. FROM THE JUNCTION OF EL TORO RD. WITH GLEN - MEADOW DR. TO THE FIRST AREA HAVING CUT BANKS ON EACH SIDE AND 700 FT. BACK SW FROM WHERE THE STEEL TRANSMISSION TOWER WIRE CROSS OVER EL TORO RD., ABOUT 98 FT. SE OF C OF RD. ABOUT 23 FT. N OF THE DRAIN WHICH IS ON THE SELY SIDE OF THE RD. NEAR A CONC. DIVERSION DITCH. A CONC. POST 10" ABOVE GR. WITH A PADDLEBOARD 1 FT. E OF IT. MON IS AT RD. CONST. STA. 518+94.

BASIS OF BEARING:

STATE OF CALIFORNIA LAMBERT COORDINATE SYSTEM - "ZONE VI" BASED ON THE LINE BETWEEN ORANGE COUNTY SURVEYOR'S HORIZONTAL CONTROL STATION "3-1-12-68" AND "CANADA" (OCS 1-1-75 DATUM)
BEING N 77° 20' 41" E

UNAUTHORIZED CHANGES & USES

CAUTION: The engineer(s) preparing these plans will not be responsible for, or liable for, unauthorized changes to or uses of these plans. All changes to the plans must be in writing and must be approved by the preparer of these plans.

California Council of Civil Engineers & Land Surveyors

STORM DRAIN MAINTAINED BY COUNTY OF ORANGE

(WITHIN PUBLIC R/W)

BLOCK : 5456 MODULE: 62,63,71,72,73

ENGINEER

Robert Bein, William Frost & Associates
PROFESSIONAL ENGINEERS, PLANNERS & SURVEYORS
P.O. BOX 19739 • 14725 ALTON PARKWAY, IRVINE, CALIFORNIA 92718
(714) 472-2505

PREPARED UNDER SUPERVISION OF:

BY: James E. McDonald
JAMES E. MCDONALD RCE NO. 29464
EXP 3-31-91

DATE: 2-28-89

EMA - REGULATION

THIS PLAN IS SIGNED BY EMA/ REGULATION FOR CONCEPT, ADHERENCE TO COUNTY STANDARDS AND REQUIREMENTS ONLY. EMA/ REGULATION IS NOT RESPONSIBLE FOR DESIGN, ASSUMPTIONS OR ACCURACY.

APPROVED: Patrick Stanton
RCE

DATE: 11/16/89

DEVELOPER

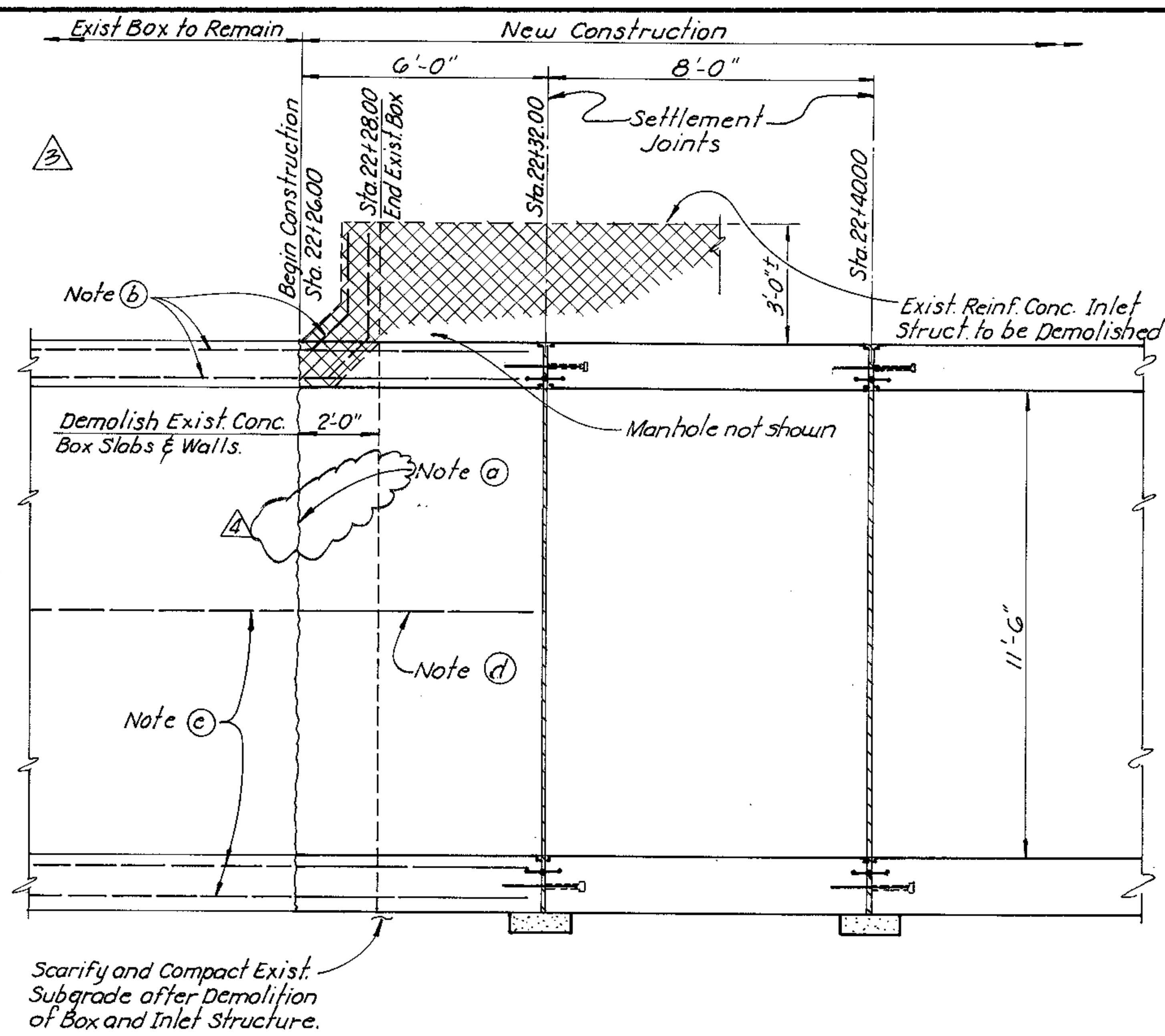
LOS ALISOS DEVELOPMENT COMPANY
2 PARK PLAZA, SUITE 980
IRVINE, CA., 92714
(714) 250-1806

NO.	DESCRIPTION	SHT.	APPROVED	DATE
	REVISIONS			
△4	RELOCATE SETTLEMENT JOINTS PER OWNER	3A,4A,5A	P. Stanton	2/20/91
△3	REVISE/ADDITION & CHANNEL PROFILE	3A,5	P. Stanton	2/20/91
△2	REV. B.C. STATION	5A	P. Stanton	7/17/90
△1	REV. PLAN, PROFILE, DETAILS & QUANTITIES	1-7	P. Stanton	4/6/90

DWG. NO. F19S02-713-2

SHEET 1 OF 7

JN 24321
24321.08 - IMP.SMAP



DETAIL - JOINT AT NEW AND EXIST. CONSTRUCTION (STA. 22+26.00)
Scale: 1"=3'

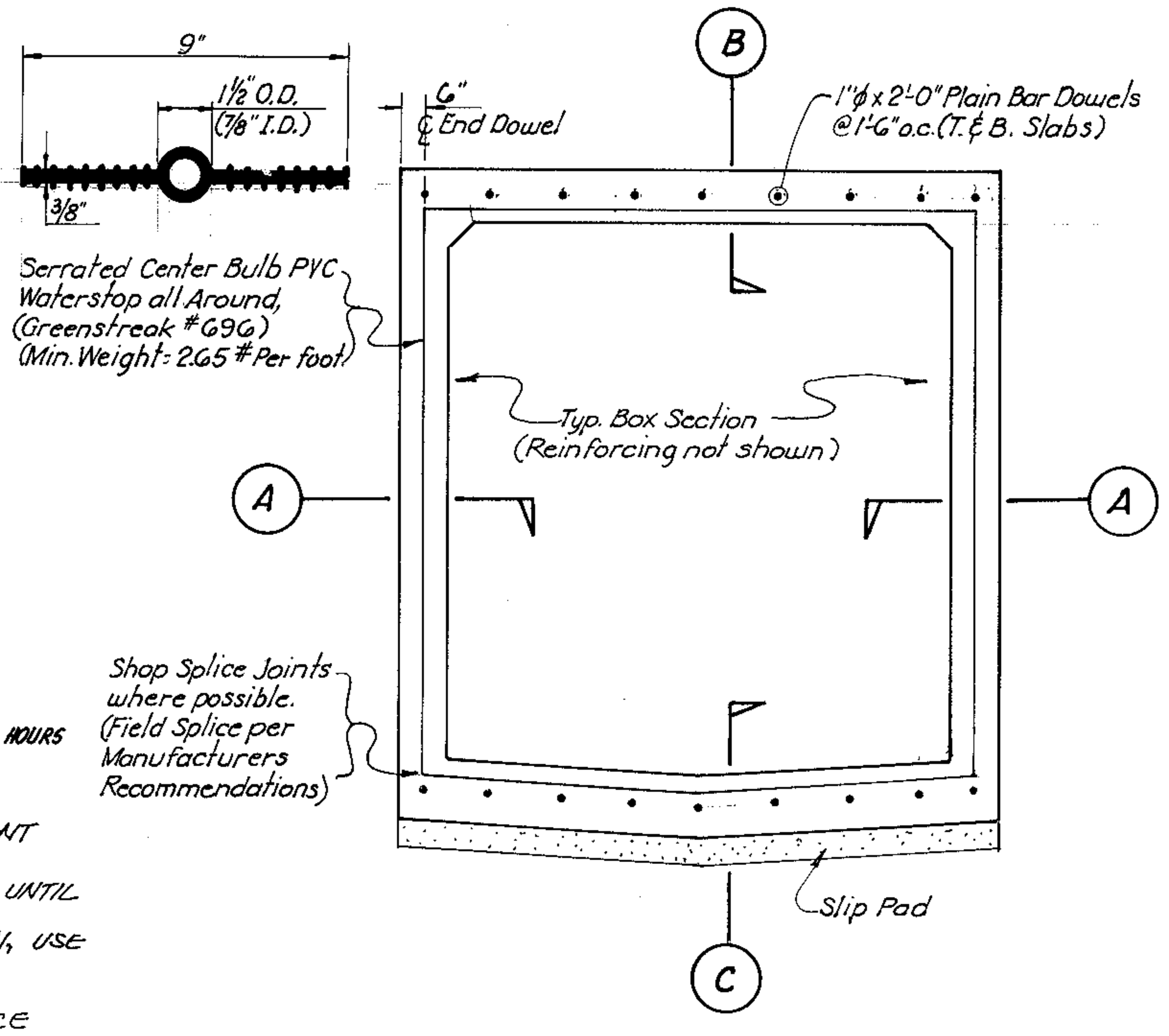
STORM DRAIN

1. ALL CONCRETE IN REINFORCED CONCRETE STRUCTURES MUST BE 3250 POUNDS PER SQUARE INCH IN 28 DAYS; TYPE OF PORTLAND CEMENT CONCRETE TO BE DETERMINED BY OCEMA MATERIALS LAB.
2. ALL PIPE LENGTHS ARE HORIZONTAL PROJECTIONS, UNLESS OTHERWISE SHOWN.
3. FOR TRENCH EXCAVATIONS IN NATIVE SOIL, SHORING SHALL BE PROVIDED TO SATISFY STATE OF CALIFORNIA SAFETY REQUIREMENTS.
4. PIPE CONSTRUCTION IN FILL AREA MUST BE COORDINATED WITH THE GRADING TO INSURE THAT WHEN THE FILL OPERATION HAS BEEN COMPLETED AT GRADE THERE IS A MINIMUM 2 FEET OF FILL ABOVE THE TOP OF PIPE.
5. ALL WORK MUST BE IN CONFORMANCE WITH THE CURRENT ORANGE COUNTY E.M.A. STANDARD SPECIFICATIONS AND MUST BE KEPT ON THE JOB SITE AT ALL TIMES.
6. THE CONTRACTOR MUST NOTIFY THE O.C.E.M.A. INSPECTOR AT LEAST (2) WORKING DAYS PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION BY TELEPHONING 567-7800 OR BY WRITING THE ORANGE COUNTY E.M.A., ATTN: CONSTRUCTION, P.O. BOX 486, SANTA ANA, CA 92702.
7. ALL FILLS MUST BE COMPACTED TO 90% RELATIVE COMPACTION AS DETERMINED BY THE CALIFORNIA TEST METHOD NO. 216, 1978 "FIVE LAYER METHOD." ALL BACKFILL MUST BE FREE OF VEGETABLE MATTER.
8. ALL SURVEYING REQUIRED FOR VERTICAL AND HORIZONTAL ALIGNMENT MUST BE PROVIDED BY THE CONTRACTOR OR DEVELOPER AND SUFFICIENT REFERENCE STAKING MUST BE IN ACCORDANCE WITH THE REQUEST OF THE O.C.E.M.A. INSPECTOR.
9. ALL REINFORCED CONCRETE PIPE MUST BE BEDDED IN ACCORDANCE WITH PIPE BEDDING DETAIL PER O.C.E.M.A. STANDARD PLAN 1319.
10. PRIOR TO THE PLACEMENT OF STORM DRAIN IMPROVEMENTS, THE DEVELOPER'S SOILS ENGINEER SHALL CERTIFY IN WRITING TO THE E.M.A. INSPECTOR THAT THE STORM DRAIN'S SUBGRADE IS OF ADEQUATE STRENGTH TO SUPPORT THE STRUCTURES AND ANY ANTICIPATED LOADS.
11. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, THE DEVELOPER'S CONTRACTOR SHALL OBTAIN A PERMIT FROM THE STATE DIVISION OF INDUSTRIAL SAFETY. A COPY OF THE PERMIT SHALL BE KEPT ON THE JOB SITE AT ALL TIMES.
12. WHENEVER APPLICABLE, THE DEVELOPER SHALL OBTAIN A PERMIT FROM THE STATE DEPARTMENT OF FISH AND GAME IN ACCORDANCE WITH SECTION 1602 OF THE CALIFORNIA FISH AND GAME CODE PRIOR TO COMMENCEMENT OF CONSTRUCTION.
13. ALL STEEL THAT IS TO BE CONTINUOUS SHALL BE LAPPED A MINIMUM OF 45 BAR DIAMETERS.
14. ALL MATERIALS TESTING FOR THE DRAINAGE FACILITIES SHALL BE PROVIDED BY THE DEVELOPER OR CONTRACTOR IN ACCORDANCE WITH THE NUMBER, LOCATION AND FREQUENCY REQUESTED BY THE O.C.E.M.A. INSPECTOR.
15. CHAMFER ALL EXPOSED EDGES OF CONCRETE 3/4" MINIMUM.
16. A PERMIT FOR WORK WITHIN EXISTING STREET RIGHT OF WAY IS REQUIRED FROM THE O.C.E.M.A. FOR ANY ENCROACHMENT NECESSARY FOR CONSTRUCTION IN PUBLIC RIGHT OF WAY.
17. LENGTH OF MANHOLE STRUCTURES MAY BE INCREASED TO MEET PIPE ENDS AT OPTION OF CONTRACTOR AS LONG AS REINFORCING STEEL IS CONTINUED AS REQUIRED. ANY CHANGE IN SPUR LOCATION MUST BE APPROVED BY THE ENGINEER.
18. FLOOR OF MANHOLE STRUCTURE SHALL BE STEEL TROWELED TO SPRING LINE.
19. BODY OF MANHOLE STRUCTURE, INCLUDING SPUR, MUST BE POURED IN ONE CONTINUOUS OPERATION, EXCEPT THAT CONSTRUCTION JOINT AT THE SPRING LINE WITH A LONGITUDINAL KEYWAY IS PERMITTED.
20. ALL REINFORCING BARS MUST BE SECURELY HELD IN PLACE IN THE FORMS. TWO WAY MATS OF STEEL MUST BE WIRED TOGETHER BOTH WAYS AT ALTERNATE INTERSECTIONS.
21. STORM DRAIN BACKFILL FOR ALL FACILITIES WITHIN STREET RIGHT OF WAY IS TO BE PLACED AND COMPACTED UNDER O.C.E.M.A. INSPECTION AND MEET OR EXCEED O.C.E.M.A. MINIMUM STANDARDS.
22. ALL R.C.P. PIPE TO BE BANDED AND GROUTED.
23. R.C.P. SHALL COMPLY WITH ALL A.S.T.M. APPLICABLE STANDARDS.
24. WORKING WITHIN ORANGE COUNTY FLOOD CONTROL FACILITIES IS RESTRICTED TO THE PERIOD OF APRIL 15 TO OCTOBER 15.
25. THE CONTRACTOR SHALL CONDUCT CONSTRUCTION OPERATIONS IN SUCH A MANNER THAT STORM OR OTHER WATERS MAY PROCEED UNINTERRUPTED ALONG THEIR EXISTING STREET OR DRAINAGE COURSES.
26. IN THE COURSE OF WATER CONTROL, THE CONTRACTOR SHALL CONDUCT CONSTRUCTION OPERATIONS TO PROTECT WATERS FROM POLLUTION WITH FUELS, OILS, BITUMENS OR HARMFUL MATERIALS.
27. ALL UTILITY TRENCH BACKFILL AND COMPACTION INSPECTION OUTSIDE THE LIMITS OF DEDICATED STREET RIGHT-OF-WAY SHALL BE PERFORMED BY O.C.E.M.A. REGULATION.
28. CONTRACTOR SHALL NOTIFY O.C.E.M.A. MATERIALS LAB (PHONE: (714) 567-7805) 48 HOURS PRIOR TO D-LOAD TESTING OF R.C.P. FOR VERIFICATION OF RESULTS.
29. ALL LOCAL DEPRESSIONS SHALL BE CONSTRUCTED PER STREET IMPROVEMENT PLANS IN ACCORDANCE WITH O.C.E.M.A. STANDARD PLANS. HOWEVER, ALL CATCH BASINS WILL BE SHOWN ON STREET IMPROVEMENT PLANS.
30. LOCAL DEPRESSIONS AND DECKS OF CURB INLETS SHALL NOT BE POURED UNTIL ADJACENT CURB AND GUTTER HAS BEEN POURED.
31. IF A DRIVEWAY ENCROACHES WITHIN A LOCAL DEPRESSION TRANSITION, USE E.M.A. STANDARD PLAN #1308 - TYPE A.
32. ALL MATERIALS TESTING FOR DRAINAGE FACILITIES SHALL BE PROVIDED BY THE DEVELOPER OR CONTRACTOR IN ACCORDANCE WITH THE NUMBER, LOCATION AND FREQUENCY REQUESTED BY THE O.C.E.M.A. INSPECTOR.

R.C.B. ALTERNATE

CONSTRUCTION NOTES AND ESTIMATED QUANTITIES

No.	CONSTRUCTION ITEM	UNIT	QUANT.	
1	CONST. 10.5' W x 10.5' H R.C.B. PER DETAIL SHT. NO. 6A	L.F.	1228.17	1, 3
2	CONST. 10.5' W x 11.5' H R.C.B. PER DETAIL SHT. NO. 6A	L.F.	390	
3	CONST. JUNC. STRUCT. TYPE V PER OCEMA STD. PLAN NO. 1314	EA.	9	
4	CONST. R.C. BOX MANHOLE PER OCEMA STD. PLAN NO. 1506	EA.	4	
5	REMOVE EXIST. RIP-RAP PER LIMITS SHOWN ON PLANS	C.Y.	430	
6	REMOVE EXIST. REINF. CONC. INLET.	EA	1	
7	CONST. 30" RCP D-LOAD PER PROFILE	L.F.	210	1
8	CONST. SETTLEMENT JOINTS PER DETAILS THIS SHEET	EA.	20	4, 1
9				3
10	CONST. 8" BRICK AND MORTAR PLUG	EA.	7	1
11				1
12	CONST. 24" RCP (1750-D)	L.F.	8	1
13	CONST. 48" RCP (1200-D) WITH 1½" ADDITIONAL STEEL COVER	L.F.	8	
14	CONST. 60" RCP (1600-D) WITH 1½" ADDITIONAL STEEL COVER	L.F.	8	
17	CONST. DEEP MANHOLE LANDING PER DETAILS ON SHEET NO. 7	EA.	3	1
18	CONST. 24" RCP (D-2500) 1½" MIN. STEEL CLR. COVER	L.F.	68	1
19	CONST. RISER INLET PER OCEMA STD. PLAN NO. 1305	EA.	2	1
20	CONST. CONC. COLLAR PER OCEMA STD. PLAN NO. 1317	EA.	4	1
21	CONST. CONC. PIPE SLOPE ANCHOR PER OCEMA STD. PLAN NO. 1333	EA.	8	1



SECTION @ VERTICAL JOINT

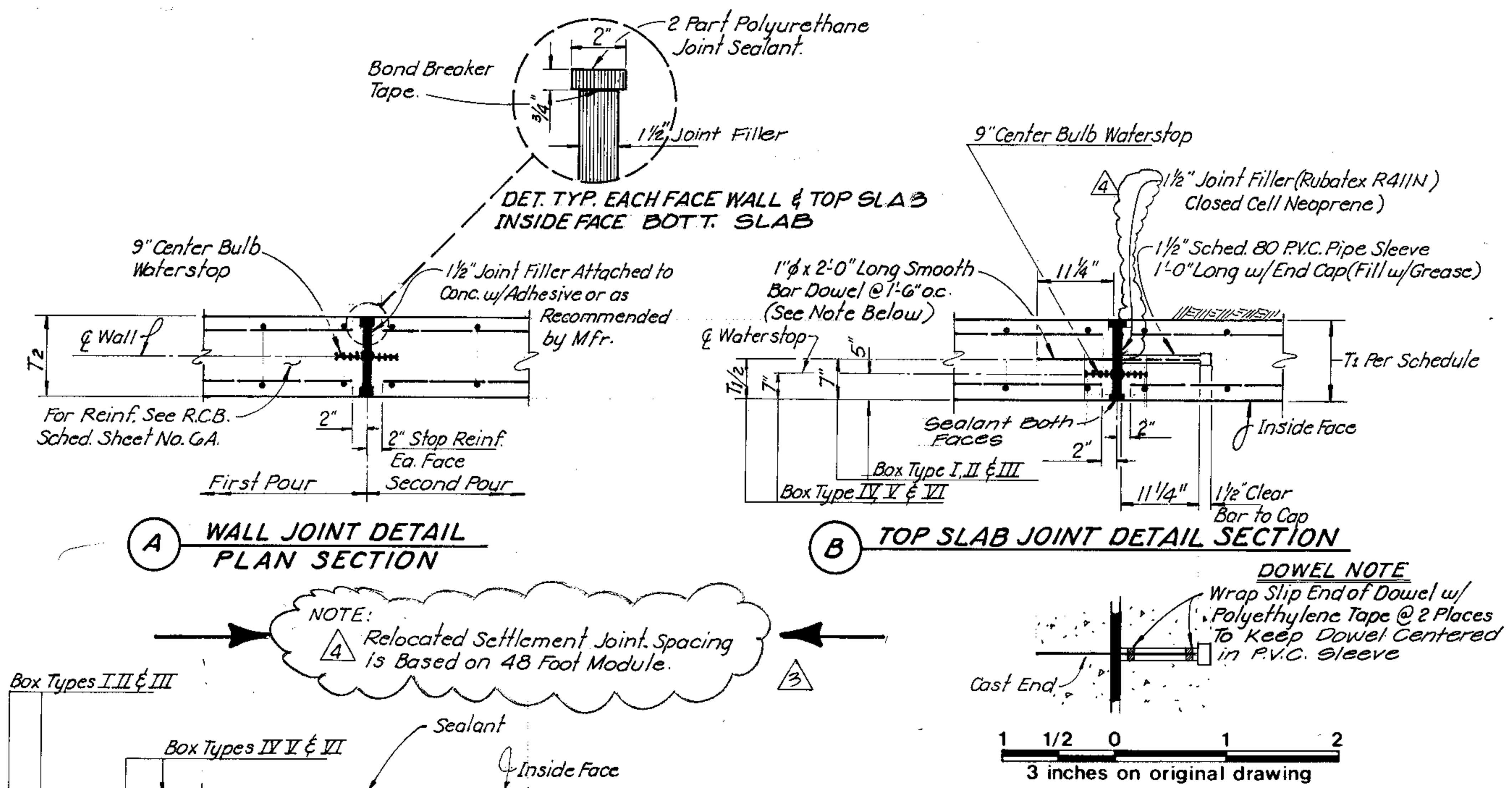
DETAIL - JOINT AT NEW AND EXIST. CONSTRUCTION (NOTES)
(STA 22+26.00)

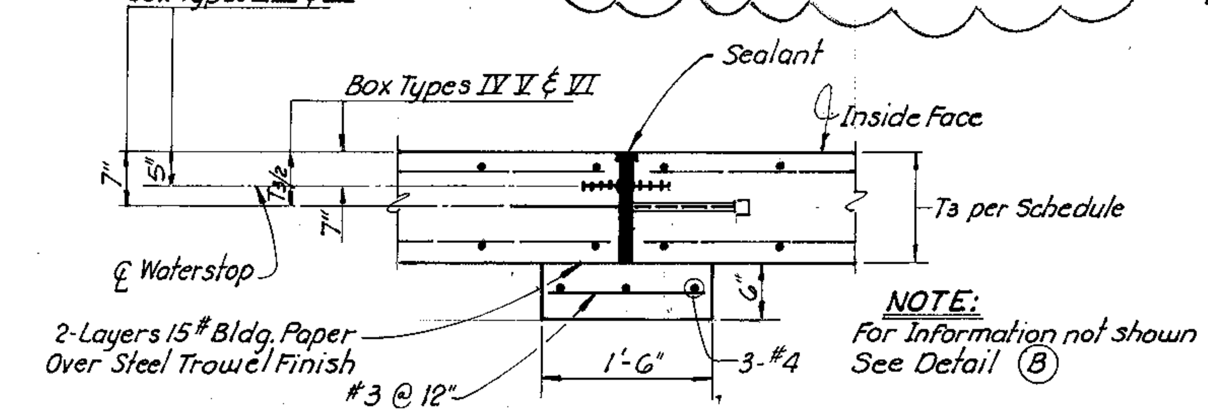
Note (a) SAW CUT EXISTING (TOP AND BOTTOM SLABS AND WALLS) ON BOTH FACES DOWN TO 1 INCH MAXIMUM DEPTH. REMOVE CONCRETE AT THE SAW CUTS WITHOUT DAMAGE TO EXISTING LONGITUDINAL REINFORCING. PREPARE CONCRETE SURFACE TO EXPOSE SOUND AGGREGATE IN MORTAR MATRIX AND REMOVE ALL LOOSE MORTAR. MOISTEN EXPOSED CONCRETE SURFACE AND COAT WITH CEMENT SLURRY IMMEDIATELY PRIOR TO PLACING NEW CONCRETE AT THE JOINT.

Note (b) CLEAN AND STRAIGHTEN ALL EXISTING LONGITUDINAL BARS IN TOP SLAB AND PARAPET FOR EMBEDMENT IN NEW CONCRETE.

Note (c) CLEAN ALL EXISTING LONGITUDINAL BARS IN WALLS AND BOTTOM SLAB FOR EMBEDMENT IN NEW CONCRETE.

Note (d) CUT ALL EXISTING BARS 2" CLEAR FROM SETTLEMENT JOINT STA 22+32.00





BOTTOM SLAB JOINT DETAIL SECTION

8 DETAIL SETTLEMENT JOINT @ SPECIFIC LOCATIONS (See Profile for Locations)

MARK	DATE	DESCRIPTION
4	1/18/91	RELOCATED ARROWS ADDED NOTES
3	11/26/90	
1	1-30-90	ADD NOTES - MODIFY QUANTS.

REVISIONS

DESIGNED SKG DRAWN SS CHECKED BMP

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY F19S02

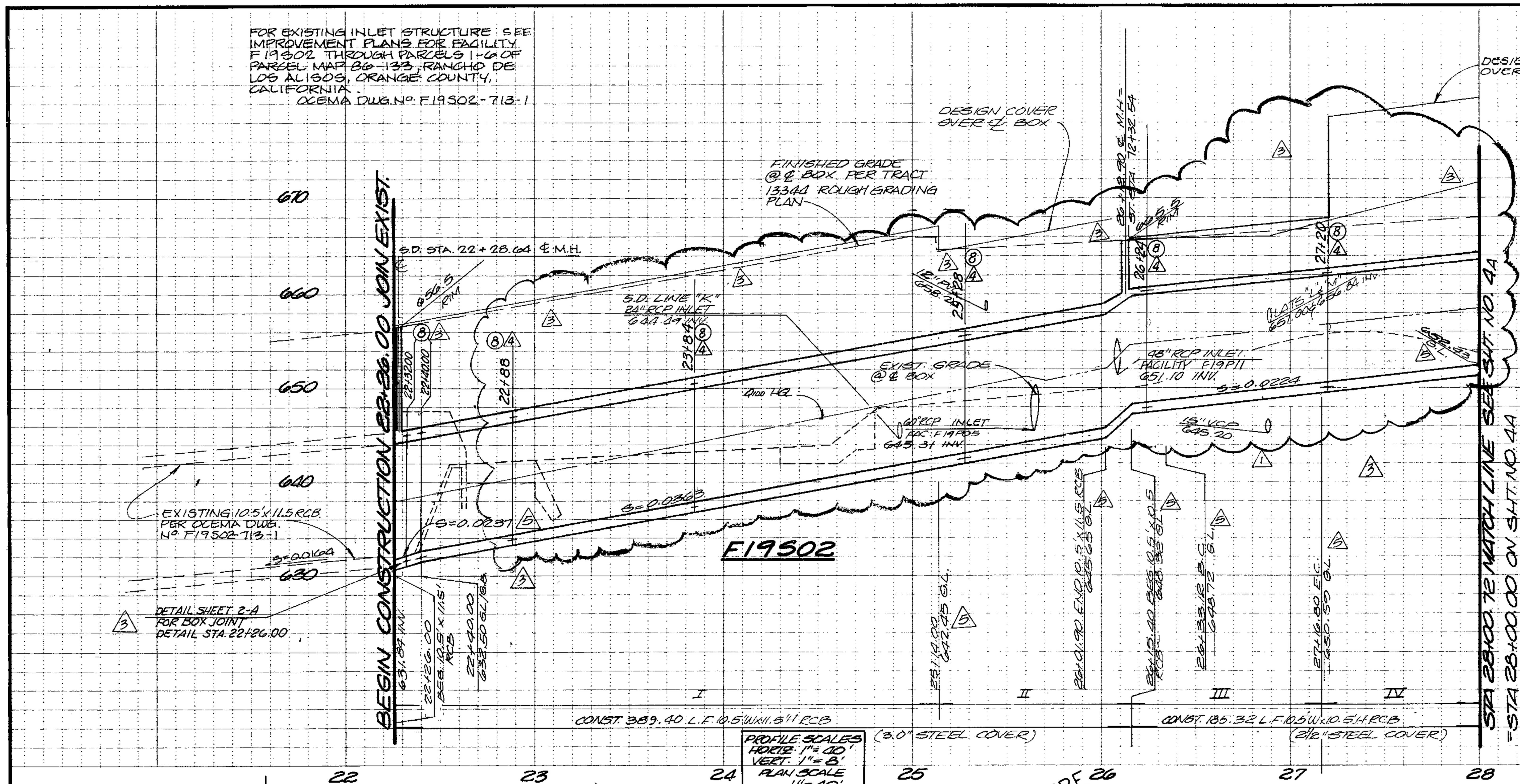
CONSTRUCTION & GENERAL NOTES
ESTIMATED QUANTITIES
SETTLEMENT JOINTS & DETAILS

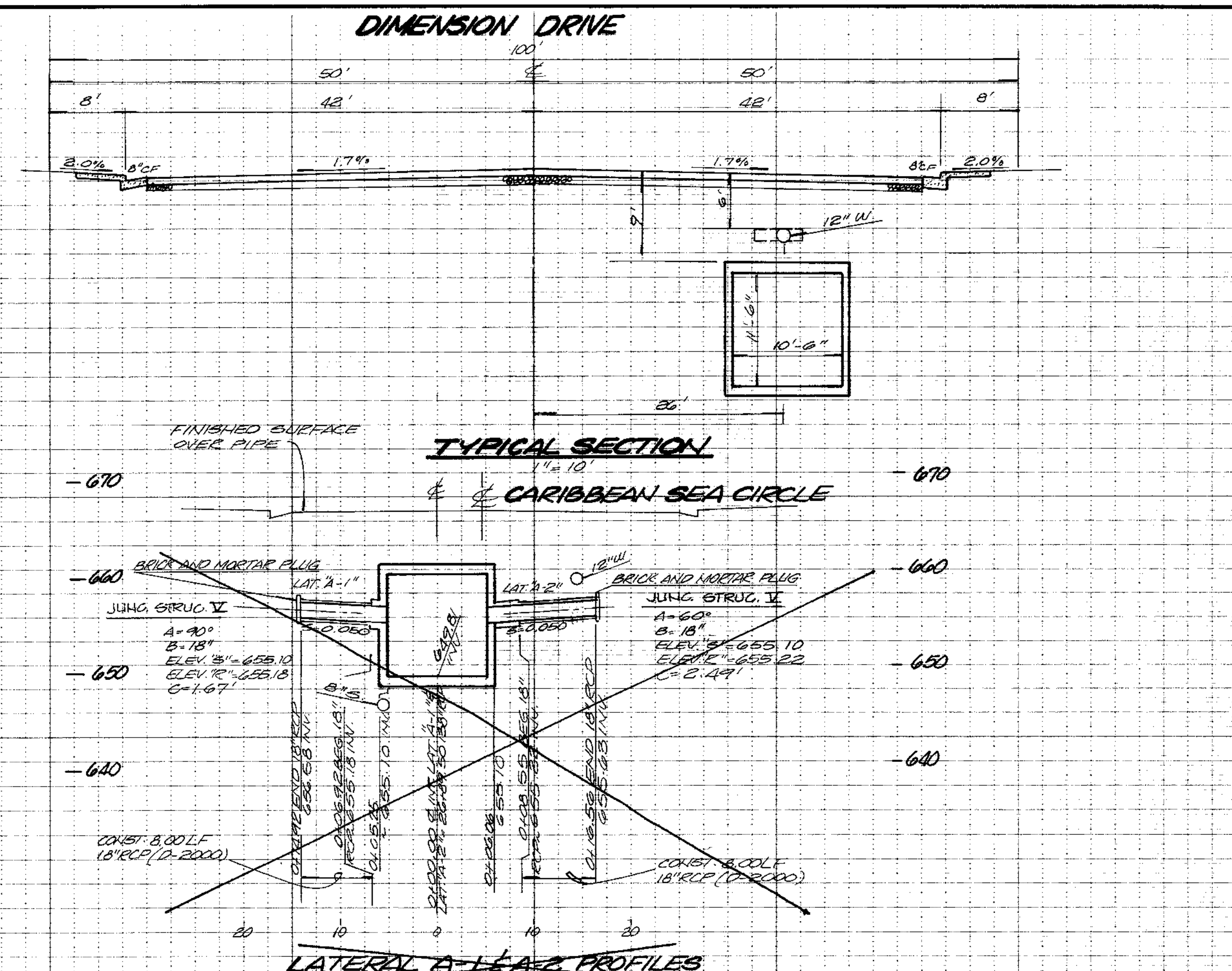
R.C.B. ALTERNATE

PREPARED UNDER SUPERVISION OF James E. McDonald 2/28/89 RCE 29464 EXP 3-31-91 DATE

SCALE AS SHOWN | DATE | DWG. NO. F19S02-713-2 | SHEET 2A OF 7

24321.28 - IMP. SMFF.

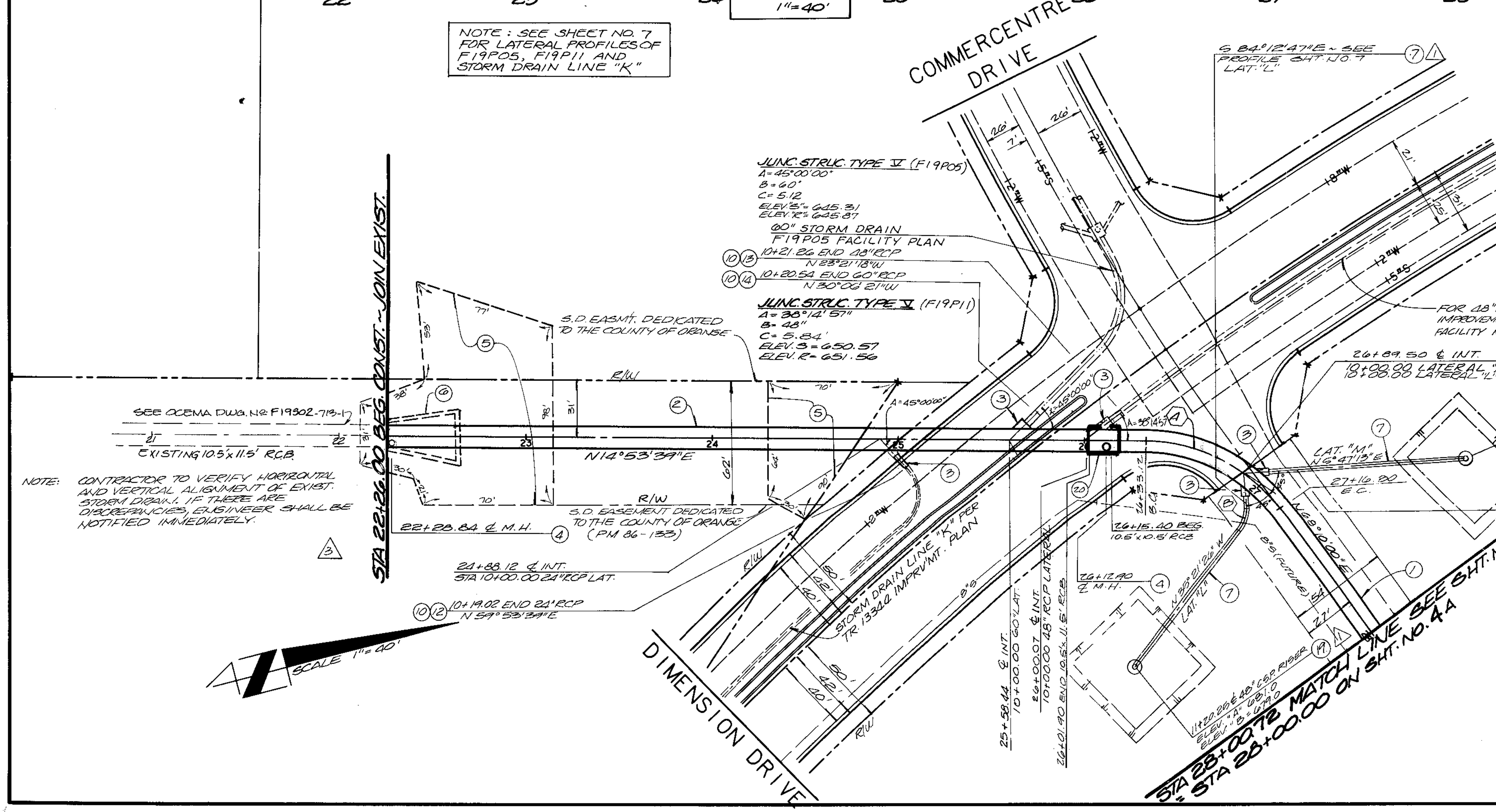


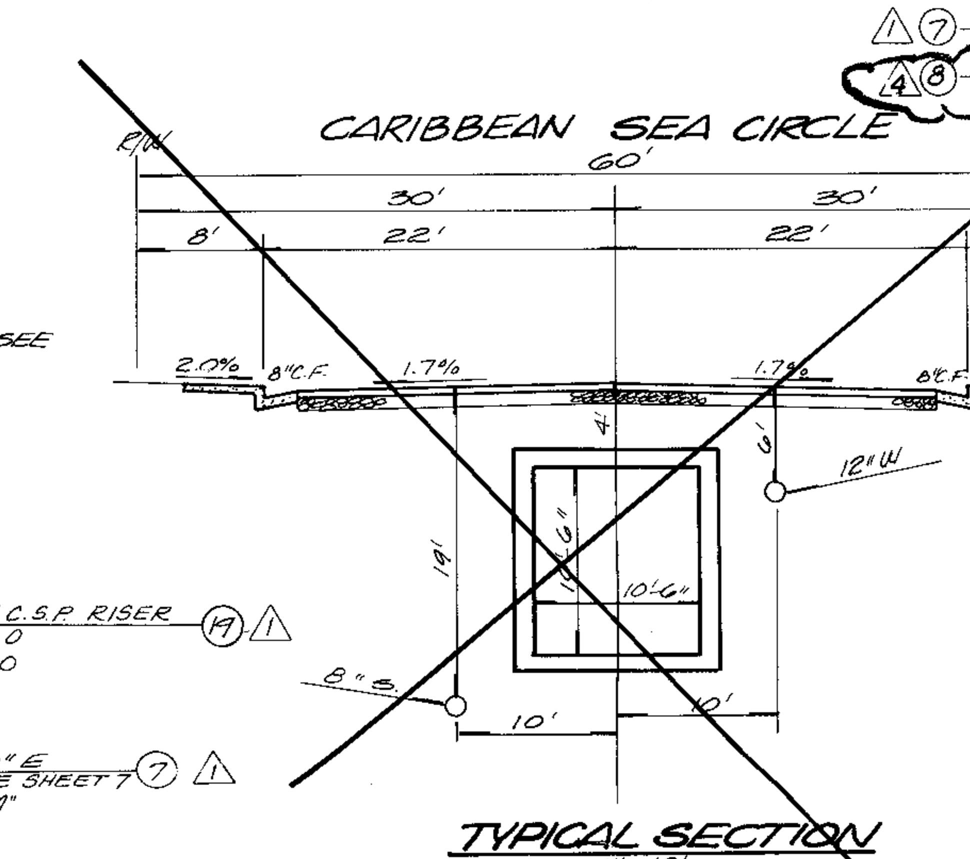


⚠1 HYDRAULIC DATA										
STA TO STA	Q25	d	So	Sf	n	Dn	Vn	Fn	Dc	Vc
LAT. "L" 10+07.67-10+16.67	44.61	30"	0.01	0.012	0.013	PRESSURE FLOW			2.22	9.69
10+16.67-10+53.65	44.61	30"	0.57	0.57	0.013	0.64	44.86	11.71	2.22	9.69
10+53.65-11+16.19	44.61	30"	0.01	0.012	0.013	PRESSURE FLOW			2.22	9.69
LAT. "M" 10+07.23-10+16.23	47.77	30"	0.01	0.014	0.013	PRESSURE FLOW			2.27	10.20
10+16.23-10+67.43	47.77	30"	0.48	0.48	0.013	0.69	43.02	10.77	2.27	10.20
10+67.43-11+19.00	47.77	30"	0.01	0.014	0.013	PRESSURE FLOW			2.27	10.20

CONSTRUCTION NOTES

1. —CONST. 10.5'Wx10.5'H RCB PER DETAIL SHT. NO. 6
2. —CONST. 10.5'Wx11.5'H RCB PER DETAIL SHT. NO. 6
3. —CONST. JUNC. STRUC. TYPE NO V PER OCEMA STD. PLAN NO. 1314
4. —CONST. R.C. BOX MANHOLE PER OCEMA STD. PLAN NO. 1506
5. —REMOVE EXIST. RIP-RAP PER LIMITS SHOWN ON PLANS.
6. ⚠3 —REMOVE EXIST. REINFORCED CONC. INLET & PORTION OF EXISTING BOX PER DET. SHT. 2A.
7. ⚠1 —CONST. 30" RCP D-LOAD PER PROFILE
8. ⚠4 —CONST. SETTLEMENT JOINTS PER SHEET 2A
10. —CONST. BRICK AND MORTAR PLUG.
12. —CONST. 24" RCP (1750-D)
13. —CONST. 48" RCP (1200-D) WITH 1½" ADDITIONAL STEEL COVER
14. —CONST. 60" RCP (1600-D) WITH 1½" ADDITIONAL STEEL COVER
19. ⚠1 —CONST. RISER INLET PER OCEMA STD. PLAN NO. 1305.
20. ⚠1 —CONST. CONCRETE COLLAR PER OCEMA STD PL. NO. 1317
21. ⚠1 —CONST. CONC. PIPE SLOPE ANCHOR PER OCEMA STD. PLAN NO. 1333





CURVE DATA					
NO.	REFERENCE	Δ	R	L	T
A	℄ STORM DRAIN	53°16'21"	90.00	83.68	45.14
⚠1 B	℄ LAT. "L"	48°51'22"	22.50	19.19	10.22

HYDRAULIC DATA										
STA TO STA	Q100 cfs	b	w	So	Sf	n = 0.014 Dn	Vn	F	Dc	Vc
22+31.17-25+58.44	2220	10.5	11.5	0.036	0.03598	5.2	41.0	3.18	11.2	19.0
25+58.44-26+01.90	2103	10.5	11.5	0.036	0.03599	5.0	40.5	3.20	10.8	18.6
26+15.40-28+00.72	1916	10.5	10.5	0.02	0.02	6.1	30.0	2.14	10.1	18.0

REGISTERED PROFESSIONAL ENGINEER JAMES E. McDONALD NO. 29464 EXP. 3/31/91 CIVIL STATE OF CALIFORNIA

1 1/2 0 1 2
3 inches on original drawing

MARK	DATE	DESCRIPTION
⚠4	1/18/91	RELOCATE SETTLEMENT JOINTS PER OWNER
⚠3	11-26-90	REV. BEGIN STATION & CHANNEL PROFILE, ADDED SETT. JOINTS, ADDED DET. REF, ADDED NOTE (8)
⚠1	1-30-90	ADD LATS, MOD. PROF.

REVISIONS

DESIGNED SKG
DRAWN SS CHECKED BMP

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY F19S02

PLAN AND PROFILE

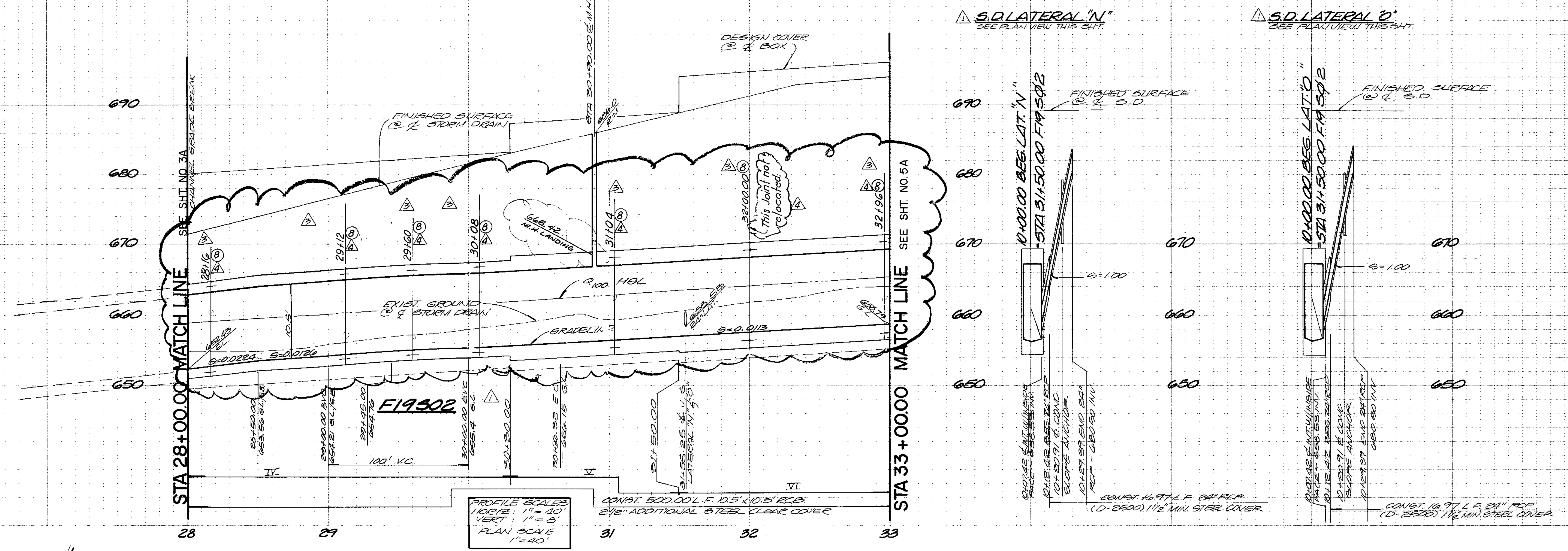
R.C.B. ALTERNATE
WITHIN FINAL TRACTS 13344 AND 13179
(A PORTION OF VESTING TENTATIVE TRACT 13179)

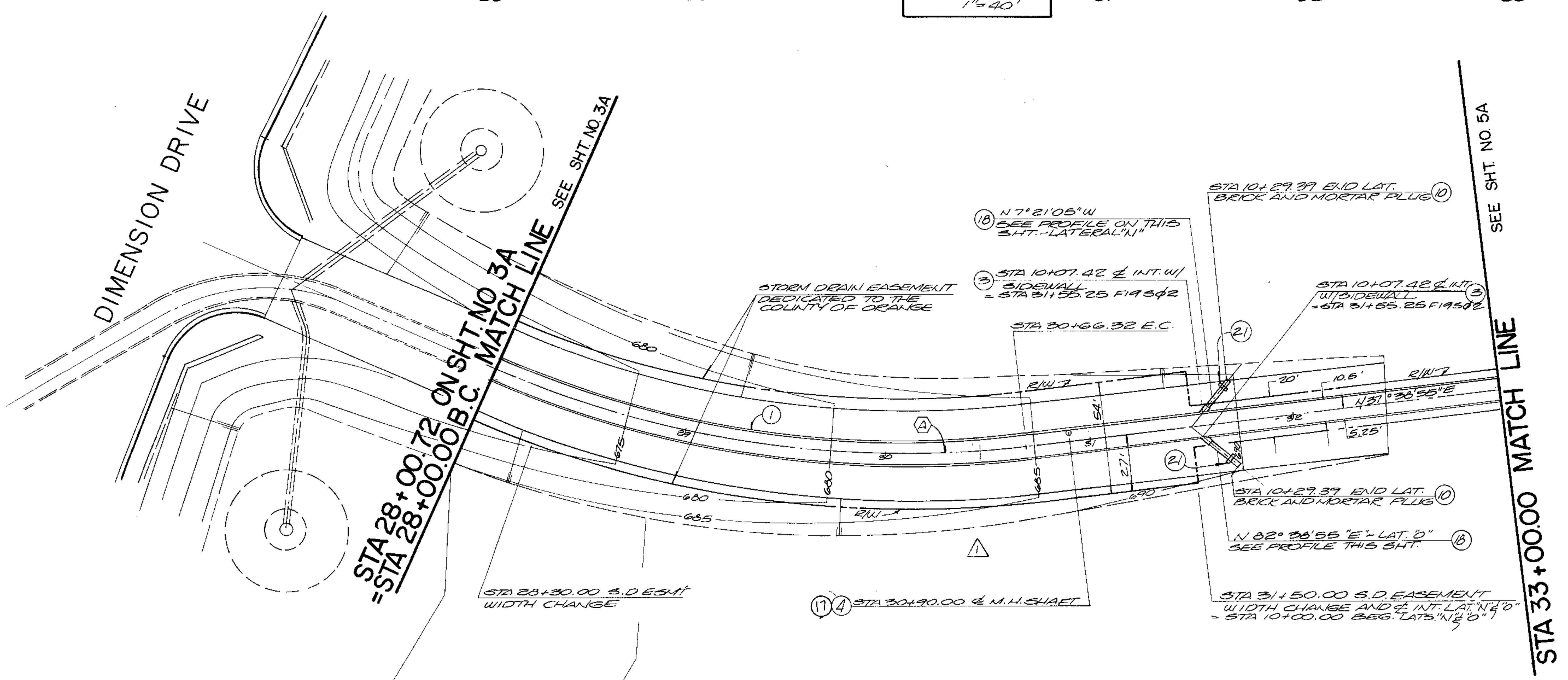
STA 22+26.00 TO STA 28+00.00

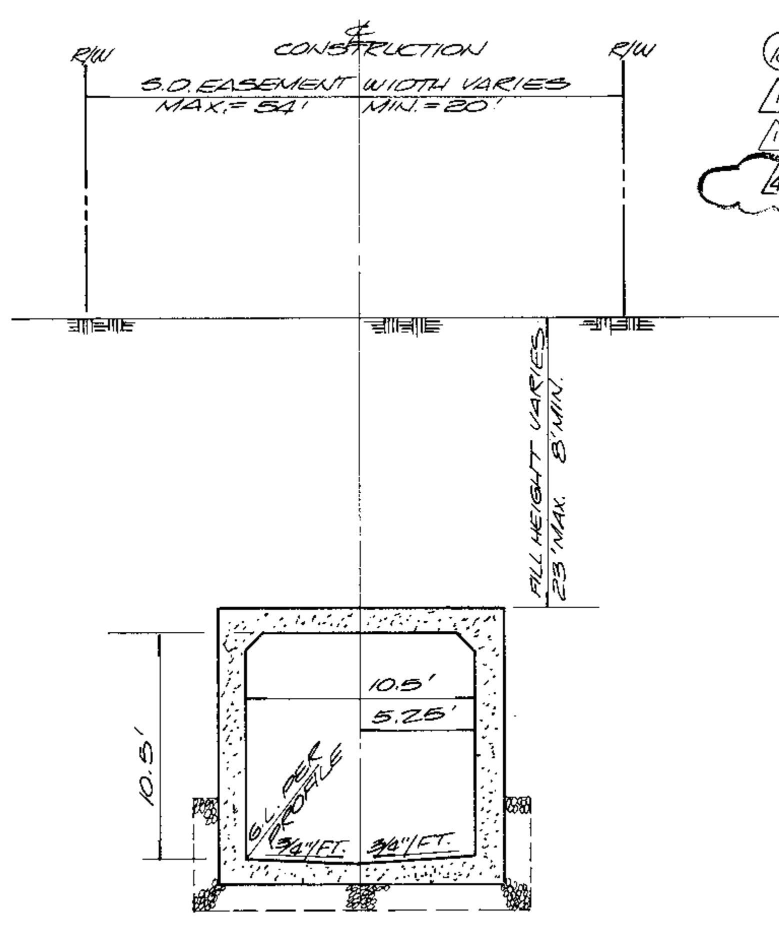
PREPARED UNDER SUPERVISION OF [signature] EXP 3-31-91 2/28/89
RCE 29464 DATE

SCALE AS SHOWN | DATE | DWG. NO. F19S02-713-2 | SHEET 3A OF 7

24321.28 - IMP. SMFF.







TYPICAL SECTION
N.T.S.

CONSTRUCTION NOTES

1 — CONST. 10.5'x10.5' R.C. BOX PER SCHED. & DETAIL PER SHT. NO. 6
3 — CONST. JUNC. STRUCT. TYPE NO. V PER OCEMA STD. PLAN NO. 1314.
4 — CONST. R.C. BOX M.H. PER OCEMA STD. PLAN NO. 1506
10 — CONST. 8" BRICK & MORTAR PLUG
△1 18 — CONST. 24" RCP (D-LOAD PER PROFILE)
△1 21 — CONST. CONC. PIPE SLOPE ANCHOR PER OCEMA ~~STD. PLAN NO. 1333~~
△4 8 — CONST. SETTLEMENT JOINTS PER SHEET 2-A.
17 — CONST. DEEP MANHOLE LANDING PER DETAIL ON SHEET NO. 7

1 1/2 0 1 2
3 inches on original drawing

REGISTERED PROFESSIONAL ENGINEER JAMES E. McDONALD NO. 29464 EXP. 3/31/91 CIVIL STATE OF CALIFORNIA

HYDRAULIC DATA

LINE	STA TO STA	Q100	SLOPE (So)	n	SECTION	Dn (ft.)	Vn (f.p.s.)	Dc (ft.)	Vc	Nf
F19S02	28+00.00-33+00.00	1916	0.0127	.014	10.5'x10.5' RCB	7.3	25.1	10.1	18.0	1.64
LAT."N"	10+07.42-10+29.39	16.8	1.00	.013	24"	0.37	42.06	1.48	6.76	14.61
LAT."O"	10+07.42-10+29.39	17.0	1.00	.013	24"	0.37	42.16	1.48	6.78	14.61

Q25 (LAT."N", LAT."O")

CURVE DATA

NO	REFERENCE	Δ	R	L	T
4	℄ R.C.B.	30°31'05"	500.00'	266.32'	136.40'

MARK	DATE	DESCRIPTION
△4	1/18/91	RELOCATED SETT. JOINTS PER OWNER
△3	11-26-90	REV. TO CHANNEL PROFILE ADDED SETT. JOINTS
△1	1-30-90	REV. PLAN, PROFILE AND LATS.-DETAIL

REVISIONS

DESIGNED B.M. PHILLIPS
DRAWN S.S. CHECKED S.M.T.

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY F19S02

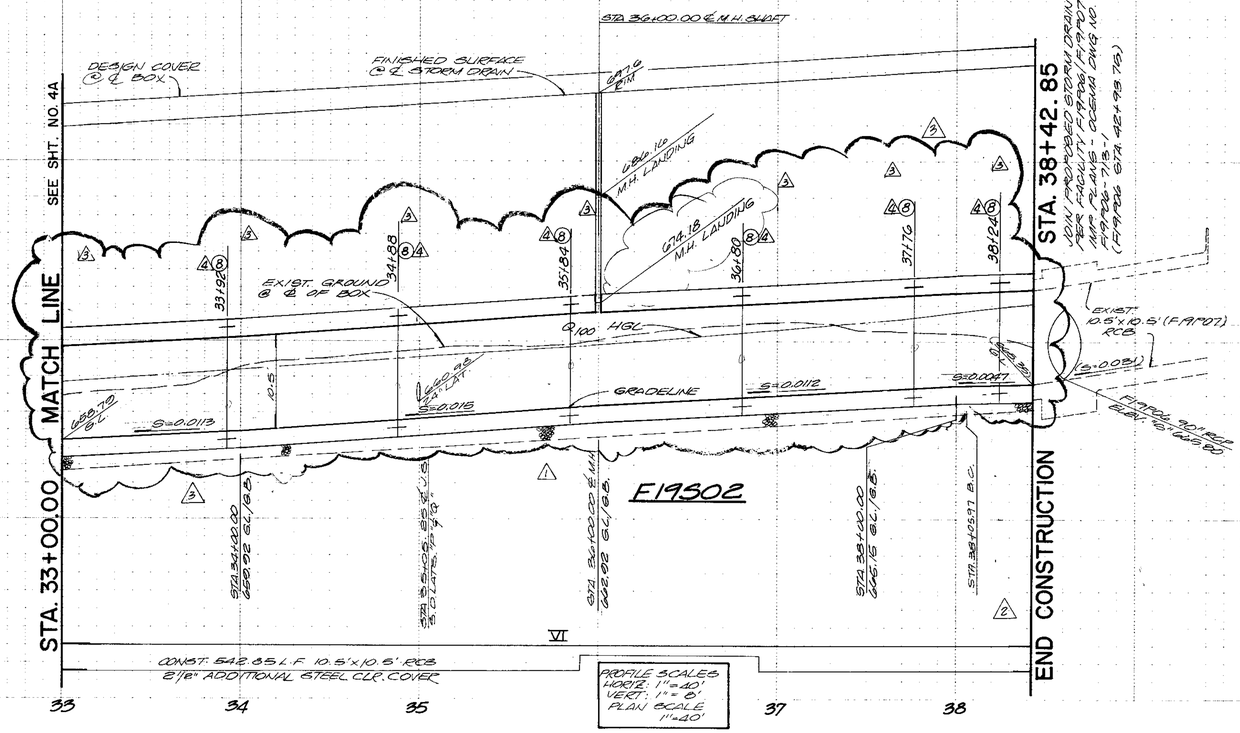
PLAN AND PROFILE

R.C.B. ALTERNATE WITHIN FINAL TRACTS 13344 AND 13179 (A PORTION OF VESTING TENT. TRACT 13179)
STA 28+00.00 TO STA 33+00.00

PREPARED UNDER SUPERVISION OF James E. McDonald RCE 29464 EXP 3-31-91 DATE 1-29-90

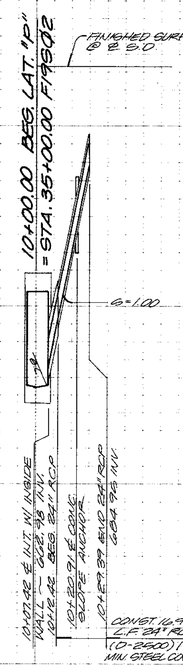
SCALE AS SHOWN | DATE | DWG. NO. F19S02-713-2 | SHEET 4A OF 7

24321.28 - IMP. SMFF.



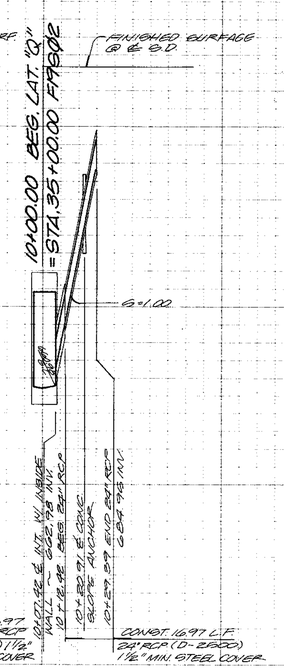
△S.D. LATERAL "P"

SEE PLAN VIEW THIS SHEET



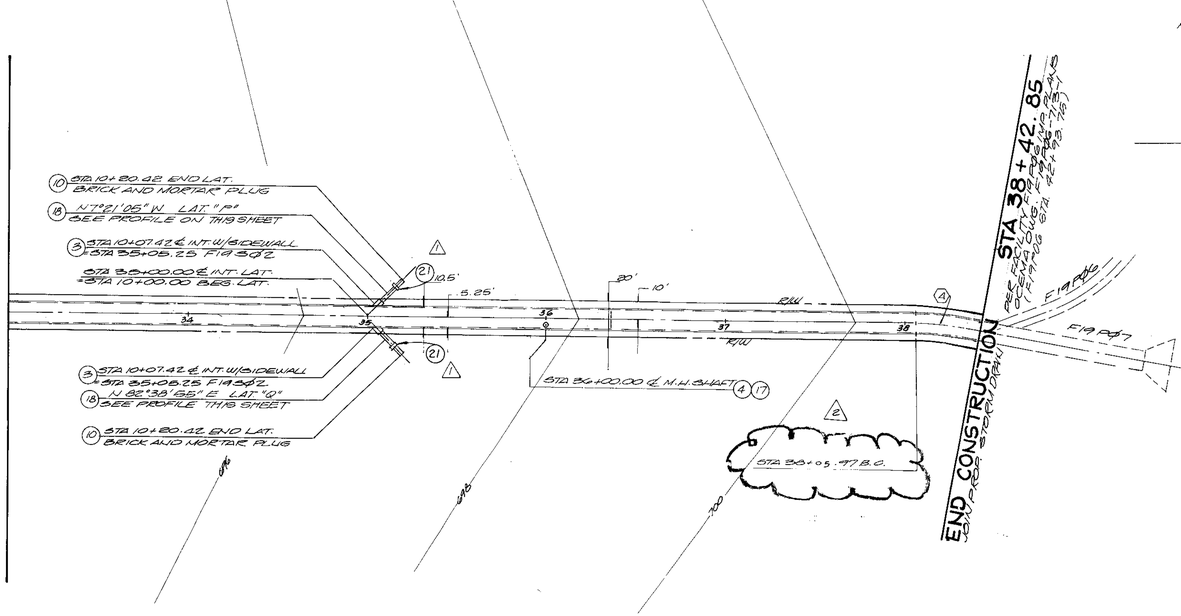
△S.D. LATERAL "Q"

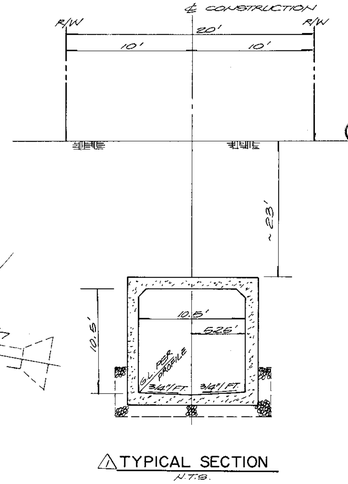
SEE PLAN VIEW THIS SHEET



CONSTRUCTION NOTES

1. CONST. 10.5' x 10.5' R.C. BOX PER SCHEDULE AND DETAILS ON SHT. NO. 5B
4. CONST. R.C. BOX M.H. PER OCEMA STD. PLAN NO. 1506.
△17. CONST. DEEP M.H. LANDINGS PER DETAILS ON SHT. NO. 7
3. CONST. J.S. TYPE NO. II PER OCEMA STD. PLAN NO. 1314
△18. CONST. 24" RCP (D-2500) PER PROFILE
10. CONST. 8" BRICK AND MORTAR PLUG.
△8. CONST. SETTLEMENT JOINTS PER SHEET 2-A.
△21. CONST. CONC. PIPE SLOPE ANCHOR PER OCEMA STD. PLAN NO. 1533





△TYPICAL SECTION
N.T.S.

HYDRAULIC DATA											
LINE	STA. TO STA.	Q 100	SLOPE (So)	n	SECTION	Dn (ft.)	Vn (f.p.s.)	Dc (ft.)	Vc	Nf
F19Q02	33+00.00-38+42.85	19.6	0.0127	.014	10.5'x10.5' RCB	7.3	25.1	10.1	18.0	1.64
LAT."P"	10+07.42-10+29.39	16.4	1.00	.013	24"	0.37	41.76	1.46	6.68	14.59
LAT."Q"	10+07.42-10+29.39	12.3	1.00	.013	24"	0.32	38.92	1.26	6.89	14.42

CURVE DATA					
NO.	REFERENCE	Δ	R	L	T
(A)	℄ R.C.B.	10°33'55"	200.00	36.83'	18.49'

1 1/2 0 1 2
3 inches on original drawing

MARK	DATE	DESCRIPTION
△4	11/8/91	RELOCATED SETT. JOINTS PER OWNER
△3	11/26/90	REV. TO CHANGED PROFILE, ADDED SETT. JOINTS
△2	9/3/90	REV. B.C. STATION
△1	1-30-90	REV. PLAN, PROFILE & DATA 10+42.85

REVISIONS

DESIGNED B.M. PHILLIPS
DRAWN S.B. CHECKED S.M.T.

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY F19S02

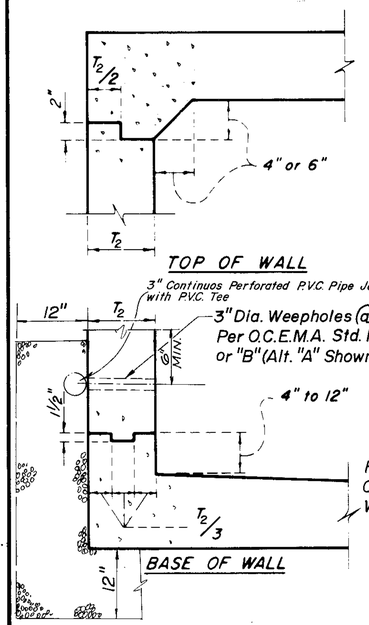
PLAN AND PROFILE

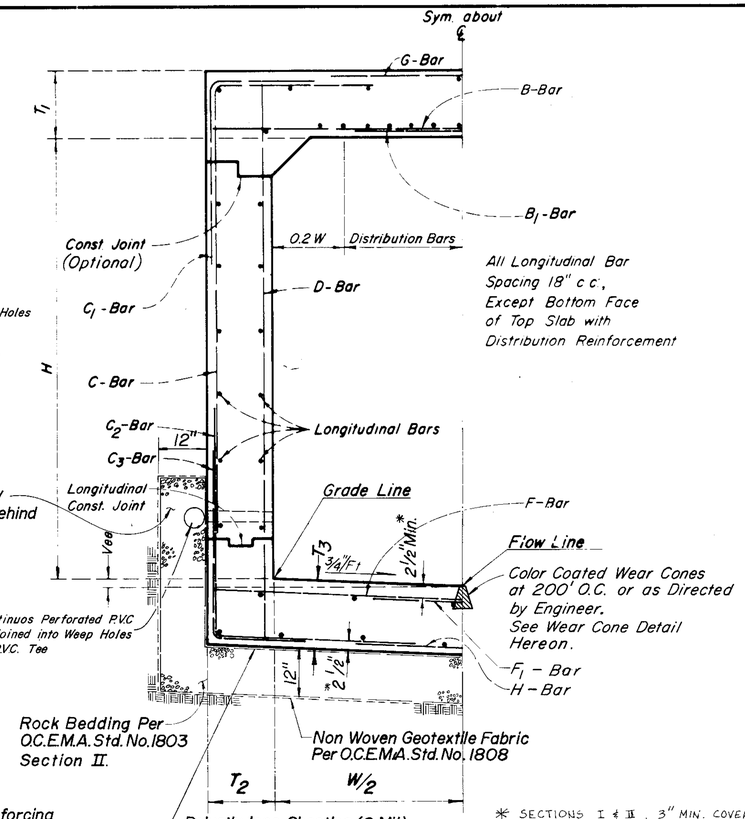
R.C.B. ALTERNATE WITHIN FINAL TRACTS 13344 AND 13179 (A PORTION OF VESTING TENT. TRACT 13179)
STA 33+00.00 TO STA 38+42.85

PREPARED UNDER SUPERVISION OF Jack E. McDonald DATE 5-3-91

SCALE AS SHOWN | DATE | DWG. NO. F19S02-713-2 | SHEET 5A OF 7

24321.20 - IMP. SMFB

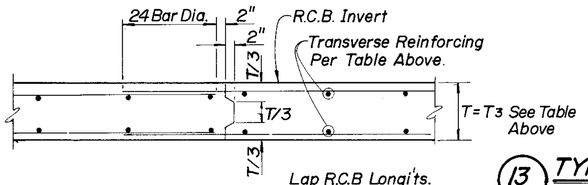




* SECTIONS I & II, 3" MIN. COVER

CONSTRUCTION JOINT DETAILS

N.T.S.



(13) TYPICAL R. C. BOX SECTION (41)

NOT TO SCALE

TRANSVERSE JOINT DETAIL

N.T.S.

DESIGN DATA

LIVE LOAD

HS20-44

DEAD LOAD

Earth load per Marston's formula: w = 110 p.c.f.
Ku = Ku' = 0.150
Bd = Outside width of box plus 3 feet
Side earth 40 p.s.f. per foot of depth

Weight of concrete: 150 p.c.f.

ALLOWABLE STRESSES

f_c' = 3250 p.s.i. at 28 days
f_c = 1462 p.s.i.
f_s = 24,000 p.s.i.
n = 8.8
shear and bond stresses per A.C.I. 318-63

INVERT AND STARTER WALLS f_c' = 4,500 P.S.I. at 28 days.

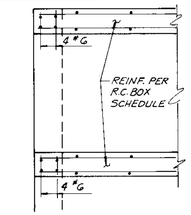
R.C. BOX LOCATION SCHEDULE

Box Sect.	Station From	Station To	REMARK
I	22+26.00	26+14	10.5'W x 11.5'H RCB
△2			
II	26+14	26+16	10.5'W x 11.5'H RCB
III	26+16	27+17	10.5'W x 10.5'H RCB
△ IV	27+17	30+30	10.5'W x 10.5'H RCB
△ V	30+30	31+50	10.5'W x 10.5'H RCB
△ VI	31+50	38+42.88	10.5'W x 10.5'H RCB

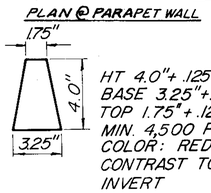
BOX SECTION		I		II		III		IV		V		VI
Design Cover		72'	△1	9'		5'		16'		20'		25'
Width	W	10.5'		10.5'		10.5'		10.5'		10.5'		10.5'
Height	H	11.5'		11.5'		10.5'		10.5'		10.5'		10.5'
Top Slab Thickness	T_1	14"		13"		13" △2 / 10" △2		18"		22"		25"
Side Wall Thickness	T_2	12"		10"		10" △2		12"		14"		15"
Bottom Slab Thickness	T_3	16"		15"		13"		20"		24"		27"
B Bars	Bar No & Spacing	#6@12"		#6@12"		#6@12"		#7@12"		#7@12"		#8@12"
	Length	12'-2"		11'-10"		11'-8"		12'-2"		12'-4"		12'-8"
B_1 Bars	Bar No & Spacing	#5@12"		#5@12"		#5@12"		#6@12"		#7@12"		#7@12"
	Length	7'-0"	△1	6'-3"		6'-9"		8'-5"		10'-7"		10'-0"
C Bars	Bar No & Spacing	#6@12"		#7@12"		#6@12"		#7@12"		#7@12"		#7@12"
	Horiz. Length	4'-8"		5'-4"		4'-4"		4'-11"		4'-10"		4'-11"
	Vert. Length	8'-5"		7'-10"		7'-6"		8'-10"		9'-1"		9'-5"
C_1 Bars	Bar No & Spacing	#6@12"		#6@12"		#5@12"		#6@12"		#6@12"		#6@12"
	Horiz. Length	3'-6"		3'-0"		2'-8"		2'-11"		2'-11"		3'-1"
	Vert. Length	3'-9"	△1	3'-2"		2'-10"		3'-7"		3'-11"		4'-3"
C_2 Bars	Bar No & Spacing	#6@12"		#7@12"		#6@12"		#7@12"		#7@12"		#7@12"
	Horiz. Length	3'-9"		4'-2"		3'-3"		3'-10"		3'-9"		3'-10"
	Vert. Length	8'-5"		7'-10"		7'-6"		8'-10"		9'-2"		9'-5"
C_3 Bars	Bar No. & Spacing	#6@12"		#6@12"		#5@12"		#6@12"		#6@12"		#6@12"
	Horiz. Length	2'-10"		2'-3"		1'-10"		2'-3"		2'-2"		2'-4"
	Vert. Length	3'-9"	△1	3'-2"		2'-10"		3'-7"		3'-11"		4'-2"
D Bars	Bar No. & Spacing	#6@12"		#5@6"		#5@12"		#6@12"		#6@12" △1		#7@12"
	Length	13'-7"		12'-5"		12'-0"		13'-3"		13'-11"		14'-5"
F Bars	Bar No & Spacing	#6@12"		#6@12"		#6-12"		#7@12"		#8@12"		#8@12"
	Length	12'-2"		11'-10"		11'-8"		12'-2"		12'-4"		12'-8"
F_1 Bars	Bar No & Spacing	#6@12"	△1	#5@12"		#6@12"		#7@12"		#7@12"		#7@12"
	Length	9'-10"	△1	8'-6"		9'-11"		10'-4"		11'-9"		12'-2"
G Bars	Bar No & Spacing	#4@12"		#4@12"		#4@12"		#4@12"		#4@12"		#4@12"
	Length	6'-0"		4'-2"		6'-1"		5'-4"		5'-10"		6'-0"
H Bars	Bar No & Spacing	#4@12"		#4@12"		#4@12"		#4@12"		#4@12"		#4@12"
	Length	7'-9"		6'-7"		8'-3"		7'-7"		7'-11"		8'-0"
NUMBER OF LONGITUDINAL REINFORCEMENT #4 BARS												
Top Slab		19		18		18		25		31		35
Bottom Slab		22		20		18		27		34		38
Side Walls		30		28		28		28		32		34
TOTAL		71		66		64		80		97		107
QUANTITIES												
Concrete Cu. Yds./Lin Ft.		2.01		1.76		1.62 △2		2.24		2.73		3.06
Steel Lbs./Lin Ft.		264.6		291.4		223.4		330.14		364.3		407.1

ADDITIONAL NOTES FOR BOX CHANNEL

1. LONGITUDINAL STEEL SHALL BE CONTINUOUS AND EXTEND THROUGH ALL CONSTRUCTION JOINTS.
2. UNLESS OTHERWISE SHOWN ON DRAWINGS, TRANSVERSE JOINT KEYWAYS (IN BOTH SLABS AND WALLS), AS DETAILED FOR LONGITUDINAL KEYWAYS AT THE BASE OF THE WALLS, SHALL BE PLACED AT THE END OF EACH POUR, BUT THE SPACING THERE OF SHALL NOT EXCEED 50 FEET OR BE LESS THAN 10 FEET. ALL CONSTRUCTION JOINTS IN BOTTOM SLAB, TOP SLAB, AND SIDE WALLS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED.
3. UNLESS OTHERWISE SHOWN ON DETAILS, IN CURVED SECTIONS TRANSVERSE BARS SHALL BE PLACED RADIALLY. STRAIGHT TRANSVERSE BARS IN TOP AND BOTTOM SLABS SHAL BE SPACED AS SHOWN ON THE TYPICAL SECTIONS; SPACING SHALL BE AT THE CENTERLINE OF THE BARREL ON OUTSIDE OF THE CURVE FOR DOUBLE BARREL BOXES. STRAIGHT BARS AND L-BARS IN WALL SHALL BE SPACED AS SHOWN ON TYPICAL SECTIONS, WITH THE SPACING MEASURED BETWEEN THE VERTICAL LEGS OF BARS.
4. AT THE BEGINING AND ENDING OF ALL POURS, A CURTAIN OF REINFORCEMENT COMPOSED OF B, C, C2, D, CW, F, G, AND H BARS SHALL BE PLACED THREE INCHES FROM THE TRANSVERSE CONSTRUCTION JOINT.
5. THE VERTICAL WALL STEEL IN INTERIOR WALLS AND IN THE INTERIOR FACE OF EXTERIOR WALLS MAY BE SPLICED AT THE CONSTRUCTION JOINT AT THE BASE OF THE WALL. THE SPLICES SHALL BE 45 BARS DIAMETERS IN LEGENTH.
6. IN ALL SECTIONS LAP C AND C2 BARS, THE VERTICAL LENGTH OF C AND C2 BARS HAVE BEEN COLCULATED FOR A 4 INCH STARTER WALL. IF THE HEIGTH OF THE STARTER WALL IS VARIED, THE VERTICAL LENGTH OF THE C AND C2 BARS SHALL BE VARIED CORRESPONDINGLY SO AS TO MAINTAIN A 45 DIAMETER LAP BETWEEN THE TWO BARS. TIE LAPS SHALL BE BASED ON THE SMALLER BARS.
7. CONCRETE QUANTITIES ARE BASED ON A 6 X 6 INCH FILLET AND THE STEEL QUANTITIES DO NOT INCLUDE ANY OPTIONAL SPLICES.
8. IF WALL THICKNESS IS 6 INCHES, PLACE REINFORCEMENT AT THE CENTERLINE OF THE WALL.
9. BOX INVERT SURFACE SHALL HAVE A STEEL TROWEL FINISH.
10. ALL CONC. SHALL BE 3250 LBS. PER SQUARE INCH IN 28 DAYS EXCEPT INVERT AND STARTER WALLS WHICH SHALL BE 4,500 LBS. PER SQUARE INCH IN 28 DAYS.



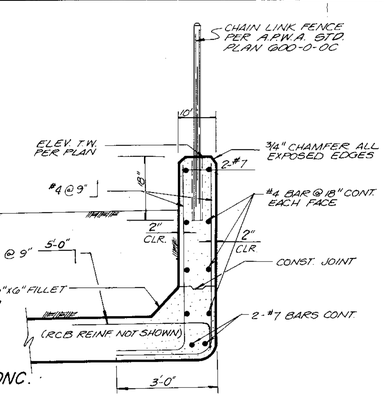
PLAN @ PARAPET WALL



HT 4.0"+.125"
BASE 3.25"+.125"
TOP 1.75"+.125"
MIN. 4,500 PSI
COLOR: RED
CONTRAST TO CONC. INVERT

WEAR CONE DETAIL

NOT TO SCALE



PARAPET WALL DETAIL

NOT TO SCALE

1 1/2 0 1 2

3 inches on original drawing

MARK	DATE	DESCRIPTION
△2	11/24/89	MODIFIED TOP SLAB & WALL (TYPE III) TO SUIT SETT. JOINTS
△1	1-30-90	P.B.V. W.E.S.O.T.R.P.J.

REVISIONS

DESIGNED PD | DRAWN SS | CHECKED BMP

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F 19502

R.C.B. ALTERNATE

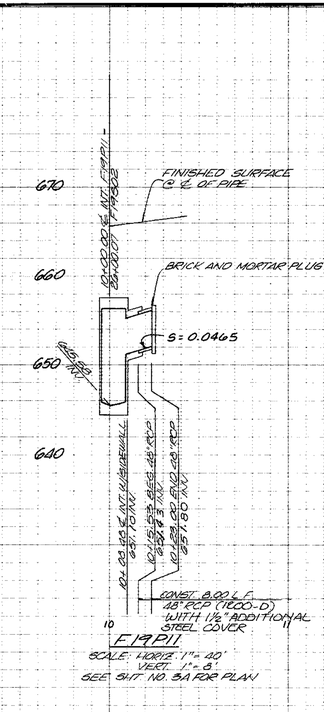
SINGLE REINF. CONC. BOX SCHEDULE AND DETAILS

PREPARED UNDER SUPERVISION OF JAMES E. McDONALD RCE 29464 | DATE 5-8-89

SCALE AS SHOWN | DATE APR 1989 | DWG. NO.

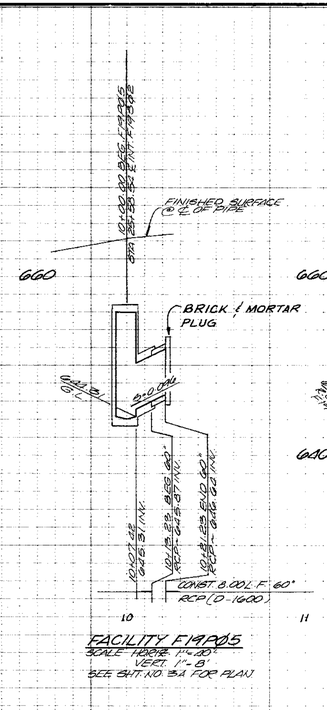
SHEET 6A OF 7

24321.28 - IMP. SMPF



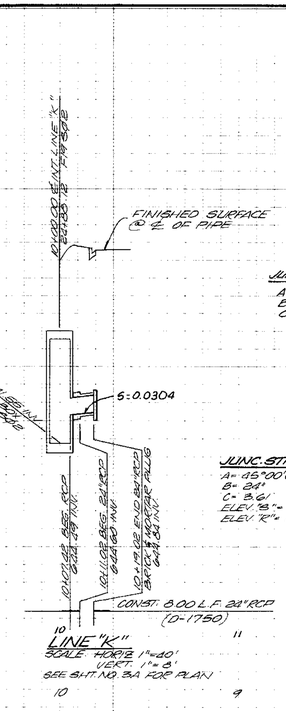
F19P11

SCALE: HORIZ. 1"=40'
VERT. 1"=8'
SEE SHT. NO. 3A FOR PLAN



FACILITY F19P05

SCALE: HORIZ. 1"=40'
VERT. 1"=8'
SEE SHT. NO. 3A FOR PLAN

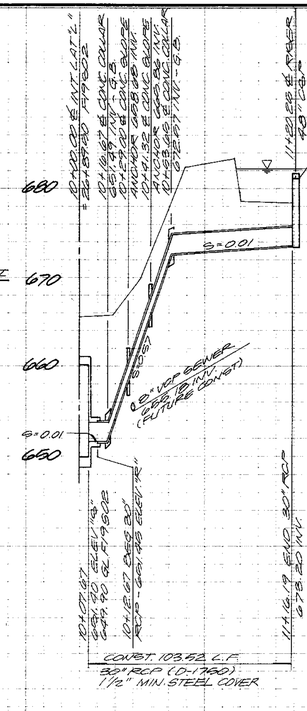


LINE "K"

SCALE: HORIZ. 1"=40'
VERT. 1"=8'
SEE SHT. NO. 3A FOR PLAN

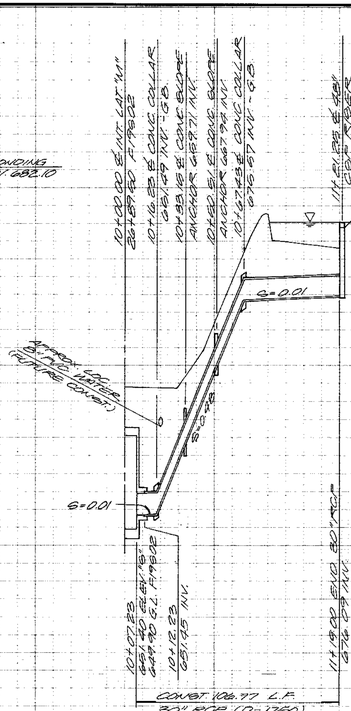
JUNC. STRUCT. TYPE NO. II
A = 45°00'00"
B = 30"
C = 6.50'

JUNC. STRUCT. TYPE II
A = 45°00'00"
B = 24"
C = 3.61'
ELEV. "B" = 644.49
ELEV. "R" = 644.60



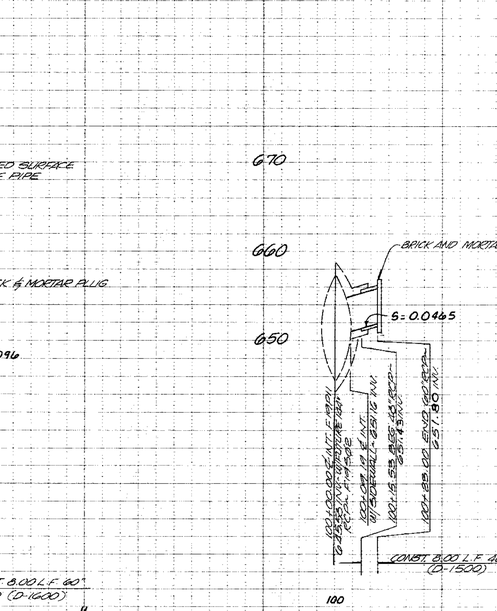
LATERAL "L"

SCALE: HORZ. 1"=40'
VERT. 1"=8'



LATERAL "M"

SCALE: HORZ. 1"=40'
VERT. 1"=8'

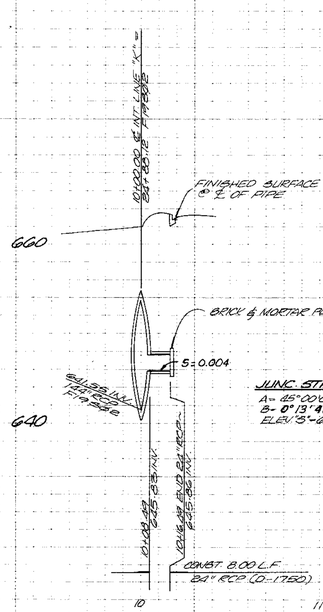


F19P05

SCALE: HORIZ. 1"=40'
VERT. 1"=8'
SEE SHT. NO. 3B FOR PLAN

F19P11

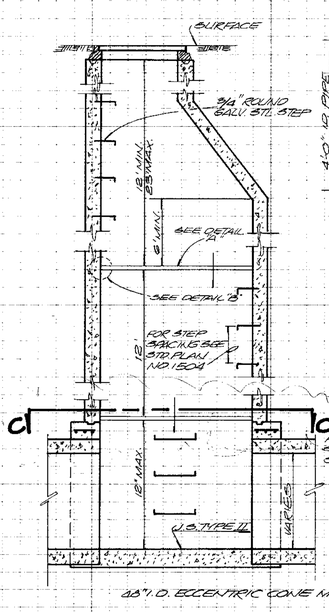
SCALE: HORIZ. 1"=40'
VERT. 1"=8'
SEE SHT. NO. 3B FOR PLAN



LINE "K"

SCALE: HORIZ. 1"=40'
VERT. 1"=8'
SEE SHT. NO. 3B FOR PLAN

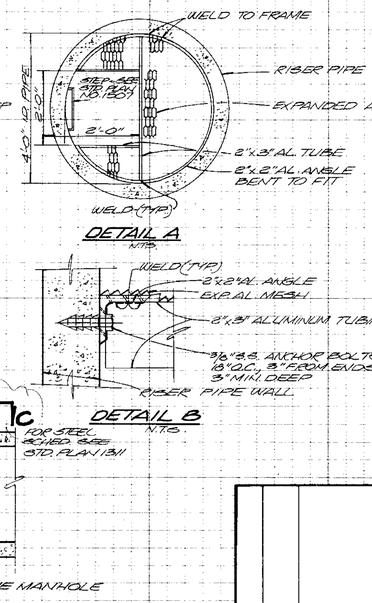
JUNC. STRUC. TYPE VI
A = 45°00'00"
B = 0°13'48"
ELEV. "S" = 645.83



DEEP MANHOLE LANDINGS

N.T.S.

NOTES:
1. SPACING DIMENSIONS BETWEEN LANDINGS TO START AT BOTTOM OF HOLE.
2. ROTATE PLATFORM OPENING 90° MIN. FROM OPENING BELOW.
3. WELDS TO BE HELI-ARC PER AWS SPECS.
4. FOR BASE SEE STD. PLAN NO. 1811
5. FOR PIPE AND CONE SEE STD. PLAN NO. 1804

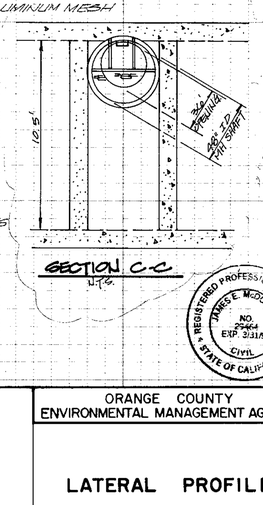


DETAIL A

N.T.S.

DETAIL B

N.T.S.



REGISTERED PROFESSIONAL ENGINEER
JAMES E. McDONALD
NO. 25464
EXP. 3/31/93
CIVIL
STATE OF CALIFORNIA

MARK	DATE	DESCRIPTION
△	1-30-90	ADD LATS "L", "M", DETAIL 17

REVISIONS

DESIGNED
DRAWN
CHECKED

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

LATERAL PROFILE

PREPARED UNDER SUPERVISION OF: James E. McDonald RCE 25464 DATE 1-29-90

SCALE: AS SHOWN
DATE
DWG. NO. F19502-713-2

SHEET 7 OF 7

94391-28 - IMP. SMPF.

E 6122407.501
N 2197544.835
E 6143907.682
N 2197544.614

41

49

51

REFERENCE PLAN F19P06-713-1
F19P06
90" RCP
Q25 = 808 CFS

REFERENCE PLAN F19P06-713-1
F19P07
10.5'X10.5' RCB
Q100 = 729.2 CFS

REFERENCE PLAN F19-701-3
F19
DBL. 12'WX8'H RCB
Q100 = 2100 CFS

(100-YEAR HC PER 2014
COUNTY HYDROLOGY
STUDY = 1950 CFS)

100-YEAR HC PER 2014
COUNTY HYDROLOGY
STUDY = 2150 CFS

100-YEAR HC PER 2014
COUNTY HYDROLOGY
STUDY = 2350 CFS

REFERENCE PLAN F19P06-713-1
F19P07
10.5'X10.5' RCB
Q100 = 1747.3 CFS

LIMESTONE–
WHITING RANCH
WILDERNESS PARK

UPPER OSO
RESERVOIR

O'NEILL
REGIONAL
PARK

CITY OF LAKE FOREST

CITY OF RANCHO SANTA MARGARITA

CITY OF MISSION VIEJO

N 2181744.911
E 6122407.313

N 2181744.655
E 6143907.541

58

NOTICE

The drainage information has been prepared for information purposes only. The location, ownership, facility information and limits have been determined from available information provided by public agencies, but may not be exact, accurate, or up-to-date. The user of this information is responsible for verifying exact location, ownership, accuracy, and the regional versus local character of drainage facilities.

Additional information may be obtained from public plans and recorded deeds. Facility designations included with this information are for convenience only and are not controlling or intended to imply ownership by the County or the Orange County Flood Control District (OCFCD). The information is being provided as a courtesy and neither the County of Orange nor OCFCD assume any liabilities for inaccuracy of the information.

To notify OC Public Works Flood Control Section of additions or corrections, please contact Sal Gutierrez at (714) 834-5396 or by email at sal.gutierrez@ocpw.ocgov.com

N

0 200 400 600 800
FEET

ORANGE COUNTY FLOOD CONTROL DISTRICT

BASE MAP OF DRAINAGE FACILITIES IN ORANGE COUNTY

REVISION	DATE	SHEET NO.	DWG. NO.
S. GUTIERREZ	MAR 12/2007	50	MAPS-113-3

- Channel Drainage Area Boundary
- Major Sub-Area Drainage Boundary
- Minor Sub-Area Drainage Boundary
- Existing O.C.F.C.D. Facility
- Existing Local Facility
- Existing Retarding Basin or Reservoir
- Natural Watercourse
- City Limits
- G G Greenbelt
- P.S. P.S. Pump Station
- Catch Basin (length in feet)
- Drop Inlet or Other Entry
- OCFCD Basins or Reservoirs

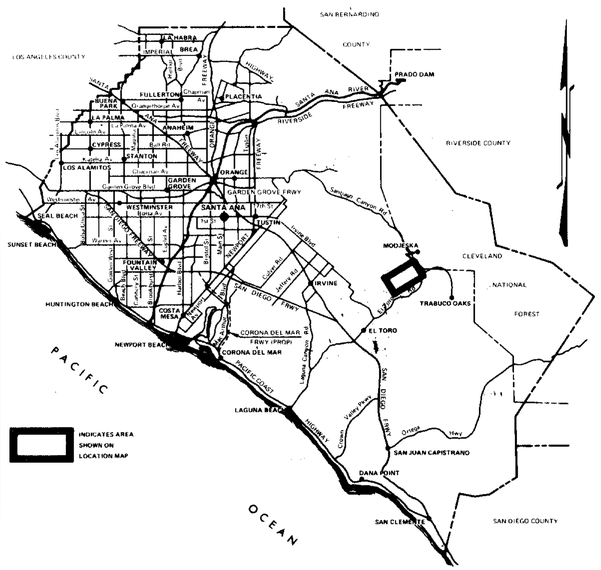
Ownership (If other than City or County): Private = P State = S Federal = F

EXISTING FACILITIES

O.C.F.C.D.	LOCAL	
		Earth Trapezoidal Channel (base width by height in feet)
		Reinforced Concrete Trapezoidal Channel (base width by height in feet)
		Reinforced Concrete Rectangular Channel (base width by height in feet)
		Reinforced Concrete Box (RCB) (number of barrels-span by height in feet)
		Reinforced Concrete Pipe (RCP) (diameter in inches)
		Metal Sheet Channel (MSC) (Base width by pile height in feet./Sheet pile total length)
		Corrugated Metal Pipe (CMP) (diameter in inches)
		Concrete Pipe (diameter in inches)
		Concrete Oval Pipe (width by height in inches)
		Steel Pipe (diameter in inches)
		Reinforced Concrete Arch (base span by height in inches)
		Corrugated Metal Arch (base span by height in inches)

50

50



VICINITY MAP

1 0 5 10
SCALE IN MILES

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

SANTA ANA, CALIFORNIA

E. SCHNEIDER, DIRECTOR

PLANS FOR CONSTRUCTION OF

THAT PORTION OF

SERRANO CREEK CHANNEL
FACILITY F19
FROM

450 FT. WEST OF LAKE FOREST DRIVE

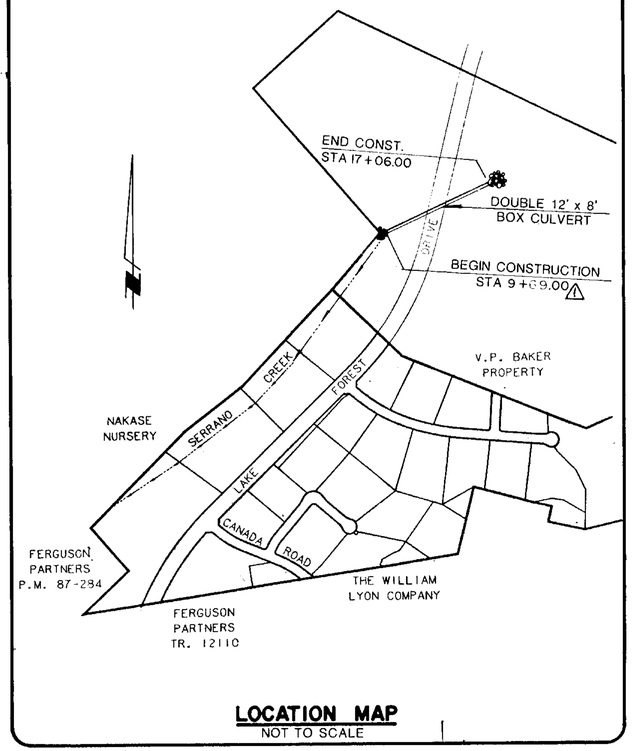
TO

280 FT. EAST OF LAKE FOREST DRIVE

(BONDED WITH TENTATIVE TRACT 13336)

INDEX OF SHEETS

SHEET	DESCRIPTION
1	TITLE SHEET
2	GENERAL NOTES, CONSTRUCTION NOTES & ESTIMATED QUANTITIES
3	PLAN & PROFILE STA. 9+20.00 TO 17+06.00
4	BOX CULVERT & INLET DETAILS
5	INLET AND OUTLET DETAILS
6	ENERGY DISSIPATOR & OUTLET DETAILS



LOCATION MAP
NOT TO SCALE

UTILITY		PHONE NO.
SEWER AND WATER	LOS ALISOS WATER DISTRICT	(714) 830-0580
ELECTRIC	SO. CAL. EDISON CO.	(714) 835-3833
GAS	SO. CAL. GAS CO.	(714) 834-0211
TELEPHONE	PACIFIC TELEPHONE CO.	(213) 621-3111
COUNTY OF ORANGE	INSPECTION	(714) 567-7800

BENCH MARK: ELEV. = 700.698
AN ALUMINUM CAP ABOUT 1.6 MILES NORTHERLY ALONG CANADA ROAD FROM ITS JUNCTION WITH OLD TRABUCO ROAD, TO THE MIDDLE OF A REVERSE CURVE IN THE ROAD, 32.5 FEET SOUTHEAST OF THE CENTER OF CANADA ROAD, 67.1 FEET EAST OF THE STEEL PIPE CORNER POST AT THE FENCE CORNER ACROSS THE ROAD, 93.0 FEET NORTHEAST OF A 20 INCH EUCALYPTUS TREE ON SOUTH SIDE OF ROAD WITH A NO TRESPASSING SIGN, SET IN TOP OF A CONCRETE POST IN THE CUTBANK OF THE ROAD, WITH WITNESS POST AND PADDLEBOARD 1.2 FEET NORTHWEST OF MONUMENT.

BASIS OF BEARING:
THE BEARING OF N. 47°01'13" E. FOR THE CENTERLINE OF CANADA ROAD PER P.M.: 79-132 PMB 143/11-16, RECORDS OF ORANGE COUNTY.

COUNTY OF ORANGE
E.M.A. REGULATION

APPROVED
BY: Patrick Stanton 3/22/90
R.C.E. DATE

THIS PLAN IS SIGNED BY E.M.A./REGULATION FOR CONCEPT AND ADHERENCE TO COUNTY STANDARDS AND REQUIREMENTS ONLY.
E.M.A./REGULATION IS NOT RESPONSIBLE FOR DESIGN, ASSUMPTIONS OR ACCURACY.

PRIVATELY MAINTAINED BETWEEN STATIONS 9+69 TO 10+56

MAINTAINED BY O.C.F.C.D. BTWN STA 10+56 TO 17+06

FUNDED BY: FOOTHILL CIRCULATION PHASING PLAN & DEVELOPER FUNDS

REGISTERED PROFESSIONAL ENGINEER
CHRIS H. ROCKWAY
No. 35370
EXP 9-30-91
CIVIL
STATE OF CALIFORNIA

COUNTY OF ORANGE
E.M.A. REGULATION

APPROVED
BY: Patrick Stanton 9/11/89
R.C.E. DATE

CONST. FROM STA 12+00 TO STA 18+00 ONLY

THIS PLAN IS SIGNED BY E.M.A./REGULATION FOR CONCEPT AND ADHERANCE TO COUNTY STANDARDS AND REQUIREMENTS ONLY.
E.M.A./REGULATION IS NOT RESPONSIBLE FOR DESIGN, ASSUMPTIONS, OR ACCURACY.

Greiner

GREINER, INC.
1221 EAST DYER ROAD, SUITE 100
SANTA ANA, CALIFORNIA 92705-5605
(714) 250-4490

A GREINER ENGINEERING INC. COMPANY

PLANS PREPARED UNDER THE DIRECTION OF:

Chris H. Rockway R.C.E. NO. 35370 DATE: 3-14-89
CHRIS H. ROCKWAY

NO.	DESCRIPTION	SHT.	APPROVED	DATE
1	W.SIDE OUTLET STRUCTURE LOCATION, CLARIFIED VARIOUS DETAILS, ADDED BOOK SIGNATURE BLOCK	1,2,5,6	P. Stanton	3/22/90

REVISIONS

W. O. NO. _____
DWG. NO. F19-701-3

SHEET 1 OF 6

STORM DRAIN GENERAL NOTES

1. ALL WORK TO BE DEDICATED TO THE ORANGE COUNTY FLOOD CONTROL DISTRICT SHALL BE IN CONFORMANCE WITH THE O.C.E.M.A. STD. SPECIFICATIONS (PUBLIC WORKS CONSTRUCTION 1985 EDITION) AND THE O.C.E.M.A. STD. PLANS WHICH MAY BE PURCHASED FROM THE DISTRICT AND SHALL BE KEPT ON THE JOB SITE AT ALL TIMES.
2. THE CONTRACTOR SHALL NOTIFY THE DISTRICT'S INSPECTOR AT LEAST 48 HOURS PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION BY TELEPHONING 567-7800 OR BY WRITING THE ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY, P. O. BOX 486, SANTA ANA, CALIFORNIA 92702.
3. ALL CONCRETE SHALL HAVE A MINIMUM 28 DAYS ULTIMATE COMPRESSIVE STRENGTH OF 3,250 PSI. CEMENT SHALL CONFORM TO ASTM C150, TYPE II. CONCRETE FOR INVERT SHALL BE 560-B-3250 AND FOR WALLS AND DECK SHALL BE 560-C-3250.
4. ALL CONDUIT LENGTHS ARE HORIZONTAL PROJECTIONS, UNLESS OTHERWISE SHOWN.
5. LOCATIONS OF PUBLIC UTILITIES SHOWN HAVE BEEN DETERMINED FROM AVAILABLE INFORMATION. HOWEVER, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE TRUE LOCATION OF ANY EXISTING UTILITIES AND TO EXERCISE PROPER PRECAUTIONS TO AVOID INJURY OR DAMAGE THERETO.
6. ALL REINFORCING BARS SHALL CONFORM TO ASTM A615 GRADE 60, DEFORMED BARS.
7. FOR ADDITIONAL STRUCTURAL NOTES, SEE THIS SHEET.
8. ALL MATERIALS TESTING FOR THE DRAINAGE FACILITIES SHALL BE PROVIDED BY THE DEVELOPER IN ACCORDANCE WITH THE NUMBER, LOCATION AND FREQUENCY REQUESTED BY THE FLOOD CONTROL DISTRICT'S INSPECTOR.
9. A SOILS INVESTIGATION REPORT ENTITLED "SUPPLEMENTAL INVESTIGATION AND GEOTECHNICAL REVIEW OF REVISED GRADING PLANS, LAKE FOREST EXTENSION BETWEEN STATIONS 290+85, COUNTY OF ORANGE CALIFORNIA" AND SHALL BE INCLUDED AS A PART OF THESE PLANS. ALL WORK SHALL CONFORM TO RECOMMENDATIONS AS OUTLINED IN SAID REPORT.
10. CHAMFER ALL EXPOSED EDGES OF CONCRETE 3/4".
11. CLEARANCE BETWEEN EDGE OF CONCRETE AND REINFORCING STEEL MUST BE 1-1/2 INCHES MINIMUM, UNLESS OTHERWISE NOTED.
12. ALL REINFORCING BARS MUST BE SECURELY HELD IN PLACE IN THE FORMS. TWO WAY MATS OF STEEL MUST BE WIRED TOGETHER BOTH WAYS AT ALTERNATE INTERSECTIONS.
13. ALL PIPE SECTIONS IN CURVES TO BE BANDED AND GROUTED.
14. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, THE DEVELOPER'S CONTRACTOR SHALL OBTAIN A PERMIT FROM THE STATE DIVISION OF INDUSTRIAL SAFETY. A COPY OF THE PERMIT SHALL BE KEPT ON THE JOB SITE AT ALL TIMES.
15. FOR TRENCH EXCAVATIONS IN NATIVE SOIL, SHORING SHALL BE PROVIDED TO SATISFY STATE OF CALIFORNIA SAFETY REQUIREMENTS.
16. PRIOR TO EXCAVATION, CONTRACTOR SHALL CONTACT PACIFIC BELL LOCATING SERVICES (PHONE 639-0811) FOR THEIR SERVICES.
17. THE CONTRACTOR SHALL CONDUCT CONSTRUCTION OPERATIONS IN SUCH A MANNER THAT STORM OR OTHER WATERS MAY PROCEED UNINTERRUPTED ALONG THEIR EXISTING STREET OR DRAINAGE COURSES.
18. IN THE COURSE OF WATER CONTROL, THE CONTRACTOR SHALL CONDUCT CONSTRUCTION OPERATIONS TO PROTECT WATERS FROM POLLUTION WITH FUELS, OILS, BITUMENS, OR OTHER HARMFUL MATERIALS.
19. ALL REINFORCED CONCRETE PIPE SHALL BE BEDDED IN ACCORDANCE WITH O.C.E.M.A. STD. PLAN NO. 1319.
20. ALL FILL AND BACKFILL SHALL BE COMPACTED TO MIN. 90 PERCENT OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE CALIFORNIA TEST METHOD NO. 216. ALL FILL AND BACKFILL SHALL BE FREE FROM VEGETABLE MATTER. HOWEVER, IT MAY CONSIST OF ONSITE SILTY SAND OR CLAYEY SAND (SM,SC). THE FILL AND BACKFILL SHALL BE COMPACTED IN APPROXIMATELY 6 INCH INCREMENTS. IN ORDER TO AVOID UNBALANCED D-LOADS ON THE STORM DRAIN, THE DIFFERENCE IN BACKFILL ELEVATION ON ADJACENT SIDES OF THE R.C.P. OR R.C.B. DRAIN SHALL NOT EXCEED 2 FEET. NO STORM DRAIN SHALL BE PLACED UNTIL THE SOILS ENGINEER HAS INSPECTED AND APPROVED THE BOTTOM OF THE TRENCH. ISOLATED ZONES OF SOFT COMPRESSIBLE SOILS OR LARGE ROCKS SHALL BE COMPLETELY REMOVED AND REPLACED WITH PROPERLY COMPACTED SOILS. PRECAUTIONS SHALL BE TAKEN TO INSURE THAT THE STORM DRAIN IS NOT DAMAGED BY HEAVY COMPACTING EQUIPMENT. HEAVY COMPACTING EQUIPMENT SHALL NOT BE USED WITHIN A 1 TO 1 PLANE RISING FROM THE BASE OF THE STORM DRAIN OR WITHIN 2 FEET OF THE TOP OF THE STORM DRAIN, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO THE STORM DRAIN RESULTING FROM INAPPROPRIATE COMPACTION TECHNIQUES AND EQUIPMENT. SOILS ENGINEER SHALL APPROVE AND SUPERVISE BACKFILLING.
21. CONSTRUCTION OF ALL REINFORCED CONCRETE SECTIONS (INCLUDING INVERTS) SHALL BE BY THE ALTERNATE PANEL METHOD, AND NO CONTINUOUS PLACEMENT THROUGH JOINTS WILL BE PERMITTED. AFTER PLACEMENT OF ALL CONCRETE IN A PANEL, OR ONE SIDE OF THE JOINT, HAS BEEN COMPLETED, PLACEMENT OF CONCRETE ON THE OTHER SIDE OF THE JOINT SHALL BE DELAYED AS DIRECTED BY THE ENGINEER, BUT IN NO EVENT SHALL THE DELAY BE LESS THAN EIGHT (8) HOURS.
22. ALL SURVEYING REQUIRED FOR VERTICAL AND HORIZONTAL ALIGNMENT MUST BE PROVIDED BY THE CONTRACTOR OR DEVELOPER AND SUFFICIENT REFERENCE STAKING MUST BE IN ACCORDANCE WITH THE REQUEST OF THE O.C.E.M.A. INSPECTOR. PROVIDE O.C.E.M.A INSPECTOR 3 COPIES OF CUT SHEET.
23. WHENEVER APPLICABLE, THE DEVELOPER SHALL OBTAIN A PERMIT FROM THE STATE DEPARTMENT OF FISH AND GAME IN ACCORDANCE WITH SECTION 1602 OF THE CALIFORNIA FISH AND GAME CODE PRIOR TO COMMENCEMENT OF CONSTRUCTION.
24. A PERMIT FOR WORK WITHIN EXISTING STREET RIGHT OF WAY IS REQUIRED FROM THE COUNTY OF ORANGE FOR ANY ENCROACHMENT NECESSARY FOR CONSTRUCTION IN PUBLIC RIGHT OF WAY.
25. STORM DRAIN BACKFILL FOR ALL FACILITIES WITHIN STREET RIGHT OF WAY IS TO BE PLACED AND COMPACTED UNDER O.C.E.M.A. INSPECTION AND MEET OR EXCEED O.C.E.M.A. MINIMUM STANDARDS.
26. LENGTH OF MANHOLE STRUCTURES MAY BE INCREASED TO MEET PIPE ENDS AT OPTION OF CONTRACTOR AS LONG AS REINFORCING STEEL IS CONTINUED AS REQUIRED. ANY CHANGE IN SPUR LOCATION MUST BE APPROVED BY THE ENGINEER.
27. LOCAL DEPRESSIONS AND DECKS OF CURB INLETS SHALL NOT BE POURED UNTIL STAKING FOR LINE AND GRADE OF CURB AND GUTTER IS COMPLETED WITHIN 25' OF INSIDE OF INLET WALLS ON BOTH SIDES OF ADJACENT CURB AND GUTTER HAS BEEN PREVIOUSLY POURED.
28. FLOOR OF MANHOLE STRUCTURE SHALL BE STEEL TROWELLED TO SPRING LINE.
29. RCP SHALL COMPLY WITH ALL A.S.T.M. APPLICABLE STANDARDS.
30. WORKING WITHIN ORANGE COUNTY FLOOD CONTROL FACILITIES AND RIGHT OF WAY IS RESTRICTED TO THE PERIOD OF APRIL 15 TO OCTOBER 15.
31. THE CONTRACTOR SHALL VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF ALL EXISTING FACILITIES PRIOR TO CONSTRUCTION. CONTRACTOR SHALL NOTIFY ENGINEER OF ANY DISCREPANCIES OR CONFLICTS.

GENERAL NOTES

1. THIS NOTE HEREIN INCORPORATES BY REFERENCE, THOSE GENERAL NOTES NUMBERED 1 THROUGH 17 OF OCEMA STANDARD PLAN 1801, 1986 EDITION.
2. THE DEVELOPER/CONTRACTOR SHALL HAVE A COPY OF THE CURRENT OCEMA STANDARD PLANS ON THE CONSTRUCTION SITE AT ALL TIMES.
3. THE DEVELOPER SHALL TELEPHONE EMA/PUBLIC WORKS/CONSTRUCTION AT 567-7800 AT LEAST 24 HOURS PRIOR TO STARTING CONSTRUCTION WORK SUBJECT TO EMA/PUBLIC WORKS' INSPECTION.
4. EMA ENCROACHMENT PERMIT REQUIRED. EMA APPROVED PLANS DO NOT RELIEVE CONTRACTOR/DEVELOPER FROM RESPONSIBILITY TO OBTAIN PUBLIC PROPERTY PERMIT WHICH SHALL BE AVAILABLE ON THE JOB AT ALL TIMES WORK IS BEING ACCOMPLISHED IN THE PUBLIC RIGHT OF WAY.
5. ALL CONCRETE CURB AND GUTTER FLOWLINES WITH LESS THAN 1% GRADE SHALL BE WATER TESTED PRIOR TO FINAL FINISHING TO INSURE PROPER DRAINAGE WITHOUT UNACCEPTABLE HIGH OR LOW SPOTS.
6. ALL UTILITY TRENCH BACKFILL AND COMPACTION INSPECTION OUTSIDE THE LIMITS OF DEDICATED STREET RIGHT-OF-WAY SHALL BE PERFORMED BY OCEMA REGULATION.
7. ALL DAMAGED CONCRETE SIDEWALKS OR CURBS SHALL BE SAW-CUT TO THE NEAREST TRANSVERSE SCORE MARK OR ADJUSTABLE CONTROL JOINT OR WEAKENED PLANE JOINT AND REPLACED IN CONFORMANCE WITH THE APPLICABELE PROVISIONS OF OCEMA STANDARD PLANS.
8. DEVELOPER SHALL MAINTAIN ADJACENT STREETS IN A NEAT, CLEAN, DUST FREE AND SANITARY CONDITION AT ALL TIMES AND TO THE SATISFACTION OF COUNTY'S INSPECTOR. THE ADJACENT STREETS SHALL BE KEPT CLEAN OF DEBRIS, WITH DUST AND OTHER NUISANCE BEING CONTROLLED AT ALL TIMES. DEVELOPER SHALL BE RESPONSIBLE FOR ANY CLEAN UP ON ADJACENT STREETS AFFECTED BY HIS CONSTRUCTION, METHOD OF STREET CLEANING SHALL BE BY DRY SWEEPING OF ALL PAVED AREAS. NO STOCKPILING OF BUILDING MATERIALS WITHIN THE COUNTY RIGHT-OF-WAY WITHOUT THE PERMISSION OF COUNTY'S INSPECTOR.
9. PRIOR TO FINAL ACCEPTANCE OF STREET IMPROVEMENTS, ALL STREET PAVEMENT, STRIPING AND STENCILING WITHIN THE PERIMETER OF THE CONSTRUCTION PROJECT WILL BE RESTORE TO A "LIKE NEW"CONDITION, IN A MANNER MEETING THE APPROVAL OF THE DIRECTOR OF PUBLIC WORKS. ALL STRIPING AND STENCILING SHALL BE ACCORDING TO STANDARD PLAN NO. 1801, NOTE 17.
10. TRAFFIC SHALL BE MAINTAINED AT ALL TIMES AND SHALL BE PROTECTED WITH ADEQUATE BARRICADES, LIGHTS, SIGNS AND WARNING DEVICES AS PER THE CURRENT STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION, MANUAL OF TRAFFIC CONTROLS AND TO THE DIRECTIONS OF THE COUNTY'S INSPECTOR.
11. OCEMA STANDARD PLANS SHALL TAKE PRECEDENCE OVER ANY CONFLICTS EXCEPT FOR STANDARD PLANS AFFECTING UTILITY COMPANIES, IF THEIR STANDARDS ARE MORE STRINGENT.
12. ANY UTILITIES UNDER PAVED AREAS OF PRIVATE STREET SHALL HAVE A MINIMUM OF 30" COVER AND DEVELOPER SHALL PROVIDE PRIVATE LABORATORY COMPACTION CERTIFICATION FOR ALL UNDERGROUND UTILITIES PRIOR TO ANY PAVING. DEVELOPER SHALL SET UP A MEETING WITH THE INSPECTOR AND THE PRIVATE LABORATORY PRIOR TO ANY TESTING.
13. NO CONCENTRATED FLOWS ACROSS ASPHALT PAVEMENT WITHOUT COUNTY INSPECTOR'S APPROVAL.

HOLD HARMLESS AND INDEMNIFICATION CLAUSE

CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

EXISTING UNDERGROUND STRUCTURES

ALL UNDERGROUND UTILITIES OR STRUCTURES REPORTED BY THE OWNER OR OTHERS, AND THOSE SHOWN ON THE RECORDS EXAMINED, ARE INDICATED WITH THEIR APPROXIMATE LOCATION AND EXTENT. THE OWNER, BY ACCEPTING THESE PLANS OR PROCEEDING WITH IMPROVEMENTS PURSUANT THERETO, AGREES TO ASSUME LIABILITY AND TO HOLD UNDERSIGNED HARMLESS FOR ANY DAMAGES RESULTING FROM THE EXISTENCE OF UNDERGROUND UTILITIES OR STRUCTURES NOT REPORTED TO THE UNDERSIGNED, NOT INDICATED ON THE PUBLIC RECORDS EXAMINED, LOCATED AT VARIANCE WITH THOSE REPORTED OR SHOWN ON RECORDS EXAMINED. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES OR STRUCTURES SHOWN AND ANY OTHER UTILITIES OR STRUCTURES FOUND AT THE SITE. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE OWNERS OF THE UTILITIES OR STRUCTURES CONCERNED BEFORE STARTING WORK.

NOTICE TO CONTRACTOR

CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND SHALL REPORT ALL DISCREPANCIES TO THE ENGINEER PRIOR TO THE COMMENCEMENT OF WORK.

CAUTION: THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ENGINEER SHALL BE NOTIFIED OF ANY REQUESTED CHANGE OR CORRECTION TO THESE PLANS.

RIP RAP CHANNEL NOTES

1. THE CHANNEL CONTRACTOR SHALL COOPERATE FULLY WITH THE ARCHEAOLOGICAL AND PALEONTOLOGICAL CONSULTANTS DESIGNATED BY THE OWNER, AND WITH COUNTY INSPECTOR. THE ARCHAEOLOGIST AND PALEONTOLOGIST SHALL BE PRESENT AT THE PRECONSTRUCTION CONFERENCE, AND THEY SHALL SET THE CONTROLS THAT SHALL BE MAINTAINED FOR ARCHAEOLOGICAL AND PALEONTOLOGICAL SURVEILLANCE DURING ANY GRADING OPERATIONS. IF ARCHAEOLOGICAL AND PALEONTOLOGIST RESOURCES ARE DISCOVERED DURING CHANNEL GRADING, THE ARCHAEOLOGIST AND/OR PALEONTOLOGIST PRESENT SHALL REPORT SUCH FINDINGS TO THE PROJECT DEVELOPER AND TO THE DIRECTOR ENVIRONMENTAL MANAGEMENT AGENCY(EMA) THE PROJECT DEVELOPER SHALL TAKE SUCH ACTIONS NECESSARY TO INSURE THE THE SITE WILL NOT BE DESTROYED BEFORE EXPLORATION AND SHALL COORDINATE FURTHER GRADING AS CONCURRED IN BY THE DIRECTOR, EMA REGULATIONS.
2. ALL WORK SHALL BE IN CONFORMANCE WITH THE ORANGE COUNTY FLOOD CONTROL DISTRICT'S STANDARD SPECIFICATIONS, A COPY OF WHICH SHALL BE KEPT ON THE JOB SITE.
3. CONTRACTOR SHALL OBTAIN PERMIT FROM ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY FOR WORK WITHIN THEIR RIGHT-OF-WAY.
4. LOCATIONS OF PUBLIC UTILITIES SHOWN HAVE BEEN DETERMINED FROM AVAILABLE INFORMATION. HOWEVER, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE TRUE LOCATION OF ANY EXISTING UTILITIES AND TO EXERCISE PROPER PRECAUTIONS TO AVOID INJURY OR DAMAGE THERETO.
5. ALL TRENCH EXCAVATIONS SHALL CONFORM TO STATE OF CALIFORNIA CONSTRUCTION SAFETY ORDERS.
6. ALL FILL MATERIAL SHALL BE COMPACTED TO 90% RELATIVE COMPACTION AS DETERMINED BY CALIFORNIA TEST METHOD 216 F.
7. ALL MATERIALS TESTING FOR THE DRAINAGE FACILITIES SHALL BE PROVIDED BY THE CONTRACTOR OR DEVELOPER IN ACCORDANCE WITH THE NUMBER, LOCATION, AND FREQUENCY REQUESTED BY THE DISTRICT'S INSPECTOR.
8. CONCRETE AGGREGATE SHALL BE PLACED PER O.C.E.M.A. STANDARD PLAN 1809 BELOW RIP RAP AS SHOWN IN DETAIL THICKNESS OF AGGREGATE TO BE 6"MIN., 8"MAX GRADATION FOR AGGREGATE SHALL BE PER O.C.E.M.A. STD. PLAN NO. 1803, GRADATION D3 WHICH IS AS FOLLOWS.

SIEVE SIZE	% PASSING
3"	100
1-1/2"	90 - 100
1"	65 - 100
3/4"	50 - 90
3/8"	0 - 50
NO. 4	0 - 10
NO. 8	0 - 5

9. DURING RIP-RAP CONSTRUCTION EXCAVATED MATERIAL TO BE STOCKPILED OUT OF CHANNEL.
10. GRADATION SHALL FOLLOW GRADATION BELOW:

RIP RAP THICKNESS = 48"

% LTR BY WT.	WT. OF STONE IN LBS. MAX	MIN
100	1638	655
50	691	328
15	346	102

CONSTRUCTION NOTES & ESTIMATE OF QUANTITIES

	NO	DESCRIPTION	UNIT	QUANTITY
STORM DRAIN	60	CONSTRUCT DOUBLE 12'X8' R.C. BOX CULVERT PER DETAIL ON SHEET 4	LF	373
	61	CONSTRUCT R.C. ENERGY DISSIPATING OUTLET STRUCTURE PER DETAILS ON SHEETS 4, 5 AND 6	EA	1
	62	JOIN EXISTING R.C.P. INTO OUTLET STRUCTURE PER DETAIL ON SHEET 5	EA	1
	63	CONSTRUCT RIP-RAP PER O.C.E.M.A. STD. PLAN 1809 AND PER GRADATION SHOWN ON SHEET 2	EA	1
	64	CONSTRUCT CHAIN LINK FENCE PER A.P.W.A. STD. 600-0-0C ON TOP OF OUTLET AND INLET STRUCTURES	L.F.	360
	65	CONSTRUCT 25'X30'8" THICK R.C. PAD. SEE SECTION J-J ON SHEET 5	EA	1
	66	CONSTRUCT R.C. INLET STRUCTURE PER DETAILS ON SHEET 4, 5 AND 6	EA.	1
	67	CONSTRUCT 8" THICK R.C. APRON PER DETAIL ON SECTION ON SHEET 4 & 5	CY.	59
	68	CONSTRUCT R.C. CULVERT DEBRIS WALL PER DETAIL ON SHEET 5 AND O.C.E.M.A. STD. PLAN 1324	CY.	57
	69	CONSTRUCT R.C. CUT-OFF WALL PER DETAIL ON SHEET 4	CY.	5
	70	CONSTRUCT 4" THICK GUNITE SLOPE PROTECTION PER DETAIL ON SHEET 3	CY.	36
	71	INSTALL 16' DOUBLE SWING GATE PER O.C.E.M.A. STD. 600-0-0C	EA.	1
	72	CONSTRUCT CONCRETE WINGWALL PER DETAIL ON SHEET 6	CY.	15

STRUCTURAL NOTES-GENERAL

1. DIMENSIONS FROM FACE OF CONCRETE TO STEEL ARE TO FACE OF BARS AND SHALL BE ONE AND A HALF INCHES CLEAR UNLESS OTHERWISE SHOWN.
2. CONCRETE DIMENSIONS SHALL BE MEASURED HORIZONTALLY OR VERTICALLY ON THE PROFILE, AND PARALLEL TO OR AT RIGHT ANGLES (OR RADIALLY) TO CENTERLINE OF CONDUIT ON THE PLAN EXCEPT AS OTHERWISE SHOWN.
3. ALL BAR BENDS AND HOOKS SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE'S "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE", 1971 EDITION, SECTION 7.1.
4. PLACING OF REINFORCEMENT SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE'S "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE", 1971 EDITION, SECTION 7.3.
5. TRANSVERSE CONSTRUCTION JOINTS SHALL NOT BE PLACED WITHIN 30 INCHES OF MANHOLE OR JUNCTION STRUCTURE OPENINGS.
6. TRANSVERSE CONSTRUCTION JOINTS IN WALLS AND SLABS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED. TRANSVERSE CONSTRUCTION JOINTS SHALL BE NORMAL OR RADIAL TO THE CENTERLINE OF CONSTRUCTION.
7. EXPOSED EDGES OF CONCRETE MEMBERS SHALL BE ROUNDED OR BEVELED.
8. NO SPLICES IN TRANSVERSE STEEL REINFORCEMENT WILL BE PERMITTED OTHER THAN SHOWN ON THE DRAWING WITHOUT APPROVAL OF THE ENGINEER. NO MORE THAN TWO SPLICES WILL BE PERMITTED IN ANY LONGITUDINAL BAR BETWEEN TRANSVERSE JOINTS. SPLICES SHALL BE STAGGERED.
9. LONGITUDINAL STEEL SHALL BE LAPPED 24 BAR DIAMETERS AT SPLICES. TRANSVERSE STEEL SHALL BE LAPPED 45 BAR DIAMETERS AT SPLICES.

ADDITIONAL NOTES FOR R.C.B.

1. LONGITUDINAL STEEL SHALL BE CONTINUOUS AND EXTEND THROUGH ALL CONSTRUCTION JOINTS.
2. UNLESS OTHERWISE SHOWN ON THE DRAWINGS, TRANSVERSE JOINT KEYWAYS (IN SLABS AND WALLS), AS DETAILED FOR LONDITUDINAL KEYWAYS AT THE BASE OF THE WALLS, SHALL BE PLACED AT THE END OF EACH POUR, BUT THE SPACING THEREOF SHALL NOT EXCEED 50 FEET OR BE LESS THAN 10 FEET. ALL CONSTRUCTION JOINTS IN BOTTOM SLAB, TOP SLAB, AND SIDE WALLS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED.
3. UNLESS OTHERWISE SHOWN ON THE DETAILS, TRANSVERSE BARS IN CURVED SECTIONS SHALL BE PLACED RADIALLY. STRAIGHT TRANSVERSE BARS IN TOP AND BOTTOM SLABS SHALL BE SPACED AS SHOWN ON THE TYPICAL SECTIONS; SPACING SHALL BE AT THE CENTERLINE OF THE BARREL ON THE OUTSIDE OF THE CURVE FOR DOUBLE BARREL BOXES. STRAIGHT BARS AND L-BARS IN WALLS SHALL BE SPACED AS SHOWN ON THE TYPICAL SECTIONS, WITH THE SPACING MEASURED BETWEEN THE VERTICAL LEGS OF BARS.
4. AT THE BEGINNING AND ENDING OF ALL POURS, A CURTAIN OF REINFORCEMENT COMPOSED OF B, C, C2, D, CW, F, G, AND H BARS SHALL BE PLACED THREE INCHES FROM THE TRANSVERSE CONSTRUCTION JOINT.
5. THE VERTICAL WALL STEEL IN THE INTERIOR WALLS AND IN THE INTERIOR FACE OF EXTERIOR WALLS MAY BE SPLICED AT THE CONSTRUCTION JOINT AT THE BASE OF THE WALL. THE SPLICES SHALL BE 45 BAR DIAMETERS IN LENGTH.
6. IN ALL SECTIONS LAP C AND C2 BARS. THE VERTICAL LENGTH OF C AND C2 BARS HAS BEEN CALCULATED FOR A FOUR INCH STARTER WALL. IF THE HEIGHT OF THE STARTER WALL IS VARIED, THE VERTICAL LENGTH OF THE C AND C2 BARS SHALL BE VARIED CORREPONDINGLY SO AS TO MAINTAIN A 45 BAR DIAMETER LAP BETWEEN THE TWO BARS. THE LAPS SHALL BE BASED ON THE SMALLER BARS.
7. CONCRETE QUANTITIES ARE BASED ON A SIX BY SIX INCH FILLET AND THE STEEL QUANTITIES DO NOT INCLUDE ANY OPTIONAL SPLICES.
8. INVERT SURFACE SHALL BE GIVEN A STEEL TROWELED SURFACE.

CONSTRUCTION NOTES & ESTIMATE OF QUANTITIES

NO.	DESCRIPTION	UNIT	QUANTITY
73	CONSTRUCT JUNCTION STRUCTURE TYPE V PER O.C.E.M.A. STA. 1314	EA.	3
74	CONSTRUCT BRICK AND MORTAR PLUG	EA.	3
75	CONSTRUCT 8' SWING GATE PER OCEMA STD. NO. 1412	EA.	1
76	8" THICK P.C.C. PAD WITH #4 BAR @ 18" O.C. EACH WAY	SF	995

MARK	DATE	DESCRIPTION
1	3-9-90	REVISED QUANTITIES

REVISIONS

DESIGNED T.S. & B.A.
DRAWN D.L. CHECKED

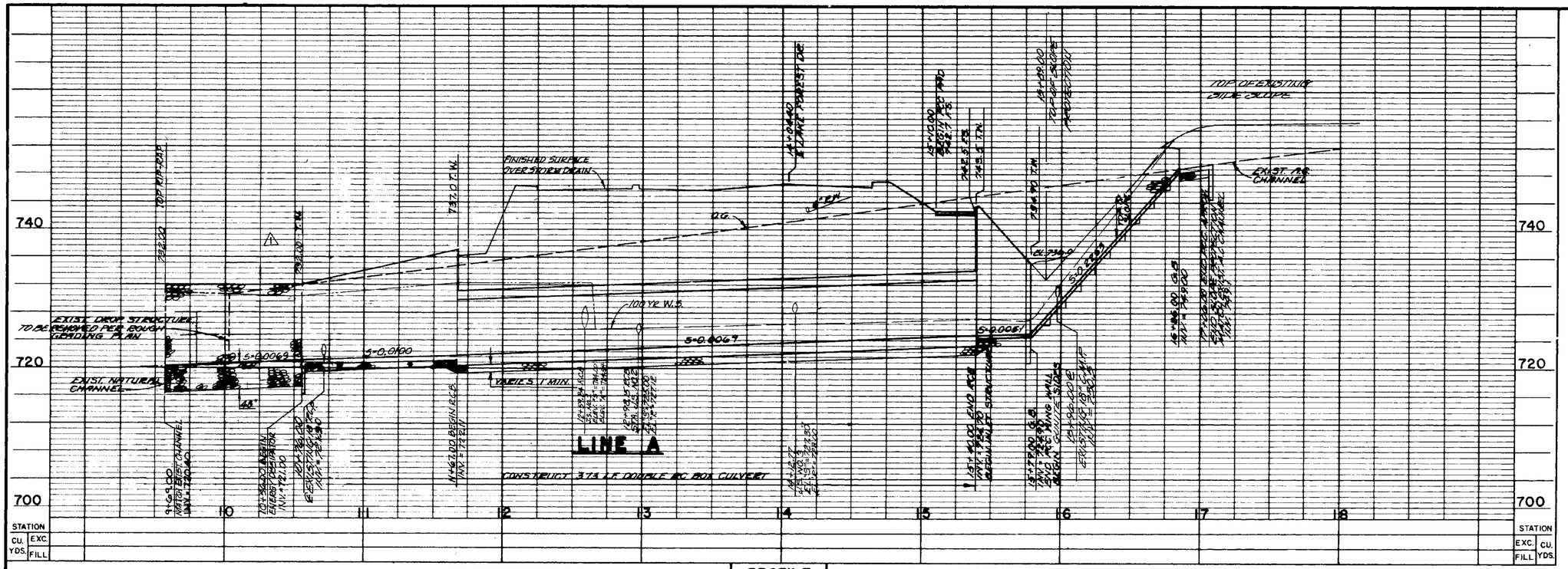
ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

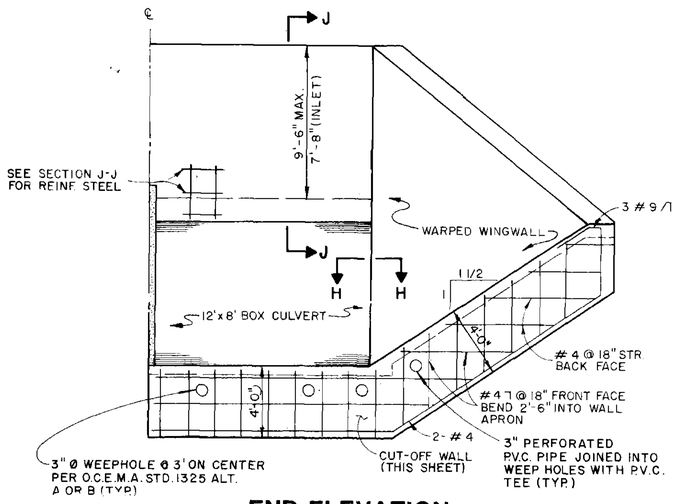
GENERAL NOTES CONSTRUCTION NOTES AND ESTIMATED QUANTITIES

PREPARED UNDER SUPERVISION OF Chris H. Rockway 3-14-90 DATE

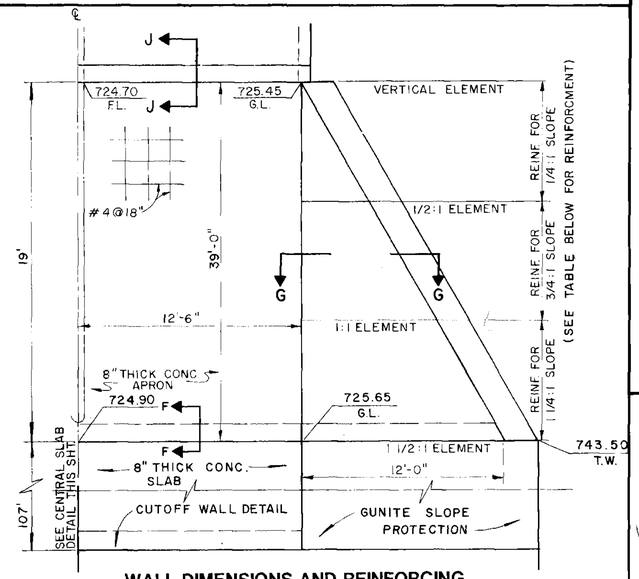
SHEET 2

SCALE AS SHOWN | DATE | DWG. NO. F19-701-3


740
720
700
STATION
CU. YDS. EXC. FILL
10
11
12
13
14
15
16
17
18
FINISHED SURFACE OVER STORM DRAIN
EXIST. DROP STRUCTURE TO BE REMOVED PER ROUGH GRADING PLAN
EXIST. NATURAL CHANNEL
100 YR. W.S.
S=0.0100
S=0.0069
S=0.0067
S=0.0025
VARIES 5' MIN.
48"
LINE A
CONSTRUCT 373 L.F. DOUBLE RC. BOX CULVERT
TOP OF EXISTING CUT SLOPE
EXIST. AC CHANNEL
737.0 T.W.
722.11 F.L.
732.00 TOP RIP-RAP
732.0 TOP RIP-RAP
9+69.00 BEGIN CHANNEL IMPROVEMENTS
10+76.00 EXISTING 48" RCP
11+67.00 BEGIN RCB
12+00.00 JOIN EXIST. RCB
12+47.51 RCB STA. = 0+00 STA. U.S. NO. 1
12+91.03 RCB STA. = 0+00 STA. U.S. NO. 2
12+98.15 RCB STA. = 0+00 STA. U.S. NO. 3
13+47.00 BEGIN 18" RCP
14+00.10 RCB STA. = 0+00 STA. U.S. NO. 3
14+12.77 END RCB
14+67.00 BEGIN 12'X8' R.C.B.
15+17.00 END 12'X8' R.C.B.
15+79.00 BEGIN TRANSITION
16+86.00 END TRANSITION
17+06.00 END CHANNEL IMPROVEMENTS
EXIST. 12'X8' R.C.B.
EXIST. 12'X8' R.C.B. TRANSITION
EXIST. 12'X8' R.C.B. WINGWALLS
EXIST. 12'X8' R.C.B. CUTOFF WALLS
EXIST. 12'X8' R.C.B. APRON
EXIST. 12'X8' R.C.B. DEBRIS WALL
EXIST. 12'X8' R.C.B. CHAIN LINK FENCE
EXIST. 12'X8' R.C.B. GUNITE SLOPE PROTECTION
EXIST. 12'X8' R.C.B. SWING GATE
EXIST. 12'X8' R.C.B. ACCESS ROAD
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P.
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK
EXIST. 12'X8' R.C.B. ACCESS ROAD GATE MOUTH OF C.M.P. CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER & DRIVEWAY & STREET & CURB & GUTTER & SIDEWALK & CROSSGUTTER



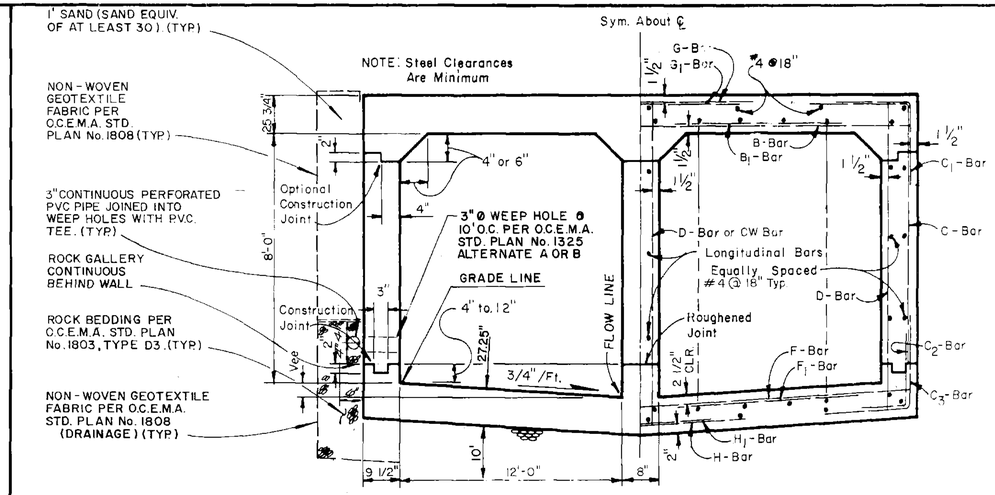
END ELEVATION
(BOX ENTRANCE)
N.T.S.



WALL DIMENSIONS AND REINFORCING

ELEMENT	"H"	8' OR LESS	10	12	14	16
1/4:1	FRONT FACE REINF	#4 a 12	#4 a 7	#5 a 7	#5 a 5	#6 a 6
	REAR FACE REINF.	#4 a 12	#4 a 12	#4 a 12	#4 a 12	#4 a 12
3/4:1	FRONT FACE REINF	#4 a 12	#4 a 12	#4 a 12		
	REAR FACE REINF	#4 a 12	#4 a 12	#4 a 12		
1 1/4:1	FRONT FACE REINF	#4 a 12				
	REAR FACE REINF	#4 a 8				
"D" AT CUT-OFF WALL		6"	6"	6"	7 1/2	8"
"D" AT CULVERT		6"	6"	6"	8"	9 1/2"

PLAN VIEW
APRON & WARPED WINGWALLS AT ENTRANCE TO BOX
(REF. CALTRANS STD. NO. D-90)
N.T.S.



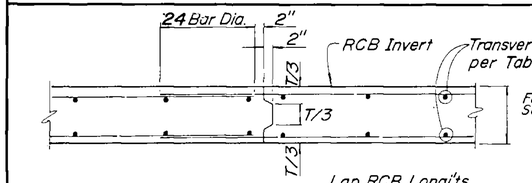
STEEL LAYOUT				
BAR DESIGNATION	BAR SIZE	BAR SPA. (IN)	HORIZ. LEN. (FT.)	VERT. LEN. (FT)
B	4	16.00	26.00	0.00
B_1	7	16.00	26.00	0.00
C	4	12.00	4.8	9.1
C_1	4	12.00	4.1	9.6
C_2	4	12.00	4.8	3.7
C_3	4	12.00	4.4	3.7
D	4	18.00	0.00	12.1
F	4	16.00	26.0	0.00
F_1	7	16.00	26.0	0.00
G	5	12.00	18.70	0.00
G_1	8	12.00	8.8	0.00
H	5	12.00	18.70	0.00
H_1	8	12.00	9.0	0.00
CW	4	18.00	0.00	12.1

NO. OF LONGITUDINAL REINFORCING # 4 BARS @ UNIFORM SPACING	
TOP SLAB	38
BOTTOM SLAB	38
SIDE & CENTER WALLS	30
TOTAL	106
QUANTITIES	
CONCRETE C.Y./LIN.FT.	5.02
STEEL LBS./LIN.FT.	424.0

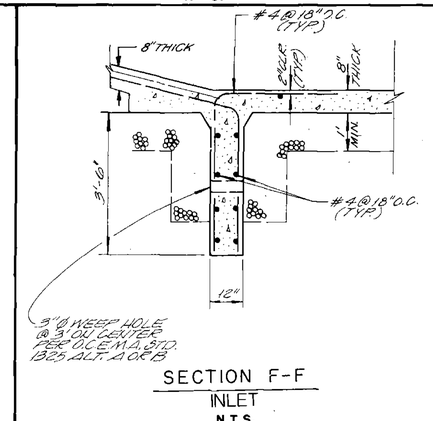
TYPICAL SECTION
DOUBLE 12'x8' BOX CULVERT
60 BOX CULVERT DETAILS

DESIGN DATA-(INLET AND OUTLET DESIGN PARAMETERS)

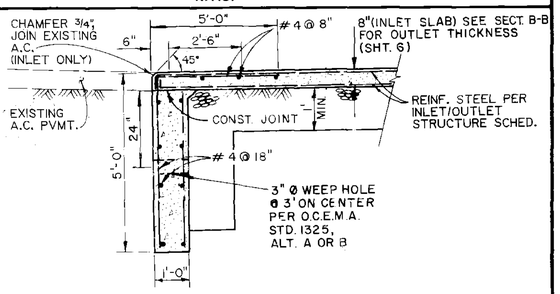
NOTES: WALLS DESIGNED FOR 2' SURCHARGE, EARTH LOAD=120 /cu ft, EQUIVALENT FLUID PRESSURE = 36 /cu ft. VARY "D" AT WARPED WALL UNIFORMLY FROM THAT AT CUT-OFF WALL TO THAT OF HEADWALL OR ENDWALL. FOR MAX "H" > 12' DIMENSIONS "L", "W", "H", "M", "N", ELEV. @ , "ANGLE OF FLARE", AND END "SLOPE" (AS APPLY) ARE SHOWN ON THE PLANS.
fc = 3250 psi, fc = 1463 psi, fy = 60,000 psi



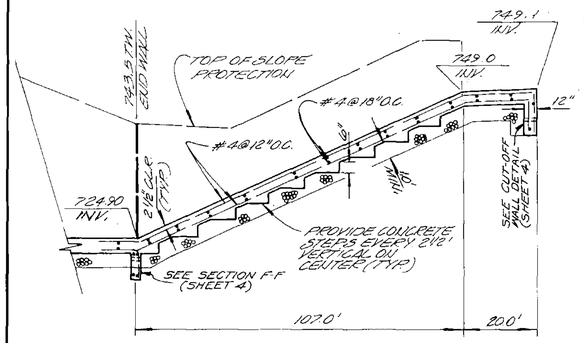
TRANSVERSE JOINT DETAIL
BOX CULVERT
N.T.S.



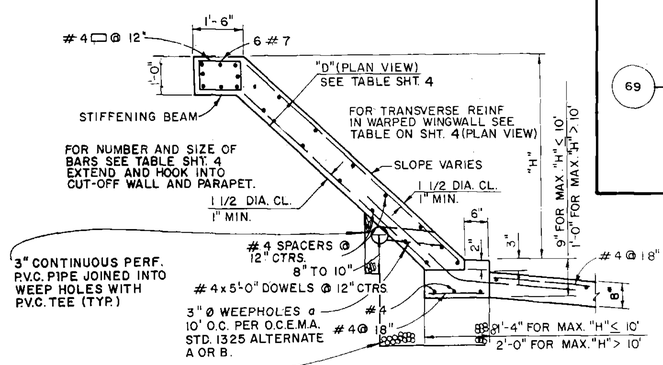
SECTION F-F
INLET
N.T.S.



69 CUT-OFF WALL DETAIL ⚠
INLET AND OUTLET
N.T.S.
1 1/2 0 1 2
3 inches on original drawing



CENTRAL SLAB INLET DETAIL
N.T.S.



SECTION G-G
INLET
(REF. CALTRANS STD. NO. D-86 A)
N.T.S.

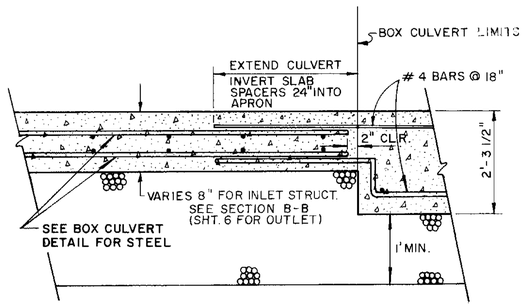
⚠	REVISED CUTOFF WALL DETAIL 6-9-90	
MARK	DATE	DESCRIPTION
REVISIONS		
DESIGNED		
DRAWN		CHECKED

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

BOX CULVERT AND INLET DETAILS

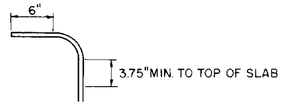
PREPARED UNDER SUPERVISION OF Chris H. Rockaway 3-14-91 DATE

SCALE AS SHOWN | DATE | DWG. NO F19-701-3 | SHEET 4

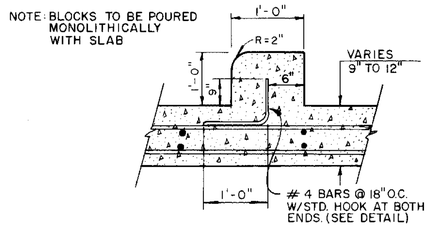


R.C.B. BOX TO SLAB CONNECTION

INLET AND OUTLET
N.T.S.



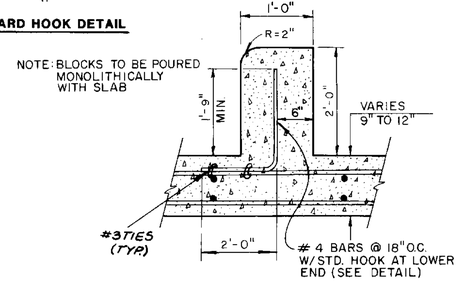
STANDARD HOOK DETAIL



SECTION D - D

TYPICAL SECTION THRU ROWS NO. 2 THRU 10 BAFFLE BLOCK WALL

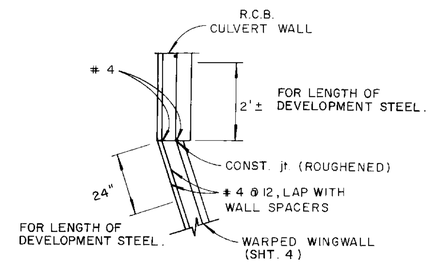
OUTLET
N.T.S.



SECTION E - E

TYPICAL SECTION THRU FIRST BAFFLE BLOCK WALL

OUTLET
N.T.S.

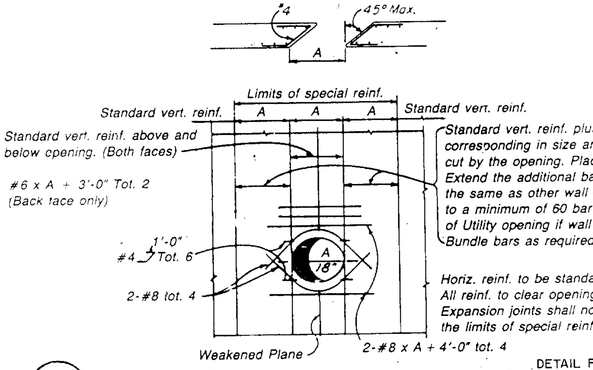


R.C.B. BOX TO WINGWALL CONNECTION SECTION H-H

INLET
N.T.S.

68 CULVERT DEBRIS WALL

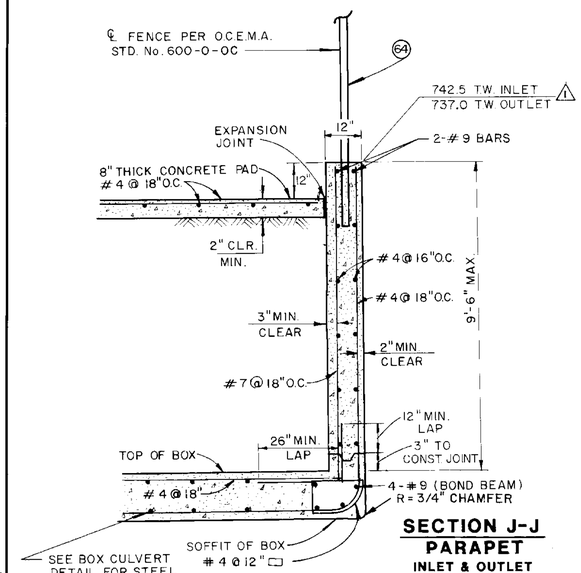
INLET
N.T.S.



62 RETAINING WALL UTILITY OPENING

OUTLET
N.T.S.

DETAIL FROM CALIFORNIA DEPARTMENT OF TRANSPORTATION- "STANDARD PLANS" No. B7-10.



SECTION J-J PARAPET

INLET & OUTLET

MARK	DATE	DESCRIPTION
1	1-9-90	REVISED HEIGHT OF PARAPET WALL

REVISIONS
DESIGNED T.S. & B.A.
DRAWN D.L. CHECKED C.H.R.

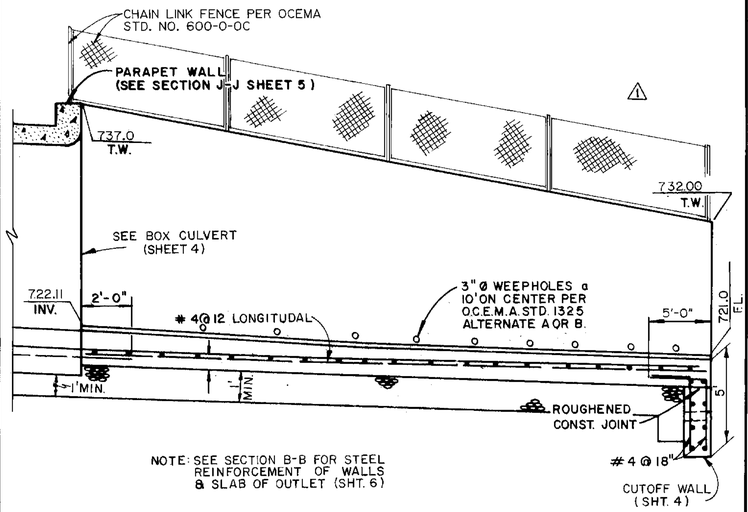
ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

INLET AND OUTLET DETAILS

PREPARED UNDER SUPERVISION OF Chris H. Rockway 3/1/89
CHRIS H. ROCKWAY DATE

SCALE	DATE	DWG. NO.
AS SHOWN	4-89	F19-701-3

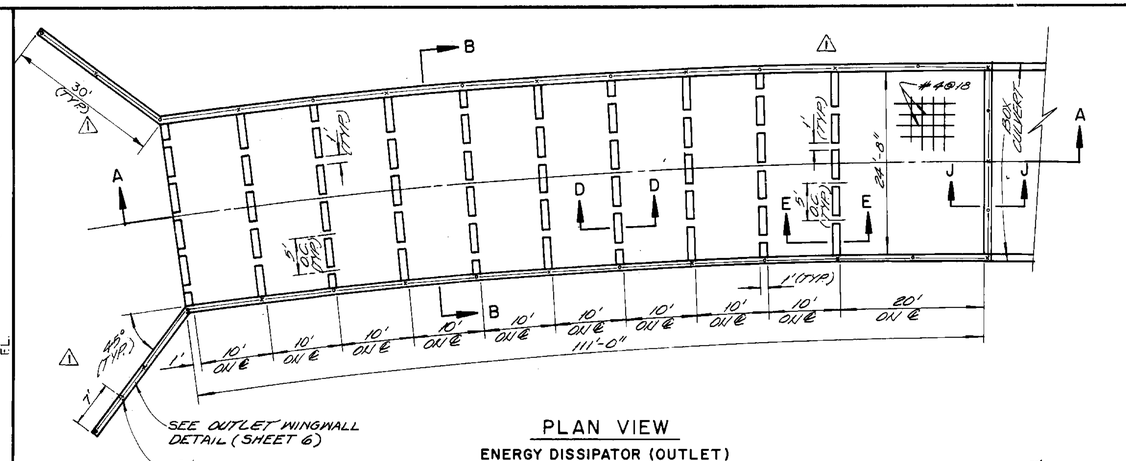
SHEET 5



NOTE: SEE SECTION B-B FOR STEEL REINFORCEMENT OF WALLS & SLAB OF OUTLET (SHT. 6)

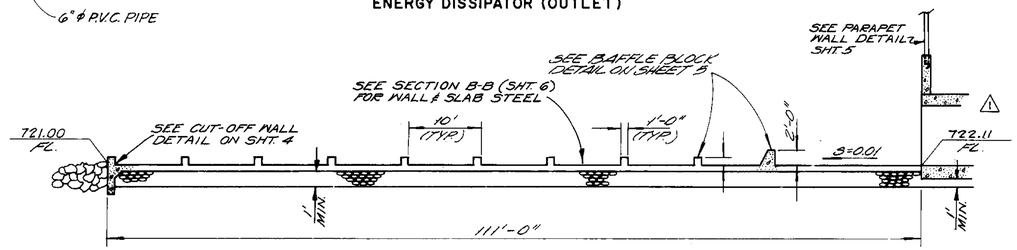
PART LONGITUDINAL SECTION

OUTLET
N.T.S.



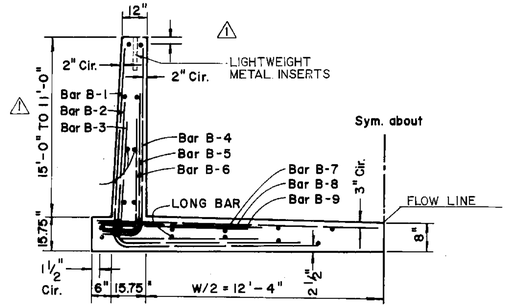
PLAN VIEW

ENERGY DISSIPATOR (OUTLET)



SECTION A-A

ENERGY DISSIPATOR (OUTLET)



SECTION B-B

OUTLET N.T.S.

	SPACING	MAX. HORIZ. LENGTH	MAX. VERT. LENGTH	
B-1	#5 @ 9" O.C.	11' 7.75"	15' 11.75"	
B-2	#6 @ 9" O.C.	7' 6.25"	9' 4.25"	
B-3	#7 @ 9" O.C.	4' 11.75"	5' 2.00"	
B-4	#5 @ 18" O.C.	2' 0.25"	15' 11.75"	
B-5	#6 @ 18" O.C.	2' 0.25"	7' 10.25"	
B-6	#7 @ 18" O.C.	2' 0.25"	4' 8.25"	
B-7	#8 @ 18" O.C.	14' 6.25"	⊖	*
B-8	#5 @ 18" O.C.	9' 4.75"	⊖	
B-9	#6 @ 18" O.C.	7' 8.25"	⊖	

* ONE CONTINUOUS BAR TWICE THIS LENGTH SHOULD BE PLACED THE WIDTH OF THE CHANNEL

LONGITUDINAL BARS

"KEY" BARS AT INTERSECTION OF WALL AND INVERT ARE COUNTED AS PART OF THE SLAB. SPACING GIVEN IS ONLY APPROXIMATE, SPACE BARS EVENLY ALONG WALLS AND SLAB.

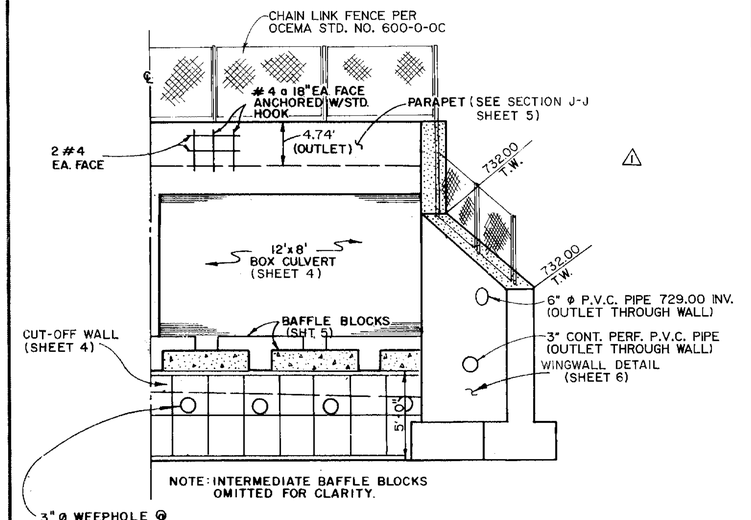
NO. 4 BARS AT 12 INCHES
54 IN SLAB 60 IN WALL
8 IN HEEL 122 BARS TOTAL

MATERIAL QUANTITIES

REINFORCED CONCRETE 2.36 CU. YDS./FT.
REINFORCING STEEL 424.7 LBS./FT.

THICKNESSES

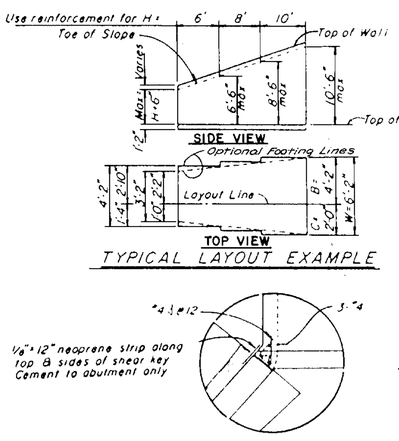
TOP OF WALL 12.00 INCHES
BASE OF WALL 15.75 INCHES
SLAB AT CENTER LINE 8.00 INCHES
SLAB AT FACE OF WALL 15.75 INCHES



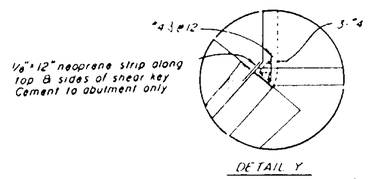
NOTE: INTERMEDIATE BAFFLE BLOCKS OMITTED FOR CLARITY.

END ELEVATION

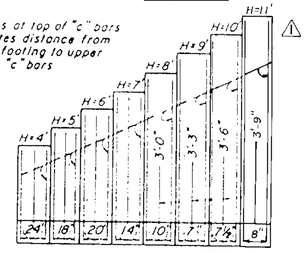
OUTLET
N.T.S.

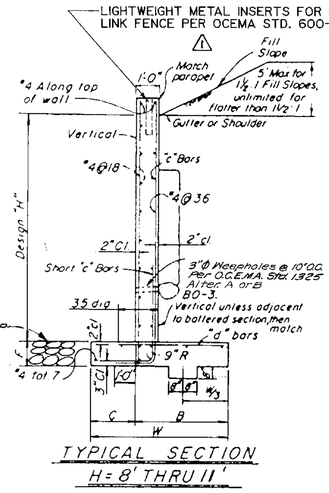


TYPICAL LAYOUT EXAMPLE

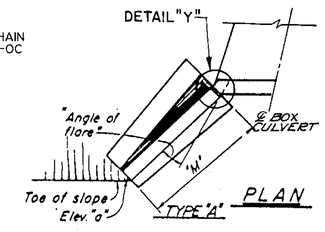


DETAIL Y





TYPICAL SECTION
H = 8' THRU 11'



REINFORCED CONCRETE WINGWALLS									
"H"	4'	5'	6'	7'	8'	9'	10'	11'	
W	3'-2"	3'-8"	4'-2"	4'-8"	5'-2"	5'-8"	6'-2"	6'-8"	
C	1'-0"	1'-2"	1'-4"	1'-6"	1'-8"	1'-10"	2'-0"	2'-2"	
B	2'-2"	2'-6"	2'-10"	3'-2"	3'-6"	3'-10"	4'-2"	4'-6"	
F	--						1'-2"		
Batter	--				None				
S	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	
"c" Bars	#4@24	#4@18	#5@20	#5@14	#5@10	#5@7	#5@7½	#7@8	
"d" Bars	#4@24	#4@18	#5@20	#5@14	#5@10	#5@14	#7@15	#8@16	
Conc. $C.Y./ft.$	0.32	0.38	0.44	0.49	0.55	0.61	0.67	0.73	
Paint $sq.ft./ft.$	13	16	19	25	30	37	49	62	

Quantities do not include that portion above the design "H" limit

Design Notes

Unit Stresses $f_s = 24{,}000$ p.s.i., $f_c = 1{,}300$ p.s.i., $n = 10$

Maximum Toe Pressure = $1\frac{1}{2}$ Tons/sq ft

Elevations, length and angle of flare of wings may be varied by the Engineer to suit conditions encountered in the field. Walls designed for 2' livelood surcharge, $1\frac{1}{2}$: 1 sloping surcharge not to exceed 5' in elevation plus 2' livelood surcharge, or unlimited 2 : 1 surcharge.

Dimensions "H," "L," "W" "N," Elev "a" and "Angle of flare" (as apply) are shown on the plans

Wall height may be exceeded by 6" before going to next greater "H"

Eliminate cut-off wall if adjacent channel is paved and skew is 20° maximum

OUTLET WINGWALL DETAIL

N.T.S.
(REF. CALTRANS STD. D-90)

1 1/2 0 1 2
3 inches on original drawing

MARK	DATE	DESCRIPTION
1	11-9-90	REVISED OUTLET STRUCTURE DETAILS

REVISIONS

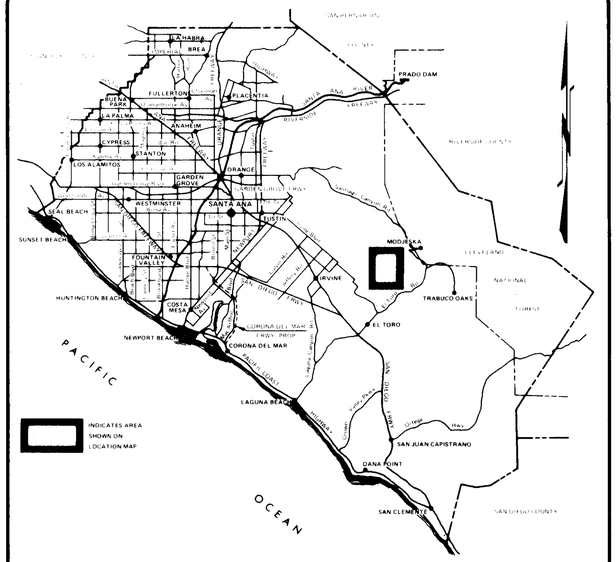
DESIGNED
DRAWN
CHECKED

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

ENERGY DISSIPATOR DETAILS

PREPARED UNDER SUPERVISION OF John H. Kellogg 3-14-89
DATE

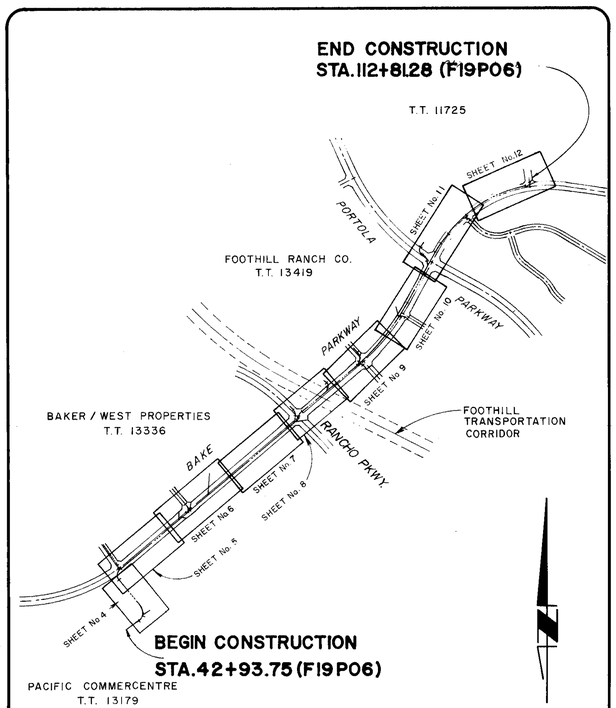
SCALE AS SHOWN | DATE | DWG. NO. F19-701-3 | SHEET 6



VICINITY MAP

1 0 5 10

SCALE IN MILES



LOCATION MAP

SCALE 1" = 800'

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

SANTA ANA, CALIFORNIA

E. SCHNEIDER, DIRECTOR

PLANS FOR CONSTRUCTION OF
THAT PORTION OF
STORM DRAIN

FACILITY NO. F19P06

STA. 42+ 93. 75 TO STA. 112+ 81.28

FACILITY NO. F19P07

STA. 10+ 00.00 TO STA. 11+ 20.00

FOR

BAKE PARKWAY

BONDED WITH TRACT NO.14045

STORM DRAIN MAINTAINED BY COUNTY OF ORANGE

INDEX OF SHEETS

SHEET	DESCRIPTION
1	TITLE SHEET
2	CONSTRUCTION NOTES, GENERAL NOTES AND ESTIMATED QUANTITIES.
3	SINGLE R.C.BOX SCHEDULE AND DETAILS SETTLEMENT JOINT DETAILS 4
4	PLAN AND PROFILE: F19P06 STA. 42+93.75 TO STA. 49+00.00 F19P07 STA. 10+ 00.00 TO STA. 11+20.00
5	PLAN AND PROFILE F19P06, STA. 49+00.00 TO STA. 57+ 00.00.
6	PLAN AND PROFILE F19P06, STA. 57+ 00.00 TO STA. 65+ 00.00
7	PLAN AND PROFILE F19P06, STA. 65+ 00.00 TO STA. 73+ 00.00.
8	PLAN AND PROFILE F19P06, STA. 73+ 00.00 TO STA. 81+ 00.00 AND LATERALS "J,K & L", & "OX".
9	PLAN AND PROFILE F19P06 STA. 81+ 00.00 TO STA. 89+ 00.00 AND LATERALS "M & N".
10	PLAN AND PROFILE F19P06, STA. 89+ 00.00 TO STA. 96+ 75.00 AND LATERALS "P & Q".
11	PLAN AND PROFILE F19P06, STA. 96+ 75.00 TO STA. 105+ 90.58 AND LATERALS "R,S & T".
12	PLAN AND PROFILE F19P06, STA. 105+ 90.58 TO STA. 112+81.28 AND LATERALS "U & V".
13	LATERAL PROFILES "C", "C-1", "C-2", "D", "E" "F", "G" & "H"
14	LATERAL PROFILES "J", "J-1", "K", "L", "M", "N", & "P"
15	LATERAL PROFILES "Q", "R", "R-1", "S", "T", "U" & "V"
16	INLET DETAILS F 19P07, SETTLEMENT JOINT AT STA.10+85.17 4
17	CONSTRUCTION DETAILS

UTILITY	PHONE NO.
IRVINE RANCH WATER DISTRICT	(714) 833-1225
LOS ALISOS WATER DISTRICT	(714) 830-0780
SOUTHERN CALIFORNIA EDISON	(714) 859-8253
PACIFIC BELL TELEPHONE	(714) 966-6216
SOUTHERN CALIFORNIA GAS COMPANY	(714) 634-3106

BENCH MARK:

3E 96 78 ON THE NORTHERLY SIDE OF TRABUCO ROAD AT ITS JUNCTION WITH PASEO SOMBRA 7.7 FEET NORTH OF THE EASTERN MOST CURB RETURN OF TRABUCO 1.5 FEET NORTHWEST OF THE STREET SIGN POST, 17.6 FEET SOUTH OF THE SERRANO PARK STONE SIGN AT THE ANGLE POINT OF THE SIDEWALK AND THE ASPHALT WALKWAY, SET IN TOP OF A CONCRETE POST, FLUSH WITH WALK

ELEVATION 432.58 ADJ. 1976

BASIS OF BEARING:

"STATE OF CALIFORNIA LAMBERT COORDINATE SYSTEM - ZONE VI" BASED ON THE LINE BETWEEN ORANGE COUNTY SURVEYOR'S HORIZONTAL CONTROL STATIONS "3-1-12-62" AND "CANADA" (OCS 1-1-75 DATUM) BEING N 77° 20' 41" E

EMA / REGULATION

CONST. FROM STA.
THIS PLAN IS SIGNED BY EMA/REGULATION FOR CONCEPT ADHERENCE TO COUNTY STANDARDS AND REQUIREMENTS ONLY. EMA/REGULATION IS NOT RESPONSIBLE FOR DESIGN, ASSUMPTIONS, OR ACCURACY.

APPROVED: Patrick Stanton R.C.E.
DATE: 5/8/90

REGISTERED PROFESSIONAL ENGINEER ROBERT KALLENBAUGH NO. 27987 EXP. 3-31-90 CIVIL STATE OF CALIFORNIA

ENGINEER

Robert Bein, William Frost & Associates
PROFESSIONAL ENGINEERS, PLANNERS & SURVEYORS

BY: S. Robert Kallenbaugh
S. ROBERT KALLENBAUGH RCE 27987
DATE: 12-29-88 EXP. 3-31-90

EMA / REGULATION

CONST. FROM STA. 50+00 TO 112+81.28 F19P06 ONLY
THIS PLAN IS SIGNED BY EMA/REGULATION FOR CONCEPT ADHERENCE TO COUNTY STANDARDS AND REQUIREMENTS ONLY. EMA/REGULATION IS NOT RESPONSIBLE FOR DESIGN, ASSUMPTIONS, OR ACCURACY.

APPROVED: P. Stanton
DATE: 10/19/89 RCE

OWNER/DEVELOPER

FOOTHILL RANCH COMPANY
25200 LA PAZ ROAD, SUITE 210
LAGUNA HILLS, CA. 92653
(714) 586-4400

NO.	DESCRIPTION	SHT.	APPROVED	DATE
4	ADDED SETTLEMENT JOINT DETAILS AND LOCATIONS, RELOCATED MH. / REV. PROFILES	2,3,4, 16&17	P. Stanton	5/15/90
3	PROFILE REVISED	4	P. Stanton	3/3/81
2	ADDED C.B. N2, C&D - SHTS. 10, 14, 15		P. Stanton	1/11/16
1	ADD LAT. "OX"	8	P. Stanton	4/20/16

REVISIONS

DWG. NO. F19P06-713-1

SHEET 1 OF 17

CONSTRUCTION NOTES & ESTIMATED QUANTITIES

NO.	ITEM	UNIT	AMOUNT	AMOUNT OF SPECIAL WALL, 1½" MIN. STEEL CLEARANCE RCP
1	CONST. 18" RCP (D-LOAD PER PROFILE)	L.F.	288	(129)
2	CONST. 21" RCP (D-LOAD PER PROFILE)	L.F.	229	(60)
3	CONST. 24" RCP (D-LOAD PER PROFILE)	L.F.	113	
4	CONST. 27" RCP (D-LOAD PER PROFILE)	L.F.	149	
5	CONST. 30" RCP (D-LOAD PER PROFILE)	L.F.	250	(156)
6	CONST. 33" RCP (D-LOAD PER PROFILE)	L.F.	286	
7	CONST. 36" RCP (D-LOAD PER PROFILE)	L.F.	—	(221)
8	CONST. 39" RCP (D-LOAD PER PROFILE)	L.F.	—	(874)
9	CONST. 45" RCP (D-LOAD PER PROFILE)	L.F.	—	(427)
10	CONST. 48" RCP (D-LOAD PER PROFILE)	L.F.	—	(75)
11	CONST. 51" RCP (D-LOAD PER PROFILE)	L.F.	—	(200)
12	CONST. 54" RCP (D-LOAD PER PROFILE)	L.F.	40	(1027)
13	CONST. 60" RCP (D-LOAD PER PROFILE)	L.F.	—	(366)
14	CONST. 72" RCP (D-LOAD PER PROFILE)	L.F.	—	(912)
15	CONST. 78" RCP (D-LOAD PER PROFILE)	L.F.	—	(1230)
16	CONST. 81" R.C.P. (D-LOAD PER PROFILE)	L.F.	—	(298)
17	CONST. 84" R.C.P. (D-LOAD PER PROFILE)	L.F.	—	
18	CONST. 87" R.C.P. (D-LOAD PER PROFILE)	L.F.	959	
19	CONST. 90" R.C.P. (D-LOAD PER PROFILE)	L.F.		(633)
20	CONST. 10.5'x10.5' RCB PER PROFILE & DETAIL ON SHT. NO. 3	L.F.	90	
21	CONST. JUNC. STRUCT. PER DETAIL SHT. NO. 17 AND OCEMA STD. PLAN 1314	EA.	1	
22	CONST. 12" A.C.P. (D-LOAD PER PROFILE)	L.F.	—	
23	CONST. S.R.P. (D-LOAD PER PROFILE)	L.F.	—	
24	CONST. S.R.P. (D-LOAD PER PROFILE)	L.F.	—	
25	CONST. JUNC. STRUCT. TYPE I PER O.C.E.M.A. STD. PLAN No. 1310	E.A.	4	
26	CONST. JUNC. STRUCT. TYPE I (OMIT SHAFT) PER O.C.E.M.A. STD. PLAN No. 1310	EA.	2	
27	CONST. JUNC. STRUCT. TYPE II PER O.C.E.M.A. STD. PLAN No. 1311	E.A.	8	
28	CONST. SETTLEMENT JOINTS PER DETAILS ON SHEET 3 & 16	EA.	6	
29	CONST. JUNC. STRUCT. TYPE III PER O.C.E.M.A. STD. PLAN No. 1312	E.A.	5	
30	CONST. JUNC. STRUCT. TYPE III (OMIT SHAFT) PER O.C.E.M.A. STD. PLAN No. 1312	EA.	2	
31	CONST. JUNC. STRUCT. TYPE IV PER O.C.E.M.A. STD. PLAN No. 1313	E.A.	4	
32	CONST. JUNC. STRUCT. TYPE III PER STD. PLAN 1312, WITH 48" M.H. PER STD PLAN 1504	EA.	1	
33	CONST. JUNC. STRUCT. TYPE VI PER O.C.E.M.A. STD. PLAN No. 1315	EA.	5	
34	CONST. REIN. CONC. COLLAR PER O.C.E.M.A. STD. PLAN No. 1333	E.A.	11	
35	CONST. INLET TYPE I PER O.C.E.M.A. STD. PLAN No. 1301	E.A.	—	
36	CONST. DBL. COURSE BRICK & MORTAR PLUG (PIPES 48" DIA. OR LARGER)	EA.	—	
37	CONST. INLET TYPE V PER O.C.E.M.A. STD. PLAN No. 1305	EA.	—	
38	CONST. RISER PER O.C.E.M.A. STD. PLAN No. 1327	EA.	—	
39	CONST. BRICK AND MORTAR PLUG	EA.	28	
40	CONST. BRICK AND MORTAR PLUG AROUND INTERIM C.S.P.	EA.	—	
41	CONST. STEEL LANDING FOR DEEP M.H. PER DETAIL ON SHT. NO. 17	EA.	2	
42	CONST. 36" THICK GROUTED RIP-RAP PER DETAIL & GRADATION ON SHT NO. 17	C.Y.	90	
44	CONST. WEEPHOLES PER DETAILS ON SHT. NO. 17	EA.	110	
45	CONST. 60" CHAIN LINK FENCE PER O.C.E.M.A. STD. PLAN NO. 1412	L.F.	110	
46	CONST. R.C. PARAPET WALL PER SHT. NO. 16	EA.	1	
47	CONST. CONCRETE PIPE SLOPE ANCHOR PER O.C.E.M.A. STD. PLAN 1333	EA.	1	
48	CONST. BOX CULVERT INLET PER DETAILS ON SHT. NO. 16	EA.	1	
50	CONST. DEBRIS POST PER DETAIL ON SHT. NO. 16	EA.	7	
51	CONST. R.C. BOX MANHOLE PER OCEMA STD. PLAN NO. 1506	EA.	1	

GENERAL NOTES

1. ALL WORK TO BE DEDICATED TO THE ORANGE COUNTY FLOOD CONTROL DISTRICT SHALL BE IN CONFORMANCE WITH THE O.C.E.M.A. STD. SPECIFICATIONS (PUBLIC WORKS CONSTRUCTION 1985 EDITION) AND THE O.C.E.M.A. STD. PLANS WHICH MAY BE PURCHASED FROM THE DISTRICT AND SHALL BE KEPT ON THE JOB SITE AT ALL TIMES.
2. THE CONTRACTOR SHALL NOTIFY THE DISTRICT'S INSPECTOR AT LEAST 48 HOURS PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION BY TELEPHONING 567-7800 OR BY WRITING THE ORANGE COUNTY E.M.A. ATTN. CONSTRUCTION, P. O. BOX 486, SANTA ANA, CALIFORNIA 92702.
3. ALL CONCRETE SHALL HAVE A MINIMUM 28 DAYS ULTIMATE COMPRESSIVE STRENGTH OF 3,250 PSI. CEMENT SHALL CONFORM TO ASTM C150, TYPE V. CONCRETE FOR INVERT SHALL BE 560-B-3250 AND FOR WALLS AND DECK SHALL BE 560-C-3250.
4. ALL CONDUIT LENGTHS ARE HORIZONTAL PROJECTIONS, UNLESS OTHERWISE SHOWN.
5. LOCATIONS OF PUBLIC UTILITIES SHOWN HAVE BEEN DETERMINED FROM AVAILABLE INFORMATION. HOWEVER, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE TRUE LOCATION OF ANY EXISTING UTILITIES AND TO EXERCISE PROPER PRECAUTIONS TO AVOID INJURY OR DAMAGE THERETO.
6. ALL REINFORCING BARS SHALL CONFORM TO ASTM A615 GRADE 60, DEFORMED BARS.
7. FOR ADDITIONAL STRUCTURAL NOTES, SEE SHEET NO. ____.
8. ALL MATERIALS TESTING FOR THE DRAINAGE FACILITIES SHALL BE PROVIDED BY THE O.C.E.M.A. MATERIALS LAB IN ACCORDANCE WITH THE NUMBER, LOCATION AND FREQUENCY REQUESTED BY THE FLOOD CONTROL DISTRICT'S INSPECTOR.
9. CHAMFER ALL EXPOSED EDGES OF CONCRETE 3/4" MIN.
10. ALL PIPE SECTIONS TO BE BANDED AND GROUTED
11. FOR TRENCH EXCAVATIONS IN NATIVE SOIL, SHORING SHALL BE PROVIDED TO SATISFY STATE OF CALIFORNIA SAFETY REQUIREMENTS.
12. THE CONTRACTOR SHALL CONDUCT CONSTRUCTION OPERATIONS IN SUCH A MANNER THAT STORM OR OTHER WATERS MAY PROCEED UNINTERRUPTED ALONG THEIR EXISTING STREET OR DRAINAGE COURSES.
13. IN THE COURSE OF WATER CONTROL, THE CONTRACTOR SHALL CONDUCT CONSTRUCTION OPERATIONS TO PROTECT WATERS FROM POLLUTION WITH FUELS, OILS, BITUMENS, OR OTHER HARMFUL MATERIALS.
14. ALL REINFORCED CONCRETE PIPE SHALL BE BEDDED IN ACCORDANCE WITH O.C.E.M.A. STD. PLAN NO. 319.
15. ALL FILL AND BACKFILL SHALL BE COMPACTED TO MIN. 90 PERCENT OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE CALIFORNIA TEST METHOD NO. 216.1978 ALL FILL AND BACKFILL SHALL BE FREE FROM VEGETABLE MATTER. HOWEVER, IT MAY CONSIST OF ONSITE SILTY SAND OR CLAYEY SAND (SM.SC). THE FILL AND BACKFILL SHALL BE COMPACTED IN APPROXIMATELY 6 INCH INCREMENTS. IN ORDER TO AVOID UNBALANCED D-LOADS ON THE STORM DRAIN, THE DIFFERENCE IN BACKFILL ELEVATION ON ADJACENT SIDES OF THE R.C.P. DRAIN SHALL NOT EXCEED 2 FEET. NO STORM DRAIN SHALL BE PLACED UNTIL THE SOILS ENGINEER HAS INSPECTED AND APPROVED THE BOTTOM OF THE TRENCH. ISOLATED ZONES OF SOFT COMPRESSIBLE SOILS OR LARGE ROCKS SHALL BE COMPLETELY REMOVED AND REPLACED WITH PROPERLY COMPACTED SOILS. PRECAUTIONS SHALL BE TAKEN TO INSURE THAT THE STORM DRAIN IS NOT DAMAGED BY HEAVY COMPACTING EQUIPMENT. HEAVY COMPACTING EQUIPMENT SHALL NOT BE USED WITHIN A 1 TO 1 PLANE RISING FROM THE BASE OF THE STORM DRAIN OR WITHIN 2 FEET OF THE TOP OF THE STORM DRAIN; THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO THE STORM DRAIN RESULTING FROM INAPPROPRIATE COMPACTION TECHNIQUES AND EQUIPMENT. SOILS ENGINEER SHALL APPROVE AND SUPERVISE BACKFILLING.
16. PIPE CONSTRUCTION IN FILL AREA MUST BE COORDINATED WITH THE GRADING TO INSURE THAT WHEN THE FILL OPERATION HAS BEEN COMPLETED AT GRADE A MINIMUM OF TWO FEET ABOVE THE TOP OF PIPE OR TO FIVE FEET (MAXIMUM) ABOVE THE PROPOSED SUB-GRADE OF THE PIPE, THE STORM DRAIN TRENCH SHALL BE EXCAVATED AND THE PIPE INSTALLED.
17. ALL SURVEYING REQUIRED FOR VERTICAL AND HORIZONTAL ALIGNMENT MUST BE PROVIDED BY THE CONTRACTOR OR DEVELOPER AND SUFFICIENT REFERENCE STAKING MUST BE IN ACCORDANCE WITH THE REQUEST OF THE O.C.E.M.A. INSPECTOR.
18. WHENEVER APPLICABLE, THE DEVELOPER SHALL OBTAIN A PERMIT FROM THE STATE DEPARTMENT OF FISH AND GAME IN ACCORDANCE WITH SECTION 1602 OF THE CALIFORNIA FISH AND GAME CODE PRIOR TO COMMENCEMENT OF CONSTRUCTION.
19. A PERMIT FOR WORK WITHIN EXISTING STREET RIGHT OF WAY IS REQUIRED FROM THE O.C.E.M.A. FOR ANY ENCROACHMENT NECESSARY FOR CONSTRUCTION IN PUBLIC RIGHT OF WAY.
20. STORM DRAIN BACKFILL FOR ALL FACILITIES WITHIN STREET RIGHT OF WAY IS TO BE PLACED AND COMPACTED UNDER O.C.E.M.A. INSPECTION AND MEET OR EXCEED O.C.E.M.A. MINIMUM STANDARDS.
21. LOCAL DEPRESSIONS AND DECKS OF CURB INLETS SHALL NOT BE POURED UNTIL STAKING FOR LINE AND GRADE OF CURB AND GUTTER IS COMPLETED WITHIN 25' OF INSIDE OF INLET WALLS ON BOTH SIDES OR ADJACENT CURB AND GUTTER HAS BEEN PREVIOUSLY POURED.
22. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, THE DEVELOPER'S CONTRACTOR SHALL OBTAIN A PERMIT FROM THE STATE DIVISION OF INDUSTRIAL SAFETY. A COPY OF PERMIT SHALL BE KEPT ON THE JOB SITE AT ALL TIMES.
23. LENGTH OF MANHOLE STRUCTURES MAY BE INCREASED TO MEET PIPE ENDS AT OPTION OF CONTRACTOR AS LONG AS REINFORCING STEEL IS CONTINUED AS REQUIRED. ANY CHANGE IN SPUR LOCATION MUST BE APPROVED BY THE ENGINEER.
24. FLOOR OF MANHOLE STRUCTURE SHALL BE STEEL TROWELLED TO SPRING LINE.
25. RCP SHALL COMPLY WITH ALL A.S.T.M. APPLICABLE STANDARDS.
26. PRIOR TO THE PLACEMENT OF STORMDRAIN IMPROVEMENTS, THE DEVELOPER'S SOIL ENGINEERING SHALL CERTIFY IN WRITING TO THE E.M.A. INSPECTOR THAT THE STORM DRAIN'S SUBGRADE IS OF ADEQUATE STRENGTH TO SUPPORT THE STRUCTURES AND ANY ANTICIPATED LOADS.
27. BODY OF MANHOLE STRUCTURE, INCLUDING SPUR, MUST BE POURED IN ONE CONTINUOUS OPERATION, EXCEPT THAT CONSTRUCTION JOINT AT THE SPRING LINE WITH A LONGITUDINAL KEYWAY IS PERMITTED.
28. LOCAL DEPRESSIONS SHALL BE CONSTRUCTED PER STREET IMPROVEMENT PLANS IN ACCORDANCE WITH O.C.E.M.A. STANDARD PLANS. HOWEVER, ALL CATCH BASINS WILL BE SHOWN ON STREET IMPROVEMENT PLANS.
29. STATIONS SHOWN THUS 0 +00 ARE STORMDRAIN STATIONS AND ARE INDEPENDENT OF ALL CENTERLINE STATIONS.
30. ALL STEEL THAT IS TO BE CONTINUOUS SHALL BE LAPPED A MINIMUM OF 45 BAR DIAMETERS.
31. ALL REINFORCING BARS MUST BE SECURELY HELD IN PLACE IN THE FORMS. TWO WAY MATS OF STEEL MUST BE WIRED TOGETHER BOTH WAYS AT ALTERNATE INTERSECTIONS.
32. WORKING WITHIN ORANGE COUNTY FLOOD CONTROL FACILITIES IS RESTRICTED TO THE PERIOD OF APRIL 15 TO OCTOBER 15
33. IF A DRIVEWAY ENCROACHES WITHIN A LOCAL DEPRESSION TRANSITION, USE E.M.A. STANDARD PLAN #1308 - TYPE A.

STONEWORK

STONE SHALL COMPLY WITH SUBSECTION 200-1.6, STONE FOR RIP-RAP, EXCEPT COBBLESTONES SHALL NOT BE USED. ALL STONES SHALL BE ANGULAR, EACH PIECE HAVING ITS GREATEST DIMENSIONS NOT GREATER THAN THREE TIMES ITS LEAST DIMENSIONS.

STONE SHALL COMPLY WITH THE TESTS SPECIFIED IN SUBSECTION 200-1.6 EXCEPT THAT SPECIFIC GRAVITY SHALL BE NOT LESS THAN 2.62.

PLACEMENT TOLERANCES FOR FINISHED SURFACE SHALL BE PLUS OR MINUS SIX INCHES FROM INDICATED LINES AND GRADES.

EACH LOAD OF STONE SHALL BE REASONABLY WELL GRADED FROM THE SMALLEST TO THE MAXIMUM SIZE SPECIFIED. STONES SMALLER THAN THE SPECIFIED 15 PERCENT SIZE AND SPALLS WILL NOT BE PERMITTED IN A AMOUNT EXCEEDING 15 PERCENT BY WEIGHT OF EACH LOAD.

STONE FOR RIP-RAP SHALL BE PLACED IN A MANNER WHICH WILL PRODUCE A REASONABLE WELL-GRADED MASS OF STONE WITH THE MINIMUM PRACTICABLE PERCENTAGE OF VOIDS. THE ENTIRE MASS OF STONE SHALL BE PLACED IN CONFORMANCE WITH THE LINES, GRADES AND THICKNESSES SHOWN ON THE PLANS. RIP-RAP SHALL BE PLACED TO ITS FULL COURSE THICKNESS IN ONE OPERATION AND IN A MANNER TO AVIOD DISPLACING THE UNDERLYING MATERIAL. PLACING OF RIP-RAP IN LAYERS BY DUMPING INTO CHUTES OR BY SIMILAR METHODS LIKELY TO CAUSE SEGREGATION, WILL NOT BE PERMITTED. SELF-PROPELLED EQUIPMENT SHALL NOT BE USED ON EMBANKMENT SLOPES.

THE LARGER STONES SHALL BE WELL DISTRIBUTED AND THE ENTIRE MASS OF STONE SHALL CONFORM TO THE GRADATION SPECIFIED. ALL MATERIAL GOING INTO RIP-RAP PROTECTOIN SHALL BE SO PLACED AND DISTRIBUTED THAT THERE WILL BE NO LARGE ACCUMULATION OF EITHER THE LARGER OR SMALLER SIZES OF STONE.

GEOTEXTILE FABRICS

THE WORK INVOLVED SHALL CONSIST OF PLACING FABRIC OF THE TYPE SPECIFIED AT LOCATIONS AND GRADES SHOWN ON THE PLANS OR AS STAKED IN THE FIELD, IN ACCORDANCE WITH THESE SPECIAL PROVISONS. ANY FABRIC DAMAGED DURING ITS INSTALLATION OR DURING ITS USE SHALL BE REPLACED. TORN OR PUNCTURED AREAS MAY BE REPAIRED WITH AN ADDITIONAL PIECE OF FABRIC LARGE ENOUGH BOTH TO COVER THE DAMAGED AREA AND SATISFY OVERLAP REQUIREMENTS. A CERTIFICATE OF COMPLIANCE, MILL CERTIFICATE OR AFFIDAVIT THAT THE FABRIC TO BE INSTALLED MEETS MINIMUM REQUIREMENTS IN EACH PRINCIPAL DIRECTION, SIGNED BY A COMPANY OFFICER AUTHORIZED TO SIGN SUCH DOCUMENTS, SHALL BE FURNISHED TO THE ENGINEER BEFORE INSTALLATION. THE ENGINEER SHALL DETERMINE THE ADEQUACY OF SUBMITTED DOCUMENTATION.

FILTER FABRIC

FABRIC SHALL BE PLACED ON SURFACES FREE OF OBSTUCTIONS, DEPRESSIONS AND DEBRIS. FABRIC SHALL BE LOOSELY PLACED AND NOT PLACED IN A STRETCHED CONDITION. FABRIC SHALL BE PLACED IN DIRECT CONTACT WITH SOIL, WITH NO BRIDGING ALLOWED. OVERLAPS SHALL VARY FROM 18 TO 36 INCHES WIDE, DEPENDING ON STONE SIZE AND SUBGRADE STABILITY, AND SHALL BE APPROVED BY THE ENGINEER. SECURING PINS AT LEAST 12 INCHES LONG WITH 1-1/2" DIAMETER WASHERS OR 8" X 1" X 8" U-SHAPED STAPLES, AND SHALL BE INSERTED THROUGH ALL OVERLAP LAYERS, AT INTERVALS NOT EXCEEDING 6 FFET, ALONG A LINE SET AT THE MID-POINT OF OVERLAPS. ADDITIONAL PINS SHALL BE INSTALLED AS NECESSARY TO PREVENT BRIDGING AND FABRIC SLOPPAGE, REGARDLESS OF THE FABRIC'S LOCATION.

FABRIC SHALL BE USED WTH A LAYER OF GRANULAR BEDDING MATERIAL PLACED ON IT PRIOR TO RIP-RAP PLACEMENT. FABRIC WITH PHYSICAL PROPERTIES LESS THAN THOSE LISTED IN TABLE 1 OF OCEMA STD PLAN NO. 808 FOR EMBANKMENT OR RIP-RAP STABILIZATION SHALL NOT BE USED. THE THICKNESS OF BEDDING MATERIAL SHALL BE COMPATIBLE WITH RIP-RAP SIZE. IN NO CASE SHALL FABRIC'S PHYSICAL PROPERTIES BE LESS THAN THOSE LISTED FOR DRAINAGE TEXTILES. FINAL DETERMINATION OF FILTER FABRIC'S ADEQUACY, CONSIDERING BEDDING MATERIAL USED, AND SIZE, THICKNESS, GRADATION AND METHOD OF PLACEMENT OF RIP-RAP SHALL BE MADE BY THE ENGINEER. IN NO CASE SHALL BEDDING MATERIAL OR RIP-RAP BE DROPPED ON FABRIC FROM A HEIGHT OF MORE THAN THREE FEET. SPECIAL CARE SHALL BE TAKEN TO ENSURE THAT METHODS OF RIP-RAP AND MATERIAL PLACEMENT SUCH AS END-DUMPING DO NOT TEAR OR OTHERWIDE DAMAGE THE FABRIC.

1 1/2 0 1 2
3 inches on original drawing

MARK	DATE	DESCRIPTION
4	2/ /91	Added Settlement Joints

REVISIONS

DESIGNED D. VORNBERGER
DRAWN SS CHECKED BMP

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

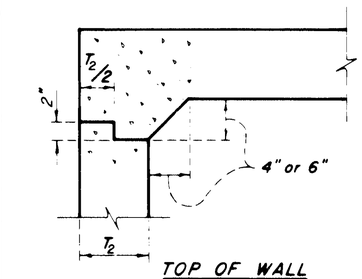
FACILITY NO. F19P06

GENERAL NOTES, CONSTRUCTION NOTES AND ESTIMATED QUANTITIES

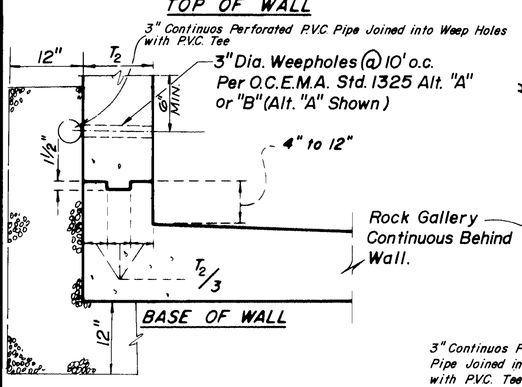
PREPARED UNDER SUPERVISION OF ________ DATE

SCALE	DATE	DWG. NO.	SHEET
AS SHOWN		F19P06-713-1	2 OF 17

J.N. 24429



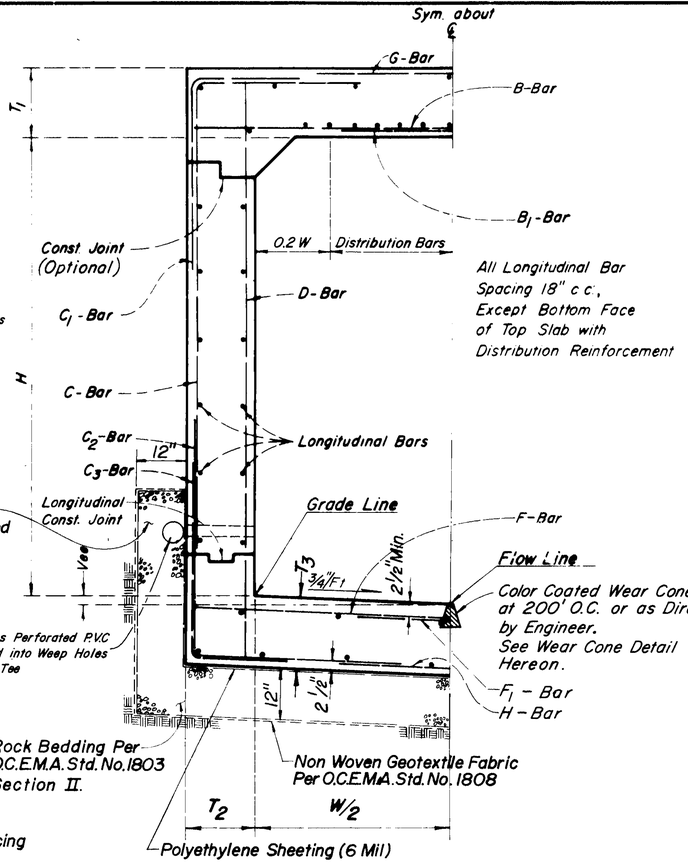
TOP OF WALL

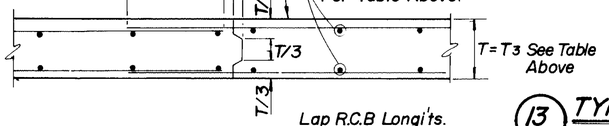


BASE OF WALL

CONSTRUCTION JOINT DETAILS

N.T.S.





(13) TYPICAL R. C. BOX SECTION (41)

NOT TO SCALE

TRANSVERSE JOINT DETAIL

N.T.S.

DESIGN DATA

LIVE LOAD
HS20-44

DEAD LOAD
Earth load per Marston's formula: w = 110 p.c.f.
Ku = Ku' = 0.150
Bd = Outside width of box plus 3 feet
Side earth 40 p.s.f. per foot of depth

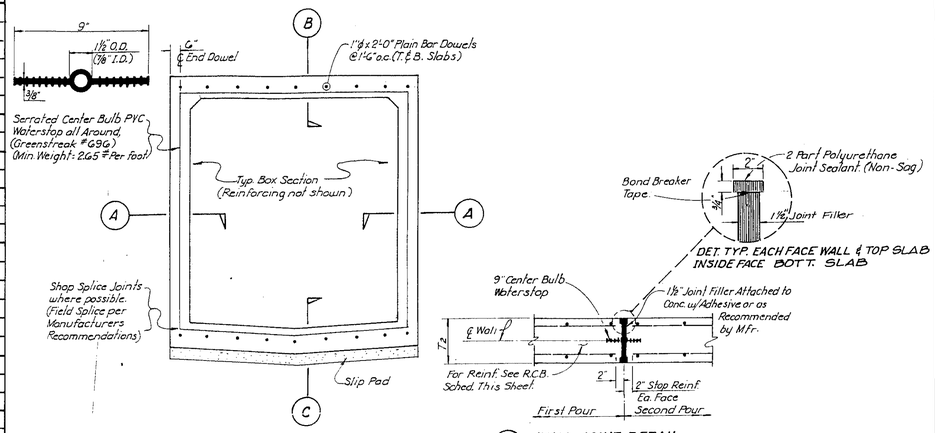
Weight of concrete 150 p.c.f.

ALLOWABLE STRESSES
f'_c = 3250 p.s.i. at 28 days
f_c = 1462 p.s.i.
f_s = 24,000 p.s.i.
n = 8.8
shear and bond stresses per A.C.I. 318-63

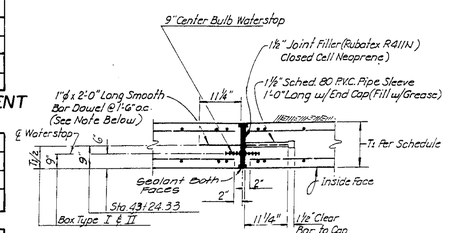
R.C. BOX LOCATION SCHEDULE			
Box Sect.	Station From	Station To	REMARKS
F19P06			
I	42+93.75	42+98.84	10.5'x 10.5' R.C.B.
F19P07			
II	42+98.84 = 9+97.09	10+25.09	10.5'x 10.5' R.C.B. @ JUNCTION BOX
F19P07			
I	10+25.09	10+90.00	10.5'x 10.5 R.C.B.

4 CONST. SETTLEMENT JOINTS PER PROFILE SHEET 4 AND DETAILS ON SHEET 3, 16 & 17

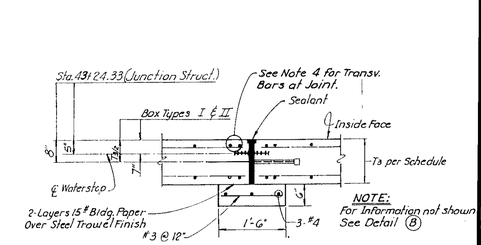
BOX SECTION		I	II
Design Cover		25'	25'
Width	W	10.5'	10.5'
Height	H	10.5'	10.5'
Top Slab Thickness	T_1	25"	30"
Side Wall Thickness	T_2	15"	15"
Bottom Slab Thickness	T_3	27"	30"
B Bars	Bar No. & Spacing	#8@12"	#8@12"
	Length	12'-8"	12'-8"
B_1 Bars	Bar No. & Spacing	#7@12"	#9@12"
	Length	10'-0"	12'-8"
C Bars	Bar No. & Spacing	#7@12"	#7@12"
	Horiz. Length	4'-11"	4'-11"
	Vert. Length	9'-5"	9'-10"
C_1 Bars	Bar No. & Spacing	#6@12"	#6@12"
	Horiz. Length	3'-1"	3'-1"
	Vert. Length	4'-3"	4'-8"
C_2 Bars	Bar No. & Spacing	#7@12"	#7@12"
	Horiz. Length	3'-10"	3'-10"
	Vert. Length	9'-5"	9'-10"
C_3 Bars	Bar No. & Spacing	#6@12"	#6@12"
	Horiz. Length	2'-4"	2'-4"
	Vert. Length	4'-2"	4'-5"
D Bars	Bar No. & Spacing	#7@12"	#7@12"
	Length	14'-5"	15'-1"
F Bars	Bar No. & Spacing	#8@12"	#8@12"
	Length	12'-8"	12'-8"
F_1 Bars	Bar No. & Spacing	#7@12"	#9@12"
	Length	12'-2"	12'-8"
G Bars	Bar No. & Spacing	#4@12"	#4@12"
	Length	6'-0"	6'-0"
H Bars	Bar No. & Spacing	#4@12"	#4@12"
	Length	8'-0"	8'-0"
NUMBER OF LONGITUDINAL REINFORCEMENT # 4 BARS			
Top Slab		35	35
Bottom Slab		38	38
Side Walls		34	34
TOTAL		107	107
QUANTITIES			
Concrete Cu. Yds./Lin. Ft.		3.06	3.22
Steel Lbs./Lin. Ft.		407.1	553.7



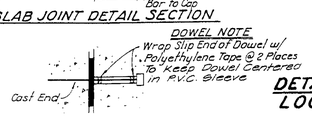
(A) WALL JOINT DETAIL PLAN SECTION



(B) TOP SLAB JOINT DETAIL SECTION



(C) BOTTOM SLAB JOINT DETAIL SECTION



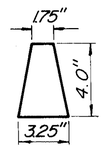
DETAIL SETTLEMENT JOINT @ SPECIFIC LOCATIONS (See Profile for Locations)

ADDITIONAL NOTES FOR BOX CHANNEL

1. LONGITUDINAL STEEL SHALL BE CONTINUOUS AND EXTEND THROUGH ALL CONSTRUCTION JOINTS. STOP BARS 2" FROM SETTLEMENT JOINTS. (4)
2. UNLESS OTHERWISE SHOWN ON DRAWINGS, TRANSVERSE JOINT KEYWAYS (IN BOTH SLABS AND WALLS), AS DETAILED FOR LONGITUDINAL KEYWAYS AT THE BASE OF THE WALLS, SHALL BE PLACED AT THE END OF EACH POUR, BUT THE SPACING THERE OF SHALL NOT EXCEED 60 FEET OR BE LESS THAN 10 FEET. ALL CONSTRUCTION JOINTS IN BOTTOM SLAB, TOP SLAB, AND SIDE WALLS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED.
3. UNLESS OTHERWISE SHOWN ON DETAILS, IN CURVED SECTIONS TRANSVERSE BARS SHALL BE PLACED RADIALLY. STRAIGHT TRANSVERSE BARS IN TOP AND BOTTOM SLABS SHALL BE SPACED AS SHOWN ON THE TYPICAL SECTIONS; SPACING SHALL BE AT THE CENTERLINE OF THE BARREL ON OUTSIDE OF THE CURVE FOR DOUBLE BARREL BOXES. STRAIGHT BARS AND L-BARS IN WALL SHALL BE SPACED AS SHOWN ON TYPICAL SECTIONS, WITH THE SPACING MEASURED BETWEEN THE VERTICAL LEGS OF BARS.
4. AT THE BEGINING AND ENDING OF ALL POURS, A CURTAIN OF REINFORCEMENT COMPOSED OF B, C, C2, D, CW, F, G, AND H BARS SHALL BE PLACED THREE INCHES & SIX INCHES FROM TRANSVERSE CONSTRUCTION AND SETTLEMENT JOINTS. (4)
5. THE VERTICAL WALL STEEL IN INTERIOR WALLS AND IN THE INTERIOR FACE OF EXTERIOR WALLS MAY BE SPLICED AT THE CONSTRUCTION JOINT AT THE BASE OF THE WALL. THE SPLICES SHALL BE 46 BARS DIAMETERS IN LENGTH.
6. IN ALL SECTIONS LAP C AND C2 BARS, THE VERTICAL LENGTH OF C AND C2 BARS HAVE BEEN CALCULATED FOR A 4 INCH STARTER WALL. IF THE HEIGTH OF THE STARTER WALL IS VARIED, THE VERTICAL LENGTH OF THE C AND C2 BARS SHALL BE VARIED CORRESPONDINGLY SO AS TO MAINTAIN A 46 DIAMETER LAP BETWEEN THE TWO BARS. THE LAPS SHALL BE BASED ON THE SMALLER BARS.
7. CONCRETE QUANTITIES ARE BASED ON A 6 x 6 INCH FILLET AND THE STEEL QUANTITIES DO NOT INCLUDE ANY OPTIONAL SPLICES.
8. IF WALL THICKNESS IS 6 INCHES, PLACE REINFORCEMENT AT THE CENTERLINE OF THE WALL.
9. BOX INVERT SURFACE SHALL HAVE A STEEL TROWEL FINISH.
10. ALL CONC. SHALL BE 3250 LBS. PER SQUARE INCH IN 28 DAYS EXCEPT INVERT AND STARTER WALLS WHICH SHALL BE 4,500 LBS. PER SQUARE INCH IN 28 DAYS.

Typical Joints @ all locations except Sta. 10+85.17 (See Sheet 16)

DETAIL SETTLEMENT JOINT @ SPECIFIC LOCATIONS (4)
(See Profile for Locations)



HT 4.0" + .125"
BASE 3.25" + .125"
TOP 1.75" + .125"
MIN. 4,500 PSI
COLOR: RED
CONTRAST TO CONC.
INVERT

WEAR CONE DETAIL
NOT TO SCALE

1/2 0 1 2
3 inches on original drawing

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P06

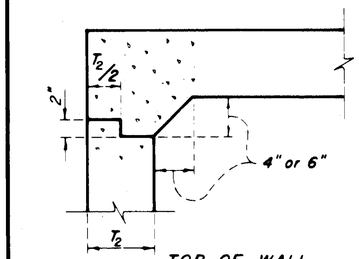
SINGLE REINFORCED CONCRETE BOX SCHEDULE AND DETAILS SETTLEMENT JOINT DETAILS

MARK	DATE	DESCRIPTION
4	2/84	Added Settlement Jts. Details, Added Notes To Box Channel Notes

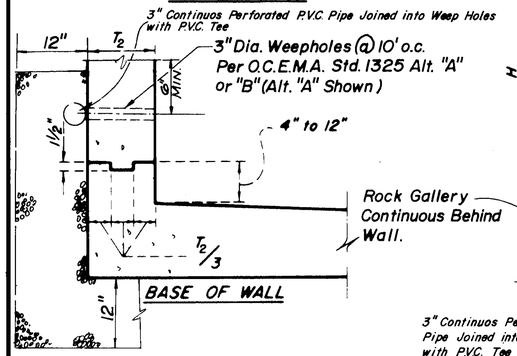
REVISIONS

PREPARED UNDER SUPERVISION OF

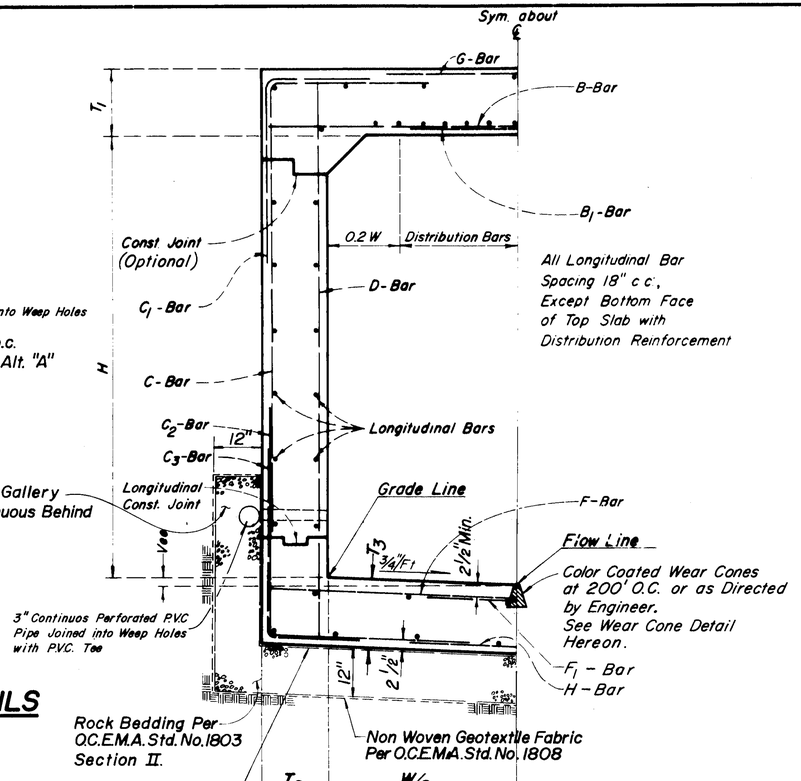
DESIGNED S. SHEIKH
DRAWN PSK CHECKED GHP
SCALE AS SHOWN
DATE
DWG. NO. F19P06-713-1
SHEET 3 OF 17



TOP OF WALL

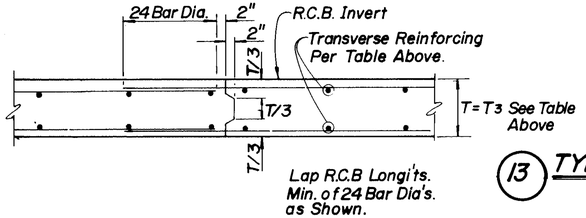


BASE OF WALL



CONSTRUCTION JOINT DETAILS

N.T.S.



(13) TYPICAL R. C. BOX SECTION (41)

NOT TO SCALE

TRANSVERSE JOINT DETAIL

N.T.S.

DESIGN DATA

LIVE LOAD
HS20-44

DEAD LOAD
Earth load per Marston's formula: w = 110 p.c.f
Ku = Ku' = 0.150
Bd = Outside width of box plus 3 feet
Side earth 40 p.s.f per foot of depth

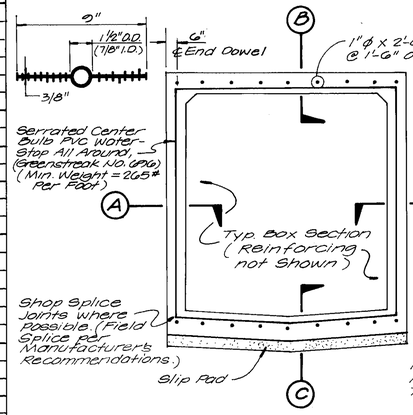
Weight of concrete 150 p.c.f

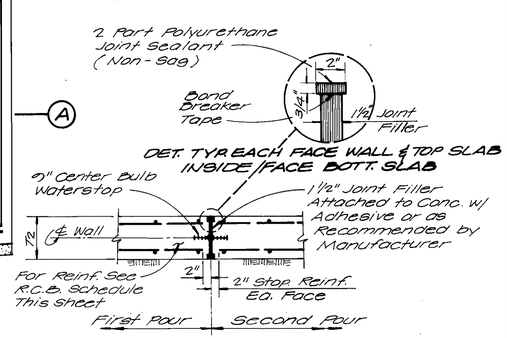
ALLOWABLE STRESSES
f'_c = 3250 p.s.i. at 28 days
f_c = 1462 p.s.i.
f_s = 24,000 p.s.i
n = 8.8
shear and bond stresses per A.C.I. 318-63

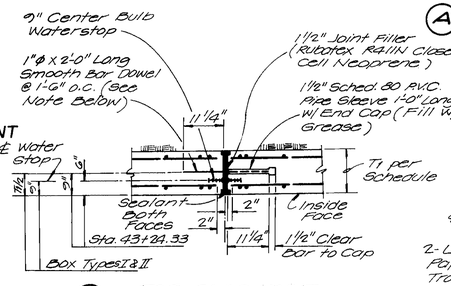
BOX SECTION		I	II
Design Cover		25'	25'
Width	W	10.5'	10.5'
Height	H	10.5'	10.5'
Top Slab Thickness	T_1	25"	30"
Side Wall Thickness	T_2	15"	15"
Bottom Slab Thickness	T_3	27"	30"
B Bars	Bar No. & Spacing	#8@12"	#8@12"
	Length	12'-8"	12'-8"
B_1 Bars	Bar No. & Spacing	#7@12"	#9@12"
	Length	10'-0"	12'-8"
C Bars	Bar No. & Spacing	#7@12"	#7@12"
	Horiz. Length	4'-11"	4'-11"
	Vert. Length	9'-5"	9'-10"
C_1 Bars	Bar No. & Spacing	#6@12"	#6@12"
	Horiz. Length	3'-1"	3'-1"
	Vert. Length	4'-3"	4'-8"
C_2 Bars	Bar No. & Spacing	#7@12"	#7@12"
	Horiz. Length	3'-10"	3'-10"
	Vert. Length	9'-5"	9'-10"
C_3 Bars	Bar No. & Spacing	#6@12"	#6@12"
	Horiz. Length	2'-4"	2'-4"
	Vert. Length	4'-2"	4'-5"
D Bars	Bar No. & Spacing	#7@12"	#7@12"
	Length	14'-5"	15'-1"
F Bars	Bar No. & Spacing	#8@12"	#8@12"
	Length	12'-8"	12'-8"
F_1 Bars	Bar No. & Spacing	#7@12"	#9@12"
	Length	12'-2"	12'-8"
G Bars	Bar No. & Spacing	#4@12"	#4@12"
	Length	6'-0"	6'-0"
H Bars	Bar No. & Spacing	#4@12"	#4@12"
	Length	8'-0"	8'-0"
NUMBER OF LONGITUDINAL REINFORCEMENT # 4 BARS			
Top Slab		35	35
Bottom Slab		38	38
Side Walls		34	34
TOTAL		107	107
QUANTITIES			
Concrete Cu. Yds/Lin. Ft.		3.06	3.22
Steel Lbs/Lin. Ft		407.1	553.7

R. C. BOX LOCATION SCHEDULE			
Box Sect	Station From	Station To	REMARK
F19P06			
I	42+93.75	42+98.84	10.5'x 10.5' R.C.B.
F19P07			
II	~~42+98.84~~ 9+97.09	10+25.09	10.5'x 10.5' R.C.B. @ JUNCTION BOX
F19P07			
I	10+25.09	10+90.00	10.5'x 10.5 R.C.B.

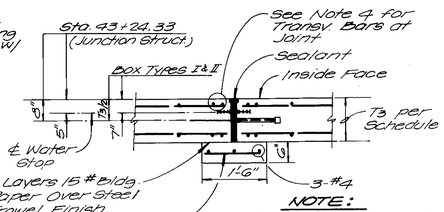
4 CONST. SETTLEMENT JOINTS PER PROFILE SHT. 4 AND DETAILS ON SHT. 3, 16 & 17







A WALL JOINT DETAIL PLAN SECTION



B TOP SLAB JOINT DETAIL SECTION

C BOTTOM SLAB JOINT DETAIL SECTION

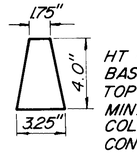
DOWEL NOTE

Typical Joints @ all locations except Sta. 10+85.17 (See Sheet 16)

ADDITIONAL NOTES FOR BOX CHANNEL

1. LONGITUDINAL STEEL SHALL BE CONTINUOUS AND EXTEND THROUGH ALL CONSTRUCTION JOINTS. STOP BARS 2" FROM SETTLEMENT JOINTS. 4
2. UNLESS OTHERWISE SHOWN ON DRAWINGS, TRANSVERSE JOINT KEYWAYS (IN BOTH SLABS AND WALLS) AS DETAILED FOR LONGITUDINAL KEYWAYS AT THE BASE OF THE WALLS, SHALL BE PLACED AT THE END OF EACH POUR, BUT THE SPACING THERE OF SHALL NOT EXCEED 60 FEET OR BE LESS THAN 10 FEET. ALL CONSTRUCTION JOINTS IN BOTTOM SLAB, TOP SLAB, AND SIDE WALLS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED.
3. UNLESS OTHERWISE SHOWN ON DETAILS, IN CURVED SECTIONS TRANSVERSE BARS SHALL BE PLACED RADIALLY. STRAIGHT TRANSVERSE BARS IN TOP AND BOTTOM SLABS SHAL BE SPACED AS SHOWN ON THE TYPICAL SECTIONS; SPACING SHALL BE AT THE CENTERLINE OF THE BARREL ON OUTSIDE OF THE CURVE FOR DOUBLE BARREL BOXES. STRAIGHT BARS AND L-BARS IN WALL SHALL BE SPACED AS SHOWN ON TYPICAL SECTIONS, WITH THE SPACING MEASURED BETWEEN THE VERTICAL LEGS OF BARS.
4. AT THE BEGINING AND ENDING OF ALL POURS, A CURTAIN OF REINFORCEMENT COMPOSED OF B, C, C2, D, C1, F, G, AND H BARS SHALL BE PLACED THREE INCHES & SIX INCHES FROM TRANSVERSE CONSTRUCTION AND SETTLEMENT JOINTS. 4
5. THE VERTICAL WALL STEEL IN INTERIOR WALLS AND IN THE INTERIOR FACE OF EXTERIOR WALLS MAY BE SPLICED AT THE CONSTRUCTION JOINT AT THE BASE OF THE WALL. THE SPLICES SHALL BE 45 BARS DIAMETERS IN LEGENTH.
6. IN ALL SECTIONS LAP C AND C2 BARS, THE VERTICAL LENGTH OF C AND C2 BARS HAVE BEEN CALCULATED FOR A 4 INCH STARTER WALL. IF THE HEIGTH OF THE STARTER WALL IS VARIED, THE VERTICAL LENGTH OF THE C AND C2 BARS SHALL BE VARIED CORRESPONDINGLY SO AS TO MAINTAIN A 45 DIAMETER LAP BETWEEN THE TWO BARS. THE LAPS SHALL BE BASED ON THE SMALLER BARS.
7. CONCRETE QUANTITIES ARE BASED ON A 6 x 6 INCH FILLET AND THE STEEL QUANTITIES DO NOT INCLUDE ANY OPTIONAL SPLICES.
8. IF WALL THICKNESS IS 6 INCHES, PLACE REINFORCEMENT AT THE CENTERLINE OF THE WALL.
9. BOX INVERT SURFACE SHALL HAVE A STEEL TROWEL FINISH.
10. ALL CONC. SHALL BE 3250 LBS. PER SQUARE INCH IN 28 DAYS EXCEPT INVERT AND STARTER WALLS WHICH SHALL BE 4,500 LBS. PER SQUARE INCH IN 28 DAYS.

DETAIL SETTLEMENT JOINT @ SPECIFIC LOCATIONS 4 (See Profile for Locations)



HT 4.0" + .125"
BASE 3.25" + .125"
TOP 1.75" + .125"
MIN. 4,500 PSI
COLOR: RED
CONTRAST TO CONC. INVERT

WEAR CONE DETAIL

NOT TO SCALE

REGISTERED PROFESSIONAL ENGINEER * ROBERT KALLENBERGER * No. C 27987 EXP. 3-31-90 CIVIL * STATE OF CALIFORNIA *

1/2 0 2

3 inches on original drawing

MARK	DATE	REVISIONS	DESIGNED S. SHEIKH	DRAWN PSK	CHECKED RWP
4	2/90	ADDED SETTLEMENT JTS. DETAILS, ADDED NOTES TO BOX CHANNEL NOTES			

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P06

SINGLE REINFORCED CONCRETE BOX SCHEDULE AND DETAILS

PREPARED UNDER SUPERVISION OF R.K. Kallenberger 2/1/90 RCE 27987

SCALE AS SHOWN | DATE | DWG. NO. F19P06-713-1

SHEET 3A OF 17

JOIN PROP. STORM DRAIN PER FACILITY F19Ø2 IMP. PLANS STA 42+93.75 F19PØ6 BEG. CONST. 10.5'x10.5' R.C.B.

FINISHED SURFACE @ ℄ STORM DRAIN

EXISTING GROUND AT ℄ OF PIPE

HGL Q25

PROP 90" R.C.P.

S=0.0155

S=0.0148

S=0.0096

SEE SHT. 17

DETAIL (1) SHT. 17 FOR SPIGOT REMOVAL

TEMPORARY CONST. END JUNCTION STRUCT.

686.60 M.H. LANDING

FACILITY NO. F19PØ6

MATCH LINE STA 49+00.00 SEE SHT. NO. 5

42+98.75 ℄ BEG. F19PØ6 225.31' ℄

43+00.25 INV. 686.61

43+24.39 ℄ SEPT. JOINT 686.61 INV.

43+32.33 END CONST. 686.61 INV.

46+00.00 G.B. 679.85 INV.

48+00.00 G.B. 678.82 INV.

49+75.16 END R.C.B. 678.46 INV.

CONST. 550.83 L.F. 90" RCP (D-2000) 1½" MIN. STEEL CLEAR COVER

CONST. 201.8 L.F. 90" R.C.P. 1½" MIN. STEEL CLR. COVER (D-2000)

700 / 680 / 660

42 43 44 45 46 47 48 49

PROFILE F19PØ7

PROP. FINISHED SURFACE @ ℄ R.C.B.

10+35.00 ℄ M.H.

EXISTING GROUND AT ℄ OF PIPE

5' C.L. FENCE

TRACT BOUNDARY

691.20 M.H. LANDING

677.00 M.H. LANDING

HGL Q100

HGL Q25

677.60

676.46

10.5'x10.5' R.C.B.

SEE SETT. JT. PROFILE

42+93.75 END F19Ø2 - BEG. F19PØ6 - ℄ B.

10+00.00 BEG. F19PØ7 - ℄ B.

10+35.00 ℄ M.H.

10+70.00 END 10.5'x10.5' R.C.B.

11+20.00 END F19PØ7 - ℄ B.

EXIST. 90.00 L.F. 10.5'x10.5' R.C.B.

15' GROUTED RIP-RAP 36" THICK

CONST. 15' INLET STRUCTURE

700 / 690 / 680 / 670 / 660

10 11 12

PROFILE SETTLEMENT JOINTS

JOINTS PER SHT. 3. EXCEPT SHT. 16 FOR STA 10+85.17

F19PØ7

PROFILE SCALES HORIZ. 1"=40' VERT. 1"=8'

PLAN SCALE 1"=40'

JOIN PROP. STORM DRAIN PER FACILITY F19SØ2 IMP. PLANS STA 42+93.75 F19PØ6 BEG. CONSTRUCTION 10.5'x10.5' RCB

F19SØ2

F19PØ6

F19PØ7

42+98.75 ℄ BEG. F19PØ6 - 43+01.75 ℄ INT. F19PØ6 - 10+00.00 BEG. F19PØ7

43+32.33 ℄ E.S. 90 RCP

N 19° 86' 49" E

43+42.75 B.C.

10+35.00 ℄ M.H.

10+90.00 END RCB BEGS. WINGWALL

11+05.00 END WINGWALL

44+37.00 E.C.

67+67.28 B.C.

N 40° 81' 11" W

S.D. EASMT.

PACIFIC COMMERCENTRE (T.T. 13179) NAKASE, INC.

EXIST. 12" WATERLINE TO BE RELOCATED BY OTHERS

EXIST. 12" WATERLINE TO BE RELOCATED BY OTHERS

11+20.00 END CONSTRUCTION F19PØ7

EX. W.

DEBRIS POSTS 7 TOTAL

RELOCATED 12" WATERLINES

48+75.16 E.C.

49+77.44 ℄ M.H. JUNC. STRUCT. TYPE II

N 20° 19' 11" E

MATCH LINE STA 49+00.00 SEE SHT. NO. 5

℄ PROP. BAKE PARKWAY

SCALE 1" = 40'

CONSTRUCTION NOTES

(19) CONST. 90" RCP (D-LOAD PER PROFILE)

(20) CONST. 10.5' x 10.5' RCB PER PROFILE THIS SHT. AND PER RCB DETAIL & S-TYPD. ON SHT. NO. 3.

(21) CONST. JUNC. STRUCT. PER OCEMA STD. PLAN NO. 1314 & DETAIL ON SHT. NO. 17

(27) CONST. JUNC. STRUCT. PER STD. PLAN NO. 1311

(51) CONST. R.C. BOX M.H. PER OCEMA STD. PLAN NO. 1506

(41) CONST. STEEL LANDING FOR DEEP M.H. PER DETAIL ON SHT. NO. 17 AND 90° M.H. STAIRS

(42) CONST. 36" GROUTED RIP-RAP PER DETAIL & GRADATION ON SHT. NO. 17

(44) CONST. WEEPHOLES PER DETAILS ON SHT. NO. 17

(45) CONST. 60" CHAIN LINK FENCE PER OCEMA STD. PLAN NO. 1412.

(46) CONST. R.C. PARAPET WALL PER DETAILS ON SHT. NO. 16

(48) CONST. BOX CULVERT INLET PER DETAILS ON SHT. NO. 16

(50) CONST. DEBRIS POSTS PER DETAIL ON SHT. NO. 16

(28) CONST. SETTLEMENT JOINTS PER SHEET 3 OR 16. (4)

HYDRAULIC DATA

LINE No.	STA TO STA	Q25	So	DIA.	Dn	Vn	Dc	Vc	Nf
F19PØ6	43+32.33 - 46+00.00	808	0.0155	90"	5.32	24.14	G.96	18.89	1.92
(4)(3) F19PØ6	46+00.00 - 48+00.00	808	0.0148	90"	5.39	23.80	G.96	18.89	1.87
F19PØ6	48+00.00 - 48+75.16	808	0.0096	90"	6.92	10.96	G.96	18.89	1.02
		Q100							
F19PØ7	42+98.75 - 10+00.00	1747.3	0.913	10.5'x10.5'	1.56	10G.9	9.51	17.5	13.1
(4) F19PØ7	10+00.00 - 10+30.00	720.2	0.0837	10.5'x10.5'	2.63	26.4	5.31	13.07	2.87
F19PØ7	10+30.00 - 10+90.00	720.2	0.0225	10.5'x10.5'	2.94	23.6	5.31	13.07	2.43

CURVE DATA

NO.	REFERENCE	Δ	L	R	T
(A)	℄ S.D.	60°00'00"	94.25'	90.00'	51.96'
(B)	℄ S.D.	68°40'65"	107.88'	90.00'	61.49'
(C)	℄ RCB	1°25'57"	5.00'	200.00'	2.50'

1 1/2 0 1 2

3 inches on original drawing

MARK	DATE	DESCRIPTION
(4)	2/14/91	ADDED SETT. JOINTS RELOCATED M.H. REV. PROFILE
(3)	2-8-91	PROFILE REVISED

REVISIONS

DESIGNED B. WORSHAM

DRAWN [illegible] CHECKED [illegible]

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19PØ6 AND F19PØ7

PLAN AND PROFILE

BAKE PARKWAY STORM DRAIN

PØ6 STA 42+93.75 TO STA 49+00.00

PØ7 STA 10+00.00 TO STA 11+20.00

PREPARED UNDER SUPERVISION OF _____ DATE _____

SCALE AS SHOWN | DATE | DWG. NO.

SHEET 4 OF 17

JOIN PROP. STORM DRAIN PER FACILITY F19SØ2 IMP. PLANS STA 42+93.75 F19PØ6 BEG. CONST. 10.5'x10.5' RCB

SEE SHT. 17

DETAIL 1 SHT. 17 FOR SPIGOT REMOVAL

FINISHED SURFACE @ ℄ STORM DRAIN

EXISTING GROUND AT ℄ OF PIPE

HGL Q25

PROP 90" R.C.P.

S = 0.0153

S = 0.0143

S = 0.0096

686.60 H.P. LANDING

FACILITY NO. F19PØ6

CONST. 550.83 L.F. 90" RCP (D-2000) 1½" MIN. STEEL CLEAR COVER

CONST. 20.18 L.F. 90" R.C.P. 1½" MIN. STEEL CLR. COVER (D-2000)

MATCH LINE STA 44+00.00 SEE SHT. NO. 5

700 / 680 / 660

42 43 44 45 46 47 48 49

PROFILE F19PØ7

PROP. FINISHED SURFACE @ ℄ RCB

10+35.00 ℄ M.H. 4

EXISTING GROUND AT ℄ OF PIPE

5'C.L. FENCE

HGL Q100

HGL Q25

677.60

678.46

10.5'x10.5' RCB

S=0.0080

S=0.0749

SEE SHT. JOINT PROFILE

CONST. 90.00 L.F. 10.5'x10.5' RCB

CONST. 15' INLET STRUCTURE

15' GROUTED RIP-RAP 36" THICK

700 / 690 / 680 / 670 / 660

10 11 12

PROFILE SETTLEMENT JOINTS

JOINTS PER SHT. 3 EXCEPT SHT. 16 FOR STA. 10+05.17

F19PØ7

PROFILE SCALES
HORIZ. 1" = 40'
VERT. 1" = 8'

PLAN SCALE
1" = 40'

CONSTRUCTION NOTES

(19) CONST. 90" R.C.P. (D-LOAD PER PROFILE)

(20) CONST. 10.5'x10.5' RCB PER PROFILE THIS SHT. AND PER RCB DETAIL & SCHED. ON SHT. NO. 3

(21) CONST. JUNC. STRUCT. PER OCEMA STD. PLAN NO. 1314 & DETAIL ON SHT. NO. 17

(27) CONST. JUNC. STRUCT. PER STD. PLAN NO. 1311

(51) CONST. R.C. BOX M.H. PER OCEMA STD. PLAN NO. 1506

(41) CONST. STEEL LANDINGS FOR DEEP M.H. PER DETAIL ON SHT. NO. 17 AND 48" M.H. STEPS

(42) CONST. 36" GROUTED RIP-RAP PER DETAIL & GRADATION ON SHT. NO. 17

(44) CONST. WEEPHOLES PER DETAILS ON SHT. NO. 17

(45) CONST. 60" CHAIN LINK FENCE PER OCEMA STD. PLAN NO. 1412.

(46) CONST. R.C. PARAPET WALL PER DETAILS ON SHT. NO. 16

(48) CONST. BOX CULVERT INLET PER DETAILS ON SHT. NO. 16

(50) CONST. DEBRIS POSTS PER DETAIL ON SHT. NO. 16

(28) CONST. SETTLEMENT JOINTS PER SHEET 3 OR 16

JOIN PROP. STORM DRAIN PER FACILITY F19SØ2 IMP. PLANS STA 42+93.75 F19PØ6 BEG. CONSTRUCTION 10.5'x10.5' RCB

F19SØ2

F19PØ6

F19PØ7

11+80.00 END CONSTRUCTION F19PØ7

RELOCATED (12" WATER LINE)

PACIFIC COMMERCE CENTRE (T.T. 13179) NAKASE BROS.

EXIST. 12" WATERLINE TO BE RELOCATED BY OTHERS

EXIST. 12" WATERLINE TO BE RELOCATED BY OTHERS

DEBRIS POSTS 7 TOTAL

MATCH LINE STA 49+00.00 SEE SHT. NO. 5

℄ PROP BAKE PARKWAY

SCALE 1" = 30'

1 1/2 0 1 2
3 inches on original drawing

HYDRAULIC DATA

	LINE NO	STA. TO STA.	Q25	S_o	DIA.	V_n	V_n	D_c	V_c	V_f
3	F19PØ6	43+32.33 - 46+00.00	808	0.015	90"	5.32	24.19	6.96	18.89	19.2
4 5	F19PØ6	46+00.00 - 48+00.00	808	0.0148	90"	5.39	23.80	6.96	18.89	18.7
4 5	F19PØ6	48+00.00 - 48+75.16	808	0.0096	90"	6.52	19.56	6.96	18.89	15.2
			Q100							
	F19PØ7	42+93.75 - 10+00.00	1767.3	0.0113	10.5'x10.5'	1.56	106.9	9.51	17.5	15.1
4	F19PØ7	10+00.00 - 10+30.00	720.2	0.0337	10.5'x10.5'	2.63	26.4	5.31	13.07	2.87
	F19PØ7	10+30.00 - 10+90.00	720.2	0.0245	10.5'x10.5'	2.94	23.6	5.31	13.07	2.43

CURVE DATA

NO.	REFERENCE	Δ	L	R	T
(A)	℄ S.D.	60°00'00"	94.25'	90.00'	51.96'
(B)	℄ S.D.	68°30'55"	107.85'	90.00'	61.49'
(C)	℄ RCB	1°25'57"	5.00'	200.00'	2.50'

MARK	DATE	DESCRIPTION
4	2-91	ADDED SETT. JOINTS RELOCATED M.H. REV. PROFILE
3	2-91	PROFILE REVISED

REVISIONS

DESIGNED B WORSHAM

DRAWN SS CHECKED BMP

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19PØ6 AND F19PØ7

PLAN AND PROFILE

BAKE PARKWAY STORM DRAIN

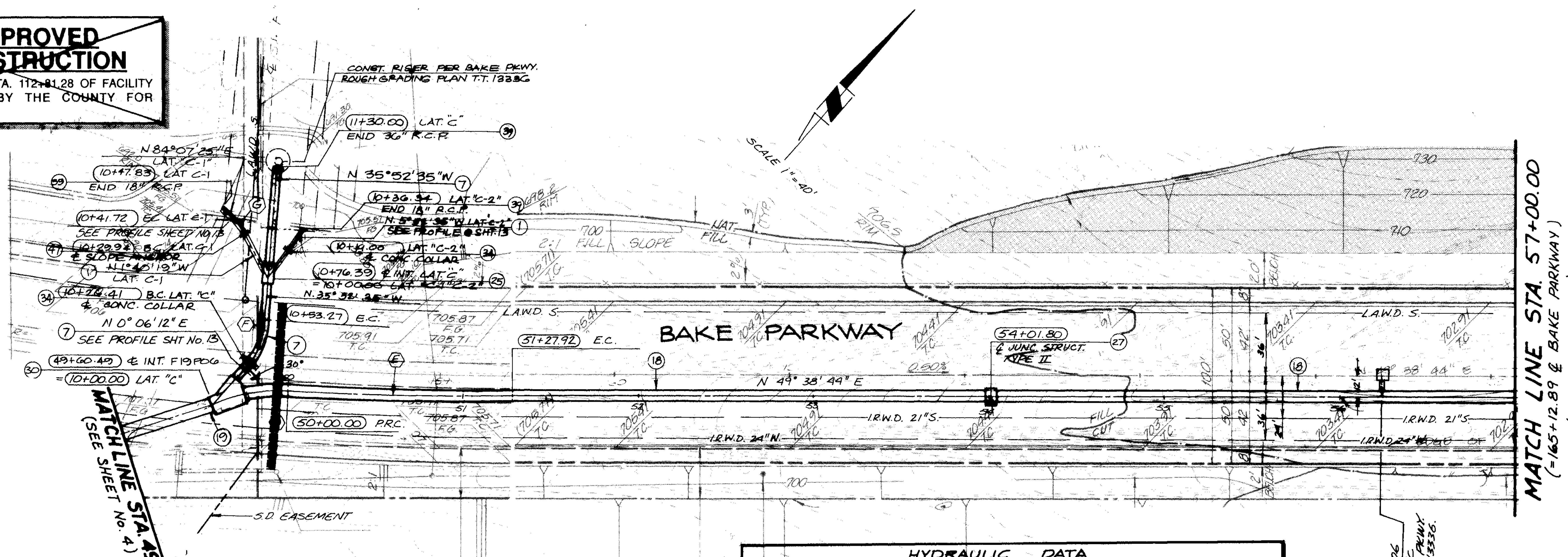
PØ6 STA 42+93.75 TO STA 49+00.00
PØ7 STA 10+00.00 TO STA 11+20.00

PREPARED UNDER SUPERVISION OF _____ DATE _____

SCALE AS SHOWN | DATE | DWG. NO. | SHEET 4A OF 17

NOT APPROVED FOR CONSTRUCTION

ONLY STA. 50+00 TO STA. 112+81.28 OF FACILITY F19P06 APPROVED BY THE COUNTY FOR CONSTRUCTION.



J.S. TYPE III DATA
@ STA. 49 + 60.49

A = 30°
B = 30°
C = 19.50'
D_1 = 87"
D_2 = 90"
ELEV. "S" = 678.98
ELEV. "R" = 679.07

CONSTRUCTION NOTES

(1) — CONST. 18" R.C.P. (D-LOAD PER PROFILE)
(7) — CONST. 36" R.C.P. (D-LOAD PER PROFILE)
(18) — CONST. 87" R.C.P. (D-LOAD PER PROFILE)
(19) — CONST. 90" R.C.P. (D-LOAD PER PROFILE)
(27) — CONST. JUNC. STRUCT. TYPE II PER O.C.E.M.A. STD. PLAN No. 1311
(30) — CONST. JUNC. STRUCT. TYPE III (OMIT SHAFT) PER O.C.E.M.A. STD. PLAN No. 1312.
(34) — CONST. REIN. CONC. COLLAR PER O.C.E.M.A. STD. PLAN No. 1317
(38) — CONST. RISER PER O.C.E.M.A. STD. PLAN No. 1327
(39) — CONST. BRICK AND MORTAR PLUG.
(25) — CONST. JUNCTION STRUCTURE TYPE I PER O.C.E.M.A STD. PLAN NO. 1310

(47) — CONST. CONC. PIPE SLOPE ANCHOR PER O.C.E.M.A. STD. PLAN No 1323.

CURVE DATA

	NO.	REFERENCE	Δ	L	R	T
BC. TO ℄ INT.	D	℄ 84" R.C.P.	25°09'02"	39.51'	90.00'	20.08'
℄ INT. TO P.R.C.	E	℄ 84" R.C.P.	3°50'00"	127.92'	1912.00'	63.98'
TOTAL CURVE	F	℄ 36" R.C.P.	34°12'16"	26.86'	45.00'	13.85'
TOTAL CURVE	G	℄ 18" R.C.P.	30°00'00"	11.78'	22.50'	6.03'
TOTAL CURVE						

HYDRAULIC DATA

LINE NO.	STATION TO STATION	Q25	So	DIA.	Dn	Vn	Dc	Vc	Nf
F19P06	49+00.00 TO 49+62.00	807.8	0.0116	90"	6.00	21.3	6.96	18.9	1.50
F19P06	49+73.00 TO 57+00.00	740.4	0.0128	87"	5.55	21.8	6.73	18.5	1.64
LAT. NO.									
C	10+07.10 TO 10+26.41	82.6	0.0136	36"	2.68	12.4	2.79	12.0	1.15
C	10+26.41 TO 10+76.39	82.6	0.0780	36"	1.40	25.6	2.79	12.0	4.34
C	10+83.39 TO 11+30.00	64.3	0.0780	36"	1.22	23.9	2.57	1.5	4.42
C-1	10+03.00 TO 10+47.83	11.2	0.2100	18"	0.49	22.2	1.28	7.0	6.53
C-2	10+03.00 TO 10+18.59	8.6	0.5400	18"	0.34	28.8	1.14	6.0	10.41
C-2	10+18.59 TO 10+36.34	8.6	0.1680	18"	0.45	19.0	1.14	6.0	5.85

1 1/2 0 1 2
3 inches on original drawing

MARK	DATE	DESCRIPTION
5	12-10-91	RELOC. MED. DRAIN FROM STA. 57+07.11 TO STA. 56+24.00

REVISIONS

DESIGNED D. VORNBERGER
DRAWN P.S.K. CHECKED

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

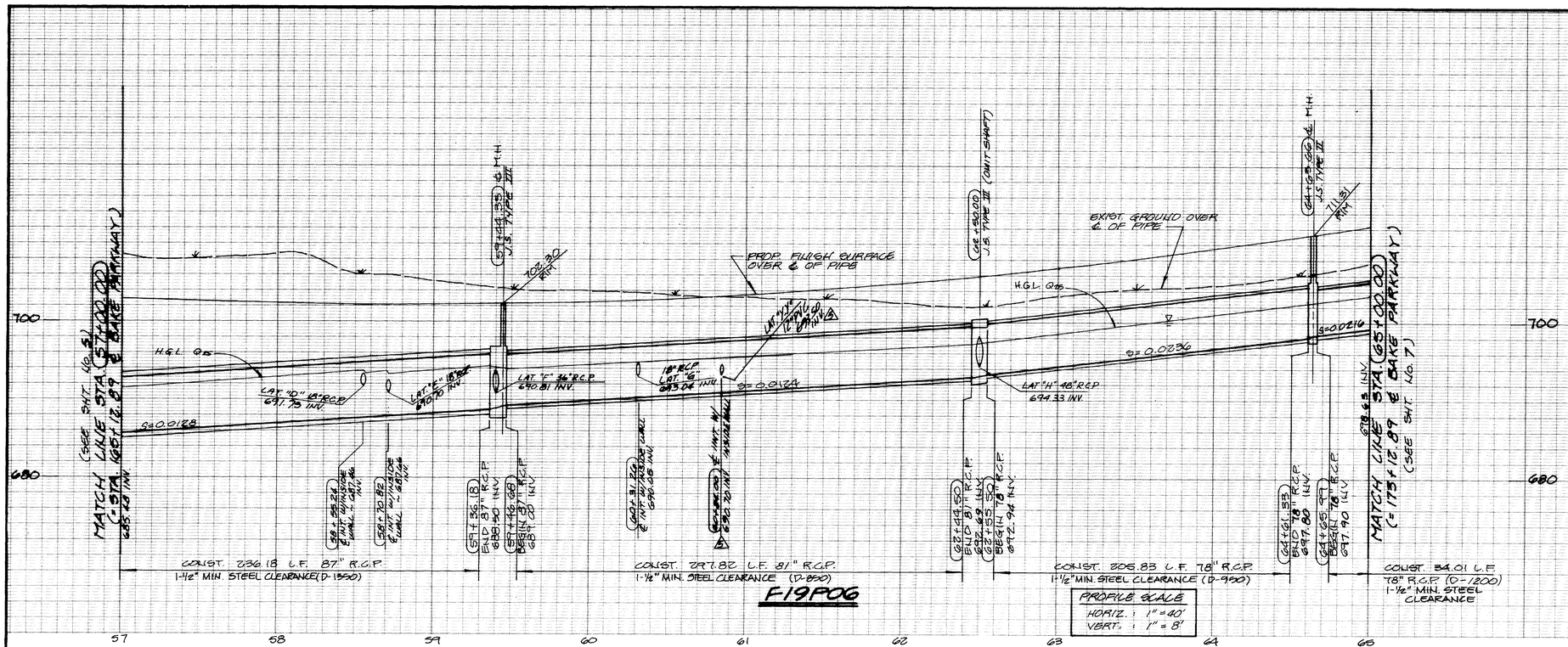
FACILITY NO. F19P06
PLAN AND PROFILE
BAKE PARKWAY
STORM DRAIN
FROM STA. 48+25.00 TO STA. 57+00.00

PREPARED UNDER SUPERVISION OF R. Kallenbaugh 4/13/89 DATE

SCALE AS SHOWN | DATE | DWG. NO. F19P06 - 713 - 1

SHEET 5 OF 17

J.N. 24429



CONSTRUCTION NOTES

1. CONST. 18" R.C.P. (D-LOAD PER PROFILE)
7. CONST. 36" R.C.P. (D-LOAD PER PROFILE)
10. CONST. 48" R.C.P. (D-LOAD PER PROFILE)
15. CONST. 78" R.C.P. (D-LOAD PER PROFILE)
16. CONST. 81" R.C.P. (D-LOAD PER PROFILE)
18. CONST. 87" R.C.P. (D-LOAD PER PROFILE)
27. CONST. JUNC. STRUCT. TYPE II PER O.C.E.M.A. STD. PLAN No. 1311
29. CONST. JUNC. STRUCT. TYPE III PER O.C.E.M.A. STD. PLAN No. 1312
30. CONST. JUNC. STRUCT. TYPE III (OMIT SHAFT) PER O.C.E.M.A. STD. PLAN No. 1312
33. CONST. JUNC. STRUCT. TYPE XI PER O.C.E.M.A. STD. PLAN No. 1315
34. CONST. REIN. CONC. COLLAR PER O.C.E.M.A. STD. PLAN No. 1317
39. CONST. BRICK AND MORTAR PLUG.

F-19P06

F19P06

CURVE DATA				
	REFERENCE	Δ	L	R	T
(G)	℄ 30" R.C.P.	60°00'00"	94.25	90.00'	51.96

HYRAULIC DATA

LINE	STATION TO STATION	Q25	So	Dia.	Dn	Vn	Dc	Vc	Nf
F19P06	57+00.00 TO 58+61.61	740.4	.0128	87"	5.55	21.8	6.73	18.5	1.64
F19P06	58+51.61 TO 58+67.79	731.8	.0128	87"	5.4	21.8	6.71	18.3	1.66
F19P06	58+67.79 TO 59+36.18	726.2	.0128	87"	5.45	21.8	6.69	18.2	1.67
F19P06	59+46.68 TO 60+27.88	650.8	.0124	81"	5.64	20.6	6.35	18.8	1.43
F19P06	60+27.88 TO 62+44.50	644.4	.0124	81"	5.52	20.6	6.32	18.5	1.48
F19P06	62+55.50 TO 64+61.33	644.4	.0236	78"	4.40	27.0	6.21	19.7	2.40
F19P06	64+65.99 TO 65+00.00	644.4	.0216	78"	4.55	26.0	6.21	19.7	2.25

DATA

LAT.	STATION TO STATION	Q25	So	Dia.	Dn	Vn	Dc	Vc	Nf
D	10+04.95 TO 10+20.95	8.9	0.2600	18"	0.41	22.45	1.15	6.1	7.28
D	10+20.95 TO 10+43.13	8.9	0.0382	18"	0.72	10.63	1.15	6.1	2.51
E	10+04.95 TO 10+76.37	6.1	0.0700	18"	0.46	12.6	0.95	5.1	3.78
F	10+13.50 TO 11+09.75	76.8	0.0448	36"	1.58	20.4	2.74	11.3	3.21
G	10+24.60 TO 10+77.07	13.8	0.0480	18"	0.84	13.6	1.38	8.1	2.91
H	10+13.00 TO 11+41.00	106.6	0.0388	48"	1.70	20.90	3.12	10.10	3.25

FOR INTERIM CASE ONLY

JUNCTION STRUCTURE TYPE III - DATA

@ STA. (59+33.68)
A = 30°
B = 36"
C = 19.50'
D1 = 81"
D2 = 87"
ELEV. R = 691.10
ELEV. S = 690.81

@ STA. (62+43.12)
A = 45°
B = 48"
C = 13.0'
D1 = 78"
D2 = 81"
ELEV. R = 694.54
ELEV. S = 694.38

PROFILE SCALE
HORIZ. : 1" = 40'
VERT. : 1" = 8'

1 1/2 0 1 2
3 inches on original drawing

REGISTERED PROFESSIONAL ENGINEER — ROBERT KALLENBACH — NO. 27367 — EXP. 3.31.10 — CIVIL — STATE OF CALIFORNIA

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P06

PLAN AND PLOT

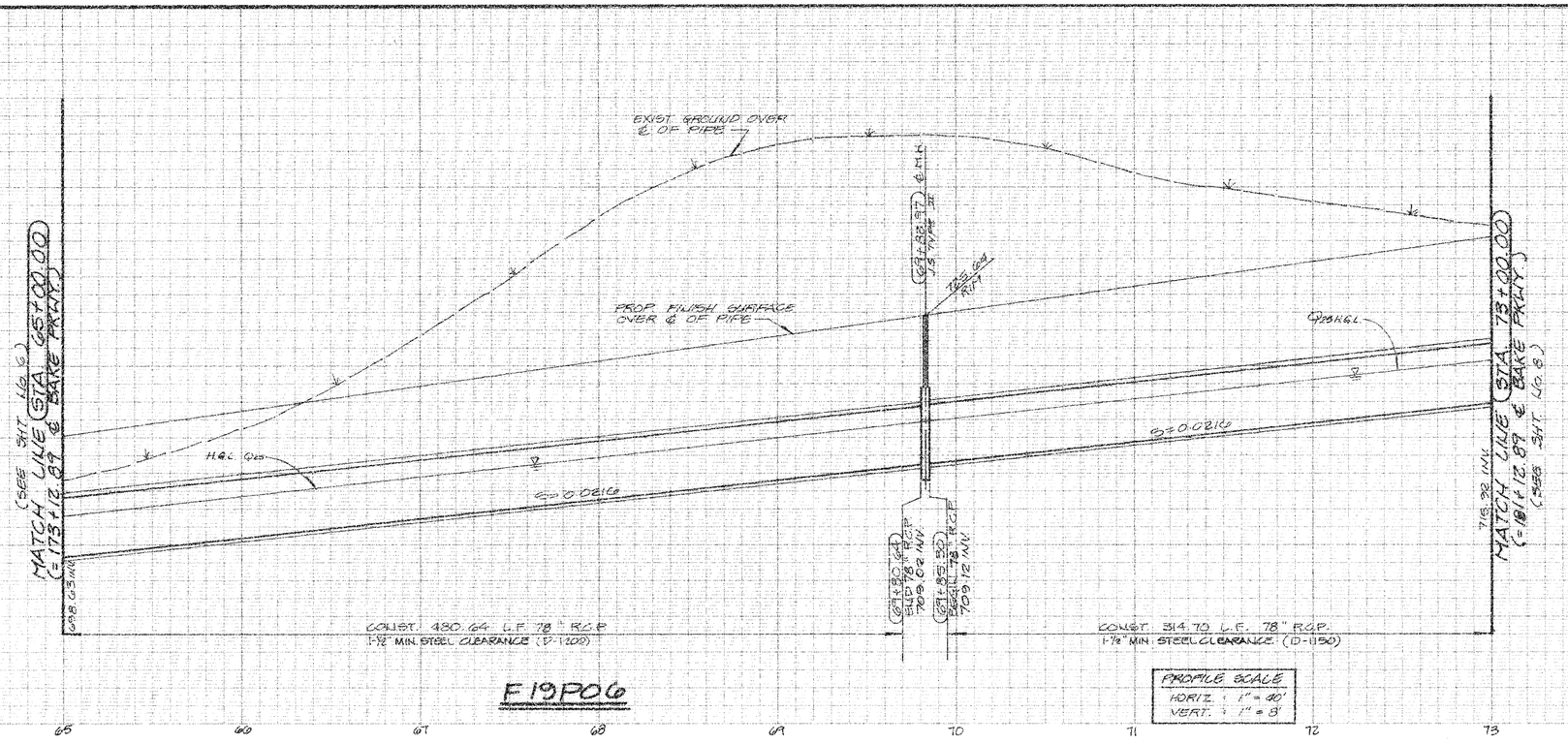
BAKE PARKWAY

STORM DRAIN

FROM STA. 57+00.00 TO STA. 65+00.00

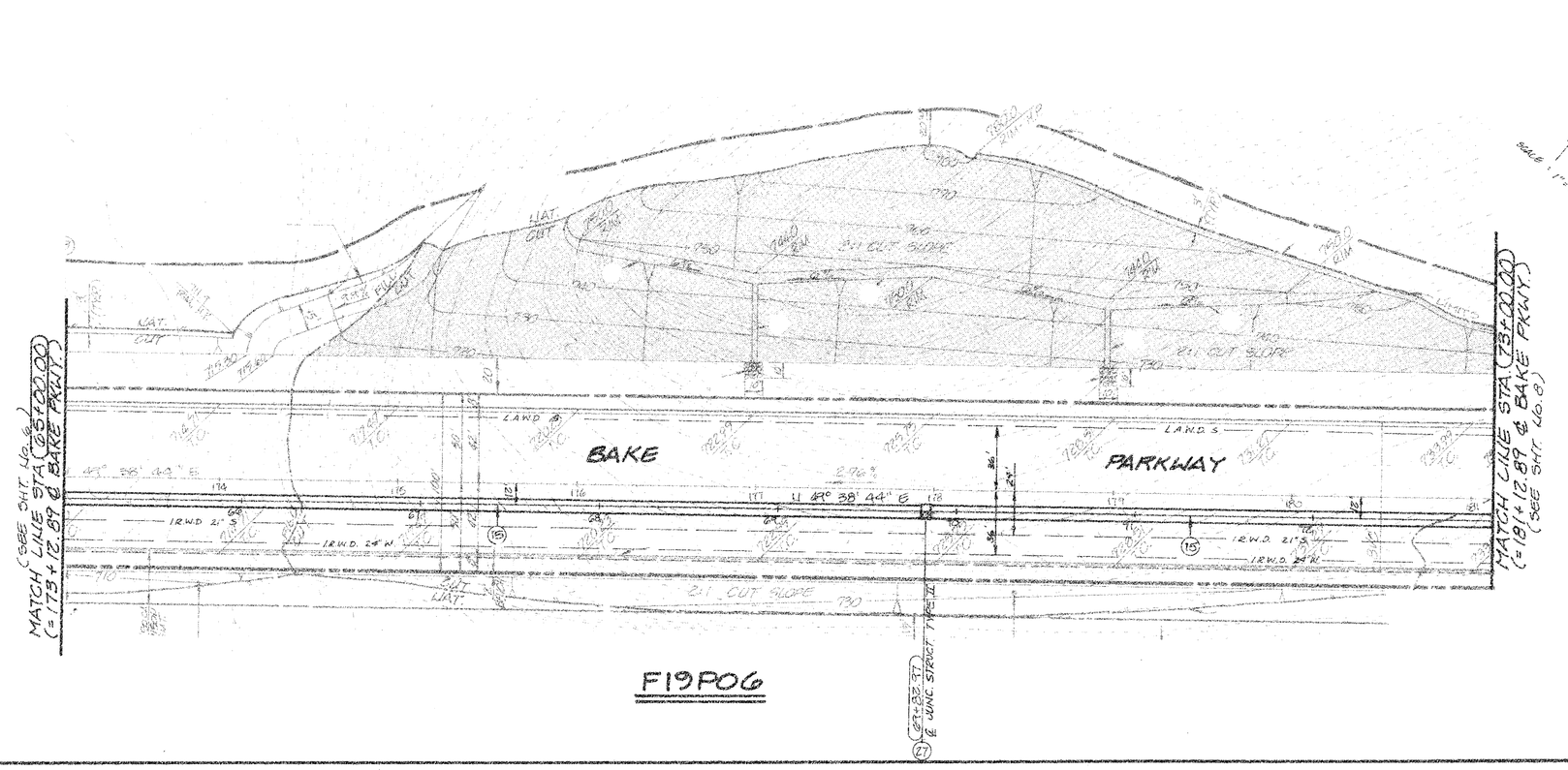
MARK	DATE	REVISIONS	PREPARED UNDER SUPERVISION OF: R. Kallenbach 2/18/09 DATE
2	12/18/09	REILOC. MEDIAN DRAIN FROM STA. 60+73.11 TO STA. 64+84.00	
			SHEET 6
DESIGNED	D. VORLIEBERGER		SCALE AS SHOWN
DRAWN	MBUCK	CHECKED	DATE
			DWG. NO. OF 17

J.N. 24429



F19P06

PROFILE SCALE
HORIZ. : 1" = 30'
VERT. : 1" = 8'



F19P06

SCALE 1" = 40'

CONSTRUCTION NOTES

(19)—CONST. 78" R.C.P. (D-LOAD PER PROFILE)

(27)—CONST. JUNCTION STRUCTURE TYPE II PER O.C.E.M.A. STD. PLAN NO. 1311

HYDRAULIC DATA

LINE	STATION TO STATION	Q25	So	Dia	Dn	Vn	Dc	Vc	Hf
F19P06	65+00.00 TO 69+80.64	644.4	.0216	78"	4.55	26.0	6.21	19.7	2.25
F19P06	69+80.64 TO 73+00.00	644.4	.0216	78"	4.55	26.0	6.21	19.7	2.25

1 1/2 0 1 2
3 inches on original drawing

REGISTERED PROFESSIONAL ENGINEER — ROBERT KALTENBRUNN — NO. 27961 — EXP. 3-31-96 — CIVIL — STATE OF CALIFORNIA

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P06

PLAN AND PLOT

BAKE PARKWAY
STORM DRAIN
FROM STA. 65+00.00 TO STA. 73+00.00

MARK	DATE	DESCRIPTION
REVISIONS		

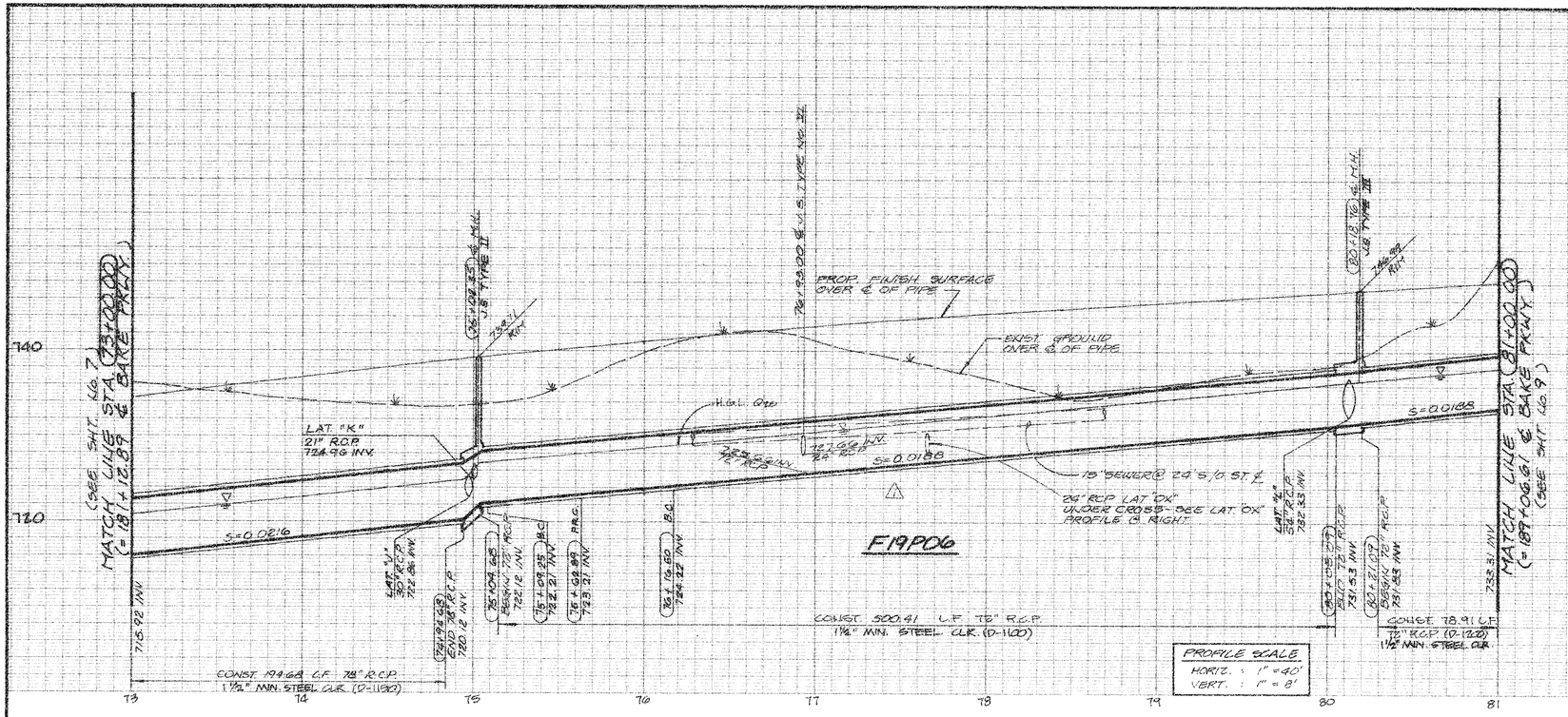
PREPARED UNDER SUPERVISION OF R. Kaltenbrunn DATE 4/1/96

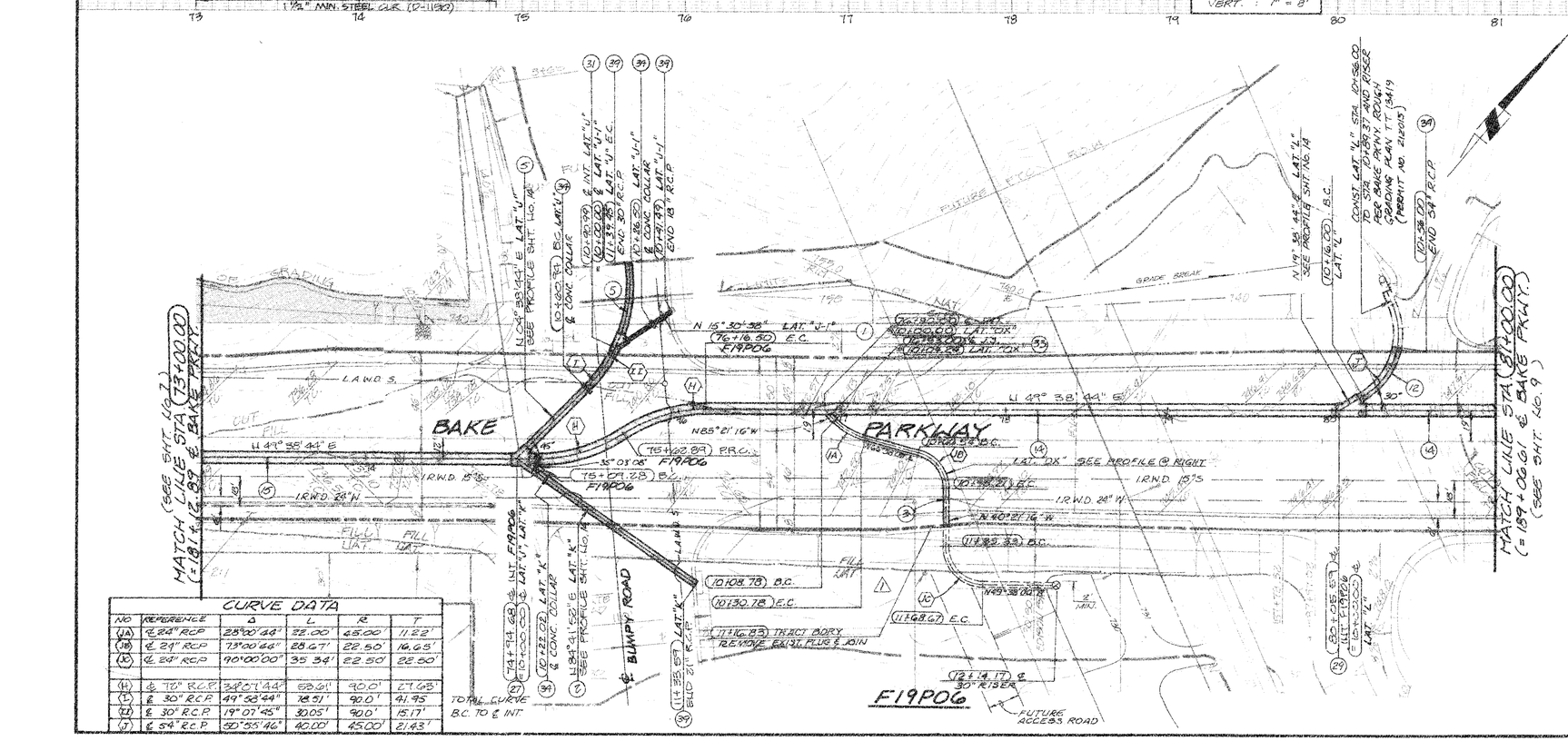
SHEET 7

DESIGNED D. VORLEBERGER
DRAWN MARK E. CHECKED

SCALE AS SHOWN | DATE | DWG. NO. F19P06-713-1 | OF 17

J.N. 24439





CURVE DATA

NO	REFERENCE	Δ	L	R	T
(1A)	℄ 24" RCP	28°00'44"	32.00	65.00	11.22
(1B)	℄ 21" RCP	73°00'44"	28.67'	22.50'	16.65'
(1C)	℄ 24" RCP	90°00'00"	35.34'	22.50'	22.50'
(H)	℄ 72" R.C.P.	340°14'44"	62.61'	90.0'	2'-7.65"
(T)	℄ 30" R.C.P.	49°58'44"	18.51'	90.0'	41.95
(12)	℄ 30" R.C.P.	19°07'45"	30.05'	90.0'	15.17'
(J)	℄ 54" R.C.P.	50°55'46"	40.00'	4500'	21.43'

TOTAL CURVE B.C. TO ℄ INT.

HYDRAULIC DATA

LINE	STATION TO STATION	Q100	So	Dia	Dn	Vfl	Df	Vc	Llp
F19P06	73+00.00 TO 74+94.68	644.4	0.0216	78"	4.55	26.0	6.21	19.7	2.25
F19P06	75+04.68 TO 80+05.09	574.3	0.0188	72"	4.86	23.4	5.80	20.5	1.81
F19P06	80+21.09 TO 81+00.00	574.3	0.0188	72"	4.86	23.4	5.80	20.5	1.81
LAT.									
J	10+06.92 TO 10+60.94	51.4	0.0356	30"	1.49	16.9	2.32	10.8	2.67
J	10+60.94 TO 10+90.99	51.4	0.0560	30"	1.29	20.1	2.32	10.8	3.49
J	10+90.99 TO 11+39.45	42.4	0.0560	30"	1.16	19.1	2.18	9.3	3.57
J-1	10+02.50 TO 10+26.50	10.1	0.2500	18"	0.45	22.9	1.22	6.5	7.14
J-1	10+26.50 TO 10+41.99	10.1	0.0660	18"	0.64	14.2	1.22	6.5	3.60
K	10+06.02 TO 10+22.02	24.4	0.3612	21"	0.60	33.1	1.67	10.3	8.78
K	10+22.02 TO 11+33.59	24.4	0.0316	21"	1.26	15.2	1.67	10.3	2.14
L	10+16.00 TO 10+89.37	134.1	0.0090	54"	2.78	18.8	3.39	10.2	1.48
OX	0+04.24 TO 1+16.83	20.0	0.002	24"	FULL	FLOW	1.61	7.40	—

REGISTERED PROFESSIONAL ENGINEER ROBERT R. ALLENDORF NO. 27961 EXP. 9-30-90 CIVIL STATE OF CALIFORNIA

MARK	DATE	DESCRIPTION
1	1-3-90	ADD LAT. "OX"

REVISIONS

DESIGNED D. VORHEER-KAER
DRAWN P.BUCK CHECKED

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P06

PLAN AND PROFILE

BAKE PARKWAY

STORM DRAIN

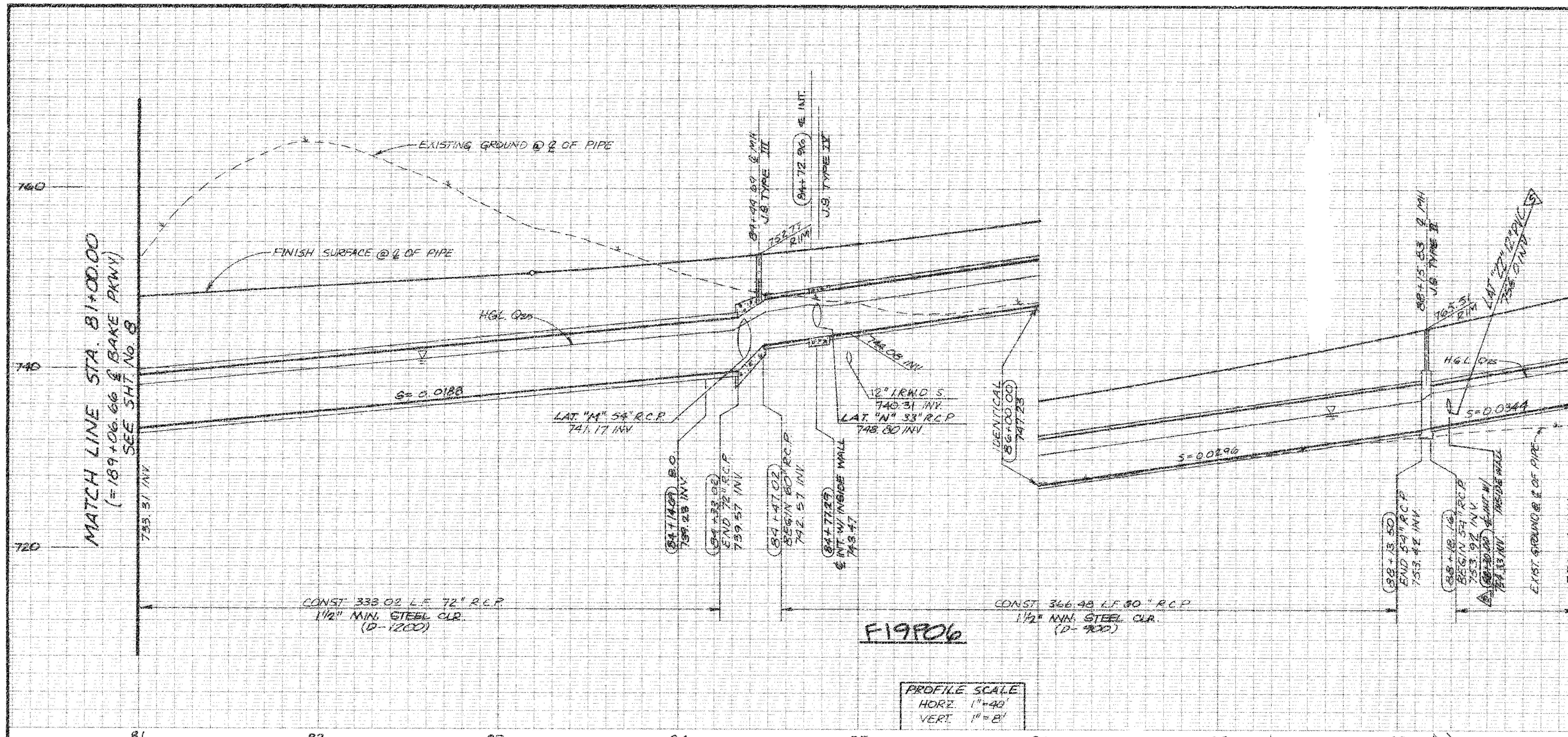
FROM STA. 73+00.00 TO STA. 81+00.00

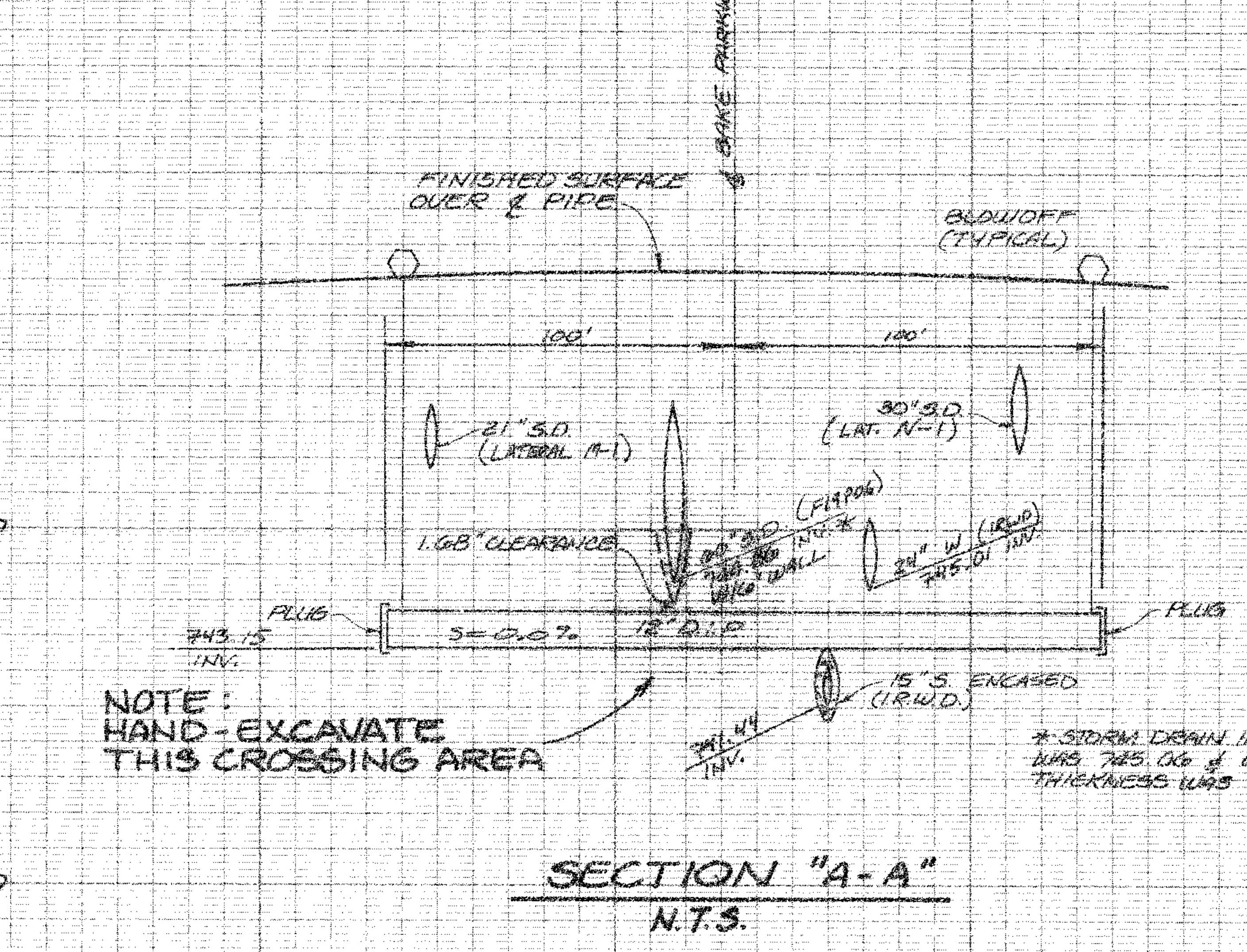
PREPARED UNDER SUPERVISION OF: R. Allendorf DATE: 1/3/90

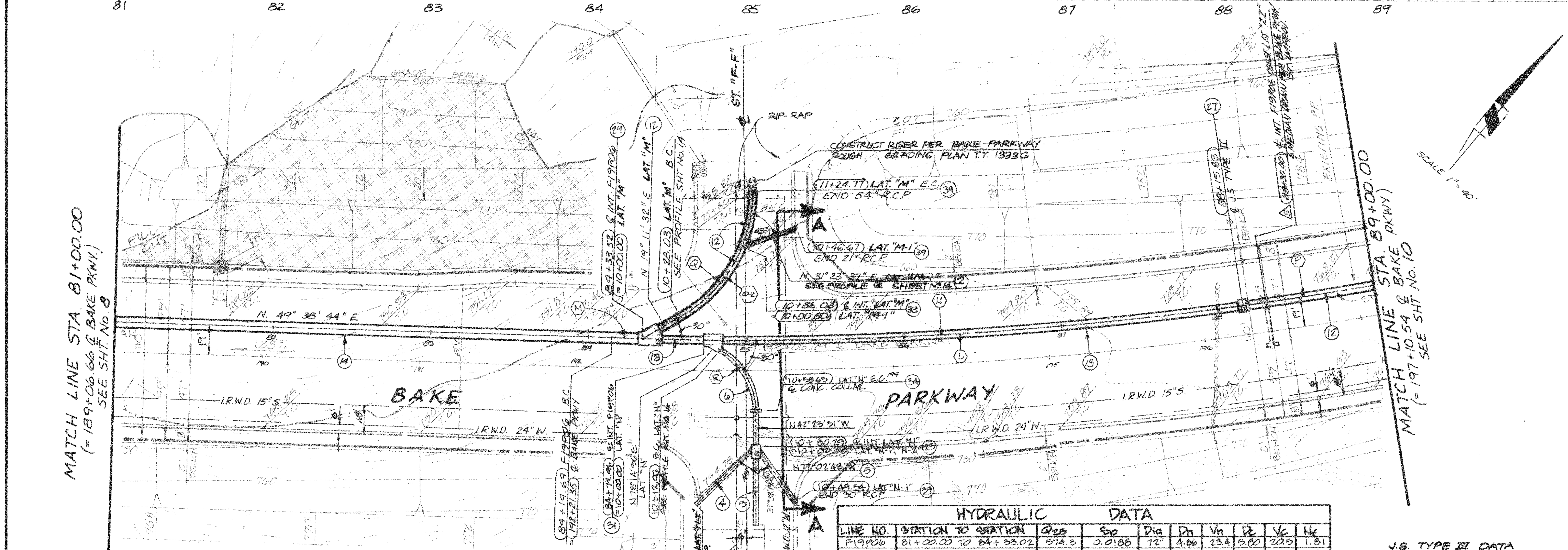
SCALE: AS SHOWN | DATE | DWG. NO. F19P06-713-1

SHEET 8 OF 17

J.N. 24429







CONSTRUCTION NOTES

(2) — CONST. 21" R.C.P. (D-LOAD PER PROFILE).
(4) — CONST. 27" R.C.P. (D-LOAD PER PROFILE).
(5) — CONST. 30" R.C.P. (D-LOAD PER PROFILE).
(6) — CONST. 33" R.C.P. (D-LOAD PER PROFILE).
(12) — CONST. 54" R.C.P. (D-LOAD PER PROFILE).
(13) — CONST. 60" R.C.P. (D-LOAD PER PROFILE).
(14) — CONST. 72" R.C.P. (D-LOAD PER PROFILE).

(25) — CONST. JUNCTION STRUCTURE TYPE I PER O.C.E.M.A. STD. PLAN Nº 1310.
(27) — CONST. JUNC. STRUCT. TYPE II PER O.C.E.M.A. STD. PLAN Nº 1311.
(29) — CONST. JUNC. STRUCT. TYPE III PER O.C.E.M.A. STD. PLAN Nº 1312.
(31) — CONST. JUNC. STRUCT. TYPE IV PER O.C.E.M.A. STD. PLAN Nº 1313.
(34) — CONST. REINF. CONC. COLLAR PER O.C.E.M.A. STD. PLAN Nº 1333.
(33) — CONST. JUNC. STRUCT. TYPE VI PER O.C.E.M.A. STD. PLAN NO. 1315.
(39) — CONST. BRICK AND MORTAR PLUG.

CURVE DATA

No.	REFERENCE	Δ	L	R	T	
L	℄ F19P06	21°23'44"	889.11'	2381.00'	449.80'	TOTAL CURVE
M	℄ 72" R.C.P.	00°27'12"	18.85'	2381.00'	9.42'	B.C. TO ℄ INT. LAT "M"
N	℄ 60" R.C.P.	00°56'57"	39.44'	2381.00'	19.72'	℄ INT. LAT. "M" TO ℄ INT. LAT "N"
P	℄ 60" R.C.P.	15°15'13"	633.88'	2381.00'	318.85'	℄ INT. LAT. "N" TO ℄ INT. LAT. "P"
Q	℄ 54" R.C.P.	61°35'03"	96.74'	90.00'	53.63'	TOTAL CURVE
Q2	℄ 54" R.C.P.	36°55'24"	58.00'	90.00'	30.05'	B.C. TO ℄ INT.
R	℄ 30" R.C.P.	59°21'53"	46.63'	45.00'	25.16'	TOTAL CURVE

HYDRAULIC DATA

LINE NO.	STATION TO STATION	Q25	So	Dia	Dn	Vn	Dc	Vc	Nc
F19P06	81+00.00 TO 84+33.02	574.3	0.0188	72"	4.86	23.4	5.80	20.5	1.81
F19P06	84+47.02 TO 84+72.96	389.2	0.0296	60"	3.60	25.7	4.87	20.0	2.47
F19P06	84+84.00 TO 88+13.50	352.5	0.0296	60"	3.34	25.3	4.81	18.2	2.59
F19P06	88+18.16 TO 89+00.00	352.5	0.0344	54"	3.56	26.1	4.44	22.2	2.40
LAT. NO.									
M	10+13.50 TO 10+86.03	196.8	0.0280	54"	2.51	21.6	4.01	13.1	2.67
M	10+86.03 TO 11+24.77	181.8	0.0280	54"	2.39	21.2	3.90	12.4	2.71
M-1	10+03.18 TO 10+46.67	15.4	0.0820	21"	0.70	17.1	1.45	7.2	4.14
N	10+05.00 TO 10+58.63	43.9	0.0500	33"	1.16	18.4	2.20	8.6	3.47
N	10+58.63 TO 10+80.00	43.9	0.0090	33"	1.99	9.5	2.20	8.6	1.23
N	10+87.00 TO 11+30.00	35.0	0.0090	30"	1.85	9.0	2.01	8.3	1.18
N-1	10+02.24 TO 10+49.54	25.4	0.0224	30"	1.12	11.9	1.72	7.1	2.27
N-2	10+01.94 TO 10+54.45	18.6	0.0112	27"	1.21	8.5	1.51	6.6	1.52

J.S. TYPE III DATA @ STA. 84 + 33.52

A = 30°
B = 54"
C = 13.50'
D1 = 60"
D2 = 72"
ELEV. R = 741.39
ELEV. S = 741.17

1 1/2 0 1 2
3 inches on original drawing

REGISTERED PROFESSIONAL ENGINEER — R. KALLENBACH — CIVIL — STATE OF CALIFORNIA

MARK	DATE	DESCRIPTION
5	12-16-91	RELOCATED MED. DRAIN FROM STA. 87+95.62 TO STA. 86+20.00

REVISIONS

DESIGNED D. VORNBERGER
DRAWN P.S.K. CHECKED

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P06

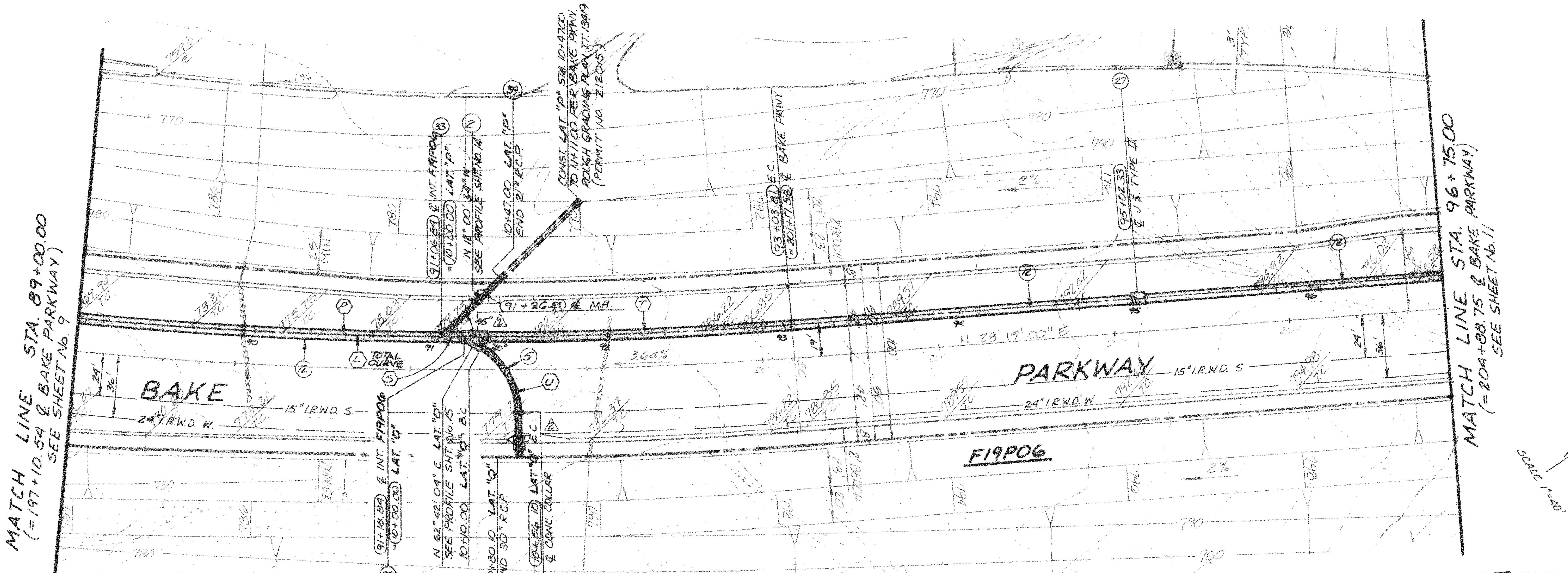
PLAN AND PROFILE

BAKE PARKWAY
STORM DRAIN
FROM STA. 81+00.00 TO STA. 89+00.00

PREPARED UNDER SUPERVISION OF R. Kallenbach 4/13/87 DATE

SCALE AS SHOWN | DATE | DWG. NO. F19P06-713-1 | SHEET 9 OF 17

J.N. 24429



CONSTRUCTION NOTES

(2) — CONST. 21" R.C.P. (D-LOAD PER PROFILE)

(5) — CONST. 30" R.C.P. (D-LOAD PER PROFILE)

(12) — CONST. 54" R.C.P. (D-LOAD PER PROFILE)

(27) — CONST. JUNC. STRUCT. TYPE II PER O.C.E.M.A. STD. PLAN NO. 1311

(29) — CONST. JUNC. STRUCT. TYPE III PER O.C.E.M.A. STD. PLAN NO. 1312

(33) — CONST. JUNC. STRUCT. TYPE VI PER O.C.E.M.A. STD. PLAN NO. 1315

(34) — CONST. REIN. CONC. COLLAR PER O.C.E.M.A. STD. PLAN NO. 1317

(39) — CONST. BRICK AND MORTAR PLUG

1 1/2 0 1 2
3 inches on original drawing

CURVE DATA

No.	REFERENCE	Δ	L	R	T
L	℄ LINE "A"	21° 23' 44"	889.11'	2381.00'	449.80'
P	℄ 54" R.C.P.	15° 15' 13"	633.88'	2381.00'	318.83'
S	℄ 54" R.C.P.	0° 17' 20"	12.00'	2381.00'	6.00'
T	℄ 51" R.C.P.	4° 43' 40"	196.97'	2381.00'	98.29'
U	℄ 30" R.C.P.	58° 41' 33"	46.10'	45.00'	25.30'

TOTAL CURVE
℄ INT. LAT. "N" TO ℄ INT. LAT. "P"
℄ INT. LAT. "P" TO ℄ INT. LAT. "Q"

HYDRAULIC DATA

LINE No.	STATION TO STATION	Q_{25}	So	Dia.	Dn.	Vn.	Dc.	Vc	N#
F19P06	89+00.00 TO 91+06.84	352.5	0.0344	54"	3.56	26.1	4.44	22.2	2.40
F19P06	91+06.84 TO 91+18.84	327.3	0.0344	54"	3.33	25.9	4.42	20.7	2.56
F19P06	91+28.84 TO 95+00.00	293.7	0.0388	54"	2.93	26.8	4.38	18.6	2.95
F19P06	95+04.66 TO 96+75.00	293.7	0.0240	54"	3.55	21.8	4.38	18.6	2.01
LAT. No.									
P	10+07.00 TO 11+11.00	29.8	0.1480	21"	0.86	25.2	1.71	12.5	5.40
Q	10+10.00 TO 10+56.10	33.8	0.1300	30"	0.81	24.4	1.98	8.1	5.60
Q	10+56.10 TO 10+80.10	33.8	0.0400	30"	1.12	15.9	1.98	8.1	3.03

J.B. TYPE III DATA @ STA. 91 + 18.84

A = 30°
B = 30"
C = 10.0'
D_1 = 54"
D_2 = 54"
ELEV. R = 766.57
ELEV. S = 765.85

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P06

PLAN AND PROFILE

BAKE PARKWAY
STORM DRAIN
FROM STA. 89+00.00 TO STA. 96+75.00

MARK	DATE	DESCRIPTION
2	8-22-90	ADDED C.B.'s

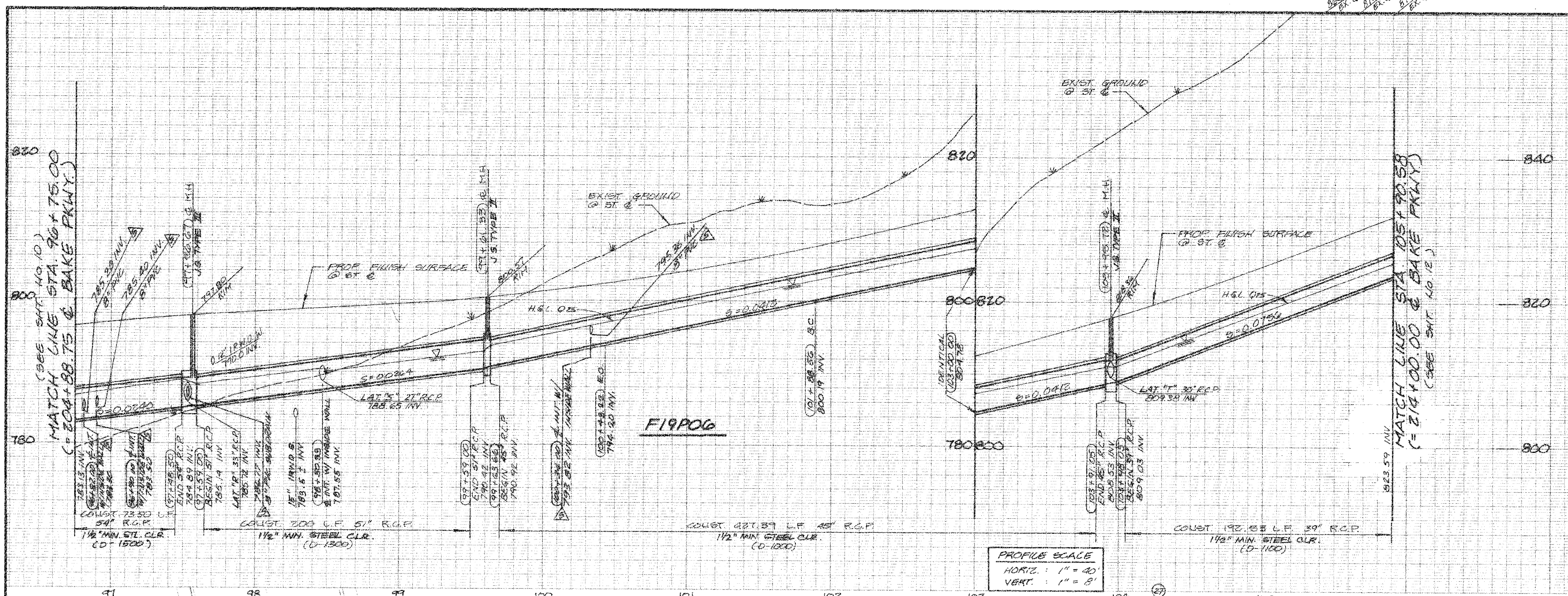
REVISIONS

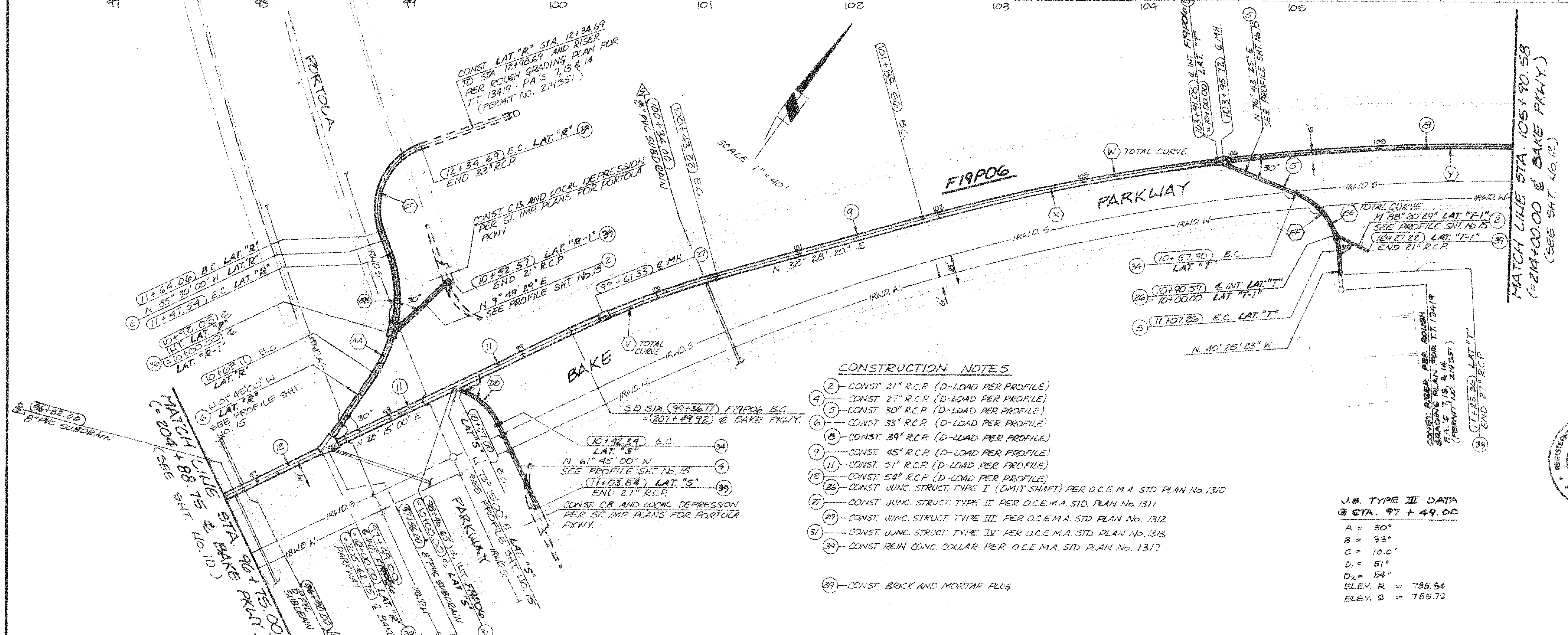
PREPARED UNDER SUPERVISION OF [signature] DATE

DESIGNED D. VORNBERGER
DRAWN P.S.K.
CHECKED

SCALE AS SHOWN
DATE
DWG. NO. F19P06-713-1
SHEET 10 OF 17

J.N. 24429





No.	REFERENCE	Δ	L	R	T	
CURVE DATA						
(V)	F19P06	10°13'20"	107.05'	600.00'	53.67	TOTAL CURVE
(W)	F19P06	40°59'24"	1003.82'	1406.00'	529.38'	TOTAL CURVE
(X)	F19P06	8°15'05"	202.49'	1406.00'	101.92'	B.C. TO Ⓒ INT.
(Y)	F19P06	32°39'19"	801.34'	1406.00'	411.88'	Ⓒ INT. TO P.R.C.
( )						
(AA)	Ⓒ LAT. "R"	18°25'17"	28.94'	90.00'	14.59'	B.C. TO Ⓒ INT.
(BB)	Ⓒ LAT. "R"	35°19'43"	55.49'	90.00'	28.66'	Ⓒ INT. TO E.C.
(CC)	Ⓒ LAT. "R"	89°55'28"	70.63'	45.00'	44.99'	TOTAL CURVE
(DD)	Ⓒ LAT. "S"	45°00'00"	35.34'	45.00'	18.64'	TOTAL CURVE
(EE)	Ⓒ LAT. "T"	62°51'12"	49.36'	45.00'	27.50'	TOTAL CURVE
(FF)	Ⓒ LAT. "T"	41°37'20"	32.69	45.00'	17.10'	B.C. TO Ⓒ INT.
( )						

LINE No.	STATION TO STATION	Q_{25}	So	Dia.	Dn.	Vn.	Dc.	Vc.	Nf
HYDRAULIC DATA									
F19P06	96+75.00 TO 97+48.50	295.7	0.0240	54"	3.55	21.8	4.38	18.6	2.01
F19P06	97+59.00 TO 98+46.65	242.7	0.0264	51"	3.11	21.8	4.11	17.3	2.24
F19P06	98+46.65 TO 99+59.00	221.5	0.0264	51"	2.89	21.5	4.05	15.9	2.35
F19P06	99+63.66 TO 103+91.05	221.5	0.0412	45"	2.79	25.2	3.70	20.1	2.71
F19P06	103+98.05 TO 105+90.58	168.4	0.0756	39"	2.08	30.0	3.22	20.3	3.93
LAT. No.									
R	10+10.00 TO 10+91.05	52.6	0.0212	33"	1.67	14.0	2.38	9.6	2.08
R	10+98.05 TO 12+98.69	34.6	0.0212	33"	1.29	12.6	1.96	7.6	2.23
R-1	10+03.25 TO 10+52.57	18.1	0.0812	21"	0.77	17.7	1.55	8.0	4.08
S	10+07.00 TO 10+42.34	21.5	0.0708	27"	0.78	17.4	1.62	7.0	4.05
S	10+42.34 TO 11+03.84	21.5	0.0108	27"	1.34	8.7	1.62	7.0	1.44
T	10+04.01 TO 10+57.90	55.8	0.0540	30"	1.37	20.2	2.36	11.6	3.73
T	10+57.90 TO 10+90.09	55.8	0.0260	30"	1.76	15.1	2.36	11.6	2.09
T	10+95.59 TO 11+23.26	38.0	0.0260	30"	1.36	13.9	2.08	8.7	2.35
T-1	10+02.50 TO 10+27.22	18.4	0.1000	21"	0.78	19.2	1.56	8.1	4.55

CONSTRUCTION NOTES

- (2) CONST. 21" R.C.P. (D-LOAD PER PROFILE)
- (4) CONST. 27" R.C.P. (D-LOAD PER PROFILE)
- (5) CONST. 30" R.C.P. (D-LOAD PER PROFILE)
- (6) CONST. 33" R.C.P. (D-LOAD PER PROFILE)
- (8) CONST. 39" R.C.P. (D-LOAD PER PROFILE)
- (9) CONST. 45" R.C.P. (D-LOAD PER PROFILE)
- (11) CONST. 51" R.C.P. (D-LOAD PER PROFILE)
- (12) CONST. 54" R.C.P. (D-LOAD PER PROFILE)
- (26) CONST. JUNC. STRUCT. TYPE I (OMIT SHAFT) PER O.C.E.M.A. STD. PLAN No. 1310
- (27) CONST. JUNC. STRUCT. TYPE II PER O.C.E.M.A. STD. PLAN No. 1311
- (29) CONST. JUNC. STRUCT. TYPE III PER O.C.E.M.A. STD. PLAN No. 1312
- (31) CONST. JUNC. STRUCT. TYPE IV PER O.C.E.M.A. STD. PLAN No. 1313
- (34) CONST. REIN. CONC. COLLAR PER O.C.E.M.A. STD. PLAN No. 1317
- (39) CONST. BRICK AND MORTAR PLUG.

J.S. TYPE III DATA @ STA. 97 + 49.00

A = 30°
B = 33°
C = 10.0'
D_1 = 51"
D_2 = 54"
ELEV. R = 785.84
ELEV. S = 785.72

1 1/2 0 1 2
3 inches on original drawing

REGISTERED PROFESSIONAL ENGINEER · S. ROBERT KALLENBAUGH · NO. 27987 · EXP. 3-31-93 · CIVIL · STATE OF CALIFORNIA

MARK	DATE	DESCRIPTION
1	12-13-91	ADD SUBDRAIN CONNECTION

REVISIONS

DESIGNED D. VORUBERGER
DRAWN MBUCK CHECKED

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P06

PLAN AND PROFILE

BAKE PARKWAY
STORM DRAIN

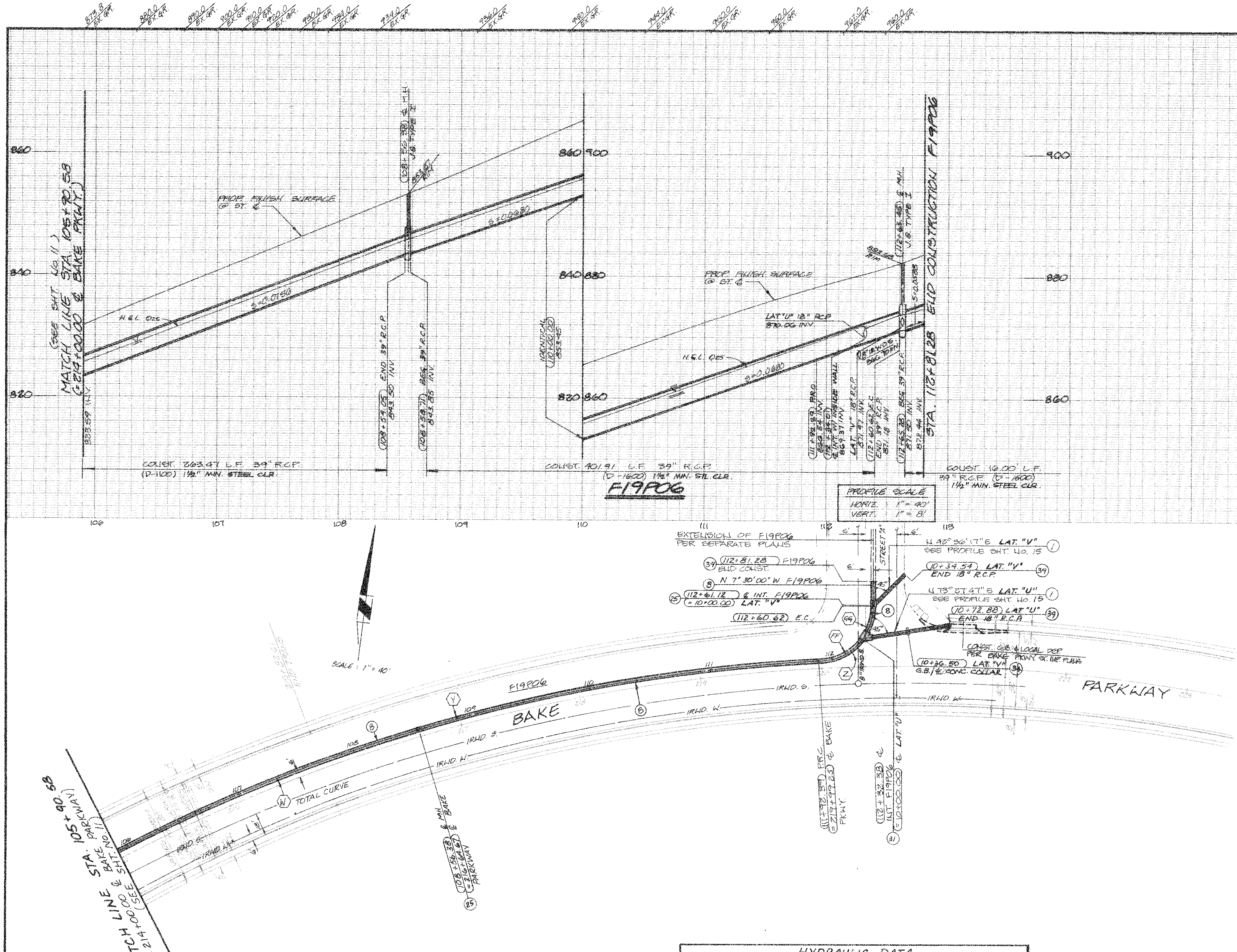
FROM STA. 96+75.00 TO STA. 105+90.58

PREPARED UNDER SUPERVISION OF S R Kallenbaugh 4/13/89 DATE

SHEET 11 OF 17

SCALE AS SHOWN | DATE | DWG. NO. F19P06-713-1

J.N. 24429



CONSTRUCTION NOTES

(1)— CONST. 18" R.C.P. (D-LOAD PER PROFILE)
(8)— CONST. 39" R.C.P. (D-LOAD PER PROFILE)
(25)— CONST. JUNC. STRUCT. TYPE I PER O.C.E.M.A. STD. PLAN No. 1310
(31)— CONST. JUNC. STRUCT. TYPE IV PER O.C.E.M.A. STD. PLAN No. 1313
(39)— CONST. BRICK AND MORTAR PLUG.
(34)— CONST. REINF. CONC. COLLAR PER O.C.E.M.A. STD. PLAN NO. 1333.

CURVE DATA

NO.	REFERENCE	Δ	L	R	T	
W	F19P06	40°54'24"	1003.82'	1406.00'	524.38'	TOTAL CURVE
Y	℄ 39" R.C.P.	32°39'19"	801.34'	1406.00'	411.88'	℄ INT. TO P.R.C.
Z	F19P06	86°52'44"	68.23'	45.00'	42.61'	TOTAL CURVE
FF	F19P06	50°54'57"	39.99'	45.00'	21.42'	P.R.C. TO ℄ INT.
GG	F19P06	35°57'47"	28.25'	45.00'	14.61'	℄ INT. TO E.C.

HYDRAULIC DATA

LINE No.	STATION TO STATION	Q25	So	Dia.	Dn.	Vn.	Dc.	Vc.	Nf.
F19P06	105+90.58 TO 108+54.05	168.4	0.0756	39"	2.08	30.0	3.22	20.3	3.93
F19P06	108+58.71 TO 112+32.38	168.4	0.0680	39"	2.16	28.7	3.22	20.3	3.66
F19P06	112+32.38 TO 112+60.62	162.3	0.0680	39"	2.11	28.5	3.21	19.6	3.71
F19P06	112+65.28 TO 112+81.28	159.6	0.0588	39"	2.19	26.8	3.21	19.3	3.38
LAT. No.									
U	10+04.50 TO 10+36.50	7.2	0.0280	18"	0.67	9.5	1.04	5.5	2.33
U	10+36.50 TO 10+72.88	7.2	0.1920	18"	0.40	19.0	1.04	5.5	6.25
V	10+02.47 TO 10+34.54	3.7	0.0340	18"	0.41	8.5	0.73	4.3	2.63

1 1/2 0 1 2
3 inches on original drawing

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P06

PLAN AND PROFILE

BAKE PARKWAY
STORM DRAIN
FROM STA. 105+90.58 TO STA. 112+80.62

MARK	DATE	DESCRIPTION

REVISIONS

DESIGNED D. VORNBERGER
DRAWN P.S.K. CHECKED

PREPARED UNDER SUPERVISION OF [signature] DATE

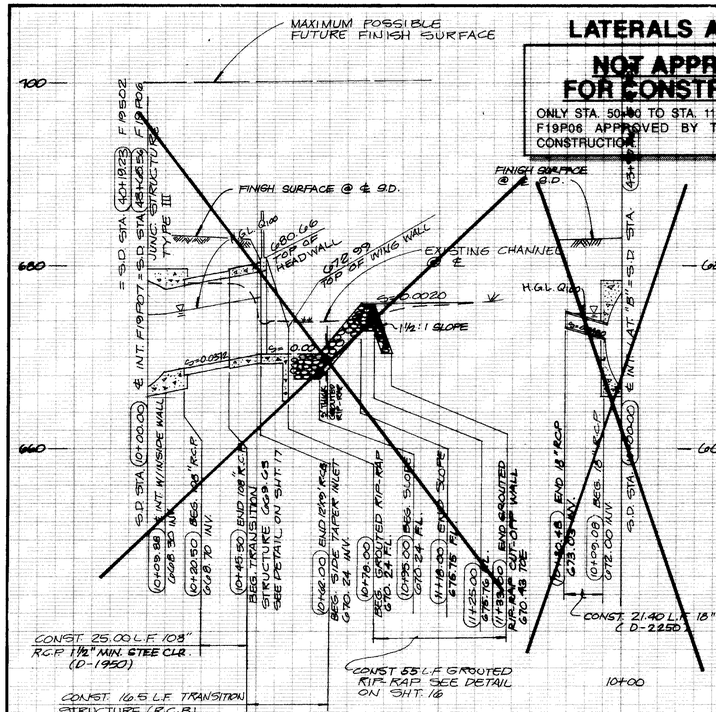
SCALE AS SHOWN | DATE | DWG. NO. F19P06-713-1 | SHEET 12 OF 17

J.H. 24447

LATERALS A, B, & C

NOT APPROVED FOR CONSTRUCTION

ONLY STA. 50+00 TO STA. 112+81.28 OF FACILITY F19P06 APPROVED BY THE COUNTY FOR CONSTRUCTION

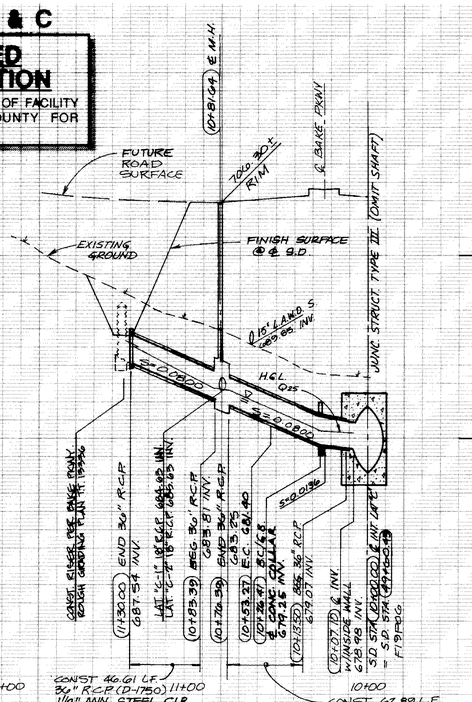


F19P07 (LATERAL "A")

(FOR PLAN SEE SHT. No. 4)

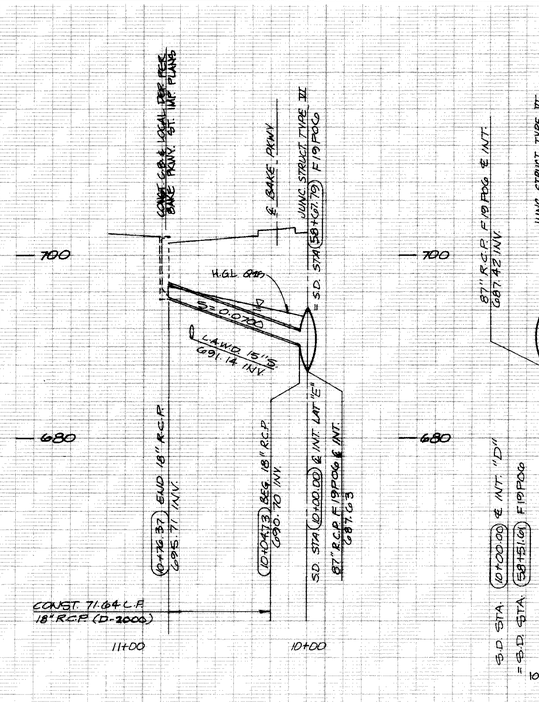
LATERAL "B"

(FOR PLAN SEE SHT. No.4)



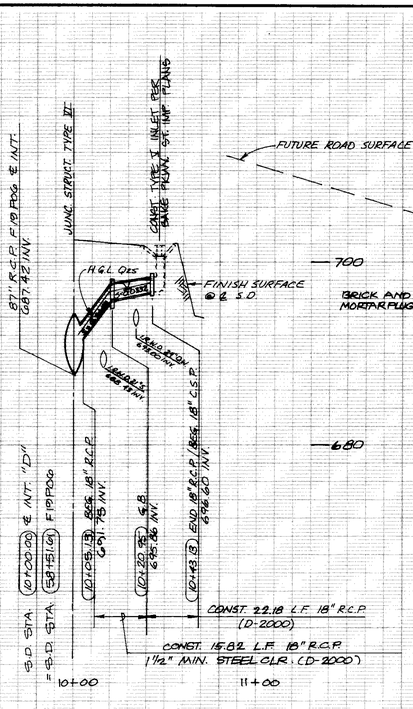
LATERAL "C"

(FOR PLAN SEE SHEET No. 5)



LATERAL "E"

(FOR PLAN SEE SHEET No 6)

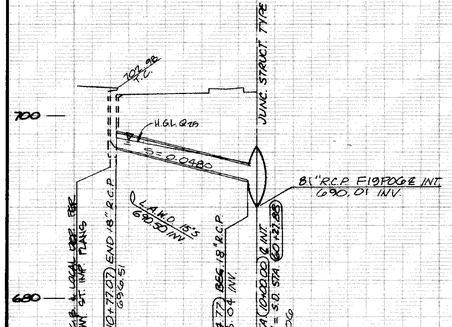


LATERAL "D"

(FOR PLAN SEE SHEET No 6)

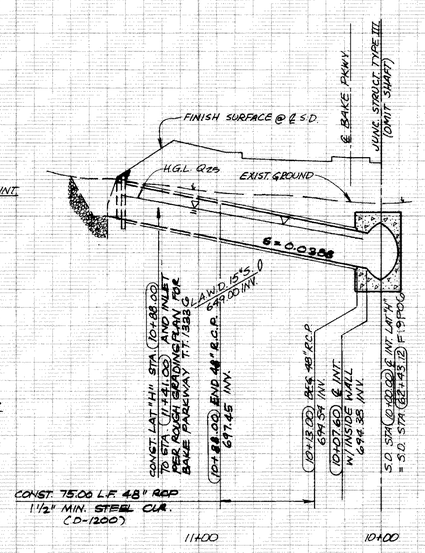
LATERAL "F"

(FOR PLAN SEE SHEET No. 6)



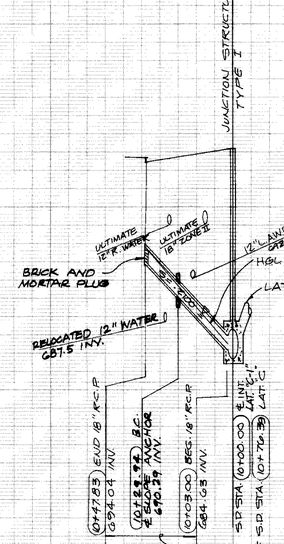
LATERAL "G"

(FOR PLAN SEE SHEET No.6)



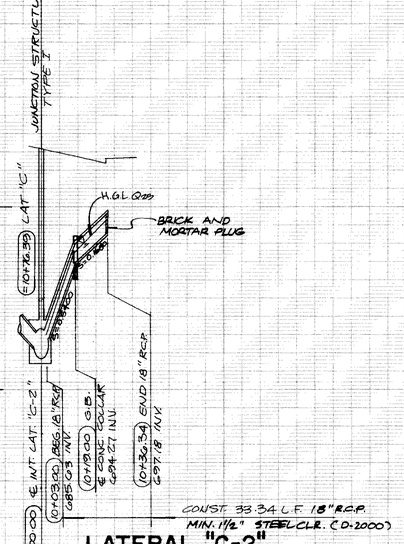
LATERAL "H"

(FOR PLAN SEE SHEET No.6)



LATERAL "C-1"

(FOR PLAN SEE SHT. No.5)



LATERAL "C-2"

(FOR PLAN SEE SHT. No. 5)

HYDRAULIC DATA									
LAT. No.	STATION TO STATION	Q25	So	Dia.	Dn.	Vn.	Dc.	Vc	N.F.
F19P07	10+09.68 TO 10+45.50	540.6	0.0372	108"	2.95	30.8	5.86	12.8	3.71
B	10+09.08 TO 10+30.48	2.7	0.0480	18"	0.36	8.7	0.62	3.9	3.11
C	10+07.10 TO 10+26.41	82.6	0.0130	36"	2.68	12.4	2.79	12.0	1.16
C	10+26.41 TO 10+76.39	82.6	0.0780	36"	1.40	25.6	2.79	12.0	4.34
C	10+83.39 TO 11+30.00	64.3	0.0780	36"	1.22	23.9	2.51	1.5	4.42
C-1	10+03.00 TO 10+47.83	11.2	0.2100	18"	0.99	22.2	1.28	7.0	6.83
C-2	10+03.00 TO 10+18.59	8.6	0.5400	18"	0.54	28.8	1.14	6.0	10.41
C-2	10+18.59 TO 10+36.34	8.6	0.1680	18"	0.95	19.0	1.14	6.0	5.85
D	10+05.13 TO 10+20.95	8.9	0.2600	18"	0.41	22.45	1.15	6.10	7.28
D	10+20.95 TO 10+43.13	8.9	0.0332	18"	0.72	10.63	1.15	6.10	2.51
E	10+04.73 TO 10+76.37	6.1	0.0700	18"	0.48	12.6	0.95	5.1	3.78
F	10+06.86 TO 11+25.00	76.8	0.0448	36"	1.58	20.4	2.74	11.3	3.21
G	10+04.77 TO 10+77.07	13.8	0.0480	18"	0.84	13.6	1.38	8.1	2.91
(INTERIM FLOW) H	10+07.60 TO 10+88.00	106.6	0.0388	48"	1.70	20.90	3.12	10.1	3.26

REGISTERED PROFESSIONAL ENGINEER S. RUDERT KALLENBERG EXP. 3-31-90 CIVIL STATE OF CALIFORNIA

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P06

LATERAL PROFILES

MARK	DATE	DESCRIPTION
REVISIONS		

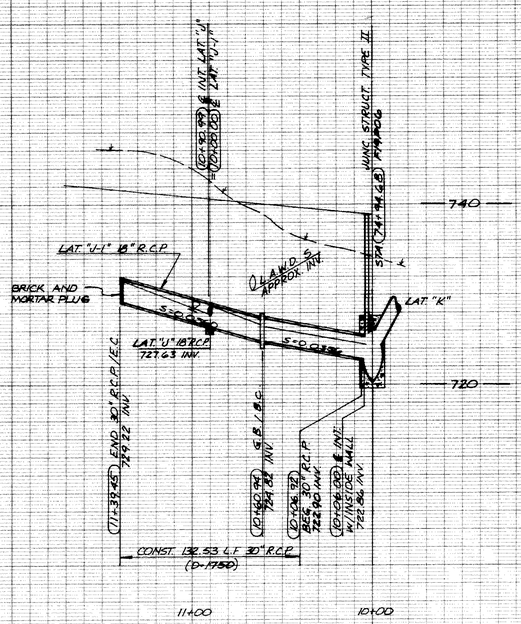
DESIGNED D VORNBERGER
DRAWN PSK CHECKED

PREPARED UNDER SUPERVISION OF S.R. Kallenberg 4/13/89 DATE

SCALE AS SHOWN DATE DWG. NO. F19P06-713-1

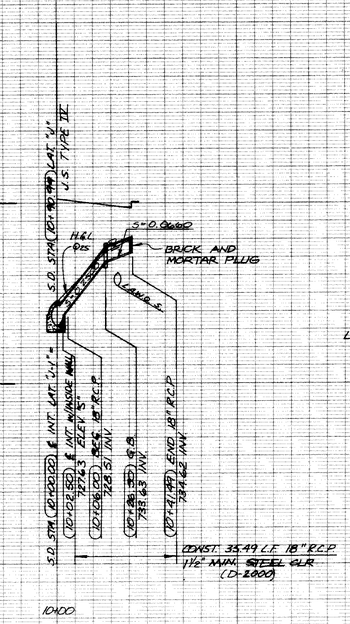
SHEET 13 OF 17

J.N. 24429



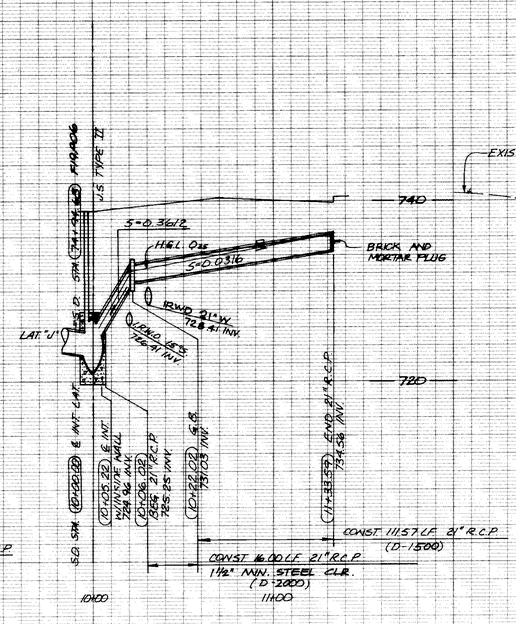
LATERAL "J"

(FOR PLAN SEE SHEET No. 8)



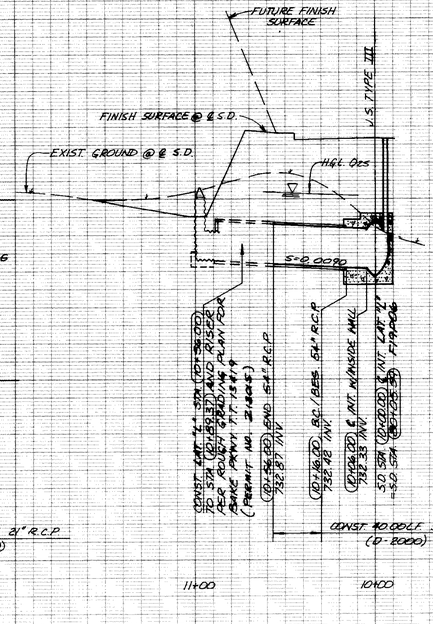
LATERAL "J-1"

(FOR PLAN SEE SHEET No. 8)



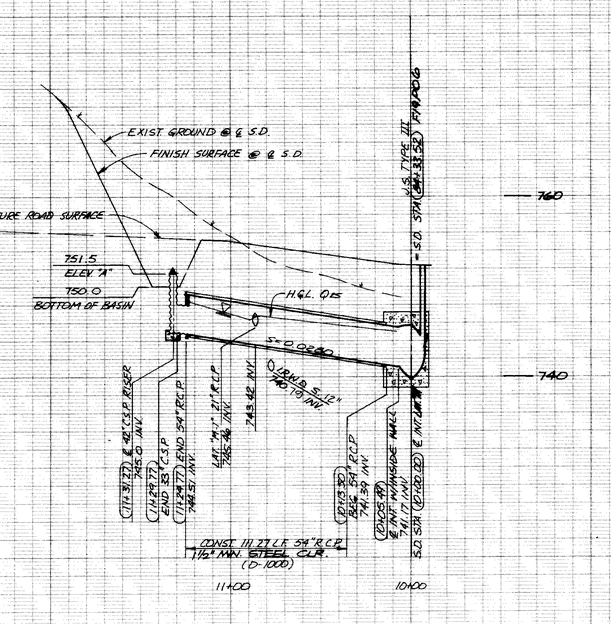
LATERAL "K"

(FOR PLAN SEE SHEET No. 8)



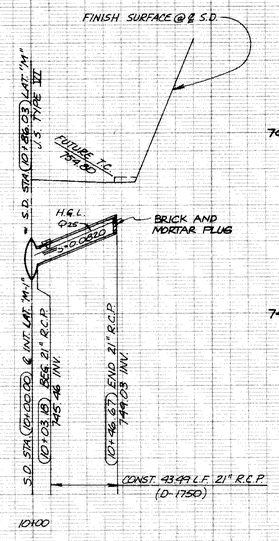
LATERAL "L"

(FOR PLAN SEE SHEET No. 8)



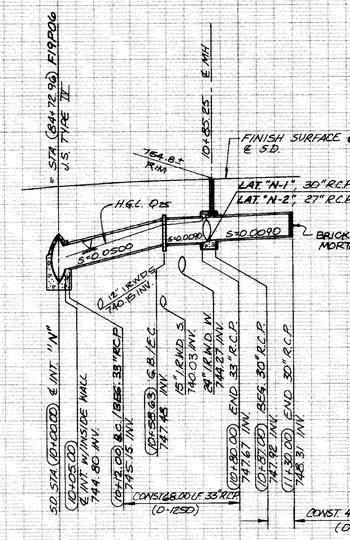
LATERAL "M"

(FOR PLAN SEE SHEET No. 9)



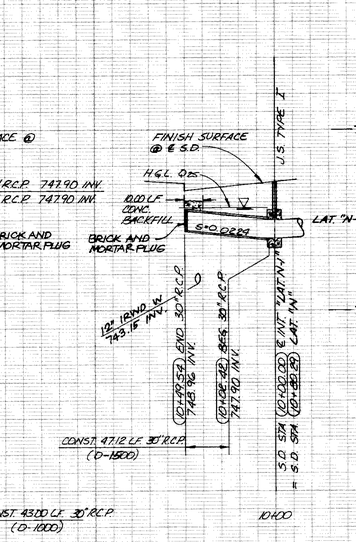
LATERAL "M-1"

(FOR PLAN SEE SHEET No. 9)



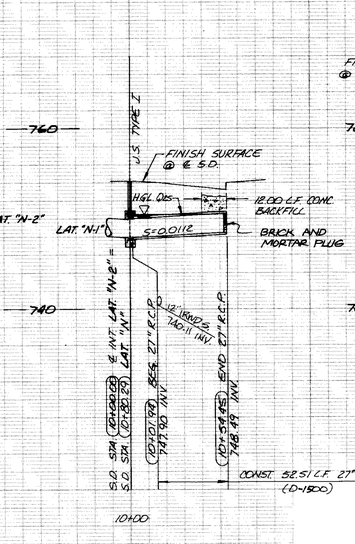
LATERAL "N"

(FOR PLAN SEE SHEET No. 9)



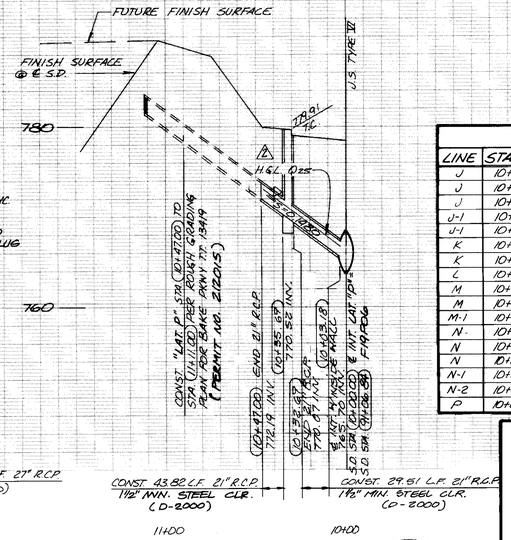
LATERAL "N-1"

(FOR PLAN SEE SHEET No. 9)



LATERAL "N-2"

(FOR PLAN SEE SHEET No. 9)



LATERAL "P"

(FOR PLAN SEE SHEET No. 10)

HYDRAULIC DATA

LINE	STATION TO STATION	Qes	So	Dia	Dn	Vn	Dc	Vc	Nf
J	10+06.92 TO 10+60.94	51.4	0.0356	30"	1.49	16.9	2.32	10.8	2.67
J	10+60.94 TO 10+90.99	51.4	0.0560	30"	1.29	20.1	2.32	10.8	3.49
J	10+90.99 TO 11+39.45	42.4	0.0560	30"	1.16	19.1	2.18	9.3	3.57
J-1	10+02.50 TO 10+26.50	10.1	0.2500	18"	0.45	22.9	1.22	6.5	7.14
J-1	10+26.50 TO 10+41.49	10.1	0.0660	18"	0.64	14.2	1.22	6.5	3.60
K	10+06.02 TO 10+22.02	24.4	0.3612	21"	0.60	33.1	1.67	10.3	8.78
K	10+22.02 TO 11+33.59	24.4	0.0316	21"	1.26	13.2	1.67	10.3	2.14
L	10+16.00 TO 10+89.37	134.1	0.0090	54"	2.78	12.8	3.39	10.2	1.48
M	10+13.50 TO 10+86.03	146.8	0.0280	54"	2.51	21.6	4.01	13.1	2.67
M	10+86.03 TO 11+24.77	181.8	0.0280	54"	2.39	21.2	3.90	12.4	2.71
M-1	10+03.18 TO 10+46.67	15.4	0.0820	21"	0.70	17.1	1.45	7.2	4.14
N	10+05.00 TO 10+38.63	43.9	0.0500	33"	1.16	18.4	2.20	8.6	3.47
N	10+58.63 TO 10+80.00	43.9	0.0090	33"	1.99	9.5	2.20	8.6	1.23
N	10+87.00 TO 11+30.00	35.0	0.0090	30"	1.85	9.0	2.01	8.3	1.18
N-1	10+02.24 TO 10+49.54	25.4	0.0090	30"	1.12	11.9	1.72	7.1	2.27
N-2	10+01.94 TO 10+54.45	18.6	0.0224	27"	1.21	8.5	1.51	6.6	1.52
P	10+03.18 TO 10+47.00	29.8	0.1480	21"	0.86	25.2	1.71	12.5	5.40

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P06

LATERAL PROFILES

MARK	DATE	DESCRIPTION
1	8-22-90	ADDED L.B. TO LAT. "P"

REVISIONS

DESIGNED D. VORNBERGER

DRAWN P.S.K. CHECKED

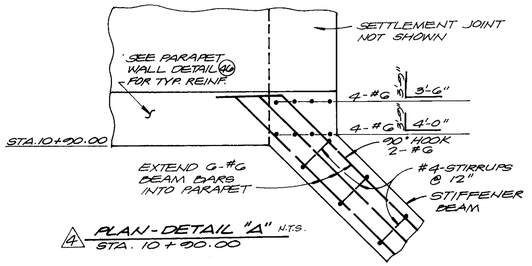
PREPARED UNDER SUPERVISION OF R. Kallenberger 4/13/89 DATE

SCALE AS SHOWN

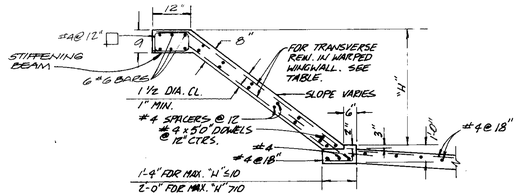
DATE

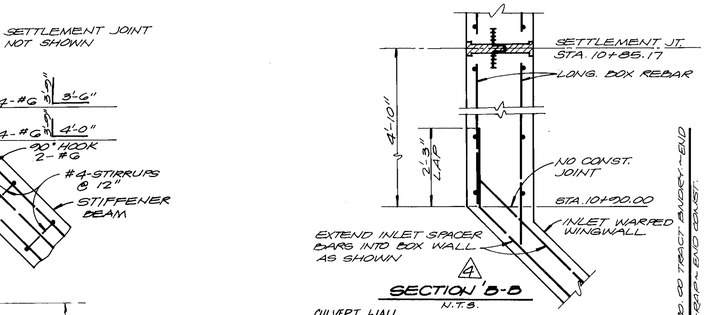
DWG. NO. F19P06-713-1

SHEET 14 OF 17

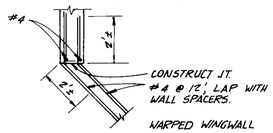


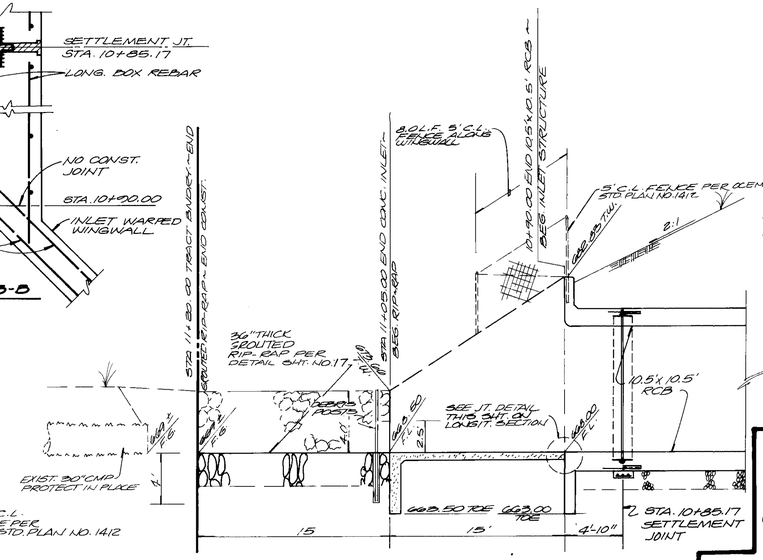
4 PLAN-DETAIL "A" N.T.S.
STA. 10+00.00



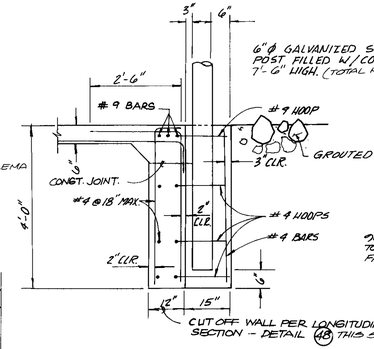


4 SECTION 'B-B' N.T.S.



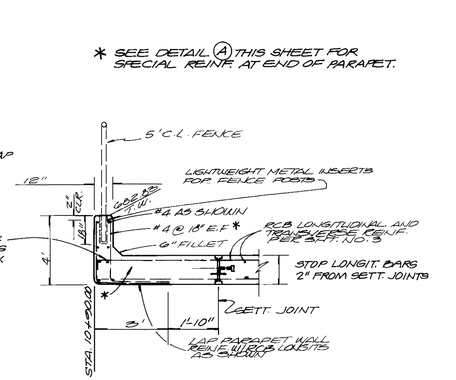


48 10.5'x10.5' R.C.B. INLET - PROFILE N.T.S.

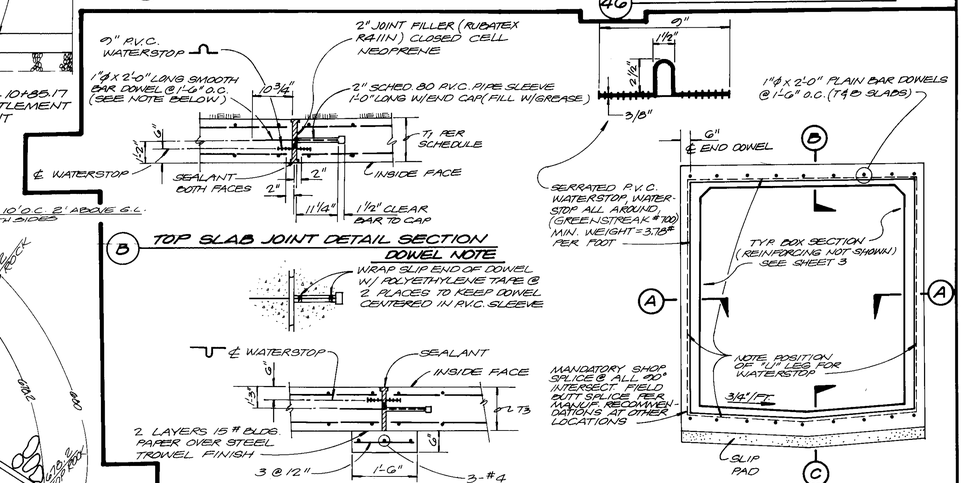


50 DEBRIS POST DETAIL N.T.S.

* SEE DETAIL A THIS SHEET FOR SPECIAL REINF. AT END OF PARAPET.

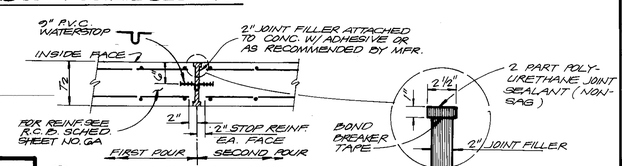


46 PARAPET WALL DETAIL



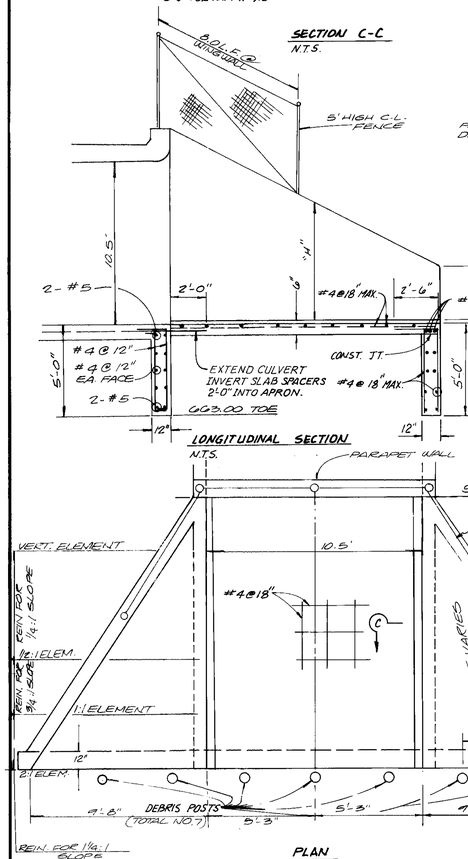
B TOP SLAB JOINT DETAIL SECTION
DOWEL NOTE

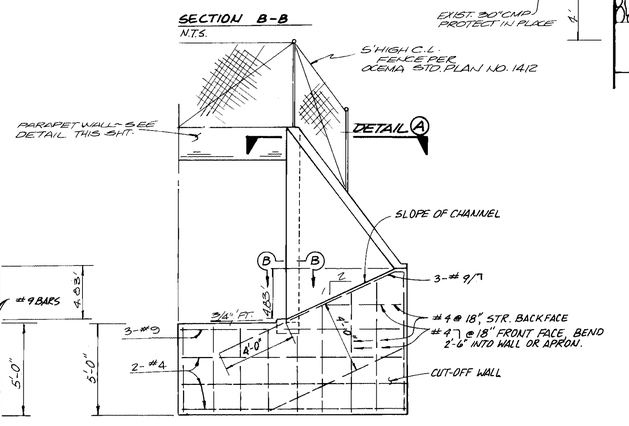
C BOTTOM SLAB JOINT DETAIL SECTION



A WALL JOINT DETAIL PLAN SECTION

DET. TYP. EACH FACE WALL & TOP SLAB, INSIDE FACE BOTT. SLAB



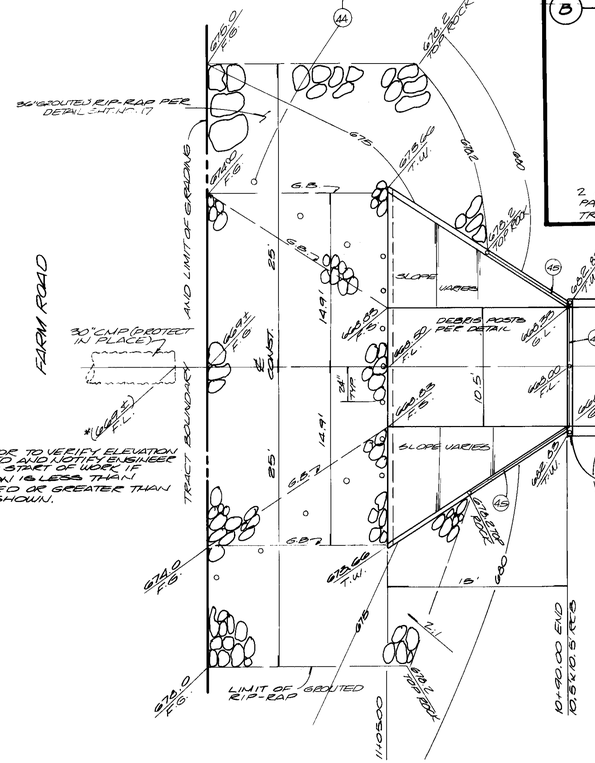


WARPED WINGWALLS WALL DIMENSIONS AND REINFORCING					
ELEMENT SLOPE	"H"	8' OR LESS	10'	12'	14'
¼:1	FRONT FACE REIN	#4@12	#4@7	#5@7	#5@5
	REAR FACE REIN	#4@12	#4@12	#4@12	#4@12
¾:1	FRONT FACE REIN	#4@12	#4@12	#4@12	#4@12
	REAR FACE REIN	#4@12	#4@12	#4@12	#4@10
1¼:1	FRONT FACE REIN	#4@12	#4@12	#4@12	#4@12
	REAR FACE REIN	#4@8	#9@8	#4@5	#5@6

NOTE: WALLS DESIGNED FOR 2' SUR. CHARGE; EARTH LOAD = 120 LB/CU.FT.; EQUIVALENT FLUID PRESSURE = 86 LB/CU.FT. VARY "D" OF WARPED WALL UNIFORMLY FROM THAT AT CUT-OFF WALL TO THAT AT CULVERT, FOR MAX. "H" > 12'.

48 BOX CULVERT WARPED WINGWALLS N.T.S.

DESIGN REFERENCE:
CALTRANS STD. PLAN D86A
DATED JAN. 1988
"BOX CULVERT WARPED WINGWALL"



48 10.5'x10.5' R.C.B. INLET - PLAN N.T.S.

1 1/2 0 1 2
3 inches on original drawing

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P07 INLET DETAILS SETTLEMENT JOINT AT STA. 10+85.17

BAKE PARKWAY STORM DRAIN

MARK	DATE	DESCRIPTION
4	12-89	ADDED SETT. JOINT DET. REVISED BOX INLET CONNECTION

REVISIONS

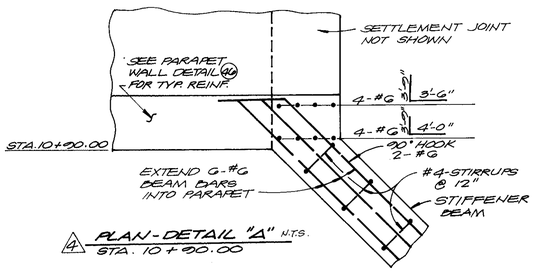
PREPARED UNDER SUPERVISION OF S.R. Kallenbrough 4/12/89 DATE

DESIGNED D. VORNBERGER
DRAWN S.S. CHECKED BMP
SCALE AS SHOWN
DATE
DWG. NO. F19P06-713-1

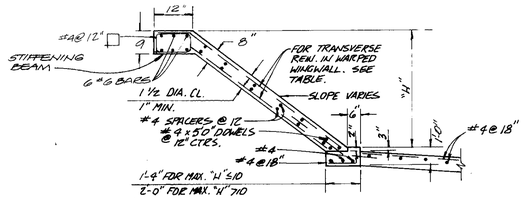
SHEET 16 OF 17

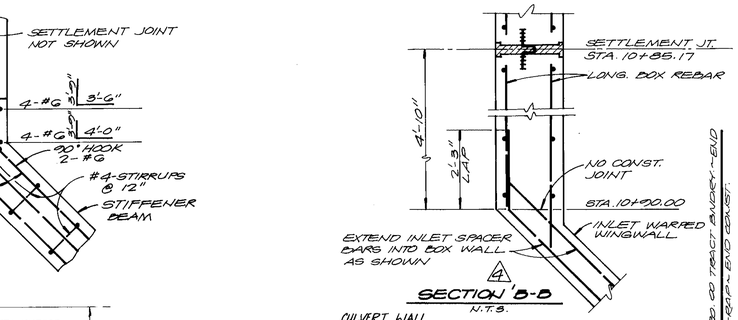
PROFESSIONAL ENGINEER ROBERT KALLENBROUGH STATE OF CALIFORNIA

J.N. 24429

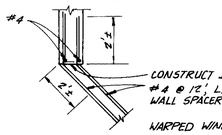


(4) PLAN-DETAIL "A" N.T.S.
STA. 10+90.00

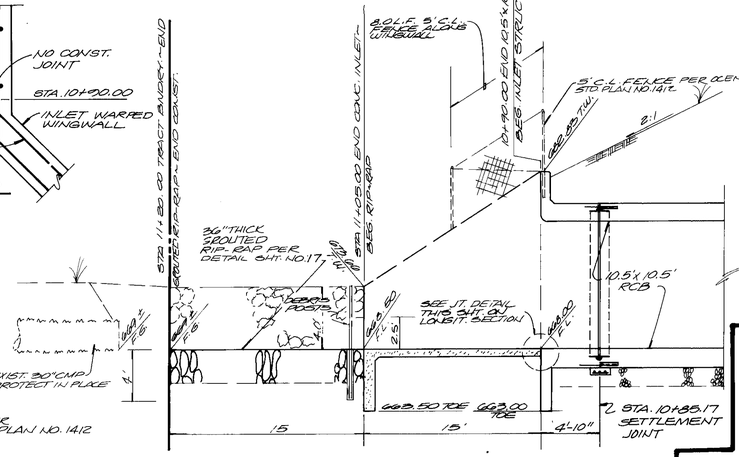




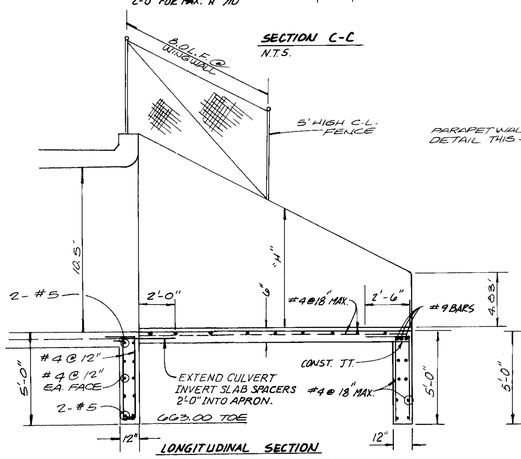
(4) SECTION B-B
N.T.S.



CULVERT WALL

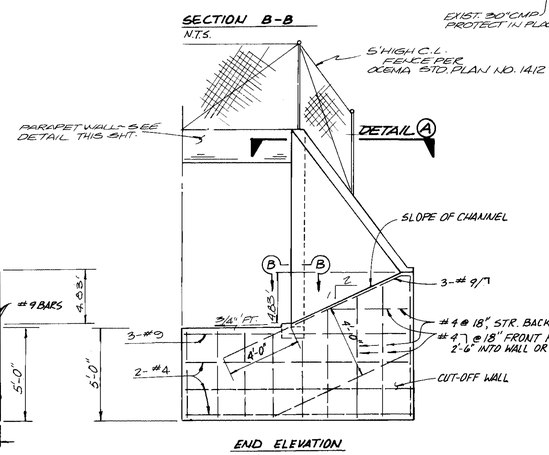


(48) 10.5'x10.5' R.C.B. INLET-PROFILE
N.T.S.

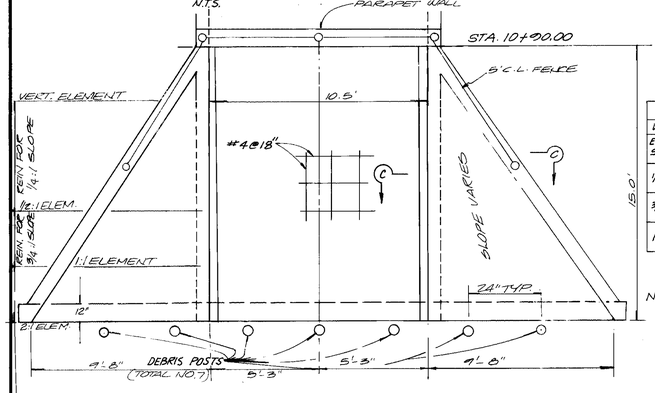


SECTION C-C
N.T.S.

LONGITUDINAL SECTION
N.T.S.



END ELEVATION
N.T.S.



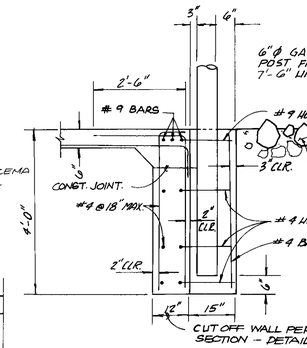
PLAN

WARPED WINGWALLS					
WALL DIMENSIONS AND REINFORCING					
ELEMENT SLOPE	"H"	8' OR LESS	10'	12'	14'
1/4 : 1	FRONT FACE REIN.	#4@12	#4@7	#5@7	#5@5
	REAR FACE REIN.	#4@12	#4@12	#4@12	#4@12
3/4 : 1	FRONT FACE REIN.	#4@12	#4@12	#4@12	#4@12
	REAR FACE REIN.	#4@12	#4@12	#4@12	#4@10
1 1/4 : 1	FRONT FACE REIN.	#4@12	#4@12	#4@12	#4@12
	REAR FACE REIN.	#4@8	#4@8	#4@5	#5@6

NOTE: WALLS DESIGNED FOR 2' SUR. CHARGE; EARTH LOAD = 120 LB/CU.FT.; EQUIVALENT FLUID PRESSURE = 36 LB/CU.FT., VARY "D" OF WARPED WALL UNIFORMLY FROM THAT AT CUT-OFF WALL TO THAT AT CULVERT, FOR MAX. "H" > 12'.

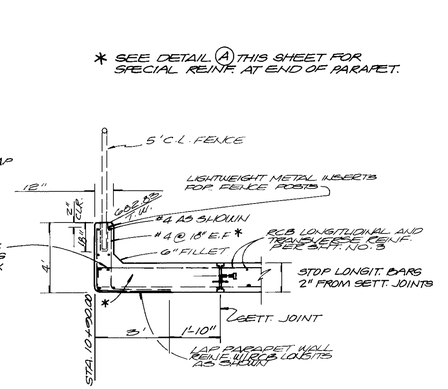
(48) BOX CULVERT WARPED WINGWALLS
N.T.S.

DESIGN REFERENCE:
CALTRANS STD. PLAN D86A
DATED JAN. 1988
"BOX CULVERT WARPED WINGWALL"

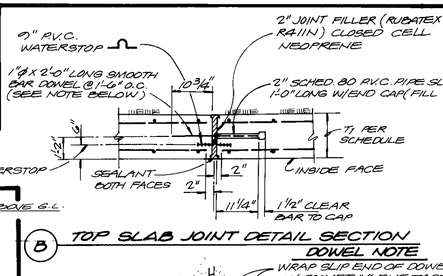


CUT OFF WALL PER LONGITUDINAL SECTION - DETAIL (4B) THIS SHEET

(50) DEBRIS POST DETAIL
N.T.S.



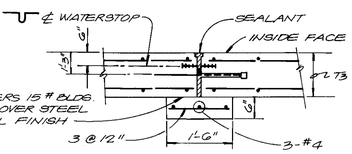
(4G) PARAPET WALL DETAIL



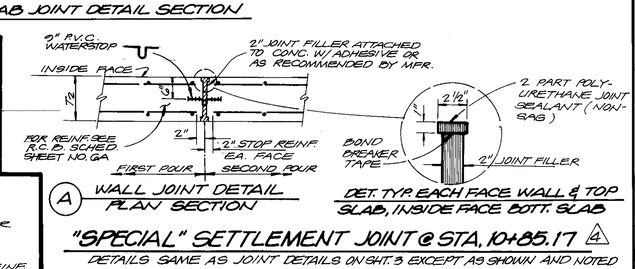
(B) TOP SLAB JOINT DETAIL SECTION

DOWEL NOTE

WRAP SLIP END OF DOWEL W/ POLYETHYLENE TAPE @ 2 PLACES TO KEEP DOWEL CENTERED IN P.V.C. SLEEVE

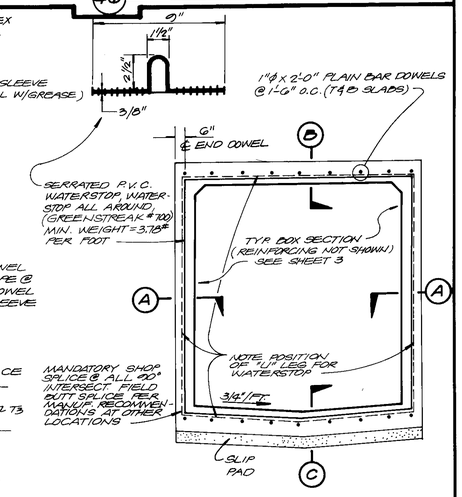


(C) BOTTOM SLAB JOINT DETAIL SECTION



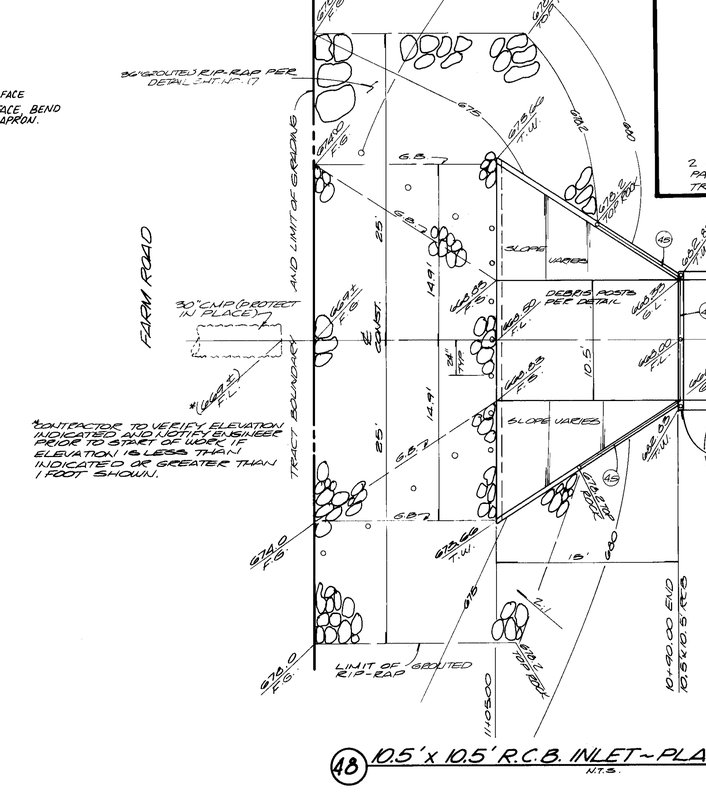
(A) WALL JOINT DETAIL PLAN SECTION

DET. TYP. EACH FACE WALL & TOP SLAB, INSIDE FACE BOTT. SLAB



"SPECIAL" SETTLEMENT JOINT @ STA. 10+85.17 (4)

DETAILS SAME AS JOINT DETAILS ON SHT. 3 EXCEPT AS SHOWN AND NOTED



*CONTRACTOR TO VERIFY ELEVATION INDICATED AND NOTIFY ENGINEER PRIOR TO START OF WORK IF ELEVATION IS LESS THAN INDICATED OR GREATER THAN 1 FOOT SHOWN.

(48) 10.5'x 10.5' R.C.B. INLET-PLAN
N.T.S.

1 1/2 0 1 2
3 inches on original drawing

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P07
INLET DETAILS
(4) SETTLEMENT JOINT AT STA. 10+85.17

BAKE PARKWAY STORM DRAIN

MARK	DATE	DESCRIPTION
(4) 2-	-91	ADDED SETT. JOINT DET., REVISED BOX INLET CONNECTION

REVISIONS

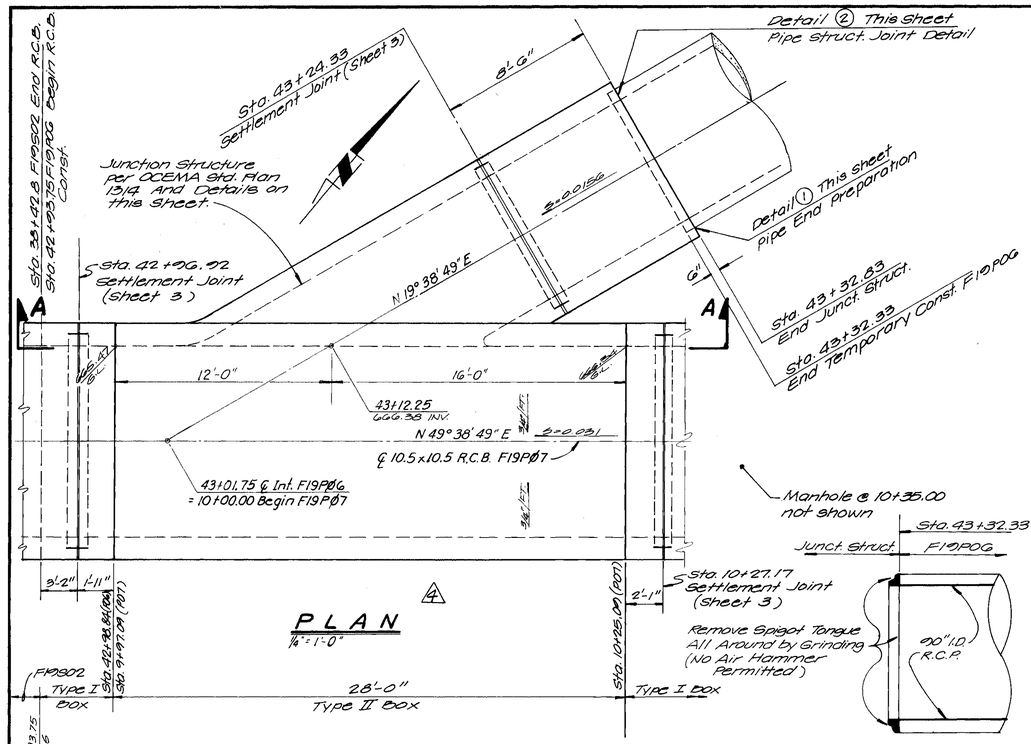
DESIGNED D. VORNBERGER
DRAWN SS CHECKED BMP

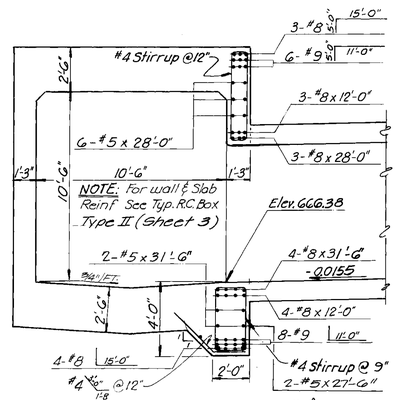
PREPARED UNDER SUPERVISION OF R. Kallenbrunn 4/13/91 DATE

SCALE AS SHOWN | DATE | DWG. NO. F19P06-713-1

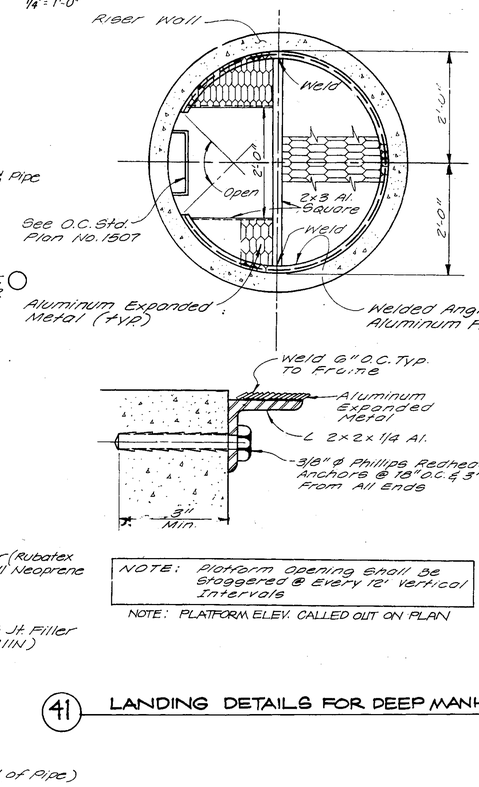
SHEET 16 OF 17

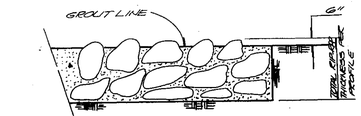
J.N. 24429





SECTION "B-B" (4)
1/4" = 1'-0"



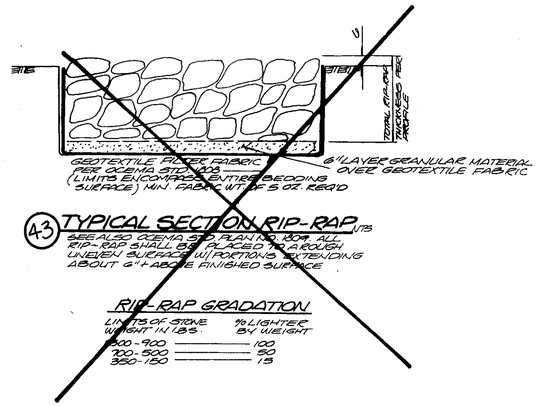


(42) TYPICAL SECTION GROUTED RIP-RAP

SEE ALSO OCEMA STD. PLAN NO. 809. ALL RIP-RAP SHALL BE PLACED TO A REASONABLY UNIFORM FINISHED SURFACE AND WITH STONES ABOUT 6"± ABOVE FINISHED SURFACE AND WITH FULL R.C.C. GROUT PENETRATION FOR THE LOWER ROCK WASH EXPOSED SURFACE OF ROCK WITH HIGH PRESSURE WATER TO REMOVE GROUT CONTACTING EXPOSED SURFACE ROCK

RIP-RAP GRADATION

LIMITS OF STONE WEIGHT IN LBS	% LIGHTER BY WEIGHT
2500-900	100
700-300	50
350-150	15

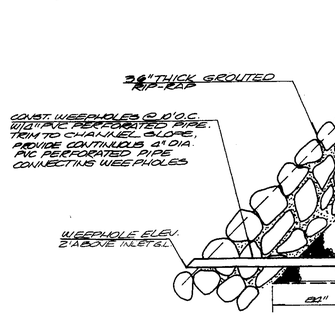


(43) TYPICAL SECTION RIP-RAP

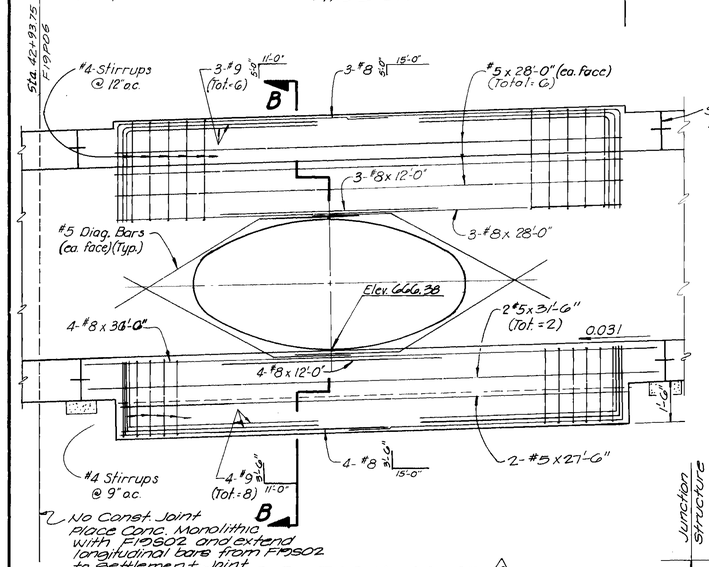
SEE ALSO OCEMA STD. PLAN NO. 809. ALL RIP-RAP SHALL BE PLACED TO A REASONABLY UNIFORM SURFACE W/ STONES PROTRUDING ABOUT 6"± ABOVE FINISHED SURFACE

RIP-RAP GRADATION

LIMITS OF STONE WEIGHT IN LBS	% LIGHTER BY WEIGHT
2500-900	100
700-300	50
350-150	15

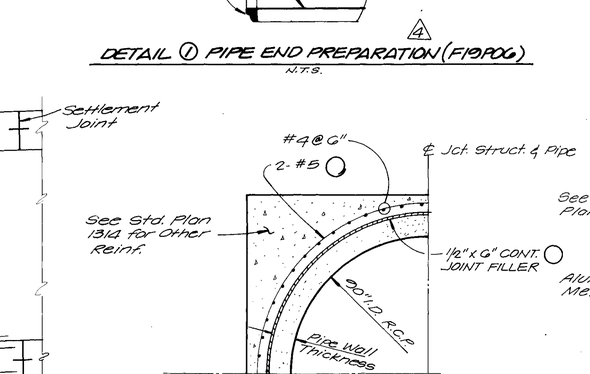


(44) WEEPHOLE DETAIL
N.T.S.

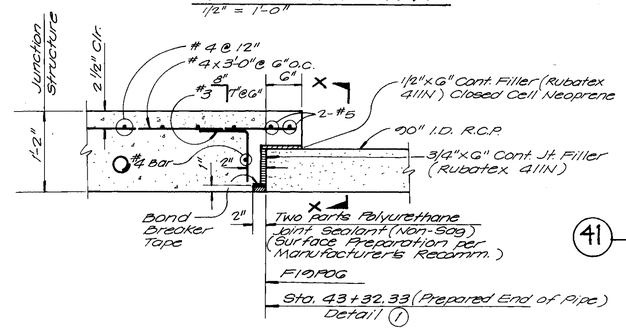


SECTION "A-A" (4)
1/4" = 1'-0"

NOTE:
Wall reinf. not shown for clarity. Cut wall reinf. as required at Junction Box Opening.



END SECTION "X-X" (4)
1/2" = 1'-0"



DETAIL 2 - PIPE/STRUCTURE JOINT DETAIL (4)
1"=1'-0"

NOTE: Platform opening shall be staggered @ every 12' vertical intervals

NOTE: PLATFORM ELEV. CALLED OUT ON PLAN

(41) LANDING DETAILS FOR DEEP MANHOLE
N.T.S.

1 1/2 0 1 2
3 inches on original drawing

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P06

DETAILS AT JUNCTION STRUCTURE

BAKE PARKWAY STORM DRAIN

MARK	DATE	DESCRIPTION
4	2/19/	PIPE END PREPARATION, ADDED SETTLEMENT JOINT LOCATIONS, EXTEND JUNCT. STRUCT.

REVISIONS

PREPARED UNDER SUPERVISION OF S.R. Kallenbach 4/30/87 DATE

SHEET 17

DESIGNED D.V.O'R.H.B. CHECKED S.R.K.

DRAWN S.S./L.L.S. CHECKED E.M.P.

SCALE AS SHOWN

DATE

DWG. NO. F19P06-713-1

OF 17

REGISTERED PROFESSIONAL ENGINEER S. ROBERT KALLENBACH NO. 23967 EXP. 3-31-90 CIVIL STATE OF CALIFORNIA

J.N. 24429

CONSTRUCTION NOTES & ESTIMATED QUANTITIES

	NO.	ITEM	UNIT	AMOUNT	AMOUNT OF SPECIAL WALL, 1½" MIN. STEEL CLEARANCE RCP
	1	CONST. 18" RCP (D-LOAD PER PROFILE)	L.F.	288	(129)
	2	CONST. 21" RCP (D-LOAD PER PROFILE)	L.F.	229	(60)
	3	CONST. 24" RCP (D-LOAD PER PROFILE)	L.F.	113	△
	4	CONST. 27" RCP (D-LOAD PER PROFILE)	L.F.	149	
	5	CONST. 30" RCP (D-LOAD PER PROFILE)	L.F.	250	(156)
	6	CONST. 33" RCP (D-LOAD PER PROFILE)	L.F.	286	
	7	CONST. 36" RCP (D-LOAD PER PROFILE)	L.F.	——	(221)
	8	CONST. 39" RCP (D-LOAD PER PROFILE)	L.F.	——	(874)
	9	CONST. 45" RCP (D-LOAD PER PROFILE)	L.F.	——	(427)
	10	CONST. 48" RCP (D-LOAD PER PROFILE)	L.F.	——	(75)
	11	CONST. 51" RCP (D-LOAD PER PROFILE)	L.F.	——	(200)
	12	CONST. 54" RCP (D-LOAD PER PROFILE)	L.F.	40	(1027)
	13	CONST. 60" RCP (D-LOAD PER PROFILE)	L.F.	——	(366)
	14	CONST. 72" RCP (D-LOAD PER PROFILE)	L.F.	——	(912)
	15	CONST. 78" RCP (D-LOAD PER PROFILE)	L.F.	——	(1230)
	16	CONST. 81" R.C.P. (D-LOAD PER PROFILE)	L.F.	——	(298)
	17	CONST. 84" R.C.P. (D-LOAD PER PROFILE)	L.F.	——	
	18	CONST. 87" R.C.P. (D-LOAD PER PROFILE)	L.F.	959	
	19	CONST. 90" R.C.P. (D-LOAD PER PROFILE)	L.F.		(633)
	20	CONST. 10.5'x 10.5' RCB PER PROFILE & DETAIL ON SHEET No. 3	L.F.	90	
△4	21	CONST. JUNC. STRUCT. PER DETAIL SHEET No. 17 AND OCEMA STD. PLAN NO. 1314	EA.	1	
	22	CONST. 12" A.C.P. (D-LOAD PER PROFILE)	L.F.	——	
	23	CONST. S.R.P. (D-LOAD PER PROFILE)	L.F.	——	
	24	CONST. S.R.P. (D-LOAD PER PROFILE)	L.F.	——	
	25	CONST. JUNC. STRUCT. TYPE I PER O.C.E.M.A. STD. PLAN No. 1310	EA.	4	
	26	CONST. JUNC. STRUCT. TYPE I (OMIT SHAFT) PER O.C.E.M.A. STD. PLAN No. 1310	EA.	2	
	27	CONST. JUNC. STRUCT. TYPE II PER O.C.E.M.A. STD. PLAN No. 1311	EA.	8	
△4	28	CONST. SETTLEMENT JOINTS PER DETAILS ON SHEET 3 & 16	EA.	6	
	29	CONST. JUNC. STRUCT. TYPE III PER O.C.E.M.A. STD. PLAN No. 1312	EA.	5	
	30	CONST. JUNC. STRUCT. TYPE III (OMIT SHAFT) PER O.C.E.M.A. STD. PLAN No. 1312	EA.	2	
	31	CONST. JUNC. STRUCT. TYPE IV PER O.C.E.M.A. STD. PLAN No. 1313	EA.	4	
	32	CONST. JUNC. STRUCT. TYPE III PER STD. PLAN 1312, WITH 48" M.H. PER STD PLAN 1504	EA.	1	
	33	CONST. JUNC. STRUCT. TYPE VI PER O.C.E.M.A. STD. PLAN No. 1315	EA.	5	
	34	CONST. REIN. CONC. COLLAR PER O.C.E.M.A. STD. PLAN No. 1333	EA.	11	
	35	CONST. INLET TYPE I PER O.C.E.M.A. STD. PLAN No. 1301	EA.	——	
	36	CONST. DBL. COURSE BRICK & MORTAR PLUG (PIPES 48" DIA. OR LARGER)	EA.	——	
	37	CONST. INLET TYPE V PER O.C.E.M.A. STD. PLAN No. 1305	EA.	——	
	38	CONST. RISER PER O.C.E.M.A. STD. PLAN No. 1327	EA.	——	
	39	CONST. BRICK AND MORTAR PLUG	EA.	28	
	40	CONST. BRICK AND MORTAR PLUG AROUND INTERIM C.S.P.	EA.	——	
	41	CONST. STEEL LANDING FOR DEEP M.H. PER DETAIL ON SHEET No. 17.	EA.	2	
	42	CONST. 36" THICK GROUTED RIP-RAP PER DETAIL & GRADATION ON SHT NO. 17	C.Y.	90	
	44	CONST. WEEPHOLE PER DETAILS SHEET No. 17	EA.	110	
	45	CONST. 60" CHAIN LINK FENCE PER O.C.E.M.A. STD. PLAN NO. 1412	L.F.	110	
	46	CONST. R.C. PARAPET WALL PER SHEET No. 16	EA.	1	
	47	CONST. CONCRETE PIPE SLOPE ANCHOR PER O.C.E.M.A. STD. PLAN 1333	EA.	1	
	48	CONST. BOX CULVERT INLET PER DETAIL ON SHEET NO. 16	EA.	1	
	50	CONST. DEBRIS POST PER DETAIL ON SHT. NO. 16	EA.	7	
	51	CONST. R.C. BOX MANHOLE PER OCEMA STD. PLAN NO. 1506	EA.	1	

GENERAL NOTES

1. ALL WORK TO BE DEDICATED TO THE ORANGE COUNTY FLOOD CONTROL DISTRICT SHALL BE IN CONFORMANCE WITH THE O.C.E.M.A. STD. SPECIFICATIONS (PUBLIC WORKS CONSTRUCTION 1985 EDITION) AND THE O.C.E.M.A. STD. PLANS WHICH MAY BE PURCHASED FROM THE DISTRICT AND SHALL BE KEPT ON THE JOB SITE AT ALL TIMES.
2. THE CONTRACTOR SHALL NOTIFY THE DISTRICT'S INSPECTOR AT LEAST 48 HOURS PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION BY TELEPHONING 567-7800 OR BY WRITING THE ORANGE COUNTY E.M.A. ATTN. CONSTRUCTION, P. O. BOX 486, SANTA ANA, CALIFORNIA 92702.
3. ALL CONCRETE SHALL HAVE A MINIMUM 28 DAYS ULTIMATE COMPRESSIVE STRENGTH OF 3,250 PSI. CEMENT SHALL CONFORM TO ASTM C150, TYPE V. CONCRETE FOR INVERT SHALL BE 560-B-3250 AND FOR WALLS AND DECK SHALL BE 560-C-3250.
4. ALL CONDUIT LENGTHS ARE HORIZONTAL PROJECTIONS, UNLESS OTHERWISE SHOWN.
5. LOCATIONS OF PUBLIC UTILITIES SHOWN HAVE BEEN DETERMINED FROM AVAILABLE INFORMATION. HOWEVER, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE TRUE LOCATION OF ANY EXISTING UTILITIES AND TO EXERCISE PROPER PRECAUTIONS TO AVOID INJURY OR DAMAGE THERETO.
6. ALL REINFORCING BARS SHALL CONFORM TO ASTM A615 GRADE 60, DEFORMED BARS.
7. FOR ADDITIONAL STRUCTURAL NOTES, SEE SHEET NO. ______.
8. ALL MATERIALS TESTING FOR THE DRAINAGE FACILITIES SHALL BE PROVIDED BY THE O.C.E.M.A. MATERIALS LAB IN ACCORDANCE WITH THE NUMBER, LOCATION AND FREQUENCY REQUESTED BY THE FLOOD CONTROL DISTRICT'S INSPECTOR.
9. CHAMFER ALL EXPOSED EDGES OF CONCRETE 3/4" MIN.
10. ALL PIPE SECTIONS TO BE BANDED AND GROUTED
11. FOR TRENCH EXCAVATIONS IN NATIVE SOIL, SHORING SHALL BE PROVIDED TO SATISFY STATE OF CALIFORNIA SAFETY REQUIREMENTS.
12. THE CONTRACTOR SHALL CONDUCT CONSTRUCTION OPERATIONS IN SUCH A MANNER THAT STORM OR OTHER WATERS MAY PROCEED UNINTERRUPTED ALONG THEIR EXISTING STREET OR DRAINAGE COURSES.
13. IN THE COURSE OF WATER CONTROL, THE CONTRACTOR SHALL CONDUCT CONSTRUCTION OPERATIONS TO PROTECT WATERS FROM POLLUTION WITH FUELS, OILS, BITUMENS, OR OTHER HARMFUL MATERIALS.
14. ALL REINFORCED CONCRETE PIPE SHALL BE BEDDED IN ACCORDANCE WITH O.C.E.M.A. STD. PLAN NO. 319.
15. ALL FILL AND BACKFILL SHALL BE COMPACTED TO MIN. 90 PERCENT OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE CALIFORNIA TEST METHOD NO. 216. ALL FILL AND BACKFILL SHALL BE FREE FROM VEGETABLE MATTER. HOWEVER, IT MAY CONSIST OF ONSITE SILTY SAND OR CLAYEY SAND (SM.SC). THE FILL AND BACKFILL SHALL BE COMPACTED IN APPROXIMATELY 6 INCH INCREMENTS. IN ORDER TO AVOID UNBALANCED D-LOADS ON THE STORM DRAIN, THE DIFFERENCE IN BACKFILL ELEVATION ON ADJACENT SIDES OF THE R.C.P. DRAIN SHALL NOT EXCEED 2 FEET. NO STORM DRAIN SHALL BE PLACED UNTIL THE SOILS ENGINEER HAS INSPECTED AND APPROVED THE BOTTOM OF THE TRENCH. ISOLATED ZONES OF SOFT COMPRESSIBLE SOILS OR LARGE ROCKS SHALL BE COMPLETELY REMOVED AND REPLACED WITH PROPERLY COMPACTED SOILS. PRECAUTIONS SHALL BE TAKEN TO INSURE THAT THE STORM DRAIN IS NOT DAMAGED BY HEAVY COMPACTING EQUIPMENT. HEAVY COMPACTING EQUIPMENT SHALL NOT BE USED WITHIN A 1 TO 1 PLANE RISING FROM THE BASE OF THE STORM DRAIN OR WITHIN 2 FEET OF THE TOP OF THE STORM DRAIN; THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO THE STORM DRAIN RESULTING FROM INAPPROPRIATE COMPACTION TECHNIQUES AND EQUIPMENT. SOILS ENGINEER SHALL APPROVE AND SUPERVISE BACKFILLING.
16. PIPE CONSTRUCTION IN FILL AREA MUST BE COORDINATED WITH THE GRADING TO INSURE THAT WHEN THE FILL OPERATION HAS BEEN COMPLETED AT GRADE A MINIMUM OF TWO FEET ABOVE THE TOP OF PIPE OR TO FIVE FEET (MAXIMUM) ABOVE THE PROPOSED SUB-GRADE OF THE PIPE, THE STORM DRAIN TRENCH SHALL BE EXCAVATED AND THE PIPE INSTALLED.
17. ALL SURVEYING REQUIRED FOR VERTICAL AND HORIZONTAL ALIGNMENT MUST BE PROVIDED BY THE CONTRACTOR OR DEVELOPER AND SUFFICIENT REFERENCE STAKING MUST BE IN ACCORDANCE WITH THE REQUEST OF THE O.C.E.M.A. INSPECTOR.
18. WHENEVER APPLICABLE, THE DEVELOPER SHALL OBTAIN A PERMIT FROM THE STATE DEPARTMENT OF FISH AND GAME IN ACCORDANCE WITH SECTION 1602 OF THE CALIFORNIA FISH AND GAME CODE PRIOR TO COMMENCEMENT OF CONSTRUCTION.
19. A PERMIT FOR WORK WITHIN EXISTING STREET RIGHT OF WAY IS REQUIRED FROM THE O.C.E.M.A. FOR ANY ENCROACHMENT NECESSARY FOR CONSTRUCTION IN PUBLIC RIGHT OF WAY.
20. STORM DRAIN BACKFILL FOR ALL FACILITIES WITHIN STREET RIGHT OF WAY IS TO BE PLACED AND COMPACTED UNDER O.C.E.M.A. INSPECTION AND MEET OR EXCEED O.C.E.M.A. MINIMUM STANDARDS.
21. LOCAL DEPRESSIONS AND DECKS OF CURB INLETS SHALL NOT BE POURED UNTIL STAKING FOR LINE AND GRADE OF CURB AND GUTTER IS COMPLETED WITHIN 25' OF INSIDE OF INLET WALLS ON BOTH SIDES OR ADJACENT CURB AND GUTTER HAS BEEN PREVIOUSLY POURED.
22. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, THE DEVELOPER'S CONTRACTOR SHALL OBTAIN A PERMIT FROM THE STATE DIVISION OF INDUSTRIAL SAFETY. A COPY OF PERMIT SHALL BE KEPT ON THE JOB SITE AT ALL TIMES.
23. LENGTH OF MANHOLE STRUCTURES MAY BE INCREASED TO MEET PIPE ENDS AT OPTION OF CONTRACTOR AS LONG AS REINFORCING STEEL IS CONTINUED AS REQUIRED. ANY CHANGE IN SPUR LOCATION MUST BE APPROVED BY THE ENGINEER.
24. FLOOR OF MANHOLE STRUCTURE SHALL BE STEEL TROWELLED TO SPRING LINE.
25. RCP SHALL COMPLY WITH ALL A.S.T.M. APPLICABLE STANDARDS.
26. PRIOR TO THE PLACEMENT OF STORMDRAIN IMPROVEMENTS, THE DEVELOPER'S SOIL ENGINEERING SHALL CERTIFY IN WRITING TO THE E.M.A. INSPECTOR THAT THE STORM DRAIN'S SUBGRADE IS OF ADEQUATE STRENGTH TO SUPPORT THE STRUCTURES AND ANY ANTICIPATED LOADS.
27. BODY OF MANHOLE STRUCTURE, INCLUDING SPUR, MUST BE POURED IN ONE CONTINUOUS OPERATION, EXCEPT THAT CONSTRUCTION JOINT AT THE SPRING LINE WITH A LONGITUDINAL KEYWAY IS PERMITTED.
28. LOCAL DEPRESSIONS SHALL BE CONSTRUCTED PER STREET IMPROVEMENT PLANS IN ACCORDANCE WITH O.C.E.M.A. STANDARD PLANS. HOWEVER, ALL CATCH BASINS WILL BE SHOWN ON STREET IMPROVEMENT PLANS.
29. STATIONS SHOWN THUS 0 +00 ARE STORMDRAIN STATIONS AND ARE INDEPENDENT OF ALL CENTERLINE STATIONS.
30. ALL STEEL THAT IS TO BE CONTINUOUS SHALL BE LAPPED A MINIMUM OF 45 BAR DIAMETERS.
31. ALL REINFORCING BARS MUST BE SECURELY HELD IN PLACE IN THE FORMS. TWO WAY MATS OF STEEL MUST BE WIRED TOGETHER BOTH WAYS AT ALTERNATE INTERSECTIONS.
32. WORKING WITHIN ORANGE COUNTY FLOOD CONTROL FACILITIES IS RESTRICTED TO THE PERIOD OF APRIL 15 TO OCTOBER 15
33. IF A DRIVEWAY ENCROACHES WITHIN A LOCAL DEPRESSION TRANSITION, USE E.M.A. STANDARD PLAN #1308 - TYPE A.

STONEWORK

STONE SHALL COMPLY WITH SUBSECTION 200-1.6, STONE FOR RIP-RAP, EXCEPT COBBLESTONES SHALL NOT BE USED. ALL STONES SHALL BE ANGULAR, EACH PIECE HAVING ITS GREATEST DIMENSIONS NOT GREATER THAN THREE TIMES ITS LEAST DIMENSIONS.

STONE SHALL COMPLY WITH THE TESTS SPECIFIED IN SUBSECTION 200-1.6 EXCEPT THAT SPECIFIC GRAVITY SHALL BE NOT LESS THAN 2.62.

PLACEMENT TOLERANCES FOR FINISHED SURFACE SHALL BE PLUS OR MINUS SIX INCHES FROM INDICATED LINES AND GRADES.

EACH LOAD OF STONE SHALL BE REASONABLY WELL GRADED FROM THE SMALLEST TO THE MAXIMUM SIZE SPECIFIED. STONES SMALLER THAN THE SPECIFIED 15 PERCENT SIZE AND SPALLS WILL NOT BE PERMITTED IN A AMOUNT EXCEEDING 15 PERCENT BY WEIGHT OF EACH LOAD.

STONE FOR RIP-RAP SHALL BE PLACED IN A MANNER WHICH WILL PRODUCE A REASONABLE WELL-GRADED MASS OF STONE WITH THE MINIMUM PRACTICABLE PERCENTAGE OF VOIDS. THE ENTIRE MASS OF STONE SHALL BE PLACED IN CONFORMANCE WITH THE LINES, GRADES AND THICKNESSES SHOWN ON THE PLANS. RIP-RAP SHALL BE PLACED TO ITS FULL COURSE THICKNESS IN ONE OPERATION AND IN A MANNER TO AVIOD DISPLACING THE UNDERLYING MATERIAL. PLACING OF RIP-RAP IN LAYERS BY DUMPING INTO CHUTES OR BY SIMILAR METHODS LIKELY TO CAUSE SEGREGATION, WILL NOT BE PERMITTED. SELF-PROPELLED EQUIPMENT SHALL NOT BE USED ON EMBANKMENT SLOPES.

THE LARGER STONES SHALL BE WELL DISTRIBUTED AND THE ENTIRE MASS OF STONE SHALL CONFORM TO THE GRADATION SPECIFIED. ALL MATERIAL GOING INTO RIP-RAP PROTECTOIN SHALL BE SO PLACED AND DISTRIBUTED THAT THERE WILL BE NO LARGE ACCUMULATION OF EITHER THE LARGER OR SMALLER SIZES OF STONE.

GEOTEXTILE FABRICS

THE WORK INVOLVED SHALL CONSIST OF PLACING FABRIC OF THE TYPE SPECIFIED AT LOCATIONS AND GRADES SHOWN ON THE PLANS OR AS STAKED IN THE FIELD, IN ACCORDANCE WITH THESE SPECIAL PROVISONS. ANY FABRIC DAMAGED DURING ITS INSTALLATION OR DURING ITS USE SHALL BE REPLACED. TORN OR PUNCTURED AREAS MAY BE REPAIRED WITH AN ADDITIONAL PIECE OF FABRIC LARGE ENOUGH BOTH TO COVER THE DAMAGED AREA AND SATISFY OVERLAP REQUIREMENTS. A CERTIFICATE OF COMPLIANCE, MILL CERTIFICATE OR AFFIDAVIT THAT THE FABRIC TO BE INSTALLED MEETS MINIMUM REQUIREMENTS IN EACH PRINCIPAL DIRECTION, SIGNED BY A COMPANY OFFICER AUTHORIZED TO SIGN SUCH DOCUMENTS, SHALL BE FURNISHED TO THE ENGINEER BEFORE INSTALLATION. THE ENGINEER SHALL DETERMINE THE ADEQUACY OF SUBMITTED DOCUMENTATION.

FILTER FABRIC

FABRIC SHALL BE PLACED ON SURFACES FREE OF OBSTUCTIONS, DEPRESSIONS AND DEBRIS. FABRIC SHALL BE LOOSELY PLACED AND NOT PLACED IN A STRETCHED CONDITION. FABRIC SHALL BE PLACED IN DIRECT CONTACT WITH SOIL, WITH NO BRIDGING ALLOWED. OVERLAPS SHALL VARY FROM 18 TO 36 INCHES WIDE, DEPENDING ON STONE SIZE AND SUBGRADE STABILITY, AND SHALL BE APPROVED BY THE ENGINEER. SECURING PINS AT LEAST 12 INCHES LONG WITH 1-1/2" DIAMETER WASHERS OR 8" X 1" X 8" U-SHAPED STAPLES, AND SHALL BE INSERTED THROUGH ALL OVERLAP LAYERS, AT INTERVALS NOT EXCEEDING 6 FFET, ALONG A LINE SET AT THE MID-POINT OF OVERLAPS. ADDITIONAL PINS SHALL BE INSTALLED AS NECESSARY TO PREVENT BRIDGING AND FABRIC SLOPPAGE, REGARDLESS OF THE FABRIC'S LOCATION.

FABRIC SHALL BE USED WTH A LAYER OF GRANULAR BEDDING MATERIAL PLACED ON IT PRIOR TO RIP-RAP PLACEMENT. FABRIC WITH PHYSICAL PROPERTIES LESS THAN THOSE LISTED IN TABLE 1 OF OCEMA STD PLAN NO. 808 FOR EMBANKMENT OR RIP-RAP STABILIZATION SHALL NOT BE USED. THE THICKNESS OF BEDDING MATERIAL SHALL BE COMPATIBLE WITH RIP-RAP SIZE. IN NO CASE SHALL FABRIC'S PHYSICAL PROPERTIES BE LESS THAN THOSE LISTED FOR DRAINAGE TEXTILES. FINAL DETERMINATION OF FILTER FABRIC'S ADEQUACY, CONSIDERING BEDDING MATERIAL USED, AND SIZE, THICKNESS, GRADATION AND METHOD OF PLACEMENT OF RIP-RAP SHALL BE MADE BY THE ENGINEER. IN NO CASE SHALL BEDDING MATERIAL OR RIP-RAP BE DROPPED ON FABRIC FROM A HEIGHT OF MORE THAN THREE FEET. SPECIAL CARE SHALL BE TAKEN TO ENSURE THAT METHODS OF RIP-RAP AND MATERIAL PLACEMENT SUCH AS END-DUMPING DO NOT TEAR OR OTHERWIDE DAMAGE THE FABRIC.

1 1/2 0 1 2
3 inches on original drawing

REGISTERED PROFESSIONAL ENGINEER — S. ROBERT KALLENBAUGH — NO. 27987 — EXP. 3-31-90 — CIVIL — STATE OF CALIFORNIA

MARK	DATE	DESCRIPTION
△4	2/ /91	ADDED SETTLEMENT JOINTS

REVISIONS

DESIGNED D. VORNBERGER
DRAWN SS — CHECKED B.M.P.

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P06

GENERAL NOTES, CONSTRUCTION NOTES AND ESTIMATED QUANTITIES

PREPARED UNDER SUPERVISION OF S R Kallenbaugh 4/ /91 DATE

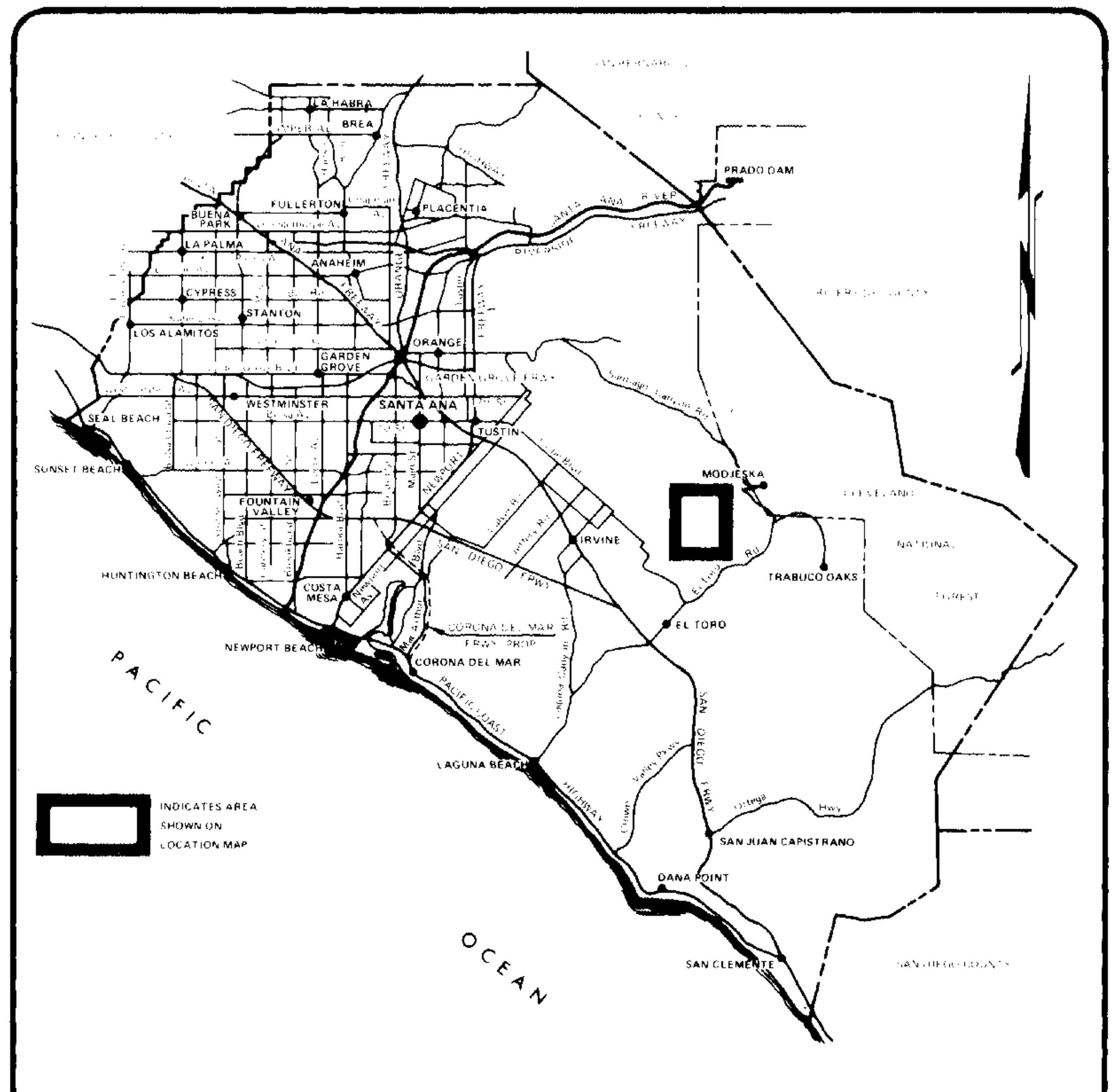
SCALE	DATE	DWG. NO.	SHEET
AS SHOWN		F19P06-713-1	2A OF 17

J.N. 24429

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

SANTA ANA, CALIFORNIA

E. SCHNEIDER, DIRECTOR



VICINITY MAP

SCALE IN MILES

PLANS FOR CONSTRUCTION OF THAT PORTION OF STORM DRAIN

FACILITY NO. F19P06

STA. 42 + 93. 75 TO STA. 112+ 81.28

FACILITY NO. F19P07

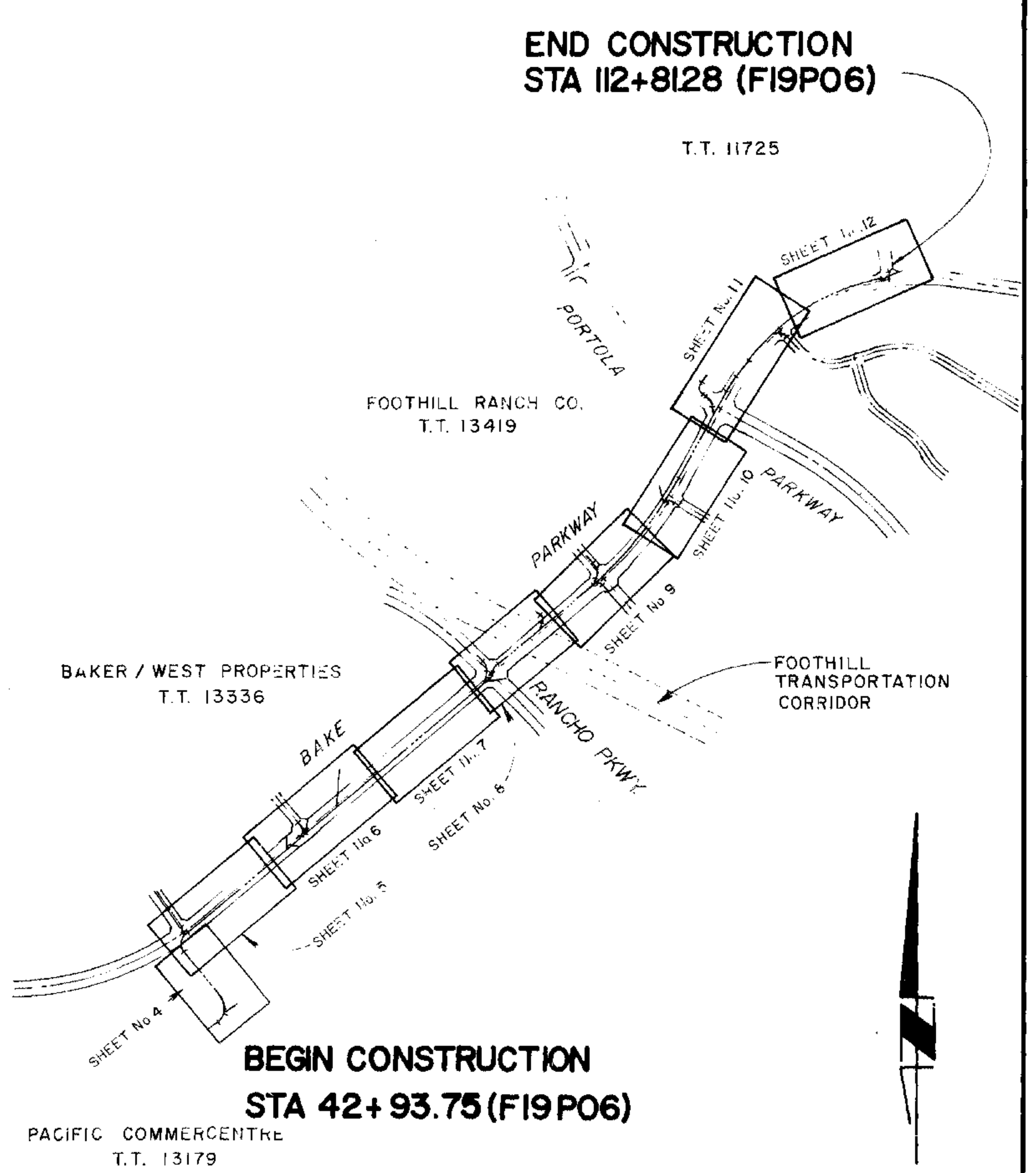
STA. 10+ 00.00 TO STA. 11+ 20.00

FOR

BAKE PARKWAY

BONDED WITH TRACT NO. 14045

STORM DRAIN MAINTAINED BY COUNTY OF ORANGE



LOCATION MAP

SCALE 1" = 800'

INDEX OF SHEETS

SHEET	DESCRIPTION
1	TITLE SHEET
2	CONSTRUCTION NOTES, GENERAL NOTES AND ESTIMATED QUANTITIES.
3	SINGLE R.C.BOX SCHEDULE AND DETAILS SETTLEMENT JOINT DETAILS 4
4	PLAN AND PROFILE: F19P06 STA. 42+ 93.75 TO STA 49+ 00.00 F19P07 STA. 10+ 00.00 TO STA. 11+ 20.00
5	PLAN AND PROFILE F19P06, STA. 49+ 00.00 TO STA. 57+ 00.00.
6	PLAN AND PROFILE F19P06, STA. 57+ 00.00 TO STA. 65+ 00.00
7	PLAN AND PROFILE F19P06, STA. 65+ 00.00 TO STA. 73+ 00.00.
8	PLAN AND PROFILE F19P06, STA. 73+ 00.00 TO STA. 81+ 00.00 AND LATERALS "J,K & L", & "OX"
9	PLAN AND PROFILE F19P06 STA. 81+ 00.00 TO STA. 89+ 00.00 AND LATERALS "M & N"
10	PLAN AND PROFILE F19P06, STA. 89+ 00.00 TO STA. 96+ 75.00 AND LATERALS "P & [illegible]
11	PLAN AND PROFILE F19P06, STA. 96+ 75.00 TO STA. 105+ 90.58 AND LATERALS "R,S & T".
12	PLAN AND PROFILE F19P06, STA. 105+ 90.58 TO STA. 112+81.28 A[illegible] LATERALS "U & V".
13	LATERAL PROFILES "C", "C-1", "C-2", "D", "E" "F", "G" & "H"
14	LATERAL PROFILES "J", "J-1", "K", "L", "M", "N", & "P"
15	LATERAL PROFILES "Q", "R", "R-1", "S", "T", "U" & "V"
16	INLET DETAILS F19P07. SETTLEMENT JOINT AT STA.10+85.17 4
17	CONSTRUCTION DETAILS

UTILITY	PHONE NO.
IRVINE RANCH [illegible] DISTRICT	[illegible]
LO[illegible] WATER DISTRICT	[illegible]
SOUTHERN CALIFORNIA [illegible]	[illegible]
PACIFIC BELL TELEPHONE	[illegible]
SOUTHERN CALIFORNIA [illegible]	[illegible]

BENCH MARK:

3E 96 78 ON THE NORTHERLY SIDE OF TRABUCO ROAD AT ITS JUNCTION WITH PASEO SOMBRA 7.7 FEET NORTH OF THE EASTERN MOST CURB RETURN OF TRABUCO 1.5 FEET NORTHWEST OF THE STREET SIGN POST, 17.6 FEET SOUTH OF THE SERRANO PARK STONE SIGN AT THE ANGLE POINT OF THE SIDEWALK AND THE ASPHALT WALKWAY, SET IN TOP OF A CONCRETE POST, FLUSH WITH WALK

ELEVATION 432.58 ADJ. 1976

BASIS OF BEARING:

"STATE OF CALIFORNIA [illegible] SYSTEM – ZONE VI" BASED [illegible] BETWEEN ORANGE COUNTY SURVEYOR'S HORIZONTAL CONTROL [illegible] AND "CANADA" (O.C.S. [illegible]) N 77° 20' 41" E

EMA / REGULATION

CONST. FROM STA. TO
THIS PLAN IS SIGNED BY EMA / REGULATION FOR CONCEPT ADHERENCE TO COUNTY STANDARDS AND REQUIREMENTS ONLY. EMA / REGULATION IS NOT RESPONSIBLE FOR DESIGN, ASSUMPTIONS, OR ACCURACY.

APPROVED: Patrick Stanton R.C.E.
DATE: 5/8/90

ENGINEER

Robert Bein, William Frost & Associates

BY: S. ROBERT KALLENBAUGH RCE [illegible]
DATE: [illegible] EXP. 3-31-90

EMA / REGULATION

CONST. FROM STA. 50+00 TO 112+ 81.28 F19P06 ONLY
THIS PLAN IS SIGNED BY EMA/REGULATION FOR CONCEPT ADHERENCE TO COUNTY STANDARDS AND REQUIREMENTS ONLY. EMA/REGULATION IS NOT RESPONSIBLE FOR DESIGN, ASSUMPTIONS, OR ACCURACY.

APPROVED: P. Stanton RCE
DATE: 10/19/89

OWNER/DEVELOPER

FOOTHILL RANCH COMPANY
25200 LA PAZ ROAD, SUITE 210
LAGUNA HILLS, CA. 92653
(714) 586-4400

NO.	DESCRIPTION	SHT.	APPROVED	DATE
5	SUBDRAINS & MEDIAN DRAINS CONNECTION	5,6,9,11	AS BUILT	
4	Added Settlement Joint Details And Locations, Relocated M.H./REV. PROFILE	2,3,4 16 & 17	P. Stanton	5/15/91
3	PROFILE REVISED	4	P. Stanton	2/13/91
2	ADD C.B. No "C" & "D" SH. 10,14,15		P. Stanton	10/11/90
1	ADD LAT. "OX"	8	P. Stanton	4/20/90

REVISIONS

DWG. NO. F19P06-713-1

SHEET 1A OF 17

IMPROVEMENT PLANS

RANCHO PARKWAY
FOR PARCEL MAP NO. 98-103
CITY OF LAKE FOREST, CALIF

20021 LAKE FOREST DRIVE, LAKE FOREST, CA. 92630
SDP 99-01

CONSTRUCTION NOTES & QUANTITIES

STREET :

No.	Description	Qty	Unit
1	CONST. _ A.C. W/ SEAL COAT OVER _ A.B. W/ PRIME COAT.	.	SF
2	CONST. 8" P.C.C. CURB & GUTTER TYPE "A2-8" PER P.F.R.D. STD. PLAN NO. 120-0-00	.	LF
3	CONST. CONC. CURB & GUTTER TYPE "A3-8" PER OCEMA STD PLAN No. 120-0-00	.	LF
4	CONST. 4" P.C.C. SIDEWALK PER P.F.R.D. STD. PLAN NO ____	.	SF
5	CONST. STREET LIGHT PER P.F.R.D. STD. PLAN NO 1410 & 1411 (16,000 LUMENS)	.	SF
6	CONST. STREET LIGHT PER P.F.R.D. STD. PLAN NO 1410 & 1411 (DOUBLE 9500 LUMENS)	.	EA
7	CONST. HANDICAP RAMP PER ORANGE CO. P.F.R.D. STD. PLAN NO. 1115 REQUIREMENT	.	EA
8	CONST. P.C.C. CROSS GUTTER PER P.F.R.D. STD. PLAN NO. 122-1-00	.	EA
9	CONST. ENRICHED PAVEMENT MEDIAN MOW STRIP PER DETAIL SHEET NO. 1 & LANDSCAPE ARCHITECT'S PLANS.	.	EA
10	CONST. MEDIAN UNDERDRAIN PER P.F.R.D. STD. PLAN NO.1114 AND DETAIL SHEET 1	.	SF
11	FEATHED & JOIN EXIST. PAVEMENT.	.	EA
12	CONST. FLARED DEPRESSED DRIVEWAY APPROACH PER P.F.R.D. STD. PLAN NO. 1210	.	EA
13	CONST. MEDIAN TAPER PER P.F.R.D. STD. PLAN No. 140-1-00	.	EA
14	CONST. MEDIAN FLARE PER P.F.R.D. STD. PLAN No. 140-1-00	.	LS
15	CONST. LOCAL DEPRESSION DETAIL PER P.F.R.D. STD. PLAN NO. 1308	.	LS
16	CONST. EQUESTRIAN TRAIL CROSSING PER DETAILS SHEET NO. 14	.	LS

WATER :

No.	Description	Qty	Unit
30	INSTALL 1 1/2" WATER SERVICE & METER PER L.A.W.D. STD. PLAN W-2	-	EA
31	REMOVE PLUG AND JOIN EXISTING WATERMAIN TO THE SATISFACTION OF L.A.W.D. INSPECTOR	4	EA
32	INSTALL 8" P.V.C. (A.W.W.A. C-900) CLASS 150 DOMESTIC WATER LINE PER L.A.W.D. STANDARDS	4,342	LF
33	INSTALL FIRE HYDRANT ASSEMBLY PER L.A.W.D. STD. PLAN NO. W-5	24	EA
34	INSTALL 8" GATE VALVE PER L.A.W.D. STD. PLAN NO. W-6	19	EA
35	.	.	EA
36	INSTALL THRUSTBLOCKS AS REQUIRED PER L.A.W.D. STD. PLAN NO. W-9	56	EA
37	INSTALL D.I.P. 8" x 8" x 4" TEE	1	EA
38	INSTALL 2" WATER SERVICE & METER PER L.A.W.D. STD. PLAN W-2	8	EA
39	CONST. 4" DETECTOR CHECK ASSEMBLY WITH P.I.V. & FIRE DEPT. CONNECTION AS REQUIRED, PER L.A.W.D. STD. PLAN NO. W-10	2	EA
40	INSTALL 8" DIA. D.I.P. 90° ELBOW	3	EA
41	INSTALL 8"X8"X8" D.I.P. TEE	6	EA
42	INSTALL 4" D.W. END CAP	-	EA
43	.		
44	PROTECT AND ADJUST EXISTING VALVE OR VENT TO GRADE AS REQUIRED	.	LS
45	INSTALL 45°, 22.5°, OR 11.5° ELBOW AS SHOWN ON PLANS	11	LF
46	.		
47	CONST. 12" P.V.C. (A.W.W.A. C-900) CLASS 200 ZONE I I DOMESTIC WATER MAIN PER L.A.W.D. STANDARDS.	2,058	LF
48	CONST. 16" P.V.C. (A.W.W.A. C-905) CLASS 235 ZONE I I I DOMESTIC WATER MAIN PER L.A.W.D. STANDARDS.	2,035	LF
49	INSTALL 16" x 16" x 8" D.I.P. TEE	3	EA
50	INSTALL STD. AIR RELEASE ASSEMBLY PER L.A.W.D. STD. PLAN W-7A	3	EA
51	INSTALL 2" BLOWOFF ASSEMBLY PLAN W-7B	2	EA
52	INSTALL 16" BUTTERFLY VALVE PER L.A.W.D. STD. PLAN NO. W-6	6	EA
53	CONST. ABOVE GROUND 8" AMES MODEL 3000 SS DOUBLE DETECTION CHECK ASSEMBLY PER L.A.W.D. STD PLAN NO. W-10	1	EA
54	CONST. 3" WATER SERVICE WITH 2" DOMESTIC WATER METER.	2	EA

RECLAIMED WATER

No.	Description	Qty	Unit
55	REMOVE PLUG & JOIN EX. 12" RECLAIMED WATER WATER TO THE SATISFACTION OF L.A.W.D. INSPECTOR.	1	EA
56	INSTALL 12" P.V.C. (A.W.W.A. C-900) CLASS 200 RECLAIMED WATER LINE PER L.A.W.D. STANDARD	2,092	LF
57	INSTALL 4" P.V.C. RECLAIMED WATER GATE VALVE PER L.A.W.D. STD PLAN NO. W-6	4	EA
58	INSTALL 4" R.W. END CAP	4	EA
59	INSTALL 4" P.V.C. (A.W.W.A. C-900) CLASS 150 RECLAIMED WATER LINE PER L.A.W.D. STANDARD	230	LF
60	INSTALL 12" X 4" D.I.P. CROSS	2	EA
60A	INSTALL 2" IRRIGATION WATER SERVICE & METER PER L.A.W.D. STD. PLAN W-2 R/W METER IS PAID FOR BY DEVELOPMENT AND INSTALLED BY L.A.W.D.	4	EA
60B	INSTALL 12" END CAP	1	EA

CONSTRUCTION NOTES & QUANTITIES

STORM DRAIN:

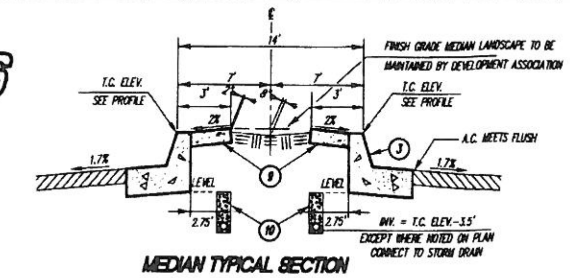
No.	Description	Qty	Unit
70	CONST. 15" R.C.P. STORM DRAIN LINE (D LOAD PER PROFILE)	-	LF
71	CONST. 18" R.C.P. STORM DRAIN LINE (D LOAD PER PROFILE)	378	LF
72	CONST. 24" R.C.P. STORM DRAIN LINE (D LOAD PER PROFILE)	418	LF
73	CONST. 36" R.C.P. STORM DRAIN LINE (D LOAD PER ROFILE)	203	LF
74	CONST. J.S. TYPE 1 PER P.F.R.D. STD. PLAN No. 1310.	4	EA
75	CONST. OUTLET HEADWALL & WINGWALLS PER CALTRANS STD. PLAN D90 AND DETAILS SHEET NO. 13	1	EA
76	CONST. C.B. INLET TYPE 2 PER P.F.R.D. STD. PLAN No. 1302	7	EA
77	CONST. J.S. TYPE 4 PER P.F.R.D. STD PLAN No. 1313	3	EA
78	CONST. 15" P.V.C. SCHED 40 OR APPROVED EQUAL	319	LF
79	INSTALL 6' CHAIN LINK SECURITY FENCE PER A.P.W.A. STD. PLAN NO 600-1	58	LF
80	CONST. REINFORCED CONC. COLLAR PER P.F.R.D. STD. PLAN No. 1317	2	EA
81	CONST. J.S. TYPE 2 PER P.F.R.D. STD. PLAN No. 1311	2	EA
82	CONS. 78" R.C.P. (D LOAD PER PROFILE) W/ SLURRY BEDDING PER DETAIL SHEET 10	575	LF
83	REMOVE EXIST. HEADWALL &/ OUTLET STRUCTURE	1	EA
84	REMOVE INTERFERING PORTION OF EXIST 78" R.C.P. STORM DRAIN.	1	LS
85	CONST. REINFORCED CONC. RETAINING WALL, TYPE 6, PER APWA STD. PLAN PLAN NO. 615-2	22	LF
86	INSTALL BROOKS PRODUCTS BOX INLET OR APPVD. EQUAL (86a = 12" x 12", 86b = 18" X 18", 86c = 24" X 24") - NOT A PART (FUTURE BY OTHERS)	-	EA
87	CONST. 84" R.C.P. (D LOAD PER PROFILE)	106	LF
88	CONST. 18" P.V.C. SCHED 40 OR APPROVED EQUAL	268	EA
89	CONST. 3 FT. THICK RIP RAP PAP CHANNEL W/ 5 FT. DEEP CUT-OFF WALL STONEWORK PER P.F.R.D. STD. PLAN NO. 1809 SEE SHEET 10 FOR DETAIL	54	LF
90	CONST. 30" R.C.P. STORM DRAIN LINE (D LOAD PER PROFILE)	27	LF
91	CONST. J.S. TYPE 3 PER P.F.R.D. STD. PLAN No. 1312	1	EA
92	CONST. C.B. INLET TYPE 1 PER P.F.R.D. STD. PLAN NO. 1301	1	EA
93	CONST. 21" R.C.P. STORM DRAIN LINE (D LOAD PER PROFILE)	74	LF

SEWER :

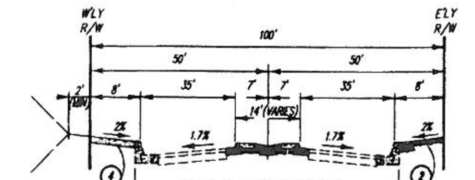
No.	Description	Qty	Unit
61	CONST. 8" V.C.P. SEWER MAIN PER L.A.W.D. STD. PLAN S-5 OR APPROVED EQUAL	3,017	LF
62	.	.	LF
63	CONST. 6" V.C.P. OR APPROVED EQUAL SEWER LATERAL AT 2% SLOPE MIN.	737	LF
64	CONST. 48" SEWER MANHOLE PER L.A.W.D. STD. PLAN S-1	11	EA
65		.	EA
66	REMOVE PLUG AND JOIN EXIST. SEWER TO THE SATISFACTION OF L.A.W.D. INSPECTOR	1	LS
67	CONST. 72" SEWER MANHOLE PER L.A.W.D. STD. PLAN S-1	2	EA
68	INSTALL 8" SEWER END PLUG	4	EA
69	INSTALL 8" SEWER STUB (L = 4.0') AT 2.0%	4	EA

PRIVATE FIRE LINE :

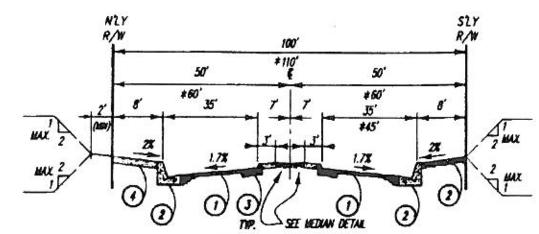
No.	Description	Qty	Unit
A	INSTALL 8" P.V.C. (A.W.W.A. C-900) CLASS 150 DOMESTIC WATER LINE PER L.A.W.D. STANDARDS	191	LF
B	INSTALL 6" P.V.C. (A.W.W.A. C-900) CLASS 150 DOMESTIC WATER LINE PER L.A.W.D. STANDARDS	191	LF
C	INSTALL THRUSTBLOCKS AS REQUIRED PER L.A.W.D. STD. PLAN NO. W-9	3	EA
D	INSTALL 6" DIA. D.I.P. 90° ELBOW	3	EA
E	CONST. 4 WAY F.D.C. & CHECK VALVE.	1	EA



MEDIAN TYPICAL SECTION
N.T.S.
EXCEPT WHERE FULL-WIDTH MEDIAN HARDSCAPE IS NOTED ON PLAN



LAKE FOREST DRIVE
N.T.S.



RANCHO PARKWAY
N.T.S.

FROM STA. 54+05 TO STA. 67+65.00
* FROM STA. 47+38.51 TO STA. 49+95
NOTE: TRANSITIONS BETWEEN ST. 49+95 TO 54+05

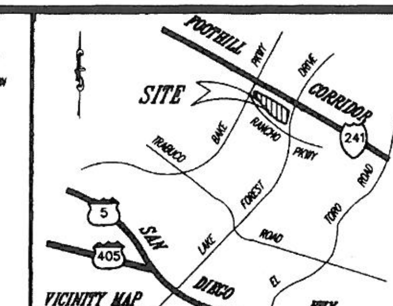
IMPORTANT NOTES

1. PLEASE NOTIFY THE TRABUCO CANYON WATER DISTRICT AT LEAST 48 HOURS IN ADVANCE OF ANY CONSTRUCTION ACTIVITY. CONTACT BRIAN LEE, DISTRICT ENGINEER, AT (949) 858-0277
2. CAUTION ! THE TRABUCO CANYON WATER DISTRICT WATER LINE IS A HIGH PRESSURE SYSTEM. WATER PRESSURE IN THE PIPELINE MAY EXCEED 250 PSI. EXERCISE DUE CARE DURING CONSTRUCTION NEAR THIS FACILITY.

DECLARATION OF RESPONSIBLE CHARGE

I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PLANS AND SPECIFICATIONS BY THE CITY OF LAKE FOREST IS CONFINED TO REVIEW ONLY, AND DOES NOT RELIEVE ME AS ENGINEER OF WORK OF MY RESPONSIBILITIES FOR THE PROJECT.



VICINITY MAP
N.T.S.

HOLD HARMLESS & INDEMNIFICATION CLAUSE

THE CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY, AND HOLD THE CITY OF LAKE FOREST, THE OWNER, AND THE PRIVATE ENGINEERS HARMLESS FROM ANY LIABILITY; REAL OR ALLEGED, IN CONNECTION WITH PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR CONSULTING ENGINEER OR THE CITY OF LAKE FOREST.

EXISTING UNDERGROUND STRUCTURES

ALL UNDERGROUND UTILITIES OR STRUCTURES REPORTED BY THE OWNER OR OTHERS, AND THOSE SHOWN ON THE RECORDS EXAMINED, ARE INDICATED WITH THEIR APPROXIMATE LOCATION AND EXTENT. THE CONTRACTOR, BY ACCEPTING THESE PLANS OR PROCEEDING WITH IMPROVEMENTS PURSUANT THERETO, AGREES TO ASSUME LIABILITY AND TO HOLD UNDERSIGNED HARMLESS FOR ANY DAMAGES RESULTING FROM THE EXISTING OF UNDERGROUND UTILITIES OR STRUCTURES NOT REPORTED TO THE UNDERSIGNED, NOT INDICATED ON THE PUBLIC RECORDS EXAMINED. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT UTILITIES AS IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE OWNERS OF THE UTILITIES OR STRUCTURES CONCERNED BEFORE STARTING WORK.

NOTICE TO CONTRACTOR

1. CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND SHALL REPORT ALL DISCREPANCIES TO THE ENGINEER PRIOR TO THE COMMENCEMENT OF WORK. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ALL WORK IF PRIOR NOTICE IS NOT GIVEN FOR DISCREPANCIES.
2. CONTRACTOR SHALL VERIFY HORIZONTAL AND VERTICAL ALIGNMENT OF EXISTING UTILITIES PRIOR TO COMMENCING ANY CONSTRUCTION.
3. ANY AND ALL QUANTITIES SHOWN ON THESE PLANS ARE NOT WARANTEED AND THE CONTRACTOR SHALL PERFORM AND BID ACCORDING TO HIS OWN ESTIMATE OF QUANTITIES.
4. THE CONTRACTOR IS RESPONSIBLE FOR ALL GRADING INCLUDING BUT NOT LIMITED TO ALL IMPORT AND/OR EXPORT AND CONSTRUCTING ALL GRADES PER THE CONSTRUCTION DOCUMENTS. NO CHANGE ORDERS SHALL BE CONSIDERED CONSIDERED CONCERNING ANY IMPORT OR EXPORT OF MATERIAL.

CONTRACTOR SHALL ENSURE THE FOLLOWING :

A. ALL CONSTRUCTION VEHICLES OR EQUIPMENT, FIXED OR MOBILE, OPERATED WITHIN 1000 FEET OF A DWELLING SHALL BE EQUIPPED WITH PROPERLY OPERATING AND MAINTAINED MUFFLERS.

B. ALL OPERATIONS SHALL COMPLY WITH ORANGE COUNTY CODIFIED ORDINANCE DIVISION 6 (NOISE CONTROL).

C. STOCKPILING AND/OR VEHICLE STAGING AREAS SHALL BE LOCATED AS FAR AS PRACTICABLE FROM DWELLINGS.

SD-1007

BASIS OF BEARINGS:

THE CENTERLINE OF LAKE FOREST DRIVE BEING NORTH 14°29'27" EAST AS SHOWN ON TRACT MAP NO. 13932 IN BOOK 657 PAGES 27 THROUGH 32, INCLUSIVE OF MISCELLANEOUS MAPS IN THE OFFICE OF THE COUNTY RECORDER OF ORANGE COUNTY, STATE OF CALIFORNIA.

LEGAL DESCRIPTION

ALL THE CERTAIN LAND SITUATED IN THE STATE OF CALIFORNIA, COUNTY OF ORANGE, CITY OF LAKE FOREST, DESCRIBED AS FOLLOWS:

PARCEL 1:

PARCEL 2 AS SHOWN ON THE MAP ATTACHED TO THE CERTIFICATE OF COMPLIANCE CC 97-003 RECORDED AUGUST 26, 1997 AS INSTRUMENT NO. 19970415117 OF OFFICIAL RECORDS OF ORANGE COUNTY, CALIFORNIA.

PARCEL 2:

LOT 22 OF TRACT NO. 13932, AS SHOWN ON A MAP FILED IN BOOK 657, PAGES 26 THROUGH 32 INCLUSIVE OF MISCELLANEOUS MAPS, RECORDS OF ORANGE COUNTY, CALIFORNIA.

PARCEL 3:

LOT C OF TRACT NO. 13932, AS SHOWN ON A MAP FILED IN BOOK 657, PAGES 26 THROUGH 32 INCLUSIVE, OF MISCELLANEOUS MAPS, RECORDS OF ORANGE COUNTY, CALIFORNIA.

REGISTERED PROFESSIONAL ENGINEER
CARLOS A. ALBA
NO. 54843
Exp. 6-30-00
CIVIL
STATE OF CALIFORNIA

IMPORTANT NOTICE

SECTION 4212/4217 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A PERMIT TO EXCAVATE WILL BE VALID. FOR YOUR DIG ALERT ID NUMBER CALL UNDERGROUND SERVICE ALERT TOLL FREE 1-800-422-4133 TWO WORKING DAYS BEFORE YOU DIG

APPROVED FOR STORM DRAIN IMPROVEMENTS ONLY:
9-04-99
ROBERT L. WOODINGS, P.E. DATE
PUBLIC WORKS DIRECTOR / CITY ENGINEER

LOS ALISOS WATER DISTRICT
UTILITY APPROVALS
LAND PROJECT # 98011

FOR SEWER IMPROVEMENTS : LOS ALISOS WATER DISTRICT : DATE	FOR SEWER SYSTEM OPERATIONS : LOS ALISOS WATER DISTRICT : DATE
FOR WATER IMPROVEMENTS : LOS ALISOS WATER DISTRICT : DATE	FOR WATER SYSTEM OPERATIONS : LOS ALISOS WATER DISTRICT : DATE
FOR RECLAIMED WATER IMPROVEMENTS : LOS ALISOS WATER DISTRICT : DATE	FOR RECLAIMED WATER SYSTEM OPERATIONS : LOS ALISOS WATER DISTRICT : DATE

FOR FIRE PROTECTION :
ORANGE COUNTY FIRE AUTHORITY: (FIRE HYDRANT & ACCESS ONLY)
DATE

BENCHMARK :
DESCRIBED BY ORANGE COUNTY SURVEY 1890 AT THE NORTHEAST PORTION OF THE INTERSECTION OF LAKE FOREST DRIVE, AND VISTA TERRACE, 47 FT. EASTERLY OF THE CENTERLINE OF LAKE FOREST DRIVE, 50 FT. NORTHERLY OF THE CENTERLINE OF VISTA TERRACE, 17 FT. NORTHERLY OF A STREET STANDARD, SET AT A 11 FT. BY 4 FT. CATCH BASIN, 4.5 FT. BEHIND CURB FACE. OCS B.M. # 3J-20-80 NAVD88/1985 OCS ADJ.: 731.926

OWNER/ DEVELOPER:
STEADFAST PROPERTIES
2424 S.E. BRISTOL, #350
NEWPORT BEACH, CA 92660
TEL : (949) 852-0700 FAX : (949) 852-0143

PREPARED UNDER THE SUPERVISION OF :
MR. CARLOS A. ALBA, R.C.E 54843, EXP 6-30-00

A.C.E. CIVIL ENGINEERING, INC.
3187-C AIRWAY AVENUE
COSTA MESA, CALIFORNIA 92626
TEL : (714) 641-3300 FAX : (714) 545 - 5623

NO.	DATE	BY	DESCRIPTION	APPV
1	10-12-99	C.A.A.	REVISED SHEET 10 STORM DRAIN PLAN	

REVISIONS

APPROVED FOR CONSTRUCTION IN PUBLIC RIGHT-OF-WAY ONLY
DATE
ROBERT L. WOODINGS, P.E.
PUBLIC WORKS DIRECTOR / CITY ENGINEER

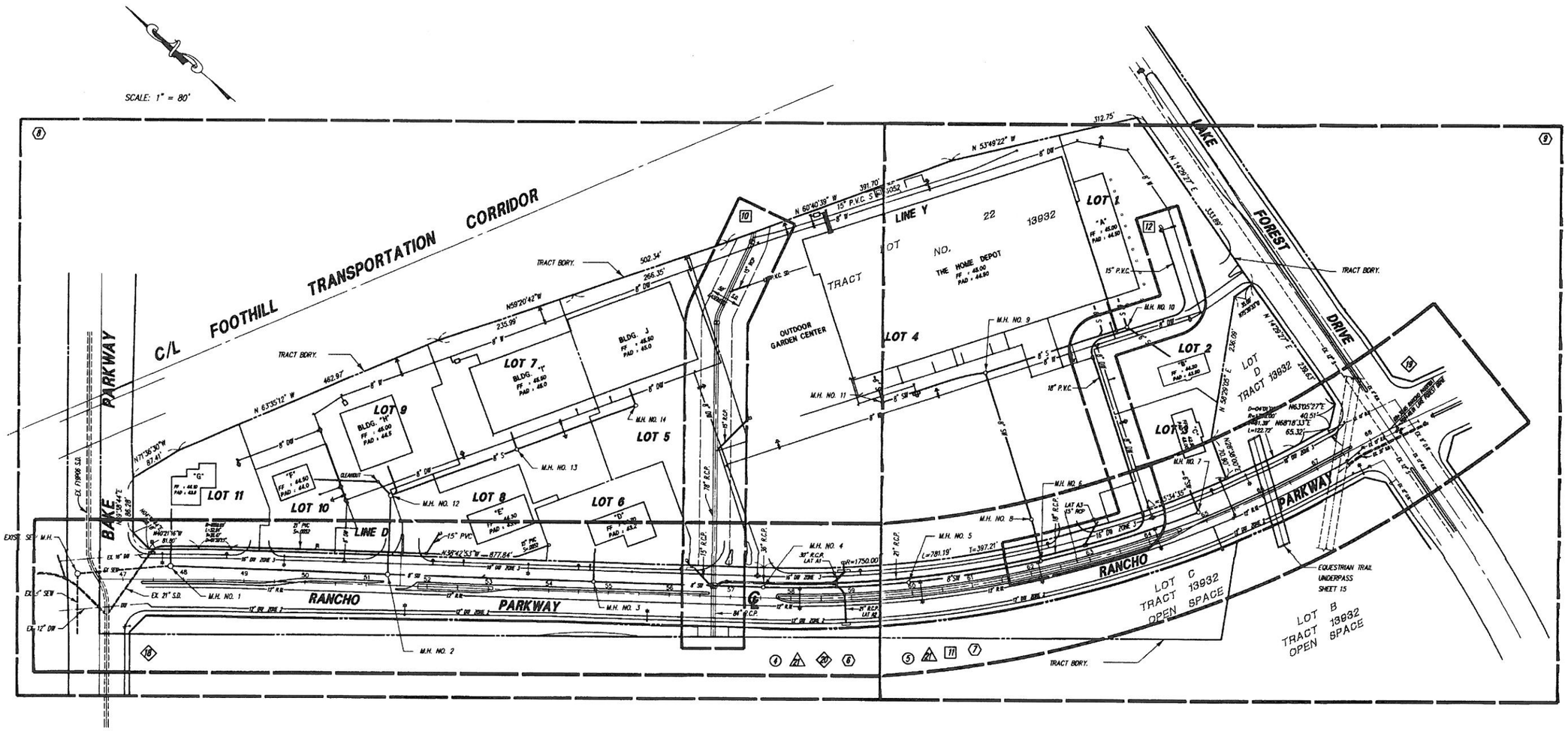
IMPROVEMENT PLANS
LAKE FOREST CORRIDOR CENTER, P.M. 98-103
SDP 98-01
20021 LAKE FOREST DRIVE
LAKE FOREST, CA. 92630

CITY OF LAKE FOREST
PUBLIC WORKS DEPARTMENT
SD-1007
SHEET 1 OF 7

09730/ 2108/ 1140
98-0118 \ SP1.DWG

SD-1007 F19P07
Bake and Rancho

SCALE: 1" = 80'



SHEET INDEX

SHT.	DESCRIPTION
1.	VICINITY MAP, BENCHMARK, BASIS OF BEARINGS, NOTICE TO CONTRACTOR AND SIGNATURE BLOCKS.
2.	INDEX MAP, SHEET LEGEND AND NOTES.
3.	GENERAL AND UTILITY NOTES.
4.	RANCHO PARKWAY STREET IMPROVEMENT PLANS; PLAN AND PROFILE: FROM STA. 46+61.51 TO STA. 59+50.
5.	RANCHO PARKWAY STREET IMPROVEMENT PLANS; PLAN AND PROFILE: FROM STA. 59+50 TO STA. 68+36.05.
6.	RANCHO PARKWAY WATER AND SEWER; PLAN AND PROFILE FROM STA. 46+61.51 TO STA. 59+00.
7.	RANCHO PARKWAY WATER AND SEWER; PLAN AND PROFILE FROM STA. 59+00 TO STA. 68+00.
8.	WATER AND SEWER IMPROVEMENT PLANS ON SITE, PARCEL MAP NO. 99-103.
9.	WATER AND SEWER IMPROVEMENT PLANS ON SITE, PARCEL MAP NO. 99-103.
10.	F19-P07 STORM DRAIN IMPROVEMENT PLAN FOR PARCEL MAP NO. 99-103.
11.	LINE "A" STORM DRAIN IMPROVEMENT PLAN FOR PARCEL MAP NO. 99-103.
12.	LINE "A" STORM DRAIN IMPROVEMENT PLAN FOR PARCEL MAP NO. 99-103.
13.	MASONRY RETAINING WALL
14.	DETAILS EQUESTRIAN UNDERCROSSING.
15.	SPECIFICATIONS OF EQUESTRIAN UNDERCROSSING.
16.	STRIPING DETAILS.
17.	TRAFFIC SIGNAL @ RANCHO PKWY & BAKE.
18.	TRAFFIC SIGNAL PLANS @ LAKE FOREST & RANCHO PKWY.
19.	TRAFFIC SIGNAL PLANS @ RANCHO PKWY & MALL ENTRANCE DRWY.
20.	TRAFFIC STRIPING PLANS FOR RANCHO PARKWAY.
21.	TRAFFIC SIGNAL INTERCONNECT PLAN

STREET LEGEND
- STREET LIGHTING
- STREET CENTERLINE
- TRACT BOUNDARY

SHEET NO. LEGEND
- STREET PLAN
- SEWER AND WATER PLAN
- SIGNING AND STRIPING
- STORM DRAIN
- CONDUIT PLANS
- TRAFFIC SIGNAL PLANS

SEWER LEGEND
- SW — PROPOSED SEWER MAIN
- SW — EXISTING SEWER MAIN
- PROPOSED MANHOLE
- EXISTING MANHOLE
- SEWER LATERAL

STORM DRAIN LEGEND
- PROPOSED STORM DRAIN
- PROPOSED CATCH BASIN
- EXISTING STORM DRAIN

WATER LEGEND
- DW — PROPOSED DOMESTIC WATER MAIN (ZONE II OR III PER PLAN)
- DW — EXISTING DOMESTIC WATER PLAN (ZONE II OR III PER PLAN)
- RW — PROPOSED RECLAIMED WATER MAIN
- RW — RECLAIMED WATER MAIN (EXIST)
- WATER VALVE
- FIRE HYDRANT
- AIR RELEASE
- BLOWOFF
- REDUCER
- END PLUG
- WATER SERVICE LATERAL
- EXISTING WATER VALVE
- THRUST BLOCK

GRAPHIC SCALE
80 0 40 80 160
(IN FEET)
1 inch = 80 ft.

REGISTERED PROFESSIONAL ENGINEER — CARLOS A. ALBA — NO. 54843 Exp. 6-30-00 — CIVIL — STATE OF CALIFORNIA

OWNER/ DEVELOPER:
STEADFAST PROPERTIES
2424 S.E. BRISTOL, #250
NEWPORT BEACH, CA 92660
TEL : (949) 852-0700 FAX : (949) 852-0143

PREPARED UNDER THE SUPERVISION OF :
MR. CARLOS A. ALBA, R.C.E. 54843 , EXP. 6-30-00

A.C.E. CIVIL ENGINEERING, INC.
3187-C AIRWAY AVENUE
COSTA MESA, CALIFORNIA 92626
TEL : (714) 641-3300 FAX : (714) 545 - 5823

DATE	BY	DESCRIPTION	APPV

REVISIONS

SD-1007

INDEX MAP, SHEET LEGEND & NOTES
LAKE FOREST CORRIDOR CENTER, P.M. 99-103
SDP 99-01
20021 LAKE FOREST DRIVE
LAKE FOREST, CA. 92630

CITY OF LAKE FOREST
PUBLIC WORKS DEPARTMENT

SD-1007
SHEET 2 OF 7

09730/ 2108/ 1140 J.N. 98-010, SDP2-INDEX-MAP.DWG

COPYRIGHT 1999 — A.C.E. CIVIL ENGINEERING, INC. — ALL RIGHTS RESERVED

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE GRADING CODE OF THE LOCAL JURISDICTION AND ANY SPECIAL REQUIREMENTS OF THE PERMIT. A COPY OF THE GRADING CODE SHALL BE RETAINED ON THE JOB SITE WHILE WORK IS IN PROGRESS. WHEN REFERENCED ON THE PLANS, A COPY OF E.M.A. OR LOCAL JURISDICTION SHALL ALSO BE RETAINED ON THE SITE.
2. GRADING SHALL NOT BE STARTED WITHOUT FIRST NOTIFYING THE GRADING INSPECTOR. A PRE-GRADING MEETING ON THE SITE IS REQUIRED BEFORE START OF GRADING WITH THE FOLLOWING PEOPLE PRESENT: OWNER, GRADING CONTRACTOR, DESIGN CIVIL ENGINEER, SOIL ENGINEER, GEOLOGIST, GRADING INSPECTOR AND WHEN REQUIRED THE ARCHAEOLOGIST AND PALEONTOLOGIST. THE REQUIRED INSPECTIONS FOR GRADING WILL BE EXPLAINED AT THIS MEETING.
3. AN APPROVED COPY OF THE GRADING PLAN SHALL BE ON THE PERMITTED SITE WHILE WORK IS IN PROGRESS.
4. CUT AND FILL SLOPES SHALL BE NO STEEPER THAN 2 FOOT HORIZONTAL TO 1 FOOT VERTICAL (2:1) EXCEPT WHERE SPECIFICALLY APPROVED OTHERWISE.
5. FILLS SHALL BE COMPACTED THROUGHOUT TO A MINIMUM OF 90 PERCENT RELATIVE DENSITY. AGGREGATE BASE OF ASPHALTIC AREAS SHALL BE COMPACTED TO A MINIMUM OF 95 PERCENT RELATIVE DENSITY. MAXIMUM DENSITY SHALL BE DETERMINED BY UNIFORM BUILDING CODE STANDARD NO. 70-2 OR APPROVED EQUIVALENT.
6. AREAS TO RECEIVE FILL SHALL BE PROPERLY PREPARED AND APPROVED IN WRITING BY THE SOIL ENGINEER AND THE BUILDING OFFICIAL PRIOR TO PLACING FILL.
7. FILLS SHALL BE BENCHED INTO COMPETENT MATERIAL PER LOCAL JURISDICTION OR EMA STANDARD PLAN NO. 1322.
8. ALL EXISTING FILLS SHALL BE APPROVED BY THE BUILDING OFFICIAL OR REMOVED PRIOR TO PLACING ADDITIONAL FILLS.
9. ANY EXISTING IRRIGATION LINES AND CISTERNS SHALL BE REMOVED, OR CRUSHED IN PLACE, AND APPROVED BY THE BUILDING OFFICIAL AND SOIL ENGINEER.
10. STOCK PILING OF EXCESS MATERIAL SHALL BE APPROVED BY THE BUILDING OFFICIAL PRIOR TO EXCAVATION.
11. THE DESIGN ENGINEER, AS A CONDITION OF ROUGH GRADE APPROVAL, SHALL PROVIDE A BLUE TOP WITH ACCOMPANYING WITNESS STAKE, SET AT THE CENTER OF EACH PAD REFLECTING THE PAD ELEVATION FOR PRECISE PERMITS AND A BLUE TOP WITH WITNESS STAKE SET AT THE DRAINAGE SWALE HIGH POINT REFLECTING THE HIGH POINT ELEVATION FOR PRELIMINARY PERMITS.
12. ALL TRENCH BACKFILLS SHALL BE TESTED AND APPROVED BY THE SOIL ENGINEER PER THE GRADING CODE.
13. THE ENGINEERING GEOLOGIST AND SOIL ENGINEER SHALL, AFTER CLEARING AND PRIOR TO THE PLACEMENT OF FILL IN CANYONS, INSPECT EACH CANYON FOR AREAS OF ADVERSE STABILITY AND TO DETERMINE THE PRESENCE OR ABSENCE OF SUBSURFACE WATER OR SPRING FLOW. IF NEEDED, SUBDRAINS WILL BE DESIGNED AND CONSTRUCTED PRIOR TO THE PLACEMENT OF FILL IN EACH RESPECTIVE CANYON.
14. SUBDRAIN OUTLETS SHALL BE COMPLETED AT THE BEGINNING OF THE SUBDRAIN CONSTRUCTION.
15. THE EXACT LOCATION OF THE SUBDRAINS SHALL BE SURVEYED IN THE FIELD FOR LINE/GRADE AND REFLECTED ON AS-GRADED PLANS.
16. ALL CUT SLOPES SHALL BE INVESTIGATED BOTH DURING AND AFTER GRADING BY THE ENGINEERING GEOLOGIST TO DETERMINE IF ANY SLOPE STABILITY PROBLEM EXISTS. SHOULD EXCAVATION DISCLOSE ANY GEOLOGICAL HAZARDS OR POTENTIAL GEOLOGICAL HAZARDS, THE ENGINEERING GEOLOGIST SHALL SUBMIT RECOMMENDED TREATMENT TO THE BUILDING OFFICIAL FOR APPROVAL.
17. WHERE SUPPORT OR BUTTRESSING OF CUT AND NATURAL SLOPES IS DETERMINED TO BE NECESSARY BY THE ENGINEERING GEOLOGIST AND SOIL ENGINEER, THE SOIL ENGINEER SHALL SUBMIT DESIGN, LOCATIONS AND CALCULATIONS TO THE BUILDING OFFICIAL PRIOR TO CONSTRUCTION. THE ENGINEERING GEOLOGIST AND SOIL ENGINEER SHALL INSPECT AND CONTROL THE CONSTRUCTION OF THE BUTTRESSING AND CERTIFY TO THE STABILITY OF THE SLOPE AND ADJACENT STRUCTURES UPON COMPLETION.
18. WHEN CUT PADS ARE BROUGHT TO NEAR GRADE, THE ENGINEERING GEOLOGIST SHALL DETERMINE IF THE BEDROCK IS EXTENSIVELY FRACTURED OR FAULTED AND WILL READILY TRANSMIT WATER. IF CONSIDERED NECESSARY BY THE ENGINEERING GEOLOGIST AND SOIL ENGINEER, A COMPACTED FILL BLANKET WILL BE PLACED.
19. THE ENGINEERING GEOLOGIST SHALL PERFORM PERIODIC INSPECTIONS AND SUBMIT A COMPLETE REPORT AND MAP UPON COMPLETION OF THE ROUGH GRADING.
20. THE COMPACTION REPORT AND APPROVAL FROM THE SOIL ENGINEER SHALL INDICATE THE TYPE OF FIELD TESTING PERFORMED. EACH TESTS SHALL BE IDENTIFIED WITH THE METHOD OF OBTAINING THE IN-PLACE DENSITY, WHETHER SAND CONE OR DRIVE RING AND SHALL BE SO NOTED FOR EACH TEST. SUFFICIENT MAXIMUM DENSITY DETERMINATIONS SHALL BE PERFORMED TO VERIFY THE ACCURACY OF THE MAXIMUM DENSITY CURVES USED BY THE FIELD TECHNICIAN.
21. THE SOIL ENGINEER AND ENGINEERING GEOLOGIST SHALL PERFORM SUFFICIENT INSPECTIONS AND BE AVAILABLE DURING GRADING AND CONSTRUCTION TO VERIFY COMPLIANCE WITH THE PLANS, SPECIFICATIONS, AND THE CODE WITHIN THEIR PURVIEW.
22. THE CIVIL ENGINEER SHALL BE AVAILABLE DURING GRADING TO VERIFY COMPLIANCE WITH THE PLANS, SPECIFICATIONS, CODE AND ANY SPECIAL CONDITIONS OF THE PERMIT WITHIN THEIR PURVIEW.
23. THE PERMITTEE IS RESPONSIBLE FOR DUST CONTROL MEASURES.
24. SANITARY FACILITIES SHALL BE MAINTAINED ON THE SITE.
25. THE LOCATION AND PROTECTION OF ALL UTILITIES IS THE RESPONSIBILITY OF THE PERMITTEE.
26. APPROVED PROTECTIVE MEASURES AND TEMPORARY DRAINAGE PROVISIONS SHALL BE USED TO PROTECT ADJOINING PROPERTIES DURING GRADING.
27. ANY EXISTING WATER WELLS SHALL BE ABANDONED IN COMPLIANCE WITH THE SPECIFICATIONS APPROVED BY THE BUILDING OFFICIAL.
28. ANY EXISTING OIL WELLS SHALL BE ABANDONED IN COMPLIANCE WITH THE SPECIFICATIONS APPROVED BY THE BUILDING OFFICIAL.
29. ANY EXISTING CESSPOOLS AND SEPTIC TANKS SHALL BE ABANDONED IN COMPLIANCE WITH THE UNIFORM PLUMBING CODE TO THE APPROVAL OF THE BUILDING OFFICIAL.
30. PRIOR TO FINAL APPROVAL, THE CIVIL ENGINEER SHALL CERTIFY TO THE BUILDING OFFICIAL THE AMOUNT OF EARTH MOVED DURING MOVED DURING THE GRADING OPERATION.
31. THE PERMITTEE SHALL COMPLY WITH THE GRADING CODE REQUIREMENTS WHEN AN EXCESS OF 5,000 CUBIC YARDS OF EARTH IS TRANSPORTED TO OR FROM A PERMITTED SITE ON PUBLIC ROADWAYS.
32. ASPHALT CONCRETE SHALL BE CONSTRUCTED PER THE REQUIREMENTS OF THE LOCAL JURISDICTION STANDARD OR EMA STANDARD PLAN 1805.
33. AGGREGATE BASE SECTION SHALL BE CONSTRUCTED PER LOCAL JURISDICTION STANDARD OR EMA STANDARD PLAN 1804.
34. ALL CONCRETE STRUCTURES THAT COME IN CONTACT WITH THE ON-SITE SOILS SHALL BE CONSTRUCTED WITH TYPE V CEMENT, UNLESS DEEMED UNNECESSARY BY SOLUABLE SULPHATE-CONTENT TESTS CONDUCTED BY THE SOIL ENGINEER.
35. EXPORT SOIL MUST BE TRANSPORTED TO A LEGAL DUMP OR TO A PERMITTED SITE APPROVED BY THE DISTRICT GRADING INSPECTOR.
36. SLOPES EXCEEDING 5 FEET IN HEIGHT SHALL BE PLANTED WITH AN APPROVED PLAN MATERIAL. IN ADDITION, SLOPES EXCEEDING 15' IN HEIGHT SHALL BE PROVIDED WITH AN APPROVED IRRIGATION SYSTEM, UNLESS OTHERWISE APPROVED BY THE BUILDING OFFICIAL.
37. THE ENGINEER SHALL SUBMIT A LETTER OF CERTIFICATION TO THE BUILDING OFFICIAL STATING THAT THE GRADING WAS DONE IN COMPLIANCE WITH THE APPROVED GRADING PLAN.
38. ASPHALT SECTIONS MUST BE PER CODE: PARKING STALLS = 3" A/C OVER 6" A/B, DRIVES 3" A/C OVER 10" (COMMERCIAL) 12" (INDUSTRIAL) OR: PRIOR TO ROUGH GRADE RELEASE FOR BUILDING PERMITS BY THE GRADING INSPECTOR, THE SOIL ENGINEER SHALL SUBMIT FOR APPROVAL PAVEMENT SECTION RECOMMENDATIONS BASED ON "R" VALUE ANALYSIS OF THE SUBGRADE SOILS, AND EXPECTED TRAFFIC INDICES.
39. PRELIMINARY SOIL AND GEOLOGY REPORTS AND ALL SUBSEQUENT REPORTS AS APPROVED BY THE LOCAL JURISDICTION ARE CONSIDERED A PART OF THE APPROVED GRADING PLAN.
40. ALL EXISTING DRAINAGE COURSES THROUGH THIS SITE SHALL REMAIN OPEN UNTIL FACILITIES TO HANDLE STORM WATER ARE APPROVED AND FUNCTIONAL; HOWEVER, IN ANY CASE, THE PERMITTEE SHALL BE HELD LIABLE FOR ANY DAMAGE DUE TO OBSTRUCTING NATURAL DRAINAGE PATTERNS.
41. GRADING OPERATIONS INCLUDING MAINTENANCE OF EQUIPMENT SHALL BE ACCOMPLISHED WITH THE CONFINES OF THE NOISE ORDINANCE AND POLICIES OF THE LOCA JURISDICTION.
42. ROOF GUTTERS SHALL BE INSTALLED TO PREVENT ROOF DRAINAGE FROM FALLING ON MANUFACTURED SLOPES.
43. THE PERMITTEE SHALL BE GIVEN REASONABLE NOTICE TO THE OWNER OF ADJOINING LANDS AND BUILDINGS PRIOR TO BEGINNING EXCAVATIONS WHICH MAY AFFECT THE LATERAL AND SUBJACENT SUPPORT OF THE ADJOINING PROPERTY. THE NOTICE SHALL STATE THE INTENDED DEPTH OF EXCAVATION AND WHEN THE EXCAVATION WILL COMMENCE. THE ADJOINING OWNER SHALL BE ALLOWED AT LEAST 30 DAYS AND REASONABLE ACCESS ON THE PERMITTED PROPERTY TO PROTECT HIS STRUCTURE, IF HE SO DESIRES, UNLESS OTHERWISE PROTECTED BY LAW.

EROSION CONTROL NOTES

44. IN CASE OF EMERGENCY CALL : PATRICK COX
(WORK) (949) 852-0700
(CELLULAR PHONE) (949) 632-2772
45. EQUIPMENT AND WORKERS FOR EMERGENCY WORK SHALL BE MADE AVAILABLE ATALL TIMES DURING THE RAINY SEASON. NECESSARY MATERIALS SHALL BE AVAILABLE ON-SITE AND STOCKPILED AT CONVENIENT LOCATIONS TO FACILITATE RAPID CONSTRUCTION OF TEMPORARY DEVICES WHEN RAIN IS IMMINENT.
46. EROSION CONTROL DEVICES SHALL NOT BE MOVED OR MODIFIED WITHOUT THE APPROVAL OF THE BUILDING OFFICIAL.
47. ALL REMOVABLE EROSION PROTECTION DEVICES SHALL BE IN PLACE AT THE END OF EACH WORKING DAY WHEN A 5-DAY RAIN PROBABILITY FORECAST EXCEEDS 40 PERCENT.
48. AFTER A RAINSTORM ALL SILT AND DEBRIS SHALL BE REMOVED FROM STREETS, CHECK BERMS, AND BASINS.
49. GRADED AREAS ON THE PERMITTED AREA PERIMETER MUST DRAIN AWAY FROM THE FACE OF SLOPES AT THE CONCLUSION OF EACH WORKING DAY. DRAINAGE TO BE DIRECTED TOWARD DESILTING FACILITIES.
50. THE PERMITTEE AND CONTRACTOR SHALL BE RESPONSIBLE AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT PUBLIC TRESPASS INTO AREAS WHERE IMPOUNDED WATER CREATES A HAZARDOUS CONDITION.
51. THE UNDERSIGNED CIVIL ENGINEER SHALL INSPECT THE EROSION CONTROL WORK AND ENSURE THAT THE WORK IS IN ACCORDANCE WITH THE APPROVED PLANS.

SIGNATURE ________ DATE 9/22/99

UNDERGROUND STORAGE TANK REMOVAL

52. IN THE EVENT THAT SOIL CONTAMINATION IS DISCOVERED DURING EXCAVATION AND REMOVAL OF AN EXISTING TANK, WORK SHALL BE STOPPED UNTIL A SITE ASSESSMENT AND MITIGATION PLAN HAS BEEN PREPARED, SUBMITTED AND APPROVED BY A COUNTY HEALTH OFFICER AND THE LOCAL JURISDICTION.
53. ISSUANCE OF A GRADING PERMIT DOES NOT ELIMINATE THE NEED FOR PERMITS FROM OTHER AGENCIES WITH REGULATORY RESPONSIBILITIES FOR CONSTRUCTION ACTIVITIES ASSOCIATED WITH THE WORK AUTHORIZED ON THIS PLAN.

ENVIRONMENTAL NOTES:

54. THE PERMITTEE SHALL NOTIFY ALL GENERAL CONTRACTORS, SUBCONTRACTORS, MATERIAL SUPPLIERS, LESSEES, AND PROPERTY OWNERS THAT DUMPING OF CHEMICALS INTO THE STORM DRAIN SYSTEM OR THE WATERSHED IS PROHIBITED.
55. PERMITTEE SHALL MAINTAIN CONSTRUCTION SITE IN SUCH A CONDITION THAT AN ANTICIPATED STORM DOES NOT CARRY WASTES OR POLLUTANTS OFF THE SITE. POTENTIAL POLLUTANTS INCLUDE BUT ARE NOT LIMITED TO: SOLID OR LIQUID CHEMICAL SPILLS; WASTES FROM PAINTS, STAINS, SEALANTS, GLUES, LIMES, PESTICIDES, HERBICIDES, WOOD PRESERVATIVES AND SOLVENTS; ASBESTOS FIBERS, PAINT FLAKES OR STUCCO FRAGMENTS; FUELS, OILS, LUBRICANTS, AND HYDRAULIC, RADIATOR OR BATTERY FLUIDS; FERTILIZERS, VEHICLE/EQUIPMENT WASH WATER AND CONCRETE WASH WATER; CONCRETE, DETERGENT OR FLOATABLE WASTES; WASTES FROM ANY ENGINE/ EQUIPMENT STEAM CLEANING OR CHEMICAL DEGREASING; AND SUPERCHLORINATED POTABLE WATER LINE FLUSHINGS."
DURING CONSTRUCTION, PERMITTEE SHALL DISPOSE OF SUCH MATERIALS IN A SPECIFIED AND CONTROLLED TEMPORARY AREA ON-SITE, PHYSICALLY SEPARATED FROM POTENTIAL STORMWATER RUNOFF, WITH ULTIMATE DISPOSAL IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REQUIREMENTS.
56. PERMITTEE MAY DISCHARGE MATERIAL OTHER THAN STORMWATER ONLY WHEN NECESSARY FOR PERFORMANCE AND COMPLETION OF CONSTRUCTION PRACTICES AND WHERE THEY DO NOT: CAUSE OR CONTRIBUTE TO A VIOLATION OF ANY WATER QUALITY STANDARD; CAUSE OR THREATEN TO CAUSE POLLUTION, CONTAMINATION, OR NUISANCE; OR CONTAIN A HAZARDOUS SUBSTANCE IN A QUANTITY REPORTABLE UNDER FEDERAL REGULATIONS 40 CFR PARTS 117 AND 302.
57. DEWATERING OF CONTAMINATED GROUNDWATER, OR DISCHARGING CONTAMINATED SOILS VIA SURFACE EROSION IS PROHIBITED. DEWATERING OF NON-CONTAMINATED GROUNDWATER REQUIRES A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT FROM THE RESPECTIVE STATE REGIONAL WATER QUALITY CONTROL BOARD.
58. "SURVEY MONUMENTS SHALL BE PRESERVED AND REFERENCED BEFORE CONSTRUCTION AND REPLACED AFTER CONSTRUCTION PURSUANT TO SECTION 8771 OF THE BUSINESS AND PROFESSIONS CODE."

STORM DRAIN NOTES

1. ALL CONCRETE IN REINFORCED CONCRETE STRUCTURES MUST BE 3250 PSI IN 28 DAYS. TYPE V PORTLAND CEMENT CONCRETE. CLASS A.
2. ALL PIPE LENGTHS SHALL BE HORIZONTAL PROJECTIONS, UNLESS OTHERWISE SHOWN.
3. SHORING SHALL BE PROVIDED FOR TRENCH EXCAVATIONS IN NATIVE SOIL, TO SATISFY STATE OF CALIFORNIA SAFETY REQUIREMENTS.
4. ALL PIPE CONSTRUCTION WITHIN THE FILL AREA MUST BE COORDINATED WITH THE GRADING WORK, TO ENSURE THAT WHEN THE FILL OPERATION HAS BEEN COMPLETED, AT GRADE, A MINIMUM OF ONE FOOT ABOVE THE TOP OF PIPE OR TO A MAXIMUM OF FIVE FEET ABOVE THE TOP OF PIPE OR TO A MAXIMUM OF FIVE FEET ABOVE THE PROPOSED SUBGRADE OF THE PIPE, THE STORM DRAIN TRENCH SHALL BE EXCAVATED AND THE PIPE INSTALLED.
5. ALL WORK SHALL CONFORM TO THE ORANGE COUNTY PUBLIC FACILITIES & RESOURCES DEPARTMENT'S (PF&RD) STANDARD SPECIFICATIONS. THESE SPECIFICATIONS, WHICH CAN BE PURCHASED FROM THE COUNTY, SHALL BE KEPT ON THE JOB SITE AT ALL TIMES.
6. THE CONTRACTOR MUST NOTIFY THE CITY OF LAKE FOREST'S PUBLIC WORKS OBSERVER AT LEAST TWO (2) WORKING DAYS PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION. (714) 461-3494.
7. ALL FILLS SHALL BE COMPACTED TO 90 % RELATIVE COMPACTION AS DETERMINED BY THE CALIFORNIA TEST METHOD NO. 216-F, 1983 "FIVE LAYER METHOD." ALL BACKFILL MATERIAL MUST BE FREE OF ORGANIC MATTER.
8. THE CONTRACTOR OR DEVELOPER SHALL PROVIDE ALL SURVEYING REQUIRED FOR VERTICAL AND HORIZONTAL ALIGNMENT. AT THE REQUEST OF THE CITY OF LAKE FOREST SUFFICIENT REFERENCE STAKING SHOULD BE PROVIDED.
9. ALL REINFORCED CONCRETE PIPE SHALL BE BEDDED IN ACCORDANCE WITH PIPE BEDDING DETAIL PER PF&RD STANDARD PLAN 1319.
10. PRIOR TO THE PLACEMENT OF STORM DRAIN IMPROVEMENTS, THE DEVELOPER'S SOILS ENGINEER SHALL CERTIFY IN WRITING TO THE DIRECTOR OF PUBLIC WORKS/CITY ENGINEER THAT THE STORM DRAIN'S SUBGRADE IS OF ADEQUATE STRENGTH TO SUPPORT THE STRUCTURES AND ANY ANTICIPATED LOADS.
11. PRIOR TO BEGINNING CONSTRUCTION WORK, THE DEVELOPER'S CONTRACTOR SHALL OBTAIN A PERMIT FROM THE STATE DIVISION OF INDUSTRIAL SAFETY. A COPY OF THE PERMIT SHALL BE KEPT ON THE JOB SITE AT ALL TIMES.
12. WHEN APPLICABLE, THE DEVELOPER SHALL OBTAIN A PERMIT FROM THE STATE DEPARTMENT OF FISH AND GAME IN ACCORDANCE WITH SECTION 1602 OF CALIFORNIA FISH AND GAME CODE PRIOR TO COMMENCEMENT OF CONSTRUCTION.
13. ALL CONTINUOUS STEEL SHALL BE LAPPED A MINIMUM OF 45 BAR DIAMETERS.
14. ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 3/4 INCH MINIMUM.
15. A CITY OF LAKE FOREST ENCROACHMENT PERMIT WILL BE REQUIRED TO PERFORM WORK WITHIN THE PUBLIC RIGHT-OF-WAY. ALL WORK SHALL CONFORM TO THE STANDARD PROVISIONS LISTED ON THE ENCROACHMENT PERMIT.
16. THE LENGTH OF MANHOLE STRUCTURES MAY BE INCREASED TO MEET PIPE ENDS AS LONG AS THE REINFORCING STEEL IS CONTINUED AS REQUIRED. THE DIRECTOR OF PUBLIC WORKS/CITY ENGINEER OR HIS AUTHORIZED REPRESENTATIVE MUST APPROVE ANY CHANGE IN SPUR LOCATION.
17. THE FLOOR OF THE MANHOLE STRUCTURES SHALL BE STEEL TROWELED TO THE SPRING LINE.
18. THE BODY OF THE MANHOLE STRUCTURES, INCLUDING SPUR, MUST BE POURED IN ONE CONTINUOUS OPERATION. A CONSTRUCTION JOINT AT THE SPRING LINE, WITH A LONGITUDINAL KEYWAY, WILL BE PERMITTED.
19. ALL REINFORCING BARS MUST BE SECURELY HELD IN PLACE IN THE FORMS. EACH MAT OF STEEL MUST BE TIE-WIRED TOGETHER TWO WAYS AT ALTERNATE INTERSECTIONS.
20. STORM DRAIN BACKFILL FOR ALL FACILITIES WITHIN THE PUBLIC RIGHT-OF-WAY SHALL BE PLACED AND COMPACTED IN THE PRESENCE OF THE CITY OF LAKE FOREST'S PUBLIC WORKS OBSERVER AND MEET OR EXCEED PF&RD MINIMUM STANDARDS.
21. ALL PIPES SHALL BE BANDED AND GROUTED.
22. ALL AREA DRAIN PIPES SHALL BE:

A. ACRYLONITRILE BUTADIENE STYRENE (ABS) SOLID WALL PIPE CONFORMING TO ASTM D2751, SDR35;
B. POLYVINYL CHLORIDE
C. PLASTIC (PVC) PIPE CONFORMING TO ASTM D3034, SDR35;
C. ASBESTOS CEMENT PIPE CONFORMING TO ASTM C-663; OR
D. AN APPROVED EQUAL.

23. RCP SHALL COMPLY WITH ALL ASTM APPLICABLE STANDARDS.
24. CONSTRUCTION MATERIALS AND METHODS SHALL BE SUBJECT TO APPROVAL BY THE DIRECTOR OR PUBLIC WORKS/CITY ENGINEER OR HIS AUTHORIZED REPRESENTATIVE.
25. CONSTRUCTION HOURS OF OPERATION SHALL BE BETWEEN 7:00 A.M. AND 3:30 P.M., MONDAY THROUGH FRIDAY. CONSTRUCTION DURING HOURS OTHER THAN THOSE SPECIFIED SHALL REQUIRE A WRITTEN AUTHORIZATION FROM THE DIRECTOR OF PUBLIC WORKS/CITY ENGINEER.
26. STATE LAW SB 3019 REQUIRES THE CONTRACTOR TO OBTAIN AN IDENTIFICATION NUMBER FROM UNDERGROUND SERVICE ALERT (USA) PRIOR TO THE ISSUANCE OF A CITY ENCROACHMENT PERMIT. THE CONTRACTOR SHALL NOTIFY USA TWO FULL WORKING DAYS (MINIMUM OF 48 HOURS) PRIOR TO ANY CONSTRUCTION ACTIVITIES, INCLUDING PAVEMENT REMOVAL, EXCAVATION AND ASPHALT CONCRETE OVERLAY, WHICH COULD AFFECT UNDERGROUND UTILITIES.
27. ANY CONTRACTORS OR SUBCONTRACTORS PERFORMING WORK ON THIS PROJECT SHALL FAMILIARIZE THEMSELVES WITH THE SITE AND BE RESPONSIBLE FOR ANY DAMAGE TO EXISTING FACILITIES RESULTING DIRECTLY OR INDIRECTLY FROM THEIR OPERATIONS, WHETHER OR NOT SUCH FACILITIES ARE SHOWN ON THE PLANS.
28. PRIOR TO BEGINNING ANY CONSTRUCTION WORK WHICH COULD DAMAGE OR CONFLICT WITH UNDERGROUND STRUCTURES OR UTILITIES, THE CONTRACTOR SHALL EXCAVATE INSPECTION HOLES TO DETERMINE THE LOCATION AND DEPTH OF SAID STRUCTURES AND UTILITIES.
29. PRIOR TO TAKING WATER FROM A FIRE HYDRANT, THE CONTRACTOR SHALL MAKE ARRANGEMENTS TO OBTAIN A HYDRANT WATER METER FROM THE RESPONSIBLE WATER DISTRICT.
30. IF UTILITIES OR OTHER FACILITIES CONFLICT WITH THE PROPOSED IMPROVEMENTS, WORK SHALL STOP AND THE DIRECTOR OF PUBLIC WORKS/CITY ENGINEER OR HIS AUTHORIZED REPRESENTATIVE, SHALL BE NOTIFIED IMMEDIATELY.
31. THE CONTRACTOR SHALL REPAIR OR REPLACE ANY DAMAGED OR ALTERED EXISTING IMPROVEMENTS WITHIN THE PUBLIC RIGHT-OF-WAY AS DIRECTED BY THE DIRECTOR OF PUBLIC WORKS/CITY ENGINEER OR HIS AUTHORIZED REPRESENTATIVE.
32. THE CONTRACTOR SHALL MAINTAIN DUST CONTROL AT ALL TIMES.
33. SURVEY MONUMENTS SHALL BE PROTECTED AND PERPETUATED IN PLACE. DISTURBED OR COVERED MONUMENTS SHALL BE RESET BY A REGISTERED CIVIL ENGINEER, WHO IS AUTHORIZED TO PRACTICE LAND SURVEYING, OR A LICENSED LAND SURVEYOR.
34. IRRIGATION LINES SHALL BE REMOVED, RELOCATED OR RECONSTRUCTED AS SHOWN OR AS DIRECTED BY THE DIRECTOR OF PUBLIC WORKS/CITY ENGINEER OR HIS AUTHORIZED REPRESENTATIVE, IN THE FIELD.
35. NEW AND EXISTING MANHOLES AND WATER VALVES SHALL BE ADJUSTED TO GRADE.
36. PRIOR TO PAVING OF STREET, ALL UTILITIES SHALL BE INSTALLED, TESTED AND APPROVED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE APPROPRIATE SERVING UTILITY COMPANY AND VERIFYING THAT THE UTILITY FACILITY IS IN PLACE BEFORE PAVING.
37. TRENCH BACKFILL SHALL BE PROVIDED IN ACCORDANCE WITH THE STANDARD PROVISIONS LISTED ON THE ENCROACHMENT PERMIT.
38. THE CONTRACTOR SHALL NOT ORDER OR PLACE ANY CONCRETE OR ASPHALT CONCRETE PAVING UNTIL THE FORMS AND SUBGRADE OR AGGREGATE BASE HAS BEEN INSPECTED AND APPROVED IN THE FIELD BY THE PUBLIC WORKS OBSERVER.
39. THE CONTRACTOR SHALL REMOVE AND REPLACE, IN KIND, A MINIMUM OF 1 FOOT OF EXISTING ASPHALT CONCRETE AND AGGREGATE BASE ADJACENT TO NEWLY CONSTRUCTED CURB AND GUTTER.
40. THE FINAL OR SURFACE LAYER OF ASPHALT CONCRETE SHALL NOT BE PLACED UNTIL ALL ON-SITE IMPROVEMENTS, INCLUDING GRADING HAVE BEEN COMPLETED AND ALL UNACCEPTABLE WORK HAS BEEN CORRECTED, UNLESS OTHERWISE APPROVED BY THE DIRECTOR OF PUBLIC WORKS/CITY ENGINEER OR HIS AUTHORIZED REPRESENTATIVE.
41. "AS-BUILT" RECORD DRAWINGS SHALL BE FURNISHED TO THE CITY UPON COMPLETION OF CONSTRUCTION.
42. APPROVAL OF THESE PLANS BY THE CITY OR ITS AGENTS SHALL NOT RELIEVE THE CONTRACTOR OR THE APPLICANT FROM THE RESPONSIBILITY FOR THE CORRECTION OF ERRORS OR OMISSIONS DISCOVERED DURING CONSTRUCTION. UPON REQUEST, THE APPROPRIATE REVISIONS SHALL BE SUBMITTED TO THE DIRECTOR OF PUBLIC WORKS/CITY ENGINEER AND APPROVAL.

WATER AND SEWER NOTES

WATER :

1. THE WATER SYSTEM SHALL CONFORM TO THE LOS ALISOS WATER DISTRICT'S "STANDARD SPECIFICATIONS FOR DOMESTIC WATER SYSTEM. AS LAST REVISED.
2. THE DISTRICT ENGINEER SHALL BE FURNISHED WITH FOUR COPIES OF APPROVED CONSTRUCTION PLANS PRIOR TO STARTING CONSTRUCTION.
3. THE DISTRICT INSPECTOR SHALL BE NOTIFIED AT LEAST TWO WORKING-DAYS PRIOR TO BEGINNING CONSTRUCTION OR ANY INSPECTION. CALL 714-830-0580.
4. WATER MAINS SHALL BE INSTALLED 6 FEET OFF THE CURB FACE, UNLESS OTHERWISE INDICATED, AND PRIOR TO PAVING OF THE STREETS.
5. FIRE HYDRANTS AND BLOWOFFS SHALL BE INSTALLED IN ACCORDANCE WITH THE APPROPRIATE DETAILS HEREIN AND INSTALLED BEHIND CURBS AND SIDEWALKS WHERE THE SIDEWALKS ARE ADJACENT TO CURBS.
6. METER SERVICES SHALL BE SIZED BY THE LOS ALISOS WATER DISTRICT.
7. THE DEVELOPER SHALL FURNISH THE LOS ALISOS WATER DISTRICT WITH EASEMENTS FOR ALL PORTIONS OF THE SYSTEM OUTSIDE OF THE PUBLIC RIGHT-OF-WAY. THESE EASEMENTS SHALL BE RECORDED PRIOR TO FINAL ACCEPTANCE.
8. ALL FLANGED CONNECTIONS SHALL BE COATED WITH TWO COATS OF 10 MILS EACH OF E C 244 MANUFACTURED BY MINNESOTA MINING AND MANUFACTURING AFTER INSTALLATION INCLUDING NUTS, BOLTS AND FLANGES, AND WRAPPED WITH POLYETHYLENE PER AWWA C105.
9. NO FACILITY IS TO BE BACKFILLED UNTIL INSPECTED BY THE LOS ALISOS WATER DISTRICT.
10. SHUTDOWN OF EXISTING WATER LINES TO FACILITATE CONNECTION TO EXISTING FACILITIES SHALL BE COORDINATED WITH THE LOS ALISOS WATER DISTRICT.
11. ALL HOUSE SERVICES BELOW THE FOLLOWING WATER ZONE ELEVATIONS SHALL BE FURNISHED WITH A PRESSURE REDUCING VALVE SET AT A MAXIMUM PRESSURE OF 80 PSI.

DISTRICT WATER ZONE	PRV REQUIRED BELOW ELEVATION
I	435
II	680
III	885

12. ALL WATER HOUSE LATERALS ARE TO BE LOCATED WITH A LETTER "W" CHISELED IN CURB FACE PER LOS ALISOS WATER DISTRICT SPECIFICATIONS.
13. WATER METERS LOCATED IN DRIVEWAY AREAS WILL NOT BE ACCEPTED. THE DEVELOPER SHALL RELOCATE SUCH METERS TO A LOCATION ACCEPTABLE TO THE DISTRICT INSPECTOR.
14. O.C.E.M.A. STANDARDS SHALL TAKE PRECEDENCE IN CASE OF ANY CONFLICTS WITH ROADWAY SUBGRADE, PAVEMENT, OR LOCATION OR PARKWAY OBSTRUCTIONS WITHIN STREET RIGHT-OF-WAY.
15. A SET OF "AS CONSTRUCTED" RECORD DRAWINGS SHALL BE FURNISHED TO THE DISTRICT PRIOR TO RELEASE OF BONDS.
16. PLAN CHECK REQUIRED FOR SITE DEVELOPMENT. METERS TO BE APPROVED AND INSTALLED AT TIME OF SITE DEVELOPMENT.

SEWER :

1. ALL SANITARY SEWER WORK SHALL CONFORM TO THE "STANDARD SPECIFICATIONS" OF THE LOS ALISOS WATER DISTRICT THE CONTRACTOR SHALL KEEP A COPY OF THE STANDARD SPECIFICATIONS AND DRAWINGS ON THE JOB SITE AT ALL TIMES.
2. FOUR COPIES OF APPROVED CONSTRUCTION PLANS SHALL BE FURNISHED TO THE DISTRICT ENGINEER'S OFFICE PRIOR TO BEGINNING CONSTRUCTION.
3. THE DISTRICT INSPECTOR SHALL BE NOTIFIED AT LEAST TWO WORKING DAYS PRIOR TO ANY INSPECTION. CALL (714) 830-0580.
4. FOUR-INCH, INTERNAL DIAMETER, VCP HOUSE CONNECTIONS ARE TO BE CONSTRUCTED FROM THE SEWER MAIN LINE TO THE PROPERTY LINE FOR EACH LOT OR AS SHOWN ON THE PLANS.
5. ALL SEWER MAINS, HOUSE CONNECTIONS, AND APPURTENANCES SHALL BE CONSTRUCTED PRIOR TO PAVING OF THE STREET.
6. SEWER LENGTHS ARE CALCULATED ON HORIZONTAL DISTANCES.
7. VCP STUBS AND THE FIRST TWO JOINTS OUT OF ALL MANHOLES SHALL BE ONE FOOT MAXIMUM MEASURED FROM THE INSIDE WALL OF THE MANHOLE.
8. THE SURVEYOR SHALL STAKE THE LOCATION OF ALL WYE FITTINGS. ALL HOUSE LATERALS NOT NORMAL TO STREET SEWERS SHALL HAVE END OF LATERAL AT PROPERTY LINE STAKED AND TIED TO A PROPERTY LINE AS SHOWN ON THE PLANS.
9. IT SHALL BE THE RESPONSIBILITY OF THE SEWER CONTRACTOR TO EXPOSE ALL JOINT POINTS TO EXISTING LINES AND TO HAVE THE LOCATION AND ELEVATION VERIFIED BY THE DISTRICT ENGINEER PRIOR TO ANY SEWER STAKES BEING FURNISHED.
10. THE LOS ALISOS WATER DISTRICT WILL INSPECT ALL MAIN LINE SEWERS. THE CITY OF LAKE FOREST BUILDING AND SAFETY DEPARTMENT WILL INSPECT AND CERTIFY ALL HOUSE LATERALS. A MINIMUM OF 10 FEET 4 INCHES OF HOUSE LATERAL SHALL BE INSTALLED AND INSPECTED BY THE CITY OF LAKE FOREST BUILDING AND SAFETY DEPARTMENT AND TESTED JOINTLY WITH THE MAIN LINE UNDER THE JURISDICTION OF THE LOS ALISOS WATER DISTRICT.
11. IN ORDER TO PREVENT ACCIDENTAL USE OF THE NEW SEWER PRIOR TO COMPLETION AND ACCEPTANCE, THE INLET OF THE DOWNSTREAM EXISTING MANHOLE SHOULD BE PLUGGED WITH BRICK AND MORTAR.
12. NO FACILITY SHALL BE BACKFILLED UNTIL INSPECTED BY THE LOS ALISOS WATER DISTRICT.
13. SEWER MAIN OWNERSHIP - UPON COMPLETION OF ALL TESTS AND DEDICATION BY THE DEVELOPER, OPERATION AND MAINTENANCE SHALL BE THE RESPONSIBILITY OF LOS ALISOS WATER DISTRICT.
14. SEWER LATERAL OWNERSHIP - UPON COMPLETION OF ALL TESTS AND ACCEPTANCE BY THE CITY OF LAKE FOREST BUILDING DEPARTMENT, OPERATION AND MAINTENANCE SHALL NOT BE THE RESPONSIBILITY OF LOS ALISOS WATER DISTRICT.
15. PROVIDE A CLEANOUT STUB OUTSIDE OF THE HOUSE OR GARAGE AND IDENTIFY WITH A LANDMARK TO FACILITATE SEWER HOUSE LATERALS AND MAIN LINE CLEANING.
16. ALL SEWER HOUSE LATERALS ARE TO BE LOCATED WITH A LETTER "S" CHISELED IN CURB FACE PER LOS ALISOS WATER DISTRICT SPECIFICATIONS.
17. THE SEWER IMPROVEMENTS AND SEWER SYSTEM OPERATIONS ARE APPROVED, SUBJECT TO FUTURE SEWER SYSTEM OPERATIONS ARE APPROVED, SUBJECT TO FUTURE SEWER DISCHARGES CONFORMING TO THE LOS ALISOS WATER DISTRICT "RULES AND REGULATIONS FOR SEWER CONSTRUCTION, SEWER USE AND INDUSTRIAL WASTE WATER DISCHARGES AND FUTURE REVISIONS."
18. O.C.E.M.A. STANDARDS SHALL TAKE PRECEDENCE IN CASE OF ANY CONFLICTS WITH ROADWAY SUBGRADE, PAVEMENT, OR LOCATION OF PARKWAY OBSTRUCTIONS WITHIN STREET RIGHT-OF-WAY.
19. A SET OF "AS-CONSTRUCTED" RECORD DRAWINGS (MYLARS) SHALL BE FURNISHED TO THE DISTRICT PRIOR TO RELEASE OF BONDS.

RECLAIMED WATER NOTES

1. THE RECLAIMED WATER SYSTEM SHALL CONFORM TO ALL THE LOS ALISOS WATER DISTRICT STANDARD SPECIFICATIONS FOR RECLAIMED WATER SYSTEM AS LAST REVISED.
2. THE DISTRICT ENGINEER SHALL BE FURNISHED WITH FOUR COPIES OF APPROVED CONSTRUCTION PLANS PRIOR TO STARTING CONSTRUCTION.
3. THE DISTRICT INSPECTOR SHALL BE NOTIFIED AT LEAST TWO WORKING DAYS PRIOR TO BEGINNING CONSTRUCTION OR ANY INSPECTION. CA (714) 830-0580.
4. THE DEVELOPER SHALL FURNISH THE LOS ALISOS WATER DISTRICT WITH EASEMENTS FOR ALL PORTIONS OF THE SYSTEM TO BE ACCEPTED BY THE DISTRICT OUTSIDE OF THE PUBLIC RIGHT-OF-WAY. THESE EASEMENTS SHALL BE RECORDED PRIOR TO FINAL ACCEPTANCE.
5. ALL FLANGED CONNECTIONS SHALL BE COATED PER SYSTEM 24 OF SECTION 09900 OF THE STANDARD SPECIFICATIONS, INCLUDING NUTS, BOLTS AND FLANGES, AND WRAPPED WITH POLYETHYLENE PER AWWA C 105.
6. NO FACILITY TO BE BACKFILLED UNTIL INSPECTED BY THE LOS ALISOS WATER DISTRICT.
7. SHUTDOWN OF EXISTING WATER LINES TO FACILITATE CONNECTION TO EXISTING FACILITIES SHALL BE COORDINATED WITH THE LOS ALISOS WATER DISTRICT.
8. A SET OF MYLAR "AS CONSTRUCTED" RECORD DRAWINGS SHALL BE FURNISHED TO THE DISTRICT PRIOR TO RELEASE OF BONDS.

ONSITE RECLAIMED WATER NOTES

(1) THE INSTALLATION OF THE RECLAIMED WATER SYSTEM SHALL CONFORM TO THE RULES AND REGULATIONS FOR THE CONSTRUCTION OF RECLAIMED WATER SYSTEMS WITHIN THE DISTRICT AND THE STANDARD SPECIFICATIONS.

(2) THE DISTRICT SHALL BE NOTIFIED TWO DAYS PRIOR TO THE START OF CONSTRUCTION AT (714) 830-0580 AND EACH WORKDAY THEREAFTER UNTIL COMPLETION OF PROJECT.

(3) ALL ONSITE CONTINUOUSLY PRESSURIZED RECLAIMED AND POTABLE WATER MAIN LINE PIPING INSTALLED ON THIS PROJECT SHALL BE IDENTIFIED IN ACCORDANCE WITH THE DISTRICT'S REGULATIONS AND THE STANDARD SPECIFICATIONS.

(a) WARNING TAPES SHALL BE USED ON ALL CONSTANT PRESSURE MAIN LINE PIPING CARRYING EITHER RECLAIMED OR POTABLE WATER. WARNING TAPES SHALL BE A MINIMUM OF 3 INCHES WIDE AND SHALL RUN CONTINUOUSLY FOR THE ENTIRE LENGTH OF ALL CONSTANT PRESSURE MAIN LINE PIPING. THE TAPE SHALL BE ATTACHED TO THE TOP OF THE PIPE WITH PLASTIC TAPE BANDED AROUND THE WARNING TAPE AND THE PIPE EVERY 5 FEET ON CENTER.

(b) WARNING TAPE FOR THE CONSTANT PRESSURE POTABLE WATER PIPING SHALL BE BLUE IN COLOR WITH THE WORDS "CAUTION BURIED WATERLINE BELOW" IMPRINTED MINIMUM 1-INCH-HIGH LETTERS BLACK IN COLOR. IMPRINTING SHALL BE CONTINUOUS AND PERMANENT.

(c) WARNING TAPE FOR THE CONSTANT PRESSURE RECLAIMED WATER PIPING SHALL BE RED IN COLOR WITH THE WORDS "CAUTION RECLAIMED WATER" IMPRINTED IN MINIMUM 1-INCH HIGH LETTERS BLACK IN COLOR. IMPRINTING SHALL BE CONTINUOUS AND PERMANENT.

(4) ALL PRESSURE MAIN LINE PIPING FROM THE RECLAIMED WATER SYSTEM SHALL BE INSTALLED TO MAINTAIN 10-FOOT-MINIMUM-HORIZONTAL SEPARATION FROM ALL POTABLE WATER PIPING. WHERE RECLAIMED AND POTABLE WATER PRESSURE MAIN LINE PIPING CROSS, THE RECLAIMED WATER PIPING SHALL BE INSTALLED BELOW THE POTABLE WATER PIPING IN A POLYVINYL CHLORIDE (PVC) CLASS 200 PIPE SLEEVE WHICH EXTENDS A MINIMUM OF 5 FEET ON EITHER SIDE OF THE POTABLE WATER PIPING. PROVIDE A MINIMUM VERTICAL CLEARANCE OF 6 INCHES.

(5) ALL AUTOMATIC CONTROLLERS MUST BE SET TO OPERATE BETWEEN THE HOURS OF 9 P.M. AND 6 A.M., UNLESS OTHERWISE DIRECTED BY THE DISTRICT.

(6) CONTACT THE DISTRICT'S OFFICE TWO DAYS PRIOR TO THE IRRIGATION SYSTEM COVERAGE TEST AT (714) 830-0580 AND ARRANGE FOR A WALK THROUGH OF THE SYSTEM.

(7) A SET OF MYLAR "AS CONSTRUCTED" RECORD DRAWINGS SHALL BE FURNISHED TO THE DISTRICT PRIOR TO RELEASE OF BONDS.

NOTICE TO CONTRACTOR

CAUTION: THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO, OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING, AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY FACILITIES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. THE LOCATIONS SHOWN ARE APPROXIMATE AND SHALL BE CONFIRMED IN THE FIELD BY THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING ANY NECESSARY ADJUSTMENTS TO ALIGNMENT AND/OR GRADE OF THE PROPOSED IMPROVEMENTS. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PREVENT DAMAGE TO ANY UTILITY FACILITIES SHOWN AND ANY OTHER FACILITIES NOT SHOWN ON THESE PLANS.

ALL CONTRACTORS AND SUBCONTRACTORS PERFORMING WORK SHOWN ON THESE PLANS AGREE THAT, IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, THEY WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT. THIS INCLUDES PROVIDING FOR THE SAFETY OF ALL PERSONS AND PROPERTY AND SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS. THE CONTRACTORS AND SUBCONTRACTORS FURTHER AGREE TO DEFEND, INDEMNIFY AND HOLD HARMLESS THE DESIGN PROFESSIONAL FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPT FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE DESIGN PROFESSIONAL.

REGISTERED PROFESSIONAL ENGINEER — CARLOS A. ALBA — NO. 54843 — Exp. 6-30-00 — CIVIL — STATE OF CALIFORNIA

SD-1007

OWNER/ DEVELOPER:
STEADFAST PROPERTIES
2424 S.E. BRISTOL, #350
NEWPORT BEACH, CA 92660
TEL : (949) 852-0700 FAX : (949) 852-0143

PREPARED UNDER THE SUPERVISION OF :
CARLOS A. ALBA, R.C.E 54843, EXP 6-30-00

A.C.E. CIVIL ENGINEERING, INC.
3187-C AIRWAY AVENUE
COSTA MESA, CALIFORNIA 92626
TEL : (714) 641-3300 FAX : (714) 545 - 5623

DATE	BY	DESCRIPTION	APPV

REVISIONS

GENERAL AND UTILITY NOTES
LAKE FOREST CORRIDOR CENTER, P.M. 98-103
SDP 98-01
20021 LAKE FOREST DRIVE
LAKE FOREST, CA. 92630

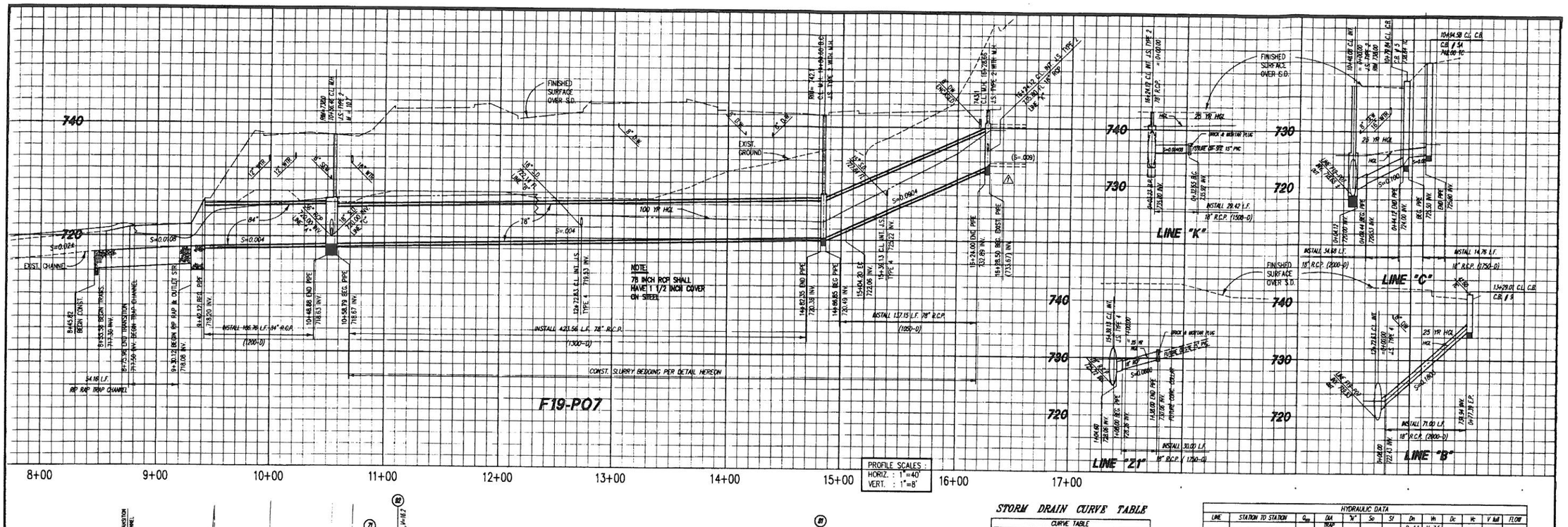
CITY OF LAKE FOREST
PUBLIC WORKS DEPARTMENT

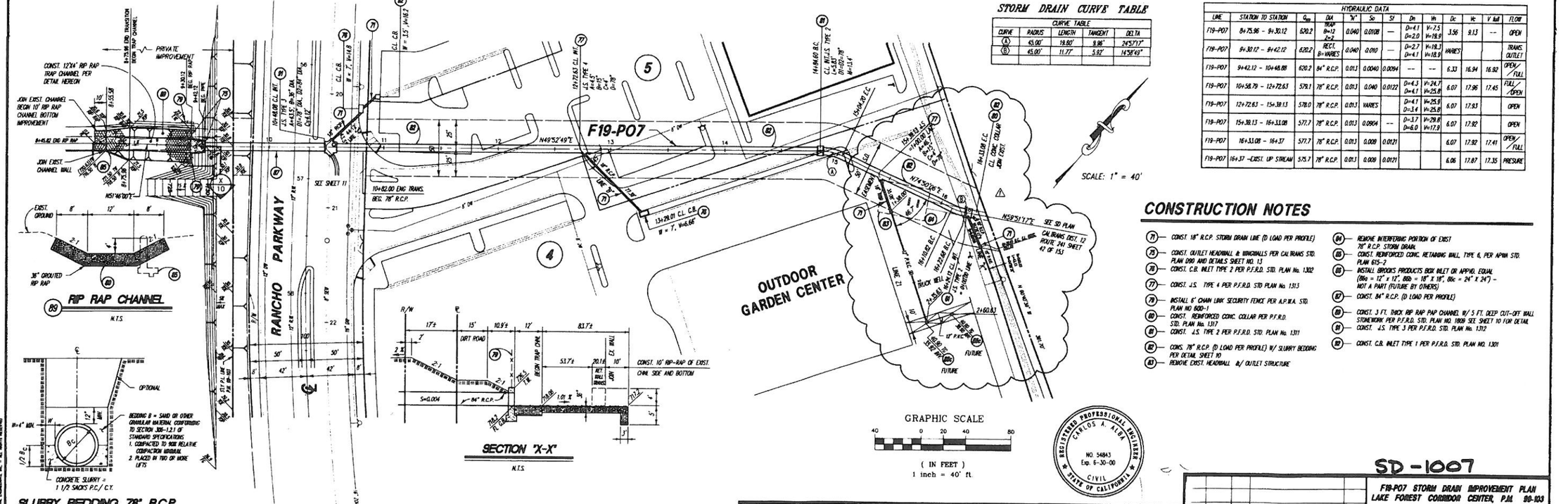
SD-1007
SHEET 3 OF 7

09730/ 2108/ 1140

98-0118 \ SP3.DWG

COPYRIGHT 1999 - A.C.E. CIVIL ENGINEERING, INC. - ALL RIGHTS RESERVED





STORM DRAIN CURVE TABLE

CURVE TABLE				
CURVE	RADIUS	LENGTH	TANGENT	DELTA
(A)	45.00'	19.80'	9.86'	24°57'17"
(B)	45.00'	11.77'	5.92'	14°58'49"

HYDRAULIC DATA

LINE	STATION TO STATION	Q_{100}	DIA	"N"	So	Sf	Dn	Vn	Dc	Vc	V full	FLOW
F19-P07	8+75.96 – 9+30.12	620.2	78" R.C.P. B=12 Z=2	0.040	0.0108	—	D=4.1 D=2.0	V=7.5 V=19.9	3.56	9.13	--	OPEN
F19-P07	9+30.12 – 9+42.12	620.2	RECT. B=VARIES	0.040	0.010	—	D=2.7 D=4.1	V=19.1 V=18.9	VARIES			TRANS. OUTLET
F19-P07	9+42.12 – 10+48.08	620.2	84" R.C.P.	0.013	0.0040	0.0094	--	--	6.33	16.94	16.82	OPEN/ FULL
F19-P07	10+58.79 – 12+72.63	579.1	78" R.C.P.	0.013	0.040	0.0122	D=4.3 D=4.1	V=24.7 V=25.8	6.07	17.96	17.45	FULL/ OPEN
F19-P07	12+72.63 – 15+39.13	578.0	78" R.C.P.	0.013	VARIES		D=4.1 D=3.4	V=25.9 V=25.9	6.07	17.93		OPEN
F19-P07	15+39.13 – 16+33.08	577.7	78" R.C.P.	0.013	0.0964	--	D=3.7 D=6.0	V=29.8 V=17.9	6.07	17.92		OPEN
F19-P07	16+33.08 – 16+37	577.7	78" R.C.P.	0.013	0.008	0.0121			6.07	17.92	17.41	OPEN/ FULL
F19-P07	16+37 –EXIST. UP STREAM	575.7	78" R.C.P.	0.013	0.008	0.0121			6.06	17.87	17.35	PRESSURE

CONSTRUCTION NOTES

(71) CONST. 18" R.C.P. STORM DRAIN LINE (D LOAD PER PROFILE)
(73) CONST. OUTLET HEADWALL & WINGWALLS PER CALTRANS STD. PLAN D90 AND DETAILS SHEET NO. 13
(76) CONST. C.B. INLET TYPE 2 PER P.F.R.D. STD. PLAN No. 1302
(77) CONST. J.S. TYPE 4 PER P.F.R.D. STD PLAN No. 1313
(79) INSTALL 6' CHAIN LINK SECURITY FENCE PER A.P.W.A. STD. PLAN NO 600-1
(80) CONST. REINFORCED CONC. COLLAR PER P.F.R.D. STD. PLAN No. 1317
(81) CONST. J.S. TYPE 2 PER P.F.R.D. STD. PLAN No. 1311
(82) CONS. 78" R.C.P. (D LOAD PER PROFILE) W/ SLURRY BEDDING PER DETAIL SHEET 10
(83) REMOVE EXIST. HEADWALL &/ OUTLET STRUCTURE
(84) REMOVE INTERFERING PORTION OF EXIST 78" R.C.P. STORM DRAIN.
(85) CONST. REINFORCED CONC. RETAINING WALL, TYPE 6, PER APWA STD. PLAN 615-2
(88) INSTALL BROOKS PRODUCTS BOX INLET OR APPRD. EQUAL (88a = 12' x 12', 88b = 18' X 18', 88c = 24' X 24') – NOT A PART (FUTURE BY OTHERS)
(87) CONST. 84" R.C.P. (D LOAD PER PROFILE)
(88) CONST. 3 FT. THICK RIP RAP TRAP CHANNEL W/ 5 FT. DEEP CUT-OFF WALL STONEWORK PER P.F.R.D. STD. PLAN NO. 1809 SEE SHEET 10 FOR DETAIL
(91) CONST. J.S. TYPE 3 PER P.F.R.D. STD. PLAN No. 1312
(92) CONST. C.B. INLET TYPE 1 PER P.F.R.D. STD. PLAN NO. 1301

REGISTERED PROFESSIONAL ENGINEER CARLOS A. ALBA NO. 54843 Exp. 6-30-00 CIVIL STATE OF CALIFORNIA

NO.	DATE	BY	DESCRIPTION	APPV
1	10-12-99	C.A.A.	REVISED LINE "K" AND F19P07	

REVISIONS

OWNER/ DEVELOPER:
STEADFAST PROPERTIES
2424 S.E. BRISTOL, #250
NEWPORT BEACH, CA 92660
TEL : (949) 852-0700 FAX : (949) 852-0143

PREPARED UNDER THE SUPERVISION OF :
MR. CARLOS A. ALBA, R.C.E 54843 , EXP 6-30-00

A.C.E. CIVIL ENGINEERING, INC.
3187-C AIRWAY AVENUE
COSTA MESA, CALIFORNIA 92626
TEL : (714) 641-3300 FAX : (714) 545 – 5623

F19-P07 STORM DRAIN IMPROVEMENT PLAN
LAKE FOREST CORRIDOR CENTER, P.M. 98-103
SDP 98-01
20021 LAKE FOREST DRIVE
LAKE FOREST, CA. 92630

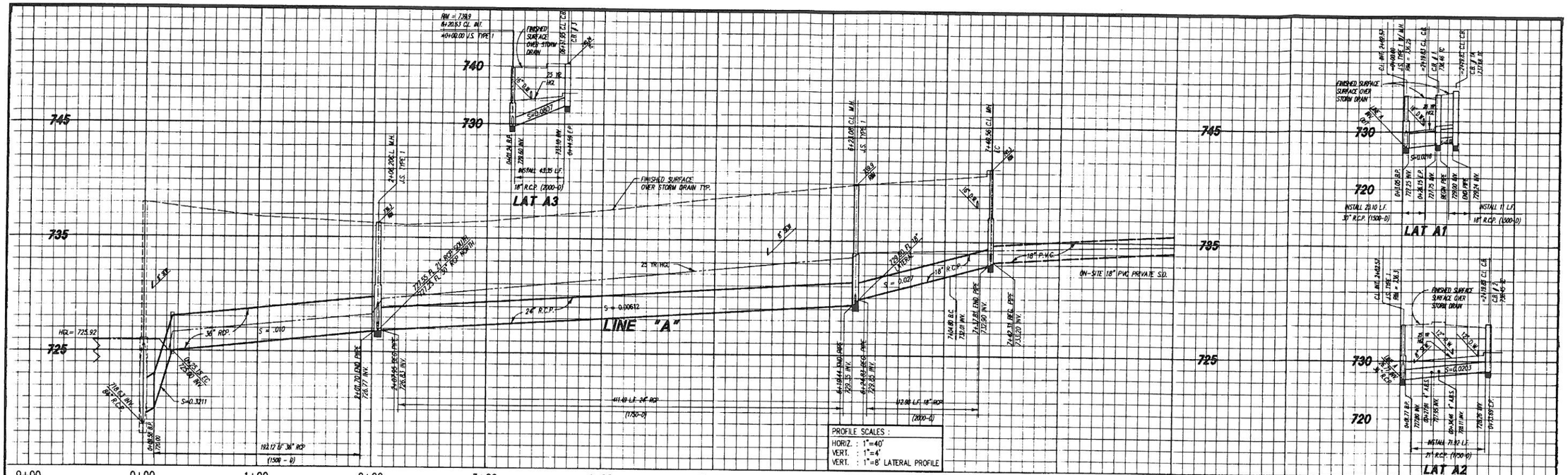
CITY OF LAKE FOREST
PUBLIC WORKS DEPARTMENT

SD-1007
SHEET 6 OF 7

09730/ 2108/ 1140

J.N. 98-0118\ SP10-SD.DWG

SD-1007



CONSTRUCTION NOTES

(70) CONST. MEDIAN UNDERDRAIN PER P.F.R.D. STD. PLAN NO. 1114 AND DETAIL SHEET 1
(71) CONST. 15" R.C.P. STORM DRAIN LINE (D LOAD PER PROFILE)
(72) CONST. 18" R.C.P. STORM DRAIN LINE (D LOAD PER PROFILE)
(73) CONST. 24" R.C.P. STORM DRAIN LINE (D LOAD PER PROFILE)
(74) CONST. 36" R.C.P. STORM DRAIN LINE (D LOAD PER PROFILE)
(75) CONST. J.S. TYPE 1 PER P.F.R.D. STD. PLAN No. 1310.
(78) CONST. C.B. INLET TYPE 2 PER P.F.R.D. STD. PLAN No. 1302
(80) CONST. REINFORCED CONC. COLLAR PER P.F.R.D. STD. PLAN No. 1317
(81) CONST. 30" R.C.P. STORM DRAIN LINE (D LOAD PER PROFILE)
(83) CONST. 21" R.C.P. STORM DRAIN LINE (D LOAD PER PROFILE)

SCALE: 1" = 40'

HYDRAULIC DATA

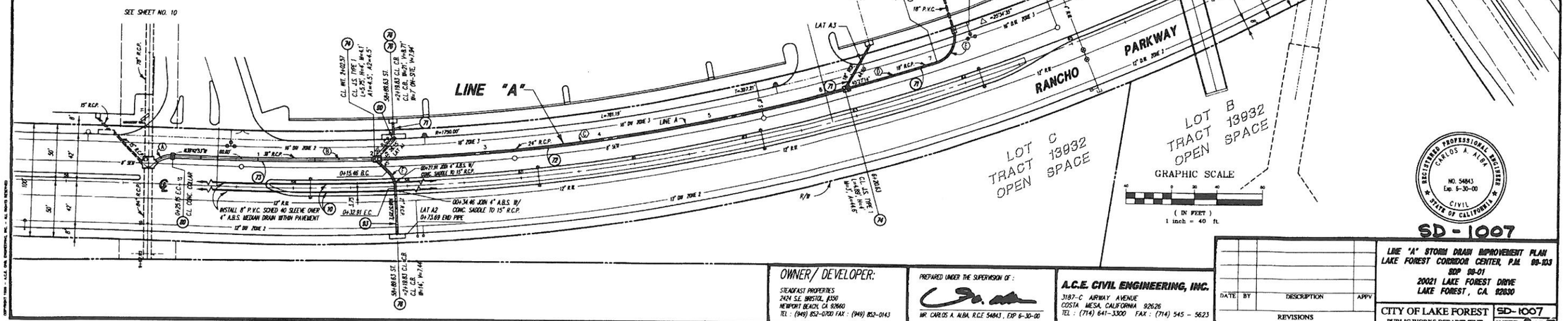
LINE	STATION TO STATION	Q_{25}	BM	"n"	So	SI	Dn	Vn	Dc	Vc	Wsat	FLOW
A	0+08.58 – 0+25.15	35.8	3.00	.013	.3791	.0029	(Dmin=1.04)	Vmax 16.4	1.94	7.38	--	OPEN
A	0+25.15 – 2+01.70	35.8	3.00	.013	.0100	.0029	1.56	9.80	1.94	7.38	--	OPEN
A	2+07.95 – 6+13.44	14.7	1.75	.013	.0100	.0086	--	--	--	--	6.11	FULL
A	6+24.83 – 10+06.00	8.2	1.50	.013	.0060	.0061	1.24	5.25	1.11	5.85	4.63	FULL — SURCH.
A	10+10.50 – 10+72	5.3	1.25	.013	.0060	.0067	--	--	--	--	4.31	FULL
A	10+72 – 13+27.07	4.8	1.25	.013	.0060	.0055	--	--	--	--	3.90	FULL
LAT A1	TO CB IN RANCHO	16.1	2.50	.013	.020	.0021	--	--	--	--	5.28	ENTRANCE CONTROL
LAT A1	FROM CB TO ONSITE	9.7	1.25	.013	.020	.0225	--	--	--	--	7.88	FULL
LAT A2	TO CB IN RANCHO	6.3	1.75	.013	.020	.0016	.63	8.00	.93	4.89	2.61	FULL — SURCH.
LAT A3	TO ONSITE	8.0	1.25	.013	.020	.0153	--	--	--	--	--	--

STORM DRAIN CURVE DATA

CURVE TABLE

CURVE	DELTA	RADIUS	LENGTH	TANGENT
(A)	48°24'18"	22.50'	18.27'	9.64'
(B)	03°46'15"	1775.00'	116.82'	58.43'
(C)	13°29'41"	1775.00'	418.06'	210.00'
(D)	02°43'01"	1775.00'	84.17'	42.08'
(E)	89°48'27"	22.50'	35.27'	22.42'
(F)	44°26'54"	22.50'	17.45'	9.19'

NOTE:
J.S. TYPE 1
H & W DIMENSIONS
ARE ASSUMED FROM
UPSTREAM PIPE INVERT



REGISTERED PROFESSIONAL ENGINEER
CARLOS A. ALBA
NO. 54843
Exp. 6-30-00
CIVIL
STATE OF CALIFORNIA

SD - 1007

OWNER/ DEVELOPER:
STEADFAST PROPERTIES
2424 S.E. BRISTOL, #350
NEWPORT BEACH, CA 92660
TEL : (949) 852-0700 FAX : (949) 852-0143

PREPARED UNDER THE SUPERVISION OF :
MR. CARLOS A. ALBA, R.C.E 54843, EXP. 6-30-00

A.C.E. CIVIL ENGINEERING, INC.
3187-C AIRWAY AVENUE
COSTA MESA, CALIFORNIA 92626
TEL : (714) 641-3300 FAX : (714) 545 – 5623

DATE	BY	DESCRIPTION	APPV
		REVISIONS	

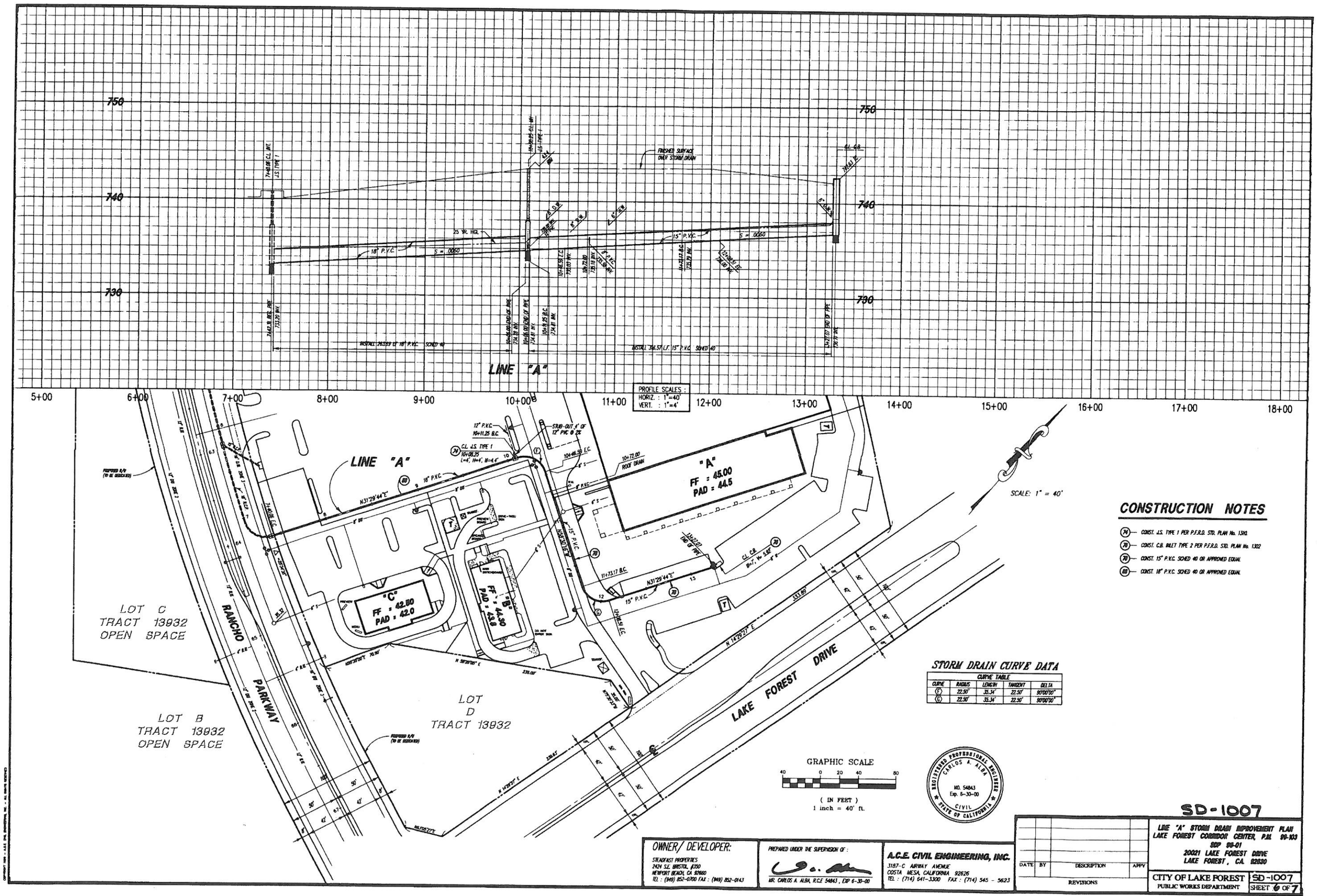
LINE "A" STORM DRAIN IMPROVEMENT PLAN
LAKE FOREST CORRIDOR CENTER, P.M. 88-103
SDP 88-01
20021 LAKE FOREST DRIVE
LAKE FOREST, CA. 92630

CITY OF LAKE FOREST — PUBLIC WORKS DEPARTMENT
SD-1007
SHEET 2 OF 27

09730/ 2108/ 1140

J.N. 98-0118\ SP11-SD-SD.DWG

COPYRIGHT 1998 – A.C.E. CIVIL ENGINEERING, INC. – ALL RIGHTS RESERVED



CONSTRUCTION NOTES

(74) — CONST. L.S. TYPE 1 PER P.F.R.D. STD. PLAN No. 1310
(78) — CONST. C.B. INLET TYPE 2 PER P.F.R.D. STD. PLAN No. 1322
(79) — CONST. 15" P.V.C. SCHED 40 OR APPROVED EQUAL
(80) — CONST. 18" P.V.C. SCHED 40 OR APPROVED EQUAL

STORM DRAIN CURVE DATA

CURVE TABLE

CURVE	RADIUS	LENGTH	TANGENT	DELTA
(F)	22.50'	35.34'	22.50'	90°00'00"
(G)	22.50'	35.34'	22.50'	90°00'00"

REGISTERED PROFESSIONAL ENGINEER — CARLOS A. ALBA — NO. 54843 Exp. 6-30-00 — CIVIL — STATE OF CALIFORNIA

OWNER/ DEVELOPER:
STEADFAST PROPERTIES
2424 S.E. BRISTOL, #250
NEWPORT BEACH, CA 92660
TEL : (949) 852-0700 FAX : (949) 852-0143

PREPARED UNDER THE SUPERVISION OF :
MR. CARLOS A. ALBA, R.C.E. 54843 , EXP. 6-30-00

A.C.E. CIVIL ENGINEERING, INC.
3187-C AIRWAY AVENUE
COSTA MESA, CALIFORNIA 92626
TEL : (714) 641-3300 FAX : (714) 545 - 5623

DATE	BY	DESCRIPTION	APPV
		REVISIONS	

SD-1007

LINE "A" STORM DRAIN IMPROVEMENT PLAN
LAKE FOREST CORRIDOR CENTER, P.M. 98-103
SDP 98-01
20021 LAKE FOREST DRIVE
LAKE FOREST, CA. 92630

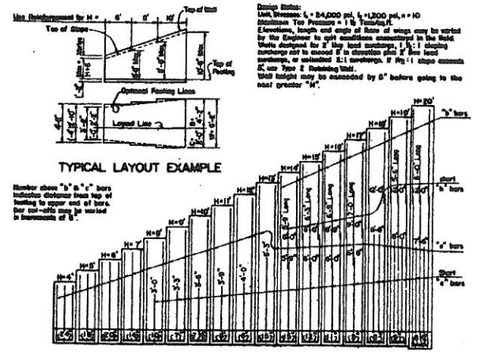
CITY OF LAKE FOREST
PUBLIC WORKS DEPARTMENT

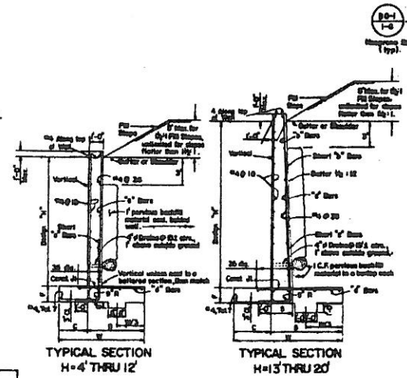
SD-1007
SHEET 6 OF 7

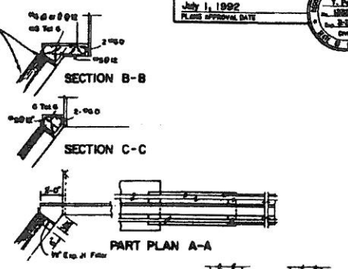
09730/ 2108/ 1140

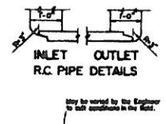
J.N. 98-0181, SP12-SD.DWG

SD-1007



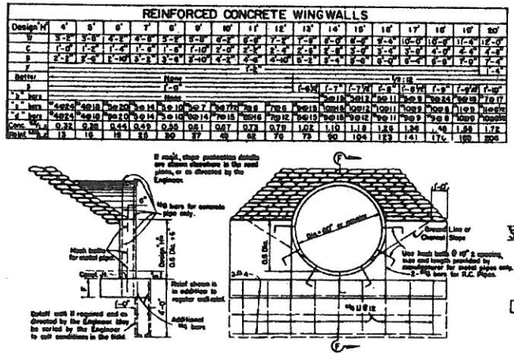


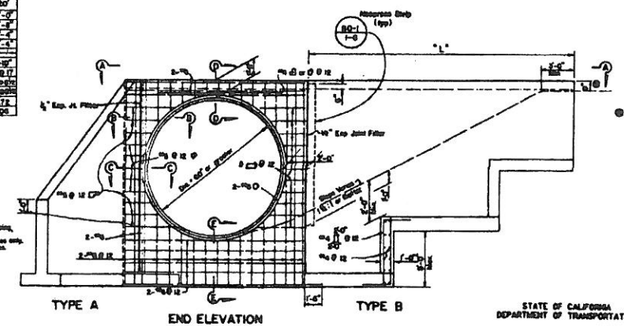




REINFORCED CONCRETE WINGWALLS

Design "H"	4'	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'
"B"	3'-0"	3'-0"	4'-0"	4'-0"	3'-0"	5'-0"	6'-0"	6'-0"	7'-0"	8'-0"	8'-0"	9'-0"	10'-0"	10'-0"	11'-0"	12'-0"	12'-0"
"C"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
"D"	2'-0"	2'-0"	2'-0"	3'-0"	3'-0"	3'-0"	4'-0"	4'-0"	4'-0"	4'-0"	5'-0"	5'-0"	5'-0"	5'-0"	6'-0"	6'-0"	6'-0"
Batter	Note: Vertical Wall for 1'-0"																1":1'
"A" bars	#4@24"	#5@18"	#5@20"	#5@16"	#5@10"	#6@7"	#6@7½"	#6@5"	#6@5"	#6@5"	#6@5"	#7@11"	#7@11"	#7@11"	#8@9"	#8@9"	#8@7½"
"B" bars	#4@24"	#5@18"	#5@20"	#5@16"	#5@10"	#5@14"	#5@10"	#6@15"	#6@12"	#6@12"	#6@15"	#6@12"	#6@11"	#6@9"	#6@8"	#6@8"	#6@6"
"C" bars	#4@24"	#5@18"	#5@20"	#5@16"	#5@10"	#5@14"	#5@10"	#6@15"	#6@12"	#6@12"	#6@15"	#6@12"	#6@11"	#6@9"	#6@8"	#6@8"	#6@6"
Conc. ℄	0.32	0.38	0.44	0.49	0.55	0.61	0.67	0.73	0.79	1.02	1.10	1.18	1.26	1.34	1.42	1.50	1.72
Steel ℄	13	16	18	18	20	20	27	40	52	70	79	90	104	123	141	171	189	200





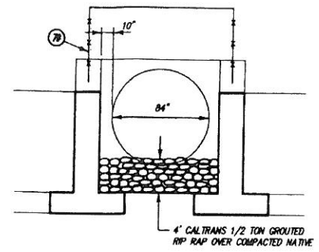
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PIPE CULVERT
HEADWALLS, ENDWALLS AND WINGWALLS
TYPES A, B AND C

NO SCALE

D90

STD. PLAN D90

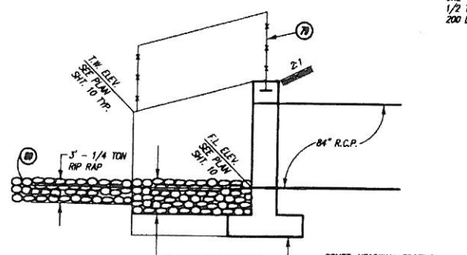


TRANSVERSE PIPE OUTLET X-SECT.

N.T.S.

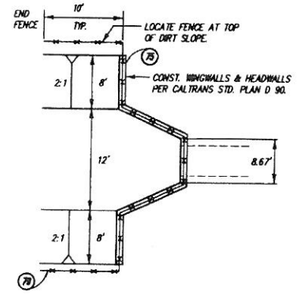
NOTE : GROUT SHALL NOT BE ALLOWED ABOVE FLOW LINE.

CALTRANS 1/2 TON ROCK:
PERCENT LARGER THAN:
ONE TON ROCK 0-5%
1/2 TON ROCK 50-100%
200 Lb. ROCK 95-100%



LONGITUDINAL PIPE OUTLET X-SECT.

N.T.S.



OUTLET TRANSITION GEOMETRY

N.T.S.

CONSTRUCTION NOTES

(75) CONST. OUTLET HEADWALL & WINGWALLS PER CALTRANS STD. PLAN D-90 AND DETAILS SHEET NO. 13

(78) INSTALL 6' CHAIN LINK SECURITY FENCE PER A.P.W.A. STD. PLAN NO 600-1

REGISTERED PROFESSIONAL ENGINEER
CARLOS A. ALBA
NO. 54843
Exp. 6-30-00
CIVIL
STATE OF CALIFORNIA

SD-1007

OWNER/ DEVELOPER:
STEADFAST PROPERTIES
2424 S.E. BRISTOL #350
NEWPORT BEACH, CA 92660
TEL : (949) 852-0700 FAX : (949) 852-0143

PREPARED UNDER THE SUPERVISION OF :
MR. CARLOS A. ALBA, R.C.E. 54843, EXP. 6-30-00

A.C.E. CIVIL ENGINEERING, INC.
3187-C AIRWAY AVENUE
COSTA MESA, CALIFORNIA 92626
TEL : (714) 641-3300 FAX : (714) 545 - 5823

DATE	BY	DESCRIPTION	APPV

REVISIONS

MASONRY RETAINING WALL
LAKE FOREST CORRIDOR CENTER, P.M. 98-109
EDP 98-01
20021 LAKE FOREST DRIVE
LAKE FOREST, CA. 92630

CITY OF LAKE FOREST
PUBLIC WORKS DEPARTMENT

SD-1007
SHEET 7 OF 7

09730/ 2108/ 1140

98-0118 \ SP13.DWG

SD-1007

DIST | COUNTY | ROUTE | POST MILE TOTAL PROJECT | SHEET NO. | TOTAL SHEETS

July 1, 1992
PLANS APPROVAL DATE

86

FILE: EXIST.WSW W S P G W - EDIT LISTING - Version 14.10 Date:10-11-2017 Time:11:17:54

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	3	0	.000	11.500	10.500	.000	.000	-3.94										
CD	2	4	1		5.000														
CD	3	4	1		4.000														
CD	4	3	0	.000	10.500	10.500	.000	.000	-3.94										
CD	5	4	1		2.000														
CD	6	4	1		7.500														

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

EXISTING F19S02-713, F19P06 & F19P07

HEADING LINE NO 2 IS -

OUTLET AT SOUTHWEST OF PROJECT BOUNDARY

HEADING LINE NO 3 IS -

W.O. #1443-136X

W S P G W PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	2226.000	631.840	1	638.000

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2240.000	632.500	1	.013	.000	.000	.000	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2514.000	642.450	1	.013	.000	.000	.000	0

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2558.440	644.064	1	.013	.000	.000	.000	0

ELEMENT NO 5 IS A JUNCTION * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	2558.450	644.065	1	2	0	.013	117.000	.000	645.310	.000	-45.000	.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2601.900	645.650	1	.013	.000	.000	.000	0

ELEMENT NO 7 IS A JUNCTION * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	2615.400	648.320	4	3	0	.013	187.000	.000	651.100	.000	-38.200	.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 8 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H

```
                          2633.120  648.720    4              .013                        .000     .000      .000     0
ELEMENT NO   9 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                      RADIUS    ANGLE     ANG PT  MAN H
                          2689.500  649.990    4              .013                      98.760   32.709      .000     0
ELEMENT NO  10 IS A JUNCTION         *         *     *     *              *                 *                *
                  U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                          2689.510  649.991    4     5     5   .013      .001      .001   657.000   656.840  45.000  -45.000
                                                                                          RADIUS    ANGLE
                                                                                            .000     .006
                                                      W S P G W                                                PAGE NO   3
                                WATER SURFACE PROFILE - ELEMENT CARD LISTING
ELEMENT NO  11 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                      RADIUS    ANGLE     ANG PT  MAN H
                          2716.800  650.590    4              .013                      76.066   20.556      .000     0
ELEMENT NO  12 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                      RADIUS    ANGLE     ANG PT  MAN H
                          2850.000  653.560    4              .013                     499.987  -15.264      .000     0
ELEMENT NO  13 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                      RADIUS    ANGLE     ANG PT  MAN H
                          2900.000  654.210    4              .013                     499.963   -5.730      .000     0
ELEMENT NO  14 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                      RADIUS    ANGLE     ANG PT  MAN H
                          2945.000  654.760    4              .013                     499.963   -5.157      .000     0
ELEMENT NO  15 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                      RADIUS    ANGLE     ANG PT  MAN H
                          3000.000  655.400    4              .013                     499.963   -6.303      .000     0
ELEMENT NO  16 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                      RADIUS    ANGLE     ANG PT  MAN H
                          3066.320  656.150    4              .013                     499.982   -7.600      .000     0
ELEMENT NO  17 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                      RADIUS    ANGLE     ANG PT  MAN H
                          3155.250  657.155    4              .013                       .000     .000      .000     0
ELEMENT NO  18 IS A JUNCTION         *         *     *     *              *                 *                *
                  U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                          3155.260  657.156    4     5     5   .013      .001      .001   658.580   658.580 -45.000   45.000
                                                                                          RADIUS    ANGLE
                                                                                            .000     .000
ELEMENT NO  19 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                      RADIUS    ANGLE     ANG PT  MAN H
                          3400.000  659.920    4              .013                       .000     .000      .000     0
ELEMENT NO  20 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                      RADIUS    ANGLE     ANG PT  MAN H
                          3505.250  661.500    4              .013                       .000     .000      .000     0
ELEMENT NO  21 IS A JUNCTION         *         *     *     *              *                 *                *
                  U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                          3505.260  661.510    4     5     5   .013      .001      .001   662.980   662.980 -45.000   45.000
                                                                                          RADIUS    ANGLE
                                                                                            .000     .000
```

W S P G W PAGE NO 4

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 22 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3600.000	662.920	4	.013	.000	.000	.000	0

ELEMENT NO 23 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3800.000	665.150	4	.013	.000	.000	.000	0

ELEMENT NO 24 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3805.970	665.180	4	.013	.000	.000	.000	0

ELEMENT NO 25 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3842.850	665.350	4	.013	200.007	10.565	.000	0

ELEMENT NO 26 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3850.850	666.080	4	.013	.000	.000	.000	0

ELEMENT NO 27 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3859.940	666.390	4	.013	.000	.000	.000	0

ELEMENT NO 28 IS A JUNCTION * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	3859.950	666.391	4	6	0	.013	1186.800	.000	666.740	.000	-30.000	.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 29 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3880.850	667.090	4	.013	.000	.000	.000	0

ELEMENT NO 30 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3940.850	668.560	4	.013	.000	.000	.000	0

ELEMENT NO 31 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	3940.850	668.560	4	668.560

FILE: EXIST.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 1

Program Package Serial Number: 7181

WATER SURFACE PROFILE LISTING Date:10-11-2017 Time:11:17:56

EXISTING F19S02-713, F19P06 & F19P07
OUTLET AT SOUTHWEST OF PROJECT BOUNDARY
W.O. #1443-136X

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	ZR	No Wth Prs/Pip	Type Ch
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall				
2226.000	631.840	6.045	637.885	2220.01	35.95	20.07	657.95	.00	11.32	10.50	11.500	10.500	.00	0	.0	
14.000	.0471					.0246	.34	6.05	2.61	4.79	.013	-3.94	.00			BOX
2240.000	632.500	6.100	638.600	2220.01	35.62	19.70	658.30	.00	11.32	10.50	11.500	10.500	.00	0	.0	
38.720	.0363					.0239	.92	6.10	2.58	5.26	.013	-3.94	.00			BOX
2278.720	633.906	6.187	640.093	2220.01	35.10	19.14	659.23	.00	11.32	10.50	11.500	10.500	.00	0	.0	
101.293	.0363					.0220	2.23	6.19	2.52	5.26	.013	-3.94	.00			BOX
2380.013	637.584	6.481	644.065	2220.01	33.47	17.40	661.46	.00	11.32	10.50	11.500	10.500	.00	0	.0	
75.617	.0363					.0195	1.47	6.48	2.35	5.26	.013	-3.94	.00			BOX
2455.629	640.330	6.789	647.120	2220.01	31.91	15.81	662.93	.00	11.32	10.50	11.500	10.500	.00	0	.0	
58.371	.0363					.0172	1.01	6.79	2.18	5.26	.013	-3.94	.00			BOX
2514.000	642.450	7.113	649.563	2220.01	30.43	14.38	663.94	.00	11.32	10.50	11.500	10.500	.00	0	.0	
44.440	.0363					.0153	.68	7.11	2.03	5.26	.013	-3.94	.00			BOX
2558.440	644.064	7.439	651.503	2220.01	29.06	13.11	664.62	.00	11.32	10.50	11.500	10.500	.00	0	.0	
JUNCT STR	.0976					.0163	.00	7.44	1.90		.013	-3.94	.00			BOX
2558.450	644.065	6.536	650.601	2103.01	31.43	15.34	665.94	.00	10.93	10.50	11.500	10.500	.00	0	.0	
43.450	.0365					.0173	.75	6.54	2.19	5.05	.013	-3.94	.00			BOX
2601.900	645.650	6.769	652.419	2103.01	30.32	14.28	666.70	.00	10.93	10.50	11.500	10.500	.00	0	.0	
JUNCT STR	.1978					.0161	.22	6.77	2.08		.013	-3.94	.00			BOX

FILE: EXIST.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 2

Program Package Serial Number: 7181

WATER SURFACE PROFILE LISTING Date:10-11-2017 Time:11:17:56

EXISTING F19S02-713, F19P06 & F19P07
OUTLET AT SOUTHWEST OF PROJECT BOUNDARY
W.O. #1443-136X

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	ZR	No Wth Prs/Pip	Type Ch
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall				
2615.400	648.320	6.427	654.747	1916.01	29.14	13.18	667.93	.00	10.28	10.50	10.500	10.500	.00	0	.0	
17.720	.0226					.0156	.28	6.43	2.05	5.62	.013	-3.94	.00	BOX		
2633.120	648.720	6.466	655.186	1916.01	28.96	13.02	668.21	2.77	10.28	10.50	10.500	10.500	.00	0	.0	
56.380	.0225					.0151	.85	9.23	2.03	5.63	.013	-3.94	.00	BOX		
2689.500	649.990	6.606	656.596	1916.01	28.33	12.46	669.06	.00	10.28	10.50	10.500	10.500	.00	0	.0	
JUNCT STR	.1037					.0146	.00	10.05	1.97		.013	-3.94	.00	BOX		
2689.510	649.991	6.607	656.598	1916.00	28.32	12.46	669.05	3.44	10.28	10.50	10.500	10.500	.00	0	.0	
27.290	.0219					.0144	.39	10.05	1.97	5.68	.013	-3.94	.00	BOX		
2716.800	650.590	6.680	657.270	1916.00	28.01	12.18	669.45	.51	10.28	10.50	10.500	10.500	.00	0	.0	
61.546	.0223					.0137	.84	7.19	1.93	5.65	.013	-3.94	.00	BOX		
2778.346	651.962	6.886	658.849	1916.00	27.15	11.44	670.29	.48	10.28	10.50	10.500	10.500	.00	0	.0	
71.654	.0223					.0124	.89	7.37	1.85	5.65	.013	-3.94	.00	BOX		
2850.000	653.560	7.215	660.774	1916.00	25.88	10.40	671.18	.44	10.28	10.50	10.500	10.500	.00	0	.0	
50.000	.0130					.0115	.58	7.65	1.72	6.91	.013	-3.94	.00	BOX		
2900.000	654.210	7.253	661.463	1916.00	25.74	10.29	671.75	.43	10.28	10.50	10.500	10.500	.00	0	.0	
45.000	.0122					.0114	.51	7.68	1.70	7.07	.013	-3.94	.00	BOX		
2945.000	654.760	7.272	662.032	1916.00	25.67	10.23	672.27	.43	10.28	10.50	10.500	10.500	.00	0	.0	
55.000	.0116					.0113	.62	7.70	1.70	7.21	.013	-3.94	.00	BOX		

FILE: EXIST.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 3

Program Package Serial Number: 7181

WATER SURFACE PROFILE LISTING Date:10-11-2017 Time:11:17:56

EXISTING F19S02-713, F19P06 & F19P07
OUTLET AT SOUTHWEST OF PROJECT BOUNDARY
W.O. #1443-136X

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
3000.000	655.400	7.280	662.680	1916.00	25.64	10.21	672.89	.43	10.28	10.50	10.500	10.500	.00	0 .0
66.320	.0113					.0113	.75	7.71	1.69	7.29	.013	-3.94	.00	BOX
3066.320	656.150	7.278	663.428	1916.00	25.65	10.22	673.64	.00	10.28	10.50	10.500	10.500	.00	0 .0
88.930	.0113					.0113	1.01	7.28	1.69	7.29	.013	-3.94	.00	BOX
3155.250	657.155	7.276	664.431	1916.00	25.66	10.22	674.65	.00	10.28	10.50	10.500	10.500	.00	0 .0
JUNCT STR	.0976					.0113	.00	7.28	1.70		.013	-3.94	.00	BOX
3155.260	657.156	7.277	664.433	1916.00	25.65	10.22	674.65	.00	10.28	10.50	10.500	10.500	.00	0 .0
244.740	.0113					.0114	2.78	7.28	1.70	7.29	.013	-3.94	.00	BOX
3400.000	659.920	7.268	667.188	1916.00	25.69	10.24	677.43	.00	10.28	10.50	10.500	10.500	.00	0 .0
105.250	.0150					.0109	1.15	7.27	1.70	6.54	.013	-3.94	.00	BOX
3505.250	661.500	7.516	669.016	1916.00	24.82	9.56	678.58	.00	10.28	10.50	10.500	10.500	.00	0 .0
JUNCT STR	1.0000					.0104	.00	7.52	1.61		.013	-3.94	.00	BOX
3505.260	661.510	7.523	669.033	1916.00	24.80	9.55	678.58	.00	10.28	10.50	10.500	10.500	.00	0 .0
94.740	.0149					.0098	.93	7.52	1.61	6.57	.013	-3.94	.00	BOX
3600.000	662.920	7.857	670.777	1916.00	23.72	8.74	679.51	.00	10.28	10.50	10.500	10.500	.00	0 .0
44.659	.0112					.0092	.41	7.86	1.51	7.33	.013	-3.94	.00	BOX
3644.659	663.418	7.927	671.345	1916.00	23.51	8.58	679.92	.00	10.28	10.50	10.500	10.500	.00	0 .0
155.341	.0112					.0086	1.33	7.93	1.49	7.33	.013	-3.94	.00	BOX

FILE: EXIST.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 4

Program Package Serial Number: 7181

WATER SURFACE PROFILE LISTING Date:10-11-2017 Time:11:17:56

EXISTING F19S02-713, F19P06 & F19P07
OUTLET AT SOUTHWEST OF PROJECT BOUNDARY
W.O. #1443-136X

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
3800.000	665.150	8.306	673.456	1916.00	22.41	7.80	681.26	.00	10.28	10.50	10.500	10.500	.00	0 .0
5.970	.0050					.0081	.05	8.31	1.38	10.01	.013	-3.94	.00	BOX
3805.970	665.180	8.286	673.466	1916.00	22.47	7.84	681.30	.41	10.28	10.50	10.500	10.500	.00	0 .0
36.880	.0046					.0083	.31	8.70	1.39	10.36	.013	-3.94	.00	BOX
3842.850	665.350	8.148	673.498	1916.00	22.86	8.11	681.61	.00	10.28	10.50	10.500	10.500	.00	0 .0
1.324	.0913					.0083	.01	8.15	1.43	3.44	.013	-3.94	.00	BOX
3844.174	665.471	8.259	673.729	1916.00	22.54	7.89	681.62	.00	10.28	10.50	10.500	10.500	.00	0 .0
3.858	.0913					.0077	.03	8.26	1.40	3.44	.013	-3.94	.00	BOX
3848.032	665.823	8.654	674.477	1916.00	21.49	7.17	681.65	.00	10.28	10.50	10.500	10.500	.00	0 .0
2.818	.0913					.0068	.02	8.65	1.30	3.44	.013	-3.94	.00	BOX
3850.850	666.080	9.068	675.148	1916.00	20.49	6.52	681.67	.00	10.28	10.50	10.500	10.500	.00	0 .0
4.088	.0341					.0062	.03	9.07	1.21	4.84	.013	-3.94	.00	BOX
3854.938	666.219	9.355	675.574	1916.00	19.85	6.12	681.70	.00	10.28	10.50	10.500	10.500	.00	0 .0
3.787	.0341					.0056	.02	9.36	1.15	4.84	.013	-3.94	.00	BOX
3858.725	666.349	9.804	676.152	1916.00	18.93	5.56	681.72	.00	10.28	10.50	10.500	10.500	.00	0 .0
1.215	.0341					.0050	.01	9.80	1.07	4.84	.013	-3.94	.00	BOX

---------- WARNING - Flow depth near top of box conduit ----------

FILE: EXIST.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 5

Program Package Serial Number: 7181

WATER SURFACE PROFILE LISTING Date:10-11-2017 Time:11:17:56

EXISTING F19S02-713, F19P06 & F19P07
OUTLET AT SOUTHWEST OF PROJECT BOUNDARY
W.O. #1443-136X

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
3859.940	666.390	10.275	676.665	1916.00	18.05	5.06	681.72	.00	10.28	10.50	10.500	10.500	.00	0 .0
JUNCT STR	.0976					.0009	.00	10.28	1.00		.013	-3.94	.00	BOX
---------- WARNING - Flow depth near top of box conduit ----------														
3859.950	666.391	14.673	681.064	729.20	6.51	.66	681.72	.00	5.48	10.50	10.500	10.500	.00	0 .0
20.900	.0334					.0009	.02	14.67	.35	2.53	.013	-3.94	.00	BOX
3880.850	667.090	13.993	681.083	729.20	6.51	.66	681.74	.00	5.48	10.50	10.500	10.500	.00	0 .0
60.000	.0245					.0009	.05	13.99	.35	2.80	.013	-3.94	.00	BOX
3940.850	668.560	12.575	681.135	729.20	6.51	.66	681.79	.00	5.48	10.50	10.500	10.500	.00	0 .0

LEGEND

- REGIONAL DRAINAGE AREA BOUNDARY
- SUBAREA DRAINAGE BOUNDARY
- FLOWPATH
- 1.23 — CONCENTRATION POINT AND NUMBER
- 5,100 cfs — 100-YEAR HIGH CONFIDENCE PEAK DISCHARGE
- 4,332 ac — ACCUMLATED ACREAGE
- LAND USE
  - COMMERCIAL
  - APARTMENTS
  - 8-10 DWELLING UNITS / ACRE
  - 5-7 DWELLING UNITS / ACRE
  - PUBLIC PARK
  - NATURAL - OPEN BRUSH
- D — SOIL GROUP BOUNDARY AND DESIGNATION
- 420 — CONTOUR LINE AND ELEVATION

0' 1000'

766.1
766.2
765
1.01
1.02
1.03
1.04
1.05
1.06
1.07
1.08
1.09
1.10
1,850 cfs
857 ac
1.11
1,950 cfs
1,020 ac
2,150 cfs
1,139 ac
1.12
1.13
1.14
2,350 cfs
1,281 ac
2,350 cfs
1,299 ac
3,550 cfs
2,213 ac
1.15
1.16
3,900 cfs
2,452 ac
1.17
3,950 cfs
2,612 ac
1.18
4,000 cfs
2,835 ac
1.19
4,700 cfs
3,643 ac
1.20
4,850 cfs
3,885 ac
1.21
4,850 cfs
3,932 ac
1.22
5,100 cfs
4,332 ac
1.23
5,100 cfs
4,332 ac

F19
F19S02
F19S
F05

SANTIAGO CANYON ROAD
SERRANO CREEK
ALTON FOOTHILL PKWY
PORTOLA PKWY
TRANSPORTATION CORRIDOR
GLENN RANCH RD
BAKE PKWY
RANCHO DIMENSION DR
FOREST VISTA TERRACE
LAKE REGENCY LN
LAKE FOREST DR
TRABUCO RD
TOLEDO PKWY
JERONIMO BLVD
MUIRLANDS BLVD
RICKENBACKER BLVD
RESEARCH CENTER PKWY
IRVINE BLVD
SAN DIEGO FRWY
SANTA ANA FRWY
BARRANCA PKWY
OCTA METROLINK RR
MARINE CORPS AIR STATION
RIDGE ROUTE DR

COUNTY OF ORANGE
OC PUBLIC WORKS / FLOOD CONTROL

HYDROLOGY REPORT NO. F19-3

SERRANO CREEK FACILITY NO. F19

ENTIRE DRAINAGE SYSTEM

DRAINAGE AREA, LAND USE, AND SOIL GROUPS MAP

JULY 2014 | EXHIBIT 1

INITIAL STUDY

NAKASE NURSERY/TOLL BROTHERS PROJECT

Prepared for:

City of Lake Forest
Development Services Department
25550 Commercentre Drive, Suite 100
Lake Forest, California 92630
(949) 461-3449
(949) 461-3511 (Fax)
http://www.lakeforestca.gov/

Prepared by:

LSA
20 Executive Park, Suite 200
Irvine, California 92614
(949) 553-0666

July 2018

This page intentionally left blank

TABLE OF CONTENTS

1.0 INTRODUCTION 1-1

1.1 Contact Person 1-1

2.0 PROJECT DESCRIPTION 2-1

2.1 Existing Project Site 2-1
2.1.1 Regional Location 2-1
2.1.2 Project Vicinity and Surrounding Land Uses 2-1
2.1.3 Existing Project Site Conditions and Land Use Designations 2-1
2.1.4 Project Site History 2-11
2.2 Proposed Project 2-17
2.2.1 Area Plan Regulations 2-17
2.2.2 Project Overview 2-29
2.2.3 Implementation/Phasing 2-30
2.3 Required Permits and Approvals 2-30
2.3.1 Discretionary Actions 2-30
2.3.2 Other Ministerial City Actions 2-31
2.3.3 Probable Future Actions by Responsible Agencies 2-31

3.0 ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED AND ENVIRONMENTAL DETERMINATION 3-1

4.0 EVALUATION OF ENVIRONMENTAL IMPACTS 4-1

4.1 Aesthetics 4-2
4.2 Agriculture and Forestry 4-8
4.3 Air Quality 4-10
4.4 Biological Resources 4-13
4.5 Cultural Resources 4-16
4.6 Geology and Soils 4-18
4.7 Greenhouse Gas Emissions 4-21
4.8 Hazards and Hazardous Materials 4-22
4.9 Hydrology and Water Quality 4-25
4.10 Land Use and Planning 4-32
4.11 Mineral Resources 4-34
4.12 Noise 4-36
4.13 Population and Housing 4-38
4.14 Public Services 4-39
4.15 Recreation 4-41
4.16 Circulation and Parking 4-42
4.17 Tribal Cultural Resources 4-44
4.18 Utilities and Service Systems 4-46
4.19 Mandatory Findings of Significance 4-49

5.0 REFERENCES 5-1

FIGURES AND TABLES

FIGURES

Figure 2.1: Regional Project Location 2-3
Figure 2.2: Project Vicinity 2-5
Figure 2.3: Surrounding Land Uses 2-7
Figure 2.4: Existing Site Photos 2-9
Figure 2.5: General Plan Land Use and Business Development Overlay 2-13
Figure 2.6: Zoning Map 2-15
Figure 2.7: Conceptual Land Use Plan 2-19
Figure 2.8: Conceptual Landscape Plan 2-23
Figure 2.9: Conceptual Circulation Plan 2-25

TABLE

Table 2.A: Project Parking 2-27
Table 2.B: Probable Future Actions by Responsible Agencies 2-31

LIST OF ACRONYMS

AAQS	ambient air quality standard
AB	Assembly Bill
ac	acre/acres
APN	Assessor's Parcel Number
AQMP	Air Quality Management Plan
Area Plan	Nakase Property Area Plan
BDO	Business Development Overlay
BMP	best management practice
CALGreen	California Green Building Code
California Register	California Register of Historical Resources
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
City	City of Lake Forest
CNEL	Community Noise Equivalent Level
dB	decibels
EIR	Environmental Impact Report
EV	electric vehicle
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
ft	foot/feet
GHG	greenhouse gas
GPA	General Plan Amendment
GWR	groundwater recharge
HCP	Habitat Conservation Plan
HVAC	heating, ventilation, and air conditioning
I-5	Interstate 5
ICU	intersection capacity utilization

IRWD	Irvine Ranch Water District
LED	light-emitting diode
LOMR	Letter of Map Revision
MBTA	Migratory Bird Treaty Act
MCAS	Marine Corps Air Station
mi	mile/miles
MRZ	Mineral Resource Zone
MWRP	Michelson Water Reclamation Plant
NCCP	Natural Community Conservation Plan
OCFA	Orange County Fire Authority
OCPL	Orange County Public Library
OCWD	Orange County Water District
OSA	Opportunity Study Area
POTWs	publicly owned treatment works
PRC	Public Resources Code
Project	Nakase Nursery/Toll Brothers Project
REC1	water contact recreation
REC2	non-contact water recreation
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SCAQMD	South Coast Air Quality Management District
SCCIC	South Central Coastal Information Center
SCE	Southern California Edison
SEER	Seasonal Energy Efficiency Ratio
SR-241	State Route 241
SWPPP	Storm Water Pollution Prevention Plan
USC	United States Code
USFWS	United States Fish and Wildlife Service
WARM	warm freshwater habitat
WDR	Waste Discharge Requirements
WILD	wildlife habitat

Williamson Act	California Land Conservation Act of 1965
WQMP	Water Quality Management Plan

This page intentionally left blank

1.0 INTRODUCTION

In accordance with the California Environmental Quality Act (CEQA), the State CEQA Guidelines, the City of Lake Forest's (City) Local CEQA Guidelines, and the City's CEQA Significance Thresholds Guide (March 2009), this Initial Study has been prepared for the proposed Nakase Nursery/Toll Brothers Project (Project) in the City of Lake Forest. Pursuant to Section 15063(a) of the State CEQA Guidelines, the City is required to undertake the preparation of an Initial Study to determine whether the proposed action will have a significant effect on the environment. The purposes of this Initial Study are to: (1) identify potential environmental impacts, (2) provide the Lead Agency with information to use as the basis for deciding whether to prepare an Environmental Impact Report (EIR) or Negative Declaration, (3) enable the Lead Agency to modify the Project (through mitigation of adverse impacts), (4) facilitate assessment of potential environmental impacts early in the design of the Project, and (5) provide documentation for the potential finding that the Project will not have a significant effect on the environment or can be mitigated to a level of insignificance (CEQA Guidelines, Section 15063[c]). This Initial Study is also an informational document providing an environmental basis for subsequent discretionary actions that could be required from other Responsible Agencies.

This Initial Study evaluates the potential environmental impacts that may result from development of the Project. Consistent with State CEQA Guidelines Section 15050, the City is the Lead Agency under CEQA, and it is responsible for adoption or certification of the environmental document and approval of the Project.

1.1 CONTACT PERSON

Any questions or comments regarding the preparation of this Initial Study, its assumptions, or its conclusions should be referred to:

Marie Luna
City of Lake Forest
Development Services Department
25550 Commercentre Drive, Suite 100
Lake Forest, California 92630
(949) 461-3449 (tel)
(949) 461-3511 (fax)
mluna@lakeforestca.gov

This page intentionally left blank

2.0 PROJECT DESCRIPTION

2.1 EXISTING PROJECT SITE

2.1.1 Regional Location

The Nakase property (Project Site) is located in the north-central portion of the City of Lake Forest in Orange County, California. As shown on Figure 2.1, regional access to the Project Site is provided by State Route 241 (SR-241), which is located approximately 0.07 mile (mi) northeast of the Project Site, and Interstate 5 (I-5), which is located approximately 3.8 mi southwest of the Project Site.

2.1.2 Project Vicinity and Surrounding Land Uses

The 122-acre (ac) Project Site (Assessor's Parcel Number [APN] 612-221-01) is currently operating as the Nakase Brothers Wholesale Nurseries, an agricultural wholesale plant nursery. Refer to Figure 2.2 for the Project vicinity.

The areas surrounding the Project Site consist of a mix land uses, including commercial, office, open space, industrial, and residential. The Project Site is bounded on the northwest by Bake Parkway, on the northeast by Rancho Parkway, on the southeast by Serrano Creek Trail, and on the southwest by commercial, industrial, and office uses, with Dimension Drive beyond. Although not immediately adjacent to the Project Site, single-family and multifamily residential uses exist to the northwest, northeast, and south of the Project Site. As noted above, SR-241 is approximately 0.07 mi northeast of the Project Site. Surrounding land uses are shown on Figure 2.3.

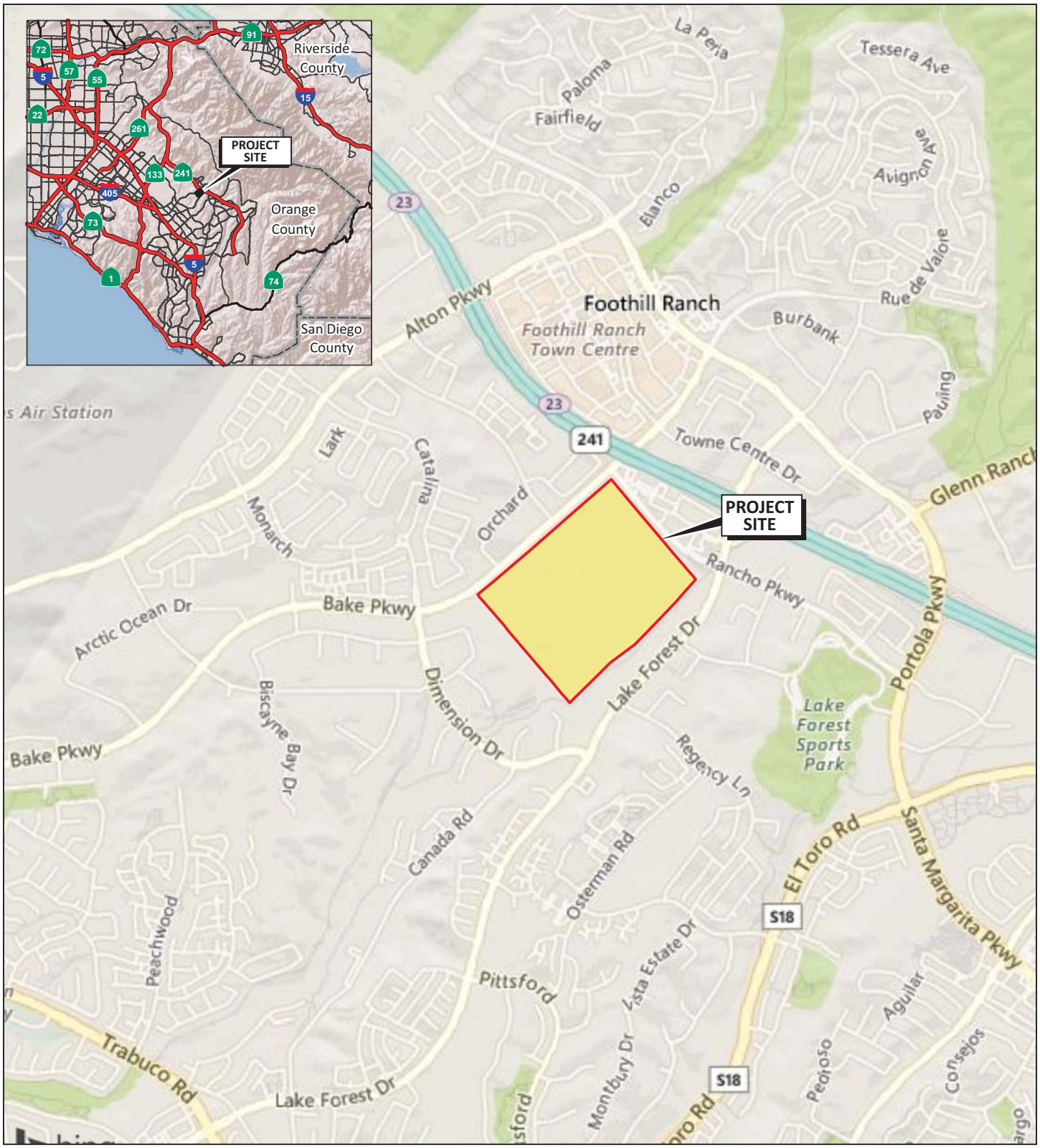
Residential planned communities in the vicinity of the Project Site include the Foothill Ranch Planned Community (PC 8) to the north, the Portola Hills Planned Community (PC 9) to the northeast, the Baker Ranch Planned Community (PC 7) to the west, and the Rancho de Los Alisos Planned Community (PC 3) to the southeast.

2.1.3 Existing Project Site Conditions and Land Use Designations

The Project Site is currently developed with multiple structures used for nursery operations, an office trailer, and a gravel parking lot that is used for trailer storage and staff parking near the center of the Project Site. Figure 2.4 provides photographs of existing conditions on the Project Site.

In the existing condition, there is one vehicular access point to the Project Site via a non-exclusive easement between adjacent properties to the south. The easement extends from Lake Forest Drive, directly north of Dimension Drive, to the southernmost point of the Project Site. Manufactured landscape slopes, chain-link fences, and block walls enclose the Project Site. In addition, several mature trees line the northeastern and southeastern boundaries of the Project Site.

This page intentionally left blank



LSA

FIGURE 2.1

N

0 1000 2000

FEET

SOURCE: Bing Maps

Nakase Nursery/Toll Brothers

Regional Project Location

I:\CLF1801\G\Regional Location.cdr (5/4/2018)

This page intentionally left blank

LSA

FIGURE 2.2

N

0 500 1000

FEET

SOURCE: Bing Maps

Nakase Nursery/Toll Brothers

Project Vicinity

I:\CLF1801\G\Project Vicinity.cdr (4/26/2018)

This page intentionally left blank

LSA

LEGEND

Project Site

LandUse

- Single Family Residential
- Multi-Family Residential
- General Office
- Commercial and Services
- Institutional
- Industrial
- Transportation, Communications, and Utilities
- Mixed Commercial and Industrial
- Open Space and Recreation
- Agriculture

N

0 325 650
FEET

SOURCE: Bing (2017)

I:\CLF1801\GIS\LandUse.mxd (5/4/2018)

FIGURE 2.3

Nakase Nursery/Toll Brothers

Existing Land Uses

This page intentionally left blank

View facing south from Bake Parkway.

View facing east from Bake Parkway.

View facing south from Rancho Parkway.

View facing west from Rancho Parkway.

LSA

FIGURE 2.4

Nakase Nursery/Toll Brothers

Existing Site Photos

I:\CLF1801\G\Existing Site Photos.cdr (5/2/2018)

This page intentionally left blank

The City's General Plan designates the Project Site as Business Park and Business Development Overlay (BDO). The Business Park land use designation is intended to provide a mix of uses as allowed under the Commercial, Professional Office, and Light Industrial designations. The Business Park designation does not provide for agricultural uses. Thus, the existing land use is inconsistent with the current Business Park designation of the Project Site.

The BDO designation applies to all areas designated for Commercial, Professional Office, Business Park, and Light Industrial land uses, and is intended to provide a balance of land uses that contribute to the future financial success of the City. No proposed land use designation changes within the BDO may result in a loss of future net revenue for the City.[1] Refer to Figure 2.5 for the Project Site's location in relation to the City's General Plan Land Use Map and the BDO.

The Project Site currently has a zoning designation of General Agriculture (A-1), which is intended to provide for agriculture, outdoor recreational uses, and other low-intensity uses requiring open space. Refer to Figure 2.6 for the Project Site's location in relation to the City's Zoning Map.

2.1.4 Project Site History

Historically, the Project Site has been used primarily for agriculture production. From 1938 through the late 1960s, the Nakase Nursery was developed with orchards. In the late 1960s, the northwestern portion of the Project Site continued operation as an orchard while the remainder of the Project Site was developed as a plant nursery. In 1988, the orchards were removed, and the entire Project Site has been used as an agricultural wholesale plant nursery since the 1990s.

The previous site of the El Toro Marine Corps Air Station (MCAS) is located in the City of Irvine, approximately 5 mi west of the Project Site. The El Toro MCAS was in operation from 1943 to 1999. In 2007, the El Toro MCAS site was redeveloped as the Orange County Great Park, located at 6950 Marine Way.[2] When the El Toro MCAS was in use, the Project Site fell within the 65-decibel (dB) Community Noise Equivalent Level (CNEL) noise contour, which restricted residential uses on the property.

After the El Toro MCAS was decommissioned in 1999, the City authorized the Opportunity Study Area (OSA), which was intended to identify potential land uses for properties that previously fell under the 65 dB CNEL noise contour. Approximately 838 ac of undeveloped properties were analyzed under the OSA, and the City initiated a General Plan Amendment (GPA) to allow the properties to change their land use designation to residential, mixed uses, and parks. However, owners of the Nakase property declined to participate in the OSA, thereby retaining the commercial and light industrial land use designation that currently characterizes the Project Site. Following approval of the GPA, properties to the north and west of the Project Site have been developed with new residential projects, including the Portola Hills and Baker Ranch Planned Communities.

1 City of Lake Forest General Plan. Land Use Element. June 1994 (revised September 2016).

2 Orange County Register. History of the El Toro Marine Corps air base and the Great Park project. January 6, 2006. Website: https://www.ocregister.com/2006/01/06/history-of-the-el-toro-marine-corps-air-base-and-the-great-park-project/, accessed July 3, 2018.

This page intentionally left blank

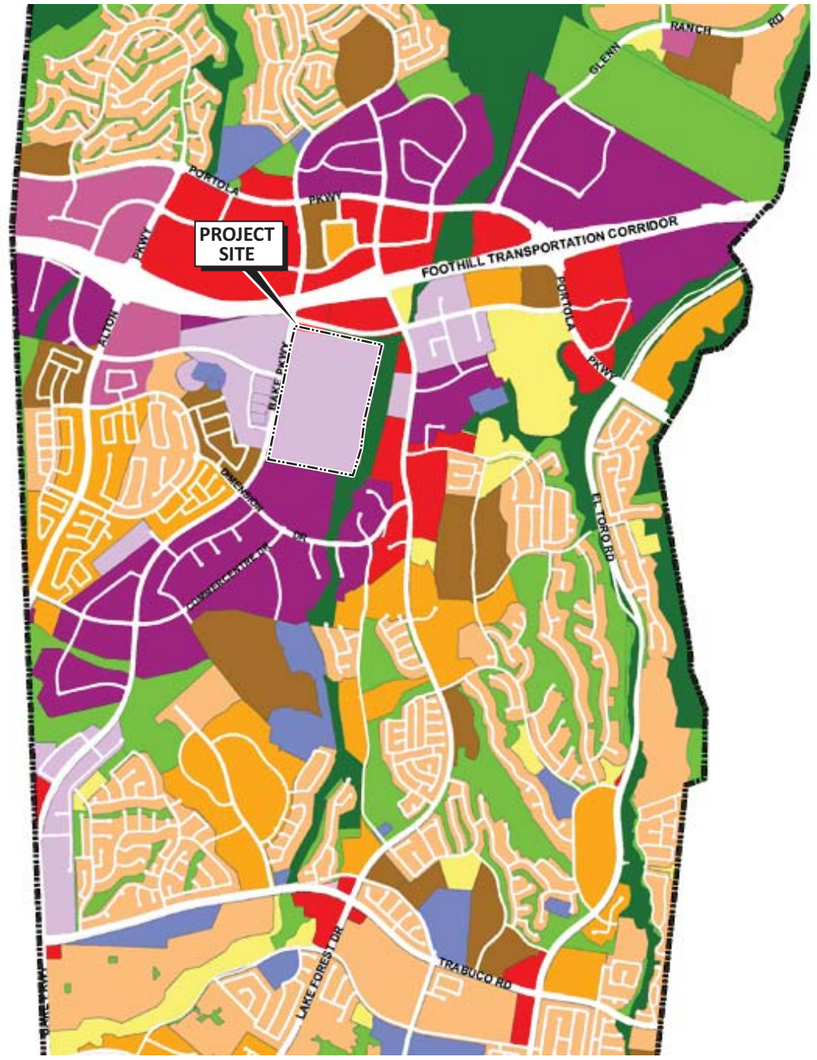
Land Use Designations

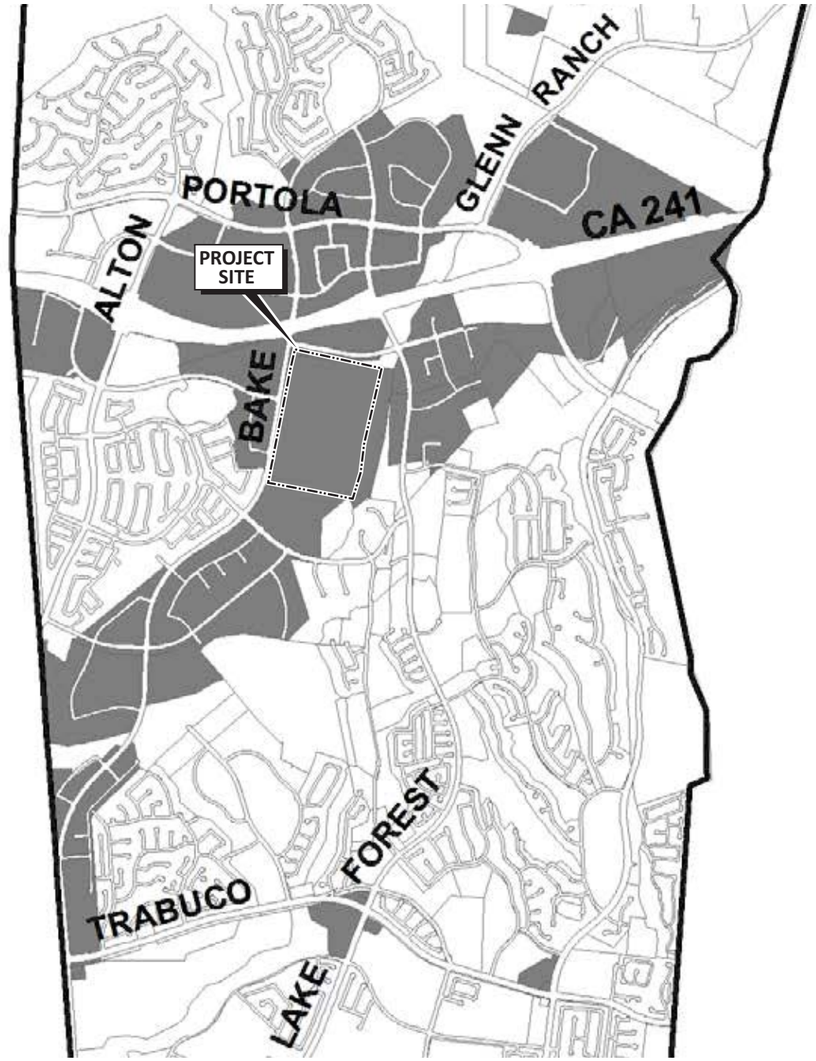
Residential Designations

- Very Low Density Residential (0 to 2 DUs/Net AC)
- Low Density Residential (2 to 7 DUs/Net AC)
- Low-Medium Density Residential (7 to 15 DUs/Net AC)
- Medium Density Residential (15 to 25 DUs/Net AC)
- High Density Residential (25 to 43 DUs/ Net AC)

Non-Residential Designations

- Commercial
- Professional Office
- Mixed-Use
- Business Park
- Light Industrial
- Public Facility
- Community Park/Open Space
- Regional Park/Open Space
- Open Space
- Lake
- Transportation Corridor
- City Boundary





Business Development Overlay

LSA

FIGURE 2.5

N

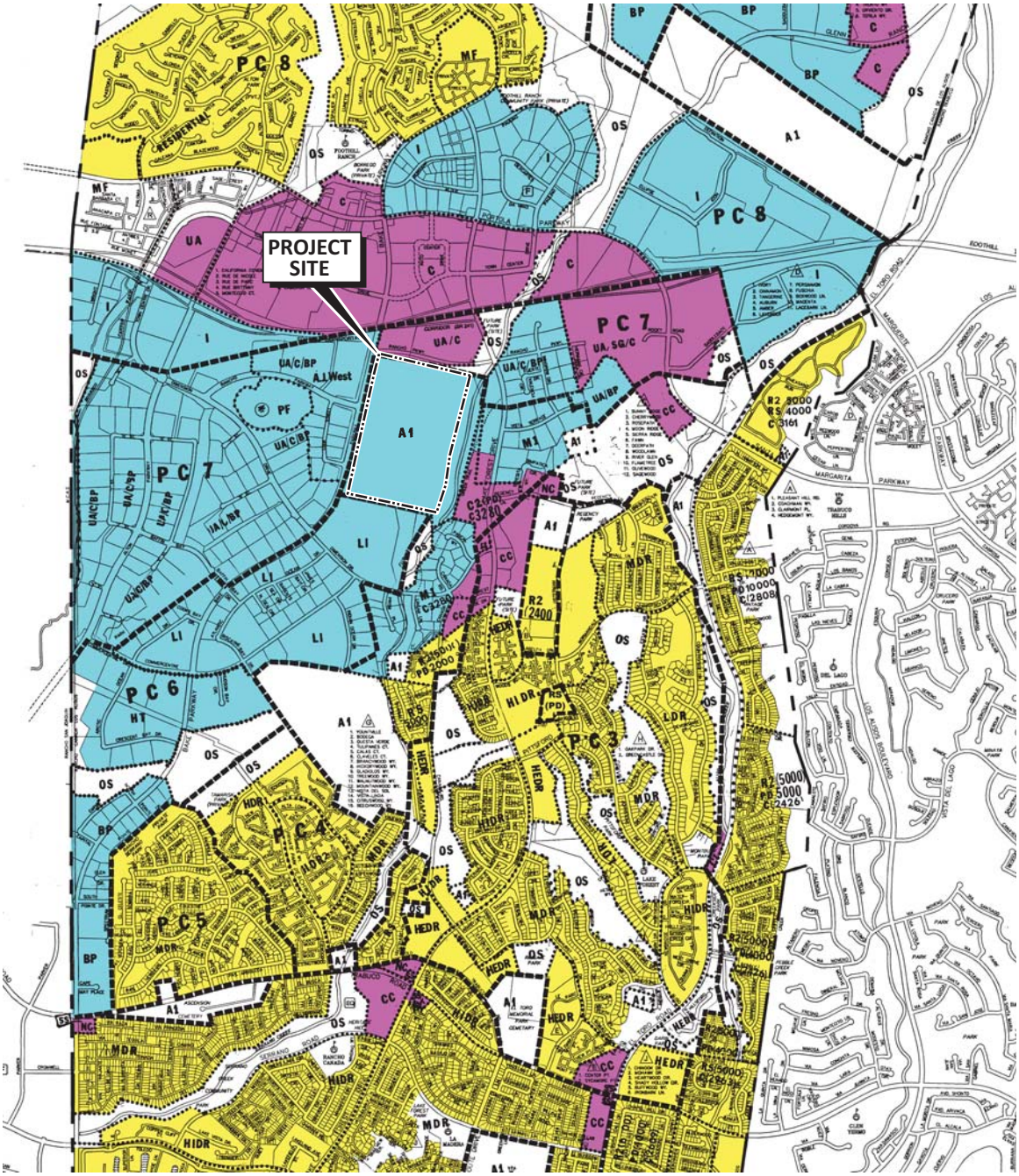
0 1500 3000
FEET

SOURCE: City of Lake Forest

I:\CLF1801\G\GPLU & BD Overlay.cdr (5/4/2018)

Nakase Nursery/Toll Brothers
General Plan Land Use and
Business Development Overlay

This page intentionally left blank



Zoning Designations

- Residential
- Commercial
- Industrial

LSA

FIGURE 2.6

N

0 1500 3000

FEET

SOURCE: City of Lake Forest

I:\CLF1801\G\Zoning.cdr (5/4/2018)

Nakase Nursery/Toll Brothers
Zoning Map

This page intentionally left blank

2.2 PROPOSED PROJECT

2.2.1 Area Plan Regulations

2.2.1.1 Land Use Plan

The Project proposes the approval of the "Nakase Property Area Plan" (referred to hereafter as the Area Plan and/or the Project), which would facilitate the development of the 122 ac Project Site as a master planned community. The planned community would be consistent with neighboring developments and reflect the vision of the City, while also demonstrating a distinct community character and establishing a sense of place.

The Area Plan would establish guidelines for the future development of the planned community, which would consist of single-family residential units (contained in five distinct neighborhoods), affordable housing units for senior citizens, an elementary school, parks and open space, an internal circulation system, and a multipurpose water quality basin. Refer to Figure 2.7 for the Conceptual Land Use Plan.

The Project proposes up to 675 two- and three-story, single-family residential units on approximately 61.4 ac of the Project Site. Five separate neighborhoods would each display a distinct style of single-family home, referred to as Garden Clusters, Sky Terraces, eHomes, Cottage Homes, and Traditional Single-Family Homes.

To meet the City's affordable housing policy as stipulated in the Housing Element (2014), up to 101 senior affordable housing units[1] would be constructed on 3.9 ac. The units would be available for rent, and the building would be two to three stories, with access provided by an elevator.

The proposed elementary school would accommodate up to 1,000 students from kindergarten through sixth grade. The school site would be located on the northeastern portion of the Project Site at the corner of Bake Parkway and Rancho Parkway.

2.2.1.2 Parks, Recreation, and Open Space

The Area Plan provides for over 28 ac of parks, open space, and habitat restoration area. The Project includes the creation of a 4.8 ac park (referred to as "Central Park") in the central area of the Project Site. A private community clubhouse and recreational facility, including pools, cabanas, multipurpose rooms, barbeques, and entertainment areas, would be provided within Central Park for use by residents. In addition, each of the five neighborhoods within the Area Plan would include a park, totaling 1.8 ac. As part of the school site, 4.0 ac of sporting fields and active play areas would be incorporated for use by students.

[1] The total number of senior affordable housing units would equal approximately 15 percent of the number of approved single-family homes.

This page intentionally left blank

LSA

FIGURE 2.7

N

0 250 500

FEET

SOURCE: Hunsaker & Associates

Nakase Nursery/Toll Brothers

Conceptual Land Use Plan

I:\CLF1801\G\Concept_Land_Use.cdr (7/9/2018)

This page intentionally left blank

Adjacent to the Serrano Creek Trail along the southeastern portion of the Project Site, a proposed open space and habitat restoration area would total 10.4 ac. As shown on Figure 2.7, designated off-street bicycle and pedestrian paths would extend along the Project's collector streets, with a connection to the Serrano Creek Trail in the southern corner of the Project Site. The Project includes 7.1 ac of parks and open space within the Project's parkways, medians, and multipurpose water quality basin.

2.2.1.3 Landscaping

As illustrated on Figure 2.8, the Project would incorporate ornamental landscaping along Bake Parkway, Rancho Parkway, the Project Site's southern boundaries, the internal access road, and throughout the Project Site. Landscaping would include a variety of drought tolerant plants as specified in the Area Plan's Community Plant Material Guidelines. A multipurpose water quality basin would be located on the southwestern portion of the Project Site.

2.2.1.4 Circulation

Three locations would provide access to the Project Site: two entries at Bake Parkway and one entry at Rancho Parkway. The two entries at Bake Parkway would line up with the existing roads (Rancho Parkway South and Orchard Street), thereby improving connectivity in the Project's vicinity. Rancho Parkway would provide access to the commercial center north of the Project Site. Additionally, the Project proposes to widen Bake Parkway at each of the Project Site entries to provide northbound right-turn lanes. Southbound turn lanes will extend from Bake Parkway to the Project's main entry. Rancho Parkway would also be widened at the Project Site entry to provide an eastbound right-turn lane and a westbound left-turn lane. No left turns would be allowed into the Project from the secondary entry on Bake Parkway. Refer to Figure 2.9 for the Conceptual Circulation Plan.

The proposed internal circulation system consists of three collector streets that would connect to smaller neighborhood streets. Street medians and parkways (totaling 3.2 ac) are proposed along the collector roads. As noted above, designated off-street bicycle and pedestrian paths would extend along the collector streets and the perimeter of Central Park that would ultimately connect to the Serrano Creek Trail from the southeastern Project Site boundary.

2.2.1.5 Parking

The City's Municipal Code (Chapter 9.168, Off-Street Parking) stipulates parking requirements for residential and school uses. In the event the Project is fully built out to the maximum number of residential units proposed, the City would require a minimum of 2,260 parking spaces. In addition, a minimum of 100 parking spaces would be required for the school site. There are no parking requirements for recreational uses, including parks. Table 2.A shows the City's minimum parking requirements and the distribution of parking proposed as part of the Project.

This page intentionally left blank

LSA

FIGURE 2.8

N

0 160 320

FEET

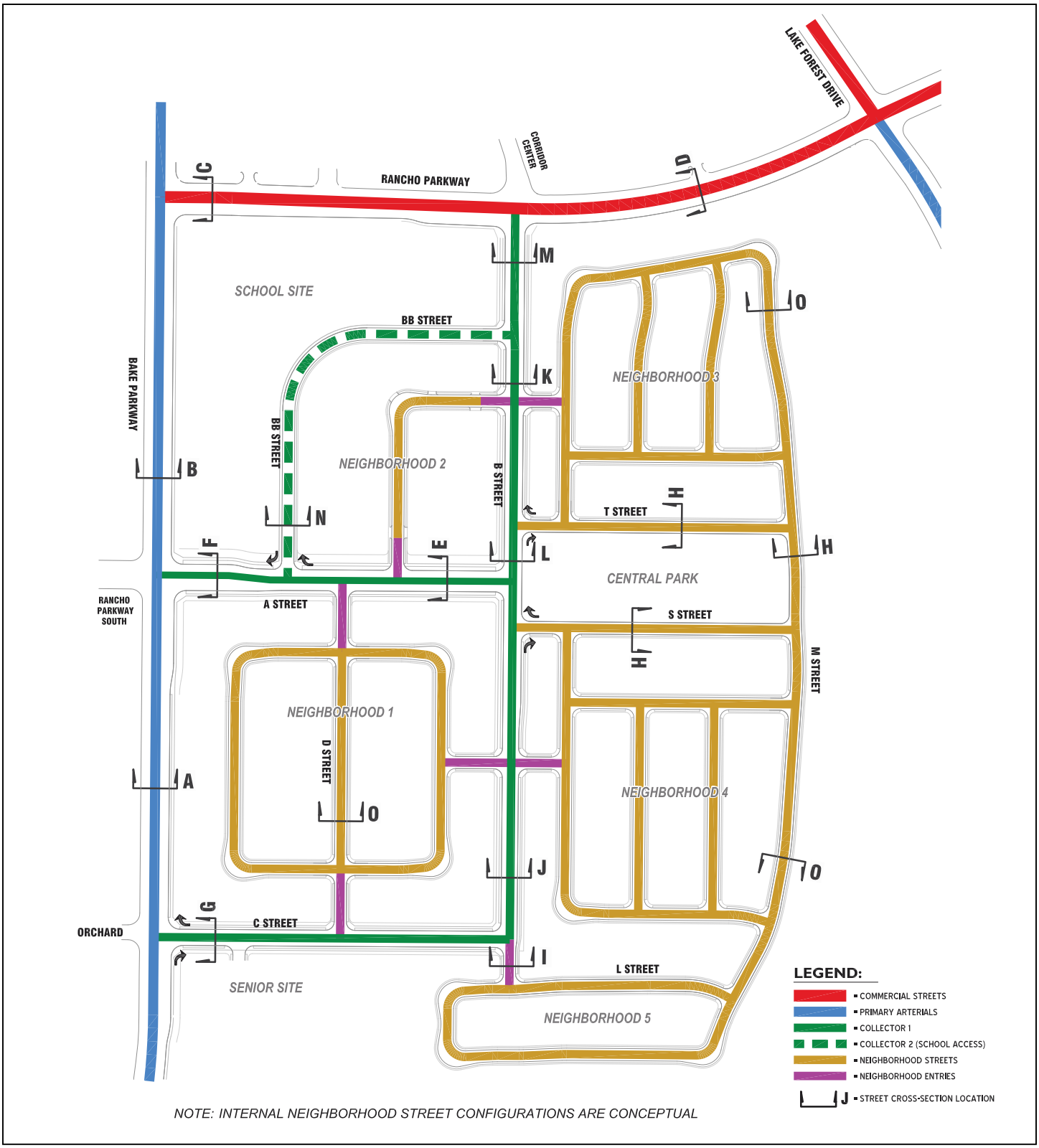
SOURCE: C2 Collaborative Landscape Architecture

I:\CLF1801\G\Concept_Landscape_Plan_11x17.cdr (7/11/2018)

Nakase Nursery/Toll Brothers

Conceptual Landscape Plan

This page intentionally left blank



NOTE: INTERNAL NEIGHBORHOOD STREET CONFIGURATIONS ARE CONCEPTUAL

LSA

FIGURE 2.9

N

NO SCALE

SOURCE: Hunsaker & Associates

I:\CLF1801\G\Concept_Circulation_Plan.cdr (5/2/2018)

Nakase Nursery/Toll Brothers

Conceptual Circulation Plan

This page intentionally left blank

Table 2.A: Project Parking

Type of Parking	Proposed Number of Parking Spaces	City Minimum Parking Requirements
Single-Family Residential		
Garage Parking	1,150–1,350	3.2 spaces (including 2.0 covered + 1.0 additional within 200 feet of the unit + 0.2 guest) per detached single-family residential unit x 675 units
Driveway Parking	1,100–1,350	
Street Parking	500–575	
Total Single-Family Residential Parking	*2,750–3,275*	*2,160*
School Site		
On-Site Parking	100–120	2 spaces per classroom x 50 classrooms
Street Parking	80–100	
Total School Site Parking	*180–220*	*100*
Central Park		
Parallel Parking	53	No parking requirement.
Perpendicular Parking	36	
Total Central Park Parking	*89*	*None required.*
Total Project Parking[1]	**3,019 – 3,584**	**2,260**

Sources: Nakase Area Plan (March 2018) and City of Lake Forest Municipal Code Chapter 9.168, Off-Street Parking.
Note: Actual project parking will be determined when site-specific neighborhoods and planning areas are developed.

[1] Total project parking does not include parking spaces required for senior affordable housing units. The total number of parking spaces provided for senior affordable housing units will be determined during the Project's final design phase and will be based upon requirements outlined in the City's Municipal Code Sections 9.168.040.D.2 or 9.168.040.D.3, as appropriate.

As shown in Table 2.A, single-family residential uses would include 2,750 to 3,275 parking spaces, the school site would include 180 to 220 parking spaces, and Central Park would include 89 parking spaces. Total project parking does not include parking spaces required for senior affordable housing units, which will be determined during the Project's final design phase and will adhere to parking requirements outlined in the City's Municipal Code Sections 9.168.040.D.2 or 9.168.040.D.3, as applicable. The Project would include 3,019 to 3,584 parking spaces. Therefore, the Project would provide a substantially higher number of parking spaces than required.

2.2.1.6 Infrastructure Improvements

The following infrastructure improvements would serve the future development included in the Project:

- **Water:** The Project Site receives domestic and recycled water service from the Irvine Ranch Water District (IRWD). An existing 24-inch domestic water main and an existing 12-inch recycled water main cross the Project Site near its southern boundary. These existing water and recycled water mains would be relocated. Consequently, portions of the existing water line system would need to be rerouted to be aligned with the proposed circulation streets and lots. All rerouting of water facilities would be reviewed and approved by the City's Public Works Department and the IRWD. There are 8-inch domestic water lines and reclaimed water lines that are proposed to be installed in each of the Project's collector streets. These water lines would provide domestic water service and reclaimed water for landscaping for the Project's various uses.

- **Sewer Service:** Sewer lines would be extended onto the Project Site. A gravity sewer system would be installed and connected to the existing sewer lines in Bake Parkway.

- **Utilities:** The Project Site receives electricity service from Southern California Edison (SCE). The Project proposes to underground the existing overhead power lines that are currently located on the east side of Bake Parkway. The Project includes gas, cable, and telephone utility lines.

- **Drainage System:** As a result of site grading, runoff flows would be directed to the southwestern portion of the Project Site to ultimately discharge into an existing 10-foot (ft) box culvert. The drainage system would include an underground detention basin beneath Central Park and would not increase peak flows or discharge rates to Serrano Creek.

2.2.1.7 Sustainability Features

Future development facilitated by Project approval would be consistent with the California Green Building Code (CALGreen) and would include the following sustainability features:

- Increased insulation values in walls and attic spaces.
- Installation of high-efficiency windows and doors.
- Installation of heating, ventilation, and air conditioning (HVAC) systems with a high Seasonal Energy Efficiency Ratio (SEER).
- Specified use of Energy Star appliances.
- Installation of water-efficient plumbing fixtures.
- Installation of tankless water heater systems.
- Installation of light-emitting diode (LED) technology within homes.
- Use of recycled water for common area landscape irrigation.
- Use of drought-tolerant plants in landscape design.
- Installation of water-efficient irrigation systems with smart sensor controls.
- Erosion, sedimentation, and site water control facilitated through the implementation of storm water management practices, bio swales, and bioretention basins.
- Installation of a 240-volt circuit in each home to allow easy installation of electric vehicle (EV) charging.
- Installation of EV charging stations at Central Park and the elementary school.[1]

[1] EV charging stations at the proposed elementary school would be subject to Saddleback Valley Unified School District (SVUSD) construction standards.

2.2.2 Project Overview

The Project includes approval of the Area Plan, a GPA and Zone Change, a Planned Community Program, a Development Agreement, and a Vesting Tentative Tract Map.

2.2.2.1 General Plan Amendment and Zone Change

As previously stated, the Project Site is designated Business Park on the City's General Plan and is classified as General Agriculture (A-1) on the City's Zoning Map. The current land use designation and zoning classification are inconsistent. To implement the Area Plan, the Project would require approval of a GPA to change the General Plan land use designation of the property to Low-Medium Residential and Institutional. A zone change would also be required to establish the Project Site's zoning classification as a Planned Community District. The zone change would require approval of the Area Plan, as well as the Nakase Property Supplemental Text and Development Plan.[1] The proposed land use designation and zoning classification would ensure consistency between the City General Plan and Municipal Code concerning land use on the Project Site. Approval of the Area Plan would be subject to approval of the GPA and Zone Change applications.

2.2.2.2 Planned Community Program

Chapter 9.112 of the City's Municipal Code requires that a Planned Community Program be developed for any project proposing a zone change to a Planned Community District. The Planned Community Program must address the entire Project Site and would be subject to approval by the City's Planning Commission, as well as adoption by the City Council. The Planned Community Program should include the following components:

- Planned community text specifying permitted uses and site development standards applicable to the entire planned community area
- A statistical summary containing appropriate statistical information such as the minimum/ maximum numbers associated with certain aspects of development proposed in the planned community (i.e., maximum number of dwelling units, minimum number of acres of open space)
- A planned community zoning map displaying the proposed uses, exterior boundaries, arterial highways, and any applicable overlay or combining districts within the planned community area
- A planned community development map displaying information such as the general location of infrastructure facilities and a detailed statistical table regulating land uses in each planned community planning area

The Area Plan generally serves as the Planned Community Program for the Project and is intended to guide development and land uses for the planned community within the Project Site. Upon

[1] The Nakase Property Supplemental Text and Development Plan would be considered equivalent to the planned community text, specified in Section 9.112.050 of the City's Municipal Code, as required under the Planned Community Program.

adoption, the Area Plan would become a part of the City's Zoning Code. In addition, the planned community zoning map would be considered a component of the City's Zoning Map. Therefore, the Area Plan was developed to serve as the mechanism for implementation of the GPA and zone change required for the proposed use of the Project Site.

2.2.2.3 Development Agreement

A Development Agreement is a legal contract negotiated between a project applicant and a public agency that governs the land uses and terms and conditions of approval that may be allowed for a particular project. A Development Agreement can also outline public benefits that the project proponent is guaranteeing to the public agency (e.g., additional fees, land dedications, or public facility improvements). The Project's Development Agreement would include obligations associated with the development of the Project Site related to phasing of land use, timing of infrastructure and public improvements, and provisions for infrastructure financing. The Project includes approval of a Development Agreement.

2.2.2.4 Vesting Tentative Tract Map

A subdivision is the division of any unit or units of land for the purpose of sale, lease, or financing, and may be initiated via a Tentative Parcel Map or Tentative Tract Map. According to Section 7.03.030 of the City's Municipal Code, a Tentative Tract Map is a preliminary map prepared for the purpose of creating five or more lots containing five or more units. Because the Project would include five or more lots, the City would consider approval of a Tentative Tract Map. The Applicant has expressed a desire to pursue the approval of a Vesting Tentative Tract Map for the Project. A Vesting Tentative Tract Map confers a vested right to proceed with development for a specified time after recordation. The Vesting Tentative Tract Map would be prepared in accordance with the Subdivision Map Act and the City's Subdivision Ordinance. The Vesting Tentative Tract Map would be submitted separately from and concurrently reviewed with the Area Plan.

2.2.3 Implementation/Phasing

The Project would be implemented over an estimated period of 67 months (approximately 5.5 years). Demolition and site preparation would span approximately 3 months, and grading would span approximately 6 months. Paving and infrastructure would take approximately 4 months and 12 months, respectively, and would occur concurrently. Building construction would be implemented over an estimated period of 46 months.

2.3 REQUIRED PERMITS AND APPROVALS

2.3.1 Discretionary Actions

Implementation of the Project would require various approvals and permits from local, State, and federal agencies with jurisdiction over specific elements of the Project. The discretionary approvals by the City, as the Lead Agency, would include the following:

- **General Plan Amendment:** (GPA 05-17-5033). The Project proposes to change the General Plan land use designation from Business Park to Low-Medium Residential and Institutional.

- **Zone Change:** (ZC 05-17-5034). The Project proposes to change the Project Site's zoning classification from General Agriculture (A-1) to Planned Community. Approval of the Planned Community Program would be required as part of the Zone Change.

- **Development Agreement:** A Development Agreement between the Applicant and the City would identify the terms for development of the Project Site and would identify the Applicant's obligations associated with the Project.

- **Vesting Tentative Tract Map:** A Vesting Tentative Tract Map would be required to subdivide the property.

2.3.2 Other Ministerial City Actions

Ministerial permits/approvals (e.g., grading permits and building permits) would be issued by the City or other appropriate agencies to allow Project Site preparation, curb cuts (if necessary), and connections to the utility infrastructure, dwelling units, paving, landscaping, walls and fences, and other Project features subject to ministerial permits.

2.3.3 Probable Future Actions by Responsible Agencies

Because the Project also involves approvals, permits, or authorization from other agencies, these agencies are "Responsible Agencies" under CEQA. Section 15381 of the State CEQA Guidelines defines Responsible Agencies as public agencies other than the Lead Agency that will have discretionary approval power over the Project or some component of the Project, including mitigation. These agencies include, but are not limited to, the agencies identified in Table 2.B.

Table 2.B: Probable Future Actions by Responsible Agencies

Responsible Agency	Action
Orange County Fire Authority	Approval of Fire Master Plan
State Water Resources Control Board	Applicant/Developer must submit Permit Registration Documents, including a Notice of Intent, to comply with the National Pollutant Discharge Elimination System North Orange County Permit (Order No. R8-2009-030).
Irvine Ranch Water District	Approval of an Addendum to the Lake Forest Sub-Area Master Plan
California Department of Fish and Wildlife	Approval of Section 1602 Permit
Regional Water Quality Control Board	Section 401 Water Quality Certification and Issuance of Waste Discharge Requirements (WDRs)
United States Army Corps of Engineers	Approval of Section 404 Permit

This page intentionally left blank

3.0 ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED AND ENVIRONMENTAL DETERMINATION

The environmental factors checked below potentially would be affected by the Project and include at least one impact that is a "Potentially Significant Impact," as indicated by the checklist on the following pages. Please see the Environmental Checklist for additional information.

☒ Aesthetics	☒ Agriculture and Forestry	☒ Air Quality
☒ Biological Resources	☒ Cultural Resources	☒ Geology and Soils
☒ Greenhouse Gas Emissions	☒ Hazards and Hazardous Materials	☒ Hydrology and Water Quality
☒ Land Use/Planning	☐ Mineral Resources	☒ Noise
☒ Population/Housing	☒ Public Services	☒ Recreation
☒ Transportation/Traffic	☒ Tribal Cultural Resources	☒ Utilities and Service Systems
☒ Findings of Mandatory Significance		

DETERMINATION. On the basis of this initial evaluation:

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☐ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☒ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Gayle Ackerman — City of Lake Forest

Signature — **Agency**

Gayle Ackerman / Community Dev. Director — 7/11/18

Printed Name/Title — **Date**

This page intentionally left blank

4.0 EVALUATION OF ENVIRONMENTAL IMPACTS

1. A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a Lead Agency cites in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to Projects like the one involved (e.g., the Project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on Project-specific factors as well as general standards (e.g., the Project will not expose sensitive receptors to pollutants, based on a Project-specific screening analysis).
2. All answers must take account of the whole action involved, including off site as well as on site, cumulative as well as Project level, indirect as well as direct, and construction as well as operational impacts.
3. Once the Lead Agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.
4. "Negative Declaration: Less Than Significant With Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." The Lead Agency must describe the mitigation measures and briefly explain how they reduce the effect to a less than significant level (mitigation measures from earlier analyses may be cross-referenced, as discussed below).
5. Earlier analyses may be used where, pursuant to the tiering, Program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or Negative Declaration (Section 15063 (c)(3)(D)). In this case, a brief discussion should identify the following:
    - **Earlier Analysis Used:** Identify and state where they are available for review.
    - **Impacts Adequately Addressed:** Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.
    - **Mitigation Measures:** For effects that are "Less Than Significant with Mitigation Measures Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the Project.
6. Lead Agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.
7. **Supporting Information Sources:** A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.
8. This is only a suggested form, and Lead Agencies are free to use different formats; however, Lead Agencies should normally address the questions from this checklist that are relevant to a Project's environmental effects in whatever format is selected.
9. The explanation of each issue should identify:
    a. The significance criteria or threshold, if any, used to evaluate each question; and
    b. The mitigation measure identified, if any, to reduce the impact to less than significant.

4.1 AESTHETICS

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Substantially damage scenic resources, including scenic vistas from public parks and views from designated scenic highways or arterial roadways?	☒	☐	☐	☐
b. Create a new source of substantial night lighting that would result in "sky glow" (i.e. illumination of the night sky in urban areas) or "spill light" (i.e. light that falls outside of the area intended to be lighted) onto adjacent sensitive land uses?	☒	☐	☐	☐
c. Create a new source of substantial glare which would adversely affect daytime visibility and/or views in the area?	☐	☐	☒	☐
d. Substantially degrade the existing visual character or quality of the site and its surroundings where:				
i. The project exceeds the allowed height or bulk regulations, or exceeds the prevailing height and bulk of existing structures.	☒	☐	☐	☐
ii. The project is proposed to have an architectural style or to use building materials that will be in vivid contrast to an adjacent development where that development had been constructed adhering to a common architectural style or theme.	☐	☐	☒	☐
iii. The project is located on a visually prominent site and, due to its height, bulk, architecture or signage, will be in vivid contrast to the surrounding development or environment degrading the visual unity of the area.	☐	☐	☒	☐
iv. A project would include unscreened outdoor uses or materials.	☐	☐	☐	☒
v. A project would result in the introduction of an architectural feature or building mass that conflicts with the character of the surrounding development.	☐	☐	☒	☐

Impact Analysis

a) Potentially Significant Impact. The Project Site is located in a fully developed area in the northern portion of Lake Forest in Orange County, California. The Project Site is located approximately 10 mi northeast of the Pacific Ocean, although the ocean cannot be seen from the Project Site due to intervening land uses. SR-241 is approximately 405 ft from the Project Site. According to the California Scenic Highway Mapping System, SR-241 is not considered a

State Scenic Highway. In addition, there are no officially listed or eligible State Scenic Highways in the vicinity of the Project Site.[1]

The Serrano Creek Trail is adjacent to the Project Site along the southeastern boundary and is considered an Open Space/Recreation Resource according to the City's Recreation and Resources Element (1991, revised 2015). In addition, Nature Park is located adjacent to the southwest boundary of the Project Site. According to the City's Recreation and Resources Element, Nature Park is a 4.5 ac park with walking trails, picnic tables, and a gazebo picnic area. The Recreation and Resources Element notes that natural resources and open space contribute to the visual quality of the City. Upon Project implementation, views from Serrano Creek Trail and Nature Park may be obstructed from some vantage points. As a result, the Project has the potential to substantially damage scenic resources, including views from public parks. Therefore, the Project could potentially result in adverse impacts on scenic vistas and resources. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project impacts related to damage to scenic resources, including scenic vistas from public parks.**

b) Potentially Significant Impact. The Project Site is currently developed with few structures, and the majority of the Project Site is not illuminated at night. The Project proposes redevelopment of the Project Site to accommodate a planned community, including up to 675 single-family residential units, up to 101 senior affordable housing units, an elementary school with a capacity of up to 1,000 students, multiple parks and open space areas, recreation amenities, and an internal circulation system. Due to the intensification in land use from agriculture to planned community, the Project would require the installation of new lighting. Spill light occurs when lighting fixtures such as streetlights, parking lot lighting, exterior building lighting, and landscape lighting are not properly aimed or shielded to direct light to the desired location, and light escapes and partially illuminates a surrounding location. Sensitive uses (e.g., Serrano Creek Trail and Nature Park) surrounding the Project Site could be impacted by the light from development within the boundaries of the Project Site. Therefore, the Project could potentially result in adverse impacts as a result of new sources of lighting. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project impacts related to new sources of substantial night lighting.**

c) Less than Significant Impact. Glare refers to the sensation experienced looking into an excessively bright light source that causes a reduction in the ability to see or causes discomfort. Glare generally does not result in illumination of off-site locations but results in a visible source of light, such as sunlight, viewable from a distance. As stated previously, the Project proposes redevelopment of the Project Site to accommodate a planned community, including up to 675 single-family residential units, up to 101 senior affordable housing units, an elementary school with a capacity of up to 1,000 students, multiple parks and open space areas, recreation amenities, and an internal circulation system. The anticipated building materials (e.g., concrete,

[1] California Department of Transportation. California Scenic Highway Mapping System, Orange County. Website: http://www.dot.ca.gov/hq/LandArch/16_livability/scenic_highways/, accessed April 26, 2018.

stucco, wood) and proposed uses are typical of those found in the surrounding areas and are not anticipated to create unusual or isolated glare effects that would affect daytime visibility or views in the Project vicinity. In addition, the use of extensive landscaping along Project boundaries, as shown on Figure 2.8, and light shielding required by the Lake Forest Municipal Code (LFMC) Section 9.56.080 would prevent direct views of light sources and reduce the potential for glare during the day. Impacts related to glare are anticipated to be less than significant. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

d)(i) Potentially Significant Impact. The Project proposes redevelopment of the Project Site to accommodate a planned community, including up to 675 two- to three-story, single-family residential units, a two- to three-story apartment building with up to 101 units, and an elementary school. Surrounding developments range in height from one to four stories. As part of the Project, a zone change would change the zoning classification from General Agriculture (A-1) to Planned Community District. The A1 District allows building heights up to 35 ft. As proposed in the Area Plan, single-family residential building heights would be up to 36 ft. In addition, the senior affordable housing units and elementary school site heights may exceed 36 ft. However, the Planned Community classification results in flexibility by allowing development standards (including lot coverage, building height, and building size) to be determined through the approval of a Planned Community Program. Chapter 9.112 of the City's Municipal Code requires that any project proposing a zone change to a Planned Community District is required to develop a Planned Community Program for the entire Project Site. The Planned Community Program would be subject to approval by the City's Planning Commission as well as adoption by the City Council. The Planned Community Program would include text specifying permitted uses and site development standards applicable to the entire Project Site. In addition, design features intended to minimize bulk would include multilevel roof lines, use of mixed and textured building materials, substantial setbacks, intervening streets, grade separations, and substantial landscaping, parks, and open space areas. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address the Project's potentially significant adverse impacts related to increases in building height.**

d)(ii) Less than Significant Impact. The Project includes the development of a residential community consisting of up to 675 single-family homes and up to 101 senior affordable housing units as well as development of an elementary school site. Development of the Project would convert existing agricultural land to residential and institutional uses, thereby substantially changing the aesthetic nature of the Project Site.

Land uses surrounding the Project Site include a mix of commercial, open space, industrial, transportation, and residential uses. Architectural styles in the Project vicinity are also diverse and representative of an urban and suburban neighborhood. Building materials used in existing development in the area around the Project Site include stucco, concrete, glass, and wood. Based on the diversity of uses and architectural styles, there is no common architectural style or theme in the area surrounding the Project Site. Commercial/office development in the area is largely modern in style with minimal architectural detail and substantial setbacks. The Baker Ranch Residential neighborhood reflects Tuscan, Mediterranean, and Spanish design influences.

The Project would be designed following the Contemporary, Modern, and Spanish architectural styles that would blend with existing commercial and residential development and is intended to provide a visually appealing residential development that attracts future residents. The Project would not be visually incompatible with surrounding uses because: (1) the Project Site would be located in close proximity to existing residential uses (e.g., Baker Ranch Community) and would blend with the architecture of both the existing commercial and residential development; (2) substantial landscaping would screen the Project Site from passing motorists on Bake Parkway and Rancho Parkway; and (3) setbacks, intervening streets, and grade separations between the Project Site and surrounding land uses would reduce the Project's contrast with surrounding commercial uses. Therefore, the Project would not substantially degrade the existing visual character or quality of the Project Site and its surroundings as a result of the proposed architectural styles or building materials, and the Project Site would not be in vivid contrast to an adjacent development where that development had been constructed adhering to a common architectural style or theme. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process**.

d)(iii) Less Than Significant Impact. Refer to Response 4.1 (d)(ii), above. The Project would be located on a visually prominent site. The Project Site is adjacent to the Serrano Creek Trail (a walking and nature trail) and Nature Park. In addition, the Project Site is large (122 ac) and can be seen from many area roadways. Nonetheless, it is not anticipated that the proposed height, bulk, architecture, or signage of on-site structures would be in vivid contrast to the surrounding development or result in the degradation of the visual unity of the area. Specifically:

- **Height:** Surrounding developments range in height from one to four stories. The Project would include structures one to three stories [up to 36 ft]. Therefore, the height of the proposed structures would be consistent with surrounding development.

- **Bulk:** Land uses surrounding the Project Site include a mix of commercial, open space, industrial, transportation, and residential uses. Land uses on the Project Site would include residential, institutional, and open space uses. Design features intended to minimize bulk include multilevel roof lines, use of mixed and textured building materials, substantial setbacks, intervening streets, grade separations, and substantial landscaping, parks, and open space areas.

- **Architecture:** Land uses surrounding the Project Site include a mix of commercial, open space, industrial, transportation, and residential uses. Architectural styles in the Project vicinity are also diverse and representative of an urban and suburban neighborhood. Commercial development in the area is largely modern in style with minimal architectural detail and substantial setbacks. The Baker Ranch Residential neighborhood reflects Tuscan, Mediterranean, and Spanish design influences. The Project would be designed following the Contemporary, Modern, and Spanish architectural styles that would blend with existing commercial and residential development and is intended to provide a visually appealing residential development that attracts future residents.

- **Signage:** Signage would be limited to community identification monuments near the entrances on Bake Parkway and Rancho Parkway, neighborhood signage, directional signage, and roadway signage. The monument signs on Bake Parkway and Rancho Parkway would be located on community walls, which would have a maximum height of 6 ft, and would incorporate architectural design and building materials consistent with the planned community theme.

- **Walls and Fencing:** Walls and fences would be used to emphasize the planned community theme as well as to blend the community with the surrounding area. Walls would be used for safety buffers, noise abatement, and privacy. Proposed walls include a community wall of up to 6 ft surrounding the development, a community sound wall along Bake Parkway and Rancho Parkway, retaining walls where necessary, and glass walls of up to 6 ft to enhance view opportunities. A painted tubular fence of up to 6 ft would also be used along properties adjacent to open space areas and other places where off-site views would be desirable. Hedges would be placed behind the community wall for added privacy and screening.

Development of the Project would convert existing agricultural land to residential and institutional uses thereby substantially changing the aesthetic nature of the Project Site; however, the height, bulk, architecture, and signage from resulting development would be consistent with surrounding commercial and residential development. The agricultural uses on the Project Site are particularly prominent because of their rarity in Lake Forest. While existing residents will note the change from agricultural uses to nonagricultural uses, the Project would not be in contrast with surrounding development and would not degrade the visual unity of the area. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process**.

d)(iv) No Impact. The Project includes the development of a residential community consisting of up to 675 single-family homes and up to 101 senior affordable housing units as well as development of an elementary school site. No commercial or industrial uses are proposed that would be assumed to have outdoor materials storage. Private backyards would be fenced, and much of the Project Site would be screened by proposed landscaping as shown on Figure 2.8. Therefore, it is not anticipated that the Project would substantially degrade the existing visual character or quality of the Project Site and its surroundings by including unscreened outdoor uses or materials. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process**.

d)(v) Less than Significant Impact. The Project includes the development of a residential community consisting of up to 675 single-family homes and up to 101 senior affordable housing units as well as development of an elementary school site. Architectural styles in the Project vicinity are diverse and representative of an urban and suburban neighborhood. Building materials used in existing development in the area around the Project Site include stucco, concrete, glass, and wood. Commercial development in the area is largely modern in style with minimal architectural detail and substantial setbacks. The Baker Ranch Residential neighborhood reflects Tuscan, Mediterranean, and Spanish design influences. Based on the

diversity of uses and architectural styles, no common architectural style or theme exists in the area surrounding the Project Site. The Project would be designed following the Contemporary, Modern, and Spanish architectural styles that would blend with existing commercial and residential development and is intended to provide a visually appealing residential development that attracts future residents. In addition, design features intended to minimize bulk include multilevel roof lines, use of mixed and textured building materials, substantial setbacks, intervening streets, grade separations, and substantial landscaping, parks, and open space areas. Therefore, the Project would not introduce an architectural feature or building mass that conflicts with the character of the surrounding development. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process**.

4.2 AGRICULTURE AND FORESTRY

In determining whether impacts to agricultural resources are significant environmental effects, Lead Agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☒	☐	☐	☐
b. Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☒	☐	☐	☐
c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?	☐	☐	☐	☒
d. Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☒	☐	☐	☐

Impact Analysis

a) Potentially Significant Impact. The Project Site is currently used as a commercial plant nursery and is designated as Unique Farmland by the California Department of Conservation (2014). Unique Farmland consists of lesser quality soils that may be used for the production of the State's leading agricultural crops. Therefore, the Project would potentially impact designated farmlands, specifically Unique Farmlands, through the conversion of the Project Site to a nonagricultural use. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project impacts related to the conversion of land to a nonagricultural use.**

b) Potentially Significant Impact. The Land Use Element of the City General Plan designates the Project Site as Business Park, and the Project Site is zoned A-1. While no Williamson Act (i.e., California Land Conservation Act of 1965) contracts are in effect for the Project Site, the Project proposes a zone change from the existing A-1 zone to a Planned Community District that would not include any agricultural uses. As a result, the Project would conflict with existing zoning for agricultural use. **This topic will be analyzed in the EIR, and mitigation will be developed and**

included in the EIR, if necessary, to address potentially significant adverse Project impacts due to the conflict with existing agricultural zoning.

c) **No Impact.** As previously stated, the Project Site is designated Business Park and zoned A-1. Neither the Project Site nor the surrounding area is zoned as forest land, timberland, or timberland production. As a result, no significant impacts would occur, and no mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process**.

d) **No Impact.** The Project Site is currently used as a commercial plant nursery. No forest or timberland exists at the Project Site or in the surrounding area. Therefore, the Project would not result in the loss of forest land or the conversion of forest land to non-forest use. As a result, no significant impacts would occur, and no mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process**.

e) **Potentially Significant Impact.** The Project Site is currently used as a commercial plant nursery and is zoned A-1. The Project includes a zone change that would change the Project Site's zoning classification to a Planned Community District that would not involve agricultural uses. As stated previously, the Project Site is in an area that has been designated as Unique Farmland by the California Department of Conservation (2014). Therefore, the Project would result in conversion of Farmland to a nonagricultural use. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project impacts related to the conversion of land to a nonagricultural use.**

4.3 AIR QUALITY

Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Conflict with or obstruct implementation of the applicable air quality plan?	☒	☐	☐	☐
b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☒	☐	☐	☐
c. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☒	☐	☐	☐
d. Expose sensitive receptors to substantial pollutant concentrations?	☒	☐	☐	☐
e. Create objectionable odors affecting a substantial number of people?	☐	☐	☒	☐
f. Result in a cumulatively considerable net increase of any criteria pollutants? A project will be considered to result in a cumulatively considerable net increase of any criteria pollutants for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors) where the incremental effect of the project emissions, considered together with past, present, and reasonably anticipated further project emissions, increase the level of any criteria pollutant above the existing ambient level.	☒	☐	☐	☐

Impact Analysis

a) Potentially Significant Impact. Implementation of the Project would result in the demolition of existing structures and buildings on the Project Site as well as construction of up to 675 single-family residential units, up to 101 senior affordable housing units, an elementary school with a capacity of up to 1,000 students, multiple parks and open space areas, recreation amenities, and an internal circulation system. An Air Quality Management Plan (AQMP) describes air pollution control strategies to be undertaken by a city or county in a region classified as a nonattainment area to meet the requirements of the federal Clean Air Act. The main purpose of an AQMP is to bring an area into compliance with the requirements of federal and State ambient air quality standards (AAQS). For a project to be consistent with the AQMP adopted by the South Coast Air Quality Management District (SCAQMD), the pollutants emitted from project operation should not exceed the SCAQMD daily threshold or cause a significant impact on air quality, or the project must already have been included in the AQMP projection. Because the AQMP is based

on local General Plans, projects that are deemed consistent with a specific General Plan are usually found to be consistent with the AQMP. Since the Project would require a GPA to change the Project Site's designation from Business Park to Residential and Institutional, additional analysis is needed to determine whether the Project would exceed the SCAQMD daily threshold or cause a significant impact on air quality. **This topic will be analyzed in the EIR, and mitigation, if needed, will be developed and included in the EIR to address potentially significant adverse Project effects related to consistency with the AQMP.**

b) Potentially Significant Impact. Implementation of the Project would result in the demolition of existing structures and buildings on the Project Site as well as construction of up to 675 single-family residential units, up to 101 senior affordable housing units, an elementary school with a capacity of up to 1,000 students, multiple parks and open space areas, recreation amenities, and an internal circulation system. Thus, the Project would result in short-term construction emissions and long-term operational emissions. As part of the Project, an Air Quality and GHG Emissions Assessment will be conducted to assess potentially significant adverse impacts for short- and long-term, Project-related air quality effects. The findings of the air quality analysis and recommended mitigation will be described in the EIR. **This topic will be analyzed in the EIR, and mitigation will be included in the EIR, if necessary, to address potentially significant adverse impacts for short- and/or long-term, Project-related air quality effects.**

c) Potentially Significant Impact. Implementation of the Project would result in the demolition of existing structures and buildings on the Project Site, as well as construction of up to 675 single-family residential units, up to 101 senior affordable housing units, an elementary school with a capacity of up to 1,000 students, multiple parks and open space areas, recreation amenities, and an internal circulation system. Evaluation of Project-related operations emissions will be conducted in the Air Quality and GHG Emissions Assessment to assess whether the Project would result in a cumulatively considerable net increase of any criteria pollutant when considered with other cumulative projects. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to cumulative increases in criteria pollutants.**

d) Potentially Significant Impact. Sensitive receptors are persons defined as more sensitive to the potential unhealthful effects of air emissions. Sensitive receptors can include children and the elderly. The Project Site is surrounded by a mix of land uses, including commercial, open space, industrial, transportation, and residential uses. Project construction and operation could expose sensitive receptors in the residential areas northwest and southwest of the Project Site to Project-related air emissions. Further evaluation of Project-related air emissions will be conducted as part of the air quality analysis to determine whether the Project would expose sensitive receptors to substantial pollutant concentrations. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse project air quality effects on sensitive receptors.**

e) Less Than Significant Impact. According to the SCAQMD *CEQA Air Quality Handbook*, land uses associated with odor complaints typically include agricultural uses, wastewater treatment plants, food processing plants, chemical plants, composting, refineries, landfills, dairies, and

fiberglass molding. Objectionable odors may be generated during the operation of diesel-powered construction equipment and/or asphalt paving during Project construction. Those odors would be temporary, would not result in long-term odor impacts, and would not affect a substantial number of people. The proposed uses associated with the Project are not anticipated to generate objectionable odors during operation. Therefore, the Project would not result in permanent impacts related to odors on nearby sensitive receptors (e.g., residential uses). No mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

f) Potentially Significant Impact. Refer to Response 4.3(c), above. Evaluation of Project-related operations emissions will be conducted in the Air Quality and GHG Emissions Assessment to assess whether the Project would result in a cumulatively considerable net increase of any criteria pollutant when considered with other cumulative projects. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to cumulative increases in criteria pollutants.**

4.4 BIOLOGICAL RESOURCES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☒	☐	☐	☐
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	☒	☐	☐	☐
c. Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☒	☐	☐	☐
d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☒	☐	☐	☐
e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☒	☐	☐	☐
f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☒	☐	☐	☐

Impact Analysis

a) Potentially Significant Impact. The Project proposes redevelopment of the Project Site to accommodate a planned community, including up to 675 single-family residential units, up to 101 senior affordable housing units, an elementary school with a capacity of up to 1,000 students, multiple parks and open space areas, recreation amenities, and an internal circulation system. The Open Space area, totaling approximately 10 ac, includes natural resources located in the eastern portion of the Project Site along Serrano Creek. As part of the Project, native riparian habitat will be reestablished within Serrano Creek. The intention is to contribute to the existing riparian canopy, improve Serrano Creek as a regional wildlife movement corridor, and provide live-in and breeding habitat for many wildlife species. The proposed trail along the west side of Serrano Creek will also provide connections between the Nakase Project Site and the existing regional trail system. The Project Site is in an urbanized area and is surrounded by existing urban and suburban land uses; however, the Project would change the existing low-

density agricultural land use to medium-density residential and institutional land uses, resulting in changes to the existing habitat along Serrano Creek. Project construction and operation could have potentially significant impacts either directly or through habitat modification to species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife (CDFW) or the United States Fish and Wildlife Service (USFWS). Therefore, the improvements associated with the Project could significantly affect sensitive biological resources. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse impacts to species identified as a candidate, sensitive, or special-status species.**

b) Potentially Significant Impact. Refer to Response 4.4(a) above. The Project would change the existing low-density agricultural land use to medium-density residential and institutional land uses. In addition, the Project includes restoration of native riparian habitat within Serrano Creek. The intention is to contribute to the existing riparian canopy, improve Serrano Creek as a regional wildlife movement corridor, and provide live-in and breeding habitat for many wildlife species. Project construction and operation could have potentially significant impacts on riparian habitat or other sensitive natural communities identified in local or regional plans, policies, or regulations or by the CDFW or USFWS. Therefore, the improvements associated with the Project could significantly affect sensitive biological resources. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse impacts to riparian habitat or other sensitive natural communities.**

c) Potentially Significant Impact. Refer to Response 4.4(a) above. The Project would change the existing low-density agricultural land use to medium-density residential and institutional land uses. In addition, the Project includes restoration of native riparian habitat within Serrano Creek. Project construction and operation could have potentially significant impacts on federally protected wetlands and waters of the United States as defined by Section 404 of the Clean Water Act. Therefore, the improvements associated with the Project could potentially affect wetlands. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse impacts to federally protected wetlands.**

d) Potentially Significant Impact. Refer to Response 4.4(a) above. The Project would change the existing low-density agricultural land use to medium-density residential and institutional land uses. In addition, the Project includes restoration of native riparian habitat within Serrano Creek. Project construction and operation could potentially interfere with the movement of native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors.

The existing trees around the perimeter of the Project Site may provide suitable habitat for nesting migratory birds. The removal of trees on the Project Site has the potential to impact active bird nests if vegetation and trees are removed during the nesting season. Nesting birds are protected under the federal Migratory Bird Treaty Act (MBTA) (Title 33, United States Code

[USC], Section 703 et seq.; see also Title 50, Code of Federal Regulations [CFR], Part 10) and Section 3503 of the California Department of Fish and Game Code. Implementation of the Project would be subject to the provisions of the MBTA, which prohibits disturbing or destroying active nests. Regardless, the improvements associated with the Project would potentially affect sensitive biological resources. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse impacts to movement of native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors.**

e) Potentially Significant Impact. Refer to Response 4.4(a) above. The City's Tree Preservation and Landscaping Ordinance are intended to preserve trees on both public and private property and ensure that appropriate replacement trees are planted in the event that tree removal is required. The Project would require the removal of existing trees around the perimeter of the Project Site. Therefore, the Project may conflict with a plan, policy, or ordinance relating to the protection of biological resources (e.g., the Tree Preservation and Landscaping Ordinance). **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse impacts as a result of the Project's conflict with a plan, policy, or ordinance relating to the protection of biological resources.**

f) Potentially Significant Impact. The City is a signatory jurisdiction to the Orange County Central and Coastal Natural Communities Conservation Program/Habitat Conservation Plan (NCCP/HCP); however, the Project Site's owner and the Applicant are not participating landowners. The Project Site is located within the Orange County Central and Coastal NCCP/HCP planning area but outside the boundaries of the NCCP/HCP Reserve System. The Reserve System boundary is located approximately 4,000 ft northeast of the Project Site; however, the Project Site is in an area designated for development.

As discussed in the Project Description, the Project includes restoration of native riparian habitat within Serrano Creek. The intention is to contribute to the existing riparian canopy, improve Serrano Creek as a regional wildlife movement corridor, and provide live-in and breeding habitat for many wildlife species. The Project proposes to remove approximately 0.25 acre of degraded coastal sage scrub (CSS). Although the CSS habitat is included in NCCP/HCP, the isolated patch of degraded CSS is located in an area identified for development and is not within the boundaries of the NCCP/HCP Reserve System. However, the removal of the patch of CSS will be addressed in the EIR. Therefore, development of the Project may result in the removal of sensitive habitat species identified in the Orange County Central and Coastal NCCP/HCP, and the proposed Project may conflict with the adopted NCCP/HCP. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse impacts as a result of any potential conflicts with the adopted NCCP/HCP.**

4.5 CULTURAL RESOURCES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	☒	☐	☐	☐
b. Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☒	☐	☐	☐
c. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☒	☐	☐	☐
d. Disturb any human remains, including those interred outside of formal cemeteries?	☒	☐	☐	☐

Impact Analysis

a) Potentially Significant Impact. CEQA defines a "historical resource" as a resource that meets one or more of the following criteria: (1) is listed in, or determined eligible for listing in, the California Register of Historical Resources (California Register); (2) is listed in a local register of historical resources as defined in Public Resources Code (PRC) Section 5020.1(k); (3) is identified as significant in a historical resource survey meeting the requirements of PRC Section 5024.1(g); or (4) is determined to be a historical resource by a project's Lead Agency (PRC Section 21084.1 and State CEQA Guidelines Section 15064.5[a]). According to the Office of Historic Preservation,[1] there are no historic resources on the Project Site. Records search information indicates that no properties within 0.25 mi are listed as California Points of Historical Interest or California Historical Landmarks, or are listed on the California Register. Implementation of the Project would result in the demolition of existing structures and buildings used for agricultural operations on the Project Site. The California Register requires that sufficient time has passed since a resource's period of significance to "obtain a scholarly perspective on the events or individuals associated with the resource." Typically, 50 years is used as a general estimate of time needed to develop the perspective to understand the resource's significance (California Code of Regulations [CCR] 4852(d)(2)). One or more of the existing buildings on the Project Site may have been constructed 50 years or more ago. Therefore, the existing on-site structures may be listed in, or eligible for listing in, the California Register or listed in a local register of historical resources as defined in PRC Section 5020.1(k) Therefore, the Project has the potential to result in significant impacts related to historic resources. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR to address potentially significant adverse Project impacts related to paleontological resources.**

b) Potentially Significant Impact. According to the City's Recreation and Resources Element, a majority of the City, including the Project Site, is located in a sensitive archaeological area. On

[1] California Office of Historic Preservation, Orange County Historical Landmarks, http://ohp.parks.ca.gov/?page_id=21445, accessed May 1, 2018.

February 28, 2018, a records search was conducted at the South Central Coastal Information Center (SCCIC) of the California Historical Resources Information System at California State University, Fullerton to identify previously recorded prehistoric and historic cultural resources and cultural resource surveys within 0.25 mi of the Project area. SCCIC identified no previously recorded prehistoric cultural resources on the Project Site; however, 25 archaeological sites were identified within 0.5 mi of the Project Site. As such, the Project Site is considered potentially sensitive for archaeological resources. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR to address potentially significant adverse Project impacts related to archaeological resources.**

c) **Potentially Significant Impact.** According to the City's Recreation and Resources Element, paleontological resources potentially occur throughout most of the City, including on the Project Site. Therefore, the Project Site would be considered sensitive for paleontological resources. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR to address potentially significant adverse Project impacts related to paleontological resources.**

d) **Potentially Significant Impact.** No known human remains are interred on the Project Site. Due to the level of past disturbance on the Project Site, it is not anticipated that human remains, including those interred outside of formal cemeteries, would be encountered during earth removal or disturbance activities. In the unlikely event that human remains are encountered during Project grading, the proper authorities would be notified and standard procedures for the respectful handling of human remains during the earthmoving activities would be adhered to in compliance with State Health and Safety Code Section 7050.5 and PRC Section 5097.98. Following compliance with existing State regulations, impacts in this regard would be considered less than significant. **Precautionary mitigation may be included in the EIR to address any potentially significant impacts related to unknown remains that might be uncovered at the time of grading. This topic will be addressed in the EIR, and mitigation will be included if necessary.**

4.6 GEOLOGY AND SOILS

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42?	☐	☐	☐	☒
ii. Strong seismic ground shaking?	☒	☐	☐	☐
iii. Seismic-related ground failure, including liquefaction?	☒	☐	☐	☐
iv. Landslides?	☐	☐	☐	☒
b. Result in substantial soil erosion or the loss of topsoil?	☒	☐	☐	☐
c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☒	☐	☐	☐
d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☒	☐	☐	☐
e. Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒

Impact Analysis

a)(i) **No Impact.** The Project Site is in southern California, which is a seismically active region. According to the City's Safety and Noise Element (1994), no known active fault exists within the city of Lake Forest. Thus, within the State of California Department of Conservation Earthquake Zones of Required Investigation for the Lake Forest Quadrangle, Alquist-Priolo Earthquake Fault Zones have not been prepared for the area. Therefore, the Project would not expose people or structures to substantial adverse effects involving the rupture of a known earthquake fault. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

a)(ii) **Potentially Significant Impact.** As discussed in Response 4.6(a)(i), above, Alquist-Priolo Earthquake Fault Zones have not been prepared for the area in the vicinity of the Project Site. However, southern California is a known seismically active region. Active and potentially active faults in southern California are capable of producing seismic shaking on the Project Site. Thus, it is likely the Project would periodically experience ground acceleration as a result of exposure to moderate to large magnitude earthquakes, and seismic ground shaking on one of the nearby regional faults may cause damage to development. Therefore, the Project has the potential to

expose people and structures to substantial adverse effects related to the Project Site and regional geology, including those associated with strong seismic ground shaking. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to strong seismic ground shaking.**

a)(iii) Potentially Significant Impact. The Project has the potential to expose people and structures to substantial adverse effects related to the Project Site and regional geology, including those associated with liquefaction. According to the State of California Department of Conservation Earthquake Zones of Required Investigation for the Lake Forest Quadrangle, the area around the Serrano Creek Trail, which includes the southeastern portion of the Project area, has a high potential for liquefaction. A Preliminary Geotechnical Evaluation will be prepared and summarized in the EIR, including recommendations from that report to address Project effects related to or resulting from geologic conditions. Therefore, the Project could have a potentially significant impact related to liquefaction. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to liquefaction.**

a)(iv) No Impact. The Project Site is relatively flat, and no substantial hillsides or unstable slopes are immediately adjacent to the Project Site boundary. In addition, according to the California Department of Conservation's Earthquake Zones of Required Investigation for the Lake Forest Quadrangle (2001), the Project Site is not located within an Earthquake-Induced Landslide Zone. As a result, there is no potential for landslide hazards, and no mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

b) Potentially Significant Impact. During Project Site preparation, grading, and construction, soil on the Project Site would be exposed and there would be an increased potential for soil erosion compared to existing conditions. In addition, during a storm event, soil erosion could occur at an accelerated rate. The potential for erosion during Project operations would be minimal because the Project Site would be paved, covered with buildings, and/or landscaped, and there would not be areas of exposed/disturbed soil on the Project Site. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to erosion during construction.**

c) Potentially Significant Impact. Refer to Responses 4.6(a)(iii) and (iv) above for discussion on the potential impacts associated with liquefaction and landslides, respectively. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to liquefaction.**

d) Potentially Significant Impact. The Project Site may contain expansive soils, thereby potentially creating a substantial risk to life or property. As stated previously, a Preliminary Geotechnical Evaluation will address Project effects related to or as a result of geologic conditions. In addition, the Project will be designed consistent with the relevant Uniform Building Code and California Building Code seismic standards. Therefore, the Project could have a potentially

significant impact related to expansive soils. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to expansive soils.**

e) No Impact. The Project would not include the use of septic tanks or alternative methods for disposal of wastewater into subsurface soils. No on-site sewage disposal systems (e.g., septic tanks) are planned. The Project would connect to existing public wastewater infrastructure. Therefore, the Project would not result in any impacts related to septic tanks or alternative wastewater disposal methods. No mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

4.7 GREENHOUSE GAS EMISSIONS

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☒	☐	☐	☐
b. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☒	☐	☐	☐

Impact Analysis

a) Potentially Significant Impact. The Project would generate greenhouse gas (GHG) emissions during construction and operation. An Air Quality/GHG Study will be prepared to address Project effects related to or as a result of GHG emissions, and a discussion of GHGs and their potential effects on global climate change will be included in the EIR. GHG emissions associated with Project construction would consist primarily of emissions from equipment exhaust. Long-term regional emissions would also be associated with Project-related vehicular trips and stationary source emissions (e.g., natural gas used for heating). It is anticipated that Project-related traffic trips forecast in the Traffic Study will be used in this GHG analysis. In addition, potential cumulative global climate change impacts associated with the Project will be evaluated. Emissions of carbon dioxide equivalents will be calculated and compared to the area emission levels. If necessary, mitigation measures will be identified to ensure that both short-term and long-term GHG impacts will be reduced to the extent possible. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to GHG emissions.**

b) Potentially Significant Impact. Refer to Response 4.7(a) above. Regulatory requirements on GHG emissions will be identified, and the Project's compliance with applicable plans and policies will be discussed. Emissions of carbon dioxide, a key GHG identified in Assembly Bill (AB) 32, and other major GHGs (e.g., methane and nitrous oxide) from direct and indirect Project-related sources will be calculated. The Project's emissions will be evaluated for consistency with the goals and emission projections in SCAQMD's Final 2016 AQMP to determine whether Project emissions will cause or delay the timely attainment of State and federal AAQS, as well as meet the emission reduction goals of AB 32, the California Global Warming Solutions Act of 2006, Senate Bill (SB) 32, and related climate change legislation. Standard requirements for construction activities recommended by SCAQMD will be identified and incorporated as part of the Project's standard conditions. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to conflicts with applicable plans, policies, or regulations adopted for the purpose of reducing GHG emissions.**

4.8 HAZARDS AND HAZARDOUS MATERIALS

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☒	☐	☐	☐
b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☒	☐	☐	☐
c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☒	☐	☐	☐
d. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☒	☐	☐	☐
e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
f. For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
g. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☒	☐	☐	☐
h. Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☒

Impact Analysis

a) Potentially Significant Impact. The EIR will incorporate and address the conclusions of a Phase I Environmental Site Assessment or Hazardous Materials Assessment to evaluate whether hazardous materials or other adverse environmental conditions are present due to past or present uses of the Project Site and/or properties in the vicinity of the Project Site. The Project Site assessment will identify whether the Project Site is: (1) a former hazardous waste disposal site (and whether the wastes have been removed); (2) a hazardous substance release site identified by the State Department of Health Services; or (3) a site containing one or more pipelines that carry hazardous substances, acutely hazardous substances, or hazardous wastes, except a natural gas line. Potential land use safety and hazard conflicts related to existing land uses in the vicinity of the Project Site will also be addressed.

Public or environmental exposure to hazardous materials could occur through improper handling or use of hazardous materials or hazardous wastes, a transportation accident, environmentally unsound disposal methods, fire, explosion, or other emergency. The severity of potential exposure hazards would vary due to factors such as the type of activity being conducted, the concentration and type of hazardous material or waste, and the proximity to sensitive receptors. Any exposure to hazardous materials associated with the Project is expected to occur during construction activities. The routine transport, use, or disposal of hazardous materials on the Project Site would not occur following construction activities. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to hazards to the public or the environment through the routine transport, use, or disposal of hazardous materials.**

b) Potentially Significant Impact. Refer to Response 4.8(a) above. During construction of the Project, there is potential for the accidental release of hazardous materials, which could adversely affect the public and/or environment. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to the accidental release of hazardous materials into the environment.**

c) Potentially Significant Impact. Public or environmental exposure to hazardous materials could occur through improper handling or use of hazardous materials or hazardous wastes, a transportation accident, environmentally unsound disposal methods, fire, explosion, or other emergency. The severity of potential exposure hazards would vary due to factors such as the type of activity being conducted, the concentration and type of hazardous material or waste, and the proximity to sensitive receptors. Any exposure to hazardous materials associated with the Project is expected to occur during construction activities. The routine transport, use, or disposal of hazardous materials on the Project Site would not occur following construction activities. As part of the Project, an elementary school with a capacity of 800 to 1,000 students is proposed on the Project Site. The elementary school would be located on the corner of Bake Parkway and Rancho Parkway, at the northwestern portion of the Project Site. New Thought Montessori Academy is located approximately 500 ft from the Project Site. In addition, Bella Montessori Academy (approximately 0.27 mi to the southwest), Fulbright Montessori Academy (approximately 0.39 mi to the west), Goddard School (approximately 0.60 mi to the northwest), and Foothill Ranch Elementary School (approximately 0.59 mi to the north) are in close proximity to the Project Site. The potential for the Project to emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school will be evaluated in the EIR. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to the existence of hazardous emissions, materials, substances, or waste within 0.25 mi of a proposed school.**

d) Potentially Significant Impact. Refer to Response 4.8(a) above. The Hazardous Materials Assessment will include a records search to determine if the Project Site could pose a potential environmental concern to the surrounding area, to identify any environmental violations associated with activities conducted at the Project Site, and to identify if there are any nearby

hazardous waste sites that could pose a hazard to the Project Site. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to hazardous waste sites.**

e) **No Impact.** The Project Site is approximately 12 mi east of John Wayne Airport in Santa Ana. According to the Airport Land Use Commission, the Project Site does not fall within the John Wayne Airport Planning Area. Further, the Project would not result in safety hazards for people living or working in the area different than would occur under existing conditions. Consequently, the risk of safety hazards associated with John Wayne Airport would not be substantively different in this area of Lake Forest with or without the Project. Therefore, no impacts would result, and no mitigation is required. **This topic will not be covered in the EIR unless related issues not covered here are identified during the scoping process.**

f) **No Impact.** No private airports or airstrips are located in the vicinity of the Project Site. As a result, the Project will not affect or be affected by aviation activities associated with private airports or airstrips. No mitigation is required. **This topic will not be covered in the EIR unless related issues not covered here are identified during the scoping process.**

g) **Potentially Significant Impact.** The Orange County Fire Authority (OCFA) is responsible for providing fire protection and suppression, inspection services, paramedic emergency medical services, and hazardous material response to citizens and visitors to Lake Forest. Roads used as response corridors/evacuation routes usually follow the most direct path to or from various parts of a community. For the Project Site and the surrounding areas, the main corridors anticipated to be used by emergency services providers are Bake Parkway, Lake Forest Drive, Rancho Parkway, SR-241, and other arterials and freeways in this part of Lake Forest. The proximity of these evacuation routes to the Project Site, depending on the traffic impacts of the Project, could result in potentially significant impacts. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to emergency response plans.**

h) **No Impact.** Wildland fires occur in geographic areas that contain the types and conditions of vegetation, topography, weather, and structure density susceptible to risks associated with uncontrolled fires that can be started by lightning, improperly managed camp fires, cigarettes, sparks from automobiles, and other ignition sources. The Project Site and the surrounding areas are developed with urban and suburban uses and do not include brush- and grass-covered areas typically found in areas susceptible to wildfires.

According to the California Department of Forestry and Fire Protection's (CAL FIRE) Very High Fire Hazard Severity Zones (VHFHSZ) in the Local Responsibility Area (LRA) Map for Lake Forest, the Project Site is in a non-VHFHSZ. The nearest VHFHSZ is located approximately 0.2 mi northeast of the Project Site and terminates near the SR-241 center median. The Project Site is not considered to be an area of very high fire hazard severity by CAL FIRE, and therefore, the Project would not expose people or structures to a significant risk of loss, injury, or death associated with wildland fires. No mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

4.9 HYDROLOGY AND WATER QUALITY

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Violate any water quality standards or waste discharge requirements?	☒	☐	☐	☐
b. Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☒	☐	☐	☐
c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	☒	☐	☐	☐
d. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	☒	☐	☐	☐
e. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☒	☐	☐	☐
f. Otherwise substantially degrade water quality?	☒	☐	☐	☐
g. Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☒	☐
h. Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☐	☐	☒	☐
i. Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☐	☒
j. Inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☒
k. Deposit sediment and debris materials within existing channels obstructing flows?	☒	☐	☐	☐
l. Exceed the capacity of a channel and cause overflow during design storm conditions?	☒	☐	☐	☐
m. Adversely change the rate, direction or flow of groundwater?	☒	☐	☐	☐
n. Have an impact on groundwater that is inconsistent with a groundwater management plan prepared by the water agencies with the responsibility for groundwater management?	☒	☐	☐	☐
o. Cause a significant alteration of receiving water quality during or following construction?	☒	☐	☐	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
p. Create or contribute runoff water which would generate substantial additional sources of polluted runoff?	☒	☐	☐	☐
q. Substantially degrade water quality by discharge which affects the beneficial uses (i.e. swimming, fishing, etc.) of the receiving or downstream waters?	☒	☐	☐	☐
r. Increase in any pollutant for which the receiving water body is already impaired as listed on the Clean Water Act Section 303(d) list?	☒	☐	☐	☐

Impact Analysis

a) Potentially Significant Impact. The Project proposes redevelopment of the Project Site to accommodate a planned community, including up to 675 single-family residential units, up to 101 senior affordable housing units, an elementary school with a capacity of up to 1,000 students, multiple parks and open space areas, recreation amenities, and an internal circulation system. The Project Site is bound on the southeast by Serrano Creek, which is the primary receiving water for storm water runoff from the Project Site.

Construction and operation of the Project has the potential to introduce additional pollutants into the storm drain system. During construction activities, excavated soil would be exposed, and there would be an increased potential for soil erosion and sedimentation compared to existing conditions. In addition, chemicals, liquid products, petroleum products (e.g., paints, solvents, and fuels), and concrete-related waste may be spilled or leaked and have the potential to be transported via storm runoff into receiving waters. During operation, the Project could increase operational pollutants, such as suspended solids/sediments, nutrients, heavy metals, pathogens (bacteria/viruses), pesticides, oil and grease, toxic organic compounds, and trash and debris, that are introduced into storm water runoff. The EIR will evaluate the Project's potential for pollutants of concern in storm water runoff to result in violation of water quality standards and waste discharge requirements.

Project construction would comply with the requirements of the Construction General Permit, including preparation of a Storm Water Pollution Prevention Plan (SWPPP) and implementation of Construction Best Management Practices (BMPs). In accordance with the County of Orange Model Water Quality Management Plan (WQMP) template and the Technical Guidance Document for the County of Orange and the City, a preliminary WQMP will be prepared for the Project, which will detail the Low Impact Development features and treatment control BMPs to be included in the Project to reduce pollutants of concern in storm water runoff. BMPs would include bioswales and bioretention basins to treat and control storm water runoff. Compliance with the applicable permits and the proposed BMPs will be considered in the evaluation of potential water quality impacts in the EIR. **This topic will be analyzed further in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially**

significant adverse Project effects related to water quality standards and waste discharge requirements.

b) Potentially Significant Impact. The Project Site is underlain by the Coastal Plain of Orange County Groundwater Basin. The potential for groundwater dewatering during construction cannot be ruled out at this time. In addition, the Project could change the impervious surface area of the Project Site, which could in turn affect infiltration of storm water runoff to the groundwater table. The effect the Project could have on groundwater supplies and groundwater recharge (GWR) will be analyzed in the EIR.

The depth to groundwater and the proposed depth of excavation for the Project will be evaluated in the EIR to determine whether groundwater dewatering during construction is required. Potential changes in impervious area and infiltration as a result of Project implementation will also be considered. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to groundwater.**

c) Potentially Significant Impact. Refer to Response 4.9(a) above. Although the Project would not alter topography substantially or result in long-term operational conditions that would result in substantial erosion, the Project could result in such impacts during the construction process due to ground-disturbing activities that would expose the top soil. The Project could also increase storm water runoff that could result in downstream erosion and siltation. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to changes in drainage patterns and associated erosion and siltation.**

d) Potentially Significant Impact. The Project could involve a change in impervious surface area. Using information from the Project hydrology report, the EIR will analyze Project impacts related to changes in runoff and the potential for on- and off-site flooding. The hydrology report will include calculations of the existing and proposed runoff peak flows and volume. Taking into consideration the capacity of the existing storm drain systems, the hydrology report will consider any storm drain improvements or BMPs that may be required to mitigate any increase in runoff and to comply with flood control requirements. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to changes in drainage patterns and associated flooding.**

e) Potentially Significant Impact. Refer to Responses 4.9(a) and (d) above. The EIR will consider Project compliance with regulatory requirements and proposed BMPs and drainage facilities and will evaluate the need for Project mitigation measures and additional BMPs to ensure adequate treatment and conveyance of storm flows. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to storm water drainage and pollutants.**

f) **Potentially Significant Impact.** Refer to Response 4.9(a) above. The EIR will evaluate the Project's potential for pollutants of concern in storm water runoff to degrade water quality. Compliance with the applicable permits and the proposed BMPs will be considered in the evaluation of potential water quality impacts in the EIR. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to water quality and hydrology.**

g) **Less than Significant Impact.** The Project Site is bound on the southeast by Serrano Creek. According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Map No. 06059C0316J (December 3, 2009), a portion of the Project Site along the southeast boundary is located within Zone AO of the Serrano Creek 100-year floodplain. Zone AO is defined by FEMA as a Special Flood Hazard Area subject to inundation by the 1 percent annual chance flood (100-year flood) with flood depths between 1 ft and 3 ft. However, a Letter of Map Revision (LOMR) became effective on July 16, 2018, after a 90-day appeal period, and affects the floodplains mapped on the Project Site. The proposed LOMR was noticed to the public in the Saddleback Valley News on March 9 and 16, 2018. The LOMR changed the portion of the Serrano Creek adjacent to the Project Site to Zone AE. The LOMR revised the FIRM to remove a majority of the southeastern boundary of the Project Site from the 100-year floodplain. Only the southern corner of the Project Site remains mapped within a 100-year floodplain. This portion of the Project Site is proposed as an open space and habitat restoration area. Based on the revised floodplain mapping included in the LOMR, no housing would be placed within the 100-year floodplain. Therefore, the Project would not place housing within a 100-year flood hazard area, and no mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process**.

h) **Less than Significant Impact.** Please refer to Response 4.9(g) above. Based on the revised floodplain mapping included in the LOMR, no structures would be placed within the 100-year floodplain. Therefore, the Project would not place structures within a 100-year flood hazard area, and no mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process**.

i) **No Impact.** The closest unenclosed water retention facilities to the Project Site include Upper Oso Reservoir, Lake Mission Viejo, and Irvine Lake, all of which are located more than 2 mi from the Project Site. According to the Safety Element of the Orange County General Plan (2012), the Project Site is not located within the inundation areas of these reservoirs. Therefore, the Project would not expose people or structures to loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam. No mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process**.

j) **No Impact.** Seiching is a phenomenon that occurs when seismic ground shaking induces standing waves (seiches) inside water retention facilities such as reservoirs and water tanks. Such waves can cause retention structures to fail and subsequent flooding of downstream

properties. There are no water retention facilities that are not enclosed in close proximity to the Project Site. The closest unenclosed water retention facilities include Upper Oso Reservoir, Lake Mission Viejo, and Irvine Lake, which are all located more than 2 mi from the Project Site. The risk associated with possible seiche waves is, therefore, not considered to be a potentially significant impact of the Project, and no mitigation is necessary.

Tsunamis are generated ocean wave trains generally caused by tectonic displacement of the seafloor associated with shallow earthquakes, seafloor landslides, rockfalls, and exploding volcanic islands. The Project is located approximately 10 mi from the ocean shoreline and is not in a tsunami inundation area.[1] The risk associated with tsunamis, therefore, is not considered a potential hazard or a potentially significant impact, and no mitigation is required.

Mudslides and slumps are described as a shallower type of slope failure that usually affects the upper soil mantle or weathered bedrock underlying natural slopes and is triggered by surface or shallow subsurface saturation. As discussed in Response 4.6(c) in Section 4.6, Geology and Soils, the Project Site is relatively flat, and no substantial hillsides or unstable slopes are immediately adjacent to the Project Site boundary; therefore, there is no potential risk for landslide hazard. The risk associated with possible mudflows and mudslides, therefore, is not considered a potential constraint or a potentially significant impact of the Project, and no mitigation is necessary. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process**.

k) Potentially Significant Impact. Refer to Responses 4.9(a) and (c) above. Although the Project would not substantially alter topography or result in long-term operational conditions that would result in substantial erosion, the Project could result in such impacts during the construction process due to ground-disturbing activities that would expose the top soil and increase erosion during storm events. The Project could also increase storm water runoff by increasing impervious surface areas, which could result in downstream erosion and siltation. Change in runoff and erosion and siltation patterns could result in additional sediment and debris being deposited downstream. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to changes in deposition of sediment and debris.**

l) Potentially Significant Impact. Refer to Responses 4.9(d) and (e) above. The EIR will consider Project compliance with regulatory requirements and proposed BMPs and drainage facilities and will evaluate the need for Project mitigation measures and additional BMPs and drainage facilities to ensure adequate conveyance of storm flows. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to the capacity of storm water drainage facilities.**

---

1 California Emergency Management Agency, California Geological Survey, and University of Southern California. Tsunami Inundation Map for Emergency Planning, Orange County. Website: http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/Inundation_Maps/Orange, accessed May 1, 2018.

m) Potentially Significant Impact. Refer to Response 4.9(b) above. The potential for groundwater dewatering during construction cannot be ruled out at this time. However, Project operation is not anticipated to require on-site groundwater extraction. The effect the Project could have on groundwater supplies and GWR will be analyzed in the EIR. The depth to groundwater and the proposed depth of excavation for the Project will be evaluated in the EIR to determine whether groundwater dewatering during construction is required. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to groundwater.**

n) Potentially Significant Impact. As discussed in Responses 4.9(b) and (m) above, the Project Site is underlain by the Coastal Plain of Orange County Groundwater Basin. The groundwater basin is managed by the Orange County Water District (OCWD). The current management plan for the groundwater basin is the *Orange County Groundwater Management Plan 2015 Update* (OCWD 2015). The potential for groundwater dewatering during construction cannot be ruled out at this time. However, Project operation is not anticipated to require on-site groundwater extraction. The effect the Project could have on groundwater and consistency with groundwater management plans will be analyzed in the EIR. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to consistency with groundwater management plans.**

o) Potentially Significant Impact. Refer to Response 4.9(a) above. The EIR will evaluate the Project's potential for pollutants of concern in storm water runoff to degrade receiving water quality. Compliance with the applicable permits and the proposed BMPs will be considered in the evaluation of potential water quality impacts in the EIR. In addition, a WQMP will be prepared for the Project and will detail the Low Impact Development features and treatment control BMPs to be included in the Project to reduce pollutants of concern in storm water runoff. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to receiving water quality.**

p) Potentially Significant Impact. Refer to Responses 4.9(a) and (e) above. The EIR will consider Project compliance with regulatory requirements and proposed BMPs and drainage facilities and will evaluate the need for Project mitigation measures and additional BMPs to ensure adequate treatment of storm flows. In addition, a WQMP will be prepared for the Project. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to generation of substantial additional sources of polluted runoff.**

q) Potentially Significant Impact. The Santa Ana Regional Water Quality Control Board (RWQCB) Water Quality Control Plan (January 1995, updated February 2016) lists the intermittent beneficial uses of Serrano Creek as GWR, water contact recreation (REC1), non-contact water recreation (REC2), warm freshwater habitat (WARM), and wildlife habitat (WILD). As discussed in Response 4.9(a) above, the Project has the potential to contribute pollutants of concern to downstream receiving waters (i.e., Serrano Creek). The EIR will evaluate the Project's potential

for pollutants of concern in storm water runoff to degrade receiving water quality and affect beneficial uses. Compliance with the applicable permits and the proposed BMPs will be considered in the evaluation of potential water quality impacts in the EIR. In addition, a WQMP will be prepared for the Project. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to receiving water quality and beneficial uses.**

r) Potentially Significant Impact. Serrano Creek, which is the receiving water for runoff from the Project Site, is listed as impaired for unionized ammonia on the 2014 and 2016 California Integrated Report (Clean Water Act Section 303[d] list and 305[b] report). According to the County of Orange's *Technical Guidance Document for the Preparation of Conceptual/Preliminary and/or Project Water Quality Management Plans (WQMPs)* (2013), nutrients are an expected pollutant for the proposed residential development and associated roadway system. Therefore, the Project has the potential to contribute additional pollutants to a receiving water body that is listed as impaired on the Clean Water Act Section 303(d) list. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse project air quality effects on sensitive receptors.**

4.10 LAND USE AND PLANNING

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Physically divide an established community?	☐	☐	☐	☒
b. Substantially conflict with existing on-site or adjacent land use due to project-related significant unavoidable indirect effects (i.e. noise, aesthetics, etc.) that preclude use of the land as it was intended by the General Plan?	☒	☐	☐	☐
c. Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, planned community, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☒	☐	☐	☐
d. Conflict with the Central and Coastal Natural Communities Conservation Program/Habitat Conservation Plan (NCCP/HCP) of which the City of Lake Forest is a participant.	☒	☐	☐	☐

Impact Analysis

a) No Impact. The Project Site is currently developed with existing structures and buildings related to agricultural operations, and there are no public roads through the 122 ac site. Implementation of the Project would result in the demolition of existing structures and buildings on the Project Site, as well as construction of up to 675 single-family residential units, up to 101 senior affordable housing units, an elementary school with a capacity of up to 1,000 students, multiple parks and open space areas, recreation amenities, and an internal circulation system. The area around the Project Site consists of a mix of land uses, including commercial, office, open space, industrial, and residential. The Project Site is bounded on the northwest by Bake Parkway, on the northeast by Rancho Parkway, on the southeast by Serrano Creek Trail, and on the southwest by commercial, industrial, and office uses with Dimension Drive beyond. Residential uses exist to the northwest, northeast, and south of the Project Site and consist of single-family and multifamily developments. The proposed circulation system would provide new public roads traversing the Project Site and allow access where none currently exists; however, the proposed development would not divide or separate any existing land uses or neighborhoods. The Project would also include pedestrian and bicycle access throughout the Project Site via sidewalks along the proposed roads. As a result, the Project would not result in physical divisions in any established community. No mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

b) Potentially Significant Impact. The Project Site is located in an urbanized portion of the City and is surrounded by existing urban and suburban land uses. The Land Use Element (1994, revised 2016) of the City's General Plan designates the Project Site as Business Park and includes the Project Site in the BDO. As part of the Project, a GPA would change the land use designation to Residential and Institutional. The EIR will include analysis of potential conflicts that the Project

may have with existing on-site or adjacent land use due to Project-related significant unavoidable indirect effects (e.g., effects from noise, aesthetics, and other factors). If necessary, mitigation measures will be included to reduce potential impacts. The EIR will also contain a General Plan consistency analysis as required by CEQA. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant unavoidable indirect effects as a result of the Project and how they conflict with existing on-site and adjacent land uses.**

c) **Potentially Significant Impact.** Locally adopted land use plans, policies, or regulations that would be applicable to the Project include the City's General Plan and Zoning Code. As stated previously, the Land Use Element of the City's General Plan designates the Project Site as Business Park and part of the BDO. The Project Site is zoned general Agriculture (A-1). The Project proposes a GPA to change the designation to Residential and Institutional, as well as a zone change to Planned Community District. The EIR will include analysis of potential conflicts the Project may have with applicable land use plans, policies, and regulations. The Project's compatibility with existing and planned surrounding land uses, existing land use patterns, and the existing character of the area will also be analyzed in the EIR. If necessary, mitigation measures will be included to reduce potential impacts. The EIR will also contain a General Plan consistency analysis as required by CEQA. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to consistency with applicable land use plans, policies, or regulations.**

d) **Potentially Significant Impact.** The City is a signatory jurisdiction to the Orange County Central and Coastal Natural Communities Conservation Program/Habitat Conservation Plan (NCCP/HCP); however, the Project Site's owner and the Applicant are not participating landowners. The Project Site is located within the Orange County Central and Coastal NCCP/HCP planning area but outside the boundaries of the NCCP/HCP Reserve System. The Reserve System boundary is located approximately 4,000 ft northeast of the Project Site; however, the Project Site is in an area designated for development.

As discussed in 2.0 Project Description, the Project includes restoration of native riparian habitat within Serrano Creek. The intention is to contribute to the existing riparian canopy, improve Serrano Creek as a regional wildlife movement corridor, and provide live-in and breeding habitat for many wildlife species. The Project proposes to remove approximately 0.25 acre of degraded coastal sage scrub (CSS). Although the CSS habitat is included in NCCP/HCP, the isolated patch of degraded CSS is located in an area identified for development and is not within the boundaries of the NCCP/HCP Reserve System. However, the removal of the patch of CSS will be addressed in the EIR. Therefore, development of the Project may result in the removal of sensitive habitat species identified in the Orange County Central and Coastal NCCP/HCP, and the proposed Project may conflict with the adopted NCCP/HCP. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse impacts as a result of any potential conflicts with the adopted NCCP/HCP.**

4.11 MINERAL RESOURCES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b. Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

Impact Analysis

a) No Impact. In 1975, the California Legislature enacted the Surface Mining and Reclamation Act, which, among other things, provided guidelines for the classification and designation of mineral lands. Areas are classified on the basis of geologic factors into four categories of Mineral Resource Zones (MRZs) regardless of existing land use and land ownership:

- **MRZ-1:** An area where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence
- **MRZ-2:** An area where adequate information indicates that significant mineral deposits are present, or where it is judged that a high likelihood exists for their presence
- **MRZ-3:** An area containing mineral deposits for which the significance cannot be determined from available data
- **MRZ-4:** An area where available information is inadequate for assignment to any other MRZ zone

Of the four categories, lands classified as MRZ-2 are of the greatest importance. Those areas are underlain by demonstrated mineral resources or are located where geologic data indicate significant measured or indicated resources are present. MRZ-2 areas are designated by the Mining and Geology Board as being "regionally significant." Such designations require that a Lead Agency's land use decisions involving designated areas are made in accordance with its mineral resource management policies and that Lead Agencies consider the importance of the mineral resource to the region or the State as a whole, not just to the Lead Agency's jurisdiction.

The California Department of Mines and Geology classifies the Project Site as MRZ-3, indicating the Project Site is located in an area containing mineral deposits for which the significance cannot be determined using available data. Though the Project Site is in MRZ-3, no known mineral resources are located on the Project Site, and the Project Site is not designated or zoned for the extraction of mineral deposits.

The Project would not result in the loss of a known commercially valuable mineral resource. No impacts to known mineral resources would occur as a result of the Project. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

b) No Impact. Refer to Response 4.11(a) above. The Project would not result in the loss of a known locally important mineral resource. No impacts to known mineral resources would occur as a result of the Project. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

4.12 NOISE

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project result in:				
a. A proposed project would normally have a significant offsite traffic noise impact if both of the following criteria are met:				
i. Project traffic will cause a noise level increase of 3 dB or more on a roadway segment adjacent to a noise sensitive land use. Noise sensitive land uses include the following: residential (single-family, multi-family, mobile home); hotels; motels; nursing homes; hospitals; parks, playgrounds and recreation areas; and schools.	☒	☐	☐	☐
ii. The resulting "future with project" noise level exceeds the noise standard for sensitive land uses as identified in the City of Lake Forest General Plan.	☒	☐	☐	☐
b. Exceed the stationary source noise criteria for the City of Lake Forest as specified by the Exterior noise standards set forth in the Noise Control Chapter of the Lake Forest Municipal Code?	☒	☐	☐	☐

Impact Analysis

a)(i) **Potentially Significant Impact.** The area around the Project Site consists of a mix of land uses, including commercial, office, open space, industrial, and residential. Noise sensitive land uses are in the Project vicinity. The Serrano Creek Trail is adjacent to the Project Site along the southeastern boundary. In addition, Nature Park is located adjacent to the southwest boundary of the Project Site. Residential uses exist to the northwest, northeast, and south of the Project Site and consist of single-family and multifamily developments. A hotel development exists across the street from the Project Site along Bake Parkway.

Two types of short-term noise impacts could occur during construction of the Project. First, the construction crew commutes and the transport of construction equipment and materials to the Project Site for the Project would incrementally increase noise levels on access roads leading to the Project Site. The second type of short-term noise impact is related to noise generated during excavation, grading, and construction of the Project, and is considered a stationary noise impact. Long-term noise impacts from the Project would be primarily from Project-related traffic on roadways adjacent to the Project Site. The EIR will incorporate and address the results of a Noise and Vibration Assessment, which would determine whether Project traffic will cause a noise level increase of 3 dB or more on a roadway segment adjacent to a noise sensitive land use. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to increased noise as a result of Project traffic.**

a)(ii) **Potentially Significant Impact.** Refer to Response 4. 12(a)(i) above for noise sensitive land uses in the Project vicinity and discussion of types of short-term and long-term noise impacts. The EIR will incorporate and address the results of a Noise and Vibration Assessment, which would determine whether the "future with project" noise levels would exceed the noise standard for sensitive land uses as identified in the City's General Plan. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to increased noise as a result of Project operation.**

b) **Potentially Significant Impact.** Refer to Response 4.12(a)(i) above for a discussion of types of short-term and long-term noise impacts. The City's Noise Ordinance is designed to protect people from non-transportation (stationary) noise. The City's Noise Ordinance sets limits on the level and duration of time a stationary noise source may impact a residential use. Ordinance limits generally apply to stationary sources (e.g., mechanical equipment or vehicles operating on private property). The City's Noise Ordinance limits are stated in terms of a 30-minute limit with allowable deviations from the 50th percentile standard. The louder the noise, the shorter the time it is allowed to occur. The EIR will incorporate and address the results of a Noise and Vibration Assessment, which would determine whether the Project would exceed the stationary source noise as specified by the exterior noise standards set forth in the Noise Control Chapter of the City's Municipal Code. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects as a result of the Project exceeding the City's stationary source noise requirements.**

4.13 POPULATION AND HOUSING

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☒	☐	☐	☐
b. Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
c. Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

Impact Analysis

a) **Potentially Significant Impact.** The Project proposes up to 675 single-family residential units and up to 101 affordable housing units for seniors, which may substantially increase the residential population in the City. In addition, an elementary school is proposed that would result in an increase in employment opportunities in the City. The Project would also include construction of new roads and infrastructure to support the proposed development, thereby expanding infrastructure in the Project vicinity. As such, the Project could induce population growth. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to an increase in population and jobs and expansion of infrastructure in the Project vicinity.**

b) **No Impact.** The Project would not displace any existing housing, and there are no existing residential uses on the Project Site. Therefore, there would be no impacts related to the displacement of substantial numbers of housing, and no mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

c) **No Impact.** There are no residential populations on the Project Site. The Project would not displace housing or substantial numbers of people, thereby necessitating the construction of replacement housing elsewhere. Therefore, there would be no impacts related to the displacement of substantial numbers of people, and no mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

4.14 PUBLIC SERVICES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
i. Fire protection?	☒	☐	☐	☐
ii. Police protection?	☒	☐	☐	☐
iii. Schools?	☒	☐	☐	☐
iv. Other public facilities?	☒	☐	☐	☐

Impact Analysis

a)(i) Potentially Significant Impact. OCFA is responsible for providing fire protection and suppression, inspection services, paramedic emergency medical services, and hazardous material response to citizens and visitors to Lake Forest. The Project would result in the demolition of existing structures and buildings used for agricultural operations, and construction of up to 675 single-family residential units, up to 101 senior affordable housing units, an elementary school with a capacity of up to 1,000 students, multiple parks and open space areas, recreation amenities, and an internal circulation system on the Project Site. The Project may result in increased demand for fire services on the Project Site compared to existing conditions. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to increased demand for fire protection.**

a)(ii) Potentially Significant Impact. Police Services for the City of Lake Forest are provided by contract with the Orange County Sheriff's Department. Similar to Response 4.14(a) above, the Project may result in increased demand for police protection services. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to increased demand for police protection.**

a)(iii) Potentially Significant Impact. The Project is located within the Saddleback Valley Unified School District (SVUSD). The Project would result in the demolition of existing structures and buildings used for agricultural operations, and construction of up to 675 single-family residential units which would increase demand for school. Although the Project includes the construction of an elementary school with capacity for 800 to 1,000 students, potential impacts to middle school and high schools in the SVUSD could result from Project implementation. **This topic will**

be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to increased demand for schools.

a)(iv) Potentially Significant Impact. The Orange County Public Library (OCPL) has a network of 33 libraries throughout Orange County, and two OCPL branches are located in Lake Forest. The Foothill Ranch Library is located at 27002 Cabriole Way, approximately 1.0 mi northeast of the Project Site. The El Toro Library is located at 24672 Raymond Way, approximately 4.5 mi southwest of the Project Site. Operation of the Project may result in increased demand for other public facilities, including libraries. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to increased demand for other public facilities, including libraries.**

4.15 RECREATION

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☒	☐	☐	☐
b. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☒	☐	☐	☐

Impact Analysis

a) **Potentially Significant Impact.** The City maintains and operates 27 public parks, consisting of approximately 200 ac of parklands and recreational facilities. In addition, Limestone/Whiting Wilderness Park encompasses 1,101 ac of natural land in Lake Forest. Private parks are also distributed throughout Lake Forest in various Planned Communities. The additional residents generated by development of the Project could incrementally increase usage of City parks and recreational facilities. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to increased use of parks and other recreational facilities.**

b) **Potentially Significant Impact.** The Project includes over 28 ac of parks, open space, and habitat restoration area as part of the Project. Therefore, the Project includes recreational facilities that might have an adverse physical effect on the environment, and mitigation may be required. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to the construction of recreational facilities as part of the Project.**

4.16 CIRCULATION AND PARKING

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
The project would normally have a significant impact if the following criteria are met:				
a. ICU (intersection capacity utilization) values at intersections, with the proposed project, exceed the City of Lake Forest performance criteria as specified in Table C-3 of the General Plan Circulation Element?	☒	☐	☐	☐
b. The proposed project includes design features or uses that may cause traffic hazards such as sharp curves, tight turning radii from streets, limited roadway visibility, short merging lanes, uneven road grades, or any other conditions determined by the City traffic engineer to be a hazard.	☒	☐	☐	☐
c. The project provides less parking than required, applying the standards found in the City of Lake Forest Municipal Code.	☐	☐	☐	☒

Impact Analysis

a) **Potentially Significant Impact.** The Project proposes redevelopment of the Project Site to accommodate a planned community, including up to 675 single-family residential units, up to 101 senior affordable housing units, an elementary school with a capacity of up to 1,000 students, multiple parks and open space areas, recreation amenities, and an internal circulation system. Due to the intensification in land use from agriculture to planned community, the Project would likely result in an increase in traffic trips. Therefore, a Traffic Study and Queuing Access Study will be prepared for the EIR to analyze traffic impacts as a result of the Project. Intersection capacity utilization (ICU) values at intersections will be analyzed to determine if they would exceed the performance criteria specified in Table C-3 of the City's General Plan Circulation Element. **This topic will be analyzed in the EIR, and mitigation will be developed, if necessary, and included in the EIR to address potentially significant adverse effects related to ICU values exceeding the City's performance criteria.**

b) **Potentially Significant Impact.** Refer to Response 4.16(a) above. The Project would involve the development of an internal circulation system that consists of collector streets and neighborhood streets. Therefore, the Project could include design features or uses that may cause traffic hazards (e.g., sharp curves, tight turning radii from streets, limited roadway visibility, short merging lanes, uneven road grades, or any other conditions determined by the City traffic engineer to be a hazard). **This topic will be analyzed in the EIR, and mitigation will be developed, if necessary, and included in the EIR to address potentially significant adverse impacts related to traffic hazards.**

c) **No Impact.** Refer to Section 2.2.1.5, Parking, in Chapter 2.0, Project Description, for the breakdown of the City's minimum parking requirements compared to parking proposed as part of the Project. The Project Site would provide approximately 3,019 to 3,584 total parking spaces

(residential uses would include 2,750 to 3,275 spaces, the school site would include 180 to 220 spaces, and Central Park would include 89 spaces). In the event the Project is fully built out to the maximum number of residential units proposed, the City's Municipal Code would require a minimum of 2,260 parking spaces. Therefore, the Project would satisfy the requirements of the City's Municipal Code, and there would be no adverse impacts related to parking. No mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

4.17 TRIBAL CULTURAL RESOURCES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
i. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k).	☒	☐	☐	☐
ii. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☒	☐	☐	☐

Impact Analysis

a)(i) Potentially Significant Impact. Chapter 532, Statutes of 2014 (i.e., AB 52), requires that Lead Agencies evaluate a project's potential to impact "tribal cultural resources." Such resources include sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are eligible for inclusion in the California Register or included in a local register of historical resources (PRC, Section 21074). AB 52 also gives Lead Agencies the discretion to determine, supported by substantial evidence, whether a resource falling outside the definition stated above nonetheless qualifies as a "tribal cultural resource."

Also per AB 52 (specifically PRC Section 21080.3.1), as Lead Agency, Lake Forest must consult with California Native American tribes that are traditionally and culturally affiliated with the geographic area of the Project and have previously requested that the Lead Agency provide the tribe with notice of such projects.

In compliance with AB 52, letters have been distributed to local Native American tribes who have previously requested to be notified of future projects proposed by the City. The letters have provided each tribe of the opportunity to request consultation with the City regarding the Project. In compliance with AB 52, tribes have 30 days from the date of receipt of notification to request consultation on the Project. Information provided through tribal consultation will inform the assessment as to whether tribal cultural resources are present, and the significance of any potential impacts to such resources. **This topic will be analyzed in the EIR and, if**

necessary, mitigation will be developed and included in the EIR to address potentially significant adverse Project effects to tribal historic resources.

a)(ii) Potentially Significant Impact. See Response 4.17(a)(i) above. Tribal consultation is to occur as part of the CEQA process. Information provided through tribal consultation will inform the assessment as to whether tribal cultural resources are present and the significance of any potential impacts to such resources**. This topic will be analyzed in the EIR and, if necessary, mitigation will be developed and included in the EIR to address potentially significant adverse Project effects to tribal resources.**

4.18 UTILITIES AND SERVICE SYSTEMS

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☒	☐
b. Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☒	☐	☐	☐
c. Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☒	☐	☐	☐
d. Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☒	☐	☐	☐
e. Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☒	☐	☐	☐
f. Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☒	☐	☐	☐
g. Comply with federal, state, and local statutes and regulations related to solid waste?	☒	☐	☐	☐

Impact Analysis

a) Less Than Significant Impact. The Project is not an industrial facility and is not subject to the wastewater treatment requirements of the RWQCB.

Local governments and water districts are responsible for complying with federal regulations, both for wastewater plant operation and the collection systems (e.g., sanitary sewers) that convey wastewater to the wastewater treatment facility. Proper operation and maintenance is critical for sewage collection and treatment because impacts from these processes can degrade water resources and affect human health. For these reasons, publicly owned treatment works (POTWs) receive Waste Discharge Requirements (WDRs) to ensure that such wastewater facilities operate in compliance with the water quality regulations set forth by the State. WDRs, issued by the State, establish effluent limits on the kinds and quantities of pollutants that POTWs can discharge. These permits also contain pollutant monitoring, record-keeping, and reporting requirements. Each POTW that intends to discharge into the nation's waters must obtain a WDR prior to initiating its discharge

Implementation of the Project would result in the development of up to 675 single-family residential units, up to 101 senior affordable housing units, an elementary school with a capacity

of up to 1,000 students, multiple parks and open space areas, and recreation amenities. Wastewater generated from the Project would be typical of residential wastewater flows in the City. The Project Site is within the sewer service area of the IRWD's Michelson Water Reclamation Plant (MWRP). Because IRWD's MWRP is considered a POTW, operational discharge flows treated at IRWD's MWRP would be required to comply with applicable WDRs issued by the Santa Ana RWQCB. Compliance with conditions or permit requirements established by the City as well as WDRs outlined by the Santa Ana RWQCB would ensure that wastewater discharges coming from the Project Site and treated by the wastewater treatment facility system would not exceed applicable Santa Ana RWQCB wastewater treatment requirements. Therefore, a less than significant impact associated with this issue would occur, and no mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

b) Potentially Significant Impact. The Project would involve the operation of up to 675 single-family residential units, up to 101 senior affordable housing units, an elementary school with a capacity of up to 1,000 students, multiple parks and open space areas, and recreation amenities, and as such would require water use and would result in the generation of wastewater. Potential Project-related impacts to water/wastewater treatment and collection facilities will be assessed in the EIR. **This topic will be analyzed in the EIR and, if necessary, mitigation will be developed and included in the EIR to address potentially significant adverse Project effects related to water/wastewater treatment and collection facilities.**

c) Potentially Significant Impact. Refer to Responses 4.9(d) and (e) in Section 4.9, Hydrology and Water Quality. The EIR will consider Project compliance with regulatory requirements and proposed BMPs and drainage facilities and will evaluate the need for Project mitigation measures and additional BMPs and drainage facilities to ensure adequate conveyance of storm flows. **This topic will be analyzed in the EIR and, if necessary, mitigation will be developed and included in the EIR to address potentially significant adverse Project effects related to storm water drainage facilities.**

d) Potentially Significant Impact. The Project would require water use related to the operation of up to 675 single-family residential units, up to 101 senior affordable housing units, an elementary school with a capacity of up to 1,000 students, multiple parks and open space areas, and recreation amenities. Potential Project-related impacts to water entitlements and resources will be assessed in the EIR. **This topic will be analyzed in the EIR and, if necessary, mitigation will be developed and included in the EIR to address potentially significant adverse Project effects related to water entitlements and resources.**

e) Potentially Significant Impact. Refer to Response 4.18(a) above. Potential Project-related impacts related to wastewater treatment capacity will be assessed in the EIR. **This topic will be analyzed in the EIR and, if necessary, mitigation will be developed and included in the EIR to address potentially significant adverse Project effects related to wastewater treatment capacity of local providers.**

f) **Potentially Significant Impact.** Refer to Response 4.18(a) above. The operation of up to 675 single-family residential units, up to 101 senior affordable housing units, an elementary school with a capacity of up to 1,000 students, multiple parks and open space areas, and recreation amenities as part of the Project would result in the generation of solid waste. Potential Project-related impacts to landfill capacity will be assessed in the EIR. **This topic will be analyzed in the EIR and, if necessary, mitigation will be developed and included in the EIR to address potentially significant adverse Project effects related to the capacity of regional landfills servicing the site.**

g) **Potentially Significant Impact.** Refer to Response 4.18(a) above. The operation of up to 675 single-family residential units, up to 101 senior affordable housing units, an elementary school with a capacity of up to 1,000 students, multiple parks and open space areas, and recreation amenities as part of the Project would result in the generation of solid waste. As such, the Project would be required to comply with federal, State, and local statutes and regulations related to solid wastes, and potential Project-related impacts will be assessed in the EIR. **This topic will be analyzed in the EIR and, if necessary, mitigation will be developed and included in the EIR to address potentially significant adverse Project effects related to solid waste regulations.**

4.19 MANDATORY FINDINGS OF SIGNIFICANCE

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☒	☐	☐	☐
b. Does the project have the potential to achieve short-term environmental goals to the disadvantage of long-term environmental goals?	☒	☐	☐	☐
c. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☒	☐	☐	☐
d. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☒	☐	☐	☐

Impact Analysis

a) Potentially Significant Impact. CEQA specifies that certain findings, if found to be affirmative, require that a determination of significant impact be made. As discussed in Section 4.4 Biological Resources, the Project has the potential to degrade the quality of the environment, have a significant impact on habitats of fish or wildlife species or cause a fish or wildlife population to drop below self-sustaining levels, and/or threaten to eliminate a plant or animal community, or reduce the number or restrict the range of a rare or endangered plant or animal. As discussed in Section 4.5, Cultural Resources, the Project may result in significant impacts to archaeological and/or paleontological resources. **This topic will be analyzed in the EIR and, if necessary, mitigation will be developed and included in the EIR to address potentially significant adverse Project effects.**

b) Potentially Significant Impact. State CEQA Guidelines Section 15065(a)(2) states that a Lead Agency shall find that a project may have a significant effect on the environment where there is substantial evidence that the project has the potential to achieve short-term environmental goals to the disadvantage of long-term environmental goals. As discussed in Section 4.4, Biological Resources, development of the Project may result in significant impacts to sensitive habitat species identified in the Orange County NCCP/HCP. As discussed in Section 4.7, Greenhouse Gas Emissions, the Project may also result in a significant impact related to GHG emissions and would not impede or interfere with achieving the State's emission reduction

objectives in AB 32. Therefore, the Project may achieve short-term environmental goals to the disadvantage of long-term environmental goals. **This topic will be analyzed in the EIR and, if necessary, mitigation will be developed and included in the EIR to address potentially significant adverse Project effects.**

c) Potentially Significant Impact. A significant impact may occur if the Project, in conjunction with related projects, would result in impacts that are less than significant when viewed separately but would be significant when viewed together. Due to the potentially significant impact of various sections (including Sections 4.1, Aesthetics; 4.2, Agriculture and Forestry; 4.3, Air Quality; 4.4, Biological Resources; 4.5, Cultural Resources; 4.6, Geology and Soils; 4.7, Greenhouse Gas Emissions; 4.8, Hazards and Hazardous Materials; 4.9, Hydrology and Water Quality; 4.10, Land Use and Planning; 4.12, Noise; 4.13, Population and Housing; 4.14, Public Services; 4.15, Recreation; 4.16, Circulation and Parking; 4.17, Tribal Cultural Resources; and 4.18, Utilities/Service Systems), cumulatively considerable impacts could result from implementation of the Project. **This topic will be analyzed in the EIR and, if necessary, mitigation will be developed and included in the EIR to address potentially significant adverse Project effects.**

d) Potentially Significant Impact. A significant impact may occur if environmental effects related to the Project could cause substantial direct or indirect adverse impacts to human beings as described in the checklist responses. Refer to Response 4.19(b) for a reference to all sections contained in this Initial Study that are anticipated to have a potentially significant impact as a result of the Project. **This topic will be analyzed in the EIR and, if necessary, mitigation will be developed and included in the EIR to address potentially significant adverse Project effects.**

5.0 REFERENCES

Airport Land Use Commission. Airport Environs Land Use Plans Notification Area for John Wayne Airport. Website: http://www.ocair.com/commissions/aluc/docs/jwanotf2008.pdf, accessed May 1, 2018.

California Department of Conservation. 2014. Orange County Important Farmland. Website: ftp://ftp.consrv.ca.gov/pub/dlrp/FMMP/pdf/2014/ora14.pdf, accessed April 26, 2017.

_____. 2004. Williamson Act Parcels, Agricultural Preserves. Website: ftp://ftp.consrv.ca.gov/pub/dlrp/wa/, accessed August 3, 2017.

_____. 2001. California Geological Survey. Earthquake Zones of Required Investigation. Lake Forest Quadrangle.

_____. 1994. Division of Mines and Geology. Generalized Mineral Classification of Orange County. Open-File Report 94-15, Plate 1.

_____. Guidelines for Classification and Designation of Mineral Lands. Website: http://www.conservation.ca.gov/smgb/Guidelines/Documents/ClassDesig.pdf, accessed May 1, 2018.

California Department of Transportation. Scenic Highway Mapping System, Orange County. Website: http://www.dot.ca.gov/hq/LandArch/16_livability/scenic_highways/, accessed April 26, 2018.

California Department of Water Resources. Groundwater Basin Boundary Assessment Tool. Website: https://gis.water.ca.gov/app/bbat/, accessed May 1, 2018.

California Emergency Management Agency, California Geological Survey, and University of Southern California. Tsunami Inundation Map for Emergency Planning, Orange County. Website: http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/Inundation_Maps/Orange, accessed May 1, 2018.

California Office of Historic Preservation, Orange County Historical Landmarks. Website: http://ohp.parks.ca.gov/?page_id=21445, accessed May 1, 2018.

City of Lake Forest. 2010. General Plan, Recreation and Resources Element.

_____. 1994. General Plan, Safety and Noise Element.

_____. 1992, revised 2016. General Plan, Land Use Element.

_____. Municipal Code, Chapter 9.112, PC Planned Community District.

_____. Municipal Code, Chapter 11.16, Noise Control.

_____. Municipal Code, Chapter 42, Tree Ordinance.

County of Orange. 2013. Technical Guidance Document (TGD) for the Preparation of Conceptual Preliminary and/or Project Water Quality Management Plans (WQMPs). December 20.

_____. 2012. General Plan, Safety Element.

Federal Emergency Management Agency (FEMA). 2009. Flood Insurance Rate Map (FIRM) Map No. 06059C0316J. December 3.

_____. Letter of Map Revision Determination Document for Map No. 06059C0316J.

Orange County Fire Authority (OCFA). Fire and Ambulance Services. Website: https://www.lakeforestca.gov/374/Fire-and-Ambulance-Services, accessed April 27, 2018.

Orange County Water District. 2015. Orange County Water District Groundwater Management Plan 2015 Update.

Santa Ana Regional Water Quality Control Board. January 1995, updated February 2016. Water Quality Control Plan.

South Coast Air Quality Management District (SCAQMD). 2016 Air Quality Management Plan (AQMP).

State Water Resources Control Board. 2014 and 2016 California Integrated Report (Clean Water Act Section 303[d] List and 305(b) Report. Website: https://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2014_2016.shtml, accessed May 1, 2018.

LSA

CARLSBAD
FRESNO
IRVINE
LOS ANGELES
PALM SPRINGS
POINT RICHMOND
RIVERSIDE
ROSEVILLE
SAN LUIS OBISPO

November 2, 2018

Ms. Fiona M. Sanchez
Director of Water Resources
Irvine Ranch Water District
P.O. Box 57000
Irvine, CA 92619-7000

Subject: Nakase Property Area Plan Environmental Impact Report, City of Lake Forest

Dear Ms. Sanchez

This letter has been sent to you as part of an environmental review process being conducted pursuant to the California Environmental Quality Act (CEQA). The City of Lake Forest (City) has determined that preparation of an Environmental Impact Report (EIR) is necessary to adequately analyze the environmental effects of the Nakase Property Area Plan project (proposed project). The City is the Lead Agency, and LSA Associates, Inc. (LSA) has been retained by the City to prepare the environmental analysis required for the proposed project.

The project site is approximately 122 acres located at 20261 Lake Forest Drive, Lake Forest, CA 92630 (Assessor's Parcel Number [APN] 612-221-01) and is currently operating as Nakase Brothers Wholesale Nursery, an agricultural wholesale plant nursery.

The Nakase Property Area Plan would facilitate the development of the 122 ac proposed Project site as a master-planned community. Implementation of the Area Plan would include development of residential uses, an elementary school site, and over 28 acres of parks, open space, and habitat restoration area. The Area Plan would establish guidelines for the future development of the planned community, which would consist of single-family residential units (contained in five distinct neighborhoods), affordable apartment units for senior citizens, an elementary school site, parks and open space, an internal circulation system, and a multipurpose water quality basin.

The proposed Project would entitle development of up to 675 two- and three-story, single-family residential units on approximately 61.4 acres of the site. In order to meet the City's affordable housing policy as stipulated in the Housing Element (2014), up to 101 senior affordable housing units would be constructed on 3.9 acres in a two to three story building with an elevator. The units would be available for rent. The proposed elementary school site would accommodate a school for approximately 800 to 1,000 students from kindergarten through sixth grade. The school site would be located on the northwestern portion of the proposed Project site, at the corner of Bake Parkway and Rancho Parkway. Access to the proposed Project site would be provided at three proposed locations: two entries at Bake Parkway and one entry at Rancho Parkway. The two entries at Bake Parkway would line up with existing roads (Rancho Parkway South and Orchard Street).

20 Executive Park, Suite 200, Irvine, California 92614 949.553.0666 www.lsa.net

LSA is seeking information on how the proposed project would affect the Irvine Ranch Water District's ability to provide services and whether the project would require new or expanded facilities. To assist with this effort, a questionnaire has been enclosed with specific questions relating to services near the project area. It would be helpful to the analysis for us to receive a response by Friday, November 16, 2018. Please email your response to ryan.bensley@lsa.net.

If you have any questions or comments on the questionnaire, please contact me at (949) 553-0666. Thank you for your time and assistance.

Sincerely,

LSA Associates, Inc.

Ryan Bensley
Project Manager, AICP

Attachment: Potable Water and Wastewater Questionnaire

POTABLE WATER AND WASTEWATER QUESTIONNAIRE

For your convenience, LSA has provided space below for your answers. If you choose to answer these questions in the form of a letter, please number your responses to correspond to the questions. Please email your responses ryan.bensley@lsa.net. We would appreciate a response by **November 16, 2018**.

1. Should the estimated water demand for the proposed project be calculated based on Table 3-2 Domestic Water Use Factors (September 2011), in the *Sub Area Master Plan Update Planning Areas: 30 & 51* or the rates from the January 2012 Water Resources Master Plan (Table 3-1, Interim Land Use and Water Use Factors) or some other source?

2. Estimated wastewater was generated for the proposed project was calculated using factors from Table 3-1 Water Demand and Flow Generation Factors of the *Irvine Ranch Water District Sewer Collection System Master Plan* (June 2006). Estimated wastewater was determined to be 191,034.24 gallons per day. Does IRWD have more current generation rates that should be used in the analysis in the IS/MND, or is this an acceptable estimate of wastewater generation for the proposed Project?

3. Sewer lines would be extended onto the Project site. A gravity sewer system would be installed and connected to the existing sewer line that runs along the eastern side of Bake Parkway at the intersection of Orchard and Bake Parkway. Figure 6-2: IRWD System-Wide Sewer Cleaning Plan in the *Irvine Ranch Water District SSMP* identifies the sewer line in that area as a 21 inch sanitary sewer. Please confirm the size of the existing sewer line in Bake Parkway and provide its design capacity and existing flow rate.

4. An existing 12-inch domestic water line crosses the project site near its southern boundary. This existing water line would be removed and relocated to align with the proposed circulation streets and lots on the project site. The project would install new domestic water lines in each of the project's collector streets. New domestic water connections would be made to an existing 12-inch domestic water line near the southwestern corner of the project site and an existing 12-inch domestic water line approximately 350 west of the southeastern corner of the project site. An additional connection would be made to the existing 24-inch domestic water main that runs along the eastern side of Bake Parkway at the intersection of Orchard and Bake Parkway. A fourth connection would be made to the existing 12-inch domestic water line that runs along the southern side of Rancho Parkway at the signalized entrance to the Corridor Center. Please confirm the existing size, design capacity, and existing flow rate for each existing IRWD water lines along the south side of the project site, Bake Parkway, and Rancho Parkway.

5. Are there any current plans for expansion of water or wastewater facilities? If yes, please briefly describe.

6. Would wastewater from the proposed Project site be treated at IRWD's Los Alisos Water Reclamation Plant? If not, where would the wastewater be treated?

7. Based on the *Sewer System Management Plan* (June 2013) there are no proposed projects for enhancement of the sewer system for the area around the proposed project. Are there any current plans for expansion of wastewater facilities not included in this list? If yes, please briefly describe.

8. In its scoping comments regarding the project dated August 3, 2018, the IRWD indicated that a technical memorandum or an addendum to the Sub-Area Master Plan (SAMP) would be required. Would the proposed project require a formal amendment to the SAMP?

9. Would the proposed project create a need to expand existing facilities/staff, construct a new facility, or otherwise adversely impact the types of service you provide? Please explain.

10. Based on the information provided, would IRWD be able to adequately serve the proposed project? If not, can you recommend any measures for mitigating project impacts that might be incorporated into the project?

11. Please provide any additional information that may be helpful in preparing an environmental analysis of the proposed project.

Prepared by: _____

Title: _____

Date: _____

Phone: _____

1. Use the January 2018 Table 3-1 (Land Use Water Factors) attached.
2. Use the January 2018 Table 3-1 (Land Use Water Factors), and refer to the column that identifies the "Interior" usage.
3. Please refer to the District's online GIS Map and Records located here (https://www.irwd.com/doing-business/gis-map-and-records), to download record drawings and confirm the sewer pipeline size. Based on our research, it appears that the sewer line is 21 inches.
4. The existing size of the pipelines can be researched here (https://www.irwd.com/doing-business/gis-map-and-records). IRWD does not give out design capacities of pipelines since these must be confirmed with hydraulic analyses. The Project Engineer for the project can use the volumetric flow rate equation Q = AV to determine a ballpark number for the design capacity. Keep in mind that this equation does not include headlosses through the system. All of the information requested here will be confirmed during the preparation of the SAMP Addendum that was referenced in the August 3, 2018 letter.
5. The District is continually looking for way to optimize sewage generation. Staff is currently updating the Sewer Treatment Master Plan, which will identify improvements once complete.
6. Please identify which sewer line that the project plans to connect to. There are two sewer lines in the vicinity of the project on Bake Pkwy, with one conveying flows to the Michelson Water Recycling Plant, and the other to the Los Alisos Water Recycling Plant.
7. Staff is currently updating the Sewer Treatment Master Plan, which will identify improvements once complete.
8. While the specified project location was identified as a future development in the 2010 Lake Forest Sub-Area Master Plan (LF SAMP), the proposed land used in the NOP/Initial Study is different from what was originally analyzed. Therefore a formal SAMP Addendum to the 2010 LF SAMP will be required.
9. The SAMP Addendum will analyze the impacts on existing facilities, and if any improvements will be required for the Nakase Development.
10. IRWD will be able to adequately serve the proposed project. The SAMP Addendum will analyze the need for any improvements, if necessary, to accommodate the additional sewer loads and water demands.

From:	Ryan Bensley
To:	Patrick Kallas
Subject:	FW: Nakase Property Area Plan EIR LSA Inquiry - Due Date Extension
Date:	Monday, July 08, 2019 4:56:03 PM
Attachments:	20180125_ch3tables_T3-1.pdf

From: Mitchell Robinson [mailto:Robinson@irwd.com]
Sent: Monday, November 26, 2018 7:57 AM
To: Ryan Bensley
Cc: Eric Akiyoshi; Jo Ann Corey; Fiona Sanchez
Subject: RE: Nakase Property Area Plan EIR LSA Inquiry - Due Date Extension

Hi Ryan,

Thanks for the reminder. Attached is the latest Table 3-1.

For question 6, the 21-inch sewer pipe on Bake Pkwy conveys flows to the Michelson Plant. The sewer loads from the Nakase Project will by analyzed during the completion of the SAMP Addendum. We have a sewer model in InfoSWMM that is used for this analysis.

Best Regards,

Mitch Robinson, P.E.
Associate Engineer, Planning
Irvine Ranch Water District
15600 Sand Canyon Avenue, Irvine, California 92618
Mailing: PO Box 57000, Irvine, California 92619-7000
(949) 453-5694 office (559) 681-6307 cell
Email: robinson@irwd.com

>>> Ryan Bensley <Ryan.Bensley@lsa.net> 11/21/2018 2:55 PM >>>
Hi Mitch,

The IRWD's response refers to an attachment containing January 2018 Land Use Water Factors; however, the referenced attachment was not provided. Please provide this at your earliest convenience.

Regarding question 6, the project is planned to connect to the existing 21-inch sewer line that runs along the northbound lanes of Bake Parkway at the intersection of Orchard and Bake Parkway. Does that line convey flows to the Michelson Water Recycling Plant or the Los Alisos Water Recycling Plant?

Thanks,

Ryan Bensley, AICP | Associate/Environmental Planner
LSA | 20 Executive Park, Suite 200

Irvine, CA 92614
– – – – – – – – – – –
949-553-0666 Tel
714-926-9283 Mobile
Website

From: Ryan Bensley
Sent: Wednesday, November 21, 2018 12:50 PM
To: 'Mitchell Robinson'
Cc: Eric Akiyoshi; Jo Ann Corey; Fiona Sanchez
Subject: RE: Nakase Property Area Plan EIR LSA Inquiry - Due Date Extension

Thanks, Mitch. IRWD's response regarding this project is greatly appreciated.

Ryan Bensley, AICP | Associate/Environmental Planner
LSA | 20 Executive Park, Suite 200
Irvine, CA 92614
– – – – – – – – – – –
949-553-0666 Tel
714-926-9283 Mobile
Website

From: Mitchell Robinson [mailto:Robinson@irwd.com]
Sent: Monday, November 19, 2018 5:03 PM
To: Ryan Bensley
Cc: Eric Akiyoshi; Jo Ann Corey; Fiona Sanchez
Subject: RE: Nakase Property Area Plan EIR LSA Inquiry - Due Date Extension

Hi Ryan,

Attached are responses to the inquiry.

Thank you,

Mitch Robinson, P.E.
Associate Engineer, Planning
Irvine Ranch Water District
15600 Sand Canyon Avenue, Irvine, California 92618
Mailing: PO Box 57000, Irvine, California 92619-7000
(949) 453-5694 office (559) 681-6307 cell
Email: robinson@irwd.com

>>> Ryan Bensley <Ryan.Bensley@lsa.net> 11/15/2018 5:00 PM >>>
Hi Mitch,

Per our discussion this afternoon, that would be fine.

Have a nice weekend!

Ryan Bensley, AICP | Associate/Environmental Planner
LSA | 20 Executive Park, Suite 200
Irvine, CA 92614
– – – – – – – – – – –
949-553-0666 Tel
714-926-9283 Mobile
Website

From: Mitchell Robinson [mailto:Robinson@irwd.com]
Sent: Thursday, November 15, 2018 4:58 PM
To: Ryan Bensley
Cc: Eric Akiyoshi
Subject: Nakase Property Area Plan EIR LSA Inquiry - Due Date Extension

Hi Ryan,

My name is Mitch Robinson and I work in the Planning Department at Irvine Ranch Water District. We are in the process of answering the inquiry attached. Would it be okay if we submit our answers on Monday, November 19?

Thank you,

Mitch Robinson, P.E.
Associate Engineer, Planning
Irvine Ranch Water District
15600 Sand Canyon Avenue, Irvine, California 92618
Mailing: PO Box 57000, Irvine, California 92619-7000
(949) 453-5694 office (559) 681-6307 cell
Email: robinson@irwd.com

Table 3-1: Land Use and Water Use Factors

Land Use Code	Land Use Category	Land Use		Residential/Non-Residential [1]			Irrigation Demands [2]	
		Agency	Average Density	Interior	Exterior	Total	% Area Irrigated	Irrigation Factor
1100	**Residential**				**Gal/DU/Day**			**Gal/AC/Day**
1111	Rural Density	Orange	0.3	250	170	420	0	1,000
1112	Rural Density	Irvine	0.3	250	750	1,000	5	2,800
1115	Rural Density	County of Orange	0.3	300	350	650	5	2,800
1121	Estate Density	Orange	1.2	300	350	650	5	2,800
1122	Estate Density	Irvine	0.5	300	225	525	5	2,800
1126	Estate Density	Lake Forest	0.5	300	350	650	7	3,000
1131	Low Density	Orange	4.0	300	350	650	8	2,500
1132	Low Density	Irvine	3.0	215	190	405	16	2,200
1133	Low Density	Newport Beach	1.0	250	260	510	17	2,800
1134	Low Density PC	Tustin	4.5	450	1,550	2,000	17	2,800
1135	Suburban Density	County of Orange	9.3	215	45	260	15	2,500
1136	Low Density	Lake Forest	3.0	210	210	420	20	2,800
1141	Low-Medium Density	Orange	10.5	235	145	380	15	2,500
1146	Low-Medium Density	Lake Forest	11.0	200	155	355	10	3,000
1153	Medium-Low Density	Newport Beach	2.8	400	350	750	10	2,800
1161	Medium Density	Orange	19.5	200	150	350	15	2,800
1162	Medium Density	Irvine	7.5	155	145	300	15	2,800
1163	Medium Density	Newport Beach	5.0	200	230	430	20	2,800
1164	Medium Density PC	Tustin	11.8	160	90	250	15	2,800
1166	Medium Density	Lake Forest	7.5	150	50	200	15	2,800
1172	Medium-High Density	Irvine	17.5	125	35	160	22	2,400
1175	Urban Density	County of Orange	29.0	130	55	185	20	2,800
1176	Medium-High Density	Lake Forest	17.5	110	105	215	17	2,500
1182	High Density	Irvine	32.5	120	23	143	20	2,800
1183	High Density	Newport Beach	12.3	110	15	125	20	3,200
1184	High Density PC	Tustin	17.4	100	25	125	15	2,800
1186	High Density	Lake Forest	32.5	100	25	125	20	2,800
1191	High Rise Density - Orange	Orange	35.0	115	10	125	20	2,800
1192	High Rise Density - Irvine	Irvine	40.0	120	5	125	20	2,800
1200	**Commercial**				**Gal/KSF/Day**			**Gal/AC/Day**
1210	General Office		20.0	62	10	72	20	2,500
1221	Community Commercial		9.0	142	33	175	20	3,500
1222	Regional Commercial		10.0	130	10	140	20	3,500
1230	Commercial Recreation		8.0	41	20	60	30	3,000
1235	Hotel (Gal/Room/Day)		45.0	110	50	160	30	2,800
1240	Institutional		8.0	30	15	45	30	2,750
1244	Hospital		9.0	165	65	230	30	2,850
1260	School		10.0	20	8	28	50	2,500
1261	UCI		10.0	215	15	230	40	3,800
1290	Hotel (Gal/Room/Day)		45.0	110	50	160	30	2,800
1300	**Industrial**				**Gal/KSF/Day**			**Gal/AC/Day**
1300	Industrial		9.1	600	25	625	20	2,800
1310	Industrial - Light		18.0	67	3	70	20	2,800
1320	Industrial - Heavy		25.0	2,000	18	2,018	20	2,800
1400	**Open Space and Other**				**Gal/KSF/Day**			**Gal/AC/Day**
1820	Community Park		1.0	0	0	0	86	2,200
1830	Regional Park		1.0	0	0	0	75	2,200
1840	Fuel Modification Zone		1.0	0	0	0	100	1,000
2000	**Agriculture**				**Gal/KSF/Day**			**Gal/AC/Day**
2100	Low-Irrigated AG Potable		1.0	0	0	0	80	1,800
2110	Low-Irrigated AG Untreated		1.0	0	0	0	80	1,800
2120	Low-Irrigated AG Recycled		1.0	0	0	0	80	1,800
2200	High-Irrigated AG Potable		1.0	0	0	0	80	3,100
2210	High-Irrigated AG Untreated		1.0	0	0	0	80	3,100
2220	High-Irrigation AG Recycled		1.0	0	0	0	80	3,100

(1) The Residential/Non-Residential demands area assumed to be supplied by the Potable Water System, except for those users as described in Section 3.4.1 and Section 3.4.2.

(2) The Irrigation Demands are assumed to be supplied by the Nonpotable Water System, except for those areas as shown in Figure 3-10.

Summary of Scoping Comments Received by the City of Lake Forest

Date	Commenter	General Issue(s) Raised	Specific Issue(s) Raised
July 16, 2018	Governor's Office of Planning and Research, State Clearinghouse	N/A	Confirmed the IS/NOP was distributed to appropriate State agencies
July 19, 2018	Natural Communities Coalition	N/A	Noted a recent name change of the organization (formerly known as the Nature Reserve of Orange County)
July 24, 2018	Soltani, Sima	Housing, Growth and Economic Issues (non-environmental)	In favor of new housing on the Nakase site
July 25, 2018	Herrin, Loretta	Traffic	Concerned about additional traffic on Bake Parkway
		Noise and Air Quality	Suggests adding a wall to Bake Parkway to reduce noise and air quality impacts on adjacent residents
		Noise	Suggests evaluating the installation of special pavement along Bake Parkway to reduce traffic noise
		Alternatives	Suggests evaluating the development of a cemetery for veterans or an aquatic center on the Nakase site
July 25, 2018	Holtzclaw, Bob	Traffic	Concerned about additional traffic on Bake Parkway
		Public Services - Schools	Concerned that SVUSD may not use the potential school site
July 25, 2018	Johnson, Jim	Traffic	Concerned about additional traffic on Bake Parkway, suggests that Bake Parkway may need to be widened to 3 or 4 lanes on both sides between Trabuco Road and SR-241
		Traffic	Suggests evaluating a traffic signal coordination program along Bake Parkway
		Water	Suggests evaluating whether sufficient water supplies will be available to serve the project's residents

Summary of Scoping Comments Received by the City of Lake Forest

Date	Commenter	General Issue(s) Raised	Specific Issue(s) Raised
July 25, 2018	Saddleback Valley USD	Public Services - Schools	Provided student generation rates and enrollment and capacity information relevant to the school capacity analysis for the EIR
		Traffic and Parking, Air Quality, Noise	Concerned about direct and indirect impacts on District schools, including traffic, pedestrian and bike safety, parking, air pollution, and noise
		Traffic	Concerned with traffic conditions during peak hours, vehicle queuing along BB street and access points, and pedestrian/bike safety along school routes
		Noise	Concerned with noise levels along Bake and Rancho Parkways
		Air Quality and Health Risks	Concerned about air quality in the vicinity of the proposed school site, requested that a Health Risk Assessment be completed; the HRA should address potential health impacts related to hazardous materials facilities within 0.25 mile of the school site, which should include the proposed active play area adjacent to the school, and emissions associated with SR-241
		Hazards	Requested that a Water Pipeline Risk Assessment and EMF Study be completed for the proposed school site, which should include the proposed active play area adjacent to the school
July 25,2018	Stuart, Bob	Land Use/Planning	Against zoning change for the nursery
July 25, 2018	Sullivan, Richard	Traffic	Concerned with parking and accidents along Normandale Drive and Oesterman
		Air Quality	Concerned with worsening air quality in the neighborhood of Barclay and Normandale
July 30, 2018	Nath, Sue	Traffic	Concerned about additional traffic on Bake Parkway
		Air Quality	Concerned about additional vehicle emissions

Summary of Scoping Comments Received by the City of Lake Forest

Date	Commenter	General Issue(s) Raised	Specific Issue(s) Raised
		Alternatives	Suggests evaluating the development of a park and/or garden on the Nakase site
July 31, 2018	OC Fire Authority	Hazards	Suggested that the significance conclusion related to wildland fire hazards be revised to reflect that a Fuel Modification Conceptual Plan and a Fire Protection Plan with Ember Mitigation have been approved for the project
		Public Services – Fire Protection	Suggested mitigation measures to reduce potential impacts to fire services
August 3, 2018	Irvine Ranch Water District	Land Use/Planning and Utilities/Service Systems	Indicated that the Applicant will be required to coordinate with IRWD to prepare a technical memorandum or an addendum to the 2010 Lake Forest Sub-Area Master Plan identifying the proposed project's potential impacts to IRWD's potable and recycled water and sewer systems
		Water	Suggests that a Water Supply Assessment may be required
		Water	Suggests the Applicant consider using recycled water at the project, requests that the EIR discuss recycled water demand/use
August 4, 2018	Larson, Charles	Land Use/Planning and Alternatives	In favor of agricultural zoning on the Nakase site
		Public Services - Schools	Concerned that SVUSD may not use the potential school site, Foothill Ranch Elementary is not overcrowded
		Traffic	Concerned about school-related traffic impacts, particularly at Rancho and Bake Parkways
		Hazardous Materials	Concerned about proximity of potential school site to a gas station across Rancho Parkway
August 6, 2018	Alexander, Andrea	Air Quality	Concerned about airborne particulate matter resulting from traffic along Bake Parkway and its link to cancer

Summary of Scoping Comments Received by the City of Lake Forest

Date	Commenter	General Issue(s) Raised	Specific Issue(s) Raised
		Noise	Concerned about existing truck and motorcycle noise along Bake Parkway, noise from truck breakdowns, and the apparent lack of enforcement of the City's noise ordinance during the evening and early morning hours
		Traffic	Concerned about the project's contribution to traffic congestion along Bake Parkway
		Traffic	Suggests passing an ordinance to ban trucks and motorcycles on Bake Parkway, especially between Muirlands Boulevard and Trabuco Road, rerouting truck traffic to Alton Parkway
		Noise	Suggests the Applicant build a 10–12 foot wall to protect existing residents along Bake Parkway from additional traffic noise
		Noise	Suggests the Applicant provide triple-paned windows to the existing residents along Bake Parkway
		Traffic	Suggests eliminating tolls on SR-241 at Bake and Portola Parkways to divert traffic away from Bake Parkway
		Traffic	Suggests reducing the number of lanes on Bake Parkway to make Alton Parkway a more attractive route for drivers
August 6, 2018	Esposito, Judy	Population and Housing	Concerned about potential increase in number of people due to the project's residential development
		Traffic, Noise, and Air Quality	General concern about potential increases in traffic, noise, and pollution
		Water Quality	Concerned about water quality in waterways that would receive runoff from the project site
		Utilities and Service Systems	Concerned about sewer capacity
		Biological Resources	Concerned about animals coming in closer to residential areas to scavenge trash

Summary of Scoping Comments Received by the City of Lake Forest

Date	Commenter	General Issue(s) Raised	Specific Issue(s) Raised
		Non-Environmental	Concerned about pools leading to more humidity
		Alternatives	Suggests making the nursery site into community gardens or a forest
August 8, 2018	Autumnwood HOA	General Environmental Impacts	Requests that the EIR address all of the project's potential impacts to the Autumnwood Homeowners Association (HOA), including cumulative impacts, and mitigate those impacts, if necessary
		Hydrology	Requests a full analysis of the project's potential flooding impacts along Serrano Creek, including erosion and slope stability
		Traffic and Noise	Requests that the EIR evaluate impacts associated with increased traffic and related noise
		Public Services – Public Safety	General concern about potential impacts to public safety services
		Land Use/Planning and Hydrology/Water Quality	Noted that CEQA requires a discussion of any potential inconsistencies between the project and applicable general plans and regional plans, including local and regional flood control and erosion control plans in the EIR
August 8, 2018	Native American Heritage Commission (NAHC)	Tribal Cultural Resources	Outlined the City's tribal consultation requirements under AB 52 and SB 18
August 9, 2018	Robert (Tim) and Melissa Leech	Noise	Claimed that backyard noise levels in neighborhoods along Bake Parkway between Trabuco Road and Portola Parkway currently exceed 90 dBA during daytime hours and that noise levels exceed acceptable levels for community safety; project-related traffic could exacerbate this issue
		Air Quality	Suggests conducting sampling for particulate matter and dust in the neighborhoods along Bake Parkway between Trabuco Road and Portola Parkway; project-related traffic could exacerbate this issue
		Noise	Suggests establishing a curfew or rerouting industrial traffic between the hours of 10 p.m. and 6 a.m. to help reduce noise

Summary of Scoping Comments Received by the City of Lake Forest

Date	Commenter	General Issue(s) Raised	Specific Issue(s) Raised
			impacts to residential areas; project-related traffic could exacerbate this issue
		Economic Impacts (Non-Environmental)	Residential property values for the homes adjacent to Bake Parkway are lower than other homes in the community; project-related traffic could further reduce property values
		Noise and Air Quality	Suggests conducting noise, particulate matter studies for backyards adjacent to Bake Parkway and comparing them against original environmental studies completed prior to the completion of Bake Parkway between Trabuco Road and Portola Parkway
		Noise	Suggests installation of a higher wall and/or landscaping to reduce traffic noise impacts
August 13, 2018	Caltrans	Traffic	Recommends including a discussion of potential impacts to transit, pedestrian, and bicycle facilities, also suggests incorporating transportation safety measures and development of a Safe Routes to School program, and discussing the City's Senior Mobility Program
		Traffic	Recommends the completion of a Traffic Impact Study (TIS) that follows Caltrans guidelines
		Land Use/Planning and Climate Change	Suggests incorporating practices and policies that reduce GHG emissions in accordance with AB 32 and SB 375 into the Area Plan
		Hydrology/Water Quality	Concerned that any potentially significant hydrology/water quality impacts are adequately mitigated, especially those related to discharges entering Caltrans right of way
		Project Description	Recommends coordination with Orange County Flood Control District during the encroachment permit process
		Project Description	Notes that an encroachment permit would be required if the project would require any work within the State Highway System lands

Summary of Scoping Comments Received by the City of Lake Forest

Date	Commenter	General Issue(s) Raised	Specific Issue(s) Raised
August 13, 2018	Orange County Public Works	Public Services - Libraries	Concerned about potential increases in demand for library services based on the increased population associated with the project; provides information about County's library service standards and suggests that Development Fees be considered
		Hydrology and Utilities and Service Systems - Flood Control	Concerned about increased runoff caused by development; requests that the EIR identify and mitigate any impacts to affected drainage facilities or natural water courses
		Hydrology and Utilities and Service Systems - Flood Control	Notes that all hydrological and hydraulic studies should comply with current guidelines and criteria specified in the *Orange County Hydrology Manual* and the *Orange County Flood Control Design Manual*
		Hydrology and Hazards	Suggests that the City review and approve all local hydrology and hydraulic analyses to confirm that the project is protected from erosion and flooding in a 100-year storm event
		Hazards	Suggests that the City ensure that floodplains are identified and structures conform to FEMA regulations with regard to placement adjacent to flood hazard areas
		Project Description	Notes that an encroachment permit would be required for any project work within the Orange County Flood Control District's right of way
August 14, 2018	Southern California Edison (SCE)	Project Description, Aesthetics, Biological Resources, Traffic, and Noise	Suggests an analysis of the impacts associated with project-related utility work, specifically the relocation and undergrounding of SCE's existing electric transmission lines; impacts to be addressed include biological resources (specifically nesting birds), traffic, noise, and aesthetics
		SCE Access and Maintenance (Non-Environmental)	Concerned about encroachment onto SCE right of way, potential landscaping conflicts with SCE lines, and requests a set of plans from the Applicant

Summary of Scoping Comments Received by the City of Lake Forest

Date	Commenter	General Issue(s) Raised	Specific Issue(s) Raised
		Method of Service Agreement (Non-Environmental)	Requests that the Applicant enter into a Method of Service Agreement with SCE and fund an electric service study
August 14, 2018	City of Irvine	Traffic	Requested that the traffic study prepared for the project include certain study area boundaries, including all North Irvine Transportation Mitigation-funded intersections, and all City of Irvine intersections and roadway links within these boundaries
		Traffic	Requested that the traffic study prepared for the project analyze short- and long-term interim year scenarios and a future buildout analysis scenario
		Traffic	Suggests that the traffic study prepared for the project should analyze the missing segment of Portola Parkway (between SR-241 and Alton Parkway)
		Traffic	Suggests clarifying if the project would be part of the Lake Forest Transportation Mitigation fee program
August 14, 2018	California Department of Fish and Wildlife (CDFW)	Biological Resources	Concerned about potential impacts to coastal sage scrub (CSS) and associated species, specifically whether the CSS on the project site is occupied by coastal California gnatcatcher. Comment also outlined the procedure for payment of in-lieu fees to mitigate impacts to occupied CSS and clarified that impacts to unoccupied CSS also constitute impacts
		Biological Resources	Suggests mitigation measures to compensate for potential impacts to riparian corridors and wetlands
		Biological Resources	Noted that completion of a jurisdictional delineation is required
		Biological Resources	Noted that the Applicant is required to enter into a Lake and Streambed Alteration Agreement (LSAA) and requested that impacts to stream or riparian resources be identified in the EIR

Summary of Scoping Comments Received by the City of Lake Forest

Date	Commenter	General Issue(s) Raised	Specific Issue(s) Raised
		Biological Resources	Noted that the EIR should satisfy the California Endangered Species Act Incidental Take Permit requirements
		Alternatives	Suggests the EIR describe the proposed project's purpose and need as well as a range of alternatives
		Biological Resources	Suggests a complete floral and faunal species compendium of the project site and adjacent areas be compiled, with particular focus on sensitive-status species; surveys should be undertaken at the appropriate time of year and/or day
		Biological Resources	Suggests that the EIR evaluate potential impacts related to lighting, noise, human activity, exotic species, and drainage on biological resources
		Biological Resources	Suggests mitigation for avoidance or protection of Rare Natural Communities
		Biological Resources	Suggests mitigation for any adverse project-related impacts to sensitive plants, animals, or habitats
		Biological Resources	Suggests mitigation for proposed preservation and/or restoration areas
		Biological Resources	Suggests measures be taken to avoid nesting and migratory birds
		Biological Resources	Concerned with the relocation, salvage, or transplantation of rare, threatened, or endangered species
		Biological Resources	Concerned with the expertise of the persons preparing the plans for restoration and revegetation and the inclusion of certain elements in those plans
		Biological Resources	Concerned with invasive shot hole borer beetles and their impact on trees, suggests consideration of potential mitigation measures

Summary of Scoping Comments Received by the City of Lake Forest

Date	Commenter	General Issue(s) Raised	Specific Issue(s) Raised
August 14, 2018	Transportation Corridor Agencies (TCA)	Traffic	Suggests providing a map showing the traffic study area
August 15, 2018	Santa Ana Regional Water Quality Control Board (RWQCB)	Hydrology/Water Quality	Concerned with NPDES permitting and control of residual nitrogen leaving the project site, suggests BMPs to protect from storm runoff and mitigation for any impacts to waters of the US (Serrano Creek)
		Hydrology/Water Quality	Concerned with the adequacy of proposed underground detention basin and increased peak flows downstream of project site, which could contribute to destabilization of Serrano Creek
		Hydrology/Water Quality	Requests clarification regarding whether the existing interior drainage channel on the project site will be filled in or replaced by an underground concrete channel
		Hydrology/Water Quality	Notes that a Water Quality Standards Certification would be required for any impacts to Serrano Creek or the unnamed interior drainage channel, and suggests that a jurisdictional wetland delineation would need to be performed
		Hydrology/Water Quality	Suggests maintaining the flow gaging stations at locations where Serrano Creek and the unnamed interior drainage channel exit the project site
August 15, 2018	Southern California Association of Governments (SCAG)	Land Use/Planning	Concerned with the proposed project's consistency with the 2016 Regional Transportation Plan/Sustainable Community Strategies (RTP/SCS) and suggests including a side-by-side comparison table for consistency analysis in the EIR
		Population/Housing	Concerned with including appropriate demographics and growth forecast data
		Land Use/Planning and All Environmental Topics	Recommends the use of the Final Program EIR for 2016 RTP/SCS for guidance and potential project-level mitigation measures

Summary of Scoping Comments Received by the City of Lake Forest

Date	Commenter	General Issue(s) Raised	Specific Issue(s) Raised
August 15, 2018	South Coast Air Quality Management District (SCAQMD)	Air Quality	Recommends the use of SCAQMD's Air Quality Handbook, the latest version of CalEEMod, and SCAQMD's regional and localized significance thresholds in the air quality analysis
		Air Quality	Recommends the preparation of an HRA if the proposed project would generate or attract vehicular trips, especially heavy-duty diesel-fueled vehicles
		Air Quality	Suggests potential mitigation measures that could be applied if potentially significant air quality impacts are identified
		Alternatives	Suggests consideration of potential alternatives capable of avoiding or substantially lessening any of the proposed project's significant air quality impacts, if any
		Air Quality	Provides information about how to obtain a SCAQMD permit, if necessary
		Air Quality	Notes the availability of information about SCAQMD rules, reports, and data
August 30, 2018[1]	Anonymous	Traffic	Suggests the City analyze circulation throughout the area, considering both north and south directions
		Traffic	Suggests the City analyze the potential of a direct route through the project site from Rancho Parkway South to the Sports Park Complex

[1] This comment was received after the close of the public review period for the IS/NOP; however, the City has elected to address it in the interest of furthering public engagement and the full disclosure of the proposed project's environmental impacts.

STATE OF CALIFORNIA

GOVERNOR'S OFFICE *of* PLANNING AND RESEARCH

EDMUND G. BROWN JR.
GOVERNOR

KEN ALEX
DIRECTOR

RECEIVED
JUL 19 2018
CITY OF LAKE FOREST
COMMUNITY DEVELOPMENT

Notice of Preparation

July 16, 2018

To: Reviewing Agencies

Re: Nakase Property Area Plan
SCH# 2018071035

Attached for your review and comment is the Notice of Preparation (NOP) for the Nakase Property Area Plan draft Environmental Impact Report (EIR).

Responsible agencies must transmit their comments on the scope and content of the NOP, focusing on specific information related to their own statutory responsibility, within 30 days of receipt of the NOP from the Lead Agency. This is a courtesy notice provided by the State Clearinghouse with a reminder for you to comment in a timely manner. We encourage other agencies to also respond to this notice and express their concerns early in the environmental review process.

Please direct your comments to:

Marie Luna
City of Lake Forest
25550 Commercentre Drive
Lake Forest, CA 92630

with a copy to the State Clearinghouse in the Office of Planning and Research. Please refer to the SCH number noted above in all correspondence concerning this project.

If you have any questions about the environmental document review process, please call the State Clearinghouse at (916) 445-0613.

Sincerely,

Scott Morgan
Director, State Clearinghouse

Attachments
cc: Lead Agency

1400 10th Street P.O. Box 3044 Sacramento, California 95812-3044
1-916-322-2318 FAX 1-916-558-3184 www.opr.ca.gov

Document Details Report
State Clearinghouse Data Base

SCH# 2018071035
Project Title Nakase Property Area Plan
Lead Agency Lake Forest, City of

Type NOP Notice of Preparation

Description The Nakase Property Area Plan would establish guidelines for the future development of a master-planned community on the project site and would consist of the following: up to 675 two- and three-story single-family residential units; up to 101 affordable apartment units for senior citizens in a two to three story building with an elevator; an elementary school site accommodating up to 1,000 students; parks and open space; an internal circulation system; and a multipurpose water quality basin. As part of the project, a GPA would change the LUD from Business park to low medium residential and institutional. The project proposes to change the project site's zoning classification from general ag to planned community. A vesting tentative tract map would be required to subdivide the property.

Lead Agency Contact

Name Marie Luna
Agency City of Lake Forest
Phone (949) 461-3449 **Fax**
email
Address 25550 Commercentre Drive
City Lake Forest **State** CA **Zip** 92630

Project Location

County Orange
City
Region
Cross Streets Rancho Pkwy and Bake Pkwy
Lat / Long 33° 40' 08.2" N / 117° 40' 02.6" W
Parcel No. 612-221-01
Township **Range** **Section** **Base**

Proximity to:

Highways SR 241
Airports
Railways
Waterways Serrano Crk
Schools
Land Use Z: Gen ag; GP: Business park and BDO

Project Issues Aesthetic/Visual; Agricultural Land; Air Quality; Archaeologic-Historic; Biological Resources; Cumulative Effects; Drainage/Absorption; Flood Plain/Flooding; Forest Land/Fire Hazard; Geologic/Seismic; Growth Inducing; Landuse; Minerals; Noise; Population/Housing Balance; Public Services; Recreation/Parks; Schools/Universities; Septic System; Sewer Capacity; Soil Erosion/Compaction/Grading; Solid Waste; Toxic/Hazardous; Traffic/Circulation; Vegetation; Water Quality; Water Supply; Wetland/Riparian

Reviewing Agencies Resources Agency; Department of Conservation; Office of Historic Preservation; Department of Parks and Recreation; Department of Water Resources; Department of Fish and Wildlife, Region 5; California Department of Education; Department of Housing and Community Development; Native American Heritage Commission; State Lands Commission; California Highway Patrol; Caltrans, District 12; State Water Resources Control Board, Division of Drinking Water, District 8; Department of Toxic Substances Control; Regional Water Quality Control Board, Region 8

Note: Blanks in data fields result from insufficient information provided

Document Details Report
State Clearinghouse Data Base

Date Received 07/16/2018 ***Start of Review*** 07/16/2018 ***End of Review*** 08/14/2018

Note: Blanks in data fields result from insufficient information provided by lead

Print Form

Appendix C

Notice of Completion & Environmental Document Transmittal

2018071035

Mail to: State Clearinghouse, P.O. Box 3044, Sacramento, CA 95812-3044 (916) 445-0613
For Hand Delivery/Street Address: 1400 Tenth Street, Sacramento, CA 95814

SCH #

Project Title: Nakase Property Area Plan

Lead Agency: City of Lake Forest | Contact Person: Marie Luna

Mailing Address: 25550 Commercentre Drive, Suite 100 | Phone: (949) 461-3449

City: Lake Forest | Zip: 92630 | County: Orange County

Project Location: County: Orange County | City/Nearest Community: City of Lake Forest

Cross Streets: Rancho Parkway and Bake Parkway | Zip Code:

Longitude/Latitude (degrees, minutes and seconds): 33 ° 40 ′ 08.2 ″ N / 117 ° 40 ′ 02.6 ″ W Total Acres: 122

Assessor's Parcel No.: 612-221-01 | Section: | Twp.: | Range: | Base:

Within 2 Miles: State Hwy #: State Route 241 | Waterways: Serrano Creek

Airports: N/A | Railways: N/A | Schools: See attachment

Document Type:

CEQA: ☒ NOP ☐ Draft EIR ☐ Other: ☐ Joint Document
☐ Early Cons ☐ Supplement/Subsequent EIR ☐ EA ☐ Final Document
☐ Neg Dec (Prior SCH No.) ☐ Draft EIS ☐ Other:
☐ Mit Neg Dec Other: Initial Study ☐ FONSI

Governor's Office of Planning & Research
JUL 16 2018
STATE CLEARINGHOUSE

Local Action Type:

☐ General Plan Update ☐ Specific Plan ☒ Rezone ☐ Annexation
☒ General Plan Amendment ☐ Master Plan ☐ Prezone ☐ Redevelopment
☐ General Plan Element ☐ Planned Unit Development ☐ Use Permit ☐ Coastal Permit
☐ Community Plan ☐ Site Plan ☒ Land Division (Subdivision, etc.) ☒ Other: Area Plan

Development Type:

☒ Residential: Units 675 Acres 61.4
☐ Office: Sq.ft. Acres Employees ☐ Transportation: Type
☐ Commercial: Sq.ft. Acres Employees ☐ Mining: Mineral
☐ Industrial: Sq.ft. Acres Employees ☐ Power: Type MW
☒ Educational: Elementary School ☐ Waste Treatment: Type MGD
☒ Recreational: 28 acres of parks and habitat restoration area ☐ Hazardous Waste: Type
☐ Water Facilities: Type MGD ☒ Other: Affordable Housing (up to 101 units on 3.9 acres)

Project Issues Discussed in Document:

☒ Aesthetic/Visual ☐ Fiscal ☒ Recreation/Parks ☒ Vegetation
☒ Agricultural Land ☒ Flood Plain/Flooding ☒ Schools/Universities ☒ Water Quality
☒ Air Quality ☒ Forest Land/Fire Hazard ☒ Septic Systems ☒ Water Supply/Groundwater
☒ Archeological/Historical ☒ Geologic/Seismic ☒ Sewer Capacity ☒ Wetland/Riparian
☒ Biological Resources ☒ Minerals ☒ Soil Erosion/Compaction/Grading ☒ Growth Inducement
☐ Coastal Zone ☒ Noise ☒ Solid Waste ☒ Land Use
☒ Drainage/Absorption ☒ Population/Housing Balance ☒ Toxic/Hazardous ☒ Cumulative Effects
☐ Economic/Jobs ☒ Public Services/Facilities ☒ Traffic/Circulation ☐ Other:

Present Land Use/Zoning/General Plan Designation:

Zoning: General Agriculture (A-1); General Plan: Business Park and Business Development Overlay (BDO)

Project Description: *(please use a separate page if necessary)*

The Nakase Property Area Plan would establish guidelines for the future development of a master-planned community on the Project Site and would consist of the following: up to 675 two- and three-story single-family residential units; up to 101 affordable apartment units for senior citizens in a two to three story building with an elevator; an elementary school site accommodating up to 1,000 students; parks and open space; an internal circulation system; and a multipurpose water quality basin. As part of the project, a General Plan Amendment would change the land use designation from Business Park to Low-Medium Residential and Institutional. The Project proposes to change the Project Site's zoning classification from General Agriculture (A-1) to Planned Community. A Vesting Tentative Tract Map would be required to subdivide the property.

Note: The State Clearinghouse will assign identification numbers for all new projects. If a SCH number already exists for a project (e.g. Notice of Preparation or previous draft document) please fill in.

BH

NOP Distribution List

County: Orange

SCH# 2018071035

Resources Agency

- [■] **Resources Agency**
  Nadell Gayou
- [ ] **Dept. of Boating & Waterways**
  Denise Peterson
- [ ] **California Coastal Commission**
  Allyson Hitt
- [ ] **Colorado River Board**
  Elsa Contreras
- [▪] **Dept. of Conservation**
  Crina Chan
- [ ] **Cal Fire**
  Dan Foster
- [ ] **Central Valley Flood Protection Board**
  James Herota
- [▪] **Office of Historic Preservation**
  Ron Parsons
- [■] **Dept of Parks & Recreation**
  Environmental Stewardship Section
- [ ] **S.F. Bay Conservation & Dev't. Comm.**
  Steve Goldbeck
- [▪] **Dept. of Water Resources**
  Resources Agency
  Nadell Gayou

Fish and Game

- [ ] **Depart. of Fish & Wildlife**
  Scott Flint
  Environmental Services Division
- [ ] **Fish & Wildlife Region 1**
  Curt Babcock
- [ ] **Fish & Wildlife Region 1E**
  Laurie Harnsberger
- [ ] **Fish & Wildlife Region 2**
  Jeff Drongesen
- [ ] **Fish & Wildlife Region 3**
  Craig Weightman
- [ ] **Fish & Wildlife Region 4**
  Julie Vance
- [▪] **Fish & Wildlife Region 5**
  Leslie Newton-Reed
  Habitat Conservation Program
- [ ] **Fish & Wildlife Region 6**
  Tiffany Ellis
  Habitat Conservation Program
- [ ] **Fish & Wildlife Region 6 I/M**
  Heidi Calvert
  Inyo/Mono, Habitat Conservation Program
- [ ] **Dept. of Fish & Wildlife M**
  William Paznokas
  Marine Region

Other Departments

- [▪] **California Department of Education**
  Lesley Taylor
- [ ] **OES (Office of Emergency Services)**
  Monique Wilber
- [ ] **Food & Agriculture**
  Sandra Schubert
  Dept. of Food and Agriculture
- [ ] **Dept. of General Services**
  Cathy Buck
  Environmental Services Section
- [▪] **Housing & Comm. Dev.**
  CEQA Coordinator
  Housing Policy Division

Independent Commissions,Boards

- [ ] **Delta Protection Commission**
  Erik Vink
- [ ] **Delta Stewardship Council**
  Anthony Navasero
- [ ] **California Energy Commission**
  Eric Knight
- [■] **Native American Heritage Comm.**
  Debbie Treadway
- [ ] **Public Utilities Commission**
  Supervisor
- [ ] **Santa Monica Bay Restoration**
  Guangyu Wang
- [▪] **State Lands Commission**
  Jennifer Deleong
- [ ] **Tahoe Regional Planning Agency (TRPA)**
  Cherry Jacques

Cal State Transportation Agency CalSTA

- [ ] **Caltrans - Division of Aeronautics**
  Philip Crimmins
- [ ] **Caltrans – Planning HQ LD-IGR**
  Christian Bushong
- [▪] **California Highway Patrol**
  Suzann Ikeuchi
  Office of Special Projects

Dept. of Transportation

- [ ] **Caltrans, District 1**
  Rex Jackman
- [ ] **Caltrans, District 2**
  Marcelino Gonzalez
- [ ] **Caltrans, District 3**
  Susan Zanchi - North
- [ ] **Caltrans, District 4**
  Patricia Maurice
- [ ] **Caltrans, District 5**
  Larry Newland
- [ ] **Caltrans, District 6**
  Michael Navarro
- [ ] **Caltrans, District 7**
  Dianna Watson
- [ ] **Caltrans, District 8**
  Mark Roberts
- [ ] **Caltrans, District 9**
  Gayle Rosander
- [ ] **Caltrans, District 10**
  Tom Dumas
- [ ] **Caltrans, District 11**
  Jacob Armstrong
- [▪] **Caltrans, District 12**
  Maureen El Harake

Cal EPA

Air Resources Board

- [ ] **Airport & Freight**
  Jack Wursten
  - [ ] **Transportation Projects**
    Nesamani Kalandiyur
  - [ ] **Industrial/Energy Projects**
    Mike Tollstrup
- [ ] **California Department of Resources, Recycling & Recovery**
  Kevin Taylor/Jeff Esquivel
- [ ] **State Water Resources Control Board**
  Regional Programs Unit
  Division of Financial Assistance
- [ ] **State Water Resources Control Board**
  Cindy Forbes – Asst Deputy
  Division of Drinking Water
- [▪] **State Water Resources Control Board**
  Div. Drinking Water # 8
- [ ] **State Water Resources Control Board**
  Student Intern, 401 Water Quality Certification Unit
  Division of Water Quality
- [ ] **State Water Resouces Control Board**
  Phil Crader
  Division of Water Rights
- [▪] **Dept. of Toxic Substances Control Reg. #**_____
  CEQA Tracking Center
- [ ] **Department of Pesticide Regulation**
  CEQA Coordinator

Regional Water Quality Control Board (RWQCB)

- [ ] **RWQCB 1**
  Cathleen Hudson
  North Coast Region (1)
- [ ] **RWQCB 2**
  Environmental Document Coordinator
  San Francisco Bay Region (2)
- [ ] **RWQCB 3**
  Central Coast Region (3)
- [ ] **RWQCB 4**
  Teresa Rodgers
  Los Angeles Region (4)
- [ ] **RWQCB 5S**
  Central Valley Region (5)
  - [ ] **RWQCB 5F**
    Central Valley Region (5)
    Fresno Branch Office
  - [ ] **RWQCB 5R**
    Central Valley Region (5)
    Redding Branch Office
- [ ] **RWQCB 6**
  Lahontan Region (6)
  - [ ] **RWQCB 6V**
    Lahontan Region (6)
    Victorville Branch Office
- [ ] **RWQCB 7**
  Colorado River Basin Region (7)
- [▪] **RWQCB 8**
  Santa Ana Region (8)
- [ ] **RWQCB 9**
  San Diego Region (9)

- [ ] **Other** _____
- [ ] _____
  Conservancy

Last Updated 5/22/18

Natural Communities
COALITION
restoration | management | partnership

U.S. Fish and Wildlife Service | California Department of Fish and Wildlife
Irvine Ranch Water District | California Department of Parks and Recreation | County of Orange
Metropolitan Water District | Southern California Edison | University of California, Irvine
Transporation Corridor Agencies | City of Irvine | City of Newport Beach
Irvine Company | Coastal Greenbelt Authority | Orange County Fire Authority
Southwest Resource Management Association

RECEIVED
JUL 23 2018
CITY OF LAKE FOREST
COMMUNITY DEVELOPMENT

July 19, 2018

Shelby Cramton
LSA
20 Executive Park, Suite 200
Irvine, CA 92614-4739

RE: Change of Business Name and Address for the Nature Reserve of Orange County.

Dear Ms. Cramton:

I am in receipt of Notice of Preparation of An Environmental Impact Report from the City of Lake Forest dated July 12, 2018, sent *via* USPS Priority Mail.

Please note, the Nature Reserve of Orange County has changed its name and business address. Please update your records at LSA to reflect the following changes:

Old Information	New Information
Nature Reserve of Orange County 15600 Sand Canyon Avenue Irvine, CA 92618 (949) 453-3324	**Natural Communities Coalition** 13042 Old Myford Road Irvine, CA 92602 (714) 973-6651 *www.occonservation.org*

All other information and the organization's mission remains the same. Please do not hesitate to contact me should you have any questions.

Sincerely,

James M. Sulentich
Executive Director

Cc: Marie Luna, City of Lake Forest.

From: Luna, Marie
Sent: Tuesday, July 24, 2018 11:04 AM
To: 'Sima Soltani'
Subject: RE: Nakase

Thank you Sima. We will add your comments to the record.
~Marie

Marie Swami Luna
Senior Planner
City of Lake Forest
mluna@lakeforestca.gov
949.461.3466/fax: 949.461.3511

From: Sima Soltani [mailto:simasolt@gmail.com]
Sent: Tuesday, July 24, 2018 10:29 AM
To: Luna, Marie
Subject: Nakase

Hello,

I know there is a scoping meeting on Nakase, and on lakeforestca.gov it says we can email our comments. Anyways, I think building homes at the Nakase site will not only bring much needed housing to south OC, but it will take Lake Forest into it's next phase of prosperity. If you are not growing or gaining a population of people who are of working age, you become a dead city. Plus, it increases our tax base/revenue for the city which is great for the community as a whole. Anyways just wanted to add my comments.

Thanks,

--
Sima "Sam" Soltani

PUBLIC SCOPING MEETING
Proposed Nakase Property Area Plan
Wednesday, July 25, 2018

NAME: LORETTA HERRIN

ADDRESS: 25111 CINERIA CITY: LAKE FOREST ZIP: 92630

EMAIL ADDRESS: Lbherrin@cox.net

REPRESENTING: _____

Do you wish to be added to the project mailing list? ☒ YES ☐ NO

Please drop comments in the Comment Box or mail them to:

City of Lake Forest Community Development Department
Marie Luna, Senior Planner
25550 Commercentre Drive, Suite 100
Lake Forest, CA, 92630
Phone: (949) 461-3400
E-mail: mluna@lakeforestca.gov

The purpose of this comment card is to solicit input regarding the scope and content of the Environmental Impact Report (EIR). Please submit comments for the record that pertain to the ***environmental issues*** to be addressed in the EIR (please print).

With this project, traffic will increase on Bake Pkwy. Please add a wall for residents that back to Bake Pkwy. This will help with noise + air pollution. Also, look into putting the street asphalt that reduces noise.

Alternatives to this project would be:
- put in Veteran's cemetary
- ~~aquatic~~

Add aquatic center

PUBLIC SCOPING MEETING
Proposed Nakase Property Area Plan
Wednesday, July 25, 2018

NAME: Bob HOLTZCLAW

ADDRESS: 24672 JONATHAN CITY: LAKE FOREST ZIP: 92630

EMAIL ADDRESS: LAKEFORESTBOB@HOTMAIL.COM

REPRESENTING: RESIDENT

Do you wish to be added to the project mailing list? [X] YES [ ] NO

Please drop comments in the Comment Box or mail them to:

City of Lake Forest Community Development Department
Marie Luna, Senior Planner
25550 Commercentre Drive, Suite 100
Lake Forest, CA, 92630
Phone: (949) 461-3400
E-mail: mluna@lakeforestca.gov

The purpose of this comment card is to solicit input regarding the scope and content of the Environmental Impact Report (EIR). Please submit comments for the record that pertain to the ***environmental issues*** to be addressed in the EIR (please print).

ATTACHED IS A PICTURE OF BAKE PARKWAY OCT 6TH AT 630 PM. IF YOU BUILD 800+ HOMES IN THAT AREA TRAFFIC WILL BE A BIGGER PROBLEM.

ON YOUR PLAN IT STILL SHOWS A SCHOOL. THE SCHOOL DISTRICT HAS MANY TIMES SAID THEY HAVE NO INTENTION TO BUILD A SCHOOL AT THAT LOCATION.

COMMENT CARD PUBLIC INFORMATION MEETING: JULY 25, 2018 | 5:30 - 7:30 p.m.

NAME: Jim Johnson

ORGANIZATION: _____

EMAIL: _____

PHONE: _____

ADDRESS: _____ CITY: _____ ZIP: _____

ARE YOU A BUSINESS OWNER? ☐ Yes ☒ No Business Name: _____

HOW DID YOU HEAR ABOUT THIS MEETING? ☐ Email ☐ Direct Mail ☒ Social Media ☐ Newspaper ☐ Flyer ☐ Word of Mouth

WHAT ENVIRONMENTAL ELEMENTS MOST INTEREST YOU? ☐ Air Quality ☐ Noise ☐ Land Use ☐ Visual Aesthetics

☐ Water Quality & Storm Water Runoff ☒ Community Impacts ☐ Right-of-Way ☒ Traffic ☐ Hydrology & Floodplain

☐ Other _____

If you have questions, please contact Fernando Chavarria of OCTA at (714) 560-5306 or email at fchavarria@octa.net

PLEASE WRITE ANY COMMENTS ON THE REVERSE SIDE OF THIS CARD

COMMENT CARD PUBLIC INFORMATION MEETING: JULY 25, 2018 | 5:30 - 7:30 p.m.

EL TORO RD. INTERCHANGE PROJECT

If you have questions, please contact Fernando Chavarria of OCTA at (714) 560-5306.

COMMENTS

1. BAKE WILL NEED TO INCREASE TO 3 OR 4 LANES ON BOTH SIDES FROM TRABUCO TO 241.
2. INTERCONNECT ALL TRAFFIC LIGHTS ON BAKE
3. HOW WILL NEW HOMES HAVE ENOUGH WATER?

Caltrans OCTA OCGO Local Tax Dollars at Work

THANK YOU!

☐ Please keep me informed about the I-5/El Toro Road Interchange Improvement Project and add me to your email distribution list.

Saddleback Valley
Unified School District

25631 Peter A. Hartman Way · Mission Viejo, California 92691
(949) 586-1234 · www.svusd.org

Board of Education
Amanda Morrell, President · Suzie R. Swartz, Vice President · Dr. Edward Wong, Clerk
Dennis Walsh, Member · Dolores Winchell, Member

Crystal Turner, Ed.D.
Superintendent

July 25, 2018

Marie Luna
Community Development Department
City of Lake Forest
25550 Commercentre Drive, Suite 100
Lake Forest, CA 92630

Subject: Response to Notice of Preparation of the Nakase Property Area Plan Environmental Impact Report

Dear Ms. Luna:

Thank you for the opportunity to comment on the NOP and Initial Study for the upcoming Nakase Property Area Plan Environmental Impact Report.

The Nakase Property Area Plan proposes to create a planned community consisting of single-family residential units in five distinct neighborhoods, affordable housing for senior citizens, an elementary school, parks and open space, an internal circulation system, and multipurpose water quality basin. The project would provide a maximum of 675 two- and three-story single-family residences and a maximum of 101 senior affordable housing units. The Area Plan also includes a school site and adjacent park designed to accommodate 1,000 K–6 students.

The District requests that the Nakase Area Plan EIR address the ability of the District's existing elementary, intermediate, and high schools to accommodate the additional students generated by the 675 dwelling units based on current enrollment and school capacities. The analysis should address elementary school impacts following two scenarios: the first is based on completion of the elementary school as proposed, and the second is based on the potential for the elementary school to be delayed or not built so that K–6 students are housed at existing elementary schools.

Table 1 presents the student generation rates that should be applied to the 675 dwelling units in the Area Plan. Table 2 provides current enrollment and capacity data for district schools.

Table 1. Adjusted Student Generation Rates

SCHOOL LEVEL	STUDENT GENERATION FACTORS
Elementary School	0.1994
Intermediate School	0.0674
High School	0.1505
Total	0.4173

Source: Cooperative Strategies, SVUSD, Residential Development School Fee Justification Study, Table 5, page 11.

Table 2. Enrollment and Capacity Analysis

SCHOOL FACILITY	CAPACITY	ENROLLMENT	SURPLUS (SHORTAGE) OF SEATS
Foothill Elementary	932	1,194	(262)
La Madera Elementary	609	610	(1)
Lake Forest Elementary	755	864	(109)
Olivewood Elementary	455	519	(64)
Portola Hills Elementary	664	653	11
Rancho Canada Elementary	872	565	307
Santiago Elementary	520	368	152
Total Elementary School Capacity	**4,807**	**4,771**	**34**
Serrano Intermediate	1,458	1,169	289
Total Intermediate School Capacity	**1,458**	**1,169**	**289**
El Toro High School	2,754	2,435	319
Trabuco Hills High School	2,943	2,831	112
Total High School Capacity	**5,697**	**5,266**	**431**

Source: Cooperative Strategies, SVUSD, Residential Development School Fee Justification Study, Exhibit B.

The District requests that the Nakase Area Plan EIR address all relevant direct and indirect environmental impacts of the project on District schools. The major environmental issues for any receiving school include traffic, pedestrian and bike safety, parking, air pollution, and noise.

The District is especially interested in ensuring that the elementary school site proposed within the Area Plan is suitable from an environmental perspective. For the proposed school site, the EIR should address: 1) traffic conditions during peak hours; 2) vehicle queuing along "BB" Street and access points; 3) pedestrian/bike safety and safe routes to school; 4) noise levels along Bake Parkway and Rancho Parkway; 5) and air quality.

Please clarify whether vehicular access to Neighborhood 2 is limited exclusively via "A" and "B" streets, and "BB" street is intended for school and park access only.

The District also requests that the suitability of the selected school site be reviewed pursuant the State's school siting requirements, which are addressed in detail below.

California School Siting Requirements

At the request of Saddleback Valley Unified School District, Toll Brothers engaged an environmental consulting firm to prepare a Geological and Environmental Hazards Assessment (GEHA) of the entire 12.83-acre Nakase property. The intent of the study was to inform the site planning process and ensure an appropriate site was selected for the school. The GEHA evaluates potential environmental hazards per the State's school siting standards, Title 5 of the California Code of Regulations (CCR) Section 14010, and additional codes and regulations applicable to school facilities that are found in the Education, Government and Public Resources Codes (Ed. Code, Gov't Code, and PRC, respectively).

Based on the GEHA, there are three detailed studies that are required to ensure the selected school site will satisfy the above-referenced standards and be eligible to receive approval of the California Department of Education (CDE):

- **Water Pipeline Risk Assessment (WPRA).** A WPRA is needed to address potential impacts from the 19 large volume (>12-inch diameter) pipelines within 1,500 feet of the project site. Although the school site appears to be more than 1,500 feet from two water tanks west of the site, confirmation that the tanks do not represent a hazard is recommended.

- **EMF Study.** The proximity of the school site to the 66-kV power line in Bake Parkway triggers the need to address EMF exposure and Title 5's 100-foot setback requirement.

- **Health Risk Assessment**. Based on the search conducted in 2017, there are 56 permitted or nonpermitted facilities within a quarter mile of the whole Nakase Area Plan. A refined search using a quarter-mile radius around the selected school site should be conducted and a Health Risk Assessment prepared covering the facilities within that radius. The HRA must also address emissions associated with the site's proximity to the SR-241 freeway.

Based on a review of Figures 2.7 and 2.8 in the Initial Study, the school and park are shown as separate and distinct. However, for the purposes of any review under Title 5 requirements, any measurements from the perimeter of the school boundaries to potential hazards must include both school and park. The school must comply with State requirements for school size, and it appears that the park would also be required to satisfy site size requirements. Additionally, if the park is to be operated under a joint-use agreement to satisfy the school's physical education requirements, CDE will require that the park satisfy all Title 5 requirements as well. For example, although the school site appears to be farther than 1,500 feet from the water tanks to the west, the park appears to be within that zone; if this is so, it triggers the requirement for a water tank inundation study.

The District requests that the EIR address the issues identified above to ensure that the school site will meet all state school site standards.

Thank you for the opportunity to comment on the scope of the upcoming Nakase Area Plan EIR. We look forward to reviewing the Draft EIR and working closely with the City to ensure development of a safe and environmentally-sensitive community.

If you have any questions or need clarification concerning our comments, please call the undersigned.

Sincerely,

SADDLEBACK VALLEY UNIFIED SCHOOL DISTRICT

Stella Escario-Doiron
Chief of Facilities, Maintenance, Operations, Construction and Transportation

c: Crystal Turner, Ed.D, Superintendent
Connie Cavanaugh, Assistant Superintendent, Business Services
Mark Perez, Director, Communications & Administrative Services

From: Bob Stuart
To: Luna, Marie
Subject: Nursery Zoning change....
Date: Wednesday, July 25, 2018 8:35:52 PM

Save it, don't pave it!

PUBLIC SCOPING MEETING
Proposed Nakase Property Area Plan
Wednesday, July 25, 2018

NAME: Richard Sullivan

ADDRESS: 21081 BARCLAY LANE CITY: LAKE FOREST ZIP: 92630

EMAIL ADDRESS: RSullivan3@cox.net

REPRESENTING: MY HOME & FAMILY

Do you wish to be added to the project mailing list? ☒ YES ☐ NO

Please drop comments in the Comment Box or mail them to:

City of Lake Forest Community Development Department
Marie Luna, Senior Planner
25550 Commercentre Drive, Suite 100
Lake Forest, CA, 92630
Phone: (949) 461-3400
E-mail: mluna@lakeforestca.gov

The purpose of this comment card is to solicit input regarding the scope and content of the Environmental Impact Report (EIR). Please submit comments for the record that pertain to the ***environmental issues*** to be addressed in the EIR (please print).

We currently live on the corner of Barclay & Normandale. All of the latest additional homes in the immediate area has caused major parking issues on Normandale & yesterday causing accidents daily also most of the residents have multiple cars for 1 allotted space. These people dump fast food packaging all along Normandale and has now spilled over to Barclay parking in front of my home and in front of the fire hydrant across the street. The parking has affected the resale value of our home. Adding the Toll Bros 800 additional homes will create great havoc to the neighborhood, the air quality & the safety to all current residents. I suggest you fix the current issues mentioned above before you dump on another tsunami of trouble

From: Sue Nath [mailto:suenath@yahoo.com]
Sent: Monday, July 30, 2018 12:22 PM
To: Luna, Marie
Subject: About Nakase Nursery site conversion issue

Dear Marie Luna,

I understand that the Nakase Nursery site is going to be the future site for building more homes. I regret that this is going to increase traffic and hence pollution in this area. We already have enough homes in this area and Bake is what all these current homes mostly use.

What could be done is to build a park in this site. Plant as many shady and eco-friendly trees and may be a place where people can have a gathering (birthday, wedding, etc.). The city can charge a fee for those who want to rent the place for a block of time. Let's convert this place to a natural environment where people can go and breath fresh air.

Since it used to be a nursery, a beautiful garden patch will be ideal to keep the environment pollution-free and healthy for all who have already moved into this neighborhood.

Thank you.
Regards,
Sue Nath
21731 Eveningside Lane
Lake Forest, Ca. 92630
(951)760-2991

PS.
I have also attached the Public Scoping Meeting form regarding the same issue here.

ORANGE COUNTY FIRE AUTHORITY
P. O. Box 57115, Irvine, CA 92619-7115
1 Fire Authority Way, Irvine, CA 92602
Brian Fennessy, Fire Chief • www.ocfa.org • (714) 573-6000 / Fax (714) 368-8843

July 31, 2018

City of Lake Forest
Community Development Department
Attn: Marie Luna, Senior Planner
25550 Commercentre Drive, Suite 100
Lake Forest, CA 92630

Ref: Notice of Preparation for the Proposed Nakase Property Area Plan

Dear Marie Luna:

Thank you for the opportunity to review the subject document. The Orange County Fire Authority (OCFA) provides fire protection and emergency medical services response to the project area. Services include: structural fire protection, emergency medical and rescue services, education and hazardous material response. OCFA also participates in disaster planning as it relates to emergency operations, which includes high occupant areas and schools sites and may participate in community disaster drills planned by others. Resources are deployed based upon a regional service delivery system, assigning personnel and equipment to emergency incidents without regard to jurisdictional boundaries. The equipment used by the department has the versatility to respond to both urban and wildland emergency conditions

Orange County Fire Authority has the following comments:

Statement in Subject Document, Page 4-24: h) (*Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?*)**:**
No Impact. Wildland fires occur in geographic areas that contain the types and conditions of vegetation, topography, weather, and structure density susceptible to risks associated with uncontrolled fires that can be started by lightning, improperly managed camp fires, cigarettes, sparks from automobiles, and other ignition sources. The Project Site and the surrounding areas are developed with urban and suburban uses and do not include brush- and grass-covered areas typically found in areas susceptible to wildfires.

OCFA Response to Statement in Subject Document, Page 4-24: h) (*Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?*)**:**
This project currently has an approved Fuel Modification Conceptual Plan with OCFA. It also has a Fire Protection Plan with Ember Mitigation in place. With these plans in place this should be **Less Than Significant With Mitigation Incorporated.**

Statement in Subject Document, Page 4-39: a)(i) (*Fire Protection*):
Potentially Significant Impact. OCFA is responsible for providing fire protection and suppression, inspection services, paramedic emergency medical services, and hazardous material response to citizens and visitors to Lake Forest. The Project would result in the demolition of existing structures and buildings used for agricultural operations, and construction of up to 675 single-family residential units, up to 101 senior affordable housing units, an elementary school with a capacity of up to 1,000 students, multiple parks and open space areas, recreation amenities, and an internal circulation system on the Project Site. The Project may result in increased demand for fire services on the Project Site compared to existing conditions. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to increased demand for fire protection.**

OCFA Response to Statement in Subject Document, Page 4-39: a) (i) (*Fire Protection*):
OCFA agrees this project could potentially have a significant impact on services and response times. We believe the projects impact on fire services will be reduced with the following Mitigation Measures:

- Prior to approval of any subdivision or comprehensive plan approval for a project, the designated site developer may be required to enter into a Secured Fire Protection Agreement with the Orange County Fire Authority.
    - This Agreement shall specify the developer's pro-rata fair share funding of capital improvements necessary to establish adequate fire protection facilities and equipment, and/or personnel. Said agreement shall be reached as early as possible in the planning process, preferably for each phase or land use sector of the project, rather than on a parcel by parcel basis
- The project is subject to review by the City and the OCFA for various construction document plan checks for the applicable fire life safety codes and regulations. The project will be subject to the 2016 editions of the CBC, CFC and related codes.
- Structures of this size and occupancy are required to have automatic fire sprinkler systems designed per NFPA 13 as required in the 2016 CBC, CFC.
- A water supply system to supply fire hydrants and automatic fire sprinkler systems is required. Fire flow and hydrant spacing shall meet the minimums identified in the codes. Please refer to the California Fire Code Appendix section. These tables are also located in OCFA Guideline B09, Attachment 23.
- Fire apparatus and personnel access to and around structures shall meet the minimum development standards of the OCFA and California Fire Code requirements. Please reference Section 2 of the OCFA's Guideline B-09 at www.ocfa.org.
- If the project scope includes or requires the installation of traffic signals on public access ways, these improvements shall include the installation of optical preemption devices.
- Occupancy for senior building shall be after this building is fully complete and final.
- Provide full fire access around each of the 5 neighborhoods, including around the senior unit building

In addition, we would like to point out that all standard conditions with regard to development, including water supply, built in fire protection systems, road grades and width, access, building materials, and the like will be applied to this project at the time of

plan submittal. Thank you for providing us with this information. Please contact me at 714-573-6199 if you have any questions.

Sincerely,

Tamera Rivers
Management Analyst
Strategic Services Section
tamyrivers@ocfa.org
714-573-6199

Irvine Ranch
WATER DISTRICT

RECEIVED
AUG 03 2018
CITY OF LAKE FOREST
COMMUNITY DEVELOPMENT

August 3, 2018

Ms. Marie Luna, Senior Planner
Development Services Department
City of Lake Forest
25550 Commercentre Drive, Suite 100
Lake Forest, CA 92630

Re: Notice of Preparation for Proposed Nakase Property Area Plan Environmental Impact Report

Dear Ms. Luna:

Irvine Ranch Water District (IRWD) has received and reviewed the Notice of Preparation (NOP)/Initial Study for the subject project, and offers the following comments.

IRWD will be the domestic water, recycled water, and wastewater service provider for the project. While the specified project location has been identified as a future development in the 2010 Lake Forest Sub-Area Master Plan (SAMP), the proposed land use in the NOP/Initial Study is different from what was originally analyzed. Prior to development plan submittal and approval, the project proponent shall coordinate with IRWD to develop a technical memorandum or SAMP Addendum, identifying potential impacts to the potable, recycled, and sewer systems from this proposed project. Please contact Eric Akiyoshi at (949) 453-5552 for additional information on Sub-Area Master Plans.

A water supply assessment (WSA) may be required and should be addressed during project level CEQA analysis. As the service provider, IRWD is required by Section 10910 *et. seq.* of the Water Code to provide the City with a WSA for defined types of projects. Under this law, the City must determine whether this project requires a water supply assessment. If the City determines this project does require a WSA, a WSA request form must be completed and returned to IRWD. IRWD will have 90 days after the receipt of a completed request form to prepare and approve the WSA. Please contact Kellie Welch at (949) 453-5604 for a WSA request form or for additional information on Water Supply Assessments.

The Environmental Impact Report (EIR) should provide a discussion of recycled water demand or uses. Recycled water will be available to the project and IRWD requests the project proponent to maximize the use of recycled water. IRWD requests that Lake Forest City staff contact Mark Tettemer at (949) 453-5592 to review the project's design to determine how recycled water can be used for irrigation, water features and other approved uses.

IRWD appreciates the opportunity to review and provide input to this NOP/Initial Study. IRWD looks forward to receiving the Draft EIR when it is ready for public review. If you have any questions or require additional information, please contact the undersigned at (949) 453-5325 or Jo Ann Corey, Environmental Compliance Specialist at (949) 453-5326.

Sincerely,

Fiona M. Sanchez
Director of Water Resources

Cc: Eric Akiyoshi, IRWD
Kellie Welch, IRWD
Mark Tettemer, IRWD

From: Charles Larson [mailto:cdlarson777@yahoo.com]
Sent: Saturday, August 04, 2018 5:18 PM
To: Luna, Marie
Subject: Nakase property input

Hello,

Here is my input:

1. I do not want homes built on this property.
2. I understand it is zoned Agricultural by the County, but Business Park (or some such thing) by the City in the General Plan. I would like this inconsistency resolved in favor of Agricultural or Horticultural (if such a sub-designation exists) consistent with its current use.
3. The notion that a school is going to be built is bogus. The facts: a) My son attends FHR Elementary, and I have spoken with the Principal, Mr. MacNevin, about this several times. He insists that FHR Elementary is NOT overcrowded for two reasons: 1) it is well below its historic maximum enrollment; and 2) he can just install more portable classrooms to add capacity. That being the case, what Toll Brothers is asserting is at best mistaken. I have not seen the SVUSD express any interest in buying the property, paying to build a school, and paying to staff a new school so close to an existing school.
4. Regarding the existing school plan, there are also two major problems:
   a) Traffic. Dropoff traffic at FHR Elementary is torturous in the mornings, and there are long lines. The intersection at Rancho and Bake cannot handle this load.
   b) A Gas Station Across the Street. Uh, what could *possibly* go wrong?

Please do not rezone the property so Toll Brothers can further destroy our community with more homes and traffic.

Charles Larson
15 Coronado
Foothill Ranch/Lake Forest

PUBLIC SCOPING MEETING
Proposed Nakase Property Area Plan
Wednesday, July 25, 2018

NAME: ANDREA ALEXANDER

ADDRESS: 24412 CALLE TORCIDO CITY: LAKE FOREST ZIP: 92630

EMAIL ADDRESS: andreaalexander12@Ymail.com

REPRESENTING: Residents

Do you wish to be added to the project mailing list? ☑ YES ☐ NO

Please drop comments in the Comment Box or mail them to:

City of Lake Forest Community Development Department
Marie Luna, Senior Planner
25550 Commercentre Drive, Suite 100
Lake Forest, CA, 92630
Phone: (949) 461-3400
E-mail: mluna@lakeforestca.gov

The purpose of this comment card is to solicit input regarding the scope and content of the Environmental Impact Report (EIR). Please submit comments for the record that pertain to the ***environmental issues*** to be addressed in the EIR (please print).

See attached documentation

August 6, 2018

City of Lake Forest
Community Development Dept
Marie Luna, Senior Planner
25550 Commercentre Drive, Suite 100
Lake Forest, CA 92630

To whom it may concern;

I am very concerned about the planned development of the Nakase Nursery site because it will cause more traffic on the already overburdened Bake Parkway. There are currently approximately 3 blocks of homes on Bake Parkway between Trabuco and Muirlands whose backyards are right against Bake Parkway. This is a problem for so many reasons as I have noted below:

1. Fuel particulates are known carcinogens (I have enclosed studies that show this). There are currently 4 diagnosed cancers in my Cul de sac alone.

2. I wipe off my backyard patio table daily and the rag is covered in soot from Bake Parkway pollution and this is constant and cancer causing.

3. We experience traffic is at all hours of the day and night. Trucks and motorcycles in particular make an excessive amount of noise. We have ordinances that apply to noise pollution before 7:00 am and after 8 pm. These noise ordinances are not being enforced on Bake Parkway.

4. Everyone is saying that the flow of traffic on Bake Parkway is so much better and that traffic is not at a stand still. Well I have pictures to show you that prove this is not the case. Lines of cars and trucks sit outside my back wall waiting for the light to change. Not only is this very noisy but it also produces more pollution. At one point a large semi broke down right outside my backyard and sat there all night with the engine running so they could have AC I'm guessing. It was right below my bedroom window.

I realize that, short of chaining myself to the fence at Nakase Nursery, my concerns will be outweighed by the amount of revenue an 800 home development would provide to the city. Some even say the new homes will increase the value of our older homes. However there are pollution and noise issues that need to be addressed and you can insist that the developer, city and county participate in the mitigation of the pollution and noise. I have noted below some ways in which this might happen.

1. Pass an ordinance to remove trucks and motorcycles from Bake Parkway. If not all of Bake Parkway at least those 3 blocks of homes whose backyards butt up against the Parkway. Alton is completely industrial they can use that thoroughfare.

2. We currently have a noise ordinance in LF. (Municipal Code , Chapter 11.16), that speaks to this. We should enforce this ordinance on Bake Parkway and remove the trucks and motorcycles before 7:00 AM and after 8:00 PM.

3. Have the developer build a 10 or 12 foot wall in those areas that are affected by the Bake Parkway pollution and noise. They would have to work with the Association regarding this but they allowed a wall around the lake in our area because of the noise from traffic on Bake and also on Toledo. This development will clearly increase the traffic on Bake and the builder should be responsible for mitigating it, not the Association. If this is route taken then the wall should have some glass in it so we do not loose the sunlight completely. Perhaps a wall that utilizes a few rows of glass brick. Glass brick is easier to maintain than a plexiglass barrier placed on top of our existing wall.

4. The developer could also provide triple paned windows for those homes that butt up against Bake Parkway. This would help to eliminate some of the noise pollution.....until you have to open the windows for ventilation. Alas, not the best fix but does help some.

5. City could work with the Transportation Authority in providing access to the toll roads that would be more desirable for the homeowners and others using Bake Parkway. Perhaps eliminated tolls at the Bake Parkway and Portola Parkway toll road locations would help to divert traffic elsewhere.

6. Everyone talks about the flow of traffic. Keep the flow moving. The flow at some point always has to be interrupted because of the lights. Flow doesn't reduce traffic it just makes it move better. If you want to reduce traffic you must have fewer lanes so people are forced to use another route.....like Alton. People don't use Alton much at all. If you were to compare Alton and Bake I think you will find this to be true. So find a way to move the traffic from Bake that has residential property abutting it to Alton that is completely industrial.

So there you have it.....my complaints and concerns and also ways to mitigate them. I hope you take them to heart and come up with some viable solutions some of which I may have presented herein.

Thank you for your kind consideration. I look forward to hearing your response to these concerns. Please feel free to contact me by cell or text to 415-747-1294.

Respectfully yours,

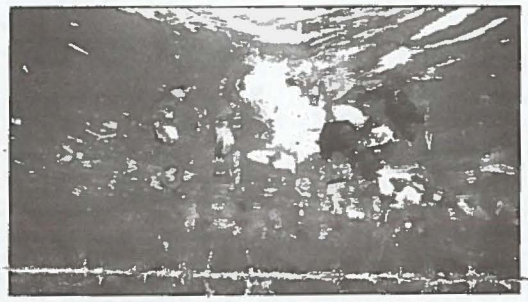
Andrea Alexander

Andrea Alexander
Resident LF2

Early human arrivals in North America?

A group of scientists has claimed that ancient humans may have settled in North America as long as 130,000 years ago—some 115,000 years earlier than previously thought. The controversial assertion, which is viewed with skepticism by most other paleontologists, is based on analysis of the fossilized remains of a mastodon, a long-extinct mammoth-like animal. Discovered beside a freeway near San Diego in 1992, the mastodon bones were scratched and broken into many pieces, surrounded by several large rocks that may have served as hammers and anvils. Researchers at the University of Michigan and elsewhere have concluded that the bones are 130,000 years old, and that they were opened when fresh by a Neanderthal or other ancient human relative using rocks to try to extract bone marrow. It's widely accepted that *Homo sapiens* arrived in North America about 15,000 years ago, across a land bridge connecting Siberia and Alaska; the mastodon findings, if confirmed, would indicate that another hominin species somehow reached this continent much earlier. If that hypothesis is true, it would rewrite the story of human migration. Skeptics argue that there are more-plausible explanations for the bone fractures and markings, such as pressure from the sediment on top of it. Paleontologist Thomas A. Deméré, a co-author of the study, acknowledged that the findings seem "impossible," but said, "People have to be open to the possibility that humans were here this long ago."

Scratches and dents on the mastodon bones



Our plastic refuse travels far and wide.

Trash in the Arctic Ocean

The world's seas have long been littered with trillions of tiny pieces of plastic—and a lot of it is ending up in the Arctic Ocean. The first major survey of the region's icy waters found that the planet's northernmost ocean is clogged with about 300 billion pieces of debris from things like plastic bottles, bags, and fishing lines. Carried there from the North Atlantic by a major ocean current, this seaborne junk has few ways to escape the "dead-end" ocean, reports *The New York Times*. The pollution is different from the "trash patches" that have accumulated in the Pacific and Atlantic oceans; rather than collecting in certain areas, the debris in the Arctic is spreading more evenly throughout the sea. "We don't fully understand the consequences the plastic is having or will have in our oceans," says study leader Andrés Cózar Cabañas. "What we do know is that these consequences will be felt at greater scale in an ecosystem like this." Cabañas says further research is needed to determine whether ocean currents could eventually enable the plastic to work its way out of the region.

Plastic-eating caterpillars

Scientists may have found an unlikely candidate to clean up the mounds of non-biodegradable plastic trash in the world's landfills: the humble wax worm. Federica Bertocchini, a developmental biologist and amateur beekeeper in Spain, first came up with the idea after finding her beehives infested with the beeswax-loving caterpillar larvae of wax moths. She put the grubs in a plastic bag—whereupon they immediately ate their way out. Plastic and wax have similar chemical structures. Bertocchini posited that in evolving to digest wax, wax worms may have also gained the ability to break down polyethylene, the world's most common plastic. She took her theory to biochemists at the University of Cambridge, who found that 100 wax worms could gulp down 92 milligrams of polyethylene in about 12 hours and degrade plastic bags much faster than any known method. "If a single enzyme is responsible for this chemical process," study co-author Paolo Bombelli tells *CNN.com*, "its reproduction on a large scale using biotechnological methods should be achievable."

Diet soda and dementia

Sugar-free versions of soda may increase people's risk of suffering a stroke or developing dementia, reports *The Washington Post*. Scientists at Boston University studied more than 4,000 people over a 10-year period. They found that those who consumed at least one artificially sweetened drink a day were almost three times more likely to have a stroke or be diagnosed with dementia than those who had one or fewer a week. To the researchers' surprise, a parallel study of sugary drinks did not find a similar association. Matthew Pase, the study's lead author, offered several caveats on the findings, most notably that the actual number of diagnoses was very low and that the results showed only correlation, not causation. He also urged people not to see the study as an incentive to switch to regular soda, noting that sugary drinks have been linked to obesity, poor memory, and accelerated brain aging. But Pase did say the findings suggested consumers should be "cautious" about their diet soda intake and switch to water or other unsweetened drinks.

Health scare of the week
Pollution reaches bloodstream

Tiny airborne pollutants from power plants, cars, and trucks may be able to get through the lungs' filter system and work their way into the bloodstream, new research suggests. Scientists at the University of Edinburgh in the U.K. asked 14 healthy volunteers to inhale air filled with harmless gold nanoparticles. They found that these nanoparticles were detectable in the participants' blood within 15 minutes and were still in their blood and urine three months later. When the researchers then tested 12 people who were due to undergo surgery to clear blocked arteries, they found that the gold nanoparticles accumulated in the fatty plaques that grew inside the patients' blood vessels. If the reactive compounds found in air pollution act in the same way, they could increase the risk for heart disease, stroke, and other health issues. "There is no doubt that air pollution is a killer," Jeremy Pearson from the British Heart Foundation charity tells *Reuters.com*. "This study brings us a step closer to solving the mystery of how air pollution damages our cardiovascular health."

Tom Deméré/San Diego Natural History Museum, Getty (1)

Diesel Exhaust and Cancer

What is diesel exhaust?

Diesel is a type of fuel derived from crude oil. Diesel fuel is used in most large engines, including those used in many trucks, buses, trains, construction and farm equipment, generators, ships, and in some cars.

Diesel exhaust is made up of 2 main parts: gases and soot (particles). Each of these, in turn, is made up of many different substances.

- The gas portion of diesel exhaust is mostly carbon dioxide, carbon monoxide, nitric oxide, nitrogen dioxide, sulfur oxides, and hydrocarbons, including polycyclic aromatic hydrocarbons (PAHs).
- The soot (particulate) portion of diesel exhaust is made up of particles such as carbon, organic materials (including PAHs), and traces of metallic compounds.

Both the gases and the soot of diesel exhaust contain PAHs.

Exhaust from diesel engines brings a complex mixture of soot and gases to roadways, cities, farms, and other places. Health concerns about diesel exhaust relate not only to cancer, but also to other health problems such as lung and heart diseases.

How are people exposed to diesel exhaust?

People can be exposed to diesel exhaust at work, around the home, or while traveling mainly by breathing in the soot and gases. Diesel exhaust exposure is widespread in the modern world.

The amount of diesel exhaust people are exposed to varies greatly. Measuring these exposures is not easy because diesel exhaust is chemically complex and many parts of it are also found in a lot of other sources. This is a major challenge when trying to study the health effects of diesel exhaust.

At work

People with some of the highest work exposures include truck drivers, toll booth workers, miners, forklift drivers and other heavy machinery operators, railroad and dock workers, and garage workers and mechanics. Some farm workers also spend a lot of time around diesel exhaust.

Where you live and play

People can also be exposed to diesel exhaust where they live and play, although this is typically at lower levels than in the workplace. Exposures are highest where diesel traffic is heaviest, such as along major highways and in cities.

While traveling in a vehicle

Exposure to diesel exhaust may be higher, especially when traveling on roads with heavier truck or bus traffic. Commuting for work is a potential source of diesel exhaust exposure for many people. One particular area of concern is children's exposures to diesel exhaust and other pollutants while riding in school buses, as the buses themselves typically run on diesel fuel.

Does diesel exhaust cause cancer?

Two main types of studies are used to try to figure out if a substance or exposure causes cancer.

- **Studies in labs:** In these studies, animals are exposed to a substance (often in very large doses) to see if it causes tumors or other health problems. Researchers might also expose normal cells in a lab dish to the substance to see if it causes the types of changes seen in cancer cells. It's not always clear if the results from these types of studies will apply to humans, but lab studies are a good way to find out if a substance might possibly cause cancer.
- **Studies in people:** Another type of study looks at cancer rates in different groups of people. Such a study might compare the cancer rate in a group exposed to a substance to the cancer rate in a group not exposed to it, or compare it to the cancer rate in the general population. But sometimes it can be hard to know what the results of these studies mean, because many other factors might affect the results.

In most cases neither type of study provides enough evidence on its own, so researchers usually look at both lab-based and human studies when trying to figure out if something causes cancer.

Results of studies in the lab

In studies of cells done in lab dishes, diesel exhaust (as soot or chemical extracts) has been found to cause changes in the cells' DNA. These types of changes are usually needed for cancer to develop, although not all substances that cause DNA changes also cause cancer.

Several studies have found that long-term, heavy exposure to diesel exhaust can cause lung cancer in lab animals such as rats.

Results of studies in people

It's not easy to study the possible health effects of diesel exhaust in people. First, it is often very hard to correctly define and measure the level of exposure. It can also be hard to account for the other cancer risk factors that people exposed to diesel exhaust might have, such as smoking.

Lung cancer

Lung cancer is the major cancer thought to be linked to diesel exhaust. Several studies of workers exposed to diesel exhaust have shown small but significant increases in risk of lung cancer. Men with the heaviest and most prolonged exposures, such as railroad workers, heavy equipment operators, miners, and truck drivers, have been found to have higher lung cancer death rates than unexposed workers. Based on the number of people exposed at work, diesel exhaust may pose a substantial health risk.

The possible link between lung cancer and exposure to diesel exhaust outside the workplace has not been studied extensively.

Other cancers

Several studies have looked for possible links between diesel exhaust and other cancers, including cancers of the bladder, larynx (voice box), esophagus, stomach, and pancreas. Studies have also looked for links to blood system cancers such as lymphomas and leukemias (including childhood leukemia). While some studies have found possible links, others have not. More research is needed to show if diesel exhaust exposure is linked to any of these other cancers.

What expert agencies say about diesel exhaust

Several national and international agencies study substances in the environment to determine if they can cause cancer. (A substance that causes cancer or helps cancer grow is called a *carcinogen*.) The American Cancer Society looks to these organizations to evaluate the risks based on evidence from laboratory, animal, and human research studies.

Some of these expert agencies have classified diesel exhaust as to whether it can cause cancer, based largely on the possible link to lung cancer.

The **International Agency for Research on Cancer (IARC)** is part of the World Health Organization (WHO). Its major goal is to identify causes of cancer. IARC classifies diesel engine exhaust as "carcinogenic to humans," based on sufficient evidence that it is linked to an increased risk of lung cancer. IARC also notes that there is "some evidence of a positive association" between diesel exhaust and bladder cancer.

The **National Toxicology Program (NTP)** is formed from parts of several different US government agencies, including the National Institutes of Health (NIH), the Centers for Disease Control and Prevention (CDC), and the Food and Drug Administration (FDA). The NTP has classified exposure to diesel exhaust particulates as "reasonably anticipated to be a human

carcinogen," based on limited evidence from studies in humans (mainly linking it to lung cancer) and supporting evidence from lab studies.

The US **Environmental Protection Agency (EPA)** maintains the Integrated Risk Information System (IRIS), an electronic database that contains information on human health effects from exposure to various substances in the environment. The EPA classifies diesel exhaust as "likely to be carcinogenic to humans."

The **National Institute for Occupational Safety and Health (NIOSH)** is part of the CDC that studies exposures in the workplace. NIOSH has determined that diesel exhaust is a "potential occupational carcinogen."

(For more information on the classification systems used by these agencies, see *Known and Probable Human Carcinogens* (/cancer/cancer-causes/general-info/known-and-probable-human-carcinogens.html).)

Can I reduce my exposure to diesel exhaust?

Diesel exhaust can cause health problems and can most likely increase the risk of lung cancer (and possibly other cancers).

Since most people's exposure is from exhaust near highways and other roads, government regulations may be as important as personal choices in limiting exposure to potentially harmful chemicals in diesel exhaust. For example, as a result of EPA regulations and improvements in technology, new diesel engines give off much lower amounts of certain chemicals than

older engines. Still, it's not yet clear how much this might lower the risks, and many older diesel engines are still in use, so it makes sense to avoid exposure whenever possible.

At work

If you are exposed to diesel exhaust at work, there are ways to reduce or prevent exposures. Some of these measures can also help protect you from other chemical exposures that are likely to happen in the workplace.

If you work in or around vehicles that run on diesel fuel, you might be able to limit the amount of time you spend near engines while they are running. Limiting the time spent near idling engines may help lower your exposure to fumes.

Talk with your employer to be sure that you are protected adequately. Personal protective equipment, such as respirators, may be a key part of a workplace protective program. If needed, engineering changes, such as ventilating the exhaust away from where you breathe, can also be important.

For more information on preventing or reducing workplace exposures at your job, consult your company's safety and health manager. If needed, you can get additional assistance from the Occupational Safety & Health Administration (OSHA) (https://www.osha.gov/SLTC/dieselexhaust/), the government agency responsible for enforcing workplace safety.

Where you live and play

If you are exposed to diesel exhaust fumes in your environment, you can take some of the same precautions. For example, try to avoid or limit spending time near large sources of diesel exhaust, such as near trucks and buses. Commuting to and from work exposes many people to possible sources of diesel exhaust, whether they are in a car or on some type of public transportation. For some people, working from home

(telecommuting or teleworking) might be an option to lower their exposure, as well as to save money on commuting expenses.

On a governmental level, regulations such as the Clean Air Act and programs such as the EPA's National Clean Diesel Campaign are designed to reduce diesel emissions from trucks and other large engines, lowering public exposure to diesel exhaust.

Another important program is Clean School Bus USA. Children can be exposed to diesel exhaust during school bus travel or when standing near running school buses outside of school. Clean School Bus USA brings together partners from business, education, transportation, and public-health organizations to reduce children's exposure to bus-related air pollutants by aiming to:

- Reduce unnecessary school bus idling
- Replace older buses with newer, less-polluting buses
- Upgrade existing buses with technologies to reduce their emissions

Written by Additional resources References

The American Cancer Society medical and editorial content team

(/cancer/acs-medical-content-and-news-staff.html)Our team is made up of doctors and master's-prepared nurses with deep knowledge of cancer care as well as journalists, editors, and translators with extensive experience in medical writing.

Last Medical Review: July 24, 2015 | Last Revised: July 27, 2015

2,797 views | Sep 28, 2015, 06:00am

Dieselgate Is A Cancer Problem

Elaine Schattner Contributor
Pharma & Healthcare

Emissions from diesel engines cause lung cancer. The World Health Organization's IARC confirmed the long-suspected fact that diesel engine exhaust (DEE) is a human carcinogen in 2012.

Like others, I'm concerned about the environmental ramifications and all else that's wrong about the VW emission scandal. But primarily I see this as a public health issue. As with most environmental toxins, the clearest risk of disease from exposure applies to people working or living in places with frequently-high levels. Although everyday (non-occupational) exposure to diesel engine exhaust is hard to gauge, the effects are real.

"Exhaust from diesel engines contributes to air pollution and is a cancer hazard to humans," said Dr. Kurt Straif in a phone interview. "Therefore trying to get around these regulations is certainly a big concern." Straif is a physician and epidemiologist who heads the International Agency for Research on Cancer (IARC) monographs on carcinogens.

"The IARC doesn't get into the politics, we stick with the science." A working group of leading international experts unanimously concluded that diesel exhaust is carcinogenic to humans, Straif noted.

The agency published a report supporting this designation in the Lancet Oncology.

The IARC monographs don't provide recommendations, Straif emphasized. "But my personal opinion as a research scientist, having worked in the field of public health and cancer for many years, is that this is a real concern."

In this Dec. 17, 2010 file photo, trucks make their way on eastbound in Livermore, Calif. The World Health Organization's cancer agency has determined that diesel exhaust causes cancer. (AP Photo/Ben Margot)

MORE FROM FORBES

"I would think cancer is an important element in this discussion about fuel emissions," Straif said. "There is concern about air pollution and climate change. But certainly also about human health hazards."

I asked Straif if gasoline is a less toxic energy source for vehicles, as compared to diesel. "From the IARC monographs, there is clear evidence that diesel exhaust causes human cancer. There is not such evidence for gasoline. For diesel exhaust, we have it from all lines of evidence: cancer in humans, animals and mechanistic,"

he said.

The incidence of lung cancer in non-smokers has been rising. Among people with lung cancer who haven't smoked and lack occupational risks, the cause is rarely known. Environmental hazards, including air pollution and naturally-occurring substances, like radon, are implicated in lung cancer. With some exceptions, inherited genetic changes are not considered to play a major role in lung cancer risk.

I asked Straif if diesel exhaust might contribute to the recent rise in lung cancer among non-smokers. "It is certainly possible," he said. "In the United Kingdom, exposure to diesel engine exhaust is among the top three occupational causes of cancer," Straif said. "Environmental exposures are harder to measure."

There's evidence that diesel exhaust causes inflammation and is toxic to DNA, Straif added. "But it can be hard to disentangle what in the environment comes from air pollution, in general, and from diesel exhaust. It's a complex mixture."

The nitrogen oxides (NOx), which can be assessed in vehicle exhaust, are probably not the underlying cause of cancer, Straif suggested. "Those measurable compounds are a surrogate for what's in the pollution mix," he said. Teasing out which substance causes cancer in those exposed challenges environmental scientists. "It could be particulate matter or other polyaromatic hydrocarbons, he said.

"It is interesting to note that the Volkswagen problem was first discovered by U.S. regulators," Straif said. In Europe, independent monitoring is less common, he suggested. "The strongest regulations are for the passenger cars."

The fact that diesel engine exhaust is a carcinogen had been has been suspected at least since 1955. The evidence comes mainly from studies of lung cancer in high-risk workers, such as non-metal miners. In 2011, the *Journal of the National*

Cancer Institute published two papers on occupational exposure to diesel exhaust with a focus on lung cancer. In an accompanying editorial, The Problem with Diesel, Dr. Lesley Rushton, provides a highly-readable summary of diesel exhaust chemistry, engines in industry and related diseases including exacerbation of asthma, other respiratory problems, heart disease and lung cancer.

In 2014, a paper published in the NIEHS-backed journal *Environmental Health Perspectives* estimated that diesel engine exhaust (DEE) accounts for approximately 6% of all lung cancer deaths, mostly due to occupational exposure. In their discussion, the investigators wrote:

> "Diesel engines were initially used predominantly to power heavy-duty equipment, with trains converting to diesel locomotives mainly after World War II and with heavy-duty trucks converting to diesel primarily during the mid- to late 1950s. Dieselization of equipment in underground mines occurred mostly in the 1960s–1970s. Diesel engines also are used in automobiles, especially in Europe. Large groups in the general population living in urban areas or close to highways are exposed to DEE, albeit to lower levels than in most occupational settings. Given that DEE is classified as a known human carcinogen, the impact of both occupational and environmental exposures on the overall lung cancer burden is potentially significant.*

The researchers conclude: "Given that DEE is classified as a known human carcinogen, both occupational and environmental exposures on the overall lung cancer burden is potentially significant." They state: "We estimated that approximately 1.3% and 4.8% of annual lung cancer deaths at 70 years of age in the United States and the United Kingdom are due to past occupational and environmental DEE exposures, respectively." The authors admit – and emphasize – that these are rough estimates.

But the insight holds: Because diesel exhaust is carcinogenic, which has been

established over decades, based on numerous studies of occupational exposure, it is a contributor to the toll of lung cancer worldwide. Even if it's just a small fraction of the global tally of 1.2 million new lung cancer cases, and over a million deaths, ever year, a small percent is not be trivial – especially if the diesel exhaust has a synergistic effect with other toxins, some known, others unknown and most unmeasured. It causes DNA damage, inflammation, disease and deaths from lung disease including cancer.

Meanwhile, a recent article the Guardian suggests that some European governments, while expressing concern about the Volkswagen deception, are pushing for less strict emission controls.

Here in the U.S., plans to reduce regulation of industry and environmental protections have been raised by some presidential candidates. Days ago, the *Wall Street Journal* published an op-ed by Jeb Bush. The Republican contender wrote that he'd repeal and slash EPA rules.

What's evident is that the problem of unchecked toxins, falsification of environmental compliance and hard-to-assess harms extend beyond the wrongdoing of any one company. The recent Volkswagen problem should be taken as an alarm, about the need for effective regulation of industry, occupational and public health hazards.

---

*I've removed the in-text references for clarity; I encourage readers to read the original *EHP* paper (vol **122: pp. 172–177**), where references are fully listed (and useful), here, ES.

Please follow me here at Forbes. Also I'm on Twitter: @ESchattner, & Facebook. Thank you for your readership!

I'm a journalist, physician, and life-long patient who advocates for universal access to modern and compassionate health care. I am writing a book about public attitudes toward cancer. I've been on the faculty at Weill Cornell Medicine since 1993. Earlier in my career, I... MORE

Privacy and cookies Jobs Dating Offers Shop Puzzles Investor Log in Register Subscribe

Accessibility links

- Skip to article
- Skip to navigation

The Telegraph
Telegraph.co.uk

Tuesday 07 August 2018

Advertisement

The statistics about diesel are crystal clear. It's deadly

Rigorous research over the past twenty years has proved the dangers of the fuel beyond all doubt

Particulate pollution from all sources kills 29,000 Britons a year Photo: ALAMY

By Geoffrey Lean

5:33PM BST 29 Sep 2015

Follow

Do diesel fumes really kill thousands of Britons each year? And how can we possibly know for sure? In the wake of the Volkswagen scandal some reassuring voices have suggested that the claim is alarmist. Unfortunately, the evidence for the fuel's deadly effects is powerful.

Diesel exhausts emit two main pollutants: particulates and nitrogen dioxide (N02), and account for almost half the N02 and about 70 per cent of the particulates in London air. Measuring the effects, admittedly, is not easy. Doctors don't put "air pollution" or "diesel" on death certificates. Nor can we take a crowd of people, expose them over a long period to diesel fumes and then count how many died. Other, less direct, ways have to be found of getting at the truth.

Diesel accounts for about 70 per cent of the particulates in London air

Particulates – tiny sooty particles in the air – were the first of the pollutants to be identified as toxic, 22 years ago, in a big Harvard study. The seminal 1993 research, dubbed "the six cities study" compared mortality rates in half a dozen representative US urban areas, following the fates of

8,111 adults for at least 14 years. It found – after adjusting for risk factors like obesity, smoking and occupational exposure – that death rates were 26 per cent higher in the city with the highest particulate pollution than the two with the lowest .

By itself this did not constitute proof but, in the intervening years, hundreds of similar studies – some so vast they tracked more than half a million people – have come to similar conclusions, establishing the danger beyond doubt.

HHS Public Access
Author manuscript
Peer-reviewed and accepted for publication
About author manuscripts | Submit a manuscript

Occup Environ Med. Author manuscript; available in PMC 2017 Mar 15.
Published in final edited form as:
Occup Environ Med. 2017 Mar; 74(4): 233–234.
Published online 2017 Jan 9. doi: 10.1136/oemed-2016-104197

PMCID: PMC5352477
NIHMSID: NIHMS837674
PMID: 28069968

Diesel Exhaust Causes Lung Cancer – Now What?

Debra T. Silverman, ScD, ScM

Debra T. Silverman, Occupational and Environmental Epidemiology Branch, Division of Cancer Epidemiology and Genetics, National Cancer Institute, National Institutes of Health, DHHS, Bethesda, Maryland;
Correspondence: Debra T. Silverman, ScD, ScM. Occupational and Environmental Epidemiology Branch, Division of Cancer Epidemiology and Genetics, National Cancer Institute, National Institutes of Health, DHHS, 9609 Medical Center Drive, MSC 9774, Bethesda, Maryland, 20892-9774 (silvermd@mail.nih.gov, tel: 240-276-7174)

Copyright notice

The publisher's final edited version of this article is available at Occup Environ Med
See other articles in PMC that cite the published article.

After three decades of epidemiologic research, diesel exhaust was classified as a carcinogen in humans by the International Agency for Research on Cancer (IARC) in 2012 based on evidence of its carcinogenicity to the lung (1). This determination was largely based on results from two recent epidemiologic studies of occupational diesel exhaust exposures among nonmetal miners (Diesel Exhaust in Miners Study (DEMS)) (2, 3) and truck drivers (4). The next challenge is to determine how to regulate exposure to diesel exhaust. Governmental regulatory agencies are charged with setting safe levels of exposure in the workplace and in the outdoor ambient environment in various countries. Much of the current regulatory activity has been focused on the workplace. Many countries lack workplace regulations, and many others have regulations that need re-evaluation by quantitative risk assessors in light of the new research findings. The new findings and the potential need for regulation has stimulated exposure assessments such as that led by Peters and colleagues in Western Australian mining (5).

In 2013, the Health Effects Institute (HEI) convened an independent panel of scientists to evaluate whether the findings from the two new studies of nonmetal miners and truck drivers were suitable for conducting quantitative risk assessment. In 2015, the HEI panel issued a report indicating that they found the studies to be "well designed and well conducted"; through re-analysis of the primary data, the panel replicated the published results of these studies and concluded that these data were useful for quantitative risk assessment (6). In the past two years, several investigators have attempted to determine what level of exposure would be "safe" in the workplace and in the environment. Based on the exposure-response relationship between cumulative elemental carbon (a key surrogate of diesel exhaust) and lung cancer mortality derived from a meta-regression of data from the studies of nonmetal

miners (2), truck drivers (4), and an older study of truck drivers (7), Vermeulen and colleagues (8) estimated the excess lifetime risk of lung cancer mortality in the U.S. under various exposure scenarios. The estimated numbers of excess lung cancer deaths through age 80 for lifetime workplace exposures of 1, 10, and 25 $\mu g/m^3$ elemental carbon (EC) were 17, 200, and 689 per 10,000, respectively, which exceed the typically acceptable levels of occupational risk of 1/1,000 in the U.S. and Europe (8). With regard to environmental exposures, they estimated 21 excess lung cancer deaths per 10,000 for lifetime environmental exposure to 0.8 $\mu g/m^3$ EC, which exceeds the typically acceptable level of 1/100,000 in the U.S. and Europe.

In Western Australia, Peters et al (5) conducted an extensive diesel exhaust exposure assessment in 124 mine sites (mainly metal and nonmetal). Based on an approach similar to that taken by Vermeulen et al (8), they estimated that a lifetime underground mining career (45 years), with an estimated average exposure of 44 $\mu g/m^3$ EC in 2011, was associated with 38 excess lung cancer deaths per 1,000 miners. However, EC exposure levels have been decreasing over time in these Australian mines, so use of recent measurements likely results in an underestimation of lifetime exposure, and thus, an underestimation of excess lung cancer deaths. Australia has a recommended level of occupational exposure to EC of 100 $\mu g/m^3$, but no workplace regulations exist (5). This lung cancer risk exceeds levels that are acceptable in Europe and the U.S., leading the investigators to call for "the implementation of stringent occupational exposure limits for diesel exhaust" (5).

In 2016, Vermeulen and Portengen (9) conducted a quantitative risk assessment based on the exposure-response relationship derived from the 2014 meta-regression (8) and additional sensitivity analyses based on alternative exposure-response relationships. They estimated workplace EC exposure levels for both acceptable risk (AR) and maximum tolerable risk (MTR) of 4×10^{-5} and 4×10^{-3}, respectively, for lifetime cumulative excess risk of dying from lung cancer. To achieve these AR and MTR limits, they found that EC exposures would need to be 0.01 and 1.0 $\mu g/m^3$, respectively, which are at or far below current workplace exposure levels, leading the authors to suggest that "diesel engines using older technologies should be removed from the workplace when possible or emissions strictly controlled" (9). Lastly, to correct for healthy worker survivor bias that may have led to an underestimation of lung cancer mortality in underground diesel-exposed nonmetal miners in DEMS, Neophytou and colleagues (10) applied an accelerated failure time model to assess the effect of exposures to EC on time to termination of employment and found time to termination decreased with increased EC exposure. Adjusting for time-varying employment status, they applied the parametric g-formula to evaluate the effect of various interventions on lifetime lung cancer mortality. They observed a 20% reduction in mortality with an EC limit of ≤ 25 $\mu g/m^3$ compared to no intervention, providing hypothetical evidence of the beneficial effect of lowering EC exposure limits in underground nonmetal mining. The authors concluded that to achieve a risk of 1/1,000 would require reducing EC exposure to below 1 $\mu g/m^3$, making continued use of diesel equipment based on older technology difficult.

With an eye to future research, several pressing scientific questions merit our attention. First, is the carcinogenicity of diesel exhaust in humans limited to the lung? As we observed for cigarette smoke, a product of combustion and a powerful lung carcinogen that causes cancer of 20 other sites, diesel exhaust may cause cancer of sites such as the urinary bladder, larynx, and colon (1). Additionally, diesel exhaust is a major contributor to air pollution in most urban areas, specifically the fine

particulate component ($PM_{2.5}$). IARC classifies outdoor air pollution, specifically particulate matter, as a cause of lung cancer (11). How much of the carcinogenicity of air pollution is attributable to diesel exhaust? Air pollution also causes cardiovascular disease (12). Does diesel exhaust cause cardiovascular disease and other diseases such as nonmalignant respiratory disease?

Finally, the gravity of the adverse health effects of air pollution in some metropolitan areas is perhaps best reflected by the recent proposals by mayors of Mexico City, Paris, Madrid and Athens to ban diesel vehicles by 2025; possibly, more cities will follow suit. Alternatively, would the replacement of "old" with "new" technology diesel engines, which drastically reduce emissions of many compounds and elemental carbon, prove to be sufficient for safety from disease for the millions of diesel-exposed workers and the populations in urban areas worldwide? If so, improving air quality to protect health may depend to a large extent on the turnover rate from old- to new-technology engines in both developed and developing countries.

Footnotes

Go to:

Funding: Intramural Research Program of the National Institutes of Health, National Cancer Institute, Division of Cancer Epidemiology and Genetics.

References

Go to:

1. IARC. Diesel and gasoline engine exhausts and some nitroarenes. Vol. 105. Lyon, France: International Agency for Research in Cancer; 2013. IARC Monographs on the Evaluation of the Carcinogenic Risks to Humans. [PubMed]

2. Silverman DT, Samanic CM, Lubin JH, et al. The Diesel Exhaust in Miners Study: a nested case-control study of lung cancer and diesel exhaust. J Natl Cancer Inst. 2012;104:855–68. [PMC free article] [PubMed]

3. Attfield MD, Schleiff PL, Lubin JH, et al. The Diesel Exhaust in Miners Study: a cohort mortality study with emphasis on lung cancer. J Natl Cancer Inst. 2012;104:869–83. [PMC free article] [PubMed]

4. Garshick E, Laden F, Hart JE, et al. Lung cancer and elemental carbon exposure in trucking industry workers. Environ Health Perspect. 2012;120:1301–6. [PMC free article] [PubMed]

5. Peters S, de Klerk N, Reid A, et al. Estimation of quantitative levels of diesel exhaust exposure and the health impact in the contemporary Australian mining industry. Occup Environ Med. doi: 10.1136/oemed-2016-103808. Epub 2016 Nov 15. [PubMed] [Cross Ref]

6. HEI Diesel Epidemiology Panel. Special Report. Boston, MA: 2015. Diesel emissions and lung cancer: an evaluation of recent epidemiological evidence for quantitative risk assessment. [PubMed]

7. Steenland K, Deddens J, Stayner L. Diesel exhaust and lung cancer in the trucking industry: exposure-response analyses and risk assessment. Am J Ind Med. 1998;34:220–8. [PubMed]

8. Vermeulen R, Silverman DT, Garshick E, et al. Exposure-response estimates for diesel engine exhaust and lung cancer mortality based on data from three occupational cohorts. Environ Health Perspect. 2014;122:172–7. [PMC free article] [PubMed]

9. Vermeulen R, Portengen L. Is diesel equipment in the workplace safe or not? Occup Environ Med. 2016;73:846–8. [PubMed]

10. Neophytou AM, Picciotto S, Costello S, Eisen EA. Occupational diesel exposure, duration of employment, and lung cancer: an application of the parametric g-formula. Epidemiology. 2016;27:21–8. [PMC free article] [PubMed]

11. IARC. Outdoor Air Pollution. Vol. 109. Lyon, France: International Agency for Research in Cancer; 2016. IARC Monographs on the Evaluation of the Carcinogenic Risks to Humans.

12. Thurston GD, Burnett RT, Turner MC, et al. Ischemic Heart Disease Mortality and Long-Term Exposure to Source-Related Components of U.S. Fine Particle Air Pollution. Environ Health Perspect. 2016;124:785–94. [PMC free article] [PubMed]

Overview: Diesel Exhaust and Health

CATEGORIES

Topics Health, Air Pollution, Truck & Bus, Cars & Trucks, Construction & Earthmoving Equipment, Environmental Justice, Oceangoing Vessels & Harbor Craft, Ports, Freight & Moving Goods in California, Trains & Railyards, Transit, VW Diesel Vehicles

Programs Exposure, Research Planning, Community Air Protection Program AB 617

Type Information

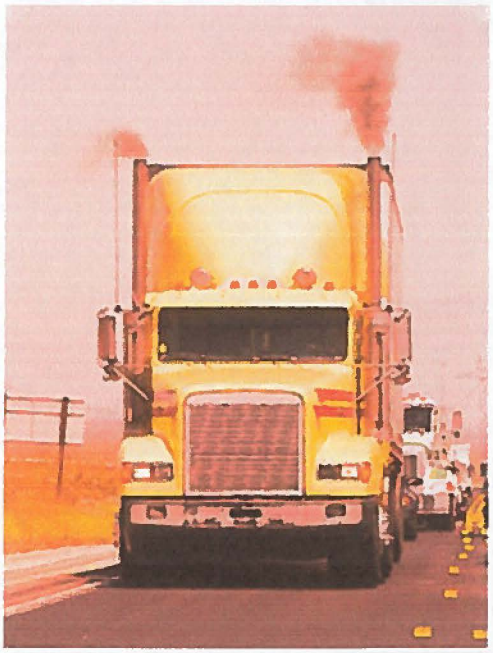
CONTACT

Email research@arb.ca.gov

Phone (916) 445-0753

Background

Diesel engines emit a complex mixture of air pollutants, including both gaseous and solid material.The solid material in diesel exhaust is known as diesel particulate matter (DPM). More than 90% of DPM is less than 1 µm in diameter (about 1/70th the diameter of a human hair), and thus is a subset of particulate matter less than 2.5 microns in diameter (PM2.5). Most PM2.5 derives from combustion, such as use of gasoline and diesel fuels by motor vehicles, burning of natural gas to generate electricity, and wood burning. PM2.5 is the size of ambient particulate matter air pollution most associated with adverse health effects of the air pollutants that have ambient air quality standards. These health effects include cardiovascular and respiratory hospitalizations, and premature death. As a California statewide average, DPM comprises about 8% of PM2.5 in outdoor air, although DPM levels vary regionally due to the non-uniform distribution of sources throughout the state.



DPM is typically composed of carbon particles ("soot", also called black carbon, or BC) and numerous organic compounds, including over 40 known cancer-causing organic substances. Examples of these chemicals include polycyclic aromatic hydrocarbons, benzene, formaldehyde, acetaldehyde, acrolein, and 1,3-butadiene. Diesel exhaust also contains gaseous pollutants, including volatile organic compounds and oxides of nitrogen (NO_x). NO_x emissions from diesel engines are important because they can undergo chemical reactions in the atmosphere leading to formation of PM2.5 and ozone.

Most major sources of diesel emissions, such as ships, trains, and trucks operate in and around ports, rail yards, and heavily traveled roadways. These areas are often located near highly populated areas. Because of this, elevated DPM levels are mainly an urban problem, with large numbers of people exposed to higher DPM concentrations, resulting in greater health consequences compared to rural areas. A large fraction of personal exposure to DPM occurs during travel on roadways. Although Californians spend a relatively small proportion of their time in enclosed vehicles (about 7% for adults and teenagers, and 4% for children under 12), 30 to 55% of total daily DPM exposure typically occurs during the time people spend in motor vehicles.

Diesel Particulate Matter and Health

The majority of DPM is small enough to be inhaled into the lungs. Most inhaled particles are subsequently exhaled, but some deposit on the lung surface. Although particles the size of DPM can deposit throughout the lung, the largest fraction deposits in the deepest regions of the lungs where the lung is most susceptible to injury.

In 1998, the California Air Resources Board (CARB) identified DPM as a toxic air contaminant based on published evidence of a relationship between diesel exhaust exposure and lung cancer and other adverse health effects. In 2012, additional studies on the cancer-causing potential of diesel exhaust published since CARB's determination led the International Agency for Research on Cancer (IARC, a division of the World Health Organization) to list diesel engine exhaust as "carcinogenic to humans". This determination is based primarily on evidence from occupational studies that show a link between exposure to DPM and lung cancer induction, as well as death from lung cancer. Download the IARC report (external site).

Because it is part of PM2.5, DPM also contributes to the same non-cancer health effects as PM2.5 exposure. These effects include premature death, hospitalizations and emergency department visits for exacerbated chronic heart and lung disease, including asthma, increased respiratory

symptoms, and decreased lung function in children. Several studies suggest that exposure to DPM may also facilitate development of new allergies. Those most vulnerable to non-cancer health effects are children whose lungs are still developing and the elderly who often have chronic health problems.

Estimated Health Effects of DPM in California

DPM has a significant impact on California's population. It is estimated that about 70% of total known cancer risk related to air toxics in California is attributable to DPM. Based on 2012 estimates of statewide exposure, DPM is estimated to increase statewide cancer risk by 520 cancers per million residents exposed over a lifetime. Non-cancer health effects associated with exposure to DPM (based on 2009 - 2011 air quality data) are shown in the table below.

Health Effect	Estimated Annual Number of Cases*
Cardiopulmonary Death	1,400 (1,100 – 1,800)
Cardiovascular Hospitalization	100 (0 – 250)
Respiratory Hospitalization	120 (30 – 250)
Respiratory Emergency Room Visits (Including Asthma)	600 (400 – 800)

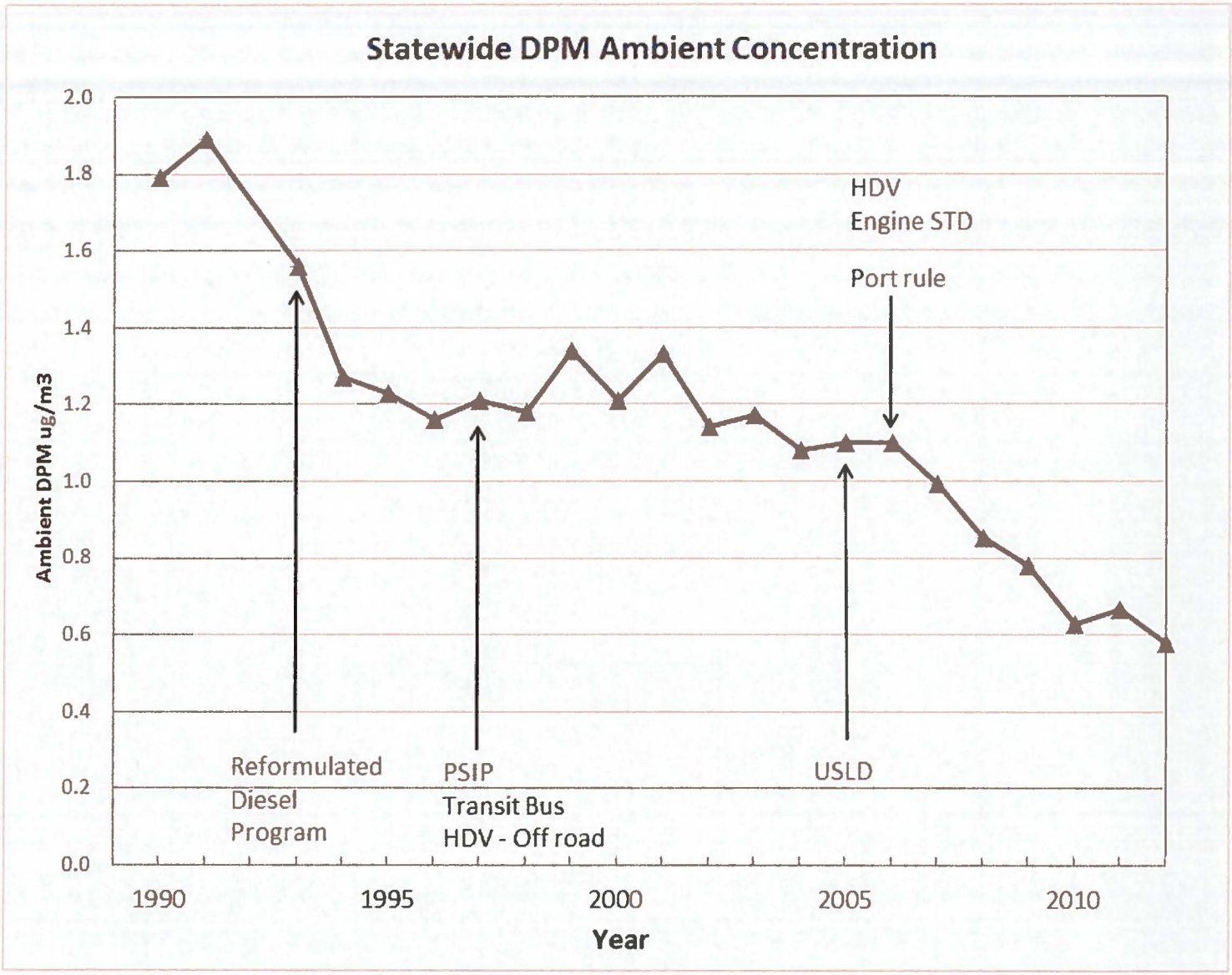
*Values in parenthesis indicate 95% confidence interval.

More information on DPM and health.

Trends in Outdoor Levels of DPM

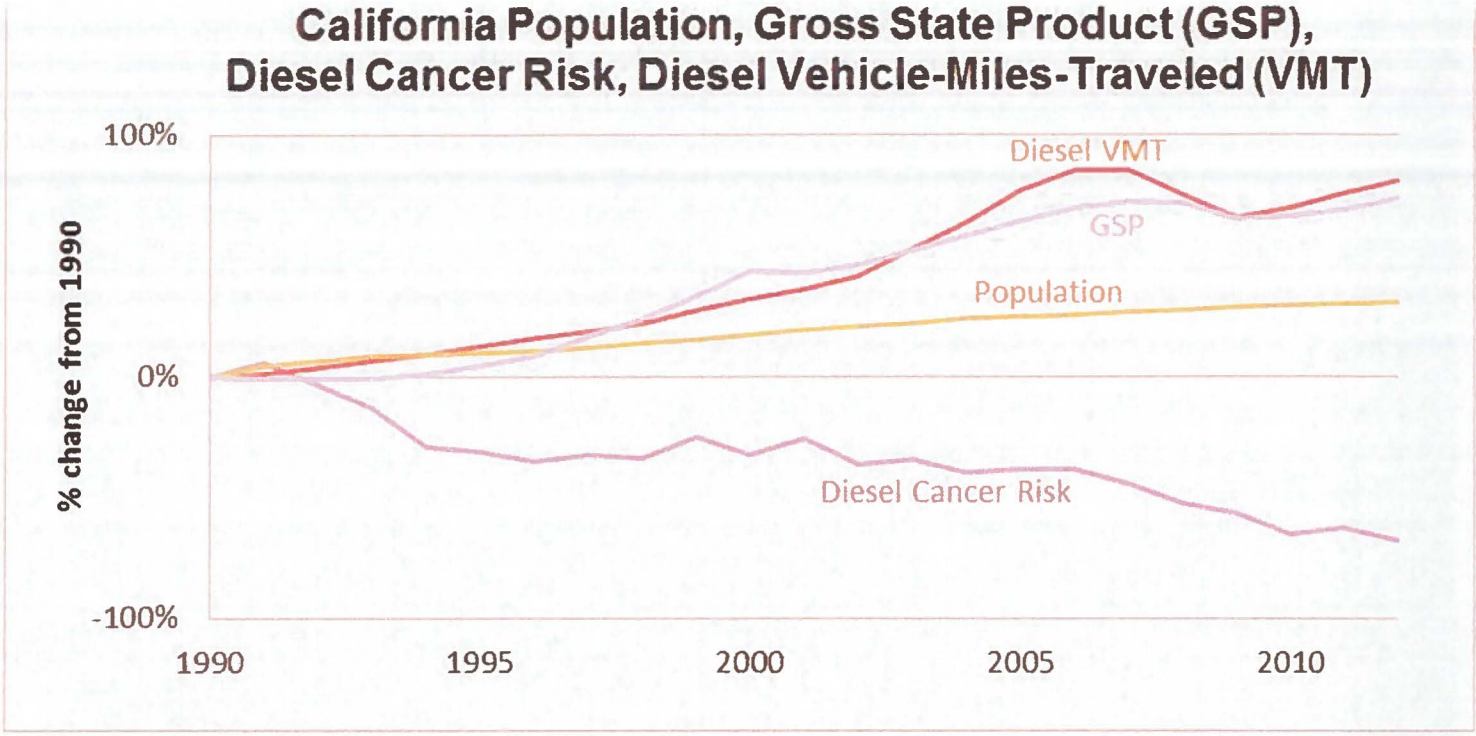
The figure below shows the trend in ambient DPM. CARB regulations** of diesel engines and fuels have had a dramatic effect on DPM concentrations. Since 1990, DPM levels have decreased by 68%. The figure also shows which regulations have had the greatest impact on DPM.

DPM levels are expected to continue declining as additional controls are adopted, and the number of new technology diesel vehicles increases.



**Abbreviations of CARB regulations used in table: HDV Engine STD = Heavy-duty diesel truck engine standard; HDV - Off road = Heavy-duty off-road diesel engines; Port rule = Port (drayage) trucks; PSIP = Periodic self-inspection program; Transit bus = Urban transit buses; ULSD = Clean diesel fuel

The figure below shows that despite the increased number of vehicle miles traveled by diesel vehicles (VMT, red line), and despite increases in statewide population (green line) and gross state product (GSP, a measure of growth in the state's economy, light blue line), CARB's regulatory programs still led to a decline in statewide cancer risk (dark blue line).



Additional Information:

- CARB's diesel programs
- CARB's diesel mobile vehicles and equipment activities
- CARB's freight transport, ports and rail programs
- California's diesel fuel program
- Other diesel-related programs
- Selected references on diesel-related health effects

Environmental Effects of Diesel Exhaust

In addition to its health effects, diesel exhaust significantly contributes to haze that reduces visibility by obscuring outdoor views and decreasing the distance over which one can distinguish features across the landscape. Researchers have reported that in the San Joaquin Valley and in southern California, diesel engines contribute to a reduction in visibility. This decrease in visibility is caused by scattering and absorption of sunlight by particles and gases present in diesel emissions.

DPM also plays an important role in climate change. A large proportion of DPM is composed of BC. Recent studies cited in the Intergovernmental Panel on Climate Change report estimate that emissions of BC are the second largest contributor to global warming, after carbon dioxide emissions. Warming occurs when BC particles absorb sunlight, convert it into infrared (heat) radiation, and emit that radiation to the surrounding air. A recent California-specific study showed that the darkening of snow and ice by BC deposition is a major factor in the rapid disappearance of the Sierra Nevada snow packs. Melting of the snow pack of the Sierra Nevada earlier in the spring is one of the contributing factors to the serious decline in California's water supply. As additional DPM controls are adopted, and the number of new technology diesel vehicles increases, BC emissions will continue to decline.

Conclusions

Although progress has been made over the past decade in reducing exposure to diesel exhaust, diesel exhaust still poses substantial risks to public health and the environment. Efforts to reduce DPM exposure through use of cleaner-burning diesel fuel, retrofitting engines with particle-trapping filters, introduction of new, advanced technologies that reduce particle emissions, and use of alternative fuels are approaches that are being explored and implemented. CARB anticipates that newly adopted diesel exhaust control measures will reduce population exposure even further, and that as the sustainable freight program expands, population exposure to diesel exhaust pollution will decrease even further. It is estimated that emissions of DPM in 2035 will be less than half those in 2010, further reducing statewide cancer risk and non-cancer health effects.

RELATED RESOURCES

Community Air Protection Program Consultation Group July 2018 Community Recommendations Presentation

Community Air Protection Program Consultation Group July 2018 Notice

Community Air Protection Program Consultation Group July 2018 Agenda

(800) 242-4450 | helpline@arb.ca.gov
1001 I Street, Sacramento, CA 95814
P.O. Box 2815, Sacramento, CA 95812

Copyright © 2018 State of California

PUBLIC SCOPING MEETING
Proposed Nakase Property Area Plan
Wednesday, July 25, 2018

NAME: Richard Sullivan

ADDRESS: 21081 BARCLAY LANE CITY: LAKE FOREST ZIP: 92630

EMAIL ADDRESS: RSullivan3@Cox.net

REPRESENTING: MY HOME & FAMILY

Do you wish to be added to the project mailing list? ☒ YES ☐ NO

Please drop comments in the Comment Box or mail them to:

City of Lake Forest Community Development Department
Marie Luna, Senior Planner
25550 Commercentre Drive, Suite 100
Lake Forest, CA, 92630
Phone: (949) 461-3400
E-mail: mluna@lakeforestca.gov

The purpose of this comment card is to solicit input regarding the scope and content of the Environmental Impact Report (EIR). Please submit comments for the record that pertain to the ***environmental issues*** to be addressed in the EIR (please print).

WE CURRENTLY LIVE ON THE CORNER OF BARCLAY & NORMANDALE. ALL OF THE LATEST ADDITIONAL HOMES IN THE IMMEDIATE AREA HAS CAUSED MAJOR PARKING ISSUES ON NORMANDALE & OSTERMAN CAUSING ACCIDENTS DAILY. ALSO MOST OF THE RESIDENTS HAVE MULTIPLE CARS FOR LIMITED SPACE. THESE PEOPLE DUMP FAST FOOD PACKAGING ALL ALONG NORMANDALE AND HAS NOW SPILLED OVER TO BARCLAY PARKING INFRONT OF MY HOME AND IN FRONT OF THE FIRE HYDRANT ACROSS THE STREET. THE PARKING HAS AFFECTED THE RESALE VALUE OF OUR HOME. ADDING THE TOLL BROS 800 ADDITIONAL HOMES WILL CREATE GREAT HAVOC TO THE NEIGHBORHOOD, THE AIR QUALITY & THE SAFETY TO ALL CURRENT RESIDENTS. I SUGGEST YOU FIX THE CURRENT ISSUES MENTIONED ABOVE BEFORE YOU DUMP ON ANOTHER TSUNAMI OF TROUBLE

RECEIVED

AUG 06 2018

CITY OF LAKE FOREST
COMMUNITY DEVELOPMENT

PUBLIC SCOPING MEETING
Proposed Nakase Property Area Plan
Wednesday, July 25, 2018

NAME: Judy Esposito
ADDRESS: 22675 Jubilo Pl CITY: L F ZIP: 92630
EMAIL ADDRESS: judyeteacher1@Hotmail.com
REPRESENTING: citizen of Lake Forest
Do you wish to be added to the project mailing list? ☒ YES ☐ NO

Please drop comments in the Comment Box or mail them to:

City of Lake Forest Community Development Department
Marie Luna, Senior Planner
25550 Commercentre Drive, Suite 100
Lake Forest, CA, 92630
Phone: (949) 461-3400
E-mail: mluna@lakeforestca.gov

The purpose of this comment card is to solicit input regarding the scope and content of the Environmental Impact Report (EIR). Please submit comments for the record that pertain to the *environmental issues* to be addressed in the EIR (please print).

Environmental Issues - Number of people = increase in people = increase in polution - house, cars etc traffic increase = emissions, schools, businesses everything "stepped up" increases pollution Noise pollution; increase traffic = increased car pollation, gas stations = polutants in the ground More roads paved over; water drainage not good quality; sewers over loaded; trash disposal = mounds of trash effects animals = they to learn to scavenge instead of their normal way of getting food = diseases from trash spreading of diseases.
Ideas - Make areas for people to rent + make gardens - OR turn it into a FOREST more pools = more humidity

3145957)

What a loser... must've been seriously trashed to have hit that many cars. Probably alcohol and other drugs. Should be put away for awhile.

ALESHIRE & WYNDER LLP
ATTORNEYS AT LAW

ORANGE COUNTY | LOS ANGELES | RIVERSIDE | CENTRAL VALLEY

ataylor@awattorneys.com
(949) 250-5427

18881 Von Karman Avenue,
Suite 1700
Irvine, CA 92612
P (949) 223-1170
F (949) 223-1180

AWATTORNEYS.COM

August 8, 2018

mluna@lakeforestca.gov

Ms. Marie Luna
Senior Planner
City of Lake Forest
25550 Commercentre Drive
Suite 100
Lake Forest, CA 92630

Re: Comments By Autumnwood HOA Re Proposed Nakase Property Area Plan

Dear Ms. Luna:

I represent Autumnwood Homeowners Association ("Autumnwood HOA") and I am providing comments for Autumnwood HOA in response to the City's notice inviting written comments concerning the scope of the Environmental Impact Report ("EIR") for the Proposed Nakase Property Area Plan. The proposed project would entitle development of up to 675 two and three story, single-family residential units on approximately 61.4 acres of the 122 acre proposed project site and the proposed project also includes an elementary school that would accommodate approximately 800 to 1,000 students from kindergarten through sixth grade (the "Project"). The current land use for the Project site is the Nakase Brothers Wholesale Nursery, an agricultural wholesale plant nursery.

The City has determined from the Initial Study completed for the proposed Project that the proposed Project could result in potential impacts related to aesthetics, agriculture and forestry, air quality, biological resources, cultural resources, geology and soils, greenhouse gas emissions, hazards and hazardous materials, hydrology and water quality, land use/planning, noise, population/housing, public services, recreation, transportation/traffic, tribal cultural resources, and utilities and service systems. The City has indicated that these potential impacts will be analyzed in the EIR. The City has further indicated that mitigation measures will be developed and included in the EIR, but only "if necessary" to address the proposed Project's potentially significant adverse effects.

The EIR for the proposed Project must fully analyze all potential impacts to Autumnwood HOA including, without limitation, all cumulative impacts, impacts involving potential flooding along Serrano Creek (including, without limitation, erosion and slope stability), increased traffic, noise, impacts on limited public services including public safety services, besides the potential impacts provided above that have been identified by the City. For purposes of this analysis, "[t]he area involved shall be the area in which significant effects would

occur either directly or indirectly as a result of the project. The "environment" includes both natural and man-made conditions." (14 Cal. Code Regs. 15360)

For each of the above matters, "[t]he EIR shall discuss any inconsistencies between the proposed project and applicable general plans and regional plans." (14 Cal. Code Regs. 15125(d).) For example, all local and regional flood control and erosion control plans must be analyzed as part of the EIR. Increased traffic impacts must also be fully analyzed, among the other areas of concern provided above.

For each environmental impact that is found to be significant, the EIR must include comprehensive mitigation measures that protect communities like Autumnwood HOA from all adverse environmental impacts. The development of comprehensive mitigation measures that fully protect Autumnwood HOA is essential based on the concerns raised in this letter.

I also request continued notification of all opportunities for comment and public input during the EIR process for the proposed Project. I plan to provide detailed comments to the Draft EIR once it is completed.

Should you have any questions, or if you need any additional information about Autumnwood HOA's concerns about the proposed Project, please let me know.

Sincerely,

ALESHIRE & WYNDER, LLP

Anthony R. Taylor

STATE OF CALIFORNIA Edmund G. Brown Jr., Governor
NATIVE AMERICAN HERITAGE COMMISSION
Cultural and Environmental Department
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691
Phone (916) 373-3710

August 8, 2018

Marie Luna
City of Lake Forest
25550 Commercentre Drive
Lake Forest, CA 92630

Also sent via e-mail: mluna@lakeforestca.gov

RE: SCH# 2018071035, Nakase Property Area Plan Project, City of Lake Forest; Orange County, California

Dear Ms. Luna:

The Native American Heritage Commission has received the Notice of Preparation (NOP) for Draft Environmental Impact Report for the project referenced above. The California Environmental Quality Act (CEQA) (Pub. Resources Code § 21000 et seq.), specifically Public Resources Code section 21084.1, states that a project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment. (Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, § 15064.5 (b) (CEQA Guidelines Section 15064.5 (b)). If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, an environmental impact report (EIR) shall be prepared. (Pub. Resources Code § 21080 (d); Cal. Code Regs., tit. 14, § 15064 subd. (a)(1) (CEQA Guidelines § 15064 (a)(1)). In order to determine whether a project will cause a substantial adverse change in the significance of a historical resource, a lead agency will need to determine whether there are historical resources with the area of project effect (APE).

CEQA was amended significantly in 2014. Assembly Bill 52 (Gatto, Chapter 532, Statutes of 2014) (AB 52) amended CEQA to create a **separate category of cultural resources**, "tribal cultural resources" (Pub. Resources Code § 21074) and provides that a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment (Pub. Resources Code § 21084.2). Please reference California Natural Resources Agency (2016) "Final Text for tribal cultural resources update to Appendix G: Environmental Checklist Form," http://resources.ca.gov/ceqa/docs/ab52/Clean-final-AB-52-App-G-text-Submitted.pdf. Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource. (Pub. Resources Code § 21084.3 (a)). **AB 52 applies to any project for which a notice of preparation or a notice of negative declaration or mitigated negative declaration is filed on or after July 1, 2015.** If your project involves the adoption of or amendment to a general plan or a specific plan, or the designation or proposed designation of open space, on or after March 1, 2005, it may also be subject to Senate Bill 18 (Burton, Chapter 905, Statutes of 2004) (SB 18). **Both SB 18 and AB 52 have tribal consultation requirements**. If your project is also subject to the federal National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA), the tribal consultation requirements of Section 106 of the National Historic Preservation Act of 1966 (154 U.S.C. 300101, 36 C.F.R. § 800 et seq.) may also apply.

The NAHC recommends **lead agencies consult with all California Native American tribes** that are traditionally and culturally affiliated with the geographic area of your proposed project as early as possible in order to avoid inadvertent discoveries of Native American human remains and best protect tribal cultural resources. Below is a brief summary of portions of AB 52 and SB 18 as well as the NAHC's recommendations for conducting cultural resources assessments. **Consult your legal counsel about compliance with AB 52 and SB 18 as well as compliance with any other applicable laws**.

AB 52

AB 52 has added to CEQA the additional requirements listed below, along with many other requirements:

1. Fourteen Day Period to Provide Notice of Completion of an Application/Decision to Undertake a Project: Within fourteen (14) days of determining that an application for a project is complete or of a decision by a public agency to undertake a project, a **lead agency** shall provide formal notification to a designated contact of, or tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, to be accomplished by at least one written notice that includes:
   - **a.** A brief description of the project.
   - **b.** The lead agency contact information.
   - **c.** Notification that the California Native American tribe has 30 days to request consultation. (Pub. Resources Code § 21080.3.1 (d)).
   - **d.** A "California Native American tribe" is defined as a Native American tribe located in California that is on the contact list maintained by the NAHC for the purposes of Chapter 905 of Statutes of 2004 (SB 18). (Pub. Resources Code § 21073).

2. Begin Consultation Within 30 Days of Receiving a Tribe's Request for Consultation and Before Releasing a Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report: A **lead agency** shall begin the consultation process within 30 days of receiving a request for consultation from a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project. (Pub. Resources Code § 21080.3.1, subds. (d) and (e)) and prior to the release of a negative declaration, mitigated negative declaration or environmental impact report. (Pub. Resources Code § 21080.3.1(b)).
   - **a.** For purposes of AB 52, "consultation shall have the same meaning as provided in Gov. Code § 65352.4 (SB 18). (Pub. Resources Code § 21080.3.1 (b)).

3. Mandatory Topics of Consultation If Requested by a Tribe: The following topics of consultation, if a tribe requests to discuss them, are mandatory topics of consultation:
   - **a.** Alternatives to the project**.**
   - **b.** Recommended mitigation measures**.**
   - **c.** Significant effects**.** (Pub. Resources Code § 21080.3.2 (a)).

4. Discretionary Topics of Consultation: The following topics are discretionary topics of consultation:
   - **a.** Type of environmental review necessary.
   - **b.** Significance of the tribal cultural resources.
   - **c.** Significance of the project's impacts on tribal cultural resources.
   - **d.** If necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend to the lead agency. (Pub. Resources Code § 21080.3.2 (a)).

5. Confidentiality of Information Submitted by a Tribe During the Environmental Review Process: With some exceptions, any information, including but not limited to, the location, description, and use of tribal cultural resources submitted by a California Native American tribe during the environmental review process shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public, consistent with Government Code sections 6254 (r) and 6254.10. Any information submitted by a California Native American tribe during the consultation or environmental review process shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public. (Pub. Resources Code § 21082.3 (c)(1)).

6. Discussion of Impacts to Tribal Cultural Resources in the Environmental Document: If a project may have a significant impact on a tribal cultural resource, the lead agency's environmental document shall discuss both of the following:
   - **a.** Whether the proposed project has a significant impact on an identified tribal cultural resource.
   - **b.** Whether feasible alternatives or mitigation measures, including those measures that may be agreed to pursuant to Public Resources Code section 21082.3, subdivision (a), avoid or substantially lessen the impact on the identified tribal cultural resource. (Pub. Resources Code § 21082.3 (b)).

7. Conclusion of Consultation: Consultation with a tribe shall be considered concluded when either of the following occurs:
    a. The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or
    b. A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached. (Pub. Resources Code § 21080.3.2 (b)).

8. Recommending Mitigation Measures Agreed Upon in Consultation in the Environmental Document: Any mitigation measures agreed upon in the consultation conducted pursuant to Public Resources Code section 21080.3.2 shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program, if determined to avoid or lessen the impact pursuant to Public Resources Code section 21082.3, subdivision (b), paragraph 2, and shall be fully enforceable. (Pub. Resources Code § 21082.3 (a)).

9. Required Consideration of Feasible Mitigation: If mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of consultation, or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, the lead agency shall consider feasible mitigation pursuant to Public Resources Code section 21084.3 (b). (Pub. Resources Code § 21082.3 (e)).

10. Examples of Mitigation Measures That, If Feasible, May Be Considered to Avoid or Minimize Significant Adverse Impacts to Tribal Cultural Resources:
    a. Avoidance and preservation of the resources in place, including, but not limited to:
        i. Planning and construction to avoid the resources and protect the cultural and natural context.
        ii. Planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.
    b. Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:
        i. Protecting the cultural character and integrity of the resource.
        ii. Protecting the traditional use of the resource.
        iii. Protecting the confidentiality of the resource.
    c. Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.
    d. Protecting the resource. (Pub. Resource Code § 21084.3 (b)).
    e. Please note that a federally recognized California Native American tribe or a nonfederally recognized California Native American tribe that is on the contact list maintained by the NAHC to protect a California prehistoric, archaeological, cultural, spiritual, or ceremonial place may acquire and hold conservation easements if the conservation easement is voluntarily conveyed. (Civ. Code § 815.3 (c)).
    f. Please note that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated. (Pub. Resources Code § 5097.991).

11. Prerequisites for Certifying an Environmental Impact Report or Adopting a Mitigated Negative Declaration or Negative Declaration with a Significant Impact on an Identified Tribal Cultural Resource: An environmental impact report may not be certified, nor may a mitigated negative declaration or a negative declaration be adopted unless one of the following occurs:
    a. The consultation process between the tribes and the lead agency has occurred as provided in Public Resources Code sections 21080.3.1 and 21080.3.2 and concluded pursuant to Public Resources Code section 21080.3.2.
    b. The tribe that requested consultation failed to provide comments to the lead agency or otherwise failed to engage in the consultation process.
    c. The lead agency provided notice of the project to the tribe in compliance with Public Resources Code section 21080.3.1 (d) and the tribe failed to request consultation within 30 days. (Pub. Resources Code § 21082.3 (d)).

    This process should be documented in the Cultural Resources section of your environmental document.

The NAHC's PowerPoint presentation titled, "Tribal Consultation Under AB 52: Requirements and Best Practices" may be found online at: http://nahc.ca.gov/wp-content/uploads/2015/10/AB52TribalConsultation_CalEPAPDF.pdf

SB 18

SB 18 applies to local governments and requires **local governments** to contact, provide notice to, refer plans to, and consult with tribes prior to the adoption or amendment of a general plan or a specific plan, or the designation of open space. (Gov. Code § 65352.3). Local governments should consult the Governor's Office of Planning and Research's "Tribal Consultation Guidelines," which can be found online at: https://www.opr.ca.gov/docs/09_14_05_Updated_Guidelines_922.pdf

Some of SB 18's provisions include:

1. Tribal Consultation: If a local government considers a proposal to adopt or amend a general plan or a specific plan, or to designate open space it is required to contact the appropriate tribes identified by the NAHC by requesting a "Tribal Consultation List." If a tribe, once contacted, requests consultation the local government must consult with the tribe on the plan proposal. **A tribe has 90 days from the date of receipt of notification to request consultation unless a shorter timeframe has been agreed to by the tribe.** (Gov. Code § 65352.3 (a)(2)).
2. No Statutory Time Limit on SB 18 Tribal Consultation. There is no statutory time limit on SB 18 tribal consultation.
3. Confidentiality: Consistent with the guidelines developed and adopted by the Office of Planning and Research pursuant to Gov. Code section 65040.2, the city or county shall protect the confidentiality of the information concerning the specific identity, location, character, and use of places, features and objects described in Public Resources Code sections 5097.9 and 5097.993 that are within the city's or county's jurisdiction. (Gov. Code § 65352.3 (b)).
4. Conclusion of SB 18 Tribal Consultation: Consultation should be concluded at the point in which:
    a. The parties to the consultation come to a mutual agreement concerning the appropriate measures for preservation or mitigation; or
    b. Either the local government or the tribe, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached concerning the appropriate measures of preservation or mitigation. (Tribal Consultation Guidelines, Governor's Office of Planning and Research (2005) at p. 18).

Agencies should be aware that neither AB 52 nor SB 18 precludes agencies from initiating tribal consultation with tribes that are traditionally and culturally affiliated with their jurisdictions before the timeframes provided in AB 52 and SB 18. For that reason, we urge you to continue to request Native American Tribal Contact Lists and "Sacred Lands File" searches from the NAHC. The request forms can be found online at: http://nahc.ca.gov/resources/forms/

NAHC Recommendations for Cultural Resources Assessments

To adequately assess the existence and significance of tribal cultural resources and plan for avoidance, preservation in place, or barring both, mitigation of project-related impacts to tribal cultural resources, the NAHC recommends the following actions:

1. Contact the appropriate regional California Historical Research Information System (CHRIS) Center (http://ohp.parks.ca.gov/?page_id=1068) for an archaeological records search. The records search will determine:
    a. If part or all of the APE has been previously surveyed for cultural resources.
    b. If any known cultural resources have been already been recorded on or adjacent to the APE.
    c. If the probability is low, moderate, or high that cultural resources are located in the APE.
    d. If a survey is required to determine whether previously unrecorded cultural resources are present.

2. If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
    a. The final report containing site forms, site significance, and mitigation measures should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum and not be made available for public disclosure.

b. The final written report should be submitted within 3 months after work has been completed to the appropriate regional CHRIS center.

3. Contact the NAHC for:
- **a.** A Sacred Lands File search. Remember that tribes do not always record their sacred sites in the Sacred Lands File, nor are they required to do so. A Sacred Lands File search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with the geographic area of the project's APE.
- **b.** A Native American Tribal Consultation List of appropriate tribes for consultation concerning the project site and to assist in planning for avoidance, preservation in place, or, failing both, mitigation measures.

4. Remember that the lack of surface evidence of archaeological resources (including tribal cultural resources) does not preclude their subsurface existence.
- **a.** Lead agencies should include in their mitigation and monitoring reporting program plan provisions for the identification and evaluation of inadvertently discovered archaeological resources per Cal. Code Regs., tit. 14, section 15064.5(f) (CEQA Guidelines section 15064.5(f)). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American with knowledge of cultural resources should monitor all ground-disturbing activities.
- **b.** Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the disposition of recovered cultural items that are not burial associated in consultation with culturally affiliated Native Americans.
- **c.** Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the treatment and disposition of inadvertently discovered Native American human remains. Health and Safety Code section 7050.5, Public Resources Code section 5097.98, and Cal. Code Regs., tit. 14, section 15064.5, subdivisions (d) and (e) (CEQA Guidelines section 15064.5, subds. (d) and (e)) address the processes to be followed in the event of an inadvertent discovery of any Native American human remains and associated grave goods in a location other than a dedicated cemetery.

Please contact me if you need any additional information at gayle.totton@nahc.ca.gov.

Sincerely,

Gayle Totton

Gayle Totton, M.A., Ph.D.
Associate Governmental Program Analyst
(916) 373-3714

cc: State Clearinghouse

PUBLIC SCOPING MEETING
Proposed Nakase Property Area Plan
Wednesday, July 25, 2018

Name:	Robert (Tim) and Melissa Leech
Address:	24406 Calle Torcido Lake Forest, CA 92630
Email:	leechtim@icloud.com
Cell:	949-514-0367
*Please add me to the email distribution list.	

We have lived in our current home for approximately 16.5 years and love the community. There is little we as citizens can do to stop progress and/or population growth in the area. With that said, we should also not have to shoulder the health effects from increased traffic, products of combustion, particulates and noise without reasonable accommodation and/or attempts to mitigate the exposure. This is a long standing issue that has existed since Bake was open between Trabuco and Portola and continues to worsen with added growth in the area.

Vocationally, I am a Certified Safety Professional and specialize in industrial safety. While our community concerns are of a public nature, the principles of control are similar and potential health effects expressed are of equal if not greater concern than many industrial scenarios.

Health Concerns

Noise: Noise levels are well above acceptable levels especially at peak traffic hours. Back yard sound level readings exceed 90 dbA during most of the daytime hours. 24 hour average has not been sampled. Safe community levels are generally established at 70 dbA average for a 24 hour threshold.

Airborne Particulates and Products of Combustion: While I have not taken total dust samples or tested for other products of combustion, the level of particulate and dust that settle from traffic on our windows, patio and porch would indicate that there is reasonable evidence to support conducting sampling and ensure that there are no unacceptable health exposures.

Industrial Traffic: Industrial traffic is permitted 24 hours and causes frequent sleep interruption due to heavy braking and road noise despite the fact that most homes have dual pane windows, foliage, etc. that help to reduce noise levels. Establishing a curfew and/or re-routing industrial traffic between the hours of 10:00 PM and 6:00 AM, as a suggestion, would help to reduce unwanted late night/early morning homeowner noise exposures.

Property Values: Property values and marketability are negatively impacted as compared to similar units within the community. Furthering this impacts resident's ability to sale, refinance, etc. While this is secondary to the health concerns expressed, it is still a consideration and negative impact is felt.

SUGGESTED MITIGATION

Consider a two pronged approach.

1. Contract an independent firm with proper qualifications (Certified Industrial Hygienist) to conduct and confirm that average noise levels, total dust and product of combustion are at safe levels in

back yards adjacent to Bake Parkway. Compare those levels to the original environmental study conducted prior to opening Bake up between Trabuco and Portola Blvd. I have attempted to acquire original environmental studies in the past yet have failed.

2. Mitigate noise, dust and products of combustion levels to safe public levels using a combination of engineering and administrative controls.
    a. Engineering controls may include installation of a higher wall with sound absorbing qualities. There are "green" alternatives, landscaping and other methods available as well.
    b. Administrative controls may include re-routing industrial traffic as outlined previously in this report.

I suspect that the issue has been ignored in the past due to the small number of residents that own homes lining Bake Parkway and also believe that the original environmental studies were inaccurate based on the actual impact we experience daily. It is not our intention to make unreasonable or unattainable requests. I believe there is an acceptable and mutually beneficial resolve and appreciate efforts to fairly address the issues represented.

Signed: Aug. 9, 2018

Robert (Tim)othy Leech, CSP, ARM
24406 Calle Torcido
Lake Forest, CA 92630

DEPARTMENT OF TRANSPORTATION
DISTRICT 12
1750 EAST FOURTH STREET, SUITE 100
SANTA ANA, CA 92705
PHONE (657) 328-6267
FAX (657) 328-6510
TTY 711
www.dot.ca.gov

Making Conservation a California Way of Life.

August 13, 2018

Marie Luna
City of Lake Forest
25550 Commercentre Drive
Lake Forest, CA 92630

File: IGR/CEQA
SCH#: 2018071035
12-ORA-2018-00918
SR 241, PM 22.661
I-5, PM 19.217

Dear Ms. Luna,

Thank you for including the California Department of Transportation (Caltrans) in the review of the Initial Study Notice of Preparation (NOP) for the Nakase Property Area Plan project in the City of Lake Forest. The mission of Caltrans is to provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability.

The proposed project consists of up to 675 two- and three-story single-family residential units, 101 affordable apartment units for senior citizens in a two to three story building, an elementary school site accommodating up to 1,000 students, parks and open space, an internal circulation system and a multipurpose water quality basin. State Route (SR) 241 is located approximately 0.07 miles northeast of the project site and Interstate 5 (I-5) is located approximately 3.8 miles southwest of the project site. Caltrans is a commenting agency on this project and upon review, we have the following comments:

Transportation Planning

Upon review, we recommend a discussion of the potential impacts to transit, pedestrian, and bicycle facilities in the next phase of the project. There are several existing transit, pedestrian, and bicycle facilities located near the project site. To ensure regional connectivity, we recommend that any proposed multi-modal opportunities are coordinated with existing facilities.

The project contains multiple components throughout the project site. Therefore, the city should consider incorporating appropriate elements to address safety. As such, in the next phase of the project, please include a discussion of proposed ADA facilities and opportunities. We also recommend that the city considers developing a Safe Routes to School program for the proposed elementary school and other schools (i.e., middle schools and high schools) within the project vicinity.

The project also contains approximately 101 affordable apartment units for senior citizens. We recommend a discussion of the City of Lake Forest's Senior Mobility Program and its potential in providing transit opportunities for the project.

Traffic Impact Study

The Environmental Impact Report (EIR) should include a Traffic Impact Study (TIS) that analyzes potential short-term and long-term impacts to the State Highway System (SHS) including on-ramps, off-ramps, and freeway mainline specifically for SR 241 and I-5, based on criteria and methodologies established in the Caltrans Traffic Impact Study Guide: http://www.dot.ca.gov/hq/tpp/offices/ocp/igr_ceqa_files/tisguide.pdf

The specific intersections requiring study would likely include the intersections of SR 241 at Lake Forest Drive, Portola Parkway, and the I-5 intersections at Lake Forest Drive and Bake Parkway. Additional intersections may be required for study depending on the outcome of the TIS trip distribution analysis.

Please include the following:

- Existing and Build-out Annual Average Daily traffic volumes.
- Existing and Build-out AM and PM Peak Hour traffic volumes.
- A discussion of trip generation and assignments, justification of modal splits, etc.
- A discussion of any Transportation Demand Management measures including potential funding to support longevity of these measures.
- Traffic impact analysis methodology used and any specific assumptions used that are unique to the City of Lake Forest.
- Ninety-five percent queue information for all off-ramps on the SHS under the Build-out condition.
- Potentially significant adverse impacts and its associated mitigation measures. Any impacts to the SHS should not be deemed "Significant and Unavoidable" without consultation with Caltrans to mitigate these impacts in the early development stages of the environmental document.

Climate Change Reductions

AB 32, also known as the California Global Warming Solutions Act of 2006 mandates Greenhouse Gas (GHG) emissions reduction in California. Senate Bill (SB) 375, also known as the Sustainable Communities and Climate Protection Act of 2008, capitalizes on the need for reducing GHG by directing the California Air Resources Board to set regional targets for reducing GHG emissions. SB 375 sets emission reduction standards for the years 2020 and 2035. To be consistent with the goals brought forth by AB 32, SB 375 encourages plans/projects that achieves GHG reductions as those highlighted in the Southern California Association of Governments' (SCAG) 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS). It is important to address these environmental concerns and it is our recommendation for the city of Lake Forest to incorporate these recommended practices and policies within the Nakase Property Area Plan.

National Pollutant Discharge Elimination System (NPDES)

The Hydrology and Water Quality section in the Notice of Preparation for the project states that potentially significant impacts will result from the project. Please ensure that these impacts are

studied and that the project should also include mitigation measures that result in less than significant for discharges that enter Caltrans right of way.

Encroachment Permit Process

Hydrology

In coordination with Orange County Flood Control District (OCFCD), the city of Lake Forest will need concurring approval of this proposal prior to Caltrans final approval. Final storm drain plans, hydrology calculations and maps (existing and proposed conditions) need to be reviewed and approved during the Encroachment Permit process. Hydraulics calculations and maps (existing and proposed conditions) need to be reviewed and approved during the Encroachment Permit process to clarify that there will be no increase in water surface elevation in existing systems.

Encroachment Permit

Please be advised that any project work proposed in the vicinity of the State Highway System (SHS) will require an Encroachment Permit and all environmental concerns must be adequately addressed. If the environmental documentation for the project does not meet Caltrans' requirements, additional documentation would be required before the approval of the Encroachment Permit. For specific details for Encroachment Permits procedure, please refer to the Caltrans' Encroachment Permits Manual. The latest edition of the Manual is available on the web site: http://www.dot.ca.gov/hq/traffops/developserv/permits/

Please continue to keep us informed of this project and any future developments which could potentially impact the SHS. If you have any questions, please do not hesitate to contact Joseph Jamoralin, at (657) 328-6276 or Joseph.Jamoralin@dot.ca.gov.

Sincerely,

SCOTT SHELLEY
Branch Chief, Regional-IGR-Transit Planning
District 12

OC PublicWorks
Integrity, Accountability, Service, Trust
Shane L. Silsby, Director

August 13, 2018 NCL-18-045

Marie Luna
Senior Planner
City of Lake Forest
25550 Commercentre Drive, Suite 100
Lake Forest, CA 92630

Subject: Notice of Preparation of Environmental Impact Report – Nakase Property Area Plan

Dear Ms. Luna:

Thank you for the opportunity to comment on the Environmental Impact Report (EIR) for the Nakase Property Area Plan. The County of Orange offers the following comments for your consideration.

OC Community Resources/Libraries

1. The comment below refers to the Notice of Preparation for the Proposed Nakase Area Plan: Initial Study Nakase Nursery/Toll Brothers, specifically page 4-40. Please see excerpt below:
    a. ***a)(iv) Potentially Significant Impact.*** *The Orange County Public Library (OCPL) has a network of 33 libraries throughout Orange County, and two OCPL branches are located in Lake Forest. The Foothill Ranch Library is located at 27002 Cabriole Way, approximately 1.0 mi northeast of the Project Site. The El Toro library is located at 24672 Raymond Way, approximately 4.5 mi southwest of the Project Site. Operation of the Project may result in increased demand for other public facilities, including libraries.* ***This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to increased demand for the other public facilities, including libraries***

    Further information will be necessary to determine specific library needs up to and including the need for upgrades of existing nearby branches and/or the need of an additional branch location. New land development proposals increase library user populations. The increase of approximately 776 residences will have potentially significant impact on library resources. The County has service standards including per square foot of facilities and volumes of books per capita, funding would be required to maintain service standards for the area. The County Library requests the review and need for Developmental Fees be a consideration for approval of the new Nakase Area Plan development in Lake Forest.

OC Infrastructure Programs /Flood Programs/Hydrology

1. The Nakase Nursery project development area covers approximately 122 acres of commercial/light industrial land and is proposed to be developed into a residential, park, school, and open space uses, including habitat restoration area. It appears that adjacent to the proposed project there is a portion of Serrano Creek (F19) where the Orange County Flood Control District (OCFCD) has easement rights. The DIER should clearly identify all drainage facilities and unimproved, natural watercourse that may be impacted by the project.

2. The increase in runoff caused by development has the potential to cause adverse impacts to existing drainage facilities and unimproved watercourses within and downstream of the Nakase property development area. Impacts to these facilities should be analyzed and appropriate mitigation measures proposed to alleviate any adverse impacts. The DEIR should analyze and discuss impacts, if any, of the proposed development on natural, unimproved channel segments within and downstream of the project area and propose measures that will mitigate increased peak flows, erosion and scour, that may result from the proposed development.

3. The City of Lake Forest must confirm that all hydrological and hydraulic studies uphold to the current guidelines and criteria as specified in the Orange County Hydrology Manual (OCHM), Addendum No. 1 to the OCHM, and the Orange County Flood Control Design Manual.

4. Since the City of Lake Forest (City) is responsible for land use planning and development within its municipal limits, the City should review and approve all local hydrology and hydraulic analyses. The project proponent should ensure that the proposed development is adequately protected from erosion and from flooding in a 100-year storm event.

5. The City, as floodplain administrator, should ensure that floodplains are properly identified and structures within the flood hazard areas will be located outside the 100-year floodplain in conformance with Federal Emergency Management Agency (FEMA) regulations.

6. Any work related to the proposed project within OCFCD right-of-way will require an encroachment permit from the County Property Permits Section. In addition, all work within OCFCD right-of-way should be performed in a manner that will not adversely impact the hydraulic flow conditions, access and/or maintenance requirements of OCFCD facilities. Information regarding permit application is available on our website – http://www.ocpublicworks.com/ds.

If you have any questions regarding these comments, please contact Cindy Salazar at (714) 667-8870 in OC Development Services.

Sincerely,

Richard Vuong, Manager, Planning Division
OC Public Works Service Area/OC Development Services
300 North Flower Street
Santa Ana, California 92702-4048
Richard.Vuong@ocpw.ocgov.com

cc: Helen Fried, OC Community Resources/Libraries
Penny Lew, OC Flood Programs/Hydrology & Floodplain Management

SOUTHERN CALIFORNIA EDISON
An *EDISON INTERNATIONAL* Company

Sent via electronic mail to mluna@lakeforestca.gov

August 14, 2018

Marie Luna, Senior Planner
City of Lake Forest Community Development Department
25550 Commercentre Drive, Suite 100
Lake Forest CA 92630

RE: Notice of Preparation for the Proposed Nakase Property Area Plan Environmental Impact Report

Dear Ms. Luna:

Southern California Edison (SCE) is pleased to submit the following comments on the above referenced project which would facilitate the development of the 122 acre Nakase property as a master planned community including the development of residential uses, an elementary school site and over 28 acres of parks, open space ad habitat restoration areas.

SCE's Electrical Facilities
SCE provides electric service to the City of Lake Forest and maintains electrical transmission and distribution facilities, as well as substations and supporting appurtenances within the City. Page 2-28 of the Project's Notice of Preparation states that "The Project Site receives electricity service from Southern California Edison (SCE). The Project proposes to underground the existing overhead power lines that are currently located on the east side of Bake Parkway. The Project includes gas, cable, and telephone utility lines."

SCE recommends analysis of the construction impacts of the utility work within the DEIR. The relocation and proposed undergrounding of SCE's utility lines, including any temporary structures needed for these relocations, may result in significant environmental impacts. Therefore, the DEIR should identify and discuss any potential impacts that would result from the relocation and undergrounding of the utility lines and structures to avoid additional permitting through the California Public Utilities Commission. Utility work impacts to biological resources (specifically nesting birds), traffic, noise, and aesthetics, amongst others, should be considered.

The design of SCE's generating stations, substations, and transmission lines are regulated by Order of the California Public Utilities Commission (CPUC). Specifically, the undergrounding of SCE's transmission lines is governed under SCE Tariff Rule 20. A Tariff Rule is a rule of service that is approved by the CPUC. See *City of Anaheim v. Pacific Bell Co*., 119 Cal. App. 4th, 838 (Cal. App. 4th 2004) (undergrounding tariff rule constituted CPUC's entry into field of regulation for utility undergrounding). SCE Tariff Rule 20 will need to be a consideration for this Project.

Development within SCE's Rights-of-Way and Access Roads
As the proposed project has the potential to encroach and impact SCE's existing utility corridors and access roads, please note that it should not unreasonably interfere with SCE's ability to access, maintain, and operate its current and future facilities. Additionally, if any development which includes permanent, temporary or grading within the Right-of-Way (such as bike lanes and landscaping) are planned within SCE's corridors a written consent agreement signed between the developer and SCE is required. Any parkways or pathways (either by foot, bicycles, or other means) that invite the public onto SCE's right-of-way will require the installation of fencing and/or Climbing Discouragers on each transmission line tower at the customer's expense.

SCE's rights-of-way and fee-owned properties are used by SCE to operate and maintain its present and future facilities. SCE will review any proposed use on a case-by-case basis. Approvals or denials will be in writing based upon review of the maps provided by the developer and compatibility with SCE right-of-way constraints and rights. Please forward five (5) sets of plans depicting SCE's facilities and associated land rights to the following location:

Real Properties Department
Southern California Edison Company
2 Innovation Way
Pomona, CA 91768

General Order 131-D
The construction, modification, and relocation of transmission lines, or electrical facilities that are designed to operate at or above 50 kilovolts (kV) may be subject to the California Public Utilities Commission's (CPUC) General Order 131-D[1]. If the construction, modification, or relocation of transmission lines results in significant environmental impacts, they should be identified and discussed in the Draft EIR, specifically as it relates to aesthetics, biological resources (e.g., nesting birds), transportation, noise, and air quality. As mentioned, If the analysis is not included, SCE may be required to pursue a separate, mandatory CEQA review through the CPUC, which could delay approval of the SCE transmission line portion of the project for two years or longer.

General Order 95
SCE must comply with General Order (GO) 95, which establishes rules and regulations for the overhead line design, construction, and maintenance. GO 95 also includes vertical clearance requirements from thoroughfares, ground, and railroads, as well as specific minimum clearances from tree branches and vegetation around overhead wires. The project's landscaping should not conflict with SCE's existing and proposed transmission line designs.

Method of Service
In order to determine electrical infrastructure necessary to support the proposed project, the project proponent must submit a signed Method of Service agreement to SCE and pay engineering fees for an electric service study to be completed. Infrastructure necessary to support this project is subject to licensing and permitting authority of the CPUC.

SCE appreciates the opportunity to comment on the proposed Nakase Property Area Plan Project. SCE looks forward to working and collaborating with the City. If you have any questions regarding this letter, please contact me at heather.neely@sce.com or 626.476.7839

Regards,

Heather Neely
Third Party Environmental Reviews
Environmental Services
Southern California Edison
2244 Walnut Grove Avenue
Rosemead CA 91770

[1] http://docs.cpuc.ca.gov/PUBLISHED/Graphics/589.PDF

Community Development
1 Civic Center Plaza, Irvine, CA 92606-5208
cityofirvine.org
949-724-6000

August 14, 2018

Ms. Marie Luna
City of Lake Forest
Community Development Department
25550 Commercentre Drive, Suite 100
Lake Forest, CA 92630

Subject: **Notice of Preparation of an Environmental Impact Report for the proposed Nakase Property Area Plan located at 20261 Lake Forest Drive in the City of Lake Forest.**

Dear Ms. Luna:

Thank you for the opportunity to review the Notice of Preparation for the Draft Environmental Impact Report (EIR) for the proposed Nakase Property Area Plan in the City of Lake Forest. The Nakase Property Area Plan would facilitate the development of a 122-acre master planned community consisting of 675, two and three-story, single family residential homes, 101 senior affordable housing units, and a K-6 elementary school.

Staff completed its review and is providing the enclosed comments. If you have any questions, please contact me at 949-724-6364 or by email at jequina@cityofirvine.org.

Sincerely,

Justin Equina
Associate Planner

Enclosure: Staff Comments

ec: Kerwin Lau, Manager of Planning Services
Bill Jacobs, Principal Planner
Lisa Thai, Supervising Transportation Analyst

Enclosure
City of Irvine Comments for
Initial Study and Notice of Preparation of a Draft EIR for
Nakase Property Area Plan in the City of Lake Forest

1) The proposed Nakase Property Area Plan is within the North Irvine Transportation Mitigation (NITM) study area and within close proximity to the City of Irvine. Therefore, the study area should include the following:

   - Sand Canyon to the west
   - Bake to the east
   - Portola to the north; and
   - I-5 to the south

   The study should also include all NITM funded intersections and all City of Irvine intersections and roadway links within these boundaries. In addition, the following intersections and roadway links, consistent with Irvine's performance criteria, should be analyzed using our ITAM model.

   Intersections

   - Bake/Irvine
   - Bake/Toledo
   - Bake/Jeronimo
   - Bake/Muirlands
   - Bake/Rockfield
   - I-5 NB Ramps/Bake
   - Bake/I-5 SB Ramps
   - Alton/Irvine
   - Alton/Toledo
   - Alton/Jeronimo
   - Alton/Muirlands
   - Ada/Alton
   - Technology W/Alton
   - I-5 NB Ramp/Alton
   - Alton/Enterprise
   - Marine/Alton
   - Marine/Barranca
   - Marine/Great Park Boulevard
   - Portola/SR-241 NB Ramps
   - Portola/SR-241 SB Ramps
   - Chinon/Irvine
   - Modjeska/Irvine
   - Bosque/Irvine
   - Ridge Valley/Portola

- Ridge Valley/Irvine
- Arrowhead/Irvine
- SR-133 SB Ramps/Irvine
- SR-133/NB Ramps/Irvine
- Sand Canyon/Portola
- Sand Canyon/Irvine
- Sand Canyon/Trabuco
- Ridge Valley/Trabuco
- Lake Forest/Avenida Carlota/I-5

Roadway Links

- Bake (Trabuco to I-5 SB Ramps)
- Alton (Irvine to Enterprise)
- Portola (Sand Canyon to SR-241 NB Ramps)
- Irvine (Sand Canyon to Bake)
- Trabuco (Sand Canyon to Ridge Valley)
- Marine Way (Sand Canyon to Muirlands)

Please contact Lisa Thai, 949-724-7360 or lthai@cityofirvine.org, for the latest ITAM model.

2) In the traffic study, analyze the following study years and its potential cumulative impacts.

   - Interim Year Short Term
   - Interim Year Long Term
   - Buildout

3) In the traffic study, analyze the improvements (including the timing and implementation plan) for the missing segment of Portola Parkway (SR-241 to Alton) located in the City of Irvine's sphere of influence.

4) Clarify if the proposed project will be part of the Lake Forest Transportation Mitigation (LFTM) fee program.

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
South Coast Region
3883 Ruffin Road
San Diego, CA 92123
(858) 467-4201
www.wildlife.ca.gov

EDMUND G. BROWN JR., Governor
CHARLTON H. BONHAM, Director

August 14, 2018

Ms. Marie Luna
City of Lake Forest
25550 Commerce Centre Drive, Suite 100
Lake Forest, CA 92630
mluna@lakeforestca.gov

Subject: Comments on the Notice of Preparation of a Draft Environmental Impact Report for the Nakase Property Area Plan, Lake Forest, CA (SCH# 2018071035)

Dear Ms. Luna:

The California Department of Fish and Wildlife (Department) has reviewed the above-referenced Notice of Preparation (NOP) and Initial Study (IS) for the Nakase Property Area Plan Draft Environmental Impact Report (DEIR). The following statements and comments have been prepared pursuant to the Department's authority as Trustee Agency with jurisdiction over natural resources affected by the project (California Environmental Quality Act [CEQA] Guidelines § 15386) and pursuant to our authority as a Responsible Agency under CEQA Guidelines section 15381 over those aspects of the proposed project that come under the purview of the California Endangered Species Act (Fish and Game Code § 2050 *et seq.*) and Fish and Game Code section 1600 *et seq*. The Department also administers the Natural Community Conservation Planning (NCCP) program. The City of Lake Forest (City) is identified as a non-participating landowner in the Central/Coastal Orange County NCCP/Habitat Conservation Plan (HCP).

The project proposes to develop Nakase Brothers Wholesale Nurseries, a 122-acre commercial plant nursery, into a master community that includes up to 675 single-family residential units, an elementary school, a public park, and designated "open space/habitat restoration." Nakase Brothers Wholesale Nurseries is located at 20621 Lake Forest Drive, with Bake Parkway to the north, Rancho Parkway to the east, and Serrano Creek along its southern boundary. The project site is also within the NCCP/HCP planning area, with the boundary of the NCCP/HCP Reserve System approximately 1 mile to the northeast.

The Department offers the following comments and recommendations to assist the City in avoiding or minimizing potential project impacts on biological resources.

Specific Comment

1. The proposed project proposes to remove approximately 0.25 acre of degraded coastal sage scrub (CSS) habitat (IS, page 4-15). Based on the information provided, it is unclear where the CSS habitat occurs on the property and whether it is occupied by the federal Endangered Species Act threatened coastal California gnatcatcher (*Polioptila californica californica*, "gnatcatcher"). Because the project is located in a jurisdiction covered by the NCCP/HCP, it is eligible to use the in-lieu fee to address impacts to occupied CSS habitat. The DEIR should specify whether the CSS habitat to be impacted is occupied by gnatcatcher and whether the in-lieu fee will be used to mitigate the 0.25 acre of impact. Use of the in-lieu fee must be coordinated with the NCCP/HCP non-profit

management organization, the Natural Communities Coalition. Unoccupied CSS is still considered sensitive habitat and any impacts should be appropriately mitigated. Depending on the habitat quality, we recommend using a 2:1 or 3:1 conservation-to-impact ratio to mitigate for losses of non-occupied CSS.

General Comments

1. The Department has responsibility for wetland and riparian habitats. It is the policy of the Department to strongly discourage development in wetlands or conversion of wetlands to uplands. We oppose any development or conversion that would result in a reduction of wetland acreage or wetland habitat values, unless, at a minimum, project mitigation assures there will be "no net loss" of either wetland habitat values or acreage. Development and conversion include but are not limited to conversion to subsurface drains, placement of fill or building of structures within the wetland, and channelization or removal of materials from the streambed. All wetlands and watercourses, whether ephemeral, intermittent, or perennial, should be retained and provided with substantial setbacks that preserve the riparian and aquatic values and maintain their value to on-site and off-site wildlife populations. Mitigation measures to compensate for impacts to mature riparian corridors must be included in the DEIR and must compensate for the loss of function and value of a wildlife corridor.

    a. The project area supports aquatic, riparian, and wetland habitats; therefore, a jurisdictional delineation of the creeks and their associated riparian habitats should be included in the DEIR. The delineation should be conducted pursuant to the U. S. Fish and Wildlife Service wetland definition adopted by the Department.[1] Please note that some wetland and riparian habitats subject to the Department's authority may extend beyond the jurisdictional limits of the U.S. Army Corps of Engineers.
    b. The Department also has regulatory authority over activities in streams and/or lakes that will divert or obstruct the natural flow, or change the bed, channel, or bank (which may include associated riparian resources) of any river, stream, or lake or use material from a river, stream, or lake. For any such activities, the project applicant (or "entity") must provide written notification to the Department pursuant to section 1600 et seq. of the Fish and Game Code. Based on this notification and other information, the Department determines whether a Lake and Streambed Alteration Agreement (LSAA) with the applicant is required prior to conducting the proposed activities. The Department's issuance of a LSAA for a project that is subject to CEQA will require CEQA compliance actions by the Department as a Responsible Agency. The Department as a Responsible Agency under CEQA may consider the local jurisdiction's (lead agency) Negative Declaration or Environmental Impact Report for the project. To minimize additional requirements by the Department pursuant to

---

1 Cowardin, Lewis M., et al. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service.

section 1600 *et seq.* and/or under CEQA, the document should fully identify the potential impacts to the stream or riparian resources and provide adequate avoidance, mitigation, monitoring and reporting commitments for issuance of the LSAA.[2]

2. The Department considers adverse impacts to a species protected by the California Endangered Species Act (CESA), for the purposes of CEQA, to be significant without mitigation. As to CESA, take of any endangered, threatened, or candidate species that results from the project is prohibited, except as authorized by state law (Fish and Game Code, §§ 2080, 2085). Consequently, if the Project, Project construction, or any Project-related activity during the life of the Project will result in take of a species designated as endangered or threatened, or a candidate for listing under CESA, the Department recommends that the project proponent seek appropriate take authorization under CESA prior to implementing the project. Appropriate authorization from the Department may include an incidental take permit (ITP) or a consistency determination in certain circumstances, among other options (Fish and Game Code §§ 2080.1, 2081, subds. (b),(c)). Early consultation is encouraged, as significant modification to a project and mitigation measures may be required in order to obtain a CESA Permit. Revisions to the Fish and Game Code, effective January 1998, may require that the Department issue a separate CEQA document for the issuance of an ITP unless the project CEQA document addresses all project impacts to CESA-listed species and specifies a mitigation monitoring and reporting program that will meet the requirements of an ITP. For these reasons, biological mitigation monitoring and reporting proposals should be of sufficient detail and resolution to satisfy the requirements for a CESA ITP.
3. To enable the Department to adequately review and comment on the proposed project from the standpoint of the protection of plants, fish, and wildlife, we recommend the following information be included in the DEIR.

   a) The document should contain a complete discussion of the purpose and need for, and description of, the proposed project, including all staging areas and access routes to the construction and staging areas.
   b) A range of feasible alternatives should be included to ensure that alternatives to the proposed project are fully considered and evaluated; the alternatives should avoid or otherwise minimize impacts to sensitive biological resources. Specific alternative locations should be evaluated in areas with lower resource sensitivity where appropriate.

<u>Biological Resources within the Project's Area of Potential Effect</u>

4. The document should provide a complete assessment of the flora and fauna within and adjacent to the project area, with particular emphasis upon identifying endangered,

---

2 A notification package may be obtained by accessing the Department's web site at http://www.wildlife.ca.gov/Conservation/LSA

threatened, sensitive, and locally unique species and sensitive habitats. This should include a complete floral and faunal species compendium of the entire project site, undertaken at the appropriate time of year. The DEIR should include the following information.

a) CEQA Guidelines, section 15125(c), specifies that knowledge on the regional setting is critical to an assessment of environmental impacts and that special emphasis should be placed on resources that are rare or unique to the region.
b) A thorough, recent floristic-based assessment of special status plants and natural communities, following the Department's Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities (see https://www.wildlife.ca.gov/Conservation/Plants/Info). The Department recommends that floristic, alliance-based and/or association-based mapping and vegetation impact assessments be conducted at the Project site and neighboring vicinity. The Manual of California Vegetation, second edition, should also be used to inform this mapping and assessment (Sawyer et al. 2008[3]). Adjoining habitat areas should be included in this assessment where site activities could lead to direct or indirect impacts offsite. Habitat mapping at the alliance level will help establish baseline vegetation conditions.
c) A current inventory of the biological resources associated with each habitat type on site and within the area of potential effect. The Department's California Natural Diversity Data Base in Sacramento should be contacted at www.wildlife.ca.gov/biogeodata/ to obtain current information on any previously reported sensitive species and habitat, including Significant Natural Areas identified under Chapter 12 of the Fish and Game Code.
d) An inventory of rare, threatened, endangered and other sensitive species on site and within the area of potential effect. Species to be addressed should include all those which meet the CEQA definition (see CEQA Guidelines, § 15380). This should include sensitive fish, wildlife, reptile, and amphibian species. Seasonal variations in use of the project area should also be addressed. Focused species-specific surveys, conducted at the appropriate time of year and time of day when the sensitive species are active or otherwise identifiable, are required. Acceptable species-specific survey procedures should be developed in consultation with the Department and the U.S. Fish and Wildlife Service.

Analyses of the Potential Project-Related Impacts on the Biological Resources

5. To provide a thorough discussion of direct, indirect, and cumulative impacts expected to adversely affect biological resources, with specific measures to offset such impacts, the following should be addressed in the DEIR.

a) A discussion of potential adverse impacts from lighting, noise, human activity, exotic species, and drainage should also be included. The latter subject should address: project-related changes on drainage patterns on and downstream of the project site;

---

3 Sawyer, J. O., T. Keeler-Wolf and J.M. Evens. 2009. A Manual of California Vegetation, Second Edition. California Native Plant Society Press, Sacramento.

the volume, velocity, and frequency of existing and post-project surface flows; polluted runoff; soil erosion and/or sedimentation in streams and water bodies; and post-project fate of runoff from the project site. The discussions should also address the proximity of the extraction activities to the water table, whether dewatering would be necessary, and the potential resulting impacts on the habitat, if any, supported by the groundwater. Mitigation measures proposed to alleviate such impacts should be included.

b) Discussions regarding indirect project impacts on biological resources, including resources in nearby public lands, open space, adjacent natural habitats, riparian ecosystems, and any designated and/or proposed or existing reserve lands (e.g., preserve lands associated with a NCCP). Impacts on, and maintenance of, wildlife corridor/movement areas, including access to undisturbed habitats in adjacent areas, should be fully evaluated in the DEIR.
c) The zoning of areas for development projects or other uses that are nearby or adjacent to natural areas may inadvertently contribute to wildlife-human interactions. A discussion of possible conflicts and mitigation measures to reduce these conflicts should be included in the environmental document.
d) A cumulative effects analysis should be developed as described under CEQA Guidelines, section 15130. General and specific plans, as well as past, present, and anticipated future projects, should be analyzed relative to their impacts on similar plant communities and wildlife habitats.

Mitigation for the Project-related Biological Impacts

6. The DEIR should include measures to fully avoid and otherwise protect Rare Natural Communities from project-related impacts. The Department considers these communities as threatened habitats having both regional and local significance.

7. The DEIR should include mitigation measures for adverse project-related impacts to sensitive plants, animals, and habitats. Mitigation measures should emphasize avoidance and reduction of project impacts. For unavoidable impacts, on-site habitat restoration or enhancement should be discussed in detail. If on-site mitigation is not feasible or would not be biologically viable and therefore not adequately mitigate the loss of biological functions and values, off-site mitigation through habitat creation and/or acquisition and preservation in perpetuity should be addressed.

8. For proposed preservation and/or restoration, the DEIR should include measures to perpetually protect the targeted habitat values from direct and indirect negative impacts. The objective should be to offset the project-induced qualitative and quantitative losses of wildlife habitat values. Issues that should be addressed include restrictions on access, proposed land dedications, monitoring and management programs, control of illegal dumping, water pollution, increased human intrusion, etc.

9. The Department recommends that measures be taken to avoid project impacts to nesting birds. Migratory nongame native bird species are protected by international treaty under the Federal Migratory Bird Treaty Act (MBTA) of 1918 (Title 50, § 10.13, Code of Federal Regulations). Sections 3503.5 and 3513 of the California Fish and Game Code prohibit take of all raptors and other migratory nongame birds and section 3503 prohibits take of the nests and eggs of all birds. Proposed project activities

(including, but not limited to, staging and disturbances to native and nonnative vegetation, structures, and substrates) should occur outside of the avian breeding season which generally runs from February 1- September 1 (as early as January 1 for some raptors) to avoid take of birds or their eggs. If avoidance of the avian breeding season is not feasible, the Department recommends surveys by a qualified biologist with experience in conducting breeding bird surveys to detect protected native birds occurring in suitable nesting habitat that is to be disturbed and (as access to adjacent areas allows) any other such habitat within 300 feet of the disturbance area (within 500 feet for raptors). Project personnel, including all contractors working on site, should be instructed on the sensitivity of the area. Reductions in the nest buffer distance may be appropriate depending on the avian species involved, ambient levels of human activity, screening vegetation, or possibly other factors.

10. The Department generally does not support the use of relocation, salvage, and/or transplantation as mitigation for impacts to rare, threatened, or endangered species. Studies have shown that these efforts are experimental in nature and largely unsuccessful.

11. Plans for restoration and revegetation should be prepared by persons with expertise in southern California ecosystems and native plant revegetation techniques. Each plan should include, at a minimum: (a) the location of the mitigation site; (b) the plant species to be used, container sizes, and seeding rates; (c) a schematic depicting the mitigation area; (d) planting schedule; (e) a description of the irrigation methodology; (f) measures to control exotic vegetation on site; (g) specific success criteria; (h) a detailed monitoring program; (i) contingency measures should the success criteria not be met; and (j) identification of the party responsible for meeting the success criteria and providing for conservation of the mitigation site in perpetuity.

12. The Polyphagous and Kuroshio shot hole borers (ISHBs) are invasive ambrosia beetles that introduce fungi and other pathogens into host trees. The adult female (1.8-2.5 mm long) tunnels galleries into the cambium of a wide variety of host trees, where it lays its eggs and propagates the *Fusarium* fungi species for the express purpose of feeding its young. These fungi cause *Fusarium* dieback disease, which interrupts the transport of water and nutrients in at least 58 reproductive host tree species, with impacts to other host tree species as well. With documented occurrences in Serrano Creek 0.8 mile upstream and approximately 2.06 miles downstream, the spread of invasive shot hole borers (ISHBs) could have significant impacts in local ecosystems. Therefore, with regard to ISHBs, we recommend the draft DEIR include the following:

    a. a thorough discussion of the direct, indirect, and cumulative impacts that could occur from the potential spread of ISHBs as a result of proposed activities in the DEIR;
    b. an analysis of the likelihood of the spread of ISHBs as a result of the invasive species' proximity to above referenced activities;
    c. figures that depict potentially sensitive or susceptible vegetation communities within the project area, the known occurrences of ISHB within the project area (if any), and ISHB's proximity to above referenced activities; and
    d. a mitigation measure or measure(s) within the DEIR that describe Best Management Practices (BMPs) that bring impacts of the project on the spread of ISHB below a level of significance. Examples of such BMPs include:

i. education of on-site workers regarding ISHB and its spread;
ii. reporting sign of ISHB infestation, including sugary exudate ("weeping") on trunks or branches and ISHB entry/exit-holes (about the size of the tip of a ballpoint pen), to the Department and UCR's Eskalen Lab;
iii. equipment disinfection;
iv. pruning infected limbs in infested areas where project activities may occur;
v. avoidance and minimization of transport of potential host tree materials;
vi. chipping potential host materials to less than 1 inch and solarization, prior to delivering to a landfill;
vii. chipping potential host materials to less than 1 inch, and solarization, prior to composting on-site;
viii. solarization of cut logs; and/or
ix. burning of potential host tree materials.

Please refer to UCR's Eskalen lab website for more information regarding ISHBs: http://eskalenlab.ucr.edu/pshb.html.

We appreciate the opportunity to comment on the referenced NOP. Questions regarding this letter and further coordination on these issues should be directed to Jennifer Turner at (858-467-2717) or jennifer.turner@wildlife.ca.gov.

Sincerely,

Gail K. Sevrens
Environmental Program Manager
South Coast Region

ec: Scott Morgan, State Clearinghouse
Christine Medak, U.S. Fish and Wildlife Service

San Joaquin Hills
Transportation
Corridor Agency

Chair:
Fred Minagar
Laguna Niguel

Transportation Corridor Agencies™

Foothill/Eastern
Transportation
Corridor Agency

Chair:
Ed Sachs
Mission Viejo

Via e-mail: mluna@lakeforestca.gov

August 14, 2018

Marie Luna
City of Lake Forest
25550 Commercentre Drive, Suite 100
Lake Forest, CA 92630

Re: Notice of Preparation (NOP) of an Environmental Impact Report for the Proposed Nakase Property Area Plan

Dear Ms. Luna,

The Transportation Corridor Agencies wishes to thank you for the opportunity to review and comment on the above-mentioned notification. We would like to provide the following comment for your consideration for inclusion in the forthcoming Environmental Impact Report (EIR):

- Please provide a map showing the traffic study area.

Again, thank you for the opportunity to review and comment on the NOP. We look forward to reviewing the Draft EIR when it becomes available. Should you have any questions or concerns regarding this information, please feel free to contact me at (949) 754-3487 or via email at vgomez@thetollroads.com.

Sincerely,

Virginia Gomez
Environmental Planner
Transportation Corridor Agencies

Santa Ana Regional Water Quality Control Board

August 15, 2018

Marie Luna, Senior Planner
City of Lake Forest Community Development Department
25550 Commercentre Drive, Suite 100
Lake Forest, CA 92630

Email MLuna@lakeforestca.gov

NOTICE OF PREPARATION OF A DRAFT ENVIRONMENTAL IMPACT REPORT, NAKASE PROPERTY AREA PLAN, CITY OF LAKE FOREST (NO STATE CLEARING HOUSE NUMBER)

Dear Ms. Luna:

Staff of the Regional Water Quality Control Board, Santa Ana Region (Regional Board) has reviewed the Notice of Preparation and Initial Study (NOP/IS) for the proposed "Nakase Property Area Plan" (Area Plan; Project) in the Serrano Creek watershed in Lake Forest. The 122-acre Nakase property is bounded by Bake Parkway, Rancho Parkway and Dimension Drive. Approval of the Area Plan would facilitate development of a master-planned community on the site of the Nakase Brothers Wholesale Nursery (Nakase Nursery). The Area Plan would establish guidelines for the future development of approximately 61.4 acres of the site, along with open space to include parks and areas of habitat restoration. Area Plan developments would consist of up to 675 single-family residential units, an elementary school, a multi-purpose water quality basin, and roads.

The Nakase Nursery property is bisected by a 0.6-mile-long, unnamed earthen drainage channel. This interior channel is a perennial stream tributary to Serrano Creek, and it is supplied by flows originating upstream of the Nakase property. After leaving the Nakase property, this drainage channel runs underground for 0.5 miles before surfacing as a concrete channel 100 yards upstream of its junction with Serrano Creek (0.6 miles downstream of the Nakase property as measured along Serrano Creek).

We recommend that the DEIR incorporate the following comments in order for the Project to best protect water quality standards (water quality objectives, beneficial uses and antidegradation policy), as defined in the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan):

Permitting

1. The Regional Board issued Waste Discharge Requirements (WDRs) to Nakase Nursery in 2005 (Order No. R8-2005-0006) that were primarily intended to ensure facility

compliance with the Total Maximum Daily Load (TMDL) for nutrients in the Newport Bay Watershed. The WDRs will be rescinded when the Nakase Nursery property is converted to residential/urban land uses. However, the property will remain under the requirements of the Regional Board's areawide Municipal Separate Storm Sewer Systems (MS4) permit, Regional Board Order No. RB8-2009-0030, NPDES No. CAS618030 (and iterations), which addresses site runoff and TMDL compliance. Of particular concern is the control of residual nitrogen leaving the nursery site, and this control should be explained in the DEIR.

Coverage is required under State Water Resources Control Board Water Quality Order No. 99-08-DWQ, NPDES General Permit for Storm Water Discharges Associated with Construction Activity, for individual projects occurring on an area of one or more acres. A Notice of Intent (NOI) with the appropriate fees for coverage of the project under this Permit must be submitted to the SWRCB at least 30 days prior to the initiation of construction activity at the site. Information about this permit program can be found at https://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.html .

A variety of Best Management Practices (BMPs) should be included in the Project to ensure that the hydrograph of post-project storm runoff approximates pre-project flows. This regulation of flows is necessary to reduce or prevent the hydromodification of on-site and downslope drainages.

We discuss in Comment 3, below, the need for Certification that impacts to waters of the United States (Serrano Creek) have had state-designated beneficial uses mitigated for, including those of tributary streams to Serrano Creek. Waters not specifically named in the Basin Plan are presumed to have the same beneficial uses as the waters to which they are tributary, by virtue of the Basin Plan's tributary rule (Basin Plan pages 3-5). The existing waters on the Project site support the following intermittent beneficial uses:

a) Groundwater Recharge (GWR)
b) Water Contact Recreation (REC1)
c) Non-contact Water Recreation (REC2)
d) Warm Freshwater Habitat (WARM)
e) Wildlife Habitat (WILD)

Drainage Improvements and Their Impacts

2. Based on the site's monthly inflow and outflow data as reported by Nakase Nursery, some of the site's incoming flow is probably from urban runoff, but additional contributions from springs are likely. According to these data, this inflow volume is greater than that of the dry weather runoff leaving the nursery indicating that a significant fraction of the flow entering the property infiltrates prior to reaching the downstream property boundary. The DEIR should acknowledge that the Project must not result in increasing peak flows downstream, in compliance with Order No. R8-2009-0030. Increased peak flows due to urban development have already destabilized Serrano Creek downstream of the Project Site. In 2001, the State of California, the County of Orange, the City of Lake Forest, and the Serrano Creek Conservancy funded a restoration project to halt destabilization along a 1.1-mile segment of Serrano Creek downstream of Trabuco Road.

The surface and subsurface drainage patterns of the Project should be explained more clearly in the DEIR and the impacts evaluated in more detail. The NOP/IS (p. 2.28) states that "*as a result of site grading, runoff flows to the southwestern portion of the Project Site to ultimately discharge into an existing 10-foot box culvert. The drainage system would include an underground detention basin beneath Central Park and would not increase peak flows or discharge rates to Serrano Creek.*" About 60 percent of the site would appear to currently drain into the unnamed interior channel and not directly to Serrano Creek. The proposed underground detention basin must therefore be properly sized to accommodate all flows from the newly configured area that will be draining to Serrano Creek and must meet the specific sizing criteria in Order No. R8-2009-0030.

Further, the conceptual land use plan and the conceptual landscape plan (Figures 2.7 and 2.8) indicate that the interior drainage channel will be eliminated, but the DEIR must clarify whether the channel will be completely filled in or replaced by an underground concrete channel. The Initial Study states that the site will be regraded to direct all runoff to Serrano Creek; however, the location of the multipurpose treatment basin along the southwestern boundary of the Nakase property (where the tributary channel exits the property) suggests that this will not be the case.

Water Quality Standards Certification

3. Any temporary or permanent impacts to Serrano Creek and the unnamed interior drainage channel will require a Clean Water Act Section 401 Water Quality Standards Certification. Impacts to these waters and their beneficial uses should be avoided to the maximum extent possible. Where avoidance is not practicable, impacts to these waters should be minimized. Unavoidable impacts must be mitigated.

   However, if the project will cause material to be dredged from, or filled into, federally-jurisdictional waters, then a Clean Water Act (CWA) Section 404 permit is required from the U.S. Army Corps of Engineers (USACE), and a prerequisite CWA Section 401 Water Quality Standards Certification is required from the Regional Board. Where the USACE rules that a water body does not fall under their jurisdiction, the Regional Board may still determine that waste discharge requirements are necessary for protection of waters of the State. Therefore, a jurisdictional wetland delineation will need to be performed for the site. A Streambed Alteration Agreement from the California Department of Fish and Wildlife may be necessary as well.

Flow Gauging Stations

4. Nakase Nursery constructed flow gaging stations at the locations where Serrano Creek and the unnamed interior drainage channel exit the property. Construction of these stations was funded, in part, by a grant from the U.S. EPA administered by Regional Board staff. Continued operation of these stations will provide useful hydrologic data for the Serrano Creek watershed. The DEIR should consider options to maintain these stations in partnership with other interested stakeholders.

If you have any questions, please contact Glenn Robertson at (951) 782-3259 and Glenn.Robertson@waterboards.ca.gov , or me at (951) 782-4995 and Terri.Reeder@waterboards.ca.gov

Sincerely,

Terri S. Reeder, PG, CEG, CHG
Senior Engineering Geologist
Supervisor, Coastal Waters Planning and CEQA Section

Cc:

Stephanie J. Hall, U.S. Army Corps of Engineers, Los Angeles – Stephanie.J.Hall@usace.army.mil

Karin Cleary-Rose, U.S. Fish and Wildlife Service, Palm Springs office - karin_cleary-rose@fws.gov

State Clearinghouse, Sacramento - State.clearinghouse@opr.ca.gov

Valerie Taylor and Mary Larson, California Department of Fish and Wildlife, Los Alamitos office – Valerie.Taylor@wildlife.ca.gov and Mary.Larson@wildlife.ca.gov

SCAG
INNOVATING FOR A BETTER TOMORROW

SOUTHERN CALIFORNIA
ASSOCIATION OF GOVERNMENTS
900 Wilshire Blvd., Ste. 1700
Los Angeles, CA 90017
T: (213) 236-1800
www.scag.ca.gov

REGIONAL COUNCIL OFFICERS

President
Alan D. Wapner, San Bernardino County Transportation Authority

First Vice President
Bill Jahn, Big Bear Lake

Second Vice President
Randon Lane, Murrieta

Immediate Past President
Margaret E. Finlay, Duarte

COMMITTEE CHAIRS

Executive/Administration
Alan D. Wapner, San Bernardino County Transportation Authority

Community, Economic & Human Development
Peggy Huang, Transportation Corridor Agencies

Energy & Environment
Linda Parks, Ventura County

Transportation
Curt Hagman, San Bernardino County

August 15, 2018

Ms. Marie Luna, Senior Planner
City of Lake Forest Community Development Department
25550 Commercentre Drive, Suite 100
Lake Forest, California 92630
E-mail: mluna@lakeforestca.gov

RE: SCAG Comments on the Notice of Preparation of a Draft Environmental Impact Report for the Nakase Property Area Plan [SCAG NO. IGR9668]

Dear Ms. Luna,

Thank you for submitting the Notice of Preparation of a Draft Environmental Impact Report for the Nakase Property Area Plan ("proposed project") to the Southern California Association of Governments (SCAG) for review and comment. SCAG is the authorized regional agency for Inter-Governmental Review (IGR) of programs proposed for Federal financial assistance and direct Federal development activities, pursuant to Presidential Executive Order 12372. Additionally, SCAG reviews the Environmental Impact Reports of projects of regional significance for consistency with regional plans pursuant to the California Environmental Quality Act (CEQA) and CEQA Guidelines.

SCAG is also the designated Regional Transportation Planning Agency under state law, and is responsible for preparation of the Regional Transportation Plan (RTP) including the Sustainable Communities Strategy (SCS) pursuant to Senate Bill (SB) 375. As the clearinghouse for regionally significant projects per Executive Order 12372, SCAG reviews the consistency of local plans, projects, and programs with regional plans.[1] SCAG's feedback is intended to assist local jurisdictions and project proponents to implement projects that have the potential to contribute to attainment of Regional Transportation Plan/Sustainable Community Strategies (RTP/SCS) goals and align with RTP/SCS policies.

SCAG staff has reviewed the Notice of Preparation of a Draft Environmental Impact Report for the Nakase Property Area Plan in Orange County. The proposed project includes guidelines for the development of up to 776 residential units including 101 affordable units, an elementary school, and parks and open space on 122 acres.

When available, please send environmental documentation to *SCAG's Los Angeles office in Los Angeles (900 Wilshire Boulevard, Ste. 1700, Los Angeles, California 90017) or by email to au@scag.ca.gov* providing, at a minimum, the full public comment period for review.

If you have any questions regarding the attached comments, please contact the Inter-Governmental Review (IGR) Program, attn.: Anita Au, Associate Regional Planner, at (213) 236-1874 or au@scag.ca.gov. Thank you.

Sincerely,

Ping Chang

Ping Chang
Acting Manager, Compliance and Performance Monitoring

[1] Lead agencies such as local jurisdictions have the sole discretion in determining a local project's consistency with the 2016 RTP/SCS for the purpose of determining consistency for CEQA. Any "consistency" finding by SCAG pursuant to the IGR process should not be construed as a determination of consistency with the 2016 RTP/SCS for CEQA.

COMMENTS ON THE NOTICE OF PREPARATION OF A DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE NAKASE PROPERTY AREA PLAN [SCAG NO. IGR9668]

CONSISTENCY WITH RTP/SCS

SCAG reviews environmental documents for regionally significant projects for their consistency with the adopted RTP/SCS. For the purpose of determining consistency with CEQA, lead agencies such as local jurisdictions have the sole discretion in determining a local project's consistency with the RTP/SCS.

2016 RTP/SCS GOALS

The SCAG Regional Council adopted the 2016 RTP/SCS in April 2016. The 2016 RTP/SCS seeks to improve mobility, promote sustainability, facilitate economic development and preserve the quality of life for the residents in the region. The long-range visioning plan balances future mobility and housing needs with goals for the environment, the regional economy, social equity and environmental justice, and public health (see http://scagrtpscs.net/Pages/FINAL2016RTPSCS.aspx). The goals included in the 2016 RTP/SCS may be pertinent to the proposed project. These goals are meant to provide guidance for considering the proposed project within the context of regional goals and policies. Among the relevant goals of the 2016 RTP/SCS are the following:

SCAG 2016 RTP/SCS GOALS	
RTP/SCS G1:	*Align the plan investments and policies with improving regional economic development and competitiveness*
RTP/SCS G2:	*Maximize mobility and accessibility for all people and goods in the region*
RTP/SCS G3:	*Ensure travel safety and reliability for all people and goods in the region*
RTP/SCS G4:	*Preserve and ensure a sustainable regional transportation system*
RTP/SCS G5:	*Maximize the productivity of our transportation system*
RTP/SCS G6:	*Protect the environment and health for our residents by improving air quality and encouraging active transportation (e.g., bicycling and walking)*
RTP/SCS G7:	*Actively encourage and create incentives for energy efficiency, where possible*
RTP/SCS G8:	*Encourage land use and growth patterns that facilitate transit and active transportation*
RTP/SCS G9:	*Maximize the security of the regional transportation system through improved system monitoring, rapid recovery planning, and coordination with other security agencies**
	**SCAG does not yet have an agreed-upon security-performance measure.*

For ease of review, we encourage the use of a side-by-side comparison of SCAG goals with discussions of the consistency, non-consistency or non-applicability of the goals and supportive analysis in a table format. Suggested format is as follows:

SCAG 2016 RTP/SCS GOALS		
	Goal	Analysis
RTP/SCS G1:	*Align the plan investments and policies with improving regional economic development and competitiveness*	*Consistent: Statement as to why;* *Not-Consistent: Statement as to why;* *Or* *Not Applicable: Statement as to why;* *DEIR page number reference*
RTP/SCS G2:	*Maximize mobility and accessibility for all people and goods in the region*	*Consistent: Statement as to why;* *Not-Consistent: Statement as to why;* *Or* *Not Applicable: Statement as to why;* *DEIR page number reference*
etc.		etc.

2016 RTP/SCS STRATEGIES

To achieve the goals of the 2016 RTP/SCS, a wide range of land use and transportation strategies are included in the 2016 RTP/SCS. Technical appendances of the 2016 RTP/SCS provide additional supporting information in detail. To view the 2016 RTP/SCS, please visit: http://scagrtpscs.net/Pages/FINAL2016RTPSCS.aspx. The 2016 RTP/SCS builds upon the progress from the 2012 RTP/SCS and continues to focus on integrated, coordinated, and balanced planning for land use and transportation that the SCAG region strives toward a more sustainable region, while the region meets and exceeds in meeting all of applicable statutory requirements pertinent to the 2016 RTP/SCS. These strategies within the regional context are provided as guidance for lead agencies such as local jurisdictions when the proposed project is under consideration.

DEMOGRAPHICS AND GROWTH FORECASTS

Local input plays an important role in developing a reasonable growth forecast for the 2016 RTP/SCS. SCAG used a bottom-up local review and input process and engaged local jurisdictions in establishing the base geographic and socioeconomic projections including population, household and employment. At the time of this letter, the most recently adopted SCAG jurisdictional-level growth forecasts that were developed in accordance with the bottom-up local review and input process consist of the 2020, 2035, and 2040 population, households and employment forecasts. To view them, please visit http://www.scag.ca.gov/Documents/2016GrowthForecastByJurisdiction.pdf. The growth forecasts for the region and applicable jurisdictions are below.

	Adopted SCAG Region Wide Forecasts			Adopted City of Lake Forest Forecasts		
	Year 2020	Year 2035	Year 2040	Year 2020	Year 2035	Year 2040
Population	19,663,000	22,091,000	22,138,800	90,700	90,800	90,700
Households	6,458,000	7,325,000	7,412,300	30,300	30,400	30,500
Employment	8,414,000	9,441,000	9,871,500	44,700	48,700	49,000

MITIGATION MEASURES

SCAG staff recommends that you review the Final Program Environmental Impact Report (Final PEIR) for the 2016 RTP/SCS for guidance, as appropriate. SCAG's Regional Council certified the Final PEIR and adopted the associated Findings of Fact and a Statement of Overriding Considerations (FOF/SOC) and Mitigation Monitoring and Reporting Program (MMRP) on April 7, 2016 (please see: http://scagrtpscs.net/Pages/FINAL2016PEIR.aspx). The Final PEIR includes a list of project-level performance standards-based mitigation measures that may be considered for adoption and implementation by lead, responsible, or trustee agencies in the region, as applicable and feasible. Project-level mitigation measures are within responsibility, authority, and/or jurisdiction of project-implementing agency or other public agency serving as lead agency under CEQA in subsequent project- and site- specific design, CEQA review, and decision-making processes, to meet the performance standards for each of the CEQA resource categories.

South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 • www.aqmd.gov

SENT VIA USPS AND E-MAIL:
mluna@lakeforestca.gov
Marie Luna, Senior Planner
City of Lake Forest, Community Development Department
25550 Commercentre Drive, Suite 100
Lake Forest, California 92630

August 15, 2018

Notice of Preparation of a Draft Environmental Impact Report for the Proposed Nakase Property Area Plan

The South Coast Air Quality Management District (SCAQMD) staff appreciates the opportunity to comment on the above-mentioned document. SCAQMD staff's comments are recommendations regarding the analysis of potential air quality impacts from the Proposed Project that should be included in the Draft Environmental Impact Report (Draft EIR). Please send SCAQMD a copy of the Draft EIR upon its completion. Note that copies of the Draft EIR that are submitted to the State Clearinghouse are not forwarded to SCAQMD. Please forward a copy of the Draft EIR directly to SCAQMD at the address shown in the letterhead. **In addition, please send with the Draft EIR all appendices or technical documents related to the air quality, health risk, and greenhouse gas analyses and electronic versions of all air quality modeling and health risk assessment files[1]. These include emission calculation spreadsheets and modeling input and output files (not PDF files). Without all files and supporting documentation, SCAQMD staff will be unable to complete our review of the air quality analyses in a timely manner. Any delays in providing all supporting documentation will require additional time for review beyond the end of the comment period.**

Air Quality Analysis

The SCAQMD adopted its California Environmental Quality Act (CEQA) Air Quality Handbook in 1993 to assist other public agencies with the preparation of air quality analyses. The SCAQMD staff recommends that the Lead Agency use this Handbook as guidance when preparing its air quality analyses. Copies of the Handbook are available from the SCAQMD's Subscription Services Department by calling (909) 396-3720. More recent guidance developed since this Handbook was published is also available on SCAQMD's website at: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/ceqa-air-quality-handbook-(1993). The SCAQMD staff also recommends that the Lead Agency use the CalEEMod land use emissions software. This software has recently been updated to incorporate up-to-date state and locally approved emission factors and methodologies for estimating pollutant emissions from typical land use development. CalEEMod is the only software model maintained by the California Air Pollution Control Officers Association (CAPCOA) and replaces the now outdated URBEMIS. This model is available free of charge at: www.caleemod.com.

On March 3, 2017, the SCAQMD's Governing Board adopted the 2016 Air Quality Management Plan (2016 AQMP), which was later approved by the California Air Resources Board on March 23, 2017. Built upon the progress in implementing the 2007 and 2012 AQMPs, the 2016 AQMP provides a regional

[1] Pursuant to the CEQA Guidelines Section 15174, the information contained in an EIR shall include summarized technical data, maps, plot plans, diagrams, and similar relevant information sufficient to permit full assessment of significant environmental impacts by reviewing agencies and members of the public. Placement of highly technical and specialized analysis and data in the body of an EIR should be avoided through inclusion of supporting information and analyses as appendices to the main body of the EIR. Appendices to the EIR may be prepared in volumes separate from the basic EIR document, but shall be readily available for public examination and shall be submitted to all clearinghouses which assist in public review.

perspective on air quality and the challenges facing the South Coast Air Basin. The most significant air quality challenge in the Basin is to achieve an additional 45 percent reduction in nitrogen oxide (NOx) emissions in 2023 and an additional 55 percent NOx reduction beyond 2031 levels for ozone attainment. The 2016 AQMP is available on SCAQMD's website at: http://www.aqmd.gov/home/library/clean-air-plans/air-quality-mgt-plan.

SCAQMD staff recognizes that there are many factors Lead Agencies must consider when making local planning and land use decisions. To facilitate stronger collaboration between Lead Agencies and the SCAQMD to reduce community exposure to source-specific and cumulative air pollution impacts, the SCAQMD adopted the Guidance Document for Addressing Air Quality Issues in General Plans and Local Planning in 2005. This Guidance Document provides suggested policies that local governments can use in their General Plans or through local planning to prevent or reduce potential air pollution impacts and protect public health. SCAQMD staff recommends that the Lead Agency review this Guidance Document as a tool when making local planning and land use decisions. This Guidance Document is available on SCAQMD's website at: http://www.aqmd.gov/docs/default-source/planning/air-quality-guidance/complete-guidance-document.pdf. Additional guidance on siting incompatible land uses (such as placing homes near freeways or other polluting sources) can be found in the California Air Resources Board's *Air Quality and Land Use Handbook: A Community Health Perspective*, which can be found at: http://www.arb.ca.gov/ch/handbook.pdf. Guidance[2] on strategies to reduce air pollution exposure near high-volume roadways can be found at: https://www.arb.ca.gov/ch/rd_technical_advisory_final.PDF.

The SCAQMD has also developed both regional and localized significance thresholds. SCAQMD staff requests that the Lead Agency compare the emission results to the recommended regional significance thresholds found here: http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf. In addition to analyzing regional air quality impacts, SCAQMD staff recommends calculating localized air quality impacts and comparing the results to localized significance thresholds (LSTs). LSTs can be used in addition to the recommended regional significance thresholds as a second indication of air quality impacts when preparing a CEQA document. Therefore, when preparing the air quality analysis for the Proposed Project, it is recommended that the Lead Agency perform a localized analysis by either using the LSTs developed by the SCAQMD or performing dispersion modeling as necessary. Guidance for performing a localized air quality analysis can be found at: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/localized-significance-thresholds.

When specific development is reasonably foreseeable as result of the goals, policies, and guidelines in the Proposed Project, the Lead Agency should identify any potential adverse air quality impacts and sources of air pollution that could occur using its best efforts to find out and a good-faith effort at full disclosure in the Draft EIR. The degree of specificity will correspond to the degree of specificity involved in the underlying activity which is described in the Draft EIR (CEQA Guidelines Section 15146). When quantifying air quality emissions, emissions from both construction (including demolition, if any) and operations should be calculated. Construction-related air quality impacts typically include, but are not limited to, emissions from the use of heavy-duty equipment from grading, earth-loading/unloading, paving, architectural coatings, off-road mobile sources (e.g., heavy-duty construction equipment) and on-road mobile sources (e.g., construction worker vehicle trips, material transport trips). Operation-related air quality impacts may include, but are not limited to, emissions from stationary sources (e.g., boilers), area sources (e.g., solvents and coatings), and vehicular trips (e.g., on- and off-road tailpipe emissions and

[2] In April 2017, CARB published a technical advisory, *Strategies to Reduce Air Pollution Exposure Near High-Volume Roadways: Technical Advisory*, to supplement CARB's Air Quality and Land Use Handbook: A Community Health Perspective. This technical advisory is intended to provide information on strategies to reduce exposures to traffic emissions near high-volume roadways to assist land use planning and decision-making in order to protect public health and promote equity and environmental justice. The technical advisory is available at: https://www.arb.ca.gov/ch/landuse.htm.

entrained dust). Air quality impacts from indirect sources, such as sources that generate or attract vehicular trips, should be included in the analysis. Furthermore, for phased projects where there will be an overlap between construction and operation, the air quality impacts from the overlap should be combined and compared to SCAQMD's regional air quality CEQA operational thresholds to determine significance.

In the event that the Proposed Project generates or attracts vehicular trips, especially heavy-duty diesel-fueled vehicles, it is recommended that the Lead Agency perform a mobile source health risk assessment. Guidance for performing a mobile source health risk assessment ("*Health Risk Assessment Guidance for Analyzing Cancer Risk from Mobile Source Diesel Idling Emissions for CEQA Air Quality Analysis*") can be found at: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/mobile-source-toxics-analysis. An analysis of all toxic air contaminant impacts due to the use of equipment potentially generating such air pollutants should also be included.

Mitigation Measures

In the event that the Proposed Project generates significant adverse air quality impacts, CEQA requires that all feasible mitigation measures that go beyond what is required by law be utilized during project construction and operation to minimize or eliminate these impacts. Pursuant to CEQA Guidelines Section 15126.4 (a)(1)(D), any impacts resulting from mitigation measures must also be discussed. Several resources are available to assist the Lead Agency with identifying possible mitigation measures for the Proposed Project, including:

- Chapter 11 of the SCAQMD *CEQA Air Quality Handbook*
- SCAQMD's CEQA web pages available here: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/mitigation-measures-and-control-efficiencies
- SCAQMD's Rule 403 – Fugitive Dust, and the Implementation Handbook for controlling construction-related emissions and Rule 1403 – Asbestos Emissions from Demolition/Renovation Activities
- SCAG's MMRP for the 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy available here: http://scagrtpscs.net/Documents/2016/peir/final/2016fPEIR_ExhibitB_MMRP.pdf
- CAPCOA's *Quantifying Greenhouse Gas Mitigation Measures* available here: http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

Alternatives

In the event that the Proposed Project generates significant adverse air quality impacts, CEQA requires the consideration and discussion of alternatives to the project or its location which are capable of avoiding or substantially lessening any of the significant effects of the project. The discussion of a reasonable range of potentially feasible alternatives, including a "no project" alternative, is intended to foster informed decision-making and public participation. Pursuant to CEQA Guidelines Section 15126.6(d), the Draft EIR shall include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the Proposed Project.

Permits

In the event that the Proposed Project requires a permit from SCAQMD, SCAQMD should be identified as a responsible agency for the Proposed Project. For more information on permits, please visit SCAQMD webpage at: http://www.aqmd.gov/home/permits. Questions on permits can be directed to SCAQMD's Engineering and Permitting staff at (909) 396-3385.

Data Sources

SCAQMD rules and relevant air quality reports and data are available by calling the SCAQMD's Public Information Center at (909) 396-2039. Much of the information available through the Public Information Center is also available via the SCAQMD's webpage (http://www.aqmd.gov).

The SCAQMD staff is available to work with the Lead Agency to ensure that project air quality and health risk impacts are accurately evaluated and mitigated where feasible. Please contact Robert Dalbeck, Assistant Air Quality Specialist, at rdalbeck@aqmd.gov, if you have any questions regarding these comments.

Sincerely,

Daniel Garcia

Daniel Garcia
Program Supervisor
Planning, Rule Development & Area Sources

DG/RD
ORC180713-01
Control Number

From: noreply@civicplus.com [mailto:noreply@civicplus.com]
Sent: Thursday, August 30, 2018 8:49 PM
To: Luna, Marie
Subject: Online Form Submittal: Submit Scoping Comments

Submit Scoping Comments

Use this form to submit comments and suggestions regarding the scope of the Environmental Impact Report (EIR) to be prepared for the proposed Nakase property General Plan Amendment and Zone Change. While the City of Lake Forest values all comments, this form is not intended for comments on the merits of the proposed project. Additional opportunities for public input regarding the project will be provided later in the environmental and project review process when the EIR has been completed and is available for public review and comment. The City's Planning Commission and City Council are both expected to hold public hearings on the project during Summer/Fall 2019.

Submit Comments Here

Regarding this latest Nakase development proposal I do think the city needs to look into the circulation of traffic throughout the area. It would be logical to consider traffics movement from the north and south directions. This should include a direct route through this community from Rancho South to the Sport Park Complex.

Email not displaying correctly? View it in your browser.

All Comments

Comments

Sue Klingseis · 37:06 Interesting
Manage
Like
· Reply · Message · 5w

Marietta Bianchini Philpott · 3:27 Interesting
Manage
Like
· Reply · Message · 5w

France Imagawa · 2:43 Interesting
Manage
Like
· Reply · Message · 5w

Nikita Ganatra · 23:01 Let's go!
Manage
Like
· Reply · Message · 5w

Barbara Cangas · 0:00 Tracy
Manage
Like
· Reply · Message · 5w

Eric Koff · 12:43 Toll probably has the option to purchase the land after entitlements are received.
Manage
Like
· Reply · Message · 5w

C.d. Larson · 28:29 AirBnB is not allowed! Interesting.
Manage
Like
· Reply · Message · 5w

Maria Fernada Nelson · 39:52 Great question?

Manage
Like
· Reply · Message · 5w

Josh Abner Vizcay · 28:32 Interesting how Gayle from the city is not pulling any punches “selling” the Toll Brothers position
Manage
Like
· Reply · Message · 5w

Josh Abner Vizcay · 43:09 Why Gayle are you selling Toll brothers position so hard ? As a business person i am learning the “spin”
Manage
Like
· Reply · Message · 5w

Kim Leone · 30:22 Could we please leave have less concrete? The noise and the heat has increased significantly.
Manage
Like
· Reply · Message · 5w

Rose Tingle · 23:33 City of lake forest are you going to pose our facebook questions to the speakers?
Manage
Like
· Reply · Message · 5w

Rose Tingle · 26:32 How many more trips estimated by cars to the freeway?
Manage
Like
· Reply · Message · 5w

Dan Grantham · 28:24 100 year nursery with 100 years of commercial pesticides and fertilizers... please take that into consideration.
Manage
Like
· Reply · Message · 5w

Eric Koff · 2:39 I can hear him
Manage
Like
· Reply · Message · 5w

Eric Koff · 20:55 Don't blame Toll Brothers about the school, blame the school district.
Manage
Like
· Reply · Message · 5w

Michelle Thomas · 0:20 does the city still have a tree for every building policy?
Manage
Like
· Reply · Message · 5w

Michelle Thomas · 0:47 How much is it? Maybe the people of Lake Forest can buy it
Manage
Like
· Reply · Message · 5w

John Ugrin · 31:57 Regency is a very busy thoroughfare now. Can you imagine the cut through it will become with 800 more homes in that area

1

Manage
Like
· Reply · Message · 5w

Peter Cheng · 46:37 Melinda its being proposed
Manage
Like
· Reply · Message · 5w

Patrick McDonagh · 21:18 Respect
Manage
Like
· Reply · Message · 5w

C.d. Larson · 49:52http://www.parks.ca.gov/.../files/savingclover%20valley.pdf tl;dr: This is a long and sad tale about how the PR firm Toll Brothers used was able to develop some pristine land in Northern California. They had ancient petroglyphs, sacred Native American sites, and Indian tribes on their side. They lost. Our only defense is a 3:2 Council majority.

2

Manage
Like
· Reply · Message · 5w · Edited

Melissa Sims · 22:52 Voters do
Manage
Like
· Reply · Message · 5w

Melissa Sims · 22:59 Not get a vote
Manage
Like
· Reply · Message · 5w

Melinda Kennedy · 46:57 And Peter
Manage
Like
· Reply · Message · 5w

Julie Mayr Grable · 18:09 Mini van mamas

1

Manage
Like
· Reply · Message · 5w

Melinda Kennedy · 46:42 Thanks Maria
Manage
Like
· Reply · Message · 5w

Rose Tingle · 4:11 NO, its not better
Manage
Like
· Reply · Message · 5w

Rob Anthony · 18:05 No more houses. Need more schools

1

Manage
Like

· Reply · Message · 5w

Dustin Miller · 20:16 WRITE it down. The ppl are talking

1

Manage
Like
· Reply · Message · 5w

Kathy Kaufman · 48:41 Following from FHR
Manage
Like
· Reply · Message · 5w

Daniel Warner · 49:36 No Traders Joe's? 😂
Manage
Like
· Reply · Message · 5w

Holly Turner · 17:30 No more houses!!

1

Manage
Like
· Reply · Message · 5w

Dustin Miller · 19:53 They dont care. Unbelievable
Manage
Like
· Reply · Message · 5w

Maria Fernada Nelson · 12:29 What about a school?
Manage
Like
· Reply · Message · 5w

Maria Fernada Nelson · 17:18 No more over crowed FRE

1

Manage
Like
· Reply · Message · 5w

Trisha Goyal · 23:47 Why not keep it agricultural?

1

Manage
Like
· Reply · Message · 5w

Rose Tingle · 7:20 now there is an echo
Manage
Like
· Reply · Message · 5w

Maria Fernada Nelson · 17:52 Thank you for speaking for all us about FRE
Manage
Like
· Reply · Message · 5w

Trisha Goyal · 15:57 No more houses

6

Manage
Like
· Reply · Message · 5w

Maria Fernada Nelson · 16:10 I agree!
Manage
Like
· Reply · Message · 5w

Pavla Dlab · 44:08 This proposal is wayyyyy too heavily reliant on a school—which 99% won't happen. Any agency (design, development, etc) should be used to proposing multiple options if one should fail in gathering approval. Clearly, Toll Brothers is banking on ultimate re-designation of the school site, as more housing.

1

Manage
Like
· Reply · Message · 5w

Barbara Cangas · 0:00 And it’s 10 acres of land currently designated for “proposed school site”. That’d be a lot of extra homes on that “corner”

Manage
Like
· Reply · Message · 5w

Peter Cheng · 48:18 Foothill elementary does seem to be over crowded though
Manage
Like
· Reply · Message · 5w

Julie Mayr Grable · 49:01 and the district doesn't want a school
Manage
Like
· Reply · Message · 5w

Peter Cheng · 48:54 especially with all the new kids coming in with the new housing
Manage
Like
· Reply · Message · 5w

Tracey Tingley · 27:23 Of course the property owners are requesting the change. The value of the property increases to developers if it is changed to residential. Developers would not be as interested if it was not residential.
Manage
Like
· Reply · Message · 5w

C.d. Larson · 51:52 In case you missed it, the County has the property zoned for Agriculture, but the City General Plan calls for Business/Industrial Parks. Interesting. I'd like the Council to update the General Plan to designate the property for Agriculture, not houses.

3

Manage
Like
· Reply · Message · 5w

C.d. Larson · 0:00 Net from tonight: they didn't write anything down, only your written comments matter. email it in and you're ahead of all of us who showed up.
Manage
Like
· Reply · Message · 5w

Judy Elmore · 0:00 Stop building!!!!! Our roads and resources cannot handle the load! This used to be such a nice place to live, but so crowded now it is smothering!

1

Manage
Like
· Reply · Message · 5w

Kim Leone · 40:39 Thank you Jonathan volzke. I just don't want to see it made worse. 22 yr resident...too hot here now...reduce concrete. We do need more schools, and more fun things to do for families (I'm not a skater)...have to to Irvine Spectrum for fun.

Manage
Like
· Reply · Message · 5w

Peter Cheng · 45:29 I'm all for a new school, BUT NOT next to the GAS STATION!!! How dangerous is that?!

1

Manage
Like
· Reply · Message · 5w

Sheila Robinson · 46:20 Yes! The Cal-trans project needs to be looked at in tandem with this one!

1

Manage
Like
· Reply · Message · 5w

Constance Seymour · 52:49 Much prefer agriculture to homes on top of each other and even more traffic.

1

Manage
Like
· Reply · Message · 5w

Dan Grantham · 20:43 26 portable buildings at foothill ranch elementary.

1

Manage

Like
· Reply · Message · 5w

Josh Abner Vizcay · 4:43 Already using using Toll Brothers $$$ to fix things
Manage
Like
· Reply · Message · 5w

Josh Abner Vizcay · 9:42 So she is saying people do not not go on vacation during summer or celebrate graduations
Manage
Like
· Reply · Message · 5w

Josh Abner Vizcay · 19:55 The purpose is to make money for Toll Brothers stakeholders & shareholders

1

Manage
Like
· Reply · Message · 5w

Pavla Dlab · 11:48 So, has the project site officially been sold to Toll Brothers?
Manage
Like
· Reply · Message · 5w

Sean Fletcher · 20:31 Remember SVUSD has an elementary school that it may be able to reopen in the future.

1

Manage
Like
· Reply · Message · 5w

Terri Gordon Grisenti · 20:53 Condition any future project such that the developer is required to garner an agreement from the school district to build a school.
Manage
Like
· Reply · Message · 5w

Maria Fernada Nelson · 21:44 This 👆
Manage

Like
· Reply · Message · 5w

Pavla Dlab · 22:49 Omg if it’s zoned as agricultural, then you keep it agricultural.

1

Manage
Like
· Reply · Message · 5w

Pavla Dlab · 23:19 None of this forced zone change to make it developable
Manage
Like
· Reply · Message · 5w

Pavla Dlab · 26:41 Yes, but quite a few of us are interested in ag options
Manage
Like
· Reply · Message · 5w

Pavla Dlab · 40:19 So it would be a dirt lot if there is no school?
Manage
Like
· Reply · Message · 5w

Pavla Dlab · 52:54 C.d. Larson sounds like maybe an alternative Party needs to contact Nakase, to counter the Toll Bros. proposal

1

Manage
Like
· Reply · Message · 5w

Madison Ortiz · 48:55 What can we do to oppose this? FRE is way overcrowded. 1/2 kids in portables or more. Wasn’t built for this impaction
Manage
Like
· Reply · Message · 5w

Sylvia Walker · 4:40 Still can't hear what is being said.
Manage
Like
· Reply · Message · 5w

Melissa Sims · 26:56 Houses are fine as long as they build more schools and infrastructure to handle if
Manage
Like
· Reply · Message · 5w

Melissa Sims · 27:20 The property owners are being paid a lot by developers to change it

1

Manage
Like
· Reply · Message · 5w

Trisha Goyal · 16:59 What why all the lake forest schools are already low enrollment

1

Manage
Like
· Reply · Message · 5w

Maria Fernada Nelson · 18:32 Irvine builds homes and schools at the same time
Manage
Like
· Reply · Message · 5w

Rose Tingle · 3:11 City of Lake Forest can't hear speakers!!!

1

Manage
Like
· Reply · Message · 5w

Maria Fernada Nelson · 27:36 Melissa they said school is up to the school distric to approve it
Manage
Like
· Reply · Message · 5w

Michelle Thomas · 0:20 just like the sewage is up to IRWD but shouldn't the city stand up for us and advocate for it?
Manage
Like
· Reply · Message · 5w

Maria Fernada Nelson · 45:14 It would be the same when Baker Ranch proposal came out.
Manage
Like
· Reply · Message · 5w

Maria Fernada Nelson · 45:32 No school, more homes, more traffic

1

Manage
Like
· Reply · Message · 5w

Trisha Goyal · 18:48 Good schools are crowded because people transfer their kids from the low rated schools
Manage
Like
· Reply · Message · 5w

Rose Tingle · 42:54 I'm curious in what city the Toll Bros. rep lives?
Manage
Like
· Reply · Message · 5w

Melinda Kennedy · 45:58 Sorry, late to the game here - so the Nakase site will def be residential?

1

Manage
Like
· Reply · Message · 5w

Julie Mayr Grable · 16:39 Toll builds lovely houses and what they develop will be an asset to our community!
Manage
Like
· Reply · Message · 5w

Holly Turner · 0:00 Please share how more houses, more people, more cars, and more traffic to our small city will be an asset outlet community. Oh yeah your husband is the developer so it will be an asset to your pocket..

Manage
Like
· Reply · Message · 5w · Edited

Susan Wattles · 0:00 I've lived in Lake Forest for thirty years and have seen no benefit, and no improvement to the quality of my life from all the new homes. How would this be any different?

1

Manage
Like
· Reply · Message · 5w

Julie Mayr Grable · 0:00 Susan 30 years. means you didn't buy the first house built in the City. So you got yours now nobody else should get theirs, right?

Manage
Like
· Reply · Message · 5w

Julie Mayr Grable · 0:00 Holly you know nothing about my husband or my "pocket" 🤦‍♀️

Manage
Like
· Reply · Message · 5w

Holly Turner · 0:00 Julie Mayr Grable except that he works for a builder in Irvine, so your interest is in support of the developers & builders for your own interest and not the true interest of the community. I know more than you think. My interest is my city and commun…See More

Manage
Like
· Reply · Message · 5w

Julie Mayr Grable · 0:00 Wow. Lots of assumptions there. You have NO IDEA of my involvement with, or interest in, the city or our county. Nice of you to speak my "truth" for me though.

1

Manage
Like
· Reply · Message · 5w

Holly Turner · 0:00 Julie Mayr Grable You say in a previous post that it's not personal, but you seem to be taking it personal. I am against big developers/builders in my city. You are obviously for them because one provides your husband with a paycheck..I get it. I am …See More

1

Manage
Like

· Reply · Message · 5w · Edited

Susan Wattles · 0:00 Julie Mayr Grable. Laughable argument.
Manage
Like
· Reply · Message · 5w

Judy Elmore · 0:00 What are you smoking!!!! Our nice community is going to hell in a handbasket! Closed businesses, over crowded roads, packed schools, open your eyes!

1

Manage
Like
· Reply · Message · 5w

Delcie RH · 17:14 We don’t need anymore houses please, a school would be great!
Manage
Like
· Reply · Message · 5w

Delcie RH · 22:06 Do the voters have to approve a zone change to allow housing?
Manage
Like
· Reply · Message · 5w

Julie Mayr Grable · 19:33 Perhaps SVUSD knows they don't need a school..... hmmm? Without housing, population decreases and schools are not as needed...
Manage
Like
· Reply · Message · 5w

Julie Mayr Grable · 21:37 SVUSD doesn't want a school. They've said so repeatedly
Manage
Like
· Reply · Message · 5w

Delcie RH · 35:58 There weren’t ever supposed to be trucks allowed on bake when Alton opened.
Manage
Like
· Reply · Message · 5w

Julie Mayr Grable · 42:20 Might become a Tent City if homes aren't built....
Manage
Like
· Reply · Message · 5w

Delcie RH · 46:00 No Melinda but that is what they are looking at
Manage
Like
· Reply · Message · 5w

Julie Mayr Grable · 53:20 Guys: Nakase wants to sell the land. You want to try force them to keep it?
Manage
Like
· Reply · Message · 5w

Michelle Thomas · 0:20 how much are they selling it for? maybe the community can purchase it, to prevent the new housing
Manage
Like
· Reply · Message · 5w

Julie Mayr Grable · 0:00 Michelle Thomas "the community"?
Manage
Like
· Reply · Message · 5w

Rebecca Goddard · 20:41 SVISD won’t allow school choice into any lake forest schools
Manage
Like
· Reply · Message · 5w

Julie Mayr Grable · 23:01 They have an application online to do intra district transfers....
Manage
Like
· Reply · Message · 5w

Rebecca Goddard · 22:04 Tax revenue and secret money to the city council

Manage
Like
· Reply · Message · 5w

John Claycomb · 0:00 Secret money? Like to see the proof on this one. As for tax revenue, why else would we want to build homes or commercial property?

Manage
Like
· Reply · Message · 5w

Rebecca Goddard · 0:00 John Claycomb traffic quality of life, environmental damage.

Manage
Like
· Reply · Message · 5w

John Claycomb · 25:21 Pavla, most land was agriculture before homes were built.

1

Manage
Like
· Reply · Message · 5w

John Claycomb · 30:02 Homes can include low density and middle density for senior living

Manage
Like
· Reply · Message · 5w

Dan Grantham · 18:59 SVUSD has already said no school.

2

Manage
Like
· Reply · Message · 5w

Rose Tingle · 15:23 How much more water will be needed to support each new house per year?

2

Manage
Like
· Reply · Message · 5w

Rebecca Goddard · 1:34 You're RUINING OUR CANYON. STOP lining your pockets and ruining our environment and making traffic.

2

Manage
Like
· Reply · Message · 5w

Josh Abner Vizcay · 6:06 City Attomey's job is make sure city does not get sued : not to investigate Toll brother payoffs to rig the process

Manage
Like
· Reply · Message · 5w

Delcie RH · 28:12 My concerns are with the additional traffic that will come with 800 houses. We need more green space, a park with a splash pad perhaps...a city pool, etc Center, etc.

1

Manage
Like
· Reply · Message · 5w

Julie Mayr Grable · 31:50 And who will pay for this? Home building brings revenue to City. Build the homes and condition them to add these types of amenities.

Manage
Like
· Reply · Message · 5w

Josh Abner Vizcay · 14:45 Already giving "talking points" to to change the zoning so Toll Brothers share holders can make more $$$ current stock price $34.00 down from $54 ....

Manage
Like
· Reply · Message · 5w

C.d. Larson · 28:07 Bicycle paths....hahahahahahahhahahahahaha. For all those cyclists who ride to the store and the gym....wait, that's me. That's *nobody* but me.

Manage
Like
· Reply · Message · 5w

Madison Ortiz · 47:19 They can not force the school district to build a school and the district already said they wouldn't. This is just get more $ resulting in more traffic.

1

Manage
Like
· Reply · Message · 5w

Kim Leone · 29:04 But the city rarely does enough for infrastructure, nor have they considered the safety of residents simply trying to cross streets or get out of your neighborhood

1

Manage
Like
· Reply · Message · 5w

Madison Ortiz · 50:14 They are proposing something as part of this "plan" that they have no ability to follow thru with. It's all up to the district

2

Manage
Like
· Reply · Message · 5w

Brian FitzGerald · 34:06 Shouldn't the people who will be impacted, the residents of Lake Forest, be able to vote on whether there is a change of zoning from agricultural to commercial and residential?

2

Manage
Like
· Reply · Message · 5w

C.d. Larson · 10:07 Guy into and out of frame on the right side works for Toll Brothers. He entered unannounced. Blue shirt, tan pants, smoothie. He spoke at the session at Baker Ranch. Polite guy.

Manage
Like
· Reply · Message · 5w

Kim Leone · 34:21 City, my concern is that these impact studies are rarely done on offshoot streets. For example, when Alton was opened, you increased the traffic and danger along Antibes and Paloma when we have one way out.

Did anyone consider this impact and the danger you have already placed on us and our kids? Will you consider those streets, for example, Commerce Center and Towns Center?

1

Manage
Like
· Reply · Message · 5w

City of Lake Forest - Government · 36:04 Great comment, Kim - I (Jonathan Volzke here), am not familiar with the Alton impact study. We can follow up on that. But in this case, yes, we will. Great comment, thank you.
Manage
Like
· Reply · Commented on by Don Jose Serrano · 5w

Rose Tingle · 2:26 Please tell the speakers to use a mike, can't hear Mayor Jim Gardner

1

Manage
Like
· Reply · Message · 5w

City of Lake Forest - Government · 3:40 Sound should be better now.
Manage
Like
· Reply · Commented on by Don Jose Serrano · 5w

Pavla Dlab · 24:51 Exactly Trisha. But agricultural isn't appealing from a tax revenue standpoint
Manage
Like
· Reply · Message · 5w

City of Lake Forest - Government · 27:02 The property owners are requesting the change.

1

Manage
Like
· Reply · Commented on by Don Jose Serrano · 5w

Trisha Goyal · 0:00 City of Lake Forest - Government of course the property owners are requesting the change so they can sell to the highest bidder. Sadly that would most likely be a housing development. 👎.
Manage
Like
· Reply · Message · 5w

City of Lake Forest - Government · 13:33That is Planning Director Gayle Ackerman speaking.
Manage
Like
· Reply · Commented on by Don Jose Serrano · 5w

City of Lake Forest - Government · 13:52Saddleback Valley Unified School District will decide on whether a school is included.
Manage
Like
· Reply · Commented on by Don Jose Serrano · 5w

Dan Grantham · 0:00 They already said no.....
Manage
Like
· Reply · Message · 5w

Dustin Miller · 0:00 Dan Grantham really?
Manage
Like
· Reply · Message · 5w

Barbara Cangas · 0:00 Yes, SVUSD has declined building new schools because of costs and declining attendance numbers in older areas of the city and in the district. I went to one of the first meetings about the land use of Nakase Nursery. Toll Brothers hosted it at Baker Ranch Club House
Manage
Like
· Reply · Message · 5w

City of Lake Forest - Government · 52:49Thank you for joining us online tonight - we had as many people "attend" via Facebook as were in the room. This will remain up; remember to read the documents on the planning pages at www.lakeforestca.gov and follow us on social media - we will keep you abreast of meetings and deadlines. Thank you.
Manage
LAKEFORESTCA.GOV
Lake Forest, CA - Official Website |…

2

Like
· Reply · Remove Preview · Commented on by Don Jose Serrano · 5w

City of Lake Forest - Government · 8:56Thank you! Sorry for the audio challenges tonight; different room without formal audio system.
Manage
Like
· Reply · Commented on by Don Jose Serrano · 5w

City of Lake Forest - Government · 11:12We will be updating the Planning Website with notes and information from tonight as well.
Manage
Like
· Reply · Commented on by Don Jose Serrano · 5w

City of Lake Forest - Government · 16:03About 15 people in the room.
Manage
Like
· Reply · Commented on by Don Jose Serrano · 5w

City of Lake Forest - Government · 44:10We will be taking comments online, as well.
Manage
Like
· Reply · Commented on by Don Jose Serrano · 5w

City of Lake Forest - Government · 30:40Traffic will be studied; the EIR identifies the mitigation necessary to offset the impacts. A speaker just identified traffic and noise as potential impacts.

1

Manage
Like
· Reply · Commented on by Don Jose Serrano · 5w

City of Lake Forest - Government · 14:34An important key made earlier: The proposed developer pays for the environmental study, but the firm doing the study (LSA) works for the City.
Manage
Like
· Reply · Commented on by Don Jose Serrano · 5w

City of Lake Forest - Government · 38:35Remember to go to the planning page on www.lakeforestca.gov - you will find documents there, including detailed application for the proposed project.
Manage
LAKEFORESTCA.GOV
Lake Forest, CA - Official Website |…
Like
· Reply · Remove Preview · Commented on by Don Jose Serrano · 5w

City of Lake Forest - Government · 46:01 If you stay online, I will try to take the portable camera up to show the display boards.I will mute the sound to prevent the feedback we had earlier.

2

Manage
Like
· Reply · Commented on by Don Jose Serrano · 5w

Dan Grantham · 0:00 Thank you for doing all of this! It makes a difference'

3

Manage
Like
· Reply · Message · 5w · Edited

City of Lake Forest - Government · 33:54Responding to a question, City officials pointing out that the City also studies nearby development - even in other cities - to determine the impacts and how a potential project will fit in.
Manage
Like
· Reply · Commented on by Don Jose Serrano · 5w

Appendix A. California Agricultural LESA Worksheets

NOTES

Nakase Project

The Nakase Project is a 122 acre parcel located in the City of Lake Forest, Orange County, California. The site is currently occupied by a nursery and once the Project is approved the site will be developed with a master planned community. Eight soil mapping units have been identified on the site and the acres of each have been determined using GIS. The soils include: Unit 135 5.6 acres; Unit 136 4.0 acres; Unit 142 20.2 acres; Unit 149 27.8 acres; Unit 176 1.5 acres; Unit 174 11.6 acres; Unit 191 1.4 acres; and Unit 207 48.9 acres. The acreage of each soil type is divided by the total Project acreage, 121.1 acres to determine the proportion of each soil type that occurs on the Project site.

The LCCs for the eight soil types were found in the Orange County Soil Survey and are identified as follows: Unit 135 LCC IIIe; Unit 136 LCC IVe; Unit 142 LCC VIIe; Unit 149 LCC IIe; Unit 176 LCC VIe; Unit 174 LCC VIe; Unit 191 LCC VIIIw; and, Unit 207 LCC IIe. From the LCC Scoring Table the LCC point ratings for the eight soils are: Unit 135 LCC Rating 70; Unit 136 LCC Rating 50; Unit 142 LCC Rating 10; Unit 149 LCC Rating 90; Unit 176 LCC Rating 20; Unit 174 LCC Rating 20; Unit 191 LCC Rating 0; and, Unit 207 LCC Rating 90. The portion of each soil type represented is multiplied by its point rating in Column E to determine the LCC Score in Column F. The LCC Scores are then summed in Column F to get a total LCC Score of 65.6 , which has been entered in Box <1> of the Final LESA Score Sheet.

Storie Index Ratings (SIR) for each soil type was obtained from the Orange County Soil Survey and are as follows: Unit 135 SIR 90; Unit 136 SIR 81; Unit 142 SIR 7; Unit 149 SIR 47; Unit 176 SIR 27; Unit 174 SIR 35; Unit 191 SIR 40; and, Unit 207 SIR 90. The Storie Index ratings are multiplied by the proportion of each soil type in the Project area and the score is entered in Column H. Column H is summed to get a total Storie Index Score of 59.1 points, which has been entered in Box <2> of the Final LESA Score Sheet.

Calculation of the Land Evaluation (LE) Score

Part 1. Land Capability Classification (LCC) Score:

(1) Determine the total acreage of the project.
(2) Determine the soil types within the project area and enter them in **Column A** of the **Land Evaluation Worksheet** provided on page 2-A.
(3) Calculate the total acres of each soil type and enter the amounts in **Column B**.
(4) Divide the acres of each soil type (**Column B**) by the total acreage to determine the proportion of each soil type present. Enter the proportion of each soil type in **Column C**.
(5) Determine the LCC for each soil type from the applicable Soil Survey and enter it in **Column D**.
(6) From the LCC Scoring Table below, determine the point rating corresponding to the LCC for each soil type and enter it in **Column E**.

LCC Scoring Table

LCC Class	I	IIe	IIs,w	IIIe	IIIs,w	IVe	IVs,w	V	VI	VII	VIII
Points	100	90	80	70	60	50	40	30	20	10	0

(7) Multiply the proportion of each soil type (**Column C**) by the point score (**Column E**) and enter the resulting scores in **Column F**.
(8) Sum the LCC scores in **Column F**.
(9) Enter the LCC score in box <1> of the **Final LESA Score Sheet** on page 10-A.

Part 2. Storie Index Score:

(1) Determine the Storie Index rating for each soil type and enter it in **Column G**.
(2) Multiply the proportion of each soil type (**Column C**) by the Storie Index rating (**Column G**) and enter the scores in **Column H**.
(3) Sum the Storie Index scores in **Column H** to gain the Storie Index Score.
(4) Enter the Storie Index Score in box <2> of the **Final LESA Score Sheet** on page 10-A.

Land Evaluation Worksheet

Land Capability Classification (LCC) and Storie Index Scores

A	B	C	D	E	F	G	H
Soil Map Unit	Project Acres	Proportion of Project Area	LCC	LCC Rating	LCC Score	Storie Index	Storie Index Score
135	5.6	0.05	IIIe	70	3.5	90	4.5
136	4.0	0.03	IVe	50	1.5	81	2.4
142	20.2	0.17	VIIe	10	1.7	7	1.2
149	27.8	0.23	IIe	90	20.7	47	10.8
176	1.5	0.01	VIe	20	0.2	27	0.3
174	11.6	0.10	VIe	20	2.0	35	3.5
191	1.4	0.01	VIIIw	0	0	40	0.4
207	48.9	0.40	IIe	90	36	90	36.0
Totals	121.1	(Must Sum to 1.0)		***LCC Total Score***	65.6	***Storie Index Total Score***	59.1

Site Assessment Worksheet 1.

Project Size Score

	I	J	K
	LCC Class I - II	LCC Class III	LCC Class IV - VIII
	27.8	5.6	4.0
	48.9		20.2
			1.5
			11.6
			1.4
Total Acres	76.7	5.6	38.7
Project Size Scores	90	0	0

Highest Project Size Score 90

Updated 2011

LESA Worksheet (cont.)

NOTES CON.

Column I sums to 76.7 acres of Class I or II soils.
Column J sums to 5.6 acres of Class III soils.
Column K sums to 38.7 acres of Class IV to VIII soils.

Column I - 76.7 acres of Class I or II soils corresponds to a score of 90 points.
Column J - 5.6 acres of Class III soils corresponds to a score of 0 points.
Column K- 38.7 acres of Class IV to VIII soils corresponds to a score of 0 points.

The highest score is for Column I, 90 points, which has been entered in box <3> of the Final LESA Score Sheet.

Calculation of the Site Assessment (SA) Score

Part 1. Project Size Score:.

(1) Using **Site Assessment Worksheet 1** provided on page 2-A, enter the acreage of each soil type from **Column B** in the **Column - I, J or K** - that corresponds to the LCC for that soil. (Note: While the Project Size Score is a component of the Site Assessment calculations, the score sheet is an extension of data collected in the Land Evaluation Worksheet, and is therefore displayed beside it).
(2) Sum **Column I** to determine the total amount of class I and II soils on the project site.
(3) Sum **Column J** to determine the total amount of class III soils on the project site.
(4) Sum **Column K** to determine the total amount of class IV and lower soils on the project site.
(5) Compare the total score for each LCC group in the Project Size Scoring Table below and determine which group receives the highest score.

Project Size Scoring Table

Class I or II		**Class III**		**Class IV or Lower**	
Acreage	Points	Acreage	Points	Acreage	Points
>80	100	>160	100	>320	100
60-79	90	120-159	90	240-319	80
40-59	80	80-119	80	160-239	60
20-39	50	60-79	70	100-159	40
10-19	30	40-59	60	40-99	20
10<	0	20-39	30	40<	0
		10-19	10		
		10<	0		

(6) Enter the **Project Size Score** (the highest score from the three LCC categories) in box <3> of the **Final LESA Score Sheet** on page 10-A.

LESA Worksheet (cont.)

NOTES

There is one type of irrigation on the Project site: Well water is used all year. During periods of drought Irvine Ranch Water District (IRWD) water is used as a supplement to the on-site well water when needed. The Project site includes one portion according to irrigation availability:

Portion 1: Well water used on 100% of the Project Site. During Non-Drought Years irrigated production is feasible. There are typically no physical restrictions nor economic restrictions on-site during Non-Drought Years. During Drought Years, irrigated production is feasible however. If hot weather persists than Irvine Ranch Water District water is available to supplement the well water. Economic restrictions can also occur on site during Drought Years as the rise in water costs could result in the reduction of consumption on the Project site for the existing nursery.

Portion 1 - (80 points)(1.0) = 80 points

Portion 1 = 80 points has been entered in Box <4> of the Final LESA Score Sheet.

Part 2. Water Resource Availability Score:

(1) Determine the type(s) of irrigation present on the project site, including a determination of whether there is dryland agricultural activity as well.

(2) Divide the site into portions according to the type or types of irrigation or dryland cropping that is available in each portion. Enter this information in **Column B** of **Site Assessment Worksheet 2. - Water Resources Availability**.

(3) Determine the proportion of the total site represented for each portion identified, and enter this information in **Column C**.

(4) Using the Water Resources Availability Scoring Table, identify the option that is most applicable for each portion, based upon the feasibility of irrigation in drought and non-drought years, and whether physical or economic restrictions are likely to exist. Enter the applicable Water Resource Availability Score into **Column D**.

(5) Multiply the Water Resource Availability Score for each portion by the proportion of the project area it represents to determine the weighted score for each portion in **Column E**.

(6) Sum the scores for all portions to determine the project's total Water Resources Availability Score

(7) Enter the Water Resource Availability Score in box <4> of the **Final LESA Score Sheet** on page 10-A.

Site Assessment Worksheet 2. - Water Resources Availability

A	B	C	D	E
Project Portion	Water Source	Proportion of Project Area	Water Availability Score	Weighted Availability Score (C x D)
1	Irvine Ranch Water District Domestic and Recycled	1.0	80	80
2				
3				
4				
5				
6				
		(Must Sum to 1.0)	***Total Water Resource Score***	80

Water Resource Availability Scoring Table

Option	Non-Drought Years			Drought Years			WATER RESOURCE SCORE
	RESTRICTIONS			RESTRICTIONS			
	Irrigated Production Feasible?	Physical Restrictions ?	Economic Restrictions ?	Irrigated Production Feasible?	Physical Restrictions ?	Economic Restrictions ?	
1	YES	NO	NO	YES	NO	NO	100
2	YES	NO	NO	YES	NO	YES	95
3	YES	NO	YES	YES	NO	YES	90
4	YES	NO	NO	YES	YES	NO	85
5	YES	NO	NO	YES	YES	YES	80
6	YES	YES	NO	YES	YES	NO	75
7	YES	YES	YES	YES	YES	YES	65
8	YES	NO	NO	NO	-- --	-- --	50
9	YES	NO	YES	NO	-- --	-- --	45
10	YES	YES	NO	NO	-- --	-- --	35
11	YES	YES	YES	NO	-- --	-- --	30
12	Irrigated production not feasible, but rainfall adequate for dryland production in both drought and non-drought years						25
13	Irrigated production not feasible, but rainfall adequate for dryland production in non-drought years (but not in drought years)						20
14	Neither irrigated nor dryland production feasible						0

NOTES

The Project site is surrounded by 7 parcels totaling approximately 545.3 acres. The ZOI is composed of these parcels and as such is 545.3 acres in size.

After reviewing images from Google Earth, the parcels composed of the ZOI look to be under urban uses, and no agricultural uses are visible. Review of the United States Department of Agriculture National Agricultural Statistics Service CropScape-Cropland Data Layer website (https://nassgeodata.gmu.edu/CropScape/) for 2017 indicates that the ZOI contains 18.9 acres of Grass/Pasture which is considered a "crop" category. As such, the percent of the ZOI in agriculture is 18.9 acres divided by 545.3 acres, or 3.5 percent. This percentage (3.5 percent) corresponds to a score of 0 points.

0 points is entered in box <5> of the Final LESA Score Sheet.

Part 3. Surrounding Agricultural Land Use Score:

(1) Calculate the project's Zone of Influence (ZOI) as follows:
(a) a rectangle is drawn around the project such that the rectangle is the smallest that can completely encompass the project area.
(b) a second rectangle is then drawn which extends one quarter mile on all sides beyond the first rectangle.
(c) The ZOI includes all parcels that are contained within or are intersected by the second rectangle, less the area of the project itself.
(2) Sum the area of all parcels to determine the total acreage of the ZOI.
(3) Determine which parcels are in agricultural use and sum the areas of these parcels
(4) Divide the area in agriculture found in step (3) by the total area of the ZOI found in step (2) to determine the percent of the ZOI that is in agricultural use.
(5) Determine the Surrounding Agricultural Land Score utilizing the Surrounding Agricultural Land Scoring Table below.

Surrounding Agricultural Land Scoring Table

Percent of ZOI in Agriculture	Surrounding Agricultural Land Score
90-100	100
80-89	90
75-79	80
70-74	70
65-69	60
60-64	50
55-59	40
50-54	30
45-49	20
40-44	10
<40	0

(5) Enter the Surrounding Agricultural Land Score in box <5> of the **Final LESA Score Sheet** on page 10-A.

Site Assessment Worksheet 3.
Surrounding Agricultural Land and Surrounding Protected Resource Land

A	B	C	D	E	F	G
Zone of Influence						
Total Acres	Acres in Agriculture	Acres of Protected Resource Land	Percent in Agriculture (A/B)	Percent Protected Resource Land (A/C)	Surrounding Agricultural Land Score (From Table)	Surrounding Protected Resource Land Score (From Table)
545.3	18.9	0	3.5	0	0	0

NOTES

Review of the California Department of Conservation California Land Conservation Act of 1965 2016 Status Report indicates that in 2015 Orange County (https://www.conservation.ca.gov/dlrp/wa/Documents/stats_reports/2016%20LCA%20Status%20Report.pdf) did not have any land inventoried under Williamson Act or Farmland Security Zone contracts. As such, the parcels of the ZOI do not have any Williamson Act or Farmland Security Zone contracts established. Furthermore, the parcels within the ZOI are fully urbanized; as such, there is no publicly owned lands maintained as park, forest, or watershed resources; and there are no lands with agriculture, wildlife habitat, open space, or other natural resource easements that restrict the conversion of such land to urban or industrial uses.

Based on the information above, 0 percent of the ZOI is protected; as such, the Protected Resource Land score is 0 points.

0 points has been entered in Box <6> of the Final LESA Score Sheet.

Part 4. Protected Resource Lands Score:

The Protected Resource Lands scoring relies upon the same Zone of Influence information gathered in Part 3, and figures are entered in Site Assessment Worksheet 3, which combines the surrounding agricultural and protected lands calculations.

(1) Use the total area of the ZOI calculated in Part 3. for the Surrounding Agricultural Land Use score.

(2) Sum the area of those parcels within the ZOI that are protected resource lands, as defined in the California Agricultural LESA Guidelines.

(3) Divide the area that is determined to be protected in Step (2) by the total acreage of the ZOI to determine the percentage of the surrounding area that is under resource protection.

(4) Determine the Surrounding Protected Resource Land Score utilizing the Surrounding Protected Resource Land Scoring Table below.

Surrounding Protected Resource Land Scoring Table

Percent of ZOI Protected	Protected Resource Land Score
90-100	100
80-89	90
75-79	80
70-74	70
65-69	60
60-64	50
55-59	40
50-54	30
45-49	20
40-44	10
<40	0

(5) Enter the Protected Resource Land score in box <6> of the **Final LESA Score Sheet** on page 10-A.

NOTES

The component LE and SA Scores have been entered into the Final LESA Score Sheet. The LE factor scores were multiplied by the factor weights to determine the weighted score for each. The weighted LE factor scores were summarized to determine the LE portion of the Final LESA score.

The SA factor scores were multiplied by the factor weights to determine the weighted score for each. The weighted SA factor scores are summed to determine the SA portion of the Final LESA score. The LE and SA subtotals are summed to determined the Final LESA score.

The Final LESA Score for the Project is 56.7. This score is considered significant since the LE and SA subscores are each greater than or equal to 20 points. For further information on the scoring thresholds under the California Agricultural LESA Model, consult Section 4 of the LESA Instruction Manual.

Final LESA Score Sheet

Calculation of the Final LESA Score:

(1) Multiply each factor score by the factor weight to determine the weighted score and enter in Weighted Factor Scores column.
(2) Sum the weighted factor scores for the LE factors to determine the total LE score for the project.
(3) Sum the weighted factor scores for the SA factors to determine the total SA score for the project.
(4) Sum the total LE and SA scores to determine the Final LESA Score for the project.

	Factor Scores	Factor Weight	Weighted Factor Scores
LE Factors			
Land Capability Classification	<1> 65.6	0.25	16.4
Storie Index	<2> 59.1	0.25	14.8
LE Subtotal		***0.50***	**31.2**
SA Factors			
Project Size	<3> 90	0.15	13.5
Water Resource Availability	<4> 80	0.15	12
Surrounding Agricultural Land	<5> 0	0.15	0
Protected Resource Land	<6> 0	0.05	0
SA Subtotal		***0.50***	**25.5**
		Final LESA Score	**56.7**

CARLSBAD
FRESNO
IRVINE
LOS ANGELES
PALM SPRINGS
POINT RICHMOND
RIVERSIDE
ROSEVILLE
SAN LUIS OBISPO

October 31, 2018

Mr. Richard Vuong
Planning Division
OC Public Works Service Area/ OC Development Services
300 North Flower Street
Santa Ana, CA 92702-4048

Subject: Nakase Property Area Plan Environmental Impact Report, City of Lake Forest

Dear Mr. Vuong:

This letter has been sent to you as part of an environmental review process being conducted pursuant to the California Environmental Quality Act (CEQA). The City of Lake Forest (City) has determined that preparation of an Environmental Impact Report (EIR) is necessary to adequately analyze the environmental effects of the Nakase Property Area Plan project (proposed project). The City is the Lead Agency, and LSA Associates, Inc. (LSA) has been retained by the City to prepare the environmental analysis required for the proposed project.

The project site is approximately 122 acres located at 20261 Lake Forest Drive, Lake Forest, CA 92630 (Assessor's Parcel Number [APN] 612-221-01) and is currently operating as Nakase Brothers Wholesale Nursery, an agricultural wholesale plant nursery. The location of the Project site is shown on Figure 1.

The Nakase Property Area Plan would facilitate the development of the 122 ac proposed Project site as a master-planned community. Implementation of the Area Plan would include development of residential uses, an elementary school site, and over 28 acres of parks, open space, and habitat restoration area. The Area Plan would establish guidelines for the future development of the planned community, which would consist of single-family residential units (contained in five distinct neighborhoods), affordable apartment units for senior citizens, an elementary school site, parks and open space, an internal circulation system, and a multipurpose water quality basin.

The proposed Project would entitle development of up to 675 two- and three-story, single-family residential units on approximately 61.4 acres of the site. In order to meet the City's affordable housing policy as stipulated in the Housing Element (2014), up to 101 senior affordable housing units1 would be constructed on 3.9 acres in a two to three story building with an elevator. The units would be available for rent. The proposed elementary school site would accommodate a school for approximately 800 to 1,000 students from kindergarten through sixth grade. The school site would be located on the northwestern portion of the proposed Project site, at the corner of Bake Parkway and Rancho Parkway. Access to the proposed Project site would be provided at three proposed locations: two entries at Bake Parkway and one entry at Rancho Parkway. The two entries at Bake Parkway would line up with existing roads (Rancho Parkway South and Orchard Street).

20 Executive Park, Suite 200, Irvine, California 92614 949.553.0666 www.lsa.net

LSA is seeking information on how the proposed project would affect the Orange County Public Library's ability to provide services and whether the project would require new or expanded facilities. To assist with this effort, a questionnaire has been enclosed with specific questions relating to services near the project area. It would be helpful to the analysis for us to receive a response by Friday, November 16, 2018. Please email your response to ryan.bensley@lsa.net.

If you have any questions or comments on the questionnaire, please contact me at (949) 553-0666. Thank you for your time and assistance.

Sincerely,

LSA Associates, Inc.

Ryan Bensley
Project Manager, AICP

Attachment: OCPL Questionnaire

LIBRARY QUESTIONNAIRE

For your convenience, LSA has provided space below for your answers. If you choose to answer these questions in the form of a letter, please number your responses to correspond to the questions. Please email your responses ryan.bensley@lsa.net. We would appreciate a response by **November 16, 2018**.

1. **Please confirm the following information regarding County library facilities:**

   The Orange County Public Library (OCPL) system provides library services to the County, including the City, and includes 33 branches, and two OCPL branches are located in Lake Forest. The Foothill Ranch Library is located at 27002 Cabriole Way, approximately 1.0 mi northeast of the Project Site. The El Toro Library is located at 24672 Raymond Way, approximately 4.5 mi southwest of the Project Site.

2. **According to the Growth Management Element of the Orange County General Plan (2012), the County's standards for library service are one 10,000 sf branch library facility per 50,000 residents, or if appropriate, one 15,000 sf regional library per 75,000 residents. This translates into 0.2 square foot of library space per capita. Please confirm that OCPL is still using this service standard for square footage per capita.**

3. **In its scoping comments regarding the Nakase Property (proposed project) dated August 13, 2018, OCPL indicated that it also has a volumes per capita service standard. Based on our previous experience in Orange County, OCPL's adopted service standard is 1.5 volumes of books per capita. Please confirm that OCPL is still using this service standard or provide updated information.**

4. **What are the square footage and resource capacity (ie. books and other resources) of the Foothill Ranch Library and El Toro Library?**

5. **In its scoping comments regarding the Nakase Property (proposed project) dated August 13, 2018, OCPL indicated that the "review and need for Developmental Fees" be considered for the proposed project. Has the County adopted any library development fees that would apply to new residential development? If so, does OCPL have an arrangement with the City to collect these fees? Does OCPL have any recommended mitigating measures if Library facilities are deficient in space or resources for the needs of the proposed project?**

6. **Please provide any additional information that may be helpful in preparing an environmental analysis of the proposed project.**

Prepared by: _____

Title: _____

Date: _____

Phone: _____

LIBRARY QUESTIONNAIRE –
RESPONSE TO: NAKASE PROPERTY AREA PLAN ENVIRONMENTAL IMPACT REPORT, CITY OF LAKE FOREST

ryan.bensley@

1. Please confirm the following information regarding County library facilities

The Orange County Public Library (OCPL) system provides library services to the County, including the City, and includes 33 branches, and two OCPL branches are located in Lake Forest. The Foothill Ranch Library is located at 27002 Cabriole Way, approximately 1.0 miles northeast of the Project Stie. The El Toro Library is located at 24672 Raymond Way, approximately 4.5 miles southwest of the Project Site.

The above information is correct.

2. According to the Growth Management Element of the Orange County General Plan (2012), the County's standards for library service are one 10,000 sf branch library facility per 50,000 residents, or if appropriate, one 15,000 sf regional library per 75,000 residents. This translates into 0.2 square foot of library space per capita. Please confirm that OCPL is still using this service standard for square footage per capita.

According to the American Library Association (ALA) they no longer set quantitative "space per capita standards" for public library buildings. The information previously used by the County is from the early 1970s and is no longer relevant. Libraries are constantly evolving to meet the needs of the communities they serve. A complete analysis would be necessary at both sites to determine the exact plan of action to accommodate the increased population/usage. Both El Toro and Foothill Ranch branches are at maximum capacity. In general, the following would need to be considered:

- *Nearby/existing buildings and structures – can an expansion be completed that includes better use of space to accommodate the growing community including both internal (community and program rooms, technological impacts and upgrades, expanded collections) as well as external (parking and ease of access) renovations.*
- *Cost analysis of a renovation/expansion – infrastructure (ex. HVAC, lighting, plumbing for expanded areas), possible building expansion, staffing, technology infrastructure (cabling, WIFI, computers etc.), shelving systems for increased size of collection, additional electricity outlets, furniture with charging stations for expanded digital usage, space for kiosks to check out laptops and chargers.*

3. In its scoping comments regarding the Nakase Property (proposed project) dated August 13, 2018, OCPL indicated that it also has a volumes per capita

service standard. Based on our previous experience in Orange County, OCPL's adopted service standard is 1.5 volumes of books per capita. Please confirm that OCPL is still using this service standard or provide updated information.

Service standards too, are now rapidly changing and no longer "quantified" as volumes of books per capita. The form and function of the library system has dramatically changed and continues to evolve. Libraries are not "just for books". Communities (especially new communities) expect Libraries to be used as gathering spaces, community hubs, a place to go for educational programming and lectures, specific programming for children, teens, adults, seniors and students as well as a growing resource for business. Libraries are designated "safe spaces" for all and include specific programming and services for the underserved.

Expectations to accommodate the increase growth of the City would include, but not be limited to, adding on to existing structures, upgrading amenities to encourage more remote or online usage, additional programming opportunities, infrastructure upgrades to keep up with the increase usage. More time would be necessary to quantify a "standard" we would expect that the 1970s 1.52 volume would be increased and can be compared to standard models such as the Consumer Price Index, or a comparison of other community necessity studies, such as fire, police and parks.

4. What are the square footage and resource capacity (ie. Books and other resources) of the Foothill Ranch Library and El Toro Library?

El Toro Library is 13,940 sq. ft. which includes a Community Room and the Friends of the Library space. Resources are lacking, as there is no room to add shelving for collections, Kiosks for checking out laptops and charges, the community room does not accommodate the programming needs, parking is limited, the Library needs new furniture to accommodate electrical outlets for users.

Foothill Ranch Library is 12,914sq. ft. which includes a Community Room and Friends of the Library space. Resources are also limited and need upgrading to meet the needs or a new community. Upgraded electrical, WIFI, furniture, HVAC, and space. Parking is also limited.

The resources at both locations currently are over capacity.

5. In its scoping comments regarding the Nakase Property (proposed project) dated August 13, 2018, OCPL indicated that the "review and need for Developmental Fees" be considered for the proposed project. Has the County adopted any library development fees that would apply to new residential development? If so, does OCPL have an arrangement with the City to collect these fees? Does OCPL have any recommended mitigating measures if Library facilities are deficient in space or resources for the needs of the proposed project?

To date, conversations have not begun regarding the Cities' expectations of Library services for the new community. As with other cities, the goal would be to enter into an agreement with the City to set aside funds targeted specifically for the renovation/upgrade of the libraries, to serve their community. The expansion of either El Toro and/or Foothill Ranch are not budgeted and library capital funds are limited at best. The County is open to ideas and continued a partnership with the City.

6. Please provide any additional information that may be helpful in preparing an environmental analysis of the proposed project.

Extensive research (collectively known as "School Library Impact Studies") shows that schools have relied on their libraries to support student growth, specifically in the areas of literacy, information literacy, technological skills, and access to resources and equipment, and have seen increased motivation, higher assessment scores, and ultimately higher graduation rates. With a new elementary school in the proposed plan Library capacity will need to be expanded.

The El Toro Library is in need of expanding its Summer Lunch @ the Library program for low income youth (<18) to meet the need in the area. The Community Room cannot accommodate the residents currently participating, much less the anticipated expanding community.

Prepared by: Julie A. Oakley
Title: Administrative Manager OCPL
Date: November 21, 2018
Phone: 714 566-3024

June 2019

PRELIMINARY HYDROLOGY ANALYSIS

"Nakase Property"

Vesting Tentative Tract Map No. 18142

City of Lake Forest | County of Orange

Prepared For:

Toll Brothers
AMERICA'S LUXURY HOME BUILDER

725 Town & Country Road
Suite 200
Orange, CA 92868

Phone: (714) 347-1300

Prepared By:

HUNSAKER & ASSOCIATES IRVINE, INC.
Three Hughes, Irvine, CA 92618 | 949.583.1010

WO#: 1443-135X HydroAnalVTTM18142NakasePrpty

June 2019

PRELIMINARY HYDROLOGY ANALYSIS

"Nakase Property"

Vesting Tentative Tract Map No. 18142

City of Lake Forest | County of Orange

HUNSAKER & ASSOCIATES IRVINE, INC.

PRELIMINARY HYDROLOGY ANALYSIS

" Nakase Property"

Vesting Tentative Tract Map No. 18142

City of Lake Forest | County of Orange

HUNSAKER & ASSOCIATES IRVINE, INC.

June 2019

PRELIMINARY HYDROLOGY STUDY

For

Nakase Property
Vesting Tentative Tract Map No. 18142

City of Lake Forest
County of Orange

PREPARED BY:

HUNSAKER & ASSOCIATES IRVINE, INC.
3 Hughes, Irvine, California 92618

Prepared under the supervision of:

Mohammed Rowther, P.E. **R.C.E. 37127** **Exp. 06/30/19**

TABLE OF CONTENTS

SECTION TITLE

1 INTRODUCTION 1

1. Background / Purpose 2
2. Methodology 2
3. Existing Conditions 5
4. Proposed Conditions 8
5. Conclusion 9

LIST OF TABLES

Table 3-1 Existing Hydrology Study Summary 6
Table 4-1 Proposed Hydrology Study Summary (No Detention) 9
Table 5-1 Proposed Hydrology Study Summary (With Detention)... 9
Table 5-2 Onsite & Offsite Area "A" Flood Volume Summary at Node 61 10
Table 5-3 Onsite Area "B" Flood Volume Summary at Node 61… . 10
Table 5-4 100-Year Total Site Flood Volume Summary (Area "A" + Area "B" 11

LIST OF EXHIBITS

Exhibit 1 "Preliminary Hydrology Vicinity Map"
Exhibit 2 "Hydrology Map Nakase Ranch Nursery Existing Condition"
Exhibits 2A & 2B "Hydrology Maps VTM 18142 (Offsite) Existing Condition"
Exhibit 3 "Hydrology Map VTM 18142 Proposed Condition"
Exhibit 4 "Tributary Area to F19-P07 VTM 18142 Existing Condition"
Exhibit 5 "Tributary Area to F19-P07 VTM 18142 Proposed Condition"
Exhibit 6 "Serrano Creek Confluence with F19-S02 Existing Condition"
Exhibit 7 "Node Location Map"

2 APPENDICES 13

APPENDIX A 14
Existing Condition Hydrology .
2-Year, 25-Year & 100-Year Storm Hydrology Calculations
- (Onsite Hydrology Area "A" without Offsite Runoffs)
- (Onsite Hydrology Area "B")
- (Offsite Hydrology at Rancho Parkway 84" RCP Inlet (F19-P07))
- (Onsite Hydrology Area "A" with Offsite Runoffs)

APPENDIX B 15
Proposed Condition Hydrology.
2-Year, 25-Year & 100-Year Storm Hydrology Calculations
- (Onsite Hydrology Area "A" with Offsite Runoffs, without Detention)
- (Onsite Hydrology Area "A" with Offsite Runoffs, with Detention)

APPENDIX C 16
Flood Routing Calculations.
- Area-Averaged Loss Rate and Low Loss Fraction Estimations
- Storage Volume Versus Depth and Outflow Calculations
- Detention Basin Routing

APPENDIX D 17
- As-Built Storm Drain Plans
- Existing F19S02-713, F19P06 & F19P07 – Hydraulic
- Serrano Creek Facility No. F19, Drainage Area, Land Use and Soil Groups Map

SECTION 1

INTRODUCTION

INTRODUCTION

1. Background/Purpose

This hydrology study has been prepared by Hunsaker and Associates Irvine, Inc. (H&A) for Vesting Tentative Tract Map (VTTM) No. 18142 (The Project). The Project is a community residential development consisting of approximately 122 acres of land located centrally within the northern portion of the City of Lake Forest, County of Orange as shown in Exhibit 1 - Vicinity Map. The site is bounded to the north by Rancho Parkway and an existing shopping center ("Corridor Center") beyond; to the east by Serrano Creek, business centers and Lake Forest Drive beyond; to the south by business centers and Enterprise Way beyond; and to the west by Bake Parkway and business centers beyond. Current address for the site is 20621 Lake Forest Drive. The Project is currently undeveloped and is known as Nakase Property. Toll Bothers is planning to develop this site with a maximum of 675 single-family homes, 101 senior affordable housing residential units, an elementary school that can accommodate up to 1,000 students, park/open space uses, and supporting infrastructure.

The Project lies in an approximately 227.9-acre watershed tributary to County of Orange Flood Control District's 84 inch RCP storm drain (F19-P07) in Rancho Parkway. This storm drain was built in 1999 (Parcel Map No. 99-103) with a design capacity of 621 cubic feet per second (cfs) per storm drain plans, Drawing No. 1007, included in the Appendix Section for reference.

The purpose of this study is to evaluate on-site and off-site hydrology for existing (pre-project) and proposed (post-project) conditions, for 100-year, 25-year and 2-year return frequency storm events.

2. Methodology

This hydrology study has been prepared in conformance with procedures and criteria outlined in Orange County Hydrology Manual, dated October 1996, Addendum 1.

The rational method was used to calculate the design discharge for the local drainage

areas since the watershed area to the proposed storm drain systems is less than one square mile. The Rational Method is an empirical computation procedure for developing a peak runoff rate (discharge) for small watersheds for storms of a specified recurrence interval. The rational method equation is based on the assumption that the peak flow rate is directly proportional to the drainage area, rainfall intensity and a loss coefficient which describes the effects of land use and soil type. The design discharges were computed by generating a hydrologic "link-node" model which divides the area into subareas, each tributary to a concentration point or hydrologic "node" point determined by the proposed terrain or street layout.

The following assumptions/guidelines were applied for use of the Rational Method.

1. The rational Method Hydrology includes the effects of infiltration caused by soil surface characteristics. The soil map from Orange County Hydrology Manual indicates that the study area consists of soil type B, C and D. Hydrologic soils ratings are based on a scale of A through D, where A is the most pervious, providing the least runoff.

2. The infiltration rate is also affected by the type of vegetation or ground cover and percentage of impervious surface. The runoff coefficients used for this study were based on the proposed land uses.

3. Standard intensity-duration curve data was taken from the Orange County Hydrology Manual, dated October, 1986.

Calculations to determine peak flow rates, and volumes, at critical flow concentration points (nodes) throughout the project site were performed using the Advanced Engineering Software (A.E.S.) computer program for Orange County. The results of the hydrologic calculations will be used for the sizing of the required on-site and off-site storm drains, on-site detention basins, and appurtenant drainage structures.

PROJECT SITE

SCALE: 1" = 2500'

DRAWN BY: HTC DATE: 06/29/2018 W.O.: 1443-135X	PREPARED BY: HUNSAKER & ASSOCIATES IRVINE, INC. PLANNING ▪ ENGINEERING ▪ SURVEYING Three Hughes, Irvine, CA 92618 ▪ PH: (949) 583-1010 ▪ FX: (949) 583-0759	PREPARED FOR: **TOLL BROTHERS, INC.** 725 W. TOWN & COUNTRY ROAD, SUITE 200 ORANGE, CA 92686 (714) 347-1300	"NAKASE PROPERTY" VESTING TENTATIVE TRACT MAP NO. 18142 SOUTH OF BAKE PARKWAY & RANCHO PARKWAY CITY OF LAKE FOREST, CA	EXHIBIT 1 PRELIMINARY HYDROLOGY VICINITY MAP

DATE: Jun. 29, 2018 04:00:46 PM FILE: F:\0894\Engineering\SY_Hydrology\REPORT\PWQMP_VIC Nakase.dwg

3. Existing Conditions

In the pre-project condition, onsite drainage is divided into two drainage:

Drainage "A" consists of the western portion of site (approximately 76.6 acres) and drains southwesterly via sheet flow to a channelized onsite natural and partly paved drainage system. This flows to an existing 10.5' x 10.5' reinforced concrete box (RCB) storm drain (OCFCD Facility No. F19-P07) and ultimately to (OCFCD Facility No. F19-S02). This drainage confluences with Serrano Creek approximately 0.6 miles to the southeast. See Exhibit 6. Run-on to Drainage "A" consists of offsite areas to the north (approximately 227.9 acres) that discharge into the site via an existing 84" RCP (OCFCD Facility No. F19-P07) in Rancho Parkway at node 24. See Exhibit 7.

Drainage "B" consists of the eastern portion of the site (approximately 43.4 acres) and drains easterly via sheet flow to Serrano Creek (OCFCD Facility No. F19). This facility is located at the eastern edge of the property limits. There is no offsite run-on to Drainage "B".

There is an additional 2 acres that is within the boundary of this site. This 2 acres is the actual portion of natural Serrano Creek along the easterly edge of the property. Serrano Creek itself does not drain into the site. The flows within Serrano Creek are not impacted by this development.

Therefore, the site total acreage is 122 acres.

The total drainage area "A", with the offsite run-on drainage area tributary to the existing 10.5' x 10.5' RCB (F19-P07), is approximately 304.5 acres and produces a 100-year peak discharge of 671.2 cfs.

Onsite drainage area "B" is tributary to the existing 84" RCP (F19) at node 15 located at the southeast corner of the site, with a 100-year peak discharge of 84.2 cfs. See Exhibit 7.

The total drainage area tributary to the existing 84 inch RCP (F19), at the southeast corner of the site, is approximately 1,281 acres, with a 100-year peak discharge of 2,350 cfs per the Orange County Hydrology Study for Serrano Creek dated 2014.

Once leaving the Nakase site, all runoff is then conveyed southeasterly prior to discharging to San Diego Creek (Reach 1), San Diego Creek (Reach 2), Newport Bay (Upper and Lower) and the Pacific Ocean.

The hydrology analysis for the onsite drainage areas "A", "B", and offsite run-on drainage area are shown in *Exhibits 2, 2A & 2B Hydrology Map (Existing Condition)*. The results are summarized in Table 3-1.

Table 3-1 Existing Hydrology Study Summary

Location (Node)	Area (acres)	2-Year (cfs)	25-Year (cfs)	100-Year (cfs)
Offsite Area @ Rancho Pkwy Node 24.1	227.9	200.1	475.9	621.0
Area "A" with offsite Area @ Node 61	304.5	208.6	508.7	671.2
Area "B" @ Node 15	43.4	19.6	62.2	84.2

4. Proposed Conditions

Toll Brothers is planning to develop this area with approximately 675 single-family detached homes, 101 senior affordable housing residential units, an elementary school that can accommodate up to 1,000 students, park/open spaces uses, and supporting infrastructure.

Offsite run-on through the site, via the existing 84" RCP (F19-P07) at Rancho Parkway, will be connected to a proposed 84" RCP on-site storm drain system in "B" Street.

The flows in "B" Street continue traveling south in an 84" RCP. On-site runoffs are accepted by this system. Approximately 900' downstream, a diversion structure will be designed for a flow-by of 100.0 cfs at node 56.3. Another diversion structure will be constructed in "S" Street with a flow-by of 10.0 cfs at node 35.2. The excess runoffs from both of the diversion structures will overflow into a proposed underground detention basin in the Central Park Area at node 35.1. See flood routing analysis in Appendix C and Exhibit 7 for details.

In the proposed condition, Drainage Area A and a majority portion of Drainage Area B have been combined for a total of 111.9 acres, not including any of the site run-on. This onsite area generates 272 cfs. This flow, when combined with the 621 cfs from 84" RCP (OCFCD's Facility No. F19-P07) generates a total flow of 893 cfs. The total unmitigated flow of 893 cfs is reduced to 454 cfs via the proposed onsite underground detention facility.

The remaining 7.3 acres of Drainage Area B generates 14 cfs, which continues to drain to natural streambed Serrano Creek.

The total project development mitigated flow rate leaving the site is 468 cfs.

The proposed underground detention basin outlet at node 35 is designed with orifices and a weir to regulate outflows to ensure that there are no hydromodification impacts to downstream Serrano Creek. See Exhibit 7 for node location. The regulated outflows continue traveling south in "B" and "C" Streets within a proposed closed conduit. This system will accept on-site runoffs. The flows continue and eventually connect to the existing 10.5'x10.5' RCB (F19-P07) and ultimately to the existing

storm drain (OCFCD Facility No. F19-S02). This facility confluences with Serrano Creek approximately 0.6 miles to the southeast. See storm drain layout as shown in *Exhibit 3 – Hydrology Map (Proposed Condition*) for details; see *Exhibit 4 – Tributary Area to F19-P07 (Existing Condition); Exhibit 5 – Tributary Area to F19-P07 (Proposed Condition)* and *Exhibit 6 – Serrano Creek Confluence with F19-S02.*

The hydrology analysis results for the proposed condition with no detention is presented in Table 4-1.

Table 4-1 Proposed Hydrology Study Summary (No Detention)

Location (Node)	Area (acres)	2-Year (cfs)	25-Year (cfs)	100-Year (cfs)
Offsite Area @ Rancho Pkwy Node 24.1	227.9	200.1	475.9	621.0
Area "A" with offsite Area and diverted Area "B" @ Node 61	339.8	284.8	683.5	892.6

5. Conclusion

The hydrology analysis results for the proposed condition with detention is presented in Table 5-1. Based on this analysis, the Project will not exceed the existing peak discharge for 2-year, 25-year, or 100-year frequency storm events and will reduce flooding conditions in the downstream storm drain facilities and on private property as compared to existing conditions. Thus, the Project will have no significant hydraulic effect.

Table 5-1 Proposed Hydrology Study Summary (With Detention)

Location (Node)	Area (acres)	2-Year (cfs)	25-Year (cfs)	100-Year (cfs)
Existing Condition Area "A" @ Node 61	304.5	208.6	508.7	671.2
Proposed Condition Area "A" @ Node 61	339.8	202.2	369.0	453.9

The results of flood routing analysis for off-site and on-site are presented in Tables 5-2, 5-3 and 5-4, on the following page.

Table 5-2. Onsite & Offsite Area "A" Flood Volume Summary at Node 61

(Exist. 10.5'x10.5' RCB - F19-P07)

Storm Frequency (yr)	Location & Node No.	Existing Condition				Proposed Condition (With Detention)					
		Area (ac)	Q (cfs)	Tc (min)	Volume (ac-ft)	Area (ac)	Q (cfs)	Tc (min)	Volume (ac-ft)	$Q_{Decrease}$ (cfs)	$Q_{Reduction}$ (%)
2	Exit at Exist. 10.5'x10.5' RCB (F19-P07) Node 61	304.45	208.6	27.74	27.52	339.75	202.16	23.43	36.29	6.44	3.09
25		304.45	508.7	23.90	77.74	339.75	369.01	20.80	93.07	139.69	27.46
100		304.45	671.2	22.88	112.17	339.75	453.85	20.07	127.47	217.35	32.38

Table 5-3. Onsite Area "B" Flood Volume Summary at Node 15

(Exist. 84" RCP - F19)

Storm Frequency (yr)	Location & Node No.	Existing Condition				Proposed Condition (With Detention)					
		Area (ac)	Q (cfs)	Tc (min)	Volume (ac-ft)	Area (ac)	$Q_{Prorate}$ (cfs)	Tc (min)	Volume (ac-ft)	$Q_{Decrease}$ (cfs)	$Q_{Reduction}$ (%)
2	Exit at Exist. 84" RCP (F19) Node 15	43.4	19.6	33.75	1.06	7.3	3.3	33.75	0.15	16.30	83.16
25		43.4	62.2	27.28	7.81	7.3	10.5	27.28	1.14	51.70	83.12
100		43.4	84.2	25.93	14.87	7.3	14.2	25.93	2.31	70.00	83.14

Table 5-4. 100-Year Total Site Flood Volume Summary (Area "A" + Area "B")

(Exist. 10.5'x10.5' RCB - F19-P07 and Exist. 84" RCP - F19)

Storm Frequency (yr)	Location & Node No.	Existing Condition				Proposed Condition (With Detention)					
		∑Area (ac)	∑Q (cfs)	Tc (min)	∑Volume (ac-ft)	∑Area (ac)	∑Q (cfs)	Tc (min)	∑Volume (ac-ft)	$\sum Q_{Decrease}$ (cfs)	$\sum Q_{Reduction}$ (%)
2	Exit at Exist. 10.5'x10.5' RCB (F19-P07) Node 61	347.85	228.2	N/A	28.58	347.05	205.46	N/A	36.44	22.74	9.96
25		347.85	570.9	N/A	85.55	347.05	379.51	N/A	94.21	191.39	33.52
100		347.85	755.4	N/A	127.04	347.05	468.05	N/A	129.78	287.35	38.04

EXIST. DBL 12'X8' RCB
(F19) SERRANO CREEK
Q100=2,100 CFS

RANCHO PARKWAY

EXISTING 84"RCP
F19–P07

Q_2 =200.1cfs
Q_{25} =475.9cfs
Q_{100}=621.0cfs
t=16.7, EL=718.6
Area=227.90 acres

L=110'

24

24.1

Q_2 = 0.6cfs
Q_{25} = 1.5cfs
Q_{100} = 1.9cfs
t=13.2, EL=731.0
Area=0.65 acre

A 0.65

L=300'

10

10.1

21.1

Q_2 = 0.5cfs
Q_{25} = 1.3cfs
Q_{100} = 1.7cfs
t=13.0, EL=730.0
Area=0.58 acre

B 0.58

11

L=300'

Q_2 =200.1cfs
Q_{25} =475.9cfs
Q_{100}=621.0cfs
t=16.7, EL=718.2
Area=227.90 acres

A 1.97

B 1.41

L=280'

L=280'

22.1

12

Q_2 = 2.0cfs
Q_{25} = 5.3cfs
Q_{100} = 7.0cfs
t=15.6, EL=725.5
Area=2.62 acres

Q_2 = 1.5cfs
Q_{25} = 4.0cfs
Q_{100} = 5.3cfs
t=15.7, EL=724.5
Area=1.99 acre

L=898'

Existing Earth Channel

A 12.76

L=415'

A 1.95

L=410'

B 3.31

Q_2 = 2.8cfs
Q_{25} = 8.1cfs
Q_{100} =10.8cfs
t=18.8, EL=720.0
Area=4.57 acres

L=670'

23.1

13

Q_2 = 3.4cfs
Q_{25} = 9.5cfs
Q_{100}=12.7cfs
t=18.5, EL=717.0
Area=5.30 acre

BAKE PARKWAY

A 18.94

Q_2 =208.6cfs
Q_{25} =501.6cfs
Q_{100}=655.6cfs
t=18.9, EL=709.0
Area=245.23 acres

Existing Earth Channel

Q_2 =208.6cfs
Q_{25} =501.6cfs
Q_{100}=655.6cfs
t=19.9, EL=704.0
Area=264.17 acres

24.2

25.1

L=480'

Q_2 = 8.8cfs
Q_{25} =27.2cfs
Q_{100} =36.7cfs
t=22.2, EL=709.0
Area=17.33 acres

RANCHO PARKWAY S.

Q_2 =11.1cfs
Q_{25} =32.1cfs
Q_{100} =43.0cfs
t=19.9, EL=704.0
Area=18.94 acres

B 12.11

L=505'

14

Q_2 = 9.5cfs
Q_{25} =28.3cfs
Q_{100} =38.0cfs
t=21.3, EL=711.2
Area=17.41 acres

SERRANO CREEK

A 21.60

Existing Earth Channel

L=975'

Q_2 =208.6cfs
Q_{25} =501.6cfs
Q_{100}=655.6cfs
t=21.6, EL=684.5
Area=285.77 acres

Q_2 =12.3cfs
Q_{25} =35.2cfs
Q_{100}=47.2cfs
t=21.6, EL=684.5
Area=21.60 acres

26.1

B 25.99

L=1,330'

ORCHARD

EXISTING 90" PIPE
Q25=808 CFS

Existing Earth Channel

L=660'

Q_2 =10.1cfs
Q_{25} =29.3cfs
Q_{100}=39.3cfs
t=22.9, EL=675.2
Area=18.68 acres

A 18.68

Q_2 =208.6cfs
Q_{25} =508.7cfs
Q_{100}=671.2cfs
t=22.9, EL=684.5
Area=304.45 acres

61

15

EXIST. 84" PIPE

EXISTING 90" PIPE (F19–P06)
Q25=808 CFS

EXISTING 10.5'X10.5' RCB (F19–P07)
Q100=729.2 CFS

(F19) SERRANO CREEK
Q100=2350 CFS
TOTAL AREA=1281 ACRES

Q_2 =19.6cfs
Q_{25} =62.2cfs
Q_{100} =84.2cfs
t=25.9
Total Area=43.40 acres

EXISTING 10.5'X10.5' RCB (F19–S02)
Q100=1916 CFS

EXISTING 10.5'X10.5' RCB (F19–P07)
Q100=1747.3 CFS

LEGEND

- MAJOR DRAINAGE BOUNDARY
- MINOR DRAINAGE BOUNDARY
- 100 — NODE NUMBER
- A / 1.0 — AREA DESIGNATION / AREA ACREAGE (IN ACRES)
- Q_{100}=8.0cfs, t=15.0 — PEAK FLOW RATE / TIME OF CONCENTRATION
- TQ_{100}=10.0cfs, t=15.0 — PEAK CONFLUENCE FLOW RATE / TIME OF CONCENTRATION
- A — SOIL GROUP

1" = 100'

100 50 0 100 300

MAP DATE IDENTIFIER
DATE OF LATEST CHANGE TO THIS MAP
10/06/17 BY: HTC
DATE OF THIS PLOT
06/29/18

EXHIBIT 2

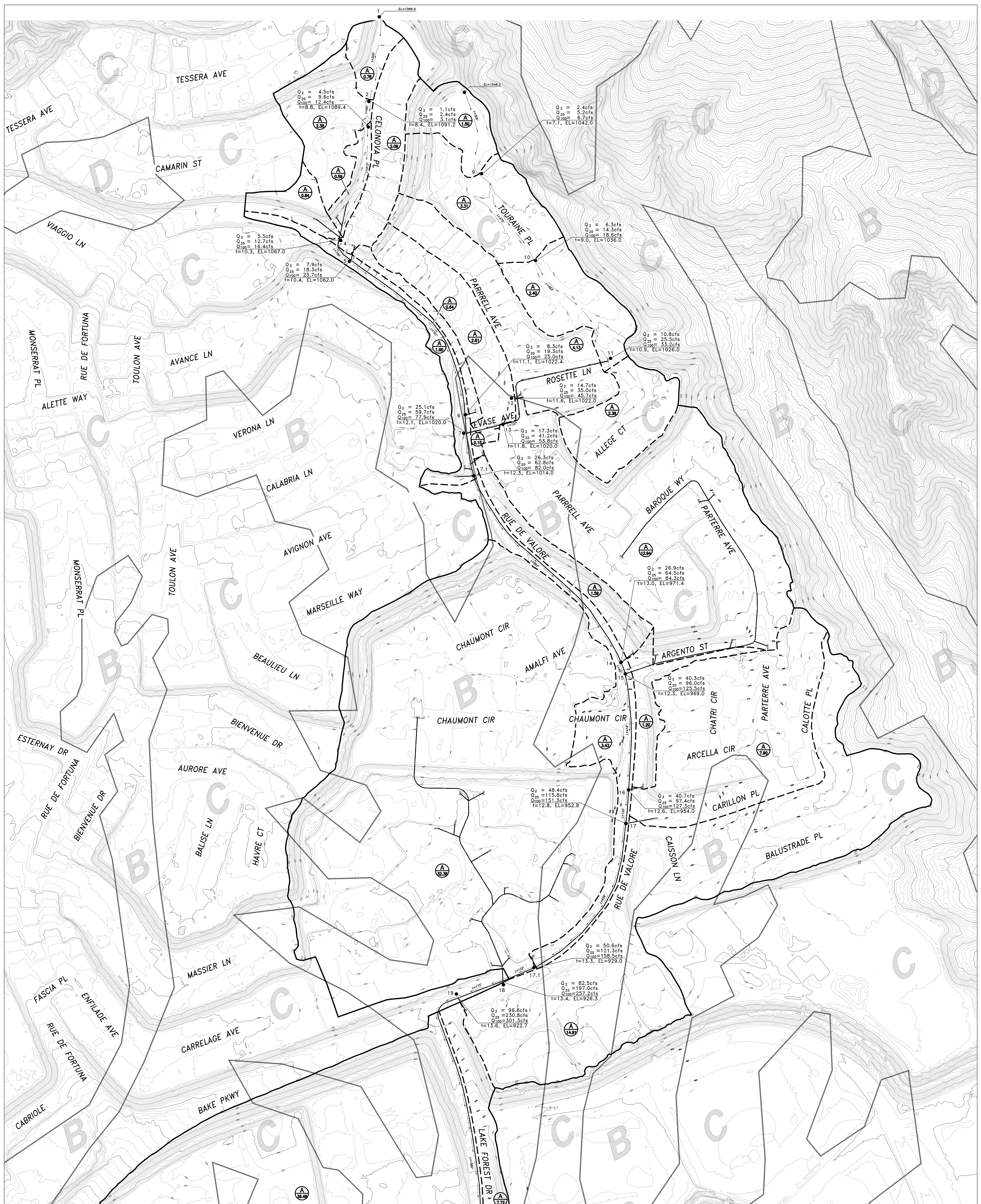
HYDROLOGY MAP
NAKASE RANCH NURSERY
EXISTING CONIDITION
CITY OF LAKE FOREST

PREPARED FOR:
TOLL BROTHERS, INC.
725 W. TOWN & COUNTRY
ROAD, SUITE 200
ORANGE, CA 92686

PREPARED BY:
HUNSAKER & ASSOCIATES
IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes ▪ Irvine, CA 92618 ▪ PH: (949) 583-1010 ▪ FX: (949) 583-0759

PLOTTED BY: Ha To Chau DATE: Jun. 29, 2018 06:09:29 PM FILE: F:\0894\Engineering\SY_Hydrology\Onsite\Hydrology – Existing with offsite.dwg

WO: 1443-136X
HYDROLOGY MAP FOR NAKASE NURSERY



LEGEND

- MAJOR DRAINAGE BOUNDARY
- MINOR DRAINAGE BOUNDARY
- NODE NUMBER
- AREA DESIGNATION / AREA ACREAGE (IN ACRES)
- PEAK FLOW RATE / TIME OF CONCENTRATION
- PEAK CONFLUENCE FLOW RATE / TIME OF CONCENTRATION
- PROPOSED STORM DRAIN
- SOIL GROUP

PREPARED FOR:

TOLL BROTHERS, INC.
725 W. TOWN & COUNTRY
ROAD, SUITE 200
ORANGE, CA 92686

PREPARED BY:

HUNSAKER & ASSOCIATES
IRVINE INC
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes ▪ Irvine, CA 92618

MAP DATE IDENTIFIER
DATE OF LATEST CHANGE TO THIS MAP: 07/07/17 BY: HTC
DATE OF THIS PLOT: 10/22/18

EXHIBIT 2A

HYDROLOGY MAP
VTM 18142 (OFFSITE)
(EXISTING CONDITION)

CITY OF LAKE FOREST

WO: 1443-136x
HYDROLOGY MAP FOR NAKASE NURSERY

PLOTTED BY: Ha To Chau DATE: Oct. 22, 2018 03:38:00 PM FILE: F:\0894\Engineering\SY_Hydrology\Off Site\Hydrology – Offsite.dwg

LEGEND

- MAJOR DRAINAGE BOUNDARY
- MINOR DRAINAGE BOUNDARY
- NODE NUMBER
- AREA DESIGNATION / AREA ACREAGE (IN ACRES)
- PEAK FLOW RATE / TIME OF CONCENTRATION
- PEAK CONFLUENCE FLOW RATE / TIME OF CONCENTRATION
- PROPOSED STORM DRAIN
- SOIL GROUP

PREPARED FOR:

TOLL BROTHERS, INC.
725 W. TOWN & COUNTRY ROAD, SUITE 200
ORANGE, CA 92686

PREPARED BY:

HUNSAKER & ASSOCIATES
IRVINE, INC.
PLANNING • ENGINEERING • SURVEYING
Three Hughes • Irvine, CA 92618 • PH: (949) 583-1010 • FX: (949) 583-0759

1"=100'

100 50 0 100 300

MAP DATE IDENTIFIER
07/07/17 BH-MD
10/02/18

EXHIBIT 2B

HYDROLOGY MAP
VTM 18142 (OFFSITE)
(EXISTING CONDITION)

CITY OF LAKE FOREST

MD-17422 - MAP
HYDROLOGY MAP FOR MAKAS NURSERY

PLOTTED BY: Ha To Chau DATE: Oct. 22, 2018 03:37:15 PM FILE: F:\08941\Engineering\SH_Hydrology\Off Site\Hydrology – Offsite.dwg

SEE OFFSITE HYDROLOGY CALCULATIONS & MAPS FOR UPSTREAM OF THIS AREA
EXISTING 84" RCP F19-P07
EXIST. DBL 12'X8' RCB (F19) SERRANO CREEK Q100=2,100 CFS
RANCHO PARKWAY
BAKE PARKWAY
RANCHO PARKWAY S.
ORCHARD
FOOTHILL TRANSPORTATION CORRIDOR
VICINITY MAP
SITE
SERRANO CREEK Q100=2150 CFS
AREA INCLUDED IN OFFSITE
FLOW-BY DIVERSION STRUCTURE
UNDERGROUND WATER QUALITY SYSTEM
PRORATE PER HYDROLOGY CALCS IN EXIST. CONDITION @ THIS NODE
EXISTING 90" PIPE (F19-P06) Q25=808 CFS
EXIST. 84" PIPE
(F19) SERRANO CREEK Q100=2350 CFS TOTAL AREA=1281 ACRES
EXISTING 10.5'X10.5' RCB (F19-P07) Q100=729.2 CFS
EXISTING 10.5'X10.5' RCB (F19-S02) Q100=1916 CFS
EXISTING 10.5'X10.5' RCB (F19-P07) Q100=1747.3 CFS
LEGEND
MAJOR DRAINAGE BOUNDARY
MINOR DRAINAGE BOUNDARY
NODE NUMBER
AREA DESIGNATION
AREA ACREAGE (IN ACRES)
PEAK FLOW RATE
TIME OF CONCENTRATION
PEAK CONFLUENCE FLOW RATE
TIME OF CONCENTRATION
PROPOSED STORM DRAIN
SOIL GROUP
PREPARED FOR:
TOLL BROTHERS, INC.
725 W. TOWN & COUNTRY ROAD, SUITE 200
ORANGE, CA 92686
PREPARED BY:
HUNSAKER & ASSOCIATES IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes ▪ Irvine, CA 92618 ▪ PH: (949) 583-1010 ▪ FX: (949) 583-0759
SCALE: 1" = 100'
MAP DATE IDENTIFIER
06/05/19 BY: HTC
06/10/19
EXHIBIT 3
HYDROLOGY MAP
VTM 18142
(PROPOSED CONDITION)
CITY OF LAKE FOREST
WO: 1443-136X
HYDROLOGY MAP FOR NAKASE NURSERY
PLOTTED BY: Ha To Chau DATE: Jun. 10, 2019 12:43:56 PM FILE: F:\0894\Engineering\SY_Hydrology\Onsite\Exhibit 3 - Hydrology - Proposed with Offsite-06-10-2019.dwg

SCALE: 1" =400'

AREA OFFSITE
$A_{OFFSITE}$=227.9 Acres

Q_{100}= 621.0 cfs
A_{100}= 227.9 acres

EXISTING 84"RCP
F19–P07

RANCHO PKWY N.

EXISTING PROJECT BOUNDARY (EPB)
A_{EPB}= 122 acres

PROPOSED ONSITE DRAINAGE BOUNDARY (PODB)
A_{PODB}= 111.7 acres

Area A
A_A=76.6 Acres

Existing Earth Channel

EXISTING PROJECT BOUNDARY (EPB)
A_{EPB}= 122 acres

SERRANO CREEK
Q_{100}=2150 cfs

Existing Onsite Area A with Offsite Area
$A_A+A_{OFFSITE}$=76.6+227.9=304.5 Acres

Existing Earth Channel

Area B
A_B=43.4 Ac.

RANCHO PKWY S.

PROPOSED ONSITE DRAINAGE BOUNDARY (PODB)
A_{PODB}= 111.9 acres

EXISTING ONSITE AREA "A" DRAINAGE BOUNDARY
A_A= 76.6 acres (Shaded Area)

EXISTING ONSITE AREA "B" DRAINAGE BOUNDARY
A_B= 43.4 acres (Tributary to Serrano Creek)

BAKE PARKWAY

Existing Earth Channel

Existing Onsite Area Tributary to Serrano Creek (F19)= 46.9 acres

Existing Onsite Area Tributary to Serrano Creek (F19)= 3.1 acres

ORCHARD

EXISTING PROJECT BOUNDARY (EPB)
A_{EPB}= 122 acres

EXISTING PROJECT BOUNDARY (EPB)
A_{EPB}= 122 acres

$Q_{100EXIST}$= 84.2 cfs
$A_{100EXIST}$= 43.4 acres

Existing Earth Channel

$Q_{100EXIST}$= 671.2 cfs
$A_{100EXIST}$= 304.5 acres

EXIST. 84" PIPE

EXISTING 90" RCP (F19–P06)
Q_{25}=808 cfs

EXISTING 10.5'X10.5' RCB (F19–P07)
Q_{100}=729.2 cfs

SERRANO CREEK (F19)
Q_{100} =2350 cfs
$AREA_{TOTAL}$=1281 acres

EXISTING 10.5'X10.5' RCB (F19–S02)
Q_{100}=1916 cfs

EXISTING 10.5'X10.5' RCB (F19–P07)
Q_{100}=1747.3 cfs

LEGEND

- EXISTING ONSITE DRAINAGE BOUNDARY
- PROPOSED ONSITE DRAINAGE BOUNDARY (PODP)
- OFFSITE DRAINAGE BOUNDARY
- EXISTING PROJECT BOUNDARY (EPB)

PREPARED FOR:

TOLL BROTHERS, INC.
725 W. TOWN & COUNTRY ROAD, SUITE 200
ORANGE, CA 92686

PREPARED BY:

HUNSAKER & ASSOCIATES IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes ▪ Irvine, CA 92618 ▪ PH: (949) 583-1010 ▪ FX: (949) 583-0759

EXHIBIT 4
TRIBUTARY AREA TO F19-P07
VTM 18142
(EXISTING CONDITION)
CITY OF LAKE FOREST

PLOTTED BY: Ha To Chau DATE: Jun. 06, 2019 11:11:28 AM FILE: F:\0894\Engineering\SY_Hydrology\Onsite\Exhibit 4 – Existing with offsite_Existing Project Boundary and Existing Drainage Boundaries.dwg

SCALE: 1" =400'

AREA OFFSITE
$A_{OFFSITE}$=227.9 acres

Q_{100}= 621.0 cfs
A_{100}= 227.9 acres

EXISTING 84"RCP
F19–P07

RANCHO PKWY N.

EXISTING PROJECT BOUNDARY (EPB)
A_{EPB}= 122 acres

EXISTING PROJECT BOUNDARY (EPB)
A_{EPB}= 122 acres

PROPOSED ONSITE DRAINAGE BOUNDARY (PODB)
A_{PODB}= 111.7 acres (Shaded Area)

SERRANO CREEK
Q_{100}=2150 cfs

Proposed Onsite Area with Offsite Area
$A_{PODB}+A_{OFFSITE}$=111.7+227.9=339.6 acres

FLOWBY DIVERSION STRUCTURE

RANCHO PKWY S.

EXISTING ONSITE AREA "A" DRAINAGE BOUNDARY (76.6 acres)

UNDERGROUND DETENTION BASIN

FLOWBY DIVERSION STRUCTURE

EXISTING ONSITE AREA "B" DRAINAGE BOUNDARY (43.4 acres)

BAKE PARKWAY

Proposed Onsite Area Tributary to Serrano Creek (F19)= 10.4 acres

Proposed Onsite Area Tributary to Serrano Creek (F19)= 7.3 acres

EXISTING PROJECT BOUNDARY (EPB)
A_{EPB}= 122 acres

Proposed Onsite Area Tributary to Serrano Creek (F19)= 3.1 acres

EXISTING PROJECT BOUNDARY (EPB)
A_{EPB}= 122 acres

ORCHARD

UNDERGROUND WATER QUALITY SYSTEM

$Q_{100PROP}$= 892.6 cfs
$A_{100PROP}$= 339.6 acres

$Q_{100PRORATE}$= 14.2 cfs
$A_{100PRORATE}$= 7.3 acres

EXIST. 84" PIPE

EXISTING 90" RCP (F19–P06)
Q_{25}=808 cfs

EXISTING 10.5'X10.5' RCB (F19–P07)
Q_{100}=729.2 cfs

EXISTING 10.5'X10.5' RCB (F19–S02)
Q_{100}=1916 cfs

EXISTING 10.5'X10.5' RCB (F19–P07)
Q_{100}=1747.3 cfs

(F19) SERRANO CREEK
Q_{100} =2350 cfs
$AREA_{TOTAL}$=1281 acres

LEGEND

- EXISTING ONSITE DRAINAGE BOUNDARY
- PROPOSED ONSITE DRAINAGE BOUNDARY (PODP)
- OFFSITE DRAINAGE BOUNDARY
- EXISTING PROJECT BOUNDARY (EPB)
- PROPOSED STORM DRAIN

PREPARED FOR:

TOLL BROTHERS, INC.
725 W. TOWN & COUNTRY ROAD, SUITE 200
ORANGE, CA 92686

PREPARED BY:

HUNSAKER & ASSOCIATES IRVINE, INC.
PLANNING • ENGINEERING • SURVEYING
Three Hughes • Irvine, CA 92618 • PH: (949) 583-1010 • FX: (949) 583-0759

EXHIBIT 5

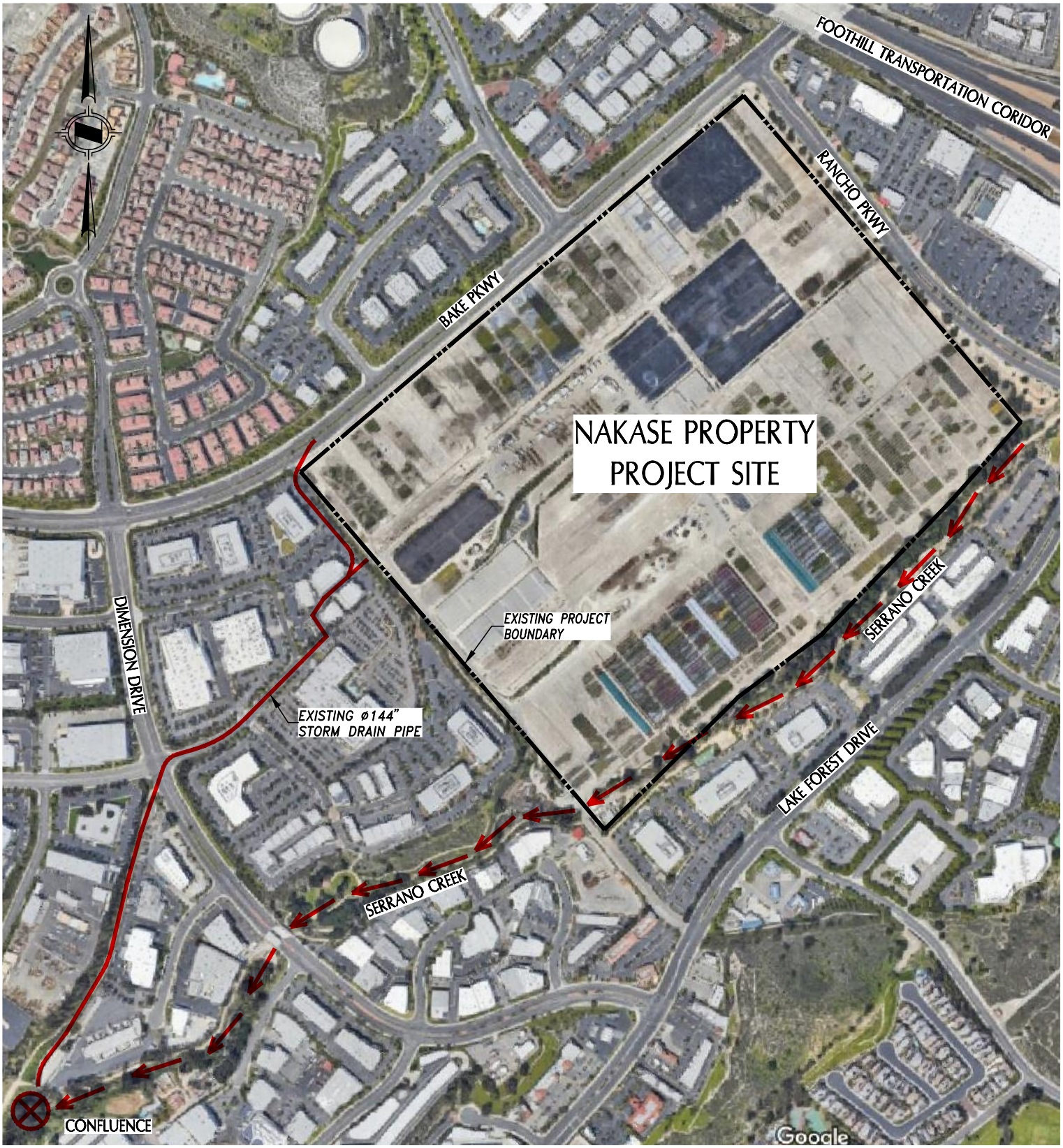
TRIBUTARY AREA TO F19-P07
VTM 18142

(PROPOSED CONDITION)

CITY OF LAKE FOREST

PLOTTED BY: Ha To Chau DATE: Jun. 06, 2019 11:12:49 AM FILE: F:\0894\Engineering\SY_Hydrology\Onsite\Exhibit 5 – Proposed with offsite_Proposed Drainage Boundary–06–05–2019.dwg

SCALE: 1" =600'



PREPARED FOR:

TOLL BROTHERS, INC.
725 W. TOWN & COUNTRY
ROAD, SUITE 200
ORANGE, CA 92686

PREPARED BY:

HUNSAKER & ASSOCIATES
IRVINE, INC.
PLANNING ENGINEERING SURVEYING
Three Hughes Irvine, CA 92618 PH: (949) 583-1010 FX: (949) 583-0759

EXHIBIT 6
SERRANO CREEK CONFLUENCE WITH F19-S02
(EXISTING CONDITION)
CITY OF LAKE FOREST

PLOTTED BY: Ha To Chau DATE: Jun. 06, 2019 03:19:30 PM FILE: F:\0894\Engineering\SY_Hydrology\Hydrology – Existing–SD.dwg

SCALE: 1" =400'

AREA OFFSITE
$A_{OFFSITE}$=227.9 acres

Q_{100}= 621.0 cfs
A_{100}= 227.9 acres

EXISTING 84"RCP
F19–P07

24

24.1

RANCHO PKWY N.

EXISTING PROJECT BOUNDARY (EPB)
A_{EPB}= 122 acres

"Y" STREET

EXISTING PROJECT BOUNDARY (EPB)
A_{EPB}= 122 acres

"BB" STREET

"X" STREET

"W" STREET

"V" STREET

"M" STREET

SERRANO CREEK
Q_{100}=2150 cfs

"Z" STREET

"U" STREET

"BB" STREET

"AA" STREET

"B" STREET

UNDERGROUND
DETENTION BASIN

FLOWBY
DIVERSION
STRUCTURE

"T" STREET

RANCHO
PKWY S.

EXISTING ONSITE AREA "A"
DRAINAGE BOUNDARY (76.6 acres)

56.3

35.1

35

FLOWBY
DIVERSION
STRUCTURE

"A" STREET

"S" STREET

35.2

"L" STREET

"C" STREET

EXISTING ONSITE AREA "B"
DRAINAGE BOUNDARY (43.4 acres)

"B" STREET

"R" STREET

BAKE PARKWAY

"P" STREET

"D" STREET

"H" STREET

"I" STREET

"Q" STREET

"O" STREET

EXISTING PROJECT BOUNDARY (EPB)
A_{EPB}= 122 acres

"E" STREET

"C" STREET

"N" STREET

ORCHARD

"K" STREET

"J" STREET

61

15

EXIST. 84" PIPE

EXISTING 90" RCP (F19–P06)
Q_{25}=808 cfs

EXISTING 10.5'X10.5' RCB (F19–P07)
Q_{100}=729.2 cfs

(F19) SERRANO CREEK
Q_{100} =2350 cfs
$AREA_{TOTAL}$=1281 acres

EXISTING 10.5'X10.5' RCB (F19–S02)
Q_{100}=1916 cfs

EXISTING 10.5'X10.5' RCB (F19–P07)
Q_{100}=1747.3 cfs

LEGEND

- 24 NODE NUMBER
- PROPOSED ONSITE DRAINAGE BOUNDARY (PODP)
- OFFSITE DRAINAGE BOUNDARY
- EXISTING PROJECT BOUNDARY (EPB)
- PROPOSED STORM DRAIN

PREPARED FOR:

TOLL BROTHERS, INC.
725 W. TOWN & COUNTRY
ROAD, SUITE 200
ORANGE, CA 92686

PREPARED BY:

HUNSAKER & ASSOCIATES
IRVINE, INC.
PLANNING • ENGINEERING • SURVEYING
Three Hughes • Irvine, CA 92618 • PH: (949) 583-1010 • FX: (949) 583-0759

EXHIBIT 7
NODE LOCATTION MAP
VTM 18142
(PROPOSED CONDITION)
CITY OF LAKE FOREST

PLOTTED BY: Ha To Chau DATE: Oct. 27, 2019 09:23:01 AM FILE: F:\0894\Engineering\SY_Hydrology\Onsite\Exhibit 7 – Node Location Map.dwg

SECTION 2
APPENDICES

APPENDIX A
Existing Condition Hydrology

- 2-Year Storm Hydrology Calculations
- 25-Year Storm Hydrology Calculations
- 100-Year Storm Hydrology Calculations

APPENDIX B
Proposed Condition Hydrology
(With and Without Detention)

- 2-Year Storm Hydrology Calculations
- 25-Year Storm Hydrology Calculations
- 100-Year Storm Hydrology Calculations

APPENDIX C
Flood Routing Calculations

- Area-Averaged Loss Rate and Low Loss Fraction Estimations
- Storage Volume Versus Depth and Outflow Calculation
- Detention Basin Routing

APPENDIX D

- As-Built Storm Drain Plans
- Existing F19S02-713, F19P06 & F19P07 – Hydraulic
- Serrano Creek Facility No. F19, Drainage Area, Land Use and Soil Groups Map

APPENDIX A
Existing Condition Hydrology

- 2-Year Storm Hydrology Calculations
- 25-Year Storm Hydrology Calculations
- 100-Year Storm Hydrology Calculations

```
 ************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY IN CITY OF LAKE FOREST                             *
* ONSITE AREA "A" EXISTING CONDITION @ 2-YEAR STORM                       *
* W.O. #1443-136X                                                         *
 ************************************************************************

  FILE NAME: EX02-A.DAT
  TIME/DATE OF STUDY: 17:08 06/26/2018
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE     10.10 TO NODE     21.10 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    743.00  DOWNSTREAM(FEET) =    731.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.160
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.299
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.41      0.30     1.000    46   13.16
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.24      0.20     1.000    67   13.16
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.61
  TOTAL AREA(ACRES) =      0.65   PEAK FLOW RATE(CFS) =      0.61

************************************************************************
  FLOW PROCESS FROM NODE     21.10 TO NODE     22.10 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    731.00  DOWNSTREAM(FEET) =    725.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.0196
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.120
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        1.19      0.30     1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.78      0.20     1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.37
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.20
  AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   3.88
  Tc(MIN.) =   17.04
  SUBAREA AREA(ACRES) =     1.97       SUBAREA RUNOFF(CFS) =    1.52
  EFFECTIVE AREA(ACRES) =      2.62     AREA-AVERAGED Fm(INCH/HR) =   0.26
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        2.6         PEAK FLOW RATE(CFS) =       2.03

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.14   FLOW VELOCITY(FEET/SEC.) =   1.39
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     22.10 =     580.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     22.10 TO NODE     23.10 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    725.50  DOWNSTREAM(FEET) =    720.00
```

Onsite Hydrology Area "A"

2-Year Storm Existing Condition

```
 CHANNEL LENGTH THRU SUBAREA(FEET) =   415.00   CHANNEL SLOPE =  0.0133
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.964
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        1.80      0.30     1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        0.15      0.20     1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.62
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.36
 AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   5.10
 Tc(MIN.) =   22.14
 SUBAREA AREA(ACRES) =     1.95       SUBAREA RUNOFF(CFS) =    1.18
 EFFECTIVE AREA(ACRES) =      4.57     AREA-AVERAGED Fm(INCH/HR) =   0.27
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        4.6         PEAK FLOW RATE(CFS) =       2.84

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.20   FLOW VELOCITY(FEET/SEC.) =   1.40
 LONGEST FLOWPATH FROM NODE     10.10 TO NODE     23.10 =     995.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.10 TO NODE     24.20 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    720.00  DOWNSTREAM(FEET) =    709.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   670.00   CHANNEL SLOPE =  0.0164
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.847
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B       10.16      0.30     1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"               C        0.80      0.25     1.000    59
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        1.80      0.20     1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.10
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.01
 AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   5.56
 Tc(MIN.) =   27.70
 SUBAREA AREA(ACRES) =    12.76       SUBAREA RUNOFF(CFS) =    6.48
 EFFECTIVE AREA(ACRES) =     17.33     AREA-AVERAGED Fm(INCH/HR) =   0.28
 AREA-AVERAGED Fp(INCH/HR) =   0.28  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       17.3         PEAK FLOW RATE(CFS) =       8.84

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.36   FLOW VELOCITY(FEET/SEC.) =   2.28
 LONGEST FLOWPATH FROM NODE     10.10 TO NODE     24.20 =    1665.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.20 TO NODE     25.10 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    709.00  DOWNSTREAM(FEET) =    704.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   480.00   CHANNEL SLOPE =  0.0104
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.791
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B       14.00      0.30     1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"               C        0.90      0.25     1.000    59
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        4.04      0.20     1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.24
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.29
 AVERAGE FLOW DEPTH(FEET) =   0.52   TRAVEL TIME(MIN.) =   3.50
 Tc(MIN.) =   31.19
 SUBAREA AREA(ACRES) =    18.94       SUBAREA RUNOFF(CFS) =    8.78
 EFFECTIVE AREA(ACRES) =     36.27     AREA-AVERAGED Fm(INCH/HR) =   0.28
 AREA-AVERAGED Fp(INCH/HR) =   0.28  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       36.3         PEAK FLOW RATE(CFS) =      16.75

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.60   FLOW VELOCITY(FEET/SEC.) =   2.49
 LONGEST FLOWPATH FROM NODE     10.10 TO NODE     25.10 =    2145.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.10 TO NODE     26.10 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    704.00  DOWNSTREAM(FEET) =    684.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   975.00   CHANNEL SLOPE =  0.0200
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.728
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        8.10      0.30     1.000    46
```

Onsite Hydrology Area "A"

2-Year Storm Existing Condition

```
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        4.10      0.25     1.000    59
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        9.40      0.20     1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      21.44
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.34
  AVERAGE FLOW DEPTH(FEET) =   0.58   TRAVEL TIME(MIN.) =   4.86
  Tc(MIN.) =   36.05
  SUBAREA AREA(ACRES) =    21.60       SUBAREA RUNOFF(CFS) =    9.36
  EFFECTIVE AREA(ACRES) =     57.87     AREA-AVERAGED Fm(INCH/HR) =   0.27
  AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       57.9          PEAK FLOW RATE(CFS) =      24.05

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.61   FLOW VELOCITY(FEET/SEC.) =   3.49
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     26.10 =    3120.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     26.10 TO NODE     61.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    684.50  DOWNSTREAM(FEET) =    675.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   660.00   CHANNEL SLOPE =  0.0141
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.692
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        6.00      0.30     1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        6.10      0.25     1.000    59
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        6.58      0.20     1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      27.78
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.26
  AVERAGE FLOW DEPTH(FEET) =   0.74   TRAVEL TIME(MIN.) =   3.38
  Tc(MIN.) =   39.43
  SUBAREA AREA(ACRES) =    18.68       SUBAREA RUNOFF(CFS) =    7.45
  EFFECTIVE AREA(ACRES) =     76.55     AREA-AVERAGED Fm(INCH/HR) =   0.26
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       76.5          PEAK FLOW RATE(CFS) =      29.60

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.77   FLOW VELOCITY(FEET/SEC.) =   3.34
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     61.00 =    3780.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       76.5  TC(MIN.) =     39.43
  EFFECTIVE AREA(ACRES) =     76.55  AREA-AVERAGED Fm(INCH/HR)=  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =      29.60
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Onsite Hydrology Area "A"

2-Year Storm Existing Condition

```
 ************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                           Analysis prepared by:

                           HUNSAKER & ASSOCIATES
                                Irvine,Inc
                        Planning * Engineering * Surveying
                 Three Hughes * Irvine, California 92618 * (949)583-1010

  ************************* DESCRIPTION OF STUDY *************************
 * Hydrology Study for Nakase Nursery                                   *
 * City of Lake Forest                                                  *
 * Existing Condition - 2-year Storm                                    *
  ************************************************************************

   FILE NAME: LFE-2.DAT
   TIME/DATE OF STUDY: 13:47 10/27/2017
 ========================================================================
   USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
 ========================================================================
                      --*TIME-OF-CONCENTRATION MODEL*--

   USER SPECIFIED STORM EVENT(YEAR) =    2.00
   SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
   SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
   *DATA BANK RAINFALL USED*
   *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

   *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
      HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
      WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
 NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
 ===  =====  =========  =================  ======  ===== ====== ===== =======
   1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 FEET
        as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
     2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
   *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
    OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
   *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

 ************************************************************************
   FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
 ------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ========================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
   ELEVATION DATA: UPSTREAM(FEET) =    743.00  DOWNSTREAM(FEET) =    730.00
   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.951
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.311
   SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
   NATURAL FAIR COVER
   "OPEN BRUSH"               B        0.49      0.30     1.000    46   12.95
   NATURAL FAIR COVER
   "OPEN BRUSH"               D        0.09      0.20     1.000    67   12.95
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =      0.54
   TOTAL AREA(ACRES) =      0.58   PEAK FLOW RATE(CFS) =      0.54

 ************************************************************************
   FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  51
 ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    730.00  DOWNSTREAM(FEET) =    724.50
   CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.0196
   CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.114
   SUBAREA LOSS RATE DATA(AMC  I ):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   NATURAL FAIR COVER
   "OPEN BRUSH"               B        0.81      0.30     1.000    46
   NATURAL FAIR COVER
   "OPEN BRUSH"               D        0.60      0.20     1.000    67
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.08
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.10
   AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   4.24
   Tc(MIN.) =   17.19
   SUBAREA AREA(ACRES) =     1.41     SUBAREA RUNOFF(CFS) =    1.09
   EFFECTIVE AREA(ACRES) =      1.99     AREA-AVERAGED Fm(INCH/HR) =   0.27
   AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        2.0         PEAK FLOW RATE(CFS) =       1.52

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   1.25
   LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     580.00 FEET.

 ************************************************************************
   FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  51
 ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    724.50  DOWNSTREAM(FEET) =    717.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   410.00   CHANNEL SLOPE =  0.0183
   CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
```

Onsite Hydrology at Existing 84” Node 15, Area B
(F19) Serrano Creek, Q_{100}=2350 cfs

2-Year Storm Existing Condition

```
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.974
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        2.26      0.30     1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        1.05      0.20     1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.57
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.51
 AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   4.53
 Tc(MIN.) =   21.72
 SUBAREA AREA(ACRES) =     3.31       SUBAREA RUNOFF(CFS) =    2.10
 EFFECTIVE AREA(ACRES) =      5.30     AREA-AVERAGED Fm(INCH/HR) =   0.27
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        5.3         PEAK FLOW RATE(CFS) =       3.37

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.20   FLOW VELOCITY(FEET/SEC.) =   1.66
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =     990.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    717.00  DOWNSTREAM(FEET) =    711.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   505.00   CHANNEL SLOPE =  0.0115
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.873
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        7.09      0.30     1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"               C        2.28      0.25     1.000    59
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        2.74      0.20     1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.69
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.84
 AVERAGE FLOW DEPTH(FEET) =   0.34   TRAVEL TIME(MIN.) =   4.58
 Tc(MIN.) =   26.30
 SUBAREA AREA(ACRES) =    12.11       SUBAREA RUNOFF(CFS) =    6.59
 EFFECTIVE AREA(ACRES) =     17.41     AREA-AVERAGED Fm(INCH/HR) =   0.27
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       17.4         PEAK FLOW RATE(CFS) =       9.48

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.42   FLOW VELOCITY(FEET/SEC.) =   2.10
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     14.00 =    1495.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    711.20  DOWNSTREAM(FEET) =    685.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1330.00   CHANNEL SLOPE =  0.0197
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   4.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.757
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        8.80      0.30     1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"               C        5.39      0.25     1.000    59
 NATURAL FAIR COVER
 "OPEN BRUSH"               D       11.80      0.20     1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.51
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.98
 AVERAGE FLOW DEPTH(FEET) =   0.48   TRAVEL TIME(MIN.) =   7.45
 Tc(MIN.) =   33.75
 SUBAREA AREA(ACRES) =    25.99       SUBAREA RUNOFF(CFS) =   11.98
 EFFECTIVE AREA(ACRES) =     43.40     AREA-AVERAGED Fm(INCH/HR) =   0.25
 AREA-AVERAGED Fp(INCH/HR) =   0.25  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       43.4         PEAK FLOW RATE(CFS) =      19.64

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.55   FLOW VELOCITY(FEET/SEC.) =   3.24
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =    2825.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       43.4  TC(MIN.) =     33.75
 EFFECTIVE AREA(ACRES) =      43.40  AREA-AVERAGED Fm(INCH/HR)=  0.25
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =      19.64
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

Onsite Hydrology at Existing 84” Node 15, Area B
(F19) Serrano Creek, Q_{100}=2350 cfs
2-Year Storm Existing Condition

```
 ************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                      Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY IN CITY OF LAKE FOREST                           *
* OFFSITE EXISTING CONDITION @ 2-YEAR STORM                             *
* W.O. #1443-136X                                                       *
 ************************************************************************

  FILE NAME: NAKASE02.DAT
  TIME/DATE OF STUDY: 14:01 07/19/2017
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1099.00  DOWNSTREAM(FEET) =   1091.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.370
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.684
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.78      0.25      0.600    50    8.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      1.08
  TOTAL AREA(ACRES) =      0.78   PEAK FLOW RATE(CFS) =      1.08

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1091.20  DOWNSTREAM ELEVATION(FEET) = 1089.40
  STREET LENGTH(FEET) =    90.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.69
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    9.52
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.89
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.87
  STREET FLOW TRAVEL TIME(MIN.) =   0.52   Tc(MIN.) =    8.89
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.627
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.38      0.25      0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    3.22
  EFFECTIVE AREA(ACRES) =      3.16    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =       4.25

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.55
  FLOW VELOCITY(FEET/SEC.) =  3.24   DEPTH*VELOCITY(FT*FT/SEC.) =   1.09
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) = 1089.40  DOWNSTREAM ELEVATION(FEET) = 1067.00
  STREET LENGTH(FEET) =   513.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.61
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =   10.13
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.45
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.38
  STREET FLOW TRAVEL TIME(MIN.) =   1.92   Tc(MIN.) =   10.81
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.454
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.34      0.25     0.100    50
  PUBLIC PARK                C        0.25      0.25     0.850    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.418
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    0.72
  EFFECTIVE AREA(ACRES) =      3.75    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =       4.48

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =  10.03
  FLOW VELOCITY(FEET/SEC.) =  4.40   DEPTH*VELOCITY(FT*FT/SEC.) =   1.36
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     903.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.81
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.454
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.35      0.25     0.100    50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.49      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.333
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    1.04
  EFFECTIVE AREA(ACRES) =      4.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.6       PEAK FLOW RATE(CFS) =       5.52

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1067.00  DOWNSTREAM(FEET) =  1062.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.46
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.52
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   10.97
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1003.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.97
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.442
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.09      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.09      SUBAREA RUNOFF(CFS) =    2.48
  EFFECTIVE AREA(ACRES) =      6.68   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        6.7       PEAK FLOW RATE(CFS) =       7.94

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1062.00  DOWNSTREAM(FEET) =  1022.40
  FLOW LENGTH(FEET) =   701.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.08
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.94
  PIPE TRAVEL TIME(MIN.) =   0.97    Tc(MIN.) =   11.94
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1704.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.94
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.374
```

```
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.18      0.30      0.100    36
  COMMERCIAL                  C        0.46      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.64      SUBAREA RUNOFF(CFS) =     0.78
  EFFECTIVE AREA(ACRES) =      7.32   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        7.3       PEAK FLOW RATE(CFS) =       8.31

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.40  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.10
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.31
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   12.26
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.26
  RAINFALL INTENSITY(INCH/HR) =   1.35
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       7.32
  TOTAL STREAM AREA(ACRES) =       7.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.31

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   305.00
  ELEVATION DATA: UPSTREAM(FEET) =   1046.00  DOWNSTREAM(FEET) =   1042.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.129
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.847
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  C        1.00      0.25      0.100    50    7.13
  RESIDENTIAL
  ".4 DWELLING/ACRE"          C        0.50      0.25      0.900    50   11.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
  SUBAREA RUNOFF(CFS) =      2.37
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      2.37

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1042.00  DOWNSTREAM ELEVATION(FEET) = 1036.00
  STREET LENGTH(FEET) =   373.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.52
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    9.21
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.57
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.76
  STREET FLOW TRAVEL TIME(MIN.) =   2.42   Tc(MIN.) =    9.55
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.562
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        3.31      0.25      0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     3.31      SUBAREA RUNOFF(CFS) =     4.28
  EFFECTIVE AREA(ACRES) =      4.81    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =        4.8       PEAK FLOW RATE(CFS) =       6.26

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =  10.64
  FLOW VELOCITY(FEET/SEC.) =  2.77   DEPTH*VELOCITY(FT*FT/SEC.) =   0.88
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     678.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1036.00  DOWNSTREAM ELEVATION(FEET) = 1026.00
```

```
 STREET LENGTH(FEET) =   463.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.61
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.32
   HALFSTREET FLOOD WIDTH(FEET) =   10.84
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.25
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.05
 STREET FLOW TRAVEL TIME(MIN.) =   2.37   Tc(MIN.) =   11.92
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.375
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        2.40      0.25     0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    2.70
 EFFECTIVE AREA(ACRES) =      7.21    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =       8.16

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  11.25
 FLOW VELOCITY(FEET/SEC.) =  3.26   DEPTH*VELOCITY(FT*FT/SEC.) =   1.08
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1141.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.92
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.375
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.16      0.30     0.500    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        2.22      0.25     0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    2.67
 EFFECTIVE AREA(ACRES) =      9.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =        9.6       PEAK FLOW RATE(CFS) =      10.83

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1026.00  DOWNSTREAM(FEET) =  1022.00
 FLOW LENGTH(FEET) =   395.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.84
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.83
 PIPE TRAVEL TIME(MIN.) =   0.96    Tc(MIN.) =   12.88
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1536.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.88
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.315
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.07      0.30     0.500    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        4.06      0.25     0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    4.13      SUBAREA RUNOFF(CFS) =    4.42
 EFFECTIVE AREA(ACRES) =     13.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
 TOTAL AREA(ACRES) =       13.7       PEAK FLOW RATE(CFS) =      14.73

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1022.00  DOWNSTREAM(FEET) =  1020.00
 FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.68
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      14.73
 PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   13.13
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1663.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.13
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.301
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
```

```
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.55      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.06      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     2.61      SUBAREA RUNOFF(CFS) =     2.75
  EFFECTIVE AREA(ACRES) =     16.33   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      17.31

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1020.00  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.10
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.31
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   13.57
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    1799.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.57
  RAINFALL INTENSITY(INCH/HR) =   1.28
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =      16.33
  TOTAL STREAM AREA(ACRES) =      16.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      17.31

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        8.31   12.26    1.353  0.25( 0.11) 0.45       7.3       1.00
      2       17.31   13.57    1.276  0.25( 0.12) 0.49      16.3       8.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       24.98   12.26    1.353  0.25( 0.12) 0.48      22.1       1.00
      2       25.10   13.57    1.276  0.25( 0.12) 0.48      23.6       8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      25.10    Tc(MIN.) =    13.57
  EFFECTIVE AREA(ACRES) =      23.65   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       23.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1019.50  DOWNSTREAM(FEET) =  1014.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.30
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.10
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   13.77
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.10 =    2014.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.77
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.266
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.15      0.30     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.15      SUBAREA RUNOFF(CFS) =     0.17
  EFFECTIVE AREA(ACRES) =     23.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       23.8       PEAK FLOW RATE(CFS) =      25.10
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.77
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.266
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.16      0.30     0.100    36
  COMMERCIAL                 C        1.44      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     1.79
  EFFECTIVE AREA(ACRES) =     25.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       25.4       PEAK FLOW RATE(CFS) =      26.34
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1014.00  DOWNSTREAM(FEET) =   971.40
  FLOW LENGTH(FEET) =   863.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.38
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.34
  PIPE TRAVEL TIME(MIN.) =   0.93    Tc(MIN.) =   14.70
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    2877.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.70
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.219
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.82      0.30     0.100    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.77      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.294
  SUBAREA AREA(ACRES) =    1.59      SUBAREA RUNOFF(CFS) =    1.64
  EFFECTIVE AREA(ACRES) =     26.99   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       27.0       PEAK FLOW RATE(CFS) =      26.91

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   971.40  DOWNSTREAM(FEET) =   969.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.71
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.91
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   14.74
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    2917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.74
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.217
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        2.46      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C       10.48      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   12.94      SUBAREA RUNOFF(CFS) =   12.66
  EFFECTIVE AREA(ACRES) =     39.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       39.9       PEAK FLOW RATE(CFS) =      39.52

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       40.28   13.43    1.284  0.25( 0.12) 0.46      38.3       1.00
      2       39.52   14.74    1.217  0.25( 0.12) 0.46      39.9       8.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      40.28  Tc(MIN.) =   13.43
  AREA-AVERAGED Fm(INCH/HR) =  0.12  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.46  EFFECTIVE AREA(ACRES) =      38.35

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   969.00  DOWNSTREAM(FEET) =   954.00
  FLOW LENGTH(FEET) =   416.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.79
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      40.28
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   13.90
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    3333.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.90
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.259
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.77      0.25     0.100    50
  PUBLIC PARK                C        0.43      0.25     0.850    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.369
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    1.26
  EFFECTIVE AREA(ACRES) =     39.55   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       41.1       PEAK FLOW RATE(CFS) =      40.68

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
```

```
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   954.00  DOWNSTREAM(FEET) =   952.80
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.41
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      40.68
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   14.11
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    3453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   14.11
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.248
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.88      0.30     0.400    36
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        7.02      0.25     0.400    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    7.90      SUBAREA RUNOFF(CFS) =    8.15
  EFFECTIVE AREA(ACRES) =     47.45   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       49.0       PEAK FLOW RATE(CFS) =      48.43

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.10 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   952.80  DOWNSTREAM(FEET) =   929.00
  FLOW LENGTH(FEET) =   636.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.05
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      48.43
  PIPE TRAVEL TIME(MIN.) =   0.66    Tc(MIN.) =   14.77
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.10 =    4089.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     17.10 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   14.77
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.216
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.68      0.30     0.500    36
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"        C        0.89      0.25     0.600    50
  COMMERCIAL                  C        1.86      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.309
  SUBAREA AREA(ACRES) =    3.43      SUBAREA RUNOFF(CFS) =    3.50
  EFFECTIVE AREA(ACRES) =     50.88   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       52.5       PEAK FLOW RATE(CFS) =      50.55

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     18.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   929.00  DOWNSTREAM(FEET) =   926.30
  FLOW LENGTH(FEET) =   122.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.29
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      50.55
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   14.92
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     18.00 =    4211.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   14.92
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.209
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS                B       24.46      0.30     0.350    36
  CONDOMINIUMS                C        7.92      0.25     0.350    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =   32.38      SUBAREA RUNOFF(CFS) =   32.28
  EFFECTIVE AREA(ACRES) =     83.26   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       84.8       PEAK FLOW RATE(CFS) =      82.51

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   926.30  DOWNSTREAM(FEET) =   922.70
  FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.62
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      82.51
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   15.12
```

```
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     19.00 =    4384.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.12
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.199
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        1.62      0.30     0.400    36
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       C        6.09      0.25     0.400    50
 COMMERCIAL                  B        2.90      0.30     0.100    36
 COMMERCIAL                  C        3.15      0.25     0.100    50
 NATURAL POOR COVER
 "GRASS"                     B        0.76      0.30     1.000    61
 NATURAL POOR COVER
 "GRASS"                     C        0.39      0.25     1.000    72
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
 SUBAREA AREA(ACRES) =   14.91      SUBAREA RUNOFF(CFS) =   14.93
 EFFECTIVE AREA(ACRES) =     98.17   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.39
 TOTAL AREA(ACRES) =       99.8       PEAK FLOW RATE(CFS) =      96.76

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   922.70  DOWNSTREAM(FEET) =   815.60
 FLOW LENGTH(FEET) =  1580.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  23.49
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      96.76
 PIPE TRAVEL TIME(MIN.) =   1.12    Tc(MIN.) =   16.24
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     20.00 =    5964.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.24
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.151
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B       19.45      0.30     0.100    36
 COMMERCIAL                  C       16.92      0.25     0.100    50
 COMMERCIAL                  D        0.11      0.20     0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =   36.48      SUBAREA RUNOFF(CFS) =   36.89
 EFFECTIVE AREA(ACRES) =    134.65   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =      136.2       PEAK FLOW RATE(CFS) =     129.38

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   815.60  DOWNSTREAM(FEET) =   799.50
 FLOW LENGTH(FEET) =   449.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.15
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     129.38
 PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   16.61
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6413.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.61
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.136
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        2.38      0.30     0.100    36
 COMMERCIAL                  C        0.87      0.25     0.100    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    3.24
 EFFECTIVE AREA(ACRES) =    137.90   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =      139.5       PEAK FLOW RATE(CFS) =     130.82

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.61
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.136
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        4.10      0.30     0.100    36
 COMMERCIAL                  C        1.54      0.25     0.100    50
 COMMERCIAL                  D        2.08      0.20     0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    7.72      SUBAREA RUNOFF(CFS) =    7.71
 EFFECTIVE AREA(ACRES) =    145.62   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.30
 TOTAL AREA(ACRES) =      147.2       PEAK FLOW RATE(CFS) =     138.54
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   799.50  DOWNSTREAM(FEET) =   765.50
  FLOW LENGTH(FEET) =  1056.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.31
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     138.54
  PIPE TRAVEL TIME(MIN.) =   0.91    Tc(MIN.) =   17.52
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     22.00 =    7469.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.52
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.102
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.06      0.30     0.100    36
  COMMERCIAL                 C        1.74      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    3.80      SUBAREA RUNOFF(CFS) =    3.67
  EFFECTIVE AREA(ACRES) =    149.42   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      151.0       PEAK FLOW RATE(CFS) =     138.54
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.52
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.102
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.23      0.30     0.100    36
  COMMERCIAL                 D        5.07      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    5.30      SUBAREA RUNOFF(CFS) =    5.16
  EFFECTIVE AREA(ACRES) =    154.72   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =      156.3       PEAK FLOW RATE(CFS) =     142.87

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   765.50  DOWNSTREAM(FEET) =   755.00
  FLOW LENGTH(FEET) =   465.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  34.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.99
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     142.87
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   17.98
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     23.00 =    7934.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.98
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.086
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        9.15      0.30     0.100    36
  COMMERCIAL                 C       10.79      0.25     0.100    50
  COMMERCIAL                 D        1.81      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   21.75      SUBAREA RUNOFF(CFS) =   20.73
  EFFECTIVE AREA(ACRES) =    176.47   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =      178.1       PEAK FLOW RATE(CFS) =     161.36

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.98
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.086
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        7.47      0.30     0.100    36
  COMMERCIAL                 C        0.40      0.25     0.100    50
  COMMERCIAL                 D       17.76      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   25.63      SUBAREA RUNOFF(CFS) =   24.52
  EFFECTIVE AREA(ACRES) =    202.10   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      203.7       PEAK FLOW RATE(CFS) =     185.88

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   755.00  DOWNSTREAM(FEET) =   736.00
  FLOW LENGTH(FEET) =  1257.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  39.4 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.79
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     185.88
  PIPE TRAVEL TIME(MIN.) =   1.33    Tc(MIN.) =   19.31
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.00 =    9191.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.31
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.042
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B       16.13      0.30     0.100    36
  COMMERCIAL                 C        3.87      0.25     0.100    50
  COMMERCIAL                 D        4.22      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   24.22      SUBAREA RUNOFF(CFS) =   22.12
  EFFECTIVE AREA(ACRES) =    226.32   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      227.9       PEAK FLOW RATE(CFS) =     200.10
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      227.9  TC(MIN.) =     19.31
  EFFECTIVE AREA(ACRES) =    226.32  AREA-AVERAGED Fm(INCH/HR)=  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap = 0.226
  PEAK FLOW RATE(CFS)   =     200.10

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      200.10   19.31    1.042  0.27( 0.06) 0.23     226.3       1.00
      2      193.37   20.64    1.003  0.27( 0.06) 0.23     227.9       8.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY IN CITY OF LAKE FOREST                             *
* OFFSITE & ONSITE EXISTING CONDITION @ 2-YEAR STORM                      *
* W.O. #1443-136X                                                         *
 ************************************************************************

  FILE NAME: EXIST02.DAT
  TIME/DATE OF STUDY: 17:05 10/05/2017
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1099.00  DOWNSTREAM(FEET) =   1091.20
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.370
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.684
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.78      0.25     0.600    50    8.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      1.08
  TOTAL AREA(ACRES) =      0.78   PEAK FLOW RATE(CFS) =      1.08

************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 1091.20  DOWNSTREAM ELEVATION(FEET) = 1089.40
  STREET LENGTH(FEET) =    90.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.69
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    9.52
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.89
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.87
  STREET FLOW TRAVEL TIME(MIN.) =   0.52   Tc(MIN.) =    8.89
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.627
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.38      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    3.22
  EFFECTIVE AREA(ACRES) =      3.16    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =       4.25

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.55
  FLOW VELOCITY(FEET/SEC.) =  3.24   DEPTH*VELOCITY(FT*FT/SEC.) =   1.09
```

```
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     390.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1089.40  DOWNSTREAM ELEVATION(FEET) = 1067.00
 STREET LENGTH(FEET) =   513.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.61
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.31
   HALFSTREET FLOOD WIDTH(FEET) =   10.13
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.45
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.38
 STREET FLOW TRAVEL TIME(MIN.) =   1.92   Tc(MIN.) =   10.81
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.454
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                C        0.34      0.25     0.100    50
 PUBLIC PARK               C        0.25      0.25     0.850    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.418
 SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    0.72
 EFFECTIVE AREA(ACRES) =      3.75    AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.51
 TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =       4.48

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =  10.03
 FLOW VELOCITY(FEET/SEC.) =  4.40   DEPTH*VELOCITY(FT*FT/SEC.) =   1.36
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     903.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.81
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.454
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                C        0.35      0.25     0.100    50
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"      C        0.49      0.25     0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.333
 SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    1.04
 EFFECTIVE AREA(ACRES) =      4.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =       5.52

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1067.00  DOWNSTREAM(FEET) =  1062.00
 FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.46
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.52
 PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   10.97
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1003.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.97
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.442
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"      C        2.09      0.25     0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.09      SUBAREA RUNOFF(CFS) =    2.48
 EFFECTIVE AREA(ACRES) =      6.68   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =        6.7        PEAK FLOW RATE(CFS) =       7.94

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1062.00  DOWNSTREAM(FEET) =  1022.40
 FLOW LENGTH(FEET) =   701.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.08
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.94
  PIPE TRAVEL TIME(MIN.) =   0.97    Tc(MIN.) =   11.94
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1704.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.94
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.374
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.18      0.30      0.100    36
  COMMERCIAL                 C        0.46      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.64      SUBAREA RUNOFF(CFS) =     0.78
  EFFECTIVE AREA(ACRES) =      7.32   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        7.3       PEAK FLOW RATE(CFS) =       8.31

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.40  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.10
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.31
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   12.26
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.26
  RAINFALL INTENSITY(INCH/HR) =   1.35
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       7.32
  TOTAL STREAM AREA(ACRES) =       7.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.31

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   305.00
  ELEVATION DATA: UPSTREAM(FEET) =   1046.00  DOWNSTREAM(FEET) =   1042.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.129
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.847
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 C        1.00      0.25      0.100    50    7.13
  RESIDENTIAL
  ".4 DWELLING/ACRE"         C        0.50      0.25      0.900    50   11.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
  SUBAREA RUNOFF(CFS) =      2.37
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      2.37

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1042.00  DOWNSTREAM ELEVATION(FEET) = 1036.00
  STREET LENGTH(FEET) =   373.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.52
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    9.21
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.57
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.76
  STREET FLOW TRAVEL TIME(MIN.) =   2.42   Tc(MIN.) =    9.55
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.562
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        3.31      0.25      0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
```

```
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    3.31      SUBAREA RUNOFF(CFS) =    4.28
 EFFECTIVE AREA(ACRES) =      4.81    AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =        4.8        PEAK FLOW RATE(CFS) =       6.26

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =  10.64
 FLOW VELOCITY(FEET/SEC.) =  2.77   DEPTH*VELOCITY(FT*FT/SEC.) =   0.88
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     678.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1036.00  DOWNSTREAM ELEVATION(FEET) = 1026.00
 STREET LENGTH(FEET) =   463.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.61
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.32
   HALFSTREET FLOOD WIDTH(FEET) =   10.84
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.25
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.05
 STREET FLOW TRAVEL TIME(MIN.) =   2.37   Tc(MIN.) =   11.92
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.375
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        2.40      0.25      0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    2.70
 EFFECTIVE AREA(ACRES) =      7.21    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =       8.16

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  11.25
 FLOW VELOCITY(FEET/SEC.) =  3.26   DEPTH*VELOCITY(FT*FT/SEC.) =   1.08
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1141.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.92
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.375
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.16      0.30      0.500    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        2.22      0.25      0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    2.67
 EFFECTIVE AREA(ACRES) =      9.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =        9.6        PEAK FLOW RATE(CFS) =      10.83

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1026.00  DOWNSTREAM(FEET) =  1022.00
 FLOW LENGTH(FEET) =   395.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.84
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.83
 PIPE TRAVEL TIME(MIN.) =   0.96    Tc(MIN.) =   12.88
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1536.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.88
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.315
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.07      0.30      0.500    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        4.06      0.25      0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    4.13      SUBAREA RUNOFF(CFS) =    4.42
 EFFECTIVE AREA(ACRES) =     13.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
 TOTAL AREA(ACRES) =       13.7       PEAK FLOW RATE(CFS) =      14.73
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.00  DOWNSTREAM(FEET) =  1020.00
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.68
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.73
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   13.13
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.13
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.301
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.55      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        2.06      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.61      SUBAREA RUNOFF(CFS) =    2.75
  EFFECTIVE AREA(ACRES) =     16.33   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      17.31

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1020.00  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.10
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.31
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   13.57
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    1799.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.57
  RAINFALL INTENSITY(INCH/HR) =   1.28
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =      16.33
  TOTAL STREAM AREA(ACRES) =      16.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      17.31

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        8.31   12.26    1.353  0.25( 0.11) 0.45       7.3        1.00
      2       17.31   13.57    1.276  0.25( 0.12) 0.49      16.3        8.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       24.98   12.26    1.353  0.25( 0.12) 0.48      22.1        1.00
      2       25.10   13.57    1.276  0.25( 0.12) 0.48      23.6        8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      25.10    Tc(MIN.) =    13.57
  EFFECTIVE AREA(ACRES) =      23.65   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       23.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1019.50  DOWNSTREAM(FEET) =  1014.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.30
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.10
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   13.77
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.10 =    2014.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.77
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.266
```

```
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.15      0.30      0.100    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.15      SUBAREA RUNOFF(CFS) =     0.17
 EFFECTIVE AREA(ACRES) =     23.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =       23.8       PEAK FLOW RATE(CFS) =      25.10
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.77
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.266
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.16      0.30      0.100    36
 COMMERCIAL                  C        1.44      0.25      0.100    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     1.79
 EFFECTIVE AREA(ACRES) =     25.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
 TOTAL AREA(ACRES) =       25.4       PEAK FLOW RATE(CFS) =      26.34

****************************************************************************
 FLOW PROCESS FROM NODE      7.10 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1014.00  DOWNSTREAM(FEET) =   971.40
 FLOW LENGTH(FEET) =   863.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.38
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      26.34
 PIPE TRAVEL TIME(MIN.) =   0.93    Tc(MIN.) =   14.70
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    2877.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.70
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.219
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.82      0.30      0.100    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C        0.77      0.25      0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.294
 SUBAREA AREA(ACRES) =     1.59      SUBAREA RUNOFF(CFS) =     1.64
 EFFECTIVE AREA(ACRES) =     26.99   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
 TOTAL AREA(ACRES) =       27.0       PEAK FLOW RATE(CFS) =      26.91

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   971.40  DOWNSTREAM(FEET) =   969.00
 FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.71
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      26.91
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   14.74
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    2917.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.74
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.217
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        2.46      0.30      0.500    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C       10.48      0.25      0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    12.94      SUBAREA RUNOFF(CFS) =    12.66
 EFFECTIVE AREA(ACRES) =     39.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =       39.9       PEAK FLOW RATE(CFS) =      39.52

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       40.28   13.43    1.284  0.25( 0.12) 0.46      38.3       1.00
     2       39.52   14.74    1.217  0.25( 0.12) 0.46      39.9       8.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      40.28  Tc(MIN.) =   13.43
 AREA-AVERAGED Fm(INCH/HR) =  0.12  AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.46  EFFECTIVE AREA(ACRES) =      38.35
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   969.00  DOWNSTREAM(FEET) =   954.00
  FLOW LENGTH(FEET) =   416.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.79
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      40.28
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   13.90
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    3333.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.90
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.259
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                C        0.77      0.25     0.100    50
  PUBLIC PARK               C        0.43      0.25     0.850    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.369
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    1.26
  EFFECTIVE AREA(ACRES) =     39.55   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       41.1       PEAK FLOW RATE(CFS) =      40.68

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   954.00  DOWNSTREAM(FEET) =   952.80
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.41
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      40.68
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   14.11
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    3453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.11
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.248
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.88      0.30     0.400    36
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        7.02      0.25     0.400    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    7.90      SUBAREA RUNOFF(CFS) =    8.15
  EFFECTIVE AREA(ACRES) =     47.45   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       49.0       PEAK FLOW RATE(CFS) =      48.43

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   952.80  DOWNSTREAM(FEET) =   929.00
  FLOW LENGTH(FEET) =   636.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.05
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      48.43
  PIPE TRAVEL TIME(MIN.) =   0.66    Tc(MIN.) =   14.77
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.10 =    4089.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     17.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.77
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.216
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.68      0.30     0.500    36
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.89      0.25     0.600    50
  COMMERCIAL                 C        1.86      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.309
  SUBAREA AREA(ACRES) =    3.43      SUBAREA RUNOFF(CFS) =    3.50
  EFFECTIVE AREA(ACRES) =     50.88   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       52.5       PEAK FLOW RATE(CFS) =      50.55

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   929.00  DOWNSTREAM(FEET) =   926.30
  FLOW LENGTH(FEET) =   122.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.29
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      50.55
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   14.92
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     18.00 =    4211.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   14.92
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.209
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS               B       24.46      0.30     0.350    36
  CONDOMINIUMS               C        7.92      0.25     0.350    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =   32.38      SUBAREA RUNOFF(CFS) =   32.28
  EFFECTIVE AREA(ACRES) =     83.26   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       84.8       PEAK FLOW RATE(CFS) =      82.51

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   926.30  DOWNSTREAM(FEET) =   922.70
  FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.62
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      82.51
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   15.12
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     19.00 =    4384.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   15.12
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.199
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        1.62      0.30     0.400    36
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        6.09      0.25     0.400    50
  COMMERCIAL                 B        2.90      0.30     0.100    36
  COMMERCIAL                 C        3.15      0.25     0.100    50
  NATURAL POOR COVER
  "GRASS"                    B        0.76      0.30     1.000    61
  NATURAL POOR COVER
  "GRASS"                    C        0.39      0.25     1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
  SUBAREA AREA(ACRES) =   14.91      SUBAREA RUNOFF(CFS) =   14.93
  EFFECTIVE AREA(ACRES) =     98.17   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =       99.8       PEAK FLOW RATE(CFS) =      96.76

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   922.70  DOWNSTREAM(FEET) =   815.60
  FLOW LENGTH(FEET) =  1580.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.49
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      96.76
  PIPE TRAVEL TIME(MIN.) =   1.12    Tc(MIN.) =   16.24
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     20.00 =    5964.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   16.24
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.151
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B       19.45      0.30     0.100    36
  COMMERCIAL                 C       16.92      0.25     0.100    50
  COMMERCIAL                 D        0.11      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   36.48      SUBAREA RUNOFF(CFS) =   36.89
  EFFECTIVE AREA(ACRES) =    134.65   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      136.2       PEAK FLOW RATE(CFS) =     129.38

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   815.60  DOWNSTREAM(FEET) =   799.50
  FLOW LENGTH(FEET) =   449.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.15
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     129.38
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   16.61
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6413.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.136
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.38      0.30     0.100    36
  COMMERCIAL                 C        0.87      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    3.24
  EFFECTIVE AREA(ACRES) =    137.90   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      139.5       PEAK FLOW RATE(CFS) =     130.82

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.136
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        4.10      0.30     0.100    36
  COMMERCIAL                 C        1.54      0.25     0.100    50
  COMMERCIAL                 D        2.08      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    7.72      SUBAREA RUNOFF(CFS) =    7.71
  EFFECTIVE AREA(ACRES) =    145.62   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      147.2       PEAK FLOW RATE(CFS) =     138.54

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   799.50  DOWNSTREAM(FEET) =   765.50
  FLOW LENGTH(FEET) =  1056.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.31
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     138.54
  PIPE TRAVEL TIME(MIN.) =   0.91    Tc(MIN.) =   17.52
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     22.00 =    7469.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.52
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.102
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.06      0.30     0.100    36
  COMMERCIAL                 C        1.74      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    3.80      SUBAREA RUNOFF(CFS) =    3.67
  EFFECTIVE AREA(ACRES) =    149.42   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      151.0       PEAK FLOW RATE(CFS) =     138.54
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.52
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.102
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.23      0.30     0.100    36
  COMMERCIAL                 D        5.07      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    5.30      SUBAREA RUNOFF(CFS) =    5.16
  EFFECTIVE AREA(ACRES) =    154.72   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =      156.3       PEAK FLOW RATE(CFS) =     142.87

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   765.50  DOWNSTREAM(FEET) =   755.00
  FLOW LENGTH(FEET) =   465.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  34.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.99
```

```
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     142.87
 PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   17.98
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     23.00 =    7934.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.98
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.086
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        9.15      0.30      0.100    36
 COMMERCIAL                 C       10.79      0.25      0.100    50
 COMMERCIAL                 D        1.81      0.20      0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =   21.75      SUBAREA RUNOFF(CFS) =   20.73
 EFFECTIVE AREA(ACRES) =    176.47   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.26
 TOTAL AREA(ACRES) =      178.1       PEAK FLOW RATE(CFS) =     161.36

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.98
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.086
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        7.47      0.30      0.100    36
 COMMERCIAL                 C        0.40      0.25      0.100    50
 COMMERCIAL                 D       17.76      0.20      0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =   25.63      SUBAREA RUNOFF(CFS) =   24.52
 EFFECTIVE AREA(ACRES) =    202.10   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.24
 TOTAL AREA(ACRES) =      203.7       PEAK FLOW RATE(CFS) =     185.88

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   755.00  DOWNSTREAM(FEET) =   736.00
 FLOW LENGTH(FEET) =  1257.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  39.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.79
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     185.88
 PIPE TRAVEL TIME(MIN.) =   1.33    Tc(MIN.) =   19.31
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.00 =    9191.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.31
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.042
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B       16.13      0.30      0.100    36
 COMMERCIAL                 C        3.87      0.25      0.100    50
 COMMERCIAL                 D        4.22      0.20      0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =   24.22      SUBAREA RUNOFF(CFS) =   22.12
 EFFECTIVE AREA(ACRES) =    226.32   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
 TOTAL AREA(ACRES) =      227.9       PEAK FLOW RATE(CFS) =     200.10

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     24.10 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   718.60  DOWNSTREAM(FEET) =   718.20
 FLOW LENGTH(FEET) =   110.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  84.0 INCH PIPE IS  44.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.71
 GIVEN PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     200.10
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   19.49
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.10 =    9301.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.10 TO NODE     24.20 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    718.20  DOWNSTREAM(FEET) =    709.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   898.00   CHANNEL SLOPE =  0.0102
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     200.10
 FLOW VELOCITY(FEET/SEC.) =   5.45   FLOW DEPTH(FEET) =   2.46
 TRAVEL TIME(MIN.) =   2.74   Tc(MIN.) =   22.24
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.20 =   10199.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.20 TO NODE     24.20 IS CODE =   1
```

```
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   22.24
  RAINFALL INTENSITY(INCH/HR) =   0.96
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.23
  EFFECTIVE STREAM AREA(ACRES) =     226.32
  TOTAL STREAM AREA(ACRES) =     227.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     200.10

****************************************************************************
  FLOW PROCESS FROM NODE     10.10 TO NODE     21.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    743.00  DOWNSTREAM(FEET) =    731.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.160
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.299
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        0.41      0.30     1.000    46   13.16
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.24      0.20     1.000    67   13.16
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.61
  TOTAL AREA(ACRES) =      0.65   PEAK FLOW RATE(CFS) =      0.61

****************************************************************************
  FLOW PROCESS FROM NODE     21.10 TO NODE     22.10 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    731.00  DOWNSTREAM(FEET) =    725.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.0196
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.120
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        1.19      0.30     1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.78      0.20     1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.37
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.20
  AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   3.88
  Tc(MIN.) =   17.04
  SUBAREA AREA(ACRES) =     1.97     SUBAREA RUNOFF(CFS) =    1.52
  EFFECTIVE AREA(ACRES) =      2.62     AREA-AVERAGED Fm(INCH/HR) =   0.26
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        2.6          PEAK FLOW RATE(CFS) =       2.03

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.14   FLOW VELOCITY(FEET/SEC.) =   1.39
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     22.10 =     580.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.10 TO NODE     23.10 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    725.50  DOWNSTREAM(FEET) =    720.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   415.00   CHANNEL SLOPE =  0.0133
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.964
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        1.80      0.30     1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.15      0.20     1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.62
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.36
  AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   5.10
  Tc(MIN.) =   22.14
  SUBAREA AREA(ACRES) =     1.95     SUBAREA RUNOFF(CFS) =    1.18
  EFFECTIVE AREA(ACRES) =      4.57     AREA-AVERAGED Fm(INCH/HR) =   0.27
  AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        4.6          PEAK FLOW RATE(CFS) =       2.84

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.20   FLOW VELOCITY(FEET/SEC.) =   1.40
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     23.10 =     995.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.10 TO NODE     24.20 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    720.00  DOWNSTREAM(FEET) =    709.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   670.00   CHANNEL SLOPE =  0.0164
```

```
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.847
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B       10.16      0.30     1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.80      0.25     1.000    59
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.80      0.20     1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.10
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.01
 AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   5.56
 Tc(MIN.) =   27.70
 SUBAREA AREA(ACRES) =    12.76       SUBAREA RUNOFF(CFS) =    6.48
 EFFECTIVE AREA(ACRES) =     17.33     AREA-AVERAGED Fm(INCH/HR) =   0.28
 AREA-AVERAGED Fp(INCH/HR) =   0.28  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       17.3          PEAK FLOW RATE(CFS) =       8.84

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.36   FLOW VELOCITY(FEET/SEC.) =   2.28
 LONGEST FLOWPATH FROM NODE     10.10 TO NODE     24.20 =    1665.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.20 TO NODE     24.20 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   27.70
 RAINFALL INTENSITY(INCH/HR) =   0.85
 AREA-AVERAGED Fm(INCH/HR) =  0.28
 AREA-AVERAGED Fp(INCH/HR) =  0.28
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      17.33
 TOTAL STREAM AREA(ACRES) =      17.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.84

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      200.10   22.24    0.961  0.27( 0.06) 0.23     226.3       1.00
     1      193.37   23.60    0.929  0.27( 0.06) 0.23     227.9       8.00
     2        8.84   27.70    0.847  0.28( 0.28) 1.00      17.3      10.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      208.62   22.24    0.961  0.27( 0.07) 0.27     240.2       1.00
     2      201.99   23.60    0.929  0.27( 0.07) 0.28     242.7       8.00
     3      184.04   27.70    0.847  0.27( 0.08) 0.28     245.2      10.10

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     208.62    Tc(MIN.) =    22.24
 EFFECTIVE AREA(ACRES) =     240.23   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
 TOTAL AREA(ACRES) =      245.2
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.20 =   10199.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.20 TO NODE     25.10 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    709.00  DOWNSTREAM(FEET) =    704.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   480.00   CHANNEL SLOPE =  0.0104
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.927
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B       14.00      0.30     1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.90      0.25     1.000    59
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        4.04      0.20     1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     214.17
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.60
 AVERAGE FLOW DEPTH(FEET) =   2.54   TRAVEL TIME(MIN.) =   1.43
 Tc(MIN.) =   23.67
 SUBAREA AREA(ACRES) =    18.94       SUBAREA RUNOFF(CFS) =   11.10
 EFFECTIVE AREA(ACRES) =    259.17     AREA-AVERAGED Fm(INCH/HR) =   0.09
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   0.32
 TOTAL AREA(ACRES) =      264.2          PEAK FLOW RATE(CFS) =     208.62
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  2.51   FLOW VELOCITY(FEET/SEC.) =   5.55
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     25.10 =   10679.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.10 TO NODE     26.10 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    704.00  DOWNSTREAM(FEET) =    684.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   975.00   CHANNEL SLOPE =  0.0200
```

```
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.879
 SUBAREA LOSS RATE DATA(AMC   I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        8.10      0.30     1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        4.10      0.25     1.000    59
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        9.40      0.20     1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     214.77
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.06
 AVERAGE FLOW DEPTH(FEET) =   2.13   TRAVEL TIME(MIN.) =   2.30
 Tc(MIN.) =   25.97
 SUBAREA AREA(ACRES) =    21.60       SUBAREA RUNOFF(CFS) =   12.29
 EFFECTIVE AREA(ACRES) =    280.77     AREA-AVERAGED Fm(INCH/HR) =   0.10
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   0.38
 TOTAL AREA(ACRES) =      285.8         PEAK FLOW RATE(CFS) =     208.62
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  2.10   FLOW VELOCITY(FEET/SEC.) =   6.99
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     26.10 =   11654.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     26.10 TO NODE     61.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    684.50  DOWNSTREAM(FEET) =    675.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   660.00   CHANNEL SLOPE =  0.0141
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.847
 SUBAREA LOSS RATE DATA(AMC   I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        6.00      0.30     1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        6.10      0.25     1.000    59
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        6.58      0.20     1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     213.65
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.23
 AVERAGE FLOW DEPTH(FEET) =   2.34   TRAVEL TIME(MIN.) =   1.77
 Tc(MIN.) =   27.74
 SUBAREA AREA(ACRES) =    18.68       SUBAREA RUNOFF(CFS) =   10.06
 EFFECTIVE AREA(ACRES) =    299.45     AREA-AVERAGED Fm(INCH/HR) =   0.11
 AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   0.42
 TOTAL AREA(ACRES) =      304.5         PEAK FLOW RATE(CFS) =     208.62
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  2.31   FLOW VELOCITY(FEET/SEC.) =   6.18
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     61.00 =   12314.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =      304.5  TC(MIN.) =     27.74
 EFFECTIVE AREA(ACRES) =    299.45  AREA-AVERAGED Fm(INCH/HR)=  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap = 0.415
 PEAK FLOW RATE(CFS)   =     208.62

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      208.62   27.74    0.847  0.26( 0.11) 0.42     299.5       1.00
     2      201.99   29.15    0.823  0.26( 0.11) 0.42     301.9       8.00
     3      184.04   33.40    0.761  0.26( 0.11) 0.42     304.5      10.10
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY IN CITY OF LAKE FOREST                           *
* ONSITE AREA "A" EXISTING CONDITION @ 25-YEAR STORM                    *
* W.O. #1443-136X                                                       *
 ************************************************************************

  FILE NAME: EX25-A.DAT
  TIME/DATE OF STUDY: 17:53 06/26/2018
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE     10.10 TO NODE     21.10 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    743.00  DOWNSTREAM(FEET) =    731.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.160
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.789
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.41      0.30     1.000    66   13.16
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.24      0.20     1.000    83   13.16
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.48
  TOTAL AREA(ACRES) =      0.65   PEAK FLOW RATE(CFS) =      1.48

************************************************************************
  FLOW PROCESS FROM NODE     21.10 TO NODE     22.10 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    731.00  DOWNSTREAM(FEET) =    725.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.0196
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.507
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        1.19      0.30     1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.78      0.20     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.48
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.71
  AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =   2.73
  Tc(MIN.) =   15.89
  SUBAREA AREA(ACRES) =     1.97       SUBAREA RUNOFF(CFS) =    3.98
  EFFECTIVE AREA(ACRES) =      2.62     AREA-AVERAGED Fm(INCH/HR) =   0.26
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        2.6         PEAK FLOW RATE(CFS) =       5.30

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   1.98
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     22.10 =     580.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     22.10 TO NODE     23.10 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    725.50  DOWNSTREAM(FEET) =    720.00
```

Onsite Hydrology Area "A"

25-Year Storm Existing Condition

```
 CHANNEL LENGTH THRU SUBAREA(FEET) =   415.00   CHANNEL SLOPE =  0.0133
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.240
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        1.80      0.30     1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.15      0.20     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.01
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.97
 AVERAGE FLOW DEPTH(FEET) =   0.33   TRAVEL TIME(MIN.) =   3.50
 Tc(MIN.) =   19.39
 SUBAREA AREA(ACRES) =     1.95       SUBAREA RUNOFF(CFS) =    3.42
 EFFECTIVE AREA(ACRES) =      4.57     AREA-AVERAGED Fm(INCH/HR) =   0.27
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        4.6         PEAK FLOW RATE(CFS) =       8.08

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.36   FLOW VELOCITY(FEET/SEC.) =   2.07
 LONGEST FLOWPATH FROM NODE     10.10 TO NODE     23.10 =     995.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.10 TO NODE     24.20 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    720.00  DOWNSTREAM(FEET) =    709.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   670.00   CHANNEL SLOPE =  0.0164
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.025
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B       10.16      0.30     1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.80      0.25     1.000    77
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.80      0.20     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      18.11
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.95
 AVERAGE FLOW DEPTH(FEET) =   0.55   TRAVEL TIME(MIN.) =   3.78
 Tc(MIN.) =   23.17
 SUBAREA AREA(ACRES) =    12.76       SUBAREA RUNOFF(CFS) =   20.01
 EFFECTIVE AREA(ACRES) =     17.33     AREA-AVERAGED Fm(INCH/HR) =   0.28
 AREA-AVERAGED Fp(INCH/HR) =   0.28  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       17.3         PEAK FLOW RATE(CFS) =      27.21

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.70   FLOW VELOCITY(FEET/SEC.) =   3.41
 LONGEST FLOWPATH FROM NODE     10.10 TO NODE     24.20 =    1665.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.20 TO NODE     25.10 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    709.00  DOWNSTREAM(FEET) =    704.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   480.00   CHANNEL SLOPE =  0.0104
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  1.916
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B       14.00      0.30     1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.90      0.25     1.000    77
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        4.04      0.20     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      41.19
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.36
 AVERAGE FLOW DEPTH(FEET) =   1.02   TRAVEL TIME(MIN.) =   2.38
 Tc(MIN.) =   25.55
 SUBAREA AREA(ACRES) =    18.94       SUBAREA RUNOFF(CFS) =   27.95
 EFFECTIVE AREA(ACRES) =     36.27     AREA-AVERAGED Fm(INCH/HR) =   0.28
 AREA-AVERAGED Fp(INCH/HR) =   0.28  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       36.3         PEAK FLOW RATE(CFS) =      53.46

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.18   FLOW VELOCITY(FEET/SEC.) =   3.67
 LONGEST FLOWPATH FROM NODE     10.10 TO NODE     25.10 =    2145.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.10 TO NODE     26.10 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    704.00  DOWNSTREAM(FEET) =    684.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   975.00   CHANNEL SLOPE =  0.0200
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  1.790
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        8.10      0.30     1.000    66
```

Onsite Hydrology Area "A"

25-Year Storm Existing Condition

```
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        4.10      0.25     1.000    77
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        9.40      0.20     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      68.46
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.96
  AVERAGE FLOW DEPTH(FEET) =   1.13   TRAVEL TIME(MIN.) =   3.28
  Tc(MIN.) =   28.82
  SUBAREA AREA(ACRES) =    21.60       SUBAREA RUNOFF(CFS) =   29.99
  EFFECTIVE AREA(ACRES) =     57.87     AREA-AVERAGED Fm(INCH/HR) =   0.27
  AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       57.9          PEAK FLOW RATE(CFS) =      79.32

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.23   FLOW VELOCITY(FEET/SEC.) =   5.20
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     26.10 =    3120.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     26.10 TO NODE     61.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    684.50  DOWNSTREAM(FEET) =    675.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   660.00   CHANNEL SLOPE =  0.0141
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  1.714
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        6.00      0.30     1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        6.10      0.25     1.000    77
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        6.58      0.20     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      91.65
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.83
  AVERAGE FLOW DEPTH(FEET) =   1.47   TRAVEL TIME(MIN.) =   2.28
  Tc(MIN.) =   31.10
  SUBAREA AREA(ACRES) =    18.68       SUBAREA RUNOFF(CFS) =   24.64
  EFFECTIVE AREA(ACRES) =     76.55     AREA-AVERAGED Fm(INCH/HR) =   0.26
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       76.5          PEAK FLOW RATE(CFS) =     100.04

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.54   FLOW VELOCITY(FEET/SEC.) =   4.97
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     61.00 =    3780.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       76.5  TC(MIN.) =     31.10
  EFFECTIVE AREA(ACRES) =     76.55  AREA-AVERAGED Fm(INCH/HR)=  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =     100.04
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Onsite Hydrology Area "A"

25-Year Storm Existing Condition

```
 ------------------------------------------------------------------------
 ************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                            Analysis prepared by:

                            HUNSAKER & ASSOCIATES
                                 Irvine,Inc
                        Planning * Engineering * Surveying
                Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* Hydrology Study for Nakase Nursery                                    *
* City of Lake Forest                                                   *
* Existing Condition - 25-year Storm                                    *
 ************************************************************************

  FILE NAME: LFE-25.DAT
  TIME/DATE OF STUDY: 13:48 10/27/2017
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    743.00  DOWNSTREAM(FEET) =    730.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.951
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.815
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.49      0.30     1.000    66   12.95
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.09      0.20     1.000    83   12.95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.32
  TOTAL AREA(ACRES) =      0.58   PEAK FLOW RATE(CFS) =      1.32

************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    730.00  DOWNSTREAM(FEET) =    724.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.0196
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.502
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.81      0.30     1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.60      0.20     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.75
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.56
  AVERAGE FLOW DEPTH(FEET) =   0.17   TRAVEL TIME(MIN.) =   3.00
  Tc(MIN.) =   15.95
  SUBAREA AREA(ACRES) =     1.41     SUBAREA RUNOFF(CFS) =     2.85
  EFFECTIVE AREA(ACRES) =      1.99     AREA-AVERAGED Fm(INCH/HR) =   0.27
  AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      2.0      PEAK FLOW RATE(CFS) =      4.01

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.21   FLOW VELOCITY(FEET/SEC.) =   1.82
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     580.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    724.50  DOWNSTREAM(FEET) =    717.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   410.00   CHANNEL SLOPE =  0.0183
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
```

Onsite Hydrology at Existing 84” Node 15, Area B
(F19) Serrano Creek, Q_{100}=2350 cfs

25-Year Storm Existing Condition

```
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.260
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        2.26      0.30     1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        1.05      0.20     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.98
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.18
 AVERAGE FLOW DEPTH(FEET) =   0.30   TRAVEL TIME(MIN.) =   3.14
 Tc(MIN.) =   19.09
 SUBAREA AREA(ACRES) =     3.31       SUBAREA RUNOFF(CFS) =    5.93
 EFFECTIVE AREA(ACRES) =      5.30     AREA-AVERAGED Fm(INCH/HR) =   0.27
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        5.3         PEAK FLOW RATE(CFS) =       9.51

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.36   FLOW VELOCITY(FEET/SEC.) =   2.44
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =     990.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    717.00  DOWNSTREAM(FEET) =    711.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   505.00   CHANNEL SLOPE =  0.0115
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.075
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        7.09      0.30     1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"               C        2.28      0.25     1.000    77
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        2.74      0.20     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      19.37
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.70
 AVERAGE FLOW DEPTH(FEET) =   0.64   TRAVEL TIME(MIN.) =   3.12
 Tc(MIN.) =   22.20
 SUBAREA AREA(ACRES) =    12.11       SUBAREA RUNOFF(CFS) =   19.69
 EFFECTIVE AREA(ACRES) =     17.41     AREA-AVERAGED Fm(INCH/HR) =   0.27
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       17.4         PEAK FLOW RATE(CFS) =      28.31

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.80   FLOW VELOCITY(FEET/SEC.) =   3.07
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     14.00 =    1495.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    711.20  DOWNSTREAM(FEET) =    685.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1330.00   CHANNEL SLOPE =  0.0197
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   4.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  1.846
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        8.80      0.30     1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"               C        5.39      0.25     1.000    77
 NATURAL FAIR COVER
 "OPEN BRUSH"               D       11.80      0.20     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      47.09
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.36
 AVERAGE FLOW DEPTH(FEET) =   0.91   TRAVEL TIME(MIN.) =   5.08
 Tc(MIN.) =   27.28
 SUBAREA AREA(ACRES) =    25.99       SUBAREA RUNOFF(CFS) =   37.47
 EFFECTIVE AREA(ACRES) =     43.40     AREA-AVERAGED Fm(INCH/HR) =   0.25
 AREA-AVERAGED Fp(INCH/HR) =   0.25  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       43.4         PEAK FLOW RATE(CFS) =      62.21

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.07   FLOW VELOCITY(FEET/SEC.) =   4.78
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =    2825.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       43.4  TC(MIN.) =     27.28
 EFFECTIVE AREA(ACRES) =      43.40  AREA-AVERAGED Fm(INCH/HR)=  0.25
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =      62.21
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

Onsite Hydrology at Existing 84” Node 15, Area B
(F19) Serrano Creek, Q_{100}=2350 cfs
25-Year Storm Existing Condition

```
 ************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                      Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY IN CITY OF LAKE FOREST                           *
* OFFSITE EXISTING CONDITION @ 25-YEAR STORM                            *
* W.O. #1443-136X                                                       *
 ************************************************************************

  FILE NAME: NAKASE25.DAT
  TIME/DATE OF STUDY: 14:13 07/19/2017
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1099.00  DOWNSTREAM(FEET) =   1091.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.370
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.603
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.78      0.25      0.600    69    8.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      2.42
  TOTAL AREA(ACRES) =      0.78   PEAK FLOW RATE(CFS) =      2.42

************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 1091.20  DOWNSTREAM ELEVATION(FEET) = 1089.40
  STREET LENGTH(FEET) =    90.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.04
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   13.38
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.52
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.30
  STREET FLOW TRAVEL TIME(MIN.) =   0.43   Tc(MIN.) =    8.80
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.503
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.38      0.25      0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    7.24
  EFFECTIVE AREA(ACRES) =      3.16    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =       9.59

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  16.12
  FLOW VELOCITY(FEET/SEC.) =  3.93   DEPTH*VELOCITY(FT*FT/SEC.) =   1.64
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     390.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) = 1089.40  DOWNSTREAM ELEVATION(FEET) = 1067.00
  STREET LENGTH(FEET) =   513.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.41
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   14.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.35
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.06
  STREET FLOW TRAVEL TIME(MIN.) =   1.60   Tc(MIN.) =   10.39
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.188
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        0.34      0.25     0.100    69
  PUBLIC PARK                 C        0.25      0.25     0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.418
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    1.64
  EFFECTIVE AREA(ACRES) =      3.75    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =      10.33

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  14.19
  FLOW VELOCITY(FEET/SEC.) =  5.38   DEPTH*VELOCITY(FT*FT/SEC.) =   2.06
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     903.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.39
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.188
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        0.35      0.25     0.100    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.49      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.333
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    2.35
  EFFECTIVE AREA(ACRES) =      4.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.6       PEAK FLOW RATE(CFS) =      12.68

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1067.00  DOWNSTREAM(FEET) =  1062.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.02
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.68
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   10.52
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1003.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.52
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.166
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        2.09      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.09      SUBAREA RUNOFF(CFS) =    5.72
  EFFECTIVE AREA(ACRES) =      6.68   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        6.7       PEAK FLOW RATE(CFS) =      18.31

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1062.00  DOWNSTREAM(FEET) =  1022.40
  FLOW LENGTH(FEET) =   701.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.79
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.31
  PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   11.31
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1704.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.31
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.039
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.18      0.30      0.100    56
  COMMERCIAL                  C        0.46      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.64      SUBAREA RUNOFF(CFS) =    1.74
  EFFECTIVE AREA(ACRES) =      7.32   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        7.3       PEAK FLOW RATE(CFS) =      19.28

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.40  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.72
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.28
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   11.58
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.58
  RAINFALL INTENSITY(INCH/HR) =   3.00
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       7.32
  TOTAL STREAM AREA(ACRES) =       7.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      19.28

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   305.00
  ELEVATION DATA: UPSTREAM(FEET) =   1046.00  DOWNSTREAM(FEET) =   1042.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.129
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.946
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  C        1.00      0.25      0.100    69    7.13
  RESIDENTIAL
  ".4 DWELLING/ACRE"          C        0.50      0.25      0.900    69   11.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
  SUBAREA RUNOFF(CFS) =      5.20
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      5.20

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1042.00  DOWNSTREAM ELEVATION(FEET) = 1036.00
  STREET LENGTH(FEET) =   373.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.13
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   13.07
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.08
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.12
  STREET FLOW TRAVEL TIME(MIN.) =   2.02   Tc(MIN.) =    9.15
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.426
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        3.31      0.25      0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.31      SUBAREA RUNOFF(CFS) =    9.83
  EFFECTIVE AREA(ACRES) =      4.81    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =        4.8         PEAK FLOW RATE(CFS) =      14.34

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  15.00
  FLOW VELOCITY(FEET/SEC.) =  3.36   DEPTH*VELOCITY(FT*FT/SEC.) =   1.34
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     678.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1036.00  DOWNSTREAM ELEVATION(FEET) = 1026.00
  STREET LENGTH(FEET) =   463.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00
```

```
  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.52
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   15.31
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.96
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.59
  STREET FLOW TRAVEL TIME(MIN.) =   1.95   Tc(MIN.) =   11.10
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.072
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.40      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    6.36
  EFFECTIVE AREA(ACRES) =      7.21    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =      19.16

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  15.92
  FLOW VELOCITY(FEET/SEC.) =  4.02   DEPTH*VELOCITY(FT*FT/SEC.) =   1.66
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1141.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.10
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.072
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.16      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.22      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    6.31
  EFFECTIVE AREA(ACRES) =      9.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        9.6       PEAK FLOW RATE(CFS) =      25.47

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1026.00  DOWNSTREAM(FEET) =  1022.00
  FLOW LENGTH(FEET) =   395.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.36
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.47
  PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   11.89
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1536.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.89
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.955
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.07      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        4.06      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    4.13      SUBAREA RUNOFF(CFS) =   10.52
  EFFECTIVE AREA(ACRES) =     13.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       13.7       PEAK FLOW RATE(CFS) =      34.98

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.00  DOWNSTREAM(FEET) =  1020.00
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.55
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      34.98
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   12.09
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.927
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
```

```
  "5-7 DWELLINGS/ACRE"       B        0.55      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.06      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     2.61      SUBAREA RUNOFF(CFS) =     6.57
  EFFECTIVE AREA(ACRES) =     16.33   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      41.21

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1020.00  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.45
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.21
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   12.44
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    1799.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.44
  RAINFALL INTENSITY(INCH/HR) =   2.88
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =      16.33
  TOTAL STREAM AREA(ACRES) =      16.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      41.21

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       19.28   11.58    2.999  0.25( 0.11) 0.45       7.3       1.00
      2       41.21   12.44    2.880  0.25( 0.12) 0.49      16.3       8.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       59.29   11.58    2.999  0.25( 0.12) 0.48      22.5       1.00
      2       59.69   12.44    2.880  0.25( 0.12) 0.48      23.6       8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      59.69    Tc(MIN.) =    12.44
  EFFECTIVE AREA(ACRES) =      23.65   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       23.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1019.50  DOWNSTREAM(FEET) =  1014.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.64
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      59.69
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   12.59
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.10 =    2014.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.59
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.860
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.15      0.30      0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.15      SUBAREA RUNOFF(CFS) =     0.38
  EFFECTIVE AREA(ACRES) =     23.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       23.8       PEAK FLOW RATE(CFS) =      59.69
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.59
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.860
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.16      0.30      0.100    56
  COMMERCIAL                  C        1.44      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     4.08
  EFFECTIVE AREA(ACRES) =     25.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       25.4       PEAK FLOW RATE(CFS) =      62.78

****************************************************************************
```

```
 FLOW PROCESS FROM NODE      7.10 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1014.00  DOWNSTREAM(FEET) =   971.40
 FLOW LENGTH(FEET) =   863.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.70
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      62.78
 PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =   13.36
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    2877.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.36
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.765
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.82      0.30     0.100    56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C        0.77      0.25     0.500    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.294
 SUBAREA AREA(ACRES) =    1.59      SUBAREA RUNOFF(CFS) =    3.85
 EFFECTIVE AREA(ACRES) =     26.99   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
 TOTAL AREA(ACRES) =       27.0       PEAK FLOW RATE(CFS) =      64.47

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   971.40  DOWNSTREAM(FEET) =   969.00
 FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.47
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      64.47
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   13.40
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    2917.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.40
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.761
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        2.46      0.30     0.500    56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C       10.48      0.25     0.500    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =   12.94      SUBAREA RUNOFF(CFS) =   30.65
 EFFECTIVE AREA(ACRES) =     39.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =       39.9       PEAK FLOW RATE(CFS) =      95.02

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       96.03   12.54    2.867  0.25( 0.12) 0.46      38.8       1.00
     2       95.02   13.40    2.761  0.25( 0.12) 0.46      39.9       8.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      96.03  Tc(MIN.) =   12.54
 AREA-AVERAGED Fm(INCH/HR) =  0.12  AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.46  EFFECTIVE AREA(ACRES) =      38.80

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   969.00  DOWNSTREAM(FEET) =   954.00
 FLOW LENGTH(FEET) =   416.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.88
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      96.03
 PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   12.90
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    3333.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.90
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.821
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        0.77      0.25     0.100    69
 PUBLIC PARK                 C        0.43      0.25     0.850    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.369
 SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    2.95
 EFFECTIVE AREA(ACRES) =     40.00   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =       41.1       PEAK FLOW RATE(CFS) =      97.36

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   954.00  DOWNSTREAM(FEET) =   952.80
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  31.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.66
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      97.36
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   13.07
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    3453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   13.07
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.800
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.88      0.30     0.400    56
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        7.02      0.25     0.400    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    7.90      SUBAREA RUNOFF(CFS) =   19.18
  EFFECTIVE AREA(ACRES) =     47.90   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       49.0       PEAK FLOW RATE(CFS) =     115.78

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   952.80  DOWNSTREAM(FEET) =   929.00
  FLOW LENGTH(FEET) =   636.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.70
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     115.78
  PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =   13.61
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.10 =    4089.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     17.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   13.61
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.736
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.68      0.30     0.500    56
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"        C        0.89      0.25     0.600    69
  COMMERCIAL                  C        1.86      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.309
  SUBAREA AREA(ACRES) =    3.43      SUBAREA RUNOFF(CFS) =    8.19
  EFFECTIVE AREA(ACRES) =     51.33   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       52.5       PEAK FLOW RATE(CFS) =     121.25

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   929.00  DOWNSTREAM(FEET) =   926.30
  FLOW LENGTH(FEET) =   122.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.58
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     121.25
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   13.74
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     18.00 =    4211.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   13.74
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.723
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS                B       24.46      0.30     0.350    56
  CONDOMINIUMS                C        7.92      0.25     0.350    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =   32.38      SUBAREA RUNOFF(CFS) =   76.41
  EFFECTIVE AREA(ACRES) =     83.71   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       84.8       PEAK FLOW RATE(CFS) =     197.02

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   926.30  DOWNSTREAM(FEET) =   922.70
  FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  36.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.29
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     197.02
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   13.89
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     19.00 =    4384.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.89
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.705
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        1.62      0.30     0.400    56
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        6.09      0.25     0.400    69
  COMMERCIAL                  B        2.90      0.30     0.100    56
  COMMERCIAL                  C        3.15      0.25     0.100    69
  NATURAL POOR COVER
  "GRASS"                     B        0.76      0.30     1.000    78
  NATURAL POOR COVER
  "GRASS"                     C        0.39      0.25     1.000    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
  SUBAREA AREA(ACRES) =   14.91      SUBAREA RUNOFF(CFS) =   35.13
  EFFECTIVE AREA(ACRES) =     98.62   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =       99.8       PEAK FLOW RATE(CFS) =     230.83

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   922.70  DOWNSTREAM(FEET) =   815.60
  FLOW LENGTH(FEET) =  1580.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.33
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     230.83
  PIPE TRAVEL TIME(MIN.) =   0.90    Tc(MIN.) =   14.79
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     20.00 =    5964.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.79
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.611
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B       19.45      0.30     0.100    56
  COMMERCIAL                  C       16.92      0.25     0.100    69
  COMMERCIAL                  D        0.11      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   36.48      SUBAREA RUNOFF(CFS) =   84.81
  EFFECTIVE AREA(ACRES) =    135.10   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      136.2       PEAK FLOW RATE(CFS) =     307.28

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   815.60  DOWNSTREAM(FEET) =   799.50
  FLOW LENGTH(FEET) =   449.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  38.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.02
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     307.28
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   15.09
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6413.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.581
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        2.38      0.30     0.100    56
  COMMERCIAL                  C        0.87      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    7.47
  EFFECTIVE AREA(ACRES) =    138.35   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      139.5       PEAK FLOW RATE(CFS) =     311.17

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.581
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        4.10      0.30     0.100    56
  COMMERCIAL                  C        1.54      0.25     0.100    69
  COMMERCIAL                  D        2.08      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    7.72      SUBAREA RUNOFF(CFS) =   17.75
  EFFECTIVE AREA(ACRES) =    146.07   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      147.2       PEAK FLOW RATE(CFS) =     328.93

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   799.50  DOWNSTREAM(FEET) =   765.50
  FLOW LENGTH(FEET) =  1056.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  43.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.99
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     328.93
  PIPE TRAVEL TIME(MIN.) =   0.73    Tc(MIN.) =   15.82
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     22.00 =    7469.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.82
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.513
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.06      0.30      0.100    56
  COMMERCIAL                 C        1.74      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    3.80      SUBAREA RUNOFF(CFS) =    8.50
  EFFECTIVE AREA(ACRES) =    149.87   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      151.0       PEAK FLOW RATE(CFS) =     328.93
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.82
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.513
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.23      0.30      0.100    56
  COMMERCIAL                 D        5.07      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    5.30      SUBAREA RUNOFF(CFS) =   11.89
  EFFECTIVE AREA(ACRES) =    155.17   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      156.3       PEAK FLOW RATE(CFS) =     340.32

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   765.50  DOWNSTREAM(FEET) =   755.00
  FLOW LENGTH(FEET) =   465.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  45.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.44
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     340.32
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =   16.18
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     23.00 =    7934.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.18
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.481
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        9.15      0.30      0.100    56
  COMMERCIAL                 C       10.79      0.25      0.100    69
  COMMERCIAL                 D        1.81      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   21.75      SUBAREA RUNOFF(CFS) =   48.05
  EFFECTIVE AREA(ACRES) =    176.92   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =      178.1       PEAK FLOW RATE(CFS) =     383.91

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.18
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.481
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        7.47      0.30      0.100    56
  COMMERCIAL                 C        0.40      0.25      0.100    69
  COMMERCIAL                 D       17.76      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   25.63      SUBAREA RUNOFF(CFS) =   56.70
  EFFECTIVE AREA(ACRES) =    202.55   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      203.7       PEAK FLOW RATE(CFS) =     440.61

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   755.00  DOWNSTREAM(FEET) =   736.00
  FLOW LENGTH(FEET) =  1257.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  69.0 INCH PIPE IS  56.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.36
  ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =     440.61
  PIPE TRAVEL TIME(MIN.) =   1.08    Tc(MIN.) =   17.27
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.00 =    9191.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.27
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.392
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B       16.13      0.30     0.100    56
  COMMERCIAL                  C        3.87      0.25     0.100    69
  COMMERCIAL                  D        4.22      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   24.22      SUBAREA RUNOFF(CFS) =   51.54
  EFFECTIVE AREA(ACRES) =    226.77   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      227.9       PEAK FLOW RATE(CFS) =     475.88
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      227.9  TC(MIN.) =     17.27
  EFFECTIVE AREA(ACRES) =    226.77  AREA-AVERAGED Fm(INCH/HR)=  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap = 0.227
  PEAK FLOW RATE(CFS)   =     475.88

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      475.88   17.27    2.392  0.27( 0.06) 0.23     226.8       1.00
      2      464.42   18.16    2.325  0.27( 0.06) 0.23     227.9       8.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
 ------------------------------------------------------------------------
 ************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                            Analysis prepared by:

                            HUNSAKER & ASSOCIATES
                                 Irvine,Inc
                        Planning * Engineering * Surveying
             Three Hughes * Irvine, California 92618 * (949)583-1010

  ************************* DESCRIPTION OF STUDY *************************
 * NAKASE RANCH NURSERY IN CITY OF LAKE FOREST                           *
 * OFFSITE & ONSITE EXISTING CONDITION @ 25-YEAR STORM                   *
 * W.O. #1443-136X                                                       *
  ************************************************************************

   FILE NAME: EXIST25.DAT
   TIME/DATE OF STUDY: 17:26 10/05/2017
 ========================================================================
   USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
 ========================================================================
                      --*TIME-OF-CONCENTRATION MODEL*--

   USER SPECIFIED STORM EVENT(YEAR) =   25.00
   SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
   SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
   *DATA BANK RAINFALL USED*
   *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

   *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
      HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
      WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
 NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
 ===  =====  =========  ================  ======  ===== ====== ===== =======
   1   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.125 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 FEET
        as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
     2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
   *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
    OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
   *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

 ************************************************************************
   FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
 ------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ========================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
   ELEVATION DATA: UPSTREAM(FEET) =   1099.00  DOWNSTREAM(FEET) =   1091.20
   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.370
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.603
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
   RESIDENTIAL
   "3-4 DWELLINGS/ACRE"       C        0.78      0.25      0.600    69    8.37
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
   SUBAREA RUNOFF(CFS) =      2.42
   TOTAL AREA(ACRES) =      0.78   PEAK FLOW RATE(CFS) =      2.42

 ************************************************************************
   FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
 ------------------------------------------------------------------------
   >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
 ========================================================================
   UPSTREAM ELEVATION(FEET) = 1091.20  DOWNSTREAM ELEVATION(FEET) = 1089.40
   STREET LENGTH(FEET) =    90.00   CURB HEIGHT(INCHES) =  6.0
   STREET HALFWIDTH(FEET) = 18.00

   DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
   INSIDE STREET CROSSFALL(DECIMAL) =  0.018
   OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

   SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
   STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
   Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
   Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

     **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.04
     STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
     STREET FLOW DEPTH(FEET) =  0.37
     HALFSTREET FLOOD WIDTH(FEET) =   13.38
     AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.52
     PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.30
   STREET FLOW TRAVEL TIME(MIN.) =   0.43   Tc(MIN.) =    8.80
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.503
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       C        2.38      0.25      0.500    69
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
   SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    7.24
   EFFECTIVE AREA(ACRES) =      3.16    AREA-AVERAGED Fm(INCH/HR) =  0.13
   AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.52
   TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =       9.59

   END OF SUBAREA STREET FLOW HYDRAULICS:
   DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  16.12
   FLOW VELOCITY(FEET/SEC.) =  3.93   DEPTH*VELOCITY(FT*FT/SEC.) =   1.64
   LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     390.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1089.40  DOWNSTREAM ELEVATION(FEET) = 1067.00
  STREET LENGTH(FEET) =   513.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.41
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   14.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.35
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.06
  STREET FLOW TRAVEL TIME(MIN.) =   1.60   Tc(MIN.) =   10.39
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.188
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                C        0.34      0.25     0.100    69
  PUBLIC PARK               C        0.25      0.25     0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.418
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    1.64
  EFFECTIVE AREA(ACRES) =      3.75    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =      10.33

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  14.19
  FLOW VELOCITY(FEET/SEC.) =  5.38   DEPTH*VELOCITY(FT*FT/SEC.) =   2.06
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     903.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.39
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.188
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                C        0.35      0.25     0.100    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"      C        0.49      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.333
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    2.35
  EFFECTIVE AREA(ACRES) =      4.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.6       PEAK FLOW RATE(CFS) =      12.68

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1067.00  DOWNSTREAM(FEET) =  1062.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.02
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.68
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   10.52
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1003.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.52
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.166
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"      C        2.09      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.09      SUBAREA RUNOFF(CFS) =    5.72
  EFFECTIVE AREA(ACRES) =      6.68   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        6.7       PEAK FLOW RATE(CFS) =      18.31

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1062.00  DOWNSTREAM(FEET) =  1022.40
  FLOW LENGTH(FEET) =   701.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.79
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.31
  PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   11.31
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1704.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.31
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.039
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.18      0.30      0.100    56
  COMMERCIAL                 C        0.46      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.64      SUBAREA RUNOFF(CFS) =    1.74
  EFFECTIVE AREA(ACRES) =      7.32   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        7.3       PEAK FLOW RATE(CFS) =      19.28

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.40  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.72
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.28
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   11.58
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.58
  RAINFALL INTENSITY(INCH/HR) =   3.00
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       7.32
  TOTAL STREAM AREA(ACRES) =       7.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      19.28

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   305.00
  ELEVATION DATA: UPSTREAM(FEET) =   1046.00  DOWNSTREAM(FEET) =   1042.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.129
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.946
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 C        1.00      0.25      0.100    69    7.13
  RESIDENTIAL
  ".4 DWELLING/ACRE"         C        0.50      0.25      0.900    69   11.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
  SUBAREA RUNOFF(CFS) =      5.20
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      5.20

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1042.00  DOWNSTREAM ELEVATION(FEET) = 1036.00
  STREET LENGTH(FEET) =   373.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.13
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   13.07
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.08
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.12
  STREET FLOW TRAVEL TIME(MIN.) =   2.02   Tc(MIN.) =    9.15
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.426
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        3.31      0.25      0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.31      SUBAREA RUNOFF(CFS) =    9.83
  EFFECTIVE AREA(ACRES) =      4.81    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =        4.8       PEAK FLOW RATE(CFS) =      14.34

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  15.00
```

```
  FLOW VELOCITY(FEET/SEC.) =  3.36   DEPTH*VELOCITY(FT*FT/SEC.) =   1.34
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     678.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1036.00  DOWNSTREAM ELEVATION(FEET) = 1026.00
  STREET LENGTH(FEET) =   463.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.52
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   15.31
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.96
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.59
  STREET FLOW TRAVEL TIME(MIN.) =   1.95   Tc(MIN.) =   11.10
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.072
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.40      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    6.36
  EFFECTIVE AREA(ACRES) =      7.21    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =      19.16

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  15.92
  FLOW VELOCITY(FEET/SEC.) =  4.02   DEPTH*VELOCITY(FT*FT/SEC.) =   1.66
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1141.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.10
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.072
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.16      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.22      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    6.31
  EFFECTIVE AREA(ACRES) =      9.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        9.6        PEAK FLOW RATE(CFS) =      25.47

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1026.00  DOWNSTREAM(FEET) =  1022.00
  FLOW LENGTH(FEET) =   395.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.36
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.47
  PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   11.89
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1536.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.89
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.955
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.07      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        4.06      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    4.13      SUBAREA RUNOFF(CFS) =   10.52
  EFFECTIVE AREA(ACRES) =     13.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       13.7       PEAK FLOW RATE(CFS) =      34.98

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.00  DOWNSTREAM(FEET) =  1020.00
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.55
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      34.98
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   12.09
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.927
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.55      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.06      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.61      SUBAREA RUNOFF(CFS) =    6.57
  EFFECTIVE AREA(ACRES) =     16.33   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      41.21

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1020.00  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.45
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.21
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   12.44
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    1799.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.44
  RAINFALL INTENSITY(INCH/HR) =   2.88
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =      16.33
  TOTAL STREAM AREA(ACRES) =      16.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      41.21

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       19.28   11.58    2.999  0.25( 0.11) 0.45       7.3       1.00
      2       41.21   12.44    2.880  0.25( 0.12) 0.49      16.3       8.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       59.29   11.58    2.999  0.25( 0.12) 0.48      22.5       1.00
      2       59.69   12.44    2.880  0.25( 0.12) 0.48      23.6       8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      59.69    Tc(MIN.) =    12.44
  EFFECTIVE AREA(ACRES) =      23.65   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       23.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1019.50  DOWNSTREAM(FEET) =  1014.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.64
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      59.69
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   12.59
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.10 =    2014.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.59
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.860
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.15      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.38
  EFFECTIVE AREA(ACRES) =     23.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       23.8       PEAK FLOW RATE(CFS) =      59.69
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.59
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.860
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.16      0.30     0.100    56
  COMMERCIAL                  C        1.44      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     4.08
  EFFECTIVE AREA(ACRES) =     25.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       25.4       PEAK FLOW RATE(CFS) =      62.78

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1014.00  DOWNSTREAM(FEET) =   971.40
  FLOW LENGTH(FEET) =   863.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.70
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      62.78
  PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =   13.36
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    2877.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.36
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.765
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.82      0.30     0.100    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.77      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.294
  SUBAREA AREA(ACRES) =     1.59      SUBAREA RUNOFF(CFS) =     3.85
  EFFECTIVE AREA(ACRES) =     26.99   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       27.0       PEAK FLOW RATE(CFS) =      64.47

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   971.40  DOWNSTREAM(FEET) =   969.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.47
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      64.47
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   13.40
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    2917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.40
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.761
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        2.46      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C       10.48      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   12.94      SUBAREA RUNOFF(CFS) =   30.65
  EFFECTIVE AREA(ACRES) =     39.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       39.9       PEAK FLOW RATE(CFS) =      95.02

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       96.03   12.54    2.867  0.25( 0.12) 0.46      38.8       1.00
      2       95.02   13.40    2.761  0.25( 0.12) 0.46      39.9       8.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      96.03  Tc(MIN.) =   12.54
  AREA-AVERAGED Fm(INCH/HR) =  0.12  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.46  EFFECTIVE AREA(ACRES) =      38.80

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   969.00  DOWNSTREAM(FEET) =   954.00
  FLOW LENGTH(FEET) =   416.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.88
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      96.03
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   12.90
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    3333.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.90
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.821
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.77      0.25      0.100    69
  PUBLIC PARK                C        0.43      0.25      0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.369
  SUBAREA AREA(ACRES) =     1.20      SUBAREA RUNOFF(CFS) =     2.95
  EFFECTIVE AREA(ACRES) =     40.00   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       41.1       PEAK FLOW RATE(CFS) =      97.36

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   954.00  DOWNSTREAM(FEET) =   952.80
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  31.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.66
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      97.36
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   13.07
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    3453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.07
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.800
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.88      0.30      0.400    56
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        7.02      0.25      0.400    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =     7.90      SUBAREA RUNOFF(CFS) =    19.18
  EFFECTIVE AREA(ACRES) =     47.90   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       49.0       PEAK FLOW RATE(CFS) =     115.78

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   952.80  DOWNSTREAM(FEET) =   929.00
  FLOW LENGTH(FEET) =   636.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.70
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     115.78
  PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =   13.61
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.10 =    4089.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     17.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.61
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.736
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.68      0.30      0.500    56
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.89      0.25      0.600    69
  COMMERCIAL                 C        1.86      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.309
  SUBAREA AREA(ACRES) =     3.43      SUBAREA RUNOFF(CFS) =     8.19
  EFFECTIVE AREA(ACRES) =     51.33   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       52.5       PEAK FLOW RATE(CFS) =     121.25

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   929.00  DOWNSTREAM(FEET) =   926.30
  FLOW LENGTH(FEET) =   122.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.58
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     121.25
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   13.74
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     18.00 =    4211.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.74
```

```
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.723
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS                B       24.46      0.30     0.350    56
 CONDOMINIUMS                C        7.92      0.25     0.350    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA AREA(ACRES) =   32.38      SUBAREA RUNOFF(CFS) =   76.41
 EFFECTIVE AREA(ACRES) =     83.71   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =       84.8       PEAK FLOW RATE(CFS) =     197.02

****************************************************************************
 FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   926.30  DOWNSTREAM(FEET) =   922.70
 FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  36.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.29
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     197.02
 PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   13.89
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     19.00 =    4384.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.89
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.705
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        1.62      0.30     0.400    56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       C        6.09      0.25     0.400    69
 COMMERCIAL                  B        2.90      0.30     0.100    56
 COMMERCIAL                  C        3.15      0.25     0.100    69
 NATURAL POOR COVER
 "GRASS"                     B        0.76      0.30     1.000    78
 NATURAL POOR COVER
 "GRASS"                     C        0.39      0.25     1.000    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
 SUBAREA AREA(ACRES) =   14.91      SUBAREA RUNOFF(CFS) =   35.13
 EFFECTIVE AREA(ACRES) =     98.62   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.39
 TOTAL AREA(ACRES) =       99.8       PEAK FLOW RATE(CFS) =     230.83

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   922.70  DOWNSTREAM(FEET) =   815.60
 FLOW LENGTH(FEET) =  1580.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  29.33
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     230.83
 PIPE TRAVEL TIME(MIN.) =   0.90    Tc(MIN.) =   14.79
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     20.00 =    5964.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.79
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.611
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B       19.45      0.30     0.100    56
 COMMERCIAL                  C       16.92      0.25     0.100    69
 COMMERCIAL                  D        0.11      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =   36.48      SUBAREA RUNOFF(CFS) =   84.81
 EFFECTIVE AREA(ACRES) =    135.10   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =      136.2       PEAK FLOW RATE(CFS) =     307.28

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   815.60  DOWNSTREAM(FEET) =   799.50
 FLOW LENGTH(FEET) =   449.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  38.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  25.02
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     307.28
 PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   15.09
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6413.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.09
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.581
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL               B        2.38      0.30     0.100    56
  COMMERCIAL               C        0.87      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     3.25      SUBAREA RUNOFF(CFS) =     7.47
  EFFECTIVE AREA(ACRES) =    138.35   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      139.5       PEAK FLOW RATE(CFS) =     311.17

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.581
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL               B        4.10      0.30     0.100    56
  COMMERCIAL               C        1.54      0.25     0.100    69
  COMMERCIAL               D        2.08      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     7.72      SUBAREA RUNOFF(CFS) =    17.75
  EFFECTIVE AREA(ACRES) =    146.07   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      147.2       PEAK FLOW RATE(CFS) =     328.93

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   799.50  DOWNSTREAM(FEET) =   765.50
  FLOW LENGTH(FEET) =  1056.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  43.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.99
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     328.93
  PIPE TRAVEL TIME(MIN.) =   0.73    Tc(MIN.) =   15.82
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     22.00 =    7469.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.82
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.513
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL               B        2.06      0.30     0.100    56
  COMMERCIAL               C        1.74      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     3.80      SUBAREA RUNOFF(CFS) =     8.50
  EFFECTIVE AREA(ACRES) =    149.87   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      151.0       PEAK FLOW RATE(CFS) =     328.93
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.82
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.513
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL               B        0.23      0.30     0.100    56
  COMMERCIAL               D        5.07      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     5.30      SUBAREA RUNOFF(CFS) =    11.89
  EFFECTIVE AREA(ACRES) =    155.17   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      156.3       PEAK FLOW RATE(CFS) =     340.32

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   765.50  DOWNSTREAM(FEET) =   755.00
  FLOW LENGTH(FEET) =   465.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  45.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.44
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     340.32
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =   16.18
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     23.00 =    7934.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.18
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.481
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL               B        9.15      0.30     0.100    56
  COMMERCIAL               C       10.79      0.25     0.100    69
  COMMERCIAL               D        1.81      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
  SUBAREA AREA(ACRES) =   21.75      SUBAREA RUNOFF(CFS) =   48.05
  EFFECTIVE AREA(ACRES) =    176.92   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =      178.1       PEAK FLOW RATE(CFS) =     383.91

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.18
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.481
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        7.47      0.30      0.100    56
  COMMERCIAL                 C        0.40      0.25      0.100    69
  COMMERCIAL                 D       17.76      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   25.63      SUBAREA RUNOFF(CFS) =   56.70
  EFFECTIVE AREA(ACRES) =    202.55   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      203.7       PEAK FLOW RATE(CFS) =     440.61

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   755.00  DOWNSTREAM(FEET) =   736.00
  FLOW LENGTH(FEET) =  1257.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  69.0 INCH PIPE IS  56.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.36
  ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     440.61
  PIPE TRAVEL TIME(MIN.) =   1.08    Tc(MIN.) =   17.27
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.00 =    9191.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.27
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.392
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B       16.13      0.30      0.100    56
  COMMERCIAL                 C        3.87      0.25      0.100    69
  COMMERCIAL                 D        4.22      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   24.22      SUBAREA RUNOFF(CFS) =   51.54
  EFFECTIVE AREA(ACRES) =    226.77   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      227.9       PEAK FLOW RATE(CFS) =     475.88

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.10 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   718.60  DOWNSTREAM(FEET) =   718.20
  FLOW LENGTH(FEET) =   110.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.50
  (PIPE FLOW VELOCITY CORRESPONDING TO FULL PIPE CAPACITY FLOW)
  GIVEN PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     475.88
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   17.46
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.10 =    9301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.10 TO NODE     24.20 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    718.20  DOWNSTREAM(FEET) =    709.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   898.00   CHANNEL SLOPE =  0.0102
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     475.88
  FLOW VELOCITY(FEET/SEC.) =   6.95   FLOW DEPTH(FEET) =   3.86
  TRAVEL TIME(MIN.) =   2.15   Tc(MIN.) =   19.61
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.20 =   10199.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.20 TO NODE     24.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.61
  RAINFALL INTENSITY(INCH/HR) =   2.23
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.23
  EFFECTIVE STREAM AREA(ACRES) =     226.77
  TOTAL STREAM AREA(ACRES) =     227.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     475.88

****************************************************************************
  FLOW PROCESS FROM NODE     10.10 TO NODE     21.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
```

```
  ELEVATION DATA: UPSTREAM(FEET) =    743.00  DOWNSTREAM(FEET) =    731.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.160
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.789
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        0.41      0.30     1.000    66   13.16
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.24      0.20     1.000    83   13.16
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.48
  TOTAL AREA(ACRES) =      0.65   PEAK FLOW RATE(CFS) =      1.48

****************************************************************************
  FLOW PROCESS FROM NODE     21.10 TO NODE     22.10 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    731.00  DOWNSTREAM(FEET) =    725.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.0196
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.507
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        1.19      0.30     1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.78      0.20     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.48
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.71
  AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =   2.73
  Tc(MIN.) =   15.89
  SUBAREA AREA(ACRES) =     1.97       SUBAREA RUNOFF(CFS) =    3.98
  EFFECTIVE AREA(ACRES) =      2.62     AREA-AVERAGED Fm(INCH/HR) =   0.26
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        2.6         PEAK FLOW RATE(CFS) =       5.30

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   1.98
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     22.10 =     580.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.10 TO NODE     23.10 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    725.50  DOWNSTREAM(FEET) =    720.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   415.00   CHANNEL SLOPE =  0.0133
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.240
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        1.80      0.30     1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.15      0.20     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.01
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.97
  AVERAGE FLOW DEPTH(FEET) =   0.33   TRAVEL TIME(MIN.) =   3.50
  Tc(MIN.) =   19.39
  SUBAREA AREA(ACRES) =     1.95       SUBAREA RUNOFF(CFS) =    3.42
  EFFECTIVE AREA(ACRES) =      4.57     AREA-AVERAGED Fm(INCH/HR) =   0.27
  AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        4.6         PEAK FLOW RATE(CFS) =       8.08

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.36   FLOW VELOCITY(FEET/SEC.) =   2.07
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     23.10 =     995.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.10 TO NODE     24.20 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    720.00  DOWNSTREAM(FEET) =    709.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   670.00   CHANNEL SLOPE =  0.0164
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.025
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B       10.16      0.30     1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.80      0.25     1.000    77
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        1.80      0.20     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      18.11
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.95
  AVERAGE FLOW DEPTH(FEET) =   0.55   TRAVEL TIME(MIN.) =   3.78
  Tc(MIN.) =   23.17
  SUBAREA AREA(ACRES) =    12.76       SUBAREA RUNOFF(CFS) =   20.01
  EFFECTIVE AREA(ACRES) =     17.33     AREA-AVERAGED Fm(INCH/HR) =   0.28
  AREA-AVERAGED Fp(INCH/HR) =   0.28  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       17.3         PEAK FLOW RATE(CFS) =      27.21
```

```
 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.70   FLOW VELOCITY(FEET/SEC.) =   3.41
 LONGEST FLOWPATH FROM NODE     10.10 TO NODE     24.20 =    1665.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.20 TO NODE     24.20 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   23.17
 RAINFALL INTENSITY(INCH/HR) =   2.03
 AREA-AVERAGED Fm(INCH/HR) =  0.28
 AREA-AVERAGED Fp(INCH/HR) =  0.28
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      17.33
 TOTAL STREAM AREA(ACRES) =      17.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      27.21

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      475.88   19.61    2.225  0.27( 0.06) 0.23     226.8       1.00
     1      464.42   20.52    2.169  0.27( 0.06) 0.23     227.9       8.00
     2       27.21   23.17    2.025  0.28( 0.28) 1.00      17.3      10.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      501.55   19.61    2.225  0.27( 0.07) 0.27     241.4       1.00
     2      490.51   20.52    2.169  0.27( 0.07) 0.28     243.2       8.00
     3      459.88   23.17    2.025  0.27( 0.08) 0.28     245.2      10.10

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     501.55    Tc(MIN.) =    19.61
 EFFECTIVE AREA(ACRES) =     241.44   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
 TOTAL AREA(ACRES) =      245.2
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.20 =   10199.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.20 TO NODE     25.10 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    709.00  DOWNSTREAM(FEET) =    704.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   480.00   CHANNEL SLOPE =  0.0104
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.157
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B       14.00      0.30     1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"               C        0.90      0.25     1.000    77
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        4.04      0.20     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     517.58
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.15
 AVERAGE FLOW DEPTH(FEET) =   4.02   TRAVEL TIME(MIN.) =   1.12
 Tc(MIN.) =   20.73
 SUBAREA AREA(ACRES) =    18.94       SUBAREA RUNOFF(CFS) =   32.05
 EFFECTIVE AREA(ACRES) =    260.38     AREA-AVERAGED Fm(INCH/HR) =   0.09
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   0.33
 TOTAL AREA(ACRES) =      264.2         PEAK FLOW RATE(CFS) =     501.55
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  3.95   FLOW VELOCITY(FEET/SEC.) =   7.10
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     25.10 =   10679.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.10 TO NODE     26.10 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    704.00  DOWNSTREAM(FEET) =    684.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   975.00   CHANNEL SLOPE =  0.0200
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.058
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        8.10      0.30     1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"               C        4.10      0.25     1.000    77
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        9.40      0.20     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     519.16
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.07
 AVERAGE FLOW DEPTH(FEET) =   3.41   TRAVEL TIME(MIN.) =   1.79
 Tc(MIN.) =   22.53
 SUBAREA AREA(ACRES) =    21.60       SUBAREA RUNOFF(CFS) =   35.20
 EFFECTIVE AREA(ACRES) =    281.98     AREA-AVERAGED Fm(INCH/HR) =   0.10
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   0.38
 TOTAL AREA(ACRES) =      285.8         PEAK FLOW RATE(CFS) =     501.55
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
  DEPTH(FEET) =  3.34   FLOW VELOCITY(FEET/SEC.) =   8.99
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     26.10 =   11654.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     26.10 TO NODE     61.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    684.50  DOWNSTREAM(FEET) =    675.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   660.00   CHANNEL SLOPE =  0.0141
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  1.990
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        6.00      0.30     1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"               C        6.10      0.25     1.000    77
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        6.58      0.20     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     516.19
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.98
  AVERAGE FLOW DEPTH(FEET) =   3.71   TRAVEL TIME(MIN.) =   1.38
  Tc(MIN.) =   23.90
  SUBAREA AREA(ACRES) =    18.68       SUBAREA RUNOFF(CFS) =   29.27
  EFFECTIVE AREA(ACRES) =    300.66     AREA-AVERAGED Fm(INCH/HR) =   0.11
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   0.42
  TOTAL AREA(ACRES) =      304.5         PEAK FLOW RATE(CFS) =     508.72

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  3.69   FLOW VELOCITY(FEET/SEC.) =   7.94
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     61.00 =   12314.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      304.5  TC(MIN.) =     23.90
  EFFECTIVE AREA(ACRES) =    300.66  AREA-AVERAGED Fm(INCH/HR)=  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap = 0.417
  PEAK FLOW RATE(CFS)   =     508.72

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      508.72   23.90    1.990  0.26( 0.11) 0.42     300.7       1.00
      2      500.04   24.84    1.947  0.26( 0.11) 0.42     302.5       8.00
      3      472.48   27.56    1.836  0.26( 0.11) 0.42     304.5      10.10
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
 ************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                      Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY IN CITY OF LAKE FOREST                             *
* ONSITE AREA "A" EXISTING CONDITION @ 100-YEAR STORM                     *
* W.O. #1443-136X                                                         *
 *************************************************************************

  FILE NAME: EX100-A.DAT
  TIME/DATE OF STUDY: 18:25 06/19/2018
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE     10.10 TO NODE     21.10 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    743.00  DOWNSTREAM(FEET) =    731.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.160
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.554
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.41      0.30     1.000    84   13.16
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.24      0.20     1.000    96   13.16
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.93
  TOTAL AREA(ACRES) =      0.65   PEAK FLOW RATE(CFS) =      1.93

************************************************************************
  FLOW PROCESS FROM NODE     21.10 TO NODE     22.10 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    731.00  DOWNSTREAM(FEET) =    725.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.0196
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.218
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        1.19      0.30     1.000    84
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.78      0.20     1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.55
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.88
  AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   2.48
  Tc(MIN.) =   15.64
  SUBAREA AREA(ACRES) =     1.97       SUBAREA RUNOFF(CFS) =    5.24
  EFFECTIVE AREA(ACRES) =      2.62     AREA-AVERAGED Fm(INCH/HR) =   0.26
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       2.6         PEAK FLOW RATE(CFS) =       6.97

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.29   FLOW VELOCITY(FEET/SEC.) =   2.23
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     22.10 =     580.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     22.10 TO NODE     23.10 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    725.50  DOWNSTREAM(FEET) =    720.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   415.00   CHANNEL SLOPE =  0.0133
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.895
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
```

```
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        1.80      0.30     1.000    84
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.15      0.20     1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.26
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.18
  AVERAGE FLOW DEPTH(FEET) =   0.39   TRAVEL TIME(MIN.) =   3.17
  Tc(MIN.) =   18.82
  SUBAREA AREA(ACRES) =     1.95       SUBAREA RUNOFF(CFS) =    4.57
  EFFECTIVE AREA(ACRES) =      4.57     AREA-AVERAGED Fm(INCH/HR) =   0.27
  AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        4.6         PEAK FLOW RATE(CFS) =      10.78

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.43   FLOW VELOCITY(FEET/SEC.) =   2.30
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     23.10 =     995.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.10 TO NODE     24.20 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    720.00  DOWNSTREAM(FEET) =    709.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   670.00   CHANNEL SLOPE =  0.0164
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.633
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B       10.16      0.30     1.000    84
  NATURAL FAIR COVER
  "OPEN BRUSH"               C        0.80      0.25     1.000    92
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        1.80      0.20     1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      24.30
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.29
  AVERAGE FLOW DEPTH(FEET) =   0.65   TRAVEL TIME(MIN.) =   3.39
  Tc(MIN.) =   22.21
  SUBAREA AREA(ACRES) =    12.76       SUBAREA RUNOFF(CFS) =   26.99
  EFFECTIVE AREA(ACRES) =     17.33     AREA-AVERAGED Fm(INCH/HR) =   0.28
  AREA-AVERAGED Fp(INCH/HR) =   0.28  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       17.3          PEAK FLOW RATE(CFS) =      36.69

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.83   FLOW VELOCITY(FEET/SEC.) =   3.77
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     24.20 =    1665.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.20 TO NODE     25.10 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    709.00  DOWNSTREAM(FEET) =    704.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   480.00   CHANNEL SLOPE =  0.0104
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.497
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B       14.00      0.30     1.000    84
  NATURAL FAIR COVER
  "OPEN BRUSH"               C        0.90      0.25     1.000    92
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        4.04      0.20     1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      55.62
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.73
  AVERAGE FLOW DEPTH(FEET) =   1.20   TRAVEL TIME(MIN.) =   2.15
  Tc(MIN.) =   24.36
  SUBAREA AREA(ACRES) =    18.94       SUBAREA RUNOFF(CFS) =   37.86
  EFFECTIVE AREA(ACRES) =     36.27     AREA-AVERAGED Fm(INCH/HR) =   0.28
  AREA-AVERAGED Fp(INCH/HR) =   0.28  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       36.3          PEAK FLOW RATE(CFS) =      72.43

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.40   FLOW VELOCITY(FEET/SEC.) =   4.05
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     25.10 =    2145.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     25.10 TO NODE     26.10 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    704.00  DOWNSTREAM(FEET) =    684.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   975.00   CHANNEL SLOPE =  0.0200
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.338
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        8.10      0.30     1.000    84
  NATURAL FAIR COVER
  "OPEN BRUSH"               C        4.10      0.25     1.000    92
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        9.40      0.20     1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      92.76
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.47
  AVERAGE FLOW DEPTH(FEET) =   1.34   TRAVEL TIME(MIN.) =   2.97
  Tc(MIN.) =   27.33
  SUBAREA AREA(ACRES) =    21.60       SUBAREA RUNOFF(CFS) =   40.65
  EFFECTIVE AREA(ACRES) =     57.87     AREA-AVERAGED Fm(INCH/HR) =   0.27
```

```
  AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       57.9          PEAK FLOW RATE(CFS) =     107.88

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.46   FLOW VELOCITY(FEET/SEC.) =   5.72
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     26.10 =    3120.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     26.10 TO NODE     61.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    684.50  DOWNSTREAM(FEET) =    675.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   660.00   CHANNEL SLOPE =  0.0141
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.242
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        6.00      0.30     1.000    84
  NATURAL FAIR COVER
  "OPEN BRUSH"               C        6.10      0.25     1.000    92
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        6.58      0.20     1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     124.64
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.30
  AVERAGE FLOW DEPTH(FEET) =   1.74   TRAVEL TIME(MIN.) =   2.07
  Tc(MIN.) =   29.40
  SUBAREA AREA(ACRES) =    18.68       SUBAREA RUNOFF(CFS) =   33.52
  EFFECTIVE AREA(ACRES) =     76.55     AREA-AVERAGED Fm(INCH/HR) =   0.26
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       76.5          PEAK FLOW RATE(CFS) =     136.40

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.83   FLOW VELOCITY(FEET/SEC.) =   5.46
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     61.00 =    3780.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       76.5  TC(MIN.) =     29.40
  EFFECTIVE AREA(ACRES) =     76.55  AREA-AVERAGED Fm(INCH/HR)=  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =     136.40
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
 ************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                      Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* Hydrology Study for Nakase Nursery                                    *
* City of Lake Forest                                                   *
* Existing Condition - 100-year Storm                                   *
 ************************************************************************

  FILE NAME: LFE-100.DAT
  TIME/DATE OF STUDY: 13:48 10/27/2017
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    743.00  DOWNSTREAM(FEET) =    730.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.951
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.586
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"              B        0.49      0.30     1.000    84   12.95
  NATURAL FAIR COVER
  "OPEN BRUSH"              D        0.09      0.20     1.000    96   12.95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.72
  TOTAL AREA(ACRES) =      0.58   PEAK FLOW RATE(CFS) =      1.72

************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    730.00  DOWNSTREAM(FEET) =    724.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.0196
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.217
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"              B        0.81      0.30     1.000    84
  NATURAL FAIR COVER
  "OPEN BRUSH"              D        0.60      0.20     1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.60
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.72
  AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =   2.71
  Tc(MIN.) =   15.66
  SUBAREA AREA(ACRES) =     1.41     SUBAREA RUNOFF(CFS) =     3.76
  EFFECTIVE AREA(ACRES) =     1.99     AREA-AVERAGED Fm(INCH/HR) =   0.27
  AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      2.0      PEAK FLOW RATE(CFS) =      5.29

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   1.98
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     580.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    724.50  DOWNSTREAM(FEET) =    717.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   410.00   CHANNEL SLOPE =  0.0183
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
```

Onsite Hydrology at Existing 84” Node 15, Area B
(F19) Serrano Creek, Q_{100}=2350 cfs

100-Year Storm Existing Condition

```
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.921
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        2.26      0.30     1.000    84
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.05      0.20     1.000    96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.25
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.39
 AVERAGE FLOW DEPTH(FEET) =   0.36   TRAVEL TIME(MIN.) =   2.86
 Tc(MIN.) =   18.52
 SUBAREA AREA(ACRES) =     3.31       SUBAREA RUNOFF(CFS) =    7.90
 EFFECTIVE AREA(ACRES) =      5.30     AREA-AVERAGED Fm(INCH/HR) =   0.27
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        5.3         PEAK FLOW RATE(CFS) =      12.66

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.43   FLOW VELOCITY(FEET/SEC.) =   2.70
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =     990.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    717.00  DOWNSTREAM(FEET) =    711.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   505.00   CHANNEL SLOPE =  0.0115
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.694
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        7.09      0.30     1.000    84
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        2.28      0.25     1.000    92
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        2.74      0.20     1.000    96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      25.90
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.99
 AVERAGE FLOW DEPTH(FEET) =   0.75   TRAVEL TIME(MIN.) =   2.81
 Tc(MIN.) =   21.34
 SUBAREA AREA(ACRES) =    12.11       SUBAREA RUNOFF(CFS) =   26.44
 EFFECTIVE AREA(ACRES) =     17.41     AREA-AVERAGED Fm(INCH/HR) =   0.27
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       17.4         PEAK FLOW RATE(CFS) =      38.02

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.94   FLOW VELOCITY(FEET/SEC.) =   3.40
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     14.00 =    1495.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    711.20  DOWNSTREAM(FEET) =    685.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1330.00   CHANNEL SLOPE =  0.0197
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   4.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.409
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        8.80      0.30     1.000    84
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        5.39      0.25     1.000    92
 NATURAL FAIR COVER
 "OPEN BRUSH"                D       11.80      0.20     1.000    96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      63.38
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.82
 AVERAGE FLOW DEPTH(FEET) =   1.08   TRAVEL TIME(MIN.) =   4.60
 Tc(MIN.) =   25.93
 SUBAREA AREA(ACRES) =    25.99       SUBAREA RUNOFF(CFS) =   50.64
 EFFECTIVE AREA(ACRES) =     43.40     AREA-AVERAGED Fm(INCH/HR) =   0.25
 AREA-AVERAGED Fp(INCH/HR) =   0.25  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       43.4         PEAK FLOW RATE(CFS) =      84.19

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.27   FLOW VELOCITY(FEET/SEC.) =   5.28
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =    2825.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       43.4  TC(MIN.) =     25.93
 EFFECTIVE AREA(ACRES) =      43.40  AREA-AVERAGED Fm(INCH/HR)=  0.25
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =      84.19
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

Onsite Hydrology at Existing 84” Node 15, Area B
(F19) Serrano Creek, Q_{100}=2350 cfs
100-Year Storm Existing Condition

```
 ************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY IN CITY OF LAKE FOREST                           *
* OFFSITE EXISTING CONDITION @ 100-YEAR STORM                           *
* W.O. #1443-136X                                                       *
 ************************************************************************

  FILE NAME: NAKASE99.DAT
  TIME/DATE OF STUDY: 14:46 07/19/2017
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1099.00  DOWNSTREAM(FEET) =   1091.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.370
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.605
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.78      0.25      0.600    86    8.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      3.13
  TOTAL AREA(ACRES) =      0.78   PEAK FLOW RATE(CFS) =      3.13

************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 1091.20  DOWNSTREAM ELEVATION(FEET) = 1089.40
  STREET LENGTH(FEET) =    90.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.80
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   14.90
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.71
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.47
  STREET FLOW TRAVEL TIME(MIN.) =   0.40   Tc(MIN.) =    8.78
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.483
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.38      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    9.33
  EFFECTIVE AREA(ACRES) =      3.16    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =      12.38

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  17.85
  FLOW VELOCITY(FEET/SEC.) =  4.17   DEPTH*VELOCITY(FT*FT/SEC.) =   1.87
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     390.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  62
```

```
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) = 1089.40  DOWNSTREAM ELEVATION(FEET) = 1067.00
  STREET LENGTH(FEET) =   513.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.44
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.41
    HALFSTREET FLOOD WIDTH(FEET) =   15.82
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.71
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.35
  STREET FLOW TRAVEL TIME(MIN.) =   1.50   Tc(MIN.) =   10.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.095
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.34      0.25     0.100    86
  PUBLIC PARK                C        0.25      0.25     0.850    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.418
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    2.12
  EFFECTIVE AREA(ACRES) =      3.75    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =      13.39

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  15.82
  FLOW VELOCITY(FEET/SEC.) =  5.69   DEPTH*VELOCITY(FT*FT/SEC.) =   2.34
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     903.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.095
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.35      0.25     0.100    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.49      0.25     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.333
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    3.03
  EFFECTIVE AREA(ACRES) =      4.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =      16.43

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1067.00  DOWNSTREAM(FEET) =  1062.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.79
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.43
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   10.39
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1003.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.39
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.068
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.09      0.25     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.09      SUBAREA RUNOFF(CFS) =    7.42
  EFFECTIVE AREA(ACRES) =      6.68   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        6.7        PEAK FLOW RATE(CFS) =      23.73

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1062.00  DOWNSTREAM(FEET) =  1022.40
  FLOW LENGTH(FEET) =   701.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.89
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.73
  PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =   11.13
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1704.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
  MAINLINE Tc(MIN.) =   11.13
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.912
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.18      0.30     0.100    76
  COMMERCIAL                 C        0.46      0.25     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.64      SUBAREA RUNOFF(CFS) =    2.24
  EFFECTIVE AREA(ACRES) =      7.32   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        7.3       PEAK FLOW RATE(CFS) =      25.03

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.40  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.49
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.03
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   11.38
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.38
  RAINFALL INTENSITY(INCH/HR) =   3.86
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       7.32
  TOTAL STREAM AREA(ACRES) =       7.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      25.03

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   305.00
  ELEVATION DATA: UPSTREAM(FEET) =   1046.00  DOWNSTREAM(FEET) =   1042.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.129
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.049
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 C        1.00      0.25     0.100    86    7.13
  RESIDENTIAL
  ".4 DWELLING/ACRE"         C        0.50      0.25     0.900    86   11.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
  SUBAREA RUNOFF(CFS) =      6.69
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      6.69

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1042.00  DOWNSTREAM ELEVATION(FEET) = 1036.00
  STREET LENGTH(FEET) =   373.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.09
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   14.50
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.28
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.27
  STREET FLOW TRAVEL TIME(MIN.) =   1.90   Tc(MIN.) =    9.03
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.411
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        3.31      0.25     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.31      SUBAREA RUNOFF(CFS) =   12.77
  EFFECTIVE AREA(ACRES) =      4.81    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =        4.8        PEAK FLOW RATE(CFS) =      18.60

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  16.63
  FLOW VELOCITY(FEET/SEC.) =  3.59   DEPTH*VELOCITY(FT*FT/SEC.) =   1.53
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     678.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) = 1036.00  DOWNSTREAM ELEVATION(FEET) = 1026.00
  STREET LENGTH(FEET) =   463.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      22.75
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.43
    HALFSTREET FLOOD WIDTH(FEET) =   17.04
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.19
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.82
  STREET FLOW TRAVEL TIME(MIN.) =   1.84   Tc(MIN.) =   10.87
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.966
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.40      0.25     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    8.30
  EFFECTIVE AREA(ACRES) =      7.21    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =        7.2         PEAK FLOW RATE(CFS) =      24.97

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  17.64
  FLOW VELOCITY(FEET/SEC.) =  4.30   DEPTH*VELOCITY(FT*FT/SEC.) =   1.91
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1141.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.87
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.966
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.16      0.30     0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.22      0.25     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    8.22
  EFFECTIVE AREA(ACRES) =      9.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        9.6       PEAK FLOW RATE(CFS) =      33.19

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1026.00  DOWNSTREAM(FEET) =  1022.00
  FLOW LENGTH(FEET) =   395.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.95
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      33.19
  PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =   11.60
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1536.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.60
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.820
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.07      0.30     0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        4.06      0.25     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    4.13      SUBAREA RUNOFF(CFS) =   13.73
  EFFECTIVE AREA(ACRES) =     13.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       13.7       PEAK FLOW RATE(CFS) =      45.66

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.00  DOWNSTREAM(FEET) =  1020.00
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.30
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      45.66
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   11.79
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
================================================================================
  MAINLINE Tc(MIN.) =   11.79
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.785
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.55      0.30     0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        2.06      0.25     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.61      SUBAREA RUNOFF(CFS) =    8.59
  EFFECTIVE AREA(ACRES) =     16.33   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      53.82

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1020.00  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.83
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      53.82
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   12.12
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    1799.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.12
  RAINFALL INTENSITY(INCH/HR) =   3.73
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =      16.33
  TOTAL STREAM AREA(ACRES) =      16.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      53.82

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       25.03   11.38    3.863  0.25( 0.11) 0.45       7.3       1.00
      2       53.82   12.12    3.725  0.25( 0.12) 0.49      16.3       8.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       77.47   11.38    3.863  0.25( 0.12) 0.48      22.6       1.00
      2       77.93   12.12    3.725  0.25( 0.12) 0.48      23.6       8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      77.93    Tc(MIN.) =    12.12
  EFFECTIVE AREA(ACRES) =      23.65   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       23.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1019.50  DOWNSTREAM(FEET) =  1014.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.77
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      77.93
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   12.27
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.10 =    2014.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.700
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.15      0.30     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.50
  EFFECTIVE AREA(ACRES) =     23.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       23.8       PEAK FLOW RATE(CFS) =      77.93
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.700
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.16      0.30     0.100    76
```

```
  COMMERCIAL                 C        1.44      0.25     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     5.29
  EFFECTIVE AREA(ACRES) =     25.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       25.4       PEAK FLOW RATE(CFS) =      81.99

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1014.00  DOWNSTREAM(FEET) =   971.40
  FLOW LENGTH(FEET) =   863.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.04
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      81.99
  PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =   12.98
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    2877.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.98
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.581
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                   B        0.82      0.30     0.100    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"         C        0.77      0.25     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.294
  SUBAREA AREA(ACRES) =     1.59      SUBAREA RUNOFF(CFS) =     5.02
  EFFECTIVE AREA(ACRES) =     26.99   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       27.0       PEAK FLOW RATE(CFS) =      84.29

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   971.40  DOWNSTREAM(FEET) =   969.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.92
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      84.29
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   13.01
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    2917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.01
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.577
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"         B        2.46      0.30     0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"         C       10.48      0.25     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   12.94      SUBAREA RUNOFF(CFS) =   40.14
  EFFECTIVE AREA(ACRES) =     39.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       39.9       PEAK FLOW RATE(CFS) =     124.32

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      125.50   12.27    3.699  0.25( 0.12) 0.46      38.9       1.00
      2      124.32   13.01    3.577  0.25( 0.12) 0.46      39.9       8.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =     125.50  Tc(MIN.) =   12.27
  AREA-AVERAGED Fm(INCH/HR) =  0.12  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.46  EFFECTIVE AREA(ACRES) =      38.93

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   969.00  DOWNSTREAM(FEET) =   954.00
  FLOW LENGTH(FEET) =   416.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.10
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     125.50
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   12.61
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    3333.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.61
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.641
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                   C        0.77      0.25     0.100    86
  PUBLIC PARK                  C        0.43      0.25     0.850    86
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.369
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    3.83
  EFFECTIVE AREA(ACRES) =     40.13   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       41.1       PEAK FLOW RATE(CFS) =     127.29

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   954.00  DOWNSTREAM(FEET) =   952.80
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.32
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     127.29
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   12.78
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    3453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.78
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.614
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.88      0.30     0.400    76
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        7.02      0.25     0.400    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    7.90      SUBAREA RUNOFF(CFS) =   24.97
  EFFECTIVE AREA(ACRES) =     48.03   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       49.0       PEAK FLOW RATE(CFS) =     151.30

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   952.80  DOWNSTREAM(FEET) =   929.00
  FLOW LENGTH(FEET) =   636.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.82
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     151.30
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   13.29
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.10 =    4089.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     17.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.29
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.534
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.68      0.30     0.500    76
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"        C        0.89      0.25     0.600    86
  COMMERCIAL                  C        1.86      0.25     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.309
  SUBAREA AREA(ACRES) =    3.43      SUBAREA RUNOFF(CFS) =   10.66
  EFFECTIVE AREA(ACRES) =     51.46   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       52.5       PEAK FLOW RATE(CFS) =     158.50

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   929.00  DOWNSTREAM(FEET) =   926.30
  FLOW LENGTH(FEET) =   122.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  34.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.55
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     158.50
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   13.40
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     18.00 =    4211.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.40
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.517
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS                B       24.46      0.30     0.350    76
  CONDOMINIUMS                C        7.92      0.25     0.350    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =   32.38      SUBAREA RUNOFF(CFS) =   99.55
  EFFECTIVE AREA(ACRES) =     83.84   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       84.8       PEAK FLOW RATE(CFS) =     257.24

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
```

```
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   926.30  DOWNSTREAM(FEET) =   922.70
  FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  42.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.26
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     257.24
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   13.55
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     19.00 =    4384.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.55
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.494
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        1.62      0.30     0.400    76
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        6.09      0.25     0.400    86
  COMMERCIAL                  B        2.90      0.30     0.100    76
  COMMERCIAL                  C        3.15      0.25     0.100    86
  NATURAL POOR COVER
  "GRASS"                     B        0.76      0.30     1.000    93
  NATURAL POOR COVER
  "GRASS"                     C        0.39      0.25     1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
  SUBAREA AREA(ACRES) =   14.91      SUBAREA RUNOFF(CFS) =   45.73
  EFFECTIVE AREA(ACRES) =     98.75   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =       99.8       PEAK FLOW RATE(CFS) =     301.28

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   922.70  DOWNSTREAM(FEET) =   815.60
  FLOW LENGTH(FEET) =  1580.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  34.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  31.69
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     301.28
  PIPE TRAVEL TIME(MIN.) =   0.83    Tc(MIN.) =   14.38
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     20.00 =    5964.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.38
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.377
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B       19.45      0.30     0.100    76
  COMMERCIAL                  C       16.92      0.25     0.100    86
  COMMERCIAL                  D        0.11      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   36.48      SUBAREA RUNOFF(CFS) =  109.98
  EFFECTIVE AREA(ACRES) =    135.23   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      136.2       PEAK FLOW RATE(CFS) =     400.84

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   815.60  DOWNSTREAM(FEET) =   799.50
  FLOW LENGTH(FEET) =   449.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  45.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.25
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     400.84
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   14.67
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6413.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.340
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        2.38      0.30     0.100    76
  COMMERCIAL                  C        0.87      0.25     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    9.68
  EFFECTIVE AREA(ACRES) =    138.48   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      139.5       PEAK FLOW RATE(CFS) =     405.93

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.340
```

```
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        4.10      0.30      0.100    76
  COMMERCIAL                 C        1.54      0.25      0.100    86
  COMMERCIAL                 D        2.08      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    7.72      SUBAREA RUNOFF(CFS) =   23.02
  EFFECTIVE AREA(ACRES) =    146.20   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      147.2       PEAK FLOW RATE(CFS) =     428.95

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   799.50  DOWNSTREAM(FEET) =   765.50
  FLOW LENGTH(FEET) =  1056.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  47.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.72
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     428.95
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   15.35
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     22.00 =    7469.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.35
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.253
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.06      0.30      0.100    76
  COMMERCIAL                 C        1.74      0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    3.80      SUBAREA RUNOFF(CFS) =   11.03
  EFFECTIVE AREA(ACRES) =    150.00   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      151.0       PEAK FLOW RATE(CFS) =     428.95
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.35
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.253
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.23      0.30      0.100    76
  COMMERCIAL                 D        5.07      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    5.30      SUBAREA RUNOFF(CFS) =   15.42
  EFFECTIVE AREA(ACRES) =    155.30   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      156.3       PEAK FLOW RATE(CFS) =     444.07

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   765.50  DOWNSTREAM(FEET) =   755.00
  FLOW LENGTH(FEET) =   465.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  50.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.88
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     444.07
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   15.69
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     23.00 =    7934.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.213
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        9.15      0.30      0.100    76
  COMMERCIAL                 C       10.79      0.25      0.100    86
  COMMERCIAL                 D        1.81      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   21.75      SUBAREA RUNOFF(CFS) =   62.37
  EFFECTIVE AREA(ACRES) =    177.05   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =      178.1       PEAK FLOW RATE(CFS) =     500.79

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.213
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        7.47      0.30      0.100    76
  COMMERCIAL                 C        0.40      0.25      0.100    86
  COMMERCIAL                 D       17.76      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   25.63      SUBAREA RUNOFF(CFS) =   73.58
  EFFECTIVE AREA(ACRES) =    202.68   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      203.7       PEAK FLOW RATE(CFS) =     574.38

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   755.00  DOWNSTREAM(FEET) =   736.00
  FLOW LENGTH(FEET) =  1257.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  78.0 INCH PIPE IS  60.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.95
  ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     574.38
  PIPE TRAVEL TIME(MIN.) =   1.00    Tc(MIN.) =   16.69
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.00 =    9191.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.101
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B       16.13      0.30     0.100    76
  COMMERCIAL                  C        3.87      0.25     0.100    86
  COMMERCIAL                  D        4.22      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   24.22      SUBAREA RUNOFF(CFS) =   67.00
  EFFECTIVE AREA(ACRES) =    226.90   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      227.9       PEAK FLOW RATE(CFS) =     621.00
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      227.9  TC(MIN.) =     16.69
  EFFECTIVE AREA(ACRES) =    226.90  AREA-AVERAGED Fm(INCH/HR)=  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap = 0.227
  PEAK FLOW RATE(CFS)   =     621.00

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      621.00   16.69    3.101  0.27( 0.06) 0.23     226.9       1.00
      2      607.40   17.46    3.022  0.27( 0.06) 0.23     227.9       8.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
 ************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY IN CITY OF LAKE FOREST                             *
* OFFSITE & ONSITE EXISTING CONDITION @ 100-YEAR STORM                    *
* W.O. #1443-136X                                                         *
 ************************************************************************

  FILE NAME: EXIST100.DAT
  TIME/DATE OF STUDY: 20:10 10/05/2017
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1099.00  DOWNSTREAM(FEET) =   1091.20
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.370
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.605
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.78      0.25      0.600    86    8.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      3.13
  TOTAL AREA(ACRES) =      0.78   PEAK FLOW RATE(CFS) =      3.13

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1091.20  DOWNSTREAM ELEVATION(FEET) = 1089.40
  STREET LENGTH(FEET) =    90.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.80
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   14.90
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.71
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.47
  STREET FLOW TRAVEL TIME(MIN.) =   0.40   Tc(MIN.) =    8.78
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.483
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.38      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    9.33
  EFFECTIVE AREA(ACRES) =      3.16    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =      12.38

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  17.85
  FLOW VELOCITY(FEET/SEC.) =  4.17   DEPTH*VELOCITY(FT*FT/SEC.) =   1.87
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     390.00 FEET.
```

Offsite Hydrology at Rancho Parkway (F19-P07)
Confluences with Onsite at Existing 10.5’ x 10.5’ RCB (F19S02)

100-Year Storm Existing Condition

```
****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1089.40  DOWNSTREAM ELEVATION(FEET) = 1067.00
  STREET LENGTH(FEET) =   513.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.44
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.41
    HALFSTREET FLOOD WIDTH(FEET) =   15.82
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.71
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.35
  STREET FLOW TRAVEL TIME(MIN.) =   1.50   Tc(MIN.) =   10.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.095
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.34      0.25     0.100    86
  PUBLIC PARK                C        0.25      0.25     0.850    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.418
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    2.12
  EFFECTIVE AREA(ACRES) =      3.75    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =      13.39

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  15.82
  FLOW VELOCITY(FEET/SEC.) =  5.69   DEPTH*VELOCITY(FT*FT/SEC.) =   2.34
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     903.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.095
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.35      0.25     0.100    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.49      0.25     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.333
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    3.03
  EFFECTIVE AREA(ACRES) =      4.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =      16.43

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1067.00  DOWNSTREAM(FEET) =  1062.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.79
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.43
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   10.39
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1003.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.39
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.068
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.09      0.25     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.09      SUBAREA RUNOFF(CFS) =    7.42
  EFFECTIVE AREA(ACRES) =      6.68   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        6.7        PEAK FLOW RATE(CFS) =      23.73

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1062.00  DOWNSTREAM(FEET) =  1022.40
  FLOW LENGTH(FEET) =   701.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.89
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.73
  PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =   11.13
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1704.00 FEET.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.13
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.912
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                B        0.18      0.30     0.100    76
 COMMERCIAL                C        0.46      0.25     0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.64      SUBAREA RUNOFF(CFS) =    2.24
 EFFECTIVE AREA(ACRES) =      7.32   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
 TOTAL AREA(ACRES) =        7.3       PEAK FLOW RATE(CFS) =      25.03

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1022.40  DOWNSTREAM(FEET) =  1019.50
 FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.49
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      25.03
 PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   11.38
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   11.38
 RAINFALL INTENSITY(INCH/HR) =   3.86
 AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.45
 EFFECTIVE STREAM AREA(ACRES) =       7.32
 TOTAL STREAM AREA(ACRES) =       7.32
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      25.03

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   305.00
 ELEVATION DATA: UPSTREAM(FEET) =   1046.00  DOWNSTREAM(FEET) =   1042.00
 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.129
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.049
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                C        1.00      0.25     0.100    86    7.13
 RESIDENTIAL
 ".4 DWELLING/ACRE"        C        0.50      0.25     0.900    86   11.42
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
 SUBAREA RUNOFF(CFS) =      6.69
 TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      6.69

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1042.00  DOWNSTREAM ELEVATION(FEET) = 1036.00
 STREET LENGTH(FEET) =   373.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.09
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.39
   HALFSTREET FLOOD WIDTH(FEET) =   14.50
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.28
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.27
 STREET FLOW TRAVEL TIME(MIN.) =   1.90   Tc(MIN.) =    9.03
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.411
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"      C        3.31      0.25     0.500    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    3.31      SUBAREA RUNOFF(CFS) =   12.77
 EFFECTIVE AREA(ACRES) =      4.81    AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =        4.8       PEAK FLOW RATE(CFS) =      18.60

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  16.63
 FLOW VELOCITY(FEET/SEC.) =  3.59   DEPTH*VELOCITY(FT*FT/SEC.) =   1.53
```

```
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     678.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1036.00  DOWNSTREAM ELEVATION(FEET) = 1026.00
 STREET LENGTH(FEET) =   463.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      22.75
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.43
   HALFSTREET FLOOD WIDTH(FEET) =   17.04
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.19
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.82
 STREET FLOW TRAVEL TIME(MIN.) =   1.84   Tc(MIN.) =   10.87
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.966
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        2.40      0.25     0.500    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    8.30
 EFFECTIVE AREA(ACRES) =      7.21    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =      24.97

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  17.64
 FLOW VELOCITY(FEET/SEC.) =  4.30   DEPTH*VELOCITY(FT*FT/SEC.) =   1.91
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1141.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.87
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.966
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.16      0.30     0.500    76
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        2.22      0.25     0.500    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    8.22
 EFFECTIVE AREA(ACRES) =      9.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =        9.6        PEAK FLOW RATE(CFS) =      33.19

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1026.00  DOWNSTREAM(FEET) =  1022.00
 FLOW LENGTH(FEET) =   395.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.95
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      33.19
 PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =   11.60
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1536.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.60
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.820
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.07      0.30     0.500    76
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        4.06      0.25     0.500    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    4.13      SUBAREA RUNOFF(CFS) =   13.73
 EFFECTIVE AREA(ACRES) =     13.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
 TOTAL AREA(ACRES) =       13.7       PEAK FLOW RATE(CFS) =      45.66

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1022.00  DOWNSTREAM(FEET) =  1020.00
 FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.30
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =      45.66
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   11.79
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.79
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.785
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.55      0.30     0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.06      0.25     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     2.61      SUBAREA RUNOFF(CFS) =     8.59
  EFFECTIVE AREA(ACRES) =     16.33   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      53.82

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1020.00  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.83
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      53.82
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   12.12
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    1799.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.12
  RAINFALL INTENSITY(INCH/HR) =   3.73
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =      16.33
  TOTAL STREAM AREA(ACRES) =      16.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      53.82

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       25.03   11.38    3.863  0.25( 0.11) 0.45       7.3        1.00
      2       53.82   12.12    3.725  0.25( 0.12) 0.49      16.3        8.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       77.47   11.38    3.863  0.25( 0.12) 0.48      22.6        1.00
      2       77.93   12.12    3.725  0.25( 0.12) 0.48      23.6        8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      77.93    Tc(MIN.) =    12.12
  EFFECTIVE AREA(ACRES) =      23.65   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       23.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1019.50  DOWNSTREAM(FEET) =  1014.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.77
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      77.93
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   12.27
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.10 =    2014.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.700
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.15      0.30     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.15      SUBAREA RUNOFF(CFS) =     0.50
  EFFECTIVE AREA(ACRES) =     23.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       23.8       PEAK FLOW RATE(CFS) =      77.93
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
```

```
 FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.27
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.700
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.16      0.30     0.100    76
 COMMERCIAL                 C        1.44      0.25     0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    1.60      SUBAREA RUNOFF(CFS) =    5.29
 EFFECTIVE AREA(ACRES) =     25.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
 TOTAL AREA(ACRES) =       25.4       PEAK FLOW RATE(CFS) =      81.99

****************************************************************************
 FLOW PROCESS FROM NODE      7.10 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1014.00  DOWNSTREAM(FEET) =   971.40
 FLOW LENGTH(FEET) =   863.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.04
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      81.99
 PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =   12.98
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    2877.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.98
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.581
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.82      0.30     0.100    76
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        0.77      0.25     0.500    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.294
 SUBAREA AREA(ACRES) =    1.59      SUBAREA RUNOFF(CFS) =    5.02
 EFFECTIVE AREA(ACRES) =     26.99   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
 TOTAL AREA(ACRES) =       27.0       PEAK FLOW RATE(CFS) =      84.29

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   971.40  DOWNSTREAM(FEET) =   969.00
 FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  21.92
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      84.29
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   13.01
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    2917.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.01
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.577
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        2.46      0.30     0.500    76
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C       10.48      0.25     0.500    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =   12.94      SUBAREA RUNOFF(CFS) =   40.14
 EFFECTIVE AREA(ACRES) =     39.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =       39.9       PEAK FLOW RATE(CFS) =     124.32

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      125.50   12.27    3.699  0.25( 0.12) 0.46      38.9       1.00
     2      124.32   13.01    3.577  0.25( 0.12) 0.46      39.9       8.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =     125.50  Tc(MIN.) =   12.27
 AREA-AVERAGED Fm(INCH/HR) =  0.12  AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.46  EFFECTIVE AREA(ACRES) =      38.93

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   969.00  DOWNSTREAM(FEET) =   954.00
 FLOW LENGTH(FEET) =   416.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.10
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     125.50
 PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   12.61
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    3333.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.61
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.641
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        0.77      0.25      0.100    86
  PUBLIC PARK                 C        0.43      0.25      0.850    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.369
  SUBAREA AREA(ACRES) =     1.20      SUBAREA RUNOFF(CFS) =     3.83
  EFFECTIVE AREA(ACRES) =     40.13   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       41.1       PEAK FLOW RATE(CFS) =     127.29

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   954.00  DOWNSTREAM(FEET) =   952.80
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.32
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     127.29
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   12.78
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    3453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.78
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.614
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.88      0.30      0.400    76
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        7.02      0.25      0.400    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =     7.90      SUBAREA RUNOFF(CFS) =    24.97
  EFFECTIVE AREA(ACRES) =     48.03   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       49.0       PEAK FLOW RATE(CFS) =     151.30

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   952.80  DOWNSTREAM(FEET) =   929.00
  FLOW LENGTH(FEET) =   636.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.82
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     151.30
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   13.29
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.10 =    4089.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     17.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.29
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.534
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.68      0.30      0.500    76
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"        C        0.89      0.25      0.600    86
  COMMERCIAL                  C        1.86      0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.309
  SUBAREA AREA(ACRES) =     3.43      SUBAREA RUNOFF(CFS) =    10.66
  EFFECTIVE AREA(ACRES) =     51.46   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       52.5       PEAK FLOW RATE(CFS) =     158.50

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   929.00  DOWNSTREAM(FEET) =   926.30
  FLOW LENGTH(FEET) =   122.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  34.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.55
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     158.50
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   13.40
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     18.00 =    4211.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.40
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.517
```

```
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS                B       24.46      0.30      0.350    76
 CONDOMINIUMS                C        7.92      0.25      0.350    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA AREA(ACRES) =   32.38      SUBAREA RUNOFF(CFS) =   99.55
 EFFECTIVE AREA(ACRES) =     83.84   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =       84.8       PEAK FLOW RATE(CFS) =     257.24

****************************************************************************
 FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   926.30  DOWNSTREAM(FEET) =   922.70
 FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  42.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.26
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     257.24
 PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   13.55
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     19.00 =    4384.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.55
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.494
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        1.62      0.30      0.400    76
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       C        6.09      0.25      0.400    86
 COMMERCIAL                  B        2.90      0.30      0.100    76
 COMMERCIAL                  C        3.15      0.25      0.100    86
 NATURAL POOR COVER
 "GRASS"                     B        0.76      0.30      1.000    93
 NATURAL POOR COVER
 "GRASS"                     C        0.39      0.25      1.000    97
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
 SUBAREA AREA(ACRES) =   14.91      SUBAREA RUNOFF(CFS) =   45.73
 EFFECTIVE AREA(ACRES) =     98.75   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.39
 TOTAL AREA(ACRES) =       99.8       PEAK FLOW RATE(CFS) =     301.28

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   922.70  DOWNSTREAM(FEET) =   815.60
 FLOW LENGTH(FEET) =  1580.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  34.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  31.69
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     301.28
 PIPE TRAVEL TIME(MIN.) =   0.83    Tc(MIN.) =   14.38
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     20.00 =    5964.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.38
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.377
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B       19.45      0.30      0.100    76
 COMMERCIAL                  C       16.92      0.25      0.100    86
 COMMERCIAL                  D        0.11      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =   36.48      SUBAREA RUNOFF(CFS) =  109.98
 EFFECTIVE AREA(ACRES) =    135.23   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =      136.2       PEAK FLOW RATE(CFS) =     400.84

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   815.60  DOWNSTREAM(FEET) =   799.50
 FLOW LENGTH(FEET) =   449.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  45.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  26.25
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     400.84
 PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   14.67
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6413.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.67
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.340
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  COMMERCIAL                  B        2.38      0.30     0.100    76
  COMMERCIAL                  C        0.87      0.25     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     3.25      SUBAREA RUNOFF(CFS) =     9.68
  EFFECTIVE AREA(ACRES) =    138.48   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      139.5       PEAK FLOW RATE(CFS) =     405.93

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.340
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        4.10      0.30     0.100    76
  COMMERCIAL                  C        1.54      0.25     0.100    86
  COMMERCIAL                  D        2.08      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     7.72      SUBAREA RUNOFF(CFS) =    23.02
  EFFECTIVE AREA(ACRES) =    146.20   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      147.2       PEAK FLOW RATE(CFS) =     428.95

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   799.50  DOWNSTREAM(FEET) =   765.50
  FLOW LENGTH(FEET) =  1056.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  47.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.72
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     428.95
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   15.35
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     22.00 =    7469.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.35
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.253
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        2.06      0.30     0.100    76
  COMMERCIAL                  C        1.74      0.25     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     3.80      SUBAREA RUNOFF(CFS) =    11.03
  EFFECTIVE AREA(ACRES) =    150.00   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      151.0       PEAK FLOW RATE(CFS) =     428.95
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.35
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.253
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.23      0.30     0.100    76
  COMMERCIAL                  D        5.07      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     5.30      SUBAREA RUNOFF(CFS) =    15.42
  EFFECTIVE AREA(ACRES) =    155.30   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      156.3       PEAK FLOW RATE(CFS) =     444.07

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   765.50  DOWNSTREAM(FEET) =   755.00
  FLOW LENGTH(FEET) =   465.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  50.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.88
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     444.07
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   15.69
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     23.00 =    7934.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.213
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        9.15      0.30     0.100    76
  COMMERCIAL                  C       10.79      0.25     0.100    86
  COMMERCIAL                  D        1.81      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    21.75      SUBAREA RUNOFF(CFS) =    62.37
```

```
  EFFECTIVE AREA(ACRES) =    177.05   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =      178.1       PEAK FLOW RATE(CFS) =     500.79

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.213
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        7.47      0.30      0.100    76
  COMMERCIAL                 C        0.40      0.25      0.100    86
  COMMERCIAL                 D       17.76      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   25.63      SUBAREA RUNOFF(CFS) =   73.58
  EFFECTIVE AREA(ACRES) =    202.68   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      203.7       PEAK FLOW RATE(CFS) =     574.38

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   755.00  DOWNSTREAM(FEET) =   736.00
  FLOW LENGTH(FEET) =  1257.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  78.0 INCH PIPE IS  60.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.95
  ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     574.38
  PIPE TRAVEL TIME(MIN.) =   1.00    Tc(MIN.) =   16.69
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.00 =    9191.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.101
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B       16.13      0.30      0.100    76
  COMMERCIAL                 C        3.87      0.25      0.100    86
  COMMERCIAL                 D        4.22      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   24.22      SUBAREA RUNOFF(CFS) =   67.00
  EFFECTIVE AREA(ACRES) =    226.90   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      227.9       PEAK FLOW RATE(CFS) =     621.00

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.10 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   718.60  DOWNSTREAM(FEET) =   718.20
  FLOW LENGTH(FEET) =   110.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.50
  (PIPE FLOW VELOCITY CORRESPONDING TO FULL PIPE CAPACITY FLOW)
  GIVEN PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     621.00
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   16.88
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.10 =    9301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.10 TO NODE     24.20 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    718.20  DOWNSTREAM(FEET) =    709.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   898.00   CHANNEL SLOPE =  0.0102
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     621.00
  FLOW VELOCITY(FEET/SEC.) =   7.46   FLOW DEPTH(FEET) =   4.42
  TRAVEL TIME(MIN.) =   2.01   Tc(MIN.) =   18.89
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.20 =   10199.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.20 TO NODE     24.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.89
  RAINFALL INTENSITY(INCH/HR) =   2.89
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.23
  EFFECTIVE STREAM AREA(ACRES) =     226.90
  TOTAL STREAM AREA(ACRES) =     227.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     621.00

****************************************************************************
  FLOW PROCESS FROM NODE     10.10 TO NODE     21.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    743.00  DOWNSTREAM(FEET) =    731.00
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.160
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.554
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        0.41      0.30     1.000    84   13.16
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.24      0.20     1.000    96   13.16
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.93
  TOTAL AREA(ACRES) =      0.65   PEAK FLOW RATE(CFS) =      1.93

****************************************************************************
  FLOW PROCESS FROM NODE     21.10 TO NODE     22.10 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    731.00  DOWNSTREAM(FEET) =    725.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.0196
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.218
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        1.19      0.30     1.000    84
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.78      0.20     1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.55
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.88
  AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   2.48
  Tc(MIN.) =   15.64
  SUBAREA AREA(ACRES) =     1.97       SUBAREA RUNOFF(CFS) =    5.24
  EFFECTIVE AREA(ACRES) =      2.62     AREA-AVERAGED Fm(INCH/HR) =   0.26
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        2.6          PEAK FLOW RATE(CFS) =       6.97

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.29   FLOW VELOCITY(FEET/SEC.) =   2.23
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     22.10 =     580.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.10 TO NODE     23.10 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    725.50  DOWNSTREAM(FEET) =    720.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   415.00   CHANNEL SLOPE =  0.0133
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.895
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        1.80      0.30     1.000    84
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.15      0.20     1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.26
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.18
  AVERAGE FLOW DEPTH(FEET) =   0.39   TRAVEL TIME(MIN.) =   3.17
  Tc(MIN.) =   18.82
  SUBAREA AREA(ACRES) =     1.95       SUBAREA RUNOFF(CFS) =    4.57
  EFFECTIVE AREA(ACRES) =      4.57     AREA-AVERAGED Fm(INCH/HR) =   0.27
  AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        4.6          PEAK FLOW RATE(CFS) =      10.78

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.43   FLOW VELOCITY(FEET/SEC.) =   2.30
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     23.10 =     995.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.10 TO NODE     24.20 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    720.00  DOWNSTREAM(FEET) =    709.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   670.00   CHANNEL SLOPE =  0.0164
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.633
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B       10.16      0.30     1.000    84
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.80      0.25     1.000    92
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        1.80      0.20     1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      24.30
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.29
  AVERAGE FLOW DEPTH(FEET) =   0.65   TRAVEL TIME(MIN.) =   3.39
  Tc(MIN.) =   22.21
  SUBAREA AREA(ACRES) =    12.76       SUBAREA RUNOFF(CFS) =   26.99
  EFFECTIVE AREA(ACRES) =     17.33     AREA-AVERAGED Fm(INCH/HR) =   0.28
  AREA-AVERAGED Fp(INCH/HR) =   0.28  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       17.3          PEAK FLOW RATE(CFS) =      36.69

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
 DEPTH(FEET) =  0.83   FLOW VELOCITY(FEET/SEC.) =   3.77
 LONGEST FLOWPATH FROM NODE     10.10 TO NODE     24.20 =    1665.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.20 TO NODE     24.20 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   22.21
 RAINFALL INTENSITY(INCH/HR) =   2.63
 AREA-AVERAGED Fm(INCH/HR) =  0.28
 AREA-AVERAGED Fp(INCH/HR) =  0.28
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      17.33
 TOTAL STREAM AREA(ACRES) =      17.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      36.69

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      621.00   18.89    2.889  0.27( 0.06) 0.23     226.9       1.00
     1      607.40   19.67    2.822  0.27( 0.06) 0.23     227.9       8.00
     2       36.69   22.21    2.633  0.28( 0.28) 1.00      17.3      10.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      655.59   18.89    2.889  0.27( 0.07) 0.27     241.6       1.00
     2      642.52   19.67    2.822  0.27( 0.07) 0.28     243.2       8.00
     3      602.40   22.21    2.633  0.27( 0.08) 0.28     245.2      10.10

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     655.59    Tc(MIN.) =    18.89
 EFFECTIVE AREA(ACRES) =     241.64   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
 TOTAL AREA(ACRES) =      245.2
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.20 =   10199.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.20 TO NODE     25.10 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    709.00  DOWNSTREAM(FEET) =    704.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   480.00   CHANNEL SLOPE =  0.0104
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.801
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B       14.00      0.30     1.000    84
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.90      0.25     1.000    92
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        4.04      0.20     1.000    96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     677.12
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.69
 AVERAGE FLOW DEPTH(FEET) =   4.59   TRAVEL TIME(MIN.) =   1.04
 Tc(MIN.) =   19.93
 SUBAREA AREA(ACRES) =    18.94       SUBAREA RUNOFF(CFS) =   43.04
 EFFECTIVE AREA(ACRES) =    260.58     AREA-AVERAGED Fm(INCH/HR) =   0.09
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   0.33
 TOTAL AREA(ACRES) =      264.2         PEAK FLOW RATE(CFS) =     655.59
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  4.52   FLOW VELOCITY(FEET/SEC.) =   7.62
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     25.10 =   10679.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.10 TO NODE     26.10 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    704.00  DOWNSTREAM(FEET) =    684.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   975.00   CHANNEL SLOPE =  0.0200
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.676
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        8.10      0.30     1.000    84
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        4.10      0.25     1.000    92
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        9.40      0.20     1.000    96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     679.20
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.77
 AVERAGE FLOW DEPTH(FEET) =   3.90   TRAVEL TIME(MIN.) =   1.66
 Tc(MIN.) =   21.59
 SUBAREA AREA(ACRES) =    21.60       SUBAREA RUNOFF(CFS) =   47.21
 EFFECTIVE AREA(ACRES) =    282.18     AREA-AVERAGED Fm(INCH/HR) =   0.10
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   0.38
 TOTAL AREA(ACRES) =      285.8         PEAK FLOW RATE(CFS) =     655.59
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  3.83   FLOW VELOCITY(FEET/SEC.) =   9.68
```

```
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     26.10 =   11654.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     26.10 TO NODE     61.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    684.50  DOWNSTREAM(FEET) =    675.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   660.00   CHANNEL SLOPE =  0.0141
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   5.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.589
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        6.00      0.30     1.000    84
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        6.10      0.25     1.000    92
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        6.58      0.20     1.000    96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     675.27
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.58
 AVERAGE FLOW DEPTH(FEET) =   4.25   TRAVEL TIME(MIN.) =   1.28
 Tc(MIN.) =   22.88
 SUBAREA AREA(ACRES) =    18.68       SUBAREA RUNOFF(CFS) =   39.34
 EFFECTIVE AREA(ACRES) =    300.86     AREA-AVERAGED Fm(INCH/HR) =   0.11
 AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   0.42
 TOTAL AREA(ACRES) =      304.5          PEAK FLOW RATE(CFS) =     671.23

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  4.24   FLOW VELOCITY(FEET/SEC.) =   8.57
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     61.00 =   12314.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =      304.5  TC(MIN.) =     22.88
 EFFECTIVE AREA(ACRES) =    300.86  AREA-AVERAGED Fm(INCH/HR)=  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap = 0.417
 PEAK FLOW RATE(CFS)   =     671.23

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      671.23   22.88    2.589  0.26( 0.11) 0.42     300.9       1.00
     2      660.90   23.68    2.538  0.26( 0.11) 0.42     302.5       8.00
     3      624.49   26.29    2.390  0.26( 0.11) 0.42     304.5      10.10
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

APPENDIX B

Proposed Condition Hydrology

(With and Without Detention)

- 2-Year Storm Hydrology Calculations
- 25-Year Storm Hydrology Calculations
- 100-Year Storm Hydrology Calculations

```
************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY IN CITY OF LAKE FOREST                           *
* OFFSITE & ONSITE PROPOSED CONDITION @ 2-YEAR STORM                    *
* W.O. #1443-136X                                                       *
 ************************************************************************

  FILE NAME: PROP_02.DAT
  TIME/DATE OF STUDY: 10:57 06/10/2019
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  2   20.0     15.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1099.00  DOWNSTREAM(FEET) =   1091.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.370
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.684
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.78      0.25      0.600    50    8.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      1.08
  TOTAL AREA(ACRES) =      0.78   PEAK FLOW RATE(CFS) =      1.08

************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 1091.20  DOWNSTREAM ELEVATION(FEET) = 1089.40
  STREET LENGTH(FEET) =    90.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.69
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    9.52
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.89
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.87
  STREET FLOW TRAVEL TIME(MIN.) =   0.52   Tc(MIN.) =    8.89
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.627
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.38      0.25      0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    3.22
  EFFECTIVE AREA(ACRES) =      3.16    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =       4.25

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.55
```

Onsite Hydrology Area “A”

With Upstream Offsite Runoffs via 84” RCP Inlet at Rancho Parkway (F19-P07) Node 24.1 and Outlet at Downstream of Existing 10.5’ x 10.5’ RCB (F19-P07) Node 61, ***without Detention***

2-Year Storm Proposed Condition

```
  FLOW VELOCITY(FEET/SEC.) =  3.24   DEPTH*VELOCITY(FT*FT/SEC.) =   1.09
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1089.40  DOWNSTREAM ELEVATION(FEET) = 1067.00
  STREET LENGTH(FEET) =   513.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.61
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =   10.13
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.45
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.38
  STREET FLOW TRAVEL TIME(MIN.) =   1.92   Tc(MIN.) =   10.81
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.454
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                C        0.34      0.25     0.100    50
  PUBLIC PARK               C        0.25      0.25     0.850    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.418
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    0.72
  EFFECTIVE AREA(ACRES) =      3.75    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =       4.48

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =  10.03
  FLOW VELOCITY(FEET/SEC.) =  4.40   DEPTH*VELOCITY(FT*FT/SEC.) =   1.36
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     903.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.81
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.454
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                C        0.35      0.25     0.100    50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"      C        0.49      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.333
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    1.04
  EFFECTIVE AREA(ACRES) =      4.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =       5.52

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1067.00  DOWNSTREAM(FEET) =  1062.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.46
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.52
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   10.97
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1003.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.97
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.442
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"      C        2.09      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.09      SUBAREA RUNOFF(CFS) =    2.48
  EFFECTIVE AREA(ACRES) =      6.68   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        6.7        PEAK FLOW RATE(CFS) =       7.94

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1062.00  DOWNSTREAM(FEET) =  1022.40
  FLOW LENGTH(FEET) =   701.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.2 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.08
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.94
  PIPE TRAVEL TIME(MIN.) =   0.97    Tc(MIN.) =   11.94
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1704.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.94
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.374
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.18      0.30     0.100    36
  COMMERCIAL                 C        0.46      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.64      SUBAREA RUNOFF(CFS) =     0.78
  EFFECTIVE AREA(ACRES) =      7.32   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        7.3       PEAK FLOW RATE(CFS) =       8.31

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.40  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.10
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.31
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   12.26
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.26
  RAINFALL INTENSITY(INCH/HR) =   1.35
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       7.32
  TOTAL STREAM AREA(ACRES) =       7.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.31

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   305.00
  ELEVATION DATA: UPSTREAM(FEET) =   1046.00  DOWNSTREAM(FEET) =   1042.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.129
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.847
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 C        1.00      0.25     0.100    50    7.13
  RESIDENTIAL
  ".4 DWELLING/ACRE"         C        0.50      0.25     0.900    50   11.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
  SUBAREA RUNOFF(CFS) =      2.37
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      2.37

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1042.00  DOWNSTREAM ELEVATION(FEET) = 1036.00
  STREET LENGTH(FEET) =   373.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.52
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    9.21
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.57
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.76
  STREET FLOW TRAVEL TIME(MIN.) =   2.42   Tc(MIN.) =    9.55
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.562
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        3.31      0.25     0.500    50
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.31      SUBAREA RUNOFF(CFS) =    4.28
  EFFECTIVE AREA(ACRES) =      4.81    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =        4.8        PEAK FLOW RATE(CFS) =       6.26

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =  10.64
  FLOW VELOCITY(FEET/SEC.) =  2.77   DEPTH*VELOCITY(FT*FT/SEC.) =   0.88
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     678.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1036.00  DOWNSTREAM ELEVATION(FEET) = 1026.00
  STREET LENGTH(FEET) =   463.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.61
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =   10.84
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.25
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.05
  STREET FLOW TRAVEL TIME(MIN.) =   2.37   Tc(MIN.) =   11.92
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.375
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.40      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    2.70
  EFFECTIVE AREA(ACRES) =      7.21    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =       8.16

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  11.25
  FLOW VELOCITY(FEET/SEC.) =  3.26   DEPTH*VELOCITY(FT*FT/SEC.) =   1.08
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1141.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.92
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.375
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.16      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.22      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    2.67
  EFFECTIVE AREA(ACRES) =      9.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        9.6        PEAK FLOW RATE(CFS) =      10.83

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1026.00  DOWNSTREAM(FEET) =  1022.00
  FLOW LENGTH(FEET) =   395.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.84
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.83
  PIPE TRAVEL TIME(MIN.) =   0.96    Tc(MIN.) =   12.88
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1536.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.88
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.315
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.07      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        4.06      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    4.13      SUBAREA RUNOFF(CFS) =    4.42
  EFFECTIVE AREA(ACRES) =     13.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       13.7       PEAK FLOW RATE(CFS) =      14.73
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.00  DOWNSTREAM(FEET) =  1020.00
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.68
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.73
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   13.13
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.13
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.301
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.55      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        2.06      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.61      SUBAREA RUNOFF(CFS) =    2.75
  EFFECTIVE AREA(ACRES) =     16.33   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      17.31

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1020.00  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.10
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.31
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   13.57
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    1799.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.57
  RAINFALL INTENSITY(INCH/HR) =   1.28
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =      16.33
  TOTAL STREAM AREA(ACRES) =      16.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      17.31

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        8.31   12.26    1.353  0.25( 0.11) 0.45       7.3       1.00
      2       17.31   13.57    1.276  0.25( 0.12) 0.49      16.3       8.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       24.98   12.26    1.353  0.25( 0.12) 0.48      22.1       1.00
      2       25.10   13.57    1.276  0.25( 0.12) 0.48      23.6       8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      25.10    Tc(MIN.) =    13.57
  EFFECTIVE AREA(ACRES) =      23.65   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       23.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1019.50  DOWNSTREAM(FEET) =  1014.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.30
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.10
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   13.77
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.10 =    2014.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.77
```

```
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.266
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.15      0.30     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.15      SUBAREA RUNOFF(CFS) =     0.17
  EFFECTIVE AREA(ACRES) =     23.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       23.8       PEAK FLOW RATE(CFS) =      25.10
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.77
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.266
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.16      0.30     0.100    36
  COMMERCIAL                 C        1.44      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     1.79
  EFFECTIVE AREA(ACRES) =     25.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       25.4       PEAK FLOW RATE(CFS) =      26.34

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1014.00  DOWNSTREAM(FEET) =   971.40
  FLOW LENGTH(FEET) =   863.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.38
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.34
  PIPE TRAVEL TIME(MIN.) =   0.93    Tc(MIN.) =   14.70
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    2877.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.70
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.219
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.82      0.30     0.100    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.77      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.294
  SUBAREA AREA(ACRES) =     1.59      SUBAREA RUNOFF(CFS) =     1.64
  EFFECTIVE AREA(ACRES) =     26.99   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       27.0       PEAK FLOW RATE(CFS) =      26.91

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   971.40  DOWNSTREAM(FEET) =   969.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.71
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.91
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   14.74
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    2917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.74
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.217
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        2.46      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C       10.48      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   12.94      SUBAREA RUNOFF(CFS) =    12.66
  EFFECTIVE AREA(ACRES) =     39.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       39.9       PEAK FLOW RATE(CFS) =      39.52

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       40.28   13.43    1.284  0.25( 0.12) 0.46      38.3       1.00
      2       39.52   14.74    1.217  0.25( 0.12) 0.46      39.9       8.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      40.28  Tc(MIN.) =   13.43
  AREA-AVERAGED Fm(INCH/HR) =  0.12  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.46  EFFECTIVE AREA(ACRES) =      38.35
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   969.00  DOWNSTREAM(FEET) =   954.00
  FLOW LENGTH(FEET) =   416.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.79
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      40.28
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   13.90
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    3333.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.90
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.259
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.77      0.25      0.100    50
  PUBLIC PARK                C        0.43      0.25      0.850    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.369
  SUBAREA AREA(ACRES) =     1.20      SUBAREA RUNOFF(CFS) =     1.26
  EFFECTIVE AREA(ACRES) =     39.55   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       41.1       PEAK FLOW RATE(CFS) =      40.68

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   954.00  DOWNSTREAM(FEET) =   952.80
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.41
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      40.68
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   14.11
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    3453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.11
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.248
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.88      0.30      0.400    36
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        7.02      0.25      0.400    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =     7.90      SUBAREA RUNOFF(CFS) =     8.15
  EFFECTIVE AREA(ACRES) =     47.45   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       49.0       PEAK FLOW RATE(CFS) =      48.43

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   952.80  DOWNSTREAM(FEET) =   929.00
  FLOW LENGTH(FEET) =   636.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.05
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      48.43
  PIPE TRAVEL TIME(MIN.) =   0.66    Tc(MIN.) =   14.77
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.10 =    4089.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     17.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.77
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.216
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.68      0.30      0.500    36
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.89      0.25      0.600    50
  COMMERCIAL                 C        1.86      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.309
  SUBAREA AREA(ACRES) =     3.43      SUBAREA RUNOFF(CFS) =     3.50
  EFFECTIVE AREA(ACRES) =     50.88   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       52.5       PEAK FLOW RATE(CFS) =      50.55

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   929.00  DOWNSTREAM(FEET) =   926.30
  FLOW LENGTH(FEET) =   122.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.29
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      50.55
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   14.92
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     18.00 =    4211.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   14.92
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.209
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS               B       24.46      0.30     0.350    36
  CONDOMINIUMS               C        7.92      0.25     0.350    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =   32.38      SUBAREA RUNOFF(CFS) =   32.28
  EFFECTIVE AREA(ACRES) =     83.26   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       84.8       PEAK FLOW RATE(CFS) =      82.51

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   926.30  DOWNSTREAM(FEET) =   922.70
  FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.62
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      82.51
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   15.12
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     19.00 =    4384.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   15.12
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.199
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        1.62      0.30     0.400    36
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        6.09      0.25     0.400    50
  COMMERCIAL                 B        2.90      0.30     0.100    36
  COMMERCIAL                 C        3.15      0.25     0.100    50
  NATURAL POOR COVER
  "GRASS"                    B        0.76      0.30     1.000    61
  NATURAL POOR COVER
  "GRASS"                    C        0.39      0.25     1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
  SUBAREA AREA(ACRES) =   14.91      SUBAREA RUNOFF(CFS) =   14.93
  EFFECTIVE AREA(ACRES) =     98.17   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =       99.8       PEAK FLOW RATE(CFS) =      96.76

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   922.70  DOWNSTREAM(FEET) =   815.60
  FLOW LENGTH(FEET) =  1580.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.49
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      96.76
  PIPE TRAVEL TIME(MIN.) =   1.12    Tc(MIN.) =   16.24
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     20.00 =    5964.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   16.24
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.151
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B       19.45      0.30     0.100    36
  COMMERCIAL                 C       16.92      0.25     0.100    50
  COMMERCIAL                 D        0.11      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   36.48      SUBAREA RUNOFF(CFS) =   36.89
  EFFECTIVE AREA(ACRES) =    134.65   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      136.2       PEAK FLOW RATE(CFS) =     129.38

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   815.60  DOWNSTREAM(FEET) =   799.50
  FLOW LENGTH(FEET) =   449.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.15
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     129.38
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   16.61
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6413.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.136
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.38      0.30      0.100    36
  COMMERCIAL                 C        0.87      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     3.25      SUBAREA RUNOFF(CFS) =     3.24
  EFFECTIVE AREA(ACRES) =    137.90   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      139.5       PEAK FLOW RATE(CFS) =     130.82

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.136
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        4.10      0.30      0.100    36
  COMMERCIAL                 C        1.54      0.25      0.100    50
  COMMERCIAL                 D        2.08      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     7.72      SUBAREA RUNOFF(CFS) =     7.71
  EFFECTIVE AREA(ACRES) =    145.62   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      147.2       PEAK FLOW RATE(CFS) =     138.54

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   799.50  DOWNSTREAM(FEET) =   765.50
  FLOW LENGTH(FEET) =  1056.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.31
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     138.54
  PIPE TRAVEL TIME(MIN.) =   0.91    Tc(MIN.) =   17.52
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     22.00 =    7469.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.52
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.102
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.06      0.30      0.100    36
  COMMERCIAL                 C        1.74      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     3.80      SUBAREA RUNOFF(CFS) =     3.67
  EFFECTIVE AREA(ACRES) =    149.42   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      151.0       PEAK FLOW RATE(CFS) =     138.54
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.52
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.102
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.23      0.30      0.100    36
  COMMERCIAL                 D        5.07      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     5.30      SUBAREA RUNOFF(CFS) =     5.16
  EFFECTIVE AREA(ACRES) =    154.72   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =      156.3       PEAK FLOW RATE(CFS) =     142.87

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   765.50  DOWNSTREAM(FEET) =   755.00
  FLOW LENGTH(FEET) =   465.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  34.3 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.99
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     142.87
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   17.98
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     23.00 =    7934.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.98
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.086
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        9.15      0.30      0.100    36
  COMMERCIAL                 C       10.79      0.25      0.100    50
  COMMERCIAL                 D        1.81      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   21.75      SUBAREA RUNOFF(CFS) =   20.73
  EFFECTIVE AREA(ACRES) =    176.47   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =      178.1       PEAK FLOW RATE(CFS) =     161.36

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.98
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.086
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        7.47      0.30      0.100    36
  COMMERCIAL                 C        0.40      0.25      0.100    50
  COMMERCIAL                 D       17.76      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   25.63      SUBAREA RUNOFF(CFS) =   24.52
  EFFECTIVE AREA(ACRES) =    202.10   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      203.7       PEAK FLOW RATE(CFS) =     185.88

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   755.00  DOWNSTREAM(FEET) =   736.00
  FLOW LENGTH(FEET) =  1257.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  39.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.79
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     185.88
  PIPE TRAVEL TIME(MIN.) =   1.33    Tc(MIN.) =   19.31
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.00 =    9191.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.31
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.042
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B       16.13      0.30      0.100    36
  COMMERCIAL                 C        3.87      0.25      0.100    50
  COMMERCIAL                 D        4.22      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   24.22      SUBAREA RUNOFF(CFS) =   22.12
  EFFECTIVE AREA(ACRES) =    226.32   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      227.9       PEAK FLOW RATE(CFS) =     200.10

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     30.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   736.00  DOWNSTREAM(FEET) =   720.00
  FLOW LENGTH(FEET) =   212.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  29.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.46
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     200.10
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   19.43
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.10 =    9403.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.10 TO NODE     30.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   720.00  DOWNSTREAM(FEET) =   716.00
  FLOW LENGTH(FEET) =   156.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.69
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     200.10
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   19.56
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    9559.00 FEET.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   19.56
 RAINFALL INTENSITY(INCH/HR) =   1.03
 AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.27
 AREA-AVERAGED Ap =  0.23
 EFFECTIVE STREAM AREA(ACRES) =     226.32
 TOTAL STREAM AREA(ACRES) =     227.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     200.10

****************************************************************************
 FLOW PROCESS FROM NODE     30.20 TO NODE     30.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =    740.00  DOWNSTREAM(FEET) =    726.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.494
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.144
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  B        0.42      0.30      0.100    36    5.49
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      0.80
 TOTAL AREA(ACRES) =      0.42   PEAK FLOW RATE(CFS) =      0.80

****************************************************************************
 FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    5.49
 RAINFALL INTENSITY(INCH/HR) =   2.14
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.42
 TOTAL STREAM AREA(ACRES) =       0.42
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.80

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      200.10   19.56    1.035  0.27( 0.06) 0.23     226.3       1.00
     1      193.37   20.89    0.996  0.27( 0.06) 0.23     227.9       8.00
     2        0.80    5.49    2.144  0.30( 0.03) 0.10       0.4      30.20

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      121.02    5.49    2.144  0.27( 0.06) 0.23      64.0      30.20
     2      200.48   19.56    1.035  0.27( 0.06) 0.23     226.7       1.00
     3      193.74   20.89    0.996  0.27( 0.06) 0.23     228.3       8.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     200.48    Tc(MIN.) =    19.56
 EFFECTIVE AREA(ACRES) =     226.74   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
 TOTAL AREA(ACRES) =      228.3
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    9559.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     30.00 TO NODE     33.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   716.00  DOWNSTREAM(FEET) =   714.30
 FLOW LENGTH(FEET) =   210.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  44.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.82
 ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     200.48
 PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   19.83
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     33.00 =    9769.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.83
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.027
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.35      0.30      0.100    36
 COMMERCIAL                  B        0.62      0.30      0.100    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.97      SUBAREA RUNOFF(CFS) =    0.87
 EFFECTIVE AREA(ACRES) =    227.71   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
 TOTAL AREA(ACRES) =      229.3       PEAK FLOW RATE(CFS) =     200.48
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.30  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =   420.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  42.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.24
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     200.48
  PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =   20.32
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     38.00 TO NODE     39.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    730.50  DOWNSTREAM(FEET) =    726.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.427
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.573
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.80      0.30     0.500    36    9.43
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.42      0.20     0.500    57    9.43
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.58
  TOTAL AREA(ACRES) =      1.22   PEAK FLOW RATE(CFS) =      1.58

****************************************************************************
  FLOW PROCESS FROM NODE     39.00 TO NODE     40.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  726.20  DOWNSTREAM ELEVATION(FEET) =  719.50
  STREET LENGTH(FEET) =   711.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL) =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.74
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =   11.25
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.19
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.72
  STREET FLOW TRAVEL TIME(MIN.) =   5.41   Tc(MIN.) =   14.84
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.212
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        2.40      0.30     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    2.29
  EFFECTIVE AREA(ACRES) =      3.62    AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =       3.48

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  12.46
  FLOW VELOCITY(FEET/SEC.) =  2.31   DEPTH*VELOCITY(FT*FT/SEC.) =   0.81
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.00 =    1041.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.84
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.212
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.93      0.30     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.93      SUBAREA RUNOFF(CFS) =    0.89
  EFFECTIVE AREA(ACRES) =      4.55   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =       4.37

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   719.50  DOWNSTREAM(FEET) =   718.40
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.03
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.37
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   14.97
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.10 =    1096.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.10 TO NODE     40.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   14.97
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.206
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.19      0.30     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.18
  EFFECTIVE AREA(ACRES) =      4.74   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.7       PEAK FLOW RATE(CFS) =       4.52

****************************************************************************
  FLOW PROCESS FROM NODE     40.10 TO NODE     40.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   718.40  DOWNSTREAM(FEET) =   717.00
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.75
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.52
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   15.09
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.20 =    1151.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     40.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   15.09
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.201
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.22      0.30     0.850    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.45      0.30     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.615
  SUBAREA AREA(ACRES) =    0.67      SUBAREA RUNOFF(CFS) =    0.61
  EFFECTIVE AREA(ACRES) =      5.41   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =       5.11

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     40.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   15.09
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.201
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.34      0.30     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.34      SUBAREA RUNOFF(CFS) =    0.32
  EFFECTIVE AREA(ACRES) =      5.75   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =       5.44

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     41.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   717.00  DOWNSTREAM(FEET) =   713.40
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.79
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.44
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   15.31
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.00 =    1266.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.31
  RAINFALL INTENSITY(INCH/HR) =   1.19
  AREA-AVERAGED Fm(INCH/HR) =  0.15
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.51
  EFFECTIVE STREAM AREA(ACRES) =       5.75
  TOTAL STREAM AREA(ACRES) =       5.75
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.44

****************************************************************************
  FLOW PROCESS FROM NODE     41.20 TO NODE     41.30 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    728.20  DOWNSTREAM(FEET) =    723.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.184
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.597
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.02      0.30     0.500    36    9.18
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.61      0.20     0.500    57    9.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.85
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      0.85

****************************************************************************
  FLOW PROCESS FROM NODE     41.30 TO NODE     41.40 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  723.30  DOWNSTREAM ELEVATION(FEET) =  718.00
  STREET LENGTH(FEET) =   323.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.33
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    7.18
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.29
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.59
  STREET FLOW TRAVEL TIME(MIN.) =   2.36   Tc(MIN.) =   11.54
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.401
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.72      0.30     0.400    36
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.11      0.20     0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.83      SUBAREA RUNOFF(CFS) =    0.96
  EFFECTIVE AREA(ACRES) =      1.46    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       1.70

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   8.10
  FLOW VELOCITY(FEET/SEC.) =  2.40   DEPTH*VELOCITY(FT*FT/SEC.) =   0.66
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.40 =     653.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.40 TO NODE     41.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.54
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.401
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        1.24      0.30     0.400    36
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.03      0.20     0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.27      SUBAREA RUNOFF(CFS) =    1.46
  EFFECTIVE AREA(ACRES) =      2.73   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =        2.7        PEAK FLOW RATE(CFS) =       3.16

****************************************************************************
  FLOW PROCESS FROM NODE     41.40 TO NODE     41.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   718.00  DOWNSTREAM(FEET) =   717.00
  FLOW LENGTH(FEET) =    62.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.96
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.16
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   11.71
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.50 =     715.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     41.50 TO NODE     41.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.71
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.389
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.09      0.30      0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.11
  EFFECTIVE AREA(ACRES) =      2.82   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        2.8       PEAK FLOW RATE(CFS) =       3.24

****************************************************************************
  FLOW PROCESS FROM NODE     41.50 TO NODE     41.51 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   717.00  DOWNSTREAM(FEET) =   715.50
  FLOW LENGTH(FEET) =   154.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.99
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.24
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   12.23
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.51 =     869.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.51 TO NODE     41.51 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.23
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.355
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.44      0.30      0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.44      SUBAREA RUNOFF(CFS) =    1.56
  EFFECTIVE AREA(ACRES) =      4.26   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =        4.3       PEAK FLOW RATE(CFS) =       4.72

****************************************************************************
  FLOW PROCESS FROM NODE     41.51 TO NODE     41.60 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   715.50  DOWNSTREAM(FEET) =   714.90
  FLOW LENGTH(FEET) =    59.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.60
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.72
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   12.40
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.60 =     928.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.60 TO NODE     41.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.40
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.344
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.06      0.30      0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.06      SUBAREA RUNOFF(CFS) =    1.14
  EFFECTIVE AREA(ACRES) =      5.32   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        5.3       PEAK FLOW RATE(CFS) =       5.82

****************************************************************************
  FLOW PROCESS FROM NODE     41.60 TO NODE     41.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.40
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.344
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.47      0.30      0.400    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.47      SUBAREA RUNOFF(CFS) =    0.52
  EFFECTIVE AREA(ACRES) =      5.79   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =       6.33

****************************************************************************
  FLOW PROCESS FROM NODE     41.60 TO NODE     41.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.90  DOWNSTREAM(FEET) =   713.40
  FLOW LENGTH(FEET) =   148.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.01
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        6.33
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   12.81
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.00 =    1076.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.81
  RAINFALL INTENSITY(INCH/HR) =   1.32
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       5.79
  TOTAL STREAM AREA(ACRES) =       5.79
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.33

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        5.44   15.31    1.191  0.29( 0.15) 0.51       5.8      38.00
      2        6.33   12.81    1.319  0.29( 0.13) 0.45       5.8      41.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       11.44   12.81    1.319  0.29( 0.14) 0.48      10.6      41.20
      2       11.09   15.31    1.191  0.29( 0.14) 0.48      11.5      38.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      11.44    Tc(MIN.) =    12.81
  EFFECTIVE AREA(ACRES) =      10.60   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       11.5
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.00 =    1266.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.80 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.40  DOWNSTREAM(FEET) =   712.60
  FLOW LENGTH(FEET) =    83.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.78
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.44
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   13.02
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.80 =    1349.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.02
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.307
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.27      0.30      0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.13      0.20      0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    0.42
  EFFECTIVE AREA(ACRES) =     11.00   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       11.9       PEAK FLOW RATE(CFS) =      11.57

****************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.02
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.307
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.21      0.30      0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.01      0.20      0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.22      SUBAREA RUNOFF(CFS) =    0.23
  EFFECTIVE AREA(ACRES) =     11.22   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       12.2       PEAK FLOW RATE(CFS) =      11.80

****************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.90 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.60  DOWNSTREAM(FEET) =   711.80
  FLOW LENGTH(FEET) =    77.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.03
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.80
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   13.20
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.90 =    1426.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.20
  RAINFALL INTENSITY(INCH/HR) =   1.30
  AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.48
  EFFECTIVE STREAM AREA(ACRES) =      11.22
  TOTAL STREAM AREA(ACRES) =      12.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      11.80

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    77.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  SUBAREA LOSS RATE DATA(AMC   I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.06      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.12
  TOTAL AREA(ACRES) =      0.06   PEAK FLOW RATE(CFS) =      0.12

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.00
  RAINFALL INTENSITY(INCH/HR) =   2.26
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.06
  TOTAL STREAM AREA(ACRES) =       0.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.12

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  7700.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  SUBAREA LOSS RATE DATA(AMC   I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.06      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.12
  TOTAL AREA(ACRES) =      0.06   PEAK FLOW RATE(CFS) =      0.12

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.00
  RAINFALL INTENSITY(INCH/HR) =   2.26
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.06
  TOTAL STREAM AREA(ACRES) =       0.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.12

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       11.80   13.20    1.297  0.29( 0.14) 0.48       11.2       41.20
      1       11.41   15.70    1.174  0.29( 0.14) 0.48       12.2       38.00
      2        0.12    5.00    2.264  0.20( 0.10) 0.50        0.1       41.90
      3        0.12    5.00    2.264  0.20( 0.10) 0.50        0.1       41.90

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        8.44    5.00    2.264  0.29( 0.14) 0.48        4.4       41.90
```

```
     2        8.44    5.00    2.264  0.29( 0.14) 0.48       4.4      41.90
     3       11.93   13.20    1.297  0.29( 0.14) 0.48      11.3      41.20
     4       11.52   15.70    1.174  0.29( 0.14) 0.48      12.3      38.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      11.93    Tc(MIN.) =    13.20
  EFFECTIVE AREA(ACRES) =      11.34   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       12.3
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     41.90 =    7700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     46.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   711.80  DOWNSTREAM(FEET) =   710.50
  FLOW LENGTH(FEET) =   132.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.89
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.93
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   13.52
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     46.00 =    7832.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     46.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.52
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.279
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.21      0.30      0.100    36
  COMMERCIAL                 D        0.29      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.50      SUBAREA RUNOFF(CFS) =     0.56
  EFFECTIVE AREA(ACRES) =     11.84   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       12.8       PEAK FLOW RATE(CFS) =      12.21

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.50  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =    68.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.05
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.21
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   13.68
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     34.00 =    7900.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        8.99    5.53    2.138  0.29( 0.13) 0.44       4.9      41.90
      2        8.99    5.53    2.138  0.29( 0.13) 0.44       4.9      41.90
      3       12.21   13.68    1.270  0.29( 0.13) 0.46      11.8      41.20
      4       11.80   16.18    1.154  0.29( 0.13) 0.47      12.8      38.00
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     34.00 =    7900.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      121.02    6.36    1.971  0.27( 0.06) 0.22      65.0      30.20
      2      200.48   20.32    1.012  0.27( 0.06) 0.23     227.7       1.00
      3      193.74   21.66    0.976  0.27( 0.06) 0.23     229.3       8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      123.22    5.53    2.138  0.27( 0.06) 0.24      61.3      41.90
      2      123.22    5.53    2.138  0.27( 0.06) 0.24      61.3      41.90
      3      130.35    6.36    1.971  0.27( 0.06) 0.24      70.6      30.20
      4      174.88   13.68    1.270  0.27( 0.07) 0.24     162.1      41.20
      5      188.70   16.18    1.154  0.27( 0.06) 0.24     192.2      38.00
      6      210.64   20.32    1.012  0.27( 0.06) 0.24     240.5       1.00
      7      203.48   21.66    0.976  0.27( 0.06) 0.24     242.1       8.00
    TOTAL AREA(ACRES) =       242.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      210.64  Tc(MIN.) =   20.322
  EFFECTIVE AREA(ACRES) =    240.49  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      242.1
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     56.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   703.70
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.01
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     210.64
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   20.40
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   20.40
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.010
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.23      0.30     0.100    36
  COMMERCIAL                  D        0.51      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.74      SUBAREA RUNOFF(CFS) =    0.66
  EFFECTIVE AREA(ACRES) =    241.23   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      242.8       PEAK FLOW RATE(CFS) =     210.64
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
================================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     32.20 TO NODE     32.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    745.00  DOWNSTREAM(FEET) =    742.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.917
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.739
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  B        0.11      0.30     0.100    36    7.92
  COMMERCIAL                  C        0.26      0.25     0.100    50    7.92
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.57
  TOTAL AREA(ACRES) =      0.37   PEAK FLOW RATE(CFS) =      0.57

****************************************************************************
  FLOW PROCESS FROM NODE     32.10 TO NODE     32.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  742.00  DOWNSTREAM ELEVATION(FEET) =  740.00
  STREET LENGTH(FEET) =    96.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.66
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.21
    HALFSTREET FLOOD WIDTH(FEET) =    4.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.30
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.48
  STREET FLOW TRAVEL TIME(MIN.) =   0.70   Tc(MIN.) =    8.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.657
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.06      0.30     0.100    36
  COMMERCIAL                  C        0.06      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.12      SUBAREA RUNOFF(CFS) =    0.18
  EFFECTIVE AREA(ACRES) =      0.49    AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       0.72

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.21   HALFSTREET FLOOD WIDTH(FEET) =   4.62
  FLOW VELOCITY(FEET/SEC.) =  2.30   DEPTH*VELOCITY(FT*FT/SEC.) =   0.49
  LONGEST FLOWPATH FROM NODE     32.20 TO NODE     32.00 =     426.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    724.60  DOWNSTREAM(FEET) =    723.00
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.167
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.359
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  SCHOOL                     B        0.33      0.30      0.600    36   12.17
  SCHOOL                     C        0.85      0.25      0.600    50   12.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      1.27
  TOTAL AREA(ACRES) =      1.18   PEAK FLOW RATE(CFS) =      1.27

****************************************************************************
  FLOW PROCESS FROM NODE     52.00 TO NODE     53.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  723.00  DOWNSTREAM ELEVATION(FEET) =  719.00
  STREET LENGTH(FEET) =   412.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.77
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =   11.25
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.22
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.73
  STREET FLOW TRAVEL TIME(MIN.) =   3.10   Tc(MIN.) =   15.26
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.193
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  SCHOOL                     B        2.48      0.30      0.600    36
  SCHOOL                     C        0.77      0.25      0.600    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    2.98
  EFFECTIVE AREA(ACRES) =      4.43    AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        4.4        PEAK FLOW RATE(CFS) =       4.08

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  13.28
  FLOW VELOCITY(FEET/SEC.) =  2.41   DEPTH*VELOCITY(FT*FT/SEC.) =   0.88
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     53.00 =     742.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     53.00 TO NODE     54.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  719.00  DOWNSTREAM ELEVATION(FEET) =  712.50
  STREET LENGTH(FEET) =   633.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.02
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   14.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.58
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.99
  STREET FLOW TRAVEL TIME(MIN.) =   4.09   Tc(MIN.) =   19.35
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.041
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  SCHOOL                     B        2.42      0.30      0.600    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    2.42      SUBAREA RUNOFF(CFS) =    1.88
  EFFECTIVE AREA(ACRES) =      6.85    AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        6.9        PEAK FLOW RATE(CFS) =       5.35

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  14.60
  FLOW VELOCITY(FEET/SEC.) =  2.65   DEPTH*VELOCITY(FT*FT/SEC.) =   1.03
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     54.00 =    1375.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.35
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.041
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.32      0.30      0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.32      SUBAREA RUNOFF(CFS) =     0.29
  EFFECTIVE AREA(ACRES) =      7.17   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.58
  TOTAL AREA(ACRES) =        7.2       PEAK FLOW RATE(CFS) =       5.64

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.35
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.041
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  SCHOOL                     B        2.40      0.30      0.600    36
  SCHOOL                     C        0.07      0.25      0.600    50
  SCHOOL                     D        2.82      0.20      0.600    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =     5.29      SUBAREA RUNOFF(CFS) =     4.25
  EFFECTIVE AREA(ACRES) =     12.46   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.59
  TOTAL AREA(ACRES) =       12.5       PEAK FLOW RATE(CFS) =       9.90

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.35
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.041
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.78      0.30      0.100    36
  COMMERCIAL                 C        0.03      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.81      SUBAREA RUNOFF(CFS) =     0.74
  EFFECTIVE AREA(ACRES) =     13.27   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =       13.3       PEAK FLOW RATE(CFS) =      10.63

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.50  DOWNSTREAM(FEET) =   712.30
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.44
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.63
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   19.45
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     55.00 =    1409.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.45
  RAINFALL INTENSITY(INCH/HR) =   1.04
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =      13.27
  TOTAL STREAM AREA(ACRES) =      13.27
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.63

****************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.10 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    34.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.13      0.30      0.100    36
  COMMERCIAL                 D        0.14      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.54
  TOTAL AREA(ACRES) =      0.27   PEAK FLOW RATE(CFS) =      0.54

****************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.24      0.30      0.100    36
  COMMERCIAL                 D        0.01      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.25      SUBAREA RUNOFF(CFS) =     0.50
  EFFECTIVE AREA(ACRES) =      0.52   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
```

```
 TOTAL AREA(ACRES) =        0.5       PEAK FLOW RATE(CFS) =       1.05

****************************************************************************
 FLOW PROCESS FROM NODE     55.10 TO NODE     55.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   713.00  DOWNSTREAM(FEET) =   712.30
 FLOW LENGTH(FEET) =   275.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.24
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.05
 PIPE TRAVEL TIME(MIN.) =   2.04    Tc(MIN.) =    7.04
 LONGEST FLOWPATH FROM NODE     55.10 TO NODE     55.00 =     309.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.04
 RAINFALL INTENSITY(INCH/HR) =   1.86
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.27
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.52
 TOTAL STREAM AREA(ACRES) =       0.52
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.05

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       10.63   19.45    1.038  0.27( 0.15) 0.56      13.3      51.00
     2        1.05    7.04    1.860  0.27( 0.03) 0.10       0.5      55.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        8.46    7.04    1.860  0.27( 0.14) 0.51       5.3      55.10
     2       11.21   19.45    1.038  0.27( 0.15) 0.54      13.8      51.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      11.21    Tc(MIN.) =    19.45
 EFFECTIVE AREA(ACRES) =      13.79   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.54
 TOTAL AREA(ACRES) =       13.8
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     55.00 =    1409.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     55.00 TO NODE     56.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   712.30  DOWNSTREAM(FEET) =   711.00
 FLOW LENGTH(FEET) =   165.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.21
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.21
 PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   19.90
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.00 =    1574.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.00 TO NODE     56.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.90
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.025
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.49      0.30      0.100    36
 COMMERCIAL                  D        0.04      0.20      0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.53      SUBAREA RUNOFF(CFS) =    0.47
 EFFECTIVE AREA(ACRES) =     14.32   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =       14.3       PEAK FLOW RATE(CFS) =      11.38

****************************************************************************
 FLOW PROCESS FROM NODE     56.00 TO NODE     56.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   711.00  DOWNSTREAM(FEET) =   710.10
 FLOW LENGTH(FEET) =   172.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.40
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.38
 PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   20.43
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     56.11 TO NODE     56.12 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    720.80  DOWNSTREAM(FEET) =    717.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.438
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.676
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.91      0.30     0.200    36    8.44
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      1.32
  TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      1.32

****************************************************************************
  FLOW PROCESS FROM NODE     56.12 TO NODE     56.13 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  717.80  DOWNSTREAM ELEVATION(FEET) =  713.60
  STREET LENGTH(FEET) =   486.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.30
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =   10.64
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.03
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.65
  STREET FLOW TRAVEL TIME(MIN.) =   3.99   Tc(MIN.) =   12.43
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.342
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        1.68      0.30     0.200    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    1.68      SUBAREA RUNOFF(CFS) =    1.94
  EFFECTIVE AREA(ACRES) =      2.59    AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       2.6        PEAK FLOW RATE(CFS) =       2.99

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.96
  FLOW VELOCITY(FEET/SEC.) =  2.14   DEPTH*VELOCITY(FT*FT/SEC.) =   0.73
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.13 =     816.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.43
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.342
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        2.11      0.30     0.200    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    2.11      SUBAREA RUNOFF(CFS) =    2.44
  EFFECTIVE AREA(ACRES) =      4.70   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       4.7        PEAK FLOW RATE(CFS) =       5.42

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.43
  RAINFALL INTENSITY(INCH/HR) =   1.34
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =       4.70
  TOTAL STREAM AREA(ACRES) =       4.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.42

****************************************************************************
  FLOW PROCESS FROM NODE     56.14 TO NODE     56.15 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    719.20  DOWNSTREAM(FEET) =    715.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.182
```

```
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.706
SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE"       B        0.84      0.30     0.200    36    8.18
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
SUBAREA RUNOFF(CFS) =      1.24
TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      1.24

****************************************************************************
FLOW PROCESS FROM NODE     56.15 TO NODE     56.13 IS CODE =  62
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) =  715.70  DOWNSTREAM ELEVATION(FEET) =  713.60
STREET LENGTH(FEET) =   200.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.018
OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.60
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.28
  HALFSTREET FLOOD WIDTH(FEET) =    8.71
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.01
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.57
STREET FLOW TRAVEL TIME(MIN.) =   1.66   Tc(MIN.) =    9.84
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.535
SUBAREA LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"       B        0.54      0.30     0.200    36
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
SUBAREA AREA(ACRES) =    0.54      SUBAREA RUNOFF(CFS) =    0.72
EFFECTIVE AREA(ACRES) =      1.38    AREA-AVERAGED Fm(INCH/HR) =  0.06
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       1.83

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   9.21
FLOW VELOCITY(FEET/SEC.) =  2.08   DEPTH*VELOCITY(FT*FT/SEC.) =   0.61
LONGEST FLOWPATH FROM NODE     56.14 TO NODE     56.13 =     530.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =    9.84
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.535
SUBAREA LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"       B        0.70      0.30     0.200    36
RESIDENTIAL
"11+ DWELLINGS/ACRE"       D        0.52      0.20     0.200    57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
SUBAREA AREA(ACRES) =    1.22      SUBAREA RUNOFF(CFS) =    1.63
EFFECTIVE AREA(ACRES) =      2.60   AREA-AVERAGED Fm(INCH/HR) =  0.06
AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.20
TOTAL AREA(ACRES) =        2.6        PEAK FLOW RATE(CFS) =       3.46

****************************************************************************
FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =    9.84
RAINFALL INTENSITY(INCH/HR) =   1.53
AREA-AVERAGED Fm(INCH/HR) =  0.06
AREA-AVERAGED Fp(INCH/HR) =  0.28
AREA-AVERAGED Ap =  0.20
EFFECTIVE STREAM AREA(ACRES) =       2.60
TOTAL STREAM AREA(ACRES) =       2.60
PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.46

** CONFLUENCE DATA **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1        5.42   12.43    1.342  0.30( 0.06) 0.20       4.7      56.11
    2        3.46    9.84    1.535  0.28( 0.06) 0.20       2.6      56.14

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1        8.40    9.84    1.535  0.29( 0.06) 0.20       6.3      56.14
    2        8.43   12.43    1.342  0.29( 0.06) 0.20       7.3      56.11

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =       8.43    Tc(MIN.) =    12.43
EFFECTIVE AREA(ACRES) =       7.30   AREA-AVERAGED Fm(INCH/HR) =  0.06
AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
```

```
  TOTAL AREA(ACRES) =        7.3
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.13 =     816.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.16 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.60  DOWNSTREAM(FEET) =   712.50
  FLOW LENGTH(FEET) =    94.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.75
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.43
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   12.66
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.16 =     910.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.16 TO NODE     56.16 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.66
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.328
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.46      0.30     0.200    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.46      SUBAREA RUNOFF(CFS) =    0.53
  EFFECTIVE AREA(ACRES) =      7.76   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =       8.87

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        8.89   10.07    1.514  0.29( 0.06) 0.20       6.8      56.14
      2        8.87   12.66    1.328  0.29( 0.06) 0.20       7.8      56.11
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =       8.89  Tc(MIN.) =   10.07
  AREA-AVERAGED Fm(INCH/HR) =  0.06  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.20  EFFECTIVE AREA(ACRES) =       6.78

****************************************************************************
  FLOW PROCESS FROM NODE     56.16 TO NODE     56.16 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.07
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.514
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.05      0.30     0.200    36
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        0.41      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.46      SUBAREA RUNOFF(CFS) =    0.61
  EFFECTIVE AREA(ACRES) =      7.24   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        8.2       PEAK FLOW RATE(CFS) =       9.50

****************************************************************************
  FLOW PROCESS FROM NODE     56.16 TO NODE     56.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.50  DOWNSTREAM(FEET) =   710.10
  FLOW LENGTH(FEET) =    38.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.19
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.50
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   10.12
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.10 =     948.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        9.50   10.12    1.510  0.29( 0.06) 0.20       7.2      56.14
      2        9.40   12.71    1.325  0.29( 0.06) 0.20       8.2      56.11
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.10 =     948.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        8.75    8.10    1.717  0.27( 0.13) 0.48       5.9      55.10
      2       11.38   20.43    1.009  0.27( 0.14) 0.52      14.3      51.00
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       17.43    8.10    1.717  0.28( 0.09) 0.34      11.6      55.10
      2       18.68   10.12    1.510  0.28( 0.09) 0.34      14.5      56.14
      3       19.13   12.71    1.325  0.28( 0.10) 0.35      17.2      56.11
      4       18.43   20.43    1.009  0.27( 0.11) 0.41      22.5      51.00
    TOTAL AREA(ACRES) =        22.5
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       19.13  Tc(MIN.) =   12.706
  EFFECTIVE AREA(ACRES) =     17.24  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.34
  TOTAL AREA(ACRES) =       22.5
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     56.10 TO NODE     56.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.10  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.76
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.13
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   12.81
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.20 =    1790.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.20 TO NODE     56.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.81
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.319
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.39      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.39      SUBAREA RUNOFF(CFS) =     0.46
  EFFECTIVE AREA(ACRES) =     17.63   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =       22.9       PEAK FLOW RATE(CFS) =      19.41

****************************************************************************
  FLOW PROCESS FROM NODE     56.20 TO NODE     56.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   703.70
  FLOW LENGTH(FEET) =   290.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.24
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.41
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   13.29
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.30 =    2080.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM        Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       17.46    8.69    1.648  0.27( 0.09) 0.33       12.0       55.10
      2       18.86   10.70    1.462  0.27( 0.09) 0.34       14.9       56.14
      3       19.41   13.29    1.292  0.27( 0.10) 0.35       17.6       56.11
      4       18.50   21.01    0.993  0.27( 0.11) 0.40       22.9       51.00
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.30 =    2080.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM        Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      123.22    5.61    2.119  0.27( 0.06) 0.24       62.0       41.90
      2      123.22    5.61    2.119  0.27( 0.06) 0.24       62.0       41.90
      3      130.35    6.45    1.957  0.27( 0.06) 0.24       71.3       30.20
      4      176.08   13.76    1.266  0.27( 0.06) 0.24      162.9       41.20
      5      188.70   16.26    1.151  0.27( 0.06) 0.24      192.9       38.00
      6      210.64   20.40    1.010  0.27( 0.06) 0.24      241.2        1.00
      7      203.48   21.74    0.974  0.27( 0.06) 0.24      242.8        8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM        Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      137.90    5.61    2.119  0.27( 0.07) 0.25       69.8       41.90
      2      137.90    5.61    2.119  0.27( 0.07) 0.25       69.8       41.90
      3      145.87    6.45    1.957  0.27( 0.07) 0.25       80.2       30.20
      4      161.84    8.69    1.648  0.27( 0.07) 0.25      111.4       55.10
      5      175.84   10.70    1.462  0.27( 0.07) 0.25      139.5       56.14
      6      192.54   13.29    1.292  0.27( 0.07) 0.25      174.6       56.11
      7      195.43   13.76    1.266  0.27( 0.07) 0.25      180.8       41.20
      8      207.76   16.26    1.151  0.27( 0.07) 0.25      212.6       38.00
      9      229.21   20.40    1.010  0.27( 0.07) 0.25      263.7        1.00
     10      225.86   21.01    0.993  0.27( 0.07) 0.25      264.9       51.00
     11      221.58   21.74    0.974  0.27( 0.07) 0.25      265.7        8.00
    TOTAL AREA(ACRES) =       265.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      229.21  Tc(MIN.) =   20.395
  EFFECTIVE AREA(ACRES) =    263.74  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =      265.7
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     35.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   703.70  DOWNSTREAM(FEET) =   703.00
  FLOW LENGTH(FEET) =    74.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  46.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.93
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     229.21
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   20.48
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    729.10  DOWNSTREAM(FEET) =    723.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.849
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.631
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.39      0.30     0.500    36    8.85
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.52      0.20     0.500    57    8.85
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.24
  TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      1.24

****************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     44.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  723.20  DOWNSTREAM ELEVATION(FEET) =  714.50
  STREET LENGTH(FEET) =   493.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.91
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    7.39
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.39
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.63
  STREET FLOW TRAVEL TIME(MIN.) =   3.43   Tc(MIN.) =   12.28
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.351
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        2.25      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.79      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.04      SUBAREA RUNOFF(CFS) =    3.32
  EFFECTIVE AREA(ACRES) =      3.95    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.9        PEAK FLOW RATE(CFS) =       4.33

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   8.91
  FLOW VELOCITY(FEET/SEC.) =  2.61   DEPTH*VELOCITY(FT*FT/SEC.) =   0.75
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     44.00 =     823.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     44.00 TO NODE     45.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.50  DOWNSTREAM(FEET) =   713.50
  FLOW LENGTH(FEET) =    33.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.16
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.33
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   12.35
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.20 =     856.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     45.20 TO NODE     45.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.35
  RAINFALL INTENSITY(INCH/HR) =   1.35
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       3.95
  TOTAL STREAM AREA(ACRES) =       3.95
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.33

****************************************************************************
  FLOW PROCESS FROM NODE     45.00 TO NODE     45.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    721.00  DOWNSTREAM(FEET) =    717.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.195
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.596
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.58      0.30     0.400    36    9.20
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.06      0.20     0.400    57    9.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      0.85
  TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      0.85

****************************************************************************
  FLOW PROCESS FROM NODE     45.10 TO NODE     45.20 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  717.00  DOWNSTREAM ELEVATION(FEET) =  714.00
  STREET LENGTH(FEET) =   318.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.31
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    8.10
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.86
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.51
  STREET FLOW TRAVEL TIME(MIN.) =   2.85   Tc(MIN.) =   12.05
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.366
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.82      0.30     0.400    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.82      SUBAREA RUNOFF(CFS) =    0.92
  EFFECTIVE AREA(ACRES) =      1.46    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       1.64

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   9.01
  FLOW VELOCITY(FEET/SEC.) =  1.94   DEPTH*VELOCITY(FT*FT/SEC.) =   0.56
  LONGEST FLOWPATH FROM NODE     45.00 TO NODE     45.20 =     648.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     45.20 TO NODE     45.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.05
  RAINFALL INTENSITY(INCH/HR) =   1.37
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.40
  EFFECTIVE STREAM AREA(ACRES) =       1.46
  TOTAL STREAM AREA(ACRES) =       1.46
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.64

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        4.33   12.35    1.347  0.27( 0.13) 0.50       3.9      42.00
      2        1.64   12.05    1.366  0.30( 0.12) 0.40       1.5      45.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
```

```
 STREAM        Q      Tc   Intensity   Fp(Fm)     Ap      Ae      HEADWATER
 NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
    1         5.93   12.05    1.366  0.27( 0.13) 0.47       5.3       45.00
    2         5.94   12.35    1.347  0.27( 0.13) 0.47       5.4       42.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       5.94    Tc(MIN.) =    12.35
 EFFECTIVE AREA(ACRES) =       5.41   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =         5.4
 LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.20 =     856.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     45.20 TO NODE     45.30 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   713.50  DOWNSTREAM(FEET) =   711.90
 FLOW LENGTH(FEET) =   157.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.93
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.94
 PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   12.79
 LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.30 =    1013.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     45.30 TO NODE     45.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.79
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.320
 SUBAREA LOSS RATE DATA(AMC   I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        0.66      0.30      0.400    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.66      SUBAREA RUNOFF(CFS) =     0.71
 EFFECTIVE AREA(ACRES) =      6.07   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =         6.1       PEAK FLOW RATE(CFS) =       6.51

****************************************************************************
 FLOW PROCESS FROM NODE     45.30 TO NODE     45.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.79
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.320
 SUBAREA LOSS RATE DATA(AMC   I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                 B        1.89      0.30      0.850    36
 COMMERCIAL                  D        0.04      0.20      0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.834
 SUBAREA AREA(ACRES) =     1.93      SUBAREA RUNOFF(CFS) =     1.86
 EFFECTIVE AREA(ACRES) =      8.00   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.55
 TOTAL AREA(ACRES) =         8.0       PEAK FLOW RATE(CFS) =       8.37

 ** PEAK FLOW RATE TABLE **
  STREAM        Q      Tc   Intensity   Fp(Fm)     Ap      Ae      HEADWATER
  NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1         8.40   12.49    1.339  0.28( 0.16) 0.55       7.9       45.00
     2         8.37   12.79    1.320  0.28( 0.16) 0.55       8.0       42.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =       8.40  Tc(MIN.) =   12.49
 AREA-AVERAGED Fm(INCH/HR) =  0.16  AREA-AVERAGED Fp(INCH/HR) =  0.28
 AREA-AVERAGED Ap =  0.55  EFFECTIVE AREA(ACRES) =       7.90

****************************************************************************
 FLOW PROCESS FROM NODE     45.30 TO NODE     47.20 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   711.90  DOWNSTREAM(FEET) =   710.80
 FLOW LENGTH(FEET) =   106.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.42
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.40
 PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =   12.76
 LONGEST FLOWPATH FROM NODE     42.00 TO NODE     47.20 =    1119.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.20 TO NODE     47.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.76
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.322
 SUBAREA LOSS RATE DATA(AMC   I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.13      0.30      0.100    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.13      SUBAREA RUNOFF(CFS) =     0.15
 EFFECTIVE AREA(ACRES) =      8.03   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.55
 TOTAL AREA(ACRES) =         8.1       PEAK FLOW RATE(CFS) =       8.43

****************************************************************************
 FLOW PROCESS FROM NODE     47.20 TO NODE     35.20 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.80  DOWNSTREAM(FEET) =   703.90
  FLOW LENGTH(FEET) =   695.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.31
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.43
  PIPE TRAVEL TIME(MIN.) =   1.84    Tc(MIN.) =   14.60
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     35.20 =    1814.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.20 TO NODE     35.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.60
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.224
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 B        1.02      0.30     0.850    36
  PUBLIC PARK                 C        0.05      0.25     0.850    50
  PUBLIC PARK                 D        2.20      0.20     0.850    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    3.27      SUBAREA RUNOFF(CFS) =    3.02
  EFFECTIVE AREA(ACRES) =     11.30   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.64
  TOTAL AREA(ACRES) =       11.4       PEAK FLOW RATE(CFS) =      10.74

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       10.74   14.60    1.224  0.26( 0.17) 0.64      11.3      45.00
      2       10.69   14.90    1.209  0.26( 0.17) 0.63      11.4      42.00
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     35.10 =    1814.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      137.90    5.71    2.098  0.27( 0.07) 0.25      69.8      41.90
      2      137.90    5.71    2.098  0.27( 0.07) 0.25      69.8      41.90
      3      145.87    6.54    1.940  0.27( 0.07) 0.25      80.2      30.20
      4      161.84    8.78    1.638  0.27( 0.07) 0.25     111.4      55.10
      5      175.84   10.80    1.455  0.27( 0.07) 0.25     139.5      56.14
      6      192.54   13.38    1.287  0.27( 0.07) 0.25     174.6      56.11
      7      195.43   13.85    1.261  0.27( 0.07) 0.25     180.8      41.20
      8      207.76   16.35    1.147  0.27( 0.07) 0.25     212.6      38.00
      9      229.21   20.48    1.008  0.27( 0.07) 0.25     263.7       1.00
     10      225.86   21.10    0.991  0.27( 0.07) 0.25     264.9      51.00
     11      221.58   21.83    0.972  0.27( 0.07) 0.25     265.7       8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      145.58    5.71    2.098  0.27( 0.07) 0.27      74.2      41.90
      2      145.58    5.71    2.098  0.27( 0.07) 0.27      74.2      41.90
      3      153.94    6.54    1.940  0.27( 0.07) 0.27      85.3      30.20
      4      170.84    8.78    1.638  0.27( 0.07) 0.27     118.2      55.10
      5      185.52   10.80    1.455  0.27( 0.07) 0.27     147.8      56.14
      6      202.97   13.38    1.287  0.27( 0.07) 0.27     184.9      56.11
      7      205.99   13.85    1.261  0.27( 0.07) 0.27     191.5      41.20
      8      209.89   14.60    1.224  0.27( 0.07) 0.27     201.7      45.00
      9      211.33   14.90    1.209  0.27( 0.07) 0.27     205.6      42.00
     10      217.81   16.35    1.147  0.27( 0.07) 0.27     224.0      38.00
     11      237.83   20.48    1.008  0.27( 0.07) 0.27     275.1       1.00
     12      234.30   21.10    0.991  0.27( 0.07) 0.27     276.3      51.00
     13      229.83   21.83    0.972  0.27( 0.07) 0.27     277.1       8.00
    TOTAL AREA(ACRES) =       277.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      237.83  Tc(MIN.) =   20.484
  EFFECTIVE AREA(ACRES) =    275.14  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      277.1
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =   695.70
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  55.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.21
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     237.83
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   20.61
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     36.00 =   10453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
  MAINLINE Tc(MIN.) =   20.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.004
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        0.16      0.25     0.100    50
  COMMERCIAL                  D        0.29      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.45      SUBAREA RUNOFF(CFS) =    0.40
  EFFECTIVE AREA(ACRES) =    275.59   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      277.6       PEAK FLOW RATE(CFS) =     237.83
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     37.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.70  DOWNSTREAM(FEET) =   695.40
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  55.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.21
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     237.83
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   20.73
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.00 =   10528.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.00 TO NODE     37.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.40  DOWNSTREAM(FEET) =   694.00
  FLOW LENGTH(FEET) =   355.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  55.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.15
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     237.83
  PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =   21.31
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.10 =   10883.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.31
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.985
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        0.68      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.68      SUBAREA RUNOFF(CFS) =    0.59
  EFFECTIVE AREA(ACRES) =    276.27   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      278.3       PEAK FLOW RATE(CFS) =     237.83
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.31
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.985
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        0.46      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.46      SUBAREA RUNOFF(CFS) =    0.40
  EFFECTIVE AREA(ACRES) =    276.73   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      278.7       PEAK FLOW RATE(CFS) =     237.83
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.00  DOWNSTREAM(FEET) =   693.80
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  52.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.72
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     237.83
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   21.36
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     37.60 TO NODE     37.70 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    718.50  DOWNSTREAM(FEET) =    714.40
```

```
 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.517
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.564
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.13      0.30     0.500    36    9.52
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.51      0.20     0.500    57    9.52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA RUNOFF(CFS) =      0.84
 TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      0.84

****************************************************************************
 FLOW PROCESS FROM NODE     37.70 TO NODE     37.80 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  714.40  DOWNSTREAM ELEVATION(FEET) =  710.60
 STREET LENGTH(FEET) =   349.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.18
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.26
   HALFSTREET FLOOD WIDTH(FEET) =    7.49
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.90
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.50
 STREET FLOW TRAVEL TIME(MIN.) =   3.06   Tc(MIN.) =   12.58
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.333
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        0.15      0.25     0.500    50
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.47      0.20     0.500    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.62      SUBAREA RUNOFF(CFS) =    0.68
 EFFECTIVE AREA(ACRES) =      1.26    AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =       1.39

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   8.10
 FLOW VELOCITY(FEET/SEC.) =  1.97   DEPTH*VELOCITY(FT*FT/SEC.) =   0.54
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.80 =     679.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.80 TO NODE     37.90 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   710.60  DOWNSTREAM(FEET) =   709.80
 FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.41
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.39
 PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   12.81
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.90 =     739.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.90 TO NODE     37.90 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.81
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.319
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        0.21      0.25     0.500    50
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.93      0.20     0.500    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    1.14      SUBAREA RUNOFF(CFS) =    1.25
 EFFECTIVE AREA(ACRES) =      2.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        2.4       PEAK FLOW RATE(CFS) =       2.62

****************************************************************************
 FLOW PROCESS FROM NODE     37.90 TO NODE     37.50 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   708.00
 FLOW LENGTH(FEET) =   221.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.41
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.62
```

```
  PIPE TRAVEL TIME(MIN.) =   0.83    Tc(MIN.) =   13.64
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.50 =     960.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.50 TO NODE     37.50 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.64
  RAINFALL INTENSITY(INCH/HR) =   1.27
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       2.40
  TOTAL STREAM AREA(ACRES) =       2.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.62

****************************************************************************
  FLOW PROCESS FROM NODE     37.30 TO NODE     37.40 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    713.10  DOWNSTREAM(FEET) =    709.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.880
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.531
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.70      0.25     0.500    50    9.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.89
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      0.89

****************************************************************************
  FLOW PROCESS FROM NODE     37.40 TO NODE     37.50 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  709.70  DOWNSTREAM ELEVATION(FEET) =  708.10
  STREET LENGTH(FEET) =   124.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.08
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    6.88
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.99
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.50
  STREET FLOW TRAVEL TIME(MIN.) =   1.04   Tc(MIN.) =   10.92
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.446
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.33      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.33      SUBAREA RUNOFF(CFS) =    0.39
  EFFECTIVE AREA(ACRES) =      1.03    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.0        PEAK FLOW RATE(CFS) =       1.22

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   7.29
  FLOW VELOCITY(FEET/SEC.) =  2.06   DEPTH*VELOCITY(FT*FT/SEC.) =   0.53
  LONGEST FLOWPATH FROM NODE     37.30 TO NODE     37.50 =     454.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.50 TO NODE     37.50 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.92
  RAINFALL INTENSITY(INCH/HR) =   1.45
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       1.03
  TOTAL STREAM AREA(ACRES) =       1.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.22

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        2.62   13.64    1.272  0.21( 0.11) 0.50       2.4      37.60
      2        1.22   10.92    1.446  0.25( 0.12) 0.50       1.0      37.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
```

```
 STREAM        Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1         3.63   10.92    1.446  0.23( 0.11) 0.50       3.0      37.30
    2         3.68   13.64    1.272  0.22( 0.11) 0.50       3.4      37.60

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.68    Tc(MIN.) =    13.64
  EFFECTIVE AREA(ACRES) =       3.43   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.4
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.50 =     960.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.50 TO NODE     37.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   708.00  DOWNSTREAM(FEET) =   693.80
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.67
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.68
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   13.80
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.20 =    1080.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
 STREAM        Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1         3.63   11.08    1.434  0.23( 0.11) 0.50       3.0      37.30
    2         3.68   13.80    1.264  0.22( 0.11) 0.50       3.4      37.60
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.20 =    1080.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM        Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1       145.58    6.70    1.914  0.27( 0.07) 0.27      75.8      41.90
    2       145.58    6.70    1.914  0.27( 0.07) 0.27      75.8      41.90
    3       153.94    7.53    1.789  0.27( 0.07) 0.27      86.9      30.20
    4       170.84    9.74    1.544  0.27( 0.07) 0.27     119.8      55.10
    5       185.52   11.73    1.388  0.27( 0.07) 0.27     149.4      56.14
    6       202.97   14.28    1.239  0.27( 0.07) 0.27     186.5      56.11
    7       205.99   14.75    1.216  0.27( 0.07) 0.27     193.1      41.20
    8       209.89   15.50    1.182  0.27( 0.07) 0.27     203.3      45.00
    9       211.33   15.80    1.169  0.27( 0.07) 0.27     207.2      42.00
   10       217.81   17.25    1.112  0.27( 0.07) 0.27     225.6      38.00
   11       237.83   21.36    0.984  0.27( 0.07) 0.27     276.7       1.00
   12       234.30   21.98    0.968  0.27( 0.07) 0.27     277.9      51.00
   13       229.83   22.71    0.950  0.27( 0.07) 0.27     278.7       8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

  ** PEAK FLOW RATE TABLE **
 STREAM        Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1       148.58    6.70    1.914  0.27( 0.07) 0.27      77.6      41.90
    2       148.58    6.70    1.914  0.27( 0.07) 0.27      77.6      41.90
    3       157.08    7.53    1.789  0.27( 0.07) 0.27      88.9      30.20
    4       174.30    9.74    1.544  0.27( 0.07) 0.27     122.4      55.10
    5       184.34   11.08    1.434  0.27( 0.07) 0.28     142.7      37.30
    6       189.17   11.73    1.388  0.27( 0.07) 0.28     152.5      56.14
    7       203.34   13.80    1.264  0.27( 0.07) 0.28     182.9      37.60
    8       206.58   14.28    1.239  0.27( 0.07) 0.28     190.0      56.11
    9       209.52   14.75    1.216  0.27( 0.07) 0.28     196.5      41.20
   10       213.31   15.50    1.182  0.27( 0.07) 0.28     206.7      45.00
   11       214.71   15.80    1.169  0.27( 0.07) 0.28     210.6      42.00
   12       221.01   17.25    1.112  0.27( 0.07) 0.27     229.0      38.00
   13       240.62   21.36    0.984  0.27( 0.07) 0.27     280.2       1.00
   14       237.04   21.98    0.968  0.27( 0.07) 0.27     281.3      51.00
   15       232.51   22.71    0.950  0.27( 0.07) 0.27     282.2       8.00
  TOTAL AREA(ACRES) =       282.2

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      240.62  Tc(MIN.) =   21.360
  EFFECTIVE AREA(ACRES) =    280.16  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      282.2
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     37.20 TO NODE     47.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.80  DOWNSTREAM(FEET) =   691.30
  FLOW LENGTH(FEET) =   487.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  69.0 INCH PIPE IS  53.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.25
  ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     240.62
  PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =   22.08
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     47.31 TO NODE     47.32 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    718.50  DOWNSTREAM(FEET) =    712.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.679
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.649
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.63      0.30      0.500    36    8.68
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.85
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      0.85

****************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.32 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.68
  RAINFALL INTENSITY(INCH/HR) =   1.65
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.63
  TOTAL STREAM AREA(ACRES) =       0.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.85

****************************************************************************
  FLOW PROCESS FROM NODE     47.33 TO NODE     47.32 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   282.00
  ELEVATION DATA: UPSTREAM(FEET) =    715.00  DOWNSTREAM(FEET) =    712.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.219
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.593
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.86      0.30      0.500    36    9.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.12
  TOTAL AREA(ACRES) =      0.86   PEAK FLOW RATE(CFS) =      1.12

****************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.32 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.22
  RAINFALL INTENSITY(INCH/HR) =   1.59
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.86
  TOTAL STREAM AREA(ACRES) =       0.86
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.12

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        0.85    8.68    1.649  0.30( 0.15) 0.50       0.6      47.31
      2        1.12    9.22    1.593  0.30( 0.15) 0.50       0.9      47.33

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        1.94    8.68    1.649  0.30( 0.15) 0.50       1.4      47.31
      2        1.94    9.22    1.593  0.30( 0.15) 0.50       1.5      47.33

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       1.94    Tc(MIN.) =     8.68
  EFFECTIVE AREA(ACRES) =       1.44   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.5
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.32 =     330.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.34 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.00  DOWNSTREAM(FEET) =   698.50
  FLOW LENGTH(FEET) =   102.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.38
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =       1.94
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =    9.18
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.34 =     432.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.34 TO NODE     47.34 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.18
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.597
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.38      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.06      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.44      SUBAREA RUNOFF(CFS) =    0.58
  EFFECTIVE AREA(ACRES) =      1.88   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.9       PEAK FLOW RATE(CFS) =       2.45

****************************************************************************
  FLOW PROCESS FROM NODE     47.34 TO NODE     47.35 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   698.50  DOWNSTREAM(FEET) =   697.50
  FLOW LENGTH(FEET) =   194.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.66
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.45
  PIPE TRAVEL TIME(MIN.) =   0.88    Tc(MIN.) =   10.06
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.35 =     626.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.06
  RAINFALL INTENSITY(INCH/HR) =   1.52
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       1.88
  TOTAL STREAM AREA(ACRES) =       1.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.45

****************************************************************************
  FLOW PROCESS FROM NODE     47.36 TO NODE     47.35 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   275.00
  ELEVATION DATA: UPSTREAM(FEET) =    713.50  DOWNSTREAM(FEET) =    711.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.418
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.574
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.72      0.30     0.500    36    9.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.92
  TOTAL AREA(ACRES) =      0.72   PEAK FLOW RATE(CFS) =      0.92

****************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.42
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.574
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.66      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.12      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.78      SUBAREA RUNOFF(CFS) =    1.00
  EFFECTIVE AREA(ACRES) =      1.50   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.5       PEAK FLOW RATE(CFS) =       1.93

****************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.42
  RAINFALL INTENSITY(INCH/HR) =   1.57
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29
```

```
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       1.50
 TOTAL STREAM AREA(ACRES) =       1.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.93

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        2.45   10.06    1.515  0.30( 0.15) 0.50       1.9      47.31
     1        2.43   10.61    1.470  0.30( 0.15) 0.50       1.9      47.33
     2        1.93    9.42    1.574  0.29( 0.15) 0.50       1.5      47.36

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        4.32    9.42    1.574  0.29( 0.15) 0.50       3.3      47.36
     2        4.30   10.06    1.515  0.29( 0.15) 0.50       3.4      47.31
     3        4.21   10.61    1.470  0.29( 0.15) 0.50       3.4      47.33

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       4.32    Tc(MIN.) =     9.42
 EFFECTIVE AREA(ACRES) =       3.26   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        3.4
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.35 =     626.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.35 TO NODE     47.37 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   697.60  DOWNSTREAM(FEET) =   696.00
 FLOW LENGTH(FEET) =   293.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.33
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.32
 PIPE TRAVEL TIME(MIN.) =   1.13    Tc(MIN.) =   10.54
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.37 =     919.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.37 TO NODE     47.37 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.54
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.475
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.67      0.30     0.500    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.12      0.20     0.500    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.79      SUBAREA RUNOFF(CFS) =    0.95
 EFFECTIVE AREA(ACRES) =      4.05   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        4.2       PEAK FLOW RATE(CFS) =       4.84

****************************************************************************
 FLOW PROCESS FROM NODE     47.37 TO NODE     47.37 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.54
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.475
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.09      0.30     0.500    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.60      0.20     0.500    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.69      SUBAREA RUNOFF(CFS) =    0.85
 EFFECTIVE AREA(ACRES) =      4.74   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        4.9       PEAK FLOW RATE(CFS) =       5.69

****************************************************************************
 FLOW PROCESS FROM NODE     47.37 TO NODE     47.30 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =   695.20
 FLOW LENGTH(FEET) =   158.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.46
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.69
 PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =   11.14
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.30 =    1077.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.30 TO NODE     47.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.14
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.430
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.28      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    0.34
  EFFECTIVE AREA(ACRES) =      5.02   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        5.2       PEAK FLOW RATE(CFS) =       5.83

****************************************************************************
  FLOW PROCESS FROM NODE     47.30 TO NODE     47.40 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.20  DOWNSTREAM(FEET) =   694.60
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.38
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.83
  PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =   11.61
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.40 =    1202.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.40 TO NODE     47.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.396
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.19      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.22
  EFFECTIVE AREA(ACRES) =      5.21   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =       5.90

****************************************************************************
  FLOW PROCESS FROM NODE     47.40 TO NODE     47.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.60  DOWNSTREAM(FEET) =   694.40
  FLOW LENGTH(FEET) =    41.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.42
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.90
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   11.76
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.50 =    1243.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.50 TO NODE     47.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.76
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.385
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.05      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.45      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.50      SUBAREA RUNOFF(CFS) =    1.73
  EFFECTIVE AREA(ACRES) =      6.71   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        6.9       PEAK FLOW RATE(CFS) =       7.58

****************************************************************************
  FLOW PROCESS FROM NODE     47.50 TO NODE     47.60 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.40  DOWNSTREAM(FEET) =   693.50
  FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.80
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.58
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =   12.39
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.60 =    1423.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.60 TO NODE     47.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.39
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.345
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.55      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.55      SUBAREA RUNOFF(CFS) =    1.74
  EFFECTIVE AREA(ACRES) =      8.26   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        8.4       PEAK FLOW RATE(CFS) =       9.08
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     47.60 TO NODE     47.70 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.50  DOWNSTREAM(FEET) =   693.30
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.96
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.08
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   12.52
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.70 =    1463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.70 TO NODE     47.70 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.52
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.336
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.04      0.25     0.500    50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.57      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.61      SUBAREA RUNOFF(CFS) =    1.79
  EFFECTIVE AREA(ACRES) =      9.87   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       10.0       PEAK FLOW RATE(CFS) =      10.81

****************************************************************************
  FLOW PROCESS FROM NODE     47.70 TO NODE     47.80 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.30  DOWNSTREAM(FEET) =   692.50
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.12
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.81
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   13.08
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.80 =    1633.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.80 TO NODE     47.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.08
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.304
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.60      0.25     0.500    50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.94      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.54      SUBAREA RUNOFF(CFS) =    1.65
  EFFECTIVE AREA(ACRES) =     11.41   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       11.6       PEAK FLOW RATE(CFS) =      12.17

****************************************************************************
  FLOW PROCESS FROM NODE     47.80 TO NODE     47.90 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.50  DOWNSTREAM(FEET) =   692.30
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  17.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.82
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.17
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   13.16
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.90 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.90 TO NODE     47.90 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.16
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.299
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        1.43      0.25     0.500    50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.14      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.57      SUBAREA RUNOFF(CFS) =    1.66
  EFFECTIVE AREA(ACRES) =     12.98   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =      13.78

****************************************************************************
  FLOW PROCESS FROM NODE     47.90 TO NODE     47.91 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.30  DOWNSTREAM(FEET) =   692.10
  FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.24
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.78
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   13.30
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.91 =    1707.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.91 TO NODE     47.91 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.30
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.291
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        1.89      0.25     0.500    50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        1.30      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     3.19      SUBAREA RUNOFF(CFS) =     3.38
  EFFECTIVE AREA(ACRES) =     16.17   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      17.06

****************************************************************************
  FLOW PROCESS FROM NODE     47.91 TO NODE     47.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.10  DOWNSTREAM(FEET) =   691.30
  FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.73
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.06
  PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =   13.79
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.00 =    1874.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       17.06   13.79    1.265  0.24( 0.12) 0.50      16.2      47.36
      2       16.67   14.45    1.231  0.24( 0.12) 0.50      16.3      47.31
      3       16.31   15.01    1.205  0.24( 0.12) 0.50      16.3      47.33
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.00 =    1874.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      148.58    7.51    1.792  0.27( 0.07) 0.27      77.6      41.90
      2      148.58    7.51    1.792  0.27( 0.07) 0.27      77.6      41.90
      3      157.08    8.33    1.689  0.27( 0.07) 0.27      88.9      30.20
      4      174.30   10.53    1.476  0.27( 0.07) 0.27     122.4      55.10
      5      184.34   11.84    1.380  0.27( 0.07) 0.28     142.7      37.30
      6      189.17   12.49    1.338  0.27( 0.07) 0.28     152.5      56.14
      7      203.34   14.55    1.226  0.27( 0.07) 0.28     182.9      37.60
      8      206.58   15.03    1.204  0.27( 0.07) 0.28     190.0      56.11
      9      209.52   15.50    1.183  0.27( 0.07) 0.28     196.5      41.20
     10      213.31   16.25    1.151  0.27( 0.07) 0.28     206.7      45.00
     11      214.71   16.55    1.139  0.27( 0.07) 0.28     210.6      42.00
     12      221.01   17.99    1.086  0.27( 0.07) 0.27     229.0      38.00
     13      240.62   22.08    0.965  0.27( 0.07) 0.27     280.2       1.00
     14      237.04   22.70    0.950  0.27( 0.07) 0.27     281.3      51.00
     15      232.51   23.43    0.933  0.27( 0.07) 0.27     282.2       8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      162.15    7.51    1.792  0.26( 0.08) 0.30      86.4      41.90
      2      162.15    7.51    1.792  0.26( 0.08) 0.30      86.4      41.90
      3      171.20    8.33    1.689  0.26( 0.08) 0.30      98.7      30.20
      4      189.74   10.53    1.476  0.26( 0.08) 0.30     134.8      55.10
      5      200.47   11.84    1.380  0.26( 0.08) 0.30     156.6      37.30
      6      205.62   12.49    1.338  0.26( 0.08) 0.30     167.1      56.14
      7      215.18   13.79    1.265  0.26( 0.08) 0.30     187.9      47.36
      8      219.34   14.45    1.231  0.26( 0.08) 0.29     197.7      47.31
      9      219.95   14.55    1.226  0.26( 0.08) 0.29     199.2      37.60
     10      222.74   15.01    1.205  0.26( 0.08) 0.29     206.0      47.33
     11      222.87   15.03    1.204  0.26( 0.08) 0.29     206.3      56.11
     12      225.50   15.50    1.183  0.26( 0.08) 0.29     212.9      41.20
     13      228.82   16.25    1.151  0.26( 0.08) 0.29     223.0      45.00
     14      230.03   16.55    1.139  0.26( 0.08) 0.29     227.0      42.00
     15      235.53   17.99    1.086  0.26( 0.08) 0.29     245.4      38.00
     16      253.33   22.08    0.965  0.26( 0.07) 0.28     296.5       1.00
     17      249.52   22.70    0.950  0.26( 0.07) 0.28     297.6      51.00
     18      244.74   23.43    0.933  0.26( 0.07) 0.28     298.5       8.00
   TOTAL AREA(ACRES) =       298.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      253.33  Tc(MIN.) =   22.082
  EFFECTIVE AREA(ACRES) =    296.50  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =      298.5
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     48.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   691.30  DOWNSTREAM(FEET) =   691.10
  FLOW LENGTH(FEET) =    61.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  75.0 INCH PIPE IS  60.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.53
  ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     253.33
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   22.19
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     48.60 TO NODE     48.61 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    712.40  DOWNSTREAM(FEET) =    707.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.660
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.652
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.05      0.30     0.400    36    8.66
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        0.02      0.25     0.400    50    8.66
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.69      0.20     0.400    57    8.66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      1.07
  TOTAL AREA(ACRES) =      0.76   PEAK FLOW RATE(CFS) =      1.07

****************************************************************************
  FLOW PROCESS FROM NODE     48.61 TO NODE     48.70 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  707.00  DOWNSTREAM ELEVATION(FEET) =  698.80
  STREET LENGTH(FEET) =   346.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.53
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    6.98
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.75
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.70
  STREET FLOW TRAVEL TIME(MIN.) =   2.10   Tc(MIN.) =   10.76
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.458
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        0.46      0.25     0.400    50
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.28      0.20     0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.74      SUBAREA RUNOFF(CFS) =    0.91
  EFFECTIVE AREA(ACRES) =      1.50    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       1.85

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   7.69
  FLOW VELOCITY(FEET/SEC.) =  2.85   DEPTH*VELOCITY(FT*FT/SEC.) =   0.76
  LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.70 =     676.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.70 TO NODE     48.70 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.76
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.458
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.59      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
  SUBAREA AREA(ACRES) =     0.59      SUBAREA RUNOFF(CFS) =     0.76
  EFFECTIVE AREA(ACRES) =      2.09   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.32
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       2.61

****************************************************************************
  FLOW PROCESS FROM NODE     48.71 TO NODE     48.71 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.76
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.458
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.09      0.30     0.400    36
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.47      0.25     0.400    50
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.80      0.20     0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =     1.36      SUBAREA RUNOFF(CFS) =     1.68
  EFFECTIVE AREA(ACRES) =      3.45   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =        3.4       PEAK FLOW RATE(CFS) =       4.29

****************************************************************************
  FLOW PROCESS FROM NODE     48.70 TO NODE     48.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   698.80  DOWNSTREAM(FEET) =   691.10
  FLOW LENGTH(FEET) =   119.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.68
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.29
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   10.94
  LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.00 =     795.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        4.29   10.94    1.444  0.22( 0.08) 0.35       3.4      48.60
  LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.00 =     795.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      162.15    7.63    1.776  0.26( 0.08) 0.30      86.4      41.90
      2      162.15    7.63    1.776  0.26( 0.08) 0.30      86.4      41.90
      3      171.20    8.44    1.676  0.26( 0.08) 0.30      98.7      30.20
      4      189.74   10.64    1.467  0.26( 0.08) 0.30     134.8      55.10
      5      200.47   11.96    1.372  0.26( 0.08) 0.30     156.6      37.30
      6      205.62   12.61    1.331  0.26( 0.08) 0.30     167.1      56.14
      7      215.18   13.90    1.259  0.26( 0.08) 0.30     187.9      47.36
      8      219.34   14.56    1.226  0.26( 0.08) 0.29     197.7      47.31
      9      219.95   14.65    1.221  0.26( 0.08) 0.29     199.2      37.60
     10      222.74   15.12    1.200  0.26( 0.08) 0.29     206.0      47.33
     11      222.87   15.14    1.199  0.26( 0.08) 0.29     206.3      56.11
     12      225.50   15.61    1.178  0.26( 0.08) 0.29     212.9      41.20
     13      228.82   16.36    1.146  0.26( 0.08) 0.29     223.0      45.00
     14      230.03   16.66    1.135  0.26( 0.08) 0.29     227.0      42.00
     15      235.53   18.09    1.082  0.26( 0.08) 0.29     245.4      38.00
     16      253.33   22.19    0.962  0.26( 0.07) 0.28     296.5       1.00
     17      249.52   22.81    0.947  0.26( 0.07) 0.28     297.6      51.00
     18      244.74   23.54    0.930  0.26( 0.07) 0.28     298.5       8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      165.87    7.63    1.776  0.26( 0.08) 0.30      88.8      41.90
      2      165.87    7.63    1.776  0.26( 0.08) 0.30      88.8      41.90
      3      175.07    8.44    1.676  0.26( 0.08) 0.30     101.3      30.20
      4      193.98   10.64    1.467  0.26( 0.08) 0.30     138.1      55.10
      5      196.48   10.94    1.444  0.26( 0.08) 0.30     143.2      48.60
      6      204.54   11.96    1.372  0.26( 0.08) 0.30     160.0      37.30
      7      209.56   12.61    1.331  0.26( 0.08) 0.30     170.6      56.14
      8      218.88   13.90    1.259  0.26( 0.08) 0.30     191.3      47.36
      9      222.94   14.56    1.226  0.26( 0.08) 0.30     201.2      47.31
     10      223.53   14.65    1.221  0.26( 0.08) 0.30     202.6      37.60
     11      226.26   15.12    1.200  0.26( 0.08) 0.29     209.4      47.33
     12      226.39   15.14    1.199  0.26( 0.08) 0.29     209.8      56.11
     13      228.95   15.61    1.178  0.26( 0.08) 0.29     216.3      41.20
     14      232.17   16.36    1.146  0.26( 0.08) 0.29     226.5      45.00
     15      233.35   16.66    1.135  0.26( 0.08) 0.29     230.4      42.00
     16      238.68   18.09    1.082  0.26( 0.08) 0.29     248.8      38.00
     17      256.11   22.19    0.962  0.26( 0.07) 0.28     299.9       1.00
     18      252.25   22.81    0.947  0.26( 0.07) 0.28     301.1      51.00
     19      247.41   23.54    0.930  0.26( 0.07) 0.28     302.0       8.00
    TOTAL AREA(ACRES) =       302.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      256.11  Tc(MIN.) =   22.188
  EFFECTIVE AREA(ACRES) =    299.95  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =      302.0
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  12
```

```
------------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
==============================================================================

******************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     49.00 IS CODE =  31
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   691.10  DOWNSTREAM(FEET) =   689.20
  FLOW LENGTH(FEET) =   384.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  53.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.32
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     256.11
  PIPE TRAVEL TIME(MIN.) =   0.57    Tc(MIN.) =   22.75
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     49.00 =   11849.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   22.75
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.949
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.31      0.30      0.100    36
  COMMERCIAL                 C        0.90      0.25      0.100    50
  COMMERCIAL                 D        0.12      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     1.33      SUBAREA RUNOFF(CFS) =     1.10
  EFFECTIVE AREA(ACRES) =    301.28   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =      303.3       PEAK FLOW RATE(CFS) =     256.11
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

******************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =   1
------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   22.75
  RAINFALL INTENSITY(INCH/HR) =   0.95
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.28
  EFFECTIVE STREAM AREA(ACRES) =     301.28
  TOTAL STREAM AREA(ACRES) =     303.28
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     256.11

******************************************************************************
  FLOW PROCESS FROM NODE     61.30 TO NODE     61.20 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    707.30  DOWNSTREAM(FEET) =    704.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.383
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.683
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  APARTMENTS                 B        0.53      0.30      0.200    36    8.38
  APARTMENTS                 D        0.77      0.20      0.200    57    8.38
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      1.91
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      1.91

******************************************************************************
  FLOW PROCESS FROM NODE     61.20 TO NODE     61.10 IS CODE =  91
------------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
==============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    704.20
  DOWNSTREAM NODE ELEVATION(FEET) =    703.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   119.00
  "V" GUTTER WIDTH(FEET) =   1.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.10000
  MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.613
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        1.30      0.30      0.200    36
  APARTMENTS                 D        0.25      0.20      0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.00
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.08
  AVERAGE FLOW DEPTH(FEET) =   0.32   FLOOD WIDTH(FEET) =    6.21
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.64   Tc(MIN.) =    9.03
  SUBAREA AREA(ACRES) =    1.55       SUBAREA RUNOFF(CFS) =    2.17
  EFFECTIVE AREA(ACRES) =    2.85     AREA-AVERAGED Fm(INCH/HR) =   0.05
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   0.20
  TOTAL AREA(ACRES) =        2.8         PEAK FLOW RATE(CFS) =       4.00

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.36   FLOOD WIDTH(FEET) =    6.93
  FLOW VELOCITY(FEET/SEC.) =   3.31   DEPTH*VELOCITY(FT*FT/SEC) =   1.18
  LONGEST FLOWPATH FROM NODE     61.30 TO NODE     61.10 =     449.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     61.10 TO NODE     49.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  703.00  DOWNSTREAM ELEVATION(FEET) =  699.50
  STREET LENGTH(FEET) =   380.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.49
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   13.88
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.42
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.92
  STREET FLOW TRAVEL TIME(MIN.) =   2.61   Tc(MIN.) =   11.64
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.394
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.26      0.30     0.100    36
  COMMERCIAL                 C        0.25      0.25     0.100    50
  COMMERCIAL                 D        0.29      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    0.99
  EFFECTIVE AREA(ACRES) =      3.65    AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =       4.43

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  13.76
  FLOW VELOCITY(FEET/SEC.) =  2.43   DEPTH*VELOCITY(FT*FT/SEC.) =   0.91
  LONGEST FLOWPATH FROM NODE     61.30 TO NODE     49.00 =     829.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.64
  RAINFALL INTENSITY(INCH/HR) =   1.39
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.18
  EFFECTIVE STREAM AREA(ACRES) =       3.65
  TOTAL STREAM AREA(ACRES) =       3.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.43

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1      165.87    8.27    1.696  0.26( 0.08) 0.30      90.1      41.90
      1      165.87    8.27    1.696  0.26( 0.08) 0.30      90.1      41.90
      1      175.07    9.06    1.609  0.26( 0.08) 0.30     102.7      30.20
      1      193.98   11.26    1.421  0.26( 0.08) 0.29     139.4      55.10
      1      196.48   11.56    1.399  0.26( 0.08) 0.29     144.5      48.60
      1      204.54   12.56    1.334  0.26( 0.08) 0.29     161.3      37.30
      1      209.56   13.20    1.297  0.26( 0.08) 0.29     171.9      56.14
      1      218.88   14.49    1.229  0.26( 0.08) 0.29     192.6      47.36
      1      222.94   15.15    1.198  0.26( 0.08) 0.29     202.5      47.31
      1      223.53   15.25    1.194  0.26( 0.08) 0.29     204.0      37.60
      1      226.26   15.70    1.174  0.26( 0.08) 0.29     210.8      47.33
      1      226.39   15.72    1.173  0.26( 0.08) 0.29     211.1      56.11
      1      228.95   16.19    1.153  0.26( 0.08) 0.29     217.7      41.20
      1      232.17   16.94    1.124  0.26( 0.08) 0.29     227.8      45.00
      1      233.35   17.24    1.112  0.26( 0.08) 0.29     231.8      42.00
      1      238.68   18.67    1.063  0.26( 0.08) 0.29     250.2      38.00
      1      256.11   22.75    0.949  0.26( 0.07) 0.28     301.3       1.00
      1      252.25   23.38    0.934  0.26( 0.07) 0.28     302.4      51.00
      1      247.41   24.11    0.917  0.26( 0.07) 0.28     303.3       8.00
      2        4.43   11.64    1.394  0.26( 0.05) 0.18       3.6      61.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1      169.72    8.27    1.696  0.26( 0.08) 0.29      92.7      41.90
      2      169.72    8.27    1.696  0.26( 0.08) 0.29      92.7      41.90
      3      179.07    9.06    1.609  0.26( 0.08) 0.29     105.5      30.20
      4      198.34   11.26    1.421  0.26( 0.08) 0.29     143.0      55.10
      5      200.89   11.56    1.399  0.26( 0.08) 0.29     148.1      48.60
      6      201.56   11.64    1.394  0.26( 0.08) 0.29     149.5      61.30
      7      208.77   12.56    1.334  0.26( 0.08) 0.29     165.0      37.30
      8      213.66   13.20    1.297  0.26( 0.08) 0.29     175.6      56.14
      9      222.77   14.49    1.229  0.26( 0.08) 0.29     196.3      47.36
     10      226.72   15.15    1.198  0.26( 0.08) 0.29     206.2      47.31
     11      227.30   15.25    1.194  0.26( 0.08) 0.29     207.6      37.60
     12      229.96   15.70    1.174  0.26( 0.08) 0.29     214.4      47.33
     13      230.09   15.72    1.173  0.26( 0.08) 0.29     214.7      56.11
     14      232.59   16.19    1.153  0.26( 0.08) 0.29     221.3      41.20
     15      235.71   16.94    1.124  0.26( 0.08) 0.29     231.5      45.00
     16      236.85   17.24    1.112  0.26( 0.08) 0.29     235.4      42.00
     17      242.02   18.67    1.063  0.26( 0.08) 0.29     253.8      38.00
     18      259.07   22.75    0.949  0.26( 0.07) 0.28     304.9       1.00
     19      255.17   23.38    0.934  0.26( 0.07) 0.28     306.1      51.00
     20      250.27   24.11    0.917  0.26( 0.07) 0.28     306.9       8.00
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     259.07    Tc(MIN.) =    22.75
  EFFECTIVE AREA(ACRES) =     304.93   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =      306.9
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     49.00 =   11849.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     50.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   689.20  DOWNSTREAM(FEET) =   688.90
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  69.0 INCH PIPE IS  55.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.52
  ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     259.07
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   22.83
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     57.10 TO NODE     57.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    714.00  DOWNSTREAM(FEET) =    711.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.278
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.695
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.42      0.30      0.100    36    8.28
  COMMERCIAL                 D        0.08      0.20      0.100    57    8.28
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.75
  TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      0.75

****************************************************************************
  FLOW PROCESS FROM NODE     57.20 TO NODE     57.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  711.60  DOWNSTREAM ELEVATION(FEET) =  709.00
  STREET LENGTH(FEET) =   130.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.83
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =    5.15
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.31
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.51
  STREET FLOW TRAVEL TIME(MIN.) =   0.94   Tc(MIN.) =    9.21
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.594
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.11      0.30      0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.11      SUBAREA RUNOFF(CFS) =    0.15
  EFFECTIVE AREA(ACRES) =      0.61    AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       0.86

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   5.36
  FLOW VELOCITY(FEET/SEC.) =  2.28   DEPTH*VELOCITY(FT*FT/SEC.) =   0.51
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     57.00 =     460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.21
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.594
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.29      0.30      0.100    36
  COMMERCIAL                 C        0.02      0.25      0.100    50
  COMMERCIAL                 D        0.34      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.65      SUBAREA RUNOFF(CFS) =    0.92
  EFFECTIVE AREA(ACRES) =      1.26   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
```

```
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       1.78

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.21
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.594
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.33      0.30     0.200    36
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.56      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.89      SUBAREA RUNOFF(CFS) =    1.24
  EFFECTIVE AREA(ACRES) =      2.15   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.14
  TOTAL AREA(ACRES) =        2.2       PEAK FLOW RATE(CFS) =       3.02

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.21
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.594
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.34      0.30     0.200    36
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.53      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.87      SUBAREA RUNOFF(CFS) =    1.21
  EFFECTIVE AREA(ACRES) =      3.02   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =        3.0       PEAK FLOW RATE(CFS) =       4.23

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     58.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.00  DOWNSTREAM(FEET) =   702.50
  FLOW LENGTH(FEET) =   633.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH)  INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.46
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.23
  PIPE TRAVEL TIME(MIN.) =   1.93    Tc(MIN.) =   11.15
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     58.00 =    1093.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.15
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.429
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        1.93      0.30     0.200    36
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.46      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    2.39      SUBAREA RUNOFF(CFS) =    2.95
  EFFECTIVE AREA(ACRES) =      5.41   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =       6.73

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.15
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.429
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        1.60      0.30     0.200    36
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.76      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    2.36      SUBAREA RUNOFF(CFS) =    2.92
  EFFECTIVE AREA(ACRES) =      7.77   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =       9.65

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   702.50  DOWNSTREAM(FEET) =   700.00
  FLOW LENGTH(FEET) =    67.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH)  INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.0 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.90
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.65
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.25
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     58.10 =    1160.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     58.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.25
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.421
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        1.94      0.30     0.200    36
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        C        0.82      0.25     0.200    50
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        4.28      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     7.04      SUBAREA RUNOFF(CFS) =     8.71
  EFFECTIVE AREA(ACRES) =     14.81   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       14.8       PEAK FLOW RATE(CFS) =      18.31

****************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     58.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.25
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.421
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        C        3.80      0.25     0.200    50
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        2.64      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     6.44      SUBAREA RUNOFF(CFS) =     7.97
  EFFECTIVE AREA(ACRES) =     21.25   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       21.2       PEAK FLOW RATE(CFS) =      26.28

****************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     59.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   700.00  DOWNSTREAM(FEET) =   699.50
  FLOW LENGTH(FEET) =   139.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.71
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.28
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   11.65
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.00 =    1299.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.65
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.393
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.44      0.30     0.100    36
  COMMERCIAL                  D        0.18      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.62      SUBAREA RUNOFF(CFS) =     0.76
  EFFECTIVE AREA(ACRES) =     21.87   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       21.9       PEAK FLOW RATE(CFS) =      26.50

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.50  DOWNSTREAM(FEET) =   699.10
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.45
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.50
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   11.78
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.10 =    1355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     59.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.78
  RAINFALL INTENSITY(INCH/HR) =   1.38
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  0.19
  EFFECTIVE STREAM AREA(ACRES) =      21.87
```

```
  TOTAL STREAM AREA(ACRES) =      21.87
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      26.50

****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     50.10 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    83.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.01      0.30      0.100    36
  COMMERCIAL                 C        0.06      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.14
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.14

****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     50.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.08      0.30      0.100    36
  COMMERCIAL                 C        0.01      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.09      SUBAREA RUNOFF(CFS) =     0.18
  EFFECTIVE AREA(ACRES) =      0.16   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.2       PEAK FLOW RATE(CFS) =       0.32

****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     59.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.00  DOWNSTREAM(FEET) =   699.10
  FLOW LENGTH(FEET) =   481.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.75
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.32
  PIPE TRAVEL TIME(MIN.) =   2.14    Tc(MIN.) =    7.14
  LONGEST FLOWPATH FROM NODE     50.10 TO NODE     59.10 =     564.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     59.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.14
  RAINFALL INTENSITY(INCH/HR) =   1.85
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.28
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.16
  TOTAL STREAM AREA(ACRES) =       0.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.32

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       26.50   11.78    1.384  0.24( 0.05) 0.19      21.9      57.10
      2        0.32    7.14    1.845  0.28( 0.03) 0.10       0.2      50.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       21.91    7.14    1.845  0.24( 0.05) 0.19      13.4      50.10
      2       26.74   11.78    1.384  0.24( 0.05) 0.19      22.0      57.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      26.74    Tc(MIN.) =    11.78
  EFFECTIVE AREA(ACRES) =      22.03   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       22.0
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.10 =    1355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     50.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.10  DOWNSTREAM(FEET) =   688.90
  FLOW LENGTH(FEET) =    28.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  33.03
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.74
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.79
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     50.00 =    1383.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       21.91    7.15    1.843  0.24( 0.05) 0.19      13.4      50.10
      2       26.74   11.79    1.383  0.24( 0.05) 0.19      22.0      57.10
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     50.00 =    1383.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      169.72    8.36    1.686  0.26( 0.08) 0.29      92.7      41.90
      2      169.72    8.36    1.686  0.26( 0.08) 0.29      92.7      41.90
      3      179.07    9.15    1.600  0.26( 0.08) 0.29     105.5      30.20
      4      198.34   11.34    1.415  0.26( 0.08) 0.29     143.0      55.10
      5      200.89   11.64    1.393  0.26( 0.08) 0.29     148.1      48.60
      6      201.56   11.72    1.388  0.26( 0.08) 0.29     149.5      61.30
      7      208.77   12.64    1.329  0.26( 0.08) 0.29     165.0      37.30
      8      213.66   13.29    1.292  0.26( 0.08) 0.29     175.6      56.14
      9      222.77   14.58    1.225  0.26( 0.08) 0.29     196.3      47.36
     10      226.72   15.24    1.194  0.26( 0.08) 0.29     206.2      47.31
     11      227.30   15.33    1.190  0.26( 0.08) 0.29     207.6      37.60
     12      229.96   15.78    1.170  0.26( 0.08) 0.29     214.4      47.33
     13      230.09   15.81    1.169  0.26( 0.08) 0.29     214.7      56.11
     14      232.59   16.27    1.150  0.26( 0.08) 0.29     221.3      41.20
     15      235.71   17.02    1.121  0.26( 0.08) 0.29     231.5      45.00
     16      236.85   17.32    1.109  0.26( 0.08) 0.29     235.4      42.00
     17      242.02   18.75    1.060  0.26( 0.08) 0.29     253.8      38.00
     18      259.07   22.83    0.947  0.26( 0.07) 0.28     304.9       1.00
     19      255.17   23.47    0.932  0.26( 0.07) 0.28     306.1      51.00
     20      250.27   24.20    0.916  0.26( 0.07) 0.28     306.9       8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      181.38    7.15    1.843  0.26( 0.07) 0.28      92.8      50.10
      2      192.88    8.36    1.686  0.26( 0.07) 0.28     108.4      41.90
      3      192.88    8.36    1.686  0.26( 0.07) 0.28     108.4      41.90
      4      203.06    9.15    1.600  0.26( 0.07) 0.28     122.6      30.20
      5      224.61   11.34    1.415  0.26( 0.07) 0.28     164.2      55.10
      6      227.47   11.64    1.393  0.26( 0.07) 0.28     169.9      48.60
      7      228.23   11.72    1.388  0.26( 0.07) 0.28     171.4      61.30
      8      228.84   11.79    1.383  0.26( 0.07) 0.28     172.7      57.10
      9      234.42   12.64    1.329  0.26( 0.07) 0.28     187.0      37.30
     10      238.57   13.29    1.292  0.26( 0.07) 0.28     197.6      56.14
     11      246.33   14.58    1.225  0.26( 0.07) 0.28     218.3      47.36
     12      249.67   15.24    1.194  0.26( 0.07) 0.28     228.2      47.31
     13      250.17   15.33    1.190  0.26( 0.07) 0.28     229.7      37.60
     14      252.44   15.78    1.170  0.26( 0.07) 0.28     236.4      47.33
     15      252.55   15.81    1.169  0.26( 0.07) 0.28     236.8      56.11
     16      254.65   16.27    1.150  0.26( 0.07) 0.28     243.3      41.20
     17      257.19   17.02    1.121  0.26( 0.07) 0.28     253.5      45.00
     18      258.11   17.32    1.109  0.26( 0.07) 0.28     257.4      42.00
     19      262.29   18.75    1.060  0.26( 0.07) 0.28     275.8      38.00
     20      277.07   22.83    0.947  0.26( 0.07) 0.27     327.0       1.00
     21      272.88   23.47    0.932  0.26( 0.07) 0.28     328.1      51.00
     22      267.66   24.20    0.916  0.26( 0.07) 0.28     329.0       8.00
    TOTAL AREA(ACRES) =       329.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      277.07  Tc(MIN.) =   22.835
  EFFECTIVE AREA(ACRES) =    326.96  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      329.0
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   688.90  DOWNSTREAM(FEET) =   675.00
  FLOW LENGTH(FEET) =   437.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  40.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.94
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     277.07
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   23.15
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     61.00 =   12342.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   23.15
  RAINFALL INTENSITY(INCH/HR) =   0.94
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.27
  EFFECTIVE STREAM AREA(ACRES) =     326.96
  TOTAL STREAM AREA(ACRES) =     328.96
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     277.07

****************************************************************************
  FLOW PROCESS FROM NODE     48.10 TO NODE     48.20 IS CODE =  21
----------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    712.40  DOWNSTREAM(FEET) =    709.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.947
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.525
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.15      0.30     0.400    36    9.95
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.34      0.20     0.400    57    9.95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      0.63
  TOTAL AREA(ACRES) =      0.49   PEAK FLOW RATE(CFS) =      0.63

********************************************************************************
  FLOW PROCESS FROM NODE     48.20 TO NODE     48.30 IS CODE =  62
--------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  709.70  DOWNSTREAM ELEVATION(FEET) =  703.80
  STREET LENGTH(FEET) =   500.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.32
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.69
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.04
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.54
  STREET FLOW TRAVEL TIME(MIN.) =   4.09   Tc(MIN.) =   14.03
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.252
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        0.64      0.25     0.400    50
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.68      0.20     0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.32      SUBAREA RUNOFF(CFS) =    1.38
  EFFECTIVE AREA(ACRES) =      1.81    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        1.8        PEAK FLOW RATE(CFS) =       1.89

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   9.11
  FLOW VELOCITY(FEET/SEC.) =  2.19   DEPTH*VELOCITY(FT*FT/SEC.) =   0.64
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.30 =     830.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     48.30 TO NODE     48.40 IS CODE =  62
--------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  703.80  DOWNSTREAM ELEVATION(FEET) =  700.20
  STREET LENGTH(FEET) =   522.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.61
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   11.86
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.90
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.65
  STREET FLOW TRAVEL TIME(MIN.) =   4.58   Tc(MIN.) =   18.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.064
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        0.93      0.25     0.400    50
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.71      0.20     0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.64      SUBAREA RUNOFF(CFS) =    1.44
  EFFECTIVE AREA(ACRES) =      3.45    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        3.4        PEAK FLOW RATE(CFS) =       3.02

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  12.57
  FLOW VELOCITY(FEET/SEC.) =  1.97   DEPTH*VELOCITY(FT*FT/SEC.) =   0.70
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.40 =    1352.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     48.40 TO NODE     48.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.064
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        0.44      0.25      0.400    50
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.46      0.20      0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =     0.90      SUBAREA RUNOFF(CFS) =     0.79
  EFFECTIVE AREA(ACRES) =      4.35   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        4.3       PEAK FLOW RATE(CFS) =       3.81

****************************************************************************
  FLOW PROCESS FROM NODE     48.40 TO NODE     48.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   700.20  DOWNSTREAM(FEET) =   699.80
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.07
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.81
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   18.94
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.50 =    1432.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.50 TO NODE     48.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.94
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.054
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.16      0.30      0.400    36
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        1.49      0.25      0.400    50
  PUBLIC PARK                 C        0.26      0.25      0.850    50
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.88      0.20      0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.442
  SUBAREA AREA(ACRES) =     2.79      SUBAREA RUNOFF(CFS) =     2.38
  EFFECTIVE AREA(ACRES) =      7.14   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =        7.1       PEAK FLOW RATE(CFS) =       6.15

****************************************************************************
  FLOW PROCESS FROM NODE     48.50 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.80  DOWNSTREAM(FEET) =   675.00
  FLOW LENGTH(FEET) =   425.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.40
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.15
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =   19.56
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     61.00 =    1857.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.56
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.035
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 B        1.98      0.30      0.850    36
  PUBLIC PARK                 D        1.67      0.20      0.850    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =     3.65      SUBAREA RUNOFF(CFS) =     2.69
  EFFECTIVE AREA(ACRES) =     10.79   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =       10.8       PEAK FLOW RATE(CFS) =       8.72

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.56
  RAINFALL INTENSITY(INCH/HR) =   1.03
  AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =      10.79
  TOTAL STREAM AREA(ACRES) =      10.79
```

PEAK FLOW RATE(CFS) AT CONFLUENCE = 8.72

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	181.38	7.50	1.794	0.26(0.07)	0.28	92.8	50.10
1	192.88	8.70	1.647	0.26(0.07)	0.28	108.4	41.90
1	192.88	8.70	1.647	0.26(0.07)	0.28	108.4	41.90
1	203.06	9.50	1.566	0.26(0.07)	0.28	122.6	30.20
1	224.61	11.67	1.391	0.26(0.07)	0.28	164.2	55.10
1	227.47	11.97	1.371	0.26(0.07)	0.28	169.9	48.60
1	228.23	12.06	1.366	0.26(0.07)	0.28	171.4	61.30
1	228.84	12.12	1.361	0.26(0.07)	0.28	172.7	57.10
1	234.42	12.97	1.310	0.26(0.07)	0.28	187.0	37.30
1	238.57	13.62	1.274	0.26(0.07)	0.28	197.6	56.14
1	246.33	14.90	1.210	0.26(0.07)	0.28	218.3	47.36
1	249.67	15.56	1.180	0.26(0.07)	0.28	228.2	47.31
1	250.17	15.65	1.176	0.26(0.07)	0.28	229.7	37.60
1	252.44	16.10	1.157	0.26(0.07)	0.28	236.4	47.33
1	252.55	16.13	1.156	0.26(0.07)	0.28	236.8	56.11
1	254.65	16.59	1.137	0.26(0.07)	0.28	243.3	41.20
1	257.19	17.34	1.109	0.26(0.07)	0.28	253.5	45.00
1	258.11	17.64	1.098	0.26(0.07)	0.28	257.4	42.00
1	262.29	19.07	1.050	0.26(0.07)	0.28	275.8	38.00
1	277.07	23.15	0.939	0.26(0.07)	0.27	327.0	1.00
1	272.88	23.78	0.925	0.26(0.07)	0.28	328.1	51.00
1	267.66	24.51	0.909	0.26(0.07)	0.28	329.0	8.00
2	8.72	19.56	1.035	0.24(0.14)	0.56	10.8	48.10

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	187.55	7.50	1.794	0.26(0.07)	0.29	96.9	50.10
2	199.40	8.70	1.647	0.26(0.07)	0.29	113.2	41.90
3	199.40	8.70	1.647	0.26(0.07)	0.29	113.2	41.90
4	209.80	9.50	1.566	0.26(0.07)	0.29	127.9	30.20
5	231.88	11.67	1.391	0.26(0.07)	0.29	170.6	55.10
6	234.81	11.97	1.371	0.26(0.07)	0.29	176.5	48.60
7	235.58	12.06	1.366	0.26(0.07)	0.29	178.1	61.30
8	236.21	12.12	1.361	0.26(0.07)	0.29	179.4	57.10
9	241.97	12.97	1.310	0.26(0.08)	0.29	194.2	37.30
10	246.25	13.62	1.274	0.26(0.08)	0.29	205.1	56.14
11	254.27	14.90	1.210	0.26(0.08)	0.29	226.5	47.36
12	257.73	15.56	1.180	0.26(0.08)	0.29	236.8	47.31
13	258.24	15.65	1.176	0.26(0.08)	0.29	238.3	37.60
14	260.59	16.10	1.157	0.26(0.08)	0.29	245.3	47.33
15	260.70	16.13	1.156	0.26(0.08)	0.29	245.7	56.11
16	262.89	16.59	1.137	0.26(0.08)	0.29	252.5	41.20
17	265.56	17.34	1.109	0.26(0.08)	0.29	263.1	45.00
18	266.52	17.64	1.098	0.26(0.08)	0.29	267.2	42.00
19	270.93	19.07	1.050	0.26(0.08)	0.29	286.4	38.00
20	272.78	19.56	1.035	0.26(0.08)	0.29	292.8	48.10
21	284.87	23.15	0.939	0.26(0.07)	0.28	337.7	1.00
22	280.53	23.78	0.925	0.26(0.07)	0.28	338.9	51.00
23	275.15	24.51	0.909	0.26(0.07)	0.29	339.8	8.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 284.87 Tc(MIN.) = 23.15
EFFECTIVE AREA(ACRES) = 337.75 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 339.8
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 61.00 = 12342.00 FEET.

==========

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 339.8 TC(MIN.) = 23.15
EFFECTIVE AREA(ACRES) = 337.75 AREA-AVERAGED Fm(INCH/HR)= 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.284
PEAK FLOW RATE(CFS) = 284.87

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	187.55	7.50	1.794	0.26(0.07)	0.29	96.9	50.10
2	199.40	8.70	1.647	0.26(0.07)	0.29	113.2	41.90
3	199.40	8.70	1.647	0.26(0.07)	0.29	113.2	41.90
4	209.80	9.50	1.566	0.26(0.07)	0.29	127.9	30.20
5	231.88	11.67	1.391	0.26(0.07)	0.29	170.6	55.10
6	234.81	11.97	1.371	0.26(0.07)	0.29	176.5	48.60
7	235.58	12.06	1.366	0.26(0.07)	0.29	178.1	61.30
8	236.21	12.12	1.361	0.26(0.07)	0.29	179.4	57.10
9	241.97	12.97	1.310	0.26(0.08)	0.29	194.2	37.30
10	246.25	13.62	1.274	0.26(0.08)	0.29	205.1	56.14
11	254.27	14.90	1.210	0.26(0.08)	0.29	226.5	47.36
12	257.73	15.56	1.180	0.26(0.08)	0.29	236.8	47.31
13	258.24	15.65	1.176	0.26(0.08)	0.29	238.3	37.60
14	260.59	16.10	1.157	0.26(0.08)	0.29	245.3	47.33
15	260.70	16.13	1.156	0.26(0.08)	0.29	245.7	56.11
16	262.89	16.59	1.137	0.26(0.08)	0.29	252.5	41.20
17	265.56	17.34	1.109	0.26(0.08)	0.29	263.1	45.00
18	266.52	17.64	1.098	0.26(0.08)	0.29	267.2	42.00
19	270.93	19.07	1.050	0.26(0.08)	0.29	286.4	38.00
20	272.78	19.56	1.035	0.26(0.08)	0.29	292.8	48.10
21	284.87	23.15	0.939	0.26(0.07)	0.28	337.7	1.00
22	280.53	23.78	0.925	0.26(0.07)	0.28	338.9	51.00
23	275.15	24.51	0.909	0.26(0.07)	0.29	339.8	8.00

==========

END OF RATIONAL METHOD ANALYSIS

```
______________________________________________________________________________
******************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                           Analysis prepared by:

                           HUNSAKER & ASSOCIATES
                                Irvine,Inc
                      Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY IN CITY OF LAKE FOREST                           *
* OFFSITE & ONSITE PROPOSED CONDITION @ 25-YEAR STORM                   *
* W.O. #1443-136X                                                       *
 ************************************************************************

  FILE NAME: PROP_25.DAT
  TIME/DATE OF STUDY: 10:53 06/10/2019
==============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  2   20.0     15.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

******************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1099.00  DOWNSTREAM(FEET) =   1091.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.370
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.603
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.78      0.25      0.600    69    8.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      2.42
  TOTAL AREA(ACRES) =      0.78   PEAK FLOW RATE(CFS) =      2.42

******************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) = 1091.20  DOWNSTREAM ELEVATION(FEET) = 1089.40
  STREET LENGTH(FEET) =    90.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.04
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   13.38
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.52
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.30
  STREET FLOW TRAVEL TIME(MIN.) =   0.43   Tc(MIN.) =    8.80
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.503
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.38      0.25      0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    7.24
  EFFECTIVE AREA(ACRES) =      3.16    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =       9.59

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  16.12
```

```
  FLOW VELOCITY(FEET/SEC.) =  3.93   DEPTH*VELOCITY(FT*FT/SEC.) =   1.64
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1089.40  DOWNSTREAM ELEVATION(FEET) = 1067.00
  STREET LENGTH(FEET) =   513.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.41
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   14.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.35
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.06
  STREET FLOW TRAVEL TIME(MIN.) =   1.60   Tc(MIN.) =   10.39
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.188
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                C        0.34      0.25     0.100    69
  PUBLIC PARK               C        0.25      0.25     0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.418
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    1.64
  EFFECTIVE AREA(ACRES) =      3.75    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =      10.33

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  14.19
  FLOW VELOCITY(FEET/SEC.) =  5.38   DEPTH*VELOCITY(FT*FT/SEC.) =   2.06
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     903.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.39
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.188
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                C        0.35      0.25     0.100    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"      C        0.49      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.333
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    2.35
  EFFECTIVE AREA(ACRES) =      4.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =      12.68

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1067.00  DOWNSTREAM(FEET) =  1062.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.02
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.68
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   10.52
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1003.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.52
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.166
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"      C        2.09      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.09      SUBAREA RUNOFF(CFS) =    5.72
  EFFECTIVE AREA(ACRES) =      6.68   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        6.7        PEAK FLOW RATE(CFS) =      18.31

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1062.00  DOWNSTREAM(FEET) =  1022.40
  FLOW LENGTH(FEET) =   701.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.79
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.31
  PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   11.31
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1704.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.31
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.039
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.18      0.30      0.100    56
  COMMERCIAL                 C        0.46      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.64      SUBAREA RUNOFF(CFS) =    1.74
  EFFECTIVE AREA(ACRES) =      7.32   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        7.3       PEAK FLOW RATE(CFS) =      19.28

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.40  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.72
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.28
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   11.58
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.58
  RAINFALL INTENSITY(INCH/HR) =   3.00
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       7.32
  TOTAL STREAM AREA(ACRES) =       7.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      19.28

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   305.00
  ELEVATION DATA: UPSTREAM(FEET) =   1046.00  DOWNSTREAM(FEET) =   1042.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.129
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.946
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 C        1.00      0.25      0.100    69    7.13
  RESIDENTIAL
  ".4 DWELLING/ACRE"         C        0.50      0.25      0.900    69   11.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
  SUBAREA RUNOFF(CFS) =      5.20
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      5.20

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1042.00  DOWNSTREAM ELEVATION(FEET) = 1036.00
  STREET LENGTH(FEET) =   373.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.13
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   13.07
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.08
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.12
  STREET FLOW TRAVEL TIME(MIN.) =   2.02   Tc(MIN.) =    9.15
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.426
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        3.31      0.25      0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
```

```
  SUBAREA AREA(ACRES) =     3.31      SUBAREA RUNOFF(CFS) =     9.83
  EFFECTIVE AREA(ACRES) =      4.81    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =        4.8        PEAK FLOW RATE(CFS) =      14.34

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  15.00
  FLOW VELOCITY(FEET/SEC.) =  3.36   DEPTH*VELOCITY(FT*FT/SEC.) =   1.34
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     678.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1036.00  DOWNSTREAM ELEVATION(FEET) = 1026.00
  STREET LENGTH(FEET) =   463.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.52
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   15.31
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.96
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.59
  STREET FLOW TRAVEL TIME(MIN.) =   1.95   Tc(MIN.) =   11.10
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.072
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.40      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     2.40      SUBAREA RUNOFF(CFS) =     6.36
  EFFECTIVE AREA(ACRES) =      7.21    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =      19.16

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  15.92
  FLOW VELOCITY(FEET/SEC.) =  4.02   DEPTH*VELOCITY(FT*FT/SEC.) =   1.66
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1141.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.10
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.072
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.16      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.22      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     2.38      SUBAREA RUNOFF(CFS) =     6.31
  EFFECTIVE AREA(ACRES) =      9.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        9.6        PEAK FLOW RATE(CFS) =      25.47

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1026.00  DOWNSTREAM(FEET) =  1022.00
  FLOW LENGTH(FEET) =   395.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.36
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.47
  PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   11.89
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1536.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.89
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.955
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.07      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        4.06      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     4.13      SUBAREA RUNOFF(CFS) =    10.52
  EFFECTIVE AREA(ACRES) =     13.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       13.7        PEAK FLOW RATE(CFS) =      34.98

****************************************************************************
```

```
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.00  DOWNSTREAM(FEET) =  1020.00
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.55
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      34.98
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   12.09
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.927
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.55      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        2.06      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     2.61      SUBAREA RUNOFF(CFS) =     6.57
  EFFECTIVE AREA(ACRES) =     16.33   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      41.21

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1020.00  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.45
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.21
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   12.44
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    1799.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.44
  RAINFALL INTENSITY(INCH/HR) =   2.88
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =      16.33
  TOTAL STREAM AREA(ACRES) =      16.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      41.21

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       19.28   11.58    2.999  0.25( 0.11) 0.45       7.3       1.00
      2       41.21   12.44    2.880  0.25( 0.12) 0.49      16.3       8.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       59.29   11.58    2.999  0.25( 0.12) 0.48      22.5       1.00
      2       59.69   12.44    2.880  0.25( 0.12) 0.48      23.6       8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      59.69    Tc(MIN.) =    12.44
  EFFECTIVE AREA(ACRES) =      23.65   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       23.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1019.50  DOWNSTREAM(FEET) =  1014.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.64
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      59.69
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   12.59
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.10 =    2014.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.59
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.860
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.15      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.15      SUBAREA RUNOFF(CFS) =     0.38
  EFFECTIVE AREA(ACRES) =     23.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       23.8       PEAK FLOW RATE(CFS) =      59.69
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.59
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.860
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.16      0.30     0.100    56
  COMMERCIAL                  C        1.44      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     4.08
  EFFECTIVE AREA(ACRES) =     25.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       25.4       PEAK FLOW RATE(CFS) =      62.78

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1014.00  DOWNSTREAM(FEET) =   971.40
  FLOW LENGTH(FEET) =   863.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.70
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      62.78
  PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =   13.36
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    2877.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.36
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.765
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.82      0.30     0.100    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.77      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.294
  SUBAREA AREA(ACRES) =     1.59      SUBAREA RUNOFF(CFS) =     3.85
  EFFECTIVE AREA(ACRES) =     26.99   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       27.0       PEAK FLOW RATE(CFS) =      64.47

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   971.40  DOWNSTREAM(FEET) =   969.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.47
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      64.47
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   13.40
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    2917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.40
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.761
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        2.46      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C       10.48      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   12.94      SUBAREA RUNOFF(CFS) =    30.65
  EFFECTIVE AREA(ACRES) =     39.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       39.9       PEAK FLOW RATE(CFS) =      95.02

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       96.03   12.54    2.867  0.25( 0.12) 0.46      38.8       1.00
      2       95.02   13.40    2.761  0.25( 0.12) 0.46      39.9       8.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      96.03  Tc(MIN.) =   12.54
  AREA-AVERAGED Fm(INCH/HR) =  0.12  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.46  EFFECTIVE AREA(ACRES) =      38.80

****************************************************************************
```

```
  FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   969.00  DOWNSTREAM(FEET) =   954.00
  FLOW LENGTH(FEET) =   416.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.88
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      96.03
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   12.90
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    3333.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.90
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.821
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.77      0.25     0.100    69
  PUBLIC PARK                C        0.43      0.25     0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.369
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    2.95
  EFFECTIVE AREA(ACRES) =     40.00   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       41.1       PEAK FLOW RATE(CFS) =      97.36

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   954.00  DOWNSTREAM(FEET) =   952.80
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  31.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.66
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      97.36
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   13.07
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    3453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.07
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.800
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.88      0.30     0.400    56
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        7.02      0.25     0.400    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    7.90      SUBAREA RUNOFF(CFS) =   19.18
  EFFECTIVE AREA(ACRES) =     47.90   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       49.0       PEAK FLOW RATE(CFS) =     115.78

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   952.80  DOWNSTREAM(FEET) =   929.00
  FLOW LENGTH(FEET) =   636.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.70
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     115.78
  PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =   13.61
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.10 =    4089.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     17.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.61
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.736
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.68      0.30     0.500    56
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.89      0.25     0.600    69
  COMMERCIAL                 C        1.86      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.309
  SUBAREA AREA(ACRES) =    3.43      SUBAREA RUNOFF(CFS) =    8.19
  EFFECTIVE AREA(ACRES) =     51.33   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       52.5       PEAK FLOW RATE(CFS) =     121.25

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =   929.00  DOWNSTREAM(FEET) =   926.30
 FLOW LENGTH(FEET) =   122.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.58
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     121.25
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   13.74
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     18.00 =    4211.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.74
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.723
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS                B       24.46      0.30      0.350    56
 CONDOMINIUMS                C        7.92      0.25      0.350    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA AREA(ACRES) =   32.38      SUBAREA RUNOFF(CFS) =   76.41
 EFFECTIVE AREA(ACRES) =     83.71   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =       84.8       PEAK FLOW RATE(CFS) =     197.02

****************************************************************************
 FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   926.30  DOWNSTREAM(FEET) =   922.70
 FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  36.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.29
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     197.02
 PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   13.89
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     19.00 =    4384.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.89
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.705
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        1.62      0.30      0.400    56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       C        6.09      0.25      0.400    69
 COMMERCIAL                  B        2.90      0.30      0.100    56
 COMMERCIAL                  C        3.15      0.25      0.100    69
 NATURAL POOR COVER
 "GRASS"                     B        0.76      0.30      1.000    78
 NATURAL POOR COVER
 "GRASS"                     C        0.39      0.25      1.000    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
 SUBAREA AREA(ACRES) =   14.91      SUBAREA RUNOFF(CFS) =   35.13
 EFFECTIVE AREA(ACRES) =     98.62   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.39
 TOTAL AREA(ACRES) =       99.8       PEAK FLOW RATE(CFS) =     230.83

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   922.70  DOWNSTREAM(FEET) =   815.60
 FLOW LENGTH(FEET) =  1580.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  29.33
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     230.83
 PIPE TRAVEL TIME(MIN.) =   0.90    Tc(MIN.) =   14.79
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     20.00 =    5964.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.79
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.611
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B       19.45      0.30      0.100    56
 COMMERCIAL                  C       16.92      0.25      0.100    69
 COMMERCIAL                  D        0.11      0.20      0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =   36.48      SUBAREA RUNOFF(CFS) =   84.81
 EFFECTIVE AREA(ACRES) =    135.10   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =      136.2       PEAK FLOW RATE(CFS) =     307.28

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   815.60  DOWNSTREAM(FEET) =   799.50
```

```
  FLOW LENGTH(FEET) =   449.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  38.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.02
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     307.28
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   15.09
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6413.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.581
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.38      0.30      0.100    56
  COMMERCIAL                 C        0.87      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     3.25      SUBAREA RUNOFF(CFS) =     7.47
  EFFECTIVE AREA(ACRES) =    138.35   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      139.5       PEAK FLOW RATE(CFS) =     311.17

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.581
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        4.10      0.30      0.100    56
  COMMERCIAL                 C        1.54      0.25      0.100    69
  COMMERCIAL                 D        2.08      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     7.72      SUBAREA RUNOFF(CFS) =    17.75
  EFFECTIVE AREA(ACRES) =    146.07   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      147.2       PEAK FLOW RATE(CFS) =     328.93

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   799.50  DOWNSTREAM(FEET) =   765.50
  FLOW LENGTH(FEET) =  1056.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  43.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.99
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     328.93
  PIPE TRAVEL TIME(MIN.) =   0.73    Tc(MIN.) =   15.82
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     22.00 =    7469.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.82
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.513
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.06      0.30      0.100    56
  COMMERCIAL                 C        1.74      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     3.80      SUBAREA RUNOFF(CFS) =     8.50
  EFFECTIVE AREA(ACRES) =    149.87   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      151.0       PEAK FLOW RATE(CFS) =     328.93
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.82
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.513
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.23      0.30      0.100    56
  COMMERCIAL                 D        5.07      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     5.30      SUBAREA RUNOFF(CFS) =    11.89
  EFFECTIVE AREA(ACRES) =    155.17   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      156.3       PEAK FLOW RATE(CFS) =     340.32

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   765.50  DOWNSTREAM(FEET) =   755.00
  FLOW LENGTH(FEET) =   465.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  45.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.44
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =     340.32
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =   16.18
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     23.00 =    7934.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.18
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.481
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        9.15      0.30     0.100    56
  COMMERCIAL                  C       10.79      0.25     0.100    69
  COMMERCIAL                  D        1.81      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   21.75      SUBAREA RUNOFF(CFS) =   48.05
  EFFECTIVE AREA(ACRES) =    176.92   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =      178.1       PEAK FLOW RATE(CFS) =     383.91

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.18
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.481
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        7.47      0.30     0.100    56
  COMMERCIAL                  C        0.40      0.25     0.100    69
  COMMERCIAL                  D       17.76      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   25.63      SUBAREA RUNOFF(CFS) =   56.70
  EFFECTIVE AREA(ACRES) =    202.55   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      203.7       PEAK FLOW RATE(CFS) =     440.61

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   755.00  DOWNSTREAM(FEET) =   736.00
  FLOW LENGTH(FEET) =  1257.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  69.0 INCH PIPE IS  56.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.36
  ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     440.61
  PIPE TRAVEL TIME(MIN.) =   1.08    Tc(MIN.) =   17.27
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.00 =    9191.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.27
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.392
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B       16.13      0.30     0.100    56
  COMMERCIAL                  C        3.87      0.25     0.100    69
  COMMERCIAL                  D        4.22      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   24.22      SUBAREA RUNOFF(CFS) =   51.54
  EFFECTIVE AREA(ACRES) =    226.77   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      227.9       PEAK FLOW RATE(CFS) =     475.88

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     30.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   736.00  DOWNSTREAM(FEET) =   720.00
  FLOW LENGTH(FEET) =   212.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  41.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  36.60
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     475.88
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   17.36
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.10 =    9403.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.10 TO NODE     30.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   720.00  DOWNSTREAM(FEET) =   716.00
  FLOW LENGTH(FEET) =   156.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  50.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  24.40
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     475.88
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   17.47
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    9559.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   17.47
  RAINFALL INTENSITY(INCH/HR) =   2.38
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.23
  EFFECTIVE STREAM AREA(ACRES) =     226.77
  TOTAL STREAM AREA(ACRES) =     227.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     475.88

********************************************************************************
  FLOW PROCESS FROM NODE     30.20 TO NODE     30.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    740.00  DOWNSTREAM(FEET) =    726.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.494
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.573
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  B        0.42      0.30      0.100    56    5.49
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.72
  TOTAL AREA(ACRES) =      0.42   PEAK FLOW RATE(CFS) =      1.72

********************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.49
  RAINFALL INTENSITY(INCH/HR) =   4.57
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.42
  TOTAL STREAM AREA(ACRES) =       0.42
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.72

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      475.88   17.47    2.376  0.27( 0.06) 0.23     226.8       1.00
      1      464.42   18.36    2.310  0.27( 0.06) 0.23     227.9       8.00
      2        1.72    5.49    4.573  0.30( 0.03) 0.10       0.4      30.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      293.36    5.49    4.573  0.27( 0.06) 0.23      71.7      30.20
      2      476.76   17.47    2.376  0.27( 0.06) 0.23     227.2       1.00
      3      465.28   18.36    2.310  0.27( 0.06) 0.23     228.3       8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     476.76    Tc(MIN.) =    17.47
  EFFECTIVE AREA(ACRES) =     227.19   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      228.3
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    9559.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     33.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   716.00  DOWNSTREAM(FEET) =   714.30
  FLOW LENGTH(FEET) =   210.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  81.0 INCH PIPE IS  63.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.75
  ESTIMATED PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     476.76
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   17.69
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     33.00 =    9769.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   17.69
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.359
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.35      0.30      0.100    56
  COMMERCIAL                  B        0.62      0.30      0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.97      SUBAREA RUNOFF(CFS) =    2.03
  EFFECTIVE AREA(ACRES) =    228.16   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      229.3       PEAK FLOW RATE(CFS) =     476.76
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

********************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  31
```

```
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.30  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =   420.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  78.0 INCH PIPE IS  59.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.61
  ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     476.76
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   18.09
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     38.00 TO NODE     39.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    730.50  DOWNSTREAM(FEET) =    726.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.427
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.369
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.80      0.30     0.500    56    9.43
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.42      0.20     0.500    75    9.43
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      3.55
  TOTAL AREA(ACRES) =      1.22   PEAK FLOW RATE(CFS) =      3.55

****************************************************************************
  FLOW PROCESS FROM NODE     39.00 TO NODE     40.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  726.20  DOWNSTREAM ELEVATION(FEET) =  719.50
  STREET LENGTH(FEET) =   711.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018
  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.33
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.41
    HALFSTREET FLOOD WIDTH(FEET) =   15.92
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.65
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.10
  STREET FLOW TRAVEL TIME(MIN.) =   4.46   Tc(MIN.) =   13.89
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.705
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        2.40      0.30     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    5.52
  EFFECTIVE AREA(ACRES) =      3.62    AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =       8.34

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  17.75
  FLOW VELOCITY(FEET/SEC.) =  2.85   DEPTH*VELOCITY(FT*FT/SEC.) =   1.27
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.00 =    1041.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.89
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.705
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.93      0.30     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.93      SUBAREA RUNOFF(CFS) =    2.14
  EFFECTIVE AREA(ACRES) =      4.55   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =      10.48

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   719.50  DOWNSTREAM(FEET) =   718.40
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.74
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.48
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   14.00
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.10 =    1096.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.10 TO NODE     40.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.694
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.19      0.30     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.43
  EFFECTIVE AREA(ACRES) =      4.74   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.7       PEAK FLOW RATE(CFS) =      10.87

****************************************************************************
  FLOW PROCESS FROM NODE     40.10 TO NODE     40.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   718.40  DOWNSTREAM(FEET) =   717.00
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.68
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.87
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   14.09
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.20 =    1151.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     40.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.684
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.22      0.30     0.850    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.45      0.30     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.615
  SUBAREA AREA(ACRES) =    0.67      SUBAREA RUNOFF(CFS) =    1.51
  EFFECTIVE AREA(ACRES) =      5.41   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =      12.33

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     40.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.684
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.34      0.30     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.34      SUBAREA RUNOFF(CFS) =    0.78
  EFFECTIVE AREA(ACRES) =      5.75   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      13.11

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     41.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   717.00  DOWNSTREAM(FEET) =   713.40
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.93
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.11
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   14.27
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.00 =    1266.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.27
  RAINFALL INTENSITY(INCH/HR) =   2.66
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.51
  EFFECTIVE STREAM AREA(ACRES) =       5.75
  TOTAL STREAM AREA(ACRES) =       5.75
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      13.11
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     41.20 TO NODE     41.30 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    728.20  DOWNSTREAM(FEET) =    723.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.184
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.419
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.02      0.30     0.500    56    9.18
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.61      0.20     0.500    75    9.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.88
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      1.88

****************************************************************************
  FLOW PROCESS FROM NODE     41.30 TO NODE     41.40 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  723.30  DOWNSTREAM ELEVATION(FEET) =  718.00
  STREET LENGTH(FEET) =   323.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.98
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =   10.43
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.73
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.86
  STREET FLOW TRAVEL TIME(MIN.) =   1.97   Tc(MIN.) =   11.16
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.063
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.72      0.30     0.400    56
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.11      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.83      SUBAREA RUNOFF(CFS) =    2.20
  EFFECTIVE AREA(ACRES) =      1.46    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       3.88

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.65
  FLOW VELOCITY(FEET/SEC.) =  2.91   DEPTH*VELOCITY(FT*FT/SEC.) =   0.98
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.40 =     653.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.40 TO NODE     41.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.16
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.063
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        1.24      0.30     0.400    56
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.03      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.27      SUBAREA RUNOFF(CFS) =    3.36
  EFFECTIVE AREA(ACRES) =      2.73   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =        2.7        PEAK FLOW RATE(CFS) =       7.25

****************************************************************************
  FLOW PROCESS FROM NODE     41.40 TO NODE     41.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   718.00  DOWNSTREAM(FEET) =   717.00
  FLOW LENGTH(FEET) =    62.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.40
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.25
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   11.29
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.50 =     715.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.50 TO NODE     41.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==========================================================================
  MAINLINE Tc(MIN.) =   11.29
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.041
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.09      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.24
  EFFECTIVE AREA(ACRES) =      2.82   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        2.8       PEAK FLOW RATE(CFS) =       7.44

**************************************************************************
  FLOW PROCESS FROM NODE     41.50 TO NODE     41.51 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   717.00  DOWNSTREAM(FEET) =   715.50
  FLOW LENGTH(FEET) =   154.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.12
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.44
  PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =   11.71
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.51 =     869.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     41.51 TO NODE     41.51 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   11.71
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.979
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.44      0.30     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.44      SUBAREA RUNOFF(CFS) =    3.67
  EFFECTIVE AREA(ACRES) =      4.26   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =        4.3       PEAK FLOW RATE(CFS) =      10.95

**************************************************************************
  FLOW PROCESS FROM NODE     41.51 TO NODE     41.60 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   715.50  DOWNSTREAM(FEET) =   714.90
  FLOW LENGTH(FEET) =    59.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.86
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.95
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   11.86
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.60 =     928.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     41.60 TO NODE     41.60 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   11.86
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.959
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.06      0.30     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.06      SUBAREA RUNOFF(CFS) =    2.68
  EFFECTIVE AREA(ACRES) =      5.32   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        5.3       PEAK FLOW RATE(CFS) =      13.55

**************************************************************************
  FLOW PROCESS FROM NODE     41.60 TO NODE     41.60 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   11.86
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.959
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.47      0.30     0.400    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.47      SUBAREA RUNOFF(CFS) =    1.20
  EFFECTIVE AREA(ACRES) =      5.79   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      14.75

**************************************************************************
  FLOW PROCESS FROM NODE     41.60 TO NODE     41.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.90  DOWNSTREAM(FEET) =   713.40
  FLOW LENGTH(FEET) =   148.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.17
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =      14.75
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   12.20
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.00 =    1076.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.20
  RAINFALL INTENSITY(INCH/HR) =   2.91
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       5.79
  TOTAL STREAM AREA(ACRES) =       5.79
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      14.75

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       13.11   14.27    2.665  0.29( 0.15) 0.51       5.8      38.00
      2       14.75   12.20    2.911  0.29( 0.13) 0.45       5.8      41.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       27.06   12.20    2.911  0.29( 0.14) 0.48      10.7      41.20
      2       26.55   14.27    2.665  0.29( 0.14) 0.48      11.5      38.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      27.06    Tc(MIN.) =    12.20
  EFFECTIVE AREA(ACRES) =      10.71   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       11.5
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.00 =    1266.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.80 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.40  DOWNSTREAM(FEET) =   712.60
  FLOW LENGTH(FEET) =    83.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.25
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.06
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   12.37
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.80 =    1349.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.37
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.889
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.27      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.13      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    0.99
  EFFECTIVE AREA(ACRES) =     11.11   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       11.9       PEAK FLOW RATE(CFS) =      27.50

****************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.37
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.889
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.21      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.01      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.22      SUBAREA RUNOFF(CFS) =    0.54
  EFFECTIVE AREA(ACRES) =     11.33   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       12.2       PEAK FLOW RATE(CFS) =      28.04

****************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.90 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.60  DOWNSTREAM(FEET) =   711.80
  FLOW LENGTH(FEET) =    77.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.56
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.04
```

```
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   12.52
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.90 =    1426.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.52
  RAINFALL INTENSITY(INCH/HR) =   2.87
  AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.48
  EFFECTIVE STREAM AREA(ACRES) =      11.33
  TOTAL STREAM AREA(ACRES) =      12.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      28.04

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    77.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.06      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.26
  TOTAL AREA(ACRES) =      0.06   PEAK FLOW RATE(CFS) =      0.26

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.00
  RAINFALL INTENSITY(INCH/HR) =   4.82
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.06
  TOTAL STREAM AREA(ACRES) =       0.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.26

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  7700.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.06      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.26
  TOTAL AREA(ACRES) =      0.06   PEAK FLOW RATE(CFS) =      0.26

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.00
  RAINFALL INTENSITY(INCH/HR) =   4.82
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.06
  TOTAL STREAM AREA(ACRES) =       0.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.26

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       28.04   12.52    2.869  0.29( 0.14) 0.48      11.3      41.20
      1       27.45   14.58    2.632  0.29( 0.14) 0.48      12.2      38.00
      2        0.26    5.00    4.824  0.20( 0.10) 0.50       0.1      41.90
      3        0.26    5.00    4.824  0.20( 0.10) 0.50       0.1      41.90

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       19.72    5.00    4.824  0.29( 0.14) 0.48       4.6      41.90
      2       19.72    5.00    4.824  0.29( 0.14) 0.48       4.6      41.90
      3       28.34   12.52    2.869  0.29( 0.14) 0.48      11.4      41.20
      4       27.72   14.58    2.632  0.29( 0.14) 0.48      12.3      38.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      28.34    Tc(MIN.) =    12.52
  EFFECTIVE AREA(ACRES) =      11.45   AREA-AVERAGED Fm(INCH/HR) =  0.14
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       12.3
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     41.90 =    7700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     46.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   711.80  DOWNSTREAM(FEET) =   710.50
  FLOW LENGTH(FEET) =   132.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.36
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.34
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   12.78
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     46.00 =    7832.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     46.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.78
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.836
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                B        0.21      0.30     0.100    56
  COMMERCIAL                D        0.29      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    1.27
  EFFECTIVE AREA(ACRES) =    11.95   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       12.8       PEAK FLOW RATE(CFS) =      29.06

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.50  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =    68.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.54
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      29.06
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   12.92
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     34.00 =    7900.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       21.05    5.43    4.604  0.29( 0.13) 0.44       5.1       41.90
      2       21.05    5.43    4.604  0.29( 0.13) 0.44       5.1       41.90
      3       29.06   12.92    2.819  0.29( 0.13) 0.46      11.9       41.20
      4       28.42   14.98    2.592  0.29( 0.13) 0.47      12.8       38.00
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     34.00 =    7900.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      293.36    6.19    4.275  0.27( 0.06) 0.22      72.7       30.20
      2      476.76   18.09    2.330  0.27( 0.06) 0.23     228.2        1.00
      3      465.28   18.98    2.267  0.27( 0.06) 0.23     229.3        8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      298.48    5.43    4.604  0.27( 0.06) 0.24      68.9       41.90
      2      298.48    5.43    4.604  0.27( 0.06) 0.24      68.9       41.90
      3      315.23    6.19    4.275  0.27( 0.06) 0.24      78.5       30.20
      4      426.08   12.92    2.819  0.27( 0.06) 0.24     172.5       41.20
      5      457.26   14.98    2.592  0.27( 0.06) 0.24     200.3       38.00
      6      502.15   18.09    2.330  0.27( 0.06) 0.24     240.9        1.00
      7      489.94   18.98    2.267  0.27( 0.06) 0.24     242.1        8.00
    TOTAL AREA(ACRES) =       242.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      502.15  Tc(MIN.) =   18.090
  EFFECTIVE AREA(ACRES) =    240.94  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      242.1
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================


****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     56.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   703.70
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  43.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  32.71
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =     502.15
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   18.15
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.15
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.325
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.23      0.30      0.100    56
  COMMERCIAL                 D        0.51      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.74      SUBAREA RUNOFF(CFS) =     1.53
  EFFECTIVE AREA(ACRES) =    241.68   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      242.8       PEAK FLOW RATE(CFS) =      502.15
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     32.20 TO NODE     32.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    745.00  DOWNSTREAM(FEET) =    742.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.917
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.719
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.11      0.30      0.100    56    7.92
  COMMERCIAL                 C        0.26      0.25      0.100    69    7.92
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.23
  TOTAL AREA(ACRES) =      0.37   PEAK FLOW RATE(CFS) =      1.23

****************************************************************************
  FLOW PROCESS FROM NODE     32.10 TO NODE     32.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  742.00  DOWNSTREAM ELEVATION(FEET) =  740.00
  STREET LENGTH(FEET) =    96.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.42
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    6.90
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.59
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.66
  STREET FLOW TRAVEL TIME(MIN.) =   0.62   Tc(MIN.) =    8.54
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.564
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.06      0.30      0.100    56
  COMMERCIAL                 C        0.06      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.12      SUBAREA RUNOFF(CFS) =     0.38
  EFFECTIVE AREA(ACRES) =      0.49    AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       1.56

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   7.26
  FLOW VELOCITY(FEET/SEC.) =  2.63   DEPTH*VELOCITY(FT*FT/SEC.) =   0.68
  LONGEST FLOWPATH FROM NODE     32.20 TO NODE     32.00 =     426.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    724.60  DOWNSTREAM(FEET) =    723.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.167
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.916
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  SCHOOL                     B        0.33      0.30      0.600    56   12.17
```

```
  SCHOOL                     C        0.85      0.25     0.600    69   12.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      2.93
  TOTAL AREA(ACRES) =      1.18   PEAK FLOW RATE(CFS) =      2.93

****************************************************************************
  FLOW PROCESS FROM NODE     52.00 TO NODE     53.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  723.00  DOWNSTREAM ELEVATION(FEET) =  719.00
  STREET LENGTH(FEET) =   412.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.51
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.42
    HALFSTREET FLOOD WIDTH(FEET) =   16.02
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.70
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.12
  STREET FLOW TRAVEL TIME(MIN.) =   2.54   Tc(MIN.) =   14.71
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.619
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  SCHOOL                     B        2.48      0.30     0.600    56
  SCHOOL                     C        0.77      0.25     0.600    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    7.15
  EFFECTIVE AREA(ACRES) =      4.43    AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        4.4        PEAK FLOW RATE(CFS) =       9.77

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  2.91   DEPTH*VELOCITY(FT*FT/SEC.) =   1.31
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     53.00 =     742.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     53.00 TO NODE     54.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  719.00  DOWNSTREAM ELEVATION(FEET) =  712.50
  STREET LENGTH(FEET) =   633.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.10
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.45   FLOOD WIDTH(FEET) =   18.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    3.00
    SPLIT DEPTH(FEET) =    0.34   SPLIT FLOOD WIDTH(FEET) =   11.65
    SPLIT FLOW(CFS) =    3.07   SPLIT VELOCITY(FEET/SEC.) =    2.30
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   18.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.00
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.35
  STREET FLOW TRAVEL TIME(MIN.) =   3.52   Tc(MIN.) =   18.23
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.319
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  SCHOOL                     B        2.42      0.30     0.600    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    2.42      SUBAREA RUNOFF(CFS) =    4.66
  EFFECTIVE AREA(ACRES) =      6.85    AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        6.9        PEAK FLOW RATE(CFS) =      13.23

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  3.00   DEPTH*VELOCITY(FT*FT/SEC.) =   1.35
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     54.00 =    1375.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.23
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.319
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.32      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.32      SUBAREA RUNOFF(CFS) =    0.66
```

```
  EFFECTIVE AREA(ACRES) =      7.17   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.58
  TOTAL AREA(ACRES) =        7.2       PEAK FLOW RATE(CFS) =      13.89

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.23
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.319
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  SCHOOL                     B        2.40      0.30     0.600    56
  SCHOOL                     C        0.07      0.25     0.600    69
  SCHOOL                     D        2.82      0.20     0.600    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    5.29      SUBAREA RUNOFF(CFS) =   10.34
  EFFECTIVE AREA(ACRES) =     12.46   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.59
  TOTAL AREA(ACRES) =       12.5       PEAK FLOW RATE(CFS) =      24.23

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.23
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.319
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.78      0.30     0.100    56
  COMMERCIAL                 C        0.03      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.81      SUBAREA RUNOFF(CFS) =    1.67
  EFFECTIVE AREA(ACRES) =     13.27   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =       13.3       PEAK FLOW RATE(CFS) =      25.90

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.50  DOWNSTREAM(FEET) =   712.30
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.85
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.90
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   18.31
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     55.00 =    1409.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.31
  RAINFALL INTENSITY(INCH/HR) =   2.31
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =      13.27
  TOTAL STREAM AREA(ACRES) =      13.27
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      25.90

****************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.10 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    34.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.13      0.30     0.100    56
  COMMERCIAL                 D        0.14      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.17
  TOTAL AREA(ACRES) =      0.27   PEAK FLOW RATE(CFS) =      1.17

****************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.24      0.30     0.100    56
  COMMERCIAL                 D        0.01      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    1.08
  EFFECTIVE AREA(ACRES) =      0.52   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.5       PEAK FLOW RATE(CFS) =       2.24
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.00  DOWNSTREAM(FEET) =   712.30
  FLOW LENGTH(FEET) =   275.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.76
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.24
  PIPE TRAVEL TIME(MIN.) =   1.66    Tc(MIN.) =    6.66
  LONGEST FLOWPATH FROM NODE     55.10 TO NODE     55.00 =     309.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.66
  RAINFALL INTENSITY(INCH/HR) =   4.10
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.52
  TOTAL STREAM AREA(ACRES) =       0.52
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.24

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       25.90   18.31    2.313  0.27( 0.15) 0.56      13.3      51.00
      2        2.24    6.66    4.101  0.27( 0.03) 0.10       0.5      55.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       19.45    6.66    4.101  0.27( 0.14) 0.51       5.3      55.10
      2       27.16   18.31    2.313  0.27( 0.15) 0.54      13.8      51.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      27.16    Tc(MIN.) =    18.31
  EFFECTIVE AREA(ACRES) =      13.79   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.54
  TOTAL AREA(ACRES) =       13.8
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     55.00 =    1409.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     56.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.30  DOWNSTREAM(FEET) =   711.00
  FLOW LENGTH(FEET) =   165.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.79
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.16
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   18.67
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.00 =    1574.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.00 TO NODE     56.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.67
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.289
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.49      0.30      0.100    56
  COMMERCIAL                 D        0.04      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.53      SUBAREA RUNOFF(CFS) =    1.08
  EFFECTIVE AREA(ACRES) =     14.32   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =       14.3       PEAK FLOW RATE(CFS) =      27.67

****************************************************************************
  FLOW PROCESS FROM NODE     56.00 TO NODE     56.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   711.00  DOWNSTREAM(FEET) =   710.10
  FLOW LENGTH(FEET) =   172.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  24.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.54
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.67
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   19.11
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     56.11 TO NODE     56.12 IS CODE =  21
```

```
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    720.80  DOWNSTREAM(FEET) =    717.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.438
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.587
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.91      0.30     0.200    56    8.44
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      2.89
  TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      2.89

******************************************************************************
  FLOW PROCESS FROM NODE     56.12 TO NODE     56.13 IS CODE =  62
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =  717.80  DOWNSTREAM ELEVATION(FEET) =  713.60
  STREET LENGTH(FEET) =   486.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.10
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   14.80
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.45
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.97
  STREET FLOW TRAVEL TIME(MIN.) =   3.30   Tc(MIN.) =   11.74
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.976
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        1.68      0.30     0.200    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    1.68      SUBAREA RUNOFF(CFS) =    4.41
  EFFECTIVE AREA(ACRES) =      2.59    AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        2.6        PEAK FLOW RATE(CFS) =       6.80

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  16.63
  FLOW VELOCITY(FEET/SEC.) =  2.62   DEPTH*VELOCITY(FT*FT/SEC.) =   1.12
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.13 =     816.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   11.74
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.976
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        2.11      0.30     0.200    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    2.11      SUBAREA RUNOFF(CFS) =    5.54
  EFFECTIVE AREA(ACRES) =      4.70   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        4.7        PEAK FLOW RATE(CFS) =      12.33

******************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =   1
------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.74
  RAINFALL INTENSITY(INCH/HR) =   2.98
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =       4.70
  TOTAL STREAM AREA(ACRES) =       4.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.33

******************************************************************************
  FLOW PROCESS FROM NODE     56.14 TO NODE     56.15 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    719.20  DOWNSTREAM(FEET) =    715.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.182
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.650
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
RESIDENTIAL
"11+ DWELLINGS/ACRE"        B        0.84      0.30      0.200    56    8.18
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
SUBAREA RUNOFF(CFS) =      2.71
TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      2.71

****************************************************************************
FLOW PROCESS FROM NODE     56.15 TO NODE     56.13 IS CODE =  62
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) =  715.70  DOWNSTREAM ELEVATION(FEET) =  713.60
STREET LENGTH(FEET) =   200.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.018
OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.51
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.35
  HALFSTREET FLOOD WIDTH(FEET) =   12.26
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.40
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.84
STREET FLOW TRAVEL TIME(MIN.) =   1.39   Tc(MIN.) =    9.57
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.340
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"        B        0.54      0.30      0.200    56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
SUBAREA AREA(ACRES) =     0.54      SUBAREA RUNOFF(CFS) =     1.59
EFFECTIVE AREA(ACRES) =      1.38    AREA-AVERAGED Fm(INCH/HR) =  0.06
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       4.07

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  12.97
FLOW VELOCITY(FEET/SEC.) =  2.51   DEPTH*VELOCITY(FT*FT/SEC.) =   0.91
LONGEST FLOWPATH FROM NODE     56.14 TO NODE     56.13 =     530.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =    9.57
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.340
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"        B        0.70      0.30      0.200    56
RESIDENTIAL
"11+ DWELLINGS/ACRE"        D        0.52      0.20      0.200    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
SUBAREA AREA(ACRES) =    1.22      SUBAREA RUNOFF(CFS) =    3.61
EFFECTIVE AREA(ACRES) =      2.60   AREA-AVERAGED Fm(INCH/HR) =  0.06
AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.20
TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =       7.69

****************************************************************************
FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =    9.57
RAINFALL INTENSITY(INCH/HR) =   3.34
AREA-AVERAGED Fm(INCH/HR) =  0.06
AREA-AVERAGED Fp(INCH/HR) =  0.28
AREA-AVERAGED Ap =  0.20
EFFECTIVE STREAM AREA(ACRES) =       2.60
TOTAL STREAM AREA(ACRES) =       2.60
PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.69

** CONFLUENCE DATA **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1       12.33   11.74    2.976  0.30( 0.06) 0.20       4.7      56.11
    2        7.69    9.57    3.340  0.28( 0.06) 0.20       2.6      56.14

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1       19.00    9.57    3.340  0.29( 0.06) 0.20       6.4      56.14
    2       19.17   11.74    2.976  0.29( 0.06) 0.20       7.3      56.11

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      19.17    Tc(MIN.) =    11.74
EFFECTIVE AREA(ACRES) =       7.30   AREA-AVERAGED Fm(INCH/HR) =  0.06
AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
TOTAL AREA(ACRES) =        7.3
LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.13 =     816.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.16 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.60  DOWNSTREAM(FEET) =   712.50
  FLOW LENGTH(FEET) =    94.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.25
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.17
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   11.93
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.16 =     910.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.16 TO NODE     56.16 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.93
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.949
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.46      0.30     0.200    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     0.46      SUBAREA RUNOFF(CFS) =     1.20
  EFFECTIVE AREA(ACRES) =      7.76   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =      20.19

****************************************************************************
  FLOW PROCESS FROM NODE     56.16 TO NODE     56.16 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.93
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.949
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.05      0.30     0.200    56
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        0.41      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     0.46      SUBAREA RUNOFF(CFS) =     1.20
  EFFECTIVE AREA(ACRES) =      8.22   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        8.2       PEAK FLOW RATE(CFS) =      21.39

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       21.48    9.76    3.303  0.29( 0.06) 0.20       7.4       56.14
      2       21.39   11.93    2.949  0.29( 0.06) 0.20       8.2       56.11
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      21.48  Tc(MIN.) =    9.76
  AREA-AVERAGED Fm(INCH/HR) =  0.06  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.20  EFFECTIVE AREA(ACRES) =       7.35

****************************************************************************
  FLOW PROCESS FROM NODE     56.16 TO NODE     56.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.50  DOWNSTREAM(FEET) =   710.10
  FLOW LENGTH(FEET) =    38.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.93
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.48
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    9.80
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.10 =     948.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       21.48    9.80    3.296  0.29( 0.06) 0.20       7.4       56.14
      2       21.39   11.97    2.943  0.29( 0.06) 0.20       8.2       56.11
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.10 =     948.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       20.33    7.51    3.831  0.27( 0.13) 0.48       5.9       55.10
      2       27.67   19.11    2.259  0.27( 0.14) 0.52      14.3       51.00
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       39.52    7.51    3.831  0.28( 0.09) 0.34      11.5       55.10
      2       43.26    9.80    3.296  0.28( 0.09) 0.34      14.9       56.14
      3       44.54   11.97    2.943  0.28( 0.10) 0.35      17.3       56.11
      4       43.98   19.11    2.259  0.27( 0.11) 0.41      22.5       51.00
    TOTAL AREA(ACRES) =        22.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       44.54  Tc(MIN.) =   11.968
```

```
  EFFECTIVE AREA(ACRES) =     17.34  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.34
  TOTAL AREA(ACRES) =       22.5
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     56.10 TO NODE     56.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.10  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.30
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      44.54
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   12.06
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.20 =    1790.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.20 TO NODE     56.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.06
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.931
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.39      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.39      SUBAREA RUNOFF(CFS) =     1.02
  EFFECTIVE AREA(ACRES) =     17.73   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =       22.9       PEAK FLOW RATE(CFS) =      45.24

****************************************************************************
  FLOW PROCESS FROM NODE     56.20 TO NODE     56.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   703.70
  FLOW LENGTH(FEET) =   290.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.78
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      45.24
  PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =   12.43
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.30 =    2080.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1       39.77    8.00    3.696  0.27( 0.09) 0.33       11.9       55.10
      2       43.82   10.27    3.210  0.27( 0.09) 0.34       15.3       56.14
      3       45.24   12.43    2.880  0.27( 0.10) 0.35       17.7       56.11
      4       44.23   19.57    2.228  0.27( 0.11) 0.40       22.9       51.00
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.30 =    2080.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1      298.48    5.50    4.572  0.27( 0.06) 0.24       69.7       41.90
      2      298.48    5.50    4.572  0.27( 0.06) 0.24       69.7       41.90
      3      315.23    6.25    4.250  0.27( 0.06) 0.24       79.3       30.20
      4      428.30   12.98    2.811  0.27( 0.06) 0.24      173.3       41.20
      5      457.26   15.04    2.586  0.27( 0.06) 0.24      201.1       38.00
      6      502.15   18.15    2.325  0.27( 0.06) 0.24      241.7        1.00
      7      489.94   19.04    2.263  0.27( 0.06) 0.24      242.8        8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1      332.44    5.50    4.572  0.27( 0.07) 0.25       77.8       41.90
      2      332.44    5.50    4.572  0.27( 0.07) 0.25       77.8       41.90
      3      351.08    6.25    4.250  0.27( 0.07) 0.25       88.6       30.20
      4      384.40    8.00    3.696  0.27( 0.07) 0.25      115.6       55.10
      5      426.58   10.27    3.210  0.27( 0.07) 0.25      150.7       56.14
      6      464.41   12.43    2.880  0.27( 0.07) 0.25      183.4       56.11
      7      473.46   12.98    2.811  0.27( 0.07) 0.25      191.4       41.20
      8      502.14   15.04    2.586  0.27( 0.07) 0.25      220.7       38.00
      9      546.58   18.15    2.325  0.27( 0.07) 0.25      263.6        1.00
     10      534.24   19.04    2.263  0.27( 0.07) 0.25      265.4        8.00
     11      526.36   19.57    2.228  0.27( 0.07) 0.25      265.7       51.00
    TOTAL AREA(ACRES) =       265.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      546.58  Tc(MIN.) =   18.148
  EFFECTIVE AREA(ACRES) =    263.57  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =      265.7
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  12
----------------------------------------------------------------------------
```

```
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     35.10 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   703.70  DOWNSTREAM(FEET) =   703.00
  FLOW LENGTH(FEET) =    74.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  84.0 INCH PIPE IS  63.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.39
  ESTIMATED PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     546.58
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   18.22
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  10
--------------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    729.10  DOWNSTREAM(FEET) =    723.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.849
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.492
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.39      0.30     0.500    56    8.85
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.52      0.20     0.500    75    8.85
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.76
  TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      2.76

********************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     44.00 IS CODE =  62
--------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  723.20  DOWNSTREAM ELEVATION(FEET) =  714.50
  STREET LENGTH(FEET) =   493.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.66
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =   10.74
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.90
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.93
  STREET FLOW TRAVEL TIME(MIN.) =   2.84   Tc(MIN.) =   11.69
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.983
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        2.25      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.79      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.04      SUBAREA RUNOFF(CFS) =    7.79
  EFFECTIVE AREA(ACRES) =      3.95    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.9        PEAK FLOW RATE(CFS) =      10.13

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  12.77
  FLOW VELOCITY(FEET/SEC.) =  3.21   DEPTH*VELOCITY(FT*FT/SEC.) =   1.15
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     44.00 =     823.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     44.00 TO NODE     45.20 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.50  DOWNSTREAM(FEET) =   713.50
  FLOW LENGTH(FEET) =    33.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.20
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.13
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   11.74
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.20 =     856.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     45.20 TO NODE     45.20 IS CODE =   1
```

```
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.74
  RAINFALL INTENSITY(INCH/HR) =   2.98
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       3.95
  TOTAL STREAM AREA(ACRES) =       3.95
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.13

************************************************************************
  FLOW PROCESS FROM NODE     45.00 TO NODE     45.10 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    721.00  DOWNSTREAM(FEET) =    717.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.195
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.417
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.58      0.30     0.400    56    9.20
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.06      0.20     0.400    75    9.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      1.90
  TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      1.90

************************************************************************
  FLOW PROCESS FROM NODE     45.10 TO NODE     45.20 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) =  717.00  DOWNSTREAM ELEVATION(FEET) =  714.00
  STREET LENGTH(FEET) =   318.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.96
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.34
  HALFSTREET FLOOD WIDTH(FEET) =   11.65
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.22
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.75
STREET FLOW TRAVEL TIME(MIN.) =   2.38   Tc(MIN.) =   11.58
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.999
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"8-10 DWELLINGS/ACRE"      B        0.82      0.30     0.400    56
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
SUBAREA AREA(ACRES) =    0.82      SUBAREA RUNOFF(CFS) =    2.12
EFFECTIVE AREA(ACRES) =      1.46    AREA-AVERAGED Fm(INCH/HR) =  0.12
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.40
TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       3.79

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  12.87
FLOW VELOCITY(FEET/SEC.) =  2.37   DEPTH*VELOCITY(FT*FT/SEC.) =   0.85
LONGEST FLOWPATH FROM NODE     45.00 TO NODE     45.20 =     648.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     45.20 TO NODE     45.20 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.58
  RAINFALL INTENSITY(INCH/HR) =   3.00
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.40
  EFFECTIVE STREAM AREA(ACRES) =       1.46
  TOTAL STREAM AREA(ACRES) =       1.46
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.79

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       10.13   11.74    2.976  0.27( 0.13) 0.50       3.9      42.00
      2        3.79   11.58    2.999  0.30( 0.12) 0.40       1.5      45.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       13.86   11.58    2.999  0.27( 0.13) 0.47       5.4      45.00
```

```
     2       13.89   11.74    2.976  0.27( 0.13) 0.47       5.4      42.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      13.89    Tc(MIN.) =    11.74
  EFFECTIVE AREA(ACRES) =       5.41   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =        5.4
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.20 =     856.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     45.20 TO NODE     45.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.50  DOWNSTREAM(FEET) =   711.90
  FLOW LENGTH(FEET) =   157.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.15
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.89
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   12.11
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.30 =    1013.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     45.30 TO NODE     45.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.11
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.924
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.66      0.30      0.400    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =     0.66      SUBAREA RUNOFF(CFS) =     1.67
  EFFECTIVE AREA(ACRES) =      6.07   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =        6.1       PEAK FLOW RATE(CFS) =      15.28

****************************************************************************
  FLOW PROCESS FROM NODE     45.30 TO NODE     45.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.11
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.924
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 B        1.89      0.30      0.850    56
  COMMERCIAL                  D        0.04      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.834
  SUBAREA AREA(ACRES) =     1.93      SUBAREA RUNOFF(CFS) =     4.65
  EFFECTIVE AREA(ACRES) =      8.00   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =        8.0       PEAK FLOW RATE(CFS) =      19.92

  ** PEAK FLOW RATE TABLE **
   STREAM       Q       Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       19.94   11.94    2.947  0.28( 0.16) 0.55       7.9       45.00
      2       19.92   12.11    2.924  0.28( 0.16) 0.55       8.0       42.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      19.94  Tc(MIN.) =   11.94
  AREA-AVERAGED Fm(INCH/HR) =  0.16  AREA-AVERAGED Fp(INCH/HR) =  0.28
  AREA-AVERAGED Ap =  0.55  EFFECTIVE AREA(ACRES) =       7.95

****************************************************************************
  FLOW PROCESS FROM NODE     45.30 TO NODE     47.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   711.90  DOWNSTREAM(FEET) =   710.80
  FLOW LENGTH(FEET) =   106.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.89
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.94
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   12.17
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     47.20 =    1119.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.20 TO NODE     47.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.17
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.916
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.13      0.30      0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.13      SUBAREA RUNOFF(CFS) =     0.34
  EFFECTIVE AREA(ACRES) =      8.08   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =        8.1       PEAK FLOW RATE(CFS) =      20.06

****************************************************************************
  FLOW PROCESS FROM NODE     47.20 TO NODE     35.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.80  DOWNSTREAM(FEET) =   703.90
```

```
  FLOW LENGTH(FEET) =   695.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.74
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.06
  PIPE TRAVEL TIME(MIN.) =   1.50    Tc(MIN.) =   13.67
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     35.20 =    1814.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.20 TO NODE     35.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.67
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.730
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK               B        1.02      0.30     0.850    56
  PUBLIC PARK               C        0.05      0.25     0.850    69
  PUBLIC PARK               D        2.20      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    3.27      SUBAREA RUNOFF(CFS) =    7.46
  EFFECTIVE AREA(ACRES) =     11.35   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.63
  TOTAL AREA(ACRES) =       11.4       PEAK FLOW RATE(CFS) =      26.17

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       26.17   13.67    2.730  0.26( 0.17) 0.63      11.3      45.00
      2       26.11   13.83    2.712  0.26( 0.17) 0.63      11.4      42.00
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     35.10 =    1814.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      332.44    5.58    4.534  0.27( 0.07) 0.25      77.8      41.90
      2      332.44    5.58    4.534  0.27( 0.07) 0.25      77.8      41.90
      3      351.08    6.33    4.219  0.27( 0.07) 0.25      88.6      30.20
      4      384.40    8.08    3.676  0.27( 0.07) 0.25     115.6      55.10
      5      426.58   10.35    3.196  0.27( 0.07) 0.25     150.7      56.14
      6      464.41   12.51    2.871  0.27( 0.07) 0.25     183.4      56.11
      7      473.46   13.05    2.802  0.27( 0.07) 0.25     191.4      41.20
      8      502.14   15.11    2.579  0.27( 0.07) 0.25     220.7      38.00
      9      546.58   18.22    2.320  0.27( 0.07) 0.25     263.6       1.00
     10      534.24   19.11    2.258  0.27( 0.07) 0.25     265.4       8.00
     11      526.36   19.65    2.223  0.27( 0.07) 0.25     265.7      51.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      350.64    5.58    4.534  0.27( 0.07) 0.27      82.5      41.90
      2      350.64    5.58    4.534  0.27( 0.07) 0.27      82.5      41.90
      3      370.26    6.33    4.219  0.27( 0.07) 0.27      93.8      30.20
      4      405.59    8.08    3.676  0.27( 0.07) 0.27     122.3      55.10
      5      449.99   10.35    3.196  0.27( 0.07) 0.27     159.3      56.14
      6      489.67   12.51    2.871  0.27( 0.07) 0.27     193.8      56.11
      7      499.16   13.05    2.802  0.27( 0.07) 0.27     202.2      41.20
      8      508.17   13.67    2.730  0.27( 0.07) 0.27     211.5      45.00
      9      510.34   13.83    2.712  0.27( 0.07) 0.27     213.8      42.00
     10      526.88   15.11    2.579  0.27( 0.07) 0.27     232.1      38.00
     11      568.67   18.22    2.320  0.27( 0.07) 0.27     275.0       1.00
     12      555.69   19.11    2.258  0.27( 0.07) 0.27     276.8       8.00
     13      547.45   19.65    2.223  0.27( 0.07) 0.27     277.1      51.00
    TOTAL AREA(ACRES) =       277.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      568.67  Tc(MIN.) =   18.219
  EFFECTIVE AREA(ACRES) =    274.97  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      277.1
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =   695.70
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 102.0 INCH PIPE IS  74.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.80
  ESTIMATED PIPE DIAMETER(INCH) = 102.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     568.67
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   18.32
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     36.00 =   10453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.32
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.313
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL               C        0.16      0.25      0.100    69
  COMMERCIAL               D        0.29      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.45      SUBAREA RUNOFF(CFS) =    0.93
  EFFECTIVE AREA(ACRES) =    275.42   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      277.6       PEAK FLOW RATE(CFS) =     568.67
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     37.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.70  DOWNSTREAM(FEET) =   695.40
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 102.0 INCH PIPE IS  74.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.80
  ESTIMATED PIPE DIAMETER(INCH) = 102.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     568.67
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   18.41
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.00 =   10528.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.00 TO NODE     37.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.40  DOWNSTREAM(FEET) =   694.00
  FLOW LENGTH(FEET) =   355.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 102.0 INCH PIPE IS  75.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.72
  ESTIMATED PIPE DIAMETER(INCH) = 102.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     568.67
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   18.88
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.10 =   10883.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.88
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.274
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL               C        0.68      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.68      SUBAREA RUNOFF(CFS) =    1.38
  EFFECTIVE AREA(ACRES) =    276.10   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      278.3       PEAK FLOW RATE(CFS) =     568.67
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.88
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.274
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL               C        0.46      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.46      SUBAREA RUNOFF(CFS) =    0.93
  EFFECTIVE AREA(ACRES) =    276.56   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      278.7       PEAK FLOW RATE(CFS) =     568.67
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.00  DOWNSTREAM(FEET) =   693.80
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  93.0 INCH PIPE IS  71.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.69
  ESTIMATED PIPE DIAMETER(INCH) =  93.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     568.67
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   18.92
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     37.60 TO NODE     37.70 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    718.50  DOWNSTREAM(FEET) =    714.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.517
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.351
```

```
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        0.13      0.30     0.500    56    9.52
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        D        0.51      0.20     0.500    75    9.52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA RUNOFF(CFS) =      1.87
 TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      1.87

****************************************************************************
 FLOW PROCESS FROM NODE     37.70 TO NODE     37.80 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  714.40  DOWNSTREAM ELEVATION(FEET) =  710.60
 STREET LENGTH(FEET) =   349.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.65
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.32
   HALFSTREET FLOOD WIDTH(FEET) =   10.84
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.27
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.73
 STREET FLOW TRAVEL TIME(MIN.) =   2.56   Tc(MIN.) =   12.08
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.928
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C        0.15      0.25     0.500    69
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        D        0.47      0.20     0.500    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.62      SUBAREA RUNOFF(CFS) =    1.57
 EFFECTIVE AREA(ACRES) =      1.26    AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =       3.20

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.65
 FLOW VELOCITY(FEET/SEC.) =  2.40   DEPTH*VELOCITY(FT*FT/SEC.) =   0.81
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.80 =     679.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.80 TO NODE     37.90 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   710.60  DOWNSTREAM(FEET) =   709.80
 FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.57
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.20
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   12.26
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.90 =     739.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.90 TO NODE     37.90 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.26
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.904
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C        0.21      0.25     0.500    69
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        D        0.93      0.20     0.500    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    1.14      SUBAREA RUNOFF(CFS) =    2.87
 EFFECTIVE AREA(ACRES) =      2.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        2.4       PEAK FLOW RATE(CFS) =       6.04

****************************************************************************
 FLOW PROCESS FROM NODE     37.90 TO NODE     37.50 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   708.00
 FLOW LENGTH(FEET) =   221.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.46
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.04
 PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   12.93
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.50 =     960.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.50 TO NODE     37.50 IS CODE =   1
```

```
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.93
  RAINFALL INTENSITY(INCH/HR) =   2.82
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       2.40
  TOTAL STREAM AREA(ACRES) =       2.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.04

****************************************************************************
  FLOW PROCESS FROM NODE     37.30 TO NODE     37.40 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    713.10  DOWNSTREAM(FEET) =    709.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.880
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.281
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.70      0.25      0.500    69    9.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.99
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      1.99

****************************************************************************
  FLOW PROCESS FROM NODE     37.40 TO NODE     37.50 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  709.70  DOWNSTREAM ELEVATION(FEET) =  708.10
  STREET LENGTH(FEET) =   124.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.43
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =   10.03
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.39
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.74
  STREET FLOW TRAVEL TIME(MIN.) =   0.86   Tc(MIN.) =   10.74
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.129
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.33      0.25      0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.33      SUBAREA RUNOFF(CFS) =    0.89
  EFFECTIVE AREA(ACRES) =      1.03    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.0        PEAK FLOW RATE(CFS) =       2.78

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =  10.64
  FLOW VELOCITY(FEET/SEC.) =  2.46   DEPTH*VELOCITY(FT*FT/SEC.) =   0.79
  LONGEST FLOWPATH FROM NODE     37.30 TO NODE     37.50 =     454.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.50 TO NODE     37.50 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.74
  RAINFALL INTENSITY(INCH/HR) =   3.13
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       1.03
  TOTAL STREAM AREA(ACRES) =       1.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.78

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        6.04   12.93    2.817  0.21( 0.11) 0.50       2.4      37.60
      2        2.78   10.74    3.129  0.25( 0.12) 0.50       1.0      37.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        8.38   10.74    3.129  0.23( 0.11) 0.50       3.0      37.30
      2        8.54   12.93    2.817  0.22( 0.11) 0.50       3.4      37.60
```

```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       8.54    Tc(MIN.) =    12.93
 EFFECTIVE AREA(ACRES) =       3.43   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        3.4
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.50 =     960.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.50 TO NODE     37.20 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   708.00  DOWNSTREAM(FEET) =   693.80
 FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.11
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.54
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   13.06
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.20 =    1080.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        8.38   10.87    3.108  0.23( 0.11) 0.50       3.0      37.30
     2        8.54   13.06    2.802  0.22( 0.11) 0.50       3.4      37.60
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.20 =    1080.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      350.64    6.37    4.206  0.27( 0.07) 0.27      84.1      41.90
     2      350.64    6.37    4.206  0.27( 0.07) 0.27      84.1      41.90
     3      370.26    7.12    3.948  0.27( 0.07) 0.27      95.4      30.20
     4      405.59    8.85    3.491  0.27( 0.07) 0.27     123.9      55.10
     5      449.99   11.10    3.072  0.27( 0.07) 0.27     160.9      56.14
     6      489.67   13.25    2.779  0.27( 0.07) 0.27     195.4      56.11
     7      499.16   13.79    2.717  0.27( 0.07) 0.27     203.8      41.20
     8      508.17   14.39    2.652  0.27( 0.07) 0.27     213.1      45.00
     9      510.34   14.55    2.635  0.27( 0.07) 0.27     215.4      42.00
    10      526.88   15.83    2.512  0.27( 0.07) 0.27     233.7      38.00
    11      568.67   18.92    2.271  0.27( 0.07) 0.27     276.6       1.00
    12      555.69   19.82    2.212  0.27( 0.07) 0.27     278.3       8.00
    13      547.45   20.35    2.179  0.27( 0.07) 0.27     278.7      51.00
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      357.35    6.37    4.206  0.27( 0.07) 0.27      85.8      41.90
     2      357.35    6.37    4.206  0.27( 0.07) 0.27      85.8      41.90
     3      377.29    7.12    3.948  0.27( 0.07) 0.27      97.4      30.20
     4      413.28    8.85    3.491  0.27( 0.07) 0.27     126.4      55.10
     5      453.84   10.87    3.108  0.27( 0.07) 0.27     160.1      37.30
     6      458.38   11.10    3.072  0.27( 0.07) 0.27     163.9      56.14
     7      494.76   13.06    2.802  0.27( 0.07) 0.27     195.8      37.60
     8      498.14   13.25    2.779  0.27( 0.07) 0.27     198.8      56.11
     9      507.42   13.79    2.717  0.27( 0.07) 0.27     207.2      41.20
    10      516.23   14.39    2.652  0.27( 0.07) 0.27     216.5      45.00
    11      518.35   14.55    2.635  0.27( 0.07) 0.27     218.8      42.00
    12      534.50   15.83    2.512  0.27( 0.07) 0.27     237.1      38.00
    13      575.52   18.92    2.271  0.27( 0.07) 0.27     280.0       1.00
    14      562.36   19.82    2.212  0.27( 0.07) 0.27     281.8       8.00
    15      554.01   20.35    2.179  0.27( 0.07) 0.27     282.2      51.00
  TOTAL AREA(ACRES) =       282.2

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      575.52  Tc(MIN.) =   18.918
 EFFECTIVE AREA(ACRES) =    279.99  AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
 TOTAL AREA(ACRES) =      282.2
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     37.20 TO NODE     47.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   693.80  DOWNSTREAM(FEET) =   691.30
 FLOW LENGTH(FEET) =   487.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  96.0 INCH PIPE IS  73.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.01
 ESTIMATED PIPE DIAMETER(INCH) =  96.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     575.52
 PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =   19.50
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     47.31 TO NODE     47.32 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    718.50  DOWNSTREAM(FEET) =    712.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.679
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.530
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.63      0.30     0.500    56    8.68
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.92
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      1.92

********************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.32 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.68
  RAINFALL INTENSITY(INCH/HR) =   3.53
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.63
  TOTAL STREAM AREA(ACRES) =       0.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.92

********************************************************************************
  FLOW PROCESS FROM NODE     47.33 TO NODE     47.32 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   282.00
  ELEVATION DATA: UPSTREAM(FEET) =    715.00  DOWNSTREAM(FEET) =    712.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.219
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.412
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.86      0.30     0.500    56    9.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.52
  TOTAL AREA(ACRES) =      0.86   PEAK FLOW RATE(CFS) =      2.52

********************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.32 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.22
  RAINFALL INTENSITY(INCH/HR) =   3.41
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.86
  TOTAL STREAM AREA(ACRES) =       0.86
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.52

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        1.92    8.68    3.530  0.30( 0.15) 0.50       0.6      47.31
      2        2.52    9.22    3.412  0.30( 0.15) 0.50       0.9      47.33

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        4.38    8.68    3.530  0.30( 0.15) 0.50       1.4      47.31
      2        4.37    9.22    3.412  0.30( 0.15) 0.50       1.5      47.33

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       4.38    Tc(MIN.) =     8.68
  EFFECTIVE AREA(ACRES) =       1.44   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.5
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.32 =     330.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.34 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.00  DOWNSTREAM(FEET) =   698.50
  FLOW LENGTH(FEET) =   102.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.17
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.38
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =    9.09
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.34 =     432.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     47.34 TO NODE     47.34 IS CODE =  81
```

```
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =    9.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.440
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.38      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.06      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.44      SUBAREA RUNOFF(CFS) =    1.31
  EFFECTIVE AREA(ACRES) =      1.88   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.9       PEAK FLOW RATE(CFS) =       5.57

************************************************************************
  FLOW PROCESS FROM NODE     47.34 TO NODE     47.35 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   698.50  DOWNSTREAM(FEET) =   697.50
  FLOW LENGTH(FEET) =   194.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.47
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.57
  PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =    9.81
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.35 =     626.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.81
  RAINFALL INTENSITY(INCH/HR) =   3.29
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       1.88
  TOTAL STREAM AREA(ACRES) =       1.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.57

************************************************************************
  FLOW PROCESS FROM NODE     47.36 TO NODE     47.35 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   275.00
  ELEVATION DATA: UPSTREAM(FEET) =    713.50  DOWNSTREAM(FEET) =    711.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.418
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.371
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.72      0.30     0.500    56    9.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =       2.09
  TOTAL AREA(ACRES) =       0.72   PEAK FLOW RATE(CFS) =       2.09

************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =    9.42
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.371
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.66      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.12      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.78      SUBAREA RUNOFF(CFS) =    2.27
  EFFECTIVE AREA(ACRES) =      1.50   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.5       PEAK FLOW RATE(CFS) =       4.35

************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.42
  RAINFALL INTENSITY(INCH/HR) =   3.37
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       1.50
  TOTAL STREAM AREA(ACRES) =       1.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.35

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
```

```
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1        5.57    9.81    3.294  0.30( 0.15) 0.50       1.9      47.31
    1        5.53   10.35    3.196  0.30( 0.15) 0.50       1.9      47.33
    2        4.35    9.42    3.371  0.29( 0.15) 0.50       1.5      47.36

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1        9.83    9.42    3.371  0.29( 0.15) 0.50       3.3      47.36
    2        9.82    9.81    3.294  0.29( 0.15) 0.50       3.4      47.31
    3        9.64   10.35    3.196  0.29( 0.15) 0.50       3.4      47.33

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       9.83    Tc(MIN.) =     9.42
 EFFECTIVE AREA(ACRES) =       3.30   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        3.4
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.35 =     626.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.35 TO NODE     47.37 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   697.60  DOWNSTREAM(FEET) =   696.00
 FLOW LENGTH(FEET) =   293.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.21
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       9.83
 PIPE TRAVEL TIME(MIN.) =   0.94    Tc(MIN.) =   10.35
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.37 =     919.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.37 TO NODE     47.37 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.35
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.195
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.67      0.30     0.500    56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.12      0.20     0.500    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.79      SUBAREA RUNOFF(CFS) =    2.17
 EFFECTIVE AREA(ACRES) =      4.09   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        4.2       PEAK FLOW RATE(CFS) =      11.23

****************************************************************************
 FLOW PROCESS FROM NODE     47.37 TO NODE     47.37 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.35
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.195
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.09      0.30     0.500    56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.60      0.20     0.500    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.69      SUBAREA RUNOFF(CFS) =    1.92
 EFFECTIVE AREA(ACRES) =      4.78   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        4.9       PEAK FLOW RATE(CFS) =      13.15

****************************************************************************
 FLOW PROCESS FROM NODE     47.37 TO NODE     47.30 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =   695.20
 FLOW LENGTH(FEET) =   158.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.47
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      13.15
 PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =   10.84
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.30 =    1077.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.30 TO NODE     47.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.84
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.114
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.28      0.20     0.500    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    0.76
 EFFECTIVE AREA(ACRES) =      5.06   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        5.2       PEAK FLOW RATE(CFS) =      13.56
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     47.30 TO NODE     47.40 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.20  DOWNSTREAM(FEET) =   694.60
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.36
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.56
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =   11.22
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.40 =    1202.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.40 TO NODE     47.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.22
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.052
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.19      0.20      0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.50
  EFFECTIVE AREA(ACRES) =      5.25   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =      13.79

****************************************************************************
  FLOW PROCESS FROM NODE     47.40 TO NODE     47.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.60  DOWNSTREAM(FEET) =   694.40
  FLOW LENGTH(FEET) =    41.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.41
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.79
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   11.35
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.50 =    1243.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.50 TO NODE     47.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.35
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.033
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.05      0.30      0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        1.45      0.20      0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.50      SUBAREA RUNOFF(CFS) =    3.96
  EFFECTIVE AREA(ACRES) =      6.75   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        6.9       PEAK FLOW RATE(CFS) =      17.65

****************************************************************************
  FLOW PROCESS FROM NODE     47.50 TO NODE     47.60 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.40  DOWNSTREAM(FEET) =   693.50
  FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.86
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.65
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   11.86
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.60 =    1423.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.60 TO NODE     47.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.86
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.958
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        1.55      0.20      0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.55      SUBAREA RUNOFF(CFS) =    3.99
  EFFECTIVE AREA(ACRES) =      8.30   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        8.4       PEAK FLOW RATE(CFS) =      21.18

****************************************************************************
  FLOW PROCESS FROM NODE     47.60 TO NODE     47.70 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.50  DOWNSTREAM(FEET) =   693.30
```

```
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.18
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.18
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   11.97
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.70 =    1463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.70 TO NODE     47.70 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.97
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.943
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.04      0.25     0.500    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.57      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.61      SUBAREA RUNOFF(CFS) =    4.12
  EFFECTIVE AREA(ACRES) =      9.91   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       10.0       PEAK FLOW RATE(CFS) =      25.19

****************************************************************************
  FLOW PROCESS FROM NODE     47.70 TO NODE     47.80 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.30  DOWNSTREAM(FEET) =   692.50
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.19
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.19
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   12.43
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.80 =    1633.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.80 TO NODE     47.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.43
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.881
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.60      0.25     0.500    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.94      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.54      SUBAREA RUNOFF(CFS) =    3.84
  EFFECTIVE AREA(ACRES) =     11.45   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       11.6       PEAK FLOW RATE(CFS) =      28.48

****************************************************************************
  FLOW PROCESS FROM NODE     47.80 TO NODE     47.90 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.50  DOWNSTREAM(FEET) =   692.30
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.32
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.48
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   12.50
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.90 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.90 TO NODE     47.90 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.872
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        1.43      0.25     0.500    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.14      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.57      SUBAREA RUNOFF(CFS) =    3.88
  EFFECTIVE AREA(ACRES) =     13.02   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =      32.27

****************************************************************************
  FLOW PROCESS FROM NODE     47.90 TO NODE     47.91 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.30  DOWNSTREAM(FEET) =   692.10
  FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  25.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.48
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =      32.27
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   12.61
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.91 =    1707.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.91 TO NODE     47.91 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.61
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.858
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        1.89      0.25     0.500    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        1.30      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     3.19      SUBAREA RUNOFF(CFS) =     7.87
  EFFECTIVE AREA(ACRES) =     16.21   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      39.98

****************************************************************************
  FLOW PROCESS FROM NODE     47.91 TO NODE     47.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.10  DOWNSTREAM(FEET) =   691.30
  FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.02
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      39.98
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   13.01
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.00 =    1874.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       39.98   13.01    2.808  0.24( 0.12) 0.50      16.2      47.36
      2       39.44   13.40    2.761  0.24( 0.12) 0.50      16.3      47.31
      3       38.59   13.95    2.698  0.24( 0.12) 0.50      16.3      47.33
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.00 =    1874.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      357.35    7.02    3.981  0.27( 0.07) 0.27      85.8      41.90
      2      357.35    7.02    3.981  0.27( 0.07) 0.27      85.8      41.90
      3      377.29    7.77    3.759  0.27( 0.07) 0.27      97.4      30.20
      4      413.28    9.48    3.358  0.27( 0.07) 0.27     126.4      55.10
      5      453.84   11.49    3.012  0.27( 0.07) 0.27     160.1      37.30
      6      458.38   11.72    2.979  0.27( 0.07) 0.27     163.9      56.14
      7      494.76   13.66    2.731  0.27( 0.07) 0.27     195.8      37.60
      8      498.14   13.85    2.710  0.27( 0.07) 0.27     198.8      56.11
      9      507.42   14.39    2.652  0.27( 0.07) 0.27     207.2      41.20
     10      516.23   14.99    2.591  0.27( 0.07) 0.27     216.5      45.00
     11      518.35   15.15    2.575  0.27( 0.07) 0.27     218.8      42.00
     12      534.50   16.43    2.460  0.27( 0.07) 0.27     237.1      38.00
     13      575.52   19.50    2.233  0.27( 0.07) 0.27     280.0       1.00
     14      562.36   20.41    2.176  0.27( 0.07) 0.27     281.8       8.00
     15      554.01   20.94    2.144  0.27( 0.07) 0.27     282.2      51.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      388.33    7.02    3.981  0.26( 0.08) 0.29      94.6      41.90
      2      388.33    7.02    3.981  0.26( 0.08) 0.29      94.6      41.90
      3      409.61    7.77    3.759  0.26( 0.08) 0.29     107.1      30.20
      4      448.39    9.48    3.358  0.26( 0.08) 0.29     138.2      55.10
      5      491.83   11.49    3.012  0.26( 0.08) 0.29     174.4      37.30
      6      496.68   11.72    2.979  0.26( 0.08) 0.29     178.5      56.14
      7      522.47   13.01    2.808  0.26( 0.08) 0.29     201.3      47.36
      8      529.30   13.40    2.761  0.26( 0.08) 0.29     207.8      47.31
      9      533.79   13.66    2.731  0.26( 0.08) 0.29     212.1      37.60
     10      536.89   13.85    2.710  0.26( 0.08) 0.29     215.1      56.11
     11      538.54   13.95    2.698  0.26( 0.08) 0.29     216.8      47.33
     12      545.32   14.39    2.652  0.26( 0.08) 0.29     223.6      41.20
     13      553.22   14.99    2.591  0.26( 0.08) 0.29     232.8      45.00
     14      555.11   15.15    2.575  0.26( 0.08) 0.29     235.2      42.00
     15      569.53   16.43    2.460  0.26( 0.08) 0.29     253.5      38.00
     16      607.15   19.50    2.233  0.26( 0.07) 0.28     296.3       1.00
     17      593.14   20.41    2.176  0.26( 0.07) 0.28     298.1       8.00
     18      584.32   20.94    2.144  0.26( 0.07) 0.28     298.5      51.00
    TOTAL AREA(ACRES) =       298.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      607.15  Tc(MIN.) =   19.498
  EFFECTIVE AREA(ACRES) =    296.33  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =      298.5
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     48.00 IS CODE =  31
```

```
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   691.30  DOWNSTREAM(FEET) =   691.10
  FLOW LENGTH(FEET) =    61.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 108.0 INCH PIPE IS  79.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.06
  ESTIMATED PIPE DIAMETER(INCH) = 108.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     607.15
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   19.58
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     48.60 TO NODE     48.61 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    712.40  DOWNSTREAM(FEET) =    707.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.660
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.535
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.05      0.30     0.400    56    8.66
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        0.02      0.25     0.400    69    8.66
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.69      0.20     0.400    75    8.66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      2.36
  TOTAL AREA(ACRES) =      0.76   PEAK FLOW RATE(CFS) =      2.36

****************************************************************************
  FLOW PROCESS FROM NODE     48.61 TO NODE     48.70 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  707.00  DOWNSTREAM ELEVATION(FEET) =  698.80
  STREET LENGTH(FEET) =   346.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.39
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =   10.13
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.27
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.01
  STREET FLOW TRAVEL TIME(MIN.) =   1.76   Tc(MIN.) =   10.42
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.183
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        0.46      0.25     0.400    69
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.28      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.74      SUBAREA RUNOFF(CFS) =    2.06
  EFFECTIVE AREA(ACRES) =      1.50    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       4.18

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  11.14
  FLOW VELOCITY(FEET/SEC.) =  3.40   DEPTH*VELOCITY(FT*FT/SEC.) =   1.12
  LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.70 =     676.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.70 TO NODE     48.70 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.42
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.183
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        0.59      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    1.68
  EFFECTIVE AREA(ACRES) =      2.09   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.32
  TOTAL AREA(ACRES) =        2.1        PEAK FLOW RATE(CFS) =       5.86

****************************************************************************
  FLOW PROCESS FROM NODE     48.71 TO NODE     48.71 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   10.42
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.183
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.09      0.30     0.400    56
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        0.47      0.25     0.400    69
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.80      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =     1.36      SUBAREA RUNOFF(CFS) =     3.79
  EFFECTIVE AREA(ACRES) =      3.45   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =        3.4       PEAK FLOW RATE(CFS) =       9.64

********************************************************************************
  FLOW PROCESS FROM NODE     48.70 TO NODE     48.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   698.80  DOWNSTREAM(FEET) =   691.10
  FLOW LENGTH(FEET) =   119.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.36
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.64
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   10.57
  LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.00 =     795.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  11
--------------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
================================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        9.64   10.57    3.157  0.22( 0.08) 0.35       3.4      48.60
  LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.00 =     795.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      388.33    7.12    3.951  0.26( 0.08) 0.29      94.6      41.90
      2      388.33    7.12    3.951  0.26( 0.08) 0.29      94.6      41.90
      3      409.61    7.86    3.733  0.26( 0.08) 0.29     107.1      30.20
      4      448.39    9.58    3.339  0.26( 0.08) 0.29     138.2      55.10
      5      491.83   11.58    2.999  0.26( 0.08) 0.29     174.4      37.30
      6      496.68   11.80    2.966  0.26( 0.08) 0.29     178.5      56.14
      7      522.47   13.09    2.797  0.26( 0.08) 0.29     201.3      47.36
      8      529.30   13.49    2.751  0.26( 0.08) 0.29     207.8      47.31
      9      533.79   13.75    2.721  0.26( 0.08) 0.29     212.1      37.60
     10      536.89   13.94    2.700  0.26( 0.08) 0.29     215.1      56.11
     11      538.54   14.04    2.689  0.26( 0.08) 0.29     216.8      47.33
     12      545.32   14.48    2.643  0.26( 0.08) 0.29     223.6      41.20
     13      553.22   15.08    2.582  0.26( 0.08) 0.29     232.8      45.00
     14      555.11   15.24    2.567  0.26( 0.08) 0.29     235.2      42.00
     15      569.53   16.51    2.453  0.26( 0.08) 0.29     253.5      38.00
     16      607.15   19.58    2.227  0.26( 0.07) 0.28     296.3       1.00
     17      593.14   20.49    2.171  0.26( 0.07) 0.28     298.1       8.00
     18      584.32   21.03    2.140  0.26( 0.07) 0.28     298.5      51.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      396.49    7.12    3.951  0.26( 0.08) 0.29      96.9      41.90
      2      396.49    7.12    3.951  0.26( 0.08) 0.29      96.9      41.90
      3      418.13    7.86    3.733  0.26( 0.08) 0.29     109.7      30.20
      4      457.64    9.58    3.339  0.26( 0.08) 0.29     141.3      55.10
      5      479.64   10.57    3.157  0.26( 0.08) 0.29     159.7      48.60
      6      500.98   11.58    2.999  0.26( 0.08) 0.29     177.9      37.30
      7      505.73   11.80    2.966  0.26( 0.08) 0.29     182.0      56.14
      8      530.99   13.09    2.797  0.26( 0.08) 0.29     204.7      47.36
      9      537.67   13.49    2.751  0.26( 0.08) 0.29     211.3      47.31
     10      542.07   13.75    2.721  0.26( 0.08) 0.29     215.6      37.60
     11      545.10   13.94    2.700  0.26( 0.08) 0.29     218.6      56.11
     12      546.71   14.04    2.689  0.26( 0.08) 0.29     220.2      47.33
     13      553.35   14.48    2.643  0.26( 0.08) 0.29     227.0      41.20
     14      561.06   15.08    2.582  0.26( 0.08) 0.29     236.3      45.00
     15      562.90   15.24    2.567  0.26( 0.08) 0.29     238.6      42.00
     16      576.97   16.51    2.453  0.26( 0.08) 0.29     256.9      38.00
     17      613.88   19.58    2.227  0.26( 0.07) 0.28     299.8       1.00
     18      599.70   20.49    2.171  0.26( 0.07) 0.28     301.6       8.00
     19      590.78   21.03    2.140  0.26( 0.07) 0.28     302.0      51.00
    TOTAL AREA(ACRES) =       302.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      613.88  Tc(MIN.) =   19.582
  EFFECTIVE AREA(ACRES) =    299.78  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =      302.0
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  12
--------------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     49.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   691.10  DOWNSTREAM(FEET) =   689.20
  FLOW LENGTH(FEET) =   384.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 102.0 INCH PIPE IS  72.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.17
  ESTIMATED PIPE DIAMETER(INCH) = 102.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     613.88
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =   20.03
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     49.00 =   11849.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   20.03
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.199
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.31      0.30     0.100    56
  COMMERCIAL                 C        0.90      0.25     0.100    69
  COMMERCIAL                 D        0.12      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.33      SUBAREA RUNOFF(CFS) =    2.60
  EFFECTIVE AREA(ACRES) =    301.11   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =      303.3       PEAK FLOW RATE(CFS) =     613.88
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   20.03
  RAINFALL INTENSITY(INCH/HR) =   2.20
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.28
  EFFECTIVE STREAM AREA(ACRES) =     301.11
  TOTAL STREAM AREA(ACRES) =     303.28
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     613.88

****************************************************************************
  FLOW PROCESS FROM NODE     61.30 TO NODE     61.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    707.30  DOWNSTREAM(FEET) =    704.20
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.383
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.601
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  APARTMENTS                 B        0.53      0.30     0.200    56    8.38
  APARTMENTS                 D        0.77      0.20     0.200    75    8.38
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      4.16
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      4.16

****************************************************************************
  FLOW PROCESS FROM NODE     61.20 TO NODE     61.10 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
================================================================================
  UPSTREAM NODE ELEVATION(FEET) =    704.20
  DOWNSTREAM NODE ELEVATION(FEET) =    703.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   119.00
  "V" GUTTER WIDTH(FEET) =   1.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.10000
  MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.477
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        1.30      0.30     0.200    56
  APARTMENTS                 D        0.25      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      6.54
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.71
  AVERAGE FLOW DEPTH(FEET) =   0.43   FLOOD WIDTH(FEET) =    8.37
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.53   Tc(MIN.) =    8.92
  SUBAREA AREA(ACRES) =    1.55       SUBAREA RUNOFF(CFS) =    4.77
  EFFECTIVE AREA(ACRES) =    2.85     AREA-AVERAGED Fm(INCH/HR) =   0.05
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   0.20
  TOTAL AREA(ACRES) =        2.8         PEAK FLOW RATE(CFS) =       8.78

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.48   FLOOD WIDTH(FEET) =    9.37
  FLOW VELOCITY(FEET/SEC.) =   3.98   DEPTH*VELOCITY(FT*FT/SEC) =   1.91
  LONGEST FLOWPATH FROM NODE     61.30 TO NODE     61.10 =     449.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.10 TO NODE     49.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  703.00  DOWNSTREAM ELEVATION(FEET) =  699.50
  STREET LENGTH(FEET) =   380.00   CURB HEIGHT(INCHES) =  6.0
```

```
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.88
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.47
   HALFSTREET FLOOD WIDTH(FEET) =   18.97
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.94
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.38
 STREET FLOW TRAVEL TIME(MIN.) =   2.15   Tc(MIN.) =   11.07
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.076
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.26      0.30     0.100    56
 COMMERCIAL                 C        0.25      0.25     0.100    69
 COMMERCIAL                 D        0.29      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    2.20
 EFFECTIVE AREA(ACRES) =      3.65    AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
 TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =       9.95

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.47   HALFSTREET FLOOD WIDTH(FEET) =  19.03
 FLOW VELOCITY(FEET/SEC.) =  2.94   DEPTH*VELOCITY(FT*FT/SEC.) =   1.39
 LONGEST FLOWPATH FROM NODE     61.30 TO NODE     49.00 =     829.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   11.07
 RAINFALL INTENSITY(INCH/HR) =   3.08
 AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.26
 AREA-AVERAGED Ap =  0.18
 EFFECTIVE STREAM AREA(ACRES) =       3.65
 TOTAL STREAM AREA(ACRES) =       3.65
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.95

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1      396.49    7.62    3.799  0.26( 0.08) 0.29      98.2      41.90
    1      396.49    7.62    3.799  0.26( 0.08) 0.29      98.2      41.90
    1      418.13    8.37    3.603  0.26( 0.08) 0.29     111.0      30.20
    1      457.64   10.07    3.245  0.26( 0.08) 0.29     142.7      55.10
    1      479.64   11.06    3.078  0.26( 0.08) 0.29     161.0      48.60
    1      500.98   12.06    2.930  0.26( 0.08) 0.29     179.2      37.30
    1      505.73   12.29    2.900  0.26( 0.08) 0.29     183.3      56.14
    1      530.99   13.57    2.742  0.26( 0.08) 0.29     206.1      47.36
    1      537.67   13.96    2.697  0.26( 0.08) 0.29     212.6      47.31
    1      542.07   14.22    2.669  0.26( 0.08) 0.29     216.9      37.60
    1      545.10   14.41    2.650  0.26( 0.08) 0.29     219.9      56.11
    1      546.71   14.52    2.639  0.26( 0.08) 0.29     221.6      47.33
    1      553.35   14.95    2.595  0.26( 0.08) 0.29     228.4      41.20
    1      561.06   15.55    2.538  0.26( 0.08) 0.29     237.6      45.00
    1      562.90   15.71    2.524  0.26( 0.08) 0.29     239.9      42.00
    1      576.97   16.98    2.415  0.26( 0.08) 0.29     258.2      38.00
    1      613.88   20.03    2.199  0.26( 0.07) 0.28     301.1       1.00
    1      599.70   20.95    2.144  0.26( 0.07) 0.28     302.9       8.00
    1      590.78   21.49    2.113  0.26( 0.07) 0.28     303.3      51.00
    2        9.95   11.07    3.076  0.26( 0.05) 0.18       3.6      61.30

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1      404.98    7.62    3.799  0.26( 0.08) 0.29     100.8      41.90
    2      404.98    7.62    3.799  0.26( 0.08) 0.29     100.8      41.90
    3      426.96    8.37    3.603  0.26( 0.08) 0.29     113.8      30.20
    4      467.20   10.07    3.245  0.26( 0.08) 0.29     146.0      55.10
    5      489.58   11.06    3.078  0.26( 0.08) 0.29     164.7      48.60
    6      489.89   11.07    3.076  0.26( 0.08) 0.29     164.9      61.30
    7      510.45   12.06    2.930  0.26( 0.08) 0.29     182.9      37.30
    8      515.10   12.29    2.900  0.26( 0.08) 0.29     187.0      56.14
    9      539.84   13.57    2.742  0.26( 0.08) 0.29     209.7      47.36
   10      546.38   13.96    2.697  0.26( 0.08) 0.29     216.2      47.31
   11      550.68   14.22    2.669  0.26( 0.08) 0.29     220.5      37.60
   12      553.65   14.41    2.650  0.26( 0.08) 0.29     223.6      56.11
   13      555.23   14.52    2.639  0.26( 0.08) 0.29     225.2      47.33
   14      561.72   14.95    2.595  0.26( 0.08) 0.29     232.0      41.20
   15      569.25   15.55    2.538  0.26( 0.08) 0.29     241.3      45.00
   16      571.04   15.71    2.524  0.26( 0.08) 0.29     243.6      42.00
   17      584.75   16.98    2.415  0.26( 0.08) 0.29     261.9      38.00
   18      620.95   20.03    2.199  0.26( 0.07) 0.28     304.8       1.00
   19      606.58   20.95    2.144  0.26( 0.07) 0.28     306.5       8.00
   20      597.57   21.49    2.113  0.26( 0.07) 0.28     306.9      51.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     620.95    Tc(MIN.) =    20.03
EFFECTIVE AREA(ACRES) =     304.76   AREA-AVERAGED Fm(INCH/HR) =  0.07
AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
TOTAL AREA(ACRES) =      306.9
LONGEST FLOWPATH FROM NODE      1.00 TO NODE     49.00 =   11849.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     50.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   689.20  DOWNSTREAM(FEET) =   688.90
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  96.0 INCH PIPE IS  77.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.36
  ESTIMATED PIPE DIAMETER(INCH) =  96.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     620.95
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   20.10
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     57.10 TO NODE     57.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    714.00  DOWNSTREAM(FEET) =    711.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.278
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.626
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.42      0.30      0.100    56    8.28
  COMMERCIAL                 D        0.08      0.20      0.100    75    8.28
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.62
  TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      1.62

****************************************************************************
  FLOW PROCESS FROM NODE     57.20 TO NODE     57.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  711.60  DOWNSTREAM ELEVATION(FEET) =  709.00
  STREET LENGTH(FEET) =   130.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018
  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.79
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.89
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.64
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.71
  STREET FLOW TRAVEL TIME(MIN.) =   0.82   Tc(MIN.) =    9.10
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.437
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.11      0.30      0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.11      SUBAREA RUNOFF(CFS) =    0.34
  EFFECTIVE AREA(ACRES) =      0.61    AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.6        PEAK FLOW RATE(CFS) =       1.87

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   8.00
  FLOW VELOCITY(FEET/SEC.) =  2.71   DEPTH*VELOCITY(FT*FT/SEC.) =   0.74
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     57.00 =     460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.10
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.437
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.29      0.30      0.100    56
  COMMERCIAL                 C        0.02      0.25      0.100    69
  COMMERCIAL                 D        0.34      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.65      SUBAREA RUNOFF(CFS) =    2.00
  EFFECTIVE AREA(ACRES) =      1.26   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       3.87

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.10
```

```
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.437
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        B        0.33      0.30     0.200    56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        D        0.56      0.20     0.200    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    0.89      SUBAREA RUNOFF(CFS) =    2.72
 EFFECTIVE AREA(ACRES) =      2.15   AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.14
 TOTAL AREA(ACRES) =        2.2       PEAK FLOW RATE(CFS) =       6.58

****************************************************************************
 FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.10
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.437
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        B        0.34      0.30     0.200    56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        D        0.53      0.20     0.200    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    0.87      SUBAREA RUNOFF(CFS) =    2.65
 EFFECTIVE AREA(ACRES) =      3.02   AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.16
 TOTAL AREA(ACRES) =        3.0       PEAK FLOW RATE(CFS) =       9.24

****************************************************************************
 FLOW PROCESS FROM NODE     57.00 TO NODE     58.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   709.00  DOWNSTREAM(FEET) =   702.50
 FLOW LENGTH(FEET) =   633.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.48
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       9.24
 PIPE TRAVEL TIME(MIN.) =   1.63    Tc(MIN.) =   10.73
 LONGEST FLOWPATH FROM NODE     57.10 TO NODE     58.00 =    1093.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.73
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.132
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        B        1.93      0.30     0.200    56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        D        0.46      0.20     0.200    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    2.39      SUBAREA RUNOFF(CFS) =    6.62
 EFFECTIVE AREA(ACRES) =      5.41   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
 TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =      15.02

****************************************************************************
 FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.73
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.132
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        B        1.60      0.30     0.200    56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        D        0.76      0.20     0.200    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    2.36      SUBAREA RUNOFF(CFS) =    6.54
 EFFECTIVE AREA(ACRES) =      7.77   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
 TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =      21.56

****************************************************************************
 FLOW PROCESS FROM NODE     58.00 TO NODE     58.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   702.50  DOWNSTREAM(FEET) =   700.00
 FLOW LENGTH(FEET) =    67.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.22
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      21.56
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   10.81
 LONGEST FLOWPATH FROM NODE     57.10 TO NODE     58.10 =    1160.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     58.10 TO NODE     58.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
================================================================================
  MAINLINE Tc(MIN.) =   10.81
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.118
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        1.94      0.30     0.200    56
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        C        0.82      0.25     0.200    69
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        4.28      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     7.04      SUBAREA RUNOFF(CFS) =    19.46
  EFFECTIVE AREA(ACRES) =     14.81   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       14.8       PEAK FLOW RATE(CFS) =      40.92

********************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     58.10 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   10.81
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.118
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        C        3.80      0.25     0.200    69
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        2.64      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     6.44      SUBAREA RUNOFF(CFS) =    17.80
  EFFECTIVE AREA(ACRES) =     21.25   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       21.2       PEAK FLOW RATE(CFS) =      58.72

********************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     59.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   700.00  DOWNSTREAM(FEET) =   699.50
  FLOW LENGTH(FEET) =   139.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  32.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.00
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      58.72
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   11.14
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.00 =    1299.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   11.14
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.065
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.44      0.30     0.100    56
  COMMERCIAL                  D        0.18      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.62      SUBAREA RUNOFF(CFS) =     1.70
  EFFECTIVE AREA(ACRES) =     21.87   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       21.9       PEAK FLOW RATE(CFS) =      59.41

********************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.10 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.50  DOWNSTREAM(FEET) =   699.10
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.03
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      59.41
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.25
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.10 =    1355.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     59.10 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.25
  RAINFALL INTENSITY(INCH/HR) =   3.05
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  0.19
  EFFECTIVE STREAM AREA(ACRES) =      21.87
  TOTAL STREAM AREA(ACRES) =      21.87
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      59.41

********************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     50.10 IS CODE =  22
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    83.00
```

```
  USER SPECIFIED Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.01      0.30     0.100    56
  COMMERCIAL                 C        0.06      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.30
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.30

****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     50.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.08      0.30     0.100    56
  COMMERCIAL                 C        0.01      0.25     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.39
  EFFECTIVE AREA(ACRES) =      0.16   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.2       PEAK FLOW RATE(CFS) =       0.69

****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     59.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.00  DOWNSTREAM(FEET) =   699.10
  FLOW LENGTH(FEET) =   481.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.70
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.69
  PIPE TRAVEL TIME(MIN.) =   1.71    Tc(MIN.) =    6.71
  LONGEST FLOWPATH FROM NODE     50.10 TO NODE     59.10 =     564.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     59.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.71
  RAINFALL INTENSITY(INCH/HR) =   4.09
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.28
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.16
  TOTAL STREAM AREA(ACRES) =       0.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.69

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       59.41   11.25    3.049  0.24( 0.05) 0.19      21.9      57.10
      2        0.69    6.71    4.085  0.28( 0.03) 0.10       0.2      50.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       48.35    6.71    4.085  0.24( 0.05) 0.19      13.2      50.10
      2       59.92   11.25    3.049  0.24( 0.05) 0.19      22.0      57.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      59.92    Tc(MIN.) =    11.25
  EFFECTIVE AREA(ACRES) =      22.03   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       22.0
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.10 =    1355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     50.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.10  DOWNSTREAM(FEET) =   688.90
  FLOW LENGTH(FEET) =    28.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  38.80
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      59.92
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.26
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     50.00 =    1383.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       48.35    6.72    4.081  0.24( 0.05) 0.19      13.2      50.10
      2       59.92   11.26    3.047  0.24( 0.05) 0.19      22.0      57.10
```

```
LONGEST FLOWPATH FROM NODE     57.10 TO NODE     50.00 =    1383.00 FEET.

** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1      404.98    7.70    3.779  0.26( 0.08) 0.29     100.8      41.90
    2      404.98    7.70    3.779  0.26( 0.08) 0.29     100.8      41.90
    3      426.96    8.44    3.586  0.26( 0.08) 0.29     113.8      30.20
    4      467.20   10.14    3.233  0.26( 0.08) 0.29     146.0      55.10
    5      489.58   11.13    3.068  0.26( 0.08) 0.29     164.7      48.60
    6      489.89   11.14    3.065  0.26( 0.08) 0.29     164.9      61.30
    7      510.45   12.13    2.921  0.26( 0.08) 0.29     182.9      37.30
    8      515.10   12.36    2.891  0.26( 0.08) 0.29     187.0      56.14
    9      539.84   13.63    2.734  0.26( 0.08) 0.29     209.7      47.36
   10      546.38   14.03    2.690  0.26( 0.08) 0.29     216.2      47.31
   11      550.68   14.29    2.662  0.26( 0.08) 0.29     220.5      37.60
   12      553.65   14.48    2.643  0.26( 0.08) 0.29     223.6      56.11
   13      555.23   14.58    2.632  0.26( 0.08) 0.29     225.2      47.33
   14      561.72   15.02    2.588  0.26( 0.08) 0.29     232.0      41.20
   15      569.25   15.61    2.532  0.26( 0.08) 0.29     241.3      45.00
   16      571.04   15.77    2.518  0.26( 0.08) 0.29     243.6      42.00
   17      584.75   17.04    2.410  0.26( 0.08) 0.29     261.9      38.00
   18      620.95   20.10    2.195  0.26( 0.07) 0.28     304.8       1.00
   19      606.58   21.02    2.140  0.26( 0.07) 0.28     306.5       8.00
   20      597.57   21.55    2.110  0.26( 0.07) 0.28     306.9      51.00
LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1      430.74    6.72    4.081  0.26( 0.07) 0.28     101.2      50.10
    2      455.82    7.70    3.779  0.26( 0.07) 0.28     115.9      41.90
    3      455.82    7.70    3.779  0.26( 0.07) 0.28     115.9      41.90
    4      479.70    8.44    3.586  0.26( 0.07) 0.28     130.3      30.20
    5      524.27   10.14    3.233  0.26( 0.07) 0.28     165.8      55.10
    6      549.17   11.13    3.068  0.26( 0.07) 0.28     186.4      48.60
    7      549.51   11.14    3.065  0.26( 0.07) 0.28     186.7      61.30
    8      552.27   11.26    3.047  0.26( 0.07) 0.28     189.1      57.10
    9      567.86   12.13    2.921  0.26( 0.07) 0.28     204.9      37.30
   10      571.90   12.36    2.891  0.26( 0.07) 0.28     209.0      56.14
   11      593.51   13.63    2.734  0.26( 0.07) 0.28     231.7      47.36
   12      599.17   14.03    2.690  0.26( 0.07) 0.28     238.3      47.31
   13      602.92   14.29    2.662  0.26( 0.07) 0.28     242.6      37.60
   14      605.50   14.48    2.643  0.26( 0.07) 0.28     245.6      56.11
   15      606.86   14.58    2.632  0.26( 0.07) 0.28     247.2      47.33
   16      612.49   15.02    2.588  0.26( 0.07) 0.28     254.0      41.20
   17      618.89   15.61    2.532  0.26( 0.07) 0.28     263.3      45.00
   18      620.39   15.77    2.518  0.26( 0.07) 0.28     265.6      42.00
   19      631.94   17.04    2.410  0.26( 0.07) 0.28     283.9      38.00
   20      663.86   20.10    2.195  0.26( 0.07) 0.27     326.8       1.00
   21      648.39   21.02    2.140  0.26( 0.07) 0.28     328.6       8.00
   22      638.77   21.55    2.110  0.26( 0.07) 0.28     329.0      51.00
  TOTAL AREA(ACRES) =       329.0

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      663.86  Tc(MIN.) =   20.099
  EFFECTIVE AREA(ACRES) =    326.79  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      329.0
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   688.90  DOWNSTREAM(FEET) =   675.00
  FLOW LENGTH(FEET) =   437.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  54.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  28.77
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     663.86
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   20.35
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     61.00 =   12342.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   20.35
  RAINFALL INTENSITY(INCH/HR) =   2.18
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.27
  EFFECTIVE STREAM AREA(ACRES) =     326.79
  TOTAL STREAM AREA(ACRES) =     328.96
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     663.86

****************************************************************************
  FLOW PROCESS FROM NODE     48.10 TO NODE     48.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    712.40  DOWNSTREAM(FEET) =    709.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.947
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.268
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
```

```
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.15      0.30     0.400    56    9.95
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.34      0.20     0.400    75    9.95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      1.40
  TOTAL AREA(ACRES) =      0.49   PEAK FLOW RATE(CFS) =      1.40

****************************************************************************
  FLOW PROCESS FROM NODE     48.20 TO NODE     48.30 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  709.70  DOWNSTREAM ELEVATION(FEET) =  703.80
  STREET LENGTH(FEET) =   500.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.99
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =   11.14
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.43
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.80
  STREET FLOW TRAVEL TIME(MIN.) =   3.42   Tc(MIN.) =   13.37
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.764
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.64      0.25     0.400    69
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.68      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.32      SUBAREA RUNOFF(CFS) =    3.18
  EFFECTIVE AREA(ACRES) =      1.81    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        1.8        PEAK FLOW RATE(CFS) =       4.36

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  13.07
  FLOW VELOCITY(FEET/SEC.) =  2.64   DEPTH*VELOCITY(FT*FT/SEC.) =   0.96
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.30 =     830.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.30 TO NODE     48.40 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  703.80  DOWNSTREAM ELEVATION(FEET) =  700.20
  STREET LENGTH(FEET) =   522.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.07
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.43
    HALFSTREET FLOOD WIDTH(FEET) =   16.63
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.34
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.00
  STREET FLOW TRAVEL TIME(MIN.) =   3.71   Tc(MIN.) =   17.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.406
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.93      0.25     0.400    69
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.71      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.64      SUBAREA RUNOFF(CFS) =    3.42
  EFFECTIVE AREA(ACRES) =      3.45    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        3.4        PEAK FLOW RATE(CFS) =       7.19

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  17.85
  FLOW VELOCITY(FEET/SEC.) =  2.42   DEPTH*VELOCITY(FT*FT/SEC.) =   1.09
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.40 =    1352.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.40 TO NODE     48.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.406
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.44      0.25     0.400    69
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.46      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    1.88
  EFFECTIVE AREA(ACRES) =      4.35   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        4.3       PEAK FLOW RATE(CFS) =       9.07

****************************************************************************
  FLOW PROCESS FROM NODE     48.40 TO NODE     48.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   700.20  DOWNSTREAM(FEET) =   699.80
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.96
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.07
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   17.35
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.50 =    1432.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.50 TO NODE     48.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.35
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.385
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.16      0.30     0.400    56
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        1.49      0.25     0.400    69
  PUBLIC PARK                C        0.26      0.25     0.850    69
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.88      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.442
  SUBAREA AREA(ACRES) =    2.79      SUBAREA RUNOFF(CFS) =    5.72
  EFFECTIVE AREA(ACRES) =      7.14   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =        7.1       PEAK FLOW RATE(CFS) =      14.71

****************************************************************************
  FLOW PROCESS FROM NODE     48.50 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.80  DOWNSTREAM(FEET) =   675.00
  FLOW LENGTH(FEET) =   425.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.30
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.71
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =   17.85
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     61.00 =    1857.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.85
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.347
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        1.98      0.30     0.850    56
  PUBLIC PARK                D        1.67      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    3.65      SUBAREA RUNOFF(CFS) =    7.00
  EFFECTIVE AREA(ACRES) =     10.79   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =       10.8       PEAK FLOW RATE(CFS) =      21.47

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   17.85
  RAINFALL INTENSITY(INCH/HR) =   2.35
  AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =     10.79
  TOTAL STREAM AREA(ACRES) =     10.79
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      21.47

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      430.74    7.00    3.986  0.26( 0.07) 0.28     101.2      50.10
      1      455.82    7.97    3.704  0.26( 0.07) 0.28     115.9      41.90
      1      455.82    7.97    3.704  0.26( 0.07) 0.28     115.9      41.90
      1      479.70    8.72    3.521  0.26( 0.07) 0.28     130.3      30.20
      1      524.27   10.41    3.185  0.26( 0.07) 0.28     165.8      55.10
      1      549.17   11.39    3.027  0.26( 0.07) 0.28     186.4      48.60
      1      549.51   11.41    3.024  0.26( 0.07) 0.28     186.7      61.30
```

1	552.27	11.52	3.007	0.26(0.07)	0.28	189.1	57.10
1	567.86	12.40	2.885	0.26(0.07)	0.28	204.9	37.30
1	571.90	12.62	2.857	0.26(0.07)	0.28	209.0	56.14
1	593.51	13.90	2.705	0.26(0.07)	0.28	231.7	47.36
1	599.17	14.29	2.662	0.26(0.07)	0.28	238.3	47.31
1	602.92	14.55	2.635	0.26(0.07)	0.28	242.6	37.60
1	605.50	14.74	2.616	0.26(0.07)	0.28	245.6	56.11
1	606.86	14.84	2.606	0.26(0.07)	0.28	247.2	47.33
1	612.49	15.28	2.563	0.26(0.07)	0.28	254.0	41.20
1	618.89	15.87	2.509	0.26(0.07)	0.28	263.3	45.00
1	620.39	16.03	2.495	0.26(0.07)	0.28	265.6	42.00
1	631.94	17.30	2.389	0.26(0.07)	0.28	283.9	38.00
1	663.86	20.35	2.179	0.26(0.07)	0.27	326.8	1.00
1	648.39	21.27	2.125	0.26(0.07)	0.28	328.6	8.00
1	638.77	21.81	2.095	0.26(0.07)	0.28	329.0	51.00
2	21.47	17.85	2.347	0.24(0.14)	0.56	10.8	48.10

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	445.40	7.00	3.986	0.26(0.07)	0.29	105.4	50.10
2	471.29	7.97	3.704	0.26(0.07)	0.29	120.7	41.90
3	471.29	7.97	3.704	0.26(0.07)	0.29	120.7	41.90
4	495.76	8.72	3.521	0.26(0.07)	0.29	135.6	30.20
5	541.53	10.41	3.185	0.26(0.07)	0.29	172.1	55.10
6	567.08	11.39	3.027	0.26(0.07)	0.29	193.3	48.60
7	567.43	11.41	3.024	0.26(0.07)	0.29	193.6	61.30
8	570.26	11.52	3.007	0.26(0.07)	0.29	196.1	57.10
9	586.40	12.40	2.885	0.26(0.07)	0.29	212.4	37.30
10	590.57	12.62	2.857	0.26(0.08)	0.29	216.6	56.14
11	612.92	13.90	2.705	0.26(0.08)	0.29	240.1	47.36
12	618.81	14.29	2.662	0.26(0.08)	0.29	246.9	47.31
13	622.70	14.55	2.635	0.26(0.08)	0.29	251.4	37.60
14	625.38	14.74	2.616	0.26(0.08)	0.29	254.5	56.11
15	626.79	14.84	2.606	0.26(0.08)	0.29	256.2	47.33
16	632.65	15.28	2.563	0.26(0.08)	0.29	263.3	41.20
17	639.37	15.87	2.509	0.26(0.08)	0.29	272.9	45.00
18	640.95	16.03	2.495	0.26(0.08)	0.29	275.3	42.00
19	653.14	17.30	2.389	0.26(0.08)	0.29	294.4	38.00
20	659.14	17.85	2.347	0.26(0.08)	0.29	302.4	48.10
21	683.69	20.35	2.179	0.26(0.07)	0.28	337.6	1.00
22	667.70	21.27	2.125	0.26(0.07)	0.28	339.4	8.00
23	657.79	21.81	2.095	0.26(0.07)	0.29	339.8	51.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 683.69 Tc(MIN.) = 20.35
EFFECTIVE AREA(ACRES) = 337.58 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.28
TOTAL AREA(ACRES) = 339.8
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 61.00 = 12342.00 FEET.

==========

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 339.8 TC(MIN.) = 20.35
EFFECTIVE AREA(ACRES) = 337.58 AREA-AVERAGED Fm(INCH/HR)= 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.284
PEAK FLOW RATE(CFS) = 683.69

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	445.40	7.00	3.986	0.26(0.07)	0.29	105.4	50.10
2	471.29	7.97	3.704	0.26(0.07)	0.29	120.7	41.90
3	471.29	7.97	3.704	0.26(0.07)	0.29	120.7	41.90
4	495.76	8.72	3.521	0.26(0.07)	0.29	135.6	30.20
5	541.53	10.41	3.185	0.26(0.07)	0.29	172.1	55.10
6	567.08	11.39	3.027	0.26(0.07)	0.29	193.3	48.60
7	567.43	11.41	3.024	0.26(0.07)	0.29	193.6	61.30
8	570.26	11.52	3.007	0.26(0.07)	0.29	196.1	57.10
9	586.40	12.40	2.885	0.26(0.07)	0.29	212.4	37.30
10	590.57	12.62	2.857	0.26(0.08)	0.29	216.6	56.14
11	612.92	13.90	2.705	0.26(0.08)	0.29	240.1	47.36
12	618.81	14.29	2.662	0.26(0.08)	0.29	246.9	47.31
13	622.70	14.55	2.635	0.26(0.08)	0.29	251.4	37.60
14	625.38	14.74	2.616	0.26(0.08)	0.29	254.5	56.11
15	626.79	14.84	2.606	0.26(0.08)	0.29	256.2	47.33
16	632.65	15.28	2.563	0.26(0.08)	0.29	263.3	41.20
17	639.37	15.87	2.509	0.26(0.08)	0.29	272.9	45.00
18	640.95	16.03	2.495	0.26(0.08)	0.29	275.3	42.00
19	653.14	17.30	2.389	0.26(0.08)	0.29	294.4	38.00
20	659.14	17.85	2.347	0.26(0.08)	0.29	302.4	48.10
21	683.69	20.35	2.179	0.26(0.07)	0.28	337.6	1.00
22	667.70	21.27	2.125	0.26(0.07)	0.28	339.4	8.00
23	657.79	21.81	2.095	0.26(0.07)	0.29	339.8	51.00

==========

END OF RATIONAL METHOD ANALYSIS

```
 ************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY IN CITY OF LAKE FOREST                           *
* OFFSITE & ONSITE PROPOSED CONDITION @ 100-YEAR STORM                  *
* W.O. #1443-136X                                                       *
 ************************************************************************

  FILE NAME: PROP_100.DAT
  TIME/DATE OF STUDY: 10:47 06/10/2019
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   18.0     13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  2   20.0     15.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1099.00  DOWNSTREAM(FEET) =   1091.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.370
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.605
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.78      0.25     0.600    86    8.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      3.13
  TOTAL AREA(ACRES) =      0.78   PEAK FLOW RATE(CFS) =      3.13

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1091.20  DOWNSTREAM ELEVATION(FEET) = 1089.40
  STREET LENGTH(FEET) =    90.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.80
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   14.90
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.71
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.47
  STREET FLOW TRAVEL TIME(MIN.) =   0.40   Tc(MIN.) =    8.78
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.483
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.38      0.25     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    9.33
  EFFECTIVE AREA(ACRES) =      3.16    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =      12.38
```

Onsite Hydrology Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1 and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61, ***without Detention***

100-Year Storm Proposed Condition

```
  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  17.85
  FLOW VELOCITY(FEET/SEC.) =  4.17   DEPTH*VELOCITY(FT*FT/SEC.) =   1.87
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1089.40  DOWNSTREAM ELEVATION(FEET) = 1067.00
  STREET LENGTH(FEET) =   513.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.44
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.41
    HALFSTREET FLOOD WIDTH(FEET) =   15.82
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.71
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.35
  STREET FLOW TRAVEL TIME(MIN.) =   1.50   Tc(MIN.) =   10.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.095
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.34      0.25      0.100    86
  PUBLIC PARK                C        0.25      0.25      0.850    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.418
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    2.12
  EFFECTIVE AREA(ACRES) =      3.75    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =      13.39

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  15.82
  FLOW VELOCITY(FEET/SEC.) =  5.69   DEPTH*VELOCITY(FT*FT/SEC.) =   2.34
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     903.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.095
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.35      0.25      0.100    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.49      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.333
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    3.03
  EFFECTIVE AREA(ACRES) =      4.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =      16.43

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1067.00  DOWNSTREAM(FEET) =  1062.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.79
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.43
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   10.39
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1003.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.39
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.068
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.09      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.09      SUBAREA RUNOFF(CFS) =    7.42
  EFFECTIVE AREA(ACRES) =      6.68   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        6.7        PEAK FLOW RATE(CFS) =      23.73

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1062.00  DOWNSTREAM(FEET) =  1022.40
```

```
  FLOW LENGTH(FEET) =   701.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.89
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.73
  PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =   11.13
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1704.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.13
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.912
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.18      0.30      0.100    76
  COMMERCIAL                  C        0.46      0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.64      SUBAREA RUNOFF(CFS) =     2.24
  EFFECTIVE AREA(ACRES) =      7.32   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        7.3       PEAK FLOW RATE(CFS) =      25.03

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.40  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.49
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.03
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   11.38
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.38
  RAINFALL INTENSITY(INCH/HR) =   3.86
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       7.32
  TOTAL STREAM AREA(ACRES) =       7.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      25.03

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   305.00
  ELEVATION DATA: UPSTREAM(FEET) =   1046.00  DOWNSTREAM(FEET) =   1042.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.129
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.049
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  C        1.00      0.25      0.100    86    7.13
  RESIDENTIAL
  ".4 DWELLING/ACRE"          C        0.50      0.25      0.900    86   11.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
  SUBAREA RUNOFF(CFS) =      6.69
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      6.69

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1042.00  DOWNSTREAM ELEVATION(FEET) = 1036.00
  STREET LENGTH(FEET) =   373.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.09
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   14.50
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.28
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.27
  STREET FLOW TRAVEL TIME(MIN.) =   1.90   Tc(MIN.) =    9.03
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.411
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
```

```
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        3.31      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.31      SUBAREA RUNOFF(CFS) =   12.77
  EFFECTIVE AREA(ACRES) =      4.81    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =        4.8        PEAK FLOW RATE(CFS) =      18.60

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  16.63
  FLOW VELOCITY(FEET/SEC.) =  3.59   DEPTH*VELOCITY(FT*FT/SEC.) =   1.53
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     678.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1036.00  DOWNSTREAM ELEVATION(FEET) = 1026.00
  STREET LENGTH(FEET) =   463.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      22.75
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.43
    HALFSTREET FLOOD WIDTH(FEET) =   17.04
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.19
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.82
  STREET FLOW TRAVEL TIME(MIN.) =   1.84   Tc(MIN.) =   10.87
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.966
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.40      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    8.30
  EFFECTIVE AREA(ACRES) =      7.21    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =      24.97

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  17.64
  FLOW VELOCITY(FEET/SEC.) =  4.30   DEPTH*VELOCITY(FT*FT/SEC.) =   1.91
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1141.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.87
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.966
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.16      0.30      0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.22      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    8.22
  EFFECTIVE AREA(ACRES) =      9.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        9.6        PEAK FLOW RATE(CFS) =      33.19

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1026.00  DOWNSTREAM(FEET) =  1022.00
  FLOW LENGTH(FEET) =   395.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.95
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      33.19
  PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =   11.60
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1536.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.60
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.820
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.07      0.30      0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        4.06      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     4.13      SUBAREA RUNOFF(CFS) =   13.73
  EFFECTIVE AREA(ACRES) =     13.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       13.7       PEAK FLOW RATE(CFS) =      45.66

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.00  DOWNSTREAM(FEET) =  1020.00
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.30
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      45.66
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   11.79
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.79
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.785
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.55      0.30      0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.06      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     2.61      SUBAREA RUNOFF(CFS) =     8.59
  EFFECTIVE AREA(ACRES) =     16.33   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      53.82

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1020.00  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.83
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      53.82
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   12.12
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    1799.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.12
  RAINFALL INTENSITY(INCH/HR) =   3.73
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =      16.33
  TOTAL STREAM AREA(ACRES) =      16.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      53.82

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       25.03   11.38    3.863  0.25( 0.11) 0.45       7.3       1.00
      2       53.82   12.12    3.725  0.25( 0.12) 0.49      16.3       8.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       77.47   11.38    3.863  0.25( 0.12) 0.48      22.6       1.00
      2       77.93   12.12    3.725  0.25( 0.12) 0.48      23.6       8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      77.93    Tc(MIN.) =    12.12
  EFFECTIVE AREA(ACRES) =      23.65   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       23.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1019.50  DOWNSTREAM(FEET) =  1014.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.77
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      77.93
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   12.27
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.10 =    2014.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.700
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.15      0.30      0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.50
  EFFECTIVE AREA(ACRES) =     23.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       23.8       PEAK FLOW RATE(CFS) =      77.93
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.700
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.16      0.30      0.100    76
  COMMERCIAL                 C        1.44      0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.60      SUBAREA RUNOFF(CFS) =    5.29
  EFFECTIVE AREA(ACRES) =     25.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       25.4       PEAK FLOW RATE(CFS) =      81.99

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1014.00  DOWNSTREAM(FEET) =   971.40
  FLOW LENGTH(FEET) =   863.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.04
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      81.99
  PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =   12.98
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    2877.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.98
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.581
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.82      0.30      0.100    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.77      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.294
  SUBAREA AREA(ACRES) =    1.59      SUBAREA RUNOFF(CFS) =    5.02
  EFFECTIVE AREA(ACRES) =     26.99   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       27.0       PEAK FLOW RATE(CFS) =      84.29

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   971.40  DOWNSTREAM(FEET) =   969.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.92
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      84.29
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   13.01
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    2917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.01
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.577
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        2.46      0.30      0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C       10.48      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   12.94      SUBAREA RUNOFF(CFS) =   40.14
  EFFECTIVE AREA(ACRES) =     39.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       39.9       PEAK FLOW RATE(CFS) =     124.32
```

```
 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      125.50   12.27    3.699  0.25( 0.12) 0.46      38.9       1.00
     2      124.32   13.01    3.577  0.25( 0.12) 0.46      39.9       8.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =     125.50  Tc(MIN.) =   12.27
 AREA-AVERAGED Fm(INCH/HR) =  0.12  AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.46  EFFECTIVE AREA(ACRES) =      38.93

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   969.00  DOWNSTREAM(FEET) =   954.00
 FLOW LENGTH(FEET) =   416.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.10
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     125.50
 PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   12.61
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    3333.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.61
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.641
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C        0.77      0.25     0.100    86
 PUBLIC PARK                C        0.43      0.25     0.850    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.369
 SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    3.83
 EFFECTIVE AREA(ACRES) =     40.13   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =       41.1       PEAK FLOW RATE(CFS) =     127.29

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   954.00  DOWNSTREAM(FEET) =   952.80
 FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.32
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     127.29
 PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   12.78
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    3453.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.78
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.614
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      B        0.88      0.30     0.400    76
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      C        7.02      0.25     0.400    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =    7.90      SUBAREA RUNOFF(CFS) =   24.97
 EFFECTIVE AREA(ACRES) =     48.03   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
 TOTAL AREA(ACRES) =       49.0       PEAK FLOW RATE(CFS) =     151.30

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     17.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   952.80  DOWNSTREAM(FEET) =   929.00
 FLOW LENGTH(FEET) =   636.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.82
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     151.30
 PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   13.29
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.10 =    4089.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     17.10 TO NODE     17.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.29
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.534
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.68      0.30     0.500    76
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE"       C        0.89      0.25     0.600    86
 COMMERCIAL                 C        1.86      0.25     0.100    86
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.309
  SUBAREA AREA(ACRES) =    3.43      SUBAREA RUNOFF(CFS) =   10.66
  EFFECTIVE AREA(ACRES) =     51.46   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       52.5       PEAK FLOW RATE(CFS) =     158.50

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   929.00  DOWNSTREAM(FEET) =   926.30
  FLOW LENGTH(FEET) =   122.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  34.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.55
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     158.50
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   13.40
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     18.00 =    4211.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.40
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.517
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS                B       24.46      0.30      0.350    76
  CONDOMINIUMS                C        7.92      0.25      0.350    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =   32.38      SUBAREA RUNOFF(CFS) =   99.55
  EFFECTIVE AREA(ACRES) =     83.84   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       84.8       PEAK FLOW RATE(CFS) =     257.24

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   926.30  DOWNSTREAM(FEET) =   922.70
  FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  42.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.26
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     257.24
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   13.55
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     19.00 =    4384.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.55
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.494
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        1.62      0.30      0.400    76
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        6.09      0.25      0.400    86
  COMMERCIAL                  B        2.90      0.30      0.100    76
  COMMERCIAL                  C        3.15      0.25      0.100    86
  NATURAL POOR COVER
  "GRASS"                     B        0.76      0.30      1.000    93
  NATURAL POOR COVER
  "GRASS"                     C        0.39      0.25      1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
  SUBAREA AREA(ACRES) =   14.91      SUBAREA RUNOFF(CFS) =   45.73
  EFFECTIVE AREA(ACRES) =     98.75   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =       99.8       PEAK FLOW RATE(CFS) =     301.28

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   922.70  DOWNSTREAM(FEET) =   815.60
  FLOW LENGTH(FEET) =  1580.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  34.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  31.69
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     301.28
  PIPE TRAVEL TIME(MIN.) =   0.83    Tc(MIN.) =   14.38
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     20.00 =    5964.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.38
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.377
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B       19.45      0.30      0.100    76
  COMMERCIAL                  C       16.92      0.25      0.100    86
```

```
  COMMERCIAL                D        0.11      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    36.48      SUBAREA RUNOFF(CFS) =  109.98
  EFFECTIVE AREA(ACRES) =    135.23   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      136.2       PEAK FLOW RATE(CFS) =     400.84

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   815.60  DOWNSTREAM(FEET) =   799.50
  FLOW LENGTH(FEET) =   449.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  45.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.25
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     400.84
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   14.67
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6413.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.340
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.38      0.30     0.100    76
  COMMERCIAL                 C        0.87      0.25     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     3.25      SUBAREA RUNOFF(CFS) =    9.68
  EFFECTIVE AREA(ACRES) =    138.48   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      139.5       PEAK FLOW RATE(CFS) =     405.93

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.340
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        4.10      0.30     0.100    76
  COMMERCIAL                 C        1.54      0.25     0.100    86
  COMMERCIAL                 D        2.08      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     7.72      SUBAREA RUNOFF(CFS) =   23.02
  EFFECTIVE AREA(ACRES) =    146.20   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      147.2       PEAK FLOW RATE(CFS) =     428.95

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   799.50  DOWNSTREAM(FEET) =   765.50
  FLOW LENGTH(FEET) =  1056.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  47.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.72
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     428.95
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   15.35
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     22.00 =    7469.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.35
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.253
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.06      0.30     0.100    76
  COMMERCIAL                 C        1.74      0.25     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     3.80      SUBAREA RUNOFF(CFS) =   11.03
  EFFECTIVE AREA(ACRES) =    150.00   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      151.0       PEAK FLOW RATE(CFS) =     428.95
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.35
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.253
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.23      0.30     0.100    76
  COMMERCIAL                 D        5.07      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     5.30      SUBAREA RUNOFF(CFS) =   15.42
  EFFECTIVE AREA(ACRES) =    155.30   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      156.3       PEAK FLOW RATE(CFS) =     444.07

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   765.50  DOWNSTREAM(FEET) =   755.00
  FLOW LENGTH(FEET) =   465.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  50.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.88
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     444.07
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   15.69
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     23.00 =    7934.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.213
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        9.15      0.30      0.100    76
  COMMERCIAL                 C       10.79      0.25      0.100    86
  COMMERCIAL                 D        1.81      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   21.75      SUBAREA RUNOFF(CFS) =   62.37
  EFFECTIVE AREA(ACRES) =    177.05   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =      178.1       PEAK FLOW RATE(CFS) =     500.79

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.213
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        7.47      0.30      0.100    76
  COMMERCIAL                 C        0.40      0.25      0.100    86
  COMMERCIAL                 D       17.76      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   25.63      SUBAREA RUNOFF(CFS) =   73.58
  EFFECTIVE AREA(ACRES) =    202.68   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      203.7       PEAK FLOW RATE(CFS) =     574.38

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   755.00  DOWNSTREAM(FEET) =   736.00
  FLOW LENGTH(FEET) =  1257.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  78.0 INCH PIPE IS  60.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.95
  ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     574.38
  PIPE TRAVEL TIME(MIN.) =   1.00    Tc(MIN.) =   16.69
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.00 =    9191.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.101
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B       16.13      0.30      0.100    76
  COMMERCIAL                 C        3.87      0.25      0.100    86
  COMMERCIAL                 D        4.22      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   24.22      SUBAREA RUNOFF(CFS) =   67.00
  EFFECTIVE AREA(ACRES) =    226.90   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      227.9       PEAK FLOW RATE(CFS) =     621.00

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     30.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   736.00  DOWNSTREAM(FEET) =   720.00
  FLOW LENGTH(FEET) =   212.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  45.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  39.20
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     621.00
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   16.78
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.10 =    9403.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     30.10 TO NODE     30.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   720.00  DOWNSTREAM(FEET) =   716.00
  FLOW LENGTH(FEET) =   156.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  56.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.92
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     621.00
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   16.88
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    9559.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.88
  RAINFALL INTENSITY(INCH/HR) =   3.08
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.23
  EFFECTIVE STREAM AREA(ACRES) =     226.90
  TOTAL STREAM AREA(ACRES) =     227.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     621.00

****************************************************************************
  FLOW PROCESS FROM NODE     30.20 TO NODE     30.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    740.00  DOWNSTREAM(FEET) =    726.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.494
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.862
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  B        0.42      0.30      0.100    76    5.49
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.20
  TOTAL AREA(ACRES) =      0.42   PEAK FLOW RATE(CFS) =      2.20

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.49
  RAINFALL INTENSITY(INCH/HR) =   5.86
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.42
  TOTAL STREAM AREA(ACRES) =       0.42
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.20

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      621.00   16.88    3.081  0.27( 0.06) 0.23      226.9        1.00
      1      607.40   17.65    3.003  0.27( 0.06) 0.23      227.9        8.00
      2        2.20    5.49    5.862  0.30( 0.03) 0.10        0.4       30.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      390.38    5.49    5.862  0.27( 0.06) 0.23       74.3       30.20
      2      622.15   16.88    3.081  0.27( 0.06) 0.23      227.3        1.00
      3      608.52   17.65    3.003  0.27( 0.06) 0.23      228.3        8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     622.15    Tc(MIN.) =    16.88
  EFFECTIVE AREA(ACRES) =     227.32   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      228.3
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    9559.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     33.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   716.00  DOWNSTREAM(FEET) =   714.30
  FLOW LENGTH(FEET) =   210.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  90.0 INCH PIPE IS  70.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.88
  ESTIMATED PIPE DIAMETER(INCH) =  90.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     622.15
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   17.09
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     33.00 =    9769.00 FEET.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.09
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.060
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.35      0.30     0.100    76
 COMMERCIAL                 B        0.62      0.30     0.100    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.97      SUBAREA RUNOFF(CFS) =     2.64
 EFFECTIVE AREA(ACRES) =    228.29   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
 TOTAL AREA(ACRES) =      229.3       PEAK FLOW RATE(CFS) =     622.15
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   714.30  DOWNSTREAM(FEET) =   709.80
 FLOW LENGTH(FEET) =   420.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  84.0 INCH PIPE IS  68.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.58
 ESTIMATED PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     622.15
 PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =   17.47
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     38.00 TO NODE     39.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    730.50  DOWNSTREAM(FEET) =    726.20

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.427
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.302
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.80      0.30     0.500    76    9.43
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.42      0.20     0.500    91    9.43
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA RUNOFF(CFS) =      4.58
 TOTAL AREA(ACRES) =      1.22   PEAK FLOW RATE(CFS) =      4.58

****************************************************************************
 FLOW PROCESS FROM NODE     39.00 TO NODE     40.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  726.20  DOWNSTREAM ELEVATION(FEET) =  719.50
 STREET LENGTH(FEET) =   711.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.19
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.44
   HALFSTREET FLOOD WIDTH(FEET) =   17.64
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.82
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.26
 STREET FLOW TRAVEL TIME(MIN.) =   4.20   Tc(MIN.) =   13.62
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.484
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        2.40      0.30     0.500    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =     2.40      SUBAREA RUNOFF(CFS) =     7.20
 EFFECTIVE AREA(ACRES) =      3.62    AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =      10.88

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
 FLOW VELOCITY(FEET/SEC.) =  2.87   DEPTH*VELOCITY(FT*FT/SEC.) =   1.29
 LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.00 =    1041.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  81
```

```
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   13.62
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.484
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.93      0.30      0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.93      SUBAREA RUNOFF(CFS) =    2.79
  EFFECTIVE AREA(ACRES) =      4.55   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.6       PEAK FLOW RATE(CFS) =      13.67

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   719.50  DOWNSTREAM(FEET) =   718.40
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.09
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.67
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   13.73
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.10 =    1096.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.10 TO NODE     40.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   13.73
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.469
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.19      0.30      0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.57
  EFFECTIVE AREA(ACRES) =      4.74   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.7       PEAK FLOW RATE(CFS) =      14.18

****************************************************************************
  FLOW PROCESS FROM NODE     40.10 TO NODE     40.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   718.40  DOWNSTREAM(FEET) =   717.00
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.17
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.18
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   13.82
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.20 =    1151.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     40.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   13.82
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.456
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.22      0.30      0.850    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.45      0.30      0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.615
  SUBAREA AREA(ACRES) =    0.67      SUBAREA RUNOFF(CFS) =    1.97
  EFFECTIVE AREA(ACRES) =      5.41   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =      16.10

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     40.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   13.82
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.456
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.34      0.30      0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.34      SUBAREA RUNOFF(CFS) =    1.01
  EFFECTIVE AREA(ACRES) =      5.75   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      17.11

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     41.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   717.00  DOWNSTREAM(FEET) =   713.40
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.37
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.11
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   13.98
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.00 =    1266.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.98
  RAINFALL INTENSITY(INCH/HR) =   3.43
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.51
  EFFECTIVE STREAM AREA(ACRES) =       5.75
  TOTAL STREAM AREA(ACRES) =       5.75
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      17.11

****************************************************************************
  FLOW PROCESS FROM NODE     41.20 TO NODE     41.30 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    728.20  DOWNSTREAM(FEET) =    723.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.184
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.367
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.02      0.30     0.500    76    9.18
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.61      0.20     0.500    91    9.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.42
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      2.42

****************************************************************************
  FLOW PROCESS FROM NODE     41.30 TO NODE     41.40 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  723.30  DOWNSTREAM ELEVATION(FEET) =  718.00
  STREET LENGTH(FEET) =   323.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.85
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   11.55
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.93
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.98
  STREET FLOW TRAVEL TIME(MIN.) =   1.84   Tc(MIN.) =   11.02
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.934
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.72      0.30     0.400    76
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.11      0.20     0.400    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.83      SUBAREA RUNOFF(CFS) =    2.85
  EFFECTIVE AREA(ACRES) =      1.46    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       5.03

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  12.97
  FLOW VELOCITY(FEET/SEC.) =  3.10   DEPTH*VELOCITY(FT*FT/SEC.) =   1.12
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.40 =     653.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.40 TO NODE     41.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   11.02
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.934
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        1.24      0.30     0.400    76
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.03      0.20     0.400    91
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.27      SUBAREA RUNOFF(CFS) =    4.36
  EFFECTIVE AREA(ACRES) =      2.73   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =        2.7       PEAK FLOW RATE(CFS) =       9.39

****************************************************************************
  FLOW PROCESS FROM NODE     41.40 TO NODE     41.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   718.00  DOWNSTREAM(FEET) =   717.00
  FLOW LENGTH(FEET) =    62.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.84
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.39
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   11.15
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.50 =     715.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.50 TO NODE     41.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.15
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.907
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.09      0.30      0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.31
  EFFECTIVE AREA(ACRES) =      2.82   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        2.8       PEAK FLOW RATE(CFS) =       9.64

****************************************************************************
  FLOW PROCESS FROM NODE     41.50 TO NODE     41.51 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   717.00  DOWNSTREAM(FEET) =   715.50
  FLOW LENGTH(FEET) =   154.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.35
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.64
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   11.56
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.51 =     869.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.51 TO NODE     41.51 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.56
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.828
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.44      0.30      0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.44      SUBAREA RUNOFF(CFS) =    4.77
  EFFECTIVE AREA(ACRES) =      4.26   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =        4.3       PEAK FLOW RATE(CFS) =      14.20

****************************************************************************
  FLOW PROCESS FROM NODE     41.51 TO NODE     41.60 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   715.50  DOWNSTREAM(FEET) =   714.90
  FLOW LENGTH(FEET) =    59.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.16
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.20
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   11.69
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.60 =     928.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.60 TO NODE     41.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.803
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.06      0.30      0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.06      SUBAREA RUNOFF(CFS) =    3.48
  EFFECTIVE AREA(ACRES) =      5.32   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        5.3       PEAK FLOW RATE(CFS) =      17.59

****************************************************************************
  FLOW PROCESS FROM NODE     41.60 TO NODE     41.60 IS CODE =  81
```

```
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   11.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.803
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.47      0.30      0.400    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.47      SUBAREA RUNOFF(CFS) =    1.56
  EFFECTIVE AREA(ACRES) =      5.79   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      19.15

******************************************************************************
  FLOW PROCESS FROM NODE     41.60 TO NODE     41.00 IS CODE =  31
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.90  DOWNSTREAM(FEET) =   713.40
  FLOW LENGTH(FEET) =   148.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.77
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.15
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   12.01
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.00 =    1076.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =   1
------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.01
  RAINFALL INTENSITY(INCH/HR) =   3.74
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       5.79
  TOTAL STREAM AREA(ACRES) =       5.79
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      19.15

  ** CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       17.11   13.98    3.432  0.29( 0.15) 0.51       5.8      38.00
      2       19.15   12.01    3.745  0.29( 0.13) 0.45       5.8      41.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       35.24   12.01    3.745  0.29( 0.14) 0.48      10.7      41.20
      2       34.60   13.98    3.432  0.29( 0.14) 0.48      11.5      38.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      35.24    Tc(MIN.) =    12.01
  EFFECTIVE AREA(ACRES) =      10.73   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       11.5
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.00 =    1266.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.80 IS CODE =  31
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.40  DOWNSTREAM(FEET) =   712.60
  FLOW LENGTH(FEET) =    83.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.83
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      35.24
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   12.17
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.80 =    1349.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.80 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   12.17
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.717
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.27      0.30      0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.13      0.20      0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.29
  EFFECTIVE AREA(ACRES) =     11.13   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       11.9       PEAK FLOW RATE(CFS) =      35.84

******************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.80 IS CODE =  81
------------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   12.17
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.717
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.21      0.30     0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.01      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.22      SUBAREA RUNOFF(CFS) =    0.71
  EFFECTIVE AREA(ACRES) =     11.35   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       12.2       PEAK FLOW RATE(CFS) =      36.55

********************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.90 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.60  DOWNSTREAM(FEET) =   711.80
  FLOW LENGTH(FEET) =    77.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.17
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      36.55
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   12.31
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.90 =    1426.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.31
  RAINFALL INTENSITY(INCH/HR) =   3.69
  AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.48
  EFFECTIVE STREAM AREA(ACRES) =      11.35
  TOTAL STREAM AREA(ACRES) =      12.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      36.55

********************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =  22
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    77.00
  USER SPECIFIED Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.06      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =      0.06   PEAK FLOW RATE(CFS) =      0.33

********************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.00
  RAINFALL INTENSITY(INCH/HR) =   6.19
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.06
  TOTAL STREAM AREA(ACRES) =       0.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.33

********************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =  22
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  7700.00
  USER SPECIFIED Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.06      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =      0.06   PEAK FLOW RATE(CFS) =      0.33

********************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  3
```

```
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =    5.00
 RAINFALL INTENSITY(INCH/HR) =   6.19
 AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       0.06
 TOTAL STREAM AREA(ACRES) =       0.06
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.33

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       36.55   12.31    3.693  0.29( 0.14) 0.48      11.3      41.20
     1       35.80   14.28    3.391  0.29( 0.14) 0.48      12.2      38.00
     2        0.33    5.00    6.187  0.20( 0.10) 0.50       0.1      41.90
     3        0.33    5.00    6.187  0.20( 0.10) 0.50       0.1      41.90

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       25.93    5.00    6.187  0.29( 0.14) 0.48       4.7      41.90
     2       25.93    5.00    6.187  0.29( 0.14) 0.48       4.7      41.90
     3       36.94   12.31    3.693  0.29( 0.14) 0.48      11.5      41.20
     4       36.15   14.28    3.391  0.29( 0.14) 0.48      12.3      38.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      36.94    Tc(MIN.) =    12.31
 EFFECTIVE AREA(ACRES) =      11.47   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =       12.3
 LONGEST FLOWPATH FROM NODE     41.90 TO NODE     41.90 =    7700.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     41.90 TO NODE     46.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   711.80  DOWNSTREAM(FEET) =   710.50
 FLOW LENGTH(FEET) =   132.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.96
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      36.94
 PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   12.55
 LONGEST FLOWPATH FROM NODE     41.90 TO NODE     46.00 =    7832.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     46.00 TO NODE     46.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.55
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.651
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.21      0.30      0.100    76
 COMMERCIAL                 D        0.29      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    1.63
 EFFECTIVE AREA(ACRES) =     11.97   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =       12.8       PEAK FLOW RATE(CFS) =      37.89

****************************************************************************
 FLOW PROCESS FROM NODE     46.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   710.50  DOWNSTREAM(FEET) =   709.80
 FLOW LENGTH(FEET) =    68.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.16
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      37.89
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   12.68
 LONGEST FLOWPATH FROM NODE     41.90 TO NODE     34.00 =    7900.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       27.68    5.40    5.921  0.29( 0.13) 0.44       5.2      41.90
     2       27.68    5.40    5.921  0.29( 0.13) 0.44       5.2      41.90
     3       37.89   12.68    3.631  0.29( 0.13) 0.46      12.0      41.20
     4       37.08   14.65    3.342  0.29( 0.13) 0.47      12.8      38.00
 LONGEST FLOWPATH FROM NODE     41.90 TO NODE     34.00 =    7900.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      390.38    6.15    5.497  0.27( 0.06) 0.22      75.2      30.20
     2      622.15   17.47    3.022  0.27( 0.06) 0.23     228.3       1.00
     3      608.52   18.24    2.948  0.27( 0.06) 0.23     229.3       8.00
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
```

```
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1      397.30    5.40    5.921  0.27( 0.06) 0.24      71.3      41.90
    2      397.30    5.40    5.921  0.27( 0.06) 0.24      71.3      41.90
    3      419.10    6.15    5.497  0.27( 0.06) 0.24      81.2      30.20
    4      561.99   12.68    3.631  0.27( 0.06) 0.24     175.5      41.20
    5      601.60   14.65    3.342  0.27( 0.06) 0.24     203.0      38.00
    6      655.53   17.47    3.022  0.27( 0.06) 0.24     241.1       1.00
    7      641.04   18.24    2.948  0.27( 0.06) 0.24     242.1       8.00
  TOTAL AREA(ACRES) =       242.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      655.53  Tc(MIN.) =   17.465
  EFFECTIVE AREA(ACRES) =    241.07  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      242.1
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     56.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   703.70
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  48.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  34.92
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     655.53
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   17.52
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.52
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.016
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)   (DECIMAL)  CN
  COMMERCIAL                 B        0.23      0.30      0.100    76
  COMMERCIAL                 D        0.51      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.74      SUBAREA RUNOFF(CFS) =    1.99
  EFFECTIVE AREA(ACRES) =    241.81   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      242.8       PEAK FLOW RATE(CFS) =     655.53
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     32.20 TO NODE     32.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    745.00  DOWNSTREAM(FEET) =    742.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.917
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.755
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)   (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.11      0.30      0.100    76    7.92
  COMMERCIAL                 C        0.26      0.25      0.100    86    7.92
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.57
  TOTAL AREA(ACRES) =      0.37   PEAK FLOW RATE(CFS) =      1.57

****************************************************************************
  FLOW PROCESS FROM NODE     32.10 TO NODE     32.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  742.00  DOWNSTREAM ELEVATION(FEET) =  740.00
  STREET LENGTH(FEET) =    96.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.82
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.84
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.70
```

```
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.73
  STREET FLOW TRAVEL TIME(MIN.) =   0.59   Tc(MIN.) =    8.51
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.562
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.06      0.30     0.100    76
  COMMERCIAL                  C        0.06      0.25     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.12      SUBAREA RUNOFF(CFS) =    0.49
  EFFECTIVE AREA(ACRES) =      0.49    AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       2.00

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   8.19
  FLOW VELOCITY(FEET/SEC.) =  2.76   DEPTH*VELOCITY(FT*FT/SEC.) =   0.76
  LONGEST FLOWPATH FROM NODE     32.20 TO NODE     32.00 =     426.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    724.60  DOWNSTREAM(FEET) =    723.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.167
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.717
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  SCHOOL                      B        0.33      0.30     0.600    76   12.17
  SCHOOL                      C        0.85      0.25     0.600    86   12.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      3.78
  TOTAL AREA(ACRES) =      1.18   PEAK FLOW RATE(CFS) =      3.78

****************************************************************************
  FLOW PROCESS FROM NODE     52.00 TO NODE     53.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  723.00  DOWNSTREAM ELEVATION(FEET) =  719.00
  STREET LENGTH(FEET) =   412.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018
  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.44
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   17.75
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.88
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.28
  STREET FLOW TRAVEL TIME(MIN.) =   2.39   Tc(MIN.) =   14.55
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.354
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  SCHOOL                      B        2.48      0.30     0.600    76
  SCHOOL                      C        0.77      0.25     0.600    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    9.31
  EFFECTIVE AREA(ACRES) =      4.43    AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        4.4        PEAK FLOW RATE(CFS) =      12.70

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  2.91   DEPTH*VELOCITY(FT*FT/SEC.) =   1.31
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     53.00 =     742.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     53.00 TO NODE     54.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  719.00  DOWNSTREAM ELEVATION(FEET) =  712.50
  STREET LENGTH(FEET) =   633.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.73
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.45   FLOOD WIDTH(FEET) =   18.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    3.00
    SPLIT DEPTH(FEET) =    0.42   SPLIT FLOOD WIDTH(FEET) =   16.02
```

```
    SPLIT FLOW(CFS) =    6.70   SPLIT VELOCITY(FEET/SEC.) =    2.78
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   18.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.00
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.35
  STREET FLOW TRAVEL TIME(MIN.) =   3.52   Tc(MIN.) =   18.08
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.963
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  SCHOOL                     B        2.42      0.30     0.600    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    2.42      SUBAREA RUNOFF(CFS) =    6.06
  EFFECTIVE AREA(ACRES) =      6.85    AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        6.9        PEAK FLOW RATE(CFS) =      17.20

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  3.00   DEPTH*VELOCITY(FT*FT/SEC.) =   1.35
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     54.00 =    1375.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.08
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.963
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.32      0.30     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.32      SUBAREA RUNOFF(CFS) =    0.84
  EFFECTIVE AREA(ACRES) =      7.17   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.58
  TOTAL AREA(ACRES) =        7.2       PEAK FLOW RATE(CFS) =      18.04

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.08
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.963
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  SCHOOL                     B        2.40      0.30     0.600    76
  SCHOOL                     C        0.07      0.25     0.600    86
  SCHOOL                     D        2.82      0.20     0.600    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    5.29      SUBAREA RUNOFF(CFS) =   13.40
  EFFECTIVE AREA(ACRES) =     12.46   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.59
  TOTAL AREA(ACRES) =       12.5       PEAK FLOW RATE(CFS) =      31.45

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.08
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.963
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.78      0.30     0.100    76
  COMMERCIAL                 C        0.03      0.25     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.81      SUBAREA RUNOFF(CFS) =    2.14
  EFFECTIVE AREA(ACRES) =     13.27   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =       13.3       PEAK FLOW RATE(CFS) =      33.58

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.50  DOWNSTREAM(FEET) =   712.30
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.30
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      33.58
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   18.15
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     55.00 =    1409.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.15
  RAINFALL INTENSITY(INCH/HR) =   2.96
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =      13.27
  TOTAL STREAM AREA(ACRES) =      13.27
```

```
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      33.58

****************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.10 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    34.00
  USER SPECIFIED Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.13      0.30     0.100    76
  COMMERCIAL                 D        0.14      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.50
  TOTAL AREA(ACRES) =      0.27   PEAK FLOW RATE(CFS) =      1.50

****************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.24      0.30     0.100    76
  COMMERCIAL                 D        0.01      0.20     0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    1.39
  EFFECTIVE AREA(ACRES) =      0.52   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.5       PEAK FLOW RATE(CFS) =       2.88

****************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.00  DOWNSTREAM(FEET) =   712.30
  FLOW LENGTH(FEET) =   275.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.94
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.88
  PIPE TRAVEL TIME(MIN.) =   1.56    Tc(MIN.) =    6.56
  LONGEST FLOWPATH FROM NODE     55.10 TO NODE     55.00 =     309.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.56
  RAINFALL INTENSITY(INCH/HR) =   5.30
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.52
  TOTAL STREAM AREA(ACRES) =       0.52
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.88

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       33.58   18.15    2.955  0.27( 0.15) 0.56      13.3      51.00
      2        2.88    6.56    5.297  0.27( 0.03) 0.10       0.5      55.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       25.14    6.56    5.297  0.27( 0.14) 0.51       5.3      55.10
      2       35.19   18.15    2.955  0.27( 0.15) 0.54      13.8      51.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      35.19    Tc(MIN.) =    18.15
  EFFECTIVE AREA(ACRES) =      13.79   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.54
  TOTAL AREA(ACRES) =       13.8
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     55.00 =    1409.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     56.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.30  DOWNSTREAM(FEET) =   711.00
  FLOW LENGTH(FEET) =   165.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.31
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      35.19
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   18.48
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.00 =    1574.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     56.00 TO NODE     56.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.48
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.925
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.49      0.30      0.100    76
  COMMERCIAL                 D        0.04      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.53      SUBAREA RUNOFF(CFS) =     1.38
  EFFECTIVE AREA(ACRES) =     14.32   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =       14.3       PEAK FLOW RATE(CFS) =      35.87

****************************************************************************
  FLOW PROCESS FROM NODE     56.00 TO NODE     56.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   711.00  DOWNSTREAM(FEET) =   710.10
  FLOW LENGTH(FEET) =   172.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  26.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.97
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      35.87
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   18.90
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     56.11 TO NODE     56.12 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    720.80  DOWNSTREAM(FEET) =    717.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.438
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.584
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.91      0.30      0.200    76    8.44
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      3.71
  TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      3.71

****************************************************************************
  FLOW PROCESS FROM NODE     56.12 TO NODE     56.13 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  717.80  DOWNSTREAM ELEVATION(FEET) =  713.60
  STREET LENGTH(FEET) =   486.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.56
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.42
    HALFSTREET FLOOD WIDTH(FEET) =   16.43
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.59
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.10
  STREET FLOW TRAVEL TIME(MIN.) =   3.12   Tc(MIN.) =   11.56
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.828
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        1.68      0.30      0.200    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     1.68      SUBAREA RUNOFF(CFS) =     5.70
  EFFECTIVE AREA(ACRES) =      2.59    AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        2.6        PEAK FLOW RATE(CFS) =       8.78

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  2.75   DEPTH*VELOCITY(FT*FT/SEC.) =   1.24
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.13 =     816.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==========================================================================
  MAINLINE Tc(MIN.) =   11.56
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.828
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        2.11      0.30     0.200    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    2.11      SUBAREA RUNOFF(CFS) =    7.16
  EFFECTIVE AREA(ACRES) =      4.70   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        4.7       PEAK FLOW RATE(CFS) =      15.94

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.56
  RAINFALL INTENSITY(INCH/HR) =   3.83
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =       4.70
  TOTAL STREAM AREA(ACRES) =       4.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      15.94

****************************************************************************
  FLOW PROCESS FROM NODE     56.14 TO NODE     56.15 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    719.20  DOWNSTREAM(FEET) =    715.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.182
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.666
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.84      0.30     0.200    76    8.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      3.48
  TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      3.48

****************************************************************************
  FLOW PROCESS FROM NODE     56.15 TO NODE     56.13 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  715.70  DOWNSTREAM ELEVATION(FEET) =  713.60
  STREET LENGTH(FEET) =   200.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.51
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   13.58
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.55
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.95
  STREET FLOW TRAVEL TIME(MIN.) =   1.31   Tc(MIN.) =    9.49
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.286
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.54      0.30     0.200    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.54      SUBAREA RUNOFF(CFS) =    2.05
  EFFECTIVE AREA(ACRES) =      1.38    AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       5.25

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  14.39
  FLOW VELOCITY(FEET/SEC.) =  2.66   DEPTH*VELOCITY(FT*FT/SEC.) =   1.03
  LONGEST FLOWPATH FROM NODE     56.14 TO NODE     56.13 =     530.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.49
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.286
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.70      0.30     0.200    76
  RESIDENTIAL
```

```
  "11+ DWELLINGS/ACRE"       D        0.52      0.20     0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    1.22      SUBAREA RUNOFF(CFS) =    4.65
  EFFECTIVE AREA(ACRES) =      2.60   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =       9.90

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.49
  RAINFALL INTENSITY(INCH/HR) =   4.29
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.28
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =       2.60
  TOTAL STREAM AREA(ACRES) =       2.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.90

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       15.94   11.56    3.828  0.30( 0.06) 0.20       4.7      56.11
      2        9.90    9.49    4.286  0.28( 0.06) 0.20       2.6      56.14

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       24.57    9.49    4.286  0.29( 0.06) 0.20       6.5      56.14
      2       24.76   11.56    3.828  0.29( 0.06) 0.20       7.3      56.11

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      24.76    Tc(MIN.) =    11.56
  EFFECTIVE AREA(ACRES) =       7.30   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        7.3
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.13 =     816.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.16 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.60  DOWNSTREAM(FEET) =   712.50
  FLOW LENGTH(FEET) =    94.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.84
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.76
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   11.74
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.16 =     910.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.16 TO NODE     56.16 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.74
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.795
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.46      0.30     0.200    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.46      SUBAREA RUNOFF(CFS) =    1.55
  EFFECTIVE AREA(ACRES) =      7.76   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =      26.09

****************************************************************************
  FLOW PROCESS FROM NODE     56.16 TO NODE     56.16 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.74
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.795
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.05      0.30     0.200    76
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.41      0.20     0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.46      SUBAREA RUNOFF(CFS) =    1.55
  EFFECTIVE AREA(ACRES) =      8.22   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        8.2       PEAK FLOW RATE(CFS) =      27.64

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       27.78    9.67    4.241  0.29( 0.06) 0.20       7.4      56.14
      2       27.64   11.74    3.795  0.29( 0.06) 0.20       8.2      56.11
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      27.78  Tc(MIN.) =    9.67
  AREA-AVERAGED Fm(INCH/HR) =  0.06  AREA-AVERAGED Fp(INCH/HR) =  0.29
```

```
 AREA-AVERAGED Ap =  0.20  EFFECTIVE AREA(ACRES) =       7.38

****************************************************************************
 FLOW PROCESS FROM NODE     56.16 TO NODE     56.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   712.50  DOWNSTREAM(FEET) =   710.10
 FLOW LENGTH(FEET) =    38.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.17
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      27.78
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    9.70
 LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.10 =     948.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       27.78    9.70    4.232  0.29( 0.06) 0.20       7.4      56.14
     2       27.64   11.77    3.788  0.29( 0.06) 0.20       8.2      56.11
 LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.10 =     948.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       26.32    7.37    4.956  0.27( 0.13) 0.48       5.8      55.10
     2       35.87   18.90    2.888  0.27( 0.14) 0.52      14.3      51.00
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       51.07    7.37    4.956  0.28( 0.09) 0.34      11.4      55.10
     2       56.04    9.70    4.232  0.28( 0.09) 0.34      14.9      56.14
     3       57.62   11.77    3.788  0.28( 0.10) 0.35      17.3      56.11
     4       56.85   18.90    2.888  0.27( 0.11) 0.41      22.5      51.00
   TOTAL AREA(ACRES) =        22.5

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       57.62  Tc(MIN.) =   11.774
 EFFECTIVE AREA(ACRES) =     17.30  AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.34
 TOTAL AREA(ACRES) =       22.5
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     56.10 TO NODE     56.20 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   710.10  DOWNSTREAM(FEET) =   709.80
 FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.81
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      57.62
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   11.86
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.20 =    1790.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.20 TO NODE     56.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.86
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.772
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        0.39      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.39      SUBAREA RUNOFF(CFS) =    1.32
 EFFECTIVE AREA(ACRES) =     17.69   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =       22.9       PEAK FLOW RATE(CFS) =      58.55

****************************************************************************
 FLOW PROCESS FROM NODE     56.20 TO NODE     56.30 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   703.70
 FLOW LENGTH(FEET) =   290.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.62
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      58.55
 PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   12.21
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.30 =    2080.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  11
----------------------------------------------------------------------------
```

```
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
================================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM        Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1       51.45    7.82    4.787  0.27( 0.09) 0.33      11.8      55.10
      2       56.82   10.14    4.125  0.27( 0.09) 0.34      15.3      56.14
      3       58.55   12.21    3.709  0.27( 0.10) 0.35      17.7      56.11
      4       57.20   19.34    2.851  0.27( 0.11) 0.40      22.9      51.00
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.30 =    2080.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM        Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1      397.30    5.46    5.882  0.27( 0.06) 0.24      72.1      41.90
      2      397.30    5.46    5.882  0.27( 0.06) 0.24      72.1      41.90
      3      419.10    6.21    5.465  0.27( 0.06) 0.24      81.9      30.20
      4      564.14   12.73    3.621  0.27( 0.06) 0.24     176.3      41.20
      5      601.60   14.71    3.334  0.27( 0.06) 0.24     203.8      38.00
      6      655.53   17.52    3.016  0.27( 0.06) 0.24     241.8       1.00
      7      641.04   18.29    2.942  0.27( 0.06) 0.24     242.8       8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM        Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1      441.59    5.46    5.882  0.27( 0.07) 0.25      80.3      41.90
      2      441.59    5.46    5.882  0.27( 0.07) 0.25      80.3      41.90
      3      465.84    6.21    5.465  0.27( 0.07) 0.25      91.3      30.20
      4      506.43    7.82    4.787  0.27( 0.07) 0.25     117.1      55.10
      5      563.35   10.14    4.125  0.27( 0.07) 0.25     154.1      56.14
      6      611.06   12.21    3.709  0.27( 0.07) 0.25     186.4      56.11
      7      622.59   12.73    3.621  0.27( 0.07) 0.25     194.3      41.20
      8      659.67   14.71    3.334  0.27( 0.07) 0.25     223.3      38.00
      9      713.07   17.52    3.016  0.27( 0.07) 0.25     263.4       1.00
     10      698.44   18.29    2.942  0.27( 0.07) 0.25     265.0       8.00
     11      677.80   19.34    2.851  0.27( 0.07) 0.25     265.7      51.00
    TOTAL AREA(ACRES) =      265.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     713.07  Tc(MIN.) =   17.520
  EFFECTIVE AREA(ACRES) =    263.40  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =     265.7
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     35.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   703.70  DOWNSTREAM(FEET) =   703.00
  FLOW LENGTH(FEET) =    74.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  93.0 INCH PIPE IS  70.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.60
  ESTIMATED PIPE DIAMETER(INCH) =  93.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     713.07
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   17.59
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    729.10  DOWNSTREAM(FEET) =    723.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.849
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.461
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.39      0.30      0.500    76    8.85
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.52      0.20      0.500    91    8.85
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      3.55
  TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      3.55

****************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     44.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  723.20  DOWNSTREAM ELEVATION(FEET) =  714.50
  STREET LENGTH(FEET) =   493.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
```

```
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.63
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.34
   HALFSTREET FLOOD WIDTH(FEET) =   11.96
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.09
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.06
 STREET FLOW TRAVEL TIME(MIN.) =   2.66   Tc(MIN.) =   11.51
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.837
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        2.25      0.30     0.500    76
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.79      0.20     0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    3.04      SUBAREA RUNOFF(CFS) =   10.12
 EFFECTIVE AREA(ACRES) =      3.95    AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        3.9        PEAK FLOW RATE(CFS) =      13.17

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  14.29
 FLOW VELOCITY(FEET/SEC.) =  3.39   DEPTH*VELOCITY(FT*FT/SEC.) =   1.30
 LONGEST FLOWPATH FROM NODE     42.00 TO NODE     44.00 =     823.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     44.00 TO NODE     45.20 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   714.50  DOWNSTREAM(FEET) =   713.50
 FLOW LENGTH(FEET) =    33.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.80
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      13.17
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   11.56
 LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.20 =     856.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     45.20 TO NODE     45.20 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2

 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   11.56
 RAINFALL INTENSITY(INCH/HR) =   3.83
 AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.27
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       3.95
 TOTAL STREAM AREA(ACRES) =       3.95
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      13.17

****************************************************************************
 FLOW PROCESS FROM NODE     45.00 TO NODE     45.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    721.00  DOWNSTREAM(FEET) =    717.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.195
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.364
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      B        0.58      0.30     0.400    76    9.20
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      D        0.06      0.20     0.400    91    9.20
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA RUNOFF(CFS) =      2.45
 TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      2.45

****************************************************************************
 FLOW PROCESS FROM NODE     45.10 TO NODE     45.20 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  717.00  DOWNSTREAM ELEVATION(FEET) =  714.00
 STREET LENGTH(FEET) =   318.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.83
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
```

```
   STREET FLOW DEPTH(FEET) =  0.36
   HALFSTREET FLOOD WIDTH(FEET) =   12.97
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.36
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.85
 STREET FLOW TRAVEL TIME(MIN.) =   2.25   Tc(MIN.) =   11.44
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.850
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      B        0.82      0.30     0.400    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =    0.82      SUBAREA RUNOFF(CFS) =    2.75
 EFFECTIVE AREA(ACRES) =      1.46    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       4.90

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  14.39
 FLOW VELOCITY(FEET/SEC.) =  2.49   DEPTH*VELOCITY(FT*FT/SEC.) =   0.96
 LONGEST FLOWPATH FROM NODE     45.00 TO NODE     45.20 =     648.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     45.20 TO NODE     45.20 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   11.44
 RAINFALL INTENSITY(INCH/HR) =   3.85
 AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.40
 EFFECTIVE STREAM AREA(ACRES) =       1.46
 TOTAL STREAM AREA(ACRES) =       1.46
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.90

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       13.17   11.56    3.828  0.27( 0.13) 0.50       3.9      42.00
     2        4.90   11.44    3.850  0.30( 0.12) 0.40       1.5      45.00

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       18.02   11.44    3.850  0.27( 0.13) 0.47       5.4      45.00
     2       18.04   11.56    3.828  0.27( 0.13) 0.47       5.4      42.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      18.04    Tc(MIN.) =    11.56
 EFFECTIVE AREA(ACRES) =       5.41   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        5.4
 LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.20 =     856.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     45.20 TO NODE     45.30 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   713.50  DOWNSTREAM(FEET) =   711.90
 FLOW LENGTH(FEET) =   157.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.72
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      18.04
 PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   11.90
 LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.30 =    1013.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     45.30 TO NODE     45.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.90
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.765
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      B        0.66      0.30     0.400    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =    0.66      SUBAREA RUNOFF(CFS) =    2.16
 EFFECTIVE AREA(ACRES) =      6.07   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        6.1        PEAK FLOW RATE(CFS) =      19.87

****************************************************************************
 FLOW PROCESS FROM NODE     45.30 TO NODE     45.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.90
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.765
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK               B        1.89      0.30     0.850    76
 COMMERCIAL                D        0.04      0.20     0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.834
```

```
  SUBAREA AREA(ACRES) =    1.93      SUBAREA RUNOFF(CFS) =    6.10
  EFFECTIVE AREA(ACRES) =      8.00   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =        8.0       PEAK FLOW RATE(CFS) =      25.97

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       25.99   11.78    3.786  0.28( 0.16) 0.55       8.0       45.00
      2       25.97   11.90    3.765  0.28( 0.16) 0.55       8.0       42.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      25.99  Tc(MIN.) =   11.78
  AREA-AVERAGED Fm(INCH/HR) =  0.16  AREA-AVERAGED Fp(INCH/HR) =  0.28
  AREA-AVERAGED Ap =  0.55  EFFECTIVE AREA(ACRES) =       7.96

****************************************************************************
  FLOW PROCESS FROM NODE     45.30 TO NODE     47.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   711.90  DOWNSTREAM(FEET) =   710.80
  FLOW LENGTH(FEET) =   106.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.48
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.99
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   11.99
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     47.20 =    1119.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.20 TO NODE     47.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.99
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.748
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.13      0.30      0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.13      SUBAREA RUNOFF(CFS) =    0.44
  EFFECTIVE AREA(ACRES) =      8.09   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =        8.1       PEAK FLOW RATE(CFS) =      26.16

****************************************************************************
  FLOW PROCESS FROM NODE     47.20 TO NODE     35.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.80  DOWNSTREAM(FEET) =   703.90
  FLOW LENGTH(FEET) =   695.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.33
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.16
  PIPE TRAVEL TIME(MIN.) =   1.39    Tc(MIN.) =   13.38
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     35.20 =    1814.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.20 TO NODE     35.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.38
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.520
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        1.02      0.30      0.850    76
  PUBLIC PARK                C        0.05      0.25      0.850    86
  PUBLIC PARK                D        2.20      0.20      0.850    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    3.27      SUBAREA RUNOFF(CFS) =    9.78
  EFFECTIVE AREA(ACRES) =     11.36   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.63
  TOTAL AREA(ACRES) =       11.4       PEAK FLOW RATE(CFS) =      34.27

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       34.27   13.38    3.520  0.26( 0.17) 0.63      11.4       45.00
      2       34.21   13.50    3.502  0.26( 0.17) 0.63      11.4       42.00
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     35.10 =    1814.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      441.59    5.54    5.837  0.27( 0.07) 0.25      80.3       41.90
      2      441.59    5.54    5.837  0.27( 0.07) 0.25      80.3       41.90
      3      465.84    6.28    5.428  0.27( 0.07) 0.25      91.3       30.20
      4      506.43    7.90    4.762  0.27( 0.07) 0.25     117.1       55.10
      5      563.35   10.21    4.109  0.27( 0.07) 0.25     154.1       56.14
      6      611.06   12.28    3.697  0.27( 0.07) 0.25     186.4       56.11
      7      622.59   12.80    3.610  0.27( 0.07) 0.25     194.3       41.20
      8      659.67   14.77    3.326  0.27( 0.07) 0.25     223.3       38.00
      9      713.07   17.59    3.010  0.27( 0.07) 0.25     263.4        1.00
     10      698.44   18.36    2.936  0.27( 0.07) 0.25     265.0        8.00
     11      677.80   19.40    2.845  0.27( 0.07) 0.25     265.7       51.00
```

```
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      465.57    5.54    5.837  0.27( 0.07) 0.27      85.0      41.90
     2      465.57    5.54    5.837  0.27( 0.07) 0.27      85.0      41.90
     3      491.09    6.28    5.428  0.27( 0.07) 0.27      96.6      30.20
     4      534.14    7.90    4.762  0.27( 0.07) 0.27     123.8      55.10
     5      594.10   10.21    4.109  0.27( 0.07) 0.27     162.8      56.14
     6      644.17   12.28    3.697  0.27( 0.07) 0.27     196.8      56.11
     7      656.26   12.80    3.610  0.27( 0.07) 0.27     205.2      41.20
     8      667.75   13.38    3.520  0.27( 0.07) 0.27     214.2      45.00
     9      669.89   13.50    3.502  0.27( 0.07) 0.27     215.9      42.00
    10      692.07   14.77    3.326  0.27( 0.07) 0.27     234.7      38.00
    11      742.23   17.59    3.010  0.27( 0.07) 0.27     274.8       1.00
    12      726.84   18.36    2.936  0.27( 0.07) 0.27     276.4       8.00
    13      705.27   19.40    2.845  0.27( 0.07) 0.27     277.1      51.00
   TOTAL AREA(ACRES) =       277.1

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      742.23  Tc(MIN.) =   17.586
 EFFECTIVE AREA(ACRES) =    274.80  AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
 TOTAL AREA(ACRES) =      277.1
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =   695.70
 FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN 108.0 INCH PIPE IS  87.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.42
 ESTIMATED PIPE DIAMETER(INCH) = 108.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     742.23
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   17.68
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     36.00 =   10453.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.68
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.001
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C        0.16      0.25      0.100    86
 COMMERCIAL                 D        0.29      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.45      SUBAREA RUNOFF(CFS) =    1.21
 EFFECTIVE AREA(ACRES) =    275.25   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
 TOTAL AREA(ACRES) =      277.6       PEAK FLOW RATE(CFS) =     742.23
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE     36.00 TO NODE     37.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   695.70  DOWNSTREAM(FEET) =   695.40
 FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN 108.0 INCH PIPE IS  87.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.42
 ESTIMATED PIPE DIAMETER(INCH) = 108.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     742.23
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   17.77
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.00 =   10528.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.00 TO NODE     37.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   695.40  DOWNSTREAM(FEET) =   694.00
 FLOW LENGTH(FEET) =   355.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN 108.0 INCH PIPE IS  88.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.33
 ESTIMATED PIPE DIAMETER(INCH) = 108.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     742.23
 PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   18.22
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.10 =   10883.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.10 TO NODE     37.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.22
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.950
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C        0.68      0.25      0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.68      SUBAREA RUNOFF(CFS) =     1.79
  EFFECTIVE AREA(ACRES) =    275.93   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      278.3       PEAK FLOW RATE(CFS) =     742.23
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.22
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.950
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.46      0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.46      SUBAREA RUNOFF(CFS) =     1.21
  EFFECTIVE AREA(ACRES) =    276.39   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      278.7       PEAK FLOW RATE(CFS) =     742.23
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.00  DOWNSTREAM(FEET) =   693.80
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 102.0 INCH PIPE IS  79.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.65
  ESTIMATED PIPE DIAMETER(INCH) = 102.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     742.23
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   18.25
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     37.60 TO NODE     37.70 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    718.50  DOWNSTREAM(FEET) =    714.40
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.517
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.279
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.13      0.30      0.500    76    9.52
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.51      0.20      0.500    91    9.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.40
  TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      2.40

****************************************************************************
  FLOW PROCESS FROM NODE     37.70 TO NODE     37.80 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  714.40  DOWNSTREAM ELEVATION(FEET) =  710.60
  STREET LENGTH(FEET) =   349.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.42
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   12.06
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.41
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.83
  STREET FLOW TRAVEL TIME(MIN.) =   2.41   Tc(MIN.) =   11.93
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.759
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.15      0.25      0.500    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.47      0.20      0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     0.62      SUBAREA RUNOFF(CFS) =     2.04
  EFFECTIVE AREA(ACRES) =      1.26    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.50
```

```
  TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =       4.14

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  12.97
  FLOW VELOCITY(FEET/SEC.) =  2.55   DEPTH*VELOCITY(FT*FT/SEC.) =   0.92
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.80 =     679.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.80 TO NODE     37.90 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.60  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.97
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.14
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   12.10
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.90 =     739.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.90 TO NODE     37.90 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.10
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.729
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.21      0.25     0.500    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.93      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.14      SUBAREA RUNOFF(CFS) =    3.72
  EFFECTIVE AREA(ACRES) =      2.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        2.4       PEAK FLOW RATE(CFS) =       7.83

****************************************************************************
  FLOW PROCESS FROM NODE     37.90 TO NODE     37.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   708.00
  FLOW LENGTH(FEET) =   221.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.73
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.83
  PIPE TRAVEL TIME(MIN.) =   0.64    Tc(MIN.) =   12.74
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.50 =     960.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.50 TO NODE     37.50 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.74
  RAINFALL INTENSITY(INCH/HR) =   3.62
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       2.40
  TOTAL STREAM AREA(ACRES) =       2.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.83

****************************************************************************
  FLOW PROCESS FROM NODE     37.30 TO NODE     37.40 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    713.10  DOWNSTREAM(FEET) =    709.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.880
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.188
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.70      0.25     0.500    86    9.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.56
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      2.56

****************************************************************************
  FLOW PROCESS FROM NODE     37.40 TO NODE     37.50 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  709.70  DOWNSTREAM ELEVATION(FEET) =  708.10
  STREET LENGTH(FEET) =   124.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018
```

```
 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.14
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.33
   HALFSTREET FLOOD WIDTH(FEET) =   11.14
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.55
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.84
 STREET FLOW TRAVEL TIME(MIN.) =   0.81   Tc(MIN.) =   10.69
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.003
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        0.33      0.25     0.500    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.33      SUBAREA RUNOFF(CFS) =    1.15
 EFFECTIVE AREA(ACRES) =      1.03    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        1.0        PEAK FLOW RATE(CFS) =       3.59

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.86
 FLOW VELOCITY(FEET/SEC.) =  2.61   DEPTH*VELOCITY(FT*FT/SEC.) =   0.89
 LONGEST FLOWPATH FROM NODE     37.30 TO NODE     37.50 =     454.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.50 TO NODE     37.50 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   10.69
 RAINFALL INTENSITY(INCH/HR) =   4.00
 AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       1.03
 TOTAL STREAM AREA(ACRES) =       1.03
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.59

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        7.83   12.74    3.620  0.21( 0.11) 0.50       2.4      37.60
     2        3.59   10.69    4.003  0.25( 0.12) 0.50       1.0      37.30

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       10.88   10.69    4.003  0.23( 0.11) 0.50       3.0      37.30
     2       11.07   12.74    3.620  0.22( 0.11) 0.50       3.4      37.60

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      11.07    Tc(MIN.) =    12.74
 EFFECTIVE AREA(ACRES) =       3.43   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        3.4
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.50 =     960.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.50 TO NODE     37.20 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   708.00  DOWNSTREAM(FEET) =   693.80
 FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.30
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.07
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   12.85
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.20 =    1080.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       10.88   10.81    3.978  0.23( 0.11) 0.50       3.0      37.30
     2       11.07   12.85    3.602  0.22( 0.11) 0.50       3.4      37.60
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.20 =    1080.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      465.57    6.27    5.432  0.27( 0.07) 0.27      86.6      41.90
     2      465.57    6.27    5.432  0.27( 0.07) 0.27      86.6      41.90
     3      491.09    7.02    5.094  0.27( 0.07) 0.27      98.2      30.20
     4      534.14    8.62    4.530  0.27( 0.07) 0.27     125.4      55.10
     5      594.10   10.91    3.957  0.27( 0.07) 0.27     164.4      56.14
     6      644.17   12.96    3.585  0.27( 0.07) 0.27     198.4      56.11
     7      656.26   13.48    3.505  0.27( 0.07) 0.27     206.8      41.20
     8      667.75   14.05    3.422  0.27( 0.07) 0.27     215.8      45.00
```

```
     9      669.89   14.17    3.406  0.27( 0.07) 0.27     217.5      42.00
    10      692.07   15.44    3.242  0.27( 0.07) 0.27     236.3      38.00
    11      742.23   18.25    2.946  0.27( 0.07) 0.27     276.4       1.00
    12      726.84   19.03    2.877  0.27( 0.07) 0.27     278.0       8.00
    13      705.27   20.07    2.790  0.27( 0.07) 0.27     278.7      51.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      474.26    6.27    5.432  0.27( 0.07) 0.27      88.4      41.90
      2      474.26    6.27    5.432  0.27( 0.07) 0.27      88.4      41.90
      3      500.19    7.02    5.094  0.27( 0.07) 0.27     100.2      30.20
      4      544.05    8.62    4.530  0.27( 0.07) 0.27     127.8      55.10
      5      602.30   10.81    3.978  0.27( 0.07) 0.27     165.7      37.30
      6      604.99   10.91    3.957  0.27( 0.07) 0.27     167.4      56.14
      7      652.75   12.85    3.602  0.27( 0.07) 0.27     200.1      37.60
      8      655.18   12.96    3.585  0.27( 0.07) 0.27     201.8      56.11
      9      667.02   13.48    3.505  0.27( 0.07) 0.27     210.2      41.20
     10      678.25   14.05    3.422  0.27( 0.07) 0.27     219.2      45.00
     11      680.34   14.17    3.406  0.27( 0.07) 0.27     221.0      42.00
     12      702.00   15.44    3.242  0.27( 0.07) 0.27     239.7      38.00
     13      751.21   18.25    2.946  0.27( 0.07) 0.27     279.8       1.00
     14      735.61   19.03    2.877  0.27( 0.07) 0.27     281.4       8.00
     15      713.76   20.07    2.790  0.27( 0.07) 0.27     282.2      51.00
    TOTAL AREA(ACRES) =       282.2

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      751.21  Tc(MIN.) =   18.253
  EFFECTIVE AREA(ACRES) =    279.82  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      282.2
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     37.20 TO NODE     47.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.80  DOWNSTREAM(FEET) =   691.30
  FLOW LENGTH(FEET) =   487.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 108.0 INCH PIPE IS  79.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.06
  ESTIMATED PIPE DIAMETER(INCH) = 108.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     751.21
  PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =   18.79
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     47.31 TO NODE     47.32 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    718.50  DOWNSTREAM(FEET) =    712.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.679
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.511
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.63      0.30     0.500    76    8.68
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.47
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      2.47

****************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.32 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.68
  RAINFALL INTENSITY(INCH/HR) =   4.51
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.63
  TOTAL STREAM AREA(ACRES) =       0.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.47

****************************************************************************
  FLOW PROCESS FROM NODE     47.33 TO NODE     47.32 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   282.00
  ELEVATION DATA: UPSTREAM(FEET) =    715.00  DOWNSTREAM(FEET) =    712.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.219
```

```
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.358
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        0.86      0.30      0.500    76    9.22
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA RUNOFF(CFS) =      3.26
 TOTAL AREA(ACRES) =      0.86   PEAK FLOW RATE(CFS) =      3.26

****************************************************************************
 FLOW PROCESS FROM NODE     47.32 TO NODE     47.32 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.22
 RAINFALL INTENSITY(INCH/HR) =   4.36
 AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       0.86
 TOTAL STREAM AREA(ACRES) =       0.86
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.26

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        2.47    8.68    4.511  0.30( 0.15) 0.50       0.6      47.31
     2        3.26    9.22    4.358  0.30( 0.15) 0.50       0.9      47.33

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        5.65    8.68    4.511  0.30( 0.15) 0.50       1.4      47.31
     2        5.64    9.22    4.358  0.30( 0.15) 0.50       1.5      47.33

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       5.65    Tc(MIN.) =     8.68
 EFFECTIVE AREA(ACRES) =       1.44   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =       1.5
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.32 =     330.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.32 TO NODE     47.34 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   699.00  DOWNSTREAM(FEET) =   698.50
 FLOW LENGTH(FEET) =   102.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.40
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.65
 PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =    9.07
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.34 =     432.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.34 TO NODE     47.34 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.07
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.400
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        0.38      0.30      0.500    76
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        D        0.06      0.20      0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.44      SUBAREA RUNOFF(CFS) =    1.69
 EFFECTIVE AREA(ACRES) =      1.88   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        1.9       PEAK FLOW RATE(CFS) =       7.19

****************************************************************************
 FLOW PROCESS FROM NODE     47.34 TO NODE     47.35 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   698.50  DOWNSTREAM(FEET) =   697.50
 FLOW LENGTH(FEET) =   194.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.80
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.19
 PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =    9.74
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.35 =     626.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.74
 RAINFALL INTENSITY(INCH/HR) =   4.22
```

```
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       1.88
  TOTAL STREAM AREA(ACRES) =       1.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.19

****************************************************************************
  FLOW PROCESS FROM NODE     47.36 TO NODE     47.35 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   275.00
  ELEVATION DATA: UPSTREAM(FEET) =    713.50  DOWNSTREAM(FEET) =    711.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.418
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.305
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.72      0.30      0.500    76    9.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.69
  TOTAL AREA(ACRES) =      0.72   PEAK FLOW RATE(CFS) =      2.69

****************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.42
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.305
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.66      0.30      0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.12      0.20      0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.78      SUBAREA RUNOFF(CFS) =    2.92
  EFFECTIVE AREA(ACRES) =      1.50   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.5       PEAK FLOW RATE(CFS) =       5.61

****************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.42
  RAINFALL INTENSITY(INCH/HR) =   4.30
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       1.50
  TOTAL STREAM AREA(ACRES) =       1.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.61

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        7.19    9.74    4.223  0.30( 0.15) 0.50       1.9      47.31
      1        7.14   10.31    4.088  0.30( 0.15) 0.50       1.9      47.33
      2        5.61    9.42    4.305  0.29( 0.15) 0.50       1.5      47.36

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       12.71    9.42    4.305  0.29( 0.15) 0.50       3.3      47.36
      2       12.70    9.74    4.223  0.29( 0.15) 0.50       3.4      47.31
      3       12.46   10.31    4.088  0.29( 0.15) 0.50       3.4      47.33

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      12.71    Tc(MIN.) =     9.42
  EFFECTIVE AREA(ACRES) =       3.32   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.4
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.35 =     626.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.37 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   697.60  DOWNSTREAM(FEET) =   696.00
  FLOW LENGTH(FEET) =   293.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.61
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.71
  PIPE TRAVEL TIME(MIN.) =   0.87    Tc(MIN.) =   10.29
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.37 =     919.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.37 TO NODE     47.37 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==========================================================================
  MAINLINE Tc(MIN.) =   10.29
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.092
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.67      0.30     0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.12      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.79      SUBAREA RUNOFF(CFS) =    2.81
  EFFECTIVE AREA(ACRES) =      4.11   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.2       PEAK FLOW RATE(CFS) =      14.59

**************************************************************************
  FLOW PROCESS FROM NODE     47.37 TO NODE     47.37 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   10.29
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.092
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.09      0.30     0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.60      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.69      SUBAREA RUNOFF(CFS) =    2.47
  EFFECTIVE AREA(ACRES) =      4.80   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.9       PEAK FLOW RATE(CFS) =      17.06

**************************************************************************
  FLOW PROCESS FROM NODE     47.37 TO NODE     47.30 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =   695.20
  FLOW LENGTH(FEET) =   158.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.86
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.06
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =   10.74
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.30 =    1077.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     47.30 TO NODE     47.30 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   10.74
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.993
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.28      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    0.98
  EFFECTIVE AREA(ACRES) =      5.08   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        5.2       PEAK FLOW RATE(CFS) =      17.62

**************************************************************************
  FLOW PROCESS FROM NODE     47.30 TO NODE     47.40 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.20  DOWNSTREAM(FEET) =   694.60
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.76
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.62
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =   11.10
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.40 =    1202.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     47.40 TO NODE     47.40 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   11.10
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.918
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.19      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.65
  EFFECTIVE AREA(ACRES) =      5.27   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =      17.93

**************************************************************************
  FLOW PROCESS FROM NODE     47.40 TO NODE     47.50 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.60  DOWNSTREAM(FEET) =   694.40
  FLOW LENGTH(FEET) =    41.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.82
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.93
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   11.22
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.50 =    1243.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.50 TO NODE     47.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   11.22
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.894
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.05      0.30     0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.45      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.50      SUBAREA RUNOFF(CFS) =    5.12
  EFFECTIVE AREA(ACRES) =      6.77   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        6.9       PEAK FLOW RATE(CFS) =      22.93

****************************************************************************
  FLOW PROCESS FROM NODE     47.50 TO NODE     47.60 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.40  DOWNSTREAM(FEET) =   693.50
  FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.27
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      22.93
  PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =   11.70
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.60 =    1423.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.60 TO NODE     47.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   11.70
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.802
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.55      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.55      SUBAREA RUNOFF(CFS) =    5.16
  EFFECTIVE AREA(ACRES) =      8.32   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        8.4       PEAK FLOW RATE(CFS) =      27.54

****************************************************************************
  FLOW PROCESS FROM NODE     47.60 TO NODE     47.70 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.50  DOWNSTREAM(FEET) =   693.30
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  21.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.60
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.54
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.80
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.70 =    1463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.70 TO NODE     47.70 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   11.80
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.784
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.04      0.25     0.500    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.57      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.61      SUBAREA RUNOFF(CFS) =    5.34
  EFFECTIVE AREA(ACRES) =      9.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       10.0       PEAK FLOW RATE(CFS) =      32.73

****************************************************************************
  FLOW PROCESS FROM NODE     47.70 TO NODE     47.80 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.30  DOWNSTREAM(FEET) =   692.50
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  25.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.59
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      32.73
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   12.23
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.80 =    1633.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.80 TO NODE     47.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.23
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.707
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.60      0.25     0.500    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.94      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.54      SUBAREA RUNOFF(CFS) =    4.99
  EFFECTIVE AREA(ACRES) =     11.47   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       11.6       PEAK FLOW RATE(CFS) =      37.03

****************************************************************************
  FLOW PROCESS FROM NODE     47.80 TO NODE     47.90 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.50  DOWNSTREAM(FEET) =   692.30
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.81
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      37.03
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   12.29
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.90 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.90 TO NODE     47.90 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.29
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.696
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        1.43      0.25     0.500    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.14      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.57      SUBAREA RUNOFF(CFS) =    5.05
  EFFECTIVE AREA(ACRES) =     13.04   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =      41.97

****************************************************************************
  FLOW PROCESS FROM NODE     47.90 TO NODE     47.91 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.30  DOWNSTREAM(FEET) =   692.10
  FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  29.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.88
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.97
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   12.40
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.91 =    1707.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.91 TO NODE     47.91 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.40
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.677
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        1.89      0.25     0.500    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.30      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.19      SUBAREA RUNOFF(CFS) =   10.23
  EFFECTIVE AREA(ACRES) =     16.23   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      51.98

****************************************************************************
  FLOW PROCESS FROM NODE     47.91 TO NODE     47.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.10  DOWNSTREAM(FEET) =   691.30
  FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  30.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.44
```

```
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      51.98
 PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   12.77
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.00 =    1874.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       51.98   12.77    3.615  0.24( 0.12) 0.50      16.2      47.36
     2       51.38   13.10    3.563  0.24( 0.12) 0.50      16.3      47.31
     3       50.20   13.67    3.476  0.24( 0.12) 0.50      16.3      47.33
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.00 =    1874.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      474.26    6.89    5.148  0.27( 0.07) 0.27      88.4      41.90
     2      474.26    6.89    5.148  0.27( 0.07) 0.27      88.4      41.90
     3      500.19    7.62    4.859  0.27( 0.07) 0.27     100.2      30.20
     4      544.05    9.21    4.361  0.27( 0.07) 0.27     127.8      55.10
     5      602.30   11.38    3.861  0.27( 0.07) 0.27     165.7      37.30
     6      604.99   11.49    3.842  0.27( 0.07) 0.27     167.4      56.14
     7      652.75   13.41    3.515  0.27( 0.07) 0.27     200.1      37.60
     8      655.18   13.52    3.500  0.27( 0.07) 0.27     201.8      56.11
     9      667.02   14.04    3.425  0.27( 0.07) 0.27     210.2      41.20
    10      678.25   14.61    3.347  0.27( 0.07) 0.27     219.2      45.00
    11      680.34   14.73    3.332  0.27( 0.07) 0.27     221.0      42.00
    12      702.00   16.00    3.177  0.27( 0.07) 0.27     239.7      38.00
    13      751.21   18.79    2.898  0.27( 0.07) 0.27     279.8       1.00
    14      735.61   19.57    2.831  0.27( 0.07) 0.27     281.4       8.00
    15      713.76   20.63    2.747  0.27( 0.07) 0.27     282.2      51.00
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      514.60    6.89    5.148  0.26( 0.08) 0.29      97.1      41.90
     2      514.60    6.89    5.148  0.26( 0.08) 0.29      97.1      41.90
     3      542.26    7.62    4.859  0.26( 0.08) 0.29     109.9      30.20
     4      589.52    9.21    4.361  0.26( 0.08) 0.29     139.5      55.10
     5      651.90   11.38    3.861  0.26( 0.08) 0.29     180.1      37.30
     6      654.77   11.49    3.842  0.26( 0.08) 0.29     182.0      56.14
     7      688.78   12.77    3.615  0.26( 0.08) 0.29     205.4      47.36
     8      696.28   13.10    3.563  0.26( 0.08) 0.29     211.0      47.31
     9      703.48   13.41    3.515  0.26( 0.08) 0.29     216.4      37.60
    10      705.71   13.52    3.500  0.26( 0.08) 0.29     218.1      56.11
    11      709.00   13.67    3.476  0.26( 0.08) 0.29     220.7      47.33
    12      716.45   14.04    3.425  0.26( 0.08) 0.29     226.6      41.20
    13      726.52   14.61    3.347  0.26( 0.08) 0.29     235.6      45.00
    14      728.38   14.73    3.332  0.26( 0.08) 0.29     237.3      42.00
    15      747.73   16.00    3.177  0.26( 0.08) 0.29     256.0      38.00
    16      792.76   18.79    2.898  0.26( 0.07) 0.28     296.2       1.00
    17      776.17   19.57    2.831  0.26( 0.07) 0.28     297.7       8.00
    18      753.06   20.63    2.747  0.26( 0.07) 0.28     298.5      51.00
  TOTAL AREA(ACRES) =      298.5

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      792.76  Tc(MIN.) =   18.791
 EFFECTIVE AREA(ACRES) =    296.16  AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      298.5
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     47.00 TO NODE     48.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   691.30  DOWNSTREAM(FEET) =   691.10
 FLOW LENGTH(FEET) =    61.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN 120.0 INCH PIPE IS  87.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.91
 ESTIMATED PIPE DIAMETER(INCH) = 120.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     792.76
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   18.87
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     48.60 TO NODE     48.61 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    712.40  DOWNSTREAM(FEET) =    707.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.660
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.517
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
```

```
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.05      0.30     0.400    76    8.66
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.02      0.25     0.400    86    8.66
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.69      0.20     0.400    91    8.66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      3.03
  TOTAL AREA(ACRES) =      0.76   PEAK FLOW RATE(CFS) =      3.03

****************************************************************************
  FLOW PROCESS FROM NODE     48.61 TO NODE     48.70 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  707.00  DOWNSTREAM ELEVATION(FEET) =  698.80
  STREET LENGTH(FEET) =   346.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.36
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =   11.35
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.43
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.14
  STREET FLOW TRAVEL TIME(MIN.) =   1.68   Tc(MIN.) =   10.34
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.081
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.46      0.25     0.400    86
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.28      0.20     0.400    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.74      SUBAREA RUNOFF(CFS) =    2.66
  EFFECTIVE AREA(ACRES) =      1.50    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       5.39

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  12.36
  FLOW VELOCITY(FEET/SEC.) =  3.63   DEPTH*VELOCITY(FT*FT/SEC.) =   1.27
  LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.70 =     676.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.70 TO NODE     48.70 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.34
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.081
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.59      0.25     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    2.15
  EFFECTIVE AREA(ACRES) =      2.09   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.32
  TOTAL AREA(ACRES) =        2.1        PEAK FLOW RATE(CFS) =       7.54

****************************************************************************
  FLOW PROCESS FROM NODE     48.71 TO NODE     48.71 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.34
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.081
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.09      0.30     0.400    76
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.47      0.25     0.400    86
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.80      0.20     0.400    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.36      SUBAREA RUNOFF(CFS) =    4.88
  EFFECTIVE AREA(ACRES) =      3.45   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =        3.4        PEAK FLOW RATE(CFS) =      12.43

****************************************************************************
  FLOW PROCESS FROM NODE     48.70 TO NODE     48.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   698.80  DOWNSTREAM(FEET) =   691.10
  FLOW LENGTH(FEET) =   119.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.27
```

```
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.43
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   10.48
 LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.00 =     795.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       12.43   10.48    4.049  0.22( 0.08) 0.35       3.4      48.60
 LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.00 =     795.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      514.60    6.98    5.111  0.26( 0.08) 0.29      97.1      41.90
     2      514.60    6.98    5.111  0.26( 0.08) 0.29      97.1      41.90
     3      542.26    7.71    4.827  0.26( 0.08) 0.29     109.9      30.20
     4      589.52    9.29    4.338  0.26( 0.08) 0.29     139.5      55.10
     5      651.90   11.47    3.845  0.26( 0.08) 0.29     180.1      37.30
     6      654.77   11.57    3.826  0.26( 0.08) 0.29     182.0      56.14
     7      688.78   12.85    3.602  0.26( 0.08) 0.29     205.4      47.36
     8      696.28   13.18    3.551  0.26( 0.08) 0.29     211.0      47.31
     9      703.48   13.50    3.503  0.26( 0.08) 0.29     216.4      37.60
    10      705.71   13.60    3.488  0.26( 0.08) 0.29     218.1      56.11
    11      709.00   13.76    3.465  0.26( 0.08) 0.29     220.7      47.33
    12      716.45   14.12    3.414  0.26( 0.08) 0.29     226.6      41.20
    13      726.52   14.69    3.336  0.26( 0.08) 0.29     235.6      45.00
    14      728.38   14.81    3.321  0.26( 0.08) 0.29     237.3      42.00
    15      747.73   16.08    3.168  0.26( 0.08) 0.29     256.0      38.00
    16      792.76   18.87    2.891  0.26( 0.07) 0.28     296.2       1.00
    17      776.17   19.65    2.824  0.26( 0.07) 0.28     297.7       8.00
    18      753.06   20.71    2.741  0.26( 0.07) 0.28     298.5      51.00
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      525.10    6.98    5.111  0.26( 0.08) 0.29      99.4      41.90
     2      525.10    6.98    5.111  0.26( 0.08) 0.29      99.4      41.90
     3      553.20    7.71    4.827  0.26( 0.08) 0.29     112.4      30.20
     4      601.34    9.29    4.338  0.26( 0.08) 0.29     142.5      55.10
     5      635.95   10.48    4.049  0.26( 0.08) 0.29     165.1      48.60
     6      663.69   11.47    3.845  0.26( 0.08) 0.29     183.6      37.30
     7      666.50   11.57    3.826  0.26( 0.08) 0.29     185.5      56.14
     8      699.81   12.85    3.602  0.26( 0.08) 0.29     208.9      47.36
     9      707.15   13.18    3.551  0.26( 0.08) 0.29     214.5      47.31
    10      714.20   13.50    3.503  0.26( 0.08) 0.29     219.9      37.60
    11      716.38   13.60    3.488  0.26( 0.08) 0.29     221.6      56.11
    12      719.60   13.76    3.465  0.26( 0.08) 0.29     224.2      47.33
    13      726.89   14.12    3.414  0.26( 0.08) 0.29     230.0      41.20
    14      736.71   14.69    3.336  0.26( 0.08) 0.29     239.0      45.00
    15      738.53   14.81    3.321  0.26( 0.08) 0.29     240.8      42.00
    16      757.40   16.08    3.168  0.26( 0.08) 0.29     259.5      38.00
    17      801.57   18.87    2.891  0.26( 0.07) 0.28     299.6       1.00
    18      784.76   19.65    2.824  0.26( 0.07) 0.28     301.2       8.00
    19      761.39   20.71    2.741  0.26( 0.07) 0.28     302.0      51.00
  TOTAL AREA(ACRES) =       302.0

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      801.57  Tc(MIN.) =   18.870
 EFFECTIVE AREA(ACRES) =    299.61  AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      302.0
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     48.00 TO NODE     49.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   691.10  DOWNSTREAM(FEET) =   689.20
 FLOW LENGTH(FEET) =   384.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN 108.0 INCH PIPE IS  85.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.92
 ESTIMATED PIPE DIAMETER(INCH) = 108.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     801.57
 PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   19.30
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     49.00 =   11849.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.30
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.854
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.31      0.30      0.100    76
 COMMERCIAL                  C        0.90      0.25      0.100    86
 COMMERCIAL                  D        0.12      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    1.33      SUBAREA RUNOFF(CFS) =    3.39
 EFFECTIVE AREA(ACRES) =    300.94   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
```

```
  TOTAL AREA(ACRES) =      303.3       PEAK FLOW RATE(CFS) =     801.57
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.30
  RAINFALL INTENSITY(INCH/HR) =   2.85
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.28
  EFFECTIVE STREAM AREA(ACRES) =     300.94
  TOTAL STREAM AREA(ACRES) =     303.28
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     801.57

****************************************************************************
  FLOW PROCESS FROM NODE     61.30 TO NODE     61.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    707.30  DOWNSTREAM(FEET) =    704.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.383
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.602
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  APARTMENTS                  B        0.53      0.30     0.200    76    8.38
  APARTMENTS                  D        0.77      0.20     0.200    91    8.38
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      5.33
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      5.33

****************************************************************************
  FLOW PROCESS FROM NODE     61.20 TO NODE     61.10 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    704.20
  DOWNSTREAM NODE ELEVATION(FEET) =    703.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   119.00
  "V" GUTTER WIDTH(FEET) =   1.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.10000
  MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.450
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                  B        1.30      0.30     0.200    76
  APARTMENTS                  D        0.25      0.20     0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      8.39
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.92
  AVERAGE FLOW DEPTH(FEET) =   0.47   FLOOD WIDTH(FEET) =    9.23
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.51   Tc(MIN.) =    8.89
  SUBAREA AREA(ACRES) =    1.55       SUBAREA RUNOFF(CFS) =    6.13
  EFFECTIVE AREA(ACRES) =    2.85     AREA-AVERAGED Fm(INCH/HR) =   0.05
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   0.20
  TOTAL AREA(ACRES) =        2.8          PEAK FLOW RATE(CFS) =      11.28

        ==>>ERROR:FLOW EXCEEDS CAPACITY OF CHANNEL WITH
            NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM ALLOWABLE DEPTH.
            AS AN APPROXIMATION, TRAVEL TIME CALCULATIONS ARE BASED
            ON FLOW DEPTH EQUAL TO THE SPECIFIED MAXIMUM ALLOWABLE DEPTH.


  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.50   FLOOD WIDTH(FEET) =    9.80
  FLOW VELOCITY(FEET/SEC.) =   4.68   DEPTH*VELOCITY(FT*FT/SEC) =   2.34
  LONGEST FLOWPATH FROM NODE     61.30 TO NODE     61.10 =     449.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.10 TO NODE     49.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  703.00  DOWNSTREAM ELEVATION(FEET) =  699.50
  STREET LENGTH(FEET) =   380.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.69
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.49   FLOOD WIDTH(FEET) =   20.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    3.04
    SPLIT DEPTH(FEET) =    0.28   SPLIT FLOOD WIDTH(FEET) =    8.25
    SPLIT FLOW(CFS) =    1.36   SPLIT VELOCITY(FEET/SEC.) =    1.86
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.49
    HALFSTREET FLOOD WIDTH(FEET) =   20.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.04
```

```
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.49
 STREET FLOW TRAVEL TIME(MIN.) =   2.08   Tc(MIN.) =   10.97
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.945
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.26      0.30     0.100    76
 COMMERCIAL                  C        0.25      0.25     0.100    86
 COMMERCIAL                  D        0.29      0.20     0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    2.82
 EFFECTIVE AREA(ACRES) =      3.65    AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
 TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =      12.80

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  20.00
 FLOW VELOCITY(FEET/SEC.) =  3.04   DEPTH*VELOCITY(FT*FT/SEC.) =   1.49
 LONGEST FLOWPATH FROM NODE     61.30 TO NODE     49.00 =     829.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   10.97
 RAINFALL INTENSITY(INCH/HR) =   3.94
 AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.26
 AREA-AVERAGED Ap =  0.18
 EFFECTIVE STREAM AREA(ACRES) =       3.65
 TOTAL STREAM AREA(ACRES) =       3.65
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.80

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1      525.10    7.45    4.922  0.26( 0.08) 0.29      100.8      41.90
     1      525.10    7.45    4.922  0.26( 0.08) 0.29      100.8      41.90
     1      553.20    8.18    4.665  0.26( 0.08) 0.29      113.8      30.20
     1      601.34    9.76    4.219  0.26( 0.08) 0.29      143.9      55.10
     1      635.95   10.93    3.953  0.26( 0.08) 0.29      166.4      48.60
     1      663.69   11.92    3.762  0.26( 0.08) 0.29      184.9      37.30
     1      666.50   12.02    3.744  0.26( 0.08) 0.29      186.8      56.14
     1      699.81   13.30    3.533  0.26( 0.08) 0.29      210.2      47.36
     1      707.15   13.62    3.484  0.26( 0.08) 0.29      215.8      47.31
     1      714.20   13.94    3.438  0.26( 0.08) 0.29      221.2      37.60
     1      716.38   14.03    3.426  0.26( 0.08) 0.29      222.9      56.11
     1      719.60   14.19    3.404  0.26( 0.08) 0.29      225.5      47.33
     1      726.89   14.55    3.355  0.26( 0.08) 0.29      231.3      41.20
     1      736.71   15.13    3.281  0.26( 0.08) 0.29      240.3      45.00
     1      738.53   15.24    3.267  0.26( 0.08) 0.29      242.1      42.00
     1      757.40   16.51    3.121  0.26( 0.08) 0.29      260.8      38.00
     1      801.57   19.30    2.854  0.26( 0.07) 0.28      300.9       1.00
     1      784.76   20.08    2.790  0.26( 0.07) 0.28      302.5       8.00
     1      761.39   21.14    2.709  0.26( 0.07) 0.28      303.3      51.00
     2       12.80   10.97    3.945  0.26( 0.05) 0.18        3.6      61.30

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1      535.98    7.45    4.922  0.26( 0.08) 0.29      103.2      41.90
     2      535.98    7.45    4.922  0.26( 0.08) 0.29      103.2      41.90
     3      564.52    8.18    4.665  0.26( 0.08) 0.29      116.5      30.20
     4      613.53    9.76    4.219  0.26( 0.08) 0.29      147.1      55.10
     5      648.73   10.93    3.953  0.26( 0.08) 0.29      170.1      48.60
     6      649.92   10.97    3.945  0.26( 0.08) 0.29      170.9      61.30
     7      675.89   11.92    3.762  0.26( 0.08) 0.29      188.6      37.30
     8      678.65   12.02    3.744  0.26( 0.08) 0.29      190.5      56.14
     9      711.26   13.30    3.533  0.26( 0.08) 0.29      213.9      47.36
    10      718.44   13.62    3.484  0.26( 0.08) 0.29      219.5      47.31
    11      725.34   13.94    3.438  0.26( 0.08) 0.29      224.9      37.60
    12      727.48   14.03    3.426  0.26( 0.08) 0.29      226.6      56.11
    13      730.63   14.19    3.404  0.26( 0.08) 0.29      229.2      47.33
    14      737.76   14.55    3.355  0.26( 0.08) 0.29      235.0      41.20
    15      747.34   15.13    3.281  0.26( 0.08) 0.29      244.0      45.00
    16      749.11   15.24    3.267  0.26( 0.08) 0.29      245.7      42.00
    17      767.50   16.51    3.121  0.26( 0.08) 0.29      264.5      38.00
    18      810.79   19.30    2.854  0.26( 0.07) 0.28      304.6       1.00
    19      793.77   20.08    2.790  0.26( 0.07) 0.28      306.2       8.00
    20      770.13   21.14    2.709  0.26( 0.07) 0.28      306.9      51.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     810.79    Tc(MIN.) =    19.30
 EFFECTIVE AREA(ACRES) =     304.59   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      306.9
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     49.00 =   11849.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     49.00 TO NODE     50.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   689.20  DOWNSTREAM(FEET) =   688.90
 FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN 108.0 INCH PIPE IS  82.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.49
 ESTIMATED PIPE DIAMETER(INCH) = 108.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     810.79
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   19.36
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     57.10 TO NODE     57.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    714.00  DOWNSTREAM(FEET) =    711.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.278
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.635
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.42      0.30      0.100    76    8.28
  COMMERCIAL                 D        0.08      0.20      0.100    91    8.28
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.07
  TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      2.07

****************************************************************************
  FLOW PROCESS FROM NODE     57.20 TO NODE     57.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  711.60  DOWNSTREAM ELEVATION(FEET) =  709.00
  STREET LENGTH(FEET) =   130.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.29
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    8.81
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.81
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.81
  STREET FLOW TRAVEL TIME(MIN.) =   0.77   Tc(MIN.) =    9.05
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.405
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.11      0.30      0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.11      SUBAREA RUNOFF(CFS) =     0.43
  EFFECTIVE AREA(ACRES) =      0.61    AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.6        PEAK FLOW RATE(CFS) =       2.40

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   9.01
  FLOW VELOCITY(FEET/SEC.) =  2.84   DEPTH*VELOCITY(FT*FT/SEC.) =   0.82
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     57.00 =     460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.05
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.405
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.29      0.30      0.100    76
  COMMERCIAL                 C        0.02      0.25      0.100    86
  COMMERCIAL                 D        0.34      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.65      SUBAREA RUNOFF(CFS) =     2.56
  EFFECTIVE AREA(ACRES) =      1.26   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =       4.96

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.05
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.405
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.33      0.30      0.200    76
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.56      0.20      0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     0.89      SUBAREA RUNOFF(CFS) =     3.49
  EFFECTIVE AREA(ACRES) =      2.15   AREA-AVERAGED Fm(INCH/HR) =  0.04
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.14
  TOTAL AREA(ACRES) =        2.2       PEAK FLOW RATE(CFS) =       8.45

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.05
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.405
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.34      0.30     0.200    76
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.53      0.20     0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.87      SUBAREA RUNOFF(CFS) =    3.41
  EFFECTIVE AREA(ACRES) =      3.02   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =        3.0       PEAK FLOW RATE(CFS) =      11.87

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     58.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.00  DOWNSTREAM(FEET) =   702.50
  FLOW LENGTH(FEET) =   633.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.00
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.87
  PIPE TRAVEL TIME(MIN.) =   1.51    Tc(MIN.) =   10.55
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     58.00 =    1093.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.55
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.033
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        1.93      0.30     0.200    76
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.46      0.20     0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    2.39      SUBAREA RUNOFF(CFS) =    8.55
  EFFECTIVE AREA(ACRES) =      5.41   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =      19.41

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.55
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.033
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        1.60      0.30     0.200    76
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.76      0.20     0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    2.36      SUBAREA RUNOFF(CFS) =    8.45
  EFFECTIVE AREA(ACRES) =      7.77   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =      27.86

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   702.50  DOWNSTREAM(FEET) =   700.00
  FLOW LENGTH(FEET) =    67.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.75
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.86
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   10.64
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     58.10 =    1160.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     58.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.64
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.015
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        1.94      0.30     0.200    76
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       C        0.82      0.25     0.200    86
```

```
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        4.28      0.20      0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     7.04      SUBAREA RUNOFF(CFS) =   25.14
  EFFECTIVE AREA(ACRES) =     14.81   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       14.8       PEAK FLOW RATE(CFS) =      52.88

****************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     58.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.64
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.015
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       C        3.80      0.25      0.200    86
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        2.64      0.20      0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     6.44      SUBAREA RUNOFF(CFS) =   23.00
  EFFECTIVE AREA(ACRES) =     21.25   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       21.2       PEAK FLOW RATE(CFS) =      75.88

****************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     59.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   700.00  DOWNSTREAM(FEET) =   699.50
  FLOW LENGTH(FEET) =   139.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.39
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      75.88
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =   10.95
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.00 =    1299.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.95
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.949
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.44      0.30      0.100    76
  COMMERCIAL                 D        0.18      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.62      SUBAREA RUNOFF(CFS) =    2.19
  EFFECTIVE AREA(ACRES) =     21.87   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       21.9       PEAK FLOW RATE(CFS) =      76.80

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.50  DOWNSTREAM(FEET) =   699.10
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.54
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      76.80
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.05
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.10 =    1355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     59.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.05
  RAINFALL INTENSITY(INCH/HR) =   3.93
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  0.19
  EFFECTIVE STREAM AREA(ACRES) =      21.87
  TOTAL STREAM AREA(ACRES) =      21.87
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      76.80

****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     50.10 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    83.00
  USER SPECIFIED Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.01      0.30      0.100    76
  COMMERCIAL                 C        0.06      0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.39
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.39

****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     50.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.08      0.30      0.100    76
  COMMERCIAL                 C        0.01      0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.50
  EFFECTIVE AREA(ACRES) =      0.16   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.2       PEAK FLOW RATE(CFS) =       0.89

****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     59.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.00  DOWNSTREAM(FEET) =   699.10
  FLOW LENGTH(FEET) =   481.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.05
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.89
  PIPE TRAVEL TIME(MIN.) =   1.59    Tc(MIN.) =    6.59
  LONGEST FLOWPATH FROM NODE     50.10 TO NODE     59.10 =     564.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     59.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.59
  RAINFALL INTENSITY(INCH/HR) =   5.28
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.28
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.16
  TOTAL STREAM AREA(ACRES) =       0.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.89

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       76.80   11.05    3.929  0.24( 0.05) 0.19      21.9      57.10
      2        0.89    6.59    5.283  0.28( 0.03) 0.10       0.2      50.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       62.67    6.59    5.283  0.24( 0.05) 0.19      13.2      50.10
      2       77.46   11.05    3.929  0.24( 0.05) 0.19      22.0      57.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      77.46    Tc(MIN.) =    11.05
  EFFECTIVE AREA(ACRES) =      22.03   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       22.0
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.10 =    1355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     50.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.10  DOWNSTREAM(FEET) =   688.90
  FLOW LENGTH(FEET) =    28.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  42.37
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      77.46
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.06
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     50.00 =    1383.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       62.67    6.60    5.278  0.24( 0.05) 0.19      13.2      50.10
      2       77.46   11.06    3.926  0.24( 0.05) 0.19      22.0      57.10
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     50.00 =    1383.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      535.98    7.52    4.897  0.26( 0.08) 0.29     103.2      41.90
```

```
    2      535.98    7.52    4.897  0.26( 0.08) 0.29     103.2      41.90
    3      564.52    8.25    4.644  0.26( 0.08) 0.29     116.5      30.20
    4      613.53    9.82    4.203  0.26( 0.08) 0.29     147.1      55.10
    5      648.73   10.99    3.940  0.26( 0.08) 0.29     170.1      48.60
    6      649.92   11.03    3.932  0.26( 0.08) 0.29     170.9      61.30
    7      675.89   11.98    3.751  0.26( 0.08) 0.29     188.6      37.30
    8      678.65   12.08    3.732  0.26( 0.08) 0.29     190.5      56.14
    9      711.26   13.36    3.523  0.26( 0.08) 0.29     213.9      47.36
   10      718.44   13.69    3.475  0.26( 0.08) 0.29     219.5      47.31
   11      725.34   14.00    3.429  0.26( 0.08) 0.29     224.9      37.60
   12      727.48   14.09    3.417  0.26( 0.08) 0.29     226.6      56.11
   13      730.63   14.25    3.395  0.26( 0.08) 0.29     229.2      47.33
   14      737.76   14.61    3.347  0.26( 0.08) 0.29     235.0      41.20
   15      747.34   15.19    3.274  0.26( 0.08) 0.29     244.0      45.00
   16      749.11   15.30    3.259  0.26( 0.08) 0.29     245.7      42.00
   17      767.50   16.57    3.114  0.26( 0.08) 0.29     264.5      38.00
   18      810.79   19.36    2.849  0.26( 0.07) 0.28     304.6       1.00
   19      793.77   20.14    2.785  0.26( 0.07) 0.28     306.2       8.00
   20      770.13   21.20    2.704  0.26( 0.07) 0.28     306.9      51.00
LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
    1      570.11    6.60    5.278  0.26( 0.07) 0.28     103.8      50.10
    2      601.70    7.52    4.897  0.26( 0.07) 0.28     118.3      41.90
    3      601.70    7.52    4.897  0.26( 0.07) 0.28     118.3      41.90
    4      632.66    8.25    4.644  0.26( 0.07) 0.28     132.9      30.20
    5      686.88    9.82    4.203  0.26( 0.07) 0.28     166.7      55.10
    6      725.97   10.99    3.940  0.26( 0.07) 0.28     192.0      48.60
    7      727.30   11.03    3.932  0.26( 0.07) 0.28     192.8      61.30
    8      728.10   11.06    3.926  0.26( 0.07) 0.28     193.4      57.10
    9      749.85   11.98    3.751  0.26( 0.07) 0.28     210.6      37.30
   10      752.23   12.08    3.732  0.26( 0.07) 0.28     212.5      56.14
   11      780.68   13.36    3.523  0.26( 0.07) 0.28     235.9      47.36
   12      786.88   13.69    3.475  0.26( 0.07) 0.28     241.5      47.31
   13      792.89   14.00    3.429  0.26( 0.07) 0.28     246.9      37.60
   14      794.77   14.09    3.417  0.26( 0.07) 0.28     248.6      56.11
   15      797.48   14.25    3.395  0.26( 0.07) 0.28     251.2      47.33
   16      803.65   14.61    3.347  0.26( 0.07) 0.28     257.0      41.20
   17      811.77   15.19    3.274  0.26( 0.07) 0.28     266.0      45.00
   18      813.25   15.30    3.259  0.26( 0.07) 0.28     267.8      42.00
   19      828.74   16.57    3.114  0.26( 0.07) 0.28     286.5      38.00
   20      866.73   19.36    2.849  0.26( 0.07) 0.27     326.6       1.00
   21      848.44   20.14    2.785  0.26( 0.07) 0.28     328.2       8.00
   22      823.20   21.20    2.704  0.26( 0.07) 0.28     329.0      51.00
  TOTAL AREA(ACRES) =       329.0

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      866.73  Tc(MIN.) =   19.359
EFFECTIVE AREA(ACRES) =    326.62  AREA-AVERAGED Fm(INCH/HR) =  0.07
AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.27
TOTAL AREA(ACRES) =      329.0
LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   688.90  DOWNSTREAM(FEET) =   675.00
  FLOW LENGTH(FEET) =   437.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  78.0 INCH PIPE IS  62.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  30.47
  ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     866.73
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   19.60
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     61.00 =   12342.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.60
  RAINFALL INTENSITY(INCH/HR) =   2.83
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.27
  EFFECTIVE STREAM AREA(ACRES) =     326.62
  TOTAL STREAM AREA(ACRES) =     328.96
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     866.73

****************************************************************************
  FLOW PROCESS FROM NODE     48.10 TO NODE     48.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    712.40  DOWNSTREAM(FEET) =    709.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.947
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.172
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.15      0.30      0.400    76    9.95
  RESIDENTIAL
```

Onsite Hydrology Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1 and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61, ***without Detention***

100-Year Storm Proposed Condition

```
  "8-10 DWELLINGS/ACRE"      D        0.34      0.20     0.400    91     9.95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      1.80
  TOTAL AREA(ACRES) =      0.49   PEAK FLOW RATE(CFS) =      1.80

****************************************************************************
  FLOW PROCESS FROM NODE     48.20 TO NODE     48.30 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  709.70  DOWNSTREAM ELEVATION(FEET) =  703.80
  STREET LENGTH(FEET) =   500.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.86
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   12.46
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.56
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.90
  STREET FLOW TRAVEL TIME(MIN.) =   3.25   Tc(MIN.) =   13.20
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.547
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.64      0.25     0.400    86
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.68      0.20     0.400    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.32      SUBAREA RUNOFF(CFS) =    4.11
  EFFECTIVE AREA(ACRES) =      1.81    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        1.8        PEAK FLOW RATE(CFS) =       5.63

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  14.50
  FLOW VELOCITY(FEET/SEC.) =  2.82   DEPTH*VELOCITY(FT*FT/SEC.) =   1.10
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.30 =     830.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.30 TO NODE     48.40 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  703.80  DOWNSTREAM ELEVATION(FEET) =  700.20
  STREET LENGTH(FEET) =   522.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.85
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.45   FLOOD WIDTH(FEET) =   18.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    2.45
    SPLIT DEPTH(FEET) =    0.22   SPLIT FLOOD WIDTH(FEET) =    4.95
    SPLIT FLOW(CFS) =    0.45   SPLIT VELOCITY(FEET/SEC.) =    1.33
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   18.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.45
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.11
  STREET FLOW TRAVEL TIME(MIN.) =   3.54   Tc(MIN.) =   16.75
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.095
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.93      0.25     0.400    86
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.71      0.20     0.400    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.64      SUBAREA RUNOFF(CFS) =    4.43
  EFFECTIVE AREA(ACRES) =      3.45    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        3.4        PEAK FLOW RATE(CFS) =       9.33

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  2.45   DEPTH*VELOCITY(FT*FT/SEC.) =   1.11
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.40 =    1352.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.40 TO NODE     48.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.75
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.095
```

```
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        0.44      0.25      0.400    86
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.46      0.20      0.400    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =     0.90      SUBAREA RUNOFF(CFS) =     2.43
  EFFECTIVE AREA(ACRES) =      4.35   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =         4.3       PEAK FLOW RATE(CFS) =      11.76

****************************************************************************
  FLOW PROCESS FROM NODE     48.40 TO NODE     48.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   700.20  DOWNSTREAM(FEET) =   699.80
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.33
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.76
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   17.00
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.50 =    1432.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.50 TO NODE     48.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.069
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.16      0.30      0.400    76
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        1.49      0.25      0.400    86
  PUBLIC PARK                 C        0.26      0.25      0.850    86
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.88      0.20      0.400    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.442
  SUBAREA AREA(ACRES) =     2.79      SUBAREA RUNOFF(CFS) =     7.44
  EFFECTIVE AREA(ACRES) =      7.14   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =         7.1       PEAK FLOW RATE(CFS) =      19.10

****************************************************************************
  FLOW PROCESS FROM NODE     48.50 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.80  DOWNSTREAM(FEET) =   675.00
  FLOW LENGTH(FEET) =   425.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.11
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.10
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   17.46
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     61.00 =    1857.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.46
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.022
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 B        1.98      0.30      0.850    76
  PUBLIC PARK                 D        1.67      0.20      0.850    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =     3.65      SUBAREA RUNOFF(CFS) =     9.22
  EFFECTIVE AREA(ACRES) =     10.79   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =       10.8       PEAK FLOW RATE(CFS) =      28.02

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   17.46
  RAINFALL INTENSITY(INCH/HR) =   3.02
  AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =      10.79
  TOTAL STREAM AREA(ACRES) =      10.79
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      28.02

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      570.11    6.86    5.162  0.26( 0.07) 0.28     103.8      50.10
      1      601.70    7.78    4.802  0.26( 0.07) 0.28     118.3      41.90
      1      601.70    7.78    4.802  0.26( 0.07) 0.28     118.3      41.90
```

1	632.66	8.51	4.562	0.26(0.07)	0.28	132.9	30.20
1	686.88	10.07	4.142	0.26(0.07)	0.28	166.7	55.10
1	725.97	11.24	3.890	0.26(0.07)	0.28	192.0	48.60
1	727.30	11.28	3.882	0.26(0.07)	0.28	192.8	61.30
1	728.10	11.30	3.877	0.26(0.07)	0.28	193.4	57.10
1	749.85	12.22	3.707	0.26(0.07)	0.28	210.6	37.30
1	752.23	12.33	3.690	0.26(0.07)	0.28	212.5	56.14
1	780.68	13.61	3.487	0.26(0.07)	0.28	235.9	47.36
1	786.88	13.93	3.440	0.26(0.07)	0.28	241.5	47.31
1	792.89	14.25	3.396	0.26(0.07)	0.28	246.9	37.60
1	794.77	14.34	3.383	0.26(0.07)	0.28	248.6	56.11
1	797.48	14.50	3.362	0.26(0.07)	0.28	251.2	47.33
1	803.65	14.85	3.316	0.26(0.07)	0.28	257.0	41.20
1	811.77	15.43	3.244	0.26(0.07)	0.28	266.0	45.00
1	813.25	15.54	3.231	0.26(0.07)	0.28	267.8	42.00
1	828.74	16.81	3.088	0.26(0.07)	0.28	286.5	38.00
1	866.73	19.60	2.829	0.26(0.07)	0.27	326.6	1.00
1	848.44	20.38	2.766	0.26(0.07)	0.28	328.2	8.00
1	823.20	21.44	2.687	0.26(0.07)	0.28	329.0	51.00
2	28.02	17.46	3.022	0.24(0.14)	0.56	10.8	48.10

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	589.28	6.86	5.162	0.26(0.07)	0.29	108.0	50.10
2	621.89	7.78	4.802	0.26(0.07)	0.29	123.1	41.90
3	621.89	7.78	4.802	0.26(0.07)	0.29	123.1	41.90
4	653.60	8.51	4.562	0.26(0.07)	0.29	138.2	30.20
5	709.32	10.07	4.142	0.26(0.07)	0.29	172.9	55.10
6	749.42	11.24	3.890	0.26(0.07)	0.29	198.9	48.60
7	750.78	11.28	3.882	0.26(0.07)	0.29	199.8	61.30
8	751.61	11.30	3.877	0.26(0.07)	0.29	200.4	57.10
9	774.12	12.22	3.707	0.26(0.07)	0.29	218.1	37.30
10	776.58	12.33	3.690	0.26(0.07)	0.29	220.1	56.14
11	806.02	13.61	3.487	0.26(0.08)	0.29	244.3	47.36
12	812.47	13.93	3.440	0.26(0.08)	0.29	250.1	47.31
13	818.70	14.25	3.396	0.26(0.08)	0.29	255.7	37.60
14	820.66	14.34	3.383	0.26(0.08)	0.29	257.5	56.11
15	823.48	14.50	3.362	0.26(0.08)	0.29	260.1	47.33
16	829.90	14.85	3.316	0.26(0.08)	0.29	266.2	41.20
17	838.43	15.43	3.244	0.26(0.08)	0.29	275.5	45.00
18	839.99	15.54	3.231	0.26(0.08)	0.29	277.4	42.00
19	856.34	16.81	3.088	0.26(0.08)	0.29	296.9	38.00
20	865.66	17.46	3.022	0.26(0.07)	0.29	306.7	48.10
21	892.87	19.60	2.829	0.26(0.07)	0.28	337.4	1.00
22	873.97	20.38	2.766	0.26(0.07)	0.28	339.0	8.00
23	847.96	21.44	2.687	0.26(0.07)	0.29	339.8	51.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 892.87 Tc(MIN.) = 19.60
EFFECTIVE AREA(ACRES) = 337.41 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.28

TOTAL AREA(ACRES) = 339.8
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 61.00 = 12342.00 FEET.

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 339.8 TC(MIN.) = 19.60
EFFECTIVE AREA(ACRES) = 337.41 AREA-AVERAGED Fm(INCH/HR)= 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.283
PEAK FLOW RATE(CFS) = 892.87

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	589.28	6.86	5.162	0.26(0.07)	0.29	108.0	50.10
2	621.89	7.78	4.802	0.26(0.07)	0.29	123.1	41.90
3	621.89	7.78	4.802	0.26(0.07)	0.29	123.1	41.90
4	653.60	8.51	4.562	0.26(0.07)	0.29	138.2	30.20
5	709.32	10.07	4.142	0.26(0.07)	0.29	172.9	55.10
6	749.42	11.24	3.890	0.26(0.07)	0.29	198.9	48.60
7	750.78	11.28	3.882	0.26(0.07)	0.29	199.8	61.30
8	751.61	11.30	3.877	0.26(0.07)	0.29	200.4	57.10
9	774.12	12.22	3.707	0.26(0.07)	0.29	218.1	37.30
10	776.58	12.33	3.690	0.26(0.07)	0.29	220.1	56.14
11	806.02	13.61	3.487	0.26(0.08)	0.29	244.3	47.36
12	812.47	13.93	3.440	0.26(0.08)	0.29	250.1	47.31
13	818.70	14.25	3.396	0.26(0.08)	0.29	255.7	37.60
14	820.66	14.34	3.383	0.26(0.08)	0.29	257.5	56.11
15	823.48	14.50	3.362	0.26(0.08)	0.29	260.1	47.33
16	829.90	14.85	3.316	0.26(0.08)	0.29	266.2	41.20
17	838.43	15.43	3.244	0.26(0.08)	0.29	275.5	45.00
18	839.99	15.54	3.231	0.26(0.08)	0.29	277.4	42.00
19	856.34	16.81	3.088	0.26(0.08)	0.29	296.9	38.00
20	865.66	17.46	3.022	0.26(0.07)	0.29	306.7	48.10
21	892.87	19.60	2.829	0.26(0.07)	0.28	337.4	1.00
22	873.97	20.38	2.766	0.26(0.07)	0.28	339.0	8.00
23	847.96	21.44	2.687	0.26(0.07)	0.29	339.8	51.00

END OF RATIONAL METHOD ANALYSIS

Onsite Hydrology Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1 and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61, ***without Detention***

100-Year Storm Proposed Condition

```
************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                     Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                *
* OFFSITE & ONSITE PROP. CONDITION @ 2-YEAR STORM WITH DETENTION NODE 35   *
* W.O. #1443-136X, 3.1% REDUCTION                                      *
 ************************************************************************

  FILE NAME: DET_02.DAT
  TIME/DATE OF STUDY: 10:38 06/10/2019
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   18.0      13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  2   20.0      15.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1099.00  DOWNSTREAM(FEET) =   1091.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.370
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.684
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.78      0.25      0.600    50    8.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      1.08
  TOTAL AREA(ACRES) =      0.78   PEAK FLOW RATE(CFS) =      1.08

************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 1091.20  DOWNSTREAM ELEVATION(FEET) = 1089.40
  STREET LENGTH(FEET) =    90.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.69
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    9.52
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.89
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.87
  STREET FLOW TRAVEL TIME(MIN.) =   0.52   Tc(MIN.) =    8.89
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.627
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.38      0.25      0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    3.22
  EFFECTIVE AREA(ACRES) =      3.16    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.52
```

Onsite Hydrology Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1 and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61, ***with Detention @ Node 35***

3.1% Reduction

2-Year Storm Proposed Condition

```
  TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =       4.25

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.55
  FLOW VELOCITY(FEET/SEC.) =  3.24   DEPTH*VELOCITY(FT*FT/SEC.) =   1.09
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1089.40  DOWNSTREAM ELEVATION(FEET) = 1067.00
  STREET LENGTH(FEET) =   513.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.61
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =   10.13
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.45
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.38
  STREET FLOW TRAVEL TIME(MIN.) =   1.92   Tc(MIN.) =   10.81
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.454
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.34      0.25     0.100    50
  PUBLIC PARK                C        0.25      0.25     0.850    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.418
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    0.72
  EFFECTIVE AREA(ACRES) =      3.75    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =       4.48

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =  10.03
  FLOW VELOCITY(FEET/SEC.) =  4.40   DEPTH*VELOCITY(FT*FT/SEC.) =   1.36
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     903.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.81
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.454
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.35      0.25     0.100    50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.49      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.333
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    1.04
  EFFECTIVE AREA(ACRES) =      4.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =       5.52

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1067.00  DOWNSTREAM(FEET) =  1062.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.46
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.52
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   10.97
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1003.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.97
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.442
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.09      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.09      SUBAREA RUNOFF(CFS) =    2.48
  EFFECTIVE AREA(ACRES) =      6.68   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        6.7        PEAK FLOW RATE(CFS) =       7.94

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1062.00  DOWNSTREAM(FEET) =  1022.40
  FLOW LENGTH(FEET) =   701.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.08
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.94
  PIPE TRAVEL TIME(MIN.) =   0.97    Tc(MIN.) =   11.94
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1704.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.94
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.374
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.18      0.30      0.100    36
  COMMERCIAL                  C        0.46      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.64      SUBAREA RUNOFF(CFS) =     0.78
  EFFECTIVE AREA(ACRES) =      7.32   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        7.3       PEAK FLOW RATE(CFS) =       8.31

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.40  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.10
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.31
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   12.26
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.26
  RAINFALL INTENSITY(INCH/HR) =   1.35
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       7.32
  TOTAL STREAM AREA(ACRES) =       7.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.31

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   305.00
  ELEVATION DATA: UPSTREAM(FEET) =   1046.00  DOWNSTREAM(FEET) =   1042.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.129
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.847
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  C        1.00      0.25      0.100    50    7.13
  RESIDENTIAL
  ".4 DWELLING/ACRE"          C        0.50      0.25      0.900    50   11.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
  SUBAREA RUNOFF(CFS) =      2.37
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      2.37

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1042.00  DOWNSTREAM ELEVATION(FEET) = 1036.00
  STREET LENGTH(FEET) =   373.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.52
```

```
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.29
   HALFSTREET FLOOD WIDTH(FEET) =    9.21
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.57
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.76
 STREET FLOW TRAVEL TIME(MIN.) =   2.42   Tc(MIN.) =    9.55
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.562
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        3.31      0.25     0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    3.31      SUBAREA RUNOFF(CFS) =    4.28
 EFFECTIVE AREA(ACRES) =      4.81    AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =        4.8        PEAK FLOW RATE(CFS) =       6.26

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =  10.64
 FLOW VELOCITY(FEET/SEC.) =  2.77   DEPTH*VELOCITY(FT*FT/SEC.) =   0.88
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     678.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1036.00  DOWNSTREAM ELEVATION(FEET) = 1026.00
 STREET LENGTH(FEET) =   463.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.61
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.32
   HALFSTREET FLOOD WIDTH(FEET) =   10.84
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.25
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.05
 STREET FLOW TRAVEL TIME(MIN.) =   2.37   Tc(MIN.) =   11.92
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.375
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        2.40      0.25     0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    2.70
 EFFECTIVE AREA(ACRES) =      7.21    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =       8.16

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  11.25
 FLOW VELOCITY(FEET/SEC.) =  3.26   DEPTH*VELOCITY(FT*FT/SEC.) =   1.08
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1141.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.92
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.375
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.16      0.30     0.500    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        2.22      0.25     0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    2.67
 EFFECTIVE AREA(ACRES) =      9.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =        9.6        PEAK FLOW RATE(CFS) =      10.83

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1026.00  DOWNSTREAM(FEET) =  1022.00
 FLOW LENGTH(FEET) =   395.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.84
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.83
 PIPE TRAVEL TIME(MIN.) =   0.96    Tc(MIN.) =   12.88
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1536.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
================================================================================
  MAINLINE Tc(MIN.) =   12.88
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.315
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.07      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        4.06      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     4.13      SUBAREA RUNOFF(CFS) =     4.42
  EFFECTIVE AREA(ACRES) =     13.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       13.7       PEAK FLOW RATE(CFS) =      14.73

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.00  DOWNSTREAM(FEET) =  1020.00
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.68
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.73
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   13.13
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.13
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.301
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.55      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        2.06      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     2.61      SUBAREA RUNOFF(CFS) =     2.75
  EFFECTIVE AREA(ACRES) =     16.33   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      17.31

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1020.00  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.10
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.31
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   13.57
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    1799.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.57
  RAINFALL INTENSITY(INCH/HR) =   1.28
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =      16.33
  TOTAL STREAM AREA(ACRES) =      16.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      17.31

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
      1        8.31   12.26    1.353  0.25( 0.11) 0.45       7.3        1.00
      2       17.31   13.57    1.276  0.25( 0.12) 0.49      16.3        8.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
      1       24.98   12.26    1.353  0.25( 0.12) 0.48      22.1        1.00
      2       25.10   13.57    1.276  0.25( 0.12) 0.48      23.6        8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      25.10    Tc(MIN.) =    13.57
  EFFECTIVE AREA(ACRES) =      23.65   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       23.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1019.50  DOWNSTREAM(FEET) =  1014.00
 FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.30
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      25.10
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   13.77
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.10 =    2014.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.77
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.266
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.15      0.30      0.100    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.15      SUBAREA RUNOFF(CFS) =     0.17
 EFFECTIVE AREA(ACRES) =     23.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =       23.8       PEAK FLOW RATE(CFS) =      25.10
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.77
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.266
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.16      0.30      0.100    36
 COMMERCIAL                  C        1.44      0.25      0.100    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     1.79
 EFFECTIVE AREA(ACRES) =     25.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
 TOTAL AREA(ACRES) =       25.4       PEAK FLOW RATE(CFS) =      26.34

****************************************************************************
 FLOW PROCESS FROM NODE      7.10 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1014.00  DOWNSTREAM(FEET) =   971.40
 FLOW LENGTH(FEET) =   863.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.38
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      26.34
 PIPE TRAVEL TIME(MIN.) =   0.93    Tc(MIN.) =   14.70
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    2877.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.70
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.219
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.82      0.30      0.100    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C        0.77      0.25      0.500    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.294
 SUBAREA AREA(ACRES) =     1.59      SUBAREA RUNOFF(CFS) =     1.64
 EFFECTIVE AREA(ACRES) =     26.99   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
 TOTAL AREA(ACRES) =       27.0       PEAK FLOW RATE(CFS) =      26.91

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   971.40  DOWNSTREAM(FEET) =   969.00
 FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.71
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      26.91
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   14.74
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    2917.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.74
```

```
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.217
SUBAREA LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"        B        2.46      0.30      0.500    36
RESIDENTIAL
"5-7 DWELLINGS/ACRE"        C       10.48      0.25      0.500    50
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
SUBAREA AREA(ACRES) =   12.94      SUBAREA RUNOFF(CFS) =   12.66
EFFECTIVE AREA(ACRES) =     39.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
TOTAL AREA(ACRES) =       39.9       PEAK FLOW RATE(CFS) =      39.52

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1       40.28   13.43    1.284  0.25( 0.12) 0.46      38.3       1.00
    2       39.52   14.74    1.217  0.25( 0.12) 0.46      39.9       8.00
NEW PEAK FLOW DATA ARE:
PEAK FLOW RATE(CFS) =      40.28  Tc(MIN.) =   13.43
AREA-AVERAGED Fm(INCH/HR) =  0.12  AREA-AVERAGED Fp(INCH/HR) =  0.25
AREA-AVERAGED Ap =  0.46  EFFECTIVE AREA(ACRES) =      38.35

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   969.00  DOWNSTREAM(FEET) =   954.00
  FLOW LENGTH(FEET) =   416.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.79
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      40.28
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   13.90
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    3333.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.90
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.259
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        0.77      0.25      0.100    50
  PUBLIC PARK                 C        0.43      0.25      0.850    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.369
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    1.26
  EFFECTIVE AREA(ACRES) =     39.55   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       41.1       PEAK FLOW RATE(CFS) =      40.68

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   954.00  DOWNSTREAM(FEET) =   952.80
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.41
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      40.68
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   14.11
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    3453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.11
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.248
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.88      0.30      0.400    36
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        7.02      0.25      0.400    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    7.90      SUBAREA RUNOFF(CFS) =    8.15
  EFFECTIVE AREA(ACRES) =     47.45   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       49.0       PEAK FLOW RATE(CFS) =      48.43

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   952.80  DOWNSTREAM(FEET) =   929.00
  FLOW LENGTH(FEET) =   636.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.05
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      48.43
  PIPE TRAVEL TIME(MIN.) =   0.66    Tc(MIN.) =   14.77
```

```
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.10 =    4089.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     17.10 TO NODE     17.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.77
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.216
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        0.68      0.30      0.500    36
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE"        C        0.89      0.25      0.600    50
 COMMERCIAL                  C        1.86      0.25      0.100    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.309
 SUBAREA AREA(ACRES) =    3.43      SUBAREA RUNOFF(CFS) =    3.50
 EFFECTIVE AREA(ACRES) =     50.88   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.44
 TOTAL AREA(ACRES) =       52.5       PEAK FLOW RATE(CFS) =      50.55

****************************************************************************
 FLOW PROCESS FROM NODE     17.10 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   929.00  DOWNSTREAM(FEET) =   926.30
 FLOW LENGTH(FEET) =   122.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.29
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      50.55
 PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   14.92
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     18.00 =    4211.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.92
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.209
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 CONDOMINIUMS                B       24.46      0.30      0.350    36
 CONDOMINIUMS                C        7.92      0.25      0.350    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
 SUBAREA AREA(ACRES) =   32.38      SUBAREA RUNOFF(CFS) =   32.28
 EFFECTIVE AREA(ACRES) =     83.26   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =       84.8       PEAK FLOW RATE(CFS) =      82.51

****************************************************************************
 FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   926.30  DOWNSTREAM(FEET) =   922.70
 FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.62
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      82.51
 PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   15.12
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     19.00 =    4384.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.12
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.199
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        1.62      0.30      0.400    36
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       C        6.09      0.25      0.400    50
 COMMERCIAL                  B        2.90      0.30      0.100    36
 COMMERCIAL                  C        3.15      0.25      0.100    50
 NATURAL POOR COVER
 "GRASS"                     B        0.76      0.30      1.000    61
 NATURAL POOR COVER
 "GRASS"                     C        0.39      0.25      1.000    72
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
 SUBAREA AREA(ACRES) =   14.91      SUBAREA RUNOFF(CFS) =   14.93
 EFFECTIVE AREA(ACRES) =     98.17   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.39
 TOTAL AREA(ACRES) =       99.8       PEAK FLOW RATE(CFS) =      96.76

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   922.70  DOWNSTREAM(FEET) =   815.60
 FLOW LENGTH(FEET) =  1580.00   MANNING'S N =  0.013
```

```
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  23.49
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      96.76
 PIPE TRAVEL TIME(MIN.) =   1.12    Tc(MIN.) =   16.24
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     20.00 =    5964.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.24
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.151
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B       19.45      0.30     0.100    36
 COMMERCIAL                 C       16.92      0.25     0.100    50
 COMMERCIAL                 D        0.11      0.20     0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =   36.48      SUBAREA RUNOFF(CFS) =   36.89
 EFFECTIVE AREA(ACRES) =    134.65   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =      136.2       PEAK FLOW RATE(CFS) =     129.38

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   815.60  DOWNSTREAM(FEET) =   799.50
 FLOW LENGTH(FEET) =   449.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.15
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     129.38
 PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   16.61
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6413.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.61
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.136
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        2.38      0.30     0.100    36
 COMMERCIAL                 C        0.87      0.25     0.100    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    3.24
 EFFECTIVE AREA(ACRES) =    137.90   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =      139.5       PEAK FLOW RATE(CFS) =     130.82

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.61
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.136
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        4.10      0.30     0.100    36
 COMMERCIAL                 C        1.54      0.25     0.100    50
 COMMERCIAL                 D        2.08      0.20     0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    7.72      SUBAREA RUNOFF(CFS) =    7.71
 EFFECTIVE AREA(ACRES) =    145.62   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.30
 TOTAL AREA(ACRES) =      147.2       PEAK FLOW RATE(CFS) =     138.54

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   799.50  DOWNSTREAM(FEET) =   765.50
 FLOW LENGTH(FEET) =  1056.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.31
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     138.54
 PIPE TRAVEL TIME(MIN.) =   0.91    Tc(MIN.) =   17.52
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     22.00 =    7469.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.52
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.102
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        2.06      0.30     0.100    36
 COMMERCIAL                 C        1.74      0.25     0.100    50
```

```
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     3.80      SUBAREA RUNOFF(CFS) =     3.67
 EFFECTIVE AREA(ACRES) =    149.42   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
 TOTAL AREA(ACRES) =      151.0       PEAK FLOW RATE(CFS) =     138.54
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.52
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.102
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.23      0.30      0.100    36
 COMMERCIAL                 D        5.07      0.20      0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     5.30      SUBAREA RUNOFF(CFS) =     5.16
 EFFECTIVE AREA(ACRES) =    154.72   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      156.3       PEAK FLOW RATE(CFS) =     142.87

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   765.50  DOWNSTREAM(FEET) =   755.00
 FLOW LENGTH(FEET) =   465.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  34.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.99
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     142.87
 PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   17.98
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     23.00 =    7934.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.98
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.086
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        9.15      0.30      0.100    36
 COMMERCIAL                 C       10.79      0.25      0.100    50
 COMMERCIAL                 D        1.81      0.20      0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    21.75      SUBAREA RUNOFF(CFS) =    20.73
 EFFECTIVE AREA(ACRES) =    176.47   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.26
 TOTAL AREA(ACRES) =      178.1       PEAK FLOW RATE(CFS) =     161.36

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.98
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.086
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        7.47      0.30      0.100    36
 COMMERCIAL                 C        0.40      0.25      0.100    50
 COMMERCIAL                 D       17.76      0.20      0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =   25.63      SUBAREA RUNOFF(CFS) =   24.52
 EFFECTIVE AREA(ACRES) =    202.10   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.24
 TOTAL AREA(ACRES) =      203.7       PEAK FLOW RATE(CFS) =     185.88

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   755.00  DOWNSTREAM(FEET) =   736.00
 FLOW LENGTH(FEET) =  1257.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  39.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.79
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     185.88
 PIPE TRAVEL TIME(MIN.) =   1.33    Tc(MIN.) =   19.31
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.00 =    9191.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.31
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.042
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B       16.13      0.30      0.100    36
```

```
  COMMERCIAL                C        3.87      0.25      0.100    50
  COMMERCIAL                D        4.22      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   24.22      SUBAREA RUNOFF(CFS) =   22.12
  EFFECTIVE AREA(ACRES) =    226.32   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      227.9       PEAK FLOW RATE(CFS) =     200.10

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     30.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   736.00  DOWNSTREAM(FEET) =   720.00
  FLOW LENGTH(FEET) =   212.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  29.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.46
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     200.10
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   19.43
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.10 =    9403.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.10 TO NODE     30.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   720.00  DOWNSTREAM(FEET) =   716.00
  FLOW LENGTH(FEET) =   156.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.69
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     200.10
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   19.56
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    9559.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.56
  RAINFALL INTENSITY(INCH/HR) =   1.03
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.23
  EFFECTIVE STREAM AREA(ACRES) =     226.32
  TOTAL STREAM AREA(ACRES) =     227.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     200.10

****************************************************************************
  FLOW PROCESS FROM NODE     30.20 TO NODE     30.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    740.00  DOWNSTREAM(FEET) =    726.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.494
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.144
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.42      0.30      0.100    36    5.49
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.42   PEAK FLOW RATE(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.49
  RAINFALL INTENSITY(INCH/HR) =   2.14
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.42
  TOTAL STREAM AREA(ACRES) =       0.42
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.80

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      200.10   19.56    1.035  0.27( 0.06) 0.23     226.3       1.00
      1      193.37   20.89    0.996  0.27( 0.06) 0.23     227.9       8.00
      2        0.80    5.49    2.144  0.30( 0.03) 0.10       0.4      30.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      121.02    5.49    2.144  0.27( 0.06) 0.23      64.0      30.20
      2      200.48   19.56    1.035  0.27( 0.06) 0.23     226.7       1.00
```

```
     3      193.74   20.89    0.996  0.27( 0.06) 0.23     228.3       8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     200.48    Tc(MIN.) =    19.56
  EFFECTIVE AREA(ACRES) =     226.74   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      228.3
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    9559.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     33.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   716.00  DOWNSTREAM(FEET) =   714.30
  FLOW LENGTH(FEET) =   210.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  44.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.82
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     200.48
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   19.83
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     33.00 =    9769.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.83
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.027
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.35      0.30      0.100    36
  COMMERCIAL                 B        0.62      0.30      0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.97      SUBAREA RUNOFF(CFS) =     0.87
  EFFECTIVE AREA(ACRES) =    227.71   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      229.3       PEAK FLOW RATE(CFS) =     200.48
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.30  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =   420.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  42.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.24
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     200.48
  PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =   20.32
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     38.00 TO NODE     39.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    730.50  DOWNSTREAM(FEET) =    726.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.427
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.573
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.80      0.30      0.500    36    9.43
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.42      0.20      0.500    57    9.43
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.58
  TOTAL AREA(ACRES) =      1.22   PEAK FLOW RATE(CFS) =      1.58

****************************************************************************
  FLOW PROCESS FROM NODE     39.00 TO NODE     40.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  726.20  DOWNSTREAM ELEVATION(FEET) =  719.50
  STREET LENGTH(FEET) =   711.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200
```

```
   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.74
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.33
   HALFSTREET FLOOD WIDTH(FEET) =   11.25
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.19
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.72
 STREET FLOW TRAVEL TIME(MIN.) =   5.41   Tc(MIN.) =   14.84
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.212
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        2.40      0.30     0.500    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    2.29
 EFFECTIVE AREA(ACRES) =      3.62    AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =       3.48

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  12.46
 FLOW VELOCITY(FEET/SEC.) =  2.31   DEPTH*VELOCITY(FT*FT/SEC.) =   0.81
 LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.00 =    1041.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.84
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.212
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.93      0.30     0.500    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.93      SUBAREA RUNOFF(CFS) =    0.89
 EFFECTIVE AREA(ACRES) =      4.55   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        4.6       PEAK FLOW RATE(CFS) =       4.37

****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE     40.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   719.50  DOWNSTREAM(FEET) =   718.40
 FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.03
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.37
 PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   14.97
 LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.10 =    1096.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     40.10 TO NODE     40.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.97
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.206
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.19      0.30     0.500    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.18
 EFFECTIVE AREA(ACRES) =      4.74   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        4.7       PEAK FLOW RATE(CFS) =       4.52

****************************************************************************
 FLOW PROCESS FROM NODE     40.10 TO NODE     40.20 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   718.40  DOWNSTREAM(FEET) =   717.00
 FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.75
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.52
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   15.09
 LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.20 =    1151.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     40.20 TO NODE     40.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.09
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.201
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.22      0.30     0.850    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.45      0.30     0.500    36
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.615
  SUBAREA AREA(ACRES) =     0.67      SUBAREA RUNOFF(CFS) =     0.61
  EFFECTIVE AREA(ACRES) =      5.41   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =       5.11

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     40.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.09
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.201
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.34      0.30     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     0.34      SUBAREA RUNOFF(CFS) =     0.32
  EFFECTIVE AREA(ACRES) =      5.75   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =       5.44

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     41.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   717.00  DOWNSTREAM(FEET) =   713.40
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.79
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.44
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   15.31
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.00 =    1266.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.31
  RAINFALL INTENSITY(INCH/HR) =   1.19
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.51
  EFFECTIVE STREAM AREA(ACRES) =       5.75
  TOTAL STREAM AREA(ACRES) =       5.75
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.44

****************************************************************************
  FLOW PROCESS FROM NODE     41.20 TO NODE     41.30 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    728.20  DOWNSTREAM(FEET) =    723.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.184
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.597
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.02      0.30     0.500    36    9.18
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.61      0.20     0.500    57    9.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.85
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      0.85

****************************************************************************
  FLOW PROCESS FROM NODE     41.30 TO NODE     41.40 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  723.30  DOWNSTREAM ELEVATION(FEET) =  718.00
  STREET LENGTH(FEET) =   323.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.33
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    7.18
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.29
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.59
  STREET FLOW TRAVEL TIME(MIN.) =   2.36   Tc(MIN.) =   11.54
```

```
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.401
SUBAREA LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"8-10 DWELLINGS/ACRE"       B        0.72      0.30     0.400    36
RESIDENTIAL
"8-10 DWELLINGS/ACRE"       D        0.11      0.20     0.400    57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
SUBAREA AREA(ACRES) =    0.83      SUBAREA RUNOFF(CFS) =    0.96
EFFECTIVE AREA(ACRES) =      1.46    AREA-AVERAGED Fm(INCH/HR) =  0.11
AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       1.70

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   8.10
FLOW VELOCITY(FEET/SEC.) =  2.40   DEPTH*VELOCITY(FT*FT/SEC.) =   0.66
LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.40 =     653.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     41.40 TO NODE     41.40 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   11.54
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.401
SUBAREA LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"8-10 DWELLINGS/ACRE"       B        1.24      0.30     0.400    36
RESIDENTIAL
"8-10 DWELLINGS/ACRE"       D        0.03      0.20     0.400    57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
SUBAREA AREA(ACRES) =    1.27      SUBAREA RUNOFF(CFS) =    1.46
EFFECTIVE AREA(ACRES) =      2.73   AREA-AVERAGED Fm(INCH/HR) =  0.11
AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.42
TOTAL AREA(ACRES) =        2.7        PEAK FLOW RATE(CFS) =       3.16

****************************************************************************
FLOW PROCESS FROM NODE     41.40 TO NODE     41.50 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   718.00  DOWNSTREAM(FEET) =   717.00
FLOW LENGTH(FEET) =    62.00   MANNING'S N =  0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   5.96
ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       3.16
PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   11.71
LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.50 =     715.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     41.50 TO NODE     41.50 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   11.71
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.389
SUBAREA LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  B        0.09      0.30     0.100    36
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.11
EFFECTIVE AREA(ACRES) =      2.82   AREA-AVERAGED Fm(INCH/HR) =  0.11
AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.41
TOTAL AREA(ACRES) =        2.8        PEAK FLOW RATE(CFS) =       3.24

****************************************************************************
FLOW PROCESS FROM NODE     41.50 TO NODE     41.51 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   717.00  DOWNSTREAM(FEET) =   715.50
FLOW LENGTH(FEET) =   154.00   MANNING'S N =  0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   4.99
ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       3.24
PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   12.23
LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.51 =     869.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     41.51 TO NODE     41.51 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   12.23
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.355
SUBAREA LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"        B        1.44      0.30     0.500    36
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
SUBAREA AREA(ACRES) =    1.44      SUBAREA RUNOFF(CFS) =    1.56
EFFECTIVE AREA(ACRES) =      4.26   AREA-AVERAGED Fm(INCH/HR) =  0.12
AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.44
```

```
 TOTAL AREA(ACRES) =        4.3       PEAK FLOW RATE(CFS) =       4.72

****************************************************************************
 FLOW PROCESS FROM NODE     41.51 TO NODE     41.60 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   715.50  DOWNSTREAM(FEET) =   714.90
 FLOW LENGTH(FEET) =    59.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.60
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.72
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   12.40
 LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.60 =     928.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     41.60 TO NODE     41.60 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.40
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.344
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        1.06      0.30      0.500    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =     1.06      SUBAREA RUNOFF(CFS) =     1.14
 EFFECTIVE AREA(ACRES) =      5.32   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.45
 TOTAL AREA(ACRES) =        5.3       PEAK FLOW RATE(CFS) =       5.82

****************************************************************************
 FLOW PROCESS FROM NODE     41.60 TO NODE     41.60 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.40
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.344
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        0.47      0.30      0.400    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.47      SUBAREA RUNOFF(CFS) =     0.52
 EFFECTIVE AREA(ACRES) =      5.79   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.45
 TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =       6.33

****************************************************************************
 FLOW PROCESS FROM NODE     41.60 TO NODE     41.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   714.90  DOWNSTREAM(FEET) =   713.40
 FLOW LENGTH(FEET) =   148.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.01
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.33
 PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   12.81
 LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.00 =    1076.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   12.81
 RAINFALL INTENSITY(INCH/HR) =   1.32
 AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.29
 AREA-AVERAGED Ap =  0.45
 EFFECTIVE STREAM AREA(ACRES) =       5.79
 TOTAL STREAM AREA(ACRES) =       5.79
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.33

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        5.44   15.31    1.191  0.29( 0.15) 0.51       5.8      38.00
     2        6.33   12.81    1.319  0.29( 0.13) 0.45       5.8      41.20

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       11.44   12.81    1.319  0.29( 0.14) 0.48      10.6      41.20
     2       11.09   15.31    1.191  0.29( 0.14) 0.48      11.5      38.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      11.44    Tc(MIN.) =    12.81
 EFFECTIVE AREA(ACRES) =      10.60   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =       11.5
```

```
 LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.00 =    1266.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     41.00 TO NODE     41.80 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   713.40  DOWNSTREAM(FEET) =   712.60
 FLOW LENGTH(FEET) =    83.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.78
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.44
 PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   13.02
 LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.80 =    1349.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     41.80 TO NODE     41.80 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.02
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.307
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.27      0.30     0.500    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.13      0.20     0.500    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    0.42
 EFFECTIVE AREA(ACRES) =    11.00   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =      11.9       PEAK FLOW RATE(CFS) =      11.57

****************************************************************************
 FLOW PROCESS FROM NODE     41.80 TO NODE     41.80 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.02
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.307
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.21      0.30     0.500    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.01      0.20     0.500    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.22      SUBAREA RUNOFF(CFS) =    0.23
 EFFECTIVE AREA(ACRES) =    11.22   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =      12.2       PEAK FLOW RATE(CFS) =      11.80

****************************************************************************
 FLOW PROCESS FROM NODE     41.80 TO NODE     41.90 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   712.60  DOWNSTREAM(FEET) =   711.80
 FLOW LENGTH(FEET) =    77.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.03
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.80
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   13.20
 LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.90 =    1426.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   13.20
 RAINFALL INTENSITY(INCH/HR) =   1.30
 AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.29
 AREA-AVERAGED Ap =  0.48
 EFFECTIVE STREAM AREA(ACRES) =      11.22
 TOTAL STREAM AREA(ACRES) =      12.16
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      11.80

****************************************************************************
 FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =  22
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    77.00
 USER SPECIFIED Tc(MIN.) =    5.000
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.06      0.20     0.500    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA RUNOFF(CFS) =      0.12
 TOTAL AREA(ACRES) =      0.06   PEAK FLOW RATE(CFS) =      0.12
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.00
  RAINFALL INTENSITY(INCH/HR) =   2.26
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.06
  TOTAL STREAM AREA(ACRES) =       0.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.12

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  7700.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.06      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.12
  TOTAL AREA(ACRES) =      0.06   PEAK FLOW RATE(CFS) =      0.12

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.00
  RAINFALL INTENSITY(INCH/HR) =   2.26
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.06
  TOTAL STREAM AREA(ACRES) =       0.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.12

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1       11.80   13.20    1.297  0.29( 0.14) 0.48       11.2       41.20
      1       11.41   15.70    1.174  0.29( 0.14) 0.48       12.2       38.00
      2        0.12    5.00    2.264  0.20( 0.10) 0.50        0.1       41.90
      3        0.12    5.00    2.264  0.20( 0.10) 0.50        0.1       41.90

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1        8.44    5.00    2.264  0.29( 0.14) 0.48        4.4       41.90
      2        8.44    5.00    2.264  0.29( 0.14) 0.48        4.4       41.90
      3       11.93   13.20    1.297  0.29( 0.14) 0.48       11.3       41.20
      4       11.52   15.70    1.174  0.29( 0.14) 0.48       12.3       38.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      11.93    Tc(MIN.) =    13.20
  EFFECTIVE AREA(ACRES) =      11.34   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =      12.3
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     41.90 =    7700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     46.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   711.80  DOWNSTREAM(FEET) =   710.50
  FLOW LENGTH(FEET) =   132.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.89
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.93
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   13.52
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     46.00 =    7832.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     46.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.52
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.279
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.21      0.30     0.100    36
  COMMERCIAL                  D        0.29      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
  SUBAREA AREA(ACRES) =     0.50      SUBAREA RUNOFF(CFS) =     0.56
  EFFECTIVE AREA(ACRES) =     11.84   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       12.8       PEAK FLOW RATE(CFS) =      12.21

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.50  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =    68.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.05
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.21
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   13.68
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     34.00 =    7900.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        8.99    5.53    2.138  0.29( 0.13) 0.44       4.9      41.90
      2        8.99    5.53    2.138  0.29( 0.13) 0.44       4.9      41.90
      3       12.21   13.68    1.270  0.29( 0.13) 0.46      11.8      41.20
      4       11.80   16.18    1.154  0.29( 0.13) 0.47      12.8      38.00
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     34.00 =    7900.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      121.02    6.36    1.971  0.27( 0.06) 0.22      65.0      30.20
      2      200.48   20.32    1.012  0.27( 0.06) 0.23     227.7       1.00
      3      193.74   21.66    0.976  0.27( 0.06) 0.23     229.3       8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      123.22    5.53    2.138  0.27( 0.06) 0.24      61.3      41.90
      2      123.22    5.53    2.138  0.27( 0.06) 0.24      61.3      41.90
      3      130.35    6.36    1.971  0.27( 0.06) 0.24      70.6      30.20
      4      174.88   13.68    1.270  0.27( 0.07) 0.24     162.1      41.20
      5      188.70   16.18    1.154  0.27( 0.06) 0.24     192.2      38.00
      6      210.64   20.32    1.012  0.27( 0.06) 0.24     240.5       1.00
      7      203.48   21.66    0.976  0.27( 0.06) 0.24     242.1       8.00
    TOTAL AREA(ACRES) =       242.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      210.64  Tc(MIN.) =   20.322
  EFFECTIVE AREA(ACRES) =    240.49  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      242.1
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     56.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   703.70
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.01
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     210.64
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   20.40
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.40
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.010
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.23      0.30      0.100    36
  COMMERCIAL                  D        0.51      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.74      SUBAREA RUNOFF(CFS) =     0.66
  EFFECTIVE AREA(ACRES) =    241.23   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      242.8       PEAK FLOW RATE(CFS) =     210.64
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================
```

```
******************************************************************************
  FLOW PROCESS FROM NODE     32.20 TO NODE     32.10 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    745.00  DOWNSTREAM(FEET) =    742.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.917
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.739
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.11      0.30      0.100    36    7.92
  COMMERCIAL                 C        0.26      0.25      0.100    50    7.92
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.57
  TOTAL AREA(ACRES) =      0.37   PEAK FLOW RATE(CFS) =      0.57

******************************************************************************
  FLOW PROCESS FROM NODE     32.10 TO NODE     32.00 IS CODE =  62
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =  742.00  DOWNSTREAM ELEVATION(FEET) =  740.00
  STREET LENGTH(FEET) =    96.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.66
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.21
    HALFSTREET FLOOD WIDTH(FEET) =    4.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.30
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.48
  STREET FLOW TRAVEL TIME(MIN.) =   0.70   Tc(MIN.) =    8.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.657
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.06      0.30      0.100    36
  COMMERCIAL                 C        0.06      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.12      SUBAREA RUNOFF(CFS) =    0.18
  EFFECTIVE AREA(ACRES) =      0.49    AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       0.72

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.21   HALFSTREET FLOOD WIDTH(FEET) =   4.62
  FLOW VELOCITY(FEET/SEC.) =  2.30   DEPTH*VELOCITY(FT*FT/SEC.) =   0.49
  LONGEST FLOWPATH FROM NODE     32.20 TO NODE     32.00 =     426.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    724.60  DOWNSTREAM(FEET) =    723.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.167
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.359
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  SCHOOL                     B        0.33      0.30      0.600    36   12.17
  SCHOOL                     C        0.85      0.25      0.600    50   12.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      1.27
  TOTAL AREA(ACRES) =      1.18   PEAK FLOW RATE(CFS) =      1.27

******************************************************************************
  FLOW PROCESS FROM NODE     52.00 TO NODE     53.00 IS CODE =  62
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =  723.00  DOWNSTREAM ELEVATION(FEET) =  719.00
  STREET LENGTH(FEET) =   412.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200
```

```
   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.77
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.33
   HALFSTREET FLOOD WIDTH(FEET) =   11.25
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.22
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.73
 STREET FLOW TRAVEL TIME(MIN.) =   3.10   Tc(MIN.) =   15.26
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.193
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 SCHOOL                     B        2.48      0.30     0.600    36
 SCHOOL                     C        0.77      0.25     0.600    50
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    2.98
 EFFECTIVE AREA(ACRES) =      4.43    AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.60
 TOTAL AREA(ACRES) =        4.4        PEAK FLOW RATE(CFS) =       4.08

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  13.28
 FLOW VELOCITY(FEET/SEC.) =  2.41   DEPTH*VELOCITY(FT*FT/SEC.) =   0.88
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     53.00 =     742.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     53.00 TO NODE     54.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  719.00  DOWNSTREAM ELEVATION(FEET) =  712.50
 STREET LENGTH(FEET) =   633.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.02
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.38
   HALFSTREET FLOOD WIDTH(FEET) =   14.29
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.58
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.99
 STREET FLOW TRAVEL TIME(MIN.) =   4.09   Tc(MIN.) =   19.35
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.041
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 SCHOOL                     B        2.42      0.30     0.600    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA AREA(ACRES) =    2.42      SUBAREA RUNOFF(CFS) =    1.88
 EFFECTIVE AREA(ACRES) =      6.85    AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.60
 TOTAL AREA(ACRES) =        6.9        PEAK FLOW RATE(CFS) =       5.35

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  14.60
 FLOW VELOCITY(FEET/SEC.) =  2.65   DEPTH*VELOCITY(FT*FT/SEC.) =   1.03
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     54.00 =    1375.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.35
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.041
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.32      0.30     0.100    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.32      SUBAREA RUNOFF(CFS) =    0.29
 EFFECTIVE AREA(ACRES) =      7.17   AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.58
 TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =       5.64

****************************************************************************
 FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.35
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.041
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 SCHOOL                     B        2.40      0.30     0.600    36
 SCHOOL                     C        0.07      0.25     0.600    50
 SCHOOL                     D        2.82      0.20     0.600    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA AREA(ACRES) =    5.29      SUBAREA RUNOFF(CFS) =    4.25
 EFFECTIVE AREA(ACRES) =     12.46   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.59
 TOTAL AREA(ACRES) =       12.5       PEAK FLOW RATE(CFS) =       9.90

****************************************************************************
 FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
```

```
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   19.35
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.041
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.78      0.30      0.100    36
  COMMERCIAL                  C        0.03      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.81      SUBAREA RUNOFF(CFS) =    0.74
  EFFECTIVE AREA(ACRES) =     13.27   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =       13.3       PEAK FLOW RATE(CFS) =      10.63

********************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.50  DOWNSTREAM(FEET) =   712.30
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.44
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.63
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   19.45
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     55.00 =    1409.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.45
  RAINFALL INTENSITY(INCH/HR) =   1.04
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =      13.27
  TOTAL STREAM AREA(ACRES) =      13.27
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.63

********************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.10 IS CODE =  22
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    34.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.13      0.30      0.100    36
  COMMERCIAL                  D        0.14      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.54
  TOTAL AREA(ACRES) =      0.27   PEAK FLOW RATE(CFS) =      0.54

********************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.10 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =    5.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.24      0.30      0.100    36
  COMMERCIAL                  D        0.01      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    0.50
  EFFECTIVE AREA(ACRES) =      0.52   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.5       PEAK FLOW RATE(CFS) =       1.05

********************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.00  DOWNSTREAM(FEET) =   712.30
  FLOW LENGTH(FEET) =   275.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.24
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.05
  PIPE TRAVEL TIME(MIN.) =   2.04    Tc(MIN.) =    7.04
  LONGEST FLOWPATH FROM NODE     55.10 TO NODE     55.00 =     309.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
```

```
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.04
 RAINFALL INTENSITY(INCH/HR) =   1.86
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.27
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.52
 TOTAL STREAM AREA(ACRES) =       0.52
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.05

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       10.63   19.45    1.038  0.27( 0.15) 0.56      13.3      51.00
     2        1.05    7.04    1.860  0.27( 0.03) 0.10       0.5      55.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        8.46    7.04    1.860  0.27( 0.14) 0.51       5.3      55.10
     2       11.21   19.45    1.038  0.27( 0.15) 0.54      13.8      51.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      11.21    Tc(MIN.) =    19.45
 EFFECTIVE AREA(ACRES) =      13.79   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.54
 TOTAL AREA(ACRES) =       13.8
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     55.00 =    1409.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     55.00 TO NODE     56.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   712.30  DOWNSTREAM(FEET) =   711.00
 FLOW LENGTH(FEET) =   165.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.21
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.21
 PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   19.90
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.00 =    1574.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.00 TO NODE     56.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.90
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.025
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.49      0.30      0.100    36
 COMMERCIAL                  D        0.04      0.20      0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.53      SUBAREA RUNOFF(CFS) =    0.47
 EFFECTIVE AREA(ACRES) =     14.32   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =       14.3       PEAK FLOW RATE(CFS) =      11.38

****************************************************************************
 FLOW PROCESS FROM NODE     56.00 TO NODE     56.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   711.00  DOWNSTREAM(FEET) =   710.10
 FLOW LENGTH(FEET) =   172.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.40
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.38
 PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   20.43
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     56.11 TO NODE     56.12 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    720.80  DOWNSTREAM(FEET) =    717.80

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.438
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.676
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        B        0.91      0.30      0.200    36    8.44
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA RUNOFF(CFS) =      1.32
```

```
  TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      1.32

****************************************************************************
  FLOW PROCESS FROM NODE     56.12 TO NODE     56.13 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  717.80  DOWNSTREAM ELEVATION(FEET) =  713.60
  STREET LENGTH(FEET) =   486.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.30
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =   10.64
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.03
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.65
  STREET FLOW TRAVEL TIME(MIN.) =   3.99   Tc(MIN.) =   12.43
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.342
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        1.68      0.30     0.200    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     1.68      SUBAREA RUNOFF(CFS) =     1.94
  EFFECTIVE AREA(ACRES) =      2.59    AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        2.6        PEAK FLOW RATE(CFS) =       2.99

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.96
  FLOW VELOCITY(FEET/SEC.) =  2.14   DEPTH*VELOCITY(FT*FT/SEC.) =   0.73
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.13 =     816.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.43
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.342
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        2.11      0.30     0.200    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     2.11      SUBAREA RUNOFF(CFS) =     2.44
  EFFECTIVE AREA(ACRES) =      4.70   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        4.7       PEAK FLOW RATE(CFS) =       5.42

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.43
  RAINFALL INTENSITY(INCH/HR) =   1.34
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =       4.70
  TOTAL STREAM AREA(ACRES) =       4.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.42

****************************************************************************
  FLOW PROCESS FROM NODE     56.14 TO NODE     56.15 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    719.20  DOWNSTREAM(FEET) =    715.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.182
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.706
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.84      0.30     0.200    36    8.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      1.24
  TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      1.24

****************************************************************************
  FLOW PROCESS FROM NODE     56.15 TO NODE     56.13 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
```

```
==========================================================================
  UPSTREAM ELEVATION(FEET) =  715.70  DOWNSTREAM ELEVATION(FEET) =  713.60
  STREET LENGTH(FEET) =   200.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.60
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    8.71
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.01
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.57
  STREET FLOW TRAVEL TIME(MIN.) =   1.66   Tc(MIN.) =    9.84
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.535
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.54      0.30     0.200    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.54      SUBAREA RUNOFF(CFS) =    0.72
  EFFECTIVE AREA(ACRES) =      1.38    AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       1.83

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   9.21
  FLOW VELOCITY(FEET/SEC.) =  2.08   DEPTH*VELOCITY(FT*FT/SEC.) =   0.61
  LONGEST FLOWPATH FROM NODE     56.14 TO NODE     56.13 =     530.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.84
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.535
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.70      0.30     0.200    36
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.52      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    1.22      SUBAREA RUNOFF(CFS) =    1.63
  EFFECTIVE AREA(ACRES) =      2.60   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        2.6        PEAK FLOW RATE(CFS) =       3.46

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.84
  RAINFALL INTENSITY(INCH/HR) =   1.53
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.28
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =       2.60
  TOTAL STREAM AREA(ACRES) =       2.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.46

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        5.42   12.43    1.342  0.30( 0.06) 0.20       4.7      56.11
      2        3.46    9.84    1.535  0.28( 0.06) 0.20       2.6      56.14

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        8.40    9.84    1.535  0.29( 0.06) 0.20       6.3      56.14
      2        8.43   12.43    1.342  0.29( 0.06) 0.20       7.3      56.11

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       8.43    Tc(MIN.) =    12.43
  EFFECTIVE AREA(ACRES) =       7.30   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        7.3
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.13 =     816.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.16 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.60  DOWNSTREAM(FEET) =   712.50
  FLOW LENGTH(FEET) =    94.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.0 INCHES
```

```
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.75
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.43
 PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   12.66
 LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.16 =     910.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.16 TO NODE     56.16 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.66
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.328
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        B        0.46      0.30      0.200    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =     0.46      SUBAREA RUNOFF(CFS) =     0.53
 EFFECTIVE AREA(ACRES) =      7.76   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =       8.87

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1        8.89   10.07    1.514  0.29( 0.06) 0.20       6.8       56.14
     2        8.87   12.66    1.328  0.29( 0.06) 0.20       7.8       56.11
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =       8.89  Tc(MIN.) =   10.07
 AREA-AVERAGED Fm(INCH/HR) =  0.06  AREA-AVERAGED Fp(INCH/HR) =  0.29
 AREA-AVERAGED Ap =  0.20  EFFECTIVE AREA(ACRES) =       6.78

****************************************************************************
 FLOW PROCESS FROM NODE     56.16 TO NODE     56.16 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.07
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.514
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        B        0.05      0.30      0.200    36
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        D        0.41      0.20      0.200    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =     0.46      SUBAREA RUNOFF(CFS) =     0.61
 EFFECTIVE AREA(ACRES) =      7.24   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        8.2       PEAK FLOW RATE(CFS) =       9.50

****************************************************************************
 FLOW PROCESS FROM NODE     56.16 TO NODE     56.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   712.50  DOWNSTREAM(FEET) =   710.10
 FLOW LENGTH(FEET) =    38.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.19
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       9.50
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   10.12
 LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.10 =     948.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1        9.50   10.12    1.510  0.29( 0.06) 0.20       7.2       56.14
     2        9.40   12.71    1.325  0.29( 0.06) 0.20       8.2       56.11
 LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.10 =     948.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1        8.75    8.10    1.717  0.27( 0.13) 0.48       5.9       55.10
     2       11.38   20.43    1.009  0.27( 0.14) 0.52      14.3       51.00
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1       17.43    8.10    1.717  0.28( 0.09) 0.34      11.6       55.10
     2       18.68   10.12    1.510  0.28( 0.09) 0.34      14.5       56.14
     3       19.13   12.71    1.325  0.28( 0.10) 0.35      17.2       56.11
     4       18.43   20.43    1.009  0.27( 0.11) 0.41      22.5       51.00
   TOTAL AREA(ACRES) =        22.5

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       19.13  Tc(MIN.) =   12.706
 EFFECTIVE AREA(ACRES) =     17.24  AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.34
 TOTAL AREA(ACRES) =       22.5
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     56.10 TO NODE     56.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.10  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.76
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.13
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   12.81
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.20 =    1790.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.20 TO NODE     56.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.81
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.319
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.39      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.39      SUBAREA RUNOFF(CFS) =     0.46
  EFFECTIVE AREA(ACRES) =     17.63   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =       22.9       PEAK FLOW RATE(CFS) =      19.41

****************************************************************************
  FLOW PROCESS FROM NODE     56.20 TO NODE     56.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   703.70
  FLOW LENGTH(FEET) =   290.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.24
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.41
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   13.29
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.30 =    2080.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1       17.46    8.69    1.648  0.27( 0.09) 0.33       12.0       55.10
      2       18.86   10.70    1.462  0.27( 0.09) 0.34       14.9       56.14
      3       19.41   13.29    1.292  0.27( 0.10) 0.35       17.6       56.11
      4       18.50   21.01    0.993  0.27( 0.11) 0.40       22.9       51.00
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.30 =    2080.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      123.22    5.61    2.119  0.27( 0.06) 0.24       62.0       41.90
      2      123.22    5.61    2.119  0.27( 0.06) 0.24       62.0       41.90
      3      130.35    6.45    1.957  0.27( 0.06) 0.24       71.3       30.20
      4      176.08   13.76    1.266  0.27( 0.06) 0.24      162.9       41.20
      5      188.70   16.26    1.151  0.27( 0.06) 0.24      192.9       38.00
      6      210.64   20.40    1.010  0.27( 0.06) 0.24      241.2        1.00
      7      203.48   21.74    0.974  0.27( 0.06) 0.24      242.8        8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      137.90    5.61    2.119  0.27( 0.07) 0.25       69.8       41.90
      2      137.90    5.61    2.119  0.27( 0.07) 0.25       69.8       41.90
      3      145.87    6.45    1.957  0.27( 0.07) 0.25       80.2       30.20
      4      161.84    8.69    1.648  0.27( 0.07) 0.25      111.4       55.10
      5      175.84   10.70    1.462  0.27( 0.07) 0.25      139.5       56.14
      6      192.54   13.29    1.292  0.27( 0.07) 0.25      174.6       56.11
      7      195.43   13.76    1.266  0.27( 0.07) 0.25      180.8       41.20
      8      207.76   16.26    1.151  0.27( 0.07) 0.25      212.6       38.00
      9      229.21   20.40    1.010  0.27( 0.07) 0.25      263.7        1.00
     10      225.86   21.01    0.993  0.27( 0.07) 0.25      264.9       51.00
     11      221.58   21.74    0.974  0.27( 0.07) 0.25      265.7        8.00
    TOTAL AREA(ACRES) =       265.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      229.21  Tc(MIN.) =   20.395
  EFFECTIVE AREA(ACRES) =    263.74  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =      265.7
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
```

```
==========================================================================

**************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     35.10 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   703.70  DOWNSTREAM(FEET) =   703.00
  FLOW LENGTH(FEET) =    74.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  46.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.93
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     229.21
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   20.48
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  10
--------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
==========================================================================

**************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    729.10  DOWNSTREAM(FEET) =    723.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.849
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.631
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.39      0.30     0.500    36    8.85
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.52      0.20     0.500    57    8.85
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.24
  TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      1.24

**************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     44.00 IS CODE =  62
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  723.20  DOWNSTREAM ELEVATION(FEET) =  714.50
  STREET LENGTH(FEET) =   493.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.91
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    7.39
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.39
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.63
  STREET FLOW TRAVEL TIME(MIN.) =   3.43   Tc(MIN.) =   12.28
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.351
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        2.25      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.79      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.04      SUBAREA RUNOFF(CFS) =    3.32
  EFFECTIVE AREA(ACRES) =      3.95    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.9        PEAK FLOW RATE(CFS) =       4.33

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   8.91
  FLOW VELOCITY(FEET/SEC.) =  2.61   DEPTH*VELOCITY(FT*FT/SEC.) =   0.75
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     44.00 =     823.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     44.00 TO NODE     45.20 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.50  DOWNSTREAM(FEET) =   713.50
  FLOW LENGTH(FEET) =    33.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.16
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.33
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   12.35
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.20 =     856.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     45.20 TO NODE     45.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.35
  RAINFALL INTENSITY(INCH/HR) =   1.35
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       3.95
  TOTAL STREAM AREA(ACRES) =       3.95
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.33

****************************************************************************
  FLOW PROCESS FROM NODE     45.00 TO NODE     45.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    721.00  DOWNSTREAM(FEET) =    717.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.195
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.596
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.58      0.30      0.400    36    9.20
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.06      0.20      0.400    57    9.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      0.85
  TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      0.85

****************************************************************************
  FLOW PROCESS FROM NODE     45.10 TO NODE     45.20 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  717.00  DOWNSTREAM ELEVATION(FEET) =  714.00
  STREET LENGTH(FEET) =   318.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018
  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.31
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    8.10
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.86
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.51
  STREET FLOW TRAVEL TIME(MIN.) =   2.85   Tc(MIN.) =   12.05
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.366
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.82      0.30      0.400    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.82      SUBAREA RUNOFF(CFS) =    0.92
  EFFECTIVE AREA(ACRES) =      1.46    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       1.64

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   9.01
  FLOW VELOCITY(FEET/SEC.) =  1.94   DEPTH*VELOCITY(FT*FT/SEC.) =   0.56
  LONGEST FLOWPATH FROM NODE     45.00 TO NODE     45.20 =     648.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     45.20 TO NODE     45.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.05
  RAINFALL INTENSITY(INCH/HR) =   1.37
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.40
  EFFECTIVE STREAM AREA(ACRES) =       1.46
  TOTAL STREAM AREA(ACRES) =       1.46
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.64

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1        4.33   12.35    1.347  0.27( 0.13) 0.50       3.9       42.00
      2        1.64   12.05    1.366  0.30( 0.12) 0.40       1.5       45.00
```

```
 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        5.93   12.05    1.366  0.27( 0.13) 0.47       5.3       45.00
     2        5.94   12.35    1.347  0.27( 0.13) 0.47       5.4       42.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       5.94    Tc(MIN.) =    12.35
 EFFECTIVE AREA(ACRES) =       5.41   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        5.4
 LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.20 =     856.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     45.20 TO NODE     45.30 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   713.50  DOWNSTREAM(FEET) =   711.90
 FLOW LENGTH(FEET) =   157.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.93
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.94
 PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   12.79
 LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.30 =    1013.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     45.30 TO NODE     45.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.79
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.320
 SUBAREA LOSS RATE DATA(AMC   I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        0.66      0.30      0.400    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.66      SUBAREA RUNOFF(CFS) =     0.71
 EFFECTIVE AREA(ACRES) =      6.07   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        6.1       PEAK FLOW RATE(CFS) =       6.51

****************************************************************************
 FLOW PROCESS FROM NODE     45.30 TO NODE     45.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.79
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.320
 SUBAREA LOSS RATE DATA(AMC   I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                 B        1.89      0.30      0.850    36
 COMMERCIAL                  D        0.04      0.20      0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.834
 SUBAREA AREA(ACRES) =     1.93      SUBAREA RUNOFF(CFS) =     1.86
 EFFECTIVE AREA(ACRES) =      8.00   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.55
 TOTAL AREA(ACRES) =        8.0       PEAK FLOW RATE(CFS) =       8.37

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        8.40   12.49    1.339  0.28( 0.16) 0.55       7.9       45.00
     2        8.37   12.79    1.320  0.28( 0.16) 0.55       8.0       42.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =       8.40  Tc(MIN.) =   12.49
 AREA-AVERAGED Fm(INCH/HR) =  0.16  AREA-AVERAGED Fp(INCH/HR) =  0.28
 AREA-AVERAGED Ap =  0.55  EFFECTIVE AREA(ACRES) =       7.90

****************************************************************************
 FLOW PROCESS FROM NODE     45.30 TO NODE     47.20 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   711.90  DOWNSTREAM(FEET) =   710.80
 FLOW LENGTH(FEET) =   106.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.42
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.40
 PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =   12.76
 LONGEST FLOWPATH FROM NODE     42.00 TO NODE     47.20 =    1119.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.20 TO NODE     47.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.76
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.322
 SUBAREA LOSS RATE DATA(AMC   I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.13      0.30      0.100    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
  SUBAREA AREA(ACRES) =     0.13      SUBAREA RUNOFF(CFS) =     0.15
  EFFECTIVE AREA(ACRES) =      8.03   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =        8.1       PEAK FLOW RATE(CFS) =       8.43

****************************************************************************
  FLOW PROCESS FROM NODE     47.20 TO NODE     35.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.80  DOWNSTREAM(FEET) =   703.90
  FLOW LENGTH(FEET) =   695.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.31
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.43
  PIPE TRAVEL TIME(MIN.) =   1.84    Tc(MIN.) =   14.60
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     35.20 =    1814.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.20 TO NODE     35.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.60
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.224
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 B        1.02      0.30     0.850    36
  PUBLIC PARK                 C        0.05      0.25     0.850    50
  PUBLIC PARK                 D        2.20      0.20     0.850    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =     3.27      SUBAREA RUNOFF(CFS) =     3.02
  EFFECTIVE AREA(ACRES) =     11.30   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.64
  TOTAL AREA(ACRES) =       11.4       PEAK FLOW RATE(CFS) =      10.74

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM        Q       Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1       10.74   14.60     1.224  0.26( 0.17) 0.64       11.3       45.00
      2       10.69   14.90     1.209  0.26( 0.17) 0.63       11.4       42.00
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     35.10 =    1814.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM        Q       Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      137.90    5.71     2.098  0.27( 0.07) 0.25       69.8       41.90
      2      137.90    5.71     2.098  0.27( 0.07) 0.25       69.8       41.90
      3      145.87    6.54     1.940  0.27( 0.07) 0.25       80.2       30.20
      4      161.84    8.78     1.638  0.27( 0.07) 0.25      111.4       55.10
      5      175.84   10.80     1.455  0.27( 0.07) 0.25      139.5       56.14
      6      192.54   13.38     1.287  0.27( 0.07) 0.25      174.6       56.11
      7      195.43   13.85     1.261  0.27( 0.07) 0.25      180.8       41.20
      8      207.76   16.35     1.147  0.27( 0.07) 0.25      212.6       38.00
      9      229.21   20.48     1.008  0.27( 0.07) 0.25      263.7        1.00
     10      225.86   21.10     0.991  0.27( 0.07) 0.25      264.9       51.00
     11      221.58   21.83     0.972  0.27( 0.07) 0.25      265.7        8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM        Q       Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      145.58    5.71     2.098  0.27( 0.07) 0.27       74.2       41.90
      2      145.58    5.71     2.098  0.27( 0.07) 0.27       74.2       41.90
      3      153.94    6.54     1.940  0.27( 0.07) 0.27       85.3       30.20
      4      170.84    8.78     1.638  0.27( 0.07) 0.27      118.2       55.10
      5      185.52   10.80     1.455  0.27( 0.07) 0.27      147.8       56.14
      6      202.97   13.38     1.287  0.27( 0.07) 0.27      184.9       56.11
      7      205.99   13.85     1.261  0.27( 0.07) 0.27      191.5       41.20
      8      209.89   14.60     1.224  0.27( 0.07) 0.27      201.7       45.00
      9      211.33   14.90     1.209  0.27( 0.07) 0.27      205.6       42.00
     10      217.81   16.35     1.147  0.27( 0.07) 0.27      224.0       38.00
     11      237.83   20.48     1.008  0.27( 0.07) 0.27      275.1        1.00
     12      234.30   21.10     0.991  0.27( 0.07) 0.27      276.3       51.00
     13      229.83   21.83     0.972  0.27( 0.07) 0.27      277.1        8.00
    TOTAL AREA(ACRES) =       277.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      237.83  Tc(MIN.) =   20.484
  EFFECTIVE AREA(ACRES) =    275.14  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      277.1
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   20.48   RAINFALL INTENSITY(INCH/HR) =  1.01
  EFFECTIVE AREA(ACRES) =   179.79
```

```
  TOTAL AREA(ACRES) =   277.14        PEAK FLOW RATE(CFS) =    155.41
  AREA-AVERAGED Fm(INCH/HR) =   0.07  AREA-AVERAGED Fp(INCH/HR) =   0.27
  AREA-AVERAGED Ap =  0.27
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =   695.70
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  48.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.07
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     155.41
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   20.62
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     36.00 =   10453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.62
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.004
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.16      0.25      0.100    50
  COMMERCIAL                 D        0.29      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.45      SUBAREA RUNOFF(CFS) =    0.40
  EFFECTIVE AREA(ACRES) =    180.24   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      277.6       PEAK FLOW RATE(CFS) =     155.41
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     37.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.70  DOWNSTREAM(FEET) =   695.40
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  48.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.07
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     155.41
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   20.76
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.00 =   10528.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.00 TO NODE     37.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.40  DOWNSTREAM(FEET) =   694.00
  FLOW LENGTH(FEET) =   355.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  63.0 INCH PIPE IS  45.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.21
  ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     155.41
  PIPE TRAVEL TIME(MIN.) =   0.64    Tc(MIN.) =   21.40
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.10 =   10883.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.40
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.983
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.68      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.68      SUBAREA RUNOFF(CFS) =    0.59
  EFFECTIVE AREA(ACRES) =    180.92   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      278.3       PEAK FLOW RATE(CFS) =     155.41
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.40
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.983
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.46      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.46      SUBAREA RUNOFF(CFS) =    0.40
  EFFECTIVE AREA(ACRES) =    181.38   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      278.7       PEAK FLOW RATE(CFS) =     155.41
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.00  DOWNSTREAM(FEET) =   693.80
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  43.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.60
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     155.41
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   21.45
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     37.60 TO NODE     37.70 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    718.50  DOWNSTREAM(FEET) =    714.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.517
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.564
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.13      0.30     0.500    36    9.52
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.51      0.20     0.500    57    9.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.84
  TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      0.84

****************************************************************************
  FLOW PROCESS FROM NODE     37.70 TO NODE     37.80 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  714.40  DOWNSTREAM ELEVATION(FEET) =  710.60
  STREET LENGTH(FEET) =   349.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.18
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    7.49
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.90
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.50
  STREET FLOW TRAVEL TIME(MIN.) =   3.06   Tc(MIN.) =   12.58
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.333
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.15      0.25     0.500    50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.47      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.62      SUBAREA RUNOFF(CFS) =    0.68
  EFFECTIVE AREA(ACRES) =      1.26    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =       1.39

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   8.10
  FLOW VELOCITY(FEET/SEC.) =  1.97   DEPTH*VELOCITY(FT*FT/SEC.) =   0.54
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.80 =     679.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.80 TO NODE     37.90 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.60  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.41
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.39
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   12.81
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.90 =     739.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     37.90 TO NODE     37.90 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.81
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.319
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.21      0.25     0.500    50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.93      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.14      SUBAREA RUNOFF(CFS) =    1.25
  EFFECTIVE AREA(ACRES) =      2.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        2.4       PEAK FLOW RATE(CFS) =       2.62

****************************************************************************
  FLOW PROCESS FROM NODE     37.90 TO NODE     37.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   708.00
  FLOW LENGTH(FEET) =   221.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.41
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.62
  PIPE TRAVEL TIME(MIN.) =   0.83    Tc(MIN.) =   13.64
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.50 =     960.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.50 TO NODE     37.50 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.64
  RAINFALL INTENSITY(INCH/HR) =   1.27
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       2.40
  TOTAL STREAM AREA(ACRES) =       2.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.62

****************************************************************************
  FLOW PROCESS FROM NODE     37.30 TO NODE     37.40 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    713.10  DOWNSTREAM(FEET) =    709.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.880
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.531
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.70      0.25     0.500    50    9.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.89
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      0.89

****************************************************************************
  FLOW PROCESS FROM NODE     37.40 TO NODE     37.50 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  709.70  DOWNSTREAM ELEVATION(FEET) =  708.10
  STREET LENGTH(FEET) =   124.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.08
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    6.88
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.99
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.50
  STREET FLOW TRAVEL TIME(MIN.) =   1.04   Tc(MIN.) =   10.92
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.446
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.33      0.25     0.500    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
```

```
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =     0.33      SUBAREA RUNOFF(CFS) =     0.39
 EFFECTIVE AREA(ACRES) =      1.03    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        1.0        PEAK FLOW RATE(CFS) =       1.22

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   7.29
 FLOW VELOCITY(FEET/SEC.) =  2.06   DEPTH*VELOCITY(FT*FT/SEC.) =   0.53
 LONGEST FLOWPATH FROM NODE     37.30 TO NODE     37.50 =     454.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.50 TO NODE     37.50 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   10.92
 RAINFALL INTENSITY(INCH/HR) =   1.45
 AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       1.03
 TOTAL STREAM AREA(ACRES) =       1.03
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.22

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        2.62   13.64    1.272  0.21( 0.11) 0.50       2.4      37.60
     2        1.22   10.92    1.446  0.25( 0.12) 0.50       1.0      37.30

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        3.63   10.92    1.446  0.23( 0.11) 0.50       3.0      37.30
     2        3.68   13.64    1.272  0.22( 0.11) 0.50       3.4      37.60

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       3.68    Tc(MIN.) =    13.64
 EFFECTIVE AREA(ACRES) =       3.43   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =       3.4
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.50 =     960.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.50 TO NODE     37.20 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   708.00  DOWNSTREAM(FEET) =   693.80
 FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.67
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.68
 PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   13.80
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.20 =    1080.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        3.63   11.08    1.434  0.23( 0.11) 0.50       3.0      37.30
     2        3.68   13.80    1.264  0.22( 0.11) 0.50       3.4      37.60
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.20 =    1080.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      155.41   21.45    0.981  0.27( 0.07) 0.27     181.4       1.00
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      123.86   11.08    1.434  0.27( 0.07) 0.28      96.6      37.30
     2      134.76   13.80    1.264  0.27( 0.07) 0.28     120.1      37.60
     3      158.19   21.45    0.981  0.27( 0.07) 0.27     184.8       1.00
   TOTAL AREA(ACRES) =       282.2

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      158.19  Tc(MIN.) =   21.451
 EFFECTIVE AREA(ACRES) =    184.81  AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
 TOTAL AREA(ACRES) =      282.2
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     37.20 TO NODE     47.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.80  DOWNSTREAM(FEET) =   691.30
  FLOW LENGTH(FEET) =   487.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  44.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.19
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     158.19
  PIPE TRAVEL TIME(MIN.) =   0.80    Tc(MIN.) =   22.25
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     47.31 TO NODE     47.32 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    718.50  DOWNSTREAM(FEET) =    712.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.679
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.649
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.63      0.30      0.500    36    8.68
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.85
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      0.85

****************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.32 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.68
  RAINFALL INTENSITY(INCH/HR) =   1.65
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.63
  TOTAL STREAM AREA(ACRES) =       0.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.85

****************************************************************************
  FLOW PROCESS FROM NODE     47.33 TO NODE     47.32 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   282.00
  ELEVATION DATA: UPSTREAM(FEET) =    715.00  DOWNSTREAM(FEET) =    712.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.219
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.593
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.86      0.30      0.500    36    9.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.12
  TOTAL AREA(ACRES) =      0.86   PEAK FLOW RATE(CFS) =      1.12

****************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.32 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.22
  RAINFALL INTENSITY(INCH/HR) =   1.59
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.86
  TOTAL STREAM AREA(ACRES) =       0.86
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.12

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        0.85    8.68    1.649  0.30( 0.15) 0.50       0.6      47.31
      2        1.12    9.22    1.593  0.30( 0.15) 0.50       0.9      47.33

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
```

```
     1        1.94    8.68    1.649  0.30( 0.15) 0.50       1.4      47.31
     2        1.94    9.22    1.593  0.30( 0.15) 0.50       1.5      47.33

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       1.94    Tc(MIN.) =     8.68
  EFFECTIVE AREA(ACRES) =       1.44   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =         1.5
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.32 =     330.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.34 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.00  DOWNSTREAM(FEET) =   698.50
  FLOW LENGTH(FEET) =   102.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.38
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.94
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =    9.18
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.34 =     432.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.34 TO NODE     47.34 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.18
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.597
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.38      0.30      0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.06      0.20      0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     0.44      SUBAREA RUNOFF(CFS) =     0.58
  EFFECTIVE AREA(ACRES) =      1.88   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.9       PEAK FLOW RATE(CFS) =       2.45

****************************************************************************
  FLOW PROCESS FROM NODE     47.34 TO NODE     47.35 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   698.50  DOWNSTREAM(FEET) =   697.50
  FLOW LENGTH(FEET) =   194.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.66
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.45
  PIPE TRAVEL TIME(MIN.) =   0.88    Tc(MIN.) =   10.06
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.35 =     626.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.06
  RAINFALL INTENSITY(INCH/HR) =   1.52
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       1.88
  TOTAL STREAM AREA(ACRES) =       1.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.45

****************************************************************************
  FLOW PROCESS FROM NODE     47.36 TO NODE     47.35 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   275.00
  ELEVATION DATA: UPSTREAM(FEET) =    713.50  DOWNSTREAM(FEET) =    711.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.418
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.574
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.72      0.30      0.500    36    9.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.92
  TOTAL AREA(ACRES) =      0.72   PEAK FLOW RATE(CFS) =      0.92

****************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.42
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.574
```

```
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        0.66      0.30      0.500    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        D        0.12      0.20      0.500    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =     0.78      SUBAREA RUNOFF(CFS) =     1.00
 EFFECTIVE AREA(ACRES) =      1.50   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        1.5       PEAK FLOW RATE(CFS) =       1.93

****************************************************************************
 FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.42
 RAINFALL INTENSITY(INCH/HR) =   1.57
 AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       1.50
 TOTAL STREAM AREA(ACRES) =       1.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.93

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        2.45   10.06    1.515  0.30( 0.15) 0.50       1.9      47.31
     1        2.43   10.61    1.470  0.30( 0.15) 0.50       1.9      47.33
     2        1.93    9.42    1.574  0.29( 0.15) 0.50       1.5      47.36

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        4.32    9.42    1.574  0.29( 0.15) 0.50       3.3      47.36
     2        4.30   10.06    1.515  0.29( 0.15) 0.50       3.4      47.31
     3        4.21   10.61    1.470  0.29( 0.15) 0.50       3.4      47.33

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       4.32    Tc(MIN.) =     9.42
 EFFECTIVE AREA(ACRES) =       3.26   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        3.4
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.35 =     626.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.35 TO NODE     47.37 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   697.60  DOWNSTREAM(FEET) =   696.00
 FLOW LENGTH(FEET) =   293.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.33
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.32
 PIPE TRAVEL TIME(MIN.) =   1.13    Tc(MIN.) =   10.54
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.37 =     919.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.37 TO NODE     47.37 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.54
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.475
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        0.67      0.30      0.500    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        D        0.12      0.20      0.500    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =     0.79      SUBAREA RUNOFF(CFS) =     0.95
 EFFECTIVE AREA(ACRES) =      4.05   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        4.2       PEAK FLOW RATE(CFS) =       4.84

****************************************************************************
 FLOW PROCESS FROM NODE     47.37 TO NODE     47.37 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.54
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.475
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        0.09      0.30      0.500    36
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        D        0.60      0.20      0.500    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
```

```
  SUBAREA AREA(ACRES) =     0.69      SUBAREA RUNOFF(CFS) =     0.85
  EFFECTIVE AREA(ACRES) =      4.74   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.9       PEAK FLOW RATE(CFS) =       5.69

****************************************************************************
  FLOW PROCESS FROM NODE     47.37 TO NODE     47.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =   695.20
  FLOW LENGTH(FEET) =   158.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.46
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.69
  PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =   11.14
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.30 =    1077.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.30 TO NODE     47.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.14
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.430
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.28      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     0.28      SUBAREA RUNOFF(CFS) =     0.34
  EFFECTIVE AREA(ACRES) =      5.02   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        5.2       PEAK FLOW RATE(CFS) =       5.83

****************************************************************************
  FLOW PROCESS FROM NODE     47.30 TO NODE     47.40 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.20  DOWNSTREAM(FEET) =   694.60
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.38
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.83
  PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =   11.61
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.40 =    1202.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.40 TO NODE     47.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.396
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.19      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     0.19      SUBAREA RUNOFF(CFS) =     0.22
  EFFECTIVE AREA(ACRES) =      5.21   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =       5.90

****************************************************************************
  FLOW PROCESS FROM NODE     47.40 TO NODE     47.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.60  DOWNSTREAM(FEET) =   694.40
  FLOW LENGTH(FEET) =    41.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.42
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.90
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   11.76
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.50 =    1243.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.50 TO NODE     47.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.76
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.385
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.05      0.30     0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.45      0.20     0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     1.50      SUBAREA RUNOFF(CFS) =     1.73
  EFFECTIVE AREA(ACRES) =      6.71   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        6.9       PEAK FLOW RATE(CFS) =       7.58
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     47.50 TO NODE     47.60 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.40  DOWNSTREAM(FEET) =   693.50
  FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.80
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.58
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =   12.39
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.60 =    1423.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.60 TO NODE     47.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.39
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.345
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        1.55      0.20      0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.55      SUBAREA RUNOFF(CFS) =    1.74
  EFFECTIVE AREA(ACRES) =      8.26   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        8.4       PEAK FLOW RATE(CFS) =       9.08

****************************************************************************
  FLOW PROCESS FROM NODE     47.60 TO NODE     47.70 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.50  DOWNSTREAM(FEET) =   693.30
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.96
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.08
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   12.52
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.70 =    1463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.70 TO NODE     47.70 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.52
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.336
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.04      0.25      0.500    50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        1.57      0.20      0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.61      SUBAREA RUNOFF(CFS) =    1.79
  EFFECTIVE AREA(ACRES) =      9.87   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       10.0       PEAK FLOW RATE(CFS) =      10.81

****************************************************************************
  FLOW PROCESS FROM NODE     47.70 TO NODE     47.80 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.30  DOWNSTREAM(FEET) =   692.50
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.12
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.81
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   13.08
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.80 =    1633.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.80 TO NODE     47.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.08
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.304
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.60      0.25      0.500    50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.94      0.20      0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.54      SUBAREA RUNOFF(CFS) =    1.65
  EFFECTIVE AREA(ACRES) =     11.41   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       11.6       PEAK FLOW RATE(CFS) =      12.17

****************************************************************************
```

```
  FLOW PROCESS FROM NODE     47.80 TO NODE     47.90 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.50  DOWNSTREAM(FEET) =   692.30
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  17.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.82
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.17
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   13.16
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.90 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.90 TO NODE     47.90 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.16
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.299
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        1.43      0.25      0.500    50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.14      0.20      0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     1.57      SUBAREA RUNOFF(CFS) =     1.66
  EFFECTIVE AREA(ACRES) =     12.98   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =      13.78

****************************************************************************
  FLOW PROCESS FROM NODE     47.90 TO NODE     47.91 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.30  DOWNSTREAM(FEET) =   692.10
  FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.24
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.78
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   13.30
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.91 =    1707.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.91 TO NODE     47.91 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.30
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.291
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        1.89      0.25      0.500    50
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        1.30      0.20      0.500    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     3.19      SUBAREA RUNOFF(CFS) =     3.38
  EFFECTIVE AREA(ACRES) =     16.17   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      17.06

****************************************************************************
  FLOW PROCESS FROM NODE     47.91 TO NODE     47.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.10  DOWNSTREAM(FEET) =   691.30
  FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.73
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.06
  PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =   13.79
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.00 =    1874.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       17.06   13.79    1.265  0.24( 0.12) 0.50      16.2      47.36
      2       16.67   14.45    1.231  0.24( 0.12) 0.50      16.3      47.31
      3       16.31   15.01    1.205  0.24( 0.12) 0.50      16.3      47.33
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.00 =    1874.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      123.86   11.93    1.374  0.27( 0.07) 0.28      96.6      37.30
      2      134.76   14.62    1.223  0.27( 0.07) 0.28     120.1      37.60
      3      158.19   22.25    0.961  0.27( 0.07) 0.27     184.8       1.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.
```

```
 ** PEAK FLOW RATE TABLE **
  STREAM       Q       Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1      140.03   11.93     1.374  0.26( 0.08) 0.30     110.6      37.30
     2      148.45   13.79     1.265  0.26( 0.08) 0.30     129.0      47.36
     3      150.72   14.45     1.231  0.26( 0.08) 0.30     134.8      47.31
     4      151.32   14.62     1.223  0.26( 0.08) 0.30     136.4      37.60
     5      152.25   15.01     1.205  0.26( 0.08) 0.30     139.7      47.33
     6      170.84   22.25     0.961  0.26( 0.08) 0.29     201.1       1.00
    TOTAL AREA(ACRES) =       298.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      170.84  Tc(MIN.) =   22.248
  EFFECTIVE AREA(ACRES) =    201.15  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      298.5
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     48.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   691.30  DOWNSTREAM(FEET) =   691.10
  FLOW LENGTH(FEET) =    61.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  50.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.73
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     170.84
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   22.36
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     48.60 TO NODE     48.61 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    712.40  DOWNSTREAM(FEET) =    707.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.660
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.652
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.05      0.30      0.400    36    8.66
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        0.02      0.25      0.400    50    8.66
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.69      0.20      0.400    57    8.66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      1.07
  TOTAL AREA(ACRES) =      0.76   PEAK FLOW RATE(CFS) =      1.07

****************************************************************************
  FLOW PROCESS FROM NODE     48.61 TO NODE     48.70 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  707.00  DOWNSTREAM ELEVATION(FEET) =  698.80
  STREET LENGTH(FEET) =   346.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.53
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.25
    HALFSTREET FLOOD WIDTH(FEET) =    6.98
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.75
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.70
  STREET FLOW TRAVEL TIME(MIN.) =   2.10   Tc(MIN.) =   10.76
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.458
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        0.46      0.25      0.400    50
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.28      0.20      0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.74      SUBAREA RUNOFF(CFS) =    0.91
```

```
  EFFECTIVE AREA(ACRES) =      1.50    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       1.85

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   7.69
  FLOW VELOCITY(FEET/SEC.) =  2.85   DEPTH*VELOCITY(FT*FT/SEC.) =   0.76
  LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.70 =     676.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.70 TO NODE     48.70 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.76
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.458
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C         0.59      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.59      SUBAREA RUNOFF(CFS) =     0.76
  EFFECTIVE AREA(ACRES) =      2.09   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.32
  TOTAL AREA(ACRES) =        2.1         PEAK FLOW RATE(CFS) =       2.61

****************************************************************************
  FLOW PROCESS FROM NODE     48.71 TO NODE     48.71 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.76
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.458
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B         0.09      0.30      0.400    36
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C         0.47      0.25      0.400    50
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D         0.80      0.20      0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =     1.36      SUBAREA RUNOFF(CFS) =     1.68
  EFFECTIVE AREA(ACRES) =      3.45   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =        3.4         PEAK FLOW RATE(CFS) =       4.29

****************************************************************************
  FLOW PROCESS FROM NODE     48.70 TO NODE     48.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   698.80  DOWNSTREAM(FEET) =   691.10
  FLOW LENGTH(FEET) =   119.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.68
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.29
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   10.94
  LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.00 =     795.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        4.29   10.94    1.444  0.22( 0.08) 0.35       3.4      48.60
  LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.00 =     795.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      140.03   12.05    1.366  0.26( 0.08) 0.30     110.6      37.30
      2      148.45   13.91    1.258  0.26( 0.08) 0.30     129.0      47.36
      3      150.72   14.57    1.225  0.26( 0.08) 0.30     134.8      47.31
      4      151.32   14.74    1.217  0.26( 0.08) 0.30     136.4      37.60
      5      152.25   15.13    1.199  0.26( 0.08) 0.30     139.7      47.33
      6      170.84   22.36    0.958  0.26( 0.08) 0.29     201.1       1.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      139.13   10.94    1.444  0.26( 0.08) 0.31     103.9      48.60
      2      144.07   12.05    1.366  0.26( 0.08) 0.31     114.0      37.30
      3      152.15   13.91    1.258  0.26( 0.08) 0.30     132.4      47.36
      4      154.32   14.57    1.225  0.26( 0.08) 0.30     138.3      47.31
      5      154.89   14.74    1.217  0.26( 0.08) 0.30     139.8      37.60
      6      155.77   15.13    1.199  0.26( 0.08) 0.30     143.1      47.33
      7      173.60   22.36    0.958  0.26( 0.08) 0.29     204.6       1.00
    TOTAL AREA(ACRES) =       302.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      173.60  Tc(MIN.) =   22.364
  EFFECTIVE AREA(ACRES) =    204.60  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      302.0
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     49.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   691.10  DOWNSTREAM(FEET) =   689.20
  FLOW LENGTH(FEET) =   384.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  49.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.09
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     173.60
  PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =   23.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     49.00 =   11849.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.943
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.31      0.30      0.100    36
  COMMERCIAL                 C        0.90      0.25      0.100    50
  COMMERCIAL                 D        0.12      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     1.33      SUBAREA RUNOFF(CFS) =     1.10
  EFFECTIVE AREA(ACRES) =    205.93   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      303.3       PEAK FLOW RATE(CFS) =     173.60
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   23.00
  RAINFALL INTENSITY(INCH/HR) =   0.94
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.29
  EFFECTIVE STREAM AREA(ACRES) =     205.93
  TOTAL STREAM AREA(ACRES) =     303.28
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     173.60

****************************************************************************
  FLOW PROCESS FROM NODE     61.30 TO NODE     61.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    707.30  DOWNSTREAM(FEET) =    704.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.383
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.683
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  APARTMENTS                 B        0.53      0.30      0.200    36    8.38
  APARTMENTS                 D        0.77      0.20      0.200    57    8.38
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      1.91
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      1.91

****************************************************************************
  FLOW PROCESS FROM NODE     61.20 TO NODE     61.10 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    704.20
  DOWNSTREAM NODE ELEVATION(FEET) =    703.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   119.00
  "V" GUTTER WIDTH(FEET) =   1.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.10000
  MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.613
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 B        1.30      0.30      0.200    36
  APARTMENTS                 D        0.25      0.20      0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.00
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.08
  AVERAGE FLOW DEPTH(FEET) =   0.32   FLOOD WIDTH(FEET) =    6.21
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.64   Tc(MIN.) =    9.03
  SUBAREA AREA(ACRES) =    1.55      SUBAREA RUNOFF(CFS) =    2.17
  EFFECTIVE AREA(ACRES) =    2.85    AREA-AVERAGED Fm(INCH/HR) =   0.05
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   0.20
  TOTAL AREA(ACRES) =        2.8       PEAK FLOW RATE(CFS) =       4.00
```

Onsite Hydrology Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1 and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61, ***with Detention @ Node 35***

3.1% Reduction

2-Year Storm Proposed Condition

```
  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.36   FLOOD WIDTH(FEET) =    6.93
  FLOW VELOCITY(FEET/SEC.) =   3.31   DEPTH*VELOCITY(FT*FT/SEC) =   1.18
  LONGEST FLOWPATH FROM NODE     61.30 TO NODE     61.10 =     449.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.10 TO NODE     49.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  703.00  DOWNSTREAM ELEVATION(FEET) =  699.50
  STREET LENGTH(FEET) =   380.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.49
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   13.88
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.42
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.92
  STREET FLOW TRAVEL TIME(MIN.) =   2.61   Tc(MIN.) =   11.64
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.394
  SUBAREA LOSS RATE DATA(AMC   I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.26      0.30      0.100    36
  COMMERCIAL                 C        0.25      0.25      0.100    50
  COMMERCIAL                 D        0.29      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    0.99
  EFFECTIVE AREA(ACRES) =      3.65    AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =       4.43

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  13.76
  FLOW VELOCITY(FEET/SEC.) =  2.43   DEPTH*VELOCITY(FT*FT/SEC.) =   0.91
  LONGEST FLOWPATH FROM NODE     61.30 TO NODE     49.00 =     829.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.64
  RAINFALL INTENSITY(INCH/HR) =   1.39
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.18
  EFFECTIVE STREAM AREA(ACRES) =       3.65
  TOTAL STREAM AREA(ACRES) =       3.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.43

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      139.13   11.60    1.396  0.26( 0.08) 0.30      105.2       48.60
      1      144.07   12.71    1.325  0.26( 0.08) 0.30      115.4       37.30
      1      152.15   14.55    1.226  0.26( 0.08) 0.30      133.8       47.36
      1      154.32   15.21    1.195  0.26( 0.08) 0.30      139.6       47.31
      1      154.89   15.38    1.188  0.26( 0.08) 0.30      141.2       37.60
      1      155.77   15.77    1.171  0.26( 0.08) 0.30      144.5       47.33
      1      173.60   23.00    0.943  0.26( 0.08) 0.29      205.9        1.00
      2        4.43   11.64    1.394  0.26( 0.05) 0.18        3.6       61.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      143.55   11.60    1.396  0.26( 0.08) 0.30      108.8       48.60
      2      143.72   11.64    1.394  0.26( 0.08) 0.30      109.2       61.30
      3      148.27   12.71    1.325  0.26( 0.08) 0.30      119.0       37.30
      4      156.03   14.55    1.226  0.26( 0.08) 0.30      137.4       47.36
      5      158.09   15.21    1.195  0.26( 0.08) 0.30      143.3       47.31
      6      158.64   15.38    1.188  0.26( 0.08) 0.30      144.8       37.60
      7      159.46   15.77    1.171  0.26( 0.08) 0.30      148.1       47.33
      8      176.55   23.00    0.943  0.26( 0.08) 0.29      209.6        1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     176.55    Tc(MIN.) =    23.00
  EFFECTIVE AREA(ACRES) =     209.58   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      306.9
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     49.00 =   11849.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     50.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   689.20  DOWNSTREAM(FEET) =   688.90
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  47.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.50
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     176.55
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   23.09
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     57.10 TO NODE     57.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    714.00  DOWNSTREAM(FEET) =    711.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.278
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.695
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  B        0.42      0.30      0.100    36    8.28
  COMMERCIAL                  D        0.08      0.20      0.100    57    8.28
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.75
  TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      0.75

****************************************************************************
  FLOW PROCESS FROM NODE     57.20 TO NODE     57.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  711.60  DOWNSTREAM ELEVATION(FEET) =  709.00
  STREET LENGTH(FEET) =   130.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.83
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =    5.15
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.31
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.51
  STREET FLOW TRAVEL TIME(MIN.) =   0.94   Tc(MIN.) =    9.21
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.594
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.11      0.30      0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.11      SUBAREA RUNOFF(CFS) =    0.15
  EFFECTIVE AREA(ACRES) =      0.61    AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       0.86

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   5.36
  FLOW VELOCITY(FEET/SEC.) =  2.28   DEPTH*VELOCITY(FT*FT/SEC.) =   0.51
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     57.00 =     460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.21
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.594
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.29      0.30      0.100    36
  COMMERCIAL                  C        0.02      0.25      0.100    50
  COMMERCIAL                  D        0.34      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.65      SUBAREA RUNOFF(CFS) =    0.92
  EFFECTIVE AREA(ACRES) =      1.26   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       1.78

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.21
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.594
  SUBAREA LOSS RATE DATA(AMC  I ):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.33      0.30      0.200    36
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        0.56      0.20      0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     0.89      SUBAREA RUNOFF(CFS) =     1.24
  EFFECTIVE AREA(ACRES) =      2.15   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.14
  TOTAL AREA(ACRES) =        2.2       PEAK FLOW RATE(CFS) =       3.02

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.21
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.594
  SUBAREA LOSS RATE DATA(AMC   I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.34      0.30      0.200    36
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        0.53      0.20      0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     0.87      SUBAREA RUNOFF(CFS) =     1.21
  EFFECTIVE AREA(ACRES) =      3.02   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =        3.0       PEAK FLOW RATE(CFS) =       4.23

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     58.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.00  DOWNSTREAM(FEET) =   702.50
  FLOW LENGTH(FEET) =   633.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.46
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.23
  PIPE TRAVEL TIME(MIN.) =   1.93    Tc(MIN.) =   11.15
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     58.00 =    1093.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.15
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.429
  SUBAREA LOSS RATE DATA(AMC   I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        1.93      0.30      0.200    36
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        0.46      0.20      0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     2.39      SUBAREA RUNOFF(CFS) =     2.95
  EFFECTIVE AREA(ACRES) =      5.41   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =       6.73

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.15
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.429
  SUBAREA LOSS RATE DATA(AMC   I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        1.60      0.30      0.200    36
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        0.76      0.20      0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     2.36      SUBAREA RUNOFF(CFS) =     2.92
  EFFECTIVE AREA(ACRES) =      7.77   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =       9.65

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   702.50  DOWNSTREAM(FEET) =   700.00
  FLOW LENGTH(FEET) =    67.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.90
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.65
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.25
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     58.10 =    1160.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     58.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.25
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.421
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        1.94      0.30     0.200    36
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       C        0.82      0.25     0.200    50
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        4.28      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     7.04      SUBAREA RUNOFF(CFS) =     8.71
  EFFECTIVE AREA(ACRES) =     14.81   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       14.8       PEAK FLOW RATE(CFS) =      18.31

****************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     58.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.25
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.421
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       C        3.80      0.25     0.200    50
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        2.64      0.20     0.200    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     6.44      SUBAREA RUNOFF(CFS) =     7.97
  EFFECTIVE AREA(ACRES) =     21.25   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       21.2       PEAK FLOW RATE(CFS) =      26.28

****************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     59.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   700.00  DOWNSTREAM(FEET) =   699.50
  FLOW LENGTH(FEET) =   139.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.71
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.28
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   11.65
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.00 =    1299.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.65
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.393
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.44      0.30     0.100    36
  COMMERCIAL                 D        0.18      0.20     0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.62      SUBAREA RUNOFF(CFS) =     0.76
  EFFECTIVE AREA(ACRES) =     21.87   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       21.9       PEAK FLOW RATE(CFS) =      26.50

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.50  DOWNSTREAM(FEET) =   699.10
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.45
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.50
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   11.78
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.10 =    1355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     59.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.78
  RAINFALL INTENSITY(INCH/HR) =   1.38
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  0.19
  EFFECTIVE STREAM AREA(ACRES) =      21.87
  TOTAL STREAM AREA(ACRES) =      21.87
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      26.50
```

Onsite Hydrology Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1 and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61, ***with Detention @ Node 35***

3.1% Reduction

2-Year Storm Proposed Condition

```
****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     50.10 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    83.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.01      0.30     0.100    36
  COMMERCIAL                 C        0.06      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.14
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.14

****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     50.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.08      0.30     0.100    36
  COMMERCIAL                 C        0.01      0.25     0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.18
  EFFECTIVE AREA(ACRES) =      0.16   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.2       PEAK FLOW RATE(CFS) =       0.32

****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     59.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.00  DOWNSTREAM(FEET) =   699.10
  FLOW LENGTH(FEET) =   481.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.75
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.32
  PIPE TRAVEL TIME(MIN.) =   2.14    Tc(MIN.) =    7.14
  LONGEST FLOWPATH FROM NODE     50.10 TO NODE     59.10 =     564.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     59.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.14
  RAINFALL INTENSITY(INCH/HR) =   1.85
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.28
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.16
  TOTAL STREAM AREA(ACRES) =       0.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.32

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       26.50   11.78    1.384  0.24( 0.05) 0.19      21.9      57.10
      2        0.32    7.14    1.845  0.28( 0.03) 0.10       0.2      50.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       21.91    7.14    1.845  0.24( 0.05) 0.19      13.4      50.10
      2       26.74   11.78    1.384  0.24( 0.05) 0.19      22.0      57.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      26.74    Tc(MIN.) =    11.78
  EFFECTIVE AREA(ACRES) =      22.03   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       22.0
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.10 =    1355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     50.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.10  DOWNSTREAM(FEET) =   688.90
  FLOW LENGTH(FEET) =    28.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  33.03
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.74
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.79
```

```
 LONGEST FLOWPATH FROM NODE     57.10 TO NODE     50.00 =    1383.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       21.91    7.15    1.843  0.24( 0.05) 0.19      13.4       50.10
     2       26.74   11.79    1.383  0.24( 0.05) 0.19      22.0       57.10
 LONGEST FLOWPATH FROM NODE     57.10 TO NODE     50.00 =    1383.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      143.55   11.70    1.390  0.26( 0.08) 0.30     108.8       48.60
     2      143.72   11.73    1.387  0.26( 0.08) 0.30     109.2       61.30
     3      148.27   12.80    1.320  0.26( 0.08) 0.30     119.0       37.30
     4      156.03   14.64    1.222  0.26( 0.08) 0.30     137.4       47.36
     5      158.09   15.30    1.191  0.26( 0.08) 0.30     143.3       47.31
     6      158.64   15.47    1.184  0.26( 0.08) 0.30     144.8       37.60
     7      159.46   15.86    1.167  0.26( 0.08) 0.30     148.1       47.33
     8      176.55   23.09    0.941  0.26( 0.08) 0.29     209.6        1.00
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      140.02    7.15    1.843  0.26( 0.07) 0.28      80.0       50.10
     2      170.18   11.70    1.390  0.26( 0.07) 0.28     130.7       48.60
     3      170.39   11.73    1.387  0.26( 0.07) 0.28     131.1       61.30
     4      170.72   11.79    1.383  0.26( 0.07) 0.28     131.8       57.10
     5      173.74   12.80    1.320  0.26( 0.07) 0.28     141.0       37.30
     6      179.53   14.64    1.222  0.26( 0.07) 0.28     159.5       47.36
     7      180.99   15.30    1.191  0.26( 0.07) 0.28     165.3       47.31
     8      181.38   15.47    1.184  0.26( 0.07) 0.28     166.9       37.60
     9      181.87   15.86    1.167  0.26( 0.07) 0.28     170.2       47.33
    10      194.43   23.09    0.941  0.26( 0.07) 0.28     231.6        1.00
   TOTAL AREA(ACRES) =      329.0

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     194.43  Tc(MIN.) =   23.087
 EFFECTIVE AREA(ACRES) =   231.61  AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =     329.0
 LONGEST FLOWPATH FROM NODE     1.00 TO NODE     50.00 =   11905.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     50.00 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   688.90  DOWNSTREAM(FEET) =   675.00
 FLOW LENGTH(FEET) =   437.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  35.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  21.08
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     194.43
 PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   23.43
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     61.00 =   12342.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   23.43
 RAINFALL INTENSITY(INCH/HR) =   0.93
 AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.26
 AREA-AVERAGED Ap =  0.28
 EFFECTIVE STREAM AREA(ACRES) =     231.61
 TOTAL STREAM AREA(ACRES) =     328.96
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     194.43

****************************************************************************
 FLOW PROCESS FROM NODE     48.10 TO NODE     48.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    712.40  DOWNSTREAM(FEET) =    709.70

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.947
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.525
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        0.15      0.30      0.400    36    9.95
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        0.34      0.20      0.400    57    9.95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
```

```
  SUBAREA RUNOFF(CFS) =      0.63
  TOTAL AREA(ACRES) =      0.49   PEAK FLOW RATE(CFS) =      0.63

****************************************************************************
  FLOW PROCESS FROM NODE     48.20 TO NODE     48.30 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  709.70  DOWNSTREAM ELEVATION(FEET) =  703.80
  STREET LENGTH(FEET) =   500.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.32
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.69
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.04
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.54
  STREET FLOW TRAVEL TIME(MIN.) =   4.09   Tc(MIN.) =   14.03
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.252
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.64      0.25     0.400    50
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.68      0.20     0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.32      SUBAREA RUNOFF(CFS) =    1.38
  EFFECTIVE AREA(ACRES) =      1.81    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        1.8        PEAK FLOW RATE(CFS) =       1.89

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   9.11
  FLOW VELOCITY(FEET/SEC.) =  2.19   DEPTH*VELOCITY(FT*FT/SEC.) =   0.64
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.30 =     830.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.30 TO NODE     48.40 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  703.80  DOWNSTREAM ELEVATION(FEET) =  700.20
  STREET LENGTH(FEET) =   522.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.61
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   11.86
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.90
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.65
  STREET FLOW TRAVEL TIME(MIN.) =   4.58   Tc(MIN.) =   18.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.064
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.93      0.25     0.400    50
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.71      0.20     0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.64      SUBAREA RUNOFF(CFS) =    1.44
  EFFECTIVE AREA(ACRES) =      3.45    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        3.4        PEAK FLOW RATE(CFS) =       3.02

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  12.57
  FLOW VELOCITY(FEET/SEC.) =  1.97   DEPTH*VELOCITY(FT*FT/SEC.) =   0.70
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.40 =    1352.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.40 TO NODE     48.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.064
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.44      0.25     0.400    50
  RESIDENTIAL
```

```
  "8-10 DWELLINGS/ACRE"      D        0.46      0.20     0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =     0.90      SUBAREA RUNOFF(CFS) =     0.79
  EFFECTIVE AREA(ACRES) =      4.35   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        4.3       PEAK FLOW RATE(CFS) =       3.81

****************************************************************************
  FLOW PROCESS FROM NODE     48.40 TO NODE     48.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   700.20  DOWNSTREAM(FEET) =   699.80
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.07
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.81
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   18.94
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.50 =    1432.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.50 TO NODE     48.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.94
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.054
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.16      0.30     0.400    36
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        1.49      0.25     0.400    50
  PUBLIC PARK                C        0.26      0.25     0.850    50
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.88      0.20     0.400    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.442
  SUBAREA AREA(ACRES) =     2.79      SUBAREA RUNOFF(CFS) =     2.38
  EFFECTIVE AREA(ACRES) =      7.14   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =        7.1       PEAK FLOW RATE(CFS) =       6.15

****************************************************************************
  FLOW PROCESS FROM NODE     48.50 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.80  DOWNSTREAM(FEET) =   675.00
  FLOW LENGTH(FEET) =   425.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.40
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.15
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =   19.56
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     61.00 =    1857.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.56
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.035
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        1.98      0.30     0.850    36
  PUBLIC PARK                D        1.67      0.20     0.850    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =     3.65      SUBAREA RUNOFF(CFS) =     2.69
  EFFECTIVE AREA(ACRES) =     10.79   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =       10.8       PEAK FLOW RATE(CFS) =       8.72

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.56
  RAINFALL INTENSITY(INCH/HR) =   1.03
  AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =     10.79
  TOTAL STREAM AREA(ACRES) =     10.79
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.72

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      140.02    7.52    1.791  0.26( 0.07) 0.28      80.0      50.10
      1      170.18   12.06    1.366  0.26( 0.07) 0.28     130.7      48.60
      1      170.39   12.08    1.364  0.26( 0.07) 0.28     131.1      61.30
      1      170.72   12.14    1.360  0.26( 0.07) 0.28     131.8      57.10
      1      173.74   13.15    1.299  0.26( 0.07) 0.28     141.0      37.30
```

```
     1      179.53   14.99    1.205  0.26( 0.07) 0.28      159.5       47.36
     1      180.99   15.65    1.176  0.26( 0.07) 0.28      165.3       47.31
     1      181.38   15.82    1.169  0.26( 0.07) 0.28      166.9       37.60
     1      181.87   16.21    1.153  0.26( 0.07) 0.28      170.2       47.33
     1      194.43   23.43    0.933  0.26( 0.07) 0.28      231.6        1.00
     2        8.72   19.56    1.035  0.24( 0.14) 0.56       10.8       48.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      146.19    7.52    1.791  0.26( 0.08) 0.29       84.1       50.10
      2      177.54   12.06    1.366  0.26( 0.08) 0.29      137.3       48.60
      3      177.75   12.08    1.364  0.26( 0.08) 0.29      137.8       61.30
      4      178.09   12.14    1.360  0.26( 0.08) 0.29      138.5       57.10
      5      181.33   13.15    1.299  0.26( 0.08) 0.30      148.3       37.30
      6      187.48   14.99    1.205  0.26( 0.08) 0.30      167.7       47.36
      7      189.06   15.65    1.176  0.26( 0.08) 0.30      173.9       47.31
      8      189.48   15.82    1.169  0.26( 0.08) 0.30      175.6       37.60
      9      190.04   16.21    1.153  0.26( 0.08) 0.30      179.1       47.33
     10      196.43   19.56    1.035  0.26( 0.08) 0.30      209.5       48.10
     11      202.16   23.43    0.933  0.26( 0.08) 0.29      242.4        1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     202.16    Tc(MIN.) =    23.43
  EFFECTIVE AREA(ACRES) =     242.40   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      339.8
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     61.00 =   12342.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      339.8  TC(MIN.) =     23.43
  EFFECTIVE AREA(ACRES) =    242.40  AREA-AVERAGED Fm(INCH/HR)=  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap = 0.292
  PEAK FLOW RATE(CFS)   =     202.16

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      146.19    7.52    1.791  0.26( 0.08) 0.29       84.1       50.10
      2      177.54   12.06    1.366  0.26( 0.08) 0.29      137.3       48.60
      3      177.75   12.08    1.364  0.26( 0.08) 0.29      137.8       61.30
      4      178.09   12.14    1.360  0.26( 0.08) 0.29      138.5       57.10
      5      181.33   13.15    1.299  0.26( 0.08) 0.30      148.3       37.30
      6      187.48   14.99    1.205  0.26( 0.08) 0.30      167.7       47.36
      7      189.06   15.65    1.176  0.26( 0.08) 0.30      173.9       47.31
      8      189.48   15.82    1.169  0.26( 0.08) 0.30      175.6       37.60
      9      190.04   16.21    1.153  0.26( 0.08) 0.30      179.1       47.33
     10      196.43   19.56    1.035  0.26( 0.08) 0.30      209.5       48.10
     11      202.16   23.43    0.933  0.26( 0.08) 0.29      242.4        1.00
============================================================================
============================================================================
```

END OF RATIONAL METHOD ANALYSIS

```
************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                *
* OFFSITE & ONSITE PROP CONDITION @ 25-YEAR STORM WITH DETENTION NODE 35   *
* W.O. #1443-136X, 27.5% REDUCTION                                     *
 ************************************************************************

  FILE NAME: DET_25.DAT
  TIME/DATE OF STUDY: 10:33 06/10/2019
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   18.0      13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  2   20.0      15.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1099.00  DOWNSTREAM(FEET) =   1091.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.370
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.603
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.78      0.25      0.600    69    8.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      2.42
  TOTAL AREA(ACRES) =      0.78   PEAK FLOW RATE(CFS) =      2.42

************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 1091.20  DOWNSTREAM ELEVATION(FEET) = 1089.40
  STREET LENGTH(FEET) =    90.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.04
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   13.38
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.52
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.30
  STREET FLOW TRAVEL TIME(MIN.) =   0.43   Tc(MIN.) =    8.80
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.503
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.38      0.25      0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    7.24
  EFFECTIVE AREA(ACRES) =      3.16    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.52
```

Onsite Hydrology Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1 and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61, ***with Detention @ Node 35***

27.5% Reduction

25-Year Storm Proposed Condition

```
  TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =       9.59

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  16.12
  FLOW VELOCITY(FEET/SEC.) =  3.93   DEPTH*VELOCITY(FT*FT/SEC.) =   1.64
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1089.40  DOWNSTREAM ELEVATION(FEET) = 1067.00
  STREET LENGTH(FEET) =   513.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.41
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   14.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.35
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.06
  STREET FLOW TRAVEL TIME(MIN.) =   1.60   Tc(MIN.) =   10.39
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.188
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.34      0.25     0.100    69
  PUBLIC PARK                C        0.25      0.25     0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.418
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    1.64
  EFFECTIVE AREA(ACRES) =      3.75    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =      10.33

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  14.19
  FLOW VELOCITY(FEET/SEC.) =  5.38   DEPTH*VELOCITY(FT*FT/SEC.) =   2.06
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     903.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.39
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.188
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.35      0.25     0.100    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.49      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.333
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    2.35
  EFFECTIVE AREA(ACRES) =      4.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =      12.68

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1067.00  DOWNSTREAM(FEET) =  1062.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.02
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.68
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   10.52
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1003.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.52
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.166
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.09      0.25     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.09      SUBAREA RUNOFF(CFS) =    5.72
  EFFECTIVE AREA(ACRES) =      6.68   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        6.7        PEAK FLOW RATE(CFS) =      18.31

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1062.00  DOWNSTREAM(FEET) =  1022.40
  FLOW LENGTH(FEET) =   701.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.79
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.31
  PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   11.31
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1704.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.31
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.039
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.18      0.30      0.100    56
  COMMERCIAL                 C        0.46      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.64      SUBAREA RUNOFF(CFS) =    1.74
  EFFECTIVE AREA(ACRES) =      7.32   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        7.3       PEAK FLOW RATE(CFS) =      19.28

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.40  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.72
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.28
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   11.58
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.58
  RAINFALL INTENSITY(INCH/HR) =   3.00
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       7.32
  TOTAL STREAM AREA(ACRES) =       7.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      19.28

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   305.00
  ELEVATION DATA: UPSTREAM(FEET) =   1046.00  DOWNSTREAM(FEET) =   1042.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.129
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.946
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 C        1.00      0.25      0.100    69    7.13
  RESIDENTIAL
  ".4 DWELLING/ACRE"         C        0.50      0.25      0.900    69   11.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
  SUBAREA RUNOFF(CFS) =      5.20
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      5.20

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1042.00  DOWNSTREAM ELEVATION(FEET) = 1036.00
  STREET LENGTH(FEET) =   373.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.13
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
```

```
   HALFSTREET FLOOD WIDTH(FEET) =   13.07
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.08
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.12
 STREET FLOW TRAVEL TIME(MIN.) =   2.02   Tc(MIN.) =    9.15
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.426
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C        3.31      0.25     0.500    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    3.31      SUBAREA RUNOFF(CFS) =    9.83
 EFFECTIVE AREA(ACRES) =      4.81    AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =        4.8        PEAK FLOW RATE(CFS) =      14.34

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  15.00
 FLOW VELOCITY(FEET/SEC.) =  3.36   DEPTH*VELOCITY(FT*FT/SEC.) =   1.34
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     678.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1036.00  DOWNSTREAM ELEVATION(FEET) = 1026.00
 STREET LENGTH(FEET) =   463.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.52
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.40
   HALFSTREET FLOOD WIDTH(FEET) =   15.31
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.96
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.59
 STREET FLOW TRAVEL TIME(MIN.) =   1.95   Tc(MIN.) =   11.10
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.072
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C        2.40      0.25     0.500    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    6.36
 EFFECTIVE AREA(ACRES) =      7.21    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =      19.16

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  15.92
 FLOW VELOCITY(FEET/SEC.) =  4.02   DEPTH*VELOCITY(FT*FT/SEC.) =   1.66
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1141.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.10
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.072
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        0.16      0.30     0.500    56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C        2.22      0.25     0.500    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    6.31
 EFFECTIVE AREA(ACRES) =      9.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =        9.6        PEAK FLOW RATE(CFS) =      25.47

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1026.00  DOWNSTREAM(FEET) =  1022.00
 FLOW LENGTH(FEET) =   395.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.36
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      25.47
 PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   11.89
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1536.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.89
```

```
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.955
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.07      0.30      0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        4.06      0.25      0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     4.13      SUBAREA RUNOFF(CFS) =   10.52
  EFFECTIVE AREA(ACRES) =     13.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       13.7       PEAK FLOW RATE(CFS) =      34.98

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.00  DOWNSTREAM(FEET) =  1020.00
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.55
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      34.98
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   12.09
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.927
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.55      0.30      0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        2.06      0.25      0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     2.61      SUBAREA RUNOFF(CFS) =    6.57
  EFFECTIVE AREA(ACRES) =     16.33   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      41.21

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1020.00  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.45
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.21
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   12.44
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    1799.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.44
  RAINFALL INTENSITY(INCH/HR) =   2.88
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =      16.33
  TOTAL STREAM AREA(ACRES) =      16.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      41.21

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1       19.28   11.58    2.999  0.25( 0.11) 0.45       7.3        1.00
      2       41.21   12.44    2.880  0.25( 0.12) 0.49      16.3        8.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1       59.29   11.58    2.999  0.25( 0.12) 0.48      22.5        1.00
      2       59.69   12.44    2.880  0.25( 0.12) 0.48      23.6        8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      59.69    Tc(MIN.) =    12.44
  EFFECTIVE AREA(ACRES) =      23.65   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       23.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.10 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1019.50  DOWNSTREAM(FEET) =  1014.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.64
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      59.69
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   12.59
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.10 =    2014.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   12.59
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.860
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.15      0.30      0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.15      SUBAREA RUNOFF(CFS) =     0.38
  EFFECTIVE AREA(ACRES) =     23.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       23.8       PEAK FLOW RATE(CFS) =      59.69
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   12.59
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.860
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.16      0.30      0.100    56
  COMMERCIAL                  C        1.44      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     4.08
  EFFECTIVE AREA(ACRES) =     25.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       25.4       PEAK FLOW RATE(CFS) =      62.78

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1014.00  DOWNSTREAM(FEET) =   971.40
  FLOW LENGTH(FEET) =   863.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.70
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      62.78
  PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =   13.36
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    2877.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   13.36
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.765
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.82      0.30      0.100    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.77      0.25      0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.294
  SUBAREA AREA(ACRES) =     1.59      SUBAREA RUNOFF(CFS) =     3.85
  EFFECTIVE AREA(ACRES) =     26.99   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       27.0       PEAK FLOW RATE(CFS) =      64.47

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   971.40  DOWNSTREAM(FEET) =   969.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.47
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      64.47
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   13.40
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    2917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   13.40
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.761
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"        B        2.46      0.30      0.500    56
RESIDENTIAL
"5-7 DWELLINGS/ACRE"        C       10.48      0.25      0.500    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
SUBAREA AREA(ACRES) =   12.94      SUBAREA RUNOFF(CFS) =   30.65
EFFECTIVE AREA(ACRES) =     39.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
TOTAL AREA(ACRES) =       39.9       PEAK FLOW RATE(CFS) =      95.02

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
    1       96.03   12.54    2.867  0.25( 0.12) 0.46      38.8        1.00
    2       95.02   13.40    2.761  0.25( 0.12) 0.46      39.9        8.00
NEW PEAK FLOW DATA ARE:
PEAK FLOW RATE(CFS) =      96.03  Tc(MIN.) =   12.54
AREA-AVERAGED Fm(INCH/HR) =  0.12  AREA-AVERAGED Fp(INCH/HR) =  0.25
AREA-AVERAGED Ap =  0.46  EFFECTIVE AREA(ACRES) =      38.80

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   969.00  DOWNSTREAM(FEET) =   954.00
 FLOW LENGTH(FEET) =   416.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.88
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      96.03
 PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   12.90
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    3333.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.90
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.821
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        0.77      0.25      0.100    69
 PUBLIC PARK                 C        0.43      0.25      0.850    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.369
 SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    2.95
 EFFECTIVE AREA(ACRES) =     40.00   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =       41.1       PEAK FLOW RATE(CFS) =      97.36

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   954.00  DOWNSTREAM(FEET) =   952.80
 FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  31.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.66
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      97.36
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   13.07
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    3453.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.07
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.800
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        0.88      0.30      0.400    56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       C        7.02      0.25      0.400    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =    7.90      SUBAREA RUNOFF(CFS) =   19.18
 EFFECTIVE AREA(ACRES) =     47.90   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
 TOTAL AREA(ACRES) =       49.0       PEAK FLOW RATE(CFS) =     115.78

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     17.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   952.80  DOWNSTREAM(FEET) =   929.00
 FLOW LENGTH(FEET) =   636.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.70
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     115.78
 PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =   13.61
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.10 =    4089.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     17.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.61
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.736
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.68      0.30      0.500    56
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"        C        0.89      0.25      0.600    69
  COMMERCIAL                  C        1.86      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.309
  SUBAREA AREA(ACRES) =     3.43      SUBAREA RUNOFF(CFS) =     8.19
  EFFECTIVE AREA(ACRES) =     51.33   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       52.5       PEAK FLOW RATE(CFS) =     121.25

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   929.00  DOWNSTREAM(FEET) =   926.30
  FLOW LENGTH(FEET) =   122.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.58
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     121.25
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   13.74
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     18.00 =    4211.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.74
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.723
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS                B       24.46      0.30      0.350    56
  CONDOMINIUMS                C        7.92      0.25      0.350    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =   32.38      SUBAREA RUNOFF(CFS) =    76.41
  EFFECTIVE AREA(ACRES) =     83.71   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       84.8       PEAK FLOW RATE(CFS) =     197.02

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   926.30  DOWNSTREAM(FEET) =   922.70
  FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  36.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.29
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     197.02
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   13.89
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     19.00 =    4384.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.89
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.705
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        1.62      0.30      0.400    56
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        6.09      0.25      0.400    69
  COMMERCIAL                  B        2.90      0.30      0.100    56
  COMMERCIAL                  C        3.15      0.25      0.100    69
  NATURAL POOR COVER
  "GRASS"                     B        0.76      0.30      1.000    78
  NATURAL POOR COVER
  "GRASS"                     C        0.39      0.25      1.000    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
  SUBAREA AREA(ACRES) =   14.91      SUBAREA RUNOFF(CFS) =    35.13
  EFFECTIVE AREA(ACRES) =     98.62   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =       99.8       PEAK FLOW RATE(CFS) =     230.83

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   922.70  DOWNSTREAM(FEET) =   815.60
  FLOW LENGTH(FEET) =  1580.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.33
```

```
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     230.83
 PIPE TRAVEL TIME(MIN.) =   0.90    Tc(MIN.) =   14.79
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     20.00 =    5964.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.79
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.611
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B       19.45      0.30      0.100    56
 COMMERCIAL                  C       16.92      0.25      0.100    69
 COMMERCIAL                  D        0.11      0.20      0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =   36.48      SUBAREA RUNOFF(CFS) =   84.81
 EFFECTIVE AREA(ACRES) =    135.10   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =      136.2       PEAK FLOW RATE(CFS) =     307.28

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   815.60  DOWNSTREAM(FEET) =   799.50
 FLOW LENGTH(FEET) =   449.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  38.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  25.02
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     307.28
 PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   15.09
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6413.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.09
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.581
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        2.38      0.30      0.100    56
 COMMERCIAL                  C        0.87      0.25      0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    7.47
 EFFECTIVE AREA(ACRES) =    138.35   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =      139.5       PEAK FLOW RATE(CFS) =     311.17

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.09
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.581
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        4.10      0.30      0.100    56
 COMMERCIAL                  C        1.54      0.25      0.100    69
 COMMERCIAL                  D        2.08      0.20      0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    7.72      SUBAREA RUNOFF(CFS) =   17.75
 EFFECTIVE AREA(ACRES) =    146.07   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.30
 TOTAL AREA(ACRES) =      147.2       PEAK FLOW RATE(CFS) =     328.93

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   799.50  DOWNSTREAM(FEET) =   765.50
 FLOW LENGTH(FEET) =  1056.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  43.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  23.99
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     328.93
 PIPE TRAVEL TIME(MIN.) =   0.73    Tc(MIN.) =   15.82
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     22.00 =    7469.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.82
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.513
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        2.06      0.30      0.100    56
 COMMERCIAL                  C        1.74      0.25      0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
  SUBAREA AREA(ACRES) =     3.80      SUBAREA RUNOFF(CFS) =     8.50
  EFFECTIVE AREA(ACRES) =    149.87   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      151.0       PEAK FLOW RATE(CFS) =     328.93
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.82
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.513
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.23      0.30      0.100    56
  COMMERCIAL                 D        5.07      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     5.30      SUBAREA RUNOFF(CFS) =    11.89
  EFFECTIVE AREA(ACRES) =    155.17   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      156.3       PEAK FLOW RATE(CFS) =     340.32

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   765.50  DOWNSTREAM(FEET) =   755.00
  FLOW LENGTH(FEET) =   465.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  45.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.44
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     340.32
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =   16.18
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     23.00 =    7934.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.18
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.481
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        9.15      0.30      0.100    56
  COMMERCIAL                 C       10.79      0.25      0.100    69
  COMMERCIAL                 D        1.81      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    21.75      SUBAREA RUNOFF(CFS) =    48.05
  EFFECTIVE AREA(ACRES) =    176.92   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =      178.1       PEAK FLOW RATE(CFS) =     383.91

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.18
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.481
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        7.47      0.30      0.100    56
  COMMERCIAL                 C        0.40      0.25      0.100    69
  COMMERCIAL                 D       17.76      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   25.63      SUBAREA RUNOFF(CFS) =    56.70
  EFFECTIVE AREA(ACRES) =    202.55   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      203.7       PEAK FLOW RATE(CFS) =     440.61

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   755.00  DOWNSTREAM(FEET) =   736.00
  FLOW LENGTH(FEET) =  1257.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  69.0 INCH PIPE IS  56.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.36
  ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     440.61
  PIPE TRAVEL TIME(MIN.) =   1.08    Tc(MIN.) =   17.27
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.00 =    9191.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.27
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.392
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B       16.13      0.30      0.100    56
  COMMERCIAL                 C        3.87      0.25      0.100    69
  COMMERCIAL                 D        4.22      0.20      0.100    75
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   24.22      SUBAREA RUNOFF(CFS) =   51.54
  EFFECTIVE AREA(ACRES) =    226.77   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      227.9       PEAK FLOW RATE(CFS) =     475.88

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     30.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   736.00  DOWNSTREAM(FEET) =   720.00
  FLOW LENGTH(FEET) =   212.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  41.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  36.60
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     475.88
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   17.36
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.10 =    9403.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.10 TO NODE     30.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   720.00  DOWNSTREAM(FEET) =   716.00
  FLOW LENGTH(FEET) =   156.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  50.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  24.40
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     475.88
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   17.47
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    9559.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   17.47
  RAINFALL INTENSITY(INCH/HR) =   2.38
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.23
  EFFECTIVE STREAM AREA(ACRES) =     226.77
  TOTAL STREAM AREA(ACRES) =     227.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     475.88

****************************************************************************
  FLOW PROCESS FROM NODE     30.20 TO NODE     30.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    740.00  DOWNSTREAM(FEET) =    726.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.494
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.573
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  B        0.42      0.30      0.100    56    5.49
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.72
  TOTAL AREA(ACRES) =      0.42   PEAK FLOW RATE(CFS) =      1.72

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.49
  RAINFALL INTENSITY(INCH/HR) =   4.57
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.42
  TOTAL STREAM AREA(ACRES) =       0.42
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.72

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      475.88   17.47    2.376  0.27( 0.06) 0.23     226.8       1.00
      1      464.42   18.36    2.310  0.27( 0.06) 0.23     227.9       8.00
      2        1.72    5.49    4.573  0.30( 0.03) 0.10       0.4      30.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      293.36    5.49    4.573  0.27( 0.06) 0.23      71.7      30.20
      2      476.76   17.47    2.376  0.27( 0.06) 0.23     227.2       1.00
      3      465.28   18.36    2.310  0.27( 0.06) 0.23     228.3       8.00
```

```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     476.76    Tc(MIN.) =    17.47
 EFFECTIVE AREA(ACRES) =     227.19   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
 TOTAL AREA(ACRES) =      228.3
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    9559.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     30.00 TO NODE     33.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   716.00  DOWNSTREAM(FEET) =   714.30
 FLOW LENGTH(FEET) =   210.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  81.0 INCH PIPE IS  63.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.75
 ESTIMATED PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     476.76
 PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   17.69
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     33.00 =    9769.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.69
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.359
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.35      0.30      0.100    56
 COMMERCIAL                 B        0.62      0.30      0.100    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.97      SUBAREA RUNOFF(CFS) =     2.03
 EFFECTIVE AREA(ACRES) =    228.16   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
 TOTAL AREA(ACRES) =      229.3       PEAK FLOW RATE(CFS) =     476.76
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   714.30  DOWNSTREAM(FEET) =   709.80
 FLOW LENGTH(FEET) =   420.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  78.0 INCH PIPE IS  59.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.61
 ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     476.76
 PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   18.09
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     38.00 TO NODE     39.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    730.50  DOWNSTREAM(FEET) =    726.20

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.427
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.369
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.80      0.30      0.500    56    9.43
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.42      0.20      0.500    75    9.43
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA RUNOFF(CFS) =      3.55
 TOTAL AREA(ACRES) =      1.22   PEAK FLOW RATE(CFS) =      3.55

****************************************************************************
 FLOW PROCESS FROM NODE     39.00 TO NODE     40.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  726.20  DOWNSTREAM ELEVATION(FEET) =  719.50
 STREET LENGTH(FEET) =   711.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.33
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
```

```
   STREET FLOW DEPTH(FEET) =  0.41
   HALFSTREET FLOOD WIDTH(FEET) =   15.92
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.65
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.10
 STREET FLOW TRAVEL TIME(MIN.) =   4.46   Tc(MIN.) =   13.89
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.705
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        2.40      0.30     0.500    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    5.52
 EFFECTIVE AREA(ACRES) =      3.62    AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =       8.34

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  17.75
 FLOW VELOCITY(FEET/SEC.) =  2.85   DEPTH*VELOCITY(FT*FT/SEC.) =   1.27
 LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.00 =    1041.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.89
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.705
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.93      0.30     0.500    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.93      SUBAREA RUNOFF(CFS) =    2.14
 EFFECTIVE AREA(ACRES) =      4.55   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =      10.48

****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE     40.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   719.50  DOWNSTREAM(FEET) =   718.40
 FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.74
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.48
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   14.00
 LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.10 =    1096.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     40.10 TO NODE     40.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.694
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.19      0.30     0.500    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.43
 EFFECTIVE AREA(ACRES) =      4.74   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        4.7        PEAK FLOW RATE(CFS) =      10.87

****************************************************************************
 FLOW PROCESS FROM NODE     40.10 TO NODE     40.20 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   718.40  DOWNSTREAM(FEET) =   717.00
 FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.68
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.87
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   14.09
 LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.20 =    1151.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     40.20 TO NODE     40.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.09
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.684
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.22      0.30     0.850    56
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.45      0.30     0.500    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.615
 SUBAREA AREA(ACRES) =    0.67      SUBAREA RUNOFF(CFS) =    1.51
 EFFECTIVE AREA(ACRES) =      5.41   AREA-AVERAGED Fm(INCH/HR) =  0.15
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =      12.33

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     40.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.684
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.34      0.30     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     0.34      SUBAREA RUNOFF(CFS) =     0.78
  EFFECTIVE AREA(ACRES) =      5.75   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      13.11

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     41.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   717.00  DOWNSTREAM(FEET) =   713.40
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.93
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.11
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   14.27
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.00 =    1266.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.27
  RAINFALL INTENSITY(INCH/HR) =   2.66
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.51
  EFFECTIVE STREAM AREA(ACRES) =       5.75
  TOTAL STREAM AREA(ACRES) =       5.75
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      13.11

****************************************************************************
  FLOW PROCESS FROM NODE     41.20 TO NODE     41.30 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    728.20  DOWNSTREAM(FEET) =    723.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.184
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.419
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.02      0.30     0.500    56    9.18
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.61      0.20     0.500    75    9.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.88
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      1.88

****************************************************************************
  FLOW PROCESS FROM NODE     41.30 TO NODE     41.40 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  723.30  DOWNSTREAM ELEVATION(FEET) =  718.00
  STREET LENGTH(FEET) =   323.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.98
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =   10.43
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.73
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.86
  STREET FLOW TRAVEL TIME(MIN.) =   1.97   Tc(MIN.) =   11.16
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.063
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
```

```
  "8-10 DWELLINGS/ACRE"      B        0.72      0.30     0.400    56
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.11      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.83      SUBAREA RUNOFF(CFS) =    2.20
  EFFECTIVE AREA(ACRES) =      1.46    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       3.88

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.65
  FLOW VELOCITY(FEET/SEC.) =  2.91   DEPTH*VELOCITY(FT*FT/SEC.) =   0.98
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.40 =     653.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.40 TO NODE     41.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.16
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.063
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        1.24      0.30     0.400    56
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.03      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.27      SUBAREA RUNOFF(CFS) =    3.36
  EFFECTIVE AREA(ACRES) =      2.73   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =        2.7       PEAK FLOW RATE(CFS) =       7.25

****************************************************************************
  FLOW PROCESS FROM NODE     41.40 TO NODE     41.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   718.00  DOWNSTREAM(FEET) =   717.00
  FLOW LENGTH(FEET) =    62.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH)  INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.40
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.25
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   11.29
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.50 =     715.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.50 TO NODE     41.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.29
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.041
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.09      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.24
  EFFECTIVE AREA(ACRES) =      2.82   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        2.8       PEAK FLOW RATE(CFS) =       7.44

****************************************************************************
  FLOW PROCESS FROM NODE     41.50 TO NODE     41.51 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   717.00  DOWNSTREAM(FEET) =   715.50
  FLOW LENGTH(FEET) =   154.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.12
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.44
  PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =   11.71
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.51 =     869.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.51 TO NODE     41.51 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.71
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.979
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.44      0.30     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.44      SUBAREA RUNOFF(CFS) =    3.67
  EFFECTIVE AREA(ACRES) =      4.26   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =        4.3       PEAK FLOW RATE(CFS) =      10.95

****************************************************************************
  FLOW PROCESS FROM NODE     41.51 TO NODE     41.60 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   715.50  DOWNSTREAM(FEET) =   714.90
  FLOW LENGTH(FEET) =    59.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.86
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.95
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   11.86
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.60 =     928.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.60 TO NODE     41.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   11.86
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.959
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        1.06      0.30     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     1.06      SUBAREA RUNOFF(CFS) =     2.68
  EFFECTIVE AREA(ACRES) =      5.32   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        5.3       PEAK FLOW RATE(CFS) =      13.55

****************************************************************************
  FLOW PROCESS FROM NODE     41.60 TO NODE     41.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   11.86
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.959
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.47      0.30     0.400    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =     0.47      SUBAREA RUNOFF(CFS) =     1.20
  EFFECTIVE AREA(ACRES) =      5.79   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      14.75

****************************************************************************
  FLOW PROCESS FROM NODE     41.60 TO NODE     41.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.90  DOWNSTREAM(FEET) =   713.40
  FLOW LENGTH(FEET) =   148.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.17
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.75
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   12.20
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.00 =    1076.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.20
  RAINFALL INTENSITY(INCH/HR) =   2.91
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       5.79
  TOTAL STREAM AREA(ACRES) =       5.79
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      14.75

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
      1       13.11   14.27    2.665  0.29( 0.15) 0.51       5.8       38.00
      2       14.75   12.20    2.911  0.29( 0.13) 0.45       5.8       41.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
      1       27.06   12.20    2.911  0.29( 0.14) 0.48      10.7       41.20
      2       26.55   14.27    2.665  0.29( 0.14) 0.48      11.5       38.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      27.06    Tc(MIN.) =    12.20
  EFFECTIVE AREA(ACRES) =      10.71   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       11.5
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.00 =    1266.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.80 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.40  DOWNSTREAM(FEET) =   712.60
  FLOW LENGTH(FEET) =    83.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.25
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.06
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   12.37
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.80 =    1349.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   12.37
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.889
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.27      0.30      0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.13      0.20      0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     0.40      SUBAREA RUNOFF(CFS) =     0.99
  EFFECTIVE AREA(ACRES) =     11.11   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       11.9       PEAK FLOW RATE(CFS) =      27.50

****************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   12.37
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.889
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.21      0.30      0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.01      0.20      0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     0.22      SUBAREA RUNOFF(CFS) =     0.54
  EFFECTIVE AREA(ACRES) =     11.33   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       12.2       PEAK FLOW RATE(CFS) =      28.04

****************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.90 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.60  DOWNSTREAM(FEET) =   711.80
  FLOW LENGTH(FEET) =    77.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.56
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.04
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   12.52
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.90 =    1426.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.52
  RAINFALL INTENSITY(INCH/HR) =   2.87
  AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.48
  EFFECTIVE STREAM AREA(ACRES) =      11.33
  TOTAL STREAM AREA(ACRES) =      12.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      28.04

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    77.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.06      0.20      0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.26
  TOTAL AREA(ACRES) =      0.06   PEAK FLOW RATE(CFS) =      0.26

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  3
```

```
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.00
  RAINFALL INTENSITY(INCH/HR) =   4.82
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.06
  TOTAL STREAM AREA(ACRES) =       0.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.26

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  7700.00
  USER SPECIFIED Tc(MIN.) =    5.000
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.06      0.20      0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.26
  TOTAL AREA(ACRES) =      0.06   PEAK FLOW RATE(CFS) =      0.26

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.00
  RAINFALL INTENSITY(INCH/HR) =   4.82
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.06
  TOTAL STREAM AREA(ACRES) =       0.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.26

  ** CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1       28.04   12.52     2.869  0.29( 0.14) 0.48      11.3       41.20
      1       27.45   14.58     2.632  0.29( 0.14) 0.48      12.2       38.00
      2        0.26    5.00     4.824  0.20( 0.10) 0.50       0.1       41.90
      3        0.26    5.00     4.824  0.20( 0.10) 0.50       0.1       41.90

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1       19.72    5.00     4.824  0.29( 0.14) 0.48       4.6       41.90
      2       19.72    5.00     4.824  0.29( 0.14) 0.48       4.6       41.90
      3       28.34   12.52     2.869  0.29( 0.14) 0.48      11.4       41.20
      4       27.72   14.58     2.632  0.29( 0.14) 0.48      12.3       38.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      28.34    Tc(MIN.) =    12.52
  EFFECTIVE AREA(ACRES) =      11.45   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =      12.3
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     41.90 =    7700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     46.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   711.80  DOWNSTREAM(FEET) =   710.50
  FLOW LENGTH(FEET) =   132.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.36
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.34
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   12.78
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     46.00 =    7832.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     46.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.78
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.836
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.21      0.30      0.100    56
  COMMERCIAL                  D        0.29      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    1.27
  EFFECTIVE AREA(ACRES) =     11.95   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       12.8       PEAK FLOW RATE(CFS) =      29.06

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     34.00 IS CODE =  31
```

```
------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   710.50  DOWNSTREAM(FEET) =   709.80
 FLOW LENGTH(FEET) =    68.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.54
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      29.06
 PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   12.92
 LONGEST FLOWPATH FROM NODE     41.90 TO NODE     34.00 =    7900.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       21.05    5.43    4.604  0.29( 0.13) 0.44       5.1      41.90
     2       21.05    5.43    4.604  0.29( 0.13) 0.44       5.1      41.90
     3       29.06   12.92    2.819  0.29( 0.13) 0.46      11.9      41.20
     4       28.42   14.98    2.592  0.29( 0.13) 0.47      12.8      38.00
 LONGEST FLOWPATH FROM NODE     41.90 TO NODE     34.00 =    7900.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      293.36    6.19    4.275  0.27( 0.06) 0.22      72.7      30.20
     2      476.76   18.09    2.330  0.27( 0.06) 0.23     228.2       1.00
     3      465.28   18.98    2.267  0.27( 0.06) 0.23     229.3       8.00
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      298.48    5.43    4.604  0.27( 0.06) 0.24      68.9      41.90
     2      298.48    5.43    4.604  0.27( 0.06) 0.24      68.9      41.90
     3      315.23    6.19    4.275  0.27( 0.06) 0.24      78.5      30.20
     4      426.08   12.92    2.819  0.27( 0.06) 0.24     172.5      41.20
     5      457.26   14.98    2.592  0.27( 0.06) 0.24     200.3      38.00
     6      502.15   18.09    2.330  0.27( 0.06) 0.24     240.9       1.00
     7      489.94   18.98    2.267  0.27( 0.06) 0.24     242.1       8.00
   TOTAL AREA(ACRES) =      242.1

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      502.15  Tc(MIN.) =   18.090
 EFFECTIVE AREA(ACRES) =    240.94  AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.24
 TOTAL AREA(ACRES) =      242.1
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     34.00 TO NODE     56.30 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   703.70
 FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  43.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  32.71
 ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     502.15
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   18.15
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.15
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.325
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                B        0.23      0.30      0.100    56
 COMMERCIAL                D        0.51      0.20      0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.74      SUBAREA RUNOFF(CFS) =    1.53
 EFFECTIVE AREA(ACRES) =    241.68   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.24
 TOTAL AREA(ACRES) =      242.8       PEAK FLOW RATE(CFS) =     502.15
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     32.20 TO NODE     32.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    745.00  DOWNSTREAM(FEET) =    742.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.917
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.719
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  B        0.11      0.30     0.100    56    7.92
 COMMERCIAL                  C        0.26      0.25     0.100    69    7.92
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      1.23
 TOTAL AREA(ACRES) =      0.37   PEAK FLOW RATE(CFS) =      1.23

****************************************************************************
 FLOW PROCESS FROM NODE     32.10 TO NODE     32.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  742.00  DOWNSTREAM ELEVATION(FEET) =  740.00
 STREET LENGTH(FEET) =    96.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.42
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.25
   HALFSTREET FLOOD WIDTH(FEET) =    6.90
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.59
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.66
 STREET FLOW TRAVEL TIME(MIN.) =   0.62   Tc(MIN.) =    8.54
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.564
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.06      0.30     0.100    56
 COMMERCIAL                  C        0.06      0.25     0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.12      SUBAREA RUNOFF(CFS) =    0.38
 EFFECTIVE AREA(ACRES) =      0.49    AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       1.56

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   7.26
 FLOW VELOCITY(FEET/SEC.) =  2.63   DEPTH*VELOCITY(FT*FT/SEC.) =   0.68
 LONGEST FLOWPATH FROM NODE     32.20 TO NODE     32.00 =     426.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    724.60  DOWNSTREAM(FEET) =    723.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.167
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.916
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 SCHOOL                      B        0.33      0.30     0.600    56   12.17
 SCHOOL                      C        0.85      0.25     0.600    69   12.17
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA RUNOFF(CFS) =      2.93
 TOTAL AREA(ACRES) =      1.18   PEAK FLOW RATE(CFS) =      2.93

****************************************************************************
 FLOW PROCESS FROM NODE     52.00 TO NODE     53.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  723.00  DOWNSTREAM ELEVATION(FEET) =  719.00
 STREET LENGTH(FEET) =   412.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.51
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.42
   HALFSTREET FLOOD WIDTH(FEET) =   16.02
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.70
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.12
 STREET FLOW TRAVEL TIME(MIN.) =   2.54   Tc(MIN.) =   14.71
```

```
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.619
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 SCHOOL                      B        2.48      0.30     0.600    56
 SCHOOL                      C        0.77      0.25     0.600    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    7.15
 EFFECTIVE AREA(ACRES) =      4.43    AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.60
 TOTAL AREA(ACRES) =        4.4        PEAK FLOW RATE(CFS) =       9.77

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
 FLOW VELOCITY(FEET/SEC.) =  2.91   DEPTH*VELOCITY(FT*FT/SEC.) =   1.31
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     53.00 =     742.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     53.00 TO NODE     54.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  719.00  DOWNSTREAM ELEVATION(FEET) =  712.50
 STREET LENGTH(FEET) =   633.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.10
   ***STREET FLOW SPLITS OVER STREET-CROWN***
   FULL DEPTH(FEET) =    0.45   FLOOD WIDTH(FEET) =   18.00
   FULL HALF-STREET VELOCITY(FEET/SEC.) =    3.00
   SPLIT DEPTH(FEET) =    0.34   SPLIT FLOOD WIDTH(FEET) =   11.65
   SPLIT FLOW(CFS) =    3.07   SPLIT VELOCITY(FEET/SEC.) =    2.30
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.45
   HALFSTREET FLOOD WIDTH(FEET) =   18.00
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.00
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.35
 STREET FLOW TRAVEL TIME(MIN.) =   3.52   Tc(MIN.) =   18.23
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.319
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 SCHOOL                      B        2.42      0.30     0.600    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA AREA(ACRES) =    2.42      SUBAREA RUNOFF(CFS) =    4.66
 EFFECTIVE AREA(ACRES) =      6.85    AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.60
 TOTAL AREA(ACRES) =        6.9        PEAK FLOW RATE(CFS) =      13.23

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
 FLOW VELOCITY(FEET/SEC.) =  3.00   DEPTH*VELOCITY(FT*FT/SEC.) =   1.35
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     54.00 =    1375.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.23
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.319
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.32      0.30     0.100    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.32      SUBAREA RUNOFF(CFS) =    0.66
 EFFECTIVE AREA(ACRES) =      7.17   AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.58
 TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =      13.89

****************************************************************************
 FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.23
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.319
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 SCHOOL                      B        2.40      0.30     0.600    56
 SCHOOL                      C        0.07      0.25     0.600    69
 SCHOOL                      D        2.82      0.20     0.600    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA AREA(ACRES) =    5.29      SUBAREA RUNOFF(CFS) =   10.34
 EFFECTIVE AREA(ACRES) =     12.46   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.59
 TOTAL AREA(ACRES) =       12.5       PEAK FLOW RATE(CFS) =      24.23

****************************************************************************
 FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==========================================================================
  MAINLINE Tc(MIN.) =   18.23
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.319
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.78      0.30      0.100    56
  COMMERCIAL                 C        0.03      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.81      SUBAREA RUNOFF(CFS) =     1.67
  EFFECTIVE AREA(ACRES) =    13.27   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =       13.3       PEAK FLOW RATE(CFS) =      25.90

**************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.50  DOWNSTREAM(FEET) =   712.30
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.85
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.90
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   18.31
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     55.00 =    1409.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =   1
--------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.31
  RAINFALL INTENSITY(INCH/HR) =   2.31
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =      13.27
  TOTAL STREAM AREA(ACRES) =      13.27
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      25.90

**************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.10 IS CODE =  22
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    34.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.13      0.30      0.100    56
  COMMERCIAL                 D        0.14      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.17
  TOTAL AREA(ACRES) =      0.27   PEAK FLOW RATE(CFS) =      1.17

**************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.10 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =    5.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.24      0.30      0.100    56
  COMMERCIAL                 D        0.01      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.25      SUBAREA RUNOFF(CFS) =     1.08
  EFFECTIVE AREA(ACRES) =      0.52   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.5       PEAK FLOW RATE(CFS) =       2.24

**************************************************************************
  FLOW PROCESS FROM NODE     55.10 TO NODE     55.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.00  DOWNSTREAM(FEET) =   712.30
  FLOW LENGTH(FEET) =   275.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.76
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.24
  PIPE TRAVEL TIME(MIN.) =   1.66    Tc(MIN.) =    6.66
  LONGEST FLOWPATH FROM NODE     55.10 TO NODE     55.00 =     309.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =   1
--------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
```

```
 TIME OF CONCENTRATION(MIN.) =    6.66
 RAINFALL INTENSITY(INCH/HR) =   4.10
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.27
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.52
 TOTAL STREAM AREA(ACRES) =       0.52
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.24

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       25.90   18.31    2.313  0.27( 0.15) 0.56      13.3      51.00
     2        2.24    6.66    4.101  0.27( 0.03) 0.10       0.5      55.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       19.45    6.66    4.101  0.27( 0.14) 0.51       5.3      55.10
     2       27.16   18.31    2.313  0.27( 0.15) 0.54      13.8      51.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      27.16    Tc(MIN.) =    18.31
 EFFECTIVE AREA(ACRES) =      13.79   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.54
 TOTAL AREA(ACRES) =       13.8
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     55.00 =    1409.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     55.00 TO NODE     56.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   712.30  DOWNSTREAM(FEET) =   711.00
 FLOW LENGTH(FEET) =   165.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.79
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      27.16
 PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   18.67
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.00 =    1574.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.00 TO NODE     56.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.67
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.289
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.49      0.30      0.100    56
 COMMERCIAL                 D        0.04      0.20      0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.53      SUBAREA RUNOFF(CFS) =     1.08
 EFFECTIVE AREA(ACRES) =     14.32   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =       14.3       PEAK FLOW RATE(CFS) =      27.67

****************************************************************************
 FLOW PROCESS FROM NODE     56.00 TO NODE     56.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   711.00  DOWNSTREAM(FEET) =   710.10
 FLOW LENGTH(FEET) =   172.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  24.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.54
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      27.67
 PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   19.11
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     56.11 TO NODE     56.12 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    720.80  DOWNSTREAM(FEET) =    717.80

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.438
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.587
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       B        0.91      0.30      0.200    56    8.44
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA RUNOFF(CFS) =      2.89
 TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      2.89
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     56.12 TO NODE     56.13 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  717.80  DOWNSTREAM ELEVATION(FEET) =  713.60
  STREET LENGTH(FEET) =   486.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.10
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   14.80
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.45
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.97
  STREET FLOW TRAVEL TIME(MIN.) =   3.30   Tc(MIN.) =   11.74
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.976
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        1.68      0.30     0.200    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    1.68      SUBAREA RUNOFF(CFS) =    4.41
  EFFECTIVE AREA(ACRES) =      2.59    AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        2.6        PEAK FLOW RATE(CFS) =       6.80

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  16.63
  FLOW VELOCITY(FEET/SEC.) =  2.62   DEPTH*VELOCITY(FT*FT/SEC.) =   1.12
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.13 =     816.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.74
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.976
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        2.11      0.30     0.200    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    2.11      SUBAREA RUNOFF(CFS) =    5.54
  EFFECTIVE AREA(ACRES) =      4.70   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        4.7       PEAK FLOW RATE(CFS) =      12.33

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.74
  RAINFALL INTENSITY(INCH/HR) =   2.98
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =       4.70
  TOTAL STREAM AREA(ACRES) =       4.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.33

****************************************************************************
  FLOW PROCESS FROM NODE     56.14 TO NODE     56.15 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    719.20  DOWNSTREAM(FEET) =    715.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.182
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.650
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.84      0.30     0.200    56    8.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      2.71
  TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      2.71

****************************************************************************
  FLOW PROCESS FROM NODE     56.15 TO NODE     56.13 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  715.70  DOWNSTREAM ELEVATION(FEET) =  713.60
```

```
 STREET LENGTH(FEET) =   200.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.51
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.35
   HALFSTREET FLOOD WIDTH(FEET) =   12.26
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.40
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.84
 STREET FLOW TRAVEL TIME(MIN.) =   1.39   Tc(MIN.) =    9.57
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.340
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       B        0.54      0.30     0.200    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    0.54      SUBAREA RUNOFF(CFS) =    1.59
 EFFECTIVE AREA(ACRES) =      1.38    AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       4.07

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  12.97
 FLOW VELOCITY(FEET/SEC.) =  2.51   DEPTH*VELOCITY(FT*FT/SEC.) =   0.91
 LONGEST FLOWPATH FROM NODE     56.14 TO NODE     56.13 =     530.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.57
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.340
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       B        0.70      0.30     0.200    56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       D        0.52      0.20     0.200    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    1.22      SUBAREA RUNOFF(CFS) =    3.61
 EFFECTIVE AREA(ACRES) =      2.60   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        2.6        PEAK FLOW RATE(CFS) =       7.69

****************************************************************************
 FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.57
 RAINFALL INTENSITY(INCH/HR) =   3.34
 AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.28
 AREA-AVERAGED Ap =  0.20
 EFFECTIVE STREAM AREA(ACRES) =       2.60
 TOTAL STREAM AREA(ACRES) =       2.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.69

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       12.33   11.74    2.976  0.30( 0.06) 0.20       4.7      56.11
     2        7.69    9.57    3.340  0.28( 0.06) 0.20       2.6      56.14

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       19.00    9.57    3.340  0.29( 0.06) 0.20       6.4      56.14
     2       19.17   11.74    2.976  0.29( 0.06) 0.20       7.3      56.11

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      19.17    Tc(MIN.) =    11.74
 EFFECTIVE AREA(ACRES) =       7.30   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        7.3
 LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.13 =     816.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.13 TO NODE     56.16 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   713.60  DOWNSTREAM(FEET) =   712.50
 FLOW LENGTH(FEET) =    94.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.25
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
```

```
 PIPE-FLOW(CFS) =      19.17
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   11.93
 LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.16 =     910.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.16 TO NODE     56.16 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.93
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.949
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       B        0.46      0.30     0.200    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =     0.46      SUBAREA RUNOFF(CFS) =     1.20
 EFFECTIVE AREA(ACRES) =      7.76   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =      20.19

****************************************************************************
 FLOW PROCESS FROM NODE     56.16 TO NODE     56.16 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.93
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.949
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       B        0.05      0.30     0.200    56
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       D        0.41      0.20     0.200    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =     0.46      SUBAREA RUNOFF(CFS) =     1.20
 EFFECTIVE AREA(ACRES) =      8.22   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        8.2       PEAK FLOW RATE(CFS) =      21.39

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       21.48    9.76    3.303  0.29( 0.06) 0.20       7.4       56.14
     2       21.39   11.93    2.949  0.29( 0.06) 0.20       8.2       56.11
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      21.48  Tc(MIN.) =    9.76
 AREA-AVERAGED Fm(INCH/HR) =  0.06  AREA-AVERAGED Fp(INCH/HR) =  0.29
 AREA-AVERAGED Ap =  0.20  EFFECTIVE AREA(ACRES) =       7.35

****************************************************************************
 FLOW PROCESS FROM NODE     56.16 TO NODE     56.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   712.50  DOWNSTREAM(FEET) =   710.10
 FLOW LENGTH(FEET) =    38.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.93
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      21.48
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    9.80
 LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.10 =     948.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       21.48    9.80    3.296  0.29( 0.06) 0.20       7.4       56.14
     2       21.39   11.97    2.943  0.29( 0.06) 0.20       8.2       56.11
 LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.10 =     948.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       20.33    7.51    3.831  0.27( 0.13) 0.48       5.9       55.10
     2       27.67   19.11    2.259  0.27( 0.14) 0.52      14.3       51.00
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       39.52    7.51    3.831  0.28( 0.09) 0.34      11.5       55.10
     2       43.26    9.80    3.296  0.28( 0.09) 0.34      14.9       56.14
     3       44.54   11.97    2.943  0.28( 0.10) 0.35      17.3       56.11
     4       43.98   19.11    2.259  0.27( 0.11) 0.41      22.5       51.00
   TOTAL AREA(ACRES) =        22.5

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       44.54  Tc(MIN.) =   11.968
 EFFECTIVE AREA(ACRES) =     17.34  AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.34
 TOTAL AREA(ACRES) =       22.5
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  12
----------------------------------------------------------------------------
```

```
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE     56.10 TO NODE     56.20 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.10  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.30
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      44.54
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   12.06
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.20 =    1790.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     56.20 TO NODE     56.20 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   12.06
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.931
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.39      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.39      SUBAREA RUNOFF(CFS) =    1.02
  EFFECTIVE AREA(ACRES) =     17.73   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =       22.9       PEAK FLOW RATE(CFS) =      45.24

********************************************************************************
  FLOW PROCESS FROM NODE     56.20 TO NODE     56.30 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   703.70
  FLOW LENGTH(FEET) =   290.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.78
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      45.24
  PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =   12.43
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.30 =    2080.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  11
--------------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
================================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM        Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1        39.77    8.00    3.696  0.27( 0.09) 0.33       11.9       55.10
      2        43.82   10.27    3.210  0.27( 0.09) 0.34       15.3       56.14
      3        45.24   12.43    2.880  0.27( 0.10) 0.35       17.7       56.11
      4        44.23   19.57    2.228  0.27( 0.11) 0.40       22.9       51.00
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.30 =    2080.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM        Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      298.48    5.50    4.572  0.27( 0.06) 0.24       69.7       41.90
      2      298.48    5.50    4.572  0.27( 0.06) 0.24       69.7       41.90
      3      315.23    6.25    4.250  0.27( 0.06) 0.24       79.3       30.20
      4      428.30   12.98    2.811  0.27( 0.06) 0.24      173.3       41.20
      5      457.26   15.04    2.586  0.27( 0.06) 0.24      201.1       38.00
      6      502.15   18.15    2.325  0.27( 0.06) 0.24      241.7        1.00
      7      489.94   19.04    2.263  0.27( 0.06) 0.24      242.8        8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM        Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      332.44    5.50    4.572  0.27( 0.07) 0.25       77.8       41.90
      2      332.44    5.50    4.572  0.27( 0.07) 0.25       77.8       41.90
      3      351.08    6.25    4.250  0.27( 0.07) 0.25       88.6       30.20
      4      384.40    8.00    3.696  0.27( 0.07) 0.25      115.6       55.10
      5      426.58   10.27    3.210  0.27( 0.07) 0.25      150.7       56.14
      6      464.41   12.43    2.880  0.27( 0.07) 0.25      183.4       56.11
      7      473.46   12.98    2.811  0.27( 0.07) 0.25      191.4       41.20
      8      502.14   15.04    2.586  0.27( 0.07) 0.25      220.7       38.00
      9      546.58   18.15    2.325  0.27( 0.07) 0.25      263.6        1.00
     10      534.24   19.04    2.263  0.27( 0.07) 0.25      265.4        8.00
     11      526.36   19.57    2.228  0.27( 0.07) 0.25      265.7       51.00
    TOTAL AREA(ACRES) =       265.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      546.58  Tc(MIN.) =   18.148
  EFFECTIVE AREA(ACRES) =    263.57  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =      265.7
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  12
--------------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
================================================================================

********************************************************************************
```

```
  FLOW PROCESS FROM NODE     56.30 TO NODE     35.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   703.70  DOWNSTREAM(FEET) =   703.00
  FLOW LENGTH(FEET) =    74.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  84.0 INCH PIPE IS  63.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.39
  ESTIMATED PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     546.58
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   18.22
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    729.10  DOWNSTREAM(FEET) =    723.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.849
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.492
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.39      0.30     0.500    56    8.85
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.52      0.20     0.500    75    8.85
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.76
  TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      2.76

****************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     44.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  723.20  DOWNSTREAM ELEVATION(FEET) =  714.50
  STREET LENGTH(FEET) =   493.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00
  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.66
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =   10.74
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.90
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.93
  STREET FLOW TRAVEL TIME(MIN.) =   2.84   Tc(MIN.) =   11.69
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.983
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        2.25      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.79      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.04      SUBAREA RUNOFF(CFS) =    7.79
  EFFECTIVE AREA(ACRES) =      3.95    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.9         PEAK FLOW RATE(CFS) =      10.13

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  12.77
  FLOW VELOCITY(FEET/SEC.) =  3.21   DEPTH*VELOCITY(FT*FT/SEC.) =   1.15
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     44.00 =     823.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     44.00 TO NODE     45.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.50  DOWNSTREAM(FEET) =   713.50
  FLOW LENGTH(FEET) =    33.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.20
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.13
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   11.74
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.20 =     856.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     45.20 TO NODE     45.20 IS CODE =   1
```

```
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.74
  RAINFALL INTENSITY(INCH/HR) =   2.98
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       3.95
  TOTAL STREAM AREA(ACRES) =       3.95
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.13

************************************************************************
  FLOW PROCESS FROM NODE     45.00 TO NODE     45.10 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    721.00  DOWNSTREAM(FEET) =    717.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.195
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.417
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.58      0.30     0.400    56    9.20
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.06      0.20     0.400    75    9.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      1.90
  TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      1.90

************************************************************************
  FLOW PROCESS FROM NODE     45.10 TO NODE     45.20 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) =  717.00  DOWNSTREAM ELEVATION(FEET) =  714.00
  STREET LENGTH(FEET) =   318.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.96
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   11.65
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.22
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.75
  STREET FLOW TRAVEL TIME(MIN.) =   2.38   Tc(MIN.) =   11.58
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.999
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.82      0.30     0.400    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =     0.82      SUBAREA RUNOFF(CFS) =     2.12
  EFFECTIVE AREA(ACRES) =      1.46    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       3.79

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  12.87
  FLOW VELOCITY(FEET/SEC.) =  2.37   DEPTH*VELOCITY(FT*FT/SEC.) =   0.85
  LONGEST FLOWPATH FROM NODE     45.00 TO NODE     45.20 =     648.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     45.20 TO NODE     45.20 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.58
  RAINFALL INTENSITY(INCH/HR) =   3.00
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.40
  EFFECTIVE STREAM AREA(ACRES) =       1.46
  TOTAL STREAM AREA(ACRES) =       1.46
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.79

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       10.13   11.74    2.976  0.27( 0.13) 0.50       3.9       42.00
      2        3.79   11.58    2.999  0.30( 0.12) 0.40       1.5       45.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
```

```
 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       13.86   11.58    2.999  0.27( 0.13) 0.47       5.4       45.00
     2       13.89   11.74    2.976  0.27( 0.13) 0.47       5.4       42.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      13.89    Tc(MIN.) =    11.74
 EFFECTIVE AREA(ACRES) =       5.41   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        5.4
 LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.20 =     856.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     45.20 TO NODE     45.30 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   713.50  DOWNSTREAM(FEET) =   711.90
 FLOW LENGTH(FEET) =   157.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.15
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      13.89
 PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   12.11
 LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.30 =    1013.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     45.30 TO NODE     45.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.11
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.924
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      B        0.66      0.30     0.400    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.66      SUBAREA RUNOFF(CFS) =     1.67
 EFFECTIVE AREA(ACRES) =      6.07   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        6.1       PEAK FLOW RATE(CFS) =      15.28

****************************************************************************
 FLOW PROCESS FROM NODE     45.30 TO NODE     45.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.11
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.924
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        1.89      0.30     0.850    56
 COMMERCIAL                 D        0.04      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.834
 SUBAREA AREA(ACRES) =     1.93      SUBAREA RUNOFF(CFS) =     4.65
 EFFECTIVE AREA(ACRES) =      8.00   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.55
 TOTAL AREA(ACRES) =        8.0       PEAK FLOW RATE(CFS) =      19.92

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       19.94   11.94    2.947  0.28( 0.16) 0.55       7.9       45.00
     2       19.92   12.11    2.924  0.28( 0.16) 0.55       8.0       42.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      19.94  Tc(MIN.) =   11.94
 AREA-AVERAGED Fm(INCH/HR) =  0.16  AREA-AVERAGED Fp(INCH/HR) =  0.28
 AREA-AVERAGED Ap =  0.55  EFFECTIVE AREA(ACRES) =       7.95

****************************************************************************
 FLOW PROCESS FROM NODE     45.30 TO NODE     47.20 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   711.90  DOWNSTREAM(FEET) =   710.80
 FLOW LENGTH(FEET) =   106.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.89
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      19.94
 PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   12.17
 LONGEST FLOWPATH FROM NODE     42.00 TO NODE     47.20 =    1119.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.20 TO NODE     47.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.17
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.916
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.13      0.30     0.100    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.13      SUBAREA RUNOFF(CFS) =     0.34
 EFFECTIVE AREA(ACRES) =      8.08   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.55
 TOTAL AREA(ACRES) =        8.1       PEAK FLOW RATE(CFS) =      20.06
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     47.20 TO NODE     35.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.80  DOWNSTREAM(FEET) =   703.90
  FLOW LENGTH(FEET) =   695.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.74
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.06
  PIPE TRAVEL TIME(MIN.) =   1.50    Tc(MIN.) =   13.67
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     35.20 =    1814.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.20 TO NODE     35.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.67
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.730
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 B        1.02      0.30     0.850    56
  PUBLIC PARK                 C        0.05      0.25     0.850    69
  PUBLIC PARK                 D        2.20      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    3.27      SUBAREA RUNOFF(CFS) =    7.46
  EFFECTIVE AREA(ACRES) =     11.35   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.63
  TOTAL AREA(ACRES) =       11.4       PEAK FLOW RATE(CFS) =      26.17

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       26.17   13.67    2.730  0.26( 0.17) 0.63      11.3      45.00
      2       26.11   13.83    2.712  0.26( 0.17) 0.63      11.4      42.00
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     35.10 =    1814.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      332.44    5.58    4.534  0.27( 0.07) 0.25      77.8      41.90
      2      332.44    5.58    4.534  0.27( 0.07) 0.25      77.8      41.90
      3      351.08    6.33    4.219  0.27( 0.07) 0.25      88.6      30.20
      4      384.40    8.08    3.676  0.27( 0.07) 0.25     115.6      55.10
      5      426.58   10.35    3.196  0.27( 0.07) 0.25     150.7      56.14
      6      464.41   12.51    2.871  0.27( 0.07) 0.25     183.4      56.11
      7      473.46   13.05    2.802  0.27( 0.07) 0.25     191.4      41.20
      8      502.14   15.11    2.579  0.27( 0.07) 0.25     220.7      38.00
      9      546.58   18.22    2.320  0.27( 0.07) 0.25     263.6       1.00
     10      534.24   19.11    2.258  0.27( 0.07) 0.25     265.4       8.00
     11      526.36   19.65    2.223  0.27( 0.07) 0.25     265.7      51.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      350.64    5.58    4.534  0.27( 0.07) 0.27      82.5      41.90
      2      350.64    5.58    4.534  0.27( 0.07) 0.27      82.5      41.90
      3      370.26    6.33    4.219  0.27( 0.07) 0.27      93.8      30.20
      4      405.59    8.08    3.676  0.27( 0.07) 0.27     122.3      55.10
      5      449.99   10.35    3.196  0.27( 0.07) 0.27     159.3      56.14
      6      489.67   12.51    2.871  0.27( 0.07) 0.27     193.8      56.11
      7      499.16   13.05    2.802  0.27( 0.07) 0.27     202.2      41.20
      8      508.17   13.67    2.730  0.27( 0.07) 0.27     211.5      45.00
      9      510.34   13.83    2.712  0.27( 0.07) 0.27     213.8      42.00
     10      526.88   15.11    2.579  0.27( 0.07) 0.27     232.1      38.00
     11      568.67   18.22    2.320  0.27( 0.07) 0.27     275.0       1.00
     12      555.69   19.11    2.258  0.27( 0.07) 0.27     276.8       8.00
     13      547.45   19.65    2.223  0.27( 0.07) 0.27     277.1      51.00
    TOTAL AREA(ACRES) =       277.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      568.67  Tc(MIN.) =   18.219
  EFFECTIVE AREA(ACRES) =    274.97  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      277.1
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   18.22   RAINFALL INTENSITY(INCH/HR) =  2.32
  EFFECTIVE AREA(ACRES) =   123.39
  TOTAL AREA(ACRES) =   277.14        PEAK FLOW RATE(CFS) =    255.18
  AREA-AVERAGED Fm(INCH/HR) =   0.07  AREA-AVERAGED Fp(INCH/HR) =   0.27
  AREA-AVERAGED Ap =  0.27
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
```

```
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =   695.70
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  75.0 INCH PIPE IS  55.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.45
  ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     255.18
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   18.34
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     36.00 =   10453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.34
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.312
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.16      0.25      0.100    69
  COMMERCIAL                 D        0.29      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.45      SUBAREA RUNOFF(CFS) =    0.93
  EFFECTIVE AREA(ACRES) =    123.84   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      277.6       PEAK FLOW RATE(CFS) =     255.18
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     37.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.70  DOWNSTREAM(FEET) =   695.40
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  75.0 INCH PIPE IS  55.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.45
  ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     255.18
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   18.46
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.00 =   10528.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.00 TO NODE     37.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.40  DOWNSTREAM(FEET) =   694.00
  FLOW LENGTH(FEET) =   355.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  75.0 INCH PIPE IS  56.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.39
  ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     255.18
  PIPE TRAVEL TIME(MIN.) =   0.57    Tc(MIN.) =   19.03
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.10 =   10883.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.03
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.68      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.68      SUBAREA RUNOFF(CFS) =    1.37
  EFFECTIVE AREA(ACRES) =    124.52   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      278.3       PEAK FLOW RATE(CFS) =     255.18
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.03
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.46      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.46      SUBAREA RUNOFF(CFS) =    0.93
  EFFECTIVE AREA(ACRES) =    124.98   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      278.7       PEAK FLOW RATE(CFS) =     255.18
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     37.10 TO NODE     37.20 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.00  DOWNSTREAM(FEET) =   693.80
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  69.0 INCH PIPE IS  52.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.03
  ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     255.18
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   19.08
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     37.60 TO NODE     37.70 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    718.50  DOWNSTREAM(FEET) =    714.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.517
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.351
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.13      0.30     0.500    56    9.52
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.51      0.20     0.500    75    9.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.87
  TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      1.87

****************************************************************************
  FLOW PROCESS FROM NODE     37.70 TO NODE     37.80 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  714.40  DOWNSTREAM ELEVATION(FEET) =  710.60
  STREET LENGTH(FEET) =   349.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.65
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =   10.84
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.27
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.73
  STREET FLOW TRAVEL TIME(MIN.) =   2.56   Tc(MIN.) =   12.08
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.928
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.15      0.25     0.500    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.47      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.62      SUBAREA RUNOFF(CFS) =    1.57
  EFFECTIVE AREA(ACRES) =      1.26    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =       3.20

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.65
  FLOW VELOCITY(FEET/SEC.) =  2.40   DEPTH*VELOCITY(FT*FT/SEC.) =   0.81
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.80 =     679.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.80 TO NODE     37.90 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.60  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.57
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.20
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   12.26
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.90 =     739.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.90 TO NODE     37.90 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
================================================================================
  MAINLINE Tc(MIN.) =   12.26
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.904
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.21      0.25      0.500    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.93      0.20      0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.14      SUBAREA RUNOFF(CFS) =    2.87
  EFFECTIVE AREA(ACRES) =      2.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        2.4       PEAK FLOW RATE(CFS) =       6.04

********************************************************************************
  FLOW PROCESS FROM NODE     37.90 TO NODE     37.50 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   708.00
  FLOW LENGTH(FEET) =   221.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.46
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.04
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   12.93
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.50 =     960.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     37.50 TO NODE     37.50 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.93
  RAINFALL INTENSITY(INCH/HR) =   2.82
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       2.40
  TOTAL STREAM AREA(ACRES) =       2.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.04

********************************************************************************
  FLOW PROCESS FROM NODE     37.30 TO NODE     37.40 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    713.10  DOWNSTREAM(FEET) =    709.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.880
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.281
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.70      0.25      0.500    69    9.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.99
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      1.99

********************************************************************************
  FLOW PROCESS FROM NODE     37.40 TO NODE     37.50 IS CODE =  62
--------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  709.70  DOWNSTREAM ELEVATION(FEET) =  708.10
  STREET LENGTH(FEET) =   124.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.43
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =   10.03
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.39
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.74
  STREET FLOW TRAVEL TIME(MIN.) =   0.86   Tc(MIN.) =   10.74
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.129
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.33      0.25      0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.33      SUBAREA RUNOFF(CFS) =    0.89
  EFFECTIVE AREA(ACRES) =      1.03    AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.0       PEAK FLOW RATE(CFS) =       2.78
```

```
  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =  10.64
  FLOW VELOCITY(FEET/SEC.) =  2.46   DEPTH*VELOCITY(FT*FT/SEC.) =   0.79
  LONGEST FLOWPATH FROM NODE     37.30 TO NODE     37.50 =     454.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.50 TO NODE     37.50 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.74
  RAINFALL INTENSITY(INCH/HR) =   3.13
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       1.03
  TOTAL STREAM AREA(ACRES) =       1.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.78

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        6.04   12.93    2.817  0.21( 0.11) 0.50       2.4      37.60
      2        2.78   10.74    3.129  0.25( 0.12) 0.50       1.0      37.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        8.38   10.74    3.129  0.23( 0.11) 0.50       3.0      37.30
      2        8.54   12.93    2.817  0.22( 0.11) 0.50       3.4      37.60

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       8.54    Tc(MIN.) =    12.93
  EFFECTIVE AREA(ACRES) =       3.43   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       3.4
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.50 =     960.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.50 TO NODE     37.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   708.00  DOWNSTREAM(FEET) =   693.80
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.11
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.54
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   13.06
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.20 =    1080.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        8.38   10.87    3.108  0.23( 0.11) 0.50       3.0      37.30
      2        8.54   13.06    2.802  0.22( 0.11) 0.50       3.4      37.60
  LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.20 =    1080.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      255.18   19.08    2.261  0.27( 0.07) 0.27     125.0       1.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      210.09   10.87    3.108  0.27( 0.07) 0.28      74.2      37.30
      2      226.40   13.06    2.802  0.27( 0.07) 0.28      89.0      37.60
      3      262.00   19.08    2.261  0.27( 0.07) 0.27     128.4       1.00
    TOTAL AREA(ACRES) =       282.2

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      262.00  Tc(MIN.) =   19.076
  EFFECTIVE AREA(ACRES) =    128.41  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      282.2
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     37.20 TO NODE     47.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.80  DOWNSTREAM(FEET) =   691.30
```

```
  FLOW LENGTH(FEET) =   487.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  53.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.54
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     262.00
  PIPE TRAVEL TIME(MIN.) =   0.70    Tc(MIN.) =   19.78
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     47.31 TO NODE     47.32 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    718.50  DOWNSTREAM(FEET) =    712.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.679
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.530
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.63      0.30     0.500    56    8.68
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.92
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      1.92

****************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.32 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.68
  RAINFALL INTENSITY(INCH/HR) =   3.53
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.63
  TOTAL STREAM AREA(ACRES) =       0.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.92

****************************************************************************
  FLOW PROCESS FROM NODE     47.33 TO NODE     47.32 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   282.00
  ELEVATION DATA: UPSTREAM(FEET) =    715.00  DOWNSTREAM(FEET) =    712.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.219
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.412
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.86      0.30     0.500    56    9.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.52
  TOTAL AREA(ACRES) =      0.86   PEAK FLOW RATE(CFS) =      2.52

****************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.32 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.22
  RAINFALL INTENSITY(INCH/HR) =   3.41
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.86
  TOTAL STREAM AREA(ACRES) =       0.86
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.52

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        1.92    8.68    3.530  0.30( 0.15) 0.50       0.6      47.31
      2        2.52    9.22    3.412  0.30( 0.15) 0.50       0.9      47.33

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        4.38    8.68    3.530  0.30( 0.15) 0.50       1.4      47.31
      2        4.37    9.22    3.412  0.30( 0.15) 0.50       1.5      47.33

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       4.38    Tc(MIN.) =     8.68
```

```
  EFFECTIVE AREA(ACRES) =       1.44   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.5
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.32 =     330.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.34 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.00  DOWNSTREAM(FEET) =   698.50
  FLOW LENGTH(FEET) =   102.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.17
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.38
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =    9.09
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.34 =     432.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.34 TO NODE     47.34 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.440
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.38      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.06      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.44      SUBAREA RUNOFF(CFS) =    1.31
  EFFECTIVE AREA(ACRES) =      1.88   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.9       PEAK FLOW RATE(CFS) =       5.57

****************************************************************************
  FLOW PROCESS FROM NODE     47.34 TO NODE     47.35 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   698.50  DOWNSTREAM(FEET) =   697.50
  FLOW LENGTH(FEET) =   194.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.47
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.57
  PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =    9.81
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.35 =     626.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.81
  RAINFALL INTENSITY(INCH/HR) =   3.29
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       1.88
  TOTAL STREAM AREA(ACRES) =       1.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.57

****************************************************************************
  FLOW PROCESS FROM NODE     47.36 TO NODE     47.35 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   275.00
  ELEVATION DATA: UPSTREAM(FEET) =    713.50  DOWNSTREAM(FEET) =    711.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.418
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.371
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.72      0.30     0.500    56    9.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.09
  TOTAL AREA(ACRES) =      0.72   PEAK FLOW RATE(CFS) =      2.09

****************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.42
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.371
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.66      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.12      0.20     0.500    75
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.78      SUBAREA RUNOFF(CFS) =    2.27
  EFFECTIVE AREA(ACRES) =      1.50   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.5       PEAK FLOW RATE(CFS) =       4.35

****************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.42
  RAINFALL INTENSITY(INCH/HR) =   3.37
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       1.50
  TOTAL STREAM AREA(ACRES) =       1.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.35

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        5.57    9.81    3.294  0.30( 0.15) 0.50       1.9      47.31
      1        5.53   10.35    3.196  0.30( 0.15) 0.50       1.9      47.33
      2        4.35    9.42    3.371  0.29( 0.15) 0.50       1.5      47.36

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        9.83    9.42    3.371  0.29( 0.15) 0.50       3.3      47.36
      2        9.82    9.81    3.294  0.29( 0.15) 0.50       3.4      47.31
      3        9.64   10.35    3.196  0.29( 0.15) 0.50       3.4      47.33

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       9.83    Tc(MIN.) =     9.42
  EFFECTIVE AREA(ACRES) =       3.30   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.4
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.35 =     626.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.35 TO NODE     47.37 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   697.60  DOWNSTREAM(FEET) =   696.00
  FLOW LENGTH(FEET) =   293.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.21
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.83
  PIPE TRAVEL TIME(MIN.) =   0.94    Tc(MIN.) =   10.35
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.37 =     919.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.37 TO NODE     47.37 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.35
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.195
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.67      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.12      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.79      SUBAREA RUNOFF(CFS) =    2.17
  EFFECTIVE AREA(ACRES) =      4.09   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.2       PEAK FLOW RATE(CFS) =      11.23

****************************************************************************
  FLOW PROCESS FROM NODE     47.37 TO NODE     47.37 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.35
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.195
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.09      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.60      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.69      SUBAREA RUNOFF(CFS) =    1.92
  EFFECTIVE AREA(ACRES) =      4.78   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.9       PEAK FLOW RATE(CFS) =      13.15

****************************************************************************
  FLOW PROCESS FROM NODE     47.37 TO NODE     47.30 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =   695.20
  FLOW LENGTH(FEET) =   158.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.47
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.15
  PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =   10.84
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.30 =    1077.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.30 TO NODE     47.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.84
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.114
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.28      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    0.76
  EFFECTIVE AREA(ACRES) =      5.06   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        5.2       PEAK FLOW RATE(CFS) =      13.56

****************************************************************************
  FLOW PROCESS FROM NODE     47.30 TO NODE     47.40 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.20  DOWNSTREAM(FEET) =   694.60
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.36
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.56
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =   11.22
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.40 =    1202.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.40 TO NODE     47.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.22
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.052
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.19      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.50
  EFFECTIVE AREA(ACRES) =      5.25   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =      13.79

****************************************************************************
  FLOW PROCESS FROM NODE     47.40 TO NODE     47.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.60  DOWNSTREAM(FEET) =   694.40
  FLOW LENGTH(FEET) =    41.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.41
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.79
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   11.35
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.50 =    1243.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.50 TO NODE     47.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.35
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.033
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.05      0.30     0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.45      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.50      SUBAREA RUNOFF(CFS) =    3.96
  EFFECTIVE AREA(ACRES) =      6.75   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        6.9       PEAK FLOW RATE(CFS) =      17.65

****************************************************************************
  FLOW PROCESS FROM NODE     47.50 TO NODE     47.60 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   694.40  DOWNSTREAM(FEET) =   693.50
```

```
  FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.86
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.65
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   11.86
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.60 =    1423.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.60 TO NODE     47.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.86
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.958
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        1.55      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     1.55      SUBAREA RUNOFF(CFS) =     3.99
  EFFECTIVE AREA(ACRES) =      8.30   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        8.4       PEAK FLOW RATE(CFS) =      21.18

****************************************************************************
  FLOW PROCESS FROM NODE     47.60 TO NODE     47.70 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.50  DOWNSTREAM(FEET) =   693.30
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.18
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.18
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   11.97
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.70 =    1463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.70 TO NODE     47.70 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.97
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.943
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.04      0.25     0.500    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        1.57      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     1.61      SUBAREA RUNOFF(CFS) =     4.12
  EFFECTIVE AREA(ACRES) =      9.91   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       10.0       PEAK FLOW RATE(CFS) =      25.19

****************************************************************************
  FLOW PROCESS FROM NODE     47.70 TO NODE     47.80 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.30  DOWNSTREAM(FEET) =   692.50
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.19
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.19
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   12.43
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.80 =    1633.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.80 TO NODE     47.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.43
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.881
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.60      0.25     0.500    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.94      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     1.54      SUBAREA RUNOFF(CFS) =     3.84
  EFFECTIVE AREA(ACRES) =     11.45   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       11.6       PEAK FLOW RATE(CFS) =      28.48

****************************************************************************
  FLOW PROCESS FROM NODE     47.80 TO NODE     47.90 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.50  DOWNSTREAM(FEET) =   692.30
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.2 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.32
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.48
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   12.50
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.90 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.90 TO NODE     47.90 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.872
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        1.43      0.25     0.500    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.14      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     1.57      SUBAREA RUNOFF(CFS) =     3.88
  EFFECTIVE AREA(ACRES) =     13.02   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =      32.27

****************************************************************************
  FLOW PROCESS FROM NODE     47.90 TO NODE     47.91 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.30  DOWNSTREAM(FEET) =   692.10
  FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  25.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.48
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      32.27
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   12.61
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.91 =    1707.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.91 TO NODE     47.91 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.61
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.858
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        1.89      0.25     0.500    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        1.30      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     3.19      SUBAREA RUNOFF(CFS) =     7.87
  EFFECTIVE AREA(ACRES) =     16.21   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      39.98

****************************************************************************
  FLOW PROCESS FROM NODE     47.91 TO NODE     47.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.10  DOWNSTREAM(FEET) =   691.30
  FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.02
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      39.98
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   13.01
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.00 =    1874.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1       39.98   13.01    2.808  0.24( 0.12) 0.50       16.2       47.36
      2       39.44   13.40    2.761  0.24( 0.12) 0.50       16.3       47.31
      3       38.59   13.95    2.698  0.24( 0.12) 0.50       16.3       47.33
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.00 =    1874.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      210.09   11.61    2.994  0.27( 0.07) 0.28       74.2       37.30
      2      226.40   13.80    2.715  0.27( 0.07) 0.28       89.0       37.60
      3      262.00   19.78    2.215  0.27( 0.07) 0.27      128.4        1.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      248.25   11.61    2.994  0.26( 0.08) 0.31       88.7       37.30
      2      260.45   13.01    2.808  0.26( 0.08) 0.31       99.8       47.36
      3      262.85   13.40    2.761  0.26( 0.08) 0.31      102.6       47.31
      4      265.23   13.80    2.715  0.26( 0.08) 0.31      105.3       37.60
      5      265.91   13.95    2.698  0.26( 0.08) 0.31      106.3       47.33
```

```
      6      293.36   19.78    2.215  0.26( 0.08) 0.30     144.7       1.00
    TOTAL AREA(ACRES) =       298.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      293.36  Tc(MIN.) =   19.779
  EFFECTIVE AREA(ACRES) =    144.75  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      298.5
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     48.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   691.30  DOWNSTREAM(FEET) =   691.10
  FLOW LENGTH(FEET) =    61.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  81.0 INCH PIPE IS  61.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.00
  ESTIMATED PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     293.36
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   19.88
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     48.60 TO NODE     48.61 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    712.40  DOWNSTREAM(FEET) =    707.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.660
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.535
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.05      0.30     0.400    56    8.66
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.02      0.25     0.400    69    8.66
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.69      0.20     0.400    75    8.66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      2.36
  TOTAL AREA(ACRES) =      0.76   PEAK FLOW RATE(CFS) =      2.36

****************************************************************************
  FLOW PROCESS FROM NODE     48.61 TO NODE     48.70 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  707.00  DOWNSTREAM ELEVATION(FEET) =  698.80
  STREET LENGTH(FEET) =   346.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.39
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =   10.13
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.27
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.01
  STREET FLOW TRAVEL TIME(MIN.) =   1.76   Tc(MIN.) =   10.42
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.183
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.46      0.25     0.400    69
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.28      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.74      SUBAREA RUNOFF(CFS) =    2.06
  EFFECTIVE AREA(ACRES) =      1.50    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       4.18

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  11.14
  FLOW VELOCITY(FEET/SEC.) =  3.40   DEPTH*VELOCITY(FT*FT/SEC.) =   1.12
  LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.70 =     676.00 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     48.70 TO NODE     48.70 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.42
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.183
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C        0.59      0.25      0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.59      SUBAREA RUNOFF(CFS) =     1.68
 EFFECTIVE AREA(ACRES) =      2.09   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.32
 TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       5.86

****************************************************************************
 FLOW PROCESS FROM NODE     48.71 TO NODE     48.71 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.42
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.183
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      B        0.09      0.30      0.400    56
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      C        0.47      0.25      0.400    69
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      D        0.80      0.20      0.400    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     1.36      SUBAREA RUNOFF(CFS) =     3.79
 EFFECTIVE AREA(ACRES) =      3.45   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =        3.4       PEAK FLOW RATE(CFS) =       9.64

****************************************************************************
 FLOW PROCESS FROM NODE     48.70 TO NODE     48.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   698.80  DOWNSTREAM(FEET) =   691.10
 FLOW LENGTH(FEET) =   119.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.36
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       9.64
 PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   10.57
 LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.00 =     795.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        9.64   10.57    3.157  0.22( 0.08) 0.35       3.4       48.60
 LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.00 =     795.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      248.25   11.72    2.978  0.26( 0.08) 0.31      88.7       37.30
     2      260.45   13.11    2.795  0.26( 0.08) 0.31      99.8       47.36
     3      262.85   13.51    2.749  0.26( 0.08) 0.31     102.6       47.31
     4      265.23   13.90    2.704  0.26( 0.08) 0.31     105.3       37.60
     5      265.91   14.06    2.687  0.26( 0.08) 0.31     106.3       47.33
     6      293.36   19.88    2.208  0.26( 0.08) 0.30     144.7        1.00
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      247.40   10.57    3.157  0.26( 0.08) 0.32      83.5       48.60
     2      257.33   11.72    2.978  0.26( 0.08) 0.31      92.2       37.30
     3      268.96   13.11    2.795  0.26( 0.08) 0.31     103.3       47.36
     4      271.22   13.51    2.749  0.26( 0.08) 0.31     106.0       47.31
     5      273.45   13.90    2.704  0.26( 0.08) 0.31     108.8       37.60
     6      274.08   14.06    2.687  0.26( 0.08) 0.31     109.8       47.33
     7      300.03   19.88    2.208  0.26( 0.08) 0.30     148.2        1.00
   TOTAL AREA(ACRES) =       302.0

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      300.03  Tc(MIN.) =   19.881
 EFFECTIVE AREA(ACRES) =    148.20  AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.30
 TOTAL AREA(ACRES) =      302.0
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     48.00 TO NODE     49.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   691.10  DOWNSTREAM(FEET) =   689.20
  FLOW LENGTH(FEET) =   384.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  75.0 INCH PIPE IS  58.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.69
  ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     300.03
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   20.43
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     49.00 =   11849.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.43
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.175
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.31      0.30      0.100    56
  COMMERCIAL                  C        0.90      0.25      0.100    69
  COMMERCIAL                  D        0.12      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.33      SUBAREA RUNOFF(CFS) =    2.57
  EFFECTIVE AREA(ACRES) =    149.53   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      303.3       PEAK FLOW RATE(CFS) =     300.03
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   20.43
  RAINFALL INTENSITY(INCH/HR) =   2.17
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.30
  EFFECTIVE STREAM AREA(ACRES) =     149.53
  TOTAL STREAM AREA(ACRES) =     303.28
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     300.03

****************************************************************************
  FLOW PROCESS FROM NODE     61.30 TO NODE     61.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    707.30  DOWNSTREAM(FEET) =    704.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.383
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.601
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  APARTMENTS                  B        0.53      0.30      0.200    56    8.38
  APARTMENTS                  D        0.77      0.20      0.200    75    8.38
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      4.16
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      4.16

****************************************************************************
  FLOW PROCESS FROM NODE     61.20 TO NODE     61.10 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    704.20
  DOWNSTREAM NODE ELEVATION(FEET) =    703.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   119.00
  "V" GUTTER WIDTH(FEET) =   1.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.10000
  MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.477
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                  B        1.30      0.30      0.200    56
  APARTMENTS                  D        0.25      0.20      0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      6.54
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.71
  AVERAGE FLOW DEPTH(FEET) =   0.43   FLOOD WIDTH(FEET) =    8.37
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.53   Tc(MIN.) =    8.92
  SUBAREA AREA(ACRES) =    1.55      SUBAREA RUNOFF(CFS) =    4.77
  EFFECTIVE AREA(ACRES) =    2.85     AREA-AVERAGED Fm(INCH/HR) =   0.05
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   0.20
  TOTAL AREA(ACRES) =        2.8         PEAK FLOW RATE(CFS) =       8.78

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.48   FLOOD WIDTH(FEET) =    9.37
  FLOW VELOCITY(FEET/SEC.) =   3.98   DEPTH*VELOCITY(FT*FT/SEC) =   1.91
  LONGEST FLOWPATH FROM NODE     61.30 TO NODE     61.10 =     449.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.10 TO NODE     49.00 IS CODE =  62
```

Onsite Hydrology Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1 and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61, ***with Detention @ Node 35***

27.5% Reduction

25-Year Storm Proposed Condition

```
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) =  703.00  DOWNSTREAM ELEVATION(FEET) =  699.50
  STREET LENGTH(FEET) =   380.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.88
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.47
    HALFSTREET FLOOD WIDTH(FEET) =   18.97
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.94
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.38
  STREET FLOW TRAVEL TIME(MIN.) =   2.15   Tc(MIN.) =   11.07
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.076
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.26      0.30      0.100    56
  COMMERCIAL                 C        0.25      0.25      0.100    69
  COMMERCIAL                 D        0.29      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    2.20
  EFFECTIVE AREA(ACRES) =      3.65    AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =       9.95

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.47   HALFSTREET FLOOD WIDTH(FEET) =  19.03
  FLOW VELOCITY(FEET/SEC.) =  2.94   DEPTH*VELOCITY(FT*FT/SEC.) =   1.39
  LONGEST FLOWPATH FROM NODE     61.30 TO NODE     49.00 =     829.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.07
  RAINFALL INTENSITY(INCH/HR) =   3.08
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.18
  EFFECTIVE STREAM AREA(ACRES) =       3.65
  TOTAL STREAM AREA(ACRES) =       3.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.95

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1      247.40   11.15    3.064  0.26( 0.08) 0.31      84.8      48.60
      1      257.33   12.29    2.900  0.26( 0.08) 0.31      93.5      37.30
      1      268.96   13.67    2.730  0.26( 0.08) 0.31     104.6      47.36
      1      271.22   14.07    2.686  0.26( 0.08) 0.31     107.4      47.31
      1      273.45   14.47    2.644  0.26( 0.08) 0.31     110.1      37.60
      1      274.08   14.62    2.628  0.26( 0.08) 0.31     111.1      47.33
      1      300.03   20.43    2.175  0.26( 0.08) 0.30     149.5       1.00
      2        9.95   11.07    3.076  0.26( 0.05) 0.18       3.6      61.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1      256.62   11.07    3.076  0.26( 0.08) 0.31      87.9      61.30
      2      257.31   11.15    3.064  0.26( 0.08) 0.31      88.4      48.60
      3      266.71   12.29    2.900  0.26( 0.08) 0.31      97.1      37.30
      4      277.77   13.67    2.730  0.26( 0.08) 0.31     108.3      47.36
      5      279.89   14.07    2.686  0.26( 0.08) 0.31     111.0      47.31
      6      281.98   14.47    2.644  0.26( 0.08) 0.31     113.7      37.60
      7      282.56   14.62    2.628  0.26( 0.08) 0.31     114.8      47.33
      8      307.02   20.43    2.175  0.26( 0.08) 0.30     153.2       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     307.02    Tc(MIN.) =    20.43
  EFFECTIVE AREA(ACRES) =     153.18   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      306.9
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     49.00 =   11849.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     50.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   689.20  DOWNSTREAM(FEET) =   688.90
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  75.0 INCH PIPE IS  57.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.15
  ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     307.02
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   20.51
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     57.10 TO NODE     57.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    714.00  DOWNSTREAM(FEET) =    711.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.278
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.626
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  B        0.42      0.30      0.100    56    8.28
  COMMERCIAL                  D        0.08      0.20      0.100    75    8.28
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.62
  TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      1.62

****************************************************************************
  FLOW PROCESS FROM NODE     57.20 TO NODE     57.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  711.60  DOWNSTREAM ELEVATION(FEET) =  709.00
  STREET LENGTH(FEET) =   130.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.79
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.89
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.64
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.71
    STREET FLOW TRAVEL TIME(MIN.) =   0.82   Tc(MIN.) =    9.10
    *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.437
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
         LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
    COMMERCIAL                  B        0.11      0.30      0.100    56
    SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
    SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
    SUBAREA AREA(ACRES) =    0.11      SUBAREA RUNOFF(CFS) =    0.34
    EFFECTIVE AREA(ACRES) =      0.61    AREA-AVERAGED Fm(INCH/HR) =  0.03
    AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.10
    TOTAL AREA(ACRES) =        0.6        PEAK FLOW RATE(CFS) =       1.87

    END OF SUBAREA STREET FLOW HYDRAULICS:
    DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   8.00
    FLOW VELOCITY(FEET/SEC.) =  2.71   DEPTH*VELOCITY(FT*FT/SEC.) =   0.74
    LONGEST FLOWPATH FROM NODE     57.10 TO NODE     57.00 =     460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.10
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.437
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.29      0.30      0.100    56
  COMMERCIAL                  C        0.02      0.25      0.100    69
  COMMERCIAL                  D        0.34      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.65      SUBAREA RUNOFF(CFS) =    2.00
  EFFECTIVE AREA(ACRES) =      1.26   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       3.87

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.10
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.437
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.33      0.30      0.200    56
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        0.56      0.20      0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
```

```
  SUBAREA AREA(ACRES) =    0.89      SUBAREA RUNOFF(CFS) =    2.72
  EFFECTIVE AREA(ACRES) =      2.15   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.14
  TOTAL AREA(ACRES) =        2.2       PEAK FLOW RATE(CFS) =       6.58

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.10
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.437
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.34      0.30     0.200    56
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.53      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.87      SUBAREA RUNOFF(CFS) =    2.65
  EFFECTIVE AREA(ACRES) =      3.02   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =        3.0       PEAK FLOW RATE(CFS) =       9.24

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     58.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.00  DOWNSTREAM(FEET) =   702.50
  FLOW LENGTH(FEET) =   633.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.48
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.24
  PIPE TRAVEL TIME(MIN.) =   1.63    Tc(MIN.) =   10.73
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     58.00 =    1093.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.73
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.132
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        1.93      0.30     0.200    56
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.46      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    2.39      SUBAREA RUNOFF(CFS) =    6.62
  EFFECTIVE AREA(ACRES) =      5.41   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =      15.02

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.73
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.132
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        1.60      0.30     0.200    56
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.76      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    2.36      SUBAREA RUNOFF(CFS) =    6.54
  EFFECTIVE AREA(ACRES) =      7.77   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =      21.56

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   702.50  DOWNSTREAM(FEET) =   700.00
  FLOW LENGTH(FEET) =    67.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.22
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.56
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   10.81
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     58.10 =    1160.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     58.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.81
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.118
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        1.94      0.30     0.200    56
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       C        0.82      0.25     0.200    69
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        4.28      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    7.04      SUBAREA RUNOFF(CFS) =   19.46
  EFFECTIVE AREA(ACRES) =     14.81   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       14.8       PEAK FLOW RATE(CFS) =      40.92

****************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     58.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.81
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.118
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       C        3.80      0.25     0.200    69
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        2.64      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    6.44      SUBAREA RUNOFF(CFS) =   17.80
  EFFECTIVE AREA(ACRES) =     21.25   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       21.2       PEAK FLOW RATE(CFS) =      58.72

****************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     59.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   700.00  DOWNSTREAM(FEET) =   699.50
  FLOW LENGTH(FEET) =   139.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  32.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.00
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      58.72
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   11.14
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.00 =    1299.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.14
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.065
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.44      0.30     0.100    56
  COMMERCIAL                 D        0.18      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.62      SUBAREA RUNOFF(CFS) =    1.70
  EFFECTIVE AREA(ACRES) =     21.87   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       21.9       PEAK FLOW RATE(CFS) =      59.41

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.50  DOWNSTREAM(FEET) =   699.10
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.03
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      59.41
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.25
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.10 =    1355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     59.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.25
  RAINFALL INTENSITY(INCH/HR) =   3.05
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  0.19
  EFFECTIVE STREAM AREA(ACRES) =      21.87
  TOTAL STREAM AREA(ACRES) =      21.87
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      59.41

****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     50.10 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    83.00
  USER SPECIFIED Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
```

```
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.01      0.30      0.100    56
  COMMERCIAL                  C        0.06      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.30
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.30

****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     50.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.08      0.30      0.100    56
  COMMERCIAL                  C        0.01      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.39
  EFFECTIVE AREA(ACRES) =      0.16   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.2       PEAK FLOW RATE(CFS) =       0.69

****************************************************************************
  FLOW PROCESS FROM NODE     50.10 TO NODE     59.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.00  DOWNSTREAM(FEET) =   699.10
  FLOW LENGTH(FEET) =   481.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.70
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.69
  PIPE TRAVEL TIME(MIN.) =   1.71    Tc(MIN.) =    6.71
  LONGEST FLOWPATH FROM NODE     50.10 TO NODE     59.10 =     564.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     59.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.71
  RAINFALL INTENSITY(INCH/HR) =   4.09
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.28
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.16
  TOTAL STREAM AREA(ACRES) =       0.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.69

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       59.41   11.25    3.049  0.24( 0.05) 0.19      21.9      57.10
      2        0.69    6.71    4.085  0.28( 0.03) 0.10       0.2      50.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       48.35    6.71    4.085  0.24( 0.05) 0.19      13.2      50.10
      2       59.92   11.25    3.049  0.24( 0.05) 0.19      22.0      57.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      59.92    Tc(MIN.) =    11.25
  EFFECTIVE AREA(ACRES) =      22.03   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       22.0
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.10 =    1355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     50.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.10  DOWNSTREAM(FEET) =   688.90
  FLOW LENGTH(FEET) =    28.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  38.80
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      59.92
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.26
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     50.00 =    1383.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
```

```
    1       48.35    6.72    4.081  0.24( 0.05) 0.19      13.2      50.10
    2       59.92   11.26    3.047  0.24( 0.05) 0.19      22.0      57.10
LONGEST FLOWPATH FROM NODE     57.10 TO NODE     50.00 =    1383.00 FEET.

** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM        Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
 NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1      256.62   11.15    3.063  0.26( 0.08) 0.31      87.9      61.30
    2      257.31   11.23    3.051  0.26( 0.08) 0.31      88.4      48.60
    3      266.71   12.37    2.889  0.26( 0.08) 0.31      97.1      37.30
    4      277.77   13.75    2.721  0.26( 0.08) 0.31     108.3      47.36
    5      279.89   14.15    2.678  0.26( 0.08) 0.31     111.0      47.31
    6      281.98   14.54    2.636  0.26( 0.08) 0.31     113.7      37.60
    7      282.56   14.70    2.620  0.26( 0.08) 0.31     114.8      47.33
    8      307.02   20.51    2.170  0.26( 0.08) 0.30     153.2       1.00
LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

** PEAK FLOW RATE TABLE **
 STREAM        Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
 NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1      255.66    6.72    4.081  0.26( 0.07) 0.28      66.1      50.10
    2      316.27   11.15    3.063  0.26( 0.07) 0.28     109.7      61.30
    3      317.16   11.23    3.051  0.26( 0.07) 0.28     110.4      48.60
    4      317.46   11.26    3.047  0.26( 0.07) 0.28     110.7      57.10
    5      323.48   12.37    2.889  0.26( 0.07) 0.29     119.2      37.30
    6      331.18   13.75    2.721  0.26( 0.07) 0.29     130.3      47.36
    7      332.43   14.15    2.678  0.26( 0.07) 0.29     133.0      47.31
    8      333.69   14.54    2.636  0.26( 0.07) 0.29     135.8      37.60
    9      333.96   14.70    2.620  0.26( 0.07) 0.29     136.8      47.33
   10      349.43   20.51    2.170  0.26( 0.07) 0.28     175.2       1.00
  TOTAL AREA(ACRES) =      329.0

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     349.43  Tc(MIN.) =   20.505
 EFFECTIVE AREA(ACRES) =    175.21  AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =      329.0
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     50.00 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   688.90  DOWNSTREAM(FEET) =   675.00
 FLOW LENGTH(FEET) =   437.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  42.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  24.57
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     349.43
 PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   20.80
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     61.00 =   12342.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   20.80
 RAINFALL INTENSITY(INCH/HR) =   2.15
 AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.26
 AREA-AVERAGED Ap =  0.28
 EFFECTIVE STREAM AREA(ACRES) =     175.21
 TOTAL STREAM AREA(ACRES) =     328.96
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     349.43

****************************************************************************
 FLOW PROCESS FROM NODE     48.10 TO NODE     48.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    712.40  DOWNSTREAM(FEET) =    709.70

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.947
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.268
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        0.15      0.30      0.400    56    9.95
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        0.34      0.20      0.400    75    9.95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA RUNOFF(CFS) =      1.40
 TOTAL AREA(ACRES) =      0.49   PEAK FLOW RATE(CFS) =      1.40

****************************************************************************
 FLOW PROCESS FROM NODE     48.20 TO NODE     48.30 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  709.70  DOWNSTREAM ELEVATION(FEET) =  703.80
 STREET LENGTH(FEET) =   500.00   CURB HEIGHT(INCHES) =  6.0
```

```
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.99
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.33
   HALFSTREET FLOOD WIDTH(FEET) =   11.14
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.43
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.80
 STREET FLOW TRAVEL TIME(MIN.) =   3.42   Tc(MIN.) =   13.37
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.764
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       C        0.64      0.25     0.400    69
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        0.68      0.20     0.400    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =    1.32      SUBAREA RUNOFF(CFS) =    3.18
 EFFECTIVE AREA(ACRES) =      1.81    AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =        1.8        PEAK FLOW RATE(CFS) =       4.36

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  13.07
 FLOW VELOCITY(FEET/SEC.) =  2.64   DEPTH*VELOCITY(FT*FT/SEC.) =   0.96
 LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.30 =     830.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     48.30 TO NODE     48.40 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  703.80  DOWNSTREAM ELEVATION(FEET) =  700.20
 STREET LENGTH(FEET) =   522.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.07
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.43
   HALFSTREET FLOOD WIDTH(FEET) =   16.63
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.34
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.00
 STREET FLOW TRAVEL TIME(MIN.) =   3.71   Tc(MIN.) =   17.09
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.406
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       C        0.93      0.25     0.400    69
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        0.71      0.20     0.400    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =    1.64      SUBAREA RUNOFF(CFS) =    3.42
 EFFECTIVE AREA(ACRES) =      3.45    AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =        3.4        PEAK FLOW RATE(CFS) =       7.19

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  17.85
 FLOW VELOCITY(FEET/SEC.) =  2.42   DEPTH*VELOCITY(FT*FT/SEC.) =   1.09
 LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.40 =    1352.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     48.40 TO NODE     48.40 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.09
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.406
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       C        0.44      0.25     0.400    69
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       D        0.46      0.20     0.400    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    1.88
 EFFECTIVE AREA(ACRES) =      4.35   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =        4.3        PEAK FLOW RATE(CFS) =       9.07

****************************************************************************
 FLOW PROCESS FROM NODE     48.40 TO NODE     48.50 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   700.20  DOWNSTREAM(FEET) =   699.80
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.96
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.07
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   17.35
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.50 =    1432.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.50 TO NODE     48.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.35
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.385
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.16      0.30     0.400    56
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       C        1.49      0.25     0.400    69
  PUBLIC PARK                 C        0.26      0.25     0.850    69
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.88      0.20     0.400    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.442
  SUBAREA AREA(ACRES) =    2.79      SUBAREA RUNOFF(CFS) =    5.72
  EFFECTIVE AREA(ACRES) =      7.14   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =        7.1       PEAK FLOW RATE(CFS) =      14.71

****************************************************************************
  FLOW PROCESS FROM NODE     48.50 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.80  DOWNSTREAM(FEET) =   675.00
  FLOW LENGTH(FEET) =   425.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH)  INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.30
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.71
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =   17.85
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     61.00 =    1857.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.85
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.347
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 B        1.98      0.30     0.850    56
  PUBLIC PARK                 D        1.67      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    3.65      SUBAREA RUNOFF(CFS) =    7.00
  EFFECTIVE AREA(ACRES) =     10.79   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =       10.8       PEAK FLOW RATE(CFS) =      21.47

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   17.85
  RAINFALL INTENSITY(INCH/HR) =   2.35
  AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =      10.79
  TOTAL STREAM AREA(ACRES) =      10.79
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      21.47

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      255.66    7.04    3.975  0.26( 0.07) 0.28      66.1       50.10
      1      316.27   11.46    3.017  0.26( 0.07) 0.28     109.7       61.30
      1      317.16   11.54    3.005  0.26( 0.07) 0.28     110.4       48.60
      1      317.46   11.56    3.001  0.26( 0.07) 0.28     110.7       57.10
      1      323.48   12.67    2.850  0.26( 0.07) 0.29     119.2       37.30
      1      331.18   14.06    2.687  0.26( 0.07) 0.29     130.3       47.36
      1      332.43   14.45    2.645  0.26( 0.07) 0.29     133.0       47.31
      1      333.69   14.84    2.606  0.26( 0.07) 0.29     135.8       37.60
      1      333.96   15.00    2.590  0.26( 0.07) 0.29     136.8       47.33
      1      349.43   20.80    2.153  0.26( 0.07) 0.28     175.2        1.00
      2       21.47   17.85    2.347  0.24( 0.14) 0.56      10.8       48.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
```

NUMBER	(CFS)	(MIN.)	(INCH/HR)	(INCH/HR)		(ACRES)	NODE
1	270.35	7.04	3.975	0.25(0.08)	0.30	70.4	50.10
2	334.22	11.46	3.017	0.25(0.08)	0.30	116.6	61.30
3	335.16	11.54	3.005	0.25(0.08)	0.30	117.4	48.60
4	335.47	11.56	3.001	0.25(0.08)	0.30	117.7	57.10
5	342.18	12.67	2.850	0.25(0.08)	0.30	126.8	37.30
6	350.68	14.06	2.687	0.25(0.08)	0.30	138.8	47.36
7	352.15	14.45	2.645	0.25(0.08)	0.30	141.8	47.31
8	353.62	14.84	2.606	0.25(0.08)	0.30	144.7	37.60
9	353.97	15.00	2.590	0.26(0.08)	0.30	145.9	47.33
10	363.03	17.85	2.347	0.26(0.08)	0.30	166.5	48.10
11	369.01	20.80	2.153	0.26(0.08)	0.30	186.0	1.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 369.01 Tc(MIN.) = 20.80
EFFECTIVE AREA(ACRES) = 186.00 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.30
TOTAL AREA(ACRES) = 339.8
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 61.00 = 12342.00 FEET.

==========

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 339.8 TC(MIN.) = 20.80
EFFECTIVE AREA(ACRES) = 186.00 AREA-AVERAGED Fm(INCH/HR)= 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.26 AREA-AVERAGED Ap = 0.299
PEAK FLOW RATE(CFS) = 369.01

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)		Ap (ACRES)	Ae	HEADWATER NODE
1	270.35	7.04	3.975	0.25(0.08)	0.30	70.4		50.10
2	334.22	11.46	3.017	0.25(0.08)	0.30	116.6		61.30
3	335.16	11.54	3.005	0.25(0.08)	0.30	117.4		48.60
4	335.47	11.56	3.001	0.25(0.08)	0.30	117.7		57.10
5	342.18	12.67	2.850	0.25(0.08)	0.30	126.8		37.30
6	350.68	14.06	2.687	0.25(0.08)	0.30	138.8		47.36
7	352.15	14.45	2.645	0.25(0.08)	0.30	141.8		47.31
8	353.62	14.84	2.606	0.25(0.08)	0.30	144.7		37.60
9	353.97	15.00	2.590	0.26(0.08)	0.30	145.9		47.33
10	363.03	17.85	2.347	0.26(0.08)	0.30	166.5		48.10
11	369.01	20.80	2.153	0.26(0.08)	0.30	186.0		1.00

==========

==========

END OF RATIONAL METHOD ANALYSIS

```
******************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                *
* OFFSITE & ONSITE PROP. CONDITION @ 100-YEAR STORM WITH DETENTION NODE 35 *
* W.O. #1443-136X, 32.4% REDUCTION                                     *
 ************************************************************************

  FILE NAME: DET_100.DAT
  TIME/DATE OF STUDY: 10:18 06/10/2019
==============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)   (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   18.0      13.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150
  2   20.0      15.0    0.018/0.018/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

******************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1099.00  DOWNSTREAM(FEET) =   1091.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.370
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.605
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.78      0.25      0.600    86    8.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      3.13
  TOTAL AREA(ACRES) =      0.78   PEAK FLOW RATE(CFS) =      3.13

******************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  62
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) = 1091.20  DOWNSTREAM ELEVATION(FEET) = 1089.40
  STREET LENGTH(FEET) =    90.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.80
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   14.90
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.71
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.47
  STREET FLOW TRAVEL TIME(MIN.) =   0.40   Tc(MIN.) =    8.78
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.483
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.38      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    9.33
  EFFECTIVE AREA(ACRES) =      3.16    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.52
```

Onsite Hydrology Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1 and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61, ***with Detention @ Node 35***

32.4% Reduction

100-Year Storm Proposed Condition

```
  TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =      12.38

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  17.85
  FLOW VELOCITY(FEET/SEC.) =  4.17   DEPTH*VELOCITY(FT*FT/SEC.) =   1.87
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     390.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1089.40  DOWNSTREAM ELEVATION(FEET) = 1067.00
  STREET LENGTH(FEET) =   513.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.44
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.41
    HALFSTREET FLOOD WIDTH(FEET) =   15.82
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.71
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.35
  STREET FLOW TRAVEL TIME(MIN.) =   1.50   Tc(MIN.) =   10.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.095
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.34      0.25      0.100    86
  PUBLIC PARK                C        0.25      0.25      0.850    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.418
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    2.12
  EFFECTIVE AREA(ACRES) =      3.75    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =      13.39

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  15.82
  FLOW VELOCITY(FEET/SEC.) =  5.69   DEPTH*VELOCITY(FT*FT/SEC.) =   2.34
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     903.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.095
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.35      0.25      0.100    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.49      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.333
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    3.03
  EFFECTIVE AREA(ACRES) =      4.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =      16.43

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1067.00  DOWNSTREAM(FEET) =  1062.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.79
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.43
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   10.39
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1003.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.39
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.068
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.09      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.09      SUBAREA RUNOFF(CFS) =    7.42
  EFFECTIVE AREA(ACRES) =      6.68   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        6.7        PEAK FLOW RATE(CFS) =      23.73

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1062.00  DOWNSTREAM(FEET) =  1022.40
  FLOW LENGTH(FEET) =   701.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.89
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.73
  PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =   11.13
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1704.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.13
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.912
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.18      0.30      0.100    76
  COMMERCIAL                  C        0.46      0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.64      SUBAREA RUNOFF(CFS) =    2.24
  EFFECTIVE AREA(ACRES) =      7.32   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =        7.3       PEAK FLOW RATE(CFS) =      25.03

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.40  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.49
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.03
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   11.38
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.38
  RAINFALL INTENSITY(INCH/HR) =   3.86
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.45
  EFFECTIVE STREAM AREA(ACRES) =       7.32
  TOTAL STREAM AREA(ACRES) =       7.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      25.03

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   305.00
  ELEVATION DATA: UPSTREAM(FEET) =   1046.00  DOWNSTREAM(FEET) =   1042.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.129
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.049
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  C        1.00      0.25      0.100    86    7.13
  RESIDENTIAL
  ".4 DWELLING/ACRE"          C        0.50      0.25      0.900    86   11.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.367
  SUBAREA RUNOFF(CFS) =      6.69
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      6.69

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1042.00  DOWNSTREAM ELEVATION(FEET) = 1036.00
  STREET LENGTH(FEET) =   373.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL) =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.09
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   14.50
```

```
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.28
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.27
 STREET FLOW TRAVEL TIME(MIN.) =   1.90   Tc(MIN.) =    9.03
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.411
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        3.31      0.25     0.500    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    3.31      SUBAREA RUNOFF(CFS) =   12.77
 EFFECTIVE AREA(ACRES) =      4.81    AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =        4.8        PEAK FLOW RATE(CFS) =      18.60

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  16.63
 FLOW VELOCITY(FEET/SEC.) =  3.59   DEPTH*VELOCITY(FT*FT/SEC.) =   1.53
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     678.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1036.00  DOWNSTREAM ELEVATION(FEET) = 1026.00
 STREET LENGTH(FEET) =   463.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      22.75
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.43
   HALFSTREET FLOOD WIDTH(FEET) =   17.04
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.19
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.82
 STREET FLOW TRAVEL TIME(MIN.) =   1.84   Tc(MIN.) =   10.87
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.966
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        2.40      0.25     0.500    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    8.30
 EFFECTIVE AREA(ACRES) =      7.21    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =      24.97

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  17.64
 FLOW VELOCITY(FEET/SEC.) =  4.30   DEPTH*VELOCITY(FT*FT/SEC.) =   1.91
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1141.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.87
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.966
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.16      0.30     0.500    76
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        2.22      0.25     0.500    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =    8.22
 EFFECTIVE AREA(ACRES) =      9.59   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =        9.6        PEAK FLOW RATE(CFS) =      33.19

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1026.00  DOWNSTREAM(FEET) =  1022.00
 FLOW LENGTH(FEET) =   395.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.95
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      33.19
 PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =   11.60
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1536.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.60
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.820
```

```
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.07      0.30      0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        4.06      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     4.13      SUBAREA RUNOFF(CFS) =   13.73
  EFFECTIVE AREA(ACRES) =     13.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       13.7       PEAK FLOW RATE(CFS) =      45.66

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1022.00  DOWNSTREAM(FEET) =  1020.00
  FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.30
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      45.66
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   11.79
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.79
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.785
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.55      0.30      0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        2.06      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     2.61      SUBAREA RUNOFF(CFS) =    8.59
  EFFECTIVE AREA(ACRES) =     16.33   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      53.82

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1020.00  DOWNSTREAM(FEET) =  1019.50
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.83
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      53.82
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   12.12
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    1799.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.12
  RAINFALL INTENSITY(INCH/HR) =   3.73
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =      16.33
  TOTAL STREAM AREA(ACRES) =      16.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      53.82

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       25.03   11.38    3.863  0.25( 0.11) 0.45       7.3       1.00
      2       53.82   12.12    3.725  0.25( 0.12) 0.49      16.3       8.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       77.47   11.38    3.863  0.25( 0.12) 0.48      22.6       1.00
      2       77.93   12.12    3.725  0.25( 0.12) 0.48      23.6       8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      77.93    Tc(MIN.) =    12.12
  EFFECTIVE AREA(ACRES) =      23.65   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =      23.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1859.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1019.50  DOWNSTREAM(FEET) =  1014.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.77
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      77.93
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   12.27
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.10 =    2014.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   12.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.700
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.15      0.30      0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.15      SUBAREA RUNOFF(CFS) =     0.50
  EFFECTIVE AREA(ACRES) =     23.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       23.8       PEAK FLOW RATE(CFS) =      77.93
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   12.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.700
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.16      0.30      0.100    76
  COMMERCIAL                  C        1.44      0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     5.29
  EFFECTIVE AREA(ACRES) =     25.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       25.4       PEAK FLOW RATE(CFS) =      81.99

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1014.00  DOWNSTREAM(FEET) =   971.40
  FLOW LENGTH(FEET) =   863.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.04
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      81.99
  PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =   12.98
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     14.00 =    2877.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   12.98
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.581
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.82      0.30      0.100    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.77      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.294
  SUBAREA AREA(ACRES) =     1.59      SUBAREA RUNOFF(CFS) =     5.02
  EFFECTIVE AREA(ACRES) =     26.99   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       27.0       PEAK FLOW RATE(CFS) =      84.29

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   971.40  DOWNSTREAM(FEET) =   969.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.92
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      84.29
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   13.01
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    2917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   13.01
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.577
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
```

```
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        2.46      0.30      0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C       10.48      0.25      0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   12.94      SUBAREA RUNOFF(CFS) =   40.14
  EFFECTIVE AREA(ACRES) =     39.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       39.9       PEAK FLOW RATE(CFS) =     124.32

  ** PEAK FLOW RATE TABLE **
   STREAM       Q       Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      125.50   12.27    3.699  0.25( 0.12) 0.46      38.9       1.00
      2      124.32   13.01    3.577  0.25( 0.12) 0.46      39.9       8.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =     125.50  Tc(MIN.) =   12.27
  AREA-AVERAGED Fm(INCH/HR) =  0.12  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  0.46  EFFECTIVE AREA(ACRES) =      38.93

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   969.00  DOWNSTREAM(FEET) =   954.00
  FLOW LENGTH(FEET) =   416.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.10
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     125.50
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   12.61
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     16.00 =    3333.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.61
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.641
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        0.77      0.25      0.100    86
  PUBLIC PARK                 C        0.43      0.25      0.850    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.369
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    3.83
  EFFECTIVE AREA(ACRES) =     40.13   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       41.1       PEAK FLOW RATE(CFS) =     127.29

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   954.00  DOWNSTREAM(FEET) =   952.80
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.32
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     127.29
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   12.78
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    3453.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.78
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.614
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.88      0.30      0.400    76
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        7.02      0.25      0.400    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    7.90      SUBAREA RUNOFF(CFS) =   24.97
  EFFECTIVE AREA(ACRES) =     48.03   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =       49.0       PEAK FLOW RATE(CFS) =     151.30

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   952.80  DOWNSTREAM(FEET) =   929.00
  FLOW LENGTH(FEET) =   636.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.82
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     151.30
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   13.29
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.10 =    4089.00 FEET.

****************************************************************************
```

```
  FLOW PROCESS FROM NODE     17.10 TO NODE     17.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.29
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.534
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.68      0.30      0.500    76
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.89      0.25      0.600    86
  COMMERCIAL                 C        1.86      0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.309
  SUBAREA AREA(ACRES) =    3.43      SUBAREA RUNOFF(CFS) =   10.66
  EFFECTIVE AREA(ACRES) =     51.46   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       52.5       PEAK FLOW RATE(CFS) =     158.50

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   929.00  DOWNSTREAM(FEET) =   926.30
  FLOW LENGTH(FEET) =   122.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  34.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.55
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     158.50
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   13.40
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     18.00 =    4211.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.40
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.517
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS               B       24.46      0.30      0.350    76
  CONDOMINIUMS               C        7.92      0.25      0.350    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =   32.38      SUBAREA RUNOFF(CFS) =   99.55
  EFFECTIVE AREA(ACRES) =     83.84   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       84.8       PEAK FLOW RATE(CFS) =     257.24

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   926.30  DOWNSTREAM(FEET) =   922.70
  FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  42.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.26
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     257.24
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   13.55
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     19.00 =    4384.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.55
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.494
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        1.62      0.30      0.400    76
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        6.09      0.25      0.400    86
  COMMERCIAL                 B        2.90      0.30      0.100    76
  COMMERCIAL                 C        3.15      0.25      0.100    86
  NATURAL POOR COVER
  "GRASS"                    B        0.76      0.30      1.000    93
  NATURAL POOR COVER
  "GRASS"                    C        0.39      0.25      1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.325
  SUBAREA AREA(ACRES) =   14.91      SUBAREA RUNOFF(CFS) =   45.73
  EFFECTIVE AREA(ACRES) =     98.75   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =       99.8       PEAK FLOW RATE(CFS) =     301.28

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   922.70  DOWNSTREAM(FEET) =   815.60
  FLOW LENGTH(FEET) =  1580.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  34.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  31.69
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =     301.28
  PIPE TRAVEL TIME(MIN.) =   0.83    Tc(MIN.) =   14.38
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     20.00 =    5964.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.38
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.377
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B       19.45      0.30      0.100    76
  COMMERCIAL                 C       16.92      0.25      0.100    86
  COMMERCIAL                 D        0.11      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   36.48      SUBAREA RUNOFF(CFS) =  109.98
  EFFECTIVE AREA(ACRES) =    135.23   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      136.2       PEAK FLOW RATE(CFS) =     400.84

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   815.60  DOWNSTREAM(FEET) =   799.50
  FLOW LENGTH(FEET) =   449.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  45.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.25
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     400.84
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   14.67
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =    6413.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.340
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.38      0.30      0.100    76
  COMMERCIAL                 C        0.87      0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    9.68
  EFFECTIVE AREA(ACRES) =    138.48   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      139.5       PEAK FLOW RATE(CFS) =     405.93

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.340
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        4.10      0.30      0.100    76
  COMMERCIAL                 C        1.54      0.25      0.100    86
  COMMERCIAL                 D        2.08      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    7.72      SUBAREA RUNOFF(CFS) =   23.02
  EFFECTIVE AREA(ACRES) =    146.20   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      147.2       PEAK FLOW RATE(CFS) =     428.95

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   799.50  DOWNSTREAM(FEET) =   765.50
  FLOW LENGTH(FEET) =  1056.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  47.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.72
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     428.95
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   15.35
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     22.00 =    7469.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.35
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.253
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.06      0.30      0.100    76
  COMMERCIAL                 C        1.74      0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    3.80      SUBAREA RUNOFF(CFS) =   11.03
```

```
  EFFECTIVE AREA(ACRES) =    150.00   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      151.0       PEAK FLOW RATE(CFS) =     428.95
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.35
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.253
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.23      0.30      0.100    76
  COMMERCIAL                 D        5.07      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    5.30      SUBAREA RUNOFF(CFS) =   15.42
  EFFECTIVE AREA(ACRES) =    155.30   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.29
  TOTAL AREA(ACRES) =      156.3       PEAK FLOW RATE(CFS) =     444.07

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   765.50  DOWNSTREAM(FEET) =   755.00
  FLOW LENGTH(FEET) =   465.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  50.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.88
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     444.07
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   15.69
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     23.00 =    7934.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.213
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        9.15      0.30      0.100    76
  COMMERCIAL                 C       10.79      0.25      0.100    86
  COMMERCIAL                 D        1.81      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   21.75      SUBAREA RUNOFF(CFS) =   62.37
  EFFECTIVE AREA(ACRES) =    177.05   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =      178.1       PEAK FLOW RATE(CFS) =     500.79

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.213
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        7.47      0.30      0.100    76
  COMMERCIAL                 C        0.40      0.25      0.100    86
  COMMERCIAL                 D       17.76      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   25.63      SUBAREA RUNOFF(CFS) =   73.58
  EFFECTIVE AREA(ACRES) =    202.68   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      203.7       PEAK FLOW RATE(CFS) =     574.38

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   755.00  DOWNSTREAM(FEET) =   736.00
  FLOW LENGTH(FEET) =  1257.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  78.0 INCH PIPE IS  60.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.95
  ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     574.38
  PIPE TRAVEL TIME(MIN.) =   1.00    Tc(MIN.) =   16.69
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     24.00 =    9191.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.101
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B       16.13      0.30      0.100    76
  COMMERCIAL                 C        3.87      0.25      0.100    86
  COMMERCIAL                 D        4.22      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   24.22      SUBAREA RUNOFF(CFS) =   67.00
  EFFECTIVE AREA(ACRES) =    226.90   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      227.9       PEAK FLOW RATE(CFS) =     621.00

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     30.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   736.00  DOWNSTREAM(FEET) =   720.00
  FLOW LENGTH(FEET) =   212.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  45.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  39.20
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     621.00
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   16.78
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.10 =    9403.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.10 TO NODE     30.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   720.00  DOWNSTREAM(FEET) =   716.00
  FLOW LENGTH(FEET) =   156.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  56.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.92
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     621.00
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   16.88
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    9559.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.88
  RAINFALL INTENSITY(INCH/HR) =   3.08
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.23
  EFFECTIVE STREAM AREA(ACRES) =     226.90
  TOTAL STREAM AREA(ACRES) =     227.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     621.00

****************************************************************************
  FLOW PROCESS FROM NODE     30.20 TO NODE     30.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    740.00  DOWNSTREAM(FEET) =    726.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.494
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.862
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  B        0.42      0.30      0.100    76    5.49
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.20
  TOTAL AREA(ACRES) =      0.42   PEAK FLOW RATE(CFS) =      2.20

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     30.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.49
  RAINFALL INTENSITY(INCH/HR) =   5.86
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.42
  TOTAL STREAM AREA(ACRES) =       0.42
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.20

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      621.00   16.88    3.081  0.27( 0.06) 0.23     226.9       1.00
      1      607.40   17.65    3.003  0.27( 0.06) 0.23     227.9       8.00
      2        2.20    5.49    5.862  0.30( 0.03) 0.10       0.4      30.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      390.38    5.49    5.862  0.27( 0.06) 0.23      74.3      30.20
      2      622.15   16.88    3.081  0.27( 0.06) 0.23     227.3       1.00
      3      608.52   17.65    3.003  0.27( 0.06) 0.23     228.3       8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
  PEAK FLOW RATE(CFS) =     622.15    Tc(MIN.) =    16.88
  EFFECTIVE AREA(ACRES) =     227.32   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      228.3
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     30.00 =    9559.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     33.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   716.00  DOWNSTREAM(FEET) =   714.30
  FLOW LENGTH(FEET) =   210.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  90.0 INCH PIPE IS  70.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.88
  ESTIMATED PIPE DIAMETER(INCH) =  90.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     622.15
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   17.09
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     33.00 =    9769.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.09
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.060
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.35      0.30      0.100    76
  COMMERCIAL                  B        0.62      0.30      0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.97      SUBAREA RUNOFF(CFS) =    2.64
  EFFECTIVE AREA(ACRES) =    228.29   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      229.3       PEAK FLOW RATE(CFS) =     622.15
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.30  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =   420.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  84.0 INCH PIPE IS  68.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.58
  ESTIMATED PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     622.15
  PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =   17.47
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     38.00 TO NODE     39.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    730.50  DOWNSTREAM(FEET) =    726.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.427
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.302
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.80      0.30      0.500    76    9.43
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.42      0.20      0.500    91    9.43
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      4.58
  TOTAL AREA(ACRES) =      1.22   PEAK FLOW RATE(CFS) =      4.58

****************************************************************************
  FLOW PROCESS FROM NODE     39.00 TO NODE     40.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  726.20  DOWNSTREAM ELEVATION(FEET) =  719.50
  STREET LENGTH(FEET) =   711.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.19
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.44
```

```
   HALFSTREET FLOOD WIDTH(FEET) =   17.64
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.82
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.26
  STREET FLOW TRAVEL TIME(MIN.) =   4.20   Tc(MIN.) =   13.62
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.484
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        2.40      0.30     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    7.20
  EFFECTIVE AREA(ACRES) =      3.62    AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =      10.88

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  2.87   DEPTH*VELOCITY(FT*FT/SEC.) =   1.29
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.00 =    1041.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.62
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.484
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.93      0.30     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.93      SUBAREA RUNOFF(CFS) =    2.79
  EFFECTIVE AREA(ACRES) =      4.55   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =      13.67

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     40.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   719.50  DOWNSTREAM(FEET) =   718.40
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.09
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.67
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   13.73
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.10 =    1096.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.10 TO NODE     40.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.73
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.469
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.19      0.30     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.57
  EFFECTIVE AREA(ACRES) =      4.74   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        4.7        PEAK FLOW RATE(CFS) =      14.18

****************************************************************************
  FLOW PROCESS FROM NODE     40.10 TO NODE     40.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   718.40  DOWNSTREAM(FEET) =   717.00
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.17
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.18
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   13.82
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     40.20 =    1151.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     40.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.82
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.456
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.22      0.30     0.850    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.45      0.30     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.615
  SUBAREA AREA(ACRES) =    0.67      SUBAREA RUNOFF(CFS) =    1.97
  EFFECTIVE AREA(ACRES) =      5.41   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.51
```

```
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =      16.10

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     40.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.82
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.456
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)   (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.34      0.30      0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.34      SUBAREA RUNOFF(CFS) =    1.01
  EFFECTIVE AREA(ACRES) =      5.75   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      17.11

****************************************************************************
  FLOW PROCESS FROM NODE     40.20 TO NODE     41.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   717.00  DOWNSTREAM(FEET) =   713.40
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.37
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.11
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   13.98
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.00 =    1266.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.98
  RAINFALL INTENSITY(INCH/HR) =   3.43
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.51
  EFFECTIVE STREAM AREA(ACRES) =       5.75
  TOTAL STREAM AREA(ACRES) =       5.75
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      17.11

****************************************************************************
  FLOW PROCESS FROM NODE     41.20 TO NODE     41.30 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    728.20  DOWNSTREAM(FEET) =    723.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.184
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.367
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)   (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.02      0.30      0.500    76    9.18
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.61      0.20      0.500    91    9.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.42
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      2.42

****************************************************************************
  FLOW PROCESS FROM NODE     41.30 TO NODE     41.40 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  723.30  DOWNSTREAM ELEVATION(FEET) =  718.00
  STREET LENGTH(FEET) =   323.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.85
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   11.55
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.93
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.98
  STREET FLOW TRAVEL TIME(MIN.) =   1.84   Tc(MIN.) =   11.02
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.934
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)   (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.72      0.30      0.400    76
```

```
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.11      0.20     0.400    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.83      SUBAREA RUNOFF(CFS) =    2.85
  EFFECTIVE AREA(ACRES) =      1.46    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       5.03

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  12.97
  FLOW VELOCITY(FEET/SEC.) =  3.10   DEPTH*VELOCITY(FT*FT/SEC.) =   1.12
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.40 =     653.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.40 TO NODE     41.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.02
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.934
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        1.24      0.30     0.400    76
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.03      0.20     0.400    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.27      SUBAREA RUNOFF(CFS) =    4.36
  EFFECTIVE AREA(ACRES) =      2.73    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =        2.7        PEAK FLOW RATE(CFS) =       9.39

****************************************************************************
  FLOW PROCESS FROM NODE     41.40 TO NODE     41.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   718.00  DOWNSTREAM(FEET) =   717.00
  FLOW LENGTH(FEET) =    62.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.84
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.39
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   11.15
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.50 =     715.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.50 TO NODE     41.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.15
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.907
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.09      0.30     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.31
  EFFECTIVE AREA(ACRES) =      2.82   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        2.8        PEAK FLOW RATE(CFS) =       9.64

****************************************************************************
  FLOW PROCESS FROM NODE     41.50 TO NODE     41.51 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   717.00  DOWNSTREAM(FEET) =   715.50
  FLOW LENGTH(FEET) =   154.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.35
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.64
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   11.56
  LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.51 =     869.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.51 TO NODE     41.51 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.56
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.828
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.44      0.30     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.44      SUBAREA RUNOFF(CFS) =    4.77
  EFFECTIVE AREA(ACRES) =      4.26   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =        4.3        PEAK FLOW RATE(CFS) =      14.20

****************************************************************************
  FLOW PROCESS FROM NODE     41.51 TO NODE     41.60 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =   715.50  DOWNSTREAM(FEET) =   714.90
 FLOW LENGTH(FEET) =    59.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.16
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      14.20
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   11.69
 LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.60 =     928.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     41.60 TO NODE     41.60 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.69
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.803
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        1.06      0.30      0.500    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =     1.06      SUBAREA RUNOFF(CFS) =     3.48
 EFFECTIVE AREA(ACRES) =      5.32   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.45
 TOTAL AREA(ACRES) =        5.3       PEAK FLOW RATE(CFS) =      17.59

****************************************************************************
 FLOW PROCESS FROM NODE     41.60 TO NODE     41.60 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.69
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.803
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        0.47      0.30      0.400    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.47      SUBAREA RUNOFF(CFS) =     1.56
 EFFECTIVE AREA(ACRES) =      5.79   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.45
 TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      19.15

****************************************************************************
 FLOW PROCESS FROM NODE     41.60 TO NODE     41.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   714.90  DOWNSTREAM(FEET) =   713.40
 FLOW LENGTH(FEET) =   148.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.77
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      19.15
 PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   12.01
 LONGEST FLOWPATH FROM NODE     41.20 TO NODE     41.00 =    1076.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   12.01
 RAINFALL INTENSITY(INCH/HR) =   3.74
 AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.29
 AREA-AVERAGED Ap =  0.45
 EFFECTIVE STREAM AREA(ACRES) =       5.79
 TOTAL STREAM AREA(ACRES) =       5.79
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      19.15

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1       17.11   13.98    3.432  0.29( 0.15) 0.51        5.8       38.00
     2       19.15   12.01    3.745  0.29( 0.13) 0.45        5.8       41.20

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1       35.24   12.01    3.745  0.29( 0.14) 0.48       10.7       41.20
     2       34.60   13.98    3.432  0.29( 0.14) 0.48       11.5       38.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      35.24    Tc(MIN.) =    12.01
 EFFECTIVE AREA(ACRES) =      10.73   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =       11.5
 LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.00 =    1266.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     41.00 TO NODE     41.80 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   713.40  DOWNSTREAM(FEET) =   712.60
```

```
  FLOW LENGTH(FEET) =    83.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.83
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      35.24
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   12.17
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.80 =    1349.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.17
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.717
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.27      0.30      0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.13      0.20      0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.29
  EFFECTIVE AREA(ACRES) =    11.13   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =      11.9       PEAK FLOW RATE(CFS) =      35.84

****************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.17
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.717
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.21      0.30      0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.01      0.20      0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.22      SUBAREA RUNOFF(CFS) =    0.71
  EFFECTIVE AREA(ACRES) =    11.35   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =      12.2       PEAK FLOW RATE(CFS) =      36.55

****************************************************************************
  FLOW PROCESS FROM NODE     41.80 TO NODE     41.90 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.60  DOWNSTREAM(FEET) =   711.80
  FLOW LENGTH(FEET) =    77.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.17
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      36.55
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   12.31
  LONGEST FLOWPATH FROM NODE     38.00 TO NODE     41.90 =    1426.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.31
  RAINFALL INTENSITY(INCH/HR) =   3.69
  AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.48
  EFFECTIVE STREAM AREA(ACRES) =      11.35
  TOTAL STREAM AREA(ACRES) =      12.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      36.55

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =  22
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    77.00
  USER SPECIFIED Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.06      0.20      0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =      0.06   PEAK FLOW RATE(CFS) =      0.33

****************************************************************************
  FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.00
```

```
 RAINFALL INTENSITY(INCH/HR) =   6.19
 AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       0.06
 TOTAL STREAM AREA(ACRES) =       0.06
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.33

****************************************************************************
 FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =  22
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =  7700.00
 USER SPECIFIED Tc(MIN.) =    5.000
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        D        0.06      0.20      0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA RUNOFF(CFS) =      0.33
 TOTAL AREA(ACRES) =      0.06   PEAK FLOW RATE(CFS) =      0.33

****************************************************************************
 FLOW PROCESS FROM NODE     41.90 TO NODE     41.90 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =    5.00
 RAINFALL INTENSITY(INCH/HR) =   6.19
 AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       0.06
 TOTAL STREAM AREA(ACRES) =       0.06
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.33

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       36.55   12.31    3.693  0.29( 0.14) 0.48      11.3      41.20
     1       35.80   14.28    3.391  0.29( 0.14) 0.48      12.2      38.00
     2        0.33    5.00    6.187  0.20( 0.10) 0.50       0.1      41.90
     3        0.33    5.00    6.187  0.20( 0.10) 0.50       0.1      41.90

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       25.93    5.00    6.187  0.29( 0.14) 0.48       4.7      41.90
     2       25.93    5.00    6.187  0.29( 0.14) 0.48       4.7      41.90
     3       36.94   12.31    3.693  0.29( 0.14) 0.48      11.5      41.20
     4       36.15   14.28    3.391  0.29( 0.14) 0.48      12.3      38.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      36.94    Tc(MIN.) =    12.31
 EFFECTIVE AREA(ACRES) =      11.47   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =      12.3
 LONGEST FLOWPATH FROM NODE     41.90 TO NODE     41.90 =    7700.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     41.90 TO NODE     46.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   711.80  DOWNSTREAM(FEET) =   710.50
 FLOW LENGTH(FEET) =   132.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.96
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      36.94
 PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   12.55
 LONGEST FLOWPATH FROM NODE     41.90 TO NODE     46.00 =    7832.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     46.00 TO NODE     46.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.55
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.651
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.21      0.30      0.100    76
 COMMERCIAL                 D        0.29      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    1.63
 EFFECTIVE AREA(ACRES) =     11.97   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =      12.8       PEAK FLOW RATE(CFS) =      37.89

****************************************************************************
 FLOW PROCESS FROM NODE     46.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.50  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =    68.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.16
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      37.89
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   12.68
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     34.00 =    7900.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       27.68    5.40    5.921  0.29( 0.13) 0.44       5.2      41.90
      2       27.68    5.40    5.921  0.29( 0.13) 0.44       5.2      41.90
      3       37.89   12.68    3.631  0.29( 0.13) 0.46      12.0      41.20
      4       37.08   14.65    3.342  0.29( 0.13) 0.47      12.8      38.00
  LONGEST FLOWPATH FROM NODE     41.90 TO NODE     34.00 =    7900.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      390.38    6.15    5.497  0.27( 0.06) 0.22      75.2      30.20
      2      622.15   17.47    3.022  0.27( 0.06) 0.23     228.3       1.00
      3      608.52   18.24    2.948  0.27( 0.06) 0.23     229.3       8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      397.30    5.40    5.921  0.27( 0.06) 0.24      71.3      41.90
      2      397.30    5.40    5.921  0.27( 0.06) 0.24      71.3      41.90
      3      419.10    6.15    5.497  0.27( 0.06) 0.24      81.2      30.20
      4      561.99   12.68    3.631  0.27( 0.06) 0.24     175.5      41.20
      5      601.60   14.65    3.342  0.27( 0.06) 0.24     203.0      38.00
      6      655.53   17.47    3.022  0.27( 0.06) 0.24     241.1       1.00
      7      641.04   18.24    2.948  0.27( 0.06) 0.24     242.1       8.00
    TOTAL AREA(ACRES) =       242.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      655.53  Tc(MIN.) =   17.465
  EFFECTIVE AREA(ACRES) =    241.07  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      242.1
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     34.00 =   10189.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     56.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   703.70
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  48.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  34.92
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     655.53
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   17.52
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.52
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.016
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.23      0.30      0.100    76
  COMMERCIAL                  D        0.51      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.74      SUBAREA RUNOFF(CFS) =    1.99
  EFFECTIVE AREA(ACRES) =    241.81   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      242.8       PEAK FLOW RATE(CFS) =     655.53
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     32.20 TO NODE     32.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    745.00  DOWNSTREAM(FEET) =    742.00
```

```
 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.917
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.755
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  B        0.11      0.30      0.100    76    7.92
 COMMERCIAL                  C        0.26      0.25      0.100    86    7.92
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      1.57
 TOTAL AREA(ACRES) =      0.37   PEAK FLOW RATE(CFS) =      1.57

****************************************************************************
 FLOW PROCESS FROM NODE     32.10 TO NODE     32.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  742.00  DOWNSTREAM ELEVATION(FEET) =  740.00
 STREET LENGTH(FEET) =    96.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.82
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.27
   HALFSTREET FLOOD WIDTH(FEET) =    7.84
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.70
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.73
 STREET FLOW TRAVEL TIME(MIN.) =   0.59   Tc(MIN.) =    8.51
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.562
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.06      0.30      0.100    76
 COMMERCIAL                  C        0.06      0.25      0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.12      SUBAREA RUNOFF(CFS) =    0.49
 EFFECTIVE AREA(ACRES) =      0.49    AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       2.00

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   8.19
 FLOW VELOCITY(FEET/SEC.) =  2.76   DEPTH*VELOCITY(FT*FT/SEC.) =   0.76
 LONGEST FLOWPATH FROM NODE     32.20 TO NODE     32.00 =     426.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    724.60  DOWNSTREAM(FEET) =    723.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.167
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.717
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 SCHOOL                      B        0.33      0.30      0.600    76   12.17
 SCHOOL                      C        0.85      0.25      0.600    86   12.17
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA RUNOFF(CFS) =      3.78
 TOTAL AREA(ACRES) =      1.18   PEAK FLOW RATE(CFS) =      3.78

****************************************************************************
 FLOW PROCESS FROM NODE     52.00 TO NODE     53.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  723.00  DOWNSTREAM ELEVATION(FEET) =  719.00
 STREET LENGTH(FEET) =   412.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.44
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.45
   HALFSTREET FLOOD WIDTH(FEET) =   17.75
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.88
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.28
 STREET FLOW TRAVEL TIME(MIN.) =   2.39   Tc(MIN.) =   14.55
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.354
 SUBAREA LOSS RATE DATA(AMC III):
```

```
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
SCHOOL                      B        2.48      0.30      0.600    76
SCHOOL                      C        0.77      0.25      0.600    86
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    9.31
EFFECTIVE AREA(ACRES) =      4.43    AREA-AVERAGED Fm(INCH/HR) =  0.17
AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.60
TOTAL AREA(ACRES) =        4.4        PEAK FLOW RATE(CFS) =      12.70

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
FLOW VELOCITY(FEET/SEC.) =  2.91   DEPTH*VELOCITY(FT*FT/SEC.) =   1.31
LONGEST FLOWPATH FROM NODE     51.00 TO NODE     53.00 =     742.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     53.00 TO NODE     54.00 IS CODE =  62
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) =  719.00  DOWNSTREAM ELEVATION(FEET) =  712.50
STREET LENGTH(FEET) =   633.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.018
OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.73
  ***STREET FLOW SPLITS OVER STREET-CROWN***
  FULL DEPTH(FEET) =    0.45   FLOOD WIDTH(FEET) =   18.00
  FULL HALF-STREET VELOCITY(FEET/SEC.) =    3.00
  SPLIT DEPTH(FEET) =    0.42   SPLIT FLOOD WIDTH(FEET) =   16.02
  SPLIT FLOW(CFS) =    6.70   SPLIT VELOCITY(FEET/SEC.) =    2.78
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.45
  HALFSTREET FLOOD WIDTH(FEET) =   18.00
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.00
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.35
STREET FLOW TRAVEL TIME(MIN.) =   3.52   Tc(MIN.) =   18.08
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.963
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
SCHOOL                      B        2.42      0.30      0.600    76
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
SUBAREA AREA(ACRES) =    2.42      SUBAREA RUNOFF(CFS) =    6.06
EFFECTIVE AREA(ACRES) =      6.85    AREA-AVERAGED Fm(INCH/HR) =  0.17
AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.60
TOTAL AREA(ACRES) =        6.9        PEAK FLOW RATE(CFS) =      17.20

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
FLOW VELOCITY(FEET/SEC.) =  3.00   DEPTH*VELOCITY(FT*FT/SEC.) =   1.35
LONGEST FLOWPATH FROM NODE     51.00 TO NODE     54.00 =    1375.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   18.08
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.963
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  B        0.32      0.30      0.100    76
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
SUBAREA AREA(ACRES) =    0.32      SUBAREA RUNOFF(CFS) =    0.84
EFFECTIVE AREA(ACRES) =      7.17   AREA-AVERAGED Fm(INCH/HR) =  0.17
AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.58
TOTAL AREA(ACRES) =        7.2        PEAK FLOW RATE(CFS) =      18.04

****************************************************************************
FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   18.08
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.963
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
SCHOOL                      B        2.40      0.30      0.600    76
SCHOOL                      C        0.07      0.25      0.600    86
SCHOOL                      D        2.82      0.20      0.600    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
SUBAREA AREA(ACRES) =    5.29      SUBAREA RUNOFF(CFS) =   13.40
EFFECTIVE AREA(ACRES) =     12.46   AREA-AVERAGED Fm(INCH/HR) =  0.16
AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.59
TOTAL AREA(ACRES) =       12.5       PEAK FLOW RATE(CFS) =      31.45

****************************************************************************
FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   18.08
```

```
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.963
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.78      0.30      0.100    76
 COMMERCIAL                  C        0.03      0.25      0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.81      SUBAREA RUNOFF(CFS) =    2.14
 EFFECTIVE AREA(ACRES) =     13.27   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.56
 TOTAL AREA(ACRES) =       13.3       PEAK FLOW RATE(CFS) =      33.58

****************************************************************************
 FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   712.50  DOWNSTREAM(FEET) =   712.30
 FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.30
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      33.58
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   18.15
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     55.00 =    1409.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   18.15
 RAINFALL INTENSITY(INCH/HR) =   2.96
 AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.27
 AREA-AVERAGED Ap =  0.56
 EFFECTIVE STREAM AREA(ACRES) =      13.27
 TOTAL STREAM AREA(ACRES) =      13.27
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      33.58

****************************************************************************
 FLOW PROCESS FROM NODE     55.10 TO NODE     55.10 IS CODE =  22
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    34.00
 USER SPECIFIED Tc(MIN.) =    5.000
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.13      0.30      0.100    76
 COMMERCIAL                  D        0.14      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      1.50
 TOTAL AREA(ACRES) =      0.27   PEAK FLOW RATE(CFS) =      1.50

****************************************************************************
 FLOW PROCESS FROM NODE     55.10 TO NODE     55.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    5.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.24      0.30      0.100    76
 COMMERCIAL                  D        0.01      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    1.39
 EFFECTIVE AREA(ACRES) =      0.52   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        0.5       PEAK FLOW RATE(CFS) =       2.88

****************************************************************************
 FLOW PROCESS FROM NODE     55.10 TO NODE     55.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   713.00  DOWNSTREAM(FEET) =   712.30
 FLOW LENGTH(FEET) =   275.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.94
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.88
 PIPE TRAVEL TIME(MIN.) =   1.56    Tc(MIN.) =    6.56
 LONGEST FLOWPATH FROM NODE     55.10 TO NODE     55.00 =     309.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.56
 RAINFALL INTENSITY(INCH/HR) =   5.30
```

```
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.27
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.52
 TOTAL STREAM AREA(ACRES) =       0.52
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.88

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       33.58   18.15    2.955  0.27( 0.15) 0.56      13.3      51.00
     2        2.88    6.56    5.297  0.27( 0.03) 0.10       0.5      55.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       25.14    6.56    5.297  0.27( 0.14) 0.51       5.3      55.10
     2       35.19   18.15    2.955  0.27( 0.15) 0.54      13.8      51.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      35.19    Tc(MIN.) =    18.15
 EFFECTIVE AREA(ACRES) =      13.79   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.54
 TOTAL AREA(ACRES) =       13.8
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     55.00 =    1409.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     55.00 TO NODE     56.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   712.30  DOWNSTREAM(FEET) =   711.00
 FLOW LENGTH(FEET) =   165.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.31
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      35.19
 PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   18.48
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.00 =    1574.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.00 TO NODE     56.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.48
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.925
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.49      0.30      0.100    76
 COMMERCIAL                 D        0.04      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.53      SUBAREA RUNOFF(CFS) =    1.38
 EFFECTIVE AREA(ACRES) =     14.32   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =       14.3       PEAK FLOW RATE(CFS) =      35.87

****************************************************************************
 FLOW PROCESS FROM NODE     56.00 TO NODE     56.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   711.00  DOWNSTREAM(FEET) =   710.10
 FLOW LENGTH(FEET) =   172.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  26.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.97
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      35.87
 PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   18.90
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     56.11 TO NODE     56.12 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    720.80  DOWNSTREAM(FEET) =    717.80

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.438
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.584
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       B        0.91      0.30      0.200    76    8.44
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA RUNOFF(CFS) =      3.71
 TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      3.71

****************************************************************************
 FLOW PROCESS FROM NODE     56.12 TO NODE     56.13 IS CODE =  62
```

```
--------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  717.80  DOWNSTREAM ELEVATION(FEET) =  713.60
  STREET LENGTH(FEET) =   486.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.56
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.42
    HALFSTREET FLOOD WIDTH(FEET) =   16.43
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.59
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.10
  STREET FLOW TRAVEL TIME(MIN.) =   3.12   Tc(MIN.) =   11.56
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.828
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        1.68      0.30      0.200    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     1.68      SUBAREA RUNOFF(CFS) =     5.70
  EFFECTIVE AREA(ACRES) =      2.59    AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        2.6        PEAK FLOW RATE(CFS) =       8.78

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  2.75   DEPTH*VELOCITY(FT*FT/SEC.) =   1.24
  LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.13 =     816.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.56
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.828
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        2.11      0.30      0.200    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     2.11      SUBAREA RUNOFF(CFS) =     7.16
  EFFECTIVE AREA(ACRES) =      4.70   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        4.7        PEAK FLOW RATE(CFS) =      15.94

****************************************************************************
  FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.56
  RAINFALL INTENSITY(INCH/HR) =   3.83
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =       4.70
  TOTAL STREAM AREA(ACRES) =       4.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      15.94

****************************************************************************
  FLOW PROCESS FROM NODE     56.14 TO NODE     56.15 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    719.20  DOWNSTREAM(FEET) =    715.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.182
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.666
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.84      0.30      0.200    76    8.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      3.48
  TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      3.48

****************************************************************************
  FLOW PROCESS FROM NODE     56.15 TO NODE     56.13 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  715.70  DOWNSTREAM ELEVATION(FEET) =  713.60
  STREET LENGTH(FEET) =   200.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00
```

```
 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.51
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.37
   HALFSTREET FLOOD WIDTH(FEET) =   13.58
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.55
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.95
 STREET FLOW TRAVEL TIME(MIN.) =   1.31   Tc(MIN.) =    9.49
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.286
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       B        0.54      0.30     0.200    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    0.54      SUBAREA RUNOFF(CFS) =    2.05
 EFFECTIVE AREA(ACRES) =      1.38    AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       5.25

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  14.39
 FLOW VELOCITY(FEET/SEC.) =  2.66   DEPTH*VELOCITY(FT*FT/SEC.) =   1.03
 LONGEST FLOWPATH FROM NODE     56.14 TO NODE     56.13 =     530.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.49
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.286
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       B        0.70      0.30     0.200    76
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       D        0.52      0.20     0.200    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    1.22      SUBAREA RUNOFF(CFS) =    4.65
 EFFECTIVE AREA(ACRES) =      2.60   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =       9.90

****************************************************************************
 FLOW PROCESS FROM NODE     56.13 TO NODE     56.13 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.49
 RAINFALL INTENSITY(INCH/HR) =   4.29
 AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.28
 AREA-AVERAGED Ap =  0.20
 EFFECTIVE STREAM AREA(ACRES) =       2.60
 TOTAL STREAM AREA(ACRES) =       2.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.90

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       15.94   11.56    3.828  0.30( 0.06) 0.20       4.7      56.11
     2        9.90    9.49    4.286  0.28( 0.06) 0.20       2.6      56.14

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       24.57    9.49    4.286  0.29( 0.06) 0.20       6.5      56.14
     2       24.76   11.56    3.828  0.29( 0.06) 0.20       7.3      56.11

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      24.76    Tc(MIN.) =    11.56
 EFFECTIVE AREA(ACRES) =       7.30   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        7.3
 LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.13 =     816.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.13 TO NODE     56.16 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   713.60  DOWNSTREAM(FEET) =   712.50
 FLOW LENGTH(FEET) =    94.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.84
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      24.76
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   11.74
```

```
 LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.16 =     910.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.16 TO NODE     56.16 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.74
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.795
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        B        0.46      0.30      0.200    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =     0.46      SUBAREA RUNOFF(CFS) =     1.55
 EFFECTIVE AREA(ACRES) =      7.76   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =      26.09

****************************************************************************
 FLOW PROCESS FROM NODE     56.16 TO NODE     56.16 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.74
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.795
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        B        0.05      0.30      0.200    76
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        D        0.41      0.20      0.200    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =     0.46      SUBAREA RUNOFF(CFS) =     1.55
 EFFECTIVE AREA(ACRES) =      8.22   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        8.2       PEAK FLOW RATE(CFS) =      27.64

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       27.78    9.67    4.241  0.29( 0.06) 0.20       7.4      56.14
     2       27.64   11.74    3.795  0.29( 0.06) 0.20       8.2      56.11
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      27.78  Tc(MIN.) =    9.67
 AREA-AVERAGED Fm(INCH/HR) =  0.06  AREA-AVERAGED Fp(INCH/HR) =  0.29
 AREA-AVERAGED Ap =  0.20  EFFECTIVE AREA(ACRES) =       7.38

****************************************************************************
 FLOW PROCESS FROM NODE     56.16 TO NODE     56.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   712.50  DOWNSTREAM(FEET) =   710.10
 FLOW LENGTH(FEET) =    38.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.17
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      27.78
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    9.70
 LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.10 =     948.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       27.78    9.70    4.232  0.29( 0.06) 0.20       7.4      56.14
     2       27.64   11.77    3.788  0.29( 0.06) 0.20       8.2      56.11
 LONGEST FLOWPATH FROM NODE     56.11 TO NODE     56.10 =     948.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       26.32    7.37    4.956  0.27( 0.13) 0.48       5.8      55.10
     2       35.87   18.90    2.888  0.27( 0.14) 0.52      14.3      51.00
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       51.07    7.37    4.956  0.28( 0.09) 0.34      11.4      55.10
     2       56.04    9.70    4.232  0.28( 0.09) 0.34      14.9      56.14
     3       57.62   11.77    3.788  0.28( 0.10) 0.35      17.3      56.11
     4       56.85   18.90    2.888  0.27( 0.11) 0.41      22.5      51.00
   TOTAL AREA(ACRES) =        22.5

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       57.62  Tc(MIN.) =   11.774
 EFFECTIVE AREA(ACRES) =     17.30  AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.34
 TOTAL AREA(ACRES) =       22.5
 LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.10 =    1746.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.10 TO NODE     56.10 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     56.10 TO NODE     56.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.10  DOWNSTREAM(FEET) =   709.80
  FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.81
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      57.62
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   11.86
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.20 =    1790.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.20 TO NODE     56.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.86
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.772
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.39      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.39      SUBAREA RUNOFF(CFS) =    1.32
  EFFECTIVE AREA(ACRES) =     17.69   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =       22.9       PEAK FLOW RATE(CFS) =      58.55

****************************************************************************
  FLOW PROCESS FROM NODE     56.20 TO NODE     56.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   703.70
  FLOW LENGTH(FEET) =   290.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.62
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      58.55
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   12.21
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.30 =    2080.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM        Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1       51.45    7.82    4.787  0.27( 0.09) 0.33       11.8       55.10
      2       56.82   10.14    4.125  0.27( 0.09) 0.34       15.3       56.14
      3       58.55   12.21    3.709  0.27( 0.10) 0.35       17.7       56.11
      4       57.20   19.34    2.851  0.27( 0.11) 0.40       22.9       51.00
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     56.30 =    2080.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM        Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      397.30    5.46    5.882  0.27( 0.06) 0.24       72.1       41.90
      2      397.30    5.46    5.882  0.27( 0.06) 0.24       72.1       41.90
      3      419.10    6.21    5.465  0.27( 0.06) 0.24       81.9       30.20
      4      564.14   12.73    3.621  0.27( 0.06) 0.24      176.3       41.20
      5      601.60   14.71    3.334  0.27( 0.06) 0.24      203.8       38.00
      6      655.53   17.52    3.016  0.27( 0.06) 0.24      241.8        1.00
      7      641.04   18.29    2.942  0.27( 0.06) 0.24      242.8        8.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM        Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      441.59    5.46    5.882  0.27( 0.07) 0.25       80.3       41.90
      2      441.59    5.46    5.882  0.27( 0.07) 0.25       80.3       41.90
      3      465.84    6.21    5.465  0.27( 0.07) 0.25       91.3       30.20
      4      506.43    7.82    4.787  0.27( 0.07) 0.25      117.1       55.10
      5      563.35   10.14    4.125  0.27( 0.07) 0.25      154.1       56.14
      6      611.06   12.21    3.709  0.27( 0.07) 0.25      186.4       56.11
      7      622.59   12.73    3.621  0.27( 0.07) 0.25      194.3       41.20
      8      659.67   14.71    3.334  0.27( 0.07) 0.25      223.3       38.00
      9      713.07   17.52    3.016  0.27( 0.07) 0.25      263.4        1.00
     10      698.44   18.29    2.942  0.27( 0.07) 0.25      265.0        8.00
     11      677.80   19.34    2.851  0.27( 0.07) 0.25      265.7       51.00
    TOTAL AREA(ACRES) =       265.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      713.07  Tc(MIN.) =   17.520
  EFFECTIVE AREA(ACRES) =    263.40  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =      265.7
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     56.30 =   10304.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     35.10 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   703.70  DOWNSTREAM(FEET) =   703.00
  FLOW LENGTH(FEET) =    74.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  93.0 INCH PIPE IS  70.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.60
  ESTIMATED PIPE DIAMETER(INCH) =  93.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     713.07
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   17.59
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    729.10  DOWNSTREAM(FEET) =    723.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.849
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.461
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.39      0.30     0.500    76    8.85
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.52      0.20     0.500    91    8.85
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      3.55
  TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      3.55

****************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     44.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  723.20  DOWNSTREAM ELEVATION(FEET) =  714.50
  STREET LENGTH(FEET) =   493.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.63
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   11.96
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.09
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.06
  STREET FLOW TRAVEL TIME(MIN.) =   2.66   Tc(MIN.) =   11.51
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.837
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        2.25      0.30     0.500    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.79      0.20     0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.04      SUBAREA RUNOFF(CFS) =   10.12
  EFFECTIVE AREA(ACRES) =      3.95    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =      3.9         PEAK FLOW RATE(CFS) =      13.17

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  14.29
  FLOW VELOCITY(FEET/SEC.) =  3.39   DEPTH*VELOCITY(FT*FT/SEC.) =   1.30
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     44.00 =     823.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     44.00 TO NODE     45.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.50  DOWNSTREAM(FEET) =   713.50
  FLOW LENGTH(FEET) =    33.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.80
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.17
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   11.56
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.20 =     856.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     45.20 TO NODE     45.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
```

```
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.56
  RAINFALL INTENSITY(INCH/HR) =   3.83
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       3.95
  TOTAL STREAM AREA(ACRES) =       3.95
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      13.17

****************************************************************************
  FLOW PROCESS FROM NODE     45.00 TO NODE     45.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    721.00  DOWNSTREAM(FEET) =    717.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.195
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.364
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.58      0.30      0.400    76    9.20
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.06      0.20      0.400    91    9.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      2.45
  TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      2.45

****************************************************************************
  FLOW PROCESS FROM NODE     45.10 TO NODE     45.20 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  717.00  DOWNSTREAM ELEVATION(FEET) =  714.00
  STREET LENGTH(FEET) =   318.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.83
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.36
  HALFSTREET FLOOD WIDTH(FEET) =   12.97
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.36
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.85
 STREET FLOW TRAVEL TIME(MIN.) =   2.25   Tc(MIN.) =   11.44
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.850
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"       B        0.82      0.30      0.400    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =     0.82      SUBAREA RUNOFF(CFS) =     2.75
 EFFECTIVE AREA(ACRES) =      1.46    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       4.90

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  14.39
 FLOW VELOCITY(FEET/SEC.) =  2.49   DEPTH*VELOCITY(FT*FT/SEC.) =   0.96
 LONGEST FLOWPATH FROM NODE     45.00 TO NODE     45.20 =     648.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     45.20 TO NODE     45.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.44
  RAINFALL INTENSITY(INCH/HR) =   3.85
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.40
  EFFECTIVE STREAM AREA(ACRES) =       1.46
  TOTAL STREAM AREA(ACRES) =       1.46
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.90

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       13.17   11.56    3.828  0.27( 0.13) 0.50       3.9      42.00
      2        4.90   11.44    3.850  0.30( 0.12) 0.40       1.5      45.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
```

```
     1       18.02   11.44    3.850  0.27( 0.13) 0.47       5.4      45.00
     2       18.04   11.56    3.828  0.27( 0.13) 0.47       5.4      42.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      18.04    Tc(MIN.) =    11.56
  EFFECTIVE AREA(ACRES) =       5.41   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =         5.4
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.20 =     856.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     45.20 TO NODE     45.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.50  DOWNSTREAM(FEET) =   711.90
  FLOW LENGTH(FEET) =   157.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.72
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.04
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   11.90
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     45.30 =    1013.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     45.30 TO NODE     45.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.90
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.765
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.66      0.30      0.400    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    0.66      SUBAREA RUNOFF(CFS) =    2.16
  EFFECTIVE AREA(ACRES) =      6.07   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =         6.1       PEAK FLOW RATE(CFS) =      19.87

****************************************************************************
  FLOW PROCESS FROM NODE     45.30 TO NODE     45.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.90
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.765
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        1.89      0.30      0.850    76
  COMMERCIAL                 D        0.04      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.834
  SUBAREA AREA(ACRES) =    1.93      SUBAREA RUNOFF(CFS) =    6.10
  EFFECTIVE AREA(ACRES) =      8.00   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =         8.0       PEAK FLOW RATE(CFS) =      25.97

  ** PEAK FLOW RATE TABLE **
   STREAM       Q       Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1       25.99   11.78    3.786  0.28( 0.16) 0.55        8.0       45.00
      2       25.97   11.90    3.765  0.28( 0.16) 0.55        8.0       42.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      25.99  Tc(MIN.) =   11.78
  AREA-AVERAGED Fm(INCH/HR) =  0.16  AREA-AVERAGED Fp(INCH/HR) =  0.28
  AREA-AVERAGED Ap =  0.55  EFFECTIVE AREA(ACRES) =       7.96

****************************************************************************
  FLOW PROCESS FROM NODE     45.30 TO NODE     47.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   711.90  DOWNSTREAM(FEET) =   710.80
  FLOW LENGTH(FEET) =   106.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.48
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.99
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   11.99
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     47.20 =    1119.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.20 TO NODE     47.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.99
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.748
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.13      0.30      0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.13      SUBAREA RUNOFF(CFS) =    0.44
  EFFECTIVE AREA(ACRES) =      8.09   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =         8.1       PEAK FLOW RATE(CFS) =      26.16

****************************************************************************
  FLOW PROCESS FROM NODE     47.20 TO NODE     35.20 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.80  DOWNSTREAM(FEET) =   703.90
  FLOW LENGTH(FEET) =   695.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.33
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.16
  PIPE TRAVEL TIME(MIN.) =   1.39    Tc(MIN.) =   13.38
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     35.20 =    1814.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.20 TO NODE     35.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.38
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.520
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        1.02      0.30      0.850    76
  PUBLIC PARK                C        0.05      0.25      0.850    86
  PUBLIC PARK                D        2.20      0.20      0.850    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    3.27      SUBAREA RUNOFF(CFS) =    9.78
  EFFECTIVE AREA(ACRES) =     11.36   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.63
  TOTAL AREA(ACRES) =       11.4       PEAK FLOW RATE(CFS) =      34.27

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       34.27   13.38    3.520  0.26( 0.17) 0.63      11.4      45.00
      2       34.21   13.50    3.502  0.26( 0.17) 0.63      11.4      42.00
  LONGEST FLOWPATH FROM NODE     42.00 TO NODE     35.10 =    1814.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      441.59    5.54    5.837  0.27( 0.07) 0.25      80.3      41.90
      2      441.59    5.54    5.837  0.27( 0.07) 0.25      80.3      41.90
      3      465.84    6.28    5.428  0.27( 0.07) 0.25      91.3      30.20
      4      506.43    7.90    4.762  0.27( 0.07) 0.25     117.1      55.10
      5      563.35   10.21    4.109  0.27( 0.07) 0.25     154.1      56.14
      6      611.06   12.28    3.697  0.27( 0.07) 0.25     186.4      56.11
      7      622.59   12.80    3.610  0.27( 0.07) 0.25     194.3      41.20
      8      659.67   14.77    3.326  0.27( 0.07) 0.25     223.3      38.00
      9      713.07   17.59    3.010  0.27( 0.07) 0.25     263.4       1.00
     10      698.44   18.36    2.936  0.27( 0.07) 0.25     265.0       8.00
     11      677.80   19.40    2.845  0.27( 0.07) 0.25     265.7      51.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       465.57    5.54    5.837  0.27( 0.07) 0.27      85.0      41.90
      2       465.57    5.54    5.837  0.27( 0.07) 0.27      85.0      41.90
      3       491.09    6.28    5.428  0.27( 0.07) 0.27      96.6      30.20
      4       534.14    7.90    4.762  0.27( 0.07) 0.27     123.8      55.10
      5       594.10   10.21    4.109  0.27( 0.07) 0.27     162.8      56.14
      6       644.17   12.28    3.697  0.27( 0.07) 0.27     196.8      56.11
      7       656.26   12.80    3.610  0.27( 0.07) 0.27     205.2      41.20
      8       667.75   13.38    3.520  0.27( 0.07) 0.27     214.2      45.00
      9       669.89   13.50    3.502  0.27( 0.07) 0.27     215.9      42.00
     10       692.07   14.77    3.326  0.27( 0.07) 0.27     234.7      38.00
     11       742.23   17.59    3.010  0.27( 0.07) 0.27     274.8       1.00
     12       726.84   18.36    2.936  0.27( 0.07) 0.27     276.4       8.00
     13       705.27   19.40    2.845  0.27( 0.07) 0.27     277.1      51.00
    TOTAL AREA(ACRES) =       277.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      742.23  Tc(MIN.) =   17.586
  EFFECTIVE AREA(ACRES) =    274.80  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      277.1
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     35.10 =   10378.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.10 TO NODE     35.10 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   17.59   RAINFALL INTENSITY(INCH/HR) =  3.01
  EFFECTIVE AREA(ACRES) =   112.90
  TOTAL AREA(ACRES) =   277.14        PEAK FLOW RATE(CFS) =    304.95
  AREA-AVERAGED Fm(INCH/HR) =   0.07  AREA-AVERAGED Fp(INCH/HR) =   0.27
  AREA-AVERAGED Ap =  0.27
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =   695.70
 FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  78.0 INCH PIPE IS  61.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.80
 ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     304.95
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   17.71
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     36.00 =   10453.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.71
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.998
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        0.16      0.25      0.100    86
 COMMERCIAL                  D        0.29      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.45      SUBAREA RUNOFF(CFS) =     1.21
 EFFECTIVE AREA(ACRES) =    113.35   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
 TOTAL AREA(ACRES) =      277.6       PEAK FLOW RATE(CFS) =     304.95
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE     36.00 TO NODE     37.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   695.70  DOWNSTREAM(FEET) =   695.40
 FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  78.0 INCH PIPE IS  61.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.80
 ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     304.95
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   17.82
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.00 =   10528.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.00 TO NODE     37.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   695.40  DOWNSTREAM(FEET) =   694.00
 FLOW LENGTH(FEET) =   355.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  78.0 INCH PIPE IS  62.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.73
 ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     304.95
 PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   18.37
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.10 =   10883.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.10 TO NODE     37.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.37
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.935
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        0.68      0.25      0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.68      SUBAREA RUNOFF(CFS) =     1.78
 EFFECTIVE AREA(ACRES) =    114.03   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
 TOTAL AREA(ACRES) =      278.3       PEAK FLOW RATE(CFS) =     304.95
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE     37.10 TO NODE     37.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.37
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.935
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        0.46      0.25      0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.46      SUBAREA RUNOFF(CFS) =     1.20
 EFFECTIVE AREA(ACRES) =    114.49   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
 TOTAL AREA(ACRES) =      278.7       PEAK FLOW RATE(CFS) =     304.95
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE     37.10 TO NODE     37.20 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =   694.00  DOWNSTREAM(FEET) =   693.80
 FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  72.0 INCH PIPE IS  58.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.42
 ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     304.95
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   18.42
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     37.60 TO NODE     37.70 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    718.50  DOWNSTREAM(FEET) =    714.40

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.517
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.279
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        0.13      0.30     0.500    76    9.52
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        D        0.51      0.20     0.500    91    9.52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA RUNOFF(CFS) =      2.40
 TOTAL AREA(ACRES) =      0.64   PEAK FLOW RATE(CFS) =      2.40

****************************************************************************
 FLOW PROCESS FROM NODE     37.70 TO NODE     37.80 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  714.40  DOWNSTREAM ELEVATION(FEET) =  710.60
 STREET LENGTH(FEET) =   349.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.42
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.34
   HALFSTREET FLOOD WIDTH(FEET) =   12.06
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.41
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.83
 STREET FLOW TRAVEL TIME(MIN.) =   2.41   Tc(MIN.) =   11.93
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.759
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C        0.15      0.25     0.500    86
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        D        0.47      0.20     0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =     0.62      SUBAREA RUNOFF(CFS) =     2.04
 EFFECTIVE AREA(ACRES) =      1.26    AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =       4.14

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  12.97
 FLOW VELOCITY(FEET/SEC.) =  2.55   DEPTH*VELOCITY(FT*FT/SEC.) =   0.92
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.80 =     679.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.80 TO NODE     37.90 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   710.60  DOWNSTREAM(FEET) =   709.80
 FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.97
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.14
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   12.10
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.90 =     739.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.90 TO NODE     37.90 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.10
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.729
```

```
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C        0.21      0.25      0.500    86
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        D        0.93      0.20      0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =     1.14      SUBAREA RUNOFF(CFS) =     3.72
 EFFECTIVE AREA(ACRES) =      2.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        2.4       PEAK FLOW RATE(CFS) =       7.83

****************************************************************************
 FLOW PROCESS FROM NODE     37.90 TO NODE     37.50 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   709.80  DOWNSTREAM(FEET) =   708.00
 FLOW LENGTH(FEET) =   221.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.73
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.83
 PIPE TRAVEL TIME(MIN.) =   0.64    Tc(MIN.) =   12.74
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.50 =     960.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.50 TO NODE     37.50 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   12.74
 RAINFALL INTENSITY(INCH/HR) =   3.62
 AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.21
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       2.40
 TOTAL STREAM AREA(ACRES) =       2.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.83

****************************************************************************
 FLOW PROCESS FROM NODE     37.30 TO NODE     37.40 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    713.10  DOWNSTREAM(FEET) =    709.70
 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.880
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.188
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C        0.70      0.25      0.500    86    9.88
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA RUNOFF(CFS) =      2.56
 TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      2.56

****************************************************************************
 FLOW PROCESS FROM NODE     37.40 TO NODE     37.50 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  709.70  DOWNSTREAM ELEVATION(FEET) =  708.10
 STREET LENGTH(FEET) =   124.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.14
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.33
   HALFSTREET FLOOD WIDTH(FEET) =   11.14
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.55
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.84
 STREET FLOW TRAVEL TIME(MIN.) =   0.81   Tc(MIN.) =   10.69
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.003
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C        0.33      0.25      0.500    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.33      SUBAREA RUNOFF(CFS) =    1.15
 EFFECTIVE AREA(ACRES) =      1.03    AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        1.0       PEAK FLOW RATE(CFS) =       3.59

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  11.86
```

```
 FLOW VELOCITY(FEET/SEC.) =  2.61   DEPTH*VELOCITY(FT*FT/SEC.) =   0.89
 LONGEST FLOWPATH FROM NODE     37.30 TO NODE     37.50 =     454.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.50 TO NODE     37.50 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   10.69
 RAINFALL INTENSITY(INCH/HR) =   4.00
 AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       1.03
 TOTAL STREAM AREA(ACRES) =       1.03
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.59

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        7.83   12.74    3.620  0.21( 0.11) 0.50       2.4      37.60
     2        3.59   10.69    4.003  0.25( 0.12) 0.50       1.0      37.30

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       10.88   10.69    4.003  0.23( 0.11) 0.50       3.0      37.30
     2       11.07   12.74    3.620  0.22( 0.11) 0.50       3.4      37.60

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      11.07    Tc(MIN.) =    12.74
 EFFECTIVE AREA(ACRES) =       3.43   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        3.4
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.50 =     960.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.50 TO NODE     37.20 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   708.00  DOWNSTREAM(FEET) =   693.80
 FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.30
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.07
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   12.85
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.20 =    1080.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       10.88   10.81    3.978  0.23( 0.11) 0.50       3.0      37.30
     2       11.07   12.85    3.602  0.22( 0.11) 0.50       3.4      37.60
 LONGEST FLOWPATH FROM NODE     37.60 TO NODE     37.20 =    1080.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      304.95   18.42    2.931  0.27( 0.07) 0.27     114.5       1.00
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      255.35   10.81    3.978  0.27( 0.07) 0.28      70.2      37.30
     2      273.84   12.85    3.602  0.27( 0.07) 0.28      83.3      37.60
     3      313.89   18.42    2.931  0.27( 0.07) 0.27     117.9       1.00
   TOTAL AREA(ACRES) =       282.2

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      313.89  Tc(MIN.) =   18.419
 EFFECTIVE AREA(ACRES) =    117.92  AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.27
 TOTAL AREA(ACRES) =      282.2
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     37.20 =   10917.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.20 TO NODE     37.20 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     37.20 TO NODE     47.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   693.80  DOWNSTREAM(FEET) =   691.30
 FLOW LENGTH(FEET) =   487.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  75.0 INCH PIPE IS  60.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.92
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     313.89
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   19.10
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     47.31 TO NODE     47.32 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    718.50  DOWNSTREAM(FEET) =    712.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.679
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.511
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.63      0.30      0.500    76    8.68
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.47
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      2.47

****************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.32 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.68
  RAINFALL INTENSITY(INCH/HR) =   4.51
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.63
  TOTAL STREAM AREA(ACRES) =       0.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.47

****************************************************************************
  FLOW PROCESS FROM NODE     47.33 TO NODE     47.32 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   282.00
  ELEVATION DATA: UPSTREAM(FEET) =    715.00  DOWNSTREAM(FEET) =    712.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.219
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.358
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.86      0.30      0.500    76    9.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      3.26
  TOTAL AREA(ACRES) =      0.86   PEAK FLOW RATE(CFS) =      3.26

****************************************************************************
  FLOW PROCESS FROM NODE     47.32 TO NODE     47.32 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.22
  RAINFALL INTENSITY(INCH/HR) =   4.36
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =       0.86
  TOTAL STREAM AREA(ACRES) =       0.86
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.26

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        2.47    8.68    4.511  0.30( 0.15) 0.50       0.6      47.31
      2        3.26    9.22    4.358  0.30( 0.15) 0.50       0.9      47.33

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        5.65    8.68    4.511  0.30( 0.15) 0.50       1.4      47.31
      2        5.64    9.22    4.358  0.30( 0.15) 0.50       1.5      47.33

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.65    Tc(MIN.) =     8.68
  EFFECTIVE AREA(ACRES) =       1.44   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.5
```

```
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.32 =     330.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.32 TO NODE     47.34 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   699.00  DOWNSTREAM(FEET) =   698.50
 FLOW LENGTH(FEET) =   102.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.40
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.65
 PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =    9.07
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.34 =     432.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.34 TO NODE     47.34 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.07
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.400
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.38      0.30     0.500    76
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.06      0.20     0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.44      SUBAREA RUNOFF(CFS) =    1.69
 EFFECTIVE AREA(ACRES) =      1.88   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        1.9       PEAK FLOW RATE(CFS) =       7.19

****************************************************************************
 FLOW PROCESS FROM NODE     47.34 TO NODE     47.35 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   698.50  DOWNSTREAM(FEET) =   697.50
 FLOW LENGTH(FEET) =   194.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.80
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.19
 PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =    9.74
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.35 =     626.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.74
 RAINFALL INTENSITY(INCH/HR) =   4.22
 AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       1.88
 TOTAL STREAM AREA(ACRES) =       1.93
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.19

****************************************************************************
 FLOW PROCESS FROM NODE     47.36 TO NODE     47.35 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   275.00
 ELEVATION DATA: UPSTREAM(FEET) =    713.50  DOWNSTREAM(FEET) =    711.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.418
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.305
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.72      0.30     0.500    76    9.42
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA RUNOFF(CFS) =      2.69
 TOTAL AREA(ACRES) =      0.72   PEAK FLOW RATE(CFS) =      2.69

****************************************************************************
 FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.42
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.305
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.66      0.30     0.500    76
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.12      0.20     0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.78      SUBAREA RUNOFF(CFS) =    2.92
```

```
 EFFECTIVE AREA(ACRES) =      1.50   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        1.5       PEAK FLOW RATE(CFS) =       5.61

****************************************************************************
 FLOW PROCESS FROM NODE     47.35 TO NODE     47.35 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.42
 RAINFALL INTENSITY(INCH/HR) =   4.30
 AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =       1.50
 TOTAL STREAM AREA(ACRES) =       1.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.61

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        7.19    9.74    4.223  0.30( 0.15) 0.50       1.9      47.31
     1        7.14   10.31    4.088  0.30( 0.15) 0.50       1.9      47.33
     2        5.61    9.42    4.305  0.29( 0.15) 0.50       1.5      47.36

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       12.71    9.42    4.305  0.29( 0.15) 0.50       3.3      47.36
     2       12.70    9.74    4.223  0.29( 0.15) 0.50       3.4      47.31
     3       12.46   10.31    4.088  0.29( 0.15) 0.50       3.4      47.33

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      12.71    Tc(MIN.) =     9.42
 EFFECTIVE AREA(ACRES) =       3.32   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        3.4
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.35 =     626.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.35 TO NODE     47.37 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   697.60  DOWNSTREAM(FEET) =   696.00
 FLOW LENGTH(FEET) =   293.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.61
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.71
 PIPE TRAVEL TIME(MIN.) =   0.87    Tc(MIN.) =   10.29
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.37 =     919.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.37 TO NODE     47.37 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.29
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.092
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        0.67      0.30      0.500    76
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        D        0.12      0.20      0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =     0.79      SUBAREA RUNOFF(CFS) =     2.81
 EFFECTIVE AREA(ACRES) =      4.11   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        4.2       PEAK FLOW RATE(CFS) =      14.59

****************************************************************************
 FLOW PROCESS FROM NODE     47.37 TO NODE     47.37 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.29
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.092
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        B        0.09      0.30      0.500    76
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        D        0.60      0.20      0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =     0.69      SUBAREA RUNOFF(CFS) =     2.47
 EFFECTIVE AREA(ACRES) =      4.80   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        4.9       PEAK FLOW RATE(CFS) =      17.06

****************************************************************************
 FLOW PROCESS FROM NODE     47.37 TO NODE     47.30 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =   695.20
 FLOW LENGTH(FEET) =   158.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.86
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      17.06
 PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =   10.74
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.30 =    1077.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.30 TO NODE     47.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.74
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.993
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.28      0.20     0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    0.98
 EFFECTIVE AREA(ACRES) =      5.08   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        5.2       PEAK FLOW RATE(CFS) =      17.62

****************************************************************************
 FLOW PROCESS FROM NODE     47.30 TO NODE     47.40 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   695.20  DOWNSTREAM(FEET) =   694.60
 FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.76
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      17.62
 PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =   11.10
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.40 =    1202.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.40 TO NODE     47.40 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.10
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.918
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        0.19      0.20     0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.65
 EFFECTIVE AREA(ACRES) =      5.27   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =      17.93

****************************************************************************
 FLOW PROCESS FROM NODE     47.40 TO NODE     47.50 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   694.60  DOWNSTREAM(FEET) =   694.40
 FLOW LENGTH(FEET) =    41.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.82
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      17.93
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   11.22
 LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.50 =    1243.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.50 TO NODE     47.50 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.22
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.894
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       B        0.05      0.30     0.500    76
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       D        1.45      0.20     0.500    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    1.50      SUBAREA RUNOFF(CFS) =    5.12
 EFFECTIVE AREA(ACRES) =      6.77   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        6.9       PEAK FLOW RATE(CFS) =      22.93

****************************************************************************
 FLOW PROCESS FROM NODE     47.50 TO NODE     47.60 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   694.40  DOWNSTREAM(FEET) =   693.50
 FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.27
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      22.93
  PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =   11.70
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.60 =    1423.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.60 TO NODE     47.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.70
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.802
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.55      0.20      0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     1.55      SUBAREA RUNOFF(CFS) =     5.16
  EFFECTIVE AREA(ACRES) =      8.32   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        8.4       PEAK FLOW RATE(CFS) =      27.54

****************************************************************************
  FLOW PROCESS FROM NODE     47.60 TO NODE     47.70 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.50  DOWNSTREAM(FEET) =   693.30
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  21.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.60
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.54
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.80
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.70 =    1463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.70 TO NODE     47.70 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.80
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.784
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.04      0.25      0.500    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        1.57      0.20      0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     1.61      SUBAREA RUNOFF(CFS) =     5.34
  EFFECTIVE AREA(ACRES) =      9.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       10.0       PEAK FLOW RATE(CFS) =      32.73

****************************************************************************
  FLOW PROCESS FROM NODE     47.70 TO NODE     47.80 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   693.30  DOWNSTREAM(FEET) =   692.50
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  25.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.59
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      32.73
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   12.23
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.80 =    1633.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.80 TO NODE     47.80 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.23
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.707
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.60      0.25      0.500    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.94      0.20      0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     1.54      SUBAREA RUNOFF(CFS) =     4.99
  EFFECTIVE AREA(ACRES) =     11.47   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       11.6       PEAK FLOW RATE(CFS) =      37.03

****************************************************************************
  FLOW PROCESS FROM NODE     47.80 TO NODE     47.90 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.50  DOWNSTREAM(FEET) =   692.30
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.81
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      37.03
```

```
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   12.29
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.90 =    1663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.90 TO NODE     47.90 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.29
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.696
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        1.43      0.25      0.500    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        0.14      0.20      0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     1.57      SUBAREA RUNOFF(CFS) =     5.05
  EFFECTIVE AREA(ACRES) =     13.04   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =      41.97

****************************************************************************
  FLOW PROCESS FROM NODE     47.90 TO NODE     47.91 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.30  DOWNSTREAM(FEET) =   692.10
  FLOW LENGTH(FEET) =    44.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  29.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.88
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.97
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   12.40
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.91 =    1707.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.91 TO NODE     47.91 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.40
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.677
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        1.89      0.25      0.500    86
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        D        1.30      0.20      0.500    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     3.19      SUBAREA RUNOFF(CFS) =    10.23
  EFFECTIVE AREA(ACRES) =     16.23   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       16.3       PEAK FLOW RATE(CFS) =      51.98

****************************************************************************
  FLOW PROCESS FROM NODE     47.91 TO NODE     47.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.10  DOWNSTREAM(FEET) =   691.30
  FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  30.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.44
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      51.98
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   12.77
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.00 =    1874.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       51.98   12.77    3.615  0.24( 0.12) 0.50      16.2       47.36
      2       51.38   13.10    3.563  0.24( 0.12) 0.50      16.3       47.31
      3       50.20   13.67    3.476  0.24( 0.12) 0.50      16.3       47.33
  LONGEST FLOWPATH FROM NODE     47.31 TO NODE     47.00 =    1874.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      255.35   11.53    3.834  0.27( 0.07) 0.28      70.2       37.30
      2      273.84   13.56    3.494  0.27( 0.07) 0.28      83.3       37.60
      3      313.89   19.10    2.871  0.27( 0.07) 0.27     117.9        1.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      305.20   11.53    3.834  0.26( 0.08) 0.32      84.9       37.30
      2      318.67   12.77    3.615  0.26( 0.08) 0.32      94.5       47.36
      3      321.04   13.10    3.563  0.26( 0.08) 0.31      96.7       47.31
      4      324.28   13.56    3.494  0.26( 0.08) 0.31      99.7       37.60
      5      324.90   13.67    3.476  0.26( 0.08) 0.31     100.4       47.33
      6      355.04   19.10    2.871  0.26( 0.08) 0.30     134.3        1.00
    TOTAL AREA(ACRES) =       298.5
```

```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      355.04  Tc(MIN.) =   19.099
 EFFECTIVE AREA(ACRES) =    134.26  AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.30
 TOTAL AREA(ACRES) =      298.5
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     47.00 =   11404.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     47.00 TO NODE     48.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   691.30  DOWNSTREAM(FEET) =   691.10
 FLOW LENGTH(FEET) =    61.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  87.0 INCH PIPE IS  66.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.49
 ESTIMATED PIPE DIAMETER(INCH) =  87.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     355.04
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   19.20
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     48.60 TO NODE     48.61 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
 ELEVATION DATA: UPSTREAM(FEET) =    712.40  DOWNSTREAM(FEET) =    707.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.660
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.517
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      B        0.05      0.30      0.400    76    8.66
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      C        0.02      0.25      0.400    86    8.66
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      D        0.69      0.20      0.400    91    8.66
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA RUNOFF(CFS) =      3.03
 TOTAL AREA(ACRES) =      0.76   PEAK FLOW RATE(CFS) =      3.03

****************************************************************************
 FLOW PROCESS FROM NODE     48.61 TO NODE     48.70 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  707.00  DOWNSTREAM ELEVATION(FEET) =  698.80
 STREET LENGTH(FEET) =   346.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.36
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.33
   HALFSTREET FLOOD WIDTH(FEET) =   11.35
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.43
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.14
 STREET FLOW TRAVEL TIME(MIN.) =   1.68   Tc(MIN.) =   10.34
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.081
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      C        0.46      0.25      0.400    86
 RESIDENTIAL
 "8-10 DWELLINGS/ACRE"      D        0.28      0.20      0.400    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =    0.74      SUBAREA RUNOFF(CFS) =    2.66
 EFFECTIVE AREA(ACRES) =      1.50    AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.40
 TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       5.39

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  12.36
 FLOW VELOCITY(FEET/SEC.) =  3.63   DEPTH*VELOCITY(FT*FT/SEC.) =   1.27
 LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.70 =     676.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     48.70 TO NODE     48.70 IS CODE =  81
```

```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.34
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.081
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.59      0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.59      SUBAREA RUNOFF(CFS) =     2.15
  EFFECTIVE AREA(ACRES) =      2.09   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.32
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       7.54

****************************************************************************
  FLOW PROCESS FROM NODE     48.71 TO NODE     48.71 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.34
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.081
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        0.09      0.30      0.400    76
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.47      0.25      0.400    86
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.80      0.20      0.400    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =     1.36      SUBAREA RUNOFF(CFS) =     4.88
  EFFECTIVE AREA(ACRES) =      3.45   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =        3.4       PEAK FLOW RATE(CFS) =      12.43

****************************************************************************
  FLOW PROCESS FROM NODE     48.70 TO NODE     48.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   698.80  DOWNSTREAM(FEET) =   691.10
  FLOW LENGTH(FEET) =   119.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.27
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.43
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   10.48
  LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.00 =     795.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       12.43   10.48    4.049  0.22( 0.08) 0.35       3.4      48.60
  LONGEST FLOWPATH FROM NODE     48.60 TO NODE     48.00 =     795.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      305.20   11.63    3.815  0.26( 0.08) 0.32      84.9      37.30
      2      318.67   12.87    3.599  0.26( 0.08) 0.32      94.5      47.36
      3      321.04   13.20    3.548  0.26( 0.08) 0.31      96.7      47.31
      4      324.28   13.65    3.479  0.26( 0.08) 0.31      99.7      37.60
      5      324.90   13.77    3.462  0.26( 0.08) 0.31     100.4      47.33
      6      355.04   19.20    2.862  0.26( 0.08) 0.30     134.3       1.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      304.73   10.48    4.049  0.26( 0.08) 0.32      79.9      48.60
      2      316.90   11.63    3.815  0.26( 0.08) 0.32      88.3      37.30
      3      329.69   12.87    3.599  0.26( 0.08) 0.32      97.9      47.36
      4      331.90   13.20    3.548  0.26( 0.08) 0.32     100.1      47.31
      5      334.93   13.65    3.479  0.26( 0.08) 0.31     103.1      37.60
      6      335.49   13.77    3.462  0.26( 0.08) 0.31     103.9      47.33
      7      363.75   19.20    2.862  0.26( 0.08) 0.30     137.7       1.00
    TOTAL AREA(ACRES) =       302.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      363.75  Tc(MIN.) =   19.196
  EFFECTIVE AREA(ACRES) =    137.71  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      302.0
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     48.00 =   11465.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     49.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   691.10  DOWNSTREAM(FEET) =   689.20
  FLOW LENGTH(FEET) =   384.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  81.0 INCH PIPE IS  62.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.29
  ESTIMATED PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     363.75
  PIPE TRAVEL TIME(MIN.) =   0.52    Tc(MIN.) =   19.72
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     49.00 =   11849.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   19.72
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.819
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.31      0.30      0.100    76
  COMMERCIAL                  C        0.90      0.25      0.100    86
  COMMERCIAL                  D        0.12      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.33      SUBAREA RUNOFF(CFS) =    3.34
  EFFECTIVE AREA(ACRES) =    139.04   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      303.3       PEAK FLOW RATE(CFS) =     363.75
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.72
  RAINFALL INTENSITY(INCH/HR) =   2.82
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.30
  EFFECTIVE STREAM AREA(ACRES) =     139.04
  TOTAL STREAM AREA(ACRES) =     303.28
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     363.75

****************************************************************************
  FLOW PROCESS FROM NODE     61.30 TO NODE     61.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    707.30  DOWNSTREAM(FEET) =    704.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.383
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.602
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  APARTMENTS                  B        0.53      0.30      0.200    76    8.38
  APARTMENTS                  D        0.77      0.20      0.200    91    8.38
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      5.33
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      5.33

****************************************************************************
  FLOW PROCESS FROM NODE     61.20 TO NODE     61.10 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
==========================================================================
  UPSTREAM NODE ELEVATION(FEET) =    704.20
  DOWNSTREAM NODE ELEVATION(FEET) =    703.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   119.00
  "V" GUTTER WIDTH(FEET) =   1.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.10000
  MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.450
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                  B        1.30      0.30      0.200    76
  APARTMENTS                  D        0.25      0.20      0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      8.39
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.92
  AVERAGE FLOW DEPTH(FEET) =   0.47   FLOOD WIDTH(FEET) =    9.23
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.51   Tc(MIN.) =    8.89
  SUBAREA AREA(ACRES) =    1.55      SUBAREA RUNOFF(CFS) =    6.13
  EFFECTIVE AREA(ACRES) =    2.85     AREA-AVERAGED Fm(INCH/HR) =   0.05
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   0.20
  TOTAL AREA(ACRES) =        2.8         PEAK FLOW RATE(CFS) =      11.28

        ==>>ERROR:FLOW EXCEEDS CAPACITY OF CHANNEL WITH
            NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM ALLOWABLE DEPTH.
            AS AN APPROXIMATION, TRAVEL TIME CALCULATIONS ARE BASED
            ON FLOW DEPTH EQUAL TO THE SPECIFIED MAXIMUM ALLOWABLE DEPTH.


  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.50   FLOOD WIDTH(FEET) =    9.80
  FLOW VELOCITY(FEET/SEC.) =   4.68   DEPTH*VELOCITY(FT*FT/SEC) =   2.34
  LONGEST FLOWPATH FROM NODE     61.30 TO NODE     61.10 =     449.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     61.10 TO NODE     49.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  703.00  DOWNSTREAM ELEVATION(FEET) =  699.50
  STREET LENGTH(FEET) =   380.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.69
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.49   FLOOD WIDTH(FEET) =   20.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    3.04
    SPLIT DEPTH(FEET) =    0.28   SPLIT FLOOD WIDTH(FEET) =    8.25
    SPLIT FLOW(CFS) =    1.36   SPLIT VELOCITY(FEET/SEC.) =    1.86
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.49
    HALFSTREET FLOOD WIDTH(FEET) =   20.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.04
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.49
  STREET FLOW TRAVEL TIME(MIN.) =   2.08   Tc(MIN.) =   10.97
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.945
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.26      0.30      0.100    76
  COMMERCIAL                 C        0.25      0.25      0.100    86
  COMMERCIAL                 D        0.29      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    2.82
  EFFECTIVE AREA(ACRES) =      3.65    AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =      12.80

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  20.00
  FLOW VELOCITY(FEET/SEC.) =  3.04   DEPTH*VELOCITY(FT*FT/SEC.) =   1.49
  LONGEST FLOWPATH FROM NODE     61.30 TO NODE     49.00 =     829.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.97
  RAINFALL INTENSITY(INCH/HR) =   3.94
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.18
  EFFECTIVE STREAM AREA(ACRES) =       3.65
  TOTAL STREAM AREA(ACRES) =       3.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.80

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      304.73   11.02    3.933  0.26( 0.08) 0.31      81.3      48.60
      1      316.90   12.16    3.718  0.26( 0.08) 0.31      89.6      37.30
      1      329.69   13.40    3.517  0.26( 0.08) 0.31      99.3      47.36
      1      331.90   13.73    3.468  0.26( 0.08) 0.31     101.4      47.31
      1      334.93   14.19    3.404  0.26( 0.08) 0.31     104.4      37.60
      1      335.49   14.31    3.388  0.26( 0.08) 0.31     105.2      47.33
      1      363.75   19.72    2.819  0.26( 0.08) 0.30     139.0       1.00
      2       12.80   10.97    3.945  0.26( 0.05) 0.18       3.6      61.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      316.89   10.97    3.945  0.26( 0.08) 0.31      84.5      61.30
      2      317.50   11.02    3.933  0.26( 0.08) 0.31      84.9      48.60
      3      328.96   12.16    3.718  0.26( 0.08) 0.31      93.3      37.30
      4      341.08   13.40    3.517  0.26( 0.08) 0.31     102.9      47.36
      5      343.14   13.73    3.468  0.26( 0.08) 0.31     105.1      47.31
      6      345.95   14.19    3.404  0.26( 0.08) 0.31     108.1      37.60
      7      346.46   14.31    3.388  0.26( 0.08) 0.31     108.8      47.33
      8      372.86   19.72    2.819  0.26( 0.08) 0.30     142.7       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     372.86    Tc(MIN.) =    19.72
  EFFECTIVE AREA(ACRES) =     142.69   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      306.9
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     49.00 =   11849.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     49.00 TO NODE     50.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   689.20  DOWNSTREAM(FEET) =   688.90
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  81.0 INCH PIPE IS  61.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.77
  ESTIMATED PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     372.86
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   19.79
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     57.10 TO NODE     57.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    714.00  DOWNSTREAM(FEET) =    711.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.278
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.635
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  B        0.42      0.30      0.100    76    8.28
  COMMERCIAL                  D        0.08      0.20      0.100    91    8.28
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.07
  TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      2.07

****************************************************************************
  FLOW PROCESS FROM NODE     57.20 TO NODE     57.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  711.60  DOWNSTREAM ELEVATION(FEET) =  709.00
  STREET LENGTH(FEET) =   130.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.29
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    8.81
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.81
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.81
  STREET FLOW TRAVEL TIME(MIN.) =   0.77   Tc(MIN.) =    9.05
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.405
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.11      0.30      0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.11      SUBAREA RUNOFF(CFS) =    0.43
  EFFECTIVE AREA(ACRES) =      0.61    AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       2.40

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   9.01
  FLOW VELOCITY(FEET/SEC.) =  2.84   DEPTH*VELOCITY(FT*FT/SEC.) =   0.82
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     57.00 =     460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.05
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.405
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.29      0.30      0.100    76
  COMMERCIAL                  C        0.02      0.25      0.100    86
  COMMERCIAL                  D        0.34      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.65      SUBAREA RUNOFF(CFS) =    2.56
  EFFECTIVE AREA(ACRES) =      1.26   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       4.96

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.05
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.405
  SUBAREA LOSS RATE DATA(AMC III):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.33      0.30      0.200    76
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        0.56      0.20      0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     0.89      SUBAREA RUNOFF(CFS) =     3.49
  EFFECTIVE AREA(ACRES) =      2.15   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.14
  TOTAL AREA(ACRES) =        2.2       PEAK FLOW RATE(CFS) =       8.45

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.05
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.405
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.34      0.30      0.200    76
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        0.53      0.20      0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     0.87      SUBAREA RUNOFF(CFS) =     3.41
  EFFECTIVE AREA(ACRES) =      3.02   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.16
  TOTAL AREA(ACRES) =        3.0       PEAK FLOW RATE(CFS) =      11.87

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     58.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   709.00  DOWNSTREAM(FEET) =   702.50
  FLOW LENGTH(FEET) =   633.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.00
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.87
  PIPE TRAVEL TIME(MIN.) =   1.51    Tc(MIN.) =   10.55
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     58.00 =    1093.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.55
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.033
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        1.93      0.30      0.200    76
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        0.46      0.20      0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     2.39      SUBAREA RUNOFF(CFS) =     8.55
  EFFECTIVE AREA(ACRES) =      5.41   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =      19.41

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.55
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.033
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        1.60      0.30      0.200    76
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        0.76      0.20      0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     2.36      SUBAREA RUNOFF(CFS) =     8.45
  EFFECTIVE AREA(ACRES) =      7.77   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =      27.86

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   702.50  DOWNSTREAM(FEET) =   700.00
  FLOW LENGTH(FEET) =    67.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.75
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.86
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   10.64
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     58.10 =    1160.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     58.10 IS CODE =  81
```

```
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   10.64
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.015
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        1.94      0.30      0.200    76
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        C        0.82      0.25      0.200    86
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        4.28      0.20      0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     7.04      SUBAREA RUNOFF(CFS) =   25.14
  EFFECTIVE AREA(ACRES) =     14.81   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       14.8       PEAK FLOW RATE(CFS) =      52.88

************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     58.10 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   10.64
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.015
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        C        3.80      0.25      0.200    86
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        D        2.64      0.20      0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     6.44      SUBAREA RUNOFF(CFS) =   23.00
  EFFECTIVE AREA(ACRES) =     21.25   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       21.2       PEAK FLOW RATE(CFS) =      75.88

************************************************************************
  FLOW PROCESS FROM NODE     58.10 TO NODE     59.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   700.00  DOWNSTREAM(FEET) =   699.50
  FLOW LENGTH(FEET) =   139.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.39
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      75.88
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =   10.95
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.00 =    1299.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   10.95
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.949
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.44      0.30      0.100    76
  COMMERCIAL                  D        0.18      0.20      0.100    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.62      SUBAREA RUNOFF(CFS) =    2.19
  EFFECTIVE AREA(ACRES) =     21.87   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =       21.9       PEAK FLOW RATE(CFS) =      76.80

************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.10 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.50  DOWNSTREAM(FEET) =   699.10
  FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.54
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      76.80
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.05
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.10 =    1355.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     59.10 TO NODE     59.10 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.05
  RAINFALL INTENSITY(INCH/HR) =   3.93
  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  0.19
  EFFECTIVE STREAM AREA(ACRES) =      21.87
  TOTAL STREAM AREA(ACRES) =      21.87
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      76.80

************************************************************************
```

```
 FLOW PROCESS FROM NODE     50.10 TO NODE     50.10 IS CODE =  22
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>>>>USE SPECIFIED Tc VALUE FOR INITIAL SUBAREA<<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    83.00
 USER SPECIFIED Tc(MIN.) =    5.000
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.01      0.30      0.100    76
 COMMERCIAL                  C        0.06      0.25      0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      0.39
 TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.39

****************************************************************************
 FLOW PROCESS FROM NODE     50.10 TO NODE     50.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    5.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.187
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        0.08      0.30      0.100    76
 COMMERCIAL                  C        0.01      0.25      0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.50
 EFFECTIVE AREA(ACRES) =      0.16   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        0.2       PEAK FLOW RATE(CFS) =       0.89

****************************************************************************
 FLOW PROCESS FROM NODE     50.10 TO NODE     59.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   713.00  DOWNSTREAM(FEET) =   699.10
 FLOW LENGTH(FEET) =   481.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.05
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.89
 PIPE TRAVEL TIME(MIN.) =   1.59    Tc(MIN.) =    6.59
 LONGEST FLOWPATH FROM NODE     50.10 TO NODE     59.10 =     564.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     59.10 TO NODE     59.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.59
 RAINFALL INTENSITY(INCH/HR) =   5.28
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.28
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.16
 TOTAL STREAM AREA(ACRES) =       0.16
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.89

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       76.80   11.05     3.929  0.24( 0.05) 0.19      21.9      57.10
     2        0.89    6.59     5.283  0.28( 0.03) 0.10       0.2      50.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       62.67    6.59     5.283  0.24( 0.05) 0.19      13.2      50.10
     2       77.46   11.05     3.929  0.24( 0.05) 0.19      22.0      57.10

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      77.46    Tc(MIN.) =    11.05
 EFFECTIVE AREA(ACRES) =      22.03   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.19
 TOTAL AREA(ACRES) =      22.0
 LONGEST FLOWPATH FROM NODE     57.10 TO NODE     59.10 =    1355.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     59.10 TO NODE     50.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   699.10  DOWNSTREAM(FEET) =   688.90
 FLOW LENGTH(FEET) =    28.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  42.37
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      77.46
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.06
 LONGEST FLOWPATH FROM NODE     57.10 TO NODE     50.00 =    1383.00 FEET.

****************************************************************************
```

```
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       62.67    6.60    5.278  0.24( 0.05) 0.19      13.2      50.10
      2       77.46   11.06    3.926  0.24( 0.05) 0.19      22.0      57.10
  LONGEST FLOWPATH FROM NODE     57.10 TO NODE     50.00 =    1383.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      316.89   11.05    3.929  0.26( 0.08) 0.31      84.5      61.30
      2      317.50   11.10    3.917  0.26( 0.08) 0.31      84.9      48.60
      3      328.96   12.24    3.705  0.26( 0.08) 0.31      93.3      37.30
      4      341.08   13.48    3.505  0.26( 0.08) 0.31     102.9      47.36
      5      343.14   13.80    3.458  0.26( 0.08) 0.31     105.1      47.31
      6      345.95   14.26    3.394  0.26( 0.08) 0.31     108.1      37.60
      7      346.46   14.38    3.377  0.26( 0.08) 0.31     108.8      47.33
      8      372.86   19.79    2.813  0.26( 0.08) 0.30     142.7       1.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      318.32    6.60    5.278  0.25( 0.07) 0.28      63.7      50.10
      2      394.31   11.05    3.929  0.25( 0.07) 0.28     106.5      61.30
      3      394.49   11.06    3.926  0.25( 0.07) 0.28     106.6      57.10
      4      394.78   11.10    3.917  0.25( 0.07) 0.28     106.9      48.60
      5      401.99   12.24    3.705  0.26( 0.07) 0.29     115.3      37.30
      6      410.14   13.48    3.505  0.26( 0.07) 0.29     124.9      47.36
      7      411.25   13.80    3.458  0.26( 0.07) 0.29     127.1      47.31
      8      412.78   14.26    3.394  0.26( 0.07) 0.29     130.1      37.60
      9      412.97   14.38    3.377  0.26( 0.07) 0.29     130.9      47.33
     10      428.09   19.79    2.813  0.26( 0.07) 0.28     164.7       1.00
    TOTAL AREA(ACRES) =       329.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      428.09  Tc(MIN.) =   19.790
  EFFECTIVE AREA(ACRES) =    164.72  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =      329.0
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     50.00 =   11905.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     50.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
```

```
  FLOW PROCESS FROM NODE     50.00 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   688.90  DOWNSTREAM(FEET) =   675.00
  FLOW LENGTH(FEET) =   437.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  47.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.57
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     428.09
  PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =   20.07
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     61.00 =   12342.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   20.07
  RAINFALL INTENSITY(INCH/HR) =   2.79
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.28
  EFFECTIVE STREAM AREA(ACRES) =     164.72
  TOTAL STREAM AREA(ACRES) =     328.96
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     428.09

****************************************************************************
  FLOW PROCESS FROM NODE     48.10 TO NODE     48.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    712.40  DOWNSTREAM(FEET) =    709.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.947
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.172
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       B        0.15      0.30      0.400    76    9.95
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"       D        0.34      0.20      0.400    91    9.95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      1.80
  TOTAL AREA(ACRES) =      0.49   PEAK FLOW RATE(CFS) =      1.80
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     48.20 TO NODE     48.30 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  709.70  DOWNSTREAM ELEVATION(FEET) =  703.80
  STREET LENGTH(FEET) =   500.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.86
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   12.46
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.56
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.90
  STREET FLOW TRAVEL TIME(MIN.) =   3.25   Tc(MIN.) =   13.20
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.547
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.64      0.25     0.400    86
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.68      0.20     0.400    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.32      SUBAREA RUNOFF(CFS) =    4.11
  EFFECTIVE AREA(ACRES) =      1.81    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        1.8        PEAK FLOW RATE(CFS) =       5.63

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  14.50
  FLOW VELOCITY(FEET/SEC.) =  2.82   DEPTH*VELOCITY(FT*FT/SEC.) =   1.10
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.30 =     830.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.30 TO NODE     48.40 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  703.80  DOWNSTREAM ELEVATION(FEET) =  700.20
  STREET LENGTH(FEET) =   522.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.85
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.45   FLOOD WIDTH(FEET) =   18.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    2.45
    SPLIT DEPTH(FEET) =    0.22   SPLIT FLOOD WIDTH(FEET) =    4.95
    SPLIT FLOW(CFS) =    0.45   SPLIT VELOCITY(FEET/SEC.) =    1.33
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   18.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.45
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.11
  STREET FLOW TRAVEL TIME(MIN.) =   3.54   Tc(MIN.) =   16.75
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.095
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      C        0.93      0.25     0.400    86
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      D        0.71      0.20     0.400    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.64      SUBAREA RUNOFF(CFS) =    4.43
  EFFECTIVE AREA(ACRES) =      3.45    AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        3.4        PEAK FLOW RATE(CFS) =       9.33

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  2.45   DEPTH*VELOCITY(FT*FT/SEC.) =   1.11
  LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.40 =    1352.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.40 TO NODE     48.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.75
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.095
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
```

```
"8-10 DWELLINGS/ACRE"      C        0.44      0.25      0.400    86
RESIDENTIAL
"8-10 DWELLINGS/ACRE"      D        0.46      0.20      0.400    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    2.43
EFFECTIVE AREA(ACRES) =      4.35   AREA-AVERAGED Fm(INCH/HR) =  0.09
AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.40
TOTAL AREA(ACRES) =        4.3       PEAK FLOW RATE(CFS) =      11.76

****************************************************************************
FLOW PROCESS FROM NODE     48.40 TO NODE     48.50 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   700.20  DOWNSTREAM(FEET) =   699.80
FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   5.33
ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      11.76
PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   17.00
LONGEST FLOWPATH FROM NODE     48.10 TO NODE     48.50 =    1432.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     48.50 TO NODE     48.50 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   17.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.069
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"8-10 DWELLINGS/ACRE"      B        0.16      0.30      0.400    76
RESIDENTIAL
"8-10 DWELLINGS/ACRE"      C        1.49      0.25      0.400    86
PUBLIC PARK                C        0.26      0.25      0.850    86
RESIDENTIAL
"8-10 DWELLINGS/ACRE"      D        0.88      0.20      0.400    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.442
SUBAREA AREA(ACRES) =    2.79      SUBAREA RUNOFF(CFS) =    7.44
EFFECTIVE AREA(ACRES) =      7.14   AREA-AVERAGED Fm(INCH/HR) =  0.10
AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.42
TOTAL AREA(ACRES) =        7.1       PEAK FLOW RATE(CFS) =      19.10

****************************************************************************
FLOW PROCESS FROM NODE     48.50 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   699.80  DOWNSTREAM(FEET) =   675.00
FLOW LENGTH(FEET) =   425.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  15.11
ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      19.10
PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   17.46
LONGEST FLOWPATH FROM NODE     48.10 TO NODE     61.00 =    1857.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   17.46
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.022
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
PUBLIC PARK                B        1.98      0.30      0.850    76
PUBLIC PARK                D        1.67      0.20      0.850    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
SUBAREA AREA(ACRES) =    3.65      SUBAREA RUNOFF(CFS) =    9.22
EFFECTIVE AREA(ACRES) =     10.79   AREA-AVERAGED Fm(INCH/HR) =  0.14
AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.56
TOTAL AREA(ACRES) =       10.8       PEAK FLOW RATE(CFS) =      28.02

****************************************************************************
FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =   17.46
RAINFALL INTENSITY(INCH/HR) =   3.02
AREA-AVERAGED Fm(INCH/HR) =  0.14
AREA-AVERAGED Fp(INCH/HR) =  0.24
AREA-AVERAGED Ap =  0.56
EFFECTIVE STREAM AREA(ACRES) =     10.79
TOTAL STREAM AREA(ACRES) =     10.79
PEAK FLOW RATE(CFS) AT CONFLUENCE =      28.02

** CONFLUENCE DATA **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1      318.32    6.90    5.143  0.25( 0.07) 0.28      63.7      50.10
    1      394.31   11.33    3.872  0.25( 0.07) 0.28     106.5      61.30
    1      394.49   11.35    3.869  0.25( 0.07) 0.28     106.6      57.10
    1      394.78   11.39    3.861  0.25( 0.07) 0.28     106.9      48.60
    1      401.99   12.53    3.656  0.26( 0.07) 0.29     115.3      37.30
```

```
     1      410.14   13.76    3.463  0.26( 0.07) 0.29      124.9       47.36
     1      411.25   14.09    3.417  0.26( 0.07) 0.29      127.1       47.31
     1      412.78   14.55    3.355  0.26( 0.07) 0.29      130.1       37.60
     1      412.97   14.67    3.340  0.26( 0.07) 0.29      130.9       47.33
     1      428.09   20.07    2.790  0.26( 0.07) 0.28      164.7        1.00
     2       28.02   17.46    3.022  0.24( 0.14) 0.56       10.8       48.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      337.54    6.90    5.143  0.25( 0.08) 0.30       67.9       50.10
      2      417.84   11.33    3.872  0.25( 0.08) 0.30      113.5       61.30
      3      418.03   11.35    3.869  0.25( 0.08) 0.30      113.6       57.10
      4      418.36   11.39    3.861  0.25( 0.08) 0.30      114.0       48.60
      5      426.50   12.53    3.656  0.25( 0.08) 0.30      123.1       37.30
      6      435.60   13.76    3.463  0.25( 0.08) 0.31      133.5       47.36
      7      436.95   14.09    3.417  0.25( 0.08) 0.31      135.8       47.31
      8      438.81   14.55    3.355  0.25( 0.08) 0.31      139.1       37.60
      9      439.09   14.67    3.340  0.25( 0.08) 0.31      139.9       47.33
     10      448.80   17.46    3.022  0.26( 0.08) 0.30      159.2       48.10
     11      453.85   20.07    2.790  0.26( 0.08) 0.30      175.5        1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     453.85    Tc(MIN.) =    20.07
  EFFECTIVE AREA(ACRES) =     175.51   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =      339.8
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     61.00 =   12342.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      339.8  TC(MIN.) =     20.07
  EFFECTIVE AREA(ACRES) =    175.51  AREA-AVERAGED Fm(INCH/HR)=  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap = 0.301
  PEAK FLOW RATE(CFS)   =     453.85

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      337.54    6.90    5.143  0.25( 0.08) 0.30       67.9       50.10
      2      417.84   11.33    3.872  0.25( 0.08) 0.30      113.5       61.30
      3      418.03   11.35    3.869  0.25( 0.08) 0.30      113.6       57.10
      4      418.36   11.39    3.861  0.25( 0.08) 0.30      114.0       48.60
      5      426.50   12.53    3.656  0.25( 0.08) 0.30      123.1       37.30
      6      435.60   13.76    3.463  0.25( 0.08) 0.31      133.5       47.36
      7      436.95   14.09    3.417  0.25( 0.08) 0.31      135.8       47.31
      8      438.81   14.55    3.355  0.25( 0.08) 0.31      139.1       37.60
      9      439.09   14.67    3.340  0.25( 0.08) 0.31      139.9       47.33
     10      448.80   17.46    3.022  0.26( 0.08) 0.30      159.2       48.10
     11      453.85   20.07    2.790  0.26( 0.08) 0.30      175.5        1.00
============================================================================
============================================================================
```

END OF RATIONAL METHOD ANALYSIS

APPENDIX C
Flood Routing Calculations

- Area-Averaged Loss Rate and Low Loss Fraction Estimations
- Storage Volume Versus Depth and Outflow Calculation
- Detention Basin Routing

```
 ************************************************************************
           NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                             Analysis prepared by:

                             HUNSAKER & ASSOCIATES
                                   Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   2-YEAR STORM AT NODE 24, OFF-SITE AREA TO RANCHO PKWY @ 84" RCP (F19-P07)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC I:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     2.05 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1         1.67       60.00       69.(AMC II)     0.250       0.356
          2        30.26       50.00       69.(AMC II)     0.250       0.445
          3        45.50       10.00       69.(AMC II)     0.250       0.801
          4         0.68       85.00       69.(AMC II)     0.250       0.134
          5        65.18       10.00       56.(AMC II)     0.300       0.801
          6         0.50       90.00       69.(AMC II)     0.250       0.089
          7         3.92       50.00       56.(AMC II)     0.300       0.445
          8         2.50       40.00       56.(AMC II)     0.300       0.534
          9        13.11       40.00       69.(AMC II)     0.250       0.534
         10        24.46       35.00       56.(AMC II)     0.300       0.578
         11         7.92       35.00       69.(AMC II)     0.250       0.578
         12         0.76      100.00       78.(AMC II)     0.300       0.041
         13         0.39      100.00       86.(AMC II)     0.250       0.153
         14        31.05       10.00       75.(AMC II)     0.200       0.803

     TOTAL AREA (Acres) =    227.90

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.061

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.313
 ========================================================================
```

```
 ************************************************************************
           NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                             Analysis prepared by:

                             HUNSAKER & ASSOCIATES
                                   Irvine,Inc
                         Planning * Engineering * Surveying
                  Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   25-YEAR STORM AT NODE 24, OFF-SITE AREA TO RANCHO PKWY @ 84" RCP (F19-P07)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC II:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     4.49 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1         1.67       60.00            69.       0.250       0.592
          2        30.26       50.00            69.       0.250       0.651
          3        45.50       10.00            69.       0.250       0.888
          4         0.68       85.00            69.       0.250       0.444
          5        65.18       10.00            56.       0.300       0.870
          6         0.50       90.00            69.       0.250       0.415
          7         3.92       50.00            56.       0.300       0.562
          8         2.50       40.00            56.       0.300       0.639
          9        13.11       40.00            69.       0.250       0.711
         10        24.46       35.00            56.       0.300       0.677
         11         7.92       35.00            69.       0.250       0.740
         12         0.76      100.00            78.       0.300       0.509
         13         0.39      100.00            86.       0.250       0.667
         14        31.05       10.00            75.       0.200       0.898

     TOTAL AREA (Acres) =    227.90

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.061

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.199
 ========================================================================
```

```
 ************************************************************************
           NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                             Analysis prepared by:

                             HUNSAKER & ASSOCIATES
                                   Irvine,Inc
                         Planning * Engineering * Surveying
                  Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   100-YEAR STORM AT NODE 24, OFF-SITE AREA TO RANCHO PKWY @ 84" RCP (F19-P07)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     5.63 (inches)
```

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	1.67	60.00	69.(AMC II)	0.250	0.816
2	30.26	50.00	69.(AMC II)	0.250	0.839
3	45.50	10.00	69.(AMC II)	0.250	0.934
4	0.68	85.00	69.(AMC II)	0.250	0.756
5	65.18	10.00	56.(AMC II)	0.300	0.916
6	0.50	90.00	69.(AMC II)	0.250	0.745
7	3.92	50.00	56.(AMC II)	0.300	0.751
8	2.50	40.00	56.(AMC II)	0.300	0.792
9	13.11	40.00	69.(AMC II)	0.250	0.863
10	24.46	35.00	56.(AMC II)	0.300	0.813
11	7.92	35.00	69.(AMC II)	0.250	0.875
12	0.76	100.00	78.(AMC II)	0.300	0.856
13	0.39	100.00	86.(AMC II)	0.250	0.937
14	31.05	10.00	75.(AMC II)	0.200	0.944

```
     TOTAL AREA (Acres) =    227.90

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.061

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.108
 ========================================================================
```

```
 ************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ************************************************************************
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   2-YEAR STORM AT NODE 61, OFF-SITE/ON-SITE AREAS @ 10.5'X10.5'RCB (F19-P07)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC I:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     2.05 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1         1.67       60.00       69.(AMC II)     0.250       0.356
          2        30.26       50.00       69.(AMC II)     0.250       0.445
          3        45.50       10.00       69.(AMC II)     0.250       0.801
          4         0.68       85.00       69.(AMC II)     0.250       0.134
          5        65.18       10.00       56.(AMC II)     0.300       0.801
          6         0.50       90.00       69.(AMC II)     0.250       0.089
          7         3.92       50.00       56.(AMC II)     0.300       0.445
          8         2.50       40.00       56.(AMC II)     0.300       0.534
          9        13.11       40.00       69.(AMC II)     0.250       0.534
         10        24.46       35.00       56.(AMC II)     0.300       0.578
         11         7.92       35.00       69.(AMC II)     0.250       0.578
         12         0.76      100.00       78.(AMC II)     0.300       0.041
         13         0.39      100.00       86.(AMC II)     0.250       0.153
         14        31.05       10.00       75.(AMC II)     0.200       0.803
         15        41.66      100.00       66.(AMC II)     0.300       0.000
         16        22.99      100.00       83.(AMC II)     0.200       0.092
         17        11.90      100.00       77.(AMC II)     0.250       0.028

     TOTAL AREA (Acres) =    304.45

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.111

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.477
 ========================================================================
```

```
 ************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                 Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   25-YEAR STORM AT NODE 61, OFF-SITE/ON-SITE AREAS @ 10.5'X10.5'RCB (F19-P07)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC II:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     4.49 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1         1.67       60.00            69.       0.250       0.592
          2        30.26       50.00            69.       0.250       0.651
          3        45.50       10.00            69.       0.250       0.888
          4         0.68       85.00            69.       0.250       0.444
          5        65.18       10.00            56.       0.300       0.870
          6         0.50       90.00            69.       0.250       0.415
          7         3.92       50.00            56.       0.300       0.562
          8         2.50       40.00            56.       0.300       0.639
          9        13.11       40.00            69.       0.250       0.711
         10        24.46       35.00            56.       0.300       0.677
         11         7.92       35.00            69.       0.250       0.740
         12         0.76      100.00            78.       0.300       0.509
         13         0.39      100.00            86.       0.250       0.667
         14        31.05       10.00            75.       0.200       0.898
         15        41.66      100.00            66.       0.300       0.310
         16        22.99      100.00            83.       0.200       0.605
         17        11.90      100.00            77.       0.250       0.491

     TOTAL AREA (Acres) =    304.45

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.111

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.294
 ========================================================================
```

```
 ************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ************************************************************************
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   100-YEAR STORM AT NODE 61, OFF-SITE/ON-SITE AREAS @ 10.5'X10.5'RCB (F19-P07)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     5.63 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1         1.67       60.00       69.(AMC II)     0.250       0.816
          2        30.26       50.00       69.(AMC II)     0.250       0.839
          3        45.50       10.00       69.(AMC II)     0.250       0.934
          4         0.68       85.00       69.(AMC II)     0.250       0.756
          5        65.18       10.00       56.(AMC II)     0.300       0.916
          6         0.50       90.00       69.(AMC II)     0.250       0.745
          7         3.92       50.00       56.(AMC II)     0.300       0.751
          8         2.50       40.00       56.(AMC II)     0.300       0.792
          9        13.11       40.00       69.(AMC II)     0.250       0.863
         10        24.46       35.00       56.(AMC II)     0.300       0.813
         11         7.92       35.00       69.(AMC II)     0.250       0.875
         12         0.76      100.00       78.(AMC II)     0.300       0.856
         13         0.39      100.00       86.(AMC II)     0.250       0.937
         14        31.05       10.00       75.(AMC II)     0.200       0.944
         15        41.66      100.00       66.(AMC II)     0.300       0.684
         16        22.99      100.00       83.(AMC II)     0.200       0.916
         17        11.90      100.00       77.(AMC II)     0.250       0.836

     TOTAL AREA (Acres) =    304.45

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.111

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.137
 ========================================================================
```

```
 ************************************************************************
           NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                     AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   2-YEAR STORM AT NODE 61, ON-SITE TOTAL AREA "A" TO EX. EARTHEN CHANNEL
   THEN TO EXISTING 10.5'X10.5'RCB (F19-P07)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC I:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     2.05 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1         41.66      100.00       66.(AMC II)     0.300       0.000
          2         22.99      100.00       83.(AMC II)     0.200       0.092
          3         11.90      100.00       77.(AMC II)     0.250       0.028

     TOTAL AREA (Acres) =     76.55

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.262

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.968
 ========================================================================
```

```
 ************************************************************************
           NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   25-YEAR STORM AT NODE 61, ON-SITE TOTAL AREA "A" TO EX. EARTHEN CHANNEL
   THEN TO EXISTING 10.5'X10.5'RCB (F19-P07)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC II:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     4.49 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1         41.66      100.00            66.       0.300       0.310
          2         22.99      100.00            83.       0.200       0.605
          3         11.90      100.00            77.       0.250       0.491

     TOTAL AREA (Acres) =     76.55

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.262

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.574
 ========================================================================
```

```
 ************************************************************************
           NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                     AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   100-YEAR STORM AT NODE 61, ON-SITE TOTAL AREA "A" TO EX. EARTHEN CHANNEL
   THEN TO EXISTING 10.5'X10.5'RCB (F19-P07)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     5.63 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1         41.66      100.00       66.(AMC II)     0.300       0.684
          2         22.99      100.00       83.(AMC II)     0.200       0.916
          3         11.90      100.00       77.(AMC II)     0.250       0.836

     TOTAL AREA (Acres) =     76.55

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.262

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.223
 ========================================================================
```

```
 ************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   2-YEAR STORM AT NODE 15, ON-SITE AREA "B" EXISTING CONDITION @ 84" RCP (F19)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC I:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     2.05 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1         19.45      100.00       66.(AMC II)     0.300       0.000
          2         16.28      100.00       83.(AMC II)     0.200       0.092
          3          7.67      100.00       77.(AMC II)     0.250       0.028

     TOTAL AREA (Acres) =     43.40

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.254

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.960
 ========================================================================
```

```
 ************************************************************************
           NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                     AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   25-YEAR STORM AT NODE 15, ON-SITE AREA "B" EXISTING CONDITION @ 84" RCP (F19)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC II:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     4.49 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1         19.45      100.00            66.       0.300       0.310
          2         16.28      100.00            83.       0.200       0.605
          3          7.67      100.00            77.       0.250       0.491

     TOTAL AREA (Acres) =     43.40

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.254

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.548
 ========================================================================
```

```
 ************************************************************************
           NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                             Analysis prepared by:

                             HUNSAKER & ASSOCIATES
                                   Irvine,Inc
                         Planning * Engineering * Surveying
                  Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   100-YEAR STORM AT NODE 15, ON-SITE AREA "B" EXISTING CONDITION @ 84" RCP (F19)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     5.63 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1         19.45      100.00       66.(AMC II)     0.300       0.684
          2         16.28      100.00       83.(AMC II)     0.200       0.916
          3          7.67      100.00       77.(AMC II)     0.250       0.836

     TOTAL AREA (Acres) =     43.40

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.254

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.202
 ========================================================================
```

```
 ************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ************************************************************************
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   2-YEAR STORM AT NODE 56.3, AREA TRIBUTARY TO DETENTION BASIN IN CENTRAL PARK
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC I:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     2.05 (inches)
```

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	3.36	60.00	69.(AMC II)	0.250	0.356
2	30.26	50.00	69.(AMC II)	0.250	0.445
3	45.53	10.00	69.(AMC II)	0.250	0.801
4	0.68	85.00	69.(AMC II)	0.250	0.134
5	69.06	10.00	56.(AMC II)	0.300	0.801
6	0.50	90.00	69.(AMC II)	0.250	0.089
7	12.03	50.00	56.(AMC II)	0.300	0.445
8	4.93	40.00	56.(AMC II)	0.300	0.534
9	13.11	40.00	69.(AMC II)	0.250	0.534
10	24.46	35.00	56.(AMC II)	0.300	0.578
11	7.92	35.00	69.(AMC II)	0.250	0.578
12	0.76	100.00	78.(AMC II)	0.300	0.041
13	0.39	100.00	86.(AMC II)	0.250	0.153
14	32.43	10.00	75.(AMC II)	0.200	0.803
15	1.29	50.00	75.(AMC II)	0.200	0.454
16	0.22	85.00	56.(AMC II)	0.300	0.133
17	7.63	60.00	56.(AMC II)	0.300	0.356
18	2.82	60.00	75.(AMC II)	0.200	0.366
19	7.29	20.00	56.(AMC II)	0.300	0.712
20	0.93	20.00	75.(AMC II)	0.200	0.715
21	0.14	40.00	75.(AMC II)	0.200	0.541

```
     TOTAL AREA (Acres) =    265.74

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.068

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.335
 ========================================================================
```

```
 ************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ************************************************************************
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   25-YEAR STORM AT NODE 56.3, AREA TRIBUTARY TO DETENTION BASIN IN CENTRAL PARK
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC II:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     4.49 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1         3.36       60.00            69.       0.250       0.592
          2        30.26       50.00            69.       0.250       0.651
          3        45.53       10.00            69.       0.250       0.888
          4         0.68       85.00            69.       0.250       0.444
          5        69.06       10.00            56.       0.300       0.870
          6         0.50       90.00            69.       0.250       0.415
          7        12.03       50.00            56.       0.300       0.562
          8         4.93       40.00            56.       0.300       0.639
          9        13.11       40.00            69.       0.250       0.711
         10        24.46       35.00            56.       0.300       0.677
         11         7.92       35.00            69.       0.250       0.740
         12         0.76      100.00            78.       0.300       0.509
         13         0.39      100.00            86.       0.250       0.667
         14        32.43       10.00            75.       0.200       0.898
         15         1.29       50.00            75.       0.200       0.701
         16         0.22       85.00            56.       0.300       0.292
         17         7.63       60.00            56.       0.300       0.485
         18         2.82       60.00            75.       0.200       0.652
         19         7.29       20.00            56.       0.300       0.793
         20         0.93       20.00            75.       0.200       0.849
         21         0.14       40.00            75.       0.200       0.750

     TOTAL AREA (Acres) =    265.74

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.068

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.220
 ========================================================================
```

```
 ************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ************************************************************************
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   100-YEAR STORM AT NODE 56.3, AREA TRIBUTARY TO DETENTION BASIN IN CENTRAL PARK
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     5.63 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1         3.36       60.00       69.(AMC II)     0.250       0.816
          2        30.26       50.00       69.(AMC II)     0.250       0.839
          3        45.53       10.00       69.(AMC II)     0.250       0.934
          4         0.68       85.00       69.(AMC II)     0.250       0.756
          5        69.06       10.00       56.(AMC II)     0.300       0.916
          6         0.50       90.00       69.(AMC II)     0.250       0.745
          7        12.03       50.00       56.(AMC II)     0.300       0.751
          8         4.93       40.00       56.(AMC II)     0.300       0.792
          9        13.11       40.00       69.(AMC II)     0.250       0.863
         10        24.46       35.00       56.(AMC II)     0.300       0.813
         11         7.92       35.00       69.(AMC II)     0.250       0.875
         12         0.76      100.00       78.(AMC II)     0.300       0.856
         13         0.39      100.00       86.(AMC II)     0.250       0.937
         14        32.43       10.00       75.(AMC II)     0.200       0.944
         15         1.29       50.00       75.(AMC II)     0.200       0.887
         16         0.22       85.00       56.(AMC II)     0.300       0.606
         17         7.63       60.00       56.(AMC II)     0.300       0.710
         18         2.82       60.00       75.(AMC II)     0.200       0.873
         19         7.29       20.00       56.(AMC II)     0.300       0.875
         20         0.93       20.00       75.(AMC II)     0.200       0.929
         21         0.14       40.00       75.(AMC II)     0.200       0.901

     TOTAL AREA (Acres) =    265.74

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.068

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.119
 ========================================================================
```

```
 ************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ************************************************************************
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   2-YEAR STORM AT NODE 35.2, AREA TRIBUTARY TO DETENTION BASIN IN CENTRAL PARK
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC I:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     2.05 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1          0.05       85.00       69.(AMC II)     0.250       0.134
          2          0.13       10.00       56.(AMC II)     0.300       0.801
          3          2.64       50.00       56.(AMC II)     0.300       0.445
          4          2.06       40.00       56.(AMC II)     0.300       0.534
          5          0.04       10.00       75.(AMC II)     0.200       0.803
          6          1.31       50.00       75.(AMC II)     0.200       0.454
          7          2.91       85.00       56.(AMC II)     0.300       0.133
          8          0.06       40.00       75.(AMC II)     0.200       0.541
          9          2.20       85.00       75.(AMC II)     0.200       0.148

     TOTAL AREA (Acres) =     11.40

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.168

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.670
 ========================================================================
```

```
 ************************************************************************
           NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                     AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   25-YEAR STORM AT NODE 35.2, AREA TRIBUTARY TO DETENTION BASIN IN CENTRAL PARK
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC II:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     4.49 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1          0.05       85.00            69.       0.250       0.444
          2          0.13       10.00            56.       0.300       0.870
          3          2.64       50.00            56.       0.300       0.562
          4          2.06       40.00            56.       0.300       0.639
          5          0.04       10.00            75.       0.200       0.898
          6          1.31       50.00            75.       0.200       0.701
          7          2.91       85.00            56.       0.300       0.292
          8          0.06       40.00            75.       0.200       0.750
          9          2.20       85.00            75.       0.200       0.529

     TOTAL AREA (Acres) =     11.40

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.168

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.478
 ========================================================================
```

```
 ************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   100-YEAR STORM AT NODE 35.2, AREA TRIBUTARY TO DETENTION BASIN IN CENTRAL PARK
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     5.63 (inches)

     SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
        TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
          1          0.05       85.00       69.(AMC II)     0.250       0.756
          2          0.13       10.00       56.(AMC II)     0.300       0.916
          3          2.64       50.00       56.(AMC II)     0.300       0.751
          4          2.06       40.00       56.(AMC II)     0.300       0.792
          5          0.04       10.00       75.(AMC II)     0.200       0.944
          6          1.31       50.00       75.(AMC II)     0.200       0.887
          7          2.91       85.00       56.(AMC II)     0.300       0.606
          8          0.06       40.00       75.(AMC II)     0.200       0.901
          9          2.20       85.00       75.(AMC II)     0.200       0.837

     TOTAL AREA (Acres) =     11.40

     AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.168

     AREA-AVERAGED LOW LOSS FRACTION, Y = 0.243
 ========================================================================
```

```
 ************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   2-YEAR STORM AT NODE 61, ON-SITE WITH OFF-SITE AREA "A" 10.5'X10.5'RCB (F19-P07)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC I:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     2.05 (inches)
```

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	3.36	60.00	69.(AMC II)	0.250	0.356
2	25.81	50.00	69.(AMC II)	0.250	0.445
3	45.53	10.00	69.(AMC II)	0.250	0.801
4	0.68	85.00	69.(AMC II)	0.250	0.134
5	69.06	10.00	56.(AMC II)	0.300	0.801
6	0.50	90.00	69.(AMC II)	0.250	0.089
7	11.58	50.00	56.(AMC II)	0.300	0.445
8	5.38	40.00	56.(AMC II)	0.300	0.534
9	17.56	40.00	69.(AMC II)	0.250	0.534
10	24.46	35.00	56.(AMC II)	0.300	0.578
11	7.92	35.00	69.(AMC II)	0.250	0.578
12	0.76	100.00	78.(AMC II)	0.300	0.041
13	0.39	100.00	86.(AMC II)	0.250	0.153
14	32.43	10.00	75.(AMC II)	0.200	0.803
15	1.29	50.00	75.(AMC II)	0.200	0.454
16	0.22	85.00	56.(AMC II)	0.300	0.133
17	7.63	60.00	56.(AMC II)	0.300	0.356
18	2.82	60.00	75.(AMC II)	0.200	0.366
19	7.29	20.00	56.(AMC II)	0.300	0.712
20	0.93	20.00	75.(AMC II)	0.200	0.715
21	4.98	40.00	75.(AMC II)	0.200	0.541
22	2.64	50.00	56.(AMC II)	0.300	0.445
23	1.31	50.00	75.(AMC II)	0.200	0.454
24	2.06	40.00	56.(AMC II)	0.300	0.534
25	0.06	40.00	75.(AMC II)	0.200	0.541
26	2.91	85.00	56.(AMC II)	0.300	0.133
27	0.04	10.00	75.(AMC II)	0.200	0.803
28	0.13	10.00	56.(AMC II)	0.300	0.801
29	0.05	85.00	69.(AMC II)	0.250	0.134
30	2.20	85.00	75.(AMC II)	0.200	0.148
31	2.54	10.00	69.(AMC II)	0.250	0.801
32	1.30	10.00	75.(AMC II)	0.200	0.803
33	4.49	50.00	56.(AMC II)	0.300	0.445
34	8.12	50.00	75.(AMC II)	0.200	0.454

35	9.22	50.00	69.(AMC II)	0.250	0.445
36	8.05	20.00	56.(AMC II)	0.300	0.712
37	6.12	20.00	69.(AMC II)	0.250	0.712
38	12.52	20.00	75.(AMC II)	0.200	0.715
39	1.92	10.00	56.(AMC II)	0.300	0.801
40	1.79	85.00	56.(AMC II)	0.300	0.133
41	1.70	85.00	75.(AMC II)	0.200	0.148

TOTAL AREA (Acres) = 339.75

AREA-AVERAGED LOSS RATE, $\bar{F}m$ (in./hr.) = 0.074

AREA-AVERAGED LOW LOSS FRACTION, $\bar{Y}$ = 0.360

==========

```
 ************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   25-YEAR STORM AT NODE 61, ON-SITE WITH OFF-SITE AREA "A" 10.5'X10.5'RCB (F19-P07)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC II:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     4.49 (inches)
```

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	3.36	60.00	69.	0.250	0.592
2	25.81	50.00	69.	0.250	0.651
3	45.53	10.00	69.	0.250	0.888
4	0.68	85.00	69.	0.250	0.444
5	69.06	10.00	56.	0.300	0.870
6	0.50	90.00	69.	0.250	0.415
7	11.58	50.00	56.	0.300	0.562
8	5.38	40.00	56.	0.300	0.639
9	17.56	40.00	69.	0.250	0.711
10	24.46	35.00	56.	0.300	0.677
11	7.92	35.00	69.	0.250	0.740
12	0.76	100.00	78.	0.300	0.509
13	0.39	100.00	86.	0.250	0.667
14	32.43	10.00	75.	0.200	0.898
15	1.29	50.00	75.	0.200	0.701
16	0.22	85.00	56.	0.300	0.292
17	7.63	60.00	56.	0.300	0.485
18	2.82	60.00	75.	0.200	0.652
19	7.29	20.00	56.	0.300	0.793
20	0.93	20.00	75.	0.200	0.849
21	4.98	40.00	75.	0.200	0.750
22	2.64	50.00	56.	0.300	0.562
23	1.31	50.00	75.	0.200	0.701
24	2.06	40.00	56.	0.300	0.639
25	0.06	40.00	75.	0.200	0.750
26	2.91	85.00	56.	0.300	0.292
27	0.04	10.00	75.	0.200	0.898
28	0.13	10.00	56.	0.300	0.870
29	0.05	85.00	69.	0.250	0.444
30	2.20	85.00	75.	0.200	0.529
31	2.54	10.00	69.	0.250	0.888
32	1.30	10.00	75.	0.200	0.898
33	4.49	50.00	56.	0.300	0.562
34	8.12	50.00	75.	0.200	0.701

35	9.22	50.00	69.	0.250	0.651
36	8.05	20.00	56.	0.300	0.793
37	6.12	20.00	69.	0.250	0.829
38	12.52	20.00	75.	0.200	0.849
39	1.92	10.00	56.	0.300	0.870
40	1.79	85.00	56.	0.300	0.292
41	1.70	85.00	75.	0.200	0.529

TOTAL AREA (Acres) = 339.75

AREA-AVERAGED LOSS RATE, $\bar{F}m$ (in./hr.) = 0.074

AREA-AVERAGED LOW LOSS FRACTION, $\bar{Y}$ = 0.235

==========

```
 ************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
 ========================================================================
          (C) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                              Analysis prepared by:

                              HUNSAKER & ASSOCIATES
                                    Irvine,Inc
                          Planning * Engineering * Surveying
                   Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************************************************************
 ------------------------------------------------------------------------
Problem Descriptions:
   LOW LOSS FRACTION FOR NAKASE VTM 18142
   100-YEAR STORM AT NODE 61, ON-SITE WITH OFF-SITE AREA "A" 10.5'X10.5'RCB (F19-P07)
   W.O. #1443-136X
 ========================================================================
 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
     AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

     TOTAL 24-HOUR DURATION RAINFALL DEPTH =     5.63 (inches)
```

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	3.36	60.00	69.(AMC II)	0.250	0.816
2	25.81	50.00	69.(AMC II)	0.250	0.839
3	45.53	10.00	69.(AMC II)	0.250	0.934
4	0.68	85.00	69.(AMC II)	0.250	0.756
5	69.06	10.00	56.(AMC II)	0.300	0.916
6	0.50	90.00	69.(AMC II)	0.250	0.745
7	11.58	50.00	56.(AMC II)	0.300	0.751
8	5.38	40.00	56.(AMC II)	0.300	0.792
9	17.56	40.00	69.(AMC II)	0.250	0.863
10	24.46	35.00	56.(AMC II)	0.300	0.813
11	7.92	35.00	69.(AMC II)	0.250	0.875
12	0.76	100.00	78.(AMC II)	0.300	0.856
13	0.39	100.00	86.(AMC II)	0.250	0.937
14	32.43	10.00	75.(AMC II)	0.200	0.944
15	1.29	50.00	75.(AMC II)	0.200	0.887
16	0.22	85.00	56.(AMC II)	0.300	0.606
17	7.63	60.00	56.(AMC II)	0.300	0.710
18	2.82	60.00	75.(AMC II)	0.200	0.873
19	7.29	20.00	56.(AMC II)	0.300	0.875
20	0.93	20.00	75.(AMC II)	0.200	0.929
21	4.98	40.00	75.(AMC II)	0.200	0.901
22	2.64	50.00	56.(AMC II)	0.300	0.751
23	1.31	50.00	75.(AMC II)	0.200	0.887
24	2.06	40.00	56.(AMC II)	0.300	0.792
25	0.06	40.00	75.(AMC II)	0.200	0.901
26	2.91	85.00	56.(AMC II)	0.300	0.606
27	0.04	10.00	75.(AMC II)	0.200	0.944
28	0.13	10.00	56.(AMC II)	0.300	0.916
29	0.05	85.00	69.(AMC II)	0.250	0.756
30	2.20	85.00	75.(AMC II)	0.200	0.837
31	2.54	10.00	69.(AMC II)	0.250	0.934
32	1.30	10.00	75.(AMC II)	0.200	0.944
33	4.49	50.00	56.(AMC II)	0.300	0.751
34	8.12	50.00	75.(AMC II)	0.200	0.887

35	9.22	50.00	69.(AMC II)	0.250	0.839
36	8.05	20.00	56.(AMC II)	0.300	0.875
37	6.12	20.00	69.(AMC II)	0.250	0.910
38	12.52	20.00	75.(AMC II)	0.200	0.929
39	1.92	10.00	56.(AMC II)	0.300	0.916
40	1.79	85.00	56.(AMC II)	0.300	0.606
41	1.70	85.00	75.(AMC II)	0.200	0.837

TOTAL AREA (Acres) = 339.75

AREA-AVERAGED LOSS RATE, $\bar{F}m$ (in./hr.) = 0.074

AREA-AVERAGED LOW LOSS FRACTION, $\bar{Y}$ = 0.124

==========

OUTFLOW VS DEPTH CALCULATIONS

		HOLES	HOLES	HOLES	HOLES	HOLES	HOLES	HOLES	HOLES	WEIR		
No. of Holes	→	20	1	1	1	2	0	0	0	1	←	No. of Weir
		HOLE C	HOLE C	HOLE C	HOLE C	HOLE C	HOLE C	HOLE C	HOLE C	WEIR C		
Discharge Coefficient	→	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	3.09	←	Weir Coefficient
		HOLE FL	HOLE FL	HOLE FL	HOLE FL	HOLE FL	HOLE FL	HOLE FL	HOLE FL	DIST TO WEIR		
Distance of Holes from Basin Bottom (in)	→	0	18	36	54	72	120	72	0	144	←	Distance of Top of Riser Pipe from Basin Bottom (in)
		HOLE R	HOLE R	HOLE R	HOLE R	HOLE R	HOLE R	HOLE R	HOLE R	WEIR LENGTH FT		
Hole Radius (in)	→	5.00	2.00	2.00	2.00	6	6	0	0	71.000	←	Riser Pipe Perimeter (ft) =PI*D, 96" Riser Pipe
		CEN EL	CEN EL	CEN EL	CEN EL	CEN EL	CEN EL	CEN EL	CEN EL	WEIR ELEV		
Hole Centerline Elev (ft)	→	696.4167	697.6667	699.1667	700.6667	702.5	706.5	702	696	708.0	←	Top of Riser Elevation (ft)

ELEV	DEPTH	OUTFLOW								AREA		
696.00	0	0								0	←	(sq-ft)
696.50	0.5	15.16	15.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
697.00	1	40.12	40.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
697.50	1.5	54.67	54.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
698.00	2	66.33	66.09	0.24	0.00	0.00	0.00	0.00	0.00	0.00		
698.50	2.5	76.19	75.81	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
699.00	3	84.90	84.42	0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
699.50	3.5	93.04	92.23	0.57	0.24	0.00	0.00	0.00	0.00	0.00	0.00	
700.00	4	100.45	99.42	0.64	0.38	0.00	0.00	0.00	0.00	0.00	0.00	
700.50	4.5	107.33	106.14	0.71	0.49	0.00	0.00	0.00	0.00	0.00	0.00	
701.00	5	114.02	112.45	0.77	0.57	0.24	0.00	0.00	0.00	0.00	0.00	
701.50	5.5	120.27	118.42	0.82	0.64	0.38	0.00	0.00	0.00	0.00	0.00	
702.00	6	126.17	124.11	0.87	0.71	0.49	0.00	0.00	0.00	0.00	0.00	
703.00	7	142.55	134.76	0.97	0.82	0.64	5.35	0.00	0.00	0.00	0.00	0.00
704.00	8	156.65	144.64	1.06	0.92	0.77	9.26	0.00	0.00	0.00	0.00	0.00
705.00	9	168.87	153.88	1.14	1.01	0.87	11.96	0.00	0.00	0.00	0.00	0.00
706.00	10	180.03	162.60	1.21	1.10	0.97	14.15	0.00	0.00	0.00	0.00	0.00
707.00	11	190.43	170.87	1.28	1.18	1.06	16.04	0.00	0.00	0.00	0.00	0.00
708.00	12	200.23	178.76	1.35	1.25	1.14	17.74	0.00	0.00	0.00	0.00	0.00
709.00	13	428.93	186.32	1.41	1.32	1.21	19.28	0.00	0.00	0.00	219.39	0.00
710.00	14	838.96	193.58	1.48	1.38	1.28	20.71	0.00	0.00	0.00	620.53	0.00

↑ [Σ FLOWS (HOLES+RISER)]

(OUTFLOW THROUGH HOLES)

↑ (FLOW OVER TOP OF RISER)

Note:

1. Orifice outflow is based on:
   $Q=CA(2gH)^{0.5}$
   where:
   C = Coefficient, 0.6 used here
   A = Orifice Area
   H = Headwater

2. Weir flow is based on:
   $Q=CLH^{1.5}$
   where:
   C = Coefficient, 2.8 used here
   L = Weir Length, Riser Pipe Perimeter was used here
   H = Headwater

W.O. #1443-136X, NAKASE'S NURSERY IN CITY OF LAKE FOREST
10/11/2017
PROPOSED BASINS AT NODES 35 AND 61
With 20 @ 10", 1 @ 4", 1 @ 4", 1 @ 4" and 2 @ 12" Diameter Orifices
at 696.42, 697.67, 699.17, 700.67 & 702.50 Center Hole Elevation Respectively.

STORAGE CAPACITY CALCULATION

Elevation (ft)	Contour Interval (ft)	Accumulate Depth (ft)	Area (sqft)	Area (acre)	Mean Area (acre)	Volume (ac.ft)	$Volume_{ACCUMULATE}$ (ac.ft)	$Volume_{ACCUMULATE}$ (cuyd)	Qout (cfs)
696.00			44100	1.01					0.00
	0.50				1.01	0.51	0.51	816.67	15.16
696.50		0.50	44100	1.01					
	0.50				1.01	0.51	1.01	1633.33	40.12
697.00		1.00	44100	1.01					
	0.50				1.01	0.51	1.52	2450.00	54.67
697.50		1.50	44100	1.01					
	0.50				1.01	0.51	2.02	3266.67	66.33
698.00		2.00	44100	1.01					
	0.50				1.01	0.51	2.53	4083.33	76.19
698.50		2.50	44100	1.01					
	0.50				1.01	0.51	3.04	4900.00	84.90
699.00		3.00	44100	1.01					
	0.50				1.01	0.51	3.54	5716.67	93.04
699.50		3.50	44100	1.01					
	0.50				1.01	0.51	4.05	6533.33	100.45
700.00		4.00	44100	1.01					
	0.50				1.01	0.51	4.56	7350.00	107.33
700.50		4.50	44100	1.01					
	0.50				1.01	0.51	5.06	8166.67	114.02
701.00		5.00	44100	1.01					
	0.50				1.01	0.51	5.57	8983.33	120.27
701.50		5.50	44100	1.01					
	0.50				1.01	0.51	6.07	9800.00	126.17
702.00		6.00	44100	1.01					
	1.00				1.01	1.01	7.09	11433.33	142.55
703.00		7.00	44100	1.01					
	1.00				1.01	1.01	8.10	13066.67	156.65
704.00		8.00	44100	1.01					
	1.00				1.01	1.01	9.11	14700.00	168.87
705.00		9.00	44100	1.01					
	1.00				1.01	1.01	10.12	16333.33	180.03
706.00		10.00	44100	1.01					
	1.00				1.01	1.01	11.14	17966.67	190.43
707.00		11.00	44100	1.01					
	1.00				1.01	1.01	12.15	19600.00	200.23
708.00	71' WEIR	12.00	44100	1.01					
	1.00				1.01	1.01	13.16	21233.33	428.93
709.00		13.00	44100	1.01					
	1.00				1.01	1.01	14.17	22866.67	838.96
710.00		14.00	44100	1.01					

```
*******************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
         (c) Copyright 1989-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                      Planning * Engineering * Surveying
              Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                   *
* 2-YEAR STORM EXISTING CONDITION OFFSITE RUN-ON AT RANCHO PARKWAY NODE 24 *
* W.O. #1443-136X                                                         *
 *************************************************************************

  FILE NAME: FL-02X.DAT
  TIME/DATE OF STUDY: 14:38 11/07/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


*******************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE     24.00 IS CODE = 1.2
-------------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
===============================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =  227.90
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.061
    LOW LOSS FRACTION = 0.313
    TIME OF CONCENTRATION(MIN.) = 19.31
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =   2
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.53
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  0.89
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.22
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  2.05

-------------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =    25.77
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =    13.17

-------------------------------------------------------------------------------

===============================================================================

                      2 4 - H O U R    S T O R M
                   R U N O F F    H Y D R O G R A P H

===============================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
-------------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       49.9      99.9     149.8     199.8
-------------------------------------------------------------------------------
  14.000      8.6550     17.62  .  Q      .  V      .         .         .
  14.017      8.6793     17.67  .  Q      .  V      .         .         .
  14.033      8.7037     17.71  .  Q      .  V      .         .         .
  14.050      8.7282     17.76  .  Q      .  V      .         .         .
  14.067      8.7527     17.80  .  Q      .  V      .         .         .
  14.083      8.7773     17.89  .  Q      .  V      .         .         .
  14.100      8.8022     18.03  .  Q      .  V      .         .         .
  14.117      8.8272     18.18  .  Q      .  V      .         .         .
  14.133      8.8525     18.33  .  Q      .  V      .         .         .
  14.150      8.8779     18.48  .  Q      .  V      .         .         .
  14.167      8.9036     18.63  .  Q      .  V      .         .         .
  14.183      8.9295     18.78  .  Q      .  V      .         .         .
  14.200      8.9556     18.93  .  Q      .  V      .         .         .
  14.217      8.9818     19.08  .  Q      .  V      .         .         .
  14.233      9.0083     19.23  .  Q      .  V      .         .         .
  14.250      9.0350     19.38  .  Q      .   V     .         .         .
  14.267      9.0619     19.53  .  Q      .   V     .         .         .
  14.283      9.0890     19.68  .  Q      .   V     .         .         .
  14.300      9.1163     19.83  .  Q      .   V     .         .         .
  14.317      9.1439     19.98  .   Q     .   V     .         .         .
  14.333      9.1716     20.13  .   Q     .   V     .         .         .
  14.350      9.1995     20.28  .   Q     .   V     .         .         .
  14.367      9.2277     20.43  .   Q     .   V     .         .         .
  14.383      9.2560     20.58  .   Q     .   V     .         .         .
  14.400      9.2845     20.71  .   Q     .   V     .         .         .
  14.417      9.3132     20.80  .   Q     .   V     .         .         .
  14.433      9.3419     20.87  .   Q     .   V     .         .         .
  14.450      9.3708     20.94  .   Q     .   V     .         .         .
  14.467      9.3997     21.02  .   Q     .   V     .         .         .
  14.483      9.4288     21.09  .   Q     .   V     .         .         .
  14.500      9.4579     21.16  .   Q     .   V     .         .         .
  14.517      9.4872     21.24  .   Q     .   V     .         .         .
  14.533      9.5165     21.31  .   Q     .   V     .         .         .
  14.550      9.5460     21.38  .   Q     .   V     .         .         .
  14.567      9.5755     21.46  .   Q     .   V     .         .         .
  14.583      9.6052     21.53  .   Q     .   V     .         .         .
  14.600      9.6349     21.60  .   Q     .   V     .         .         .
  14.617      9.6648     21.68  .   Q     .    V    .         .         .
  14.633      9.6948     21.75  .   Q     .    V    .         .         .
  14.650      9.7248     21.82  .   Q     .    V    .         .         .
  14.667      9.7550     21.90  .   Q     .    V    .         .         .
```

Offsite Area Flood Routing

Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24

2-Year Storm Existing Condition

14.683	9.7852	21.97	.	Q	.	V	.	.	.	
14.700	9.8156	22.04	.	Q	.	V	.	.	.	
14.717	9.8461	22.12	.	Q	.	V	.	.	.	
14.733	9.8768	22.29	.	Q	.	V	.	.	.	
14.750	9.9078	22.49	.	Q	.	V	.	.	.	
14.767	9.9390	22.70	.	Q	.	V	.	.	.	
14.783	9.9706	22.90	.	Q	.	V	.	.	.	
14.800	10.0024	23.11	.	Q	.	V	.	.	.	
14.817	10.0345	23.31	.	Q	.	V	.	.	.	
14.833	10.0669	23.52	.	Q	.	V	.	.	.	
14.850	10.0996	23.72	.	Q	.	V	.	.	.	
14.867	10.1325	23.93	.	Q	.	V	.	.	.	
14.883	10.1658	24.13	.	Q	.	V	.	.	.	
14.900	10.1993	24.34	.	Q	.	V	.	.	.	
14.917	10.2331	24.54	.	Q	.	V	.	.	.	
14.933	10.2672	24.75	.	Q	.	V	.	.	.	
14.950	10.3015	24.95	.	Q	.	V	.	.	.	
14.967	10.3362	25.16	.	Q	.	V	.	.	.	
14.983	10.3711	25.36	.	Q	.	V	.	.	.	
15.000	10.4063	25.56	.	Q	.	V	.	.	.	
15.017	10.4418	25.77	.	Q	.	V	.	.	.	
15.033	10.4776	25.97	.	Q	.	V	.	.	.	
15.050	10.5137	26.17	.	Q	.	V	.	.	.	
15.067	10.5500	26.36	.	Q	.	V	.	.	.	
15.083	10.5865	26.55	.	Q	.	V	.	.	.	
15.100	10.6234	26.74	.	Q	.	V	.	.	.	
15.117	10.6605	26.93	.	Q	.	V	.	.	.	
15.133	10.6978	27.12	.	Q	.	V	.	.	.	
15.150	10.7354	27.30	.	Q	.	V	.	.	.	
15.167	10.7733	27.49	.	Q	.	V	.	.	.	
15.183	10.8114	27.68	.	Q	.	V	.	.	.	
15.200	10.8498	27.87	.	Q	.	V	.	.	.	
15.217	10.8885	28.06	.	Q	.	V	.	.	.	
15.233	10.9274	28.25	.	Q	.	V	.	.	.	
15.250	10.9665	28.44	.	Q	.	V	.	.	.	
15.267	11.0060	28.63	.	Q	.	V	.	.	.	
15.283	11.0457	28.82	.	Q	.	V	.	.	.	
15.300	11.0856	29.00	.	Q	.	V	.	.	.	
15.317	11.1258	29.19	.	Q	.	V	.	.	.	
15.333	11.1663	29.38	.	Q	.	V	.	.	.	
15.350	11.2070	29.57	.	Q	.	V	.	.	.	
15.367	11.2481	29.81	.	Q	.	V	.	.	.	
15.383	11.2897	30.22	.	Q	.	V	.	.	.	
15.400	11.3319	30.65	.	Q	.	V	.	.	.	
15.417	11.3747	31.08	.	Q	.	V	.	.	.	
15.433	11.4181	31.51	.	Q	.	V	.	.	.	
15.450	11.4621	31.94	.	Q	.	V	.	.	.	
15.467	11.5067	32.37	.	Q	.	V	.	.	.	
15.483	11.5519	32.79	.	Q	.	V	.	.	.	
15.500	11.5976	33.22	.	Q	.	V	.	.	.	
15.517	11.6440	33.65	.	Q	.	V	.	.	.	
15.533	11.6909	34.08	.	Q	.	V	.	.	.	
15.550	11.7385	34.51	.	Q	.	V	.	.	.	
15.567	11.7866	34.94	.	Q	.	V	.	.	.	
15.583	11.8353	35.37	.	Q	.	V	.	.	.	
15.600	11.8846	35.80	.	Q	.	V	.	.	.	
15.617	11.9345	36.23	.	Q	.	V	.	.	.	
15.633	11.9850	36.66	.	Q	.	V	.	.	.	
15.650	12.0361	37.09	.	Q	.	V	.	.	.	
15.667	12.0878	37.52	.	Q	.	V	.	.	.	
15.683	12.1401	37.98	.	Q	.	V	.	.	.	
15.700	12.1936	38.85	.	Q	.	V	.	.	.	
15.717	12.2485	39.87	.	Q	.	V	.	.	.	
15.733	12.3049	40.89	.	Q	.	V	.	.	.	
15.750	12.3626	41.90	.	Q	.	V	.	.	.	
15.767	12.4217	42.92	.	Q	.	V	.	.	.	
15.783	12.4822	43.94	.	Q	.	V	.	.	.	
15.800	12.5441	44.95	.	Q	.	V	.	.	.	
15.817	12.6075	45.97	.	Q	.	V	.	.	.	
15.833	12.6722	46.99	.	Q	.	V	.	.	.	
15.850	12.7383	48.00	.	Q	.	V	.	.	.	
15.867	12.8058	49.02	.	Q	.	V	.	.	.	
15.883	12.8747	50.04	.	Q	.	V	.	.	.	
15.900	12.9451	51.05	.	Q	.	V	.	.	.	
15.917	13.0168	52.07	.	Q	.	V	.	.	.	
15.933	13.0899	53.08	.	Q	.	V	.	.	.	
15.950	13.1644	54.10	.	Q	.	V	.	.	.	
15.967	13.2403	55.12	.	Q	.	V	.	.	.	
15.983	13.3176	56.13	.	Q	.	V	.	.	.	
16.000	13.3964	57.15	.	Q	.	V	.	.	.	
16.017	13.4809	61.34	.	Q	.	V	.	.	.	
16.033	13.5755	68.70	.	Q	.	V	.	.	.	
16.050	13.6802	76.06	.	Q	.	V	.	.	.	
16.067	13.7951	83.42	.	Q	.	V	.	.	.	
16.083	13.9202	90.78	.	Q	.	V	.	.	.	
16.100	14.0554	98.14	.	Q	.	V	.	.	.	
16.117	14.2007	105.50	.	Q	.	V	.	.	.	
16.133	14.3561	112.86	.	Q	.	V	.	.	.	
16.150	14.5217	120.22	.	Q	.	V	.	.	.	
16.167	14.6974	127.58	.	Q	.	V	.	.	.	
16.183	14.8833	134.93	.	Q	.	V	.	.	.	
16.200	15.0793	142.29	.	Q	.	V	.	.	.	
16.217	15.2854	149.65	.	Q	.	V	.	.	.	
16.233	15.5017	157.01	.	Q	.	V	.	.	.	
16.250	15.7281	164.37	.	Q	.	V	.	.	.	
16.267	15.9647	171.73	.	Q	.	V	.	.	.	
16.283	16.2113	179.09	.	Q	.	V	.	.	.	
16.300	16.4682	186.45	.	Q	.	V	.	.	.	
16.317	16.7351	193.81	.	Q	.	V	.	.	.	
16.333	17.0103	199.77	.	Q	.	V	.	.	.	
16.350	17.2715	189.62	.	Q	.	V	.	.	.	
16.367	17.5209	181.09	.	Q	.	V	.	.	.	
16.383	17.7586	172.56	.	Q	.	V	.	.	.	
16.400	17.9845	164.02	.	Q	.	V	.	.	.	
16.417	18.1987	155.49	.	Q	.	V	.	.	.	
16.433	18.4011	146.96	.	Q	.	V	.	.	.	
16.450	18.5918	138.43	.	Q	.	V	.	.	.	
16.467	18.7707	129.89	.	Q	.	V	.	.	.	
16.483	18.9379	121.36	.	Q	.	V	.	.	.	
16.500	19.0933	112.83	.	Q	.	V	.	.	.	
16.517	19.2369	104.30	.	Q	.	V	.	.	.	
16.533	19.3688	95.77	.	Q	.	V	.	.	.	
16.550	19.4890	87.23	.	Q	.	V	.	.	.	
16.567	19.5974	78.70	.	Q	.	V	.	.	.	
16.583	19.6941	70.17	.	Q	.	V	.	.	.	
16.600	19.7790	61.64	.	Q	.	V	.	.	.	

Offsite Area Flood Routing

Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24

2-Year Storm Existing Condition

16.617	19.8521	53.11	.		Q	.	V	.		
16.633	19.9135	44.57	.		Q	.	V	.		
16.650	19.9639	36.62	.		Q	.	V	.		
16.667	20.0115	34.51	.	Q	.	.	.V	.		
16.683	20.0582	33.93	.	Q	.	.	.V	.		
16.700	20.1042	33.36	.	Q	.	.	.V	.		
16.717	20.1493	32.78	.	Q	.	.	.V	.		
16.733	20.1937	32.20	.	Q	.	.	.V	.		
16.750	20.2372	31.63	.	Q	.	.	.V	.		
16.767	20.2800	31.05	.	Q	.	.	.V	.		
16.783	20.3220	30.47	.	Q	.	.	.V	.		
16.800	20.3632	29.90	.	Q	.	.	.V	.		
16.817	20.4035	29.32	.	Q	.	.	.V	.		
16.833	20.4431	28.74	.	Q	.	.	.V	.		
16.850	20.4819	28.17	.	Q	.	.	.V	.		
16.867	20.5199	27.59	.	Q	.	.	.V	.		
16.883	20.5571	27.01	.	Q	.	.	.V	.		
16.900	20.5935	26.44	.	Q	.	.	.V	.		
16.917	20.6292	25.86	.	Q	.	.	. V	.		
16.933	20.6640	25.28	.	Q	.	.	. V	.		
16.950	20.6980	24.70	.	Q	.	.	. V	.		
16.967	20.7313	24.13	.	Q	.	.	. V	.		
16.983	20.7639	23.74	.	Q	.	.	. V	.		
17.000	20.7963	23.49	.	Q	.	.	. V	.		
17.017	20.8283	23.24	.	Q	.	.	. V	.		
17.033	20.8600	22.99	.	Q	.	.	. V	.		
17.050	20.8913	22.74	.	Q	.	.	. V	.		
17.067	20.9223	22.49	.	Q	.	.	. V	.		
17.083	20.9529	22.24	.	Q	.	.	. V	.		
17.100	20.9832	21.99	.	Q	.	.	. V	.		
17.117	21.0131	21.74	.	Q	.	.	. V	.		
17.133	21.0427	21.49	.	Q	.	.	. V	.		
17.150	21.0720	21.24	.	Q	.	.	. V	.		
17.167	21.1009	20.99	.	Q	.	.	. V	.		
17.183	21.1295	20.74	.	Q	.	.	. V	.		
17.200	21.1577	20.49	.	Q	.	.	. V	.		
17.217	21.1856	20.24	.	Q	.	.	. V	.		
17.233	21.2131	19.99	.	Q	.	.	. V	.		
17.250	21.2403	19.74	.	Q	.	.	. V	.		
17.267	21.2672	19.49	.	Q	.	.	. V	.		
17.283	21.2937	19.24	.	Q	.	.	. V	.		
17.300	21.3199	19.02	.	Q	.	.	. V	.		
17.317	21.3459	18.87	.	Q	.	.	. V	.		
17.333	21.3717	18.73	.	Q	.	.	. V	.		
17.350	21.3973	18.58	.	Q	.	.	. V	.		
17.367	21.4226	18.43	.	Q	.	.	. V	.		
17.383	21.4478	18.28	.	Q	.	.	. V	.		
17.400	21.4728	18.14	.	Q	.	.	. V	.		
17.417	21.4976	17.99	.	Q	.	.	. V	.		
17.433	21.5222	17.84	.	Q	.	.	. V	.		
17.450	21.5465	17.69	.	Q	.	.	. V	.		
17.467	21.5707	17.55	.	Q	.	.	. V	.		
17.483	21.5947	17.40	.	Q	.	.	. V	.		
17.500	21.6184	17.25	.	Q	.	.	. V	.		
17.517	21.6420	17.11	.	Q	.	.	. V	.		
17.533	21.6654	16.96	.	Q	.	.	. V	.		
17.550	21.6885	16.81	.	Q	.	.	. V	.		
17.567	21.7115	16.66	.	Q	.	.	. V	.		
17.583	21.7342	16.52	.	Q	.	.	. V	.		
17.600	21.7568	16.37	.	Q	.	.	. V	.		
17.617	21.7791	16.23	.	Q	.	.	. V	.		
17.633	21.8013	16.13	.	Q	.	.	. V	.		
17.650	21.8234	16.03	.	Q	.	.	. V	.		
17.667	21.8454	15.94	.	Q	.	.	. V	.		
17.683	21.8672	15.85	.	Q	.	.	. V	.		
17.700	21.8889	15.75	.	Q	.	.	. V	.		
17.717	21.9105	15.66	.	Q	.	.	. V	.		
17.733	21.9319	15.57	.	Q	.	.	. V	.		
17.750	21.9532	15.47	.	Q	.	.	. V	.		
17.767	21.9744	15.38	.	Q	.	.	. V	.		
17.783	21.9955	15.29	.	Q	.	.	. V	.		
17.800	22.0164	15.20	.	Q	.	.	. V	.		
17.817	22.0372	15.10	.	Q	.	.	. V	.		
17.833	22.0579	15.01	.	Q	.	.	. V	.		
17.850	22.0784	14.92	.	Q	.	.	. V	.		
17.867	22.0988	14.82	.	Q	.	.	. V	.		
17.883	22.1191	14.73	.	Q	.	.	. V	.		
17.900	22.1393	14.64	.	Q	.	.	. V	.		
17.917	22.1593	14.55	.	Q	.	.	. V	.		
17.933	22.1792	14.45	.	Q	.	.	. V	.		
17.950	22.1990	14.35	.	Q	.	.	. V	.		
17.967	22.2186	14.24	.	Q	.	.	. V	.		
17.983	22.2381	14.13	.	Q	.	.	. V	.		
18.000	22.2574	14.01	.	Q	.	.	. V	.		

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	880.0
20%	275.0
30%	180.0
40%	150.0
50%	125.0
60%	105.0
70%	75.0
80%	50.0
90%	25.0

END OF FLOODSCx ROUTING ANALYSIS

```
**************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
        (c) Copyright 1989-2016 Advanced Engineering Software (aes)
            Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                        Analysis prepared by:

                        HUNSAKER & ASSOCIATES
                              Irvine,Inc
                    Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                  *
* 25-YEAR STORM EXISTING CONDITION OFFSITE RUN-ON AT RANCHO PARKWAY NODE 24*
* W.O. #1443-136X                                                        *
 **************************************************************************

  FILE NAME: FL-25X.DAT
  TIME/DATE OF STUDY: 14:36 11/07/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE     24.00 IS CODE = 1.2
--------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
==========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =  227.90
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.061
    LOW LOSS FRACTION = 0.199
    TIME OF CONCENTRATION(MIN.) = 17.27
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =  25
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.87
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.15
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.94
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  2.71
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  4.49

--------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =    64.53
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =    20.75

--------------------------------------------------------------------------

==========================================================================

                    2 4 - H O U R    S T O R M
                  R U N O F F    H Y D R O G R A P H

==========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
--------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.      118.9     237.7     356.6     475.4
--------------------------------------------------------------------------
  14.000     22.3090     48.75  .   Q     .  V      .         .         .
  14.017     22.3764     48.88  .   Q     .  V      .         .         .
  14.033     22.4439     49.00  .   Q     .  V      .         .         .
  14.050     22.5115     49.13  .   Q     .  V      .         .         .
  14.067     22.5794     49.25  .   Q     .  V      .         .         .
  14.083     22.6474     49.38  .   Q     .   V     .         .         .
  14.100     22.7156     49.51  .   Q     .   V     .         .         .
  14.117     22.7840     49.63  .   Q     .   V     .         .         .
  14.133     22.8525     49.76  .   Q     .   V     .         .         .
  14.150     22.9212     49.88  .   Q     .   V     .         .         .
  14.167     22.9901     50.01  .   Q     .   V     .         .         .
  14.183     23.0591     50.14  .   Q     .   V     .         .         .
  14.200     23.1284     50.26  .   Q     .   V     .         .         .
  14.217     23.1978     50.39  .   Q     .   V     .         .         .
  14.233     23.2674     50.51  .   Q     .   V     .         .         .
  14.250     23.3371     50.64  .   Q     .   V     .         .         .
  14.267     23.4070     50.76  .   Q     .   V     .         .         .
  14.283     23.4772     50.94  .   Q     .   V     .         .         .
  14.300     23.5479     51.32  .   Q     .   V     .         .         .
  14.317     23.6191     51.72  .   Q     .   V     .         .         .
  14.333     23.6909     52.12  .   Q     .   V     .         .         .
  14.350     23.7633     52.52  .   Q     .   V     .         .         .
  14.367     23.8362     52.92  .   Q     .   V     .         .         .
  14.383     23.9096     53.32  .   Q     .   V     .         .         .
  14.400     23.9836     53.72  .   Q     .   V     .         .         .
  14.417     24.0581     54.12  .   Q     .   V     .         .         .
  14.433     24.1332     54.52  .   Q     .   V     .         .         .
  14.450     24.2089     54.92  .   Q     .    V    .         .         .
  14.467     24.2851     55.32  .   Q     .    V    .         .         .
  14.483     24.3618     55.72  .   Q     .    V    .         .         .
  14.500     24.4391     56.12  .   Q     .    V    .         .         .
  14.517     24.5170     56.52  .   Q     .    V    .         .         .
  14.533     24.5954     56.92  .   Q     .    V    .         .         .
  14.550     24.6743     57.32  .   Q     .    V    .         .         .
  14.567     24.7538     57.71  .   Q     .    V    .         .         .
  14.583     24.8337     58.01  .   Q     .    V    .         .         .
  14.600     24.9140     58.29  .   Q     .    V    .         .         .
  14.617     24.9946     58.56  .   Q     .    V    .         .         .
  14.633     25.0757     58.84  .   Q     .    V    .         .         .
  14.650     25.1571     59.12  .   Q     .    V    .         .         .
  14.667     25.2389     59.39  .   Q     .    V    .         .         .
```

Offsite Area Flood Routing

Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24

25-Year Storm Existing Condition

14.683	25.3211	59.67	. Q . V . . .
14.700	25.4037	59.94	. Q . V . . .
14.717	25.4866	60.22	. Q . V . . .
14.733	25.5700	60.50	. Q . V . . .
14.750	25.6537	60.77	. Q . V . . .
14.767	25.7378	61.05	. Q . V . . .
14.783	25.8222	61.33	. Q . V . . .
14.800	25.9071	61.60	. Q . V . . .
14.817	25.9923	61.88	. Q . V . . .
14.833	26.0779	62.16	. Q . V . . .
14.850	26.1639	62.43	. Q . V . . .
14.867	26.2507	63.00	. Q . V . . .
14.883	26.3385	63.76	. Q . V . . .
14.900	26.4274	64.53	. Q . V . . .
14.917	26.5174	65.30	. Q . V . . .
14.933	26.6084	66.07	. Q . V . . .
14.950	26.7005	66.84	. Q . V . . .
14.967	26.7936	67.61	. Q . V . . .
14.983	26.8878	68.38	. Q . V . . .
15.000	26.9830	69.15	. Q . V . . .
15.017	27.0793	69.92	. Q . V . . .
15.033	27.1767	70.69	. Q . V . . .
15.050	27.2751	71.46	. Q . V . . .
15.067	27.3746	72.23	. Q . V . . .
15.083	27.4752	73.00	. Q . V . . .
15.100	27.5768	73.77	. Q . V . . .
15.117	27.6795	74.54	. Q . V . . .
15.133	27.7832	75.31	. Q . V . . .
15.150	27.8879	76.01	. Q . V . . .
15.167	27.9934	76.59	. Q . V . . .
15.183	28.0997	77.16	. Q . V . . .
15.200	28.2067	77.73	. Q . V . . .
15.217	28.3146	78.30	. Q . V . . .
15.233	28.4232	78.87	. Q . V . . .
15.250	28.5326	79.44	. Q . V . . .
15.267	28.6428	80.01	. Q . V . . .
15.283	28.7538	80.58	. Q . V . . .
15.300	28.8656	81.15	. Q . V . . .
15.317	28.9782	81.72	. Q . V . . .
15.333	29.0915	82.29	. Q . V . . .
15.350	29.2057	82.86	. Q . V . . .
15.367	29.3206	83.43	. Q . V . . .
15.383	29.4363	84.00	. Q . V . . .
15.400	29.5528	84.57	. Q . V . . .
15.417	29.6701	85.14	. Q . V . . .
15.433	29.7882	85.78	. Q . V . . .
15.450	29.9078	86.78	. Q . V . . .
15.467	30.0287	87.83	. Q . V . . .
15.483	30.1512	88.88	. Q . V . . .
15.500	30.2750	89.93	. Q . V . . .
15.517	30.4004	90.98	. Q . V . . .
15.533	30.5271	92.03	. Q . V . . .
15.550	30.6553	93.08	. Q . V. . .
15.567	30.7850	94.13	. Q . V. . .
15.583	30.9161	95.18	. Q . V. . .
15.600	31.0486	96.23	. Q . V. . .
15.617	31.1826	97.28	. Q . V. . .
15.633	31.3181	98.33	. Q . V. . .
15.650	31.4550	99.38	. Q . V. . .
15.667	31.5933	100.43	. Q . V. . .
15.683	31.7331	101.48	. Q . V. . .
15.700	31.8743	102.53	. Q . V. . .
15.717	32.0171	103.65	. Q . V. . .
15.733	32.1632	106.13	. Q . V. . .
15.750	32.3136	109.14	. Q. V . . .
15.767	32.4680	112.14	. Q. V . . .
15.783	32.6266	115.15	. Q. V . . .
15.800	32.7894	118.15	. Q. V . . .
15.817	32.9563	121.15	. Q V . . .
15.833	33.1273	124.16	. Q V . . .
15.850	33.3024	127.16	. Q V . . .
15.867	33.4817	130.17	. Q V . . .
15.883	33.6652	133.17	. .Q V . . .
15.900	33.8527	136.18	. .Q V . . .
15.917	34.0444	139.18	. .Q .V . . .
15.933	34.2403	142.18	. .Q .V . . .
15.950	34.4403	145.19	. . Q .V . . .
15.967	34.6444	148.19	. . Q .V . . .
15.983	34.8526	151.20	. . Q .V . . .
16.000	35.0650	154.20	. . Q .V . . .
16.017	35.2923	164.96	. . Q .V . . .
16.033	35.5450	183.47	. . Q . V . . .
16.050	35.8232	201.99	. . Q . V . . .
16.067	36.1269	220.50	. . Q . V . . .
16.083	36.4561	239.01	. . Q V . . .
16.100	36.8108	257.52	. . .QV . . .
16.117	37.1911	276.04	. . . Q . . .
16.133	37.5968	294.55	. . . VQ . . .
16.150	38.0280	313.06	. . . V Q . . .
16.167	38.4847	331.57	. . . V Q . . .
16.183	38.9669	350.09	. . . V Q. . .
16.200	39.4746	368.60	. . . V .Q . . .
16.217	40.0078	387.11	. . . V . Q . . .
16.233	40.5666	405.63	. . . V . Q . . .
16.250	41.1508	424.14	. . . V . Q . . .
16.267	41.7605	442.65	. . . V . Q . . .
16.283	42.3957	461.16	. . . V . Q . . .
16.300	43.0505	475.42	. . . V . Q . . .
16.317	43.6677	448.07	. . . V . Q . . .
16.333	44.2543	425.83	. . . V . Q . . .
16.350	44.8102	403.59	. . . V . Q . . .
16.367	45.3354	381.35	. . . V . Q . . .
16.383	45.8301	359.11	. . . V Q . . .
16.400	46.2941	336.87	. . . Q . . .
16.417	46.7275	314.63	. . . Q V . . .
16.433	47.1302	292.40	. . . Q V. . .
16.450	47.5023	270.16	. . . Q V. . .
16.467	47.8438	247.92	. . . Q V. . .
16.483	48.1547	225.68	. . . Q . V. . .
16.500	48.4349	203.44	. . . Q . V . . .
16.517	48.6845	181.20	. . Q . V . . .
16.533	48.9034	158.96	. . Q . V . . .
16.550	49.0917	136.72	. .Q . V . . .
16.567	49.2494	114.48	. Q. . V . . .
16.583	49.3795	94.46	. Q . V . . .
16.600	49.5036	90.08	. Q . V . . .

Offsite Area Flood Routing

Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24

25-Year Storm Existing Condition

```
  16.617    49.6259    88.75  .      Q  .         .         V         .
  16.633    49.7463    87.42  .      Q  .         .         V         .
  16.650    49.8649    86.09  .      Q  .         .         V         .
  16.667    49.9816    84.76  .      Q  .         .         V         .
  16.683    50.0965    83.44  .      Q  .         .         .V        .
  16.700    50.2096    82.11  .     Q   .         .         .V        .
  16.717    50.3209    80.78  .     Q   .         .         .V        .
  16.733    50.4303    79.45  .     Q   .         .         .V        .
  16.750    50.5379    78.12  .     Q   .         .         .V        .
  16.767    50.6437    76.79  .     Q   .         .         .V        .
  16.783    50.7477    75.46  .     Q   .         .         .V        .
  16.800    50.8498    74.14  .     Q   .         .         .V        .
  16.817    50.9501    72.81  .     Q   .         .         .V        .
  16.833    51.0485    71.48  .     Q   .         .         .V        .
  16.850    51.1451    70.15  .    Q    .         .         .V        .
  16.867    51.2400    68.83  .    Q    .         .         .V        .
  16.883    51.3334    67.83  .    Q    .         .         .V        .
  16.900    51.4256    66.98  .    Q    .         .         .V        .
  16.917    51.5167    66.13  .    Q    .         .         .V        .
  16.933    51.6067    65.29  .    Q    .         .         .V        .
  16.950    51.6954    64.44  .    Q    .         .         . V       .
  16.967    51.7830    63.59  .    Q    .         .         . V       .
  16.983    51.8694    62.75  .    Q    .         .         . V       .
  17.000    51.9547    61.90  .    Q    .         .         . V       .
  17.017    52.0388    61.05  .    Q    .         .         . V       .
  17.033    52.1217    60.21  .    Q    .         .         . V       .
  17.050    52.2035    59.36  .   Q     .         .         . V       .
  17.067    52.2841    58.51  .   Q     .         .         . V       .
  17.083    52.3635    57.67  .   Q     .         .         . V       .
  17.100    52.4418    56.82  .   Q     .         .         . V       .
  17.117    52.5189    55.97  .   Q     .         .         . V       .
  17.133    52.5948    55.13  .   Q     .         .         . V       .
  17.150    52.6696    54.28  .   Q     .         .         . V       .
  17.167    52.7434    53.62  .   Q     .         .         . V       .
  17.183    52.8167    53.20  .   Q     .         .         . V       .
  17.200    52.8894    52.79  .   Q     .         .         . V       .
  17.217    52.9616    52.37  .   Q     .         .         . V       .
  17.233    53.0331    51.96  .   Q     .         .         . V       .
  17.250    53.1041    51.55  .   Q     .         .         . V       .
  17.267    53.1746    51.13  .   Q     .         .         . V       .
  17.283    53.2444    50.72  .   Q     .         .         .  V      .
  17.300    53.3137    50.30  .   Q     .         .         .  V      .
  17.317    53.3824    49.89  .   Q     .         .         .  V      .
  17.333    53.4506    49.48  .   Q     .         .         .  V      .
  17.350    53.5182    49.06  .   Q     .         .         .  V      .
  17.367    53.5852    48.65  .   Q     .         .         .  V      .
  17.383    53.6516    48.24  .   Q     .         .         .  V      .
  17.400    53.7175    47.82  .   Q     .         .         .  V      .
  17.417    53.7828    47.41  .  Q      .         .         .  V      .
  17.433    53.8475    46.99  .  Q      .         .         .  V      .
  17.450    53.9117    46.61  .  Q      .         .         .  V      .
  17.467    53.9755    46.32  .  Q      .         .         .  V      .
  17.483    54.0389    46.03  .  Q      .         .         .  V      .
  17.500    54.1019    45.75  .  Q      .         .         .  V      .
  17.517    54.1645    45.46  .  Q      .         .         .  V      .
  17.533    54.2268    45.18  .  Q      .         .         .  V      .
  17.550    54.2886    44.89  .  Q      .         .         .  V      .
  17.567    54.3500    44.61  .  Q      .         .         .  V      .
  17.583    54.4111    44.32  .  Q      .         .         .  V      .
  17.600    54.4717    44.04  .  Q      .         .         .  V      .
  17.617    54.5320    43.75  .  Q      .         .         .  V      .
  17.633    54.5919    43.47  .  Q      .         .         .  V      .
  17.650    54.6514    43.18  .  Q      .         .         .  V      .
  17.667    54.7104    42.90  .  Q      .         .         .  V      .
  17.683    54.7691    42.61  .  Q      .         .         .  V      .
  17.700    54.8274    42.33  .  Q      .         .         .  V      .
  17.717    54.8853    42.04  .  Q      .         .         .   V     .
  17.733    54.9429    41.76  .  Q      .         .         .   V     .
  17.750    55.0001    41.54  .  Q      .         .         .   V     .
  17.767    55.0570    41.33  .  Q      .         .         .   V     .
  17.783    55.1136    41.11  .  Q      .         .         .   V     .
  17.800    55.1700    40.90  .  Q      .         .         .   V     .
  17.817    55.2260    40.69  .  Q      .         .         .   V     .
  17.833    55.2818    40.48  .  Q      .         .         .   V     .
  17.850    55.3372    40.27  .  Q      .         .         .   V     .
  17.867    55.3924    40.06  .  Q      .         .         .   V     .
  17.883    55.4473    39.84  .  Q      .         .         .   V     .
  17.900    55.5019    39.63  .  Q      .         .         .   V     .
  17.917    55.5562    39.42  .  Q      .         .         .   V     .
  17.933    55.6102    39.21  .  Q      .         .         .   V     .
  17.950    55.6639    39.00  .  Q      .         .         .   V     .
  17.967    55.7174    38.79  .  Q      .         .         .   V     .
  17.983    55.7705    38.58  .  Q      .         .         .   V     .
  18.000    55.8233    38.36  .  Q      .         .         .   V     .
--------------------------------------------------------------------------------
   TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
   (Note: 100% of Peak Flow Rate estimate assumed to have
   an instantaneous time duration)

   Percentile of Estimated                Duration
       Peak Flow Rate                     (minutes)
   =======================                =========
              0%                            1081.0
             10%                            1050.0
             20%                             300.0
             30%                             180.0
             40%                             140.0
             50%                             120.0
             60%                              95.0
             70%                              70.0
             80%                              50.0
             90%                              20.0
============================================================================

 END OF FLOODSCx ROUTING ANALYSIS
```

```
******************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
         (c) Copyright 1989-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                      Planning * Engineering * Surveying
               Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                    *
* 100-YEAR STORM EXIST. CONDITION OFFSITE RUN-ON AT RANCHO PARKWAY NODE 24 *
* W.O. #1443-136X                                                          *
 **************************************************************************

  FILE NAME: FL-100X.DAT
  TIME/DATE OF STUDY: 14:40 11/07/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


******************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE     24.00 IS CODE = 1.2
------------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
==============================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =  227.90
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.061
    LOW LOSS FRACTION = 0.108
    TIME OF CONCENTRATION(MIN.) = 16.69
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.52
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.09
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.45
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.43
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.36
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.63

------------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =    86.98
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =    19.95

------------------------------------------------------------------------------

==============================================================================

                      2 4 - H O U R    S T O R M
                   R U N O F F    H Y D R O G R A P H

==============================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
------------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.      154.6     309.2     463.7     618.3
------------------------------------------------------------------------------
  14.000     31.1788     65.76  .   Q     .   V     .         .         .
  14.017     31.2699     66.09  .   Q     .   V     .         .         .
  14.033     31.3614     66.42  .   Q     .   V     .         .         .
  14.050     31.4533     66.75  .   Q     .   V     .         .         .
  14.067     31.5456     67.04  .   Q     .   V     .         .         .
  14.083     31.6383     67.26  .   Q     .   V     .         .         .
  14.100     31.7312     67.48  .   Q     .   V     .         .         .
  14.117     31.8245     67.69  .   Q     .   V     .         .         .
  14.133     31.9180     67.91  .   Q     .   V     .         .         .
  14.150     32.0118     68.13  .   Q     .   V     .         .         .
  14.167     32.1060     68.34  .   Q     .   V     .         .         .
  14.183     32.2004     68.56  .   Q     .   V     .         .         .
  14.200     32.2952     68.78  .   Q     .   V     .         .         .
  14.217     32.3902     68.99  .   Q     .   V     .         .         .
  14.233     32.4855     69.21  .   Q     .   V     .         .         .
  14.250     32.5811     69.43  .   Q     .   V     .         .         .
  14.267     32.6771     69.64  .   Q     .    V    .         .         .
  14.283     32.7733     69.86  .   Q     .    V    .         .         .
  14.300     32.8698     70.08  .   Q     .   V     .         .         .
  14.317     32.9666     70.29  .   Q     .   V     .         .         .
  14.333     33.0638     70.51  .   Q     .   V     .         .         .
  14.350     33.1614     70.91  .   Q     .   V     .         .         .
  14.367     33.2598     71.42  .   Q     .   V     .         .         .
  14.383     33.3589     71.93  .   Q     .   V     .         .         .
  14.400     33.4587     72.43  .   Q     .   V     .         .         .
  14.417     33.5591     72.94  .   Q     .   V     .         .         .
  14.433     33.6603     73.45  .   Q     .   V     .         .         .
  14.450     33.7622     73.96  .   Q     .   V     .         .         .
  14.467     33.8647     74.46  .   Q     .   V     .         .         .
  14.483     33.9680     74.97  .   Q     .   V     .         .         .
  14.500     34.0720     75.48  .   Q     .   V     .         .         .
  14.517     34.1766     75.99  .   Q     .   V     .         .         .
  14.533     34.2820     76.49  .   Q     .   V     .         .         .
  14.550     34.3880     77.00  .   Q     .   V     .         .         .
  14.567     34.4948     77.51  .    Q    .   V     .         .         .
  14.583     34.6023     78.01  .    Q    .   V     .         .         .
  14.600     34.7104     78.52  .    Q    .   V     .         .         .
  14.617     34.8192     79.01  .    Q    .    V    .         .         .
  14.633     34.9286     79.36  .    Q    .    V    .         .         .
  14.650     35.0383     79.69  .    Q    .   V     .         .         .
  14.667     35.1485     80.01  .    Q    .    V    .         .         .
```

Offsite Area Flood Routing

Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24

100-Year Storm Existing Condition

14.683	35.2592	80.34	.	Q	.	V	.	.	.
14.700	35.3703	80.67	.	Q	.	V	.	.	.
14.717	35.4819	80.99	.	Q	.	V	.	.	.
14.733	35.5939	81.32	.	Q	.	V	.	.	.
14.750	35.7063	81.64	.	Q	.	V	.	.	.
14.767	35.8192	81.97	.	Q	.	V	.	.	.
14.783	35.9326	82.29	.	Q	.	V	.	.	.
14.800	36.0464	82.62	.	Q	.	V	.	.	.
14.817	36.1606	82.94	.	Q	.	V	.	.	.
14.833	36.2753	83.27	.	Q	.	V	.	.	.
14.850	36.3905	83.60	.	Q	.	V	.	.	.
14.867	36.5061	83.92	.	Q	.	V	.	.	.
14.883	36.6221	84.25	.	Q	.	V	.	.	.
14.900	36.7388	84.74	.	Q	.	V	.	.	.
14.917	36.8568	85.63	.	Q	.	V	.	.	.
14.933	36.9760	86.54	.	Q	.	V	.	.	.
14.950	37.0964	87.45	.	Q	.	V	.	.	.
14.967	37.2181	88.35	.	Q	.	V	.	.	.
14.983	37.3411	89.26	.	Q	.	V	.	.	.
15.000	37.4653	90.17	.	Q	.	V	.	.	.
15.017	37.5907	91.08	.	Q	.	V	.	.	.
15.033	37.7174	91.98	.	Q	.	V	.	.	.
15.050	37.8454	92.89	.	Q	.	V	.	.	.
15.067	37.9746	93.80	.	Q	.	V	.	.	.
15.083	38.1050	94.71	.	Q	.	V	.	.	.
15.100	38.2367	95.61	.	Q	.	V	.	.	.
15.117	38.3697	96.52	.	Q	.	V	.	.	.
15.133	38.5039	97.43	.	Q	.	V	.	.	.
15.150	38.6393	98.34	.	Q	.	V	.	.	.
15.167	38.7760	99.24	.	Q	.	V	.	.	.
15.183	38.9138	100.05	.	Q	.	V	.	.	.
15.200	39.0526	100.78	.	Q	.	V	.	.	.
15.217	39.1925	101.51	.	Q	.	V	.	.	.
15.233	39.3333	102.23	.	Q	.	V	.	.	.
15.250	39.4751	102.96	.	Q	.	V	.	.	.
15.267	39.6179	103.69	.	Q	.	V	.	.	.
15.283	39.7618	104.42	.	Q	.	V	.	.	.
15.300	39.9066	105.15	.	Q	.	V	.	.	.
15.317	40.0524	105.88	.	Q	.	V	.	.	.
15.333	40.1993	106.60	.	Q	.	V	.	.	.
15.350	40.3471	107.33	.	Q	.	V	.	.	.
15.367	40.4960	108.06	.	Q	.	V	.	.	.
15.383	40.6458	108.79	.	Q	.	V	.	.	.
15.400	40.7967	109.52	.	Q	.	V	.	.	.
15.417	40.9485	110.25	.	Q	.	V	.	.	.
15.433	41.1014	110.97	.	Q	.	V	.	.	.
15.450	41.2553	111.77	.	Q	.	V	.	.	.
15.467	41.4114	113.28	.	Q	.	V.	.	.	.
15.483	41.5697	114.98	.	Q	.	V.	.	.	.
15.500	41.7304	116.67	.	Q	.	V.	.	.	.
15.517	41.8935	118.37	.	Q	.	V.	.	.	.
15.533	42.0588	120.06	.	Q	.	V.	.	.	.
15.550	42.2266	121.75	.	Q	.	V.	.	.	.
15.567	42.3966	123.45	.	Q	.	V.	.	.	.
15.583	42.5690	125.14	.	Q	.	V.	.	.	.
15.600	42.7437	126.84	.	Q	.	V.	.	.	.
15.617	42.9207	128.53	.	Q	.	V.	.	.	.
15.633	43.1001	130.23	.	Q	.	V.	.	.	.
15.650	43.2818	131.92	.	Q	.	V.	.	.	.
15.667	43.4659	133.62	.	Q	.	V.	.	.	.
15.683	43.6522	135.31	.	Q	.	V	.	.	.
15.700	43.8410	137.01	.	Q	.	V	.	.	.
15.717	44.0320	138.70	.	Q	.	V	.	.	.
15.733	44.2259	140.80	.	Q.	.	V	.	.	.
15.750	44.4244	144.10	.	Q.	.	V	.	.	.
15.767	44.6275	147.48	.	Q.	.	V	.	.	.
15.783	44.8353	150.86	.	Q.	.	V	.	.	.
15.800	45.0478	154.24	.	Q.	.	V	.	.	.
15.817	45.2649	157.62	.	Q	.	V	.	.	.
15.833	45.4867	161.00	.	Q	.	V	.	.	.
15.850	45.7131	164.38	.	Q	.	.V	.	.	.
15.867	45.9442	167.76	.	Q	.	.V	.	.	.
15.883	46.1799	171.14	.	.Q	.	.V	.	.	.
15.900	46.4203	174.52	.	.Q	.	.V	.	.	.
15.917	46.6653	177.90	.	.Q	.	.V	.	.	.
15.933	46.9150	181.28	.	.Q	.	.V	.	.	.
15.950	47.1694	184.66	.	.Q	.	.V	.	.	.
15.967	47.4284	188.04	.	. Q	.	.V	.	.	.
15.983	47.6921	191.42	.	. Q	.	.V	.	.	.
16.000	47.9604	194.80	.	. Q	.	. V	.	.	.
16.017	48.2484	209.13	.	. Q	.	. V	.	.	.
16.033	48.5713	234.41	.	. Q	.	. V	.	.	.
16.050	48.9290	259.68	.	. Q	.	. V	.	.	.
16.067	49.3215	284.96	.	. Q	.	. V	.	.	.
16.083	49.7488	310.23	.	. Q	.	V	.	.	.
16.100	50.2109	335.51	.	. Q	.	V	.	.	.
16.117	50.7079	360.78	.	.	.	Q	.	.	.
16.133	51.2396	386.05	.	.	.	VQ	.	.	.
16.150	51.8062	411.33	.	.	.	V	Q	.	.
16.167	52.4076	436.60	.	.	.	V	Q	.	.
16.183	53.0438	461.88	.	.	.	V	Q.	.	.
16.200	53.7148	487.15	.	.	.	V	.Q	.	.
16.217	54.4206	512.43	.	.	.	V	. Q	.	.
16.233	55.1612	537.70	.	.	.	V	. Q	.	.
16.250	55.9367	562.97	.	.	.	V	. Q	.	.
16.267	56.7469	588.25	.	.	.	V	. Q	.	.
16.283	57.5986	618.32	.	.	.	V	. Q	.	.
16.300	58.4170	594.10	.	.	.	V	. Q	.	.
16.317	59.1941	564.20	.	.	.	V	. Q	.	.
16.333	59.9300	534.30	.	.	.	V	. Q	.	.
16.350	60.6248	504.39	.	.	.	V	. Q	.	.
16.367	61.2784	474.49	.	.	.	V Q	.	.	.
16.383	61.8907	444.59	.	.	.	Q	.	.	.
16.400	62.4619	414.69	.	.	.	Q V	.	.	.
16.417	62.9920	384.79	.	.	.	Q	V	.	.
16.433	63.4808	354.88	.	.	. Q	.	V.	.	.
16.450	63.9284	324.98	.	.	.Q	.	V.	.	.
16.467	64.3348	295.08	.	.	Q.	.	V.	.	.
16.483	64.7001	265.18	.	.	Q	.	V.	.	.
16.500	65.0242	235.27	.	.	Q	.	V.	.	.
16.517	65.3071	205.37	.	. Q	.	.	V	.	.
16.533	65.5487	175.47	.	.Q	.	.	V	.	.
16.550	65.7493	145.57	.	Q.	.	.	V	.	.
16.567	65.9160	121.09	.	Q	.	.	V	.	.
16.583	66.0777	117.37	.	Q	.	.	V	.	.
16.600	66.2370	115.68	.	Q	.	.	V	.	.

16.617	66.3941	114.00	.	Q	.	.	V	.		
16.633	66.5488	112.32	.	Q	.	.	V	.		
16.650	66.7012	110.64	.	Q	.	.	V	.		
16.667	66.8512	108.95	.	Q	.	.	V	.		
16.683	66.9990	107.27	.	Q	.	.	V	.		
16.700	67.1444	105.59	.	Q	.	.	V	.		
16.717	67.2876	103.90	.	Q	.	.	V	.		
16.733	67.4284	102.22	.	Q	.	.	.V	.		
16.750	67.5668	100.54	.	Q	.	.	.V	.		
16.767	67.7030	98.85	.	Q	.	.	.V	.		
16.783	67.8368	97.17	.	Q	.	.	.V	.		
16.800	67.9684	95.49	.	Q	.	.	.V	.		
16.817	68.0976	93.81	.	Q	.	.	.V	.		
16.833	68.2245	92.12	.	Q	.	.	.V	.		
16.850	68.3494	90.74	.	Q	.	.	.V	.		
16.867	68.4730	89.74	.	Q	.	.	.V	.		
16.883	68.5953	88.74	.	Q	.	.	.V	.		
16.900	68.7161	87.74	.	Q	.	.	.V	.		
16.917	68.8356	86.75	.	Q	.	.	.V	.		
16.933	68.9537	85.75	.	Q	.	.	.V	.		
16.950	69.0705	84.75	.	Q	.	.	.V	.		
16.967	69.1858	83.75	.	Q	.	.	.V	.		
16.983	69.2998	82.76	.	Q	.	.	.V	.		
17.000	69.4124	81.76	.	Q	.	.	.V	.		
17.017	69.5237	80.76	.	Q	.	.	.V	.		
17.033	69.6336	79.77	.	Q	.	.	. V	.		
17.050	69.7421	78.77	.	Q	.	.	. V	.		
17.067	69.8492	77.77	.	Q	.	.	. V	.		
17.083	69.9549	76.77	.	Q	.	.	. V	.		
17.100	70.0593	75.78	.	Q	.	.	. V	.		
17.117	70.1623	74.79	.	Q	.	.	. V	.		
17.133	70.2643	74.06	.	Q	.	.	. V	.		
17.150	70.3655	73.43	.	Q	.	.	. V	.		
17.167	70.4658	72.80	.	Q	.	.	. V	.		
17.183	70.5652	72.18	.	Q	.	.	. V	.		
17.200	70.6637	71.55	.	Q	.	.	. V	.		
17.217	70.7614	70.92	.	Q	.	.	. V	.		
17.233	70.8582	70.30	.	Q	.	.	. V	.		
17.250	70.9542	69.67	.	Q	.	.	. V	.		
17.267	71.0493	69.04	.	Q	.	.	. V	.		
17.283	71.1435	68.42	.	Q	.	.	. V	.		
17.300	71.2369	67.79	.	Q	.	.	. V	.		
17.317	71.3294	67.16	.	Q	.	.	. V	.		
17.333	71.4211	66.54	.	Q	.	.	. V	.		
17.350	71.5119	65.91	.	Q	.	.	. V	.		
17.367	71.6018	65.28	.	Q	.	.	. V	.		
17.383	71.6908	64.66	.	Q	.	.	. V	.		
17.400	71.7791	64.06	.	Q	.	.	. V	.		
17.417	71.8667	63.62	.	Q	.	.	. V	.		
17.433	71.9538	63.21	.	Q	.	.	. V	.		
17.450	72.0403	62.79	.	Q	.	.	. V	.		
17.467	72.1262	62.38	.	Q	.	.	. V	.		
17.483	72.2115	61.96	.	Q	.	.	. V	.		
17.500	72.2963	61.55	.	Q	.	.	. V	.		
17.517	72.3805	61.13	.	Q	.	.	. V	.		
17.533	72.4641	60.71	.	Q	.	.	. V	.		
17.550	72.5472	60.30	.	Q	.	.	. V	.		
17.567	72.6297	59.88	.	Q	.	.	. V	.		
17.583	72.7116	59.47	.	Q	.	.	. V	.		
17.600	72.7929	59.05	.	Q	.	.	. V	.		
17.617	72.8737	58.64	.	Q	.	.	. V	.		
17.633	72.9539	58.22	.	Q	.	.	. V	.		
17.650	73.0335	57.80	.	Q	.	.	. V	.		
17.667	73.1125	57.39	.	Q	.	.	. V	.		
17.683	73.1911	57.01	.	Q	.	.	. V	.		
17.700	73.2692	56.70	.	Q	.	.	. V	.		
17.717	73.3469	56.40	.	Q	.	.	. V	.		
17.733	73.4241	56.09	.	Q	.	.	. V	.		
17.750	73.5009	55.78	.	Q	.	.	. V	.		
17.767	73.5774	55.47	.	Q	.	.	. V	.		
17.783	73.6533	55.16	.	Q	.	.	. V	.		
17.800	73.7289	54.86	.	Q	.	.	. V	.		
17.817	73.8040	54.55	.	Q	.	.	. V	.		
17.833	73.8787	54.24	.	Q	.	.	. V	.		
17.850	73.9530	53.93	.	Q	.	.	. V	.		
17.867	74.0269	53.63	.	Q	.	.	. V	.		
17.883	74.1003	53.32	.	Q	.	.	. V	.		
17.900	74.1733	53.01	.	Q	.	.	. V	.		
17.917	74.2459	52.70	.	Q	.	.	. V	.		
17.933	74.3181	52.39	.	Q	.	.	. V	.		
17.950	74.3898	52.08	.	Q	.	.	. V	.		
17.967	74.4610	51.66	.	Q	.	.	. V	.		
17.983	74.5315	51.17	.	Q	.	.	. V	.		
18.000	74.6013	50.67	.	Q	.	.	. V	.		

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	1081.0
20%	295.0
30%	170.0
40%	135.0
50%	115.0
60%	90.0
70%	70.0
80%	45.0
90%	25.0

END OF FLOODSCx ROUTING ANALYSIS

```
************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
         (c) Copyright 1989-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                         Analysis prepared by:

                         HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                  *
* 2-YEAR STORM PROP. CONDITION FLOWBY AT NODES 56.3 & 35.2               *
* W.O. #1443-136X                                                        *
 ************************************************************************

  FILE NAME: 18142-02.DAT
  TIME/DATE OF STUDY: 18:19 10/16/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE = 1.2
------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =  265.74
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.068
    LOW LOSS FRACTION = 0.335
    TIME OF CONCENTRATION(MIN.) = 20.40
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =   2
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.53
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  0.89
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.22
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  2.05

------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =    29.24
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =    16.16

------------------------------------------------------------------------

========================================================================

                      2 4 - H O U R    S T O R M
                   R U N O F F    H Y D R O G R A P H

========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       55.9     111.7     167.6     223.5
------------------------------------------------------------------------
  14.000      9.7431     19.81  .  Q     .  V      .         .         .
  14.017      9.7706     19.96  .  Q     .  V      .         .         .
  14.033      9.7983     20.11  .  Q     .  V      .         .         .
  14.050      9.8262     20.26  .  Q     .  V      .         .         .
  14.067      9.8544     20.41  .  Q     .  V      .         .         .
  14.083      9.8827     20.56  .  Q     .  V      .         .         .
  14.100      9.9112     20.71  .  Q     .  V      .         .         .
  14.117      9.9399     20.86  .  Q     .  V      .         .         .
  14.133      9.9689     21.01  .  Q     .  V      .         .         .
  14.150      9.9980     21.16  .  Q     .  V      .         .         .
  14.167     10.0274     21.31  .  Q     .  V      .         .         .
  14.183     10.0569     21.46  .  Q     .  V      .         .         .
  14.200     10.0867     21.61  .  Q     .  V      .         .         .
  14.217     10.1167     21.76  .  Q     .  V      .         .         .
  14.233     10.1468     21.91  .  Q     .  V      .         .         .
  14.250     10.1772     22.05  .  Q     .  V      .         .         .
  14.267     10.2078     22.20  .  Q     .  V      .         .         .
  14.283     10.2386     22.35  .   Q    .   V     .         .         .
  14.300     10.2696     22.50  .   Q    .   V     .         .         .
  14.317     10.3007     22.62  .   Q    .   V     .         .         .
  14.333     10.3320     22.70  .   Q    .   V     .         .         .
  14.350     10.3634     22.79  .   Q    .   V     .         .         .
  14.367     10.3949     22.87  .   Q    .   V     .         .         .
  14.383     10.4265     22.95  .   Q    .   V     .         .         .
  14.400     10.4582     23.04  .   Q    .   V     .         .         .
  14.417     10.4901     23.12  .   Q    .   V     .         .         .
  14.433     10.5220     23.20  .   Q    .   V     .         .         .
  14.450     10.5541     23.28  .   Q    .   V     .         .         .
  14.467     10.5863     23.37  .   Q    .   V     .         .         .
  14.483     10.6186     23.45  .   Q    .   V     .         .         .
  14.500     10.6510     23.53  .   Q    .   V     .         .         .
  14.517     10.6835     23.62  .   Q    .   V     .         .         .
  14.533     10.7162     23.70  .   Q    .   V     .         .         .
  14.550     10.7489     23.78  .   Q    .   V     .         .         .
  14.567     10.7818     23.87  .   Q    .   V     .         .         .
  14.583     10.8148     23.95  .   Q    .   V     .         .         .
  14.600     10.8479     24.03  .   Q    .   V     .         .         .
```

Onsite Flood Routing Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1

with Flowby Detention @ Node 56.3 (100cfs) & Node 35.2 (10cfs), User input for total flowby @ Rational Node 35

2-Year Storm Proposed Condition

```
14.617   10.8811    24.12  .   Q     .   V     .         .         .
14.633   10.9145    24.20  .   Q     .   V     .         .         .
14.650   10.9479    24.30  .   Q     .   V     .         .         .
14.667   10.9817    24.50  .   Q     .    V    .         .         .
14.683   11.0157    24.72  .   Q     .    V    .         .         .
14.700   11.0501    24.93  .   Q     .    V    .         .         .
14.717   11.0847    25.14  .   Q     .    V    .         .         .
14.733   11.1196    25.35  .   Q     .    V    .         .         .
14.750   11.1548    25.57  .   Q     .    V    .         .         .
14.767   11.1904    25.78  .   Q     .    V    .         .         .
14.783   11.2262    25.99  .   Q     .    V    .         .         .
14.800   11.2623    26.21  .   Q     .    V    .         .         .
14.817   11.2986    26.42  .   Q     .    V    .         .         .
14.833   11.3353    26.63  .   Q     .    V    .         .         .
14.850   11.3723    26.84  .   Q     .    V    .         .         .
14.867   11.4096    27.06  .   Q     .    V    .         .         .
14.883   11.4471    27.27  .   Q     .    V    .         .         .
14.900   11.4850    27.48  .   Q     .    V    .         .         .
14.917   11.5231    27.69  .   Q     .    V    .         .         .
14.933   11.5616    27.91  .   Q     .    V    .         .         .
14.950   11.6003    28.12  .    Q    .    V    .         .         .
14.967   11.6393    28.33  .    Q    .    V    .         .         .
14.983   11.6786    28.54  .    Q    .    V    .         .         .
15.000   11.7182    28.72  .    Q    .     V   .         .         .
15.017   11.7580    28.88  .    Q    .     V   .         .         .
15.033   11.7980    29.03  .    Q    .     V   .         .         .
15.050   11.8382    29.19  .    Q    .     V   .         .         .
15.067   11.8786    29.35  .    Q    .     V   .         .         .
15.083   11.9192    29.51  .    Q    .     V   .         .         .
15.100   11.9601    29.67  .    Q    .     V   .         .         .
15.117   12.0012    29.82  .    Q    .     V   .         .         .
15.133   12.0425    29.98  .    Q    .     V   .         .         .
15.150   12.0840    30.14  .    Q    .     V   .         .         .
15.167   12.1257    30.30  .    Q    .     V   .         .         .
15.183   12.1677    30.45  .    Q    .     V   .         .         .
15.200   12.2098    30.61  .    Q    .     V   .         .         .
15.217   12.2522    30.77  .    Q    .     V   .         .         .
15.233   12.2948    30.93  .    Q    .     V   .         .         .
15.250   12.3376    31.08  .    Q    .     V   .         .         .
15.267   12.3807    31.24  .    Q    .     V   .         .         .
15.283   12.4239    31.40  .    Q    .     V   .         .         .
15.300   12.4674    31.56  .    Q    .      V  .         .         .
15.317   12.5111    31.72  .    Q    .      V  .         .         .
15.333   12.5551    31.97  .    Q    .      V  .         .         .
15.350   12.5998    32.42  .    Q    .      V  .         .         .
15.367   12.6451    32.89  .    Q    .      V  .         .         .
15.383   12.6910    33.35  .    Q    .      V  .         .         .
15.400   12.7376    33.81  .     Q   .      V  .         .         .
15.417   12.7848    34.28  .     Q   .      V  .         .         .
15.433   12.8326    34.74  .     Q   .      V  .         .         .
15.450   12.8811    35.20  .     Q   .      V  .         .         .
15.467   12.9303    35.67  .     Q   .      V  .         .         .
15.483   12.9800    36.13  .     Q   .      V  .         .         .
15.500   13.0304    36.59  .     Q   .      V  .         .         .
15.517   13.0815    37.06  .     Q   .      V  .         .         .
15.533   13.1331    37.52  .     Q   .      V  .         .         .
15.550   13.1855    37.98  .     Q   .       V .         .         .
15.567   13.2384    38.45  .     Q   .       V .         .         .
15.583   13.2920    38.91  .     Q   .       V .         .         .
15.600   13.3462    39.37  .      Q  .       V .         .         .
15.617   13.4011    39.83  .      Q  .       V .         .         .
15.633   13.4566    40.30  .      Q  .       V .         .         .
15.650   13.5128    40.76  .      Q  .       V .         .         .
15.667   13.5696    41.27  .      Q  .       V .         .         .
15.683   13.6278    42.22  .      Q  .       V .         .         .
15.700   13.6874    43.27  .      Q  .       V .         .         .
15.717   13.7484    44.33  .      Q  .       V .         .         .
15.733   13.8109    45.39  .       Q .       V .         .         .
15.750   13.8749    46.44  .       Q .       V .         .         .
15.767   13.9403    47.50  .       Q .        V.         .         .
15.783   14.0072    48.56  .       Q .        V.         .         .
15.800   14.0756    49.61  .       Q .        V.         .         .
15.817   14.1454    50.67  .        Q.        V.         .         .
15.833   14.2166    51.73  .        Q.        V.         .         .
15.850   14.2893    52.78  .        Q.        V.         .         .
15.867   14.3635    53.84  .        Q.        V.         .         .
15.883   14.4391    54.90  .        Q.        V.         .         .
15.900   14.5161    55.95  .         Q        V.         .         .
15.917   14.5947    57.01  .         Q        V.         .         .
15.933   14.6747    58.07  .         Q         V         .         .
15.950   14.7561    59.12  .         Q         V         .         .
15.967   14.8390    60.18  .         Q         V         .         .
15.983   14.9233    61.23  .         Q         V         .         .
16.000   15.0091    62.29  .         .Q        V         .         .
16.017   15.1011    66.76  .         .Q        V         .         .
16.033   15.2039    74.64  .         .  Q      V         .         .
16.050   15.3175    82.51  .         .   Q     V         .         .
16.067   15.4420    90.39  .         .     Q   .V        .         .
16.083   15.5774    98.27  .         .      Q  .V        .         .
16.100   15.7236   106.15  .         .       Q .V        .         .
16.117   15.8807   114.02  .         .         QV        .         .
16.133   16.0486   121.90  .         .         .Q        .         .
16.150   16.2273   129.78  .         .         . VQ      .         .
16.167   16.4169   137.66  .         .         . V Q     .         .
16.183   16.6174   145.53  .         .         . V   Q   .         .
16.200   16.8287   153.41  .         .         .  V   Q  .         .
16.217   17.0509   161.29  .         .         .  V    Q .         .
16.233   17.2839   169.17  .         .         .  V      Q         .
16.250   17.5278   177.05  .         .         .  V      .Q        .
16.267   17.7825   184.92  .         .         .   V     .  Q      .
16.283   18.0480   192.80  .         .         .   V     .   Q     .
16.300   18.3245   200.68  .         .         .    V    .    Q    .
16.317   18.6117   208.56  .         .         .    V    .      Q  .
16.333   18.9098   216.43  .         .         .    V    .       Q .
16.350   19.2177   223.48  .         .         .     V   .         Q
16.367   19.5117   213.46  .         .         .     V   .       Q .
16.383   19.7932   204.39  .         .         .      V  .     Q   .
16.400   20.0622   195.31  .         .         .      V  .   Q     .
16.417   20.3188   186.24  .         .         .      V  .  Q      .
16.433   20.5628   177.17  .         .         .       V .Q        .
16.450   20.7943   168.10  .         .         .       V Q         .
16.467   21.0134   159.02  .         .         .       Q .         .
```

16.483	21.2199	149.95	. . . . Q V. .
16.500	21.4140	140.88	. . . . Q V. .
16.517	21.5955	131.81	. . . Q . V. .
16.533	21.7646	122.73	. . . .Q . V. .
16.550	21.9211	113.66	. . . Q . V. .
16.567	22.0652	104.59	. . . Q . . V .
16.583	22.1968	95.52	. . . Q . . V .
16.600	22.3158	86.44	. . . Q . . V .
16.617	22.4224	77.37	. . Q . . . V .
16.633	22.5165	68.30	. . Q . . . V .
16.650	22.5981	59.23	. . Q . . . V .
16.667	22.6672	50.15	. . Q . . . .V .
16.683	22.7240	41.27	. . Q . . . .V .
16.700	22.7764	38.02	. . Q . . . .V .
16.717	22.8279	37.42	. . Q . . . .V .
16.733	22.8786	36.82	. . Q . . . .V .
16.750	22.9285	36.22	. . Q . . . .V .
16.767	22.9776	35.62	. . Q . . . .V .
16.783	23.0258	35.02	. . Q . . . .V .
16.800	23.0732	34.42	. . Q . . . .V .
16.817	23.1198	33.81	. . Q . . . .V .
16.833	23.1656	33.21	. . Q . . . .V .
16.850	23.2105	32.61	. . Q . . . .V .
16.867	23.2546	32.01	. . Q . . . .V .
16.883	23.2978	31.41	. . Q . . . .V .
16.900	23.3403	30.81	. . Q . . . .V .
16.917	23.3819	30.21	. . Q . . . .V .
16.933	23.4226	29.61	. . Q . . . . V .
16.950	23.4626	29.00	. . Q . . . . V .
16.967	23.5017	28.40	. . Q . . . . V .
16.983	23.5400	27.80	. . Q . . . . V .
17.000	23.5775	27.20	. . Q . . . . V .
17.017	23.6141	26.60	. . Q . . . . V .
17.033	23.6501	26.11	. . Q . . . . V .
17.050	23.6856	25.83	. . Q . . . . V .
17.067	23.7208	25.56	. . Q . . . . V .
17.083	23.7557	25.28	. . Q . . . . V .
17.100	23.7901	25.01	. . Q . . . . V .
17.117	23.8242	24.74	. . Q . . . . V .
17.133	23.8579	24.47	. . Q . . . . V .
17.150	23.8912	24.19	. . Q . . . . V .
17.167	23.9242	23.92	. . Q . . . . V .
17.183	23.9568	23.65	. . Q . . . . V .
17.200	23.9890	23.38	. . Q . . . . V .
17.217	24.0208	23.10	. . Q . . . . V .
17.233	24.0522	22.83	. . Q . . . . V .
17.250	24.0833	22.56	. . Q . . . . V .
17.267	24.1140	22.29	. Q . . . . V .
17.283	24.1443	22.02	. Q . . . . V .
17.300	24.1743	21.74	. Q . . . . V .
17.317	24.2038	21.47	. Q . . . . V .
17.333	24.2330	21.20	. Q . . . . V .
17.350	24.2619	20.93	. Q . . . . V .
17.367	24.2903	20.67	. Q . . . . V .
17.383	24.3186	20.50	. Q . . . . V .
17.400	24.3466	20.36	. Q . . . . V .
17.417	24.3745	20.22	. Q . . . . V .
17.433	24.4021	20.08	. Q . . . . V .
17.450	24.4296	19.94	. Q . . . . V .
17.467	24.4569	19.80	. Q . . . . V .
17.483	24.4840	19.66	. Q . . . . V .
17.500	24.5108	19.52	. Q . . . . V .
17.517	24.5375	19.38	. Q . . . . V .
17.533	24.5640	19.24	. Q . . . . V .
17.550	24.5903	19.10	. Q . . . . V .
17.567	24.6164	18.96	. Q . . . . V .
17.583	24.6424	18.81	. Q . . . . V .
17.600	24.6681	18.67	. Q . . . . V .
17.617	24.6936	18.53	. Q . . . . V .
17.633	24.7189	18.39	. Q . . . . V .
17.650	24.7441	18.25	. Q . . . . V .
17.667	24.7690	18.11	. Q . . . . V .
17.683	24.7938	17.97	. Q . . . . V .
17.700	24.8183	17.83	. Q . . . . V .
17.717	24.8427	17.71	. Q . . . . V .
17.733	24.8670	17.62	. Q . . . . V .
17.750	24.8911	17.52	. Q . . . . V .
17.767	24.9151	17.42	. Q . . . . V .
17.783	24.9390	17.33	. Q . . . . V .
17.800	24.9627	17.23	. Q . . . . V .
17.817	24.9863	17.13	. Q . . . . V .
17.833	25.0098	17.04	. Q . . . . V .
17.850	25.0331	16.94	. Q . . . . V .
17.867	25.0563	16.84	. Q . . . . V .
17.883	25.0794	16.75	. Q . . . . V .
17.900	25.1023	16.65	. Q . . . . V .
17.917	25.1251	16.56	. Q . . . . V .
17.933	25.1478	16.46	. Q . . . . V .
17.950	25.1704	16.36	. Q . . . . V .
17.967	25.1928	16.27	. Q . . . . V .
17.983	25.2150	16.17	. Q . . . . V .
18.000	25.2372	16.07	. Q . . . . V .

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	895.0
20%	285.0
30%	185.0
40%	160.0
50%	135.0
60%	105.0
70%	80.0
80%	50.0
90%	25.0

```
**************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     35.10 IS CODE =   2
--------------------------------------------------------------------------
  >>>>>FLOWBY STRUCTURE ROUTING MODEL APPLIED TO STREAM #1<<<<<
==========================================================================


        MODEL STREAM NUMBER 1 FLOWING PAST A FLOWBY STRUCTURE:
        FLOWRATES IN STREAM # 1 WHICH ARE GREATER THAN
           100.0 CFS ARE ASSUMED TO BE EXCESS FLOWS.
        FLOW EXCESS IS ASSUMED TO BE ADDED TO STREAM NUMBER 3


              INFLOW              INFLOW
            (STREAM 3)          (STREAM 1)
                |                   |
                |                   |
                |    flow excess    |
                |<------------------* <=flowby structure
                |                   | (maximum flowby Q =    100.0 cfs)
                |                   |
                |                   |
                |                   |
                V                   V
              STREAM 3            STREAM 1
          + FLOW EXCESS            FLOWBY



        FLOWBY BASIN MODELING RESULTS:

         MODEL         INFLOW     INFLOW    OUTFLOW    FLOWBY
          TIME     (STREAM 3) (STREAM 1) (STREAM 3) (STREAM 1)
         (HRS)          (CFS)      (CFS)      (CFS)      (CFS)
         14.000         0.00      19.81       0.00      19.81
         14.017         0.00      19.96       0.00      19.96
         14.033         0.00      20.11       0.00      20.11
         14.050         0.00      20.26       0.00      20.26
         14.067         0.00      20.41       0.00      20.41
         14.083         0.00      20.56       0.00      20.56
         14.100         0.00      20.71       0.00      20.71
         14.117         0.00      20.86       0.00      20.86
         14.133         0.00      21.01       0.00      21.01
         14.150         0.00      21.16       0.00      21.16
         14.167         0.00      21.31       0.00      21.31
         14.183         0.00      21.46       0.00      21.46
         14.200         0.00      21.61       0.00      21.61
         14.217         0.00      21.76       0.00      21.76
         14.233         0.00      21.91       0.00      21.91
         14.250         0.00      22.05       0.00      22.05
         14.267         0.00      22.20       0.00      22.20
         14.283         0.00      22.35       0.00      22.35
         14.300         0.00      22.50       0.00      22.50
         14.317         0.00      22.62       0.00      22.62
         14.333         0.00      22.70       0.00      22.70
         14.350         0.00      22.79       0.00      22.79
         14.367         0.00      22.87       0.00      22.87
         14.383         0.00      22.95       0.00      22.95
         14.400         0.00      23.04       0.00      23.04
         14.417         0.00      23.12       0.00      23.12
         14.433         0.00      23.20       0.00      23.20
         14.450         0.00      23.28       0.00      23.28
         14.467         0.00      23.37       0.00      23.37
         14.483         0.00      23.45       0.00      23.45
         14.500         0.00      23.53       0.00      23.53
         14.517         0.00      23.62       0.00      23.62
         14.533         0.00      23.70       0.00      23.70
         14.550         0.00      23.78       0.00      23.78
         14.567         0.00      23.87       0.00      23.87
         14.583         0.00      23.95       0.00      23.95
         14.600         0.00      24.03       0.00      24.03
         14.617         0.00      24.12       0.00      24.12
         14.633         0.00      24.20       0.00      24.20
         14.650         0.00      24.30       0.00      24.30
         14.667         0.00      24.50       0.00      24.50
         14.683         0.00      24.72       0.00      24.72
         14.700         0.00      24.93       0.00      24.93
         14.717         0.00      25.14       0.00      25.14
         14.733         0.00      25.35       0.00      25.35
         14.750         0.00      25.57       0.00      25.57
         14.767         0.00      25.78       0.00      25.78
         14.783         0.00      25.99       0.00      25.99
         14.800         0.00      26.21       0.00      26.21
         14.817         0.00      26.42       0.00      26.42
         14.833         0.00      26.63       0.00      26.63
         14.850         0.00      26.84       0.00      26.84
         14.867         0.00      27.06       0.00      27.06
         14.883         0.00      27.27       0.00      27.27
         14.900         0.00      27.48       0.00      27.48
         14.917         0.00      27.69       0.00      27.69
         14.933         0.00      27.91       0.00      27.91
         14.950         0.00      28.12       0.00      28.12
         14.967         0.00      28.33       0.00      28.33
         14.983         0.00      28.54       0.00      28.54
         15.000         0.00      28.72       0.00      28.72
         15.017         0.00      28.88       0.00      28.88
         15.033         0.00      29.03       0.00      29.03
         15.050         0.00      29.19       0.00      29.19
         15.067         0.00      29.35       0.00      29.35
         15.083         0.00      29.51       0.00      29.51
         15.100         0.00      29.67       0.00      29.67
         15.117         0.00      29.82       0.00      29.82
         15.133         0.00      29.98       0.00      29.98
         15.150         0.00      30.14       0.00      30.14
         15.167         0.00      30.30       0.00      30.30
         15.183         0.00      30.45       0.00      30.45
         15.200         0.00      30.61       0.00      30.61
         15.217         0.00      30.77       0.00      30.77
         15.233         0.00      30.93       0.00      30.93
         15.250         0.00      31.08       0.00      31.08
         15.267         0.00      31.24       0.00      31.24
```

15.283	0.00	31.40	0.00	31.40
15.300	0.00	31.56	0.00	31.56
15.317	0.00	31.72	0.00	31.72
15.333	0.00	31.97	0.00	31.97
15.350	0.00	32.42	0.00	32.42
15.367	0.00	32.89	0.00	32.89
15.383	0.00	33.35	0.00	33.35
15.400	0.00	33.81	0.00	33.81
15.417	0.00	34.28	0.00	34.28
15.433	0.00	34.74	0.00	34.74
15.450	0.00	35.20	0.00	35.20
15.467	0.00	35.67	0.00	35.67
15.483	0.00	36.13	0.00	36.13
15.500	0.00	36.59	0.00	36.59
15.517	0.00	37.06	0.00	37.06
15.533	0.00	37.52	0.00	37.52
15.550	0.00	37.98	0.00	37.98
15.567	0.00	38.45	0.00	38.45
15.583	0.00	38.91	0.00	38.91
15.600	0.00	39.37	0.00	39.37
15.617	0.00	39.83	0.00	39.83
15.633	0.00	40.30	0.00	40.30
15.650	0.00	40.76	0.00	40.76
15.667	0.00	41.27	0.00	41.27
15.683	0.00	42.22	0.00	42.22
15.700	0.00	43.27	0.00	43.27
15.717	0.00	44.33	0.00	44.33
15.733	0.00	45.39	0.00	45.39
15.750	0.00	46.44	0.00	46.44
15.767	0.00	47.50	0.00	47.50
15.783	0.00	48.56	0.00	48.56
15.800	0.00	49.61	0.00	49.61
15.817	0.00	50.67	0.00	50.67
15.833	0.00	51.73	0.00	51.73
15.850	0.00	52.78	0.00	52.78
15.867	0.00	53.84	0.00	53.84
15.883	0.00	54.90	0.00	54.90
15.900	0.00	55.95	0.00	55.95
15.917	0.00	57.01	0.00	57.01
15.933	0.00	58.07	0.00	58.07
15.950	0.00	59.12	0.00	59.12
15.967	0.00	60.18	0.00	60.18
15.983	0.00	61.23	0.00	61.23
16.000	0.00	62.29	0.00	62.29
16.017	0.00	66.76	0.00	66.76
16.033	0.00	74.64	0.00	74.64
16.050	0.00	82.51	0.00	82.51
16.067	0.00	90.39	0.00	90.39
16.083	0.00	98.27	0.00	98.27
16.100	0.00	106.15	6.15	100.00
16.117	0.00	114.02	14.02	100.00
16.133	0.00	121.90	21.90	100.00
16.150	0.00	129.78	29.78	100.00
16.167	0.00	137.66	37.66	100.00
16.183	0.00	145.53	45.53	100.00
16.200	0.00	153.41	53.41	100.00
16.217	0.00	161.29	61.29	100.00
16.233	0.00	169.17	69.17	100.00
16.250	0.00	177.05	77.05	100.00
16.267	0.00	184.92	84.92	100.00
16.283	0.00	192.80	92.80	100.00
16.300	0.00	200.68	100.68	100.00
16.317	0.00	208.56	108.56	100.00
16.333	0.00	216.43	116.43	100.00
16.350	0.00	223.48	123.48	100.00
16.367	0.00	213.46	113.46	100.00
16.383	0.00	204.39	104.39	100.00
16.400	0.00	195.31	95.31	100.00
16.417	0.00	186.24	86.24	100.00
16.433	0.00	177.17	77.17	100.00
16.450	0.00	168.10	68.10	100.00
16.467	0.00	159.02	59.02	100.00
16.483	0.00	149.95	49.95	100.00
16.500	0.00	140.88	40.88	100.00
16.517	0.00	131.81	31.81	100.00
16.533	0.00	122.73	22.73	100.00
16.550	0.00	113.66	13.66	100.00
16.567	0.00	104.59	4.59	100.00
16.583	0.00	95.52	0.00	95.52
16.600	0.00	86.44	0.00	86.44
16.617	0.00	77.37	0.00	77.37
16.633	0.00	68.30	0.00	68.30
16.650	0.00	59.23	0.00	59.23
16.667	0.00	50.15	0.00	50.15
16.683	0.00	41.27	0.00	41.27
16.700	0.00	38.02	0.00	38.02
16.717	0.00	37.42	0.00	37.42
16.733	0.00	36.82	0.00	36.82
16.750	0.00	36.22	0.00	36.22
16.767	0.00	35.62	0.00	35.62
16.783	0.00	35.02	0.00	35.02
16.800	0.00	34.42	0.00	34.42
16.817	0.00	33.81	0.00	33.81
16.833	0.00	33.21	0.00	33.21
16.850	0.00	32.61	0.00	32.61
16.867	0.00	32.01	0.00	32.01
16.883	0.00	31.41	0.00	31.41
16.900	0.00	30.81	0.00	30.81
16.917	0.00	30.21	0.00	30.21
16.933	0.00	29.61	0.00	29.61
16.950	0.00	29.00	0.00	29.00
16.967	0.00	28.40	0.00	28.40
16.983	0.00	27.80	0.00	27.80
17.000	0.00	27.20	0.00	27.20
17.017	0.00	26.60	0.00	26.60
17.033	0.00	26.11	0.00	26.11
17.050	0.00	25.83	0.00	25.83
17.067	0.00	25.56	0.00	25.56
17.083	0.00	25.28	0.00	25.28
17.100	0.00	25.01	0.00	25.01
17.117	0.00	24.74	0.00	24.74
17.133	0.00	24.47	0.00	24.47

17.150	0.00	24.19	0.00	24.19
17.167	0.00	23.92	0.00	23.92
17.183	0.00	23.65	0.00	23.65
17.200	0.00	23.38	0.00	23.38
17.217	0.00	23.10	0.00	23.10
17.233	0.00	22.83	0.00	22.83
17.250	0.00	22.56	0.00	22.56
17.267	0.00	22.29	0.00	22.29
17.283	0.00	22.02	0.00	22.02
17.300	0.00	21.74	0.00	21.74
17.317	0.00	21.47	0.00	21.47
17.333	0.00	21.20	0.00	21.20
17.350	0.00	20.93	0.00	20.93
17.367	0.00	20.67	0.00	20.67
17.383	0.00	20.50	0.00	20.50
17.400	0.00	20.36	0.00	20.36
17.417	0.00	20.22	0.00	20.22
17.433	0.00	20.08	0.00	20.08
17.450	0.00	19.94	0.00	19.94
17.467	0.00	19.80	0.00	19.80
17.483	0.00	19.66	0.00	19.66
17.500	0.00	19.52	0.00	19.52
17.517	0.00	19.38	0.00	19.38
17.533	0.00	19.24	0.00	19.24
17.550	0.00	19.10	0.00	19.10
17.567	0.00	18.96	0.00	18.96
17.583	0.00	18.81	0.00	18.81
17.600	0.00	18.67	0.00	18.67
17.617	0.00	18.53	0.00	18.53
17.633	0.00	18.39	0.00	18.39
17.650	0.00	18.25	0.00	18.25
17.667	0.00	18.11	0.00	18.11
17.683	0.00	17.97	0.00	17.97
17.700	0.00	17.83	0.00	17.83
17.717	0.00	17.71	0.00	17.71
17.733	0.00	17.62	0.00	17.62
17.750	0.00	17.52	0.00	17.52
17.767	0.00	17.42	0.00	17.42
17.783	0.00	17.33	0.00	17.33
17.800	0.00	17.23	0.00	17.23
17.817	0.00	17.13	0.00	17.13
17.833	0.00	17.04	0.00	17.04
17.850	0.00	16.94	0.00	16.94
17.867	0.00	16.84	0.00	16.84
17.883	0.00	16.75	0.00	16.75
17.900	0.00	16.65	0.00	16.65
17.917	0.00	16.56	0.00	16.56
17.933	0.00	16.46	0.00	16.46
17.950	0.00	16.36	0.00	16.36
17.967	0.00	16.27	0.00	16.27
17.983	0.00	16.17	0.00	16.17
18.000	0.00	16.07	0.00	16.07

****

FLOW PROCESS FROM NODE 56.30 TO NODE 36.00 IS CODE = 11

>>>>>VIEW STREAM NUMBER 1 HYDROGRAPH<<<<<

==========

STREAM HYDROGRAPH IN ONE-MINUTE UNIT INTERVALS(CFS)

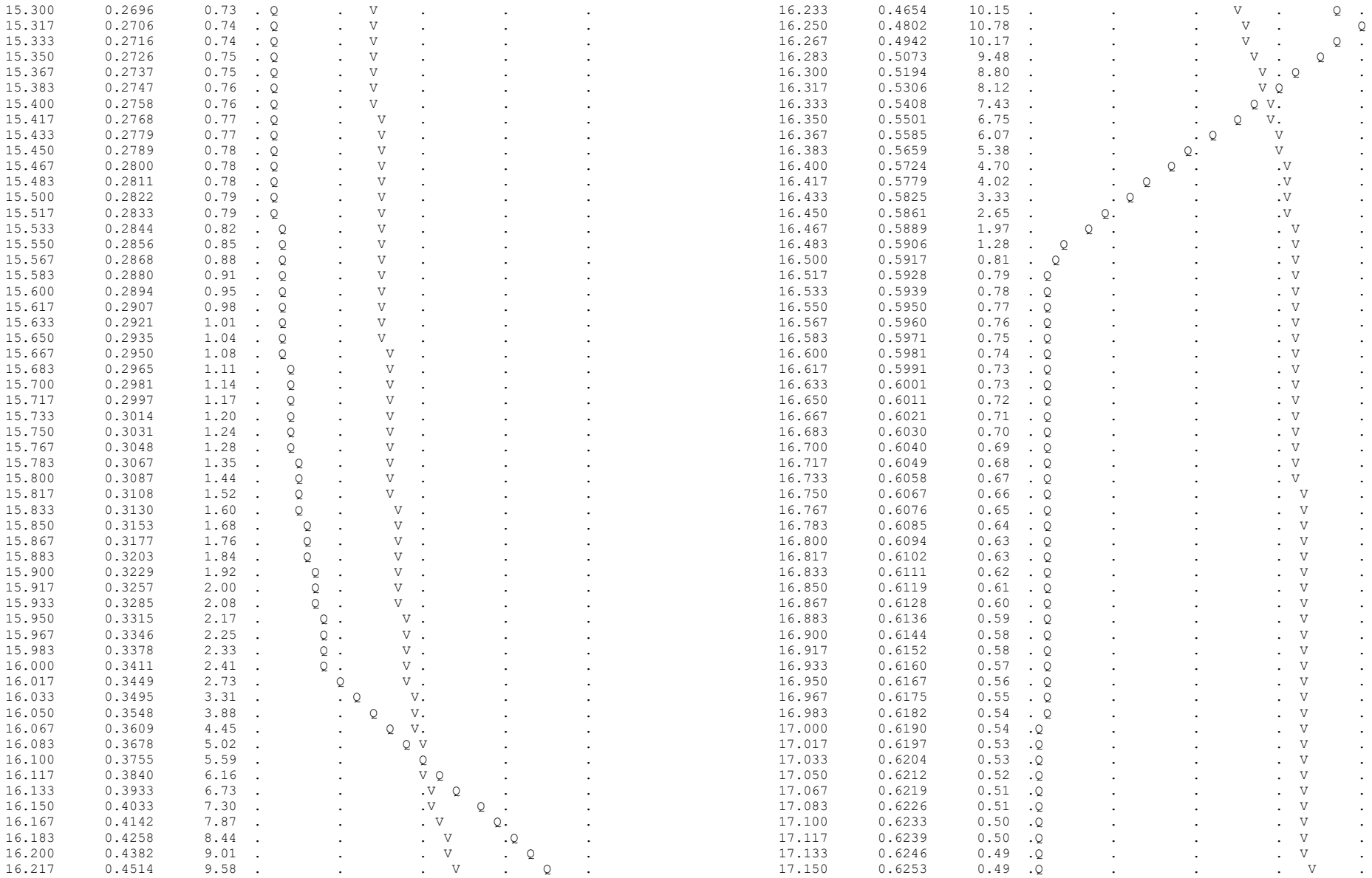
(Notes: Time indicated is at END of Each Unit Intervals.
Peak 5-minute rainfall intensity is modeled as
a constant value for entire 5-minute period.)

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	50.0	100.0	150.0	200.0
14.000	9.7431	19.81	. Q	. V	.	.	.
14.017	9.7706	19.96	. Q	. V	.	.	.
14.033	9.7983	20.11	. Q	. V	.	.	.
14.050	9.8262	20.26	. Q	. V	.	.	.
14.067	9.8544	20.41	. Q	. V	.	.	.
14.083	9.8827	20.56	. Q	. V	.	.	.
14.100	9.9112	20.71	. Q	. V	.	.	.
14.117	9.9399	20.86	. Q	. V	.	.	.
14.133	9.9689	21.01	. Q	. V	.	.	.
14.150	9.9980	21.16	. Q	. V	.	.	.
14.167	10.0274	21.31	. Q	. V	.	.	.
14.183	10.0569	21.46	. Q	. V	.	.	.
14.200	10.0867	21.61	. Q	. V	.	.	.
14.217	10.1167	21.76	. Q	. V	.	.	.
14.233	10.1468	21.91	. Q	. V	.	.	.
14.250	10.1772	22.05	. Q	. V	.	.	.
14.267	10.2078	22.20	. Q	. V	.	.	.
14.283	10.2386	22.35	. Q	. V	.	.	.
14.300	10.2696	22.50	. Q	. V	.	.	.
14.317	10.3007	22.62	. Q	. V	.	.	.
14.333	10.3320	22.70	. Q	. V	.	.	.
14.350	10.3634	22.79	. Q	. V	.	.	.
14.367	10.3949	22.87	. Q	. V	.	.	.
14.383	10.4265	22.95	. Q	. V	.	.	.
14.400	10.4582	23.04	. Q	. V	.	.	.
14.417	10.4901	23.12	. Q	. V	.	.	.
14.433	10.5220	23.20	. Q	. V	.	.	.
14.450	10.5541	23.28	. Q	. V	.	.	.
14.467	10.5863	23.37	. Q	. V	.	.	.
14.483	10.6186	23.45	. Q	. V	.	.	.
14.500	10.6510	23.53	. Q	. V	.	.	.
14.517	10.6835	23.62	. Q	. V	.	.	.
14.533	10.7162	23.70	. Q	. V	.	.	.
14.550	10.7489	23.78	. Q	. V	.	.	.
14.567	10.7818	23.87	. Q	. V	.	.	.
14.583	10.8148	23.95	. Q	. V	.	.	.
14.600	10.8479	24.03	. Q	. V	.	.	.
14.617	10.8811	24.12	. Q	. V	.	.	.
14.633	10.9145	24.20	. Q	. V	.	.	.
14.650	10.9479	24.30	. Q	. V	.	.	.
14.667	10.9817	24.50	. Q	. V	.	.	.
14.683	11.0157	24.72	. Q	. V	.	.	.
14.700	11.0501	24.93	. Q	. V	.	.	.
14.717	11.0847	25.14	. Q	. V	.	.	.
14.733	11.1196	25.35	. Q	. V	.	.	.

```
14.750     11.1548     25.57  .    Q    .     V   .         .         .
14.767     11.1904     25.78  .    Q    .     V   .         .         .
14.783     11.2262     25.99  .    Q    .     V   .         .         .
14.800     11.2623     26.21  .    Q    .     V   .         .         .
14.817     11.2986     26.42  .    Q    .     V   .         .         .
14.833     11.3353     26.63  .    Q    .     V   .         .         .
14.850     11.3723     26.84  .    Q    .      V  .         .         .
14.867     11.4096     27.06  .    Q    .      V  .         .         .
14.883     11.4471     27.27  .    Q    .      V  .         .         .
14.900     11.4850     27.48  .    Q    .      V  .         .         .
14.917     11.5231     27.69  .    Q    .      V  .         .         .
14.933     11.5616     27.91  .    Q    .      V  .         .         .
14.950     11.6003     28.12  .    Q    .      V  .         .         .
14.967     11.6393     28.33  .    Q    .      V  .         .         .
14.983     11.6786     28.54  .    Q    .      V  .         .         .
15.000     11.7182     28.72  .    Q    .      V  .         .         .
15.017     11.7580     28.88  .    Q    .      V  .         .         .
15.033     11.7980     29.03  .    Q    .      V  .         .         .
15.050     11.8382     29.19  .    Q    .      V  .         .         .
15.067     11.8786     29.35  .    Q    .      V  .         .         .
15.083     11.9192     29.51  .    Q    .      V  .         .         .
15.100     11.9601     29.67  .    Q    .      V  .         .         .
15.117     12.0012     29.82  .    Q    .      V  .         .         .
15.133     12.0425     29.98  .    Q    .       V .         .         .
15.150     12.0840     30.14  .     Q   .       V .         .         .
15.167     12.1257     30.30  .     Q   .       V .         .         .
15.183     12.1677     30.45  .     Q   .       V .         .         .
15.200     12.2098     30.61  .     Q   .       V .         .         .
15.217     12.2522     30.77  .     Q   .       V .         .         .
15.233     12.2948     30.93  .     Q   .       V .         .         .
15.250     12.3376     31.08  .     Q   .       V .         .         .
15.267     12.3807     31.24  .     Q   .       V .         .         .
15.283     12.4239     31.40  .     Q   .       V .         .         .
15.300     12.4674     31.56  .     Q   .       V .         .         .
15.317     12.5111     31.72  .     Q   .       V .         .         .
15.333     12.5551     31.97  .     Q   .       V .         .         .
15.350     12.5998     32.42  .     Q   .       V .         .         .
15.367     12.6451     32.89  .     Q   .       V .         .         .
15.383     12.6910     33.35  .     Q   .       V .         .         .
15.400     12.7376     33.81  .     Q   .        V.         .         .
15.417     12.7848     34.28  .     Q   .        V.         .         .
15.433     12.8326     34.74  .     Q   .        V.         .         .
15.450     12.8811     35.20  .      Q  .        V.         .         .
15.467     12.9303     35.67  .      Q  .        V.         .         .
15.483     12.9800     36.13  .      Q  .        V.         .         .
15.500     13.0304     36.59  .      Q  .        V.         .         .
15.517     13.0815     37.06  .      Q  .        V.         .         .
15.533     13.1331     37.52  .      Q  .        V.         .         .
15.550     13.1855     37.98  .      Q  .        V.         .         .
15.567     13.2384     38.45  .      Q  .        V.         .         .
15.583     13.2920     38.91  .      Q  .        V.         .         .
15.600     13.3462     39.37  .      Q  .        V.         .         .
15.617     13.4011     39.83  .      Q  .         V         .         .
15.633     13.4566     40.30  .       Q .         V         .         .
15.650     13.5128     40.76  .       Q .         V         .         .
15.667     13.5696     41.27  .       Q .         V         .         .
15.683     13.6278     42.22  .       Q .         V         .         .
15.700     13.6874     43.27  .       Q .         V         .         .
15.717     13.7484     44.33  .       Q .         V         .         .
15.733     13.8109     45.39  .        Q.         V         .         .
15.750     13.8749     46.44  .        Q.         V         .         .
15.767     13.9403     47.50  .        Q.         V         .         .
15.783     14.0072     48.56  .        Q.         V         .         .
15.800     14.0756     49.61  .        Q.         .V        .         .
15.817     14.1454     50.67  .         Q         .V        .         .
15.833     14.2166     51.73  .         Q         .V        .         .
15.850     14.2893     52.78  .         Q         .V        .         .
15.867     14.3635     53.84  .         Q         .V        .         .
15.883     14.4391     54.90  .         Q         .V        .         .
15.900     14.5161     55.95  .         .Q        .V        .         .
15.917     14.5947     57.01  .         .Q        .V        .         .
15.933     14.6747     58.07  .         .Q        .V        .         .
15.950     14.7561     59.12  .         .Q        . V       .         .
15.967     14.8390     60.18  .         . Q       . V       .         .
15.983     14.9233     61.23  .         . Q       . V       .         .
16.000     15.0091     62.29  .         . Q       . V       .         .
16.017     15.1011     66.76  .         .  Q      . V       .         .
16.033     15.2039     74.64  .         .   Q     . V       .         .
16.050     15.3175     82.51  .         .     Q   . V       .         .
16.067     15.4420     90.39  .         .       Q .  V      .         .
16.083     15.5774     98.27  .         .        Q.  V      .         .
16.100     15.7151    100.00  .         .         Q  V      .         .
16.117     15.8529    100.00  .         .         Q  V      .         .
16.133     15.9906    100.00  .         .         Q  V      .         .
16.150     16.1284    100.00  .         .         Q   V     .         .
16.167     16.2661    100.00  .         .         Q   V     .         .
16.183     16.4038    100.00  .         .         Q   V     .         .
16.200     16.5416    100.00  .         .         Q   V     .         .
16.217     16.6793    100.00  .         .         Q   V     .         .
16.233     16.8171    100.00  .         .         Q    V    .         .
16.250     16.9548    100.00  .         .         Q    V    .         .
16.267     17.0926    100.00  .         .         Q    V    .         .
16.283     17.2303    100.00  .         .         Q    V    .         .
16.300     17.3680    100.00  .         .         Q    V    .         .
16.317     17.5058    100.00  .         .         Q     V   .         .
16.333     17.6435    100.00  .         .         Q     V   .         .
16.350     17.7813    100.00  .         .         Q     V   .         .
16.367     17.9190    100.00  .         .         Q     V   .         .
16.383     18.0567    100.00  .         .         Q      V  .         .
16.400     18.1945    100.00  .         .         Q      V  .         .
16.417     18.3322    100.00  .         .         Q      V  .         .
16.433     18.4700    100.00  .         .         Q      V  .         .
16.450     18.6077    100.00  .         .         Q      V  .         .
16.467     18.7454    100.00  .         .         Q       V .         .
16.483     18.8832    100.00  .         .         Q       V .         .
16.500     19.0209    100.00  .         .         Q       V .         .
16.517     19.1587    100.00  .         .         Q       V .         .
16.533     19.2964    100.00  .         .         Q       V .         .
16.550     19.4342    100.00  .         .         Q        V.         .
16.567     19.5719    100.00  .         .         Q        V.         .
16.583     19.7035     95.52  .         .        Q.        V.         .
16.600     19.8225     86.44  .         .      Q  .        V.         .
```

```
16.617      19.9291      77.37  .          .    Q    .          V.         .
16.633      20.0232      68.30  .          .  Q      .          V.         .
16.650      20.1048      59.23  .          .Q        .           V         .
16.667      20.1738      50.15  .          Q         .           V         .
16.683      20.2307      41.27  .        Q .         .           V         .
16.700      20.2831      38.02  .       Q  .         .           V         .
16.717      20.3346      37.42  .       Q  .         .           V         .
16.733      20.3853      36.82  .       Q  .         .           V         .
16.750      20.4352      36.22  .       Q  .         .           V         .
16.767      20.4843      35.62  .       Q  .         .           V         .
16.783      20.5325      35.02  .       Q  .         .           V         .
16.800      20.5799      34.42  .      Q   .         .           V         .
16.817      20.6265      33.81  .      Q   .         .           V         .
16.833      20.6722      33.21  .      Q   .         .           V         .
16.850      20.7172      32.61  .      Q   .         .           V         .
16.867      20.7613      32.01  .      Q   .         .           .V        .
16.883      20.8045      31.41  .      Q   .         .           .V        .
16.900      20.8470      30.81  .      Q   .         .           .V        .
16.917      20.8886      30.21  .      Q   .         .           .V        .
16.933      20.9293      29.61  .     Q    .         .           .V        .
16.950      20.9693      29.00  .     Q    .         .           .V        .
16.967      21.0084      28.40  .     Q    .         .           .V        .
16.983      21.0467      27.80  .     Q    .         .           .V        .
17.000      21.0842      27.20  .     Q    .         .           .V        .
17.017      21.1208      26.60  .     Q    .         .           .V        .
17.033      21.1568      26.11  .     Q    .         .           .V        .
17.050      21.1923      25.83  .     Q    .         .           .V        .
17.067      21.2275      25.56  .     Q    .         .           .V        .
17.083      21.2624      25.28  .     Q    .         .           .V        .
17.100      21.2968      25.01  .     Q    .         .           .V        .
17.117      21.3309      24.74  .    Q     .         .           .V        .
17.133      21.3646      24.47  .    Q     .         .           .V        .
17.150      21.3979      24.19  .    Q     .         .           . V       .
17.167      21.4309      23.92  .    Q     .         .           . V       .
17.183      21.4634      23.65  .    Q     .         .           . V       .
17.200      21.4956      23.38  .    Q     .         .           . V       .
17.217      21.5275      23.10  .    Q     .         .           . V       .
17.233      21.5589      22.83  .    Q     .         .           . V       .
17.250      21.5900      22.56  .    Q     .         .           . V       .
17.267      21.6207      22.29  .    Q     .         .           . V       .
17.283      21.6510      22.02  .    Q     .         .           . V       .
17.300      21.6810      21.74  .    Q     .         .           . V       .
17.317      21.7105      21.47  .    Q     .         .           . V       .
17.333      21.7397      21.20  .    Q     .         .           . V       .
17.350      21.7686      20.93  .    Q     .         .           . V       .
17.367      21.7970      20.67  .    Q     .         .           . V       .
17.383      21.8253      20.50  .    Q     .         .           . V       .
17.400      21.8533      20.36  .    Q     .         .           . V       .
17.417      21.8812      20.22  .    Q     .         .           . V       .
17.433      21.9088      20.08  .    Q     .         .           . V       .
17.450      21.9363      19.94  .   Q      .         .           . V       .
17.467      21.9636      19.80  .   Q      .         .           . V       .
17.483      21.9906      19.66  .   Q      .         .           . V       .
17.500      22.0175      19.52  .   Q      .         .           . V       .
17.517      22.0442      19.38  .   Q      .         .           . V       .
17.533      22.0707      19.24  .   Q      .         .           .  V      .
17.550      22.0970      19.10  .  Q      .         .         .  V       .
17.567      22.1231      18.96  .  Q      .         .         .  V       .
17.583      22.1490      18.81  .  Q      .         .         .  V       .
17.600      22.1748      18.67  .  Q      .         .         .  V       .
17.617      22.2003      18.53  .  Q      .         .         .  V       .
17.633      22.2256      18.39  .  Q      .         .         .  V       .
17.650      22.2508      18.25  .  Q      .         .         .  V       .
17.667      22.2757      18.11  .  Q      .         .         .  V       .
17.683      22.3005      17.97  .  Q      .         .         .  V       .
17.700      22.3250      17.83  .  Q      .         .         .  V       .
17.717      22.3494      17.71  .  Q      .         .         .  V       .
17.733      22.3737      17.62  .  Q      .         .         .  V       .
17.750      22.3978      17.52  .  Q      .         .         .  V       .
17.767      22.4218      17.42  .  Q      .         .         .  V       .
17.783      22.4457      17.33  .  Q      .         .         .  V       .
17.800      22.4694      17.23  .  Q      .         .         .  V       .
17.817      22.4930      17.13  .  Q      .         .         .  V       .
17.833      22.5165      17.04  .  Q      .         .         .  V       .
17.850      22.5398      16.94  .  Q      .         .         .  V       .
17.867      22.5630      16.84  .  Q      .         .         .  V       .
17.883      22.5861      16.75  .  Q      .         .         .  V       .
17.900      22.6090      16.65  .  Q      .         .         .  V       .
17.917      22.6318      16.56  .  Q      .         .         .  V       .
17.933      22.6545      16.46  .  Q      .         .         .  V       .
17.950      22.6770      16.36  .  Q      .         .         .  V       .
17.967      22.6994      16.27  .  Q      .         .         .  V       .
17.983      22.7217      16.17  .  Q      .         .         .  V       .
18.000      22.7439      16.07  .  Q      .         .         .   V      .
--------------------------------------------------------------------------------
    TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
    (Note: 100% of Peak Flow Rate estimate assumed to have
    an instantaneous time duration)

    Percentile of Estimated                   Duration
        Peak Flow Rate                        (minutes)
    =======================                   =========
               0%                              1081.0
              10%                              1081.0
              20%                              1025.0
              30%                               535.0
              40%                               320.0
              50%                               260.0
              60%                               205.0
              70%                               180.0
              80%                               170.0
              90%                               160.0


****************************************************************************
  FLOW PROCESS FROM NODE      35.20 TO NODE      35.20 IS CODE = 1.2
----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
============================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #2)
```

```
   RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
   TOTAL CATCHMENT AREA(ACRES) =   11.40
   SOIL-LOSS RATE, Fm,(INCH/HR) =  0.168
   LOW LOSS FRACTION = 0.670
   TIME OF CONCENTRATION(MIN.) = 14.60
   SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
   ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
   RETURN FREQUENCY(YEARS) =   2
      5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
     30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
      1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.53
      3-HOUR   POINT RAINFALL VALUE(INCHES) =  0.89
      6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.22
     24-HOUR   POINT RAINFALL VALUE(INCHES) =  2.05

--------------------------------------------------------------------------------
   TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.74
   TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     1.21

--------------------------------------------------------------------------------

================================================================================

                    2 4 - H O U R    S T O R M
                 R U N O F F    H Y D R O G R A P H

================================================================================
            HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
       (Notes: Time indicated is at END of Each Unit Intervals.
               Peak 5-minute rainfall intensity is modeled as
               a constant value for entire 5-minute period.)
--------------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.        2.7       5.4       8.1       10.8
--------------------------------------------------------------------------------
  14.000      0.2099      0.43  .Q        .V        .         .         .
  14.017      0.2105      0.43  .Q        .V        .         .         .
  14.033      0.2111      0.43  .Q        .V        .         .         .
  14.050      0.2117      0.43  .Q        .V        .         .         .
  14.067      0.2123      0.44  .Q        .V        .         .         .
  14.083      0.2129      0.44  .Q        .V        .         .         .
  14.100      0.2135      0.44  .Q        .V        .         .         .
  14.117      0.2141      0.45  .Q        .V        .         .         .
  14.133      0.2147      0.45  .Q        .V        .         .         .
  14.150      0.2154      0.46  .Q        .V        .         .         .
  14.167      0.2160      0.46  .Q        .V        .         .         .
  14.183      0.2166      0.46  .Q        .V        .         .         .
  14.200      0.2173      0.47  .Q        .V        .         .         .
  14.217      0.2179      0.47  .Q        .V        .         .         .
  14.233      0.2186      0.48  .Q        .V        .         .         .
  14.250      0.2192      0.48  .Q        .V        .         .         .
  14.267      0.2199      0.48  .Q        .V        .         .         .
  14.283      0.2206      0.49  .Q        .V        .         .         .
  14.300      0.2213      0.49  .Q        . V       .         .         .
  14.317      0.2219      0.49  .Q        . V       .         .         .
  14.333      0.2226      0.49  .Q        . V       .         .         .
  14.350      0.2233      0.50  .Q        . V       .         .         .
  14.367      0.2240      0.50  .Q        . V       .         .         .
  14.383      0.2247      0.50  .Q        . V       .         .         .
  14.400      0.2254      0.50  .Q        . V       .         .         .
  14.417      0.2261      0.50  .Q        . V       .         .         .
  14.433      0.2267      0.50  .Q        . V       .         .         .
  14.450      0.2274      0.51  .Q        . V       .         .         .
  14.467      0.2281      0.51  .Q        . V       .         .         .
  14.483      0.2288      0.51  .Q        . V       .         .         .
  14.500      0.2296      0.51  .Q        . V       .         .         .
  14.517      0.2303      0.51  .Q        . V       .         .         .
  14.533      0.2310      0.51  .Q        . V       .         .         .
  14.550      0.2317      0.52  .Q        . V       .         .         .
  14.567      0.2324      0.52  .Q        . V       .         .         .
  14.583      0.2331      0.52  .Q        . V       .         .         .
  14.600      0.2338      0.53  .Q        . V       .         .         .
  14.617      0.2346      0.53  .Q        . V       .         .         .
  14.633      0.2353      0.54  .Q        . V       .         .         .
  14.650      0.2361      0.54  . Q       . V       .         .         .
  14.667      0.2368      0.55  . Q       . V       .         .         .
  14.683      0.2376      0.55  . Q       . V       .         .         .
  14.700      0.2383      0.55  . Q       . V       .         .         .
  14.717      0.2391      0.56  . Q       .  V      .         .         .
  14.733      0.2399      0.56  . Q       .  V      .         .         .
  14.750      0.2407      0.57  . Q       .  V      .         .         .
  14.767      0.2414      0.57  . Q       .  V      .         .         .
  14.783      0.2422      0.57  . Q       .  V      .         .         .
  14.800      0.2430      0.58  . Q       .  V      .         .         .
  14.817      0.2438      0.58  . Q       .  V      .         .         .
  14.833      0.2446      0.58  . Q       .  V      .         .         .
  14.850      0.2454      0.59  . Q       .  V      .         .         .
  14.867      0.2463      0.59  . Q       .  V      .         .         .
  14.883      0.2471      0.59  . Q       .  V      .         .         .
  14.900      0.2479      0.59  . Q       .  V      .         .         .
  14.917      0.2487      0.60  . Q       .  V      .         .         .
  14.933      0.2495      0.60  . Q       .  V      .         .         .
  14.950      0.2504      0.60  . Q       .  V      .         .         .
  14.967      0.2512      0.61  . Q       .  V      .         .         .
  14.983      0.2520      0.61  . Q       .  V      .         .         .
  15.000      0.2529      0.61  . Q       .  V      .         .         .
  15.017      0.2537      0.61  . Q       .  V      .         .         .
  15.033      0.2546      0.62  . Q       .  V      .         .         .
  15.050      0.2554      0.62  . Q       .  V      .         .         .
  15.067      0.2563      0.63  . Q       .  V      .         .         .
  15.083      0.2572      0.64  . Q       .  V      .         .         .
  15.100      0.2581      0.65  . Q       .   V     .         .         .
  15.117      0.2590      0.65  . Q       .   V     .         .         .
  15.133      0.2599      0.66  . Q       .   V     .         .         .
  15.150      0.2608      0.67  . Q       .   V     .         .         .
  15.167      0.2617      0.68  . Q       .   V     .         .         .
  15.183      0.2627      0.68  . Q       .   V     .         .         .
  15.200      0.2636      0.69  . Q       .   V     .         .         .
  15.217      0.2646      0.70  . Q       .   V     .         .         .
  15.233      0.2656      0.71  . Q       .   V     .         .         .
  15.250      0.2666      0.71  . Q       .   V     .         .         .
  15.267      0.2675      0.72  . Q       .   V     .         .         .
  15.283      0.2686      0.73  . Q       .   V     .         .         .
```



Onsite Flood Routing Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1

with Flowby Detention @ Node 56.3 (100cfs) & Node 35.2 (10cfs), User input for total flowby @ Rational Node 35

2-Year Storm Proposed Condition

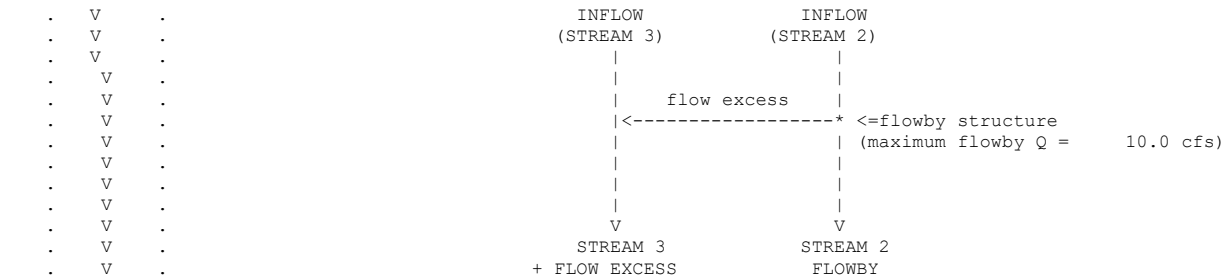
17.167	0.6259	0.48	.Q	.	.	.	V	.
17.183	0.6266	0.47	.Q	.	.	.	V	.
17.200	0.6272	0.47	.Q	.	.	.	V	.
17.217	0.6279	0.46	.Q	.	.	.	V	.
17.233	0.6285	0.46	.Q	.	.	.	V	.
17.250	0.6291	0.45	.Q	.	.	.	V	.
17.267	0.6298	0.45	.Q	.	.	.	V	.
17.283	0.6304	0.45	.Q	.	.	.	V	.
17.300	0.6310	0.44	.Q	.	.	.	V	.
17.317	0.6316	0.44	.Q	.	.	.	V	.
17.333	0.6322	0.43	.Q	.	.	.	V	.
17.350	0.6328	0.43	.Q	.	.	.	V	.
17.367	0.6334	0.43	.Q	.	.	.	V	.
17.383	0.6339	0.42	.Q	.	.	.	V	.
17.400	0.6345	0.42	.Q	.	.	.	V	.
17.417	0.6351	0.42	.Q	.	.	.	V	.
17.433	0.6357	0.41	.Q	.	.	.	V	.
17.450	0.6362	0.41	.Q	.	.	.	V	.
17.467	0.6368	0.40	.Q	.	.	.	V	.
17.483	0.6373	0.40	.Q	.	.	.	V	.
17.500	0.6379	0.40	.Q	.	.	.	V	.
17.517	0.6384	0.40	.Q	.	.	.	V	.
17.533	0.6390	0.39	.Q	.	.	.	V	.
17.550	0.6395	0.39	.Q	.	.	.	V	.
17.567	0.6400	0.39	.Q	.	.	.	V	.
17.583	0.6406	0.39	.Q	.	.	.	V	.
17.600	0.6411	0.38	.Q	.	.	.	V	.
17.617	0.6416	0.38	.Q	.	.	.	V	.
17.633	0.6421	0.38	.Q	.	.	.	V	.
17.650	0.6427	0.38	.Q	.	.	.	V	.
17.667	0.6432	0.37	.Q	.	.	.	V	.
17.683	0.6437	0.37	.Q	.	.	.	V	.
17.700	0.6442	0.37	.Q	.	.	.	V	.
17.717	0.6447	0.37	.Q	.	.	.	V	.
17.733	0.6452	0.36	.Q	.	.	.	V	.
17.750	0.6457	0.36	.Q	.	.	.	V	.
17.767	0.6462	0.36	.Q	.	.	.	V	.
17.783	0.6467	0.36	.Q	.	.	.	V	.
17.800	0.6472	0.36	.Q	.	.	.	V	.
17.817	0.6477	0.35	.Q	.	.	.	V	.
17.833	0.6482	0.35	.Q	.	.	.	V	.
17.850	0.6486	0.35	.Q	.	.	.	V	.
17.867	0.6491	0.35	.Q	.	.	.	V	.
17.883	0.6496	0.35	.Q	.	.	.	V	.
17.900	0.6501	0.34	.Q	.	.	.	V	.
17.917	0.6505	0.34	.Q	.	.	.	V	.
17.933	0.6510	0.34	.Q	.	.	.	V	.
17.950	0.6515	0.34	.Q	.	.	.	V	.
17.967	0.6519	0.34	.Q	.	.	.	V	.
17.983	0.6524	0.33	.Q	.	.	.	V	.
18.000	0.6528	0.33	.Q	.	.	.	V	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	245.0
20%	155.0
30%	125.0
40%	105.0
50%	85.0
60%	70.0
70%	50.0
80%	35.0
90%	15.0

```
**************************************************************************
  FLOW PROCESS FROM NODE     35.20 TO NODE     35.00 IS CODE =   2
--------------------------------------------------------------------------
  >>>>>FLOWBY STRUCTURE ROUTING MODEL APPLIED TO STREAM #2<<<<<
==========================================================================
```

MODEL STREAM NUMBER 2 FLOWING PAST A FLOWBY STRUCTURE:
FLOWRATES IN STREAM # 2 WHICH ARE GREATER THAN
10.0 CFS ARE ASSUMED TO BE EXCESS FLOWS.
FLOW EXCESS IS ASSUMED TO BE ADDED TO STREAM NUMBER 3



FLOWBY BASIN MODELING RESULTS:

MODEL TIME (HRS)	INFLOW (STREAM 3) (CFS)	INFLOW (STREAM 2) (CFS)	OUTFLOW (STREAM 3) (CFS)	FLOWBY (STREAM 2) (CFS)
14.000	0.00	0.43	0.00	0.43
14.017	0.00	0.43	0.00	0.43
14.033	0.00	0.43	0.00	0.43
14.050	0.00	0.43	0.00	0.43
14.067	0.00	0.44	0.00	0.44
14.083	0.00	0.44	0.00	0.44

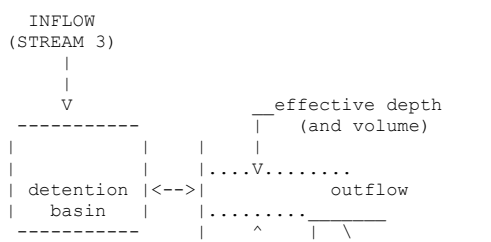
14.100	0.00	0.44	0.00	0.44
14.117	0.00	0.45	0.00	0.45
14.133	0.00	0.45	0.00	0.45
14.150	0.00	0.46	0.00	0.46
14.167	0.00	0.46	0.00	0.46
14.183	0.00	0.46	0.00	0.46
14.200	0.00	0.47	0.00	0.47
14.217	0.00	0.47	0.00	0.47
14.233	0.00	0.48	0.00	0.48
14.250	0.00	0.48	0.00	0.48
14.267	0.00	0.48	0.00	0.48
14.283	0.00	0.49	0.00	0.49
14.300	0.00	0.49	0.00	0.49
14.317	0.00	0.49	0.00	0.49
14.333	0.00	0.49	0.00	0.49
14.350	0.00	0.50	0.00	0.50
14.367	0.00	0.50	0.00	0.50
14.383	0.00	0.50	0.00	0.50
14.400	0.00	0.50	0.00	0.50
14.417	0.00	0.50	0.00	0.50
14.433	0.00	0.50	0.00	0.50
14.450	0.00	0.51	0.00	0.51
14.467	0.00	0.51	0.00	0.51
14.483	0.00	0.51	0.00	0.51
14.500	0.00	0.51	0.00	0.51
14.517	0.00	0.51	0.00	0.51
14.533	0.00	0.51	0.00	0.51
14.550	0.00	0.52	0.00	0.52
14.567	0.00	0.52	0.00	0.52
14.583	0.00	0.52	0.00	0.52
14.600	0.00	0.53	0.00	0.53
14.617	0.00	0.53	0.00	0.53
14.633	0.00	0.54	0.00	0.54
14.650	0.00	0.54	0.00	0.54
14.667	0.00	0.55	0.00	0.55
14.683	0.00	0.55	0.00	0.55
14.700	0.00	0.55	0.00	0.55
14.717	0.00	0.56	0.00	0.56
14.733	0.00	0.56	0.00	0.56
14.750	0.00	0.57	0.00	0.57
14.767	0.00	0.57	0.00	0.57
14.783	0.00	0.57	0.00	0.57
14.800	0.00	0.58	0.00	0.58
14.817	0.00	0.58	0.00	0.58
14.833	0.00	0.58	0.00	0.58
14.850	0.00	0.59	0.00	0.59
14.867	0.00	0.59	0.00	0.59
14.883	0.00	0.59	0.00	0.59
14.900	0.00	0.59	0.00	0.59
14.917	0.00	0.60	0.00	0.60
14.933	0.00	0.60	0.00	0.60
14.950	0.00	0.60	0.00	0.60
14.967	0.00	0.61	0.00	0.61
14.983	0.00	0.61	0.00	0.61
15.000	0.00	0.61	0.00	0.61
15.017	0.00	0.61	0.00	0.61
15.033	0.00	0.62	0.00	0.62
15.050	0.00	0.62	0.00	0.62
15.067	0.00	0.63	0.00	0.63
15.083	0.00	0.64	0.00	0.64
15.100	0.00	0.65	0.00	0.65
15.117	0.00	0.65	0.00	0.65
15.133	0.00	0.66	0.00	0.66
15.150	0.00	0.67	0.00	0.67
15.167	0.00	0.68	0.00	0.68
15.183	0.00	0.68	0.00	0.68
15.200	0.00	0.69	0.00	0.69
15.217	0.00	0.70	0.00	0.70
15.233	0.00	0.71	0.00	0.71
15.250	0.00	0.71	0.00	0.71
15.267	0.00	0.72	0.00	0.72
15.283	0.00	0.73	0.00	0.73
15.300	0.00	0.73	0.00	0.73
15.317	0.00	0.74	0.00	0.74
15.333	0.00	0.74	0.00	0.74
15.350	0.00	0.75	0.00	0.75
15.367	0.00	0.75	0.00	0.75
15.383	0.00	0.76	0.00	0.76
15.400	0.00	0.76	0.00	0.76
15.417	0.00	0.77	0.00	0.77
15.433	0.00	0.77	0.00	0.77
15.450	0.00	0.78	0.00	0.78
15.467	0.00	0.78	0.00	0.78
15.483	0.00	0.78	0.00	0.78
15.500	0.00	0.79	0.00	0.79
15.517	0.00	0.79	0.00	0.79
15.533	0.00	0.82	0.00	0.82
15.550	0.00	0.85	0.00	0.85
15.567	0.00	0.88	0.00	0.88
15.583	0.00	0.91	0.00	0.91
15.600	0.00	0.95	0.00	0.95
15.617	0.00	0.98	0.00	0.98
15.633	0.00	1.01	0.00	1.01
15.650	0.00	1.04	0.00	1.04
15.667	0.00	1.08	0.00	1.08
15.683	0.00	1.11	0.00	1.11
15.700	0.00	1.14	0.00	1.14
15.717	0.00	1.17	0.00	1.17
15.733	0.00	1.20	0.00	1.20
15.750	0.00	1.24	0.00	1.24
15.767	0.00	1.28	0.00	1.28
15.783	0.00	1.35	0.00	1.35
15.800	0.00	1.44	0.00	1.44
15.817	0.00	1.52	0.00	1.52
15.833	0.00	1.60	0.00	1.60
15.850	0.00	1.68	0.00	1.68
15.867	0.00	1.76	0.00	1.76
15.883	0.00	1.84	0.00	1.84
15.900	0.00	1.92	0.00	1.92
15.917	0.00	2.00	0.00	2.00
15.933	0.00	2.08	0.00	2.08
15.950	0.00	2.17	0.00	2.17

15.967	0.00	2.25	0.00	2.25
15.983	0.00	2.33	0.00	2.33
16.000	0.00	2.41	0.00	2.41
16.017	0.00	2.73	0.00	2.73
16.033	0.00	3.31	0.00	3.31
16.050	0.00	3.88	0.00	3.88
16.067	0.00	4.45	0.00	4.45
16.083	0.00	5.02	0.00	5.02
16.100	6.15	5.59	6.15	5.59
16.117	14.02	6.16	14.02	6.16
16.133	21.90	6.73	21.90	6.73
16.150	29.78	7.30	29.78	7.30
16.167	37.66	7.87	37.66	7.87
16.183	45.53	8.44	45.53	8.44
16.200	53.41	9.01	53.41	9.01
16.217	61.29	9.58	61.29	9.58
16.233	69.17	10.15	69.32	10.00
16.250	77.05	10.78	77.83	10.00
16.267	84.92	10.17	85.09	10.00
16.283	92.80	9.48	92.80	9.48
16.300	100.68	8.80	100.68	8.80
16.317	108.56	8.12	108.56	8.12
16.333	116.43	7.43	116.43	7.43
16.350	123.48	6.75	123.48	6.75
16.367	113.46	6.07	113.46	6.07
16.383	104.39	5.38	104.39	5.38
16.400	95.31	4.70	95.31	4.70
16.417	86.24	4.02	86.24	4.02
16.433	77.17	3.33	77.17	3.33
16.450	68.10	2.65	68.10	2.65
16.467	59.02	1.97	59.02	1.97
16.483	49.95	1.28	49.95	1.28
16.500	40.88	0.81	40.88	0.81
16.517	31.81	0.79	31.81	0.79
16.533	22.73	0.78	22.73	0.78
16.550	13.66	0.77	13.66	0.77
16.567	4.59	0.76	4.59	0.76
16.583	0.00	0.75	0.00	0.75
16.600	0.00	0.74	0.00	0.74
16.617	0.00	0.73	0.00	0.73
16.633	0.00	0.73	0.00	0.73
16.650	0.00	0.72	0.00	0.72
16.667	0.00	0.71	0.00	0.71
16.683	0.00	0.70	0.00	0.70
16.700	0.00	0.69	0.00	0.69
16.717	0.00	0.68	0.00	0.68
16.733	0.00	0.67	0.00	0.67
16.750	0.00	0.66	0.00	0.66
16.767	0.00	0.65	0.00	0.65
16.783	0.00	0.64	0.00	0.64
16.800	0.00	0.63	0.00	0.63
16.817	0.00	0.63	0.00	0.63
16.833	0.00	0.62	0.00	0.62
16.850	0.00	0.61	0.00	0.61
16.867	0.00	0.60	0.00	0.60
16.883	0.00	0.59	0.00	0.59
16.900	0.00	0.58	0.00	0.58
16.917	0.00	0.58	0.00	0.58
16.933	0.00	0.57	0.00	0.57
16.950	0.00	0.56	0.00	0.56
16.967	0.00	0.55	0.00	0.55
16.983	0.00	0.54	0.00	0.54
17.000	0.00	0.54	0.00	0.54
17.017	0.00	0.53	0.00	0.53
17.033	0.00	0.53	0.00	0.53
17.050	0.00	0.52	0.00	0.52
17.067	0.00	0.51	0.00	0.51
17.083	0.00	0.51	0.00	0.51
17.100	0.00	0.50	0.00	0.50
17.117	0.00	0.50	0.00	0.50
17.133	0.00	0.49	0.00	0.49
17.150	0.00	0.49	0.00	0.49
17.167	0.00	0.48	0.00	0.48
17.183	0.00	0.47	0.00	0.47
17.200	0.00	0.47	0.00	0.47
17.217	0.00	0.46	0.00	0.46
17.233	0.00	0.46	0.00	0.46
17.250	0.00	0.45	0.00	0.45
17.267	0.00	0.45	0.00	0.45
17.283	0.00	0.45	0.00	0.45
17.300	0.00	0.44	0.00	0.44
17.317	0.00	0.44	0.00	0.44
17.333	0.00	0.43	0.00	0.43
17.350	0.00	0.43	0.00	0.43
17.367	0.00	0.43	0.00	0.43
17.383	0.00	0.42	0.00	0.42
17.400	0.00	0.42	0.00	0.42
17.417	0.00	0.42	0.00	0.42
17.433	0.00	0.41	0.00	0.41
17.450	0.00	0.41	0.00	0.41
17.467	0.00	0.40	0.00	0.40
17.483	0.00	0.40	0.00	0.40
17.500	0.00	0.40	0.00	0.40
17.517	0.00	0.40	0.00	0.40
17.533	0.00	0.39	0.00	0.39
17.550	0.00	0.39	0.00	0.39
17.567	0.00	0.39	0.00	0.39
17.583	0.00	0.39	0.00	0.39
17.600	0.00	0.38	0.00	0.38
17.617	0.00	0.38	0.00	0.38
17.633	0.00	0.38	0.00	0.38
17.650	0.00	0.38	0.00	0.38
17.667	0.00	0.37	0.00	0.37
17.683	0.00	0.37	0.00	0.37
17.700	0.00	0.37	0.00	0.37
17.717	0.00	0.37	0.00	0.37
17.733	0.00	0.36	0.00	0.36
17.750	0.00	0.36	0.00	0.36
17.767	0.00	0.36	0.00	0.36
17.783	0.00	0.36	0.00	0.36
17.800	0.00	0.36	0.00	0.36
17.817	0.00	0.35	0.00	0.35

17.833	0.00	0.35	0.00	0.35
17.850	0.00	0.35	0.00	0.35
17.867	0.00	0.35	0.00	0.35
17.883	0.00	0.35	0.00	0.35
17.900	0.00	0.34	0.00	0.34
17.917	0.00	0.34	0.00	0.34
17.933	0.00	0.34	0.00	0.34
17.950	0.00	0.34	0.00	0.34
17.967	0.00	0.34	0.00	0.34
17.983	0.00	0.33	0.00	0.33
18.000	0.00	0.33	0.00	0.33

****
FLOW PROCESS FROM NODE 35.00 TO NODE 35.00 IS CODE = 3.2

>>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #3<<<<<
==========



ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 3
THROUGH A FLOW-THROUGH DETENTION BASIN
SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
DEAD STORAGE(AF) = 0.000
SPECIFIED DEAD STORAGE(AF) FILLED = 0.000
SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET = 0.000
DETENTION BASIN CONSTANT LOSS RATE(CFS) = 0.00

BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

INTERVAL NUMBER	DEPTH (FT)	OUTFLOW (CFS)	STORAGE (AF)
1	0.00	0.00	0.000
2	0.50	15.16	0.510
3	1.00	40.12	1.010
4	1.50	54.67	1.520
5	2.00	66.33	2.020
6	2.50	76.19	2.530
7	3.00	84.90	3.040
8	3.50	93.04	3.540
9	4.00	100.45	4.050
10	4.50	107.33	4.560
11	5.00	114.02	5.060
12	5.50	120.27	5.570
13	6.00	126.17	6.070
14	7.00	142.55	7.090
15	8.00	156.65	8.100
16	9.00	168.87	9.110
17	10.00	180.03	10.120
18	11.00	190.43	11.140
19	12.00	200.23	12.150
20	13.00	428.93	13.160
21	14.00	838.96	14.170

==========
MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
16.017	0.000	0.00	0.00	0.00	0.0	0.000
16.033	0.000	0.00	0.00	0.00	0.0	0.000
16.050	0.000	0.00	0.00	0.00	0.0	0.000
16.067	0.000	0.00	0.00	0.00	0.0	0.000
16.083	0.000	0.00	0.00	0.00	0.0	0.000
16.100	0.000	6.15	0.00	0.01	0.1	0.008
16.117	0.000	14.02	0.00	0.03	0.5	0.027
16.133	0.000	21.90	0.00	0.05	1.2	0.055
16.150	0.000	29.78	0.00	0.09	2.2	0.093
16.167	0.000	37.66	0.00	0.14	3.5	0.140
16.183	0.000	45.53	0.00	0.19	5.0	0.196
16.200	0.000	53.41	0.00	0.26	6.8	0.260
16.217	0.000	61.29	0.00	0.33	8.8	0.333
16.233	0.000	69.32	0.00	0.40	11.1	0.413
16.250	0.000	77.83	0.00	0.49	13.6	0.501
16.267	0.000	85.09	0.00	0.59	17.2	0.595
16.283	0.000	92.80	0.00	0.68	21.8	0.693
16.300	0.000	100.68	0.00	0.78	26.8	0.794
16.317	0.000	108.56	0.00	0.89	32.0	0.900
16.333	0.000	116.43	0.00	1.00	37.3	1.009
16.350	0.000	123.48	0.00	1.11	41.7	1.122
16.367	0.000	113.46	0.00	1.20	44.7	1.216
16.383	0.000	104.39	0.00	1.28	47.1	1.295
16.400	0.000	95.31	0.00	1.34	49.2	1.359
16.417	0.000	86.24	0.00	1.39	50.8	1.408
16.433	0.000	77.17	0.00	1.42	52.0	1.442
16.450	0.000	68.10	0.00	1.44	52.8	1.463
16.467	0.000	59.02	0.00	1.45	53.2	1.472
16.483	0.000	49.95	0.00	1.45	53.2	1.467
16.500	0.000	40.88	0.00	1.43	52.9	1.450

16.517	0.000	31.81	0.00	1.40	52.3	1.422
16.533	0.000	22.73	0.00	1.37	51.3	1.383
16.550	0.000	13.66	0.00	1.32	50.0	1.333
16.567	0.000	4.59	0.00	1.26	48.5	1.272
16.583	0.000	0.00	0.00	1.19	46.7	1.208
16.600	0.000	0.00	0.00	1.13	44.9	1.146
16.617	0.000	0.00	0.00	1.08	43.2	1.087
16.633	0.000	0.00	0.00	1.02	41.5	1.030
16.650	0.000	0.00	0.00	0.97	39.5	0.975
16.667	0.000	0.00	0.00	0.91	37.1	0.924
16.683	0.000	0.00	0.00	0.87	34.6	0.876
16.700	0.000	0.00	0.00	0.82	32.3	0.832
16.717	0.000	0.00	0.00	0.78	30.2	0.790
16.733	0.000	0.00	0.00	0.74	28.2	0.751
16.750	0.000	0.00	0.00	0.71	26.3	0.715
16.767	0.000	0.00	0.00	0.67	24.6	0.681
16.783	0.000	0.00	0.00	0.64	22.9	0.650
16.800	0.000	0.00	0.00	0.61	21.4	0.620
16.817	0.000	0.00	0.00	0.58	20.0	0.593
16.833	0.000	0.00	0.00	0.56	18.7	0.567
16.850	0.000	0.00	0.00	0.53	17.4	0.543
16.867	0.000	0.00	0.00	0.51	16.3	0.521
16.883	0.000	0.00	0.00	0.49	15.3	0.500
16.900	0.000	0.00	0.00	0.47	14.6	0.480
16.917	0.000	0.00	0.00	0.45	14.0	0.460
16.933	0.000	0.00	0.00	0.43	13.4	0.442
16.950	0.000	0.00	0.00	0.42	12.9	0.424
16.967	0.000	0.00	0.00	0.40	12.4	0.407
16.983	0.000	0.00	0.00	0.38	11.9	0.391
17.000	0.000	0.00	0.00	0.37	11.4	0.375
17.017	0.000	0.00	0.00	0.35	10.9	0.360
17.033	0.000	0.00	0.00	0.34	10.5	0.346
17.050	0.000	0.00	0.00	0.33	10.1	0.332
17.067	0.000	0.00	0.00	0.31	9.7	0.318
17.083	0.000	0.00	0.00	0.30	9.3	0.306
17.100	0.000	0.00	0.00	0.29	8.9	0.293
17.117	0.000	0.00	0.00	0.28	8.5	0.282
17.133	0.000	0.00	0.00	0.27	8.2	0.270
17.150	0.000	0.00	0.00	0.25	7.9	0.259
17.167	0.000	0.00	0.00	0.24	7.6	0.249
17.183	0.000	0.00	0.00	0.23	7.3	0.239
17.200	0.000	0.00	0.00	0.22	7.0	0.229
17.217	0.000	0.00	0.00	0.22	6.7	0.220
17.233	0.000	0.00	0.00	0.21	6.4	0.211
17.250	0.000	0.00	0.00	0.20	6.2	0.203
17.267	0.000	0.00	0.00	0.19	5.9	0.195
17.283	0.000	0.00	0.00	0.18	5.7	0.187
17.300	0.000	0.00	0.00	0.18	5.4	0.180
17.317	0.000	0.00	0.00	0.17	5.2	0.172
17.333	0.000	0.00	0.00	0.16	5.0	0.165
17.350	0.000	0.00	0.00	0.16	4.8	0.159
17.367	0.000	0.00	0.00	0.15	4.6	0.152
17.383	0.000	0.00	0.00	0.14	4.4	0.146
17.400	0.000	0.00	0.00	0.14	4.3	0.140
17.417	0.000	0.00	0.00	0.13	4.1	0.135
17.433	0.000	0.00	0.00	0.13	3.9	0.129
17.450	0.000	0.00	0.00	0.12	3.8	0.124
17.467	0.000	0.00	0.00	0.12	3.6	0.119
17.483	0.000	0.00	0.00	0.11	3.5	0.114
17.500	0.000	0.00	0.00	0.11	3.3	0.110
17.517	0.000	0.00	0.00	0.10	3.2	0.105
17.533	0.000	0.00	0.00	0.10	3.1	0.101
17.550	0.000	0.00	0.00	0.10	2.9	0.097
17.567	0.000	0.00	0.00	0.09	2.8	0.093
17.583	0.000	0.00	0.00	0.09	2.7	0.089
17.600	0.000	0.00	0.00	0.08	2.6	0.086
17.617	0.000	0.00	0.00	0.08	2.5	0.082
17.633	0.000	0.00	0.00	0.08	2.4	0.079
17.650	0.000	0.00	0.00	0.07	2.3	0.076
17.667	0.000	0.00	0.00	0.07	2.2	0.073
17.683	0.000	0.00	0.00	0.07	2.1	0.070
17.700	0.000	0.00	0.00	0.07	2.0	0.067
17.717	0.000	0.00	0.00	0.06	2.0	0.064
17.733	0.000	0.00	0.00	0.06	1.9	0.062
17.750	0.000	0.00	0.00	0.06	1.8	0.059
17.767	0.000	0.00	0.00	0.06	1.7	0.057
17.783	0.000	0.00	0.00	0.05	1.7	0.055
17.800	0.000	0.00	0.00	0.05	1.6	0.053
17.817	0.000	0.00	0.00	0.05	1.5	0.050
17.833	0.000	0.00	0.00	0.05	1.5	0.048
17.850	0.000	0.00	0.00	0.05	1.4	0.046
17.867	0.000	0.00	0.00	0.04	1.4	0.045
17.883	0.000	0.00	0.00	0.04	1.3	0.043
17.900	0.000	0.00	0.00	0.04	1.2	0.041
17.917	0.000	0.00	0.00	0.04	1.2	0.039
17.933	0.000	0.00	0.00	0.04	1.1	0.038
17.950	0.000	0.00	0.00	0.04	1.1	0.036
17.967	0.000	0.00	0.00	0.03	1.1	0.035
17.983	0.000	0.00	0.00	0.03	1.0	0.033
18.000	0.000	0.00	0.00	0.03	1.0	0.032
18.017	0.000	0.00	0.00	0.03	0.9	0.031
18.033	0.000	0.00	0.00	0.03	0.9	0.030
18.050	0.000	0.00	0.00	0.03	0.9	0.028
18.067	0.000	0.00	0.00	0.03	0.8	0.027
18.083	0.000	0.00	0.00	0.03	0.8	0.026
18.100	0.000	0.00	0.00	0.02	0.8	0.025
18.117	0.000	0.00	0.00	0.02	0.7	0.024
18.133	0.000	0.00	0.00	0.02	0.7	0.023
18.150	0.000	0.00	0.00	0.02	0.7	0.022
18.167	0.000	0.00	0.00	0.02	0.6	0.021
18.183	0.000	0.00	0.00	0.02	0.6	0.020
18.200	0.000	0.00	0.00	0.02	0.6	0.020
18.217	0.000	0.00	0.00	0.02	0.6	0.019
18.233	0.000	0.00	0.00	0.02	0.5	0.018
18.250	0.000	0.00	0.00	0.02	0.5	0.017
18.267	0.000	0.00	0.00	0.02	0.5	0.017
18.283	0.000	0.00	0.00	0.02	0.5	0.016
18.300	0.000	0.00	0.00	0.02	0.5	0.015
18.317	0.000	0.00	0.00	0.01	0.4	0.015
18.333	0.000	0.00	0.00	0.01	0.4	0.014
18.350	0.000	0.00	0.00	0.01	0.4	0.014
18.367	0.000	0.00	0.00	0.01	0.4	0.013

18.383	0.000	0.00	0.00	0.01	0.4	0.013
18.400	0.000	0.00	0.00	0.01	0.4	0.012
18.417	0.000	0.00	0.00	0.01	0.4	0.012
18.433	0.000	0.00	0.00	0.01	0.3	0.011
18.450	0.000	0.00	0.00	0.01	0.3	0.011
18.467	0.000	0.00	0.00	0.01	0.3	0.010
18.483	0.000	0.00	0.00	0.01	0.3	0.010
18.500	0.000	0.00	0.00	0.01	0.3	0.009
18.517	0.000	0.00	0.00	0.01	0.3	0.009
18.533	0.000	0.00	0.00	0.01	0.3	0.009
18.550	0.000	0.00	0.00	0.01	0.3	0.008
18.567	0.000	0.00	0.00	0.01	0.2	0.008
18.583	0.000	0.00	0.00	0.01	0.2	0.008
18.600	0.000	0.00	0.00	0.01	0.2	0.007
18.617	0.000	0.00	0.00	0.01	0.2	0.007
18.633	0.000	0.00	0.00	0.01	0.2	0.007
18.650	0.000	0.00	0.00	0.01	0.2	0.007
18.667	0.000	0.00	0.00	0.01	0.2	0.006
18.683	0.000	0.00	0.00	0.01	0.2	0.006
18.700	0.000	0.00	0.00	0.01	0.2	0.006
18.717	0.000	0.00	0.00	0.01	0.2	0.006
18.733	0.000	0.00	0.00	0.01	0.2	0.005
18.750	0.000	0.00	0.00	0.00	0.2	0.005
18.767	0.000	0.00	0.00	0.00	0.1	0.005
18.783	0.000	0.00	0.00	0.00	0.1	0.005
18.800	0.000	0.00	0.00	0.00	0.1	0.005
18.817	0.000	0.00	0.00	0.00	0.1	0.004
18.833	0.000	0.00	0.00	0.00	0.1	0.004
18.850	0.000	0.00	0.00	0.00	0.1	0.004
18.867	0.000	0.00	0.00	0.00	0.1	0.004
18.883	0.000	0.00	0.00	0.00	0.1	0.004
18.900	0.000	0.00	0.00	0.00	0.1	0.004
18.917	0.000	0.00	0.00	0.00	0.1	0.003
18.933	0.000	0.00	0.00	0.00	0.1	0.003
18.950	0.000	0.00	0.00	0.00	0.1	0.003
18.967	0.000	0.00	0.00	0.00	0.1	0.003
18.983	0.000	0.00	0.00	0.00	0.1	0.003
19.000	0.000	0.00	0.00	0.00	0.1	0.003
19.017	0.000	0.00	0.00	0.00	0.1	0.003
19.033	0.000	0.00	0.00	0.00	0.1	0.003
19.050	0.000	0.00	0.00	0.00	0.1	0.002
19.067	0.000	0.00	0.00	0.00	0.1	0.002
19.083	0.000	0.00	0.00	0.00	0.1	0.002
19.100	0.000	0.00	0.00	0.00	0.1	0.002
19.117	0.000	0.00	0.00	0.00	0.1	0.002
19.133	0.000	0.00	0.00	0.00	0.1	0.002
19.150	0.000	0.00	0.00	0.00	0.1	0.002
19.167	0.000	0.00	0.00	0.00	0.1	0.002
19.183	0.000	0.00	0.00	0.00	0.1	0.002
19.200	0.000	0.00	0.00	0.00	0.1	0.002
19.217	0.000	0.00	0.00	0.00	0.0	0.002
19.233	0.000	0.00	0.00	0.00	0.0	0.002
19.250	0.000	0.00	0.00	0.00	0.0	0.001
19.267	0.000	0.00	0.00	0.00	0.0	0.001
19.283	0.000	0.00	0.00	0.00	0.0	0.001
19.300	0.000	0.00	0.00	0.00	0.0	0.001
19.317	0.000	0.00	0.00	0.00	0.0	0.001
19.333	0.000	0.00	0.00	0.00	0.0	0.001
19.350	0.000	0.00	0.00	0.00	0.0	0.001
19.367	0.000	0.00	0.00	0.00	0.0	0.001
19.383	0.000	0.00	0.00	0.00	0.0	0.001
19.400	0.000	0.00	0.00	0.00	0.0	0.001
19.417	0.000	0.00	0.00	0.00	0.0	0.001
19.433	0.000	0.00	0.00	0.00	0.0	0.001
19.450	0.000	0.00	0.00	0.00	0.0	0.001
19.467	0.000	0.00	0.00	0.00	0.0	0.001
19.483	0.000	0.00	0.00	0.00	0.0	0.001
19.500	0.000	0.00	0.00	0.00	0.0	0.001
19.517	0.000	0.00	0.00	0.00	0.0	0.001
19.533	0.000	0.00	0.00	0.00	0.0	0.001
19.550	0.000	0.00	0.00	0.00	0.0	0.001
19.567	0.000	0.00	0.00	0.00	0.0	0.001
19.583	0.000	0.00	0.00	0.00	0.0	0.001
19.600	0.000	0.00	0.00	0.00	0.0	0.001
19.617	0.000	0.00	0.00	0.00	0.0	0.001
19.633	0.000	0.00	0.00	0.00	0.0	0.001
19.650	0.000	0.00	0.00	0.00	0.0	0.001
19.667	0.000	0.00	0.00	0.00	0.0	0.001
19.683	0.000	0.00	0.00	0.00	0.0	0.001
19.700	0.000	0.00	0.00	0.00	0.0	0.000

```
--------------------------------------------------------------------------------
  PROCESS SUMMARY OF STORAGE:
    INFLOW  VOLUME =      2.495 AF
    BASIN  STORAGE =      0.000 AF (WITH      0.000 AF INITIALLY FILLED)
    OUTFLOW VOLUME =      2.495 AF
    LOSS    VOLUME =      0.000 AF


********************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     35.20 IS CODE =   7
--------------------------------------------------------------------------------
  >>>>>STREAM NUMBER 1 ADDED TO STREAM NUMBER 2<<<<<
================================================================================


********************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  11
--------------------------------------------------------------------------------
  >>>>>VIEW STREAM NUMBER 2 HYDROGRAPH<<<<<
================================================================================

           STREAM HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
       (Notes: Time indicated is at END of Each Unit Intervals.
               Peak 5-minute rainfall intensity is modeled as
               a constant value for entire 5-minute period.)
--------------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       50.0     100.0     150.0     200.0
--------------------------------------------------------------------------------
  14.000      9.9530     20.25  .   Q     .   V     .         .         .
  14.017      9.9811     20.40  .   Q     .   V     .         .         .
  14.033     10.0094     20.55  .   Q     .   V     .         .         .
  14.050     10.0379     20.70  .   Q     .   V     .         .         .
```

```
14.067  10.0666  20.85 .  Q   .  V    .    .    .
14.083  10.0956  21.00 .  Q   .  V    .    .    .
14.100  10.1247  21.15 .  Q   .  V    .    .    .
14.117  10.1541  21.31 .  Q   .  V    .    .    .
14.133  10.1836  21.46 .  Q   .  V    .    .    .
14.150  10.2134  21.61 .  Q   .  V    .    .    .
14.167  10.2434  21.77 .  Q   .  V    .    .    .
14.183  10.2736  21.92 .  Q   .  V    .    .    .
14.200  10.3040  22.07 .  Q   .  V    .    .    .
14.217  10.3346  22.23 .  Q   .   V   .    .    .
14.233  10.3654  22.38 .  Q   .   V   .    .    .
14.250  10.3965  22.53 .  Q   .   V   .    .    .
14.267  10.4277  22.69 .  Q   .   V   .    .    .
14.283  10.4592  22.84 .  Q   .   V   .    .    .
14.300  10.4908  22.99 .  Q   .   V   .    .    .
14.317  10.5227  23.11 .  Q   .   V   .    .    .
14.333  10.5546  23.20 .  Q   .   V   .    .    .
14.350  10.5867  23.28 .  Q   .   V   .    .    .
14.367  10.6189  23.37 .  Q   .   V   .    .    .
14.383  10.6512  23.45 .  Q   .   V   .    .    .
14.400  10.6836  23.54 .  Q   .   V   .    .    .
14.417  10.7161  23.62 .  Q   .   V   .    .    .
14.433  10.7488  23.71 .  Q   .   V   .    .    .
14.450  10.7816  23.79 .  Q   .   V   .    .    .
14.467  10.8144  23.88 .  Q   .   V   .    .    .
14.483  10.8475  23.96 .  Q   .   V   .    .    .
14.500  10.8806  24.05 .  Q   .   V   .    .    .
14.517  10.9138  24.13 .  Q   .   V   .    .    .
14.533  10.9472  24.21 .  Q   .   V   .    .    .
14.550  10.9806  24.30 .  Q   .   V   .    .    .
14.567  11.0142  24.39 .  Q   .    V  .    .    .
14.583  11.0479  24.47 .  Q   .    V  .    .    .
14.600  11.0818  24.56 .  Q   .    V  .    .    .
14.617  11.1157  24.65 .  Q   .    V  .    .    .
14.633  11.1498  24.74 .  Q   .    V  .    .    .
14.650  11.1840  24.84 .  Q   .    V  .    .    .
14.667  11.2185  25.05 .   Q  .    V  .    .    .
14.683  11.2533  25.27 .   Q  .    V  .    .    .
14.700  11.2884  25.48 .   Q  .    V  .    .    .
14.717  11.3238  25.70 .   Q  .    V  .    .    .
14.733  11.3595  25.92 .   Q  .    V  .    .    .
14.750  11.3955  26.13 .   Q  .    V  .    .    .
14.767  11.4318  26.35 .   Q  .    V  .    .    .
14.783  11.4684  26.57 .   Q  .    V  .    .    .
14.800  11.5053  26.78 .   Q  .    V  .    .    .
14.817  11.5425  27.00 .   Q  .    V  .    .    .
14.833  11.5800  27.21 .   Q  .    V  .    .    .
14.850  11.6178  27.43 .   Q  .    V  .    .    .
14.867  11.6558  27.64 .   Q  .    V  .    .    .
14.883  11.6942  27.86 .   Q  .     V .    .    .
14.900  11.7329  28.08 .   Q  .     V .    .    .
14.917  11.7718  28.29 .   Q  .     V .    .    .
14.933  11.8111  28.51 .   Q  .     V .    .    .
14.950  11.8507  28.72 .   Q  .     V .    .    .
14.967  11.8905  28.94 .   Q  .     V .    .    .
14.983  11.9307  29.15 .   Q  .     V .    .    .
15.000  11.9711  29.33 .  Q   .   V .    .    .
15.017  12.0117  29.49 .  Q   .   V .    .    .
15.033  12.0525  29.65 .  Q   .   V .    .    .
15.050  12.0936  29.82 .  Q   .   V .    .    .
15.067  12.1349  29.98 .  Q   .   V .    .    .
15.083  12.1764  30.15 .   Q  .   V .    .    .
15.100  12.2182  30.31 .   Q  .   V .    .    .
15.117  12.2602  30.48 .   Q  .   V .    .    .
15.133  12.3024  30.64 .   Q  .   V .    .    .
15.150  12.3448  30.81 .   Q  .   V .    .    .
15.167  12.3875  30.97 .   Q  .    V .   .    .
15.183  12.4304  31.14 .   Q  .    V .   .    .
15.200  12.4735  31.30 .   Q  .    V .   .    .
15.217  12.5168  31.47 .   Q  .    V .   .    .
15.233  12.5604  31.63 .   Q  .    V .   .    .
15.250  12.6042  31.80 .   Q  .    V .   .    .
15.267  12.6482  31.96 .   Q  .    V .   .    .
15.283  12.6925  32.13 .   Q  .    V .   .    .
15.300  12.7369  32.29 .   Q  .    V .   .    .
15.317  12.7816  32.45 .   Q  .    V .   .    .
15.333  12.8267  32.71 .   Q  .    V .   .    .
15.350  12.8724  33.17 .   Q  .    V .   .    .
15.367  12.9187  33.64 .   Q  .    V .   .    .
15.383  12.9657  34.11 .   Q  .    V .   .    .
15.400  13.0133  34.58 .   Q  .    V .   .    .
15.417  13.0616  35.04 .    Q .     V.   .    .
15.433  13.1105  35.51 .    Q .     V.   .    .
15.450  13.1601  35.98 .    Q .     V.   .    .
15.467  13.2103  36.45 .    Q .     V.   .    .
15.483  13.2611  36.91 .    Q .     V.   .    .
15.500  13.3126  37.38 .    Q .     V.   .    .
15.517  13.3647  37.85 .    Q .     V.   .    .
15.533  13.4175  38.34 .    Q .     V.   .    .
15.550  13.4710  38.83 .    Q .     V.   .    .
15.567  13.5252  39.33 .    Q .     V.   .    .
15.583  13.5801  39.82 .    Q .     V.   .    .
15.600  13.6356  40.32 .     Q.     V.   .    .
15.617  13.6918  40.81 .     Q.     V.   .    .
15.633  13.7487  41.31 .     Q.      V   .    .
15.650  13.8063  41.80 .     Q.      V   .    .
15.667  13.8646  42.35 .     Q.      V   .    .
15.683  13.9243  43.33 .     Q.      V   .    .
15.700  13.9855  44.41 .     Q.      V   .    .
15.717  14.0482  45.50 .      Q.     V   .    .
15.733  14.1123  46.59 .      Q.     V   .    .
15.750  14.1780  47.68 .      Q.     V   .    .
15.767  14.2452  48.78 .      Q.     V   .    .
15.783  14.3139  49.91 .      Q.     V   .    .
15.800  14.3843  51.05 .       Q     V   .    .
15.817  14.4561  52.19 .       Q     .V  .    .
15.833  14.5296  53.32 .       Q     .V  .    .
15.850  14.6046  54.46 .       Q     .V  .    .
15.867  14.6812  55.60 .       .Q    .V  .    .
15.883  14.7593  56.74 .       .Q    .V  .    .
15.900  14.8391  57.87 .       .Q    .V  .    .
15.917  14.9203  59.01 .       .Q    .V  .    .
```

15.933	15.0032	60.15	. . Q .V . .
15.950	15.0876	61.29	. . Q .V . .
15.967	15.1736	62.43	. . Q . V . .
15.983	15.2611	63.56	. . Q . V . .
16.000	15.3503	64.70	. . Q . V . .
16.017	15.4460	69.49	. . Q . V . .
16.033	15.5533	77.94	. . Q . V . .
16.050	15.6723	86.39	. . Q . V . .
16.067	15.8030	94.84	. . Q . V . .
16.083	15.9452	103.29	. . Q V . .
16.100	16.0907	105.59	. . .Q V . .
16.117	16.2369	106.16	. . .Q V . .
16.133	16.3839	106.73	. . .Q V . .
16.150	16.5317	107.30	. . .Q V . .
16.167	16.6803	107.87	. . .Q V . .
16.183	16.8297	108.44	. . .Q V . .
16.200	16.9798	109.01	. . .Q V . .
16.217	17.1308	109.58	. . .Q V . .
16.233	17.2823	110.00	. . . Q V . .
16.250	17.4338	110.00	. . . Q V . .
16.267	17.5853	110.00	. . . Q V . .
16.283	17.7361	109.48	. . .Q V . .
16.300	17.8860	108.80	. . .Q V . .
16.317	18.0349	108.12	. . .Q V . .
16.333	18.1829	107.43	. . .Q V . .
16.350	18.3299	106.75	. . .Q V . .
16.367	18.4760	106.07	. . .Q V . .
16.383	18.6211	105.38	. . .Q V . .
16.400	18.7654	104.70	. . Q V . .
16.417	18.9086	104.02	. . Q V . .
16.433	19.0510	103.33	. . Q V . .
16.450	19.1924	102.65	. . Q V . .
16.467	19.3328	101.97	. . Q V . .
16.483	19.4723	101.28	. . Q V . .
16.500	19.6112	100.81	. . Q V . .
16.517	19.7500	100.79	. . Q V . .
16.533	19.8888	100.78	. . Q V . .
16.550	20.0276	100.77	. . Q V. .
16.567	20.1664	100.76	. . Q V. .
16.583	20.2990	96.27	. . Q. V. .
16.600	20.4191	87.19	. . Q . V. .
16.617	20.5267	78.11	. . Q . V. .
16.633	20.6218	69.02	. . Q . V .
16.650	20.7043	59.94	. .Q . V .
16.667	20.7744	50.86	. .Q . V .
16.683	20.8322	41.97	. Q . . V .
16.700	20.8855	38.71	. Q . . V .
16.717	20.9380	38.10	. Q . . V .
16.733	20.9896	37.49	. Q . . V .
16.750	21.0404	36.88	. Q . . V .
16.767	21.0904	36.27	. Q . . V .
16.783	21.1395	35.66	. Q . . V .
16.800	21.1878	35.05	. Q . . V .
16.817	21.2352	34.44	. Q . . V .
16.833	21.2818	33.83	. Q . . V .
16.850	21.3276	33.22	. Q . . .V .

16.867	21.3725	32.61	. Q . . .V .
16.883	21.4166	32.00	. Q . . .V .
16.900	21.4598	31.39	. Q . . .V .
16.917	21.5022	30.78	. Q . . .V .
16.933	21.5438	30.17	. Q . . .V .
16.950	21.5845	29.56	. Q . . .V .
16.967	21.6244	28.95	. Q . . .V .
16.983	21.6634	28.34	. Q . . .V .
17.000	21.7017	27.74	. Q . . .V .
17.017	21.7390	27.13	. Q . . .V .
17.033	21.7757	26.63	. Q . . .V .
17.050	21.8120	26.35	. Q . . .V .
17.067	21.8479	26.07	. Q . . .V .
17.083	21.8834	25.79	. Q . . .V .
17.100	21.9186	25.51	. Q . . .V .
17.117	21.9533	25.24	. Q . . .V .
17.133	21.9877	24.96	. Q . . . V .
17.150	22.0217	24.68	. Q . . . V .
17.167	22.0553	24.40	. Q . . . V .
17.183	22.0885	24.12	. Q . . . V .
17.200	22.1214	23.85	. Q . . . V .
17.217	22.1539	23.57	. Q . . . V .
17.233	22.1859	23.29	. Q . . . V .
17.250	22.2176	23.01	. Q . . . V .
17.267	22.2490	22.74	. Q . . . V .
17.283	22.2799	22.46	. Q . . . V .
17.300	22.3104	22.19	. Q . . . V .
17.317	22.3406	21.91	. Q . . . V .
17.333	22.3704	21.63	. Q . . . V .
17.350	22.3998	21.36	. Q . . . V .
17.367	22.4289	21.09	. Q . . . V .
17.383	22.4577	20.93	. Q . . . V .
17.400	22.4863	20.78	. Q . . . V .
17.417	22.5148	20.64	. Q . . . V .
17.433	22.5430	20.49	. Q . . . V .
17.450	22.5710	20.35	. Q . . . V .
17.467	22.5988	20.20	. Q . . . V .
17.483	22.6265	20.06	. Q . . . V .
17.500	22.6539	19.92	. Q . . . V .
17.517	22.6812	19.77	. Q . . . V .
17.533	22.7082	19.63	. Q . . . V .
17.550	22.7350	19.49	. Q . . . V .
17.567	22.7617	19.34	. Q . . . V .
17.583	22.7881	19.20	. Q . . . V .
17.600	22.8144	19.06	. Q . . . V .
17.617	22.8404	18.91	. Q . . . V .
17.633	22.8663	18.77	. Q . . . V .
17.650	22.8919	18.63	. Q . . . V .
17.667	22.9174	18.48	. Q . . . V .
17.683	22.9427	18.34	. Q . . . V .
17.700	22.9677	18.20	. Q . . . V .
17.717	22.9926	18.08	. Q . . . V .
17.733	23.0174	17.98	. Q . . . V .
17.750	23.0420	17.88	. Q . . . V .
17.767	23.0665	17.78	. Q . . . V .
17.783	23.0909	17.68	. Q . . . V .

```
  17.800     23.1151     17.59  .  Q      .         .         .  V      .
  17.817     23.1392     17.49  .  Q      .         .         .  V      .
  17.833     23.1631     17.39  .  Q      .         .         .  V      .
  17.850     23.1870     17.29  .  Q      .         .         .  V      .
  17.867     23.2106     17.19  .  Q      .         .         .  V      .
  17.883     23.2342     17.09  .  Q      .         .         .  V      .
  17.900     23.2576     17.00  .  Q      .         .         .  V      .
  17.917     23.2809     16.90  .  Q      .         .         .  V      .
  17.933     23.3040     16.80  .  Q      .         .         .  V      .
  17.950     23.3270     16.70  .  Q      .         .         .  V      .
  17.967     23.3499     16.60  .  Q      .         .         .  V      .
  17.983     23.3726     16.50  .  Q      .         .         .   V     .
  18.000     23.3952     16.40  .  Q      .         .         .   V     .
--------------------------------------------------------------------------------
    TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
    (Note: 100% of Peak Flow Rate estimate assumed to have
    an instantaneous time duration)

    Percentile of Estimated                Duration
        Peak Flow Rate                     (minutes)
    ======================                 =========
               0%                           1081.0
              10%                           1081.0
              20%                            935.0
              30%                            455.0
              40%                            295.0
              50%                            240.0
              60%                            190.0
              70%                            180.0
              80%                            160.0
              90%                            150.0


********************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =   7
--------------------------------------------------------------------------------
  >>>>>STREAM NUMBER 2 ADDED TO STREAM NUMBER 3<<<<<
================================================================================


********************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  11
--------------------------------------------------------------------------------
  >>>>>VIEW STREAM NUMBER 3 HYDROGRAPH<<<<<
================================================================================

            STREAM HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
         (Notes: Time indicated is at END of Each Unit Intervals.
                 Peak 5-minute rainfall intensity is modeled as
                 a constant value for entire 5-minute period.)
--------------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)    Q(CFS) 0.       50.0     100.0     150.0     200.0
--------------------------------------------------------------------------------
  14.000      9.9530     20.25  .   Q     .  V      .         .         .
  14.017      9.9811     20.40  .   Q     .  V      .         .         .
  14.033     10.0094     20.55  .   Q     .  V      .         .         .
  14.050     10.0379     20.70  .   Q     .  V      .         .         .
  14.067     10.0666     20.85  .   Q     .  V      .         .         .
  14.083     10.0956     21.00  .   Q     .  V      .         .         .
  14.100     10.1247     21.15  .   Q     .  V      .         .         .
  14.117     10.1541     21.31  .   Q     .  V      .         .         .
  14.133     10.1836     21.46  .   Q     .  V      .         .         .
  14.150     10.2134     21.61  .   Q     .  V      .         .         .
  14.167     10.2434     21.77  .   Q     .  V      .         .         .
  14.183     10.2736     21.92  .   Q     .  V      .         .         .
  14.200     10.3040     22.07  .   Q     .  V      .         .         .
  14.217     10.3346     22.23  .   Q     .  V      .         .         .
  14.233     10.3654     22.38  .   Q     .  V      .         .         .
  14.250     10.3965     22.53  .   Q     .  V      .         .         .
  14.267     10.4277     22.69  .   Q     .  V      .         .         .
  14.283     10.4592     22.84  .   Q     .  V      .         .         .
  14.300     10.4908     22.99  .   Q     .  V      .         .         .
  14.317     10.5227     23.11  .   Q     .   V     .         .         .
  14.333     10.5546     23.20  .   Q     .   V     .         .         .
  14.350     10.5867     23.28  .   Q     .  V      .         .         .
  14.367     10.6189     23.37  .   Q     .  V      .         .         .
  14.383     10.6512     23.45  .   Q     .  V      .         .         .
  14.400     10.6836     23.54  .   Q     .  V      .         .         .
  14.417     10.7161     23.62  .   Q     .  V      .         .         .
  14.433     10.7488     23.71  .   Q     .  V      .         .         .
  14.450     10.7816     23.79  .   Q     .  V      .         .         .
  14.467     10.8144     23.88  .   Q     .  V      .         .         .
  14.483     10.8475     23.96  .   Q     .  V      .         .         .
  14.500     10.8806     24.05  .   Q     .  V      .         .         .
  14.517     10.9138     24.13  .   Q     .  V      .         .         .
  14.533     10.9472     24.21  .   Q     .  V      .         .         .
  14.550     10.9806     24.30  .   Q     .  V      .         .         .
  14.567     11.0142     24.39  .   Q     .  V      .         .         .
  14.583     11.0479     24.47  .   Q     .  V      .         .         .
  14.600     11.0818     24.56  .   Q     .  V      .         .         .
  14.617     11.1157     24.65  .   Q     .  V      .         .         .
  14.633     11.1498     24.74  .   Q     .  V      .         .         .
  14.650     11.1840     24.84  .   Q     .  V      .         .         .
  14.667     11.2185     25.05  .    Q    .  V      .         .         .
  14.683     11.2533     25.27  .    Q    .   V     .         .         .
  14.700     11.2884     25.48  .    Q    .  V      .         .         .
  14.717     11.3238     25.70  .    Q    .  V      .         .         .
  14.733     11.3595     25.92  .    Q    .  V      .         .         .
  14.750     11.3955     26.13  .    Q    .  V      .         .         .
  14.767     11.4318     26.35  .    Q    .  V      .         .         .
  14.783     11.4684     26.57  .    Q    .  V      .         .         .
  14.800     11.5053     26.78  .    Q    .  V      .         .         .
  14.817     11.5425     27.00  .    Q    .  V      .         .         .
  14.833     11.5800     27.21  .    Q    .  V      .         .         .
  14.850     11.6178     27.43  .    Q    .  V      .         .         .
  14.867     11.6558     27.64  .    Q    .  V      .         .         .
  14.883     11.6942     27.86  .    Q    .  V      .         .         .
  14.900     11.7329     28.08  .    Q    .  V      .         .         .
  14.917     11.7718     28.29  .    Q    .  V      .         .         .
  14.933     11.8111     28.51  .    Q    .  V      .         .         .
  14.950     11.8507     28.72  .    Q    .  V      .         .         .
  14.967     11.8905     28.94  .    Q    .  V      .         .         .
```

```
14.983     11.9307     29.15  .    Q    .    V    .         .         .
15.000     11.9711     29.33  .    Q    .    V    .         .         .
15.017     12.0117     29.49  .    Q    .     V   .         .         .
15.033     12.0525     29.65  .    Q    .     V   .         .         .
15.050     12.0936     29.82  .    Q    .     V   .         .         .
15.067     12.1349     29.98  .    Q    .     V   .         .         .
15.083     12.1764     30.15  .     Q   .     V   .         .         .
15.100     12.2182     30.31  .     Q   .     V   .         .         .
15.117     12.2602     30.48  .     Q   .     V   .         .         .
15.133     12.3024     30.64  .     Q   .     V   .         .         .
15.150     12.3448     30.81  .     Q   .     V   .         .         .
15.167     12.3875     30.97  .     Q   .     V   .         .         .
15.183     12.4304     31.14  .     Q   .     V   .         .         .
15.200     12.4735     31.30  .     Q   .     V   .         .         .
15.217     12.5168     31.47  .     Q   .     V   .         .         .
15.233     12.5604     31.63  .     Q   .     V   .         .         .
15.250     12.6042     31.80  .     Q   .     V   .         .         .
15.267     12.6482     31.96  .     Q   .     V   .         .         .
15.283     12.6925     32.13  .     Q   .     V   .         .         .
15.300     12.7369     32.29  .     Q   .     V   .         .         .
15.317     12.7816     32.45  .     Q   .      V  .         .         .
15.333     12.8267     32.71  .     Q   .      V  .         .         .
15.350     12.8724     33.17  .     Q   .      V  .         .         .
15.367     12.9187     33.64  .     Q   .      V  .         .         .
15.383     12.9657     34.11  .     Q   .      V  .         .         .
15.400     13.0133     34.58  .     Q   .      V  .         .         .
15.417     13.0616     35.04  .      Q  .      V  .         .         .
15.433     13.1105     35.51  .      Q  .      V  .         .         .
15.450     13.1601     35.98  .      Q  .      V  .         .         .
15.467     13.2103     36.45  .      Q  .      V  .         .         .
15.483     13.2611     36.91  .      Q  .      V  .         .         .
15.500     13.3126     37.38  .      Q  .      V  .         .         .
15.517     13.3647     37.85  .      Q  .      V  .         .         .
15.533     13.4175     38.34  .      Q  .      V  .         .         .
15.550     13.4710     38.83  .      Q  .      V  .         .         .
15.567     13.5252     39.33  .      Q  .       V .         .         .
15.583     13.5801     39.82  .      Q  .       V .         .         .
15.600     13.6356     40.32  .       Q .       V .         .         .
15.617     13.6918     40.81  .       Q .       V .         .         .
15.633     13.7487     41.31  .       Q .       V .         .         .
15.650     13.8063     41.80  .       Q .       V .         .         .
15.667     13.8646     42.35  .       Q .       V .         .         .
15.683     13.9243     43.33  .       Q .       V .         .         .
15.700     13.9855     44.41  .       Q .       V .         .         .
15.717     14.0482     45.50  .        Q.       V .         .         .
15.733     14.1123     46.59  .        Q.       V .         .         .
15.750     14.1780     47.68  .        Q.       V .         .         .
15.767     14.2452     48.78  .        Q.        V.         .         .
15.783     14.3139     49.91  .        Q.        V.         .         .
15.800     14.3843     51.05  .         Q        V.         .         .
15.817     14.4561     52.19  .         Q        V.         .         .
15.833     14.5296     53.32  .         Q        V.         .         .
15.850     14.6046     54.46  .         Q        V.         .         .
15.867     14.6812     55.60  .         .Q       V.         .         .
15.883     14.7593     56.74  .         .Q       V.         .         .
15.900     14.8391     57.87  .         .Q       V.         .         .
15.917     14.9203     59.01  .         .Q       V.         .         .
15.933     15.0032     60.15  .         . Q       V         .         .
15.950     15.0876     61.29  .         . Q       V         .         .
15.967     15.1736     62.43  .         . Q       V         .         .
15.983     15.2611     63.56  .         . Q       V         .         .
16.000     15.3503     64.70  .         . Q       V         .         .
16.017     15.4460     69.49  .         .  Q      V         .         .
16.033     15.5533     77.94  .         .    Q    V         .         .
16.050     15.6723     86.39  .         .      Q  V         .         .
16.067     15.8030     94.84  .         .       Q .V        .         .
16.083     15.9452    103.29  .         .         QV        .         .
16.100     16.0908    105.71  .         .         .Q        .         .
16.117     16.2378    106.68  .         .         .Q        .         .
16.133     16.3865    107.95  .         .         .Q        .         .
16.150     16.5373    109.51  .         .         .QV       .         .
16.167     16.6907    111.35  .         .         . Q       .         .
16.183     16.8470    113.45  .         .         . Q       .         .
16.200     17.0065    115.80  .         .         . VQ      .         .
16.217     17.1695    118.40  .         .         . VQ      .         .
16.233     17.3363    121.08  .         .         .  VQ     .         .
16.250     17.5066    123.59  .         .         .  VQ     .         .
16.267     17.6817    127.16  .         .         .  V Q    .         .
16.283     17.8626    131.33  .         .         .  V  Q   .         .
16.300     18.0494    135.62  .         .         .   V  Q  .         .
16.317     18.2424    140.11  .         .         .   V   Q .         .
16.333     18.4418    144.78  .         .         .   V   Q .         .
16.350     18.6463    148.43  .         .         .   V    Q.         .
16.367     18.8539    150.72  .         .         .    V    Q         .
16.383     19.0639    152.51  .         .         .    V    Q         .
16.400     19.2759    153.86  .         .         .    V    Q         .
16.417     19.4891    154.78  .         .         .     V   Q         .
16.433     19.7030    155.29  .         .         .     V   .Q        .
16.450     19.9170    155.41  .         .         .     V   .Q        .
16.467     20.1307    155.14  .         .         .     V   .Q        .
16.483     20.3435    154.51  .         .         .      V  Q         .
16.500     20.5553    153.74  .         .         .      V  Q         .
16.517     20.7661    153.07  .         .         .      V  Q         .
16.533     20.9756    152.10  .         .         .      V  Q         .
16.550     21.1834    150.82  .         .         .       V Q         .
16.567     21.3889    149.23  .         .         .       VQ.         .
16.583     21.5858    142.96  .         .         .       Q .         .
16.600     21.7678    132.08  .         .         .     Q  V.         .
16.617     21.9348    121.26  .         .         .   Q    V.         .
16.633     22.0870    110.52  .         .         . Q      V.         .
16.650     22.2240     99.47  .         .        Q.        V.         .
16.667     22.3452     87.96  .         .      Q  .        V.         .
16.683     22.4507     76.60  .         .    Q    .        V.         .
16.700     22.5486     71.05  .         .   Q     .         V         .
16.717     22.6426     68.29  .         .  Q      .         V         .
16.733     22.7331     65.67  .         .  Q      .         V         .
16.750     22.8201     63.19  .         . Q       .         V         .
16.767     22.9039     60.83  .         . Q       .         V         .
16.783     22.9846     58.58  .         .Q        .         V         .
16.800     23.0624     56.45  .         .Q        .         V         .
16.817     23.1373     54.42  .         Q         .         V         .
16.833     23.2096     52.48  .         Q         .         V         .
```

```
16.850    23.2793    50.63  .         Q         .         .V        .
16.867    23.3466    48.86  .        Q.         .         .V        .
16.883    23.4118    47.28  .        Q.         .         .V        .
16.900    23.4751    45.95  .        Q.         .         .V        .
16.917    23.5367    44.75  .       Q .         .         .V        .
16.933    23.5967    43.58  .       Q .         .         .V        .
16.950    23.6552    42.44  .       Q .         .         .V        .
16.967    23.7121    41.31  .       Q .         .         .V        .
16.983    23.7675    40.20  .       Q .         .         .V        .
17.000    23.8213    39.12  .      Q  .         .         .V        .
17.017    23.8738    38.06  .      Q  .         .         .V        .
17.033    23.9249    37.12  .      Q  .         .         .V        .
17.050    23.9751    36.42  .      Q  .         .         .V        .
17.067    24.0243    35.73  .      Q  .         .         . V       .
17.083    24.0726    35.07  .      Q  .         .         . V       .
17.100    24.1200    34.42  .     Q   .         .         . V       .
17.117    24.1665    33.78  .     Q   .         .         . V       .
17.133    24.2122    33.16  .     Q   .         .         . V       .
17.150    24.2570    32.55  .     Q   .         .         . V       .
17.167    24.3011    31.96  .     Q   .         .         . V       .
17.183    24.3443    31.38  .     Q   .         .         . V       .
17.200    24.3867    30.81  .     Q   .         .         . V       .
17.217    24.4284    30.25  .     Q   .         .         . V       .
17.233    24.4693    29.71  .    Q    .         .         . V       .
17.250    24.5095    29.17  .    Q    .         .         . V       .
17.267    24.5490    28.65  .    Q    .         .         . V       .
17.283    24.5877    28.14  .    Q    .         .         . V       .
17.300    24.6258    27.63  .    Q    .         .         . V       .
17.317    24.6632    27.14  .    Q    .         .         . V       .
17.333    24.6999    26.65  .    Q    .         .         . V       .
17.350    24.7359    26.17  .    Q    .         .         .  V      .
17.367    24.7713    25.72  .    Q    .         .         .  V      .
17.383    24.8063    25.36  .    Q    .         .         .  V      .
17.400    24.8408    25.04  .    Q    .         .         .  V      .
17.417    24.8748    24.73  .   Q     .         .         .  V      .
17.433    24.9085    24.42  .   Q     .         .         .  V      .
17.450    24.9417    24.12  .   Q     .         .         .  V      .
17.467    24.9745    23.82  .   Q     .         .         .  V      .
17.483    25.0069    23.53  .   Q     .         .         .  V      .
17.500    25.0389    23.25  .   Q     .         .         .  V      .
17.517    25.0706    22.97  .   Q     .         .         .  V      .
17.533    25.1018    22.70  .   Q     .         .         .  V      .
17.550    25.1327    22.43  .   Q     .         .         .  V      .
17.567    25.1633    22.17  .   Q     .         .         .  V      .
17.583    25.1935    21.92  .   Q     .         .         .  V      .
17.600    25.2233    21.66  .   Q     .         .         .  V      .
17.617    25.2528    21.42  .   Q     .         .         .  V      .
17.633    25.2820    21.17  .   Q     .         .         .  V      .
17.650    25.3108    20.93  .   Q     .         .         .  V      .
17.667    25.3393    20.70  .   Q     .         .         .  V      .
17.683    25.3675    20.47  .   Q     .         .         .  V      .
17.700    25.3954    20.24  .   Q     .         .         .  V      .
17.717    25.4230    20.04  .   Q     .         .         .  V      .
17.733    25.4503    19.86  .  Q      .         .         .  V      .
17.750    25.4774    19.68  .  Q      .         .         .  V      .
17.767    25.5043    19.51  .  Q      .         .         .   V     .
17.783    25.5310    19.35  .  Q      .         .         .   V     .
17.800    25.5574    19.18  .  Q      .         .         .   V     .
17.817    25.5836    19.02  .  Q      .         .         .   V     .
17.833    25.6096    18.86  .  Q      .         .         .   V     .
17.850    25.6353    18.70  .  Q      .         .         .   V     .
17.867    25.6609    18.55  .  Q      .         .         .   V     .
17.883    25.6862    18.39  .  Q      .         .         .   V     .
17.900    25.7113    18.24  .  Q      .         .         .   V     .
17.917    25.7363    18.09  .  Q      .         .         .   V     .
17.933    25.7610    17.95  .  Q      .         .         .   V     .
17.950    25.7855    17.80  .  Q      .         .         .   V     .
17.967    25.8098    17.66  .  Q      .         .         .   V     .
17.983    25.8340    17.52  .  Q      .         .         .   V     .
18.000    25.8579    17.38  .  Q      .         .         .   V     .
```

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	1081.0
20%	605.0
30%	345.0
40%	240.0
50%	195.0
60%	180.0
70%	150.0
80%	105.0
90%	85.0

END OF FLOODSCx ROUTING ANALYSIS

```
************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
         (c) Copyright 1989-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                         Analysis prepared by:

                         HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                  *
* 25-YEAR STORM PROP. CONDITION FLOWBY AT NODES 56.3 & 35.2              *
* W.O. #1443-136X                                                        *
 ************************************************************************

  FILE NAME: 18142-25.DAT
  TIME/DATE OF STUDY: 18:22 10/16/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE = 1.2
------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =  265.74
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.068
    LOW LOSS FRACTION = 0.220
    TIME OF CONCENTRATION(MIN.) = 18.15
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =  25
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.87
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.15
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.94
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  2.71
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  4.49

------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =    73.83
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =    25.60

------------------------------------------------------------------------

========================================================================

                      2 4 - H O U R    S T O R M
                   R U N O F F    H Y D R O G R A P H

========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.      134.2     268.5     402.7     536.9
------------------------------------------------------------------------
  14.000     25.1582     54.84  .   Q     .  V      .         .         .
  14.017     25.2339     54.98  .   Q     .  V      .         .         .
  14.033     25.3098     55.12  .   Q     .  V      .         .         .
  14.050     25.3860     55.27  .   Q     .  V      .         .         .
  14.067     25.4623     55.41  .   Q     .  V      .         .         .
  14.083     25.5388     55.55  .   Q     .  V      .         .         .
  14.100     25.6155     55.70  .   Q     .  V      .         .         .
  14.117     25.6924     55.84  .   Q     .  V      .         .         .
  14.133     25.7695     55.98  .   Q     .  V      .         .         .
  14.150     25.8468     56.13  .   Q     .   V     .         .         .
  14.167     25.9244     56.27  .   Q     .   V     .         .         .
  14.183     26.0021     56.41  .   Q     .   V     .         .         .
  14.200     26.0801     56.65  .   Q     .   V     .         .         .
  14.217     26.1587     57.04  .   Q     .   V     .         .         .
  14.233     26.2378     57.43  .   Q     .   V     .         .         .
  14.250     26.3174     57.82  .   Q     .   V     .         .         .
  14.267     26.3976     58.21  .   Q     .   V     .         .         .
  14.283     26.4783     58.61  .   Q     .   V     .         .         .
  14.300     26.5596     59.00  .   Q     .   V     .         .         .
  14.317     26.6414     59.39  .   Q     .   V     .         .         .
  14.333     26.7237     59.78  .   Q     .   V     .         .         .
  14.350     26.8066     60.17  .   Q     .   V     .         .         .
  14.367     26.8900     60.56  .   Q     .   V     .         .         .
  14.383     26.9740     60.95  .   Q     .   V     .         .         .
  14.400     27.0585     61.34  .   Q     .   V     .         .         .
  14.417     27.1435     61.73  .   Q     .   V     .         .         .
  14.433     27.2291     62.12  .   Q     .   V     .         .         .
  14.450     27.3152     62.51  .   Q     .   V     .         .         .
  14.467     27.4018     62.90  .   Q     .   V     .         .         .
  14.483     27.4890     63.29  .   Q     .   V     .         .         .
  14.500     27.5767     63.66  .   Q     .   V     .         .         .
  14.517     27.6648     63.96  .   Q     .   V     .         .         .
  14.533     27.7533     64.26  .   Q     .    V    .         .         .
  14.550     27.8422     64.56  .   Q     .    V    .         .         .
  14.567     27.9315     64.86  .   Q     .    V    .         .         .
  14.583     28.0213     65.16  .   Q     .    V    .         .         .
  14.600     28.1115     65.46  .   Q     .    V    .         .         .
```

Onsite Flood Routing Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1

with Flowby Detention @ Node 56.3 (100cfs) & Node 35.2 (10cfs), User input for total flowby @ Rational Node 35

25-Year Storm Proposed Condition

14.617	28.2020	65.75	. Q . V . . .
14.633	28.2930	66.05	. Q . V . . .
14.650	28.3844	66.35	. Q . V . . .
14.667	28.4762	66.65	. Q . V . . .
14.683	28.5684	66.95	. Q . V . . .
14.700	28.6611	67.25	. Q . V . . .
14.717	28.7541	67.55	. Q . V . . .
14.733	28.8476	67.85	. Q . V . . .
14.750	28.9414	68.15	. Q . V . . .
14.767	29.0357	68.44	. Q . V . . .
14.783	29.1304	68.74	. Q . V . . .
14.800	29.2256	69.14	. Q . V . . .
14.817	29.3219	69.92	. Q . V . . .
14.833	29.4194	70.76	. Q . V . . .
14.850	29.5180	71.59	. Q . V . . .
14.867	29.6177	72.42	. Q . V . . .
14.883	29.7186	73.25	. Q . V . . .
14.900	29.8207	74.08	. Q . V . . .
14.917	29.9239	74.92	. Q . V . . .
14.933	30.0282	75.75	. Q . V . . .
14.950	30.1337	76.58	. Q . V . . .
14.967	30.2403	77.41	. Q . V . . .
14.983	30.3481	78.24	. Q . V . . .
15.000	30.4570	79.08	. Q . V . . .
15.017	30.5671	79.91	. Q . V . . .
15.033	30.6783	80.74	. Q . V . . .
15.050	30.7907	81.57	. Q . V . . .
15.067	30.9042	82.41	. Q . V . . .
15.083	31.0188	83.24	. Q . V . . .
15.100	31.1346	84.05	. Q . V . . .
15.117	31.2513	84.70	. Q . V . . .
15.133	31.3688	85.31	. Q . V . . .
15.150	31.4871	85.93	. Q . V . . .
15.167	31.6063	86.55	. Q . V . . .
15.183	31.7264	87.16	. Q . V . . .
15.200	31.8473	87.78	. Q . V . . .
15.217	31.9691	88.40	. Q . V . . .
15.233	32.0917	89.01	. Q . V . . .
15.250	32.2151	89.63	. Q . V . . .
15.267	32.3395	90.25	. Q . V . . .
15.283	32.4646	90.86	. Q . V . . .
15.300	32.5906	91.48	. Q . V . . .
15.317	32.7175	92.10	. Q . V . . .
15.333	32.8452	92.71	. Q . V . . .
15.350	32.9737	93.33	. Q . V . . .
15.367	33.1031	93.95	. Q . V . . .
15.383	33.2334	94.56	. Q . V . . .
15.400	33.3645	95.20	. Q . V . . .
15.417	33.4970	96.19	. Q . V . . .
15.433	33.6311	97.30	. Q . V . . .
15.450	33.7666	98.41	. Q . V . . .
15.467	33.9037	99.51	. Q . V . . .
15.483	34.0423	100.62	. Q . V . . .
15.500	34.1824	101.73	. Q . V . . .
15.517	34.3241	102.84	. Q . V . . .
15.533	34.4672	103.95	. Q . V . . .
15.550	34.6119	105.06	. Q . V . . .
15.567	34.7582	106.17	. Q . V . . .
15.583	34.9059	107.27	. Q . V . . .
15.600	35.0552	108.38	. Q . V . . .
15.617	35.2060	109.49	. Q . V. . .
15.633	35.3584	110.60	. Q . V. . .
15.650	35.5122	111.71	. Q . V. . .
15.667	35.6676	112.82	. Q . V. . .
15.683	35.8246	113.92	. Q . V. . .
15.700	35.9830	115.06	. Q . V. . .
15.717	36.1449	117.49	. Q . V. . .
15.733	36.3111	120.68	. Q . V. . .
15.750	36.4817	123.87	. Q. V. . .
15.767	36.6567	127.06	. Q. V. . .
15.783	36.8361	130.25	. Q. V. . .
15.800	37.0199	133.44	. Q. V . .
15.817	37.2081	136.63	. Q V . .
15.833	37.4007	139.82	. Q V . .
15.850	37.5977	143.00	. Q V . .
15.867	37.7990	146.19	. Q V . .
15.883	38.0048	149.38	. .Q V . .
15.900	38.2150	152.57	. .Q V . .
15.917	38.4295	155.76	. .Q V . .
15.933	38.6484	158.95	. .Q V . .
15.950	38.8718	162.14	. . Q .V . .
15.967	39.0995	165.33	. . Q .V . .
15.983	39.3316	168.52	. . Q .V . .
16.000	39.5681	171.71	. . Q .V . .
16.017	39.8206	183.32	. . Q .V . .
16.033	40.1007	203.36	. . Q .V . .
16.050	40.4085	223.39	. . Q .V . .
16.067	40.7438	243.43	. . Q . V . .
16.083	41.1067	263.47	. . Q. V . .
16.100	41.4972	283.50	. . .QV . .
16.117	41.9153	303.54	. . . Q . .
16.133	42.3610	323.58	. . . V Q . .
16.150	42.8343	343.61	. . . V Q . .
16.167	43.3352	363.65	. . . V Q . .
16.183	43.8637	383.69	. . . V Q . .
16.200	44.4197	403.72	. . . V Q .
16.217	45.0034	423.76	. . . V .Q .
16.233	45.6147	443.80	. . . V . Q .
16.250	46.2536	463.83	. . . V . Q .
16.267	46.9201	483.87	. . . V . Q .
16.283	47.6142	503.91	. . . V . Q .
16.300	48.3359	523.94	. . . V . Q.
16.317	49.0754	536.93	. . . V . Q
16.333	49.7707	504.74	. . . V . Q .
16.350	50.4331	480.94	. . . V . Q .
16.367	51.0628	457.14	. . . V . Q .
16.383	51.6597	433.33	. . . V . Q .
16.400	52.2238	409.53	. . . V Q .
16.417	52.7551	385.73	. . . Q . .
16.433	53.2536	361.92	. . . Q V . .
16.450	53.7193	338.12	. . . Q V. .
16.467	54.1522	314.31	. . . Q V. .

16.483	54.5524	290.51	. . .Q V. .
16.500	54.9198	266.70	. . Q. V. .
16.517	55.2543	242.90	. . Q . V. .
16.533	55.5561	219.10	. . Q . V .
16.550	55.8251	195.29	. . Q . V .
16.567	56.0613	171.49	. . Q . V .
16.583	56.2647	147.68	. .Q . V .
16.600	56.4354	123.88	. Q. . V .
16.617	56.5808	105.57	. Q . . V .
16.633	56.7226	102.99	. Q . . V .
16.650	56.8623	101.38	. Q . . V .
16.667	56.9997	99.77	. Q . . V .
16.683	57.1349	98.15	. Q . . V .
16.700	57.2679	96.54	. Q . . .V .
16.717	57.3986	94.93	. Q . . .V .
16.733	57.5272	93.32	. Q . . .V .
16.750	57.6535	91.71	. Q . . .V .
16.767	57.7776	90.09	. Q . . .V .
16.783	57.8995	88.48	. Q . . .V .
16.800	58.0191	86.87	. Q . . .V .
16.817	58.1366	85.26	. Q . . .V .
16.833	58.2518	83.64	. Q . . .V .
16.850	58.3648	82.03	. Q . . .V .
16.867	58.4755	80.42	. Q . . .V .
16.883	58.5841	78.81	. Q . . .V .
16.900	58.6904	77.20	. Q . . .V .
16.917	58.7947	75.69	. Q . . .V .
16.933	58.8976	74.71	. Q . . .V .
16.950	58.9992	73.80	. Q . . .V .
16.967	59.0996	72.89	. Q . . . V .
16.983	59.1988	71.98	. Q . . . V .
17.000	59.2967	71.07	. Q . . . V .
17.017	59.3933	70.16	. Q . . . V .
17.033	59.4887	69.25	. Q . . . V .
17.050	59.5828	68.34	. Q . . . V .
17.067	59.6757	67.42	. Q . . . V .
17.083	59.7673	66.51	. Q . . . V .
17.100	59.8577	65.60	. Q . . . V .
17.117	59.9468	64.69	. Q . . . V .
17.133	60.0346	63.78	. Q . . . V .
17.150	60.1212	62.87	. Q . . . V .
17.167	60.2066	61.96	. Q . . . V .
17.183	60.2906	61.05	. Q . . . V .
17.200	60.3735	60.14	. Q . . . V .
17.217	60.4551	59.27	. Q . . . V .
17.233	60.5360	58.77	. Q . . . V .
17.250	60.6164	58.35	. Q . . . V .
17.267	60.6962	57.94	. Q . . . V .
17.283	60.7755	57.52	. Q . . . V .
17.300	60.8541	57.11	. Q . . . V .
17.317	60.9322	56.69	. Q . . . . V .
17.333	61.0097	56.28	. Q . . . . V .
17.350	61.0867	55.86	. Q . . . . V .
17.367	61.1630	55.45	. Q . . . . V .
17.383	61.2389	55.03	. Q . . . . V .
17.400	61.3141	54.62	. Q . . . . V .
17.417	61.3888	54.21	. Q . . . . V .
17.433	61.4628	53.79	. Q . . . . V .
17.450	61.5364	53.38	. Q . . . . V .
17.467	61.6093	52.96	. Q . . . . V .
17.483	61.6817	52.55	. Q . . . . V .
17.500	61.7535	52.13	. Q . . . . V .
17.517	61.8247	51.72	. Q . . . . V .
17.533	61.8955	51.39	. Q . . . . V .
17.550	61.9659	51.09	. Q . . . . V .
17.567	62.0359	50.79	. Q . . . . V .
17.583	62.1054	50.49	. Q . . . . V .
17.600	62.1745	50.19	. Q . . . . V .
17.617	62.2433	49.89	. Q . . . . V .
17.633	62.3116	49.59	. Q . . . . V .
17.650	62.3795	49.29	. Q . . . . V .
17.667	62.4469	48.99	. Q . . . . V .
17.683	62.5140	48.69	. Q . . . . V .
17.700	62.5807	48.39	. Q . . . . V .
17.717	62.6469	48.09	. Q . . . . V .
17.733	62.7127	47.79	. Q . . . . V .
17.750	62.7782	47.49	. Q . . . . . V .
17.767	62.8432	47.19	. Q . . . . . V .
17.783	62.9077	46.89	. Q . . . . . V .
17.800	62.9719	46.59	. Q . . . . . V .
17.817	63.0357	46.29	. Q . . . . . V .
17.833	63.0991	46.04	. Q . . . . . V .
17.850	63.1622	45.82	. Q . . . . . V .
17.867	63.2250	45.59	. Q . . . . . V .
17.883	63.2875	45.37	. Q . . . . . V .
17.900	63.3497	45.15	. Q . . . . . V .
17.917	63.4116	44.92	. Q . . . . . V .
17.933	63.4731	44.70	. Q . . . . . V .
17.950	63.5344	44.48	. Q . . . . . V .
17.967	63.5954	44.26	. Q . . . . . V .
17.983	63.6560	44.03	. Q . . . . . V .
18.000	63.7164	43.81	. Q . . . . . V .

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	1070.0
20%	305.0
30%	190.0
40%	150.0
50%	120.0
60%	100.0
70%	75.0
80%	50.0
90%	25.0

```
****************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     35.10 IS CODE =   2
----------------------------------------------------------------------------
  >>>>>FLOWBY STRUCTURE ROUTING MODEL APPLIED TO STREAM #1<<<<<
============================================================================

        MODEL STREAM NUMBER 1 FLOWING PAST A FLOWBY STRUCTURE:
        FLOWRATES IN STREAM # 1 WHICH ARE GREATER THAN
           100.0 CFS ARE ASSUMED TO BE EXCESS FLOWS.
        FLOW EXCESS IS ASSUMED TO BE ADDED TO STREAM NUMBER 3


              INFLOW              INFLOW
             (STREAM 3)          (STREAM 1)
                 |                   |
                 |                   |
                 |    flow excess    |
                 |<------------------* <=flowby structure
                 |                   | (maximum flowby Q =    100.0 cfs)
                 |                   |
                 |                   |
                 |                   |
                 V                   V
               STREAM 3            STREAM 1
           + FLOW EXCESS            FLOWBY



        FLOWBY BASIN MODELING RESULTS:

         MODEL        INFLOW    INFLOW   OUTFLOW    FLOWBY
          TIME    (STREAM 3) (STREAM 1) (STREAM 3) (STREAM 1)
         (HRS)         (CFS)     (CFS)     (CFS)     (CFS)
        14.000         0.00     54.84      0.00     54.84
        14.017         0.00     54.98      0.00     54.98
        14.033         0.00     55.12      0.00     55.12
        14.050         0.00     55.27      0.00     55.27
        14.067         0.00     55.41      0.00     55.41
        14.083         0.00     55.55      0.00     55.55
        14.100         0.00     55.70      0.00     55.70
        14.117         0.00     55.84      0.00     55.84
        14.133         0.00     55.98      0.00     55.98
        14.150         0.00     56.13      0.00     56.13
        14.167         0.00     56.27      0.00     56.27
        14.183         0.00     56.41      0.00     56.41
        14.200         0.00     56.65      0.00     56.65
        14.217         0.00     57.04      0.00     57.04
        14.233         0.00     57.43      0.00     57.43
        14.250         0.00     57.82      0.00     57.82
        14.267         0.00     58.21      0.00     58.21
        14.283         0.00     58.61      0.00     58.61
        14.300         0.00     59.00      0.00     59.00
        14.317         0.00     59.39      0.00     59.39
        14.333         0.00     59.78      0.00     59.78
        14.350         0.00     60.17      0.00     60.17
        14.367         0.00     60.56      0.00     60.56
        14.383         0.00     60.95      0.00     60.95
        14.400         0.00     61.34      0.00     61.34
        14.417         0.00     61.73      0.00     61.73
        14.433         0.00     62.12      0.00     62.12
        14.450         0.00     62.51      0.00     62.51
        14.467         0.00     62.90      0.00     62.90
        14.483         0.00     63.29      0.00     63.29
        14.500         0.00     63.66      0.00     63.66
        14.517         0.00     63.96      0.00     63.96
        14.533         0.00     64.26      0.00     64.26
        14.550         0.00     64.56      0.00     64.56
        14.567         0.00     64.86      0.00     64.86
        14.583         0.00     65.16      0.00     65.16
        14.600         0.00     65.46      0.00     65.46
        14.617         0.00     65.75      0.00     65.75
        14.633         0.00     66.05      0.00     66.05
        14.650         0.00     66.35      0.00     66.35
        14.667         0.00     66.65      0.00     66.65
        14.683         0.00     66.95      0.00     66.95
        14.700         0.00     67.25      0.00     67.25
        14.717         0.00     67.55      0.00     67.55
        14.733         0.00     67.85      0.00     67.85
        14.750         0.00     68.15      0.00     68.15
        14.767         0.00     68.44      0.00     68.44
        14.783         0.00     68.74      0.00     68.74
        14.800         0.00     69.14      0.00     69.14
        14.817         0.00     69.92      0.00     69.92
        14.833         0.00     70.76      0.00     70.76
        14.850         0.00     71.59      0.00     71.59
        14.867         0.00     72.42      0.00     72.42
        14.883         0.00     73.25      0.00     73.25
        14.900         0.00     74.08      0.00     74.08
        14.917         0.00     74.92      0.00     74.92
        14.933         0.00     75.75      0.00     75.75
        14.950         0.00     76.58      0.00     76.58
        14.967         0.00     77.41      0.00     77.41
        14.983         0.00     78.24      0.00     78.24
        15.000         0.00     79.08      0.00     79.08
        15.017         0.00     79.91      0.00     79.91
        15.033         0.00     80.74      0.00     80.74
        15.050         0.00     81.57      0.00     81.57
        15.067         0.00     82.41      0.00     82.41
        15.083         0.00     83.24      0.00     83.24
        15.100         0.00     84.05      0.00     84.05
        15.117         0.00     84.70      0.00     84.70
        15.133         0.00     85.31      0.00     85.31
        15.150         0.00     85.93      0.00     85.93
        15.167         0.00     86.55      0.00     86.55
        15.183         0.00     87.16      0.00     87.16
        15.200         0.00     87.78      0.00     87.78
        15.217         0.00     88.40      0.00     88.40
        15.233         0.00     89.01      0.00     89.01
        15.250         0.00     89.63      0.00     89.63
        15.267         0.00     90.25      0.00     90.25
```

15.283	0.00	90.86	0.00	90.86
15.300	0.00	91.48	0.00	91.48
15.317	0.00	92.10	0.00	92.10
15.333	0.00	92.71	0.00	92.71
15.350	0.00	93.33	0.00	93.33
15.367	0.00	93.95	0.00	93.95
15.383	0.00	94.56	0.00	94.56
15.400	0.00	95.20	0.00	95.20
15.417	0.00	96.19	0.00	96.19
15.433	0.00	97.30	0.00	97.30
15.450	0.00	98.41	0.00	98.41
15.467	0.00	99.51	0.00	99.51
15.483	0.00	100.62	0.62	100.00
15.500	0.00	101.73	1.73	100.00
15.517	0.00	102.84	2.84	100.00
15.533	0.00	103.95	3.95	100.00
15.550	0.00	105.06	5.06	100.00
15.567	0.00	106.17	6.17	100.00
15.583	0.00	107.27	7.27	100.00
15.600	0.00	108.38	8.38	100.00
15.617	0.00	109.49	9.49	100.00
15.633	0.00	110.60	10.60	100.00
15.650	0.00	111.71	11.71	100.00
15.667	0.00	112.82	12.82	100.00
15.683	0.00	113.92	13.92	100.00
15.700	0.00	115.06	15.06	100.00
15.717	0.00	117.49	17.49	100.00
15.733	0.00	120.68	20.68	100.00
15.750	0.00	123.87	23.87	100.00
15.767	0.00	127.06	27.06	100.00
15.783	0.00	130.25	30.25	100.00
15.800	0.00	133.44	33.44	100.00
15.817	0.00	136.63	36.63	100.00
15.833	0.00	139.82	39.82	100.00
15.850	0.00	143.00	43.00	100.00
15.867	0.00	146.19	46.19	100.00
15.883	0.00	149.38	49.38	100.00
15.900	0.00	152.57	52.57	100.00
15.917	0.00	155.76	55.76	100.00
15.933	0.00	158.95	58.95	100.00
15.950	0.00	162.14	62.14	100.00
15.967	0.00	165.33	65.33	100.00
15.983	0.00	168.52	68.52	100.00
16.000	0.00	171.71	71.71	100.00
16.017	0.00	183.32	83.32	100.00
16.033	0.00	203.36	103.36	100.00
16.050	0.00	223.39	123.39	100.00
16.067	0.00	243.43	143.43	100.00
16.083	0.00	263.47	163.47	100.00
16.100	0.00	283.50	183.50	100.00
16.117	0.00	303.54	203.54	100.00
16.133	0.00	323.58	223.58	100.00
16.150	0.00	343.61	243.61	100.00
16.167	0.00	363.65	263.65	100.00
16.183	0.00	383.69	283.69	100.00
16.200	0.00	403.72	303.72	100.00
16.217	0.00	423.76	323.76	100.00
16.233	0.00	443.80	343.80	100.00
16.250	0.00	463.83	363.83	100.00
16.267	0.00	483.87	383.87	100.00
16.283	0.00	503.91	403.91	100.00
16.300	0.00	523.94	423.94	100.00
16.317	0.00	536.93	436.93	100.00
16.333	0.00	504.74	404.74	100.00
16.350	0.00	480.94	380.94	100.00
16.367	0.00	457.14	357.14	100.00
16.383	0.00	433.33	333.33	100.00
16.400	0.00	409.53	309.53	100.00
16.417	0.00	385.73	285.73	100.00
16.433	0.00	361.92	261.92	100.00
16.450	0.00	338.12	238.12	100.00
16.467	0.00	314.31	214.31	100.00
16.483	0.00	290.51	190.51	100.00
16.500	0.00	266.70	166.70	100.00
16.517	0.00	242.90	142.90	100.00
16.533	0.00	219.10	119.10	100.00
16.550	0.00	195.29	95.29	100.00
16.567	0.00	171.49	71.49	100.00
16.583	0.00	147.68	47.68	100.00
16.600	0.00	123.88	23.88	100.00
16.617	0.00	105.57	5.57	100.00
16.633	0.00	102.99	2.99	100.00
16.650	0.00	101.38	1.38	100.00
16.667	0.00	99.77	0.00	99.77
16.683	0.00	98.15	0.00	98.15
16.700	0.00	96.54	0.00	96.54
16.717	0.00	94.93	0.00	94.93
16.733	0.00	93.32	0.00	93.32
16.750	0.00	91.71	0.00	91.71
16.767	0.00	90.09	0.00	90.09
16.783	0.00	88.48	0.00	88.48
16.800	0.00	86.87	0.00	86.87
16.817	0.00	85.26	0.00	85.26
16.833	0.00	83.64	0.00	83.64
16.850	0.00	82.03	0.00	82.03
16.867	0.00	80.42	0.00	80.42
16.883	0.00	78.81	0.00	78.81
16.900	0.00	77.20	0.00	77.20
16.917	0.00	75.69	0.00	75.69
16.933	0.00	74.71	0.00	74.71
16.950	0.00	73.80	0.00	73.80
16.967	0.00	72.89	0.00	72.89
16.983	0.00	71.98	0.00	71.98
17.000	0.00	71.07	0.00	71.07
17.017	0.00	70.16	0.00	70.16
17.033	0.00	69.25	0.00	69.25
17.050	0.00	68.34	0.00	68.34
17.067	0.00	67.42	0.00	67.42
17.083	0.00	66.51	0.00	66.51
17.100	0.00	65.60	0.00	65.60
17.117	0.00	64.69	0.00	64.69
17.133	0.00	63.78	0.00	63.78

17.150	0.00	62.87	0.00	62.87
17.167	0.00	61.96	0.00	61.96
17.183	0.00	61.05	0.00	61.05
17.200	0.00	60.14	0.00	60.14
17.217	0.00	59.27	0.00	59.27
17.233	0.00	58.77	0.00	58.77
17.250	0.00	58.35	0.00	58.35
17.267	0.00	57.94	0.00	57.94
17.283	0.00	57.52	0.00	57.52
17.300	0.00	57.11	0.00	57.11
17.317	0.00	56.69	0.00	56.69
17.333	0.00	56.28	0.00	56.28
17.350	0.00	55.86	0.00	55.86
17.367	0.00	55.45	0.00	55.45
17.383	0.00	55.03	0.00	55.03
17.400	0.00	54.62	0.00	54.62
17.417	0.00	54.21	0.00	54.21
17.433	0.00	53.79	0.00	53.79
17.450	0.00	53.38	0.00	53.38
17.467	0.00	52.96	0.00	52.96
17.483	0.00	52.55	0.00	52.55
17.500	0.00	52.13	0.00	52.13
17.517	0.00	51.72	0.00	51.72
17.533	0.00	51.39	0.00	51.39
17.550	0.00	51.09	0.00	51.09
17.567	0.00	50.79	0.00	50.79
17.583	0.00	50.49	0.00	50.49
17.600	0.00	50.19	0.00	50.19
17.617	0.00	49.89	0.00	49.89
17.633	0.00	49.59	0.00	49.59
17.650	0.00	49.29	0.00	49.29
17.667	0.00	48.99	0.00	48.99
17.683	0.00	48.69	0.00	48.69
17.700	0.00	48.39	0.00	48.39
17.717	0.00	48.09	0.00	48.09
17.733	0.00	47.79	0.00	47.79
17.750	0.00	47.49	0.00	47.49
17.767	0.00	47.19	0.00	47.19
17.783	0.00	46.89	0.00	46.89
17.800	0.00	46.59	0.00	46.59
17.817	0.00	46.29	0.00	46.29
17.833	0.00	46.04	0.00	46.04
17.850	0.00	45.82	0.00	45.82
17.867	0.00	45.59	0.00	45.59
17.883	0.00	45.37	0.00	45.37
17.900	0.00	45.15	0.00	45.15
17.917	0.00	44.92	0.00	44.92
17.933	0.00	44.70	0.00	44.70
17.950	0.00	44.48	0.00	44.48
17.967	0.00	44.26	0.00	44.26
17.983	0.00	44.03	0.00	44.03
18.000	0.00	43.81	0.00	43.81

****

FLOW PROCESS FROM NODE 56.30 TO NODE 36.00 IS CODE = 11

>>>>>VIEW STREAM NUMBER 1 HYDROGRAPH<<<<<

==========

STREAM HYDROGRAPH IN ONE-MINUTE UNIT INTERVALS(CFS)

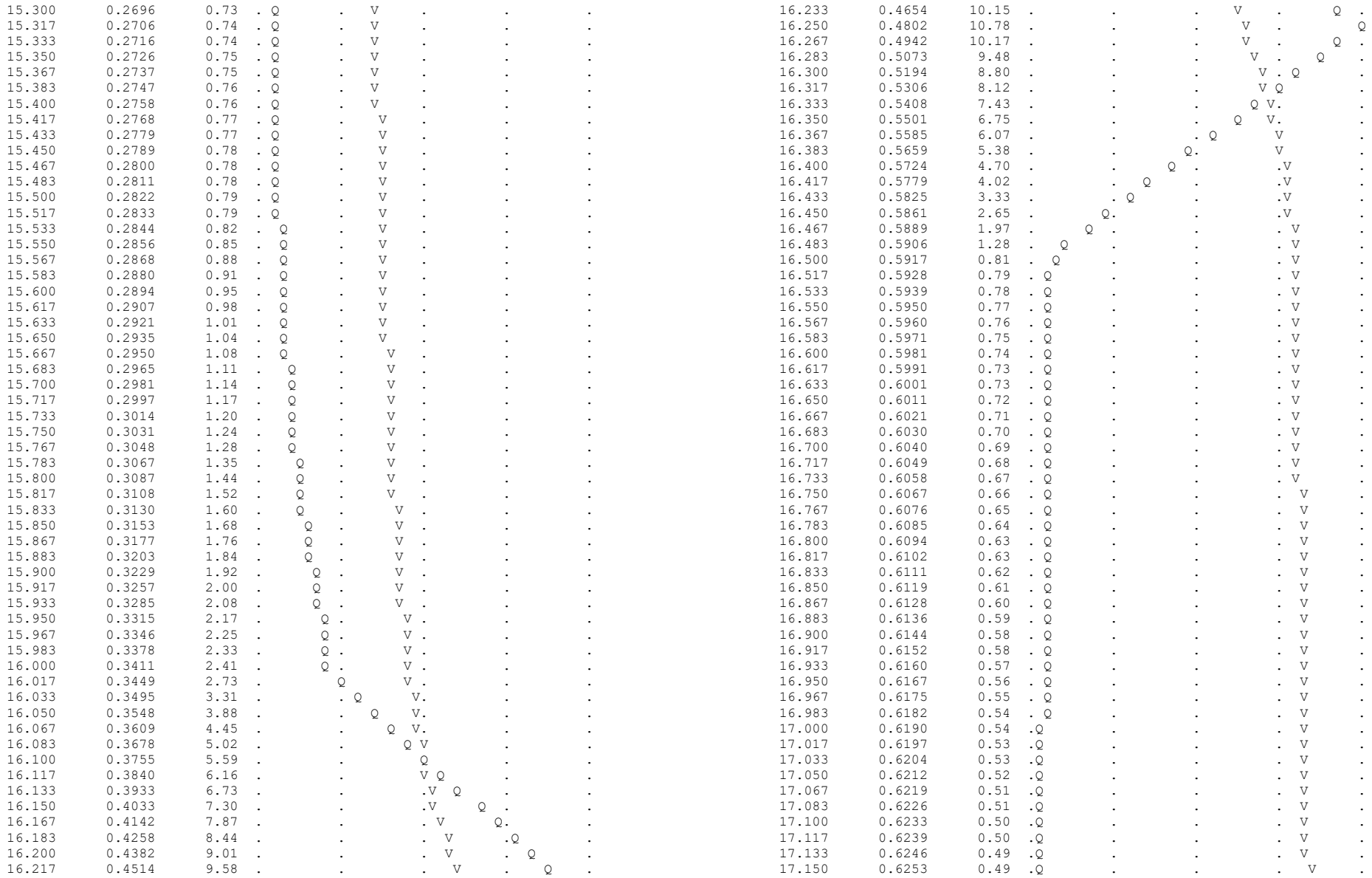
(Notes: Time indicated is at END of Each Unit Intervals.
Peak 5-minute rainfall intensity is modeled as
a constant value for entire 5-minute period.)

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	50.0	100.0	150.0	200.0
14.000	25.1582	54.84	.	Q	V	.	.
14.017	25.2339	54.98	.	Q	V	.	.
14.033	25.3098	55.12	.	.Q	V	.	.
14.050	25.3860	55.27	.	.Q	V	.	.
14.067	25.4623	55.41	.	.Q	V	.	.
14.083	25.5388	55.55	.	.Q	V	.	.
14.100	25.6155	55.70	.	.Q	V	.	.
14.117	25.6924	55.84	.	.Q	V	.	.
14.133	25.7695	55.98	.	.Q	V	.	.
14.150	25.8468	56.13	.	.Q	V	.	.
14.167	25.9244	56.27	.	.Q	V	.	.
14.183	26.0021	56.41	.	.Q	V	.	.
14.200	26.0801	56.65	.	.Q	V	.	.
14.217	26.1587	57.04	.	.Q	V	.	.
14.233	26.2378	57.43	.	.Q	V	.	.
14.250	26.3174	57.82	.	.Q	V	.	.
14.267	26.3976	58.21	.	.Q	V	.	.
14.283	26.4783	58.61	.	.Q	V	.	.
14.300	26.5596	59.00	.	.Q	V	.	.
14.317	26.6414	59.39	.	.Q	V	.	.
14.333	26.7237	59.78	.	.Q	V	.	.
14.350	26.8066	60.17	.	. Q	V	.	.
14.367	26.8900	60.56	.	. Q	V	.	.
14.383	26.9740	60.95	.	. Q	V	.	.
14.400	27.0585	61.34	.	. Q	V	.	.
14.417	27.1435	61.73	.	. Q	V	.	.
14.433	27.2291	62.12	.	. Q	V	.	.
14.450	27.3152	62.51	.	. Q	V	.	.
14.467	27.4018	62.90	.	. Q	V	.	.
14.483	27.4890	63.29	.	. Q	V	.	.
14.500	27.5767	63.66	.	. Q	V	.	.
14.517	27.6648	63.96	.	. Q	V	.	.
14.533	27.7533	64.26	.	. Q	V	.	.
14.550	27.8422	64.56	.	. Q	V	.	.
14.567	27.9315	64.86	.	. Q	V	.	.
14.583	28.0213	65.16	.	. Q	V	.	.
14.600	28.1115	65.46	.	. Q	V	.	.
14.617	28.2020	65.75	.	. Q	V	.	.
14.633	28.2930	66.05	.	. Q	V	.	.
14.650	28.3844	66.35	.	. Q	V	.	.
14.667	28.4762	66.65	.	. Q	V	.	.
14.683	28.5684	66.95	.	. Q	V	.	.
14.700	28.6611	67.25	.	. Q	V	.	.
14.717	28.7541	67.55	.	. Q	V	.	.
14.733	28.8476	67.85	.	. Q	V	.	.

```
 14.750    28.9414    68.15  .         . Q     V.         .         .
 14.767    29.0357    68.44  .         . Q     V.         .         .
 14.783    29.1304    68.74  .         . Q     V.         .         .
 14.800    29.2256    69.14  .         . Q     V.         .         .
 14.817    29.3219    69.92  .         . Q     V.         .         .
 14.833    29.4194    70.76  .         .  Q    V.         .         .
 14.850    29.5180    71.59  .         .  Q    V.         .         .
 14.867    29.6177    72.42  .         .  Q    V.         .         .
 14.883    29.7186    73.25  .         .  Q    V.         .         .
 14.900    29.8207    74.08  .         .  Q    V.         .         .
 14.917    29.9239    74.92  .         .  Q    V.         .         .
 14.933    30.0282    75.75  .         .   Q   V.         .         .
 14.950    30.1337    76.58  .         .   Q   V.         .         .
 14.967    30.2403    77.41  .         .   Q   V.         .         .
 14.983    30.3481    78.24  .         .   Q    V         .         .
 15.000    30.4570    79.08  .         .   Q    V         .         .
 15.017    30.5671    79.91  .         .   Q    V         .         .
 15.033    30.6783    80.74  .         .    Q   V         .         .
 15.050    30.7907    81.57  .         .    Q   V         .         .
 15.067    30.9042    82.41  .         .    Q   V         .         .
 15.083    31.0188    83.24  .         .    Q   V         .         .
 15.100    31.1346    84.05  .         .    Q   V         .         .
 15.117    31.2513    84.70  .         .    Q   V         .         .
 15.133    31.3688    85.31  .         .     Q  V         .         .
 15.150    31.4871    85.93  .         .     Q  V         .         .
 15.167    31.6063    86.55  .         .     Q  V         .         .
 15.183    31.7264    87.16  .         .     Q  V         .         .
 15.200    31.8473    87.78  .         .     Q  .V        .         .
 15.217    31.9691    88.40  .         .     Q  .V        .         .
 15.233    32.0917    89.01  .         .     Q  .V        .         .
 15.250    32.2151    89.63  .         .     Q  .V        .         .
 15.267    32.3395    90.25  .         .      Q .V        .         .
 15.283    32.4646    90.86  .         .      Q .V        .         .
 15.300    32.5906    91.48  .         .      Q .V        .         .
 15.317    32.7175    92.10  .         .      Q .V        .         .
 15.333    32.8452    92.71  .         .      Q .V        .         .
 15.350    32.9737    93.33  .         .      Q .V        .         .
 15.367    33.1031    93.95  .         .      Q .V        .         .
 15.383    33.2334    94.56  .         .      Q .V        .         .
 15.400    33.3645    95.20  .         .       Q. V       .         .
 15.417    33.4970    96.19  .         .       Q. V       .         .
 15.433    33.6311    97.30  .         .       Q. V       .         .
 15.450    33.7666    98.41  .         .       Q. V       .         .
 15.467    33.9037    99.51  .         .       Q. V       .         .
 15.483    34.0414   100.00  .         .        Q V       .         .
 15.500    34.1792   100.00  .         .        Q V       .         .
 15.517    34.3169   100.00  .         .        Q V       .         .
 15.533    34.4546   100.00  .         .        Q V       .         .
 15.550    34.5924   100.00  .         .        Q V       .         .
 15.567    34.7301   100.00  .         .        Q V       .         .
 15.583    34.8679   100.00  .         .        Q V       .         .
 15.600    35.0056   100.00  .         .        Q  V      .         .
 15.617    35.1433   100.00  .         .        Q  V      .         .
 15.633    35.2811   100.00  .         .        Q  V      .         .
 15.650    35.4188   100.00  .         .        Q  V      .         .
 15.667    35.5566   100.00  .         .        Q  V      .         .
 15.683    35.6943   100.00  .         .         Q  V       .         .
 15.700    35.8320   100.00  .         .         Q  V       .         .
 15.717    35.9698   100.00  .         .         Q  V       .         .
 15.733    36.1075   100.00  .         .         Q  V       .         .
 15.750    36.2453   100.00  .         .         Q  V       .         .
 15.767    36.3830   100.00  .         .         Q  V       .         .
 15.783    36.5208   100.00  .         .         Q   V      .         .
 15.800    36.6585   100.00  .         .         Q   V      .         .
 15.817    36.7962   100.00  .         .         Q   V      .         .
 15.833    36.9340   100.00  .         .         Q   V      .         .
 15.850    37.0717   100.00  .         .         Q   V      .         .
 15.867    37.2095   100.00  .         .         Q   V      .         .
 15.883    37.3472   100.00  .         .         Q   V      .         .
 15.900    37.4849   100.00  .         .         Q   V      .         .
 15.917    37.6227   100.00  .         .         Q   V      .         .
 15.933    37.7604   100.00  .         .         Q   V      .         .
 15.950    37.8982   100.00  .         .         Q   V      .         .
 15.967    38.0359   100.00  .         .         Q    V     .         .
 15.983    38.1736   100.00  .         .         Q    V     .         .
 16.000    38.3114   100.00  .         .         Q    V     .         .
 16.017    38.4491   100.00  .         .         Q    V     .         .
 16.033    38.5869   100.00  .         .         Q    V     .         .
 16.050    38.7246   100.00  .         .         Q    V     .         .
 16.067    38.8624   100.00  .         .         Q    V     .         .
 16.083    39.0001   100.00  .         .         Q    V     .         .
 16.100    39.1378   100.00  .         .         Q    V     .         .
 16.117    39.2756   100.00  .         .         Q    V     .         .
 16.133    39.4133   100.00  .         .         Q    V     .         .
 16.150    39.5511   100.00  .         .         Q     V    .         .
 16.167    39.6888   100.00  .         .         Q     V    .         .
 16.183    39.8265   100.00  .         .         Q     V    .         .
 16.200    39.9643   100.00  .         .         Q     V    .         .
 16.217    40.1020   100.00  .         .         Q     V    .         .
 16.233    40.2398   100.00  .         .         Q     V    .         .
 16.250    40.3775   100.00  .         .         Q     V    .         .
 16.267    40.5152   100.00  .         .         Q     V    .         .
 16.283    40.6530   100.00  .         .         Q     V    .         .
 16.300    40.7907   100.00  .         .         Q     V    .         .
 16.317    40.9285   100.00  .         .         Q     V    .         .
 16.333    41.0662   100.00  .         .         Q      V   .         .
 16.350    41.2039   100.00  .         .         Q      V   .         .
 16.367    41.3417   100.00  .         .         Q      V   .         .
 16.383    41.4794   100.00  .         .         Q      V   .         .
 16.400    41.6172   100.00  .         .         Q      V   .         .
 16.417    41.7549   100.00  .         .         Q      V   .         .
 16.433    41.8927   100.00  .         .         Q      V   .         .
 16.450    42.0304   100.00  .         .         Q      V   .         .
 16.467    42.1681   100.00  .         .         Q      V   .         .
 16.483    42.3059   100.00  .         .         Q      V   .         .
 16.500    42.4436   100.00  .         .         Q      V   .         .
 16.517    42.5814   100.00  .         .         Q       V  .         .
 16.533    42.7191   100.00  .         .         Q       V  .         .
 16.550    42.8568   100.00  .         .         Q       V  .         .
 16.567    42.9946   100.00  .         .         Q       V  .         .
 16.583    43.1323   100.00  .         .         Q       V  .         .
 16.600    43.2701   100.00  .         .         Q       V  .         .
```

```
16.617    43.4078   100.00  .         .         Q       V .         .
16.633    43.5455   100.00  .         .         Q       V .         .
16.650    43.6833   100.00  .         .         Q       V .         .
16.667    43.8207    99.77  .         .        Q.       V .         .
16.683    43.9559    98.15  .         .        Q.       V .         .
16.700    44.0889    96.54  .         .        Q.        V.         .
16.717    44.2196    94.93  .         .       Q .        V.         .
16.733    44.3482    93.32  .         .       Q .        V.         .
16.750    44.4745    91.71  .         .       Q .        V.         .
16.767    44.5986    90.09  .         .       Q .        V.         .
16.783    44.7205    88.48  .         .      Q  .        V.         .
16.800    44.8401    86.87  .         .      Q  .        V.         .
16.817    44.9576    85.26  .         .      Q  .        V.         .
16.833    45.0728    83.64  .         .     Q   .        V.         .
16.850    45.1858    82.03  .         .     Q   .        V.         .
16.867    45.2965    80.42  .         .     Q   .        V.         .
16.883    45.4051    78.81  .         .    Q    .        V.         .
16.900    45.5114    77.20  .         .    Q    .         V         .
16.917    45.6157    75.69  .         .    Q    .         V         .
16.933    45.7186    74.71  .         .   Q     .         V         .
16.950    45.8202    73.80  .         .   Q     .         V         .
16.967    45.9206    72.89  .         .   Q     .         V         .
16.983    46.0198    71.98  .         .   Q     .         V         .
17.000    46.1177    71.07  .         .   Q     .         V         .
17.017    46.2143    70.16  .         .   Q     .         V         .
17.033    46.3097    69.25  .         .  Q      .         V         .
17.050    46.4038    68.34  .         .  Q      .         V         .
17.067    46.4967    67.42  .         .  Q      .         V         .
17.083    46.5883    66.51  .         .  Q      .         V         .
17.100    46.6787    65.60  .         .  Q      .         V         .
17.117    46.7678    64.69  .         . Q       .         V         .
17.133    46.8556    63.78  .         . Q       .         V         .
17.150    46.9422    62.87  .         . Q       .         V         .
17.167    47.0276    61.96  .         . Q       .         .V        .
17.183    47.1116    61.05  .         . Q       .         .V        .
17.200    47.1945    60.14  .         . Q       .         .V        .
17.217    47.2761    59.27  .         .Q        .         .V        .
17.233    47.3571    58.77  .         .Q        .         .V        .
17.250    47.4374    58.35  .         .Q        .         .V        .
17.267    47.5172    57.94  .         .Q        .         .V        .
17.283    47.5965    57.52  .         .Q        .         .V        .
17.300    47.6751    57.11  .         .Q        .         .V        .
17.317    47.7532    56.69  .         .Q        .         .V        .
17.333    47.8307    56.28  .         .Q        .         .V        .
17.350    47.9077    55.86  .         .Q        .         .V        .
17.367    47.9841    55.45  .         .Q        .         .V        .
17.383    48.0599    55.03  .         .Q        .         .V        .
17.400    48.1351    54.62  .         Q         .         .V        .
17.417    48.2098    54.21  .         Q         .         .V        .
17.433    48.2838    53.79  .         Q         .         .V        .
17.450    48.3574    53.38  .         Q         .         .V        .
17.467    48.4303    52.96  .         Q         .         .V        .
17.483    48.5027    52.55  .         Q         .         .V        .
17.500    48.5745    52.13  .         Q         .         . V       .
17.517    48.6457    51.72  .         Q         .         . V       .
17.533    48.7165    51.39  .         Q         .         . V       .
17.550    48.7869    51.09  .         Q         .         . V       .
17.567    48.8569    50.79  .         Q         .         . V       .
17.583    48.9264    50.49  .         Q         .         . V       .
17.600    48.9955    50.19  .         Q         .         . V       .
17.617    49.0643    49.89  .        Q.         .         . V       .
17.633    49.1326    49.59  .        Q.         .         . V       .
17.650    49.2005    49.29  .        Q.         .         . V       .
17.667    49.2680    48.99  .        Q.         .         . V       .
17.683    49.3350    48.69  .        Q.         .         . V       .
17.700    49.4017    48.39  .        Q.         .         . V       .
17.717    49.4679    48.09  .        Q.         .         . V       .
17.733    49.5337    47.79  .        Q.         .         . V       .
17.750    49.5992    47.49  .        Q.         .         . V       .
17.767    49.6642    47.19  .        Q.         .         . V       .
17.783    49.7287    46.89  .        Q.         .         . V       .
17.800    49.7929    46.59  .        Q.         .         . V       .
17.817    49.8567    46.29  .        Q.         .         . V       .
17.833    49.9201    46.04  .        Q.         .         . V       .
17.850    49.9832    45.82  .        Q.         .         . V       .
17.867    50.0460    45.59  .        Q.         .         .  V      .
17.883    50.1085    45.37  .        Q.         .         .  V      .
17.900    50.1707    45.15  .        Q.         .         .  V      .
17.917    50.2326    44.92  .       Q .         .         .  V      .
17.933    50.2941    44.70  .       Q .         .         .  V      .
17.950    50.3554    44.48  .       Q .         .         .  V      .
17.967    50.4164    44.26  .       Q .         .         .  V      .
17.983    50.4770    44.03  .       Q .         .         .  V      .
18.000    50.5374    43.81  .       Q .         .         .  V      .
--------------------------------------------------------------------------------
  TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
  (Note: 100% of Peak Flow Rate estimate assumed to have
  an instantaneous time duration)

  Percentile of Estimated          Duration
      Peak Flow Rate               (minutes)
  =======================          =========
            0%                      1081.0
           10%                      1081.0
           20%                      1081.0
           30%                      1081.0
           40%                      1081.0
           50%                      1081.0
           60%                       860.0
           70%                       660.0
           80%                       555.0
           90%                       455.0

********************************************************************************
  FLOW PROCESS FROM NODE     35.20 TO NODE     35.20 IS CODE = 1.2
--------------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
================================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #2)
```

```
   RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
   TOTAL CATCHMENT AREA(ACRES) =   11.40
   SOIL-LOSS RATE, Fm,(INCH/HR) =  0.168
   LOW LOSS FRACTION = 0.670
   TIME OF CONCENTRATION(MIN.) = 14.60
   SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
   ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
   RETURN FREQUENCY(YEARS) =   2
      5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
     30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
      1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.53
      3-HOUR   POINT RAINFALL VALUE(INCHES) =  0.89
      6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.22
     24-HOUR   POINT RAINFALL VALUE(INCHES) =  2.05

--------------------------------------------------------------------------------
   TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.74
   TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     1.21

--------------------------------------------------------------------------------

================================================================================

                    2 4 - H O U R    S T O R M
                 R U N O F F    H Y D R O G R A P H

================================================================================
            HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
       (Notes: Time indicated is at END of Each Unit Intervals.
               Peak 5-minute rainfall intensity is modeled as
               a constant value for entire 5-minute period.)
--------------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.        2.7       5.4       8.1       10.8
--------------------------------------------------------------------------------
  14.000      0.2099      0.43  .Q        .V        .         .         .
  14.017      0.2105      0.43  .Q        .V        .         .         .
  14.033      0.2111      0.43  .Q        .V        .         .         .
  14.050      0.2117      0.43  .Q        .V        .         .         .
  14.067      0.2123      0.44  .Q        .V        .         .         .
  14.083      0.2129      0.44  .Q        .V        .         .         .
  14.100      0.2135      0.44  .Q        .V        .         .         .
  14.117      0.2141      0.45  .Q        .V        .         .         .
  14.133      0.2147      0.45  .Q        .V        .         .         .
  14.150      0.2154      0.46  .Q        .V        .         .         .
  14.167      0.2160      0.46  .Q        .V        .         .         .
  14.183      0.2166      0.46  .Q        .V        .         .         .
  14.200      0.2173      0.47  .Q        .V        .         .         .
  14.217      0.2179      0.47  .Q        .V        .         .         .
  14.233      0.2186      0.48  .Q        .V        .         .         .
  14.250      0.2192      0.48  .Q        .V        .         .         .
  14.267      0.2199      0.48  .Q        .V        .         .         .
  14.283      0.2206      0.49  .Q        .V        .         .         .
  14.300      0.2213      0.49  .Q        . V       .         .         .
  14.317      0.2219      0.49  .Q        . V       .         .         .
  14.333      0.2226      0.49  .Q        . V       .         .         .
  14.350      0.2233      0.50  .Q        . V       .         .         .
  14.367      0.2240      0.50  .Q        . V       .         .         .
  14.383      0.2247      0.50  .Q        . V       .         .         .
  14.400      0.2254      0.50  .Q        . V       .         .         .
  14.417      0.2261      0.50  .Q        . V       .         .         .
  14.433      0.2267      0.50  .Q        . V       .         .         .
  14.450      0.2274      0.51  .Q        . V       .         .         .
  14.467      0.2281      0.51  .Q        . V       .         .         .
  14.483      0.2288      0.51  .Q        . V       .         .         .
  14.500      0.2296      0.51  .Q        . V       .         .         .
  14.517      0.2303      0.51  .Q        . V       .         .         .
  14.533      0.2310      0.51  .Q        . V       .         .         .
  14.550      0.2317      0.52  .Q        . V       .         .         .
  14.567      0.2324      0.52  .Q        . V       .         .         .
  14.583      0.2331      0.52  .Q        . V       .         .         .
  14.600      0.2338      0.53  .Q        . V       .         .         .
  14.617      0.2346      0.53  .Q        . V       .         .         .
  14.633      0.2353      0.54  .Q        . V       .         .         .
  14.650      0.2361      0.54  . Q       . V       .         .         .
  14.667      0.2368      0.55  . Q       . V       .         .         .
  14.683      0.2376      0.55  . Q       . V       .         .         .
  14.700      0.2383      0.55  . Q       . V       .         .         .
  14.717      0.2391      0.56  . Q       .  V      .         .         .
  14.733      0.2399      0.56  . Q       .  V      .         .         .
  14.750      0.2407      0.57  . Q       .  V      .         .         .
  14.767      0.2414      0.57  . Q       .  V      .         .         .
  14.783      0.2422      0.57  . Q       .  V      .         .         .
  14.800      0.2430      0.58  . Q       .  V      .         .         .
  14.817      0.2438      0.58  . Q       .  V      .         .         .
  14.833      0.2446      0.58  . Q       .  V      .         .         .
  14.850      0.2454      0.59  . Q       .  V      .         .         .
  14.867      0.2463      0.59  . Q       .  V      .         .         .
  14.883      0.2471      0.59  . Q       .  V      .         .         .
  14.900      0.2479      0.59  . Q       .  V      .         .         .
  14.917      0.2487      0.60  . Q       .  V      .         .         .
  14.933      0.2495      0.60  . Q       .  V      .         .         .
  14.950      0.2504      0.60  . Q       .  V      .         .         .
  14.967      0.2512      0.61  . Q       .  V      .         .         .
  14.983      0.2520      0.61  . Q       .  V      .         .         .
  15.000      0.2529      0.61  . Q       .  V      .         .         .
  15.017      0.2537      0.61  . Q       .  V      .         .         .
  15.033      0.2546      0.62  . Q       .  V      .         .         .
  15.050      0.2554      0.62  . Q       .  V      .         .         .
  15.067      0.2563      0.63  . Q       .  V      .         .         .
  15.083      0.2572      0.64  . Q       .  V      .         .         .
  15.100      0.2581      0.65  . Q       .   V     .         .         .
  15.117      0.2590      0.65  . Q       .   V     .         .         .
  15.133      0.2599      0.66  . Q       .   V     .         .         .
  15.150      0.2608      0.67  . Q       .   V     .         .         .
  15.167      0.2617      0.68  . Q       .   V     .         .         .
  15.183      0.2627      0.68  . Q       .   V     .         .         .
  15.200      0.2636      0.69  . Q       .   V     .         .         .
  15.217      0.2646      0.70  . Q       .   V     .         .         .
  15.233      0.2656      0.71  . Q       .   V     .         .         .
  15.250      0.2666      0.71  . Q       .   V     .         .         .
  15.267      0.2675      0.72  . Q       .   V     .         .         .
  15.283      0.2686      0.73  . Q       .   V     .         .         .
```



Onsite Flood Routing Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1

with Flowby Detention @ Node 56.3 (100cfs) & Node 35.2 (10cfs), User input for total flowby @ Rational Node 35

25-Year Storm Proposed Condition

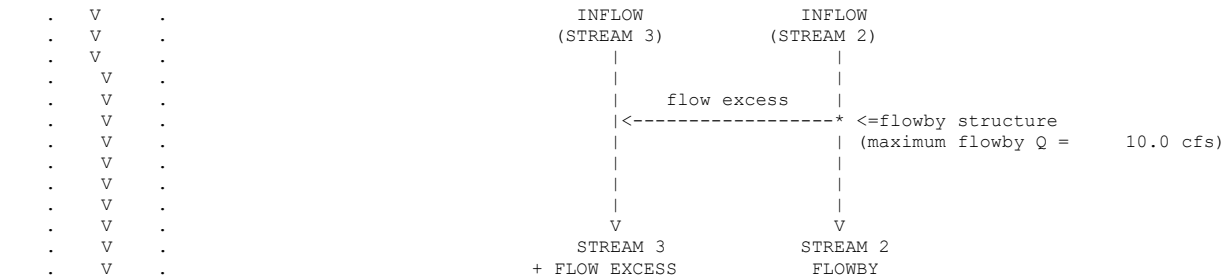
17.167	0.6259	0.48	.Q	.	.	.	V	.
17.183	0.6266	0.47	.Q	.	.	.	V	.
17.200	0.6272	0.47	.Q	.	.	.	V	.
17.217	0.6279	0.46	.Q	.	.	.	V	.
17.233	0.6285	0.46	.Q	.	.	.	V	.
17.250	0.6291	0.45	.Q	.	.	.	V	.
17.267	0.6298	0.45	.Q	.	.	.	V	.
17.283	0.6304	0.45	.Q	.	.	.	V	.
17.300	0.6310	0.44	.Q	.	.	.	V	.
17.317	0.6316	0.44	.Q	.	.	.	V	.
17.333	0.6322	0.43	.Q	.	.	.	V	.
17.350	0.6328	0.43	.Q	.	.	.	V	.
17.367	0.6334	0.43	.Q	.	.	.	V	.
17.383	0.6339	0.42	.Q	.	.	.	V	.
17.400	0.6345	0.42	.Q	.	.	.	V	.
17.417	0.6351	0.42	.Q	.	.	.	V	.
17.433	0.6357	0.41	.Q	.	.	.	V	.
17.450	0.6362	0.41	.Q	.	.	.	V	.
17.467	0.6368	0.40	.Q	.	.	.	V	.
17.483	0.6373	0.40	.Q	.	.	.	V	.
17.500	0.6379	0.40	.Q	.	.	.	V	.
17.517	0.6384	0.40	.Q	.	.	.	V	.
17.533	0.6390	0.39	.Q	.	.	.	V	.
17.550	0.6395	0.39	.Q	.	.	.	V	.
17.567	0.6400	0.39	.Q	.	.	.	V	.
17.583	0.6406	0.39	.Q	.	.	.	V	.
17.600	0.6411	0.38	.Q	.	.	.	V	.
17.617	0.6416	0.38	.Q	.	.	.	V	.
17.633	0.6421	0.38	.Q	.	.	.	V	.
17.650	0.6427	0.38	.Q	.	.	.	V	.
17.667	0.6432	0.37	.Q	.	.	.	V	.
17.683	0.6437	0.37	.Q	.	.	.	V	.
17.700	0.6442	0.37	.Q	.	.	.	V	.
17.717	0.6447	0.37	.Q	.	.	.	V	.
17.733	0.6452	0.36	.Q	.	.	.	V	.
17.750	0.6457	0.36	.Q	.	.	.	V	.
17.767	0.6462	0.36	.Q	.	.	.	V	.
17.783	0.6467	0.36	.Q	.	.	.	V	.
17.800	0.6472	0.36	.Q	.	.	.	V	.
17.817	0.6477	0.35	.Q	.	.	.	V	.
17.833	0.6482	0.35	.Q	.	.	.	V	.
17.850	0.6486	0.35	.Q	.	.	.	V	.
17.867	0.6491	0.35	.Q	.	.	.	V	.
17.883	0.6496	0.35	.Q	.	.	.	V	.
17.900	0.6501	0.34	.Q	.	.	.	V	.
17.917	0.6505	0.34	.Q	.	.	.	V	.
17.933	0.6510	0.34	.Q	.	.	.	V	.
17.950	0.6515	0.34	.Q	.	.	.	V	.
17.967	0.6519	0.34	.Q	.	.	.	V	.
17.983	0.6524	0.33	.Q	.	.	.	V	.
18.000	0.6528	0.33	.Q	.	.	.	V	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	245.0
20%	155.0
30%	125.0
40%	105.0
50%	85.0
60%	70.0
70%	50.0
80%	35.0
90%	15.0

```
**************************************************************************
  FLOW PROCESS FROM NODE     35.20 TO NODE     35.00 IS CODE =   2
--------------------------------------------------------------------------
  >>>>>FLOWBY STRUCTURE ROUTING MODEL APPLIED TO STREAM #2<<<<<
==========================================================================
```

MODEL STREAM NUMBER 2 FLOWING PAST A FLOWBY STRUCTURE:
FLOWRATES IN STREAM # 2 WHICH ARE GREATER THAN
10.0 CFS ARE ASSUMED TO BE EXCESS FLOWS.
FLOW EXCESS IS ASSUMED TO BE ADDED TO STREAM NUMBER 3



FLOWBY BASIN MODELING RESULTS:

MODEL TIME (HRS)	INFLOW (STREAM 3) (CFS)	INFLOW (STREAM 2) (CFS)	OUTFLOW (STREAM 3) (CFS)	FLOWBY (STREAM 2) (CFS)
14.000	0.00	0.43	0.00	0.43
14.017	0.00	0.43	0.00	0.43
14.033	0.00	0.43	0.00	0.43
14.050	0.00	0.43	0.00	0.43
14.067	0.00	0.44	0.00	0.44
14.083	0.00	0.44	0.00	0.44

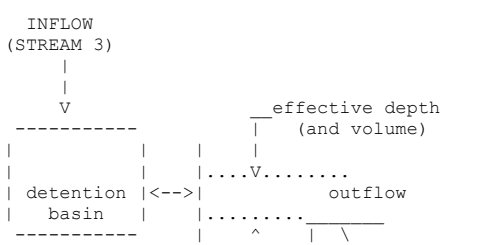
14.100	0.00	0.44	0.00	0.44
14.117	0.00	0.45	0.00	0.45
14.133	0.00	0.45	0.00	0.45
14.150	0.00	0.46	0.00	0.46
14.167	0.00	0.46	0.00	0.46
14.183	0.00	0.46	0.00	0.46
14.200	0.00	0.47	0.00	0.47
14.217	0.00	0.47	0.00	0.47
14.233	0.00	0.48	0.00	0.48
14.250	0.00	0.48	0.00	0.48
14.267	0.00	0.48	0.00	0.48
14.283	0.00	0.49	0.00	0.49
14.300	0.00	0.49	0.00	0.49
14.317	0.00	0.49	0.00	0.49
14.333	0.00	0.49	0.00	0.49
14.350	0.00	0.50	0.00	0.50
14.367	0.00	0.50	0.00	0.50
14.383	0.00	0.50	0.00	0.50
14.400	0.00	0.50	0.00	0.50
14.417	0.00	0.50	0.00	0.50
14.433	0.00	0.50	0.00	0.50
14.450	0.00	0.51	0.00	0.51
14.467	0.00	0.51	0.00	0.51
14.483	0.00	0.51	0.00	0.51
14.500	0.00	0.51	0.00	0.51
14.517	0.00	0.51	0.00	0.51
14.533	0.00	0.51	0.00	0.51
14.550	0.00	0.52	0.00	0.52
14.567	0.00	0.52	0.00	0.52
14.583	0.00	0.52	0.00	0.52
14.600	0.00	0.53	0.00	0.53
14.617	0.00	0.53	0.00	0.53
14.633	0.00	0.54	0.00	0.54
14.650	0.00	0.54	0.00	0.54
14.667	0.00	0.55	0.00	0.55
14.683	0.00	0.55	0.00	0.55
14.700	0.00	0.55	0.00	0.55
14.717	0.00	0.56	0.00	0.56
14.733	0.00	0.56	0.00	0.56
14.750	0.00	0.57	0.00	0.57
14.767	0.00	0.57	0.00	0.57
14.783	0.00	0.57	0.00	0.57
14.800	0.00	0.58	0.00	0.58
14.817	0.00	0.58	0.00	0.58
14.833	0.00	0.58	0.00	0.58
14.850	0.00	0.59	0.00	0.59
14.867	0.00	0.59	0.00	0.59
14.883	0.00	0.59	0.00	0.59
14.900	0.00	0.59	0.00	0.59
14.917	0.00	0.60	0.00	0.60
14.933	0.00	0.60	0.00	0.60
14.950	0.00	0.60	0.00	0.60
14.967	0.00	0.61	0.00	0.61
14.983	0.00	0.61	0.00	0.61
15.000	0.00	0.61	0.00	0.61
15.017	0.00	0.61	0.00	0.61
15.033	0.00	0.62	0.00	0.62
15.050	0.00	0.62	0.00	0.62
15.067	0.00	0.63	0.00	0.63
15.083	0.00	0.64	0.00	0.64
15.100	0.00	0.65	0.00	0.65
15.117	0.00	0.65	0.00	0.65
15.133	0.00	0.66	0.00	0.66
15.150	0.00	0.67	0.00	0.67
15.167	0.00	0.68	0.00	0.68
15.183	0.00	0.68	0.00	0.68
15.200	0.00	0.69	0.00	0.69
15.217	0.00	0.70	0.00	0.70
15.233	0.00	0.71	0.00	0.71
15.250	0.00	0.71	0.00	0.71
15.267	0.00	0.72	0.00	0.72
15.283	0.00	0.73	0.00	0.73
15.300	0.00	0.73	0.00	0.73
15.317	0.00	0.74	0.00	0.74
15.333	0.00	0.74	0.00	0.74
15.350	0.00	0.75	0.00	0.75
15.367	0.00	0.75	0.00	0.75
15.383	0.00	0.76	0.00	0.76
15.400	0.00	0.76	0.00	0.76
15.417	0.00	0.77	0.00	0.77
15.433	0.00	0.77	0.00	0.77
15.450	0.00	0.78	0.00	0.78
15.467	0.00	0.78	0.00	0.78
15.483	0.62	0.78	0.62	0.78
15.500	1.73	0.79	1.73	0.79
15.517	2.84	0.79	2.84	0.79
15.533	3.95	0.82	3.95	0.82
15.550	5.06	0.85	5.06	0.85
15.567	6.17	0.88	6.17	0.88
15.583	7.27	0.91	7.27	0.91
15.600	8.38	0.95	8.38	0.95
15.617	9.49	0.98	9.49	0.98
15.633	10.60	1.01	10.60	1.01
15.650	11.71	1.04	11.71	1.04
15.667	12.82	1.08	12.82	1.08
15.683	13.92	1.11	13.92	1.11
15.700	15.06	1.14	15.06	1.14
15.717	17.49	1.17	17.49	1.17
15.733	20.68	1.20	20.68	1.20
15.750	23.87	1.24	23.87	1.24
15.767	27.06	1.28	27.06	1.28
15.783	30.25	1.35	30.25	1.35
15.800	33.44	1.44	33.44	1.44
15.817	36.63	1.52	36.63	1.52
15.833	39.82	1.60	39.82	1.60
15.850	43.00	1.68	43.00	1.68
15.867	46.19	1.76	46.19	1.76
15.883	49.38	1.84	49.38	1.84
15.900	52.57	1.92	52.57	1.92
15.917	55.76	2.00	55.76	2.00
15.933	58.95	2.08	58.95	2.08
15.950	62.14	2.17	62.14	2.17

15.967	65.33	2.25	65.33	2.25
15.983	68.52	2.33	68.52	2.33
16.000	71.71	2.41	71.71	2.41
16.017	83.32	2.73	83.32	2.73
16.033	103.36	3.31	103.36	3.31
16.050	123.39	3.88	123.39	3.88
16.067	143.43	4.45	143.43	4.45
16.083	163.47	5.02	163.47	5.02
16.100	183.50	5.59	183.50	5.59
16.117	203.54	6.16	203.54	6.16
16.133	223.58	6.73	223.58	6.73
16.150	243.61	7.30	243.61	7.30
16.167	263.65	7.87	263.65	7.87
16.183	283.69	8.44	283.69	8.44
16.200	303.72	9.01	303.72	9.01
16.217	323.76	9.58	323.76	9.58
16.233	343.80	10.15	343.95	10.00
16.250	363.83	10.78	364.61	10.00
16.267	383.87	10.17	384.04	10.00
16.283	403.91	9.48	403.91	9.48
16.300	423.94	8.80	423.94	8.80
16.317	436.93	8.12	436.93	8.12
16.333	404.74	7.43	404.74	7.43
16.350	380.94	6.75	380.94	6.75
16.367	357.14	6.07	357.14	6.07
16.383	333.33	5.38	333.33	5.38
16.400	309.53	4.70	309.53	4.70
16.417	285.73	4.02	285.73	4.02
16.433	261.92	3.33	261.92	3.33
16.450	238.12	2.65	238.12	2.65
16.467	214.31	1.97	214.31	1.97
16.483	190.51	1.28	190.51	1.28
16.500	166.70	0.81	166.70	0.81
16.517	142.90	0.79	142.90	0.79
16.533	119.10	0.78	119.10	0.78
16.550	95.29	0.77	95.29	0.77
16.567	71.49	0.76	71.49	0.76
16.583	47.68	0.75	47.68	0.75
16.600	23.88	0.74	23.88	0.74
16.617	5.57	0.73	5.57	0.73
16.633	2.99	0.73	2.99	0.73
16.650	1.38	0.72	1.38	0.72
16.667	0.00	0.71	0.00	0.71
16.683	0.00	0.70	0.00	0.70
16.700	0.00	0.69	0.00	0.69
16.717	0.00	0.68	0.00	0.68
16.733	0.00	0.67	0.00	0.67
16.750	0.00	0.66	0.00	0.66
16.767	0.00	0.65	0.00	0.65
16.783	0.00	0.64	0.00	0.64
16.800	0.00	0.63	0.00	0.63
16.817	0.00	0.63	0.00	0.63
16.833	0.00	0.62	0.00	0.62
16.850	0.00	0.61	0.00	0.61
16.867	0.00	0.60	0.00	0.60
16.883	0.00	0.59	0.00	0.59
16.900	0.00	0.58	0.00	0.58
16.917	0.00	0.58	0.00	0.58
16.933	0.00	0.57	0.00	0.57
16.950	0.00	0.56	0.00	0.56
16.967	0.00	0.55	0.00	0.55
16.983	0.00	0.54	0.00	0.54
17.000	0.00	0.54	0.00	0.54
17.017	0.00	0.53	0.00	0.53
17.033	0.00	0.53	0.00	0.53
17.050	0.00	0.52	0.00	0.52
17.067	0.00	0.51	0.00	0.51
17.083	0.00	0.51	0.00	0.51
17.100	0.00	0.50	0.00	0.50
17.117	0.00	0.50	0.00	0.50
17.133	0.00	0.49	0.00	0.49
17.150	0.00	0.49	0.00	0.49
17.167	0.00	0.48	0.00	0.48
17.183	0.00	0.47	0.00	0.47
17.200	0.00	0.47	0.00	0.47
17.217	0.00	0.46	0.00	0.46
17.233	0.00	0.46	0.00	0.46
17.250	0.00	0.45	0.00	0.45
17.267	0.00	0.45	0.00	0.45
17.283	0.00	0.45	0.00	0.45
17.300	0.00	0.44	0.00	0.44
17.317	0.00	0.44	0.00	0.44
17.333	0.00	0.43	0.00	0.43
17.350	0.00	0.43	0.00	0.43
17.367	0.00	0.43	0.00	0.43
17.383	0.00	0.42	0.00	0.42
17.400	0.00	0.42	0.00	0.42
17.417	0.00	0.42	0.00	0.42
17.433	0.00	0.41	0.00	0.41
17.450	0.00	0.41	0.00	0.41
17.467	0.00	0.40	0.00	0.40
17.483	0.00	0.40	0.00	0.40
17.500	0.00	0.40	0.00	0.40
17.517	0.00	0.40	0.00	0.40
17.533	0.00	0.39	0.00	0.39
17.550	0.00	0.39	0.00	0.39
17.567	0.00	0.39	0.00	0.39
17.583	0.00	0.39	0.00	0.39
17.600	0.00	0.38	0.00	0.38
17.617	0.00	0.38	0.00	0.38
17.633	0.00	0.38	0.00	0.38
17.650	0.00	0.38	0.00	0.38
17.667	0.00	0.37	0.00	0.37
17.683	0.00	0.37	0.00	0.37
17.700	0.00	0.37	0.00	0.37
17.717	0.00	0.37	0.00	0.37
17.733	0.00	0.36	0.00	0.36
17.750	0.00	0.36	0.00	0.36
17.767	0.00	0.36	0.00	0.36
17.783	0.00	0.36	0.00	0.36
17.800	0.00	0.36	0.00	0.36
17.817	0.00	0.35	0.00	0.35

17.833	0.00	0.35	0.00	0.35
17.850	0.00	0.35	0.00	0.35
17.867	0.00	0.35	0.00	0.35
17.883	0.00	0.35	0.00	0.35
17.900	0.00	0.34	0.00	0.34
17.917	0.00	0.34	0.00	0.34
17.933	0.00	0.34	0.00	0.34
17.950	0.00	0.34	0.00	0.34
17.967	0.00	0.34	0.00	0.34
17.983	0.00	0.33	0.00	0.33
18.000	0.00	0.33	0.00	0.33

****
FLOW PROCESS FROM NODE 35.00 TO NODE 35.00 IS CODE = 3.2

>>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #3<<<<<
==========



ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 3
THROUGH A FLOW-THROUGH DETENTION BASIN
SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
DEAD STORAGE(AF) = 0.000
SPECIFIED DEAD STORAGE(AF) FILLED = 0.000
SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET = 0.000
DETENTION BASIN CONSTANT LOSS RATE(CFS) = 0.00

BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

INTERVAL NUMBER	DEPTH (FT)	OUTFLOW (CFS)	STORAGE (AF)
1	0.00	0.00	0.000
2	0.50	15.16	0.510
3	1.00	40.12	1.010
4	1.50	54.67	1.520
5	2.00	66.33	2.020
6	2.50	76.19	2.530
7	3.00	84.90	3.040
8	3.50	93.04	3.540
9	4.00	100.45	4.050
10	4.50	107.33	4.560
11	5.00	114.02	5.060
12	5.50	120.27	5.570
13	6.00	126.17	6.070
14	7.00	142.55	7.090
15	8.00	156.65	8.100
16	9.00	168.87	9.110
17	10.00	180.03	10.120
18	11.00	190.43	11.140
19	12.00	200.23	12.150
20	13.00	428.93	13.160
21	14.00	838.96	14.170

==========
MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
15.417	0.000	0.00	0.00	0.00	0.0	0.000
15.433	0.000	0.00	0.00	0.00	0.0	0.000
15.450	0.000	0.00	0.00	0.00	0.0	0.000
15.467	0.000	0.00	0.00	0.00	0.0	0.000
15.483	0.000	0.62	0.00	0.00	0.0	0.001
15.500	0.000	1.73	0.00	0.00	0.1	0.003
15.517	0.000	2.84	0.00	0.01	0.1	0.007
15.533	0.000	3.95	0.00	0.01	0.3	0.012
15.550	0.000	5.06	0.00	0.02	0.4	0.018
15.567	0.000	6.17	0.00	0.03	0.7	0.026
15.583	0.000	7.27	0.00	0.03	0.9	0.035
15.600	0.000	8.38	0.00	0.04	1.2	0.045
15.617	0.000	9.49	0.00	0.05	1.5	0.056
15.633	0.000	10.60	0.00	0.07	1.8	0.068
15.650	0.000	11.71	0.00	0.08	2.2	0.081
15.667	0.000	12.82	0.00	0.09	2.6	0.095
15.683	0.000	13.92	0.00	0.11	3.0	0.110
15.700	0.000	15.06	0.00	0.12	3.5	0.126
15.717	0.000	17.49	0.00	0.14	4.0	0.144
15.733	0.000	20.68	0.00	0.16	4.6	0.166
15.750	0.000	23.87	0.00	0.19	5.3	0.192
15.767	0.000	27.06	0.00	0.22	6.1	0.221
15.783	0.000	30.25	0.00	0.25	7.0	0.253
15.800	0.000	33.44	0.00	0.28	8.0	0.288
15.817	0.000	36.63	0.00	0.32	9.1	0.326
15.833	0.000	39.82	0.00	0.36	10.3	0.366
15.850	0.000	43.00	0.00	0.40	11.5	0.410
15.867	0.000	46.19	0.00	0.45	12.9	0.456
15.883	0.000	49.38	0.00	0.49	14.3	0.504
15.900	0.000	52.57	0.00	0.54	16.2	0.554

15.917	0.000	55.76	0.00	0.60	18.6	0.605
15.933	0.000	58.95	0.00	0.65	21.2	0.657
15.950	0.000	62.14	0.00	0.70	23.8	0.710
15.967	0.000	65.33	0.00	0.75	26.5	0.763
15.983	0.000	68.52	0.00	0.81	29.2	0.818
16.000	0.000	71.71	0.00	0.86	31.9	0.873
16.017	0.000	83.32	0.00	0.93	34.9	0.939
16.033	0.000	103.36	0.00	1.02	38.6	1.028
16.050	0.000	123.39	0.00	1.13	42.2	1.140
16.067	0.000	143.43	0.00	1.26	45.8	1.275
16.083	0.000	163.47	0.00	1.41	49.9	1.431
16.100	0.000	183.50	0.00	1.59	54.4	1.609
16.117	0.000	203.54	0.00	1.79	59.1	1.808
16.133	0.000	223.58	0.00	2.01	63.9	2.028
16.150	0.000	243.61	0.00	2.24	68.8	2.269
16.167	0.000	263.65	0.00	2.50	73.7	2.530
16.183	0.000	283.69	0.00	2.78	78.6	2.813
16.200	0.000	303.72	0.00	3.08	83.6	3.116
16.217	0.000	323.76	0.00	3.40	88.8	3.440
16.233	0.000	343.95	0.00	3.74	94.0	3.784
16.250	0.000	364.61	0.00	4.10	99.2	4.150
16.267	0.000	384.04	0.00	4.48	104.4	4.535
16.283	0.000	403.91	0.00	4.88	109.7	4.940
16.300	0.000	423.94	0.00	5.30	115.1	5.365
16.317	0.000	436.93	0.00	5.73	120.4	5.801
16.333	0.000	404.74	0.00	6.11	125.5	6.186
16.350	0.000	380.94	0.00	6.45	130.8	6.531
16.367	0.000	357.14	0.00	6.75	136.0	6.835
16.383	0.000	333.33	0.00	7.01	140.6	7.101
16.400	0.000	309.53	0.00	7.24	144.3	7.328
16.417	0.000	285.73	0.00	7.42	147.2	7.519
16.433	0.000	261.92	0.00	7.58	149.6	7.674
16.450	0.000	238.12	0.00	7.70	151.5	7.793
16.467	0.000	214.31	0.00	7.78	153.0	7.878
16.483	0.000	190.51	0.00	7.83	153.9	7.928
16.500	0.000	166.70	0.00	7.85	154.4	7.945
16.517	0.000	142.90	0.00	7.83	154.4	7.929
16.533	0.000	119.10	0.00	7.78	153.9	7.881
16.550	0.000	95.29	0.00	7.70	153.0	7.802
16.567	0.000	71.49	0.00	7.60	151.7	7.691
16.583	0.000	47.68	0.00	7.46	150.0	7.550
16.600	0.000	23.88	0.00	7.29	147.8	7.380
16.617	0.000	5.57	0.00	7.10	145.2	7.187
16.633	0.000	2.99	0.00	6.91	142.5	6.995
16.650	0.000	1.38	0.00	6.72	139.5	6.805
16.667	0.000	0.00	0.00	6.54	136.5	6.617
16.683	0.000	0.00	0.00	6.36	133.5	6.433
16.700	0.000	0.00	0.00	6.18	130.6	6.253
16.717	0.000	0.00	0.00	6.01	127.7	6.077
16.733	0.000	0.00	0.00	5.83	125.3	5.905
16.750	0.000	0.00	0.00	5.67	123.2	5.735
16.767	0.000	0.00	0.00	5.50	121.2	5.568
16.783	0.000	0.00	0.00	5.34	119.2	5.404
16.800	0.000	0.00	0.00	5.18	117.2	5.242
16.817	0.000	0.00	0.00	5.02	115.3	5.084
16.833	0.000	0.00	0.00	4.87	113.3	4.927
16.850	0.000	0.00	0.00	4.71	111.2	4.774
16.867	0.000	0.00	0.00	4.56	109.2	4.624
16.883	0.000	0.00	0.00	4.42	107.2	4.476
16.900	0.000	0.00	0.00	4.28	105.2	4.331
16.917	0.000	0.00	0.00	4.14	103.3	4.189
16.933	0.000	0.00	0.00	4.00	101.4	4.049
16.950	0.000	0.00	0.00	3.87	99.4	3.912
16.967	0.000	0.00	0.00	3.73	97.5	3.778
16.983	0.000	0.00	0.00	3.60	95.5	3.647
17.000	0.000	0.00	0.00	3.48	93.6	3.518
17.017	0.000	0.00	0.00	3.35	91.6	3.391
17.033	0.000	0.00	0.00	3.23	89.6	3.268
17.050	0.000	0.00	0.00	3.11	87.6	3.147
17.067	0.000	0.00	0.00	2.99	85.7	3.029
17.083	0.000	0.00	0.00	2.88	83.7	2.914
17.100	0.000	0.00	0.00	2.77	81.8	2.801
17.117	0.000	0.00	0.00	2.66	79.9	2.691
17.133	0.000	0.00	0.00	2.55	78.0	2.584
17.150	0.000	0.00	0.00	2.45	76.2	2.479
17.167	0.000	0.00	0.00	2.35	74.2	2.377
17.183	0.000	0.00	0.00	2.25	72.3	2.277
17.200	0.000	0.00	0.00	2.16	70.4	2.180
17.217	0.000	0.00	0.00	2.06	68.5	2.086
17.233	0.000	0.00	0.00	1.97	66.7	1.994
17.250	0.000	0.00	0.00	1.88	64.7	1.905
17.267	0.000	0.00	0.00	1.80	62.6	1.819
17.283	0.000	0.00	0.00	1.72	60.7	1.735
17.300	0.000	0.00	0.00	1.63	58.7	1.654
17.317	0.000	0.00	0.00	1.56	56.9	1.576
17.333	0.000	0.00	0.00	1.48	55.0	1.500
17.350	0.000	0.00	0.00	1.41	53.1	1.427
17.367	0.000	0.00	0.00	1.34	51.0	1.357
17.383	0.000	0.00	0.00	1.27	49.0	1.289
17.400	0.000	0.00	0.00	1.21	47.2	1.224
17.417	0.000	0.00	0.00	1.15	45.3	1.162
17.433	0.000	0.00	0.00	1.09	43.6	1.102
17.450	0.000	0.00	0.00	1.03	41.9	1.044
17.467	0.000	0.00	0.00	0.98	40.1	0.989
17.483	0.000	0.00	0.00	0.93	37.8	0.937
17.500	0.000	0.00	0.00	0.88	35.2	0.888
17.517	0.000	0.00	0.00	0.83	32.9	0.843
17.533	0.000	0.00	0.00	0.79	30.7	0.800
17.550	0.000	0.00	0.00	0.75	28.7	0.761
17.567	0.000	0.00	0.00	0.71	26.8	0.724
17.583	0.000	0.00	0.00	0.68	25.0	0.690
17.600	0.000	0.00	0.00	0.65	23.3	0.658
17.617	0.000	0.00	0.00	0.62	21.8	0.628
17.633	0.000	0.00	0.00	0.59	20.3	0.600
17.650	0.000	0.00	0.00	0.56	19.0	0.573
17.667	0.000	0.00	0.00	0.54	17.7	0.549
17.683	0.000	0.00	0.00	0.52	16.5	0.526
17.700	0.000	0.00	0.00	0.50	15.5	0.505
17.717	0.000	0.00	0.00	0.48	14.7	0.485
17.733	0.000	0.00	0.00	0.46	14.1	0.465
17.750	0.000	0.00	0.00	0.44	13.6	0.447
17.767	0.000	0.00	0.00	0.42	13.0	0.429

17.783	0.000	0.00	0.00	0.40	12.5	0.411
17.800	0.000	0.00	0.00	0.39	12.0	0.395
17.817	0.000	0.00	0.00	0.37	11.5	0.379
17.833	0.000	0.00	0.00	0.36	11.0	0.364
17.850	0.000	0.00	0.00	0.34	10.6	0.349
17.867	0.000	0.00	0.00	0.33	10.2	0.335
17.883	0.000	0.00	0.00	0.32	9.8	0.322
17.900	0.000	0.00	0.00	0.30	9.4	0.309
17.917	0.000	0.00	0.00	0.29	9.0	0.296
17.933	0.000	0.00	0.00	0.28	8.6	0.285
17.950	0.000	0.00	0.00	0.27	8.3	0.273
17.967	0.000	0.00	0.00	0.26	8.0	0.262
17.983	0.000	0.00	0.00	0.25	7.6	0.252
18.000	0.000	0.00	0.00	0.24	7.3	0.242
18.017	0.000	0.00	0.00	0.23	7.0	0.232
18.033	0.000	0.00	0.00	0.22	6.8	0.223
18.050	0.000	0.00	0.00	0.21	6.5	0.214
18.067	0.000	0.00	0.00	0.20	6.2	0.205
18.083	0.000	0.00	0.00	0.19	6.0	0.197
18.100	0.000	0.00	0.00	0.19	5.7	0.189
18.117	0.000	0.00	0.00	0.18	5.5	0.181
18.133	0.000	0.00	0.00	0.17	5.3	0.174
18.150	0.000	0.00	0.00	0.16	5.1	0.167
18.167	0.000	0.00	0.00	0.16	4.9	0.160
18.183	0.000	0.00	0.00	0.15	4.7	0.154
18.200	0.000	0.00	0.00	0.14	4.5	0.148
18.217	0.000	0.00	0.00	0.14	4.3	0.142
18.233	0.000	0.00	0.00	0.13	4.1	0.136
18.250	0.000	0.00	0.00	0.13	4.0	0.131
18.267	0.000	0.00	0.00	0.12	3.8	0.125
18.283	0.000	0.00	0.00	0.12	3.7	0.120
18.300	0.000	0.00	0.00	0.11	3.5	0.116
18.317	0.000	0.00	0.00	0.11	3.4	0.111
18.333	0.000	0.00	0.00	0.10	3.2	0.107
18.350	0.000	0.00	0.00	0.10	3.1	0.102
18.367	0.000	0.00	0.00	0.10	3.0	0.098
18.383	0.000	0.00	0.00	0.09	2.9	0.094
18.400	0.000	0.00	0.00	0.09	2.7	0.090
18.417	0.000	0.00	0.00	0.09	2.6	0.087
18.433	0.000	0.00	0.00	0.08	2.5	0.083
18.450	0.000	0.00	0.00	0.08	2.4	0.080
18.467	0.000	0.00	0.00	0.08	2.3	0.077
18.483	0.000	0.00	0.00	0.07	2.2	0.074
18.500	0.000	0.00	0.00	0.07	2.1	0.071
18.517	0.000	0.00	0.00	0.07	2.1	0.068
18.533	0.000	0.00	0.00	0.06	2.0	0.065
18.550	0.000	0.00	0.00	0.06	1.9	0.063
18.567	0.000	0.00	0.00	0.06	1.8	0.060
18.583	0.000	0.00	0.00	0.06	1.7	0.058
18.600	0.000	0.00	0.00	0.05	1.7	0.055
18.617	0.000	0.00	0.00	0.05	1.6	0.053
18.633	0.000	0.00	0.00	0.05	1.5	0.051
18.650	0.000	0.00	0.00	0.05	1.5	0.049
18.667	0.000	0.00	0.00	0.05	1.4	0.047
18.683	0.000	0.00	0.00	0.04	1.4	0.045
18.700	0.000	0.00	0.00	0.04	1.3	0.043
18.717	0.000	0.00	0.00	0.04	1.3	0.042
18.733	0.000	0.00	0.00	0.04	1.2	0.040
18.750	0.000	0.00	0.00	0.04	1.2	0.038
18.767	0.000	0.00	0.00	0.04	1.1	0.037
18.783	0.000	0.00	0.00	0.03	1.1	0.035
18.800	0.000	0.00	0.00	0.03	1.0	0.034
18.817	0.000	0.00	0.00	0.03	1.0	0.032
18.833	0.000	0.00	0.00	0.03	0.9	0.031
18.850	0.000	0.00	0.00	0.03	0.9	0.030
18.867	0.000	0.00	0.00	0.03	0.9	0.029
18.883	0.000	0.00	0.00	0.03	0.8	0.028
18.900	0.000	0.00	0.00	0.03	0.8	0.026
18.917	0.000	0.00	0.00	0.02	0.8	0.025
18.933	0.000	0.00	0.00	0.02	0.7	0.024
18.950	0.000	0.00	0.00	0.02	0.7	0.023
18.967	0.000	0.00	0.00	0.02	0.7	0.022
18.983	0.000	0.00	0.00	0.02	0.7	0.022
19.000	0.000	0.00	0.00	0.02	0.6	0.021
19.017	0.000	0.00	0.00	0.02	0.6	0.020
19.033	0.000	0.00	0.00	0.02	0.6	0.019
19.050	0.000	0.00	0.00	0.02	0.6	0.018
19.067	0.000	0.00	0.00	0.02	0.5	0.018
19.083	0.000	0.00	0.00	0.02	0.5	0.017
19.100	0.000	0.00	0.00	0.02	0.5	0.016
19.117	0.000	0.00	0.00	0.02	0.5	0.016
19.133	0.000	0.00	0.00	0.01	0.5	0.015
19.150	0.000	0.00	0.00	0.01	0.4	0.014
19.167	0.000	0.00	0.00	0.01	0.4	0.014
19.183	0.000	0.00	0.00	0.01	0.4	0.013
19.200	0.000	0.00	0.00	0.01	0.4	0.013
19.217	0.000	0.00	0.00	0.01	0.4	0.012
19.233	0.000	0.00	0.00	0.01	0.4	0.012
19.250	0.000	0.00	0.00	0.01	0.3	0.011
19.267	0.000	0.00	0.00	0.01	0.3	0.011
19.283	0.000	0.00	0.00	0.01	0.3	0.010
19.300	0.000	0.00	0.00	0.01	0.3	0.010
19.317	0.000	0.00	0.00	0.01	0.3	0.010
19.333	0.000	0.00	0.00	0.01	0.3	0.009
19.350	0.000	0.00	0.00	0.01	0.3	0.009
19.367	0.000	0.00	0.00	0.01	0.3	0.008
19.383	0.000	0.00	0.00	0.01	0.2	0.008
19.400	0.000	0.00	0.00	0.01	0.2	0.008
19.417	0.000	0.00	0.00	0.01	0.2	0.007
19.433	0.000	0.00	0.00	0.01	0.2	0.007
19.450	0.000	0.00	0.00	0.01	0.2	0.007
19.467	0.000	0.00	0.00	0.01	0.2	0.007
19.483	0.000	0.00	0.00	0.01	0.2	0.006
19.500	0.000	0.00	0.00	0.01	0.2	0.006
19.517	0.000	0.00	0.00	0.01	0.2	0.006
19.533	0.000	0.00	0.00	0.01	0.2	0.006
19.550	0.000	0.00	0.00	0.01	0.2	0.005
19.567	0.000	0.00	0.00	0.01	0.2	0.005
19.583	0.000	0.00	0.00	0.00	0.1	0.005
19.600	0.000	0.00	0.00	0.00	0.1	0.005
19.617	0.000	0.00	0.00	0.00	0.1	0.005
19.633	0.000	0.00	0.00	0.00	0.1	0.004

19.650	0.000	0.00	0.00	0.00	0.1	0.004
19.667	0.000	0.00	0.00	0.00	0.1	0.004
19.683	0.000	0.00	0.00	0.00	0.1	0.004
19.700	0.000	0.00	0.00	0.00	0.1	0.004
19.717	0.000	0.00	0.00	0.00	0.1	0.004
19.733	0.000	0.00	0.00	0.00	0.1	0.003
19.750	0.000	0.00	0.00	0.00	0.1	0.003
19.767	0.000	0.00	0.00	0.00	0.1	0.003
19.783	0.000	0.00	0.00	0.00	0.1	0.003
19.800	0.000	0.00	0.00	0.00	0.1	0.003
19.817	0.000	0.00	0.00	0.00	0.1	0.003
19.833	0.000	0.00	0.00	0.00	0.1	0.003
19.850	0.000	0.00	0.00	0.00	0.1	0.003
19.867	0.000	0.00	0.00	0.00	0.1	0.002
19.883	0.000	0.00	0.00	0.00	0.1	0.002
19.900	0.000	0.00	0.00	0.00	0.1	0.002
19.917	0.000	0.00	0.00	0.00	0.1	0.002
19.933	0.000	0.00	0.00	0.00	0.1	0.002
19.950	0.000	0.00	0.00	0.00	0.1	0.002
19.967	0.000	0.00	0.00	0.00	0.1	0.002
19.983	0.000	0.00	0.00	0.00	0.1	0.002
20.000	0.000	0.00	0.00	0.00	0.1	0.002
20.017	0.000	0.00	0.00	0.00	0.1	0.002
20.033	0.000	0.00	0.00	0.00	0.0	0.002
20.050	0.000	0.00	0.00	0.00	0.0	0.002
20.067	0.000	0.00	0.00	0.00	0.0	0.002
20.083	0.000	0.00	0.00	0.00	0.0	0.001
20.100	0.000	0.00	0.00	0.00	0.0	0.001
20.117	0.000	0.00	0.00	0.00	0.0	0.001
20.133	0.000	0.00	0.00	0.00	0.0	0.001
20.150	0.000	0.00	0.00	0.00	0.0	0.001
20.167	0.000	0.00	0.00	0.00	0.0	0.001
20.183	0.000	0.00	0.00	0.00	0.0	0.001
20.200	0.000	0.00	0.00	0.00	0.0	0.001
20.217	0.000	0.00	0.00	0.00	0.0	0.001
20.233	0.000	0.00	0.00	0.00	0.0	0.001
20.250	0.000	0.00	0.00	0.00	0.0	0.001
20.267	0.000	0.00	0.00	0.00	0.0	0.001
20.283	0.000	0.00	0.00	0.00	0.0	0.001
20.300	0.000	0.00	0.00	0.00	0.0	0.001
20.317	0.000	0.00	0.00	0.00	0.0	0.001
20.333	0.000	0.00	0.00	0.00	0.0	0.001
20.350	0.000	0.00	0.00	0.00	0.0	0.001
20.367	0.000	0.00	0.00	0.00	0.0	0.001
20.383	0.000	0.00	0.00	0.00	0.0	0.001
20.400	0.000	0.00	0.00	0.00	0.0	0.001
20.417	0.000	0.00	0.00	0.00	0.0	0.001
20.433	0.000	0.00	0.00	0.00	0.0	0.001
20.450	0.000	0.00	0.00	0.00	0.0	0.001
20.467	0.000	0.00	0.00	0.00	0.0	0.001
20.483	0.000	0.00	0.00	0.00	0.0	0.001
20.500	0.000	0.00	0.00	0.00	0.0	0.001
20.517	0.000	0.00	0.00	0.00	0.0	0.000
20.533	0.000	0.00	0.00	0.00	0.0	0.000
20.550	0.000	0.00	0.00	0.00	0.0	0.000
20.567	0.000	0.00	0.00	0.00	0.0	0.000
20.583	0.000	0.00	0.00	0.00	0.0	0.000
20.600	0.000	0.00	0.00	0.00	0.0	0.000

```
--------------------------------------------------------------------------------
  PROCESS SUMMARY OF STORAGE:
    INFLOW  VOLUME =     13.181 AF
    BASIN  STORAGE =      0.000 AF (WITH      0.000 AF INITIALLY FILLED)
    OUTFLOW VOLUME =     13.181 AF
    LOSS    VOLUME =      0.000 AF


********************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     35.20 IS CODE =   7
--------------------------------------------------------------------------------
  >>>>>STREAM NUMBER 1 ADDED TO STREAM NUMBER 2<<<<<
================================================================================


********************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  11
--------------------------------------------------------------------------------
  >>>>>VIEW STREAM NUMBER 2 HYDROGRAPH<<<<<
================================================================================

           STREAM HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
--------------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)    Q(CFS) 0.       50.0     100.0     150.0     200.0
--------------------------------------------------------------------------------
  14.000     25.3681     55.27  .         .Q    V   .         .         .
  14.017     25.4444     55.41  .         .Q    V   .         .         .
  14.033     25.5209     55.56  .         .Q    V   .         .         .
  14.050     25.5976     55.70  .         .Q    V   .         .         .
  14.067     25.6746     55.84  .         .Q    V   .         .         .
  14.083     25.7517     55.99  .         .Q    V   .         .         .
  14.100     25.8290     56.14  .         .Q    V   .         .         .
  14.117     25.9065     56.29  .         .Q    V   .         .         .
  14.133     25.9843     56.43  .         .Q    V   .         .         .
  14.150     26.0622     56.58  .         .Q    V   .         .         .
  14.167     26.1403     56.73  .         .Q     V  .         .         .
  14.183     26.2187     56.88  .         .Q     V  .         .         .
  14.200     26.2974     57.12  .         .Q     V  .         .         .
  14.217     26.3766     57.51  .         .Q     V  .         .         .
  14.233     26.4563     57.91  .         .Q     V  .         .         .
  14.250     26.5366     58.30  .         .Q     V  .         .         .
  14.267     26.6175     58.70  .         .Q     V  .         .         .
  14.283     26.6989     59.09  .         .Q     V  .         .         .
  14.300     26.7808     59.49  .         .Q     V  .         .         .
  14.317     26.8633     59.88  .         .Q     V  .         .         .
  14.333     26.9463     60.27  .         . Q    V  .         .         .
  14.350     27.0299     60.66  .         . Q    V  .         .         .
  14.367     27.1140     61.06  .         . Q    V  .         .         .
  14.383     27.1986     61.45  .         . Q    V  .         .         .
  14.400     27.2838     61.84  .         . Q    V  .         .         .
  14.417     27.3695     62.23  .         . Q    V  .         .         .
```

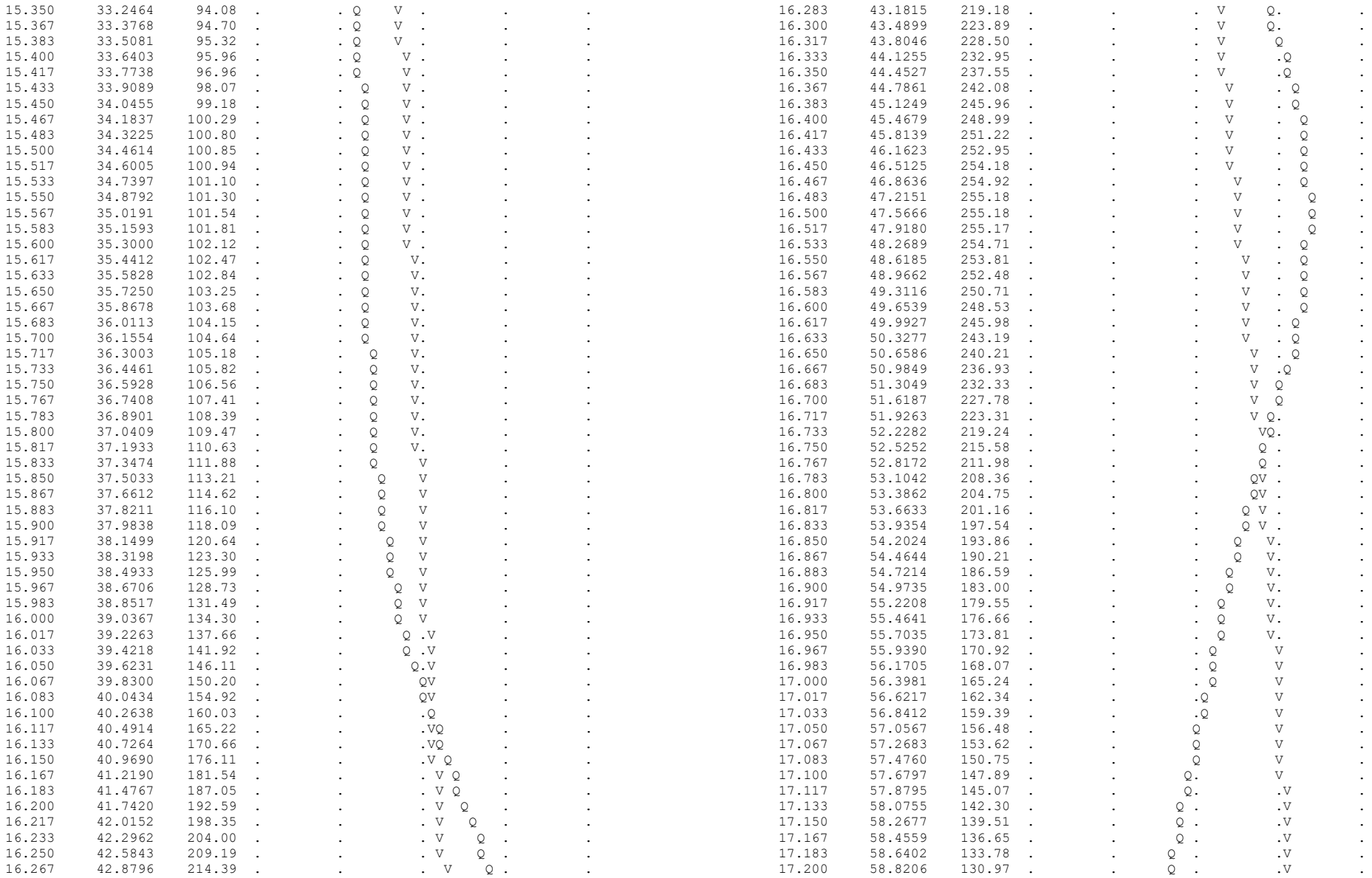
```
14.433    27.4558    62.63  .          . Q    V  .         .         .
14.450    27.5426    63.02  .          . Q    V  .         .         .
14.467    27.6299    63.41  .          . Q     V .         .         .
14.483    27.7178    63.80  .          . Q     V .         .         .
14.500    27.8062    64.17  .          . Q     V .         .         .
14.517    27.8950    64.47  .          . Q     V .         .         .
14.533    27.9842    64.77  .          . Q     V .         .         .
14.550    28.0739    65.08  .          .  Q    V .         .         .
14.567    28.1639    65.38  .          .  Q    V .         .         .
14.583    28.2544    65.68  .          .  Q    V .         .         .
14.600    28.3453    65.98  .          .  Q    V .         .         .
14.617    28.4366    66.29  .          .  Q    V .         .         .
14.633    28.5283    66.59  .          .  Q    V .         .         .
14.650    28.6205    66.89  .          .  Q    V .         .         .
14.667    28.7130    67.20  .          .  Q    V .         .         .
14.683    28.8060    67.50  .          .  Q    V .         .         .
14.700    28.8994    67.80  .          .  Q    V .         .         .
14.717    28.9932    68.11  .          .  Q    V .         .         .
14.733    29.0874    68.41  .          .  Q    V .         .         .
14.750    29.1821    68.71  .          .  Q     V.         .         .
14.767    29.2771    69.02  .          .  Q     V.         .         .
14.783    29.3726    69.32  .          .  Q     V.         .         .
14.800    29.4686    69.71  .          .  Q     V.         .         .
14.817    29.5658    70.50  .          .   Q    V.         .         .
14.833    29.6640    71.34  .          .   Q    V.         .         .
14.850    29.7634    72.17  .          .   Q    V.         .         .
14.867    29.8640    73.01  .          .   Q    V.         .         .
14.883    29.9657    73.84  .          .   Q    V.         .         .
14.900    30.0686    74.68  .          .   Q    V.         .         .
14.917    30.1726    75.51  .          .    Q   V.         .         .
14.933    30.2778    76.35  .          .    Q   V.         .         .
14.950    30.3841    77.18  .          .    Q   V.         .         .
14.967    30.4915    78.02  .          .    Q   V.         .         .
14.983    30.6001    78.85  .          .    Q   V.         .         .
15.000    30.7099    79.69  .          .    Q    V         .         .
15.017    30.8208    80.52  .          .     Q   V         .         .
15.033    30.9329    81.36  .          .     Q   V         .         .
15.050    31.0461    82.20  .          .     Q   V         .         .
15.067    31.1605    83.04  .          .     Q   V         .         .
15.083    31.2760    83.88  .          .     Q   V         .         .
15.100    31.3927    84.69  .          .     Q   V         .         .
15.117    31.5102    85.35  .          .      Q  V         .         .
15.133    31.6287    85.98  .          .      Q  V         .         .
15.150    31.7479    86.60  .          .      Q  V         .         .
15.167    31.8681    87.22  .          .      Q  V         .         .
15.183    31.9891    87.85  .          .      Q  V         .         .
15.200    32.1109    88.47  .          .      Q  V         .         .
15.217    32.2337    89.10  .          .      Q  .V        .         .
15.233    32.3573    89.72  .          .      Q  .V        .         .
15.250    32.4817    90.35  .          .       Q .V        .         .
15.267    32.6070    90.97  .          .       Q .V        .         .
15.283    32.7332    91.59  .          .       Q .V        .         .
15.300    32.8602    92.21  .          .       Q .V        .         .
15.317    32.9880    92.84  .          .       Q .V        .         .
15.333    33.1168    93.46  .          .       Q .V        .         .
15.350    33.2464    94.08  .          .       Q .V        .         .
15.367    33.3768    94.70  .          .         Q .V      .         .
15.383    33.5081    95.32  .          .          Q.V      .         .
15.400    33.6403    95.96  .          .          Q.V      .         .
15.417    33.7738    96.96  .          .          Q. V     .         .
15.433    33.9089    98.07  .          .          Q. V     .         .
15.450    34.0455    99.18  .          .          Q. V     .         .
15.467    34.1837   100.29  .          .           Q V     .         .
15.483    34.3225   100.78  .          .           Q V     .         .
15.500    34.4613   100.79  .          .           Q V     .         .
15.517    34.6002   100.79  .          .           Q V     .         .
15.533    34.7390   100.82  .          .           Q V     .         .
15.550    34.8779   100.85  .          .           Q V     .         .
15.567    35.0169   100.88  .          .           Q V     .         .
15.583    35.1559   100.91  .          .           Q V     .         .
15.600    35.2949   100.95  .          .           Q V     .         .
15.617    35.4340   100.98  .          .           Q  V    .         .
15.633    35.5732   101.01  .          .           Q  V    .         .
15.650    35.7123   101.04  .          .           Q  V    .         .
15.667    35.8516   101.08  .          .           Q  V    .         .
15.683    35.9908   101.11  .          .           Q  V    .         .
15.700    36.1301   101.14  .          .           Q  V    .         .
15.717    36.2695   101.17  .          .           Q  V    .         .
15.733    36.4089   101.20  .          .           Q  V    .         .
15.750    36.5483   101.24  .          .           Q  V    .         .
15.767    36.6878   101.28  .          .           Q  V    .         .
15.783    36.8274   101.35  .          .           Q  V    .         .
15.800    36.9672   101.44  .          .           Q   V   .         .
15.817    37.1070   101.52  .          .           Q   V   .         .
15.833    37.2469   101.60  .          .           Q   V   .         .
15.850    37.3870   101.68  .          .           Q   V   .         .
15.867    37.5272   101.76  .          .           Q   V   .         .
15.883    37.6674   101.84  .          .           Q   V   .         .
15.900    37.8078   101.92  .          .           Q   V   .         .
15.917    37.9483   102.00  .          .           Q   V   .         .
15.933    38.0889   102.08  .          .           Q   V   .         .
15.950    38.2297   102.17  .          .           Q   V   .         .
15.967    38.3705   102.25  .          .           Q    V  .         .
15.983    38.5114   102.33  .          .           Q    V  .         .
16.000    38.6525   102.41  .          .           Q    V  .         .
16.017    38.7940   102.73  .          .           Q    V  .         .
16.033    38.9363   103.31  .          .           Q    V  .         .
16.050    39.0794   103.88  .          .           Q    V  .         .
16.067    39.2233   104.45  .          .           Q    V  .         .
16.083    39.3679   105.02  .          .           .Q   V  .         .
16.100    39.5134   105.59  .          .           .Q   V  .         .
16.117    39.6596   106.16  .          .           .Q   V  .         .
16.133    39.8066   106.73  .          .           .Q   V  .         .
16.150    39.9544   107.30  .          .           .Q    V .         .
16.167    40.1030   107.87  .          .           .Q    V .         .
16.183    40.2523   108.44  .          .           .Q    V .         .
16.200    40.4025   109.01  .          .           .Q    V .         .
16.217    40.5534   109.58  .          .           .Q    V .         .
16.233    40.7049   110.00  .          .           . Q   V .         .
16.250    40.8565   110.00  .          .           . Q   V .         .
16.267    41.0080   110.00  .          .           . Q   V .         .
16.283    41.1588   109.48  .          .           .Q    V .         .
```

```
16.300     41.3086    108.80  .         .         .Q    V   .         .
16.317     41.4576    108.12  .         .         .Q     V  .         .
16.333     41.6055    107.43  .         .         .Q     V  .         .
16.350     41.7526    106.75  .         .         .Q     V  .         .
16.367     41.8987    106.07  .         .         .Q     V  .         .
16.383     42.0438    105.38  .         .         .Q     V  .         .
16.400     42.1880    104.70  .         .         Q      V  .         .
16.417     42.3313    104.02  .         .         Q      V  .         .
16.433     42.4736    103.33  .         .         Q      V  .         .
16.450     42.6150    102.65  .         .         Q      V  .         .
16.467     42.7555    101.97  .         .         Q      V  .         .
16.483     42.8950    101.28  .         .         Q      V  .         .
16.500     43.0339    100.81  .         .         Q       V .         .
16.517     43.1727    100.79  .         .         Q       V .         .
16.533     43.3115    100.78  .         .         Q       V .         .
16.550     43.4503    100.77  .         .         Q       V .         .
16.567     43.5891    100.76  .         .         Q       V .         .
16.583     43.7279    100.75  .         .         Q       V .         .
16.600     43.8666    100.74  .         .         Q       V .         .
16.617     44.0054    100.73  .         .         Q       V .         .
16.633     44.1441    100.73  .         .         Q       V .         .
16.650     44.2829    100.72  .         .         Q       V .         .
16.667     44.4213    100.47  .         .         Q       V .         .
16.683     44.5574     98.85  .         .        Q.        V.         .
16.700     44.6913     97.23  .         .        Q.        V.         .
16.717     44.8230     95.61  .         .        Q.        V.         .
16.733     44.9525     93.99  .         .       Q .        V.         .
16.750     45.0797     92.36  .         .       Q .        V.         .
16.767     45.2047     90.74  .         .       Q .        V.         .
16.783     45.3275     89.12  .         .      Q  .        V.         .
16.800     45.4480     87.50  .         .      Q  .        V.         .
16.817     45.5663     85.88  .         .      Q  .        V.         .
16.833     45.6824     84.26  .         .     Q   .        V.         .
16.850     45.7962     82.64  .         .     Q   .        V.         .
16.867     45.9078     81.02  .         .     Q   .        V.         .
16.883     46.0171     79.40  .         .    Q    .        V.         .
16.900     46.1243     77.78  .         .    Q    .         V         .
16.917     46.2293     76.27  .         .    Q    .         V         .
16.933     46.3330     75.28  .         .    Q    .         V         .
16.950     46.4355     74.36  .         .   Q     .         V         .
16.967     46.5366     73.44  .         .   Q     .         V         .
16.983     46.6365     72.52  .         .   Q     .         V         .
17.000     46.7351     71.61  .         .   Q     .         V         .
17.017     46.8325     70.69  .         .   Q     .         V         .
17.033     46.9286     69.77  .         .  Q      .         V         .
17.050     47.0234     68.86  .         .  Q      .         V         .
17.067     47.1170     67.94  .         .  Q      .         V         .
17.083     47.2093     67.02  .         .  Q      .         V         .
17.100     47.3004     66.11  .         .  Q      .         V         .
17.117     47.3902     65.19  .         .  Q      .         V         .
17.133     47.4787     64.27  .         . Q       .         V         .
17.150     47.5660     63.35  .         . Q       .         V         .
17.167     47.6520     62.44  .         . Q       .         .V        .
17.183     47.7367     61.52  .         . Q       .         .V        .
17.200     47.8202     60.60  .         . Q       .         .V        .
17.217     47.9025     59.73  .         .Q        .         .V        .
17.233     47.9840     59.22  .         .Q        .         .V        .
17.250     48.0650     58.80  .         .Q        .         .V        .
17.267     48.1455     58.39  .         .Q        .         .V        .
17.283     48.2253     57.97  .         .Q        .         .V        .
17.300     48.3046     57.55  .         .Q        .         .V        .
17.317     48.3833     57.13  .         .Q        .         .V        .
17.333     48.4614     56.71  .         .Q        .         .V        .
17.350     48.5389     56.29  .         .Q        .         .V        .
17.367     48.6159     55.88  .         .Q        .         .V        .
17.383     48.6923     55.46  .         .Q        .         .V        .
17.400     48.7681     55.04  .         .Q        .         .V        .
17.417     48.8433     54.62  .          Q        .         .V        .
17.433     48.9180     54.20  .          Q        .         .V        .
17.450     48.9921     53.78  .          Q        .         .V        .
17.467     49.0656     53.37  .          Q        .         .V        .
17.483     49.1385     52.95  .          Q        .         . V       .
17.500     49.2109     52.53  .          Q        .         . V       .
17.517     49.2826     52.12  .          Q        .         . V       .
17.533     49.3540     51.78  .          Q        .         . V       .
17.550     49.4249     51.48  .          Q        .         . V       .
17.567     49.4954     51.18  .          Q        .         . V       .
17.583     49.5655     50.88  .          Q        .         . V       .
17.600     49.6351     50.57  .          Q        .         . V       .
17.617     49.7044     50.27  .          Q        .         . V       .
17.633     49.7732     49.97  .         Q.        .         . V       .
17.650     49.8416     49.67  .         Q.        .         . V       .
17.667     49.9096     49.36  .         Q.        .         . V       .
17.683     49.9772     49.06  .         Q.        .         . V       .
17.700     50.0443     48.76  .         Q.        .         . V       .
17.717     50.1111     48.46  .         Q.        .         . V       .
17.733     50.1774     48.16  .         Q.        .         . V       .
17.750     50.2433     47.85  .         Q.        .         . V       .
17.767     50.3088     47.55  .         Q.        .         . V       .
17.783     50.3739     47.25  .         Q.        .         . V       .
17.800     50.4386     46.95  .         Q.        .         . V       .
17.817     50.5028     46.65  .         Q.        .         . V       .
17.833     50.5667     46.39  .         Q.        .         . V       .
17.850     50.6303     46.17  .         Q.        .         . V       .
17.867     50.6936     45.94  .         Q.        .         .  V      .
17.883     50.7566     45.72  .         Q.        .         .  V      .
17.900     50.8192     45.49  .         Q.        .         .  V      .
17.917     50.8816     45.27  .         Q.        .         .  V      .
17.933     50.9436     45.04  .         Q.        .         .  V      .
17.950     51.0054     44.82  .        Q .        .         .  V      .
17.967     51.0668     44.59  .        Q .        .         .  V      .
17.983     51.1279     44.37  .        Q .        .         .  V      .
18.000     51.1887     44.14  .        Q .        .         .  V      .
--------------------------------------------------------------------------------
```

```
    TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
    (Note: 100% of Peak Flow Rate estimate assumed to have
    an instantaneous time duration)

    Percentile of Estimated                  Duration
        Peak Flow Rate                       (minutes)
    =======================                  =========
              0%                               1081.0
```

10%	1081.0
20%	1081.0
30%	1081.0
40%	1081.0
50%	1030.0
60%	750.0
70%	590.0
80%	480.0
90%	370.0

```
****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>STREAM NUMBER 2 ADDED TO STREAM NUMBER 3<<<<<
============================================================================


****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>VIEW STREAM NUMBER 3 HYDROGRAPH<<<<<
============================================================================

           STREAM HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
       (Notes: Time indicated is at END of Each Unit Intervals.
               Peak 5-minute rainfall intensity is modeled as
               a constant value for entire 5-minute period.)
----------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       75.0     150.0     225.0     300.0
----------------------------------------------------------------------------
  14.000     25.3681     55.27  .      Q  .  V      .         .         .
  14.017     25.4444     55.41  .      Q  .  V      .         .         .
  14.033     25.5209     55.56  .      Q  .  V      .         .         .
  14.050     25.5976     55.70  .      Q  .  V      .         .         .
  14.067     25.6746     55.84  .      Q  .  V      .         .         .
  14.083     25.7517     55.99  .      Q  .  V      .         .         .
  14.100     25.8290     56.14  .      Q  .  V      .         .         .
  14.117     25.9065     56.29  .      Q  .  V      .         .         .
  14.133     25.9843     56.43  .      Q  .  V      .         .         .
  14.150     26.0622     56.58  .      Q  .  V      .         .         .
  14.167     26.1403     56.73  .      Q  .   V     .         .         .
  14.183     26.2187     56.88  .      Q  .   V     .         .         .
  14.200     26.2974     57.12  .      Q  .   V     .         .         .
  14.217     26.3766     57.51  .      Q  .   V     .         .         .
  14.233     26.4563     57.91  .      Q  .   V     .         .         .
  14.250     26.5366     58.30  .      Q  .   V     .         .         .
  14.267     26.6175     58.70  .      Q  .   V     .         .         .
  14.283     26.6989     59.09  .      Q  .   V     .         .         .
  14.300     26.7808     59.49  .      Q  .   V     .         .         .
  14.317     26.8633     59.88  .      Q  .   V     .         .         .
  14.333     26.9463     60.27  .       Q .   V     .         .         .
  14.350     27.0299     60.66  .       Q .   V     .         .         .
  14.367     27.1140     61.06  .       Q .   V     .         .         .
  14.383     27.1986     61.45  .       Q .   V     .         .         .
  14.400     27.2838     61.84  .       Q .   V     .         .         .
  14.417     27.3695     62.23  .       Q .   V     .         .         .
  14.433     27.4558     62.63  .       Q .   V     .         .         .
  14.450     27.5426     63.02  .       Q .   V     .         .         .
  14.467     27.6299     63.41  .       Q .   V     .         .         .
  14.483     27.7178     63.80  .       Q .   V     .         .         .
  14.500     27.8062     64.17  .       Q .   V     .         .         .
  14.517     27.8950     64.47  .       Q .   V     .         .         .
  14.533     27.9842     64.77  .       Q .    V    .         .         .
  14.550     28.0739     65.08  .       Q .    V    .         .         .
  14.567     28.1639     65.38  .       Q .    V    .         .         .
  14.583     28.2544     65.68  .       Q .    V    .         .         .
  14.600     28.3453     65.98  .       Q .    V    .         .         .
  14.617     28.4366     66.29  .       Q .    V    .         .         .
  14.633     28.5283     66.59  .       Q .    V    .         .         .
  14.650     28.6205     66.89  .       Q .    V    .         .         .
  14.667     28.7130     67.20  .       Q .    V    .         .         .
  14.683     28.8060     67.50  .       Q.     V    .         .         .
  14.700     28.8994     67.80  .       Q.     V    .         .         .
  14.717     28.9932     68.11  .       Q.     V    .         .         .
  14.733     29.0874     68.41  .       Q.     V    .         .         .
  14.750     29.1821     68.71  .       Q.     V    .         .         .
  14.767     29.2771     69.02  .       Q.     V    .         .         .
  14.783     29.3726     69.32  .       Q.     V    .         .         .
  14.800     29.4686     69.71  .       Q.     V    .         .         .
  14.817     29.5658     70.50  .       Q.     V    .         .         .
  14.833     29.6640     71.34  .       Q.     V    .         .         .
  14.850     29.7634     72.17  .       Q.     V    .         .         .
  14.867     29.8640     73.01  .       Q.      V   .         .         .
  14.883     29.9657     73.84  .       Q.      V   .         .         .
  14.900     30.0686     74.68  .       Q.      V   .         .         .
  14.917     30.1726     75.51  .        Q      V   .         .         .
  14.933     30.2778     76.35  .        Q      V   .         .         .
  14.950     30.3841     77.18  .        Q      V   .         .         .
  14.967     30.4915     78.02  .        Q      V   .         .         .
  14.983     30.6001     78.85  .        Q      V   .         .         .
  15.000     30.7099     79.69  .        Q      V   .         .         .
  15.017     30.8208     80.52  .        Q      V   .         .         .
  15.033     30.9329     81.36  .        Q      V   .         .         .
  15.050     31.0461     82.20  .        Q      V   .         .         .
  15.067     31.1605     83.04  .        .Q     V   .         .         .
  15.083     31.2760     83.88  .        .Q     V   .         .         .
  15.100     31.3927     84.69  .        .Q     V   .         .         .
  15.117     31.5102     85.35  .        .Q     V   .         .         .
  15.133     31.6287     85.98  .        .Q     V   .         .         .
  15.150     31.7479     86.60  .        .Q      V  .         .         .
  15.167     31.8681     87.22  .        .Q      V  .         .         .
  15.183     31.9891     87.85  .        .Q      V  .         .         .
  15.200     32.1109     88.47  .        .Q      V  .         .         .
  15.217     32.2337     89.10  .        .Q      V  .         .         .
  15.233     32.3573     89.72  .        .Q      V  .         .         .
  15.250     32.4817     90.35  .         . Q    V  .         .         .
  15.267     32.6070     90.97  .         . Q    V  .         .         .
  15.283     32.7332     91.59  .         . Q    V  .         .         .
  15.300     32.8602     92.21  .         . Q    V  .         .         .
  15.317     32.9880     92.84  .         . Q    V  .         .         .
  15.333     33.1168     93.46  .         . Q    V  .         .         .
```



Onsite Flood Routing Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1

with Flowby Detention @ Node 56.3 (100cfs) & Node 35.2 (10cfs), User input for total flowby @ Rational Node 35

25-Year Storm Proposed Condition

17.217	58.9972	128.24	. . Q . .V .
17.233	59.1706	125.88	. . Q . .V .
17.250	59.3407	123.49	. . Q . .V .
17.267	59.5074	121.02	. . Q . .V .
17.283	59.6708	118.63	. . Q . . V .
17.300	59.8310	116.29	. . Q . . V .
17.317	59.9880	114.01	. . Q . . V .
17.333	60.1419	111.75	. . Q . . V .
17.350	60.2926	109.35	. . Q . . V .
17.367	60.4398	106.89	. . Q . . V .
17.383	60.5837	104.50	. . Q . . V .
17.400	60.7245	102.19	. . Q . . V .
17.417	60.8622	99.96	. . Q . . V .
17.433	60.9969	97.79	. . Q . . V .
17.450	61.1287	95.69	. . Q . . V .
17.467	61.2574	93.44	. . Q . . V .
17.483	61.3823	90.71	. . Q . . V .
17.500	61.5032	87.78	. .Q . . V .
17.517	61.6204	85.02	. .Q . . V .
17.533	61.7340	82.50	. .Q . . V .
17.550	61.8444	80.16	. Q . . V .
17.567	61.9518	77.95	. Q . . V .
17.583	62.0563	75.87	. Q . . V .
17.600	62.1581	73.90	. Q. . . V .
17.617	62.2573	72.05	. Q. . . V .
17.633	62.3541	70.30	. Q. . . V .
17.650	62.4487	68.65	. Q. . . V .
17.667	62.5411	67.08	. Q . . . V .
17.683	62.6315	65.60	. Q . . . V .
17.700	62.7200	64.25	. Q . . . V .
17.717	62.8070	63.16	. Q . . . V .
17.733	62.8927	62.27	. Q . . . V .
17.750	62.9773	61.40	. Q . . . V .
17.767	63.0607	60.56	. Q . . . V .
17.783	63.1430	59.73	. Q . . . V .
17.800	63.2242	58.93	. Q . . . V .
17.817	63.3043	58.15	. Q . . . V .
17.833	63.3834	57.43	. Q . . . V .
17.850	63.4616	56.76	. Q . . . V .
17.867	63.5389	56.11	. Q . . . V .
17.883	63.6153	55.48	. Q . . . V .
17.900	63.6909	54.87	. Q . . . V .
17.917	63.7656	54.26	. Q . . . V .
17.933	63.8395	53.68	. Q . . . V .
17.950	63.9127	53.11	. Q . . . V .
17.967	63.9851	52.55	. Q . . . V .
17.983	64.0567	52.00	. Q . . . V .
18.000	64.1276	51.47	. Q . . . V .

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	1081.0
20%	1081.0
30%	790.0
40%	545.0
50%	380.0
60%	300.0
70%	230.0
80%	170.0
90%	110.0

END OF FLOODSCx ROUTING ANALYSIS

```
************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
         (c) Copyright 1989-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                      Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                  *
* 100-YEAR STORM PROP. CONDITION FLOWBY AT NODES 56.3 & 35.2             *
* W.O. #1443-136X                                                        *
 ************************************************************************

  FILE NAME: 18142-99.DAT
  TIME/DATE OF STUDY: 18:27 10/16/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     56.30 IS CODE = 1.2
------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =  265.74
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.068
    LOW LOSS FRACTION = 0.119
    TIME OF CONCENTRATION(MIN.) = 17.52
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.52
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.09
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.45
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.43
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.36
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.63

------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =   100.47
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =    24.20

------------------------------------------------------------------------

========================================================================

                      2 4 - H O U R    S T O R M
                   R U N O F F    H Y D R O G R A P H

========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.      174.7     349.3     524.0     698.7
------------------------------------------------------------------------
  14.000     35.8548     75.63  .   Q     .   V     .         .         .
  14.017     35.9593     75.85  .   Q     .   V     .         .         .
  14.033     36.0640     76.07  .   Q     .   V     .         .         .
  14.050     36.1691     76.29  .   Q     .   V     .         .         .
  14.067     36.2745     76.51  .   Q     .   V     .         .         .
  14.083     36.3802     76.73  .   Q     .   V     .         .         .
  14.100     36.4862     76.95  .   Q     .   V     .         .         .
  14.117     36.5925     77.17  .   Q     .   V     .         .         .
  14.133     36.6991     77.39  .   Q     .   V     .         .         .
  14.150     36.8060     77.61  .   Q     .   V     .         .         .
  14.167     36.9132     77.83  .   Q     .   V     .         .         .
  14.183     37.0207     78.05  .   Q     .   V     .         .         .
  14.200     37.1285     78.27  .   Q     .   V     .         .         .
  14.217     37.2366     78.49  .   Q     .   V     .         .         .
  14.233     37.3450     78.71  .   Q     .   V     .         .         .
  14.250     37.4537     78.93  .   Q     .   V     .         .         .
  14.267     37.5630     79.35  .   Q     .   V     .         .         .
  14.283     37.6731     79.91  .   Q     .   V     .         .         .
  14.300     37.7839     80.46  .   Q     .    V    .         .         .
  14.317     37.8955     81.02  .   Q     .    V    .         .         .
  14.333     38.0079     81.57  .   Q     .   V     .         .         .
  14.350     38.1210     82.13  .   Q     .   V     .         .         .
  14.367     38.2349     82.68  .   Q     .   V     .         .         .
  14.383     38.3495     83.24  .   Q     .   V     .         .         .
  14.400     38.4650     83.79  .   Q     .   V     .         .         .
  14.417     38.5811     84.35  .   Q     .   V     .         .         .
  14.433     38.6981     84.90  .   Q     .   V     .         .         .
  14.450     38.8158     85.46  .   Q     .   V     .         .         .
  14.467     38.9343     86.01  .   Q     .   V     .         .         .
  14.483     39.0535     86.57  .   Q     .   V     .         .         .
  14.500     39.1735     87.12  .   Q     .   V     .         .         .
  14.517     39.2943     87.68  .    Q    .   V     .         .         .
  14.533     39.4158     88.23  .    Q    .   V     .         .         .
  14.550     39.5381     88.75  .    Q    .   V     .         .         .
  14.567     39.6608     89.11  .    Q    .   V     .         .         .
  14.583     39.7840     89.46  .    Q    .   V     .         .         .
  14.600     39.9077     89.81  .    Q    .   V     .         .         .
```

```
14.617    40.0319     90.16  .    Q    .    V    .         .         .
14.633    40.1566     90.51  .    Q    .    V    .         .         .
14.650    40.2817     90.85  .    Q    .     V   .         .         .
14.667    40.4074     91.20  .    Q    .     V   .         .         .
14.683    40.5335     91.55  .    Q    .     V   .         .         .
14.700    40.6600     91.90  .    Q    .     V   .         .         .
14.717    40.7871     92.25  .    Q    .     V   .         .         .
14.733    40.9146     92.59  .    Q    .     V   .         .         .
14.750    41.0427     92.94  .    Q    .     V   .         .         .
14.767    41.1712     93.29  .    Q    .     V   .         .         .
14.783    41.3001     93.64  .    Q    .     V   .         .         .
14.800    41.4296     93.99  .    Q    .     V   .         .         .
14.817    41.5595     94.34  .    Q    .     V   .         .         .
14.833    41.6900     94.69  .    Q    .     V   .         .         .
14.850    41.8214     95.39  .    Q    .     V   .         .         .
14.867    41.9541     96.36  .    Q    .     V   .         .         .
14.883    42.0882     97.33  .    Q    .     V   .         .         .
14.900    42.2236     98.30  .    Q    .     V   .         .         .
14.917    42.3603     99.27  .    Q    .     V   .         .         .
14.933    42.4984    100.24  .    Q    .     V   .         .         .
14.950    42.6378    101.21  .    Q    .     V   .         .         .
14.967    42.7785    102.19  .    Q    .      V  .         .         .
14.983    42.9206    103.16  .    Q    .      V  .         .         .
15.000    43.0641    104.13  .    Q    .      V  .         .         .
15.017    43.2088    105.10  .     Q   .      V  .         .         .
15.033    43.3549    106.07  .     Q   .      V  .         .         .
15.050    43.5023    107.04  .     Q   .      V  .         .         .
15.067    43.6511    108.01  .     Q   .      V  .         .         .
15.083    43.8012    108.98  .     Q   .      V  .         .         .
15.100    43.9527    109.95  .     Q   .      V  .         .         .
15.117    44.1055    110.92  .     Q   .      V  .         .         .
15.133    44.2595    111.85  .     Q   .      V  .         .         .
15.150    44.4147    112.63  .     Q   .      V  .         .         .
15.167    44.5708    113.38  .     Q   .      V  .         .         .
15.183    44.7280    114.13  .     Q   .      V  .         .         .
15.200    44.8863    114.88  .     Q   .      V  .         .         .
15.217    45.0456    115.63  .     Q   .      V  .         .         .
15.233    45.2059    116.38  .     Q   .      V  .         .         .
15.250    45.3672    117.14  .     Q   .       V .         .         .
15.267    45.5296    117.89  .     Q   .       V .         .         .
15.283    45.6930    118.64  .     Q   .       V .         .         .
15.300    45.8575    119.39  .     Q   .       V .         .         .
15.317    46.0229    120.14  .     Q   .       V .         .         .
15.333    46.1895    120.89  .     Q   .       V .         .         .
15.350    46.3570    121.65  .     Q   .       V .         .         .
15.367    46.5256    122.40  .      Q  .       V .         .         .
15.383    46.6952    123.15  .      Q  .       V .         .         .
15.400    46.8659    123.90  .      Q  .       V .         .         .
15.417    47.0376    124.65  .      Q  .       V .         .         .
15.433    47.2111    125.97  .      Q  .       V .         .         .
15.450    47.3871    127.78  .      Q  .       V .         .         .
15.467    47.5656    129.59  .      Q  .       V .         .         .
15.483    47.7466    131.39  .      Q  .        V.         .         .
15.500    47.9300    133.20  .      Q  .        V.         .         .
15.517    48.1160    135.01  .      Q  .        V.         .         .
15.533    48.3045    136.81  .      Q  .        V.         .         .
15.550    48.4954    138.62  .      Q  .        V.         .         .
15.567    48.6888    140.43  .       Q .        V.         .         .
15.583    48.8847    142.23  .       Q .        V.         .         .
15.600    49.0831    144.04  .       Q .        V.         .         .
15.617    49.2840    145.85  .       Q .        V.         .         .
15.633    49.4874    147.65  .       Q .        V.         .         .
15.650    49.6933    149.46  .       Q .        V.         .         .
15.667    49.9016    151.27  .       Q .        V.         .         .
15.683    50.1124    153.07  .       Q .        V.         .         .
15.700    50.3258    154.88  .       Q .         V         .         .
15.717    50.5419    156.93  .       Q .         V         .         .
15.733    50.7628    160.37  .        Q.         V         .         .
15.750    50.9888    164.02  .        Q.         V         .         .
15.767    51.2197    167.66  .        Q.         V         .         .
15.783    51.4557    171.31  .        Q.         V         .         .
15.800    51.6966    174.96  .         Q         V         .         .
15.817    51.9427    178.60  .         Q         V         .         .
15.833    52.1937    182.25  .         Q         V         .         .
15.850    52.4497    185.90  .         Q         V         .         .
15.867    52.7108    189.54  .         Q         V         .         .
15.883    52.9769    193.19  .         .Q        .V        .         .
15.900    53.2481    196.84  .         .Q        .V        .         .
15.917    53.5242    200.48  .         .Q        .V        .         .
15.933    53.8054    204.13  .         .Q        .V        .         .
15.950    54.0916    207.78  .         .Q        .V        .         .
15.967    54.3828    211.42  .         . Q       .V        .         .
15.983    54.6790    215.07  .         . Q       .V        .         .
16.000    54.9803    218.72  .         . Q       .V        .         .
16.017    55.3028    234.18  .         .  Q      . V       .         .
16.033    55.6630    261.47  .         .   Q     . V       .         .
16.050    56.0608    288.76  .         .     Q   . V       .         .
16.067    56.4961    316.05  .         .       Q . V       .         .
16.083    56.9690    343.35  .         .        Q. V       .         .
16.100    57.4795    370.63  .         .         .QV       .         .
16.117    58.0276    397.92  .         .         . QV      .         .
16.133    58.6133    425.21  .         .         .  VQ     .         .
16.150    59.2366    452.50  .         .         .  V Q    .         .
16.167    59.8975    479.79  .         .         .  V   Q  .         .
16.183    60.5959    507.08  .         .         .   V    Q.         .
16.200    61.3320    534.37  .         .         .   V     Q         .
16.217    62.1056    561.66  .         .         .   V     . Q       .
16.233    62.9169    588.95  .         .         .    V    .  Q      .
16.250    63.7657    616.24  .         .         .    V    .    Q    .
16.267    64.6521    643.53  .         .         .    V    .     Q   .
16.283    65.5761    670.82  .         .         .     V   .       Q .
16.300    66.5384    698.66  .         .         .     V   .         Q
16.317    67.4575    667.22  .         .         .     V   .       Q .
16.333    68.3323    635.14  .         .         .      V  .     Q   .
16.350    69.1630    603.06  .         .         .      V  .   Q     .
16.367    69.9495    570.99  .         .         .      V  . Q       .
16.383    70.6918    538.91  .         .         .       V Q         .
16.400    71.3899    506.83  .         .         .       VQ.         .
16.417    72.0438    474.76  .         .         .      QV .         .
16.433    72.6536    442.68  .         .         .    Q  V .         .
16.450    73.2191    410.60  .         .         .  Q     V.         .
16.467    73.7405    378.52  .         .         .Q       V.         .
```

```
16.483     74.2177    346.45  .         .        Q.        V.         .
16.500     74.6507    314.37  .         .      Q  .        V.         .
16.517     75.0396    282.29  .         .     Q   .        V.         .
16.533     75.3842    250.22  .         .   Q     .         V         .
16.550     75.6847    218.14  .         . Q       .         V         .
16.567     75.9409    186.06  .         Q         .         V         .
16.583     76.1530    153.98  .       Q .         .         V         .
16.600     76.3401    135.78  .      Q  .         .         V         .
16.617     76.5244    133.80  .      Q  .         .         V         .
16.633     76.7060    131.84  .      Q  .         .         V         .
16.650     76.8849    129.88  .      Q  .         .         V         .
16.667     77.0611    127.92  .      Q  .         .         V         .
16.683     77.2346    125.96  .      Q  .         .         V         .
16.700     77.4054    124.00  .      Q  .         .         V         .
16.717     77.5735    122.04  .     Q   .         .         V         .
16.733     77.7389    120.08  .     Q   .         .         V         .
16.750     77.9016    118.12  .     Q   .         .         .V        .
16.767     78.0615    116.16  .     Q   .         .         .V        .
16.783     78.2188    114.20  .     Q   .         .         .V        .
16.800     78.3735    112.24  .     Q   .         .         .V        .
16.817     78.5254    110.28  .     Q   .         .         .V        .
16.833     78.6746    108.32  .     Q   .         .         .V        .
16.850     78.8211    106.36  .     Q   .         .         .V        .
16.867     78.9649    104.40  .    Q    .         .         .V        .
16.883     79.1061    102.53  .    Q    .         .         .V        .
16.900     79.2456    101.32  .    Q    .         .         .V        .
16.917     79.3837    100.25  .    Q    .         .         .V        .
16.933     79.5203     99.19  .    Q    .         .         .V        .
16.950     79.6555     98.12  .    Q    .         .         .V        .
16.967     79.7892     97.06  .    Q    .         .         .V        .
16.983     79.9214     95.99  .    Q    .         .         .V        .
17.000     80.0521     94.92  .    Q    .         .         .V        .
17.017     80.1814     93.86  .    Q    .         .         .V        .
17.033     80.3092     92.79  .    Q    .         .         .V        .
17.050     80.4356     91.72  .    Q    .         .         . V       .
17.067     80.5604     90.66  .    Q    .         .         . V       .
17.083     80.6839     89.59  .    Q    .         .         . V       .
17.100     80.8058     88.53  .    Q    .         .         . V       .
17.117     80.9263     87.46  .    Q    .         .         . V       .
17.133     81.0453     86.39  .   Q     .         .         . V       .
17.150     81.1628     85.33  .   Q     .         .         . V       .
17.167     81.2789     84.26  .   Q     .         .         . V       .
17.183     81.3937     83.36  .   Q     .         .         . V       .
17.200     81.5076     82.69  .   Q     .         .         . V       .
17.217     81.6206     82.02  .   Q     .         .         . V       .
17.233     81.7326     81.35  .   Q     .         .         . V       .
17.250     81.8437     80.68  .   Q     .         .         . V       .
17.267     81.9539     80.01  .   Q     .         .         . V       .
17.283     82.0632     79.34  .   Q     .         .         . V       .
17.300     82.1716     78.67  .   Q     .         .         . V       .
17.317     82.2790     78.00  .   Q     .         .         . V       .
17.333     82.3855     77.33  .   Q     .         .         . V       .
17.350     82.4911     76.66  .   Q     .         .         . V       .
17.367     82.5958     75.98  .   Q     .         .         . V       .
17.383     82.6995     75.31  .   Q     .         .         . V       .
17.400     82.8023     74.64  .   Q     .         .         . V       .
17.417     82.9042     73.97  .   Q     .         .         .  V      .
17.433     83.0052     73.30  .   Q     .         .         .  V      .
17.450     83.1052     72.63  .   Q     .         .         .  V      .
17.467     83.2044     71.98  .   Q     .         .         .  V      .
17.483     83.3028     71.49  .   Q     .         .         .  V      .
17.500     83.4007     71.05  .   Q     .         .         .  V      .
17.517     83.4980     70.60  .   Q     .         .         .  V      .
17.533     83.5946     70.16  .   Q     .         .         .  V      .
17.550     83.6906     69.72  .  Q      .         .         .  V      .
17.567     83.7860     69.27  .  Q      .         .         .  V      .
17.583     83.8808     68.83  .  Q      .         .         .  V      .
17.600     83.9750     68.38  .  Q      .         .         .  V      .
17.617     84.0686     67.94  .  Q      .         .         .  V      .
17.633     84.1616     67.49  .  Q      .         .         .  V      .
17.650     84.2539     67.05  .  Q      .         .         .  V      .
17.667     84.3457     66.60  .  Q      .         .         .  V      .
17.683     84.4368     66.16  .  Q      .         .         .  V      .
17.700     84.5273     65.72  .  Q      .         .         .  V      .
17.717     84.6172     65.27  .  Q      .         .         .  V      .
17.733     84.7065     64.83  .  Q      .         .         .  V      .
17.750     84.7952     64.38  .  Q      .         .         .  V      .
17.767     84.8833     63.98  .  Q      .         .         .  V      .
17.783     84.9710     63.65  .  Q      .         .         .  V      .
17.800     85.0582     63.32  .  Q      .         .         .  V      .
17.817     85.1450     62.99  .  Q      .         .         .  V      .
17.833     85.2313     62.67  .  Q      .         .         .  V      .
17.850     85.3172     62.34  .  Q      .         .         .  V      .
17.867     85.4026     62.01  .  Q      .         .         .  V      .
17.883     85.4875     61.68  .  Q      .         .         .   V     .
17.900     85.5720     61.35  .  Q      .         .         .   V     .
17.917     85.6561     61.02  .  Q      .         .         .   V     .
17.933     85.7397     60.69  .  Q      .         .         .   V     .
17.950     85.8228     60.36  .  Q      .         .         .   V     .
17.967     85.9055     60.03  .  Q      .         .         .   V     .
17.983     85.9878     59.70  .  Q      .         .         .   V     .
18.000     86.0695     59.37  .  Q      .         .         .   V     .
--------------------------------------------------------------------------------
 TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
 (Note: 100% of Peak Flow Rate estimate assumed to have
 an instantaneous time duration)

 Percentile of Estimated                 Duration
     Peak Flow Rate                      (minutes)
 =======================                 =========
            0%                            1081.0
           10%                            1081.0
           20%                             310.0
           30%                             180.0
           40%                             145.0
           50%                             115.0
           60%                              95.0
           70%                              70.0
           80%                              50.0
           90%                              25.0
```

```
**************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     35.10 IS CODE =   2
--------------------------------------------------------------------------
  >>>>>FLOWBY STRUCTURE ROUTING MODEL APPLIED TO STREAM #1<<<<<
==========================================================================


        MODEL STREAM NUMBER 1 FLOWING PAST A FLOWBY STRUCTURE:
        FLOWRATES IN STREAM # 1 WHICH ARE GREATER THAN
           100.0 CFS ARE ASSUMED TO BE EXCESS FLOWS.
        FLOW EXCESS IS ASSUMED TO BE ADDED TO STREAM NUMBER 3


              INFLOW              INFLOW
             (STREAM 3)          (STREAM 1)
                 |                   |
                 |                   |
                 |    flow excess    |
                 |<------------------* <=flowby structure
                 |                   | (maximum flowby Q =    100.0 cfs)
                 |                   |
                 |                   |
                 |                   |
                 V                   V
               STREAM 3            STREAM 1
           + FLOW EXCESS            FLOWBY



        FLOWBY BASIN MODELING RESULTS:

         MODEL        INFLOW    INFLOW   OUTFLOW    FLOWBY
          TIME    (STREAM 3) (STREAM 1) (STREAM 3) (STREAM 1)
         (HRS)         (CFS)     (CFS)     (CFS)     (CFS)
         14.000         0.00     75.63      0.00     75.63
         14.017         0.00     75.85      0.00     75.85
         14.033         0.00     76.07      0.00     76.07
         14.050         0.00     76.29      0.00     76.29
         14.067         0.00     76.51      0.00     76.51
         14.083         0.00     76.73      0.00     76.73
         14.100         0.00     76.95      0.00     76.95
         14.117         0.00     77.17      0.00     77.17
         14.133         0.00     77.39      0.00     77.39
         14.150         0.00     77.61      0.00     77.61
         14.167         0.00     77.83      0.00     77.83
         14.183         0.00     78.05      0.00     78.05
         14.200         0.00     78.27      0.00     78.27
         14.217         0.00     78.49      0.00     78.49
         14.233         0.00     78.71      0.00     78.71
         14.250         0.00     78.93      0.00     78.93
         14.267         0.00     79.35      0.00     79.35
         14.283         0.00     79.91      0.00     79.91
         14.300         0.00     80.46      0.00     80.46
         14.317         0.00     81.02      0.00     81.02
         14.333         0.00     81.57      0.00     81.57
         14.350         0.00     82.13      0.00     82.13
         14.367         0.00     82.68      0.00     82.68
         14.383         0.00     83.24      0.00     83.24
         14.400         0.00     83.79      0.00     83.79
         14.417         0.00     84.35      0.00     84.35
         14.433         0.00     84.90      0.00     84.90
         14.450         0.00     85.46      0.00     85.46
         14.467         0.00     86.01      0.00     86.01
         14.483         0.00     86.57      0.00     86.57
         14.500         0.00     87.12      0.00     87.12
         14.517         0.00     87.68      0.00     87.68
         14.533         0.00     88.23      0.00     88.23
         14.550         0.00     88.75      0.00     88.75
         14.567         0.00     89.11      0.00     89.11
         14.583         0.00     89.46      0.00     89.46
         14.600         0.00     89.81      0.00     89.81
         14.617         0.00     90.16      0.00     90.16
         14.633         0.00     90.51      0.00     90.51
         14.650         0.00     90.85      0.00     90.85
         14.667         0.00     91.20      0.00     91.20
         14.683         0.00     91.55      0.00     91.55
         14.700         0.00     91.90      0.00     91.90
         14.717         0.00     92.25      0.00     92.25
         14.733         0.00     92.59      0.00     92.59
         14.750         0.00     92.94      0.00     92.94
         14.767         0.00     93.29      0.00     93.29
         14.783         0.00     93.64      0.00     93.64
         14.800         0.00     93.99      0.00     93.99
         14.817         0.00     94.34      0.00     94.34
         14.833         0.00     94.69      0.00     94.69
         14.850         0.00     95.39      0.00     95.39
         14.867         0.00     96.36      0.00     96.36
         14.883         0.00     97.33      0.00     97.33
         14.900         0.00     98.30      0.00     98.30
         14.917         0.00     99.27      0.00     99.27
         14.933         0.00    100.24      0.24    100.00
         14.950         0.00    101.21      1.21    100.00
         14.967         0.00    102.19      2.19    100.00
         14.983         0.00    103.16      3.16    100.00
         15.000         0.00    104.13      4.13    100.00
         15.017         0.00    105.10      5.10    100.00
         15.033         0.00    106.07      6.07    100.00
         15.050         0.00    107.04      7.04    100.00
         15.067         0.00    108.01      8.01    100.00
         15.083         0.00    108.98      8.98    100.00
         15.100         0.00    109.95      9.95    100.00
         15.117         0.00    110.92     10.92    100.00
         15.133         0.00    111.85     11.85    100.00
         15.150         0.00    112.63     12.63    100.00
         15.167         0.00    113.38     13.38    100.00
         15.183         0.00    114.13     14.13    100.00
         15.200         0.00    114.88     14.88    100.00
         15.217         0.00    115.63     15.63    100.00
         15.233         0.00    116.38     16.38    100.00
         15.250         0.00    117.14     17.14    100.00
         15.267         0.00    117.89     17.89    100.00
```

15.283	0.00	118.64	18.64	100.00
15.300	0.00	119.39	19.39	100.00
15.317	0.00	120.14	20.14	100.00
15.333	0.00	120.89	20.89	100.00
15.350	0.00	121.65	21.65	100.00
15.367	0.00	122.40	22.40	100.00
15.383	0.00	123.15	23.15	100.00
15.400	0.00	123.90	23.90	100.00
15.417	0.00	124.65	24.65	100.00
15.433	0.00	125.97	25.97	100.00
15.450	0.00	127.78	27.78	100.00
15.467	0.00	129.59	29.59	100.00
15.483	0.00	131.39	31.39	100.00
15.500	0.00	133.20	33.20	100.00
15.517	0.00	135.01	35.01	100.00
15.533	0.00	136.81	36.81	100.00
15.550	0.00	138.62	38.62	100.00
15.567	0.00	140.43	40.43	100.00
15.583	0.00	142.23	42.23	100.00
15.600	0.00	144.04	44.04	100.00
15.617	0.00	145.85	45.85	100.00
15.633	0.00	147.65	47.65	100.00
15.650	0.00	149.46	49.46	100.00
15.667	0.00	151.27	51.27	100.00
15.683	0.00	153.07	53.07	100.00
15.700	0.00	154.88	54.88	100.00
15.717	0.00	156.93	56.93	100.00
15.733	0.00	160.37	60.37	100.00
15.750	0.00	164.02	64.02	100.00
15.767	0.00	167.66	67.66	100.00
15.783	0.00	171.31	71.31	100.00
15.800	0.00	174.96	74.96	100.00
15.817	0.00	178.60	78.60	100.00
15.833	0.00	182.25	82.25	100.00
15.850	0.00	185.90	85.90	100.00
15.867	0.00	189.54	89.54	100.00
15.883	0.00	193.19	93.19	100.00
15.900	0.00	196.84	96.84	100.00
15.917	0.00	200.48	100.48	100.00
15.933	0.00	204.13	104.13	100.00
15.950	0.00	207.78	107.78	100.00
15.967	0.00	211.42	111.42	100.00
15.983	0.00	215.07	115.07	100.00
16.000	0.00	218.72	118.72	100.00
16.017	0.00	234.18	134.18	100.00
16.033	0.00	261.47	161.47	100.00
16.050	0.00	288.76	188.76	100.00
16.067	0.00	316.05	216.05	100.00
16.083	0.00	343.35	243.35	100.00
16.100	0.00	370.63	270.63	100.00
16.117	0.00	397.92	297.92	100.00
16.133	0.00	425.21	325.21	100.00
16.150	0.00	452.50	352.50	100.00
16.167	0.00	479.79	379.79	100.00
16.183	0.00	507.08	407.08	100.00
16.200	0.00	534.37	434.37	100.00
16.217	0.00	561.66	461.66	100.00
16.233	0.00	588.95	488.95	100.00
16.250	0.00	616.24	516.24	100.00
16.267	0.00	643.53	543.53	100.00
16.283	0.00	670.82	570.82	100.00
16.300	0.00	698.66	598.66	100.00
16.317	0.00	667.22	567.22	100.00
16.333	0.00	635.14	535.14	100.00
16.350	0.00	603.06	503.06	100.00
16.367	0.00	570.99	470.99	100.00
16.383	0.00	538.91	438.91	100.00
16.400	0.00	506.83	406.83	100.00
16.417	0.00	474.76	374.76	100.00
16.433	0.00	442.68	342.68	100.00
16.450	0.00	410.60	310.60	100.00
16.467	0.00	378.52	278.52	100.00
16.483	0.00	346.45	246.45	100.00
16.500	0.00	314.37	214.37	100.00
16.517	0.00	282.29	182.29	100.00
16.533	0.00	250.22	150.22	100.00
16.550	0.00	218.14	118.14	100.00
16.567	0.00	186.06	86.06	100.00
16.583	0.00	153.98	53.98	100.00
16.600	0.00	135.78	35.78	100.00
16.617	0.00	133.80	33.80	100.00
16.633	0.00	131.84	31.84	100.00
16.650	0.00	129.88	29.88	100.00
16.667	0.00	127.92	27.92	100.00
16.683	0.00	125.96	25.96	100.00
16.700	0.00	124.00	24.00	100.00
16.717	0.00	122.04	22.04	100.00
16.733	0.00	120.08	20.08	100.00
16.750	0.00	118.12	18.12	100.00
16.767	0.00	116.16	16.16	100.00
16.783	0.00	114.20	14.20	100.00
16.800	0.00	112.24	12.24	100.00
16.817	0.00	110.28	10.28	100.00
16.833	0.00	108.32	8.32	100.00
16.850	0.00	106.36	6.36	100.00
16.867	0.00	104.40	4.40	100.00
16.883	0.00	102.53	2.53	100.00
16.900	0.00	101.32	1.32	100.00
16.917	0.00	100.25	0.25	100.00
16.933	0.00	99.19	0.00	99.19
16.950	0.00	98.12	0.00	98.12
16.967	0.00	97.06	0.00	97.06
16.983	0.00	95.99	0.00	95.99
17.000	0.00	94.92	0.00	94.92
17.017	0.00	93.86	0.00	93.86
17.033	0.00	92.79	0.00	92.79
17.050	0.00	91.72	0.00	91.72
17.067	0.00	90.66	0.00	90.66
17.083	0.00	89.59	0.00	89.59
17.100	0.00	88.53	0.00	88.53
17.117	0.00	87.46	0.00	87.46
17.133	0.00	86.39	0.00	86.39

17.150	0.00	85.33	0.00	85.33
17.167	0.00	84.26	0.00	84.26
17.183	0.00	83.36	0.00	83.36
17.200	0.00	82.69	0.00	82.69
17.217	0.00	82.02	0.00	82.02
17.233	0.00	81.35	0.00	81.35
17.250	0.00	80.68	0.00	80.68
17.267	0.00	80.01	0.00	80.01
17.283	0.00	79.34	0.00	79.34
17.300	0.00	78.67	0.00	78.67
17.317	0.00	78.00	0.00	78.00
17.333	0.00	77.33	0.00	77.33
17.350	0.00	76.66	0.00	76.66
17.367	0.00	75.98	0.00	75.98
17.383	0.00	75.31	0.00	75.31
17.400	0.00	74.64	0.00	74.64
17.417	0.00	73.97	0.00	73.97
17.433	0.00	73.30	0.00	73.30
17.450	0.00	72.63	0.00	72.63
17.467	0.00	71.98	0.00	71.98
17.483	0.00	71.49	0.00	71.49
17.500	0.00	71.05	0.00	71.05
17.517	0.00	70.60	0.00	70.60
17.533	0.00	70.16	0.00	70.16
17.550	0.00	69.72	0.00	69.72
17.567	0.00	69.27	0.00	69.27
17.583	0.00	68.83	0.00	68.83
17.600	0.00	68.38	0.00	68.38
17.617	0.00	67.94	0.00	67.94
17.633	0.00	67.49	0.00	67.49
17.650	0.00	67.05	0.00	67.05
17.667	0.00	66.60	0.00	66.60
17.683	0.00	66.16	0.00	66.16
17.700	0.00	65.72	0.00	65.72
17.717	0.00	65.27	0.00	65.27
17.733	0.00	64.83	0.00	64.83
17.750	0.00	64.38	0.00	64.38
17.767	0.00	63.98	0.00	63.98
17.783	0.00	63.65	0.00	63.65
17.800	0.00	63.32	0.00	63.32
17.817	0.00	62.99	0.00	62.99
17.833	0.00	62.67	0.00	62.67
17.850	0.00	62.34	0.00	62.34
17.867	0.00	62.01	0.00	62.01
17.883	0.00	61.68	0.00	61.68
17.900	0.00	61.35	0.00	61.35
17.917	0.00	61.02	0.00	61.02
17.933	0.00	60.69	0.00	60.69
17.950	0.00	60.36	0.00	60.36
17.967	0.00	60.03	0.00	60.03
17.983	0.00	59.70	0.00	59.70
18.000	0.00	59.37	0.00	59.37

****

FLOW PROCESS FROM NODE 56.30 TO NODE 36.00 IS CODE = 11

>>>>>VIEW STREAM NUMBER 1 HYDROGRAPH<<<<<

==========

STREAM HYDROGRAPH IN ONE-MINUTE UNIT INTERVALS(CFS)

(Notes: Time indicated is at END of Each Unit Intervals.
Peak 5-minute rainfall intensity is modeled as
a constant value for entire 5-minute period.)

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	50.0	100.0	150.0	200.0
14.000	35.8548	75.63	.	.	Q V .	.	.
14.017	35.9593	75.85	.	.	Q V .	.	.
14.033	36.0640	76.07	.	.	Q V .	.	.
14.050	36.1691	76.29	.	.	Q V .	.	.
14.067	36.2745	76.51	.	.	Q V .	.	.
14.083	36.3802	76.73	.	.	Q V .	.	.
14.100	36.4862	76.95	.	.	Q V .	.	.
14.117	36.5925	77.17	.	.	Q V .	.	.
14.133	36.6991	77.39	.	.	Q V .	.	.
14.150	36.8060	77.61	.	.	Q V .	.	.
14.167	36.9132	77.83	.	.	Q V .	.	.
14.183	37.0207	78.05	.	.	Q V .	.	.
14.200	37.1285	78.27	.	.	Q V .	.	.
14.217	37.2366	78.49	.	.	Q V .	.	.
14.233	37.3450	78.71	.	.	Q V .	.	.
14.250	37.4537	78.93	.	.	Q V .	.	.
14.267	37.5630	79.35	.	.	Q V .	.	.
14.283	37.6731	79.91	.	.	Q V .	.	.
14.300	37.7839	80.46	.	.	Q V .	.	.
14.317	37.8955	81.02	.	.	Q V .	.	.
14.333	38.0079	81.57	.	.	Q V.	.	.
14.350	38.1210	82.13	.	.	Q V.	.	.
14.367	38.2349	82.68	.	.	Q V.	.	.
14.383	38.3495	83.24	.	.	Q V.	.	.
14.400	38.4650	83.79	.	.	Q V.	.	.
14.417	38.5811	84.35	.	.	Q V.	.	.
14.433	38.6981	84.90	.	.	Q V.	.	.
14.450	38.8158	85.46	.	.	Q V.	.	.
14.467	38.9343	86.01	.	.	Q V.	.	.
14.483	39.0535	86.57	.	.	Q V.	.	.
14.500	39.1735	87.12	.	.	Q V.	.	.
14.517	39.2943	87.68	.	.	Q V.	.	.
14.533	39.4158	88.23	.	.	Q V.	.	.
14.550	39.5381	88.75	.	.	Q V.	.	.
14.567	39.6608	89.11	.	.	Q V.	.	.
14.583	39.7840	89.46	.	.	Q V.	.	.
14.600	39.9077	89.81	.	.	Q V.	.	.
14.617	40.0319	90.16	.	.	Q V	.	.
14.633	40.1566	90.51	.	.	Q V	.	.
14.650	40.2817	90.85	.	.	Q V	.	.
14.667	40.4074	91.20	.	.	Q V	.	.
14.683	40.5335	91.55	.	.	Q V	.	.
14.700	40.6600	91.90	.	.	Q V	.	.
14.717	40.7871	92.25	.	.	Q V	.	.
14.733	40.9146	92.59	.	.	Q V	.	.

14.750	41.0427	92.94	.	.	Q V	.	.
14.767	41.1712	93.29	.	.	Q V	.	.
14.783	41.3001	93.64	.	.	Q V	.	.
14.800	41.4296	93.99	.	.	Q V	.	.
14.817	41.5595	94.34	.	.	Q V	.	.
14.833	41.6900	94.69	.	.	Q V	.	.
14.850	41.8214	95.39	.	.	QV	.	.
14.867	41.9541	96.36	.	.	QV	.	.
14.883	42.0882	97.33	.	.	Q.V	.	.
14.900	42.2236	98.30	.	.	Q.V	.	.
14.917	42.3603	99.27	.	.	Q.V	.	.
14.933	42.4980	100.00	.	.	QV	.	.
14.950	42.6358	100.00	.	.	QV	.	.
14.967	42.7735	100.00	.	.	QV	.	.
14.983	42.9113	100.00	.	.	QV	.	.
15.000	43.0490	100.00	.	.	QV	.	.
15.017	43.1867	100.00	.	.	QV	.	.
15.033	43.3245	100.00	.	.	QV	.	.
15.050	43.4622	100.00	.	.	QV	.	.
15.067	43.6000	100.00	.	.	QV	.	.
15.083	43.7377	100.00	.	.	QV	.	.
15.100	43.8755	100.00	.	.	QV	.	.
15.117	44.0132	100.00	.	.	Q V	.	.
15.133	44.1509	100.00	.	.	Q V	.	.
15.150	44.2887	100.00	.	.	Q V	.	.
15.167	44.4264	100.00	.	.	Q V	.	.
15.183	44.5642	100.00	.	.	Q V	.	.
15.200	44.7019	100.00	.	.	Q V	.	.
15.217	44.8396	100.00	.	.	Q V	.	.
15.233	44.9774	100.00	.	.	Q V	.	.
15.250	45.1151	100.00	.	.	Q V	.	.
15.267	45.2529	100.00	.	.	Q V	.	.
15.283	45.3906	100.00	.	.	Q V	.	.
15.300	45.5283	100.00	.	.	Q V	.	.
15.317	45.6661	100.00	.	.	Q V	.	.
15.333	45.8038	100.00	.	.	Q V	.	.
15.350	45.9416	100.00	.	.	Q V	.	.
15.367	46.0793	100.00	.	.	Q V	.	.
15.383	46.2171	100.00	.	.	Q V	.	.
15.400	46.3548	100.00	.	.	Q V	.	.
15.417	46.4925	100.00	.	.	Q V	.	.
15.433	46.6303	100.00	.	.	Q V	.	.
15.450	46.7680	100.00	.	.	Q V	.	.
15.467	46.9058	100.00	.	.	Q V	.	.
15.483	47.0435	100.00	.	.	Q V	.	.
15.500	47.1812	100.00	.	.	Q V	.	.
15.517	47.3190	100.00	.	.	Q V	.	.
15.533	47.4567	100.00	.	.	Q V	.	.
15.550	47.5945	100.00	.	.	Q V	.	.
15.567	47.7322	100.00	.	.	Q V	.	.
15.583	47.8699	100.00	.	.	Q V	.	.
15.600	48.0077	100.00	.	.	Q V	.	.
15.617	48.1454	100.00	.	.	Q V	.	.
15.633	48.2832	100.00	.	.	Q V	.	.
15.650	48.4209	100.00	.	.	Q V	.	.
15.667	48.5587	100.00	.	.	Q V	.	.
15.683	48.6964	100.00	.	.	Q V	.	.
15.700	48.8341	100.00	.	.	Q V	.	.
15.717	48.9719	100.00	.	.	Q V	.	.
15.733	49.1096	100.00	.	.	Q V	.	.
15.750	49.2474	100.00	.	.	Q V	.	.
15.767	49.3851	100.00	.	.	Q V	.	.
15.783	49.5228	100.00	.	.	Q V	.	.
15.800	49.6606	100.00	.	.	Q V	.	.
15.817	49.7983	100.00	.	.	Q V	.	.
15.833	49.9361	100.00	.	.	Q V	.	.
15.850	50.0738	100.00	.	.	Q V	.	.
15.867	50.2115	100.00	.	.	Q V	.	.
15.883	50.3493	100.00	.	.	Q V	.	.
15.900	50.4870	100.00	.	.	Q V	.	.
15.917	50.6248	100.00	.	.	Q V	.	.
15.933	50.7625	100.00	.	.	Q V	.	.
15.950	50.9002	100.00	.	.	Q V	.	.
15.967	51.0380	100.00	.	.	Q V	.	.
15.983	51.1757	100.00	.	.	Q V	.	.
16.000	51.3135	100.00	.	.	Q V	.	.
16.017	51.4512	100.00	.	.	Q V	.	.
16.033	51.5890	100.00	.	.	Q V	.	.
16.050	51.7267	100.00	.	.	Q V	.	.
16.067	51.8644	100.00	.	.	Q V	.	.
16.083	52.0022	100.00	.	.	Q V	.	.
16.100	52.1399	100.00	.	.	Q V	.	.
16.117	52.2777	100.00	.	.	Q V	.	.
16.133	52.4154	100.00	.	.	Q V	.	.
16.150	52.5531	100.00	.	.	Q V	.	.
16.167	52.6909	100.00	.	.	Q V	.	.
16.183	52.8286	100.00	.	.	Q V	.	.
16.200	52.9664	100.00	.	.	Q V	.	.
16.217	53.1041	100.00	.	.	Q V	.	.
16.233	53.2418	100.00	.	.	Q V	.	.
16.250	53.3796	100.00	.	.	Q V	.	.
16.267	53.5173	100.00	.	.	Q V	.	.
16.283	53.6551	100.00	.	.	Q V	.	.
16.300	53.7928	100.00	.	.	Q V	.	.
16.317	53.9306	100.00	.	.	Q V	.	.
16.333	54.0683	100.00	.	.	Q V	.	.
16.350	54.2060	100.00	.	.	Q V	.	.
16.367	54.3438	100.00	.	.	Q V	.	.
16.383	54.4815	100.00	.	.	Q V	.	.
16.400	54.6193	100.00	.	.	Q V	.	.
16.417	54.7570	100.00	.	.	Q V	.	.
16.433	54.8947	100.00	.	.	Q V	.	.
16.450	55.0325	100.00	.	.	Q V	.	.
16.467	55.1702	100.00	.	.	Q V	.	.
16.483	55.3080	100.00	.	.	Q V	.	.
16.500	55.4457	100.00	.	.	Q V	.	.
16.517	55.5834	100.00	.	.	Q V	.	.
16.533	55.7212	100.00	.	.	Q V	.	.
16.550	55.8589	100.00	.	.	Q V	.	.
16.567	55.9967	100.00	.	.	Q V	.	.
16.583	56.1344	100.00	.	.	Q V	.	.
16.600	56.2722	100.00	.	.	Q V	.	.

```
16.617     56.4099    100.00  .         .         Q       V .         .
16.633     56.5476    100.00  .         .         Q       V .         .
16.650     56.6854    100.00  .         .         Q       V .         .
16.667     56.8231    100.00  .         .         Q       V .         .
16.683     56.9609    100.00  .         .         Q       V .         .
16.700     57.0986    100.00  .         .         Q       V .         .
16.717     57.2363    100.00  .         .         Q       V .         .
16.733     57.3741    100.00  .         .         Q       V .         .
16.750     57.5118    100.00  .         .         Q       V .         .
16.767     57.6496    100.00  .         .         Q       V .         .
16.783     57.7873    100.00  .         .         Q       V .         .
16.800     57.9250    100.00  .         .         Q       V .         .
16.817     58.0628    100.00  .         .         Q        V.         .
16.833     58.2005    100.00  .         .         Q        V.         .
16.850     58.3383    100.00  .         .         Q        V.         .
16.867     58.4760    100.00  .         .         Q        V.         .
16.883     58.6138    100.00  .         .         Q        V.         .
16.900     58.7515    100.00  .         .         Q        V.         .
16.917     58.8892    100.00  .         .         Q        V.         .
16.933     59.0259     99.19  .         .        Q.        V.         .
16.950     59.1610     98.12  .         .        Q.        V.         .
16.967     59.2947     97.06  .         .        Q.        V.         .
16.983     59.4269     95.99  .         .        Q.        V.         .
17.000     59.5577     94.92  .         .       Q .        V.         .
17.017     59.6869     93.86  .         .       Q .        V.         .
17.033     59.8148     92.79  .         .       Q .        V.         .
17.050     59.9411     91.72  .         .       Q .        V.         .
17.067     60.0660     90.66  .         .       Q .         V         .
17.083     60.1894     89.59  .         .      Q  .         V         .
17.100     60.3113     88.53  .         .      Q  .         V         .
17.117     60.4318     87.46  .         .      Q  .         V         .
17.133     60.5508     86.39  .         .      Q  .         V         .
17.150     60.6683     85.33  .         .      Q  .         V         .
17.167     60.7844     84.26  .         .     Q   .         V         .
17.183     60.8992     83.36  .         .     Q   .         V         .
17.200     61.0131     82.69  .         .     Q   .         V         .
17.217     61.1261     82.02  .         .     Q   .         V         .
17.233     61.2381     81.35  .         .     Q   .         V         .
17.250     61.3493     80.68  .         .     Q   .         V         .
17.267     61.4595     80.01  .         .     Q   .         V         .
17.283     61.5687     79.34  .         .    Q    .         V         .
17.300     61.6771     78.67  .         .    Q    .         V         .
17.317     61.7845     78.00  .         .    Q    .         V         .
17.333     61.8910     77.33  .         .    Q    .         V         .
17.350     61.9966     76.66  .         .    Q    .         .V        .
17.367     62.1013     75.98  .         .    Q    .         .V        .
17.383     62.2050     75.31  .         .    Q    .         .V        .
17.400     62.3078     74.64  .         .   Q     .         .V        .
17.417     62.4097     73.97  .         .   Q     .         .V        .
17.433     62.5107     73.30  .         .   Q     .         .V        .
17.450     62.6107     72.63  .         .   Q     .         .V        .
17.467     62.7099     71.98  .         .   Q     .         .V        .
17.483     62.8084     71.49  .         .   Q     .         .V        .
17.500     62.9062     71.05  .         .   Q     .         .V        .
17.517     63.0035     70.60  .         .   Q     .         .V        .
17.533     63.1001     70.16  .         .   Q     .         .V        .
17.550     63.1961     69.72  .         .   Q     .         .V        .
17.567     63.2916     69.27  .         .   Q     .         .V        .
17.583     63.3864     68.83  .         .   Q     .         .V        .
17.600     63.4805     68.38  .         .   Q     .         .V        .
17.617     63.5741     67.94  .         .   Q     .         .V        .
17.633     63.6671     67.49  .         .   Q     .         .V        .
17.650     63.7594     67.05  .         .   Q     .         .V        .
17.667     63.8512     66.60  .         .   Q     .         .V        .
17.683     63.9423     66.16  .         .   Q     .         .V        .
17.700     64.0328     65.72  .         .   Q     .         . V       .
17.717     64.1227     65.27  .         .   Q     .         . V       .
17.733     64.2120     64.83  .         . Q       .         . V       .
17.750     64.3007     64.38  .         . Q       .         . V       .
17.767     64.3888     63.98  .         . Q       .         . V       .
17.783     64.4765     63.65  .         . Q       .         . V       .
17.800     64.5637     63.32  .         . Q       .         . V       .
17.817     64.6505     62.99  .         . Q       .         . V       .
17.833     64.7368     62.67  .         . Q       .         . V       .
17.850     64.8227     62.34  .         . Q       .         . V       .
17.867     64.9081     62.01  .         . Q       .         . V       .
17.883     64.9931     61.68  .         . Q       .         . V       .
17.900     65.0776     61.35  .         . Q       .         . V       .
17.917     65.1616     61.02  .         . Q       .         . V       .
17.933     65.2452     60.69  .         . Q       .         . V       .
17.950     65.3284     60.36  .         . Q       .         . V       .
17.967     65.4110     60.03  .         . Q       .         . V       .
17.983     65.4933     59.70  .         .Q        .         . V       .
18.000     65.5751     59.37  .         .Q        .         . V       .
```

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	1081.0
20%	1081.0
30%	1081.0
40%	1081.0
50%	1081.0
60%	1081.0
70%	1081.0
80%	895.0
90%	740.0

```
****************************************************************************
  FLOW PROCESS FROM NODE     35.20 TO NODE     35.20 IS CODE = 1.2
----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
============================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #2)
```

```
   RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
   TOTAL CATCHMENT AREA(ACRES) =   11.40
   SOIL-LOSS RATE, Fm,(INCH/HR) =  0.168
   LOW LOSS FRACTION = 0.243
   TIME OF CONCENTRATION(MIN.) = 13.38
   SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
   ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
   RETURN FREQUENCY(YEARS) = 100
      5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.52
     30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.09
      1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.45
      3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.43
      6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.36
     24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.63

--------------------------------------------------------------------------------
   TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     3.78
   TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     1.57

--------------------------------------------------------------------------------

================================================================================

                    2 4 - H O U R    S T O R M
                 R U N O F F    H Y D R O G R A P H

================================================================================
            HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
       (Notes: Time indicated is at END of Each Unit Intervals.
               Peak 5-minute rainfall intensity is modeled as
               a constant value for entire 5-minute period.)
--------------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.        8.6      17.1      25.7      34.2
--------------------------------------------------------------------------------
  14.000      1.3337      2.82  .  Q      .   V     .         .         .
  14.017      1.3376      2.83  .  Q      .   V     .         .         .
  14.033      1.3415      2.84  .  Q      .   V     .         .         .
  14.050      1.3454      2.85  .  Q      .   V     .         .         .
  14.067      1.3493      2.86  .  Q      .   V     .         .         .
  14.083      1.3533      2.87  .  Q      .   V     .         .         .
  14.100      1.3573      2.88  .  Q      .   V     .         .         .
  14.117      1.3612      2.89  .  Q      .   V     .         .         .
  14.133      1.3652      2.90  .  Q      .   V     .         .         .
  14.150      1.3692      2.90  .  Q      .   V     .         .         .
  14.167      1.3732      2.91  .  Q      .   V     .         .         .
  14.183      1.3773      2.92  .  Q      .   V     .         .         .
  14.200      1.3813      2.93  .  Q      .   V     .         .         .
  14.217      1.3854      2.94  .  Q      .   V     .         .         .
  14.233      1.3894      2.95  .  Q      .   V     .         .         .
  14.250      1.3935      2.97  .  Q      .   V     .         .         .
  14.267      1.3976      2.99  .  Q      .   V     .         .         .
  14.283      1.4018      3.01  .  Q      .   V     .         .         .
  14.300      1.4060      3.04  .  Q      .   V     .         .         .
  14.317      1.4102      3.06  .  Q      .   V     .         .         .
  14.333      1.4144      3.08  .  Q      .   V     .         .         .
  14.350      1.4187      3.10  .  Q      .    V    .         .         .
  14.367      1.4230      3.12  .  Q      .    V    .         .         .
  14.383      1.4273      3.14  .  Q      .    V    .         .         .
  14.400      1.4316      3.16  .  Q      .    V    .         .         .
  14.417      1.4360      3.18  .  Q      .    V    .         .         .
  14.433      1.4404      3.20  .  Q      .    V    .         .         .
  14.450      1.4449      3.22  .  Q      .    V    .         .         .
  14.467      1.4493      3.23  .  Q      .    V    .         .         .
  14.483      1.4538      3.24  .  Q      .    V    .         .         .
  14.500      1.4582      3.25  .  Q      .    V    .         .         .
  14.517      1.4627      3.26  .  Q      .    V    .         .         .
  14.533      1.4672      3.28  .  Q      .    V    .         .         .
  14.550      1.4718      3.29  .  Q      .    V    .         .         .
  14.567      1.4763      3.30  .  Q      .    V    .         .         .
  14.583      1.4809      3.31  .  Q      .    V    .         .         .
  14.600      1.4855      3.32  .  Q      .    V    .         .         .
  14.617      1.4900      3.33  .  Q      .    V    .         .         .
  14.633      1.4947      3.35  .  Q      .    V    .         .         .
  14.650      1.4993      3.36  .  Q      .    V    .         .         .
  14.667      1.5039      3.37  .  Q      .    V    .         .         .
  14.683      1.5086      3.40  .  Q      .    V    .         .         .
  14.700      1.5133      3.43  .   Q     .    V    .         .         .
  14.717      1.5181      3.46  .   Q     .    V    .         .         .
  14.733      1.5229      3.49  .   Q     .    V    .         .         .
  14.750      1.5277      3.52  .   Q     .    V    .         .         .
  14.767      1.5326      3.55  .   Q     .    V    .         .         .
  14.783      1.5375      3.58  .   Q     .    V    .         .         .
  14.800      1.5425      3.61  .   Q     .    V    .         .         .
  14.817      1.5475      3.64  .   Q     .    V    .         .         .
  14.833      1.5526      3.67  .   Q     .    V    .         .         .
  14.850      1.5576      3.70  .   Q     .    V    .         .         .
  14.867      1.5628      3.73  .   Q     .    V    .         .         .
  14.883      1.5679      3.76  .   Q     .    V    .         .         .
  14.900      1.5732      3.78  .   Q     .    V    .         .         .
  14.917      1.5784      3.80  .   Q     .    V    .         .         .
  14.933      1.5837      3.82  .   Q     .    V    .         .         .
  14.950      1.5889      3.84  .   Q     .    V    .         .         .
  14.967      1.5943      3.86  .   Q     .    V    .         .         .
  14.983      1.5996      3.88  .   Q     .    V    .         .         .
  15.000      1.6050      3.90  .   Q     .     V   .         .         .
  15.017      1.6104      3.92  .   Q     .     V   .         .         .
  15.033      1.6158      3.94  .   Q     .     V   .         .         .
  15.050      1.6212      3.96  .   Q     .     V   .         .         .
  15.067      1.6267      3.97  .   Q     .     V   .         .         .
  15.083      1.6322      3.99  .   Q     .     V   .         .         .
  15.100      1.6377      4.01  .   Q     .     V   .         .         .
  15.117      1.6433      4.04  .   Q     .     V   .         .         .
  15.133      1.6489      4.09  .   Q     .     V   .         .         .
  15.150      1.6546      4.14  .   Q     .     V   .         .         .
  15.167      1.6604      4.20  .   Q     .     V   .         .         .
  15.183      1.6663      4.25  .   Q     .     V   .         .         .
  15.200      1.6722      4.30  .    Q    .     V   .         .         .
  15.217      1.6782      4.36  .    Q    .     V   .         .         .
  15.233      1.6843      4.41  .    Q    .     V   .         .         .
  15.250      1.6904      4.47  .    Q    .     V   .         .         .
  15.267      1.6966      4.52  .    Q    .     V   .         .         .
  15.283      1.7029      4.57  .    Q    .      V  .         .         .
```

15.300	1.7093	4.63	Q V
15.317	1.7158	4.68	Q V
15.333	1.7223	4.74	Q V
15.350	1.7289	4.77	Q V
15.367	1.7354	4.78	Q V
15.383	1.7421	4.80	Q V
15.400	1.7487	4.81	Q V
15.417	1.7553	4.83	Q V
15.433	1.7620	4.85	Q V
15.450	1.7687	4.86	Q V
15.467	1.7754	4.88	Q V
15.483	1.7822	4.90	Q V
15.500	1.7889	4.91	Q V
15.517	1.7957	4.93	Q V
15.533	1.8025	4.94	Q V
15.550	1.8094	4.96	Q V
15.567	1.8163	5.02	Q V
15.583	1.8234	5.16	Q V
15.600	1.8307	5.31	Q V
15.617	1.8382	5.46	Q V
15.633	1.8459	5.61	Q V
15.650	1.8539	5.76	Q V
15.667	1.8620	5.91	Q V
15.683	1.8704	6.06	Q V
15.700	1.8789	6.21	Q V
15.717	1.8877	6.36	Q V
15.733	1.8966	6.51	Q V
15.750	1.9058	6.66	Q V
15.767	1.9152	6.81	Q V
15.783	1.9248	6.96	Q V
15.800	1.9347	7.19	Q V
15.817	1.9449	7.43	Q V
15.833	1.9555	7.67	Q V
15.850	1.9664	7.91	Q V
15.867	1.9776	8.15	Q V
15.883	1.9891	8.39	Q .V
15.900	2.0010	8.63	Q .V
15.917	2.0132	8.87	Q .V
15.933	2.0258	9.11	Q .V
15.950	2.0387	9.35	Q .V
15.967	2.0519	9.59	.Q .V
15.983	2.0654	9.83	.Q .V
16.000	2.0793	10.07	.Q . V
16.017	2.0945	11.08	. Q . V
16.033	2.1123	12.88	. Q . V
16.050	2.1325	14.67	. Q . V
16.067	2.1552	16.47	. Q. V
16.083	2.1803	18.26	.Q V
16.100	2.2080	20.06	. Q
16.117	2.2381	21.85	. V Q
16.133	2.2706	23.65	. V Q
16.150	2.3057	25.44	. V Q.
16.167	2.3432	27.24	. V .Q
16.183	2.3832	29.03	. V . Q
16.200	2.4257	30.83	. V . Q
16.217	2.4706	32.62	. V . Q
16.233	2.5177	34.20	. V . Q
16.250	2.5615	31.79	. V . Q .
16.267	2.6023	29.64	. V . Q .
16.283	2.6402	27.48	. V . Q .
16.300	2.6751	25.33	. VQ. .
16.317	2.7070	23.18	. QV . .
16.333	2.7359	21.02	. Q V . .
16.350	2.7619	18.87	. Q V. .
16.367	2.7850	16.71	. Q. V. .
16.383	2.8050	14.56	. Q . V. .
16.400	2.8221	12.41	. Q . V. .
16.417	2.8362	10.25	.Q . V .
16.433	2.8474	8.10	Q. . V .
16.450	2.8557	6.01	Q . . V .
16.467	2.8630	5.33	Q . . V .
16.483	2.8702	5.25	Q . . V .
16.500	2.8774	5.17	Q . . V .
16.517	2.8844	5.10	Q . . V .
16.533	2.8913	5.02	Q . . V .
16.550	2.8981	4.94	Q . . V .
16.567	2.9048	4.86	Q . . V .
16.583	2.9114	4.79	Q . . V .
16.600	2.9179	4.71	Q . . V .
16.617	2.9243	4.63	Q . . V .
16.633	2.9305	4.56	Q . . .V .
16.650	2.9367	4.48	Q . . .V .
16.667	2.9428	4.40	Q . . .V .
16.683	2.9487	4.33	Q . . .V .
16.700	2.9546	4.27	Q . . .V .
16.717	2.9604	4.21	Q . . .V .
16.733	2.9661	4.15	Q . . .V .
16.750	2.9718	4.09	Q . . .V .
16.767	2.9773	4.03	Q . . .V .
16.783	2.9828	3.97	Q . . .V .
16.800	2.9882	3.91	Q . . .V .
16.817	2.9935	3.85	Q . . .V .
16.833	2.9987	3.80	Q . . .V .
16.850	3.0039	3.74	Q . . .V .
16.867	3.0089	3.68	Q . . .V .
16.883	3.0139	3.62	Q . . .V .
16.900	3.0188	3.56	Q . . .V .
16.917	3.0237	3.52	Q . . . V .
16.933	3.0285	3.49	Q . . . V .
16.950	3.0332	3.45	Q . . . V .
16.967	3.0379	3.41	Q . . . V .
16.983	3.0426	3.38	Q . . . V .
17.000	3.0472	3.34	Q . . . V .
17.017	3.0517	3.31	Q . . . V .
17.033	3.0562	3.27	Q . . . V .
17.050	3.0607	3.23	Q . . . V .
17.067	3.0651	3.20	Q . . . V .
17.083	3.0694	3.16	Q . . . V .
17.100	3.0737	3.13	Q . . . V .
17.117	3.0780	3.09	Q . . . V .
17.133	3.0822	3.06	Q . . . V .
17.150	3.0864	3.03	Q . . . V .

```
 17.167      3.0905      3.01  .  Q      .         .         . V       .
 17.183      3.0946      2.98  .  Q      .         .         . V       .
 17.200      3.0987      2.96  .  Q      .         .         . V       .
 17.217      3.1027      2.93  .  Q      .         .         . V       .
 17.233      3.1067      2.90  .  Q      .         .         . V       .
 17.250      3.1107      2.88  .  Q      .         .         . V       .
 17.267      3.1146      2.85  .  Q      .         .         . V       .
 17.283      3.1185      2.83  .  Q      .         .         .  V      .
 17.300      3.1224      2.80  .  Q      .         .         .  V      .
 17.317      3.1262      2.77  .  Q      .         .         .  V      .
 17.333      3.1300      2.75  .  Q      .         .         .  V      .
 17.350      3.1337      2.72  .  Q      .         .         .  V      .
 17.367      3.1375      2.71  .  Q      .         .         .  V      .
 17.383      3.1412      2.69  .  Q      .         .         .  V      .
 17.400      3.1448      2.67  .  Q      .         .         .  V      .
 17.417      3.1485      2.65  .  Q      .         .         .  V      .
 17.433      3.1521      2.63  .  Q      .         .         .  V      .
 17.450      3.1557      2.61  .  Q      .         .         .  V      .
 17.467      3.1593      2.60  .  Q      .         .         .  V      .
 17.483      3.1628      2.58  .  Q      .         .         .  V      .
 17.500      3.1664      2.56  . Q       .         .         .  V      .
 17.517      3.1699      2.54  . Q       .         .         .  V      .
 17.533      3.1733      2.52  . Q       .         .         .  V      .
 17.550      3.1768      2.50  . Q       .         .         .  V      .
 17.567      3.1802      2.49  . Q       .         .         .  V      .
 17.583      3.1836      2.47  . Q       .         .         .  V      .
 17.600      3.1870      2.46  . Q       .         .         .  V      .
 17.617      3.1904      2.44  . Q       .         .         .  V      .
 17.633      3.1937      2.43  . Q       .         .         .  V      .
 17.650      3.1970      2.41  . Q       .         .         .  V      .
 17.667      3.2003      2.40  . Q       .         .         .  V      .
 17.683      3.2036      2.38  . Q       .         .         .  V      .
 17.700      3.2069      2.37  . Q       .         .         .  V      .
 17.717      3.2101      2.36  . Q       .         .         .   V     .
 17.733      3.2134      2.34  . Q       .         .         .   V     .
 17.750      3.2166      2.33  . Q       .         .         .   V     .
 17.767      3.2198      2.31  . Q       .         .         .   V     .
 17.783      3.2229      2.30  . Q       .         .         .   V     .
 17.800      3.2261      2.29  . Q       .         .         .   V     .
 17.817      3.2292      2.27  . Q       .         .         .   V     .
 17.833      3.2323      2.26  . Q       .         .         .   V     .
 17.850      3.2354      2.25  . Q       .         .         .   V     .
 17.867      3.2385      2.24  . Q       .         .         .   V     .
 17.883      3.2416      2.23  . Q       .         .         .   V     .
 17.900      3.2446      2.22  . Q       .         .         .   V     .
 17.917      3.2477      2.21  . Q       .         .         .   V     .
 17.933      3.2507      2.19  . Q       .         .         .   V     .
 17.950      3.2537      2.18  . Q       .         .         .   V     .
 17.967      3.2567      2.17  . Q       .         .         .   V     .
 17.983      3.2597      2.16  . Q       .         .         .   V     .
 18.000      3.2626      2.15  . Q       .         .         .   V     .
--------------------------------------------------------------------------------
   TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
   (Note: 100% of Peak Flow Rate estimate assumed to have
   an instantaneous time duration)
```

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	680.0
20%	200.0
30%	120.0
40%	105.0
50%	85.0
60%	70.0
70%	50.0
80%	35.0
90%	20.0

```
********************************************************************************
  FLOW PROCESS FROM NODE     35.20 TO NODE     35.00 IS CODE =   2
--------------------------------------------------------------------------------
  >>>>>FLOWBY STRUCTURE ROUTING MODEL APPLIED TO STREAM #2<<<<<
================================================================================

        MODEL STREAM NUMBER 2 FLOWING PAST A FLOWBY STRUCTURE:
        FLOWRATES IN STREAM # 2 WHICH ARE GREATER THAN
            10.0 CFS ARE ASSUMED TO BE EXCESS FLOWS.
        FLOW EXCESS IS ASSUMED TO BE ADDED TO STREAM NUMBER 3


              INFLOW              INFLOW
            (STREAM 3)          (STREAM 2)
                |                   |
                |                   |
                |    flow excess    |
                |<------------------* <=flowby structure
                |                   | (maximum flowby Q =     10.0 cfs)
                |                   |
                |                   |
                |                   |
                V                   V
             STREAM 3            STREAM 2
          + FLOW EXCESS           FLOWBY



        FLOWBY BASIN MODELING RESULTS:

         MODEL        INFLOW    INFLOW   OUTFLOW    FLOWBY
          TIME    (STREAM 3) (STREAM 2) (STREAM 3) (STREAM 2)
         (HRS)         (CFS)     (CFS)     (CFS)     (CFS)
        14.000          0.00      2.82      0.00      2.82
        14.017          0.00      2.83      0.00      2.83
        14.033          0.00      2.84      0.00      2.84
        14.050          0.00      2.85      0.00      2.85
        14.067          0.00      2.86      0.00      2.86
        14.083          0.00      2.87      0.00      2.87
```

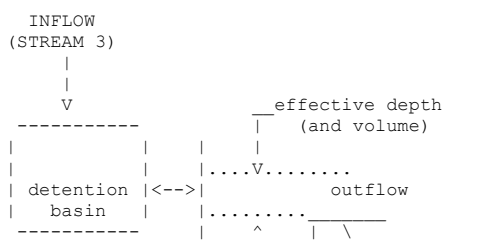
14.100	0.00	2.88	0.00	2.88
14.117	0.00	2.89	0.00	2.89
14.133	0.00	2.90	0.00	2.90
14.150	0.00	2.90	0.00	2.90
14.167	0.00	2.91	0.00	2.91
14.183	0.00	2.92	0.00	2.92
14.200	0.00	2.93	0.00	2.93
14.217	0.00	2.94	0.00	2.94
14.233	0.00	2.95	0.00	2.95
14.250	0.00	2.97	0.00	2.97
14.267	0.00	2.99	0.00	2.99
14.283	0.00	3.01	0.00	3.01
14.300	0.00	3.04	0.00	3.04
14.317	0.00	3.06	0.00	3.06
14.333	0.00	3.08	0.00	3.08
14.350	0.00	3.10	0.00	3.10
14.367	0.00	3.12	0.00	3.12
14.383	0.00	3.14	0.00	3.14
14.400	0.00	3.16	0.00	3.16
14.417	0.00	3.18	0.00	3.18
14.433	0.00	3.20	0.00	3.20
14.450	0.00	3.22	0.00	3.22
14.467	0.00	3.23	0.00	3.23
14.483	0.00	3.24	0.00	3.24
14.500	0.00	3.25	0.00	3.25
14.517	0.00	3.26	0.00	3.26
14.533	0.00	3.28	0.00	3.28
14.550	0.00	3.29	0.00	3.29
14.567	0.00	3.30	0.00	3.30
14.583	0.00	3.31	0.00	3.31
14.600	0.00	3.32	0.00	3.32
14.617	0.00	3.33	0.00	3.33
14.633	0.00	3.35	0.00	3.35
14.650	0.00	3.36	0.00	3.36
14.667	0.00	3.37	0.00	3.37
14.683	0.00	3.40	0.00	3.40
14.700	0.00	3.43	0.00	3.43
14.717	0.00	3.46	0.00	3.46
14.733	0.00	3.49	0.00	3.49
14.750	0.00	3.52	0.00	3.52
14.767	0.00	3.55	0.00	3.55
14.783	0.00	3.58	0.00	3.58
14.800	0.00	3.61	0.00	3.61
14.817	0.00	3.64	0.00	3.64
14.833	0.00	3.67	0.00	3.67
14.850	0.00	3.70	0.00	3.70
14.867	0.00	3.73	0.00	3.73
14.883	0.00	3.76	0.00	3.76
14.900	0.00	3.78	0.00	3.78
14.917	0.00	3.80	0.00	3.80
14.933	0.24	3.82	0.24	3.82
14.950	1.21	3.84	1.21	3.84
14.967	2.19	3.86	2.19	3.86
14.983	3.16	3.88	3.16	3.88
15.000	4.13	3.90	4.13	3.90
15.017	5.10	3.92	5.10	3.92
15.033	6.07	3.94	6.07	3.94
15.050	7.04	3.96	7.04	3.96
15.067	8.01	3.97	8.01	3.97
15.083	8.98	3.99	8.98	3.99
15.100	9.95	4.01	9.95	4.01
15.117	10.92	4.04	10.92	4.04
15.133	11.85	4.09	11.85	4.09
15.150	12.63	4.14	12.63	4.14
15.167	13.38	4.20	13.38	4.20
15.183	14.13	4.25	14.13	4.25
15.200	14.88	4.30	14.88	4.30
15.217	15.63	4.36	15.63	4.36
15.233	16.38	4.41	16.38	4.41
15.250	17.14	4.47	17.14	4.47
15.267	17.89	4.52	17.89	4.52
15.283	18.64	4.57	18.64	4.57
15.300	19.39	4.63	19.39	4.63
15.317	20.14	4.68	20.14	4.68
15.333	20.89	4.74	20.89	4.74
15.350	21.65	4.77	21.65	4.77
15.367	22.40	4.78	22.40	4.78
15.383	23.15	4.80	23.15	4.80
15.400	23.90	4.81	23.90	4.81
15.417	24.65	4.83	24.65	4.83
15.433	25.97	4.85	25.97	4.85
15.450	27.78	4.86	27.78	4.86
15.467	29.59	4.88	29.59	4.88
15.483	31.39	4.90	31.39	4.90
15.500	33.20	4.91	33.20	4.91
15.517	35.01	4.93	35.01	4.93
15.533	36.81	4.94	36.81	4.94
15.550	38.62	4.96	38.62	4.96
15.567	40.43	5.02	40.43	5.02
15.583	42.23	5.16	42.23	5.16
15.600	44.04	5.31	44.04	5.31
15.617	45.85	5.46	45.85	5.46
15.633	47.65	5.61	47.65	5.61
15.650	49.46	5.76	49.46	5.76
15.667	51.27	5.91	51.27	5.91
15.683	53.07	6.06	53.07	6.06
15.700	54.88	6.21	54.88	6.21
15.717	56.93	6.36	56.93	6.36
15.733	60.37	6.51	60.37	6.51
15.750	64.02	6.66	64.02	6.66
15.767	67.66	6.81	67.66	6.81
15.783	71.31	6.96	71.31	6.96
15.800	74.96	7.19	74.96	7.19
15.817	78.60	7.43	78.60	7.43
15.833	82.25	7.67	82.25	7.67
15.850	85.90	7.91	85.90	7.91
15.867	89.54	8.15	89.54	8.15
15.883	93.19	8.39	93.19	8.39
15.900	96.84	8.63	96.84	8.63
15.917	100.48	8.87	100.48	8.87
15.933	104.13	9.11	104.13	9.11
15.950	107.78	9.35	107.78	9.35

15.967	111.42	9.59	111.42	9.59
15.983	115.07	9.83	115.07	9.83
16.000	118.72	10.07	118.78	10.00
16.017	134.18	11.08	135.27	10.00
16.033	161.47	12.88	164.35	10.00
16.050	188.76	14.67	193.44	10.00
16.067	216.05	16.47	222.52	10.00
16.083	243.35	18.26	251.61	10.00
16.100	270.63	20.06	280.69	10.00
16.117	297.92	21.85	309.78	10.00
16.133	325.21	23.65	338.86	10.00
16.150	352.50	25.44	367.95	10.00
16.167	379.79	27.24	397.03	10.00
16.183	407.08	29.03	426.12	10.00
16.200	434.37	30.83	455.20	10.00
16.217	461.66	32.62	484.29	10.00
16.233	488.95	34.20	513.16	10.00
16.250	516.24	31.79	538.03	10.00
16.267	543.53	29.64	563.17	10.00
16.283	570.82	27.48	588.30	10.00
16.300	598.66	25.33	613.99	10.00
16.317	567.22	23.18	580.40	10.00
16.333	535.14	21.02	546.16	10.00
16.350	503.06	18.87	511.93	10.00
16.367	470.99	16.71	477.70	10.00
16.383	438.91	14.56	443.47	10.00
16.400	406.83	12.41	409.24	10.00
16.417	374.76	10.25	375.01	10.00
16.433	342.68	8.10	342.68	8.10
16.450	310.60	6.01	310.60	6.01
16.467	278.52	5.33	278.52	5.33
16.483	246.45	5.25	246.45	5.25
16.500	214.37	5.17	214.37	5.17
16.517	182.29	5.10	182.29	5.10
16.533	150.22	5.02	150.22	5.02
16.550	118.14	4.94	118.14	4.94
16.567	86.06	4.86	86.06	4.86
16.583	53.98	4.79	53.98	4.79
16.600	35.78	4.71	35.78	4.71
16.617	33.80	4.63	33.80	4.63
16.633	31.84	4.56	31.84	4.56
16.650	29.88	4.48	29.88	4.48
16.667	27.92	4.40	27.92	4.40
16.683	25.96	4.33	25.96	4.33
16.700	24.00	4.27	24.00	4.27
16.717	22.04	4.21	22.04	4.21
16.733	20.08	4.15	20.08	4.15
16.750	18.12	4.09	18.12	4.09
16.767	16.16	4.03	16.16	4.03
16.783	14.20	3.97	14.20	3.97
16.800	12.24	3.91	12.24	3.91
16.817	10.28	3.85	10.28	3.85
16.833	8.32	3.80	8.32	3.80
16.850	6.36	3.74	6.36	3.74
16.867	4.40	3.68	4.40	3.68
16.883	2.53	3.62	2.53	3.62
16.900	1.32	3.56	1.32	3.56
16.917	0.25	3.52	0.25	3.52
16.933	0.00	3.49	0.00	3.49
16.950	0.00	3.45	0.00	3.45
16.967	0.00	3.41	0.00	3.41
16.983	0.00	3.38	0.00	3.38
17.000	0.00	3.34	0.00	3.34
17.017	0.00	3.31	0.00	3.31
17.033	0.00	3.27	0.00	3.27
17.050	0.00	3.23	0.00	3.23
17.067	0.00	3.20	0.00	3.20
17.083	0.00	3.16	0.00	3.16
17.100	0.00	3.13	0.00	3.13
17.117	0.00	3.09	0.00	3.09
17.133	0.00	3.06	0.00	3.06
17.150	0.00	3.03	0.00	3.03
17.167	0.00	3.01	0.00	3.01
17.183	0.00	2.98	0.00	2.98
17.200	0.00	2.96	0.00	2.96
17.217	0.00	2.93	0.00	2.93
17.233	0.00	2.90	0.00	2.90
17.250	0.00	2.88	0.00	2.88
17.267	0.00	2.85	0.00	2.85
17.283	0.00	2.83	0.00	2.83
17.300	0.00	2.80	0.00	2.80
17.317	0.00	2.77	0.00	2.77
17.333	0.00	2.75	0.00	2.75
17.350	0.00	2.72	0.00	2.72
17.367	0.00	2.71	0.00	2.71
17.383	0.00	2.69	0.00	2.69
17.400	0.00	2.67	0.00	2.67
17.417	0.00	2.65	0.00	2.65
17.433	0.00	2.63	0.00	2.63
17.450	0.00	2.61	0.00	2.61
17.467	0.00	2.60	0.00	2.60
17.483	0.00	2.58	0.00	2.58
17.500	0.00	2.56	0.00	2.56
17.517	0.00	2.54	0.00	2.54
17.533	0.00	2.52	0.00	2.52
17.550	0.00	2.50	0.00	2.50
17.567	0.00	2.49	0.00	2.49
17.583	0.00	2.47	0.00	2.47
17.600	0.00	2.46	0.00	2.46
17.617	0.00	2.44	0.00	2.44
17.633	0.00	2.43	0.00	2.43
17.650	0.00	2.41	0.00	2.41
17.667	0.00	2.40	0.00	2.40
17.683	0.00	2.38	0.00	2.38
17.700	0.00	2.37	0.00	2.37
17.717	0.00	2.36	0.00	2.36
17.733	0.00	2.34	0.00	2.34
17.750	0.00	2.33	0.00	2.33
17.767	0.00	2.31	0.00	2.31
17.783	0.00	2.30	0.00	2.30
17.800	0.00	2.29	0.00	2.29
17.817	0.00	2.27	0.00	2.27

17.833	0.00	2.26	0.00	2.26
17.850	0.00	2.25	0.00	2.25
17.867	0.00	2.24	0.00	2.24
17.883	0.00	2.23	0.00	2.23
17.900	0.00	2.22	0.00	2.22
17.917	0.00	2.21	0.00	2.21
17.933	0.00	2.19	0.00	2.19
17.950	0.00	2.18	0.00	2.18
17.967	0.00	2.17	0.00	2.17
17.983	0.00	2.16	0.00	2.16
18.000	0.00	2.15	0.00	2.15

****
FLOW PROCESS FROM NODE 35.00 TO NODE 35.00 IS CODE = 3.2

>>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #3<<<<<
==========



ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 3
THROUGH A FLOW-THROUGH DETENTION BASIN
SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
DEAD STORAGE(AF) = 0.000
SPECIFIED DEAD STORAGE(AF) FILLED = 0.000
SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET = 0.000
DETENTION BASIN CONSTANT LOSS RATE(CFS) = 0.00

BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

INTERVAL NUMBER	DEPTH (FT)	OUTFLOW (CFS)	STORAGE (AF)
1	0.00	0.00	0.000
2	0.50	15.16	0.510
3	1.00	40.12	1.010
4	1.50	54.67	1.520
5	2.00	66.33	2.020
6	2.50	76.19	2.530
7	3.00	84.90	3.040
8	3.50	93.04	3.540
9	4.00	100.45	4.050
10	4.50	107.33	4.560
11	5.00	114.02	5.060
12	5.50	120.27	5.570
13	6.00	126.17	6.070
14	7.00	142.55	7.090
15	8.00	156.65	8.100
16	9.00	168.87	9.110
17	10.00	180.03	10.120
18	11.00	190.43	11.140
19	12.00	200.23	12.150
20	13.00	428.93	13.160
21	14.00	838.96	14.170

==========
MODIFIED-PULS BASIN ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
14.917	0.000	0.00	0.00	0.00	0.0	0.000
14.933	0.000	0.24	0.00	0.00	0.0	0.000
14.950	0.000	1.21	0.00	0.00	0.0	0.002
14.967	0.000	2.19	0.00	0.00	0.1	0.005
14.983	0.000	3.16	0.00	0.01	0.2	0.009
15.000	0.000	4.13	0.00	0.01	0.3	0.014
15.017	0.000	5.10	0.00	0.02	0.5	0.020
15.033	0.000	6.07	0.00	0.03	0.7	0.028
15.050	0.000	7.04	0.00	0.04	1.0	0.036
15.067	0.000	8.01	0.00	0.04	1.2	0.046
15.083	0.000	8.98	0.00	0.05	1.5	0.056
15.100	0.000	9.95	0.00	0.07	1.8	0.067
15.117	0.000	10.92	0.00	0.08	2.2	0.079
15.133	0.000	11.85	0.00	0.09	2.5	0.092
15.150	0.000	12.63	0.00	0.10	2.9	0.105
15.167	0.000	13.38	0.00	0.12	3.3	0.119
15.183	0.000	14.13	0.00	0.13	3.8	0.133
15.200	0.000	14.88	0.00	0.15	4.2	0.148
15.217	0.000	15.63	0.00	0.16	4.6	0.163
15.233	0.000	16.38	0.00	0.18	5.1	0.179
15.250	0.000	17.14	0.00	0.19	5.6	0.195
15.267	0.000	17.89	0.00	0.21	6.0	0.211
15.283	0.000	18.64	0.00	0.22	6.5	0.228
15.300	0.000	19.39	0.00	0.24	7.0	0.245
15.317	0.000	20.14	0.00	0.26	7.5	0.262
15.333	0.000	20.89	0.00	0.27	8.1	0.280
15.350	0.000	21.65	0.00	0.29	8.6	0.298
15.367	0.000	22.40	0.00	0.31	9.1	0.316
15.383	0.000	23.15	0.00	0.33	9.7	0.335
15.400	0.000	23.90	0.00	0.35	10.2	0.354

15.417	0.000	24.65	0.00	0.37	10.8	0.373
15.433	0.000	25.97	0.00	0.39	11.4	0.393
15.450	0.000	27.78	0.00	0.41	12.0	0.414
15.467	0.000	29.59	0.00	0.43	12.7	0.438
15.483	0.000	31.39	0.00	0.45	13.4	0.463
15.500	0.000	33.20	0.00	0.48	14.1	0.489
15.517	0.000	35.01	0.00	0.51	15.0	0.516
15.533	0.000	36.81	0.00	0.53	16.2	0.545
15.550	0.000	38.62	0.00	0.56	17.6	0.574
15.567	0.000	40.43	0.00	0.59	19.1	0.603
15.583	0.000	42.23	0.00	0.62	20.6	0.633
15.600	0.000	44.04	0.00	0.65	22.1	0.663
15.617	0.000	45.85	0.00	0.68	23.6	0.694
15.633	0.000	47.65	0.00	0.71	25.1	0.725
15.650	0.000	49.46	0.00	0.75	26.7	0.756
15.667	0.000	51.27	0.00	0.78	28.2	0.788
15.683	0.000	53.07	0.00	0.81	29.8	0.820
15.700	0.000	54.88	0.00	0.84	31.4	0.852
15.717	0.000	56.93	0.00	0.88	33.1	0.885
15.733	0.000	60.37	0.00	0.91	34.8	0.920
15.750	0.000	64.02	0.00	0.95	36.6	0.958
15.767	0.000	67.66	0.00	0.99	38.5	0.998
15.783	0.000	71.31	0.00	1.03	40.3	1.041
15.800	0.000	74.96	0.00	1.08	41.7	1.087
15.817	0.000	78.60	0.00	1.12	43.0	1.136
15.833	0.000	82.25	0.00	1.17	44.5	1.188
15.850	0.000	85.90	0.00	1.23	46.0	1.243
15.867	0.000	89.54	0.00	1.29	47.6	1.301
15.883	0.000	93.19	0.00	1.34	49.3	1.361
15.900	0.000	96.84	0.00	1.41	51.0	1.424
15.917	0.000	100.48	0.00	1.47	52.9	1.490
15.933	0.000	104.13	0.00	1.54	54.7	1.558
15.950	0.000	107.78	0.00	1.61	56.4	1.629
15.967	0.000	111.42	0.00	1.68	58.1	1.702
15.983	0.000	115.07	0.00	1.76	59.8	1.778
16.000	0.000	118.78	0.00	1.84	61.6	1.857
16.017	0.000	135.27	0.00	1.94	63.7	1.956
16.033	0.000	164.35	0.00	2.07	66.3	2.091
16.050	0.000	193.44	0.00	2.24	69.4	2.262
16.067	0.000	222.52	0.00	2.44	73.0	2.468
16.083	0.000	251.61	0.00	2.67	77.1	2.708
16.100	0.000	280.69	0.00	2.94	81.6	2.982
16.117	0.000	309.78	0.00	3.25	86.4	3.290
16.133	0.000	338.86	0.00	3.59	91.7	3.631
16.150	0.000	367.95	0.00	3.95	97.1	4.004
16.167	0.000	397.03	0.00	4.35	102.5	4.409
16.183	0.000	426.12	0.00	4.79	108.2	4.847
16.200	0.000	455.20	0.00	5.25	114.2	5.317
16.217	0.000	484.29	0.00	5.75	120.2	5.818
16.233	0.000	513.16	0.00	6.27	126.9	6.350
16.250	0.000	538.03	0.00	6.82	135.1	6.905
16.267	0.000	563.17	0.00	7.39	143.8	7.483
16.283	0.000	588.30	0.00	7.98	152.2	8.084
16.300	0.000	613.99	0.00	8.60	160.2	8.709
16.317	0.000	580.40	0.00	9.17	167.4	9.278
16.333	0.000	546.16	0.00	9.67	173.6	9.791
16.350	0.000	511.93	0.00	10.13	178.9	10.250
16.367	0.000	477.70	0.00	10.52	183.4	10.655
16.383	0.000	443.47	0.00	10.87	187.3	11.008
16.400	0.000	409.24	0.00	11.17	190.6	11.309
16.417	0.000	375.01	0.00	11.42	193.3	11.559
16.433	0.000	342.68	0.00	11.62	195.5	11.762
16.450	0.000	310.60	0.00	11.77	197.2	11.918
16.467	0.000	278.52	0.00	11.88	198.5	12.028
16.483	0.000	246.45	0.00	11.94	199.4	12.093
16.500	0.000	214.37	0.00	11.96	199.8	12.113
16.517	0.000	182.29	0.00	11.94	199.8	12.089
16.533	0.000	150.22	0.00	11.87	199.3	12.022
16.550	0.000	118.14	0.00	11.76	198.4	11.911
16.567	0.000	86.06	0.00	11.61	197.2	11.758
16.583	0.000	53.98	0.00	11.42	195.5	11.563
16.600	0.000	35.78	0.00	11.20	193.5	11.346
16.617	0.000	33.80	0.00	10.99	191.4	11.129
16.633	0.000	31.84	0.00	10.78	189.2	10.912
16.650	0.000	29.88	0.00	10.56	187.0	10.696
16.667	0.000	27.92	0.00	10.35	184.8	10.480
16.683	0.000	25.96	0.00	10.14	182.6	10.264
16.700	0.000	24.00	0.00	9.93	180.4	10.048
16.717	0.000	22.04	0.00	9.72	178.1	9.834
16.733	0.000	20.08	0.00	9.50	175.7	9.619
16.750	0.000	18.12	0.00	9.29	173.3	9.405
16.767	0.000	16.16	0.00	9.08	171.0	9.192
16.783	0.000	14.20	0.00	8.87	168.5	8.980
16.800	0.000	12.24	0.00	8.66	166.0	8.768
16.817	0.000	10.28	0.00	8.45	163.5	8.557
16.833	0.000	8.32	0.00	8.24	160.9	8.347
16.850	0.000	6.36	0.00	8.04	158.4	8.137
16.867	0.000	4.40	0.00	7.83	155.7	7.929
16.883	0.000	2.53	0.00	7.63	152.8	7.722
16.900	0.000	1.32	0.00	7.42	149.9	7.517
16.917	0.000	0.25	0.00	7.22	147.1	7.315
16.933	0.000	0.00	0.00	7.03	144.3	7.116
16.950	0.000	0.00	0.00	6.83	141.4	6.921
16.967	0.000	0.00	0.00	6.65	138.3	6.731
16.983	0.000	0.00	0.00	6.47	135.3	6.545
17.000	0.000	0.00	0.00	6.29	132.3	6.362
17.017	0.000	0.00	0.00	6.11	129.4	6.184
17.033	0.000	0.00	0.00	5.94	126.7	6.009
17.050	0.000	0.00	0.00	5.77	124.4	5.838
17.067	0.000	0.00	0.00	5.60	122.4	5.669
17.083	0.000	0.00	0.00	5.43	120.4	5.503
17.100	0.000	0.00	0.00	5.27	118.5	5.340
17.117	0.000	0.00	0.00	5.12	116.5	5.180
17.133	0.000	0.00	0.00	4.96	114.5	5.022
17.150	0.000	0.00	0.00	4.81	112.5	4.867
17.167	0.000	0.00	0.00	4.66	110.4	4.715
17.183	0.000	0.00	0.00	4.51	108.4	4.566
17.200	0.000	0.00	0.00	4.36	106.4	4.419
17.217	0.000	0.00	0.00	4.22	104.5	4.275
17.233	0.000	0.00	0.00	4.08	102.5	4.134
17.250	0.000	0.00	0.00	3.95	100.6	3.996
17.267	0.000	0.00	0.00	3.81	98.7	3.860

17.283	0.000	0.00	0.00	3.68	96.7	3.726
17.300	0.000	0.00	0.00	3.55	94.8	3.596
17.317	0.000	0.00	0.00	3.43	92.9	3.468
17.333	0.000	0.00	0.00	3.30	90.8	3.343
17.350	0.000	0.00	0.00	3.18	88.8	3.220
17.367	0.000	0.00	0.00	3.06	86.9	3.101
17.383	0.000	0.00	0.00	2.94	84.9	2.984
17.400	0.000	0.00	0.00	2.83	83.0	2.870
17.417	0.000	0.00	0.00	2.72	81.0	2.758
17.433	0.000	0.00	0.00	2.62	79.2	2.649
17.450	0.000	0.00	0.00	2.51	77.3	2.542
17.467	0.000	0.00	0.00	2.41	75.4	2.439
17.483	0.000	0.00	0.00	2.31	73.4	2.337
17.500	0.000	0.00	0.00	2.21	71.5	2.239
17.517	0.000	0.00	0.00	2.12	69.6	2.143
17.533	0.000	0.00	0.00	2.03	67.8	2.050
17.550	0.000	0.00	0.00	1.94	65.9	1.959
17.567	0.000	0.00	0.00	1.85	63.9	1.871
17.583	0.000	0.00	0.00	1.77	61.9	1.786
17.600	0.000	0.00	0.00	1.68	59.9	1.703
17.617	0.000	0.00	0.00	1.60	58.0	1.623
17.633	0.000	0.00	0.00	1.53	56.2	1.546
17.650	0.000	0.00	0.00	1.45	54.3	1.471
17.667	0.000	0.00	0.00	1.38	52.2	1.399
17.683	0.000	0.00	0.00	1.31	50.2	1.330
17.700	0.000	0.00	0.00	1.25	48.3	1.263
17.717	0.000	0.00	0.00	1.19	46.4	1.199
17.733	0.000	0.00	0.00	1.13	44.6	1.138
17.750	0.000	0.00	0.00	1.07	42.9	1.079
17.767	0.000	0.00	0.00	1.01	41.3	1.022
17.783	0.000	0.00	0.00	0.96	39.2	0.968
17.800	0.000	0.00	0.00	0.91	36.8	0.917
17.817	0.000	0.00	0.00	0.86	34.3	0.870
17.833	0.000	0.00	0.00	0.82	32.0	0.826
17.850	0.000	0.00	0.00	0.77	29.9	0.785
17.867	0.000	0.00	0.00	0.74	27.9	0.746
17.883	0.000	0.00	0.00	0.70	26.1	0.710
17.900	0.000	0.00	0.00	0.67	24.3	0.677
17.917	0.000	0.00	0.00	0.64	22.7	0.646
17.933	0.000	0.00	0.00	0.61	21.2	0.616
17.950	0.000	0.00	0.00	0.58	19.8	0.589
17.967	0.000	0.00	0.00	0.55	18.5	0.564
17.983	0.000	0.00	0.00	0.53	17.2	0.540
18.000	0.000	0.00	0.00	0.51	16.1	0.518
18.017	0.000	0.00	0.00	0.49	15.2	0.497
18.033	0.000	0.00	0.00	0.47	14.5	0.477
18.050	0.000	0.00	0.00	0.45	13.9	0.458
18.067	0.000	0.00	0.00	0.43	13.3	0.439
18.083	0.000	0.00	0.00	0.41	12.8	0.422
18.100	0.000	0.00	0.00	0.40	12.3	0.405
18.117	0.000	0.00	0.00	0.38	11.8	0.389
18.133	0.000	0.00	0.00	0.37	11.3	0.373
18.150	0.000	0.00	0.00	0.35	10.9	0.358
18.167	0.000	0.00	0.00	0.34	10.4	0.344
18.183	0.000	0.00	0.00	0.32	10.0	0.330
18.200	0.000	0.00	0.00	0.31	9.6	0.317
18.217	0.000	0.00	0.00	0.30	9.2	0.304
18.233	0.000	0.00	0.00	0.29	8.9	0.292
18.250	0.000	0.00	0.00	0.27	8.5	0.280
18.267	0.000	0.00	0.00	0.26	8.2	0.269
18.283	0.000	0.00	0.00	0.25	7.8	0.258
18.300	0.000	0.00	0.00	0.24	7.5	0.248
18.317	0.000	0.00	0.00	0.23	7.2	0.238
18.333	0.000	0.00	0.00	0.22	6.9	0.228
18.350	0.000	0.00	0.00	0.21	6.6	0.219
18.367	0.000	0.00	0.00	0.21	6.4	0.210
18.383	0.000	0.00	0.00	0.20	6.1	0.202
18.400	0.000	0.00	0.00	0.19	5.9	0.194
18.417	0.000	0.00	0.00	0.18	5.6	0.186
18.433	0.000	0.00	0.00	0.17	5.4	0.178
18.450	0.000	0.00	0.00	0.17	5.2	0.171
18.467	0.000	0.00	0.00	0.16	5.0	0.164
18.483	0.000	0.00	0.00	0.15	4.8	0.158
18.500	0.000	0.00	0.00	0.15	4.6	0.152
18.517	0.000	0.00	0.00	0.14	4.4	0.145
18.533	0.000	0.00	0.00	0.14	4.2	0.140
18.550	0.000	0.00	0.00	0.13	4.1	0.134
18.567	0.000	0.00	0.00	0.13	3.9	0.129
18.583	0.000	0.00	0.00	0.12	3.7	0.123
18.600	0.000	0.00	0.00	0.12	3.6	0.119
18.617	0.000	0.00	0.00	0.11	3.5	0.114
18.633	0.000	0.00	0.00	0.11	3.3	0.109
18.650	0.000	0.00	0.00	0.10	3.2	0.105
18.667	0.000	0.00	0.00	0.10	3.1	0.101
18.683	0.000	0.00	0.00	0.09	2.9	0.097
18.700	0.000	0.00	0.00	0.09	2.8	0.093
18.717	0.000	0.00	0.00	0.09	2.7	0.089
18.733	0.000	0.00	0.00	0.08	2.6	0.085
18.750	0.000	0.00	0.00	0.08	2.5	0.082
18.767	0.000	0.00	0.00	0.08	2.4	0.079
18.783	0.000	0.00	0.00	0.07	2.3	0.076
18.800	0.000	0.00	0.00	0.07	2.2	0.073
18.817	0.000	0.00	0.00	0.07	2.1	0.070
18.833	0.000	0.00	0.00	0.07	2.0	0.067
18.850	0.000	0.00	0.00	0.06	1.9	0.064
18.867	0.000	0.00	0.00	0.06	1.9	0.062
18.883	0.000	0.00	0.00	0.06	1.8	0.059
18.900	0.000	0.00	0.00	0.06	1.7	0.057
18.917	0.000	0.00	0.00	0.05	1.7	0.054
18.933	0.000	0.00	0.00	0.05	1.6	0.052
18.950	0.000	0.00	0.00	0.05	1.5	0.050
18.967	0.000	0.00	0.00	0.05	1.5	0.048
18.983	0.000	0.00	0.00	0.05	1.4	0.046
19.000	0.000	0.00	0.00	0.04	1.3	0.044
19.017	0.000	0.00	0.00	0.04	1.3	0.043
19.033	0.000	0.00	0.00	0.04	1.2	0.041
19.050	0.000	0.00	0.00	0.04	1.2	0.039
19.067	0.000	0.00	0.00	0.04	1.1	0.038
19.083	0.000	0.00	0.00	0.04	1.1	0.036
19.100	0.000	0.00	0.00	0.03	1.1	0.035
19.117	0.000	0.00	0.00	0.03	1.0	0.033
19.133	0.000	0.00	0.00	0.03	1.0	0.032

19.150	0.000	0.00	0.00	0.03	0.9	0.031
19.167	0.000	0.00	0.00	0.03	0.9	0.029
19.183	0.000	0.00	0.00	0.03	0.9	0.028
19.200	0.000	0.00	0.00	0.03	0.8	0.027
19.217	0.000	0.00	0.00	0.03	0.8	0.026
19.233	0.000	0.00	0.00	0.02	0.8	0.025
19.250	0.000	0.00	0.00	0.02	0.7	0.024
19.267	0.000	0.00	0.00	0.02	0.7	0.023
19.283	0.000	0.00	0.00	0.02	0.7	0.022
19.300	0.000	0.00	0.00	0.02	0.6	0.021
19.317	0.000	0.00	0.00	0.02	0.6	0.020
19.333	0.000	0.00	0.00	0.02	0.6	0.020
19.350	0.000	0.00	0.00	0.02	0.6	0.019
19.367	0.000	0.00	0.00	0.02	0.5	0.018
19.383	0.000	0.00	0.00	0.02	0.5	0.017
19.400	0.000	0.00	0.00	0.02	0.5	0.017
19.417	0.000	0.00	0.00	0.02	0.5	0.016
19.433	0.000	0.00	0.00	0.01	0.5	0.015
19.450	0.000	0.00	0.00	0.01	0.4	0.015
19.467	0.000	0.00	0.00	0.01	0.4	0.014
19.483	0.000	0.00	0.00	0.01	0.4	0.014
19.500	0.000	0.00	0.00	0.01	0.4	0.013
19.517	0.000	0.00	0.00	0.01	0.4	0.012
19.533	0.000	0.00	0.00	0.01	0.4	0.012
19.550	0.000	0.00	0.00	0.01	0.3	0.011
19.567	0.000	0.00	0.00	0.01	0.3	0.011
19.583	0.000	0.00	0.00	0.01	0.3	0.011
19.600	0.000	0.00	0.00	0.01	0.3	0.010
19.617	0.000	0.00	0.00	0.01	0.3	0.010
19.633	0.000	0.00	0.00	0.01	0.3	0.009
19.650	0.000	0.00	0.00	0.01	0.3	0.009
19.667	0.000	0.00	0.00	0.01	0.3	0.009
19.683	0.000	0.00	0.00	0.01	0.3	0.008
19.700	0.000	0.00	0.00	0.01	0.2	0.008
19.717	0.000	0.00	0.00	0.01	0.2	0.008
19.733	0.000	0.00	0.00	0.01	0.2	0.007
19.750	0.000	0.00	0.00	0.01	0.2	0.007
19.767	0.000	0.00	0.00	0.01	0.2	0.007
19.783	0.000	0.00	0.00	0.01	0.2	0.006
19.800	0.000	0.00	0.00	0.01	0.2	0.006
19.817	0.000	0.00	0.00	0.01	0.2	0.006
19.833	0.000	0.00	0.00	0.01	0.2	0.006
19.850	0.000	0.00	0.00	0.01	0.2	0.005
19.867	0.000	0.00	0.00	0.01	0.2	0.005
19.883	0.000	0.00	0.00	0.00	0.2	0.005
19.900	0.000	0.00	0.00	0.00	0.1	0.005
19.917	0.000	0.00	0.00	0.00	0.1	0.005
19.933	0.000	0.00	0.00	0.00	0.1	0.004
19.950	0.000	0.00	0.00	0.00	0.1	0.004
19.967	0.000	0.00	0.00	0.00	0.1	0.004
19.983	0.000	0.00	0.00	0.00	0.1	0.004
20.000	0.000	0.00	0.00	0.00	0.1	0.004
20.017	0.000	0.00	0.00	0.00	0.1	0.004
20.033	0.000	0.00	0.00	0.00	0.1	0.004
20.050	0.000	0.00	0.00	0.00	0.1	0.003
20.067	0.000	0.00	0.00	0.00	0.1	0.003
20.083	0.000	0.00	0.00	0.00	0.1	0.003
20.100	0.000	0.00	0.00	0.00	0.1	0.003
20.117	0.000	0.00	0.00	0.00	0.1	0.003
20.133	0.000	0.00	0.00	0.00	0.1	0.003
20.150	0.000	0.00	0.00	0.00	0.1	0.003
20.167	0.000	0.00	0.00	0.00	0.1	0.003
20.183	0.000	0.00	0.00	0.00	0.1	0.002
20.200	0.000	0.00	0.00	0.00	0.1	0.002
20.217	0.000	0.00	0.00	0.00	0.1	0.002
20.233	0.000	0.00	0.00	0.00	0.1	0.002
20.250	0.000	0.00	0.00	0.00	0.1	0.002
20.267	0.000	0.00	0.00	0.00	0.1	0.002
20.283	0.000	0.00	0.00	0.00	0.1	0.002
20.300	0.000	0.00	0.00	0.00	0.1	0.002
20.317	0.000	0.00	0.00	0.00	0.1	0.002
20.333	0.000	0.00	0.00	0.00	0.1	0.002
20.350	0.000	0.00	0.00	0.00	0.0	0.002
20.367	0.000	0.00	0.00	0.00	0.0	0.002
20.383	0.000	0.00	0.00	0.00	0.0	0.001
20.400	0.000	0.00	0.00	0.00	0.0	0.001
20.417	0.000	0.00	0.00	0.00	0.0	0.001
20.433	0.000	0.00	0.00	0.00	0.0	0.001
20.450	0.000	0.00	0.00	0.00	0.0	0.001
20.467	0.000	0.00	0.00	0.00	0.0	0.001
20.483	0.000	0.00	0.00	0.00	0.0	0.001
20.500	0.000	0.00	0.00	0.00	0.0	0.001
20.517	0.000	0.00	0.00	0.00	0.0	0.001
20.533	0.000	0.00	0.00	0.00	0.0	0.001
20.550	0.000	0.00	0.00	0.00	0.0	0.001
20.567	0.000	0.00	0.00	0.00	0.0	0.001
20.583	0.000	0.00	0.00	0.00	0.0	0.001
20.600	0.000	0.00	0.00	0.00	0.0	0.001
20.617	0.000	0.00	0.00	0.00	0.0	0.001
20.633	0.000	0.00	0.00	0.00	0.0	0.001
20.650	0.000	0.00	0.00	0.00	0.0	0.001
20.667	0.000	0.00	0.00	0.00	0.0	0.001
20.683	0.000	0.00	0.00	0.00	0.0	0.001
20.700	0.000	0.00	0.00	0.00	0.0	0.001
20.717	0.000	0.00	0.00	0.00	0.0	0.001
20.733	0.000	0.00	0.00	0.00	0.0	0.001
20.750	0.000	0.00	0.00	0.00	0.0	0.001
20.767	0.000	0.00	0.00	0.00	0.0	0.001
20.783	0.000	0.00	0.00	0.00	0.0	0.001
20.800	0.000	0.00	0.00	0.00	0.0	0.001
20.817	0.000	0.00	0.00	0.00	0.0	0.001
20.833	0.000	0.00	0.00	0.00	0.0	0.000
20.850	0.000	0.00	0.00	0.00	0.0	0.000
20.867	0.000	0.00	0.00	0.00	0.0	0.000
20.883	0.000	0.00	0.00	0.00	0.0	0.000
20.900	0.000	0.00	0.00	0.00	0.0	0.000

PROCESS SUMMARY OF STORAGE:

INFLOW VOLUME = 20.907 AF

BASIN STORAGE = 0.000 AF (WITH 0.000 AF INITIALLY FILLED)

OUTFLOW VOLUME = 20.907 AF

LOSS VOLUME = 0.000 AF

```
**************************************************************************
  FLOW PROCESS FROM NODE     56.30 TO NODE     35.20 IS CODE =   7
--------------------------------------------------------------------------
  >>>>>STREAM NUMBER 1 ADDED TO STREAM NUMBER 2<<<<<
==========================================================================


**************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  11
--------------------------------------------------------------------------
  >>>>>VIEW STREAM NUMBER 2 HYDROGRAPH<<<<<
==========================================================================

           STREAM HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
--------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       50.0     100.0     150.0     200.0
--------------------------------------------------------------------------
  14.000     37.1884     78.46  .         .    Q V  .         .         .
  14.017     37.2968     78.68  .         .    Q V  .         .         .
  14.033     37.4055     78.91  .         .    Q V  .         .         .
  14.050     37.5145     79.14  .         .    Q  V .         .         .
  14.067     37.6238     79.37  .         .    Q  V .         .         .
  14.083     37.7335     79.60  .         .    Q  V .         .         .
  14.100     37.8434     79.83  .         .    Q  V .         .         .
  14.117     37.9537     80.06  .         .     Q V .         .         .
  14.133     38.0643     80.28  .         .     Q V .         .         .
  14.150     38.1752     80.51  .         .     Q V .         .         .
  14.167     38.2864     80.74  .         .     Q V .         .         .
  14.183     38.3979     80.97  .         .     Q V .         .         .
  14.200     38.5098     81.20  .         .     Q V .         .         .
  14.217     38.6219     81.43  .         .     Q V .         .         .
  14.233     38.7344     81.66  .         .     Q V .         .         .
  14.250     38.8472     81.90  .         .     Q V .         .         .
  14.267     38.9607     82.35  .         .     Q V .         .         .
  14.283     39.0749     82.92  .         .     Q V .         .         .
  14.300     39.1899     83.50  .         .     Q V .         .         .
  14.317     39.3057     84.07  .         .     Q V .         .         .
  14.333     39.4223     84.65  .         .     Q V .         .         .
  14.350     39.5397     85.22  .         .      QV .         .         .
  14.367     39.6579     85.80  .         .      Q V.         .         .
  14.383     39.7768     86.37  .         .      Q V.         .         .
  14.400     39.8966     86.95  .         .      Q V.         .         .
  14.417     40.0172     87.52  .         .      Q V.         .         .
  14.433     40.1385     88.10  .         .      Q V.         .         .
  14.450     40.2606     88.67  .         .      Q V.         .         .
  14.467     40.3836     89.24  .         .      Q V.         .         .
  14.483     40.5073     89.81  .         .      Q V.         .         .
  14.500     40.6317     90.37  .         .       QV.         .         .
  14.517     40.7570     90.94  .         .       QV.         .         .
  14.533     40.8831     91.51  .         .       QV.         .         .
  14.550     41.0098     92.04  .         .       QV.         .         .
  14.567     41.1371     92.41  .         .       QV.         .         .
  14.583     41.2649     92.77  .         .       QV.         .         .
  14.600     41.3932     93.13  .         .       QV.         .         .
  14.617     41.5220     93.49  .         .       QV.         .         .
  14.633     41.6512     93.85  .         .       QV.         .         .
  14.650     41.7810     94.21  .         .       Q V         .         .
  14.667     41.9113     94.57  .         .       Q V         .         .
  14.683     42.0420     94.95  .         .       Q V         .         .
  14.700     42.1733     95.32  .         .        QV         .         .
  14.717     42.3052     95.70  .         .        QV         .         .
  14.733     42.4375     96.08  .         .        QV         .         .
  14.750     42.5704     96.46  .         .        QV         .         .
  14.767     42.7038     96.84  .         .        QV         .         .
  14.783     42.8377     97.21  .         .        QV         .         .
  14.800     42.9721     97.59  .         .        QV         .         .
  14.817     43.1070     97.97  .         .        QV         .         .
  14.833     43.2425     98.35  .         .        QV         .         .
  14.850     43.3790     99.09  .         .        QV         .         .
  14.867     43.5168    100.09  .         .         Q         .         .
  14.883     43.6561    101.09  .         .         Q         .         .
  14.900     43.7967    102.08  .         .         QV        .         .
  14.917     43.9387    103.07  .         .         QV        .         .
  14.933     44.0817    103.82  .         .         QV        .         .
  14.950     44.2247    103.84  .         .         QV        .         .
  14.967     44.3678    103.86  .         .         QV        .         .
  14.983     44.5108    103.88  .         .         QV        .         .
  15.000     44.6540    103.90  .         .         QV        .         .
  15.017     44.7971    103.92  .         .         QV        .         .
  15.033     44.9403    103.94  .         .         QV        .         .
  15.050     45.0834    103.96  .         .         QV        .         .
  15.067     45.2267    103.97  .         .         QV        .         .
  15.083     45.3699    103.99  .         .         QV        .         .
  15.100     45.5132    104.01  .         .         QV        .         .
  15.117     45.6565    104.04  .         .         QV        .         .
  15.133     45.7998    104.09  .         .         QV        .         .
  15.150     45.9433    104.14  .         .         Q V       .         .
  15.167     46.0868    104.20  .         .         Q V       .         .
  15.183     46.2304    104.25  .         .         Q V       .         .
  15.200     46.3741    104.30  .         .         Q V       .         .
  15.217     46.5178    104.36  .         .         Q V       .         .
  15.233     46.6616    104.41  .         .         Q V       .         .
  15.250     46.8055    104.47  .         .         Q V       .         .
  15.267     46.9495    104.52  .         .         Q V       .         .
  15.283     47.0935    104.57  .         .         Q V       .         .
  15.300     47.2376    104.63  .         .         Q V       .         .
  15.317     47.3818    104.68  .         .         Q V       .         .
  15.333     47.5261    104.74  .         .         Q V       .         .
  15.350     47.6704    104.77  .         .         Q V       .         .
  15.367     47.8147    104.78  .         .         Q V       .         .
  15.383     47.9591    104.80  .         .         Q  V      .         .
  15.400     48.1035    104.81  .         .         Q  V      .         .
  15.417     48.2478    104.83  .         .         Q  V      .         .
  15.433     48.3923    104.85  .         .         Q  V      .         .
  15.450     48.5367    104.86  .         .         Q  V      .         .
  15.467     48.6812    104.88  .         .         Q  V      .         .
  15.483     48.8257    104.90  .         .         Q  V      .         .
```

15.500	48.9702	104.91	.	.	Q	V	.	.		16.433	57.3294	108.10	.	.	.Q	V	.	.	
15.517	49.1147	104.93	.	.	Q	V	.	.		16.450	57.4754	106.01	.	.	.Q	V	.	.	
15.533	49.2592	104.94	.	.	Q	V	.	.		16.467	57.6205	105.33	.	.	.Q	V	.	.	
15.550	49.4038	104.96	.	.	Q	V	.	.		16.483	57.7655	105.25	.	.	.Q	V	.	.	
15.567	49.5485	105.02	.	.	.Q	V	.	.		16.500	57.9104	105.17	.	.	.Q	V	.	.	
15.583	49.6933	105.16	.	.	.Q	V	.	.		16.517	58.0551	105.10	.	.	.Q	V	.	.	
15.600	49.8384	105.31	.	.	.Q	V	.	.		16.533	58.1998	105.02	.	.	.Q	V	.	.	
15.617	49.9836	105.46	.	.	.Q	V	.	.		16.550	58.3443	104.94	.	.	Q	V	.	.	
15.633	50.1291	105.61	.	.	.Q	V	.	.		16.567	58.4888	104.86	.	.	Q	V	.	.	
15.650	50.2748	105.76	.	.	.Q	V	.	.		16.583	58.6331	104.79	.	.	Q	V	.	.	
15.667	50.4207	105.91	.	.	.Q	V	.	.		16.600	58.7773	104.71	.	.	Q	V	.	.	
15.683	50.5667	106.06	.	.	.Q	V	.	.		16.617	58.9214	104.63	.	.	Q	V	.	.	
15.700	50.7130	106.21	.	.	.Q	V	.	.		16.633	59.0655	104.56	.	.	Q	V	.	.	
15.717	50.8595	106.36	.	.	.Q	V	.	.		16.650	59.2094	104.48	.	.	Q	V	.	.	
15.733	51.0062	106.51	.	.	.Q	V	.	.		16.667	59.3532	104.40	.	.	Q	V	.	.	
15.750	51.1532	106.66	.	.	.Q	V	.	.		16.683	59.4969	104.33	.	.	Q	V	.	.	
15.767	51.3003	106.81	.	.	.Q	V	.	.		16.700	59.6405	104.27	.	.	Q	V	.	.	
15.783	51.4476	106.96	.	.	.Q	V	.	.		16.717	59.7840	104.21	.	.	Q	V	.	.	
15.800	51.5952	107.19	.	.	.Q	V	.	.		16.733	59.9275	104.15	.	.	Q	V	.	.	
15.817	51.7432	107.43	.	.	.Q	V	.	.		16.750	60.0709	104.09	.	.	Q	V	.	.	
15.833	51.8915	107.67	.	.	.Q	V	.	.		16.767	60.2142	104.03	.	.	Q	V	.	.	
15.850	52.0402	107.91	.	.	.Q	V	.	.		16.783	60.3574	103.97	.	.	Q	V	.	.	
15.867	52.1891	108.15	.	.	.Q	V	.	.		16.800	60.5005	103.91	.	.	Q	V.	.	.	
15.883	52.3384	108.39	.	.	.Q	V	.	.		16.817	60.6436	103.85	.	.	Q	V.	.	.	
15.900	52.4880	108.63	.	.	.Q	V	.	.		16.833	60.7865	103.80	.	.	Q	V.	.	.	
15.917	52.6380	108.87	.	.	.Q	V	.	.		16.850	60.9294	103.74	.	.	Q	V.	.	.	
15.933	52.7883	109.11	.	.	.Q	V	.	.		16.867	61.0722	103.68	.	.	Q	V.	.	.	
15.950	52.9389	109.35	.	.	.Q	V	.	.		16.883	61.2150	103.62	.	.	Q	V.	.	.	
15.967	53.0898	109.59	.	.	.Q	V	.	.		16.900	61.3576	103.56	.	.	Q	V.	.	.	
15.983	53.2411	109.83	.	.	.Q	V	.	.		16.917	61.5002	103.52	.	.	Q	V.	.	.	
16.000	53.3926	110.00	.	.	.Q	V	.	.		16.933	61.6416	102.67	.	.	Q	V.	.	.	
16.017	53.5441	110.00	.	.	.Q	V	.	.		16.950	61.7815	101.57	.	.	Q	V.	.	.	
16.033	53.6957	110.00	.	.	.Q	V	.	.		16.967	61.9199	100.47	.	.	Q	V.	.	.	
16.050	53.8472	110.00	.	.	.Q	V	.	.		16.983	62.0568	99.37	.	.	Q.	V.	.	.	
16.067	53.9987	110.00	.	.	.Q	V	.	.		17.000	62.1921	98.26	.	.	Q.	V.	.	.	
16.083	54.1502	110.00	.	.	.Q	V	.	.		17.017	62.3260	97.16	.	.	Q.	V.	.	.	
16.100	54.3017	110.00	.	.	.Q	V	.	.		17.033	62.4583	96.06	.	.	Q.	V.	.	.	
16.117	54.4532	110.00	.	.	.Q	V	.	.		17.050	62.5891	94.96	.	.	Q.	V	.	.	
16.133	54.6048	110.00	.	.	.Q	V	.	.		17.067	62.7183	93.86	.	.	Q.	V	.	.	
16.150	54.7563	110.00	.	.	.Q	V	.	.		17.083	62.8461	92.75	.	.	Q.	V	.	.	
16.167	54.9078	110.00	.	.	.Q	V	.	.		17.100	62.9724	91.65	.	.	Q.	V	.	.	
16.183	55.0593	110.00	.	.	.Q	V	.	.		17.117	63.0971	90.55	.	.	Q.	V	.	.	
16.200	55.2108	110.00	.	.	.Q	V	.	.		17.133	63.2203	89.45	.	.	Q.	V	.	.	
16.217	55.3623	110.00	.	.	.Q	V	.	.		17.150	63.3420	88.36	.	.	Q.	V	.	.	
16.233	55.5139	110.00	.	.	.Q	V	.	.		17.167	63.4622	87.27	.	.	Q.	V	.	.	
16.250	55.6654	110.00	.	.	.Q	V	.	.		17.183	63.5811	86.34	.	.	Q.	V	.	.	
16.267	55.8169	110.00	.	.	.Q	V	.	.		17.200	63.6991	85.65	.	.	Q.	V	.	.	
16.283	55.9684	110.00	.	.	.Q	V	.	.		17.217	63.8161	84.95	.	.	Q.	V	.	.	
16.300	56.1199	110.00	.	.	.Q	V	.	.		17.233	63.9322	84.25	.	.	Q.	V	.	.	
16.317	56.2714	110.00	.	.	.Q	V	.	.		17.250	64.0473	83.56	.	.	Q.	V	.	.	
16.333	56.4229	110.00	.	.	.Q	V	.	.		17.267	64.1614	82.86	.	.	Q.	V	.	.	
16.350	56.5745	110.00	.	.	.Q	V	.	.		17.283	64.2746	82.16	.	.	Q.	V	.	.	
16.367	56.7260	110.00	.	.	.Q	V	.	.		17.300	64.3868	81.47	.	.	Q.	V	.	.	
16.383	56.8775	110.00	.	.	.Q	V	.	.		17.317	64.4980	80.77	.	.	Q.	V	.	.	
16.400	57.0290	110.00	.	.	.Q	V	.	.		17.333	64.6083	80.07	.	.	Q.	.V	.	.	
16.417	57.1805	110.00	.	.	.Q	V	.	.		17.350	64.7177	79.38	.	.	Q.	.V	.	.	

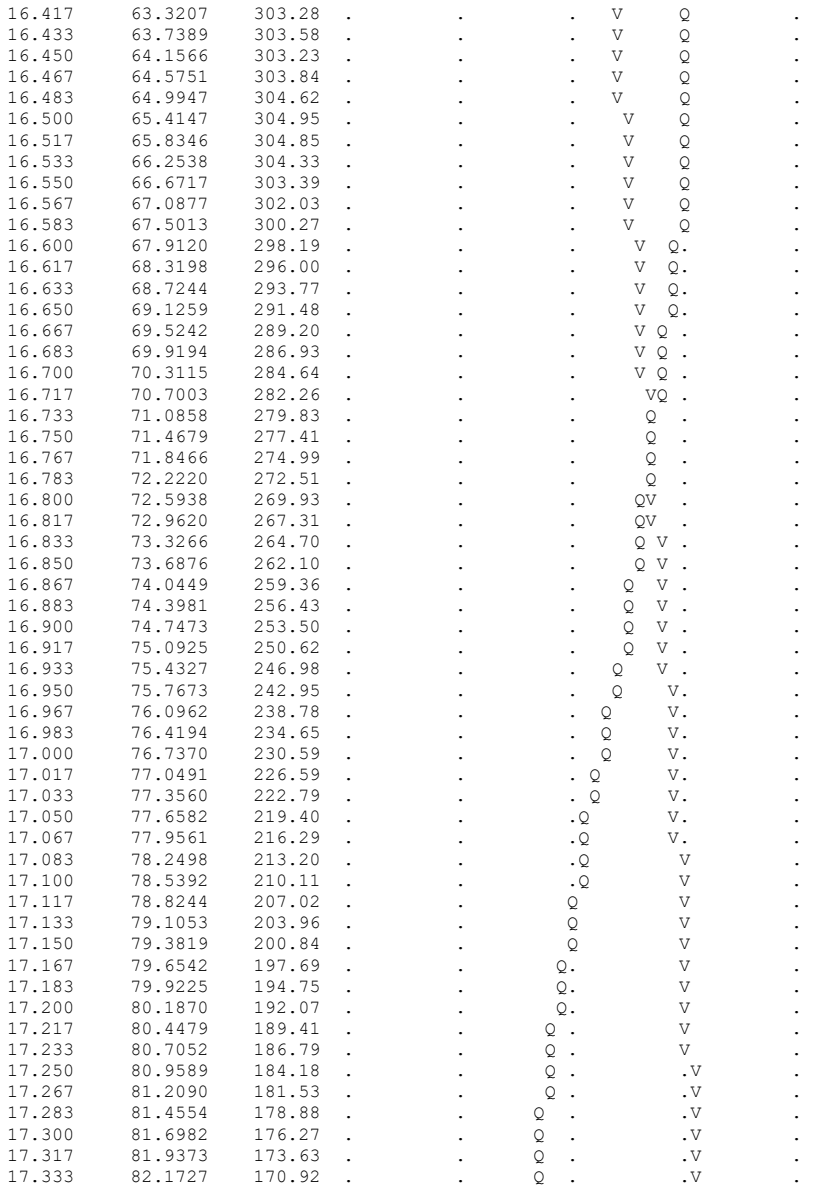
17.367	64.8261	78.69	.	.	Q	.	.V	.
17.383	64.9335	78.00	.	.	Q	.	.V	.
17.400	65.0400	77.31	.	.	Q	.	.V	.
17.417	65.1455	76.62	.	.	Q	.	.V	.
17.433	65.2501	75.93	.	.	Q	.	.V	.
17.450	65.3538	75.24	.	.	Q	.	.V	.
17.467	65.4565	74.57	.	.	Q	.	.V	.
17.483	65.5585	74.07	.	.	Q	.	.V	.
17.500	65.6599	73.61	.	.	Q	.	.V	.
17.517	65.7607	73.14	.	.	Q	.	.V	.
17.533	65.8608	72.68	.	.	Q	.	.V	.
17.550	65.9602	72.22	.	.	Q	.	.V	.
17.567	66.0591	71.76	.	.	Q	.	.V	.
17.583	66.1573	71.30	.	.	Q	.	.V	.
17.600	66.2549	70.84	.	.	Q	.	.V	.
17.617	66.3518	70.38	.	.	Q	.	.V	.
17.633	66.4481	69.92	.	.	Q	.	.V	.
17.650	66.5438	69.46	.	.	Q	.	.V	.
17.667	66.6388	69.00	.	.	Q	.	.V	.
17.683	66.7333	68.55	.	.	Q	.	. V	.
17.700	66.8270	68.09	.	.	Q	.	. V	.
17.717	66.9202	67.63	.	.	Q	.	. V	.
17.733	67.0127	67.17	.	.	Q	.	. V	.
17.750	67.1046	66.71	.	.	Q	.	. V	.
17.767	67.1959	66.30	.	.	Q	.	. V	.
17.783	67.2868	65.95	.	.	Q	.	. V	.
17.800	67.3771	65.61	.	.	Q	.	. V	.
17.817	67.4670	65.27	.	.	Q	.	. V	.
17.833	67.5565	64.93	.	.	Q	.	. V	.
17.850	67.6454	64.59	.	.	Q	.	. V	.
17.867	67.7339	64.25	.	.	Q	.	. V	.
17.883	67.8220	63.91	.	.	Q	.	. V	.
17.900	67.9095	63.57	.	.	Q	.	. V	.
17.917	67.9966	63.23	.	.	Q	.	. V	.
17.933	68.0832	62.88	.	.	Q	.	. V	.
17.950	68.1694	62.54	.	.	Q	.	. V	.
17.967	68.2550	62.20	.	.	Q	.	. V	.
17.983	68.3403	61.86	.	.	Q	.	. V	.
18.000	68.4250	61.52	.	.	Q	.	. V	.

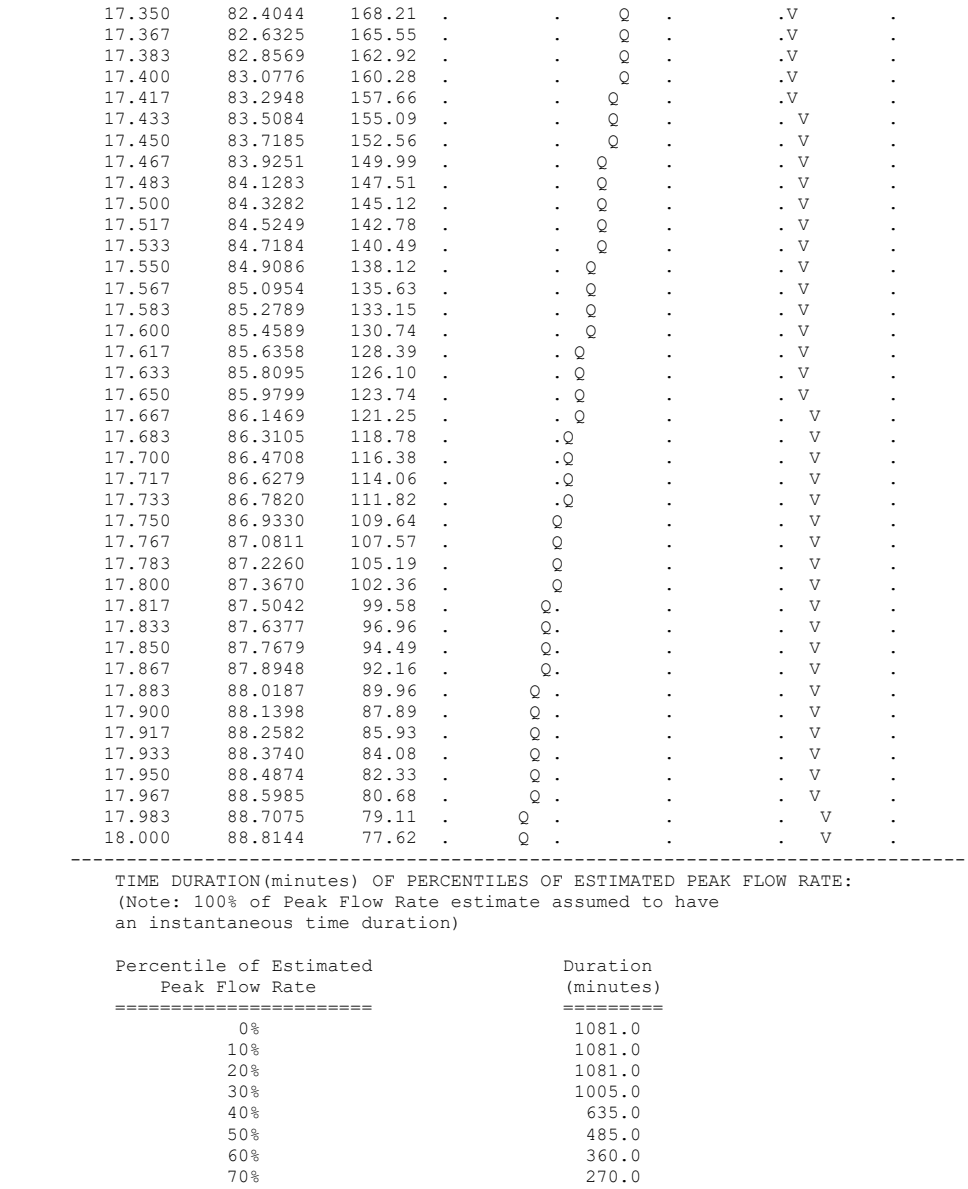
TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	1081.0
20%	1081.0
30%	1081.0
40%	1081.0
50%	1081.0
60%	1081.0
70%	1045.0
80%	820.0
90%	645.0

```
****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>STREAM NUMBER 2 ADDED TO STREAM NUMBER 3<<<<<
============================================================================


****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>VIEW STREAM NUMBER 3 HYDROGRAPH<<<<<
============================================================================

           STREAM HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
       (Notes: Time indicated is at END of Each Unit Intervals.
               Peak 5-minute rainfall intensity is modeled as
               a constant value for entire 5-minute period.)
----------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)    Q(CFS) 0.      100.0     200.0     300.0     400.0
----------------------------------------------------------------------------
  14.000     37.1884     78.46  .      Q  .   V     .         .         .
  14.017     37.2968     78.68  .      Q  .   V     .         .         .
  14.033     37.4055     78.91  .      Q  .   V     .         .         .
  14.050     37.5145     79.14  .      Q  .   V     .         .         .
  14.067     37.6238     79.37  .      Q  .   V     .         .         .
  14.083     37.7335     79.60  .      Q  .   V     .         .         .
  14.100     37.8434     79.83  .      Q  .   V     .         .         .
  14.117     37.9537     80.06  .       Q .   V     .         .         .
  14.133     38.0643     80.28  .       Q .   V     .         .         .
  14.150     38.1752     80.51  .       Q .   V     .         .         .
  14.167     38.2864     80.74  .       Q .   V     .         .         .
  14.183     38.3979     80.97  .       Q .   V     .         .         .
  14.200     38.5098     81.20  .       Q .   V     .         .         .
  14.217     38.6219     81.43  .       Q .   V     .         .         .
  14.233     38.7344     81.66  .       Q .   V     .         .         .
  14.250     38.8472     81.90  .       Q .   V     .         .         .
  14.267     38.9607     82.35  .       Q .   V     .         .         .
  14.283     39.0749     82.92  .       Q .   V     .         .         .
  14.300     39.1899     83.50  .       Q .    V    .         .         .
  14.317     39.3057     84.07  .       Q .    V    .         .         .
  14.333     39.4223     84.65  .       Q .    V    .         .         .
  14.350     39.5397     85.22  .       Q .    V    .         .         .
  14.367     39.6579     85.80  .       Q .    V    .         .         .
  14.383     39.7768     86.37  .       Q .    V    .         .         .
  14.400     39.8966     86.95  .       Q .    V    .         .         .
  14.417     40.0172     87.52  .       Q .    V    .         .         .
  14.433     40.1385     88.10  .       Q .    V    .         .         .
  14.450     40.2606     88.67  .       Q .    V    .         .         .
  14.467     40.3836     89.24  .       Q .    V    .         .         .
  14.483     40.5073     89.81  .       Q .    V    .         .         .
  14.500     40.6317     90.37  .        Q.    V    .         .         .
  14.517     40.7570     90.94  .        Q.    V    .         .         .
  14.533     40.8831     91.51  .        Q.    V    .         .         .
```

```
14.550     41.0098     92.04  .        Q.    V    .         .         .
14.567     41.1371     92.41  .        Q.    V    .         .         .
14.583     41.2649     92.77  .        Q.    V    .         .         .
14.600     41.3932     93.13  .        Q.    V    .         .         .
14.617     41.5220     93.49  .        Q.    V    .         .         .
14.633     41.6512     93.85  .        Q.    V    .         .         .
14.650     41.7810     94.21  .        Q.     V   .         .         .
14.667     41.9113     94.57  .        Q.     V   .         .         .
14.683     42.0420     94.95  .        Q.     V   .         .         .
14.700     42.1733     95.32  .        Q.     V   .         .         .
14.717     42.3052     95.70  .        Q.     V   .         .         .
14.733     42.4375     96.08  .        Q.     V   .         .         .
14.750     42.5704     96.46  .        Q.     V   .         .         .
14.767     42.7038     96.84  .        Q.     V   .         .         .
14.783     42.8377     97.21  .        Q.     V   .         .         .
14.800     42.9721     97.59  .        Q.     V   .         .         .
14.817     43.1070     97.97  .        Q.     V   .         .         .
14.833     43.2425     98.35  .        Q.     V   .         .         .
14.850     43.3790     99.09  .        Q.     V   .         .         .
14.867     43.5168    100.09  .         Q     V   .         .         .
14.883     43.6561    101.09  .         Q     V   .         .         .
14.900     43.7967    102.08  .         Q     V   .         .         .
14.917     43.9387    103.07  .         Q     V   .         .         .
14.933     44.0817    103.82  .         Q     V   .         .         .
14.950     44.2248    103.87  .         Q     V   .         .         .
14.967     44.3680    103.96  .         Q      V  .         .         .
14.983     44.5113    104.08  .         Q      V  .         .         .
15.000     44.6549    104.24  .         Q      V  .         .         .
15.017     44.7987    104.43  .         Q      V  .         .         .
15.033     44.9429    104.65  .         Q      V  .         .         .
15.050     45.0874    104.91  .         Q      V  .         .         .
15.067     45.2323    105.19  .         Q      V  .         .         .
15.083     45.3776    105.50  .         Q      V  .         .         .
15.100     45.5234    105.84  .         Q      V  .         .         .
15.117     45.6697    106.21  .         Q      V  .         .         .
15.133     45.8165    106.63  .         Q      V  .         .         .
15.150     45.9640    107.07  .         Q      V  .         .         .
15.167     46.1121    107.53  .         Q      V  .         .         .
15.183     46.2609    108.00  .         Q      V  .         .         .
15.200     46.4103    108.49  .         Q      V  .         .         .
15.217     46.5605    108.99  .         Q      V  .         .         .
15.233     46.7113    109.50  .         Q      V  .         .         .
15.250     46.8628    110.02  .         .Q     V  .         .         .
15.267     47.0151    110.55  .         .Q      V .         .         .
15.283     47.1681    111.10  .         .Q      V .         .         .
15.300     47.3219    111.65  .         .Q      V .         .         .
15.317     47.4765    112.22  .         .Q      V .         .         .
15.333     47.6318    112.79  .         .Q      V .         .         .
15.350     47.7880    113.35  .         .Q      V .         .         .
15.367     47.9449    113.91  .         .Q      V .         .         .
15.383     48.1025    114.47  .         .Q      V .         .         .
15.400     48.2610    115.04  .         .Q      V .         .         .
15.417     48.4203    115.62  .         .Q      V .         .         .
15.433     48.5804    116.22  .         .Q      V .         .         .
15.450     48.7413    116.86  .         .Q      V .         .         .
15.467     48.9032    117.55  .         .Q      V .         .         .
15.483     49.0661    118.28  .         .Q      V .         .         .
15.500     49.2301    119.05  .         .Q      V .         .         .
15.517     49.3953    119.93  .         .Q      V .         .         .
15.533     49.5622    121.13  .         . Q      V.         .         .
15.550     49.7310    122.58  .         . Q      V.         .         .
15.567     49.9019    124.09  .         . Q      V.         .         .
15.583     50.0751    125.72  .         . Q      V.         .         .
15.600     50.2505    127.37  .         . Q      V.         .         .
15.617     50.4283    129.04  .         . Q      V.         .         .
15.633     50.6083    130.73  .         .  Q     V.         .         .
15.650     50.7908    132.44  .         .  Q     V.         .         .
15.667     50.9755    134.16  .         .  Q     V.         .         .
15.683     51.1627    135.90  .         .  Q     V.         .         .
15.700     51.3523    137.65  .         .  Q     V.         .         .
15.717     51.5444    139.43  .         .  Q     V.         .         .
15.733     51.7390    141.28  .         .   Q    V.         .         .
15.750     51.9363    143.25  .         .   Q    V.         .         .
15.767     52.1365    145.35  .         .   Q     V         .         .
15.783     52.3393    147.24  .         .   Q     V         .         .
15.800     52.5443    148.85  .         .   Q     V         .         .
15.817     52.7516    150.44  .         .    Q    V         .         .
15.833     52.9611    152.12  .         .    Q    V         .         .
15.850     53.1731    153.89  .         .    Q    V         .         .
15.867     53.3876    155.74  .         .    Q    V         .         .
15.883     53.6048    157.67  .         .    Q    V         .         .
15.900     53.8247    159.67  .         .    Q    V         .         .
15.917     54.0475    161.74  .         .     Q   V         .         .
15.933     54.2731    163.79  .         .     Q   V         .         .
15.950     54.5014    165.73  .         .     Q   V         .         .
15.967     54.7323    167.65  .         .     Q   .V        .         .
15.983     54.9659    169.64  .         .     Q   .V        .         .
16.000     55.2023    171.62  .         .      Q  .V        .         .
16.017     55.4416    173.68  .         .      Q  .V        .         .
16.033     55.6844    176.27  .         .      Q  .V        .         .
16.050     55.9314    179.35  .         .      Q  .V        .         .
16.067     56.1835    183.00  .         .       Q .V        .         .
16.083     56.4412    187.11  .         .       Q .V        .         .
16.100     56.7051    191.57  .         .        Q.V        .         .
16.117     56.9756    196.44  .         .        Q.V        .         .
16.133     57.2534    201.66  .         .         QV        .         .
16.150     57.5386    207.07  .         .         Q V       .         .
16.167     57.8314    212.54  .         .         .QV       .         .
16.183     58.1320    218.23  .         .         .QV       .         .
16.200     58.4408    224.17  .         .         . Q       .         .
16.217     58.7578    230.18  .         .         . VQ      .         .
16.233     59.0842    236.94  .         .         . VQ      .         .
16.250     59.4218    245.13  .         .         . V Q     .         .
16.267     59.7714    253.81  .         .         . V  Q    .         .
16.283     60.1326    262.23  .         .         .  V  Q   .         .
16.300     60.5048    270.22  .         .         .  V   Q  .         .
16.317     60.8869    277.37  .         .         .  V   Q  .         .
16.333     61.2774    283.56  .         .         .  V    Q .         .
16.350     61.6753    288.87  .         .         .  V    Q .         .
16.367     62.0795    293.42  .         .         .  V     Q.         .
16.383     62.4890    297.28  .         .         .  V     Q.         .
16.400     62.9030    300.58  .         .         .   V     Q         .
```





TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	1081.0
20%	1081.0
30%	1005.0
40%	635.0
50%	485.0
60%	360.0
70%	270.0

```
            80%                             210.0
            90%                             140.0
================================================================================

  END OF FLOODSCx ROUTING ANALYSIS
```

```
************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
          (c) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                     Planning * Engineering * Surveying
              Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                 *
* 2-YEAR STORM PROPOSED CONDITION WITH OFFSITE RUN-ON (COMBINE TO 1 AREA)  *
* W.O. #1443-136X. NO DETENTION                                         *
 ************************************************************************

  FILE NAME: FLD-02DC.DAT
  TIME/DATE OF STUDY: 11:38 06/10/2019

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE     61.00 IS CODE = 1.2
------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =  339.75
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.074
    LOW LOSS FRACTION = 0.360
    TIME OF CONCENTRATION(MIN.) = 23.43
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =   2
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.53
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  0.89
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.22
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  2.05

------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =    36.29
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =    21.75

------------------------------------------------------------------------

========================================================================

                        2 4 - H O U R    S T O R M
                     R U N O F F    H Y D R O G R A P H

========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       65.0     130.0     195.0     260.0
------------------------------------------------------------------------
  14.000     11.9135     24.62  .  Q     .  V     .         .         .
  14.017     11.9476     24.74  .  Q     .  V     .         .         .
  14.033     11.9818     24.85  .  Q     .  V     .         .         .
  14.050     12.0162     24.97  .  Q     .  V     .         .         .
  14.067     12.0508     25.08  .  Q     .  V     .         .         .
  14.083     12.0855     25.18  .  Q     .  V     .         .         .
  14.100     12.1203     25.29  .  Q     .  V     .         .         .
  14.117     12.1553     25.39  .  Q     .  V     .         .         .
  14.133     12.1904     25.50  .  Q     .  V     .         .         .
  14.150     12.2257     25.60  .  Q     .  V     .         .         .
  14.167     12.2611     25.70  .  Q     .  V     .         .         .
  14.183     12.2966     25.81  .  Q     .  V     .         .         .
  14.200     12.3323     25.91  .  Q     .  V     .         .         .
  14.217     12.3681     26.02  .   Q    .  V     .         .         .
  14.233     12.4041     26.12  .   Q    .  V     .         .         .
  14.250     12.4402     26.22  .   Q    .  V     .         .         .
  14.267     12.4765     26.33  .   Q    .  V     .         .         .
  14.283     12.5129     26.43  .   Q    .  V     .         .         .
  14.300     12.5495     26.54  .   Q    .  V     .         .         .
  14.317     12.5861     26.64  .   Q    .  V     .         .         .
  14.333     12.6230     26.74  .   Q    .  V     .         .         .
  14.350     12.6600     26.85  .   Q    .  V     .         .         .
  14.367     12.6971     26.95  .   Q    .  V     .         .         .
  14.383     12.7344     27.06  .   Q    .   V    .         .         .
  14.400     12.7718     27.16  .   Q    .   V    .         .         .
  14.417     12.8093     27.26  .   Q    .   V    .         .         .
  14.433     12.8470     27.37  .   Q    .   V    .         .         .
  14.450     12.8849     27.50  .   Q    .   V    .         .         .
  14.467     12.9231     27.72  .   Q    .   V    .         .         .
  14.483     12.9616     27.95  .   Q    .   V    .         .         .
  14.500     13.0004     28.17  .   Q    .   V    .         .         .
  14.517     13.0395     28.40  .   Q    .   V    .         .         .
  14.533     13.0789     28.62  .   Q    .   V    .         .         .
  14.550     13.1187     28.85  .   Q    .   V    .         .         .
  14.567     13.1587     29.07  .   Q    .   V    .         .         .
  14.583     13.1991     29.30  .   Q    .   V    .         .         .
  14.600     13.2397     29.52  .   Q    .   V    .         .         .
  14.617     13.2807     29.75  .   Q    .   V    .         .         .
  14.633     13.3220     29.97  .   Q    .   V    .         .         .
  14.650     13.3636     30.20  .   Q    .   V    .         .         .
  14.667     13.4055     30.42  .   Q    .   V    .         .         .
```

Onsite Flood Routing Area “A”

With Upstream Offsite Runoffs via 84” RCP Inlet at Rancho Parkway (F19-P07) Node 24.1
and Outlet at Downstream of Existing 10.5’ x 10.5’ RCB (F19-P07) Node 61, ***with no Detention @ Node 56.3 & Node 35.2***

2-Year Storm Proposed Condition

```
14.683   13.4477    30.65  .   Q     .   V     .         .         .
14.700   13.4902    30.87  .   Q     .   V     .         .         .
14.717   13.5330    31.10  .   Q     .   V     .         .         .
14.733   13.5762    31.32  .   Q     .   V     .         .         .
14.750   13.6196    31.55  .   Q     .    V    .         .         .
14.767   13.6634    31.77  .   Q     .    V    .         .         .
14.783   13.7075    31.99  .   Q     .    V    .         .         .
14.800   13.7519    32.22  .   Q     .    V    .         .         .
14.817   13.7965    32.44  .   Q     .    V    .         .         .
14.833   13.8415    32.67  .    Q    .    V    .         .         .
14.850   13.8868    32.84  .    Q    .    V    .         .         .
14.867   13.9322    33.00  .    Q    .    V    .         .         .
14.883   13.9779    33.15  .    Q    .    V    .         .         .
14.900   14.0238    33.31  .    Q    .    V    .         .         .
14.917   14.0699    33.47  .    Q    .    V    .         .         .
14.933   14.1162    33.63  .    Q    .    V    .         .         .
14.950   14.1627    33.78  .    Q    .    V    .         .         .
14.967   14.2095    33.94  .    Q    .    V    .         .         .
14.983   14.2564    34.10  .    Q    .    V    .         .         .
15.000   14.3036    34.25  .    Q    .    V    .         .         .
15.017   14.3510    34.41  .    Q    .    V    .         .         .
15.033   14.3986    34.57  .    Q    .    V    .         .         .
15.050   14.4465    34.72  .    Q    .    V    .         .         .
15.067   14.4945    34.88  .    Q    .    V    .         .         .
15.083   14.5428    35.04  .    Q    .     V   .         .         .
15.100   14.5912    35.20  .    Q    .     V   .         .         .
15.117   14.6399    35.35  .    Q    .     V   .         .         .
15.133   14.6889    35.51  .    Q    .     V   .         .         .
15.150   14.7380    35.67  .    Q    .     V   .         .         .
15.167   14.7873    35.82  .    Q    .     V   .         .         .
15.183   14.8369    35.98  .    Q    .     V   .         .         .
15.200   14.8867    36.14  .    Q    .     V   .         .         .
15.217   14.9366    36.29  .    Q    .     V   .         .         .
15.233   14.9871    36.60  .    Q    .     V   .         .         .
15.250   15.0382    37.14  .    Q    .     V   .         .         .
15.267   15.0901    37.68  .    Q    .     V   .         .         .
15.283   15.1428    38.23  .    Q    .     V   .         .         .
15.300   15.1962    38.77  .    Q    .     V   .         .         .
15.317   15.2503    39.32  .     Q   .     V   .         .         .
15.333   15.3052    39.86  .     Q   .     V   .         .         .
15.350   15.3609    40.41  .     Q   .     V   .         .         .
15.367   15.4173    40.96  .     Q   .     V   .         .         .
15.383   15.4745    41.50  .     Q   .      V  .         .         .
15.400   15.5324    42.05  .     Q   .      V  .         .         .
15.417   15.5911    42.59  .     Q   .      V  .         .         .
15.433   15.6505    43.14  .     Q   .      V  .         .         .
15.450   15.7107    43.68  .     Q   .      V  .         .         .
15.467   15.7716    44.23  .     Q   .      V  .         .         .
15.483   15.8333    44.78  .     Q   .      V  .         .         .
15.500   15.8957    45.32  .     Q   .      V  .         .         .
15.517   15.9589    45.87  .      Q  .      V  .         .         .
15.533   16.0228    46.41  .      Q  .      V  .         .         .
15.550   16.0875    46.96  .      Q  .      V  .         .         .
15.567   16.1529    47.50  .      Q  .      V  .         .         .
15.583   16.2191    48.05  .      Q  .      V  .         .         .
15.600   16.2860    48.59  .      Q  .      V  .         .         .
15.617   16.3538    49.17  .      Q  .       V .         .         .
15.633   16.4226    50.01  .      Q  .       V .         .         .
15.650   16.4928    50.90  .      Q  .       V .         .         .
15.667   16.5641    51.80  .      Q  .       V .         .         .
15.683   16.6367    52.69  .       Q .       V .         .         .
15.700   16.7105    53.58  .       Q .       V .         .         .
15.717   16.7855    54.48  .       Q .       V .         .         .
15.733   16.8618    55.37  .       Q .       V .         .         .
15.750   16.9393    56.26  .       Q .       V .         .         .
15.767   17.0180    57.16  .       Q .       V .         .         .
15.783   17.0980    58.05  .       Q .       V .         .         .
15.800   17.1792    58.94  .        Q.       V .         .         .
15.817   17.2616    59.84  .        Q.        V.         .         .
15.833   17.3452    60.73  .        Q.        V.         .         .
15.850   17.4301    61.62  .        Q.        V.         .         .
15.867   17.5162    62.52  .        Q.        V.         .         .
15.883   17.6036    63.41  .        Q.        V.         .         .
15.900   17.6921    64.30  .        Q.        V.         .         .
15.917   17.7819    65.20  .         Q        V.         .         .
15.933   17.8730    66.09  .         Q        V.         .         .
15.950   17.9652    66.98  .         Q        V.         .         .
15.967   18.0587    67.88  .         Q        V.         .         .
15.983   18.1535    68.77  .         Q         V         .         .
16.000   18.2494    69.66  .         Q         V         .         .
16.017   18.3516    74.16  .         .Q        V         .         .
16.033   18.4649    82.27  .         . Q       V         .         .
16.050   18.5894    90.37  .         .  Q      V         .         .
16.067   18.7250    98.48  .         .    Q    V         .         .
16.083   18.8718   106.59  .         .     Q   V         .         .
16.100   19.0298   114.69  .         .      Q  V         .         .
16.117   19.1989   122.80  .         .       Q .V        .         .
16.133   19.3792   130.90  .         .         QV        .         .
16.150   19.5707   139.01  .         .         .Q        .         .
16.167   19.7733   147.11  .         .         .VQ       .         .
16.183   19.9871   155.22  .         .         . VQ      .         .
16.200   20.2121   163.32  .         .         . V  Q    .         .
16.217   20.4482   171.43  .         .         . V   Q   .         .
16.233   20.6955   179.53  .         .         . V    Q  .         .
16.250   20.9540   187.64  .         .         .  V    Q .         .
16.267   21.2236   195.74  .         .         .  V      Q         .
16.283   21.5044   203.85  .         .         .  V      .Q        .
16.300   21.7963   211.95  .         .         .   V     . Q       .
16.317   22.0994   220.06  .         .         .   V     .  Q      .
16.333   22.4137   228.16  .         .         .   V     .    Q    .
16.350   22.7391   236.27  .         .         .    V    .     Q   .
16.367   23.0757   244.37  .         .         .    V    .      Q  .
16.383   23.4235   252.48  .         .         .    V    .       Q .
16.400   23.7817   260.02  .         .         .     V   .         Q
16.417   24.1261   250.08  .         .         .     V   .       Q .
16.433   24.4578   240.79  .         .         .     V   .      Q  .
16.450   24.7767   231.50  .         .         .      V  .    Q    .
16.467   25.0827   222.21  .         .         .      V  .   Q     .
16.483   25.3760   212.92  .         .         .      V  . Q       .
16.500   25.6565   203.63  .         .         .       V .Q        .
16.517   25.9242   194.35  .         .         .       VQ.         .
16.533   26.1791   185.06  .         .         .       Q .         .
16.550   26.4212   175.77  .         .         .      Q V.         .
16.567   26.6505   166.48  .         .         .    Q    V.         .
16.583   26.8670   157.19  .         .         .   Q     V.         .
16.600   27.0707   147.90  .         .         . Q       V.         .
```

Onsite Flood Routing Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1

*and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61, **with no Detention @ Node 56.3 & Node 35.2***

2-Year Storm Proposed Condition

F:\0894\Engineering\SY_Hydrology\Onsite\AES\Post-developed\Flood Routing\Flood Proposed\FLD-02DC.docx

```
16.617     27.2617    138.61  .         .         .Q        V         .
16.633     27.4398    129.32  .         .        Q.         V         .
16.650     27.6052    120.04  .         .       Q .         V         .
16.667     27.7577    110.75  .         .      Q  .         V         .
16.683     27.8974    101.46  .         .    Q    .         V         .
16.700     28.0244     92.17  .         .   Q     .         V         .
16.717     28.1386     82.88  .         . Q       .         .V        .
16.733     28.2399     73.59  .         .Q        .         .V        .
16.750     28.3285     64.30  .        Q.         .         .V        .
16.767     28.4043     55.02  .       Q .         .         .V        .
16.783     28.4674     45.81  .      Q  .         .         .V        .
16.800     28.5253     42.04  .     Q   .         .         .V        .
16.817     28.5825     41.51  .     Q   .         .         .V        .
16.833     28.6389     40.98  .     Q   .         .         .V        .
16.850     28.6946     40.45  .     Q   .         .         .V        .
16.867     28.7496     39.92  .     Q   .         .         .V        .
16.883     28.8039     39.39  .     Q   .         .         .V        .
16.900     28.8574     38.86  .    Q    .         .         .V        .
16.917     28.9102     38.33  .    Q    .         .         .V        .
16.933     28.9623     37.80  .    Q    .         .         .V        .
16.950     29.0136     37.27  .    Q    .         .         .V        .
16.967     29.0642     36.73  .    Q    .         .         . V       .
16.983     29.1141     36.20  .    Q    .         .         . V       .
17.000     29.1632     35.67  .    Q    .         .         . V       .
17.017     29.2116     35.14  .    Q    .         .         . V       .
17.033     29.2593     34.61  .    Q    .         .         . V       .
17.050     29.3062     34.08  .    Q    .         .         . V       .
17.067     29.3524     33.55  .    Q    .         .         . V       .
17.083     29.3979     33.02  .    Q    .         .         . V       .
17.100     29.4427     32.49  .   Q     .         .         . V       .
17.117     29.4867     31.96  .   Q     .         .         . V       .
17.133     29.5300     31.43  .   Q     .         .         . V       .
17.150     29.5725     30.89  .   Q     .         .         . V       .
17.167     29.6143     30.36  .   Q     .         .         . V       .
17.183     29.6555     29.90  .   Q     .         .         . V       .
17.200     29.6963     29.61  .   Q     .         .         . V       .
17.217     29.7367     29.34  .   Q     .         .         . V       .
17.233     29.7768     29.07  .   Q     .         .         . V       .
17.250     29.8164     28.79  .   Q     .         .         . V       .
17.267     29.8557     28.52  .   Q     .         .         . V       .
17.283     29.8946     28.25  .   Q     .         .         . V       .
17.300     29.9331     27.97  .   Q     .         .         . V       .
17.317     29.9713     27.70  .   Q     .         .         .  V      .
17.333     30.0091     27.43  .   Q     .         .         .  V      .
17.350     30.0465     27.15  .   Q     .         .         .  V      .
17.367     30.0835     26.88  .   Q     .         .         .  V      .
17.383     30.1201     26.61  .   Q     .         .         .  V      .
17.400     30.1564     26.33  .   Q     .         .         .  V      .
17.417     30.1923     26.06  .   Q     .         .         .  V      .
17.433     30.2278     25.79  .  Q      .         .         .  V      .
17.450     30.2630     25.51  .  Q      .         .         .  V      .
17.467     30.2977     25.24  .  Q      .         .         .  V      .
17.483     30.3321     24.97  .  Q      .         .         .  V      .
17.500     30.3661     24.69  .  Q      .         .         .  V      .
17.517     30.3998     24.42  .  Q      .         .         .  V      .
17.533     30.4330     24.15  .  Q      .         .         .  V      .
17.550     30.4659     23.87  .  Q      .         .         .  V      .
17.567     30.4984     23.60  .  Q      .         .         .  V      .
17.583     30.5307     23.43  .  Q      .         .         .  V      .
17.600     30.5628     23.29  .  Q      .         .         .  V      .
17.617     30.5946     23.15  .  Q      .         .         .  V      .
17.633     30.6263     23.01  .  Q      .         .         .  V      .
17.650     30.6578     22.87  .  Q      .         .         .  V      .
17.667     30.6892     22.73  .  Q      .         .         .  V      .
17.683     30.7203     22.59  .  Q      .         .         .  V      .
17.700     30.7512     22.45  .  Q      .         .         .  V      .
17.717     30.7819     22.31  .  Q      .         .         .  V      .
17.733     30.8125     22.17  .  Q      .         .         .  V      .
17.750     30.8428     22.03  .  Q      .         .         .  V      .
17.767     30.8730     21.89  .  Q      .         .         .   V     .
17.783     30.9029     21.75  .  Q      .         .         .   V     .
17.800     30.9327     21.61  .  Q      .         .         .   V     .
17.817     30.9623     21.47  .  Q      .         .         .   V     .
17.833     30.9917     21.33  .  Q      .         .         .   V     .
17.850     31.0209     21.19  .  Q      .         .         .   V     .
17.867     31.0499     21.05  .  Q      .         .         .   V     .
17.883     31.0787     20.91  .  Q      .         .         .   V     .
17.900     31.1073     20.77  .  Q      .         .         .   V     .
17.917     31.1357     20.64  .  Q      .         .         .   V     .
17.933     31.1639     20.50  .  Q      .         .         .   V     .
17.950     31.1920     20.36  .  Q      .         .         .   V     .
17.967     31.2198     20.20  .  Q      .         .         .   V     .
17.983     31.2474     20.02  .  Q      .         .         .   V     .
18.000     31.2747     19.84  .  Q      .         .         .   V     .
--------------------------------------------------------------------------------
   TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
   (Note: 100% of Peak Flow Rate estimate assumed to have
   an instantaneous time duration)

   Percentile of Estimated                Duration
       Peak Flow Rate                     (minutes)
   =======================                =========
             0%                             1081.0
            10%                              965.0
            20%                              330.0
            30%                              210.0
            40%                              180.0
            50%                              150.0
            60%                              120.0
            70%                               90.0
            80%                               60.0
            90%                               30.0
 ============================================================================

  END OF FLOODSCx ROUTING ANALYSIS
```

```
**************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
          (c) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                     Planning * Engineering * Surveying
              Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                  *
* 25-YEAR STORM PROPOSED CONDITION WITH OFFSITE RUN-ON (COMBINE TO 1 AREA) *
* W.O. #1443-136X. NO DETENTION                                          *
 **************************************************************************

  FILE NAME: FLD-25DC.DAT
  TIME/DATE OF STUDY: 11:36 06/10/2019

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE     61.00 IS CODE = 1.2
--------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
==========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =  339.75
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.074
    LOW LOSS FRACTION = 0.235
    TIME OF CONCENTRATION(MIN.) = 20.80
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =  25
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.87
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.15
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.94
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  2.71
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  4.49

--------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =    93.07
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =    34.05

--------------------------------------------------------------------------

==========================================================================

                        2 4 - H O U R    S T O R M
                     R U N O F F    H Y D R O G R A P H

==========================================================================
              HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
--------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.      158.0     316.0     474.0     632.1
--------------------------------------------------------------------------
  14.000     31.3139     67.47  .   Q      .  V      .         .         .
  14.017     31.4073     67.81  .   Q      .  V      .         .         .
  14.033     31.5012     68.14  .   Q      .  V      .         .         .
  14.050     31.5955     68.48  .   Q      .  V      .         .         .
  14.067     31.6903     68.82  .   Q      .  V      .         .         .
  14.083     31.7856     69.16  .   Q      .  V      .         .         .
  14.100     31.8813     69.50  .   Q      .  V      .         .         .
  14.117     31.9775     69.83  .   Q      .  V      .         .         .
  14.133     32.0741     70.17  .   Q      .  V      .         .         .
  14.150     32.1712     70.51  .   Q      .  V      .         .         .
  14.167     32.2688     70.85  .   Q      .  V      .         .         .
  14.183     32.3669     71.18  .   Q      .  V      .         .         .
  14.200     32.4654     71.52  .   Q      .  V      .         .         .
  14.217     32.5644     71.86  .   Q      .  V      .         .         .
  14.233     32.6638     72.20  .   Q      .   V     .         .         .
  14.250     32.7637     72.54  .   Q      .   V     .         .         .
  14.267     32.8641     72.87  .   Q      .   V     .         .         .
  14.283     32.9649     73.18  .   Q      .   V     .         .         .
  14.300     33.0661     73.46  .   Q      .   V     .         .         .
  14.317     33.1677     73.74  .   Q      .   V     .         .         .
  14.333     33.2696     74.02  .   Q      .   V     .         .         .
  14.350     33.3720     74.30  .   Q      .   V     .         .         .
  14.367     33.4747     74.59  .   Q      .   V     .         .         .
  14.383     33.5778     74.87  .   Q      .   V     .         .         .
  14.400     33.6813     75.15  .   Q      .   V     .         .         .
  14.417     33.7852     75.43  .   Q      .   V     .         .         .
  14.433     33.8895     75.71  .   Q      .   V     .         .         .
  14.450     33.9942     75.99  .   Q      .   V     .         .         .
  14.467     34.0992     76.27  .   Q      .   V     .         .         .
  14.483     34.2047     76.55  .   Q      .   V     .         .         .
  14.500     34.3105     76.83  .   Q      .   V     .         .         .
  14.517     34.4167     77.11  .   Q      .   V     .         .         .
  14.533     34.5233     77.39  .   Q      .   V     .         .         .
  14.550     34.6303     77.67  .   Q      .   V     .         .         .
  14.567     34.7377     77.95  .   Q      .   V     .         .         .
  14.583     34.8455     78.24  .   Q      .   V     .         .         .
  14.600     34.9536     78.52  .   Q      .    V    .         .         .
  14.617     35.0622     78.81  .   Q      .    V    .         .         .
  14.633     35.1716     79.49  .    Q     .    V    .         .         .
```

Onsite Flood Routing Area “A”

With Upstream Offsite Runoffs via 84” RCP Inlet at Rancho Parkway (F19-P07) Node 24.1
and Outlet at Downstream of Existing 10.5’ x 10.5’ RCB (F19-P07) Node 61, ***with no Detention @ Node 56.3 & Node 35.2***

25-Year Storm Proposed Condition

14.650	35.2823	80.35	. Q . V . . .
14.667	35.3942	81.21	. Q . V . . .
14.683	35.5072	82.08	. Q . V . . .
14.700	35.6215	82.94	. Q . V . . .
14.717	35.7369	83.81	. Q . V . . .
14.733	35.8535	84.67	. Q . V . . .
14.750	35.9714	85.54	. Q . V . . .
14.767	36.0904	86.40	. Q . V . . .
14.783	36.2106	87.26	. Q . V . . .
14.800	36.3320	88.13	. Q . V . . .
14.817	36.4545	88.99	. Q . V . . .
14.833	36.5783	89.86	. Q . V . . .
14.850	36.7033	90.72	. Q . V . . .
14.867	36.8294	91.58	. Q . V . . .
14.883	36.9567	92.45	. Q . V . . .
14.900	37.0853	93.31	. Q . V . . .
14.917	37.2150	94.18	. Q . V . . .
14.933	37.3459	95.04	. Q . V . . .
14.950	37.4780	95.91	. Q . V . . .
14.967	37.6113	96.75	. Q . V . . .
14.983	37.7455	97.43	. Q . V . . .
15.000	37.8806	98.07	. Q . V . . .
15.017	38.0165	98.71	. Q . V . . .
15.033	38.1534	99.35	. Q . V . . .
15.050	38.2911	99.99	. Q . V . . .
15.067	38.4297	100.63	. Q . V . . .
15.083	38.5692	101.28	. Q . V . . .
15.100	38.7096	101.92	. Q . V . . .
15.117	38.8509	102.56	. Q . V . . .
15.133	38.9930	103.20	. Q . V . . .
15.150	39.1360	103.84	. Q . V . . .
15.167	39.2799	104.48	. Q . V . . .
15.183	39.4247	105.12	. Q . V . . .
15.200	39.5704	105.76	. Q . V . . .
15.217	39.7170	106.40	. Q . V . . .
15.233	39.8644	107.04	. Q . V . . .
15.250	40.0127	107.68	. Q . V . . .
15.267	40.1619	108.32	. Q . V . . .
15.283	40.3120	108.96	. Q . V . . .
15.300	40.4630	109.60	. Q . V . . .
15.317	40.6150	110.35	. Q . V . . .
15.333	40.7686	111.52	. Q . V . . .
15.350	40.9239	112.74	. Q . V . . .
15.367	41.0808	113.96	. Q . V . . .
15.383	41.2395	115.17	. Q . V . . .
15.400	41.3998	116.39	. Q . V . . .
15.417	41.5618	117.61	. Q . V . . .
15.433	41.7255	118.83	. Q . V . . .
15.450	41.8908	120.05	. Q . V . . .
15.467	42.0579	121.27	. Q . V . . .
15.483	42.2266	122.49	. Q . V . . .
15.500	42.3970	123.71	. Q . V . . .
15.517	42.5690	124.93	. Q . V . . .
15.533	42.7428	126.15	. Q . V . . .
15.550	42.9182	127.36	. Q . V . . .
15.567	43.0954	128.58	. Q . V . . .
15.583	43.2741	129.80	. Q . V . . .

15.600	43.4546	131.02	. Q . V . . .
15.617	43.6368	132.24	. Q . V . . .
15.633	43.8206	133.46	. Q . V . . .
15.650	44.0061	134.68	. Q . V . . .
15.667	44.1941	136.47	. Q . V . . .
15.683	44.3861	139.44	. Q . V. . .
15.700	44.5823	142.44	. Q. V. . .
15.717	44.7827	145.44	. Q. V. . .
15.733	44.9871	148.44	. Q. V. . .
15.750	45.1957	151.45	. Q. V. . .
15.767	45.4085	154.45	. Q. V. . .
15.783	45.6254	157.45	. Q. V. . .
15.800	45.8464	160.46	. Q V. . .
15.817	46.0715	163.46	. Q V. . .
15.833	46.3008	166.46	. Q V. . .
15.850	46.5342	169.47	. Q V. . .
15.867	46.7718	172.47	. Q V . .
15.883	47.0135	175.47	. .Q V . .
15.900	47.2593	178.48	. .Q V . .
15.917	47.5093	181.48	. .Q V . .
15.933	47.7634	184.48	. .Q V . .
15.950	48.0216	187.48	. .Q V . .
15.967	48.2840	190.49	. . Q V . .
15.983	48.5505	193.49	. . Q V . .
16.000	48.8212	196.49	. . Q V . .
16.017	49.1083	208.43	. . Q .V . .
16.033	49.4241	229.30	. . Q .V . .
16.050	49.7687	250.17	. . Q .V . .
16.067	50.1420	271.03	. . Q .V . .
16.083	50.5441	291.90	. . Q .V . .
16.100	50.9749	312.77	. . Q.V . .
16.117	51.4345	333.64	. . .QV . .
16.133	51.9228	354.51	. . . Q . .
16.150	52.4398	375.38	. . . VQ . .
16.167	52.9856	396.24	. . . V Q . .
16.183	53.5601	417.11	. . . V Q . .
16.200	54.1634	437.98	. . . V Q . .
16.217	54.7954	458.85	. . . V Q. .
16.233	55.4562	479.72	. . . V Q .
16.250	56.1457	500.59	. . . V .Q .
16.267	56.8640	521.45	. . . V . Q .
16.283	57.6110	542.32	. . . V . Q .
16.300	58.3867	563.19	. . . V . Q .
16.317	59.1912	584.06	. . . V . Q .
16.333	60.0244	604.93	. . . V . Q .
16.350	60.8950	632.06	. . . V . Q
16.367	61.7423	615.13	. . . V . Q .
16.383	62.5563	590.94	. . . V . Q .
16.400	63.3369	566.76	. . . V . Q .
16.417	64.0843	542.58	. . . V . Q .
16.433	64.7983	518.39	. . . V . Q .
16.450	65.4791	494.21	. . . V .Q .
16.467	66.1265	470.02	. . . VQ. .
16.483	66.7406	445.84	. . . Q . .
16.500	67.3214	421.66	. . . Q V . .
16.517	67.8689	397.47	. . . Q V. .
16.533	68.3830	373.29	. . . Q V. .

Onsite Flood Routing Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1

and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61, ***with no Detention @ Node 56.3 & Node 35.2***

25-Year Storm Proposed Condition

16.550	68.8639	349.11	. . . Q V. .
16.567	69.3114	324.92	. . Q V. .
16.583	69.7257	300.74	. . Q. V. .
16.600	70.1066	276.55	. . Q . V .
16.617	70.4542	252.37	. . Q . V .
16.633	70.7685	228.19	. . Q . V .
16.650	71.0495	204.00	. . Q . V .
16.667	71.2972	179.82	. .Q . V .
16.683	71.5116	155.64	. Q. . V .
16.700	71.6951	133.23	. Q . . V .
16.717	71.8703	127.21	. Q . . V .
16.733	72.0427	125.18	. Q . . V .
16.750	72.2124	123.15	. Q . . .V .
16.767	72.3792	121.12	. Q . . .V .
16.783	72.5432	119.09	. Q . . .V .
16.800	72.7045	117.06	. Q . . .V .
16.817	72.8629	115.03	. Q . . .V .
16.833	73.0185	113.00	. Q . . .V .
16.850	73.1714	110.97	. Q . . .V .
16.867	73.3214	108.94	. Q . . .V .
16.883	73.4687	106.91	. Q . . .V .
16.900	73.6131	104.88	. Q . . .V .
16.917	73.7548	102.85	. Q . . .V .
16.933	73.8937	100.82	. Q . . .V .
16.950	74.0297	98.79	. Q . . .V .
16.967	74.1630	96.75	. Q . . .V .
16.983	74.2935	94.72	. Q . . .V .
17.000	74.4212	92.69	. Q . . .V .
17.017	74.5461	90.66	. Q . . . V .
17.033	74.6681	88.63	. Q . . . V .
17.050	74.7877	86.82	. Q . . . V .
17.067	74.9060	85.89	. Q . . . V .
17.083	75.0232	85.06	. Q . . . V .
17.100	75.1392	84.23	. Q . . . V .
17.117	75.2541	83.40	. Q . . . V .
17.133	75.3678	82.57	. Q . . . V .
17.150	75.4804	81.74	. Q . . . V .
17.167	75.5919	80.91	. Q . . . V .
17.183	75.7022	80.08	. Q . . . V .
17.200	75.8113	79.25	. Q . . . V .
17.217	75.9193	78.42	. Q . . . V .
17.233	76.0262	77.59	. Q . . . V .
17.250	76.1319	76.76	. Q . . . V .
17.267	76.2365	75.93	. Q . . . V .
17.283	76.3400	75.10	. Q . . . V .
17.300	76.4423	74.27	. Q . . . V .
17.317	76.5434	73.44	. Q . . . V .
17.333	76.6434	72.60	. Q . . . V .
17.350	76.7423	71.77	. Q . . . V .
17.367	76.8400	70.94	. Q . . . V .
17.383	76.9366	70.11	. Q . . . V .
17.400	77.0322	69.41	. Q . . . V .
17.417	77.1272	68.96	. Q . . . V .
17.433	77.2215	68.51	. Q . . . V .
17.450	77.3153	68.07	. Q . . . V .
17.467	77.4084	67.63	. Q . . . V .
17.483	77.5010	67.18	. Q . . . V .
17.500	77.5929	66.74	. Q . . . V .
17.517	77.6842	66.30	. Q . . . V .
17.533	77.7749	65.85	. Q . . . V .
17.550	77.8650	65.41	. Q . . . V .
17.567	77.9545	64.97	. Q . . . V .
17.583	78.0434	64.52	. Q . . . V .
17.600	78.1316	64.08	. Q . . . V .
17.617	78.2193	63.64	. Q . . . V .
17.633	78.3063	63.19	. Q . . . V .
17.650	78.3928	62.75	. Q . . . V .
17.667	78.4786	62.31	. Q . . . V .
17.683	78.5638	61.86	. Q . . . V .
17.700	78.6484	61.42	. Q . . . V .
17.717	78.7324	60.98	. Q . . . V .
17.733	78.8158	60.53	. Q . . . V .
17.750	78.8986	60.16	. Q . . . V .
17.767	78.9811	59.85	. Q . . . V .
17.783	79.0631	59.55	. Q . . . V .
17.800	79.1447	59.24	. Q . . . V .
17.817	79.2259	58.94	. Q . . . V .
17.833	79.3066	58.63	. Q . . . V .
17.850	79.3870	58.32	. Q . . . V .
17.867	79.4669	58.02	. Q . . . V .
17.883	79.5464	57.71	. Q . . . V .
17.900	79.6255	57.41	. Q . . . V .
17.917	79.7041	57.10	. Q . . . V .
17.933	79.7823	56.80	. Q . . . V .
17.950	79.8602	56.49	. Q . . . V .
17.967	79.9375	56.18	. Q . . . V .
17.983	80.0145	55.88	. Q . . . V .
18.000	80.0911	55.57	. Q . . . V .

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	1081.0
20%	355.0
30%	210.0
40%	165.0
50%	140.0
60%	110.0
70%	85.0
80%	55.0
90%	25.0

END OF FLOODSCx ROUTING ANALYSIS

```
**************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
          (c) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                     Planning * Engineering * Surveying
              Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                  *
* 100-YEAR STORM PROPOSED CONDITION WITH OFFSITE RUN-ON (COMBINE TO 1 AREA *
* W.O. #1443-136X. NO DETENTION                                          *
 **************************************************************************

  FILE NAME: FLD-99DC.DAT
  TIME/DATE OF STUDY: 11:31 06/10/2019

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE     61.00 IS CODE = 1.2
--------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
==========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =  339.75
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.074
    LOW LOSS FRACTION = 0.124
    TIME OF CONCENTRATION(MIN.) = 20.07
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.52
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.09
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.45
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.43
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.36
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.63

--------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =   127.47
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =    31.93

--------------------------------------------------------------------------

==========================================================================

                        2 4 - H O U R    S T O R M
                      R U N O F F    H Y D R O G R A P H

==========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
--------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.      205.3     410.7     616.0     821.3
--------------------------------------------------------------------------
  14.000     45.3846    93.31  .   Q     .   V     .         .         .
  14.017     45.5138    93.83  .   Q     .   V     .         .         .
  14.033     45.6438    94.41  .   Q     .   V     .         .         .
  14.050     45.7747    94.99  .   Q     .   V     .         .         .
  14.067     45.9063    95.57  .   Q     .   V     .         .         .
  14.083     46.0388    96.15  .   Q     .   V     .         .         .
  14.100     46.1720    96.73  .   Q     .   V     .         .         .
  14.117     46.3060    97.31  .   Q     .   V     .         .         .
  14.133     46.4409    97.89  .   Q     .   V     .         .         .
  14.150     46.5765    98.47  .   Q     .   V     .         .         .
  14.167     46.7129    99.05  .   Q     .   V     .         .         .
  14.183     46.8502    99.63  .   Q     .   V     .         .         .
  14.200     46.9882   100.21  .   Q     .   V     .         .         .
  14.217     47.1270   100.79  .   Q     .   V     .         .         .
  14.233     47.2667   101.37  .   Q     .   V     .         .         .
  14.250     47.4071   101.95  .   Q     .   V     .         .         .
  14.267     47.5483   102.54  .   Q     .   V     .         .         .
  14.283     47.6904   103.12  .    Q    .   V     .         .         .
  14.300     47.8332   103.70  .    Q    .    V    .         .         .
  14.317     47.9768   104.28  .    Q    .    V    .         .         .
  14.333     48.1213   104.84  .    Q    .    V    .         .         .
  14.350     48.2662   105.25  .    Q    .    V    .         .         .
  14.367     48.4117   105.61  .    Q    .    V    .         .         .
  14.383     48.5577   105.97  .    Q    .    V    .         .         .
  14.400     48.7041   106.33  .    Q    .    V    .         .         .
  14.417     48.8511   106.69  .    Q    .    V    .         .         .
  14.433     48.9985   107.05  .    Q    .    V    .         .         .
  14.450     49.1465   107.41  .    Q    .    V    .         .         .
  14.467     49.2949   107.77  .    Q    .    V    .         .         .
  14.483     49.4439   108.13  .    Q    .    V    .         .         .
  14.500     49.5933   108.49  .    Q    .    V    .         .         .
  14.517     49.7432   108.85  .    Q    .    V    .         .         .
  14.533     49.8937   109.21  .    Q    .    V    .         .         .
  14.550     50.0446   109.57  .    Q    .    V    .         .         .
  14.567     50.1960   109.93  .    Q    .    V    .         .         .
  14.583     50.3480   110.29  .    Q    .    V    .         .         .
  14.600     50.5004   110.65  .    Q    .    V    .         .         .
  14.617     50.6533   111.02  .    Q    .    V    .         .         .
  14.633     50.8067   111.38  .    Q    .    V    .         .         .
  14.650     50.9606   111.74  .    Q    .    V    .         .         .
  14.667     51.1150   112.12  .    Q    .     V   .         .         .
```

Onsite Flood Routing Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1
and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61, ***with no Detention @ Node 56.3 & Node 35.2***

100-Year Storm Proposed Condition

14.683	51.2706	112.96	. Q . V . . .
14.700	51.4276	113.96	. Q . V . . .
14.717	51.5859	114.96	. Q . V . . .
14.733	51.7457	115.96	. Q . V . . .
14.750	51.9068	116.97	. Q . V . . .
14.767	52.0693	117.97	. Q . V . . .
14.783	52.2331	118.97	. Q . V . . .
14.800	52.3984	119.97	. Q . V . . .
14.817	52.5650	120.97	. Q . V . . .
14.833	52.7330	121.98	. Q . V . . .
14.850	52.9024	122.98	. Q . V . . .
14.867	53.0732	123.98	. Q . V . . .
14.883	53.2453	124.98	. Q . V . . .
14.900	53.4189	125.98	. Q . V . . .
14.917	53.5938	126.99	. Q . V . . .
14.933	53.7701	127.99	. Q . V . . .
14.950	53.9477	128.99	. Q . V . . .
14.967	54.1268	129.99	. Q . V . . .
14.983	54.3072	130.99	. Q . V . . .
15.000	54.4890	131.99	. Q . V . . .
15.017	54.6720	132.81	. Q . V . . .
15.033	54.8559	133.56	. Q . V . . .
15.050	55.0409	134.30	. Q . V . . .
15.067	55.2269	135.05	. Q . V . . .
15.083	55.4140	135.79	. Q . V . . .
15.100	55.6020	136.53	. Q . V . . .
15.117	55.7911	137.28	. Q . V . . .
15.133	55.9812	138.02	. Q . V . . .
15.150	56.1724	138.76	. Q . V . . .
15.167	56.3645	139.51	. Q . V . . .
15.183	56.5577	140.25	. Q . V . . .
15.200	56.7519	141.00	. Q . V . . .
15.217	56.9472	141.74	. Q . V . . .
15.233	57.1434	142.48	. Q . V . . .
15.250	57.3407	143.23	. Q . V . . .
15.267	57.5390	143.97	. Q . V . . .
15.283	57.7383	144.71	. Q . V . . .
15.300	57.9387	145.46	. Q . V . . .
15.317	58.1401	146.20	. Q . V . . .
15.333	58.3425	146.96	. Q . V . . .
15.350	58.5468	148.31	. Q . V . . .
15.367	58.7534	150.03	. Q . V . . .
15.383	58.9625	151.75	. Q . V . . .
15.400	59.1739	153.47	. Q . V . . .
15.417	59.3876	155.19	. Q . V . . .
15.433	59.6038	156.91	. Q . V . . .
15.450	59.8223	158.63	. Q . V . . .
15.467	60.0431	160.35	. Q . V . . .
15.483	60.2664	162.07	. Q . V . . .
15.500	60.4920	163.79	. Q . V . . .
15.517	60.7200	165.51	. Q . V. . .
15.533	60.9503	167.23	. Q . V. . .
15.550	61.1830	168.95	. Q . V. . .
15.567	61.4181	170.67	. Q . V. . .
15.583	61.6556	172.39	. Q . V. . .
15.600	61.8954	174.11	. Q . V. . .
15.617	62.1376	175.83	. Q . V. . .
15.633	62.3821	177.55	. Q . V. . .
15.650	62.6291	179.27	. Q . V. . .
15.667	62.8784	180.99	. Q . V. . .
15.683	63.1316	183.86	. Q . V. . .
15.700	63.3900	187.59	. Q. V. . .
15.717	63.6535	191.33	. Q. V. . .
15.733	63.9222	195.07	. Q. V . .
15.750	64.1961	198.80	. Q. V . .
15.767	64.4750	202.54	. Q. V . .
15.783	64.7592	206.28	. Q V . .
15.800	65.0484	210.01	. Q V . .
15.817	65.3429	213.75	. Q V . .
15.833	65.6424	217.48	. Q V . .
15.850	65.9471	221.22	. Q V . .
15.867	66.2570	224.96	. Q V . .
15.883	66.5720	228.69	. .Q V . .
15.900	66.8922	232.43	. .Q V . .
15.917	67.2175	236.17	. .Q .V . .
15.933	67.5479	239.90	. .Q .V . .
15.950	67.8835	243.64	. .Q .V . .
15.967	68.2242	247.37	. . Q .V . .
15.983	68.5701	251.11	. . Q .V . .
16.000	68.9211	254.85	. . Q .V . .
16.017	69.2941	270.78	. . Q .V . .
16.033	69.7058	298.91	. . Q .V . .
16.050	70.1563	327.05	. . Q . V . .
16.067	70.6455	355.18	. . Q . V . .
16.083	71.1735	383.31	. . Q . V . .
16.100	71.7402	411.45	. . Q V . .
16.117	72.3457	439.58	. . .QV . .
16.133	72.9900	467.71	. . . Q . .
16.150	73.6729	495.84	. . . VQ . .
16.167	74.3947	523.97	. . . V Q . .
16.183	75.1551	552.11	. . . V Q . .
16.200	75.9544	580.24	. . . V Q . .
16.217	76.7923	608.37	. . . V Q. .
16.233	77.6691	636.51	. . . V Q .
16.250	78.5845	664.64	. . . V . Q .
16.267	79.5388	692.77	. . . V . Q .
16.283	80.5318	720.90	. . . V . Q .
16.300	81.5635	749.03	. . . V . Q .
16.317	82.6340	777.17	. . . V . Q .
16.333	83.7432	805.30	. . . V . Q.
16.350	84.8745	821.33	. . . V . Q
16.367	85.9419	774.90	. . . V . Q .
16.383	86.9645	742.42	. . . V . Q .
16.400	87.9424	709.95	. . . V . Q .
16.417	88.8755	677.47	. . . V . Q .
16.433	89.7640	645.00	. . . V .Q .
16.450	90.6077	612.53	. . . VQ. .
16.467	91.4066	580.05	. . . Q . .
16.483	92.1609	547.58	. . . Q V . .
16.500	92.8704	515.10	. . . Q V. .
16.517	93.5352	482.63	. . . Q V. .
16.533	94.1552	450.16	. . .Q V. .
16.550	94.7305	417.68	. . Q V. .
16.567	95.2611	385.21	. . Q . V. .
16.583	95.7470	352.73	. . Q . V .
16.600	96.1881	320.26	. . Q . V .

Onsite Flood Routing Area "A"

With Upstream Offsite Runoffs via 84" RCP Inlet at Rancho Parkway (F19-P07) Node 24.1
and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61, ***with no Detention @ Node 56.3 & Node 35.2***

100-Year Storm Proposed Condition

```
16.617     96.5845    287.79  .         .   Q     .         V         .
16.633     96.9362    255.31  .         . Q       .         V         .
16.650     97.2431    222.84  .         Q         .         V         .
16.667     97.5053    190.37  .        Q.         .         V         .
16.683     97.7381    169.00  .       Q .         .         V         .
16.700     97.9672    166.29  .       Q .         .         V         .
16.717     98.1929    163.87  .      Q  .         .         V         .
16.733     98.4153    161.45  .      Q  .         .         V         .
16.750     98.6343    159.04  .      Q  .         .         V         .
16.767     98.8501    156.62  .      Q  .         .         .V        .
16.783     99.0625    154.20  .      Q  .         .         .V        .
16.800     99.2715    151.78  .      Q  .         .         .V        .
16.817     99.4773    149.36  .      Q  .         .         .V        .
16.833     99.6797    146.94  .      Q  .         .         .V        .
16.850     99.8787    144.52  .      Q  .         .         .V        .
16.867    100.0745    142.10  .     Q   .         .         .V        .
16.883    100.2669    139.69  .     Q   .         .         .V        .
16.900    100.4559    137.27  .     Q   .         .         .V        .
16.917    100.6417    134.85  .     Q   .         .         .V        .
16.933    100.8241    132.43  .     Q   .         .         .V        .
16.950    101.0032    130.01  .     Q   .         .         .V        .
16.967    101.1789    127.59  .     Q   .         .         .V        .
16.983    101.3513    125.17  .     Q   .         .         .V        .
17.000    101.5204    122.76  .    Q    .         .         .V        .
17.017    101.6867    120.74  .    Q    .         .         .V        .
17.033    101.8514    119.58  .    Q    .         .         .V        .
17.050    102.0146    118.46  .    Q    .         .         . V       .
17.067    102.1762    117.33  .    Q    .         .         . V       .
17.083    102.3363    116.20  .    Q    .         .         . V       .
17.100    102.4948    115.07  .    Q    .         .         . V       .
17.117    102.6517    113.95  .    Q    .         .         . V       .
17.133    102.8071    112.82  .    Q    .         .         . V       .
17.150    102.9610    111.69  .    Q    .         .         . V       .
17.167    103.1133    110.56  .    Q    .         .         . V       .
17.183    103.2640    109.44  .    Q    .         .         . V       .
17.200    103.4132    108.31  .    Q    .         .         . V       .
17.217    103.5608    107.18  .    Q    .         .         . V       .
17.233    103.7069    106.05  .    Q    .         .         . V       .
17.250    103.8514    104.93  .    Q    .         .         . V       .
17.267    103.9944    103.80  .    Q    .         .         . V       .
17.283    104.1358    102.67  .    Q    .         .         . V       .
17.300    104.2757    101.54  .   Q     .         .         . V       .
17.317    104.4140    100.42  .   Q     .         .         . V       .
17.333    104.5507     99.29  .   Q     .         .         . V       .
17.350    104.6861     98.28  .   Q     .         .         . V       .
17.367    104.8205     97.59  .   Q     .         .         . V       .
17.383    104.9540     96.93  .   Q     .         .         . V       .
17.400    105.0866     96.26  .   Q     .         .         . V       .
17.417    105.2183     95.59  .   Q     .         .         .  V      .
17.433    105.3491     94.92  .   Q     .         .         .  V      .
17.450    105.4789     94.26  .   Q     .         .         .  V      .
17.467    105.6078     93.59  .   Q     .         .         .  V      .
17.483    105.7358     92.92  .   Q     .         .         .  V      .
17.500    105.8629     92.26  .   Q     .         .         .  V      .
17.517    105.9890     91.59  .   Q     .         .         .  V      .
17.533    106.1143     90.92  .   Q     .         .         .  V      .
17.550    106.2386     90.25  .   Q     .         .         .  V      .
17.567    106.3620     89.59  .   Q     .         .         .  V      .
17.583    106.4844     88.92  .   Q     .         .         .  V      .
17.600    106.6060     88.25  .   Q     .         .         .  V      .
17.617    106.7266     87.58  .   Q     .         .         .  V      .
17.633    106.8464     86.92  .   Q     .         .         .  V      .
17.650    106.9652     86.25  .   Q     .         .         .  V      .
17.667    107.0830     85.58  .   Q     .         .         .  V      .
17.683    107.2001     84.96  .   Q     .         .         .  V      .
17.700    107.3164     84.49  .   Q     .         .         .  V      .
17.717    107.4322     84.03  .   Q     .         .         .  V      .
17.733    107.5473     83.57  .   Q     .         .         .  V      .
17.750    107.6618     83.11  .   Q     .         .         .  V      .
17.767    107.7756     82.65  .   Q     .         .         .  V      .
17.783    107.8888     82.19  .   Q     .         .         .  V      .
17.800    108.0014     81.73  .  Q      .         .         .  V      .
17.817    108.1133     81.28  .  Q      .         .         .  V      .
17.833    108.2247     80.82  .  Q      .         .         .  V      .
17.850    108.3354     80.36  .  Q      .         .         .  V      .
17.867    108.4454     79.90  .  Q      .         .         .   V     .
17.883    108.5548     79.44  .  Q      .         .         .   V     .
17.900    108.6636     78.98  .  Q      .         .         .   V     .
17.917    108.7718     78.52  .  Q      .         .         .   V     .
17.933    108.8793     78.06  .  Q      .         .         .   V     .
17.950    108.9862     77.61  .  Q      .         .         .   V     .
17.967    109.0925     77.15  .  Q      .         .         .   V     .
17.983    109.1981     76.69  .  Q      .         .         .   V     .
18.000    109.3031     76.23  .  Q      .         .         .   V     .
--------------------------------------------------------------------------------
```

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	1081.0
20%	360.0
30%	205.0
40%	160.0
50%	140.0
60%	110.0
70%	85.0
80%	55.0
90%	30.0

==

END OF FLOODSCx ROUTING ANALYSIS

```
**************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
         (c) Copyright 1989-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                         Analysis prepared by:

                         HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                  *
* 2-YEAR STORM EXISTING CONDITION AREA "B" AT NODE 15                    *
* W.O. #1443-136X                                                        *
 **************************************************************************

  FILE NAME: ON02X15.DAT
  TIME/DATE OF STUDY: 09:00 10/29/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


**************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     15.00 IS CODE = 1.2
--------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
==========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =   43.40
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.254
    LOW LOSS FRACTION = 0.960
    TIME OF CONCENTRATION(MIN.) = 33.75
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =   2
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.53
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  0.89
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.22
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  2.05

--------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     1.06
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     6.36

--------------------------------------------------------------------------

==========================================================================

                      2 4 - H O U R    S T O R M
                   R U N O F F    H Y D R O G R A P H

==========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
--------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.        4.8       9.6       14.4      19.2
--------------------------------------------------------------------------
  14.000      0.0590      0.19  Q V       .         .         .         .
  14.017      0.0593      0.19  Q V       .         .         .         .
  14.033      0.0596      0.19  Q V       .         .         .         .
  14.050      0.0598      0.19  Q V       .         .         .         .
  14.067      0.0601      0.19  Q V       .         .         .         .
  14.083      0.0604      0.20  Q V       .         .         .         .
  14.100      0.0606      0.20  Q V       .         .         .         .
  14.117      0.0609      0.20  Q V       .         .         .         .
  14.133      0.0612      0.20  Q V       .         .         .         .
  14.150      0.0615      0.20  Q V       .         .         .         .
  14.167      0.0617      0.20  Q V       .         .         .         .
  14.183      0.0620      0.20  Q V       .         .         .         .
  14.200      0.0623      0.20  Q V       .         .         .         .
  14.217      0.0626      0.20  Q V       .         .         .         .
  14.233      0.0629      0.20  Q V       .         .         .         .
  14.250      0.0631      0.21  Q V       .         .         .         .
  14.267      0.0634      0.21  Q V       .         .         .         .
  14.283      0.0637      0.21  Q V       .         .         .         .
  14.300      0.0640      0.21  Q V       .         .         .         .
  14.317      0.0643      0.21  Q V       .         .         .         .
  14.333      0.0646      0.21  Q V       .         .         .         .
  14.350      0.0649      0.21  Q V       .         .         .         .
  14.367      0.0652      0.21  Q V       .         .         .         .
  14.383      0.0655      0.21  Q V       .         .         .         .
  14.400      0.0657      0.21  Q V       .         .         .         .
  14.417      0.0660      0.22  Q V       .         .         .         .
  14.433      0.0663      0.22  Q V       .         .         .         .
  14.450      0.0666      0.22  Q V       .         .         .         .
  14.467      0.0669      0.22  Q V       .         .         .         .
  14.483      0.0672      0.22  Q V       .         .         .         .
  14.500      0.0675      0.22  Q V       .         .         .         .
  14.517      0.0678      0.22  Q V       .         .         .         .
  14.533      0.0682      0.22  Q V       .         .         .         .
  14.550      0.0685      0.22  Q V       .         .         .         .
  14.567      0.0688      0.22  Q V       .         .         .         .
  14.583      0.0691      0.22  Q V       .         .         .         .
  14.600      0.0694      0.22  Q V       .         .         .         .
  14.617      0.0697      0.23  Q V       .         .         .         .
  14.633      0.0700      0.23  Q V       .         .         .         .
  14.650      0.0703      0.23  Q V       .         .         .         .
  14.667      0.0706      0.23  Q V       .         .         .         .
```

14.683	0.0709	0.23	Q	V	.	.	.	.
14.700	0.0713	0.23	Q	V	.	.	.	.
14.717	0.0716	0.23	Q	V	.	.	.	.
14.733	0.0719	0.23	Q	V	.	.	.	.
14.750	0.0722	0.23	Q	V	.	.	.	.
14.767	0.0725	0.23	Q	V	.	.	.	.
14.783	0.0729	0.23	Q	V	.	.	.	.
14.800	0.0732	0.24	Q	V	.	.	.	.
14.817	0.0735	0.24	Q	V	.	.	.	.
14.833	0.0738	0.24	Q	V	.	.	.	.
14.850	0.0742	0.24	Q	V	.	.	.	.
14.867	0.0745	0.24	Q	V	.	.	.	.
14.883	0.0748	0.24	Q	V	.	.	.	.
14.900	0.0752	0.24	Q	V	.	.	.	.
14.917	0.0755	0.24	Q	V	.	.	.	.
14.933	0.0758	0.25	Q	V	.	.	.	.
14.950	0.0762	0.25	Q	V	.	.	.	.
14.967	0.0765	0.25	Q	V	.	.	.	.
14.983	0.0769	0.26	Q	V	.	.	.	.
15.000	0.0772	0.26	Q	V	.	.	.	.
15.017	0.0776	0.26	Q	V	.	.	.	.
15.033	0.0780	0.26	Q	V	.	.	.	.
15.050	0.0783	0.27	Q	V	.	.	.	.
15.067	0.0787	0.27	Q	V	.	.	.	.
15.083	0.0791	0.27	Q	V	.	.	.	.
15.100	0.0795	0.27	Q	V	.	.	.	.
15.117	0.0798	0.28	Q	V	.	.	.	.
15.133	0.0802	0.28	Q	V	.	.	.	.
15.150	0.0806	0.28	Q	V	.	.	.	.
15.167	0.0810	0.28	Q	V	.	.	.	.
15.183	0.0814	0.29	Q	V	.	.	.	.
15.200	0.0818	0.29	Q	V	.	.	.	.
15.217	0.0822	0.29	Q	V	.	.	.	.
15.233	0.0826	0.29	Q	V	.	.	.	.
15.250	0.0830	0.30	Q	V	.	.	.	.
15.267	0.0834	0.30	Q	V	.	.	.	.
15.283	0.0838	0.30	Q	V	.	.	.	.
15.300	0.0843	0.31	Q	V	.	.	.	.
15.317	0.0847	0.31	Q	V	.	.	.	.
15.333	0.0851	0.31	Q	V	.	.	.	.
15.350	0.0855	0.31	Q	V	.	.	.	.
15.367	0.0860	0.32	Q	V	.	.	.	.
15.383	0.0864	0.32	Q	V	.	.	.	.
15.400	0.0869	0.32	Q	V	.	.	.	.
15.417	0.0873	0.32	Q	V	.	.	.	.
15.433	0.0877	0.33	Q	V	.	.	.	.
15.450	0.0882	0.33	Q	V	.	.	.	.
15.467	0.0887	0.33	Q	V	.	.	.	.
15.483	0.0891	0.33	Q	V	.	.	.	.
15.500	0.0896	0.33	Q	V	.	.	.	.
15.517	0.0900	0.34	Q	V	.	.	.	.
15.533	0.0905	0.34	Q	V	.	.	.	.
15.550	0.0910	0.34	Q	V	.	.	.	.
15.567	0.0914	0.34	Q	V	.	.	.	.
15.583	0.0919	0.34	Q	V	.	.	.	.
15.600	0.0924	0.35	Q	V	.	.	.	.
15.617	0.0929	0.35	Q	V	.	.	.	.
15.633	0.0933	0.35	Q	V	.	.	.	.
15.650	0.0938	0.35	Q	V	.	.	.	.
15.667	0.0943	0.35	Q	V	.	.	.	.
15.683	0.0948	0.35	Q	V	.	.	.	.
15.700	0.0953	0.36	Q	V	.	.	.	.
15.717	0.0958	0.36	Q	V	.	.	.	.
15.733	0.0963	0.36	Q	V	.	.	.	.
15.750	0.0968	0.36	Q	V	.	.	.	.
15.767	0.0973	0.36	Q	V	.	.	.	.
15.783	0.0978	0.37	Q	V	.	.	.	.
15.800	0.0983	0.37	Q	V	.	.	.	.
15.817	0.0988	0.37	Q	V	.	.	.	.
15.833	0.0993	0.37	Q	V	.	.	.	.
15.850	0.0998	0.37	Q	V	.	.	.	.
15.867	0.1003	0.38	Q	V	.	.	.	.
15.883	0.1009	0.38	Q	V	.	.	.	.
15.900	0.1014	0.38	Q	V	.	.	.	.
15.917	0.1019	0.38	Q	V	.	.	.	.
15.933	0.1024	0.38	Q	V	.	.	.	.
15.950	0.1030	0.38	Q	V	.	.	.	.
15.967	0.1035	0.39	Q	V	.	.	.	.
15.983	0.1040	0.39	Q	V	.	.	.	.
16.000	0.1046	0.39	Q	V	.	.	.	.
16.017	0.1055	0.67	.Q	V	.	.	.	.
16.033	0.1072	1.23	. Q	V	.	.	.	.
16.050	0.1096	1.79	.	QV	.	.	.	.
16.067	0.1129	2.34	.	Q	.	.	.	.
16.083	0.1169	2.90	.	V Q	.	.	.	.
16.100	0.1216	3.46	.	V	Q .	.	.	.
16.117	0.1272	4.02	.	V	Q .	.	.	.
16.133	0.1335	4.57	.	V	Q.	.	.	.
16.150	0.1405	5.13	.	V	Q	.	.	.
16.167	0.1484	5.69	.	V	.Q	.	.	.
16.183	0.1570	6.25	.	V	. Q	.	.	.
16.200	0.1663	6.81	.	V	. Q	.	.	.
16.217	0.1765	7.36	.	V	. Q	.	.	.
16.233	0.1874	7.92	.	V	. Q	.	.	.
16.250	0.1991	8.48	.	V	. Q	.	.	.
16.267	0.2115	9.04	.	V	. Q	.	.	.
16.283	0.2247	9.59	.	V	. Q.	.	.	.
16.300	0.2387	10.15	.	V.	.Q	.	.	.
16.317	0.2535	10.71	.	V.	. Q	.	.	.
16.333	0.2690	11.27	.	V	. Q	.	.	.
16.350	0.2853	11.82	.	V	. Q	.	.	.
16.367	0.3023	12.38	.	.V	. Q	.	.	.
16.383	0.3202	12.94	.	. V	. Q	.	.	.
16.400	0.3388	13.50	.	. V	. Q	.	.	.
16.417	0.3581	14.06	.	. V	. Q.	.	.	.
16.433	0.3782	14.61	.	. V	. Q	.	.	.
16.450	0.3991	15.17	.	. V	. .Q	.	.	.
16.467	0.4208	15.73	.	. V	. . Q	.	.	.
16.483	0.4432	16.29	.	. V	. . Q	.	.	.
16.500	0.4664	16.84	.	. V	. . Q	.	.	.
16.517	0.4904	17.40	.	. V	. . Q	.	.	.
16.533	0.5152	17.96	.	. V.	. . Q	.	.	.
16.550	0.5407	18.52	.	. V	. . Q	.	.	.
16.567	0.5671	19.22	.	. .V	. . Q	.	.	.
16.583	0.5930	18.79	.	. . V	. . Q.	.	.	.
16.600	0.6181	18.23	.	. . V	. . Q	.	.	.

Onsite Flood Routing Area "B" @ Node 15

Drainage Area "B" Tributary to Existing 84" RCP (F19) Serrano Creek

2-Year Storm Existing Condition

16.617	0.6425	17.67	. . . V . Q .
16.633	0.6660	17.11	. . . V . Q .
16.650	0.6888	16.55	. . . V . Q .
16.667	0.7109	15.99	. . . V . Q .
16.683	0.7321	15.43	. . . V . Q .
16.700	0.7526	14.87	. . . V Q .
16.717	0.7723	14.30	. . . Q. .
16.733	0.7912	13.74	. . . QV. .
16.750	0.8094	13.18	. . . Q V .
16.767	0.8268	12.62	. . . Q .V .
16.783	0.8434	12.06	. . . Q .V .
16.800	0.8592	11.50	. . Q . V .
16.817	0.8743	10.94	. . Q . V .
16.833	0.8886	10.38	. .Q . V .
16.850	0.9021	9.81	. . Q . V .
16.867	0.9148	9.25	. . Q. . V .
16.883	0.9268	8.69	. . Q . . V .
16.900	0.9380	8.13	. . Q . . V .
16.917	0.9484	7.57	. . Q . . V .
16.933	0.9581	7.01	. . Q . . V .
16.950	0.9670	6.45	. . Q . . V .
16.967	0.9751	5.89	. . Q . . V .
16.983	0.9824	5.32	. .Q . . V .
17.000	0.9890	4.76	. Q. . . V .
17.017	0.9948	4.20	. Q . . . V .
17.033	0.9998	3.64	. Q . . . V .
17.050	1.0040	3.08	. Q . . . V .
17.067	1.0075	2.52	. Q . . . V .
17.083	1.0102	1.96	. Q . . . V .
17.100	1.0121	1.40	. Q . . . V .
17.117	1.0132	0.84	.Q . . . V .
17.133	1.0137	0.34	Q . . . V .
17.150	1.0141	0.27	Q . . . V .
17.167	1.0145	0.27	Q . . . V .
17.183	1.0148	0.27	Q . . . V .
17.200	1.0152	0.26	Q . . . V .
17.217	1.0156	0.26	Q . . . V .
17.233	1.0159	0.26	Q . . . V .
17.250	1.0163	0.26	Q . . . V .
17.267	1.0166	0.25	Q . . . V .
17.283	1.0170	0.25	Q . . . V .
17.300	1.0173	0.25	Q . . . V .
17.317	1.0176	0.25	Q . . . V .
17.333	1.0180	0.24	Q . . . V .
17.350	1.0183	0.24	Q . . . V .
17.367	1.0186	0.24	Q . . . V .
17.383	1.0190	0.24	Q . . . V .
17.400	1.0193	0.23	Q . . . V .
17.417	1.0196	0.23	Q . . . V .
17.433	1.0199	0.23	Q . . . V .
17.450	1.0202	0.23	Q . . . V .
17.467	1.0205	0.22	Q . . . V .
17.483	1.0209	0.22	Q . . . V .
17.500	1.0212	0.22	Q . . . V .
17.517	1.0215	0.22	Q . . . V .
17.533	1.0217	0.21	Q . . . V .
17.550	1.0220	0.21	Q . . . V .
17.567	1.0223	0.21	Q . . . V .
17.583	1.0226	0.21	Q . . . V .
17.600	1.0229	0.20	Q . . . V .
17.617	1.0232	0.20	Q . . . V .
17.633	1.0234	0.20	Q . . . V .
17.650	1.0237	0.20	Q . . . V .
17.667	1.0240	0.19	Q . . . V .
17.683	1.0242	0.19	Q . . . V .
17.700	1.0245	0.19	Q . . . V .
17.717	1.0248	0.19	Q . . . V .
17.733	1.0250	0.19	Q . . . V .
17.750	1.0253	0.19	Q . . . V .
17.767	1.0255	0.19	Q . . . V .
17.783	1.0258	0.18	Q . . . V .
17.800	1.0260	0.18	Q . . . V .
17.817	1.0263	0.18	Q . . . V .
17.833	1.0265	0.18	Q . . . V .
17.850	1.0268	0.18	Q . . . V .
17.867	1.0270	0.18	Q . . . V .
17.883	1.0273	0.18	Q . . . V .
17.900	1.0275	0.18	Q . . . V .
17.917	1.0278	0.18	Q . . . V .
17.933	1.0280	0.17	Q . . . V .
17.950	1.0282	0.17	Q . . . V .
17.967	1.0285	0.17	Q . . . V .
17.983	1.0287	0.17	Q . . . V .
18.000	1.0289	0.17	Q . . . V .

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	310.0
20%	275.0
30%	240.0
40%	205.0
50%	170.0
60%	135.0
70%	105.0
80%	70.0
90%	35.0

END OF FLOODSCx ROUTING ANALYSIS

Onsite Flood Routing Area "B" @ Node 15

Drainage Area "B" Tributary to Existing 84" RCP (F19) Serrano Creek

2-Year Storm Existing Condition

```
**************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
         (c) Copyright 1989-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                         Analysis prepared by:

                         HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                  *
* 25-YEAR STORM EXISTING CONDITION AREA "B" AT NODE 15                   *
* W.O. #1443-136X                                                        *
 **************************************************************************

  FILE NAME: ON25X15.DAT
  TIME/DATE OF STUDY: 09:02 10/29/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


**************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     15.00 IS CODE = 1.2
--------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
==========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =   43.40
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.254
    LOW LOSS FRACTION = 0.548
    TIME OF CONCENTRATION(MIN.) = 27.28
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =  25
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.87
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.15
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.94
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  2.71
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  4.49

--------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     7.81
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     8.43

--------------------------------------------------------------------------

==========================================================================

                      2 4 - H O U R    S T O R M
                   R U N O F F    H Y D R O G R A P H

==========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
--------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       15.5      30.9      46.4      61.8
--------------------------------------------------------------------------
  14.000      2.3200      5.02  .  Q      .V        .         .         .
  14.017      2.3269      5.03  .  Q      .V        .         .         .
  14.033      2.3338      5.04  .  Q      .V        .         .         .
  14.050      2.3408      5.06  .  Q      .V        .         .         .
  14.067      2.3478      5.07  .  Q      . V       .         .         .
  14.083      2.3548      5.08  .  Q      . V       .         .         .
  14.100      2.3618      5.09  .  Q      . V       .         .         .
  14.117      2.3688      5.10  .  Q      . V       .         .         .
  14.133      2.3759      5.12  .  Q      . V       .         .         .
  14.150      2.3829      5.13  .  Q      . V       .         .         .
  14.167      2.3900      5.14  .  Q      . V       .         .         .
  14.183      2.3971      5.15  .  Q      . V       .         .         .
  14.200      2.4042      5.17  .  Q      . V       .         .         .
  14.217      2.4114      5.20  .  Q      . V       .         .         .
  14.233      2.4186      5.24  .  Q      . V       .         .         .
  14.250      2.4259      5.27  .  Q      . V       .         .         .
  14.267      2.4332      5.30  .  Q      . V       .         .         .
  14.283      2.4405      5.33  .  Q      . V       .         .         .
  14.300      2.4479      5.36  .  Q      . V       .         .         .
  14.317      2.4553      5.39  .  Q      . V       .         .         .
  14.333      2.4628      5.42  .  Q      . V       .         .         .
  14.350      2.4703      5.45  .  Q      . V       .         .         .
  14.367      2.4778      5.48  .  Q      . V       .         .         .
  14.383      2.4854      5.51  .  Q      . V       .         .         .
  14.400      2.4930      5.54  .  Q      . V       .         .         .
  14.417      2.5007      5.57  .  Q      . V       .         .         .
  14.433      2.5084      5.60  .  Q      . V       .         .         .
  14.450      2.5162      5.63  .  Q      . V       .         .         .
  14.467      2.5240      5.66  .  Q      . V       .         .         .
  14.483      2.5318      5.69  .  Q      . V       .         .         .
  14.500      2.5397      5.72  .  Q      .  V      .         .         .
  14.517      2.5476      5.75  .  Q      .  V      .         .         .
  14.533      2.5556      5.78  .  Q      .  V      .         .         .
  14.550      2.5636      5.81  .  Q      .  V      .         .         .
  14.567      2.5716      5.84  .  Q      .  V      .         .         .
  14.583      2.5797      5.87  .  Q      .  V      .         .         .
  14.600      2.5878      5.90  .  Q      .  V      .         .         .
  14.617      2.5960      5.93  .  Q      .  V      .         .         .
  14.633      2.6042      5.96  .  Q      .  V      .         .         .
  14.650      2.6125      5.99  .  Q      .  V      .         .         .
  14.667      2.6208      6.02  .  Q      .  V      .         .         .
```

Onsite Flood Routing Area "B" @ Node 15

Drainage Area "B" Tributary to Existing 84" RCP (F19) Serrano Creek

25-Year Storm Existing Condition

14.683	2.6291	6.04	. Q . V . . .
14.700	2.6375	6.07	. Q . V . . .
14.717	2.6458	6.09	. Q . V . . .
14.733	2.6543	6.12	. Q . V . . .
14.750	2.6627	6.14	. Q . V . . .
14.767	2.6712	6.16	. Q . V . . .
14.783	2.6797	6.19	. Q . V . . .
14.800	2.6883	6.21	. Q . V . . .
14.817	2.6969	6.24	. Q . V . . .
14.833	2.7055	6.26	. Q . V . . .
14.850	2.7142	6.29	. Q . V . . .
14.867	2.7229	6.31	. Q . V . . .
14.883	2.7316	6.34	. Q . V . . .
14.900	2.7404	6.36	. Q . V . . .
14.917	2.7492	6.38	. Q . V . . .
14.933	2.7580	6.41	. Q . V . . .
14.950	2.7668	6.43	. Q . V . . .
14.967	2.7757	6.46	. Q . V . . .
14.983	2.7847	6.48	. Q . V . . .
15.000	2.7936	6.51	. Q . V . . .
15.017	2.8026	6.53	. Q . V . . .
15.033	2.8117	6.56	. Q . V . . .
15.050	2.8207	6.58	. Q . V . . .
15.067	2.8298	6.60	. Q . V . . .
15.083	2.8389	6.63	. Q . V . . .
15.100	2.8481	6.67	. Q . V . . .
15.117	2.8574	6.76	. Q . V . . .
15.133	2.8669	6.87	. Q . V . . .
15.150	2.8765	6.97	. Q . V . . .
15.167	2.8863	7.08	. Q . V . . .
15.183	2.8962	7.18	. Q . V . . .
15.200	2.9062	7.29	. Q . V . . .
15.217	2.9164	7.39	. Q . V . . .
15.233	2.9267	7.50	. Q . V . . .
15.250	2.9372	7.60	. Q . V . . .
15.267	2.9478	7.71	. Q . V . . .
15.283	2.9586	7.81	. Q . V . . .
15.300	2.9695	7.92	. Q . V . . .
15.317	2.9805	8.02	. Q . V . . .
15.333	2.9917	8.13	. Q . V . . .
15.350	3.0031	8.23	. Q . V . . .
15.367	3.0146	8.34	. Q . V . . .
15.383	3.0262	8.44	. Q . V . . .
15.400	3.0380	8.55	. Q . V . . .
15.417	3.0499	8.65	. Q . V . . .
15.433	3.0619	8.76	. Q . V . . .
15.450	3.0742	8.86	. Q . V . . .
15.467	3.0865	8.97	. Q . V . . .
15.483	3.0990	9.08	. Q . V . . .
15.500	3.1117	9.18	. Q . V . . .
15.517	3.1244	9.29	. Q . V . . .
15.533	3.1374	9.39	. Q . V . . .
15.550	3.1505	9.50	. Q . V . . .
15.567	3.1637	9.63	. Q . V . . .
15.583	3.1772	9.77	. Q . V . . .
15.600	3.1909	9.92	. Q . V . . .
15.617	3.2047	10.06	. Q . V . . .
15.633	3.2188	10.21	. Q . V . . .
15.650	3.2330	10.35	. Q . V . . .
15.667	3.2475	10.49	. Q . V . . .
15.683	3.2621	10.64	. Q . V . . .
15.700	3.2770	10.78	. Q . V . . .
15.717	3.2920	10.93	. Q . V . . .
15.733	3.3073	11.07	. Q . V . . .
15.750	3.3227	11.21	. Q . V . . .
15.767	3.3384	11.36	. Q . V . . .
15.783	3.3542	11.50	. Q . V . . .
15.800	3.3703	11.64	. Q . V . . .
15.817	3.3865	11.79	. Q . V . . .
15.833	3.4029	11.93	. Q . V . . .
15.850	3.4196	12.08	. Q . V . . .
15.867	3.4364	12.22	. Q . V . . .
15.883	3.4534	12.36	. Q . V . . .
15.900	3.4707	12.51	. Q . V . . .
15.917	3.4881	12.65	. Q . V . . .
15.933	3.5057	12.80	. Q . V . . .
15.950	3.5235	12.94	. Q . V . . .
15.967	3.5415	13.08	. Q . V . . .
15.983	3.5598	13.23	. Q . V . . .
16.000	3.5782	13.37	. Q . V . . .
16.017	3.5979	14.33	. Q. V . . .
16.033	3.6201	16.10	. Q V . . .
16.050	3.6447	17.87	. Q V . . .
16.067	3.6718	19.65	. Q V . . .
16.083	3.7013	21.42	. Q V . . .
16.100	3.7332	23.19	. Q V. . . .
16.117	3.7676	24.97	. Q V. . . .
16.133	3.8044	26.74	. Q V. . . .
16.150	3.8437	28.51	. QV. . . .
16.167	3.8854	30.28	. Q. . . .
16.183	3.9296	32.06	. Q . . .
16.200	3.9762	33.83	. VQ . . .
16.217	4.0252	35.60	. V Q . . .
16.233	4.0767	37.37	. V Q . . .
16.250	4.1306	39.15	. .V Q . . .
16.267	4.1870	40.92	. .V Q . . .
16.283	4.2458	42.69	. .V Q . . .
16.300	4.3070	44.46	. . V Q . . .
16.317	4.3707	46.24	. . V Q. . . .
16.333	4.4368	48.01	. . V .Q . . .
16.350	4.5054	49.78	. . V . Q . . .
16.367	4.5764	51.56	. . V . Q . . .
16.383	4.6499	53.33	. . V . Q . . .
16.400	4.7258	55.10	. . V . Q . . .
16.417	4.8041	56.87	. . V . Q . . .
16.433	4.8849	58.65	. . V . Q . . .
16.450	4.9681	60.42	. . V . Q. . .
16.467	5.0532	61.80	. . V . Q . .
16.483	5.1350	59.38	. . V . Q . . .
16.500	5.2141	57.39	. . V . Q . . .
16.517	5.2904	55.40	. . V . Q . . .
16.533	5.3640	53.42	. . V . Q . . .
16.550	5.4348	51.43	. . V . Q . . .
16.567	5.5029	49.44	. . V . Q . . .
16.583	5.5683	47.46	. . V Q . . .
16.600	5.6309	45.47	. . VQ. . . .

Onsite Flood Routing Area "B" @ Node 15

Drainage Area "B" Tributary to Existing 84" RCP (F19) Serrano Creek

25-Year Storm Existing Condition

```
16.617     5.6908    43.48  .         .         .       QV.         .
16.633     5.7480    41.49  .         .         .     Q  V.         .
16.650     5.8024    39.51  .         .         .    Q   V.         .
16.667     5.8541    37.52  .         .         .   Q    V.         .
16.683     5.9030    35.53  .         .         . Q       V         .
16.700     5.9492    33.55  .         .         .Q        V         .
16.717     5.9927    31.56  .         .         Q         V         .
16.733     6.0334    29.57  .         .        Q.         V         .
16.750     6.0714    27.59  .         .      Q  .         .V        .
16.767     6.1067    25.60  .         .     Q   .         .V        .
16.783     6.1392    23.61  .         .    Q    .         .V        .
16.800     6.1690    21.63  .         .  Q      .         .V        .
16.817     6.1960    19.64  .         . Q       .         .V        .
16.833     6.2204    17.65  .         .Q        .         .V        .
16.850     6.2419    15.66  .         Q         .         .V        .
16.867     6.2608    13.68  .       Q .         .         . V       .
16.883     6.2769    11.69  .      Q  .         .         . V       .
16.900     6.2902     9.70  .     Q   .         .         . V       .
16.917     6.3011     7.90  .    Q    .         .         . V       .
16.933     6.3115     7.52  .   Q     .         .         . V       .
16.950     6.3217     7.45  .   Q     .         .         . V       .
16.967     6.3319     7.37  .   Q     .         .         . V       .
16.983     6.3419     7.30  .   Q     .         .         . V       .
17.000     6.3519     7.22  .   Q     .         .         . V       .
17.017     6.3617     7.14  .   Q     .         .         . V       .
17.033     6.3715     7.07  .   Q     .         .         . V       .
17.050     6.3811     6.99  .   Q     .         .         . V       .
17.067     6.3906     6.91  .   Q     .         .         . V       .
17.083     6.4000     6.84  .   Q     .         .         . V       .
17.100     6.4093     6.76  .   Q     .         .         . V       .
17.117     6.4185     6.68  .   Q     .         .         . V       .
17.133     6.4276     6.61  .   Q     .         .         . V       .
17.150     6.4366     6.53  .   Q     .         .         . V       .
17.167     6.4455     6.45  .   Q     .         .         .  V      .
17.183     6.4543     6.38  .   Q     .         .         .  V      .
17.200     6.4630     6.30  .   Q     .         .         .  V      .
17.217     6.4716     6.22  .   Q     .         .         .  V      .
17.233     6.4800     6.15  .  Q      .         .         .  V      .
17.250     6.4884     6.07  .  Q      .         .         .  V      .
17.267     6.4967     6.00  .  Q      .         .         .  V      .
17.283     6.5048     5.92  .  Q      .         .         .  V      .
17.300     6.5129     5.84  .  Q      .         .         .  V      .
17.317     6.5208     5.77  .  Q      .         .         .  V      .
17.333     6.5286     5.69  .  Q      .         .         .  V      .
17.350     6.5364     5.61  .  Q      .         .         .  V      .
17.367     6.5440     5.54  .  Q      .         .         .  V      .
17.383     6.5515     5.49  .  Q      .         .         .  V      .
17.400     6.5591     5.45  .  Q      .         .         .  V      .
17.417     6.5665     5.42  .  Q      .         .         .  V      .
17.433     6.5739     5.38  .  Q      .         .         .  V      .
17.450     6.5813     5.35  .  Q      .         .         .  V      .
17.467     6.5886     5.31  .  Q      .         .         .  V      .
17.483     6.5959     5.28  .  Q      .         .         .  V      .
17.500     6.6031     5.24  .  Q      .         .         .  V      .
17.517     6.6103     5.21  .  Q      .         .         .  V      .
17.533     6.6174     5.17  .  Q      .         .         .  V      .
17.550     6.6245     5.14  .  Q      .         .         .  V      .
17.567     6.6315     5.10  .  Q      .         .         .  V      .
17.583     6.6385     5.07  .  Q      .         .         .   V     .
17.600     6.6454     5.03  .  Q      .         .         .   V     .
17.617     6.6523     5.00  .  Q      .         .         .   V     .
17.633     6.6592     4.96  .  Q      .         .         .   V     .
17.650     6.6660     4.93  .  Q      .         .         .   V     .
17.667     6.6727     4.90  .  Q      .         .         .   V     .
17.683     6.6794     4.86  .  Q      .         .         .   V     .
17.700     6.6860     4.83  .  Q      .         .         .   V     .
17.717     6.6926     4.79  .  Q      .         .         .   V     .
17.733     6.6992     4.76  .  Q      .         .         .   V     .
17.750     6.7057     4.72  .  Q      .         .         .   V     .
17.767     6.7121     4.69  .  Q      .         .         .   V     .
17.783     6.7186     4.65  .  Q      .         .         .   V     .
17.800     6.7249     4.62  . Q       .         .         .   V     .
17.817     6.7312     4.58  . Q       .         .         .   V     .
17.833     6.7375     4.55  . Q       .         .         .   V     .
17.850     6.7437     4.53  . Q       .         .         .   V     .
17.867     6.7499     4.51  . Q       .         .         .   V     .
17.883     6.7561     4.49  . Q       .         .         .   V     .
17.900     6.7623     4.46  . Q       .         .         .   V     .
17.917     6.7684     4.44  . Q       .         .         .   V     .
17.933     6.7745     4.42  . Q       .         .         .   V     .
17.950     6.7805     4.40  . Q       .         .         .   V     .
17.967     6.7866     4.37  . Q       .         .         .   V     .
17.983     6.7926     4.35  . Q       .         .         .   V     .
18.000     6.7985     4.33  . Q       .         .         .   V     .
--------------------------------------------------------------------------------
    TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
    (Note: 100% of Peak Flow Rate estimate assumed to have
    an instantaneous time duration)

    Percentile of Estimated                  Duration
        Peak Flow Rate                       (minutes)
    =======================                  =========
               0%                             1081.0
              10%                              735.0
              20%                              300.0
              30%                              230.0
              40%                              200.0
              50%                              165.0
              60%                              135.0
              70%                              100.0
              80%                               70.0
              90%                               30.0
 ============================================================================

   END OF FLOODSCx ROUTING ANALYSIS
```

Onsite Flood Routing Area "B" @ Node 15

Drainage Area "B" Tributary to Existing 84" RCP (F19) Serrano Creek

25-Year Storm Existing Condition

```
************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
         (c) Copyright 1989-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                         Analysis prepared by:

                         HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                  *
* 100-YEAR STORM EXISTING CONDITION AREA "B" AT NODE 15                  *
* W.O. #1443-136X                                                        *
 ************************************************************************

  FILE NAME: ON100X15.DAT
  TIME/DATE OF STUDY: 09:05 10/29/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     15.00 IS CODE = 1.2
------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =   43.40
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.254
    LOW LOSS FRACTION = 0.202
    TIME OF CONCENTRATION(MIN.) = 25.93
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.52
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.09
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.45
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.43
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.36
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.63

------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =    14.87
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     5.50

------------------------------------------------------------------------

========================================================================

                    2 4 - H O U R    S T O R M
                  R U N O F F    H Y D R O G R A P H

========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       20.7      41.4      62.1      82.8
------------------------------------------------------------------------
  14.000      5.1946     10.86  .    Q    .  V      .         .         .
  14.017      5.2096     10.89  .    Q    .   V     .         .         .
  14.033      5.2246     10.92  .    Q    .   V     .         .         .
  14.050      5.2397     10.94  .    Q    .   V     .         .         .
  14.067      5.2548     10.97  .    Q    .   V     .         .         .
  14.083      5.2699     11.00  .    Q    .   V     .         .         .
  14.100      5.2851     11.03  .    Q    .   V     .         .         .
  14.117      5.3004     11.06  .    Q    .   V     .         .         .
  14.133      5.3156     11.09  .    Q    .   V     .         .         .
  14.150      5.3309     11.11  .    Q    .   V     .         .         .
  14.167      5.3463     11.14  .    Q    .   V     .         .         .
  14.183      5.3617     11.17  .    Q    .   V     .         .         .
  14.200      5.3771     11.20  .    Q    .   V     .         .         .
  14.217      5.3926     11.23  .    Q    .   V     .         .         .
  14.233      5.4081     11.26  .    Q    .   V     .         .         .
  14.250      5.4236     11.28  .    Q    .   V     .         .         .
  14.267      5.4392     11.31  .    Q    .   V     .         .         .
  14.283      5.4548     11.35  .    Q    .   V     .         .         .
  14.300      5.4706     11.43  .    Q    .   V     .         .         .
  14.317      5.4864     11.51  .    Q    .   V     .         .         .
  14.333      5.5024     11.60  .    Q    .   V     .         .         .
  14.350      5.5185     11.68  .    Q    .   V     .         .         .
  14.367      5.5347     11.76  .    Q    .   V     .         .         .
  14.383      5.5510     11.84  .    Q    .   V     .         .         .
  14.400      5.5674     11.92  .    Q    .   V     .         .         .
  14.417      5.5839     12.00  .    Q    .    V    .         .         .
  14.433      5.6006     12.08  .    Q    .    V    .         .         .
  14.450      5.6173     12.16  .    Q    .    V    .         .         .
  14.467      5.6342     12.24  .    Q    .    V    .         .         .
  14.483      5.6512     12.33  .    Q    .    V    .         .         .
  14.500      5.6683     12.41  .    Q    .    V    .         .         .
  14.517      5.6855     12.49  .     Q   .    V    .         .         .
  14.533      5.7028     12.57  .     Q   .    V    .         .         .
  14.550      5.7202     12.65  .     Q   .    V    .         .         .
  14.567      5.7378     12.73  .     Q   .    V    .         .         .
  14.583      5.7554     12.81  .     Q   .    V    .         .         .
  14.600      5.7732     12.89  .     Q   .    V    .         .         .
  14.617      5.7910     12.98  .     Q   .    V    .         .         .
  14.633      5.8090     13.06  .     Q   .    V    .         .         .
  14.650      5.8271     13.14  .     Q   .    V    .         .         .
  14.667      5.8453     13.22  .     Q   .    V    .         .         .
```

Onsite Flood Routing Area "B" @ Node 15

Drainage Area "B" Tributary to Existing 84" RCP (F19) Serrano Creek

100-Year Storm Existing Condition

14.683	5.8636	13.30	.	Q	.	V	.	.	.
14.700	5.8821	13.38	.	Q	.	V	.	.	.
14.717	5.9006	13.46	.	Q	.	V	.	.	.
14.733	5.9192	13.51	.	Q	.	V	.	.	.
14.750	5.9379	13.57	.	Q	.	V	.	.	.
14.767	5.9567	13.63	.	Q	.	V	.	.	.
14.783	5.9756	13.69	.	Q	.	V	.	.	.
14.800	5.9945	13.75	.	Q	.	V	.	.	.
14.817	6.0135	13.81	.	Q	.	V	.	.	.
14.833	6.0326	13.87	.	Q	.	V	.	.	.
14.850	6.0518	13.92	.	Q	.	V	.	.	.
14.867	6.0711	13.98	.	Q	.	V	.	.	.
14.883	6.0904	14.04	.	Q	.	V	.	.	.
14.900	6.1098	14.10	.	Q	.	V	.	.	.
14.917	6.1293	14.16	.	Q	.	V	.	.	.
14.933	6.1489	14.22	.	Q	.	V	.	.	.
14.950	6.1686	14.28	.	Q	.	V	.	.	.
14.967	6.1883	14.33	.	Q	.	V	.	.	.
14.983	6.2081	14.39	.	Q	.	V	.	.	.
15.000	6.2280	14.45	.	Q	.	V	.	.	.
15.017	6.2480	14.51	.	Q	.	V	.	.	.
15.033	6.2681	14.57	.	Q	.	V	.	.	.
15.050	6.2882	14.63	.	Q	.	V	.	.	.
15.067	6.3085	14.68	.	Q	.	V	.	.	.
15.083	6.3288	14.74	.	Q	.	V	.	.	.
15.100	6.3491	14.80	.	Q	.	V	.	.	.
15.117	6.3696	14.86	.	Q	.	V	.	.	.
15.133	6.3902	14.92	.	Q	.	V	.	.	.
15.150	6.4109	15.02	.	Q	.	V	.	.	.
15.167	6.4318	15.20	.	Q	.	V	.	.	.
15.183	6.4530	15.38	.	Q	.	V	.	.	.
15.200	6.4744	15.57	.	Q	.	V	.	.	.
15.217	6.4961	15.75	.	Q	.	V	.	.	.
15.233	6.5181	15.93	.	Q	.	V	.	.	.
15.250	6.5403	16.11	.	Q	.	V	.	.	.
15.267	6.5627	16.29	.	Q	.	V	.	.	.
15.283	6.5854	16.47	.	Q	.	V	.	.	.
15.300	6.6083	16.66	.	Q	.	V	.	.	.
15.317	6.6315	16.84	.	Q	.	V	.	.	.
15.333	6.6550	17.02	.	Q	.	V	.	.	.
15.350	6.6787	17.20	.	Q	.	V	.	.	.
15.367	6.7026	17.38	.	Q	.	V	.	.	.
15.383	6.7268	17.57	.	Q	.	V	.	.	.
15.400	6.7512	17.75	.	Q	.	V	.	.	.
15.417	6.7759	17.93	.	Q	.	V	.	.	.
15.433	6.8009	18.11	.	Q	.	V	.	.	.
15.450	6.8261	18.29	.	Q	.	V	.	.	.
15.467	6.8515	18.47	.	Q	.	V	.	.	.
15.483	6.8772	18.66	.	Q.		V	.	.	.
15.500	6.9032	18.84	.	Q.		V	.	.	.
15.517	6.9294	19.02	.	Q.		V	.	.	.
15.533	6.9558	19.20	.	Q.		V	.	.	.
15.550	6.9825	19.38	.	Q.		V	.	.	.
15.567	7.0095	19.56	.	Q.		V	.	.	.
15.583	7.0367	19.75	.	Q.		V	.	.	.
15.600	7.0641	19.93	.	Q.		V.		.	.
15.617	7.0918	20.12	.	Q.		V.		.	.
15.633	7.1198	20.30	.	Q.		V.		.	.
15.650	7.1480	20.49	.	Q.		V.		.	.
15.667	7.1765	20.67	.	Q.		V.		.	.
15.683	7.2052	20.86	.	Q		V.		.	.
15.700	7.2342	21.04	.	Q		V.		.	.
15.717	7.2634	21.23	.	Q		V.		.	.
15.733	7.2929	21.41	.	Q		V.		.	.
15.750	7.3227	21.60	.	Q		V.		.	.
15.767	7.3527	21.78	.	Q		V.		.	.
15.783	7.3829	21.97	.	Q		V.		.	.
15.800	7.4135	22.15	.	Q		V.		.	.
15.817	7.4442	22.34	.	Q		V		.	.
15.833	7.4752	22.52	.	Q		V		.	.
15.850	7.5065	22.71	.	Q		V		.	.
15.867	7.5381	22.89	.	.Q		V		.	.
15.883	7.5698	23.08	.	.Q		V		.	.
15.900	7.6019	23.26	.	.Q		V		.	.
15.917	7.6342	23.45	.	.Q		V		.	.
15.933	7.6667	23.63	.	.Q		V		.	.
15.950	7.6996	23.82	.	.Q		V		.	.
15.967	7.7326	24.00	.	.Q		V		.	.
15.983	7.7659	24.19	.	.Q		V		.	.
16.000	7.7995	24.37	.	.Q		V		.	.
16.017	7.8348	25.59	.	. Q		.V		.	.
16.033	7.8731	27.84	.	. Q		.V		.	.
16.050	7.9146	30.09	.	. Q		.V		.	.
16.067	7.9591	32.35	.	. Q		.V		.	.
16.083	8.0068	34.60	.	. Q		.V		.	.
16.100	8.0575	36.85	.	. Q		.V		.	.
16.117	8.1114	39.10	.	. Q		.V		.	.
16.133	8.1683	41.35	.	. Q		.V		.	.
16.150	8.2284	43.60	.	.		.QV		.	.
16.167	8.2915	45.85	.	.		. Q		.	.
16.183	8.3578	48.10	.	.		. VQ		.	.
16.200	8.4272	50.35	.	.		. V Q		.	.
16.217	8.4996	52.61	.	.		. V Q		.	.
16.233	8.5752	54.86	.	.		. V Q		.	.
16.250	8.6538	57.11	.	.		. V Q		.	.
16.267	8.7356	59.36	.	.		. V Q		.	.
16.283	8.8205	61.61	.	.		. V Q.		.	.
16.300	8.9084	63.86	.	.		. V Q		.	.
16.317	8.9995	66.11	.	.		. V .Q		.	.
16.333	9.0936	68.36	.	.		. V . Q		.	.
16.350	9.1909	70.61	.	.		. V . Q		.	.
16.367	9.2913	72.86	.	.		. V . Q		.	.
16.383	9.3947	75.12	.	.		. V . Q		.	.
16.400	9.5013	77.37	.	.		. V . Q		.	.
16.417	9.6110	79.62	.	.		. V . Q		.	.
16.433	9.7251	82.84	.	.		. V . Q		.	.
16.450	9.8372	81.39	.	.		. V . Q.		.	.
16.467	9.9458	78.86	.	.		. V . Q		.	.
16.483	10.0509	76.32	.	.		. V . Q		.	.
16.500	10.1526	73.79	.	.		. V . Q		.	.
16.517	10.2507	71.25	.	.		. V . Q		.	.
16.533	10.3454	68.72	.	.		. V . Q		.	.
16.550	10.4365	66.18	.	.		. V .Q		.	.
16.567	10.5242	63.65	.	.		. V Q		.	.
16.583	10.6084	61.11	.	.		. VQ.		.	.
16.600	10.6891	58.58	.	.		. Q .		.	.

Onsite Flood Routing Area "B" @ Node 15

Drainage Area "B" Tributary to Existing 84" RCP (F19) Serrano Creek

100-Year Storm Existing Condition

```
16.617     10.7662     56.04  .          .          .       QV .          .
16.633     10.8399     53.51  .          .          .     Q   V.          .
16.650     10.9102     50.97  .          .          .   Q     V.          .
16.667     10.9769     48.44  .          .          . Q       V.          .
16.683     11.0401     45.90  .          .          .Q        V.          .
16.700     11.0998     43.37  .          .          Q         V.          .
16.717     11.1561     40.83  .          .        Q.          V           .
16.733     11.2088     38.30  .          .      Q   .          V           .
16.750     11.2581     35.76  .          .    Q     .          V           .
16.767     11.3039     33.23  .          .  Q       .          V           .
16.783     11.3461     30.69  .          .Q         .          V           .
16.800     11.3849     28.16  .          Q          .          V           .
16.817     11.4202     25.62  .          Q          .          V           .
16.833     11.4520     23.09  .          Q          .          V           .
16.850     11.4803     20.55  .        Q.           .          V           .
16.867     11.5052     18.04  .        Q .          .          V           .
16.883     11.5286     16.99  .        Q .          .          .V          .
16.900     11.5517     16.80  .        Q .          .          .V          .
16.917     11.5746     16.62  .        Q .          .          .V          .
16.933     11.5972     16.43  .      Q   .          .          .V          .
16.950     11.6196     16.24  .      Q   .          .          .V          .
16.967     11.6417     16.06  .      Q   .          .          .V          .
16.983     11.6636     15.87  .      Q   .          .          .V          .
17.000     11.6852     15.69  .      Q   .          .          .V          .
17.017     11.7066     15.50  .      Q   .          .          .V          .
17.033     11.7277     15.32  .      Q   .          .          .V          .
17.050     11.7485     15.13  .      Q   .          .          .V          .
17.067     11.7691     14.95  .      Q   .          .          .V          .
17.083     11.7894     14.76  .      Q   .          .          .V          .
17.100     11.8095     14.57  .      Q   .          .          .V          .
17.117     11.8293     14.39  .    Q     .          .          .V          .
17.133     11.8489     14.20  .    Q     .          .          .V          .
17.150     11.8682     14.02  .    Q     .          .          .V          .
17.167     11.8872     13.83  .    Q     .          .          .V          .
17.183     11.9060     13.65  .    Q     .          .          . V         .
17.200     11.9246     13.46  .    Q     .          .          . V         .
17.217     11.9428     13.27  .    Q     .          .          . V         .
17.233     11.9609     13.09  .    Q     .          .          . V         .
17.250     11.9786     12.90  .    Q     .          .          . V         .
17.267     11.9962     12.72  .    Q     .          .          . V         .
17.283     12.0134     12.53  .    Q     .          .          . V         .
17.300     12.0304     12.35  .  Q       .          .          . V         .
17.317     12.0473     12.23  .  Q       .          .          . V         .
17.333     12.0640     12.14  .  Q       .          .          . V         .
17.350     12.0806     12.05  .  Q       .          .          . V         .
17.367     12.0971     11.96  .  Q       .          .          . V         .
17.383     12.1134     11.87  .  Q       .          .          . V         .
17.400     12.1297     11.79  .  Q       .          .          . V         .
17.417     12.1458     11.70  .  Q       .          .          . V         .
17.433     12.1618     11.61  .  Q       .          .          . V         .
17.450     12.1776     11.52  .  Q       .          .          . V         .
17.467     12.1934     11.43  .  Q       .          .          . V         .
17.483     12.2090     11.34  .  Q       .          .          . V         .
17.500     12.2245     11.25  .  Q       .          .          . V         .
17.517     12.2399     11.16  .  Q       .          .          . V         .
17.533     12.2552     11.08  .  Q       .          .          . V         .
17.550     12.2703     10.99  .  Q       .          .          .  V        .
17.567     12.2853     10.90  .  Q       .          .          .  V        .
17.583     12.3002     10.81  .  Q       .          .          .  V        .
17.600     12.3150     10.72  .  Q       .          .          .  V        .
17.617     12.3296     10.63  .  Q       .          .          .  V        .
17.633     12.3441     10.54  .  Q       .          .          .  V        .
17.650     12.3585     10.45  .  Q       .          .          .  V        .
17.667     12.3728     10.37  .  Q       .          .          .  V        .
17.683     12.3870     10.28  .  Q       .          .          .  V        .
17.700     12.4010     10.19  .  Q       .          .          .  V        .
17.717     12.4149     10.10  .  Q       .          .          .  V        .
17.733     12.4287     10.01  .  Q       .          .          .  V        .
17.750     12.4424      9.95  .  Q       .          .          .  V        .
17.767     12.4560      9.90  .  Q       .          .          .  V        .
17.783     12.4696      9.85  .  Q       .          .          .  V        .
17.800     12.4831      9.79  .  Q       .          .          .  V        .
17.817     12.4965      9.74  .  Q       .          .          .  V        .
17.833     12.5098      9.69  .  Q       .          .          .  V        .
17.850     12.5231      9.64  .  Q       .          .          .  V        .
17.867     12.5363      9.58  .  Q       .          .          .  V        .
17.883     12.5494      9.53  .  Q       .          .          .  V        .
17.900     12.5625      9.48  .  Q       .          .          .  V        .
17.917     12.5755      9.43  .  Q       .          .          .  V        .
17.933     12.5884      9.37  .  Q       .          .          .  V        .
17.950     12.6012      9.32  .  Q       .          .          .  V        .
17.967     12.6140      9.27  .  Q       .          .          .  V        .
17.983     12.6267      9.22  .  Q       .          .          .  V        .
18.000     12.6393      9.16  .  Q       .          .          .   V       .
```

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	1081.0
20%	490.0
30%	245.0
40%	210.0
50%	170.0
60%	140.0
70%	105.0
80%	65.0
90%	35.0

END OF FLOODSCx ROUTING ANALYSIS

Onsite Flood Routing Area "B" @ Node 15

Drainage Area "B" Tributary to Existing 84" RCP (F19) Serrano Creek

100-Year Storm Existing Condition

```
**************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
         (c) Copyright 1989-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                         Analysis prepared by:

                         HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                  *
* 25-YEAR STORM EXISTING CONDITION AREA "B" AT NODE 15                   *
* W.O. #1443-136X                                                        *
 **************************************************************************

  FILE NAME: ON25X15.DAT
  TIME/DATE OF STUDY: 09:02 10/29/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


**************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     15.00 IS CODE = 1.2
--------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
==========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =   43.40
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.254
    LOW LOSS FRACTION = 0.548
    TIME OF CONCENTRATION(MIN.) = 27.28
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =  25
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.87
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.15
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.94
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  2.71
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  4.49

--------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     7.81
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     8.43

--------------------------------------------------------------------------

==========================================================================

                      2 4 - H O U R    S T O R M
                   R U N O F F    H Y D R O G R A P H

==========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
--------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       15.5      30.9      46.4      61.8
--------------------------------------------------------------------------
  14.000      2.3200      5.02  .  Q      .V        .         .         .
  14.017      2.3269      5.03  .  Q      .V        .         .         .
  14.033      2.3338      5.04  .  Q      .V        .         .         .
  14.050      2.3408      5.06  .  Q      .V        .         .         .
  14.067      2.3478      5.07  .  Q      . V       .         .         .
  14.083      2.3548      5.08  .  Q      . V       .         .         .
  14.100      2.3618      5.09  .  Q      . V       .         .         .
  14.117      2.3688      5.10  .  Q      . V       .         .         .
  14.133      2.3759      5.12  .  Q      . V       .         .         .
  14.150      2.3829      5.13  .  Q      . V       .         .         .
  14.167      2.3900      5.14  .  Q      . V       .         .         .
  14.183      2.3971      5.15  .  Q      . V       .         .         .
  14.200      2.4042      5.17  .  Q      . V       .         .         .
  14.217      2.4114      5.20  .  Q      . V       .         .         .
  14.233      2.4186      5.24  .  Q      . V       .         .         .
  14.250      2.4259      5.27  .  Q      . V       .         .         .
  14.267      2.4332      5.30  .  Q      . V       .         .         .
  14.283      2.4405      5.33  .  Q      . V       .         .         .
  14.300      2.4479      5.36  .  Q      . V       .         .         .
  14.317      2.4553      5.39  .  Q      . V       .         .         .
  14.333      2.4628      5.42  .  Q      . V       .         .         .
  14.350      2.4703      5.45  .  Q      . V       .         .         .
  14.367      2.4778      5.48  .  Q      . V       .         .         .
  14.383      2.4854      5.51  .  Q      . V       .         .         .
  14.400      2.4930      5.54  .  Q      . V       .         .         .
  14.417      2.5007      5.57  .  Q      . V       .         .         .
  14.433      2.5084      5.60  .  Q      . V       .         .         .
  14.450      2.5162      5.63  .  Q      . V       .         .         .
  14.467      2.5240      5.66  .  Q      . V       .         .         .
  14.483      2.5318      5.69  .  Q      . V       .         .         .
  14.500      2.5397      5.72  .  Q      .  V      .         .         .
  14.517      2.5476      5.75  .  Q      .  V      .         .         .
  14.533      2.5556      5.78  .  Q      .  V      .         .         .
  14.550      2.5636      5.81  .  Q      .  V      .         .         .
  14.567      2.5716      5.84  .  Q      .  V      .         .         .
  14.583      2.5797      5.87  .  Q      .  V      .         .         .
  14.600      2.5878      5.90  .  Q      .  V      .         .         .
  14.617      2.5960      5.93  .  Q      .  V      .         .         .
  14.633      2.6042      5.96  .  Q      .  V      .         .         .
  14.650      2.6125      5.99  .  Q      .  V      .         .         .
  14.667      2.6208      6.02  .  Q      .  V      .         .         .
```

Onsite Flood Routing Area "B" @ Node 15

Drainage Area "B" Tributary to Existing 84" RCP (F19) Serrano Creek

25-Year Storm Existing Condition

14.683	2.6291	6.04	. Q . V . . .
14.700	2.6375	6.07	. Q . V . . .
14.717	2.6458	6.09	. Q . V . . .
14.733	2.6543	6.12	. Q . V . . .
14.750	2.6627	6.14	. Q . V . . .
14.767	2.6712	6.16	. Q . V . . .
14.783	2.6797	6.19	. Q . V . . .
14.800	2.6883	6.21	. Q . V . . .
14.817	2.6969	6.24	. Q . V . . .
14.833	2.7055	6.26	. Q . V . . .
14.850	2.7142	6.29	. Q . V . . .
14.867	2.7229	6.31	. Q . V . . .
14.883	2.7316	6.34	. Q . V . . .
14.900	2.7404	6.36	. Q . V . . .
14.917	2.7492	6.38	. Q . V . . .
14.933	2.7580	6.41	. Q . V . . .
14.950	2.7668	6.43	. Q . V . . .
14.967	2.7757	6.46	. Q . V . . .
14.983	2.7847	6.48	. Q . V . . .
15.000	2.7936	6.51	. Q . V . . .
15.017	2.8026	6.53	. Q . V . . .
15.033	2.8117	6.56	. Q . V . . .
15.050	2.8207	6.58	. Q . V . . .
15.067	2.8298	6.60	. Q . V . . .
15.083	2.8389	6.63	. Q . V . . .
15.100	2.8481	6.67	. Q . V . . .
15.117	2.8574	6.76	. Q . V . . .
15.133	2.8669	6.87	. Q . V . . .
15.150	2.8765	6.97	. Q . V . . .
15.167	2.8863	7.08	. Q . V . . .
15.183	2.8962	7.18	. Q . V . . .
15.200	2.9062	7.29	. Q . V . . .
15.217	2.9164	7.39	. Q . V . . .
15.233	2.9267	7.50	. Q . V . . .
15.250	2.9372	7.60	. Q . V . . .
15.267	2.9478	7.71	. Q . V . . .
15.283	2.9586	7.81	. Q . V . . .
15.300	2.9695	7.92	. Q . V . . .
15.317	2.9805	8.02	. Q . V . . .
15.333	2.9917	8.13	. Q . V . . .
15.350	3.0031	8.23	. Q . V . . .
15.367	3.0146	8.34	. Q . V . . .
15.383	3.0262	8.44	. Q . V . . .
15.400	3.0380	8.55	. Q . V . . .
15.417	3.0499	8.65	. Q . V . . .
15.433	3.0619	8.76	. Q . V . . .
15.450	3.0742	8.86	. Q . V . . .
15.467	3.0865	8.97	. Q . V . . .
15.483	3.0990	9.08	. Q . V . . .
15.500	3.1117	9.18	. Q . V . . .
15.517	3.1244	9.29	. Q . V . . .
15.533	3.1374	9.39	. Q . V . . .
15.550	3.1505	9.50	. Q . V . . .
15.567	3.1637	9.63	. Q . V . . .
15.583	3.1772	9.77	. Q . V . . .
15.600	3.1909	9.92	. Q . V . . .
15.617	3.2047	10.06	. Q . V . . .
15.633	3.2188	10.21	. Q . V . . .
15.650	3.2330	10.35	. Q . V . . .
15.667	3.2475	10.49	. Q . V . . .
15.683	3.2621	10.64	. Q . V . . .
15.700	3.2770	10.78	. Q . V . . .
15.717	3.2920	10.93	. Q . V . . .
15.733	3.3073	11.07	. Q . V . . .
15.750	3.3227	11.21	. Q . V . . .
15.767	3.3384	11.36	. Q . V . . .
15.783	3.3542	11.50	. Q . V . . .
15.800	3.3703	11.64	. Q . V . . .
15.817	3.3865	11.79	. Q . V . . .
15.833	3.4029	11.93	. Q . V . . .
15.850	3.4196	12.08	. Q . V . . .
15.867	3.4364	12.22	. Q . V . . .
15.883	3.4534	12.36	. Q . V . . .
15.900	3.4707	12.51	. Q . V . . .
15.917	3.4881	12.65	. Q . V . . .
15.933	3.5057	12.80	. Q . V . . .
15.950	3.5235	12.94	. Q . V . . .
15.967	3.5415	13.08	. Q . V . . .
15.983	3.5598	13.23	. Q . V . . .
16.000	3.5782	13.37	. Q . V . . .
16.017	3.5979	14.33	. Q. V . . .
16.033	3.6201	16.10	. Q V . . .
16.050	3.6447	17.87	. Q V . . .
16.067	3.6718	19.65	. Q V . . .
16.083	3.7013	21.42	. Q V . . .
16.100	3.7332	23.19	. Q V. . . .
16.117	3.7676	24.97	. Q V. . . .
16.133	3.8044	26.74	. Q V. . . .
16.150	3.8437	28.51	. QV. . . .
16.167	3.8854	30.28	. Q. . . .
16.183	3.9296	32.06	. Q . . .
16.200	3.9762	33.83	. VQ . . .
16.217	4.0252	35.60	. V Q . . .
16.233	4.0767	37.37	. V Q . . .
16.250	4.1306	39.15	. .V Q . . .
16.267	4.1870	40.92	. .V Q . . .
16.283	4.2458	42.69	. .V Q . . .
16.300	4.3070	44.46	. . V Q . . .
16.317	4.3707	46.24	. . V Q. . . .
16.333	4.4368	48.01	. . V .Q . . .
16.350	4.5054	49.78	. . V . Q . . .
16.367	4.5764	51.56	. . V . Q . . .
16.383	4.6499	53.33	. . V . Q . . .
16.400	4.7258	55.10	. . V . Q . . .
16.417	4.8041	56.87	. . V . Q . . .
16.433	4.8849	58.65	. . V . Q . . .
16.450	4.9681	60.42	. . V . Q. . .
16.467	5.0532	61.80	. . V . Q . .
16.483	5.1350	59.38	. . V . Q . . .
16.500	5.2141	57.39	. . V . Q . . .
16.517	5.2904	55.40	. . V . Q . . .
16.533	5.3640	53.42	. . V . Q . . .
16.550	5.4348	51.43	. . V . Q . . .
16.567	5.5029	49.44	. . V . Q . . .
16.583	5.5683	47.46	. . V Q . . .
16.600	5.6309	45.47	. . VQ. . . .

Onsite Flood Routing Area "B" @ Node 15

Drainage Area "B" Tributary to Existing 84" RCP (F19) Serrano Creek

25-Year Storm Existing Condition

```
16.617      5.6908     43.48  .         .         .       QV.         .
16.633      5.7480     41.49  .         .         .     Q  V.         .
16.650      5.8024     39.51  .         .         .    Q   V.         .
16.667      5.8541     37.52  .         .         .   Q    V.         .
16.683      5.9030     35.53  .         .         . Q       V         .
16.700      5.9492     33.55  .         .         .Q        V         .
16.717      5.9927     31.56  .         .         Q         V         .
16.733      6.0334     29.57  .         .        Q.         V         .
16.750      6.0714     27.59  .         .      Q  .         .V        .
16.767      6.1067     25.60  .         .     Q   .         .V        .
16.783      6.1392     23.61  .         .    Q    .         .V        .
16.800      6.1690     21.63  .         .  Q      .         .V        .
16.817      6.1960     19.64  .         . Q       .         .V        .
16.833      6.2204     17.65  .         .Q        .         .V        .
16.850      6.2419     15.66  .         Q         .         .V        .
16.867      6.2608     13.68  .       Q .         .         . V       .
16.883      6.2769     11.69  .      Q  .         .         . V       .
16.900      6.2902      9.70  .     Q   .         .         . V       .
16.917      6.3011      7.90  .    Q    .         .         . V       .
16.933      6.3115      7.52  .   Q     .         .         . V       .
16.950      6.3217      7.45  .   Q     .         .         . V       .
16.967      6.3319      7.37  .   Q     .         .         . V       .
16.983      6.3419      7.30  .   Q     .         .         . V       .
17.000      6.3519      7.22  .   Q     .         .         . V       .
17.017      6.3617      7.14  .   Q     .         .         . V       .
17.033      6.3715      7.07  .   Q     .         .         . V       .
17.050      6.3811      6.99  .   Q     .         .         . V       .
17.067      6.3906      6.91  .   Q     .         .         . V       .
17.083      6.4000      6.84  .   Q     .         .         . V       .
17.100      6.4093      6.76  .   Q     .         .         . V       .
17.117      6.4185      6.68  .   Q     .         .         . V       .
17.133      6.4276      6.61  .   Q     .         .         . V       .
17.150      6.4366      6.53  .   Q     .         .         . V       .
17.167      6.4455      6.45  .   Q     .         .         .  V      .
17.183      6.4543      6.38  .   Q     .         .         .  V      .
17.200      6.4630      6.30  .   Q     .         .         .  V      .
17.217      6.4716      6.22  .   Q     .         .         .  V      .
17.233      6.4800      6.15  .  Q      .         .         .  V      .
17.250      6.4884      6.07  .  Q      .         .         .  V      .
17.267      6.4967      6.00  .  Q      .         .         .  V      .
17.283      6.5048      5.92  .  Q      .         .         .  V      .
17.300      6.5129      5.84  .  Q      .         .         .  V      .
17.317      6.5208      5.77  .  Q      .         .         .  V      .
17.333      6.5286      5.69  .  Q      .         .         .  V      .
17.350      6.5364      5.61  .  Q      .         .         .  V      .
17.367      6.5440      5.54  .  Q      .         .         .  V      .
17.383      6.5515      5.49  .  Q      .         .         .  V      .
17.400      6.5591      5.45  .  Q      .         .         .  V      .
17.417      6.5665      5.42  .  Q      .         .         .  V      .
17.433      6.5739      5.38  .  Q      .         .         .  V      .
17.450      6.5813      5.35  .  Q      .         .         .  V      .
17.467      6.5886      5.31  .  Q      .         .         .  V      .
17.483      6.5959      5.28  .  Q      .         .         .  V      .
17.500      6.6031      5.24  .  Q      .         .         .  V      .
17.517      6.6103      5.21  .  Q      .         .         .  V      .
17.533      6.6174      5.17  .  Q      .         .         .  V      .
17.550      6.6245      5.14  .  Q      .         .         .  V      .
17.567      6.6315      5.10  .  Q      .         .         .  V      .
17.583      6.6385      5.07  .  Q      .         .         .   V     .
17.600      6.6454      5.03  .  Q      .         .         .   V     .
17.617      6.6523      5.00  .  Q      .         .         .   V     .
17.633      6.6592      4.96  .  Q      .         .         .   V     .
17.650      6.6660      4.93  .  Q      .         .         .   V     .
17.667      6.6727      4.90  .  Q      .         .         .   V     .
17.683      6.6794      4.86  .  Q      .         .         .   V     .
17.700      6.6860      4.83  .  Q      .         .         .   V     .
17.717      6.6926      4.79  .  Q      .         .         .   V     .
17.733      6.6992      4.76  .  Q      .         .         .   V     .
17.750      6.7057      4.72  .  Q      .         .         .   V     .
17.767      6.7121      4.69  .  Q      .         .         .   V     .
17.783      6.7186      4.65  .  Q      .         .         .   V     .
17.800      6.7249      4.62  . Q       .         .         .   V     .
17.817      6.7312      4.58  . Q       .         .         .   V     .
17.833      6.7375      4.55  . Q       .         .         .   V     .
17.850      6.7437      4.53  . Q       .         .         .   V     .
17.867      6.7499      4.51  . Q       .         .         .   V     .
17.883      6.7561      4.49  . Q       .         .         .   V     .
17.900      6.7623      4.46  . Q       .         .         .   V     .
17.917      6.7684      4.44  . Q       .         .         .   V     .
17.933      6.7745      4.42  . Q       .         .         .   V     .
17.950      6.7805      4.40  . Q       .         .         .   V     .
17.967      6.7866      4.37  . Q       .         .         .   V     .
17.983      6.7926      4.35  . Q       .         .         .   V     .
18.000      6.7985      4.33  . Q       .         .         .   V     .
--------------------------------------------------------------------------------
   TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
   (Note: 100% of Peak Flow Rate estimate assumed to have
   an instantaneous time duration)

   Percentile of Estimated                 Duration
       Peak Flow Rate                      (minutes)
   =======================                 =========
              0%                            1081.0
             10%                             735.0
             20%                             300.0
             30%                             230.0
             40%                             200.0
             50%                             165.0
             60%                             135.0
             70%                             100.0
             80%                              70.0
             90%                              30.0
============================================================================

 END OF FLOODSCx ROUTING ANALYSIS
```

```
************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
         (c) Copyright 1989-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                         Analysis prepared by:

                         HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                  *
* 100-YEAR STORM EXISTING CONDITION AREA "B" AT NODE 15                  *
* W.O. #1443-136X                                                        *
 ************************************************************************

  FILE NAME: ON100X15.DAT
  TIME/DATE OF STUDY: 09:05 10/29/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     15.00 IS CODE = 1.2
------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =   43.40
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.254
    LOW LOSS FRACTION = 0.202
    TIME OF CONCENTRATION(MIN.) = 25.93
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.52
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.09
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.45
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.43
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.36
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.63

------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =    14.87
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     5.50

------------------------------------------------------------------------

========================================================================

                    2 4 - H O U R    S T O R M
                  R U N O F F    H Y D R O G R A P H

========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       20.7      41.4      62.1      82.8
------------------------------------------------------------------------
  14.000      5.1946     10.86  .    Q    .  V      .         .         .
  14.017      5.2096     10.89  .    Q    .   V     .         .         .
  14.033      5.2246     10.92  .    Q    .   V     .         .         .
  14.050      5.2397     10.94  .    Q    .   V     .         .         .
  14.067      5.2548     10.97  .    Q    .   V     .         .         .
  14.083      5.2699     11.00  .    Q    .   V     .         .         .
  14.100      5.2851     11.03  .    Q    .   V     .         .         .
  14.117      5.3004     11.06  .    Q    .   V     .         .         .
  14.133      5.3156     11.09  .    Q    .   V     .         .         .
  14.150      5.3309     11.11  .    Q    .   V     .         .         .
  14.167      5.3463     11.14  .    Q    .   V     .         .         .
  14.183      5.3617     11.17  .    Q    .   V     .         .         .
  14.200      5.3771     11.20  .    Q    .   V     .         .         .
  14.217      5.3926     11.23  .    Q    .   V     .         .         .
  14.233      5.4081     11.26  .    Q    .   V     .         .         .
  14.250      5.4236     11.28  .    Q    .   V     .         .         .
  14.267      5.4392     11.31  .    Q    .   V     .         .         .
  14.283      5.4548     11.35  .    Q    .   V     .         .         .
  14.300      5.4706     11.43  .    Q    .   V     .         .         .
  14.317      5.4864     11.51  .    Q    .   V     .         .         .
  14.333      5.5024     11.60  .    Q    .   V     .         .         .
  14.350      5.5185     11.68  .    Q    .   V     .         .         .
  14.367      5.5347     11.76  .    Q    .   V     .         .         .
  14.383      5.5510     11.84  .    Q    .   V     .         .         .
  14.400      5.5674     11.92  .    Q    .   V     .         .         .
  14.417      5.5839     12.00  .    Q    .    V    .         .         .
  14.433      5.6006     12.08  .    Q    .    V    .         .         .
  14.450      5.6173     12.16  .    Q    .    V    .         .         .
  14.467      5.6342     12.24  .    Q    .    V    .         .         .
  14.483      5.6512     12.33  .    Q    .    V    .         .         .
  14.500      5.6683     12.41  .    Q    .    V    .         .         .
  14.517      5.6855     12.49  .     Q   .    V    .         .         .
  14.533      5.7028     12.57  .     Q   .    V    .         .         .
  14.550      5.7202     12.65  .     Q   .    V    .         .         .
  14.567      5.7378     12.73  .     Q   .    V    .         .         .
  14.583      5.7554     12.81  .     Q   .    V    .         .         .
  14.600      5.7732     12.89  .     Q   .    V    .         .         .
  14.617      5.7910     12.98  .     Q   .    V    .         .         .
  14.633      5.8090     13.06  .     Q   .    V    .         .         .
  14.650      5.8271     13.14  .     Q   .    V    .         .         .
  14.667      5.8453     13.22  .     Q   .    V    .         .         .
```

Onsite Flood Routing Area "B" @ Node 15

Drainage Area "B" Tributary to Existing 84" RCP (F19) Serrano Creek

100-Year Storm Existing Condition

14.683	5.8636	13.30	.	Q	.	V	.	.	.
14.700	5.8821	13.38	.	Q	.	V	.	.	.
14.717	5.9006	13.46	.	Q	.	V	.	.	.
14.733	5.9192	13.51	.	Q	.	V	.	.	.
14.750	5.9379	13.57	.	Q	.	V	.	.	.
14.767	5.9567	13.63	.	Q	.	V	.	.	.
14.783	5.9756	13.69	.	Q	.	V	.	.	.
14.800	5.9945	13.75	.	Q	.	V	.	.	.
14.817	6.0135	13.81	.	Q	.	V	.	.	.
14.833	6.0326	13.87	.	Q	.	V	.	.	.
14.850	6.0518	13.92	.	Q	.	V	.	.	.
14.867	6.0711	13.98	.	Q	.	V	.	.	.
14.883	6.0904	14.04	.	Q	.	V	.	.	.
14.900	6.1098	14.10	.	Q	.	V	.	.	.
14.917	6.1293	14.16	.	Q	.	V	.	.	.
14.933	6.1489	14.22	.	Q	.	V	.	.	.
14.950	6.1686	14.28	.	Q	.	V	.	.	.
14.967	6.1883	14.33	.	Q	.	V	.	.	.
14.983	6.2081	14.39	.	Q	.	V	.	.	.
15.000	6.2280	14.45	.	Q	.	V	.	.	.
15.017	6.2480	14.51	.	Q	.	V	.	.	.
15.033	6.2681	14.57	.	Q	.	V	.	.	.
15.050	6.2882	14.63	.	Q	.	V	.	.	.
15.067	6.3085	14.68	.	Q	.	V	.	.	.
15.083	6.3288	14.74	.	Q	.	V	.	.	.
15.100	6.3491	14.80	.	Q	.	V	.	.	.
15.117	6.3696	14.86	.	Q	.	V	.	.	.
15.133	6.3902	14.92	.	Q	.	V	.	.	.
15.150	6.4109	15.02	.	Q	.	V	.	.	.
15.167	6.4318	15.20	.	Q	.	V	.	.	.
15.183	6.4530	15.38	.	Q	.	V	.	.	.
15.200	6.4744	15.57	.	Q	.	V	.	.	.
15.217	6.4961	15.75	.	Q	.	V	.	.	.
15.233	6.5181	15.93	.	Q	.	V	.	.	.
15.250	6.5403	16.11	.	Q	.	V	.	.	.
15.267	6.5627	16.29	.	Q	.	V	.	.	.
15.283	6.5854	16.47	.	Q	.	V	.	.	.
15.300	6.6083	16.66	.	Q	.	V	.	.	.
15.317	6.6315	16.84	.	Q	.	V	.	.	.
15.333	6.6550	17.02	.	Q	.	V	.	.	.
15.350	6.6787	17.20	.	Q	.	V	.	.	.
15.367	6.7026	17.38	.	Q	.	V	.	.	.
15.383	6.7268	17.57	.	Q	.	V	.	.	.
15.400	6.7512	17.75	.	Q	.	V	.	.	.
15.417	6.7759	17.93	.	Q	.	V	.	.	.
15.433	6.8009	18.11	.	Q	.	V	.	.	.
15.450	6.8261	18.29	.	Q	.	V	.	.	.
15.467	6.8515	18.47	.	Q	.	V	.	.	.
15.483	6.8772	18.66	.	Q.		V	.	.	.
15.500	6.9032	18.84	.	Q.		V	.	.	.
15.517	6.9294	19.02	.	Q.		V	.	.	.
15.533	6.9558	19.20	.	Q.		V	.	.	.
15.550	6.9825	19.38	.	Q.		V	.	.	.
15.567	7.0095	19.56	.	Q.		V	.	.	.
15.583	7.0367	19.75	.	Q.		V	.	.	.
15.600	7.0641	19.93	.	Q.		V.		.	.
15.617	7.0918	20.12	.	Q.		V.		.	.
15.633	7.1198	20.30	.	Q.		V.		.	.
15.650	7.1480	20.49	.	Q.		V.		.	.
15.667	7.1765	20.67	.	Q.		V.		.	.
15.683	7.2052	20.86	.	Q		V.		.	.
15.700	7.2342	21.04	.	Q		V.		.	.
15.717	7.2634	21.23	.	Q		V.		.	.
15.733	7.2929	21.41	.	Q		V.		.	.
15.750	7.3227	21.60	.	Q		V.		.	.
15.767	7.3527	21.78	.	Q		V.		.	.
15.783	7.3829	21.97	.	Q		V.		.	.
15.800	7.4135	22.15	.	Q		V.		.	.
15.817	7.4442	22.34	.	Q		V		.	.
15.833	7.4752	22.52	.	Q		V		.	.
15.850	7.5065	22.71	.	Q		V		.	.
15.867	7.5381	22.89	.	.Q		V		.	.
15.883	7.5698	23.08	.	.Q		V		.	.
15.900	7.6019	23.26	.	.Q		V		.	.
15.917	7.6342	23.45	.	.Q		V		.	.
15.933	7.6667	23.63	.	.Q		V		.	.
15.950	7.6996	23.82	.	.Q		V		.	.
15.967	7.7326	24.00	.	.Q		V		.	.
15.983	7.7659	24.19	.	.Q		V		.	.
16.000	7.7995	24.37	.	.Q		V		.	.
16.017	7.8348	25.59	.	. Q		.V		.	.
16.033	7.8731	27.84	.	. Q		.V		.	.
16.050	7.9146	30.09	.	. Q		.V		.	.
16.067	7.9591	32.35	.	. Q		.V		.	.
16.083	8.0068	34.60	.	. Q		.V		.	.
16.100	8.0575	36.85	.	. Q		.V		.	.
16.117	8.1114	39.10	.	. Q		.V		.	.
16.133	8.1683	41.35	.	. Q		.V		.	.
16.150	8.2284	43.60	.	.		.QV		.	.
16.167	8.2915	45.85	.	.		. Q		.	.
16.183	8.3578	48.10	.	.		. VQ		.	.
16.200	8.4272	50.35	.	.		. V Q		.	.
16.217	8.4996	52.61	.	.		. V Q		.	.
16.233	8.5752	54.86	.	.		. V Q		.	.
16.250	8.6538	57.11	.	.		. V Q		.	.
16.267	8.7356	59.36	.	.		. V Q		.	.
16.283	8.8205	61.61	.	.		. V Q.		.	.
16.300	8.9084	63.86	.	.		. V Q		.	.
16.317	8.9995	66.11	.	.		. V .Q		.	.
16.333	9.0936	68.36	.	.		. V . Q		.	.
16.350	9.1909	70.61	.	.		. V . Q		.	.
16.367	9.2913	72.86	.	.		. V . Q		.	.
16.383	9.3947	75.12	.	.		. V . Q		.	.
16.400	9.5013	77.37	.	.		. V . Q		.	.
16.417	9.6110	79.62	.	.		. V . Q		.	.
16.433	9.7251	82.84	.	.		. V . Q		.	.
16.450	9.8372	81.39	.	.		. V . Q.		.	.
16.467	9.9458	78.86	.	.		. V . Q		.	.
16.483	10.0509	76.32	.	.		. V . Q		.	.
16.500	10.1526	73.79	.	.		. V . Q		.	.
16.517	10.2507	71.25	.	.		. V . Q		.	.
16.533	10.3454	68.72	.	.		. V . Q		.	.
16.550	10.4365	66.18	.	.		. V .Q		.	.
16.567	10.5242	63.65	.	.		. V Q		.	.
16.583	10.6084	61.11	.	.		. VQ.		.	.
16.600	10.6891	58.58	.	.		. Q .		.	.

Onsite Flood Routing Area "B" @ Node 15

Drainage Area "B" Tributary to Existing 84" RCP (F19) Serrano Creek

100-Year Storm Existing Condition

```
16.617     10.7662     56.04  .          .          .       QV .          .
16.633     10.8399     53.51  .          .          .     Q   V.          .
16.650     10.9102     50.97  .          .          .   Q     V.          .
16.667     10.9769     48.44  .          .          . Q       V.          .
16.683     11.0401     45.90  .          .          .Q        V.          .
16.700     11.0998     43.37  .          .          Q         V.          .
16.717     11.1561     40.83  .          .        Q.          V           .
16.733     11.2088     38.30  .          .      Q   .          V           .
16.750     11.2581     35.76  .          .    Q     .          V           .
16.767     11.3039     33.23  .          .  Q       .          V           .
16.783     11.3461     30.69  .          .Q         .          V           .
16.800     11.3849     28.16  .          Q          .          V           .
16.817     11.4202     25.62  .          Q          .          V           .
16.833     11.4520     23.09  .          Q          .          V           .
16.850     11.4803     20.55  .        Q.           .          V           .
16.867     11.5052     18.04  .        Q .          .          V           .
16.883     11.5286     16.99  .        Q .          .          .V          .
16.900     11.5517     16.80  .        Q .          .          .V          .
16.917     11.5746     16.62  .        Q .          .          .V          .
16.933     11.5972     16.43  .      Q   .          .          .V          .
16.950     11.6196     16.24  .      Q   .          .          .V          .
16.967     11.6417     16.06  .      Q   .          .          .V          .
16.983     11.6636     15.87  .      Q   .          .          .V          .
17.000     11.6852     15.69  .      Q   .          .          .V          .
17.017     11.7066     15.50  .      Q   .          .          .V          .
17.033     11.7277     15.32  .      Q   .          .          .V          .
17.050     11.7485     15.13  .      Q   .          .          .V          .
17.067     11.7691     14.95  .      Q   .          .          .V          .
17.083     11.7894     14.76  .      Q   .          .          .V          .
17.100     11.8095     14.57  .      Q   .          .          .V          .
17.117     11.8293     14.39  .    Q     .          .          .V          .
17.133     11.8489     14.20  .    Q     .          .          .V          .
17.150     11.8682     14.02  .    Q     .          .          .V          .
17.167     11.8872     13.83  .    Q     .          .          .V          .
17.183     11.9060     13.65  .    Q     .          .          . V         .
17.200     11.9246     13.46  .    Q     .          .          . V         .
17.217     11.9428     13.27  .    Q     .          .          . V         .
17.233     11.9609     13.09  .    Q     .          .          . V         .
17.250     11.9786     12.90  .    Q     .          .          . V         .
17.267     11.9962     12.72  .    Q     .          .          . V         .
17.283     12.0134     12.53  .    Q     .          .          . V         .
17.300     12.0304     12.35  .  Q       .          .          . V         .
17.317     12.0473     12.23  .  Q       .          .          . V         .
17.333     12.0640     12.14  .  Q       .          .          . V         .
17.350     12.0806     12.05  .  Q       .          .          . V         .
17.367     12.0971     11.96  .  Q       .          .          . V         .
17.383     12.1134     11.87  .  Q       .          .          . V         .
17.400     12.1297     11.79  .  Q       .          .          . V         .
17.417     12.1458     11.70  .  Q       .          .          . V         .
17.433     12.1618     11.61  .  Q       .          .          . V         .
17.450     12.1776     11.52  .  Q       .          .          . V         .
17.467     12.1934     11.43  .  Q       .          .          . V         .
17.483     12.2090     11.34  .  Q       .          .          . V         .
17.500     12.2245     11.25  .  Q       .          .          . V         .
17.517     12.2399     11.16  .  Q       .          .          . V         .
17.533     12.2552     11.08  .  Q       .          .          . V         .
17.550     12.2703     10.99  .  Q       .          .          .  V        .
17.567     12.2853     10.90  .  Q       .          .          .  V        .
17.583     12.3002     10.81  .  Q       .          .          .  V        .
17.600     12.3150     10.72  .  Q       .          .          .  V        .
17.617     12.3296     10.63  .  Q       .          .          .  V        .
17.633     12.3441     10.54  .  Q       .          .          .  V        .
17.650     12.3585     10.45  .  Q       .          .          .  V        .
17.667     12.3728     10.37  .  Q       .          .          .  V        .
17.683     12.3870     10.28  .  Q       .          .          .  V        .
17.700     12.4010     10.19  .  Q       .          .          .  V        .
17.717     12.4149     10.10  .  Q       .          .          .  V        .
17.733     12.4287     10.01  .  Q       .          .          .  V        .
17.750     12.4424      9.95  .  Q       .          .          .  V        .
17.767     12.4560      9.90  .  Q       .          .          .  V        .
17.783     12.4696      9.85  .  Q       .          .          .  V        .
17.800     12.4831      9.79  .  Q       .          .          .  V        .
17.817     12.4965      9.74  .  Q       .          .          .  V        .
17.833     12.5098      9.69  .  Q       .          .          .  V        .
17.850     12.5231      9.64  .  Q       .          .          .  V        .
17.867     12.5363      9.58  .  Q       .          .          .  V        .
17.883     12.5494      9.53  .  Q       .          .          .  V        .
17.900     12.5625      9.48  .  Q       .          .          .  V        .
17.917     12.5755      9.43  .  Q       .          .          .  V        .
17.933     12.5884      9.37  .  Q       .          .          .  V        .
17.950     12.6012      9.32  .  Q       .          .          .  V        .
17.967     12.6140      9.27  .  Q       .          .          .  V        .
17.983     12.6267      9.22  .  Q       .          .          .  V        .
18.000     12.6393      9.16  .  Q       .          .          .   V       .
```

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	1081.0
20%	490.0
30%	245.0
40%	210.0
50%	170.0
60%	140.0
70%	105.0
80%	65.0
90%	35.0

END OF FLOODSCx ROUTING ANALYSIS

Onsite Flood Routing Area "B" @ Node 15

Drainage Area "B" Tributary to Existing 84" RCP (F19) Serrano Creek

100-Year Storm Existing Condition

```
**************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
         (c) Copyright 1989-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                      Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                  *
* 2-YEAR STORM PROPOSED CONDITION AREA "B" AT NODE 15                    *
* W.O. #1443-136X                                                        *
 **************************************************************************

  FILE NAME: ON02P15.DAT
  TIME/DATE OF STUDY: 09:33 10/29/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


**************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE = 1.2
--------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
==========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    7.30
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.283
    LOW LOSS FRACTION = 0.986
    TIME OF CONCENTRATION(MIN.) = 33.75
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =   2
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.19
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.53
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  0.89
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.22
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  2.05

--------------------------------------------------------------------------
    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.15
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     1.10

--------------------------------------------------------------------------

==========================================================================

                      2 4 - H O U R    S T O R M
                   R U N O F F    H Y D R O G R A P H

==========================================================================
               HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
--------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.        0.8       1.5       2.3       3.0
--------------------------------------------------------------------------
  14.000      0.0001      0.01  Q         .         .         .         .
  14.017      0.0001      0.01  Q         .         .         .         .
  14.033      0.0001      0.01  Q         .         .         .         .
  14.050      0.0001      0.01  Q         .         .         .         .
  14.067      0.0001      0.01  Q         .         .         .         .
  14.083      0.0001      0.01  Q         .         .         .         .
  14.100      0.0001      0.01  Q         .         .         .         .
  14.117      0.0001      0.01  Q         .         .         .         .
  14.133      0.0001      0.01  Q         .         .         .         .
  14.150      0.0001      0.01  Q         .         .         .         .
  14.167      0.0002      0.01  Q         .         .         .         .
  14.183      0.0002      0.01  Q         .         .         .         .
  14.200      0.0002      0.01  Q         .         .         .         .
  14.217      0.0002      0.01  Q         .         .         .         .
  14.233      0.0002      0.01  Q         .         .         .         .
  14.250      0.0002      0.01  Q         .         .         .         .
  14.267      0.0002      0.01  Q         .         .         .         .
  14.283      0.0003      0.01  Q         .         .         .         .
  14.300      0.0003      0.01  Q         .         .         .         .
  14.317      0.0003      0.01  Q         .         .         .         .
  14.333      0.0003      0.01  Q         .         .         .         .
  14.350      0.0003      0.01  Q         .         .         .         .
  14.367      0.0003      0.01  Q         .         .         .         .
  14.383      0.0004      0.01  Q         .         .         .         .
  14.400      0.0004      0.01  Q         .         .         .         .
  14.417      0.0004      0.01  Q         .         .         .         .
  14.433      0.0004      0.01  Q         .         .         .         .
  14.450      0.0004      0.01  Q         .         .         .         .
  14.467      0.0004      0.01  Q         .         .         .         .
  14.483      0.0005      0.01  Q         .         .         .         .
  14.500      0.0005      0.01  Q         .         .         .         .
  14.517      0.0005      0.01  Q         .         .         .         .
  14.533      0.0005      0.01  Q         .         .         .         .
  14.550      0.0005      0.01  Q         .         .         .         .
  14.567      0.0006      0.01  Q         .         .         .         .
  14.583      0.0006      0.01  Q         .         .         .         .
  14.600      0.0006      0.01  Q         .         .         .         .
```

Onsite Flood Routing Area "B" @ Node 15

With Most of Drainage Area "B" in Existing Condition Diverting to Area "A" and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61

2-Year Storm Proposed Condition

```
14.617    0.0006    0.01  Q        .        .        .        .
14.633    0.0006    0.01  Q        .        .        .        .
14.650    0.0006    0.01  Q        .        .        .        .
14.667    0.0007    0.01  Q        .        .        .        .
14.683    0.0007    0.01  Q        .        .        .        .
14.700    0.0007    0.01  Q        .        .        .        .
14.717    0.0007    0.01  Q        .        .        .        .
14.733    0.0007    0.01  Q        .        .        .        .
14.750    0.0008    0.01  Q        .        .        .        .
14.767    0.0008    0.01  Q        .        .        .        .
14.783    0.0008    0.01  Q        .        .        .        .
14.800    0.0008    0.01  Q        .        .        .        .
14.817    0.0008    0.01  Q        .        .        .        .
14.833    0.0009    0.01  Q        .        .        .        .
14.850    0.0009    0.01  Q        .        .        .        .
14.867    0.0009    0.01  Q        .        .        .        .
14.883    0.0009    0.01  Q        .        .        .        .
14.900    0.0009    0.01  Q        .        .        .        .
14.917    0.0010    0.01  Q        .        .        .        .
14.933    0.0010    0.01  Q        .        .        .        .
14.950    0.0010    0.01  Q        .        .        .        .
14.967    0.0010    0.01  Q        .        .        .        .
14.983    0.0010    0.02  Q        .        .        .        .
15.000    0.0011    0.02  Q        .        .        .        .
15.017    0.0011    0.02  Q        .        .        .        .
15.033    0.0011    0.02  Q        .        .        .        .
15.050    0.0011    0.02  Q        .        .        .        .
15.067    0.0011    0.02  Q        .        .        .        .
15.083    0.0012    0.02  Q        .        .        .        .
15.100    0.0012    0.02  Q        .        .        .        .
15.117    0.0012    0.02  Q        .        .        .        .
15.133    0.0012    0.02  Q        .        .        .        .
15.150    0.0013    0.02  Q        .        .        .        .
15.167    0.0013    0.02  Q        .        .        .        .
15.183    0.0013    0.02  Q        .        .        .        .
15.200    0.0013    0.02  Q        .        .        .        .
15.217    0.0013    0.02  Q        .        .        .        .
15.233    0.0014    0.02  Q        .        .        .        .
15.250    0.0014    0.02  Q        .        .        .        .
15.267    0.0014    0.02  Q        .        .        .        .
15.283    0.0014    0.02  Q        .        .        .        .
15.300    0.0015    0.02  Q        .        .        .        .
15.317    0.0015    0.02  Q        .        .        .        .
15.333    0.0015    0.02  Q        .        .        .        .
15.350    0.0015    0.02  Q        .        .        .        .
15.367    0.0016    0.02  Q        .        .        .        .
15.383    0.0016    0.02  Q        .        .        .        .
15.400    0.0016    0.02  Q        .        .        .        .
15.417    0.0016    0.02  Q        .        .        .        .
15.433    0.0017    0.02  Q        .        .        .        .
15.450    0.0017    0.02  Q        .        .        .        .
15.467    0.0017    0.02  Q        .        .        .        .
15.483    0.0018    0.02  Q        .        .        .        .
15.500    0.0018    0.02  Q        .        .        .        .
15.517    0.0018    0.02  Q        .        .        .        .
15.533    0.0018    0.02  Q        .        .        .        .
15.550    0.0019    0.02  Q        .        .        .        .
15.567    0.0019    0.02  Q        .        .        .        .
15.583    0.0019    0.02  Q        .        .        .        .
15.600    0.0019    0.02  Q        .        .        .        .
15.617    0.0020    0.02  Q        .        .        .        .
15.633    0.0020    0.02  Q        .        .        .        .
15.650    0.0020    0.02  Q        .        .        .        .
15.667    0.0021    0.02  Q        .        .        .        .
15.683    0.0021    0.02  Q        .        .        .        .
15.700    0.0021    0.02  Q        .        .        .        .
15.717    0.0021    0.02  Q        .        .        .        .
15.733    0.0022    0.02  Q        .        .        .        .
15.750    0.0022    0.02  Q        .        .        .        .
15.767    0.0022    0.02  Q        .        .        .        .
15.783    0.0023    0.02  Q        .        .        .        .
15.800    0.0023    0.02  Q        .        .        .        .
15.817    0.0023    0.02  Q        .        .        .        .
15.833    0.0024    0.02  Q        .        .        .        .
15.850    0.0024    0.02  Q        .        .        .        .
15.867    0.0024    0.02  Q        .        .        .        .
15.883    0.0024    0.02  Q        .        .        .        .
15.900    0.0025    0.02  Q        .        .        .        .
15.917    0.0025    0.02  Q        .        .        .        .
15.933    0.0025    0.02  Q        .        .        .        .
15.950    0.0026    0.02  Q        .        .        .        .
15.967    0.0026    0.02  Q        .        .        .        .
15.983    0.0026    0.02  Q        .        .        .        .
16.000    0.0027    0.02  Q        .        .        .        .
16.017    0.0028    0.07  Q        .        .        .        .
16.033    0.0030    0.16  V Q      .        .        .        .
16.050    0.0033    0.25  V  Q     .        .        .        .
16.067    0.0038    0.34  .V  Q    .        .        .        .
16.083    0.0044    0.43  .V   Q   .        .        .        .
16.100    0.0051    0.51  .V    Q  .        .        .        .
16.117    0.0059    0.60  .V     Q .        .        .        .
16.133    0.0069    0.69  .V      Q.        .        .        .
16.150    0.0079    0.78  . V      Q        .        .        .
16.167    0.0091    0.87  . V       .Q      .        .        .
16.183    0.0105    0.96  . V       . Q     .        .        .
16.200    0.0119    1.05  .  V      .  Q    .        .        .
16.217    0.0135    1.14  .  V      .    Q  .        .        .
16.233    0.0152    1.23  .   V     .     Q .        .        .
16.250    0.0170    1.32  .   V     .      Q.        .        .
16.267    0.0189    1.41  .    V    .       Q        .        .
16.283    0.0210    1.50  .    V    .       Q.       .        .
16.300    0.0232    1.59  .     V   .        Q       .        .
16.317    0.0255    1.68  .      V  .        . Q     .        .
16.333    0.0279    1.77  .      V  .        .  Q    .        .
16.350    0.0305    1.86  .       V .        .   Q   .        .
16.367    0.0332    1.95  .        V.        .    Q  .        .
16.383    0.0360    2.04  .        V.        .     Q .        .
16.400    0.0389    2.12  .         V        .      Q.        .
16.417    0.0420    2.21  .         .V       .       Q        .
16.433    0.0451    2.30  .         . V      .       .Q       .
16.450    0.0484    2.39  .         .  V     .       . Q      .
16.467    0.0518    2.48  .         .   V    .       .  Q     .
```

Onsite Flood Routing Area "B" @ Node 15

With Most of Drainage Area "B" in Existing Condition Diverting to Area "A" and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61

2-Year Storm Proposed Condition

```
  16.483      0.0554      2.57  .         .    V    .         .  Q      .
  16.500      0.0591      2.66  .         .     V   .         .    Q    .
  16.517      0.0628      2.75  .         .      V  .         .     Q   .
  16.533      0.0668      2.84  .         .       V .         .      Q  .
  16.550      0.0708      2.93  .         .        V.         .       Q .
  16.567      0.0750      3.04  .         .         V         .        Q
  16.583      0.0791      2.97  .         .         .V        .         Q.
  16.600      0.0830      2.88  .         .         . V       .       Q  .
  16.617      0.0869      2.80  .         .         .  V      .      Q   .
  16.633      0.0906      2.71  .         .         .   V     .     Q    .
  16.650      0.0942      2.62  .         .         .    V    .    Q     .
  16.667      0.0977      2.53  .         .         .     V   .  Q       .
  16.683      0.1011      2.44  .         .         .      V  . Q        .
  16.700      0.1043      2.35  .         .         .       V Q          .
  16.717      0.1074      2.26  .         .         .        Q.          .
  16.733      0.1104      2.17  .         .         .       Q V          .
  16.750      0.1133      2.08  .         .         .      Q  .V         .
  16.767      0.1160      1.99  .         .         .     Q   .V         .
  16.783      0.1186      1.90  .         .         .   Q     . V        .
  16.800      0.1211      1.81  .         .         .  Q      .  V       .
  16.817      0.1235      1.72  .         .         . Q       .  V       .
  16.833      0.1257      1.63  .         .         .Q        .   V      .
  16.850      0.1278      1.54  .         .        Q          .    V     .
  16.867      0.1298      1.45  .         .       Q.          .    V     .
  16.883      0.1317      1.36  .         .      Q  .         .     V    .
  16.900      0.1335      1.27  .         .     Q   .         .     V    .
  16.917      0.1351      1.18  .         .    Q    .         .      V   .
  16.933      0.1366      1.09  .         .   Q     .         .      V   .
  16.950      0.1380      1.00  .         .  Q      .         .      V   .
  16.967      0.1392      0.91  .         . Q       .         .       V  .
  16.983      0.1404      0.82  .         Q         .         .       V  .
  17.000      0.1414      0.73  .        Q.         .         .       V  .
  17.017      0.1423      0.64  .       Q .         .         .        V.
  17.033      0.1430      0.55  .      Q  .         .         .        V.
  17.050      0.1437      0.46  .     Q   .         .         .        V.
  17.067      0.1442      0.37  .   Q     .         .         .        V.
  17.083      0.1446      0.29  .  Q      .         .         .        V.
  17.100      0.1448      0.20  . Q       .         .         .        V.
  17.117      0.1450      0.11  .Q        .         .         .        V.
  17.133      0.1450      0.03  Q         .         .         .        V.
  17.150      0.1450      0.02  Q         .         .         .        V.
  17.167      0.1451      0.02  Q         .         .         .        V.
  17.183      0.1451      0.01  Q         .         .         .        V.
  17.200      0.1451      0.01  Q         .         .         .        V.
  17.217      0.1451      0.01  Q         .         .         .        V.
  17.233      0.1451      0.01  Q         .         .         .        V.
  17.250      0.1452      0.01  Q         .         .         .        V.
  17.267      0.1452      0.01  Q         .         .         .        V.
  17.283      0.1452      0.01  Q         .         .         .        V.
  17.300      0.1452      0.01  Q         .         .         .        V.
  17.317      0.1452      0.01  Q         .         .         .        V.
  17.333      0.1452      0.01  Q         .         .         .        V.
  17.350      0.1452      0.01  Q         .         .         .        V.
--------------------------------------------------------------------------------
    TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
    (Note: 100% of Peak Flow Rate estimate assumed to have
    an instantaneous time duration)

    Percentile of Estimated          Duration
        Peak Flow Rate               (minutes)
    ======================           =========
               0%                     1041.0
              10%                      305.0
              20%                      270.0
              30%                      240.0
              40%                      205.0
              50%                      170.0
              60%                      135.0
              70%                      100.0
              80%                       70.0
              90%                       35.0
================================================================================

    END OF FLOODSCx ROUTING ANALYSIS
```

Onsite Flood Routing Area "B" @ Node 15

With Most of Drainage Area "B" in Existing Condition Diverting to Area "A" and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61

2-Year Storm Proposed Condition

```
************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
          (c) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                      Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                 *
* 25-YEAR STORM PROPOSED CONDITION AREA "B" AT NODE 15                  *
* W.O. #1443-136X                                                       *
 ************************************************************************

  FILE NAME: ON25P15.DAT
  TIME/DATE OF STUDY: 09:35 10/29/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE = 1.2
------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    7.30
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.283
    LOW LOSS FRACTION = 0.639
    TIME OF CONCENTRATION(MIN.) = 27.28
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) =  25
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.40
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.87
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.15
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.94
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  2.71
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  4.49

------------------------------------------------------------------------
   TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     1.14
   TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     1.60

------------------------------------------------------------------------

========================================================================

                      2 4 - H O U R    S T O R M
                   R U N O F F    H Y D R O G R A P H

========================================================================
              HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       2.6       5.1       7.7      10.2
------------------------------------------------------------------------
  14.000      0.3117      0.67  . Q       V         .         .         .
  14.017      0.3126      0.68  . Q       .V        .         .         .
  14.033      0.3135      0.68  . Q       .V        .         .         .
  14.050      0.3145      0.68  . Q       .V        .         .         .
  14.067      0.3154      0.68  . Q       .V        .         .         .
  14.083      0.3163      0.68  . Q       .V        .         .         .
  14.100      0.3173      0.68  . Q       .V        .         .         .
  14.117      0.3182      0.69  . Q       .V        .         .         .
  14.133      0.3192      0.69  . Q       .V        .         .         .
  14.150      0.3201      0.69  . Q       .V        .         .         .
  14.167      0.3211      0.69  . Q       .V        .         .         .
  14.183      0.3220      0.69  . Q       .V        .         .         .
  14.200      0.3230      0.70  . Q       .V        .         .         .
  14.217      0.3239      0.70  . Q       .V        .         .         .
  14.233      0.3249      0.70  . Q       .V        .         .         .
  14.250      0.3259      0.71  . Q       .V        .         .         .
  14.267      0.3269      0.71  . Q       .V        .         .         .
  14.283      0.3279      0.72  . Q       .V        .         .         .
  14.300      0.3288      0.72  . Q       .V        .         .         .
  14.317      0.3298      0.72  . Q       .V        .         .         .
  14.333      0.3308      0.73  . Q       .V        .         .         .
  14.350      0.3319      0.73  . Q       .V        .         .         .
  14.367      0.3329      0.74  . Q       .V        .         .         .
  14.383      0.3339      0.74  . Q       .V        .         .         .
  14.400      0.3349      0.74  . Q       .V        .         .         .
  14.417      0.3359      0.75  . Q       .V        .         .         .
  14.433      0.3370      0.75  . Q       .V        .         .         .
  14.450      0.3380      0.76  . Q       .V        .         .         .
  14.467      0.3391      0.76  . Q       .V        .         .         .
  14.483      0.3401      0.76  . Q       .V        .         .         .
  14.500      0.3412      0.77  .  Q      . V       .         .         .
  14.517      0.3422      0.77  .  Q      . V       .         .         .
  14.533      0.3433      0.78  .  Q      . V       .         .         .
  14.550      0.3444      0.78  .  Q      . V       .         .         .
  14.567      0.3455      0.78  .  Q      . V       .         .         .
  14.583      0.3466      0.79  .  Q      . V       .         .         .
  14.600      0.3476      0.79  .  Q      . V       .         .         .
  14.617      0.3487      0.80  .  Q      . V       .         .         .
  14.633      0.3499      0.80  .  Q      . V       .         .         .
```

Onsite Flood Routing Area "B" @ Node 15

With Most of Drainage Area "B" in Existing Condition Diverting to Area "A" and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61

25-Year Storm Proposed Condition

14.650	0.3510	0.81	. Q . V . . .
14.667	0.3521	0.81	. Q . V . . .
14.683	0.3532	0.81	. Q . V . . .
14.700	0.3543	0.81	. Q . V . . .
14.717	0.3554	0.82	. Q . V . . .
14.733	0.3566	0.82	. Q . V . . .
14.750	0.3577	0.82	. Q . V . . .
14.767	0.3588	0.83	. Q . V . . .
14.783	0.3600	0.83	. Q . V . . .
14.800	0.3611	0.83	. Q . V . . .
14.817	0.3623	0.84	. Q . V . . .
14.833	0.3635	0.84	. Q . V . . .
14.850	0.3646	0.84	. Q . V . . .
14.867	0.3658	0.85	. Q . V . . .
14.883	0.3670	0.85	. Q . V . . .
14.900	0.3681	0.85	. Q . V . . .
14.917	0.3693	0.86	. Q . V . . .
14.933	0.3705	0.86	. Q . V . . .
14.950	0.3717	0.86	. Q . V . . .
14.967	0.3729	0.87	. Q . V . . .
14.983	0.3741	0.87	. Q . V . . .
15.000	0.3753	0.87	. Q . V . . .
15.017	0.3765	0.88	. Q . V . . .
15.033	0.3777	0.88	. Q . V . . .
15.050	0.3789	0.88	. Q . V . . .
15.067	0.3802	0.89	. Q . V . . .
15.083	0.3814	0.89	. Q . V . . .
15.100	0.3826	0.90	. Q . V . . .
15.117	0.3839	0.91	. Q . V . . .
15.133	0.3852	0.93	. Q . V . . .
15.150	0.3865	0.95	. Q . V . . .
15.167	0.3878	0.97	. Q . V . . .
15.183	0.3892	0.99	. Q . V . . .
15.200	0.3906	1.01	. Q . V . . .
15.217	0.3920	1.03	. Q . V . . .
15.233	0.3934	1.05	. Q . V . . .
15.250	0.3949	1.07	. Q . V . . .
15.267	0.3964	1.08	. Q . V . . .
15.283	0.3979	1.10	. Q . V . . .
15.300	0.3994	1.12	. Q . V . . .
15.317	0.4010	1.14	. Q . V . . .
15.333	0.4026	1.16	. Q . V . . .
15.350	0.4042	1.18	. Q . V . . .
15.367	0.4059	1.20	. Q . V . . .
15.383	0.4076	1.22	. Q . V . . .
15.400	0.4093	1.24	. Q . V . . .
15.417	0.4110	1.25	. Q . V . . .
15.433	0.4127	1.27	. Q . V . . .
15.450	0.4145	1.29	. Q . V . . .
15.467	0.4163	1.31	. Q . V . . .
15.483	0.4182	1.33	. Q . V . . .
15.500	0.4200	1.35	. Q . V . . .
15.517	0.4219	1.37	. Q . V . . .
15.533	0.4238	1.39	. Q . V . . .
15.550	0.4258	1.41	. Q . V . . .
15.567	0.4277	1.43	. Q . V . . .
15.583	0.4297	1.45	. Q . V . . .
15.600	0.4318	1.48	. Q . V . . .
15.617	0.4338	1.50	. Q . V . . .
15.633	0.4359	1.53	. Q . V . . .
15.650	0.4381	1.55	. Q . V . . .
15.667	0.4402	1.57	. Q . V . . .
15.683	0.4424	1.60	. Q . V . . .
15.700	0.4447	1.62	. Q . V . . .
15.717	0.4469	1.65	. Q . V . . .
15.733	0.4492	1.67	. Q . V . . .
15.750	0.4516	1.70	. Q . V . . .
15.767	0.4540	1.72	. Q . V . . .
15.783	0.4564	1.74	. Q . V . . .
15.800	0.4588	1.77	. Q . V . . .
15.817	0.4613	1.79	. Q . V . . .
15.833	0.4638	1.82	. Q . V . . .
15.850	0.4663	1.84	. Q . V . . .
15.867	0.4689	1.86	. Q . V . . .
15.883	0.4715	1.89	. Q . V . . .
15.900	0.4741	1.91	. Q . V . . .
15.917	0.4768	1.94	. Q . V . . .
15.933	0.4795	1.96	. Q . V . . .
15.950	0.4822	1.99	. Q . V . . .
15.967	0.4850	2.01	. Q . V . . .
15.983	0.4878	2.03	. Q . V . . .
16.000	0.4906	2.06	. Q . V . . .
16.017	0.4937	2.22	. Q . V . . .
16.033	0.4971	2.52	. Q. V . . .
16.050	0.5010	2.82	. .Q V . . .
16.067	0.5053	3.11	. . Q V . . .
16.083	0.5100	3.41	. . Q V . . .
16.100	0.5151	3.71	. . Q V . . .
16.117	0.5206	4.01	. . Q V . . .
16.133	0.5266	4.31	. . Q V . . .
16.150	0.5329	4.61	. . Q . . .
16.167	0.5397	4.90	. . Q. . . .
16.183	0.5468	5.20	. . VQ . . .
16.200	0.5544	5.50	. . V.Q . . .
16.217	0.5624	5.80	. . V. Q . . .
16.233	0.5708	6.10	. . V Q . . .
16.250	0.5796	6.39	. . V Q . . .
16.267	0.5888	6.69	. . V Q . . .
16.283	0.5984	6.99	. . .V Q . . .
16.300	0.6085	7.29	. . .V Q . . .
16.317	0.6189	7.59	. . .V Q. . .
16.333	0.6298	7.88	. . . V Q . .
16.350	0.6411	8.18	. . . V . Q . .
16.367	0.6528	8.48	. . . V . Q . .
16.383	0.6648	8.78	. . . V . Q . .
16.400	0.6773	9.08	. . . V . Q . .
16.417	0.6903	9.38	. . . V . Q . .
16.433	0.7036	9.67	. . . V . Q . .
16.450	0.7173	9.97	. . . V . Q. .
16.467	0.7314	10.20	. . . V . Q .
16.483	0.7449	9.79	. . . V . Q . .
16.500	0.7579	9.46	. . . V . Q . .
16.517	0.7705	9.12	. . . V . Q . .
16.533	0.7826	8.78	. . . V . Q . .

Onsite Flood Routing Area "B" @ Node 15

With Most of Drainage Area "B" in Existing Condition Diverting to Area "A" and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61

25-Year Storm Proposed Condition

```
16.550      0.7942      8.45  .          .          .       V   .  Q       .
16.567      0.8054      8.11  .          .          .        V .Q         .
16.583      0.8161      7.77  .          .          .        V Q          .
16.600      0.8263      7.44  .          .          .         Q.          .
16.617      0.8361      7.10  .          .          .       Q V.          .
16.633      0.8454      6.76  .          .          .     Q   V.          .
16.650      0.8543      6.43  .          .          .   Q     V           .
16.667      0.8627      6.09  .          .          . Q       V           .
16.683      0.8706      5.75  .          .          .Q        V           .
16.700      0.8780      5.42  .          .         .Q         V           .
16.717      0.8850      5.08  .          .        Q.          .V          .
16.733      0.8916      4.74  .          .      Q .           .V          .
16.750      0.8976      4.41  .          .     Q  .           .V          .
16.767      0.9033      4.07  .          .   Q    .           .V          .
16.783      0.9084      3.73  .          .  Q     .           . V         .
16.800      0.9131      3.40  .          .Q       .           . V         .
16.817      0.9173      3.06  .         .Q        .           . V         .
16.833      0.9210      2.72  .         Q         .           . V         .
16.850      0.9243      2.39  .        Q.         .           . V         .
16.867      0.9272      2.05  .       Q .         .           . V         .
16.883      0.9295      1.71  .     Q   .         .           . V         .
16.900      0.9314      1.38  .   Q     .         .           . V         .
16.917      0.9329      1.07  .  Q      .         .           . V         .
16.933      0.9343      1.01  . Q       .         .           . V         .
16.950      0.9357      1.00  . Q       .         .           . V         .
16.967      0.9370      0.99  . Q       .         .           .  V        .
16.983      0.9384      0.98  . Q       .         .           .  V        .
17.000      0.9397      0.97  . Q       .         .           .  V        .
17.017      0.9410      0.96  . Q       .         .           .  V        .
17.033      0.9423      0.95  . Q       .         .           .  V        .
17.050      0.9436      0.94  . Q       .         .           .  V        .
17.067      0.9449      0.93  . Q       .         .           .  V        .
17.083      0.9462      0.92  . Q       .         .           .  V        .
17.100      0.9474      0.91  . Q       .         .           .  V        .
17.117      0.9487      0.90  . Q       .         .           .  V        .
17.133      0.9499      0.89  . Q       .         .           .  V        .
17.150      0.9511      0.88  . Q       .         .           .  V        .
17.167      0.9523      0.87  . Q       .         .           .  V        .
17.183      0.9535      0.86  . Q       .         .           .  V        .
17.200      0.9546      0.85  . Q       .         .           .  V        .
17.217      0.9558      0.84  . Q       .         .           .  V        .
17.233      0.9569      0.83  . Q       .         .           .  V        .
17.250      0.9581      0.82  . Q       .         .           .  V        .
17.267      0.9592      0.81  . Q       .         .           .  V        .
17.283      0.9603      0.80  . Q       .         .           .  V        .
17.300      0.9613      0.78  . Q       .         .           .  V        .
17.317      0.9624      0.77  . Q       .         .           .  V        .
17.333      0.9635      0.76  .Q        .         .           .  V        .
17.350      0.9645      0.75  .Q        .         .           .  V        .
17.367      0.9655      0.74  .Q        .         .           .   V       .
17.383      0.9665      0.74  .Q        .         .           .   V       .
17.400      0.9675      0.73  .Q        .         .           .   V       .
17.417      0.9685      0.73  .Q        .         .           .   V       .
17.433      0.9695      0.72  .Q        .         .           .   V       .
17.450      0.9705      0.72  .Q        .         .           .   V       .
17.467      0.9715      0.71  .Q        .         .           .   V       .
17.483      0.9725      0.71  .Q        .         .           .   V       .
17.500      0.9735      0.70  .Q        .         .           .   V       .
17.517      0.9744      0.70  .Q        .         .           .   V       .
17.533      0.9754      0.70  .Q        .         .           .   V       .
17.550      0.9763      0.69  .Q        .         .           .   V       .
17.567      0.9773      0.69  .Q        .         .           .   V       .
17.583      0.9782      0.68  .Q        .         .           .   V       .
17.600      0.9791      0.68  .Q        .         .           .   V       .
17.617      0.9801      0.67  .Q        .         .           .   V       .
17.633      0.9810      0.67  .Q        .         .           .   V       .
17.650      0.9819      0.66  .Q        .         .           .   V       .
17.667      0.9828      0.66  .Q        .         .           .   V       .
17.683      0.9837      0.65  .Q        .         .           .   V       .
17.700      0.9846      0.65  .Q        .         .           .   V       .
17.717      0.9855      0.64  .Q        .         .           .   V       .
17.733      0.9864      0.64  .Q        .         .           .   V       .
17.750      0.9872      0.63  .Q        .         .           .   V       .
17.767      0.9881      0.63  .Q        .         .           .   V       .
17.783      0.9890      0.62  .Q        .         .           .   V       .
17.800      0.9898      0.62  .Q        .         .           .   V       .
17.817      0.9907      0.62  .Q        .         .           .   V       .
17.833      0.9915      0.61  .Q        .         .           .   V       .
17.850      0.9924      0.61  .Q        .         .           .   V       .
17.867      0.9932      0.61  .Q        .         .           .    V      .
17.883      0.9940      0.60  .Q        .         .           .    V      .
17.900      0.9948      0.60  .Q        .         .           .    V      .
17.917      0.9957      0.60  .Q        .         .           .    V      .
17.933      0.9965      0.59  .Q        .         .           .    V      .
17.950      0.9973      0.59  .Q        .         .           .    V      .
17.967      0.9981      0.59  .Q        .         .           .    V      .
17.983      0.9989      0.58  .Q        .         .           .    V      .
18.000      0.9997      0.58  .Q        .         .           .    V      .
```

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	515.0
20%	265.0
30%	225.0
40%	190.0
50%	160.0
60%	125.0
70%	95.0
80%	65.0
90%	30.0

END OF FLOODSCx ROUTING ANALYSIS

Onsite Flood Routing Area "B" @ Node 15

With Most of Drainage Area "B" in Existing Condition Diverting to Area "A" and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61

25-Year Storm Proposed Condition

```
************************************************************************

             F L O O D    R O U T I N G    A N A L Y S I S
             USING COUNTY HYDROLOGY MANUAL OF ORANGE(1986)
          (c) Copyright 1989-2016 Advanced Engineering Software (aes)
              Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                      Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* NAKASE RANCH NURSERY VTM 18142 IN CITY OF LAKE FOREST                 *
* 100-YEAR STORM PROPOSED CONDITION AREA "B" AT NODE 15                 *
* W.O. #1443-136X                                                       *
 ************************************************************************

  FILE NAME: ON100P15.DAT
  TIME/DATE OF STUDY: 09:36 10/29/2018

   The Small Area Unit Hydrograph Procedures in Section J
   of the Hydrology Manual provides estimates of runoff
   hydrograph and runoff volume for watersheds whose time of
   concentration is less than 25 minutes. The PROGRAM User
   should check the applicability of using the small area unit
   hydrograph procedures, and follow the guidelines in
   Sections J and K.5 in complex watershed modeling.


************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE = 1.2
------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (SMALL AREA UNIT-HYDROGRAPH ANALYSIS) <<<<<
========================================================================

  (SMALL AREA UNIT-HYDROGRAPH ADDED TO STREAM #1)

    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    7.30
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.283
    LOW LOSS FRACTION = 0.275
    TIME OF CONCENTRATION(MIN.) = 25.93
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED:
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.52
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.09
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.45
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.43
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.36
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.63

------------------------------------------------------------------------
   TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     2.31
   TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     1.11

------------------------------------------------------------------------

========================================================================

                        2 4 - H O U R    S T O R M
                     R U N O F F    H Y D R O G R A P H

========================================================================
              HYDROGRAPH IN  ONE-MINUTE UNIT INTERVALS(CFS)
        (Notes: Time indicated is at END of Each Unit Intervals.
                Peak 5-minute rainfall intensity is modeled as
                a constant value for entire 5-minute period.)
------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       3.4      6.9      10.3     13.7
------------------------------------------------------------------------
  14.000      0.7938      1.66  .   Q     .  V     .        .        .
  14.017      0.7961      1.66  .   Q     .  V     .        .        .
  14.033      0.7984      1.67  .   Q     .  V     .        .        .
  14.050      0.8007      1.67  .   Q     .  V     .        .        .
  14.067      0.8030      1.68  .   Q     .  V     .        .        .
  14.083      0.8053      1.68  .   Q     .  V     .        .        .
  14.100      0.8077      1.69  .   Q     .  V     .        .        .
  14.117      0.8100      1.69  .   Q     .   V    .        .        .
  14.133      0.8123      1.69  .   Q     .   V    .        .        .
  14.150      0.8147      1.70  .   Q     .   V    .        .        .
  14.167      0.8170      1.70  .   Q     .   V    .        .        .
  14.183      0.8193      1.71  .   Q     .   V    .        .        .
  14.200      0.8217      1.71  .   Q     .   V    .        .        .
  14.217      0.8241      1.72  .   Q     .   V    .        .        .
  14.233      0.8264      1.72  .    Q    .   V    .        .        .
  14.250      0.8288      1.72  .    Q    .   V    .        .        .
  14.267      0.8312      1.73  .    Q    .   V    .        .        .
  14.283      0.8336      1.74  .    Q    .   V    .        .        .
  14.300      0.8360      1.75  .    Q    .   V    .        .        .
  14.317      0.8384      1.76  .    Q    .   V    .        .        .
  14.333      0.8409      1.77  .    Q    .   V    .        .        .
  14.350      0.8433      1.78  .    Q    .   V    .        .        .
  14.367      0.8458      1.80  .    Q    .   V    .        .        .
  14.383      0.8483      1.81  .    Q    .   V    .        .        .
  14.400      0.8508      1.82  .    Q    .   V    .        .        .
  14.417      0.8533      1.83  .    Q    .   V    .        .        .
  14.433      0.8559      1.85  .    Q    .   V    .        .        .
  14.450      0.8584      1.86  .    Q    .   V    .        .        .
  14.467      0.8610      1.87  .    Q    .   V    .        .        .
  14.483      0.8636      1.88  .    Q    .   V    .        .        .
  14.500      0.8662      1.90  .    Q    .   V    .        .        .
  14.517      0.8688      1.91  .    Q    .    V   .        .        .
  14.533      0.8715      1.92  .    Q    .    V   .        .        .
  14.550      0.8741      1.93  .    Q    .    V   .        .        .
  14.567      0.8768      1.95  .    Q    .    V   .        .        .
  14.583      0.8795      1.96  .    Q    .    V   .        .        .
  14.600      0.8822      1.97  .    Q    .    V   .        .        .
  14.617      0.8850      1.98  .    Q    .    V   .        .        .
  14.633      0.8877      2.00  .    Q    .    V   .        .        .
```

Onsite Flood Routing Area "B" @ Node 15

With Most of Drainage Area "B" in Existing Condition Diverting to Area "A" and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61

100-Year Storm Proposed Condition

14.650	0.8905	2.01	.	Q	.	V	.	.	.	.
14.667	0.8933	2.02	.	Q	.	V	.	.	.	.
14.683	0.8961	2.03	.	Q	.	V	.	.	.	.
14.700	0.8989	2.04	.	Q	.	V	.	.	.	.
14.717	0.9017	2.06	.	Q	.	V	.	.	.	.
14.733	0.9046	2.07	.	Q	.	V	.	.	.	.
14.750	0.9074	2.07	.	Q	.	V	.	.	.	.
14.767	0.9103	2.08	.	Q	.	V	.	.	.	.
14.783	0.9132	2.09	.	Q	.	V	.	.	.	.
14.800	0.9161	2.10	.	Q	.	V	.	.	.	.
14.817	0.9190	2.11	.	Q	.	V	.	.	.	.
14.833	0.9219	2.12	.	Q	.	V	.	.	.	.
14.850	0.9248	2.13	.	Q	.	V	.	.	.	.
14.867	0.9278	2.14	.	Q	.	V	.	.	.	.
14.883	0.9307	2.15	.	Q	.	V	.	.	.	.
14.900	0.9337	2.15	.	Q	.	V	.	.	.	.
14.917	0.9367	2.16	.	Q	.	V	.	.	.	.
14.933	0.9396	2.17	.	Q	.	V	.	.	.	.
14.950	0.9427	2.18	.	Q	.	V	.	.	.	.
14.967	0.9457	2.19	.	Q	.	V	.	.	.	.
14.983	0.9487	2.20	.	Q	.	V	.	.	.	.
15.000	0.9517	2.21	.	Q	.	V	.	.	.	.
15.017	0.9548	2.22	.	Q	.	V	.	.	.	.
15.033	0.9579	2.23	.	Q	.	V	.	.	.	.
15.050	0.9609	2.24	.	Q	.	V	.	.	.	.
15.067	0.9640	2.24	.	Q	.	V	.	.	.	.
15.083	0.9671	2.25	.	Q	.	V	.	.	.	.
15.100	0.9703	2.26	.	Q	.	V	.	.	.	.
15.117	0.9734	2.27	.	Q	.	V	.	.	.	.
15.133	0.9765	2.28	.	Q	.	V	.	.	.	.
15.150	0.9797	2.30	.	Q	.	V	.	.	.	.
15.167	0.9829	2.32	.	Q	.	V	.	.	.	.
15.183	0.9861	2.35	.	Q	.	V	.	.	.	.
15.200	0.9894	2.38	.	Q	.	V	.	.	.	.
15.217	0.9927	2.41	.	Q	.	V	.	.	.	.
15.233	0.9961	2.43	.	Q	.	V	.	.	.	.
15.250	0.9995	2.46	.	Q	.	V	.	.	.	.
15.267	1.0029	2.49	.	Q	.	V	.	.	.	.
15.283	1.0064	2.52	.	Q	.	V	.	.	.	.
15.300	1.0099	2.55	.	Q	.	V	.	.	.	.
15.317	1.0134	2.57	.	Q	.	V	.	.	.	.
15.333	1.0170	2.60	.	Q	.	V	.	.	.	.
15.350	1.0206	2.63	.	Q	.	V	.	.	.	.
15.367	1.0243	2.66	.	Q	.	V	.	.	.	.
15.383	1.0280	2.68	.	Q	.	V	.	.	.	.
15.400	1.0317	2.71	.	Q	.	V	.	.	.	.
15.417	1.0355	2.74	.	Q	.	V	.	.	.	.
15.433	1.0393	2.77	.	Q	.	V	.	.	.	.
15.450	1.0431	2.80	.	Q	.	V	.	.	.	.
15.467	1.0470	2.82	.	Q	.	V	.	.	.	.
15.483	1.0509	2.85	.	Q	.	V	.	.	.	.
15.500	1.0549	2.88	.	Q	.	V	.	.	.	.
15.517	1.0589	2.91	.	Q	.	V	.	.	.	.
15.533	1.0630	2.93	.	Q	.	V	.	.	.	.
15.550	1.0670	2.96	.	Q	.	V	.	.	.	.
15.567	1.0712	2.99	.	Q	.	V	.	.	.	.
15.583	1.0753	3.02	.	Q	.	V	.	.	.	.
15.600	1.0795	3.05	.	Q	.	V	.	.	.	.
15.617	1.0837	3.07	.	Q	.	V	.	.	.	.
15.633	1.0880	3.10	.	Q	.	V	.	.	.	.
15.650	1.0923	3.13	.	Q	.	V	.	.	.	.
15.667	1.0967	3.16	.	Q	.	V	.	.	.	.
15.683	1.1011	3.19	.	Q	.	V	.	.	.	.
15.700	1.1055	3.22	.	Q	.	V	.	.	.	.
15.717	1.1100	3.24	.	Q	.	V	.	.	.	.
15.733	1.1145	3.27	.	Q	.	V	.	.	.	.
15.750	1.1190	3.30	.	Q	.	V	.	.	.	.
15.767	1.1236	3.33	.	Q	.	V	.	.	.	.
15.783	1.1282	3.36	.	Q	.	V	.	.	.	.
15.800	1.1329	3.39	.	Q	.	V	.	.	.	.
15.817	1.1376	3.41	.	Q	.	V	.	.	.	.
15.833	1.1423	3.44	.	Q	.	V	.	.	.	.
15.850	1.1471	3.47	.	Q	.	V	.	.	.	.
15.867	1.1519	3.50	.	Q	.	V	.	.	.	.
15.883	1.1568	3.53	.	Q	.	V	.	.	.	.
15.900	1.1617	3.56	.	Q	.	V	.	.	.	.
15.917	1.1666	3.58	.	Q	.	V	.	.	.	.
15.933	1.1716	3.61	.	Q	.	V	.	.	.	.
15.950	1.1766	3.64	.	Q	.	V	.	.	.	.
15.967	1.1817	3.67	.	Q	.	V	.	.	.	.
15.983	1.1868	3.70	.	Q	.	V	.	.	.	.
16.000	1.1919	3.72	.	Q	.	V	.	.	.	.
16.017	1.1973	3.93	.	.Q	.	V	.	.	.	.
16.033	1.2033	4.32	.	. Q	.	V	.	.	.	.
16.050	1.2097	4.70	.	. Q	.	V	.	.	.	.
16.067	1.2167	5.09	.	. Q	.	.V	.	.	.	.
16.083	1.2243	5.48	.	. Q	.	.V	.	.	.	.
16.100	1.2324	5.86	.	. Q	.	.V	.	.	.	.
16.117	1.2410	6.25	.	. Q	.	.V	.	.	.	.
16.133	1.2501	6.63	.	. Q	.	.V	.	.	.	.
16.150	1.2598	7.02	.	. Q	.	V	.	.	.	.
16.167	1.2700	7.40	.	. Q	.	.	.	.	.	.
16.183	1.2807	7.79	.	. Q	.	.	.	.	.	.
16.200	1.2919	8.18	.	. Q	.	V	.	.	.	.
16.217	1.3037	8.56	.	. Q	.	V	.	.	.	.
16.233	1.3161	8.95	.	. Q	.	V	.	.	.	.
16.250	1.3289	9.33	.	. Q	.	V	.	.	.	.
16.267	1.3423	9.72	.	. Q	.	V	.	.	.	.
16.283	1.3562	10.10	.	. Q	.	V	.	.	.	.
16.300	1.3707	10.49	.	. Q	.	V	.	.	.	.
16.317	1.3857	10.88	.	. Q	.	V	.	.	.	.
16.333	1.4012	11.26	.	. Q	.	V	.	.	.	.
16.350	1.4172	11.65	.	. Q	.	V	.	.	.	.
16.367	1.4338	12.03	.	. Q	.	V	.	.	.	.
16.383	1.4509	12.42	.	. Q	.	V	.	.	.	.
16.400	1.4685	12.81	.	. Q	.	V	.	.	.	.
16.417	1.4867	13.19	.	. Q	.	V	.	.	.	.
16.433	1.5056	13.74	.	. Q	.	V	.	.	.	.
16.450	1.5242	13.50	.	. Q	.	V	.	.	.	.
16.467	1.5422	13.07	.	. Q	.	V	.	.	.	.
16.483	1.5596	12.64	.	. Q	.	V	.	.	.	.
16.500	1.5765	12.21	.	. Q	.	V	.	.	.	.
16.517	1.5927	11.78	.	. Q	.	V	.	.	.	.
16.533	1.6083	11.35	.	. Q	.	V	.	.	.	.

Onsite Flood Routing Area "B" @ Node 15

With Most of Drainage Area "B" in Existing Condition Diverting to Area "A" and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61

100-Year Storm Proposed Condition

```
16.550      1.6234     10.92  .          .          .        V .Q        .
16.567      1.6378     10.49  .          .          .        V Q         .
16.583      1.6517     10.06  .          .          .        VQ.         .
16.600      1.6650      9.64  .          .          .        Q .         .
16.617      1.6776      9.21  .          .          .      Q  V.         .
16.633      1.6897      8.78  .          .          .    Q    V.         .
16.650      1.7012      8.35  .          .          .  Q      V.         .
16.667      1.7121      7.92  .          .          .Q       V.         .
16.683      1.7225      7.49  .          .        .Q         V.         .
16.700      1.7322      7.06  .          .        Q          V.         .
16.717      1.7413      6.63  .          .      Q.           V          .
16.733      1.7499      6.20  .          .    Q .            V          .
16.750      1.7578      5.77  .          .  Q   .            V          .
16.767      1.7652      5.34  .          .Q     .            V          .
16.783      1.7719      4.91  .          . Q    .            V          .
16.800      1.7781      4.49  .          .  Q   .            V          .
16.817      1.7837      4.06  .          .Q     .            V          .
16.833      1.7887      3.63  .          Q      .            V          .
16.850      1.7931      3.20  .        Q.       .            .V         .
16.867      1.7969      2.77  .          Q .    .            .V         .
16.883      1.8005      2.60  .       Q  .      .            .V         .
16.900      1.8040      2.57  .       Q  .      .            .V         .
16.917      1.8075      2.54  .       Q  .      .            .V         .
16.933      1.8110      2.51  .       Q  .      .            .V         .
16.950      1.8144      2.48  .       Q  .      .            .V         .
16.967      1.8178      2.45  .       Q  .      .            .V         .
16.983      1.8211      2.43  .       Q  .      .            .V         .
17.000      1.8244      2.40  .     Q    .      .            .V         .
17.017      1.8277      2.37  .     Q    .      .            .V         .
17.033      1.8309      2.34  .     Q    .      .            .V         .
17.050      1.8341      2.31  .     Q    .      .            .V         .
17.067      1.8372      2.28  .     Q    .      .            .V         .
17.083      1.8404      2.26  .     Q    .      .            .V         .
17.100      1.8434      2.23  .     Q    .      .            .V         .
17.117      1.8464      2.20  .     Q    .      .            .V         .
17.133      1.8494      2.17  .     Q    .      .            . V        .
17.150      1.8524      2.14  .     Q    .      .            . V        .
17.167      1.8553      2.11  .     Q    .      .            . V        .
17.183      1.8582      2.09  .     Q    .      .            . V        .
17.200      1.8610      2.06  .   Q      .      .            . V        .
17.217      1.8638      2.03  .   Q      .      .            . V        .
17.233      1.8666      2.00  .   Q      .      .            . V        .
17.250      1.8693      1.97  .   Q      .      .            . V        .
17.267      1.8719      1.94  .   Q      .      .            . V        .
17.283      1.8746      1.92  .   Q      .      .            . V        .
17.300      1.8772      1.89  .   Q      .      .            . V        .
17.317      1.8798      1.87  .   Q      .      .            . V        .
17.333      1.8823      1.86  .   Q      .      .            . V        .
17.350      1.8849      1.84  .   Q      .      .            . V        .
17.367      1.8874      1.83  .   Q      .      .            . V        .
17.383      1.8899      1.81  .   Q      .      .            . V        .
17.400      1.8924      1.80  .   Q      .      .            . V        .
17.417      1.8948      1.79  .   Q      .      .            . V        .
17.433      1.8973      1.77  .   Q      .      .            . V        .
17.450      1.8997      1.76  .   Q      .      .            . V        .
17.467      1.9021      1.75  .   Q      .      .            . V        .
17.483      1.9045      1.73  .   Q      .      .            . V        .
17.500      1.9068      1.72  .    Q     .      .            . V        .
17.517      1.9092      1.71  .   Q      .      .            . V        .
17.533      1.9115      1.69  .   Q      .      .            . V        .
17.550      1.9138      1.68  .   Q      .      .            . V        .
17.567      1.9161      1.67  .   Q      .      .            . V        .
17.583      1.9184      1.65  .   Q      .      .            . V        .
17.600      1.9207      1.64  .   Q      .      .            . V        .
17.617      1.9229      1.62  .   Q      .      .            . V        .
17.633      1.9251      1.61  .   Q      .      .            . V        .
17.650      1.9273      1.60  .   Q      .      .            . V        .
17.667      1.9295      1.58  .   Q      .      .            . V        .
17.683      1.9317      1.57  .   Q      .      .            . V        .
17.700      1.9338      1.56  .   Q      .      .            . V        .
17.717      1.9359      1.54  .   Q      .      .            . V        .
17.733      1.9380      1.53  .   Q      .      .            . V        .
17.750      1.9401      1.52  .   Q      .      .            . V        .
17.767      1.9422      1.51  .   Q      .      .            . V        .
17.783      1.9443      1.50  .   Q      .      .            . V        .
17.800      1.9464      1.50  .   Q      .      .            . V        .
17.817      1.9484      1.49  .   Q      .      .            . V        .
17.833      1.9504      1.48  .   Q      .      .            . V        .
17.850      1.9525      1.47  .   Q      .      .            . V        .
17.867      1.9545      1.46  .   Q      .      .            . V        .
17.883      1.9565      1.46  .   Q      .      .            . V        .
17.900      1.9585      1.45  .   Q      .      .            . V        .
17.917      1.9605      1.44  .   Q      .      .            . V        .
17.933      1.9624      1.43  .   Q      .      .            . V        .
17.950      1.9644      1.42  .   Q      .      .            .  V       .
17.967      1.9664      1.42  .   Q      .      .            .  V       .
17.983      1.9683      1.41  .   Q      .      .            .  V       .
18.000      1.9702      1.40  .   Q      .      .            .  V       .
```

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1081.0
10%	1081.0
20%	435.0
30%	235.0
40%	200.0
50%	170.0
60%	135.0
70%	105.0
80%	65.0
90%	35.0

END OF FLOODSCx ROUTING ANALYSIS

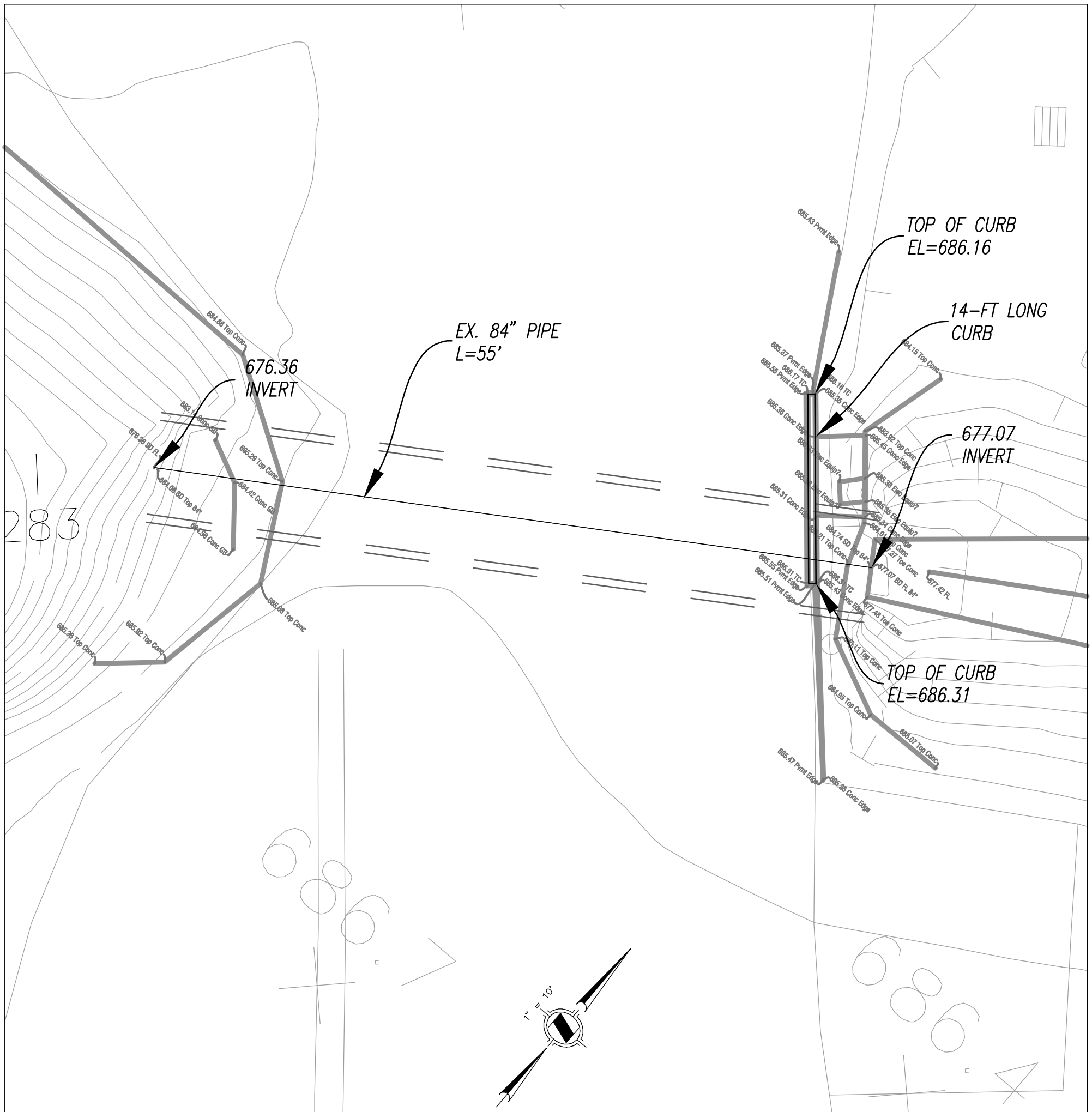
Onsite Flood Routing Area "B" @ Node 15

With Most of Drainage Area "B" in Existing Condition Diverting to Area "A" and Outlet at Downstream of Existing 10.5' x 10.5' RCB (F19-P07) Node 61

100-Year Storm Proposed Condition

APPENDIX D

- As-Built Storm Drain Plans
- Existing F19S02-713, F19P06 & F19P07 - Hydraulic
- Serrano Creek Facility No. F19, Drainage Area, Land Use and Soil Groups Map



10 5 0 10

GRAPHIC SCALE 1"=10'

REGISTERED PROFESSIONAL ENGINEER
JIANHUA GUAN
No. 64519
Exp.06/30/19
CIVIL
STATE OF CALIFORNIA

DATUM: NAVD 88

SURVEY SKETCH
EXISTING 84" PIPE AT STATION 283+50
FOR SERRANO CREEK LOMR
CITY OF LAKE FOREST, COUNTY OF ORANGE

WO: 1443-136x

PLOTTED BY: Ha To Chau DATE: Oct. 26, 2017 03:41:00 PM FILE: F:\0894\Engineering\SY_Channel\LOMR\84 inch Pipe.dwg

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

SANTA ANA, CALIFORNIA

E. SCHNEIDER, DIRECTOR

PLANS FOR CONSTRUCTION OF

THAT PORTION OF

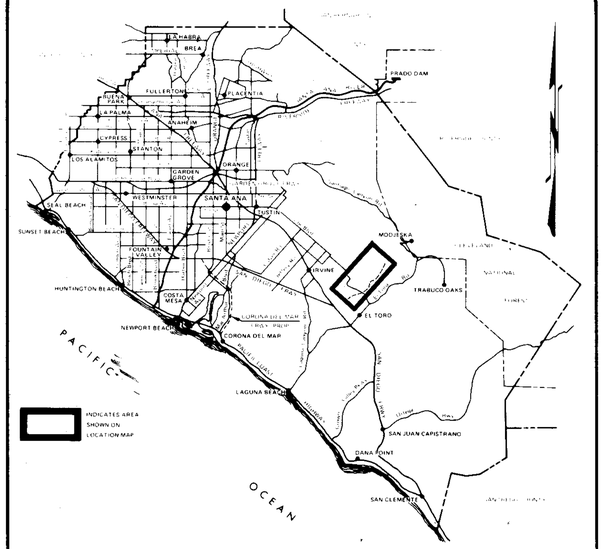
FACILITY NO. F19S02

FOR

TRACTS 13344 AND 13179

FROM STA. 22+26.00 TO STA. 38+42.85 △3

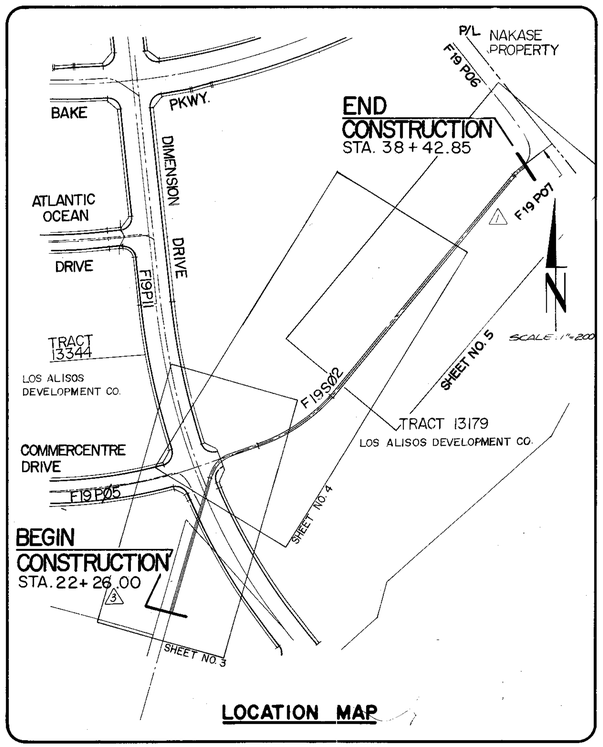
BONDED WITH TRACT 13179 △



VICINITY MAP

1 0 5 10

SCALE IN MILES



LOCATION MAP

INDEX OF SHEETS

SHEET	DESCRIPTION
1	TITLE SHEET
△3 2A	CONSTRUCTION AND GENERAL NOTES ESTIMATED QUANTITIES SETTLEMENT JOINTS AND DETAILS
	PLAN AND PROFILE
3A	STA 22+26.00 TO STA 28+00.72 △
4A	STA 28+00.00 TO STA 33+00.00 △
5A	STA 33+00.00 TO STA 38+42.85 △2
6A	STRUCTURAL DETAILS △
7.	LATERAL PROFILES & DETAILS △

UTILITY	PHONE NO.
LOS ALISOS WATER DISTRICT	(714) 830-0508
SOUTHERN CALIFORNIA GAS COMPANY	(714) 634-0251
SOUTHERN CALIFORNIA EDISON	(714) 973-5642
PACIFIC BELL COMPANY	(714) 422-4133
(UNDERGROUND ALERT)	(800) 422-4133

BENCH MARK:

GO ONE MILE NE ON THE NEW EL TORO RD. FROM THE JUNCTION OF EL TORO RD. WITH GLEN - MEADOW DR. TO THE FIRST AREA HAVING CUT BANKS ON EACH SIDE AND 700 FT. BACK SW FROM WHERE THE STEEL TRANSMISSION TOWER WIRE CROSS OVER EL TORO RD., ABOUT 98 FT. SE OF C OF RD. ABOUT 23 FT. N OF THE DRAIN WHICH IS ON THE SELY SIDE OF THE RD. NEAR A CONC. DIVERSION DITCH. A CONC. POST 10" ABOVE GR. WITH A PADDLEBOARD 1 FT. E OF IT. MON IS AT RD. CONST. STA. 518+94.

BASIS OF BEARING:

STATE OF CALIFORNIA LAMBERT COORDINATE SYSTEM - "ZONE VI" BASED ON THE LINE BETWEEN ORANGE COUNTY SURVEYOR'S HORIZONTAL CONTROL STATION "3-1-12-68" AND "CANADA" (OCS 1-1-75 DATUM)
BEING N 77° 20' 41" E

UNAUTHORIZED CHANGES & USES

CAUTION: The engineer(s) preparing these plans will not be responsible for, or liable for, unauthorized changes to or uses of these plans. All changes to the plans must be in writing and must be approved by the preparer of these plans.

California Council of Civil Engineers & Land Surveyors

STORM DRAIN MAINTAINED BY COUNTY OF ORANGE

(WITHIN PUBLIC R/W)

BLOCK : 5456 MODULE: 62,63,71,72,73

ENGINEER

Robert Bein, William Frost & Associates
PROFESSIONAL ENGINEERS, PLANNERS & SURVEYORS
P.O. BOX 19739 • 14725 ALTON PARKWAY, IRVINE, CALIFORNIA 92718
(714) 472-2505

PREPARED UNDER SUPERVISION OF:

BY: James E. McDonald
JAMES E. MCDONALD RCE NO. 29464
EXP 3-31-91

DATE: 2-28-89

EMA - REGULATION

THIS PLAN IS SIGNED BY EMA/ REGULATION FOR CONCEPT, ADHERENCE TO COUNTY STANDARDS AND REQUIREMENTS ONLY. EMA/ REGULATION IS NOT RESPONSIBLE FOR DESIGN, ASSUMPTIONS OR ACCURACY.

APPROVED: Patrick Stanton
RCE

DATE: 11/16/89

DEVELOPER

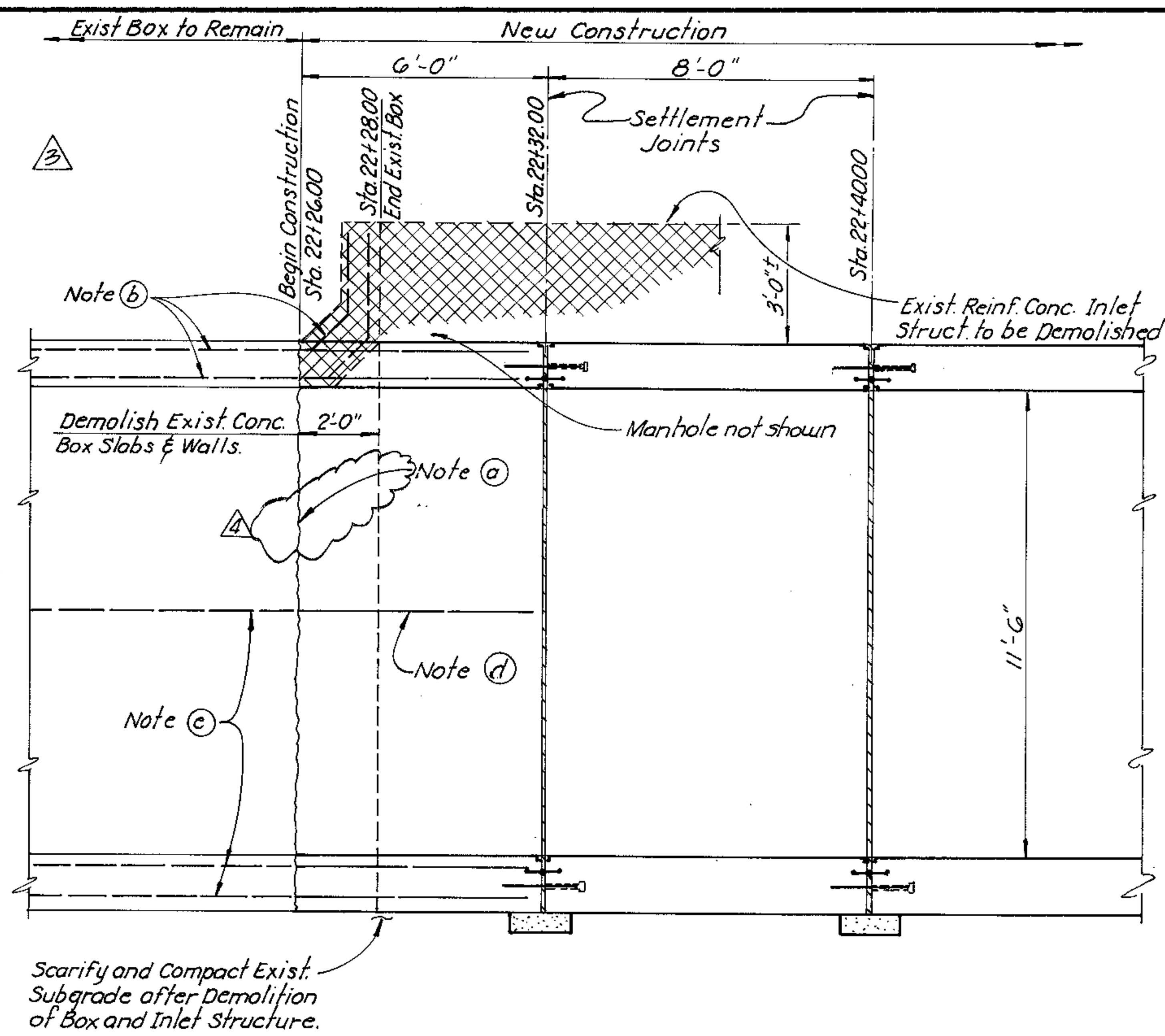
LOS ALISOS DEVELOPMENT COMPANY
2 PARK PLAZA, SUITE 980
IRVINE, CA., 92714
(714) 250-1806

NO.	DESCRIPTION	SHT.	APPROVED	DATE
	REVISIONS			
△4	RELOCATE SETTLEMENT JOINTS PER OWNER	3A,4A,5A	P. Stanton	2/20/91
△3	REVISE/ADDITION & CHANNEL PROFILE	3A,5	P. Stanton	2/20/91
△2	REV. B.C. STATION	5A	P. Stanton	7/17/90
△1	REV. PLAN, PROFILE, DETAILS & QUANTITIES	1-7	P. Stanton	4/6/90

DWG. NO. F19S02-713-2

SHEET 1 OF 7

JN 24321
24321.08 - IMP.SMAP



DETAIL - JOINT AT NEW AND EXIST. CONSTRUCTION (STA. 22+26.00)
Scale: 1"=3'

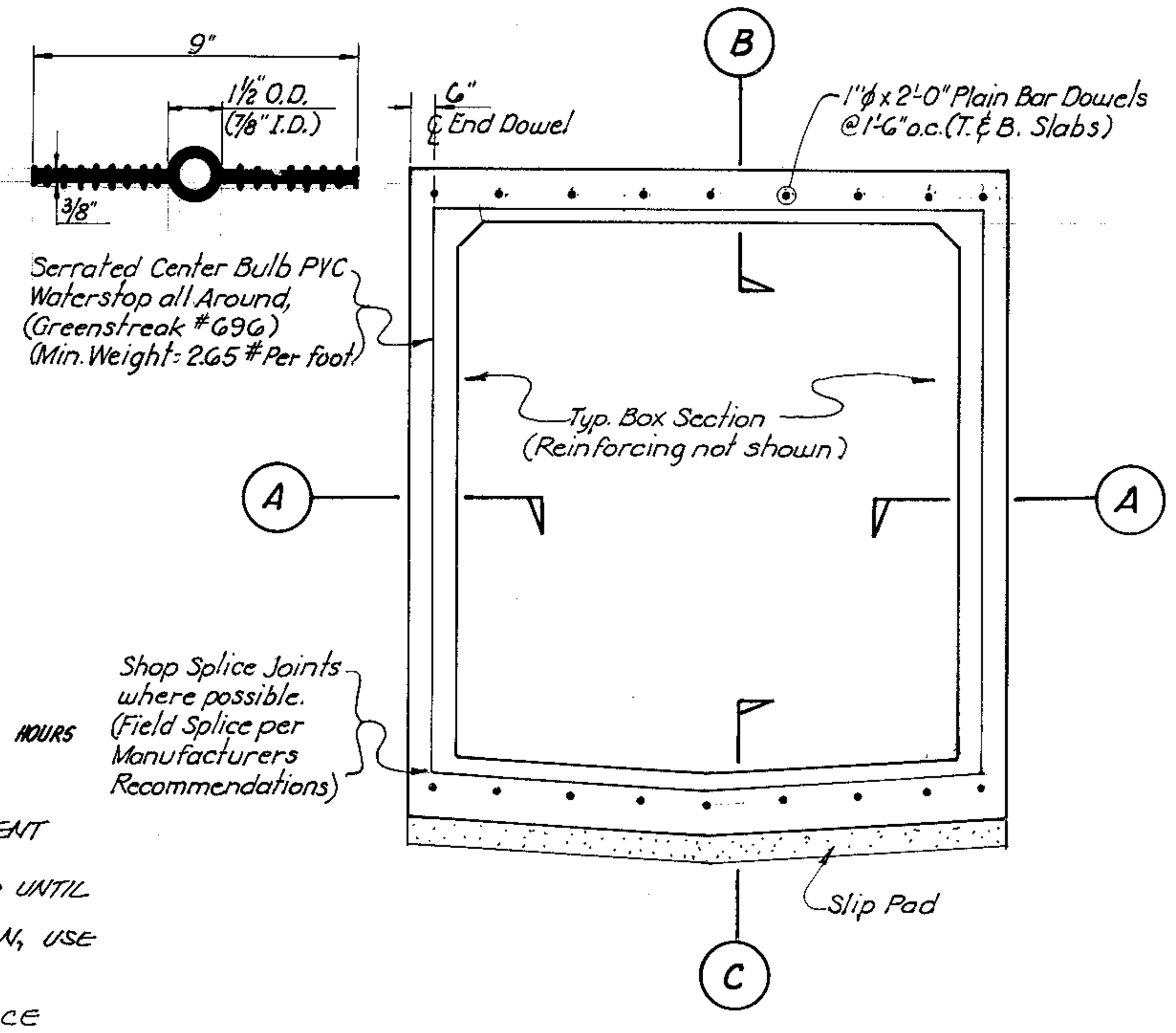
STORM DRAIN

1. ALL CONCRETE IN REINFORCED CONCRETE STRUCTURES MUST BE 3250 POUNDS PER SQUARE INCH IN 28 DAYS; TYPE OF PORTLAND CEMENT CONCRETE TO BE DETERMINED BY OCEMA MATERIALS LAB.
2. ALL PIPE LENGTHS ARE HORIZONTAL PROJECTIONS, UNLESS OTHERWISE SHOWN.
3. FOR TRENCH EXCAVATIONS IN NATIVE SOIL, SHORING SHALL BE PROVIDED TO SATISFY STATE OF CALIFORNIA SAFETY REQUIREMENTS.
4. PIPE CONSTRUCTION IN FILL AREA MUST BE COORDINATED WITH THE GRADING TO INSURE THAT WHEN THE FILL OPERATION HAS BEEN COMPLETED AT GRADE THERE IS A MINIMUM 2 FEET OF FILL ABOVE THE TOP OF PIPE.
5. ALL WORK MUST BE IN CONFORMANCE WITH THE CURRENT ORANGE COUNTY E.M.A. STANDARD SPECIFICATIONS AND MUST BE KEPT ON THE JOB SITE AT ALL TIMES.
6. THE CONTRACTOR MUST NOTIFY THE O.C.E.M.A. INSPECTOR AT LEAST (2) WORKING DAYS PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION BY TELEPHONING 567-7800 OR BY WRITING THE ORANGE COUNTY E.M.A., ATTN: CONSTRUCTION, P.O. BOX 486, SANTA ANA, CA 92702.
7. ALL FILLS MUST BE COMPACTED TO 90% RELATIVE COMPACTION AS DETERMINED BY THE CALIFORNIA TEST METHOD NO. 216, 1978 "FIVE LAYER METHOD." ALL BACKFILL MUST BE FREE OF VEGETABLE MATTER.
8. ALL SURVEYING REQUIRED FOR VERTICAL AND HORIZONTAL ALIGNMENT MUST BE PROVIDED BY THE CONTRACTOR OR DEVELOPER AND SUFFICIENT REFERENCE STAKING MUST BE IN ACCORDANCE WITH THE REQUEST OF THE O.C.E.M.A. INSPECTOR.
9. ALL REINFORCED CONCRETE PIPE MUST BE BEDDED IN ACCORDANCE WITH PIPE BEDDING DETAIL PER O.C.E.M.A. STANDARD PLAN 1319.
10. PRIOR TO THE PLACEMENT OF STORM DRAIN IMPROVEMENTS, THE DEVELOPER'S SOILS ENGINEER SHALL CERTIFY IN WRITING TO THE E.M.A. INSPECTOR THAT THE STORM DRAIN'S SUBGRADE IS OF ADEQUATE STRENGTH TO SUPPORT THE STRUCTURES AND ANY ANTICIPATED LOADS.
11. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, THE DEVELOPER'S CONTRACTOR SHALL OBTAIN A PERMIT FROM THE STATE DIVISION OF INDUSTRIAL SAFETY. A COPY OF THE PERMIT SHALL BE KEPT ON THE JOB SITE AT ALL TIMES.
12. WHENEVER APPLICABLE, THE DEVELOPER SHALL OBTAIN A PERMIT FROM THE STATE DEPARTMENT OF FISH AND GAME IN ACCORDANCE WITH SECTION 1602 OF THE CALIFORNIA FISH AND GAME CODE PRIOR TO COMMENCEMENT OF CONSTRUCTION.
13. ALL STEEL THAT IS TO BE CONTINUOUS SHALL BE LAPPED A MINIMUM OF 45 BAR DIAMETERS.
14. ALL MATERIALS TESTING FOR THE DRAINAGE FACILITIES SHALL BE PROVIDED BY THE DEVELOPER OR CONTRACTOR IN ACCORDANCE WITH THE NUMBER, LOCATION AND FREQUENCY REQUESTED BY THE O.C.E.M.A. INSPECTOR.
15. CHAMFER ALL EXPOSED EDGES OF CONCRETE 3/4" MINIMUM.
16. A PERMIT FOR WORK WITHIN EXISTING STREET RIGHT OF WAY IS REQUIRED FROM THE O.C.E.M.A. FOR ANY ENCROACHMENT NECESSARY FOR CONSTRUCTION IN PUBLIC RIGHT OF WAY.
17. LENGTH OF MANHOLE STRUCTURES MAY BE INCREASED TO MEET PIPE ENDS AT OPTION OF CONTRACTOR AS LONG AS REINFORCING STEEL IS CONTINUED AS REQUIRED. ANY CHANGE IN SPUR LOCATION MUST BE APPROVED BY THE ENGINEER.
18. FLOOR OF MANHOLE STRUCTURE SHALL BE STEEL TROWELED TO SPRING LINE.
19. BODY OF MANHOLE STRUCTURE, INCLUDING SPUR, MUST BE POURED IN ONE CONTINUOUS OPERATION, EXCEPT THAT CONSTRUCTION JOINT AT THE SPRING LINE WITH A LONGITUDINAL KEYWAY IS PERMITTED.
20. ALL REINFORCING BARS MUST BE SECURELY HELD IN PLACE IN THE FORMS. TWO WAY MATS OF STEEL MUST BE WIRED TOGETHER BOTH WAYS AT ALTERNATE INTERSECTIONS.
21. STORM DRAIN BACKFILL FOR ALL FACILITIES WITHIN STREET RIGHT OF WAY IS TO BE PLACED AND COMPACTED UNDER O.C.E.M.A. INSPECTION AND MEET OR EXCEED O.C.E.M.A. MINIMUM STANDARDS.
22. ALL R.C.P. PIPE TO BE BANDED AND GROUTED.
23. R.C.P. SHALL COMPLY WITH ALL A.S.T.M. APPLICABLE STANDARDS.
24. WORKING WITHIN ORANGE COUNTY FLOOD CONTROL FACILITIES IS RESTRICTED TO THE PERIOD OF APRIL 15 TO OCTOBER 15.
25. THE CONTRACTOR SHALL CONDUCT CONSTRUCTION OPERATIONS IN SUCH A MANNER THAT STORM OR OTHER WATERS MAY PROCEED UNINTERRUPTED ALONG THEIR EXISTING STREET OR DRAINAGE COURSES.
26. IN THE COURSE OF WATER CONTROL, THE CONTRACTOR SHALL CONDUCT CONSTRUCTION OPERATIONS TO PROTECT WATERS FROM POLLUTION WITH FUELS, OILS, BITUMENS OR HARMFUL MATERIALS.
27. ALL UTILITY TRENCH BACKFILL AND COMPACTION INSPECTION OUTSIDE THE LIMITS OF DEDICATED STREET RIGHT-OF-WAY SHALL BE PERFORMED BY O.C.E.M.A. REGULATION.
28. CONTRACTOR SHALL NOTIFY O.C.E.M.A. MATERIALS LAB (PHONE: (714) 567-7805) 48 HOURS PRIOR TO D-LOAD TESTING OF R.C.P. FOR VERIFICATION OF RESULTS.
29. ALL LOCAL DEPRESSIONS SHALL BE CONSTRUCTED PER STREET IMPROVEMENT PLANS IN ACCORDANCE WITH O.C.E.M.A. STANDARD PLANS. HOWEVER, ALL CATCH BASINS WILL BE SHOWN ON STREET IMPROVEMENT PLANS.
30. LOCAL DEPRESSIONS AND DECKS OF CURB INLETS SHALL NOT BE POURED UNTIL ADJACENT CURB AND GUTTER HAS BEEN POURED.
31. IF A DRIVEWAY ENCROACHES WITHIN A LOCAL DEPRESSION TRANSITION, USE E.M.A. STANDARD PLAN #1308-TYPE A.
32. ALL MATERIALS TESTING FOR DRAINAGE FACILITIES SHALL BE PROVIDED BY THE DEVELOPER OR CONTRACTOR IN ACCORDANCE WITH THE NUMBER, LOCATION AND FREQUENCY REQUESTED BY THE O.C.E.M.A. INSPECTOR.

R.C.B. ALTERNATE

CONSTRUCTION NOTES AND ESTIMATED QUANTITIES

	CONSTRUCTION ITEM	UNIT	QUANT.	
(1)	CONST. 10.5'W x 10.5'H R.C.B. PER DETAIL SHT. NO. 6A	L.F.	1228.17	△1 △3
(2)	CONST. 10.5'W x 11.5'H R.C.B. PER DETAIL SHT. NO. 6A	L.F.	390	
(3)	CONST. JUNC. STRUCT. TYPE V PER OCEMA STD. PLAN NO. 1314	EA.	9	
(4)	CONST. R.C. BOX MANHOLE PER OCEMA STD. PLAN NO. 1506	EA.	4	
(5)	REMOVE EXIST. RIP-RAP PER LIMITS SHOWN ON PLANS	C.Y.	930	
(6)	REMOVE EXIST. REINF. CONC. INLET.	EA	1	
△1 (7)	CONST. 30" RCP D-LOAD PER PROFILE	L.F.	210	
△4 △1 (8)	CONST. SETTLEMENT JOINTS PER DETAILS THIS SHEET	EA.	20	
(9)				△3
(10)	CONST. 8" BRICK AND MORTAR PLUG.	EA.	7	△1
△1 (11)				
(12)	CONST. 24" RCP (1750-D)	L.F.	8	△1
(13)	CONST. 48" RCP (1200-D) WITH 1½" ADDITIONAL STEEL COVER	L.F.	8	
(14)	CONST. 60" RCP (1600-D) WITH 1½" ADDITIONAL STEEL COVER	L.F.	8	
△1 (17)	CONST. DEEP MANHOLE LANDING PER DETAILS ON SHEET NO. 7	EA.	3	
(18)	CONST. 24" RCP (D-2500) 1½" MIN. STEEL CLR. COVER	L.F.	68	
(19)	CONST. RISER INLET PER OCEMA STD. PLAN NO. 1305	EA.	2	
(20)	CONST. CONC. COLLAR PER OCEMA STD. PLAN NO. 1317	EA.	4	
(21)	CONST. CONC. PIPE SLOPE ANCHOR PER OCEMA STD. PLAN NO. 1333	EA.	8	△1



SECTION @ VERTICAL JOINT

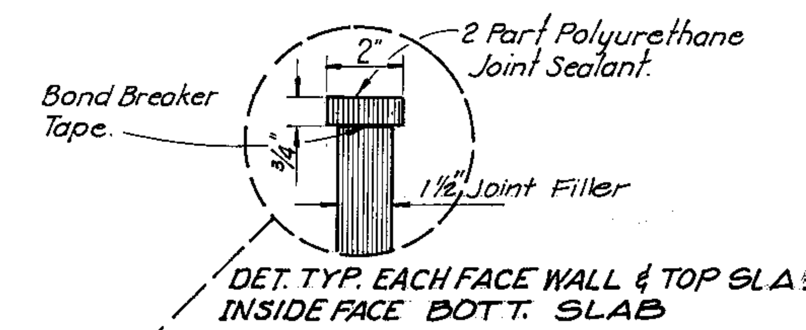
DETAIL - JOINT AT NEW AND EXIST. CONSTRUCTION (NOTES)
(STA 22+26.00)

Note (a) SAW CUT EXISTING (TOP AND BOTTOM SLABS AND WALLS) ON BOTH FACES DOWN TO 1 INCH MAXIMUM DEPTH. REMOVE CONCRETE AT THE SAW CUTS WITHOUT DAMAGE TO EXISTING LONGITUDINAL REINFORCING. PREPARE CONCRETE SURFACE TO EXPOSE SOUND AGGREGATE IN MORTAR MATRIX AND REMOVE ALL LOOSE MORTAR. MOISTEN EXPOSED CONCRETE SURFACE AND COAT WITH CEMENT SLURRY IMMEDIATELY PRIOR TO PLACING NEW CONCRETE AT THE JOINT.

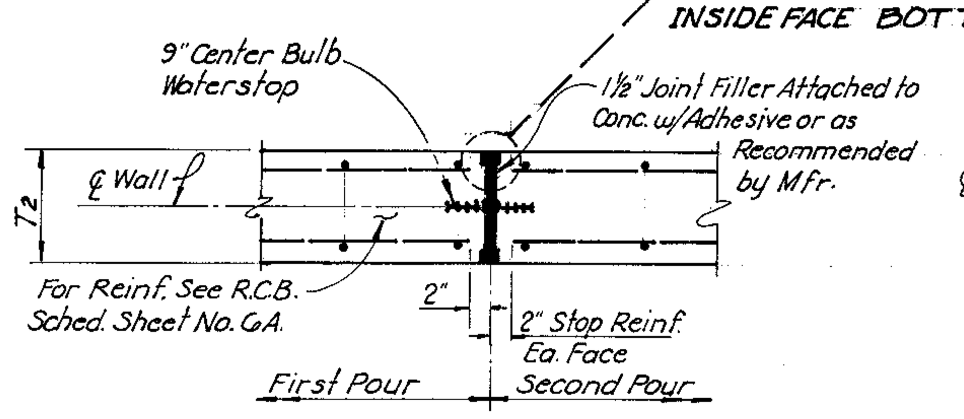
Note (b) CLEAN AND STRAIGHTEN ALL EXISTING LONGITUDINAL BARS IN TOP SLAB AND PARAPET FOR EMBEDMENT IN NEW CONCRETE.

Note (c) CLEAN ALL EXISTING LONGITUDINAL BARS IN WALLS AND BOTTOM SLAB FOR EMBEDMENT IN NEW CONCRETE.

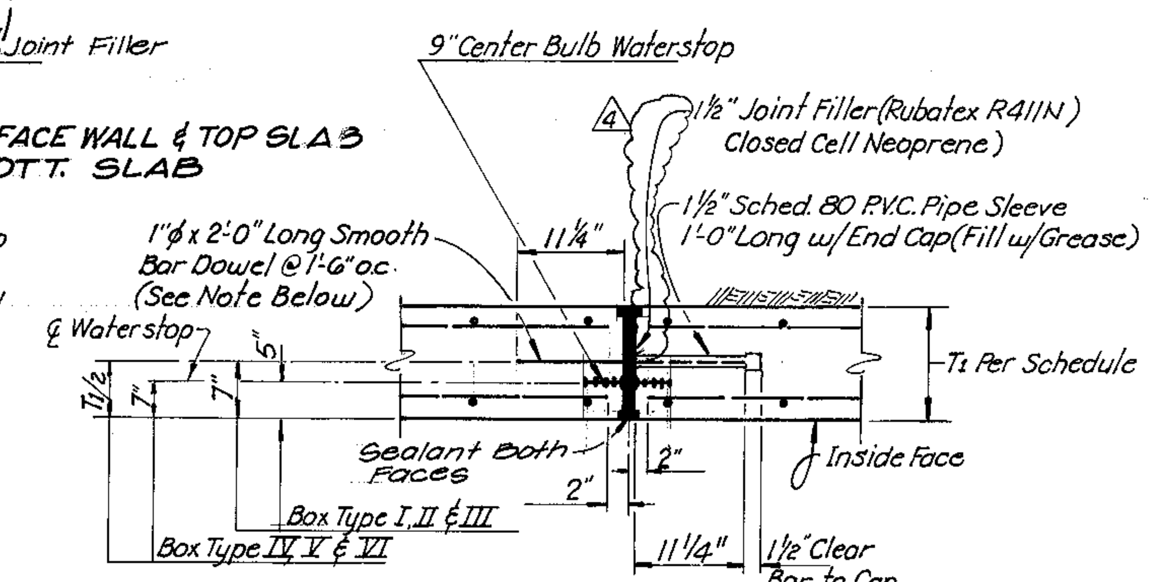
Note (d) CUT ALL EXISTING BARS 2" CLEAR FROM SETTLEMENT JOINT STA 22+32.00



DET. TYP. EACH FACE WALL & TOP SLAB
INSIDE FACE BOTT. SLAB



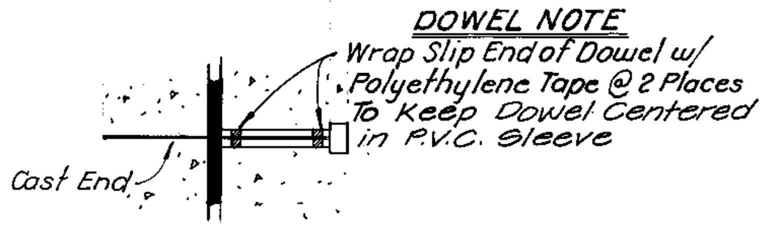
(A) WALL JOINT DETAIL PLAN SECTION



(B) TOP SLAB JOINT DETAIL SECTION

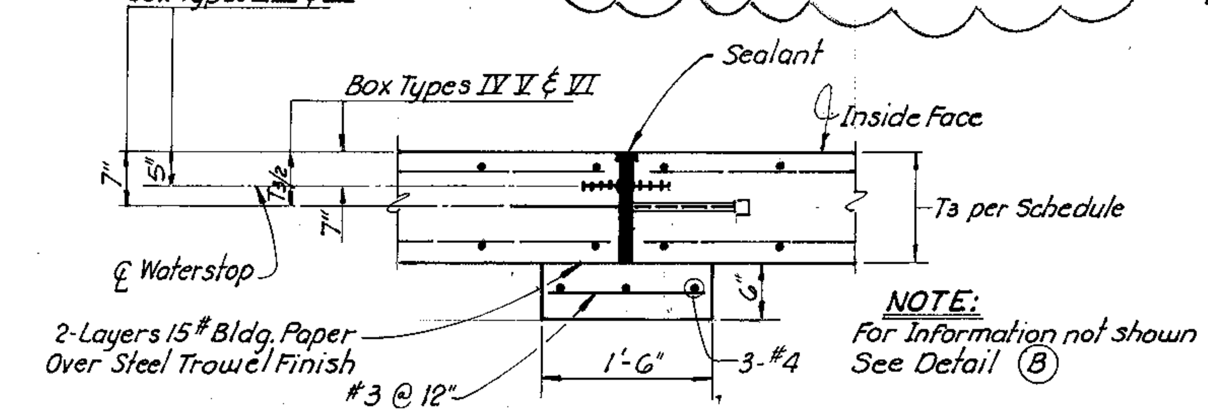
DOWEL NOTE

Wrap Slip End of Dowel w/ Polyethylene Tape @ 2 Places To Keep Dowel Centered in P.V.C. Sleeve



NOTE:
△4 Relocated Settlement Joint Spacing is Based on 48 Foot Module.

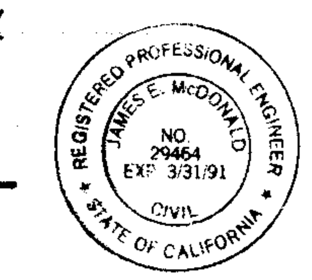
1 1/2 0 1 2
3 inches on original drawing



NOTE:
For Information not shown
See Detail (B)

(C) BOTTOM SLAB JOINT DETAIL SECTION

(8) DETAIL SETTLEMENT JOINT @ SPECIFIC LOCATIONS (See Profile for Locations)



MARK	DATE	DESCRIPTION
△4	1/18/91	RELOCATED ARROWS ADDED NOTES
△3	11/26/90	
△1	1-30-90	ADD NOTES - MODIFY QUANTS.

REVISIONS

DESIGNED SKG
DRAWN SS CHECKED BMP

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY F19S02

CONSTRUCTION & GENERAL NOTES
ESTIMATED QUANTITIES
SETTLEMENT JOINTS & DETAILS

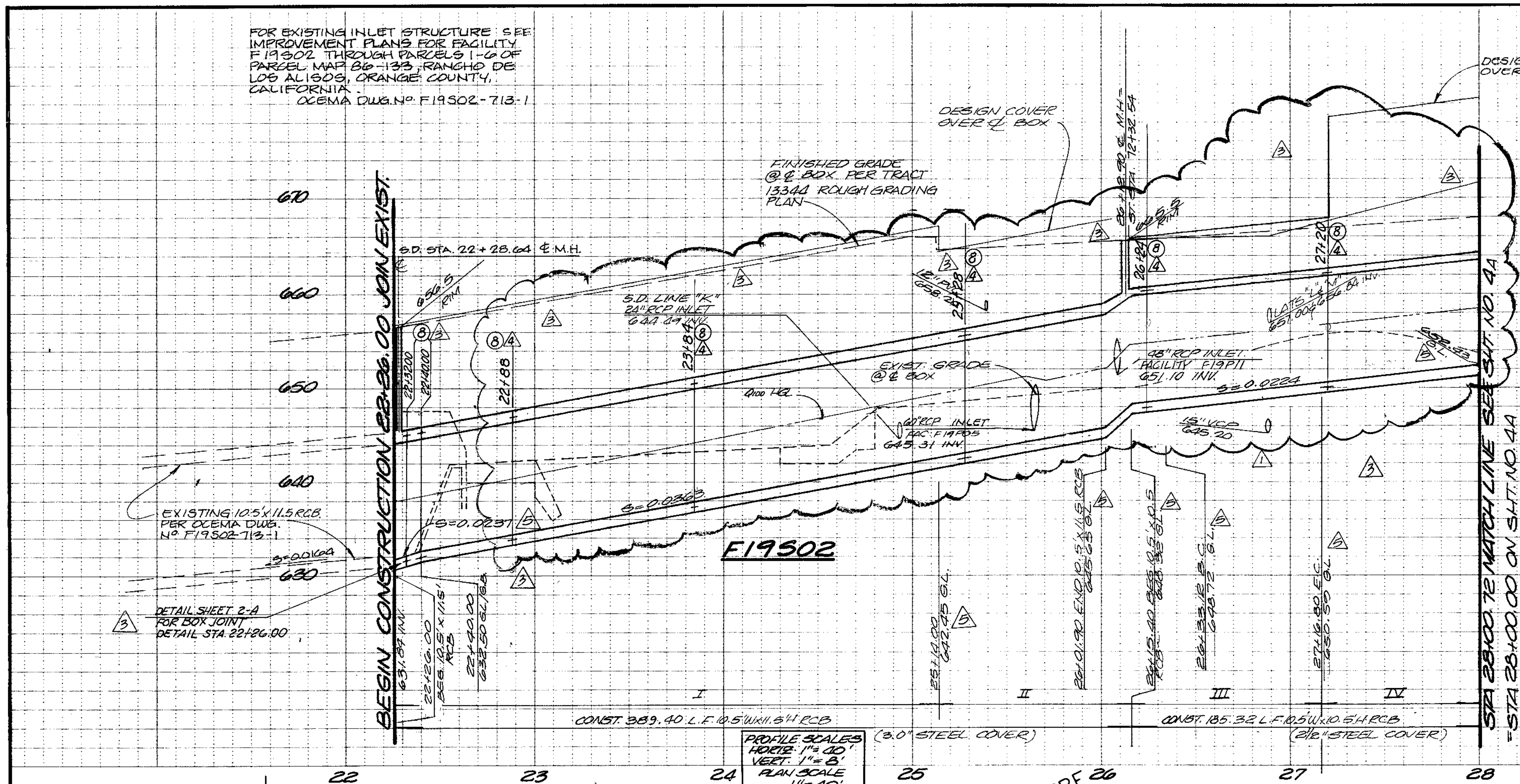
R.C.B. ALTERNATE

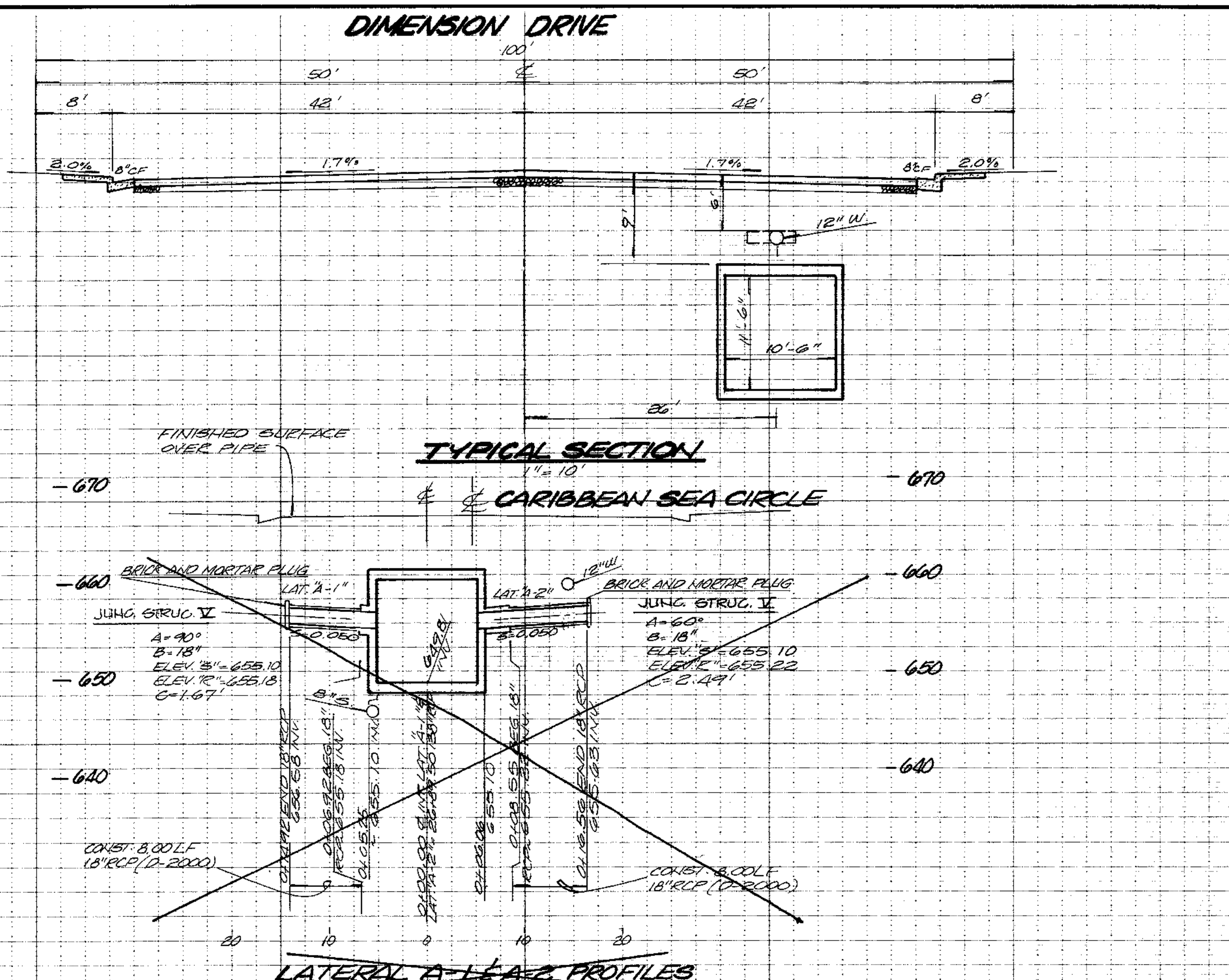
PREPARED UNDER SUPERVISION OF James E. McDonald 2/28/89 EXP 3-31-91 RCE 29464 DATE

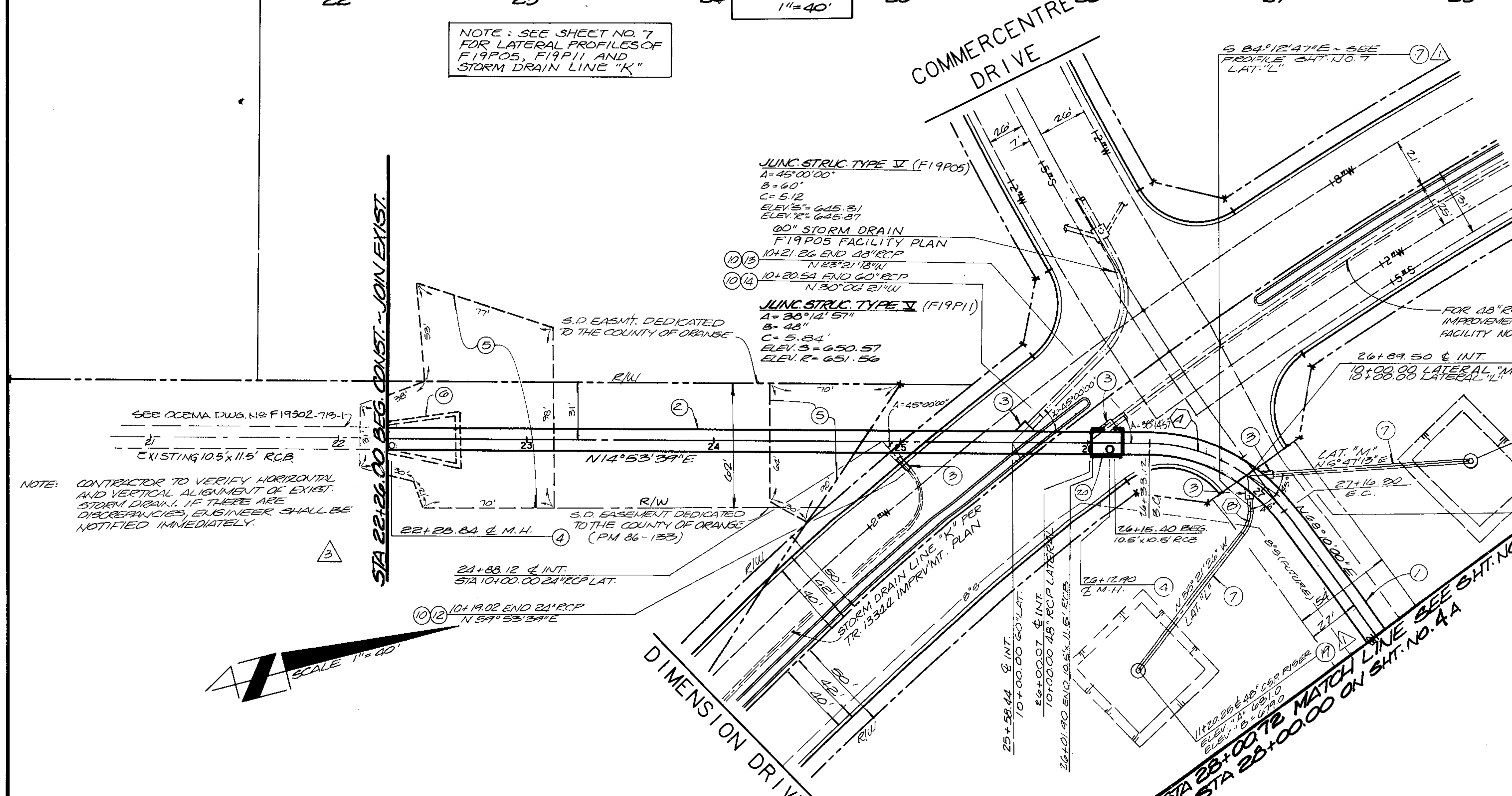
SCALE AS SHOWN | DATE | DWG. NO. F19S02-713-2

SHEET 2A OF 7

24321.28 - IMP. SMFF.



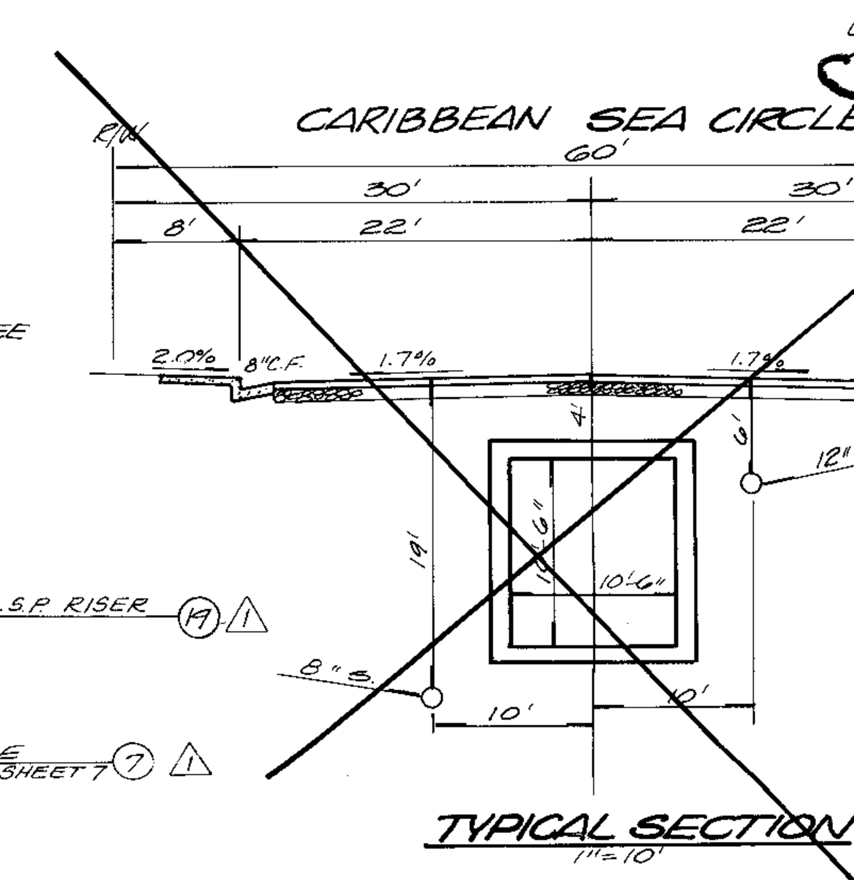




△1 HYDRAULIC DATA										
STA TO STA	Q_{25}	d	S_o	S_f	n	Dn	Vn	Fn	Dc	Vc
LAT. "L" 10+07.67-10+16.67	44.61	30"	0.01	0.012	0.013	PRESSURE FLOW			2.22	9.69
10+16.67-10+53.65	44.61	30"	0.57	0.57	0.013	0.64	44.86	11.71	2.22	9.69
10+53.65-11+16.19	44.61	30"	0.01	0.012	0.013	PRESSURE FLOW			2.22	9.69
LAT. "M" 10+07.23-10+16.23	47.77	30"	0.01	0.014	0.013	PRESSURE FLOW			2.27	10.20
10+16.23-10+67.43	47.77	30"	0.48	0.48	0.013	0.69	43.02	10.77	2.27	10.20
10+67.43-11+19.00	47.77	30"	0.01	0.014	0.013	PRESSURE FLOW			2.27	10.20

CONSTRUCTION NOTES

(1) — CONST. 10.5'W x 10.5'H RCB PER DETAIL SHT. NO. 6
(2) — CONST. 10.5'W x 11.5'H RCB PER DETAIL SHT. NO. 6
(3) — CONST. JUNC. STRUC. TYPE NO V PER OCEMA STD. PLAN NO. 1314
(4) — CONST. R.C. BOX MANHOLE PER OCEMA STD. PLAN NO. 1506
(5) — REMOVE EXIST. RIP-RAP PER LIMITS SHOWN ON PLANS.
△3 (6) — REMOVE EXIST. REINFORCED CONC. INLET & PORTION OF EXISTING BOX PER DET. SHT. 2A.
△1 (7) — CONST. 30" RCP D-LOAD PER PROFILE
△4 (8) — CONST. SETTLEMENT JOINTS PER SHEET 2A
(10) — CONST. BRICK AND MORTAR PLUG.
(12) — CONST. 24" RCP (1750-D)
(13) — CONST. 48" RCP (1200-D) WITH 1½" ADDITIONAL STEEL COVER
(14) — CONST. 60" RCP (1600-D) WITH 1½" ADDITIONAL STEEL COVER
△1 (19) — CONST. RISER INLET PER OCEMA STD. PLAN NO. 1305.
(20) — CONST. CONCRETE COLLAR PER OCEMA STD PL. NO. 1317
(21) — CONST. CONC. PIPE SLOPE ANCHOR PER OCEMA STD. PLAN NO. 1333



3 inches on original drawing

CURVE DATA					
NO.	REFERENCE	Δ	R	L	T
(A)	℄ STORM DRAIN	53°16'21"	90.00	83.68	45.14
△1 (B)	℄ LAT. "L"	48°51'22"	22.50	19.19	10.22

HYDRAULIC DATA										
STA TO STA	Q_{100} cfs	b	w	S_o	S_f	n = 0.014 Dn	Vn	F	Dc	Vc
22+31.17-25+58.44	2220	10.5	11.5	0.036	0.03598	5.2	41.0	3.18	11.2	19.0
25+58.44-26+01.90	2103	10.5	11.5	0.036	0.03599	5.0	40.5	3.20	10.8	18.6
26+15.40-28+00.72	1916	10.5	10.5	0.02	0.02	6.1	30.0	2.14	10.1	18.0

MARK	DATE	DESCRIPTION
△4	1/18/91	RELOCATE SETTLEMENT JOINTS PER OWNER
△3	11-26-90	REV. BEGIN STATION & CHANNEL PROFILE, ADDED SETT. JOINTS, ADDED DET. REF., ADDED NOTE (8)
△1	1-30-90	ADD LATS, MOD. PROF.

REVISIONS

DESIGNED SKG
DRAWN SS CHECKED BMP

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY F19S02

PLAN AND PROFILE

R.C.B. ALTERNATE
WITHIN FINAL TRACTS 13344 AND 13179
(A PORTION OF VESTING TENTATIVE TRACT 13179)

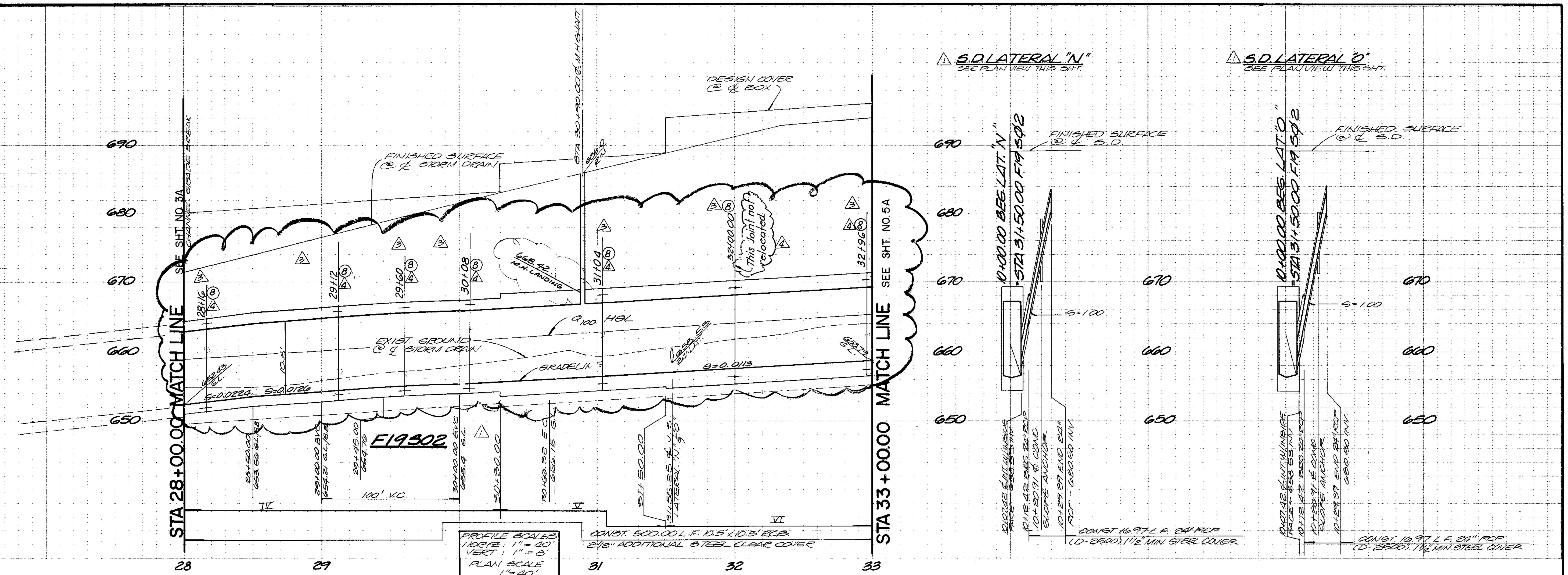
STA 22+26.00 TO STA 28+00.00

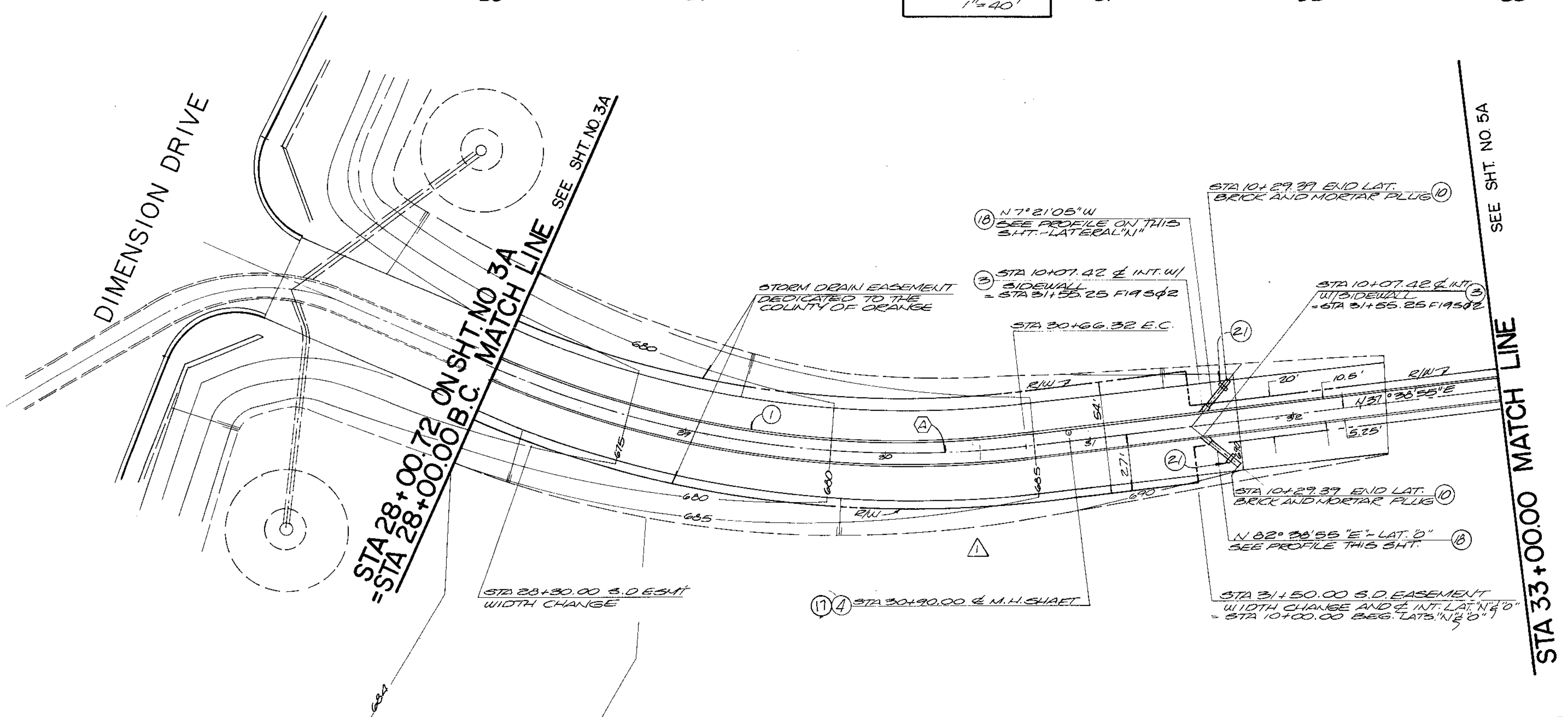
PREPARED UNDER SUPERVISION OF [signature] EXP 3-31-91 RCE 29464 2/28/89 DATE

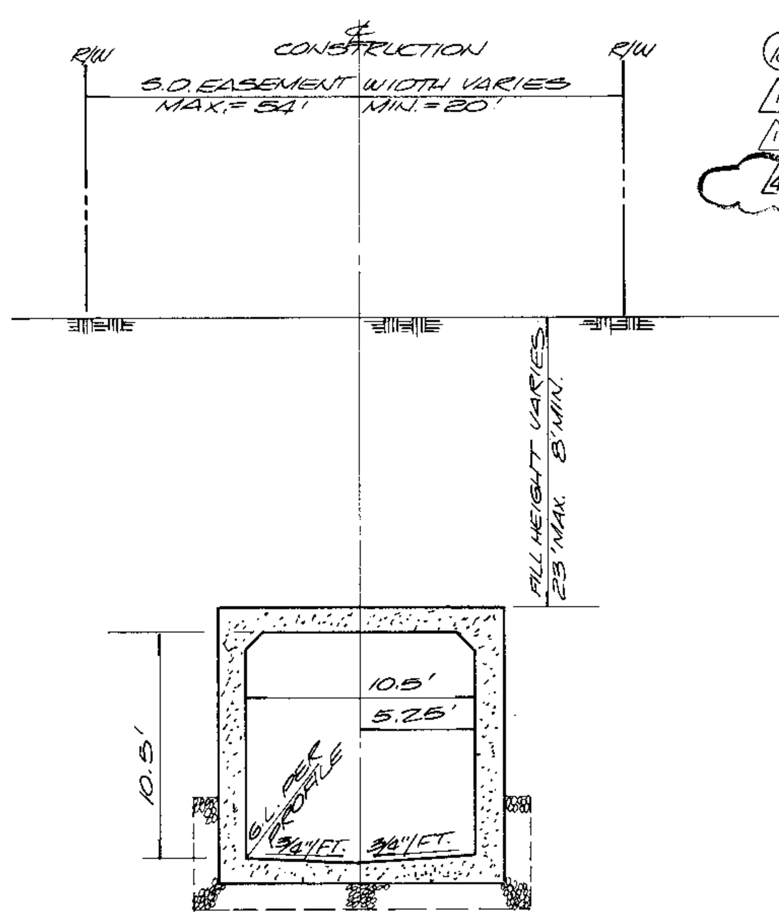
REGISTERED PROFESSIONAL ENGINEER JAMES E. McDONALD NO. 29464 EXP. 3/31/91 CIVIL STATE OF CALIFORNIA

SCALE	DATE	DWG. NO.	SHEET
AS SHOWN		F19S02-713-2	3A OF 7

24321.28 - IMP. SMFF.







△ TYPICAL SECTION
N.T.S.

CONSTRUCTION NOTES

(1) — CONST. 10.5'x10.5' R.C. BOX PER SCHED. & DETAIL PER SHT. NO. 6
(3) — CONST. JUNC. STRUCT. TYPE NO. V PER OCEMA STD. PLAN NO. 1314.
(4) — CONST. R.C. BOX M.H. PER OCEMA STD. PLAN NO. 1506
(10) — CONST. 8" BRICK & MORTAR PLUG
△1 (18) — CONST. 24" RCP (D-LOAD PER PROFILE)
△1 (21) — CONST. CONC. PIPE SLOPE ANCHOR PER OCEMA STD. PLAN NO. 1333
△4 (8) CONST. SETTLEMENT JOINTS PER SHEET 2-A.
(17) — CONST. DEEP MANHOLE LANDING PER DETAIL ON SHEET NO. 7

1 1/2 0 1 2
3 inches on original drawing

HYDRAULIC DATA											
LINE	STA TO STA	Q 100	SLOPE (So)	n	SECTION	Dn (ft.)	Vn (f.p.s.)	Dc (ft.)	Vc	Nf
F19S02	28+00.00-33+00.00	1916	0.0127	.014	10.5'x10.5' RCB	7.3	25.1	10.1	18.0	1.64
LAT. "N"	10+07.42-10+29.39	16.8	1.00	.013	24"	0.37	42.06	1.48	6.76	14.61
LAT. "O"	10+07.42-10+29.39	17.0	1.00	.013	24"	0.37	42.16	1.48	6.78	14.61

Q25 (LAT. "N", LAT. "O")

CURVE DATA					
NO	REFERENCE	Δ	R	L	T
4	℄ R.C.B.	30°31'05"	500.00'	266.38'	136.40'

MARK	DATE	DESCRIPTION
4	1/18/91	RELOCATED SETT. JOINTS PER OWNER
3	11-26-90	REV. TO CHANNEL PROFILE ADDED SETT. JOINTS
1	1-30-90	REV. PLAN, PROFILE AND LATS.-DETAIL

REVISIONS

DESIGNED B.M. PHILLIPS
DRAWN S.S. CHECKED SMT

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY F19S02

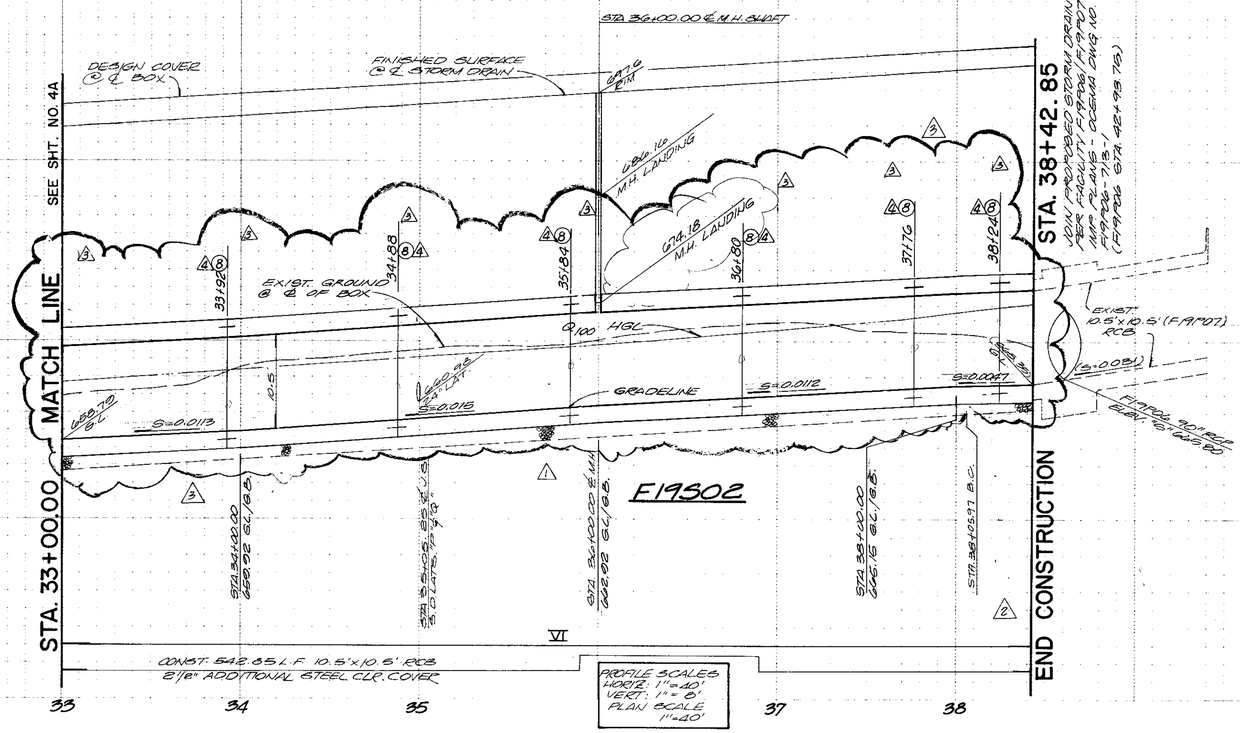
PLAN AND PROFILE

R.C.B. ALTERNATE WITHIN FINAL TRACTS 13344 AND 13179 (A PORTION OF VESTING TENT. TRACT 13179)
STA 28+00.00 TO STA 33+00.00

PREPARED UNDER SUPERVISION OF James E. McDonald RCE 29464 EXP 3-31-91 DATE 1-29-90

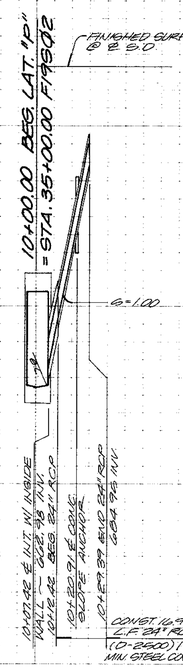
SCALE AS SHOWN | DATE | DWG. NO. F19S02-713-2 | SHEET 4A OF 7

24321.28 - IMP. SMFF.



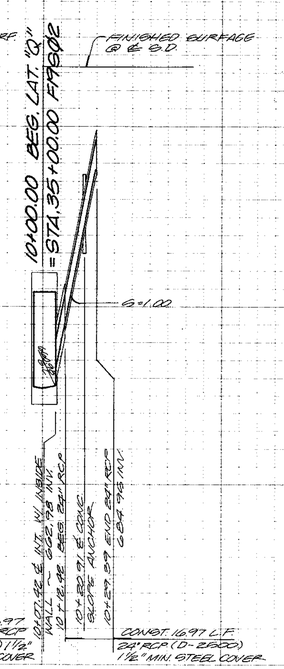
△S.D. LATERAL "P"

SEE PLAN VIEW THIS SHEET



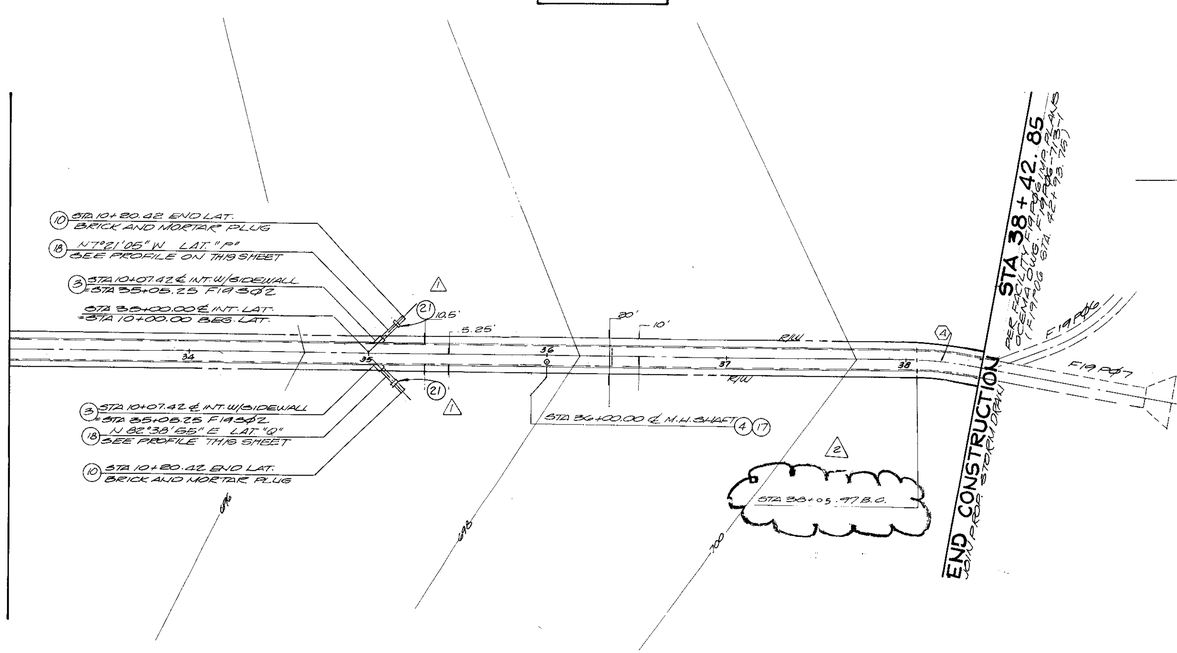
△S.D. LATERAL "Q"

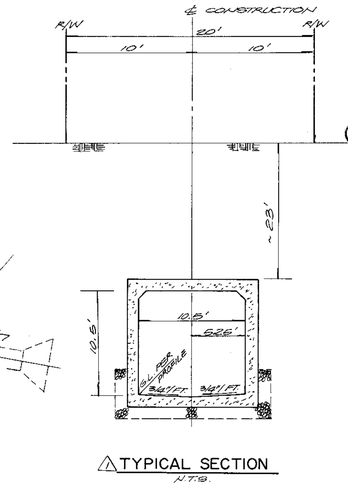
SEE PLAN VIEW THIS SHEET



CONSTRUCTION NOTES

1. CONST. 10.5' x 10.5' R.C. BOX PER SCHEDULE AND DETAILS ON SHT. NO. 6
4. CONST. R.C. BOX M.H. PER OCEMA STD. PLAN NO. 1506
△17. CONST. DEEP M.H. LANDINGS PER DETAILS ON SHT. NO. 7
3. CONST. J.S. TYPE NO. II PER OCEMA STD. PLAN NO. 1314
△18. CONST. 24" RCP (D-2600) PER PROFILE
10. CONST. 8" BRICK AND MORTAR PLUG.
△8. CONST. SETTLEMENT JOINTS PER SHEET 2-A.
△21. CONST. CONC. PIPE SLOPE ANCHOR PER OCEMA STD. PLAN NO. 1533





△TYPICAL SECTION
N.T.S.

HYDRAULIC DATA											
LINE	STA. TO STA.	Q 100	SLOPE (So)	n	SECTION	Dn (ft.)	Vn (f.p.s.)	Dc (ft.)	Vc	Nf
F19P02	33+00.00-38+42.85	1916	0.0127	.014	10.5'x10.5' RCB	7.3	25.1	10.1	18.0	1.64
LAT."P"	10+07.42-10+29.39	14.4	1.00	.013	24"	0.37	41.76	1.46	6.68	14.59
LAT."Q"	10+07.42-10+29.39	12.3	1.00	.013	24"	0.32	38.92	1.26	6.89	12.42

CURVE DATA					
NO.	REFERENCE	Δ	R	L	T
(A)	℄ R.C.B.	10°33'55"	200.00	36.88'	18.49'

1 1/2 0 1 2
3 inches on original drawing

MARK	DATE	DESCRIPTION
△4	11/8/91	RELOCATED SETT. JOINTS PER OWNER
△3	11/26/90	REV. TO CHANGED PROFILE, ADDED SETT. JOINTS
△2	9/3/90	REV. B.C. STATION
△1	1-30-90	REV. PLAN, PROFILE & DATA 10+42.85

REVISIONS

DESIGNED B.M. PHILLIPS
DRAWN S.B. CHECKED S.M.T.

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY F19S02

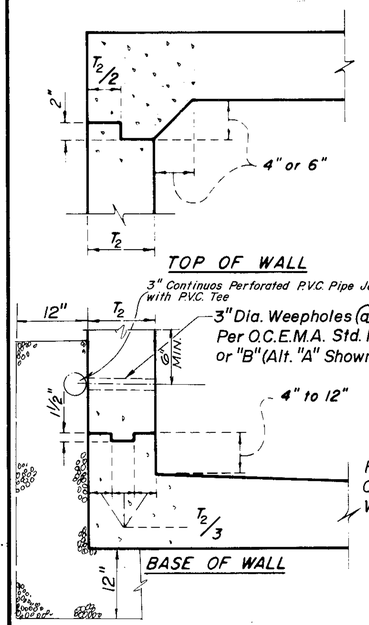
PLAN AND PROFILE

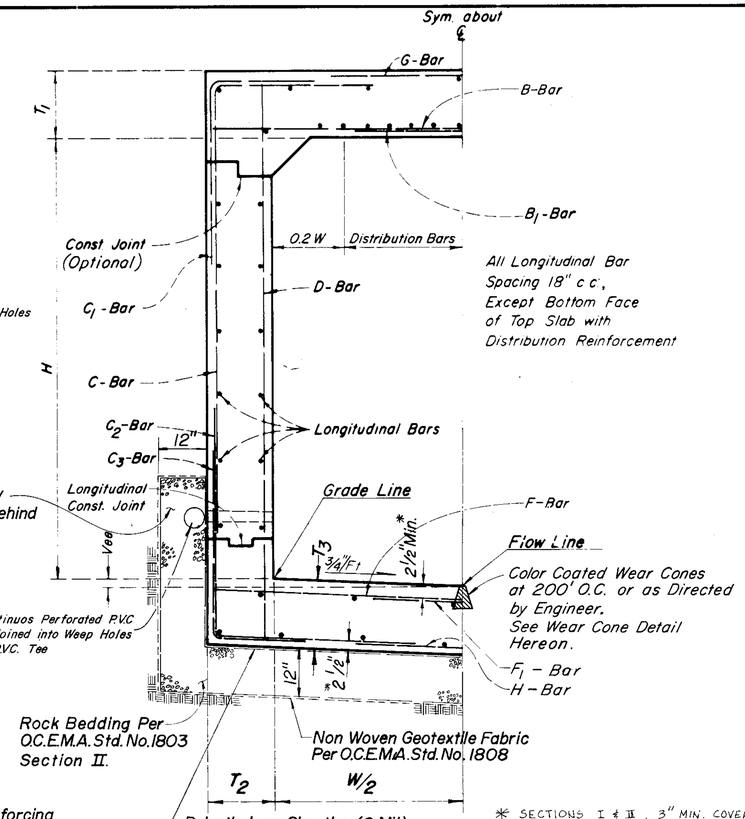
R.C.B. ALTERNATE WITHIN FINAL TRACTS 13344 AND 13179 (A PORTION OF VESTING TENT. TRACT 13179)
STA 33+00.00 TO STA 38+42.85

PREPARED UNDER SUPERVISION OF Jack E. McDonald DATE 5-3-91

SCALE AS SHOWN | DATE | DWG. NO. F19S02-713-2 | SHEET 5A OF 7

24321.20 - IMP. SMFB

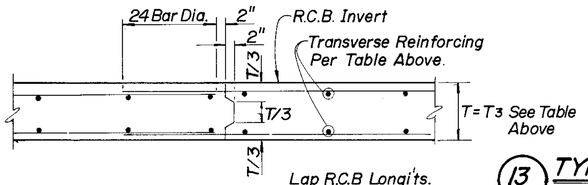




* SECTIONS I & II, 3" MIN. COVER

CONSTRUCTION JOINT DETAILS

N.T.S.



(13) TYPICAL R. C. BOX SECTION (41)

NOT TO SCALE

TRANSVERSE JOINT DETAIL

N.T.S.

DESIGN DATA

LIVE LOAD

HS20-44

DEAD LOAD

Earth load per Marston's formula: w = 110 p.c.f.
Ku = Ku' = 0.150
Bd = Outside width of box plus 3 feet
Side earth 40 p.s.f. per foot of depth

Weight of concrete: 150 p.c.f.

ALLOWABLE STRESSES

f_c' = 3250 p.s.i. at 28 days
f_c = 1462 p.s.i.
f_s = 24,000 p.s.i.
n = 8.8
shear and bond stresses per A.C.I. 318-63

INVERT AND STARTER WALLS f_c' = 4,500 P.S.I. at 28 days.

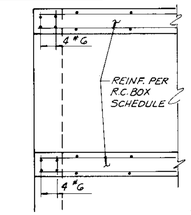
R.C. BOX LOCATION SCHEDULE

Box Sect.	Station From	Station To	REMARK
I	22+26.00	26+14	10.5'W x 11.5'H RCB
△2			
II	26+14	26+16	10.5'W x 11.5'H RCB
III	26+16	27+17	10.5'W x 10.5'H RCB
△ IV	27+17	30+30	10.5'W x 10.5'H RCB
△ V	30+30	31+50	10.5'W x 10.5'H RCB
△ VI	31+50	38+42.88	10.5'W x 10.5'H RCB

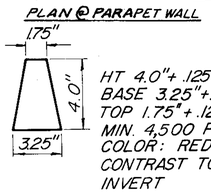
BOX SECTION		I		II		III		IV		V		VI
Design Cover		72'	△1	9'		5'		16'		20'		25'
Width	W	10.5'		10.5'		10.5'		10.5'		10.5'		10.5'
Height	H	11.5'		11.5'		10.5'		10.5'		10.5'		10.5'
Top Slab Thickness	T_1	14"		13"		13" △2 / 10" △2		18"		22"		25"
Side Wall Thickness	T_2	12"		10"		10" △2		12"		14"		15"
Bottom Slab Thickness	T_3	16"		15"		13"		20"		24"		27"
B Bars	Bar No & Spacing	#6@12"		#6@12"		#6@12"		#7@12"		#7@12"		#8@12"
	Length	12'-2"		11'-10"		11'-8"		12'-2"		12'-4"		12'-8"
B_1 Bars	Bar No & Spacing	#5@12"		#5@12"		#5@12"		#6@12"		#7@12"		#7@12"
	Length	7'-0"	△1	6'-3"		6'-9"		8'-5"		10'-7"		10'-0"
C Bars	Bar No & Spacing	#6@12"		#7@12"		#6@12"		#7@12"		#7@12"		#7@12"
	Horiz. Length	4'-8"		5'-4"		4'-4"		4'-11"		4'-10"		4'-11"
	Vert. Length	8'-5"		7'-10"		7'-6"		8'-10"		9'-1"		9'-5"
C_1 Bars	Bar No & Spacing	#6@12"		#6@12"		#5@12"		#6@12"		#6@12"		#6@12"
	Horiz. Length	3'-6"		3'-0"		2'-8"		2'-11"		2'-11"		3'-1"
	Vert. Length	3'-9"	△1	3'-2"		2'-10"		3'-7"		3'-11"		4'-3"
C_2 Bars	Bar No & Spacing	#6@12"		#7@12"		#6@12"		#7@12"		#7@12"		#7@12"
	Horiz. Length	3'-9"		4'-2"		3'-3"		3'-10"		3'-9"		3'-10"
	Vert. Length	8'-5"		7'-10"		7'-6"		8'-10"		9'-2"		9'-5"
C_3 Bars	Bar No. & Spacing	#6@12"		#6@12"		#5@12"		#6@12"		#6@12"		#6@12"
	Horiz. Length	2'-10"		2'-3"		1'-10"		2'-3"		2'-2"		2'-4"
	Vert. Length	3'-9"	△1	3'-2"		2'-10"		3'-7"		3'-11"		4'-2"
D Bars	Bar No. & Spacing	#6@12"		#5@6"		#5@12"		#6@12"		#6@12" △1		#7@12"
	Length	13'-7"		12'-5"		12'-0"		13'-3"		13'-11"		14'-5"
F Bars	Bar No & Spacing	#6@12"		#6@12"		#6-12"		#7@12"		#8@12"		#8@12"
	Length	12'-2"		11'-10"		11'-8"		12'-2"		12'-4"		12'-8"
F_1 Bars	Bar No & Spacing	#6@12"	△1	#5@12"		#6@12"		#7@12"		#7@12"		#7@12"
	Length	9'-10"	△1	8'-6"		9'-11"		10'-4"		11'-9"		12'-2"
G Bars	Bar No & Spacing	#4@12"		#4@12"		#4@12"		#4@12"		#4@12"		#4@12"
	Length	6'-0"		4'-2"		6'-1"		5'-4"		5'-10"		6'-0"
H Bars	Bar No & Spacing	#4@12"		#4@12"		#4@12"		#4@12"		#4@12"		#4@12"
	Length	7'-9"		6'-7"		8'-3"		7'-7"		7'-11"		8'-0"
NUMBER OF LONGITUDINAL REINFORCEMENT #4 BARS												
Top Slab		19		18		18		25		31		35
Bottom Slab		22		20		18		27		34		38
Side Walls		30		28		28		28		32		34
TOTAL		71		66		64		80		97		107
QUANTITIES												
Concrete Cu. Yds./Lin Ft.		2.01		1.76		1.62 △2		2.24		2.73		3.06
Steel Lbs./Lin Ft.		264.6		291.4		223.4		330.14		364.3		407.1

ADDITIONAL NOTES FOR BOX CHANNEL

1. LONGITUDINAL STEEL SHALL BE CONTINUOUS AND EXTEND THROUGH ALL CONSTRUCTION JOINTS.
2. UNLESS OTHERWISE SHOWN ON DRAWINGS, TRANSVERSE JOINT KEYWAYS (IN BOTH SLABS AND WALLS), AS DETAILED FOR LONGITUDINAL KEYWAYS AT THE BASE OF THE WALLS, SHALL BE PLACED AT THE END OF EACH POUR, BUT THE SPACING THERE OF SHALL NOT EXCEED 50 FEET OR BE LESS THAN 10 FEET. ALL CONSTRUCTION JOINTS IN BOTTOM SLAB, TOP SLAB, AND SIDE WALLS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED.
3. UNLESS OTHERWISE SHOWN ON DETAILS, IN CURVED SECTIONS TRANSVERSE BARS SHALL BE PLACED RADIALLY. STRAIGHT TRANSVERSE BARS IN TOP AND BOTTOM SLABS SHAL BE SPACED AS SHOWN ON THE TYPICAL SECTIONS; SPACING SHALL BE AT THE CENTERLINE OF THE BARREL ON OUTSIDE OF THE CURVE FOR DOUBLE BARREL BOXES. STRAIGHT BARS AND L-BARS IN WALL SHALL BE SPACED AS SHOWN ON TYPICAL SECTIONS, WITH THE SPACING MEASURED BETWEEN THE VERTICAL LEGS OF BARS.
4. AT THE BEGINING AND ENDING OF ALL POURS, A CURTAIN OF REINFORCEMENT COMPOSED OF B, C, C2, D, CW, F, G, AND H BARS SHALL BE PLACED THREE INCHES FROM THE TRANSVERSE CONSTRUCTION JOINT.
5. THE VERTICAL WALL STEEL IN INTERIOR WALLS AND IN THE INTERIOR FACE OF EXTERIOR WALLS MAY BE SPLICED AT THE CONSTRUCTION JOINT AT THE BASE OF THE WALL. THE SPLICES SHALL BE 45 BARS DIAMETERS IN LEGENTH.
6. IN ALL SECTIONS LAP C AND C2 BARS, THE VERTICAL LENGTH OF C AND C2 BARS HAVE BEEN COLCULATED FOR A 4 INCH STARTER WALL. IF THE HEIGTH OF THE STARTER WALL IS VARIED, THE VERTICAL LENGTH OF THE C AND C2 BARS SHALL BE VARIED CORRESPONDINGLY SO AS TO MAINTAIN A 45 DIAMETER LAP BETWEEN THE TWO BARS. TIE LAPS SHALL BE BASED ON THE SMALLER BARS.
7. CONCRETE QUANTITIES ARE BASED ON A 6 X 6 INCH FILLET AND THE STEEL QUANTITIES DO NOT INCLUDE ANY OPTIONAL SPLICES.
8. IF WALL THICKNESS IS 6 INCHES, PLACE REINFORCEMENT AT THE CENTERLINE OF THE WALL.
9. BOX INVERT SURFACE SHALL HAVE A STEEL TROWEL FINISH.
10. ALL CONC. SHALL BE 3250 LBS. PER SQUARE INCH IN 28 DAYS EXCEPT INVERT AND STARTER WALLS WHICH SHALL BE 4,500 LBS. PER SQUARE INCH IN 28 DAYS.



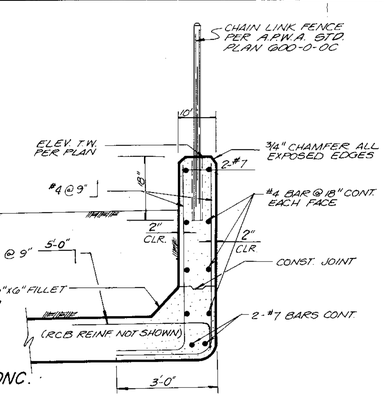
PLAN @ PARAPET WALL



HT 4.0"+.125"
BASE 3.25"+.125"
TOP 1.75"+.125"
MIN. 4,500 PSI
COLOR: RED
CONTRAST TO CONC. INVERT

WEAR CONE DETAIL

NOT TO SCALE



PARAPET WALL DETAIL

NOT TO SCALE

1 1/2 0 1 2

3 inches on original drawing

MARK	DATE	DESCRIPTION
△2	11/24/89	MODIFIED TOP SLAB & WALL (TYPE III) TO SUIT SETT. JOINTS
△1	1-30-90	P.B.V. W.E.S.O.T.R.P.J.

REVISIONS

DESIGNED PD | DRAWN SS | CHECKED BMP

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F 19502

R.C.B. ALTERNATE

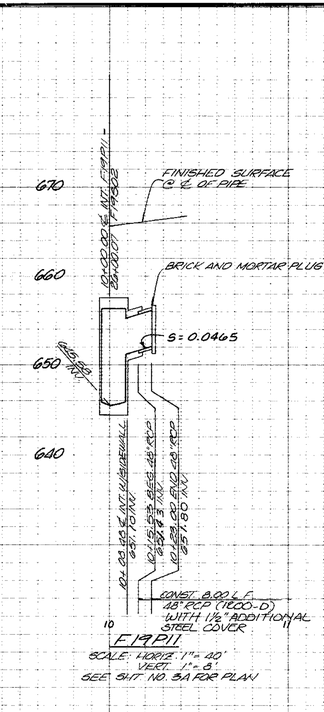
SINGLE REINF. CONC. BOX SCHEDULE AND DETAILS

PREPARED UNDER SUPERVISION OF JAMES E. McDONALD RCE 29464 | DATE 5-8-89

SCALE AS SHOWN | DATE APR 1989 | DWG. NO.

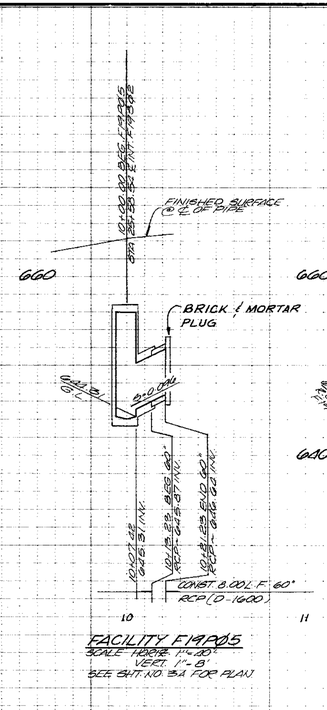
SHEET 6A OF 7

24321.28 - IMP. SMPF



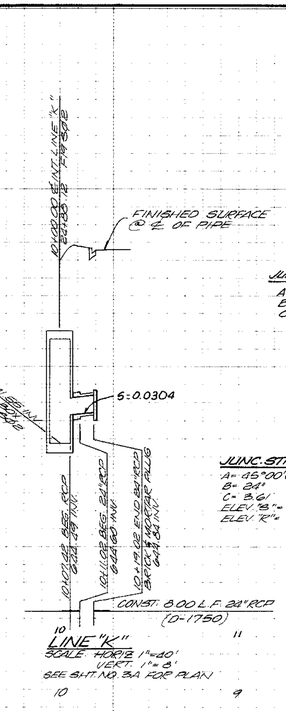
F19P11

SCALE: HORIZ. 1"=40'
VERT. 1"=8'
SEE SHT. NO. 3A FOR PLAN



FACILITY F19P05

SCALE: HORIZ. 1"=40'
VERT. 1"=8'
SEE SHT. NO. 3A FOR PLAN

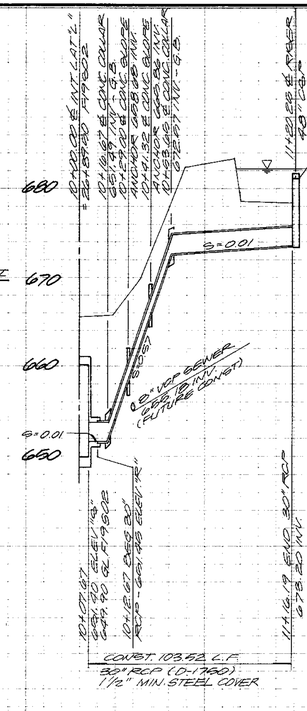


LINE "K"

SCALE: HORIZ. 1"=40'
VERT. 1"=8'
SEE SHT. NO. 3A FOR PLAN

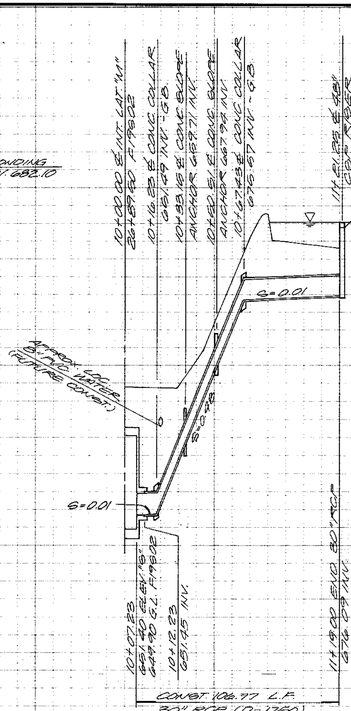
JUNC. STRUCT. TYPE NO. II
A = 45°00'00"
B = 30"
C = 6.50'

JUNC. STRUCT. TYPE II
A = 45°00'00"
B = 24"
C = 3.61'
ELEV. "B" = 644.49
ELEV. "R" = 644.60



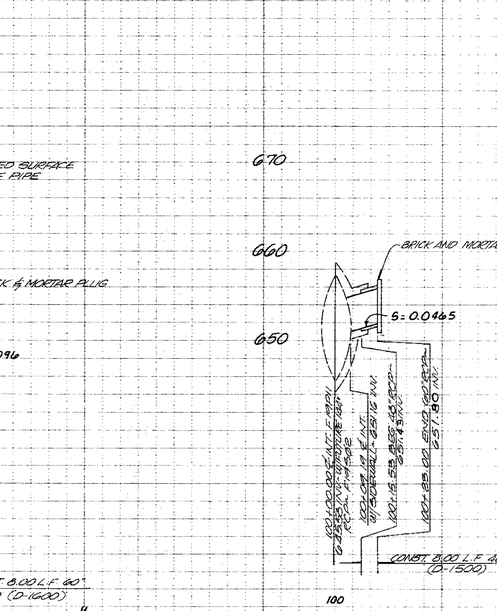
LATERAL "L"

SCALE: HORZ. 1"=40'
VERT. 1"=8'



LATERAL "M"

SCALE: HORZ. 1"=40'
VERT. 1"=8'

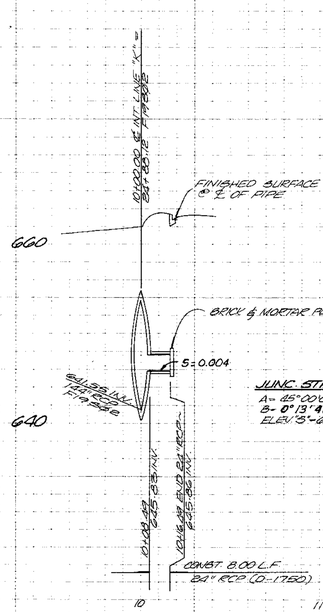


F19P05

SCALE: HORIZ. 1"=40'
VERT. 1"=8'
SEE SHT. NO. 3B FOR PLAN

F19P11

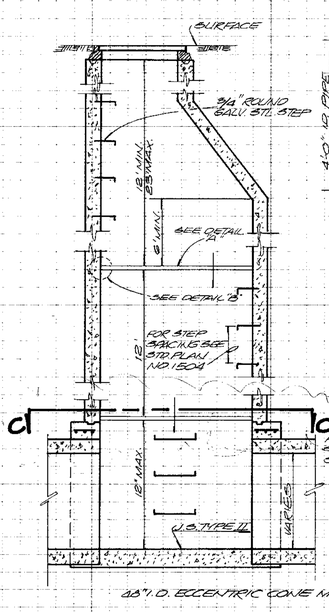
SCALE: HORIZ. 1"=40'
VERT. 1"=8'
SEE SHT. NO. 3B FOR PLAN



LINE "K"

SCALE: HORIZ. 1"=40'
VERT. 1"=8'
SEE SHT. NO. 3B FOR PLAN

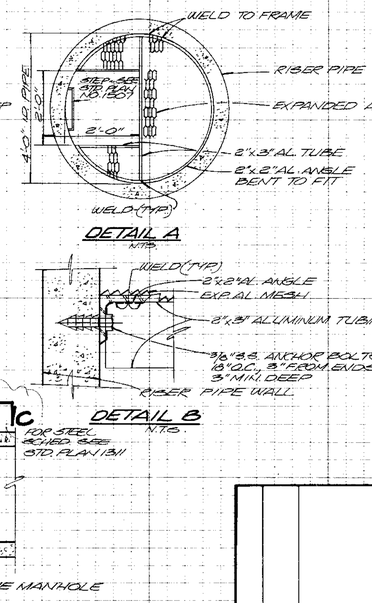
JUNC. STRUC. TYPE VI
A = 45°00'00"
B = 0°13'48"
ELEV. "S" = 645.83



DEEP MANHOLE LANDINGS

N.T.S.

NOTES:
1. SPACING DIMENSIONS BETWEEN LANDINGS TO START AT BOTTOM OF HOLE.
2. ROTATE PLATFORM OPENING 90° MIN. FROM OPENING BELOW.
3. WELDS TO BE HELI-ARC PER AWS SPECS.
4. FOR BASE SEE STD. PLAN NO. 1811
5. FOR PIPE AND CONE SEE STD. PLAN NO. 1804

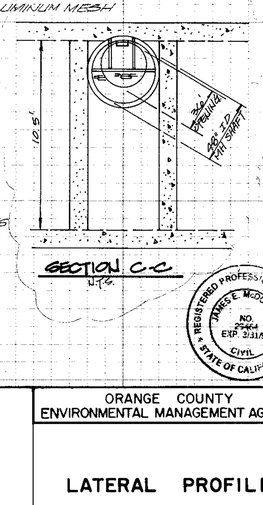


DETAIL A

N.T.S.

DETAIL B

N.T.S.



REGISTERED PROFESSIONAL ENGINEER
JAMES E. McDONALD
NO. 25464
EXP. 3/31/93
CIVIL
STATE OF CALIFORNIA

MARK	DATE	DESCRIPTION
△	1-30-90	ADD LATS "L", "M", DETAIL 17

REVISIONS

DESIGNED
DRAWN
CHECKED

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

LATERAL PROFILE

PREPARED UNDER SUPERVISION OF: James E. McDonald RCE 25464 DATE 1-29-90

SCALE: AS SHOWN
DATE
DWG. NO. F19502-713-2

SHEET 7 OF 7

94391-28 - IMP. SMPF.

E 6122407.501
N 2197544.835
E 6143907.682
N 2197544.614

41

49

51

REFERENCE PLAN F19P06-713-1
F19P06
90" RCP
Q25 = 808 CFS

REFERENCE PLAN F19P06-713-1
F19P07
10.5'X10.5' RCB
Q100 = 729.2 CFS

REFERENCE PLAN F19-701-3
F19
DBL. 12'WX8'H RCB
Q100 = 2100 CFS

(100-YEAR HC PER 2014
COUNTY HYDROLOGY
STUDY = 1950 CFS)

100-YEAR HC PER 2014
COUNTY HYDROLOGY
STUDY = 2150 CFS

100-YEAR HC PER 2014
COUNTY HYDROLOGY
STUDY = 2350 CFS

REFERENCE PLAN F19P06-713-1
F19P07
10.5'X10.5' RCB
Q100 = 1747.3 CFS

LIMESTONE–
WHITING RANCH
WILDERNESS PARK

UPPER OSO
RESERVOIR

O'NEILL
REGIONAL
PARK

CITY OF LAKE FOREST

CITY OF RANCHO SANTA MARGARITA

CITY OF MISSION VIEJO

N 2181744.911
E 6122407.313

N 2181744.655
E 6143907.541

58

NOTICE

The drainage information has been prepared for information purposes only. The location, ownership, facility information and limits have been determined from available information provided by public agencies, but may not be exact, accurate, or up-to-date. The user of this information is responsible for verifying exact location, ownership, accuracy, and the regional versus local character of drainage facilities.

Additional information may be obtained from public plans and recorded deeds. Facility designations included with this information are for convenience only and are not controlling or intended to imply ownership by the County or the Orange County Flood Control District (OCFCD). The information is being provided as a courtesy and neither the County of Orange nor OCFCD assume any liabilities for inaccuracy of the information.

To notify OC Public Works Flood Control Section of additions or corrections, please contact Sal Gutierrez at (714) 834-5396 or by email at sal.gutierrez@ocpw.ocgov.com

N

0 200 400 600 800
FEET

ORANGE COUNTY FLOOD CONTROL DISTRICT

BASE MAP OF DRAINAGE FACILITIES IN ORANGE COUNTY

REVISION	DATE	SHEET NO.	DWG. NO.
S. GUTIERREZ	MAR 12/2007	50	MAPS-113-3

- Channel Drainage Area Boundary
- Major Sub-Area Drainage Boundary
- Minor Sub-Area Drainage Boundary
- Existing O.C.F.C.D. Facility
- Existing Local Facility
- Existing Retarding Basin or Reservoir
- Natural Watercourse
- City Limits
- G G Greenbelt
- P.S. P.S. Pump Station
- Catch Basin (length in feet)
- Drop Inlet or Other Entry
- OCFCD Basins or Reservoirs

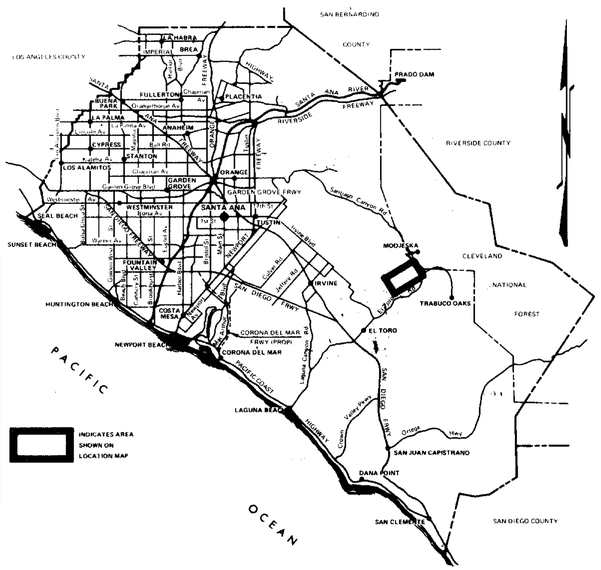
Ownership (If other than City or County): Private = P State = S Federal = F

EXISTING FACILITIES

O.C.F.C.D.	LOCAL	
		Earth Trapezoidal Channel (base width by height in feet)
		Reinforced Concrete Trapezoidal Channel (base width by height in feet)
		Reinforced Concrete Rectangular Channel (base width by height in feet)
		Reinforced Concrete Box (RCB) (number of barrels-span by height in feet)
		Reinforced Concrete Pipe (RCP) (diameter in inches)
		Metal Sheet Channel (MSC) (Base width by pile height in feet./Sheet pile total length)
		Corrugated Metal Pipe (CMP) (diameter in inches)
		Concrete Pipe (diameter in inches)
		Concrete Oval Pipe (width by height in inches)
		Steel Pipe (diameter in inches)
		Reinforced Concrete Arch (base span by height in inches)
		Corrugated Metal Arch (base span by height in inches)

50

50



VICINITY MAP

1 0 5 10
SCALE IN MILES

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

SANTA ANA, CALIFORNIA

E. SCHNEIDER, DIRECTOR

PLANS FOR CONSTRUCTION OF

THAT PORTION OF

SERRANO CREEK CHANNEL
FACILITY F19
FROM

450 FT. WEST OF LAKE FOREST DRIVE

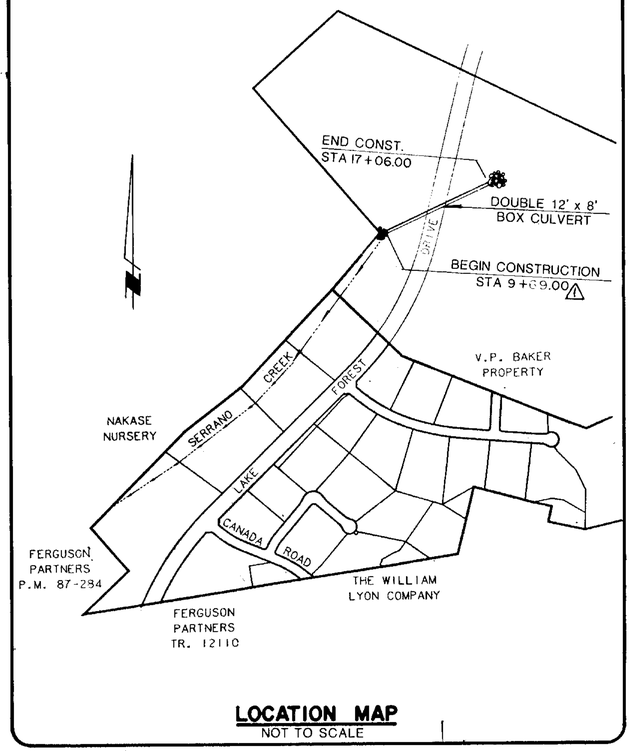
TO

280 FT. EAST OF LAKE FOREST DRIVE

(BONDED WITH TENTATIVE TRACT 13336)

INDEX OF SHEETS

SHEET	DESCRIPTION
1	TITLE SHEET
2	GENERAL NOTES, CONSTRUCTION NOTES & ESTIMATED QUANTITIES
3	PLAN & PROFILE STA. 9+20.00 TO 17+06.00
4	BOX CULVERT & INLET DETAILS
5	INLET AND OUTLET DETAILS
6	ENERGY DISSIPATOR & OUTLET DETAILS



LOCATION MAP
NOT TO SCALE

UTILITY		PHONE NO.
SEWER AND WATER	LOS ALISOS WATER DISTRICT	(714) 830-0580
ELECTRIC	SO. CAL. EDISON CO.	(714) 835-3833
GAS	SO. CAL. GAS CO.	(714) 834-0211
TELEPHONE	PACIFIC TELEPHONE CO.	(213) 621-3111
COUNTY OF ORANGE	INSPECTION	(714) 567-7800

BENCH MARK: ELEV. = 700.698
AN ALUMINUM CAP ABOUT 1.6 MILES NORTHERLY ALONG CANADA ROAD FROM ITS JUNCTION WITH OLD TRABUCO ROAD, TO THE MIDDLE OF A REVERSE CURVE IN THE ROAD, 32.5 FEET SOUTHEAST OF THE CENTER OF CANADA ROAD, 67.1 FEET EAST OF THE STEEL PIPE CORNER POST AT THE FENCE CORNER ACROSS THE ROAD, 93.0 FEET NORTHEAST OF A 20 INCH EUCALYPTUS TREE ON SOUTH SIDE OF ROAD WITH A NO TRESPASSING SIGN, SET IN TOP OF A CONCRETE POST IN THE CUTBANK OF THE ROAD, WITH WITNESS POST AND PADDLEBOARD 1.2 FEET NORTHWEST OF MONUMENT.

BASIS OF BEARING:
THE BEARING OF N. 47°01'13" E. FOR THE CENTERLINE OF CANADA ROAD PER P.M.: 79-132 PMB 143/11-16, RECORDS OF ORANGE COUNTY.

COUNTY OF ORANGE
E.M.A. REGULATION

APPROVED
BY: Patrick Stanton 3/22/90
R.C.E. DATE

THIS PLAN IS SIGNED BY E.M.A./REGULATION FOR CONCEPT AND ADHERENCE TO COUNTY STANDARDS AND REQUIREMENTS ONLY.
E.M.A./REGULATION IS NOT RESPONSIBLE FOR DESIGN, ASSUMPTIONS OR ACCURACY.

PRIVATELY MAINTAINED BETWEEN STATIONS 9+69 TO 10+56

MAINTAINED BY O.C.F.C.D. BTWN STA 10+56 TO 17+06

FUNDED BY: FOOTHILL CIRCULATION PHASING PLAN & DEVELOPER FUNDS

REGISTERED PROFESSIONAL ENGINEER
CHRIS H. ROCKWAY
No. 35370
EXP 9-30-91
CIVIL
STATE OF CALIFORNIA

COUNTY OF ORANGE
E.M.A. REGULATION

APPROVED
BY: Patrick Stanton 9/11/89
R.C.E. DATE

CONST. FROM STA 12+00 TO STA 18+00 ONLY

THIS PLAN IS SIGNED BY E.M.A./REGULATION FOR CONCEPT AND ADHERANCE TO COUNTY STANDARDS AND REQUIREMENTS ONLY.
E.M.A./REGULATION IS NOT RESPONSIBLE FOR DESIGN, ASSUMPTIONS, OR ACCURACY.

Greiner

GREINER, INC.
1221 EAST DYER ROAD, SUITE 100
SANTA ANA, CALIFORNIA 92705-5605
(714) 250-4490

A GREINER ENGINEERING INC. COMPANY

PLANS PREPARED UNDER THE DIRECTION OF:

Chris H. Rockway R.C.E. NO. 35370 DATE: 3-14-89
CHRIS H. ROCKWAY

NO.	DESCRIPTION	SHT.	APPROVED	DATE
1	W.SIDE OUTLET STRUCTURE LOCATION, CLARIFIED VARIOUS DETAILS, ADDED BOOK SIGNATURE BLOCK	1,2,5,6	P. Stanton	3/22/90

REVISIONS

W. O. NO. _____
DWG. NO. F19-701-3

SHEET 1 OF 6

STORM DRAIN GENERAL NOTES

1. ALL WORK TO BE DEDICATED TO THE ORANGE COUNTY FLOOD CONTROL DISTRICT SHALL BE IN CONFORMANCE WITH THE O.C.E.M.A. STD. SPECIFICATIONS (PUBLIC WORKS CONSTRUCTION 1985 EDITION) AND THE O.C.E.M.A. STD. PLANS WHICH MAY BE PURCHASED FROM THE DISTRICT AND SHALL BE KEPT ON THE JOB SITE AT ALL TIMES.
2. THE CONTRACTOR SHALL NOTIFY THE DISTRICT'S INSPECTOR AT LEAST 48 HOURS PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION BY TELEPHONING 567-7800 OR BY WRITING THE ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY, P. O. BOX 486, SANTA ANA, CALIFORNIA 92702.
3. ALL CONCRETE SHALL HAVE A MINIMUM 28 DAYS ULTIMATE COMPRESSIVE STRENGTH OF 3,250 PSI. CEMENT SHALL CONFORM TO ASTM C150, TYPE II. CONCRETE FOR INVERT SHALL BE 560-B-3250 AND FOR WALLS AND DECK SHALL BE 560-C-3250.
4. ALL CONDUIT LENGTHS ARE HORIZONTAL PROJECTIONS, UNLESS OTHERWISE SHOWN.
5. LOCATIONS OF PUBLIC UTILITIES SHOWN HAVE BEEN DETERMINED FROM AVAILABLE INFORMATION. HOWEVER, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE TRUE LOCATION OF ANY EXISTING UTILITIES AND TO EXERCISE PROPER PRECAUTIONS TO AVOID INJURY OR DAMAGE THERETO.
6. ALL REINFORCING BARS SHALL CONFORM TO ASTM A615 GRADE 60, DEFORMED BARS.
7. FOR ADDITIONAL STRUCTURAL NOTES, SEE THIS SHEET.
8. ALL MATERIALS TESTING FOR THE DRAINAGE FACILITIES SHALL BE PROVIDED BY THE DEVELOPER IN ACCORDANCE WITH THE NUMBER, LOCATION AND FREQUENCY REQUESTED BY THE FLOOD CONTROL DISTRICT'S INSPECTOR.
9. A SOILS INVESTIGATION REPORT ENTITLED "SUPPLEMENTAL INVESTIGATION AND GEOTECHNICAL REVIEW OF REVISED GRADING PLANS, LAKE FOREST EXTENSION BETWEEN STATIONS 290+85, COUNTY OF ORANGE CALIFORNIA" AND SHALL BE INCLUDED AS A PART OF THESE PLANS. ALL WORK SHALL CONFORM TO RECOMMENDATIONS AS OUTLINED IN SAID REPORT.
10. CHAMFER ALL EXPOSED EDGES OF CONCRETE 3/4".
11. CLEARANCE BETWEEN EDGE OF CONCRETE AND REINFORCING STEEL MUST BE 1-1/2 INCHES MINIMUM, UNLESS OTHERWISE NOTED.
12. ALL REINFORCING BARS MUST BE SECURELY HELD IN PLACE IN THE FORMS. TWO WAY MATS OF STEEL MUST BE WIRED TOGETHER BOTH WAYS AT ALTERNATE INTERSECTIONS.
13. ALL PIPE SECTIONS IN CURVES TO BE BANDED AND GROUTED.
14. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, THE DEVELOPER'S CONTRACTOR SHALL OBTAIN A PERMIT FROM THE STATE DIVISION OF INDUSTRIAL SAFETY. A COPY OF THE PERMIT SHALL BE KEPT ON THE JOB SITE AT ALL TIMES.
15. FOR TRENCH EXCAVATIONS IN NATIVE SOIL, SHORING SHALL BE PROVIDED TO SATISFY STATE OF CALIFORNIA SAFETY REQUIREMENTS.
16. PRIOR TO EXCAVATION, CONTRACTOR SHALL CONTACT PACIFIC BELL LOCATING SERVICES (PHONE 639-0811) FOR THEIR SERVICES.
17. THE CONTRACTOR SHALL CONDUCT CONSTRUCTION OPERATIONS IN SUCH A MANNER THAT STORM OR OTHER WATERS MAY PROCEED UNINTERRUPTED ALONG THEIR EXISTING STREET OR DRAINAGE COURSES.
18. IN THE COURSE OF WATER CONTROL, THE CONTRACTOR SHALL CONDUCT CONSTRUCTION OPERATIONS TO PROTECT WATERS FROM POLLUTION WITH FUELS, OILS, BITUMENS, OR OTHER HARMFUL MATERIALS.
19. ALL REINFORCED CONCRETE PIPE SHALL BE BEDDED IN ACCORDANCE WITH O.C.E.M.A. STD. PLAN NO. 1319.
20. ALL FILL AND BACKFILL SHALL BE COMPACTED TO MIN. 90 PERCENT OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE CALIFORNIA TEST METHOD NO. 216. ALL FILL AND BACKFILL SHALL BE FREE FROM VEGETABLE MATTER. HOWEVER, IT MAY CONSIST OF ONSITE SILTY SAND OR CLAYEY SAND (SM,SC). THE FILL AND BACKFILL SHALL BE COMPACTED IN APPROXIMATELY 6 INCH INCREMENTS. IN ORDER TO AVOID UNBALANCED D-LOADS ON THE STORM DRAIN, THE DIFFERENCE IN BACKFILL ELEVATION ON ADJACENT SIDES OF THE R.C.P. OR R.C.B. DRAIN SHALL NOT EXCEED 2 FEET. NO STORM DRAIN SHALL BE PLACED UNTIL THE SOILS ENGINEER HAS INSPECTED AND APPROVED THE BOTTOM OF THE TRENCH. ISOLATED ZONES OF SOFT COMPRESSIBLE SOILS OR LARGE ROCKS SHALL BE COMPLETELY REMOVED AND REPLACED WITH PROPERLY COMPACTED SOILS. PRECAUTIONS SHALL BE TAKEN TO INSURE THAT THE STORM DRAIN IS NOT DAMAGED BY HEAVY COMPACTING EQUIPMENT. HEAVY COMPACTING EQUIPMENT SHALL NOT BE USED WITHIN A 1 TO 1 PLANE RISING FROM THE BASE OF THE STORM DRAIN OR WITHIN 2 FEET OF THE TOP OF THE STORM DRAIN, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO THE STORM DRAIN RESULTING FROM INAPPROPRIATE COMPACTION TECHNIQUES AND EQUIPMENT. SOILS ENGINEER SHALL APPROVE AND SUPERVISE BACKFILLING.
21. CONSTRUCTION OF ALL REINFORCED CONCRETE SECTIONS (INCLUDING INVERTS) SHALL BE BY THE ALTERNATE PANEL METHOD, AND NO CONTINUOUS PLACEMENT THROUGH JOINTS WILL BE PERMITTED. AFTER PLACEMENT OF ALL CONCRETE IN A PANEL, OR ONE SIDE OF THE JOINT, HAS BEEN COMPLETED, PLACEMENT OF CONCRETE ON THE OTHER SIDE OF THE JOINT SHALL BE DELAYED AS DIRECTED BY THE ENGINEER, BUT IN NO EVENT SHALL THE DELAY BE LESS THAN EIGHT (8) HOURS.
22. ALL SURVEYING REQUIRED FOR VERTICAL AND HORIZONTAL ALIGNMENT MUST BE PROVIDED BY THE CONTRACTOR OR DEVELOPER AND SUFFICIENT REFERENCE STAKING MUST BE IN ACCORDANCE WITH THE REQUEST OF THE O.C.E.M.A. INSPECTOR. PROVIDE O.C.E.M.A INSPECTOR 3 COPIES OF CUT SHEET.
23. WHENEVER APPLICABLE, THE DEVELOPER SHALL OBTAIN A PERMIT FROM THE STATE DEPARTMENT OF FISH AND GAME IN ACCORDANCE WITH SECTION 1602 OF THE CALIFORNIA FISH AND GAME CODE PRIOR TO COMMENCEMENT OF CONSTRUCTION.
24. A PERMIT FOR WORK WITHIN EXISTING STREET RIGHT OF WAY IS REQUIRED FROM THE COUNTY OF ORANGE FOR ANY ENCROACHMENT NECESSARY FOR CONSTRUCTION IN PUBLIC RIGHT OF WAY.
25. STORM DRAIN BACKFILL FOR ALL FACILITIES WITHIN STREET RIGHT OF WAY IS TO BE PLACED AND COMPACTED UNDER O.C.E.M.A. INSPECTION AND MEET OR EXCEED O.C.E.M.A. MINIMUM STANDARDS.
26. LENGTH OF MANHOLE STRUCTURES MAY BE INCREASED TO MEET PIPE ENDS AT OPTION OF CONTRACTOR AS LONG AS REINFORCING STEEL IS CONTINUED AS REQUIRED. ANY CHANGE IN SPUR LOCATION MUST BE APPROVED BY THE ENGINEER.
27. LOCAL DEPRESSIONS AND DECKS OF CURB INLETS SHALL NOT BE POURED UNTIL STAKING FOR LINE AND GRADE OF CURB AND GUTTER IS COMPLETED WITHIN 25' OF INSIDE OF INLET WALLS ON BOTH SIDES OF ADJACENT CURB AND GUTTER HAS BEEN PREVIOUSLY POURED.
28. FLOOR OF MANHOLE STRUCTURE SHALL BE STEEL TROWELLED TO SPRING LINE.
29. RCP SHALL COMPLY WITH ALL A.S.T.M. APPLICABLE STANDARDS.
30. WORKING WITHIN ORANGE COUNTY FLOOD CONTROL FACILITIES AND RIGHT OF WAY IS RESTRICTED TO THE PERIOD OF APRIL 15 TO OCTOBER 15.
31. THE CONTRACTOR SHALL VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF ALL EXISTING FACILITIES PRIOR TO CONSTRUCTION. CONTRACTOR SHALL NOTIFY ENGINEER OF ANY DISCREPANCIES OR CONFLICTS.

GENERAL NOTES

1. THIS NOTE HEREIN INCORPORATES BY REFERENCE, THOSE GENERAL NOTES NUMBERED 1 THROUGH 17 OF OCEMA STANDARD PLAN 1801, 1986 EDITION.
2. THE DEVELOPER/CONTRACTOR SHALL HAVE A COPY OF THE CURRENT OCEMA STANDARD PLANS ON THE CONSTRUCTION SITE AT ALL TIMES.
3. THE DEVELOPER SHALL TELEPHONE EMA/PUBLIC WORKS/CONSTRUCTION AT 567-7800 AT LEAST 24 HOURS PRIOR TO STARTING CONSTRUCTION WORK SUBJECT TO EMA/PUBLIC WORKS' INSPECTION.
4. EMA ENCROACHMENT PERMIT REQUIRED. EMA APPROVED PLANS DO NOT RELIEVE CONTRACTOR/DEVELOPER FROM RESPONSIBILITY TO OBTAIN PUBLIC PROPERTY PERMIT WHICH SHALL BE AVAILABLE ON THE JOB AT ALL TIMES WORK IS BEING ACCOMPLISHED IN THE PUBLIC RIGHT OF WAY.
5. ALL CONCRETE CURB AND GUTTER FLOWLINES WITH LESS THAN 1% GRADE SHALL BE WATER TESTED PRIOR TO FINAL FINISHING TO INSURE PROPER DRAINAGE WITHOUT UNACCEPTABLE HIGH OR LOW SPOTS.
6. ALL UTILITY TRENCH BACKFILL AND COMPACTION INSPECTION OUTSIDE THE LIMITS OF DEDICATED STREET RIGHT-OF-WAY SHALL BE PERFORMED BY OCEMA REGULATION.
7. ALL DAMAGED CONCRETE SIDEWALKS OR CURBS SHALL BE SAW-CUT TO THE NEAREST TRANSVERSE SCORE MARK OR ADJUSTABLE CONTROL JOINT OR WEAKENED PLANE JOINT AND REPLACED IN CONFORMANCE WITH THE APPLICABELE PROVISIONS OF OCEMA STANDARD PLANS.
8. DEVELOPER SHALL MAINTAIN ADJACENT STREETS IN A NEAT, CLEAN, DUST FREE AND SANITARY CONDITION AT ALL TIMES AND TO THE SATISFACTION OF COUNTY'S INSPECTOR. THE ADJACENT STREETS SHALL BE KEPT CLEAN OF DEBRIS, WITH DUST AND OTHER NUISANCE BEING CONTROLLED AT ALL TIMES. DEVELOPER SHALL BE RESPONSIBLE FOR ANY CLEAN UP ON ADJACENT STREETS AFFECTED BY HIS CONSTRUCTION, METHOD OF STREET CLEANING SHALL BE BY DRY SWEEPING OF ALL PAVED AREAS. NO STOCKPILING OF BUILDING MATERIALS WITHIN THE COUNTY RIGHT-OF-WAY WITHOUT THE PERMISSION OF COUNTY'S INSPECTOR.
9. PRIOR TO FINAL ACCEPTANCE OF STREET IMPROVEMENTS, ALL STREET PAVEMENT, STRIPING AND STENCILING WITHIN THE PERIMETER OF THE CONSTRUCTION PROJECT WILL BE RESTORE TO A "LIKE NEW"CONDITION, IN A MANNER MEETING THE APPROVAL OF THE DIRECTOR OF PUBLIC WORKS. ALL STRIPING AND STENCILING SHALL BE ACCORDING TO STANDARD PLAN NO. 1801, NOTE 17.
10. TRAFFIC SHALL BE MAINTAINED AT ALL TIMES AND SHALL BE PROTECTED WITH ADEQUATE BARRICADES, LIGHTS, SIGNS AND WARNING DEVICES AS PER THE CURRENT STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION, MANUAL OF TRAFFIC CONTROLS AND TO THE DIRECTIONS OF THE COUNTY'S INSPECTOR.
11. OCEMA STANDARD PLANS SHALL TAKE PRECEDENCE OVER ANY CONFLICTS EXCEPT FOR STANDARD PLANS AFFECTING UTILITY COMPANIES, IF THEIR STANDARDS ARE MORE STRINGENT.
12. ANY UTILITIES UNDER PAVED AREAS OF PRIVATE STREET SHALL HAVE A MINIMUM OF 30" COVER AND DEVELOPER SHALL PROVIDE PRIVATE LABORATORY COMPACTION CERTIFICATION FOR ALL UNDERGROUND UTILITIES PRIOR TO ANY PAVING. DEVELOPER SHALL SET UP A MEETING WITH THE INSPECTOR AND THE PRIVATE LABORATORY PRIOR TO ANY TESTING.
13. NO CONCENTRATED FLOWS ACROSS ASPHALT PAVEMENT WITHOUT COUNTY INSPECTOR'S APPROVAL.

HOLD HARMLESS AND INDEMNIFICATION CLAUSE

CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

EXISTING UNDERGROUND STRUCTURES

ALL UNDERGROUND UTILITIES OR STRUCTURES REPORTED BY THE OWNER OR OTHERS, AND THOSE SHOWN ON THE RECORDS EXAMINED, ARE INDICATED WITH THEIR APPROXIMATE LOCATION AND EXTENT. THE OWNER, BY ACCEPTING THESE PLANS OR PROCEEDING WITH IMPROVEMENTS PURSUANT THERETO, AGREES TO ASSUME LIABILITY AND TO HOLD UNDERSIGNED HARMLESS FOR ANY DAMAGES RESULTING FROM THE EXISTENCE OF UNDERGROUND UTILITIES OR STRUCTURES NOT REPORTED TO THE UNDERSIGNED, NOT INDICATED ON THE PUBLIC RECORDS EXAMINED, LOCATED AT VARIANCE WITH THOSE REPORTED OR SHOWN ON RECORDS EXAMINED. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES OR STRUCTURES SHOWN AND ANY OTHER UTILITIES OR STRUCTURES FOUND AT THE SITE. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE OWNERS OF THE UTILITIES OR STRUCTURES CONCERNED BEFORE STARTING WORK.

NOTICE TO CONTRACTOR

CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND SHALL REPORT ALL DISCREPANCIES TO THE ENGINEER PRIOR TO THE COMMENCEMENT OF WORK.

CAUTION: THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ENGINEER SHALL BE NOTIFIED OF ANY REQUESTED CHANGE OR CORRECTION TO THESE PLANS.

RIP RAP CHANNEL NOTES

1. THE CHANNEL CONTRACTOR SHALL COOPERATE FULLY WITH THE ARCHEAOLOGICAL AND PALEONTOLOGICAL CONSULTANTS DESIGNATED BY THE OWNER, AND WITH COUNTY INSPECTOR. THE ARCHAEOLOGIST AND PALEONTOLOGIST SHALL BE PRESENT AT THE PRECONSTRUCTION CONFERENCE, AND THEY SHALL SET THE CONTROLS THAT SHALL BE MAINTAINED FOR ARCHAEOLOGICAL AND PALEONTOLOGICAL SURVEILLANCE DURING ANY GRADING OPERATIONS. IF ARCHAEOLOGICAL AND PALEONTOLOGIST RESOURCES ARE DISCOVERED DURING CHANNEL GRADING, THE ARCHAEOLOGIST AND/OR PALEONTOLOGIST PRESENT SHALL REPORT SUCH FINDINGS TO THE PROJECT DEVELOPER AND TO THE DIRECTOR ENVIRONMENTAL MANAGEMENT AGENCY(EMA) THE PROJECT DEVELOPER SHALL TAKE SUCH ACTIONS NECESSARY TO INSURE THE THE SITE WILL NOT BE DESTROYED BEFORE EXPLORATION AND SHALL COORDINATE FURTHER GRADING AS CONCURRED IN BY THE DIRECTOR, EMA REGULATIONS.
2. ALL WORK SHALL BE IN CONFORMANCE WITH THE ORANGE COUNTY FLOOD CONTROL DISTRICT'S STANDARD SPECIFICATIONS, A COPY OF WHICH SHALL BE KEPT ON THE JOB SITE.
3. CONTRACTOR SHALL OBTAIN PERMIT FROM ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY FOR WORK WITHIN THEIR RIGHT-OF-WAY.
4. LOCATIONS OF PUBLIC UTILITIES SHOWN HAVE BEEN DETERMINED FROM AVAILABLE INFORMATION. HOWEVER, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE TRUE LOCATION OF ANY EXISTING UTILITIES AND TO EXERCISE PROPER PRECAUTIONS TO AVOID INJURY OR DAMAGE THERETO.
5. ALL TRENCH EXCAVATIONS SHALL CONFORM TO STATE OF CALIFORNIA CONSTRUCTION SAFETY ORDERS.
6. ALL FILL MATERIAL SHALL BE COMPACTED TO 90% RELATIVE COMPACTION AS DETERMINED BY CALIFORNIA TEST METHOD 216 F.
7. ALL MATERIALS TESTING FOR THE DRAINAGE FACILITIES SHALL BE PROVIDED BY THE CONTRACTOR OR DEVELOPER IN ACCORDANCE WITH THE NUMBER, LOCATION, AND FREQUENCY REQUESTED BY THE DISTRICT'S INSPECTOR.
8. CONCRETE AGGREGATE SHALL BE PLACED PER O.C.E.M.A. STANDARD PLAN 1809 BELOW RIP RAP AS SHOWN IN DETAIL THICKNESS OF AGGREGATE TO BE 6"MIN., 8"MAX GRADATION FOR AGGREGATE SHALL BE PER O.C.E.M.A. STD. PLAN NO. 1803, GRADATION D3 WHICH IS AS FOLLOWS.

SIEVE SIZE	% PASSING
3"	100
1-1/2"	90 - 100
1"	65 - 100
3/4"	50 - 90
3/8"	0 - 50
NO. 4	0 - 10
NO. 8	0 - 5

9. DURING RIP-RAP CONSTRUCTION EXCAVATED MATERIAL TO BE STOCKPILED OUT OF CHANNEL.
10. GRADATION SHALL FOLLOW GRADATION BELOW:

RIP RAP THICKNESS = 48"

% LTR BY WT.	WT. OF STONE IN LBS. MAX	MIN
100	1638	655
50	691	328
15	346	102

CONSTRUCTION NOTES & ESTIMATE OF QUANTITIES

	NO	DESCRIPTION	UNIT	QUANTITY
STORM DRAIN	60	CONSTRUCT DOUBLE 12'X8' R.C. BOX CULVERT PER DETAIL ON SHEET 4	LF	373
	61	CONSTRUCT R.C. ENERGY DISSIPATING OUTLET STRUCTURE PER DETAILS ON SHEETS 4, 5 AND 6	EA	1
	62	JOIN EXISTING R.C.P. INTO OUTLET STRUCTURE PER DETAIL ON SHEET 5	EA	1
	63	CONSTRUCT RIP-RAP PER O.C.E.M.A. STD. PLAN 1809 AND PER GRADATION SHOWN ON SHEET 2	EA	1
	64	CONSTRUCT CHAIN LINK FENCE PER A.P.W.A. STD. 600-0-0C ON TOP OF OUTLET AND INLET STRUCTURES	L.F.	360
	65	CONSTRUCT 25'X30'8" THICK R.C. PAD. SEE SECTION J-J ON SHEET 5	EA	1
	66	CONSTRUCT R.C. INLET STRUCTURE PER DETAILS ON SHEET 4, 5 AND 6	EA.	1
	67	CONSTRUCT 8" THICK R.C. APRON PER DETAIL ON SECTION ON SHEET 4 & 5	CY.	59
	68	CONSTRUCT R.C. CULVERT DEBRIS WALL PER DETAIL ON SHEET 5 AND O.C.E.M.A. STD. PLAN 1324	CY.	57
	69	CONSTRUCT R.C. CUT-OFF WALL PER DETAIL ON SHEET 4	CY.	5
	70	CONSTRUCT 4" THICK GUNITE SLOPE PROTECTION PER DETAIL ON SHEET 3	CY.	36
	71	INSTALL 16' DOUBLE SWING GATE PER O.C.E.M.A. STD. 600-0-0C	EA.	1
	72	CONSTRUCT CONCRETE WINGWALL PER DETAIL ON SHEET 6	CY.	15

STRUCTURAL NOTES-GENERAL

1. DIMENSIONS FROM FACE OF CONCRETE TO STEEL ARE TO FACE OF BARS AND SHALL BE ONE AND A HALF INCHES CLEAR UNLESS OTHERWISE SHOWN.
2. CONCRETE DIMENSIONS SHALL BE MEASURED HORIZONTALLY OR VERTICALLY ON THE PROFILE, AND PARALLEL TO OR AT RIGHT ANGLES (OR RADIALLY) TO CENTERLINE OF CONDUIT ON THE PLAN EXCEPT AS OTHERWISE SHOWN.
3. ALL BAR BENDS AND HOOKS SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE'S "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE", 1971 EDITION, SECTION 7.1.
4. PLACING OF REINFORCEMENT SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE'S "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE", 1971 EDITION, SECTION 7.3.
5. TRANSVERSE CONSTRUCTION JOINTS SHALL NOT BE PLACED WITHIN 30 INCHES OF MANHOLE OR JUNCTION STRUCTURE OPENINGS.
6. TRANSVERSE CONSTRUCTION JOINTS IN WALLS AND SLABS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED. TRANSVERSE CONSTRUCTION JOINTS SHALL BE NORMAL OR RADIAL TO THE CENTERLINE OF CONSTRUCTION.
7. EXPOSED EDGES OF CONCRETE MEMBERS SHALL BE ROUNDED OR BEVELED.
8. NO SPLICES IN TRANSVERSE STEEL REINFORCEMENT WILL BE PERMITTED OTHER THAN SHOWN ON THE DRAWING WITHOUT APPROVAL OF THE ENGINEER. NO MORE THAN TWO SPLICES WILL BE PERMITTED IN ANY LONGITUDINAL BAR BETWEEN TRANSVERSE JOINTS. SPLICES SHALL BE STAGGERED.
9. LONGITUDINAL STEEL SHALL BE LAPPED 24 BAR DIAMETERS AT SPLICES. TRANSVERSE STEEL SHALL BE LAPPED 45 BAR DIAMETERS AT SPLICES.

ADDITIONAL NOTES FOR R.C.B.

1. LONGITUDINAL STEEL SHALL BE CONTINUOUS AND EXTEND THROUGH ALL CONSTRUCTION JOINTS.
2. UNLESS OTHERWISE SHOWN ON THE DRAWINGS, TRANSVERSE JOINT KEYWAYS (IN SLABS AND WALLS), AS DETAILED FOR LONDITUDINAL KEYWAYS AT THE BASE OF THE WALLS, SHALL BE PLACED AT THE END OF EACH POUR, BUT THE SPACING THEREOF SHALL NOT EXCEED 50 FEET OR BE LESS THAN 10 FEET. ALL CONSTRUCTION JOINTS IN BOTTOM SLAB, TOP SLAB, AND SIDE WALLS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED.
3. UNLESS OTHERWISE SHOWN ON THE DETAILS, TRANSVERSE BARS IN CURVED SECTIONS SHALL BE PLACED RADIALLY. STRAIGHT TRANSVERSE BARS IN TOP AND BOTTOM SLABS SHALL BE SPACED AS SHOWN ON THE TYPICAL SECTIONS; SPACING SHALL BE AT THE CENTERLINE OF THE BARREL ON THE OUTSIDE OF THE CURVE FOR DOUBLE BARREL BOXES. STRAIGHT BARS AND L-BARS IN WALLS SHALL BE SPACED AS SHOWN ON THE TYPICAL SECTIONS, WITH THE SPACING MEASURED BETWEEN THE VERTICAL LEGS OF BARS.
4. AT THE BEGINNING AND ENDING OF ALL POURS, A CURTAIN OF REINFORCEMENT COMPOSED OF B, C, C2, D, CW, F, G, AND H BARS SHALL BE PLACED THREE INCHES FROM THE TRANSVERSE CONSTRUCTION JOINT.
5. THE VERTICAL WALL STEEL IN THE INTERIOR WALLS AND IN THE INTERIOR FACE OF EXTERIOR WALLS MAY BE SPLICED AT THE CONSTRUCTION JOINT AT THE BASE OF THE WALL. THE SPLICES SHALL BE 45 BAR DIAMETERS IN LENGTH.
6. IN ALL SECTIONS LAP C AND C2 BARS. THE VERTICAL LENGTH OF C AND C2 BARS HAS BEEN CALCULATED FOR A FOUR INCH STARTER WALL. IF THE HEIGHT OF THE STARTER WALL IS VARIED, THE VERTICAL LENGTH OF THE C AND C2 BARS SHALL BE VARIED CORREPONDINGLY SO AS TO MAINTAIN A 45 BAR DIAMETER LAP BETWEEN THE TWO BARS. THE LAPS SHALL BE BASED ON THE SMALLER BARS.
7. CONCRETE QUANTITIES ARE BASED ON A SIX BY SIX INCH FILLET AND THE STEEL QUANTITIES DO NOT INCLUDE ANY OPTIONAL SPLICES.
8. INVERT SURFACE SHALL BE GIVEN A STEEL TROWELED SURFACE.

CONSTRUCTION NOTES & ESTIMATE OF QUANTITIES

NO.	DESCRIPTION	UNIT	QUANTITY
73	CONSTRUCT JUNCTION STRUCTURE TYPE V PER O.C.E.M.A. STA. 1314	EA.	3
74	CONSTRUCT BRICK AND MORTAR PLUG	EA.	3
75	CONSTRUCT 8' SWING GATE PER OCEMA STD. NO. 1412	EA.	1
76	8" THICK P.C.C. PAD WITH #4 BAR @ 18" O.C. EACH WAY	SF	995

MARK	DATE	DESCRIPTION
1	3-9-90	REVISED QUANTITIES

REVISIONS

DESIGNED T.S. & B.A.
DRAWN D.L. CHECKED

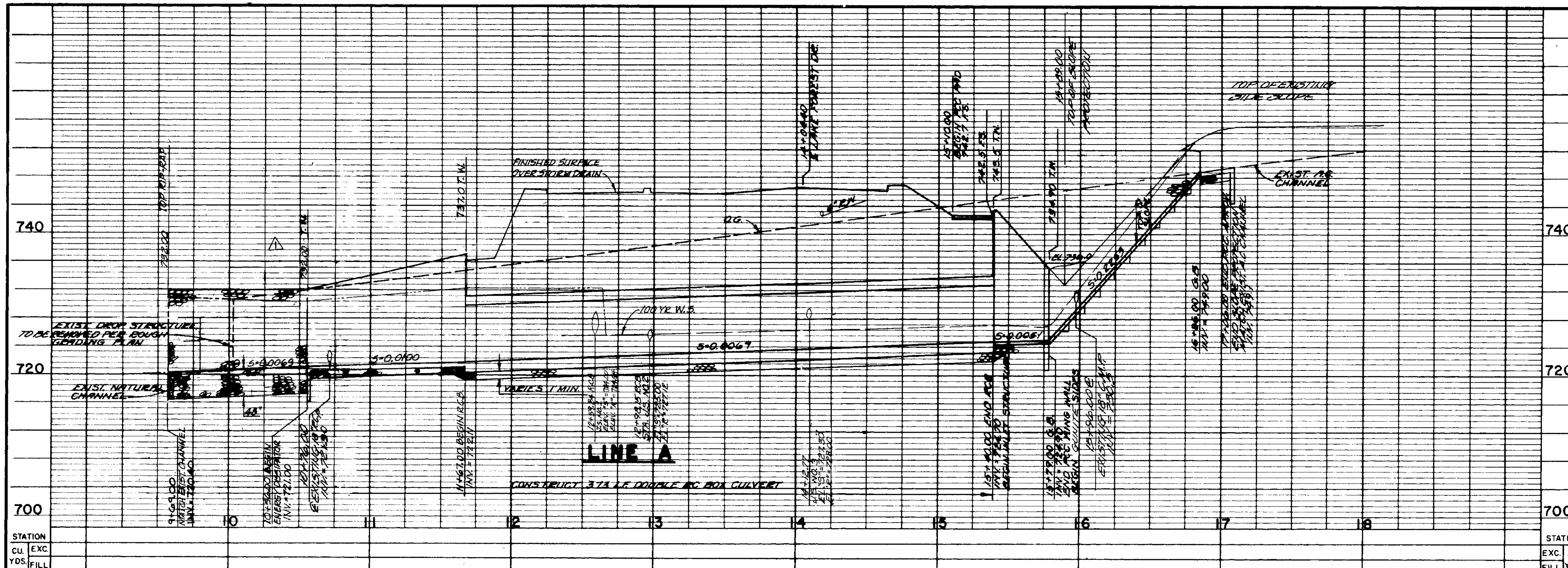
ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

GENERAL NOTES CONSTRUCTION NOTES AND ESTIMATED QUANTITIES

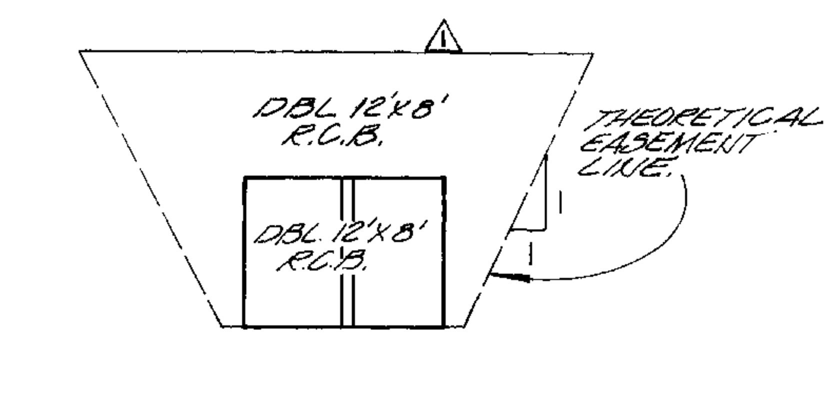
PREPARED UNDER SUPERVISION OF Chris H. Rockway 3-14-90 DATE

SHEET 2

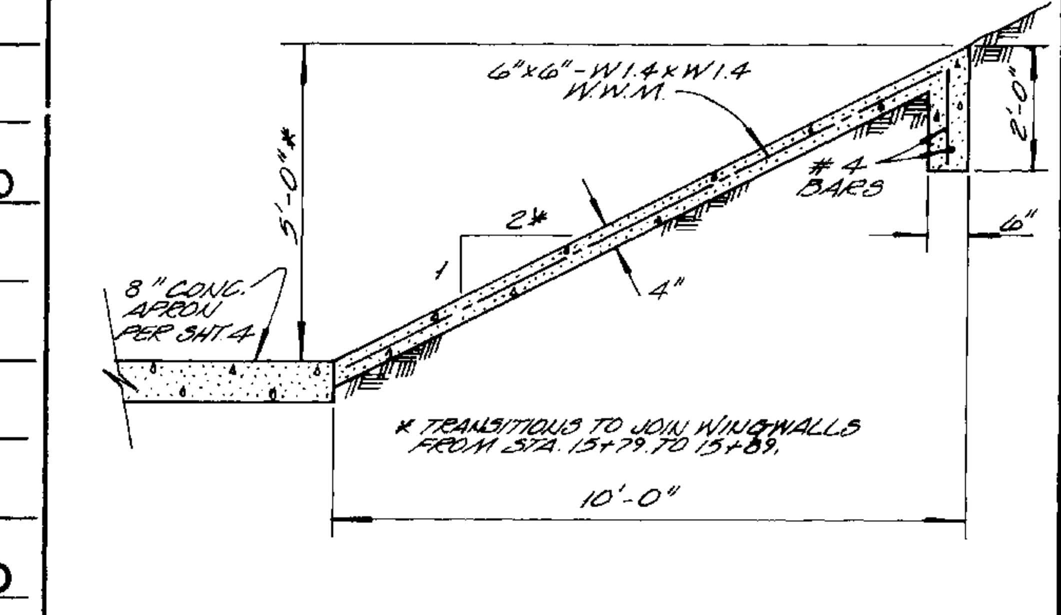
SCALE AS SHOWN | DATE | DWG. NO. F19-701-3



PROFILE
HORIZ: 1"=40'
VERT: 1"=8'



TYPICAL SECTION
N.T.S.
STA. 10+76.00 TO STA. 15+40.00

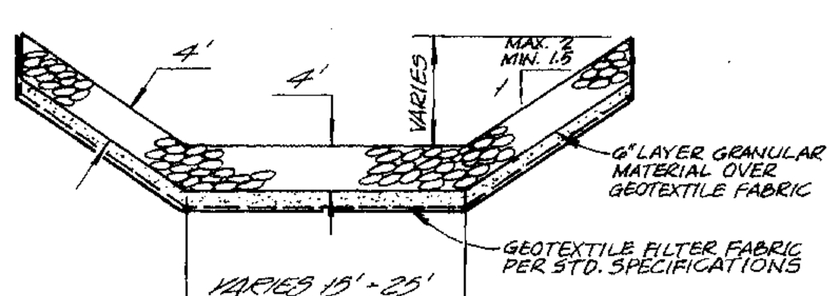


GUNITE SLOPE PROTECTION DETAIL
STA. 15+89.00 TO 17+06.00

1 CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS OF 2500 P.S.I. CONCRETE MAY BE PNEUMATICALLY PLACED AND SHALL CONFORM TO SECTION 2621 OF THE UNIFORM BUILDING CODE.

2 REINFORCING SHALL BE 6"X6" - W 1.4 X W 1.4 WELDED WIRE MESH (W.W.M.) OR APPROVED EQUAL.

3 GROUND SHALL BE PRE-WETTED TO THE SATISFACTION OF THE BUILDING OFFICIAL OR ENGINEER PRIOR TO PLACEMENT OF CONCRETE. MOISTURE LOSS RETARDANT SHALL BE USED WHEN REQUIRED BY THE BUILDING OFFICIAL OR ENGINEER.



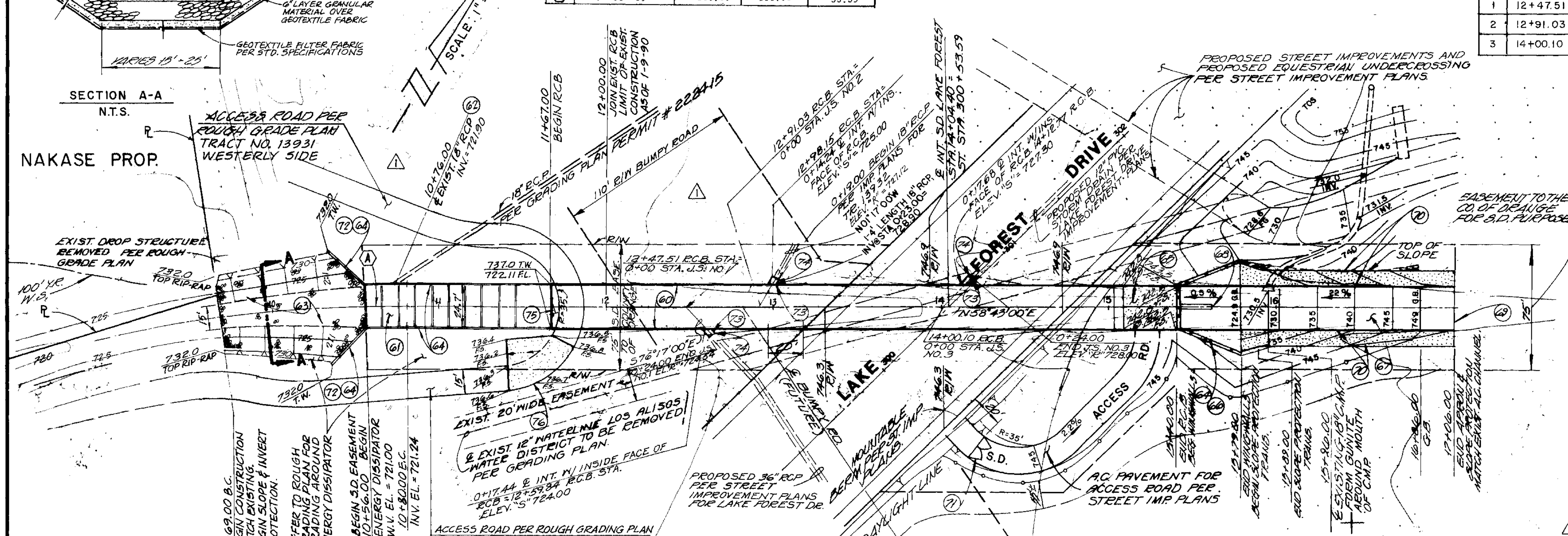
SECTION A-A
N.T.S.

CURVE DATA

	Δ	R	L	T
(A)	7° 56' 59"	800.00'	111.00'	55.59'

JUNCTION STRUCTURE VALUES

NO.	RCB ℄ STA.	RCB STA. @ INS. FACE	B	C	S	R	A
1	12+47.51	12+59.84	36"	6.56'	724.00	724.54	45°00'00"
2	12+91.03	12+98.15	18"	4.76'	725.00	727.12	60°00'00"
3	14+00.10	14+12.77	12"	6.32	727.30	728.00	44°13'33"



CONSTRUCTION NOTES

(60) CONSTRUCT DOUBLE 12'X8' R.C. BOX CULVERT PER DETAIL ON SHEET 4

(61) CONSTRUCT R.C. ENERGY DISSIPATING OUTLET STRUCTURE PER DETAILS ON SHEETS 4, 5 AND 6

(62) JOIN EXISTING R.C.P. INTO OUTLET STRUCTURE PER DETAIL ON SHEET 5

(63) CONSTRUCT RIP-RAP PER O.C.E.M.A. STD. PLAN 1809 AND PER GRADATION SHOWN ON SHEET 2

(64) CONSTRUCT CHAIN LINK FENCE PER A.P.W.A. STD. 600-0-OC ON TOP OF OUTLET AND INLET STRUCTURES

(65) CONSTRUCT 25'X30'X 8" THICK R.C. PAD. SEE SECTION J-J ON SHEET 5

(66) CONSTRUCT R.C. INLET STRUCTURE PER DETAILS ON SHEET 4, 5 AND 6

(67) CONSTRUCT 8" THICK R.C. APRON PER DETAIL ON SECTION ON SHEET 4 AND 5

(68) CONSTRUCT R.C. CULVERT DEBRIS WALL PER DETAIL ON SHEET 5 AND O.C.E.M.A. STD. PLAN 1324

(69) CONSTRUCT R.C. CUT-OFF WALL PER DETAIL ON SHEET 4

(70) CONSTRUCT 4" THICK GUNITE SLOPE PROTECTION PER DETAIL ON THIS SHT.

(71) INSTALL 16' DOUBLE SWING GATE PER O.C.E.M.A. STD. 600-OC

(72) CONSTRUCT CONCRETE WINGWALL PER DETAIL SHEET 6

(73) CONSTRUCT JUNCTION STRUCTURE TYPE V PER O.C.E.M.A. STD. 1314

(74) CONSTRUCT BRICK AND MORTAR PLUG

△1 (75) CONSTRUCT 8' SWING GATE PER OCEMA STD. 1412

(76) 8" THICK P.C.C. PAD WITH #4 BARS @ 18"O.C. EACH WAY.

1/2 0 1 2
3 inches on original drawing

HYDRAULIC DATA

STA. TO STA.	Q_{100}	b	z	S_o	S_f(FULL)	D_N	V_N	D_c	VFULL	n	FLOW
△1 9+69.00 - 10+56.00	2100	24.7	2	0.0069	---	6.09	9.36	5.24	---	0.035	OPEN
10+56.00 - 11+47.00	2100	24.7	0	0.0100	---	11.25	7.57	6.08	---	0.064	OPEN
11+47.00 - 11+67.00	2100	24.7	0	0.0100	---	4.07	20.91	6.08	---	0.015	OPEN

PLAN
1"=40'

HYDRAULIC DATA

STA. TO STA.	Q_{100}	b	z	S_o	S_f(FULL)	D_N	V_N	D_c	VFULL	n	FLOW
11+67.00 - 15+40.00	2100	DOUBLE 12x8 BOX		0.0069	0.0017	4.78	18.31	6.20	10.94	0.013	OPEN
15+40.00 - 15+79.00	2100	24.7	VARIES	0.0051	---	---	---	---	---	0.015	OPEN
15+79.00 - 16+86.00	2100	25.0	2	0.2253	---	1.65	44.97	5.21	---	0.015	OPEN

REGISTERED PROFESSIONAL ENGINEER CHRIS H. ROCKWAY No. 35370 Exp. 9-30-91 CIVIL STATE OF CALIFORNIA

MARK	DATE	DESCRIPTION
△1		REVISED OUTLET STRUCTURE LOCATION, REVISED ACCESS ROAD (1-9-90)

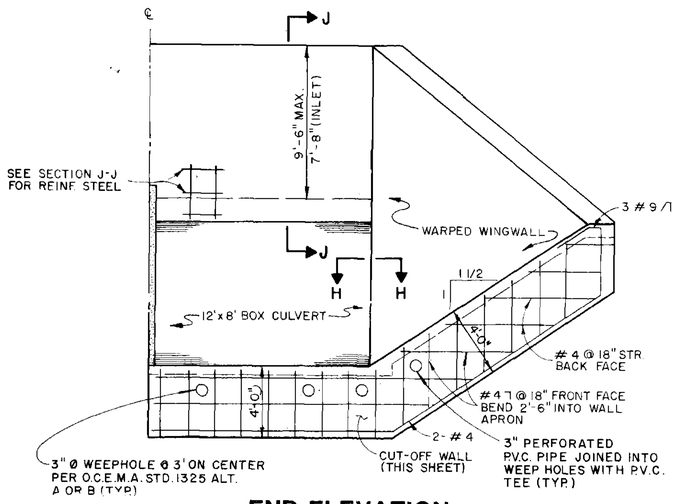
REVISIONS
DESIGNED T.R.S.
DRAWN C.O. CHECKED C.H.R.

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

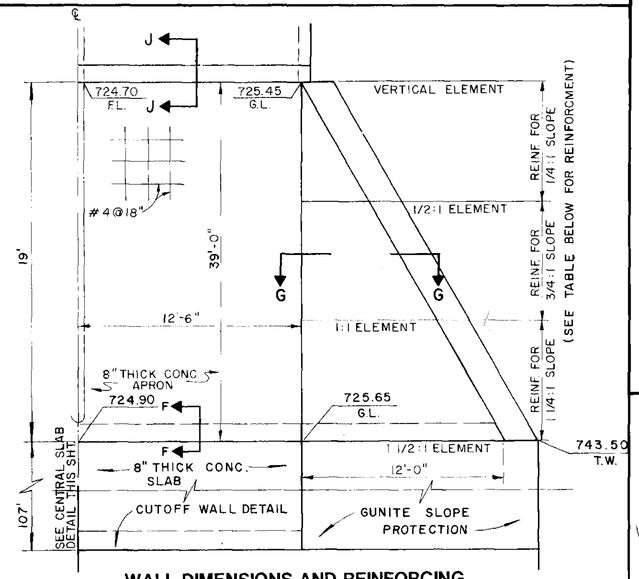
PLAN & PROFILE
STA. 9+69.00 TO 17+06.00

PREPARED UNDER SUPERVISION OF Chris H Rockway 3-14-89
CHRIS H. ROCKWAY RCE NO. 35370 DATE

SCALE	DATE	DWG. NO.	SHEET
AS SHOWN	1/89	F19-701-3	3



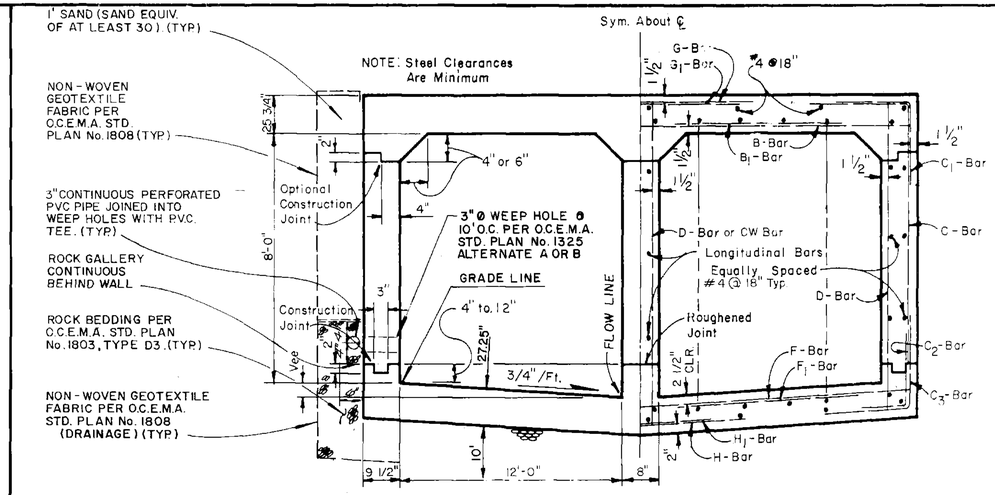
END ELEVATION
(BOX ENTRANCE)
N.T.S.



WALL DIMENSIONS AND REINFORCING

ELEMENT	"H"	8' OR LESS	10	12	14	16
1/4:1	FRONT FACE REINF	#4 a 12	#4 a 7	#5 a 7	#5 a 5	#6 a 6
	REAR FACE REINF.	#4 a 12	#4 a 12	#4 a 12	#4 a 12	#4 a 12
3/4:1	FRONT FACE REINF	#4 a 12	#4 a 12	#4 a 12		
	REAR FACE REINF	#4 a 12	#4 a 12	#4 a 12		
1 1/4:1	FRONT FACE REINF	#4 a 12				
	REAR FACE REINF	#4 a 8				
"D" AT CUT-OFF WALL		6"	6"	6"	7 1/2	8"
"D" AT CULVERT		6"	6"	6"	8"	9 1/2"

PLAN VIEW
APRON & WARPED WINGWALLS AT ENTRANCE TO BOX
(REF. CALTRANS STD. NO. D-90)
N.T.S.



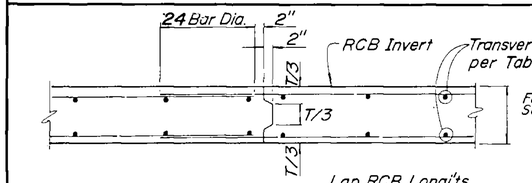
STEEL LAYOUT				
BAR DESIGNATION	BAR SIZE	BAR SPA. (IN)	HORIZ. LEN. (FT.)	VERT. LEN. (FT)
B	4	16.00	26.00	0.00
B_1	7	16.00	26.00	0.00
C	4	12.00	4.8	9.1
C_1	4	12.00	4.1	9.6
C_2	4	12.00	4.8	3.7
C_3	4	12.00	4.4	3.7
D	4	18.00	0.00	12.1
F	4	16.00	26.0	0.00
F_1	7	16.00	26.0	0.00
G	5	12.00	18.70	0.00
G_1	8	12.00	8.8	0.00
H	5	12.00	18.70	0.00
H_1	8	12.00	9.0	0.00
CW	4	18.00	0.00	12.1

NO. OF LONGITUDINAL REINFORCING # 4 BARS @ UNIFORM SPACING	
TOP SLAB	38
BOTTOM SLAB	38
SIDE & CENTER WALLS	30
TOTAL	106
QUANTITIES	
CONCRETE C.Y./LIN.FT.	5.02
STEEL LBS./LIN.FT.	424.0

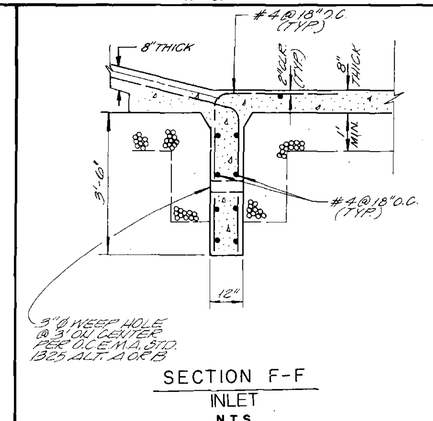
TYPICAL SECTION
DOUBLE 12'x8' BOX CULVERT
60 BOX CULVERT DETAILS

DESIGN DATA-(INLET AND OUTLET DESIGN PARAMETERS)

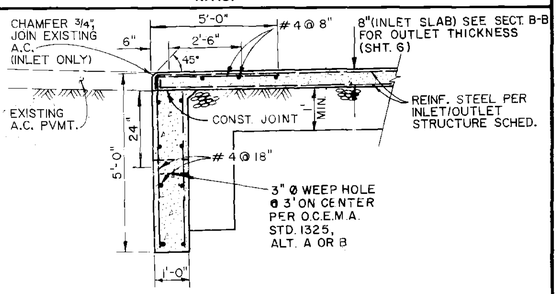
NOTES: WALLS DESIGNED FOR 2' SURCHARGE, EARTH LOAD=120 /cu ft, EQUIVALENT FLUID PRESSURE = 36 /cu ft. VARY "D" AT WARPED WALL UNIFORMLY FROM THAT AT CUT-OFF WALL TO THAT OF HEADWALL OR ENDWALL. FOR MAX "H" > 12' DIMENSIONS "L", "W", "H", "M", "N", ELEV. @ , "ANGLE OF FLARE", AND END "SLOPE" (AS APPLY) ARE SHOWN ON THE PLANS.
fc = 3250 psi, fc = 1463 psi, fy = 60,000 psi



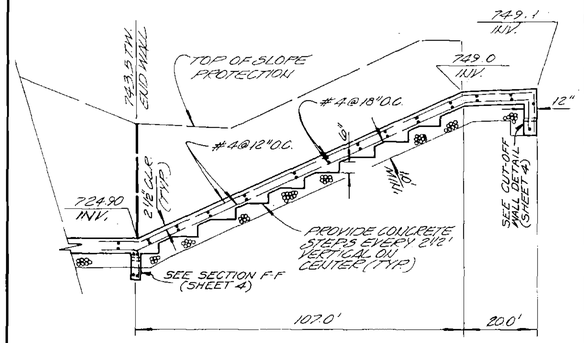
TRANSVERSE JOINT DETAIL
BOX CULVERT
N.T.S.



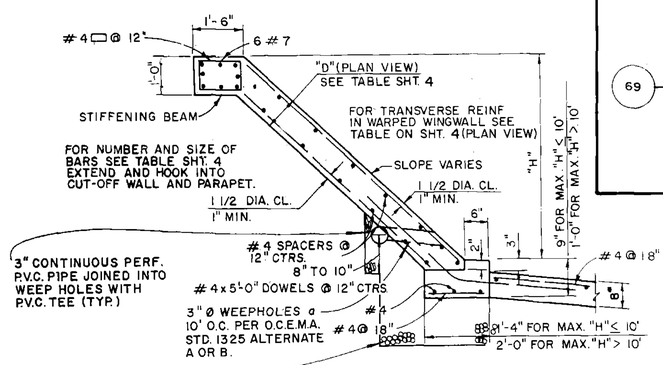
SECTION F-F
INLET
N.T.S.



69 CUT-OFF WALL DETAIL ⚠
INLET AND OUTLET
N.T.S.
1 1/2 0 1 2
3 inches on original drawing



CENTRAL SLAB INLET DETAIL
N.T.S.



SECTION G-G
INLET
(REF. CALTRANS STD. NO. D-86 A)
N.T.S.

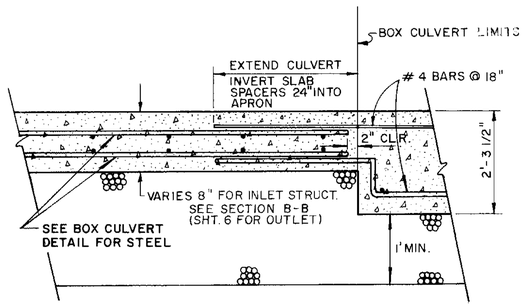
⚠	REVISED CUTOFF WALL DETAIL 6-9-90	
MARK	DATE	DESCRIPTION
REVISIONS		
DESIGNED		
DRAWN		CHECKED

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

BOX CULVERT AND INLET DETAILS

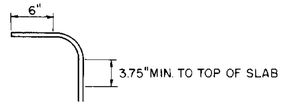
PREPARED UNDER SUPERVISION OF Chris H. Rockaway 3-14-91 DATE

SCALE AS SHOWN | DATE | DWG. NO F19-701-3 | SHEET 4

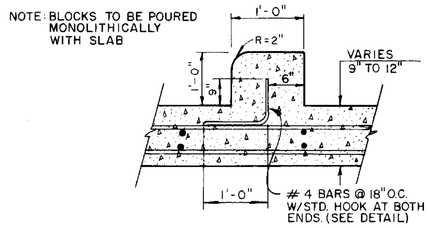


R.C.B. BOX TO SLAB CONNECTION

INLET AND OUTLET
N.T.S.



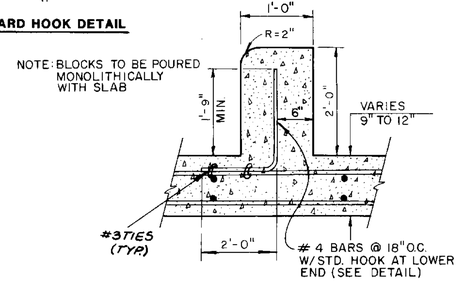
STANDARD HOOK DETAIL



SECTION D - D

TYPICAL SECTION THRU ROWS NO. 2 THRU 10 BAFFLE BLOCK WALL

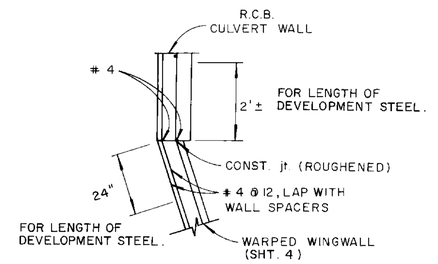
OUTLET
N.T.S.



SECTION E - E

TYPICAL SECTION THRU FIRST BAFFLE BLOCK WALL

OUTLET
N.T.S.

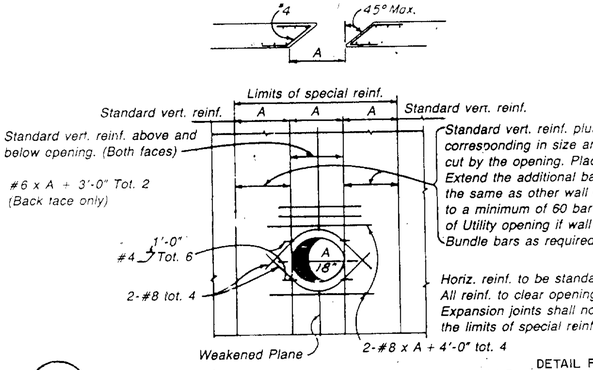


R.C.B. BOX TO WINGWALL CONNECTION SECTION H-H

INLET
N.T.S.

68 CULVERT DEBRIS WALL

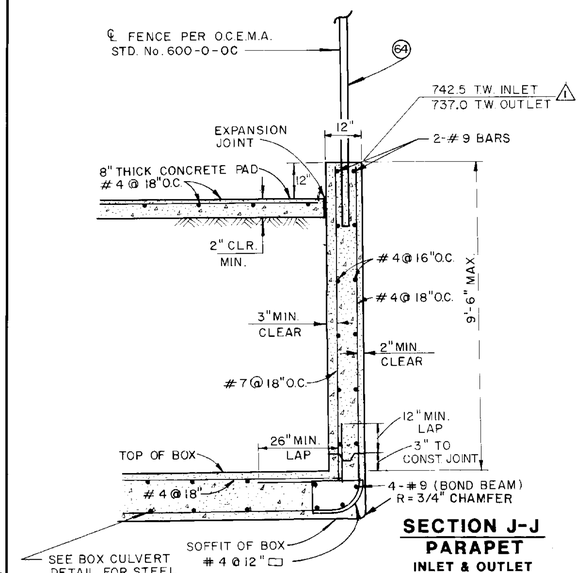
INLET
N.T.S.



62 RETAINING WALL UTILITY OPENING

OUTLET
N.T.S.

DETAIL FROM CALIFORNIA DEPARTMENT OF TRANSPORTATION- "STANDARD PLANS" No. B7-10.



SECTION J-J PARAPET

INLET & OUTLET

MARK	DATE	DESCRIPTION
1	1-9-90	REVISED HEIGHT OF PARAPET WALL

REVISIONS
DESIGNED T.S. & B.A.
DRAWN D.L. CHECKED C.H.R.

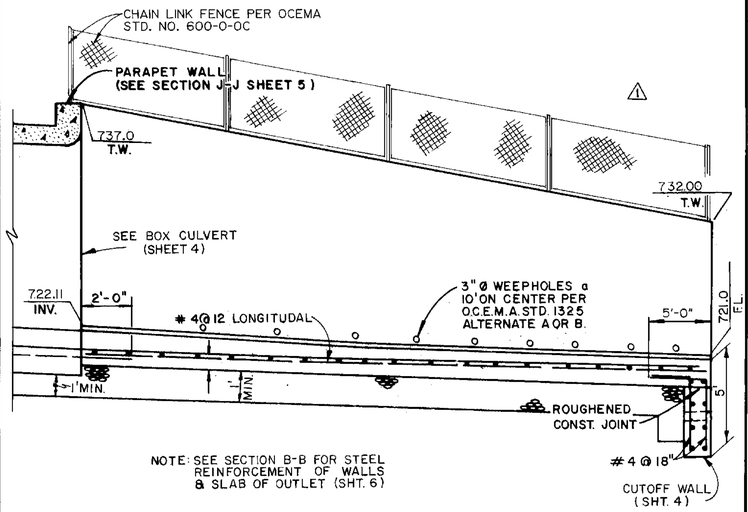
ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

INLET AND OUTLET DETAILS

PREPARED UNDER SUPERVISION OF Chris H. Rockway 3/1/89
CHRIS H. ROCKWAY DATE

SCALE	DATE	DWG. NO.
AS SHOWN	4-89	F19-701-3

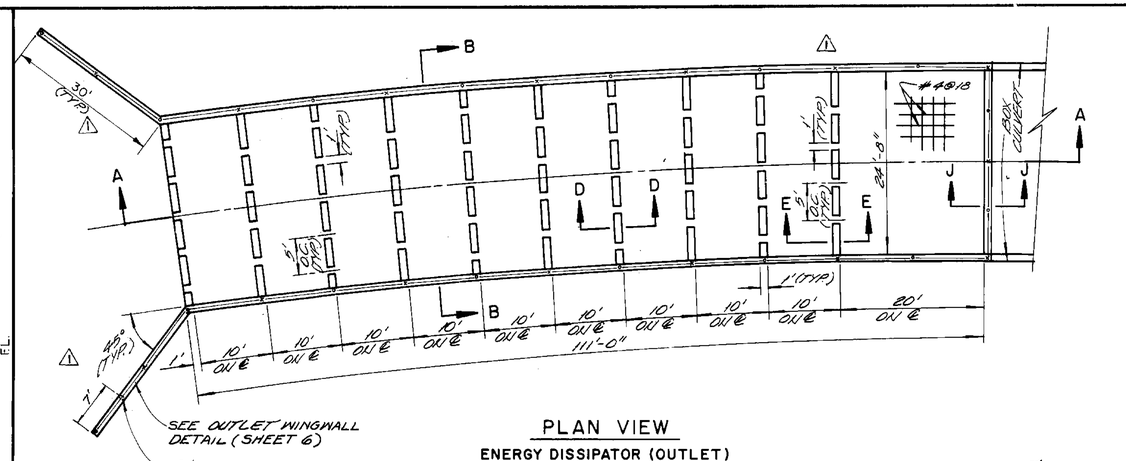
SHEET 5



NOTE: SEE SECTION B-B FOR STEEL REINFORCEMENT OF WALLS & SLAB OF OUTLET (SHT. 6)

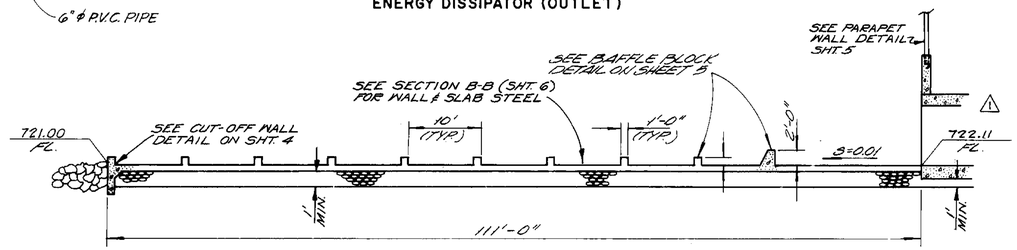
PART LONGITUDINAL SECTION

OUTLET
N.T.S.



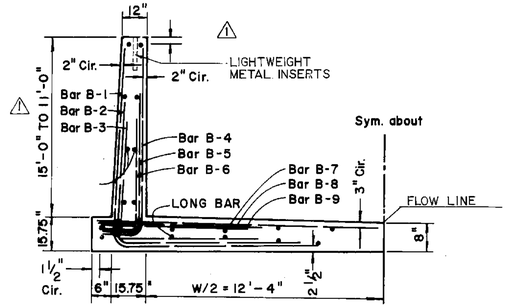
PLAN VIEW

ENERGY DISSIPATOR (OUTLET)



SECTION A-A

ENERGY DISSIPATOR (OUTLET)



SECTION B-B

OUTLET N.T.S.

	SPACING	MAX. HORIZ. LENGTH	MAX. VERT. LENGTH	
B-1	#5 @ 9" O.C.	11' 7.75"	15' 11.75"	
B-2	#6 @ 9" O.C.	7' 6.25"	9' 4.25"	
B-3	#7 @ 9" O.C.	4' 11.75"	5' 2.00"	
B-4	#5 @ 18" O.C.	2' 0.25"	15' 11.75"	
B-5	#6 @ 18" O.C.	2' 0.25"	7' 10.25"	
B-6	#7 @ 18" O.C.	2' 0.25"	4' 8.25"	
B-7	#8 @ 18" O.C.	14' 6.25"	⊖	*
B-8	#5 @ 18" O.C.	9' 4.75"	⊖	
B-9	#6 @ 18" O.C.	7' 8.25"	⊖	

* ONE CONTINUOUS BAR TWICE THIS LENGTH SHOULD BE PLACED THE WIDTH OF THE CHANNEL

LONGITUDINAL BARS

"KEY" BARS AT INTERSECTION OF WALL AND INVERT ARE COUNTED AS PART OF THE SLAB. SPACING GIVEN IS ONLY APPROXIMATE, SPACE BARS EVENLY ALONG WALLS AND SLAB.

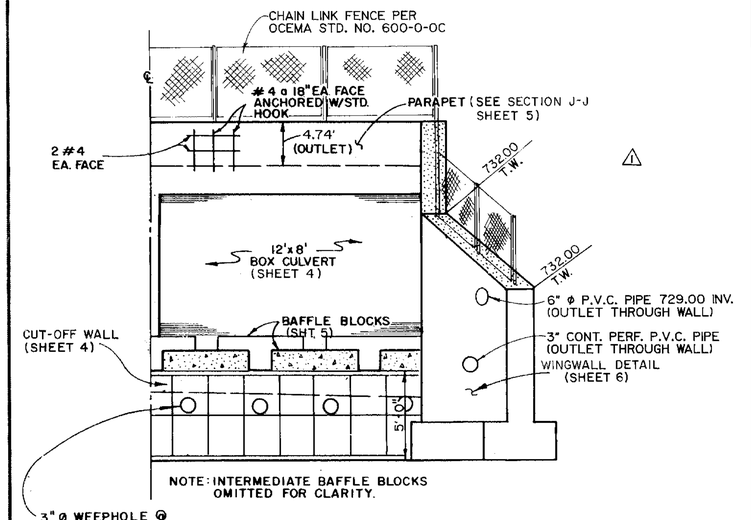
NO. 4 BARS AT 12 INCHES
54 IN SLAB 60 IN WALL
8 IN HEEL 122 BARS TOTAL

MATERIAL QUANTITIES

REINFORCED CONCRETE 2.36 CU. YDS./FT.
REINFORCING STEEL 424.7 LBS./FT.

THICKNESSES

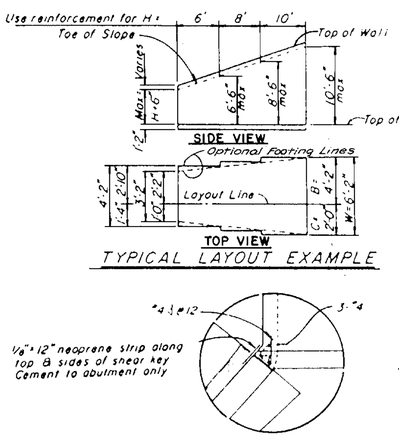
TOP OF WALL 12.00 INCHES
BASE OF WALL 15.75 INCHES
SLAB AT CENTER LINE 8.00 INCHES
SLAB AT FACE OF WALL 15.75 INCHES



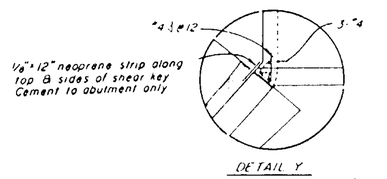
NOTE: INTERMEDIATE BAFFLE BLOCKS OMITTED FOR CLARITY.

END ELEVATION

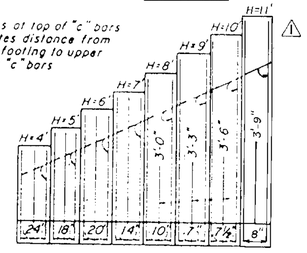
OUTLET
N.T.S.

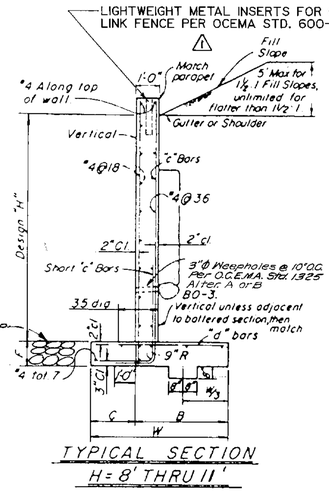


TYPICAL LAYOUT EXAMPLE

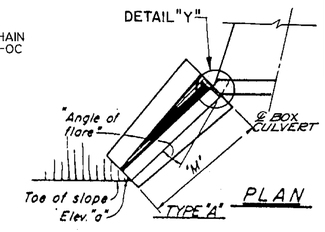


DETAIL Y





TYPICAL SECTION
H = 8' THRU 11'



REINFORCED CONCRETE WINGWALLS									
"H"	4'	5'	6'	7'	8'	9'	10'	11'	
W	3'-2"	3'-8"	4'-2"	4'-8"	5'-2"	5'-8"	6'-2"	6'-8"	
C	1'-0"	1'-2"	1'-4"	1'-6"	1'-8"	1'-10"	2'-0"	2'-2"	
B	2'-2"	2'-6"	2'-10"	3'-2"	3'-6"	3'-10"	4'-2"	4'-6"	
F	--						1'-2"		
Batter	--				None				
S	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	
"c" Bars	#4@24	#4@18	#5@20	#5@14	#5@10	#5@7	#5@7½	#7@8	
"d" Bars	#4@24	#4@18	#5@20	#5@14	#5@10	#5@14	#7@15	#8@16	
Conc. $C.Y./ft.$	0.32	0.38	0.44	0.49	0.55	0.61	0.67	0.73	
Paint $sq.ft./ft.$	13	16	19	25	30	37	49	62	

Quantities do not include that portion above the design "H" limit

Design Notes

Unit Stresses $f_s = 24{,}000$ p.s.i., $f_c = 1{,}300$ p.s.i., $n = 10$

Maximum Toe Pressure = $1\frac{1}{2}$ Tons/sq ft

Elevations, length and angle of flare of wings may be varied by the Engineer to suit conditions encountered in the field. Walls designed for 2' livelood surcharge, $1\frac{1}{2}$: 1 sloping surcharge not to exceed 5' in elevation plus 2' livelood surcharge, or unlimited 2 : 1 surcharge.

Dimensions "H," "L," "W" "N," Elev "a" and "Angle of flare" (as apply) are shown on the plans

Wall height may be exceeded by 6" before going to next greater "H"

Eliminate cut-off wall if adjacent channel is paved and skew is 20° maximum

OUTLET WINGWALL DETAIL

N.T.S.
(REF. CALTRANS STD. D-90)

1 1/2 0 1 2
3 inches on original drawing

MARK	DATE	DESCRIPTION
1	11-9-90	REVISED OUTLET STRUCTURE DETAILS

REVISIONS

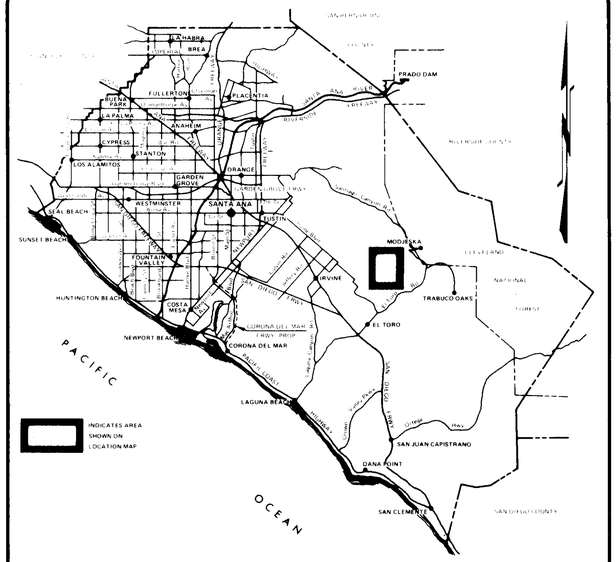
DESIGNED
DRAWN
CHECKED

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

ENERGY DISSIPATOR DETAILS

PREPARED UNDER SUPERVISION OF John H. Kellogg 3-14-89
DATE

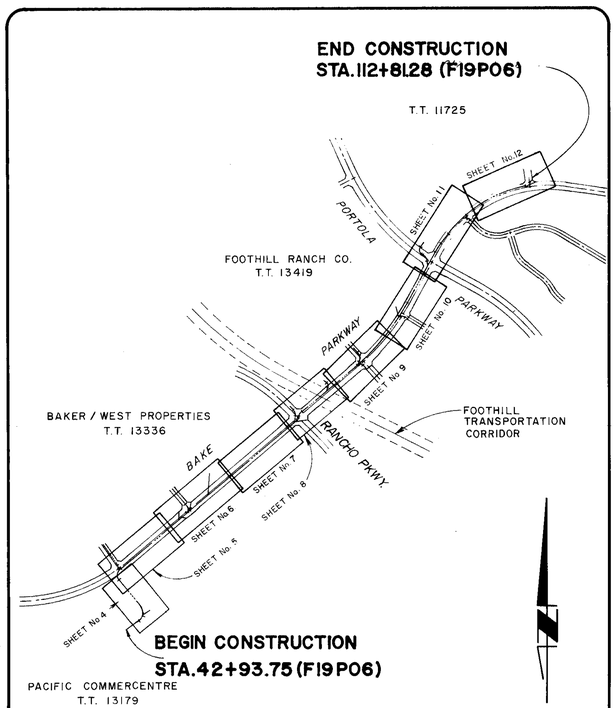
SCALE AS SHOWN | DATE | DWG. NO. F19-701-3 | SHEET 6



VICINITY MAP

1 0 5 10

SCALE IN MILES



LOCATION MAP

SCALE 1" = 800'

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

SANTA ANA, CALIFORNIA

E. SCHNEIDER, DIRECTOR

PLANS FOR CONSTRUCTION OF
THAT PORTION OF
STORM DRAIN

FACILITY NO. F19P06

STA. 42+ 93. 75 TO STA. 112+ 81.28

FACILITY NO. F19P07

STA. 10+ 00.00 TO STA. 11+ 20.00

FOR

BAKE PARKWAY

BONDED WITH TRACT NO.14045

STORM DRAIN MAINTAINED BY COUNTY OF ORANGE

INDEX OF SHEETS

SHEET	DESCRIPTION
1	TITLE SHEET
2	CONSTRUCTION NOTES, GENERAL NOTES AND ESTIMATED QUANTITIES.
3	SINGLE R.C.BOX SCHEDULE AND DETAILS SETTLEMENT JOINT DETAILS 4
4	PLAN AND PROFILE: F19P06 STA. 42+93.75 TO STA. 49+00.00 F19P07 STA. 10+ 00.00 TO STA. 11+20.00
5	PLAN AND PROFILE F19P06, STA. 49+00.00 TO STA. 57+ 00.00.
6	PLAN AND PROFILE F19P06, STA. 57+ 00.00 TO STA. 65+ 00.00
7	PLAN AND PROFILE F19P06, STA. 65+ 00.00 TO STA. 73+ 00.00.
8	PLAN AND PROFILE F19P06, STA. 73+ 00.00 TO STA. 81+ 00.00 AND LATERALS "J,K & L", & "OX".
9	PLAN AND PROFILE F19P06 STA. 81+ 00.00 TO STA. 89+ 00.00 AND LATERALS "M & N".
10	PLAN AND PROFILE F19P06, STA. 89+ 00.00 TO STA. 96+ 75.00 AND LATERALS "P & Q".
11	PLAN AND PROFILE F19P06, STA. 96+ 75.00 TO STA. 105+ 90.58 AND LATERALS "R,S & T".
12	PLAN AND PROFILE F19P06, STA. 105+ 90.58 TO STA. 112+81.28 AND LATERALS "U & V".
13	LATERAL PROFILES "C", "C-1", "C-2", "D", "E" "F", "G" & "H"
14	LATERAL PROFILES "J", "J-1", "K", "L", "M", "N", & "P"
15	LATERAL PROFILES "Q", "R", "R-1", "S", "T", "U" & "V"
16	INLET DETAILS F 19P07, SETTLEMENT JOINT AT STA.10+85.17 4
17	CONSTRUCTION DETAILS

UTILITY	PHONE NO.
IRVINE RANCH WATER DISTRICT	(714) 833-1225
LOS ALISOS WATER DISTRICT	(714) 830-0780
SOUTHERN CALIFORNIA EDISON	(714) 859-8253
PACIFIC BELL TELEPHONE	(714) 966-6216
SOUTHERN CALIFORNIA GAS COMPANY	(714) 634-3106

BENCH MARK:

3E 96 78 ON THE NORTHERLY SIDE OF TRABUCO ROAD AT ITS JUNCTION WITH PASEO SOMBRA 7.7 FEET NORTH OF THE EASTERN MOST CURB RETURN OF TRABUCO 1.5 FEET NORTHWEST OF THE STREET SIGN POST, 17.6 FEET SOUTH OF THE SERRANO PARK STONE SIGN AT THE ANGLE POINT OF THE SIDEWALK AND THE ASPHALT WALKWAY, SET IN TOP OF A CONCRETE POST, FLUSH WITH WALK

ELEVATION 432.58 ADJ. 1976

BASIS OF BEARING:

"STATE OF CALIFORNIA LAMBERT COORDINATE SYSTEM - ZONE VI" BASED ON THE LINE BETWEEN ORANGE COUNTY SURVEYOR'S HORIZONTAL CONTROL STATIONS "3-1-12-62" AND "CANADA" (OCS 1-1-75 DATUM) BEING N 77° 20' 41" E

EMA / REGULATION

CONST. FROM STA.
THIS PLAN IS SIGNED BY EMA/REGULATION FOR CONCEPT ADHERENCE TO COUNTY STANDARDS AND REQUIREMENTS ONLY. EMA/REGULATION IS NOT RESPONSIBLE FOR DESIGN, ASSUMPTIONS, OR ACCURACY.

APPROVED: Patrick Stanton R.C.E.
DATE: 5/8/90

REGISTERED PROFESSIONAL ENGINEER ROBERT KALLENBAUGH NO. 27987 EXP. 3-31-90 CIVIL STATE OF CALIFORNIA

ENGINEER

Robert Bein, William Frost & Associates
PROFESSIONAL ENGINEERS, PLANNERS & SURVEYORS

BY: S. Robert Kallenbaugh
S. ROBERT KALLENBAUGH RCE 27987
DATE: 12-29-88 EXP. 3-31-90

EMA / REGULATION

CONST. FROM STA. 50+00 TO 112+81.28 F19P06 ONLY
THIS PLAN IS SIGNED BY EMA/REGULATION FOR CONCEPT ADHERENCE TO COUNTY STANDARDS AND REQUIREMENTS ONLY. EMA/REGULATION IS NOT RESPONSIBLE FOR DESIGN, ASSUMPTIONS, OR ACCURACY.

APPROVED: P. Stanton
DATE: 10/19/89 RCE

OWNER/DEVELOPER

FOOTHILL RANCH COMPANY
25200 LA PAZ ROAD, SUITE 210
LAGUNA HILLS, CA. 92653
(714) 586-4400

NO.	DESCRIPTION	SHT.	APPROVED	DATE
4	ADDED SETTLEMENT JOINT DETAILS AND LOCATIONS, RELOCATED MH. / REV. PROFILES	2,3,4, 16&17	P. Stanton	5/15/90
3	PROFILE REVISED	4	P. Stanton	3/3/81
2	ADDED C.B. N2, C&D - SHTS. 10, 14, 15		P. Stanton	1/11/16
1	ADD LAT. "OX"	8	P. Stanton	4/20/16

REVISIONS

DWG. NO. F19P06-713-1

SHEET 1 OF 17

CONSTRUCTION NOTES & ESTIMATED QUANTITIES

NO.	ITEM	UNIT	AMOUNT	AMOUNT OF SPECIAL WALL, 1½" MIN. STEEL CLEARANCE RCP
1	CONST. 18" RCP (D-LOAD PER PROFILE)	L.F.	288	(129)
2	CONST. 21" RCP (D-LOAD PER PROFILE)	L.F.	229	(60)
3	CONST. 24" RCP (D-LOAD PER PROFILE)	L.F.	113 △1	
4	CONST. 27" RCP (D-LOAD PER PROFILE)	L.F.	149	
5	CONST. 30" RCP (D-LOAD PER PROFILE)	L.F.	250	(156)
6	CONST. 33" RCP (D-LOAD PER PROFILE)	L.F.	286	
7	CONST. 36" RCP (D-LOAD PER PROFILE)	L.F.	—	(221)
8	CONST. 39" RCP (D-LOAD PER PROFILE)	L.F.	—	(874)
9	CONST. 45" RCP (D-LOAD PER PROFILE)	L.F.	—	(427)
10	CONST. 48" RCP (D-LOAD PER PROFILE)	L.F.	—	(75)
11	CONST. 51" RCP (D-LOAD PER PROFILE)	L.F.	—	(200)
12	CONST. 54" RCP (D-LOAD PER PROFILE)	L.F.	40	(1027)
13	CONST. 60" RCP (D-LOAD PER PROFILE)	L.F.	—	(366)
14	CONST. 72" RCP (D-LOAD PER PROFILE)	L.F.	—	(912)
15	CONST. 78" RCP (D-LOAD PER PROFILE)	L.F.	—	(1230)
16	CONST. 81" R.C.P. (D-LOAD PER PROFILE)	L.F.	—	(298)
17	CONST. 84" R.C.P. (D-LOAD PER PROFILE)	L.F.	—	
18	CONST. 87" R.C.P. (D-LOAD PER PROFILE)	L.F.	959	
19	CONST. 90" R.C.P. (D-LOAD PER PROFILE)	L.F.		(633)
20	CONST. 10.5'x10.5' RCB PER PROFILE & DETAIL ON SHT. NO. 3	L.F.	40	
△4 21	CONST. JUNC. STRUCT. PER DETAIL SHT. NO. 17 AND OCEMA STD. PLAN 1314	EA.	1	
22	CONST. 12" A.C.P. (D-LOAD PER PROFILE)	L.F.	—	
23	CONST. S.R.P. (D-LOAD PER PROFILE)	L.F.	—	
24	CONST. S.R.P. (D-LOAD PER PROFILE)	L.F.	—	
25	CONST. JUNC. STRUCT. TYPE I PER O.C.E.M.A. STD. PLAN No. 1310	E.A.	4	
26	CONST. JUNC. STRUCT. TYPE I (OMIT SHAFT) PER O.C.E.M.A. STD. PLAN No. 1310	E.A.	2	
27	CONST. JUNC. STRUCT. TYPE II PER O.C.E.M.A. STD. PLAN No. 1311	E.A.	8	
△4 28	CONST. SETTLEMENT JOINTS PER DETAILS ON SHEET 3 & 16	EA.	6	
29	CONST. JUNC. STRUCT. TYPE III PER O.C.E.M.A. STD. PLAN No. 1312	E.A.	5	
30	CONST. JUNC. STRUCT. TYPE III (OMIT SHAFT) PER O.C.E.M.A. STD. PLAN No. 1312	E.A.	2	
31	CONST. JUNC. STRUCT. TYPE IV PER O.C.E.M.A. STD. PLAN No. 1313	E.A.	4	
32	CONST. JUNC. STRUCT. TYPE III PER STD. PLAN 1312, WITH 48" M.H. PER STD PLAN 1504	EA.	1	
33	CONST. JUNC. STRUCT. TYPE VI PER O.C.E.M.A. STD. PLAN No. 1315	E.A.	5	
34	CONST. REIN. CONC. COLLAR PER O.C.E.M.A. STD. PLAN No. 1333	E.A.	11	
35	CONST. INLET TYPE I PER O.C.E.M.A. STD. PLAN No. 1301	E.A.	—	
36	CONST. DBL. COURSE BRICK & MORTAR PLUG (PIPES 48" DIA. OR LARGER)	EA.	—	
37	CONST. INLET TYPE V PER O.C.E.M.A. STD. PLAN No. 1305	E.A.	—	
38	CONST. RISER PER O.C.E.M.A. STD. PLAN No. 1327	EA.	—	
39	CONST. BRICK AND MORTAR PLUG	EA.	28	
40	CONST. BRICK AND MORTAR PLUG AROUND INTERIM C.S.P.	EA.	—	
41	CONST. STEEL LANDING FOR DEEP M.H. PER DETAIL ON SHT. NO. 17	EA.	2	
42	CONST. 36" THICK GROUTED RIP-RAP PER DETAIL & GRADATION ON SHT NO. 17	C.Y.	90	
44	CONST. WEEPHOLES PER DETAILS ON SHT. NO. 17	EA.	110	
45	CONST. 60" CHAIN LINK FENCE PER O.C.E.M.A. STD. PLAN NO. 1412	L.F.	110	
46	CONST. R.C. PARAPET WALL PER SHT. NO. 16	EA.	1	
47	CONST. CONCRETE PIPE SLOPE ANCHOR PER O.C.E.M.A. STD. PLAN 1333	EA.	1	
48	CONST. BOX CULVERT INLET PER DETAILS ON SHT. NO. 16	EA.	1	
50	CONST. DEBRIS POST PER DETAIL ON SHT. NO. 16	EA.	7	
51	CONST. R.C. BOX MANHOLE PER OCEMA STD. PLAN NO. 1506	EA.	1	

GENERAL NOTES

1. ALL WORK TO BE DEDICATED TO THE ORANGE COUNTY FLOOD CONTROL DISTRICT SHALL BE IN CONFORMANCE WITH THE O.C.E.M.A. STD. SPECIFICATIONS (PUBLIC WORKS CONSTRUCTION 1985 EDITION) AND THE O.C.E.M.A. STD. PLANS WHICH MAY BE PURCHASED FROM THE DISTRICT AND SHALL BE KEPT ON THE JOB SITE AT ALL TIMES.
2. THE CONTRACTOR SHALL NOTIFY THE DISTRICT'S INSPECTOR AT LEAST 48 HOURS PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION BY TELEPHONING 567-7800 OR BY WRITING THE ORANGE COUNTY E.M.A. ATTN. CONSTRUCTION, P. O. BOX 486, SANTA ANA, CALIFORNIA 92702.
3. ALL CONCRETE SHALL HAVE A MINIMUM 28 DAYS ULTIMATE COMPRESSIVE STRENGTH OF 3,250 PSI. CEMENT SHALL CONFORM TO ASTM C150, TYPE V. CONCRETE FOR INVERT SHALL BE 560-B-3250 AND FOR WALLS AND DECK SHALL BE 560-C-3250.
4. ALL CONDUIT LENGTHS ARE HORIZONTAL PROJECTIONS, UNLESS OTHERWISE SHOWN.
5. LOCATIONS OF PUBLIC UTILITIES SHOWN HAVE BEEN DETERMINED FROM AVAILABLE INFORMATION. HOWEVER, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE TRUE LOCATION OF ANY EXISTING UTILITIES AND TO EXERCISE PROPER PRECAUTIONS TO AVOID INJURY OR DAMAGE THERETO.
6. ALL REINFORCING BARS SHALL CONFORM TO ASTM A615 GRADE 60, DEFORMED BARS.
7. FOR ADDITIONAL STRUCTURAL NOTES, SEE SHEET NO. ______.
8. ALL MATERIALS TESTING FOR THE DRAINAGE FACILITIES SHALL BE PROVIDED BY THE O.C.E.M.A. MATERIALS LAB IN ACCORDANCE WITH THE NUMBER, LOCATION AND FREQUENCY REQUESTED BY THE FLOOD CONTROL DISTRICT'S INSPECTOR.
9. CHAMFER ALL EXPOSED EDGES OF CONCRETE 3/4" MIN.
10. ALL PIPE SECTIONS TO BE BANDED AND GROUTED
11. FOR TRENCH EXCAVATIONS IN NATIVE SOIL, SHORING SHALL BE PROVIDED TO SATISFY STATE OF CALIFORNIA SAFETY REQUIREMENTS.
12. THE CONTRACTOR SHALL CONDUCT CONSTRUCTION OPERATIONS IN SUCH A MANNER THAT STORM OR OTHER WATERS MAY PROCEED UNINTERRUPTED ALONG THEIR EXISTING STREET OR DRAINAGE COURSES.
13. IN THE COURSE OF WATER CONTROL, THE CONTRACTOR SHALL CONDUCT CONSTRUCTION OPERATIONS TO PROTECT WATERS FROM POLLUTION WITH FUELS, OILS, BITUMENS, OR OTHER HARMFUL MATERIALS.
14. ALL REINFORCED CONCRETE PIPE SHALL BE BEDDED IN ACCORDANCE WITH O.C.E.M.A. STD. PLAN NO. 319.
15. ALL FILL AND BACKFILL SHALL BE COMPACTED TO MIN. 90 PERCENT OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE CALIFORNIA TEST METHOD NO. 216.1978 ALL FILL AND BACKFILL SHALL BE FREE FROM VEGETABLE MATTER. HOWEVER, IT MAY CONSIST OF ONSITE SILTY SAND OR CLAYEY SAND (SM.SC). THE FILL AND BACKFILL SHALL BE COMPACTED IN APPROXIMATELY 6 INCH INCREMENTS. IN ORDER TO AVOID UNBALANCED D-LOADS ON THE STORM DRAIN, THE DIFFERENCE IN BACKFILL ELEVATION ON ADJACENT SIDES OF THE R.C.P. DRAIN SHALL NOT EXCEED 2 FEET. NO STORM DRAIN SHALL BE PLACED UNTIL THE SOILS ENGINEER HAS INSPECTED AND APPROVED THE BOTTOM OF THE TRENCH. ISOLATED ZONES OF SOFT COMPRESSIBLE SOILS OR LARGE ROCKS SHALL BE COMPLETELY REMOVED AND REPLACED WITH PROPERLY COMPACTED SOILS. PRECAUTIONS SHALL BE TAKEN TO INSURE THAT THE STORM DRAIN IS NOT DAMAGED BY HEAVY COMPACTING EQUIPMENT. HEAVY COMPACTING EQUIPMENT SHALL NOT BE USED WITHIN A 1 TO 1 PLANE RISING FROM THE BASE OF THE STORM DRAIN OR WITHIN 2 FEET OF THE TOP OF THE STORM DRAIN; THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO THE STORM DRAIN RESULTING FROM INAPPROPRIATE COMPACTION TECHNIQUES AND EQUIPMENT. SOILS ENGINEER SHALL APPROVE AND SUPERVISE BACKFILLING.
16. PIPE CONSTRUCTION IN FILL AREA MUST BE COORDINATED WITH THE GRADING TO INSURE THAT WHEN THE FILL OPERATION HAS BEEN COMPLETED AT GRADE A MINIMUM OF TWO FEET ABOVE THE TOP OF PIPE OR TO FIVE FEET (MAXIMUM) ABOVE THE PROPOSED SUB-GRADE OF THE PIPE, THE STORM DRAIN TRENCH SHALL BE EXCAVATED AND THE PIPE INSTALLED.
17. ALL SURVEYING REQUIRED FOR VERTICAL AND HORIZONTAL ALIGNMENT MUST BE PROVIDED BY THE CONTRACTOR OR DEVELOPER AND SUFFICIENT REFERENCE STAKING MUST BE IN ACCORDANCE WITH THE REQUEST OF THE O.C.E.M.A. INSPECTOR.
18. WHENEVER APPLICABLE, THE DEVELOPER SHALL OBTAIN A PERMIT FROM THE STATE DEPARTMENT OF FISH AND GAME IN ACCORDANCE WITH SECTION 1602 OF THE CALIFORNIA FISH AND GAME CODE PRIOR TO COMMENCEMENT OF CONSTRUCTION.
19. A PERMIT FOR WORK WITHIN EXISTING STREET RIGHT OF WAY IS REQUIRED FROM THE O.C.E.M.A. FOR ANY ENCROACHMENT NECESSARY FOR CONSTRUCTION IN PUBLIC RIGHT OF WAY.
20. STORM DRAIN BACKFILL FOR ALL FACILITIES WITHIN STREET RIGHT OF WAY IS TO BE PLACED AND COMPACTED UNDER O.C.E.M.A. INSPECTION AND MEET OR EXCEED O.C.E.M.A. MINIMUM STANDARDS.
21. LOCAL DEPRESSIONS AND DECKS OF CURB INLETS SHALL NOT BE POURED UNTIL STAKING FOR LINE AND GRADE OF CURB AND GUTTER IS COMPLETED WITHIN 25' OF INSIDE OF INLET WALLS ON BOTH SIDES OR ADJACENT CURB AND GUTTER HAS BEEN PREVIOUSLY POURED.
22. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, THE DEVELOPER'S CONTRACTOR SHALL OBTAIN A PERMIT FROM THE STATE DIVISION OF INDUSTRIAL SAFETY. A COPY OF PERMIT SHALL BE KEPT ON THE JOB SITE AT ALL TIMES.
23. LENGTH OF MANHOLE STRUCTURES MAY BE INCREASED TO MEET PIPE ENDS AT OPTION OF CONTRACTOR AS LONG AS REINFORCING STEEL IS CONTINUED AS REQUIRED. ANY CHANGE IN SPUR LOCATION MUST BE APPROVED BY THE ENGINEER.
24. FLOOR OF MANHOLE STRUCTURE SHALL BE STEEL TROWELLED TO SPRING LINE.
25. RCP SHALL COMPLY WITH ALL A.S.T.M. APPLICABLE STANDARDS.
26. PRIOR TO THE PLACEMENT OF STORMDRAIN IMPROVEMENTS, THE DEVELOPER'S SOIL ENGINEERING SHALL CERTIFY IN WRITING TO THE E.M.A. INSPECTOR THAT THE STORM DRAIN'S SUBGRADE IS OF ADEQUATE STRENGTH TO SUPPORT THE STRUCTURES AND ANY ANTICIPATED LOADS.
27. BODY OF MANHOLE STRUCTURE, INCLUDING SPUR, MUST BE POURED IN ONE CONTINUOUS OPERATION, EXCEPT THAT CONSTRUCTION JOINT AT THE SPRING LINE WITH A LONGITUDINAL KEYWAY IS PERMITTED.
28. LOCAL DEPRESSIONS SHALL BE CONSTRUCTED PER STREET IMPROVEMENT PLANS IN ACCORDANCE WITH O.C.E.M.A. STANDARD PLANS. HOWEVER, ALL CATCH BASINS WILL BE SHOWN ON STREET IMPROVEMENT PLANS.
29. STATIONS SHOWN THUS 0 +00 ARE STORMDRAIN STATIONS AND ARE INDEPENDENT OF ALL CENTERLINE STATIONS.
30. ALL STEEL THAT IS TO BE CONTINUOUS SHALL BE LAPPED A MINIMUM OF 45 BAR DIAMETERS.
31. ALL REINFORCING BARS MUST BE SECURELY HELD IN PLACE IN THE FORMS. TWO WAY MATS OF STEEL MUST BE WIRED TOGETHER BOTH WAYS AT ALTERNATE INTERSECTIONS.
32. WORKING WITHIN ORANGE COUNTY FLOOD CONTROL FACILITIES IS RESTRICTED TO THE PERIOD OF APRIL 15 TO OCTOBER 15
33. IF A DRIVEWAY ENCROACHES WITHIN A LOCAL DEPRESSION TRANSITION, USE E.M.A. STANDARD PLAN #1308 - TYPE A.

STONEWORK

STONE SHALL COMPLY WITH SUBSECTION 200-1.6, STONE FOR RIP-RAP, EXCEPT COBBLESTONES SHALL NOT BE USED. ALL STONES SHALL BE ANGULAR, EACH PIECE HAVING ITS GREATEST DIMENSIONS NOT GREATER THAN THREE TIMES ITS LEAST DIMENSIONS.

STONE SHALL COMPLY WITH THE TESTS SPECIFIED IN SUBSECTION 200-1.6 EXCEPT THAT SPECIFIC GRAVITY SHALL BE NOT LESS THAN 2.62.

PLACEMENT TOLERANCES FOR FINISHED SURFACE SHALL BE PLUS OR MINUS SIX INCHES FROM INDICATED LINES AND GRADES.

EACH LOAD OF STONE SHALL BE REASONABLY WELL GRADED FROM THE SMALLEST TO THE MAXIMUM SIZE SPECIFIED. STONES SMALLER THAN THE SPECIFIED 15 PERCENT SIZE AND SPALLS WILL NOT BE PERMITTED IN A AMOUNT EXCEEDING 15 PERCENT BY WEIGHT OF EACH LOAD.

STONE FOR RIP-RAP SHALL BE PLACED IN A MANNER WHICH WILL PRODUCE A REASONABLE WELL-GRADED MASS OF STONE WITH THE MINIMUM PRACTICABLE PERCENTAGE OF VOIDS. THE ENTIRE MASS OF STONE SHALL BE PLACED IN CONFORMANCE WITH THE LINES, GRADES AND THICKNESSES SHOWN ON THE PLANS. RIP-RAP SHALL BE PLACED TO ITS FULL COURSE THICKNESS IN ONE OPERATION AND IN A MANNER TO AVIOD DISPLACING THE UNDERLYING MATERIAL. PLACING OF RIP-RAP IN LAYERS BY DUMPING INTO CHUTES OR BY SIMILAR METHODS LIKELY TO CAUSE SEGREGATION, WILL NOT BE PERMITTED. SELF-PROPELLED EQUIPMENT SHALL NOT BE USED ON EMBANKMENT SLOPES.

THE LARGER STONES SHALL BE WELL DISTRIBUTED AND THE ENTIRE MASS OF STONE SHALL CONFORM TO THE GRADATION SPECIFIED. ALL MATERIAL GOING INTO RIP-RAP PROTECTOIN SHALL BE SO PLACED AND DISTRIBUTED THAT THERE WILL BE NO LARGE ACCUMULATION OF EITHER THE LARGER OR SMALLER SIZES OF STONE.

GEOTEXTILE FABRICS

THE WORK INVOLVED SHALL CONSIST OF PLACING FABRIC OF THE TYPE SPECIFIED AT LOCATIONS AND GRADES SHOWN ON THE PLANS OR AS STAKED IN THE FIELD, IN ACCORDANCE WITH THESE SPECIAL PROVISONS. ANY FABRIC DAMAGED DURING ITS INSTALLATION OR DURING ITS USE SHALL BE REPLACED. TORN OR PUNCTURED AREAS MAY BE REPAIRED WITH AN ADDITIONAL PIECE OF FABRIC LARGE ENOUGH BOTH TO COVER THE DAMAGED AREA AND SATISFY OVERLAP REQUIREMENTS. A CERTIFICATE OF COMPLIANCE, MILL CERTIFICATE OR AFFIDAVIT THAT THE FABRIC TO BE INSTALLED MEETS MINIMUM REQUIREMENTS IN EACH PRINCIPAL DIRECTION, SIGNED BY A COMPANY OFFICER AUTHORIZED TO SIGN SUCH DOCUMENTS, SHALL BE FURNISHED TO THE ENGINEER BEFORE INSTALLATION. THE ENGINEER SHALL DETERMINE THE ADEQUACY OF SUBMITTED DOCUMENTATION.

FILTER FABRIC

FABRIC SHALL BE PLACED ON SURFACES FREE OF OBSTUCTIONS, DEPRESSIONS AND DEBRIS. FABRIC SHALL BE LOOSELY PLACED AND NOT PLACED IN A STRETCHED CONDITION. FABRIC SHALL BE PLACED IN DIRECT CONTACT WITH SOIL, WITH NO BRIDGING ALLOWED. OVERLAPS SHALL VARY FROM 18 TO 36 INCHES WIDE, DEPENDING ON STONE SIZE AND SUBGRADE STABILITY, AND SHALL BE APPROVED BY THE ENGINEER. SECURING PINS AT LEAST 12 INCHES LONG WITH 1-1/2" DIAMETER WASHERS OR 8" X 1" X 8" U-SHAPED STAPLES, AND SHALL BE INSERTED THROUGH ALL OVERLAP LAYERS, AT INTERVALS NOT EXCEEDING 6 FFET, ALONG A LINE SET AT THE MID-POINT OF OVERLAPS. ADDITIONAL PINS SHALL BE INSTALLED AS NECESSARY TO PREVENT BRIDGING AND FABRIC SLOPPAGE, REGARDLESS OF THE FABRIC'S LOCATION.

FABRIC SHALL BE USED WTH A LAYER OF GRANULAR BEDDING MATERIAL PLACED ON IT PRIOR TO RIP-RAP PLACEMENT. FABRIC WITH PHYSICAL PROPERTIES LESS THAN THOSE LISTED IN TABLE 1 OF OCEMA STD PLAN NO. 808 FOR EMBANKMENT OR RIP-RAP STABILIZATION SHALL NOT BE USED. THE THICKNESS OF BEDDING MATERIAL SHALL BE COMPATIBLE WITH RIP-RAP SIZE. IN NO CASE SHALL FABRIC'S PHYSICAL PROPERTIES BE LESS THAN THOSE LISTED FOR DRAINAGE TEXTILES. FINAL DETERMINATION OF FILTER FABRIC'S ADEQUACY, CONSIDERING BEDDING MATERIAL USED, AND SIZE, THICKNESS, GRADATION AND METHOD OF PLACEMENT OF RIP-RAP SHALL BE MADE BY THE ENGINEER. IN NO CASE SHALL BEDDING MATERIAL OR RIP-RAP BE DROPPED ON FABRIC FROM A HEIGHT OF MORE THAN THREE FEET. SPECIAL CARE SHALL BE TAKEN TO ENSURE THAT METHODS OF RIP-RAP AND MATERIAL PLACEMENT SUCH AS END-DUMPING DO NOT TEAR OR OTHERWIDE DAMAGE THE FABRIC.

1 1/2 0 1 2
3 inches on original drawing

MARK	DATE	DESCRIPTION
△4	2/ /91	Added Settlement Joints

REVISIONS

DESIGNED D. VORNBERGER
DRAWN SG CHECKED BMP

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

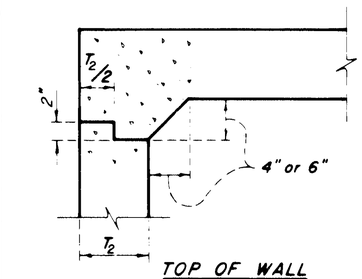
FACILITY NO. F19P06

GENERAL NOTES, CONSTRUCTION NOTES AND ESTIMATED QUANTITIES

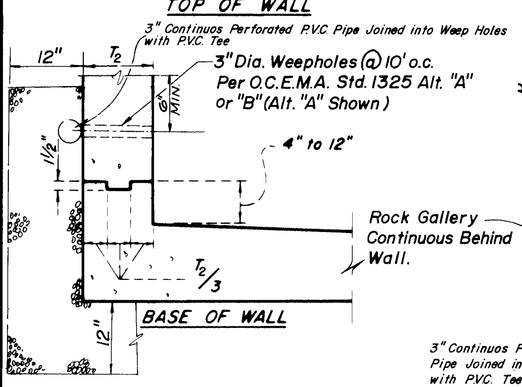
PREPARED UNDER SUPERVISION OF [signature] DATE

SCALE	DATE	DWG. NO.	SHEET
AS SHOWN		F19P06-713-1	2 OF 17

J.N. 24429



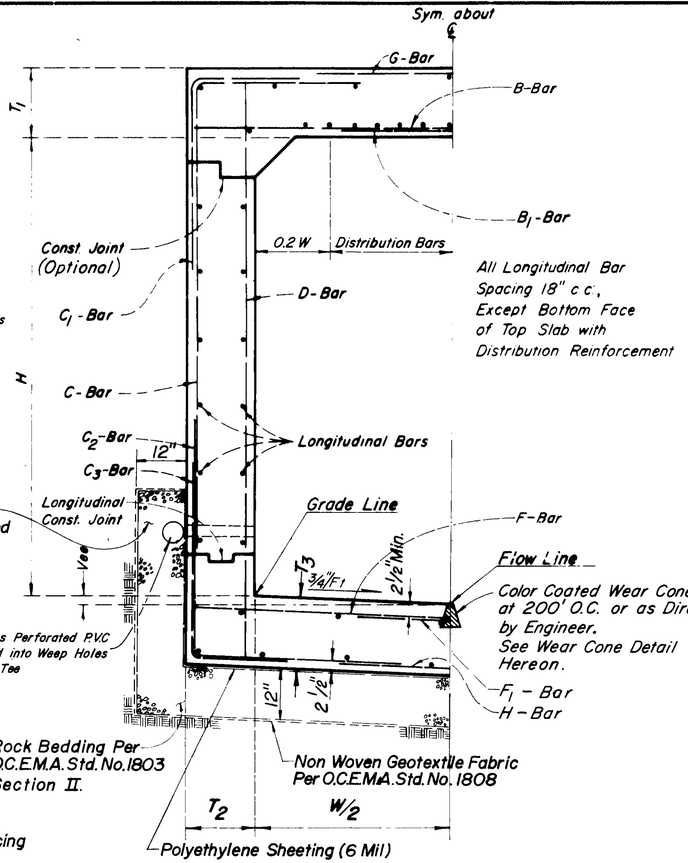
TOP OF WALL

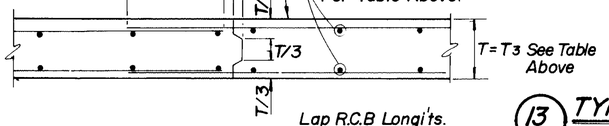


BASE OF WALL

CONSTRUCTION JOINT DETAILS

N.T.S.





(13) TYPICAL R. C. BOX SECTION (41)

NOT TO SCALE

TRANSVERSE JOINT DETAIL

N.T.S.

DESIGN DATA

LIVE LOAD
HS20-44

DEAD LOAD
Earth load per Marston's formula: w = 110 p.c.f.
Ku = Ku' = 0.150
Bd = Outside width of box plus 3 feet
Side earth 40 p.s.f. per foot of depth

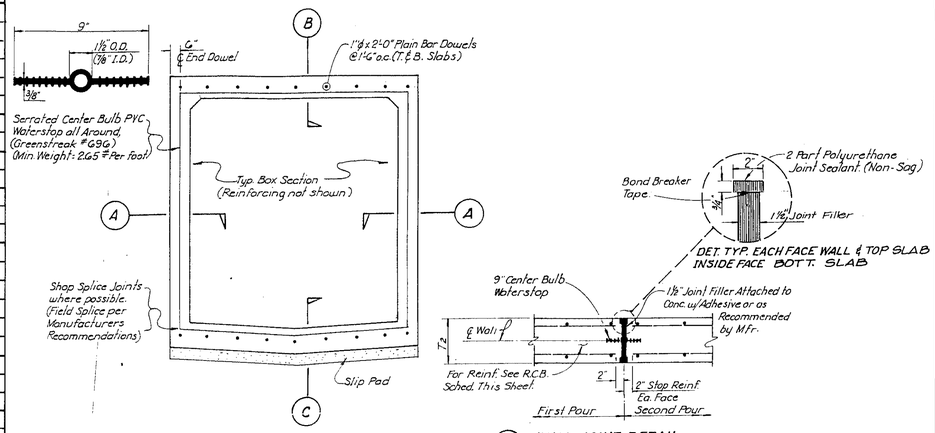
Weight of concrete 150 p.c.f.

ALLOWABLE STRESSES
f'_c = 3250 p.s.i. at 28 days
f_c = 1462 p.s.i.
f_s = 24,000 p.s.i.
n = 8.8
shear and bond stresses per A.C.I. 318-63

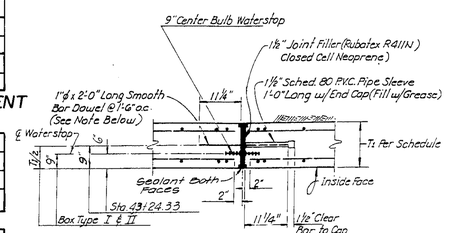
R.C. BOX LOCATION SCHEDULE			
Box Sect.	Station From	Station To	REMARKS
F19P06			
I	42+93.75	42+98.84	10.5'x 10.5' R.C.B.
F19P07			
II	42+98.84 = 9+97.09	10+25.09	10.5'x 10.5' R.C.B. @ JUNCTION BOX
F19P07			
I	10+25.09	10+90.00	10.5'x 10.5 R.C.B.

4 CONST. SETTLEMENT JOINTS PER PROFILE SHEET 4 AND DETAILS ON SHEET 3, 16 & 17

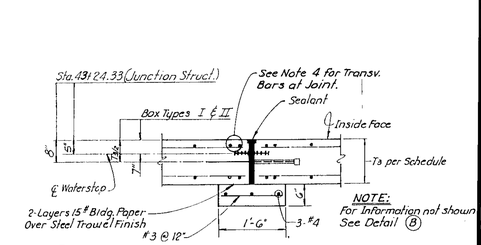
BOX SECTION		I	II
Design Cover		25'	25'
Width	W	10.5'	10.5'
Height	H	10.5'	10.5'
Top Slab Thickness	T_1	25"	30"
Side Wall Thickness	T_2	15"	15"
Bottom Slab Thickness	T_3	27"	30"
B Bars	Bar No. & Spacing	#8@12"	#8@12"
	Length	12'-8"	12'-8"
B_1 Bars	Bar No. & Spacing	#7@12"	#9@12"
	Length	10'-0"	12'-8"
C Bars	Bar No. & Spacing	#7@12"	#7@12"
	Horiz. Length	4'-11"	4'-11"
	Vert. Length	9'-5"	9'-10"
C_1 Bars	Bar No. & Spacing	#6@12"	#6@12"
	Horiz. Length	3'-1"	3'-1"
	Vert. Length	4'-3"	4'-8"
C_2 Bars	Bar No. & Spacing	#7@12"	#7@12"
	Horiz. Length	3'-10"	3'-10"
	Vert. Length	9'-5"	9'-10"
C_3 Bars	Bar No. & Spacing	#6@12"	#6@12"
	Horiz. Length	2'-4"	2'-4"
	Vert. Length	4'-2"	4'-5"
D Bars	Bar No. & Spacing	#7@12"	#7@12"
	Length	14'-5"	15'-1"
F Bars	Bar No. & Spacing	#8@12"	#8@12"
	Length	12'-8"	12'-8"
F_1 Bars	Bar No. & Spacing	#7@12"	#9@12"
	Length	12'-2"	12'-8"
G Bars	Bar No. & Spacing	#4@12"	#4@12"
	Length	6'-0"	6'-0"
H Bars	Bar No. & Spacing	#4@12"	#4@12"
	Length	8'-0"	8'-0"
NUMBER OF LONGITUDINAL REINFORCEMENT # 4 BARS			
Top Slab		35	35
Bottom Slab		38	38
Side Walls		34	34
TOTAL		107	107
QUANTITIES			
Concrete Cu. Yds./Lin. Ft.		3.06	3.22
Steel Lbs./Lin. Ft.		407.1	553.7



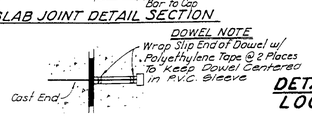
(A) WALL JOINT DETAIL PLAN SECTION



(B) TOP SLAB JOINT DETAIL SECTION



(C) BOTTOM SLAB JOINT DETAIL SECTION



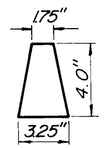
DETAIL SETTLEMENT JOINT @ SPECIFIC LOCATIONS (See Profile for Locations)

ADDITIONAL NOTES FOR BOX CHANNEL

1. LONGITUDINAL STEEL SHALL BE CONTINUOUS AND EXTEND THROUGH ALL CONSTRUCTION JOINTS. STOP BARS 2" FROM SETTLEMENT JOINTS. (4)
2. UNLESS OTHERWISE SHOWN ON DRAWINGS, TRANSVERSE JOINT KEYWAYS (IN BOTH SLABS AND WALLS), AS DETAILED FOR LONGITUDINAL KEYWAYS AT THE BASE OF THE WALLS, SHALL BE PLACED AT THE END OF EACH POUR, BUT THE SPACING THERE OF SHALL NOT EXCEED 60 FEET OR BE LESS THAN 10 FEET. ALL CONSTRUCTION JOINTS IN BOTTOM SLAB, TOP SLAB, AND SIDE WALLS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED.
3. UNLESS OTHERWISE SHOWN ON DETAILS, IN CURVED SECTIONS TRANSVERSE BARS SHALL BE PLACED RADIALLY. STRAIGHT TRANSVERSE BARS IN TOP AND BOTTOM SLABS SHALL BE SPACED AS SHOWN ON THE TYPICAL SECTIONS; SPACING SHALL BE AT THE CENTERLINE OF THE BARREL ON OUTSIDE OF THE CURVE FOR DOUBLE BARREL BOXES. STRAIGHT BARS AND L-BARS IN WALL SHALL BE SPACED AS SHOWN ON TYPICAL SECTIONS, WITH THE SPACING MEASURED BETWEEN THE VERTICAL LEGS OF BARS.
4. AT THE BEGINING AND ENDING OF ALL POURS, A CURTAIN OF REINFORCEMENT COMPOSED OF B, C, C2, D, CW, F, G, AND H BARS SHALL BE PLACED THREE INCHES & SIX INCHES FROM TRANSVERSE CONSTRUCTION AND SETTLEMENT JOINTS. (4)
5. THE VERTICAL WALL STEEL IN INTERIOR WALLS AND IN THE INTERIOR FACE OF EXTERIOR WALLS MAY BE SPLICED AT THE CONSTRUCTION JOINT AT THE BASE OF THE WALL. THE SPLICES SHALL BE 46 BARS DIAMETERS IN LENGTH.
6. IN ALL SECTIONS LAP C AND C2 BARS, THE VERTICAL LENGTH OF C AND C2 BARS HAVE BEEN CALCULATED FOR A 4 INCH STARTER WALL. IF THE HEIGTH OF THE STARTER WALL IS VARIED, THE VERTICAL LENGTH OF THE C AND C2 BARS SHALL BE VARIED CORRESPONDINGLY SO AS TO MAINTAIN A 46 DIAMETER LAP BETWEEN THE TWO BARS. THE LAPS SHALL BE BASED ON THE SMALLER BARS.
7. CONCRETE QUANTITIES ARE BASED ON A 6 x 6 INCH FILLET AND THE STEEL QUANTITIES DO NOT INCLUDE ANY OPTIONAL SPLICES.
8. IF WALL THICKNESS IS 6 INCHES, PLACE REINFORCEMENT AT THE CENTERLINE OF THE WALL.
9. BOX INVERT SURFACE SHALL HAVE A STEEL TROWEL FINISH.
10. ALL CONC. SHALL BE 3250 LBS. PER SQUARE INCH IN 28 DAYS EXCEPT INVERT AND STARTER WALLS WHICH SHALL BE 4,500 LBS. PER SQUARE INCH IN 28 DAYS.

Typical Joints @ all locations except Sta. 10+85.17 (See Sheet 16)

DETAIL SETTLEMENT JOINT @ SPECIFIC LOCATIONS (4)
(See Profile for Locations)



HT 4.0" + .125"
BASE 3.25" + .125"
TOP 1.75" + .125"
MIN. 4,500 PSI
COLOR: RED
CONTRAST TO CONC.
INVERT

WEAR CONE DETAIL
NOT TO SCALE

1/2 0 1 2
3 inches on original drawing

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P06

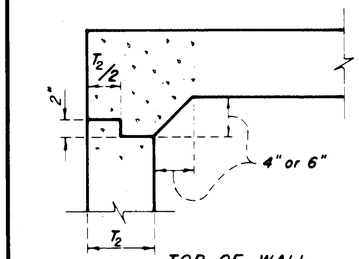
SINGLE REINFORCED CONCRETE BOX SCHEDULE AND DETAILS SETTLEMENT JOINT DETAILS

MARK	DATE	DESCRIPTION
4	2/84	Added Settlement Jts. Details, Added Notes To Box Channel Notes

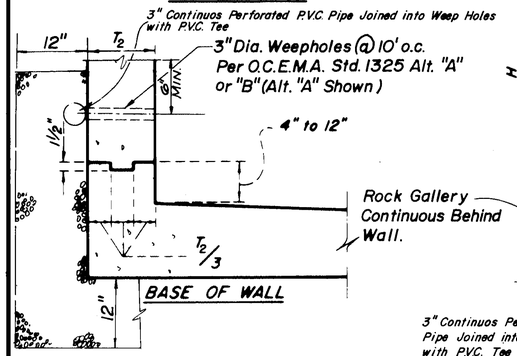
REVISIONS

PREPARED UNDER SUPERVISION OF

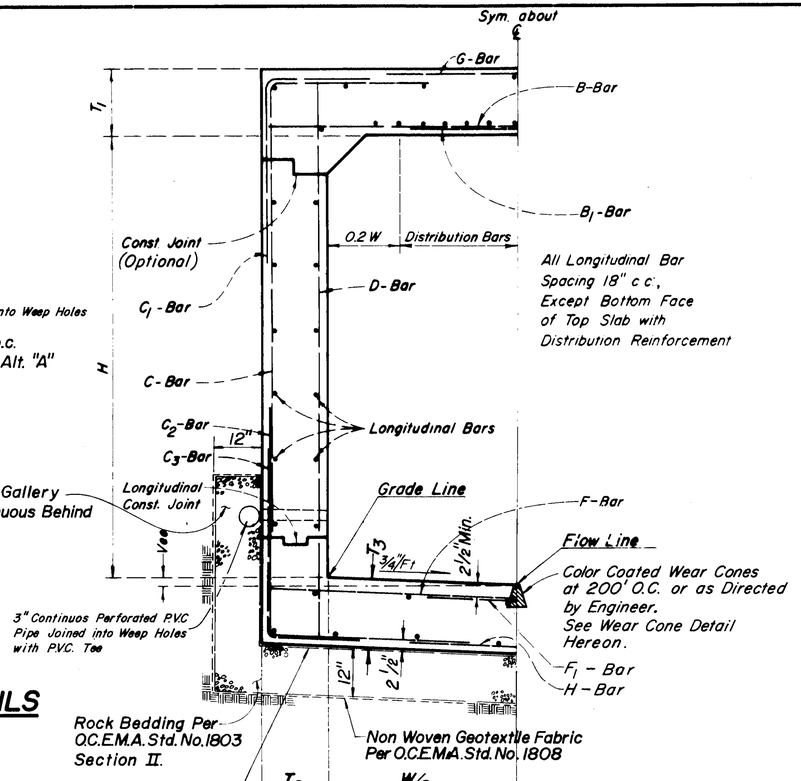
DESIGNED S. SHEIKH
DRAWN PSK CHECKED GHP
SCALE AS SHOWN
DATE
DWG. NO. F19P06-713-1
SHEET 3 OF 17



TOP OF WALL

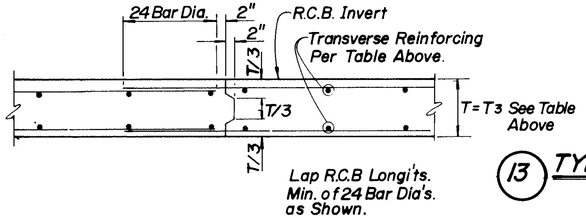


BASE OF WALL



CONSTRUCTION JOINT DETAILS

N.T.S.



(13) TYPICAL R. C. BOX SECTION (41)

NOT TO SCALE

TRANSVERSE JOINT DETAIL

N.T.S.

DESIGN DATA

LIVE LOAD
HS20-44

DEAD LOAD
Earth load per Marston's formula: w = 110 p.c.f
Ku = Ku' = 0.150
Bd = Outside width of box plus 3 feet
Side earth 40 p.s.f per foot of depth

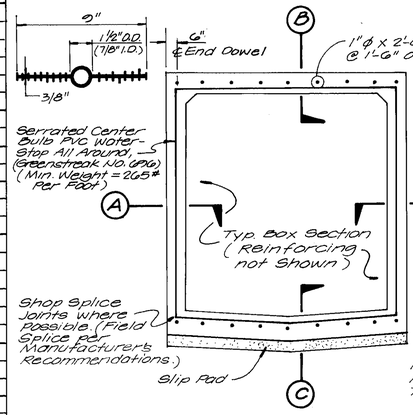
Weight of concrete 150 p.c.f

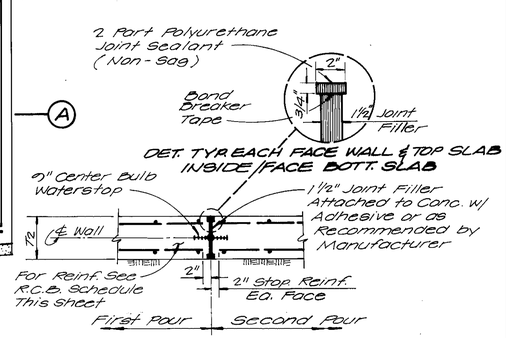
ALLOWABLE STRESSES
f'_c = 3250 p.s.i. at 28 days
f_c = 1462 p.s.i.
f_s = 24,000 p.s.i
n = 8.8
shear and bond stresses per A.C.I. 318-63

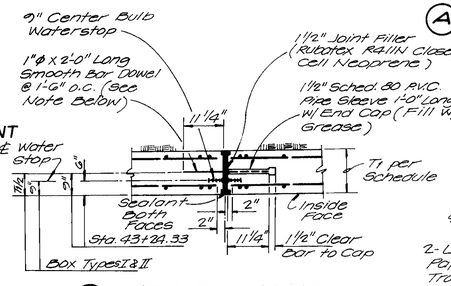
BOX SECTION		I	II
Design Cover		25'	25'
Width	W	10.5'	10.5'
Height	H	10.5'	10.5'
Top Slab Thickness	T_1	25"	30"
Side Wall Thickness	T_2	15"	15"
Bottom Slab Thickness	T_3	27"	30"
B Bars	Bar No. & Spacing	#8@12"	#8@12"
	Length	12'-8"	12'-8"
B_1 Bars	Bar No. & Spacing	#7@12"	#9@12"
	Length	10'-0"	12'-8"
C Bars	Bar No. & Spacing	#7@12"	#7@12"
	Horiz. Length	4'-11"	4'-11"
	Vert. Length	9'-5"	9'-10"
C_1 Bars	Bar No. & Spacing	#6@12"	#6@12"
	Horiz. Length	3'-1"	3'-1"
	Vert. Length	4'-3"	4'-8"
C_2 Bars	Bar No. & Spacing	#7@12"	#7@12"
	Horiz. Length	3'-10"	3'-10"
	Vert. Length	9'-5"	9'-10"
C_3 Bars	Bar No. & Spacing	#6@12"	#6@12"
	Horiz. Length	2'-4"	2'-4"
	Vert. Length	4'-2"	4'-5"
D Bars	Bar No. & Spacing	#7@12"	#7@12"
	Length	14'-5"	15'-1"
F Bars	Bar No. & Spacing	#8@12"	#8@12"
	Length	12'-8"	12'-8"
F_1 Bars	Bar No. & Spacing	#7@12"	#9@12"
	Length	12'-2"	12'-8"
G Bars	Bar No. & Spacing	#4@12"	#4@12"
	Length	6'-0"	6'-0"
H Bars	Bar No. & Spacing	#4@12"	#4@12"
	Length	8'-0"	8'-0"
NUMBER OF LONGITUDINAL REINFORCEMENT # 4 BARS			
Top Slab		35	35
Bottom Slab		38	38
Side Walls		34	34
TOTAL		107	107
QUANTITIES			
Concrete Cu. Yds/Lin. Ft.		3.06	3.22
Steel Lbs/Lin. Ft		407.1	553.7

R. C. BOX LOCATION SCHEDULE			
Box Sect	Station From	Station To	REMARK
F19P06			
I	42+93.75	42+98.84	10.5'x 10.5' R.C.B.
F19P07			
II	~~42+98.84~~ 9+97.09	10+25.09	10.5'x 10.5' R.C.B. @ JUNCTION BOX
F19P07			
I	10+25.09	10+90.00	10.5'x 10.5 R.C.B.

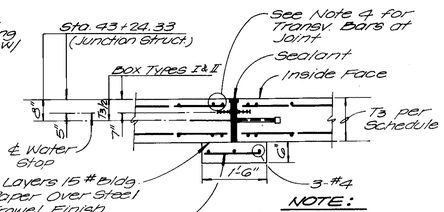
4 CONST. SETTLEMENT JOINTS PER PROFILE SHT. 4 AND DETAILS ON SHT. 3, 16 & 17







A WALL JOINT DETAIL PLAN SECTION



B TOP SLAB JOINT DETAIL SECTION

C BOTTOM SLAB JOINT DETAIL SECTION

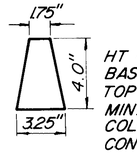
DOWEL NOTE

Typical Joints @ all locations except Sta. 10+85.17 (See Sheet 16)

ADDITIONAL NOTES FOR BOX CHANNEL

1. LONGITUDINAL STEEL SHALL BE CONTINUOUS AND EXTEND THROUGH ALL CONSTRUCTION JOINTS. STOP BARS 2" FROM SETTLEMENT JOINTS. 4
2. UNLESS OTHERWISE SHOWN ON DRAWINGS, TRANSVERSE JOINT KEYWAYS (IN BOTH SLABS AND WALLS) AS DETAILED FOR LONGITUDINAL KEYWAYS AT THE BASE OF THE WALLS, SHALL BE PLACED AT THE END OF EACH POUR, BUT THE SPACING THERE OF SHALL NOT EXCEED 60 FEET OR BE LESS THAN 10 FEET. ALL CONSTRUCTION JOINTS IN BOTTOM SLAB, TOP SLAB, AND SIDE WALLS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED.
3. UNLESS OTHERWISE SHOWN ON DETAILS, IN CURVED SECTIONS TRANSVERSE BARS SHALL BE PLACED RADIALLY. STRAIGHT TRANSVERSE BARS IN TOP AND BOTTOM SLABS SHAL BE SPACED AS SHOWN ON THE TYPICAL SECTIONS; SPACING SHALL BE AT THE CENTERLINE OF THE BARREL ON OUTSIDE OF THE CURVE FOR DOUBLE BARREL BOXES. STRAIGHT BARS AND L-BARS IN WALL SHALL BE SPACED AS SHOWN ON TYPICAL SECTIONS, WITH THE SPACING MEASURED BETWEEN THE VERTICAL LEGS OF BARS.
4. AT THE BEGINING AND ENDING OF ALL POURS, A CURTAIN OF REINFORCEMENT COMPOSED OF B, C, C2, D, C1, F, G, AND H BARS SHALL BE PLACED THREE INCHES & SIX INCHES FROM TRANSVERSE CONSTRUCTION AND SETTLEMENT JOINTS. 4
5. THE VERTICAL WALL STEEL IN INTERIOR WALLS AND IN THE INTERIOR FACE OF EXTERIOR WALLS MAY BE SPLICED AT THE CONSTRUCTION JOINT AT THE BASE OF THE WALL. THE SPLICES SHALL BE 45 BARS DIAMETERS IN LEGENTH.
6. IN ALL SECTIONS LAP C AND C2 BARS, THE VERTICAL LENGTH OF C AND C2 BARS HAVE BEEN CALCULATED FOR A 4 INCH STARTER WALL. IF THE HEIGTH OF THE STARTER WALL IS VARIED, THE VERTICAL LENGTH OF THE C AND C2 BARS SHALL BE VARIED CORRESPONDINGLY SO AS TO MAINTAIN A 45 DIAMETER LAP BETWEEN THE TWO BARS. THE LAPS SHALL BE BASED ON THE SMALLER BARS.
7. CONCRETE QUANTITIES ARE BASED ON A 6 x 6 INCH FILLET AND THE STEEL QUANTITIES DO NOT INCLUDE ANY OPTIONAL SPLICES.
8. IF WALL THICKNESS IS 6 INCHES, PLACE REINFORCEMENT AT THE CENTERLINE OF THE WALL.
9. BOX INVERT SURFACE SHALL HAVE A STEEL TROWEL FINISH.
10. ALL CONC. SHALL BE 3250 LBS. PER SQUARE INCH IN 28 DAYS EXCEPT INVERT AND STARTER WALLS WHICH SHALL BE 4,500 LBS. PER SQUARE INCH IN 28 DAYS.

DETAIL SETTLEMENT JOINT @ SPECIFIC LOCATIONS 4 (See Profile for Locations)



HT 4.0" + .125"
BASE 3.25" + .125"
TOP 1.75" + .125"
MIN. 4,500 PSI
COLOR: RED
CONTRAST TO CONC. INVERT

WEAR CONE DETAIL

NOT TO SCALE

REGISTERED PROFESSIONAL ENGINEER * ROBERT KALLENBERGER * No. C 27987 EXP. 3-31-90 CIVIL * STATE OF CALIFORNIA *

1/2 0 2

3 inches on original drawing

MARK	DATE	REVISIONS	DESIGNED S. SHEIKH	DRAWN PSK	CHECKED RWP
4	2/90	ADDED SETTLEMENT JTS. DETAILS, ADDED NOTES TO BOX CHANNEL NOTES			

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P06

SINGLE REINFORCED CONCRETE BOX SCHEDULE AND DETAILS

PREPARED UNDER SUPERVISION OF R.K. Kallenberger 2/1/90 RCE 27987

SCALE AS SHOWN | DATE | DWG. NO. F19P06-713-1

SHEET 3A OF 17

JOIN PROP. STORM DRAIN PER FACILITY F19Ø2 IMP. PLANS STA 42+93.75 F19PØ6 BEG. CONST. 10.5'x10.5' R.C.B.

FINISHED SURFACE @ ℄ STORM DRAIN

EXISTING GROUND AT ℄ OF PIPE

HGL Q25

PROP 90" R.C.P.

S=0.0155

S=0.0148

S=0.0096

SEE SHT. 17

DETAIL (1) SHT. 17 FOR SPIGOT REMOVAL

TEMPORARY CONST. END JUNCTION STRUCT.

686.60 M.H. LANDING

FACILITY NO. F19PØ6

MATCH LINE STA 49+00.00 SEE SHT. NO. 5

42+98.75 ℄ BEG. F19PØ6 225.31' ℄

43+00.25 INV. 686.61

43+24.39 ℄ SEPT. JOINT 686.61 INV.

43+32.33 END CONST. 686.61 INV.

46+00.00 G.B. 679.85 INV.

48+00.00 G.B. 678.82 INV.

49+75.16 END R.C.B. 678.46 INV.

CONST. 550.83 L.F. 90" RCP (D-2000) 1½" MIN. STEEL CLEAR COVER

CONST. 201.8 L.F. 90" R.C.P. 1½" MIN. STEEL CLR. COVER (D-2000)

700 / 680 / 660

42 43 44 45 46 47 48 49

PROFILE F19PØ7

PROP. FINISHED SURFACE @ ℄ R.C.B.

10+35.00 ℄ M.H.

EXISTING GROUND AT ℄ OF PIPE

5' C.L. FENCE

TRACT BOUNDARY

691.20 M.H. LANDING

677.00 M.H. LANDING

HGL Q100

HGL Q25

677.60

676.46

10.5'x10.5' R.C.B.

SEE SETT. JT. PROFILE

42+93.75 END F19Ø2 - BEG. F19PØ6 - ℄ B.

10+00.00 BEG. F19PØ7 - ℄ B.

10+35.00 ℄ M.H.

10+70.00 END 10.5'x10.5' R.C.B.

11+20.00 END F19PØ7 - ℄ B.

EXIST. 90.00 L.F. 10.5'x10.5' R.C.B.

15' GROUTED RIP-RAP 36" THICK

CONST. 15' INLET STRUCTURE

700 / 690 / 680 / 670 / 660

10 11 12

PROFILE SETTLEMENT JOINTS

JOINTS PER SHT. 3. EXCEPT SHT. 16 FOR STA 10+85.17

F19PØ7

PROFILE SCALES HORIZ. 1"=40' VERT. 1"=8'

PLAN SCALE 1"=40'

JOIN PROP. STORM DRAIN PER FACILITY F19SØ2 IMP. PLANS STA 42+93.75 F19PØ6 BEG. CONSTRUCTION 10.5'x10.5' RCB

F19SØ2

F19PØ6

F19PØ7

42+98.75 ℄ BEG. F19PØ6 - 43+01.75 ℄ INT. F19PØ6 - 10+00.00 BEG. F19PØ7

43+32.33 ℄ E.S. 90 RCP

N 19° 86' 49" E

43+42.75 B.C.

10+35.00 ℄ M.H.

10+90.00 END RCB BEGS. WINGWALL

11+05.00 END WINGWALL

44+37.00 E.C.

67+67.28 B.C.

N 40° 81' 11" W

S.D. EASMT.

PACIFIC COMMERCENTRE (T.T. 13179) NAKASE, INC.

EXIST. 12" WATERLINE TO BE RELOCATED BY OTHERS

EXIST. 12" WATERLINE TO BE RELOCATED BY OTHERS

11+20.00 END CONSTRUCTION F19PØ7

EX. W.

DEBRIS POSTS 7 TOTAL

RELOCATED 12" WATERLINES

48+75.16 E.C.

49+77.44 ℄ M.H. JUNC. STRUCT. TYPE II

N 20° 19' 11" E

MATCH LINE STA 49+00.00 SEE SHT. NO. 5

℄ PROP. BAKE PARKWAY

SCALE 1" = 40'

CONSTRUCTION NOTES

(19) CONST. 90" RCP (D-LOAD PER PROFILE)

(20) CONST. 10.5' x 10.5' RCB PER PROFILE THIS SHT. AND PER RCB DETAIL & S-TYPD. ON SHT. NO. 3.

(21) CONST. JUNC. STRUCT. PER OCEMA STD. PLAN NO. 1314 & DETAIL ON SHT. NO. 17

(27) CONST. JUNC. STRUCT. PER STD. PLAN NO. 1311

(51) CONST. R.C. BOX M.H. PER OCEMA STD. PLAN NO. 1506

(41) CONST. STEEL LANDING FOR DEEP M.H. PER DETAIL ON SHT. NO. 17 AND 90° M.H. STAIRS

(42) CONST. 36" GROUTED RIP-RAP PER DETAIL & GRADATION ON SHT. NO. 17

(44) CONST. WEEPHOLES PER DETAILS ON SHT. NO. 17

(45) CONST. 60" CHAIN LINK FENCE PER OCEMA STD. PLAN NO. 1412.

(46) CONST. R.C. PARAPET WALL PER DETAILS ON SHT. NO. 16

(48) CONST. BOX CULVERT INLET PER DETAILS ON SHT. NO. 16

(50) CONST. DEBRIS POSTS PER DETAIL ON SHT. NO. 16

(28) CONST. SETTLEMENT JOINTS PER SHEET 3 OR 16. (4)

HYDRAULIC DATA

LINE No.	STA TO STA	Q25	So	DIA.	Dn	Vn	Dc	Vc	Nf
F19PØ6	43+32.33 - 46+00.00	808	0.0155	90"	5.32	24.14	G.96	18.89	1.92
(4)(3) F19PØ6	46+00.00 - 48+00.00	808	0.0148	90"	5.39	23.80	G.96	18.89	1.87
F19PØ6	48+00.00 - 48+75.16	808	0.0096	90"	6.92	10.96	G.96	18.89	1.02
		Q100							
F19PØ7	42+98.75 - 10+00.00	1747.3	0.913	10.5'x10.5'	1.56	10G.9	9.51	17.5	13.1
(4) F19PØ7	10+00.00 - 10+30.00	720.2	0.0837	10.5'x10.5'	2.63	26.4	5.31	13.07	2.87
F19PØ7	10+30.00 - 10+90.00	720.2	0.0225	10.5'x10.5'	2.94	23.6	5.31	13.07	2.43

CURVE DATA

NO.	REFERENCE	Δ	L	R	T
(A)	℄ S.D.	60°00'00"	94.25'	90.00'	51.96'
(B)	℄ S.D.	68°40'65"	107.88'	90.00'	61.49'
(C)	℄ RCB	1°25'57"	5.00'	200.00'	2.50'

1 1/2 0 1 2

3 inches on original drawing

MARK	DATE	DESCRIPTION
(4)	2/14/91	ADDED SETT. JOINTS RELOCATED M.H. REV. PROFILE
(3)	2-8-91	PROFILE REVISED

REVISIONS

DESIGNED B. WORSHAM

DRAWN [illegible] CHECKED [illegible]

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19PØ6 AND F19PØ7

PLAN AND PROFILE

BAKE PARKWAY STORM DRAIN

PØ6 STA 42+93.75 TO STA 49+00.00

PØ7 STA 10+00.00 TO STA 11+20.00

PREPARED UNDER SUPERVISION OF _____ DATE _____

SCALE AS SHOWN | DATE | DWG. NO.

SHEET 4 OF 17

JOIN PROP. STORM DRAIN PER FACILITY F19SØ2 IMP. PLANS STA 42+93.75 F19PØ6 BEG. CONST. 10.5'x10.5' RCB

SEE SHT. 17

DETAIL 1 SHT. 17 FOR SPIGOT REMOVAL

FINISHED SURFACE @ ℄ STORM DRAIN

EXISTING GROUND AT ℄ OF PIPE

HGL Q25

PROP 90" R.C.P.

S = 0.0153

S = 0.0143

S = 0.0096

686.60 H.P. LANDING

FACILITY NO. F19PØ6

CONST. 550.83 L.F. 90" RCP (D-2000) 1½" MIN. STEEL CLEAR COVER

CONST. 20.18 L.F. 90" R.C.P. 1½" MIN. STEEL CLR. COVER (D-2000)

MATCH LINE STA 44+00.00 SEE SHT. NO. 5

700 / 680 / 660

42 43 44 45 46 47 48 49

PROFILE F19PØ7

PROP. FINISHED SURFACE @ ℄ RCB

10+35.00 ℄ M.H. 4

EXISTING GROUND AT ℄ OF PIPE

5'C.L. FENCE

HGL Q100

HGL Q25

677.60

678.46

10.5'x10.5' RCB

S=0.0080

S=0.0749

SEE SHT. JOINT PROFILE

CONST. 90.00 L.F. 10.5'x10.5' RCB

CONST. 15' INLET STRUCTURE

15' GROUTED RIP-RAP 36" THICK

700 / 690 / 680 / 670 / 660

10 11 12

PROFILE SETTLEMENT JOINTS

JOINTS PER SHT. 3 EXCEPT SHT. 16 FOR STA. 10+05.17

F19PØ7

PROFILE SCALES
HORIZ. 1" = 40'
VERT. 1" = 8'

PLAN SCALE
1" = 40'

CONSTRUCTION NOTES

(19) CONST. 90" R.C.P. (D-LOAD PER PROFILE)

(20) CONST. 10.5'x10.5' RCB PER PROFILE THIS SHT. AND PER RCB DETAIL & SCHED. ON SHT. NO. 3

(21) CONST. JUNC. STRUCT. PER OCEMA STD. PLAN NO. 1314 & DETAIL ON SHT. NO. 17

(27) CONST. JUNC. STRUCT. PER STD. PLAN NO. 1311

(51) CONST. R.C. BOX M.H. PER OCEMA STD. PLAN NO. 1506

(41) CONST. STEEL LANDINGS FOR DEEP M.H. PER DETAIL ON SHT. NO. 17 AND 48" M.H. STEPS

(42) CONST. 36" GROUTED RIP-RAP PER DETAIL & GRADATION ON SHT. NO. 17

(44) CONST. WEEPHOLES PER DETAILS ON SHT. NO. 17

(45) CONST. 60" CHAIN LINK FENCE PER OCEMA STD. PLAN NO. 1412.

(46) CONST. R.C. PARAPET WALL PER DETAILS ON SHT. NO. 16

(48) CONST. BOX CULVERT INLET PER DETAILS ON SHT. NO. 16

(50) CONST. DEBRIS POSTS PER DETAIL ON SHT. NO. 16

(28) CONST. SETTLEMENT JOINTS PER SHEET 3 OR 16

JOIN PROP. STORM DRAIN PER FACILITY F19SØ2 IMP. PLANS STA 42+93.75 F19PØ6 BEG. CONSTRUCTION 10.5'x10.5' RCB

F19SØ2

F19PØ6

F19PØ7

11+80.00 END CONSTRUCTION F19PØ7

RELOCATED (12" WATER LINE)

PACIFIC COMMERCE CENTRE (T.T. 13179) NAKASE BROS.

EXIST. 12" WATERLINE TO BE RELOCATED BY OTHERS

EXIST. 12" WATERLINE TO BE RELOCATED BY OTHERS

DEBRIS POSTS 7 TOTAL

MATCH LINE STA 49+00.00 SEE SHT. NO. 5

℄ PROP BAKE PARKWAY

SCALE 1" = 30'

1 1/2 0 1 2
3 inches on original drawing

HYDRAULIC DATA

	LINE NO	STA. TO STA.	Q25	S_o	DIA.	V_n	V_n	D_c	V_c	V_f
3	F19PØ6	43+32.33 - 46+00.00	808	0.015	90"	5.32	24.19	6.96	18.89	19.2
4 5	F19PØ6	46+00.00 - 48+00.00	808	0.0148	90"	5.39	23.80	6.96	18.89	18.7
4 5	F19PØ6	48+00.00 - 48+75.16	808	0.0096	90"	6.52	19.56	6.96	18.89	15.2
			Q100							
	F19PØ7	42+93.75 - 10+00.00	1767.3	0.0113	10.5'x10.5'	1.56	106.9	9.51	17.5	15.1
4	F19PØ7	10+00.00 - 10+30.00	720.2	0.0337	10.5'x10.5'	2.63	26.4	5.31	13.07	2.87
	F19PØ7	10+30.00 - 10+90.00	720.2	0.0245	10.5'x10.5'	2.94	23.6	5.31	13.07	2.43

CURVE DATA

NO.	REFERENCE	Δ	L	R	T
(A)	℄ S.D.	60°00'00"	94.25'	90.00'	51.96'
(B)	℄ S.D.	68°30'55"	107.85'	90.00'	61.49'
(C)	℄ RCB	1°25'57"	5.00'	200.00'	2.50'

MARK	DATE	DESCRIPTION
4	2-91	ADDED SETT. JOINTS RELOCATED M.H. REV. PROFILE
3	2-91	PROFILE REVISED

REVISIONS

DESIGNED B WORSHAM

DRAWN SS CHECKED BMP

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19PØ6 AND F19PØ7

PLAN AND PROFILE

BAKE PARKWAY STORM DRAIN

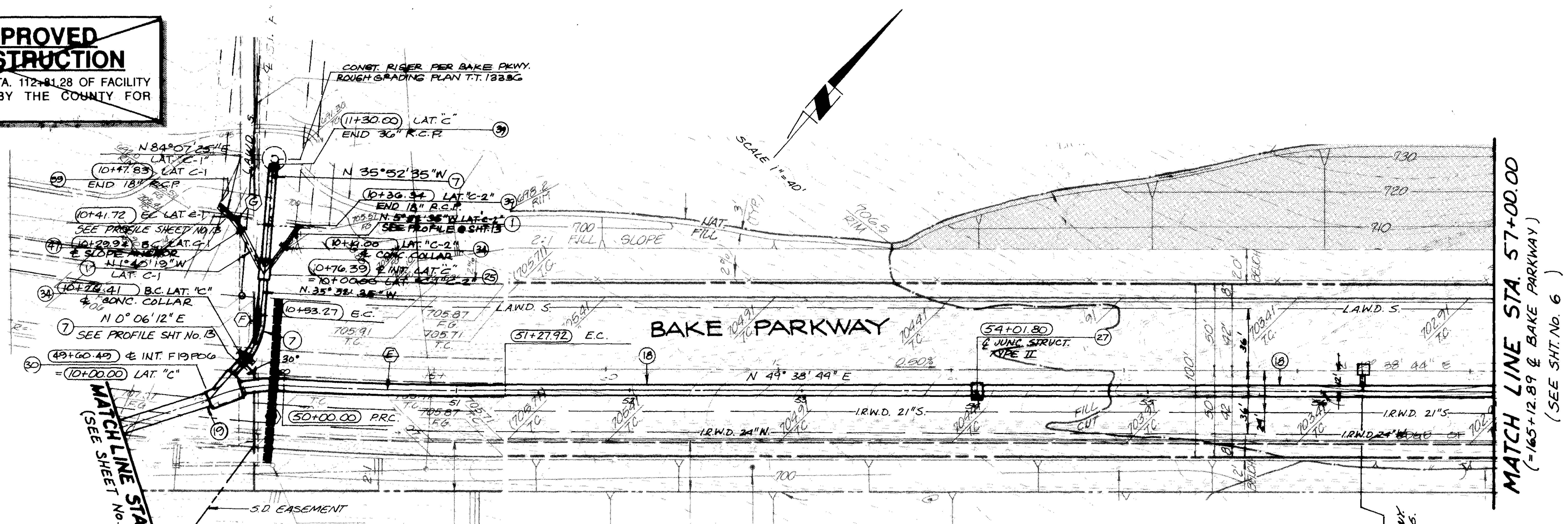
PØ6 STA 42+93.75 TO STA 49+00.00
PØ7 STA 10+00.00 TO STA 11+20.00

PREPARED UNDER SUPERVISION OF _____ DATE _____

SCALE AS SHOWN | DATE | DWG. NO. | SHEET 4A OF 17

NOT APPROVED FOR CONSTRUCTION

ONLY STA. 50+00 TO STA. 112+81.28 OF FACILITY F19P06 APPROVED BY THE COUNTY FOR CONSTRUCTION.



J.S. TYPE III DATA
@ STA. 49 + 60.49

A = 30°
B = 30°
C = 19.50'
D_1 = 87"
D_2 = 90"
ELEV."S" = 678.98
ELEV."R" = 679.07

CONSTRUCTION NOTES

(1) CONST. 18" R.C.P. (D-LOAD PER PROFILE)
(7) CONST. 36" R.C.P. (D-LOAD PER PROFILE)
(18) CONST. 87" R.C.P. (D-LOAD PER PROFILE)
(19) CONST. 90" R.C.P. (D-LOAD PER PROFILE)
(27) CONST. JUNC. STRUCT. TYPE II PER O.C.E.M.A. STD. PLAN No. 1311
(30) CONST. JUNC. STRUCT. TYPE III (OMIT SHAFT) PER O.C.E.M.A. STD. PLAN No. 1312.
(34) CONST. REIN. CONC. COLLAR PER O.C.E.M.A. STD. PLAN No. 1317
(38) CONST. RISER PER O.C.E.M.A. STD. PLAN No. 1327
(39) CONST. BRICK AND MORTAR PLUG.
(25) CONST. JUNCTION STRUCTURE TYPE I PER O.C.E.M.A. STD. PLAN NO. 1310
(47) CONST. CONC. PIPE SLOPE ANCHOR PER O.C.E.M.A. STD. PLAN No. 1323.

BC. TO ℄ INT.
℄ INT. TO P.R.C.
TOTAL CURVE
TOTAL CURVE
TOTAL CURVE

CURVE DATA

NO.	REFERENCE	Δ	L	R	T
D	℄ 84" R.C.P.	25°09'02"	39.51'	90.00'	20.08'
E	℄ 84" R.C.P.	3°50'00"	127.92'	1912.00'	63.98'
F	℄ 36" R.C.P.	34°12'16"	26.86'	45.00'	13.85'
G	℄ 18" R.C.P.	30°00'00"	11.78'	22.50'	6.03'

HYDRAULIC DATA

LINE NO.	STATION TO STATION	Q_{25}	So	DIA.	Dn	Vn	Dc	Vc	Nf
F19P06	49+00.00 TO 49+62.00	807.8	0.0116	90"	6.00	21.3	6.96	18.9	1.50
F19P06	49+73.00 TO 57+00.00	740.4	0.0128	87"	5.55	21.8	6.73	18.5	1.64
LAT. NO.									
C	10+07.10 TO 10+26.41	82.6	0.0136	36"	2.68	12.4	2.79	12.0	1.15
C	10+26.41 TO 10+76.39	82.6	0.0780	36"	1.40	25.6	2.79	12.0	4.34
C	10+83.39 TO 11+30.00	64.3	0.0780	36"	1.22	23.9	2.57	1.5	4.42
C-1	10+03.00 TO 10+47.83	11.2	0.2100	18"	0.49	22.2	1.28	7.0	6.53
C-2	10+03.00 TO 10+18.59	8.6	0.5400	18"	0.34	28.8	1.14	6.0	10.41
C-2	10+18.59 TO 10+36.34	8.6	0.1680	18"	0.45	19.0	1.14	6.0	5.85

1 1/2 0 1 2
3 inches on original drawing

REGISTERED PROFESSIONAL ENGINEER · ROBERT KALLENBAUGH · No. 27967 · EXP. 3-31-90 · CIVIL · STATE OF CALIFORNIA

MARK	DATE	DESCRIPTION
5	12-10-91	RELOC. MED. DRAIN FROM STA. 57+07.11 TO STA. 56+24.00

REVISIONS

DESIGNED D. VORNBERGER
DRAWN P.S.K. CHECKED

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

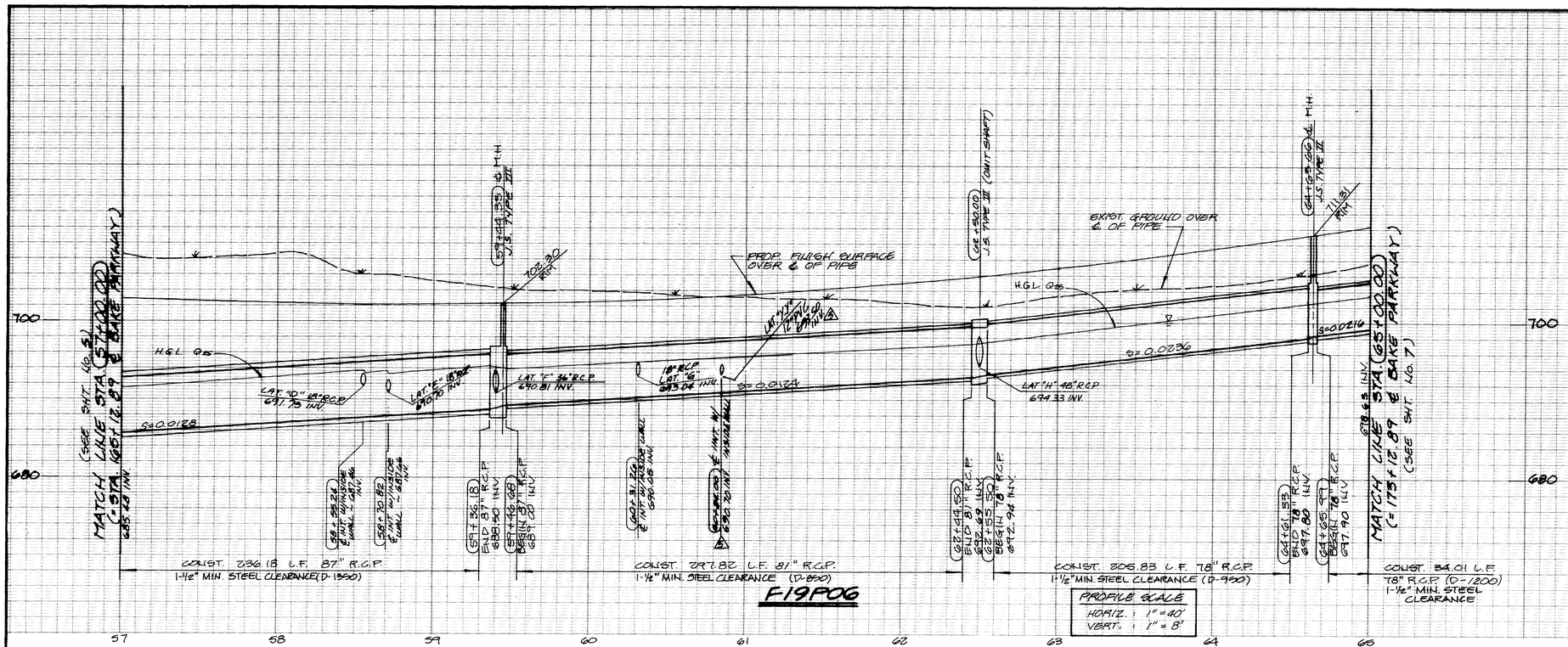
FACILITY NO.
F19P06
PLAN AND PROFILE
BAKE PARKWAY
STORM DRAIN
FROM STA. 48+25.00 TO STA. 57+00.00

PREPARED UNDER SUPERVISION OF R. Kallenbaugh 4/13/89 DATE

SCALE AS SHOWN | DATE | DWG. NO. F19P06-713-1

SHEET 5 OF 17

J.N. 24429



CONSTRUCTION NOTES

1. CONST. 18" R.C.P. (D-LOAD PER PROFILE)
7. CONST. 36" R.C.P. (D-LOAD PER PROFILE)
10. CONST. 48" R.C.P. (D-LOAD PER PROFILE)
15. CONST. 78" R.C.P. (D-LOAD PER PROFILE)
16. CONST. 81" R.C.P. (D-LOAD PER PROFILE)
18. CONST. 87" R.C.P. (D-LOAD PER PROFILE)
27. CONST. JUNC. STRUCT. TYPE II PER O.C.E.M.A. STD. PLAN No. 1311
29. CONST. JUNC. STRUCT. TYPE III PER O.C.E.M.A. STD. PLAN No. 1312
30. CONST. JUNC. STRUCT. TYPE III (OMIT SHAFT) PER O.C.E.M.A. STD. PLAN No. 1312
33. CONST. JUNC. STRUCT. TYPE XI PER O.C.E.M.A. STD. PLAN No. 1315
34. CONST. REIN. CONC. COLLAR PER O.C.E.M.A. STD. PLAN No. 1317
39. CONST. BRICK AND MORTAR PLUG.

F-19P06

F19P06

CURVE DATA				
	REFERENCE	Δ	L	R	T
(G)	℄ 30" R.C.P.	60°00'00"	94.25	90.00'	51.96

HYRAULIC DATA

LINE	STATION TO STATION	Q25	So	Dia.	Dn	Vn	Dc	Vc	Nf
F19P06	57+00.00 TO 58+61.61	740.4	.0128	87"	5.55	21.8	6.73	18.5	1.64
F19P06	58+51.61 TO 58+67.79	731.8	.0128	87"	5.4	21.8	6.71	18.3	1.66
F19P06	58+67.79 TO 59+36.18	726.2	.0128	87"	5.45	21.8	6.69	18.2	1.67
F19P06	59+46.68 TO 60+27.88	650.8	.0124	81"	5.64	20.6	6.35	18.8	1.43
F19P06	60+27.88 TO 62+44.50	644.4	.0124	81"	5.52	20.6	6.32	18.5	1.48
F19P06	62+55.50 TO 64+61.33	644.4	.0236	78"	4.40	27.0	6.21	19.7	2.40
F19P06	64+65.99 TO 65+00.00	644.4	.0216	78"	4.55	26.0	6.21	19.7	2.25

DATA

LAT.	STATION TO STATION	Q25	So	Dia.	Dn	Vn	Dc	Vc	Nf
D	10+04.95 TO 10+20.95	8.9	0.2600	18"	0.41	22.45	1.15	6.1	7.28
D	10+20.95 TO 10+43.13	8.9	0.0382	18"	0.72	10.63	1.15	6.1	2.51
E	10+04.95 TO 10+76.37	6.1	0.0700	18"	0.46	12.6	0.95	5.1	3.78
F	10+13.50 TO 11+09.75	76.8	0.0448	36"	1.58	20.4	2.74	11.3	3.21
G	10+24.60 TO 10+77.07	13.8	0.0480	18"	0.84	13.6	1.38	8.1	2.91
H	10+13.00 TO 11+41.00	106.6	0.0388	48"	1.70	20.90	3.12	10.10	3.25

FOR INTERIM CASE ONLY

JUNCTION STRUCTURE TYPE III - DATA

@ STA. (59+33.68)
A = 30°
B = 36"
C = 19.50'
D1 = 81"
D2 = 87"
ELEV. R = 691.10
ELEV. S = 690.81

@ STA. (62+43.12)
A = 45°
B = 48"
C = 13.0'
D1 = 78"
D2 = 81"
ELEV. R = 694.54
ELEV. S = 694.38

PROFILE SCALE
HORIZ. : 1" = 40'
VERT. : 1" = 8'

1 1/2 0 1 2
3 inches on original drawing

REGISTERED PROFESSIONAL ENGINEER — ROBERT KALLENBACH — NO. 27367 — EXP. 3.31.10 — CIVIL — STATE OF CALIFORNIA

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P06

PLAN AND PLOT

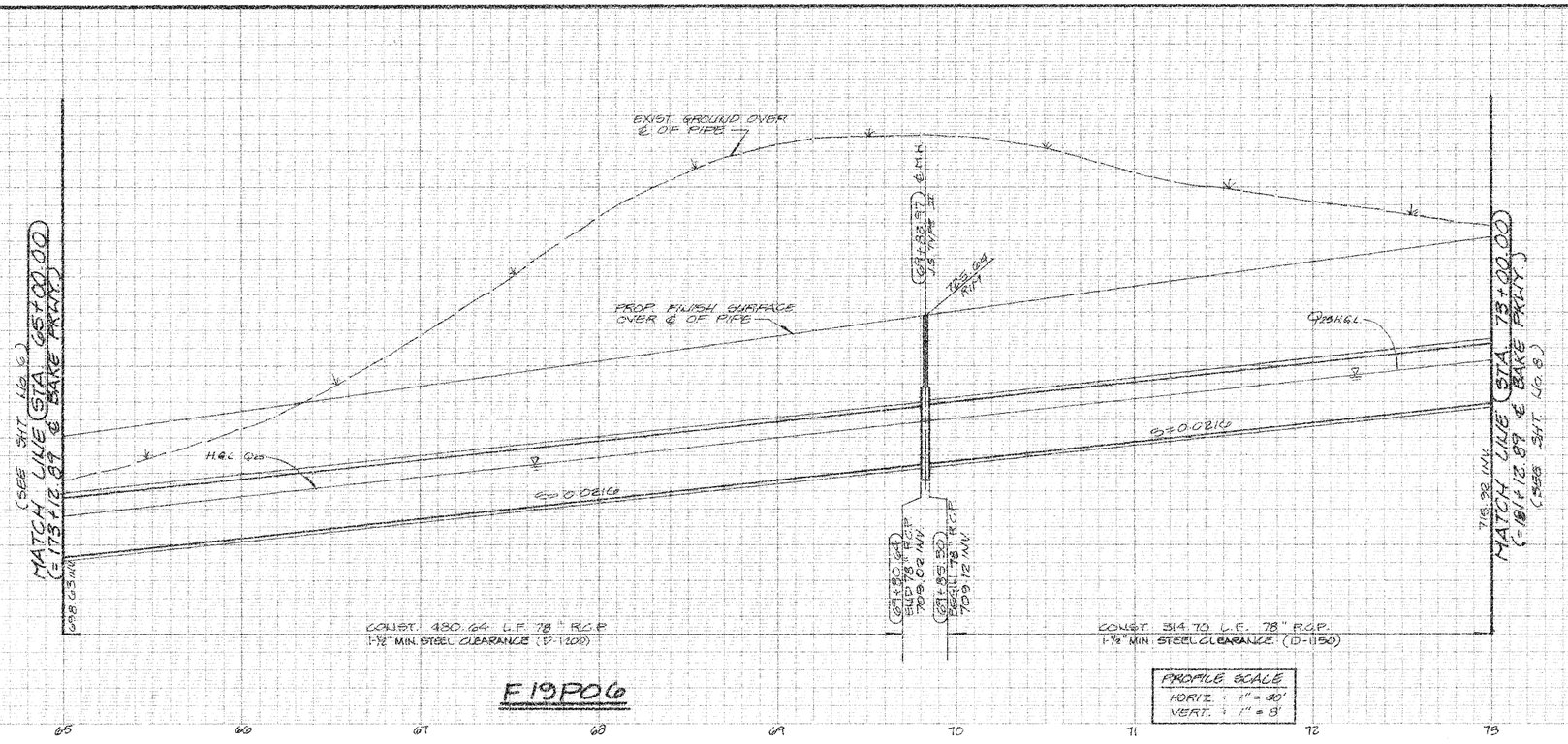
BAKE PARKWAY

STORM DRAIN

FROM STA. 57+00.00 TO STA. 65+00.00

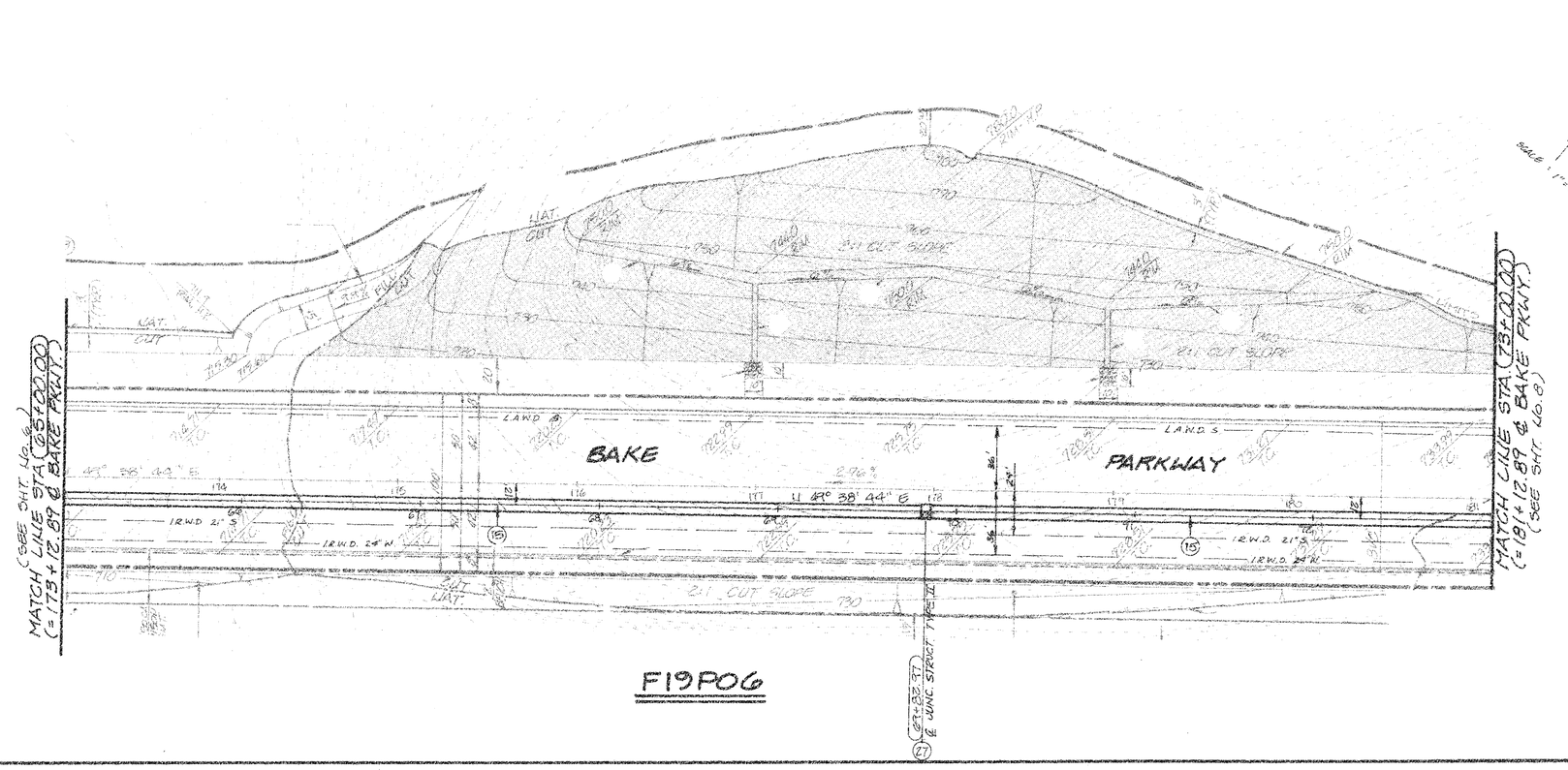
MARK	DATE	REVISIONS	PREPARED UNDER SUPERVISION OF: R. Kallenbach 2/18/09 DATE
2	12/18/09	REILOC. MEDIAN DRAIN FROM STA. 60+73.11 TO STA. 64+84.00	
			SHEET 6
DESIGNED	D. VORLIEBERGER		SCALE AS SHOWN
DRAWN	MBUCK	CHECKED	DATE
			DWG. NO. OF 17

J.N. 24429



F19P06

PROFILE SCALE
HORIZ. : 1" = 30'
VERT. : 1" = 8'



F19P06

SCALE 1" = 40'

CONSTRUCTION NOTES

(19)—CONST. 78" R.C.P. (D-LOAD PER PROFILE)

(27)—CONST. JUNCTION STRUCTURE TYPE II PER O.C.E.M.A. STD. PLAN NO. 1311

HYDRAULIC DATA

LINE	STATION TO STATION	Q25	So	Dia	Dn	Vn	Dc	Vc	Hf
F19P06	65+00.00 TO 69+80.64	644.4	.0216	78"	4.55	26.0	6.21	19.7	2.25
F19P06	69+80.64 TO 73+00.00	644.4	.0216	78"	4.55	26.0	6.21	19.7	2.25

1 1/2 0 1 2
3 inches on original drawing

REGISTERED PROFESSIONAL ENGINEER — ROBERT KALTENBRUNN — NO. 27961 — EXP. 3-31-96 — CIVIL — STATE OF CALIFORNIA

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P06

PLAN AND PLOT

BAKE PARKWAY
STORM DRAIN
FROM STA. 65+00.00 TO STA. 73+00.00

MARK	DATE	DESCRIPTION
REVISIONS		

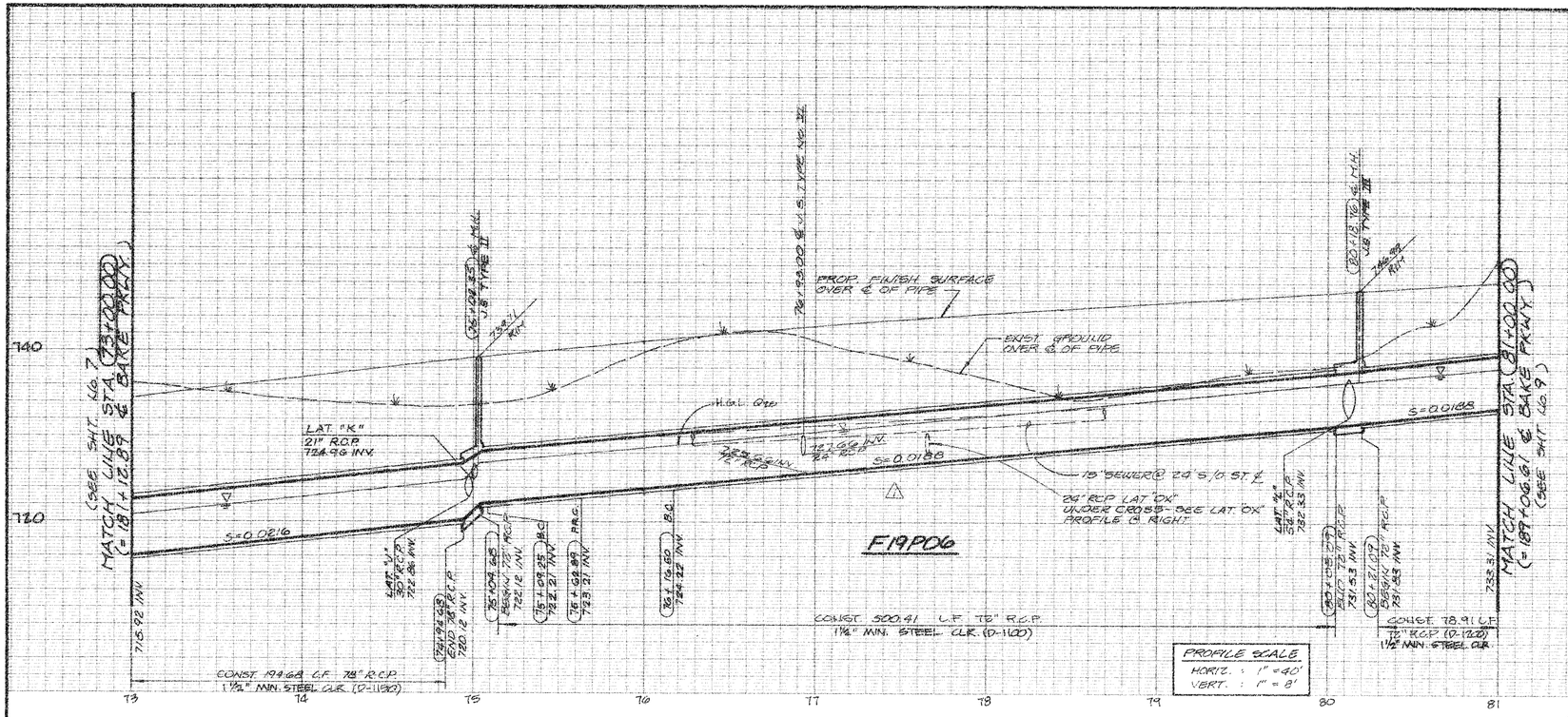
PREPARED UNDER SUPERVISION OF R. Kaltenbrunn DATE 4/1/96

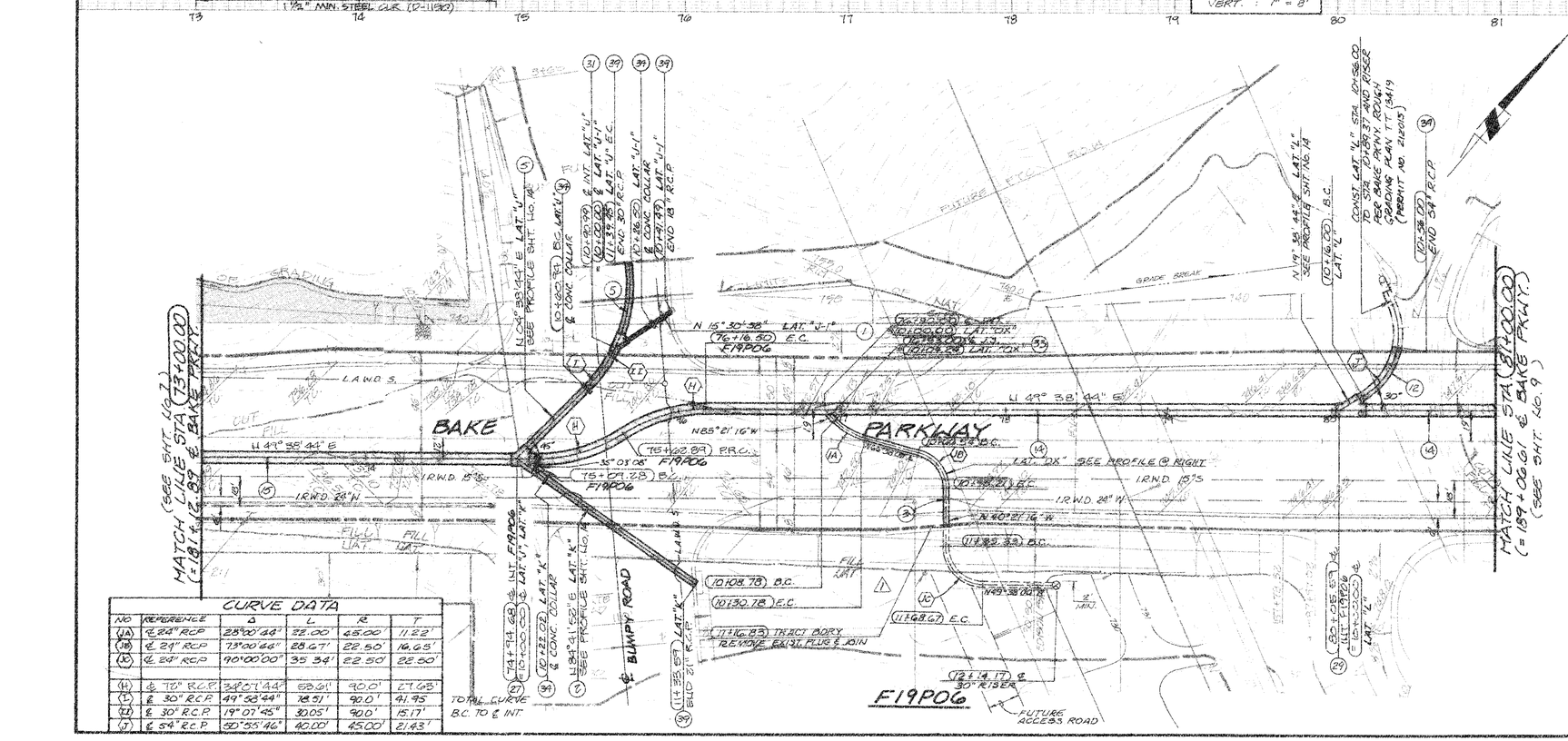
SHEET 7

DESIGNED D. VORLEBERGER
DRAWN MARK E. CHECKED

SCALE AS SHOWN | DATE | DWG. NO. F19P06-713-1 | OF 17

J.N. 24439





CURVE DATA

NO	REFERENCE	Δ	L	R	T
(1A)	℄ 24" RCP	28°00'44"	32.00	65.00	11.22
(1B)	℄ 21" RCP	73°00'44"	28.67'	22.50'	16.65'
(1C)	℄ 24" RCP	90°00'00"	35.34'	22.50'	22.50'
(H)	℄ 72" R.C.P.	340°14'44"	62.61'	90.0'	2'-7.65"
(T)	℄ 30" R.C.P.	49°58'44"	18.51'	90.0'	41.95
(12)	℄ 30" R.C.P.	19°07'45"	30.05'	90.0'	15.17'
(J)	℄ 54" R.C.P.	50°55'46"	40.00'	4500'	21.43'

TOTAL CURVE B.C. TO ℄ INT.

HYDRAULIC DATA

LINE	STATION TO STATION	Q100	So	Dia	Dn	Vfl	Df	Vc	Llp
F19P06	73+00.00 TO 74+94.68	644.4	0.0216	78"	4.55	26.0	6.21	19.7	2.25
F19P06	75+04.68 TO 80+05.09	574.3	0.0188	72"	4.86	23.4	5.80	20.5	1.81
F19P06	80+21.09 TO 81+00.00	574.3	0.0188	72"	4.86	23.4	5.80	20.5	1.81
LAT.									
J	10+06.92 TO 10+60.94	51.4	0.0356	30"	1.49	16.9	2.32	10.8	2.67
J	10+60.94 TO 10+90.99	51.4	0.0560	30"	1.29	20.1	2.32	10.8	3.49
J	10+90.99 TO 11+39.45	42.4	0.0560	30"	1.16	19.1	2.18	9.3	3.57
J-1	10+02.50 TO 10+26.50	10.1	0.2500	18"	0.45	22.9	1.22	6.5	7.14
J-1	10+26.50 TO 10+41.99	10.1	0.0660	18"	0.64	14.2	1.22	6.5	3.60
K	10+06.02 TO 10+22.02	24.4	0.3612	21"	0.60	33.1	1.67	10.3	8.78
K	10+22.02 TO 11+33.59	24.4	0.0316	21"	1.26	15.2	1.67	10.3	2.14
L	10+16.00 TO 10+89.37	134.1	0.0090	54"	2.78	18.8	3.39	10.2	1.48
OX	0+04.24 TO 1+16.83	20.0	0.002	24"	FULL	FLOW	1.61	7.40	—

REGISTERED PROFESSIONAL ENGINEER ROBERT R. ALLENDORF NO. 27961 EXP. 9-30-90 CIVIL STATE OF CALIFORNIA

MARK	DATE	DESCRIPTION
1	1-3-90	ADD LAT. "OX"

REVISIONS

DESIGNED D. VORHEER-KAER
DRAWN P.BUCK CHECKED

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P06

PLAN AND PROFILE

BAKE PARKWAY

STORM DRAIN

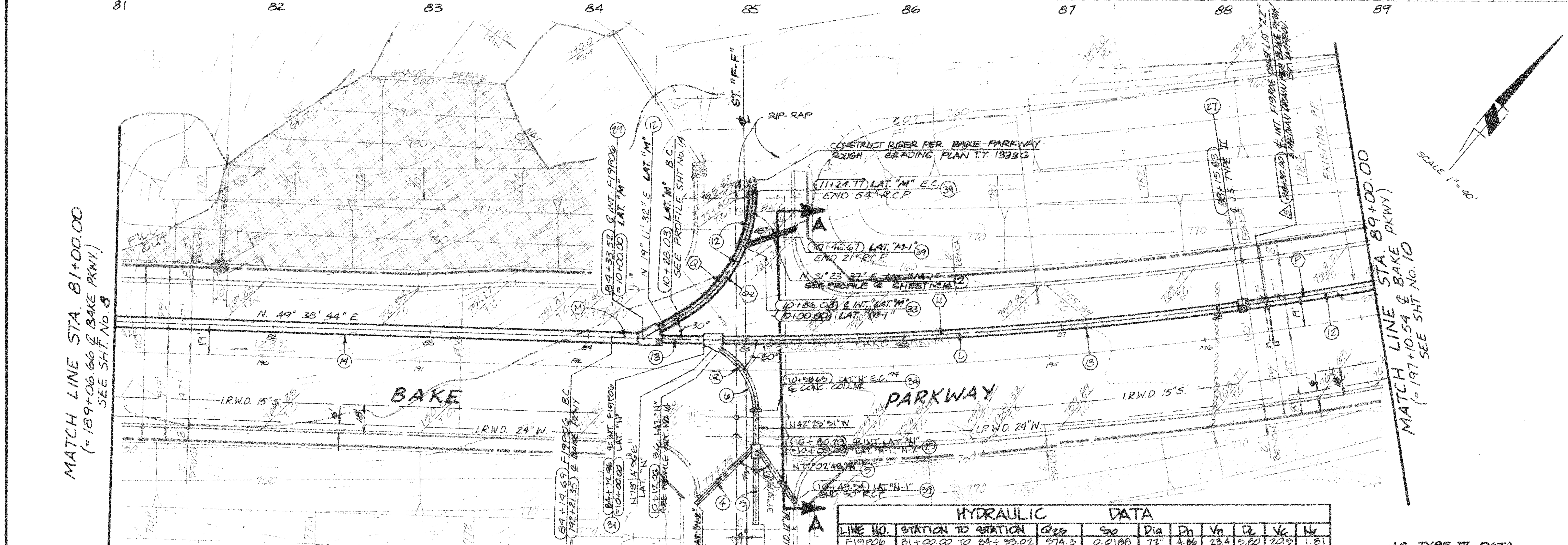
FROM STA. 73+00.00 TO STA. 81+00.00

PREPARED UNDER SUPERVISION OF: R. Allendorf DATE: 1/3/90

SCALE: AS SHOWN | DATE | DWG. NO. F19P06-713-1

SHEET 8 OF 17

J.N. 24429



CONSTRUCTION NOTES

(2)— CONST. 21" R.C.P. (D-LOAD PER PROFILE).
(4)— CONST. 27" R.C.P. (D-LOAD PER PROFILE).
(5)— CONST. 30" R.C.P. (D-LOAD PER PROFILE).
(6)— CONST. 33" R.C.P. (D-LOAD PER PROFILE).
(12)— CONST. 54" R.C.P. (D-LOAD PER PROFILE).
(13)— CONST. 60" R.C.P. (D-LOAD PER PROFILE).
(14)— CONST. 72" R.C.P. (D-LOAD PER PROFILE).

(25)— CONST. JUNCTION STRUCTURE TYPE I PER O.C.E.M.A. STD. PLAN № 1310.
(27)— CONST. JUNC. STRUCT. TYPE II PER O.C.E.M.A. STD. PLAN № 1311.
(29)— CONST. JUNC. STRUCT. TYPE III PER O.C.E.M.A. STD. PLAN № 1312.
(31)— CONST. JUNC. STRUCT. TYPE IV PER O.C.E.M.A. STD. PLAN № 1313.
(34)— CONST. REINF. CONC. COLLAR PER O.C.E.M.A. STD. PLAN № 1333.
(33)— CONST. JUNC. STRUCT. TYPE VI PER O.C.E.M.A. STD. PLAN NO. 1315.
(39)— CONST. BRICK AND MORTAR PLUG.

1 1/2 0 1 2
3 inches on original drawing

CURVE DATA

No.	REFERENCE	Δ	L	R	T	
L	℄ F19P06	21°23'44"	889.11'	2381.00'	449.80'	TOTAL CURVE
M	℄ 72" R.C.P.	00°27'12"	18.85'	2381.00'	9.42'	B.C. TO ℄ INT. LAT "M"
N	℄ 60" R.C.P.	00°56'57"	39.44'	2381.00'	19.72'	℄ INT. LAT. "M" TO ℄ INT. LAT. "N"
P	℄ 60" R.C.P.	15°15'13"	633.88'	2381.00'	318.83'	℄ INT. LAT. "N" TO ℄ INT. LAT. "P"
Q	℄ 54" R.C.P.	61°35'03"	96.74'	90.00'	53.63'	TOTAL CURVE
Q2	℄ 54" R.C.P.	36°55'24"	58.00'	90.00'	30.05'	B.C. TO ℄ INT.
R	℄ 30" R.C.P.	59°21'53"	46.63'	45.00'	25.16'	TOTAL CURVE

HYDRAULIC DATA

LINE NO.	STATION TO STATION	Q_{25}	So	Dia	Dn	Vn	Dc	Vc	Hc
F19P06	81+00.00 TO 84+33.02	574.3	0.0188	72"	4.86	23.4	5.80	20.5	1.81
F19P06	84+47.02 TO 84+72.96	389.2	0.0296	60"	3.60	25.7	4.87	20.0	2.47
F19P06	84+84.00 TO 88+13.50	352.5	0.0296	60"	3.34	25.3	4.81	18.2	2.59
F19P06	88+18.16 TO 89+00.00	352.5	0.0344	54"	3.56	26.1	4.44	22.2	2.40
LAT. NO.									
M	10+13.50 TO 10+86.03	196.8	0.0280	54"	2.51	21.6	4.01	13.1	2.67
M	10+86.03 TO 11+24.77	181.8	0.0280	54"	2.39	21.2	3.90	12.4	2.71
M-1	10+03.18 TO 10+46.67	15.4	0.0820	21"	0.70	17.1	1.45	7.2	4.14
N	10+05.00 TO 10+58.63	43.9	0.0500	33"	1.16	18.4	2.20	8.6	3.47
N	10+58.63 TO 10+80.00	43.9	0.0090	33"	1.99	9.5	2.20	8.6	1.23
N	10+87.00 TO 11+30.00	35.0	0.0090	30"	1.85	9.0	2.01	8.3	1.18
N-1	10+02.24 TO 10+49.54	25.4	0.0224	30"	1.12	11.9	1.72	7.1	2.27
N-2	10+01.94 TO 10+54.45	18.6	0.0112	27"	1.21	8.5	1.51	6.6	1.52

J.S. TYPE III DATA
@ STA. 84 + 33.52

A = 30°
B = 54"
C = 13.50'
D_1 = 60"
D_2 = 72"
ELEV. R = 741.39
ELEV. S = 741.17

REGISTERED PROFESSIONAL ENGINEER · S. ROBERT KALLENBACH · No. 27987 · EXP. 3.31.90 · CIVIL · STATE OF CALIFORNIA

MARK	DATE	DESCRIPTION
5	12-16-91	RELOCATED NED DRAIN FROM STA. 87+95.62 TO STA. 88+30.00

REVISIONS

DESIGNED D. VORNBERGER
DRAWN P.S.K. CHECKED

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P06

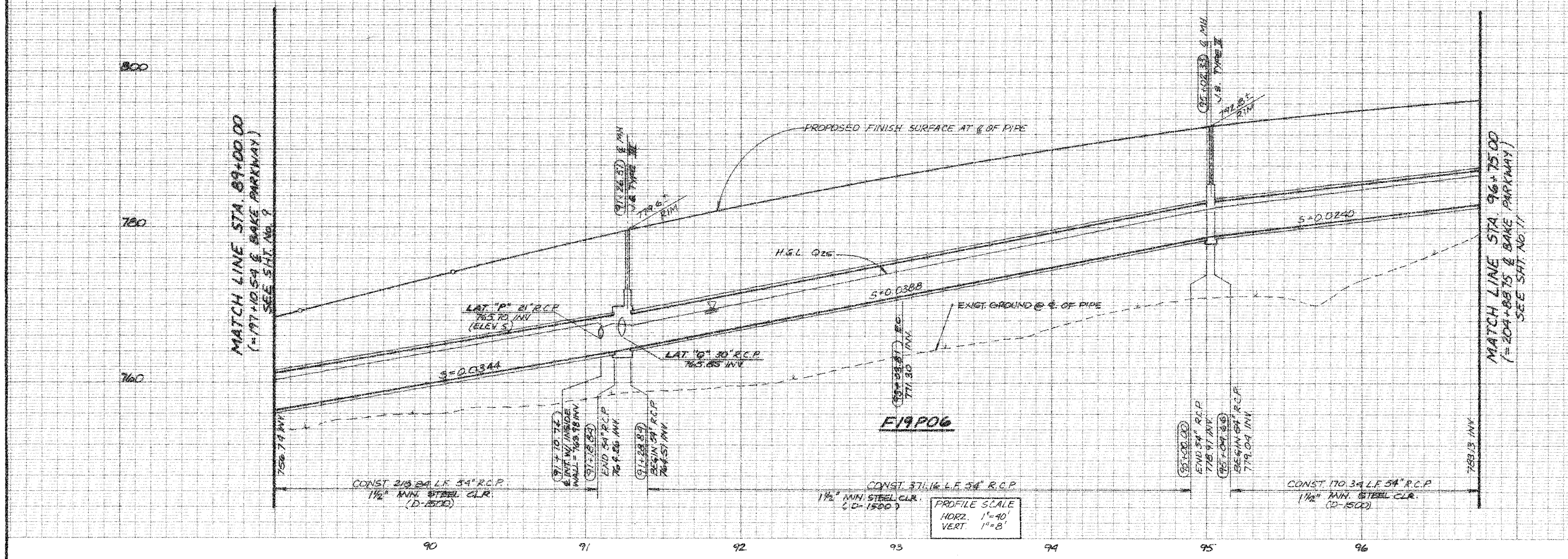
PLAN AND PROFILE

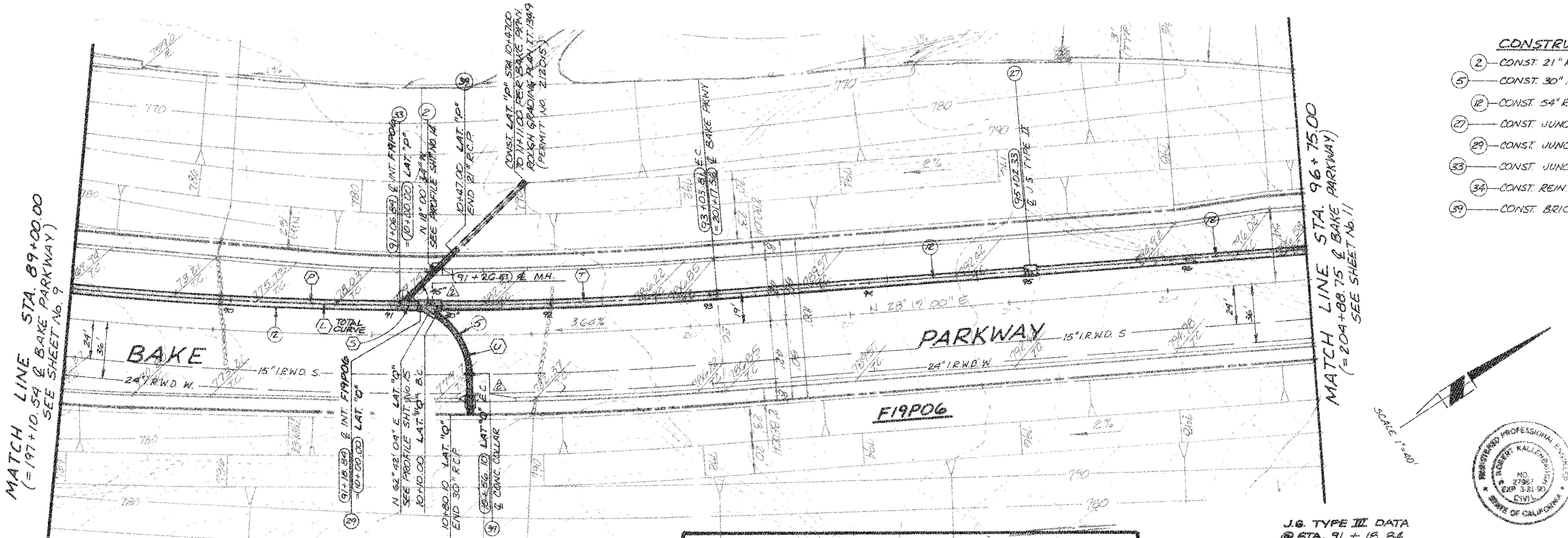
BAKE PARKWAY
STORM DRAIN
FROM STA. 81+00.00 TO STA. 89+00.00

PREPARED UNDER SUPERVISION OF S.R. Kallenbach 4/13/87 DATE

SCALE AS SHOWN | DATE | DWG. NO. F19P06-713-1 | SHEET 9 OF 17

J.N. 24429





CONSTRUCTION NOTES

- (2) — CONST. 21" R.C.P. (D-LOAD PER PROFILE)
- (5) — CONST. 30" R.C.P. (D-LOAD PER PROFILE)
- (12) — CONST. 54" R.C.P. (D-LOAD PER PROFILE)
- (27) — CONST. JUNC. STRUCT. TYPE II PER O.C.E.M.A. STD. PLAN NO. 1311
- (29) — CONST. JUNC. STRUCT. TYPE III PER O.C.E.M.A. STD. PLAN NO. 1312
- (33) — CONST. JUNC. STRUCT. TYPE VI PER O.C.E.M.A. STD. PLAN NO. 1315
- (34) — CONST. REIN. CONC. COLLAR PER O.C.E.M.A. STD. PLAN NO. 1317
- (39) — CONST. BRICK AND MORTAR PLUG

1 1/2 0 1 2
3 inches on original drawing

CURVE DATA

No.	REFERENCE	Δ	L	R	T
L	Ⓒ LINE "A"	21° 23' 44"	889.11'	2381.00'	449.80'
P	Ⓒ 54" R.C.P.	15° 15' 13"	633.88'	2381.00'	318.83'
S	Ⓒ 54" R.C.P.	0° 17' 20"	12.00'	2381.00'	6.00'
T	Ⓒ 51" R.C.P.	4° 43' 40"	196.47'	2381.00'	98.29'
U	Ⓒ 30" R.C.P.	58° 41' 33"	46.10'	45.00'	25.30'

TOTAL CURVE
Ⓒ INT. LAT. "N" TO Ⓒ INT. LAT. "P"
Ⓒ INT. LAT. "P" TO Ⓒ INT. LAT. "Q"

HYDRAULIC DATA

LINE No.	STATION TO STATION	Q25	So	Dia.	Dn.	Vn.	Dc.	Vc	N#
F19P06	89+00.00 TO 91+06.84	352.5	0.0344	54"	3.56	26.1	4.44	22.2	2.40
F19P06	91+06.84 TO 91+18.84	327.3	0.0344	54"	3.33	25.9	4.42	20.7	2.56
F19P06	91+28.84 TO 95+00.00	293.7	0.0388	54"	2.93	26.8	4.38	18.6	2.95
F19P06	95+04.66 TO 96+75.00	293.7	0.0240	54"	3.55	21.8	4.38	18.6	2.01
LAT. No.									
P	10+07.00 TO 11+11.00	29.8	0.1480	21"	0.86	25.2	1.71	12.5	5.40
Q	10+10.00 TO 10+56.10	33.8	0.1300	30"	0.81	24.4	1.98	8.1	5.60
Q	10+56.10 TO 10+80.10	33.8	0.0400	30"	1.12	15.9	1.98	8.1	3.03

J.S. TYPE III DATA @ STA. 91 + 18.84

A = 30°
B = 30"
C = 10.0'
D1 = 54"
D2 = 54"
ELEV. R = 766.57
ELEV. S = 765.85

REGISTERED PROFESSIONAL ENGINEER — ROBERT KALLENBAUGH — NO. 27987 — EXP. 3.31.90 — CIVIL — STATE OF CALIFORNIA

MARK	DATE	DESCRIPTION
2	8-22-90	ADDED C.B.'s

REVISIONS

DESIGNED D. VORNBERGER
DRAWN P.S.K.
CHECKED

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P06

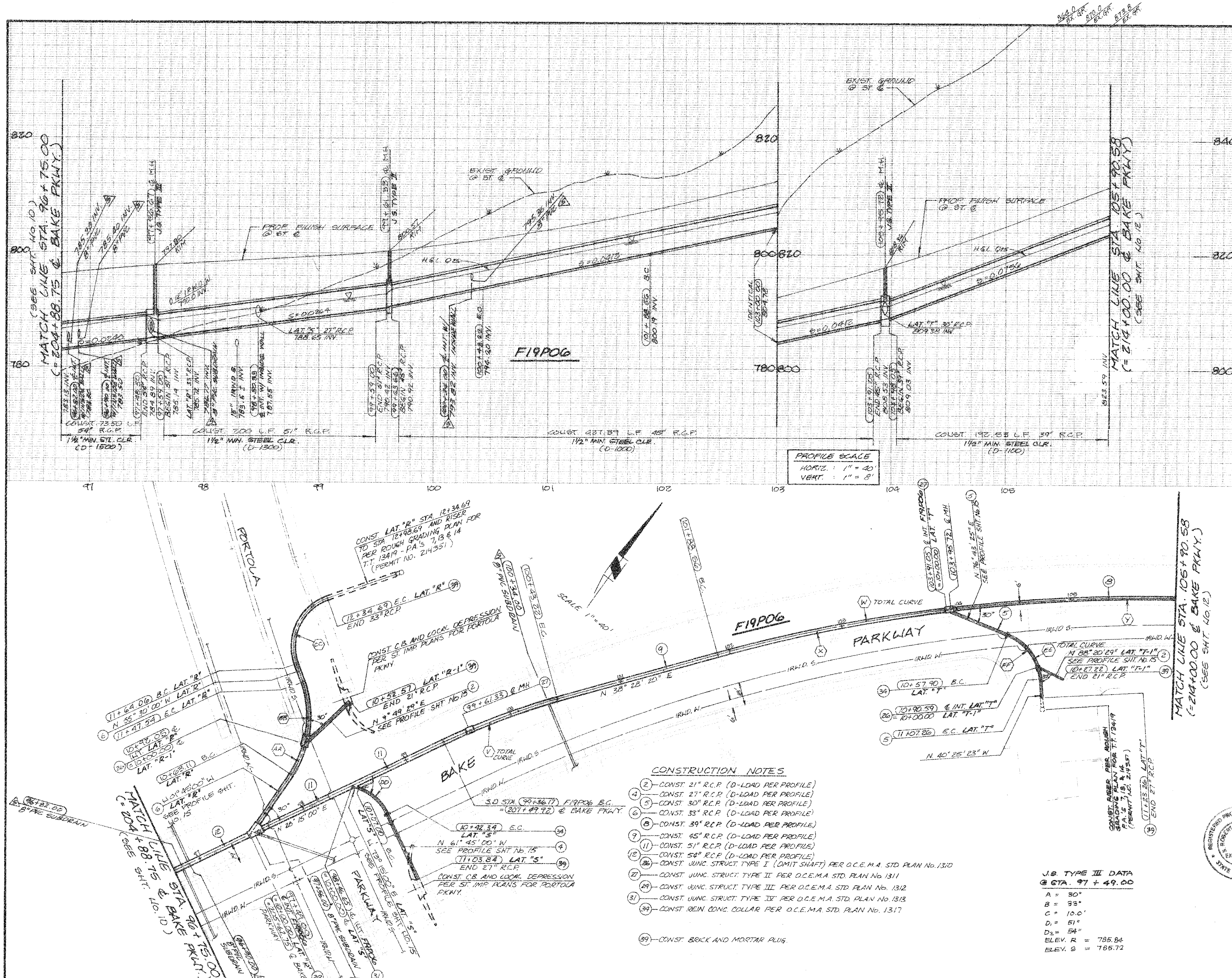
PLAN AND PROFILE

BAKE PARKWAY
STORM DRAIN
FROM STA. 89+00.00 TO STA. 96+75.00

PREPARED UNDER SUPERVISION OF [signature] DATE

SCALE AS SHOWN | DATE | DWG. NO. F19P06-713-1 | SHEET 10 OF 17

J.N. 24429



CURVE DATA

No.	REFERENCE	Δ	L	R	T	
V	F19P06	10°13'20"	107.05'	600.00'	53.67	TOTAL CURVE
W	F19P06	40°54'24"	1003.82'	1406.00'	524.38'	TOTAL CURVE
X	F19P06	8°15'05"	202.49'	1406.00'	101.92'	B.C. TO ℄ INT.
Y	F19P06	32°39'19"	801.34'	1406.00'	411.88'	℄ INT. TO P.R.C.
AA	℄ LAT. "R"	18°25'17"	28.94'	90.00'	14.59'	B.C. TO ℄ INT.
BB	℄ LAT. "R"	35°19'43"	55.49'	90.00'	28.66'	℄ INT. TO E.C.
CC	℄ LAT. "R"	89°55'28"	70.63'	45.00'	44.99'	TOTAL CURVE
DD	℄ LAT. "S"	45°00'00"	35.34'	45.00'	18.64'	TOTAL CURVE
EE	℄ LAT. "T"	62°51'12"	49.36'	45.00'	27.50'	TOTAL CURVE
FF	℄ LAT. "T"	41°37'20"	32.69	45.00'	17.10'	B.C. TO ℄ INT.

HYDRAULIC DATA

LINE No.	STATION TO STATION	Q25	So	Dia.	Dn.	Vn.	Dc.	Vc.	Nf
F19P06	96+75.00 TO 97+48.50	293.7	0.0240	54"	3.55	21.8	4.38	18.6	2.01
F19P06	97+59.00 TO 98+46.65	242.7	0.0264	51"	3.11	21.8	4.11	17.3	2.24
F19P06	98+46.65 TO 99+59.00	221.5	0.0264	51"	2.89	21.5	4.05	15.9	2.35
F19P06	99+63.66 TO 103+91.05	221.5	0.0412	45"	2.79	25.2	3.70	20.1	2.71
F19P06	103+98.05 TO 105+90.58	168.4	0.0756	39"	2.08	30.0	3.22	20.3	3.93
LAT. No.									
R	10+10.00 TO 10+91.05	52.6	0.0212	33"	1.67	14.0	2.38	9.6	2.08
R	10+98.05 TO 12+98.69	34.6	0.0212	33"	1.29	12.6	1.96	7.6	2.23
R-1	10+03.25 TO 10+52.57	18.1	0.0812	21"	0.77	17.7	1.55	8.0	4.08
S	10+07.00 TO 10+42.34	21.5	0.0708	27"	0.78	17.4	1.62	7.0	4.05
S	10+42.34 TO 11+03.84	21.5	0.0108	27"	1.34	8.7	1.62	7.0	1.44
T	10+04.01 TO 10+57.90	55.8	0.0540	30"	1.37	20.2	2.36	11.6	3.73
T	10+57.90 TO 10+90.09	55.8	0.0260	30"	1.76	15.1	2.36	11.6	2.09
T	10+95.59 TO 11+23.26	38.0	0.0260	30"	1.36	13.9	2.08	8.7	2.35
T-1	10+02.50 TO 10+27.22	18.4	0.1000	21"	0.73	19.2	1.56	8.1	4.55

CONSTRUCTION NOTES

(2) CONST. 21" R.C.P. (D-LOAD PER PROFILE)
(4) CONST. 27" R.C.P. (D-LOAD PER PROFILE)
(5) CONST. 30" R.C.P. (D-LOAD PER PROFILE)
(6) CONST. 33" R.C.P. (D-LOAD PER PROFILE)
(8) CONST. 39" R.C.P. (D-LOAD PER PROFILE)
(9) CONST. 45" R.C.P. (D-LOAD PER PROFILE)
(11) CONST. 51" R.C.P. (D-LOAD PER PROFILE)
(12) CONST. 54" R.C.P. (D-LOAD PER PROFILE)
(26) CONST. JUNC. STRUCT. TYPE I (OMIT SHAFT) PER O.C.E.M.A. STD. PLAN No. 1310
(27) CONST. JUNC. STRUCT. TYPE II PER O.C.E.M.A. STD. PLAN No. 1311
(29) CONST. JUNC. STRUCT. TYPE III PER O.C.E.M.A. STD. PLAN No. 1312
(31) CONST. JUNC. STRUCT. TYPE IV PER O.C.E.M.A. STD. PLAN No. 1313
(34) CONST. REIN. CONC. COLLAR PER O.C.E.M.A. STD. PLAN No. 1317

(39) CONST. BRICK AND MORTAR PLUG.

J.S. TYPE III DATA @ STA. 97 + 49.00

A = 30°
B = 33°
C = 10.0'
D_1 = 51"
D_2 = 54"
ELEV. R = 785.84
ELEV. S = 785.72

1 1/2 0 1 2
3 inches on original drawing

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P06

PLAN AND PROFILE

BAKE PARKWAY
STORM DRAIN
FROM STA. 96+75.00 TO STA. 105+90.58

MARK	DATE	DESCRIPTION
5	12-13-91	ADD SUBDRAIN CONNECTION

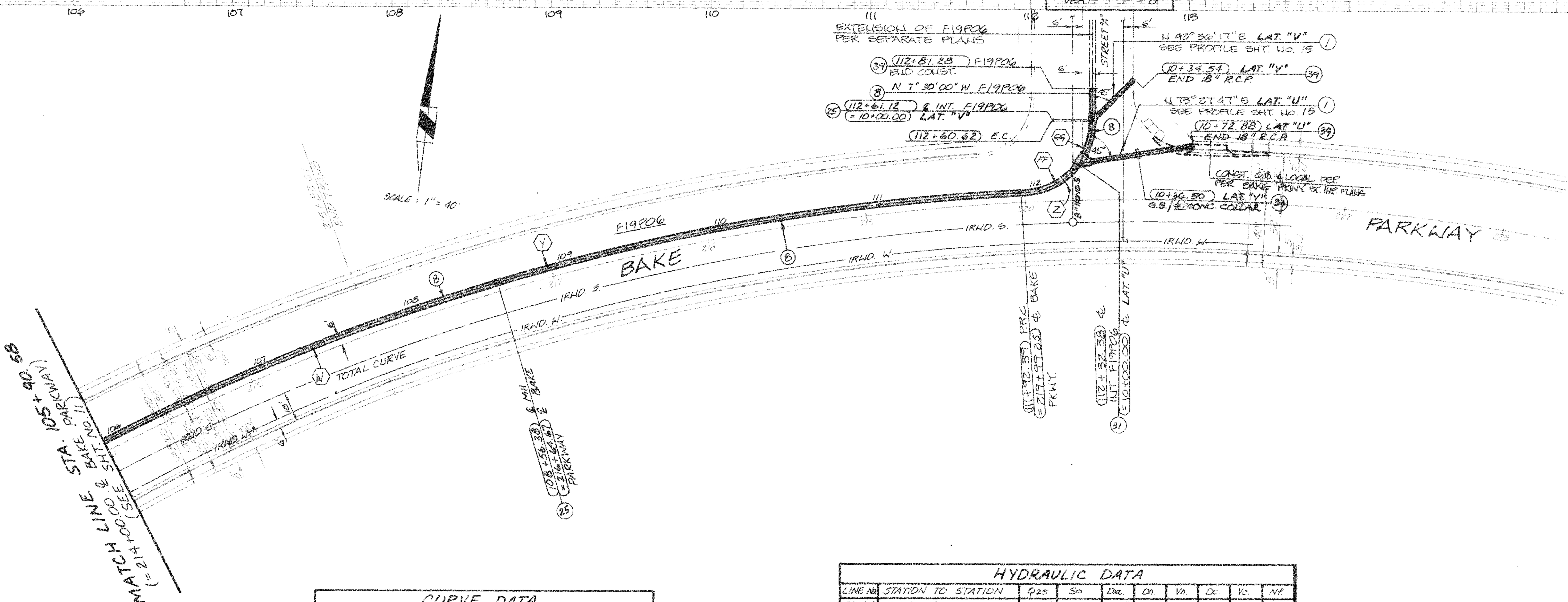
REVISIONS

PREPARED UNDER SUPERVISION OF: R. Kallenbaugh (signature) DATE

DESIGNED D. VORUBERGER
DRAWN M.BUCK
CHECKED

SCALE: AS SHOWN
DATE
DWG. NO. F19P06-713-1
SHEET 11 OF 17

J.N. 24429



CONSTRUCTION NOTES

(1)—CONST. 18" R.C.P. (D-LOAD PER PROFILE)
(8)—CONST. 39" R.C.P. (D-LOAD PER PROFILE)
(25)—CONST. JUNC. STRUCT. TYPE I PER O.C.E.M.A. STD. PLAN No. 1310
(31)—CONST. JUNC. STRUCT. TYPE IV PER O.C.E.M.A. STD. PLAN No. 1313
(39)—CONST. BRICK AND MORTAR PLUG.
(34)—CONST. REINF. CONC. COLLAR PER O.C.E.M.A. STD. PLAN NO. 1333.

CURVE DATA

NO.	REFERENCE	Δ	L	R	T	
W	F19P06	40°54'24"	1003.82'	1406.00'	524.38'	TOTAL CURVE
Y	℄ 39" R.C.P.	32°39'19"	801.34'	1406.00'	411.88'	℄ INT. TO P.R.C.
Z	F19P06	86°52'44"	68.23'	45.00'	42.61'	TOTAL CURVE
FF	F19P06	50°54'57"	39.99'	45.00'	21.42'	P.R.C. TO ℄ INT.
GG	F19P06	35°57'47"	28.25'	45.00'	14.61'	℄ INT. TO E.C.

HYDRAULIC DATA

LINE No.	STATION TO STATION	Q25	So	Dia.	Dn.	Vn.	Dc.	Vc.	Nf.
F19P06	105+90.58 TO 108+54.05	168.4	0.0756	39"	2.08	30.0	3.22	20.3	3.93
F19P06	108+58.71 TO 112+32.38	168.4	0.0680	39"	2.16	28.7	3.22	20.3	3.66
F19P06	112+32.38 TO 112+60.62	162.3	0.0680	39"	2.11	28.5	3.21	19.6	3.71
F19P06	112+65.28 TO 112+81.28	159.6	0.0588	39"	2.19	26.8	3.21	19.3	3.38
LAT. No.									
U	10+04.50 TO 10+36.50	7.2	0.0280	18"	0.67	9.5	1.04	5.5	2.33
U	10+36.50 TO 10+72.88	7.2	0.1920	18"	0.40	19.0	1.04	5.5	6.25
V	10+02.47 TO 10+34.54	3.7	0.0340	18"	0.41	8.5	0.73	4.3	2.63

1 1/2 0 1 2
3 inches on original drawing

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P06

PLAN AND PROFILE

BAKE PARKWAY
STORM DRAIN
FROM STA. 105+90.58 TO STA. 112+80.62

MARK	DATE	DESCRIPTION

REVISIONS

DESIGNED D. VORNBERGER
DRAWN P.S.K. CHECKED

PREPARED UNDER SUPERVISION OF [signature] DATE 4/13/89

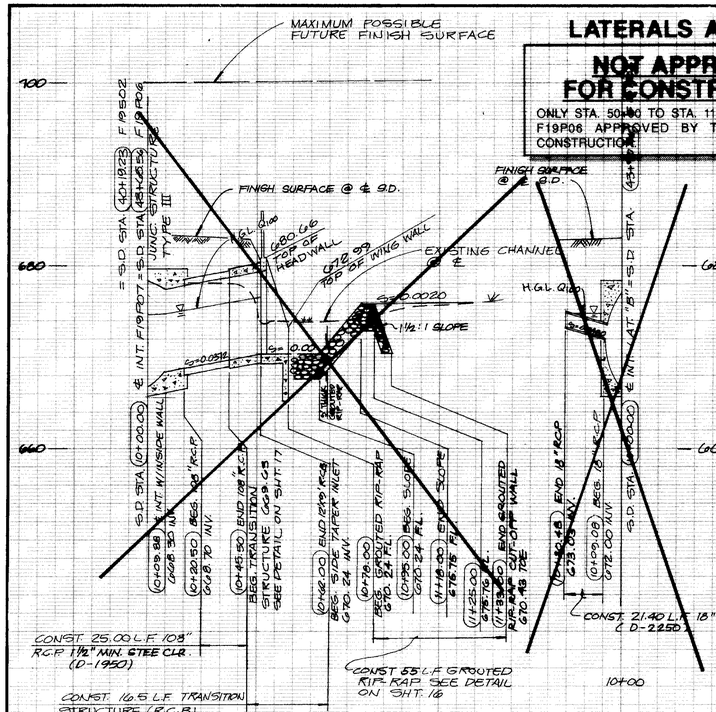
SCALE AS SHOWN | DATE | DWG. NO. F19P06-713-1 | SHEET 12 OF 17

J.H. 24447

LATERALS A, B, & C

NOT APPROVED FOR CONSTRUCTION

ONLY STA. 50+00 TO STA. 112+81.28 OF FACILITY F19P06 APPROVED BY THE COUNTY FOR CONSTRUCTION

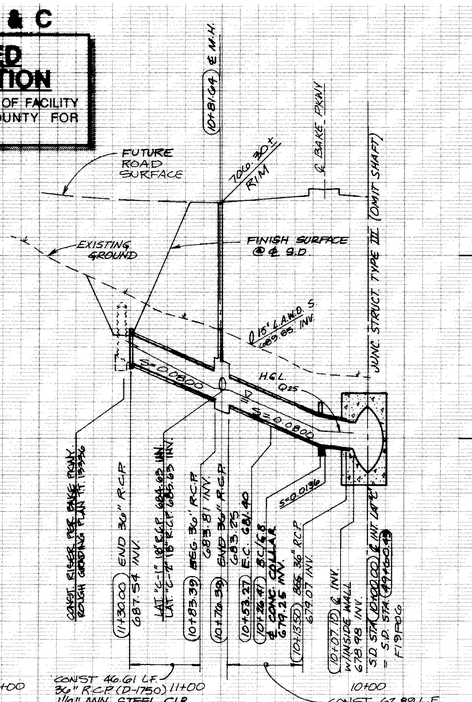


F19P07 (LATERAL "A")

(FOR PLAN SEE SHT. No. 4)

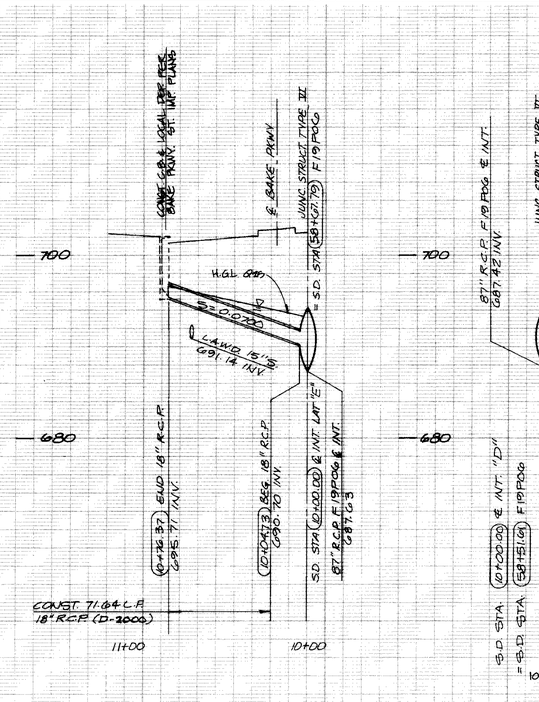
LATERAL "B"

(FOR PLAN SEE SHT. No.4)



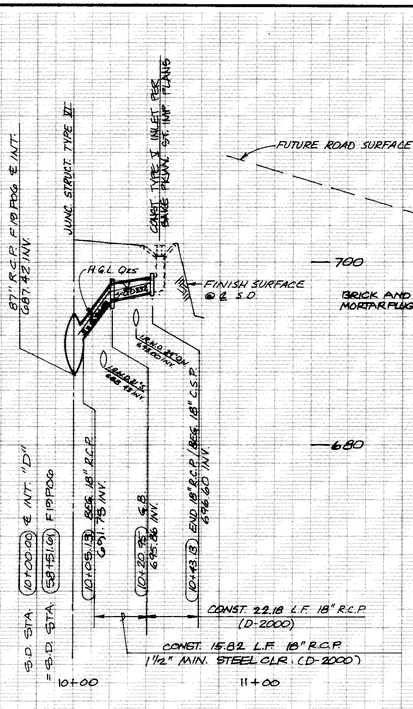
LATERAL "C"

(FOR PLAN SEE SHEET No. 5)



LATERAL "E"

(FOR PLAN SEE SHEET No 6)

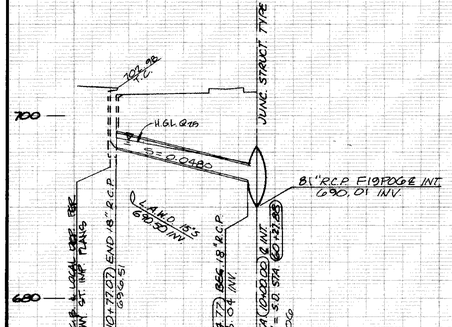


LATERAL "D"

(FOR PLAN SEE SHEET No 6)

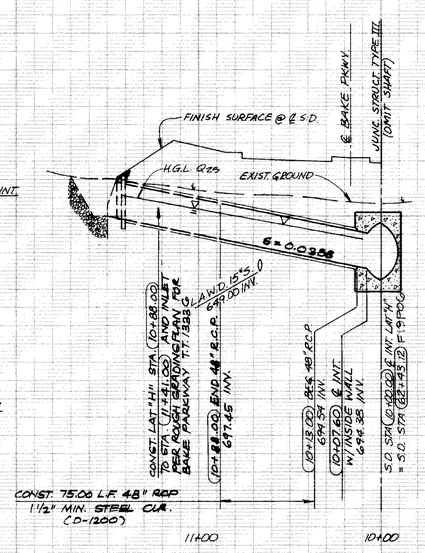
LATERAL "F"

(FOR PLAN SEE SHEET No. 6)



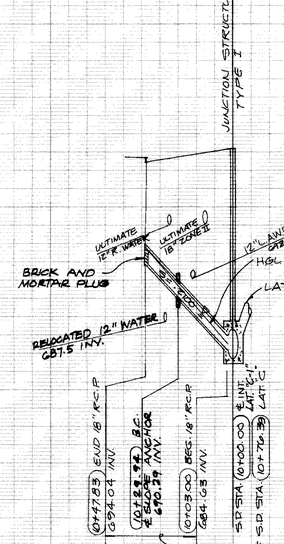
LATERAL "G"

(FOR PLAN SEE SHEET No.6)



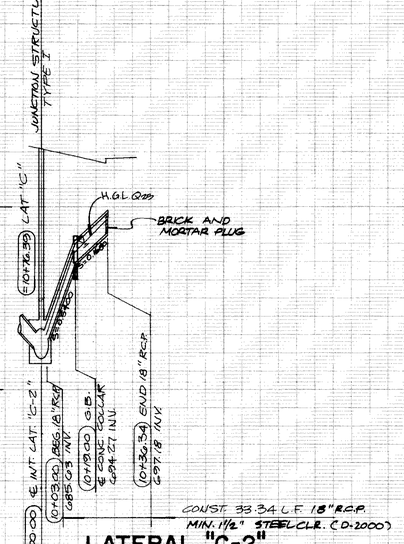
LATERAL "H"

(FOR PLAN SEE SHEET No.6)



LATERAL "C-1"

(FOR PLAN SEE SHT. No.5)



LATERAL "C-2"

(FOR PLAN SEE SHT. No. 5)

HYDRAULIC DATA									
LAT. No.	STATION TO STATION	Q25	So	Dia.	Dn.	Vn.	Dc.	Vc	N.F.
F19P07	10+09.68 TO 10+45.50	540.6	0.0372	108"	2.95	30.8	5.86	12.8	3.71
B	10+09.08 TO 10+30.48	2.7	0.0480	18"	0.36	8.7	0.62	3.9	3.11
C	10+07.10 TO 10+26.41	82.6	0.0130	36"	2.68	12.4	2.79	12.0	1.16
C	10+26.41 TO 10+76.39	82.6	0.0780	36"	1.40	25.6	2.79	12.0	4.34
C	10+83.39 TO 11+30.00	64.3	0.0780	36"	1.22	23.9	2.51	1.5	4.42
C-1	10+03.00 TO 10+47.83	11.2	0.2100	18"	0.99	22.2	1.28	7.0	6.83
C-2	10+03.00 TO 10+18.59	8.6	0.5400	18"	0.54	28.8	1.14	6.0	10.41
C-2	10+18.59 TO 10+36.34	8.6	0.1680	18"	0.95	19.0	1.14	6.0	5.85
D	10+05.13 TO 10+20.95	8.9	0.2600	18"	0.41	22.45	1.15	6.10	7.28
D	10+20.95 TO 10+43.13	8.9	0.0332	18"	0.72	10.63	1.15	6.10	2.51
E	10+04.73 TO 10+76.37	6.1	0.0700	18"	0.48	12.6	0.95	5.1	3.78
F	10+06.86 TO 11+25.00	76.8	0.0448	36"	1.58	20.4	2.74	11.3	3.21
G	10+04.77 TO 10+77.07	13.8	0.0480	18"	0.84	13.6	1.38	8.1	2.91
(INTERIM FLOW) H	10+07.60 TO 10+88.00	106.6	0.0388	48"	1.70	20.90	3.12	10.1	3.26

REGISTERED PROFESSIONAL ENGINEER S. RUDERT KALLENBERG EXP. 3-31-90 CIVIL STATE OF CALIFORNIA

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P06

LATERAL PROFILES

MARK	DATE	DESCRIPTION
REVISIONS		

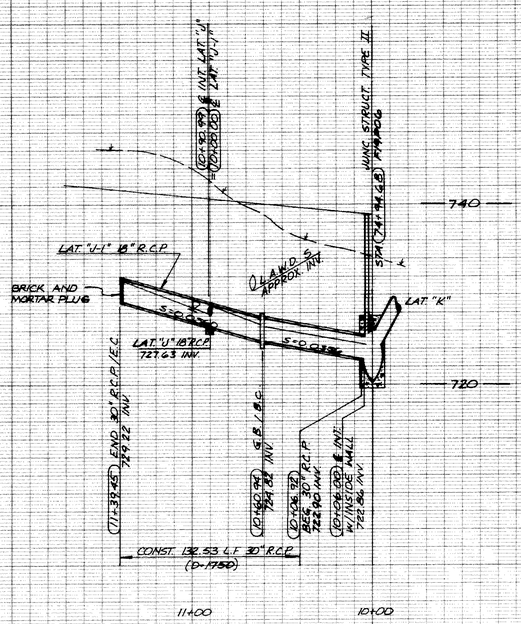
DESIGNED O VORNBERGER
DRAWN PSK CHECKED

PREPARED UNDER SUPERVISION OF S.R. Kallenberg 4/13/89 DATE

SCALE AS SHOWN DATE DWG. NO. F19P06-713-1

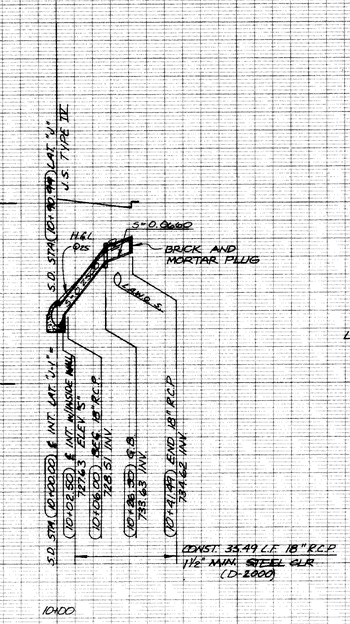
SHEET 13 OF 17

J.N. 24429



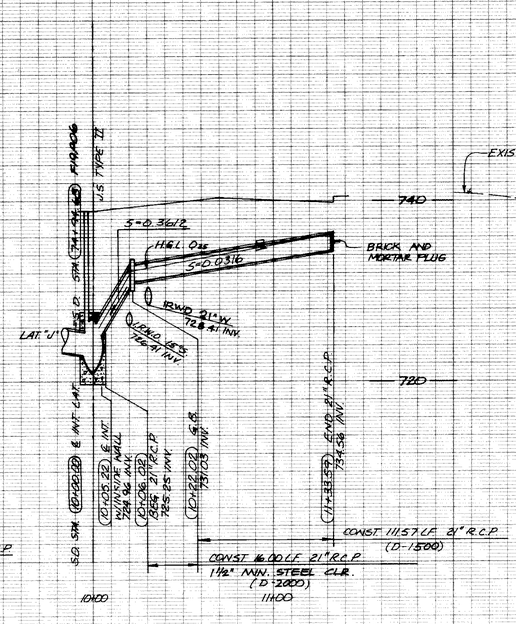
LATERAL "J"

(FOR PLAN SEE SHEET No. 8)



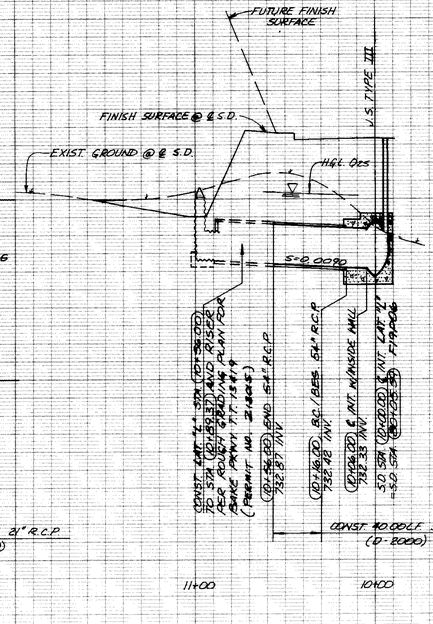
LATERAL "J-1"

(FOR PLAN SEE SHEET No. 8)



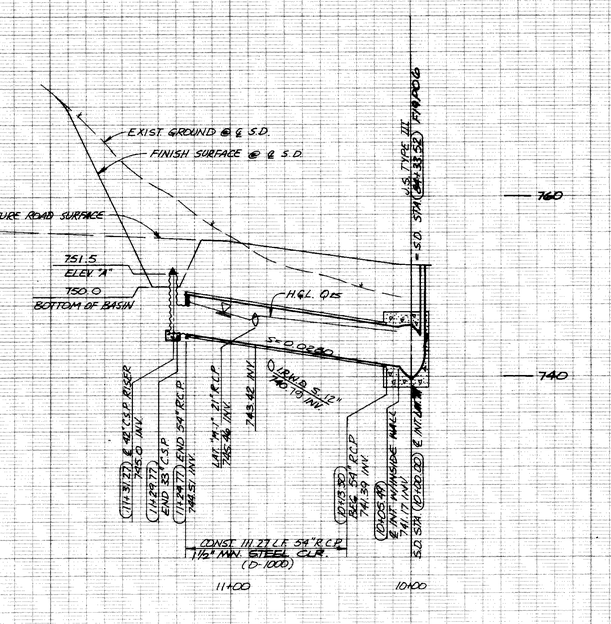
LATERAL "K"

(FOR PLAN SEE SHEET No. 8)



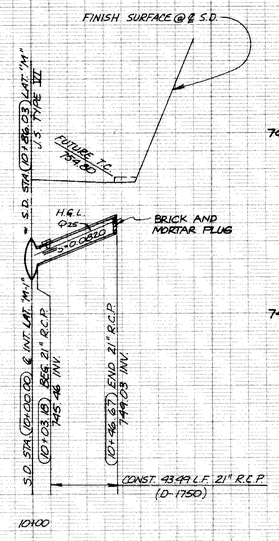
LATERAL "L"

(FOR PLAN SEE SHEET No. 8)



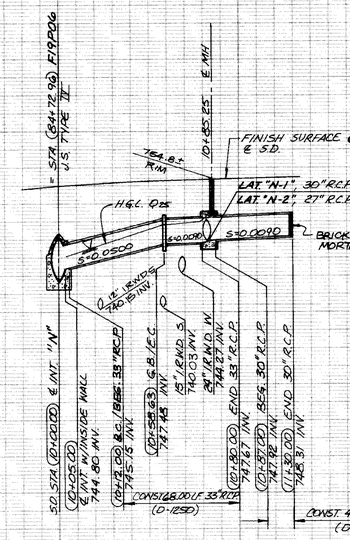
LATERAL "M"

(FOR PLAN SEE SHEET No. 9)



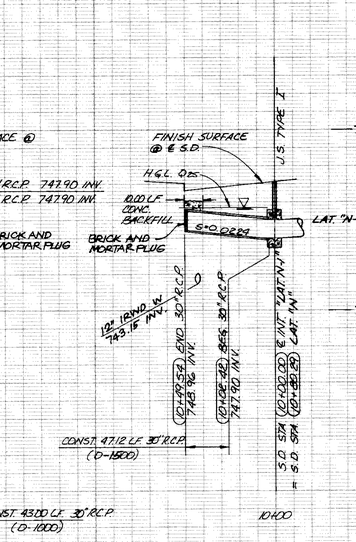
LATERAL "M-1"

(FOR PLAN SEE SHEET No. 9)



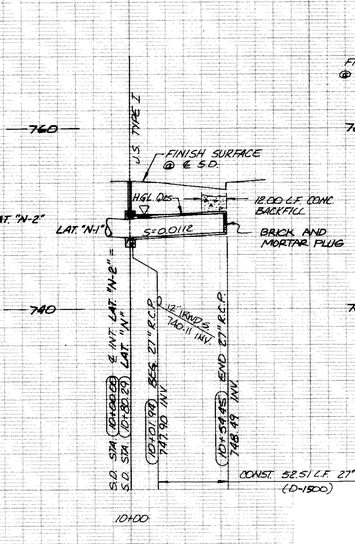
LATERAL "N"

(FOR PLAN SEE SHEET No. 9)



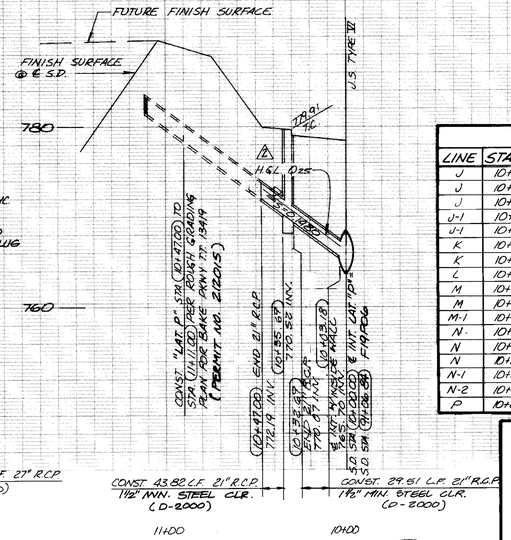
LATERAL "N-1"

(FOR PLAN SEE SHEET No. 9)



LATERAL "N-2"

(FOR PLAN SEE SHEET No. 9)



LATERAL "P"

(FOR PLAN SEE SHEET No. 10)

HYDRAULIC DATA

LINE	STATION TO STATION	Qes	So	Dia	Dn	Vn	Dc	Vc	Nf
J	10+06.92 TO 10+60.94	51.4	0.0356	30"	1.49	16.9	2.32	10.8	2.67
J	10+60.94 TO 10+90.99	51.4	0.0560	30"	1.29	20.1	2.32	10.8	3.49
J	10+90.99 TO 11+39.45	42.4	0.0560	30"	1.16	19.1	2.18	9.3	3.57
J-1	10+02.50 TO 10+26.50	10.1	0.2500	18"	0.45	22.9	1.22	6.5	7.14
J-1	10+26.50 TO 10+41.49	10.1	0.0660	18"	0.64	14.2	1.22	6.5	3.60
K	10+06.02 TO 10+22.02	24.4	0.3612	21"	0.60	33.1	1.67	10.3	8.78
K	10+22.02 TO 11+33.59	24.4	0.0316	21"	1.26	13.2	1.67	10.3	2.14
L	10+16.00 TO 10+89.37	134.1	0.0090	54"	2.78	12.8	3.39	10.2	1.48
M	10+13.50 TO 10+86.03	146.8	0.0280	54"	2.51	21.6	4.01	13.1	2.67
M	10+86.03 TO 11+24.77	181.8	0.0280	54"	2.39	21.2	3.90	12.4	2.71
M-1	10+03.18 TO 10+46.67	15.4	0.0820	21"	0.70	17.1	1.45	7.2	4.14
N	10+05.00 TO 10+38.63	43.9	0.0500	33"	1.16	18.4	2.20	8.6	3.47
N	10+58.63 TO 10+80.00	43.9	0.0090	33"	1.99	9.5	2.20	8.6	1.23
N	10+87.00 TO 11+30.00	35.0	0.0090	30"	1.85	9.0	2.01	8.3	1.18
N-1	10+02.24 TO 10+49.54	25.4	0.0090	30"	1.12	11.9	1.72	7.1	2.27
N-2	10+01.94 TO 10+54.45	18.6	0.0224	27"	1.21	8.5	1.51	6.6	1.52
P	10+03.18 TO 10+47.00	29.8	0.1480	21"	0.86	25.2	1.71	12.5	5.40

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P06

LATERAL PROFILES

MARK	DATE	DESCRIPTION
1	8-22-90	ADDED L.B. TO LAT. "P"

REVISIONS

DESIGNED D. VORNBERGER

DRAWN P.S.K. CHECKED

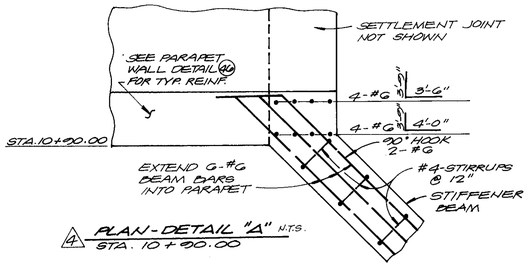
PREPARED UNDER SUPERVISION OF R. Kallenberger 4/13/89 DATE

SCALE AS SHOWN

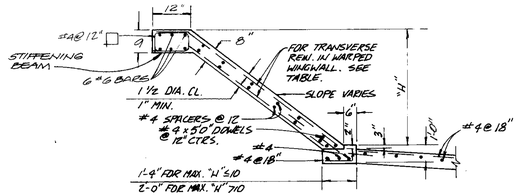
DATE

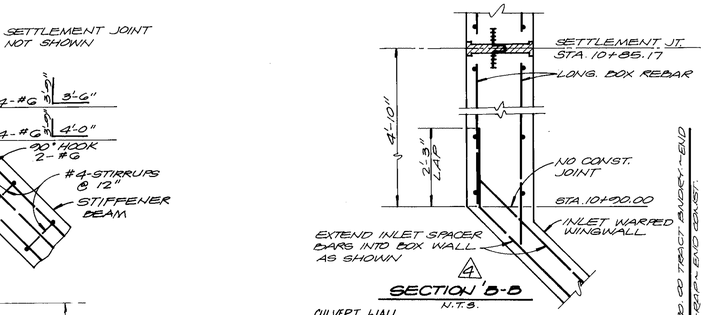
DWG. NO. F19P06-713-1

SHEET 14 OF 17

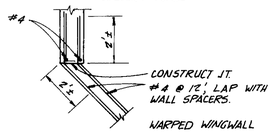


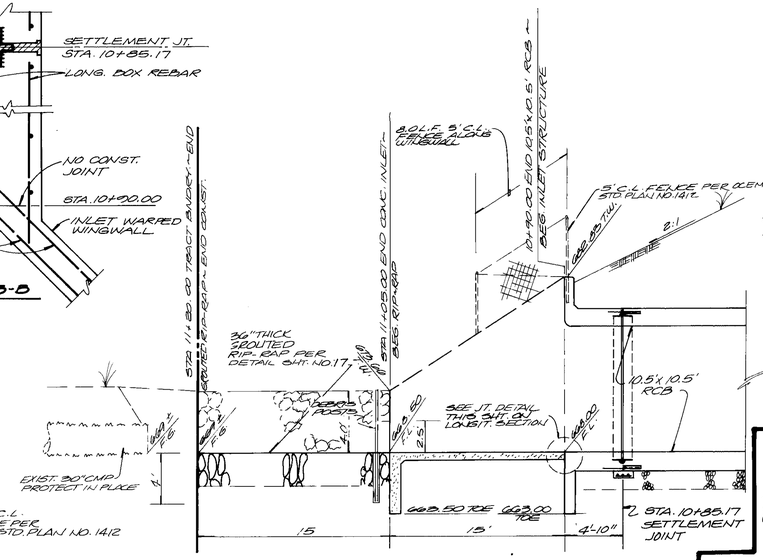
4 PLAN-DETAIL "A" N.T.S.
STA. 10+00.00



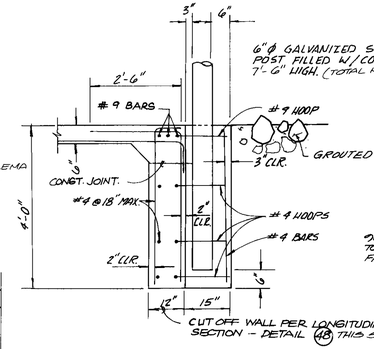


4 SECTION 'B-B' N.T.S.



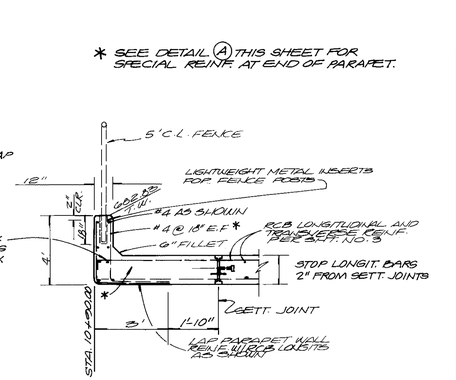


48 10.5'x10.5' R.C.B. INLET - PROFILE N.T.S.

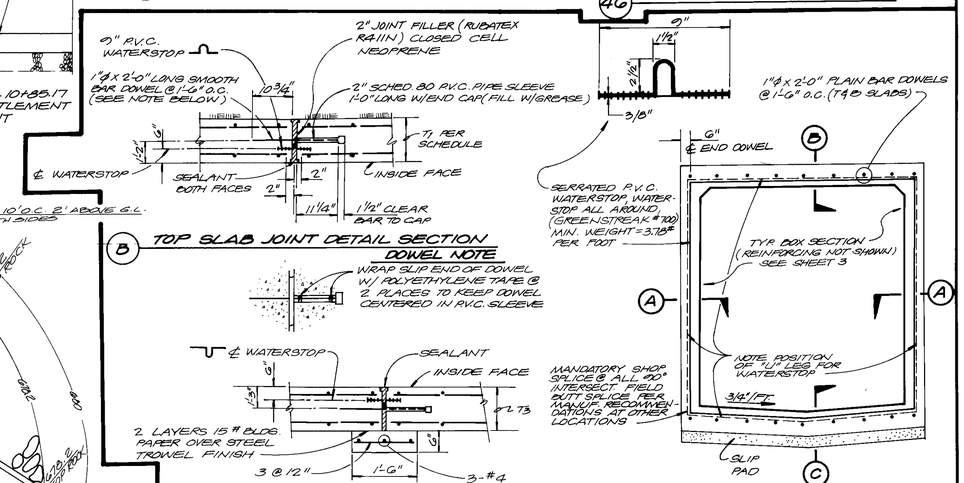


50 DEBRIS POST DETAIL N.T.S.

* SEE DETAIL A THIS SHEET FOR SPECIAL REINF. AT END OF PARAPET.

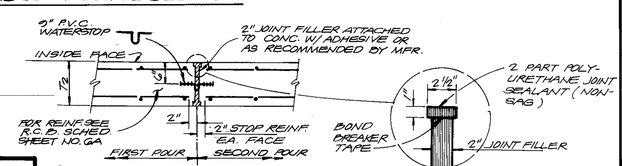


46 PARAPET WALL DETAIL



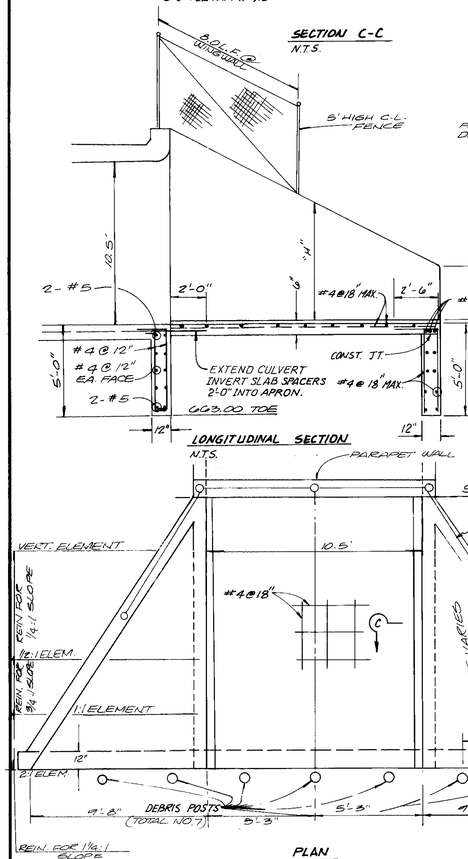
B TOP SLAB JOINT DETAIL SECTION
DOWEL NOTE

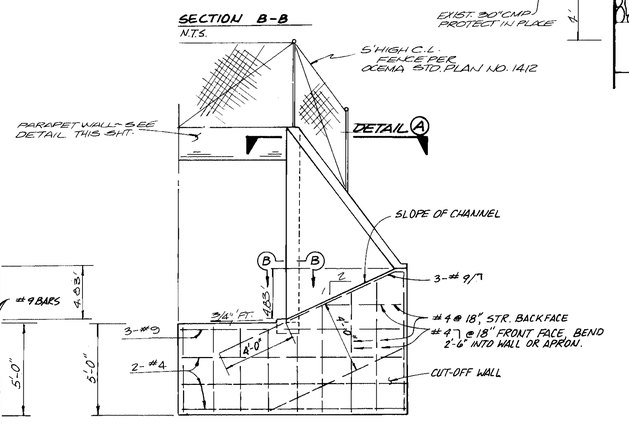
C BOTTOM SLAB JOINT DETAIL SECTION



A WALL JOINT DETAIL PLAN SECTION

DET. TYP. EACH FACE WALL & TOP SLAB, INSIDE FACE BOTT. SLAB



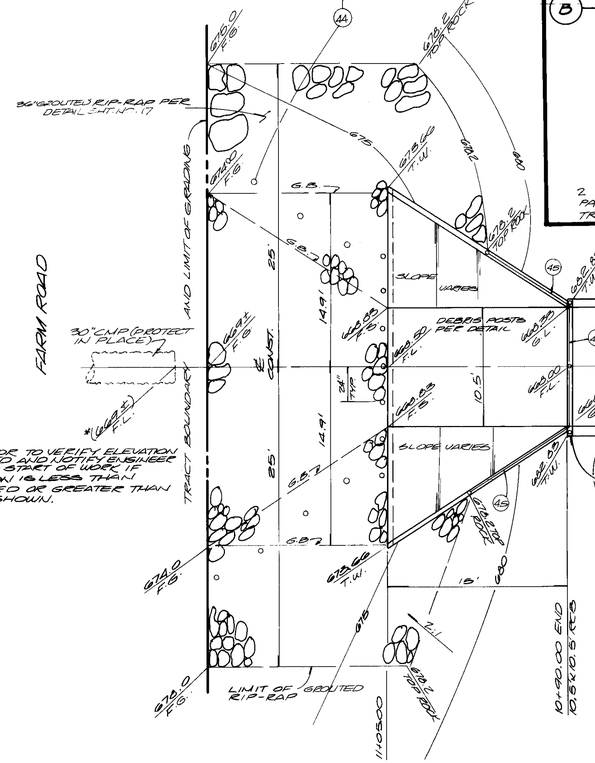


WARPED WINGWALLS WALL DIMENSIONS AND REINFORCING					
ELEMENT SLOPE	"H"	8' OR LESS	10'	12'	14'
¼:1	FRONT FACE REIN	#4@12	#4@7	#5@7	#5@5
	REAR FACE REIN	#4@12	#4@12	#4@12	#4@12
¾:1	FRONT FACE REIN	#4@12	#4@12	#4@12	#4@12
	REAR FACE REIN	#4@12	#4@12	#4@12	#4@10
1¼:1	FRONT FACE REIN	#4@12	#4@12	#4@12	#4@12
	REAR FACE REIN	#4@8	#9@8	#4@5	#5@6

NOTE: WALLS DESIGNED FOR 2' SUR. CHARGE; EARTH LOAD = 120 LB/CU.FT.; EQUIVALENT FLUID PRESSURE = 86 LB/CU.FT. VARY "D" OF WARPED WALL UNIFORMLY FROM THAT AT CUT-OFF WALL TO THAT AT CULVERT, FOR MAX. "H" > 12'.

48 BOX CULVERT WARPED WINGWALLS N.T.S.

DESIGN REFERENCE:
CALTRANS STD. PLAN D86A
DATED JAN. 1988
"BOX CULVERT WARPED WINGWALL"



48 10.5'x10.5' R.C.B. INLET - PLAN N.T.S.

1 1/2 0 1 2
3 inches on original drawing

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P07 INLET DETAILS SETTLEMENT JOINT AT STA. 10+85.17

BAKE PARKWAY STORM DRAIN

MARK	DATE	DESCRIPTION
4	12-89	ADDED SETT. JOINT DET. REVISED BOX INLET CONNECTION

REVISIONS

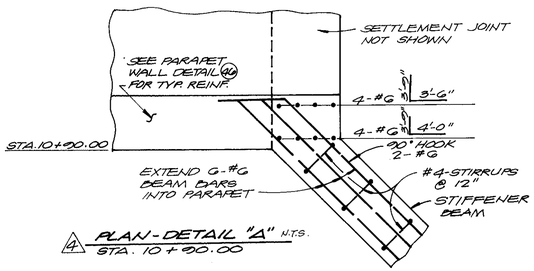
PREPARED UNDER SUPERVISION OF S.R. Kallenbrough 4/12/89 DATE

DESIGNED D. VORNBERGER
DRAWN S.S. CHECKED BMP
SCALE AS SHOWN
DATE
DWG. NO. F19P06-713-1

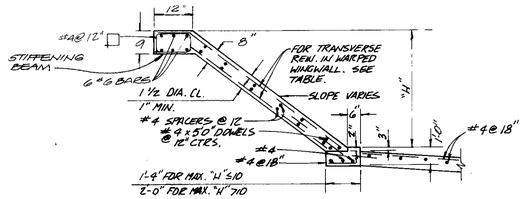
SHEET 16 OF 17

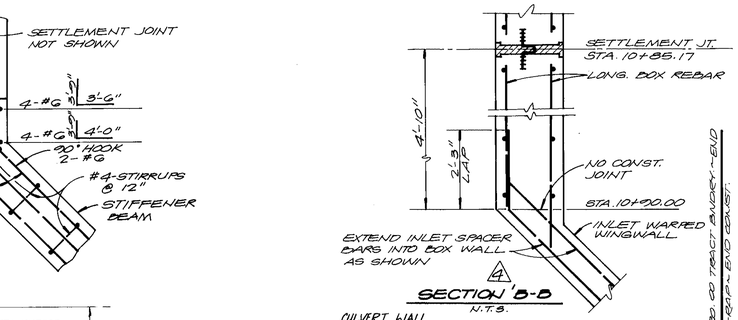
PROFESSIONAL ENGINEER ROBERT KALLENBROUGH STATE OF CALIFORNIA

J.N. 24429

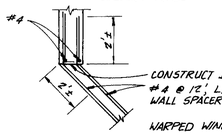


(4) PLAN-DETAIL "A" N.T.S.
STA. 10+90.00

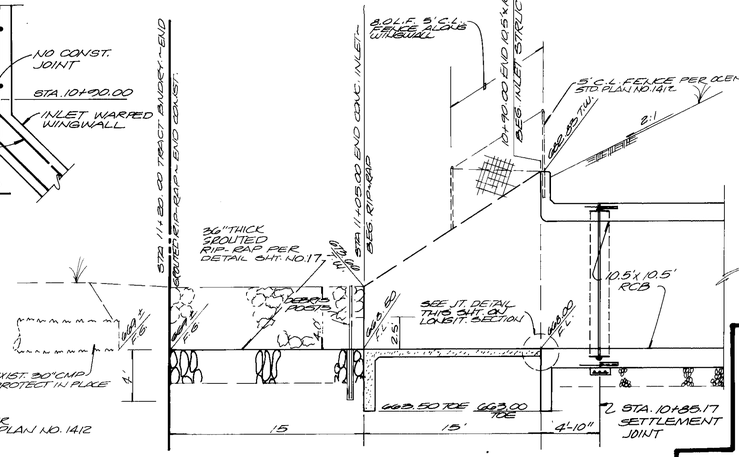




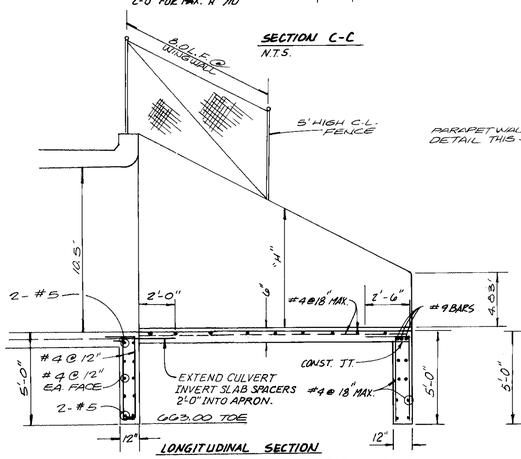
(4) SECTION B-B
N.T.S.



CULVERT WALL

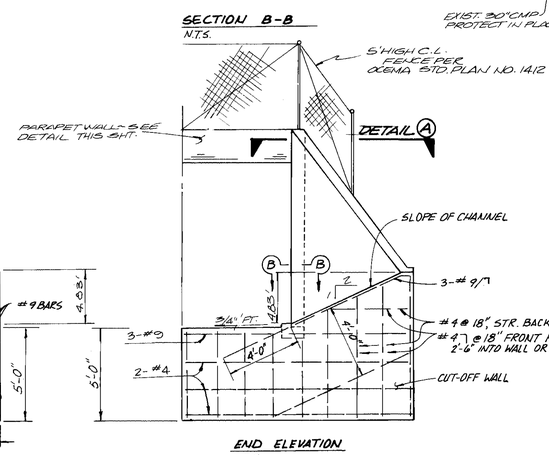


(48) 10.5'x10.5' R.C.B. INLET-PROFILE
N.T.S.

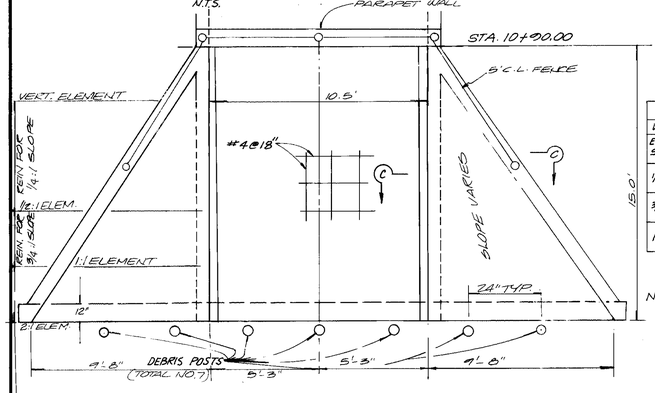


SECTION C-C
N.T.S.

LONGITUDINAL SECTION
N.T.S.



END ELEVATION
N.T.S.



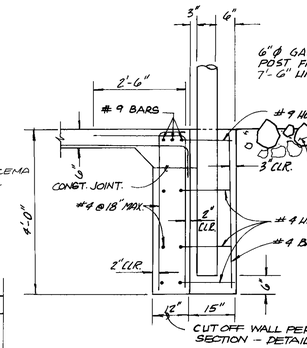
PLAN

WARPED WINGWALLS					
WALL DIMENSIONS AND REINFORCING					
ELEMENT SLOPE	"H"	8' OR LESS	10'	12'	14'
1/4 : 1	FRONT FACE REIN.	#4@12	#4@7	#5@7	#5@5
	REAR FACE REIN.	#4@12	#4@12	#4@12	#4@12
3/4 : 1	FRONT FACE REIN.	#4@12	#4@12	#4@12	#4@12
	REAR FACE REIN.	#4@12	#4@12	#4@12	#4@10
1 1/4 : 1	FRONT FACE REIN.	#4@12	#4@12	#4@12	#4@12
	REAR FACE REIN.	#4@8	#4@8	#4@5	#5@6

NOTE: WALLS DESIGNED FOR 2' SUR. CHARGE; EARTH LOAD = 120 LB/CU.FT.; EQUIVALENT FLUID PRESSURE = 36 LB/CU.FT., VARY "D" OF WARPED WALL UNIFORMLY FROM THAT AT CUT-OFF WALL TO THAT AT CULVERT, FOR MAX. "H" > 12'.

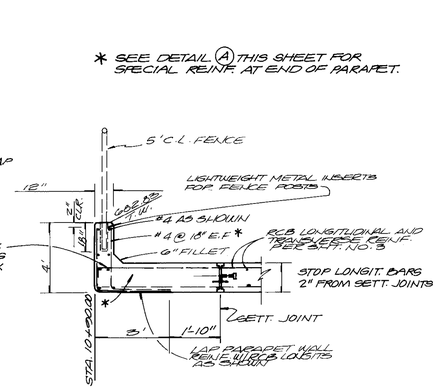
(48) BOX CULVERT WARPED WINGWALLS
N.T.S.

DESIGN REFERENCE:
CALTRANS STD. PLAN D86A
DATED JAN. 1988
"BOX CULVERT WARPED WINGWALL"

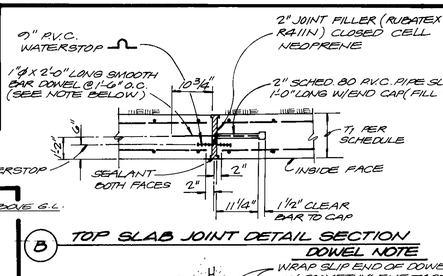


CUT OFF WALL PER LONGITUDINAL SECTION - DETAIL (4B) THIS SHEET

(50) DEBRIS POST DETAIL
N.T.S.



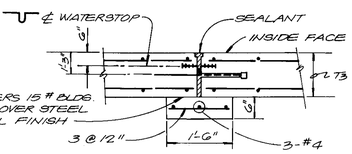
(4G) PARAPET WALL DETAIL



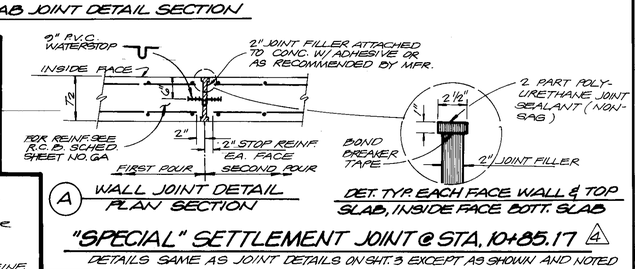
(B) TOP SLAB JOINT DETAIL SECTION

DOWEL NOTE

WRAP SLIP END OF DOWEL W/ POLYETHYLENE TAPE @ 2 PLACES TO KEEP DOWEL CENTERED IN P.V.C. SLEEVE

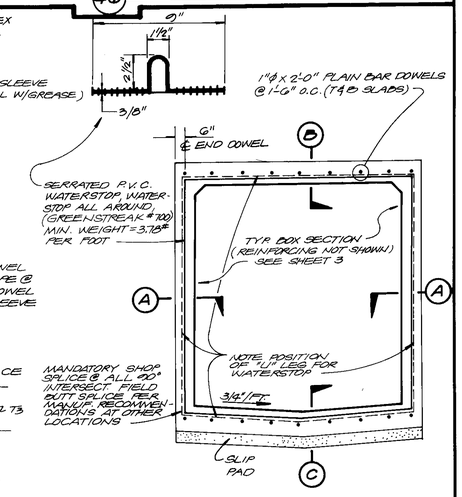


(C) BOTTOM SLAB JOINT DETAIL SECTION



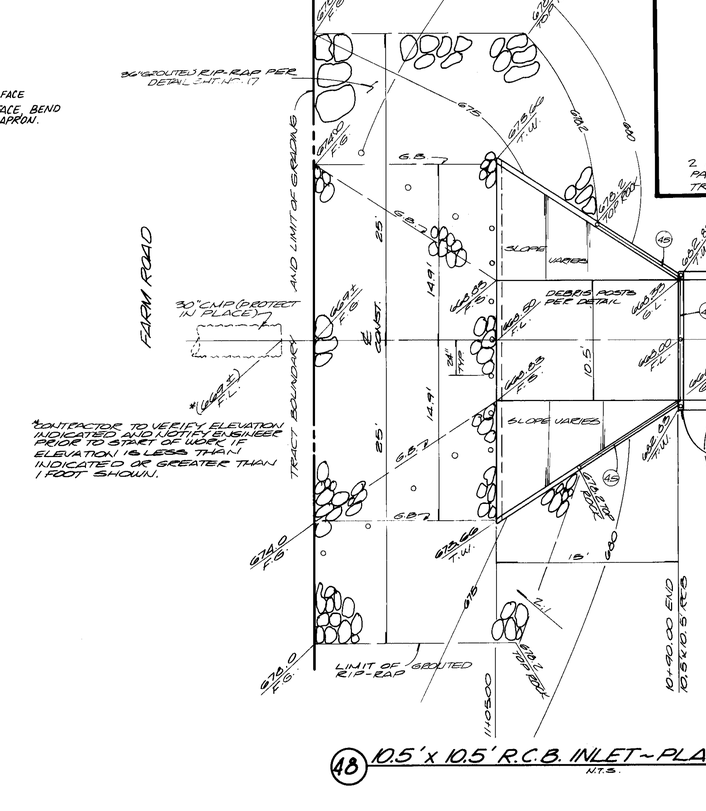
(A) WALL JOINT DETAIL PLAN SECTION

DET. TYP. EACH FACE WALL & TOP SLAB, INSIDE FACE BOTT. SLAB



"SPECIAL" SETTLEMENT JOINT @ STA. 10+85.17 (4)

DETAILS SAME AS JOINT DETAILS ON SHT. 3 EXCEPT AS SHOWN AND NOTED



*CONTRACTOR TO VERIFY ELEVATION INDICATED AND NOTIFY ENGINEER PRIOR TO START OF WORK IF ELEVATION IS LESS THAN INDICATED OR GREATER THAN 1 FOOT SHOWN.

(48) 10.5'x 10.5' R.C.B. INLET-PLAN
N.T.S.

1 1/2 0 1 2
3 inches on original drawing

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P07
INLET DETAILS
(4) SETTLEMENT JOINT AT STA. 10+85.17

BAKE PARKWAY STORM DRAIN

MARK	DATE	DESCRIPTION
(4) 2-	-91	ADDED SETT. JOINT DET., REVISED BOX INLET CONNECTION

REVISIONS

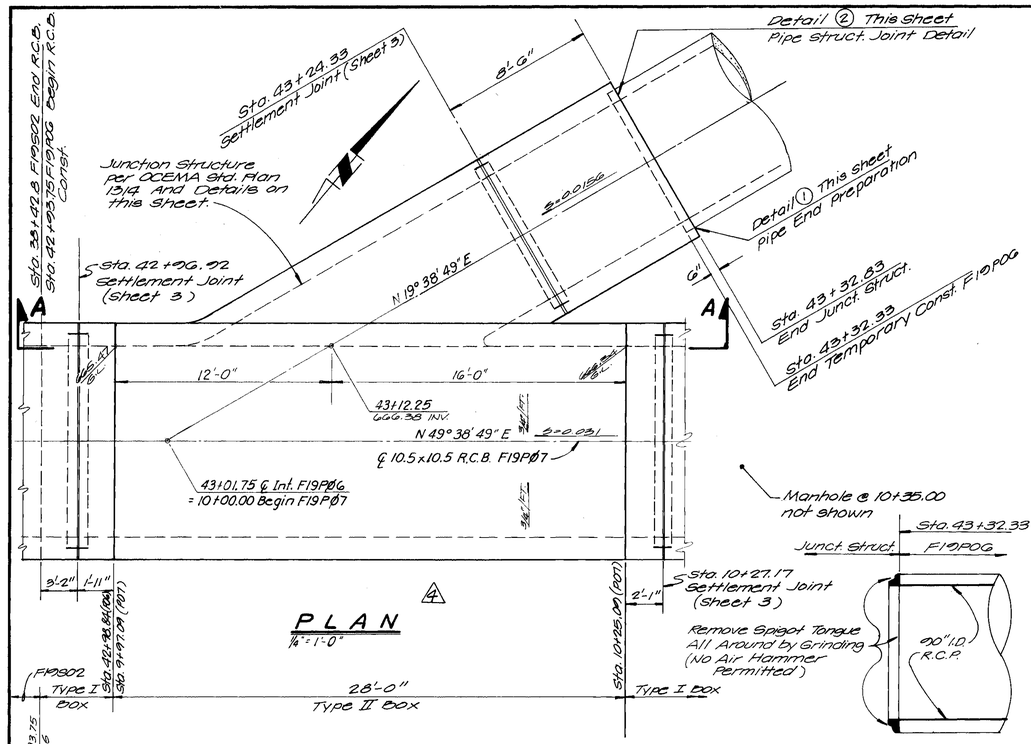
DESIGNED D. VORNBERGER
DRAWN SS CHECKED BMP

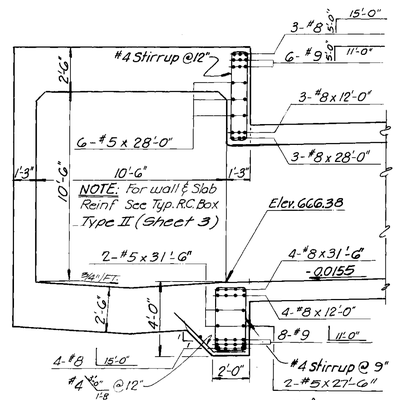
PREPARED UNDER SUPERVISION OF R. Kallenbrunn 4/13/91 DATE

SCALE AS SHOWN | DATE | DWG. NO. F19P06-713-1

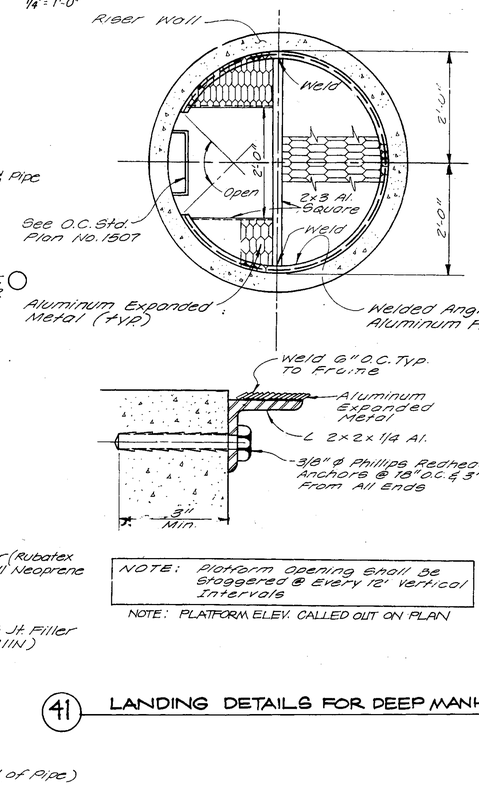
SHEET 16 OF 17

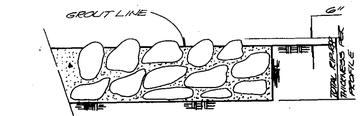
J.N. 24429





SECTION "B-B" (4)
1/4" = 1'-0"



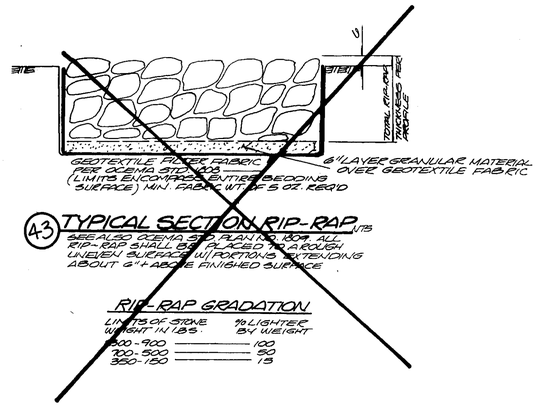


(42) TYPICAL SECTION GROUTED RIP-RAP

SEE ALSO OCEMA STD. PLAN NO. 809. ALL RIP-RAP SHALL BE PLACED TO A REASONABLY UNIFORM FINISHED SURFACE AND WITH STONES ABOUT 6"± ABOVE FINISHED SURFACE AND WITH FULL R.C.C. GROUT PENETRATION FOR THE LOWER ROCK WASH EXPOSED SURFACE OF ROCK WITH HIGH PRESSURE WATER TO REMOVE GROUT CONTACTING EXPOSED SURFACE ROCK

RIP-RAP GRADATION

LIMITS OF STONE WEIGHT IN LBS	% LIGHTER BY WEIGHT
2500-900	100
700-300	50
350-150	15

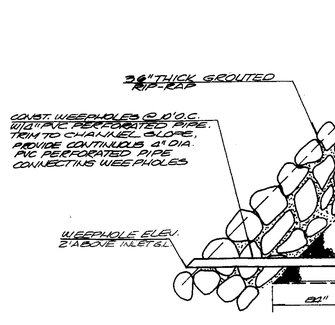


(43) TYPICAL SECTION RIP-RAP

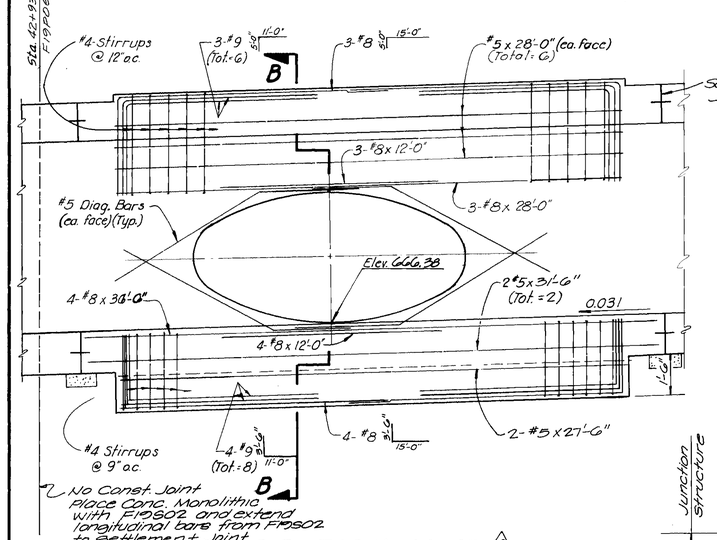
SEE ALSO OCEMA STD. PLAN NO. 809. ALL RIP-RAP SHALL BE PLACED TO A REASONABLY UNIFORM SURFACE W/ STONES PROTRUDING ABOUT 6"± ABOVE FINISHED SURFACE

RIP-RAP GRADATION

LIMITS OF STONE WEIGHT IN LBS	% LIGHTER BY WEIGHT
2500-900	100
700-300	50
350-150	15

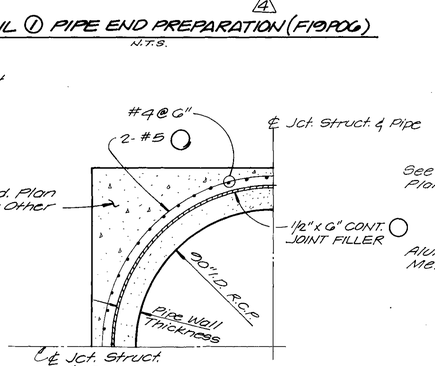


(44) WEEPHOLE DETAIL
N.T.S.

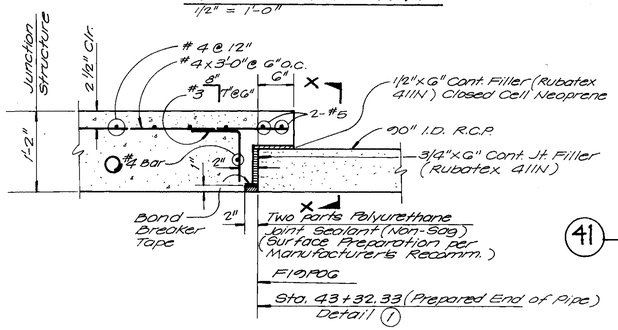


SECTION "A-A" (4)
1/4" = 1'-0"

NOTE:
Wall reinf. not shown for clarity. Cut wall reinf. as required at Junction Box Opening.



END SECTION "X-X" (4)
1/2" = 1'-0"



DETAIL (1) PIPE END PREPARATION (F19P06)
N.T.S.

DETAIL 2 - PIPE/STRUCTURE JOINT DETAIL (4)
1"=1'-0"

NOTE: Platform opening shall be staggered @ every 12' vertical intervals

NOTE: PLATFORM ELEV. CALLED OUT ON PLAN

(41) LANDING DETAILS FOR DEEP MANHOLE
N.T.S.

1 1/2 0 1 2
3 inches on original drawing

REGISTERED PROFESSIONAL ENGINEER S. ROBERT KALLEMEYN No. 23967 EXP 3-31-90 CIVIL STATE OF CALIFORNIA

MARK	DATE	DESCRIPTION
4	2/19	PIPE END PREPARATION, ADDED SETTLEMENT JOINT LOCATIONS, EXTEND JUNCT. STRUCT.

REVISIONS

DESIGNED D.V.O'R./R.KALLEMEYN DRAWN S.S./J.L.S. CHECKED R.M.P.

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P06

DETAILS AT JUNCTION STRUCTURE

BAKE PARKWAY STORM DRAIN

PREPARED UNDER SUPERVISION OF S.R. Kallemeyn 4/13/89 DATE

SCALE AS SHOWN | DATE | DWG. NO. F19P06-713-1 | SHEET 17 OF 17

J.N. 24429

CONSTRUCTION NOTES & ESTIMATED QUANTITIES

REV.	NO.	ITEM	UNIT	AMOUNT	AMOUNT OF SPECIAL WALL, 1½" MIN. STEEL CLEARANCE RCP
	1	CONST. 18" RCP (D-LOAD PER PROFILE)	L.F.	288	(129)
	2	CONST. 21" RCP (D-LOAD PER PROFILE)	L.F.	229	(60)
	3	CONST. 24" RCP (D-LOAD PER PROFILE)	L.F.	113	△
	4	CONST. 27" RCP (D-LOAD PER PROFILE)	L.F.	149	
	5	CONST. 30" RCP (D-LOAD PER PROFILE)	L.F.	250	(156)
	6	CONST. 33" RCP (D-LOAD PER PROFILE)	L.F.	286	
	7	CONST. 36" RCP (D-LOAD PER PROFILE)	L.F.	——	(221)
	8	CONST. 39" RCP (D-LOAD PER PROFILE)	L.F.	——	(874)
	9	CONST. 45" RCP (D-LOAD PER PROFILE)	L.F.	——	(427)
	10	CONST. 48" RCP (D-LOAD PER PROFILE)	L.F.	——	(75)
	11	CONST. 51" RCP (D-LOAD PER PROFILE)	L.F.	——	(200)
	12	CONST. 54" RCP (D-LOAD PER PROFILE)	L.F.	40	(1027)
	13	CONST. 60" RCP (D-LOAD PER PROFILE)	L.F.	——	(366)
	14	CONST. 72" RCP (D-LOAD PER PROFILE)	L.F.	——	(912)
	15	CONST. 78" RCP (D-LOAD PER PROFILE)	L.F.	——	(1230)
	16	CONST. 81" R.C.P. (D-LOAD PER PROFILE)	L.F.	——	(298)
	17	CONST. 84" R.C.P. (D-LOAD PER PROFILE)	L.F.	——	
	18	CONST. 87" R.C.P. (D-LOAD PER PROFILE)	L.F.	959	
	19	CONST. 90" R.C.P. (D-LOAD PER PROFILE)	L.F.		(633)
	20	CONST. 10.5'x 10.5' RCB PER PROFILE & DETAIL ON SHEET No. 3	L.F.	90	
△4	21	CONST. JUNC. STRUCT. PER DETAIL SHEET No. 17 AND OCEMA STD. PLAN NO. 1314	E.A.	1	
	22	CONST. 12" A.C.P. (D-LOAD PER PROFILE)	L.F.	——	
	23	CONST. S.R.P. (D-LOAD PER PROFILE)	L.F.	——	
	24	CONST. S.R.P. (D-LOAD PER PROFILE)	L.F.	——	
	25	CONST. JUNC. STRUCT. TYPE I PER O.C.E.M.A. STD. PLAN No. 1310	E.A.	4	
	26	CONST. JUNC. STRUCT. TYPE I (OMIT SHAFT) PER O.C.E.M.A. STD. PLAN No. 1310	E.A.	2	
	27	CONST. JUNC. STRUCT. TYPE II PER O.C.E.M.A. STD. PLAN No. 1311	E.A.	8	
△4	28	CONST. SETTLEMENT JOINTS PER DETAILS ON SHEET 3 & 16	E.A.	6	
	29	CONST. JUNC. STRUCT. TYPE III PER O.C.E.M.A. STD. PLAN No. 1312	E.A.	5	
	30	CONST. JUNC. STRUCT. TYPE III (OMIT SHAFT) PER O.C.E.M.A. STD. PLAN No. 1312	E.A.	2	
	31	CONST. JUNC. STRUCT. TYPE IV PER O.C.E.M.A. STD. PLAN No. 1313	E.A.	4	
	32	CONST. JUNC. STRUCT. TYPE III PER STD. PLAN 1312, WITH 48" M.H. PER STD PLAN 1504	EA.	1	
	33	CONST. JUNC. STRUCT. TYPE VI PER O.C.E.M.A. STD. PLAN No. 1315	E.A.	5	
	34	CONST. REIN. CONC. COLLAR PER O.C.E.M.A. STD. PLAN No. 1333	E.A.	11	
	35	CONST. INLET TYPE I PER O.C.E.M.A. STD. PLAN No. 1301	E.A.	——	
	36	CONST. DBL. COURSE BRICK & MORTAR PLUG (PIPES 48" DIA. OR LARGER)	E.A.	——	
	37	CONST. INLET TYPE V PER O.C.E.M.A. STD. PLAN No. 1305	E.A.	——	
	38	CONST. RISER PER O.C.E.M.A. STD. PLAN No. 1327	EA.	——	
	39	CONST. BRICK AND MORTAR PLUG	EA.	28	
	40	CONST. BRICK AND MORTAR PLUG AROUND INTERIM C.S.P.	EA.	——	
	41	CONST. STEEL LANDING FOR DEEP M.H. PER DETAIL ON SHEET No. 17.	EA.	2	
	42	CONST. 36" THICK GROUTED RIP-RAP PER DETAIL & GRADATION ON SHT NO. 17	C.Y.	90	
	44	CONST. WEEPHOLE PER DETAILS SHEET No. 17	EA.	110	
	45	CONST. 60" CHAIN LINK FENCE PER O.C.E.M.A. STD. PLAN NO. 1412	L.F.	110	
	46	CONST. R.C. PARAPET WALL PER SHEET No. 16	EA.	1	
	47	CONST. CONCRETE PIPE SLOPE ANCHOR PER O.C.E.M.A. STD. PLAN 1333	EA.	1	
	48	CONST. BOX CULVERT INLET PER DETAIL ON SHEET NO. 16	EA.	1	
	50	CONST. DEBRIS POST PER DETAIL ON SHT. NO. 16	EA.	7	
	51	CONST. R.C. BOX MANHOLE PER OCEMA STD. PLAN NO. 1506	EA.	1	

GENERAL NOTES

1. ALL WORK TO BE DEDICATED TO THE ORANGE COUNTY FLOOD CONTROL DISTRICT SHALL BE IN CONFORMANCE WITH THE O.C.E.M.A. STD. SPECIFICATIONS (PUBLIC WORKS CONSTRUCTION 1985 EDITION) AND THE O.C.E.M.A. STD. PLANS WHICH MAY BE PURCHASED FROM THE DISTRICT AND SHALL BE KEPT ON THE JOB SITE AT ALL TIMES.
2. THE CONTRACTOR SHALL NOTIFY THE DISTRICT'S INSPECTOR AT LEAST 48 HOURS PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION BY TELEPHONING 567-7800 OR BY WRITING THE ORANGE COUNTY E.M.A. ATTN. CONSTRUCTION, P. O. BOX 486, SANTA ANA, CALIFORNIA 92702.
3. ALL CONCRETE SHALL HAVE A MINIMUM 28 DAYS ULTIMATE COMPRESSIVE STRENGTH OF 3,250 PSI. CEMENT SHALL CONFORM TO ASTM C150, TYPE V. CONCRETE FOR INVERT SHALL BE 560-B-3250 AND FOR WALLS AND DECK SHALL BE 560-C-3250.
4. ALL CONDUIT LENGTHS ARE HORIZONTAL PROJECTIONS, UNLESS OTHERWISE SHOWN.
5. LOCATIONS OF PUBLIC UTILITIES SHOWN HAVE BEEN DETERMINED FROM AVAILABLE INFORMATION. HOWEVER, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE TRUE LOCATION OF ANY EXISTING UTILITIES AND TO EXERCISE PROPER PRECAUTIONS TO AVOID INJURY OR DAMAGE THERETO.
6. ALL REINFORCING BARS SHALL CONFORM TO ASTM A615 GRADE 60, DEFORMED BARS.
7. FOR ADDITIONAL STRUCTURAL NOTES, SEE SHEET NO. ______.
8. ALL MATERIALS TESTING FOR THE DRAINAGE FACILITIES SHALL BE PROVIDED BY THE O.C.E.M.A. MATERIALS LAB IN ACCORDANCE WITH THE NUMBER, LOCATION AND FREQUENCY REQUESTED BY THE FLOOD CONTROL DISTRICT'S INSPECTOR.
9. CHAMFER ALL EXPOSED EDGES OF CONCRETE 3/4" MIN.
10. ALL PIPE SECTIONS TO BE BANDED AND GROUTED
11. FOR TRENCH EXCAVATIONS IN NATIVE SOIL, SHORING SHALL BE PROVIDED TO SATISFY STATE OF CALIFORNIA SAFETY REQUIREMENTS.
12. THE CONTRACTOR SHALL CONDUCT CONSTRUCTION OPERATIONS IN SUCH A MANNER THAT STORM OR OTHER WATERS MAY PROCEED UNINTERRUPTED ALONG THEIR EXISTING STREET OR DRAINAGE COURSES.
13. IN THE COURSE OF WATER CONTROL, THE CONTRACTOR SHALL CONDUCT CONSTRUCTION OPERATIONS TO PROTECT WATERS FROM POLLUTION WITH FUELS, OILS, BITUMENS, OR OTHER HARMFUL MATERIALS.
14. ALL REINFORCED CONCRETE PIPE SHALL BE BEDDED IN ACCORDANCE WITH O.C.E.M.A. STD. PLAN NO. 319.
15. ALL FILL AND BACKFILL SHALL BE COMPACTED TO MIN. 90 PERCENT OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE CALIFORNIA TEST METHOD NO. 216. 1978 ALL FILL AND BACKFILL SHALL BE FREE FROM VEGETABLE MATTER. HOWEVER, IT MAY CONSIST OF ONSITE SILTY SAND OR CLAYEY SAND (SM. SC). THE FILL AND BACKFILL SHALL BE COMPACTED IN APPROXIMATELY 6 INCH INCREMENTS. IN ORDER TO AVOID UNBALANCED D-LOADS ON THE STORM DRAIN, THE DIFFERENCE IN BACKFILL ELEVATION ON ADJACENT SIDES OF THE R.C.P. DRAIN SHALL NOT EXCEED 2 FEET. NO STORM DRAIN SHALL BE PLACED UNTIL THE SOILS ENGINEER HAS INSPECTED AND APPROVED THE BOTTOM OF THE TRENCH. ISOLATED ZONES OF SOFT COMPRESSIBLE SOILS OR LARGE ROCKS SHALL BE COMPLETELY REMOVED AND REPLACED WITH PROPERLY COMPACTED SOILS. PRECAUTIONS SHALL BE TAKEN TO INSURE THAT THE STORM DRAIN IS NOT DAMAGED BY HEAVY COMPACTING EQUIPMENT. HEAVY COMPACTING EQUIPMENT SHALL NOT BE USED WITHIN A 1 TO 1 PLANE RISING FROM THE BASE OF THE STORM DRAIN OR WITHIN 2 FEET OF THE TOP OF THE STORM DRAIN; THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO THE STORM DRAIN RESULTING FROM INAPPROPRIATE COMPACTION TECHNIQUES AND EQUIPMENT. SOILS ENGINEER SHALL APPROVE AND SUPERVISE BACKFILLING.
16. PIPE CONSTRUCTION IN FILL AREA MUST BE COORDINATED WITH THE GRADING TO INSURE THAT WHEN THE FILL OPERATION HAS BEEN COMPLETED AT GRADE A MINIMUM OF TWO FEET ABOVE THE TOP OF PIPE OR TO FIVE FEET (MAXIMUM) ABOVE THE PROPOSED SUB-GRADE OF THE PIPE, THE STORM DRAIN TRENCH SHALL BE EXCAVATED AND THE PIPE INSTALLED.
17. ALL SURVEYING REQUIRED FOR VERTICAL AND HORIZONTAL ALIGNMENT MUST BE PROVIDED BY THE CONTRACTOR OR DEVELOPER AND SUFFICIENT REFERENCE STAKING MUST BE IN ACCORDANCE WITH THE REQUEST OF THE O.C.E.M.A. INSPECTOR.
18. WHENEVER APPLICABLE, THE DEVELOPER SHALL OBTAIN A PERMIT FROM THE STATE DEPARTMENT OF FISH AND GAME IN ACCORDANCE WITH SECTION 1602 OF THE CALIFORNIA FISH AND GAME CODE PRIOR TO COMMENCEMENT OF CONSTRUCTION.
19. A PERMIT FOR WORK WITHIN EXISTING STREET RIGHT OF WAY IS REQUIRED FROM THE O.C.E.M.A. FOR ANY ENCROACHMENT NECESSARY FOR CONSTRUCTION IN PUBLIC RIGHT OF WAY.
20. STORM DRAIN BACKFILL FOR ALL FACILITIES WITHIN STREET RIGHT OF WAY IS TO BE PLACED AND COMPACTED UNDER O.C.E.M.A. INSPECTION AND MEET OR EXCEED O.C.E.M.A. MINIMUM STANDARDS.
21. LOCAL DEPRESSIONS AND DECKS OF CURB INLETS SHALL NOT BE POURED UNTIL STAKING FOR LINE AND GRADE OF CURB AND GUTTER IS COMPLETED WITHIN 25' OF INSIDE OF INLET WALLS ON BOTH SIDES OR ADJACENT CURB AND GUTTER HAS BEEN PREVIOUSLY POURED.
22. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, THE DEVELOPER'S CONTRACTOR SHALL OBTAIN A PERMIT FROM THE STATE DIVISION OF INDUSTRIAL SAFETY. A COPY OF PERMIT SHALL BE KEPT ON THE JOB SITE AT ALL TIMES.
23. LENGTH OF MANHOLE STRUCTURES MAY BE INCREASED TO MEET PIPE ENDS AT OPTION OF CONTRACTOR AS LONG AS REINFORCING STEEL IS CONTINUED AS REQUIRED. ANY CHANGE IN SPUR LOCATION MUST BE APPROVED BY THE ENGINEER.
24. FLOOR OF MANHOLE STRUCTURE SHALL BE STEEL TROWELLED TO SPRING LINE.
25. RCP SHALL COMPLY WITH ALL A.S.T.M. APPLICABLE STANDARDS.
26. PRIOR TO THE PLACEMENT OF STORMDRAIN IMPROVEMENTS, THE DEVELOPER'S SOIL ENGINEERING SHALL CERTIFY IN WRITING TO THE E.M.A. INSPECTOR THAT THE STORM DRAIN'S SUBGRADE IS OF ADEQUATE STRENGTH TO SUPPORT THE STRUCTURES AND ANY ANTICIPATED LOADS.
27. BODY OF MANHOLE STRUCTURE, INCLUDING SPUR, MUST BE POURED IN ONE CONTINUOUS OPERATION, EXCEPT THAT CONSTRUCTION JOINT AT THE SPRING LINE WITH A LONGITUDINAL KEYWAY IS PERMITTED.
28. LOCAL DEPRESSIONS SHALL BE CONSTRUCTED PER STREET IMPROVEMENT PLANS IN ACCORDANCE WITH O.C.E.M.A. STANDARD PLANS. HOWEVER, ALL CATCH BASINS WILL BE SHOWN ON STREET IMPROVEMENT PLANS.
29. STATIONS SHOWN THUS 0 +00 ARE STORMDRAIN STATIONS AND ARE INDEPENDENT OF ALL CENTERLINE STATIONS.
30. ALL STEEL THAT IS TO BE CONTINUOUS SHALL BE LAPPED A MINIMUM OF 45 BAR DIAMETERS.
31. ALL REINFORCING BARS MUST BE SECURELY HELD IN PLACE IN THE FORMS. TWO WAY MATS OF STEEL MUST BE WIRED TOGETHER BOTH WAYS AT ALTERNATE INTERSELTIONS.
32. WORKING WITHIN ORANGE COUNTY FLOOD CONTROL FACILITIES IS RESTRICTED TO THE PERIOD OF APRIL 15 TO OCTOBER 15
33. IF A DRIVEWAY ENCROACHES WITHIN A LOCAL DEPRESSION TRANSITION, USE E.M.A. STANDARD PLAN #1308 - TYPE A.

STONEWORK

STONE SHALL COMPLY WITH SUBSECTION 200-1.6, STONE FOR RIP-RAP, EXCEPT COBBLESTONES SHALL NOT BE USED. ALL STONES SHALL BE ANGULAR, EACH PIECE HAVING ITS GREATEST DIMENSIONS NOT GREATER THAN THREE TIMES ITS LEAST DIMENSIONS.

STONE SHALL COMPLY WITH THE TESTS SPECIFIED IN SUBSECTION 200-1.6 EXCEPT THAT SPECIFIC GRAVITY SHALL BE NOT LESS THAN 2.62.

PLACEMENT TOLERANCES FOR FINISHED SURFACE SHALL BE PLUS OR MINUS SIX INCHES FROM INDICATED LINES AND GRADES.

EACH LOAD OF STONE SHALL BE REASONABLY WELL GRADED FROM THE SMALLEST TO THE MAXIMUM SIZE SPECIFIED. STONES SMALLER THAN THE SPECIFIED 15 PERCENT SIZE AND SPALLS WILL NOT BE PERMITTED IN A AMOUNT EXCEEDING 15 PERCENT BY WEIGHT OF EACH LOAD.

STONE FOR RIP-RAP SHALL BE PLACED IN A MANNER WHICH WILL PRODUCE A REASONABLE WELL-GRADED MASS OF STONE WITH THE MINIMUM PRACTICABLE PERCENTAGE OF VOIDS. THE ENTIRE MASS OF STONE SHALL BE PLACED IN CONFORMANCE WITH THE LINES, GRADES AND THICKNESSES SHOWN ON THE PLANS. RIP-RAP SHALL BE PLACED TO ITS FULL COURSE THICKNESS IN ONE OPERATION AND IN A MANNER TO AVIOD DISPLACING THE UNDERLYING MATERIAL. PLACING OF RIP-RAP IN LAYERS BY DUMPING INTO CHUTES OR BY SIMILAR METHODS LIKELY TO CAUSE SEGREGATION, WILL NOT BE PERMITTED. SELF-PROPELLED EQUIPMENT SHALL NOT BE USED ON EMBANKMENT SLOPES.

THE LARGER STONES SHALL BE WELL DISTRIBUTED AND THE ENTIRE MASS OF STONE SHALL CONFORM TO THE GRADATION SPECIFIED. ALL MATERIAL GOING INTO RIP-RAP PROTECTOIN SHALL BE SO PLACED AND DISTRIBUTED THAT THERE WILL BE NO LARGE ACCUMULATION OF EITHER THE LARGER OR SMALLER SIZES OF STONE.

GEOTEXTILE FABRICS

THE WORK INVOLVED SHALL CONSIST OF PLACING FABRIC OF THE TYPE SPECIFIED AT LOCATIONS AND GRADES SHOWN ON THE PLANS OR AS STAKED IN THE FIELD, IN ACCORDANCE WITH THESE SPECIAL PROVISONS. ANY FABRIC DAMAGED DURING ITS INSTALLATION OR DURING ITS USE SHALL BE REPLACED. TORN OR PUNCTURED AREAS MAY BE REPAIRED WITH AN ADDITIONAL PIECE OF FABRIC LARGE ENOUGH BOTH TO COVER THE DAMAGED AREA AND SATISFY OVERLAP REQUIREMENTS. A CERTIFICATE OF COMPLIANCE, MILL CERTIFICATE OR AFFIDAVIT THAT THE FABRIC TO BE INSTALLED MEETS MINIMUM REQUIREMENTS IN EACH PRINCIPAL DIRECTION, SIGNED BY A COMPANY OFFICER AUTHORIZED TO SIGN SUCH DOCUMENTS, SHALL BE FURNISHED TO THE ENGINEER BEFORE INSTALLATION. THE ENGINEER SHALL DETERMINE THE ADEQUACY OF SUBMITTED DOCUMENTATION.

FILTER FABRIC

FABRIC SHALL BE PLACED ON SURFACES FREE OF OBSTUCTIONS, DEPRESSIONS AND DEBRIS. FABRIC SHALL BE LOOSELY PLACED AND NOT PLACED IN A STRETCHED CONDITION. FABRIC SHALL BE PLACED IN DIRECT CONTACT WITH SOIL, WITH NO BRIDGING ALLOWED. OVERLAPS SHALL VARY FROM 18 TO 36 INCHES WIDE, DEPENDING ON STONE SIZE AND SUBGRADE STABILITY, AND SHALL BE APPROVED BY THE ENGINEER. SECURING PINS AT LEAST 12 INCHES LONG WITH 1-1/2" DIAMETER WASHERS OR 8" X 1" X 8" U-SHAPED STAPLES, AND SHALL BE INSERTED THROUGH ALL OVERLAP LAYERS, AT INTERVALS NOT EXCEEDING 6 FFET, ALONG A LINE SET AT THE MID-POINT OF OVERLAPS. ADDITIONAL PINS SHALL BE INSTALLED AS NECESSARY TO PREVENT BRIDGING AND FABRIC SLOPPAGE, REGARDLESS OF THE FABRIC'S LOCATION.

FABRIC SHALL BE USED WTH A LAYER OF GRANULAR BEDDING MATERIAL PLACED ON IT PRIOR TO RIP-RAP PLACEMENT. FABRIC WITH PHYSICAL PROPERTIES LESS THAN THOSE LISTED IN TABLE 1 OF OCEMA STD PLAN NO. 808 FOR EMBANKMENT OR RIP-RAP STABILIZATION SHALL NOT BE USED. THE THICKNESS OF BEDDING MATERIAL SHALL BE COMPATIBLE WITH RIP-RAP SIZE. IN NO CASE SHALL FABRIC'S PHYSICAL PROPERTIES BE LESS THAN THOSE LISTED FOR DRAINAGE TEXTILES. FINAL DETERMINATION OF FILTER FABRIC'S ADEQUACY, CONSIDERING BEDDING MATERIAL USED, AND SIZE, THICKNESS, GRADATION AND METHOD OF PLACEMENT OF RIP-RAP SHALL BE MADE BY THE ENGINEER. IN NO CASE SHALL BEDDING MATERIAL OR RIP-RAP BE DROPPED ON FABRIC FROM A HEIGHT OF MORE THAN THREE FEET. SPECIAL CARE SHALL BE TAKEN TO ENSURE THAT METHODS OF RIP-RAP AND MATERIAL PLACEMENT SUCH AS END-DUMPING DO NOT TEAR OR OTHERWIDE DAMAGE THE FABRIC.

1 1/2 0 1 2
3 inches on original drawing

REGISTERED PROFESSIONAL ENGINEER — S. ROBERT KALLENBAUGH — NO. 27987 — EXP. 3-31-90 — CIVIL — STATE OF CALIFORNIA

MARK	DATE	DESCRIPTION
△4	2/ /91	ADDED SETTLEMENT JOINTS

REVISIONS

DESIGNED D. VORNBERGER
DRAWN SS CHECKED B.M.P.

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

FACILITY NO. F19P06

GENERAL NOTES, CONSTRUCTION NOTES AND ESTIMATED QUANTITIES

PREPARED UNDER SUPERVISION OF S R Kallenbaugh 4/ /91 DATE

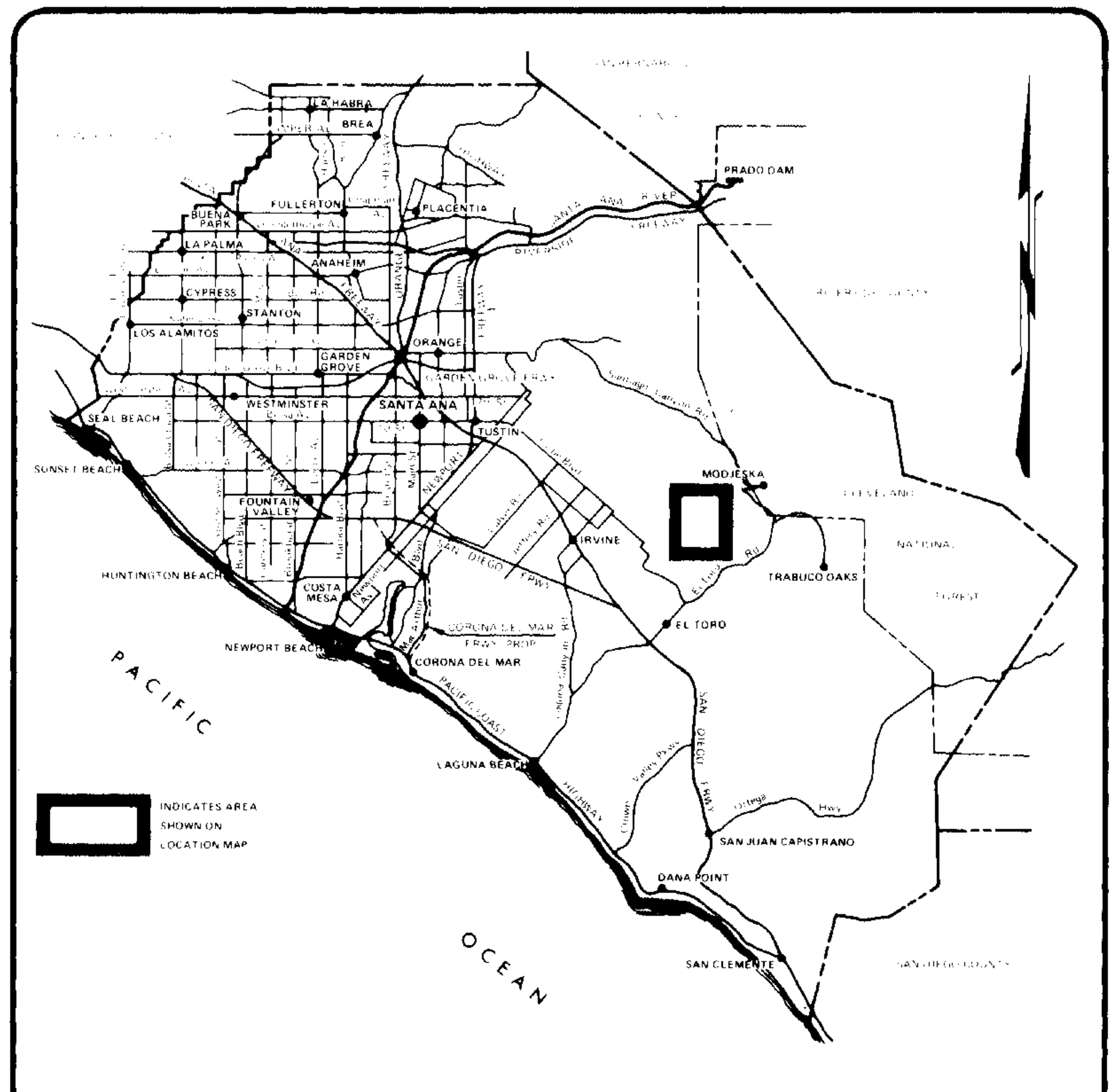
SCALE AS SHOWN | DATE | DWG. NO. F19P06-713-1 | SHEET 2A OF 17

J.N. 24429

ORANGE COUNTY
ENVIRONMENTAL MANAGEMENT AGENCY

SANTA ANA, CALIFORNIA

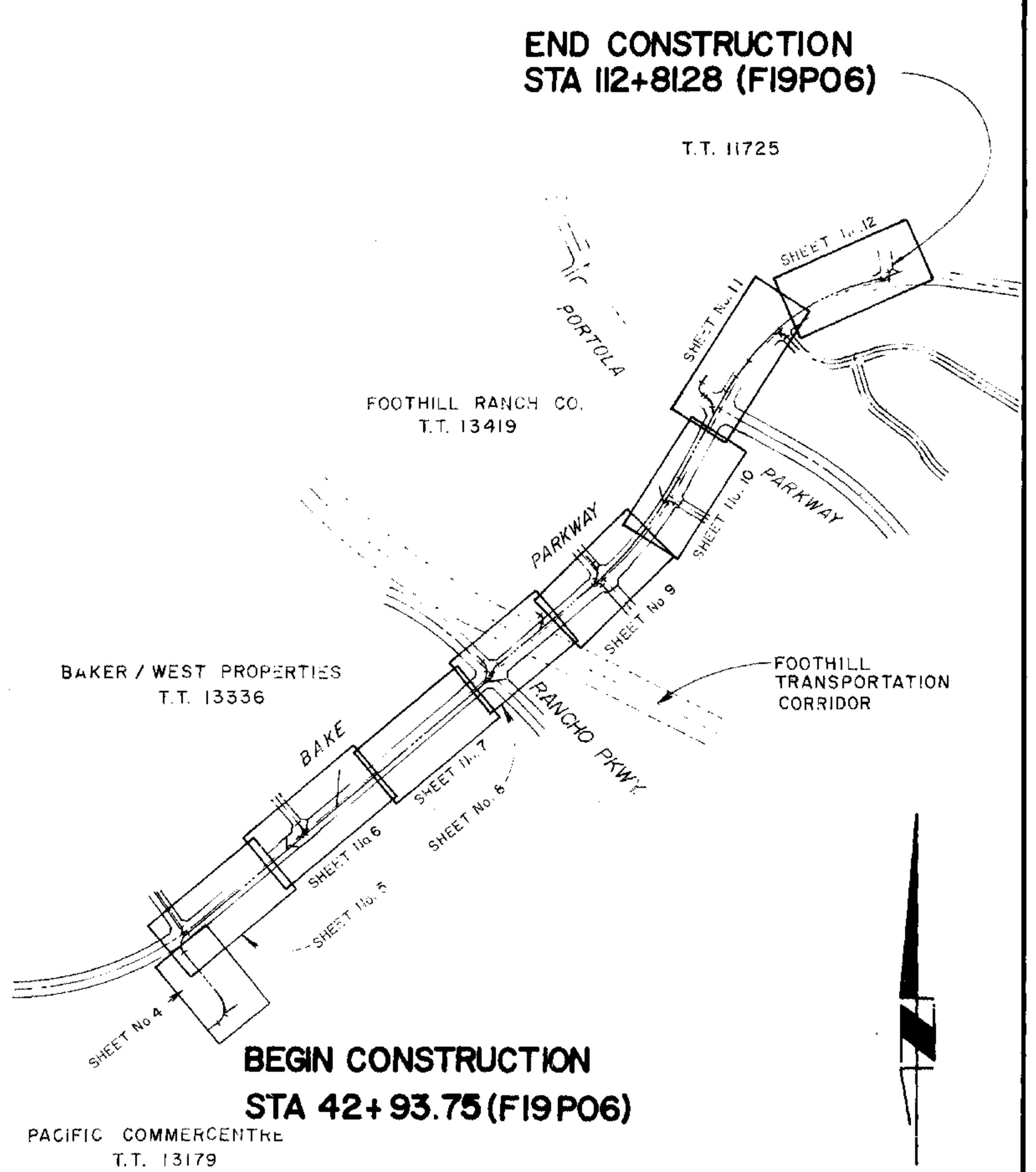
E. SCHNEIDER, DIRECTOR



VICINITY MAP

0 5 10

SCALE IN MILES



LOCATION MAP

SCALE 1" = 800'

PLANS FOR CONSTRUCTION OF THAT PORTION OF STORM DRAIN

FACILITY NO. F19P06

STA. 42 + 93. 75 TO STA. 112+ 81.28

FACILITY NO. F19P07

STA. 10+ 00.00 TO STA. 11+ 20.00

FOR

BAKE PARKWAY

BONDED WITH TRACT NO. 14045

STORM DRAIN MAINTAINED BY COUNTY OF ORANGE

EMA / REGULATION

CONST. FROM STA. TO

THIS PLAN IS SIGNED BY EMA / REGULATION FOR CONCEPT ADHERENCE TO COUNTY STANDARDS AND REQUIREMENTS ONLY. EMA / REGULATION IS NOT RESPONSIBLE FOR DESIGN, ASSUMPTIONS, OR ACCURACY.

APPROVED: Patrick Stanton R.C.E.

DATE: 5/8/90

ENGINEER

Robert Bein, William Frost & Associates

BY:
S. ROBERT KALLENBAUGH RCE
DATE: EXP. 3-31-90

EMA / REGULATION

CONST. FROM STA. 50+00 TO 112+81.28 F19P06 ONLY

THIS PLAN IS SIGNED BY EMA/REGULATION FOR CONCEPT ADHERENCE TO COUNTY STANDARDS AND REQUIREMENTS ONLY. EMA/REGULATION IS NOT RESPONSIBLE FOR DESIGN, ASSUMPTIONS, OR ACCURACY.

APPROVED: P. Stanton RCE

DATE: 10/19/89

OWNER/DEVELOPER

FOOTHILL RANCH COMPANY
25200 LA PAZ ROAD, SUITE 210
LAGUNA HILLS, CA. 92653
(714) 586-4400

INDEX OF SHEETS

SHEET	DESCRIPTION
1	TITLE SHEET
2	CONSTRUCTION NOTES, GENERAL NOTES AND ESTIMATED QUANTITIES.
3	SINGLE R.C.BOX SCHEDULE AND DETAILS SETTLEMENT JOINT DETAILS 4
4	PLAN AND PROFILE: F19P06 STA. 42+ 93.75 TO STA 49+ 00.00 F19P07 STA. 10+ 00.00 TO STA. 11+ 20.00
5	PLAN AND PROFILE F19P06, STA. 49+ 00.00 TO STA. 57+ 00.00.
6	PLAN AND PROFILE F19P06, STA. 57+ 00.00 TO STA. 65+ 00.00
7	PLAN AND PROFILE F19P06, STA. 65+ 00.00 TO STA. 73+ 00.00.
8	PLAN AND PROFILE F19P06, STA. 73+ 00.00 TO STA. 81+ 00.00 AND LATERALS "J,K & L", & "OX"
9	PLAN AND PROFILE F19P06 STA. 81+ 00.00 TO STA. 89+ 00.00 AND LATERALS "M & N"
10	PLAN AND PROFILE F19P06, STA. 89+ 00.00 TO STA. 96+ 75.00 AND LATERALS "P &
11	PLAN AND PROFILE F19P06, STA. 96+ 75.00 TO STA. 105+ 90.58 AND LATERALS "R,S & T".
12	PLAN AND PROFILE F19P06, STA. 105+ 90.58 TO STA. 112+81.28 A LATERALS "U & V".
13	LATERAL PROFILES "C", "C-1", "C-2", "D", "E" "F", "G" & "H"
14	LATERAL PROFILES "J", "J-1", "K", "L", "M", "N", & "P"
15	LATERAL PROFILES "Q", "R", "R-1", "S", "T", "U" & "V"
16	INLET DETAILS F19P07. SETTLEMENT JOINT AT STA.10+85.17 4
17	CONSTRUCTION DETAILS

UTILITY	PHONE NO.
IRVINE RANCH WATER DISTRICT	
LOS ALISOS WATER DISTRICT	
SOUTHERN CALIFORNIA EDISON	
PACIFIC BELL TELEPHONE	
SOUTHERN CALIFORNIA GAS CO.	

BENCH MARK:

3E 96 78 ON THE NORTHERLY SIDE OF TRABUCO ROAD AT ITS JUNCTION WITH PASEO SOMBRA 7.7 FEET NORTH OF THE EASTERN MOST CURB RETURN OF TRABUCO 1.5 FEET NORTHWEST OF THE STREET SIGN POST, 17.6 FEET SOUTH OF THE SERRANO PARK STONE SIGN AT THE ANGLE POINT OF THE SIDEWALK AND THE ASPHALT WALKWAY, SET IN TOP OF A CONCRETE POST, FLUSH WITH WALK

ELEVATION 432.58 ADJ. 1976

BASIS OF BEARING:

"STATE OF CALIFORNIA COORDINATE SYSTEM – ZONE VI" BASED ON THE LINE BETWEEN ORANGE COUNTY SURVEYOR'S HORIZONTAL CONTROL STATIONS "[illegible]" AND "CANADA" (U.C.S. [illegible]) BEING N 77° 20' 41" E

NO.	DESCRIPTION	SHT.	APPROVED	DATE
5	SUBDRAINS & MEDIAN DRAINS CONNECTION	5,6,9,11	AS BUILT	
4	Added Settlement Joint Details And Locations, Relocated M.H./Rev. Profile	2,3,4, 16 & 17	P. Stanton	5/15/91
3	PROFILE REVISED	4	P. Stanton	2/13/91
2	ADD C.B. No "C" & "D" SH. 10,14,15		P. Stanton	10/11/90
1	ADD LAT. "OX"	8	P. Stanton	4/20/90

REVISIONS

DWG. NO. F19P06-713-1

SHEET 1A OF 17

IMPROVEMENT PLANS

RANCHO PARKWAY
FOR PARCEL MAP NO. 99-103
CITY OF LAKE FOREST, CALIF

20021 LAKE FOREST DRIVE, LAKE FOREST, CA. 92630
SDP 99-01

CONSTRUCTION NOTES & QUANTITIES

STREET :

No.	Description	Qty.	Unit
1	CONST. _ A.C. W/ SEAL COAT OVER _ A.B. W/ PRIME COAT.	.	SF
2	CONST. 8" P.C.C. CURB & GUTTER TYPE "A2-8" PER P.F.R.D. STD. PLAN NO. 120-0-00	.	LF
3	CONST. CONC. CURB & GUTTER TYPE "A3-8" PER OCEMA STD PLAN No. 120-0-00	.	LF
4	CONST. 4" P.C.C. SIDEWALK PER P.F.R.D. STD. PLAN NO ____	.	SF
5	CONST. STREET LIGHT PER P.F.R.D. STD. PLAN NO 1410 & 1411 (16,000 LUMENS)	.	SF
6	CONST. STREET LIGHT PER P.F.R.D. STD. PLAN NO 1410 & 1411 (DOUBLE 9500 LUMENS)	.	EA
7	CONST. HANDICAP RAMP PER ORANGE CO. P.F.R.D. STD. PLAN NO. 1115 REQUIREMENT	.	EA
8	CONST. P.C.C. CROSS GUTTER PER P.F.R.D. STD. PLAN NO. 122-1-00	.	EA
9	CONST. ENRICHED PAVEMENT MEDIAN MOW STRIP PER DETAIL SHEET NO. 1 & LANDSCAPE ARCHITECT'S PLANS.	.	EA
10	CONST. MEDIAN UNDERDRAIN PER P.F.R.D. STD. PLAN NO.1114 AND DETAIL SHEET 1	.	SF
11	FEATHED & JOIN EXIST. PAVEMENT.	.	EA
12	CONST. FLARED DEPRESSED DRIVEWAY APPROACH PER P.F.R.D. STD. PLAN NO. 1210	.	EA
13	CONST. MEDIAN TAPER PER P.F.R.D. STD. PLAN No. 140-1-00	.	EA
14	CONST. MEDIAN FLARE PER P.F.R.D. STD. PLAN No. 140-1-00	.	LS
15	CONST. LOCAL DEPRESSION DETAIL PER P.F.R.D. STD. PLAN NO. 1308	.	LS
16	CONST. EQUESTRIAN TRAIL CROSSING PER DETAILS SHEET NO. 14	.	LS

WATER :

No.	Description	Qty.	Unit
30	INSTALL 1 1/2" WATER SERVICE & METER PER L.A.W.D. STD. PLAN W-2	-	EA
31	REMOVE PLUG AND JOIN EXISTING WATERMAIN TO THE SATISFACTION OF L.A.W.D. INSPECTOR	4	EA
32	INSTALL 8" P.V.C. (A.W.W.A. C-900) CLASS 150 DOMESTIC WATER LINE PER L.A.W.D. STANDARDS	4,342	LF
33	INSTALL FIRE HYDRANT ASSEMBLY PER L.A.W.D. STD. PLAN NO. W-5	24	EA
34	INSTALL 8" GATE VALVE PER L.A.W.D. STD. PLAN NO. W-6	19	EA
35	.	.	EA
36	INSTALL THRUSTBLOCKS AS REQUIRED PER L.A.W.D. STD. PLAN NO. W-9	56	EA
37	INSTALL D.I.P. 8" x 8" x 4" TEE	1	EA
38	INSTALL 2" WATER SERVICE & METER PER L.A.W.D. STD. PLAN W-2	8	EA
39	CONST. 4" DETECTOR CHECK ASSEMBLY WITH P.I.V. & FIRE DEPT. CONNECTION AS REQUIRED, PER L.A.W.D. STD. PLAN NO. W-10	2	EA
40	INSTALL 8" DIA. D.I.P. 90° ELBOW	3	EA
41	INSTALL 8"X8"X8" D.I.P. TEE	6	EA
42	INSTALL 4" D.W. END CAP	-	EA
43	.		
44	PROTECT AND ADJUST EXISTING VALVE OR VENT TO GRADE AS REQUIRED	.	LS
45	INSTALL 45°, 22.5°, OR 11.5° ELBOW AS SHOWN ON PLANS	11	LF
46	.		
47	CONST. 12" P.V.C. (A.W.W.A. C-900) CLASS 200 ZONE I I DOMESTIC WATER MAIN PER L.A.W.D. STANDARDS.	2,058	LF
48	CONST. 16" P.V.C. (A.W.W.A. C-905) CLASS 235 ZONE I I I DOMESTIC WATER MAIN PER L.A.W.D. STANDARDS.	2,035	LF
49	INSTALL 16" x 16" x 8" D.I.P. TEE	3	EA
50	INSTALL STD. AIR RELEASE ASSEMBLY PER L.A.W.D. STD. PLAN W-7A	3	EA
51	INSTALL 2" BLOWOFF ASSEMBLY PLAN W-7B	2	EA
52	INSTALL 16" BUTTERFLY VALVE PER L.A.W.D. STD. PLAN NO. W-6	6	EA
53	CONST. ABOVE GROUND 8" AMES MODEL 3000 SS DOUBLE DETECTION CHECK ASSEMBLY PER L.A.W.D. STD PLAN NO. W-10	1	EA
54	CONST. 3" WATER SERVICE WITH 2" DOMESTIC WATER METER.	2	EA

RECLAIMED WATER

No.	Description	Qty.	Unit
55	REMOVE PLUG & JOIN EX. 12" RECLAIMED WATER WATER TO THE SATISFACTION OF L.A.W.D. INSPECTOR.	1	EA
56	INSTALL 12" P.V.C. (A.W.W.A. C-900) CLASS 200 RECLAIMED WATER LINE PER L.A.W.D. STANDARD	2,092	LF
57	INSTALL 4" P.V.C. RECLAIMED WATER GATE VALVE PER L.A.W.D. STD PLAN NO. W-6	4	EA
58	INSTALL 4" R.W. END CAP	4	EA
59	INSTALL 4" P.V.C. (A.W.W.A C-900) CLASS 150 RECLAIMED WATER LINE PER L.A.W.D. STANDARD	230	LF
60	INSTALL 12" X 4" D.I.P. CROSS	2	EA
60A	INSTALL 2" IRRIGATION WATER SERVICE & METER PER L.A.W.D. STD. PLAN W-2 R/W METER IS PAID FOR BY DEVELOPMENT AND INSTALLED BY L.A.W.D.	4	EA
60B	INSTALL 12" END CAP	1	EA

CONSTRUCTION NOTES & QUANTITIES

STORM DRAIN:

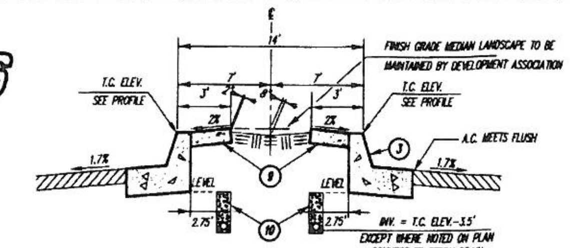
No.	Description	Qty.	Unit
70	CONST. 15" R.C.P. STORM DRAIN LINE (D LOAD PER PROFILE)	-	LF
71	CONST. 18" R.C.P. STORM DRAIN LINE (D LOAD PER PROFILE)	378	LF
72	CONST. 24" R.C.P. STORM DRAIN LINE (D LOAD PER PROFILE)	418	LF
73	CONST. 36" R.C.P. STORM DRAIN LINE (D LOAD PER ROFILE)	203	LF
74	CONST. J.S. TYPE 1 PER P.F.R.D. STD. PLAN No. 1310.	4	EA
75	CONST. OUTLET HEADWALL & WINGWALLS PER CALTRANS STD. PLAN D90 AND DETAILS SHEET NO. 13	1	EA
76	CONST. C.B. INLET TYPE 2 PER P.F.R.D. STD. PLAN No. 1302	7	EA
77	CONST. J.S. TYPE 4 PER P.F.R.D. STD PLAN No. 1313	3	EA
78	CONST. 15" P.V.C. SCHED 40 OR APPROVED EQUAL	319	LF
79	INSTALL 6' CHAIN LINK SECURITY FENCE PER A.P.W.A. STD. PLAN NO 600-1	58	LF
80	CONST. REINFORCED CONC. COLLAR PER P.F.R.D. STD. PLAN No. 1317	2	EA
81	CONST. J.S. TYPE 2 PER P.F.R.D. STD. PLAN No. 1311	2	EA
82	CONS. 78" R.C.P. (D LOAD PER PROFILE) W/ SLURRY BEDDING PER DETAIL SHEET 10	575	LF
83	REMOVE EXIST. HEADWALL &/ OUTLET STRUCTURE	1	EA
84	REMOVE INTERFERING PORTION OF EXIST 78" R.C.P. STORM DRAIN.	1	LS
85	CONST. REINFORCED CONC. RETAINING WALL, TYPE 6, PER APWA STD. PLAN PLAN NO. 615-2	22	LF
86	INSTALL BROOKS PRODUCTS BOX INLET OR APPVD. EQUAL (86a = 12" x 12", 86b = 18" X 18", 86c = 24" X 24") - NOT A PART (FUTURE BY OTHERS)	-	EA
87	CONST. 84" R.C.P. (D LOAD PER PROFILE)	106	LF
88	CONST. 18" P.V.C. SCHED 40 OR APPROVED EQUAL	268	EA
89	CONST. 3 FT. THICK RIP RAP PAP CHANNEL W/ 5 FT. DEEP CUT-OFF WALL STONEWORK PER P.F.R.D. STD. PLAN NO. 1809 SEE SHEET 10 FOR DETAIL	54	LF
90	CONST. 30" R.C.P. STORM DRAIN LINE (D LOAD PER PROFILE)	27	LF
91	CONST. J.S. TYPE 3 PER P.F.R.D. STD. PLAN No. 1312	1	EA
92	CONST. C.B. INLET TYPE 1 PER P.F.R.D. STD. PLAN NO. 1301	1	EA
93	CONST. 21" R.C.P. STORM DRAIN LINE (D LOAD PER PROFILE)	74	LF

SEWER :

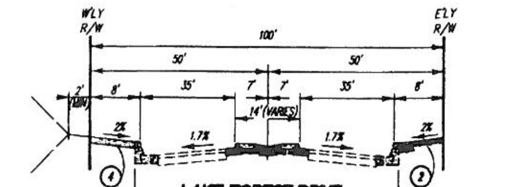
No.	Description	Qty.	Unit
61	CONST. 8" V.C.P. SEWER MAIN PER L.A.W.D. STD. PLAN S-5 OR APPROVED EQUAL	3,017	LF
62	.	.	LF
63	CONST. 6" V.C.P. OR APPROVED EQUAL SEWER LATERAL AT 2% SLOPE MIN.	737	LF
64	CONST. 48" SEWER MANHOLE PER L.A.W.D. STD. PLAN S-1	11	EA
65		.	EA
66	REMOVE PLUG AND JOIN EXIST. SEWER TO THE SATISFACTION OF L.A.W.D. INSPECTOR	1	LS
67	CONST. 72" SEWER MANHOLE PER L.A.W.D. STD. PLAN S-1	2	EA
68	INSTALL 8" SEWER END PLUG	4	EA
69	INSTALL 8" SEWER STUB (L = 4.0') AT 2.0%	4	EA

PRIVATE FIRE LINE :

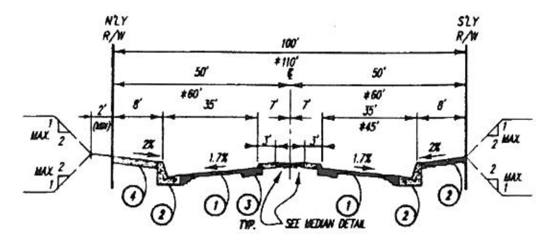
No.	Description	Qty.	Unit
A	INSTALL 8" P.V.C. (A.W.W.A. C-900) CLASS 150 DOMESTIC WATER LINE PER L.A.W.D. STANDARDS	191	LF
B	INSTALL 6" P.V.C. (A.W.W.A. C-900) CLASS 150 DOMESTIC WATER LINE PER L.A.W.D. STANDARDS	191	LF
C	INSTALL THRUSTBLOCKS AS REQUIRED PER L.A.W.D. STD. PLAN NO. W-9	3	EA
D	INSTALL 6" DIA. D.I.P. 90° ELBOW	3	EA
E	CONST. 4 WAY F.D.C. & CHECK VALVE.	1	EA



MEDIAN TYPICAL SECTION
N.T.S.
EXCEPT WHERE FULL-WIDTH MEDIAN HARDSCAPE IS NOTED ON PLAN

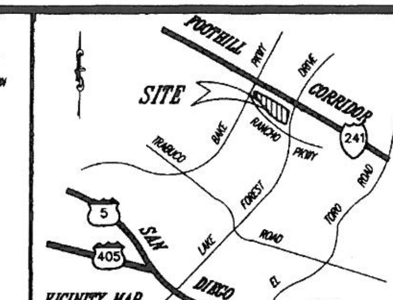


LAKE FOREST DRIVE
N.T.S.



RANCHO PARKWAY
N.T.S.

FROM STA. 54+05 TO STA. 67+65.00
* FROM STA. 47+38.51 TO STA. 49+95
NOTE: TRANSITIONS BETWEEN ST. 49+95 TO 54+05



VICINITY MAP
N.T.S.

IMPORTANT NOTES

1. PLEASE NOTIFY THE TRABUCO CANYON WATER DISTRICT AT LEAST 48 HOURS IN ADVANCE OF ANY CONSTRUCTION ACTIVITY. CONTACT BRIAN LEE, DISTRICT ENGINEER, AT (949) 858-0277
2. CAUTION ! THE TRABUCO CANYON WATER DISTRICT WATER LINE IS A HIGH PRESSURE SYSTEM. WATER PRESSURE IN THE PIPELINE MAY EXCEED 250 PSI. EXERCISE DUE CARE DURING CONSTRUCTION NEAR THIS FACILITY.

DECLARATION OF RESPONSIBLE CHARGE

I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PLANS AND SPECIFICATIONS BY THE CITY OF LAKE FOREST IS CONFINED TO REVIEW ONLY, AND DOES NOT RELIEVE ME AS ENGINEER OF WORK OF MY RESPONSIBILITIES FOR THE PROJECT.

HOLD HARMLESS & INDEMNIFICATION CLAUSE

THE CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY, AND HOLD THE CITY OF LAKE FOREST, THE OWNER, AND THE PRIVATE ENGINEERS HARMLESS FROM ANY LIABILITY; REAL OR ALLEGED, IN CONNECTION WITH PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR CONSULTING ENGINEER OR THE CITY OF LAKE FOREST.

EXISTING UNDERGROUND STRUCTURES

ALL UNDERGROUND UTILITIES OR STRUCTURES REPORTED BY THE OWNER OR OTHERS, AND THOSE SHOWN ON THE RECORDS EXAMINED, ARE INDICATED WITH THEIR APPROXIMATE LOCATION AND EXTENT. THE CONTRACTOR, BY ACCEPTING THESE PLANS OR PROCEEDING WITH IMPROVEMENTS PURSUANT THERETO, AGREES TO ASSUME LIABILITY AND TO HOLD UNDERSIGNED HARMLESS FOR ANY DAMAGES RESULTING FROM THE EXISTING OF UNDERGROUND UTILITIES OR STRUCTURES NOT REPORTED TO THE UNDERSIGNED, NOT INDICATED ON THE PUBLIC RECORDS EXAMINED. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT UTILITIES AS IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE OWNERS OF THE UTILITIES OR STRUCTURES CONCERNED BEFORE STARTING WORK.

NOTICE TO CONTRACTOR

1. CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND SHALL REPORT ALL DISCREPANCIES TO THE ENGINEER PRIOR TO THE COMMENCEMENT OF WORK. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ALL WORK IF PRIOR NOTICE IS NOT GIVEN FOR DISCREPANCIES.
2. CONTRACTOR SHALL VERIFY HORIZONTAL AND VERTICAL ALIGNMENT OF EXISTING UTILITIES PRIOR TO COMMENCING ANY CONSTRUCTION.
3. ANY AND ALL QUANTITIES SHOWN ON THESE PLANS ARE NOT WARANTEED AND THE CONTRACTOR SHALL PERFORM AND BID ACCORDING TO HIS OWN ESTIMATE OF QUANTITIES.
4. THE CONTRACTOR IS RESPONSIBLE FOR ALL GRADING INCLUDING BUT NOT LIMITED TO ALL IMPORT AND/OR EXPORT AND CONSTRUCTING ALL GRADES PER THE CONSTRUCTION DOCUMENTS. NO CHANGE ORDERS SHALL BE CONSIDERED CONSIDERED CONCERNING ANY IMPORT OR EXPORT OF MATERIAL.

CONTRACTOR SHALL ENSURE THE FOLLOWING :

A. ALL CONSTRUCTION VEHICLES OR EQUIPMENT, FIXED OR MOBILE, OPERATED WITHIN 1000 FEET OF A DWELLING SHALL BE EQUIPPED WITH PROPERLY OPERATING AND MAINTAINED MUFFLERS.

B. ALL OPERATIONS SHALL COMPLY WITH ORANGE COUNTY CODIFIED ORDINANCE DIVISION 6 (NOISE CONTROL).

C. STOCKPILING AND/OR VEHICLE STAGING AREAS SHALL BE LOCATED AS FAR AS PRACTICABLE FROM DWELLINGS.

BASIS OF BEARINGS:

THE CENTERLINE OF LAKE FOREST DRIVE BEING NORTH 14°29'27" EAST AS SHOWN ON TRACT MAP NO. 13932 IN BOOK 657 PAGES 27 THROUGH 32, INCLUSIVE OF MISCELLANEOUS MAPS IN THE OFFICE OF THE COUNTY RECORDER OF ORANGE COUNTY, STATE OF CALIFORNIA.

LEGAL DESCRIPTION

ALL THE CERTAIN LAND SITUATED IN THE STATE OF CALIFORNIA, COUNTY OF ORANGE, CITY OF LAKE FOREST, DESCRIBED AS FOLLOWS:

PARCEL 1:

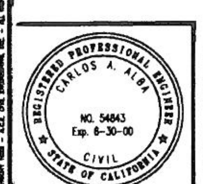
PARCEL 2 AS SHOWN ON THE MAP ATTACHED TO THE CERTIFICATE OF COMPLIANCE CC 97-003 RECORDED AUGUST 26, 1997 AS INSTRUMENT NO. 19970415117 OF OFFICIAL RECORDS OF ORANGE COUNTY, CALIFORNIA.

PARCEL 2:

LOT 22 OF TRACT NO. 13932, AS SHOWN ON A MAP FILED IN BOOK 657, PAGES 26 THROUGH 32 INCLUSIVE OF MISCELLANEOUS MAPS, RECORDS OF ORANGE COUNTY, CALIFORNIA.

PARCEL 3:

LOT C OF TRACT NO. 13932, AS SHOWN ON A MAP FILED IN BOOK 657, PAGES 26 THROUGH 32 INCLUSIVE, OF MISCELLANEOUS MAPS, RECORDS OF ORANGE COUNTY, CALIFORNIA.



IMPORTANT NOTICE

SECTION 4212/4217 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A PERMIT TO EXCAVATE WILL BE VALID. FOR YOUR DIG ALERT ID NUMBER CALL UNDERGROUND SERVICE ALERT TOLL FREE 1-800-422-4133 TWO WORKING DAYS BEFORE YOU DIG

BENCHMARK :

DESCRIBED BY ORANGE COUNTY SURVEY 1980 AT THE NORTHEAST PORTION OF THE INTERSECTION OF LAKE FOREST DRIVE, AND VISTA TERRACE, 47 FT. EASTERLY OF THE CENTERLINE OF LAKE FOREST DRIVE, 50 FT. NORTHERLY OF THE CENTERLINE OF VISTA TERRACE, 17 FT. NORTHERLY OF A STREET STANDARD, SET AT A 11 FT. BY 4 FT. CATCH BASIN, 4.5 FT. BEHIND CURB FACE.
OCS B.M. # 3U-20-80 NAVD88/ 1985 OCS ADJ: 731.926

OWNER/ DEVELOPER:

STEADFAST PROPERTIES
2424 S.E. BRISTOL, #350
NEWPORT BEACH, CA 92660
TEL : (949) 852-0700 FAX : (949) 852-0143

PREPARED UNDER THE SUPERVISION OF :

MR. CARLOS A. ALBA, R.C.E 54843, EXP 6-30-00

A.C.E. CIVIL ENGINEERING, INC.

3187-C AIRWAY AVENUE
COSTA MESA, CALIFORNIA 92626
TEL : (714) 641-3300 FAX : (714) 545 - 5623

APPROVED FOR STORM DRAIN IMPROVEMENTS ONLY:

9-24-99
ROBERT L. WOODINGS, P.E. DATE
PUBLIC WORKS DIRECTOR / CITY ENGINEER

SD-1007

LOS ALISOS WATER DISTRICT UTILITY APPROVALS

LAWD PROJECT # 98011

FOR SEWER IMPROVEMENTS :	FOR SEWER SYSTEM OPERATIONS :
LOS ALISOS WATER DISTRICT : ____ DATE	LOS ALISOS WATER DISTRICT : ____ DATE
FOR WATER IMPROVEMENTS :	**FOR WATER SYSTEM OPERATIONS :**
LOS ALISOS WATER DISTRICT : ____ DATE	LOS ALISOS WATER DISTRICT : ____ DATE
FOR RECLAIMED WATER IMPROVEMENTS :	**FOR RECLAIMED WATER SYSTEM OPERATIONS :**
LOS ALISOS WATER DISTRICT : ____ DATE	LOS ALISOS WATER DISTRICT : ____ DATE

FOR FIRE PROTECTION :
ORANGE COUNTY FIRE AUTHORITY: (FIRE HYDRANT & ACCESS ONLY)
____ DATE

REVISIONS

NO.	DATE	BY	DESCRIPTION	APPV
1	10-12-99	C.A.A.	REVISED SHEET 10 STORM DRAIN PLAN	

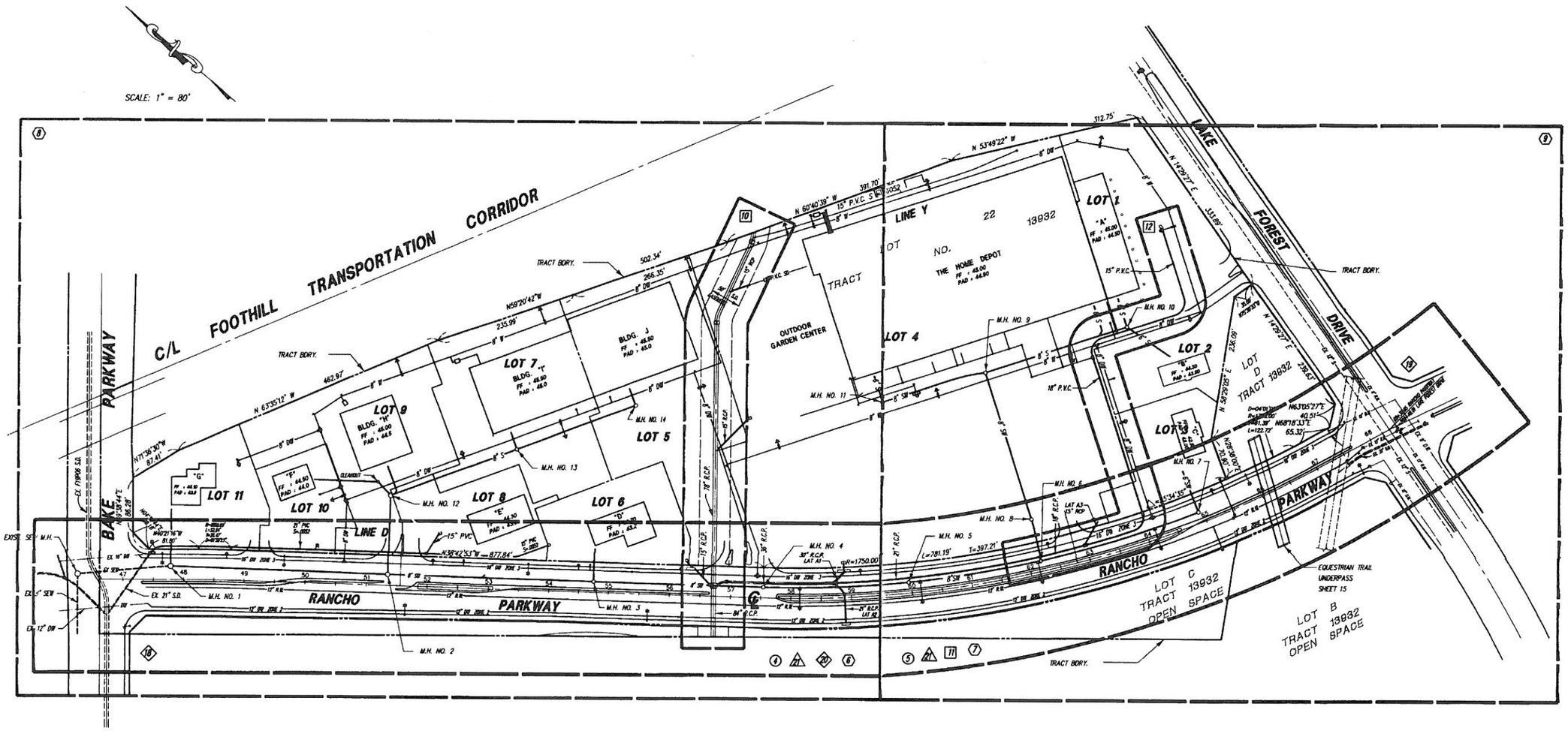
APPROVED FOR CONSTRUCTION IN PUBLIC RIGHT-OF-WAY ONLY
____ DATE
ROBERT L. WOODINGS, P.E.
PUBLIC WORKS DIRECTOR / CITY ENGINEER

IMPROVEMENT PLANS
LAKE FOREST CORRIDOR CENTER, P.M. 99-103
SDP 99-01
20021 LAKE FOREST DRIVE
LAKE FOREST, CA. 92630

CITY OF LAKE FOREST
PUBLIC WORKS DEPARTMENT
SD-1007
SHEET 1 OF 7

09730/ 2108/ 1140
98-0118 \ SIP1.DWG

SCALE: 1" = 80'



SHEET INDEX

SHT.	DESCRIPTION
1.	VICINITY MAP, BENCHMARK, BASIS OF BEARINGS, NOTICE TO CONTRACTOR AND SIGNATURE BLOCKS.
2.	INDEX MAP, SHEET LEGEND AND NOTES.
3.	GENERAL AND UTILITY NOTES.
4.	RANCHO PARKWAY STREET IMPROVEMENT PLANS; PLAN AND PROFILE: FROM STA. 46+61.51 TO STA. 59+50.
5.	RANCHO PARKWAY STREET IMPROVEMENT PLANS; PLAN AND PROFILE: FROM STA. 59+50 TO STA. 68+36.05.
6.	RANCHO PARKWAY WATER AND SEWER; PLAN AND PROFILE FROM STA. 46+61.51 TO STA. 59+00.
7.	RANCHO PARKWAY WATER AND SEWER; PLAN AND PROFILE FROM STA. 59+00 TO STA. 68+00.
8.	WATER AND SEWER IMPROVEMENT PLANS ON SITE, PARCEL MAP NO. 99-103.
9.	WATER AND SEWER IMPROVEMENT PLANS ON SITE, PARCEL MAP NO. 99-103.
10.	F19-P07 STORM DRAIN IMPROVEMENT PLAN FOR PARCEL MAP NO. 99-103.
11.	LINE "A" STORM DRAIN IMPROVEMENT PLAN FOR PARCEL MAP NO. 99-103.
12.	LINE "A" STORM DRAIN IMPROVEMENT PLAN FOR PARCEL MAP NO. 99-103.
13.	MASONRY RETAINING WALL
14.	DETAILS EQUESTRIAN UNDERCROSSING.
15.	SPECIFICATIONS OF EQUESTRIAN UNDERCROSSING.
16.	STRIPING DETAILS.
17.	TRAFFIC SIGNAL @ RANCHO PKWY & BAKE.
18.	TRAFFIC SIGNAL PLANS @ LAKE FOREST & RANCHO PKWY.
19.	TRAFFIC SIGNAL PLANS @ RANCHO PKWY & MALL ENTRANCE DRWY.
20.	TRAFFIC STRIPING PLANS FOR RANCHO PARKWAY.
21.	TRAFFIC SIGNAL INTERCONNECT PLAN

STREET LEGEND
- STREET LIGHTING
- STREET CENTERLINE
- TRACT BOUNDARY

SHEET NO. LEGEND
- STREET PLAN
- SEWER AND WATER PLAN
- SIGNING AND STRIPING
- STORM DRAIN
- CONDUIT PLANS
- TRAFFIC SIGNAL PLANS

SEWER LEGEND
- SW — PROPOSED SEWER MAIN
- SW — EXISTING SEWER MAIN
- PROPOSED MANHOLE
- EXISTING MANHOLE
- SEWER LATERAL

STORM DRAIN LEGEND
- PROPOSED STORM DRAIN
- PROPOSED CATCH BASIN
- EXISTING STORM DRAIN

WATER LEGEND
- DW — PROPOSED DOMESTIC WATER MAIN (ZONE II OR III PER PLAN)
- DW — EXISTING DOMESTIC WATER PLAN (ZONE II OR III PER PLAN)
- RW — PROPOSED RECLAIMED WATER MAIN
- RW — RECLAIMED WATER MAIN (EXIST)
- WATER VALVE
- FIRE HYDRANT
- AIR RELEASE
- BLOWOFF
- REDUCER
- END PLUG
- WATER SERVICE LATERAL
- EXISTING WATER VALVE
- THRUST BLOCK

GRAPHIC SCALE
80 0 40 80 160
(IN FEET)
1 inch = 80 ft.

REGISTERED PROFESSIONAL ENGINEER — CARLOS A. ALBA — NO. 54843 Exp. 6-30-00 — CIVIL — STATE OF CALIFORNIA

OWNER/ DEVELOPER:
STEADFAST PROPERTIES
2424 S.E. BRISTOL, #250
NEWPORT BEACH, CA 92660
TEL : (949) 852-0700 FAX : (949) 852-0143

PREPARED UNDER THE SUPERVISION OF :
MR. CARLOS A. ALBA, R.C.E. 54843 , EXP. 6-30-00

A.C.E. CIVIL ENGINEERING, INC.
3187-C AIRWAY AVENUE
COSTA MESA, CALIFORNIA 92626
TEL : (714) 641-3300 FAX : (714) 545 - 5823

DATE	BY	DESCRIPTION	APPV

REVISIONS

SD-1007

INDEX MAP, SHEET LEGEND & NOTES
LAKE FOREST CORRIDOR CENTER, P.M. 99-103
SDP 99-01
20021 LAKE FOREST DRIVE
LAKE FOREST, CA. 92630

CITY OF LAKE FOREST
PUBLIC WORKS DEPARTMENT

SD-1007
SHEET 2 OF 7

09730/ 2108/ 1140 J.N. 98-010, SDP2-INDEX-MAP.DWG

COPYRIGHT 1999 — A.C.E. CIVIL ENGINEERING, INC. — ALL RIGHTS RESERVED

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE GRADING CODE OF THE LOCAL JURISDICTION AND ANY SPECIAL REQUIREMENTS OF THE PERMIT. A COPY OF THE GRADING CODE SHALL BE RETAINED ON THE JOB SITE WHILE WORK IS IN PROGRESS. WHEN REFERENCED ON THE PLANS, A COPY OF E.M.A. OR LOCAL JURISDICTION SHALL ALSO BE RETAINED ON THE SITE.
2. GRADING SHALL NOT BE STARTED WITHOUT FIRST NOTIFYING THE GRADING INSPECTOR. A PRE-GRADING MEETING ON THE SITE IS REQUIRED BEFORE START OF GRADING WITH THE FOLLOWING PEOPLE PRESENT: OWNER, GRADING CONTRACTOR, DESIGN CIVIL ENGINEER, SOIL ENGINEER, GEOLOGIST, GRADING INSPECTOR AND WHEN REQUIRED THE ARCHAEOLOGIST AND PALEONTOLOGIST. THE REQUIRED INSPECTIONS FOR GRADING WILL BE EXPLAINED AT THIS MEETING.
3. AN APPROVED COPY OF THE GRADING PLAN SHALL BE ON THE PERMITTED SITE WHILE WORK IS IN PROGRESS.
4. CUT AND FILL SLOPES SHALL BE NO STEEPER THAN 2 FOOT HORIZONTAL TO 1 FOOT VERTICAL (2:1) EXCEPT WHERE SPECIFICALLY APPROVED OTHERWISE.
5. FILLS SHALL BE COMPACTED THROUGHOUT TO A MINIMUM OF 90 PERCENT RELATIVE DENSITY. AGGREGATE BASE OF ASPHALTIC AREAS SHALL BE COMPACTED TO A MINIMUM OF 95 PERCENT RELATIVE DENSITY. MAXIMUM DENSITY SHALL BE DETERMINED BY UNIFORM BUILDING CODE STANDARD NO. 70-2 OR APPROVED EQUIVALENT.
6. AREAS TO RECEIVE FILL SHALL BE PROPERLY PREPARED AND APPROVED IN WRITING BY THE SOIL ENGINEER AND THE BUILDING OFFICIAL PRIOR TO PLACING FILL.
7. FILLS SHALL BE BENCHED INTO COMPETENT MATERIAL PER LOCAL JURISDICTION OR EMA STANDARD PLAN NO. 1322.
8. ALL EXISTING FILLS SHALL BE APPROVED BY THE BUILDING OFFICIAL OR REMOVED PRIOR TO PLACING ADDITIONAL FILLS.
9. ANY EXISTING IRRIGATION LINES AND CISTERNS SHALL BE REMOVED, OR CRUSHED IN PLACE, AND APPROVED BY THE BUILDING OFFICIAL AND SOIL ENGINEER.
10. STOCK PILING OF EXCESS MATERIAL SHALL BE APPROVED BY THE BUILDING OFFICIAL PRIOR TO EXCAVATION.
11. THE DESIGN ENGINEER, AS A CONDITION OF ROUGH GRADE APPROVAL, SHALL PROVIDE A BLUE TOP WITH ACCOMPANYING WITNESS STAKE, SET AT THE CENTER OF EACH PAD REFLECTING THE PAD ELEVATION FOR PRECISE PERMITS AND A BLUE TOP WITH WITNESS STAKE SET AT THE DRAINAGE SWALE HIGH POINT REFLECTING THE HIGH POINT ELEVATION FOR PRELIMINARY PERMITS.
12. ALL TRENCH BACKFILLS SHALL BE TESTED AND APPROVED BY THE SOIL ENGINEER PER THE GRADING CODE.
13. THE ENGINEERING GEOLOGIST AND SOIL ENGINEER SHALL, AFTER CLEARING AND PRIOR TO THE PLACEMENT OF FILL IN CANYONS, INSPECT EACH CANYON FOR AREAS OF ADVERSE STABILITY AND TO DETERMINE THE PRESENCE OR ABSENCE OF SUBSURFACE WATER OR SPRING FLOW. IF NEEDED, SUBDRAINS WILL BE DESIGNED AND CONSTRUCTED PRIOR TO THE PLACEMENT OF FILL IN EACH RESPECTIVE CANYON.
14. SUBDRAIN OUTLETS SHALL BE COMPLETED AT THE BEGINNING OF THE SUBDRAIN CONSTRUCTION.
15. THE EXACT LOCATION OF THE SUBDRAINS SHALL BE SURVEYED IN THE FIELD FOR LINE/GRADE AND REFLECTED ON AS-GRADED PLANS.
16. ALL CUT SLOPES SHALL BE INVESTIGATED BOTH DURING AND AFTER GRADING BY THE ENGINEERING GEOLOGIST TO DETERMINE IF ANY SLOPE STABILITY PROBLEM EXISTS. SHOULD EXCAVATION DISCLOSE ANY GEOLOGICAL HAZARDS OR POTENTIAL GEOLOGICAL HAZARDS, THE ENGINEERING GEOLOGIST SHALL SUBMIT RECOMMENDED TREATMENT TO THE BUILDING OFFICIAL FOR APPROVAL.
17. WHERE SUPPORT OR BUTTRESSING OF CUT AND NATURAL SLOPES IS DETERMINED TO BE NECESSARY BY THE ENGINEERING GEOLOGIST AND SOIL ENGINEER, THE SOIL ENGINEER SHALL SUBMIT DESIGN, LOCATIONS AND CALCULATIONS TO THE BUILDING OFFICIAL PRIOR TO CONSTRUCTION. THE ENGINEERING GEOLOGIST AND SOIL ENGINEER SHALL INSPECT AND CONTROL THE CONSTRUCTION OF THE BUTTRESSING AND CERTIFY TO THE STABILITY OF THE SLOPE AND ADJACENT STRUCTURES UPON COMPLETION.
18. WHEN CUT PADS ARE BROUGHT TO NEAR GRADE, THE ENGINEERING GEOLOGIST SHALL DETERMINE IF THE BEDROCK IS EXTENSIVELY FRACTURED OR FAULTED AND WILL READILY TRANSMIT WATER. IF CONSIDERED NECESSARY BY THE ENGINEERING GEOLOGIST AND SOIL ENGINEER, A COMPACTED FILL BLANKET WILL BE PLACED.
19. THE ENGINEERING GEOLOGIST SHALL PERFORM PERIODIC INSPECTIONS AND SUBMIT A COMPLETE REPORT AND MAP UPON COMPLETION OF THE ROUGH GRADING.
20. THE COMPACTION REPORT AND APPROVAL FROM THE SOIL ENGINEER SHALL INDICATE THE TYPE OF FIELD TESTING PERFORMED. EACH TESTS SHALL BE IDENTIFIED WITH THE METHOD OF OBTAINING THE IN-PLACE DENSITY, WHETHER SAND CONE OR DRIVE RING AND SHALL BE SO NOTED FOR EACH TEST. SUFFICIENT MAXIMUM DENSITY DETERMINATIONS SHALL BE PERFORMED TO VERIFY THE ACCURACY OF THE MAXIMUM DENSITY CURVES USED BY THE FIELD TECHNICIAN.
21. THE SOIL ENGINEER AND ENGINEERING GEOLOGIST SHALL PERFORM SUFFICIENT INSPECTIONS AND BE AVAILABLE DURING GRADING AND CONSTRUCTION TO VERIFY COMPLIANCE WITH THE PLANS, SPECIFICATIONS, AND THE CODE WITHIN THEIR PURVIEW.
22. THE CIVIL ENGINEER SHALL BE AVAILABLE DURING GRADING TO VERIFY COMPLIANCE WITH THE PLANS, SPECIFICATIONS, CODE AND ANY SPECIAL CONDITIONS OF THE PERMIT WITHIN THEIR PURVIEW.
23. THE PERMITTEE IS RESPONSIBLE FOR DUST CONTROL MEASURES.
24. SANITARY FACILITIES SHALL BE MAINTAINED ON THE SITE.
25. THE LOCATION AND PROTECTION OF ALL UTILITIES IS THE RESPONSIBILITY OF THE PERMITTEE.
26. APPROVED PROTECTIVE MEASURES AND TEMPORARY DRAINAGE PROVISIONS SHALL BE USED TO PROTECT ADJOINING PROPERTIES DURING GRADING.
27. ANY EXISTING WATER WELLS SHALL BE ABANDONED IN COMPLIANCE WITH THE SPECIFICATIONS APPROVED BY THE BUILDING OFFICIAL.
28. ANY EXISTING OIL WELLS SHALL BE ABANDONED IN COMPLIANCE WITH THE SPECIFICATIONS APPROVED BY THE BUILDING OFFICIAL.
29. ANY EXISTING CESSPOOLS AND SEPTIC TANKS SHALL BE ABANDONED IN COMPLIANCE WITH THE UNIFORM PLUMBING CODE TO THE APPROVAL OF THE BUILDING OFFICIAL.
30. PRIOR TO FINAL APPROVAL, THE CIVIL ENGINEER SHALL CERTIFY TO THE BUILDING OFFICIAL THE AMOUNT OF EARTH MOVED DURING MOVED DURING THE GRADING OPERATION.
31. THE PERMITTEE SHALL COMPLY WITH THE GRADING CODE REQUIREMENTS WHEN AN EXCESS OF 5,000 CUBIC YARDS OF EARTH IS TRANSPORTED TO OR FROM A PERMITTED SITE ON PUBLIC ROADWAYS.
32. ASPHALT CONCRETE SHALL BE CONSTRUCTED PER THE REQUIREMENTS OF THE LOCAL JURISDICTION STANDARD OR EMA STANDARD PLAN 1805.
33. AGGREGATE BASE SECTION SHALL BE CONSTRUCTED PER LOCAL JURISDICTION STANDARD OR EMA STANDARD PLAN 1804.
34. ALL CONCRETE STRUCTURES THAT COME IN CONTACT WITH THE ON-SITE SOILS SHALL BE CONSTRUCTED WITH TYPE V CEMENT, UNLESS DEEMED UNNECESSARY BY SOLUABLE SULPHATE-CONTENT TESTS CONDUCTED BY THE SOIL ENGINEER.
35. EXPORT SOIL MUST BE TRANSPORTED TO A LEGAL DUMP OR TO A PERMITTED SITE APPROVED BY THE DISTRICT GRADING INSPECTOR.
36. SLOPES EXCEEDING 5 FEET IN HEIGHT SHALL BE PLANTED WITH AN APPROVED PLAN MATERIAL. IN ADDITION, SLOPES EXCEEDING 15' IN HEIGHT SHALL BE PROVIDED WITH AN APPROVED IRRIGATION SYSTEM, UNLESS OTHERWISE APPROVED BY THE BUILDING OFFICIAL.
37. THE ENGINEER SHALL SUBMIT A LETTER OF CERTIFICATION TO THE BUILDING OFFICIAL STATING THAT THE GRADING WAS DONE IN COMPLIANCE WITH THE APPROVED GRADING PLAN.
38. ASPHALT SECTIONS MUST BE PER CODE: PARKING STALLS = 3" A/C OVER 6" A/B, DRIVES 3" A/C OVER 10" (COMMERCIAL) 12" (INDUSTRIAL), OR: PRIOR TO ROUGH GRADE RELEASE FOR BUILDING PERMITS BY THE GRADING INSPECTOR, THE SOIL ENGINEER SHALL SUBMIT FOR APPROVAL PAVEMENT SECTION RECOMMENDATIONS BASED ON "R" VALUE ANALYSIS OF THE SUBGRADE SOILS, AND EXPECTED TRAFFIC INDICES.
39. PRELIMINARY SOIL AND GEOLOGY REPORTS AND ALL SUBSEQUENT REPORTS AS APPROVED BY THE LOCAL JURISDICTION ARE CONSIDERED A PART OF THE APPROVED GRADING PLAN.
40. ALL EXISTING DRAINAGE COURSES THROUGH THIS SITE SHALL REMAIN OPEN UNTIL FACILITIES TO HANDLE STORM WATER ARE APPROVED AND FUNCTIONAL; HOWEVER, IN ANY CASE, THE PERMITTEE SHALL BE HELD LIABLE FOR ANY DAMAGE DUE TO OBSTRUCTING NATURAL DRAINAGE PATTERNS.
41. GRADING OPERATIONS INCLUDING MAINTENANCE OF EQUIPMENT SHALL BE ACCOMPLISHED WITH THE CONFINES OF THE NOISE ORDINANCE AND POLICIES OF THE LOCA JURISDICTION.
42. ROOF GUTTERS SHALL BE INSTALLED TO PREVENT ROOF DRAINAGE FROM FALLING ON MANUFACTURED SLOPES.
43. THE PERMITTEE SHALL BE GIVEN REASONABLE NOTICE TO THE OWNER OF ADJOINING LANDS AND BUILDINGS PRIOR TO BEGINNING EXCAVATIONS WHICH MAY AFFECT THE LATERAL AND SUBJACENT SUPPORT OF THE ADJOINING PROPERTY. THE NOTICE SHALL STATE THE INTENDED DEPTH OF EXCAVATION AND WHEN THE EXCAVATION WILL COMMENCE. THE ADJOINING OWNER SHALL BE ALLOWED AT LEAST 30 DAYS AND REASONABLE ACCESS ON THE PERMITTED PROPERTY TO PROTECT HIS STRUCTURE, IF HE SO DESIRES, UNLESS OTHERWISE PROTECTED BY LAW.

EROSION CONTROL NOTES

44. IN CASE OF EMERGENCY CALL : PATRICK COX
    (WORK) (949) 852-0700
    (CELLULAR PHONE) (949) 632-2772
45. EQUIPMENT AND WORKERS FOR EMERGENCY WORK SHALL BE MADE AVAILABLE ATALL TIMES DURING THE RAINY SEASON. NECESSARY MATERIALS SHALL BE AVAILABLE ON-SITE AND STOCKPILED AT CONVENIENT LOCATIONS TO FACILITATE RAPID CONSTRUCTION OF TEMPORARY DEVICES WHEN RAIN IS IMMINENT.
46. EROSION CONTROL DEVICES SHALL NOT BE MOVED OR MODIFIED WITHOUT THE APPROVAL OF THE BUILDING OFFICIAL.
47. ALL REMOVABLE EROSION PROTECTION DEVICES SHALL BE IN PLACE AT THE END OF EACH WORKING DAY WHEN A 5-DAY RAIN PROBABILITY FORECAST EXCEEDS 40 PERCENT.
48. AFTER A RAINSTORM ALL SILT AND DEBRIS SHALL BE REMOVED FROM STREETS, CHECK BERMS, AND BASINS.
49. GRADED AREAS ON THE PERMITTED AREA PERIMETER MUST DRAIN AWAY FROM THE FACE OF SLOPES AT THE CONCLUSION OF EACH WORKING DAY. DRAINAGE TO BE DIRECTED TOWARD DESILTING FACILITIES.
50. THE PERMITTEE AND CONTRACTOR SHALL BE RESPONSIBLE AND SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT PUBLIC TRESPASS INTO AREAS WHERE IMPOUNDED WATER CREATES A HAZARDOUS CONDITION.
51. THE UNDERSIGNED CIVIL ENGINEER SHALL INSPECT THE EROSION CONTROL WORK AND ENSURE THAT THE WORK IS IN ACCORDANCE WITH THE APPROVED PLANS.

SIGNATURE [signature] DATE 9/02/99

UNDERGROUND STORAGE TANK REMOVAL

52. IN THE EVENT THAT SOIL CONTAMINATION IS DISCOVERED DURING EXCAVATION AND REMOVAL OF AN EXISTING TANK, WORK SHALL BE STOPPED UNTIL A SITE ASSESSMENT AND MITIGATION PLAN HAS BEEN PREPARED, SUBMITTED AND APPROVED BY A COUNTY HEALTH OFFICER AND THE LOCAL JURISDICTION.
53. ISSUANCE OF A GRADING PERMIT DOES NOT ELIMINATE THE NEED FOR PERMITS FROM OTHER AGENCIES WITH REGULATORY RESPONSIBILITIES FOR CONSTRUCTION ACTIVITIES ASSOCIATED WITH THE WORK AUTHORIZED ON THIS PLAN.

ENVIRONMENTAL NOTES:

54. THE PERMITTEE SHALL NOTIFY ALL GENERAL CONTRACTORS, SUBCONTRACTORS, MATERIAL SUPPLIERS, LESSEES, AND PROPERTY OWNERS THAT DUMPING OF CHEMICALS INTO THE STORM DRAIN SYSTEM OR THE WATERSHED IS PROHIBITED.
55. PERMITTEE SHALL MAINTAIN CONSTRUCTION SITE IN SUCH A CONDITION THAT AN ANTICIPATED STORM DOES NOT CARRY WASTES OR POLLUTANTS OFF THE SITE. POTENTIAL POLLUTANTS INCLUDE BUT ARE NOT LIMITED TO: SOLID OR LIQUID CHEMICAL SPILLS; WASTES FROM PAINTS, STAINS, SEALANTS, GLUES, LIMES, PESTICIDES, HERBICIDES, WOOD PRESERVATIVES AND SOLVENTS; ASBESTOS FIBERS, PAINT FLAKES OR STUCCO FRAGMENTS; FUELS, OILS, LUBRICANTS, AND HYDRAULIC, RADIATOR OR BATTERY FLUIDS; FERTILIZERS, VEHICLE/EQUIPMENT WASH WATER AND CONCRETE WASH WATER; CONCRETE, DETERGENT OR FLOATABLE WASTES; WASTES FROM ANY ENGINE/ EQUIPMENT STEAM CLEANING OR CHEMICAL DEGREASING; AND SUPERCHLORINATED POTABLE WATER LINE FLUSHINGS."
    DURING CONSTRUCTION, PERMITTEE SHALL DISPOSE OF SUCH MATERIALS IN A SPECIFIED AND CONTROLLED TEMPORARY AREA ON-SITE, PHYSICALLY SEPARATED FROM POTENTIAL STORMWATER RUNOFF, WITH ULTIMATE DISPOSAL IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REQUIREMENTS.
56. PERMITTEE MAY DISCHARGE MATERIAL OTHER THAN STORMWATER ONLY WHEN NECESSARY FOR PERFORMANCE AND COMPLETION OF CONSTRUCTION PRACTICES AND WHERE THEY DO NOT: CAUSE OR CONTRIBUTE TO A VIOLATION OF ANY WATER QUALITY STANDARD; CAUSE OR THREATEN TO CAUSE POLLUTION, CONTAMINATION, OR NUISANCE; OR CONTAIN A HAZARDOUS SUBSTANCE IN A QUANTITY REPORTABLE UNDER FEDERAL REGULATIONS 40 CFR PARTS 117 AND 302.
57. DEWATERING OF CONTAMINATED GROUNDWATER, OR DISCHARGING CONTAMINATED SOILS VIA SURFACE EROSION IS PROHIBITED. DEWATERING OF NON-CONTAMINATED GROUNDWATER REQUIRES A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT FROM THE RESPECTIVE STATE REGIONAL WATER QUALITY CONTROL BOARD.
58. "SURVEY MONUMENTS SHALL BE PRESERVED AND REFERENCED BEFORE CONSTRUCTION AND REPLACED AFTER CONSTRUCTION PURSUANT TO SECTION 8771 OF THE BUSINESS AND PROFESSIONS CODE."

STORM DRAIN NOTES

1. ALL CONCRETE IN REINFORCED CONCRETE STRUCTURES MUST BE 3250 PSI IN 28 DAYS. TYPE V PORTLAND CEMENT CONCRETE. CLASS A.
2. ALL PIPE LENGTHS SHALL BE HORIZONTAL PROJECTIONS, UNLESS OTHERWISE SHOWN.
3. SHORING SHALL BE PROVIDED FOR TRENCH EXCAVATIONS IN NATIVE SOIL, TO SATISFY STATE OF CALIFORNIA SAFETY REQUIREMENTS.
4. ALL PIPE CONSTRUCTION WITHIN THE FILL AREA MUST BE COORDINATED WITH THE GRADING WORK, TO ENSURE THAT WHEN THE FILL OPERATION HAS BEEN COMPLETED, AT GRADE, A MINIMUM OF ONE FOOT ABOVE THE TOP OF PIPE OR TO A MAXIMUM OF FIVE FEET ABOVE THE TOP OF PIPE OR TO A MAXIMUM OF FIVE FEET ABOVE THE PROPOSED SUBGRADE OF THE PIPE, THE STORM DRAIN TRENCH SHALL BE EXCAVATED AND THE PIPE INSTALLED.
5. ALL WORK SHALL CONFORM TO THE ORANGE COUNTY PUBLIC FACILITIES & RESOURCES DEPARTMENT'S (PF&RD) STANDARD SPECIFICATIONS. THESE SPECIFICATIONS, WHICH CAN BE PURCHASED FROM THE COUNTY, SHALL BE KEPT ON THE JOB SITE AT ALL TIMES.
6. THE CONTRACTOR MUST NOTIFY THE CITY OF LAKE FOREST'S PUBLIC WORKS OBSERVER AT LEAST TWO (2) WORKING DAYS PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION. (714) 461-3484.
7. ALL FILLS SHALL BE COMPACTED TO 90 % RELATIVE COMPACTION AS DETERMINED BY THE CALIFORNIA TEST METHOD NO. 216-F, 1983 "FIVE LAYER METHOD." ALL BACKFILL MATERIAL MUST BE FREE OF ORGANIC MATTER.
8. THE CONTRACTOR OR DEVELOPER SHALL PROVIDE ALL SURVEYING REQUIRED FOR VERTICAL AND HORIZONTAL ALIGNMENT. AT THE REQUEST OF THE CITY OF LAKE FOREST SUFFICIENT REFERENCE STAKING SHOULD BE PROVIDED.
9. ALL REINFORCED CONCRETE PIPE SHALL BE BEDDED IN ACCORDANCE WITH PIPE BEDDING DETAIL PER PF&RD STANDARD PLAN 1318.
10. PRIOR TO THE PLACEMENT OF STORM DRAIN IMPROVEMENTS, THE DEVELOPER'S SOILS ENGINEER SHALL CERTIFY IN WRITING TO THE DIRECTOR OF PUBLIC WORKS/CITY ENGINEER THAT THE STORM DRAIN'S SUBGRADE IS OF ADEQUATE STRENGTH TO SUPPORT THE STRUCTURES AND ANY ANTICIPATED LOADS.
11. PRIOR TO BEGINNING CONSTRUCTION WORK, THE DEVELOPER'S CONTRACTOR SHALL OBTAIN A PERMIT FROM THE STATE DIVISION OF INDUSTRIAL SAFETY. A COPY OF THE PERMIT SHALL BE KEPT ON THE JOB SITE AT ALL TIMES.
12. WHEN APPLICABLE, THE DEVELOPER SHALL OBTAIN A PERMIT FROM THE STATE DEPARTMENT OF FISH AND GAME IN ACCORDANCE WITH SECTION 1602 OF CALIFORNIA FISH AND GAME CODE PRIOR TO COMMENCEMENT OF CONSTRUCTION.
13. ALL CONTINUOUS STEEL SHALL BE LAPPED A MINIMUM OF 45 BAR DIAMETERS.
14. ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 3/4 INCH MINIMUM.
15. A CITY OF LAKE FOREST ENCROACHMENT PERMIT WILL BE REQUIRED TO PERFORM WORK WITHIN THE PUBLIC RIGHT-OF-WAY. ALL WORK SHALL CONFORM TO THE STANDARD PROVISIONS LISTED ON THE ENCROACHMENT PERMIT.
16. THE LENGTH OF MANHOLE STRUCTURES MAY BE INCREASED TO MEET PIPE ENDS AS LONG AS THE REINFORCING STEEL IS CONTINUED AS REQUIRED. THE DIRECTOR OF PUBLIC WORKS/CITY ENGINEER OR HIS AUTHORIZED REPRESENTATIVE MUST APPROVE ANY CHANGE IN SPUR LOCATION.
17. THE FLOOR OF THE MANHOLE STRUCTURES SHALL BE STEEL TROWELED TO THE SPRING LINE.
18. THE BODY OF THE MANHOLE STRUCTURES, INCLUDING SPUR, MUST BE POURED IN ONE CONTINUOUS OPERATION. A CONSTRUCTION JOINT AT THE SPRING LINE, WITH A LONGITUDINAL KEYWAY, WILL BE PERMITTED.
19. ALL REINFORCING BARS MUST BE SECURELY HELD IN PLACE IN THE FORMS. EACH MAT OF STEEL MUST BE TIE-WIRED TOGETHER TWO WAYS AT ALTERNATE INTERSECTIONS.
20. STORM DRAIN BACKFILL FOR ALL FACILITIES WITHIN THE PUBLIC RIGHT-OF-WAY SHALL BE PLACED AND COMPACTED IN THE PRESENCE OF THE CITY OF LAKE FOREST'S PUBLIC WORKS OBSERVER AND MEET OR EXCEED PF&RD MINIMUM STANDARDS.
21. ALL PIPES SHALL BE BANDED AND GROUTED.
22. ALL AREA DRAIN PIPES SHALL BE:
    A. ACRYLONITRILE BUTADIENE STYRENE (ABS) SOLID WALL PIPE CONFORMING TO ASTM D2751, SDR35;
    B. POLYVINYL CHLORIDE
    C. PLASTIC (PVC) PIPE CONFORMING TO ASTM D3034, SDR35;
    C. ASBESTOS CEMENT PIPE CONFORMING TO ASTM C-663; OR
    D. AN APPROVED EQUAL.
23. RCP SHALL COMPLY WITH ALL ASTM APPLICABLE STANDARDS.
24. CONSTRUCTION MATERIALS AND METHODS SHALL BE SUBJECT TO APPROVAL BY THE DIRECTOR OR PUBLIC WORKS/CITY ENGINEER OR HIS AUTHORIZED REPRESENTATIVE.
25. CONSTRUCTION HOURS OF OPERATION SHALL BE BETWEEN 7:00 A.M. AND 3:30 P.M., MONDAY THROUGH FRIDAY. CONSTRUCTION DURING HOURS OTHER THAN THOSE SPECIFIED SHALL REQUIRE A WRITTEN AUTHORIZATION FROM THE DIRECTOR OF PUBLIC WORKS/CITY ENGINEER.
26. STATE LAW SB 3019 REQUIRES THE CONTRACTOR TO OBTAIN AN IDENTIFICATION NUMBER FROM UNDERGROUND SERVICE ALERT (USA) PRIOR TO THE ISSUANCE OF A CITY ENCROACHMENT PERMIT. THE CONTRACTOR SHALL NOTIFY USA TWO FULL WORKING DAYS (MINIMUM OF 48 HOURS) PRIOR TO ANY CONSTRUCTION ACTIVITIES, INCLUDING PAVEMENT REMOVAL, EXCAVATION AND ASPHALT CONCRETE OVERLAY, WHICH COULD AFFECT UNDERGROUND UTILITIES.
27. ANY CONTRACTORS OR SUBCONTRACTORS PERFORMING WORK ON THIS PROJECT SHALL FAMILIARIZE THEMSELVES WITH THE SITE AND BE RESPONSIBLE FOR ANY DAMAGE TO EXISTING FACILITIES RESULTING DIRECTLY OR INDIRECTLY FROM THEIR OPERATIONS, WHETHER OR NOT SUCH FACILITIES ARE SHOWN ON THE PLANS.
28. PRIOR TO BEGINNING ANY CONSTRUCTION WORK WHICH COULD DAMAGE OR CONFLICT WITH UNDERGROUND STRUCTURES OR UTILITIES, THE CONTRACTOR SHALL EXCAVATE INSPECTION HOLES TO DETERMINE THE LOCATION AND DEPTH OF SAID STRUCTURES AND UTILITIES.
29. PRIOR TO TAKING WATER FROM A FIRE HYDRANT, THE CONTRACTOR SHALL MAKE ARRANGEMENTS TO OBTAIN A HYDRANT WATER METER FROM THE RESPONSIBLE WATER DISTRICT.
30. IF UTILITIES OR OTHER FACILITIES CONFLICT WITH THE PROPOSED IMPROVEMENTS, WORK SHALL STOP AND THE DIRECTOR OF PUBLIC WORKS/CITY ENGINEER OR HIS AUTHORIZED REPRESENTATIVE, SHALL BE NOTIFIED IMMEDIATELY.
31. THE CONTRACTOR SHALL REPAIR OR REPLACE ANY DAMAGED OR ALTERED EXISTING IMPROVEMENTS WITHIN THE PUBLIC RIGHT-OF-WAY AS DIRECTED BY THE DIRECTOR OF PUBLIC WORKS/CITY ENGINEER OR HIS AUTHORIZED REPRESENTATIVE.
32. THE CONTRACTOR SHALL MAINTAIN DUST CONTROL AT ALL TIMES.
33. SURVEY MONUMENTS SHALL BE PROTECTED AND PERPETUATED IN PLACE. DISTURBED OR COVERED MONUMENTS SHALL BE RESET BY A REGISTERED CIVIL ENGINEER, WHO IS AUTHORIZED TO PRACTICE LAND SURVEYING, OR A LICENSED LAND SURVEYOR.
34. IRRIGATION LINES SHALL BE REMOVED, RELOCATED OR RECONSTRUCTED AS SHOWN OR AS DIRECTED BY THE DIRECTOR OF PUBLIC WORKS/CITY ENGINEER OR HIS AUTHORIZED REPRESENTATIVE, IN THE FIELD.
35. NEW AND EXISTING MANHOLES AND WATER VALVES SHALL BE ADJUSTED TO GRADE.
36. PRIOR TO PAVING OF STREET, ALL UTILITIES SHALL BE INSTALLED, TESTED AND APPROVED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE APPROPRIATE SERVING UTILITY COMPANY AND VERIFYING THAT THE UTILITY FACILITY IS IN PLACE BEFORE PAVING.
37. TRENCH BACKFILL SHALL BE PROVIDED IN ACCORDANCE WITH THE STANDARD PROVISIONS LISTED ON THE ENCROACHMENT PERMIT.
38. THE CONTRACTOR SHALL NOT ORDER OR PLACE ANY CONCRETE OR ASPHALT CONCRETE PAVING UNTIL THE FORMS AND SUBGRADE OR AGGREGATE BASE HAS BEEN INSPECTED AND APPROVED IN THE FIELD BY THE PUBLIC WORKS OBSERVER.
39. THE CONTRACTOR SHALL REMOVE AND REPLACE, IN KIND, A MINIMUM OF 1 FOOT OF EXISTING ASPHALT CONCRETE AND AGGREGATE BASE ADJACENT TO NEWLY CONSTRUCTED CURB AND GUTTER.
40. THE FINAL OR SURFACE LAYER OF ASPHALT CONCRETE SHALL NOT BE PLACED UNTIL ALL ON-SITE IMPROVEMENTS, INCLUDING GRADING HAVE BEEN COMPLETED AND ALL UNACCEPTABLE WORK HAS BEEN CORRECTED, UNLESS OTHERWISE APPROVED BY THE DIRECTOR OF PUBLIC WORKS/CITY ENGINEER OR HIS AUTHORIZED REPRESENTATIVE.
41. "AS-BUILT" RECORD DRAWINGS SHALL BE FURNISHED TO THE CITY UPON COMPLETION OF CONSTRUCTION.
42. APPROVAL OF THESE PLANS BY THE CITY OR ITS AGENTS SHALL NOT RELIEVE THE CONTRACTOR OR THE APPLICANT FROM THE RESPONSIBILITY FOR THE CORRECTION OF ERRORS OR OMISSIONS DISCOVERED DURING CONSTRUCTION. UPON REQUEST, THE APPROPRIATE REVISIONS SHALL BE SUBMITTED TO THE DIRECTOR OF PUBLIC WORKS/CITY ENGINEER AND APPROVAL.

WATER AND SEWER NOTES

WATER :

1. THE WATER SYSTEM SHALL CONFORM TO THE LOS ALISOS WATER DISTRICT'S "STANDARD SPECIFICATIONS FOR DOMESTIC WATER SYSTEM. AS LAST REVISED.
2. THE DISTRICT ENGINEER SHALL BE FURNISHED WITH FOUR COPIES OF APPROVED CONSTRUCTION PLANS PRIOR TO STARTING CONSTRUCTION.
3. THE DISTRICT INSPECTOR SHALL BE NOTIFIED AT LEAST TWO WORKING-DAYS PRIOR TO BEGINNING CONSTRUCTION OR ANY INSPECTION. CALL 714-830-0580.
4. WATER MAINS SHALL BE INSTALLED 6 FEET OFF THE CURB FACE, UNLESS OTHERWISE INDICATED, AND PRIOR TO PAVING OF THE STREETS.
5. FIRE HYDRANTS AND BLOWOFFS SHALL BE INSTALLED IN ACCORDANCE WITH THE APPROPRIATE DETAILS HEREIN AND INSTALLED BEHIND CURBS AND SIDEWALKS WHERE THE SIDEWALKS ARE ADJACENT TO CURBS.
6. METER SERVICES SHALL BE SIZED BY THE LOS ALISOS WATER DISTRICT.
7. THE DEVELOPER SHALL FURNISH THE LOS ALISOS WATER DISTRICT WITH EASEMENTS FOR ALL PORTIONS OF THE SYSTEM OUTSIDE OF THE PUBLIC RIGHT-OF-WAY. THESE EASEMENTS SHALL BE RECORDED PRIOR TO FINAL ACCEPTANCE.
8. ALL FLANGED CONNECTIONS SHALL BE COATED WITH TWO COATS OF 10 MILS EACH OF E C 244 MANUFACTURED BY MINNESOTA MINING AND MANUFACTURING AFTER INSTALLATION INCLUDING NUTS, BOLTS AND FLANGES, AND WRAPPED WITH POLYETHYLENE PER AWWA C105.
9. NO FACILITY IS TO BE BACKFILLED UNTIL INSPECTED BY THE LOS ALISOS WATER DISTRICT.
10. SHUTDOWN OF EXISTING WATER LINES TO FACILITATE CONNECTION TO EXISTING FACILITIES SHALL BE COORDINATED WITH THE LOS ALISOS WATER DISTRICT.
11. ALL HOUSE SERVICES BELOW THE FOLLOWING WATER ZONE ELEVATIONS SHALL BE FURNISHED WITH A PRESSURE REDUCING VALVE SET AT A MAXIMUM PRESSURE OF 80 PSI.

DISTRICT WATER ZONE	PRV REQUIRED BELOW ELEVATION
I	435
II	680
III	885

12. ALL WATER HOUSE LATERALS ARE TO BE LOCATED WITH A LETTER "W" CHISELED IN CURB FACE PER LOS ALISOS WATER DISTRICT SPECIFICATIONS.
13. WATER METERS LOCATED IN DRIVEWAY AREAS WILL NOT BE ACCEPTED. THE DEVELOPER SHALL RELOCATE SUCH METERS TO A LOCATION ACCEPTABLE TO THE DISTRICT INSPECTOR.
14. O.C.E.M.A. STANDARDS SHALL TAKE PRECEDENCE IN CASE OF ANY CONFLICTS WITH ROADWAY SUBGRADE, PAVEMENT, OR LOCATION OR PARKWAY OBSTRUCTIONS WITHIN STREET RIGHT-OF-WAY.
15. A SET OF "AS CONSTRUCTED" RECORD DRAWINGS SHALL BE FURNISHED TO THE DISTRICT PRIOR TO RELEASE OF BONDS.
16. PLAN CHECK REQUIRED FOR SITE DEVELOPMENT. METERS TO BE APPROVED AND INSTALLED AT TIME OF SITE DEVELOPMENT.

SEWER :

1. ALL SANITARY SEWER WORK SHALL CONFORM TO THE "STANDARD SPECIFICATIONS" OF THE LOS ALISOS WATER DISTRICT THE CONTRACTOR SHALL KEEP A COPY OF THE STANDARD SPECIFICATIONS AND DRAWINGS ON THE JOB SITE AT ALL TIMES.
2. FOUR COPIES OF APPROVED CONSTRUCTION PLANS SHALL BE FURNISHED TO THE DISTRICT ENGINEER'S OFFICE PRIOR TO BEGINNING CONSTRUCTION.
3. THE DISTRICT INSPECTOR SHALL BE NOTIFIED AT LEAST TWO WORKING DAYS PRIOR TO ANY INSPECTION. CALL (714) 830-0580.
4. FOUR-INCH, INTERNAL DIAMETER, VCP HOUSE CONNECTIONS ARE TO BE CONSTRUCTED FROM THE SEWER MAIN LINE TO THE PROPERTY LINE FOR EACH LOT OR AS SHOWN ON THE PLANS.
5. ALL SEWER MAINS, HOUSE CONNECTIONS, AND APPURTENANCES SHALL BE CONSTRUCTED PRIOR TO PAVING OF THE STREET.
6. SEWER LENGTHS ARE CALCULATED ON HORIZONTAL DISTANCES.
7. VCP STUBS AND THE FIRST TWO JOINTS OUT OF ALL MANHOLES SHALL BE ONE FOOT MAXIMUM MEASURED FROM THE INSIDE WALL OF THE MANHOLE.
8. THE SURVEYOR SHALL STAKE THE LOCATION OF ALL WYE FITTINGS. ALL HOUSE LATERALS NOT NORMAL TO STREET SEWERS SHALL HAVE END OF LATERAL AT PROPERTY LINE STAKED AND TIED TO A PROPERTY LINE AS SHOWN ON THE PLANS.
9. IT SHALL BE THE RESPONSIBILITY OF THE SEWER CONTRACTOR TO EXPOSE ALL JOINT POINTS TO EXISTING LINES AND TO HAVE THE LOCATION AND ELEVATION VERIFIED BY THE DISTRICT ENGINEER PRIOR TO ANY SEWER STAKES BEING FURNISHED.
10. THE LOS ALISOS WATER DISTRICT WILL INSPECT ALL MAIN LINE SEWERS. THE CITY OF LAKE FOREST BUILDING AND SAFETY DEPARTMENT WILL INSPECT AND CERTIFY ALL HOUSE LATERALS. A MINIMUM OF 10 FEET 4 INCHES OF HOUSE LATERAL SHALL BE INSTALLED AND INSPECTED BY THE CITY OF LAKE FOREST BUILDING AND SAFETY DEPARTMENT AND TESTED JOINTLY WITH THE MAIN LINE UNDER THE JURISDICTION OF THE LOS ALISOS WATER DISTRICT.
11. IN ORDER TO PREVENT ACCIDENTAL USE OF THE NEW SEWER PRIOR TO COMPLETION AND ACCEPTANCE, THE INLET OF THE DOWNSTREAM EXISTING MANHOLE SHOULD BE PLUGGED WITH BRICK AND MORTAR.
12. NO FACILITY SHALL BE BACKFILLED UNTIL INSPECTED BY THE LOS ALISOS WATER DISTRICT.
13. SEWER MAIN OWNERSHIP - UPON COMPLETION OF ALL TESTS AND DEDICATION BY THE DEVELOPER, OPERATION AND MAINTENANCE SHALL BE THE RESPONSIBILITY OF LOS ALISOS WATER DISTRICT.
14. SEWER LATERAL OWNERSHIP - UPON COMPLETION OF ALL TESTS AND ACCEPTANCE BY THE CITY OF LAKE FOREST BUILDING DEPARTMENT, OPERATION AND MAINTENANCE SHALL NOT BE THE RESPONSIBILITY OF LOS ALISOS WATER DISTRICT.
15. PROVIDE A CLEANOUT STUB OUTSIDE OF THE HOUSE OR GARAGE AND IDENTIFY WITH A LANDMARK TO FACILITATE SEWER HOUSE LATERALS AND MAIN LINE CLEANING.
16. ALL SEWER HOUSE LATERALS ARE TO BE LOCATED WITH A LETTER "S" CHISELED IN CURB FACE PER LOS ALISOS WATER DISTRICT SPECIFICATIONS.
17. THE SEWER IMPROVEMENTS AND SEWER SYSTEM OPERATIONS ARE APPROVED, SUBJECT TO FUTURE SEWER SYSTEM OPERATIONS ARE APPROVED, SUBJECT TO FUTURE SEWER DISCHARGES CONFORMING TO THE LOS ALISOS WATER DISTRICT "RULES AND REGULATIONS FOR SEWER CONSTRUCTION, SEWER USE AND INDUSTRIAL WASTE WATER DISCHARGES AND FUTURE REVISIONS."
18. O.C.E.M.A. STANDARDS SHALL TAKE PRECEDENCE IN CASE OF ANY CONFLICTS WITH ROADWAY SUBGRADE, PAVEMENT, OR LOCATION OF PARKWAY OBSTRUCTIONS WITHIN STREET RIGHT-OF-WAY.
19. A SET OF "AS-CONSTRUCTED" RECORD DRAWINGS (MYLARS) SHALL BE FURNISHED TO THE DISTRICT PRIOR TO RELEASE OF BONDS.

RECLAIMED WATER NOTES

1. THE RECLAIMED WATER SYSTEM SHALL CONFORM TO ALL THE LOS ALISOS WATER DISTRICT STANDARD SPECIFICATIONS FOR RECLAIMED WATER SYSTEM AS LAST REVISED.
2. THE DISTRICT ENGINEER SHALL BE FURNISHED WITH FOUR COPIES OF APPROVED CONSTRUCTION PLANS PRIOR TO STARTING CONSTRUCTION.
3. THE DISTRICT INSPECTOR SHALL BE NOTIFIED AT LEAST TWO WORKING DAYS PRIOR TO BEGINNING CONSTRUCTION OR ANY INSPECTION. CA (714) 830-0580.
4. THE DEVELOPER SHALL FURNISH THE LOS ALISOS WATER DISTRICT WITH EASEMENTS FOR ALL PORTIONS OF THE SYSTEM TO BE ACCEPTED BY THE DISTRICT OUTSIDE OF THE PUBLIC RIGHT-OF-WAY. THESE EASEMENTS SHALL BE RECORDED PRIOR TO FINAL ACCEPTANCE.
5. ALL FLANGED CONNECTIONS SHALL BE COATED PER SYSTEM 24 OF SECTION 09900 OF THE STANDARD SPECIFICATIONS, INCLUDING NUTS, BOLTS AND FLANGES, AND WRAPPED WITH POLYETHYLENE PER AWWA C 105.
6. NO FACILITY TO BE BACKFILLED UNTIL INSPECTED BY THE LOS ALISOS WATER DISTRICT.
7. SHUTDOWN OF EXISTING WATER LINES TO FACILITATE CONNECTION TO EXISTING FACILITIES SHALL BE COORDINATED WITH THE LOS ALISOS WATER DISTRICT.
8. A SET OF MYLAR "AS CONSTRUCTED" RECORD DRAWINGS SHALL BE FURNISHED TO THE DISTRICT PRIOR TO RELEASE OF BONDS.

ONSITE RECLAIMED WATER NOTES

(1) THE INSTALLATION OF THE RECLAIMED WATER SYSTEM SHALL CONFORM TO THE RULES AND REGULATIONS FOR THE CONSTRUCTION OF RECLAIMED WATER SYSTEMS WITHIN THE DISTRICT AND THE STANDARD SPECIFICATIONS.

(2) THE DISTRICT SHALL BE NOTIFIED TWO DAYS PRIOR TO THE START OF CONSTRUCTION AT (714) 830-0580 AND EACH WORKDAY THEREAFTER UNTIL COMPLETION OF PROJECT.

(3) ALL ONSITE CONTINUOUSLY PRESSURIZED RECLAIMED AND POTABLE WATER MAIN LINE PIPING INSTALLED ON THIS PROJECT SHALL BE IDENTIFIED IN ACCORDANCE WITH THE DISTRICT'S REGULATIONS AND THE STANDARD SPECIFICATIONS.

(a) WARNING TAPES SHALL BE USED ON ALL CONSTANT PRESSURE MAIN LINE PIPING CARRYING EITHER RECLAIMED OR POTABLE WATER. WARNING TAPES SHALL BE A MINIMUM OF 3 INCHES WIDE AND SHALL RUN CONTINUOUSLY FOR THE ENTIRE LENGTH OF ALL CONSTANT PRESSURE MAIN LINE PIPING. THE TAPE SHALL BE ATTACHED TO THE TOP OF THE PIPE WITH PLASTIC TAPE BANDED AROUND THE WARNING TAPE AND THE PIPE EVERY 5 FEET ON CENTER.

(b) WARNING TAPE FOR THE CONSTANT PRESSURE POTABLE WATER PIPING SHALL BE BLUE IN COLOR WITH THE WORDS "CAUTION BURIED WATERLINE BELOW" IMPRINTED MINIMUM 1-INCH-HIGH LETTERS BLACK IN COLOR. IMPRINTING SHALL BE CONTINUOUS AND PERMANENT.

(c) WARNING TAPE FOR THE CONSTANT PRESSURE RECLAIMED WATER PIPING SHALL BE RED IN COLOR WITH THE WORDS "CAUTION RECLAIMED WATER" IMPRINTED IN MINIMUM 1-INCH HIGH LETTERS BLACK IN COLOR. IMPRINTING SHALL BE CONTINUOUS AND PERMANENT.

(4) ALL PRESSURE MAIN LINE PIPING FROM THE RECLAIMED WATER SYSTEM SHALL BE INSTALLED TO MAINTAIN 10-FOOT-MINIMUM-HORIZONTAL SEPARATION FROM ALL POTABLE WATER PIPING. WHERE RECLAIMED AND POTABLE WATER PRESSURE MAIN LINE PIPING CROSS, THE RECLAIMED WATER PIPING SHALL BE INSTALLED BELOW THE POTABLE WATER PIPING IN A POLYVINYL CHLORIDE (PVC) CLASS 200 PIPE SLEEVE WHICH EXTENDS A MINIMUM OF 5 FEET ON EITHER SIDE OF THE POTABLE WATER PIPING. PROVIDE A MINIMUM VERTICAL CLEARANCE OF 6 INCHES.

(5) ALL AUTOMATIC CONTROLLERS MUST BE SET TO OPERATE BETWEEN THE HOURS OF 9 P.M. AND 6 A.M., UNLESS OTHERWISE DIRECTED BY THE DISTRICT.

(6) CONTACT THE DISTRICT'S OFFICE TWO DAYS PRIOR TO THE IRRIGATION SYSTEM COVERAGE TEST AT (714) 830-0580 AND ARRANGE FOR A WALK THROUGH OF THE SYSTEM.

(7) A SET OF MYLAR "AS CONSTRUCTED" RECORD DRAWINGS SHALL BE FURNISHED TO THE DISTRICT PRIOR TO RELEASE OF BONDS.

NOTICE TO CONTRACTOR

CAUTION: THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO, OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING, AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY FACILITIES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. THE LOCATIONS SHOWN ARE APPROXIMATE AND SHALL BE CONFIRMED IN THE FIELD BY THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING ANY NECESSARY ADJUSTMENTS TO ALIGNMENT AND/OR GRADE OF THE PROPOSED IMPROVEMENTS. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PREVENT DAMAGE TO ANY UTILITY FACILITIES SHOWN AND ANY OTHER FACILITIES NOT SHOWN ON THESE PLANS.

ALL CONTRACTORS AND SUBCONTRACTORS PERFORMING WORK SHOWN ON THESE PLANS AGREE THAT, IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, THEY WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT. THIS INCLUDES PROVIDING FOR THE SAFETY OF ALL PERSONS AND PROPERTY AND SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS. THE CONTRACTORS AND SUBCONTRACTORS FURTHER AGREE TO DEFEND, INDEMNIFY AND HOLD HARMLESS THE DESIGN PROFESSIONAL FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPT FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE DESIGN PROFESSIONAL.

REGISTERED PROFESSIONAL ENGINEER — CARLOS A. ALBA — NO. 54843 — Exp. 6-30-00 — CIVIL — STATE OF CALIFORNIA

SD-1007

OWNER/ DEVELOPER:
STEADFAST PROPERTIES
2424 S.E. BRISTOL, #350
NEWPORT BEACH, CA 92660
TEL : (949) 852-0700 FAX : (949) 852-0143

PREPARED UNDER THE SUPERVISION OF :
[signature]
CARLOS A. ALBA, R.C.E 54843, EXP 6-30-00

A.C.E. CIVIL ENGINEERING, INC.
3187-C AIRWAY AVENUE
COSTA MESA, CALIFORNIA 92626
TEL : (714) 641-3300 FAX : (714) 545 - 5623

DATE	BY	DESCRIPTION	APPV
		REVISIONS	

GENERAL AND UTILITY NOTES
LAKE FOREST CORRIDOR CENTER, P.M. 98-103
SDP 98-01
20021 LAKE FOREST DRIVE
LAKE FOREST, CA. 92630

CITY OF LAKE FOREST
PUBLIC WORKS DEPARTMENT

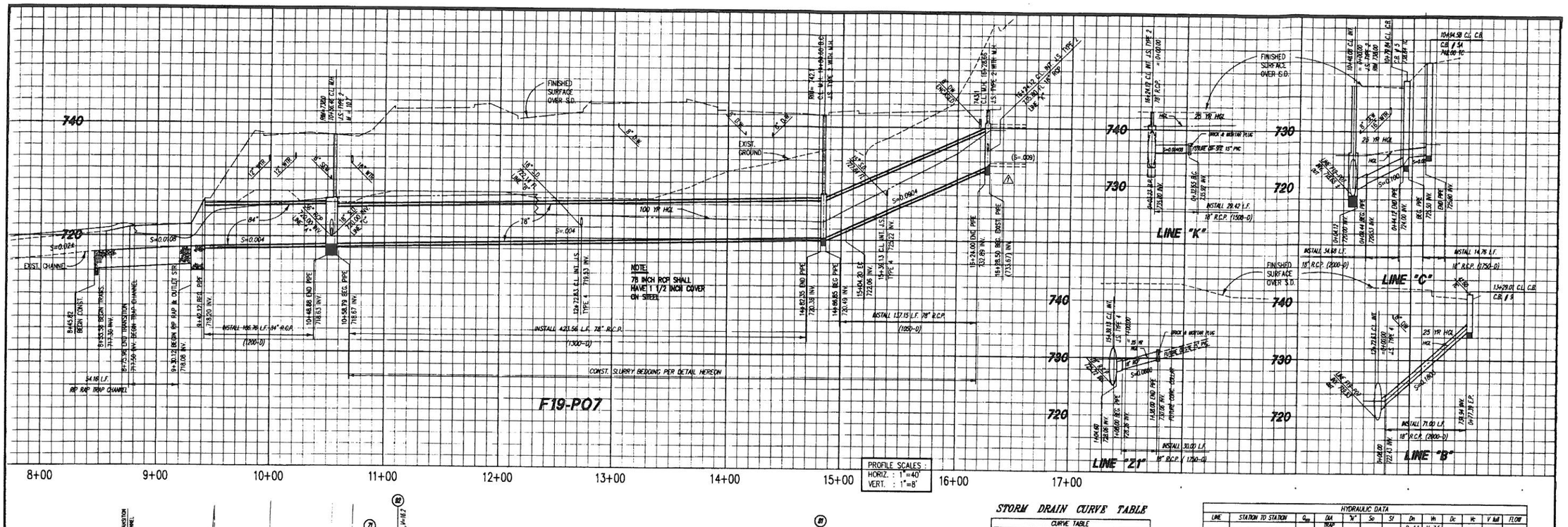
SD-1007
SHEET 3 OF 7

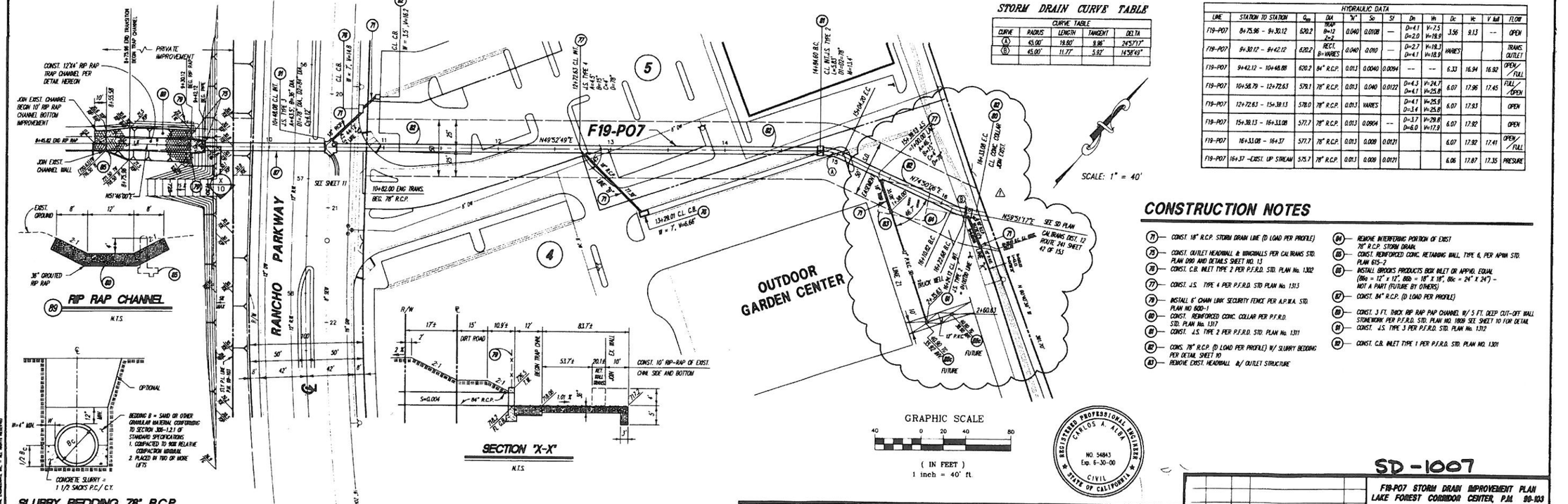
09730/ 2108/ 1140

98-0118 | SP3.DWG

COPYRIGHT 1999 - A.C.E. CIVIL ENGINEERING, INC. - ALL RIGHTS RESERVED

SD-1007





STORM DRAIN CURVE TABLE

CURVE TABLE				
CURVE	RADIUS	LENGTH	TANGENT	DELTA
(A)	45.00'	19.80'	9.86'	24°57'17"
(B)	45.00'	11.77'	5.92'	14°58'49"

HYDRAULIC DATA

LINE	STATION TO STATION	Q_{100}	DIA	"N"	So	Sf	Dn	Vn	Dc	Vc	V full	FLOW
F19-P07	8+75.96 – 9+30.12	620.2	78" R.C.P. B=12 Z=2	0.040	0.0108	—	D=4.1 D=2.0	V=7.5 V=19.9	3.56	9.13	--	OPEN
F19-P07	9+30.12 – 9+42.12	620.2	RECT. B=VARIES	0.040	0.010	—	D=2.7 D=4.1	V=19.1 V=18.9	VARIES			TRANS. OUTLET
F19-P07	9+42.12 – 10+48.08	620.2	84" R.C.P.	0.013	0.0040	0.0094	--	--	6.33	16.94	16.82	OPEN/ FULL
F19-P07	10+58.79 – 12+72.63	579.1	78" R.C.P.	0.013	0.040	0.0122	D=4.3 D=4.1	V=24.7 V=25.8	6.07	17.96	17.45	FULL/ OPEN
F19-P07	12+72.63 – 15+39.13	578.0	78" R.C.P.	0.013	VARIES		D=4.1 D=3.4	V=25.9 V=25.9	6.07	17.93		OPEN
F19-P07	15+39.13 – 16+33.08	577.7	78" R.C.P.	0.013	0.0964	--	D=3.7 D=6.0	V=29.8 V=17.9	6.07	17.92		OPEN
F19-P07	16+33.08 – 16+37	577.7	78" R.C.P.	0.013	0.008	0.0121			6.07	17.92	17.41	OPEN/ FULL
F19-P07	16+37 –EXIST. UP STREAM	575.7	78" R.C.P.	0.013	0.008	0.0121			6.06	17.87	17.35	PRESSURE

CONSTRUCTION NOTES

(71) CONST. 18" R.C.P. STORM DRAIN LINE (D LOAD PER PROFILE)
(73) CONST. OUTLET HEADWALL & WINGWALLS PER CALTRANS STD. PLAN D90 AND DETAILS SHEET NO. 13
(76) CONST. C.B. INLET TYPE 2 PER P.F.R.D. STD. PLAN No. 1302
(77) CONST. J.S. TYPE 4 PER P.F.R.D. STD PLAN No. 1313
(79) INSTALL 6' CHAIN LINK SECURITY FENCE PER A.P.W.A. STD. PLAN NO 600-1
(80) CONST. REINFORCED CONC. COLLAR PER P.F.R.D. STD. PLAN No. 1317
(81) CONST. J.S. TYPE 2 PER P.F.R.D. STD. PLAN No. 1311
(82) CONS. 78" R.C.P. (D LOAD PER PROFILE) W/ SLURRY BEDDING PER DETAIL SHEET 10
(83) REMOVE EXIST. HEADWALL &/ OUTLET STRUCTURE
(84) REMOVE INTERFERING PORTION OF EXIST 78" R.C.P. STORM DRAIN.
(85) CONST. REINFORCED CONC. RETAINING WALL, TYPE 6, PER APWA STD. PLAN 615-2
(88) INSTALL BROOKS PRODUCTS BOX INLET OR APPRD. EQUAL (88a = 12' x 12', 88b = 18' X 18', 88c = 24' X 24') – NOT A PART (FUTURE BY OTHERS)
(87) CONST. 84" R.C.P. (D LOAD PER PROFILE)
(88) CONST. 3 FT. THICK RIP RAP TRAP CHANNEL W/ 5 FT. DEEP CUT-OFF WALL STONEWORK PER P.F.R.D. STD. PLAN NO. 1809 SEE SHEET 10 FOR DETAIL
(91) CONST. J.S. TYPE 3 PER P.F.R.D. STD. PLAN No. 1312
(92) CONST. C.B. INLET TYPE 1 PER P.F.R.D. STD. PLAN NO. 1301

REGISTERED PROFESSIONAL ENGINEER CARLOS A. ALBA NO. 54843 Exp. 6-30-00 CIVIL STATE OF CALIFORNIA

NO.	DATE	BY	DESCRIPTION	APPV
1	10-12-99	C.A.A.	REVISED LINE "K" AND F19P07	

REVISIONS

OWNER/ DEVELOPER:
STEADFAST PROPERTIES
2424 S.E. BRISTOL, #250
NEWPORT BEACH, CA 92660
TEL : (949) 852-0700 FAX : (949) 852-0143

PREPARED UNDER THE SUPERVISION OF :
MR. CARLOS A. ALBA, R.C.E 54843 , EXP 6-30-00

A.C.E. CIVIL ENGINEERING, INC.
3187-C AIRWAY AVENUE
COSTA MESA, CALIFORNIA 92626
TEL : (714) 641-3300 FAX : (714) 545 – 5623

F19-P07 STORM DRAIN IMPROVEMENT PLAN
LAKE FOREST CORRIDOR CENTER, P.M. 98-103
SDP 98-01
20021 LAKE FOREST DRIVE
LAKE FOREST, CA. 92630

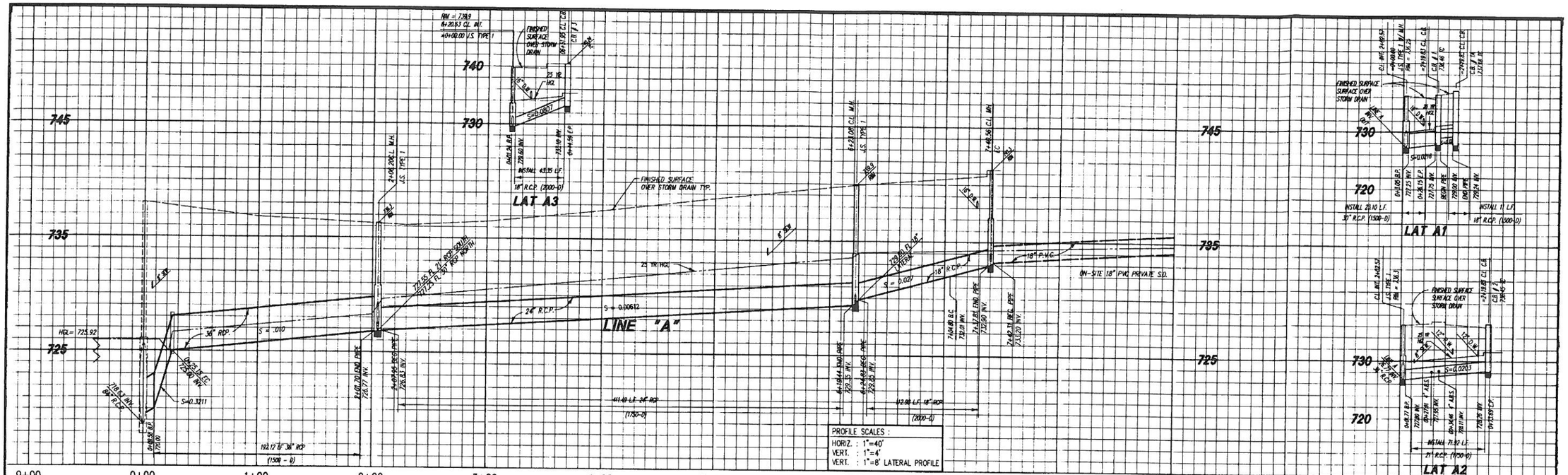
CITY OF LAKE FOREST
PUBLIC WORKS DEPARTMENT

SD-1007
SHEET 6 OF 7

09730/ 2108/ 1140

J.N. 98-0118\ SP10-SD.DWG

SD-1007



CONSTRUCTION NOTES

(70) CONST. MEDIAN UNDERDRAIN PER P.F.R.D. STD. PLAN NO. 1114 AND DETAIL SHEET 1
(71) CONST. 15" R.C.P. STORM DRAIN LINE (D LOAD PER PROFILE)
(72) CONST. 18" R.C.P. STORM DRAIN LINE (D LOAD PER PROFILE)
(73) CONST. 24" R.C.P. STORM DRAIN LINE (D LOAD PER PROFILE)
(74) CONST. 36" R.C.P. STORM DRAIN LINE (D LOAD PER PROFILE)
(75) CONST. J.S. TYPE 1 PER P.F.R.D. STD. PLAN No. 1310.
(78) CONST. C.B. INLET TYPE 2 PER P.F.R.D. STD. PLAN No. 1302
(80) CONST. REINFORCED CONC. COLLAR PER P.F.R.D. STD. PLAN No. 1317
(81) CONST. 30" R.C.P. STORM DRAIN LINE (D LOAD PER PROFILE)
(83) CONST. 21" R.C.P. STORM DRAIN LINE (D LOAD PER PROFILE)

SCALE: 1" = 40'

HYDRAULIC DATA

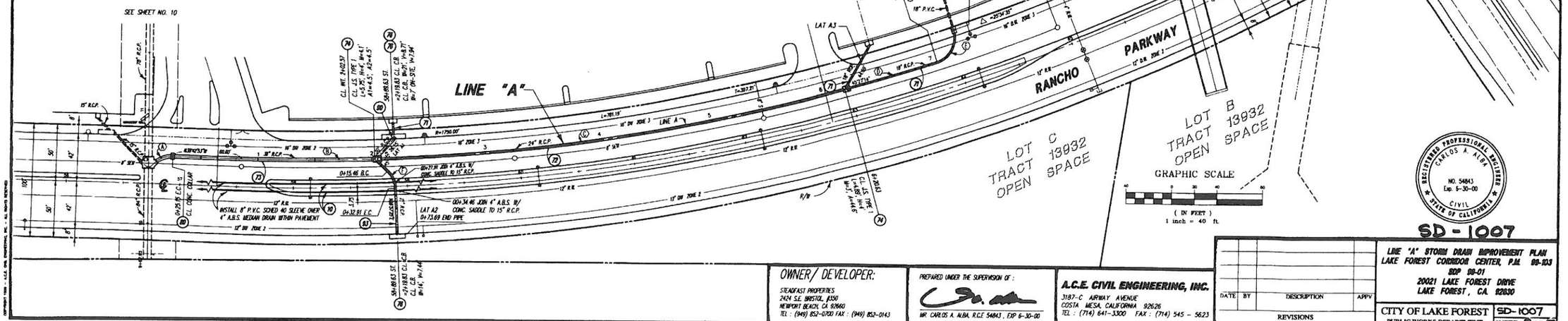
LINE	STATION TO STATION	Q_{25}	BM	"n"	So	SI	Dn	Vn	Dc	Vc	Wsat	FLOW
A	0+08.58 – 0+25.15	35.8	3.00	.013	.3791	.0029	(Dmin=1.04)	Vmax 16.4	1.94	7.38	--	OPEN
A	0+25.15 – 2+01.70	35.8	3.00	.013	.0100	.0029	1.56	9.80	1.94	7.38	--	OPEN
A	2+07.95 – 6+13.44	14.7	1.75	.013	.0100	.0086	--	--	--	--	6.11	FULL
A	6+24.83 – 10+06.00	8.2	1.50	.013	.0060	.0061	1.24	5.25	1.11	5.85	4.63	FULL — SURCH.
A	10+10.50 – 10+72	5.3	1.25	.013	.0060	.0067	--	--	--	--	4.31	FULL
A	10+72 – 13+27.07	4.8	1.25	.013	.0060	.0055	--	--	--	--	3.90	FULL
LAT A1	TO CB IN RANCHO	16.1	2.50	.013	.020	.0021	--	--	--	--	5.28	ENTRANCE CONTROL
LAT A1	FROM CB TO ONSITE	9.7	1.25	.013	.020	.0225	--	--	--	--	7.88	FULL
LAT A2	TO CB IN RANCHO	6.3	1.75	.013	.020	.0016	.63	8.00	.93	4.89	2.61	FULL — SURCH.
LAT A3	TO ONSITE	8.0	1.25	.013	.020	.0153	--	--	--	--	--	--

STORM DRAIN CURVE DATA

CURVE TABLE

CURVE	DELTA	RADIUS	LENGTH	TANGENT
(A)	48°24'18"	22.50'	18.27'	9.64'
(B)	03°46'15"	1775.00'	116.82'	58.43'
(C)	13°29'41"	1775.00'	418.06'	210.00'
(D)	02°43'01"	1775.00'	84.17'	42.08'
(E)	89°48'27"	22.50'	35.27'	22.42'
(F)	44°26'54"	22.50'	17.45'	9.19'

NOTE:
J.S. TYPE 1
H & W DIMENSIONS
ARE ASSUMED FROM
UPSTREAM PIPE INVERT



REGISTERED PROFESSIONAL ENGINEER
CARLOS A. ALBA
NO. 54843
Exp. 6-30-00
CIVIL
STATE OF CALIFORNIA

SD - 1007

OWNER/ DEVELOPER:
STEADFAST PROPERTIES
2424 S.E. BRISTOL, #350
NEWPORT BEACH, CA 92660
TEL : (949) 852-0700 FAX : (949) 852-0143

PREPARED UNDER THE SUPERVISION OF :
MR. CARLOS A. ALBA, R.C.E 54843, EXP. 6-30-00

A.C.E. CIVIL ENGINEERING, INC.
3187-C AIRWAY AVENUE
COSTA MESA, CALIFORNIA 92626
TEL : (714) 641-3300 FAX : (714) 545 – 5623

DATE	BY	DESCRIPTION	APPV
		REVISIONS	

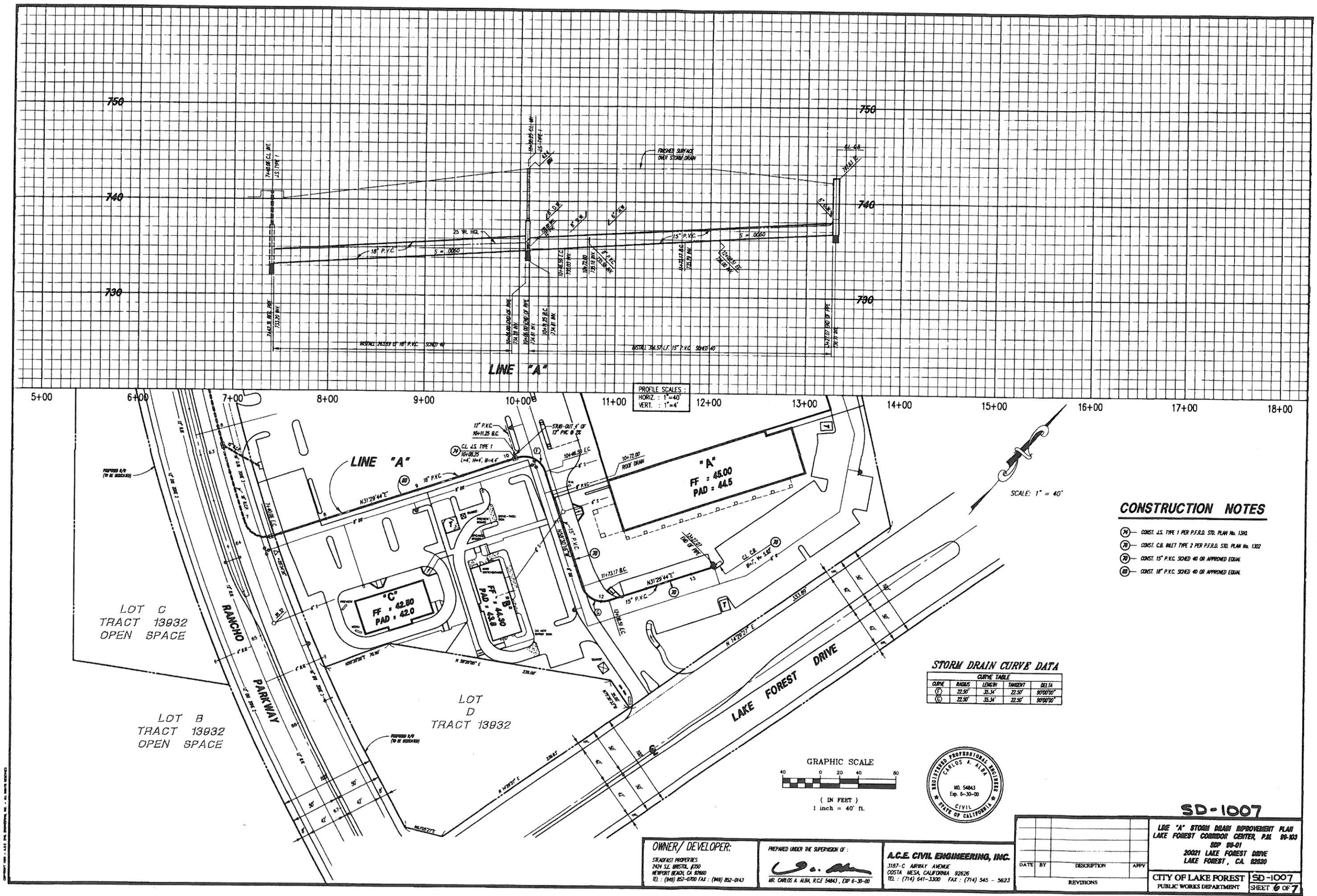
LINE "A" STORM DRAIN IMPROVEMENT PLAN
LAKE FOREST CORRIDOR CENTER, P.M. 88-103
SDP 88-01
20021 LAKE FOREST DRIVE
LAKE FOREST, CA. 92630

CITY OF LAKE FOREST — PUBLIC WORKS DEPARTMENT
SD-1007
SHEET 2 OF 27

09730/ 2108/ 1140

J.N. 98-0118\ SP11-SD-SD.DWG

COPYRIGHT 1998 – A.C.E. CIVIL ENGINEERING, INC. – ALL RIGHTS RESERVED



CONSTRUCTION NOTES

(74) — CONST. L.S. TYPE 1 PER P.F.R.D. STD. PLAN No. 1310
(78) — CONST. C.B. INLET TYPE 2 PER P.F.R.D. STD. PLAN No. 1322
(79) — CONST. 15" P.V.C. SCHED 40 OR APPROVED EQUAL
(80) — CONST. 18" P.V.C. SCHED 40 OR APPROVED EQUAL

STORM DRAIN CURVE DATA

CURVE TABLE

CURVE	RADIUS	LENGTH	TANGENT	DELTA
(F)	22.50'	35.34'	22.50'	90°00'00"
(G)	22.50'	35.34'	22.50'	90°00'00"

REGISTERED PROFESSIONAL ENGINEER — CARLOS A. ALBA — NO. 54843 Exp. 6-30-00 — CIVIL — STATE OF CALIFORNIA

OWNER/ DEVELOPER:
STEADFAST PROPERTIES
2424 S.E. BRISTOL, #250
NEWPORT BEACH, CA 92660
TEL : (949) 852-0700 FAX : (949) 852-0143

PREPARED UNDER THE SUPERVISION OF :
MR. CARLOS A. ALBA, R.C.E. 54843 , EXP. 6-30-00

A.C.E. CIVIL ENGINEERING, INC.
3187-C AIRWAY AVENUE
COSTA MESA, CALIFORNIA 92626
TEL : (714) 641-3300 FAX : (714) 545 - 5623

DATE	BY	DESCRIPTION	APPV
		REVISIONS	

SD-1007

LINE "A" STORM DRAIN IMPROVEMENT PLAN
LAKE FOREST CORRIDOR CENTER, P.M. 98-103
SDP 98-01
20021 LAKE FOREST DRIVE
LAKE FOREST, CA. 92630

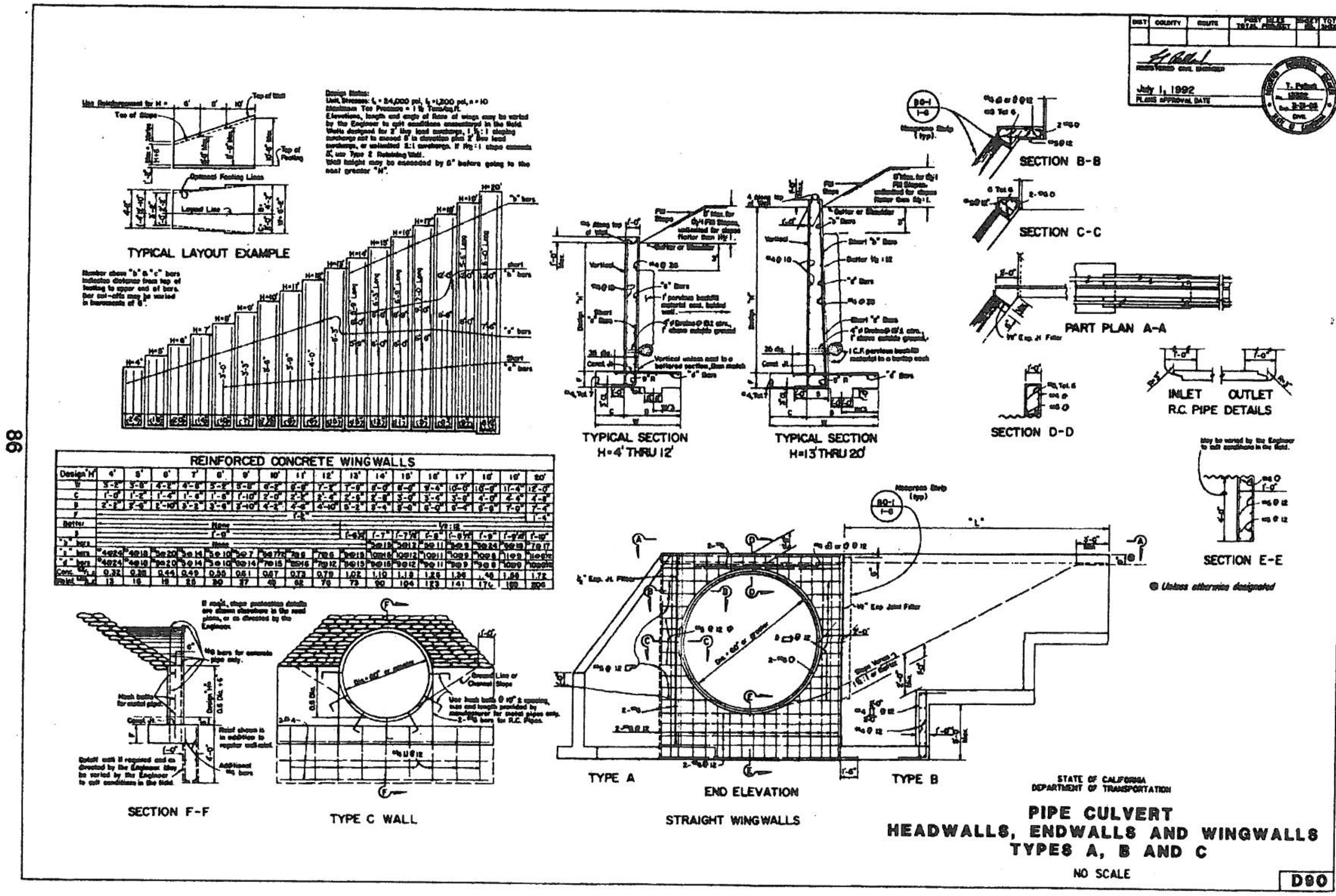
CITY OF LAKE FOREST
PUBLIC WORKS DEPARTMENT

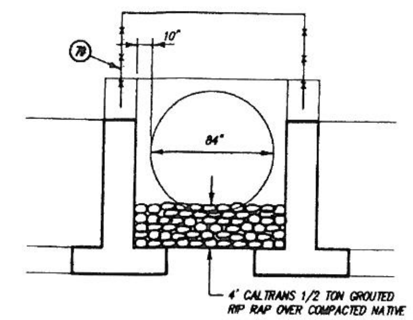
SD-1007
SHEET 6 OF 7

09730/ 2108/ 1140

J.N. 98-0181, SP12-SD.DWG

SD-1007



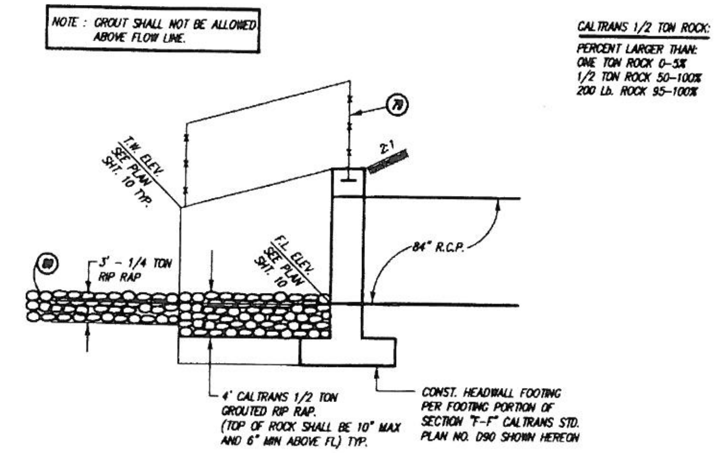


TRANSVERSE PIPE OUTLET X-SECT.

N.T.S.

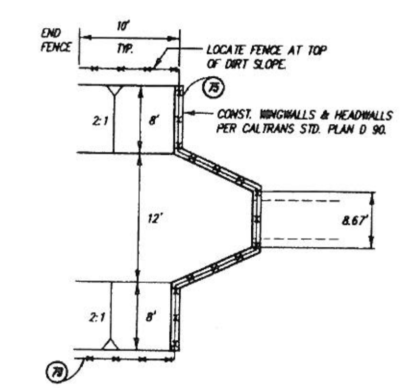
NOTE : GROUT SHALL NOT BE ALLOWED ABOVE FLOW LINE.

CALTRANS 1/2 TON ROCK:
PERCENT LARGER THAN:
ONE TON ROCK 0-5%
1/2 TON ROCK 50-100%
200 Lb. ROCK 95-100%



LONGITUDINAL PIPE OUTLET X-SECT.

N.T.S.



OUTLET TRANSITION GEOMETRY

N.T.S.

CONSTRUCTION NOTES

(75) — CONST. OUTLET HEADWALL & WINGWALLS PER CALTRANS STD. PLAN D-90 AND DETAILS SHEET NO. 13

(79) — INSTALL 6' CHAIN LINK SECURITY FENCE PER A.P.W.A. STD. PLAN NO 600-1

REGISTERED PROFESSIONAL ENGINEER
CARLOS A. ALBA
NO. 54843
Exp. 6-30-00
CIVIL
STATE OF CALIFORNIA

SD-1007

OWNER/ DEVELOPER:
STEADFAST PROPERTIES
2424 S.E. BRISTOL, #350
NEWPORT BEACH, CA 92660
TEL : (949) 852-0700 FAX : (949) 852-0143

PREPARED UNDER THE SUPERVISION OF :
MR. CARLOS A. ALBA, R.C.E 54843 , EXP 6-30-00

A.C.E. CIVIL ENGINEERING, INC.
3187-C AIRWAY AVENUE
COSTA MESA, CALIFORNIA 92626
TEL : (714) 641-3300 FAX : (714) 545 - 5623

DATE	BY	DESCRIPTION	APPV

REVISIONS

MASONRY RETAINING WALL
LAKE FOREST CORRIDOR CENTER, P.M. 98-103
SDP 98-01
20021 LAKE FOREST DRIVE
LAKE FOREST, CA 92630

CITY OF LAKE FOREST
PUBLIC WORKS DEPARTMENT

SD-1007
SHEET 7 OF 7

09730/ 2108/ 1140

98-0118 \ SP13.DWG

FILE: EXIST.WSW W S P G W - EDIT LISTING - Version 14.10 Date:10-11-2017 Time:11:17:54

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	3	0	.000	11.500	10.500	.000	.000	-3.94										
CD	2	4	1		5.000														
CD	3	4	1		4.000														
CD	4	3	0	.000	10.500	10.500	.000	.000	-3.94										
CD	5	4	1		2.000														
CD	6	4	1		7.500														

W S P G W PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

EXISTING F19S02-713, F19P06 & F19P07

HEADING LINE NO 2 IS -

OUTLET AT SOUTHWEST OF PROJECT BOUNDARY

HEADING LINE NO 3 IS -

W.O. #1443-136X

W S P G W PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	2226.000	631.840	1	638.000

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2240.000	632.500	1	.013	.000	.000	.000	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2514.000	642.450	1	.013	.000	.000	.000	0

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2558.440	644.064	1	.013	.000	.000	.000	0

ELEMENT NO 5 IS A JUNCTION * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	2558.450	644.065	1	2	0	.013	117.000	.000	645.310	.000	-45.000	.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2601.900	645.650	1	.013	.000	.000	.000	0

ELEMENT NO 7 IS A JUNCTION * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	2615.400	648.320	4	3	0	.013	187.000	.000	651.100	.000	-38.200	.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 8 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H

```
                          2633.120  648.720    4              .013                        .000     .000      .000     0
ELEMENT NO   9 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                      RADIUS    ANGLE     ANG PT  MAN H
                          2689.500  649.990    4              .013                      98.760   32.709      .000     0
ELEMENT NO  10 IS A JUNCTION         *         *     *     *              *                 *                *
                  U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                          2689.510  649.991    4     5     5   .013      .001      .001   657.000   656.840  45.000  -45.000
                                                                                          RADIUS    ANGLE
                                                                                            .000     .006
                                                      W S P G W                                                PAGE NO   3
                                WATER SURFACE PROFILE - ELEMENT CARD LISTING
ELEMENT NO  11 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                      RADIUS    ANGLE     ANG PT  MAN H
                          2716.800  650.590    4              .013                      76.066   20.556      .000     0
ELEMENT NO  12 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                      RADIUS    ANGLE     ANG PT  MAN H
                          2850.000  653.560    4              .013                     499.987  -15.264      .000     0
ELEMENT NO  13 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                      RADIUS    ANGLE     ANG PT  MAN H
                          2900.000  654.210    4              .013                     499.963   -5.730      .000     0
ELEMENT NO  14 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                      RADIUS    ANGLE     ANG PT  MAN H
                          2945.000  654.760    4              .013                     499.963   -5.157      .000     0
ELEMENT NO  15 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                      RADIUS    ANGLE     ANG PT  MAN H
                          3000.000  655.400    4              .013                     499.963   -6.303      .000     0
ELEMENT NO  16 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                      RADIUS    ANGLE     ANG PT  MAN H
                          3066.320  656.150    4              .013                     499.982   -7.600      .000     0
ELEMENT NO  17 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                      RADIUS    ANGLE     ANG PT  MAN H
                          3155.250  657.155    4              .013                       .000     .000      .000     0
ELEMENT NO  18 IS A JUNCTION         *         *     *     *              *                 *                *
                  U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                          3155.260  657.156    4     5     5   .013      .001      .001   658.580   658.580 -45.000   45.000
                                                                                          RADIUS    ANGLE
                                                                                            .000     .000
ELEMENT NO  19 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                      RADIUS    ANGLE     ANG PT  MAN H
                          3400.000  659.920    4              .013                       .000     .000      .000     0
ELEMENT NO  20 IS A REACH            *         *     *
                  U/S DATA   STATION    INVERT  SECT              N                      RADIUS    ANGLE     ANG PT  MAN H
                          3505.250  661.500    4              .013                       .000     .000      .000     0
ELEMENT NO  21 IS A JUNCTION         *         *     *     *              *                 *                *
                  U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4     INVERT-3 INVERT-4  PHI 3  PHI 4
                          3505.260  661.510    4     5     5   .013      .001      .001   662.980   662.980 -45.000   45.000
                                                                                          RADIUS    ANGLE
                                                                                            .000     .000
```

W S P G W PAGE NO 4

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 22 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3600.000	662.920	4	.013	.000	.000	.000	0

ELEMENT NO 23 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3800.000	665.150	4	.013	.000	.000	.000	0

ELEMENT NO 24 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3805.970	665.180	4	.013	.000	.000	.000	0

ELEMENT NO 25 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3842.850	665.350	4	.013	200.007	10.565	.000	0

ELEMENT NO 26 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3850.850	666.080	4	.013	.000	.000	.000	0

ELEMENT NO 27 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3859.940	666.390	4	.013	.000	.000	.000	0

ELEMENT NO 28 IS A JUNCTION * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	3859.950	666.391	4	6	0	.013	1186.800	.000	666.740	.000	-30.000	.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 29 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3880.850	667.090	4	.013	.000	.000	.000	0

ELEMENT NO 30 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3940.850	668.560	4	.013	.000	.000	.000	0

ELEMENT NO 31 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	3940.850	668.560	4	668.560

FILE: EXIST.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 1

Program Package Serial Number: 7181

WATER SURFACE PROFILE LISTING Date:10-11-2017 Time:11:17:56

EXISTING F19S02-713, F19P06 & F19P07
OUTLET AT SOUTHWEST OF PROJECT BOUNDARY
W.O. #1443-136X

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	ZR	No Wth Prs/Pip	Type Ch
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall				
2226.000	631.840	6.045	637.885	2220.01	35.95	20.07	657.95	.00	11.32	10.50	11.500	10.500	.00	0	.0	
14.000	.0471					.0246	.34	6.05	2.61	4.79	.013	-3.94	.00			BOX
2240.000	632.500	6.100	638.600	2220.01	35.62	19.70	658.30	.00	11.32	10.50	11.500	10.500	.00	0	.0	
38.720	.0363					.0239	.92	6.10	2.58	5.26	.013	-3.94	.00			BOX
2278.720	633.906	6.187	640.093	2220.01	35.10	19.14	659.23	.00	11.32	10.50	11.500	10.500	.00	0	.0	
101.293	.0363					.0220	2.23	6.19	2.52	5.26	.013	-3.94	.00			BOX
2380.013	637.584	6.481	644.065	2220.01	33.47	17.40	661.46	.00	11.32	10.50	11.500	10.500	.00	0	.0	
75.617	.0363					.0195	1.47	6.48	2.35	5.26	.013	-3.94	.00			BOX
2455.629	640.330	6.789	647.120	2220.01	31.91	15.81	662.93	.00	11.32	10.50	11.500	10.500	.00	0	.0	
58.371	.0363					.0172	1.01	6.79	2.18	5.26	.013	-3.94	.00			BOX
2514.000	642.450	7.113	649.563	2220.01	30.43	14.38	663.94	.00	11.32	10.50	11.500	10.500	.00	0	.0	
44.440	.0363					.0153	.68	7.11	2.03	5.26	.013	-3.94	.00			BOX
2558.440	644.064	7.439	651.503	2220.01	29.06	13.11	664.62	.00	11.32	10.50	11.500	10.500	.00	0	.0	
JUNCT STR	.0976					.0163	.00	7.44	1.90		.013	-3.94	.00			BOX
2558.450	644.065	6.536	650.601	2103.01	31.43	15.34	665.94	.00	10.93	10.50	11.500	10.500	.00	0	.0	
43.450	.0365					.0173	.75	6.54	2.19	5.05	.013	-3.94	.00			BOX
2601.900	645.650	6.769	652.419	2103.01	30.32	14.28	666.70	.00	10.93	10.50	11.500	10.500	.00	0	.0	
JUNCT STR	.1978					.0161	.22	6.77	2.08		.013	-3.94	.00			BOX

FILE: EXIST.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 2

Program Package Serial Number: 7181

WATER SURFACE PROFILE LISTING Date:10-11-2017 Time:11:17:56

EXISTING F19S02-713, F19P06 & F19P07
OUTLET AT SOUTHWEST OF PROJECT BOUNDARY
W.O. #1443-136X

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	ZR	No Wth Prs/Pip	Type Ch
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall				
2615.400	648.320	6.427	654.747	1916.01	29.14	13.18	667.93	.00	10.28	10.50	10.500	10.500	.00	0	.0	
17.720	.0226					.0156	.28	6.43	2.05	5.62	.013	-3.94	.00	BOX		
2633.120	648.720	6.466	655.186	1916.01	28.96	13.02	668.21	2.77	10.28	10.50	10.500	10.500	.00	0	.0	
56.380	.0225					.0151	.85	9.23	2.03	5.63	.013	-3.94	.00	BOX		
2689.500	649.990	6.606	656.596	1916.01	28.33	12.46	669.06	.00	10.28	10.50	10.500	10.500	.00	0	.0	
JUNCT STR	.1037					.0146	.00	10.05	1.97		.013	-3.94	.00	BOX		
2689.510	649.991	6.607	656.598	1916.00	28.32	12.46	669.05	3.44	10.28	10.50	10.500	10.500	.00	0	.0	
27.290	.0219					.0144	.39	10.05	1.97	5.68	.013	-3.94	.00	BOX		
2716.800	650.590	6.680	657.270	1916.00	28.01	12.18	669.45	.51	10.28	10.50	10.500	10.500	.00	0	.0	
61.546	.0223					.0137	.84	7.19	1.93	5.65	.013	-3.94	.00	BOX		
2778.346	651.962	6.886	658.849	1916.00	27.15	11.44	670.29	.48	10.28	10.50	10.500	10.500	.00	0	.0	
71.654	.0223					.0124	.89	7.37	1.85	5.65	.013	-3.94	.00	BOX		
2850.000	653.560	7.215	660.774	1916.00	25.88	10.40	671.18	.44	10.28	10.50	10.500	10.500	.00	0	.0	
50.000	.0130					.0115	.58	7.65	1.72	6.91	.013	-3.94	.00	BOX		
2900.000	654.210	7.253	661.463	1916.00	25.74	10.29	671.75	.43	10.28	10.50	10.500	10.500	.00	0	.0	
45.000	.0122					.0114	.51	7.68	1.70	7.07	.013	-3.94	.00	BOX		
2945.000	654.760	7.272	662.032	1916.00	25.67	10.23	672.27	.43	10.28	10.50	10.500	10.500	.00	0	.0	
55.000	.0116					.0113	.62	7.70	1.70	7.21	.013	-3.94	.00	BOX		

FILE: EXIST.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 3

Program Package Serial Number: 7181

WATER SURFACE PROFILE LISTING Date:10-11-2017 Time:11:17:56

EXISTING F19S02-713, F19P06 & F19P07
OUTLET AT SOUTHWEST OF PROJECT BOUNDARY
W.O. #1443-136X

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
3000.000	655.400	7.280	662.680	1916.00	25.64	10.21	672.89	.43	10.28	10.50	10.500	10.500	.00	0 .0
66.320	.0113					.0113	.75	7.71	1.69	7.29	.013	-3.94	.00	BOX
3066.320	656.150	7.278	663.428	1916.00	25.65	10.22	673.64	.00	10.28	10.50	10.500	10.500	.00	0 .0
88.930	.0113					.0113	1.01	7.28	1.69	7.29	.013	-3.94	.00	BOX
3155.250	657.155	7.276	664.431	1916.00	25.66	10.22	674.65	.00	10.28	10.50	10.500	10.500	.00	0 .0
JUNCT STR	.0976					.0113	.00	7.28	1.70		.013	-3.94	.00	BOX
3155.260	657.156	7.277	664.433	1916.00	25.65	10.22	674.65	.00	10.28	10.50	10.500	10.500	.00	0 .0
244.740	.0113					.0114	2.78	7.28	1.70	7.29	.013	-3.94	.00	BOX
3400.000	659.920	7.268	667.188	1916.00	25.69	10.24	677.43	.00	10.28	10.50	10.500	10.500	.00	0 .0
105.250	.0150					.0109	1.15	7.27	1.70	6.54	.013	-3.94	.00	BOX
3505.250	661.500	7.516	669.016	1916.00	24.82	9.56	678.58	.00	10.28	10.50	10.500	10.500	.00	0 .0
JUNCT STR	1.0000					.0104	.00	7.52	1.61		.013	-3.94	.00	BOX
3505.260	661.510	7.523	669.033	1916.00	24.80	9.55	678.58	.00	10.28	10.50	10.500	10.500	.00	0 .0
94.740	.0149					.0098	.93	7.52	1.61	6.57	.013	-3.94	.00	BOX
3600.000	662.920	7.857	670.777	1916.00	23.72	8.74	679.51	.00	10.28	10.50	10.500	10.500	.00	0 .0
44.659	.0112					.0092	.41	7.86	1.51	7.33	.013	-3.94	.00	BOX
3644.659	663.418	7.927	671.345	1916.00	23.51	8.58	679.92	.00	10.28	10.50	10.500	10.500	.00	0 .0
155.341	.0112					.0086	1.33	7.93	1.49	7.33	.013	-3.94	.00	BOX

FILE: EXIST.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 4

Program Package Serial Number: 7181

WATER SURFACE PROFILE LISTING Date:10-11-2017 Time:11:17:56

EXISTING F19S02-713, F19P06 & F19P07
OUTLET AT SOUTHWEST OF PROJECT BOUNDARY
W.O. #1443-136X

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
3800.000	665.150	8.306	673.456	1916.00	22.41	7.80	681.26	.00	10.28	10.50	10.500	10.500	.00	0 .0
5.970	.0050					.0081	.05	8.31	1.38	10.01	.013	-3.94	.00	BOX
3805.970	665.180	8.286	673.466	1916.00	22.47	7.84	681.30	.41	10.28	10.50	10.500	10.500	.00	0 .0
36.880	.0046					.0083	.31	8.70	1.39	10.36	.013	-3.94	.00	BOX
3842.850	665.350	8.148	673.498	1916.00	22.86	8.11	681.61	.00	10.28	10.50	10.500	10.500	.00	0 .0
1.324	.0913					.0083	.01	8.15	1.43	3.44	.013	-3.94	.00	BOX
3844.174	665.471	8.259	673.729	1916.00	22.54	7.89	681.62	.00	10.28	10.50	10.500	10.500	.00	0 .0
3.858	.0913					.0077	.03	8.26	1.40	3.44	.013	-3.94	.00	BOX
3848.032	665.823	8.654	674.477	1916.00	21.49	7.17	681.65	.00	10.28	10.50	10.500	10.500	.00	0 .0
2.818	.0913					.0068	.02	8.65	1.30	3.44	.013	-3.94	.00	BOX
3850.850	666.080	9.068	675.148	1916.00	20.49	6.52	681.67	.00	10.28	10.50	10.500	10.500	.00	0 .0
4.088	.0341					.0062	.03	9.07	1.21	4.84	.013	-3.94	.00	BOX
3854.938	666.219	9.355	675.574	1916.00	19.85	6.12	681.70	.00	10.28	10.50	10.500	10.500	.00	0 .0
3.787	.0341					.0056	.02	9.36	1.15	4.84	.013	-3.94	.00	BOX
3858.725	666.349	9.804	676.152	1916.00	18.93	5.56	681.72	.00	10.28	10.50	10.500	10.500	.00	0 .0
1.215	.0341					.0050	.01	9.80	1.07	4.84	.013	-3.94	.00	BOX

---------- WARNING - Flow depth near top of box conduit ----------

FILE: EXIST.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 5

Program Package Serial Number: 7181

WATER SURFACE PROFILE LISTING Date:10-11-2017 Time:11:17:56

EXISTING F19S02-713, F19P06 & F19P07
OUTLET AT SOUTHWEST OF PROJECT BOUNDARY
W.O. #1443-136X

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
3859.940	666.390	10.275	676.665	1916.00	18.05	5.06	681.72	.00	10.28	10.50	10.500	10.500	.00	0 .0
JUNCT STR	.0976					.0009	.00	10.28	1.00		.013	-3.94	.00	BOX
---------- WARNING - Flow depth near top of box conduit ----------														
3859.950	666.391	14.673	681.064	729.20	6.51	.66	681.72	.00	5.48	10.50	10.500	10.500	.00	0 .0
20.900	.0334					.0009	.02	14.67	.35	2.53	.013	-3.94	.00	BOX
3880.850	667.090	13.993	681.083	729.20	6.51	.66	681.74	.00	5.48	10.50	10.500	10.500	.00	0 .0
60.000	.0245					.0009	.05	13.99	.35	2.80	.013	-3.94	.00	BOX
3940.850	668.560	12.575	681.135	729.20	6.51	.66	681.79	.00	5.48	10.50	10.500	10.500	.00	0 .0

LEGEND

- REGIONAL DRAINAGE AREA BOUNDARY
- SUBAREA DRAINAGE BOUNDARY
- FLOWPATH
- 1.23 — CONCENTRATION POINT AND NUMBER
- 5,100 cfs — 100-YEAR HIGH CONFIDENCE PEAK DISCHARGE
- 4,332 ac — ACCUMLATED ACREAGE
- LAND USE
  - COMMERCIAL
  - APARTMENTS
  - 8-10 DWELLING UNITS / ACRE
  - 5-7 DWELLING UNITS / ACRE
  - PUBLIC PARK
  - NATURAL - OPEN BRUSH
- D — SOIL GROUP BOUNDARY AND DESIGNATION
- 420 — CONTOUR LINE AND ELEVATION

0' 1000'

766.1
766.2
765
1.01
1.02
1.03
1.04
1.05
1.06
1.07
1.08
1.09
1.10
1,850 cfs
857 ac
1.11
1,950 cfs
1,020 ac
2,150 cfs
1,139 ac
1.12
1.13
1.14
2,350 cfs
1,281 ac
2,350 cfs
1,299 ac
3,550 cfs
2,213 ac
1.15
1.16
3,900 cfs
2,452 ac
1.17
3,950 cfs
2,612 ac
1.18
4,000 cfs
2,835 ac
1.19
4,700 cfs
3,643 ac
1.20
4,850 cfs
3,885 ac
1.21
4,850 cfs
3,932 ac
1.22
5,100 cfs
4,332 ac
1.23
5,100 cfs
4,332 ac

F19
F19S02
F19S
F05

SANTIAGO CANYON ROAD
SERRANO CREEK
ALTON FOOTHILL PKWY
PORTOLA PKWY
TRANSPORTATION CORRIDOR
GLENN RANCH RD
BAKE PKWY
RANCHO DIMENSION DR
FOREST VISTA TERRACE
LAKE REGENCY LN
LAKE FOREST DR
TRABUCO RD
TOLEDO PKWY
JERONIMO BLVD
MUIRLANDS BLVD
RICKENBACKER BLVD
RESEARCH CENTER PKWY
IRVINE BLVD
SAN DIEGO FRWY
SANTA ANA FRWY
BARRANCA PKWY
OCTA METROLINK RR
MARINE CORPS AIR STATION
RIDGE ROUTE DR

COUNTY OF ORANGE
OC PUBLIC WORKS / FLOOD CONTROL

HYDROLOGY REPORT NO. F19-3

SERRANO CREEK FACILITY NO. F19

ENTIRE DRAINAGE SYSTEM

DRAINAGE AREA, LAND USE, AND SOIL GROUPS MAP

JULY 2014 | EXHIBIT 1

Nakase Property

NOISE AND VIBRATION IMPACT ANALYSIS

CITY OF LAKE FOREST

PREPARED BY:

Bill Lawson, PE, INCE
blawson@urbanxroads.com
(949) 336-5979

Alex Wolfe, INCE
awolfe@urbanxroads.com
(949) 336-5977

November 28, 2018

TABLE OF CONTENTS

TABLE OF CONTENTS III
APPENDICES IV
LIST OF EXHIBITS V
LIST OF TABLES V
LIST OF ABBREVIATED TERMS VI

EXECUTIVE SUMMARY 1
Off-Site Traffic Noise Analysis 1
On-Site Traffic Noise Analysis 1
Operational Noise Analysis 3
Construction Noise Analysis 4
Construction Vibration Analysis 4
Summary of CEQA Significance Findings 4

1 INTRODUCTION 7
1.1 Site Location 7
1.2 Project Description 7

2 FUNDAMENTALS 11
2.1 Range of Noise 11
2.2 Noise Descriptors 12
2.3 Sound Propagation 12
2.4 Noise Control 13
2.5 Noise Barrier Attenuation 14
2.6 Land Use Compatibility With Noise 14
2.7 Community Response to Noise 14
2.8 Vibration 15

3 REGULATORY SETTING 17
3.1 State of California Noise Requirements 17
3.2 State of California Building Code 17
3.3 City of Lake Forest General Plan Safety and Noise Element 17
3.4 Operational Noise Standards 20
3.5 Construction Noise Standards 20
3.6 Construction Vibration Standards 21

4 SIGNIFICANCE CRITERIA 23
4.1 City of Lake Forest CEQA Significance Thresholds 23
4.2 Significance Criteria Summary 24

5 EXISTING NOISE LEVEL MEASUREMENTS 27
5.1 Measurement Procedure and Criteria 27
5.2 Noise Measurement Locations 27
5.3 Noise Measurement Results 28

6 METHODS AND PROCEDURES 33
6.1 FHWA Traffic Noise Prediction Model 33
6.2 Operational Reference Noise Levels and Analysis Methods 38
6.3 Construction Reference Noise Levels and Analysis Methods 40
6.4 Construction Vibration Assessment Methodology 42
7 OFF-SITE TRANSPORTATION NOISE IMPACTS 45
7.1 Traffic Noise Contours 45
7.2 Existing Condition Project Traffic Noise Level Contributions 57
7.3 Interim Year 2020 Project Traffic Noise Level Contributions 58
7.4 2040 Without Portola Extension Project Traffic Noise Level Contributions 58
7.5 2040 With Portola Extension Project Traffic Noise Level Contributions 58
8 ON-SITE NOISE IMPACTS 63
8.1 Exterior Noise Analysis 63
8.2 Interior Noise Analysis 64
9 RECEIVER LOCATIONS 67
10 OPERATIONAL IMPACTS 69
10.1 Operational Noise Levels 69
10.2 Unmitigated Operational Noise Level Compliance 71
11 CONSTRUCTION IMPACTS 73
11.1 Construction Noise Analysis 74
11.2 Construction Noise Thresholds of Significance 78
11.3 Construction Vibration Impacts 79
12 REFERENCES 81
13 CERTIFICATION 83

APPENDICES

APPENDIX 3.1: CITY OF LAKE FOREST MUNICIPAL CODE
APPENDIX 5.1: STUDY AREA PHOTOS
APPENDIX 5.2: NOISE LEVEL MEASUREMENT WORKSHEETS
APPENDIX 7.1: OFF-SITE TRAFFIC NOISE LEVEL CONTOURS
APPENDIX 8.1: ON-SITE TRAFFIC NOISE LEVEL CALCULATIONS
APPENDIX 10.1: OPERATIONAL NOISE LEVEL CALCULATIONS

LIST OF EXHIBITS

EXHIBIT ES-A: SUMMARY OF ON-SITE RECOMMENDATIONS 6
EXHIBIT 1-A: LOCATION MAP 8
EXHIBIT 1-B: CONCEPTUAL LAND USE PLAN 9
EXHIBIT 2-A: TYPICAL NOISE LEVELS 11
EXHIBIT 2-B: NOISE LEVEL INCREASE PERCEPTION 15
EXHIBIT 2-C: TYPICAL LEVELS OF GROUND-BORNE VIBRATION 16
EXHIBIT 3-A: NOISE/LAND USE NOISE COMPATIBILITY MATRIX 18
EXHIBIT 3-B: INTERIOR AND EXTERIOR NOISE STANDARDS 19
EXHIBIT 5-A: NOISE MEASUREMENT LOCATIONS 31
EXHIBIT 9-A: RECEIVER LOCATIONS 68
EXHIBIT 10-A: OPERATIONAL NOISE SOURCE AND RECEIVER LOCATIONS 70
EXHIBIT 11-A: CONSTRUCTION ACTIVITY AND RECEIVER LOCATIONS 73

LIST OF TABLES

TABLE ES-1: SUMMARY OF CEQA SIGNIFICANCE FINDINGS 5
TABLE 3-1: STATIONARY-SOURCE NOISE LEVEL STANDARDS 20
TABLE 4-1: SIGNIFICANCE CRITERIA SUMMARY 25
TABLE 5-1: 24-HOUR AMBIENT NOISE LEVEL MEASUREMENTS 30
TABLE 6-1: OFF-SITE ROADWAY PARAMETERS 34
TABLE 6-2: AVERAGE DAILY TRAFFIC VOLUMES 35
TABLE 6-3: TIME OF DAY VEHICLE SPLITS 37
TABLE 6-4: DISTRIBUTION OF TRAFFIC FLOW BY VEHICLE TYPE (VEHICLE MIX) 37
TABLE 6-5: ON-SITE ROADWAY PARAMETERS 38
TABLE 6-6: REFERENCE NOISE LEVEL MEASUREMENTS 40
TABLE 6-7: CONSTRUCTION REFERENCE NOISE LEVELS 41
TABLE 6-8: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT 43
TABLE 7-1: EXISTING WITHOUT PROJECT CONDITIONS NOISE CONTOURS 46
TABLE 7-2: EXISTING WITH PROJECT CONDITIONS NOISE CONTOURS 47
TABLE 7-3: INTERIM YEAR 2020 WITHOUT PROJECT CONDITIONS NOISE CONTOURS 49
TABLE 7-4: INTERIM YEAR 2020 WITH PROJECT CONDITIONS NOISE CONTOURS 50
TABLE 7-5: 2040 WITHOUT PORTOLA EXT. WITHOUT PROJECT CONDITIONS NOISE CONTOURS 52
TABLE 7-6: 2040 WITHOUT PORTOLA EXT. WITH PROJECT CONDITIONS NOISE CONTOURS 53
TABLE 7-7: 2040 WITH PORTOLA EXT. WITHOUT PROJECT CONDITIONS NOISE CONTOURS 55
TABLE 7-8: 2040 WITH PORTOLA EXT. WITHOUT PROJECT CONDITIONS NOISE CONTOURS 56
TABLE 7-9: EXISTING PLUS PROJECT OFF-SITE TRAFFIC NOISE IMPACTS 59
TABLE 7-10: INTERIM YEAR PLUS PROJECT OFF-SITE TRAFFIC NOISE IMPACTS 60
TABLE 7-11: 2040 WITHOUT PORTOLA EXT. PLUS PROJECT OFF-SITE TRAFFIC NOISE IMPACTS 61
TABLE 7-12: 2040 WITH PORTOLA EXT. PLUS PROJECT OFF-SITE TRAFFIC NOISE IMPACTS 62
TABLE 8-1: UNMITIGATED EXTERIOR TRAFFIC NOISE LEVELS 64
TABLE 8-2: FIRST-FLOOR INTERIOR NOISE IMPACTS (CNEL) 65
TABLE 8-3: SECOND-FLOOR INTERIOR NOISE IMPACTS (CNEL) 66
TABLE 10-1: UNMITIGATED PROJECT OPERATIONAL NOISE LEVELS 69
TABLE 10-2: UNMITIGATED OPERATIONAL NOISE LEVEL COMPLIANCE 71

TABLE 11-1: DEMOLITION ACTIVITY NOISE LEVELS 74
TABLE 11-2: GRADING ACTIVITY NOISE LEVELS 75
TABLE 11-3: INFRASTRUCTURE ACTIVITY NOISE LEVELS 75
TABLE 11-4: BUILDING CONSTRUCTION ACTIVITY NOISE LEVELS 76
TABLE 11-5: PAVING ACTIVITY NOISE LEVELS 77
TABLE 11-6: ARCHITECTURAL COATING ACTIVITY NOISE LEVELS 78
TABLE 11-7: UNMITIGATED CONSTRUCTION EQUIPMENT NOISE LEVEL SUMMARY 78
TABLE 11-8: CONSTRUCTION EQUIPMENT NOISE LEVEL COMPLIANCE 79
TABLE 11-9: UNMITIGATED CONSTRUCTION EQUIPMENT VIBRATION LEVELS 80

LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
ANSI	American National Standards Institute
Calveno	California Vehicle Noise
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dBA	A-weighted decibels
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
INCE	Institute of Noise Control Engineering
L_{eq}	Equivalent continuous (average) sound level
L_{max}	Maximum level measured over the time interval
L_{min}	Minimum level measured over the time interval
mph	Miles per hour
PPV	Peak Particle Velocity
Project	Nakase Property
REMEL	Reference Energy Mean Emission Level
RMS	Root-mean-square
SR-241	State Route 241
VdB	Vibration Decibels

EXECUTIVE SUMMARY

Urban Crossroads, Inc. has prepared this Noise and Vibration Impact Analysis to determine the potential impacts and the necessary mitigation measures for the proposed Nakase Property development ("Project"). The Project site is located east of Bake Parkway and south of Rancho Parkway in the City of Lake Forest. The proposed Project consists of 675 single-family dwelling units, 101 senior affordable residential units, an elementary school with athletic/sports fields which could accommodate up to 1,000 students, and park/open space uses. This study has been prepared consistent with applicable City of Lake Forest noise standards to address Appendix G of the California Environmental Quality Act (CEQA) Guidelines consistent with the *City of Lake Forest CEQA Significance Thresholds Guide*. (1; 2)

OFF-SITE TRAFFIC NOISE ANALYSIS

Traffic generated by the operation of the proposed Project will influence the traffic noise levels in surrounding off-site areas. To quantify the traffic noise increases on the surrounding off-site areas, the changes in traffic noise levels on 39 roadway segments surrounding the Project site were calculated based on the change in the average daily traffic (ADT) volumes. The traffic noise levels provided in this analysis are based on the traffic forecasts found in *Nakase Property Traffic Impact Analysis*. (3) To assess the off-site noise level impacts associated with the proposed Project, noise contour boundaries were developed for Existing, Interim Year 2020, 2040 General Plan With Approved Business Park Land Use Without Portola Extension, and 2040 General Plan With Approved Business Park Land Use With Portola Extension conditions consistent with the *Traffic Impact Analysis*. The analysis shows that the unmitigated Project-related traffic noise level increases under all traffic scenarios will be *less than significant*.

ON-SITE TRAFFIC NOISE ANALYSIS

A noise impact analysis has been completed to determine the future noise levels that would result from adjacent and dominant traffic noise sources in the Project study area, and to identify potential noise mitigation measures that would achieve acceptable Project exterior and interior noise levels. The primary source of traffic noise affecting the Project site is anticipated to be from State Route 241 (SR-241), Bake Parkway, Rancho Parkway, and Lake Forest Drive. The Project will also experience some background traffic noise impacts from the Project's internal local streets, however, due to the low traffic volume and low speeds of vehicles transiting into the Project site, traffic noise from these roadways will not make a significant contribution to the noise environment beyond of the right-of-way.

EXTERIOR NOISE LEVELS

The future exterior traffic noise levels are shown to range from 51.6 to 64.7 dBA CNEL at the outdoor areas (e.g., residential private yards and school playground and picnic areas) within the Project site with the planned 6-foot high noise barriers for residential uses. No exterior noise barriers are required to satisfy the City of Lake Forest 65 dBA CNEL exterior noise level standard at the school outdoor playground and picnic areas. Therefore, no exterior noise mitigation is

required to satisfy the City of Lake Forest 65 dBA CNEL exterior noise level standards for residential and school land uses. With the planned noise barriers shown on Exhibit ES-A, the future exterior noise levels are considered to be a *less than significant* noise impact. This noise analysis shows that the planned noise barriers will satisfy the City of Lake Forest 65 dBA CNEL exterior noise level standards. The effective noise barrier height represents the minimum wall and/or berm combination height to satisfy the City of Lake Forest exterior noise level standards.

The noise control barriers shall be constructed so that the top of each barrier is 6 feet higher than the pad elevation of the lot it is shielding. When the road is elevated above the pad elevation, the barrier shall extend to the planned 6-foot height above the highest point between the residential home and the road. The barriers shall provide a weight of at least 4 pounds per square foot of face area with no decorative cutouts or line-of-sight openings between shielded areas and the roadways. The barrier must present a solid face from top to bottom. All gaps (except for weep holes) should be filled with grout or caulking. The noise barrier shall be constructed using one of the following materials:

- Masonry block;
- Stucco veneer over wood framing (or foam core), or one-inch thick tongue and groove wood of sufficient weight per square foot;
- Glass (1/4-inch-thick), or other transparent material with sufficient weight per square foot capable of providing a minimum transmission loss of 20 dBA;
- Earthen berm;
- Any combination of these construction materials.

INTERIOR NOISE LEVELS

This noise analysis evaluates the interior noise levels at the Project buildings based on the City of Lake Forest 45 dBA CNEL interior noise level standards. The Project buildings are shown to require a Noise Reduction (NR) of up to 24.2 dBA and a windows-closed condition requiring a means of mechanical ventilation (e.g. air conditioning). With the following standard building construction noise reduction measures and subsequent, project-specific Final Noise Studies, the Project will satisfy the interior noise level standards:

- Windows/Sliding Glass Doors: All residential and school buildings require windows and sliding glass doors that have well-fitted, well-weather-stripped assemblies, and minimum sound transmission class (STC) ratings of 27.
- Exterior Doors (Non-Glass): All exterior doors shall be well weather-stripped and have well-sealed perimeter gaps to achieve minimum sound transmission class (STC) ratings of 27. (4)
- Exterior Walls: At any penetrations of exterior walls by pipes, ducts, or conduits, the space between the wall and pipes, ducts, or conduits shall be caulked or filled with mortar to form an airtight seal.
- Roof: Roof sheathing of wood construction shall be per manufacturer's specification or caulked plywood of at least one-half inch thick. Ceilings shall be per manufacturer's specification or well-sealed gypsum board of at least one-half inch thick. Insulation with at least a rating of R-19 shall be used in the attic space.

- Ventilation:
    - Arrangements for any habitable room shall be such that any exterior door or window can be kept closed when the room is in use and still receive circulated air. A forced air circulation system (e.g. air conditioning) or active ventilation system (e.g. fresh air supply) shall be provided which satisfies the requirements of the Uniform Building Code.
    - Residential and school exterior vents shall be oriented away from SR-241, Bake Parkway, and Rancho Parkway. If such an orientation cannot be avoided, then an acoustical baffle shall be placed in the attic space behind the vents.
- Final Noise Study: A final noise study shall be prepared prior to obtaining building permits for the Project consistent with the *City of Lake Forest CEQA Significance Thresholds Guide*, Page 19. (2) This report would finalize the measures described in this study using the precise grading plans, architectural floor plans and elevations, and actual building design specifications, and may include additional measures, if necessary, to meet the City of Lake Forest 45 dBA CNEL interior noise level standard. Further, the Final Noise Study for the elementary school shall confirm that school bell and/or public address systems would comply with the City of Lake Forest exterior noise level standards at nearby sensitive receiver locations.

OPERATIONAL NOISE ANALYSIS

Using reference noise levels to represent the expected noise sources from the Nakase Property site, this analysis estimates the Project-related stationary-source noise levels at nearby off-site sensitive receiver locations. The normal activities associated with the proposed Nakase Property are anticipated to include playgrounds, sports fields, outdoor pool/spa activities, a dog park, and school parking lot vehicle movements. The operational noise analysis shows that the Project-related stationary-source noise levels at the nearby sensitive receiver locations will satisfy the City of Lake Forest exterior noise level standards. Therefore, the operational noise level impacts associated with the proposed Project activities, such as the playgrounds, sports fields, outdoor pool/spa activities, a dog park, and school parking lot vehicle movements, are considered *less than significant*.

The residential development within the Project site is not expected to include any specific type of operational noise levels beyond the typical noise sources associated with residential land use (e.g., air conditioning, backyard activities) and is generally considered a noise-sensitive receiving land use. Potential noise levels produced by residential air conditioning units and elementary school bell and/or public address systems are not anticipated to generate noise levels above the Municipal Code exterior noise standards at off-site sensitive receiver locations. Further, these potential noise levels would be reduced by the attenuation provided by intervening structures and distance, in addition to the lower frequencies of noise events (i.e., regular school bells and public addresses) as compared to the operational activities analyzed in this report.

The Final Noise Study for the elementary school, as previously identified for on-site traffic noise, shall confirm that school bell and/or public address systems would comply with the City of Lake Forest exterior noise level standards.

CONSTRUCTION NOISE ANALYSIS

Construction-related noise impacts are expected to create temporary and intermittent high-level noise conditions at receivers surrounding the Project site when certain activities occur at the closest point to the nearby receiver locations from primary Project construction activity. Using sample reference noise levels to represent the planned construction activities of the Nakase Property site, this analysis estimates the Project-related construction noise levels at nearby sensitive receiver locations. Since the City of Lake Forest General Plan, Municipal Code, and *CEQA Significance Thresholds Guide* do not identify specific construction noise level thresholds, a threshold is identified based on the National Institute for Occupational Safety and Health (NIOSH) limits for construction noise. The results of the analysis show that the Project-related short-term construction noise levels are expected to range from 53.3 to 65.2 dBA L_{eq} and will satisfy the 85 dBA L_{eq} threshold identified by NIOSH at all receiver locations.

CONSTRUCTION VIBRATION ANALYSIS

At distances ranging from 130 to 304 feet from primary Project construction activity, construction vibration velocity levels are expected to range from 0.002 to 0.008 in/sec PPV. Based on the results of the analysis, the Project construction vibration levels will remain below the Caltrans building damage threshold of 0.3 in/sec PPV and human annoyance threshold of 0.04 in/sec PPV at all receiver locations. The Project-related vibration impacts at the nearby sensitive receiver locations, therefore, represent a *less than significant* impact Project construction activities.

CONSTRUCTION NOISE AND VIBRATION BEST PRACTICES

Though construction noise and vibration are temporary, intermittent, will be short in duration, and will not present any long-term impacts, the following best practices, while not required, would further reduce noise and vibration levels produced by the construction equipment to the nearby sensitive residential land uses. The following best practices are consistent with measures identified in the *City of Lake Forest CEQA Significance Thresholds Guide*, as follows:

- *Use noise control devices such as equipment mufflers, enclosures, and barriers. Natural and artificial barriers such as ground elevation changes and existing buildings can shield construction noise. Stage construction operations as far from noise sensitive uses as possible.*
- *Avoid residential areas when planning haul truck routes.*
- *Maintain all sound-reducing devices and restrictions throughout the construction period.*
- *Change the timing and/or sequence of the noisiest construction operations to avoid sensitive times of day.*

SUMMARY OF CEQA SIGNIFICANCE FINDINGS

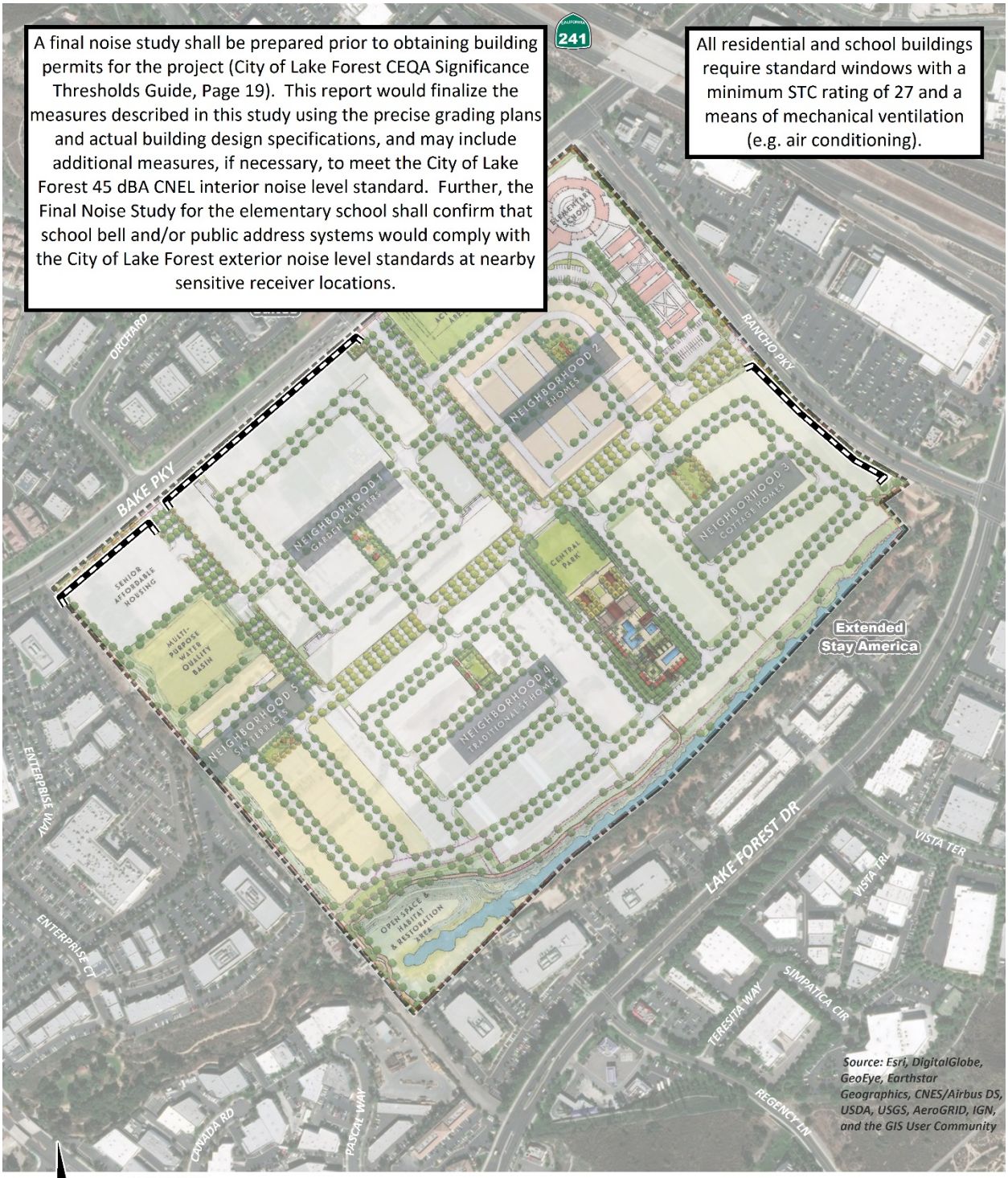
The results of this Nakase Property Noise Impact Analysis are summarized below based on the significance criteria in Section 4 of this report consistent with Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (1). Table ES-1 shows the findings of significance

for each potential noise and/or vibration impact under CEQA before and after any required mitigation measures described below.

TABLE ES-1: SUMMARY OF CEQA SIGNIFICANCE FINDINGS

Analysis	Report Section	Significance Findings	
		Unmitigated	**Mitigated**
Off-Site Traffic Noise Levels	7	*Less Than Significant*	*n/a*
On-Site Exterior Traffic Noise Levels	8	*Less Than Significant*	*n/a*
On-Site Interior Traffic Noise Levels		*Less Than Significant*	*n/a*
Operational Noise Levels	10	*Less Than Significant*	*n/a*
Construction Noise Levels	11	*Less Than Significant*	*n/a*
Construction Vibration Levels		*Less Than Significant*	*n/a*

EXHIBIT ES-A: SUMMARY OF ON-SITE RECOMMENDATIONS



1 INTRODUCTION

This noise analysis has been completed to determine the noise impacts associated with the development of the proposed Nakase Property ("Project"). This report briefly describes the proposed Project, provides information regarding noise fundamentals, describes the local regulatory setting, provides the study methods and procedures for transportation noise analysis, and evaluates the future exterior noise environment. In addition, this study includes an analysis of the potential Project-related long-term operational noise and short-term construction noise and vibration impacts.

1.1 SITE LOCATION

The proposed Nakase Property Project is located east of Bake Parkway and south of Rancho Parkway in the City of Lake Forest, as shown on Exhibit 1-A. The Project site is currently occupied by the Nakase Brothers Wholesale Nursery. State Route 241 (SR-241) is located roughly 300 feet north of the Project site boundaries. Existing residential uses are located west of the Project site, and office and commercial uses are located north, south, east, and west of the Project site. The Serrano Creek Trail runs adjacent to the southern Project site boundaries.

1.2 PROJECT DESCRIPTION

The proposed Project consists of 675 single-family dwelling units, 101 senior affordable residential units, an elementary school with athletic/sports fields which could accommodate up to 1,000 students, and park/open space uses. The proposed residences would predominantly consist of single-family detached units. Any single-family attached units would be located in Neighborhoods 2 and 5., as shown on Exhibit 1-B. The on-site Project-only operational noise sources are expected to include: playgrounds, sports fields, outdoor pool/spa activities, a dog park, and school parking lot vehicle movements.

According to the *Traffic Impact Analysis*, the proposed Project is anticipated to generate a net total of approximately 8,789 trip-ends per day on a typical weekday. The Project trips will be 14,122 fewer trips per day, with 1,377 fewer vehicles per hour during the AM peak hour and 1,442 fewer vehicles per hour during the PM peak hour, in comparison to the approved General Plan designation of business park land use for the site. (3)

EXHIBIT 1-A: LOCATION MAP

EXHIBIT 1-B: CONCEPTUAL LAND USE PLAN

LEGEND

- Neighborhood 1
- Neighborhood 2
- Neighborhood 3
- Neighborhood 4
- Neighborhood 5
- Senior Affordable Housing
- Elementary School Site
- Parks
- Multi-purpose Water Quality Basin
- Open Space & Habitat & Restoration Area
- Streets
- Bike Trail

FEET: 0, 250, 500, 1000
INCHES: 0, 1/2, 1, 2
SCALE: 1" = 500'

N

This page intentionally left blank

2 FUNDAMENTALS

Noise has been simply defined as "unwanted sound." Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm or when it has adverse effects on health. Noise is measured on a logarithmic scale of sound pressure level known as a decibel (dB). A-weighted decibels (dBA) approximate the subjective response of the human ear to broad frequency noise source by discriminating against very low and very high frequencies of the audible spectrum. They are adjusted to reflect only those frequencies which are audible to the human ear. Exhibit 2-A presents a summary of the typical noise levels and their subjective loudness and effects that are described in more detail below.

EXHIBIT 2-A: TYPICAL NOISE LEVELS

COMMON OUTDOOR ACTIVITIES	COMMON INDOOR ACTIVITIES	A - WEIGHTED SOUND LEVEL dBA	SUBJECTIVE LOUDNESS	EFFECTS OF NOISE
THRESHOLD OF PAIN		140	INTOLERABLE OR DEAFENING	HEARING LOSS
NEAR JET ENGINE		130		
		120		
JET FLY-OVER AT 300m (1000 ft)	ROCK BAND	110		
LOUD AUTO HORN		100	VERY NOISY	
GAS LAWN MOWER AT 1m (3 ft)		90		
DIESEL TRUCK AT 15m (50 ft), at 80 km/hr (50 mph)	FOOD BLENDER AT 1m (3 ft)	80		SPEECH INTERFERENCE
NOISY URBAN AREA, DAYTIME	VACUUM CLEANER AT 3m (10 ft)	70	LOUD	
HEAVY TRAFFIC AT 90m (300 ft)	NORMAL SPEECH AT 1m (3 ft)	60		
QUIET URBAN DAYTIME	LARGE BUSINESS OFFICE	50	MODERATE	SLEEP DISTURBANCE
QUIET URBAN NIGHTTIME	THEATER, LARGE CONFERENCE ROOM (BACKGROUND)	40		
QUIET SUBURBAN NIGHTTIME	LIBRARY	30	FAINT	NO EFFECT
QUIET RURAL NIGHTTIME	BEDROOM AT NIGHT, CONCERT HALL (BACKGROUND)	20		
	BROADCAST/RECORDING STUDIO	10	VERY FAINT	
LOWEST THRESHOLD OF HUMAN HEARING	LOWEST THRESHOLD OF HUMAN HEARING	0		

Source: Environmental Protection Agency Office of Noise Abatement and Control, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (EPA/ONAC 550/9-74-004) March 1974.

2.1 RANGE OF NOISE

Since the range of intensities that the human ear can detect is so large, the scale frequently used to measure intensity is a scale based on multiples of 10, the logarithmic scale. The scale for measuring intensity is the decibel scale. Each interval of 10 decibels indicates a sound energy ten times greater than before, which is perceived by the human ear as being roughly twice as loud. (5) The most common sounds vary between 40 dBA (very quiet) to 100 dBA (very loud). Normal conversation at three feet is roughly at 60 dBA, while loud jet engine noises equate to 110 dBA

at approximately 100 feet, which can cause serious discomfort. (6) Another important aspect of noise is the duration of the sound and the way it is described and distributed in time.

2.2 NOISE DESCRIPTORS

Environmental noise descriptors are generally based on averages, rather than instantaneous, noise levels. The most commonly used figure is the equivalent level (L_{eq}). Equivalent sound levels are not measured directly but are calculated from sound pressure levels typically measured in A-weighted decibels (dBA). The equivalent sound level (L_{eq}) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period and is commonly used to describe the "average" noise levels within the environment.

To describe the time-varying character of environmental noise, the statistical or percentile noise descriptors L_{50}, L_{25}, L_8 and L_2, are commonly used. The percentile noise descriptors are the noise levels equaled or exceeded during 50 percent, 25 percent, 8 percent and 2 percent of a stated time. Sound levels associated with the L_2 and L_8 typically describe transient or short-term events, while levels associated with the L_{50} describe the steady state (or median) noise conditions. The City of Lake Forest relies on the percentile noise levels to describe the stationary source noise level limits. While the L_{50} describes the noise levels occurring 50 percent of the time, the L_{eq} accounts for the total energy (average) observed for the entire hour.

Peak hour or average noise levels, while useful, do not completely describe a given noise environment. Noise levels lower than peak hour may be disturbing if they occur during times when quiet is most desirable, namely evening and nighttime (sleeping) hours. To account for this, the Community Noise Equivalent Level (CNEL), representing a composite 24-hour noise level is utilized. The CNEL is the weighted average of the intensity of a sound, with corrections for time of day, and averaged over 24 hours. The time of day corrections require the addition of 5 decibels to dBA L_{eq} sound levels in the evening from 7:00 p.m. to 10:00 p.m., and the addition of 10 decibels to dBA L_{eq} sound levels at night between 10:00 p.m. and 7:00 a.m. These additions are made to account for the noise sensitive time periods during the evening and night hours when sound appears louder. CNEL does not represent the actual sound level heard at any time, but rather represents the total sound exposure. The City of Lake Forest relies on the 24-hour CNEL level to assess land use compatibility with transportation related noise sources.

2.3 SOUND PROPAGATION

When sound propagates over a distance, it changes in level and frequency content. The way noise reduces with distance depends on the following factors.

2.3.1 GEOMETRIC SPREADING

Sound from a localized source (i.e., a stationary point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (or decreases) at a rate of 6 dB for each doubling of distance from a point source. Highways consist of several localized noise sources on a defined path and hence can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to

as cylindrical spreading. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source. (5)

2.3.2 GROUND ABSORPTION

The propagation path of noise from a highway to a receptor is usually very close to the ground. Noise attenuation from ground absorption and reflective wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is usually sufficiently accurate for distances of less than 200 ft. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receptor, such as a parking lot or body of water), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receptor such as soft dirt, grass, or scattered bushes and trees), an excess ground attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to the cylindrical spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance from a line source. (7)

2.3.3 ATMOSPHERIC EFFECTS

Receptors located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound levels can be increased at large distances (e.g., more than 500 feet) due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also have significant effects. (5)

2.3.4 SHIELDING

A large object or barrier in the path between a noise source and a receptor can substantially attenuate noise levels at the receptor. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Shielding by trees and other such vegetation typically only has an “out of sight, out of mind” effect. That is, the perception of noise impact tends to decrease when vegetation blocks the line-of-sight to nearby resident. However, for vegetation to provide a substantial, or even noticeable, noise reduction, the vegetation area must be at least 15 feet in height, 100 feet wide and dense enough to completely obstruct the line-of sight between the source and the receiver. The FHWA does not consider the planting of vegetation to be a noise abatement measure. (7)

2.4 NOISE CONTROL

Noise control is the process of obtaining an acceptable noise environment for an observation point or receptor by controlling the noise source, transmission path, receptor, or all three. This concept is known as the source-path-receptor concept. In general, noise control measures can be applied to these three elements.

2.5 NOISE BARRIER ATTENUATION

Effective noise barriers can reduce noise levels by 10 to 15 dBA, cutting the loudness of traffic noise in half. A noise barrier is most effective when placed close to the noise source or receptor. Noise barriers, however, do have limitations. For a noise barrier to work, it must be high enough and long enough to block the path of the noise source. (7)

2.6 LAND USE COMPATIBILITY WITH NOISE

Some land uses are more tolerant of noise than others. For example, schools, hospitals, churches, and residences are more sensitive to noise intrusion than are commercial or industrial developments and related activities. As ambient noise levels affect the perceived amenity or livability of a development, so too can the mismanagement of noise impacts impair the economic health and growth potential of a community by reducing the area's desirability as a place to live, shop and work. For this reason, land use compatibility with the noise environment is an important consideration in the planning and design process. The FHWA encourages State and Local government to regulate land development in such a way that noise-sensitive land uses are either prohibited from being located adjacent to a highway, or that the developments are planned, designed, and constructed in such a way that noise impacts are minimized. (8)

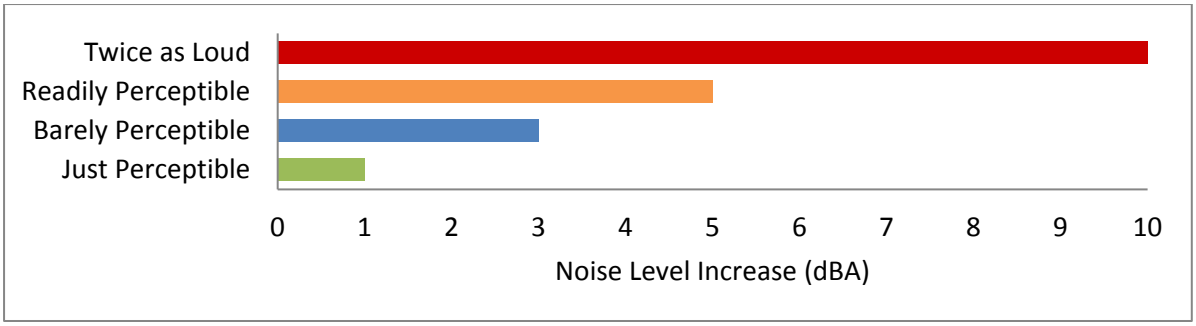
2.7 COMMUNITY RESPONSE TO NOISE

Community responses to noise may range from registering a complaint by telephone or letter, to initiating court action, depending upon everyone's susceptibility to noise and personal attitudes about noise. Several factors are related to the level of community annoyance including:

- Fear associated with noise producing activities;
- Socio-economic status and educational level;
- Perception that those affected are being unfairly treated;
- Attitudes regarding the usefulness of the noise-producing activity;
- Belief that the noise source can be controlled.

Approximately ten percent of the population has a very low tolerance for noise and will object to any noise not of their making. Consequently, even in the quietest environment, some complaints will occur. Another twenty-five percent of the population will not complain even in very severe noise environments. Thus, a variety of reactions can be expected from people exposed to any given noise environment. (9) Surveys have shown that about ten percent of the people exposed to traffic noise of 60 dBA will report being highly annoyed with the noise, and each increase of one dBA is associated with approximately two percent more people being highly annoyed. When traffic noise exceeds 60 dBA or aircraft noise exceeds 55 dBA, people may begin to complain. (9) Despite this variability in behavior on an individual level, the population can be expected to exhibit the following responses to changes in noise levels as shown on Exhibit 2-B. An increase or decrease of 1 dBA cannot be perceived except in carefully controlled laboratory experiments, a change of 3 dBA are considered *barely perceptible*, and changes of 5 dBA are considered *readily perceptible*. (7)

EXHIBIT 2-B: NOISE LEVEL INCREASE PERCEPTION



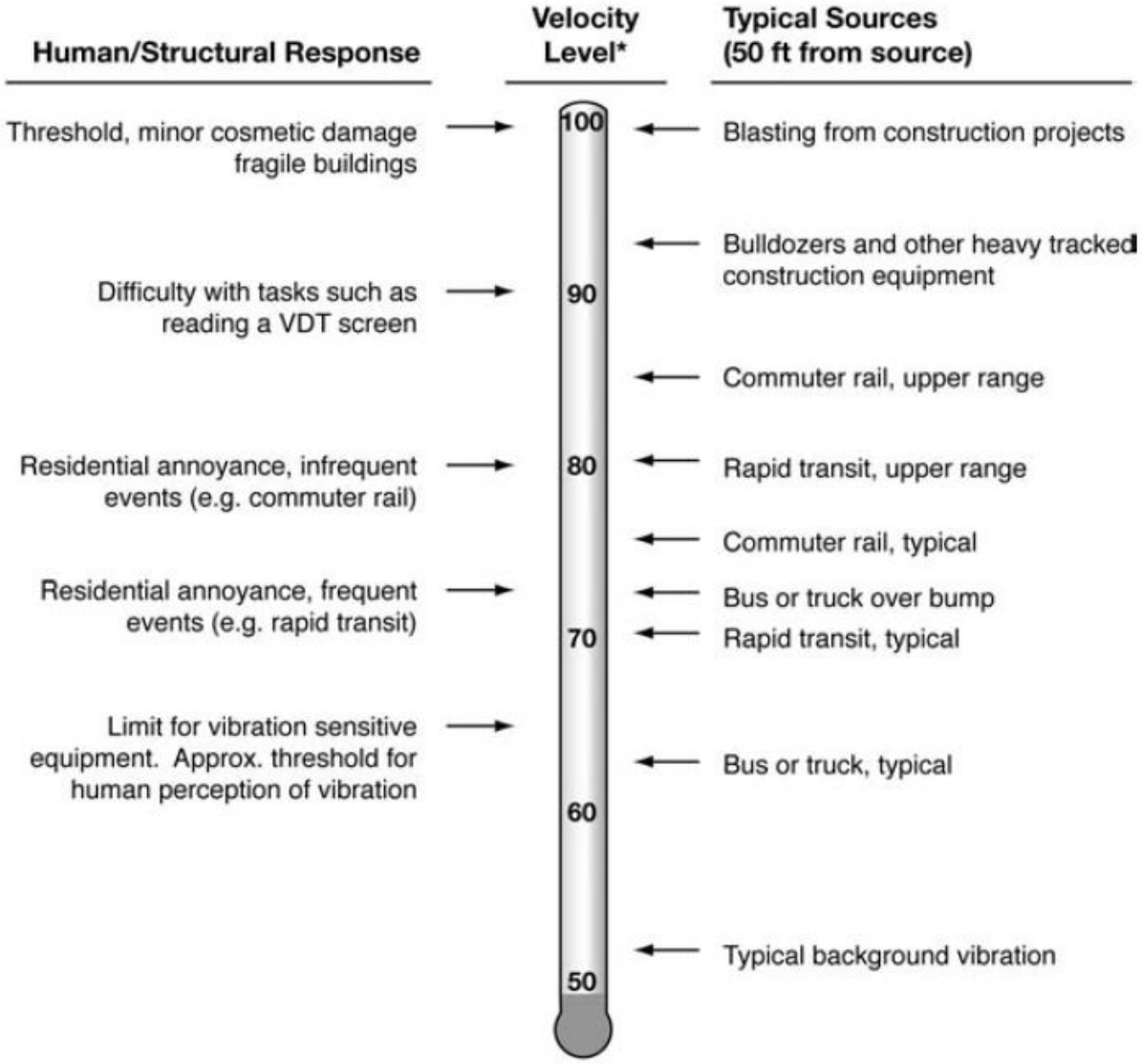
2.8 VIBRATION

Per the Federal Transit Administration (FTA) *Transit Noise Impact and Vibration Assessment* (10), vibration is the periodic oscillation of a medium or object. The rumbling sound caused by the vibration of room surfaces is called structure-borne noise. Sources of ground-borne vibrations include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or human-made causes (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, such as factory machinery, or transient, such as explosions. As is the case with airborne sound, ground-borne vibrations may be described by amplitude and frequency.

There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. The PPV is most frequently used to describe vibration impacts to buildings but is not always suitable for evaluating human response (annoyance) because it takes some time for the human body to respond to vibration signals. Instead, the human body responds to average vibration amplitude often described as the root mean square (RMS). The RMS amplitude is defined as the average of the squared amplitude of the signal and is most frequently used to describe the effect of vibration on the human body. Decibel notation (VdB) is commonly used to measure RMS. Decibel notation (VdB) serves to reduce the range of numbers used to describe human response to vibration. Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Sensitive receivers for vibration include structures (especially older masonry structures), people (especially residents, the elderly, and sick), and vibration-sensitive equipment.

The background vibration-velocity level in residential areas is generally 50 VdB. Ground-borne vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the ground-borne vibration is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration-velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings. Exhibit 2-C illustrates common vibration sources and the human and structural response to ground-borne vibration.

EXHIBIT 2-C: TYPICAL LEVELS OF GROUND-BORNE VIBRATION



** RMS Vibration Velocity Level in VdB relative to 10^{-6} inches/second*

Source: Federal Transit Administration (FTA) Transit Noise Impact and Vibration Assessment.

3 REGULATORY SETTING

To limit population exposure to physically and/or psychologically damaging as well as intrusive noise levels, the federal government, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise. In most areas, automobile and truck traffic is the major source of environmental noise. Traffic activity generally produces an average sound level that remains constant with time. Air and rail traffic, and commercial and industrial activities are also major sources of noise in some areas. Federal, state, and local agencies regulate different aspects of environmental noise. Federal and state agencies generally set noise standards for mobile sources such as aircraft and motor vehicles, while regulation of stationary sources is left to local agencies.

3.1 STATE OF CALIFORNIA NOISE REQUIREMENTS

The State of California regulates freeway noise, sets standards for sound transmission, provides occupational noise control criteria, identifies noise standards, and provides guidance for local land use compatibility. State law requires that each county and city adopt a General Plan that includes a Noise Element which is to be prepared per guidelines adopted by the Governor's Office of Planning and Research. (11) The purpose of the Noise Element is to *limit the exposure of the community to excessive noise levels*. In addition, the California Environmental Quality Act (CEQA) requires that all known environmental effects of a project be analyzed, including environmental noise impacts.

3.2 STATE OF CALIFORNIA BUILDING CODE

The State of California's noise insulation standards are codified in the California Code of Regulations, Title 24, Building Standards Administrative Code, Part 2, and the California Building Code. These noise standards are applied to new construction in California for the purpose of controlling interior noise levels resulting from exterior noise sources. The regulations specify that acoustical studies must be prepared when noise-sensitive structures, such as residential buildings, schools, or hospitals, are developed near major transportation noise sources, and where such noise sources create an exterior noise level of 60 dBA CNEL or higher. Acoustical studies that accompany building plans for noise-sensitive land uses must demonstrate that the structure has been designed to limit interior noise in habitable rooms to acceptable noise levels. For new residential buildings, schools, and hospitals, the acceptable interior noise limit for new construction is 45 dBA CNEL.

3.3 CITY OF LAKE FOREST GENERAL PLAN SAFETY AND NOISE ELEMENT

The City of Lake Forest has adopted a Safety and Noise Element of the General Plan to address public safety and quality of life issues. (12) The Safety and Noise Element specifies the maximum exterior and interior noise levels for new developments impacted by transportation noise sources such as arterial roads, freeways, airports, and railroads. In addition, the Safety and Noise Element identifies noise standards designed to protect, create, and maintain an environment free from noise that may jeopardize the health or welfare of sensitive receivers, or degrade quality of life.

3.3.1 LAND USE COMPATIBILITY

The noise criteria identified in the City of Lake Forest Safety and Noise Element are guidelines to evaluate the land use compatibility of transportation related noise. The land use compatibility criteria, shown on Exhibit 3-A, provides the City with a planning tool to gauge the compatibility of land uses relative to existing and future exterior noise levels.

The *Noise/Land Use Noise Compatibility Matrix* (Table SN-3) in the City of Lake Forest General Plan provides guidelines to evaluate the acceptability of transportation related noise level impacts. These guidelines are based on the Governor's Office of Planning and Research and are used to assess the long-term traffic noise impacts on land uses. Noise-sensitive land uses such as single-family residential homes and schools are considered *normally acceptable* with exterior noise levels below 60 dBA CNEL and *conditionally acceptable* with noise levels below 65 dBA CNEL. For *conditionally acceptable* land use, *new construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features are included in the design*. (12)

EXHIBIT 3-A: NOISE/LAND USE NOISE COMPATIBILITY MATRIX

Land Use Categories	Community Noise Equivalent Level (CNEL)						
	55	60	65	70	75	80	
Residential - Single Family, Multi-family, duplex	A	A	B	C	C		
Residential - Mobile Homes	A	A	B	C	C		
Transient Lodging - Motels, Hotels	A	A	B	B	C	C	
Schools, Libraries, Churches, Hospitals, Nursing/Convalescent Homes, Preschools, Day Care Centers(1)	A	A	B	C	C		
Auditoriums, Concert Halls, Amphitheaters, Meeting Halls	B	B	C	C			
Sports Arenas, Outdoor Spectator Sport, Amusement Parks	A	A	A	B	B		
Playgrounds, Neighborhood Parks	A	A	A	B	C		
Golf Courses, Riding Stables, Cemeteries	A	A	A	A	B	C	C
Office and Professional Buildings	A	A	A	B	B	C	
Commercial Retail, Banks, Restaurants, Theaters	A	A	A	A	B	B	C
Industrial, Manufacturing, Utilities, Wholesale, Service Stations	A	A	A	A	B	B	B
Agriculture	A	A	A	A	A	A	A

Zone A - Normally Acceptable

Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction without any special noise insulation requirements.

Zone B - Conditionally Acceptable

New construction or development should be undertaken only after detailed analysis of the noise reduction requirement is made and needed noise insulation features in the design are determined. Conventional construction, with closed windows and fresh air supply systems or air conditionaing, will normally suffice.

Zone C - Normally Unacceptable

New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of noise reduction requirements must be made and needed noise insulation features included in the design.

Notes:

(1) Religious institutions (Churches, synagogues, temples and other places of worship) of a small size (occupancy of 100 persons or less) may occupy existing buildings within areas of exterior noise levels ranging from 65 to 75 dB CNEL without providing additional noise insulation for the building.

(2) Shaded areas indicate new construction or development should generally not be undertaken.

3.3.2 TRANSPORTATION NOISE STANDARDS

The City of Lake Forest has established the *CEQA Significance Thresholds Guide* provides exterior and interior noise level standards, as shown on Exhibit 3-B. (2) The City of Lake Forest General Plan and *CEQA Significance Thresholds Guide* provide specific noise level standards for all land use categories that are used to regulate transportation-related noise levels for noise sensitive uses.

EXHIBIT 3-B: INTERIOR AND EXTERIOR NOISE STANDARDS

Land Use Categories	Noise Standards[1]	
	Interior[2,3]	Exterior
Residential - Single Family, multi-family, duplex, mobile home	CNEL 45 dB	CNEL 65 dB[4]
Residential - Transient lodging, hotels, motels, nursing homes, hospitals	CNEL 45 dB	CNEL 65 dB[4]
Private offices, church sanctuaries, libraries, board rooms, conference rooms, theaters, auditoriums, concert halls, meeting halls, etc.	L_{eq}(12) 45 dB(A)[2,6]	-
Schools	L_{eq}(12) 45 dB(A)	CNEL 65 dB[5]
General offices, reception, clerical, etc.	L_{eq}(12) 50 dB(A)	-
Bank lobby, retail store, restaurant, typing pool, etc.	L_{eq}(12) 55 dB(A)	-
Manufacturing, kitchen, warehousing, etc.	L_{eq}(12) 65 dB(A)	-
Parks, playgrounds	-	CNEL 65 dB[5]
Golf courses, outdoor spectator sports, amusement parks	-	CNEL 70 dB[5]

[1] "CNEL" = Community Noise Equivalent Level; "L_{eq}(12)" = The A-weighted equivalent sound level averaged over a 12-hour period (usually the hours of operation).
[2] Noise standard with windows closed. Mechanical ventilation shall be provided per UBC requirements to provide a habitable environment.
[3] Indoor environment excluding bathrooms, toilets, closets, and corridors.
[4] Outdoor environment limited to rear yard of single-family homes, multi-family patios and balconies (with a depth of 6' or more) and common recreation areas.
[5] Outdoor environment limited to playground areas, picnic areas, and other areas of frequent human use.
[6] Religious institutions (Churches, temples, and other places of worship) of a small size (occupancy of 100 persons or less) may occupy existing buildings within areas of exterior noise levels ranging from 65 to 75 dB CNEL without providing additional noise insulation for the building.

For noise-sensitive land uses such as the residential homes of the Project, the Safety and Noise Element and *CEQA Significance Thresholds Guide* requires an exterior noise level not to exceed 65 dBA CNEL within outdoor living areas (e.g., rear yards, patios and balconies 6-feet or greater, or common recreation areas). Further, school uses within the proposed Project are required to comply with an exterior noise level of 65 dBA CNEL at outdoor environments (e.g., playground areas, picnic areas, and other areas of frequent human use). In addition, the 24-hour 45 dBA CNEL residential interior noise level standard is used in this noise analysis for school uses to present a conservative approach. This approach is consistent with Tables SN-2 and SN-3 of the General Plan Safety and Noise Element and the *CEQA Significance Thresholds Guide*.

3.4 OPERATIONAL NOISE STANDARDS

To analyze noise impacts originating from a designated fixed location or private property such as the Project, stationary-source (operational) noise such as the proposed playgrounds, sports fields, outdoor pool/spa activities, a dog park, and school parking lot vehicle movements are typically evaluated against standards established under a jurisdiction's Municipal Code.

The Project operational noise impacts are governed by the City of Lake Forest Municipal Code, Title 11 – *Peace and Safety*, Division II – *Offenses Against Public Peace*, Chapter 11.16 – *Noise Control*, included in Appendix 3.1. The Municipal Code indicates the *Noise Standards* outlined in Section 11.16.040(A) shall apply to all residential property. The *Noise Standards* limit the allowable exterior noise level to 55 dBA during the daytime hours (7:00 a.m. to 10:00 p.m.), and 50 dBA during the nighttime hours (10:00 p.m. to 7:00 a.m.), as shown on Table 3-1. (13) To assess the stationary noise sources in the Project study area, the Municipal Code, Sections 11.16.040(B)(1-5), identify percentile noise level standards. The percentile noise levels represent the noise level standard (as show on Table 3-1) for residential land use for a cumulative period of more than thirty minutes (L_{50}) in any hour. These standards shall not be exceeded for a cumulative period of 30 minutes (L_{50}), or the standard plus 5 dBA cannot be exceeded for a cumulative period of more than 15 minutes (L_{25}) in any hour, or the standard plus 10 dBA for a cumulative period of more than 5 minutes (L_8) in any hour, or the standard plus 15 dBA for a cumulative period of more than 1 minute (L_2) in any hour, or the standard plus 20 dBA at any time (L_{max}). (13) These standards are consistent with those identified for operational noise in the *CEQA Significance Thresholds Guide*.

TABLE 3-1: STATIONARY-SOURCE NOISE LEVEL STANDARDS

Land Use	Time Period	Maximum Permissible Exterior Noise Levels[2]				
		L_{50} (30 mins)	L_{25} (15 mins)	L_8 (5 mins)	L_2 (1 min)	L_{max} (Anytime)
Residential[1]	Daytime (7:00 a.m. - 10:00 p.m.)	55	60	65	70	75
	Nighttime (10:00 p.m. - 7:00 a.m.)	50	55	60	65	70

[1] Source: Sections 11.16.040(A) & (B) of the City of Lake Forest Municipal Code.
[2] The percent noise level is the level exceeded "n" percent of the time during the measurement period. L_{25} is the noise level exceeded 25% of the time.

3.5 CONSTRUCTION NOISE STANDARDS

Noise from construction activities are typically limited to the hours of operation established under a City's Municipal Code. However, both the City of Lake Forest Municipal Code and *CEQA Significance Thresholds Guide* consider construction noise exempt from the Municipal Code stationary-source noise level standards (Section 11.16.060 of the Municipal Code), and do not establish a numeric maximum acceptable construction-source noise level threshold for potentially affected receivers, which would allow for a quantified determination of potential impacts under CEQA. Therefore, the following construction noise level threshold is used in this report.

To evaluate whether the Project will generate potentially significant construction noise levels at off-site sensitive receiver locations, a construction-related noise level threshold is adopted from the *Criteria for Recommended Standard: Occupational Noise Exposure* prepared by the National Institute for Occupational Safety and Health (NIOSH). (14) A division of the U.S. Department of Health and Human Services, NIOSH identifies a noise level threshold based on the duration of exposure to the source. The construction related noise level threshold starts at 85 dBA for more than eight hours per day, and for every 3 dBA increase, the exposure time is cut in half. This results in noise level thresholds of 88 dBA for more than four hours per day, 92 dBA for more than one hour per day, 96 dBA for more than 30 minutes per day, and up to 100 dBA for more than 15 minutes per day. (14) For the purposes of this analysis, the lowest, more conservative construction noise level threshold of 85 dBA L_{eq} is used as an acceptable threshold for construction noise at the nearby sensitive receiver locations. Since this construction-related noise level threshold represents the energy average of the noise source over a given time, they are expressed as L_{eq} noise levels. Therefore, the noise level threshold of 85 dBA L_{eq} over a period of eight hours or more is used to evaluate the potential Project-related construction noise level impacts at the nearby sensitive receiver locations.

3.6 CONSTRUCTION VIBRATION STANDARDS

The City of Lake Forest General Plan and Municipal Code do not identify specific vibration level standards. Therefore, applicable vibration standards identified by the California Department of Transportation ("Caltrans") *Transportation and Construction Vibration Guidance Manual* are used in this report. (15) According to the Caltrans vibration manual, large bulldozers, and loaded trucks used during construction activities can produce vibration which can potentially cause annoyance at sensitive land uses within the Project study area, or damage to adjacent structures. The Caltrans vibration manual establishes thresholds for determining potential vibration impacts resulting in building damage for older residential structures of 0.3 in/sec PPV, and for human annoyance of 0.04 in/sec PPV. These Caltrans thresholds are used in this analysis to assess potential impacts at the adjacent sensitive uses to the Project site.

This page intentionally left blank

4 SIGNIFICANCE CRITERIA

This study has been prepared consistent with applicable City of Lake Forest noise standards to address Appendix G of the California Environmental Quality Act (CEQA) Guidelines consistent with the *City of Lake Forest CEQA Significance Thresholds Guide*. (1; 2)Appendix G of the California Environmental Quality Act (CEQA) Guidelines are listed below for reference:

A. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

B. Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.

C. A substantial permanent increase in ambient noise levels in the Project vicinity above existing levels without the proposed Project; or

D. A substantial temporary or periodic increase in ambient noise levels in the Project vicinity above noise levels existing without the proposed Project.

E. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the Project area to excessive noise levels.

F. For a project within the vicinity of a private airstrip, expose people residing or working in the Project area to excessive noise levels.

While the CEQA Guidelines and the City of Lake Forest General Plan Guidelines provide direction on noise compatibility and establish noise standards by land use type that are sufficient to assess the significance of noise impacts under CEQA Guideline A, they do not define the levels at which increases are considered substantial for use under Guidelines B, C, and D. CEQA Guidelines E and F apply to nearby public and private airports, if any, and the Project's land use compatibility.

CEQA GUIDELINES NOT FURTHER ANALYZED

The closest airport to the Project site is John Wayne Airport which is located approximately 11 miles northwest of the Project site, and therefore, the Project site is not located within two miles of a public airport or within an airport land use plan; nor is the Project within the vicinity of a private airstrip. As such, the Project site would not be exposed to excessive noise levels from airport operations, and therefore, impacts are considered *less than significant,* and no further noise analysis is conducted in relation to Guidelines E and F.

4.1 CITY OF LAKE FOREST CEQA SIGNIFICANCE THRESHOLDS

Noise level increases resulting from the Project are evaluated consistent with the Appendix G CEQA Guidelines listed above based on the *City of Lake Forest CEQA Significance Thresholds Guide*. Under CEQA, consideration must be given to the magnitude of the increase, the existing ambient noise levels, and the location of noise-sensitive receivers to determine if a noise increase represents a significant adverse environmental impact. This approach recognizes *that there is no single noise increase that renders the noise impact significant.* (16) Unfortunately, there is no

completely satisfactory way to measure the subjective effects of noise or of the corresponding human reactions of annoyance and dissatisfaction. This is primarily because of the wide variation in individual thresholds of annoyance and differing individual experiences with noise. Thus, an important way of determining a person's subjective reaction to a new noise is the comparison of it to the existing environment to which one has adapted—the so-called *ambient* environment.

The *City of Lake Forest CEQA Significance Thresholds Guide* identifies the following two significance criteria related to potential Project traffic-related noise level increases for CEQA analysis purposes. Project impacts would be considered potentially significant if *both of the following criteria are met*:

- *Project traffic will cause a noise level increase of 3 dB or more on a roadway segment adjacent to a noise sensitive land use. Noise sensitive land uses include the following: residential (single-family, multi-family, mobile home); hotels; motels; nursing homes; hospitals; parks, playgrounds and recreation areas; and schools.*
- *The resulting "future with project" noise level exceeds the noise standard for sensitive land uses as identified in the City of Lake Forest General Plan (refer to Table 3-1 above, Interior and Exterior Noise Standards).*

4.2 SIGNIFICANCE CRITERIA SUMMARY

Noise impacts shall be considered significant if any of the following occur as a direct result of the proposed development. Table 4-1 shows the significance criteria summary matrix.

OFF-SITE TRAFFIC NOISE

- When both of the following criteria are met at noise-sensitive land uses (e.g., residential, hotels, motels, nursing homes, hospitals, parks, playgrounds and recreation areas, and schools):
    - Project traffic will cause a noise level increase of 3 dBA CNEL or more on a roadway segment adjacent to a noise-sensitive land use; and
    - The resulting "future with project" noise level exceeds the 65 dBA CNEL exterior noise level standard for sensitive land uses (City of Lake Forest CEQA Significance Thresholds Guide, Section 3.4).

ON-SITE TRAFFIC NOISE

- If the on-site noise levels:
    - exceed the exterior noise level standard of 65 dBA CNEL for outdoor areas (e.g., rear yard of single-family homes, multi-family patios and balconies (with a depth of six feet or more), common recreation areas, playgrounds, or picnic areas); or
    - exceed an interior noise level of 45 dBA CNEL for noise-sensitive uses (City of Lake Forest CEQA Significance Thresholds Guide, Table 3-1).

OPERATIONAL NOISE

- If Project-related operational (stationary source) noise levels exceed the exterior 55 dBA L_{50} daytime or 50 dBA L_{50} nighttime noise level standards for sensitive land uses. These standards shall not be exceeded for a cumulative period of 30 minutes (L_{50}), or the standard plus 5 dBA cannot be exceeded for a cumulative period of more than 15 minutes (L_{25}) in any hour, or the

standard plus 10 dBA for a cumulative period of more than 5 minutes (L_8) in any hour, or the standard plus 15 dBA for a cumulative period of more than 1 minute (L_2) in any hour, or the standard plus 20 dBA at any time (L_{max}) (Sections 11.16.040(A) & (B) of the City of Lake Forest Municipal Code, and Table 3-2 of the City of Lake Forest CEQA Significance Thresholds Guide).

CONSTRUCTION NOISE AND VIBRATION

- If Project-related construction activities create noise levels which exceed the 85 dBA L_{eq} acceptable noise level threshold at the nearby sensitive receiver locations (NIOSH, Criteria for Recommended Standard: Occupational Noise Exposure); or
- If Project-related construction activities generate vibration levels which exceed the Caltrans building damage vibration level threshold for older residential structures of 0.3 in/sec PPV, or the *distinctly perceptible* human annoyance vibration level threshold of 0.04 in/sec PPV at nearby sensitive receiver locations (Caltrans Transportation and Construction Vibration Guidance Manual, Tables 19 & 20).

TABLE 4-1: SIGNIFICANCE CRITERIA SUMMARY

Analysis	Receiving Land Use	Condition(s)	Significance Criteria	
			Daytime	Nighttime
Off-Site Traffic Noise[1]	Noise-Sensitive	Exterior Noise Level Criteria	≥ 3 dBA CNEL Project Increase & Resulting With Project Noise Level > 65 dBA CNEL	
On-Site Traffic Noise[1]	Residential & School	Exterior Noise Level Standard	65 dBA CNEL	
		Interior Noise Level Standard	45 dBA CNEL	
Operational Noise[1]	Noise-Sensitive	Exterior Noise Level Standards	See Table 3-1.	
Construction Noise & Vibration	Noise-Sensitive	Noise Level Threshold[2]	85 dBA L_{eq}	n/a
		Vibration Level Threshold (Building Damage)[3]	0.3 in/sec PPV	n/a
		Vibration Level Threshold (Distinctly Perceptible)[3]	0.04 in/sec PPV	n/a

[1] Source: City of Lake Forest CEQA Thresholds Guide.
[2] Source: NIOSH, Criteria for Recommended Standard: Occupational Noise Exposure, June 1998.
[3] Source: Caltrans Transportation and Construction Vibration Guidance Manual, September 2013, Tables 19 & 20.
"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.; "n/a" = No nighttime construction activity is permitted, so no nighttime construction noise level limits are identified; "PPV" = peak particle velocity

This page intentionally left blank

5 EXISTING NOISE LEVEL MEASUREMENTS

To assess the existing noise level environment, eight 24-hour noise level measurements were taken at sensitive receiver locations in the Project study area. The receiver locations were selected to describe and document the existing noise environment within the Project study area. Exhibit 5-A provides the boundaries of the Project study area and the noise level measurement locations. To fully describe the existing noise conditions, noise level measurements were collected by Urban Crossroads, Inc. on Wednesday, May 17th, 2017 and on Wednesday, May 31st, 2018. Appendix 5.1 includes study area photos.

5.1 MEASUREMENT PROCEDURE AND CRITERIA

To describe the existing noise environment, the hourly noise levels were measured during typical weekday conditions over a 24-hour period. By collecting individual hourly noise level measurements, it is possible to describe the daytime and nighttime hourly noise levels and calculate the 24-hour CNEL. The long-term noise readings were recorded using Piccolo Type 2 integrating sound level meter and dataloggers. The Piccolo sound level meters were calibrated using a Larson-Davis calibrator, Model CAL 150. All noise meters were programmed in "slow" mode to record noise levels in "A" weighted form. The sound level meters and microphones were equipped with a windscreen during all measurements. All noise level measurement equipment satisfies the American National Standards Institute (ANSI) standard specifications for sound level meters ANSI S1.4-2014/IEC 61672-1:2013. (17)

5.2 NOISE MEASUREMENT LOCATIONS

The long-term noise level measurements were positioned as close to the nearest sensitive receiver locations as possible to assess the existing ambient hourly noise levels surrounding the Project site. Both Caltrans and the FTA recognize that it is not reasonable to collect noise level measurements that can fully represent any part of a private yard, patio, deck, or balcony normally used for human activity when estimating impacts for new development projects. This is demonstrated in the Caltrans general site location guidelines which indicate that, *sites must be free of noise contamination by sources other than sources of interest. Avoid sites located near sources such as barking dogs, lawnmowers, pool pumps, and air conditioners unless it is the express intent of the analyst to measure these sources*. (5) Further, FTA guidance states, t*hat it is not necessary nor recommended that existing noise exposure be determined by measuring at every noise-sensitive location in the project area. Rather, the recommended approach is to characterize the noise environment for clusters of sites based on measurements or estimates at representative locations in the community*. (10)

Based on recommendations of Caltrans and the FTA, it is not necessary to collect measurements at each individual building or residence, because each receiver measurement represents a group of buildings that share acoustical equivalence. (10) In other words, the area represented by the receiver shares similar shielding, terrain, and geometric relationship to the reference noise source. Receivers represent a location of noise sensitive areas and are used to estimate the future noise level impacts. Collecting reference ambient noise level measurements at the nearby

sensitive receiver locations allows for a comparison of the before and after Project noise levels and is necessary to assess potential noise impacts due to the Project's contribution to the ambient noise levels.

5.3 NOISE MEASUREMENT RESULTS

The noise measurements presented below focus on the average or equivalent sound levels (L_{eq}). The equivalent sound level (L_{eq}) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period. Table 5-1 identifies the hourly daytime (7:00 a.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) noise levels at each noise level measurement location. Additional median noise levels (L_{50}) are provided on Table 5-1 consistent with the City of Lake Forest Municipal Code exterior noise level standards. Appendix 5.2 provides a summary of the existing hourly ambient noise levels described below:

- Location L1 represents the noise levels on Rancho Parkway adjacent to existing commercial uses north of the Project site. The noise level measurements collected show an overall 24-hour exterior noise level of 67.8 dBA CNEL. The energy (logarithmic) average daytime noise level was calculated at 64.1 dBA L_{eq} with an average nighttime noise level of 60.0 dBA L_{eq}.
- Location L2 represents the noise levels east of the Project site adjacent to an existing pedestrian trail and an Extended Stay America hotel. The noise level measurements collected show an overall 24-hour exterior noise level of 57.8 dBA CNEL. The energy (logarithmic) average daytime noise level was calculated at 54.4 dBA L_{eq} with an average nighttime noise level of 50.1 dBA L_{eq}.
- Location L3 represents the noise levels southeast of the Project site at an adjacent pedestrian trail near existing office buildings on Lake Forest Drive. The 24-hour CNEL indicates that the overall exterior noise level is 49.8 dBA CNEL. The energy (logarithmic) average daytime noise level was calculated at 46.2 dBA L_{eq} with an average nighttime noise level of 42.3 dBA L_{eq}.
- Location L4 represents the noise levels at the western Project site boundary adjacent to an existing parking lot for office uses. The noise level measurements collected show an overall 24-hour exterior noise level of 57.0 dBA CNEL. The energy (logarithmic) average daytime noise level was calculated at 52.2 dBA L_{eq} with an average nighttime noise level of 49.9 dBA L_{eq}.
- Location L5 represents the noise levels southwest of the Project site within an existing parking lot for office uses. The noise level measurements collected show an overall 24-hour exterior noise level of 55.3 dBA CNEL. The energy (logarithmic) average daytime noise level was calculated at 50.0 dBA L_{eq} with an average nighttime noise level of 48.4 dBA L_{eq}.
- Location L6 represents the noise levels northwest of the Project site near existing residential homes on Agave. The noise level measurements collected show an overall 24-hour exterior noise level of 51.1 dBA CNEL. The energy (logarithmic) average daytime noise level was calculated at 46.7 dBA L_{eq} with an average nighttime noise level of 43.8 dBA L_{eq}.
- Location L7 represents the noise levels north of the Project site across Bake Parkway adjacent to an existing Staybridge Suites hotel. The noise level measurements collected show an overall 24-hour exterior noise level of 61.1 dBA CNEL. The energy (logarithmic) average daytime noise level was calculated at 56.6 dBA L_{eq} with an average nighttime noise level of 53.8 dBA L_{eq}.

- Location L8 represents the noise levels at the northwestern Project site boundary adjacent to Bake Parkway. The noise level measurements collected show an overall 24-hour exterior noise level of 79.0 dBA CNEL. The energy (logarithmic) average daytime noise level was calculated at 75.1 dBA L_{eq} with an average nighttime noise level of 71.5 dBA L_{eq}.

Table 5-1 provides the (energy average) noise levels used to describe the daytime and nighttime ambient conditions. These daytime and nighttime energy average noise levels represent the average of all hourly noise levels observed during these time periods expressed as a single number. Appendix 5.2 provides summary worksheets of the noise levels for each hour as well as the minimum, maximum, L_1, L_2, L_5, L_8, L_{25}, L_{50}, L_{90}, L_{95}, and L_{99} percentile noise levels observed during the daytime and nighttime periods.

The background ambient noise levels in the Project study area are dominated by the transportation-related noise associated with the arterial roadway network. The 24-hour existing noise level measurements shown on Table 5-1 present the existing ambient noise conditions.

TABLE 5-1: 24-HOUR AMBIENT NOISE LEVEL MEASUREMENTS

Location[1]	Date	Distance to Project Boundary (Feet)	Description	Energy Average Noise Level (dBA L_{eq})[2]		Average Median Noise Level (dBA L_{50})[2]		CNEL
				Daytime	Nighttime	Daytime	Nighttime	
L1	5/31/2018	140'	Located on Rancho Parkway adjacent to existing commercial uses north of the Project site.	64.1	60.0	58.9	48.0	67.8
L2	5/31/2018	115'	Located east of the Project site adjacent to an existing pedestrian trail and an Extended Stay America hotel.	54.4	50.1	50.8	42.8	57.8
L3	5/31/2018	45'	Located southeast of the Project site at an adjacent pedestrian trail near existing office buildings on Lake Forest Drive.	46.2	42.3	43.2	39.4	49.8
L4	5/17/2017	0'	Located at the western Project site boundary adjacent to an existing parking lot for office uses.	52.2	49.9	48.5	46.6	57.0
L5	5/17/2017	151'	Located southwest of the Project site within an existing parking lot for office uses.	50.0	48.4	47.0	46.1	55.3
L6	5/17/2017	390'	Located northwest of the Project site near existing residential homes on Agave.	46.7	43.8	43.9	41.8	51.1
L7	5/17/2017	250'	Located north of the Project site across Bake Parkway adjacent to an existing Staybridge Suites hotel.	56.6	53.8	54.4	52.0	61.1
L8	5/17/2017	0'	Located at the northwestern Project site boundary adjacent to Bake Parkway.	75.1	71.5	69.5	56.0	79.0

[1] See Exhibit 5-A for the noise level measurement locations.
[2] The long-term 24-hour measurement worksheets are included in Appendix 5.2.
"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

EXHIBIT 5-A: NOISE MEASUREMENT LOCATIONS

This page intentionally left blank

6 METHODS AND PROCEDURES

The following section outlines the methods and procedures used to model and analyze the potential future Project-related impacts related to traffic noise, operational noise, and construction noise and vibration.

6.1 FHWA TRAFFIC NOISE PREDICTION MODEL

The estimated roadway noise impacts from vehicular traffic were calculated using a computer program that replicates the Federal Highway Administration (FHWA) Traffic Noise Prediction Model- FHWA-RD-77-108. (18) The FHWA Model arrives at a predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). In California the national REMELs are substituted with the California Vehicle Noise (Calveno) Emission Levels. (19) Adjustments are then made to the REMEL to account for: the roadway classification (e.g., collector, secondary, major or arterial), the roadway active width (i.e., the distance between the center of the outermost travel lanes on each side of the roadway), the total average daily traffic (ADT), the travel speed, the percentages of automobiles, medium trucks, and heavy trucks in the traffic volume, the roadway grade, the angle of view (e.g., whether the roadway view is blocked), the site conditions ("hard" or "soft" relates to the absorption of the ground, pavement, or landscaping), and the percentage of total ADT which flows each hour throughout a 24-hour period.

6.1.1 OFF-SITE TRAFFIC NOISE PREDICTION MODEL INPUTS

Table 6-1 presents the roadway parameters used to assess the Project's off-site transportation noise impacts. Table 6-1 identifies the 39 study area roadway segments, the distance from the centerline to adjacent land use based on the functional roadway classifications per the City of Lake Forest General Plan Circulation Element, and the posted vehicle speeds. For this analysis, soft site conditions are used to analyze the traffic noise impacts within the Project study area. Soft site conditions account for the sound propagation loss over natural surfaces such as normal earth and ground vegetation. Caltrans' research has shown that the use of soft site conditions is appropriate for the application of the FHWA traffic noise prediction model as used in this off-site traffic noise analysis. (20)

The Existing, Interim Year 2020, 2040 General Plan With Approved Business Park Land Use Without Portola Extension, and 2040 General Plan With Approved Business Park Land Use With Portola Extension average daily traffic volumes used for this study are presented on Table 6-2 and are provided by *Nakase Property Traffic Impact Analysis*. (3) Table 6-3 presents the time of day vehicle splits and Table 6-4 presents the traffic flow distributions (vehicle mix) used for this analysis. The vehicle mix provides the hourly distribution percentages of automobile, medium trucks, and heavy trucks for input into the FHWA noise prediction model.

TABLE 6-1: OFF-SITE ROADWAY PARAMETERS

ID	Roadway	Segment	Adjacent Land Use[1]	Distance From Centerline To Nearest Adjacent Land Use (Feet)[2]	Vehicle Speed (mph)[3]
1	Trabuco Rd.	s/o Bake Pkwy.	Comm./Office/Public/Res.	60'	55
2	Trabuco Rd.	s/o Lake Forest Dr.	Commercial/Residential	60'	50
3	Rancho Pkwy. S.	s/o Alton Pkwy.	Mixed-Use (Residential)	50'	40
4	Rancho Pkwy. S.	n/o Bake Pkwy.	Business Park	50'	40
5	Rancho Pkwy.	s/o Lake Forest Dr.	Business Park	30'	45
6	Towne Centre Dr.	s/o Alton Pkwy.	Commercial	30'	35
7	Towne Centre Dr.	s/o Bake Pkwy.	Commercial/Residential	30'	35
8	Towne Centre Dr.	s/o Lake Forest Dr.	Commercial	30'	35
9	Portola Pkwy.	s/o Alton Pkwy.	Commercial/Residential	60'	40
10	Portola Pkwy.	n/o Rancho Pkwy.	Commercial/Residential	70'	50
11	Santa Margarita Pkwy.	s/o El Toro Rd.	Residential	60'	50
12	Santa Margarita Pkwy.	s/o Los Alisos Bl.	Residential	60'	45
13	Alton Pkwy.	w/o Irvine Bl.	Business Park	60'	55
14	Alton Pkwy.	e/o Irvine Bl.	Business Park	60'	60
15	Alton Pkwy.	w/o Rancho Pkwy. S.	Residential	60'	55
16	Bake Pkwy.	w/o Rockfield Bl.	Business Park	60'	55
17	Bake Pkwy.	e/o Rockfield Bl.	Business Park	60'	55
18	Bake Pkwy.	e/o Muirlands Bl.	Business Park/Residential	60'	55
19	Bake Pkwy.	e/o Jeronimo Rd.	Business Park/Residential	60'	50
20	Bake Pkwy.	e/o Toledo Wy.	Business Park/Residential	60'	50
21	Bake Pkwy.	e/o Trabuco Rd.	Business Park	60'	50
22	Bake Pkwy.	w/o Dimension Dr.	Light Industrial/Residential	50'	50
23	Bake Pkwy.	e/o Dimension Dr.	Light Industrial/Residential	50'	50
24	Bake Pkwy.	e/o Rancho Pkwy. S.	Business Park	50'	50
25	Bake Pkwy.	w/o Towne Centre Dr.	Commercial	30'	50
26	Bake Pkwy.	e/o Towne Centre Dr.	Commercial/Residential	30'	50
27	Lake Forest Dr.	w/o Serrano Rd.	Residential	60'	50
28	Lake Forest Dr.	e/o Serrano Rd.	Commercial/Residential	60'	50
29	Lake Forest Dr.	e/o Trabuco Rd.	Commercial/Residential	50'	50
30	Lake Forest Dr.	e/o Dimension Dr.	Commercial	50'	50
31	Lake Forest Dr.	e/o Rancho Pkwy.	Commercial/Community Park	30'	50
32	Lake Forest Dr.	e/o Towne Centre Dr.	Commercial	30'	50
33	Lake Forest Dr.	e/o Portola Pkwy.	Light Industrial	30'	45
34	El Toro Rd.	w/o Jeronimo Rd.	Commercial/Residential	70'	50
35	El Toro Rd.	e/o Jeronimo Rd.	Residential	70'	50
36	El Toro Rd.	e/o Serrano Rd.	Commercial/Residential	70'	50
37	El Toro Rd.	e/o Trabuco Rd.	Commercial/Residential	60'	50
38	El Toro Rd.	w/o Portola Pkwy.	Residential/Regional Park	60'	55
39	El Toro Rd.	e/o Portola Pkwy.	Residential/Regional Park	60'	55

[1] Source: City of Lake Forest General Plan Land Use Element, Figure LU-1.
[2] Distance to adjacent land use is based on the right-of-way distance for each roadway classification provided in the General Plan Circulation Element.
[3] Source: Nakase Property Traffic Impact Analysis, September 2018.

TABLE 6-2: AVERAGE DAILY TRAFFIC VOLUMES

ID	Roadway	Segment	Average Daily Traffic (1,000's)[1]							
			Existing		Interim Year 2020		2040 General Plan without Portola Extension[2]		2040 General Plan with Portola Extension[2]	
			Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
1	Trabuco Rd.	s/o Bake Pkwy.	18.6	18.9	23.0	23.0	27.0	27.0	34.0	35.0
2	Trabuco Rd.	s/o Lake Forest Dr.	23.2	23.7	33.0	33.0	39.0	39.0	26.0	27.0
3	Rancho Pkwy. S.	s/o Alton Pkwy.	5.6	6.5	9.2	10.3	16.7	15.7	16.6	15.3
4	Rancho Pkwy. S.	n/o Bake Pkwy.	7.2	8.5	9.0	10.0	13.0	12.0	13.0	12.0
5	Rancho Pkwy.	s/o Lake Forest Dr.	15.5	16.9	19.0	19.0	36.0	33.0	35.0	33.0
6	Towne Centre Dr.	s/o Alton Pkwy.	14.5	14.9	14.5	15.1	15.1	15.2	14.9	15.4
7	Towne Centre Dr.	s/o Bake Pkwy.	7.8	8.0	7.9	8.2	9.5	9.4	9.0	8.7
8	Towne Centre Dr.	s/o Lake Forest Dr.	5.2	5.4	5.4	5.4	5.3	5.1	5.7	5.1
9	Portola Pkwy.	s/o Alton Pkwy.	22.4	22.7	27.5	27.7	33.9	34.3	42.2	42.6
10	Portola Pkwy.	n/o Rancho Pkwy.	25.1	25.4	29.0	29.0	35.0	35.0	35.0	35.0
11	Santa Margarita Pkwy.	s/o El Toro Rd.	37.9	38.5	39.0	39.0	49.0	48.0	49.0	48.0
12	Santa Margarita Pkwy.	s/o Los Alisos Bl.	35.1	35.6	37.9	37.9	46.7	45.5	46.8	45.5
13	Alton Pkwy.	w/o Irvine Bl.	22.0	22.4	29.1	29.0	33.7	33.7	33.2	33.3
14	Alton Pkwy.	e/o Irvine Bl.	23.9	24.7	25.0	26.0	29.0	28.0	24.0	24.0
15	Alton Pkwy.	w/o Rancho Pkwy. S.	23.3	24.1	35.3	36.8	54.9	53.9	50.7	49.7
16	Bake Pkwy.	w/o Rockfield Bl.	72.2	73.6	74.0	75.0	89.0	88.0	88.0	88.0
17	Bake Pkwy.	e/o Rockfield Bl.	62.8	64.2	66.4	66.8	71.1	70.5	70.7	70.0
18	Bake Pkwy.	e/o Muirlands Bl.	61.1	62.8	63.4	64.0	69.1	68.5	68.5	68.3
19	Bake Pkwy.	e/o Jeronimo Rd.	51.4	53.1	55.7	56.3	60.6	60.0	59.9	59.5
20	Bake Pkwy.	e/o Toledo Wy.	49.3	51.0	51.0	52.0	55.0	55.0	55.0	55.0
21	Bake Pkwy.	e/o Trabuco Rd.	37.4	39.5	36.0	37.0	40.0	39.0	38.0	38.0
22	Bake Pkwy.	w/o Dimension Dr.	27.0	29.2	34.5	35.5	38.6	37.8	37.6	36.9
23	Bake Pkwy.	e/o Dimension Dr.	29.0	31.8	30.0	31.0	40.0	38.0	38.0	37.0
24	Bake Pkwy.	e/o Rancho Pkwy. S.	29.5	30.4	30.0	31.0	37.0	37.0	36.0	37.0
25	Bake Pkwy.	w/o Towne Centre Dr.	27.4	28.5	28.0	29.0	31.0	31.0	31.0	31.0

ID	Roadway	Segment	Average Daily Traffic (1,000's)[1]							
			Existing		Interim Year 2020		2040 General Plan without Portola Extension[2]		2040 General Plan with Portola Extension[2]	
			Without Project	With Project	Without Project	With Project	Without Project	With Project	Without Project	With Project
26	Bake Pkwy.	e/o Towne Centre Dr.	17.0	17.5	25.9	25.5	28.4	28.0	28.3	27.9
27	Lake Forest Dr.	w/o Serrano Rd.	35.1	35.6	42.2	42.4	43.8	44.7	43.8	43.8
28	Lake Forest Dr.	e/o Serrano Rd.	37.5	38.0	42.2	42.5	43.2	43.6	42.9	43.6
29	Lake Forest Dr.	e/o Trabuco Rd.	36.9	37.5	39.2	40.1	40.9	40.7	44.7	40.5
30	Lake Forest Dr.	e/o Dimension Dr.	22.3	23.0	28.0	29.0	37.0	35.0	37.0	35.0
31	Lake Forest Dr.	e/o Rancho Pkwy.	16.3	17.2	22.0	23.0	30.0	28.0	29.0	27.0
32	Lake Forest Dr.	e/o Towne Centre Dr.	10.0	10.3	17.7	18.5	21.8	20.0	20.2	19.3
33	Lake Forest Dr.	e/o Portola Pkwy.	8.5	8.8	7.2	7.2	11.1	10.7	10.6	10.7
34	El Toro Rd.	w/o Jeronimo Rd.	39.6	40.1	41.7	42.2	41.4	40.9	41.1	40.9
35	El Toro Rd.	e/o Jeronimo Rd.	39.1	39.6	44.6	45.1	46.4	46.7	46.6	45.9
36	El Toro Rd.	e/o Serrano Rd.	33.0	33.5	43.0	43.0	45.0	44.0	45.0	44.0
37	El Toro Rd.	e/o Trabuco Rd.	35.0	35.2	40.2	40.5	45.4	44.9	44.4	44.1
38	El Toro Rd.	w/o Portola Pkwy.	25.5	25.7	29.0	29.0	33.0	33.0	33.0	33.0
39	El Toro Rd.	e/o Portola Pkwy.	14.8	15.1	28.0	28.3	33.8	33.2	33.7	33.2

[1] Source: Nakase Property Traffic Impact Analysis, September 2018.

[2] 2040 General Plan ADT volumes under without Project conditions include those with the currently approved Business Park land use for the Project site. As such, the with Project ADT volumes under 2040 General Plan scenarios result in reductions in ADT volumes since the ADT volumes from the proposed land use are less than the currently approved Business Park use on some roadway segments.

TABLE 6-3: TIME OF DAY VEHICLE SPLITS

Vehicle Type	Time of Day Splits[1]			Total of Time of Day Splits
	Daytime	Evening	Nighttime	
Autos	77.50%	12.90%	9.60%	100.00%
Medium Trucks	84.80%	4.90%	10.30%	100.00%
Heavy Trucks	86.50%	2.70%	10.80%	100.00%

[1] Source: Typical Southern California vehicle mix & County of Orange Land Use/Noise Compatibility Manual, December 1993.
"Daytime" = 7:00 a.m. to 7:00 p.m.; "Evening" = 7:00 p.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

TABLE 6-4: DISTRIBUTION OF TRAFFIC FLOW BY VEHICLE TYPE (VEHICLE MIX)

Classification	Total % Traffic Flow			Total
	Autos	Medium Trucks	Heavy Trucks	
SR-241[1]	96.92%	1.97%	1.11%	100.00%
All Roadways[2]	97.42%	1.84%	0.74%	100.00%

[1] Source: Caltrans Data Branch Annual Average Daily Truck Traffic on the California Highways System, 2016.
[2] Source: County of Orange Land Use/Noise Compatibility Manual, December 1993.

6.1.2 ON-SITE TRAFFIC NOISE PREDICTION MODEL INPUTS

The on-site roadway parameters including the average daily traffic (ADT) volumes used for this study are presented on Table 6-5. The average daily traffic volumes for SR-241 are based on a 10-percent increase in existing volumes obtained from the Caltrans Traffic Data Branch Annual Average Daily Truck Traffic on the California Highways System 2016 data. (21) Future traffic volumes on City of Lake Forest roadways are based on General Plan Circulation Element roadway capacity volumes by classification. (22) Soft site conditions were used to analyze the traffic noise impacts within the Project study area which account for the sound propagation loss over natural surfaces such as normal earth and ground vegetation. Research by Caltrans shows that the use of soft site conditions is appropriate for the application of the FHWA traffic noise prediction model used in this analysis. (20)

As previously described, Table 6-3 presents the time of day vehicle splits and Table 6-4 presents the traffic flow distributions (vehicle mix) used for this analysis. The vehicle mix provides the hourly distribution percentages of automobile, medium trucks, and heavy trucks for input into the FHWA noise prediction model.

TABLE 6-5: ON-SITE ROADWAY PARAMETERS

Roadway Segment	Lanes	Classification[1]	Future ADT Volume[2]	Speed Limit (mph)[3]	Site Conditions
SR-241	6	Freeway	44,110	70	Soft
Bake Pkwy.	4	Primary	36,000	50	Soft
Rancho Pkwy.	4	Primary (Commercial)	36,000	45	Soft
Lake Forest Dr.	4	Primary	36,000	50	Soft

[1] Road classifications based upon the City of Lake Forest General Plan Circulation Element, Figure C-1.
[2] Roadway volumes were obtained from the City of Lake Forest General Plan Circulation Element, Page 10, Representative Roadway Capacities. The volume for SR-241 is based on 10-percent growth over data obtained from the Caltrans Traffic Data Branch Annual Average Daily Truck Traffic on the California Highways System, 2016.
[3] Posted speed limits. SR-241 speed is based on a conservative 5 mph above the posted speed limit of 65 mph.

The site plan is used to identify the relationship between the roadway centerline elevation, the pad elevation and the centerline distance to any intervening noise barriers, and the building façade. The exterior noise level receivers are placed five feet above the pad elevation in outdoor living areas or at the proposed building façade for first-floor exterior noise level analysis. All second-floor receivers are located at a height of 14 feet.

6.2 OPERATIONAL REFERENCE NOISE LEVELS AND ANALYSIS METHODS

To estimate the Project operational noise impacts, reference noise level measurements were collected from similar types of activities to represent the noise levels expected with the development of the proposed Project. Based upon these reference noise levels, it is possible to estimate the Project operational stationary-source noise levels at each of the sensitive receiver locations identified in Section 9.

6.2.1 PROJECT REFERENCE OPERATIONAL NOISE LEVELS

This section provides a detailed description of the reference noise level measurements shown on Table 6-6 used to estimate the Project operational noise impacts. It is important to note that the following projected noise levels assume the worst-case noise environment with the playgrounds, sports fields, outdoor pool/spa activities, a dog park, and school parking lot vehicle movements all operating continuously. These noise level impacts will likely vary throughout the day.

Playground and Sports Field Activity

To represent the potential noise level impacts associated with the Project's playgrounds, a reference noise level measurement was collected on Wednesday, October 8th, 2014 at the Founders Park in the unincorporated community of Ladera Ranch in the County of Orange. The reference noise levels collected at the Founders Park are expected to reflect the noise level activities within the playgrounds and tot lots at the Project site, since the reference noise level measurement includes parents speaking on cell phones, kids playing on swing sets, and background girls youth soccer games, with coaches shouting instructions and people cheering

and clapping. Using the uniform reference distance of 50 feet, the reference playground activity noise level is 41.7 dBA L_{50}. The playground activities are estimated to occur for 60 minutes during the peak hour conditions.

Outdoor Pool/Spa Activity

To represent the noise levels associated with pool activities, Urban Crossroads collected a reference noise level measurement on July 5th, 2017 at the Covenant Hill Clubhouse Pool in the unincorporated community of Ladera Ranch in the County of Orange. The measured reference noise level at the uniform 50-foot reference distance is 48.7 dBA L_{50} for pool activity. The pool activity noise levels include kids playing, running, screaming, splashing, playing with a ball, and parents talking. Noise associated with pool activities is expected to occur for the entire hour (60 minutes).

Dog Park Activity

To describe the potential noise level impacts associated with a dog park, a reference noise level measurement was collected on Wednesday, October 8th, 2014 at La Paws Dog Park in the City of Mission Viejo. The reference noise level measurement at the dog park includes people talking, dogs running, playing fetch, chasing each other, growling, barking and dog owners talking on cell phones. As observed during the noise level measurement, the dual entry gate of the La Paws Dog Park was identified as a key source of noise when opened and closed due to metal hinges squeaking and the metal to metal contact with the gate and its closure. At the normalized reference distance of 50 feet from the noise source, the reference noise level is 38.5 dBA L_{50}. The dog park activities are estimated to operate continuously for up to 60 minutes during the peak hour conditions.

School Parking Lot Vehicle Movements

To determine the noise levels associated with school parking lot vehicle movements, including morning drop-off activities, Urban Crossroads collected reference noise level measurements at the Orange Crescent School, adjacent to Hill Elementary School, in the City of Garden Grove on September 19th, 2018. The reference 1-hour noise level measurement indicates that the parking lot vehicle movements generates noise levels of 50.0 dBA L_{50} at a normalized distance of 50 feet. The school parking lot noise levels are mainly due to cars pulling in and out of spaces, parents dropping children off for school, and background traffic noise levels due to queuing cars. Noise associated with parking lot vehicle movements are estimated to operate continuously for up to 60 minutes during the peak hour conditions..

TABLE 6-6: REFERENCE NOISE LEVEL MEASUREMENTS

Noise Source	Duration (hh:mm:ss)	Ref. Distance (Feet)	Noise Source Height (Feet)	Hourly Activity (Mins)[5]	Reference Noise Level (dBA L_{50})	
					@ Ref. Dist.	@ 50 Feet
Playground/Sports Field Activity[1]	00:15:00	5'	4'	60	61.7	41.7
Outdoor Pool/Spa Activity[2]	00:10:00	5'	4'	60	68.7	48.7
Dog Park Activity[3]	00:15:00	5'	4'	60	58.5	38.5
School Parking Lot Vehicle Movements[4]	01:00:00	50'	5'	60	50.0	50.0

[1] As measured by Urban Crossroads, Inc. on 10/8/2014 at the Founder's Park in Ladera Ranch (County of Orange).
[2] As measured by Urban Crossroads, Inc. on 7/5/2017 at the Covenant Hill Clubhouse pool in the unincorporated community of Ladera Ranch in the County of Orange.
[3] As measured by Urban Crossroads, Inc. on 10/8/2014 at the La Paws Dog Park in the City of Mission Viejo.
[4] As measured by Urban Crossroads, Inc. on 9/19/2018 at the parking lot for the Orange Crescent School, adjacent to Hill Elementary School.
[5] Anticipated duration (minutes within the hour) of noise activity during typical hourly conditions expected at the Project site based on the reference noise level measurement activity.

6.2.2 OPERATIONAL NOISE ANALYSIS METHODS

The operational noise level calculations provided in this report account for the distance attenuation provided due to geometric spreading, when sound from a localized stationary source (i.e., a point source) propagates uniformly outward in a spherical pattern. Hard site conditions are used in the operational noise analysis which result in noise levels that attenuate (or decrease) at a rate of 6 dBA for each doubling of distance from a point source. The basic noise attenuation equation shown below is used to calculate the distance attenuation based on a reference noise level (SPL_1):

$$SPL_2 = SPL_1 - 20\log(D_2/D_1)$$

Where SPL_2 is the resulting noise level after attenuation, SPL_1 is the source noise level, D_2 is the distance to the reference sound pressure level (SPL_1), and D_1 is the distance to the receiver location.

6.3 CONSTRUCTION REFERENCE NOISE LEVELS AND ANALYSIS METHODS

To describe the Project construction noise levels, reference measurements were collected for similar activities at several construction sites. The construction noise analysis provided in this report was prepared using reference noise level measurements taken by Urban Crossroads, Inc. to describe the typical construction activity noise levels for each stage of Project construction.

6.3.1 PROJECT REFERENCE CONSTRUCTION NOISE LEVELS

Table 6-7 provides a summary of the construction reference noise level measurements. Since the reference noise levels were collected at varying distances, all construction noise level measurements presented on Table 6-7 have been adjusted to describe a common reference distance of 50 feet. While some of the reference noise level measurements are provided below

for similar activities, the construction noise analysis relies on the highest reference noise level to present a conservative analysis.

Further, the reference noise level measurements below include multiple pieces of construction equipment operating simultaneously. For example, the reference Dozer Activity noise level measurement includes greater dozer use (e.g., moving of dirt in addition to movement of the equipment) during the measurement period than that of the Truck Pass-Bys and Dozer Activity measurement (e.g., truck pass-by and limited dozer movements). As such, the reference noise levels of similar equipment types vary in Table 6-7 depending on the amount of activity at the time of the measurement period.

TABLE 6-7: CONSTRUCTION REFERENCE NOISE LEVELS

ID	Noise Source	Reference Distance From Source (Feet)	Reference Noise Levels @ Reference Distance (dBA L_{eq})	Reference Noise Levels @ 50 Feet (dBA L_{eq})[5]
1	Truck Pass-Bys & Dozer Activity[1]	30'	63.6	59.2
2	Dozer Activity[1]	30'	68.6	64.2
3	Construction Vehicle Maintenance Activities[2]	30'	71.9	67.5
4	Foundation Trenching[2]	30'	72.6	68.2
5	Rough Grading Activities[2]	30'	77.9	73.5
6	Framing[3]	30'	66.7	62.3
7	Concrete Mixer Truck Movements[4]	50'	71.2	71.2
8	Concrete Paver Activities[4]	30'	70.0	65.6
9	Concrete Mixer Pour & Paving Activities[4]	30'	70.3	65.9
10	Concrete Mixer Backup Alarms & Air Brakes[4]	50'	71.6	71.6
11	Concrete Mixer Pour Activities[4]	50'	67.7	67.7

[1] As measured by Urban Crossroads, Inc. on 10/14/15 at a business park construction site located at the northwest corner of Barranca Parkway and Alton Parkway in the City of Irvine.
[2] As measured by Urban Crossroads, Inc. on 10/20/15 at a construction site located in Rancho Mission Viejo.
[3] As measured by Urban Crossroads, Inc. on 10/20/15 at a residential construction site located in Rancho Mission Viejo.
[4] Reference noise level measurements were collected from a nighttime concrete pour at an industrial construction site, located at 27334 San Bernardino Avenue in the City of Redlands, between 1:00 a.m. to 2:00 a.m. on 7/1/15.
[5] Reference noise levels are calculated at 50 feet using a drop off rate of 6 dBA per doubling of distance (point source).

6.3.2 CONSTRUCTION NOISE ANALYSIS METHODS

Noise generated by the Project construction equipment will include a combination of trucks, power tools, concrete mixers, and portable generators that when combined can reach high levels. The number and mix of construction equipment is expected to occur in the following stages:

- Demolition
- Grading

- Infrastructure
- Building Construction
- Paving
- Architectural Coating

The construction reference noise level measurements represent a list of typical construction activity noise levels. Noise levels generated by heavy construction equipment can range from approximately 68 dBA to in excess of 80 dBA when measured at 50 feet. Hard site conditions are used in the construction noise analysis which result in noise levels that attenuate (or decrease) at a rate of 6 dBA for each doubling of distance from a point source (i.e. construction equipment). For example, a noise level of 80 dBA measured at 50 feet from the noise source to the receiver would be reduced to 74 dBA at 100 feet from the source to the receiver and would be further reduced to 68 dBA at 200 feet from the source to the receiver. The construction stages used in this analysis are consistent with the data used to support the construction emissions in the *Nakase Property Air Quality Impact Analysis* prepared by Urban Crossroads, Inc. (23)

6.4 CONSTRUCTION VIBRATION ASSESSMENT METHODOLOGY

This analysis focuses on the potential ground-borne vibration associated with vehicular traffic and construction activities. Ground-borne vibration levels from automobile traffic are generally overshadowed by vibration generated by heavy trucks that roll over the same uneven roadway surfaces. However, due to the rapid drop-off rate of ground-borne vibration and the short duration of the associated events, vehicular traffic-induced ground-borne vibration is rarely perceptible beyond the roadway right-of-way, and rarely results in vibration levels that cause damage to buildings in the vicinity.

While vehicular traffic is rarely perceptible, construction activity has the potential to result in varying degrees of temporary ground vibration, depending on the specific construction activities and equipment used. Ground vibration levels associated with various types of construction equipment are summarized on Table 6-8. Based on the reference vibration levels provided by the Federal Transit Administration (FTA) for various construction equipment types, it is possible to estimate the potential building damage and human response (annoyance) using the following vibration assessment methods defined by the FTA and Caltrans. To describe the potential vibration impacts, the following equation is used: $PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$

TABLE 6-8: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	PPV (in/sec) at 25 feet
Small bulldozer	0.003
Jackhammer	0.035
Loaded Trucks	0.076
Large bulldozer	0.089

Source: Federal Transit Administration, Transit Noise and Vibration Impact Assessment, May 2006.

This page intentionally left blank

7 OFF-SITE TRANSPORTATION NOISE IMPACTS

To assess the off-site transportation CNEL noise level impacts associated with development of the proposed Project, noise contours were developed based on *Nakase Property Traffic Impact Analysis*. (3) Noise contour boundaries represent the equal levels of noise exposure and are measured in CNEL from the center of the roadway. Noise contours were developed for the following traffic scenarios:

- Existing Conditions Without/With Project: This scenario refers to the existing present-day noise conditions without and with the proposed Project.
- Interim Year 2020 Without/With Project: This scenario refers to Interim Year noise conditions without and with the proposed Project.
- 2040 General Plan With Approved Business Park Land Use Without Portola Extension Without/With Project: This scenario refers to the background noise conditions at future Year 2040 without and with the proposed Project, and includes all cumulative projects identified in the *Traffic Impact Analysis*.
- 2040 General Plan With Approved Business Park Land Use With Portola Extension Without/With Project: This scenario refers to the background noise conditions at future Year 2040 without and with the proposed Project, and includes all cumulative projects identified in the *Traffic Impact Analysis*.

7.1 TRAFFIC NOISE CONTOURS

Noise contours were used to assess the Project's incremental traffic-related noise impacts at land uses adjacent to roadways conveying Project traffic. The noise contours represent the distance to noise levels of a constant value and are measured from the center of the roadway for the 70, 65, and 60 dBA noise levels. The noise contours do not consider the effect of any existing noise barriers or topography that may attenuate ambient noise levels. In addition, because the noise contours reflect modeling of vehicular noise on area roadways, they appropriately do not reflect noise contributions from the surrounding stationary noise sources within the Project study area. Tables 7-1 and 7-8 present a summary of the exterior traffic noise levels, without barrier attenuation, for the 39 study area roadway segments analyzed from the without Project to the with Project conditions under Existing, Interim Year 2020, 2040 General Plan With Approved Business Park Land Use Without Portola Extension, and 2040 General Plan With Approved Business Park Land Use With Portola Extension conditions. Appendix 7.1 includes a summary of the traffic noise level contours for each of the traffic scenarios.

TABLE 7-1: EXISTING WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Trabuco Rd.	s/o Bake Pkwy.	Comm./Office/Public/Res.	71.7	78	168	363
2	Trabuco Rd.	s/o Lake Forest Dr.	Commercial/Residential	71.6	77	166	358
3	Rancho Pkwy. S.	s/o Alton Pkwy.	Mixed-Use (Residential)	63.6	RW	RW	87
4	Rancho Pkwy. S.	n/o Bake Pkwy.	Business Park	64.7	RW	RW	103
5	Rancho Pkwy.	s/o Lake Forest Dr.	Business Park	73.1	48	104	224
6	Towne Centre Dr.	s/o Alton Pkwy.	Commercial	70.1	31	66	142
7	Towne Centre Dr.	s/o Bake Pkwy.	Commercial/Residential	67.4	RW	44	94
8	Towne Centre Dr.	s/o Lake Forest Dr.	Commercial	65.7	RW	33	72
9	Portola Pkwy.	s/o Alton Pkwy.	Commercial/Residential	69.1	RW	112	241
10	Portola Pkwy.	n/o Rancho Pkwy.	Commercial/Residential	71.6	90	193	416
11	Santa Margarita Pkwy.	s/o El Toro Rd.	Residential	73.8	107	230	496
12	Santa Margarita Pkwy.	s/o Los Alisos Bl.	Residential	72.3	85	183	395
13	Alton Pkwy.	w/o Irvine Bl.	Business Park	72.5	87	188	406
14	Alton Pkwy.	e/o Irvine Bl.	Business Park	73.8	107	231	498
15	Alton Pkwy.	w/o Rancho Pkwy. S.	Residential	72.7	91	196	422
16	Bake Pkwy.	w/o Rockfield Bl.	Business Park	77.6	193	416	896
17	Bake Pkwy.	e/o Rockfield Bl.	Business Park	77.0	176	379	817
18	Bake Pkwy.	e/o Muirlands Bl.	Business Park/Residential	76.9	173	372	802
19	Bake Pkwy.	e/o Jeronimo Rd.	Business Park/Residential	75.1	131	282	608
20	Bake Pkwy.	e/o Toledo Wy.	Business Park/Residential	74.9	127	275	592
21	Bake Pkwy.	e/o Trabuco Rd.	Business Park	73.7	106	228	492
22	Bake Pkwy.	w/o Dimension Dr.	Light Industrial/Residential	72.9	78	167	360
23	Bake Pkwy.	e/o Dimension Dr.	Light Industrial/Residential	73.2	81	175	377
24	Bake Pkwy.	e/o Rancho Pkwy. S.	Business Park	73.2	82	177	382
25	Bake Pkwy.	w/o Towne Centre Dr.	Commercial	76.7	84	182	392
26	Bake Pkwy.	e/o Towne Centre Dr.	Commercial/Residential	74.7	61	132	285
27	Lake Forest Dr.	w/o Serrano Rd.	Residential	73.4	102	219	472
28	Lake Forest Dr.	e/o Serrano Rd.	Commercial/Residential	73.7	106	229	493
29	Lake Forest Dr.	e/o Trabuco Rd.	Commercial/Residential	74.2	95	206	443
30	Lake Forest Dr.	e/o Dimension Dr.	Commercial	72.0	68	147	317
31	Lake Forest Dr.	e/o Rancho Pkwy.	Commercial/Community Park	74.5	60	129	277
32	Lake Forest Dr.	e/o Towne Centre Dr.	Commercial	72.4	43	93	200
33	Lake Forest Dr.	e/o Portola Pkwy.	Light Industrial	70.5	32	70	150
34	El Toro Rd.	w/o Jeronimo Rd.	Commercial/Residential	73.6	121	262	564
35	El Toro Rd.	e/o Jeronimo Rd.	Residential	73.5	120	259	559

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
36	El Toro Rd.	e/o Serrano Rd.	Commercial/Residential	72.8	108	232	499
37	El Toro Rd.	e/o Trabuco Rd.	Commercial/Residential	73.4	101	219	471
38	El Toro Rd.	w/o Portola Pkwy.	Residential/Regional Park	73.1	97	208	448
39	El Toro Rd.	e/o Portola Pkwy.	Residential/Regional Park	70.7	67	145	312

[1] Source: City of Lake Forest General Plan Land Use Element, Figure LU-1.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-2: EXISTING WITH PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Trabuco Rd.	s/o Bake Pkwy.	Comm./Office/Public/Res.	71.8	79	170	367
2	Trabuco Rd.	s/o Lake Forest Dr.	Commercial/Residential	71.7	78	169	363
3	Rancho Pkwy. S.	s/o Alton Pkwy.	Mixed-Use (Residential)	64.3	RW	RW	96
4	Rancho Pkwy. S.	n/o Bake Pkwy.	Business Park	65.4	RW	53	115
5	Rancho Pkwy.	s/o Lake Forest Dr.	Business Park	73.5	51	110	238
6	Towne Centre Dr.	s/o Alton Pkwy.	Commercial	70.2	31	67	145
7	Towne Centre Dr.	s/o Bake Pkwy.	Commercial/Residential	67.5	RW	44	96
8	Towne Centre Dr.	s/o Lake Forest Dr.	Commercial	65.8	RW	34	74
9	Portola Pkwy.	s/o Alton Pkwy.	Commercial/Residential	69.1	RW	113	243
10	Portola Pkwy.	n/o Rancho Pkwy.	Commercial/Residential	71.7	90	195	419
11	Santa Margarita Pkwy.	s/o El Toro Rd.	Residential	73.8	108	233	502
12	Santa Margarita Pkwy.	s/o Los Alisos Bl.	Residential	72.3	86	185	399
13	Alton Pkwy.	w/o Irvine Bl.	Business Park	72.5	89	191	411
14	Alton Pkwy.	e/o Irvine Bl.	Business Park	73.9	110	236	509
15	Alton Pkwy.	w/o Rancho Pkwy. S.	Residential	72.9	93	200	431
16	Bake Pkwy.	w/o Rockfield Bl.	Business Park	77.7	196	421	908
17	Bake Pkwy.	e/o Rockfield Bl.	Business Park	77.1	179	385	829
18	Bake Pkwy.	e/o Muirlands Bl.	Business Park/Residential	77.0	176	379	817
19	Bake Pkwy.	e/o Jeronimo Rd.	Business Park/Residential	75.2	134	289	622
20	Bake Pkwy.	e/o Toledo Wy.	Business Park/Residential	75.1	130	281	605
21	Bake Pkwy.	e/o Trabuco Rd.	Business Park	73.9	110	237	510
22	Bake Pkwy.	w/o Dimension Dr.	Light Industrial/Residential	73.2	82	176	379
23	Bake Pkwy.	e/o Dimension Dr.	Light Industrial/Residential	73.6	86	186	401

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
24	Bake Pkwy.	e/o Rancho Pkwy. S.	Business Park	73.4	84	181	389
25	Bake Pkwy.	w/o Towne Centre Dr.	Commercial	76.9	87	187	402
26	Bake Pkwy.	e/o Towne Centre Dr.	Commercial/Residential	74.8	63	135	290
27	Lake Forest Dr.	w/o Serrano Rd.	Residential	73.5	103	221	476
28	Lake Forest Dr.	e/o Serrano Rd.	Commercial/Residential	73.8	107	231	497
29	Lake Forest Dr.	e/o Trabuco Rd.	Commercial/Residential	74.3	97	208	448
30	Lake Forest Dr.	e/o Dimension Dr.	Commercial	72.2	70	150	323
31	Lake Forest Dr.	e/o Rancho Pkwy.	Commercial/Community Park	74.7	62	133	287
32	Lake Forest Dr.	e/o Towne Centre Dr.	Commercial	72.5	44	95	204
33	Lake Forest Dr.	e/o Portola Pkwy.	Light Industrial	70.7	33	71	154
34	El Toro Rd.	w/o Jeronimo Rd.	Commercial/Residential	73.6	122	264	568
35	El Toro Rd.	e/o Jeronimo Rd.	Residential	73.6	121	262	564
36	El Toro Rd.	e/o Serrano Rd.	Commercial/Residential	72.9	109	234	504
37	El Toro Rd.	e/o Trabuco Rd.	Commercial/Residential	73.4	102	219	473
38	El Toro Rd.	w/o Portola Pkwy.	Residential/Regional Park	73.1	97	209	450
39	El Toro Rd.	e/o Portola Pkwy.	Residential/Regional Park	70.8	68	147	316

[1] Source: City of Lake Forest General Plan Land Use Element, Figure LU-1.

[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.

"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-3: INTERIM YEAR 2020 WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Trabuco Rd.	s/o Bake Pkwy.	Comm./Office/Public/Res.	72.6	90	194	418
2	Trabuco Rd.	s/o Lake Forest Dr.	Commercial/Residential	73.2	98	210	453
3	Rancho Pkwy. S.	s/o Alton Pkwy.	Mixed-Use (Residential)	65.8	RW	56	121
4	Rancho Pkwy. S.	n/o Bake Pkwy.	Business Park	65.7	RW	55	119
5	Rancho Pkwy.	s/o Lake Forest Dr.	Business Park	74.0	55	119	257
6	Towne Centre Dr.	s/o Alton Pkwy.	Commercial	70.1	31	66	142
7	Towne Centre Dr.	s/o Bake Pkwy.	Commercial/Residential	67.5	RW	44	95
8	Towne Centre Dr.	s/o Lake Forest Dr.	Commercial	65.8	RW	34	74
9	Portola Pkwy.	s/o Alton Pkwy.	Commercial/Residential	70.0	60	128	276
10	Portola Pkwy.	n/o Rancho Pkwy.	Commercial/Residential	72.2	99	213	458
11	Santa Margarita Pkwy.	s/o El Toro Rd.	Residential	73.9	109	235	506
12	Santa Margarita Pkwy.	s/o Los Alisos Bl.	Residential	72.6	90	193	416
13	Alton Pkwy.	w/o Irvine Bl.	Business Park	73.7	105	227	489
14	Alton Pkwy.	e/o Irvine Bl.	Business Park	74.0	110	238	513
15	Alton Pkwy.	w/o Rancho Pkwy. S.	Residential	74.5	120	258	556
16	Bake Pkwy.	w/o Rockfield Bl.	Business Park	77.7	196	423	911
17	Bake Pkwy.	e/o Rockfield Bl.	Business Park	77.3	183	394	848
18	Bake Pkwy.	e/o Muirlands Bl.	Business Park/Residential	77.1	177	382	822
19	Bake Pkwy.	e/o Jeronimo Rd.	Business Park/Residential	75.4	138	298	642
20	Bake Pkwy.	e/o Toledo Wy.	Business Park/Residential	75.1	130	281	605
21	Bake Pkwy.	e/o Trabuco Rd.	Business Park	73.5	103	223	480
22	Bake Pkwy.	w/o Dimension Dr.	Light Industrial/Residential	73.9	91	197	424
23	Bake Pkwy.	e/o Dimension Dr.	Light Industrial/Residential	73.3	83	179	386
24	Bake Pkwy.	e/o Rancho Pkwy. S.	Business Park	73.3	83	179	386
25	Bake Pkwy.	w/o Towne Centre Dr.	Commercial	76.8	86	184	397
26	Bake Pkwy.	e/o Towne Centre Dr.	Commercial/Residential	76.5	81	175	377
27	Lake Forest Dr.	w/o Serrano Rd.	Residential	74.2	115	248	533
28	Lake Forest Dr.	e/o Serrano Rd.	Commercial/Residential	74.2	115	248	533
29	Lake Forest Dr.	e/o Trabuco Rd.	Commercial/Residential	74.5	99	214	461
30	Lake Forest Dr.	e/o Dimension Dr.	Commercial	73.0	79	171	369
31	Lake Forest Dr.	e/o Rancho Pkwy.	Commercial/Community Park	75.8	73	157	338
32	Lake Forest Dr.	e/o Towne Centre Dr.	Commercial	74.8	63	136	293
33	Lake Forest Dr.	e/o Portola Pkwy.	Light Industrial	69.8	RW	62	135
34	El Toro Rd.	w/o Jeronimo Rd.	Commercial/Residential	73.8	126	271	583
35	El Toro Rd.	e/o Jeronimo Rd.	Residential	74.1	131	283	610

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
36	El Toro Rd.	e/o Serrano Rd.	Commercial/Residential	73.9	128	276	595
37	El Toro Rd.	e/o Trabuco Rd.	Commercial/Residential	74.0	111	240	516
38	El Toro Rd.	w/o Portola Pkwy.	Residential/Regional Park	73.7	105	227	488
39	El Toro Rd.	e/o Portola Pkwy.	Residential/Regional Park	73.5	103	221	477

[1] Source: City of Lake Forest General Plan Land Use Element, Figure LU-1.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-4: INTERIM YEAR 2020 WITH PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Trabuco Rd.	s/o Bake Pkwy.	Comm./Office/Public/Res.	72.6	90	194	418
2	Trabuco Rd.	s/o Lake Forest Dr.	Commercial/Residential	73.2	98	210	453
3	Rancho Pkwy. S.	s/o Alton Pkwy.	Mixed-Use (Residential)	66.3	RW	61	131
4	Rancho Pkwy. S.	n/o Bake Pkwy.	Business Park	66.1	RW	59	128
5	Rancho Pkwy.	s/o Lake Forest Dr.	Business Park	74.0	55	119	257
6	Towne Centre Dr.	s/o Alton Pkwy.	Commercial	70.3	31	68	146
7	Towne Centre Dr.	s/o Bake Pkwy.	Commercial/Residential	67.7	RW	45	97
8	Towne Centre Dr.	s/o Lake Forest Dr.	Commercial	65.8	RW	34	74
9	Portola Pkwy.	s/o Alton Pkwy.	Commercial/Residential	70.0	60	129	278
10	Portola Pkwy.	n/o Rancho Pkwy.	Commercial/Residential	72.2	99	213	458
11	Santa Margarita Pkwy.	s/o El Toro Rd.	Residential	73.9	109	235	506
12	Santa Margarita Pkwy.	s/o Los Alisos Bl.	Residential	72.6	90	193	416
13	Alton Pkwy.	w/o Irvine Bl.	Business Park	73.7	105	227	488
14	Alton Pkwy.	e/o Irvine Bl.	Business Park	74.1	113	244	526
15	Alton Pkwy.	w/o Rancho Pkwy. S.	Residential	74.7	123	266	572
16	Bake Pkwy.	w/o Rockfield Bl.	Business Park	77.8	198	427	920
17	Bake Pkwy.	e/o Rockfield Bl.	Business Park	77.3	183	395	851
18	Bake Pkwy.	e/o Muirlands Bl.	Business Park/Residential	77.1	178	384	827
19	Bake Pkwy.	e/o Jeronimo Rd.	Business Park/Residential	75.5	139	300	646
20	Bake Pkwy.	e/o Toledo Wy.	Business Park/Residential	75.1	132	285	613
21	Bake Pkwy.	e/o Trabuco Rd.	Business Park	73.7	105	227	489
22	Bake Pkwy.	w/o Dimension Dr.	Light Industrial/Residential	74.0	93	200	432
23	Bake Pkwy.	e/o Dimension Dr.	Light Industrial/Residential	73.5	85	183	395

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
24	Bake Pkwy.	e/o Rancho Pkwy. S.	Business Park	73.5	85	183	395
25	Bake Pkwy.	w/o Towne Centre Dr.	Commercial	77.0	88	189	407
26	Bake Pkwy.	e/o Towne Centre Dr.	Commercial/Residential	76.4	80	173	373
27	Lake Forest Dr.	w/o Serrano Rd.	Residential	74.3	115	248	535
28	Lake Forest Dr.	e/o Serrano Rd.	Commercial/Residential	74.3	115	249	536
29	Lake Forest Dr.	e/o Trabuco Rd.	Commercial/Residential	74.6	101	217	468
30	Lake Forest Dr.	e/o Dimension Dr.	Commercial	73.2	81	175	377
31	Lake Forest Dr.	e/o Rancho Pkwy.	Commercial/Community Park	76.0	75	162	348
32	Lake Forest Dr.	e/o Towne Centre Dr.	Commercial	75.0	65	140	301
33	Lake Forest Dr.	e/o Portola Pkwy.	Light Industrial	69.8	RW	62	135
34	El Toro Rd.	w/o Jeronimo Rd.	Commercial/Residential	73.9	127	273	588
35	El Toro Rd.	e/o Jeronimo Rd.	Residential	74.2	132	285	615
36	El Toro Rd.	e/o Serrano Rd.	Commercial/Residential	73.9	128	276	595
37	El Toro Rd.	e/o Trabuco Rd.	Commercial/Residential	74.1	112	241	519
38	El Toro Rd.	w/o Portola Pkwy.	Residential/Regional Park	73.7	105	227	488
39	El Toro Rd.	e/o Portola Pkwy.	Residential/Regional Park	73.5	103	223	480

[1] Source: City of Lake Forest General Plan Land Use Element, Figure LU-1.

[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.

"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-5: 2040 WITHOUT PORTOLA EXT. WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Trabuco Rd.	s/o Bake Pkwy.	Comm./Office/Public/Res.	73.3	100	216	465
2	Trabuco Rd.	s/o Lake Forest Dr.	Commercial/Residential	73.9	109	235	506
3	Rancho Pkwy. S.	s/o Alton Pkwy.	Mixed-Use (Residential)	68.3	RW	84	180
4	Rancho Pkwy. S.	n/o Bake Pkwy.	Business Park	67.3	RW	71	152
5	Rancho Pkwy.	s/o Lake Forest Dr.	Business Park	76.8	85	183	394
6	Towne Centre Dr.	s/o Alton Pkwy.	Commercial	70.3	31	68	146
7	Towne Centre Dr.	s/o Bake Pkwy.	Commercial/Residential	68.3	RW	50	107
8	Towne Centre Dr.	s/o Lake Forest Dr.	Commercial	65.8	RW	34	73
9	Portola Pkwy.	s/o Alton Pkwy.	Commercial/Residential	70.9	68	148	318
10	Portola Pkwy.	n/o Rancho Pkwy.	Commercial/Residential	73.1	112	241	519
11	Santa Margarita Pkwy.	s/o El Toro Rd.	Residential	74.9	127	273	589
12	Santa Margarita Pkwy.	s/o Los Alisos Bl.	Residential	73.5	103	222	478
13	Alton Pkwy.	w/o Irvine Bl.	Business Park	74.3	116	250	539
14	Alton Pkwy.	e/o Irvine Bl.	Business Park	74.6	122	263	566
15	Alton Pkwy.	w/o Rancho Pkwy. S.	Residential	76.4	161	347	747
16	Bake Pkwy.	w/o Rockfield Bl.	Business Park	78.5	222	478	1031
17	Bake Pkwy.	e/o Rockfield Bl.	Business Park	77.5	191	412	887
18	Bake Pkwy.	e/o Muirlands Bl.	Business Park/Residential	77.4	188	404	871
19	Bake Pkwy.	e/o Jeronimo Rd.	Business Park/Residential	75.8	146	315	679
20	Bake Pkwy.	e/o Toledo Wy.	Business Park/Residential	75.4	137	295	636
21	Bake Pkwy.	e/o Trabuco Rd.	Business Park	74.0	111	239	515
22	Bake Pkwy.	w/o Dimension Dr.	Light Industrial/Residential	74.4	98	212	457
23	Bake Pkwy.	e/o Dimension Dr.	Light Industrial/Residential	74.6	101	217	468
24	Bake Pkwy.	e/o Rancho Pkwy. S.	Business Park	74.2	96	206	444
25	Bake Pkwy.	w/o Towne Centre Dr.	Commercial	77.3	92	197	425
26	Bake Pkwy.	e/o Towne Centre Dr.	Commercial/Residential	76.9	86	186	401
27	Lake Forest Dr.	w/o Serrano Rd.	Residential	74.4	118	254	547
28	Lake Forest Dr.	e/o Serrano Rd.	Commercial/Residential	74.3	117	251	542
29	Lake Forest Dr.	e/o Trabuco Rd.	Commercial/Residential	74.7	102	220	475
30	Lake Forest Dr.	e/o Dimension Dr.	Commercial	74.2	96	206	444
31	Lake Forest Dr.	e/o Rancho Pkwy.	Commercial/Community Park	77.1	90	193	416
32	Lake Forest Dr.	e/o Towne Centre Dr.	Commercial	75.7	72	156	336
33	Lake Forest Dr.	e/o Portola Pkwy.	Light Industrial	71.7	39	83	180
34	El Toro Rd.	w/o Jeronimo Rd.	Commercial/Residential	73.8	125	269	581
35	El Toro Rd.	e/o Jeronimo Rd.	Residential	74.3	135	291	626

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
36	El Toro Rd.	e/o Serrano Rd.	Commercial/Residential	74.1	132	285	614
37	El Toro Rd.	e/o Trabuco Rd.	Commercial/Residential	74.6	121	260	560
38	El Toro Rd.	w/o Portola Pkwy.	Residential/Regional Park	74.2	115	247	532
39	El Toro Rd.	e/o Portola Pkwy.	Residential/Regional Park	74.3	116	251	540

[1] Source: City of Lake Forest General Plan Land Use Element, Figure LU-1.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-6: 2040 WITHOUT PORTOLA EXT. WITH PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Trabuco Rd.	s/o Bake Pkwy.	Comm./Office/Public/Res.	73.3	100	216	465
2	Trabuco Rd.	s/o Lake Forest Dr.	Commercial/Residential	73.9	109	235	506
3	Rancho Pkwy. S.	s/o Alton Pkwy.	Mixed-Use (Residential)	68.1	RW	80	173
4	Rancho Pkwy. S.	n/o Bake Pkwy.	Business Park	66.9	RW	67	145
5	Rancho Pkwy.	s/o Lake Forest Dr.	Business Park	76.4	80	172	371
6	Towne Centre Dr.	s/o Alton Pkwy.	Commercial	70.3	32	68	147
7	Towne Centre Dr.	s/o Bake Pkwy.	Commercial/Residential	68.2	RW	49	106
8	Towne Centre Dr.	s/o Lake Forest Dr.	Commercial	65.6	RW	33	71
9	Portola Pkwy.	s/o Alton Pkwy.	Commercial/Residential	70.9	69	149	320
10	Portola Pkwy.	n/o Rancho Pkwy.	Commercial/Residential	73.1	112	241	519
11	Santa Margarita Pkwy.	s/o El Toro Rd.	Residential	74.8	125	270	581
12	Santa Margarita Pkwy.	s/o Los Alisos Bl.	Residential	73.4	101	218	470
13	Alton Pkwy.	w/o Irvine Bl.	Business Park	74.3	116	250	539
14	Alton Pkwy.	e/o Irvine Bl.	Business Park	74.5	119	257	553
15	Alton Pkwy.	w/o Rancho Pkwy. S.	Residential	76.3	159	342	738
16	Bake Pkwy.	w/o Rockfield Bl.	Business Park	78.5	220	475	1023
17	Bake Pkwy.	e/o Rockfield Bl.	Business Park	77.5	190	410	882
18	Bake Pkwy.	e/o Muirlands Bl.	Business Park/Residential	77.4	186	402	866
19	Bake Pkwy.	e/o Jeronimo Rd.	Business Park/Residential	75.8	145	313	674
20	Bake Pkwy.	e/o Toledo Wy.	Business Park/Residential	75.4	137	295	636
21	Bake Pkwy.	e/o Trabuco Rd.	Business Park	73.9	109	235	506
22	Bake Pkwy.	w/o Dimension Dr.	Light Industrial/Residential	74.3	97	209	450
23	Bake Pkwy.	e/o Dimension Dr.	Light Industrial/Residential	74.3	97	210	452

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
24	Bake Pkwy.	e/o Rancho Pkwy. S.	Business Park	74.2	96	206	444
25	Bake Pkwy.	w/o Towne Centre Dr.	Commercial	77.3	92	197	425
26	Bake Pkwy.	e/o Towne Centre Dr.	Commercial/Residential	76.8	86	184	397
27	Lake Forest Dr.	w/o Serrano Rd.	Residential	74.5	119	257	554
28	Lake Forest Dr.	e/o Serrano Rd.	Commercial/Residential	74.4	117	253	545
29	Lake Forest Dr.	e/o Trabuco Rd.	Commercial/Residential	74.6	102	220	473
30	Lake Forest Dr.	e/o Dimension Dr.	Commercial	74.0	92	199	428
31	Lake Forest Dr.	e/o Rancho Pkwy.	Commercial/Community Park	76.8	86	184	397
32	Lake Forest Dr.	e/o Towne Centre Dr.	Commercial	75.4	68	147	317
33	Lake Forest Dr.	e/o Portola Pkwy.	Light Industrial	71.5	38	81	175
34	El Toro Rd.	w/o Jeronimo Rd.	Commercial/Residential	73.7	124	267	576
35	El Toro Rd.	e/o Jeronimo Rd.	Residential	74.3	136	292	629
36	El Toro Rd.	e/o Serrano Rd.	Commercial/Residential	74.0	130	281	605
37	El Toro Rd.	e/o Trabuco Rd.	Commercial/Residential	74.5	120	258	556
38	El Toro Rd.	w/o Portola Pkwy.	Residential/Regional Park	74.2	115	247	532
39	El Toro Rd.	e/o Portola Pkwy.	Residential/Regional Park	74.2	115	248	534

[1] Source: City of Lake Forest General Plan Land Use Element, Figure LU-1.

[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.

"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-7: 2040 WITH PORTOLA EXT. WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Trabuco Rd.	s/o Bake Pkwy.	Comm./Office/Public/Res.	74.3	117	252	543
2	Trabuco Rd.	s/o Lake Forest Dr.	Commercial/Residential	72.1	83	179	386
3	Rancho Pkwy. S.	s/o Alton Pkwy.	Mixed-Use (Residential)	68.3	RW	83	179
4	Rancho Pkwy. S.	n/o Bake Pkwy.	Business Park	67.3	RW	71	152
5	Rancho Pkwy.	s/o Lake Forest Dr.	Business Park	76.6	83	179	386
6	Towne Centre Dr.	s/o Alton Pkwy.	Commercial	70.2	31	67	145
7	Towne Centre Dr.	s/o Bake Pkwy.	Commercial/Residential	68.1	RW	48	103
8	Towne Centre Dr.	s/o Lake Forest Dr.	Commercial	66.1	RW	35	76
9	Portola Pkwy.	s/o Alton Pkwy.	Commercial/Residential	71.8	79	171	368
10	Portola Pkwy.	n/o Rancho Pkwy.	Commercial/Residential	73.1	112	241	519
11	Santa Margarita Pkwy.	s/o El Toro Rd.	Residential	74.9	127	273	589
12	Santa Margarita Pkwy.	s/o Los Alisos Bl.	Residential	73.5	103	222	479
13	Alton Pkwy.	w/o Irvine Bl.	Business Park	74.2	115	248	534
14	Alton Pkwy.	e/o Irvine Bl.	Business Park	73.8	108	232	499
15	Alton Pkwy.	w/o Rancho Pkwy. S.	Residential	76.1	153	329	708
16	Bake Pkwy.	w/o Rockfield Bl.	Business Park	78.5	220	475	1023
17	Bake Pkwy.	e/o Rockfield Bl.	Business Park	77.5	190	410	884
18	Bake Pkwy.	e/o Muirlands Bl.	Business Park/Residential	77.4	186	402	866
19	Bake Pkwy.	e/o Jeronimo Rd.	Business Park/Residential	75.8	145	313	674
20	Bake Pkwy.	e/o Toledo Wy.	Business Park/Residential	75.4	137	295	636
21	Bake Pkwy.	e/o Trabuco Rd.	Business Park	73.8	107	231	497
22	Bake Pkwy.	w/o Dimension Dr.	Light Industrial/Residential	74.3	97	208	449
23	Bake Pkwy.	e/o Dimension Dr.	Light Industrial/Residential	74.3	97	210	452
24	Bake Pkwy.	e/o Rancho Pkwy. S.	Business Park	74.1	94	202	436
25	Bake Pkwy.	w/o Towne Centre Dr.	Commercial	77.3	92	197	425
26	Bake Pkwy.	e/o Towne Centre Dr.	Commercial/Residential	76.9	86	186	400
27	Lake Forest Dr.	w/o Serrano Rd.	Residential	74.4	118	254	547
28	Lake Forest Dr.	e/o Serrano Rd.	Commercial/Residential	74.3	116	250	539
29	Lake Forest Dr.	e/o Trabuco Rd.	Commercial/Residential	75.0	108	234	504
30	Lake Forest Dr.	e/o Dimension Dr.	Commercial	74.2	96	206	444
31	Lake Forest Dr.	e/o Rancho Pkwy.	Commercial/Community Park	77.0	88	189	407
32	Lake Forest Dr.	e/o Towne Centre Dr.	Commercial	75.4	69	148	320
33	Lake Forest Dr.	e/o Portola Pkwy.	Light Industrial	71.5	38	81	174
34	El Toro Rd.	w/o Jeronimo Rd.	Commercial/Residential	73.7	124	268	578
35	El Toro Rd.	e/o Jeronimo Rd.	Residential	74.3	135	292	628

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
36	El Toro Rd.	e/o Serrano Rd.	Commercial/Residential	74.1	132	285	614
37	El Toro Rd.	e/o Trabuco Rd.	Commercial/Residential	74.5	119	256	552
38	El Toro Rd.	w/o Portola Pkwy.	Residential/Regional Park	74.2	115	247	532
39	El Toro Rd.	e/o Portola Pkwy.	Residential/Regional Park	74.3	116	250	539

[1] Source: City of Lake Forest General Plan Land Use Element, Figure LU-1.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-8: 2040 WITH PORTOLA EXT. WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Trabuco Rd.	s/o Bake Pkwy.	Comm./Office/Public/Res.	74.5	119	257	553
2	Trabuco Rd.	s/o Lake Forest Dr.	Commercial/Residential	72.3	85	184	396
3	Rancho Pkwy. S.	s/o Alton Pkwy.	Mixed-Use (Residential)	68.0	RW	79	170
4	Rancho Pkwy. S.	n/o Bake Pkwy.	Business Park	66.9	RW	67	145
5	Rancho Pkwy.	s/o Lake Forest Dr.	Business Park	76.4	80	172	371
6	Towne Centre Dr.	s/o Alton Pkwy.	Commercial	70.4	32	69	148
7	Towne Centre Dr.	s/o Bake Pkwy.	Commercial/Residential	67.9	RW	47	101
8	Towne Centre Dr.	s/o Lake Forest Dr.	Commercial	65.6	RW	33	71
9	Portola Pkwy.	s/o Alton Pkwy.	Commercial/Residential	71.9	80	172	370
10	Portola Pkwy.	n/o Rancho Pkwy.	Commercial/Residential	73.1	112	241	519
11	Santa Margarita Pkwy.	s/o El Toro Rd.	Residential	74.8	125	270	581
12	Santa Margarita Pkwy.	s/o Los Alisos Bl.	Residential	73.4	101	218	470
13	Alton Pkwy.	w/o Irvine Bl.	Business Park	74.3	115	248	535
14	Alton Pkwy.	e/o Irvine Bl.	Business Park	73.8	108	232	499
15	Alton Pkwy.	w/o Rancho Pkwy. S.	Residential	76.0	151	324	699
16	Bake Pkwy.	w/o Rockfield Bl.	Business Park	78.5	220	475	1023
17	Bake Pkwy.	e/o Rockfield Bl.	Business Park	77.5	189	408	878
18	Bake Pkwy.	e/o Muirlands Bl.	Business Park/Residential	77.4	186	401	864
19	Bake Pkwy.	e/o Jeronimo Rd.	Business Park/Residential	75.7	144	311	671
20	Bake Pkwy.	e/o Toledo Wy.	Business Park/Residential	75.4	137	295	636
21	Bake Pkwy.	e/o Trabuco Rd.	Business Park	73.8	107	231	497
22	Bake Pkwy.	w/o Dimension Dr.	Light Industrial/Residential	74.2	95	206	443

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
23	Bake Pkwy.	e/o Dimension Dr.	Light Industrial/Residential	74.2	96	206	444
24	Bake Pkwy.	e/o Rancho Pkwy. S.	Business Park	74.2	96	206	444
25	Bake Pkwy.	w/o Towne Centre Dr.	Commercial	77.3	92	197	425
26	Bake Pkwy.	e/o Towne Centre Dr.	Commercial/Residential	76.8	85	184	396
27	Lake Forest Dr.	w/o Serrano Rd.	Residential	74.4	118	254	547
28	Lake Forest Dr.	e/o Serrano Rd.	Commercial/Residential	74.4	117	253	545
29	Lake Forest Dr.	e/o Trabuco Rd.	Commercial/Residential	74.6	102	219	472
30	Lake Forest Dr.	e/o Dimension Dr.	Commercial	74.0	92	199	428
31	Lake Forest Dr.	e/o Rancho Pkwy.	Commercial/Community Park	76.7	84	180	388
32	Lake Forest Dr.	e/o Towne Centre Dr.	Commercial	75.2	67	144	310
33	Lake Forest Dr.	e/o Portola Pkwy.	Light Industrial	71.5	38	81	175
34	El Toro Rd.	w/o Jeronimo Rd.	Commercial/Residential	73.7	124	267	576
35	El Toro Rd.	e/o Jeronimo Rd.	Residential	74.2	134	289	622
36	El Toro Rd.	e/o Serrano Rd.	Commercial/Residential	74.0	130	281	605
37	El Toro Rd.	e/o Trabuco Rd.	Commercial/Residential	74.4	118	255	549
38	El Toro Rd.	w/o Portola Pkwy.	Residential/Regional Park	74.2	115	247	532
39	El Toro Rd.	e/o Portola Pkwy.	Residential/Regional Park	74.2	115	248	534

[1] Source: City of Lake Forest General Plan Land Use Element, Figure LU-1.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

7.2 EXISTING CONDITION PROJECT TRAFFIC NOISE LEVEL CONTRIBUTIONS

Table 7-1 presents the Existing without Project conditions CNEL noise levels. The without Project exterior noise levels are expected to range from 63.6 to 77.6 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography. Table 7-2 shows the Existing with Project conditions will range from 64.3 to 77.7 dBA CNEL. As shown on Table 7-9 the Project will generate a noise level increase of up to 0.7 dBA CNEL on the study area roadway segments. The Project-related noise level increases are considered *less than significant* under Existing with Project conditions at the noise-sensitive land uses adjacent to roadways conveying Project traffic since they would not result in an exceedance of the 3 dBA CNEL increase criteria identified by the *City of Lake Forest CEQA Significance Thresholds Guide* when the with Project noise level exceeds the 65 dBA CNEL noise level standard for sensitive land uses.

7.3 INTERIM YEAR 2020 PROJECT TRAFFIC NOISE LEVEL CONTRIBUTIONS

Table 7-3 presents the Interim Year without Project conditions CNEL noise levels which are expected to range from 65.7 to 77.7 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography. Table 7-4 shows the Interim Year with Project conditions will range from 65.8 to 77.8 dBA CNEL. As shown on Table 7-10 the Project will generate a noise level increase of up to 0.5 dBA CNEL on the study area roadway segments. The Project-related noise level increases are considered *less than significant* under Interim Year with Project conditions at the noise-sensitive land uses adjacent to roadways conveying Project traffic since they would not result in an exceedance of the 3 dBA CNEL increase criteria identified by the *City of Lake Forest CEQA Significance Thresholds Guide* when the with Project noise level exceeds the 65 dBA CNEL noise level standard for sensitive land uses.

7.4 2040 WITHOUT PORTOLA EXTENSION PROJECT TRAFFIC NOISE LEVEL CONTRIBUTIONS

Table 7-5 presents the 2040 General Plan With Approved Business Park Land Use Without Portola Extension without Project conditions CNEL noise levels are expected to range from 65.8 to 78.5 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography. Table 7-6 shows the 2040 General Plan With Approved Business Park Land Use Without Portola Extension with Project conditions will range from 65.6 to 78.5 dBA CNEL. As shown on Table 7-11 the Project will generate a noise level increase of up to 0.1 dBA CNEL on the study area roadway segments. The Project-related noise level increases are considered *less than significant* under 2040 General Plan With Approved Business Park Land Use Without Portola Extension with Project conditions at the noise-sensitive land uses adjacent to roadways conveying Project traffic since they would not result in an exceedance of the 3 dBA CNEL increase criteria identified by the *City of Lake Forest CEQA Significance Thresholds Guide* when the with Project noise level exceeds the 65 dBA CNEL noise level standard for sensitive land uses.

7.5 2040 WITH PORTOLA EXTENSION PROJECT TRAFFIC NOISE LEVEL CONTRIBUTIONS

Table 7-5 presents the 2040 General Plan With Approved Business Park Land Use With Portola Extension without Project conditions CNEL noise levels are expected to range from 66.1 to 78.5 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography. Table 7-6 shows the 2040 General Plan With Approved Business Park Land Use With Portola Extension with Project conditions will range from 65.6 to 78.5 dBA CNEL. As shown on Table 7-11 the Project will generate a noise level increase of up to 0.2 dBA CNEL on the study area roadway segments. The Project-related noise level increases are considered *less than significant* under 2040 General Plan With Approved Business Park Land Use With Portola Extension with Project conditions at the noise-sensitive land uses adjacent to roadways conveying Project traffic since they would not result in an exceedance of the 3 dBA CNEL increase criteria identified by the *City of Lake Forest CEQA Significance Thresholds Guide* when the with Project noise level exceeds the 65 dBA CNEL noise level standard for sensitive land uses.

TABLE 7-9: EXISTING PLUS PROJECT OFF-SITE TRAFFIC NOISE IMPACTS

ID	Road	Segment	CNEL at Adjacent Land Use (dBA)[1]			Noise-Sensitive Land Use?	Without Proj. Noise Level Exceeds Standard?[2]	Threshold Exceeded?[3]
			No Project	With Project	Project Addition			
1	Trabuco Rd.	s/o Bake Pkwy.	71.7	71.8	0.1	Yes	Yes	No
2	Trabuco Rd.	s/o Lake Forest Dr.	71.6	71.7	0.1	Yes	Yes	No
3	Rancho Pkwy. S.	s/o Alton Pkwy.	63.6	64.3	0.6	Yes	No	No
4	Rancho Pkwy. S.	n/o Bake Pkwy.	64.7	65.4	0.7	No	-	No
5	Rancho Pkwy.	s/o Lake Forest Dr.	73.1	73.5	0.4	No	-	No
6	Towne Centre Dr.	s/o Alton Pkwy.	70.1	70.2	0.1	No	-	No
7	Towne Centre Dr.	s/o Bake Pkwy.	67.4	67.5	0.1	Yes	Yes	No
8	Towne Centre Dr.	s/o Lake Forest Dr.	65.7	65.8	0.2	No	-	No
9	Portola Pkwy.	s/o Alton Pkwy.	69.1	69.1	0.1	Yes	Yes	No
10	Portola Pkwy.	n/o Rancho Pkwy.	71.6	71.7	0.1	Yes	Yes	No
11	Santa Margarita Pkwy.	s/o El Toro Rd.	73.8	73.8	0.1	Yes	Yes	No
12	Santa Margarita Pkwy.	s/o Los Alisos Bl.	72.3	72.3	0.1	Yes	Yes	No
13	Alton Pkwy.	w/o Irvine Bl.	72.5	72.5	0.1	No	-	No
14	Alton Pkwy.	e/o Irvine Bl.	73.8	73.9	0.1	No	-	No
15	Alton Pkwy.	w/o Rancho Pkwy. S.	72.7	72.9	0.1	Yes	Yes	No
16	Bake Pkwy.	w/o Rockfield Bl.	77.6	77.7	0.1	No	-	No
17	Bake Pkwy.	e/o Rockfield Bl.	77.0	77.1	0.1	No	-	No
18	Bake Pkwy.	e/o Muirlands Bl.	76.9	77.0	0.1	Yes	Yes	No
19	Bake Pkwy.	e/o Jeronimo Rd.	75.1	75.2	0.1	Yes	Yes	No
20	Bake Pkwy.	e/o Toledo Wy.	74.9	75.1	0.1	Yes	Yes	No
21	Bake Pkwy.	e/o Trabuco Rd.	73.7	73.9	0.2	No	-	No
22	Bake Pkwy.	w/o Dimension Dr.	72.9	73.2	0.3	Yes	Yes	No
23	Bake Pkwy.	e/o Dimension Dr.	73.2	73.6	0.4	Yes	Yes	No
24	Bake Pkwy.	e/o Rancho Pkwy. S.	73.2	73.4	0.1	No	-	No
25	Bake Pkwy.	w/o Towne Centre Dr.	76.7	76.9	0.2	No	-	No
26	Bake Pkwy.	e/o Towne Centre Dr.	74.7	74.8	0.1	Yes	Yes	No
27	Lake Forest Dr.	w/o Serrano Rd.	73.4	73.5	0.1	Yes	Yes	No
28	Lake Forest Dr.	e/o Serrano Rd.	73.7	73.8	0.1	Yes	Yes	No
29	Lake Forest Dr.	e/o Trabuco Rd.	74.2	74.3	0.1	Yes	Yes	No
30	Lake Forest Dr.	e/o Dimension Dr.	72.0	72.2	0.1	No	-	No
31	Lake Forest Dr.	e/o Rancho Pkwy.	74.5	74.7	0.2	Yes	Yes	No
32	Lake Forest Dr.	e/o Towne Centre Dr.	72.4	72.5	0.1	No	-	No
33	Lake Forest Dr.	e/o Portola Pkwy.	70.5	70.7	0.2	No	-	No
34	El Toro Rd.	w/o Jeronimo Rd.	73.6	73.6	0.1	Yes	Yes	No
35	El Toro Rd.	e/o Jeronimo Rd.	73.5	73.6	0.1	Yes	Yes	No
36	El Toro Rd.	e/o Serrano Rd.	72.8	72.9	0.1	Yes	Yes	No
37	El Toro Rd.	e/o Trabuco Rd.	73.4	73.4	0.0	Yes	Yes	No
38	El Toro Rd.	w/o Portola Pkwy.	73.1	73.1	0.0	Yes	Yes	No
39	El Toro Rd.	e/o Portola Pkwy.	70.7	70.8	0.1	Yes	Yes	No

[1] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.

[2] Does the without Project off-site traffic noise level already exceed the City of Lake Forest 65 dBA CNEL exterior noise level standard at adjacent noise-sensitive land uses?

[3] Significance Criteria (Section 4).

TABLE 7-10: INTERIM YEAR PLUS PROJECT OFF-SITE TRAFFIC NOISE IMPACTS

ID	Road	Segment	CNEL at Adjacent Land Use (dBA)[1]			Noise-Sensitive Land Use?	Without Proj. Noise Level Exceeds Standard?[2]	Threshold Exceeded?[3]
			No Project	With Project	Project Addition			
1	Trabuco Rd.	s/o Bake Pkwy.	72.6	72.6	0.0	Yes	Yes	No
2	Trabuco Rd.	s/o Lake Forest Dr.	73.2	73.2	0.0	Yes	Yes	No
3	Rancho Pkwy. S.	s/o Alton Pkwy.	65.8	66.3	0.5	Yes	Yes	No
4	Rancho Pkwy. S.	n/o Bake Pkwy.	65.7	66.1	0.5	No	-	No
5	Rancho Pkwy.	s/o Lake Forest Dr.	74.0	74.0	0.0	No	-	No
6	Towne Centre Dr.	s/o Alton Pkwy.	70.1	70.3	0.2	No	-	No
7	Towne Centre Dr.	s/o Bake Pkwy.	67.5	67.7	0.2	Yes	Yes	No
8	Towne Centre Dr.	s/o Lake Forest Dr.	65.8	65.8	0.0	No	-	No
9	Portola Pkwy.	s/o Alton Pkwy.	70.0	70.0	0.0	Yes	Yes	No
10	Portola Pkwy.	n/o Rancho Pkwy.	72.2	72.2	0.0	Yes	Yes	No
11	Santa Margarita Pkwy.	s/o El Toro Rd.	73.9	73.9	0.0	Yes	Yes	No
12	Santa Margarita Pkwy.	s/o Los Alisos Bl.	72.6	72.6	0.0	Yes	Yes	No
13	Alton Pkwy.	w/o Irvine Bl.	73.7	73.7	0.0	No	-	No
14	Alton Pkwy.	e/o Irvine Bl.	74.0	74.1	0.2	No	-	No
15	Alton Pkwy.	w/o Rancho Pkwy. S.	74.5	74.7	0.2	Yes	Yes	No
16	Bake Pkwy.	w/o Rockfield Bl.	77.7	77.8	0.1	No	-	No
17	Bake Pkwy.	e/o Rockfield Bl.	77.3	77.3	0.0	No	-	No
18	Bake Pkwy.	e/o Muirlands Bl.	77.1	77.1	0.0	Yes	Yes	No
19	Bake Pkwy.	e/o Jeronimo Rd.	75.4	75.5	0.0	Yes	Yes	No
20	Bake Pkwy.	e/o Toledo Wy.	75.1	75.1	0.1	Yes	Yes	No
21	Bake Pkwy.	e/o Trabuco Rd.	73.5	73.7	0.1	No	-	No
22	Bake Pkwy.	w/o Dimension Dr.	73.9	74.0	0.1	Yes	Yes	No
23	Bake Pkwy.	e/o Dimension Dr.	73.3	73.5	0.1	Yes	Yes	No
24	Bake Pkwy.	e/o Rancho Pkwy. S.	73.3	73.5	0.1	No	-	No
25	Bake Pkwy.	w/o Towne Centre Dr.	76.8	77.0	0.2	No	-	No
26	Bake Pkwy.	e/o Towne Centre Dr.	76.5	76.4	0.0	Yes	Yes	No
27	Lake Forest Dr.	w/o Serrano Rd.	74.2	74.3	0.0	Yes	Yes	No
28	Lake Forest Dr.	e/o Serrano Rd.	74.2	74.3	0.0	Yes	Yes	No
29	Lake Forest Dr.	e/o Trabuco Rd.	74.5	74.6	0.1	Yes	Yes	No
30	Lake Forest Dr.	e/o Dimension Dr.	73.0	73.2	0.2	No	-	No
31	Lake Forest Dr.	e/o Rancho Pkwy.	75.8	76.0	0.2	Yes	Yes	No
32	Lake Forest Dr.	e/o Towne Centre Dr.	74.8	75.0	0.2	No	-	No
33	Lake Forest Dr.	e/o Portola Pkwy.	69.8	69.8	0.0	No	-	No
34	El Toro Rd.	w/o Jeronimo Rd.	73.8	73.9	0.1	Yes	Yes	No
35	El Toro Rd.	e/o Jeronimo Rd.	74.1	74.2	0.0	Yes	Yes	No
36	El Toro Rd.	e/o Serrano Rd.	73.9	73.9	0.0	Yes	Yes	No
37	El Toro Rd.	e/o Trabuco Rd.	74.0	74.1	0.0	Yes	Yes	No
38	El Toro Rd.	w/o Portola Pkwy.	73.7	73.7	0.0	Yes	Yes	No
39	El Toro Rd.	e/o Portola Pkwy.	73.5	73.5	0.0	Yes	Yes	No

[1] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.

[2] Does the without Project off-site traffic noise level already exceed the City of Lake Forest 65 dBA CNEL exterior noise level standard at adjacent noise-sensitive land uses?

[3] Significance Criteria (Section 4).

TABLE 7-11: 2040 WITHOUT PORTOLA EXT. PLUS PROJECT OFF-SITE TRAFFIC NOISE IMPACTS

ID	Road	Segment	CNEL at Adjacent Land Use (dBA)[1]			Noise-Sensitive Land Use?	Without Proj. Noise Level Exceeds Standard?[2]	Threshold Exceeded?[3]
			No Project	With Project	Project Addition			
1	Trabuco Rd.	s/o Bake Pkwy.	73.3	73.3	0.0	Yes	Yes	No
2	Trabuco Rd.	s/o Lake Forest Dr.	73.9	73.9	0.0	Yes	Yes	No
3	Rancho Pkwy. S.	s/o Alton Pkwy.	68.3	68.1	0.0	Yes	Yes	No
4	Rancho Pkwy. S.	n/o Bake Pkwy.	67.3	66.9	0.0	No	-	No
5	Rancho Pkwy.	s/o Lake Forest Dr.	76.8	76.4	0.0	No	-	No
6	Towne Centre Dr.	s/o Alton Pkwy.	70.3	70.3	0.0	No	-	No
7	Towne Centre Dr.	s/o Bake Pkwy.	68.3	68.2	0.0	Yes	Yes	No
8	Towne Centre Dr.	s/o Lake Forest Dr.	65.8	65.6	0.0	No	-	No
9	Portola Pkwy.	s/o Alton Pkwy.	70.9	70.9	0.1	Yes	Yes	No
10	Portola Pkwy.	n/o Rancho Pkwy.	73.1	73.1	0.0	Yes	Yes	No
11	Santa Margarita Pkwy.	s/o El Toro Rd.	74.9	74.8	0.0	Yes	Yes	No
12	Santa Margarita Pkwy.	s/o Los Alisos Bl.	73.5	73.4	0.0	Yes	Yes	No
13	Alton Pkwy.	w/o Irvine Bl.	74.3	74.3	0.0	No	-	No
14	Alton Pkwy.	e/o Irvine Bl.	74.6	74.5	0.0	No	-	No
15	Alton Pkwy.	w/o Rancho Pkwy. S.	76.4	76.3	0.0	Yes	Yes	No
16	Bake Pkwy.	w/o Rockfield Bl.	78.5	78.5	0.0	No	-	No
17	Bake Pkwy.	e/o Rockfield Bl.	77.5	77.5	0.0	No	-	No
18	Bake Pkwy.	e/o Muirlands Bl.	77.4	77.4	0.0	Yes	Yes	No
19	Bake Pkwy.	e/o Jeronimo Rd.	75.8	75.8	0.0	Yes	Yes	No
20	Bake Pkwy.	e/o Toledo Wy.	75.4	75.4	0.0	Yes	Yes	No
21	Bake Pkwy.	e/o Trabuco Rd.	74.0	73.9	0.0	No	-	No
22	Bake Pkwy.	w/o Dimension Dr.	74.4	74.3	0.0	Yes	Yes	No
23	Bake Pkwy.	e/o Dimension Dr.	74.6	74.3	0.0	Yes	Yes	No
24	Bake Pkwy.	e/o Rancho Pkwy. S.	74.2	74.2	0.0	No	-	No
25	Bake Pkwy.	w/o Towne Centre Dr.	77.3	77.3	0.0	No	-	No
26	Bake Pkwy.	e/o Towne Centre Dr.	76.9	76.8	0.0	Yes	Yes	No
27	Lake Forest Dr.	w/o Serrano Rd.	74.4	74.5	0.1	Yes	Yes	No
28	Lake Forest Dr.	e/o Serrano Rd.	74.3	74.4	0.0	Yes	Yes	No
29	Lake Forest Dr.	e/o Trabuco Rd.	74.7	74.6	0.0	Yes	Yes	No
30	Lake Forest Dr.	e/o Dimension Dr.	74.2	74.0	0.0	No	-	No
31	Lake Forest Dr.	e/o Rancho Pkwy.	77.1	76.8	0.0	Yes	Yes	No
32	Lake Forest Dr.	e/o Towne Centre Dr.	75.7	75.4	0.0	No	-	No
33	Lake Forest Dr.	e/o Portola Pkwy.	71.7	71.5	0.0	No	-	No
34	El Toro Rd.	w/o Jeronimo Rd.	73.8	73.7	0.0	Yes	Yes	No
35	El Toro Rd.	e/o Jeronimo Rd.	74.3	74.3	0.0	Yes	Yes	No
36	El Toro Rd.	e/o Serrano Rd.	74.1	74.0	0.0	Yes	Yes	No
37	El Toro Rd.	e/o Trabuco Rd.	74.6	74.5	0.0	Yes	Yes	No
38	El Toro Rd.	w/o Portola Pkwy.	74.2	74.2	0.0	Yes	Yes	No
39	El Toro Rd.	e/o Portola Pkwy.	74.3	74.2	0.0	Yes	Yes	No

[1] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.

[2] Does the without Project off-site traffic noise level already exceed the City of Lake Forest 65 dBA CNEL exterior noise level standard at adjacent noise-sensitive land uses?

[3] Significance Criteria (Section 4).

TABLE 7-12: 2040 WITH PORTOLA EXT. PLUS PROJECT OFF-SITE TRAFFIC NOISE IMPACTS

ID	Road	Segment	CNEL at Adjacent Land Use (dBA)[1]			Noise-Sensitive Land Use?	Without Proj. Noise Level Exceeds Standard?[2]	Threshold Exceeded?[3]
			No Project	With Project	Project Addition			
1	Trabuco Rd.	s/o Bake Pkwy.	74.3	74.5	0.1	Yes	Yes	No
2	Trabuco Rd.	s/o Lake Forest Dr.	72.1	72.3	0.2	Yes	Yes	No
3	Rancho Pkwy. S.	s/o Alton Pkwy.	68.3	68.0	0.0	Yes	Yes	No
4	Rancho Pkwy. S.	n/o Bake Pkwy.	67.3	66.9	0.0	No	-	No
5	Rancho Pkwy.	s/o Lake Forest Dr.	76.6	76.4	0.0	No	-	No
6	Towne Centre Dr.	s/o Alton Pkwy.	70.2	70.4	0.1	No	-	No
7	Towne Centre Dr.	s/o Bake Pkwy.	68.1	67.9	0.0	Yes	Yes	No
8	Towne Centre Dr.	s/o Lake Forest Dr.	66.1	65.6	0.0	No	-	No
9	Portola Pkwy.	s/o Alton Pkwy.	71.8	71.9	0.0	Yes	Yes	No
10	Portola Pkwy.	n/o Rancho Pkwy.	73.1	73.1	0.0	Yes	Yes	No
11	Santa Margarita Pkwy.	s/o El Toro Rd.	74.9	74.8	0.0	Yes	Yes	No
12	Santa Margarita Pkwy.	s/o Los Alisos Bl.	73.5	73.4	0.0	Yes	Yes	No
13	Alton Pkwy.	w/o Irvine Bl.	74.2	74.3	0.0	No	-	No
14	Alton Pkwy.	e/o Irvine Bl.	73.8	73.8	0.0	No	-	No
15	Alton Pkwy.	w/o Rancho Pkwy. S.	76.1	76.0	0.0	Yes	Yes	No
16	Bake Pkwy.	w/o Rockfield Bl.	78.5	78.5	0.0	No	-	No
17	Bake Pkwy.	e/o Rockfield Bl.	77.5	77.5	0.0	No	-	No
18	Bake Pkwy.	e/o Muirlands Bl.	77.4	77.4	0.0	Yes	Yes	No
19	Bake Pkwy.	e/o Jeronimo Rd.	75.8	75.7	0.0	Yes	Yes	No
20	Bake Pkwy.	e/o Toledo Wy.	75.4	75.4	0.0	Yes	Yes	No
21	Bake Pkwy.	e/o Trabuco Rd.	73.8	73.8	0.0	No	-	No
22	Bake Pkwy.	w/o Dimension Dr.	74.3	74.2	0.0	Yes	Yes	No
23	Bake Pkwy.	e/o Dimension Dr.	74.3	74.2	0.0	Yes	Yes	No
24	Bake Pkwy.	e/o Rancho Pkwy. S.	74.1	74.2	0.1	No	-	No
25	Bake Pkwy.	w/o Towne Centre Dr.	77.3	77.3	0.0	No	-	No
26	Bake Pkwy.	e/o Towne Centre Dr.	76.9	76.8	0.0	Yes	Yes	No
27	Lake Forest Dr.	w/o Serrano Rd.	74.4	74.4	0.0	Yes	Yes	No
28	Lake Forest Dr.	e/o Serrano Rd.	74.3	74.4	0.1	Yes	Yes	No
29	Lake Forest Dr.	e/o Trabuco Rd.	75.0	74.6	0.0	Yes	Yes	No
30	Lake Forest Dr.	e/o Dimension Dr.	74.2	74.0	0.0	No	-	No
31	Lake Forest Dr.	e/o Rancho Pkwy.	77.0	76.7	0.0	Yes	Yes	No
32	Lake Forest Dr.	e/o Towne Centre Dr.	75.4	75.2	0.0	No	-	No
33	Lake Forest Dr.	e/o Portola Pkwy.	71.5	71.5	0.0	No	-	No
34	El Toro Rd.	w/o Jeronimo Rd.	73.7	73.7	0.0	Yes	Yes	No
35	El Toro Rd.	e/o Jeronimo Rd.	74.3	74.2	0.0	Yes	Yes	No
36	El Toro Rd.	e/o Serrano Rd.	74.1	74.0	0.0	Yes	Yes	No
37	El Toro Rd.	e/o Trabuco Rd.	74.5	74.4	0.0	Yes	Yes	No
38	El Toro Rd.	w/o Portola Pkwy.	74.2	74.2	0.0	Yes	Yes	No
39	El Toro Rd.	e/o Portola Pkwy.	74.3	74.2	0.0	Yes	Yes	No

[1] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.

[2] Does the without Project off-site traffic noise level already exceed the City of Lake Forest 65 dBA CNEL exterior noise level standard at adjacent noise-sensitive land uses?

[3] Significance Criteria (Section 4).

8 ON-SITE NOISE IMPACTS

A noise impact analysis has been completed to determine the noise exposure levels that would result from adjacent and dominant traffic noise sources in the Project study area, and to identify potential noise mitigation measures that would achieve acceptable Project exterior and interior noise levels. The primary source of traffic noise affecting the Project site is anticipated to be from SR-241, Bake Parkway, Rancho Parkway, and Lake Forest Drive. The Project will also experience some background traffic noise impacts from the Project's internal local streets, however, due to the low traffic volume and low speeds of vehicles transiting into the Project site, traffic noise from these roadways will not make a significant contribution to the noise environment beyond of the right-of-way.

8.1 EXTERIOR NOISE ANALYSIS

Using the FHWA traffic noise prediction model, and the parameters outlined in Section 6, the expected future exterior noise levels are calculated at the noise-sensitive residential and school uses within the Project site. Table 8-1 presents a summary of future exterior noise level impacts at the outdoor areas (e.g., residential private yards and school playgrounds and picnic areas) and first-floor building façade receiver locations. Table 8-1 presents a summary of future exterior noise level impacts with the planned 6-foot high noise barriers. The on-site traffic noise analysis calculations are provided in Appendix 8.1.

The future exterior traffic noise levels are shown to range from 51.6 to 64.7 dBA CNEL at the outdoor areas (e.g., residential private yards and school playground and picnic areas) within the Project site with the planned 6-foot high noise barriers for residential uses. No exterior noise barriers are required to satisfy the City of Lake Forest 65 dBA CNEL exterior noise level standard at the school outdoor playground and picnic areas. Therefore, no exterior noise mitigation is required to satisfy the City of Lake Forest 65 dBA CNEL exterior noise level standards for residential and school land uses. With the planned noise barriers shown on Exhibit ES-A, the future exterior noise levels are considered to be a *less than significant* noise impact. This noise analysis shows that the planned noise barriers will satisfy the City of Lake Forest 65 dBA CNEL exterior noise level standards. The effective noise barrier height represents the minimum wall and/or berm combination height to satisfy the City of Lake Forest exterior noise level standards.

TABLE 8-1: UNMITIGATED EXTERIOR TRAFFIC NOISE LEVELS

On-Site Receiver Location	Roadway	Individual Noise Level With Any Planned Barriers (dBA CNEL)	Total Noise Level With Any Planned Barriers (dBA CNEL)	Exterior Noise Level Threshold (dBA CNEL)	Threshold Exceeded?
Senior Affordable	Bake Pkwy.	55.7	55.7	65	No
Neighborhood 1	Bake Pkwy.	63.1	63.1	65	No
School Playground	Bake Pkwy.	63.1	63.1	65	No
School Picnic Area	SR-241	56.1	64.7	65	No
	Bake Pkwy.	64.0			
School Classroom Building	SR-241	57.0	59.9	65	No
	Rancho Pkwy.	56.8			
School Outdoor Learning Area	SR-241	56.0	61.2	65	No
	Rancho Pkwy.	59.6			
Neighborhood 3	SR-241	53.3	59.9	65	No
	Rancho Pkwy.	56.6			
	Lake Forest Dr.	54.8			
Neighborhood 4	Lake Forest Dr.	51.6	51.6	65	No

8.2 INTERIOR NOISE ANALYSIS

To ensure that the interior noise levels comply with the City of Lake Forest interior noise level standards, future noise levels were calculated at the first to fifth-floor building façades.

8.2.1 NOISE REDUCTION METHODOLOGY

The interior noise level is the difference between the predicted exterior noise level at the building facade and the noise reduction of the structure. Typical building construction will provide a Noise Reduction (NR) of approximately 12 dBA with "windows open" and a minimum 25 dBA noise reduction with "windows closed." (7; 24) However, sound leaks, cracks and openings within the window assembly can greatly diminish its effectiveness in reducing noise. Several methods are used to improve interior noise reduction, including: (1) weather-stripped solid core exterior doors; (2) upgraded dual glazed windows; (3) mechanical ventilation/air conditioning; and (4) exterior wall/roof assembles free of cut outs or openings.

8.2.2 INTERIOR NOISE LEVEL ASSESSMENT

Tables 8-2 and 8-3 show that the Project buildings will require a windows-closed condition and a means of mechanical ventilation (e.g. air conditioning). Table 8-2 shows that the future exterior noise levels at the first-floor building façades are expected to range from 51.7 to 62.2 dBA CNEL. The first-floor interior noise level analysis shows that the City of Lake Forest 45 dBA CNEL

residential and school interior noise level standard can be satisfied using standard windows and sliding glass doors with minimum STC ratings of 27.

Table 8-3 shows that the future exterior noise levels at the second-floor building façades are expected to range from 56.9 to 69.2 dBA CNEL. The second-floor interior noise level analysis shows that the City of Lake Forest 45 dBA CNEL residential and school interior noise level standard can be satisfied using standard windows and sliding glass doors with minimum STC ratings of 27. Therefore, impacts related to interior noise levels are *less than significant* and a final noise study will be required as indicated below.

A final noise study shall be prepared prior to obtaining building permits for the Project consistent with the *City of Lake Forest CEQA Significance Thresholds Guide*, Page 19. (2) This report would finalize the measures described in this study using the precise grading plans, architectural floor plans and elevations, and actual building design specifications, and may include additional measures, if necessary, to meet the City of Lake Forest 45 dBA CNEL interior noise level standard.

TABLE 8-2: FIRST-FLOOR INTERIOR NOISE IMPACTS (CNEL)

Receiver Location	Noise Level at Façade[1]	Required Interior NR[2]	Minimum Interior NR[3]	Upgraded Windows[4]	Interior Noise Level[5]	Threshold	Threshold Exceeded?
Senior Affordable	57.0	12.0	25	No	32.0	45	No
Neighborhood 1	62.2	17.2	25	No	37.2	45	No
School Classroom Building	59.9	14.9	25	No	34.9	45	No
Neighborhood 3	60.6	15.6	25	No	35.6	45	No
Neighborhood 4	51.7	6.7	25	No	26.7	45	No

[1] Exterior noise level at the facade with a windows-closed condition requiring a means of mechanical ventilation (e.g. air conditioning).
[2] Noise reduction to satisfy the interior noise standard of 45 dBA CNEL for residential use.
[3] Minimum interior noise reduction with standard building construction.
[4] Does the required interior noise reduction trigger upgraded windows with a minimum STC rating of greater than 27?
[5] Estimated interior noise level with minimum STC rating for all windows.
"NR" = Noise Reduction

TABLE 8-3: SECOND-FLOOR INTERIOR NOISE IMPACTS (CNEL)

Receiver Location	Noise Level at Façade[1]	Required Interior NR[2]	Minimum Interior NR[3]	Upgraded Windows[4]	Interior Noise Level[5]	Threshold	Threshold Exceeded?
Senior Affordable	67.7	22.7	25	No	42.7	45	No
Neighborhood 1	69.2	24.2	25	No	44.2	45	No
School Classroom Building	67.0	22.0	25	No	42.0	45	No
Neighborhood 3	68.8	23.8	25	No	43.8	45	No
Neighborhood 4	56.9	11.9	25	No	31.9	45	No

[1] Exterior noise level at the facade with a windows-closed condition requiring a means of mechanical ventilation (e.g. air conditioning).
[2] Noise reduction to satisfy the interior noise standard of 45 dBA CNEL for residential use.
[3] Minimum interior noise reduction with standard building construction.
[4] Does the required interior noise reduction trigger upgraded windows with a minimum STC rating of greater than 27?
[5] Estimated interior noise level with minimum STC rating for all windows.
"NR" = Noise Reduction

9 RECEIVER LOCATIONS

To assess the potential for long-term operational and short-term construction noise impacts, the following receiver locations as shown on Exhibit 9-A were identified as representative locations for focused analysis based on the *City of Lake Forest CEQA Significance Thresholds Guide* which defines noise-sensitive uses as *residential (single-family, multi-family, mobile home); hotels; motels; nursing homes; hospitals; parks, playgrounds and recreation areas; and schools*. (2) Land uses that are considered relatively insensitive to noise include business, commercial, and professional developments. Land uses that are typically not affected by noise include: industrial, manufacturing, utilities, agriculture, natural open space, undeveloped land, parking lots, warehousing, liquid and solid waste facilities, salvage yards, and transit terminals.

Sensitive receivers near the Project site include existing residential homes, hotels, and the existing Serrano Creek trail area, as described below. Other sensitive land uses in the Project study area that are located at greater distances than those identified in this report will experience lower noise levels than those presented in this report due to the additional attenuation from distance and the shielding of intervening structures.

R1: Located approximately 197 feet north of the Project site, R1 represents existing residential homes north of Bake Parkway. A 24-hour noise level measurement was taken near this location, L6, to describe the existing ambient noise environment.

R2: Location R2 represents existing Staybridge Suites hotel north of the Project site at roughly 264 feet across Bake Parkway. A 24-hour noise level measurement was taken near this location, L7, to describe the existing ambient noise environment.

R3: Location R3 represents existing Extended Stay America hotel southeast of the Project site at approximately 216 feet on Lake Forest Drive. A 24-hour noise level measurement was taken near this location, L2, to describe the existing ambient noise environment.

R4: Location R4 represents existing Serrano Creek trail area adjacent to the southern Project site boundary at approximately 80 feet southeast. A 24-hour noise level measurement was taken near this location, L3, to describe the existing ambient noise environment.

EXHIBIT 9-A: RECEIVER LOCATIONS

10 OPERATIONAL IMPACTS

This section analyzes the potential operational noise impacts due to the Project's stationary noise sources on the off-site sensitive receiver locations identified in Section 9. Exhibit 10-A identifies the receiver locations and noise source locations used to assess the Project-related operational noise levels.

10.1 OPERATIONAL NOISE LEVELS

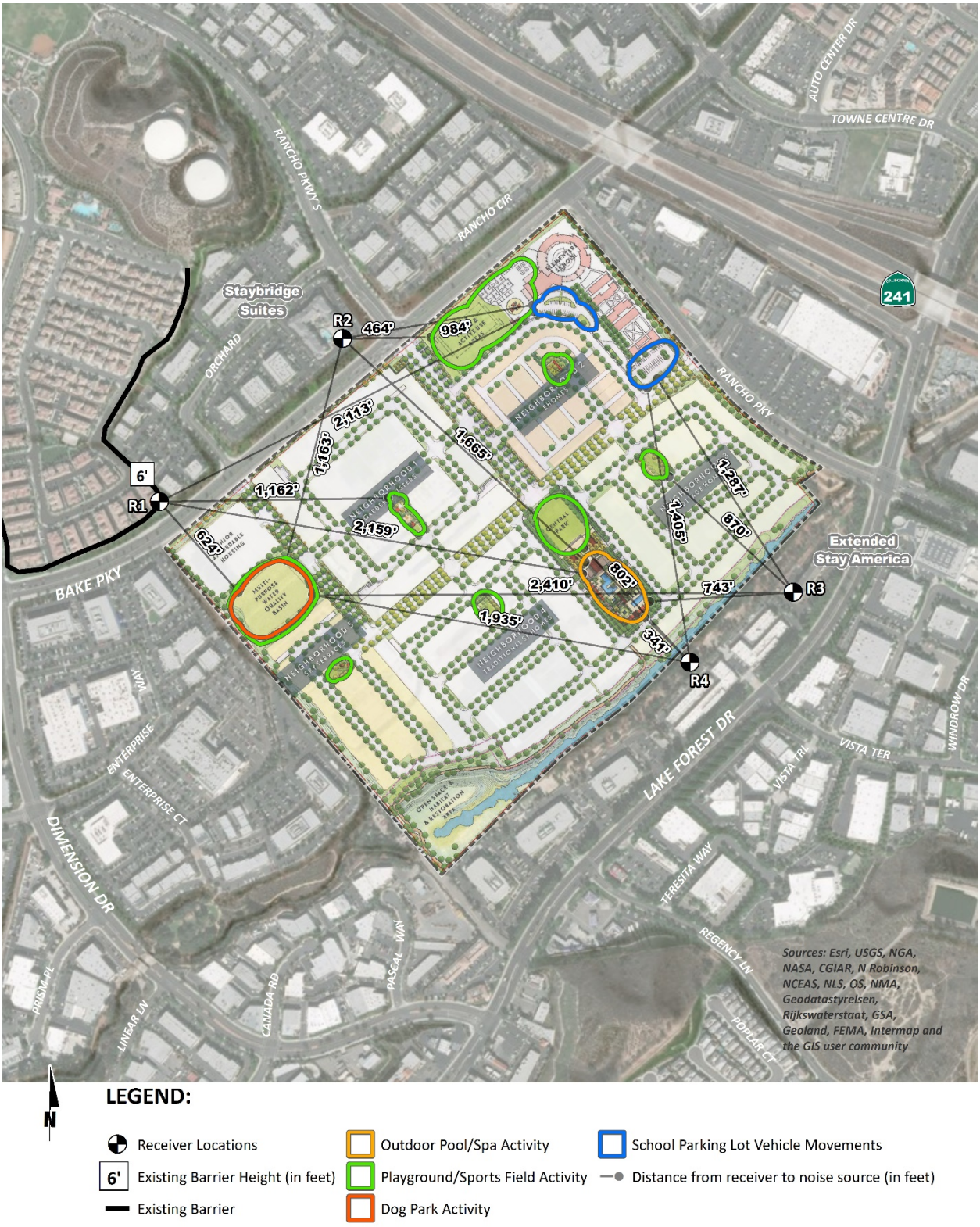
Table 10-1 indicates that the hourly noise levels associated with the playgrounds, sports fields, outdoor pool/spa activities, a dog park, and school parking lot vehicle movements are expected to range from 17.9 to 32.5 dBA L_{50} at the sensitive off-site receiver locations. The operational noise level calculation worksheets are included in Appendix 10.1 and include barrier attenuation provided by existing noise barriers in the Project study area, previously shown on Exhibit 10-A.

TABLE 10-1: UNMITIGATED PROJECT OPERATIONAL NOISE LEVELS

Receiver Location[1]	Noise Source[2]	Project Operational Noise Levels (dBA)[3]				
		L_{50} (30 mins)	L_{25} (15 mins)	L_8 (5 mins)	L_2 (1 min)	L_{max} (<1 min)
R1	Playground/Sports Field Activity	13.7	16.1	19.0	21.7	25.9
	Outdoor Pool/Spa Activity	10.4	13.4	16.7	19.8	25.2
	Dog Park Activity	10.4	12.9	17.1	24.5	30.5
	School Parking Lot Vehicle Movements	12.0	17.0	23.0	27.0	45.9
	Combined Noise Level:	**17.9**	**21.2**	**25.8**	**30.1**	**46.1**
R2	Playground/Sports Field Activity	22.3	24.7	27.6	30.3	34.5
	Outdoor Pool/Spa Activity	18.3	21.3	24.6	27.7	33.1
	Dog Park Activity	11.2	13.7	17.9	25.3	31.3
	School Parking Lot Vehicle Movements	24.1	29.1	35.1	39.1	58.0
	Combined Noise Level:	**27.1**	**31.0**	**36.2**	**40.1**	**58.0**
R3	Playground/Sports Field Activity	16.9	19.3	22.2	24.9	29.1
	Outdoor Pool/Spa Activity	25.3	28.3	31.6	34.7	40.1
	Dog Park Activity	4.8	7.3	11.5	18.9	24.9
	School Parking Lot Vehicle Movements	21.8	26.8	32.8	36.8	55.7
	Combined Noise Level:	**27.3**	**31.0**	**35.5**	**39.1**	**55.8**
R4	Playground/Sports Field Activity	17.6	20.0	22.9	25.6	29.8
	Outdoor Pool/Spa Activity	32.0	35.0	38.3	41.4	46.8
	Dog Park Activity	6.7	9.2	13.4	20.8	26.8
	School Parking Lot Vehicle Movements	21.0	26.0	32.0	36.0	54.9
	Combined Noise Level:	**32.5**	**35.6**	**39.3**	**42.6**	**55.5**

[1] See Exhibit 10-A for the receiver and noise source locations.
[2] Reference noise sources as shown on Table 6-6.
[3] Operational noise level calculations are provided in Appendix 10.1.

EXHIBIT 10-A: OPERATIONAL NOISE SOURCE AND RECEIVER LOCATIONS



10.2 UNMITIGATED OPERATIONAL NOISE LEVEL COMPLIANCE

To demonstrate compliance with local noise regulations, the Project-only operational noise levels are evaluated against exterior noise level threshold based on the City of Lake Forest exterior noise level standards. Table 10-2 shows the operational noise levels associated with Nakase Property Project will satisfy the City of Lake Forest Municipal Code daytime and nighttime exterior noise level standards at all receiver locations, and therefore, are considered a *less than significant* noise impact.

TABLE 10-2: UNMITIGATED OPERATIONAL NOISE LEVEL COMPLIANCE

Receiver Location[1]	Land Use	Noise Level at Receiver Locations (dBA)[2]					Threshold Exceeded?[3]
		L_{50} (30 mins)	L_{25} (15 mins)	L_8 (5 mins)	L_2 (1 min)	L_{max} (<1 min)	
Daytime	**Residential Standards**	**55**	**60**	**65**	**70**	**75**	**-**
Nighttime		**50**	**55**	**60**	**65**	**70**	**-**
R1	Residential	17.9	21.2	25.8	30.1	46.1	No
R2	Hotel	27.1	31.0	36.2	40.1	58.0	No
R3	Hotel	27.3	31.0	35.5	39.1	55.8	No
R4	Recreation	32.5	35.6	39.3	42.6	55.5	No

[1] See Exhibit 10-A for the receiver and noise source locations.
[2] Estimated unmitigated Project operational noise levels as shown on Table 10-1.
[3] Do the estimated Project operational noise levels meet the operational noise level standards (Table 3-1)?

This page intentionally left blank

11 CONSTRUCTION IMPACTS

This section analyzes potential impacts resulting from the short-term construction activities associated with the development of the Project. Exhibit 11-A shows the construction activity boundaries in relation to the nearby sensitive receiver locations.

EXHIBIT 11-A: CONSTRUCTION ACTIVITY AND RECEIVER LOCATIONS

11.1 CONSTRUCTION NOISE ANALYSIS

Tables 11-1 to 11-6 show the Project construction stages and the reference construction noise levels used for each stage. Table 11-7 provides a summary of the noise levels from each stage of construction at each of the sensitive receiver locations. Based on the reference construction noise levels, the Project-related construction noise levels when the highest reference noise level is operating at the edge of primary construction activity nearest each sensitive receiver location will range from 53.3 to 65.2 dBA L_{eq} at the sensitive receiver locations, as shown on Table 11-7.

TABLE 11-1: DEMOLITION ACTIVITY NOISE LEVELS

Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA L_{eq})
Truck Pass-Bys & Dozer Activity	59.2
Dozer Activity	64.2
Highest Reference Noise Level at 50 Feet (dBA L_{eq}):	64.2

Receiver Location	Distance to Construction Activity (Feet)[2]	Distance Attenuation (dBA L_{eq})[3]	Calculated Noise Barrier Attenuation (dBA L_{eq})[4]	Construction Noise Level (dBA L_{eq})
R1	266'	-14.5	-5.6	44.0
R2	304'	-15.7	0.0	48.5
R3	266'	-14.5	0.0	49.6
R4	130'	-8.3	0.0	55.9

[1] Reference construction noise level measurements taken by Urban Crossroads, Inc.
[2] Distance from the nearest point of construction activity to the nearest receiver.
[3] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[4] Calculated barrier attenuation from existing barriers in the Project study area (Appendix 10.1).

TABLE 11-2: GRADING ACTIVITY NOISE LEVELS

Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA L_{eq})
Truck Pass-Bys & Dozer Activity	59.2
Dozer Activity	64.2
Rough Grading Activities	73.5
Highest Reference Noise Level at 50 Feet (dBA L_{eq}):	73.5

Receiver Location	Distance to Construction Activity (Feet)[2]	Distance Attenuation (dBA L_{eq})[3]	Calculated Noise Barrier Attenuation (dBA L_{eq})[4]	Construction Noise Level (dBA L_{eq})
R1	266'	-14.5	-5.6	53.3
R2	304'	-15.7	0.0	57.8
R3	266'	-14.5	0.0	58.9
R4	130'	-8.3	0.0	65.2

[1] Reference construction noise level measurements taken by Urban Crossroads, Inc.
[2] Distance from the nearest point of construction activity to the nearest receiver.
[3] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[4] Calculated barrier attenuation from existing barriers in the Project study area (Appendix 10.1).

TABLE 11-3: INFRASTRUCTURE ACTIVITY NOISE LEVELS

Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA L_{eq})
Truck Pass-Bys & Dozer Activity	59.2
Dozer Activity	64.2
Highest Reference Noise Level at 50 Feet (dBA L_{eq}):	64.2

Receiver Location	Distance to Construction Activity (Feet)[2]	Distance Attenuation (dBA L_{eq})[3]	Calculated Noise Barrier Attenuation (dBA L_{eq})[4]	Construction Noise Level (dBA L_{eq})
R1	266'	-14.5	-5.6	44.0
R2	304'	-15.7	0.0	48.5
R3	266'	-14.5	0.0	49.6
R4	130'	-8.3	0.0	55.9

[1] Reference construction noise level measurements taken by Urban Crossroads, Inc.
[2] Distance from the nearest point of construction activity to the nearest receiver.
[3] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[4] Calculated barrier attenuation from existing barriers in the Project study area (Appendix 10.1).

TABLE 11-4: BUILDING CONSTRUCTION ACTIVITY NOISE LEVELS

Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA L_{eq})
Construction Vehicle Maintenance Activities	67.5
Foundation Trenching	68.2
Framing	62.3
Highest Reference Noise Level at 50 Feet (dBA L_{eq}):	68.2

Receiver Location	Distance to Construction Activity (Feet)[2]	Distance Attenuation (dBA L_{eq})[3]	Calculated Noise Barrier Attenuation (dBA L_{eq})[4]	Construction Noise Level (dBA L_{eq})
R1	266'	-14.5	-5.6	48.0
R2	304'	-15.7	0.0	52.5
R3	266'	-14.5	0.0	53.6
R4	130'	-8.3	0.0	59.9

[1] Reference construction noise level measurements taken by Urban Crossroads, Inc.
[2] Distance from the nearest point of construction activity to the nearest receiver.
[3] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[4] Calculated barrier attenuation from existing barriers in the Project study area (Appendix 10.1).

TABLE 11-5: PAVING ACTIVITY NOISE LEVELS

Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA L_{eq})
Concrete Mixer Truck Movements	71.2
Concrete Paver Activities	65.6
Concrete Mixer Pour & Paving Activities	65.9
Concrete Mixer Backup Alarms & Air Brakes	71.6
Concrete Mixer Pour Activities	67.7
Highest Reference Noise Level at 50 Feet (dBA L_{eq}):	71.6

Receiver Location	Distance to Construction Activity (Feet)[2]	Distance Attenuation (dBA L_{eq})[3]	Calculated Noise Barrier Attenuation (dBA L_{eq})[4]	Construction Noise Level (dBA L_{eq})
R1	266'	-14.5	-5.6	51.5
R2	304'	-15.7	0.0	55.9
R3	266'	-14.5	0.0	57.1
R4	130'	-8.3	0.0	63.3

[1] Reference construction noise level measurements taken by Urban Crossroads, Inc.
[2] Distance from the nearest point of construction activity to the nearest receiver.
[3] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[4] Calculated barrier attenuation from existing barriers in the Project study area (Appendix 10.1).

TABLE 11-6: ARCHITECTURAL COATING ACTIVITY NOISE LEVELS

Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA L_{eq})
Construction Vehicle Maintenance Activities	67.5
Foundation Trenching	68.2
Framing	62.3
Highest Reference Noise Level at 50 Feet (dBA L_{eq}):	68.2

Receiver Location	Distance to Construction Activity (Feet)[2]	Distance Attenuation (dBA L_{eq})[3]	Calculated Noise Barrier Attenuation (dBA L_{eq})[4]	Construction Noise Level (dBA L_{eq})
R1	266'	-14.5	-5.6	48.0
R2	304'	-15.7	0.0	52.5
R3	266'	-14.5	0.0	53.6
R4	130'	-8.3	0.0	59.9

[1] Reference construction noise level measurements taken by Urban Crossroads, Inc.
[2] Distance from the nearest point of construction activity to the nearest receiver.
[3] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[4] Calculated barrier attenuation from existing barriers in the Project study area (Appendix 10.1).

11.2 CONSTRUCTION NOISE THRESHOLDS OF SIGNIFICANCE

The construction noise analysis shows that the highest construction noise levels will occur when construction activities take place at the closest point from the edge of primary construction activity to each of the nearby receiver locations. As shown on Table 11-7, the unmitigated construction noise levels are expected to range from 53.3 to 65.2 dBA L_{eq} at the nearby receiver locations.

TABLE 11-7: UNMITIGATED CONSTRUCTION EQUIPMENT NOISE LEVEL SUMMARY

Receiver Location[1]	Construction Noise Levels by Stage (dBA L_{eq})						
	Demolition	Grading	Infrastructure	Building Construction	Paving	Architectural Coating	Highest Construction Noise Level[2]
R1	44.0	53.3	44.0	48.0	51.5	48.0	53.3
R2	48.5	57.8	48.5	52.5	55.9	52.5	57.8
R3	49.6	58.9	49.6	53.6	57.1	53.6	58.9
R4	55.9	65.2	55.9	59.9	63.3	59.9	65.2

[1] Noise receiver locations are shown on Exhibit 11-A.
[2] Estimated construction noise levels during peak operating conditions.

Table 11-8 shows the highest construction noise levels at the potentially impacted receiver locations are expected to approach 65.2 dBA L_{eq} and, therefore, will satisfy the construction noise level threshold of 85 dBA L_{eq} at all receiver locations. The noise impact due to unmitigated Project construction noise levels is, therefore, considered a *less than significant* impact at all receiver locations.

TABLE 11-8: CONSTRUCTION EQUIPMENT NOISE LEVEL COMPLIANCE

Receiver Location[1]	Construction Noise Levels (dBA L_{eq})		
	Highest Construction Noise Levels[2]	Threshold[3]	Threshold Exceeded?[4]
R1	53.3	85	No
R2	57.8	85	No
R3	58.9	85	No
R4	65.2	85	No

[1] Noise receiver locations are shown on Exhibit 11-A.
[2] Estimated construction noise levels during worst-case operating conditions, as shown on Table 11-7.
[3] Construction noise level threshold as shown on Table 4-1.
[4] Do the estimated Project construction noise levels exceed the construction noise level threshold?

11.3 CONSTRUCTION VIBRATION IMPACTS

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods used, distance to the affected structures and soil type. It is expected that ground-borne vibration from Project construction activities would cause only intermittent, localized intrusion. The proposed Project's construction activities most likely to cause vibration impacts are:

- Heavy Construction Equipment: Although all heavy mobile construction equipment has the potential of causing at least some perceptible vibration while operating close to buildings, the vibration is usually short-term and is not of sufficient magnitude to cause building damage.
- Trucks: Trucks hauling building materials to construction sites can be sources of vibration intrusion if the haul routes pass through residential neighborhoods on streets with bumps or potholes. Repairing the bumps and potholes generally eliminates the problem.

Ground-borne vibration levels resulting from construction activities occurring within the Project site were estimated by data published by the Federal Transit Administration (FTA). Construction activities that would have the potential to generate low levels of ground-borne vibration within the Project site include mobile equipment activities and pile driving, among others. Using the vibration source level of construction equipment provided on Table 6-8 and the construction vibration assessment methodology published by the FTA, it is possible to estimate the Project vibration impacts. Table 11-9 presents the expected Project related vibration levels at distances ranging from 130 to 304 feet from primary Project construction activity.

Based on the reference vibration levels provided by the FTA, a large bulldozer represents the peak source of vibration with a reference velocity of 0.089 in/sec PPV at 25 feet. At distances ranging from 130 to 304 feet from primary Project construction activities, construction vibration velocity levels are expected to range from 0.002 to 0.008 in/sec PPV, as shown on Table 11-9. Table 11-9 shows that the Project construction vibration levels will remain below the Caltrans building damage threshold of 0.3 in/sec PPV at all receiver locations.

Compared with the Caltrans construction vibration standard for human annoyance, the proposed Project construction activities will remain below the *distinctly perceptible* vibration standard of 0.04 in/sec PPV at all receiver locations. The Project-related vibration impacts at the nearby sensitive receiver locations, therefore, represent a *less than significant* impact Project construction activities.

TABLE 11-9: UNMITIGATED CONSTRUCTION EQUIPMENT VIBRATION LEVELS

Receiver[1]	Distance to Const. Activity (Feet)	Receiver PPV Levels (in/sec)[2]					Thresholds (in/sec PPV)		Threshold Exceeded?[3]	
		Small Bulldozer (< 80k lbs)	Jack-hammer	Loaded Trucks	Large Bulldozer (> 80k lbs)	Highest Vibration Level	Human Annoyance	Building Damage	Human Annoyance	Building Damage
R1	266'	0.000	0.001	0.002	0.003	0.003	0.04	0.3	No	No
R2	304'	0.000	0.001	0.002	0.002	0.002	0.04	0.3	No	No
R3	266'	0.000	0.001	0.002	0.003	0.003	0.04	0.3	No	No
R4	130'	0.000	0.003	0.006	0.008	0.008	0.04	0.3	No	No

[1] Receiver locations are shown on Exhibit 11-A.
[2] Based on the Vibration Source Levels of Construction Equipment included on Table 6-8.
[3] Does the peak vibration exceed the acceptable vibration thresholds?
"PPV" = Peak Particle Velocity

SOIL EXPORT TRUCK HAUL TRIPS

The Project site will require up to 150,000 cubic yards of soil export during the construction process. Truck vibration levels are dependent on vehicle characteristics, load, speed, and pavement conditions. Typical vibration levels for the Nakase Property heavy truck activity at normal traffic speeds will approach 0.004 in/sec PPV at 25 feet based on the FTA *Transit Noise Impact and Vibration Assessment.* (10) Truck deliveries transiting on site will be travelling at very low speeds so it is expected that delivery truck vibration levels at nearby homes will remain below the Caltrans building damage threshold of 0.3 in/sec PPV and human annoyance threshold of 0.04 in/sec PPV.

12 REFERENCES

1. **State of California.** *California Environmental Quality Act, Appendix G.* 2016.
2. **City of Lake Forest.** *CEQA Significance Thresholds Guide.* March 2009.
3. **Urban Crossroads, Inc.** *Nakase Property Traffic Impact Analysis.* September 2018.
4. **Harris, Cyril M.** *Noise Control in Buildings.* s.l. : McGraw-Hill, Inc., 1994.
5. **California Department of Transportation Environmental Program.** *Technical Noise Supplement - A Technical Supplement to the Traffic Noise Analysis Protocol.* Sacramento, CA : s.n., September 2013.
6. **Environmental Protection Agency Office of Noise Abatement and Control.** *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.* March 1974. EPA/ONAC 550/9/74-004.
7. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning, Noise and Air Quality Branch.** *Highway Traffic Noise Analysis and Abatement Policy and Guidance.* June, 1995.
8. **U.S. Department of Transportation, Federal Highway Administration.** *Highway Traffic Noise in the United States, Problem and Response.* April 2000. p. 3.
9. **U.S. Environmental Protection Agency Office of Noise Abatement and Control.** *Noise Effects Handbook-A Desk Reference to Health and Welfare Effects of Noise.* October 1979 (revised July 1981). EPA 550/9/82/106.
10. **U.S. Department of Transportation, Federal Transit Administration.** *Transit Noise and Vibration Impact Assessment.* May 2006. FTA-VA-90-1003-06.
11. **Office of Planning and Research.** *State of California General Plan Guidelines.* 2017.
12. **City of Lake Forest.** *General Plan Safety and Noise Element.* June 1994.
13. —. *Municipal Code, Title 11 – Peace and Safety, Division II – Offenses Against Public Peace, Chapter 11.16 – Noise Control.*
14. **National Institute for Occupational Safety and Health.** *Criteria for Recommended Standard: Occupational Noise Exposure.* June 1998.
15. **California Department of Transportation.** *Transportation and Construction Vibration Guidance Manual.* September 2013.
16. **California Court of Appeal.** *Gray v. County of Madera, F053661.* 167 Cal.App.4th 1099; - Cal.Rptr.3d, October 2008.
17. **American National Standards Institute (ANSI).** *Specification for Sound Level Meters ANSI S1.4-2014/IEC 61672-1:2013.*
18. **U.S. Department of Transportation, Federal Highway Administration.** *FHWA Highway Traffic Noise Prediction Model.* December 1978. FHWA-RD-77-108.
19. **California Department of Transportation Environmental Program, Office of Environmental Engineering.** *Use of California Vehicle Noise Reference Energy Mean Emission Levels (Calveno REMELs) in FHWA Highway Traffic Noise Prediction.* September 1995. TAN 95-03.
20. **California Department of Transportation.** *Traffic Noise Attenuation as a Function of Ground and Vegetation Final Report.* June 1995. FHWA/CA/TL-95/23.
21. —. *Traffic Data Branch Annual Average Daily Truck Traffic on the California Highways System.* 2016.

22. **City of Lake Forest.** *General Plan Circulation Element.* July 2008.

23. **Urban Crossroads, Inc.** *Nakase Property Air Quality Impact Analysis.* September 2018.

24. **California Department of Transportation.** *Traffic Noise Analysis Protocol.* May 2011.

13 CERTIFICATION

The contents of this report represent an accurate depiction of the noise environment and impacts associated with the proposed Nakase Property Project. The information contained in this report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 336-5979.

Bill Lawson, P.E., INCE
Principal
URBAN CROSSROADS, INC.
260 E. Baker Street, Suite 200
Costa Mesa, CA 92626
(949) 336-5979
blawson@urbanxroads.com

EDUCATION

Master of Science in Civil and Environmental Engineering
California Polytechnic State University, San Luis Obispo • December, 1993

Bachelor of Science in City and Regional Planning
California Polytechnic State University, San Luis Obispo • June, 1992

PROFESSIONAL REGISTRATIONS

PE – Registered Professional Traffic Engineer – TR 2537 • January, 2009
AICP – American Institute of Certified Planners – 013011 • June, 1997–January 1, 2012
PTP – Professional Transportation Planner • May, 2007 – May, 2013
INCE – Institute of Noise Control Engineering • March, 2004

PROFESSIONAL AFFILIATIONS

ASA – Acoustical Society of America
ITE – Institute of Transportation Engineers

PROFESSIONAL CERTIFICATIONS

Certified Acoustical Consultant – County of Orange • February, 2011
FHWA-NHI-142051 Highway Traffic Noise Certificate of Training • February, 2013

This page intentionally left blank

APPENDIX 3.1:

CITY OF LAKE FOREST MUNICIPAL CODE

This page intentionally left blank

Chapter 11.16 NOISE CONTROL

11.16.010 Declaration of policy.

In order to control unnecessary, excessive and annoying sounds, it is hereby declared to be the policy of the City to prohibit such sounds generated from all sources as specified in this chapter.

It is determined that certain sound levels are detrimental to the public health, welfare and safety, and contrary to public interest. (Ord. 171 § 1, 2007)

11.16.020 Definitions.

The following words, phrases and terms as used in this chapter shall have the meaning as indicated below:

"Ambient noise level" shall mean the all-encompassing noise level associated with a given environment, being a composite of sounds from all sources, excluding the alleged offensive noise, at the location and approximate time at which a comparison with the alleged offensive noise is to be made.

"Cumulative period" shall mean an additive period of time composed of individual time segments which may be continuous or interrupted.

"Decibel (dB)" shall mean a unit which denotes the ratio between two (2) quantities which are proportional to power: the number of decibels corresponding to the ratio of two (2) amounts of power is ten (10) times the logarithm to the base ten (10) of this ratio.

"Dwelling unit" shall have the same meaning as in Section 9.04.030(D).

"Emergency machinery, vehicle or work" shall mean any machinery, vehicle or work used, employed or performed in an effort to protect, provide or restore safe conditions in the community or for the citizenry, or work by private or public utilities when restoring utility service.

"Fixed noise source" shall mean a stationary device which creates sounds while fixed or motionless, including but not limited to industrial and commercial machinery and equipment, pumps, fans, compressors, generators, air conditioners and refrigeration equipment.

"Grading" shall mean any excavating or filling of earth material, or any combination thereof, conducted at a site to prepare said site for construction or other improvements thereon.

"Impact noise" shall mean the noise produced by the collision of one (1) mass in motion with a second mass which may be either in motion or at rest.

"Mobile noise source" shall mean any noise source other than a fixed noise source.

"Noise level" shall mean the "A" weighted sound pressure level in decibels obtained by using a sound level meter at slow response with a reference pressure of twenty (20) micronewtons per square meter. The unit of measurement shall be designated as dBa.

"Person" shall mean a person, firm, association, copartnership, joint venture, corporation or any entity, public or private in nature.

"Residential property" shall mean a parcel of real property that is developed and used either in part or in whole for residential purposes, other than transient uses such as hotels and transitory lodgings.

"Simple tone noise" shall mean a noise characterized by a predominant frequency or frequencies so that other frequencies cannot be readily distinguished.

"Sound level meter" shall mean an instrument meeting American National Standard Institute's Standard S1.4-1971 for Type 1 or Type 2 sound level meters or an instrument and the associated recording and analyzing equipment which will provide equivalent data.

"Sound pressure level" of a sound, in decibels, shall mean twenty (20) times the logarithm to the base ten (10) of the ratio of the pressure of the sound to a reference pressure, which reference pressure shall be explicitly stated. (Ord. 297 § 14, 2017; Ord. 171 § 1, 2007)

11.16.025 Measurement of noise levels.

Any noise level measurements made pursuant to the provisions of this chapter shall be performed using a sound level meter as defined in Section 11.16.020. The location selected for measuring exterior noise levels shall be at any point on the affected property. Interior noise measurements shall be made within the affected dwelling unit. The measurement shall be made at a point at least four (4) feet from the wall, ceiling, or floor nearest the alleged offensive noise source and may be made with the windows of the affected unit open. (Ord. 171 § 1, 2007)

11.16.030 Designated noise zone.

The entire territory of the City of Lake Forest is hereby designated as "Noise Zone 1." (Ord. 171 § 1, 2007)

11.16.040 Exterior noise standards.

A. The following noise standards, unless otherwise specifically indicated, shall apply to all residential property within a designated noise zone:

NOISE STANDARDS

Noise Zone	Noise Level	Time Period
1	55 dBa	7:00 a.m.—10.00 p.m.
1	50 dBa	10:00 p.m.—7:00 a.m.

In the event the alleged offensive noise consists entirely of impact noise, simple tone noise, speech, music, or any combination thereof, each of the above noise levels shall be reduced by five (5) dBa.

B. It shall be unlawful for any person at any location to create any noise, or to allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, when the foregoing causes the noise level, when measured on any other residential property, to exceed:

1. The noise standard for a cumulative period of more than thirty (30) minutes in any hour; or
2. The noise standard plus five (5) dBa for a cumulative period of more than fifteen (15) minutes in any hour; or
3. The noise standard plus ten (10) dBa for a cumulative period of more than five (5) minutes in any hour; or
4. The noise standard plus fifteen (15) dBa for a cumulative period of more than one (1) minute in any hour; or
5. The noise standard plus twenty (20) dBa for any period of time.

C. In the event the ambient noise level exceeds any of the first four (4) noise limit categories above, the cumulative period applicable to said category shall be increased to reflect said ambient noise level. In the event the ambient noise level exceeds the fifth (5th) noise limit category, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level. (Ord. 171 § 1, 2007)

11.16.050 Interior noise standards.

A. The following interior noise standards, unless otherwise specifically indicated, shall apply to all residential property within a designated noise zone:

INTERIOR NOISE STANDARDS

Noise Zone	Noise Level	Time Period

1	55 dBa	7:00 a.m.—10:00 p.m.
1	45 dBa	10:00 p.m.—7:00 a.m.

In the event the alleged offensive noise consists entirely of impact noise, simple tone noise, speech, music, or any combination thereof, each of the above noise levels shall be reduced by five (5) dBa.

B. It shall be unlawful for any person at any location to create any noise, or to allow the creation of any noise, on property owned, leased, occupied, or otherwise controlled by such person, when the foregoing causes the noise level, when measured within any other dwelling unit on any residential property, to exceed:

1. The interior noise standard for a cumulative period of more than five (5) minutes in any hour; or

2. The interior noise standard plus five (5) dBa for a cumulative period of more than one (1) minute in any hour; or

3. The interior noise standard plus ten (10) dBa for any period of time.

C. In the event the ambient noise level exceeds either of the first two (2) noise limit categories above, the cumulative period applicable to said category shall be increased to reflect said ambient noise level. In the event the ambient noise level exceeds the third (3rd) noise limit category the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level. (Ord. 171 § 1, 2007)

11.16.060 Exemptions.

The following activities shall be exempted from the provisions of this chapter:

A. Activities not constituting "special events" conducted on the grounds of any public or private nursery, elementary, intermediate or secondary school or college.

B. "Special events" as defined in Section 5.05.020 provided said events are conducted pursuant to a special event permit issued as described in Chapter 5.05. However, this exemption shall not preclude use of the standards set forth in Section 11.16.040 ("Exterior noise standards") or Section 11.16.050 ("Interior noise standards") as a guide for the application, review, or issuance of a special event permit.

C. Any mechanical device, apparatus or equipment used, related to or connected with emergency machinery, vehicle or work.

D. Noise sources associated with construction, repair, remodeling, or grading of any real property, provided said activities do not take place between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a Federal holiday.

E. All mechanical devices, apparatus or equipment which are utilized for the protection or salvage of agricultural crops during periods of potential or actual frost damage or other adverse weather conditions.

F. Mobile noise sources associated with agricultural operations, provided such operations do not take place between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a Federal holiday.

G. Mobile noise sources associated with agricultural pest control through pesticide application, provided that the application is made in accordance with restricted material permits issued by or regulations enforced by the Agricultural Commissioner.

H. Noise sources associated with the maintenance of real property, provided said activities take place between 7:00 a.m. and 8:00 p.m. on any day except Sunday or a Federal holiday, or between the hours of 9:00 a.m. and 8:00 p.m. on Sunday or a Federal holiday.

I. Any activity to the extent regulation thereof has been preempted by State or Federal law.

J. Noise sources associated with solid waste collection and removal, provided such activities take place between 6:00 a.m. and 6:00 p.m. Monday through Friday where audible in residential areas; or between 7:00 a.m. and 6:00 p.m. on Saturdays where audible in residential areas; or between 5:00 a.m. and 9:00 p.m. any day where such activity is not audible in residential areas; or as otherwise provided in an approved franchise agreement between a waste hauler and the City. (Ord. 300 § 7, 2017; Ord. 171 § 1, 2007)

11.16.070 Schools, hospitals and churches—Special provisions.

It is unlawful for any person to create any noise which causes the noise level at any school, hospital or church while the same is in use to exceed the noise limits as specified in Section 11.16.040 prescribed for the assigned noise zone in which the school, hospital or church is located, or which noise level unreasonably interferes with the use of such institutions or which unreasonably disturbs or annoys patients in the hospital, provided conspicuous signs are displayed in three (3) separate locations within one-tenth (1/10) of a mile of the institution indicating the presence of a school, church or hospital. (Ord. 171 § 1, 2007)

11.16.080 Motor vehicle racing.

It is unlawful to conduct motor vehicle racing, testing, timing or similar noise-producing activities at raceways, speedways, off-road vehicle courses, drag strips or other similar places, including, but not limited to, the operation of midget race cars, drag cars, motorcycles, off-road vehicles, and specialty automobiles, between the hours of eleven-thirty p.m. and eight a.m. (Ord. 171 § 1, 2007)

11.16.090 Enforcement.

The City's law enforcement personnel, the County Health Officer and their duly authorized representatives are authorized, pursuant to Penal Code Section 836.5, to arrest any person without a warrant when they have reasonable cause to believe that such person has committed a misdemeanor in their presence.

No person shall interfere with, oppose or resist any authorized person charged with the enforcement of this chapter while such person is engaged in the performance of his duty. (Ord. 171 § 1, 2007)

11.16.100 Variance procedure.

The owner or operator of a noise source which violates any of the provisions of this chapter may file an application with the Health Officer for a variance from the provisions thereof wherein said owner or operator shall set forth all actions taken to comply with said provisions, the reasons why immediate compliance cannot be achieved, a proposed method of achieving compliance, and a proposed time schedule for its accomplishment. Said application shall be accompanied by a fee in the amount of seventy-five dollars ($75.00). A separate application shall be filed for each noise source; provided, however, that several mobile sources under common ownership, or several fixed sources on a single property may be combined into one (1) application. Upon receipt of said application and fee, the Health Officer shall refer it with his recommendation thereon within thirty (30) days to the Noise Variance Board for action thereon in accordance with the provisions of this chapter.

An applicant for a variance shall remain subject to prosecution under the terms of this chapter until a variance is granted. (Ord. 171 § 1, 2007)

11.16.110 Noise Variance Board.

The City Council shall, by resolution, appoint the Noise Variance Board, which may be composed of the City Council, Planning Commission, or any other members the City Council may select. The City Council may adopt reasonable rules and regulations for procedures to be used by the Board in carrying out its functions under the provisions of this chapter, or may allow the Board to establish such rules and regulations.

The Noise Variance Board shall evaluate all applications for variance from the requirements of this chapter and may grant said variances with respect to time for compliance, subject to such terms, conditions and requirements as it may deem reasonable to achieve maximum compliance with the provisions of this chapter. Said terms, conditions, and requirements may include but shall not be limited to limitations on noise levels and operating hours. Each such variance shall set forth in detail the approved method of achieving maximum compliance and a time schedule for its accomplishment. In its determinations said Board shall consider the magnitude of nuisance caused by the offensive noise; the uses of property within the area of impingement by the noise; the time factors related to study, design, financing and construction of remedial work; the economic factors related to age and useful life of equipment; and the general public interest and welfare. Any variance granted by said Board shall be by resolution and shall be transmitted to the Development Services Department and the Health Officer for enforcement. Any violation of the terms of said variance shall be unlawful.

Meetings of the Noise Variance Board shall be held at such times and locations as said Board shall determine. All such meetings shall be open to the public.

Traveling and other expenses incurred by each Board member in the performance of his or her official duties shall be reimbursed at a rate determined by resolution of the City Council. (Ord. 171 § 1, 2007)

View the mobile version.

This page intentionally left blank

APPENDIX 5.1:

STUDY AREA PHOTOS

This page intentionally left blank

L1
33, 40' 18.600000", 117, 39' 53.730000"

L1_N
33, 40' 18.600000", 117, 39' 53.730000"

L1_NE
33, 40' 18.600000", 117, 39' 53.730000"

L1_S
33, 40' 18.600000", 117, 39' 53.730000"

L1_SW
33, 40' 19.640000", 117, 39' 54.920000"

L2_W
33, 40' 8.440000", 117, 39' 43.180000"

L3_E
33, 39' 59.570000", 117, 39' 50.300000"

L3_NE
33, 39' 59.570000", 117, 39' 50.300000"

L3_SW
33, 39' 59.570000", 117, 39' 50.300000"

L4
33, 40' 1.680000", 117, 39' 51.970000"

L4_E
33, 39' 59.960000", 117, 40' 17.570000"

L4_N
33, 39' 59.980000", 117, 40' 17.570000"

L4_S
33, 39' 59.980000", 117, 40' 17.600000"

L4_SW
33, 39' 59.960000", 117, 40' 17.570000"

L5_E
33, 39' 58.790000", 117, 40' 20.490000"

L5_N
33, 39' 58.790000", 117, 40' 20.490000"

L5_SW
33, 39' 58.790000", 117, 40' 20.490000"

L5_W
33, 39' 58.790000", 117, 40' 20.490000"

L6
33, 40' 9.490000", 117, 40' 25.150000"

L6_N
33, 40' 9.600000", 117, 40' 25.200000"

L6_SE
33, 40' 9.650000", 117, 40' 25.230000"

L6_W
33, 40' 9.730000", 117, 40' 25.510000"

L7_N
33, 40' 15.250000", 117, 40' 13.070000"

L7_NW
33, 40' 15.250000", 117, 40' 13.070000"

L7_S
33, 40' 15.250000", 117, 40' 13.070000"

L8_N
33, 40' 15.460000", 117, 40' 14.300000"

L8_NE
33, 40' 15.460000", 117, 40' 14.300000"

L8_SW
33, 40' 15.460000", 117, 40' 14.300000"

This page intentionally left blank

APPENDIX 5.2:

NOISE LEVEL MEASUREMENT WORKSHEETS

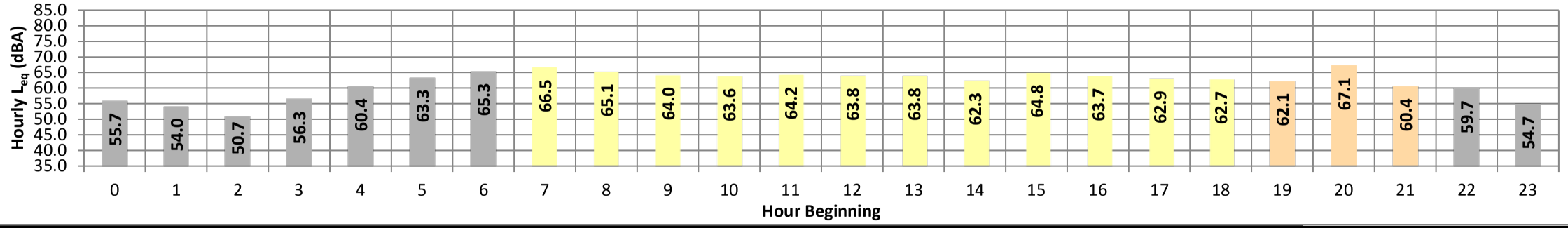
This page intentionally left blank

24-Hour Noise Level Measurement Summary

Date: Thursday, May 31, 2018 *Location:* L1 - Located on Rancho Parkway adjacent to existing commercial uses north of the Project site. *Meter:* Piccolo I *JN:* 11049

Project: Nakase *Analyst:* A. Wolfe

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	55.7	88.6	39.4	65.0	62.0	58.0	55.0	46.0	43.0	41.0	40.0	39.0	55.7	10.0	65.7
	1	54.0	72.4	39.3	64.0	62.0	60.0	59.0	48.0	44.0	41.0	39.0	39.0	54.0	10.0	64.0
	2	50.7	76.1	39.4	63.0	60.0	53.0	49.0	44.0	41.0	40.0	39.0	39.0	50.7	10.0	60.7
	3	56.3	75.8	40.7	69.0	67.0	62.0	59.0	48.0	45.0	41.0	41.0	41.0	56.3	10.0	66.3
	4	60.4	75.1	41.0	72.0	70.0	68.0	66.0	56.0	49.0	44.0	43.0	41.0	60.4	10.0	70.4
	5	63.3	82.0	43.3	73.0	71.0	69.0	68.0	62.0	54.0	47.0	46.0	45.0	63.3	10.0	73.3
	6	65.3	80.7	47.5	74.0	73.0	71.0	70.0	65.0	59.0	52.0	51.0	49.0	65.3	10.0	75.3
Day	7	66.5	82.4	48.4	74.0	73.0	72.0	71.0	67.0	62.0	53.0	52.0	50.0	66.5	0.0	66.5
	8	65.1	76.0	48.6	73.0	72.0	70.0	70.0	66.0	61.0	52.0	51.0	50.0	65.1	0.0	65.1
	9	64.0	83.7	46.4	72.0	71.0	69.0	68.0	64.0	59.0	50.0	49.0	47.0	64.0	0.0	64.0
	10	63.6	87.1	46.9	71.0	69.0	68.0	67.0	62.0	57.0	50.0	49.0	48.0	63.6	0.0	63.6
	11	64.2	83.9	46.2	73.0	71.0	69.0	68.0	64.0	59.0	51.0	50.0	48.0	64.2	0.0	64.2
	12	63.8	82.2	46.5	72.0	70.0	69.0	68.0	64.0	60.0	52.0	51.0	49.0	63.8	0.0	63.8
	13	63.8	81.5	46.4	73.0	71.0	68.0	67.0	64.0	60.0	51.0	50.0	48.0	63.8	0.0	63.8
	14	62.3	77.6	45.7	71.0	69.0	67.0	66.0	63.0	58.0	50.0	49.0	47.0	62.3	0.0	62.3
	15	64.8	86.2	48.3	74.0	73.0	70.0	68.0	64.0	60.0	52.0	51.0	50.0	64.8	0.0	64.8
	16	63.7	84.3	46.7	71.0	69.0	68.0	67.0	64.0	60.0	53.0	51.0	49.0	63.7	0.0	63.7
	17	62.9	76.9	46.4	70.0	69.0	68.0	67.0	63.0	60.0	53.0	51.0	49.0	62.9	0.0	62.9
	18	62.7	79.9	45.9	70.0	69.0	67.0	67.0	63.0	59.0	53.0	51.0	49.0	62.7	0.0	62.7
Evening	19	62.1	80.4	44.5	70.0	69.0	67.0	66.0	62.0	58.0	51.0	49.0	47.0	62.1	5.0	67.1
	20	67.1	99.4	44.5	71.0	69.0	67.0	66.0	61.0	56.0	49.0	48.0	46.0	67.1	5.0	72.1
	21	60.4	78.1	44.1	69.0	68.0	66.0	65.0	60.0	54.0	48.0	46.0	45.0	60.4	5.0	65.4
Night	22	59.7	84.8	42.4	68.0	66.0	64.0	62.0	56.0	50.0	45.0	44.0	43.0	59.7	10.0	69.7
	23	54.7	72.4	41.1	66.0	64.0	61.0	59.0	50.0	47.0	43.0	42.0	41.0	54.7	10.0	64.7

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	62.3	76.0	45.7	70.0	69.0	67.0	66.0	62.0	57.0	50.0	49.0	47.0
	Max	66.5	87.1	48.6	74.0	73.0	72.0	71.0	67.0	62.0	53.0	52.0	50.0
Energy Average		64.1	Average:		72.0	70.5	68.8	67.8	64.0	59.6	51.7	50.4	48.7
Evening	Min	60.4	78.1	44.1	69.0	68.0	66.0	65.0	60.0	54.0	48.0	46.0	45.0
	Max	67.1	99.4	44.5	71.0	69.0	67.0	66.0	62.0	58.0	51.0	49.0	47.0
Energy Average		64.2	Average:		70.0	68.7	66.7	65.7	61.0	56.0	49.3	47.7	46.0
Night	Min	50.7	72.4	39.3	63.0	60.0	53.0	49.0	44.0	41.0	40.0	39.0	39.0
	Max	65.3	88.6	47.5	74.0	73.0	71.0	70.0	65.0	59.0	52.0	51.0	49.0
Energy Average		60.0	Average:		68.2	66.1	62.9	60.8	52.8	48.0	43.8	42.8	41.9

24-Hour L_{eq} (dBA)

63.0

24-Hour CNEL (dBA)

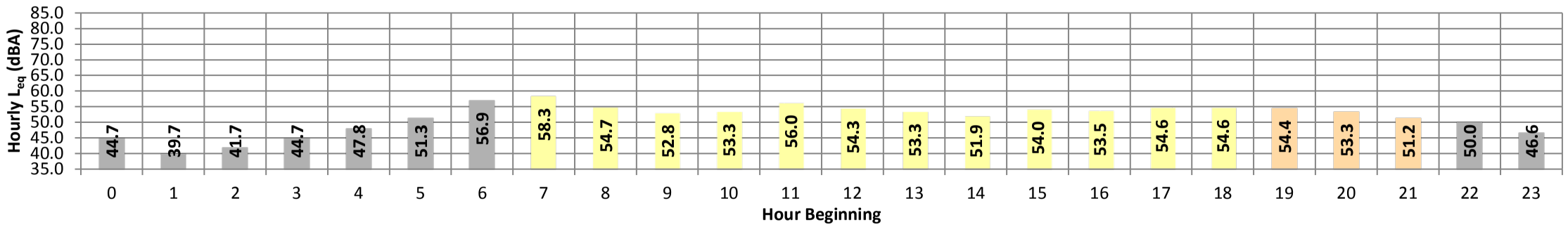
67.8

24-Hour Noise Level Measurement Summary

Date: Thursday, May 31, 2018 *Location:* L2 - Located east of the Project site adjacent to an existing pedestrian trail and an Extended Stay America hotel. *Meter:* Piccolo I *JN:* 11049

Project: Nakase *Analyst:* A. Wolfe

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	44.7	65.9	36.3	57.0	52.0	47.0	45.0	41.0	38.0	36.0	36.0	36.0	44.7	10.0	54.7
	1	39.7	57.1	36.3	49.0	46.0	43.0	42.0	38.0	36.0	36.0	36.0	36.0	39.7	10.0	49.7
	2	41.7	63.3	36.3	50.0	47.0	44.0	42.0	39.0	37.0	36.0	36.0	36.0	41.7	10.0	51.7
	3	44.7	64.7	36.3	54.0	52.0	48.0	47.0	43.0	40.0	38.0	36.0	36.0	44.7	10.0	54.7
	4	47.8	61.3	37.6	57.0	55.0	52.0	51.0	48.0	45.0	40.0	39.0	38.0	47.8	10.0	57.8
	5	51.3	70.9	39.1	60.0	59.0	55.0	54.0	51.0	48.0	44.0	43.0	41.0	51.3	10.0	61.3
	6	56.9	70.5	44.1	65.0	64.0	62.0	61.0	57.0	53.0	48.0	47.0	45.0	56.9	10.0	66.9
Day	7	58.3	80.2	46.5	66.0	64.0	62.0	61.0	58.0	55.0	51.0	50.0	48.0	58.3	0.0	58.3
	8	54.7	71.1	43.3	64.0	62.0	59.0	57.0	54.0	51.0	48.0	47.0	45.0	54.7	0.0	54.7
	9	52.8	72.7	43.1	61.0	59.0	57.0	56.0	52.0	50.0	46.0	45.0	44.0	52.8	0.0	52.8
	10	53.3	67.9	43.3	61.0	60.0	58.0	56.0	53.0	51.0	47.0	46.0	45.0	53.3	0.0	53.3
	11	56.0	71.7	46.1	63.0	61.0	60.0	59.0	56.0	54.0	49.0	49.0	47.0	56.0	0.0	56.0
	12	54.3	68.9	44.6	63.0	62.0	59.0	57.0	54.0	51.0	48.0	47.0	46.0	54.3	0.0	54.3
	13	53.3	69.5	43.2	61.0	60.0	58.0	56.0	53.0	51.0	47.0	47.0	45.0	53.3	0.0	53.3
	14	51.9	66.3	42.6	60.0	58.0	56.0	55.0	52.0	49.0	46.0	45.0	44.0	51.9	0.0	51.9
	15	54.0	70.7	45.3	63.0	61.0	58.0	56.0	53.0	51.0	48.0	48.0	47.0	54.0	0.0	54.0
	16	53.5	67.7	42.9	62.0	60.0	58.0	57.0	53.0	50.0	47.0	47.0	45.0	53.5	0.0	53.5
	17	54.6	78.0	44.0	63.0	60.0	58.0	56.0	52.0	50.0	47.0	46.0	45.0	54.6	0.0	54.6
	18	54.6	70.9	45.1	64.0	62.0	59.0	57.0	53.0	51.0	48.0	48.0	47.0	54.6	0.0	54.6
Evening	19	54.4	74.7	44.5	63.0	61.0	59.0	57.0	53.0	51.0	48.0	47.0	46.0	54.4	5.0	59.4
	20	53.3	72.6	43.3	65.0	61.0	56.0	54.0	51.0	49.0	47.0	46.0	44.0	53.3	5.0	58.3
	21	51.2	70.0	42.7	60.0	58.0	55.0	53.0	50.0	48.0	46.0	45.0	44.0	51.2	5.0	56.2
Night	22	50.0	68.8	40.3	60.0	58.0	54.0	51.1	48.0	46.0	43.0	42.0	41.0	50.0	10.0	60.0
	23	46.6	69.0	38.1	57.0	53.0	50.0	49.0	45.0	42.0	40.0	39.0	39.0	46.6	10.0	56.6

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	51.9	66.3	42.6	60.0	58.0	56.0	55.0	52.0	49.0	46.0	45.0	44.0
	Max	58.3	80.2	46.5	66.0	64.0	62.0	61.0	58.0	55.0	51.0	50.0	48.0
Energy Average		54.6	Average:		62.6	60.8	58.5	56.9	53.6	51.2	47.7	47.1	45.7
Evening	Min	51.2	70.0	42.7	60.0	58.0	55.0	53.0	50.0	48.0	46.0	45.0	44.0
	Max	54.4	74.7	44.5	65.0	61.0	59.0	57.0	53.0	51.0	48.0	47.0	46.0
Energy Average		53.2	Average:		62.7	60.0	56.7	54.7	51.3	49.3	47.0	46.0	44.7
Night	Min	39.7	57.1	36.3	49.0	46.0	43.0	42.0	38.0	36.0	36.0	36.0	36.0
	Max	56.9	70.9	44.1	65.0	64.0	62.0	61.0	57.0	53.0	48.0	47.0	45.0
Energy Average		50.1	Average:		56.6	54.0	50.6	49.1	45.6	42.8	40.1	39.3	38.7

24-Hour L_{eq} (dBA)

53.2

24-Hour CNEL (dBA)

57.8

24-Hour Noise Level Measurement Summary

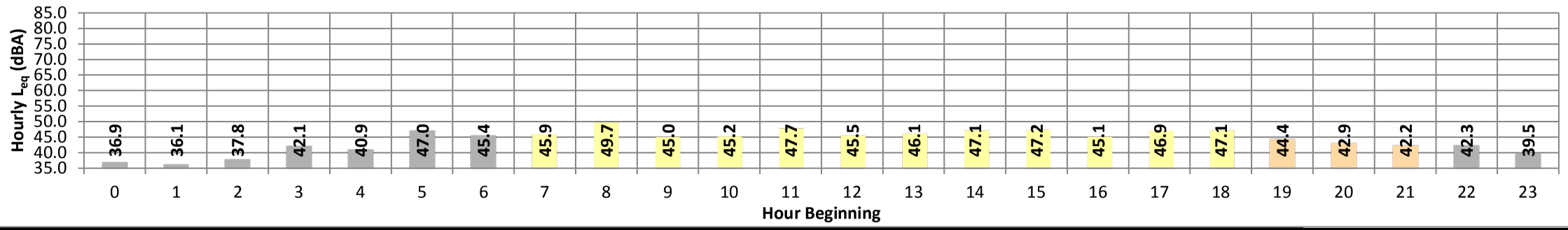
Date: Thursday, May 31, 2018
Project: Nakase

Location: L3 - Located southeast of the Project site at an adjacent pedestrian trail near existing office buildings on Lake Forest Drive.

Meter: Piccolo I

JN: 11049
Analyst: A. Wolfe

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	36.9	50.6	36.1	42.0	41.0	39.0	38.0	36.0	36.0	36.0	36.0	36.0	36.9	10.0	46.9
	1	36.1	51.8	36.1	39.0	39.0	37.0	36.0	36.0	36.0	36.0	36.0	36.0	36.1	10.0	46.1
	2	37.8	48.6	36.1	42.0	41.0	40.0	40.0	39.0	36.0	36.0	36.0	36.0	37.8	10.0	47.8
	3	42.1	49.2	38.8	45.0	45.0	44.0	44.0	43.0	41.0	39.0	39.0	39.0	42.1	10.0	52.1
	4	40.9	47.6	38.7	44.0	43.0	42.0	42.0	41.0	40.0	39.0	39.0	39.0	40.9	10.0	50.9
	5	47.0	60.6	38.9	56.0	55.0	53.0	51.0	46.0	43.0	40.0	39.0	39.0	47.0	10.0	57.0
	6	45.4	62.7	40.1	53.0	51.0	48.0	47.0	45.0	43.0	42.0	41.0	40.0	45.4	10.0	55.4
Day	7	45.9	65.8	40.7	53.0	52.0	49.0	48.0	45.0	44.0	42.0	42.0	41.0	45.9	0.0	45.9
	8	49.7	69.7	39.1	62.0	55.0	52.0	50.0	46.0	44.0	42.0	41.0	40.0	49.7	0.0	49.7
	9	45.0	64.4	39.1	54.0	51.0	48.0	47.0	44.0	42.0	40.0	40.0	39.0	45.0	0.0	45.0
	10	45.2	58.6	39.1	52.0	51.0	49.0	48.0	45.0	43.0	41.0	41.0	40.0	45.2	0.0	45.2
	11	47.7	64.8	39.1	57.0	56.0	53.0	50.0	46.0	43.0	41.0	40.0	40.0	47.7	0.0	47.7
	12	45.5	63.6	39.1	52.0	51.0	48.0	48.0	45.0	43.0	41.0	41.0	40.0	45.5	0.0	45.5
	13	46.1	63.4	39.1	55.0	52.0	49.0	48.0	45.0	43.0	41.0	40.0	39.0	46.1	0.0	46.1
	14	47.1	68.6	39.1	55.0	53.0	50.0	49.0	46.0	44.0	42.0	41.0	39.0	47.1	0.0	47.1
	15	47.2	66.0	41.8	53.0	51.0	50.0	49.0	47.0	46.0	44.0	43.0	43.0	47.2	0.0	47.2
	16	45.1	62.5	40.8	51.0	51.0	48.0	47.0	45.0	43.0	42.0	42.0	41.0	45.1	0.0	45.1
	17	46.9	67.1	39.6	56.0	54.0	50.0	48.0	45.0	43.0	41.0	40.0	40.0	46.9	0.0	46.9
	18	47.1	67.5	40.7	55.0	53.0	51.0	49.0	46.0	44.0	42.0	42.0	41.0	47.1	0.0	47.1
Evening	19	44.4	58.1	39.1	50.0	48.0	47.0	46.0	44.0	43.0	41.0	40.0	40.0	44.4	5.0	49.4
	20	42.9	56.9	39.1	48.0	47.0	45.0	44.0	43.0	42.0	40.0	40.0	39.0	42.9	5.0	47.9
	21	42.2	50.9	39.0	46.0	45.0	44.0	44.0	42.0	41.0	40.0	39.0	39.0	42.2	5.0	47.2
Night	22	42.3	53.0	36.1	48.0	47.0	45.0	44.0	42.0	41.0	39.0	39.0	39.0	42.3	10.0	52.3
	23	39.5	50.8	36.1	45.0	43.0	42.0	41.0	39.0	39.0	36.0	36.0	36.0	39.5	10.0	49.5

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	45.0	58.6	39.1	51.0	51.0	48.0	47.0	44.0	42.0	40.0	40.0	39.0
	Max	49.7	69.7	41.8	62.0	56.0	53.0	50.0	47.0	46.0	44.0	43.0	43.0
Energy Average		46.8	Average:		54.6	52.5	49.8	48.4	45.4	43.5	41.6	41.1	40.3
Evening	Min	42.2	50.9	39.0	46.0	45.0	44.0	44.0	42.0	41.0	40.0	39.0	39.0
	Max	44.4	58.1	39.1	50.0	48.0	47.0	46.0	44.0	43.0	41.0	40.0	40.0
Energy Average		43.3	Average:		48.0	46.7	45.3	44.7	43.0	42.0	40.3	39.7	39.3
Night	Min	36.1	47.6	36.1	39.0	39.0	37.0	36.0	36.0	36.0	36.0	36.0	36.0
	Max	47.0	62.7	40.1	56.0	55.0	53.0	51.0	46.0	43.0	42.0	41.0	40.0
Energy Average		42.3	Average:		46.0	45.0	43.3	42.6	40.8	39.4	38.1	37.9	37.8

24-Hour L_{eq} (dBA)

45.2

24-Hour CNEL (dBA)

49.8

24-Hour Noise Level Measurement Summary

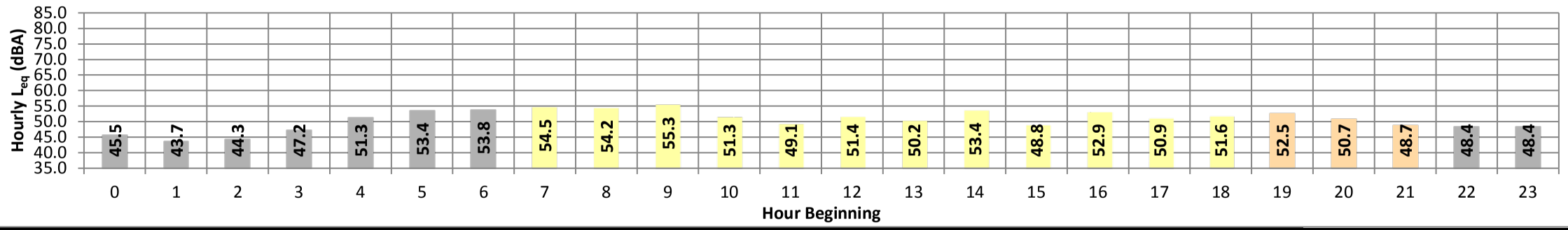
Date: Wednesday, May 17, 2017
Project: Nakase

Location: L4 - Located at the western Project site boundary adjacent to an existing parking lot for office uses.

Meter: Piccolo I

JN: 11049
Analyst: A. Wolfe

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	45.5	54.9	40.3	51.0	51.0	49.0	49.0	46.0	43.0	41.0	41.0	41.0	45.5	10.0	55.5
	1	43.7	55.0	40.3	51.0	49.0	47.0	46.0	43.0	42.0	41.0	40.0	40.0	43.7	10.0	53.7
	2	44.3	54.6	40.3	50.0	49.0	48.0	47.0	44.0	43.0	41.0	41.0	41.0	44.3	10.0	54.3
	3	47.2	56.0	41.5	53.0	52.0	51.0	50.0	48.0	45.0	42.0	42.0	41.0	47.2	10.0	57.2
	4	51.3	67.6	42.5	56.0	56.0	55.0	54.0	52.0	50.0	46.0	45.0	43.0	51.3	10.0	61.3
	5	53.4	72.1	45.7	59.0	58.0	56.0	55.0	53.0	51.0	48.0	47.0	47.0	53.4	10.0	63.4
	6	53.8	67.7	45.8	63.0	61.0	58.0	56.0	53.0	51.0	48.0	48.0	47.0	53.8	10.0	63.8
Day	7	54.5	70.6	44.8	65.0	62.0	59.0	57.0	53.0	51.0	47.0	46.0	45.0	54.5	0.0	54.5
	8	54.2	74.2	43.3	65.0	62.0	57.0	55.0	52.0	50.0	46.0	45.0	44.0	54.2	0.0	54.2
	9	55.3	81.1	44.0	64.0	59.0	55.0	53.0	51.0	49.0	46.0	45.0	44.0	55.3	0.0	55.3
	10	51.3	69.1	43.1	62.0	57.0	53.0	52.0	50.0	48.0	45.0	44.0	43.0	51.3	0.0	51.3
	11	49.1	64.4	43.1	57.0	55.0	52.0	51.0	49.0	47.0	45.0	44.0	43.0	49.1	0.0	49.1
	12	51.4	69.0	42.7	64.0	60.0	55.0	52.0	49.0	47.0	44.0	44.0	43.0	51.4	0.0	51.4
	13	50.2	68.8	42.5	61.0	58.0	53.0	51.0	48.0	46.0	44.0	44.0	43.0	50.2	0.0	50.2
	14	53.4	72.1	43.2	65.0	63.0	57.0	54.0	49.0	47.0	45.0	44.0	44.0	53.4	0.0	53.4
	15	48.8	65.4	42.3	56.0	54.0	52.0	51.0	49.0	47.0	44.0	44.0	43.0	48.8	0.0	48.8
	16	52.9	75.0	43.8	61.0	57.0	54.0	53.0	50.0	49.0	46.0	45.0	44.0	52.9	0.0	52.9
	17	50.9	58.6	44.5	56.0	55.0	54.0	53.0	51.0	50.0	47.0	46.0	45.0	50.9	0.0	50.9
	18	51.6	62.7	44.0	57.0	56.0	55.0	54.0	52.0	50.0	47.0	46.0	45.0	51.6	0.0	51.6
Evening	19	52.5	69.1	44.0	57.0	56.0	55.0	55.0	53.0	51.0	47.0	46.0	45.0	52.5	5.0	57.5
	20	50.7	60.9	42.6	56.0	55.0	54.0	54.0	51.0	49.0	45.0	44.0	43.0	50.7	5.0	55.7
	21	48.7	57.0	41.6	53.0	53.0	52.0	51.0	49.0	47.0	44.0	43.0	42.0	48.7	5.0	53.7
Night	22	48.4	60.0	41.2	54.0	53.0	52.0	51.0	49.0	47.0	43.0	43.0	41.0	48.4	10.0	58.4
	23	48.4	65.8	40.7	54.0	53.0	52.0	51.0	49.0	47.0	42.0	42.0	41.0	48.4	10.0	58.4

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	48.8	58.6	42.3	56.0	54.0	52.0	51.0	48.0	46.0	44.0	44.0	43.0
	Max	55.3	81.1	44.8	65.0	63.0	59.0	57.0	53.0	51.0	47.0	46.0	45.0
Energy Average		52.4	Average:		61.1	58.2	54.7	53.0	50.3	48.4	45.5	44.8	43.8
Evening	Min	48.7	57.0	41.6	53.0	53.0	52.0	51.0	49.0	47.0	44.0	43.0	42.0
	Max	52.5	69.1	44.0	57.0	56.0	55.0	55.0	53.0	51.0	47.0	46.0	45.0
Energy Average		50.9	Average:		55.3	54.7	53.7	53.3	51.0	49.0	45.3	44.3	43.3
Night	Min	43.7	54.6	40.3	50.0	49.0	47.0	46.0	43.0	42.0	41.0	40.0	40.0
	Max	53.8	72.1	45.8	63.0	61.0	58.0	56.0	53.0	51.0	48.0	48.0	47.0
Energy Average		49.9	Average:		54.6	53.6	52.0	51.0	48.6	46.6	43.6	43.2	42.4

24-Hour L_{eq} (dBA)

51.4

24-Hour CNEL (dBA)

57.0

24-Hour Noise Level Measurement Summary

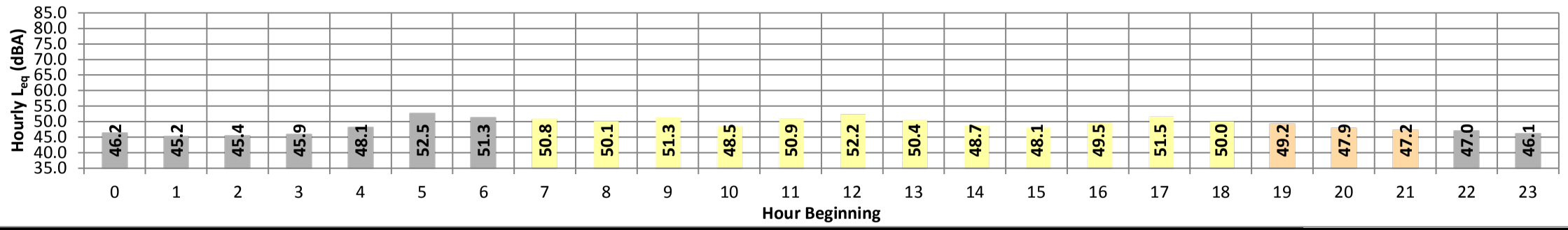
Date: Wednesday, May 17, 2017
Project: Nakase

Location: L5 - Located southwest of the Project site within an existing parking lot for office uses.

Meter: Piccolo I

JN: 11049
Analyst: A. Wolfe

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	46.2	57.5	43.3	50.0	49.0	48.0	48.0	46.0	45.0	44.0	44.0	44.0	46.2	10.0	56.2
	1	45.2	52.5	43.2	49.0	48.0	47.0	46.0	45.0	44.0	44.0	44.0	43.0	45.2	10.0	55.2
	2	45.4	51.8	43.3	49.0	47.0	46.0	46.0	45.0	45.0	44.0	44.0	43.0	45.4	10.0	55.4
	3	45.9	53.2	43.4	49.0	48.0	47.0	47.0	46.0	45.0	44.0	44.0	44.0	45.9	10.0	55.9
	4	48.1	56.4	44.0	51.0	51.0	50.0	50.0	48.0	47.0	45.0	45.0	44.0	48.1	10.0	58.1
	5	52.5	70.2	46.4	64.0	61.0	53.0	52.0	50.0	49.0	47.0	47.0	47.0	52.5	10.0	62.5
	6	51.3	69.9	46.8	58.0	56.0	54.0	53.0	51.0	49.0	48.0	48.0	47.0	51.3	10.0	61.3
Day	7	50.8	63.9	46.6	58.0	56.0	54.0	53.0	50.0	49.0	48.0	47.0	47.0	50.8	0.0	50.8
	8	50.1	64.1	45.4	58.0	56.0	53.0	52.0	49.0	48.0	47.0	46.0	46.0	50.1	0.0	50.1
	9	51.3	71.9	44.1	61.0	59.0	56.0	54.0	49.0	47.0	45.0	45.0	44.0	51.3	0.0	51.3
	10	48.5	64.7	43.2	58.0	56.0	53.0	50.0	47.0	45.0	44.0	44.0	43.0	48.5	0.0	48.5
	11	50.9	69.9	44.8	59.0	59.0	56.0	54.0	49.0	47.0	46.0	46.0	45.0	50.9	0.0	50.9
	12	52.2	68.5	45.4	64.0	61.0	57.0	54.0	49.0	48.0	46.0	46.0	46.0	52.2	0.0	52.2
	13	50.4	67.6	45.4	60.0	58.0	55.0	53.0	49.0	47.0	46.0	46.0	45.0	50.4	0.0	50.4
	14	48.7	63.9	44.9	56.0	54.0	51.0	50.0	48.0	47.0	46.0	46.0	45.0	48.7	0.0	48.7
	15	48.1	65.5	44.1	58.0	55.0	50.0	48.0	46.0	46.0	45.0	45.0	44.0	48.1	0.0	48.1
	16	49.5	70.2	44.5	58.0	56.0	54.0	52.0	48.0	46.0	45.0	45.0	45.0	49.5	0.0	49.5
	17	51.5	66.6	45.1	61.0	59.0	57.0	55.0	50.0	47.0	46.0	46.0	46.0	51.5	0.0	51.5
	18	50.0	67.0	45.3	58.0	56.0	53.0	51.0	49.0	47.0	46.0	46.0	45.0	50.0	0.0	50.0
Evening	19	49.2	63.2	45.3	56.0	54.0	51.0	50.0	49.0	48.0	46.0	46.0	45.0	49.2	5.0	54.2
	20	47.9	58.4	44.9	53.0	51.0	49.0	49.0	48.0	47.0	46.0	46.0	45.0	47.9	5.0	52.9
	21	47.2	56.9	44.1	51.0	50.0	49.0	48.0	47.0	46.0	45.0	45.0	44.0	47.2	5.0	52.2
Night	22	47.0	51.9	43.3	50.0	49.0	49.0	48.0	47.0	46.0	45.0	44.0	44.0	47.0	10.0	57.0
	23	46.1	54.1	43.2	49.0	49.0	48.0	47.0	46.0	45.0	44.0	44.0	43.0	46.1	10.0	56.1

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	48.1	63.9	43.2	56.0	54.0	50.0	48.0	46.0	45.0	44.0	44.0	43.0
	Max	52.2	71.9	46.6	64.0	61.0	57.0	55.0	50.0	49.0	48.0	47.0	47.0
Energy Average		50.3	Average:		59.1	57.1	54.1	52.2	48.6	47.0	45.8	45.7	45.1
Evening	Min	47.2	56.9	44.1	51.0	50.0	49.0	48.0	47.0	46.0	45.0	45.0	44.0
	Max	49.2	63.2	45.3	56.0	54.0	51.0	50.0	49.0	48.0	46.0	46.0	45.0
Energy Average		48.2	Average:		53.3	51.7	49.7	49.0	48.0	47.0	45.7	45.7	44.7
Night	Min	45.2	51.8	43.2	49.0	47.0	46.0	46.0	45.0	44.0	44.0	44.0	43.0
	Max	52.5	70.2	46.8	64.0	61.0	54.0	53.0	51.0	49.0	48.0	48.0	47.0
Energy Average		48.4	Average:		52.1	50.9	49.1	48.6	47.1	46.1	45.0	44.9	44.3

24-Hour L_{eq} (dBA)

49.4

24-Hour CNEL (dBA)

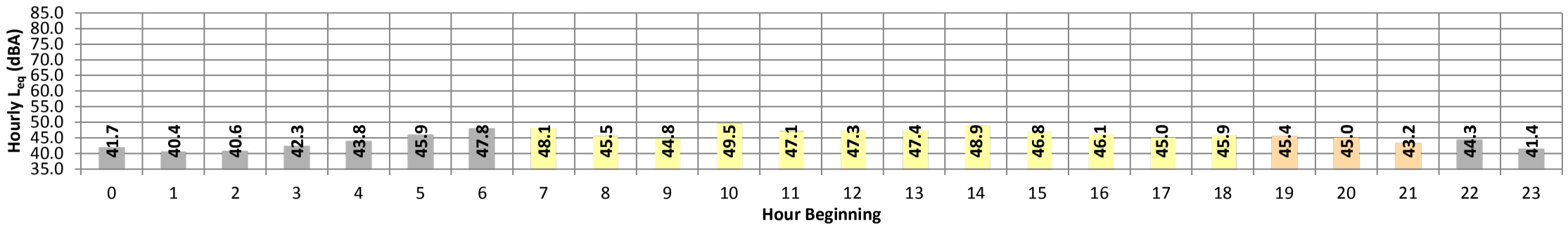
55.3

24-Hour Noise Level Measurement Summary

Date: Wednesday, May 17, 2017 *Location:* L6 - Located northwest of the Project site near existing residential homes on Agave. *Meter:* Piccolo I *JN:* 11049

Project: Nakase *Analyst:* A. Wolfe

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	41.7	52.8	39.2	47.0	46.0	45.0	44.0	41.0	40.0	39.0	39.0	39.0	41.7	10.0	51.7
	1	40.4	52.5	37.6	46.0	45.0	42.0	41.0	40.0	39.0	39.0	39.0	38.0	40.4	10.0	50.4
	2	40.6	46.9	38.9	44.0	43.0	42.0	41.0	40.0	40.0	39.0	39.0	39.0	40.6	10.0	50.6
	3	42.3	60.2	39.3	47.0	46.0	44.0	44.0	42.0	41.0	40.0	40.0	39.0	42.3	10.0	52.3
	4	43.8	52.3	40.6	47.0	46.0	45.0	45.0	44.0	43.0	42.0	41.0	41.0	43.8	10.0	53.8
	5	45.9	56.7	42.9	50.0	49.0	48.0	47.0	46.0	45.0	44.0	44.0	43.0	45.9	10.0	55.9
	6	47.8	69.2	42.7	53.0	52.0	51.0	50.0	47.0	46.0	45.0	44.0	44.0	47.8	10.0	57.8
Day	7	48.1	68.8	40.6	56.0	55.0	53.0	51.0	48.0	45.0	42.0	42.0	41.0	48.1	0.0	48.1
	8	45.5	58.5	39.7	52.0	51.0	48.0	47.0	46.0	44.0	42.0	41.0	40.0	45.5	0.0	45.5
	9	44.8	59.4	40.4	53.0	50.0	47.0	46.0	44.0	43.0	41.0	41.0	40.0	44.8	0.0	44.8
	10	49.5	64.6	40.4	60.0	58.0	54.0	52.0	47.0	45.0	43.0	42.0	41.0	49.5	0.0	49.5
	11	47.1	63.7	41.3	54.0	54.0	52.0	50.0	46.0	44.0	42.0	42.0	42.0	47.1	0.0	47.1
	12	47.3	65.8	40.5	57.0	53.0	50.0	49.0	46.0	45.0	42.0	42.0	41.0	47.3	0.0	47.3
	13	47.4	64.4	40.5	56.0	53.0	50.0	50.0	47.0	45.0	42.0	41.0	41.0	47.4	0.0	47.4
	14	48.9	76.0	40.1	54.0	52.0	50.0	49.0	46.0	44.0	42.0	41.0	41.0	48.9	0.0	48.9
	15	46.8	61.3	39.3	55.0	53.0	51.0	50.0	46.0	44.0	41.0	41.0	40.0	46.8	0.0	46.8
	16	46.1	62.4	40.5	54.0	52.0	50.0	49.0	45.0	44.0	41.0	41.0	40.0	46.1	0.0	46.1
	17	45.0	61.5	39.7	52.0	50.0	47.0	46.0	44.0	43.0	41.0	41.0	40.0	45.0	0.0	45.0
	18	45.9	68.6	41.3	52.0	50.0	48.0	47.0	45.0	44.0	42.0	42.0	42.0	45.9	0.0	45.9
Evening	19	45.4	63.3	41.4	52.0	50.0	48.0	47.0	45.0	44.0	42.0	42.0	42.0	45.4	5.0	50.4
	20	45.0	65.8	40.8	51.0	48.0	46.0	45.0	44.0	43.0	42.0	41.0	41.0	45.0	5.0	50.0
	21	43.2	59.4	40.4	49.0	47.0	45.0	44.0	43.0	42.0	41.0	40.0	40.0	43.2	5.0	48.2
Night	22	44.3	54.0	40.4	49.0	49.0	48.0	48.0	43.0	42.0	41.0	41.0	40.0	44.3	10.0	54.3
	23	41.4	48.9	39.3	45.0	45.0	43.0	43.0	41.0	40.0	39.0	39.0	39.0	41.4	10.0	51.4

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	44.8	58.5	39.3	52.0	50.0	47.0	46.0	44.0	43.0	41.0	41.0	40.0
	Max	49.5	76.0	41.3	60.0	58.0	54.0	52.0	48.0	45.0	43.0	42.0	42.0
Energy Average		47.1	Average:		54.6	52.6	50.0	48.8	45.8	44.2	41.8	41.4	40.8
Evening	Min	43.2	59.4	40.4	49.0	47.0	45.0	44.0	43.0	42.0	41.0	40.0	40.0
	Max	45.4	65.8	41.4	52.0	50.0	48.0	47.0	45.0	44.0	42.0	42.0	42.0
Energy Average		44.6	Average:		50.7	48.3	46.3	45.3	44.0	43.0	41.7	41.0	41.0
Night	Min	40.4	46.9	37.6	44.0	43.0	42.0	41.0	40.0	39.0	39.0	39.0	38.0
	Max	47.8	69.2	42.9	53.0	52.0	51.0	50.0	47.0	46.0	45.0	44.0	44.0
Energy Average		43.8	Average:		47.6	46.8	45.3	44.8	42.7	41.8	40.9	40.7	40.2

24-Hour L_{eq} (dBA)

45.8

24-Hour CNEL (dBA)

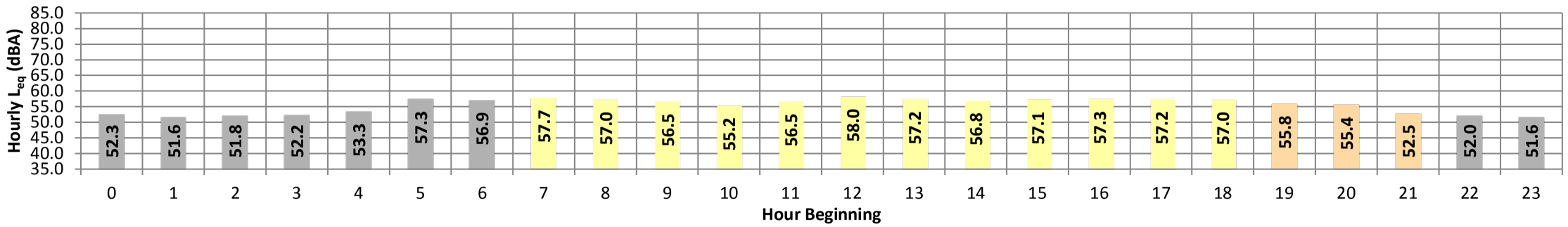
51.1

24-Hour Noise Level Measurement Summary

Date: Wednesday, May 17, 2017 *Location:* L7 - Located north of the Project site across Bake Parkway adjacent to an existing Staybridge Suites hotel. *Meter:* Piccolo I *JN:* 11049

Project: Nakase *Analyst:* A. Wolfe

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	52.3	60.0	48.8	55.0	54.0	53.0	53.0	52.0	52.0	50.0	50.0	49.0	52.3	10.0	62.3
	1	51.6	65.4	49.0	55.0	53.0	53.0	52.0	51.0	51.0	50.0	49.0	49.0	51.6	10.0	61.6
	2	51.8	57.4	49.4	54.0	54.0	53.0	52.0	52.0	51.0	50.0	50.0	49.0	51.8	10.0	61.8
	3	52.2	59.9	49.5	56.0	55.0	54.0	53.0	52.0	51.0	50.0	50.0	50.0	52.2	10.0	62.2
	4	53.3	62.7	48.9	57.0	56.0	56.0	55.0	53.0	52.0	51.0	50.0	49.0	53.3	10.0	63.3
	5	57.3	70.3	50.6	67.0	65.0	62.0	60.0	56.0	54.0	52.0	51.0	51.0	57.3	10.0	67.3
	6	56.9	73.9	51.5	64.0	63.0	60.0	59.0	57.0	55.0	53.0	53.0	52.0	56.9	10.0	66.9
Day	7	57.7	73.9	51.7	66.0	64.0	61.0	60.0	57.0	56.0	53.0	53.0	52.0	57.7	0.0	57.7
	8	57.0	73.7	48.9	64.0	62.0	60.0	59.0	57.0	55.0	52.0	51.0	49.0	57.0	0.0	57.0
	9	56.5	73.2	48.9	65.0	64.0	61.0	59.0	56.0	54.0	51.0	50.0	49.0	56.5	0.0	56.5
	10	55.2	72.3	48.5	62.0	60.0	58.0	57.0	55.0	53.0	50.0	50.0	49.0	55.2	0.0	55.2
	11	56.5	71.0	50.2	63.0	61.0	60.0	59.0	57.0	55.0	52.0	51.0	50.0	56.5	0.0	56.5
	12	58.0	69.9	49.3	67.0	66.0	64.0	61.0	57.0	55.0	52.0	51.0	50.0	58.0	0.0	58.0
	13	57.2	74.9	49.5	66.0	64.0	61.0	59.0	57.0	55.0	52.0	51.0	50.0	57.2	0.0	57.2
	14	56.8	77.4	49.4	64.0	62.0	60.0	59.0	57.0	55.0	52.0	51.0	50.0	56.8	0.0	56.8
	15	57.1	74.8	49.2	66.0	63.0	60.0	58.0	56.0	54.0	52.0	51.0	50.0	57.1	0.0	57.1
	16	57.3	74.7	50.7	66.0	63.0	60.0	59.0	57.0	55.0	52.0	52.0	51.0	57.3	0.0	57.3
	17	57.2	72.7	50.6	63.0	62.0	60.0	59.0	57.0	56.0	53.0	52.0	51.0	57.2	0.0	57.2
	18	57.0	70.7	50.0	65.0	63.0	62.0	60.0	56.0	54.0	52.0	51.0	50.0	57.0	0.0	57.0
Evening	19	55.8	68.6	49.1	63.0	61.0	59.0	58.0	56.0	54.0	51.0	51.0	50.0	55.8	5.0	60.8
	20	55.4	77.7	49.6	64.0	61.0	58.0	56.0	54.0	53.0	51.0	50.0	50.0	55.4	5.0	60.4
	21	52.5	60.9	49.0	56.0	55.0	54.0	54.0	53.0	52.0	50.0	50.0	49.0	52.5	5.0	57.5
Night	22	52.0	61.5	48.4	56.0	55.0	54.0	54.0	52.0	51.0	49.0	49.0	49.0	52.0	10.0	62.0
	23	51.6	66.0	47.6	56.0	54.0	53.0	53.0	52.0	51.0	49.0	48.0	48.0	51.6	10.0	61.6

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	55.2	69.9	48.5	62.0	60.0	58.0	57.0	55.0	53.0	50.0	50.0	49.0
	Max	58.0	77.4	51.7	67.0	66.0	64.0	61.0	57.0	56.0	53.0	53.0	52.0
Energy Average		57.0	Average:		64.8	62.8	60.6	59.1	56.6	54.8	51.9	51.2	50.1
Evening	Min	52.5	60.9	49.0	56.0	55.0	54.0	54.0	53.0	52.0	50.0	50.0	49.0
	Max	55.8	77.7	49.6	64.0	61.0	59.0	58.0	56.0	54.0	51.0	51.0	50.0
Energy Average		54.8	Average:		61.0	59.0	57.0	56.0	54.3	53.0	50.7	50.3	49.7
Night	Min	51.6	57.4	47.6	54.0	53.0	53.0	52.0	51.0	51.0	49.0	48.0	48.0
	Max	57.3	73.9	51.5	67.0	65.0	62.0	60.0	57.0	55.0	53.0	53.0	52.0
Energy Average		53.8	Average:		57.8	56.6	55.3	54.6	53.0	52.0	50.4	50.0	49.6

24-Hour L_{eq} (dBA)

55.8

24-Hour CNEL (dBA)

61.1

24-Hour Noise Level Measurement Summary

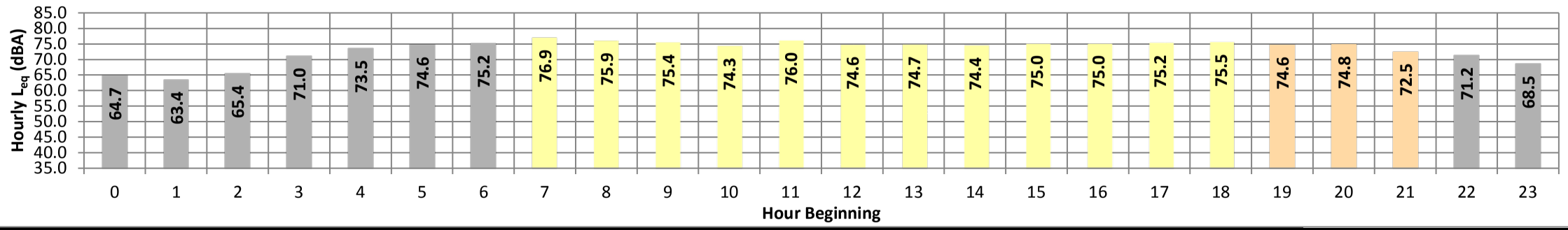
Date: Wednesday, May 17, 2017
Project: Nakase

Location: L8 - Located at the northwestern Project site boundary adjacent to Bake Parkway.

Meter: Piccolo I

JN: 11049
Analyst: A. Wolfe

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	64.7	84.5	39.5	78.0	75.0	70.0	67.0	57.0	46.0	41.0	41.0	40.0	64.7	10.0	74.7
	1	63.4	84.1	39.4	77.0	73.0	68.0	65.0	52.0	43.0	40.0	39.0	39.0	63.4	10.0	73.4
	2	65.4	87.6	39.4	79.0	76.0	69.0	66.0	53.0	44.0	41.0	40.0	39.0	65.4	10.0	75.4
	3	71.0	88.1	39.4	83.0	82.0	78.0	76.0	65.0	54.0	42.0	41.0	41.0	71.0	10.0	81.0
	4	73.5	87.9	41.8	84.0	83.0	81.0	79.0	71.0	63.0	48.0	46.0	43.0	73.5	10.0	83.5
	5	74.6	88.0	44.8	84.0	83.0	82.0	80.0	73.0	67.0	54.0	52.0	48.0	74.6	10.0	84.6
	6	75.2	88.9	50.3	83.0	83.0	81.0	80.0	75.0	70.0	57.0	55.0	52.0	75.2	10.0	85.2
Day	7	76.9	97.8	50.6	84.0	83.0	82.0	81.0	78.0	72.0	59.0	56.0	53.0	76.9	0.0	76.9
	8	75.9	95.7	48.3	84.0	83.0	81.0	81.0	77.0	70.0	59.0	57.0	52.0	75.9	0.0	75.9
	9	75.4	102.5	47.3	82.0	82.0	80.0	79.0	74.0	69.0	58.0	55.0	52.0	75.4	0.0	75.4
	10	74.3	86.3	46.5	83.0	82.0	80.0	79.0	75.0	68.0	56.0	53.0	50.0	74.3	0.0	74.3
	11	76.0	90.4	48.6	84.0	83.0	81.0	80.0	77.0	72.0	61.0	59.0	55.0	76.0	0.0	76.0
	12	74.6	87.5	51.2	82.0	82.0	81.0	80.0	75.0	69.0	60.0	58.0	55.0	74.6	0.0	74.6
	13	74.7	96.8	48.7	83.0	82.0	80.0	79.0	75.0	69.0	59.0	56.0	52.0	74.7	0.0	74.7
	14	74.4	88.2	49.1	83.0	82.0	81.0	79.0	75.0	69.0	59.0	56.0	51.0	74.4	0.0	74.4
	15	75.0	91.9	49.0	83.0	82.0	80.0	80.0	76.0	70.0	60.0	58.0	53.0	75.0	0.0	75.0
	16	75.0	88.8	53.1	82.0	81.0	80.0	79.0	76.0	71.0	61.0	59.0	56.0	75.0	0.0	75.0
	17	75.2	86.9	50.1	82.0	81.0	80.0	79.0	77.0	72.0	60.0	58.0	54.0	75.2	0.0	75.2
	18	75.5	90.6	47.9	83.0	82.0	81.0	80.0	76.0	70.0	59.0	57.0	52.0	75.5	0.0	75.5
Evening	19	74.6	87.1	48.4	83.0	82.0	81.0	80.0	75.0	68.0	57.0	54.0	51.0	74.6	5.0	79.6
	20	74.8	91.2	43.8	83.0	82.0	81.0	80.0	75.0	68.0	55.0	52.0	47.0	74.8	5.0	79.8
	21	72.5	86.2	42.0	82.0	81.0	79.0	78.0	71.0	65.0	53.0	50.0	44.0	72.5	5.0	77.5
Night	22	71.2	87.7	42.3	82.0	81.0	78.0	76.0	69.0	62.0	49.0	47.0	44.0	71.2	10.0	81.2
	23	68.5	86.8	41.0	80.0	79.0	76.0	73.0	64.0	55.0	44.0	43.0	41.0	68.5	10.0	78.5

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	74.3	86.3	46.5	82.0	81.0	80.0	79.0	74.0	68.0	56.0	53.0	50.0
	Max	76.9	102.5	53.1	84.0	83.0	82.0	81.0	78.0	72.0	61.0	59.0	56.0
Energy Average		75.3	Average:		82.9	82.1	80.6	79.7	75.9	70.1	59.3	56.8	52.9
Evening	Min	72.5	86.2	42.0	82.0	81.0	79.0	78.0	71.0	65.0	53.0	50.0	44.0
	Max	74.8	91.2	48.4	83.0	82.0	81.0	80.0	75.0	68.0	57.0	54.0	51.0
Energy Average		74.1	Average:		82.7	81.7	80.3	79.3	73.7	67.0	55.0	52.0	47.3
Night	Min	63.4	84.1	39.4	77.0	73.0	68.0	65.0	52.0	43.0	40.0	39.0	39.0
	Max	75.2	88.9	50.3	84.0	83.0	82.0	80.0	75.0	70.0	57.0	55.0	52.0
Energy Average		71.5	Average:		81.1	79.4	75.9	73.6	64.3	56.0	46.2	44.9	43.0

24-Hour L_{eq} (dBA)

74.0

24-Hour CNEL (dBA)

79.0

APPENDIX 7.1:

OFF-SITE TRAFFIC NOISE LEVEL CONTOURS

This page intentionally left blank

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Trabuco Rd.
Road Segment: s/o Bake Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,860 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-0.13	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-17.37	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-21.32	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.7	68.8	67.0	61.0	69.6	70.2
Medium Trucks:	64.1	62.6	56.2	54.7	63.2	63.4
Heavy Trucks:	64.1	62.7	53.7	54.9	63.3	63.4
Vehicle Noise:	72.3	70.5	67.6	62.7	71.2	71.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	73	157	337	727
CNEL:	78	168	363	782

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Trabuco Rd.
Road Segment: s/o Lake Forest Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,320 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	1.25	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-15.99	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-19.95	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.5	68.6	66.8	60.8	69.4	70.0
Medium Trucks:	64.1	62.6	56.2	54.7	63.1	63.4
Heavy Trucks:	64.5	63.1	54.0	55.3	63.6	63.8
Vehicle Noise:	72.2	70.4	67.4	62.6	71.2	71.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	72	155	333	718
CNEL:	77	166	358	771

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Rancho Pkwy. S.
Road Segment: s/o Alton Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	560 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	-3.96	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	77.72	-21.20	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	82.99	-25.15	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	62.2	60.3	58.5	52.5	61.1	61.7
Medium Trucks:	56.2	54.6	48.3	46.7	55.2	55.4
Heavy Trucks:	57.5	56.0	47.0	48.3	56.6	56.7
Vehicle Noise:	64.2	62.5	59.2	54.6	63.2	63.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	17	38	81	175
CNEL:	19	40	87	187

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Rancho Pkwy. S.
Road Segment: n/o Bake Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	720 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	-2.87	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	77.72	-20.10	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	82.99	-24.06	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.3	61.4	59.6	53.5	62.2	62.8
Medium Trucks:	57.2	55.7	49.4	47.8	56.3	56.5
Heavy Trucks:	58.6	57.1	48.1	49.3	57.7	57.8
Vehicle Noise:	65.3	63.5	60.3	55.7	64.3	64.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	21	45	96	207
CNEL:	22	48	103	221

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Rancho Pkwy.
Road Segment: s/o Lake Forest Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	15,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,550 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.05	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	79.45	-17.29	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	84.25	-21.24	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.8	69.9	68.2	62.1	70.7	71.3
Medium Trucks:	65.6	64.1	57.8	56.2	64.7	64.9
Heavy Trucks:	66.4	65.0	56.0	57.2	65.6	65.7
Vehicle Noise:	73.7	71.9	68.8	64.1	72.7	73.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	45	97	209	451
CNEL:	48	104	224	484

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Towne Centre Dr.
Road Segment: s/o Alton Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	14,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,450 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	0.75	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	75.75	-16.48	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	81.57	-20.44	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.5	66.6	64.8	58.8	67.4	68.0
Medium Trucks:	62.7	61.2	54.9	53.3	61.8	62.0
Heavy Trucks:	64.6	63.1	54.1	55.3	63.7	63.8
Vehicle Noise:	70.7	69.0	65.6	61.2	69.7	70.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	29	62	133	286
CNEL:	31	66	142	306

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Towne Centre Dr.
Road Segment: s/o Bake Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	780 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-1.94	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	75.75	-19.18	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	81.57	-23.13	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.8	63.9	62.1	56.1	64.7	65.3
Medium Trucks:	60.0	58.5	52.2	50.6	59.1	59.3
Heavy Trucks:	61.9	60.4	51.4	52.7	61.0	61.1
Vehicle Noise:	68.0	66.3	62.9	58.5	67.0	67.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	19	41	88	189
CNEL:	20	44	94	202

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Towne Centre Dr.
Road Segment: s/o Lake Forest Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	520 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-3.70	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	75.75	-20.94	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	81.57	-24.89	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.0	62.1	60.4	54.3	62.9	63.5
Medium Trucks:	58.3	56.8	50.4	48.9	57.3	57.6
Heavy Trucks:	60.1	58.7	49.6	50.9	59.2	59.4
Vehicle Noise:	66.3	64.5	61.1	56.7	65.2	65.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	14	31	67	145
CNEL:	15	33	72	154

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Portola Pkwy.
Road Segment: s/o Alton Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,240 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	2.06	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	77.72	-15.18	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	82.99	-19.13	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	67.6	65.7	64.0	57.9	66.5	67.1
Medium Trucks:	61.6	60.1	53.7	52.2	60.7	60.9
Heavy Trucks:	62.9	61.5	52.5	53.7	62.1	62.2
Vehicle Noise:	69.6	67.9	64.6	60.1	68.6	69.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	49	105	225	485
CNEL:	52	112	241	519

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Portola Pkwy.
Road Segment: n/o Rancho Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	25,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,510 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	1.59	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-15.65	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-19.61	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.5	68.6	66.8	60.8	69.4	70.0
Medium Trucks:	64.0	62.5	56.2	54.6	63.1	63.3
Heavy Trucks:	64.5	63.0	54.0	55.3	63.6	63.7
Vehicle Noise:	72.2	70.4	67.4	62.6	71.1	71.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	83	180	387	834
CNEL:	90	193	416	896

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Santa Margarita Pkwy.
Road Segment: s/o El Toro Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	37,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,790 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.38	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-13.86	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-17.82	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.6	70.7	69.0	62.9	71.5	72.1
Medium Trucks:	66.2	64.7	58.3	56.8	65.3	65.5
Heavy Trucks:	66.6	65.2	56.2	57.4	65.8	65.9
Vehicle Noise:	74.3	72.6	69.5	64.8	73.3	73.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	100	214	462	996
CNEL:	107	230	496	1,070

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Santa Margarita Pkwy.
Road Segment: s/o Los Alisos Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,510 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	3.50	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	79.45	-13.74	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	84.25	-17.69	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.0	69.1	67.4	61.3	69.9	70.5
Medium Trucks:	64.8	63.3	56.9	55.4	63.8	64.1
Heavy Trucks:	65.6	64.2	55.2	56.4	64.8	64.9
Vehicle Noise:	72.9	71.1	68.0	63.3	71.8	72.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	79	171	369	794
CNEL:	85	183	395	852

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Alton Pkwy.
Road Segment: w/o Irvine Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,200 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	0.60	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-16.64	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-20.59	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.4	69.5	67.8	61.7	70.3	70.9
Medium Trucks:	64.8	63.3	57.0	55.4	63.9	64.1
Heavy Trucks:	64.9	63.4	54.4	55.7	64.0	64.1
Vehicle Noise:	73.0	71.3	68.3	63.4	72.0	72.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	81	175	377	813
CNEL:	87	188	406	875

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Alton Pkwy.
Road Segment: e/o Irvine Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,390 vehicles
Vehicle Speed:	60 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	73.22	0.58	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	83.68	-16.65	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	87.33	-20.61	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.9	71.0	69.2	63.1	71.8	72.4
Medium Trucks:	66.1	64.6	58.2	56.7	65.1	65.4
Heavy Trucks:	65.8	64.3	55.3	56.6	64.9	65.0
Vehicle Noise:	74.3	72.6	69.7	64.7	73.3	73.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	100	214	462	995
CNEL:	107	231	498	1,072

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Alton Pkwy.
Road Segment: w/o Rancho Pkwy. S.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,330 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	0.85	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-16.39	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-20.34	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.7	69.8	68.0	62.0	70.6	71.2
Medium Trucks:	65.1	63.6	57.2	55.7	64.1	64.4
Heavy Trucks:	65.1	63.7	54.7	55.9	64.3	64.4
Vehicle Noise:	73.3	71.5	68.5	63.7	72.2	72.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	84	182	392	845
CNEL:	91	196	422	909

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Bake Pkwy.
Road Segment: w/o Rockfield Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	72,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	7,220 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	5.76	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-11.48	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-15.43	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.6	74.7	72.9	66.9	75.5	76.1
Medium Trucks:	70.0	68.5	62.1	60.6	69.0	69.3
Heavy Trucks:	70.0	68.6	59.6	60.8	69.2	69.3
Vehicle Noise:	78.2	76.4	73.5	68.6	77.1	77.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	180	387	833	1,795
CNEL:	193	416	896	1,931

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Bake Pkwy.
Road Segment: e/o Rockfield Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	62,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	6,280 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	5.16	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-12.08	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-16.04	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.0	74.1	72.3	66.3	74.9	75.5
Medium Trucks:	69.4	67.9	61.5	60.0	68.4	68.7
Heavy Trucks:	69.4	68.0	59.0	60.2	68.6	68.7
Vehicle Noise:	77.6	75.8	72.9	68.0	76.5	77.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	164	352	759	1,636
CNEL:	176	379	817	1,760

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Bake Pkwy.
Road Segment: e/o Muirlands Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	61,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	6,110 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	5.04	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-12.20	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-16.16	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	75.9	74.0	72.2	66.2	74.8	75.4
Medium Trucks:	69.3	67.8	61.4	59.9	68.3	68.5
Heavy Trucks:	69.3	67.9	58.8	60.1	68.4	68.6
Vehicle Noise:	77.5	75.7	72.7	67.9	76.4	76.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	161	346	746	1,606
CNEL:	173	372	802	1,728

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Bake Pkwy.
Road Segment: e/o Jeronimo Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	51,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	5,140 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.70	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-12.54	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-16.49	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	74.0	72.1	70.3	64.2	72.9	73.5
Medium Trucks:	67.5	66.0	59.7	58.1	66.6	66.8
Heavy Trucks:	67.9	66.5	57.5	58.7	67.1	67.2
Vehicle Noise:	75.7	73.9	70.9	66.1	74.6	75.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	122	263	566	1,220
CNEL:	131	282	608	1,310

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Bake Pkwy.
Road Segment: e/o Toledo Wy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	49,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,930 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.52	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-12.72	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-16.67	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.8	71.9	70.1	64.1	72.7	73.3
Medium Trucks:	67.3	65.8	59.5	57.9	66.4	66.6
Heavy Trucks:	67.8	66.3	57.3	58.5	66.9	67.0
Vehicle Noise:	75.5	73.7	70.7	65.9	74.4	74.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	119	256	551	1,186
CNEL:	127	275	592	1,275

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Bake Pkwy.
Road Segment: e/o Trabuco Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	37,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,740 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.32	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-13.92	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-17.87	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.6	70.7	68.9	62.9	71.5	72.1
Medium Trucks:	66.1	64.6	58.3	56.7	65.2	65.4
Heavy Trucks:	66.6	65.1	56.1	57.4	65.7	65.8
Vehicle Noise:	74.3	72.5	69.5	64.7	73.2	73.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	99	213	458	987
CNEL:	106	228	492	1,060

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Bake Pkwy.
Road Segment: w/o Dimension Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,700 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	1.91	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-15.33	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-19.29	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.7	69.8	68.1	62.0	70.6	71.2
Medium Trucks:	65.3	63.8	57.4	55.9	64.3	64.6
Heavy Trucks:	65.7	64.3	55.2	56.5	64.9	65.0
Vehicle Noise:	73.4	71.7	68.6	63.8	72.4	72.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	72	155	335	722
CNEL:	78	167	360	775

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Bake Pkwy.
Road Segment: e/o Dimension Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	29,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,900 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.22	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-15.02	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-18.98	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.0	70.1	68.4	62.3	70.9	71.5
Medium Trucks:	65.6	64.1	57.7	56.2	64.7	64.9
Heavy Trucks:	66.0	64.6	55.6	56.8	65.2	65.3
Vehicle Noise:	73.7	72.0	68.9	64.2	72.7	73.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	76	163	351	757
CNEL:	81	175	377	813

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Bake Pkwy.
Road Segment: e/o Rancho Pkwy. S.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	29,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,950 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.29	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-14.95	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-18.90	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.1	70.2	68.4	62.4	71.0	71.6
Medium Trucks:	65.7	64.2	57.8	56.3	64.7	65.0
Heavy Trucks:	66.1	64.7	55.6	56.9	65.2	65.4
Vehicle Noise:	73.8	72.1	69.0	64.2	72.8	73.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	77	165	355	765
CNEL:	82	177	382	822

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Bake Pkwy.
Road Segment: w/o Towne Centre Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,740 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	1.97	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	81.00	-15.27	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	85.38	-19.23	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	75.6	73.7	71.9	65.9	74.5	75.1
Medium Trucks:	69.2	67.7	61.3	59.8	68.3	68.5
Heavy Trucks:	69.6	68.2	59.1	60.4	68.7	68.9
Vehicle Noise:	77.3	75.5	72.5	67.7	76.3	76.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	79	169	364	785
CNEL:	84	182	392	844

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Bake Pkwy.
Road Segment: e/o Towne Centre Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	17,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,700 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	-0.10	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	81.00	-17.34	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	85.38	-21.30	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.5	71.6	69.9	63.8	72.4	73.0
Medium Trucks:	67.1	65.6	59.3	57.7	66.2	66.4
Heavy Trucks:	67.5	66.1	57.0	58.3	66.7	66.8
Vehicle Noise:	75.2	73.5	70.4	65.6	74.2	74.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	57	123	265	571
CNEL:	61	132	285	614

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Lake Forest Dr.
Road Segment: w/o Serrano Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,510 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.04	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-14.19	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-18.15	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.3	70.4	68.6	62.6	71.2	71.8
Medium Trucks:	65.9	64.4	58.0	56.5	64.9	65.2
Heavy Trucks:	66.3	64.9	55.8	57.1	65.4	65.6
Vehicle Noise:	74.0	72.2	69.2	64.4	73.0	73.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	95	204	439	946
CNEL:	102	219	472	1,016

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Lake Forest Dr.
Road Segment: e/o Serrano Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	37,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,750 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.33	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-13.91	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-17.86	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.6	70.7	68.9	62.9	71.5	72.1
Medium Trucks:	66.2	64.7	58.3	56.7	65.2	65.4
Heavy Trucks:	66.6	65.1	56.1	57.4	65.7	65.8
Vehicle Noise:	74.3	72.5	69.5	64.7	73.3	73.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	99	213	459	989
CNEL:	106	229	493	1,062

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Lake Forest Dr.
Road Segment: e/o Trabuco Rd.

Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,690 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.26	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-13.98	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-17.93	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.1	71.2	69.4	63.4	72.0	72.6
Medium Trucks:	66.7	65.1	58.8	57.2	65.7	65.9
Heavy Trucks:	67.1	65.6	56.6	57.9	66.2	66.3
Vehicle Noise:	74.8	73.0	70.0	65.2	73.7	74.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	89	191	412	889
CNEL:	95	206	443	955

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Lake Forest Dr.
Road Segment: e/o Dimension Dr.

Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,230 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	1.07	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-16.16	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-20.12	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.9	69.0	67.2	61.2	69.8	70.4
Medium Trucks:	64.5	63.0	56.6	55.1	63.5	63.7
Heavy Trucks:	64.9	63.5	54.4	55.7	64.0	64.2
Vehicle Noise:	72.6	70.8	67.8	63.0	71.6	72.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	64	137	295	635
CNEL:	68	147	317	682

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Lake Forest Dr.
Road Segment: e/o Rancho Pkwy.

Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	16,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,630 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	-0.29	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	81.00	-17.53	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	85.38	-21.48	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.3	71.4	69.7	63.6	72.2	72.9
Medium Trucks:	66.9	65.4	59.1	57.5	66.0	66.2
Heavy Trucks:	67.3	65.9	56.9	58.1	66.5	66.6
Vehicle Noise:	75.0	73.3	70.2	65.5	74.0	74.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	56	120	258	555
CNEL:	60	129	277	597

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Lake Forest Dr.
Road Segment: e/o Towne Centre Dr.

Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	10,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,000 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	-2.41	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	81.00	-19.65	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	85.38	-23.60	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.2	69.3	67.6	61.5	70.1	70.7
Medium Trucks:	64.8	63.3	57.0	55.4	63.9	64.1
Heavy Trucks:	65.2	63.8	54.7	56.0	64.3	64.5
Vehicle Noise:	72.9	71.2	68.1	63.3	71.9	72.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	40	86	186	401
CNEL:	43	93	200	431

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Lake Forest Dr.
Road Segment: e/o Portola Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	850 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.66	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	79.45	-19.90	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	84.25	-23.85	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.2	67.3	65.6	59.5	68.1	68.7
Medium Trucks:	63.0	61.5	55.2	53.6	62.1	62.3
Heavy Trucks:	63.8	62.4	53.4	54.6	63.0	63.1
Vehicle Noise:	71.1	69.3	66.2	61.5	70.0	70.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	30	65	140	302
CNEL:	32	70	150	324

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: El Toro Rd.
Road Segment: w/o Jeronimo Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	39,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,960 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.57	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-13.67	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-17.63	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.5	70.6	68.8	62.7	71.4	72.0
Medium Trucks:	66.0	64.5	58.2	56.6	65.1	65.3
Heavy Trucks:	66.4	65.0	56.0	57.2	65.6	65.7
Vehicle Noise:	74.2	72.4	69.4	64.6	73.1	73.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	113	243	525	1,130
CNEL:	121	262	564	1,214

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: El Toro Rd.
Road Segment: e/o Jeronimo Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	39,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,910 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.51	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-13.73	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-17.68	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.4	70.5	68.7	62.7	71.3	71.9
Medium Trucks:	66.0	64.5	58.1	56.6	65.0	65.3
Heavy Trucks:	66.4	65.0	55.9	57.2	65.5	65.7
Vehicle Noise:	74.1	72.3	69.3	64.5	73.1	73.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	112	241	520	1,121
CNEL:	120	259	559	1,204

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: El Toro Rd.
Road Segment: e/o Serrano Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,300 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.78	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-14.46	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-18.42	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.7	69.8	68.0	61.9	70.6	71.2
Medium Trucks:	65.2	63.7	57.4	55.8	64.3	64.5
Heavy Trucks:	65.6	64.2	55.2	56.4	64.8	64.9
Vehicle Noise:	73.4	71.6	68.6	63.8	72.3	72.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	100	216	465	1,001
CNEL:	108	232	499	1,075

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: El Toro Rd.
Road Segment: e/o Trabuco Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,500 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.03	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-14.21	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-18.16	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.3	70.4	68.6	62.6	71.2	71.8
Medium Trucks:	65.9	64.4	58.0	56.4	64.9	65.1
Heavy Trucks:	66.3	64.8	55.8	57.1	65.4	65.5
Vehicle Noise:	74.0	72.2	69.2	64.4	73.0	73.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	94	203	438	944
CNEL:	101	219	471	1,014

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: El Toro Rd.
Road Segment: w/o Portola Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	25,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,550 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	1.24	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-16.00	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-19.95	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.1	70.2	68.4	62.4	71.0	71.6
Medium Trucks:	65.5	64.0	57.6	56.1	64.5	64.8
Heavy Trucks:	65.5	64.1	55.0	56.3	64.6	64.8
Vehicle Noise:	73.7	71.9	68.9	64.1	72.6	73.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	90	193	416	897
CNEL:	97	208	448	965

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: El Toro Rd.
Road Segment: e/o Portola Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	14,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,480 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-1.12	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-18.36	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-22.31	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.7	67.8	66.1	60.0	68.6	69.2
Medium Trucks:	63.1	61.6	55.2	53.7	62.2	62.4
Heavy Trucks:	63.1	61.7	52.7	53.9	62.3	62.4
Vehicle Noise:	71.3	69.5	66.6	61.7	70.3	70.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	62	134	290	624
CNEL:	67	145	312	671

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Trabuco Rd.
Road Segment: s/o Bake Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,890 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-0.06	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-17.30	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-21.25	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.8	68.9	67.1	61.1	69.7	70.3
Medium Trucks:	64.2	62.7	56.3	54.8	63.2	63.5
Heavy Trucks:	64.2	62.8	53.7	55.0	63.3	63.5
Vehicle Noise:	72.4	70.6	67.6	62.8	71.3	71.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	73	158	341	735
CNEL:	79	170	367	790

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Trabuco Rd. | Job Number: 11049
Road Segment: s/o Lake Forest Dr.

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS	
Highway Data		**Site Conditions (Hard = 10, Soft = 15)**	
Average Daily Traffic (Adt):	23,700 vehicles	Autos:	15
Peak Hour Percentage:	10%	Medium Trucks (2 Axles):	15
Peak Hour Volume:	2,370 vehicles	Heavy Trucks (3+ Axles):	15
Vehicle Speed:	50 mph		
Near/Far Lane Distance:	74 feet		
Site Data		**Vehicle Mix**	
Barrier Height:	**0.0 feet**		
Barrier Type (0-Wall, 1-Berm):	0.0		
Centerline Dist. to Barrier:	60.0 feet		
Centerline Dist. to Observer:	60.0 feet		
Barrier Distance to Observer:	0.0 feet		
Observer Height (Above Pad):	5.0 feet		
Pad Elevation:	0.0 feet		
Road Elevation:	0.0 feet		
Road Grade:	0.0%		
Left View:	-90.0 degrees		
Right View:	90.0 degrees		

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	1.34	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-15.90	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-19.86	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.6	68.7	66.9	60.9	69.5	70.1
Medium Trucks:	64.2	62.7	56.3	54.8	63.2	63.4
Heavy Trucks:	64.6	63.2	54.1	55.4	63.7	63.9
Vehicle Noise:	72.3	70.5	67.5	62.7	71.3	71.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	73	157	338	728
CNEL:	78	169	363	782

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Rancho Pkwy. S. | Job Number: 11049
Road Segment: s/o Alton Pkwy.

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS	
Highway Data		**Site Conditions (Hard = 10, Soft = 15)**	
Average Daily Traffic (Adt):	6,500 vehicles	Autos:	15
Peak Hour Percentage:	10%	Medium Trucks (2 Axles):	15
Peak Hour Volume:	650 vehicles	Heavy Trucks (3+ Axles):	15
Vehicle Speed:	40 mph		
Near/Far Lane Distance:	50 feet		
Site Data		**Vehicle Mix**	
Barrier Height:	**0.0 feet**		
Barrier Type (0-Wall, 1-Berm):	0.0		
Centerline Dist. to Barrier:	50.0 feet		
Centerline Dist. to Observer:	50.0 feet		
Barrier Distance to Observer:	0.0 feet		
Observer Height (Above Pad):	5.0 feet		
Pad Elevation:	0.0 feet		
Road Elevation:	0.0 feet		
Road Grade:	0.0%		
Left View:	-90.0 degrees		
Right View:	90.0 degrees		

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	-3.31	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	77.72	-20.55	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	82.99	-24.50	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	62.8	60.9	59.2	53.1	61.7	62.3
Medium Trucks:	56.8	55.3	48.9	47.4	55.8	56.1
Heavy Trucks:	58.1	56.7	47.7	48.9	57.3	57.4
Vehicle Noise:	64.8	63.1	59.8	55.3	63.8	64.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	19	42	90	193
CNEL:	21	45	96	207

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Rancho Pkwy. S. | Job Number: 11049
Road Segment: n/o Bake Pkwy.

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS	
Highway Data		**Site Conditions (Hard = 10, Soft = 15)**	
Average Daily Traffic (Adt):	8,500 vehicles	Autos:	15
Peak Hour Percentage:	10%	Medium Trucks (2 Axles):	15
Peak Hour Volume:	850 vehicles	Heavy Trucks (3+ Axles):	15
Vehicle Speed:	40 mph		
Near/Far Lane Distance:	50 feet		
Site Data		**Vehicle Mix**	
Barrier Height:	**0.0 feet**		
Barrier Type (0-Wall, 1-Berm):	0.0		
Centerline Dist. to Barrier:	50.0 feet		
Centerline Dist. to Observer:	50.0 feet		
Barrier Distance to Observer:	0.0 feet		
Observer Height (Above Pad):	5.0 feet		
Pad Elevation:	0.0 feet		
Road Elevation:	0.0 feet		
Road Grade:	0.0%		
Left View:	-90.0 degrees		
Right View:	90.0 degrees		

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	-2.15	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	77.72	-19.38	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	82.99	-23.34	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.0	62.1	60.3	54.3	62.9	63.5
Medium Trucks:	58.0	56.5	50.1	48.5	57.0	57.2
Heavy Trucks:	59.3	57.9	48.8	50.1	58.4	58.5
Vehicle Noise:	66.0	64.3	61.0	56.4	65.0	65.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	23	50	107	231
CNEL:	25	53	115	247

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Rancho Pkwy. | Job Number: 11049
Road Segment: s/o Lake Forest Dr.

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS	
Highway Data		**Site Conditions (Hard = 10, Soft = 15)**	
Average Daily Traffic (Adt):	16,900 vehicles	Autos:	15
Peak Hour Percentage:	10%	Medium Trucks (2 Axles):	15
Peak Hour Volume:	1,690 vehicles	Heavy Trucks (3+ Axles):	15
Vehicle Speed:	45 mph		
Near/Far Lane Distance:	36 feet		
Site Data		**Vehicle Mix**	
Barrier Height:	**0.0 feet**		
Barrier Type (0-Wall, 1-Berm):	0.0		
Centerline Dist. to Barrier:	30.0 feet		
Centerline Dist. to Observer:	30.0 feet		
Barrier Distance to Observer:	0.0 feet		
Observer Height (Above Pad):	5.0 feet		
Pad Elevation:	0.0 feet		
Road Elevation:	0.0 feet		
Road Grade:	0.0%		
Left View:	-90.0 degrees		
Right View:	90.0 degrees		

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.33	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	79.45	-16.91	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	84.25	-20.87	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.2	70.3	68.6	62.5	71.1	71.7
Medium Trucks:	66.0	64.5	58.1	56.6	65.1	65.3
Heavy Trucks:	66.8	65.4	56.4	57.6	66.0	66.1
Vehicle Noise:	74.1	72.3	69.2	64.5	73.0	73.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	48	103	222	478
CNEL:	51	110	238	512

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Towne Centre Dr. | Job Number: 11049
Road Segment: s/o Alton Pkwy.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	14,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,490 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	0.87	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	75.75	-16.37	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	81.57	-20.32	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.6	66.7	64.9	58.9	67.5	68.1
Medium Trucks:	62.9	61.3	55.0	53.4	61.9	62.1
Heavy Trucks:	64.7	63.3	54.2	55.5	63.8	63.9
Vehicle Noise:	70.8	69.1	65.7	61.3	69.8	70.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	29	63	135	292
CNEL:	31	67	145	312

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Towne Centre Dr. | Job Number: 11049
Road Segment: s/o Bake Pkwy.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	800 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-1.83	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	75.75	-19.07	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	81.57	-23.02	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.9	64.0	62.2	56.2	64.8	65.4
Medium Trucks:	60.2	58.6	52.3	50.7	59.2	59.4
Heavy Trucks:	62.0	60.6	51.5	52.8	61.1	61.2
Vehicle Noise:	68.1	66.4	63.0	58.6	67.1	67.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	19	42	89	193
CNEL:	21	44	96	206

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Towne Centre Dr. | Job Number: 11049
Road Segment: s/o Lake Forest Dr.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	540 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-3.54	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	75.75	-20.77	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	81.57	-24.73	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.2	62.3	60.5	54.5	63.1	63.7
Medium Trucks:	58.4	56.9	50.6	49.0	57.5	57.7
Heavy Trucks:	60.3	58.8	49.8	51.1	59.4	59.5
Vehicle Noise:	66.4	64.7	61.3	56.9	65.4	65.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	15	32	69	148
CNEL:	16	34	74	158

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Portola Pkwy. | Job Number: 11049
Road Segment: s/o Alton Pkwy.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,270 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	2.12	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	77.72	-15.12	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	82.99	-19.07	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	67.7	65.8	64.0	58.0	66.6	67.2
Medium Trucks:	61.7	60.2	53.8	52.2	60.7	60.9
Heavy Trucks:	63.0	61.6	52.5	53.8	62.1	62.2
Vehicle Noise:	69.7	68.0	64.7	60.1	68.7	69.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	49	105	227	489
CNEL:	52	113	243	524

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Portola Pkwy.
Road Segment: n/o Rancho Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	25,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,540 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	1.64	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-15.60	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-19.55	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.5	68.6	66.9	60.8	69.4	70.0
Medium Trucks:	64.1	62.6	56.2	54.7	63.1	63.4
Heavy Trucks:	64.5	63.1	54.1	55.3	63.7	63.8
Vehicle Noise:	72.2	70.5	67.4	62.6	71.2	71.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	84	181	390	841
CNEL:	90	195	419	903

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Santa Margarita Pkwy.
Road Segment: s/o El Toro Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	38,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,850 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.45	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-13.79	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-17.75	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.7	70.8	69.0	63.0	71.6	72.2
Medium Trucks:	66.3	64.8	58.4	56.9	65.3	65.6
Heavy Trucks:	66.7	65.3	56.2	57.5	65.8	66.0
Vehicle Noise:	74.4	72.6	69.6	64.8	73.4	73.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	101	217	467	1,006
CNEL:	108	233	502	1,081

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Santa Margarita Pkwy.
Road Segment: s/o Los Alisos Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,560 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	3.56	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	79.45	-13.67	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	84.25	-17.63	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.1	69.2	67.4	61.4	70.0	70.6
Medium Trucks:	64.8	63.3	57.0	55.4	63.9	64.1
Heavy Trucks:	65.7	64.3	55.2	56.5	64.8	64.9
Vehicle Noise:	72.9	71.2	68.0	63.3	71.9	72.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	80	173	372	802
CNEL:	86	185	399	860

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Alton Pkwy.
Road Segment: w/o Irvine Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,240 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	0.68	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-16.56	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-20.51	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.5	69.6	67.9	61.8	70.4	71.0
Medium Trucks:	64.9	63.4	57.0	55.5	64.0	64.2
Heavy Trucks:	64.9	63.5	54.5	55.7	64.1	64.2
Vehicle Noise:	73.1	71.3	68.4	63.5	72.1	72.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	82	177	382	823
CNEL:	89	191	411	885

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Alton Pkwy.
Road Segment: e/o Irvine Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	24,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,470 vehicles
Vehicle Speed:	60 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	73.22	0.73	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	83.68	-16.51	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	87.33	-20.47	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.0	71.1	69.3	63.3	71.9	72.5
Medium Trucks:	66.2	64.7	58.4	56.8	65.3	65.5
Heavy Trucks:	65.9	64.5	55.5	56.7	65.1	65.2
Vehicle Noise:	74.5	72.7	69.8	64.9	73.4	73.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	102	219	472	1,018
CNEL:	110	236	509	1,096

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Alton Pkwy.
Road Segment: w/o Rancho Pkwy. S.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	24,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,410 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	1.00	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-16.24	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-20.20	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.8	69.9	68.2	62.1	70.7	71.3
Medium Trucks:	65.2	63.7	57.4	55.8	64.3	64.5
Heavy Trucks:	65.3	63.8	54.8	56.0	64.4	64.5
Vehicle Noise:	73.4	71.7	68.7	63.8	72.4	72.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	86	186	401	864
CNEL:	93	200	431	929

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Bake Pkwy.
Road Segment: w/o Rockfield Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	73,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	7,360 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	5.85	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-11.39	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-15.35	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.7	74.8	73.0	67.0	75.6	76.2
Medium Trucks:	70.1	68.6	62.2	60.7	69.1	69.4
Heavy Trucks:	70.1	68.7	59.6	60.9	69.2	69.4
Vehicle Noise:	78.3	76.5	73.5	68.7	77.2	77.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	182	392	844	1,818
CNEL:	196	421	908	1,956

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Bake Pkwy.
Road Segment: e/o Rockfield Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	64,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	6,420 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	5.25	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-11.99	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-15.94	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.1	74.2	72.4	66.4	75.0	75.6
Medium Trucks:	69.5	68.0	61.6	60.1	68.5	68.8
Heavy Trucks:	69.5	68.1	59.1	60.3	68.7	68.8
Vehicle Noise:	77.7	75.9	73.0	68.1	76.6	77.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	166	358	771	1,660
CNEL:	179	385	829	1,786

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Bake Pkwy. | Job Number: 11049
Road Segment: e/o Muirlands Bl.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	62,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	6,280 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	5.16	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-12.08	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-16.04	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.0	74.1	72.3	66.3	74.9	75.5
Medium Trucks:	69.4	67.9	61.5	60.0	68.4	68.7
Heavy Trucks:	69.4	68.0	59.0	60.2	68.6	68.7
Vehicle Noise:	77.6	75.8	72.9	68.0	76.5	77.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	164	352	759	1,636
CNEL:	176	379	817	1,760

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Bake Pkwy. | Job Number: 11049
Road Segment: e/o Jeronimo Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	53,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	5,310 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.84	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-12.40	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-16.35	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	74.1	72.2	70.4	64.4	73.0	73.6
Medium Trucks:	67.7	66.2	59.8	58.3	66.7	66.9
Heavy Trucks:	68.1	66.7	57.6	58.9	67.2	67.4
Vehicle Noise:	75.8	74.0	71.0	66.2	74.8	75.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	125	269	579	1,246
CNEL:	134	289	622	1,339

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Bake Pkwy. | Job Number: 11049
Road Segment: e/o Toledo Wy.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	51,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	5,100 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.67	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-12.57	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-16.53	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.9	72.0	70.3	64.2	72.8	73.4
Medium Trucks:	67.5	66.0	59.6	58.1	66.5	66.8
Heavy Trucks:	67.9	66.5	57.4	58.7	67.1	67.2
Vehicle Noise:	75.6	73.9	70.8	66.0	74.6	75.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	121	261	563	1,213
CNEL:	130	281	605	1,304

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Bake Pkwy. | Job Number: 11049
Road Segment: e/o Trabuco Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	39,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,950 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.56	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-13.68	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-17.64	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.8	70.9	69.2	63.1	71.7	72.3
Medium Trucks:	66.4	64.9	58.5	57.0	65.4	65.7
Heavy Trucks:	66.8	65.4	56.3	57.6	65.9	66.1
Vehicle Noise:	74.5	72.8	69.7	64.9	73.5	73.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	102	220	475	1,023
CNEL:	110	237	510	1,099

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Bake Pkwy. | Job Number: 11049
Road Segment: w/o Dimension Dr.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	29,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,920 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.25	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-14.99	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-18.95	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.1	70.2	68.4	62.3	71.0	71.6
Medium Trucks:	65.6	64.1	57.8	56.2	64.7	64.9
Heavy Trucks:	66.0	64.6	55.6	56.8	65.2	65.3
Vehicle Noise:	73.8	72.0	69.0	64.2	72.7	73.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	76	164	353	760
CNEL:	82	176	379	817

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Bake Pkwy. | Job Number: 11049
Road Segment: e/o Dimension Dr.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	31,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,180 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.62	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-14.62	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-18.58	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.4	70.5	68.8	62.7	71.3	71.9
Medium Trucks:	66.0	64.5	58.1	56.6	65.1	65.3
Heavy Trucks:	66.4	65.0	56.0	57.2	65.6	65.7
Vehicle Noise:	74.1	72.4	69.3	64.6	73.1	73.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	80	173	374	805
CNEL:	86	186	401	865

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Bake Pkwy. | Job Number: 11049
Road Segment: e/o Rancho Pkwy. S.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,040 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.42	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-14.82	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-18.77	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.2	70.3	68.6	62.5	71.1	71.8
Medium Trucks:	65.8	64.3	57.9	56.4	64.9	65.1
Heavy Trucks:	66.2	64.8	55.8	57.0	65.4	65.5
Vehicle Noise:	73.9	72.2	69.1	64.4	72.9	73.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	78	168	362	781
CNEL:	84	181	389	839

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Bake Pkwy. | Job Number: 11049
Road Segment: w/o Towne Centre Dr.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	28,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,850 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.14	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	81.00	-15.10	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	85.38	-19.05	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	75.8	73.9	72.1	66.1	74.7	75.3
Medium Trucks:	69.4	67.9	61.5	60.0	68.4	68.7
Heavy Trucks:	69.8	68.3	59.3	60.5	68.9	69.0
Vehicle Noise:	77.5	75.7	72.7	67.9	76.4	76.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	81	174	374	806
CNEL:	87	187	402	866

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Bake Pkwy.
Road Segment: e/o Towne Centre Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	17,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,750 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.02	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	81.00	-17.22	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	85.38	-21.17	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.7	71.8	70.0	63.9	72.6	73.2
Medium Trucks:	67.3	65.7	59.4	57.8	66.3	66.5
Heavy Trucks:	67.6	66.2	57.2	58.4	66.8	66.9
Vehicle Noise:	75.4	73.6	70.6	65.8	74.3	74.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	58	125	270	582
CNEL:	63	135	290	626

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Lake Forest Dr.
Road Segment: w/o Serrano Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,560 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.11	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-14.13	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-18.09	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.4	70.5	68.7	62.6	71.3	71.9
Medium Trucks:	65.9	64.4	58.1	56.5	65.0	65.2
Heavy Trucks:	66.3	64.9	55.9	57.1	65.5	65.6
Vehicle Noise:	74.1	72.3	69.3	64.5	73.0	73.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	95	206	443	955
CNEL:	103	221	476	1,026

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Lake Forest Dr.
Road Segment: e/o Serrano Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	38,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,800 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.39	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-13.85	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-17.80	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.6	70.7	69.0	62.9	71.5	72.2
Medium Trucks:	66.2	64.7	58.3	56.8	65.3	65.5
Heavy Trucks:	66.6	65.2	56.2	57.4	65.8	65.9
Vehicle Noise:	74.3	72.6	69.5	64.8	73.3	73.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	100	215	463	997
CNEL:	107	231	497	1,071

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Lake Forest Dr.
Road Segment: e/o Trabuco Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	37,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,750 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.33	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-13.91	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-17.86	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.2	71.3	69.5	63.4	72.1	72.7
Medium Trucks:	66.7	65.2	58.9	57.3	65.8	66.0
Heavy Trucks:	67.1	65.7	56.7	57.9	66.3	66.4
Vehicle Noise:	74.8	73.1	70.1	65.3	73.8	74.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	90	194	417	898
CNEL:	97	208	448	965

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Lake Forest Dr.
Road Segment: e/o Dimension Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,300 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	1.21	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-16.03	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-19.99	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.0	69.1	67.4	61.3	69.9	70.5
Medium Trucks:	64.6	63.1	56.7	55.2	63.6	63.9
Heavy Trucks:	65.0	63.6	54.6	55.8	64.2	64.3
Vehicle Noise:	72.7	71.0	67.9	63.1	71.7	72.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	65	140	301	648
CNEL:	70	150	323	697

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Lake Forest Dr.
Road Segment: e/o Rancho Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	17,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,720 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	-0.05	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	81.00	-17.29	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	85.38	-21.25	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.6	71.7	69.9	63.9	72.5	73.1
Medium Trucks:	67.2	65.7	59.3	57.8	66.2	66.5
Heavy Trucks:	67.6	66.1	57.1	58.3	66.7	66.8
Vehicle Noise:	75.3	73.5	70.5	65.7	74.2	74.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	58	124	267	576
CNEL:	62	133	287	618

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Lake Forest Dr.
Road Segment: e/o Towne Centre Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	10,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,030 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	-2.28	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	81.00	-19.52	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	85.38	-23.47	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.4	69.5	67.7	61.6	70.3	70.9
Medium Trucks:	65.0	63.4	57.1	55.5	64.0	64.2
Heavy Trucks:	65.3	63.9	54.9	56.1	64.5	64.6
Vehicle Noise:	73.1	71.3	68.3	63.5	72.0	72.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	41	88	190	409
CNEL:	44	95	204	439

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Lake Forest Dr.
Road Segment: e/o Portola Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	880 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.51	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	79.45	-19.74	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	84.25	-23.70	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.4	67.5	65.7	59.7	68.3	68.9
Medium Trucks:	63.2	61.7	55.3	53.8	62.2	62.5
Heavy Trucks:	64.0	62.6	53.5	54.8	63.1	63.3
Vehicle Noise:	71.2	69.5	66.3	61.7	70.2	70.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	31	67	143	309
CNEL:	33	71	154	332

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: El Toro Rd. | Job Number: 11049
Road Segment: w/o Jeronimo Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	40,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,010 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.62	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-13.62	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-17.57	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.5	70.6	68.8	62.8	71.4	72.0
Medium Trucks:	66.1	64.6	58.2	56.7	65.1	65.4
Heavy Trucks:	66.5	65.1	56.0	57.3	65.6	65.8
Vehicle Noise:	74.2	72.5	69.4	64.6	73.2	73.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	114	246	529	1,140
CNEL:	122	264	568	1,224

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: El Toro Rd. | Job Number: 11049
Road Segment: e/o Jeronimo Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	39,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,960 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.57	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-13.67	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-17.63	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.5	70.6	68.8	62.7	71.4	72.0
Medium Trucks:	66.0	64.5	58.2	56.6	65.1	65.3
Heavy Trucks:	66.4	65.0	56.0	57.2	65.6	65.7
Vehicle Noise:	74.2	72.4	69.4	64.6	73.1	73.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	113	243	525	1,130
CNEL:	121	262	564	1,214

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: El Toro Rd. | Job Number: 11049
Road Segment: e/o Serrano Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,350 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.84	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-14.40	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-18.35	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.7	69.8	68.1	62.0	70.6	71.2
Medium Trucks:	65.3	63.8	57.4	55.9	64.3	64.6
Heavy Trucks:	65.7	64.3	55.3	56.5	64.9	65.0
Vehicle Noise:	73.4	71.7	68.6	63.8	72.4	72.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	101	218	469	1,011
CNEL:	109	234	504	1,086

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: El Toro Rd. | Job Number: 11049
Road Segment: e/o Trabuco Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,520 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.06	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-14.18	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-18.14	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.3	70.4	68.6	62.6	71.2	71.8
Medium Trucks:	65.9	64.4	58.0	56.5	64.9	65.2
Heavy Trucks:	66.3	64.9	55.8	57.1	65.4	65.6
Vehicle Noise:	74.0	72.3	69.2	64.4	73.0	73.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	95	204	440	948
CNEL:	102	219	473	1,018

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: El Toro Rd.
Road Segment: w/o Portola Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	25,700	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,570	vehicles
Vehicle Speed:	55	mph
Near/Far Lane Distance:	74	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	71.78	1.28	0.25	-1.20	*-4.85*	0.000	0.000
Medium Trucks:	82.40	-15.96	0.27	-1.20	*-5.01*	0.000	0.000
Heavy Trucks:	86.40	-19.92	0.25	-1.20	*-5.34*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.1	70.2	68.4	62.4	71.0	71.6
Medium Trucks:	65.5	64.0	57.6	56.1	64.6	64.8
Heavy Trucks:	65.5	64.1	55.1	56.3	64.7	64.8
Vehicle Noise:	73.7	71.9	69.0	64.1	72.7	73.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	90	194	419	902
CNEL:	97	209	450	970

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: El Toro Rd.
Road Segment: e/o Portola Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	15,100	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,510	vehicles
Vehicle Speed:	55	mph
Near/Far Lane Distance:	74	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	71.78	-1.03	0.25	-1.20	*-4.85*	0.000	0.000
Medium Trucks:	82.40	-18.27	0.27	-1.20	*-5.01*	0.000	0.000
Heavy Trucks:	86.40	-22.23	0.25	-1.20	*-5.34*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	69.8	67.9	66.1	60.1	68.7	69.3
Medium Trucks:	63.2	61.7	55.3	53.8	62.2	62.5
Heavy Trucks:	63.2	61.8	52.8	54.0	62.4	62.5
Vehicle Noise:	71.4	69.6	66.7	61.8	70.3	70.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	63	136	294	633
CNEL:	68	147	316	681

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020
Road Name: Trabuco Rd.
Road Segment: s/o Bake Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,300	vehicles
Vehicle Speed:	55	mph
Near/Far Lane Distance:	74	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	71.78	0.79	0.25	-1.20	*-4.85*	0.000	0.000
Medium Trucks:	82.40	-16.44	0.27	-1.20	*-5.01*	0.000	0.000
Heavy Trucks:	86.40	-20.40	0.25	-1.20	*-5.34*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	71.6	69.7	68.0	61.9	70.5	71.1
Medium Trucks:	65.0	63.5	57.2	55.6	64.1	64.3
Heavy Trucks:	65.1	63.6	54.6	55.8	64.2	64.3
Vehicle Noise:	73.2	71.4	68.5	63.6	72.2	72.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	84	180	389	837
CNEL:	90	194	418	901

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020
Road Name: Trabuco Rd.
Road Segment: s/o Lake Forest Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,300	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	74	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	2.78	0.25	-1.20	*-4.85*	0.000	0.000
Medium Trucks:	81.00	-14.46	0.27	-1.20	*-5.01*	0.000	0.000
Heavy Trucks:	85.38	-18.42	0.25	-1.20	*-5.34*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.0	70.1	68.4	62.3	70.9	71.5
Medium Trucks:	65.6	64.1	57.7	56.2	64.7	64.9
Heavy Trucks:	66.0	64.6	55.6	56.8	65.2	65.3
Vehicle Noise:	73.7	72.0	68.9	64.1	72.7	73.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	91	196	421	908
CNEL:	98	210	453	975

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020 | Project Name: Nakase
Road Name: Rancho Pkwy. S. | Job Number: 11049
Road Segment: s/o Alton Pkwy.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	920 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	-1.80	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	77.72	-19.04	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	82.99	-23.00	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.3	62.4	60.7	54.6	63.2	63.8
Medium Trucks:	58.3	56.8	50.4	48.9	57.4	57.6
Heavy Trucks:	59.6	58.2	49.2	50.4	58.8	58.9
Vehicle Noise:	66.3	64.6	61.3	56.8	65.3	65.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	24	52	113	244
CNEL:	26	56	121	261

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020 | Project Name: Nakase
Road Name: Rancho Pkwy. S. | Job Number: 11049
Road Segment: n/o Bake Pkwy.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	900 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	-1.90	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	77.72	-19.14	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	82.99	-23.09	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.2	62.3	60.6	54.5	63.1	63.7
Medium Trucks:	58.2	56.7	50.3	48.8	57.3	57.5
Heavy Trucks:	59.5	58.1	49.1	50.3	58.7	58.8
Vehicle Noise:	66.2	64.5	61.2	56.7	65.2	65.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	24	52	111	240
CNEL:	26	55	119	257

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020 | Project Name: Nakase
Road Name: Rancho Pkwy. | Job Number: 11049
Road Segment: s/o Lake Forest Dr.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,900 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.84	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	79.45	-16.40	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	84.25	-20.36	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.7	70.8	69.1	63.0	71.6	72.2
Medium Trucks:	66.5	65.0	58.7	57.1	65.6	65.8
Heavy Trucks:	67.3	65.9	56.9	58.1	66.5	66.6
Vehicle Noise:	74.6	72.8	69.7	65.0	73.5	74.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	52	111	240	516
CNEL:	55	119	257	554

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020 | Project Name: Nakase
Road Name: Towne Centre Dr. | Job Number: 11049
Road Segment: s/o Alton Pkwy.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	14,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,450 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	0.75	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	75.75	-16.48	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	81.57	-20.44	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.5	66.6	64.8	58.8	67.4	68.0
Medium Trucks:	62.7	61.2	54.9	53.3	61.8	62.0
Heavy Trucks:	64.6	63.1	54.1	55.3	63.7	63.8
Vehicle Noise:	70.7	69.0	65.6	61.2	69.7	70.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	29	62	133	286
CNEL:	31	66	142	306

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020 | Project Name: Nakase
Road Name: Towne Centre Dr. | Job Number: 11049
Road Segment: s/o Bake Pkwy.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	790 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-1.88	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	75.75	-19.12	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	81.57	-23.08	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.8	63.9	62.2	56.1	64.7	65.4
Medium Trucks:	60.1	58.6	52.2	50.7	59.1	59.4
Heavy Trucks:	61.9	60.5	51.5	52.7	61.1	61.2
Vehicle Noise:	68.1	66.4	62.9	58.5	67.1	67.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	19	41	89	191
CNEL:	20	44	95	204

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020 | Project Name: Nakase
Road Name: Towne Centre Dr. | Job Number: 11049
Road Segment: s/o Lake Forest Dr.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	540 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-3.54	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	75.75	-20.77	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	81.57	-24.73	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.2	62.3	60.5	54.5	63.1	63.7
Medium Trucks:	58.4	56.9	50.6	49.0	57.5	57.7
Heavy Trucks:	60.3	58.8	49.8	51.1	59.4	59.5
Vehicle Noise:	66.4	64.7	61.3	56.9	65.4	65.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	15	32	69	148
CNEL:	16	34	74	158

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020 | Project Name: Nakase
Road Name: Portola Pkwy. | Job Number: 11049
Road Segment: s/o Alton Pkwy.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,750 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	2.95	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	77.72	-14.28	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	82.99	-18.24	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.5	66.6	64.9	58.8	67.4	68.0
Medium Trucks:	62.5	61.0	54.6	53.1	61.5	61.8
Heavy Trucks:	63.8	62.4	53.4	54.6	63.0	63.1
Vehicle Noise:	70.5	68.8	65.5	61.0	69.5	70.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	56	120	258	556
CNEL:	60	128	276	596

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020 | Project Name: Nakase
Road Name: Portola Pkwy. | Job Number: 11049
Road Segment: n/o Rancho Pkwy.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	29,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,900 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.22	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-15.02	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-18.98	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.1	69.2	67.4	61.4	70.0	70.6
Medium Trucks:	64.7	63.2	56.8	55.3	63.7	64.0
Heavy Trucks:	65.1	63.7	54.6	55.9	64.2	64.4
Vehicle Noise:	72.8	71.0	68.0	63.2	71.8	72.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	92	198	426	918
CNEL:	99	213	458	987

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020 | Project Name: Nakase
Road Name: Santa Margarita Pkwy. | Job Number: 11049
Road Segment: s/o El Toro Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	39,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,900 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.50	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-13.74	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-17.69	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.8	70.9	69.1	63.0	71.7	72.3
Medium Trucks:	66.3	64.8	58.5	56.9	65.4	65.6
Heavy Trucks:	66.7	65.3	56.3	57.5	65.9	66.0
Vehicle Noise:	74.5	72.7	69.7	64.9	73.4	73.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	101	219	471	1,015
CNEL:	109	235	506	1,090

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020 | Project Name: Nakase
Road Name: Santa Margarita Pkwy. | Job Number: 11049
Road Segment: s/o Los Alisos Bl.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	37,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,790 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	3.84	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	79.45	-13.40	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	84.25	-17.36	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.4	69.5	67.7	61.6	70.3	70.9
Medium Trucks:	65.1	63.6	57.2	55.7	64.2	64.4
Heavy Trucks:	65.9	64.5	55.5	56.7	65.1	65.2
Vehicle Noise:	73.2	71.4	68.3	63.6	72.2	72.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	84	180	388	836
CNEL:	90	193	416	896

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020 | Project Name: Nakase
Road Name: Alton Pkwy. | Job Number: 11049
Road Segment: w/o Irvine Bl.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	29,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,910 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	1.82	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-15.42	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-19.38	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.7	70.8	69.0	62.9	71.6	72.2
Medium Trucks:	66.0	64.5	58.2	56.6	65.1	65.3
Heavy Trucks:	66.1	64.7	55.6	56.9	65.2	65.3
Vehicle Noise:	74.2	72.5	69.5	64.6	73.2	73.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	98	211	455	980
CNEL:	105	227	489	1,054

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020 | Project Name: Nakase
Road Name: Alton Pkwy. | Job Number: 11049
Road Segment: e/o Irvine Bl.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	25,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,500 vehicles
Vehicle Speed:	60 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	73.22	0.78	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	83.68	-16.46	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	87.33	-20.42	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.1	71.2	69.4	63.3	72.0	72.6
Medium Trucks:	66.3	64.8	58.4	56.9	65.3	65.6
Heavy Trucks:	66.0	64.5	55.5	56.8	65.1	65.2
Vehicle Noise:	74.5	72.8	69.9	64.9	73.5	74.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	103	221	476	1,026
CNEL:	110	238	513	1,105

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020
Road Name: Alton Pkwy.
Road Segment: w/o Rancho Pkwy. S.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,530 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	2.66	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-14.58	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-18.54	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.5	71.6	69.8	63.8	72.4	73.0
Medium Trucks:	66.9	65.4	59.0	57.5	65.9	66.2
Heavy Trucks:	66.9	65.5	56.5	57.7	66.1	66.2
Vehicle Noise:	75.1	73.3	70.4	65.5	74.0	74.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	111	240	517	1,114
CNEL:	120	258	556	1,199

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020
Road Name: Bake Pkwy.
Road Segment: w/o Rockfield Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	74,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	7,400 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	5.87	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-11.37	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-15.32	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.7	74.8	73.0	67.0	75.6	76.2
Medium Trucks:	70.1	68.6	62.2	60.7	69.1	69.4
Heavy Trucks:	70.1	68.7	59.7	60.9	69.3	69.4
Vehicle Noise:	78.3	76.5	73.6	68.7	77.2	77.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	183	393	847	1,825
CNEL:	196	423	911	1,963

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020
Road Name: Bake Pkwy.
Road Segment: e/o Rockfield Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	66,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	6,640 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	5.40	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-11.84	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-15.80	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.2	74.3	72.6	66.5	75.1	75.7
Medium Trucks:	69.6	68.1	61.8	60.2	68.7	68.9
Heavy Trucks:	69.7	68.2	59.2	60.4	68.8	68.9
Vehicle Noise:	77.8	76.1	73.1	68.2	76.8	77.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	170	366	788	1,698
CNEL:	183	394	848	1,827

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020
Road Name: Bake Pkwy.
Road Segment: e/o Muirlands Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	63,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	6,340 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	5.20	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-12.04	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-16.00	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.0	74.1	72.4	66.3	74.9	75.5
Medium Trucks:	69.4	67.9	61.6	60.0	68.5	68.7
Heavy Trucks:	69.5	68.0	59.0	60.2	68.6	68.7
Vehicle Noise:	77.6	75.9	72.9	68.0	76.6	77.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	165	355	764	1,646
CNEL:	177	382	822	1,771

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020
Road Name: Bake Pkwy.
Road Segment: e/o Jeronimo Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	55,700	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	5,570	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	74	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	5.05	0.25	-1.20	*-4.85*	0.000	0.000
Medium Trucks:	81.00	-12.19	0.27	-1.20	*-5.01*	0.000	0.000
Heavy Trucks:	85.38	-16.14	0.25	-1.20	*-5.34*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	74.3	72.4	70.6	64.6	73.2	73.8
Medium Trucks:	67.9	66.4	60.0	58.5	66.9	67.2
Heavy Trucks:	68.3	66.9	57.8	59.1	67.4	67.6
Vehicle Noise:	76.0	74.3	71.2	66.4	75.0	75.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	129	277	597	1,287
CNEL:	138	298	642	1,383

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020
Road Name: Bake Pkwy.
Road Segment: e/o Toledo Wy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	51,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	5,100	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	74	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	4.67	0.25	-1.20	*-4.85*	0.000	0.000
Medium Trucks:	81.00	-12.57	0.27	-1.20	*-5.01*	0.000	0.000
Heavy Trucks:	85.38	-16.53	0.25	-1.20	*-5.34*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.9	72.0	70.3	64.2	72.8	73.4
Medium Trucks:	67.5	66.0	59.6	58.1	66.5	66.8
Heavy Trucks:	67.9	66.5	57.4	58.7	67.1	67.2
Vehicle Noise:	75.6	73.9	70.8	66.0	74.6	75.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	121	261	563	1,213
CNEL:	130	281	605	1,304

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020
Road Name: Bake Pkwy.
Road Segment: e/o Trabuco Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,600	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	74	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	3.15	0.25	-1.20	*-4.85*	0.000	0.000
Medium Trucks:	81.00	-14.08	0.27	-1.20	*-5.01*	0.000	0.000
Heavy Trucks:	85.38	-18.04	0.25	-1.20	*-5.34*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.4	70.5	68.7	62.7	71.3	71.9
Medium Trucks:	66.0	64.5	58.1	56.6	65.0	65.3
Heavy Trucks:	66.4	65.0	55.9	57.2	65.5	65.7
Vehicle Noise:	74.1	72.4	69.3	64.5	73.1	73.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	96	207	447	962
CNEL:	103	223	480	1,034

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020
Road Name: Bake Pkwy.
Road Segment: w/o Dimension Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	34,500	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,450	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	50.0	feet
Centerline Dist. to Observer:	50.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	2.97	0.82	-1.20	*-4.84*	0.000	0.000
Medium Trucks:	81.00	-14.27	0.83	-1.20	*-5.04*	0.000	0.000
Heavy Trucks:	85.38	-18.22	0.82	-1.20	*-5.43*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.8	70.9	69.1	63.1	71.7	72.3
Medium Trucks:	66.4	64.9	58.5	56.9	65.4	65.6
Heavy Trucks:	66.8	65.3	56.3	57.6	65.9	66.0
Vehicle Noise:	74.5	72.7	69.7	64.9	73.5	73.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	85	183	394	850
CNEL:	91	197	424	913

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020 | Project Name: Nakase
Road Name: Bake Pkwy. | Job Number: 11049
Road Segment: e/o Dimension Dr.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.36	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-14.88	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-18.83	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.2	70.3	68.5	62.5	71.1	71.7
Medium Trucks:	65.8	64.2	57.9	56.3	64.8	65.0
Heavy Trucks:	66.2	64.7	55.7	57.0	65.3	65.4
Vehicle Noise:	73.9	72.1	69.1	64.3	72.8	73.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	77	167	359	774
CNEL:	83	179	386	832

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020 | Project Name: Nakase
Road Name: Bake Pkwy. | Job Number: 11049
Road Segment: e/o Rancho Pkwy. S.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.36	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-14.88	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-18.83	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.2	70.3	68.5	62.5	71.1	71.7
Medium Trucks:	65.8	64.2	57.9	56.3	64.8	65.0
Heavy Trucks:	66.2	64.7	55.7	57.0	65.3	65.4
Vehicle Noise:	73.9	72.1	69.1	64.3	72.8	73.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	77	167	359	774
CNEL:	83	179	386	832

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020 | Project Name: Nakase
Road Name: Bake Pkwy. | Job Number: 11049
Road Segment: w/o Towne Centre Dr.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	28,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,800 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.06	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	81.00	-15.18	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	85.38	-19.13	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	75.7	73.8	72.0	66.0	74.6	75.2
Medium Trucks:	69.3	67.8	61.4	59.9	68.3	68.6
Heavy Trucks:	69.7	68.3	59.2	60.5	68.8	68.9
Vehicle Noise:	77.4	75.6	72.6	67.8	76.4	76.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	80	172	370	797
CNEL:	86	184	397	856

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020 | Project Name: Nakase
Road Name: Bake Pkwy. | Job Number: 11049
Road Segment: e/o Towne Centre Dr.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	25,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,590 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	1.72	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	81.00	-15.51	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	85.38	-19.47	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	75.4	73.5	71.7	65.6	74.3	74.9
Medium Trucks:	69.0	67.5	61.1	59.5	68.0	68.2
Heavy Trucks:	69.3	67.9	58.9	60.1	68.5	68.6
Vehicle Noise:	77.1	75.3	72.3	67.5	76.0	76.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	76	163	351	756
CNEL:	81	175	377	813

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020 | Project Name: Nakase
Road Name: Lake Forest Dr. | Job Number: 11049
Road Segment: w/o Serrano Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	42,200	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	4,220	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	74	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.84	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-13.39	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-17.35	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.1	71.2	69.4	63.4	72.0	72.6
Medium Trucks:	66.7	65.2	58.8	57.3	65.7	66.0
Heavy Trucks:	67.1	65.7	56.6	57.9	66.2	66.4
Vehicle Noise:	74.8	73.0	70.0	65.2	73.8	74.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	107	230	496	1,069
CNEL:	115	248	533	1,149

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020 | Project Name: Nakase
Road Name: Lake Forest Dr. | Job Number: 11049
Road Segment: e/o Serrano Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	42,200	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	4,220	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	74	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.84	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-13.39	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-17.35	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.1	71.2	69.4	63.4	72.0	72.6
Medium Trucks:	66.7	65.2	58.8	57.3	65.7	66.0
Heavy Trucks:	67.1	65.7	56.6	57.9	66.2	66.4
Vehicle Noise:	74.8	73.0	70.0	65.2	73.8	74.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	107	230	496	1,069
CNEL:	115	248	533	1,149

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020 | Project Name: Nakase
Road Name: Lake Forest Dr. | Job Number: 11049
Road Segment: e/o Trabuco Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	39,200	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,920	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	50.0	feet
Centerline Dist. to Observer:	50.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.52	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-13.71	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-17.67	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.3	71.4	69.7	63.6	72.2	72.9
Medium Trucks:	66.9	65.4	59.0	57.5	66.0	66.2
Heavy Trucks:	67.3	65.9	56.9	58.1	66.5	66.6
Vehicle Noise:	75.0	73.3	70.2	65.5	74.0	74.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	93	199	429	925
CNEL:	99	214	461	994

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020 | Project Name: Nakase
Road Name: Lake Forest Dr. | Job Number: 11049
Road Segment: e/o Dimension Dr.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	28,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,800	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	50.0	feet
Centerline Dist. to Observer:	50.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.06	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-15.18	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-19.13	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.9	70.0	68.2	62.2	70.8	71.4
Medium Trucks:	65.5	63.9	57.6	56.0	64.5	64.7
Heavy Trucks:	65.9	64.4	55.4	56.7	65.0	65.1
Vehicle Noise:	73.6	71.8	68.8	64.0	72.5	73.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	74	159	343	739
CNEL:	79	171	369	794

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020
Road Name: Lake Forest Dr.
Road Segment: e/o Rancho Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,200	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	36	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	30.0	feet
Centerline Dist. to Observer:	30.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	1.02	4.63	-1.20	*-4.81*	0.000	0.000
Medium Trucks:	81.00	-16.22	4.67	-1.20	*-5.14*	0.000	0.000
Heavy Trucks:	85.38	-20.18	4.63	-1.20	*-5.77*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	74.6	72.7	71.0	64.9	73.5	74.2
Medium Trucks:	68.3	66.7	60.4	58.8	67.3	67.5
Heavy Trucks:	68.6	67.2	58.2	59.4	67.8	67.9
Vehicle Noise:	76.3	74.6	71.5	66.8	75.3	75.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	68	146	315	678
CNEL:	73	157	338	729

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020
Road Name: Lake Forest Dr.
Road Segment: e/o Towne Centre Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	17,700	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,770	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	36	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	30.0	feet
Centerline Dist. to Observer:	30.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	0.07	4.63	-1.20	*-4.81*	0.000	0.000
Medium Trucks:	81.00	-17.17	4.67	-1.20	*-5.14*	0.000	0.000
Heavy Trucks:	85.38	-21.12	4.63	-1.20	*-5.77*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.7	71.8	70.0	64.0	72.6	73.2
Medium Trucks:	67.3	65.8	59.4	57.9	66.4	66.6
Heavy Trucks:	67.7	66.3	57.2	58.5	66.8	67.0
Vehicle Noise:	75.4	73.7	70.6	65.8	74.4	74.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	59	126	272	587
CNEL:	63	136	293	630

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020
Road Name: Lake Forest Dr.
Road Segment: e/o Portola Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,200	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	720	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	36	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	30.0	feet
Centerline Dist. to Observer:	30.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-3.38	4.63	-1.20	*-4.81*	0.000	0.000
Medium Trucks:	79.45	-20.62	4.67	-1.20	*-5.14*	0.000	0.000
Heavy Trucks:	84.25	-24.57	4.63	-1.20	*-5.77*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	68.5	66.6	64.8	58.8	67.4	68.0
Medium Trucks:	62.3	60.8	54.4	52.9	61.4	61.6
Heavy Trucks:	63.1	61.7	52.7	53.9	62.3	62.4
Vehicle Noise:	70.4	68.6	65.5	60.8	69.3	69.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	27	58	126	270
CNEL:	29	62	135	290

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020
Road Name: El Toro Rd.
Road Segment: w/o Jeronimo Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	41,700	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	4,170	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	98	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	70.0	feet
Centerline Dist. to Observer:	70.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	3.79	-0.11	-1.20	*-4.86*	0.000	0.000
Medium Trucks:	81.00	-13.45	-0.10	-1.20	*-5.00*	0.000	0.000
Heavy Trucks:	85.38	-17.40	-0.11	-1.20	*-5.28*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.7	70.8	69.0	63.0	71.6	72.2
Medium Trucks:	66.3	64.7	58.4	56.8	65.3	65.5
Heavy Trucks:	66.7	65.2	56.2	57.5	65.8	65.9
Vehicle Noise:	74.4	72.6	69.6	64.8	73.3	73.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	117	252	543	1,170
CNEL:	126	271	583	1,257

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020 | Project Name: Nakase
Road Name: El Toro Rd. | Job Number: 11049
Road Segment: e/o Jeronimo Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	44,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,460 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.08	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-13.15	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-17.11	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.0	71.1	69.3	63.3	71.9	72.5
Medium Trucks:	66.5	65.0	58.7	57.1	65.6	65.8
Heavy Trucks:	67.0	65.5	56.5	57.7	66.1	66.2
Vehicle Noise:	74.7	72.9	69.9	65.1	73.6	74.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	122	264	568	1,223
CNEL:	131	283	610	1,314

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020 | Project Name: Nakase
Road Name: El Toro Rd. | Job Number: 11049
Road Segment: e/o Serrano Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	43,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,300 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.93	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-13.31	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-17.27	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.8	70.9	69.2	63.1	71.7	72.3
Medium Trucks:	66.4	64.9	58.5	57.0	65.4	65.7
Heavy Trucks:	66.8	65.4	56.3	57.6	65.9	66.1
Vehicle Noise:	74.5	72.8	69.7	64.9	73.5	73.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	119	257	554	1,194
CNEL:	128	276	595	1,283

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020 | Project Name: Nakase
Road Name: El Toro Rd. | Job Number: 11049
Road Segment: e/o Trabuco Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	40,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,020 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.63	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-13.60	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-17.56	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.9	71.0	69.2	63.2	71.8	72.4
Medium Trucks:	66.5	65.0	58.6	57.0	65.5	65.7
Heavy Trucks:	66.9	65.5	56.4	57.7	66.0	66.1
Vehicle Noise:	74.6	72.8	69.8	65.0	73.6	74.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	104	223	481	1,035
CNEL:	111	240	516	1,112

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020 | Project Name: Nakase
Road Name: El Toro Rd. | Job Number: 11049
Road Segment: w/o Portola Pkwy.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	29,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,900 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	1.80	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-15.44	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-19.39	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.6	70.7	69.0	62.9	71.5	72.1
Medium Trucks:	66.0	64.5	58.2	56.6	65.1	65.3
Heavy Trucks:	66.1	64.6	55.6	56.8	65.2	65.3
Vehicle Noise:	74.2	72.5	69.5	64.6	73.2	73.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	98	211	454	977
CNEL:	105	227	488	1,051

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Interim Year 2020
Road Name: El Toro Rd.
Road Segment: e/o Portola Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	28,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,800 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	1.65	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-15.59	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-19.55	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.5	70.6	68.8	62.8	71.4	72.0
Medium Trucks:	65.9	64.4	58.0	56.5	64.9	65.2
Heavy Trucks:	65.9	64.5	55.4	56.7	65.1	65.2
Vehicle Noise:	74.1	72.3	69.3	64.5	73.0	73.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	95	206	443	955
CNEL:	103	221	477	1,027

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Trabuco Rd.
Road Segment: s/o Bake Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,300 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	0.79	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-16.44	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-20.40	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.6	69.7	68.0	61.9	70.5	71.1
Medium Trucks:	65.0	63.5	57.2	55.6	64.1	64.3
Heavy Trucks:	65.1	63.6	54.6	55.8	64.2	64.3
Vehicle Noise:	73.2	71.4	68.5	63.6	72.2	72.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	84	180	389	837
CNEL:	90	194	418	901

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Trabuco Rd.
Road Segment: s/o Lake Forest Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,300 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.78	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-14.46	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-18.42	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.0	70.1	68.4	62.3	70.9	71.5
Medium Trucks:	65.6	64.1	57.7	56.2	64.7	64.9
Heavy Trucks:	66.0	64.6	55.6	56.8	65.2	65.3
Vehicle Noise:	73.7	72.0	68.9	64.1	72.7	73.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	91	196	421	908
CNEL:	98	210	453	975

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Rancho Pkwy. S.
Road Segment: s/o Alton Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	10,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,030 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	-1.31	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	77.72	-18.55	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	82.99	-22.51	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.8	62.9	61.2	55.1	63.7	64.3
Medium Trucks:	58.8	57.3	50.9	49.4	57.8	58.1
Heavy Trucks:	60.1	58.7	49.6	50.9	59.3	59.4
Vehicle Noise:	66.8	65.1	61.8	57.3	65.8	66.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	26	57	122	263
CNEL:	28	61	131	281

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Rancho Pkwy. S.
Road Segment: n/o Bake Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	10,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,000 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	-1.44	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	77.72	-18.68	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	82.99	-22.63	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.7	62.8	61.0	55.0	63.6	64.2
Medium Trucks:	58.7	57.2	50.8	49.3	57.7	57.9
Heavy Trucks:	60.0	58.6	49.5	50.8	59.1	59.3
Vehicle Noise:	66.7	65.0	61.7	57.1	65.7	66.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	26	55	120	257
CNEL:	28	59	128	276

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Rancho Pkwy.
Road Segment: s/o Lake Forest Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,900 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.84	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	79.45	-16.40	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	84.25	-20.36	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.7	70.8	69.1	63.0	71.6	72.2
Medium Trucks:	66.5	65.0	58.7	57.1	65.6	65.8
Heavy Trucks:	67.3	65.9	56.9	58.1	66.5	66.6
Vehicle Noise:	74.6	72.8	69.7	65.0	73.5	74.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	52	111	240	516
CNEL:	55	119	257	554

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Towne Centre Dr.
Road Segment: s/o Alton Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	15,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,510 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	0.93	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	75.75	-16.31	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	81.57	-20.26	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.7	66.8	65.0	58.9	67.6	68.2
Medium Trucks:	62.9	61.4	55.0	53.5	62.0	62.2
Heavy Trucks:	64.7	63.3	54.3	55.5	63.9	64.0
Vehicle Noise:	70.9	69.2	65.7	61.3	69.9	70.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	29	63	137	294
CNEL:	31	68	146	314

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Towne Centre Dr.
Road Segment: s/o Bake Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	820 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-1.72	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	75.75	-18.96	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	81.57	-22.92	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.0	64.1	62.3	56.3	64.9	65.5
Medium Trucks:	60.3	58.8	52.4	50.8	59.3	59.5
Heavy Trucks:	62.1	60.7	51.6	52.9	61.2	61.4
Vehicle Noise:	68.2	66.5	63.1	58.7	67.2	67.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	20	42	91	196
CNEL:	21	45	97	209

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Towne Centre Dr.
Road Segment: s/o Lake Forest Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	540 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-3.54	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	75.75	-20.77	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	81.57	-24.73	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.2	62.3	60.5	54.5	63.1	63.7
Medium Trucks:	58.4	56.9	50.6	49.0	57.5	57.7
Heavy Trucks:	60.3	58.8	49.8	51.1	59.4	59.5
Vehicle Noise:	66.4	64.7	61.3	56.9	65.4	65.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	15	32	69	148
CNEL:	16	34	74	158

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Portola Pkwy.
Road Segment: s/o Alton Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,770 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	2.99	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	77.72	-14.25	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	82.99	-18.21	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.6	66.7	64.9	58.8	67.5	68.1
Medium Trucks:	62.5	61.0	54.7	53.1	61.6	61.8
Heavy Trucks:	63.8	62.4	53.4	54.6	63.0	63.1
Vehicle Noise:	70.6	68.8	65.6	61.0	69.5	70.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	56	120	259	559
CNEL:	60	129	278	598

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Portola Pkwy.
Road Segment: n/o Rancho Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	29,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,900 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.22	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-15.02	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-18.98	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.1	69.2	67.4	61.4	70.0	70.6
Medium Trucks:	64.7	63.2	56.8	55.3	63.7	64.0
Heavy Trucks:	65.1	63.7	54.6	55.9	64.2	64.4
Vehicle Noise:	72.8	71.0	68.0	63.2	71.8	72.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	92	198	426	918
CNEL:	99	213	458	987

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Santa Margarita Pkwy.
Road Segment: s/o El Toro Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	39,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,900 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.50	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-13.74	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-17.69	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.8	70.9	69.1	63.0	71.7	72.3
Medium Trucks:	66.3	64.8	58.5	56.9	65.4	65.6
Heavy Trucks:	66.7	65.3	56.3	57.5	65.9	66.0
Vehicle Noise:	74.5	72.7	69.7	64.9	73.4	73.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	101	219	471	1,015
CNEL:	109	235	506	1,090

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Santa Margarita Pkwy.
Road Segment: s/o Los Alisos Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	37,900	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,790	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	74	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	3.84	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	79.45	-13.40	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	84.25	-17.36	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.4	69.5	67.7	61.6	70.3	70.9
Medium Trucks:	65.1	63.6	57.2	55.7	64.2	64.4
Heavy Trucks:	65.9	64.5	55.5	56.7	65.1	65.2
Vehicle Noise:	73.2	71.4	68.3	63.6	72.2	72.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	84	180	388	836
CNEL:	90	193	416	896

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Alton Pkwy.
Road Segment: w/o Irvine Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	29,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,900	vehicles
Vehicle Speed:	55	mph
Near/Far Lane Distance:	74	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	1.80	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-15.44	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-19.39	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.6	70.7	69.0	62.9	71.5	72.1
Medium Trucks:	66.0	64.5	58.2	56.6	65.1	65.3
Heavy Trucks:	66.1	64.6	55.6	56.8	65.2	65.3
Vehicle Noise:	74.2	72.5	69.5	64.6	73.2	73.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	98	211	454	977
CNEL:	105	227	488	1,051

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Alton Pkwy.
Road Segment: e/o Irvine Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	26,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,600	vehicles
Vehicle Speed:	60	mph
Near/Far Lane Distance:	74	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	73.22	0.95	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	83.68	-16.29	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	87.33	-20.24	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.2	71.3	69.6	63.5	72.1	72.7
Medium Trucks:	66.5	65.0	58.6	57.0	65.5	65.7
Heavy Trucks:	66.1	64.7	55.7	56.9	65.3	65.4
Vehicle Noise:	74.7	72.9	70.1	65.1	73.7	74.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	105	227	489	1,053
CNEL:	113	244	526	1,134

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Alton Pkwy.
Road Segment: w/o Rancho Pkwy. S.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,800	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,680	vehicles
Vehicle Speed:	55	mph
Near/Far Lane Distance:	74	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	2.84	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-14.40	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-18.36	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.7	71.8	70.0	64.0	72.6	73.2
Medium Trucks:	67.1	65.6	59.2	57.7	66.1	66.3
Heavy Trucks:	67.1	65.7	56.6	57.9	66.2	66.4
Vehicle Noise:	75.3	73.5	70.5	65.7	74.2	74.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	115	247	532	1,146
CNEL:	123	266	572	1,232

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Bake Pkwy.
Road Segment: w/o Rockfield Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	75,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	7,500 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	5.93	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-11.31	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-15.27	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.8	74.9	73.1	67.0	75.7	76.3
Medium Trucks:	70.2	68.7	62.3	60.7	69.2	69.4
Heavy Trucks:	70.2	68.8	59.7	61.0	69.3	69.5
Vehicle Noise:	78.3	76.6	73.6	68.8	77.3	77.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	184	397	855	1,841
CNEL:	198	427	920	1,981

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Bake Pkwy.
Road Segment: e/o Rockfield Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	66,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	6,680 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	5.43	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-11.81	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-15.77	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.3	74.4	72.6	66.5	75.2	75.8
Medium Trucks:	69.7	68.1	61.8	60.2	68.7	68.9
Heavy Trucks:	69.7	68.3	59.2	60.5	68.8	69.0
Vehicle Noise:	77.8	76.1	73.1	68.2	76.8	77.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	170	367	791	1,705
CNEL:	183	395	851	1,834

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Bake Pkwy.
Road Segment: e/o Muirlands Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	64,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	6,400 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	5.24	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-12.00	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-15.95	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.1	74.2	72.4	66.4	75.0	75.6
Medium Trucks:	69.5	68.0	61.6	60.1	68.5	68.7
Heavy Trucks:	69.5	68.1	59.0	60.3	68.6	68.8
Vehicle Noise:	77.7	75.9	72.9	68.1	76.6	77.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	166	357	769	1,657
CNEL:	178	384	827	1,782

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Bake Pkwy.
Road Segment: e/o Jeronimo Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	56,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	5,630 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	5.10	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-12.14	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-16.10	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	74.4	72.5	70.7	64.6	73.3	73.9
Medium Trucks:	67.9	66.4	60.1	58.5	67.0	67.2
Heavy Trucks:	68.3	66.9	57.9	59.1	67.5	67.6
Vehicle Noise:	76.1	74.3	71.3	66.5	75.0	75.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	130	279	602	1,296
CNEL:	139	300	646	1,392

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Bake Pkwy.
Road Segment: e/o Toledo Wy.

Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	52,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	5,200 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.75	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-12.49	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-16.44	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	74.0	72.1	70.3	64.3	72.9	73.5
Medium Trucks:	67.6	66.1	59.7	58.2	66.6	66.9
Heavy Trucks:	68.0	66.6	57.5	58.8	67.1	67.3
Vehicle Noise:	75.7	74.0	70.9	66.1	74.7	75.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	123	265	571	1,229
CNEL:	132	285	613	1,321

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Bake Pkwy.
Road Segment: e/o Trabuco Rd.

Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	37,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,700 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.27	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-13.96	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-17.92	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.5	70.6	68.9	62.8	71.4	72.0
Medium Trucks:	66.1	64.6	58.2	56.7	65.1	65.4
Heavy Trucks:	66.5	65.1	56.1	57.3	65.7	65.8
Vehicle Noise:	74.2	72.5	69.4	64.6	73.2	73.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	98	211	455	980
CNEL:	105	227	489	1,053

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Bake Pkwy.
Road Segment: w/o Dimension Dr.

Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,550 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.09	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-14.14	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-18.10	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.9	71.0	69.3	63.2	71.8	72.4
Medium Trucks:	66.5	65.0	58.6	57.1	65.5	65.8
Heavy Trucks:	66.9	65.5	56.4	57.7	66.0	66.2
Vehicle Noise:	74.6	72.9	69.8	65.0	73.6	74.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	87	187	402	866
CNEL:	93	200	432	930

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Bake Pkwy.
Road Segment: e/o Dimension Dr.

Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	31,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,100 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.51	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-14.73	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-18.69	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.3	70.4	68.7	62.6	71.2	71.8
Medium Trucks:	65.9	64.4	58.0	56.5	64.9	65.2
Heavy Trucks:	66.3	64.9	55.8	57.1	65.5	65.6
Vehicle Noise:	74.0	72.3	69.2	64.4	73.0	73.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	79	170	367	791
CNEL:	85	183	395	850

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Bake Pkwy.
Road Segment: e/o Rancho Pkwy. S.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	31,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,100 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.51	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-14.73	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-18.69	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.3	70.4	68.7	62.6	71.2	71.8
Medium Trucks:	65.9	64.4	58.0	56.5	64.9	65.2
Heavy Trucks:	66.3	64.9	55.8	57.1	65.5	65.6
Vehicle Noise:	74.0	72.3	69.2	64.4	73.0	73.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	79	170	367	791
CNEL:	85	183	395	850

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Bake Pkwy.
Road Segment: w/o Towne Centre Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	29,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,900 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.22	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	81.00	-15.02	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	85.38	-18.98	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	75.8	73.9	72.2	66.1	74.7	75.4
Medium Trucks:	69.4	67.9	61.6	60.0	68.5	68.7
Heavy Trucks:	69.8	68.4	59.4	60.6	69.0	69.1
Vehicle Noise:	77.5	75.8	72.7	68.0	76.5	77.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	82	176	379	815
CNEL:	88	189	407	876

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Bake Pkwy.
Road Segment: e/o Towne Centre Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	25,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,550 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	1.66	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	81.00	-15.58	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	85.38	-19.54	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	75.3	73.4	71.6	65.6	74.2	74.8
Medium Trucks:	68.9	67.4	61.0	59.5	67.9	68.2
Heavy Trucks:	69.3	67.8	58.8	60.1	68.4	68.5
Vehicle Noise:	77.0	75.2	72.2	67.4	76.0	76.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	75	161	347	748
CNEL:	80	173	373	804

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Lake Forest Dr.
Road Segment: w/o Serrano Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	42,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,240 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.87	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-13.37	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-17.33	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.1	71.2	69.5	63.4	72.0	72.6
Medium Trucks:	66.7	65.2	58.8	57.3	65.7	66.0
Heavy Trucks:	67.1	65.7	56.6	57.9	66.3	66.4
Vehicle Noise:	74.8	73.1	70.0	65.2	73.8	74.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	107	231	498	1,073
CNEL:	115	248	535	1,153

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Lake Forest Dr.
Road Segment: e/o Serrano Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	42,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,250 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.88	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-13.36	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-17.32	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.1	71.2	69.5	63.4	72.0	72.6
Medium Trucks:	66.7	65.2	58.8	57.3	65.8	66.0
Heavy Trucks:	67.1	65.7	56.7	57.9	66.3	66.4
Vehicle Noise:	74.8	73.1	70.0	65.2	73.8	74.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	107	232	499	1,075
CNEL:	115	249	536	1,154

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Lake Forest Dr.
Road Segment: e/o Trabuco Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	40,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,010 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.62	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-13.62	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-17.57	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.4	71.5	69.8	63.7	72.3	73.0
Medium Trucks:	67.0	65.5	59.1	57.6	66.1	66.3
Heavy Trucks:	67.4	66.0	57.0	58.2	66.6	66.7
Vehicle Noise:	75.1	73.4	70.3	65.6	74.1	74.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	94	202	436	939
CNEL:	101	217	468	1,009

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Lake Forest Dr.
Road Segment: e/o Dimension Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	29,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,900 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.22	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-15.02	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-18.98	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.0	70.1	68.4	62.3	70.9	71.5
Medium Trucks:	65.6	64.1	57.7	56.2	64.7	64.9
Heavy Trucks:	66.0	64.6	55.6	56.8	65.2	65.3
Vehicle Noise:	73.7	72.0	68.9	64.2	72.7	73.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	76	163	351	757
CNEL:	81	175	377	813

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Lake Forest Dr.
Road Segment: e/o Rancho Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,300 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	1.21	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	81.00	-16.03	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	85.38	-19.99	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	74.8	72.9	71.2	65.1	73.7	74.3
Medium Trucks:	68.4	66.9	60.6	59.0	67.5	67.7
Heavy Trucks:	68.8	67.4	58.4	59.6	68.0	68.1
Vehicle Noise:	76.5	74.8	71.7	67.0	75.5	76.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	70	151	324	699
CNEL:	75	162	348	751

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Lake Forest Dr.
Road Segment: e/o Towne Centre Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,850 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.26	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	81.00	-16.98	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	85.38	-20.93	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.9	72.0	70.2	64.2	72.8	73.4
Medium Trucks:	67.5	66.0	59.6	58.1	66.5	66.8
Heavy Trucks:	67.9	66.5	57.4	58.7	67.0	67.1
Vehicle Noise:	75.6	73.8	70.8	66.0	74.6	75.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	60	130	281	604
CNEL:	65	140	301	649

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: Lake Forest Dr.
Road Segment: e/o Portola Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	720 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.38	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	79.45	-20.62	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	84.25	-24.57	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.5	66.6	64.8	58.8	67.4	68.0
Medium Trucks:	62.3	60.8	54.4	52.9	61.4	61.6
Heavy Trucks:	63.1	61.7	52.7	53.9	62.3	62.4
Vehicle Noise:	70.4	68.6	65.5	60.8	69.3	69.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	27	58	126	270
CNEL:	29	62	135	290

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: El Toro Rd.
Road Segment: w/o Jeronimo Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	42,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,220 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.84	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-13.39	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-17.35	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.7	70.8	69.1	63.0	71.6	72.2
Medium Trucks:	66.3	64.8	58.4	56.9	65.4	65.6
Heavy Trucks:	66.7	65.3	56.3	57.5	65.9	66.0
Vehicle Noise:	74.4	72.7	69.6	64.8	73.4	73.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	118	254	547	1,179
CNEL:	127	273	588	1,267

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: El Toro Rd.
Road Segment: e/o Jeronimo Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	45,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,510 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.13	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-13.11	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-17.06	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.0	71.1	69.4	63.3	71.9	72.5
Medium Trucks:	66.6	65.1	58.7	57.2	65.6	65.9
Heavy Trucks:	67.0	65.6	56.5	57.8	66.2	66.3
Vehicle Noise:	74.7	73.0	69.9	65.1	73.7	74.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	123	266	572	1,233
CNEL:	132	285	615	1,324

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: El Toro Rd.
Road Segment: e/o Serrano Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	43,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,300 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.93	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-13.31	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-17.27	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.8	70.9	69.2	63.1	71.7	72.3
Medium Trucks:	66.4	64.9	58.5	57.0	65.4	65.7
Heavy Trucks:	66.8	65.4	56.3	57.6	65.9	66.1
Vehicle Noise:	74.5	72.8	69.7	64.9	73.5	73.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	119	257	554	1,194
CNEL:	128	276	595	1,283

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: El Toro Rd.
Road Segment: e/o Trabuco Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	40,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,050 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.67	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-13.57	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-17.53	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.9	71.0	69.3	63.2	71.8	72.4
Medium Trucks:	66.5	65.0	58.6	57.1	65.5	65.8
Heavy Trucks:	66.9	65.5	56.4	57.7	66.1	66.2
Vehicle Noise:	74.6	72.9	69.8	65.0	73.6	74.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	104	224	483	1,041
CNEL:	112	241	519	1,118

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: El Toro Rd.
Road Segment: w/o Portola Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	29,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,900 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	1.80	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-15.44	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-19.39	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.6	70.7	69.0	62.9	71.5	72.1
Medium Trucks:	66.0	64.5	58.2	56.6	65.1	65.3
Heavy Trucks:	66.1	64.6	55.6	56.8	65.2	65.3
Vehicle Noise:	74.2	72.5	69.5	64.6	73.2	73.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	98	211	454	977
CNEL:	105	227	488	1,051

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: IY 2020 + P
Road Name: El Toro Rd.
Road Segment: e/o Portola Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	28,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,830 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	1.70	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-15.54	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-19.50	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.5	70.6	68.9	62.8	71.4	72.0
Medium Trucks:	65.9	64.4	58.1	56.5	65.0	65.2
Heavy Trucks:	66.0	64.5	55.5	56.7	65.1	65.2
Vehicle Noise:	74.1	72.3	69.4	64.5	73.1	73.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	96	207	446	962
CNEL:	103	223	480	1,034

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Trabuco Rd.
Road Segment: s/o Bake Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,700 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	1.49	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-15.75	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-19.70	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.3	70.4	68.7	62.6	71.2	71.8
Medium Trucks:	65.7	64.2	57.9	56.3	64.8	65.0
Heavy Trucks:	65.7	64.3	55.3	56.5	64.9	65.0
Vehicle Noise:	73.9	72.1	69.2	64.3	72.9	73.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	93	201	433	932
CNEL:	100	216	465	1,003

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Trabuco Rd.
Road Segment: s/o Lake Forest Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	39,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,900 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.50	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-13.74	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-17.69	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.8	70.9	69.1	63.0	71.7	72.3
Medium Trucks:	66.3	64.8	58.5	56.9	65.4	65.6
Heavy Trucks:	66.7	65.3	56.3	57.5	65.9	66.0
Vehicle Noise:	74.5	72.7	69.7	64.9	73.4	73.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	101	219	471	1,015
CNEL:	109	235	506	1,090

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Rancho Pkwy. S.
Road Segment: s/o Alton Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	16,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,670 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	0.79	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	77.72	-16.45	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	82.99	-20.41	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.9	65.0	63.3	57.2	65.8	66.4
Medium Trucks:	60.9	59.4	53.0	51.5	59.9	60.2
Heavy Trucks:	62.2	60.8	51.7	53.0	61.4	61.5
Vehicle Noise:	68.9	67.2	63.9	59.4	67.9	68.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	36	78	168	362
CNEL:	39	84	180	388

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Rancho Pkwy. S.
Road Segment: n/o Bake Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	13,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,300 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	-0.30	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	77.72	-17.54	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	82.99	-21.49	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.8	63.9	62.2	56.1	64.7	65.3
Medium Trucks:	59.8	58.3	51.9	50.4	58.9	59.1
Heavy Trucks:	61.1	59.7	50.7	51.9	60.3	60.4
Vehicle Noise:	67.8	66.1	62.8	58.3	66.8	67.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	31	66	142	307
CNEL:	33	71	152	328

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Rancho Pkwy.
Road Segment: s/o Lake Forest Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,600	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	36	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	30.0	feet
Centerline Dist. to Observer:	30.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	3.61	4.63	-1.20	*-4.81*	0.000	0.000
Medium Trucks:	79.45	-13.63	4.67	-1.20	*-5.14*	0.000	0.000
Heavy Trucks:	84.25	-17.58	4.63	-1.20	*-5.77*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	75.5	73.6	71.8	65.8	74.4	75.0
Medium Trucks:	69.3	67.8	61.4	59.9	68.3	68.6
Heavy Trucks:	70.1	68.7	59.6	60.9	69.2	69.4
Vehicle Noise:	77.3	75.6	72.4	67.8	76.3	76.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	79	170	367	791
CNEL:	85	183	394	848

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Towne Centre Dr.
Road Segment: s/o Alton Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	15,100	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,510	vehicles
Vehicle Speed:	35	mph
Near/Far Lane Distance:	36	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	30.0	feet
Centerline Dist. to Observer:	30.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	64.30	0.93	4.63	-1.20	*-4.81*	0.000	0.000
Medium Trucks:	75.75	-16.31	4.67	-1.20	*-5.14*	0.000	0.000
Heavy Trucks:	81.57	-20.26	4.63	-1.20	*-5.77*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	68.7	66.8	65.0	58.9	67.6	68.2
Medium Trucks:	62.9	61.4	55.0	53.5	62.0	62.2
Heavy Trucks:	64.7	63.3	54.3	55.5	63.9	64.0
Vehicle Noise:	70.9	69.2	65.7	61.3	69.9	70.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	29	63	137	294
CNEL:	31	68	146	314

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Towne Centre Dr.
Road Segment: s/o Bake Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,500	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	950	vehicles
Vehicle Speed:	35	mph
Near/Far Lane Distance:	36	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	30.0	feet
Centerline Dist. to Observer:	30.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	64.30	-1.08	4.63	-1.20	*-4.81*	0.000	0.000
Medium Trucks:	75.75	-18.32	4.67	-1.20	*-5.14*	0.000	0.000
Heavy Trucks:	81.57	-22.28	4.63	-1.20	*-5.77*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	66.6	64.7	63.0	56.9	65.5	66.2
Medium Trucks:	60.9	59.4	53.0	51.5	59.9	60.2
Heavy Trucks:	62.7	61.3	52.3	53.5	61.9	62.0
Vehicle Noise:	68.9	67.2	63.7	59.3	67.9	68.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	22	47	100	216
CNEL:	23	50	107	231

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Towne Centre Dr.
Road Segment: s/o Lake Forest Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,300	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	530	vehicles
Vehicle Speed:	35	mph
Near/Far Lane Distance:	36	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	30.0	feet
Centerline Dist. to Observer:	30.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	64.30	-3.62	4.63	-1.20	*-4.81*	0.000	0.000
Medium Trucks:	75.75	-20.86	4.67	-1.20	*-5.14*	0.000	0.000
Heavy Trucks:	81.57	-24.81	4.63	-1.20	*-5.77*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	64.1	62.2	60.4	54.4	63.0	63.6
Medium Trucks:	58.4	56.9	50.5	49.0	57.4	57.6
Heavy Trucks:	60.2	58.8	49.7	51.0	59.3	59.5
Vehicle Noise:	66.3	64.6	61.2	56.8	65.3	65.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	15	32	68	146
CNEL:	16	34	73	156

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Portola Pkwy.
Road Segment: s/o Alton Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,390 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	3.86	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	77.72	-13.38	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	82.99	-17.33	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.4	67.5	65.8	59.7	68.3	68.9
Medium Trucks:	63.4	61.9	55.5	54.0	62.5	62.7
Heavy Trucks:	64.7	63.3	54.3	55.5	63.9	64.0
Vehicle Noise:	71.4	69.7	66.4	61.9	70.4	70.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	64	138	297	639
CNEL:	68	148	318	685

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Portola Pkwy.
Road Segment: n/o Rancho Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,500 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.03	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-14.21	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-18.16	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.9	70.0	68.3	62.2	70.8	71.4
Medium Trucks:	65.5	64.0	57.6	56.1	64.5	64.8
Heavy Trucks:	65.9	64.5	55.4	56.7	65.0	65.2
Vehicle Noise:	73.6	71.9	68.8	64.0	72.6	73.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	104	224	483	1,041
CNEL:	112	241	519	1,118

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Santa Margarita Pkwy.
Road Segment: s/o El Toro Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	49,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,900 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.49	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-12.74	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-16.70	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.8	71.9	70.1	64.0	72.7	73.3
Medium Trucks:	67.3	65.8	59.5	57.9	66.4	66.6
Heavy Trucks:	67.7	66.3	57.3	58.5	66.9	67.0
Vehicle Noise:	75.4	73.7	70.7	65.9	74.4	74.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	118	255	548	1,181
CNEL:	127	273	589	1,269

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Santa Margarita Pkwy.
Road Segment: s/o Los Alisos Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	46,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,670 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	4.74	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	79.45	-12.50	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	84.25	-16.45	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.3	70.4	68.6	62.5	71.2	71.8
Medium Trucks:	66.0	64.5	58.1	56.6	65.1	65.3
Heavy Trucks:	66.9	65.4	56.4	57.6	66.0	66.1
Vehicle Noise:	74.1	72.4	69.2	64.5	73.1	73.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	96	207	446	960
CNEL:	103	222	478	1,030

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Alton Pkwy.
Road Segment: w/o Irvine Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,370 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	2.45	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-14.78	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-18.74	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.3	71.4	69.6	63.6	72.2	72.8
Medium Trucks:	66.7	65.2	58.8	57.3	65.7	66.0
Heavy Trucks:	66.7	65.3	56.3	57.5	65.9	66.0
Vehicle Noise:	74.9	73.1	70.2	65.3	73.8	74.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	108	233	501	1,080
CNEL:	116	250	539	1,162

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Alton Pkwy.
Road Segment: e/o Irvine Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	29,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,900 vehicles
Vehicle Speed:	60 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	73.22	1.42	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	83.68	-15.81	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	87.33	-19.77	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.7	71.8	70.0	64.0	72.6	73.2
Medium Trucks:	66.9	65.4	59.1	57.5	66.0	66.2
Heavy Trucks:	66.6	65.2	56.2	57.4	65.8	65.9
Vehicle Noise:	75.2	73.4	70.5	65.6	74.1	74.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	113	244	526	1,132
CNEL:	122	263	566	1,220

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Alton Pkwy.
Road Segment: w/o Rancho Pkwy. S.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	54,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	5,490 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	4.57	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-12.67	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-16.62	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	75.4	73.5	71.7	65.7	74.3	74.9
Medium Trucks:	68.8	67.3	60.9	59.4	67.9	68.1
Heavy Trucks:	68.8	67.4	58.4	59.6	68.0	68.1
Vehicle Noise:	77.0	75.2	72.3	67.4	76.0	76.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	150	322	694	1,496
CNEL:	161	347	747	1,609

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Bake Pkwy.
Road Segment: w/o Rockfield Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	89,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	8,900 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	6.67	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-10.57	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-14.52	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	77.5	75.6	73.8	67.8	76.4	77.0
Medium Trucks:	70.9	69.4	63.0	61.5	69.9	70.2
Heavy Trucks:	70.9	69.5	60.5	61.7	70.1	70.2
Vehicle Noise:	79.1	77.3	74.4	69.5	78.0	78.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	206	445	958	2,064
CNEL:	222	478	1,031	2,220

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Bake Pkwy.
Road Segment: e/o Rockfield Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	71,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	7,110 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	5.70	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-11.54	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-15.50	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.5	74.6	72.9	66.8	75.4	76.0
Medium Trucks:	69.9	68.4	62.1	60.5	69.0	69.2
Heavy Trucks:	70.0	68.5	59.5	60.7	69.1	69.2
Vehicle Noise:	78.1	76.3	73.4	68.5	77.1	77.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	178	383	825	1,777
CNEL:	191	412	887	1,912

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Bake Pkwy.
Road Segment: e/o Muirlands Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	69,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	6,910 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	5.57	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-11.67	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-15.62	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.4	74.5	72.7	66.7	75.3	75.9
Medium Trucks:	69.8	68.3	61.9	60.4	68.9	69.1
Heavy Trucks:	69.8	68.4	59.4	60.6	69.0	69.1
Vehicle Noise:	78.0	76.2	73.3	68.4	76.9	77.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	174	376	809	1,744
CNEL:	188	404	871	1,876

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Bake Pkwy.
Road Segment: e/o Jeronimo Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	60,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	6,060 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	5.42	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-11.82	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-15.78	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	74.7	72.8	71.0	65.0	73.6	74.2
Medium Trucks:	68.2	66.7	60.4	58.8	67.3	67.5
Heavy Trucks:	68.7	67.2	58.2	59.4	67.8	67.9
Vehicle Noise:	76.4	74.6	71.6	66.8	75.3	75.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	136	293	632	1,361
CNEL:	146	315	679	1,463

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Bake Pkwy.
Road Segment: e/o Toledo Wy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	55,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	5,500 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	5.00	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-12.24	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-16.20	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	74.3	72.4	70.6	64.5	73.2	73.8
Medium Trucks:	67.8	66.3	60.0	58.4	66.9	67.1
Heavy Trucks:	68.2	66.8	57.8	59.0	67.4	67.5
Vehicle Noise:	75.9	74.2	71.2	66.4	74.9	75.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	128	275	592	1,276
CNEL:	137	295	636	1,371

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Bake Pkwy.
Road Segment: e/o Trabuco Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	40,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,000 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.61	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-13.63	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-17.58	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.9	71.0	69.2	63.2	71.8	72.4
Medium Trucks:	66.4	64.9	58.6	57.0	65.5	65.7
Heavy Trucks:	66.9	65.4	56.4	57.6	66.0	66.1
Vehicle Noise:	74.6	72.8	69.8	65.0	73.5	74.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	103	222	479	1,032
CNEL:	111	239	515	1,109

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Bake Pkwy.
Road Segment: w/o Dimension Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	38,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,860 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.46	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-13.78	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-17.74	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.3	71.4	69.6	63.6	72.2	72.8
Medium Trucks:	66.9	65.3	59.0	57.4	65.9	66.1
Heavy Trucks:	67.3	65.8	56.8	58.1	66.4	66.5
Vehicle Noise:	75.0	73.2	70.2	65.4	73.9	74.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	92	197	425	916
CNEL:	98	212	457	984

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Bake Pkwy.
Road Segment: e/o Dimension Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	40,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,000 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.61	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-13.63	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-17.58	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.4	71.5	69.8	63.7	72.3	72.9
Medium Trucks:	67.0	65.5	59.1	57.6	66.1	66.3
Heavy Trucks:	67.4	66.0	57.0	58.2	66.6	66.7
Vehicle Noise:	75.1	73.4	70.3	65.5	74.1	74.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	94	202	435	938
CNEL:	101	217	468	1,008

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Bake Pkwy.
Road Segment: e/o Rancho Pkwy. S.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	37,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,700 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.27	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-13.96	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-17.92	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.1	71.2	69.4	63.4	72.0	72.6
Medium Trucks:	66.7	65.2	58.8	57.3	65.7	65.9
Heavy Trucks:	67.1	65.7	56.6	57.9	66.2	66.3
Vehicle Noise:	74.8	73.0	70.0	65.2	73.8	74.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	89	192	413	890
CNEL:	96	206	444	956

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Bake Pkwy.
Road Segment: w/o Towne Centre Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	31,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,100 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.51	4.63	-1.20	*-4.81*	0.000	0.000
Medium Trucks:	81.00	-14.73	4.67	-1.20	*-5.14*	0.000	0.000
Heavy Trucks:	85.38	-18.69	4.63	-1.20	*-5.77*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.1	74.2	72.5	66.4	75.0	75.6
Medium Trucks:	69.7	68.2	61.9	60.3	68.8	69.0
Heavy Trucks:	70.1	68.7	59.7	60.9	69.3	69.4
Vehicle Noise:	77.8	76.1	73.0	68.3	76.8	77.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	85	184	396	853
CNEL:	92	197	425	916

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Bake Pkwy.
Road Segment: e/o Towne Centre Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	28,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,840 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.12	4.63	-1.20	*-4.81*	0.000	0.000
Medium Trucks:	81.00	-15.11	4.67	-1.20	*-5.14*	0.000	0.000
Heavy Trucks:	85.38	-19.07	4.63	-1.20	*-5.77*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	75.8	73.9	72.1	66.0	74.7	75.3
Medium Trucks:	69.4	67.9	61.5	59.9	68.4	68.6
Heavy Trucks:	69.7	68.3	59.3	60.5	68.9	69.0
Vehicle Noise:	77.5	75.7	72.7	67.9	76.4	76.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	80	173	373	804
CNEL:	86	186	401	864

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Lake Forest Dr.
Road Segment: w/o Serrano Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	43,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,380 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.01	0.25	-1.20	*-4.85*	0.000	0.000
Medium Trucks:	81.00	-13.23	0.27	-1.20	*-5.01*	0.000	0.000
Heavy Trucks:	85.38	-17.19	0.25	-1.20	*-5.34*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.3	71.4	69.6	63.5	72.2	72.8
Medium Trucks:	66.8	65.3	59.0	57.4	65.9	66.1
Heavy Trucks:	67.2	65.8	56.8	58.0	66.4	66.5
Vehicle Noise:	75.0	73.2	70.2	65.4	73.9	74.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	110	236	509	1,096
CNEL:	118	254	547	1,178

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Lake Forest Dr.
Road Segment: e/o Serrano Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	43,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,320 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.95	0.25	-1.20	*-4.85*	0.000	0.000
Medium Trucks:	81.00	-13.29	0.27	-1.20	*-5.01*	0.000	0.000
Heavy Trucks:	85.38	-17.25	0.25	-1.20	*-5.34*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.2	71.3	69.5	63.5	72.1	72.7
Medium Trucks:	66.8	65.3	58.9	57.4	65.8	66.1
Heavy Trucks:	67.2	65.8	56.7	58.0	66.3	66.5
Vehicle Noise:	74.9	73.1	70.1	65.3	73.9	74.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	109	234	504	1,086
CNEL:	117	251	542	1,167

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Lake Forest Dr.
Road Segment: e/o Trabuco Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	40,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,090 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.71	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-13.53	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-17.49	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.5	71.6	69.9	63.8	72.4	73.0
Medium Trucks:	67.1	65.6	59.2	57.7	66.1	66.4
Heavy Trucks:	67.5	66.1	57.1	58.3	66.7	66.8
Vehicle Noise:	75.2	73.5	70.4	65.6	74.2	74.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	95	205	442	952
CNEL:	102	220	475	1,023

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Lake Forest Dr.
Road Segment: e/o Dimension Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	37,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,700 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.27	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-13.96	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-17.92	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.1	71.2	69.4	63.4	72.0	72.6
Medium Trucks:	66.7	65.2	58.8	57.3	65.7	65.9
Heavy Trucks:	67.1	65.7	56.6	57.9	66.2	66.3
Vehicle Noise:	74.8	73.0	70.0	65.2	73.8	74.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	89	192	413	890
CNEL:	96	206	444	956

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Lake Forest Dr.
Road Segment: e/o Rancho Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.36	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	81.00	-14.88	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	85.38	-18.83	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.0	74.1	72.3	66.3	74.9	75.5
Medium Trucks:	69.6	68.1	61.7	60.2	68.6	68.9
Heavy Trucks:	70.0	68.6	59.5	60.8	69.1	69.2
Vehicle Noise:	77.7	75.9	72.9	68.1	76.7	77.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	83	180	387	834
CNEL:	90	193	416	896

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Lake Forest Dr.
Road Segment: e/o Towne Centre Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,180 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.98	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	81.00	-16.26	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	85.38	-20.22	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	74.6	72.7	70.9	64.9	73.5	74.1
Medium Trucks:	68.2	66.7	60.3	58.8	67.3	67.5
Heavy Trucks:	68.6	67.2	58.1	59.4	67.7	67.9
Vehicle Noise:	76.3	74.6	71.5	66.7	75.3	75.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	67	145	313	674
CNEL:	72	156	336	724

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: Lake Forest Dr.
Road Segment: e/o Portola Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	11,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,110 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.50	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	79.45	-18.74	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	84.25	-22.69	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.4	68.5	66.7	60.7	69.3	69.9
Medium Trucks:	64.2	62.7	56.3	54.8	63.2	63.5
Heavy Trucks:	65.0	63.6	54.5	55.8	64.1	64.3
Vehicle Noise:	72.2	70.5	67.3	62.7	71.2	71.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	36	78	168	361
CNEL:	39	83	180	387

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: El Toro Rd.
Road Segment: w/o Jeronimo Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	41,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,140 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.76	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-13.48	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-17.43	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.7	70.8	69.0	62.9	71.6	72.2
Medium Trucks:	66.2	64.7	58.4	56.8	65.3	65.5
Heavy Trucks:	66.6	65.2	56.2	57.4	65.8	65.9
Vehicle Noise:	74.3	72.6	69.6	64.8	73.3	73.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	116	251	540	1,164
CNEL:	125	269	581	1,251

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: El Toro Rd.
Road Segment: e/o Jeronimo Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	46,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,640 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.26	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-12.98	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-16.94	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.1	71.2	69.5	63.4	72.0	72.7
Medium Trucks:	66.7	65.2	58.8	57.3	65.8	66.0
Heavy Trucks:	67.1	65.7	56.7	57.9	66.3	66.4
Vehicle Noise:	74.8	73.1	70.0	65.3	73.8	74.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	126	271	583	1,256
CNEL:	135	291	626	1,350

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: El Toro Rd.
Road Segment: e/o Serrano Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	45,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,500 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.12	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-13.11	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-17.07	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.0	71.1	69.3	63.3	71.9	72.5
Medium Trucks:	66.6	65.1	58.7	57.2	65.6	65.9
Heavy Trucks:	67.0	65.6	56.5	57.8	66.1	66.3
Vehicle Noise:	74.7	73.0	69.9	65.1	73.7	74.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	123	265	571	1,231
CNEL:	132	285	614	1,322

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: El Toro Rd.
Road Segment: e/o Trabuco Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	45,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,540 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.16	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-13.08	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-17.03	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.4	71.5	69.8	63.7	72.3	72.9
Medium Trucks:	67.0	65.5	59.1	57.6	66.0	66.3
Heavy Trucks:	67.4	66.0	56.9	58.2	66.5	66.7
Vehicle Noise:	75.1	73.4	70.3	65.5	74.1	74.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	112	242	521	1,123
CNEL:	121	260	560	1,206

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: El Toro Rd.
Road Segment: w/o Portola Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,300 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	2.36	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-14.88	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-18.83	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.2	71.3	69.5	63.5	72.1	72.7
Medium Trucks:	66.6	65.1	58.7	57.2	65.6	65.9
Heavy Trucks:	66.6	65.2	56.2	57.4	65.8	65.9
Vehicle Noise:	74.8	73.0	70.1	65.2	73.7	74.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	107	230	494	1,065
CNEL:	115	247	532	1,146

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ Approved Use w/o
Road Name: El Toro Rd.
Road Segment: e/o Portola Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,380 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	2.47	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-14.77	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-18.73	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.3	71.4	69.6	63.6	72.2	72.8
Medium Trucks:	66.7	65.2	58.8	57.3	65.7	66.0
Heavy Trucks:	66.7	65.3	56.3	57.5	65.9	66.0
Vehicle Noise:	74.9	73.1	70.2	65.3	73.8	74.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	108	233	502	1,082
CNEL:	116	251	540	1,164

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Trabuco Rd.
Road Segment: s/o Bake Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,700 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	1.49	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-15.75	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-19.70	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.3	70.4	68.7	62.6	71.2	71.8
Medium Trucks:	65.7	64.2	57.9	56.3	64.8	65.0
Heavy Trucks:	65.7	64.3	55.3	56.5	64.9	65.0
Vehicle Noise:	73.9	72.1	69.2	64.3	72.9	73.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	93	201	433	932
CNEL:	100	216	465	1,003

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Trabuco Rd.
Road Segment: s/o Lake Forest Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	39,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,900 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.50	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-13.74	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-17.69	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.8	70.9	69.1	63.0	71.7	72.3
Medium Trucks:	66.3	64.8	58.5	56.9	65.4	65.6
Heavy Trucks:	66.7	65.3	56.3	57.5	65.9	66.0
Vehicle Noise:	74.5	72.7	69.7	64.9	73.4	73.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	101	219	471	1,015
CNEL:	109	235	506	1,090

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Rancho Pkwy. S.
Road Segment: s/o Alton Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	15,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,570 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	0.52	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	77.72	-16.72	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	82.99	-20.67	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.6	64.8	63.0	56.9	65.6	66.2
Medium Trucks:	60.6	59.1	52.8	51.2	59.7	59.9
Heavy Trucks:	61.9	60.5	51.5	52.7	61.1	61.2
Vehicle Noise:	68.7	66.9	63.6	59.1	67.6	68.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	35	75	161	348
CNEL:	37	80	173	372

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Rancho Pkwy. S.
Road Segment: n/o Bake Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	12,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,200 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	-0.65	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	77.72	-17.89	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	82.99	-21.84	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.5	63.6	61.8	55.8	64.4	65.0
Medium Trucks:	59.5	58.0	51.6	50.0	58.5	58.7
Heavy Trucks:	60.8	59.3	50.3	51.6	59.9	60.0
Vehicle Noise:	67.5	65.8	62.5	57.9	66.5	66.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	29	63	135	291
CNEL:	31	67	145	311

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Rancho Pkwy.
Road Segment: s/o Lake Forest Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,300 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	3.23	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	79.45	-14.00	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	84.25	-17.96	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	75.1	73.2	71.5	65.4	74.0	74.6
Medium Trucks:	68.9	67.4	61.0	59.5	68.0	68.2
Heavy Trucks:	69.7	68.3	59.3	60.5	68.9	69.0
Vehicle Noise:	77.0	75.2	72.1	67.4	75.9	76.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	75	161	346	746
CNEL:	80	172	371	800

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Towne Centre Dr.
Road Segment: s/o Alton Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	15,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,520 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	0.96	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	75.75	-16.28	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	81.57	-20.24	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.7	66.8	65.0	59.0	67.6	68.2
Medium Trucks:	62.9	61.4	55.1	53.5	62.0	62.2
Heavy Trucks:	64.8	63.3	54.3	55.6	63.9	64.0
Vehicle Noise:	70.9	69.2	65.8	61.4	69.9	70.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	30	64	137	296
CNEL:	32	68	147	316

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Towne Centre Dr.
Road Segment: s/o Bake Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	940 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-1.13	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	75.75	-18.37	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	81.57	-22.32	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.6	64.7	62.9	56.9	65.5	66.1
Medium Trucks:	60.9	59.3	53.0	51.4	59.9	60.1
Heavy Trucks:	62.7	61.3	52.2	53.5	61.8	61.9
Vehicle Noise:	68.8	67.1	63.7	59.3	67.8	68.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	21	46	100	215
CNEL:	23	49	106	229

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Towne Centre Dr.
Road Segment: s/o Lake Forest Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	510 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-3.78	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	75.75	-21.02	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	81.57	-24.98	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.9	62.0	60.3	54.2	62.8	63.5
Medium Trucks:	58.2	56.7	50.3	48.8	57.2	57.5
Heavy Trucks:	60.0	58.6	49.6	50.8	59.2	59.3
Vehicle Noise:	66.2	64.5	61.0	56.6	65.2	65.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	14	31	66	143
CNEL:	15	33	71	152

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Portola Pkwy.
Road Segment: s/o Alton Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	34,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,430 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	3.91	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	77.72	-13.32	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	82.99	-17.28	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.5	67.6	65.8	59.8	68.4	69.0
Medium Trucks:	63.5	61.9	55.6	54.0	62.5	62.7
Heavy Trucks:	64.8	63.3	54.3	55.6	63.9	64.0
Vehicle Noise:	71.5	69.8	66.5	61.9	70.5	70.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	64	139	299	644
CNEL:	69	149	320	690

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Portola Pkwy.
Road Segment: n/o Rancho Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,500 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.03	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-14.21	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-18.16	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.9	70.0	68.3	62.2	70.8	71.4
Medium Trucks:	65.5	64.0	57.6	56.1	64.5	64.8
Heavy Trucks:	65.9	64.5	55.4	56.7	65.0	65.2
Vehicle Noise:	73.6	71.9	68.8	64.0	72.6	73.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	104	224	483	1,041
CNEL:	112	241	519	1,118

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Santa Margarita Pkwy.
Road Segment: s/o El Toro Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	48,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,800 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.40	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-12.83	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-16.79	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.7	71.8	70.0	63.9	72.6	73.2
Medium Trucks:	67.2	65.7	59.4	57.8	66.3	66.5
Heavy Trucks:	67.6	66.2	57.2	58.4	66.8	66.9
Vehicle Noise:	75.4	73.6	70.6	65.8	74.3	74.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	117	251	541	1,165
CNEL:	125	270	581	1,252

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Santa Margarita Pkwy.
Road Segment: s/o Los Alisos Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	45,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,550 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	4.63	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	79.45	-12.61	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	84.25	-16.57	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.1	70.2	68.5	62.4	71.0	71.7
Medium Trucks:	65.9	64.4	58.0	56.5	65.0	65.2
Heavy Trucks:	66.7	65.3	56.3	57.5	65.9	66.0
Vehicle Noise:	74.0	72.2	69.1	64.4	73.0	73.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	94	203	438	944
CNEL:	101	218	470	1,013

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Alton Pkwy.
Road Segment: w/o Irvine Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,370 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	2.45	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-14.78	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-18.74	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.3	71.4	69.6	63.6	72.2	72.8
Medium Trucks:	66.7	65.2	58.8	57.3	65.7	66.0
Heavy Trucks:	66.7	65.3	56.3	57.5	65.9	66.0
Vehicle Noise:	74.9	73.1	70.2	65.3	73.8	74.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	108	233	501	1,080
CNEL:	116	250	539	1,162

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Alton Pkwy.
Road Segment: e/o Irvine Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	28,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,800 vehicles
Vehicle Speed:	60 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	73.22	1.27	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	83.68	-15.97	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	87.33	-19.92	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.5	71.6	69.9	63.8	72.4	73.1
Medium Trucks:	66.8	65.3	58.9	57.4	65.8	66.1
Heavy Trucks:	66.5	65.0	56.0	57.2	65.6	65.7
Vehicle Noise:	75.0	73.3	70.4	65.4	74.0	74.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	111	238	513	1,106
CNEL:	119	257	553	1,192

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Alton Pkwy.
Road Segment: w/o Rancho Pkwy. S.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	53,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	5,390 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	4.49	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-12.74	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-16.70	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	75.3	73.4	71.7	65.6	74.2	74.8
Medium Trucks:	68.7	67.2	60.9	59.3	67.8	68.0
Heavy Trucks:	68.7	67.3	58.3	59.5	67.9	68.0
Vehicle Noise:	76.9	75.1	72.2	67.3	75.9	76.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	148	318	686	1,477
CNEL:	159	342	738	1,589

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Bake Pkwy.
Road Segment: w/o Rockfield Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	88,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	8,800 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	6.62	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-10.62	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-14.57	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	77.5	75.6	73.8	67.7	76.4	77.0
Medium Trucks:	70.9	69.3	63.0	61.4	69.9	70.1
Heavy Trucks:	70.9	69.5	60.4	61.7	70.0	70.2
Vehicle Noise:	79.0	77.3	74.3	69.4	78.0	78.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	205	441	951	2,048
CNEL:	220	475	1,023	2,204

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Bake Pkwy.
Road Segment: e/o Rockfield Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	70,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	7,050 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	5.66	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-11.58	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-15.53	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.5	74.6	72.8	66.8	75.4	76.0
Medium Trucks:	69.9	68.4	62.0	60.5	68.9	69.2
Heavy Trucks:	69.9	68.5	59.5	60.7	69.1	69.2
Vehicle Noise:	78.1	76.3	73.4	68.5	77.0	77.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	177	381	820	1,767
CNEL:	190	410	882	1,901

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Bake Pkwy.
Road Segment: e/o Muirlands Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	68,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	6,850 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	5.53	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-11.70	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-15.66	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.4	74.5	72.7	66.7	75.3	75.9
Medium Trucks:	69.8	68.3	61.9	60.4	68.8	69.0
Heavy Trucks:	69.8	68.4	59.3	60.6	68.9	69.1
Vehicle Noise:	77.9	76.2	73.2	68.4	76.9	77.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	173	373	805	1,733
CNEL:	186	402	866	1,865

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Bake Pkwy.
Road Segment: e/o Jeronimo Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	60,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	6,000 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	5.37	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-11.87	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-15.82	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	74.6	72.7	71.0	64.9	73.5	74.1
Medium Trucks:	68.2	66.7	60.3	58.8	67.2	67.5
Heavy Trucks:	68.6	67.2	58.2	59.4	67.8	67.9
Vehicle Noise:	76.3	74.6	71.5	66.7	75.3	75.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	135	291	628	1,352
CNEL:	145	313	674	1,453

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Bake Pkwy.
Road Segment: e/o Toledo Wy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	55,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	5,500 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	5.00	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-12.24	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-16.20	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	74.3	72.4	70.6	64.5	73.2	73.8
Medium Trucks:	67.8	66.3	60.0	58.4	66.9	67.1
Heavy Trucks:	68.2	66.8	57.8	59.0	67.4	67.5
Vehicle Noise:	75.9	74.2	71.2	66.4	74.9	75.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	128	275	592	1,276
CNEL:	137	295	636	1,371

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Bake Pkwy.
Road Segment: e/o Trabuco Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	39,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,900 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.50	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-13.74	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-17.69	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.8	70.9	69.1	63.0	71.7	72.3
Medium Trucks:	66.3	64.8	58.5	56.9	65.4	65.6
Heavy Trucks:	66.7	65.3	56.3	57.5	65.9	66.0
Vehicle Noise:	74.5	72.7	69.7	64.9	73.4	73.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	101	219	471	1,015
CNEL:	109	235	506	1,090

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Bake Pkwy.
Road Segment: w/o Dimension Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	37,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,780 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.37	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-13.87	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-17.83	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.2	71.3	69.5	63.5	72.1	72.7
Medium Trucks:	66.8	65.3	58.9	57.3	65.8	66.0
Heavy Trucks:	67.2	65.7	56.7	58.0	66.3	66.4
Vehicle Noise:	74.9	73.1	70.1	65.3	73.9	74.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	90	195	419	903
CNEL:	97	209	450	970

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Bake Pkwy.
Road Segment: e/o Dimension Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	38,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,800 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.39	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-13.85	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-17.80	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.2	71.3	69.5	63.5	72.1	72.7
Medium Trucks:	66.8	65.3	58.9	57.4	65.8	66.1
Heavy Trucks:	67.2	65.8	56.7	58.0	66.3	66.5
Vehicle Noise:	74.9	73.2	70.1	65.3	73.9	74.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	91	195	421	906
CNEL:	97	210	452	974

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Bake Pkwy.
Road Segment: e/o Rancho Pkwy. S.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	37,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,700 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.27	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-13.96	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-17.92	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.1	71.2	69.4	63.4	72.0	72.6
Medium Trucks:	66.7	65.2	58.8	57.3	65.7	65.9
Heavy Trucks:	67.1	65.7	56.6	57.9	66.2	66.3
Vehicle Noise:	74.8	73.0	70.0	65.2	73.8	74.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	89	192	413	890
CNEL:	96	206	444	956

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Bake Pkwy.
Road Segment: w/o Towne Centre Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	31,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,100 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.51	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	81.00	-14.73	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	85.38	-18.69	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.1	74.2	72.5	66.4	75.0	75.6
Medium Trucks:	69.7	68.2	61.9	60.3	68.8	69.0
Heavy Trucks:	70.1	68.7	59.7	60.9	69.3	69.4
Vehicle Noise:	77.8	76.1	73.0	68.3	76.8	77.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	85	184	396	853
CNEL:	92	197	425	916

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Bake Pkwy.
Road Segment: e/o Towne Centre Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	28,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,800	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	36	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	30.0	feet
Centerline Dist. to Observer:	30.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	2.06	4.63	-1.20	*-4.81*	0.000	0.000
Medium Trucks:	81.00	-15.18	4.67	-1.20	*-5.14*	0.000	0.000
Heavy Trucks:	85.38	-19.13	4.63	-1.20	*-5.77*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	75.7	73.8	72.0	66.0	74.6	75.2
Medium Trucks:	69.3	67.8	61.4	59.9	68.3	68.6
Heavy Trucks:	69.7	68.3	59.2	60.5	68.8	68.9
Vehicle Noise:	77.4	75.6	72.6	67.8	76.4	76.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	80	172	370	797
CNEL:	86	184	397	856

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Lake Forest Dr.
Road Segment: w/o Serrano Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	44,700	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	4,470	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	74	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	4.09	0.25	-1.20	*-4.85*	0.000	0.000
Medium Trucks:	81.00	-13.14	0.27	-1.20	*-5.01*	0.000	0.000
Heavy Trucks:	85.38	-17.10	0.25	-1.20	*-5.34*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.4	71.5	69.7	63.6	72.3	72.9
Medium Trucks:	66.9	65.4	59.1	57.5	66.0	66.2
Heavy Trucks:	67.3	65.9	56.9	58.1	66.5	66.6
Vehicle Noise:	75.0	73.3	70.3	65.5	74.0	74.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	111	239	516	1,111
CNEL:	119	257	554	1,194

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Lake Forest Dr.
Road Segment: e/o Serrano Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	43,600	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	4,360	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	74	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	3.99	0.25	-1.20	*-4.85*	0.000	0.000
Medium Trucks:	81.00	-13.25	0.27	-1.20	*-5.01*	0.000	0.000
Heavy Trucks:	85.38	-17.21	0.25	-1.20	*-5.34*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.2	71.3	69.6	63.5	72.1	72.8
Medium Trucks:	66.8	65.3	58.9	57.4	65.9	66.1
Heavy Trucks:	67.2	65.8	56.8	58.0	66.4	66.5
Vehicle Noise:	74.9	73.2	70.1	65.4	73.9	74.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	109	235	507	1,093
CNEL:	117	253	545	1,174

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Lake Forest Dr.
Road Segment: e/o Trabuco Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	40,700	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	4,070	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	50.0	feet
Centerline Dist. to Observer:	50.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	3.69	0.82	-1.20	*-4.84*	0.000	0.000
Medium Trucks:	81.00	-13.55	0.83	-1.20	*-5.04*	0.000	0.000
Heavy Trucks:	85.38	-17.51	0.82	-1.20	*-5.43*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.5	71.6	69.8	63.8	72.4	73.0
Medium Trucks:	67.1	65.6	59.2	57.7	66.1	66.4
Heavy Trucks:	67.5	66.1	57.0	58.3	66.6	66.8
Vehicle Noise:	75.2	73.5	70.4	65.6	74.2	74.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	95	204	440	949
CNEL:	102	220	473	1,019

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Lake Forest Dr.
Road Segment: e/o Dimension Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,500 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.03	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-14.21	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-18.16	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.9	71.0	69.2	63.1	71.8	72.4
Medium Trucks:	66.4	64.9	58.6	57.0	65.5	65.7
Heavy Trucks:	66.8	65.4	56.4	57.6	66.0	66.1
Vehicle Noise:	74.5	72.8	69.8	65.0	73.5	74.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	86	185	398	858
CNEL:	92	199	428	922

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Lake Forest Dr.
Road Segment: e/o Rancho Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	28,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,800 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.06	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	81.00	-15.18	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	85.38	-19.13	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	75.7	73.8	72.0	66.0	74.6	75.2
Medium Trucks:	69.3	67.8	61.4	59.9	68.3	68.6
Heavy Trucks:	69.7	68.3	59.2	60.5	68.8	68.9
Vehicle Noise:	77.4	75.6	72.6	67.8	76.4	76.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	80	172	370	797
CNEL:	86	184	397	856

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Lake Forest Dr.
Road Segment: e/o Towne Centre Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,000 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.60	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	81.00	-16.64	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	85.38	-20.59	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	74.2	72.3	70.6	64.5	73.1	73.7
Medium Trucks:	67.8	66.3	60.0	58.4	66.9	67.1
Heavy Trucks:	68.2	66.8	57.8	59.0	67.4	67.5
Vehicle Noise:	75.9	74.2	71.1	66.4	74.9	75.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	64	137	295	637
CNEL:	68	147	317	684

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: Lake Forest Dr.
Road Segment: e/o Portola Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	10,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,070 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.66	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	79.45	-18.90	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	84.25	-22.85	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.2	68.3	66.6	60.5	69.1	69.7
Medium Trucks:	64.0	62.5	56.2	54.6	63.1	63.3
Heavy Trucks:	64.8	63.4	54.4	55.6	64.0	64.1
Vehicle Noise:	72.1	70.3	67.2	62.5	71.0	71.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	35	76	163	352
CNEL:	38	81	175	378

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: El Toro Rd.
Road Segment: w/o Jeronimo Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	40,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,090 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.71	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-13.53	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-17.49	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.6	70.7	68.9	62.9	71.5	72.1
Medium Trucks:	66.2	64.7	58.3	56.8	65.2	65.4
Heavy Trucks:	66.6	65.2	56.1	57.4	65.7	65.9
Vehicle Noise:	74.3	72.5	69.5	64.7	73.3	73.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	115	249	536	1,155
CNEL:	124	267	576	1,241

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: El Toro Rd.
Road Segment: e/o Jeronimo Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	46,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,670 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.28	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-12.95	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-16.91	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.2	71.3	69.5	63.5	72.1	72.7
Medium Trucks:	66.7	65.2	58.9	57.3	65.8	66.0
Heavy Trucks:	67.2	65.7	56.7	57.9	66.3	66.4
Vehicle Noise:	74.9	73.1	70.1	65.3	73.8	74.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	126	272	586	1,262
CNEL:	136	292	629	1,355

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: El Toro Rd.
Road Segment: e/o Serrano Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	44,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,400 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.03	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-13.21	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-17.17	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.9	71.0	69.3	63.2	71.8	72.4
Medium Trucks:	66.5	65.0	58.6	57.1	65.5	65.8
Heavy Trucks:	66.9	65.5	56.4	57.7	66.0	66.2
Vehicle Noise:	74.6	72.9	69.8	65.0	73.6	74.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	121	261	563	1,212
CNEL:	130	281	605	1,303

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: El Toro Rd.
Road Segment: e/o Trabuco Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	44,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,490 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.11	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-13.12	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-17.08	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.4	71.5	69.7	63.7	72.3	72.9
Medium Trucks:	66.9	65.4	59.1	57.5	66.0	66.2
Heavy Trucks:	67.4	65.9	56.9	58.1	66.5	66.6
Vehicle Noise:	75.1	73.3	70.3	65.5	74.0	74.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	111	240	517	1,115
CNEL:	120	258	556	1,198

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: El Toro Rd.
Road Segment: w/o Portola Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,300	vehicles
Vehicle Speed:	55	mph
Near/Far Lane Distance:	74	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	71.78	2.36	0.25	-1.20	*-4.85*	0.000	0.000
Medium Trucks:	82.40	-14.88	0.27	-1.20	*-5.01*	0.000	0.000
Heavy Trucks:	86.40	-18.83	0.25	-1.20	*-5.34*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.2	71.3	69.5	63.5	72.1	72.7
Medium Trucks:	66.6	65.1	58.7	57.2	65.6	65.9
Heavy Trucks:	66.6	65.2	56.2	57.4	65.8	65.9
Vehicle Noise:	74.8	73.0	70.1	65.2	73.7	74.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	107	230	494	1,065
CNEL:	115	247	532	1,146

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2040 w/ App. Use, w/o Porto
Road Name: El Toro Rd.
Road Segment: e/o Portola Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,200	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,320	vehicles
Vehicle Speed:	55	mph
Near/Far Lane Distance:	74	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	71.78	2.39	0.25	-1.20	*-4.85*	0.000	0.000
Medium Trucks:	82.40	-14.85	0.27	-1.20	*-5.01*	0.000	0.000
Heavy Trucks:	86.40	-18.81	0.25	-1.20	*-5.34*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.2	71.3	69.6	63.5	72.1	72.7
Medium Trucks:	66.6	65.1	58.8	57.2	65.7	65.9
Heavy Trucks:	66.6	65.2	56.2	57.4	65.8	65.9
Vehicle Noise:	74.8	73.0	70.1	65.2	73.8	74.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	107	230	496	1,070
CNEL:	115	248	534	1,151

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Trabuco Rd.
Road Segment: s/o Bake Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	34,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,400 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	2.49	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-14.75	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-18.70	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.3	71.4	69.7	63.6	72.2	72.8
Medium Trucks:	66.7	65.2	58.9	57.3	65.8	66.0
Heavy Trucks:	66.7	65.3	56.3	57.5	65.9	66.0
Vehicle Noise:	74.9	73.1	70.2	65.3	73.9	74.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	109	234	504	1,087
CNEL:	117	252	543	1,169

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Trabuco Rd.
Road Segment: s/o Lake Forest Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	26,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,600 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	1.74	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-15.50	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-19.45	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.0	69.1	67.3	61.3	69.9	70.5
Medium Trucks:	64.6	63.1	56.7	55.2	63.6	63.8
Heavy Trucks:	65.0	63.6	54.5	55.8	64.1	64.3
Vehicle Noise:	72.7	70.9	67.9	63.1	71.7	72.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	77	167	359	774
CNEL:	83	179	386	832

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Rancho Pkwy. S.
Road Segment: s/o Alton Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	16,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,660 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	0.76	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	77.72	-16.48	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	82.99	-20.43	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.9	65.0	63.2	57.2	65.8	66.4
Medium Trucks:	60.9	59.4	53.0	51.5	59.9	60.1
Heavy Trucks:	62.2	60.8	51.7	53.0	61.3	61.5
Vehicle Noise:	68.9	67.2	63.9	59.3	67.9	68.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	36	78	168	361
CNEL:	39	83	179	387

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Rancho Pkwy. S.
Road Segment: n/o Bake Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	13,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,300 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	-0.30	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	77.72	-17.54	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	82.99	-21.49	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.8	63.9	62.2	56.1	64.7	65.3
Medium Trucks:	59.8	58.3	51.9	50.4	58.9	59.1
Heavy Trucks:	61.1	59.7	50.7	51.9	60.3	60.4
Vehicle Noise:	67.8	66.1	62.8	58.3	66.8	67.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	31	66	142	307
CNEL:	33	71	152	328

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Rancho Pkwy.
Road Segment: s/o Lake Forest Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,500 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	3.49	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	79.45	-13.75	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	84.25	-17.70	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	75.4	73.5	71.7	65.7	74.3	74.9
Medium Trucks:	69.2	67.7	61.3	59.8	68.2	68.5
Heavy Trucks:	70.0	68.6	59.5	60.8	69.1	69.2
Vehicle Noise:	77.2	75.5	72.3	67.6	76.2	76.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	78	167	360	776
CNEL:	83	179	386	832

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Towne Centre Dr.
Road Segment: s/o Alton Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	14,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,490 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	0.87	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	75.75	-16.37	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	81.57	-20.32	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.6	66.7	64.9	58.9	67.5	68.1
Medium Trucks:	62.9	61.3	55.0	53.4	61.9	62.1
Heavy Trucks:	64.7	63.3	54.2	55.5	63.8	63.9
Vehicle Noise:	70.8	69.1	65.7	61.3	69.8	70.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	29	63	135	292
CNEL:	31	67	145	312

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Towne Centre Dr.
Road Segment: s/o Bake Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	900 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-1.32	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	75.75	-18.56	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	81.57	-22.51	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.4	64.5	62.7	56.7	65.3	65.9
Medium Trucks:	60.7	59.2	52.8	51.3	59.7	59.9
Heavy Trucks:	62.5	61.1	52.0	53.3	61.6	61.8
Vehicle Noise:	68.6	66.9	63.5	59.1	67.6	68.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	21	45	97	208
CNEL:	22	48	103	223

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Towne Centre Dr.
Road Segment: s/o Lake Forest Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	570 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-3.30	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	75.75	-20.54	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	81.57	-24.49	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.4	62.5	60.8	54.7	63.3	63.9
Medium Trucks:	58.7	57.2	50.8	49.3	57.7	58.0
Heavy Trucks:	60.5	59.1	50.0	51.3	59.6	59.8
Vehicle Noise:	66.7	64.9	61.5	57.1	65.6	66.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	15	33	71	154
CNEL:	16	35	76	164

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Portola Pkwy.
Road Segment: s/o Alton Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	42,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,220 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	4.81	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	77.72	-12.42	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	82.99	-16.38	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.4	68.5	66.7	60.7	69.3	69.9
Medium Trucks:	64.4	62.8	56.5	54.9	63.4	63.6
Heavy Trucks:	65.7	64.2	55.2	56.5	64.8	64.9
Vehicle Noise:	72.4	70.7	67.4	62.8	71.4	71.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	74	159	343	740
CNEL:	79	171	368	792

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Portola Pkwy.
Road Segment: n/o Rancho Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,500 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.03	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-14.21	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-18.16	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.9	70.0	68.3	62.2	70.8	71.4
Medium Trucks:	65.5	64.0	57.6	56.1	64.5	64.8
Heavy Trucks:	65.9	64.5	55.4	56.7	65.0	65.2
Vehicle Noise:	73.6	71.9	68.8	64.0	72.6	73.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	104	224	483	1,041
CNEL:	112	241	519	1,118

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Santa Margarita Pkwy.
Road Segment: s/o El Toro Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	49,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,900 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.49	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-12.74	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-16.70	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.8	71.9	70.1	64.0	72.7	73.3
Medium Trucks:	67.3	65.8	59.5	57.9	66.4	66.6
Heavy Trucks:	67.7	66.3	57.3	58.5	66.9	67.0
Vehicle Noise:	75.4	73.7	70.7	65.9	74.4	74.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	118	255	548	1,181
CNEL:	127	273	589	1,269

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Santa Margarita Pkwy.
Road Segment: s/o Los Alisos Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	46,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,680 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	4.75	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	79.45	-12.49	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	84.25	-16.44	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.3	70.4	68.6	62.5	71.2	71.8
Medium Trucks:	66.0	64.5	58.2	56.6	65.1	65.3
Heavy Trucks:	66.9	65.4	56.4	57.7	66.0	66.1
Vehicle Noise:	74.1	72.4	69.2	64.5	73.1	73.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	96	207	446	962
CNEL:	103	222	479	1,032

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Alton Pkwy.
Road Segment: w/o Irvine Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,320 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	2.39	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-14.85	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-18.81	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.2	71.3	69.6	63.5	72.1	72.7
Medium Trucks:	66.6	65.1	58.8	57.2	65.7	65.9
Heavy Trucks:	66.6	65.2	56.2	57.4	65.8	65.9
Vehicle Noise:	74.8	73.0	70.1	65.2	73.8	74.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	107	230	496	1,070
CNEL:	115	248	534	1,151

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Alton Pkwy.
Road Segment: e/o Irvine Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	24,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,400 vehicles
Vehicle Speed:	60 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	73.22	0.60	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	83.68	-16.64	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	87.33	-20.59	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.9	71.0	69.2	63.2	71.8	72.4
Medium Trucks:	66.1	64.6	58.2	56.7	65.2	65.4
Heavy Trucks:	65.8	64.4	55.3	56.6	64.9	65.1
Vehicle Noise:	74.4	72.6	69.7	64.8	73.3	73.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	100	215	463	998
CNEL:	108	232	499	1,075

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Alton Pkwy.
Road Segment: w/o Rancho Pkwy. S.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	50,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	5,070 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	4.23	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-13.01	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-16.97	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	75.1	73.2	71.4	65.3	74.0	74.6
Medium Trucks:	68.5	67.0	60.6	59.0	67.5	67.7
Heavy Trucks:	68.5	67.1	58.0	59.3	67.6	67.8
Vehicle Noise:	76.6	74.9	71.9	67.1	75.6	76.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	142	306	658	1,418
CNEL:	153	329	708	1,526

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Bake Pkwy.
Road Segment: w/o Rockfield Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	88,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	8,800 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	6.62	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-10.62	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-14.57	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	77.5	75.6	73.8	67.7	76.4	77.0
Medium Trucks:	70.9	69.3	63.0	61.4	69.9	70.1
Heavy Trucks:	70.9	69.5	60.4	61.7	70.0	70.2
Vehicle Noise:	79.0	77.3	74.3	69.4	78.0	78.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	205	441	951	2,048
CNEL:	220	475	1,023	2,204

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Bake Pkwy.
Road Segment: e/o Rockfield Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	70,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	7,070 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	5.67	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-11.57	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-15.52	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.5	74.6	72.8	66.8	75.4	76.0
Medium Trucks:	69.9	68.4	62.0	60.5	68.9	69.2
Heavy Trucks:	69.9	68.5	59.5	60.7	69.1	69.2
Vehicle Noise:	78.1	76.3	73.4	68.5	77.0	77.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	177	381	822	1,770
CNEL:	190	410	884	1,905

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Bake Pkwy.
Road Segment: e/o Muirlands Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	68,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	6,850 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	5.53	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-11.70	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-15.66	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.4	74.5	72.7	66.7	75.3	75.9
Medium Trucks:	69.8	68.3	61.9	60.4	68.8	69.0
Heavy Trucks:	69.8	68.4	59.3	60.6	68.9	69.1
Vehicle Noise:	77.9	76.2	73.2	68.4	76.9	77.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	173	373	805	1,733
CNEL:	186	402	866	1,865

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Bake Pkwy.
Road Segment: e/o Jeronimo Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	59,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	5,990 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	5.37	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-11.87	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-15.83	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	74.6	72.7	71.0	64.9	73.5	74.1
Medium Trucks:	68.2	66.7	60.3	58.8	67.2	67.5
Heavy Trucks:	68.6	67.2	58.1	59.4	67.8	67.9
Vehicle Noise:	76.3	74.6	71.5	66.7	75.3	75.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	135	291	627	1,351
CNEL:	145	313	674	1,451

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Bake Pkwy.
Road Segment: e/o Toledo Wy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	55,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	5,500 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	5.00	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-12.24	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-16.20	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	74.3	72.4	70.6	64.5	73.2	73.8
Medium Trucks:	67.8	66.3	60.0	58.4	66.9	67.1
Heavy Trucks:	68.2	66.8	57.8	59.0	67.4	67.5
Vehicle Noise:	75.9	74.2	71.2	66.4	74.9	75.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	128	275	592	1,276
CNEL:	137	295	636	1,371

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Bake Pkwy.
Road Segment: e/o Trabuco Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	38,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,800 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.39	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-13.85	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-17.80	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.6	70.7	69.0	62.9	71.5	72.2
Medium Trucks:	66.2	64.7	58.3	56.8	65.3	65.5
Heavy Trucks:	66.6	65.2	56.2	57.4	65.8	65.9
Vehicle Noise:	74.3	72.6	69.5	64.8	73.3	73.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	100	215	463	997
CNEL:	107	231	497	1,071

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Bake Pkwy.
Road Segment: w/o Dimension Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	37,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,760 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.34	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-13.90	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-17.85	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.2	71.3	69.5	63.4	72.1	72.7
Medium Trucks:	66.7	65.2	58.9	57.3	65.8	66.0
Heavy Trucks:	67.1	65.7	56.7	57.9	66.3	66.4
Vehicle Noise:	74.9	73.1	70.1	65.3	73.8	74.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	90	194	418	900
CNEL:	97	208	449	967

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Bake Pkwy.
Road Segment: e/o Dimension Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	38,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,800 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.39	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-13.85	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-17.80	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.2	71.3	69.5	63.5	72.1	72.7
Medium Trucks:	66.8	65.3	58.9	57.4	65.8	66.1
Heavy Trucks:	67.2	65.8	56.7	58.0	66.3	66.5
Vehicle Noise:	74.9	73.2	70.1	65.3	73.9	74.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	91	195	421	906
CNEL:	97	210	452	974

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Bake Pkwy.
Road Segment: e/o Rancho Pkwy. S.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,600 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.15	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-14.08	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-18.04	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.0	71.1	69.3	63.3	71.9	72.5
Medium Trucks:	66.5	65.0	58.7	57.1	65.6	65.8
Heavy Trucks:	67.0	65.5	56.5	57.7	66.1	66.2
Vehicle Noise:	74.7	72.9	69.9	65.1	73.6	74.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	87	188	406	874
CNEL:	94	202	436	939

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Bake Pkwy.
Road Segment: w/o Towne Centre Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	31,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,100 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.51	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	81.00	-14.73	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	85.38	-18.69	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.1	74.2	72.5	66.4	75.0	75.6
Medium Trucks:	69.7	68.2	61.9	60.3	68.8	69.0
Heavy Trucks:	70.1	68.7	59.7	60.9	69.3	69.4
Vehicle Noise:	77.8	76.1	73.0	68.3	76.8	77.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	85	184	396	853
CNEL:	92	197	425	916

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Bake Pkwy.
Road Segment: e/o Towne Centre Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	28,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,830 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.11	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	81.00	-15.13	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	85.38	-19.08	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	75.7	73.8	72.1	66.0	74.6	75.2
Medium Trucks:	69.3	67.8	61.5	59.9	68.4	68.6
Heavy Trucks:	69.7	68.3	59.3	60.5	68.9	69.0
Vehicle Noise:	77.4	75.7	72.6	67.9	76.4	76.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	80	173	372	802
CNEL:	86	186	400	862

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Lake Forest Dr.
Road Segment: w/o Serrano Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	43,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,380 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.01	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-13.23	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-17.19	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.3	71.4	69.6	63.5	72.2	72.8
Medium Trucks:	66.8	65.3	59.0	57.4	65.9	66.1
Heavy Trucks:	67.2	65.8	56.8	58.0	66.4	66.5
Vehicle Noise:	75.0	73.2	70.2	65.4	73.9	74.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	110	236	509	1,096
CNEL:	118	254	547	1,178

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Lake Forest Dr.
Road Segment: e/o Serrano Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	42,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,290 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.92	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-13.32	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-17.28	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.2	71.3	69.5	63.5	72.1	72.7
Medium Trucks:	66.7	65.2	58.9	57.3	65.8	66.0
Heavy Trucks:	67.2	65.7	56.7	57.9	66.3	66.4
Vehicle Noise:	74.9	73.1	70.1	65.3	73.8	74.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	108	233	502	1,081
CNEL:	116	250	539	1,162

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Lake Forest Dr.
Road Segment: e/o Trabuco Rd.

Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	44,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,470 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.09	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-13.14	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-17.10	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.9	72.0	70.3	64.2	72.8	73.4
Medium Trucks:	67.5	66.0	59.6	58.1	66.5	66.8
Heavy Trucks:	67.9	66.5	57.4	58.7	67.0	67.2
Vehicle Noise:	75.6	73.9	70.8	66.0	74.6	75.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	101	218	469	1,010
CNEL:	108	234	504	1,085

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Lake Forest Dr.
Road Segment: e/o Dimension Dr.

Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	37,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,700 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.27	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-13.96	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-17.92	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.1	71.2	69.4	63.4	72.0	72.6
Medium Trucks:	66.7	65.2	58.8	57.3	65.7	65.9
Heavy Trucks:	67.1	65.7	56.6	57.9	66.2	66.3
Vehicle Noise:	74.8	73.0	70.0	65.2	73.8	74.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	89	192	413	890
CNEL:	96	206	444	956

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Lake Forest Dr.
Road Segment: e/o Rancho Pkwy.

Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	29,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,900 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.22	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	81.00	-15.02	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	85.38	-18.98	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	75.8	73.9	72.2	66.1	74.7	75.4
Medium Trucks:	69.4	67.9	61.6	60.0	68.5	68.7
Heavy Trucks:	69.8	68.4	59.4	60.6	69.0	69.1
Vehicle Noise:	77.5	75.8	72.7	68.0	76.5	77.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	82	176	379	815
CNEL:	88	189	407	876

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Lake Forest Dr.
Road Segment: e/o Towne Centre Dr.

Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,020 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.64	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	81.00	-16.59	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	85.38	-20.55	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	74.3	72.4	70.6	64.6	73.2	73.8
Medium Trucks:	67.9	66.4	60.0	58.5	66.9	67.2
Heavy Trucks:	68.3	66.8	57.8	59.0	67.4	67.5
Vehicle Noise:	76.0	74.2	71.2	66.4	74.9	75.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	64	138	297	641
CNEL:	69	148	320	688

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Lake Forest Dr.
Road Segment: e/o Portola Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	10,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,060 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.70	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	79.45	-18.94	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	84.25	-22.89	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.2	68.3	66.5	60.5	69.1	69.7
Medium Trucks:	64.0	62.5	56.1	54.6	63.0	63.3
Heavy Trucks:	64.8	63.4	54.3	55.6	63.9	64.1
Vehicle Noise:	72.0	70.3	67.1	62.5	71.0	71.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	35	75	162	350
CNEL:	38	81	174	375

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: El Toro Rd.
Road Segment: w/o Jeronimo Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	41,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,110 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.73	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-13.51	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-17.46	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.6	70.7	69.0	62.9	71.5	72.1
Medium Trucks:	66.2	64.7	58.3	56.8	65.2	65.5
Heavy Trucks:	66.6	65.2	56.1	57.4	65.7	65.9
Vehicle Noise:	74.3	72.6	69.5	64.7	73.3	73.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	116	250	538	1,159
CNEL:	124	268	578	1,245

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: El Toro Rd.
Road Segment: e/o Jeronimo Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	46,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,660 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.28	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-12.96	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-16.92	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.2	71.3	69.5	63.4	72.1	72.7
Medium Trucks:	66.7	65.2	58.9	57.3	65.8	66.0
Heavy Trucks:	67.1	65.7	56.7	57.9	66.3	66.4
Vehicle Noise:	74.9	73.1	70.1	65.3	73.8	74.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	126	271	585	1,260
CNEL:	135	292	628	1,353

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: El Toro Rd.
Road Segment: e/o Serrano Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	45,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,500 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.12	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-13.11	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-17.07	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.0	71.1	69.3	63.3	71.9	72.5
Medium Trucks:	66.6	65.1	58.7	57.2	65.6	65.9
Heavy Trucks:	67.0	65.6	56.5	57.8	66.1	66.3
Vehicle Noise:	74.7	73.0	69.9	65.1	73.7	74.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	123	265	571	1,231
CNEL:	132	285	614	1,322

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: El Toro Rd.
Road Segment: e/o Trabuco Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	44,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,440 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.07	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-13.17	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-17.13	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.3	71.4	69.7	63.6	72.2	72.8
Medium Trucks:	66.9	65.4	59.0	57.5	65.9	66.2
Heavy Trucks:	67.3	65.9	56.8	58.1	66.5	66.6
Vehicle Noise:	75.0	73.3	70.2	65.4	74.0	74.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	111	238	514	1,106
CNEL:	119	256	552	1,189

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: El Toro Rd.
Road Segment: w/o Portola Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,300 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	2.36	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-14.88	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-18.83	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.2	71.3	69.5	63.5	72.1	72.7
Medium Trucks:	66.6	65.1	58.7	57.2	65.6	65.9
Heavy Trucks:	66.6	65.2	56.2	57.4	65.8	65.9
Vehicle Noise:	74.8	73.0	70.1	65.2	73.7	74.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	107	230	494	1,065
CNEL:	115	247	532	1,146

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: El Toro Rd.
Road Segment: e/o Portola Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,370 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	2.45	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-14.78	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-18.74	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.3	71.4	69.6	63.6	72.2	72.8
Medium Trucks:	66.7	65.2	58.8	57.3	65.7	66.0
Heavy Trucks:	66.7	65.3	56.3	57.5	65.9	66.0
Vehicle Noise:	74.9	73.1	70.2	65.3	73.8	74.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	108	233	501	1,080
CNEL:	116	250	539	1,162

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Trabuco Rd.
Road Segment: s/o Bake Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,500 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	2.62	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-14.62	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-18.58	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.5	71.6	69.8	63.7	72.4	73.0
Medium Trucks:	66.8	65.3	59.0	57.4	65.9	66.1
Heavy Trucks:	66.9	65.5	56.4	57.7	66.0	66.1
Vehicle Noise:	75.0	73.3	70.3	65.4	74.0	74.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	111	239	514	1,108
CNEL:	119	257	553	1,192

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Trabuco Rd. | Job Number: 11049
Road Segment: s/o Lake Forest Dr.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,700	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	74	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	1.91	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-15.33	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-19.29	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.2	69.3	67.5	61.4	70.1	70.7
Medium Trucks:	64.7	63.2	56.9	55.3	63.8	64.0
Heavy Trucks:	65.1	63.7	54.7	55.9	64.3	64.4
Vehicle Noise:	72.9	71.1	68.1	63.3	71.8	72.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	79	171	369	794
CNEL:	85	184	396	853

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Rancho Pkwy. S. | Job Number: 11049
Road Segment: s/o Alton Pkwy.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	15,300	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,530	vehicles
Vehicle Speed:	40	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	50.0	feet
Centerline Dist. to Observer:	50.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	0.41	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	77.72	-16.83	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	82.99	-20.79	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.5	64.6	62.9	56.8	65.4	66.0
Medium Trucks:	60.5	59.0	52.6	51.1	59.6	59.8
Heavy Trucks:	61.8	60.4	51.4	52.6	61.0	61.1
Vehicle Noise:	68.5	66.8	63.5	59.0	67.5	68.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	34	74	159	342
CNEL:	37	79	170	366

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Rancho Pkwy. S. | Job Number: 11049
Road Segment: n/o Bake Pkwy.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	12,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,200	vehicles
Vehicle Speed:	40	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	50.0	feet
Centerline Dist. to Observer:	50.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	-0.65	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	77.72	-17.89	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	82.99	-21.84	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.5	63.6	61.8	55.8	64.4	65.0
Medium Trucks:	59.5	58.0	51.6	50.0	58.5	58.7
Heavy Trucks:	60.8	59.3	50.3	51.6	59.9	60.0
Vehicle Noise:	67.5	65.8	62.5	57.9	66.5	66.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	29	63	135	291
CNEL:	31	67	145	311

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Rancho Pkwy. | Job Number: 11049
Road Segment: s/o Lake Forest Dr.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,300	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	36	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	30.0	feet
Centerline Dist. to Observer:	30.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	3.23	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	79.45	-14.00	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	84.25	-17.96	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	75.1	73.2	71.5	65.4	74.0	74.6
Medium Trucks:	68.9	67.4	61.0	59.5	68.0	68.2
Heavy Trucks:	69.7	68.3	59.3	60.5	68.9	69.0
Vehicle Noise:	77.0	75.2	72.1	67.4	75.9	76.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	75	161	346	746
CNEL:	80	172	371	800

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Towne Centre Dr.
Road Segment: s/o Alton Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	15,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,540 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	1.02	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	75.75	-16.22	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	81.57	-20.18	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.7	66.8	65.1	59.0	67.6	68.3
Medium Trucks:	63.0	61.5	55.1	53.6	62.0	62.3
Heavy Trucks:	64.8	63.4	54.4	55.6	64.0	64.1
Vehicle Noise:	71.0	69.3	65.8	61.4	70.0	70.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	30	64	138	298
CNEL:	32	69	148	319

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Towne Centre Dr.
Road Segment: s/o Bake Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	870 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-1.46	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	75.75	-18.70	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	81.57	-22.66	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.3	64.4	62.6	56.5	65.2	65.8
Medium Trucks:	60.5	59.0	52.6	51.1	59.6	59.8
Heavy Trucks:	62.3	60.9	51.9	53.1	61.5	61.6
Vehicle Noise:	68.5	66.8	63.3	59.0	67.5	67.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	20	44	95	204
CNEL:	22	47	101	218

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Towne Centre Dr.
Road Segment: s/o Lake Forest Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	510 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-3.78	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	75.75	-21.02	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	81.57	-24.98	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.9	62.0	60.3	54.2	62.8	63.5
Medium Trucks:	58.2	56.7	50.3	48.8	57.2	57.5
Heavy Trucks:	60.0	58.6	49.6	50.8	59.2	59.3
Vehicle Noise:	66.2	64.5	61.0	56.6	65.2	65.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	14	31	66	143
CNEL:	15	33	71	152

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Portola Pkwy.
Road Segment: s/o Alton Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	42,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,260 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	4.85	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	77.72	-12.38	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	82.99	-16.34	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.4	68.5	66.8	60.7	69.3	69.9
Medium Trucks:	64.4	62.9	56.5	55.0	63.4	63.7
Heavy Trucks:	65.7	64.3	55.3	56.5	64.9	65.0
Vehicle Noise:	72.4	70.7	67.4	62.9	71.4	71.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	74	160	346	745
CNEL:	80	172	370	797

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Portola Pkwy. | Job Number: 11049
Road Segment: n/o Rancho Pkwy.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,500 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.03	-0.11	-1.20	*-4.86*	0.000	0.000
Medium Trucks:	81.00	-14.21	-0.10	-1.20	*-5.00*	0.000	0.000
Heavy Trucks:	85.38	-18.16	-0.11	-1.20	*-5.28*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.9	70.0	68.3	62.2	70.8	71.4
Medium Trucks:	65.5	64.0	57.6	56.1	64.5	64.8
Heavy Trucks:	65.9	64.5	55.4	56.7	65.0	65.2
Vehicle Noise:	73.6	71.9	68.8	64.0	72.6	73.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	104	224	483	1,041
CNEL:	112	241	519	1,118

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Santa Margarita Pkwy. | Job Number: 11049
Road Segment: s/o El Toro Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	48,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,800 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.40	0.25	-1.20	*-4.85*	0.000	0.000
Medium Trucks:	81.00	-12.83	0.27	-1.20	*-5.01*	0.000	0.000
Heavy Trucks:	85.38	-16.79	0.25	-1.20	*-5.34*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.7	71.8	70.0	63.9	72.6	73.2
Medium Trucks:	67.2	65.7	59.4	57.8	66.3	66.5
Heavy Trucks:	67.6	66.2	57.2	58.4	66.8	66.9
Vehicle Noise:	75.4	73.6	70.6	65.8	74.3	74.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	117	251	541	1,165
CNEL:	125	270	581	1,252

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Santa Margarita Pkwy. | Job Number: 11049
Road Segment: s/o Los Alisos Bl.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	45,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,550 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	4.63	0.25	-1.20	*-4.85*	0.000	0.000
Medium Trucks:	79.45	-12.61	0.27	-1.20	*-5.01*	0.000	0.000
Heavy Trucks:	84.25	-16.57	0.25	-1.20	*-5.34*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.1	70.2	68.5	62.4	71.0	71.7
Medium Trucks:	65.9	64.4	58.0	56.5	65.0	65.2
Heavy Trucks:	66.7	65.3	56.3	57.5	65.9	66.0
Vehicle Noise:	74.0	72.2	69.1	64.4	73.0	73.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	94	203	438	944
CNEL:	101	218	470	1,013

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Alton Pkwy. | Job Number: 11049
Road Segment: w/o Irvine Bl.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,330 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	2.40	0.25	-1.20	*-4.85*	0.000	0.000
Medium Trucks:	82.40	-14.84	0.27	-1.20	*-5.01*	0.000	0.000
Heavy Trucks:	86.40	-18.79	0.25	-1.20	*-5.34*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.2	71.3	69.6	63.5	72.1	72.7
Medium Trucks:	66.6	65.1	58.8	57.2	65.7	65.9
Heavy Trucks:	66.7	65.2	56.2	57.5	65.8	65.9
Vehicle Noise:	74.8	73.1	70.1	65.2	73.8	74.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	107	231	497	1,072
CNEL:	115	248	535	1,153

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Alton Pkwy.
Road Segment: e/o Irvine Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	24,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,400 vehicles
Vehicle Speed:	60 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	73.22	0.60	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	83.68	-16.64	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	87.33	-20.59	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.9	71.0	69.2	63.2	71.8	72.4
Medium Trucks:	66.1	64.6	58.2	56.7	65.2	65.4
Heavy Trucks:	65.8	64.4	55.3	56.6	64.9	65.1
Vehicle Noise:	74.4	72.6	69.7	64.8	73.3	73.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	100	215	463	998
CNEL:	108	232	499	1,075

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Alton Pkwy.
Road Segment: w/o Rancho Pkwy. S.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	49,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,970 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	4.14	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-13.10	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-17.05	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	75.0	73.1	71.3	65.3	73.9	74.5
Medium Trucks:	68.4	66.9	60.5	59.0	67.4	67.7
Heavy Trucks:	68.4	67.0	57.9	59.2	67.5	67.7
Vehicle Noise:	76.6	74.8	71.8	67.0	75.5	76.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	140	302	650	1,400
CNEL:	151	324	699	1,506

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Bake Pkwy.
Road Segment: w/o Rockfield Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	88,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	8,800 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	6.62	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-10.62	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-14.57	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	77.5	75.6	73.8	67.7	76.4	77.0
Medium Trucks:	70.9	69.3	63.0	61.4	69.9	70.1
Heavy Trucks:	70.9	69.5	60.4	61.7	70.0	70.2
Vehicle Noise:	79.0	77.3	74.3	69.4	78.0	78.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	205	441	951	2,048
CNEL:	220	475	1,023	2,204

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Bake Pkwy.
Road Segment: e/o Rockfield Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	70,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	7,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	5.63	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-11.61	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-15.57	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.5	74.6	72.8	66.7	75.4	76.0
Medium Trucks:	69.9	68.4	62.0	60.4	68.9	69.1
Heavy Trucks:	69.9	68.5	59.4	60.7	69.0	69.2
Vehicle Noise:	78.0	76.3	73.3	68.5	77.0	77.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	176	379	816	1,759
CNEL:	189	408	878	1,892

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Bake Pkwy.
Road Segment: e/o Muirlands Bl.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	68,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	6,830 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	5.52	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-11.72	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-15.67	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.4	74.5	72.7	66.6	75.3	75.9
Medium Trucks:	69.8	68.2	61.9	60.3	68.8	69.0
Heavy Trucks:	69.8	68.4	59.3	60.6	68.9	69.1
Vehicle Noise:	77.9	76.2	73.2	68.3	76.9	77.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	173	373	803	1,730
CNEL:	186	401	864	1,861

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Bake Pkwy.
Road Segment: e/o Jeronimo Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	59,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	5,950 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	5.34	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-11.90	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-15.86	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	74.6	72.7	70.9	64.9	73.5	74.1
Medium Trucks:	68.2	66.7	60.3	58.8	67.2	67.4
Heavy Trucks:	68.6	67.2	58.1	59.4	67.7	67.8
Vehicle Noise:	76.3	74.5	71.5	66.7	75.3	75.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	134	290	624	1,345
CNEL:	144	311	671	1,445

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Bake Pkwy.
Road Segment: e/o Toledo Wy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	55,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	5,500 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	5.00	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-12.24	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-16.20	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	74.3	72.4	70.6	64.5	73.2	73.8
Medium Trucks:	67.8	66.3	60.0	58.4	66.9	67.1
Heavy Trucks:	68.2	66.8	57.8	59.0	67.4	67.5
Vehicle Noise:	75.9	74.2	71.2	66.4	74.9	75.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	128	275	592	1,276
CNEL:	137	295	636	1,371

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Bake Pkwy.
Road Segment: e/o Trabuco Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	38,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,800 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.39	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-13.85	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-17.80	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.6	70.7	69.0	62.9	71.5	72.2
Medium Trucks:	66.2	64.7	58.3	56.8	65.3	65.5
Heavy Trucks:	66.6	65.2	56.2	57.4	65.8	65.9
Vehicle Noise:	74.3	72.6	69.5	64.8	73.3	73.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	100	215	463	997
CNEL:	107	231	497	1,071

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Bake Pkwy.
Road Segment: w/o Dimension Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,690 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.26	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-13.98	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-17.93	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.1	71.2	69.4	63.4	72.0	72.6
Medium Trucks:	66.7	65.1	58.8	57.2	65.7	65.9
Heavy Trucks:	67.1	65.6	56.6	57.9	66.2	66.3
Vehicle Noise:	74.8	73.0	70.0	65.2	73.7	74.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	89	191	412	889
CNEL:	95	206	443	955

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Bake Pkwy.
Road Segment: e/o Dimension Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	37,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,700 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.27	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-13.96	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-17.92	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.1	71.2	69.4	63.4	72.0	72.6
Medium Trucks:	66.7	65.2	58.8	57.3	65.7	65.9
Heavy Trucks:	67.1	65.7	56.6	57.9	66.2	66.3
Vehicle Noise:	74.8	73.0	70.0	65.2	73.8	74.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	89	192	413	890
CNEL:	96	206	444	956

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Bake Pkwy.
Road Segment: e/o Rancho Pkwy. S.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	37,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,700 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.27	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-13.96	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-17.92	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.1	71.2	69.4	63.4	72.0	72.6
Medium Trucks:	66.7	65.2	58.8	57.3	65.7	65.9
Heavy Trucks:	67.1	65.7	56.6	57.9	66.2	66.3
Vehicle Noise:	74.8	73.0	70.0	65.2	73.8	74.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	89	192	413	890
CNEL:	96	206	444	956

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Bake Pkwy.
Road Segment: w/o Towne Centre Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	31,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,100 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.51	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	81.00	-14.73	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	85.38	-18.69	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.1	74.2	72.5	66.4	75.0	75.6
Medium Trucks:	69.7	68.2	61.9	60.3	68.8	69.0
Heavy Trucks:	70.1	68.7	59.7	60.9	69.3	69.4
Vehicle Noise:	77.8	76.1	73.0	68.3	76.8	77.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	85	184	396	853
CNEL:	92	197	425	916

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Bake Pkwy.
Road Segment: e/o Towne Centre Dr.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,790 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	2.05	4.63	-1.20	*-4.81*	0.000	0.000
Medium Trucks:	81.00	-15.19	4.67	-1.20	*-5.14*	0.000	0.000
Heavy Trucks:	85.38	-19.15	4.63	-1.20	*-5.77*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	75.7	73.8	72.0	66.0	74.6	75.2
Medium Trucks:	69.3	67.8	61.4	59.9	68.3	68.6
Heavy Trucks:	69.7	68.2	59.2	60.5	68.8	68.9
Vehicle Noise:	77.4	75.6	72.6	67.8	76.3	76.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	79	171	369	795
CNEL:	85	184	396	854

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Lake Forest Dr.
Road Segment: w/o Serrano Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	43,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,380 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.01	0.25	-1.20	*-4.85*	0.000	0.000
Medium Trucks:	81.00	-13.23	0.27	-1.20	*-5.01*	0.000	0.000
Heavy Trucks:	85.38	-17.19	0.25	-1.20	*-5.34*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.3	71.4	69.6	63.5	72.2	72.8
Medium Trucks:	66.8	65.3	59.0	57.4	65.9	66.1
Heavy Trucks:	67.2	65.8	56.8	58.0	66.4	66.5
Vehicle Noise:	75.0	73.2	70.2	65.4	73.9	74.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	110	236	509	1,096
CNEL:	118	254	547	1,178

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Lake Forest Dr.
Road Segment: e/o Serrano Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	43,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,360 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.99	0.25	-1.20	*-4.85*	0.000	0.000
Medium Trucks:	81.00	-13.25	0.27	-1.20	*-5.01*	0.000	0.000
Heavy Trucks:	85.38	-17.21	0.25	-1.20	*-5.34*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.2	71.3	69.6	63.5	72.1	72.8
Medium Trucks:	66.8	65.3	58.9	57.4	65.9	66.1
Heavy Trucks:	67.2	65.8	56.8	58.0	66.4	66.5
Vehicle Noise:	74.9	73.2	70.1	65.4	73.9	74.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	109	235	507	1,093
CNEL:	117	253	545	1,174

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: Lake Forest Dr.
Road Segment: e/o Trabuco Rd.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	40,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,050 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.67	0.82	-1.20	*-4.84*	0.000	0.000
Medium Trucks:	81.00	-13.57	0.83	-1.20	*-5.04*	0.000	0.000
Heavy Trucks:	85.38	-17.53	0.82	-1.20	*-5.43*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.5	71.6	69.8	63.8	72.4	73.0
Medium Trucks:	67.1	65.6	59.2	57.6	66.1	66.3
Heavy Trucks:	67.5	66.0	57.0	58.3	66.6	66.7
Vehicle Noise:	75.2	73.4	70.4	65.6	74.2	74.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	95	204	439	946
CNEL:	102	219	472	1,016

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Lake Forest Dr. | Job Number: 11049
Road Segment: e/o Dimension Dr.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,500 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	43.405
Medium Trucks:	43.313
Heavy Trucks:	43.405

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.03	0.82	-1.20	-4.84	0.000	0.000
Medium Trucks:	81.00	-14.21	0.83	-1.20	-5.04	0.000	0.000
Heavy Trucks:	85.38	-18.16	0.82	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.9	71.0	69.2	63.1	71.8	72.4
Medium Trucks:	66.4	64.9	58.6	57.0	65.5	65.7
Heavy Trucks:	66.8	65.4	56.4	57.6	66.0	66.1
Vehicle Noise:	74.5	72.8	69.8	65.0	73.5	74.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	86	185	398	858
CNEL:	92	199	428	922

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Lake Forest Dr. | Job Number: 11049
Road Segment: e/o Rancho Pkwy.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,700 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	1.91	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	81.00	-15.33	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	85.38	-19.29	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	75.5	73.6	71.9	65.8	74.4	75.0
Medium Trucks:	69.1	67.6	61.3	59.7	68.2	68.4
Heavy Trucks:	69.5	68.1	59.1	60.3	68.7	68.8
Vehicle Noise:	77.2	75.5	72.4	67.7	76.2	76.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	78	168	361	778
CNEL:	84	180	388	835

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Lake Forest Dr. | Job Number: 11049
Road Segment: e/o Towne Centre Dr.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,930 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.45	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	81.00	-16.79	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	85.38	-20.75	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	74.1	72.2	70.4	64.4	73.0	73.6
Medium Trucks:	67.7	66.2	59.8	58.3	66.7	67.0
Heavy Trucks:	68.1	66.6	57.6	58.9	67.2	67.3
Vehicle Noise:	75.8	74.0	71.0	66.2	74.7	75.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	62	134	289	622
CNEL:	67	144	310	668

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: Lake Forest Dr. | Job Number: 11049
Road Segment: e/o Portola Pkwy.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	10,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,070 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	24.187
Medium Trucks:	24.021
Heavy Trucks:	24.188

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.66	4.63	-1.20	-4.81	0.000	0.000
Medium Trucks:	79.45	-18.90	4.67	-1.20	-5.14	0.000	0.000
Heavy Trucks:	84.25	-22.85	4.63	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.2	68.3	66.6	60.5	69.1	69.7
Medium Trucks:	64.0	62.5	56.2	54.6	63.1	63.3
Heavy Trucks:	64.8	63.4	54.4	55.6	64.0	64.1
Vehicle Noise:	72.1	70.3	67.2	62.5	71.0	71.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	35	76	163	352
CNEL:	38	81	175	378

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: El Toro Rd. | Job Number: 11049
Road Segment: w/o Jeronimo Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	40,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,090 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	3.71	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-13.53	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-17.49	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.6	70.7	68.9	62.9	71.5	72.1
Medium Trucks:	66.2	64.7	58.3	56.8	65.2	65.4
Heavy Trucks:	66.6	65.2	56.1	57.4	65.7	65.9
Vehicle Noise:	74.3	72.5	69.5	64.7	73.3	73.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	115	249	536	1,155
CNEL:	124	267	576	1,241

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: El Toro Rd. | Job Number: 11049
Road Segment: e/o Jeronimo Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	45,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,590 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.21	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-13.03	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-16.98	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.1	71.2	69.4	63.4	72.0	72.6
Medium Trucks:	66.7	65.2	58.8	57.3	65.7	65.9
Heavy Trucks:	67.1	65.7	56.6	57.9	66.2	66.4
Vehicle Noise:	74.8	73.0	70.0	65.2	73.8	74.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	125	269	579	1,247
CNEL:	134	289	622	1,340

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: El Toro Rd. | Job Number: 11049
Road Segment: e/o Serrano Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	44,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,400 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	98 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	70.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	50.080
Medium Trucks:	50.000
Heavy Trucks:	50.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.03	-0.11	-1.20	-4.86	0.000	0.000
Medium Trucks:	81.00	-13.21	-0.10	-1.20	-5.00	0.000	0.000
Heavy Trucks:	85.38	-17.17	-0.11	-1.20	-5.28	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.9	71.0	69.3	63.2	71.8	72.4
Medium Trucks:	66.5	65.0	58.6	57.1	65.5	65.8
Heavy Trucks:	66.9	65.5	56.4	57.7	66.0	66.2
Vehicle Noise:	74.6	72.9	69.8	65.0	73.6	74.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	121	261	563	1,212
CNEL:	130	281	605	1,303

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P | Project Name: Nakase
Road Name: El Toro Rd. | Job Number: 11049
Road Segment: e/o Trabuco Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	44,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,410 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	74 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	60.0 feet
Centerline Dist. to Observer:	60.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	4.04	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	81.00	-13.20	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	85.38	-17.16	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.3	71.4	69.6	63.6	72.2	72.8
Medium Trucks:	66.9	65.4	59.0	57.4	65.9	66.1
Heavy Trucks:	67.3	65.9	56.8	58.1	66.4	66.5
Vehicle Noise:	75.0	73.2	70.2	65.4	74.0	74.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	110	237	511	1,101
CNEL:	118	255	549	1,183

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: El Toro Rd.
Road Segment: w/o Portola Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,300	vehicles
Vehicle Speed:	55	mph
Near/Far Lane Distance:	74	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	2.36	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-14.88	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-18.83	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.2	71.3	69.5	63.5	72.1	72.7
Medium Trucks:	66.6	65.1	58.7	57.2	65.6	65.9
Heavy Trucks:	66.6	65.2	56.2	57.4	65.8	65.9
Vehicle Noise:	74.8	73.0	70.1	65.2	73.7	74.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	107	230	494	1,065
CNEL:	115	247	532	1,146

Tuesday, July 10, 2018

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P
Road Name: El Toro Rd.
Road Segment: e/o Portola Pkwy.
Project Name: Nakase
Job Number: 11049

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,200	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,320	vehicles
Vehicle Speed:	55	mph
Near/Far Lane Distance:	74	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	60.0	feet
Centerline Dist. to Observer:	60.0	feet
Barrier Distance to Observer:	0.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	0.0	feet
Road Elevation:	0.0	feet
Road Grade:	0.0%	
Left View:	-90.0	degrees
Right View:	90.0	degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	2.000		
Medium Trucks:	4.000		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.329
Medium Trucks:	47.244
Heavy Trucks:	47.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	2.39	0.25	-1.20	-4.85	0.000	0.000
Medium Trucks:	82.40	-14.85	0.27	-1.20	-5.01	0.000	0.000
Heavy Trucks:	86.40	-18.81	0.25	-1.20	-5.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.2	71.3	69.6	63.5	72.1	72.7
Medium Trucks:	66.6	65.1	58.8	57.2	65.7	65.9
Heavy Trucks:	66.6	65.2	56.2	57.4	65.8	65.9
Vehicle Noise:	74.8	73.0	70.1	65.2	73.8	74.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	107	230	496	1,070
CNEL:	115	248	534	1,151

Tuesday, July 10, 2018

This page intentionally left blank

APPENDIX 8.1:

ON-SITE TRAFFIC NOISE LEVEL CALCULATIONS

This page intentionally left blank

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Backyard With Wall
Road Name: Bake Pkwy.
Lot No: Senior Affordable

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,600	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	36	feet

Site Data

Barrier Height:	**6.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	100.0	feet
Centerline Dist. to Observer:	110.0	feet
Barrier Distance to Observer:	10.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	699.0	feet
Road Elevation:	705.0	feet
Barrier Elevation:	705.0	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	707.000		
Medium Trucks:	709.000		
Heavy Trucks:	713.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	110.655
Medium Trucks:	110.594
Heavy Trucks:	110.594

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	71.12	3.15	-5.28	-1.20	*2.20*	-12.560	-15.560
Medium Trucks:	78.79	-14.08	-5.27	-1.20	*2.07*	-12.391	-15.391
Heavy Trucks:	83.02	-18.04	-5.27	-1.20	*1.82*	-11.940	-14.940

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	67.8	65.9	64.1	58.1	66.7	67.3
Medium Trucks:	58.2	56.7	50.4	48.8	57.3	57.5
Heavy Trucks:	58.5	57.1	48.0	49.3	57.7	57.8
Vehicle Noise:	68.7	66.9	64.4	59.0	67.6	68.2

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	55.2	53.3	51.6	45.5	54.1	54.7
Medium Trucks:	45.8	44.3	38.0	36.4	44.9	45.1
Heavy Trucks:	46.6	45.1	36.1	37.4	45.7	45.8
Vehicle Noise:	56.2	54.4	51.9	46.6	55.2	55.7

Centerline Distance to Noise Contour (in feet)	*70 dBA*	*65 dBA*	*60 dBA*	*55 dBA*
CNEL:	83	179	385	829

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Backyard With Wall
Road Name: Bake Pkwy.
Lot No: Neighborhood 1

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,600 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**6.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	75.0 feet
Centerline Dist. to Observer:	85.0 feet
Barrier Distance to Observer:	10.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	707.0 feet
Road Elevation:	701.0 feet
Barrier Elevation:	707.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	703.000		
Medium Trucks:	705.000		
Heavy Trucks:	709.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	83.541
Medium Trucks:	83.296
Heavy Trucks:	82.967

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	71.12	3.15	-3.45	-1.20	*0.23*	-7.010	-10.010
Medium Trucks:	78.79	-14.08	-3.43	-1.20	*0.18*	-6.640	-9.640
Heavy Trucks:	83.02	-18.04	-3.40	-1.20	*0.10*	-6.000	-9.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	69.6	67.7	66.0	59.9	68.5	69.1
Medium Trucks:	60.1	58.6	52.2	50.7	59.1	59.4
Heavy Trucks:	60.4	59.0	49.9	51.2	59.5	59.7
Vehicle Noise:	70.5	68.7	66.2	60.9	69.5	70.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	62.6	60.7	59.0	52.9	61.5	62.1
Medium Trucks:	53.4	51.9	45.6	44.0	52.5	52.7
Heavy Trucks:	54.4	53.0	43.9	45.2	53.5	53.7
Vehicle Noise:	63.7	61.9	59.3	54.0	62.6	63.1

Centerline Distance to Noise Contour (in feet)	*70 dBA*	*65 dBA*	*60 dBA*	*55 dBA*
CNEL:	85	183	394	849

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Backyard With Wall
Road Name: Bake Pkwy.
Lot No: School Playground

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,600 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	80.0 feet
Centerline Dist. to Observer:	240.0 feet
Barrier Distance to Observer:	160.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	700.0 feet
Road Elevation:	700.0 feet
Barrier Elevation:	700.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	702.000		
Medium Trucks:	704.000		
Heavy Trucks:	708.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	239.343
Medium Trucks:	239.326
Heavy Trucks:	239.343

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	71.12	3.15	-10.30	-1.20	*-0.08*	0.000	0.000
Medium Trucks:	78.79	-14.08	-10.30	-1.20	*-0.17*	0.000	0.000
Heavy Trucks:	83.02	-18.04	-10.30	-1.20	*-0.45*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	62.8	60.9	59.1	53.1	61.7	62.3
Medium Trucks:	53.2	51.7	45.3	43.8	52.3	52.5
Heavy Trucks:	53.5	52.1	43.0	44.3	52.6	52.7
Vehicle Noise:	63.7	61.8	59.4	54.0	62.6	63.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	62.8	60.9	59.1	53.1	61.7	62.3
Medium Trucks:	53.2	51.7	45.3	43.8	52.3	52.5
Heavy Trucks:	53.5	52.1	43.0	44.3	52.6	52.7
Vehicle Noise:	63.7	61.8	59.4	54.0	62.6	63.1

Centerline Distance to Noise Contour (in feet)	*70 dBA*	*65 dBA*	*60 dBA*	*55 dBA*
CNEL:	84	180	388	836

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Backyard With Wall
Road Name: SR-241
Lot No: School Picnic Area

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	44,110	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	4,411	vehicles
Vehicle Speed:	70	mph
Near/Far Lane Distance:	162	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	110.0	feet
Centerline Dist. to Observer:	757.0	feet
Barrier Distance to Observer:	647.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	735.0	feet
Road Elevation:	770.0	feet
Barrier Elevation:	770.0	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	96.92%
Medium Trucks:	84.8%	4.9%	10.3%	1.97%
Heavy Trucks:	86.5%	2.7%	10.8%	1.11%

Noise Source Elevations (in feet)

Autos:	772.000		
Medium Trucks:	774.000		
Heavy Trucks:	778.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	722.146
Medium Trucks:	722.227
Heavy Trucks:	753.613

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	76.79	2.55	-17.50	-1.20	*0.04*	-5.400	-8.400
Medium Trucks:	82.53	-14.37	-17.50	-1.20	*0.00*	-4.900	-7.900
Heavy Trucks:	85.83	-16.86	-17.78	-1.20	*-0.03*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	60.6	58.7	57.0	50.9	59.5	60.2
Medium Trucks:	49.5	48.0	41.6	40.1	48.5	48.7
Heavy Trucks:	50.0	48.6	39.5	40.8	49.1	49.3
Vehicle Noise:	61.3	59.5	57.2	51.6	60.2	60.8

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	55.2	53.3	51.6	45.5	54.1	54.8
Medium Trucks:	44.6	43.1	36.7	35.2	43.6	43.8
Heavy Trucks:	50.0	48.6	39.5	40.8	49.1	49.3
Vehicle Noise:	56.7	54.9	52.0	47.1	55.6	56.1

Centerline Distance to Noise Contour (in feet)	*70 dBA*	*65 dBA*	*60 dBA*	*55 dBA*
CNEL:	184	396	853	1,837

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Backyard With Wall
Road Name: Bake Pkwy.
Lot No: School Picnic Area

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,600 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	210.0 feet
Barrier Distance to Observer:	140.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	724.0 feet
Road Elevation:	730.0 feet
Barrier Elevation:	730.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	732.000		
Medium Trucks:	734.000		
Heavy Trucks:	738.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	209.249
Medium Trucks:	209.287
Heavy Trucks:	209.421

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	71.12	3.15	-9.43	-1.20	*-0.01*	0.000	0.000
Medium Trucks:	78.79	-14.08	-9.43	-1.20	*-0.06*	0.000	0.000
Heavy Trucks:	83.02	-18.04	-9.43	-1.20	*-0.26*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	63.6	61.7	60.0	53.9	62.5	63.2
Medium Trucks:	54.1	52.6	46.2	44.7	53.1	53.4
Heavy Trucks:	54.3	52.9	43.9	45.1	53.5	53.6
Vehicle Noise:	64.5	62.7	60.3	54.9	63.5	64.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	63.6	61.7	60.0	53.9	62.5	63.2
Medium Trucks:	54.1	52.6	46.2	44.7	53.1	53.4
Heavy Trucks:	54.3	52.9	43.9	45.1	53.5	53.6
Vehicle Noise:	64.5	62.7	60.3	54.9	63.5	64.0

Centerline Distance to Noise Contour (in feet)	*70 dBA*	*65 dBA*	*60 dBA*	*55 dBA*
CNEL:	84	180	388	836

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Backyard With Wall
Road Name: SR-241
Lot No: School Classroom Building

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	44,110	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	4,411	vehicles
Vehicle Speed:	70	mph
Near/Far Lane Distance:	162	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	100.0	feet
Centerline Dist. to Observer:	627.0	feet
Barrier Distance to Observer:	527.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	730.0	feet
Road Elevation:	770.0	feet
Barrier Elevation:	770.0	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	96.92%
Medium Trucks:	84.8%	4.9%	10.3%	1.97%
Heavy Trucks:	86.5%	2.7%	10.8%	1.11%

Noise Source Elevations (in feet)

Autos:	772.000		
Medium Trucks:	774.000		
Heavy Trucks:	778.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	586.838
Medium Trucks:	586.940
Heavy Trucks:	623.232

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	76.79	2.55	-16.15	-1.20	*0.09*	-5.900	-8.900
Medium Trucks:	82.53	-14.37	-16.15	-1.20	*0.03*	-5.300	-8.300
Heavy Trucks:	85.83	-16.86	-16.54	-1.20	*-0.01*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	62.0	60.1	58.3	52.3	60.9	61.5
Medium Trucks:	50.8	49.3	43.0	41.4	49.9	50.1
Heavy Trucks:	51.2	49.8	40.8	42.0	50.4	50.5
Vehicle Noise:	62.6	60.8	58.5	53.0	61.6	62.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	56.1	54.2	52.4	46.4	55.0	55.6
Medium Trucks:	45.5	44.0	37.7	36.1	44.6	44.8
Heavy Trucks:	51.2	49.8	40.8	42.0	50.4	50.5
Vehicle Noise:	57.6	55.8	52.9	48.0	56.6	57.0

Centerline Distance to Noise Contour (in feet)	*70 dBA*	*65 dBA*	*60 dBA*	*55 dBA*
CNEL:	187	403	868	1,870

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Backyard With Wall
Road Name: Rancho Pkwy.
Lot No: School Classroom Building

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,600 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	100.0 feet
Centerline Dist. to Observer:	120.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	730.0 feet
Road Elevation:	742.0 feet
Barrier Elevation:	742.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	744.000		
Medium Trucks:	746.000		
Heavy Trucks:	750.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	119.577
Medium Trucks:	119.638
Heavy Trucks:	119.882

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	69.34	3.61	-5.78	-1.20	*0.85*	-9.850	-12.850
Medium Trucks:	77.62	-13.63	-5.79	-1.20	*0.75*	-9.500	-12.500
Heavy Trucks:	82.14	-17.58	-5.80	-1.20	*0.56*	-8.800	-11.800

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	66.0	64.1	62.3	56.3	64.9	65.5
Medium Trucks:	57.0	55.5	49.1	47.6	56.1	56.3
Heavy Trucks:	57.6	56.1	47.1	48.4	56.7	56.8
Vehicle Noise:	67.0	65.2	62.6	57.4	66.0	66.5

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	56.1	54.2	52.5	46.4	55.0	55.6
Medium Trucks:	47.5	46.0	39.6	38.1	46.6	46.8
Heavy Trucks:	48.8	47.3	38.3	39.6	47.9	48.0
Vehicle Noise:	57.3	55.5	52.8	47.7	56.3	56.8

Centerline Distance to Noise Contour (in feet)	*70 dBA*	*65 dBA*	*60 dBA*	*55 dBA*
CNEL:	70	150	324	698

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Backyard With Wall
Road Name: SR-241
Lot No: School Outdoor Learning Area

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	44,110	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	4,411	vehicles
Vehicle Speed:	70	mph
Near/Far Lane Distance:	162	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	105.0	feet
Centerline Dist. to Observer:	740.0	feet
Barrier Distance to Observer:	635.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	730.0	feet
Road Elevation:	775.0	feet
Barrier Elevation:	775.0	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	96.92%
Medium Trucks:	84.8%	4.9%	10.3%	1.97%
Heavy Trucks:	86.5%	2.7%	10.8%	1.11%

Noise Source Elevations (in feet)

Autos:	777.000		
Medium Trucks:	779.000		
Heavy Trucks:	783.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	703.102
Medium Trucks:	703.191
Heavy Trucks:	737.118

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	76.79	2.55	-17.32	-1.20	*0.08*	-5.800	-8.800
Medium Trucks:	82.53	-14.37	-17.32	-1.20	*0.03*	-5.300	-8.300
Heavy Trucks:	85.83	-16.86	-17.63	-1.20	*-0.01*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	60.8	58.9	57.2	51.1	59.7	60.3
Medium Trucks:	49.6	48.1	41.8	40.2	48.7	48.9
Heavy Trucks:	50.1	48.7	39.7	40.9	49.3	49.4
Vehicle Noise:	61.5	59.6	57.4	51.8	60.4	60.9

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	55.0	53.1	51.4	45.3	53.9	54.5
Medium Trucks:	44.3	42.8	36.5	34.9	43.4	43.6
Heavy Trucks:	50.1	48.7	39.7	40.9	49.3	49.4
Vehicle Noise:	56.5	54.8	51.8	46.9	55.5	56.0

Centerline Distance to Noise Contour (in feet)	*70 dBA*	*65 dBA*	*60 dBA*	*55 dBA*
CNEL:	184	397	856	1,844

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Backyard With Wall
Road Name: Rancho Pkwy.
Lot No: School Outdoor Learning Area

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,600 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	78.0 feet
Centerline Dist. to Observer:	130.0 feet
Barrier Distance to Observer:	52.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	730.0 feet
Road Elevation:	742.0 feet
Barrier Elevation:	742.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	744.000		
Medium Trucks:	746.000		
Heavy Trucks:	750.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	128.390
Medium Trucks:	128.469
Heavy Trucks:	128.785

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	69.34	3.61	-6.25	-1.20	*0.18*	-6.640	-9.640
Medium Trucks:	77.62	-13.63	-6.25	-1.20	*0.10*	-6.000	-9.000
Heavy Trucks:	82.14	-17.58	-6.27	-1.20	*0.02*	-5.200	-8.200

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	65.5	63.6	61.8	55.8	64.4	65.0
Medium Trucks:	56.5	55.0	48.7	47.1	55.6	55.8
Heavy Trucks:	57.1	55.7	46.6	47.9	56.2	56.4
Vehicle Noise:	66.6	64.7	62.2	56.9	65.5	66.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	58.9	57.0	55.2	49.2	57.8	58.4
Medium Trucks:	50.5	49.0	42.7	41.1	49.6	49.8
Heavy Trucks:	51.9	50.5	41.4	42.7	51.0	51.2
Vehicle Noise:	60.2	58.4	55.6	50.6	59.1	59.6

Centerline Distance to Noise Contour (in feet)	*70 dBA*	*65 dBA*	*60 dBA*	*55 dBA*
CNEL:	70	152	327	705

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Backyard With Wall
Road Name: SR-241
Lot No: Neighborhood 3

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	44,110	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	4,411	vehicles
Vehicle Speed:	70	mph
Near/Far Lane Distance:	162	feet

Site Data

Barrier Height:	**30.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	280.0	feet
Centerline Dist. to Observer:	1,024.0	feet
Barrier Distance to Observer:	744.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	734.0	feet
Road Elevation:	775.0	feet
Barrier Elevation:	740.0	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	96.92%
Medium Trucks:	84.8%	4.9%	10.3%	1.97%
Heavy Trucks:	86.5%	2.7%	10.8%	1.11%

Noise Source Elevations (in feet)

Autos:	777.000		
Medium Trucks:	779.000		
Heavy Trucks:	783.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	########
Medium Trucks:	########
Heavy Trucks:	########

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	76.79	2.55	-19.70	-1.20	*0.03*	-5.300	-8.300
Medium Trucks:	82.53	-14.37	-19.70	-1.20	*0.01*	-5.100	-8.100
Heavy Trucks:	85.83	-16.86	-19.70	-1.20	*0.00*	-4.900	-7.900

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	58.4	56.5	54.8	48.7	57.3	57.9
Medium Trucks:	47.3	45.8	39.4	37.9	46.3	46.5
Heavy Trucks:	48.1	46.6	37.6	38.9	47.2	47.3
Vehicle Noise:	59.1	57.3	55.0	49.5	58.0	58.6

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	53.1	51.2	49.5	43.4	52.0	52.6
Medium Trucks:	42.2	40.7	34.3	32.8	41.2	41.4
Heavy Trucks:	43.2	41.7	32.7	34.0	42.3	42.4
Vehicle Noise:	53.9	52.0	49.7	44.2	52.8	53.3

Centerline Distance to Noise Contour (in feet)	*70 dBA*	*65 dBA*	*60 dBA*	*55 dBA*
CNEL:	178	383	825	1,777

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Backyard With Wall
Road Name: Rancho Pkwy.
Lot No: Neighborhood 3

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,600 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**6.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	80.0 feet
Barrier Distance to Observer:	10.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	734.0 feet
Road Elevation:	740.0 feet
Barrier Elevation:	740.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	742.000		
Medium Trucks:	744.000		
Heavy Trucks:	748.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	79.971
Medium Trucks:	79.882
Heavy Trucks:	79.882

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	69.34	3.61	-3.16	-1.20	*2.22*	-12.586	-15.586
Medium Trucks:	77.62	-13.63	-3.16	-1.20	*2.03*	-12.339	-15.339
Heavy Trucks:	82.14	-17.58	-3.16	-1.20	*1.69*	-11.680	-14.680

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	68.6	66.7	64.9	58.9	67.5	68.1
Medium Trucks:	59.6	58.1	51.8	50.2	58.7	58.9
Heavy Trucks:	60.2	58.8	49.7	51.0	59.4	59.5
Vehicle Noise:	69.6	67.8	65.3	60.0	68.6	69.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	56.0	54.1	52.3	46.3	54.9	55.5
Medium Trucks:	47.3	45.8	39.4	37.9	46.3	46.6
Heavy Trucks:	48.5	47.1	38.1	39.3	47.7	47.8
Vehicle Noise:	57.2	55.4	52.7	47.6	56.1	56.6

Centerline Distance to Noise Contour (in feet)	*70 dBA*	*65 dBA*	*60 dBA*	*55 dBA*
CNEL:	70	150	323	697

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Backyard With Wall
Road Name: Lake Forest Dr.
Lot No: Neighborhood 3

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,600 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	369.0 feet
Centerline Dist. to Observer:	379.0 feet
Barrier Distance to Observer:	10.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	734.0 feet
Road Elevation:	740.0 feet
Barrier Elevation:	740.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	742.000		
Medium Trucks:	744.000		
Heavy Trucks:	748.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	378.616
Medium Trucks:	378.632
Heavy Trucks:	378.698

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	71.12	3.15	-13.29	-1.20	*0.04*	-5.400	-8.400
Medium Trucks:	78.79	-14.08	-13.29	-1.20	*0.04*	-5.400	-8.400
Heavy Trucks:	83.02	-18.04	-13.29	-1.20	*0.03*	-5.300	-8.300

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	59.8	57.9	56.1	50.1	58.7	59.3
Medium Trucks:	50.2	48.7	42.3	40.8	49.3	49.5
Heavy Trucks:	50.5	49.1	40.0	41.3	49.6	49.8
Vehicle Noise:	60.7	58.9	56.4	51.0	59.6	60.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	54.4	52.5	50.7	44.7	53.3	53.9
Medium Trucks:	44.8	43.3	36.9	35.4	43.9	44.1
Heavy Trucks:	45.2	43.8	34.7	36.0	44.3	44.5
Vehicle Noise:	55.3	53.5	51.0	45.6	54.2	54.8

Centerline Distance to Noise Contour (in feet)	*70 dBA*	*65 dBA*	*60 dBA*	*55 dBA*
CNEL:	83	180	387	834

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Backyard With Wall
Road Name: Lake Forest Dr.
Lot No: Neighborhood 4

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,600 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	600.0 feet
Centerline Dist. to Observer:	610.0 feet
Barrier Distance to Observer:	10.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	696.0 feet
Road Elevation:	702.0 feet
Barrier Elevation:	702.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	704.000		
Medium Trucks:	706.000		
Heavy Trucks:	710.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	609.783
Medium Trucks:	609.793
Heavy Trucks:	609.833

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	71.12	3.15	-16.40	-1.20	*0.04*	-5.400	-8.400
Medium Trucks:	78.79	-14.08	-16.40	-1.20	*0.04*	-5.400	-8.400
Heavy Trucks:	83.02	-18.04	-16.40	-1.20	*0.04*	-5.400	-8.400

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	56.7	54.8	53.0	47.0	55.6	56.2
Medium Trucks:	47.1	45.6	39.2	37.7	46.2	46.4
Heavy Trucks:	47.4	46.0	36.9	38.2	46.5	46.7
Vehicle Noise:	57.6	55.8	53.3	47.9	56.5	57.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	51.3	49.4	47.6	41.6	50.2	50.8
Medium Trucks:	41.7	40.2	33.8	32.3	40.8	41.0
Heavy Trucks:	42.0	40.6	31.5	32.8	41.1	41.3
Vehicle Noise:	52.2	50.4	47.9	42.5	51.1	51.6

Centerline Distance to Noise Contour (in feet)	*70 dBA*	*65 dBA*	*60 dBA*	*55 dBA*
CNEL:	83	180	387	834

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: First Floor With Wall
Road Name: Bake Pkwy.
Lot No: Senior Affordable

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,600	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	36	feet

Site Data

Barrier Height:	**6.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	100.0	feet
Centerline Dist. to Observer:	120.0	feet
Barrier Distance to Observer:	20.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	699.0	feet
Road Elevation:	705.0	feet
Barrier Elevation:	705.0	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	707.000		
Medium Trucks:	709.000		
Heavy Trucks:	713.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	119.638
Medium Trucks:	119.577
Heavy Trucks:	119.577

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	71.12	3.15	-5.79	-1.20	*1.21*	-10.720	-13.720
Medium Trucks:	78.79	-14.08	-5.78	-1.20	*1.08*	-10.460	-13.460
Heavy Trucks:	83.02	-18.04	-5.78	-1.20	*0.85*	-9.850	-12.850

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	67.3	65.4	63.6	57.6	66.2	66.8
Medium Trucks:	57.7	56.2	49.9	48.3	56.8	57.0
Heavy Trucks:	58.0	56.6	47.5	48.8	57.1	57.3
Vehicle Noise:	68.2	66.4	63.9	58.5	67.1	67.6

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	56.6	54.7	52.9	46.8	55.5	56.1
Medium Trucks:	47.3	45.8	39.4	37.9	46.3	46.5
Heavy Trucks:	48.1	46.7	37.7	38.9	47.3	47.4
Vehicle Noise:	57.6	55.8	53.2	47.9	56.5	57.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: First Floor With Wall
Road Name: Bake Pkwy.
Lot No: Neighborhood 1

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,600 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**6.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	75.0 feet
Centerline Dist. to Observer:	95.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	707.0 feet
Road Elevation:	701.0 feet
Barrier Elevation:	707.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	703.000		
Medium Trucks:	705.000		
Heavy Trucks:	709.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	93.516
Medium Trucks:	93.271
Heavy Trucks:	92.942

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	71.12	3.15	-4.18	-1.20	*0.26*	-7.220	-10.220
Medium Trucks:	78.79	-14.08	-4.17	-1.20	*0.19*	-6.720	-9.720
Heavy Trucks:	83.02	-18.04	-4.14	-1.20	*0.08*	-5.800	-8.800

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	68.9	67.0	65.2	59.2	67.8	68.4
Medium Trucks:	59.3	57.8	51.5	49.9	58.4	58.6
Heavy Trucks:	59.6	58.2	49.2	50.4	58.8	58.9
Vehicle Noise:	69.8	68.0	65.5	60.2	68.7	69.3

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	61.7	59.8	58.0	52.0	60.6	61.2
Medium Trucks:	52.6	51.1	44.8	43.2	51.7	51.9
Heavy Trucks:	53.8	52.4	43.4	44.6	53.0	53.1
Vehicle Noise:	62.8	61.0	58.3	53.2	61.7	62.2

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: First Floor With Wall
Road Name: Bake Pkwy.
Lot No: School Playground

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,600	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	36	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	80.0	feet
Centerline Dist. to Observer:	240.0	feet
Barrier Distance to Observer:	160.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	700.0	feet
Road Elevation:	700.0	feet
Barrier Elevation:	700.0	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	702.000		
Medium Trucks:	704.000		
Heavy Trucks:	708.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	239.343
Medium Trucks:	239.326
Heavy Trucks:	239.343

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	71.12	3.15	-10.30	-1.20	*-0.08*	0.000	0.000
Medium Trucks:	78.79	-14.08	-10.30	-1.20	*-0.17*	0.000	0.000
Heavy Trucks:	83.02	-18.04	-10.30	-1.20	*-0.45*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	62.8	60.9	59.1	53.1	61.7	62.3
Medium Trucks:	53.2	51.7	45.3	43.8	52.3	52.5
Heavy Trucks:	53.5	52.1	43.0	44.3	52.6	52.7
Vehicle Noise:	63.7	61.8	59.4	54.0	62.6	63.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	62.8	60.9	59.1	53.1	61.7	62.3
Medium Trucks:	53.2	51.7	45.3	43.8	52.3	52.5
Heavy Trucks:	53.5	52.1	43.0	44.3	52.6	52.7
Vehicle Noise:	63.7	61.8	59.4	54.0	62.6	63.1

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: First Floor With Wall
Road Name: SR-241
Lot No: School Picnic Area

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	44,110	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	4,411	vehicles
Vehicle Speed:	70	mph
Near/Far Lane Distance:	162	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	110.0	feet
Centerline Dist. to Observer:	757.0	feet
Barrier Distance to Observer:	647.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	735.0	feet
Road Elevation:	770.0	feet
Barrier Elevation:	770.0	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	96.92%
Medium Trucks:	84.8%	4.9%	10.3%	1.97%
Heavy Trucks:	86.5%	2.7%	10.8%	1.11%

Noise Source Elevations (in feet)

Autos:	772.000		
Medium Trucks:	774.000		
Heavy Trucks:	778.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	722.146
Medium Trucks:	722.227
Heavy Trucks:	753.613

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	76.79	2.55	-17.50	-1.20	*0.04*	-5.400	-8.400
Medium Trucks:	82.53	-14.37	-17.50	-1.20	*0.00*	-4.900	-7.900
Heavy Trucks:	85.83	-16.86	-17.78	-1.20	*-0.03*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	60.6	58.7	57.0	50.9	59.5	60.2
Medium Trucks:	49.5	48.0	41.6	40.1	48.5	48.7
Heavy Trucks:	50.0	48.6	39.5	40.8	49.1	49.3
Vehicle Noise:	61.3	59.5	57.2	51.6	60.2	60.8

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	55.2	53.3	51.6	45.5	54.1	54.8
Medium Trucks:	44.6	43.1	36.7	35.2	43.6	43.8
Heavy Trucks:	50.0	48.6	39.5	40.8	49.1	49.3
Vehicle Noise:	56.7	54.9	52.0	47.1	55.6	56.1

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: First Floor With Wall
Road Name: Bake Pkwy.
Lot No: School Picnic Area

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,600 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	210.0 feet
Barrier Distance to Observer:	140.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	724.0 feet
Road Elevation:	730.0 feet
Barrier Elevation:	730.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	732.000		
Medium Trucks:	734.000		
Heavy Trucks:	738.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	209.249
Medium Trucks:	209.287
Heavy Trucks:	209.421

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	71.12	3.15	-9.43	-1.20	*-0.01*	0.000	0.000
Medium Trucks:	78.79	-14.08	-9.43	-1.20	*-0.06*	0.000	0.000
Heavy Trucks:	83.02	-18.04	-9.43	-1.20	*-0.26*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	63.6	61.7	60.0	53.9	62.5	63.2
Medium Trucks:	54.1	52.6	46.2	44.7	53.1	53.4
Heavy Trucks:	54.3	52.9	43.9	45.1	53.5	53.6
Vehicle Noise:	64.5	62.7	60.3	54.9	63.5	64.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	63.6	61.7	60.0	53.9	62.5	63.2
Medium Trucks:	54.1	52.6	46.2	44.7	53.1	53.4
Heavy Trucks:	54.3	52.9	43.9	45.1	53.5	53.6
Vehicle Noise:	64.5	62.7	60.3	54.9	63.5	64.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: First Floor With Wall
Road Name: SR-241
Lot No: School Classroom Building

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	44,110	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	4,411	vehicles
Vehicle Speed:	70	mph
Near/Far Lane Distance:	162	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	100.0	feet
Centerline Dist. to Observer:	627.0	feet
Barrier Distance to Observer:	527.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	730.0	feet
Road Elevation:	770.0	feet
Barrier Elevation:	770.0	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	96.92%
Medium Trucks:	84.8%	4.9%	10.3%	1.97%
Heavy Trucks:	86.5%	2.7%	10.8%	1.11%

Noise Source Elevations (in feet)

Autos:	772.000		
Medium Trucks:	774.000		
Heavy Trucks:	778.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	586.838
Medium Trucks:	586.940
Heavy Trucks:	623.232

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	76.79	2.55	-16.15	-1.20	*0.09*	-5.900	-8.900
Medium Trucks:	82.53	-14.37	-16.15	-1.20	*0.03*	-5.300	-8.300
Heavy Trucks:	85.83	-16.86	-16.54	-1.20	*-0.01*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	62.0	60.1	58.3	52.3	60.9	61.5
Medium Trucks:	50.8	49.3	43.0	41.4	49.9	50.1
Heavy Trucks:	51.2	49.8	40.8	42.0	50.4	50.5
Vehicle Noise:	62.6	60.8	58.5	53.0	61.6	62.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	56.1	54.2	52.4	46.4	55.0	55.6
Medium Trucks:	45.5	44.0	37.7	36.1	44.6	44.8
Heavy Trucks:	51.2	49.8	40.8	42.0	50.4	50.5
Vehicle Noise:	57.6	55.8	52.9	48.0	56.6	57.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: First Floor With Wall
Road Name: Rancho Pkwy.
Lot No: School Classroom Building

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,600 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	100.0 feet
Centerline Dist. to Observer:	120.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	730.0 feet
Road Elevation:	742.0 feet
Barrier Elevation:	742.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	744.000		
Medium Trucks:	746.000		
Heavy Trucks:	750.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	119.577
Medium Trucks:	119.638
Heavy Trucks:	119.882

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	69.34	3.61	-5.78	-1.20	*0.85*	-9.850	-12.850
Medium Trucks:	77.62	-13.63	-5.79	-1.20	*0.75*	-9.500	-12.500
Heavy Trucks:	82.14	-17.58	-5.80	-1.20	*0.56*	-8.800	-11.800

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	66.0	64.1	62.3	56.3	64.9	65.5
Medium Trucks:	57.0	55.5	49.1	47.6	56.1	56.3
Heavy Trucks:	57.6	56.1	47.1	48.4	56.7	56.8
Vehicle Noise:	67.0	65.2	62.6	57.4	66.0	66.5

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	56.1	54.2	52.5	46.4	55.0	55.6
Medium Trucks:	47.5	46.0	39.6	38.1	46.6	46.8
Heavy Trucks:	48.8	47.3	38.3	39.6	47.9	48.0
Vehicle Noise:	57.3	55.5	52.8	47.7	56.3	56.8

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: First Floor With Wall
Road Name: SR-241
Lot No: School Outdoor Learning Area

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	44,110	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	4,411	vehicles
Vehicle Speed:	70	mph
Near/Far Lane Distance:	162	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	105.0	feet
Centerline Dist. to Observer:	740.0	feet
Barrier Distance to Observer:	635.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	730.0	feet
Road Elevation:	775.0	feet
Barrier Elevation:	775.0	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	96.92%
Medium Trucks:	84.8%	4.9%	10.3%	1.97%
Heavy Trucks:	86.5%	2.7%	10.8%	1.11%

Noise Source Elevations (in feet)

Autos:	777.000		
Medium Trucks:	779.000		
Heavy Trucks:	783.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	703.102
Medium Trucks:	703.191
Heavy Trucks:	737.118

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	76.79	2.55	-17.32	-1.20	*0.08*	-5.800	-8.800
Medium Trucks:	82.53	-14.37	-17.32	-1.20	*0.03*	-5.300	-8.300
Heavy Trucks:	85.83	-16.86	-17.63	-1.20	*-0.01*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	60.8	58.9	57.2	51.1	59.7	60.3
Medium Trucks:	49.6	48.1	41.8	40.2	48.7	48.9
Heavy Trucks:	50.1	48.7	39.7	40.9	49.3	49.4
Vehicle Noise:	61.5	59.6	57.4	51.8	60.4	60.9

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	55.0	53.1	51.4	45.3	53.9	54.5
Medium Trucks:	44.3	42.8	36.5	34.9	43.4	43.6
Heavy Trucks:	50.1	48.7	39.7	40.9	49.3	49.4
Vehicle Noise:	56.5	54.8	51.8	46.9	55.5	56.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: First Floor With Wall
Road Name: Rancho Pkwy.
Lot No: School Outdoor Learning Area

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,600 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	78.0 feet
Centerline Dist. to Observer:	130.0 feet
Barrier Distance to Observer:	52.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	730.0 feet
Road Elevation:	742.0 feet
Barrier Elevation:	742.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	744.000		
Medium Trucks:	746.000		
Heavy Trucks:	750.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	128.390
Medium Trucks:	128.469
Heavy Trucks:	128.785

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	69.34	3.61	-6.25	-1.20	*0.18*	-6.640	-9.640
Medium Trucks:	77.62	-13.63	-6.25	-1.20	*0.10*	-6.000	-9.000
Heavy Trucks:	82.14	-17.58	-6.27	-1.20	*0.02*	-5.200	-8.200

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	65.5	63.6	61.8	55.8	64.4	65.0
Medium Trucks:	56.5	55.0	48.7	47.1	55.6	55.8
Heavy Trucks:	57.1	55.7	46.6	47.9	56.2	56.4
Vehicle Noise:	66.6	64.7	62.2	56.9	65.5	66.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	58.9	57.0	55.2	49.2	57.8	58.4
Medium Trucks:	50.5	49.0	42.7	41.1	49.6	49.8
Heavy Trucks:	51.9	50.5	41.4	42.7	51.0	51.2
Vehicle Noise:	60.2	58.4	55.6	50.6	59.1	59.6

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: First Floor With Wall
Road Name: SR-241
Lot No: Neighborhood 3

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	44,110	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	4,411	vehicles
Vehicle Speed:	70	mph
Near/Far Lane Distance:	162	feet

Site Data

Barrier Height:	**30.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	280.0	feet
Centerline Dist. to Observer:	1,034.0	feet
Barrier Distance to Observer:	754.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	734.0	feet
Road Elevation:	775.0	feet
Barrier Elevation:	740.0	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	96.92%
Medium Trucks:	84.8%	4.9%	10.3%	1.97%
Heavy Trucks:	86.5%	2.7%	10.8%	1.11%

Noise Source Elevations (in feet)

Autos:	777.000		
Medium Trucks:	779.000		
Heavy Trucks:	783.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	########
Medium Trucks:	########
Heavy Trucks:	########

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	76.79	2.55	-19.77	-1.20	*0.03*	-5.300	-8.300
Medium Trucks:	82.53	-14.37	-19.77	-1.20	*0.01*	-5.100	-8.100
Heavy Trucks:	85.83	-16.86	-19.77	-1.20	*0.00*	-4.900	-7.900

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	58.4	56.5	54.7	48.7	57.3	57.9
Medium Trucks:	47.2	45.7	39.3	37.8	46.2	46.5
Heavy Trucks:	48.0	46.6	37.5	38.8	47.1	47.3
Vehicle Noise:	59.1	57.2	54.9	49.4	58.0	58.5

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	53.1	51.2	49.4	43.4	52.0	52.6
Medium Trucks:	42.1	40.6	34.2	32.7	41.1	41.4
Heavy Trucks:	43.1	41.7	32.6	33.9	42.2	42.4
Vehicle Noise:	53.8	52.0	49.6	44.1	52.7	53.3

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: First Floor With Wall
Road Name: Rancho Pkwy.
Lot No: Neighborhood 3

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,600 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**6.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	96.0 feet
Barrier Distance to Observer:	26.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	734.0 feet
Road Elevation:	740.0 feet
Barrier Elevation:	740.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	742.000		
Medium Trucks:	744.000		
Heavy Trucks:	748.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	94.690
Medium Trucks:	94.602
Heavy Trucks:	94.602

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	69.34	3.61	-4.26	-1.20	*0.97*	-10.210	-13.210
Medium Trucks:	77.62	-13.63	-4.26	-1.20	*0.81*	-9.730	-12.730
Heavy Trucks:	82.14	-17.58	-4.26	-1.20	*0.52*	-8.600	-11.600

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	67.5	65.6	63.8	57.8	66.4	67.0
Medium Trucks:	58.5	57.0	50.7	49.1	57.6	57.8
Heavy Trucks:	59.1	57.7	48.6	49.9	58.2	58.4
Vehicle Noise:	68.5	66.7	64.2	58.9	67.5	68.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	57.3	55.4	53.6	47.6	56.2	56.8
Medium Trucks:	48.8	47.3	40.9	39.4	47.9	48.1
Heavy Trucks:	50.5	49.1	40.0	41.3	49.6	49.8
Vehicle Noise:	58.6	56.8	54.0	49.0	57.5	58.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: First Floor With Wall
Road Name: Lake Forest Dr.
Lot No: Neighborhood 3

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,600 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	369.0 feet
Centerline Dist. to Observer:	389.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	734.0 feet
Road Elevation:	740.0 feet
Barrier Elevation:	740.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	742.000		
Medium Trucks:	744.000		
Heavy Trucks:	748.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	388.591
Medium Trucks:	388.607
Heavy Trucks:	388.673

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	71.12	3.15	-13.46	-1.20	*0.02*	-5.200	-8.200
Medium Trucks:	78.79	-14.08	-13.46	-1.20	*0.01*	-5.100	-8.100
Heavy Trucks:	83.02	-18.04	-13.46	-1.20	*0.01*	-5.100	-8.100

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	59.6	57.7	55.9	49.9	58.5	59.1
Medium Trucks:	50.0	48.5	42.2	40.6	49.1	49.3
Heavy Trucks:	50.3	48.9	39.9	41.1	49.5	49.6
Vehicle Noise:	60.5	58.7	56.2	50.9	59.4	60.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	54.4	52.5	50.7	44.7	53.3	53.9
Medium Trucks:	44.9	43.4	37.1	35.5	44.0	44.2
Heavy Trucks:	45.2	43.8	34.8	36.0	44.4	44.5
Vehicle Noise:	55.3	53.5	51.0	45.7	54.3	54.8

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: First Floor With Wall
Road Name: Lake Forest Dr.
Lot No: Neighborhood 4

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,600 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	600.0 feet
Centerline Dist. to Observer:	620.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	696.0 feet
Road Elevation:	702.0 feet
Barrier Elevation:	702.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	704.000		
Medium Trucks:	706.000		
Heavy Trucks:	710.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	619.758
Medium Trucks:	619.768
Heavy Trucks:	619.808

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	71.12	3.15	-16.50	-1.20	*0.02*	-5.200	-8.200
Medium Trucks:	78.79	-14.08	-16.50	-1.20	*0.02*	-5.200	-8.200
Heavy Trucks:	83.02	-18.04	-16.50	-1.20	*0.01*	-5.100	-8.100

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	56.6	54.7	52.9	46.9	55.5	56.1
Medium Trucks:	47.0	45.5	39.1	37.6	46.1	46.3
Heavy Trucks:	47.3	45.9	36.8	38.1	46.4	46.6
Vehicle Noise:	57.5	55.7	53.2	47.8	56.4	56.9

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	51.4	49.5	47.7	41.7	50.3	50.9
Medium Trucks:	41.8	40.3	33.9	32.4	40.9	41.1
Heavy Trucks:	42.2	40.8	31.7	33.0	41.3	41.5
Vehicle Noise:	52.3	50.5	48.0	42.6	51.2	51.7

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Second Floor With Wall
Road Name: Bake Pkwy.
Lot No: Senior Affordable

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,600 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**6.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	100.0 feet
Centerline Dist. to Observer:	120.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	699.0 feet
Road Elevation:	705.0 feet
Barrier Elevation:	705.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	707.000		
Medium Trucks:	709.000		
Heavy Trucks:	713.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	118.794
Medium Trucks:	118.710
Heavy Trucks:	118.642

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	71.12	3.15	-5.74	-1.20	*-0.03*	0.000	0.000
Medium Trucks:	78.79	-14.08	-5.74	-1.20	*-0.05*	0.000	0.000
Heavy Trucks:	83.02	-18.04	-5.73	-1.20	*-0.12*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	67.3	65.4	63.7	57.6	66.2	66.8
Medium Trucks:	57.8	56.3	49.9	48.4	56.8	57.1
Heavy Trucks:	58.0	56.6	47.6	48.8	57.2	57.3
Vehicle Noise:	68.2	66.4	63.9	58.6	67.2	67.7

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	67.3	65.4	63.7	57.6	66.2	66.8
Medium Trucks:	57.8	56.3	49.9	48.4	56.8	57.1
Heavy Trucks:	58.0	56.6	47.6	48.8	57.2	57.3
Vehicle Noise:	68.2	66.4	63.9	58.6	67.2	67.7

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Second Floor With Wall
Road Name: Bake Pkwy.
Lot No: Neighborhood 1

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,600 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**6.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	75.0 feet
Centerline Dist. to Observer:	95.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	707.0 feet
Road Elevation:	701.0 feet
Barrier Elevation:	707.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	703.000		
Medium Trucks:	705.000		
Heavy Trucks:	709.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	95.000
Medium Trucks:	94.641
Heavy Trucks:	94.047

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	71.12	3.15	-4.28	-1.20	*-0.50*	0.000	0.000
Medium Trucks:	78.79	-14.08	-4.26	-1.20	*-0.61*	0.000	0.000
Heavy Trucks:	83.02	-18.04	-4.22	-1.20	*-0.87*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	68.8	66.9	65.1	59.1	67.7	68.3
Medium Trucks:	59.2	57.7	51.4	49.8	58.3	58.5
Heavy Trucks:	59.6	58.1	49.1	50.4	58.7	58.8
Vehicle Noise:	69.7	67.9	65.4	60.1	68.6	69.2

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	68.8	66.9	65.1	59.1	67.7	68.3
Medium Trucks:	59.2	57.7	51.4	49.8	58.3	58.5
Heavy Trucks:	59.6	58.1	49.1	50.4	58.7	58.8
Vehicle Noise:	69.7	67.9	65.4	60.1	68.6	69.2

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Second Floor With Wall
Road Name: Bake Pkwy.
Lot No: School Playground

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,600 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	80.0 feet
Centerline Dist. to Observer:	240.0 feet
Barrier Distance to Observer:	160.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	700.0 feet
Road Elevation:	700.0 feet
Barrier Elevation:	700.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	702.000		
Medium Trucks:	704.000		
Heavy Trucks:	708.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	239.625
Medium Trucks:	239.533
Heavy Trucks:	239.399

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	71.12	3.15	-10.31	-1.20	*-0.33*	0.000	0.000
Medium Trucks:	78.79	-14.08	-10.31	-1.20	*-0.49*	0.000	0.000
Heavy Trucks:	83.02	-18.04	-10.31	-1.20	*-0.92*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	62.8	60.9	59.1	53.0	61.7	62.3
Medium Trucks:	53.2	51.7	45.3	43.8	52.2	52.5
Heavy Trucks:	53.5	52.1	43.0	44.3	52.6	52.7
Vehicle Noise:	63.7	61.8	59.4	54.0	62.6	63.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	62.8	60.9	59.1	53.0	61.7	62.3
Medium Trucks:	53.2	51.7	45.3	43.8	52.2	52.5
Heavy Trucks:	53.5	52.1	43.0	44.3	52.6	52.7
Vehicle Noise:	63.7	61.8	59.4	54.0	62.6	63.1

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Second Floor With Wall
Road Name: SR-241
Lot No: School Picnic Area

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	44,110	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	4,411	vehicles
Vehicle Speed:	70	mph
Near/Far Lane Distance:	162	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	110.0	feet
Centerline Dist. to Observer:	757.0	feet
Barrier Distance to Observer:	647.0	feet
Observer Height (Above Pad):	14.0	feet
Pad Elevation:	735.0	feet
Road Elevation:	770.0	feet
Barrier Elevation:	770.0	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	96.92%
Medium Trucks:	84.8%	4.9%	10.3%	1.97%
Heavy Trucks:	86.5%	2.7%	10.8%	1.11%

Noise Source Elevations (in feet)

Autos:	772.000		
Medium Trucks:	774.000		
Heavy Trucks:	778.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	721.792
Medium Trucks:	753.069
Heavy Trucks:	753.213

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	76.79	2.55	-17.50	-1.20	*0.01*	-5.100	-8.100
Medium Trucks:	82.53	-14.37	-17.77	-1.20	*0.00*	0.000	0.000
Heavy Trucks:	85.83	-16.86	-17.77	-1.20	*-0.07*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	60.6	58.7	57.0	50.9	59.6	60.2
Medium Trucks:	49.2	47.7	41.3	39.8	48.2	48.5
Heavy Trucks:	50.0	48.6	39.5	40.8	49.1	49.3
Vehicle Noise:	61.3	59.4	57.2	51.6	60.2	60.8

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	55.5	53.6	51.9	45.8	54.5	55.1
Medium Trucks:	49.2	47.7	41.3	39.8	48.2	48.5
Heavy Trucks:	50.0	48.6	39.5	40.8	49.1	49.3
Vehicle Noise:	57.3	55.6	52.5	47.8	56.3	56.8

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Second Floor With Wall
Road Name: Bake Pkwy.
Lot No: School Picnic Area

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,600 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	210.0 feet
Barrier Distance to Observer:	140.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	724.0 feet
Road Elevation:	730.0 feet
Barrier Elevation:	730.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	732.000		
Medium Trucks:	734.000		
Heavy Trucks:	738.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	209.313
Medium Trucks:	209.265
Heavy Trucks:	209.227

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	71.12	3.15	-9.43	-1.20	*-0.17*	0.000	0.000
Medium Trucks:	78.79	-14.08	-9.43	-1.20	*-0.30*	0.000	0.000
Heavy Trucks:	83.02	-18.04	-9.43	-1.20	*-0.67*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	63.6	61.7	60.0	53.9	62.5	63.2
Medium Trucks:	54.1	52.6	46.2	44.7	53.1	53.4
Heavy Trucks:	54.4	52.9	43.9	45.1	53.5	53.6
Vehicle Noise:	64.5	62.7	60.3	54.9	63.5	64.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	63.6	61.7	60.0	53.9	62.5	63.2
Medium Trucks:	54.1	52.6	46.2	44.7	53.1	53.4
Heavy Trucks:	54.4	52.9	43.9	45.1	53.5	53.6
Vehicle Noise:	64.5	62.7	60.3	54.9	63.5	64.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Second Floor With Wall
Road Name: SR-241
Lot No: School Classroom Building

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	44,110	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	4,411	vehicles
Vehicle Speed:	70	mph
Near/Far Lane Distance:	162	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	100.0	feet
Centerline Dist. to Observer:	627.0	feet
Barrier Distance to Observer:	527.0	feet
Observer Height (Above Pad):	14.0	feet
Pad Elevation:	730.0	feet
Road Elevation:	770.0	feet
Barrier Elevation:	770.0	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	96.92%
Medium Trucks:	84.8%	4.9%	10.3%	1.97%
Heavy Trucks:	86.5%	2.7%	10.8%	1.11%

Noise Source Elevations (in feet)

Autos:	772.000		
Medium Trucks:	774.000		
Heavy Trucks:	778.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	586.318
Medium Trucks:	586.420
Heavy Trucks:	622.675

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	76.79	2.55	-16.14	-1.20	*0.04*	-5.400	-8.400
Medium Trucks:	82.53	-14.37	-16.14	-1.20	*0.00*	-4.900	-7.900
Heavy Trucks:	85.83	-16.86	-16.53	-1.20	*-0.04*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	62.0	60.1	58.3	52.3	60.9	61.5
Medium Trucks:	50.8	49.3	43.0	41.4	49.9	50.1
Heavy Trucks:	51.2	49.8	40.8	42.0	50.4	50.5
Vehicle Noise:	62.6	60.8	58.5	53.0	61.6	62.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	56.6	54.7	52.9	46.9	55.5	56.1
Medium Trucks:	45.9	44.4	38.1	36.5	45.0	45.2
Heavy Trucks:	51.2	49.8	40.8	42.0	50.4	50.5
Vehicle Noise:	58.0	56.2	53.3	48.4	57.0	57.4

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Second Floor With Wall
Road Name: Rancho Pkwy.
Lot No: School Classroom Building

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,600 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	100.0 feet
Centerline Dist. to Observer:	120.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	730.0 feet
Road Elevation:	742.0 feet
Barrier Elevation:	742.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	744.000		
Medium Trucks:	746.000		
Heavy Trucks:	750.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	118.642
Medium Trucks:	118.659
Heavy Trucks:	118.794

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	69.34	3.61	-5.73	-1.20	*-0.12*	0.000	0.000
Medium Trucks:	77.62	-13.63	-5.73	-1.20	*-0.16*	0.000	0.000
Heavy Trucks:	82.14	-17.58	-5.74	-1.20	*-0.26*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	66.0	64.1	62.4	56.3	64.9	65.5
Medium Trucks:	57.1	55.6	49.2	47.6	56.1	56.3
Heavy Trucks:	57.6	56.2	47.2	48.4	56.8	56.9
Vehicle Noise:	67.1	65.3	62.7	57.4	66.0	66.5

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	66.0	64.1	62.4	56.3	64.9	65.5
Medium Trucks:	57.1	55.6	49.2	47.6	56.1	56.3
Heavy Trucks:	57.6	56.2	47.2	48.4	56.8	56.9
Vehicle Noise:	67.1	65.3	62.7	57.4	66.0	66.5

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Second Floor With Wall
Road Name: SR-241
Lot No: School Outdoor Learning Area

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	44,110 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,411 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	162 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	105.0 feet
Centerline Dist. to Observer:	740.0 feet
Barrier Distance to Observer:	635.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	730.0 feet
Road Elevation:	775.0 feet
Barrier Elevation:	775.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	96.92%
Medium Trucks:	84.8%	4.9%	10.3%	1.97%
Heavy Trucks:	86.5%	2.7%	10.8%	1.11%

Noise Source Elevations (in feet)

Autos:	777.000		
Medium Trucks:	779.000		
Heavy Trucks:	783.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	702.599
Medium Trucks:	702.689
Heavy Trucks:	736.587

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	76.79	2.55	-17.32	-1.20	*0.04*	-5.400	-8.400
Medium Trucks:	82.53	-14.37	-17.32	-1.20	*0.01*	-5.100	-8.100
Heavy Trucks:	85.83	-16.86	-17.63	-1.20	*-0.03*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	60.8	58.9	57.2	51.1	59.7	60.3
Medium Trucks:	49.6	48.1	41.8	40.2	48.7	48.9
Heavy Trucks:	50.1	48.7	39.7	40.9	49.3	49.4
Vehicle Noise:	61.5	59.6	57.4	51.8	60.4	61.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	55.4	53.5	51.8	45.7	54.3	54.9
Medium Trucks:	44.5	43.0	36.7	35.1	43.6	43.8
Heavy Trucks:	50.1	48.7	39.7	40.9	49.3	49.4
Vehicle Noise:	56.8	55.0	52.1	47.2	55.8	56.3

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Second Floor With Wall
Road Name: Rancho Pkwy.
Lot No: School Outdoor Learning Area

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,600 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	78.0 feet
Centerline Dist. to Observer:	130.0 feet
Barrier Distance to Observer:	52.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	730.0 feet
Road Elevation:	742.0 feet
Barrier Elevation:	742.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	744.000		
Medium Trucks:	746.000		
Heavy Trucks:	750.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	128.748
Medium Trucks:	128.763
Heavy Trucks:	128.888

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	69.34	3.61	-6.26	-1.20	*-0.06*	0.000	0.000
Medium Trucks:	77.62	-13.63	-6.27	-1.20	*-0.12*	0.000	0.000
Heavy Trucks:	82.14	-17.58	-6.27	-1.20	*-0.30*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	65.5	63.6	61.8	55.8	64.4	65.0
Medium Trucks:	56.5	55.0	48.7	47.1	55.6	55.8
Heavy Trucks:	57.1	55.7	46.6	47.9	56.2	56.4
Vehicle Noise:	66.5	64.7	62.2	56.9	65.5	66.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	65.5	63.6	61.8	55.8	64.4	65.0
Medium Trucks:	56.5	55.0	48.7	47.1	55.6	55.8
Heavy Trucks:	57.1	55.7	46.6	47.9	56.2	56.4
Vehicle Noise:	66.5	64.7	62.2	56.9	65.5	66.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Second Floor With Wall
Road Name: SR-241
Lot No: Neighborhood 3

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	44,110	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	4,411	vehicles
Vehicle Speed:	70	mph
Near/Far Lane Distance:	162	feet

Site Data

Barrier Height:	**30.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	280.0	feet
Centerline Dist. to Observer:	1,034.0	feet
Barrier Distance to Observer:	754.0	feet
Observer Height (Above Pad):	14.0	feet
Pad Elevation:	734.0	feet
Road Elevation:	775.0	feet
Barrier Elevation:	740.0	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	96.92%
Medium Trucks:	84.8%	4.9%	10.3%	1.97%
Heavy Trucks:	86.5%	2.7%	10.8%	1.11%

Noise Source Elevations (in feet)

Autos:	777.000		
Medium Trucks:	779.000		
Heavy Trucks:	783.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	########
Medium Trucks:	########
Heavy Trucks:	########

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	76.79	2.55	-19.76	-1.20	*0.00*	-4.900	-7.900
Medium Trucks:	82.53	-14.37	-19.76	-1.20	*0.00*	-4.900	-7.900
Heavy Trucks:	85.83	-16.86	-19.76	-1.20	*0.03*	-5.300	-8.300

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	58.4	56.5	54.7	48.7	57.3	57.9
Medium Trucks:	47.2	45.7	39.3	37.8	46.3	46.5
Heavy Trucks:	48.0	46.6	37.5	38.8	47.2	47.3
Vehicle Noise:	59.1	57.2	54.9	49.4	58.0	58.5

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	53.5	51.6	49.8	43.8	52.4	53.0
Medium Trucks:	42.3	40.8	34.4	32.9	41.4	41.6
Heavy Trucks:	42.7	41.3	32.2	33.5	41.9	42.0
Vehicle Noise:	54.1	52.3	50.0	44.5	53.1	53.6

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Second Floor With Wall
Road Name: Rancho Pkwy.
Lot No: Neighborhood 3

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,600 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**6.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	70.0 feet
Centerline Dist. to Observer:	96.0 feet
Barrier Distance to Observer:	26.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	734.0 feet
Road Elevation:	740.0 feet
Barrier Elevation:	740.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	742.000		
Medium Trucks:	744.000		
Heavy Trucks:	748.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	94.488
Medium Trucks:	94.382
Heavy Trucks:	94.297

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	69.34	3.61	-4.25	-1.20	*0.00*	0.000	0.000
Medium Trucks:	77.62	-13.63	-4.24	-1.20	*-0.02*	0.000	0.000
Heavy Trucks:	82.14	-17.58	-4.24	-1.20	*-0.10*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	67.5	65.6	63.8	57.8	66.4	67.0
Medium Trucks:	58.6	57.0	50.7	49.1	57.6	57.8
Heavy Trucks:	59.1	57.7	48.7	49.9	58.3	58.4
Vehicle Noise:	68.6	66.8	64.2	58.9	67.5	68.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	67.5	65.6	63.8	57.8	66.4	67.0
Medium Trucks:	58.6	57.0	50.7	49.1	57.6	57.8
Heavy Trucks:	59.1	57.7	48.7	49.9	58.3	58.4
Vehicle Noise:	68.6	66.8	64.2	58.9	67.5	68.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Second Floor With Wall
Road Name: Lake Forest Dr.
Lot No: Neighborhood 3

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,600 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	369.0 feet
Centerline Dist. to Observer:	389.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	734.0 feet
Road Elevation:	740.0 feet
Barrier Elevation:	740.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	742.000		
Medium Trucks:	744.000		
Heavy Trucks:	748.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	388.630
Medium Trucks:	388.604
Heavy Trucks:	388.583

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	71.12	3.15	-13.46	-1.20	*-1.47*	0.000	0.000
Medium Trucks:	78.79	-14.08	-13.46	-1.20	*-1.51*	0.000	0.000
Heavy Trucks:	83.02	-18.04	-13.46	-1.20	*-1.59*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	59.6	57.7	55.9	49.9	58.5	59.1
Medium Trucks:	50.0	48.5	42.2	40.6	49.1	49.3
Heavy Trucks:	50.3	48.9	39.9	41.1	49.5	49.6
Vehicle Noise:	60.5	58.7	56.2	50.9	59.4	60.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	59.6	57.7	55.9	49.9	58.5	59.1
Medium Trucks:	50.0	48.5	42.2	40.6	49.1	49.3
Heavy Trucks:	50.3	48.9	39.9	41.1	49.5	49.6
Vehicle Noise:	60.5	58.7	56.2	50.9	59.4	60.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 6/2/2013

Scenario: Second Floor With Wall
Road Name: Lake Forest Dr.
Lot No: Neighborhood 4

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,600 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	600.0 feet
Centerline Dist. to Observer:	620.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	696.0 feet
Road Elevation:	702.0 feet
Barrier Elevation:	702.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	704.000		
Medium Trucks:	706.000		
Heavy Trucks:	710.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	619.768
Medium Trucks:	619.752
Heavy Trucks:	619.739

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	71.12	3.15	-16.50	-1.20	*-1.48*	0.000	0.000
Medium Trucks:	78.79	-14.08	-16.50	-1.20	*-1.51*	0.000	0.000
Heavy Trucks:	83.02	-18.04	-16.50	-1.20	*-1.56*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	56.6	54.7	52.9	46.9	55.5	56.1
Medium Trucks:	47.0	45.5	39.1	37.6	46.1	46.3
Heavy Trucks:	47.3	45.9	36.8	38.1	46.4	46.6
Vehicle Noise:	57.5	55.7	53.2	47.8	56.4	56.9

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	56.6	54.7	52.9	46.9	55.5	56.1
Medium Trucks:	47.0	45.5	39.1	37.6	46.1	46.3
Heavy Trucks:	47.3	45.9	36.8	38.1	46.4	46.6
Vehicle Noise:	57.5	55.7	53.2	47.8	56.4	56.9

This page intentionally left blank

APPENDIX 10.1:

OPERATIONAL NOISE LEVEL CALCULATIONS

This page intentionally left blank

STATIONARY SOURCE NOISE PREDICTION MODEL

9/26/2018

Observer Location: **R1**
Source: Playground/Sports Field Activity
Condition: Operational

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	624.0 feet	***Barrier Height:***	**6.0 feet**
Noise Distance to Barrier:	614.0 feet	*Noise Source Height:*	4.0 feet
Barrier Distance to Observer:	10.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	728.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	700.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	728.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	0.0	61.7	64.1	67.0	69.7	73.9
Distance Attenuation	624.0	-41.9	-41.9	-41.9	-41.9	-41.9	-41.9
Shielding (Barrier Attenuation)	614.0	-6.1	-6.1	-6.1	-6.1	-6.1	-6.1
Raw (Distance + Barrier)		-48.0	13.7	16.1	19.0	21.7	25.9
60 Minute Hourly Adjustment		**-48.0**	**13.7**	**16.1**	**19.0**	**21.7**	**25.9**

STATIONARY SOURCE NOISE PREDICTION MODEL

9/26/2018

Observer Location: **R1**
Source: Outdoor Pool/Spa Activity
Condition: Operational

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	2,159.0 feet	***Barrier Height:***	**6.0 feet**
Noise Distance to Barrier:	2,149.0 feet	*Noise Source Height:*	4.0 feet
Barrier Distance to Observer:	10.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	728.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	708.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	728.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	0.0	68.7	71.7	75.0	78.1	83.5
Distance Attenuation	2,159.0	-52.7	-52.7	-52.7	-52.7	-52.7	-52.7
Shielding (Barrier Attenuation)	2,149.0	-5.6	-5.6	-5.6	-5.6	-5.6	-5.6
Raw (Distance + Barrier)		-58.3	10.4	13.4	16.7	19.8	25.2
60 Minute Hourly Adjustment		**-58.3**	**10.4**	**13.4**	**16.7**	**19.8**	**25.2**

STATIONARY SOURCE NOISE PREDICTION MODEL

9/26/2018

Observer Location: **R1**
Source: Dog Park Activity
Condition: Operational

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	624.0 feet	***Barrier Height:***	**6.0 feet**
Noise Distance to Barrier:	614.0 feet	*Noise Source Height:*	4.0 feet
Barrier Distance to Observer:	10.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	728.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	695.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	728.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	0.0	58.5	61.0	65.2	72.6	78.6
Distance Attenuation	624.0	-41.9	-41.9	-41.9	-41.9	-41.9	-41.9
Shielding (Barrier Attenuation)	614.0	-6.2	-6.2	-6.2	-6.2	-6.2	-6.2
Raw (Distance + Barrier)		-48.1	10.4	12.9	17.1	24.5	30.5
60 Minute Hourly Adjustment		**-48.1**	**10.4**	**12.9**	**17.1**	**24.5**	**30.5**

STATIONARY SOURCE NOISE PREDICTION MODEL

9/26/2018

Observer Location: **R1**
Source: School Parking Lot Vehicle Movements
Condition: Operational

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	2,113.0 feet	***Barrier Height:***	**6.0 feet**
Noise Distance to Barrier:	2,103.0 feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	10.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	728.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	720.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	728.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	50.0	0.0	50.0	55.0	61.0	65.0	83.9
Distance Attenuation	2,113.0	-32.5	-32.5	-32.5	-32.5	-32.5	-32.5
Shielding (Barrier Attenuation)	2,103.0	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5
Raw (Distance + Barrier)		-38.0	12.0	17.0	23.0	27.0	45.9
60 Minute Hourly Adjustment		**-38.0**	**12.0**	**17.0**	**23.0**	**27.0**	**45.9**

STATIONARY SOURCE NOISE PREDICTION MODEL

9/26/2018

Observer Location: **R2**
Source: Playground/Sports Field Activity
Condition: Operational

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	464.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	464.0 feet	*Noise Source Height:*	4.0 feet
Barrier Distance to Observer:	0.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	735.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	710.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	710.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	0.0	61.7	64.1	67.0	69.7	73.9
Distance Attenuation	464.0	-39.4	-39.4	-39.4	-39.4	-39.4	-39.4
Shielding (Barrier Attenuation)	464.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		-39.4	22.3	24.7	27.6	30.3	34.5
60 Minute Hourly Adjustment		**-39.4**	**22.3**	**24.7**	**27.6**	**30.3**	**34.5**

STATIONARY SOURCE NOISE PREDICTION MODEL

9/26/2018

Observer Location: **R2**
Source: Outdoor Pool/Spa Activity
Condition: Operational

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	1,665.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,665.0 feet	*Noise Source Height:*	4.0 feet
Barrier Distance to Observer:	0.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	735.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	708.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	708.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	0.0	68.7	71.7	75.0	78.1	83.5
Distance Attenuation	1,665.0	-50.4	-50.4	-50.4	-50.4	-50.4	-50.4
Shielding (Barrier Attenuation)	1,665.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		-50.4	18.3	21.3	24.6	27.7	33.1
60 Minute Hourly Adjustment		**-50.4**	**18.3**	**21.3**	**24.6**	**27.7**	**33.1**

STATIONARY SOURCE NOISE PREDICTION MODEL

9/26/2018

Observer Location: **R2**
Source: Dog Park Activity
Condition: Operational

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	1,163.0	feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,163.0	feet	*Noise Source Height:*	4.0 feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0 feet
Observer Elevation:	735.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	695.0	feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	695.0	feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	0.0	58.5	61.0	65.2	72.6	78.6
Distance Attenuation	1,163.0	-47.3	-47.3	-47.3	-47.3	-47.3	-47.3
Shielding (Barrier Attenuation)	1,163.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		-47.3	11.2	13.7	17.9	25.3	31.3
60 Minute Hourly Adjustment		**-47.3**	**11.2**	**13.7**	**17.9**	**25.3**	**31.3**

STATIONARY SOURCE NOISE PREDICTION MODEL

9/26/2018

Observer Location: **R2**
Source: School Parking Lot Vehicle Movements
Condition: Operational

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	984.0	feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	984.0	feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0 feet
Observer Elevation:	735.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	720.0	feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	720.0	feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	50.0	0.0	50.0	55.0	61.0	65.0	83.9
Distance Attenuation	984.0	-25.9	-25.9	-25.9	-25.9	-25.9	-25.9
Shielding (Barrier Attenuation)	984.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		-25.9	24.1	29.1	35.1	39.1	58.0
60 Minute Hourly Adjustment		**-25.9**	**24.1**	**29.1**	**35.1**	**39.1**	**58.0**

STATIONARY SOURCE NOISE PREDICTION MODEL

9/26/2018

Observer Location: **R3**
Source: Playground/Sports Field Activity
Condition: Operational

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	870.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	870.0 feet	*Noise Source Height:*	4.0 feet
Barrier Distance to Observer:	0.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	736.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	715.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	715.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	0.0	61.7	64.1	67.0	69.7	73.9
Distance Attenuation	870.0	-44.8	-44.8	-44.8	-44.8	-44.8	-44.8
Shielding (Barrier Attenuation)	870.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		-44.8	16.9	19.3	22.2	24.9	29.1
60 Minute Hourly Adjustment		**-44.8**	**16.9**	**19.3**	**22.2**	**24.9**	**29.1**

STATIONARY SOURCE NOISE PREDICTION MODEL

9/26/2018

Observer Location: **R3**
Source: Outdoor Pool/Spa Activity
Condition: Operational

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	743.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	743.0 feet	*Noise Source Height:*	4.0 feet
Barrier Distance to Observer:	0.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	736.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	708.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	708.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	0.0	68.7	71.7	75.0	78.1	83.5
Distance Attenuation	743.0	-43.4	-43.4	-43.4	-43.4	-43.4	-43.4
Shielding (Barrier Attenuation)	743.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		-43.4	25.3	28.3	31.6	34.7	40.1
60 Minute Hourly Adjustment		**-43.4**	**25.3**	**28.3**	**31.6**	**34.7**	**40.1**

STATIONARY SOURCE NOISE PREDICTION MODEL

9/26/2018

Observer Location: **R3**
Source: Dog Park Activity
Condition: Operational

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	2,410.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	2,410.0 feet	*Noise Source Height:*	4.0 feet
Barrier Distance to Observer:	0.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	736.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	695.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	695.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	0.0	58.5	61.0	65.2	72.6	78.6
Distance Attenuation	2,410.0	-53.7	-53.7	-53.7	-53.7	-53.7	-53.7
Shielding (Barrier Attenuation)	2,410.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		-53.7	4.8	7.3	11.5	18.9	24.9
60 Minute Hourly Adjustment		**-53.7**	**4.8**	**7.3**	**11.5**	**18.9**	**24.9**

STATIONARY SOURCE NOISE PREDICTION MODEL

9/26/2018

Observer Location: **R3**
Source: School Parking Lot Vehicle Movements
Condition: Operational

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	1,287.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,287.0 feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	0.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	736.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	720.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	720.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	50.0	0.0	50.0	55.0	61.0	65.0	83.9
Distance Attenuation	1,287.0	-28.2	-28.2	-28.2	-28.2	-28.2	-28.2
Shielding (Barrier Attenuation)	1,287.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		-28.2	21.8	26.8	32.8	36.8	55.7
60 Minute Hourly Adjustment		**-28.2**	**21.8**	**26.8**	**32.8**	**36.8**	**55.7**

STATIONARY SOURCE NOISE PREDICTION MODEL 9/26/2018

Observer Location: **R4**
Source: Playground/Sports Field Activity
Condition: Operational

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	802.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	802.0 feet	*Noise Source Height:*	4.0 feet
Barrier Distance to Observer:	0.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	718.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	715.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	715.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	0.0	61.7	64.1	67.0	69.7	73.9
Distance Attenuation	802.0	-44.1	-44.1	-44.1	-44.1	-44.1	-44.1
Shielding (Barrier Attenuation)	802.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		-44.1	17.6	20.0	22.9	25.6	29.8
60 Minute Hourly Adjustment		**-44.1**	**17.6**	**20.0**	**22.9**	**25.6**	**29.8**

STATIONARY SOURCE NOISE PREDICTION MODEL 9/26/2018

Observer Location: **R4**
Source: Outdoor Pool/Spa Activity
Condition: Operational

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	341.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	341.0 feet	*Noise Source Height:*	4.0 feet
Barrier Distance to Observer:	0.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	718.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	708.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	708.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	0.0	68.7	71.7	75.0	78.1	83.5
Distance Attenuation	341.0	-36.7	-36.7	-36.7	-36.7	-36.7	-36.7
Shielding (Barrier Attenuation)	341.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		-36.7	32.0	35.0	38.3	41.4	46.8
60 Minute Hourly Adjustment		**-36.7**	**32.0**	**35.0**	**38.3**	**41.4**	**46.8**

STATIONARY SOURCE NOISE PREDICTION MODEL

9/26/2018

Observer Location: **R4**
Source: Dog Park Activity
Condition: Operational

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	1,935.0	feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,935.0	feet	*Noise Source Height:*	4.0 feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0 feet
Observer Elevation:	718.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	695.0	feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	695.0	feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	0.0	58.5	61.0	65.2	72.6	78.6
Distance Attenuation	1,935.0	-51.8	-51.8	-51.8	-51.8	-51.8	-51.8
Shielding (Barrier Attenuation)	1,935.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		-51.8	6.7	9.2	13.4	20.8	26.8
60 Minute Hourly Adjustment		**-51.8**	**6.7**	**9.2**	**13.4**	**20.8**	**26.8**

STATIONARY SOURCE NOISE PREDICTION MODEL

9/26/2018

Observer Location: **R4**
Source: School Parking Lot Vehicle Movements
Condition: Operational

Project Name: Nakase
Job Number: 11049
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	1,405.0	feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,405.0	feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0 feet
Observer Elevation:	718.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	720.0	feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	720.0	feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	50.0	0.0	50.0	55.0	61.0	65.0	83.9
Distance Attenuation	1,405.0	-29.0	-29.0	-29.0	-29.0	-29.0	-29.0
Shielding (Barrier Attenuation)	1,405.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		-29.0	21.0	26.0	32.0	36.0	54.9
60 Minute Hourly Adjustment		**-29.0**	**21.0**	**26.0**	**32.0**	**36.0**	**54.9**

Mayor
Dr. Jim Gardner

Mayor Pro Tern
Leslie Basile

Council Members
Thomas Cagley, Scott Voigts, Dwight Robinson

City Manager
Debra D. Rose

NOTICE OF PREPARATION OF AN ENVIRONMENTAL IMPACT REPORT

SUBJECT: NOTICE OF PREPARATION FOR THE PROPOSED NAKASE PROPERTY AREA PLAN

LEAD AGENCY: CITY OF LAKE FOREST

CONTACT: MARIE LUNA, SENIOR PLANNER
CITY OF LAKE FOREST COMMUNITY DEVELOPMENT DEPARTMENT
25550 COMMERCENTRE DRIVE, SUITE 100
LAKE FOREST, CALIFORNIA 92630

The City of Lake Forest (City) has decided to prepare a draft Environmental Impact Report (EIR) for the proposed Nakase Property Area Plan (referred to hereafter as the Area Plan). Development as provided for in the Area Plan would require the following approvals from the City: (1) an Amendment to the City of Lake Forest General Plan; (2) a Zone Change; (3) approval of the Area Plan; (4) approval of a Planned Community Program; (5) approval of a Development Agreement between the City and the Developer; (5) approval of a Vesting Tentative Tract Map, and (6) subsequent approval of Site Development Permits. In addition, ministerial permits/approvals (e.g., grading permits and building permits) would be issued for the proposed Project by the City to allow for site preparation, curb cuts (if necessary), connections to the utility infrastructure, paving, landscaping, walls and fences, and other features subject to ministerial permits. Together, these approvals constitute the proposed Project for which the EIR will be prepared. Pursuant to Public Resources Code Section 21165 and the Guidelines for the California Environmental Quality Act (*State CEQA Guidelines*) Section 15050, the City is the Lead Agency responsible for preparing the EIR for the proposed Project.

The purpose of this letter is to: (1) serve as a Notice of Preparation (NOP) of an EIR pursuant to the *State CEQA Guidelines* Section 15082; (2) advise and solicit comments and suggestions regarding the scope and content of the EIR to be prepared for the proposed Project; and (3) provide notice of the public Scoping Meeting.

PROPOSED PROJECT LOCATION

The 122-acre (ac) proposed Project site is located at 20261 Lake Forest Drive, Lake Forest, CA 92630 (Assessor's Parcel Number [APN] 612-221-01) and is currently operating as Nakase Brothers Wholesale Nursery, an agricultural wholesale plant nursery. The proposed Project site is located in the north-central portion of Lake Forest in Orange County, California. The areas surrounding the proposed Project site consist of a mix of land uses, including commercial, office, open space, industrial, and residential uses. The proposed Project site is bounded on the northwest by Bake Parkway, on the northeast by Rancho Parkway, on the southeast by Serrano Creek Trail, and on the southwest by commercial, industrial, and office uses, with Dimension Drive beyond. Although not immediately adjacent to the proposed Project site, single-family and multifamily residential uses exist to the northwest, northeast, and south of the proposed Project site.

PROPOSED PROJECT DESCRIPTION

The Nakase Property Area Plan would facilitate the development of the 122 ac proposed Project site as a master-planned community. Implementation of the Area Plan would include development of residential uses, an elementary school site, and over 28 acres of parks, open space, and habitat restoration area. The Area Plan would establish guidelines for the future development of the planned community, which would consist of single-family residential units (contained in five distinct neighborhoods), affordable apartment units for senior citizens, an elementary school site, parks and open space, an internal circulation system, and a multipurpose water quality basin. The proposed Project would entitle development of up to 675 two- and three-story, single-family residential units on approximately 61.4 acres of the site. In order to meet the City's affordable housing policy as stipulated in the Housing Element (2014), up to 101 senior affordable housing units[1] would be constructed on 3.9 acres in a two to three story building with an elevator. The units would be available for rent. The proposed elementary school site would accommodate a school for approximately 800 to 1,000 students from kindergarten through sixth grade. The school site would be located on the northwestern portion of the proposed Project site, at the corner of Bake Parkway and Rancho Parkway. Access to the proposed Project site would be provided at three proposed locations: two entries at Bake Parkway and one entry at Rancho Parkway. The two entries at Bake Parkway would line up with existing roads (Rancho Parkway South and Orchard Street).

PROBABLE ENVIRONMENTAL EFFECTS

Based on the Initial Study completed for the proposed Project, the City has determined that the proposed Project could result in impacts related to aesthetics, agriculture and forestry, air quality, biological resources, cultural resources, geology and soils, greenhouse gas emissions, hazards and hazardous materials, hydrology and water quality, land use/planning, noise, population/housing, public services, recreation, transportation/traffic, tribal cultural resources, and utilities and service systems. These topics will be analyzed in the EIR. Mitigation will be developed and included in the EIR, if necessary, to address the proposed Project's potentially significant adverse effects.

DOCUMENT AVAILABILITY

Copies of this NOP have been transmitted to the California State Clearinghouse of the Office of Planning and Research, and to each applicable responsible and trustee agency. Copies of this NOP, the Initial Study, and future environmental documents prepared in conjunction with the proposed Project will be available for public review on the City's website at http://www.lakeforestca.gov and at the following locations:

- City of Lake Forest Community Development Department, 25550 Commercentre Drive, Suite 100, Lake Forest, CA 92630
- Foothill Ranch Branch Library, 27002 Cabriole, Foothill Ranch, CA 92610
- El Toro Public Library, 24672 Raymond Way, Lake Forest, CA 92630

NOTICE OF PREPARATION COMMENT PERIOD

The City invites you to submit written comments describing your specific environmental concerns, if any. **The NOP comment period begins on July 16, 2018, and ends on August 15, 2018. Your written comments must be received by 5:00 p.m. on August 15, 2018, the close of the public review period.** Please send your written comments to Marie Luna at 25550 Commercentre Drive, Suite 100, Lake Forest, CA 92630 or via email to mluna@lakeforestca.gov. Please include your name, address, and contact information in your correspondence.

PUBLIC SCOPING MEETING

To provide an additional opportunity for input, the City will be conducting a Scoping Meeting. The Scoping Meeting will be held on the following date:

Date and Time: Wednesday, July 25, 2018, at 6:30 P.M.
Location: Council Chambers at Lake Forest City Hall, 25550 Commercentre Drive, Lake Forest, CA 92630

---

[1] The total number of senior affordable housing units would equal approximately 15 percent of the number of approved single-family homes.

POLICE PROTECTION

For your convenience, we have provided space below for your answers. If you choose to answer these questions in the form of a letter, please number your responses to correspond to the questions. We would very much appreciate a response by **July 16, 2019**. Please return the completed questionnaire via email to ryan.bensley@lsa.net.

1. **Please evaluate the following statement for accuracy. If any of the information contained in the text below is incorrect or should be updated, please indicate the needed revisions below.**

The City of Lake Forest contracts with the Orange County Sheriff's Department (OCSD) for law enforcement services. The OCSD provides 24-hour contract law enforcement services to the City. The OCSD currently provides 24-hour contract law enforcement services to the City out of its Saddleback Station at 20202 Windrow in Lake Forest, approximately 0.2 mile east of the Project Site.

The OCSD/Police Services Department embraces the concept of Community-Oriented Policing, which encompasses the active participation of local government, civic and business leaders, residents, schools, churches and other public and private agencies.

A total of 53 OCSD personnel are assigned to the City, including five sergeants, three investigators, 38 deputies, an investigative assistant, five community services officers, and one crime prevention specialist. The City's staffing level is based on response times and crime rates determined to be adequate for the City.

Response times to the project site are dependent on various factors, including the location of patrol vehicles at the given moment. Emergency calls receive the quickest response, with alarm calls and non-emergency calls having longer response times. Response times for the City of Lake Forest for both Priority 1 (i.e., red light/siren) and Priority 2 (i.e., urgent – no lights/siren) are less than **5 minutes** and **7 minutes**, respectively.

2. **The new Lake Forest Civic Center being built south of the proposed project will include a new community police facility for the City of Lake Forest. Are there any other current plans for expansion of Sheriff Department facilities, services, or staff or to construct a new facility? If yes, please explain.**

There will not be any expansion of facilities or services. There are plans to add a Deputy Sheriff around March of 2020, depending on available funding in the City of Lake Forest General Fund.

3. Would the project substantially increase response times or create a substantial increase in demand for staff, facilities, equipment, or police or other emergency services (e.g., as a result of potential increase in call volume)?

No, there will not be a substantial increase.

4. Are there any specific crime prevention design features that the OCSD recommends for incorporation into the proposed project?

Proper and adequate lighting for security purposes.

5. Based on the proposed project description, will the OCSD be able to adequately serve the proposed project? If not, can you recommend any measures for mitigating project impacts that might be incorporated into the project?

Yes.

6. Please provide any additional comments or questions you would like to see addressed in the environmental analysis for this project.

Prepared by: Brett Channing

Title: Director of Management Services

Date: July 10, 2019

Phone: (949) 461-3419

HILLMANN
CONSULTING

PHASE I ENVIRONMENTAL SITE ASSESSMENT

20621 Lake Forest Drive
Lake Forest, California 92630

Prepared For:

Toll Brothers
725 Town and County Road, Suite 200
Orange, California 92868

Hillmann Project Number C3-7216

July 13, 2018
Updated September 10, 2018

Your Property. Our Priority.
1745 W. Orangewood Avenue, Suite 110, Orange, CA 92868
Telephone (714) 634-9500 Fax: (714) 634-9507 Toll free: (800) 232-4326
www.HillmannConsulting.com

HILLMANN
CONSULTING

July 13, 2018

Mr. Ilan Feingold
Toll Brothers
725 Town and County Road, Suite 200
Orange, California 92868

RE: Phase I Environmental Site Assessment
20621 Lake Forest Drive
Lake Forest, California 92630
Hillmann Project No: C3-7216

Dear Mr. Feingold:

Hillmann Consulting, LLC, is pleased to provide the results of our Phase I Environmental Site Assessment of the above referenced property. This assessment was performed in general accordance with the scope and limitations of ASTM Practice E 1527-13, which is the latest version of the E1527 standard published by the ASTM.

We appreciate the opportunity to provide environmental due diligence services. If you have any questions concerning this report, or if we can assist you in any other matter, please contact our office at 714-634-9500.

Sincerely,

Hillmann Consulting, LLC

Stephen Bartlett
Environmental Technician

James M. Riggs, MS, CHMM
Project Manager

TABLE OF CONTENTS

1.0 FINDINGS, OPINIONS, AND CONCLUSIONS 1
1.1 Summary of Project Details 1
1.2 Findings Summary Table 2
1.3 Findings and Conclusions 3
1.4 Environmental Professional Statement 4

2.0 INTRODUCTION 5
2.1 Purpose and Scope 5
2.2 Property Location/Legal Description 7
2.3 Data Gaps 7
2.4 User Reliance 7
2.5 Significant Assumptions 7
2.6 General Limitations and Exceptions 8

3.0 USER PROVIDED INFORMATION 11
3.1 Prior Environmental Reports/Documentation 11
3.2 User Questionnaire 12
3.3 Reason for Performing Phase I ESA 14

4.0 RECORDS REVIEW 15
4.1 Physical Setting Sources 15
4.2 Historical Use – Property and Adjoining Properties 15
4.3 Standard Environmental Record Sources 20
4.4 Additional Environmental Record Sources 23

5.0 SITE RECONNAISSANCE 25
5.1 Methodology and Limiting Conditions 25
5.2 General Site Setting 25
5.3 Interior & Exterior Observations 26

6.0 INTERVIEWS 30
6.1 Interviews with Past and Present Owners and Occupants 30
6.2 Interviews with State and/or Local Government Officials 30

7.0 BUSINESS ENVIRONMENTAL RISKS 31
7.1 Asbestos-Containing Material (ACM) 31
7.3 Radon 31
7.4 Mold/Microbial Damage 31

8.0 REFERENCES 32

9.0 APPENDICES 33
Appendix A Site Diagram/Vicinity Map
Appendix B Site Photographs
Appendix C Questionnaires / User Provided Information
Appendix D Historical Records Documentation
Appendix E Regulatory Records Documentation
Appendix F Other Documents
Appendix G Project Personnel Qualifications

List of Abbreviations/Acronyms

Hillmann may use the following abbreviations and acronyms for common terminology described in our report. Not all abbreviations or acronyms may be applicable to this report:

ACM	– Asbestos Containing Material
AOC	– Area of Concern
AST	– Aboveground Storage Tank
ASTM	– American Society for Testing Materials
BER	– Business Environmental Risk
CEA	– Classification Exception Area
CERCLA	– Comprehensive Environmental Response Compensation and Liability Act
CERCLIS	– Comprehensive Environmental Response Compensation and Liability Information System
CESQG	– Conditionally Exempt Small Quantity Generator
COC	– Chemicals of Concern
CORRACTS	– Corrective Action Sites
CREC	– Controlled Recognized Environmental Condition
DNPL	– Delisted National Priority List
DTSC	– Department of Toxic Substances Control
ENG	– Engineering
ERNS	– Emergency Response Notification System
CUPA	– Certified Unified Program Agency
FOI/FOIA/FOIL	– Freedom of Information / Freedom of Information Act / Freedom of Information Letter
HVAC	– Heating Ventilation & Air Conditioning
HREC	– Historic Recognized Environmental Condition
IAQ	– Indoor Air Quality
INST	– Institutional
ISRA	– Industrial Site Recovery Act
LBP	– Lead-Based Paint
LQG	– Large Quantity Generator
LTANK	– Leaking Storage Tank
LUST	– Leaking Underground Storage Tank
SDS/MSDS	– Safety Data Sheet / Material Safety Data Sheet
NA	– Not Applicable
NFA	– No Further Action
NFRAP	– No Further Remedial Actions Planned
NPDES	– National Pollutant Discharge Elimination System
NPL	– National Priority List
OPRA	– Open Public Records Act
PAH	– Polycyclic Aromatic Hydrocarbon
PCE	– Perchloroethylene
RAO	– Response Action Outcome
RCRA	– Resource Conservation and Recovery Act
RWQCB	– Regional Water Quality Control Board
SCAQMD	– South Coast Air Quality Management District
RCRIS	– Resource Conservation and Recovery Information System
REC	– Recognized Environmental Condition
SDG	– Significant Data Gap
SEMS	– Superfund Enterprise Management System
SRP	– Site Remediation Program
SQG	– Small Quantity Generator
SVOC	– Semi-Volatile Organic Compound
TCE	– Trichloroethylene
TSDF	– Treatment Storage and/or Disposal Facility
USEPA	– United States Environmental Protection Agency
UST	– Underground Storage Tank
VEC	– Vapor Encroachment Condition
VOC	– Volatile Organic Compound

1.0 FINDINGS, OPINIONS, AND CONCLUSIONS

Hillmann Consulting, LLC (Hillmann) performed a Phase I Environmental Site Assessment (ESA) of 20621 Lake Forest Drive, Lake Forest, California (the Property). This assessment has been conducted in accordance with our contracted scope of work and the ASTM Standard Practice E 1527-13 for Phase I Environmental Site Assessments and All Appropriate Inquiries (AAI) Final Rule 40 CFR Part 312. This section contains a summary of findings, opinions and conclusions made by this assessment. However, this section, alone, does not constitute the complete assessment. The report must be read in its entirety.

1.1 Summary of Project Details

Project Name:		N/A			
Primary Street Address:		20621 Lake Forest Drive			
City:	Lake Forest	**County:**	Orange	**State:**	California
Tax ID/Parcel Number:		612-221-01			
Property Owner:		Nakase Brothers			
Zoning Designation:		Agricultural			
Approx. Property Area:		121.08 acres			
Buildings/# of Floors		One single story building and garage			
Approx. Building Area:		2,500 SF			
Approx. Year Built:		1980			
Commercial Occupants:		Nakase Brothers Wholesale Nurseries			
Current Use:		Nursery			
Prior Uses:		Agricultural land			
Inspected By:		Mr. Stephen Bartlett			
Property Contact/Company:		Mr. Steve Nakase/Owner			
Property Escort/Company:		N/A			
Inspection Date:		July 11, 2018			
Weather Conditions:		Clear, 80 degrees F			

1.2 Findings Summary Table

PHASE I ENVIRONMENTAL SITE ASSESSMENT				
Assessment Subject	**No Notable Finding**	**Notable Findings**	**REC?**	**Rep. Ref.**
User Provided Info		Prior report indicates several RECs for a former UST located in the southern corner of the Property as well as historic agricultural use and current nursery use.		3.0
Data Gaps	X			2.3
Property Regulatory Records Review		Marine Corps Air Station (MCAS El Toro) is listed on the NPL database for trichloroethylene contamination in a portion of the groundwater basin. The site is out of the vicinity of our Property. Property listed on UST database.	No Yes	4.3.1
Property Historical Records Review		Property historically used as an agricultural nursery and orchards.	No	4.2
Site Reconnaissance		Seven (7) pole mounted transformers were observed on the throughout the Property. No signs of leaking or staining were observed in the area of the transformers. Five (5) ASTs were observed in the pesticide storage area, this is not part of the Property being assessed. Various drums were noted in the maintenance garage. Drums were noted in the pesticide storage area. Large quantities of pesticides are stored in the pesticide storage area in a shed and a metal storage container. This area is not part of the Property currently being assessed.	No No No No	5.0
Interviews		Mr. Eliacar Najera, Maintenance Manager, indicated that a UST was historically located in the southeastern portion of the Property.	Yes	6.0
Adjoining & Nearby Properties		The adjoining properties to the north are listed on several databases. The adjoining pesticide storage area to the southeast has five ASTs and large quantities of pesticides.	No No	4.3.2 5.2.8
BUSINESS ENVIRONMENTAL RISKS / NON-ASTM SCOPE				
BER	**Not Applicable**	**Findings**		**Rep. Ref.**
Asbestos Containing Materials (ACM)		ACM may be present based on bldg. age. Suspected ACM noted during a cursory visual screening included plaster walls, wallboard, ceiling tiles, cove base, adhesive, and stucco. Although not observed, the roofing materials may contain asbestos.		7.1
Lead Based Paint (LBP)		LBP may be present based on bldg. age. In general, painted surfaces appeared to be in fair condition.		7.2
Radon		The Property located in USEPA Radon Zone 3.		7.3
Mold		Hillmann did not observe any evidence of significant problems with moisture intrusion or mold/microbial growth at the Property.		7.4

1.3 Findings and Conclusions

1.3.1 Recognized Environmental Conditions

Hillmann has performed a Phase I Environmental Site Assessment in accordance with the scope and limitations of ASTM Practice E 1527-13 of the Property as described in Section 2 of this report. Any additions to, exceptions to, or deletions from this practice are also described in Section 2 of this report. This assessment has revealed no evidence of *recognized environmental conditions* in connection with the Property, except for the following:

RECOGNIZED ENVIRONMENTAL CONDITIONS	
REC #1	There is a UST listing associated with the Property, in addition the site representative indicated that a UST was historically located in the southeastern portion of the Property. Hillmann reviewed the response from the Orange County Department of Environmental Health and no UST closure documentation was provided, therefore the UST listing is considered to be a REC in connection with the Property.
HISTORICAL RECOGNIZED ENVIRONMENTAL CONDITIONS	
	No HRECs were identified.
CONTROLLED RECOGNIZED ENVIRONMENTAL CONDITIONS	
	No CRECs were identified.
SIGNIFICANT DATA GAPS	
	No SDGs were identified.

1.3.2 REC Response Action Recommendations

The following table presents recommended response actions to the identified RECs for further investigation and/or corrective action:

REC RESPONSE ACTION SUMMARY TABLE	
REC #	**Response Action**
REC #1	Limited Phase II Investigation and GPR Investigation prior to grading and redevelopment

1.3.3 Additional Findings

The following environmental conditions were identified, but are not considered to be a REC in connection with the Property:

NOTABLE ENVIRONMENTAL CONDITIONS	
1.	A NPL listing is located within one mile of the Property. The listing is described as Marine Corps Air Station (MCAS El Toro approximately 4,736 feet northwest of the Property and cross-gradient relative to the Property. In 1985, trichloroethylene (TCE) was found in a portion of the groundwater basin beneath the former MCAS EL Toro and Central Irvine. TCE is a volatile organic compound (VOC) that was widely used as a solvent for aircraft cleaning. Prior to the 1970s, the disposal of cleaning solvents was not regulated. As a result of past disposal practices, a one-by-three mile plume of groundwater contamination extended west of MCAS El Toro. Based on a review of the EDR report and published groundwater plume maps, the TCE contaminant plume is about 450 feet deep and located over two miles from the boundary of the Property. In addition, the groundwater flow at the plume is towards the west and migrating away from the subject property. The site has been under federal facility remedial investigation since 1990s. Considering the current status, the Property's distance from the TCE plume and respective down gradient location, this listing is not considered to be a REC in connection with the Property.
2.	Seven (7) pole mounted transformers were observed on the northeast side of the Property. No signs of leaking or staining were observed in the area of the transformers.
3.	Two 25-gallon drums containing grease and two 55-gallon drums containing tractor fluid were observed in the maintenance garage. No staining or leaking was noted in the areas of the drums.
4.	Five ASTs containing diesel and gasoline as well as large quantities of pesticides are stored on the adjoining property to the southeast and are not part of the Property being assessed.
5.	Rancho Parkway Shell #07, located at 26721 Rancho Parkway is located on the UST and EDR Historic Auto databases. This site adjoins the Property to the north-northeast and is up-gradient of the Property: The UST listing indicates an underground storage tank is registered as being on the site. Considering a lack of reported spills or releases, this listing is not considered to be a REC in connection with the Property.
6.	The Home Depot at 20021 Lake Forest Drive is located on the RCRA-SQG, FINDS, and ECHO databases. This site adjoins the Property to the northeast and is up-gradient of the Property. The RCRA-SQG listing indicates that the site is registered as a small-quantity generator of hazardous waste with no reported violations. The FINDS listing indicates that the site is on the California Hazardous Waste Tracking System – Datamart, RCRA, and State Master databases. The ECHO listing indicates a registry id of "110002941416", indicating that the site is on the RCRA program with no reported spills or violations. Due to a lack of reported spills or violations, these listings are not considered to be RECs in connection with the Property.
7.	The Property appears to have been historically utilized as orchards and/or a nursery since circa 1938. There is the potential for soil contamination due to historic application of pesticides, however due to the Phase II by Engeo indicating no impact on the soil from OCPs, this is not considered to be a REC in connection with the Property.

1.4 Environmental Professional Statement

I declare that, to the best of my professional knowledge and belief, I meet the definition of *Environmental Professional* as defined in §312.10 of 40 CFR 312. I have the specific qualifications based on education, training and experience to assess a *property* of the nature, history and setting of the subject *property*. I have developed and performed all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

James M. Riggs
Environmental Professional

2.0 INTRODUCTION

2.1 Purpose and Scope

This assessment was conducted utilizing generally accepted Phase I ESA industry standards in accordance with the ASTM Standard Practice E 1527-13. The ASTM describes these methodologies as representing good commercial and customary practice in the United States of America for conducting an environmental site assessment of a parcel of commercial real estate with respect to the range of contaminants within the scope of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and petroleum products. As such, this practice is intended to permit a user to satisfy one of the requirements to qualify for the innocent landowner, contiguous property owner or bona fide prospective purchaser limitations on CERCLA liability (hereinafter, the "landowner liability protections," or "LLPs"): that is, the practice that constitutes all appropriate inquiries into the previous ownership and uses the property consistent with good commercial and customary practice as defined at 42 U.S.C. §9601(35) (B). The primary goal of the processes established by ASTM E1527-13 is to identify *recognized environmental conditions* in connection with the Property.

The term *recognized environmental condition (REC)* is defined by the ASTM as the presence or likely presence of any hazardous substances or petroleum products in, on or at a property: (1) due to a release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment.

The ASTM has also defined the terms *historical recognized environmental conditions* and *controlled recognized environmental conditions* as two additional types of RECs. The term *historical recognized environmental condition (HREC)* is defined as a past release of any hazardous substances or petroleum products that has occurred in connection with the Property and has been addressed to the satisfaction of the applicable regulatory authority or meeting unrestricted use criteria established by a regulatory authority, without subjecting the Property to any required controls (for example, property use restrictions, activity and use limitations, institutional controls or engineering controls).

The term *controlled recognized environmental condition (CREC)* is defined as a recognized environmental condition resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority, with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls.

Conditions determined to be *"de minimis conditions"* are not considered to be RECs, HRECs or CRECs. *De minimis condition* is defined by the ASTM, "…as a condition that generally does not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies."

The chief components of this assessment are generally described as follows:

- A non-invasive visual reconnaissance of the Property and adjoining properties in accordance with ASTM guidelines for evidence of RECs.

- Interviews of past and present owners and occupants and state and local government officials, seeking information related to the potential presence of RECs at the Property.

- A review of standard physical record sources for available topographic, geologic and groundwater data.

- A review of standard historic record sources, such as fire insurance maps, city directories, aerial photographs, prior reports and interviews, etc., to determine prior uses of the Property from the present, back to the Property's first developed use, or back to 1940, whichever is earlier.

- A review of standard environmental record sources including federal and state environmental databases, and additional environmental record sources, to identify potential regulatory concerns with the Property, adjoining properties and properties located within the surrounding area.

An evaluation of environmental or other regulatory compliance matters is excluded from the scope of this assessment.

These methodologies are described as representing good commercial and customary practice for conducting an Environmental Site Assessment of a property for the purpose of identifying recognized environmental conditions.

2.1.1 Business Environmental Risks/Non-ASTM Scope Considerations

In accordance with our contract agreement, Hillmann may have addressed the following potential environmental subject matters that are outside of the requirements of the ASTM E1527-13 standard:

Asbestos-Containing Materials (ACM): A cursory non-intrusive visual screening for the presence of suspect ACM within the accessed areas of buildings built prior to 1990 on the Property. It is emphasized that this cursory non-intrusive visual screening does not constitute an asbestos survey/inspection of the premises. An asbestos survey/inspection should be sought by the report User(s) if more certainty is desired regarding ACM and potential asbestos hazards at the Property. Furthermore, a review of regulatory compliance matters pertaining to asbestos is excluded from the scope of work.

Lead-Based Paint (LBP): A cursory non-intrusive visual screening of the condition of painted surfaces in the accessed areas of residential buildings/units built prior to 1980 on the Property. It is emphasized that this cursory non-intrusive visual screening does not constitute a comprehensive survey for LBP or potential lead hazards. A comprehensive inspection should be sought by the report User(s) if more certainty is desired regarding LBP at the Property. Furthermore, a review of regulatory compliance matters pertaining to lead-based paint is excluded from the scope of work.

USEPA Designated Radon Potential: Review of general non-site specific data published by the USEPA regarding the Radon Zone classification for the area of the Property.

Mold: A cursory non-intrusive visual screening within the accessed areas of buildings on the Property for evidence of systemic microbial problems, including visible mold growth, water

damaged building materials or musty odors. It is emphasized that this cursory non-intrusive visual screening does not constitute a comprehensive survey for moisture/mold/microbial damage. A more comprehensive inspection should be sought by the report User(s) if more certainty is desired regarding the potential for moisture/mold/microbial damages at the Property.

2.2 Property Location/Legal Description

Property location and legal description details are described as follows:

Primary Street Address:		20621 Lake Forest Drive			
City:	Lake Forest	**County:**	Orange	**State:**	California
Tax ID/Parcel Number:		612-221-01			
Approx. Land Area:		121.08 acres			
Approx. Latitude/Longitude:		North 33.6684670 degrees/West 117.6677490 degrees			
Additional Details (if appl.):		NA			

2.3 Data Gaps

A *data gap* is defined by the ASTM as a lack of or inability to obtain information required by this practice despite good faith efforts by the environmental professional to gather such information. A data gap is only significant if other information and/or professional experience raises reasonable concerns involving the data gap and the ability to determine the presence or absence of recognized environmental conditions. The following table summarizes data gaps encountered during the assessment as well as a discussion of their significance.

Data Gap:	Significant (Yes/No)?	Discussion
Historical records data failure	No	See Section 4.2.9
Response to agency records requests not received as of date of report.	No	Any additional information indicative of a REC will be forwarded upon receipt.
Completed environmental questionnaire was not returned.	No	An environmental questionnaire completed by the Property representative has been requested but not yet received.

2.4 User Reliance

This report is for the exclusive use of the User(s) named on the front cover. No other party(ies) shall have any right to rely on the content of this report without first obtaining the consent of the original report User; and without obtaining written consent from Hillmann in the form of a letter of reliance or report recertification.

2.5 Significant Assumptions

The following significant assumptions are made:

- Hillmann has assumed that the site operations at the time of the site visit reflect typical site conditions relative to potential environmental conditions and that no concealment of environmental conditions or releases by site owners or occupants has occurred. Likewise, Hillmann has also assumed that no areas of the Property with potential environmental concerns or RECs were concealed or otherwise not made known to us, intentionally or unknowingly, by the Property owners/occupants and/or site escort at the time of the site visit.

- For the purpose of estimating the approximate direction of groundwater flow in the absence of site specific groundwater data, unless indicated otherwise, Hillmann has assumed that the gradient of groundwater flow follows the surface topography of the Property and immediate surrounding area.

2.6 General Limitations and Exceptions

2.6.1 Limitations

The report turnaround time specified by the contract agreement for this assessment may present a limitation to Hillmann's ability to access and review pertinent regulatory agency records. Such limitations, if encountered, are further specified in Section 4.4.

Significant limitations related to the condition or accessibility of the Property at the time of the site reconnaissance, if encountered, are reported in Section 5.1.

2.6.2 Other Exceptions or Deletions

No other exceptions or deletions from the ASTM Standard E 1527-13 are reported.

2.6.3 Special Terms and Conditions

Hillmann has prepared this Phase I Environmental Site Assessment using reasonable efforts in each phase of its work to identify recognized environmental conditions associated with hazardous substances, wastes and petroleum products at the Property. Findings within this report are based on information collected from observations made on the day of the site reconnaissance and from reasonably ascertainable information obtained from governing public agencies and private sources.

This report is not definitive and should not be assumed to be a complete or specific definition of the conditions above or below grade. Information in this report is not intended to be used as a construction document and should not be used for demolition, renovation, site development, redevelopment, or other construction purposes. Hillmann makes no representation or warranty that the past or current operations at the Property are, or have been, in compliance with all applicable federal, state and local laws, regulations and codes.

Findings, conclusions and recommendations presented in this report are based on our visual observations of the Property, interviews conducted, the records reviewed, information provided by the Client, and/or a review of readily available and supplied drawings and documents. Hillmann relies upon the information, whether written, graphic or verbal, provided by the Property contact(s) or as shown on any documents reviewed or received from the Property contact, owner or agent, or municipal source; and assumes that information to be true and correct. Although there may have

been some degree of overlap in the information provided by these various sources, Hillmann did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this assessment. Hillmann can neither warrant nor guarantee the accuracy or completeness of information that was obtained from ostensibly knowledgeable individuals, regulatory agency representatives or other secondary sources.

Regardless of the findings stated in this report, Hillmann is not responsible for consequences or conditions arising from facts that were concealed, withheld or not fully disclosed at the time the assessment was conducted.

This report does not warrant against future operations or conditions, nor does it warrant against operations or conditions present of a type or at a location not investigated.

The regulatory database report provided is based on an evaluation of the data collected and compiled by a contracted data research company. The regulatory research is designed to meet the requirements of ASTM Standard E 1527-13. Hillmann can neither warrant nor guarantee the accuracy or completeness of the information obtained from the regulatory database report provider during the course of this assessment.

Subsurface conditions may differ from the conditions implied by the surface observations and can only be reliably evaluated through intrusive techniques.

Reasonable efforts have been made during this assessment to identify aboveground and underground storage tanks and ancillary equipment. "Reasonable efforts" are limited to information gained from visual observation of largely unobstructed areas, recorded database information held in public record and available information gathered from interviews. Such methods may not identify surficial and subsurface features that may have been hidden from view due to parked automobiles and other vehicles, snow cover, vegetative growth, pavement, construction or debris pile storage or incorrect information from sources.

Hillmann is not a professional title insurance firm and makes no guarantee, explicit or implied, that the records which were reviewed represent a comprehensive or precise delineation of past Property ownership or tenancy for legal purposes.

The ASTM E1527-13 standard states that recommendations are not required to be included in a Phase I ESA report; however, further that recommendations are an additional service that may be useful in the User's analysis of landowner liability protections or business environmental risks; and that the User should consider whether recommendations for additional inquiries or other services are desired.

The recommended response actions to the identified RECs presented in Section 1.3, if any, are not intended to represent the only course(s) of action to take; nor does it imply any opinion as to the timing of the action. Furthermore, it is emphasized that additional response actions may become warranted depending on the outcome of the initial action(s) taken. Hillmann advises that consultation with legal counsel familiar with environmental and real estate law may be beneficial to the decision making process for the type and timing of a response action to identified RECs, if any.

Due to the limited nature of our review of potential Business Environmental Risks, the User of the report should consider whether to take additional action(s) to further define, properly manage and/or mitigate potential BERs.

In the event of any conflict between the terms and conditions of this report and the terms and conditions of the consulting services agreement for this project, the consulting services agreement shall control.

3.0 USER PROVIDED INFORMATION

The term "User" is defined by ASTM as the party seeking to use Practice E1527 to complete an environmental site assessment of the Property; specifically, the entities named on the front cover to which the report has been addressed.

3.1 Prior Environmental Reports/Documentation

Phase I Environmental Site Assessment, 20621 Lake Forest Drive, Lake Forest, California 92630 prepared by Hillmann Consulting LLC, and dated August 31, 2016. Below is a summary of the results of the Phase I Site Assessment.

"With the historic and current use of the Property being identified as an agricultural and wholesale plant nursery, there is potential to create contaminated soils with residual levels of pesticide, herbicide, fungicide, and insecticides which is considered to be a REC in connection with the Property.

One (1) NPL listings were identified within a one-mile radius of the Property. The listing is described as Marine Corps Air Station (MCAS El Toro approximately 4,736 feet northwest of the Property. In 1985, trichloroethylene (TCE) was found in a portion of the groundwater basin beneath the former MCAS EL Toro and Central Irvine. TCE is a volatile organic compound (VOC) that was widely used as a solvent for aircraft cleaning. Prior to the 1970s, the disposal of cleaning solvents was not regulated. As a result of past disposal practices, a one-by-three mile plume of groundwater contamination extended west of MCAS El Toro. Based on a review of the EDR report and published groundwater plume maps, the TCE contaminant plume is about 450 feet deep and located over two miles from the boundary of the Property. In addition, the groundwater flow at the plume is towards the west and migrating away from the subject property. The site has been under federal facility remedial investigation since 1990s. Considering the current status, the Property's distance from the TCE plume and respective down gradient location, this listing is not considered to be a REC in connection with the Property.

Based on the EDR Historical Auto Stations and UST databases, the Rancho Parkway Shell property, adjoining to the north-northeast, was identified to have a historical auto station in 2001 as Lake Forest Shell Gas Station. In addition, the site is also registered as having an underground storage tank (UST) at the address. No reported spills or leaks were identified for the site and is not considered to be a REC in connection with the Property.

Approximately sixty (60) 55-gallon drums were observed around the Property containing herbicides, pesticides, oils and plant foods as well as miscellaneous empty drums. No leaking or staining was observed around the vicinity of the drums.
A 500-gallon propane AST was noted on the Property. Propane storage is not considered to be a significant environmental concern, as it exists in a gaseous state when released.

Five fertilizer ASTs were noted within a fenced area in the southern portion of the site. No evidence of leakage was noted around the tanks.

Hillmann also notes several empty and/or dismantled storage tanks at various locations of the site, with no staining noted.

One (1) dry-type transformer was observed on the Property. In addition, seven (7) utility owned pole-mounted transformers were identified around the border of the Property with no indications of staining or leaking around the vicinity of the transformer. This transformer is not likely to represent an environmental concern for the Property.

Five (5) bulk petroleum ASTs were noted at a fueling station on the southwestern portion of the nursery. These ASTs were located on parcel APN# 610-401-33, which was reported to Hillmann as not a part of the Property subject to this assessment. These included an inactive empty 400-gallon diesel AST, an active 240-gallon gasoline AST with double walled construction, two active 1,000-gallon diesel ASTs and an inactive empty 1000-gallon gasoline AST.

Bulk storage of various pesticides, herbicide and fertilizer products used at the nursery were noted in storage containers at the southwestern portion of the nursery. This area was on parcel 610-401-33, which was reported to Hillmann as not being a part of Property covered by this assessment. Chemical mixing was reported to be performed in this location. In addition, farm equipment was reportedly washed down in this area.

Based on the historic and current usage as orchards and as a wholesale plant nursery, historical and current applications of pesticide/herbicide/insecticide/fungicide have likely occurred at the Property. Therefore, there is the potential for residual pesticides and related compounds to exist in shallow soils and drainage channels in the Property.

A property representative indicated that a UST was formerly used at the Property. A 400-gallon diesel steel-wall UST was reported to have been removed from the south corner of the Property in the early 1990s. No UST closure documentation was available from the property representative. Hillmann also notes that the Property was listed on the UST database; however, no details were readily available to indicate whether the listing was related to the former 400-gallon diesel UST reported to have been removed in the early 1990s. Additional information is being sought from Orange County. Hillmann further notes the potential for additional USTs to have formerly been used by the nursery in the past."

Further review by Hillmann of documents received prior from the Orange County Department of Environmental Health provided no closure documentation for the former UST located at the Property, therefore the historic UST is considered to be a REC in connection with the Property.

Phase II Environmental Site Assessment, 20621 Lake Forest Drive, Lake Forest, California 92630 prepared by Engeo, and dated September 12, 2016. Below is a summary of the results of the Phase II Site Assessment:

"Review of the laboratory test results found no detectable concentrations of OCPs. The reported lead and arsenic concentrations are within the range of expected background concentrations. Based on the findings of this soil characterizations assessment, it is out opinion that the site soils are suitable for future residential development.

According to the Phase I ESA report, it was recommended that investigation be performed where the former UST was located in the southern corner of the Property. There is currently no UST closure documentation available for the Property concerning this removal. It is conceivable some localized impacts may exist in this area. A limited subsurface assessment can be performed in the future to verify soils have not been significantly impacted."

3.2 User Questionnaire

Section 6 of the ASTM E1527-13 standard describes certain tasks required to be performed by the report User in order to qualify for landowner liability protections to CERCLA liability. To assist the report User to meet these requirements, and as recommended by the ASTM E1527-13 standard,

a Questionnaire of inquiries (User Questionnaire) specified in 40 CFR 312.25, 312.28, 312.29, 312.30, and 312.31 has been provided to the original report User. The following is a summary of the User's response:

Question:	Yes/No:	Detail:
Environmental liens that are filed or recorded against the property: Did a search of recorded land title records identify any environmental liens filed or recorded against the property under federal, tribal, state or local law?	NR	Questionnaire not completed by User.
Activity and use limitations that are in place on the property or that have been filed or recorded against the property: Did a search of recorded land title records (or judicial records where appropriate, identify any AULs, such as engineering controls, land use restrictions or institutional controls that are in place at the property and/or have been filed or recorded against the property under federal, tribal, state or local law?	NR	
Specialized knowledge or experience of the person seeking to qualify for the LLP: Do you have any specialized knowledge or experience related to the property or nearby properties? For example, are you involved in the same line of business as the current or former occupants of the property or an adjoining property so that you would have specialized knowledge of the chemicals and processes used by this type of business?	NR	
Relationship of the purchase price to the fair market value of the property if it were not contaminated: Does the purchase price being paid for this property reasonably reflect the fair market value of the property? If you conclude that there is a difference, have you considered whether the lower purchase price is because contamination is known or believed to be present at the property?	NR	
Commonly Known or Reasonably Ascertainable Information: Are you aware of commonly known or reasonably ascertainable information about the property that would help the environmental professional to identify conditions indicative of releases or threatened releases? For example,		
-Do you know the past uses of the property?	NR	
-Do you know of specific chemicals that are present or were once present at the property?	NR	
-Do you know of spills or other chemical releases that have taken place at the property?	NR	
-Do you know of any environmental cleanups that have taken place at the property?	NR	
The degree of obviousness of the presence or likely presence of contamination at the property, and the ability to detect the contamination by appropriate investigation: Based on your knowledge and experience related to the property are there any obvious indicators that point to the presence or likely presence of releases at the property?	NR	

Litigation/Administrative Proceedings/Government Notices As the User of this ESA, do you have knowledge of (1) any pending, threatened, or past litigation relevant to hazardous substances or petroleum products in, on, or from the property; (2) any pending, threatened, or past administrative proceedings relevant to hazardous substances or petroleum products in, on or from the property; and (3) any notices from any governmental entity regarding any possible violation of environmental laws or possible liability relating to hazardous substances or petroleum products.	NR	

NR-no response

3.3 Reason for Performing Phase I ESA

Hillmann assumes that the Phase I ESA was being performed in order to qualify for landowner liability protection to CERCLA liability.

4.0 RECORDS REVIEW

4.1 Physical Setting Sources

The following physical setting sources were reviewed:

Source	Discussion
USGS 7.5 minute Topographic Map Data: (EDR Geocheck-Physical Setting Source Addendum)	The Property lies at an elevation of approximately 735 feet above mean sea level on the El Toro, CA Quadrangle map. The topography indicated by the map appeared to be gently sloping downward towards the south-southwest. The closest down gradient water body is a reservoir located approximately 2.44 miles to the south-southwest.
USDA SCS Soil Data: (EDR Geocheck-Physical Setting Source Addendum)	The soil type at the Property is classified as "Cieneba". The "Cieneba" designation is described as soils with a sandy loam surface texture that have moderately fine for fine textures.
Geologic Data: (EDR Geocheck-Physical Setting Source Addendum)	The geologic formation in the vicinity of the Property is described as a stratified sequence of the Cenozoic Era, Tertiary System, and Eocene Series.
Additional Sources/ Data:	N/A
Groundwater Flow Discussion:	Based on a review of the above information as well as observation of the site, the direction of shallow groundwater flow at the site is inferred to be generally from north-northeast to south-southwest.

4.2 Historical Use – Property and Adjoining Properties

Hillmann has conducted research in order to help identify the likelihood of past uses having led to recognized environmental conditions in connection with the Property. Standard historical sources have been sought in an attempt to document the past uses of the Property as far back as it can be shown that the Property contained structures; or from the time the Property was first used for residential, agricultural, commercial, industrial or governmental purposes.

4.2.1 Fire Insurance Maps

Hillmann obtained a Certified Sanborn Map Report from EDR in order to research published historic fire insurance maps for the Property and surrounding area. A copy of the report is included in Appendix D. The following is a summary of site use information interpreted from a review of the report:

Year(s)	Description	
	Property	(No Coverage)
	Adjoining Properties	

4.2.2 City Directories

The following is a generalized summary of the findings of City Directory Research for past occupants of the Property, indicating occupants and the years indicated by the listings.

Property	
Occupant(s)	**Appr. Date Range**
Nakase Brothers Nursery	1995 – 2014

Hillmann also reviewed the EDR City Directory Abstract report for listings of historic occupants of the adjoining properties. The following is a general summary of listings of historic adjoining property occupants:

Adjoining Properties		
Address(es)	**Historic Occupant(s)**	**Appr. Date Range**
20511 Lake Forest Drive	Cameo Technologies	2005 – 2014
20381 Lake Forest Drive	Offices	1992 – 2005
20331 Lake Forest Drive	Offices	1992 – 2000

4.2.3 Historical Topographic Map Review

Hillmann reviewed historic topographic maps of the Property from EDR. The following details related to site usage were indicated by the topographic maps:

YEAR(S)	DESCRIPTION	
1902, 1935	**Property**	No improvements were depicted at the Property.
	Adjacent Properties	No improvements were depicted at the adjoining properties.
1942	**Property**	The Property is depicted as having orchards and woodlands.
	Adjacent Properties	The adjoining properties to the northwest and southeast are depicted as undeveloped land. The adjoining properties to the northeast and southwest are depicted as having orchards and woodlands.
1949	**Property**	The Property is depicted as having orchards.
	Adjacent Properties	The adjoining properties to the northwest, northeast, and southwest are depicted as undeveloped land. The adjoining properties to the southeast are depicted as undeveloped land and woodlands.
1950, 1968	**Property**	The Property is depicted as undeveloped land.
	Adjacent Properties	The adjoining properties are depicted as undeveloped land.
1978	**Property**	The Property is depicted as having undeveloped land and orchards.
	Adjacent Properties	The adjoining properties are all depicted as having undeveloped land and orchards.
1981	**Property**	The Property is depicted as undeveloped land.
	Adjacent Properties	The adjoining properties are all depicted as undeveloped land.
1982	**Property**	The Property is depicted as having agricultural land.
	Adjacent Properties	The adjoining properties are all depicted as having undeveloped land and orchards.
1997	**Property**	The Property is depicted as having orchards, two rectangular structures, and one smaller structure.
	Adjacent Properties	The adjoining properties to the northeast are depicted as orchards. The adjoining properties to the southeast are depicted as having orchards and various structures. The adjoining properties to the southwest appear to be depicted with undeveloped land, small structures, and orchards. The adjoining properties to the northwest appear to be depicted with orchards and undeveloped land.

2012	**Property**	No building development is depicted on the Topographic map.
	Adjacent Properties	No building development is depicted on the Topographic map.

4.2.4 Aerial Photograph Review

Hillmann reviewed historic aerial photographs of the Property from EDR. The following interpretation of land usage was made by review of the aerial photographs:

YEAR(S)	DESCRIPTION	
1938, 1946, 1949, 1952	**Property**	The Property appears to be developed with orchards. A small pond was present in the central portion of the Property.
	Adjacent Properties	The adjoining properties to the northeast, southeast, and northwest appear to be undeveloped land. The adjoining properties to the southwest appear to be agricultural land and undeveloped land.
1967, 1972	**Property**	The Property appears to be agricultural land developed partially with orchards. A small pond was present in the central portion of the Property.
	Adjacent Properties	The adjoining properties appear to be a mix of undeveloped and agricultural land.
1980	**Property**	The Property appears to be agricultural land, a parking lot in the central portion of the Property, and vacant land towards the southwestern portion of the Property.
	Adjacent Properties	The adjoining properties all appear to be a mix of agricultural and vacant land.
1988	**Property**	The Property appears to be developed with orchards on the NW side; and a nursery operation on the reminder of the site. A structure also appears along the southwestern border.
	Adjacent Properties	The adjoining properties to the northwest appear to be depicted as agricultural land and one rectangular structure. The adjoining properties to the southeast appear to be depicted as undeveloped land, agricultural land, and a parking lot. The adjoining properties to the southwest appear to be primarily vacant land, with one small structure. The adjoining properties to the northwest appear to be agricultural land, small structures, and vacant land.
1990	**Property**	The Property appears to be developed with an agricultural nursery operation, with various structures scattered around the Property, and a small strip of vacant land on the western corner.
	Adjacent Properties	The adjoining properties to the northeast appear to be agricultural land and vacant land with a rectangular structure. The adjoining properties to the southeast appear to be developed with large commercial structures and vacant land under construction. The adjoining properties to the southwest appear to be vacant land under construction with a commercial structure. The adjoining properties to the northwest appear to be agriculture with vacant land.
1994	**Property**	The Property appears to be developed with an agricultural nursery operation, with various structures scattered around the Property and an associated parking lot in the central portion of the site.
	Adjacent Properties	The adjoining properties to the northeast appear to be agricultural land and vacant land with a rectangular structure. The adjoining properties to the southeast appear to be developed with large commercial structures and vacant land under construction. The adjoining properties to the southwest appear to be vacant land under construction with a commercial structure. The adjoining properties to the northwest appear to be agriculture with vacant land.

YEAR(S)	DESCRIPTION	
2005	**Property**	The Property appears to be developed with an agricultural nursery operation; with various structures, an equipment yard, and associated parking lot.
	Adjacent Properties	The adjoining properties to the northeast, southeast, and southwest appear to be developed with commercial structures and associated parking lots. The adjoining properties to the northwest appear to be apartment complexes.
2009, 2012, 2016	**Property**	The Property appears to be developed with an agricultural nursery operation; with various structures, an equipment yard, and associated parking lot. Most of the prior structures were removed.
	Adjacent Properties	The adjoining properties to the northeast, southeast, southwest, and northwest appear to be developed with commercial structures, apartment complexes, and associated parking lots.

4.2.5 EDR High-Risk Historical Records

The EDR Radius Map™ report, which will be discussed in greater detail in Section 4.3, provided a search of proprietary databases of potential historical high-risk uses at or in the vicinity of the Property. These databases include EDR Historic Cleaners – a database of property addresses with records of historical occupancy by suspected cleaners businesses; EDR Historic Auto – a database of property addresses with records of historical occupancy by potential automotive gas/filling stations and repair facilities; and EDR MGP- a database of sites historically occupied by manufactured gas plants and related facilities.

EDR Historic Cleaners	No on-site or adjoining listings identified.
EDR Historic Auto	The adjoining property to the north is listed on the EDR Historic Auto database under the name Rancho Parkway Shell at 26721 Rancho Parkway. According to the listing, Rancho Parkway Shell occupied the site from 2001 to 2014.
EDR MGP	No listings identified within 1-mile search distance.

4.2.6 Petroleum/Natural Gas Well Review

Hillmann reviewed historical record sources for evidence of historic petroleum and/or natural gas wells at the Property. In addition, Hillmann conducted a search of the property location on the Division of Oil, Gas & Geothermal Resources Well Finder database (http://maps.conservation.ca.gov/doggr/index.html). No record of any historical petroleum/natural gas wells at the Property was identified.

4.2.7 Additional Historical Data

No additional historical data was reviewed and/or obtained.

4.2.8 Summary of Identified Historic Uses

The following table presents a summary of the types and approximate timeframes of identified prior uses of the Property:

Property	
Years (Approx.)	**Use**
1938 to 1972	Orchard
1980 to 1988	Orchard/nursery
1990 to Present	Nursery

The following table presents a summary of the types of identified prior uses of the adjoining properties:

Adjoining Properties	
Years (Approx.)	Use
1938 to 1980	Agricultural land
1990 to 1994	Commercial buildings/orchards
2005 to Present	Commercial buildings

4.2.9 Historical Records Data Failure

The ASTM E1527-13 standard defines data failure as a failure to achieve the ASTM specified historical research objectives after reviewing the standard historical sources that are reasonably ascertainable and likely to be useful. The objective is to identify all obvious uses of the property from the present, back to the property's first developed use, or back to 1940, whichever is earlier. Furthermore, records of historic use/conditions should be sought in intervals no less than approximately five years, unless the property conditions appear unchanged over a longer interval.

Objective	Met?	Detail	Significant Data Gap?
First developed use/date determined?	Yes	Agricultural land circa 1938	No
Record sources at 5-year intervals back to 1940 or first developed use?	No	Records gaps between 1952 and 1967, 1972 and 1978, 1982 and 1988, and 1997 and 2005; however, site conditions likely unchanged during these intervals.	No
All obvious prior uses identified?	Yes	See Section 4.2.8.	No

Please refer to Section 2.3 for additional discussion of data gaps and their significance to the findings of the assessment.

4.2.10 Historic Uses REC Discussion

The Property appears to have been historically utilized as orchards and/or a nursery since circa 1938. There is the potential for soil contamination due to historic application of pesticides, however due to the Phase II by Engeo indicating no impact on the soil from OCPs, this is not considered to be a REC in connection with the Property.

4.3 Standard Environmental Record Sources

Hillmann obtained a regulatory database report, titled EDR Radius Map™ Report, from Environmental Data Resources of Shelton, CT. The report provided a search of standard environmental record sources in general accordance with the requirements of the ASTM E1527-13. Hillmann has reviewed the regulatory database report, and a summary of findings has been presented in the following tables and report sections. Hillmann has also reviewed the list of unmapped sites (a.k.a. "Orphan List" sites). Unmapped sites identified as falling within an applicable specific search distance or warranting discussion in the report, if any, have been included in the information presented below. Detailed descriptions of the meaning and significance of the regulatory databases can be found in the regulatory database report in Appendix E.

Regulatory Database	Search Distance	Property Listed?	Adj. Properties Listed?	Total Listings Within Search Distance
Fed. NPL/Proposed NPL	1-mile	No	No	1
Fed. Delisted NPL	½-mile	No	No	0
Fed. SEMS	½-mile	No	No	0
Fed. SEMS-ARCHIVE	½-mile	No	No	0
Fed. RCRA CORRACTS	1-mile	No	No	1
Fed. RCRA TSD	½-mile	No	No	0
Fed. RCRA LQG	Site & Adj.	No	No	
Fed. RCRA SQG	Site & Adj.	No	Yes	
Fed. RCRA CESQG	Site & Adj.	No	No	
Fed. ENG Control List	Site	No		
Fed. INST Control List	Site	No		
Fed. ERNS	Site	No		
State/Tribal Hazardous Waste Site	1-mile	No	No	0
State/Tribal Landfill/Solid Waste	½-mile	No	No	0
State/Tribal Leaking Storage Tanks	½-mile	No	No	4
State/Tribal Registered Storage Tanks	Site & Adj.	Yes	Yes	
State/Tribal Eng. Control List	Site	No		
State/Tribal Inst. Control List	Site	No		
State/Tribal Voluntary Cleanup Sites	½-mile	No	No	0
State/Tribal Brownfields	½-mile	No	No	0
Supplemental Regulatory Databases	Site & Adj.	Yes	Yes	

4.3.1 Property Listings

The following Property listings were identified:

WDS – Nursery Lake Forest. The WDS listing reflects the state permitting of the on-site nursery's wastewater discharges. The facility type was listed as "Agricultural" and having a status of "Active." The primary waste discharge type was indicated to be "designated/influent or solid wastes that pose a significant threat to water quality because of their high concentrations." The Property is identified as having a moderate threat to water quality. This listing does not reflect known spills, release or site contamination, and therefore is not considered to be a REC in connection with the Property.

UST, CIWQS, FINDS – Nakase Brothers Nursery. The UST listing indicates the Property has an underground storage tank located on the Property. No further details were provided regarding the permitted UST. The CIWQS listing indicates that the site is on the California Integrated Water Quality System as a nursery with a status of active as of 02/03/2015. Considering a lack of closure documentation for the UST, this listing is considered to be a REC in connection with the Property.

4.3.2 Adjoining Property Listings

The following adjoining property listings were identified:

UST – Rancho Parkway Shell #07 at 26721 Rancho Parkway: This site adjoins the Property to the north-northeast and is up-gradient of the Property: The UST listing indicates an underground storage tank is registered as being on the site. Considering a lack of reported spills or releases, this listing is not considered to be a REC in connection with the Property.

RCRA-SQG, FINDS, ECHO – The Home Depot at 20021 Lake Forest Drive: This site adjoins the Property to the northeast and is up-gradient of the Property. The RCRA-SQG listing indicates that the site is registered as a small-quantity generator of hazardous waste with no reported violations. The FINDS listing indicates that the site is on the California Hazardous Waste Tracking System – Datamart, RCRA, and State Master databases. The ECHO listing indicates a registry id of "110002941416", indicating that the site is on the RCRA program with no reported spills or violations. Due to a lack of reported spills or violations, these listings are not considered to be RECs in connection with the Property.

4.3.3 ASTM Search Distance Findings

The following is a summary of the findings of the regulatory database review with regard to sites identified as located within the ASTM specified search distance surrounding the Property. In order to keep this report informative and yet concise, Hillmann has provided a brief discussion of the listed site(s) for each database category that appears most likely to impact the Property based on distance, topography and/or case status. A copy of the full regulatory database report, including available details of all listed sites, is included in Appendix E.

Note that listings for the following databases, if identified, would be discussed above in Sections 4.3.1 and 4.3.2: Registered Storage Tanks, Federal RCRA Generators, Federal and State INST and ENG Controls, ERNS.)

Federal NPL: One (1) NPL listings were identified within a one-mile radius of the Property. The listing is described as Marine Corps Air Station (MCAS El Toro approximately 4,736 feet northwest of the Property and cross-gradient relative to the Property. In 1985, trichloroethylene (TCE) was found in a portion of the groundwater basin beneath the former MCAS EL Toro and Central Irvine. TCE is a volatile organic compound (VOC) that was widely used as a solvent for aircraft cleaning. Prior to the 1970s, the disposal of cleaning solvents was not regulated. As a result of past disposal practices, a one-by-three mile plume of groundwater contamination extended west of MCAS El Toro. Based on a review of the EDR report and published groundwater plume maps, the TCE contaminant plume is about 450 feet deep and located over two miles from the boundary of the Property. In addition, the groundwater flow at the plume is towards the west, and migrating away from the subject property. The site has been under federal facility remedial investigation since

1990s. Considering the current status, the Property's distance from the TCE plume and respective down gradient location, this listing is not considered to be a REC in connection with the Property.

Federal Delisted NPL: No DNPL listings were identified within a ½-mile radius of the Property.

Federal CERCLIS: No CERCLIS listings were identified within a ½-mile radius of the Property.

Federal CERCLIS-NFRAP: No CERC-NFRAP listings were identified within a ½-mile radius of the Property.

Federal RCRA-CORRACTS: One (1) CORRACTS listings were identified within a one-mile radius of the Property. The listing is described as Marine Corps Air Station (MCAS El Toro approximately 4,736 feet northwest of the Property and cross-gradient relative to the Property. The listing indicated the migration of contaminated groundwater was under control as of 06/17/1998. Due to distance and hydraulic gradient, the listing is not considered to be a REC in connection with the Property.

Federal RCRA-TSD: No TSD listings were identified within a ½-mile radius of the Property.

State/Tribal Hazardous Waste Sites: No SHWS listings were identified within a one-mile radius of the Property on the EnviroStor or RESPONSE database.

State/Tribal Landfill/Solid Waste Disposal Sites: No SWF/LF listings were identified within a ½-mile radius of the Property.

State/Tribal leaking Storage Tanks: Four (4) LUST listings were identified within a ½-mile radius of the Property. The closest listing is described as Beacon Bay Car Wash at 20602 Lake Forest. This site is approximately 565 feet south and down-gradient relative to the Property. The listing indicates a status of "Completed – Case Closed" as of 09/12/2002. The potential media affected is under investigation and was caused by gasoline at the address. A leak was first discovered during a tank closure procedure on 01/01/1965. The tank was closed and removed from the site. Considering the status and only soil media was impacted, this listing is not considered to be a REC in connection with the Property. Due to distance, status, or hydraulic gradient none of the other three listed facilities represent a REC to the Property.

State/Tribal Voluntary Cleanup Sites: No VCP listings were identified within a ½-mile radius of the Property

State/Tribal Brownfields: No BROWNFIELDS listings were identified within a ½-mile radius of the Property.

Review of the sites identified within the ASTM search parameters did not identify any nearby or surrounding area sites that are considered to be a REC in connection with the Property, unless as discussed otherwise previously in this section.

4.3.4 Tier I Vapor Encroachment Screening

Hillmann reviewed adjoining and vicinity database sites to identify potential off-site sources of sub-surface vapor encroachment. This review was based upon the current ASTM "Standard Guide for Vapor Encroachment Screening on Property Involved in Real Estate Transactions" (ASTM E 2600-15); and also utilizing the "Methodology for Identifying the Area of Concern Around a Property Potentially Impacted by Vapor Migration from Nearby Contaminated Sources" (Buonicore, 2011-S-103-AWMA). Vicinity database sites pertaining to non-petroleum product releases within 1,760 feet of the Property in the up-gradient direction, 365 feet of the Property in the cross gradient direction and 100 feet of the Property in the down gradient direction; and vicinity database sites pertaining to petroleum product releases within 528 feet of the Property in the up-gradient direction, 165 feet of the Property in the cross gradient direction and 100 feet of the Property in the down gradient direction were reviewed to identify active contamination sites with the potential to affect subsurface vapor conditions at the subject property. The potential for vapor encroachment was considered in assessing whether or not a REC exists in connection with the Property when reviewing applicable sites within those distances.

Hillmann did not identify sites with active petroleum or non-petroleum releases within the search criteria specified in the preceding paragraph that are considered to be RECs due to a risk of vapor encroachment.

4.4 Additional Environmental Record Sources

4.4.1 Supplemental Database Listings

Hillmann reviewed the regulatory database report for listings on supplemental databases that were searched in addition to the Standard Environmental Record Sources. Any property or adjoining property listings on such databases, if identified, would be discussed in Section 4.3.1 and 4.3.2. None of the other supplemental database listings identified by the regulatory database report are considered to be a REC in connection with the Property.

4.4.2 Local Agency & Internet Research

Hillmann has submitted requests to local and municipal agencies for pertinent records pertaining to the Property, particularly with regard to potential environmental concerns such as petroleum storage tanks, storage and usage of hazardous substances and petroleum products, and/or known or suspected environmental contamination. Hillmann also conducted online research of government environmental regulatory databases where available, as well as a general cursory internet search of the Property address, for information indicative of a REC. The following table summarizes the findings of the research:

Source	Type of Request	Outcome
Environmental Protection Agency (EPA)	FOIA Request	Response indicated no records found.

Orange County Department of Environmental Health (CUPA)	FOIA Request	Response indicated no relevant records found.
Department of Toxic Substances Control (DTSC)	FOIA Request	Response indicated no records found.
Regional Water Quality Control Board (RWQCB) – Santa Ana Region (8)	FOIA Request	Response not received prior to report issuance.
South Coast Air Quality Management District (SCAQMD)	FOIA Request	Response indicated a permit to operate an AST with a minor violation noted for no built in check valve. No other relevant information was noted.
Orange County Geographical Information System (GIS)	On-line search	No information indicative of a REC was identified.
CA DTSC EnviroStor database http://www.envirostor.dtsc.ca.gov/public/	Internet	The Property address was searched. No results for the Property were found.
CA GeoTracker database http://geotracker.waterboards.ca.gov/	Internet	The Property address was searched. No results for the Property were found.
USEPA Envirofacts search http://www.epa.gov/enviro/index.html	Internet	The Property address was searched. No results for the Property were found.
www.google.com	On-line search	The Property address search returns results as Nakase Brothers Wholesale Nursery.
www.realquest.com	On-line search	Basic Property information such as parcel number, date of construction, and building square footages were collected. Pertinent information, where obtained, is referenced in the appropriate sections of this report.
Other:	NA	

5.0 SITE RECONNAISSANCE

5.1 Methodology and Limiting Conditions

The site reconnaissance consisted of visual and/or physical observations of the Property and improvements, adjoining properties as viewed from the Property boundaries and the surrounding area based on visual observations from adjoining public thoroughfares. Building exteriors were observed at ground level, unless otherwise indicated. Where applicable, Hillmann accessed and observed representative areas of building interiors to the extent they were made safely accessible with the cooperation of the site escort.

Site Inspection Personnel:	Mr. Stephen Bartlett
Property Escort/Company:	N/A
Inspection Date:	July 11, 2018
Weather Conditions:	Clear, 80 degrees F

5.1.1 Significant Inaccessible Areas

Hillmann is not aware of any significant areas of the Property that were inaccessible at the time of the inspection.

5.2 General Site Setting

5.2.1 Site and Vicinity Characteristics

The Property is approximately 121.08-acres in size and located south of the intersection of Bake Parkway and Rancho Parkway. The Property is developed with a nursery. The vicinity of the Property is improved primarily by commercial buildings, offices, and retail businesses.

5.2.2 Topographic Characteristics

The terrain of the Property is relatively flat, with a hill in the center. A drainage canal runs along the eastern side of the Property.

5.2.3 General Description of Structures

The Property is developed with one single story residence and a garage. The approximate square footage of the residence is 2,500. The buildings were constructed circa 1980.

5.2.4 Sources of Heating and Cooling

A natural gas heating and electric AC system was noted for the residence.

5.2.5 Potable Water Source/Sewage Disposal System

The Property is currently serviced by the municipal water under the Irvine Ranch Water District. The house located on the Property was identified as having a septic system. The Property representative reported that there is no connection to a sanitary sewer system at the site.

5.2.6 Current Use(s) of the Property

The Property is currently occupied by Nakase Brothers Wholesale Nursery.

5.2.7 Past Use(s) of the Property

No obvious indication of past Property usage likely to have involved the use, treatment, storage, disposal or generation of hazardous substances or petroleum products was observed at the time of the site visit. Please refer to Section 4.2 for findings of historical site use research.

5.2.8 Current Use(s) of the Adjoining Properties

The following table describes the current uses of the adjoining properties:

Dir	Street Address	Description
NE	26721– 26781 Rancho Pkwy, 20021, 20163 Lake Forest Dr	Commercial buildings, Home Depot, fast food, FedEx
SE	20251 – 20521 Lake Forest Drive	Commercial buildings/offices
S	20562 Pascal Way	Commercial office/warehouse spaces
SW	20542 Pascal Way, 26220 Enterprise Ct, 26200 Commerce Way, 26150, 26160 Enterprise Way	Commercial office/warehouse spaces, Hospital Clinic, Aerospace Company

No visual observations indicative of a potential environmental concern were noted on the adjoining properties.

5.2.9 Past Use(s) of the Adjoining Properties

No indication of past uses of the adjoining properties was noted at the time of the site visit. Please refer to Section 4.2 for the findings of historical site use research.

5.2.10 Current/Past Uses of Surrounding Area

The vicinity of the Property consists primarily of commercial buildings, offices, and retail businesses. No indications of past Property uses that differ substantially from current conditions were observed at the time of the site visit.

5.3 Interior & Exterior Observations

5.3.1 Storage/Usage of Hazardous Substances and Petroleum Products

The following hazardous substances and petroleum products were observed to be stored and used by property occupants:

Occupant	Substance	Qty/Container Type	Storage Conditions
Nakase Brothers Nursery	Pesticides	Various	Large amounts of pesticides are stored in a metal storage container and a shed in the pesticide storage area, this area is not part of the Property being assessed.

5.3.2 Drums

Two 25-gallon drums containing grease and two 55-gallon drums containing tractor fluid were observed in the maintenance garage area.

Two 55-gallon drums containing pesticides and one 55-gallon drum containing waste oil were observed in the pesticide storage area. This area is not part of the Property being assessed.

No staining or leaking was observed in the areas of the drums.

5.3.3 Unidentified Substance Containers

Unlabeled substance containers were observed in various locations throughout the Property. No staining or evidence of a release was noted around these containers.

5.3.4 Other Hazardous Substances/Petroleum Products

No other containers of hazardous substances or petroleum products were noted on the Property at the time of the site visit.

5.3.5 Bulk Petroleum/Hazardous Material Storage Tanks

The following storage tanks for bulk petroleum or hazardous material storage were identified or reported to be present; or are suspected to be present based on visual observations:

AST/ UST	Product	Capacity	Construction	Year Installed	Status	Location/Notes
AST	Diesel	400-gallon	Double walled steel	~1990	Inactive	Southeastern fueling area, secondary containment, no staining or leaking noted
AST	Diesel	1,000-gallon	Double walled steel	~1990	Active	Southeastern fueling area, secondary containment, no staining or leaking noted
AST	Diesel	1,000-gallon	Double walled steel	~1990	Active	Southeastern fueling area, secondary containment, no staining or leaking noted
AST	Gasoline	240-gallon	Double walled steel	~1990	Active	Southeastern fueling area, secondary containment, no staining or leaking noted
AST	Gasoline	1,000-gallon	Double walled steel	~1990	Inactive	Southeastern fueling area, secondary containment, no staining or leaking noted
AST	Fertilizer	1,500-gallons	Double walled steel	~1990	Active	Located in central portion of the Property, approximately five (5) tanks

The gasoline and diesel ASTs are located near the pesticide storage area and are not part of the Property currently being assessed.

The site representative was interviewed and indicated a UST was historically located on the southeastern portion of the Property near the maintenance garage.

Several empty above-ground tanks were noted throughout the Property, there was no indication of what they previously contained. No indications of leaks or spills were observed in the vicinity of the empty tanks.

5.3.6 PCBs in Electrical/Hydraulic Equipment

Seven (7) pole mounted transformers were observed throughout the Property. No signs of leaking or staining were observed in the area of the transformers.

No other electrical or hydraulic equipment suspected of containing PCBs was identified at the Property.

5.3.7 Odors

No strong, unusual or pungent odors were noted on the Property.

5.3.8 Pools of Liquid

No standing water or pools of liquid likely to contain hazardous substances or petroleum products were noted at the Property.

5.3.9 Interior Stains or Corrosion

No interior stains or corrosion due to hazardous substance/petroleum products spills/releases were observed.

5.3.10 Interior Drains/Sumps

No floor drains or sump pits were noted at the Property other than for storm water or sewage management.

5.3.11 Exterior Pits/Ponds/Lagoons

No evidence of exterior pits, ponds or lagoons was identified on the Property in connection with waste treatment or disposal.

5.3.12 Stained Soil, Pavement/Stressed Vegetation

No stained soil, pavement or stressed vegetation was observed at the Property.

5.3.13 On-Site Solid Waste Disposal/Fill Material

No evidence of any on-site solid waste dumping was noted at the Property.

No evidence of recently deposited fill materials was observed at the Property

5.3.14 Wastewater

Sanitary sewage and storm water runoff generated on-site are discharged into drainage channels. No other waste discharges were noted at the Property.

5.3.15 Septic Systems

One (1) septic system was reported by site representatives as being used by the house located on the Property.

5.3.16 Wells

An irrigation well was noted to be in use in the center portion of the Property. No other evidence of any wells was noted at the Property.

5.3.17 Railroad Spurs

No railroad spurs were noted on the Property at the time of the assessment.

6.0 INTERVIEWS

6.1 Interviews with Past and Present Owners and Occupants

Subject	Name/Affiliation	Summary
Property Owner / Representative	Mr. Eliacar Najera/Maintenance Manager	Mr. Najera was interviewed during the site inspection. Pertinent information, where obtained, is referenced in the appropriate sections of the report.
Property Occupants	Not applicable	Property occupants were not available for interview at the time of the assessment.
Past Owners, Occupants, Operators	Not applicable	Past owners/occupants of the Property were not available for interview at the time of the assessment.
Owners/Occupants of Adjoining or Nearby Properties	Not applicable	The Property was not an abandoned property with evidence of unauthorized uses or uncontrolled access; therefore, interviews with adjoining or nearby property owners or occupants were not conducted.

6.2 Interviews with State and/or Local Government Officials

Written and on-line requests for environmental records of the Property from State and Local governmental agencies are detailed in Section 4.4.2.

7.0 BUSINESS ENVIRONMENTAL RISKS

In accordance with the contract agreement for this assessment, Hillmann has performed cursory reviews of several potential Business Environmental Risks (also known as "Non-Scope Considerations"). The ASTM E1527-13 standard defines the term business environmental risk (BER) as, *"a risk which can have a material environmental or environmentally-driven impact on the business associated with the current or planned use of a parcel of commercial real estate, not necessarily limited to those environmental issues required to be investigated in this practice."*

7.1 Asbestos-Containing Material (ACM)

The contracted scope of work included a cursory visual screening of the accessed portions of buildings at the Property built prior to 1990 for suspect asbestos containing materials (ACM). The information provided in this section, where applicable, is limited to identification of potential suspect materials and their general condition. This is not intended to be a comprehensive survey for the presence of ACM, and no testing has been conducted.

Considering the dates of construction of the existing building, asbestos containing materials (ACM) may be present at the Property. Suspected ACM observed during a preliminary visual screening included roofing materials, plaster walls, drywall, ceiling tiles, cove base, adhesive, and stucco. It is possible that additional quantities of suspect ACM may exist in enclosed areas or areas not accessed during the assessment around the house located on the Property. It is emphasized that this limited screening does not constitute a comprehensive asbestos survey of the premises and is meant only to provide a preliminary evaluation regarding the potential presence of ACM at the Property.

7.2 Lead-Based Paint

The contracted scope of work included a cursory visual screening of the condition of painted surfaces in the accessed areas of residential buildings/units built prior to 1980. This is not intended to constitute a comprehensive survey for LBP or potential lead hazards, and no testing has been conducted.

In general, interior painted surfaces within the space were observed to be in fair condition.

7.3 Radon

Hillmann reviewed data compiled by the USEPA, as summarized by the regulatory database report, which indicated that the Property is located in an area with a low potential for radon concentrations that exceed current USEPA action guidelines. Orange County is classified as a Zone 3 or 'low risk' area for radon.

7.4 Mold/Microbial Damage

As per the contracted scope of work, Hillmann conducted a cursory visual screening of the accessed areas of the building for evidence of significant damage to building materials and finishes as result of moisture intrusion and/or mold/microbial growth. Hillmann did not observe any evidence of significant problems with moisture intrusion or mold/microbial growth at the Property.

8.0 REFERENCES

ASTM E1527-13-Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process; ASTM International, 2013

ASTM E12600-15-Standard Guide for Vapor Encroachment Screening on Property Involved in Real Estate Transaction, ASTM International, 2015

EDR Radius Map Report with GeoCheck™, Environmental Data Resources, 2017

EDR City Directory Abstract Report, Environmental Data Resources, 2017

EDR Sanborn Map Report, Environmental Data Resources, 2017

www.historicaerials.com

Methodology for Identifying the Area of Concern Around a Property Potentially Impacted by Vapor Migration from Nearby Contaminated Sources; A. Buonicore, 2011

Orange County's On-line Geographical Information System

Phase I Environmental Site Assessment, 20621 Lake Forest Drive, Lake Forest, California 92630, Hillmann Consulting LLC, August 31, 2016

Phase II Environmental Site Assessment, 20621 Lake Forest Drive, Lake Forest, California 92630, Engeo, September 12, 2016

9.0 APPENDICES

Appendix A	Site Diagram / Vicinity Map
Appendix B	Site Photographs
Appendix C	Questionnaires / User Provided Information
Appendix D	Historical Records Documentation
Appendix E	Regulatory Records Documentation
Appendix F	Other Documents
Appendix G	Project Personnel Qualifications

APPENDIX A

SITE DIAGRAM / VICINITY MAP

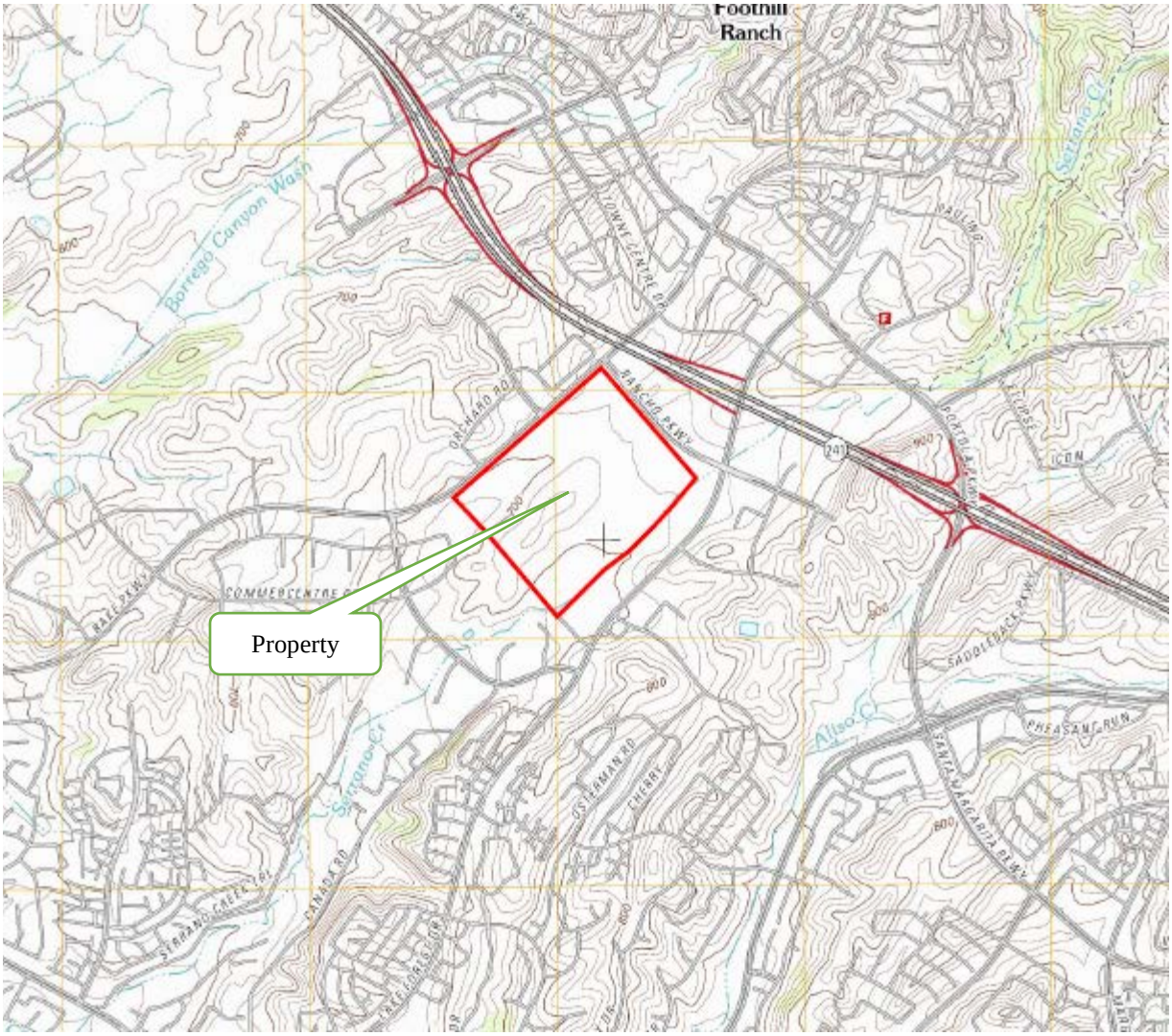


Figure 1: SITE VICINITY MAP	SCALE: (Not to Scale)	N

HILLMANN CONSULTING

Project Location:	20621 Lake Forest Drive Lake Forest, CA 92630
Project No.:	C3-7216

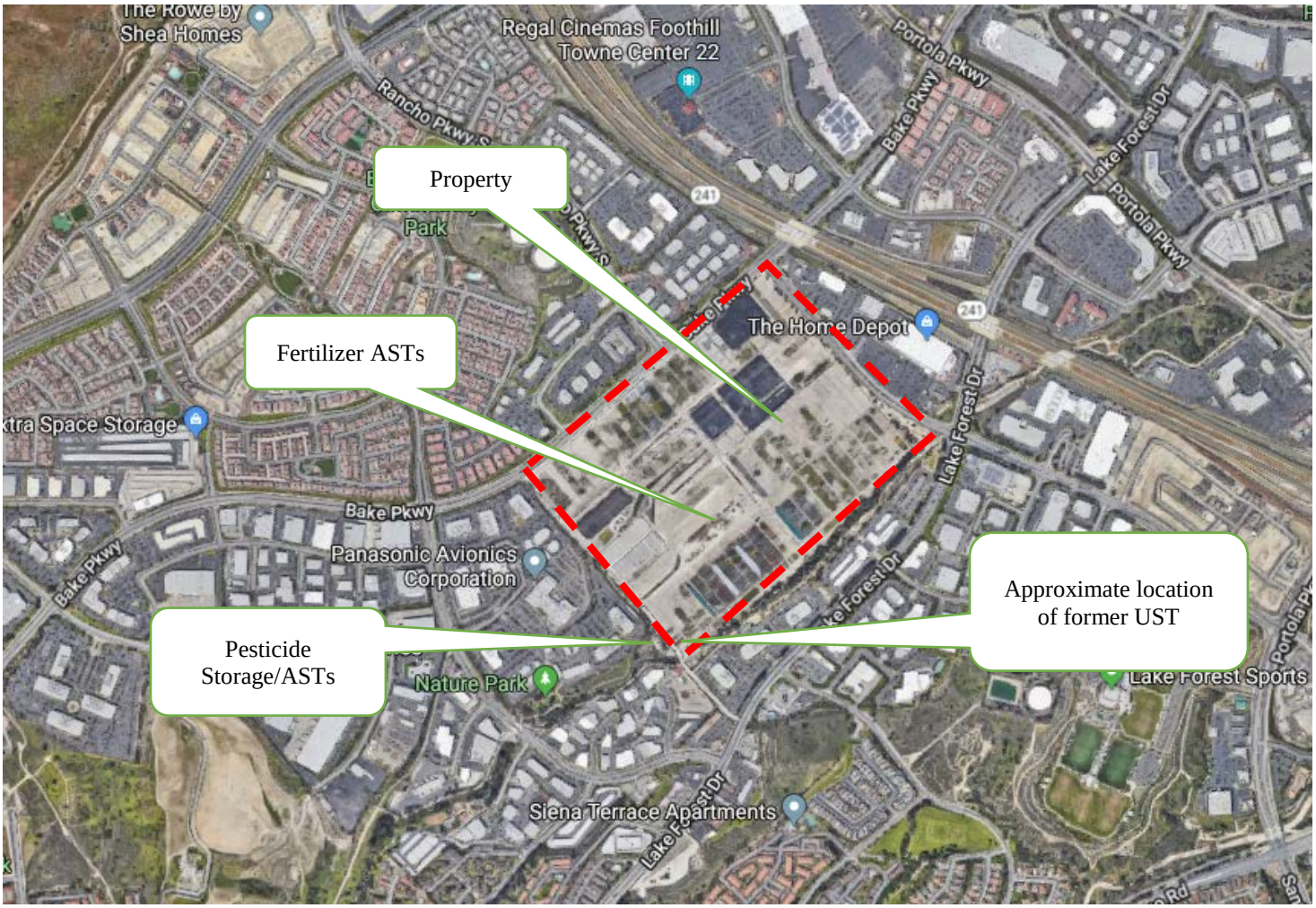


Figure 2: SITE DIAGRAM	SCALE: (Not to Scale)	N ↑

HILLMANN CONSULTING

Project Location:	20621 Lake Forest Drive Lake Forest, CA 92630
Project No.:	C3-7216

APPENDIX B

SITE PHOTOGRAPHS

PHOTO LOG
20621 Lake Forest Drive
Lake Forest, CA 92630
C3-7216

View of the central portion of the Property

View of maintenance garage

View of drums in maintenance garage

View of drums in maintenance garage

View of well on central portion of the Property

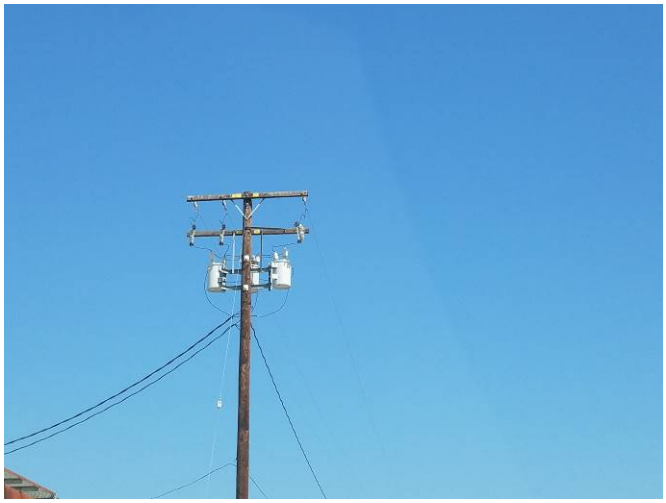
View of Property facing east

PHOTO LOG
20621 Lake Forest Drive
Lake Forest, CA 92630
C3-7216

View of fertilizer ASTs

View of loading dock area

View of Property facing west


View of transformers in central portion of the Property

View of adjoining properties to the north

View of adjoining properties to the east

PHOTO LOG
20621 Lake Forest Drive
Lake Forest, CA 92630
C3-7216

View of Property facing west

View of adjoining pesticide storage area

APPENDIX C

QUESTIONNAIRES/USER PROVIDED INFORMATION

Controlled Recognized Environmental Conditions (CRECs):

No evidence of any CRECs in connection with the Property was identified.

Historical Recognized Environmental Conditions (HRECs):

No evidence of any HRECs in connection with the Property was identified.

Engeo Report

Engeo conducted 46 soil samples on September 9, 2016.

This assessment was performed to evaluate potential impacts from organochlorine pesticide (OCPs) usage prior to 1988, when orchards were present onsite.

Review of the laboratory test results found no detectable concentrations of OCPs. The reported lead and arsenic concentrations are within the range of expected background concentrations. Based on the findings of this soil characterization assessment, it is our opinion that the site soils are suitable for future residential development. According to the phase I ESA report, it was recommended that investigation be performed where the former UST was located in the southern corner of the Property. There is currently no UST closure documentation available for the Property concerning this removal. It is conceivable some localized impacts may exist in this area. A limited subsurface assessment can be performed in the future to verify soils have not been significantly impacted.

CONCLUSION

It is our professional opinion that the project site can support the proposed development and is feasible with the proposed improvements and mitigations.

Project No.
13362.000.000

September 12, 2016

Mr. Peter Kim
Vice President, Land Development
Toll Brothers, Inc.
725 W. Town & Country Road
Orange, CA 92868

Subject: 20621 Lake Forest Drive
Lake Forest, California

SOIL CHARACTERIZATION ASSESSMENT

Reference: Hillmann; Phase I Environmental Site Assessment, 20621 Lake Forest Drive, Lake Forest, California; August 31, 2016; Project No. P2016.001.311.

Dear Mr. Kim:

We are pleased to submit our soil characterization assessment conducted at 20621 Lake Forest Drive in Lake Forest, California (Site). The purpose of the assessment was to evaluate the extent of possible agrichemical impacts associated with historic farming and orchard land use at the Site.

BACKGROUND

The Site is located behind several commercial buildings on Lake Forest Drive and directly south of the intersection of Bake Road and Rancho Parkway in Lake Forest, California. The current use of the approximately 122.07-acre property consists of temporary and permanent greenhouse structures, office trailers, semi-truck and trailer parking, and open areas. The Property in whole is an active wholesale plant nursery. The site plan is shown on Figure 1.

According to the phase I environmental site assessment (ESA) of the Property by Hillman Consultants, the Property was developed from prior to 1938 through the 1960s with orchards, then developed partially with orchards and the rest with a plant nursery until the early 1980s. All orchards were removed by 1988, and the Property was used primarily as a nursery past that point. During the phase I ESA, the following Recognized Environmental Concerns (RECs) were reported:

- Historical and current applications of pesticide/herbicide/insecticide/fungicide likely occurred at the Property based on historical and current usage. Residual pesticides and related compounds are likely to exist in shallow soils and drainage channels from usage on the Property.

- A 400-gallon diesel steel-wall UST was formerly used at the property and reported as removed from the south corner of the Property in the early 1990s. No closure documentation was available for the Property.

This assessment was performed to evaluate potential impacts from organochlorine pesticide (OCPs) usage prior to 1988, when orchards were present onsite.

FIELD ACTIVITIES

The assessment included sample collection and laboratory analysis. On September 9, 2016, 46 soil samples were collected ranging from depths of approximately 6 to 48 inches below the existing ground surface. Since fill material and gravel exist in areas of the Site, the specific sample depth was determined based on an interpretation of the original orchard elevations. In addition, a terrace cut area was observed with exposed bedrock. As the historical orchard soils were removed from this area, the terrace was not sampled. Sample locations are shown on Figure 2. Details of the sampling program are presented below.

SAMPLING ACTIVITIES

Soil Sampling

The Property was divided into quadrants and samples were recovered from the former orchard using hand-sampling equipment. One to four samples were obtained per quadrant and submitted as a 4:1 composite sample. The number of samples per quadrant was dependent on access and depth of native soil. At each location, the collected soil was placed into 1-inch by 6-inch stainless steel liners. Upon collection, a label was placed on the sample that included a unique sample number, sample location, and time/date collected. The soil samples were placed in an ice-cooled chest and submitted under documented chain-of-custody to SunStar Laboratories, a State-certified laboratory in Lake Forest, California. The soil samples were analyzed for Organochlorine Pesticides (OCPs) (EPA 8081A), lead and arsenic (EPA 6020).

The following quadrants and locations were not sampled for the following reasons:

- Sample S7C was not sampled due to thick fill materials and refusal with the hand auger from underlying concrete fragments.

- Sample S8A was not sampled because no native soils were present within the first 4 feet below the surface.

- Samples S8C and S8D were not sampled because no native soils were present from prior excavation (terrace cut).

- Samples S11A through S11D were not sampled because no native soils were present from prior excavation (terrace cut).

- Samples S13A, S13C, and S13D were not sampled because no native soils were present within the first 4 feet below the surface.

- Samples S14A through S14D were not sampled because no native soils were present from prior excavation (terrace cut).

- Sample S15B was not sampled because no native soils were present within the first 4 feet below the surface.

ANALYTICAL RESULTS

Four-point composite samples were submitted for all samples per quadrant and analyzed for organochlorine pesticides (OCPs). No detectable concentrations of OCPs were reported for the composite samples. One discrete sample per quadrant was submitted for arsenic and lead analysis. Review of the laboratory test results found detectable concentrations of lead and arsenic in each of the seven samples analyzed. Arsenic concentrations ranged from 0.48 mg/Kg to 4.7 mg/Kg, while lead ranged from 2.6 mg/Kg to 8.4 mg/Kg. While the arsenic concentrations exceed the EPA Region Screening Levels[1] (RSLs), the concentrations are within the range of expected background concentrations[3] and therefore, do not pose an environmental concern. Lead concentrations are well below the CAL-EPA Screening Levels for Soil[2]. The laboratory results are presented in their entirety in Appendix A.

DISCUSSION

Review of the laboratory test results found no detectable concentrations of OCPs. The reported lead and arsenic concentrations are within the range of expected background concentrations. Based on the findings of this soil characterization assessment, it is our opinion that the site soils are suitable for future residential development.

According to the phase I ESA report, it was recommended that investigation be performed where the former UST was located in the southern corner of the Property. There is currently no UST closure documentation available for the Property concerning this removal. It is conceivable some localized impacts may exist in this area. A limited subsurface assessment can be performed in the future to verify soils have not been significantly impacted.

---

[1] TPH (Aromatic High) - RSL Residential Soil Table, November 2015.
[2] Lead (Noncancer Endpoint) – DTSC-Recommended Screening Levels for Soil, July 2016.
[3] Arsenic (Background Levels) – G.R. Bradford, et al., Background Concentrations of Trace and Major Elements in California Soils, Kearney Foundation of Soil Science Division of Agriculture and Natural Resources, University of California, March 1996.

If you have any questions regarding this report, please contact us.

Sincerely,

ENGEO Incorporated

Lauren Gordon

Shawn Munger, CHG

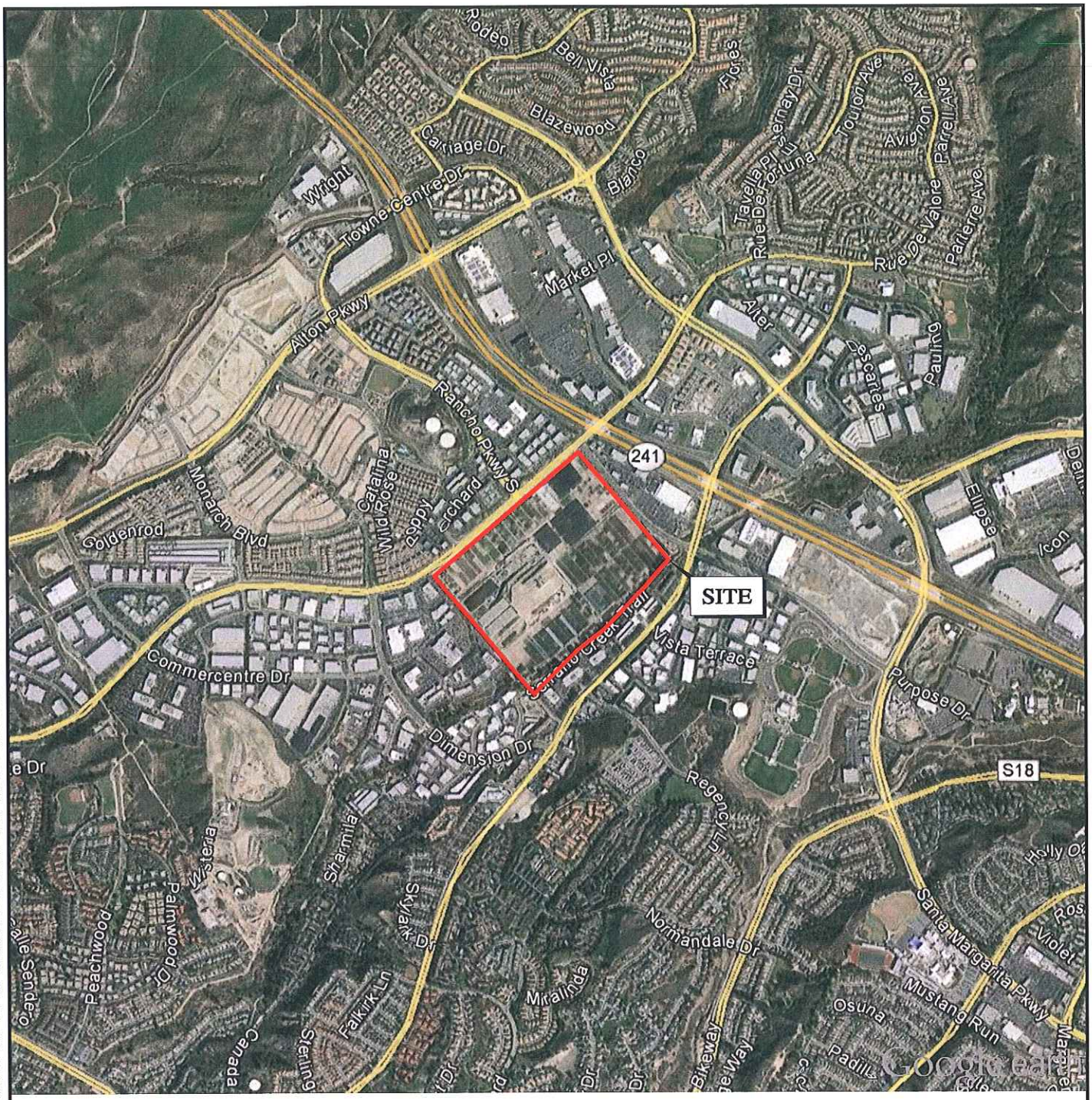
lg/sm/mgo/jtb/jf

Attachments: Figures 1 and 2
Appendix A – Analytical Report, SunStar Laboratories

FIGURES

Figure 1 – Vicinity Map
Figure 2 – Site Plan

COPYRIGHT © 2016 BY ENGEO INCORPORATED. THIS DOCUMENT MAY NOT BE REPRODUCED IN WHOLE OR IN PART BY ANY MEANS WHATSOEVER, NOR MAY IT BE QUOTED OR EXCERPTED WITHOUT THE EXPRESS WRITTEN CONSENT OF ENGEO INCORPORATED.



N

0 FEET 2000

0 METERS 1000

BASE MAP SOURCE: GOOGLE EARTH MAPPING SERVICE

ENGEO — Expect Excellence

VICINITY MAP

20621 LAKE FOREST DRIVE

LAKE FOREST, CALIFORNIA

PROJECT NO.: P2016.001.311		FIGURE NO. 1
SCALE: AS SHOWN		
DRAWN BY: PC	CHECKED BY: MH	

G:\Drafting\DRAFTING2_Dwg_NoProjectNo_Proposal\P2016\P2016001311\P2016011311-1-VicinityMap-LakeForest-0916.dwg Plot Date: 9-12-16 llee

ORIGINAL FIGURE PRINTED IN COLOR

APPENDIX A

SUNSTAR LABORATORY

Analytical Report

13362.000.000
September 12, 2016

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

09 September 2016

Matthew Harrell
Engeo
2213 Plaza Dr.
Rocklin, CA 95765

RE: 20621 Lake Forest Dr.,CA

Enclosed are the results of analyses for samples received by the laboratory on 09/08/16 14:50. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Daniel J Chávez

Daniel Chavez
Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
S1-A	T162181-01	Soil	09/08/16 10:35	09/08/16 14:50
S2-A	T162181-05	Soil	09/08/16 11:00	09/08/16 14:50
S3-A	T162181-09	Soil	09/08/16 11:25	09/08/16 14:50
S4-A	T162181-13	Soil	09/08/16 12:15	09/08/16 14:50
S5-A	T162181-17	Soil	09/08/16 14:20	09/08/16 14:50
S6-A	T162181-21	Soil	09/08/16 13:15	09/08/16 14:50
S7-A	T162181-25	Soil	09/08/16 12:20	09/08/16 14:50
COMPOSITE S1-ABCD	T162181-28	Soil	09/08/16 00:00	09/08/16 14:50
COMPOSITE S2-ABCD	T162181-29	Soil	09/08/16 00:00	09/08/16 14:50
OMPOSITE S3-ABCD	T162181-30	Soil	09/08/16 00:00	09/08/16 14:50
COMPOSITE S4-ABCD	T162181-31	Soil	09/08/16 00:00	09/08/16 14:50
COMPOSITE S5-ABCD	T162181-32	Soil	09/08/16 00:00	09/08/16 14:50
COMPOSITE S6-ABCD	T162181-33	Soil	09/08/16 00:00	09/08/16 14:50
COMPOSITE S7-ABD	T162181-34	Soil	09/08/16 00:00	09/08/16 14:50

nStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

DETECTIONS SUMMARY

Sample ID: S1-A **Laboratory ID:** T162181-01

Analyte	Result	Reporting Limit	Units	Method	Notes
Arsenic	**2.4**	0.23	mg/kg	6020 ICP-MS	
Lead	**5.0**	0.23	mg/kg	6020 ICP-MS	

Sample ID: S2-A **Laboratory ID:** T162181-05

Analyte	Result	Reporting Limit	Units	Method	Notes
Arsenic	**0.98**	0.25	mg/kg	6020 ICP-MS	
Lead	**3.6**	0.25	mg/kg	6020 ICP-MS	

Sample ID: S3-A **Laboratory ID:** T162181-09

Analyte	Result	Reporting Limit	Units	Method	Notes
Arsenic	**1.4**	0.23	mg/kg	6020 ICP-MS	
Lead	**2.6**	0.23	mg/kg	6020 ICP-MS	

Sample ID: S4-A **Laboratory ID:** T162181-13

Analyte	Result	Reporting Limit	Units	Method	Notes
Arsenic	**4.7**	0.25	mg/kg	6020 ICP-MS	
Lead	**4.1**	0.25	mg/kg	6020 ICP-MS	

Sample ID: S5-A **Laboratory ID:** T162181-17

Analyte	Result	Reporting Limit	Units	Method	Notes
Arsenic	**0.48**	0.25	mg/kg	6020 ICP-MS	
Lead	**3.7**	0.25	mg/kg	6020 ICP-MS	

mStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

Sample ID: S6-A **Laboratory ID:** T162181-21

Analyte	Result	Reporting Limit	Units	Method	Notes
Arsenic	**2.2**	0.23	mg/kg	6020 ICP-MS	
Lead	**8.4**	0.23	mg/kg	6020 ICP-MS	

Sample ID: S7-A **Laboratory ID:** T162181-25

Analyte	Result	Reporting Limit	Units	Method	Notes
Arsenic	**3.1**	0.23	mg/kg	6020 ICP-MS	
Lead	**2.9**	0.23	mg/kg	6020 ICP-MS	

Sample ID: COMPOSITE S1-ABCD **Laboratory ID:** T162181-28

No Results Detected

Sample ID: COMPOSITE S2-ABCD **Laboratory ID:** T162181-29

No Results Detected

Sample ID: COMPOSITE S3-ABCD **Laboratory ID:** T162181-30

No Results Detected

Sample ID: COMPOSITE S4-ABCD **Laboratory ID:** T162181-31

No Results Detected

nStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

Sample ID: COMPOSITE S5-ABCD **Laboratory ID:** T162181-32

No Results Detected

Sample ID: COMPOSITE S6-ABCD **Laboratory ID:** T162181-33

No Results Detected

Sample ID: COMPOSITE S7-ABD **Laboratory ID:** T162181-34

No Results Detected

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

S1-A

T162181-01 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Metals by EPA 6020 Method									
Arsenic	**2.4**	0.23	mg/kg	1	6090853	09/08/16	09/09/16	6020 ICP-MS	
Lead	**5.0**	0.23	"	"	"	"	"	"	

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

S2-A

T162181-05 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Metals by EPA 6020 Method									
Arsenic	**0.98**	0.25	mg/kg	1	6090853	09/08/16	09/09/16	6020 ICP-MS	
Lead	**3.6**	0.25	"	"	"	"	"	"	

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

S3-A

T162181-09 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Metals by EPA 6020 Method									
Arsenic	**1.4**	0.23	mg/kg	1	6090853	09/08/16	09/09/16	6020 ICP-MS	
Lead	**2.6**	0.23	"	"	"	"	"	"	

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

S4-A

T162181-13 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
SunStar Laboratories, Inc.									
Metals by EPA 6020 Method									
Arsenic	**4.7**	0.25	mg/kg	1	6090853	09/08/16	09/09/16	6020 ICP-MS	
Lead	**4.1**	0.25	"	"	"	"	"	"	

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

S5-A

T162181-17 (Soil)

SunStar Laboratories, Inc.

Metals by EPA 6020 Method

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Arsenic	**0.48**	0.25	mg/kg	1	6090853	09/08/16	09/09/16	6020 ICP-MS	
Lead	**3.7**	0.25	"	"	"	"	"	"	

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

S6-A

T162181-21 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Metals by EPA 6020 Method									
Arsenic	**2.2**	0.23	mg/kg	1	6090853	09/08/16	09/09/16	6020 ICP-MS	
Lead	**8.4**	0.23	"	"	"	"	"	"	

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

S7-A

T162181-25 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Metals by EPA 6020 Method									
Arsenic	**3.1**	0.23	mg/kg	1	6090853	09/08/16	09/09/16	6020 ICP-MS	
Lead	**2.9**	0.23	"	"	"	"	"	"	

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

COMPOSITE S1-ABCD

T162181-28 (Soil)

SunStar Laboratories, Inc.

Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
alpha-BHC	ND	5.0	ug/kg	1	6090846	09/08/16	09/09/16	EPA 8081A	
gamma-BHC (Lindane)	ND	5.0	"	"	"	"	"	"	
beta-BHC	ND	5.0	"	"	"	"	"	"	
delta-BHC	ND	5.0	"	"	"	"	"	"	
Heptachlor	ND	5.0	"	"	"	"	"	"	
Aldrin	ND	5.0	"	"	"	"	"	"	
Heptachlor epoxide	ND	5.0	"	"	"	"	"	"	
gamma-Chlordane	ND	5.0	"	"	"	"	"	"	
'ha-Chlordane	ND	5.0	"	"	"	"	"	"	
Josulfan I	ND	5.0	"	"	"	"	"	"	
4,4'-DDE	ND	5.0	"	"	"	"	"	"	
Dieldrin	ND	5.0	"	"	"	"	"	"	
Endrin	ND	5.0	"	"	"	"	"	"	
4,4'-DDD	ND	5.0	"	"	"	"	"	"	
Endosulfan II	ND	5.0	"	"	"	"	"	"	
4,4'-DDT	ND	5.0	"	"	"	"	"	"	
Endrin aldehyde	ND	5.0	"	"	"	"	"	"	
Endosulfan sulfate	ND	5.0	"	"	"	"	"	"	
Methoxychlor	ND	10	"	"	"	"	"	"	
Endrin ketone	ND	5.0	"	"	"	"	"	"	
Toxaphene	ND	200	"	"	"	"	"	"	
Surrogate: Tetrachloro-meta-xylene		*43.4 %*	*35-140*		"	"	"	"	
Surrogate: Decachlorobiphenyl		*37.2 %*	*35-140*		"	"	"	"	

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

COMPOSITE S2-ABCD

T162181-29 (Soil)

SunStar Laboratories, Inc.

Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
alpha-BHC	ND	5.0	ug/kg	1	6090846	09/08/16	09/09/16	EPA 8081A	
gamma-BHC (Lindane)	ND	5.0	"	"	"	"	"	"	
beta-BHC	ND	5.0	"	"	"	"	"	"	
delta-BHC	ND	5.0	"	"	"	"	"	"	
Heptachlor	ND	5.0	"	"	"	"	"	"	
Aldrin	ND	5.0	"	"	"	"	"	"	
Heptachlor epoxide	ND	5.0	"	"	"	"	"	"	
gamma-Chlordane	ND	5.0	"	"	"	"	"	"	
'ha-Chlordane	ND	5.0	"	"	"	"	"	"	
.dosulfan I	ND	5.0	"	"	"	"	"	"	
4,4'-DDE	ND	5.0	"	"	"	"	"	"	
Dieldrin	ND	5.0	"	"	"	"	"	"	
Endrin	ND	5.0	"	"	"	"	"	"	
4,4'-DDD	ND	5.0	"	"	"	"	"	"	
Endosulfan II	ND	5.0	"	"	"	"	"	"	
4,4'-DDT	ND	5.0	"	"	"	"	"	"	
Endrin aldehyde	ND	5.0	"	"	"	"	"	"	
Endosulfan sulfate	ND	5.0	"	"	"	"	"	"	
Methoxychlor	ND	10	"	"	"	"	"	"	
Endrin ketone	ND	5.0	"	"	"	"	"	"	
Toxaphene	ND	200	"	"	"	"	"	"	
Surrogate: Tetrachloro-meta-xylene		*59.4 %*	*35-140*		"	"	"	"	
Surrogate: Decachlorobiphenyl		*52.1 %*	*35-140*		"	"	"	"	

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

COMPOSITE S3-ABCD

T162181-30 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Organochlorine Pesticides by EPA Method 8081A									
alpha-BHC	ND	5.0	ug/kg	1	6090846	09/08/16	09/09/16	EPA 8081A	
gamma-BHC (Lindane)	ND	5.0	"	"	"	"	"	"	
beta-BHC	ND	5.0	"	"	"	"	"	"	
delta-BHC	ND	5.0	"	"	"	"	"	"	
Heptachlor	ND	5.0	"	"	"	"	"	"	
Aldrin	ND	5.0	"	"	"	"	"	"	
Heptachlor epoxide	ND	5.0	"	"	"	"	"	"	
gamma-Chlordane	ND	5.0	"	"	"	"	"	"	
ha-Chlordane	ND	5.0	"	"	"	"	"	"	
osulfan I	ND	5.0	"	"	"	"	"	"	
4,4'-DDE	ND	5.0	"	"	"	"	"	"	
Dieldrin	ND	5.0	"	"	"	"	"	"	
Endrin	ND	5.0	"	"	"	"	"	"	
4,4'-DDD	ND	5.0	"	"	"	"	"	"	
Endosulfan II	ND	5.0	"	"	"	"	"	"	
4,4'-DDT	ND	5.0	"	"	"	"	"	"	
Endrin aldehyde	ND	5.0	"	"	"	"	"	"	
Endosulfan sulfate	ND	5.0	"	"	"	"	"	"	
Methoxychlor	ND	10	"	"	"	"	"	"	
Endrin ketone	ND	5.0	"	"	"	"	"	"	
Toxaphene	ND	200	"	"	"	"	"	"	
Surrogate: Tetrachloro-meta-xylene		*68.8 %*	*35-140*		"	"	"	"	
Surrogate: Decachlorobiphenyl		*54.9 %*	*35-140*		"	"	"	"	

nStar Laboratories, Inc.

Daniel J Chavez

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Daniel Chavez, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

COMPOSITE S4-ABCD

T162181-31 (Soil)

SunStar Laboratories, Inc.

Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
alpha-BHC	ND	5.0	ug/kg	1	6090846	09/08/16	09/09/16	EPA 8081A	
gamma-BHC (Lindane)	ND	5.0	"	"	"	"	"	"	
beta-BHC	ND	5.0	"	"	"	"	"	"	
delta-BHC	ND	5.0	"	"	"	"	"	"	
Heptachlor	ND	5.0	"	"	"	"	"	"	
Aldrin	ND	5.0	"	"	"	"	"	"	
Heptachlor epoxide	ND	5.0	"	"	"	"	"	"	
gamma-Chlordane	ND	5.0	"	"	"	"	"	"	
a-Chlordane	ND	5.0	"	"	"	"	"	"	
dosulfan I	ND	5.0	"	"	"	"	"	"	
4,4'-DDE	ND	5.0	"	"	"	"	"	"	
Dieldrin	ND	5.0	"	"	"	"	"	"	
Endrin	ND	5.0	"	"	"	"	"	"	
4,4'-DDD	ND	5.0	"	"	"	"	"	"	
Endosulfan II	ND	5.0	"	"	"	"	"	"	
4,4'-DDT	ND	5.0	"	"	"	"	"	"	
Endrin aldehyde	ND	5.0	"	"	"	"	"	"	
Endosulfan sulfate	ND	5.0	"	"	"	"	"	"	
Methoxychlor	ND	10	"	"	"	"	"	"	
Endrin ketone	ND	5.0	"	"	"	"	"	"	
Toxaphene	ND	200	"	"	"	"	"	"	
Surrogate: Tetrachloro-meta-xylene		*66.8 %*	*35-140*		"	"	"	"	
Surrogate: Decachlorobiphenyl		*55.2 %*	*35-140*		"	"	"	"	

SunStar Laboratories, Inc.

Daniel J Chavez

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Daniel Chavez, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

COMPOSITE S5-ABCD

T162181-32 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Organochlorine Pesticides by EPA Method 8081A									
alpha-BHC	ND	5.0	ug/kg	1	6090846	09/08/16	09/09/16	EPA 8081A	
gamma-BHC (Lindane)	ND	5.0	"	"	"	"	"	"	
beta-BHC	ND	5.0	"	"	"	"	"	"	
delta-BHC	ND	5.0	"	"	"	"	"	"	
Heptachlor	ND	5.0	"	"	"	"	"	"	
Aldrin	ND	5.0	"	"	"	"	"	"	
Heptachlor epoxide	ND	5.0	"	"	"	"	"	"	
gamma-Chlordane	ND	5.0	"	"	"	"	"	"	
a-Chlordane	ND	5.0	"	"	"	"	"	"	
osulfan I	ND	5.0	"	"	"	"	"	"	
4,4'-DDE	ND	5.0	"	"	"	"	"	"	
Dieldrin	ND	5.0	"	"	"	"	"	"	
Endrin	ND	5.0	"	"	"	"	"	"	
4,4'-DDD	ND	5.0	"	"	"	"	"	"	
Endosulfan II	ND	5.0	"	"	"	"	"	"	
4,4'-DDT	ND	5.0	"	"	"	"	"	"	
Endrin aldehyde	ND	5.0	"	"	"	"	"	"	
Endosulfan sulfate	ND	5.0	"	"	"	"	"	"	
Methoxychlor	ND	10	"	"	"	"	"	"	
Endrin ketone	ND	5.0	"	"	"	"	"	"	
Toxaphene	ND	200	"	"	"	"	"	"	
Surrogate: Tetrachloro-meta-xylene		*49.4 %*		*35-140*	"	"	"	"	
Surrogate: Decachlorobiphenyl		*45.0 %*		*35-140*	"	"	"	"	

nStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

COMPOSITE S6-ABCD

T162181-33 (Soil)

SunStar Laboratories, Inc.

Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
alpha-BHC	ND	5.0	ug/kg	1	6090846	09/08/16	09/09/16	EPA 8081A	
gamma-BHC (Lindane)	ND	5.0	"	"	"	"	"	"	
beta-BHC	ND	5.0	"	"	"	"	"	"	
delta-BHC	ND	5.0	"	"	"	"	"	"	
Heptachlor	ND	5.0	"	"	"	"	"	"	
Aldrin	ND	5.0	"	"	"	"	"	"	
Heptachlor epoxide	ND	5.0	"	"	"	"	"	"	
gamma-Chlordane	ND	5.0	"	"	"	"	"	"	
ha-Chlordane	ND	5.0	"	"	"	"	"	"	
osulfan I	ND	5.0	"	"	"	"	"	"	
4,4'-DDE	ND	5.0	"	"	"	"	"	"	
Dieldrin	ND	5.0	"	"	"	"	"	"	
Endrin	ND	5.0	"	"	"	"	"	"	
4,4'-DDD	ND	5.0	"	"	"	"	"	"	
Endosulfan II	ND	5.0	"	"	"	"	"	"	
4,4'-DDT	ND	5.0	"	"	"	"	"	"	
Endrin aldehyde	ND	5.0	"	"	"	"	"	"	
Endosulfan sulfate	ND	5.0	"	"	"	"	"	"	
Methoxychlor	ND	10	"	"	"	"	"	"	
Endrin ketone	ND	5.0	"	"	"	"	"	"	
Toxaphene	ND	200	"	"	"	"	"	"	
Surrogate: Tetrachloro-meta-xylene		*70.3 %*	*35-140*		"	"	"	"	
Surrogate: Decachlorobiphenyl		*56.9 %*	*35-140*		"	"	"	"	

nStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

COMPOSITE S7-ABD

T162181-34 (Soil)

SunStar Laboratories, Inc.

Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
alpha-BHC	ND	5.0	ug/kg	1	6090846	09/08/16	09/09/16	EPA 8081A	
gamma-BHC (Lindane)	ND	5.0	"	"	"	"	"	"	
beta-BHC	ND	5.0	"	"	"	"	"	"	
delta-BHC	ND	5.0	"	"	"	"	"	"	
Heptachlor	ND	5.0	"	"	"	"	"	"	
Aldrin	ND	5.0	"	"	"	"	"	"	
Heptachlor epoxide	ND	5.0	"	"	"	"	"	"	
gamma-Chlordane	ND	5.0	"	"	"	"	"	"	
a-Chlordane	ND	5.0	"	"	"	"	"	"	
dosulfan I	ND	5.0	"	"	"	"	"	"	
4,4'-DDE	ND	5.0	"	"	"	"	"	"	
Dieldrin	ND	5.0	"	"	"	"	"	"	
Endrin	ND	5.0	"	"	"	"	"	"	
4,4'-DDD	ND	5.0	"	"	"	"	"	"	
Endosulfan II	ND	5.0	"	"	"	"	"	"	
4,4'-DDT	ND	5.0	"	"	"	"	"	"	
Endrin aldehyde	ND	5.0	"	"	"	"	"	"	
Endosulfan sulfate	ND	5.0	"	"	"	"	"	"	
Methoxychlor	ND	10	"	"	"	"	"	"	
Endrin ketone	ND	5.0	"	"	"	"	"	"	
Toxaphene	ND	200	"	"	"	"	"	"	
Surrogate: Tetrachloro-meta-xylene		*55.2 %*	*35-140*		"	"	"	"	
Surrogate: Decachlorobiphenyl		*55.4 %*	*35-140*		"	"	"	"	

nStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

Metals by EPA 6020 Method - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 6090853 - EPA 3051										
Blank (6090853-BLK1)				Prepared: 09/08/16 Analyzed: 09/09/16						
Arsenic	ND	0.25	mg/kg							
Lead	ND	0.25	"							
LCS (6090853-BS1)				Prepared: 09/08/16 Analyzed: 09/09/16						
Arsenic	10.4	0.25	mg/kg	10.0		104	80-120			
Lead	10.8	0.25	"	10.0		108	80-120			
Matrix Spike (6090853-MS1)	**Source: T162181-01**			Prepared: 09/08/16 Analyzed: 09/09/16						
Arsenic	14.7	0.25	mg/kg	10.0	2.38	124	75-125			
Lead	18.2	0.25	"	10.0	5.05	132	75-125			QM-07
Matrix Spike Dup (6090853-MSD1)	**Source: T162181-01**			Prepared: 09/08/16 Analyzed: 09/09/16						
Arsenic	10.3	0.23	mg/kg	9.09	2.38	86.6	75-125	35.9	20	QR-04
Lead	12.7	0.23	"	9.09	5.05	84.3	75-125	35.6	20	QM-07

Daniel J Chavez

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Daniel Chavez, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

Organochlorine Pesticides by EPA Method 8081A - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 6090846 - EPA 3510C GCMS/ECD										
Blank (6090846-BLK1)				Prepared: 09/08/16 Analyzed: 09/09/16						
alpha-BHC	ND	5.0	ug/kg							
gamma-BHC (Lindane)	ND	5.0	"							
beta-BHC	ND	5.0	"							
delta-BHC	ND	5.0	"							
Heptachlor	ND	5.0	"							
Aldrin	ND	5.0	"							
Heptachlor epoxide	ND	5.0	"							
gamma-Chlordane	ND	5.0	"							
alpha-Chlordane	ND	5.0	"							
'osulfan I	ND	5.0	"							
-DDE	ND	5.0	"							
Dieldrin	ND	5.0	"							
Endrin	ND	5.0	"							
4,4'-DDD	ND	5.0	"							
Endosulfan II	ND	5.0	"							
4,4'-DDT	ND	5.0	"							
Endrin aldehyde	ND	5.0	"							
Endosulfan sulfate	ND	5.0	"							
Methoxychlor	ND	10	"							
Endrin ketone	ND	5.0	"							
Toxaphene	ND	200	"							
Surrogate: Tetrachloro-meta-xylene	*6.36*		"	*10.0*		*63.6*	*35-140*			
Surrogate: Decachlorobiphenyl	*4.89*		"	*10.0*		*48.9*	*35-140*			
LCS (6090846-BS1)				Prepared: 09/08/16 Analyzed: 09/09/16						
gamma-BHC (Lindane)	23.2	5.0	ug/kg	40.0		58.0	40-120			
Heptachlor	20.5	5.0	"	40.0		51.1	40-120			
Aldrin	17.3	5.0	"	40.0		43.2	40-120			
Dieldrin	18.9	5.0	"	40.0		47.3	40-120			
Endrin	18.6	5.0	"	40.0		46.5	40-120			
4,4'-DDT	21.5	5.0	"	40.0		53.7	33-147			
Surrogate: Tetrachloro-meta-xylene	*6.71*		"	*10.0*		*67.1*	*35-140*			
Surrogate: Decachlorobiphenyl	*5.29*		"	*10.0*		*52.9*	*35-140*			

nStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

Organochlorine Pesticides by EPA Method 8081A - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 6090846 - EPA 3510C GCMS/ECD										
LCS Dup (6090846-BSD1)				Prepared: 09/08/16 Analyzed: 09/09/16						
gamma-BHC (Lindane)	24.5	5.0	ug/kg	40.0		61.3	40-120	5.58	30	
Heptachlor	21.4	5.0	"	40.0		53.4	40-120	4.41	30	
Aldrin	17.9	5.0	"	40.0		44.7	40-120	3.36	30	
Dieldrin	20.3	5.0	"	40.0		50.8	40-120	7.16	30	
Endrin	19.8	5.0	"	40.0		49.4	40-120	6.03	30	
4,4'-DDT	23.2	5.0	"	40.0		58.1	33-147	7.82	30	
Surrogate: Tetrachloro-meta-xylene	*6.98*		*"*	*10.0*		*69.8*	*35-140*			
Surrogate: Decachlorobiphenyl	*5.49*		*"*	*10.0*		*54.9*	*35-140*			

nStar Laboratories, Inc.

Daniel J Chávez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016001311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/09/16 17:44

Notes and Definitions

QR-04	The pecent recovery and/or RPD was outside acceptance criteria. Results accepted based upon percent recovery results in duplicate QC sample and the CCV and CCB results.
QM-07	The spike recovery and or RPD was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS recovery.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

SunStar Laboratories, Inc.
25712 Commercentre Dr
Lake Forest, CA 92630
949-297-5020

Chain of Custody Record

Client: ENGEO
Address: 6 Morgan
Phone: Fax:
Project Manager: M. Hamill

Date: 9/8/2016 Page: 1 Of 3
Project Name: 20621 LAKE FOREST DRIVE, CA
Collector: MV/MO/MRH Client Project #: P2016001331
Batch #: T162181 EDF #:

Sample ID	Date Sampled	Time	Sample Type	Container Type	8260	8260 + OXY	8260 BTEX, OXY only	8270	8021 BTEX	8015M (gasoline)	8015M (diesel)	8015M Ext./Carbon Chain	~~6010/7000 Title 22 Metals~~	LEAD 6020	ARSENIC 6020	8082 OC PEST	Laboratory ID #	Comments/Preservative	Total # of containers
S1-A	9/8/2016	10:35	Soil	2x6										X	X	X	01		4
-B		10:53															02		
-C		10:50															03		
-D		10:43															04		
S2-A		11:00												X	X	X	05		4
-B		11:20															06		
-C		11:15															07		
-D		11:10															08		
S3-A		11:25												X	X	X	09		4
-B		11:35															10		
-C		11:40															11		
-D		11:45															12		
~~S4-A~~		~~12:15~~												X	X	X	[illegible]		4
B		12:10															[illegible]	AM	
C		12:05															[illegible]		

Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time
[signature]	9/8/16 17:50	[signature] 9.8.16	14:50
Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time
Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time

Total # of containers: 12
Chain of Custody seals Y/N/NA:
Seals intact? Y/N/NA:
Received good condition/cold: 5.1

Turn around time: 24 hrs

Notes: Mon. morning 8AM
FRI COB

Sample disposal Instructions: Disposal @ $2.00 each ____ Return to client ____ Pickup ____

COC 133697

SunStar Laboratories, Inc.
25712 Commercentre Dr
Lake Forest, CA 92630
949-297-5020

Chain of Custody Record

Client: ENGEO
Address: 6 Morgan
Phone: ____ Fax: ____
Project Manager: M. Harwell

Date: 9/8/2016 Page: 2 Of 3
Project Name: 20621 Lake Forest Dr, CA
Collector: MV/MO/MRH Client Project #: P2016001331
Batch #: ____ EDF #: ____

Sample ID	Date Sampled	Time	Sample Type	Container Type	8260	8260 + OXY	8260 BTEX, OXY only	8270	8021 BTEX	8015M (gasoline)	8015M (diesel)	8015M Ext./Carbon Chain	6010/7000 Title 22 Metals	LEAD 6020	ARSENIC 6020	OC PEST 8082	Laboratory ID #	AM	Comments/Preservative	Total # of containers
S4-A	9/8/2016	12:55	SOIL	2x6										X	X	X	13			4
-B		2:10															14			
-C		2:05															15			
-D		12:18															16			
S5-A		14:20												X	X		17			4
-B		13:30															18			
-C		13:25															19			
-D		14:10															20			
S6-A		13:15												X	X		21			4
-B		13:10															22			
-C		13:05															23			
-D		13:20															24			

Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time
[signature]	9/8/16 14:50	[signature]	9.8.16 14:50
Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time
Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time

Total # of containers	12
Chain of Custody seals Y/N/NA	
Seals intact? Y/N/NA	
Received good condition/cold	5.1

Turn around time: 24hr.

Notes
Mon. Morning, Early
FRI COB

Sample disposal Instructions: Disposal @ $2.00 each ____ Return to client ____ Pickup ____

COC 133698

SunStar Laboratories, Inc.
25712 Commercentre Dr
Lake Forest, CA 92630
949-297-5020

Chain of Custody Record

Client: ENGEO
Address: C Morgan
Phone: Fax:
Project Manager: M. Hamell

Date: 9/8/2016 Page: 3 Of 3
Project Name: 20621, Lake Forest Dr, CA
Collector: MV/MO/MRH Client Project #: P2016001311
Batch #: EDF #:

Sample ID	Date Sampled	Time	Sample Type	Container Type	8260	8260 + OXY	8260 BTEX, OXY only	8270	8021 BTEX	8015M (gasoline)	8015M (diesel)	8015M Ext./Carbon Chain	6010/7000 Title 22 Metals	LEAD 6020	ARSENIC 6020	OC. PEST 8082		Laboratory ID #	AM Comments/Preservative	Total # of containers
S7 - A	9/8/2016	12:90	SOIL	2X6										X	X	X	25	~~25~~	3 jt.	3
- B	9/8/2016	12:40														X	26	~~26~~		
- D	9/8/2016	12:25														X	27	~~30~~		
~~S - A~~																				
Composite S1 - ABCD	9/8/16	-														X		28	4:1	
COMPOSITE S2 - ABCD	9/8/16	-														X		29	4:1	
COMPOSITE S3 - ABCD	9/8/16	-														X		30	4:1	
COMPOSITE S4 - ABCD	9/8/16	-														X		31	4:1	
COMPOSITE S5 - ABCD	9/8/16	-														X		32	4:1	
COMPOSITE S6 - ABCD	9/8/16	-														X		33	4:1	
COMPOSITE S7 - ABCD	9/8/16	-														X		34	4:1	

Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time
	9/8/16 14:50		9-8-16 14:50
Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time
Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time

Total # of containers: 3
Chain of Custody seals Y/N/NA:
Seals intact? Y/N/NA:
Received good condition/cold:

Turn around time: 24h

Notes
Mon Morning EOM
Fri COB

Sample disposal Instructions: Disposal @ $2.00 each ____ Return to client ____ Pickup ____

COC135860

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

SAMPLE RECEIVING REVIEW SHEET

Batch/Work Order #: T16 2181

Client Name: Engeo. Project: 20621 Lake Forest Dr., CA

Delivered by: ☒ Client ☐ SunStar Courier ☐ GSO ☐ FedEx ☐ Other

If Courier, Received by: - Date/Time Courier Received: -

Lab Received by: Sunny Date/Time Lab Received: 9/8/16 14:50

Total number of coolers received: 0

Temperature:	Cooler #1	5.3 °C +/- the CF (- 0.2°C) =	5.1	°C corrected temperature
Temperature:	Cooler #2	°C +/- the CF (- 0.2°C) =		°C corrected temperature
Temperature:	Cooler #3	°C +/- the CF (- 0.2°C) =		°C corrected temperature

Temperature criteria = ≤ 6°C (no frozen containers)	Within criteria?	☒ **Yes** ☐ **No**
If NO:		
Samples received on ice?	☐ Yes	☐ **No → Complete Non-Conformance Sheet**
If on ice, samples received same day collected?	☐ Yes → Acceptable	☐ **No → Complete Non-Conformance Sheet**

Custody seals intact on cooler/sample	☐ Yes	☐ No*	☒ N/A
Sample containers intact	☒ Yes	☐ No*	
Sample labels match Chain of Custody IDs	☒ Yes	☐ No*	
Total number of containers received match COC	☒ Yes	☐ No*	
Proper containers received for analyses requested on COC	☒ Yes	☐ No*	
Proper preservative indicated on COC/containers for analyses requested	☐ Yes	☐ No*	☒ N/A
Complete shipment received in good condition with correct temperatures, containers, labels, volumes preservatives and within method specified holding times	☒ **Yes**	☐ **No***	

* Complete Non-Conformance Receiving Sheet if checked

Cooler/Sample Review - Initials and date: AM 9/8/16

Comments:

(949) 297-5020 ■ www.sunstarlabs.com ■ 25712 Commercentre Drive ■ Lake Forest, CA 92630

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

WORK ORDER

T162181

Client: Engeo
Project: 20621 Lake Forest Dr.,CA
Project Manager: Daniel Chavez
Project Number: P2016001331

Report To:
Engeo
Matthew Harrell
2213 Plaza Dr.
Rocklin, CA 95765

Date Due: 09/09/16 17:00 (1 day TAT)
Received By: Sunny Lounethone
Date Received: 09/08/16 14:50
Logged In By: Brian Charon
Date Logged In: 09/08/16 15:01

Samples Received at: **5.1°C**
Custody Seals No Received On Ice Yes
Containers Intact Yes
COC/Labels Agree Yes
Preservation Confirm No

Analysis	Due	TAT	Expires	Comments
T162181-01 S1-A [Soil] Sampled 09/08/16 10:35 (GMT-08:00) Pacific Time (US &				
6020 Metals by ICP-MS	09/09/16 15:00	1	01/06/17 10:35	Pb,As only
T162181-02 S1-B [Soil] Sampled 09/08/16 10:55 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-03 S1-C [Soil] Sampled 09/08/16 10:50 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-04 S1-D [Soil] Sampled 09/08/16 10:43 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-05 S2-A [Soil] Sampled 09/08/16 11:00 (GMT-08:00) Pacific Time (US &				
6020 Metals by ICP-MS	09/09/16 15:00	1	01/06/17 11:00	Pb,As only
T162181-06 S2-B [Soil] Sampled 09/08/16 11:20 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-07 S2-C [Soil] Sampled 09/08/16 11:15 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

WORK ORDER

T162181

Client: Engeo
Project: 20621 Lake Forest Dr.,CA
Project Manager: Daniel Chavez
Project Number: P2016001331

Analysis	Due	TAT	Expires	Comments
T162181-08 S2-D [Soil] Sampled 09/08/16 11:10 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-09 S3-A [Soil] Sampled 09/08/16 11:25 (GMT-08:00) Pacific Time (US &				
6020 Metals by ICP-MS	09/09/16 15:00	1	01/06/17 11:25	Pb,As only
T162181-10 S3-B [Soil] Sampled 09/08/16 11:35 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-11 S3-C [Soil] Sampled 09/08/16 11:40 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-12 S3-D [Soil] Sampled 09/08/16 11:45 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-13 S4-A [Soil] Sampled 09/08/16 12:15 (GMT-08:00) Pacific Time (US &				
6020 Metals by ICP-MS	09/09/16 15:00	1	01/06/17 12:15	Pb,As only
T162181-14 S4-B [Soil] Sampled 09/08/16 12:10 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-15 S4-C [Soil] Sampled 09/08/16 12:08 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-16 S4-D [Soil] Sampled 09/08/16 12:18 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-17 S5-A [Soil] Sampled 09/08/16 14:20 (GMT-08:00) Pacific Time (US &				
6020 Metals by ICP-MS	09/09/16 15:00	1	01/06/17 14:20	Pb,As only
T162181-18 S5-B [Soil] Sampled 09/08/16 13:30 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

WORK ORDER

T162181

Client: Engeo
Project: 20621 Lake Forest Dr.,CA

Project Manager: Daniel Chavez
Project Number: P2016001331

Analysis	Due	TAT	Expires	Comments
T162181-19 S5-C [Soil] Sampled 09/08/16 13:25 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-20 S5-D [Soil] Sampled 09/08/16 14:10 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-21 S6-A [Soil] Sampled 09/08/16 13:15 (GMT-08:00) Pacific Time (US &				
6020 Metals by ICP-MS	09/09/16 15:00	1	01/06/17 13:15	Pb,As only
T162181-22 S6-B [Soil] Sampled 09/08/16 13:10 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-23 S6-C [Soil] Sampled 09/08/16 13:05 (GMT-08:00) Pacific Time (US &				
ANALYSES]				
T162181-24 S6-D [Soil] Sampled 09/08/16 13:20 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-25 S7-A [Soil] Sampled 09/08/16 12:20 (GMT-08:00) Pacific Time (US &				
6020 Metals by ICP-MS	09/09/16 15:00	1	01/06/17 12:20	Pb,As only
T162181-26 S7-B [Soil] Sampled 09/08/16 12:40 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-27 S7-D [Soil] Sampled 09/08/16 12:25 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162181-28 COMPOSITE S1-ABCD [Soil] Sampled 09/08/16 00:00 (GMT-08:00) Pacific Time (US &				**4:1**
8081 Pesticides	09/09/16 15:00	1	09/22/16 00:00	
T162181-29 COMPOSITE S2-ABCD [Soil] Sampled 09/08/16 00:00 (GMT-08:00) Pacific Time (US &				**4:1**
81 Pesticides	09/09/16 15:00	1	09/22/16 00:00	

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

WORK ORDER

T162181

Client: Engeo
Project: 20621 Lake Forest Dr.,CA

Project Manager: Daniel Chavez
Project Number: P2016001331

Analysis	Due	TAT	Expires	Comments
T162181-30 COMPOSITE S3-ABCD [Soil] Sampled 09/08/16 00:00 (GMT-08:00) Pacific Time (US &				4:1
8081 Pesticides	09/09/16 15:00	1	09/22/16 00:00	
T162181-31 COMPOSITE S4-ABCD [Soil] Sampled 09/08/16 00:00 (GMT-08:00) Pacific Time (US &				4:1
8081 Pesticides	09/09/16 15:00	1	09/22/16 00:00	
T162181-32 COMPOSITE S5-ABCD [Soil] Sampled 09/08/16 00:00 (GMT-08:00) Pacific Time (US &				4:1
8081 Pesticides	09/09/16 15:00	1	09/22/16 00:00	
T162181-33 COMPOSITE S6-ABCD [Soil] Sampled 09/08/16 00:00 (GMT-08:00) Pacific Time (US &				4:1
8081 Pesticides	09/09/16 15:00	1	09/22/16 00:00	
T162181-34 COMPOSITE S7-ABD [Soil] Sampled 09/08/16 00:00 (GMT-08:00) Pacific Time (US &				3:1
81 Pesticides	09/09/16 15:00	1	09/22/16 00:00	

Reviewed By

Date

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

12 September 2016

Matthew Harrell
Engeo
2213 Plaza Dr.
Rocklin, CA 95765

RE: 20621 Lake Forest Dr.,CA

Enclosed are the results of analyses for samples received by the laboratory on 09/08/16 18:00. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Daniel J Chavez

Daniel Chavez
Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
S10-A	T162187-01	Soil	09/08/16 16:45	09/08/16 18:00
S8-B	T162187-05	Soil	09/08/16 16:20	09/08/16 18:00
S9-A	T162187-06	Soil	09/08/16 14:50	09/08/16 18:00
S12-A	T162187-10	Soil	09/08/16 16:00	09/08/16 18:00
S15-A	T162187-14	Soil	09/08/16 15:40	09/08/16 18:00
S13-B	T162187-17	Soil	09/08/16 17:15	09/08/16 18:00
COMP: S10-A,B,C,D	T162187-18	Soil	09/08/16 00:00	09/08/16 18:00
COMP: S9-A,B,C,D	T162187-19	Soil	09/08/16 00:00	09/08/16 18:00
COMP: S12-A,B,C,D	T162187-20	Soil	09/08/16 00:00	09/08/16 18:00
OMP: S15-A,C,D	T162187-21	Soil	09/08/16 00:00	09/08/16 18:00

nStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

DETECTIONS SUMMARY

Sample ID: S10-A **Laboratory ID:** T162187-01

Analyte	Result	Reporting Limit	Units	Method	Notes
Arsenic	1.4	0.25	mg/kg	6020 ICP-MS	
Lead	5.2	0.25	mg/kg	6020 ICP-MS	

Sample ID: S8-B **Laboratory ID:** T162187-05

Analyte	Result	Reporting Limit	Units	Method	Notes
Arsenic	1.2	0.25	mg/kg	6020 ICP-MS	
Lead	2.4	0.25	mg/kg	6020 ICP-MS	

Sample ID: S9-A **Laboratory ID:** T162187-06

Analyte	Result	Reporting Limit	Units	Method	Notes
Arsenic	0.79	0.25	mg/kg	6020 ICP-MS	
Lead	2.0	0.25	mg/kg	6020 ICP-MS	

Sample ID: S12-A **Laboratory ID:** T162187-10

Analyte	Result	Reporting Limit	Units	Method	Notes
Arsenic	5.4	0.25	mg/kg	6020 ICP-MS	
Lead	4.3	0.25	mg/kg	6020 ICP-MS	

Sample ID: S15-A **Laboratory ID:** T162187-14

Analyte	Result	Reporting Limit	Units	Method	Notes
Arsenic	2.2	0.25	mg/kg	6020 ICP-MS	
Lead	7.6	0.25	mg/kg	6020 ICP-MS	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

inStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

Sample ID: S13-B **Laboratory ID:** T162187-17

Analyte	Result	Reporting Limit	Units	Method	Notes
Arsenic	**4.9**	0.25	mg/kg	6020 ICP-MS	
Lead	**3.8**	0.25	mg/kg	6020 ICP-MS	

Sample ID: COMP: S10-A,B,C,D **Laboratory ID:** T162187-18

No Results Detected

Sample ID: COMP: S9-A,B,C,D **Laboratory ID:** T162187-19

No Results Detected

Sample ID: COMP: S12-A,B,C,D **Laboratory ID:** T162187-20

No Results Detected

Sample ID: COMP: S15-A,C,D **Laboratory ID:** T162187-21

No Results Detected

nStar Laboratories, Inc.

Daniel J Chávez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

S10-A

T162187-01 (Soil)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
SunStar Laboratories, Inc.									
Metals by EPA 6020 Method									
Arsenic	**1.4**	0.25	mg/kg	1	6090853	09/08/16	09/09/16	6020 ICP-MS	
Lead	**5.2**	0.25	"	"	"	"	"	"	

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo 2213 Plaza Dr. Rocklin CA, 95765	Project: 20621 Lake Forest Dr.,CA Project Number: P2016.001.311 Project Manager: Matthew Harrell	**Reported:** 09/12/16 10:15

S8-B

T162187-05 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Metals by EPA 6020 Method									
Arsenic	**1.2**	0.25	mg/kg	1	6090853	09/08/16	09/09/16	6020 ICP-MS	
Lead	**2.4**	0.25	"	"	"	"	"	"	
Organochlorine Pesticides by EPA Method 8081A									
alpha-BHC	ND	5.0	ug/kg	1	6090905	09/09/16	09/12/16	EPA 8081A	
gamma-BHC (Lindane)	ND	5.0	"	"	"	"	"	"	
beta-BHC	ND	5.0	"	"	"	"	"	"	
delta-BHC	ND	5.0	"	"	"	"	"	"	
Heptachlor	ND	5.0	"	"	"	"	"	"	
in	ND	5.0	"	"	"	"	"	"	
Heptachlor epoxide	ND	5.0	"	"	"	"	"	"	
gamma-Chlordane	ND	5.0	"	"	"	"	"	"	
alpha-Chlordane	ND	5.0	"	"	"	"	"	"	
Endosulfan I	ND	5.0	"	"	"	"	"	"	
4,4'-DDE	ND	5.0	"	"	"	"	"	"	
Dieldrin	ND	5.0	"	"	"	"	"	"	
Endrin	ND	5.0	"	"	"	"	"	"	
4,4'-DDD	ND	5.0	"	"	"	"	"	"	
Endosulfan II	ND	5.0	"	"	"	"	"	"	
4,4'-DDT	ND	5.0	"	"	"	"	"	"	
Endrin aldehyde	ND	5.0	"	"	"	"	"	"	
Endosulfan sulfate	ND	5.0	"	"	"	"	"	"	
Methoxychlor	ND	10	"	"	"	"	"	"	
Endrin ketone	ND	5.0	"	"	"	"	"	"	
Toxaphene	ND	200	"	"	"	"	"	"	
Surrogate: Tetrachloro-meta-xylene		*63.3 %*		*35-140*	"	"	"	"	
Surrogate: Decachlorobiphenyl		*52.2 %*		*35-140*	"	"	"	"	

nStar Laboratories, Inc.

Daniel J Chávez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo 2213 Plaza Dr. Rocklin CA, 95765	Project: 20621 Lake Forest Dr.,CA Project Number: P2016.001.311 Project Manager: Matthew Harrell	**Reported:** 09/12/16 10:15

S9-A

T162187-06 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Metals by EPA 6020 Method									
Arsenic	**0.79**	0.25	mg/kg	1	6090853	09/08/16	09/09/16	6020 ICP-MS	
Lead	**2.0**	0.25	"	"	"	"	"	"	

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo 2213 Plaza Dr. Rocklin CA, 95765	Project: 20621 Lake Forest Dr.,CA Project Number: P2016.001.311 Project Manager: Matthew Harrell	**Reported:** 09/12/16 10:15

S12-A

T162187-10 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Metals by EPA 6020 Method									
Arsenic	**5.4**	0.25	mg/kg	1	6090853	09/08/16	09/09/16	6020 ICP-MS	
Lead	**4.3**	0.25	"	"	"	"	"	"	

SunStar Laboratories, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Daniel Chavez, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo 2213 Plaza Dr. Rocklin CA, 95765	Project: 20621 Lake Forest Dr.,CA Project Number: P2016.001.311 Project Manager: Matthew Harrell	**Reported:** 09/12/16 10:15

S15-A

T162187-14 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Metals by EPA 6020 Method									
Arsenic	**2.2**	0.25	mg/kg	1	6090853	09/08/16	09/09/16	6020 ICP-MS	
Lead	**7.6**	0.25	"	"	"	"	"	"	

SunStar Laboratories, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Daniel Chavez, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo 2213 Plaza Dr. Rocklin CA, 95765	Project: 20621 Lake Forest Dr.,CA Project Number: P2016.001.311 Project Manager: Matthew Harrell	**Reported:** 09/12/16 10:15

S13-B

T162187-17 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Metals by EPA 6020 Method									
Arsenic	**4.9**	0.25	mg/kg	1	6090853	09/08/16	09/09/16	6020 ICP-MS	
Lead	**3.8**	0.25	"	"	"	"	"	"	
Organochlorine Pesticides by EPA Method 8081A									
alpha-BHC	ND	5.0	ug/kg	1	6090905	09/09/16	09/12/16	EPA 8081A	
gamma-BHC (Lindane)	ND	5.0	"	"	"	"	"	"	
beta-BHC	ND	5.0	"	"	"	"	"	"	
delta-BHC	ND	5.0	"	"	"	"	"	"	
Heptachlor	ND	5.0	"	"	"	"	"	"	
rin	ND	5.0	"	"	"	"	"	"	
Heptachlor epoxide	ND	5.0	"	"	"	"	"	"	
gamma-Chlordane	ND	5.0	"	"	"	"	"	"	
alpha-Chlordane	ND	5.0	"	"	"	"	"	"	
Endosulfan I	ND	5.0	"	"	"	"	"	"	
4,4'-DDE	ND	5.0	"	"	"	"	"	"	
Dieldrin	ND	5.0	"	"	"	"	"	"	
Endrin	ND	5.0	"	"	"	"	"	"	
4,4'-DDD	ND	5.0	"	"	"	"	"	"	
Endosulfan II	ND	5.0	"	"	"	"	"	"	
4,4'-DDT	ND	5.0	"	"	"	"	"	"	
Endrin aldehyde	ND	5.0	"	"	"	"	"	"	
Endosulfan sulfate	ND	5.0	"	"	"	"	"	"	
Methoxychlor	ND	10	"	"	"	"	"	"	
Endrin ketone	ND	5.0	"	"	"	"	"	"	
Toxaphene	ND	200	"	"	"	"	"	"	
Surrogate: Tetrachloro-meta-xylene		*66.9 %*	*35-140*		"	"	"	"	
Surrogate: Decachlorobiphenyl		*56.4 %*	*35-140*		"	"	"	"	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

inStar Laboratories, Inc.

Daniel Chavez, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo 2213 Plaza Dr. Rocklin CA, 95765	Project: 20621 Lake Forest Dr.,CA Project Number: P2016.001.311 Project Manager: Matthew Harrell	**Reported:** 09/12/16 10:15

COMP: S10-A,B,C,D

T162187-18 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Organochlorine Pesticides by EPA Method 8081A									
alpha-BHC	ND	5.0	ug/kg	1	6090905	09/09/16	09/12/16	EPA 8081A	
gamma-BHC (Lindane)	ND	5.0	"	"	"	"	"	"	
beta-BHC	ND	5.0	"	"	"	"	"	"	
delta-BHC	ND	5.0	"	"	"	"	"	"	
Heptachlor	ND	5.0	"	"	"	"	"	"	
Aldrin	ND	5.0	"	"	"	"	"	"	
Heptachlor epoxide	ND	5.0	"	"	"	"	"	"	
gamma-Chlordane	ND	5.0	"	"	"	"	"	"	
ha-Chlordane	ND	5.0	"	"	"	"	"	"	
losulfan I	ND	5.0	"	"	"	"	"	"	
4,4'-DDE	ND	5.0	"	"	"	"	"	"	
Dieldrin	ND	5.0	"	"	"	"	"	"	
Endrin	ND	5.0	"	"	"	"	"	"	
4,4'-DDD	ND	5.0	"	"	"	"	"	"	
Endosulfan II	ND	5.0	"	"	"	"	"	"	
4,4'-DDT	ND	5.0	"	"	"	"	"	"	
Endrin aldehyde	ND	5.0	"	"	"	"	"	"	
Endosulfan sulfate	ND	5.0	"	"	"	"	"	"	
Methoxychlor	ND	10	"	"	"	"	"	"	
Endrin ketone	ND	5.0	"	"	"	"	"	"	
Toxaphene	ND	200	"	"	"	"	"	"	
Surrogate: Tetrachloro-meta-xylene		*65.2 %*	*35-140*		"	"	"	"	
Surrogate: Decachlorobiphenyl		*53.3 %*	*35-140*		"	"	"	"	

nStar Laboratories, Inc.

Daniel J Chávez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

COMP: S9-A,B,C,D

T162187-19 (Soil)

SunStar Laboratories, Inc.

Organochlorine Pesticides by EPA Method 8081A

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
alpha-BHC	ND	5.0	ug/kg	1	6090905	09/09/16	09/12/16	EPA 8081A	
gamma-BHC (Lindane)	ND	5.0	"	"	"	"	"	"	
beta-BHC	ND	5.0	"	"	"	"	"	"	
delta-BHC	ND	5.0	"	"	"	"	"	"	
Heptachlor	ND	5.0	"	"	"	"	"	"	
Aldrin	ND	5.0	"	"	"	"	"	"	
Heptachlor epoxide	ND	5.0	"	"	"	"	"	"	
gamma-Chlordane	ND	5.0	"	"	"	"	"	"	
ha-Chlordane	ND	5.0	"	"	"	"	"	"	
osulfan I	ND	5.0	"	"	"	"	"	"	
4,4'-DDE	ND	5.0	"	"	"	"	"	"	
Dieldrin	ND	5.0	"	"	"	"	"	"	
Endrin	ND	5.0	"	"	"	"	"	"	
4,4'-DDD	ND	5.0	"	"	"	"	"	"	
Endosulfan II	ND	5.0	"	"	"	"	"	"	
4,4'-DDT	ND	5.0	"	"	"	"	"	"	
Endrin aldehyde	ND	5.0	"	"	"	"	"	"	
Endosulfan sulfate	ND	5.0	"	"	"	"	"	"	
Methoxychlor	ND	10	"	"	"	"	"	"	
Endrin ketone	ND	5.0	"	"	"	"	"	"	
Toxaphene	ND	200	"	"	"	"	"	"	
Surrogate: Tetrachloro-meta-xylene		*61.2 %*	*35-140*		"	"	"	"	
Surrogate: Decachlorobiphenyl		*51.8 %*	*35-140*		"	"	"	"	

nStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

COMP: S12-A,B,C,D

T162187-20 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Organochlorine Pesticides by EPA Method 8081A									
alpha-BHC	ND	5.0	ug/kg	1	6090905	09/09/16	09/12/16	EPA 8081A	
gamma-BHC (Lindane)	ND	5.0	"	"	"	"	"	"	
beta-BHC	ND	5.0	"	"	"	"	"	"	
delta-BHC	ND	5.0	"	"	"	"	"	"	
Heptachlor	ND	5.0	"	"	"	"	"	"	
Aldrin	ND	5.0	"	"	"	"	"	"	
Heptachlor epoxide	ND	5.0	"	"	"	"	"	"	
gamma-Chlordane	ND	5.0	"	"	"	"	"	"	
ha-Chlordane	ND	5.0	"	"	"	"	"	"	
osulfan I	ND	5.0	"	"	"	"	"	"	
4,4'-DDE	ND	5.0	"	"	"	"	"	"	
Dieldrin	ND	5.0	"	"	"	"	"	"	
Endrin	ND	5.0	"	"	"	"	"	"	
4,4'-DDD	ND	5.0	"	"	"	"	"	"	
Endosulfan II	ND	5.0	"	"	"	"	"	"	
4,4'-DDT	ND	5.0	"	"	"	"	"	"	
Endrin aldehyde	ND	5.0	"	"	"	"	"	"	
Endosulfan sulfate	ND	5.0	"	"	"	"	"	"	
Methoxychlor	ND	10	"	"	"	"	"	"	
Endrin ketone	ND	5.0	"	"	"	"	"	"	
Toxaphene	ND	200	"	"	"	"	"	"	
Surrogate: Tetrachloro-meta-xylene		*60.5 %*	*35-140*		"	"	"	"	
Surrogate: Decachlorobiphenyl		*51.9 %*	*35-140*		"	"	"	"	

nStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

COMP: S15-A,C,D

T162187-21 (Soil)

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Organochlorine Pesticides by EPA Method 8081A									
alpha-BHC	ND	5.0	ug/kg	1	6090905	09/09/16	09/12/16	EPA 8081A	
gamma-BHC (Lindane)	ND	5.0	"	"	"	"	"	"	
beta-BHC	ND	5.0	"	"	"	"	"	"	
delta-BHC	ND	5.0	"	"	"	"	"	"	
Heptachlor	ND	5.0	"	"	"	"	"	"	
Aldrin	ND	5.0	"	"	"	"	"	"	
Heptachlor epoxide	ND	5.0	"	"	"	"	"	"	
gamma-Chlordane	ND	5.0	"	"	"	"	"	"	
'ha-Chlordane	ND	5.0	"	"	"	"	"	"	
.osulfan I	ND	5.0	"	"	"	"	"	"	
4,4'-DDE	ND	5.0	"	"	"	"	"	"	
Dieldrin	ND	5.0	"	"	"	"	"	"	
Endrin	ND	5.0	"	"	"	"	"	"	
4,4'-DDD	ND	5.0	"	"	"	"	"	"	
Endosulfan II	ND	5.0	"	"	"	"	"	"	
4,4'-DDT	ND	5.0	"	"	"	"	"	"	
Endrin aldehyde	ND	5.0	"	"	"	"	"	"	
Endosulfan sulfate	ND	5.0	"	"	"	"	"	"	
Methoxychlor	ND	10	"	"	"	"	"	"	
Endrin ketone	ND	5.0	"	"	"	"	"	"	
Toxaphene	ND	200	"	"	"	"	"	"	
Surrogate: Tetrachloro-meta-xylene		*49.9 %*	*35-140*		"	"	"	"	
Surrogate: Decachlorobiphenyl		*49.3 %*	*35-140*		"	"	"	"	

nStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

Metals by EPA 6020 Method - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 6090853 - EPA 3051										
Blank (6090853-BLK1)				Prepared: 09/08/16 Analyzed: 09/09/16						
Arsenic	ND	0.25	mg/kg							
Lead	ND	0.25	"							
LCS (6090853-BS1)				Prepared: 09/08/16 Analyzed: 09/09/16						
Arsenic	10.4	0.25	mg/kg	10.0		104	80-120			
Lead	10.8	0.25	"	10.0		108	80-120			
Matrix Spike (6090853-MS1)		**Source: T162181-01**		Prepared: 09/08/16 Analyzed: 09/09/16						
Arsenic	14.7	0.25	mg/kg	10.0	2.38	124	75-125			
Lead	18.2	0.25	"	10.0	5.05	132	75-125			QM-PS
trix Spike Dup (6090853-MSD1)		**Source: T162181-01**		Prepared: 09/08/16 Analyzed: 09/09/16						
Arsenic	10.3	0.23	mg/kg	9.09	2.38	86.6	75-125	35.9	20	QR-04
Lead	12.7	0.23	"	9.09	5.05	84.3	75-125	35.6	20	QM-PS
Post Spike (6090853-PS1)		**Source: T162181-01**		Prepared: 09/08/16 Analyzed: 09/09/16						
Arsenic	11.7		mg/kg	10.0	2.38	92.8	80-120			
Lead	14.0		"	10.0	5.05	89.4	80-120			

nStar Laboratories, Inc.

Daniel J Chávez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

Organochlorine Pesticides by EPA Method 8081A - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 6090905 - EPA 3550 ECD/GCMS										
Blank (6090905-BLK1)				Prepared: 09/09/16 Analyzed: 09/12/16						
alpha-BHC	ND	5.0	ug/kg							
gamma-BHC (Lindane)	ND	5.0	"							
beta-BHC	ND	5.0	"							
delta-BHC	ND	5.0	"							
Heptachlor	ND	5.0	"							
Aldrin	ND	5.0	"							
Heptachlor epoxide	ND	5.0	"							
gamma-Chlordane	ND	5.0	"							
alpha-Chlordane	ND	5.0	"							
'osulfan I	ND	5.0	"							
-DDE	ND	5.0	"							
Dieldrin	ND	5.0	"							
Endrin	ND	5.0	"							
4,4'-DDD	ND	5.0	"							
Endosulfan II	ND	5.0	"							
4,4'-DDT	ND	5.0	"							
Endrin aldehyde	ND	5.0	"							
Endosulfan sulfate	ND	5.0	"							
Methoxychlor	ND	10	"							
Endrin ketone	ND	5.0	"							
Toxaphene	ND	200	"							
Surrogate: Tetrachloro-meta-xylene	*6.00*		"	*10.0*		*60.0*	*35-140*			
Surrogate: Decachlorobiphenyl	*5.03*		"	*10.0*		*50.3*	*35-140*			
LCS (6090905-BS1)				Prepared: 09/09/16 Analyzed: 09/12/16						
gamma-BHC (Lindane)	22.5	5.0	ug/kg	39.6		56.9	40-120			
Heptachlor	24.0	5.0	"	39.6		60.6	40-120			
Aldrin	19.9	5.0	"	39.6		50.3	40-120			
Dieldrin	18.7	5.0	"	39.6		47.2	40-120			
Endrin	18.4	5.0	"	39.6		46.4	40-120			
4,4'-DDT	22.1	5.0	"	39.6		55.8	33-147			
Surrogate: Tetrachloro-meta-xylene	*6.80*		"	*9.90*		*68.7*	*35-140*			
Surrogate: Decachlorobiphenyl	*5.50*		"	*9.90*		*55.5*	*35-140*			

nStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

Organochlorine Pesticides by EPA Method 8081A - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 6090905 - EPA 3550 ECD/GCMS										
Matrix Spike (6090905-MS1)	**Source: T162187-05**			Prepared: 09/09/16 Analyzed: 09/12/16						
gamma-BHC (Lindane)	22.5	5.0	ug/kg	40.0	ND	56.4	30-120			
Heptachlor	20.3	5.0	"	40.0	ND	50.8	30-120			
Aldrin	18.4	5.0	"	40.0	ND	45.9	30-120			
Dieldrin	18.8	5.0	"	40.0	ND	47.0	30-120			
Endrin	18.4	5.0	"	40.0	ND	46.1	30-120			
4,4'-DDT	22.5	5.0	"	40.0	ND	56.2	30-120			
Surrogate: Tetrachloro-meta-xylene	*6.32*		"	*10.0*		*63.2*	*35-140*			
Surrogate: Decachlorobiphenyl	*5.02*		"	*10.0*		*50.2*	*35-140*			
Matrix Spike Dup (6090905-MSD1)	**Source: T162187-05**			Prepared: 09/09/16 Analyzed: 09/12/16						
gamma-BHC (Lindane)	23.4	5.0	ug/kg	39.2	ND	59.6	30-120	5.55	30	
Heptachlor	20.5	5.0	"	39.2	ND	52.2	30-120	2.75	30	
Aldrin	18.2	5.0	"	39.2	ND	46.5	30-120	1.26	30	
Dieldrin	19.3	5.0	"	39.2	ND	49.2	30-120	4.59	30	
Endrin	18.8	5.0	"	39.2	ND	47.8	30-120	3.76	30	
4,4'-DDT	23.6	5.0	"	39.2	ND	60.1	30-120	6.72	30	
Surrogate: Tetrachloro-meta-xylene	*6.46*		"	*9.80*		*65.9*	*35-140*			
Surrogate: Decachlorobiphenyl	*5.37*		"	*9.80*		*54.8*	*35-140*			

SunStar Laboratories, Inc.

Daniel J Chavez

Daniel Chavez, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Engeo	Project: 20621 Lake Forest Dr.,CA	
2213 Plaza Dr.	Project Number: P2016.001.311	**Reported:**
Rocklin CA, 95765	Project Manager: Matthew Harrell	09/12/16 10:15

Notes and Definitions

QR-04	The pecent recovery and/or RPD was outside acceptance criteria. Results accepted based upon percent recovery results in duplicate QC sample and the CCV and CCB results.
QM-PS	The percent recovery and/or RPD are outside acceptance criteria. Results accepted based upon percent recovery results in the post spike and/or serial dilution.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

SunStar Laboratories, Inc.
25712 Commercentre Dr
Lake Forest, CA 92630
949-297-5020

Chain of Custody Record

Client: ENGEO, INC
Address: 10 Morgan, Suite 162, Irvine CA
Phone: (925) 570-7768 Fax:
Project Manager: Matt Harrell

Date: 09/08/16 Page: 1 Of 2
Project Name: 20621 Lake Forest Dr.
Collector: MHarrell, M. , M. Client Project #: P2016.001.331
Batch #: 716218T EDF #:

Sample ID	Date Sampled	Time	Sample Type	Container Type	8260	8260 + OXY	8260 BTEX, OXY only	8270	8021 BTEX	8015M (gasoline)	8015M (diesel)	8015M Ext./Carbon Chain	6010/7000 Title 22 Metals	Lead, Arsenic (6020)	OCPs (8081)			Laboratory ID #	Comments/Preservative	Total # of containers
S10-A	09/08/16	1645	SOIL	SS Sleeve										X	X			01	ICE	4
S10-B		1650												X	X			02		4
S10-C		1705												X	X			03		4
S10-D		1700												X	X			04		4
S8-A																				1
S8-B		1620												X	X			05		1
S8-C																				1
S8-D																				1
S9-A		1450												X	X			06		4
S9-B		1455												X	X			07		4
S9-C		1500												X	X			08		4
S9-D		1570												X	X			09		4

Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time
Manosa	9/8/2016 18:00		9-8-16 18:00
Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time
Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time

Total # of containers
Chain of Custody seals Y/N/NA
Seals intact? Y/N/NA
Received good condition/cold 10.1

Turn around time: 24HR

Notes

Sample disposal Instructions: Disposal @ $2.00 each ____ Return to client ____ Pickup ____

COC 133694

Sunstar Laboratories, Inc.

PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

25712 Commercentre Drive, Lake Forest, CA 92630
949-297-5020

Chain of Custody Record

Client: ENGEO, Inc
Address: 6 Morgan, Suite 162, Irvine, CA
Phone: (925) 570-7768 Fax:
Project Manager: Matt Harrell

Date: 09/08/16 Page: 2 Of 2
Project Name: 20021 Lake Forest Dr
Collector: MHarrell, M.V, M.O Client Project #: P2016.001.331
Batch #: 716187 EDF #:

Sample ID	Date Sampled	Time	Sample Type	Container Type	8260	8260 + OXY	8260 BTEX, OXY only	8270	8021 BTEX	8015M (gasoline)	8015M (diesel)	8015M Ext./Carbon Chain	6010/7000 Title 22 Metals	6020 ICP-MS Metals	Lead, Arsenic (6020)	OCPs (8081)		Laboratory ID #	Comments/Preservative	Total # of containers
S12-A	09/08/16	1600	SOIL	SS Sleeve											X	X		10	ICE	4
S12-B		1555													X	X		11		4
S12-C		1545													X	X		12		4
S12-D		1550													X	X		13		4
S15-A		1540													X	X		14		4
~~S15-B~~																				~~1~~
S15-C		1520													X	X		15		3
S15-D		1525													X	X		16		4
S13-B		1715													X	X		17		4

Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time
Navaz-N	9/8/2016 / 18:00		9-8-16 18:00
Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time
Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time

Total # of containers
Chain of Custody seals Y/N/NA: N
Seals intact? Y/N/NA: NA
Received good condition/cold: 10.1

Turn around time: 24HR

Notes: Composite

Sample disposal Instructions: Disposal @ $2.00 each ____ Return to client ____ Pickup ____

COC 152208

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

SAMPLE RECEIVING REVIEW SHEET

Batch/Work Order #: 762187

Client Name: ENGEO

Project: 20621 LAKE FOREST DR.

Delivered by: ☒ **Client** ☐ **SunStar Courier** ☐ **GSO** ☐ **FedEx** ☐ **Other**

If Courier, Received by: _____ Date/Time Courier Received: _____

Lab Received by: SUNNY Date/Time Lab Received: 9.8.16 / 18:00

Total number of coolers received: 0

Temperature: Cooler #1 10.2	°C +/- the CF (- 0.2°C) = 10.1	°C corrected temperature	
Temperature: Cooler #2	°C +/- the CF (- 0.2°C) =	°C corrected temperature	
Temperature: Cooler #3	°C +/- the CF (- 0.2°C) =	°C corrected temperature	
Temperature criteria = ≤ 6°C (no frozen containers)	Within criteria?	☐ **Yes**	☒ **No**
If NO:			
Samples received on ice?	☒ Yes	☐ **No → Complete Non-Conformance Sheet**	
If on ice, samples received same day collected?	☒ Yes → Acceptable	☐ **No → Complete Non-Conformance Sheet**	

Custody seals intact on cooler/sample	☐ Yes	☐ No*	☒ N/A
Sample containers intact	☒ Yes	☐ No*	
Sample labels match Chain of Custody IDs	☒ Yes	☐ No*	
Total number of containers received match COC	☒ Yes	☐ No*	
Proper containers received for analyses requested on COC	☒ Yes	☐ No*	
Proper preservative indicated on COC/containers for analyses requested	☐ Yes	☐ No*	☒ N/A
Complete shipment received in good condition with correct temperatures, containers, labels, volumes preservatives and within method specified holding times	☒ **Yes**	☐ **No***	

* Complete Non-Conformance Receiving Sheet if checked

Cooler/Sample Review - Initials and date: SL 9.8.16

Comments:

(949) 297-5020 ■ www.sunstarlabs.com ■ 25712 Commercentre Drive ■ Lake Forest, CA 92630

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

Printed: 9/9/2016 9:26:02AM

WORK ORDER

T162187

Client: Engeo | **Project Manager:** Daniel Chavez
Project: 20621 Lake Forest Dr.,CA | **Project Number:** P2016.001.331

Report To:
Engeo
Matthew Harrell
2213 Plaza Dr.
Rocklin, CA 95765

Date Due: 09/12/16 17:00 (1 day TAT)
Received By: Sunny Lounethone | Date Received: 09/08/16 18:00
Logged In By: Sunny Lounethone | Date Logged In: 09/08/16 18:06

Samples Received at: **10.1°C**
Custody Seals No | Received On Ice Yes
Containers Intact Yes
COC/Labels Agree Yes
Preservation Confirm No

Analysis	Due	TAT	Expires	Comments
T162187-01 S10-A [Soil] Sampled 09/08/16 16:45 (GMT-08:00) Pacific Time (US &				
6020 Metals by ICP-MS	09/12/16 15:00	1	01/06/17 16:45	Pb, As only
T162187-02 S10-B [Soil] Sampled 09/08/16 16:50 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162187-03 S10-C [Soil] Sampled 09/08/16 17:05 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162187-04 S10-D [Soil] Sampled 09/08/16 17:00 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162187-05 S8-B [Soil] Sampled 09/08/16 16:20 (GMT-08:00) Pacific Time (US &				
6020 Metals by ICP-MS	09/12/16 15:00	1	01/06/17 16:20	Pb, As only
8081 Pesticides	09/12/16 15:00	1	09/22/16 16:20	
T162187-06 S9-A [Soil] Sampled 09/08/16 14:50 (GMT-08:00) Pacific Time (US &				
6020 Metals by ICP-MS	09/12/16 15:00	1	01/06/17 14:50	Pb, As only
T162187-07 S9-B [Soil] Sampled 09/08/16 14:55 (GMT-08:00) Pacific Time (US				
[NO ANALYSES]				

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

WORK ORDER

T162187

Client:	Engeo	Project Manager:	Daniel Chavez
Project:	20621 Lake Forest Dr.,CA	Project Number:	P2016.001.331

Analysis	Due	TAT	Expires	Comments
T162187-08 S9-C [Soil] Sampled 09/08/16 15:00 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162187-09 S9-D [Soil] Sampled 09/08/16 15:10 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162187-10 S12-A [Soil] Sampled 09/08/16 16:00 (GMT-08:00) Pacific Time (US &				
6020 Metals by ICP-MS	09/12/16 15:00	1	01/06/17 16:00	Pb, As only
T162187-11 S12-B [Soil] Sampled 09/08/16 15:55 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162187-12 S12-C [Soil] Sampled 09/08/16 15:45 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162187-13 S12-D [Soil] Sampled 09/08/16 15:50 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162187-14 S15-A [Soil] Sampled 09/08/16 15:40 (GMT-08:00) Pacific Time (US &				
6020 Metals by ICP-MS	09/12/16 15:00	1	01/06/17 15:40	Pb, As only
T162187-15 S15-C [Soil] Sampled 09/08/16 15:20 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162187-16 S15-D [Soil] Sampled 09/08/16 15:25 (GMT-08:00) Pacific Time (US &				
[NO ANALYSES]				
T162187-17 S13-B [Soil] Sampled 09/08/16 17:15 (GMT-08:00) Pacific Time (US &				
6020 Metals by ICP-MS	09/12/16 15:00	1	01/06/17 17:15	Pb, As only
8081 Pesticides	09/12/16 15:00	1	09/22/16 17:15	
T162187-18 COMP: S10-A,B,C,D [Soil] Sampled 09/08/16 00:00 (GMT-08:00) Pacific Time (US &				**COMPOSITE 4:1**
81 Pesticides	09/12/16 15:00	1	09/22/16 00:00	

SunStar Laboratories, Inc.
PROVIDING QUALITY ANALYTICAL SERVICES NATIONWIDE

WORK ORDER

T162187

Client: Engeo **Project Manager:** Daniel Chavez
Project: 20621 Lake Forest Dr.,CA **Project Number:** P2016.001.331

Analysis	Due	TAT	Expires	Comments
T162187-19 COMP: S9-A,B,C,D [Soil] Sampled 09/08/16 00:00 (GMT-08:00) Pacific Time (US &				**COMPOSITE 4:1**
8081 Pesticides	09/12/16 15:00	1	09/22/16 00:00	
T162187-20 COMP: S12-A,B,C,D [Soil] Sampled 09/08/16 00:00 (GMT-08:00) Pacific Time (US &				**COMPOSITE 4:1**
8081 Pesticides	09/12/16 15:00	1	09/22/16 00:00	
T162187-21 COMP: S15-A,C,D [Soil] Sampled 09/08/16 00:00 (GMT-08:00) Pacific Time (US &				**COMPOSITE 3:1**
8081 Pesticides	09/12/16 15:00	1	09/22/16 00:00	

Reviewed By

Date

HILLMANN
CONSULTING

PHASE I ENVIRONMENTAL SITE ASSESSMENT

20621 LAKE FOREST DRIVE
LAKE FOREST, CALIFORNIA 92630

Prepared For:

Toll Brothers
725 Town and Country Road, Suite 200
Orange, CA 92868

August 31, 2016

Hillmann Project No: C3-6631

DRAFT

HILLMANN
CONSULTING

August 31, 2016

Mr. David Ernst
Toll Brothers
725 Town and Country Road, Suite 200
Orange, CA 92868

RE: Phase I Environmental Site Assessment
20621 Lake Forest Drive
Lake Forest, California 92630
Hillmann Project Number: C3-6631

Dear Mr. Ernst:

Hillmann Consulting, LLC, is pleased to provide the results of our Phase I Environmental Site Assessment of the above referenced property. This assessment was performed in accordance with the scope and limitations of ASTM Practice E 1527-13, which is the latest version of the E1527 standard published by the ASTM, and All Appropriate Inquiries (AAI) Final Rule 40 CFR Part 312.

This report is for the exclusive use of the entities named on the front cover, and no other party shall have any right to rely on any service provided by Hillmann Consulting, LLC, without prior written consent.

We appreciate the opportunity to provide environmental due diligence services. If you have any questions concerning this report, or if we can assist you in any other matter, please contact the Project Manager at (714) 634-9500.

Very Truly Yours,
Hillmann Consulting, LLC

Scott Alburn
Environmental Technician

David Rutherford
Director, Due Diligence Services

DRAFT

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY 1
- 1.1 Project Details Summary Table 1
- 1.2 Findings Summary Table 2
- 1.3 General Description, Current and Historic Property Use 4
- 1.4 Findings, Opinions, and Conclusions 4
- 1.5 Recommendations 6

2.0 INTRODUCTION 8
- 2.1 Purpose and Scope 8
- 2.2 Property Location/Legal Description 10
- 2.3 Significant Assumptions 10
- 2.4 Limitations and Exceptions 10
- 2.5 Data Gaps 11
- 2.6 Special Terms and Conditions 11

3.0 USER PROVIDED INFORMATION 13
- 3.1 Prior Reports and other Provided Documentation 13
- 3.2 Title Records/Environmental Liens/Activity and Use Limitations 13
- 3.3 Specialized Knowledge or Experience 13
- 3.4 Commonly Known or Reasonably Ascertainable Information 13
- 3.5 Property Value Reduction due to Environmental Conditions 13
- 3.6 Reason for Performing Phase I ESA 13

4.0 RECORDS REVIEW 14
- 4.1 Standard Environmental Record Sources 14
- 4.2 Additional Environmental Record Sources 16
- 4.3 Physical Setting Sources 18
- 4.4 Historical Use – Property and Adjoining Properties 18

5.0 SITE RECONNAISSANCE 23
- 5.1 Methodology and Limiting Conditions 23
- 5.2 General Site Setting 23
- 5.3 Interior & Exterior Observations 24

6.0 INTERVIEWS 28
- 6.1 Interviews with Past and Present Owners and Occupants 28
- 6.2 Interviews with State and/or Local Government Officials 28

7.0 NON-ASTM SCOPE CONCERNS 29
- 7.1 Asbestos-Containing Material (ACM) 29
- 7.2 Lead-Based Paint 29
- 7.3 Radon 29
- 7.4 Mold 29
- 7.5 Wetlands 29

8.0 ENVIRONMENTAL PROFESSIONAL STATEMENT 31

9.0 REFERENCES 32

10.0 APPENDICES 33

Appendix A	Site Diagram/Vicinity Map
Appendix B	Site Photographs
Appendix C	Questionnaires / User Provided Information
Appendix D	Historical Records Documentation
Appendix E	Regulatory Records Documentation
Appendix F	Other Documents
Appendix G	Project Personnel Qualifications

DRAFT

List of Abbreviations/Acronyms

Hillmann may use the following abbreviations and acronyms for common terminology described in our report. Not all abbreviations or acronyms may be applicable to this report:

ACM	– Asbestos Containing Material
AST	– Aboveground Storage Tank
ASTM	– American Standard for Testing Materials
CERCLA	– Comprehensive Environmental Response Compensation and Liability Act
CERCLIS	– Comprehensive Environmental Response Compensation and Liability Information System
CESQG	– Conditionally Exempt Small Quantity Generator
CORRACTS	– Corrective Action Sites
CREC	– Controlled Recognized Environmental Condition
DNPL	– Delisted National Priority List
DTSC	– Department of Toxic Substances Control
ENG	– Engineering
ERNS	– Emergency Response Notification System
FOI	– Freedom of Information
FOIA	– Freedom of Information Act
FOIL	– Freedom of Information Letter
HVAC	– Heating Ventilation & Air Conditioning
HREC	– Historic Recognized Environmental Condition
IAQ	– Indoor Air Quality
INST	– Institutional
LBP	– Lead-Based Paint
LQG	– Large Quantity Generator
LUST	– Leaking Underground Storage Tank
MSDS	– Material Safety Data Sheet
NFA	– No Further Action
NFRAP	– No Further Remedial Actions Planned
NPDES	– National Pollutant Discharge Elimination System
NPL	– National Priority List
RCRA	– Resource Conservation and Recovery Act
RCRIS	– Resource Conservation and Recovery Information System
REC	– Recognized Environmental Condition
RWQCB	– Regional Water Quality Control Board
SCAQMD	– South Coast Air Quality Management District
SQG	– Small Quantity Generator
TSDF	– Treatment Storage and/or Disposal Facility
USEPA	– United States Environmental Protection Agency
UST	– Underground Storage Tank

DRAFT

1.0 EXECUTIVE SUMMARY

Hillmann Consulting, LLC (Hillmann), performed a Phase I Environmental Site Assessment (ESA) of 20621 Lake Forest Drive in Lake Forest, California (the "Property"). This assessment has been conducted in accordance with the ASTM Standard Practice E 1527-13 for Phase I Environmental Site Assessments and All Appropriate Inquiries (AAI) Final Rule 40 CFR Part 312.

1.1 Project Details Summary Table

A summary of the pertinent details of the project is provided below:

PROJECT SUMMARY TABLE						
Name of Client	Toll Brothers					
Client Project No.:	N/A					
Client Contact:	Mr. David Ernst					
Description of Project	Phase I Environmental Site Assessment					
Project Name:	N/A					
Street Address:	20621 Lake Forest Drive					
City:	Lake Forest	**County:**	Orange County	**State:**	California	
Tax ID/Parcel Number:	612-221-01(aka 104-190-28)					
Zoning Designation:	Agricultural					
Approx. Property Area:	122.07 acres					
Approximate Building Area:	N/A					
Year Built:	N/A					
General Type of Usage:	Whole agricultural nursery					
Property Owner:	Nakase Steven M & Gary S					
Occupant(s):	Nakase Brothers Wholesale Nurseries					
Assessment Personnel:	Mr. Jonathan McConnell					
Property Contact:	Mr. David Ernst					
Property Escort(s):	Unescorted					
Inspection Date:	August 22, 2016					
Weather Conditions:	Clear, 78 degrees F					

DRAFT

1.2 Findings Summary Table

The following table summarizes the key findings of this assessment. This table, alone, does not constitute the complete assessment. The report must be reviewed in its entirety.

Assessment Section	No Sig. Concern	Potential Env Concern	REC	Recommended Follow-up	Rep. Ref.
User Provided Info		Site rep stated that 400 g. diesel UST was removed in early 1990s	REC	See Bulk Storage Tank comment	3.0
Data Gaps	X				2.5
Regulatory Review		Marine Corps Air Station (MCAS El Toro) is listed on the NPL database for trichloroethylene contamination in a portion of the groundwater basin. The site is out of the vicinity of our Property. Property listed on UST database.	No REC	NFA See Bulk Storage Tank comment	4.1
Historical Review		Property historically used as an agricultural nursery and orchards.	REC	Phase II	4.4
Site Use		Use of the Property as a wholesale plant nursery.	REC	Phase II	5.2
Adjoining Properties		Rancho Parkway Shell was identified on the EDR Historical Auto and UST databases. No reported spills or leaks were reported for the subject property.	No	NA	4.1.2 5.2.8
Hazardous Materials		Several chemicals and contaminants were identified in manufacturing containers on the Property.	No	Proper handling and disposal of chemicals/ contaminants.	5.3
Bulk Petroleum Storage		Site rep reported that a 400-g. diesel UST was removed in the early 1990s from the southern corner of the Property. No UST removal documentation was available. The Property was listed on the UST database with no additional details readily available. Add'l historic USTs may have been used at the Property.	REC	Review records from Orange County DEH when available. Phase II may also be warranted. Decommission any abandoned USTs if discovered during redevelopment activities.	5.3
PCBs		One (1) dry-type transformer and seven (7) pole-mounted transformers were observed on the Property. No staining or leaking was observed around the vicinity of the transformers.	No	NFA	5.3
Waste / Discharges	X				5.3

DRAFT

Assessment Section	No Sig. Concern	Potential Env Concern	REC	Recommended Follow-up	Rep. Ref.
Asbestos Containing Materials (ACM)		Potential for ACM on Property		Compliance with regulations	7.1
Lead Based Paint (LBP)		Potential for LBP on Property		Compliance with regulations	7.2
Radon	X				7.3
Mold	X				7.4
Wetlands	X				7.5

NA = Not Applicable, TBD = To Be Determined, UNK = Unknown

DRAFT

1.3 General Description, Current and Historic Property Use

The Property consists of one large rectangular shaped parcel on the southwestern side of Rancho Parkway, between Bake Parkway and Lake Forest Drive. The Property is currently occupied by a wholesale plan nursery. The total Property area is approximately 122.07 acres. The Property is located in a suburban developed area characterized by a mix of commercial properties, single and multi-family homes, and corporate offices. The terrain of the Property appeared to be relatively flat. No natural surface bodies of water were observed.

The Property was developed from prior to 1938 through the 1960s with orchards. From the late 1960s to the early 1980s, the site was developed partially with orchards on the NW side and the reminder consisting of a nursery. By 1988, the orchards were gone. From the 1990s to the present, the entire property has been used as an agricultural nursery. Nakase Brothers Wholesale Nurseries has been located at the Property address from 2000 to present.

1.4 Findings, Opinions, and Conclusions

1.4.1 Notable Findings

With the historic and current use of the Property being identified as an agricultural and wholesale plant nursery, there is potential to create contaminated soils with residual levels of pesticide, herbicide, fungicide, and insecticides which is considered to be a REC in connection with the Property.

One (1) NPL listings were identified within a one-mile radius of the Property. The listing is described as Marine Corps Air Station (MCAS El Toro approximately 4,736 feet northwest of the Property. In 1985, trichloroethylene (TCE) was found in a portion of the groundwater basin beneath the former MCAS EL Toro and Central Irvine. TCE is a volatile organic compound (VOC) that was widely used as a solvent for aircraft cleaning. Prior to the 1970s, the disposal of cleaning solvents was not regulated. As a result of past disposal practices, a one-by-three mile plume of groundwater contamination extended west of MCAS El Toro. Based on a review of the EDR report and published groundwater plume maps, the TCE contaminant plume is about 450 feet deep and located over two mile from the boundary of the Property. In addition, the groundwater flow at the plume is towards the west, and migrating away from the subject property. The site has been under federal facility remedial investigation since 1990s. Considering the current status, the Property's distance from the TCE plume and respective down gradient location, this listing is not considered to be a REC in connection with the Property.

Based on the EDR Historical Auto Stations and UST databases, the Rancho Parkway Shell property, adjoining to the north-northeast, was identified to have a historical auto station in 2001 as Lake Forest Shell Gas Station. In addition, the site is also registered as having an underground storage tank (UST) at the address. No reported spills or leaks were identified for the site and is not considered to be a REC in connection with the Property.

Approximately sixty (60) 55-gallon drums were observed around the Property containing herbicides, pesticides, oils and plant foods as well as miscellaneous empty drums. No leaking or staining was observed around the vicinity of the drums.

DRAFT

A 500-gallon propane AST was noted on the Property. Propane storage is not considered to be a significant environmental concern, as it exists in a gaseous state when released.

Five fertilizer ASTs were noted within a fenced area in the southern portion of the site. No evidence of leakage was noted around the tanks.

Hillmann also notes several empty and/or dismantled storage tanks at various locations of the site, with no staining noted.

One (1) dry-type transformer was observed on the Property. In addition, seven (7) utility owned pole-mounted transformers were identified around the border of the Property with no indications of staining or leaking around the vicinity of the transformer. This transformer is not likely to represent an environmental concern for the Property.

Five (5) bulk petroleum ASTs were noted at a fueling station on the southwestern portion of the nursery. These ASTs were located on parcel APN# 610-401-33, which was reported to Hillmann as not a part of the Property subject to this assessment. These included an inactive empty 400-gallon diesel AST, an active 240-gallon gasoline AST with double walled construction, two active 1,000-gallon diesel ASTs and an inactive empty 1000-gallon gasoline AST.

Bulk storage of various pesticides, herbicide and fertilizer products used at the nursery were noted in storage containers at the southwestern portion of the nursery. This area was on parcel 610-401-33, which was reported to Hillmann as not being a part of Property covered by this assessment. Chemical mixing was reported to be performed in this location. In addition, farm equipment was reportedly washed down in this area.

1.4.2 Non-ASTM Scope Considerations

Hillmann has also performed preliminary evaluations for ASTM "Non-Scope" items, such as asbestos-containing materials (ACM), lead-based paint, radon, mold and wetlands. Our observations and research did not identify any notable concerns, except for the following:

Considering the dates of construction of the existing building, asbestos containing materials (ACM) may be present at the Property. Suspected ACM observed during a preliminary visual screening included roofing materials, plaster walls, drywall, ceiling tiles, cove base, adhesive, and stucco. It is possible that additional quantities of suspect ACM may exist in enclosed areas or areas not accessed during the assessment around the house located on the Property. It is emphasized that this limited screening does not constitute a comprehensive asbestos survey of the premises and is meant only to provide a preliminary evaluation regarding the potential presence of ACM at the Property.

Considering the dates of construction of the existing buildings, lead-based paint may be present at the Property. In general, interior painted surfaces within the space were observed to be in fair condition. It is emphasized that this limited screening does not constitute a comprehensive lead-based paint survey of the premises and is meant only to provide a preliminary evaluation regarding the potential presence of LBP at the Property.

DRAFT

1.4.3 Significant Data Gaps

No data gaps that significantly impacted Hillmann's ability to identify RECs in connection with the Property have been identified.

1.4.4 Recognized Environmental Conditions

Hillmann has performed a Phase I Environmental Site Assessment in accordance with the scope and limitations of ASTM Practice E 1527-13 of the Property as described in Section 2 of this report. Any additions to, exceptions to, or deletions from this practice are also described in Section 2 of this report. This assessment has revealed no evidence of *recognized environmental conditions* in connection with the Property, except for the following:

Recognized Environmental Conditions (RECs):

- Based on the historic and current usage as orchards and as a wholesale plant nursery, historical and current applications of pesticide/herbicide/insecticide/fungicide have likely occurred at the Property. Therefore, there is the potential for residual pesticides and related compounds to exist in shallow soils and drainage channels in the Property.

- A property representative indicated that a UST was formerly used at the Property. A 400-gallon diesel steel-wall UST was reported to have been removed from the south corner of the Property in the early 1990s. No UST closure documentation was available from the property representative. Hillmann also notes that the Property was listed on the UST database; however, no details were readily available to indicate whether the listing was related to the former 400-gallon diesel UST reported to have been removed in the early 1990s. Additional information is being sought from Orange County. Hillmann further notes the potential for additional USTs to have formerly been used by the nursery in the past.

Controlled Recognized Environmental Conditions (CRECs):

- No evidence of any CRECs in connection with the Property was identified.

Historical Recognized Environmental Conditions (HRECs):

- No evidence of any HRECs in connection with the Property was identified.

1.5 Recommendations

1.5.1 Recognized Environmental Conditions

Based on the findings of the Phase I Environmental Site Assessment, the following recommendations are made:

- A Phase II Site Investigation is recommended to further investigate the potential for elevated levels of pesticides/herbicides in shallow soils and drainage channels at the Property.

DRAFT

- Additional details should be sought from the Orange County Department of Environmental Health regarding the UST database listing. In additional, depending on the availability of additional data from Orange County, Phase II testing may be warranted at the locations of former UST(s).

- Additional investigation may become warranted in the event that historic USTs associated with the nursery are discovered during redevelopment activities.

1.5.2 Non-ASTM Considerations

The following should be considered with regard to further investigation or management of Non-ASTM considerations addressed by this report:

- Compliance with all applicable rules and regulations pertaining to the presence of ACM and lead based paint at the Property.

DRAFT

2.0 INTRODUCTION

2.1 Purpose and Scope

This assessment was conducted utilizing generally accepted Phase I ESA industry standards in accordance with the ASTM Standard Practice E 1527-13. The ASTM describes these methodologies as representing good commercial and customary practice in the United States of America for conducting an environmental site assessment of a parcel of commercial real estate with respect to the range of contaminants within the scope of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and petroleum products. As such, this practice is intended to permit a user to satisfy one of the requirements to qualify for the innocent landowner, contiguous property owner or bona fide prospective purchaser limitations on CERCLA liability (hereinafter, the "landowner liability protections," or "LLPs"): that is, the practice that constitutes all appropriate inquiries into the previous ownership and uses the property consistent with good commercial and customary practice as defined at 42 U.S.C. §9601(35) (B). The primary goal of the processes established by ASTM E1527-13 is to identify *recognized environmental conditions* in connection with the Property.

The term *recognized environmental condition (REC)* is defined by the ASTM as the presence or likely presence of any hazardous substances or petroleum products in, on or at a property: (1) due to a release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment.

The ASTM has also defined the terms *historical recognized environmental conditions* and *controlled recognized environmental conditions* as two additional types of RECs. The term *historical recognized environmental condition (HREC)* is defined as a past release of any hazardous substances or petroleum products that has occurred in connection with the Property and has been addressed to the satisfaction of the applicable regulatory authority or meeting unrestricted use criteria established by a regulatory authority, without subjecting the Property to any required controls (for example, property use restrictions, activity and use limitations, institutional controls or engineering controls).

The term *controlled recognized environmental condition (CREC)* is defined as a recognized environmental condition resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority, with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls.

Conditions determined to be *"de minimis conditions"* are not considered to be RECs nor CRECs. *De minimis condition* is defined by the ASTM as a condition that generally does not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies."

The chief components of this assessment are described as follows:

- A non-invasive visual reconnaissance of the Property and adjoining properties in accordance with ASTM guidelines for evidence of RECs.

DRAFT

- Interviews of past and present owners and occupants and state and local government officials, seeking information related to the potential presence of RECs at the Property.

- A review of standard physical record sources for available topographic, geologic and groundwater data.

- Review of standard historic record sources, such as fire insurance maps, city directories, aerial photographs, prior reports and interviews, etc., to determine prior uses of the Property from the present, back to the Property's first developed use, or back to 1940, whichever is earlier.

- Review of standard environmental record sources including federal and state environmental databases, and additional environmental record sources, to identify potential regulatory concerns with the Property, adjoining properties and properties located within the surrounding area.

These methodologies are described as representing good commercial and customary practice for conducting an Environmental Site Assessment of a property for the purpose of identifying recognized environmental conditions.

2.1.1 Non-ASTM Scope Considerations

In accordance with our contract agreement, Hillmann may have addressed the following potential environmental concerns that are outside of the requirements of the ASTM E1527-13 standard:

Asbestos-Containing Materials (ACM): A preliminary visual inspection for the presence of suspect ACM within the accessed areas of buildings on the Property.

Lead-Based Paint (LBP): A preliminary visual inspection of the condition of painted surfaces in the accessed areas of buildings on the Property.

USEPA Designated Radon Potential: Review of general non-site specific data published by the USEPA regarding the potential for elevated indoor levels of radon gas to occur in the area of the Property.

Mold: A preliminary visual inspection within the accessed areas of buildings on the Property for evidence of systemic microbial problems, including visible mold growth, water damaged building materials or musty odors.

Wetlands: A preliminary review of data published by the US Fish and Wildlife Service regarding the presence or absence of mapped wetlands on the Property. The US Fish and Wildlife Service wetlands data is typically provided to Hillmann by Environmental Data Resources, Inc. (EDR).

DRAFT

2.2 Property Location/Legal Description

The Property is located at 20621 Lake Forest Drive in Lake Forest, California. The legal designations of the Property are Assessor's Parcel Numbers (APNs) 612-221-01 (aka 104-190-28). The Property is located along the south side of Rancho Parkway in between Bake Parkway and Lake Forest Drive. The latitude and longitude of the Property is approximately North 33.6684 degrees, and West 117.6677 degrees.

2.3 Significant Assumptions

The following significant assumptions are made:

- Hillmann can neither warrant nor guarantee the accuracy or completeness of the information obtained from EDR during the course of this assessment.

- Hillmann can neither warrant nor guarantee the accuracy or completeness of information that was obtained from ostensibly knowledgeable individuals, regulatory agency representatives or other secondary sources.

- Hillmann has assumed that the site operations at the time of the site visit reflect typical site conditions relative to potential environmental conditions and that no concealment of environmental conditions or releases by site owners or occupants has occurred. Likewise, Hillmann has also assumed that no areas of the Property with potential environmental concerns or RECs were concealed or otherwise not made known to us, intentionally or unknowingly, by the Property owners/occupants and/or site escort at the time of the site visit.

- For the purpose of estimating the approximate direction of groundwater flow in the absence of site specific groundwater data, unless indicated otherwise, Hillmann has assumed that the gradient of groundwater flow follows the surface topography of the Property and immediate surrounding area.

2.4 Limitations and Exceptions

2.4.1 Limiting Conditions

Hillmann was unaware of any significant limiting conditions at the time of the assessment.

2.4.2 Other Exceptions or Deletions:

No exceptions or deletions from the ASTM Standard E 1527-13 are reported.

DRAFT

2.5 Data Gaps

A *data gap* is defined by the ASTM as a lack of or inability to obtain information required by this practice despite good faith efforts by the environmental professional to gather such information. A data gap is only significant if other information and/or professional experience raises reasonable concerns involving the data gap and the ability to determine the presence or absence of recognized environmental conditions.

Data Gap:	Significant (Yes/No)?	Discussion
Response to agency records requests not received as of date of report.	No	Any additional information indicative of a REC will be forwarded upon receipt.
Historical records data failure – date of first developed use not determined.	No	First documented use of the Property was agricultural orchards in 1938. It is Hillmann's opinion that this data gap is not significant to the findings of the assessment.

2.6 Special Terms and Conditions

Hillmann has prepared this Phase I Environmental Site Assessment using reasonable efforts in each phase of its work to identify recognized environmental conditions associated with hazardous substances, wastes and petroleum products at the Property. The methodology of this Phase I Environmental Site Assessment was consistent with the ASTM Standard Practice for E 1527-13. Findings within this report are based on information collected from observations made on the day of the site visit and from reasonably ascertainable information obtained from governing public agencies and private sources.

This report is not definitive and should not be assumed to be a complete or specific definition of the conditions above or below grade. Information in this report is not intended to be used as a construction document and should not be used for demolition, renovation or other construction purposes. Hillmann makes no representation or warranty that the past or current operations at the Property are, or have been, in compliance with all applicable federal, state and local laws, regulations and codes.

Findings, conclusions and recommendations presented in this report are based on our visual observations of the Property, the research findings reasonably obtained, information provided by the Client, and/or a review of readily available and supplied drawings and documents. Hillmann relies completely on the information, whether written, graphic or verbal, provided by the subject Property contact(s) or as shown on any documents reviewed or received from the subject Property contact, owner or agent, or municipal source, and assumes that information to be true and correct. Although there may have been some degree of overlap in the information provided by these various sources, Hillmann did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this assessment.

Regardless of the findings stated in this report, Hillmann is not responsible for consequences or conditions arising from facts that were concealed, withheld or not fully disclosed at the time the assessment was conducted.

DRAFT

This report does not warrant against future operations or conditions, nor does it warrant against operations or conditions present of a type or at a location not investigated.

The regulatory database report provided is based on an evaluation of the data collected and compiled by a contracted data research company. The report focuses on the Property and neighboring properties that could impact the Property. Neighboring properties listed in governmental environmental records are identified within specific search distances. The search distance varies depending upon the particular government record being checked. The regulatory research is designed to meet the requirements of ASTM Standard E 1527-13. The information provided in the regulatory database report is assumed to be correct and complete.

Subsurface conditions may differ from the conditions implied by the surface observations and can only be reliably evaluated through intrusive techniques.

Reasonable efforts have been made during this assessment to identify aboveground and underground storage tanks and ancillary equipment. “Reasonable efforts” are limited to information gained from visual observation of largely unobstructed areas, recorded database information held in public record and available information gathered from interviews. Such methods may not identify subsurface equipment that may have been hidden from view due to parked automobiles and other vehicles, snow cover, vegetative growth, pavement, construction or debris pile storage or incorrect information from sources.

Unless otherwise specified in Section 2.1 of this report, an ASTM Vapor Encroachment Screening of the Property utilizing the information collected during the course of this assessment is excluded from the scope of service for this assessment.

Hillmann is not a professional title insurance firm and makes no guarantee, explicit or implied, that the records which were reviewed represent a comprehensive or precise delineation of past Property ownership or tenancy for legal purposes.

In the event of any conflict between the terms and conditions of this report and the terms and conditions of the consulting services agreement between Toll Brothers and Hillman Consulting, the consulting services agreement shall control.

DRAFT

3.0 USER PROVIDED INFORMATION

3.1 Prior Environmental Reports/Documentation

Hillmann was not provided with any prior environmental reports or documentation.

3.2 Title Records/Environmental Liens/Activity and Use Limitations

Review of title records is not included in the scope of work for this assessment project. No information regarding environmental liens or activity and use limitations was provided to Hillmann by the Client.

3.3 Specialized Knowledge or Experience

No indication of any specialized knowledge or experience regarding the Property was reported to Hillmann by the Client.

3.4 Commonly Known or Reasonably Ascertainable Information

No commonly known or specialized knowledge of the Property was reported to Hillmann by the Client.

3.5 Property Value Reduction due to Environmental Conditions

No information was provided by the Client to Hillmann regarding a reduction of the Property value due to environmental problems or conditions.

3.6 Reason for Performing Phase I ESA

It is Hillmann's understanding that the Phase I ESA was being performed in consideration of a pending real estate transaction involving the Property.

DRAFT

4.0 RECORDS REVIEW

4.1 Standard Environmental Record Sources

An EDR Radius Map report was obtained from Environmental Data Resources of Shelton, CT. The EDR Radius Map Report provided a search of standard environmental record sources in general accordance with the requirements of the ASTM E1527-13. Hillmann has reviewed the EDR Radius Map report and a summary of findings is presented in the following tables and report sections. Hillmann also reviewed the list of unmapped sites (referred to by EDR as "Orphan List" sites). Unmapped sites identified as falling within an applicable specific search distance or warranting discussion in the report, if any, have been included in the information presented below. Detailed descriptions of the meaning and significance of the regulatory databases can be found in the EDR Radius Map Report in Appendix E.

Regulatory Database	Search Distance	Property Listed?	Adj. Properties Listed?	Total Listings Within Search Distance
Fed. NPL/Proposed NPL	1-mile	No	No	1
Fed. Delisted NPL	½-mile	No	No	0
Fed. CERCLIS	½-mile	No	No	0
Fed. CERC-NFRAP	½-mile	No	No	0
Fed. RCRA CORRACTS	1-mile	No	No	1
Fed. RCRA TSD	½-mile	No	No	0
Fed. RCRA LQG	Site & Adj.	No	No	
Fed. RCRA SQG	Site & Adj.	No	No	
Fed. RCRA CESQG	Site & Adj.	No	No	
Fed. ENG Control List	Site	No		
Fed. INST Control List	Site	No		
Fed. ERNS	Site	No		
State/Tribal Hazardous Waste Site	1-mile	No	No	0
State/Tribal Landfill/Solid Waste	½-mile	No	No	0
State/Tribal Leaking Storage Tanks	½-mile	No	No	5
State/Tribal Registered Storage Tanks	Site & Adj.	Yes	No	
State/Tribal Eng. Control List	Site	No		
State/Tribal Inst. Control List	Site	No		
State/Tribal Voluntary Cleanup Sites	½-mile	No	No	0
State/Tribal Brownfields	½-mile	No	No	0
Supplemental Databases	Site & Adj.	Yes	No	

4.1.1 Property Listings

The Property was identified on the following databases:

WDS – Nursery Lake Forest. The WDS listing reflects the state permitting of the on-site nursery's wastewater discharges. The facility type was listed as "Agricultural" and having a status of "Active." The primary waste discharge type was indicated to be "designated/influent or solid wastes that pose a significant threat to water quality because of their high concentrations." The Property is identified as having a moderate threat to water quality. This listing does not reflect known spills, release or site contamination, and therefore is not considered to be a REC in connection with the Property.

UST – Nakase Brothers Nursery. The UST listing indicates the Property has an underground storage tank located on the Property. No further details were provided regarding the permitted UST. Additional details are being sought from the Orange County Department of Environmental Health.

4.1.2 Adjoining Property Listings

EDR Hist Auto, UST – Rancho Parkway Shell #07, located at 26721 Rancho Parkway, adjoining to the north-northeast at a lower elevation relative to the Property: The EDR Hist Auto listing indicates the site was occupied by Lake Forest Shell Gas Station in 2001. The UST listing indicates an underground storage tank is registered as being on the site. Considering a lack of reported spills or releases, this listing is not considered to be a REC in connection with the Property.

4.1.3 ASTM Search Distance Findings

The following is a summary of the findings of the regulatory database review with regard to sites identified as located within the ASTM specified search distance surrounding the Property. In order to keep this report informative and yet concise, Hillmann has provided a brief discussion of the listed site(s) for each database category that appears most likely to impact the Property based on distance, topography and/or case status. A copy of the full EDR Radius Map Report, including available details of all listed sites, is included in Appendix E.

Note that listings for the following databases, if identified, would be discussed above in Sections 4.1.1 and 4.1.2: Registered Storage Tanks, Federal RCRA Generators, Federal and State INST and ENG Controls, ERNS.

Federal NPL: One (1) NPL listings were identified within a one-mile radius of the Property. The listing is described as Marine Corps Air Station (MCAS El Toro approximately 4,736 feet northwest of the Property and at a lower relative elevation. In 1985, trichloroethylene (TCE) was found in a portion of the groundwater basin beneath the former MCAS EL Toro and Central Irvine. TCE is a volatile organic compound (VOC) that was widely used as a solvent for aircraft cleaning. Prior to the 1970s, the disposal of cleaning solvents was not regulated. As a result of past disposal practices, a one-by-three mile plume of groundwater contamination extended west of MCAS El Toro. Based on a review of the EDR report and published groundwater plume maps, the TCE contaminant plume is about 450 feet deep and located over two miles from the boundary of the Property. In addition, the groundwater flow at the plume is towards the west, and migrating away from the subject property. The site has been under federal facility remedial investigation since 1990s. Considering the current status, the Property's distance from the TCE plume and respective down gradient location, this listing is not considered to be a REC in connection with the Property.

Federal Delisted NPL: No DNPL listings were identified within a ½-mile radius of the Property.

Federal CERCLIS: No CERCLIS listings were identified within a ½-mile radius of the Property.

DRAFT

Federal CERCLIS-NFRAP: No CERC-NFRAP listings were identified within a ½-mile radius of the Property.

Federal RCRA-CORRACTS: One (1) CORRACTS listings were identified within a one-mile radius of the Property. The listing is described as Marine Corps Air Station (MCAS El Toro approximately 4,736 feet northwest of the Property and at a lower relative elevation. The listing indicated the migration of contaminated groundwater was under control as of 06/17/1998. Due to distance and hydraulic gradient, the listing is not considered to be a REC in connection with the Property.

Federal RCRA-TSD: No TSD listings were identified within a ½-mile radius of the Property.

State/Tribal Hazardous Waste Sites: No SHWS listings were identified within a one-mile radius of the Property on the EnviroStor or RESPONSE database.

State/Tribal Landfill/Solid Waste Disposal Sites: No SWF/LF listings were identified within a ½-mile radius of the Property.

State/Tribal leaking Storage Tanks: Five (5) LUST listings were identified within a ½-mile radius of the Property. The closest listing is described as Beacon Bay Car Wash at 20602 Lake Forest. This site is approximately 565 feet south and at a lower elevation relative to the Property. The listing indicates a status of "Completed – Case Closed" as of 09/12/2002. The potential media affected is under investigation and was caused by gasoline at the address. A leak was first discovered during a tank closure procedure on 01/01/1965. The tank was closed and removed from the site. Considering the status and only soil media was impacted, this listing is not considered to be a REC in connection with the Property. Due to distance, status, hydraulic gradient or other reasons, none of the other four listed facilities represent a REC to the Property.

State/Tribal Voluntary Cleanup Sites: No VCP listing was identified within a ½-mile radius of the Property

State/Tribal Brownfields: No BROWNFIELDS listings were identified within a ½-mile radius of the Property.

Review of the sites identified within the ASTM search parameters did not identify any nearby or surrounding area sites that are considered to be a REC in connection with the Property, unless as discussed otherwise previously in this section.

4.2 Additional Environmental Record Sources

4.2.1 Supplemental Database Listings

Hillmann reviewed the EDR Radius Map report for listings on supplemental databases that were searched in addition to the Standard Environmental Record Sources. Any property or adjoining property listings on such databases, if identified, would be discussed in Section 4.1.1 and 4.1.2. None of the other supplemental database listings identified by the EDR Radius Map report are considered to be a REC in connection with the Property.

4.2.2 Local Agency & Internet Research

Hillmann performed a search of available local and municipal agencies for pertinent information pertaining to the Property, particularly with regard to potential environmental concerns such as petroleum storage tanks, storage and usage of hazardous substances and petroleum products, and/or known or suspected environmental contamination. Hillmann also conducted a cursory internet search of the Property address for information indicative of a REC. The following table summarizes the findings of the research:

Source:	Inquiry Made?	Type:	Outcome:
Environmental Protection Agency (EPA)	Yes	Online Request	Response not received prior to report issuance.
Orange County Fire Authority	Yes	FOIA Request	Response not received prior to report issuance.
Department of Toxic Substances Control (DTSC)	Yes	FOIA Request	Response indicated no records for the Property were found.
Regional Water Quality Control Board (RWQCB) – Santa Ana Region (8)	Yes	FOIA Request	Response not received prior to report issuance.
Orange County Health Care Agency – Environmental Health	Yes	FOIA Request	Response not received prior to report issuance.
Orange County Sanitation District	Yes	FOIA Request	Response indicated no records for the Property were found.
Orange County Agricultural Commission – Public Works	Yes	FOIA Request	Response not received prior to report issuance.
South Coast Air Quality Management District (SCAQMD)	Yes	FOIA Request	Response indicated the request has been assigned for processing.
Orange County Geographical Information System (GIS)	Yes	On-line search	No information indicative of a REC was identified.
CA DTSC EnviroStor database http://www.envirostor.dtsc.ca.gov/public/	Yes	Internet	The Property address was searched. No results for the Property were found.
CA GeoTracker database http://geotracker.waterboards.ca.gov/	Yes	Internet	The Property address was searched. No results for the Property were found.
USEPA Envirofacts search http://www.epa.gov/enviro/index.html	Yes	Internet	The Property address was searched. No results for the Property were found. Adjoining to the southeast, Western Digital Corp is listed as a small generator of hazardous wastes. The facility does not represent an environmental concern.
www.google.com	Yes	On-line search	The Property address search returns results as a wholesale plant nursery.
www.realquest.com	Yes	On-line search	Basic Property information such as parcel number, date of construction, and building square footages were collected. Pertinent information, where obtained, is referenced in the appropriate sections of this report.
Other:	NA		

DRAFT

4.3 Physical Setting Sources

4.3.1 USGS 7.5 Minute Topographic Map

The USGS 7.5 minute series topographic maps covering the Property (El Toro, CA 2012) were reviewed. The maps indicated an approximate elevation at the Property of 735 feet above mean sea level. The topography indicated by the map appeared to be sloping downward to the south-southwest. The closest down gradient body of water appeared to be a channeled portion of San Diego Creek, approximately 3.09 miles south-southwest.

4.3.2 Soils

Based on USDA Soil Conservation Service (SCS) data summarized by the EDR Geocheck-Physical Setting Source Addendum, the soil type at the Property is classified as "CINEBA." The "CINEBA" designation is described as somewhat excessively drained, sandy loam with slow infiltration rates.

4.3.3 Geology

Based on geologic data summarized by the EDR Geocheck - Physical Setting Source Addendum, the geologic formation in the vicinity of the Property is described as a stratified sequence of the Cenozoic Era, Tertiary System, Eocene Series.

4.3.4 Hydrology

No site specific hydro-geologic data was available for the Property.

4.4 Historical Use – Property and Adjoining Properties

Hillmann has conducted research in order to help identify the likelihood of past uses having led to recognized environmental conditions in connection with the Property. Standard historical sources have been sought in an attempt to document the past uses of the Property as far back as it can be shown that the Property contained structures; or from the time the Property was first used for residential, agricultural, commercial, industrial or governmental purposes.

4.4.1 Fire Insurance Maps

A search of Sanborn Fire Insurance Maps for the Property and surrounding area was conducted by Environmental Data Resources, Inc. (EDR) of Shelton, Connecticut. EDR provided a Sanborn report that stated fire insurance maps covering the target property were not found.

4.4.2 City Directories

Hillman obtained an EDR City Directory Abstract report to obtain data of historic city directory listings for the Property. The following is a generalized summary of the findings of City Directory Research:

DRAFT

YEAR(S)	SUMMARY	
2000 – 2013	**Property:**	The Property is listed as the following: Nakase Brothers Wholesale Nursery
	Adjacent Properties:	The adjoining properties to the northeast are listed as The Home Depot, Los Primos, and Rancho Parkway Shell. The adjoining property to the southeast is listed as Commercial Building (11, 14, and 17 occupants) and No Return. The adjoining properties to the southwest are listed as Apria Healthcare Group and Usra Inc. The adjoining properties to the northwest are listed as Lukos Glenn Associates, Inc.
1996 – 1999	**Property:**	The Property is not listed.
	Adjacent Properties:	The adjoining properties to the southeast are listed as Commercial Building (14 occupants)

4.4.3 Historical Topographic Map Review

Hillmann obtained and reviewed an "EDR Historical Topographic Map Report" from EDR containing historic aerial photography of the Property and adjoining properties. The following interpretation of land usage was made by review of the maps:

YEAR(S)	DESCRIPTION	
1902, 1935	**Property**	No improvements were depicted at the Property.
	Adjacent Properties	No improvements were depicted at the adjoining properties.
1942	**Property**	The Property is depicted as having orchards and woodlands.
	Adjacent Properties	The adjoining properties to the northwest and southeast are depicted as undeveloped land. The adjoining properties to the northeast and southwest are depicted as having orchards and woodlands.
1949	**Property**	The Property is depicted as having orchards.
	Adjacent Properties	The adjoining properties to the northwest, northeast, and southwest are depicted as undeveloped land. The adjoining properties to the southeast are depicted as undeveloped land and woodlands.
1950, 1968	**Property**	The Property is depicted as undeveloped land.
	Adjacent Properties	The adjoining properties are depicted as undeveloped land.
1978	**Property**	The Property is depicted as having undeveloped land and orchards.
	Adjacent Properties	The adjoining properties are all depicted as having undeveloped land and orchards.
1981	**Property**	The Property is depicted as undeveloped land.
	Adjacent Properties	The adjoining properties are all depicted as undeveloped land.
1982	**Property**	The Property is depicted as having agricultural land.
	Adjacent Properties	The adjoining properties are all depicted as having undeveloped land and orchards.
1997	**Property**	The Property is depicted as having orchards, two rectangular structures, and one smaller structure.
	Adjacent Properties	The adjoining properties to the northeast are depicted as orchards. The adjoining properties to the southeast are depicted as having orchards and various structures. The adjoining properties to the southwest appear to be depicted with undeveloped land, small structures, and orchards. The adjoining properties to the northwest appear to be depicted with orchards and undeveloped land.
2012	**Property**	No building development is depicted on the Topographic map.
	Adjacent Properties	No building development is depicted on the Topographic map.

DRAFT

4.4.4 Aerial Photograph Review

Hillmann obtained and reviewed an "EDR Aerial Photo Decade Package Report" from EDR containing historic aerial photography of the Property and adjoining properties. In addition, Hillmann reviewed historic aerial photographs of the Property online at www.historicaerials.com. The following interpretation of land usage was made by review of the aerial photographs:

YEAR(S)	DESCRIPTION	
1938, 1946, 1949, 1952	**Property**	The Property appears to be developed with orchards. A small pond was present in the central portion of the Property.
	Adjacent Properties	The adjoining properties to the northeast, southeast, and northwest appear to be undeveloped land. The adjoining properties to the southwest appear to be agricultural land and undeveloped land.
1967, 1972	**Property**	The Property appears to be agricultural land developed partially with orchards. A small pond was present in the central portion of the Property.
	Adjacent Properties	The adjoining properties appear to be a mix of undeveloped and agricultural land.
1980	**Property**	The Property appears to be agricultural land, a parking lot in the central portion of the Property, and vacant land towards the southwestern portion of the Property.
	Adjacent Properties	The adjoining properties all appear to be a mix of agricultural and vacant land.
1988	**Property**	The Property appears to be developed with orchards on the NW side; and a nursery operation on the reminder of the site. A structure also appears along the southwestern border.
	Adjacent Properties	The adjoining properties to the northwest appear to be depicted as agricultural land and one rectangular structure. The adjoining properties to the southeast appear to be depicted as undeveloped land, agricultural land, and a parking lot. The adjoining properties to the southwest appear to be depicted with one small structure and vacant land. The adjoining properties to the northwest appear to be depicted with agricultural land, small structures, and vacant land.
1990	**Property**	The Property appears to be developed with an agricultural nursery operation, with various structures scattered around the Property, and a small strip of vacant land on the western corner.
	Adjacent Properties	The adjoining properties to the northeast appear to be agricultural land and vacant land with a rectangular structure. The adjoining properties to the southeast appear to be developed with large commercial structures and vacant land under construction. The adjoining properties to the southwest appear to be vacant land under construction with a commercial structure. The adjoining properties to the northwest appear to be agriculture with vacant land.
1994	**Property**	The Property appears to be developed with an agricultural nursery operation, with various structures scattered around the Property and an associated parking lot in the central portion of the site.
	Adjacent Properties	The adjoining properties to the northeast appear to be agricultural land and vacant land with a rectangular structure. The adjoining properties to the southeast appear to be developed with large commercial structures and vacant land under construction. The adjoining properties to the southwest appear to be vacant land under construction with a commercial structure. The adjoining properties to the northwest appear to be agriculture with vacant land.

DRAFT

2002, 2004, 2005	**Property**	The Property appears to be developed with an agricultural nursery operation; with various structures, an equipment yard, and associated parking lot.
	Adjacent Properties	The adjoining properties to the northeast, southeast, and southwest appear to be developed with commercial structures and associated parking lots. The adjoining properties to the northwest appear to be apartment complexes.
2009, 2010, 2012	**Property**	The Property appears to be developed with an agricultural nursery operation; with various structures, an equipment yard, and associated parking lot. Most of the prior structures were removed.
	Adjacent Properties	The adjoining properties to the northeast, southeast, southwest, and northwest appear to be developed with commercial structures, apartment complexes, and associated parking lots.

4.4.5 Petroleum/Natural Gas Well Review

Hillmann reviewed historical record sources for evidence of historic petroleum and/or natural gas wells at the Property. In addition, Hillmann conducted a search of the property location on the Division of Oil, Gas & Geothermal Resources Well Finder database (http://maps.conservation.ca.gov/doggr/index.html). No record of any historical petroleum/natural gas wells at the Property was identified.

4.4.6 Historical Records Data Failure

Historic land use data prior to 1902 was not readily available at the time of the assessment. The earliest documented use of the Property was orchards in 1938. The date of first developed use was not determined due to data failure, thus constituting a data gap. However, it is Hillmann's opinion that the data gap is not significant to the findings and conclusions of the assessment and does not warrant additional investigation.

4.4.7 Summary of Historic Use Research

The Property was developed from prior to 1938 through the 1960s with orchards. From the late 1960s to the early 1980s, the site was developed partially with orchards on the NW side and the reminder consisting of a nursery. By 1988, the orchards were gone. From the 1990s to the present, the entire property has been used as an agricultural nursery. Nakase Brothers Wholesale Nurseries has been located at the Property address from 2000 to present.

The adjoining properties appear to have been a mix of undeveloped and agricultural land until the northeastern adjoining property had a rectangular structure. By 2005, the adjoining structure was demolished and developed with a commercial shopping stores such as The Home Depot with an associated parking lot. The adjoining properties to the southeast appear to have been agricultural land until it was under construction and the agriculture was removed. A parking lot appeared near the southern corner of the Property. Circa 1990, four commercial structures were built and remained until commercial structures occupied the entire southeastern border of the Property. By 1996, the property was identified as Commercial Building (14 occupants) and remained with varying numbers of occupants until 2010. The adjoining properties to the southwest appeared to have been undeveloped land with a portion of agricultural land until 1988 when a small structure appeared near the southern corner of the Property. By 1990, the southwestern adjoining properties were underdevelopment until it appeared with various commercials buildings and associated parking lots in 2005 and was identified as Apria Healthcare Group. The adjoining properties to

DRAFT

the northwest appear to have been a mix of agricultural and undeveloped land until 2005 when multiple commercial office buildings occupied the properties under the business names Lukos Glenn Associates Inc.

DRAFT

5.0 SITE RECONNAISSANCE

5.1 Methodology and Limiting Conditions

The site reconnaissance consisted of visual and/or physical observations of the Property and improvements, adjoining properties as viewed from the Property boundaries and the surrounding area based on visual observations from adjacent public thoroughfares. Building exteriors were observed at ground level, unless otherwise indicated. Where applicable, Hillmann accessed and observed representative areas of building interiors to the extent they were made safely accessible with the cooperation of the site escort.

The site reconnaissance was conducted by Mr. Jonathan McConnell on August 23, 2016. Weather conditions at the time of the assessment included a temperature of approximately 78 degrees F and clear skies. Hillmann was unescorted.

5.1.1 Significant Inaccessible Areas

No significant areas were excluded from Hillmann's visual inspection.

5.2 General Site Setting

5.2.1 Site and Vicinity Characteristics

The Property consists of one large rectangular shaped parcel on the southwestern side of Rancho Parkway, between Bake Parkway and Lake Forest Drive. The Property is currently occupied by a wholesale plant nursery. The total Property area is approximately 122.07 acres. The Property is located in a suburban developed area characterized by a mix of commercial properties, single and multi-family homes, and corporate offices.

5.2.2 Topographic Characteristics

The terrain of the Property appeared to be relatively flat to gently sloping. No natural surface bodies of water were observed.

5.2.3 General Description of Structures

One dwelling was located on the Property and identified to be built in 1950. The Property is also improved with multiple free standing structures for agricultural use and equipment storage.

5.2.4 Sources of Heating and Cooling

No heating or cooling systems were present at the Property at the time of the assessment.

5.2.5 Potable Water Source/Sewage Disposal System

The Property is currently serviced by the municipal water under the Irvine Ranch Water District. The house located on the Property was identified as having a septic system. The Property

DRAFT

representative reported that there is no connection to a sanitary sewer system at the site.

5.2.6 Current Use(s) of the Property

The Property is currently used as a wholesale plant nursery identified as Nakase Brothers Wholesale Nurseries.

5.2.7 Past Use(s) of the Property

No obvious indication of past Property usage likely to have involved the use, treatment, storage, disposal or generation of hazardous substances or petroleum products was observed at the time of the site visit. Please refer to Section 4.4 for findings of historical site use research.

5.2.8 Current Use(s) of the Adjoining Properties

The following describes adjacent and abutting properties:

Dir	Street Address	Description
NE	26721– 26781 Rancho Pkwy, 20021, 20163 Lake Forest Dr	Commercial buildings, Home Depot, fast food, FedEx
SE	20251 – 20521 Lake Forest Drive	Commercial buildings/offices
S	20562 Pascal Way	Commercial office/warehouse spaces
SW	20542 Pascal Way, 26220 Enterprise Ct, 26200 Commerce Way, 26150, 26160 Enterprise Way	Commercial office/warehouse spaces, Hospital Clinic, Aerospace Company
W	2 – 31 Orchard, 2 – 20 Rancho Circle,	Commercial buildings

No visual observations indicative of a potential environmental concern were noted of the adjoining properties.

5.2.9 Past Use(s) of the Adjoining Properties

No indication of past uses of the adjoining properties was noted at the time of the site visit. Please refer to Section 4.4 for the findings of historical site use research.

5.2.10 Current/Past Uses of Surrounding Area

The Property is located in a suburban developed area in Lake Forest, California characterized by a mix of commercial properties, single and multi-family homes, and corporate offices. No indications of past Property uses that differ substantially from current conditions were observed at the time of the site visit.

5.3 Interior & Exterior Observations

5.3.1 Storage/Usage of Hazardous Substances and Petroleum Products

DRAFT

The facility at the Property stored various hazardous materials including petroleum products, waste oil, herbicides, pesticides and general household cleaning products. Waste oil was stored in five (5) 55-gallon drums. The petroleum products included motor fuels for farm equipment and were stored on the southwestern portion of the property. Additional details are provided below in Section 5.3.5. The herbicides and pesticides were stored in metal storage containers on the southeastern location of the property. This is located on parcel # 610-401-33 which was reported to Hillmann as not part of the Property subject to this assessment. They are mixed at this location and used throughout the property as needed. The household cleaning products were stored within a closet in the employee area of the facility.

5.3.2 Drums

Approximately sixty (60) 55-gallon drums were observed around the Property containing herbicides, pesticides, oils and plant foods. Some of the drums were noted to be empty. No leaking or staining was observed around the vicinity of the drums.

5.3.3 Other Hazardous Substances/Petroleum Products

Other than the bulk petroleum storage tanks, which are discussed further in section 5.3.5, no other hazardous substances or petroleum products were observed at the property.

5.3.4 Unidentified Substance Containers

Unlabeled substance containers were observed in various locations throughout the Property. No staining or evidence of a release was noted around these containers.

5.3.5 Storage Tanks

Five (5) bulk petroleum ASTs were noted at a fueling station on the southwestern portion of the nursery. These ASTs were located on parcel APN# 610-401-33, which was reported to Hillmann as not a part of the Property subject to this assessment. These included an inactive empty 400-gallon diesel AST, an active 240-gallon gasoline AST with double walled construction, two active 1,000-gallon diesel ASTs and an inactive empty 1000-gallon gasoline AST.

A property representative indicated that a UST was formerly used at the Property. A 400-gallon diesel steel-wall UST was reported to have been removed from the south corner of the Property in the early 1990s. No UST closure documentation was available from the property representative.

Hillmann notes that the Property was listed on the UST database; however, no details were readily available to indicate whether the listing was related to the former 400-gallon diesel UST reported to have been removed in the early 1990s. Additional information is being sought from Orange County.

A 500-gallon propane AST was also noted on the Property. Propane storage is not considered to be a significant environmental concern, as it exists in a gaseous state when released.

DRAFT

Five fertilizer ASTs were noted within a fenced area in the southern portion of the site. No evidence of leakage was noted around the tanks.

Hillmann also noted several empty and/or dismantled storage tanks at various locations of the site, with no staining noted.

5.3.6 Polychlorinated Biphenyls (PCBs)

Seven (7) pole mounted transformers and one (1) dry type transformer was noted at the Property at the time of inspection. No leaking or surface staining was observed around the vicinity of the transformers.

5.3.7 Odors

No strong, unusual or pungent odors were noted on the Property.

5.3.8 Pools of Liquid

Pools of water were observed at the northern and southern end of the lot, likely attributed to recent irrigation. No pools of unknown liquid were noted at the Property.

5.3.9 Interior Stains or Corrosion

De minimis staining was observed on the pavement at the entry of the Property approximately two small patches, apparently from automotive drippings. No interior stains or corrosion were noted at the Property.

5.3.10 Interior Drains/Sumps

No floor drains or sump pits were noted at the Property.

5.3.11 Exterior Pits/Ponds/Lagoons

No evidence of pits, ponds or lagoons were noted at the Property.

5.3.12 Stained Soil, Pavement/Stressed Vegetation

No evidence of stained soils or stressed vegetation was identified on the Property.

5.3.13 On-Site Solid Waste Dumping/Fill Material

No evidence of on-site solid waste dumping was noted at the Property.

5.3.14 Wastewater

Waste water discharges identified at the site consisted of storm water runoff and sanitary sewage. Additional waste water is generated by nursery's operations from the washing down of farm

DRAFT

equipment; however, this was noted as being performed on parcel #610-401-33, which is not part of the Property subject to this assessment.

Storm water runoff at the site is directed into on-site catch basins and drainage channels, which discharge off-site into regional storm water drainage conduits.

Sanitary sewage generated at the on-site dwelling is discharged via a septic system. In addition, portable toilets and self-contained employee wash stations were present are reportedly serviced by Diamond Environmental Services.

5.3.15 Septic Systems

One (1) septic system was reported by site representatives as being used by the house located on the Property.

5.3.16 Wells

An irrigation well was noted to be in use in the center portion of the Property. No other evidence of any wells was noted at the Property.

DRAFT

6.0 INTERVIEWS

6.1 Interviews with Past and Present Owners and Occupants

Type	Name; Affiliation/Title	Summary
Property Owner	Mr. Steve Nakase, Property Owner, Nakase Brothers Wholesale Nurseries	Mr. Steve Nakase was interviewed regarding the uses and conditions of the Property relative to this assessment and compliance with ASTM E1527-13. Pertinent information, where obtained, is referenced in the appropriate sections of the report.
Property Occupants	Not applicable	See above.
Past Owners, Occupants, Operators	Not applicable	Past owners/occupants of the Property were not available for interview at the time of the assessment.
Owners/Occupants of Adjacent or Nearby Properties	Not applicable	The Property was not an abandoned property with evidence of unauthorized uses or uncontrolled access; therefore, interviews with adjacent or nearby property owners or occupants were not conducted.

6.2 Interviews with State and/or Local Government Officials

Written and on-line requests for environmental records of the Property from State and Local governmental agencies are detailed in Section 4.2.2.

DRAFT

7.0 NON-ASTM SCOPE CONCERNS

In accordance with our contract agreement, Hillmann has conducted preliminary evaluations of the following "Non-ASTM Scope Considerations" that are outside of the requirements of the ASTM E1527-13 standard:

7.1 Asbestos-Containing Material (ACM)

Considering the dates of construction of the existing building, asbestos containing materials (ACM) may be present at the Property. Suspected ACM observed during a preliminary visual screening included roofing materials, plaster walls, drywall, ceiling tiles, cove base, adhesive, and stucco. It is possible that additional quantities of suspect ACM may exist in enclosed areas or areas not accessed during the assessment around the house located on the Property. It is emphasized that this limited screening does not constitute a comprehensive asbestos survey of the premises and is meant only to provide a preliminary evaluation regarding the potential presence of ACM at the Property.

7.2 Lead-Based Paint

Considering the dates of construction of the existing buildings, lead-based paint may be present at the Property. In general, interior painted surfaces within the space were observed to be in fair condition. It is emphasized that this limited screening does not constitute a comprehensive lead-based paint survey of the premises and is meant only to provide a preliminary evaluation regarding the potential presence of LBP at the Property.

7.3 Radon

According to data compiled by the USEPA, as summarized by the EDR Radius Map Report with GeoCheck, the Property is located in an area with a moderate potential for radon concentrations that exceed current USEPA action guidelines. The County of Orange is classified as a Zone 2 or 'moderate risk' area for radon. Accordingly, radon is unlikely to represent an environmental concern to the Property.

7.4 Mold

During the assessment, Hillmann conducted a preliminary inspection of the accessed areas of the building for evidence of excessive or amplified mold growth, or for conditions favorable for mold growth. No obvious evidence of excessive or amplified mold growth, or conditions favorable for mold growth, was observed on the Property during the site assessment.

7.5 Wetlands

Based on a review of the EDR Radius Map Report with GeoCheck, no NWI mapped wetlands were indicated at the Property.

It is emphasized that the absence of NWI mapped wetland areas indicated by the EDR report does not necessarily rule out the potential presence of regulated wetland areas on or immediately

DRAFT

adjoining the Property. A wetland delineation should be sought from a qualified firm if a more comprehensive determination regarding the presence or absence of wetlands on or adjacent to the Property is warranted.

DRAFT

8.0 ENVIRONMENTAL PROFESSIONAL STATEMENT

I declare that, to the best of my professional knowledge and belief, I meet the definition of *Environmental Professional* as defined in §312.10 of 40 CFR 312. I have the specific qualifications based on education, training and experience to assess a *property* of the nature, history and setting of the subject *property*. Hillmann has developed and performed all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

_____

David Rutherford
Environmental Professional

DRAFT

9.0 REFERENCES

EDR Aerial Photo Decade Package, Environmental Data Resources, 2016

EDR City Directory Abstract Report, Environmental Data Resources, 2016

EDR Historical Topographic Map Report, Environmental Data Resources, 2016

EDR Radius Map Report with GeoCheck, Environmental Data Resources, 2016

EDR Sanborn Map Report, Environmental Data Resources, 2016

www.realquest.com

Orange County's On-line Geographical Information System

DRAFT

10.0 APPENDICES

Appendix A	Site Diagram / Vicinity Map
Appendix B	Site Photographs
Appendix C	Questionnaires / User Provided Information
Appendix D	Historical Records Documentation
Appendix E	Regulatory Records Documentation
Appendix F	Other Documents
Appendix G	Project Personnel Qualifications

DRAFT

DRAFT

APPENDIX A

SITE DIAGRAM / VICINITY MAP

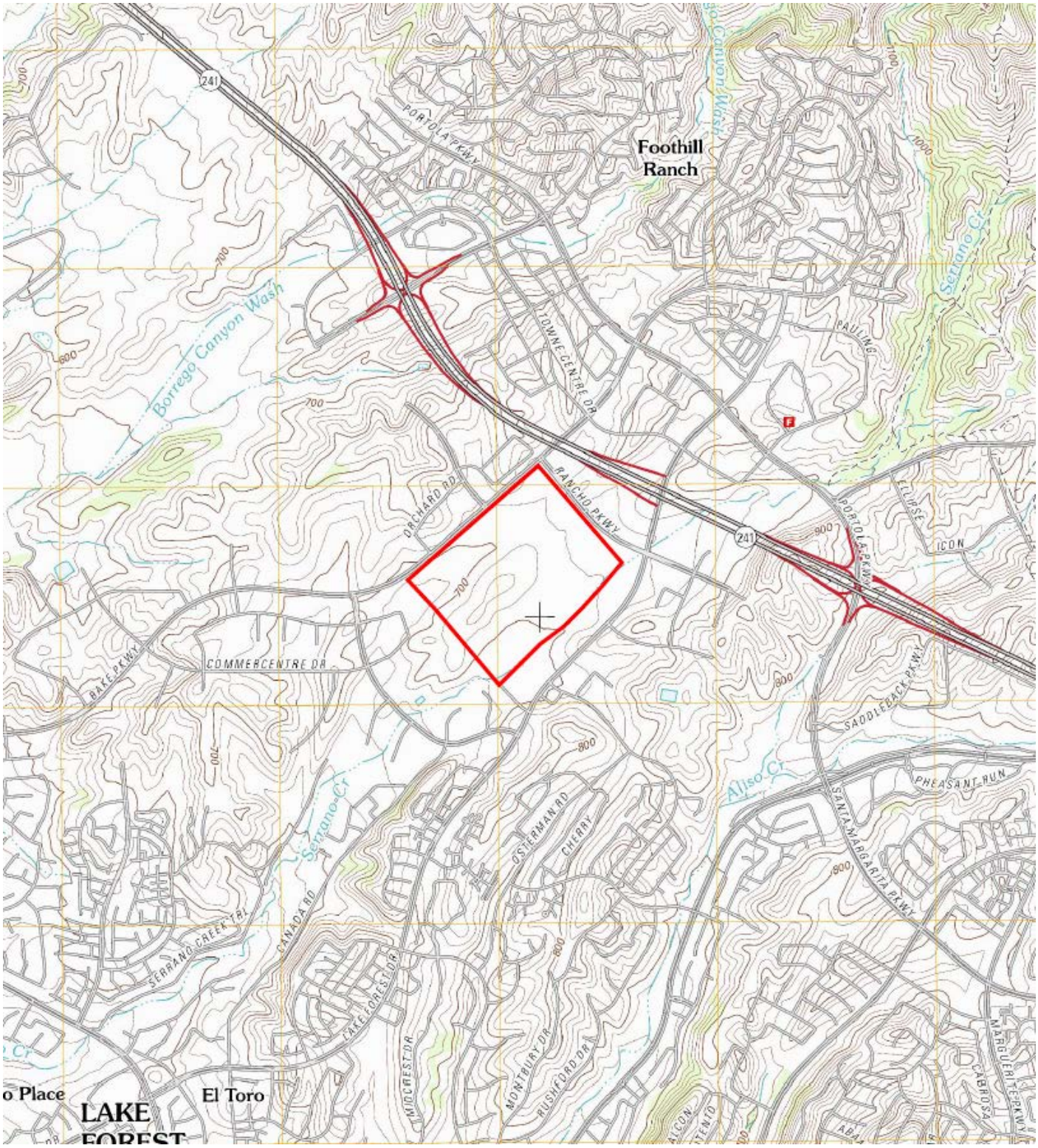


Figure 1: SITE VICINITY MAP	SCALE: (Not to Scale)	N ↑

HILLMANN CONSULTING

Project Location:	20621 Lake Forest Drive Lake Forest, California 92630
Project No.:	C3-6631

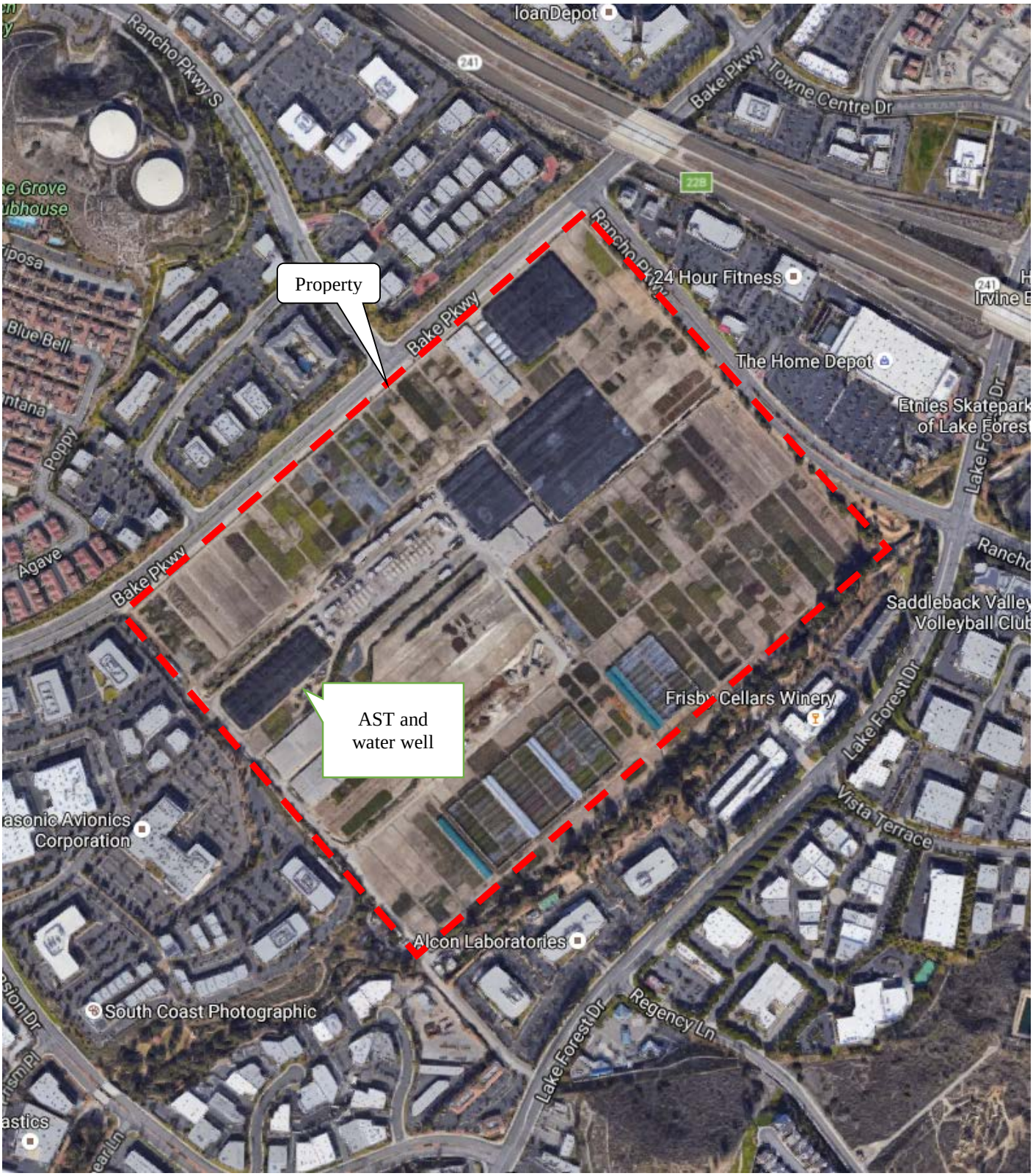


Figure 2: SITE DIAGRAM	SCALE: (Not to Scale)	N ↑

HILLMANN CONSULTING

Project Location:	20621 Lake Forest Drive Lake Forest, California 92630
Project No.:	C3-6631

DRAFT

APPENDIX B

SITE PHOTOGRAPHS

PHOTO LOG
20621 Lake Forest Drive
Lake Forest, California 92630
C3-6631

View of the Property

View of the southwestern border of the Property

View of empty canal on the Property

View of the adjacent properties to the northeast

View of the adjacent properties to the west

View of the adjacent properties to the south

PHOTO LOG
20621 Lake Forest Drive
Lake Forest, California 92630
C3-6631

View of the dry-style transformer

View of 55-gallon drums

View of above ground storage tanks containing diesel and gasoline fuel

View of fertilizer corrosive and irritant

View of empty AST

View of potable and reclaimed water pumps serviced by Irvine Ranch Water District

PHOTO LOG
20621 Lake Forest Drive
Lake Forest, California 92630
C3-6631

View of empty above ground storage tank

View of typical

View of typical storage of pesticides

View of equipment yard

View of creek

View of AST

PHOTO LOG
20621 Lake Forest Drive
Lake Forest, California 92630
C3-6631

View of drainage drain

View of well

View of pole mounted transformer

View of empty 55 gallon drums

Detailed view of drum

DRAFT

APPENDIX C

QUESTIONNAIRES/USER PROVIDED INFORMATION

HILLMANN
CONSULTING

ENVIRONMENTAL DUE DILIGENCE – USER QUESTIONNAIRE

For Landowner Liability Protections (LLPs) offered by the Small Business Liability Relief and Brownfields Revitalization Act of 2001 (the "Brownfields Amendments"), the *report user* must provide the following information (if available) to the environmental professional. As per the Brownfields Amendments, failure to provide this information could result in a determination that "all appropriate inquiry" is not complete. Please complete the following questionnaire and provide any of the referenced information (if available) to Hillmann.

Respondent Name:	David Ernst
Company/Affiliation:	Toll Brothers Inc.
Address:	725 W. Town & Country Rd, #200
Response Date:	8-30-16

1. Environmental Cleanup Liens
Are you aware of any environmental cleanup liens against the property that are filed or recorded under federal, tribal, state or local law?

Yes ☐ *No* ☑

2. Activity and Land Use Limitations
Are you aware of any AULs, such as engineering controls, land use restrictions or institutional controls that are in place at the site and/or have been filed or recorded in a registry under federal, tribal, state or local law?

Yes ☐ *No* ☑

3. Specialized Knowledge or Experience
Do you have any specialized knowledge or experiences related to the property, nearby properties, or are you involved in the same line of business as the current or former occupants of the property or an adjoining property so that you would have specialized knowledge of the chemicals and processes used by this type of business?

Yes ☐ *No* ☑

4. Purchase Price vs. Fair Market Value
Does the purchase price being paid for this property reasonably reflect the fair market value of the property?

Yes ☑ *No* ☐

5. Commonly Known or Reasonably Ascertainable Information
Are you aware of commonly known or reasonably ascertainable information about the property that would help the environmental professional to identify conditions indicative of releases or threatened releases?

Yes □ *No* ☒

5a. Do you know the past uses of the property?

Yes ☒ *No* □

5b. Do you know of specific chemicals that are present or were once were present at the property?

Yes □ *No* ☒

5c. Do you know of spills or other chemical releases that have taken place at the property?

Yes □ *No* ☒

5d. Do you know of any environmental cleanups that have taken place at the property?

Yes □ *No* ☒

6. Obviousness of the Presence or Likely Presence of Contamination
As the user of this ESA, based on your knowledge and experience related to the property are there any obvious indicators that point to the presence or likely presence of contamination at the property?

Yes □ *No* ☒

HILLMANN
CONSULTING

Phase I ESA - Environmental Questionnaire

The following questionnaire should be completed by a representative of the Property that is most knowledgeable about its usage, condition and history. Please complete and either give to the Hillmann representative during the site inspection, or fax to 714-634-9507.

General:

Property Name: Nakase Nursery Street Address: 20621 Lake Forest Dr.

City, ST Zip: Lake Forest, CA.

Completed by: Steve Nakase Company: _____

Signature: _____ (Name) Date: 8/29/2016

Number of years at or familiar with the Property: 39 years

Site Description:

Block & Lot #(s): LOTC Tract 895 Property Size: 120 Acres

Number of building(s): 1 Building Size(s) _____

Year(s) Built: 1950 # of units: (if appl.) _____

Type of Property: house

Utilities and Services: (please check "Yes", "No" or "NA-Not Applicable") and indicate provider if "Yes".

Utility	Yes	No	NA	Name of Provider	Service	Yes	No	NA	Name of Provider
Water	✓			Irvine Ranch	Fuel Oil			✓	
Sewer		✓			HVAC Maint.			✓	
Power	✓			SCE	Elev Maint.			✓	
Nat Gas		✓			Septic Maint.			✓	
Telephone	✓			VOIP	Pool Maint.			✓	

HILLMANN
CONSULTING

Instructions: Please answer each question. Check "D/K" if you don't know, or otherwise lack sufficient knowledge of the Property to answer the question.

	PREVIOUS INVESTIGATIONS	
1.	Have any previous environmental investigations (e.g.- Phase I Environmental Site Assessment, soil/groundwater testing, radon testing, asbestos survey, tank closure/removal reports, etc.) been performed at the Property?	☐ ☑ ☐ Yes No D/K
2.	If yes, what concerns were indicated or recommendations made? *(please provide a copy of all previous environmental reports)*	
	PROPERTY USAGE	
3.	To the best of your knowledge, is the Property or any adjoining property currently occupied or formerly occupied for industrial purposes? If yes, please elaborate:	Property: ☐ ☑ ☐ Yes No D/K Adj. Property: ☐ ☐ ☑ Yes No D/K
4.	Is the property or any adjoining property currently used, or have they ever been used, as a gasoline filling station, dry cleaning facility, automotive service/repair shop, auto body repair shop, commercial printing facility, photo development laboratory shop, junkyard, landfill, or as a waste treatment, storage disposal, recycling or processing facility? If yes, please elaborate:	Property: ☐ ☑ ☐ Yes No D/K Adj. Property: ☐ ☑ ☐ Yes No D/K
5.	Have any hazardous substances or petroleum products, unidentified waste materials, tires, automotive or industrial batteries,, or any other waste materials been dumped above grade, buried and/or burned on the property?	☐ ☑ Yes No
	BULK STORAGE TANKS	
6.	Are there currently, or have there been previously, any registered or unregistered above ground or underground storage tanks located at the Property? *If YES, please provide number, size, age of tanks, permits, closure reports, regulatory agency correspondence, and related information.*	Current Tanks: ☐ ☑ ☐ Yes No D/K Previous Tanks: ☐ ☑ ☐ Yes No D/K
7.	Are there currently, or have there been previously, any vent pipes, or access ways indicating a fill pipe protruding from the ground on the property or adjacent to any structure located on the property?	Current: ☐ ☑ ☐ Yes No D/K Previous: ☐ ☐ ☑ Yes No D/K
8.	Are there currently, or have there been previously, any leakage of hazardous substances or petroleum products from above ground or underground storage tank systems at the Property?	Current: ☐ ☑ ☐ Yes No D/K Previous: ☐ ☐ ☑ Yes No D/K

HILLMANN
CONSULTING

	SPILLS, RELEASES, WASTES	
9.	Are there currently, or have there been previously, any waste discharges on or adjacent to the property, other than storm water or into a municipal sanitary sewer system? If yes, please elaborate:	Current: ☐ Yes ☑ No ☐ D/K Previous: ☐ Yes ☐ No ☑ D/K
10.	Are there currently, or have there been previous, any septic systems, dry wells or leach fields on the property? If yes, please elaborate: house has septic tank	Current: ☑ Yes ☐ No ☐ D/K Previous: ☐ Yes ☐ No ☑ D/K
11.	Are there currently, or have there been previously, any flooring, drains or walls located within the facility that are, or have been, stained by substances (or, in the case of drains, used for) other than water or are emanating foul odors? If yes, please elaborate:	Current: ☐ Yes ☑ No ☐ D/K Previous: ☐ Yes ☐ No ☑ D/K
12.	Are there currently, or have there been previously, any spills or releases of hazardous substances or petroleum products within the building(s) or on the exterior of the Property?	Current: ☐ Yes ☑ No ☐ D/K Previous: ☐ Yes ☐ No ☑ D/K
13.	Has any non-native and/or contaminated fill material been deposited on the Property?	☐ Yes ☑ No ☐ D/K
14.	Have any current or former property occupants generated hazardous wastes or other wastes (such as waste oil, or medical wastes) that required non-conventional storage, handling and/or disposal methods? *If YES, please indicate type of waste and the name of the waste handling contractor:* WASTE OIL. SAFTY-CLEAN SYSTEMS INC	☑ Yes ☐ No ☐ D/K
	TRANSFORMERS/HYDRAULIC EQUIPMENT	
15.	Are any power transformers, capacitors or hydraulic equipment present at the Property? If yes, please elaborate: FRONT END LOADERS	☑ Yes ☐ No ☐ D/K
16.	If power transformers are present, who owns them? SCE	☑ Yes ☐ No ☐ D/K
17.	If hydraulic equipment is present, indicate age of equipment and name/telephone # of service contactor: 20 ~25 YEARS,	☐ Yes ☐ No ☐ D/K
	REGULATORY DISCLOSURE	
18.	Have there been any environmental liens or governmental notification or involvement relating to past or current use or disposal of hazardous substances with respect to the property of any facility or structure located on the property?	☐ Yes ☑ No ☐ D/K

HILLMANN
CONSULTING

19.	If the property is served by a private well or non-public water system, have contaminants been identified in the well or system that exceed guidelines applicable to the water system, or has the well been designated as contaminated by any government environmental/health agency? *(if not applicable, please check* NO*)*	☐ Yes ☒ No ☐ D/K
20.	Is there any environmental litigation, administrative action or cleanup action involving the property related to a release or threatened release of any hazardous substance or petroleum product?	☐ Yes ☑ No ☐ D/K
21.	Are you aware of testing of any environmental media (soil, groundwater, surface water, etc.) at the property which identified levels of contaminants in excess of regulatory standards and/or cleanup guidelines?	☐ Yes ☑ No ☐ D/K
	ENVIRONMENTAL/BUILDING CONDITIONS	
22.	Has asbestos testing ever been conducted at the Property? *If YES, please forward a copy of test results and/or survey reports:*	☐ Yes ☑ No ☐ D/K
23.	Are any asbestos containing materials present at the Property? If yes, please elaborate:	☐ Yes ☐ No ☑ D/K
24.	Has lead paint testing ever been conducted at the Property? *If YES, please forward a copy of test results.*	☐ Yes ☑ No ☐ D/K
25.	Is lead-based paint present at the Property? If yes, please elaborate:	☐ Yes ☑ No ☐ D/K
26.	Has radon testing ever been conducted at the Property? *If YES, please forward a copy of test results.*	☐ Yes ☑ No ☐ D/K
27.	Are there any problems with water intrusion, water damaged surfaces or excessive mold growth within the buildings? If yes, please elaborate:	☐ Yes ☑ No ☐ D/K

COMMENTS:

For any questions answered "YES" that warrant further elaboration, please use the following space as necessary:

DRAFT

APPENDIX D

HISTORICAL RECORDS DOCUMENTATION

20621 Lake Forest

20621 Lake Forest

Lake Forest, CA 92630

Inquiry Number: 4702716.9

August 17, 2016

The EDR Aerial Photo Decade Package

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

08/17/16

Site Name:

20621 Lake Forest
20621 Lake Forest
Lake Forest, CA 92630
EDR Inquiry # 4702716.9

Client Name:

Hillmann Environmental Co.
1745 W Orangewood Avenue
Orange, CA 92868-0000
Contact: Kristine Savona

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

Search Results:

Year	Scale	Details	Source
2012	1"=500'	Flight Year: 2012	USDA/NAIP
2010	1"=500'	Flight Year: 2010	USDA/NAIP
2009	1"=500'	Flight Year: 2009	USDA/NAIP
2005	1"=500'	Flight Year: 2005	USDA/NAIP
1994	1"=500'	Acquisition Date: June 01, 1994	USGS/DOQQ
1990	1"=500'	Flight Date: August 29, 1990	USDA
1988	1"=500'	Flight Date: September 13, 1988	USDA
1972	1"=500'	Flight Date: October 30, 1972	USGS
1967	1"=500'	Flight Date: May 07, 1967	USGS
1952	1"=500'	Flight Date: December 12, 1952	USDA
1949	1"=500'	Flight Date: May 05, 1949	USDA
1946	1"=500'	Flight Date: December 29, 1946	USGS
1938	1"=500'	Flight Date: June 14, 1938	USDA

When delivered electronically by EDR, the aerial photo images included with this report are for ONE TIME USE ONLY. Further reproduction of these aerial photo images is prohibited without permission from EDR. For more information contact your EDR Account Executive.

Disclaimer - Copyright and Trademark Notice

This Report contains certain information obtained from a variety of public and other sources reasonably available to Environmental Data Resources, Inc. It cannot be concluded from this Report that coverage information for the target and surrounding properties does not exist from other sources. NO WARRANTY EXPRESSED OR IMPLIED, IS MADE WHATSOEVER IN CONNECTION WITH THIS REPORT. ENVIRONMENTAL DATA RESOURCES, INC. SPECIFICALLY DISCLAIMS THE MAKING OF ANY SUCH WARRANTIES, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE. ALL RISK IS ASSUMED BY THE USER. IN NO EVENT SHALL ENVIRONMENTAL DATA RESOURCES, INC. BE LIABLE TO ANYONE, WHETHER ARISING OUT OF ERRORS OR OMISSIONS, NEGLIGENCE, ACCIDENT OR ANY OTHER CAUSE, FOR ANY LOSS OF DAMAGE, INCLUDING, WITHOUT LIMITATION, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES. ANY LIABILITY ON THE PART OF ENVIRONMENTAL DATA RESOURCES, INC. IS STRICTLY LIMITED TO A REFUND OF THE AMOUNT PAID FOR THIS REPORT. Purchaser accepts this Report "AS IS". Any analyses, estimates, ratings, environmental risk levels or risk codes provided in this Report are provided for illustrative purposes only, and are not intended to provide, nor should they be interpreted as providing any facts regarding, or prediction or forecast of, any environmental risk for any property. Only a Phase I Environmental Site Assessment performed by an environmental professional can provide information regarding the environmental risk for any property. Additionally, the information provided in this Report is not to be construed as legal advice.

Copyright 2016 by Environmental Data Resources, Inc. All rights reserved. Reproduction in any media or format, in whole or in part, of any report or map of Environmental Data Resources, Inc., or its affiliates, is prohibited without prior written permission.

EDR and its logos (including Sanborn and Sanborn Map) are trademarks of Environmental Data Resources, Inc. or its affiliates. All other trademarks used herein are the property of their respective owners.

INQUIRY #: 4702716.9
YEAR: 2012
= 500'
N
EDR

INQUIRY #: 4702716.9

YEAR: 2010

= 500'

N

EDR

INQUIRY #: 4702716.9
YEAR: 2009
= 500'
N
EDR

INQUIRY #: 4702716.9
YEAR: 2005
= 500'
N
EDR

INQUIRY #: 4702716.9
YEAR: 1994
= 500'
N
EDR

INQUIRY #: 4702716.9
YEAR: 1990
= 500'
N
EDR

INQUIRY #: 4702716.9

YEAR: 1988

= 500'

N

EDR

INQUIRY #: 4702716.9
YEAR: 1972
= 500'
N
EDR

INQUIRY #: 4702716.9
YEAR: 1967
= 500'
N
EDR

INQUIRY #: 4702716.9
YEAR: 1952
= 500'
N
EDR

INQUIRY #: 4702716.9
YEAR: 1949
= 500'
N
EDR

INQUIRY #: 4702716.9
YEAR: 1946
= 500'
N
EDR

INQUIRY #: 4702716.9

YEAR: 1938

= 500'

N

EDR

20621 Lake Forest

20621 Lake Forest

Lake Forest, CA 92630

Inquiry Number: 4702716.4

August 16, 2016

EDR Historical Topo Map Report

with QuadMatch™

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Historical Topo Map Report

08/16/16

Site Name:

20621 Lake Forest
20621 Lake Forest
Lake Forest, CA 92630
EDR Inquiry # 4702716.4

Client Name:

Hillmann Environmental Co.
1745 W Orangewood Avenue
Orange, CA 92868-0000
Contact: Kristine Savona

EDR Topographic Map Library has been searched by EDR and maps covering the target property location as provided by Hillmann Environmental Co. were identified for the years listed below. EDR's Historical Topo Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topo Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the late 1800s.

Search Results:

P.O.# NA
Project: C3-6631

Coordinates:

Latitude:	33.668467 33° 40' 6" North
Longitude:	-117.667749 -117° 40' 4" West
UTM Zone:	Zone 11 North
UTM X Meters:	438095.75
UTM Y Meters:	3725597.24
Elevation:	736.13' above sea level

Maps Provided:

2012	1942
1997	1935
1982	1902
1981	
1978	
1968	
1950	
1949	

Disclaimer - Copyright and Trademark Notice

This Report contains certain information obtained from a variety of public and other sources reasonably available to Environmental Data Resources, Inc. It cannot be concluded from this Report that coverage information for the target and surrounding properties does not exist from other sources. NO WARRANTY EXPRESSED OR IMPLIED, IS MADE WHATSOEVER IN CONNECTION WITH THIS REPORT. ENVIRONMENTAL DATA RESOURCES, INC. SPECIFICALLY DISCLAIMS THE MAKING OF ANY SUCH WARRANTIES, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE. ALL RISK IS ASSUMED BY THE USER. IN NO EVENT SHALL ENVIRONMENTAL DATA RESOURCES, INC. BE LIABLE TO ANYONE, WHETHER ARISING OUT OF ERRORS OR OMISSIONS, NEGLIGENCE, ACCIDENT OR ANY OTHER CAUSE, FOR ANY LOSS OF DAMAGE, INCLUDING, WITHOUT LIMITATION, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES. ANY LIABILITY ON THE PART OF ENVIRONMENTAL DATA RESOURCES, INC. IS STRICTLY LIMITED TO A REFUND OF THE AMOUNT PAID FOR THIS REPORT. Purchaser accepts this Report "AS IS". Any analyses, estimates, ratings, environmental risk levels or risk codes provided in this Report are provided for illustrative purposes only, and are not intended to provide, nor should they be interpreted as providing any facts regarding, or prediction or forecast of, any environmental risk for any property. Only a Phase I Environmental Site Assessment performed by an environmental professional can provide information regarding the environmental risk for any property. Additionally, the information provided in this Report is not to be construed as legal advice.

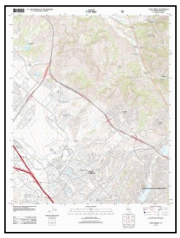
Copyright 2016 by Environmental Data Resources, Inc. All rights reserved. Reproduction in any media or format, in whole or in part, of any report or map of Environmental Data Resources, Inc., or its affiliates, is prohibited without prior written permission.

EDR and its logos (including Sanborn and Sanborn Map) are trademarks of Environmental Data Resources, Inc. or its affiliates. All other trademarks used herein are the property of their respective owners.

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

2012 Source Sheets



Lake Forest
2012
7.5-minute, 24000

1997 Source Sheets

El Toro
1997
7.5-minute, 24000
Aerial Photo Revised 1994
Edited 1997

1982 Source Sheets

El Toro
1982
7.5-minute, 24000
Photo Revised 1982
Aerial Photo Revised 1980

1981 Source Sheets

El Toro
1981
7.5-minute, 24000
Photo Revised 1981
Aerial Photo Revised 1978

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

1978 Source Sheets

El Toro
1978
7.5-minute, 24000
Photo Revised 1978
Aerial Photo Revised 1974

1968 Source Sheets

El Toro
1968
7.5-minute, 24000
Aerial Photo Revised 1967

1950 Source Sheets

El Toro
1950
7.5-minute, 24000
Aerial Photo Revised 1946

1949 Source Sheets

El Toro
1949
7.5-minute, 24000
Aerial Photo Revised 1946

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

1942 Source Sheets

Santiago Peak
1942
15-minute, 62500
Aerial Photo Revised 1939

1935 Source Sheets

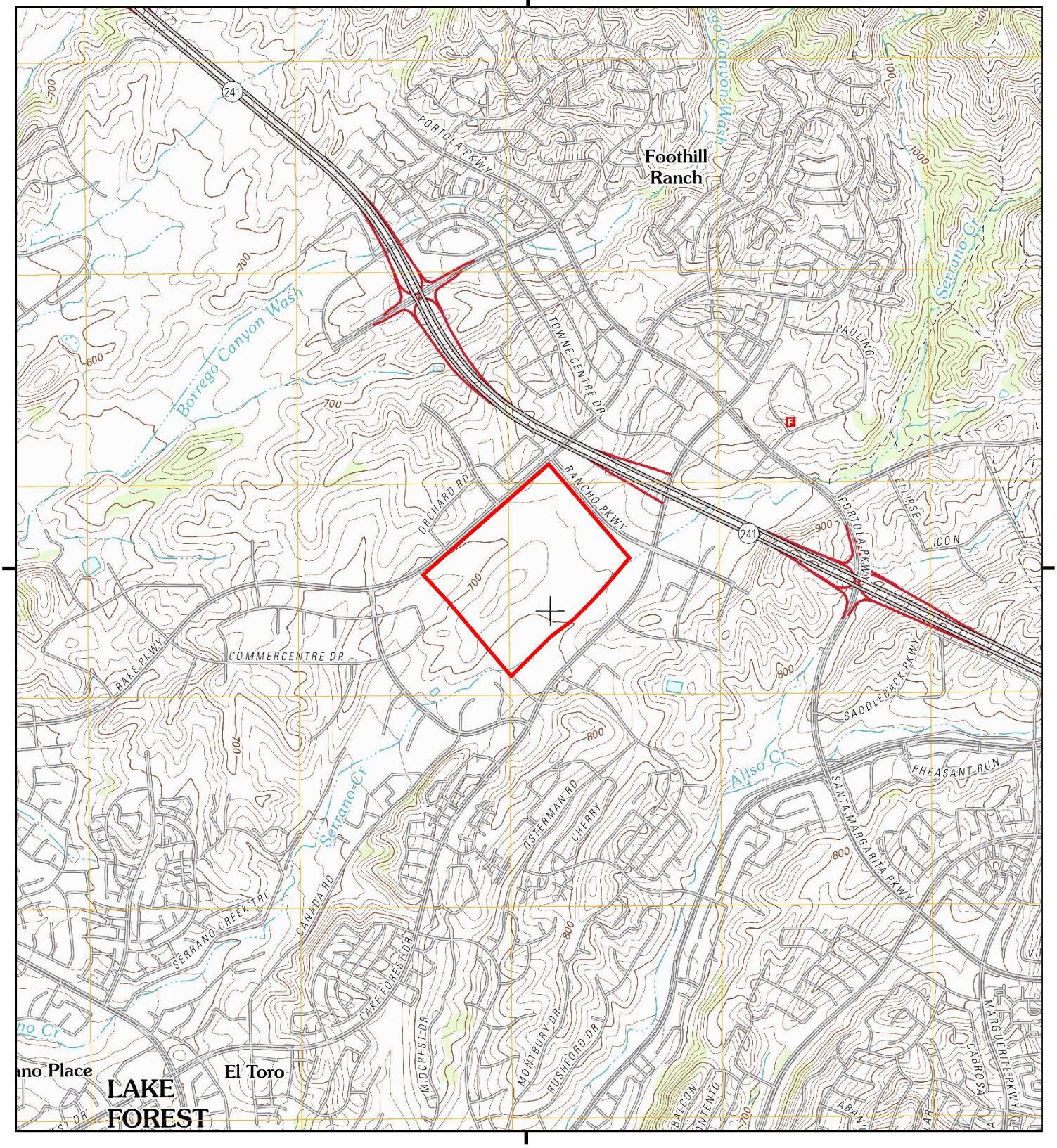
El Toro
1935
7.5-minute, 31680

1902 Source Sheets

Corona
1902
30-minute, 125000

Historical Topo Map

2012



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

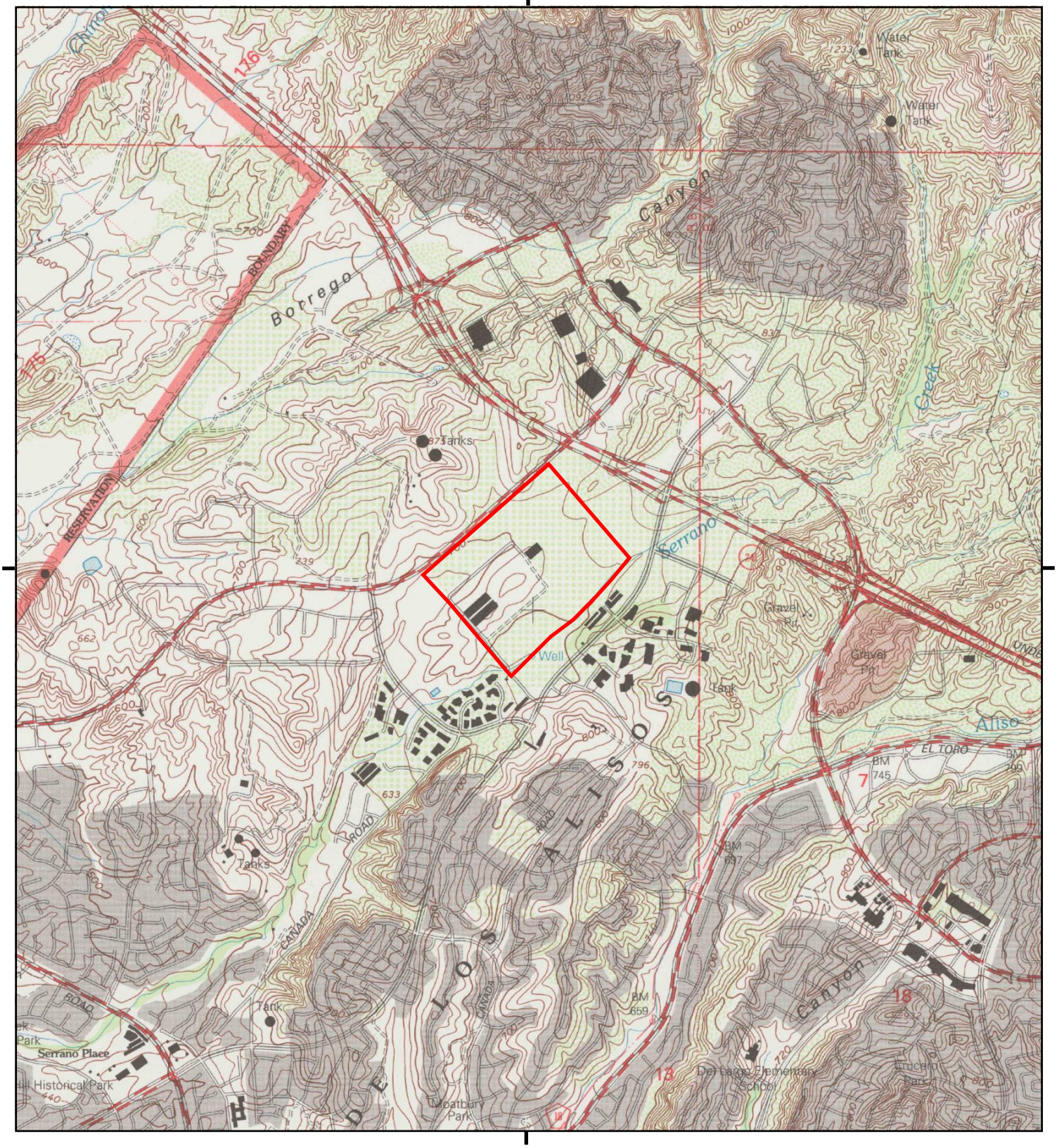
TP, Lake Forest, 2012, 7.5-minute

SITE NAME: 20621 Lake Forest
ADDRESS: 20621 Lake Forest
Lake Forest, CA 92630
CLIENT: Hillmann Environmental Co.

N

Historical Topo Map

1997



This report includes information from the following map sheet(s).

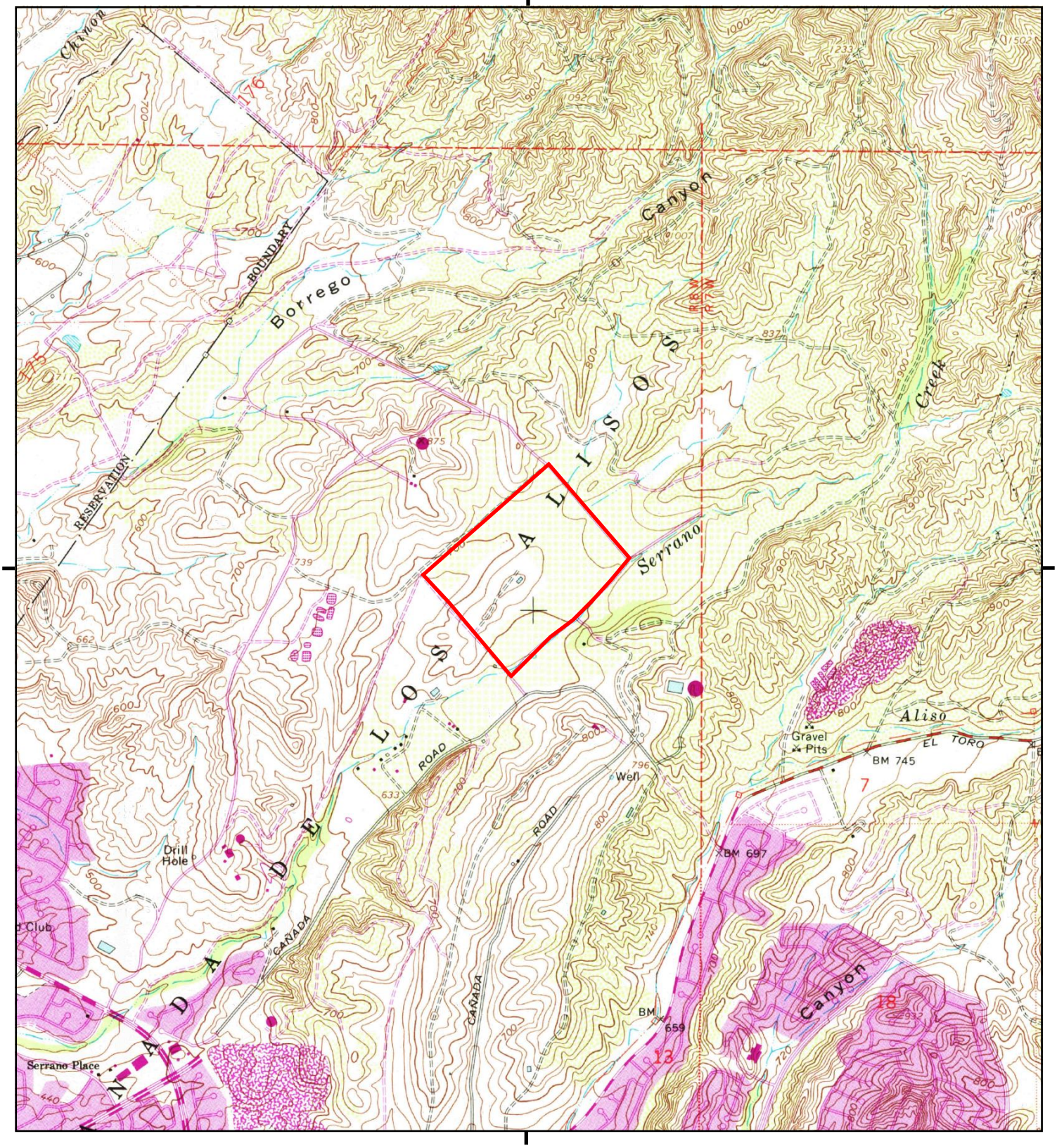
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, El Toro, 1997, 7.5-minute

SITE NAME: 20621 Lake Forest
ADDRESS: 20621 Lake Forest
Lake Forest, CA 92630
CLIENT: Hillmann Environmental Co.

N



This report includes information from the following map sheet(s).

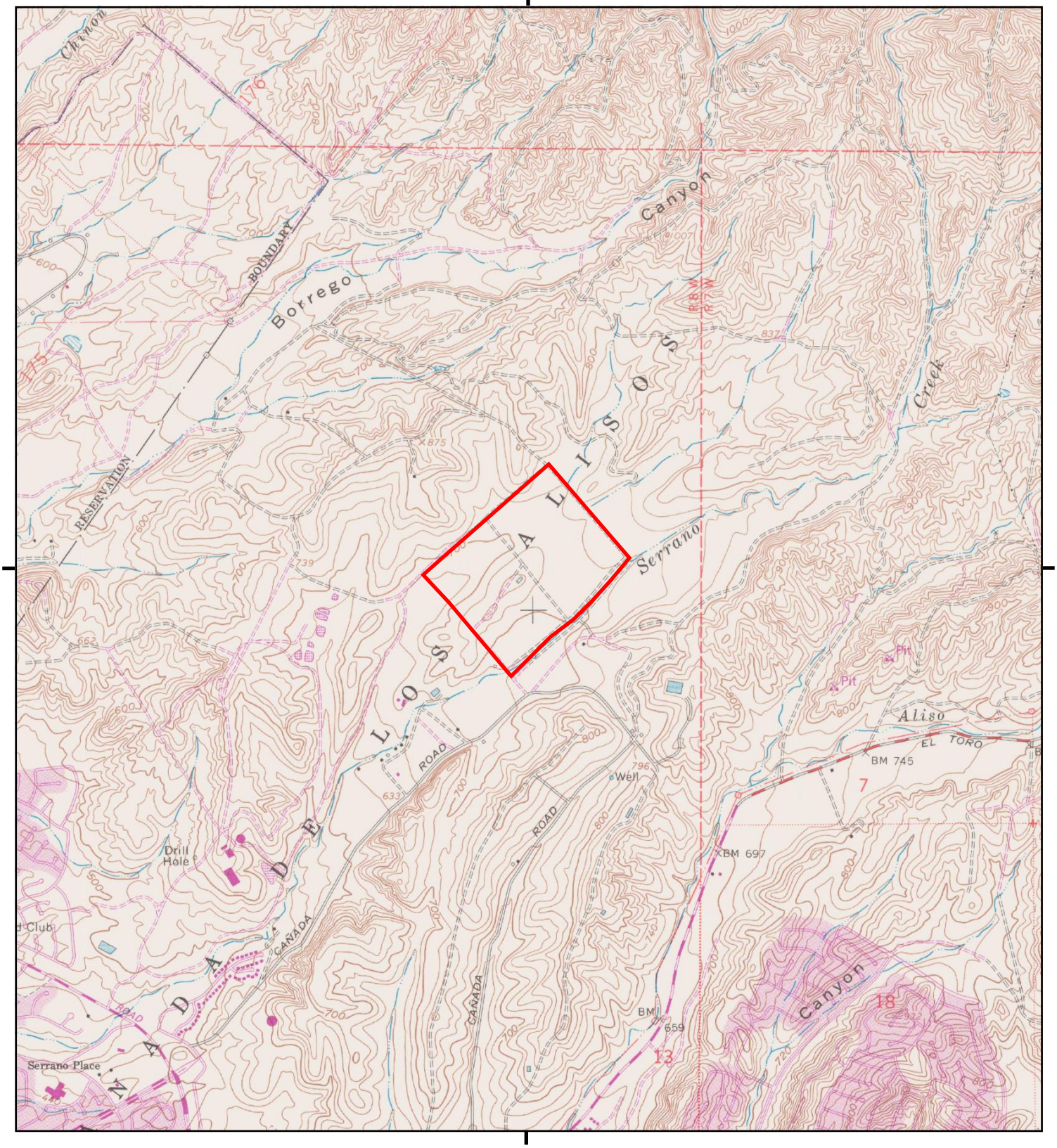
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, El Toro, 1982, 7.5-minute

SITE NAME: 20621 Lake Forest
ADDRESS: 20621 Lake Forest
Lake Forest, CA 92630
CLIENT: Hillmann Environmental Co.

N



This report includes information from the following map sheet(s).

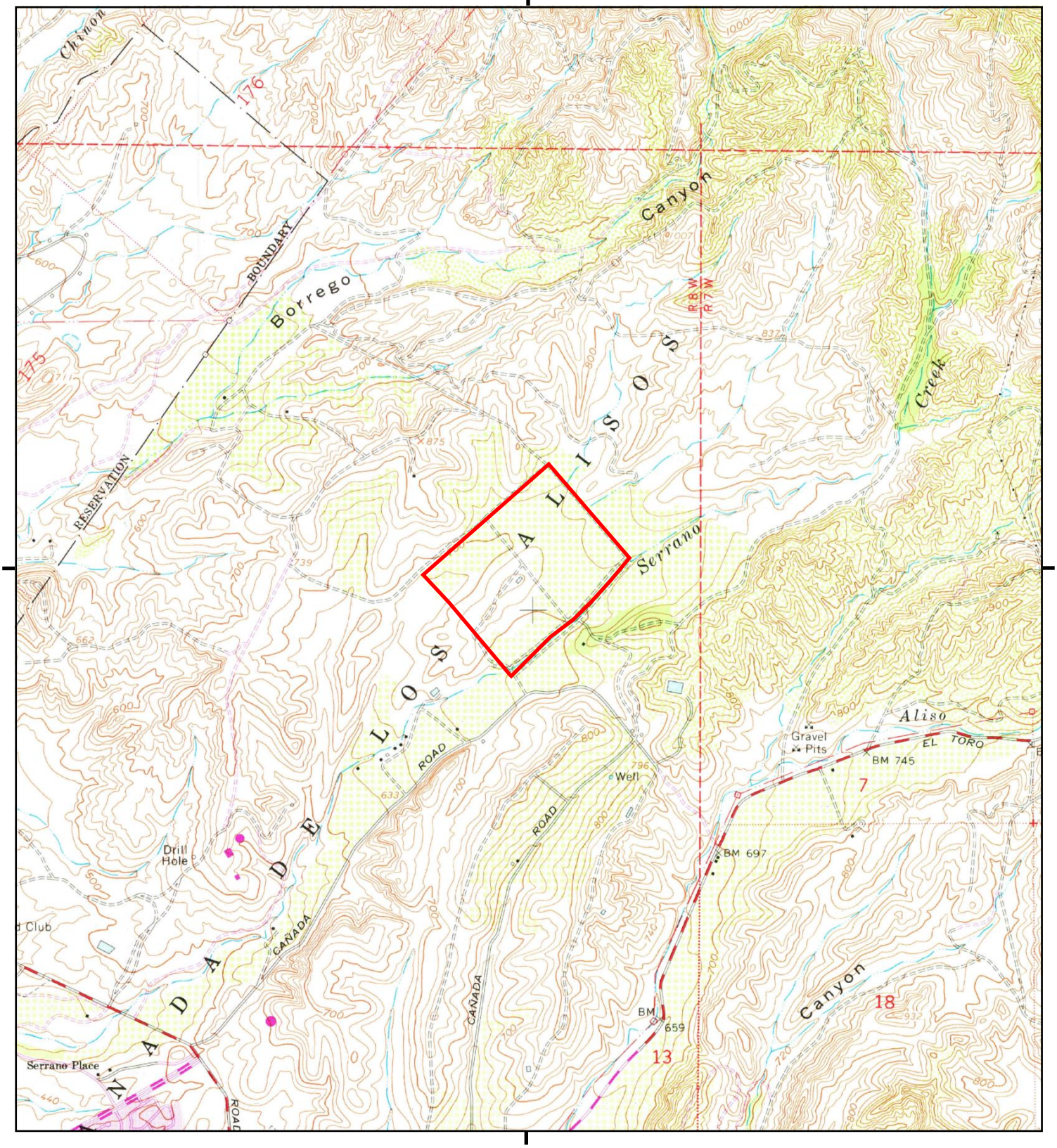
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, El Toro, 1981, 7.5-minute

SITE NAME: 20621 Lake Forest
ADDRESS: 20621 Lake Forest
Lake Forest, CA 92630
CLIENT: Hillmann Environmental Co.

N



This report includes information from the following map sheet(s).

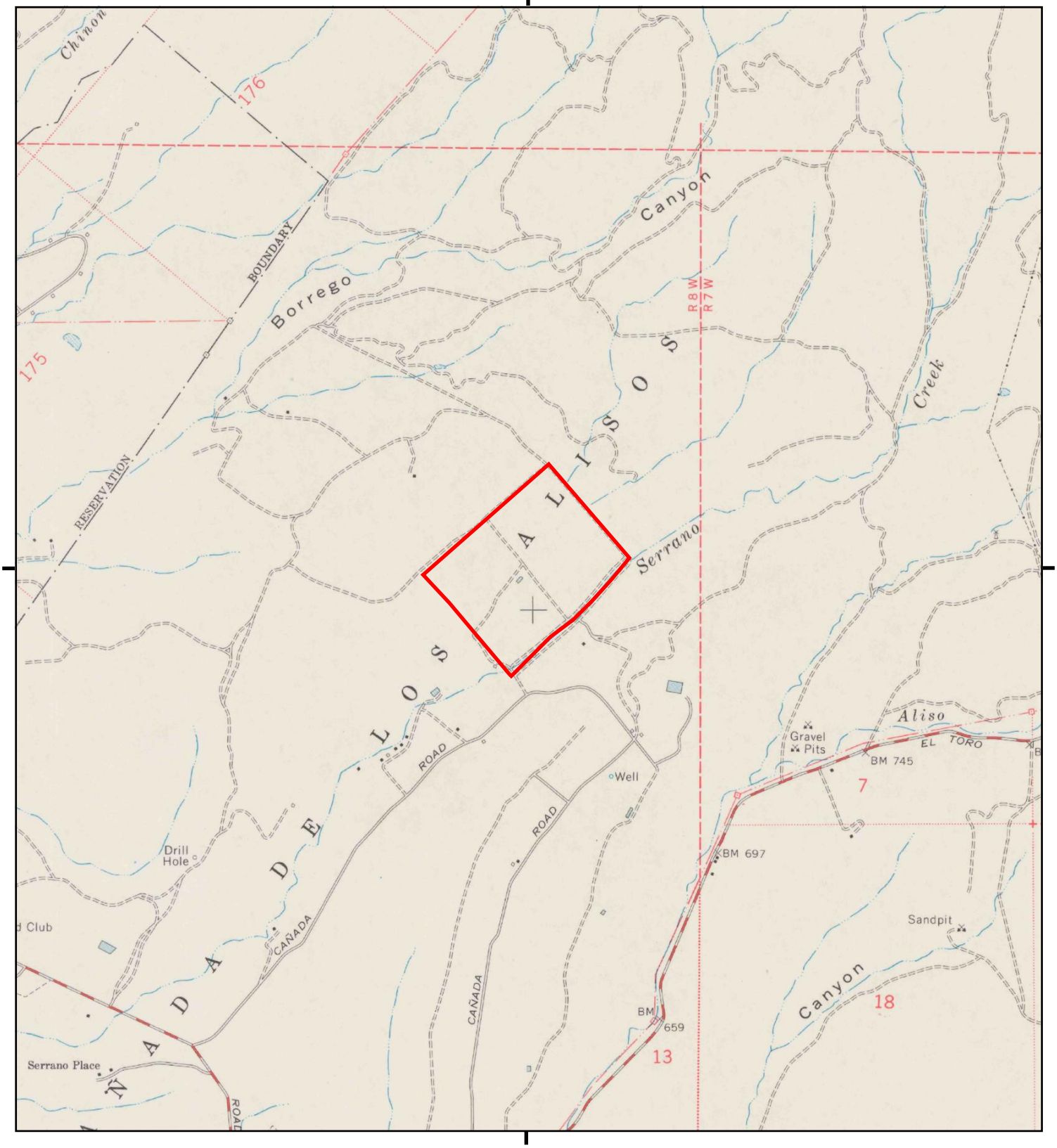
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, El Toro, 1978, 7.5-minute

SITE NAME: 20621 Lake Forest
ADDRESS: 20621 Lake Forest
Lake Forest, CA 92630
CLIENT: Hillmann Environmental Co.

N



This report includes information from the following map sheet(s).

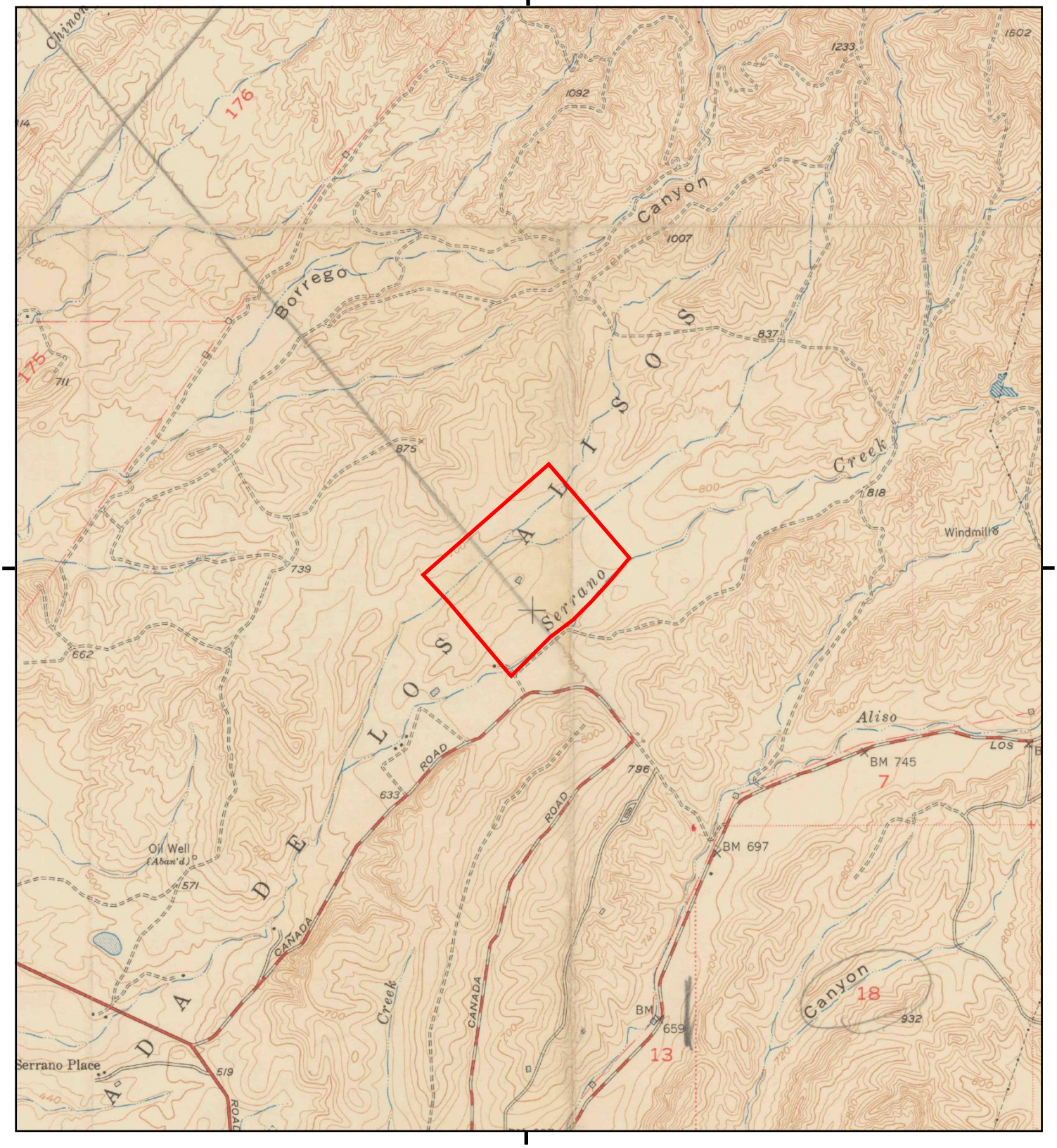
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, El Toro, 1968, 7.5-minute

SITE NAME: 20621 Lake Forest
ADDRESS: 20621 Lake Forest
Lake Forest, CA 92630
CLIENT: Hillmann Environmental Co.

N



This report includes information from the following map sheet(s).

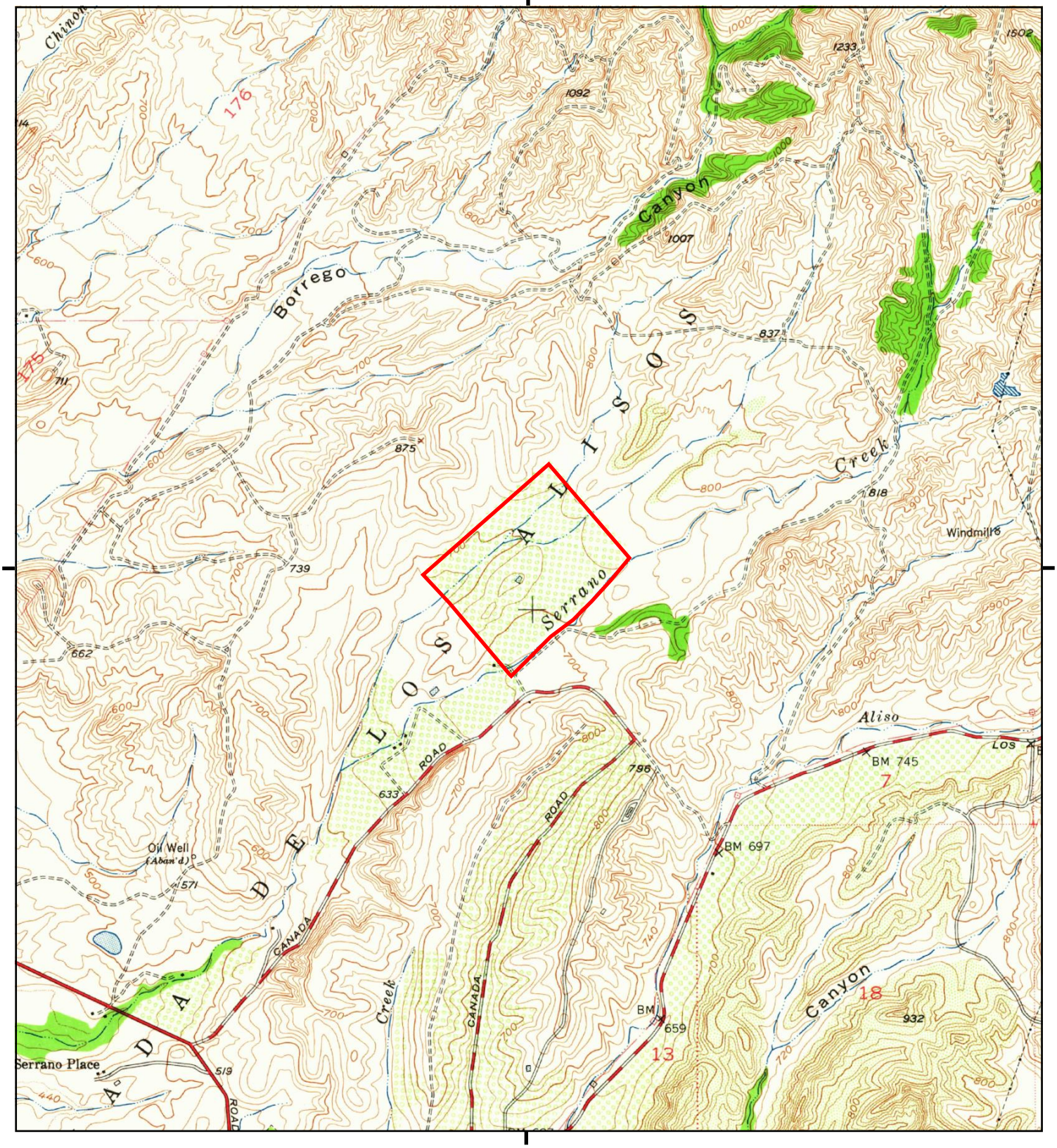
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, El Toro, 1950, 7.5-minute

SITE NAME: 20621 Lake Forest
ADDRESS: 20621 Lake Forest
Lake Forest, CA 92630
CLIENT: Hillmann Environmental Co.

N



This report includes information from the following map sheet(s).

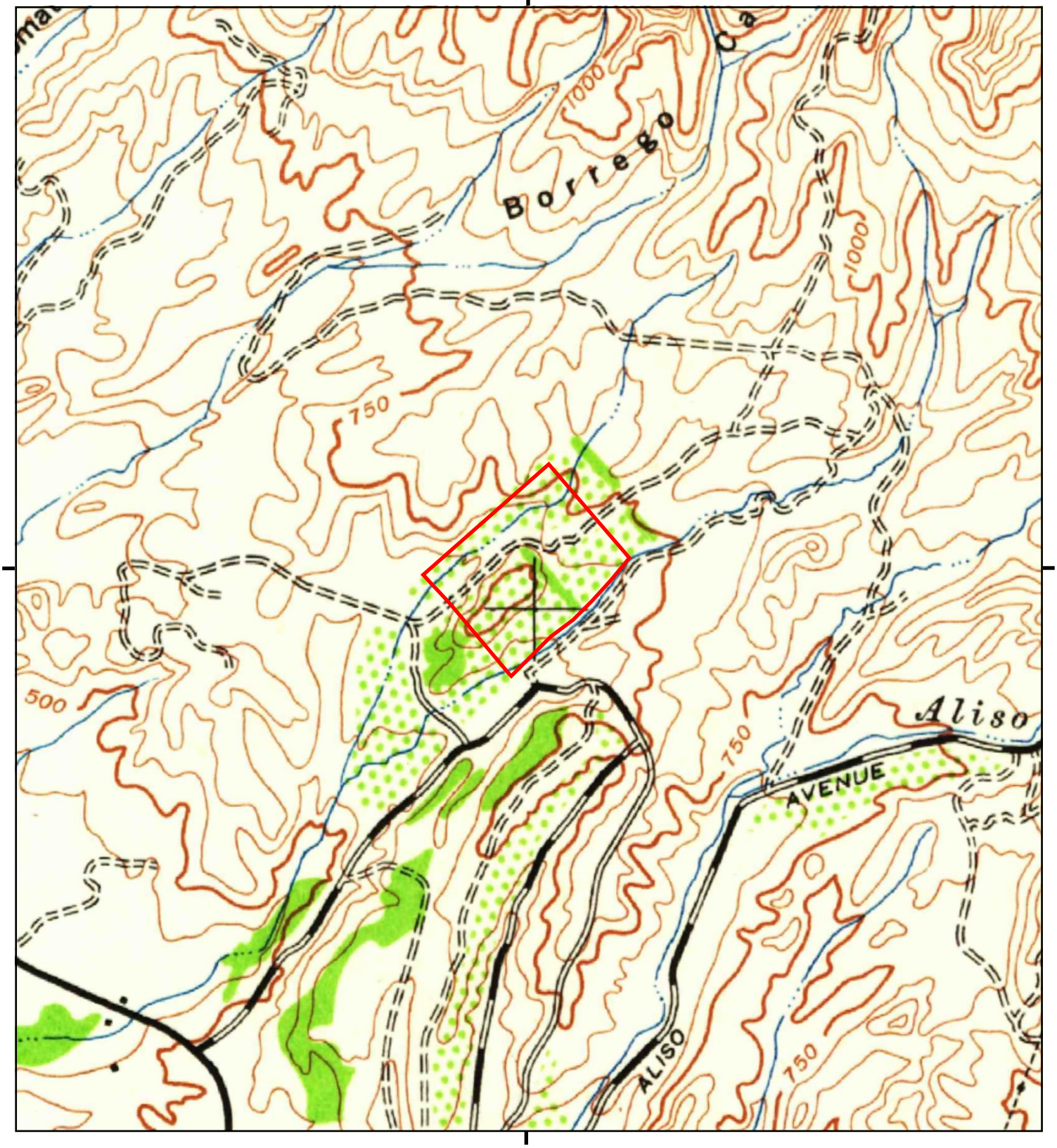
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, El Toro, 1949, 7.5-minute

SITE NAME: 20621 Lake Forest
ADDRESS: 20621 Lake Forest
Lake Forest, CA 92630
CLIENT: Hillmann Environmental Co.

N



This report includes information from the following map sheet(s).

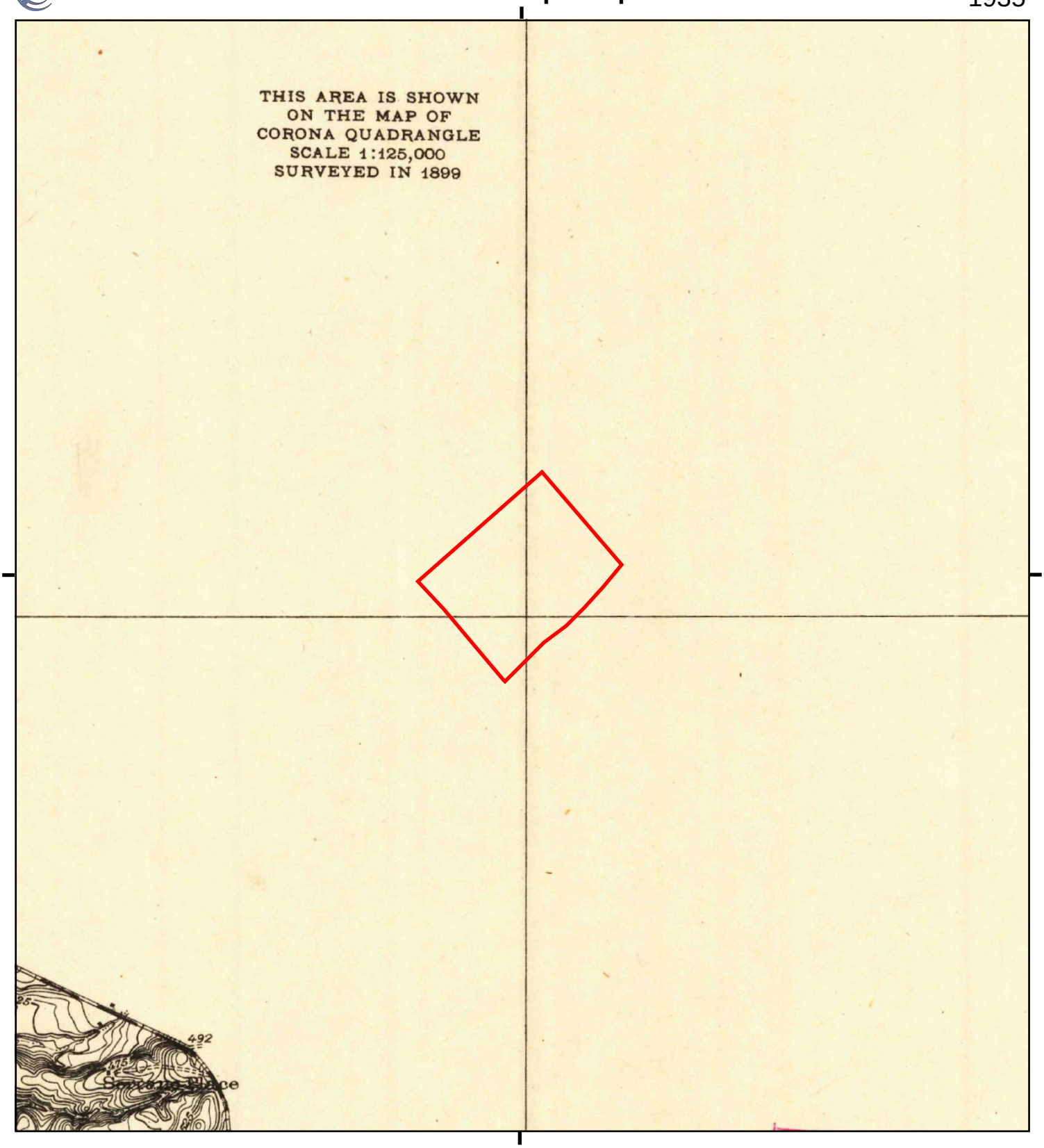
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Santiago Peak, 1942, 15-minute

SITE NAME: 20621 Lake Forest
ADDRESS: 20621 Lake Forest
Lake Forest, CA 92630
CLIENT: Hillmann Environmental Co.

N



This report includes information from the following map sheet(s).

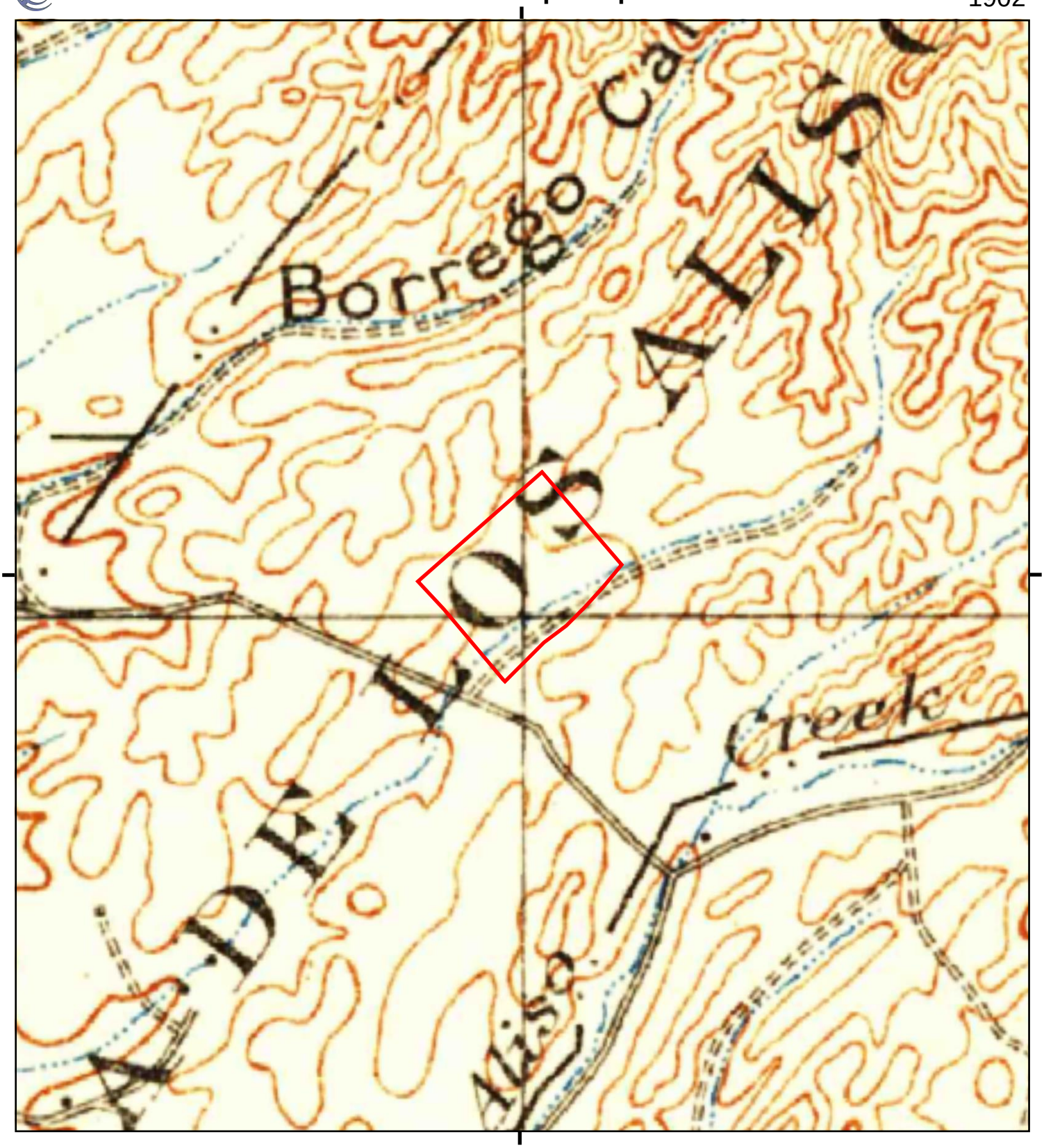
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, El Toro, 1935, 7.5-minute

SITE NAME: 20621 Lake Forest
ADDRESS: 20621 Lake Forest
Lake Forest, CA 92630
CLIENT: Hillmann Environmental Co.

N



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Corona, 1902, 30-minute

SITE NAME: 20621 Lake Forest
ADDRESS: 20621 Lake Forest
Lake Forest, CA 92630
CLIENT: Hillmann Environmental Co.

N

20621 Lake Forest

20621 Lake Forest

Lake Forest, CA 92630

Inquiry Number: 4702716.3

August 16, 2016

Certified Sanborn® Map Report

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

08/16/16

Site Name:

20621 Lake Forest
20621 Lake Forest
Lake Forest, CA 92630
EDR Inquiry # 4702716.3

Client Name:

Hillmann Environmental Co.
1745 W Orangewood Avenue
Orange, CA 92868-0000
Contact: Kristine Savona

The Sanborn Library has been searched by EDR and maps covering the target property location as provided by Hillmann Environmental Co. were identified for the years listed below. The Sanborn Library is the largest, most complete collection of fire insurance maps. The collection includes maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow, and others. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by the Sanborn Library LLC, the copyright holder for the collection. Results can be authenticated by visiting www.edrnet.com/sanborn.

The Sanborn Library is continually enhanced with newly identified map archives. This report accesses all maps in the collection as of the day this report was generated.

Certified Sanborn Results:

Certification # 6CBD-43DA-B92E

PO # NA

Project C3-6631

UNMAPPED PROPERTY

This report certifies that the complete holdings of the Sanborn Library, LLC collection have been searched based on client supplied target property information, and fire insurance maps covering the target property were not found.

Sanborn® Library search results

Certification #: 6CBD-43DA-B92E

The Sanborn Library includes more than 1.2 million fire insurance maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow and others which track historical property usage in approximately 12,000 American cities and towns. Collections searched:

- ☑ Library of Congress
- ☑ University Publications of America
- ☑ EDR Private Collection

The Sanborn Library LLC Since 1866™

Limited Permission To Make Copies

Hillmann Environmental Co. (the client) is permitted to make up to FIVE photocopies of this Sanborn Map transmittal and each fire insurance map accompanying this report solely for the limited use of its customer. No one other than the client is authorized to make copies. Upon request made directly to an EDR Account Executive, the client may be permitted to make a limited number of additional photocopies. This permission is conditioned upon compliance by the client, its customer and their agents with EDR's copyright policy; a copy of which is available upon request.

Disclaimer - Copyright and Trademark Notice

This Report contains certain information obtained from a variety of public and other sources reasonably available to Environmental Data Resources, Inc. It cannot be concluded from this Report that coverage information for the target and surrounding properties does not exist from other sources. NO WARRANTY EXPRESSED OR IMPLIED, IS MADE WHATSOEVER IN CONNECTION WITH THIS REPORT. ENVIRONMENTAL DATA RESOURCES, INC. SPECIFICALLY DISCLAIMS THE MAKING OF ANY SUCH WARRANTIES, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE. ALL RISK IS ASSUMED BY THE USER. IN NO EVENT SHALL ENVIRONMENTAL DATA RESOURCES, INC. BE LIABLE TO ANYONE, WHETHER ARISING OUT OF ERRORS OR OMISSIONS, NEGLIGENCE, ACCIDENT OR ANY OTHER CAUSE, FOR ANY LOSS OF DAMAGE, INCLUDING, WITHOUT LIMITATION, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES. ANY LIABILITY ON THE PART OF ENVIRONMENTAL DATA RESOURCES, INC. IS STRICTLY LIMITED TO A REFUND OF THE AMOUNT PAID FOR THIS REPORT. Purchaser accepts this Report "AS IS". Any analyses, estimates, ratings, environmental risk levels or risk codes provided in this Report are provided for illustrative purposes only, and are not intended to provide, nor should they be interpreted as providing any facts regarding, or prediction or forecast of, any environmental risk for any property. Only a Phase I Environmental Site Assessment performed by an environmental professional can provide information regarding the environmental risk for any property. Additionally, the information provided in this Report is not to be construed as legal advice.

Copyright 2016 by Environmental Data Resources, Inc. All rights reserved. Reproduction in any media or format, in whole or in part, of any report or map of Environmental Data Resources, Inc., or its affiliates, is prohibited without prior written permission.

EDR and its logos (including Sanborn and Sanborn Map) are trademarks of Environmental Data Resources, Inc. or its affiliates. All other trademarks used herein are the property of their respective owners.

20621 Lake Forest
20621 Lake Forest
Lake Forest, CA 92630

Inquiry Number: 4702716.5
August 23, 2016

The EDR-City Directory Abstract

Environmental Data Resources Inc

6 Armstrong Road
Shelton, CT 06484
800.352.0050
www.edrnet.com

TABLE OF CONTENTS

SECTION

Executive Summary

Findings

City Directory Images

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Disclaimer - Copyright and Trademark Notice

This Report contains certain information obtained from a variety of public and other sources reasonably available to Environmental Data Resources, Inc. It cannot be concluded from this Report that coverage information for the target and surrounding properties does not exist from other sources. **NO WARRANTY EXPRESSED OR IMPLIED, IS MADE WHATSOEVER IN CONNECTION WITH THIS REPORT. ENVIRONMENTAL DATA RESOURCES, INC. SPECIFICALLY DISCLAIMS THE MAKING OF ANY SUCH WARRANTIES, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE. ALL RISK IS ASSUMED BY THE USER. IN NO EVENT SHALL ENVIRONMENTAL DATA RESOURCES, INC. BE LIABLE TO ANYONE, WHETHER ARISING OUT OF ERRORS OR OMISSIONS, NEGLIGENCE, ACCIDENT OR ANY OTHER CAUSE, FOR ANY LOSS OR DAMAGE, INCLUDING, WITHOUT LIMITATION, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES. ANY LIABILITY ON THE PART OF ENVIRONMENTAL DATA RESOURCES, INC. IS STRICTLY LIMITED TO A REFUND OF THE AMOUNT PAID FOR THIS REPORT.** Purchaser accepts this Report "AS IS". Any analyses, estimates, ratings, environmental risk levels or risk codes provided in this Report are provided for illustrative purposes only, and are not intended to provide, nor should they be interpreted as providing any facts regarding, or prediction orforecast of, any environmental risk for any property. Only a Phase I Environmental Site Assessment performed by an environmental professional can provide information regarding the environmental risk for any property. Additionally, the information provided in this Report is not to be construed as legal advice.

Copyright 2016 by Environmental Data Resources, Inc. All rights reserved. Reproduction in any media or format, in whole or in part, of any report or map of Environmental Data Resources, Inc. or its affiliates is prohibited without prior written permission.

EDR and its logos (including Sanborn and Sanborn Map) are trademarks of Environmental Data Resources, Inc. or its affiliates. All other trademarks used herein are the property of their respective owners.

EXECUTIVE SUMMARY

DESCRIPTION

Environmental Data Resources, Inc.'s (EDR) City Directory Abstract is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's City Directory Abstract includes a search and abstract of available city directory data. For each address, the directory lists the name of the corresponding occupant at five year intervals.

RESEARCH SUMMARY

The following research sources were consulted in the preparation of this report. An "X" indicates where information was identified in the source and provided in this report.

Year	Source	TP	Adjoining	Text Abstract	Source Image
2010	Haines Criss-Cross Directory	X	X	X	-
2005	Haines Criss-Cross Directory	X	X	X	-
2000	Haines Criss-Cross Directory	X	X	X	-
1996	Haines Criss-Cross Directory	-	X	X	-
1990	Haines Criss-Cross Directory	-	-	-	-
1985	Haines Criss-Cross Directory	-	-	-	-
1980	Haines Criss-Cross Directory	-	-	-	-
1975	Haines Criss-Cross Directory	-	-	-	-
1972	Haines Criss-Cross Directory	-	-	-	-

EXECUTIVE SUMMARY

SELECTED ADDRESSES

The following addresses were selected by the client, for EDR to research. An "X" indicates where information was identified.

Address	*Type*	*Findings*
Commerce Way	Client Entered	
26220 Enterprise Court	Client Entered	X
Lake Forest Drive	Client Entered	
20021 Lake Forest Drive	Client Entered	X
20331 Lake Forest Drive	Client Entered	X
20511 Lake Forest Drive	Client Entered	X
Orchard	Client Entered	
29 Orchard	Client Entered	X
20562 Pascal Way	Client Entered	
26721 Rancho Parkway	Client Entered	X

FINDINGS

TARGET PROPERTY INFORMATION

ADDRESS

20621 Lake Forest
Lake Forest, CA 92630

FINDINGS DETAIL

Target Property research detail.

Lake Forest Drive

20621 Lake Forest Drive

Year	*Uses*	*Source*
2010	Nakase Brothers Whsl Nursery	Haines Criss-Cross Directory
2005	Nakase Brothers Whsl Nursery	Haines Criss-Cross Directory
2000	Nakase Brothers Whsl Nursery	Haines Criss-Cross Directory

FINDINGS

ADJOINING PROPERTY DETAIL

The following Adjoining Property addresses were researched for this report. Detailed findings are provided for each address.

Enterprise Court

26220 Enterprise Court

Year	*Uses*	*Source*
2010	No Return	Haines Criss-Cross Directory
2005	Apria Healthcare Group	Haines Criss-Cross Directory
	Usra Inc	Haines Criss-Cross Directory

Lake Forest Drive

20021 Lake Forest Drive

Year	*Uses*	*Source*
2010	The Home Depot	Haines Criss-Cross Directory
2005	Home Depot The	Haines Criss-Cross Directory

20331 Lake Forest Drive

Year	*Uses*	*Source*
2010	Commercial Building (11 occupants)	Haines Criss-Cross Directory
2005	Commercial Building (14 occupants)	Haines Criss-Cross Directory
2000	Commercial Building (17 occupants)	Haines Criss-Cross Directory
1996	Commercial Building (14 occupants)	Haines Criss-Cross Directory

20511 Lake Forest Drive

Year	*Uses*	*Source*
2010	No Return	Haines Criss-Cross Directory

Orchard

29 Orchard

Year	*Uses*	*Source*
2010	Glenn Lukos	Haines Criss-Cross Directory
2005	Lukos Glenn Associates Inc	Haines Criss-Cross Directory

FINDINGS

Rancho Parkway

26721 Rancho Parkway

Year	*Uses*	*Source*
2010	Los Primos	Haines Criss-Cross Directory
	Rancho Parkway Shell	Haines Criss-Cross Directory
2005	Los Primos	Haines Criss-Cross Directory
	Rancho Parkway Shell	Haines Criss-Cross Directory

FINDINGS

STREET NOT IDENTIFIED IN RESEARCH SOURCE

The following Streets were researched for this report, and the Streets were not identified in the research source.

Street Researched	Street Not Identified in Research Source
Commerce Way	2010, 2005, 2000, 1996, 1990, 1985, 1980, 1975, 1972
Enterprise Court	2000, 1996, 1990, 1985, 1980, 1975, 1972
Lake Forest Drive	1975, 1972
Orchard	2000, 1996, 1990, 1985, 1980, 1975, 1972
Pascal Way	1990, 1985, 1980, 1975, 1972
Rancho Parkway	2000, 1996, 1990, 1985, 1980, 1975, 1972

TARGET PROPERTY: ADDRESS NOT IDENTIFIED IN RESEARCH SOURCE

The following Target Property addresses were researched for this report, and the addresses were not identified in the research source.

Address Researched	Address Not Identified in Research Source
20621 Lake Forest	1996, 1990, 1985, 1980

ADJOINING PROPERTY: ADDRESSES NOT IDENTIFIED IN RESEARCH SOURCE

The following Adjoining Property addresses were researched for this report, and the addresses were not identified in research source.

Address Researched	Address Not Identified in Research Source
Commerce Way	No Years Found
Enterprise Court	No Years Found
Lake Forest Drive	No Years Found
Orchard	No Years Found
Pascal Way	No Years Found
Rancho Parkway	No Years Found
20021 Lake Forest Drive	2000, 1996, 1990, 1985, 1980
20331 Lake Forest Drive	1990, 1985, 1980
20511 Lake Forest Drive	2005, 2000, 1996, 1990, 1985, 1980
20562 Pascal Way	2010, 2005, 2000, 1996
26220 Enterprise Court	No Years Found

FINDINGS

Address Researched	Address Not Identified in Research Source
26721 Rancho Parkway	No Years Found
29 Orchard	No Years Found

DRAFT

APPENDIX E

REGULATORY RECORDS DOCUMENTATION

20621 Lake Forest
20621 Lake Forest
Lake Forest, CA 92630

Inquiry Number: 04702716.2r
August 16, 2016

The EDR Radius Map™ Report with GeoCheck®

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

SECTION	PAGE
Executive Summary	ES1
Overview Map	2
Detail Map	3
Map Findings Summary	4
Map Findings	8
Orphan Summary	137
Government Records Searched/Data Currency Tracking	GR-1

GEOCHECK ADDENDUM

Physical Setting Source Addendum	A-1
Physical Setting Source Summary	A-2
Physical Setting SSURGO Soil Map	A-5
Physical Setting Source Map	A-15
Physical Setting Source Map Findings	A-17
Physical Setting Source Records Searched	PSGR-1

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Disclaimer - Copyright and Trademark Notice

This Report contains certain information obtained from a variety of public and other sources reasonably available to Environmental Data Resources, Inc. It cannot be concluded from this Report that coverage information for the target and surrounding properties does not exist from other sources. **NO WARRANTY EXPRESSED OR IMPLIED, IS MADE WHATSOEVER IN CONNECTION WITH THIS REPORT. ENVIRONMENTAL DATA RESOURCES, INC. SPECIFICALLY DISCLAIMS THE MAKING OF ANY SUCH WARRANTIES, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE. ALL RISK IS ASSUMED BY THE USER. IN NO EVENT SHALL ENVIRONMENTAL DATA RESOURCES, INC. BE LIABLE TO ANYONE, WHETHER ARISING OUT OF ERRORS OR OMISSIONS, NEGLIGENCE, ACCIDENT OR ANY OTHER CAUSE, FOR ANY LOSS OF DAMAGE, INCLUDING, WITHOUT LIMITATION, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES. ANY LIABILITY ON THE PART OF ENVIRONMENTAL DATA RESOURCES, INC. IS STRICTLY LIMITED TO A REFUND OF THE AMOUNT PAID FOR THIS REPORT.** Purchaser accepts this Report "AS IS". Any analyses, estimates, ratings, environmental risk levels or risk codes provided in this Report are provided for illustrative purposes only, and are not intended to provide, nor should they be interpreted as providing any facts regarding, or prediction or forecast of, any environmental risk for any property. Only a Phase I Environmental Site Assessment performed by an environmental professional can provide information regarding the environmental risk for any property. Additionally, the information provided in this Report is not to be construed as legal advice.

Copyright 2016 by Environmental Data Resources, Inc. All rights reserved. Reproduction in any media or format, in whole or in part, of any report or map of Environmental Data Resources, Inc., or its affiliates, is prohibited without prior written permission.

EDR and its logos (including Sanborn and Sanborn Map) are trademarks of Environmental Data Resources, Inc. or its affiliates. All other trademarks used herein are the property of their respective owners.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

20621 LAKE FOREST
LAKE FOREST, CA 92630

COORDINATES

Latitude (North):	33.6684670 - 33° 40' 6.48''
Longitude (West):	117.6677490 - 117° 40' 3.89''
Universal Tranverse Mercator:	Zone 11
UTM X (Meters):	438094.4
UTM Y (Meters):	3725403.8
Elevation:	735 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	5636489 EL TORO, CA
Version Date:	2012

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20140603, 20140515
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
20621 LAKE FOREST
LAKE FOREST, CA 92630

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
A1	NURSERY LAKE FOREST	20621 LAKE FOREST DR	WDS		TP
A2	NAKASE BROTHERS NURS	20621 LAKE FOREST DR	UST		TP
Reg	EL TORO MARINE CORPS		DOD	Same	4906, 0.929, NW
Reg	MARINE CORPS AIR STA	MCAS EL TORO	NPL, SEMS, CORRACTS, RCRA-TSDF, RCRA-SQG, US ENG..	Same	4736, 0.897, NW
B3		26721 RANCHO PKWY	EDR Hist Auto	Lower	195, 0.037, NNE
B4	RANCHO PARKWAY SHELL	26721 RANCHO PKWY	UST	Lower	195, 0.037, NNE
C5		20602 PASCAL WAY	EDR Hist Auto	Lower	233, 0.044, SSW
B6		26731 RANCHO PKWY	EDR Hist Auto	Lower	244, 0.046, NNE
7	WESTERN DIGITAL CORP	20511 LAKE FOREST DR	RCRA-SQG, FINDS, HAZNET, ECHO	Lower	259, 0.049, South
C8		20591 PASCAL WAY	EDR Hist Auto	Lower	363, 0.069, SSW
9		20371 LAKE FOREST D	EDR Hist Auto	Lower	363, 0.069, SE
10		20331 LAKE FOREST D	EDR Hist Auto	Lower	373, 0.071, ESE
11	HOME DEPOT USA INC H	20021 LAKE FOREST DR	RCRA-SQG, FINDS, ECHO	Higher	444, 0.084, ENE
12		21 RANCHO CIR	EDR Hist Auto	Higher	491, 0.093, North
C13		20622 PASCAL WAY	EDR Hist Auto	Lower	492, 0.093, South
D14	BEACON BAY CAR WASH	20602 LAKE FOREST	LUST	Lower	565, 0.107, South
D15	BEACON BAY FOOTHILL	20602 LAKE FOREST DR	UST	Lower	565, 0.107, South
D16	CAR WASH EXPRESS	20602 LAKE FOREST DR	SWEEPS UST, CA FID UST	Lower	565, 0.107, South
17		25 ORCHARD	EDR Hist Auto	Higher	588, 0.111, WNW
D18	ARCO #81641	20572 LAKE FOREST DR	UST	Lower	589, 0.112, SSE
D19	ARCO	20572 LAKE FOREST DR	LUST	Lower	589, 0.112, SSE
D20	ARCO AM/PM	20572 LAKE FOREST DR	LUST, SWEEPS UST	Lower	589, 0.112, SSE
D21	GRAB N GO 24/7	20572 LAKE FOREST DR	UST	Lower	589, 0.112, SSE
D22	ECONO LUBE N TUNE	20572 LAKE FOREST DR	RCRA-SQG, FINDS, ECHO	Lower	589, 0.112, SSE
E23	FOOTHILL CLEANERS	20651 LAKE FOREST DR	RCRA-SQG, Orange Co. Industrial Site, FINDS,...	Lower	601, 0.114, South
E24		20651 LAKE FOREST D	EDR Hist Cleaner	Lower	601, 0.114, South
25		20025 LAKE FOREST D	EDR Hist Cleaner	Higher	652, 0.123, ENE
F26	BAKER RANCH PLAZA	20562 REGENCY LN	Orange Co. Industrial Site, DRYCLEANERS	Lower	728, 0.138, SSE
27		26642 TOWNE CENTRE D	AST	Higher	823, 0.156, North
F28	ECONO LUBE N TUNE	20592 LAKE FOREST DR	SWEEPS UST	Lower	854, 0.162, SSE
G29	G AND M OIL CO INC	20731 LAKE FOREST DR	UST	Lower	878, 0.166, South
G30	CHEVRON	20731 LAKE FOREST	LUST, SWEEPS UST, HIST CORTESE	Lower	878, 0.166, South
H31	POWER CLEANERS	20562 CANADA RD	RCRA-SQG, FINDS, ECHO	Lower	884, 0.167, SSW
H32	SALEEN ALLEN R R R S	20622 CANADA RD	RCRA-SQG, FINDS, ECHO	Lower	908, 0.172, SSW
H33	LOS ALISOS RANCH	20571 CANADA RD	HIST UST	Lower	927, 0.176, SSW
H34	FOREVER GREEN ART IN	20611 CANADA RD	RCRA-SQG, FINDS, HAZNET, ECHO	Lower	932, 0.177, SSW
H35	BOKKES IND MERCEDES	20591 CANADA RD	RCRA-SQG, FINDS, ECHO	Lower	959, 0.182, SSW
36	SADDLE BACK VALLEY O	26891 VISTA TERRACE	RCRA-SQG, HAZNET, NPDES	Higher	1021, 0.193, ESE
I37	TRABUCO CANYON WATER	20904 DIMENSION	UST	Lower	1079, 0.204, West

MAPPED SITES SUMMARY

Target Property Address:
20621 LAKE FOREST
LAKE FOREST, CA 92630

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
I38	TRABUCO CANYON WATER	20904 DIMENSION DR	SWEEPS UST, CA FID UST	Lower	1079, 0.204, West
J39	CLEANERS 2000	20761 LAKE FOREST DR	DRYCLEANERS	Lower	1102, 0.209, South
J40	SANTA MARGARITA TIRE	20761 LAKE FOREST DR	RCRA-SQG, FINDS, ECHO	Lower	1102, 0.209, South
J41	CLEANERS 2000	20761 LAKEFOREST #H	RCRA-SQG, FINDS, ECHO	Lower	1112, 0.211, South
J42	JIFFY LUBE NO 1301	20781 LAKE FOREST DR	RCRA-SQG	Lower	1246, 0.236, South
43	USA STATION #824	26732 PORTOLA PKWY	LUST	Higher	2236, 0.423, North
44	GREENWASTE COMPOSTIN	20712 INDIAN OCEAN D	WMUDS/SWAT	Lower	2425, 0.459, SW

EXECUTIVE SUMMARY

TARGET PROPERTY SEARCH RESULTS

The target property was identified in the following records. For more information on this property see page 8 of the attached EDR Radius Map report:

Site	Database(s)	EPA ID
NURSERY LAKE FOREST 20621 LAKE FOREST DR LAKE FOREST, CA 0	WDS Facility Status: A Facility Id: 8 303229001	N/A
NAKASE BROTHERS NURS 20621 LAKE FOREST DR LAKE FOREST, CA 92630	UST Database: UST, Date of Government Version: 06/13/2016 Facility Id: 11465	N/A

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

Proposed NPL ---------- Proposed National Priority List Sites
NPL LIENS ---------- Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ---------- National Priority List Deletions

Federal CERCLIS list

FEDERAL FACILITY ---------- Federal Facility Site Information listing
SEMS ---------- Superfund Enterprise Management System

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE ---------- Superfund Enterprise Management System Archive

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF ---------- RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG ---------- RCRA - Large Quantity Generators

RCRA-CESQG ---------- RCRA - Conditionally Exempt Small Quantity Generator

Federal institutional controls / engineering controls registries

LUCIS ---------- Land Use Control Information System
US ENG CONTROLS ---------- Engineering Controls Sites List
US INST CONTROL ---------- Sites with Institutional Controls

Federal ERNS list

ERNS ---------- Emergency Response Notification System

State- and tribal - equivalent NPL

RESPONSE ---------- State Response Sites

State- and tribal - equivalent CERCLIS

ENVIROSTOR ---------- EnviroStor Database

State and tribal landfill and/or solid waste disposal site lists

SWF/LF ---------- Solid Waste Information System

State and tribal leaking storage tank lists

INDIAN LUST ---------- Leaking Underground Storage Tanks on Indian Land
SLIC ---------- Statewide SLIC Cases

State and tribal registered storage tank lists

FEMA UST ---------- Underground Storage Tank Listing
INDIAN UST ---------- Underground Storage Tanks on Indian Land

State and tribal voluntary cleanup sites

VCP ---------- Voluntary Cleanup Program Properties
INDIAN VCP ---------- Voluntary Cleanup Priority Listing

State and tribal Brownfields sites

BROWNFIELDS ---------- Considered Brownfieds Sites Listing

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS ---------- A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

SWRCY ---------- Recycler Database
HAULERS ---------- Registered Waste Tire Haulers Listing
INDIAN ODI ---------- Report on the Status of Open Dumps on Indian Lands

DEBRIS REGION 9 ---- Torres Martinez Reservation Illegal Dump Site Locations
ODI ---- Open Dump Inventory

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL ---- Delisted National Clandestine Laboratory Register
HIST Cal-Sites ---- Historical Calsites Database
SCH ---- School Property Evaluation Program
CDL ---- Clandestine Drug Labs
Toxic Pits ---- Toxic Pits Cleanup Act Sites
US CDL ---- National Clandestine Laboratory Register

Local Land Records

LIENS ---- Environmental Liens Listing
LIENS 2 ---- CERCLA Lien Information
DEED ---- Deed Restriction Listing

Records of Emergency Release Reports

HMIRS ---- Hazardous Materials Information Reporting System
CHMIRS ---- California Hazardous Material Incident Report System
LDS ---- Land Disposal Sites Listing
MCS ---- Military Cleanup Sites Listing
Orange Co. Industrial Site ---- List of Industrial Site Cleanups
SPILLS 90 ---- SPILLS 90 data from FirstSearch

Other Ascertainable Records

RCRA NonGen / NLR ---- RCRA - Non Generators / No Longer Regulated
FUDS ---- Formerly Used Defense Sites
SCRD DRYCLEANERS ---- State Coalition for Remediation of Drycleaners Listing
US FIN ASSUR ---- Financial Assurance Information
EPA WATCH LIST ---- EPA WATCH LIST
2020 COR ACTION ---- 2020 Corrective Action Program List
TSCA ---- Toxic Substances Control Act
TRIS ---- Toxic Chemical Release Inventory System
SSTS ---- Section 7 Tracking Systems
RMP ---- Risk Management Plans
RAATS ---- RCRA Administrative Action Tracking System
PRP ---- Potentially Responsible Parties
PADS ---- PCB Activity Database System
ICIS ---- Integrated Compliance Information System
FTTS ---- FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
MLTS ---- Material Licensing Tracking System
COAL ASH DOE ---- Steam-Electric Plant Operation Data
COAL ASH EPA ---- Coal Combustion Residues Surface Impoundments List
PCB TRANSFORMER ---- PCB Transformer Registration Database
RADINFO ---- Radiation Information Database
HIST FTTS ---- FIFRA/TSCA Tracking System Administrative Case Listing
DOT OPS ---- Incident and Accident Data
CONSENT ---- Superfund (CERCLA) Consent Decrees
INDIAN RESERV ---- Indian Reservations
FUSRAP ---- Formerly Utilized Sites Remedial Action Program

UMTRA ---- Uranium Mill Tailings Sites
LEAD SMELTERS ---- Lead Smelter Sites
US AIRS ---- Aerometric Information Retrieval System Facility Subsystem
US MINES ---- Mines Master Index File
FINDS ---- Facility Index System/Facility Registry System
UXO ---- Unexploded Ordnance Sites
DOCKET HWC ---- Hazardous Waste Compliance Docket Listing
CA BOND EXP. PLAN ---- Bond Expenditure Plan
Cortese ---- "Cortese" Hazardous Waste & Substances Sites List
CUPA Listings ---- CUPA Resources List
EMI ---- Emissions Inventory Data
ENF ---- Enforcement Action Listing
Financial Assurance ---- Financial Assurance Information Listing
HAZNET ---- Facility and Manifest Data
HWP ---- EnviroStor Permitted Facilities Listing
HWT ---- Registered Hazardous Waste Transporter Database
MINES ---- Mines Site Location Listing
MWMP ---- Medical Waste Management Program Listing
NPDES ---- NPDES Permits Listing
PEST LIC ---- Pesticide Regulation Licenses Listing
PROC ---- Certified Processors Database
Notify 65 ---- Proposition 65 Records
UIC ---- UIC Listing
WASTEWATER PITS ---- Oil Wastewater Pits Listing
WIP ---- Well Investigation Program Case List
ECHO ---- Enforcement & Compliance History Information
FUELS PROGRAM ---- EPA Fuels Program Registered Listing

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP ---- EDR Proprietary Manufactured Gas Plants

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF ---- Recovered Government Archive Solid Waste Facilities List
RGA LUST ---- Recovered Government Archive Leaking Underground Storage Tank

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

EXECUTIVE SUMMARY

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: Also known as Superfund, the National Priority List database is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund program. The source of this database is the U.S. EPA.

A review of the NPL list, as provided by EDR, and dated 03/07/2016 has revealed that there is 1 NPL site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
MARINE CORPS AIR STA	*MCAS EL TORO*	*NW 1/2 - 1 (0.897 mi.)*	*0*	*9*

Federal RCRA CORRACTS facilities list

CORRACTS: CORRACTS is a list of handlers with RCRA Corrective Action Activity. This report shows which nationally-defined corrective action core events have occurred for every handler that has had corrective action activity.

A review of the CORRACTS list, as provided by EDR, and dated 12/09/2015 has revealed that there is 1 CORRACTS site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
MARINE CORPS AIR STA	*MCAS EL TORO*	*NW 1/2 - 1 (0.897 mi.)*	*0*	*9*

Federal RCRA generators list

RCRA-SQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

A review of the RCRA-SQG list, as provided by EDR, and dated 12/09/2015 has revealed that there are 12 RCRA-SQG sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
HOME DEPOT USA INC H	*20021 LAKE FOREST DR*	*ENE 0 - 1/8 (0.084 mi.)*	*11*	*90*
SADDLE BACK VALLEY O	*26891 VISTA TERRACE*	*ESE 1/8 - 1/4 (0.193 mi.)*	*36*	*123*
Lower Elevation	**Address**	**Direction / Distance**	**Map ID**	**Page**
WESTERN DIGITAL CORP	*20511 LAKE FOREST DR*	*S 0 - 1/8 (0.049 mi.)*	*7*	*84*
ECONO LUBE N TUNE	*20572 LAKE FOREST DR*	*SSE 0 - 1/8 (0.112 mi.)*	*D22*	*102*
FOOTHILL CLEANERS	*20651 LAKE FOREST DR*	*S 0 - 1/8 (0.114 mi.)*	*E23*	*103*
POWER CLEANERS	*20562 CANADA RD*	*SSW 1/8 - 1/4 (0.167 mi.)*	*H31*	*114*
SALEEN ALLEN R R R S	*20622 CANADA RD*	*SSW 1/8 - 1/4 (0.172 mi.)*	*H32*	*116*
FOREVER GREEN ART IN	*20611 CANADA RD*	*SSW 1/8 - 1/4 (0.177 mi.)*	*H34*	*118*
BOKKES IND MERCEDES	*20591 CANADA RD*	*SSW 1/8 - 1/4 (0.182 mi.)*	*H35*	*121*

Lower Elevation	Address	Direction / Distance	Map ID	Page
SANTA MARGARITA TIRE	***20761 LAKE FOREST DR***	***S 1/8 - 1/4 (0.209 mi.)***	***J40***	***130***
CLEANERS 2000	***20761 LAKEFOREST #H***	***S 1/8 - 1/4 (0.211 mi.)***	***J41***	***131***
JIFFY LUBE NO 1301	20781 LAKE FOREST DR	S 1/8 - 1/4 (0.236 mi.)	J42	133

State and tribal leaking storage tank lists

LUST: The Leaking Underground Storage Tank Incident Reports contain an inventory of reported leaking underground storage tank incidents. The data come from the State Water Resources Control Board Leaking Underground Storage Tank Information System.

A review of the LUST list, as provided by EDR, has revealed that there are 5 LUST sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
USA STATION #824	26732 PORTOLA PKWY	N 1/4 - 1/2 (0.423 mi.)	43	134
Database: ORANGE CO. LUST, Date of Government Version: 05/01/2016 Facility Id: 14UT002 Current Status: 3A				

Lower Elevation	Address	Direction / Distance	Map ID	Page
BEACON BAY CAR WASH	20602 LAKE FOREST	S 0 - 1/8 (0.107 mi.)	D14	93
Database: LUST, Date of Government Version: 06/13/2016 Database: LUST REG 8, Date of Government Version: 02/14/2005 Database: ORANGE CO. LUST, Date of Government Version: 05/01/2016 Status: Completed - Case Closed Facility Id: 02UT003 Facility Status: Case Closed Global Id: T0605999998 Current Status: 9 Global ID: T0605999998				
ARCO	20572 LAKE FOREST DR	SSE 0 - 1/8 (0.112 mi.)	D19	98
Database: LUST, Date of Government Version: 06/13/2016 Database: ORANGE CO. LUST, Date of Government Version: 05/01/2016 Status: Completed - Case Closed Facility Id: 02UT008 Global Id: T0605947685 Current Status: 9				
ARCO AM/PM	***20572 LAKE FOREST DR***	***SSE 0 - 1/8 (0.112 mi.)***	***D20***	***99***
Database: LUST REG 8, Date of Government Version: 02/14/2005 Facility Status: Case Closed Global ID: T0605947685				
CHEVRON	***20731 LAKE FOREST***	***S 1/8 - 1/4 (0.166 mi.)***	***G30***	***111***
Database: LUST, Date of Government Version: 06/13/2016 Database: LUST REG 8, Date of Government Version: 02/14/2005 Database: ORANGE CO. LUST, Date of Government Version: 05/01/2016 Status: Completed - Case Closed Facility Id: 97UT037 Facility Status: Case Closed				

Global Id: T0605902102
Current Status: 9
Global ID: T0605902102

State and tribal registered storage tank lists

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the State Water Resources Control Board's Hazardous Substance Storage Container Database.

A review of the UST list, as provided by EDR, has revealed that there are 6 UST sites within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
RANCHO PARKWAY SHELL Database: ORANGE CO. UST, Date of Government Version: 05/01/2016 Facility Id: FA0024028	26721 RANCHO PKWY	NNE 0 - 1/8 (0.037 mi.)	B4	82
BEACON BAY FOOTHILL Database: UST, Date of Government Version: 06/13/2016 Facility Id: 19793	20602 LAKE FOREST DR	S 0 - 1/8 (0.107 mi.)	D15	96
ARCO #81641 Database: UST, Date of Government Version: 06/13/2016 Facility Id: 12020	20572 LAKE FOREST DR	SSE 0 - 1/8 (0.112 mi.)	D18	97
GRAB N GO 24/7 Database: ORANGE CO. UST, Date of Government Version: 05/01/2016 Facility Id: FA0024654	20572 LAKE FOREST DR	SSE 0 - 1/8 (0.112 mi.)	D21	102
G AND M OIL CO INC Database: ORANGE CO. UST, Date of Government Version: 05/01/2016 Database: UST, Date of Government Version: 06/13/2016 Facility Id: FA0025150 Facility Id: 20177	20731 LAKE FOREST DR	S 1/8 - 1/4 (0.166 mi.)	G29	110
TRABUCO CANYON WATER Database: UST, Date of Government Version: 06/13/2016 Facility Id: 8466	20904 DIMENSION	W 1/8 - 1/4 (0.204 mi.)	I37	128

AST: A listing of aboveground storage tank petroleum storage tank locations.

A review of the AST list, as provided by EDR, and dated 08/01/2009 has revealed that there is 1 AST site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
Not reported	26642 TOWNE CENTRE D	N 1/8 - 1/4 (0.156 mi.)	27	110

EXECUTIVE SUMMARY

ADDITIONAL ENVIRONMENTAL RECORDS

Local Lists of Landfill / Solid Waste Disposal Sites

WMUDS/SWAT: The Waste Management Unit Database System is used for program tracking and inventory of waste management units. The source is the State Water Resources Control Board.

A review of the WMUDS/SWAT list, as provided by EDR, and dated 04/01/2000 has revealed that there is 1 WMUDS/SWAT site within approximately 0.5 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
GREENWASTE COMPOSTIN	20712 INDIAN OCEAN D	SW 1/4 - 1/2 (0.459 mi.)	44	135

Local Lists of Registered Storage Tanks

SWEEPS UST: Statewide Environmental Evaluation and Planning System. This underground storage tank listing was updated and maintained by a company contacted by the SWRCB in the early 1990's. The listing is no longer updated or maintained. The local agency is the contact for more information on a site on the SWEEPS list.

A review of the SWEEPS UST list, as provided by EDR, and dated 06/01/1994 has revealed that there are 5 SWEEPS UST sites within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
CAR WASH EXPRESS Comp Number: 12655	***20602 LAKE FOREST DR***	***S 0 - 1/8 (0.107 mi.)***	***D16***	***96***
ARCO AM/PM Status: A Tank Status: A Comp Number: 12020	***20572 LAKE FOREST DR***	***SSE 0 - 1/8 (0.112 mi.)***	***D20***	***99***
ECONO LUBE N TUNE Status: A Tank Status: A Comp Number: 12498	20592 LAKE FOREST DR	SSE 1/8 - 1/4 (0.162 mi.)	F28	110
CHEVRON Status: A Tank Status: A Comp Number: 11761	***20731 LAKE FOREST***	***S 1/8 - 1/4 (0.166 mi.)***	***G30***	***111***
TRABUCO CANYON WATER Status: A Tank Status: A Comp Number: 8466	***20904 DIMENSION DR***	***W 1/8 - 1/4 (0.204 mi.)***	***I38***	***128***

HIST UST: Historical UST Registered Database.

A review of the HIST UST list, as provided by EDR, and dated 10/15/1990 has revealed that there is 1 HIST UST site within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
LOS ALISOS RANCH Facility Id: 00000023543	20571 CANADA RD	SSW 1/8 - 1/4 (0.176 mi.)	H33	117

CA FID UST: The Facility Inventory Database contains active and inactive underground storage tank locations. The source is the State Water Resource Control Board.

A review of the CA FID UST list, as provided by EDR, and dated 10/31/1994 has revealed that there are 2 CA FID UST sites within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
CAR WASH EXPRESS Facility Id: 30017393 Status: I	***20602 LAKE FOREST DR***	***S 0 - 1/8 (0.107 mi.)***	***D16***	***96***
TRABUCO CANYON WATER Facility Id: 30017607 Status: A	***20904 DIMENSION DR***	***W 1/8 - 1/4 (0.204 mi.)***	***I38***	***128***

Other Ascertainable Records

DOD: Consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

A review of the DOD list, as provided by EDR, and dated 12/31/2005 has revealed that there is 1 DOD site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
EL TORO MARINE CORPS		NW 1/2 - 1 (0.929 mi.)	0	9

ROD: Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid the cleanup.

A review of the ROD list, as provided by EDR, and dated 11/25/2013 has revealed that there is 1 ROD site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
MARINE CORPS AIR STA	***MCAS EL TORO***	***NW 1/2 - 1 (0.897 mi.)***	***0***	***9***

DRYCLEANERS: A list of drycleaner related facilities that have EPA ID numbers. These are facilities with certain SIC codes: power laundries, family and commercial; garment pressing and cleaners' agents; linen supply; coin-operated laundries and cleaning; drycleaning plants except rugs; carpet and upholster cleaning; industrial launderers; laundry and garment services.

A review of the DRYCLEANERS list, as provided by EDR, and dated 02/08/2016 has revealed that there are 3 DRYCLEANERS sites within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
FOOTHILL CLEANERS EPA Id: CAL000298661 EPA Id: CAL000323129	***20651 LAKE FOREST DR***	***S 0 - 1/8 (0.114 mi.)***	***E23***	***103***
BAKER RANCH PLAZA EPA Id: CAD983617648	***20562 REGENCY LN***	***SSE 1/8 - 1/4 (0.138 mi.)***	***F26***	***109***
CLEANERS 2000 EPA Id: CAD983581711	20761 LAKE FOREST DR	S 1/8 - 1/4 (0.209 mi.)	J39	129

HIST CORTESE: The sites for the list are designated by the State Water Resource Control Board [LUST], the Integrated Waste Board [SWF/LS], and the Department of Toxic Substances Control [CALSITES]. This listing is no longer updated by the state agency.

A review of the HIST CORTESE list, as provided by EDR, and dated 04/01/2001 has revealed that there is 1 HIST CORTESE site within approximately 0.5 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
CHEVRON Reg Id: 083003083T	***20731 LAKE FOREST***	***S 1/8 - 1/4 (0.166 mi.)***	***G30***	***111***

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR Hist Auto: EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

A review of the EDR Hist Auto list, as provided by EDR, has revealed that there are 9 EDR Hist Auto sites within approximately 0.125 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
Not reported	21 RANCHO CIR	N 0 - 1/8 (0.093 mi.)	12	92
Not reported	25 ORCHARD	WNW 0 - 1/8 (0.111 mi.)	17	97
Lower Elevation	**Address**	**Direction / Distance**	**Map ID**	**Page**
Not reported	26721 RANCHO PKWY	NNE 0 - 1/8 (0.037 mi.)	B3	82

EXECUTIVE SUMMARY

Lower Elevation	Address	Direction / Distance	Map ID	Page
Not reported	20602 PASCAL WAY	SSW 0 - 1/8 (0.044 mi.)	C5	82
Not reported	26731 RANCHO PKWY	NNE 0 - 1/8 (0.046 mi.)	B6	83
Not reported	20591 PASCAL WAY	SSW 0 - 1/8 (0.069 mi.)	C8	88
Not reported	20371 LAKE FOREST D	SE 0 - 1/8 (0.069 mi.)	9	89
Not reported	20331 LAKE FOREST D	ESE 0 - 1/8 (0.071 mi.)	10	89
Not reported	20622 PASCAL WAY	S 0 - 1/8 (0.093 mi.)	C13	92

EDR Hist Cleaner: EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

A review of the EDR Hist Cleaner list, as provided by EDR, has revealed that there are 2 EDR Hist Cleaner sites within approximately 0.125 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
Not reported	20025 LAKE FOREST D	ENE 0 - 1/8 (0.123 mi.)	25	108

Lower Elevation	Address	Direction / Distance	Map ID	Page
Not reported	20651 LAKE FOREST D	S 0 - 1/8 (0.114 mi.)	E24	107

EXECUTIVE SUMMARY

There were no unmapped sites in this report.

OVERVIEW MAP - 04702716.2R

0 1/4 1/2 1 Miles

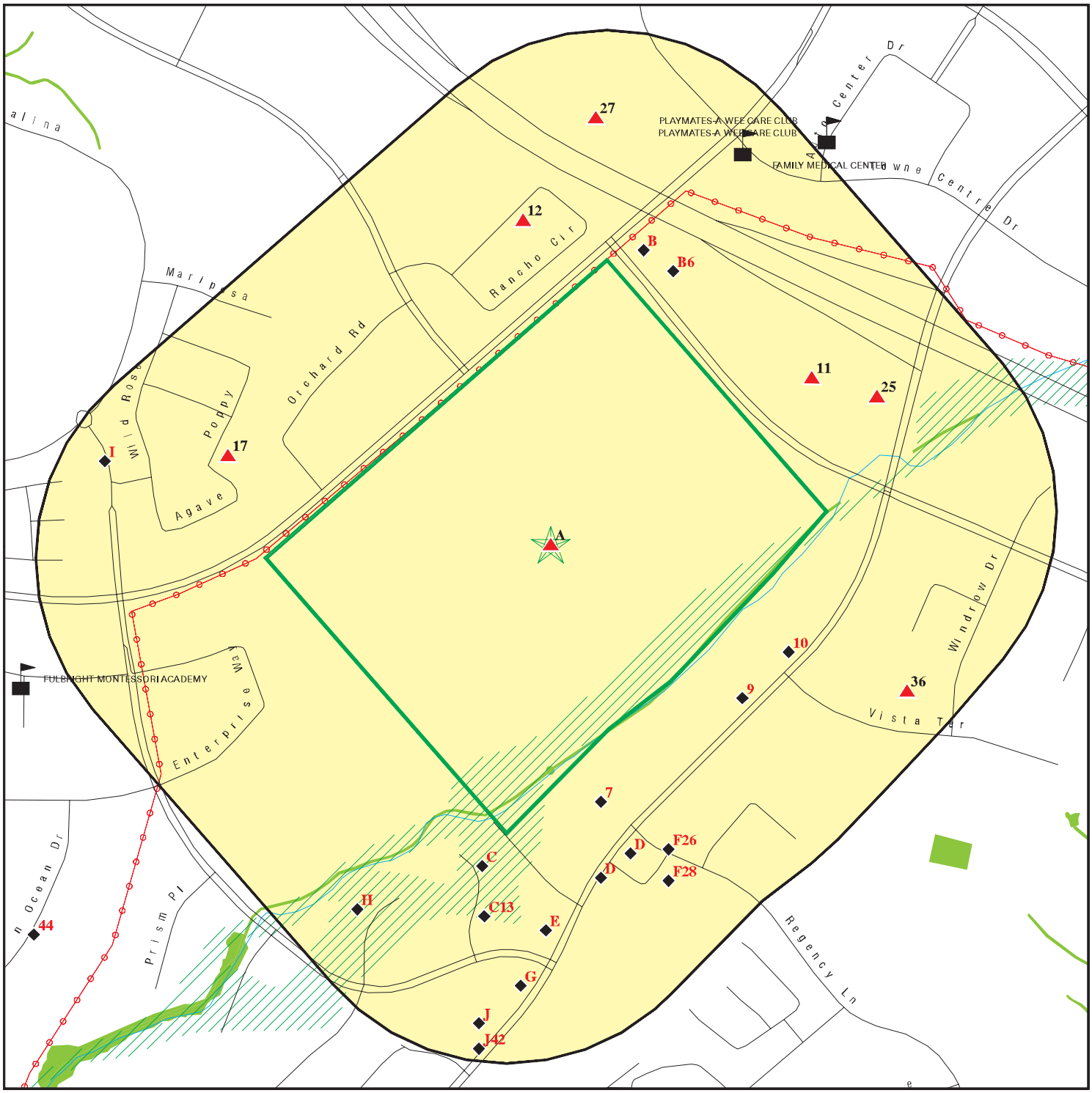
- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Power transmission lines
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory
- State Wetlands
- Areas of Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: 20621 Lake Forest	CLIENT: Hillmann Environmental Co.
ADDRESS: 20621 Lake Forest Lake Forest CA 92630	CONTACT: Kristine Savona
LAT/LONG: 33.668467 / 117.667749	INQUIRY #: 04702716.2r DATE: August 16, 2016 8:54 pm

Copyright © 2016 EDR, Inc. © 2015 TomTom Rel. 2015.

DETAIL MAP - 04702716.2R



Target Property

Sites at elevations higher than or equal to the target property

Sites at elevations lower than the target property

Manufactured Gas Plants

Sensitive Receptors

National Priority List Sites

Dept. Defense Sites

0 1/8 1/4 1/2 Miles

Indian Reservations BIA

Power transmission lines

100-year flood zone

500-year flood zone

National Wetland Inventory

State Wetlands

Areas of Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: 20621 Lake Forest	CLIENT: Hillmann Environmental Co.
ADDRESS: 20621 Lake Forest Lake Forest CA 92630	CONTACT: Kristine Savona
LAT/LONG: 33.668467 / 117.667749	INQUIRY #: 04702716.2r DATE: August 16, 2016 8:55 pm

Copyright © 2016 EDR, Inc. © 2015 TomTom Rel. 2015.

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL	1.000		0	0	0	1	NR	1
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	0.001		0	NR	NR	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	0	NR	NR	0
Federal CERCLIS NFRAP site list								
SEMS-ARCHIVE	0.500		0	0	0	NR	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS	1.000		0	0	0	1	NR	1
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		4	8	NR	NR	NR	12
RCRA-CESQG	0.250		0	0	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROL	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	0.001		0	NR	NR	NR	NR	0
State- and tribal - equivalent NPL								
RESPONSE	1.000		0	0	0	0	NR	0
State- and tribal - equivalent CERCLIS								
ENVIROSTOR	1.000		0	0	0	0	NR	0
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	0.500		0	0	0	NR	NR	0
State and tribal leaking storage tank lists								
LUST	0.500		3	1	1	NR	NR	5

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
INDIAN LUST	0.500		0	0	0	NR	NR	0
SLIC	0.500		0	0	0	NR	NR	0
State and tribal registered storage tank lists								
FEMA UST	0.250		0	0	NR	NR	NR	0
UST	0.250	1	4	2	NR	NR	NR	7
AST	0.250		0	1	NR	NR	NR	1
INDIAN UST	0.250		0	0	NR	NR	NR	0
State and tribal voluntary cleanup sites								
VCP	0.500		0	0	0	NR	NR	0
INDIAN VCP	0.500		0	0	0	NR	NR	0
State and tribal Brownfields sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
WMUDS/SWAT	0.500		0	0	1	NR	NR	1
SWRCY	0.500		0	0	0	NR	NR	0
HAULERS	0.001		0	NR	NR	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	0.001		0	NR	NR	NR	NR	0
HIST Cal-Sites	1.000		0	0	0	0	NR	0
SCH	0.250		0	0	NR	NR	NR	0
CDL	0.001		0	NR	NR	NR	NR	0
Toxic Pits	1.000		0	0	0	0	NR	0
US CDL	0.001		0	NR	NR	NR	NR	0
Local Lists of Registered Storage Tanks								
SWEEPS UST	0.250		2	3	NR	NR	NR	5
HIST UST	0.250		0	1	NR	NR	NR	1
CA FID UST	0.250		1	1	NR	NR	NR	2
Local Land Records								
LIENS	0.001		0	NR	NR	NR	NR	0
LIENS 2	0.001		0	NR	NR	NR	NR	0
DEED	0.500		0	0	0	NR	NR	0
Records of Emergency Release Reports								
HMIRS	0.001		0	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
CHMIRS	0.001		0	NR	NR	NR	NR	0
LDS	0.001		0	NR	NR	NR	NR	0
MCS	0.001		0	NR	NR	NR	NR	0
Orange Co. Industrial Site	0.001		0	NR	NR	NR	NR	0
SPILLS 90	0.001		0	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	0	NR	NR	NR	0
FUDS	1.000		0	0	0	0	NR	0
DOD	1.000		0	0	0	1	NR	1
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	0.001		0	NR	NR	NR	NR	0
EPA WATCH LIST	0.001		0	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	0.001		0	NR	NR	NR	NR	0
TRIS	0.001		0	NR	NR	NR	NR	0
SSTS	0.001		0	NR	NR	NR	NR	0
ROD	1.000		0	0	0	1	NR	1
RMP	0.001		0	NR	NR	NR	NR	0
RAATS	0.001		0	NR	NR	NR	NR	0
PRP	0.001		0	NR	NR	NR	NR	0
PADS	0.001		0	NR	NR	NR	NR	0
ICIS	0.001		0	NR	NR	NR	NR	0
FTTS	0.001		0	NR	NR	NR	NR	0
MLTS	0.001		0	NR	NR	NR	NR	0
COAL ASH DOE	0.001		0	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	0.001		0	NR	NR	NR	NR	0
RADINFO	0.001		0	NR	NR	NR	NR	0
HIST FTTS	0.001		0	NR	NR	NR	NR	0
DOT OPS	0.001		0	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	0.001		0	NR	NR	NR	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	0.001		0	NR	NR	NR	NR	0
US AIRS	0.001		0	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
FINDS	0.001		0	NR	NR	NR	NR	0
UXO	1.000		0	0	0	0	NR	0
DOCKET HWC	0.001		0	NR	NR	NR	NR	0
CA BOND EXP. PLAN	1.000		0	0	0	0	NR	0
Cortese	0.500		0	0	0	NR	NR	0
CUPA Listings	0.250		0	0	NR	NR	NR	0
DRYCLEANERS	0.250		1	2	NR	NR	NR	3
EMI	0.001		0	NR	NR	NR	NR	0
ENF	0.001		0	NR	NR	NR	NR	0
Financial Assurance	0.001		0	NR	NR	NR	NR	0
HAZNET	0.001		0	NR	NR	NR	NR	0
HIST CORTESE	0.500		0	1	0	NR	NR	1
HWP	1.000		0	0	0	0	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
HWT	0.250		0	0	NR	NR	NR	0
MINES	0.001		0	NR	NR	NR	NR	0
MWMP	0.250		0	0	NR	NR	NR	0
NPDES	0.001		0	NR	NR	NR	NR	0
PEST LIC	0.001		0	NR	NR	NR	NR	0
PROC	0.500		0	0	0	NR	NR	0
Notify 65	1.000		0	0	0	0	NR	0
UIC	0.001		0	NR	NR	NR	NR	0
WASTEWATER PITS	0.500		0	0	0	NR	NR	0
WDS	0.001	1	0	NR	NR	NR	NR	1
WIP	0.250		0	0	NR	NR	NR	0
ECHO	0.001		0	NR	NR	NR	NR	0
FUELS PROGRAM	0.250		0	0	NR	NR	NR	0
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	0	NR	0
EDR Hist Auto	0.125		9	NR	NR	NR	NR	9
EDR Hist Cleaner	0.125		2	NR	NR	NR	NR	2
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA LF	0.001		0	NR	NR	NR	NR	0
RGA LUST	0.001		0	NR	NR	NR	NR	0
- Totals --		2	26	20	2	4	0	54

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

A1
Target
Property

NURSERY LAKE FOREST
20621 LAKE FOREST DR
LAKE FOREST, CA 0

WDS **S106800804**
N/A

Site 1 of 2 in cluster A

Actual:
735 ft.

WDS:

Facility ID:	Santa Ana River 303229001
Facility Type:	Agricultural - Facility that treats and/or disposes of the wastes associated with confined and concentrated animal feeding, confined animal feeding, confined animal holding, confined and concentrated aquatic animal production facilities, and aquaculture. the treatment and/or disposal of agricultural return water is included in this category.
Facility Status:	Active - Any facility with a continuous or seasonal discharge that is under Waste Discharge Requirements.
NPDES Number:	Not reported
Subregion:	8
Facility Telephone:	Not reported
Facility Contact:	STEVE NAKASE
Agency Name:	NAKASE BROTHERS WHOLESALE NURE
Agency Address:	9441 KREPP DRIVE
Agency City,St,Zip:	HUNTINGTON BEACH 92646
Agency Contact:	STEVE NAKASE
Agency Telephone:	Not reported
Agency Type:	Private
SIC Code:	0
SIC Code 2:	Not reported
Primary Waste Type:	Designated/Influent or Solid Wastes that pose a significant threat to water quality because of their high concentrations (E.G., BOD, Hardness, TRF, Chloride). 'Manageable' hazardous wastes (E.G., inorganic salts and heavy metals) are included in this category.
Primary Waste:	IRRIGA
Waste Type2:	Not reported
Waste2:	Irrigation Runoff
Primary Waste Type:	Designated/Influent or Solid Wastes that pose a significant threat to water quality because of their high concentrations (E.G., BOD, Hardness, TRF, Chloride). 'Manageable' hazardous wastes (E.G., inorganic salts and heavy metals) are included in this category.
Secondary Waste:	Not reported
Secondary Waste Type:	Not reported
Design Flow:	0
Baseline Flow:	0
Reclamation:	No reclamation requirements associated with this facility.
POTW:	The facility is not a POTW.
Treat To Water:	Moderate Threat to Water Quality. A violation could have a major adverse impact on receiving biota, can cause aesthetic impairment to a significant human population, or render unusable a potential domestic or municipal water supply. Awsthetic impairment would include nuisance from a waste treatment facility.
Complexity:	Category C - Facilities having no waste treatment systems, such as cooling water dischargers or thosewho must comply through best management practices, facilities with passive waste treatment and disposal systems, such as septic systems with subsurface disposal, or dischargers having waste storage systems with land disposal such as dairy waste ponds.

A2
Target
Property
Actual:
735 ft.

NAKASE BROTHERS NURSERY
20621 LAKE FOREST DR
LAKE FOREST, CA 92630

UST **U003778876**
N/A

Site 2 of 2 in cluster A

UST:
Facility ID: 11465
Permitting Agency: ORANGE COUNTY
Latitude: 33.669816
Longitude: -117.6664

DOD
Region
NW
1/2-1
4906 ft.

EL TORO MARINE CORPS AIR STATION (CLOSED)

EL TORO MARINE CORPS AIR (County), CA

DOD **CUSA143948**
N/A

DOD:
Feature 1: Marine Corps DOD
Feature 2: Not reported
Feature 3: Not reported
URL: Not reported
Name 1: El Toro Marine Corps Air Station (Closed)
Name 2: Not reported
Name 3: Not reported
State: CA
DOD Site: Yes
Tile name: CAORANGE

NPL
Region
NW
1/2-1
4736 ft.

MARINE CORPS AIR STATION, EL TORO
MCAS EL TORO
EL TORO, CA 92709

NPL **1000417911**
SEMS **CA6170023208**
CORRACTS
RCRA-TSDF
RCRA-SQG
US ENG CONTROLS
US INST CONTROL
ROD
RAATS
PRP

NPL:
EPA ID: CA6170023208
Cerclis ID: 902770
EPA Region: 9
Federal: Y
Final Date: 1990-02-21 00:00:00
Site Score: 37.43
Latitude: 33.676659999999998
Longitude: -117.7176

Category Details:
NPL Status: Currently on the Final NPL
Category Description: Depth To Aquifer-> 50 And <= 100 Feet
Category Value: 100

NPL Status: Currently on the Final NPL
Category Description: Distance To Nearest Population-> 0 And <= 1/4 Mile

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Category Value: 10

Site Details:
Site Name: EL TORO MARINE CORPS AIR STATION
Site Status: Final
Site Zip: 92709
Site City: EL TORO
Site State: CA
Federal Site: Yes
Site County: ORANGE
EPA Region: 09
Date Proposed: 06/24/88
Date Deleted: Not reported
Date Finalized: 02/21/90

Substance Details:
NPL Status: Currently on the Final NPL
Substance ID: Not reported
Substance: Not reported
CAS #: Not reported
Pathway: Not reported
Scoring: Not reported

NPL Status: Currently on the Final NPL
Substance ID: A046
Substance: POLYCHLORINATED BIPHENYLS
CAS #: 1336-36-3
Pathway: NO PATHWAY INDICATED
Scoring: 1

NPL Status: Currently on the Final NPL
Substance ID: D008
Substance: LEAD (PB)
CAS #: 7439-92-1
Pathway: GROUND WATER PATHWAY
Scoring: 3

NPL Status: Currently on the Final NPL
Substance ID: U044
Substance: CHLOROFORM
CAS #: 67-66-3
Pathway: GROUND WATER PATHWAY
Scoring: 4

NPL Status: Currently on the Final NPL
Substance ID: U210
Substance: TETRACHLOROETHENE
CAS #: 127-18-4
Pathway: GROUND WATER PATHWAY
Scoring: 2

NPL Status: Currently on the Final NPL
Substance ID: U211
Substance: CARBON TETRACHLORIDE
CAS #: 56-23-5
Pathway: GROUND WATER PATHWAY

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Scoring: 4

NPL Status: Currently on the Final NPL
Substance ID: U228
Substance: TRICHLOROETHYLENE (TCE)
CAS #: 79-01-6
Pathway: NO PATHWAY INDICATED
Scoring: 1

Summary Details:

Conditions at proposal June 24, 1988): The El Toro Marine Corps Air Station covers approximately 4,700 acres southeast of Santa Ana in El Toro, Orange County, California. Commissioned in 1943, it supports the Fleet Marine Forces in the Pacific Ocean. The surrounding area, once primarily agricultural, is urbani ing rapidly. Station El Toro is participating in the Installation Restoration Program IRP), established in 1978. Under the program, the Department of Defense seeksto identify, investigate, and clean up contamination from ha ardous materials. As part of IRP, the Navy identified 21 problem areas at the station, including three landfills containing both ha ardous and solid waste; buried drums of explosivesand low-level radioactive waste; and areas where PCBs, battery acids, leaded fuels, and other ha ardous substances were dumped or spilled. In tests conducted early in 1987, the Orange County Water District found trichloroethylene and tetrachloroethylene in shallow irrigation wells on and downgradient of the site. An estimated 1,100 acres of land are irrigated by wells within 3 miles of the site. Status February 21, 1990): In April 1989, Station El Toro prepared a Perimeter Investigation Interim Report which focused on four contaminated areas. Further studies are continuing to determine the extent and sources of contamination.

Site Status Details:
NPL Status: Final
Proposed Date: 06/24/1988
Final Date: 02/21/1990
Deleted Date: Not reported

Narratives Details:
NPL Name: EL TORO MARINE CORPS AIR STATION
City: EL TORO
State: CA

SEMS:
Site ID: 902770
EPA ID: CA6170023208
Federal Facility: Y
NPL: Currently on the Final NPL
Non NPL Status: Not reported

Following information was gathered from the prior CERCLIS update completed in 10/2013:
Site ID: 0902770
EPA ID: CA6170023208
Facility County: ORANGE
Short Name: EL TORO MARINE CORPS AIR
Congressional District: 45
IFMS ID: 09H6

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

SMSA Number:	0360
USGC Hydro Unit:	18070204
Federal Facility:	Federal Facility
DMNSN Number:	4710.00000
Site Orphan Flag:	N
RCRA ID:	Not reported
USGS Quadrangle:	Not reported
Site Init By Prog:	Not reported
NFRAP Flag:	Not reported
Parent ID:	Not reported
RST Code:	Not reported
EPA Region:	09
Classification:	Federal Facility
Site Settings Code:	SU
NPL Status:	Currently on the Final NPL
DMNSN Unit Code:	ACRE
RBRAC Code:	Not reported
RResp Fed Agency Code:	USNV
Non NPL Status:	Not reported
Non NPL Status Date:	/ /
Site Fips Code:	06059
CC Concurrence Date:	/ /
CC Concurrence FY:	Not reported
Alias EPA ID:	Not reported
Site FUDS Flag:	Not reported

CERCLIS Site Contact Name(s):

Contact ID:	13003854.00000
Contact Name:	Leslie Ramirez
Contact Tel:	(415) 972-3978
Contact Title:	Site Assessment Manager (SAM)
Contact Email:	Not reported

Contact ID:	13003858.00000
Contact Name:	Sharon Murray
Contact Tel:	(415) 972-4250
Contact Title:	Site Assessment Manager (SAM)
Contact Email:	Not reported

Contact ID:	13004003.00000
Contact Name:	Carl Brickner
Contact Tel:	Not reported
Contact Title:	Site Assessment Manager (SAM)
Contact Email:	Not reported

Contact ID:	9270865.00000
Contact Name:	Mary Aycock
Contact Tel:	(415) 972-3289
Contact Title:	Remedial Project Manager (RPM)
Contact Email:	Not reported

CERCLIS Site Alias Name(s):

Alias ID:	101
Alias Name:	MARINE CORPS AIR STA EL TORO
Alias Address:	Not reported SANTA ANA, CA

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Alias ID: 102
Alias Name: EL TORO MARINE CORPS AIR STATION
Alias Address: EL TORO MARINE CORPS AIR STA
SANTA ANA, CA 92709
Alias ID: 103
Alias Name: EL TORO MARINE CORPS AIR STATION
Alias Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
Alias ID: 9270159
Alias Name: FORMER MCAS EL TORO
Alias Address: EEPB FAC MGMT DEPT
SANTA ANA, CA 91702
Alias Comments: Not reported
Site Description: MCAS El Toro was commissioned in 1943 as a Marine Corps pilot fleet operation training facility. In 1950, the Station was selected for development as a master jet station and permanent center for Marine Corps aviation on the west coast. The Station mission has involved the operation and maintenance of military aircraft and ground-support equipment. These activities generated oils, solvents, paint residues, hydraulic fluid, used batteries, and other wastes. Wastes were placed in unlined on-Station landfills, and burned or covered with soil. Environmental remediation activities at MCAS El Toro are performed under the Installation Restoration Program (IRP). The IRP was developed in 1980 by the United States Department of Defense (DoD) to comply with federal guidelines to manage and control past hazardous waste disposal actions. The first indication of contamination at the Station occurred during routine water-quality monitoring in 1985, when the Orange County Water District discovered trichloroethene (TCE) in groundwater at an irrigation well located approximately 3,000 feet downgradient of MCAS El Toro. In 1985, the DON began to work on an Initial Assessment Study (IAS) to locate potentially contaminated sites on the Station. This work was conducted for the Naval Facilities Engineering Command under the Navy Assessment and Control of Installation Pollutants Program, which was the DON version of the DoD IRP at that time. The IAS report identified 17 sites as potential sources of contamination. The identification of potentially contaminated sites was based on the results of record searches and employee interviews. The report recommended sampling locations and sample analytical parameters to confirm the suspected contamination at the sites. In 1987, the Marine Corps contracted for a review of the IAS to produce a Site Inspection Plan of Action (SIPOA). In July 1987, while the SIPOA study was underway, (California) Regional Water Quality Control Board (RWQCB) Santa Ana Region issued a cleanup and abatement order to the Marine Corps. This order required the Station to initiate a perimeter groundwater volatile organic compound (VOC) investigation and submit a draft report. The Site Inspection Plan of Action (SIPOA) released in August 1988 included a recommendation of 19 sites for study and amended the site sampling plans proposed in the IAS report. This SIPOA report served as the basis for the Sampling and Analysis Plan for the RI/Feasibility Study (FS) sites. In June 1988, the United States Environmental Protection Agency (U.S. EPA) recommended adding MCAS El Toro to the National Priorities List (NPL) of the Superfund Program due to VOC groundwater contamination at the Station boundary and in the agricultural wells west of the Station. MCAS El Toro was added to the National Priorities List (NPL) on 15 February 1990. In October 1990, the Marine Corps/DON signed a Federal Facilities Agreement (FFA) with U.S. EPA Region IX, California Department of Health Services, and the RWQCB Santa Ana Region. The FFA is a cooperative agreement that: 1) assures environmental impacts are investigated and appropriate response actions are taken to protect human health and the environment; 2) establishes a procedural framework and schedule for developing, implementing, and monitoring appropriate

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

response actions; 3) facilities cooperation, exchange of information, and participation of the parties; and 4) assures adequate assessment, prompt notification, and coordination between federal and state agencies. The implementation of the FFA is included as one of the responsibilities of the Base Realignment and Closure (BRAC) Cleanup Team (BCT). The BCT consists of representatives from the DON Southwest Division Naval Facilities Engineering Command (SWDIV), U.S. EPA, DTSC, and RWQCB Santa Ana Region. The team was established to manage and coordinate environmental restoration and compliance programs related to the operational closure of MCAS El Toro by July 1999. In addition, the MCAS El Toro BCT has specified in its mission and vision statements that: 1) fast-track remediation of sites is necessary to expedite reuse; and 2) restoration and reuse is to be maximized by 1999. In December 1989, the DON began to prepare a Phase I RI Work Plan and associated documents for MCAS El Toro. The DON reviewed the available reports and other documents pertinent to past disposal practices at the Station and concluded that 22 IRP sites would be investigated. These sites were grouped into three OU's. OU-1 comprised the regional VOC groundwater investigation (Site 18), which was conducted both on and off the Station. OU-2 included the four landfill sites (Sites 2, 3, 5, and 17) and Site 10, the Petroleum Disposal Area (this site was later moved to OU-3). The remaining 16 sites were grouped together as OU-3. These sites were considered to be potential sources for a variety of contaminants. The principal objectives of the Phase I RI were to evaluate the source(s) of contamination in regional groundwater west of the Station and determine whether contamination exists and is affecting the environment at sites in OU-2 and OU-3. The results of the Phase I RI were documented in a draft Technical Memorandum issued in July 1993, a draft RI report for OU-1 issued in July 1994, a final Soil Gas Survey Technical Memorandum issued in October 1994 and a draft final interim RI/FS Report for OU-1 issued in August 1996. A variety of contaminants in the groundwater, soil, surface water, and sediment at MCAS El Toro was identified during the Phase I RI. Contaminants in the soil and sediment consisted primarily of low concentrations of semi-volatile organic compounds (SVOCs), petroleum hydrocarbons, pesticides, herbicides, and polychlorinated biphenyls. It was also concluded during the Phase I RI that the source of contamination for regional groundwater is in the southwest quadrant of the Station, but no specific source was identified. The sampling events yielded sufficient information to warrant conducting a preliminary risk assessment of contaminants at the sites for both groundwater and soil contamination. The results of the Phase I RI provided the primary data for the Phase II RI/FS. In March 1993, MCAS El Toro was placed on the BRAC III list of military facilities considered for closure. Under the terms of the FFA, Station closure would not affect the DON's obligation to conduct the RI/FS and to comply with the other requirements of the FFA. Concurrent with the Phase I RI, the DON conducted a Resource Conservation and Recovery Act (RCRA) Facilities Assessment (RFA) at MCAS El Toro. The purpose of the RFA was to evaluate whether an additional 140 sites at MCAS El Toro would require further investigation under the Phase II RI/FS program. The final RFA report was submitted in July 1993. Base on an evaluation of the sampling results, 25 solid waste management units (SWMU's)/areas of concern (AOC's) were recommended for further action. Site 23 (Wastewater Treatment Plant Sewer Lines) was evaluated in the RFA and was recommended for no further action. The sewer lines are located within Site 24, which was added to the Phase II RI scope. Interviews with active and retired personnel form the Fuel Operations Division and Facility Management Department were held in July 1994 at MCAS El Toro. The objectives of the meeting were to confirm and supplement information obtained from past interviews and field investigations, to obtain a better understanding of current and historical operations at MCAS El Toro, and to identify new areas of potential environmental concern at MCAS El Toro. Those

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

interviewed had knowledge of operations and procedures for storage and disposal of hazardous materials and waste. In July 1995, a final Work Plan for the Phase II RI/FS was issued. This Work Plan presented an approach to conduct the Phase II RI at 24 IRP sites including 2 new sites, Site 24 and Site 25. The objectives of the plan were to present a data quality objective-based sampling strategy to establish confidence that inferences made from the data are correct, and, ultimately, to collect sufficient information to support risk management decisions. The Phase II RI was conducted in 195 and 1996. During the same time period, DON performed an evaluation of background concentrations of metals in soils and reference levels for pesticides and herbicides in soils. This enabled site-specific analytical results of soil sampling to be compared with background and reference levels during the RI to identify potential releases. Subsequent to the Phase II RI, an evaluation of metals in groundwater was performed. The purpose of this evaluation was to determine whether the reported concentrations of metals in groundwater at MCAS El Toro reflect ambient conditions or are the result of anthropogenic sources associated with historical Station activities. From 1998 through 1999, the DON conducted a historical radiological assessment (HRA) of MCAS El Toro. The assessment was performed as part of the base closure process, for the release of the Station for reuse. A draft final HRA report summarizing the results of the assessments was issued in November 1999. Former Marine Corps Air Station (MCAS) El Toro lies in a semi-urban agricultural area of southern California, approximately 8 miles southeast of Santa Ana and 12 miles northeast of the city of Laguna Beach. Land northwest of the Station is used for agriculture, whereas the land to the south and northeast is used mainly for commercial, light industrial and residential purposes. Residential areas in the vicinity of Former MCAS El Toro include the cities of Lake Forest, Irvine, and Laguna Hills. Former MCAS El Toro is bordered on the south and west by the city of Irvine and on the north and east by unincorporated lands. Former MCAS El Toro was commissioned in 1943 as a Marine Corps pilot fleet operation training facility. In 1950, the Station was selected for development as a master jet station and permanent center for Marine Corps aviation on the west coast. The Station mission has involved the operation and maintenance of military aircraft and ground-support equipment. Historical activities on the Station included aircraft maintenance and repair. These activities generated oils, solvents, paint residues, hydraulic fluid, used batteries, and other wastes. Waste were placed in unlined landfills and burned or covered with soil. In some cases, wastes were released to the ground directly as the result of spills or dust-suppression activities. To support the Station's mission, facility operations were expanded over the years to include runways, aircraft maintenance and training facilities, housing, shopping facilities, and other support facilities. Former MCAS El Toro occupies 4,738 acres of land, including 580 acres that are leased for commercial farming. Approximately 1,000 acres are designated as outleased lands that are not available for development because of airfield safety clearances. The outleased lands are along the perimeter of the Station and are used for agricultural purposes, including landscape nurseries, livestock grazing, and crop production. The adjacent/surrounding land uses around Former MCAS El Toro include residential, commercial, industrial, and recreational. During operations, land use on Former MCAS El Toro consisted of a few general types. General Station land uses are described below for the following four quadrants, as defined by the bisecting north-south and east-west runways. - The northwestern quadrant consisted of the Former MCAS El Toro headquarters, administrative services, family and bachelor housing, and community support services. - The northeastern quadrant consisted of Marine Aircraft Group activities (e.g., training, maintenance, supply and storage, and airfield operations), family housing, community support services, and ordnance storage in areas isolated by

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

topographic relief and distance from other developments. - The southeastern quadrant consisted of administrative services, maintenance facilities, ordnance storage, and the golf course. - The southwestern quadrant consisted of aircraft maintenance facilities, supply and storage facilities, and limited administrative services. Past operations and practices at Former MCAS El Toro have contributed to soil and groundwater volatile organic compound (VOC) contamination. Former MCAS El Toro was closed on 02 July 1999. Environmental compliance and restoration activities have continued since Station closure, and a caretaker staff will remain at the Station until property transfer is complete. A community reuse plan was prepared and submitted to the Department of the Navy (DON) in 1996. The reuse plan proposed to use Former MCAS El Toro for a commercial airport as well as for other public uses including schools, parks, wildlife refuges, golf courses, homeless services, and commercial/light-industrial uses. The 1996 plan was refined by the 1999 Airport System Master Plan, which incorporated airport planning activities that resulted in some land use areas being redefined. The DON and the Federal Aviation Administration are evaluating this proposed reuse of Former MCAS El Toro and other alternatives in their joint environmental impact statement. Former MCAS El Toro lies within the Irvine Forebay I Groundwater Subbasin (Irvine Subbasin), which has been designated by the California Regional Water Quality Control Board (RWQCB) Santa Ana Region as a public water supply source. The regional aquifer at Sites 18 and 24 is not currently a source of municipal drinking water because of widespread elevated concentrations of total dissolved solids (TDS) and nitrates that exceed water quality standards; however, groundwater near the Station is used for agriculture. On-Station irrigation well 18_TIC055, at the western end of the east-west runway, is connected to the regional irrigation distribution system. Eight other irrigation wells are located in the vicinity of the Station. Well 18JTIC055 is screened in the principal aquifer upgradient of the principal aquifer VOC plume and, because of its upgradient location, does not extract groundwater from the principal aquifer VOC plume. Well 18_ET1 extracts water from an area within the TCE plume. Although a risk assessment performed by the Orange County Water District (OCWD) in 1986 showed that the water from this well does not represent an unacceptable human health risk, the extracted groundwater is treated using air stripping to remove VOCs before it is discharged for irrigation. The nearest drinking-water well (Tustin Walnut Well) is located at the intersection of Redhill and Walnut, approximately 2.5 miles from the leading edge of the TCE plume; however, the well is not hydraulically downgradient of the plume. The nearest downgradient drinking-water well (Dyer Road Well #3) is 3.2 miles from the leading edge of the plume. In addition, the Irvine Ranch Water District (IRWD) plans to acquire well 18JTIC106, located approximately 1 mile from the leading edge of the plume, as a drinking-water well. Environmental remediation activities at Former MCAS El Toro are performed under the Installation Restoration Program (IRP). The IRP was developed in 1980 by the Department of Defense (DoD) to comply with federal guidelines to manage and control contamination from past hazardous waste disposal actions. The first indication of contamination at the Station occurred during routine water quality monitoring in 1985, when OCWD discovered TCE in groundwater at an irrigation well approximately 3,000 feet downgradient of Former MCAS El Toro. In 1985, the DON began to work on an initial assessment study (IAS) to locate potentially contaminated sites on the Station. This work was conducted for the Naval Facilities Engineering Command under the Navy Assessment and Control of Installation Pollutants Program, which was the DON version of the Department of Defense (DoD) IRP at that time. The IAS report identified 17 sites as potential sources of contamination. The report also identified potentially contaminated sites based on the results of record searches and employee interviews and recommended sampling locations and

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

analytical parameters to assess the suspected contamination. In 1987, the Marine Corps contracted for a review of the LAS to produce a site inspection plan of action (SIPOA). The SIPOA, released in August 1988, recommended 19 sites for study and amended the site sampling plans proposed in the IAS report. This SIPOA report was the basis for a sampling and analysis plan for the remedial investigation (RI)/feasibility study (FS) sites. In July 1987, while the SIPOA study was under way, RWQCB Santa Ana Region issued a Cleanup and Abatement Order (CAO) to the Marine Corps requiring the Station to initiate a perimeter groundwater VOC investigation and submit a draft report. Because the investigation revealed VOCs in the shallow groundwater unit near the Station boundary, an interim groundwater pump and treatment system was installed at this boundary. Between June 1989 and September 1993, the system pumped and treated groundwater from three extraction wells at approximately 30 gallons per minute (gpm). Over the life of the system, reported concentrations of TCE in the influent were about 10 to 160 micrograms per liter (ug/L) and reported concentrations of PCE were 25 to 100 ug/L. The extracted groundwater was treated with a granular activated carbon (GAC) treatment system and used to irrigate the Station golf course. On 13 April 1993, RWQCB rescinded the CAO, because the required actions were complete and because the DON had entered into a Federal Facilities Agreement (FFA) to investigate and remediate environmental impacts associated with past and present activities at Former MCAS El Toro. In September 1993, the pump and treatment system was shut down. In June 1988, U.S. EPA recommended adding Former MCAS El Toro to the National Priorities List (NPL) because of VOC contamination at the Station boundary and in the agricultural wells west of the Station. Former MCAS El Toro was added to the NPL on 15 February 1990. In October 1990, the Marine Corps/DON signed an FFA with U.S. EPA Region 9, California Department of Health Services (now referred to as the DTSC), and RWQCB Santa Ana Region. The Base Realignment and Closure (BRAC) Cleanup Team (BCT) is responsible for implementing the FFA. The BCT consists of representatives from the DON Southwest Division Naval Facilities Engineering Command (SWDIV), U.S. EPA, DTSC, and RWQCB Santa Ana Region. The team was established to manage and coordinate environmental restoration and compliance programs related to the closure and disposal of Former MCAS El Toro by July 1999. EPA OU-01: Basewide Groundwater Site 18, the regional groundwater volatile organic compound (VOC) plume, is defined as the area where TCE concentrations are greater than 5 ug/L in the principal aquifer. Site 18 is downgradient of Site 24 and is located entirely off-Station. The contaminated groundwater of Site 18 originates in the shallow aquifer at Site 24, migrates into the principal aquifer near the southwestern Station boundary, and extends into the principal aquifer off-Station approximately 3 miles to the west beneath the city of Irvine. The average width of the off-Station VOC plume is approximately 1/2 mile. VOC contamination reaches depths of 450 feet bgs in some areas. Land above the Site 18 groundwater plume has historically been used for agricultural activities. However, recently the land use has changed to mixed-use with agricultural, residential, and commercial areas. The agricultural land use has likely contributed to the reportedly elevated concentrations of total dissolved solids (TDS) and nitrate that is found throughout the basin, but it is not responsible for the extensive VOC contamination that originated at Site 24. Groundwater from Site 18 is also used to supply two artificial surface water bodies, North Lake and South Lakes, and the childrens' wading pools associated with each lake. The lakes are used for recreation, including boating, sailing, fishing, and wading. Site 24 is located in the southwestern quadrant of Former MCAS El Toro. The site is highly industrialized and contains two large aircraft hangars (Buildings 296 and 297) and several smaller buildings that were used for aircraft and vehicle maintenance and repair. The Site 24 surface cover consists of unpaved open ground, asphalt, and concrete. Most of the site (170

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

acres) is paved. Asphalt-covered areas were used primarily for access roads and parking lots for military and personal vehicles. Concrete covers the areas where most of the industrial activities at Site 24 have been conducted, including slabs for Buildings 296 and 297 (the two aircraft hangars), Building 295 (the helicopter hangar), and Building 324 (the former engine test facility). A network of storm drains collects rainwater from the paved surfaces of Site 24. When industrial activities were conducted at Site 24, wastewater generated from the concrete-paved areas would also have been transported via this network. The network discharges to Agua Chinon Wash on the eastern portion of the site and Bee Canyon Wash on the western portion, near the Station boundaries in these locations. Industrial activities at Site 24, such as dust suppression with waste liquids, paint stripping, degreasing, vehicle and aircraft washing, and waste disposal practices, involved the use of solvents containing VOCs such as trichloroethylene (TCE) and tetrachloroethene (PCE). Waste solvents may have reached the surface or subsurface through leakage, runoff, storm drains, or direct application to the soil and are believed to be the source of VOCs in the regional groundwater. The precise origin, nature, and use of TCE released at the site and the circumstances and quantities of individual releases are not documented. TCE usage at Former MCAS El Toro is believed to have been discontinued in the mid-1970s. The shallow groundwater plume associated with Site 24 originates at this site and extends off-Station approximately to Sand Canyon Avenue. Calculations performed during the Phase II remedial investigation (RI) showed that the concentrations of VOCs present in deeper subsurface soil at Site 24 were high enough to contaminate groundwater to levels above drinking water standards. Groundwater contamination, where present beneath Sites 7, 8, 9, 10, 11, 12, 22, and 25, has its origin at Site 24. The Irvine Desalter Project (IDP) is a local project prompted by a 1984 regional groundwater study that showed inorganic constituents, mainly TDS and nitrates were migrating from the Irvine area toward the main portion of the Orange County groundwater basin. The Irvine area's relatively poor quality of groundwater is mostly attributable to local geology and agricultural practices. After later studies identified VOCs, primarily TCE, in area groundwater, the IDP was modified to address VOCs in addition to TDS and nitrates. The IDP is being designed to meet all federal and state drinking-water standards. The OCWD and IRWD have entered into an agreement that covers design, construction, operation, and funding of the project. The OCWD is responsible for the planning, right-of-way acquisition, design, and construction of project facilities, with full participation by IRWD. IRWD will operate the project facilities. In June 2001, the DON and the Department of Justice (DOJ), on behalf of the Marine Corps, OCWD, and IRWD reached an agreement on how the IDP could fulfill the DON's obligation to remediate VOCs while achieving the OCWD and IRWD objectives of treating groundwater containing high concentrations of TDS and nitrates to provide a drinking- and reclaimed-water supply from the principal aquifer. A settlement agreement apportioning costs for the IDP components was signed by the OCWD on 13 June 2001, by IRWD on 19 June 2001, by the DON on 18 July 2001, and by DOJ on 07 September 2001. A Record of Decision (ROD) addressing groundwater contamination at Sites 18 and 24 was signed in June 2002. The DON's selected remedy uses the IDP as the key component of the groundwater treatment system for VOC removal at Sites 18 and 24. The Orange County Water District (OCWD), Irvine Ranch Water District (IRWD), and the Settling Federal Agencies (SFA) comprised of the U.S. Department of Justice (DOJ) and the Department of Navy (DON) reached a Settlement Agreement regarding the Modified Irvine Desalter Project (IDP) to accept and treat groundwater from Site 24 and the PA for VOC removal. Treatment of extracted groundwater contaminated with VOCs is considered the CERCLA Component of the Modified IDP. Groundwater extracted from the SGU will be conveyed by DON to a point of connection to be located at the

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

MCAS El Toro boundary. At the point of connection, IRWD will accept the water and transport it to the Modified IDP for treatment. This Settlement Agreement was incorporated as part of the Final Groundwater ROD. The agreement provides that the United States will bear the VOC treatment costs, and OCWD and IRWD will continue to bear the costs associated with reclaimed water supply treatment requirements, including those for total dissolved solids and nitrates. The agreement specifies the quantity and quality of contaminated water that can be treated by the Modified IDP. An Explanation of Significant Differences addressing Operable Unit 1 was completed in March 2006. The remedy for soil was implemented in accordance with the Interim Soil ROD and documented in the Closure Report submitted to the regulatory agencies. The regulatory agencies concurred with the Closure Report, which concluded that the remedial action objectives (RAOs) for soil have been fulfilled. A Final Soil ROD documenting NFA for Site 24 soils was approved by the FFA signatories and finalized in April 2006. An Explanation of Significant Differences addressing Operable Unit 1 was signed in December 2008. EPA OU-02: Site 24 Soil VOC Source Area Site 24 is located in the southwest quadrant of Former MCAS El Toro. Industrial activities at Site 24, such as dust suppression with waste liquids, paint stripping, degreasing, vehicle and aircraft washing, and waste disposal practices involved the use of solvents containing VOCs such as trichloroethene (TCE) and tetrachloroethene (PCE). Waste solvents may have reached the surface or subsurface through leakage, runoff, storm drain flow, or direct application to the soil. The precise origin, nature, and use of TCE released at the site and the circumstances and quantities of individual releases are not documented. TCE usage at Former MCAS El Toro is believed to have been discontinued in the mid-1970s. Site 24 encompasses approximately 200 acres. The site slopes to the west from an elevation of about 320 feet above mean sea level (MSL) at the intersection of the east-west and north south runways to approximately 240 feet above MSL near the end of the east-west runway. The site is largely industrialized and contains two large aircraft hangars (Buildings 296 and 297) and several smaller buildings that were used for aircraft and vehicle maintenance and repair. Maintenance activities (e.g., degreasing) that occurred within these buildings may have contributed to the VOC contamination present at the site. On the basis of current local zoning, the future use of Site 24 is designated as recreational and institutional. Former MCAS El Toro lies within the Irvine Groundwater Management Zone, which has been designated by Santa Ana RWQCB as a public water supply source. The regional aquifer beneath Former MCAS El Toro is not currently a source of municipal drinking water because of widespread elevated concentrations of total dissolved solids and nitrates that exceed water quality standards; however, groundwater in the vicinity of the Station is used for agricultural purposes. The horizontal and vertical extent of VOCs in the vadose zone was characterized using Phase I and Phase II soil and soil gas analytical results. The results confirmed that, at the time of the RI, a primary TCE source area was present beneath Buildings 296 and 297. This source area extended vertically to groundwater directly beneath those buildings, with the highest concentrations near the water table. The trend of increasing concentration with depth suggested a depleting source at the surface, which is consistent with the end of TCE usage in approximately 1975. The maximum concentration of TCE reported in soil during the Phase II RI was 190 micrograms per kilogram (ug/kg), compared with a concentration of 400 ug/kg during the Phase I investigation. TCE in soil gas was reported at concentrations up to 6,120 ug/L. This exceeds the concentration in equilibrium with TCE-contaminated groundwater and indicates that an active mechanism existed to transfer TCE in the vadose zone to groundwater. In addition to TCE, other chlorinated VOCs, such as PCE, carbon tetrachloride, and related organic chemicals, were also reported in soil at Site 24, but with less frequency and at much lower concentrations.

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113) had a soil gas volume nearly as large as that of TCE, but was not considered a threat to groundwater due to relatively low concentrations and toxicity. Soil Vapor Extraction (SVE) was selected for vadose zone remediation in an interim ROD that was finalized in September 1997. Transfer and installation of the SVE system used at Norton AFB was completed in 1998. In January 1999, the remedial design for the SVE system was completed and operational testing of the central treatment system remediation equipment began. Actual remedial action started in March 1999 with the use of portable SVE systems to extract VOCs from existing SVE wells. The central treatment system operation and installation of the initial phase of additional SVE wells and the associated vapor conveyance piping began in May 1999. By the end of 1999, significant progress had been made in remediating the vadose zone, and vapor concentrations in all the SVE wells were below the soil gas cleanup (threshold) levels. Rebound testing of existing SVE wells and installation of supplemental SVE wells (to confirm that soil gas cleanup goals had been achieved throughout the soil gas plume) were completed in April 2000. In June 2001, a draft closure report for soil at Site 24 was issued. This report is expected to be finalized in spring 2002. Remediation of soil at Site 24 will be discussed further in the final ROD for the Site 24 vadose zone. At the time that the SVE system was shut down, TCE and PCE concentrations in the vadose zone source area were reduced to below the final soil gas threshold concentrations set forth in the Interim ROD. Additionally, attainment of closure goals was confirmed by closure sampling conducted 7 months after shutdown. Between the start of pilot scale testing (April 1995) through September 2000, approximately 2,000 pounds of VOCs was extracted and treated at Site 24. A Record of Decision addressing OU 2 was completed in March 2006. EPA OU-03: Soil at Site 8, 11, and 12 Site 11 is located in the southwest quadrant of the MCAS El Toro and is comprised of three units. Unit 1 is a concrete pad that is about 30 feet by 30 feet in size with a strip of ground adjacent to it. Unit 2 is an asphalt lined drainage ditch, while Unit 3 is the remainder of the unpaved fenced storage yard behind Building 369. A Record of Decision was completed for Site 11 in September 1999. The Navy Installation Restoration Program (IRP) site numbers and names for the sites addressed in this Record of Decision (ROD) are: -Site 8, Defense Reutilization and Marketing Office (DRMO) Storage Area -Site 12, Sludge Drying Beds Both these sites are within Operable Unit (OU)-3A at Former Marine Corps Air Station (MCAS) El Toro. Former MCAS El Toro is situated in south-central Orange County, California, approximately 8 miles southeast of Santa Ana and 12 miles northeast of Laguna Beach. Sites 8 and 12 are located in the southwest quadrant of Former MCAS El Toro. Former MCAS El Toro provided material and support for Marine Corps aviation activities until the Station was closed in July 1999, as a part of the Base Closure and Realignment Act. At its maximum acreage, the Station comprised about 4,740 acres. In February 2005, the Department of Navy (DON) transferred major portion of the Station via public auction to a private developer. Site 8 was formerly a Defense Reutilization and Marketing Office (DRMO) storage area for containerized liquids, and scrap and salvage materials from Former MCAS El Toro and Former MCAS Tustin. The scrap materials included mechanical and electrical components and various types of liquids. Site 8 is bounded by South Marine Way to the northeast, Q Street to the northwest, Building 360 to the southwest, and Building 800 to the southeast. Site 8 comprises two distinct but adjacent areas bisected by R Street: an old salvage yard and a main storage yard. These two areas are subdivided into the following five separate units: -Unit 1, East Storage Yard -Unit 2, West Storage Yard -Unit 3, Refuse Pile Area (the location of a former refuse pile within the West Storage Yard) -Unit 4, Polychlorinated Biphenyl (PCB) Spill Area (located within the east storage yard) -Unit 5, Old Salvage Yard Site 12 is located near Plant Road, South Marine Way, and Bee Canyon Wash. Site 12

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

consists of the following four units: -Unit 1, the former location of the west sludge-drying beds -Unit 2, the former location of the east sludge-drying beds -Unit 3, a drainage ditch -Unit 4, the location of former wastewater treatment plants (WWTPs) Site 8 was used as a storage yard from the early years (late 1940s) of the Station operation. During its operation as a storage area for containerized liquids and scrap, liquids such as lubrication oil, fuels, and solvents may have spilled or leaked, impacting the shallow soil at the site. Soil at the site has also been impacted by the spillage of PCB contaminated oil from scrap electrical components. The Phase I Remedial Investigation (RI) Report documented that in 1984, approximately 5 gallons of PCB-containing oil were spilled from a leaking electrical console in a small area at the east end of the main storage yard. PCB-contaminated soil in the spill area (approximately 1,500 square feet) was excavated to a depth of 1 foot below grade. A hazardous waste contractor transported the excavated soil to an offsite disposal facility. No other spills have been documented at the site. The Phase II RI report documented that a refuse pile (Unit 3) was observed near the center of the main storage yard on aerial photographs dating back to 1952. This refuse pile remained visible in aerial photographs through 1990. The pile was removed and disposed of prior to initiation of the Phase I RI in 1991. In December 1993, the top 2 feet of the soil beneath the refuse pile was excavated and removed from Site 8 by a paving contractor. This soil was placed in a 15-foot deep excavation (pit) at Unit 2 of IRP Site 19. The WWTP at Site 12 ceased operation in the early 1970s and was demolished a few years later. The industrial wastewater treatment plant (IWWTP) was dismantled by 1961. Data collected during the Phase II RI suggest that the aboveground concrete treatment tanks were demolished in place and then covered with approximately 5 to 7 feet of fill material. The sludge produced at this facility was dewatered in the two drying bed areas (east and west). After the plant closed, the sludge remaining in the drying beds was reportedly abandoned in place. The earthen berms surrounding the sludge beds were combined with imported fill material and graded in place. The drainage ditch (Unit 3) at Site 12 is an unimproved earthen channel that skirted both sludge-drying bed areas into a catch basin located north of Plant Road, which connects to the lower reach south of Plant Road via concrete culverts. History of non-radiological investigations Investigation activities and documents have been prepared to address non-radiological contamination including VOCs, semivolatile organic compounds (SVOCs), pesticides, PCBs, total petroleum hydrocarbons (TPH), total recoverable petroleum hydrocarbons (TRPH), herbicides, and target analyte list (TAL) metals at Sites 8 and 12. In 1992 and 1993, the remedial action evaluation process was started for Sites 8 and 12 with a Phase I RI. Subsequent to the Phase I RI, a Phase II RI was conducted from 1995 through 1997 for Sites 8 and 12 in conjunction with other OU-3A site (Site 11). The Phase II RI Report for OU-3A sites (Sites 8, 11, and 12) provided an interpretation of the nature and extent of non-radiological contamination at Sites 8 and 12 based on the review of data obtained from an aerial photograph survey, and soil sampling and analysis conducted as a part of the Phase I and Phase II RIs. The site characterization information obtained from the Phase I and Phase II RIs was used to complete a Feasibility Study (FS) for Sites 8 and 12 in July 1997. The FS identified and evaluated the alternatives that could be potentially used to remediate non-radiological chemicals of potential concern (COPCs) (e.g., PCBs and polynuclear aromatic hydrocarbons [PAHs]) at the site. Based on the results of the FS, a Proposed Plan (in conjunction with Site 11) was released for public comment for Site 8, Units 3 and 5; and Site 12, Unit 3 in May 1999. The Proposed Plan identified Alternative 3, excavation, with recycling of the excavated soil as cover material at the on-Station Sites 2 and 17 landfills, as the preferred alternative for the portions of the sites contaminated with non-radiological

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

chemicals. Off-Station disposal of contaminated soil was also presented as a disposal option. The Proposed Plan recommended no further action at Units 1, 2, and 4 of Sites 8 and 12. Following issuance of the Proposed Plan, a Draft ROD was prepared for Sites 8 and 12 in combination with other OU-3A site (Site 11) at Former MCAS El Toro. This Draft ROD selected no further action (NFA) for Site 8, Units 1, 2, and 4 and further action for Site 8, Units 3 and 5. For Site 12, this ROD selected NFA for Site 12, Units 1, 2, and 4 and further action at Site 12, Unit 3. The selected remedy for Site 8, Units 3 and 5; and Site 12, Unit 3 noted as Alternative 3 in the Draft ROD consisted of excavation of non-radiologically contaminated soil with recycling of excavated soil as cover material at the on-Station Site 2 or 17 landfills. The remedy included confirmation sampling after excavation to ensure that the contaminated soil exceeding the residential risk-based concentrations (RBCs) for the non-radiological chemicals of concern (COCs) (e.g., PCBs and PAHs) at each area has been removed. The RBCs were calculated based on the risk assessment conducted as a part of the Phase II RI. As a part of activities conducted following the release of the Draft ROD, the human health risk assessment (HHRA) conducted during the Phase II RI was reviewed in detail. The review showed that several exposure factors and toxicity indices used to derive the risk estimates were not current, based on a comparison with those used by Region 9 of the U.S. EPA in the development of its preliminary remediation goal (PRG) table. It was also determined that the data from additional soil sampling conducted in May 1999 (subsequent to the Phase II RI) at Site 8, Unit 5 and Site 12, Unit 3 should also be incorporated into the risk assessment and the calculation of the RBCs. Thus, a risk reevaluation was conducted, utilizing all the available data and the California Environmental Protection Agency (Cal/EPA) and U.S. EPA Region 9 toxicity information and exposure factors for the year 2000. In general, the results of the updated HHRA indicated lower risks than the Phase II RI risk assessment values. Based on the updated cancer and noncancer risk values, the report concurred with the NFA recommendation in the Draft ROD for Units 1, 2, and 4 of both Sites 8 and 12 for non-radiological contaminants. For Site 8, Units 3 and 5; and Site 12, Unit 3, a reevaluation of the response action documented in the Draft ROD based on the updated site risks and risk management considerations was recommended. Subsequent to the preparation of the FS and Draft ROD, investigations to assess the nature and extent of potential radiological contamination were completed. The history of these investigations is presented below. History of Radiological Evaluation Subsequent to the preparation of the FS and Draft ROD, a radiological evaluation of Sites 8 and 12 was conducted as a part of the stationwide Historical Radiological Assessment (HRA) for Former MCAS El Toro in 1999 and 2000. The purpose of the HRA was to identify potential, likely, or known sources of radioactive material and radioactive contamination based on existing or derived information and to identify sites that need further action as opposed to those posing no threat to human health. As a part of HRA, interviews, records review, site inspections, and limited informal surveys were conducted at Former MCAS El Toro. Based on these investigations, the HRA recommended further investigation, including radiological surveys at Sites 8 and 12. For Site 8 this recommendation was based on an employee interview which indicated that small quantities of radium painted parts and gauges may have been stored at Site 8. Site 12 was considered potentially impacted since former IWWTP and sludge drying beds were located downstream of Building 296 (former location of radium room), and processed effluent from the Station buildings connected to the industrial waste sewer system. Subsequent to the issuance of the HRA, on-site radiological characterization surveys and sampling were conducted at Sites 8 and 12 in June through November 2001 and in March 2004. These investigations were performed in accordance with the Radiological Survey Plan and the Radiological Sampling Amendment. An analysis of data obtained

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

from radiological surveys and soil sampling indicated that locations with radium 226 (Ra-226) concentrations greater than background levels are present at Units 1 and 4 of Site 8. However, Ra-226 concentrations were found to be consistent with the background concentrations at Site 12, and Units 2, 3, and 5 of Site 8. Therefore, a radiological release report was issued for Site 12, and Units 2, 3, and 5 of Site 8 in conjunction with IRP Site 25 (Bee Canyon Wash Outfall). Based on the statistical analyses of the Ra-226 data, and risk and dose assessments, this report concluded that the occurrence and distribution of Ra-226 at Units 2, 3, and 5 of Site 8 and Site 12 are consistent with ambient concentrations. Therefore, a Site Evaluation Accomplished (SEA) recommendation was made for Units 2, 3, and 5 of Site 8 and Site 12. The SEA recommendation denotes that the CERCLA requirement for the site evaluation of radionuclides has been accomplished, and radionuclides will be removed from the list of COPCs and further consideration under CERCLA at Units 2, 3, and 5 of Site 8 and Site 12. However, since locations with higher than background concentrations of Ra-226 were found at Units 1 and 4 of Site 8, these units were selected for further response action under CERCLA. A ROD addressing OU 3 was completed in May 2007. EPA OU-04: Sites 2 & 17 Landfills Sites 2 and 17 are located in undeveloped areas, in the foothills of the Santa Ana Mountains, in the eastern portion of MCAS El Toro. Site 2 occupies approximately 27 acres and is situated between Borrego Canyon Wash and one of its tributaries. The site is situated at an elevation approximately 500 feet above mean sea level and is bisected by a man-made drainage channel that trends in a northeast-southwest direction. Site 2 is bounded on the west by Magazine Road and a dirt road runs along the southern and eastern boundary. The operational landfill was used from the late 1950s until about 1980. Until recently, unauthorized disposal has occurred on an intermittent basis in Areas C1, C2, and D2. During the 1970's, all solid waste from MCAS El Toro and some waste from MCAS Tustin were disposed in the Site 2 operational landfill. The suspected types of waste include construction debris, municipal waste, batteries, waste oils, hydraulic fluids, paint residues, transformers, and waste solvents. It is also possible that equipment painted with radium paint, or other low-level radiological materials consistent with Station operations, could have been disposed into the Site 2 landfill. The landfill is not being used currently and has become overgrown with shrubs and grasses, including a few individual plants of coastal sage scrub, which serves as habitat for the California gnatcatcher, a federally listed threatened species. A fill cover of unknown thickness has been placed over the landfill. Site 17 occupies approximately 11 acres in a canyon west of the Magazine Road Landfill. The site is located in a small canyon and extends beyond the canyon mouth onto a flat, weed-covered field formerly used for agriculture. At its lower end, the landfill elevation is about 440 feet above mean sea level; at its upper end in the canyon, the elevation is about 570 feet above mean sea level. The landfill is covered with sparse vegetation and varying amounts of fill. At the time of the Phase II remedial investigation (RI), refuse was visible at several locations and the former wash in the canyon was largely obscured by refuse and soil from the excavation of an adjacent hilltop. The Site 17 landfill was actively used from 1981 to 1983 as a Stationwide disposal facility. The site boundaries represent the operational area of the landfill. Aerial photographs indicate that landfilling activities were under way as early as 1970 and continued through 1986. Suspected waste types disposed at the site include domestic waste and rubble, cooking grease, oils and fuels from sumps, and empty drums. Reportedly, any type of waste generated at MCAS El Toro may have been disposed at the landfill. It is also possible that equipment painted with radium paint, or other low-level radiological materials consistent with Station operations, could have been disposed into the Site 17 landfill. From 1996 to 1997, removal actions were undertaken at Sites 2 and 17. Actions included fencing the sites,

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

removing drums and other debris from the surface of the landfill, and constructing drainage features to reduce the erosion that had been occurring at both sides. Sites 2 and 17 were addressed in an interim ROD that was signed in July 2000. The ROD was interim because it presented the selected remedial action for only vadose zone soil at Site 2 and for vadose zone soil and groundwater at Site 17. Remediation of groundwater at Site 2 will be addressed in the final ROD. A radiological survey was conducted at Sites 2 and 17 in August through October 2001. The final ROD will also summarize the results of the survey and address radiological contamination, if any, at both Sites 2 and 17. An Explanation of Significant Differences addressing Operable Unit 4 was signed in July 2009. EPA OU-05: Sites 3 & 5 Landfills Sites 3 and 5 will be addressed in an OU-2C ROD that is expected to be issued to the public in 2002. AA 3 encompasses an area of approximately 5.14 acres (2.08 hectares) and is located in the northwestern section of the former MCAS El Toro facility near Pusan Way and adjacent to the Agua Chinon Wash. AA 3 has also been designated as Miscellaneous Refuse (MSCR) 1, a "former refuse disposal area" in the BRAC Business Plan update. MSCR AA 3 refers to seven aerial photograph (APHO) anomaly areas (APHOs 59, 60, 61, 62, 63, 64, and 65) identified during a review of aerial. The APHO anomalies associated with AA 3 also include features that are not contiguous with the study boundary. Historically, AA 3 was used as a source of borrow material. Records indicate that some of the borrow pits and trenches were backfilled with construction debris and later covered with five feet or more of fill soil. During previous investigations, it was confirmed that there is an average of approximately 4.5 feet of soil cover with isolated areas having as little as 2 feet of soil cover over the construction debris. Based on a review of historical aerial photographs and topographic maps, placement of construction debris occurred between 1972 and 1988. Interviews with former Station personnel indicate that construction debris generated during the construction of IRP Site 3 were placed at AA 3. Previous investigations conducted at AA 3 include: -1993 - Aerial Photograph Assessment; - 1999 to 2000 - Groundwater, soil, and soil vapor investigation, geophysical investigation, trenching, and radiological screening; - 2000 - Final Historical Radiological Assessment (HRA) - 2002 to 2005 - Removal Site Evaluation (RSE) (including eight rounds of groundwater monitoring); - 2003 - Human Health and Ecological Screening Risk Assessments (SRAs); - 2003 - Expanded Site Inspection (ESI); - 2006 - Final Radiological Release Report - 2007 to 2008 - Supplemental Groundwater Monitoring; and - 2008 to 2009 - Remedial Investigation (RI)/Feasibility Study (FS). The December 2006 Final Radiological Release Report provides radiological final status survey information, with supporting data, for AA 3. No evidence of radiological materials was noted during previous investigations or during the radiological survey and soil sampling. Results from the radiological assessment indicate that the surface of AA 3 contains only radiation levels which are present as the result of natural radioactivity contained in ground surface materials (e.g., gravel, crushed rock, etc.) and that the level of Radium-226 (Ra-226) exposure at the surface of AA 3 is in the range of the Station background for a residential receptor. AA 3 was therefore considered to meet the radiological criteria for unrestricted use. CDHS concurred that AA 3 may be released for unrestricted use. The July 2009 RI/FS Report presents a summary of all previously collected data (air, soil gas, soil, groundwater, sediment, and surface water results) and RSE findings. Significant findings are briefly summarized below. - The area of waste placement at AA 3 is approximately 5.14 acres and the volume of waste within AA 3 is approximately 230,000 cubic yards. There is an average of 4.5 feet of soil cover with isolated areas having as little as 2 feet of soil cover over the construction debris. -Air sampling results showed that surface air at AA 3 has not been impacted by wastes remaining at the site and results are

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

consistent with ambient (background) air sample results. - Soil gas results showed that methane is confined to the central portion of the site and is not migrating to the perimeter of the site. - Surface soil (0 to 1 feet below ground surface [bgs]) results showed few exceedances (isolated SVOCs and dioxins) of residential U.S. EPA Region 9 preliminary remediation goals (PRGs). - All surface soil analytical results indicated that metal concentrations are below PRGs or are within background concentrations. - Subsurface soil analytical results indicated one isolated SVOC in exceedance of residential PRGs. Total petroleum hydrocarbons (TPH) as diesel was reported at low concentrations and metal exceedances of background and PRGs were isolated and likely attributable to natural conditions. - Groundwater analytical results indicated no conclusive evidence of a release from AA 3; volatile organic compounds (VOCs) and TPH have not been reported in groundwater and no conclusive trends could be established to determine that historical activities at AA 3 have impacted groundwater. -Sediment analytical results from Agua Chinon Wash indicated all metals concentrations were within the range typical of background concentrations. -Surface water analytical results from upstream and downstream locations within Agua Chinon Wash indicated maximum contaminant level (MCL) exceedances for aluminum and chromium; however, the upstream and downstream concentrations were consistent, indicating that AA 3 has not impacted surface water in the wash. - The surface of AA 3 contains only natural radioactivity (e.g. in gravel, crushed rock, etc.), and the level of exposure to Ra-226 for a potential residential receptor at AA 3 is within Station background. AA 3 was therefore reclassified as non-impacted radiologically and was accepted for unrestricted release. - Based on the RSE findings as documented in the RI/FS Report, an adequate characterization of the nature and extent of releases has been completed. The human health and ecological risks have been quantified and are within acceptable risk management ranges. However, due to the presence of construction related debris at the site, the proximity of waste to groundwater, and the presence of elevated methane concentrations in the central portion of the site, an evaluation of response actions necessary for continued protection of human health and the environment was recommended. As part of the RI/FS, groundwater sampling was conducted at AA 3 to further characterize groundwater and support the remedy selection process. Supplemental groundwater monitoring is ongoing and the results have been consistent with previous monitoring data. Former MCAS El Toro was closed on 2 July 1999. From 1994 to 2002, the County of Orange, the designated Local Reuse Authority (LRA), proposed a commercial aviation reuse for former MCAS El Toro. This proposal was submitted as a BRAC Reuse Plan. In March 2002, County voters overturned those planning efforts with the passage of Measure W, a referendum that changed the Orange County General Plan for former MCAS El Toro to a non-aviation use and recreational theme, with limited development intensities. After the March 2002 vote, the LRA decided that it would not prepare another BRAC Reuse Plan for the property. Consequently, the Navy decided not to dispose of the property with any particular reuse or redevelopment plan and that reuse would ultimately be determined by local zoning applicable at the time of sale. In November 2003, the City of Irvine annexed the former Station property. The City of Irvine has not prepared a BRAC Reuse Plan. However, a conceptual Reuse Plan titled the "Orange County Great Park" was prepared and approved by the City of Irvine; calling for mixed uses of residential, commercial, and recreational open space. In July 2005, the Navy completed the process of conveying the former Station through public sale to a private developer. Although the sale resulted in a majority of the property being transferred by deed, areas that required further environmental investigation and/or response actions were retained by the Navy. These areas, known as carve-outs (COs), were leased to the developer in accordance with the Finding of Suitability to Lease (FOSL) under a Lease in Furtherance of

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Conveyance (LIFOC). Upon meeting the environmentally suitable for transfer requirements, the COs are deeded to the buyer. Based on the Orange County Great Park Plan, AA 3 is zoned as low-density residential. AA 3 is located within CO II-C. Former MCAS El Toro is located within the Irvine Management Zone (formally known as Irvine Groundwater Forebay), which has been designated by the RWQCB as a public water supply source. The aquifer located directly beneath former MCAS El Toro is not currently used for municipal water supply; however, the groundwater near the Station is used for agricultural purposes. A Record of Decision (ROD) for the Operable Unit 05 was completed in August 2010. EPA OU-6: No Further Action Sites Sites 4, 6, 9, 10, 13, 15, 19, 20, 21, and 22 were investigated, found to contain no unacceptable risks to human health or the environment, and recommended for no action. These sites were addressed along with Site 25 in the signed no action ROD, dated September 1997. EPA OU-07: Sites 7 & 14 - No Further Action Sites 7 and 14 were addressed in a no action ROD that was signed in June 2001. EPA OU-08: Site 1 EOD Range Site 1 is a former explosive ordnance disposal (EOD) range. A site-specific perchlorate investigation at this site showed that perchlorate was present above state and federal provisional action levels (PALs) at only one well, located in approximately the center of the site. Perchlorate was also present in 4 of 42 soil samples. However, none of the reported concentrations exceeded residential or industrial preliminary remediation goals. The evaluation of radionuclides confirmed that the radionuclides in groundwater at Former MCAS El Toro are naturally occurring and are not due to historical activities conducted at the Station. Operable Unit 8: IRP Site 1 (the former Explosive Ordinance Disposal [EOD] Training Range) is located in the northeast portion of former MCAS El Toro in the foothills of the Santa Ana Mountains. IRP Site 2 (Magazine Road Landfill) is located on the eastern portion of former MCAS El Toro. IRP Site 1 IRP Site 1 is situated within a tributary canyon of Borrego Canyon Wash at elevations ranging from approximately 610 feet to 760 feet above mean sea level (msl). EOD training was conducted at IRP Site 1 from 1952 until closure of former MCAS El Toro on 2 July 1999. Military ordnance used at the Site included hand grenades, land mines, cluster bombs, smoke bombs, and rocket propelled munitions. Civilian commercial-grade explosives, such as dynamite, and plastic and gelatinous explosives have also been used at IRP Site 1. Trenches and pits were periodically excavated and munitions were detonated. The trenches and pits were then filled with soil and then subsequently re-excavated to conduct additional munitions detonation activities. Limited historical information suggests that rocket motors or Jet-Assisted Take-Off units were handled at IRP Site 1. In 1982, approximately 2,000 gallons of sulfur trioxide chlorosulfonic acid (FS smoke) were reportedly burned in trenches located in the northern portion of the Site. An estimated 300,000 gallons of petroleum fuels were burned from 1952 through 1993. In addition, there are unconfirmed reports that low-level radioactive material was handled at the Site. The potential presence of radionuclides at the Site was investigated and based on the investigation findings the site received unrestricted release from the California Department of Public Health in September 2007. IRP Site 1 includes the Northern EOD Training Range (16.9 acres), the Southern EOD Training Range (16.6 acres), a Buffer Zone (37 acres), and a Subparcel (3.3 acres), among other features, for a total area of approximately 74 acres. The majority of recent military EOD training took place at the Northern EOD Training Range. The Southern EOD Training Range was used for EOD training by the Orange County Sheriff's Department and various Federal agencies. Several demolition pits, and a range building, are present at IRP Site 1. In addition, a former observation bunker constructed from metal ammunition cans was present at IRP Site 1 prior to the 2007 Santiago Fire. In 2008, munitions characterization activities were conducted, and as part of those activities, the soil in the ammunition cans was characterized and

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

properly disposed. The Department of Justice, Federal Bureau of Investigation (FBI) used IRP Site 1 for training purposes. The FBI's activities at IRP Site 1 included bomb technician training, post-blast investigation training, and emergency response operations. These activities involved the use of explosive devices and products. IRP 2 IRP Site 2 was used as a landfill from the late 1950s until about 1980; although some unauthorized disposal may have occurred on an intermittent basis at Areas C1, C2, and D2. During the 1970s, all solid waste from former MCAS El Toro and some waste from MCAS Tustin were disposed in this landfill. Previous reports estimate 800,000 to 1,000,000 cubic yards of waste were placed in the landfill during its operation. The suspected types of waste include construction debris, municipal waste, batteries, waste oils, hydraulic fluids, paint residues, transformers, and waste solvents. The remedial action for soil at IRP Site 2 was completed in February 2008. This remedial action included consolidation of wastes from Areas C1/C2, and D2, and construction of an evapotranspiration cap. The O&M of this evapotranspiration cap is currently in progress. Previous Investigations Various environmental investigations have been conducted at IRP Sites 1 and 2 as a part of the CERCLA process to characterize the physical attributes including the geology and hydrogeology, the nature and extent of contamination, potential risks to human-health and the environment, and the feasibility of potential remedial technologies. The environmental media investigated at IRP Sites 1 and 2 included soil, surface water, groundwater, and/or air. The following subsections present a summary of the investigations performed for groundwater at IRP Sites 1 and 2. The FFA signatories reviewed and concurred with the primary documents associated with these Sites. This Record of Decision (ROD) presents the selected remedial actions for groundwater associated with Installation Restoration Program (IRP) Site 1 (former Explosive Ordnance Disposal [EOD] Training Range) and IRP Site 2 (Magazine Road Landfill) at former Marine Corps Air Station (MCAS) El Toro, located in Orange County, California. A Record of Decision addressing Operable Unit 08 of the El Toro Marine Corps Air Station Site was completed in February 2012. EPA OU-09: Site 16 Burn Pits Site 16, Crash Crew Training Pit No. 2, is located in the northwest quadrant of Former MCAS El Toro. The site consists of three units. Unit 1, Pits Perimeter Area is an approximately 320- by 260-foot oval-shaped area comprising a buffer zone surrounding three pits that were used for firefighter training exercises. During the operational life of Site 16, this area was regularly tilled as a fire-control measure. Unit 2, Main Fire-Fighting Pits, consists of three unlined earthen pits situated within the boundary of Unit 1. The largest pit, which was used for most of the training exercises and is still present at the site, is roughly circular (approximately 67 feet in diameter), and 2 to 3 feet deep. The residual fluids pit, located about 40 feet south of the main pit and connected to it by a buried pipe, is approximately 12 feet wide, 35 feet long, and 4 to 5 feet deep. The smaller third pit, roughly 10 feet by 3 feet, was used for training with handheld fire extinguishers. The pits have not been used since 1985, and the residual fluids and handheld fire-fighting training pits have been filled to the surrounding grade. Unit 3, Drainage Channel, is a low drainage swale located northwest of the pits. It slopes toward and terminates at a storm drain inlet near the intersection of El Toro Boulevard and closed Runway 21. This unit was recommended for no further action in the RI Report for Site 16. The ground surface at Site 16 consists of bare soil with partial vegetation cover in the area surrounding the main burn pit and along the drainage ditch. The bottom of the burn pit itself is bare soil, discolored as a result of the historical activities at this site. The former residual fluids pit has been partially covered by the asphalt pavement surrounding the current concrete-lined crash crew training pits located immediately south of Site 16. Surface drainage from the site appears to flow northwest to a storm drain, which eventually

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

discharges into Bee Canyon Wash. The regional aquifer beneath Former MCAS El Toro is not currently a source of municipal drinking water because of widespread elevated concentrations of total dissolved solids (TDS) and nitrates that exceed water quality standards; however, groundwater in the vicinity of the Station is used for agricultural purposes. Between 1972 and 1985, Site 16 was used by Former MCAS El Toro crash crews as a training area for firefighters. Contamination at the site originated from residual fuels and combustible fluids that were placed in fire-fighting pits, ignited, and extinguished using water or fire extinguishers during fire-fighting practice sessions. Contaminants within the unlined pits have infiltrated the soil and, eventually, migrated into the groundwater. The primary medium of concern at Site 16 is groundwater, which is found at approximately 160 feet below ground surface (bgs). The only chemical of concern in groundwater is trichloroethene (TCE). TCE is present at concentrations above drinking water standards in a plume extending from approximately 200 feet upgradient of the main pit to approximately 330 feet downgradient of the main pit. Although petroleum hydrocarbons are present at Site 16, evaluation and cleanup of these contaminants is not addressed in this Record of Decision (ROD). Petroleum hydrocarbons from fuels and oils burned and released at the site will be addressed in the Petroleum Corrective Action Program. Investigations conducted at Site 16 include aerial photographic surveys, employee interviews, Phase I and Phase II RIs, pre-FS report sampling, and an MPE pilot test conducted in support of the FFS. Data collected during the Site 16 RIs included results of shallow and deeper subsurface soils investigations, groundwater investigations, aerial photograph reviews, and interviews with Former MCAS El Toro personnel. Following closure of the base, the Department of Navy (DON) finalized an Environmental Impact Report/Environmental Impact Study in March 2002 to evaluate several alternatives for the reuse of the Station. The DON is currently working with the local community to determine an appropriate alternative for the Station. At this time, the most likely reuse of Site 16 is recreational (park). A ROD addressing Unit 3 of OU 9 was completed in August 2003.

CERCLIS Assessment History:

Action Code:	001
Action:	DISCOVERY
Date Started:	/ /
Date Completed:	08/01/86
Priority Level:	Not reported
Operable Unit:	SITEWIDE
Primary Responsibility:	Federal Facilities
Planning Status:	Not reported
Urgency Indicator:	Not reported
Action Anomaly:	Not reported

Action Code:	001
Action:	PRELIMINARY ASSESSMENT
Date Started:	/ /
Date Completed:	10/01/86
Priority Level:	Higher priority for further assessment
Operable Unit:	SITEWIDE
Primary Responsibility:	Federal Facilities
Planning Status:	Not reported
Urgency Indicator:	Not reported
Action Anomaly:	Not reported

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Action Code: 001
Action: SITE INSPECTION
Date Started: / /
Date Completed: 06/01/87
Priority Level: Higher priority for further assessment
Operable Unit: SITEWIDE
Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: HAZARD RANKING SYSTEM PACKAGE
Date Started: / /
Date Completed: 06/01/87
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: EPA Fund-Financed
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: PROPOSAL TO NATIONAL PRIORITIES LIST
Date Started: / /
Date Completed: 06/24/88
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: EPA Fund-Financed
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: FINAL LISTING ON NATIONAL PRIORITIES LIST
Date Started: / /
Date Completed: 02/21/90
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: EPA Fund-Financed
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: Notice Letters Issued
Date Started: / /
Date Completed: 05/21/90
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: EPA Fund-Financed
Planning Status: Not reported
Urgency Indicator: Not reported

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Action Anomaly: Not reported

Action Code: 001
Action: INTERAGENCY AGREEMENT NEGOTIATIONS
Date Started: 07/01/89
Date Completed: 09/28/90
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Enforcement
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: FEDERAL INTERAGENCY AGREEMENT
Date Started: 09/28/90
Date Completed: 09/28/90
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Enforcement
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: FEDERAL FACILITY REMEDIAL INVESTIGATION
Date Started: 09/28/90
Date Completed: 12/17/93
Priority Level: Not reported
Operable Unit: EOD RANGE: SITE 1
Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 007
Action: FEDERAL FACILITY REMEDIAL INVESTIGATION/FEASIBILITY STUDY
Date Started: 09/28/90
Date Completed: 09/29/97
Priority Level: Not reported
Operable Unit: SOIL VOC SOURCE AREA: SITE 24
Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 006
Action: FEDERAL FACILITY REMEDIAL INVESTIGATION/FEASIBILITY STUDY
Date Started: 09/28/90
Date Completed: 09/29/97
Priority Level: Not reported
Operable Unit: NFA SITES
Primary Responsibility: Federal Facilities

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 002
Action: RECORD OF DECISION
Date Started: / /
Date Completed: 09/29/97
Priority Level: Not reported
Operable Unit: SOIL VOC SOURCE AREA: SITE 24
Primary Responsibility: Federal Facilities
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 006
Action: RECORD OF DECISION
Date Started: / /
Date Completed: 09/29/97
Priority Level: Not reported
Operable Unit: NFA SITES
Primary Responsibility: Federal Facilities
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 002
Action: FEDERAL FACILITY REMEDIAL DESIGN
Date Started: 01/06/98
Date Completed: 01/20/99
Priority Level: Not reported
Operable Unit: SOIL VOC SOURCE AREA: SITE 24
Primary Responsibility: Federal Facilities
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 002
Action: FEDERAL FACILITY REMEDIAL INVESTIGATION
Date Started: 09/30/97
Date Completed: 09/07/99
Priority Level: Not reported
Operable Unit: NFA: SITES 7 & 14
Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 005
Action: RECORD OF DECISION
Date Started: / /
Date Completed: 09/30/99

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Priority Level: Not reported
Operable Unit: SOIL SITES: 8, 11, 12
Primary Responsibility: Federal Facilities
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 004
Action: FEDERAL FACILITY REMEDIAL INVESTIGATION/FEASIBILITY STUDY
Date Started: 09/28/90
Date Completed: 07/12/00
Priority Level: Not reported
Operable Unit: LANDFILLS: SITES 2 & 17
Primary Responsibility: Federal Facilities
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 003
Action: RECORD OF DECISION
Date Started: / /
Date Completed: 07/12/00
Priority Level: Not reported
Operable Unit: LANDFILLS: SITES 2 & 17
Primary Responsibility: Federal Facilities
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 007
Action: RECORD OF DECISION
Date Started: / /
Date Completed: 06/06/01
Priority Level: Not reported
Operable Unit: NFA: SITES 7 & 14
Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 002
Action: FEDERAL FACILITY REMEDIAL INVESTIGATION/FEASIBILITY STUDY
Date Started: 09/28/90
Date Completed: 06/27/02
Priority Level: Not reported
Operable Unit: BASEWIDE GROUNDWATER
Primary Responsibility: Federal Facilities
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: RECORD OF DECISION

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Date Started: / /
Date Completed: 06/27/02
Priority Level: Not reported
Operable Unit: BASEWIDE GROUNDWATER
Primary Responsibility: Federal Facilities
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 005
Action: FEDERAL FACILITY REMEDIAL INVESTIGATION/FEASIBILITY STUDY
Date Started: 09/28/90
Date Completed: 06/30/02
Priority Level: Not reported
Operable Unit: SOIL SITES: 8, 11, 12
Primary Responsibility: Federal Facilities
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 002
Action: FEDERAL FACILITY REMEDIAL ACTION
Date Started: 05/17/99
Date Completed: 06/30/02
Priority Level: Not reported
Operable Unit: SOIL VOC SOURCE AREA: SITE 24
Primary Responsibility: Federal Facilities
Planning Status: Primary
Urgency Indicator: Long Term Action
Action Anomaly: Not reported

Action Code: 001
Action: TREATABILITY STUDY
Date Started: 08/28/00
Date Completed: 08/28/02
Priority Level: Not reported
Operable Unit: BURN PITS: SITE 16
Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 008
Action: FEDERAL FACILITY REMEDIAL INVESTIGATION/FEASIBILITY STUDY
Date Started: 04/30/94
Date Completed: 08/30/02
Priority Level: Not reported
Operable Unit: BURN PITS: SITE 16
Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Action Code: 011
Action: RECORD OF DECISION
Date Started: / /
Date Completed: 08/16/03
Priority Level: Not reported
Operable Unit: BURN PITS: SITE 16
Primary Responsibility: Federal Facilities
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: FEDERAL FACILITY REMEDIAL INVESTIGATION/FEASIBILITY STUDY
Date Started: 09/28/90
Date Completed: 03/07/05
Priority Level: Not reported
Operable Unit: LANDFILLS: SITES 3 & 5
Primary Responsibility: Federal Facilities
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 005
Action: FEDERAL FACILITY REMEDIAL DESIGN
Date Started: 01/13/00
Date Completed: 03/31/05
Priority Level: Not reported
Operable Unit: SOIL SITES: 8, 11, 12
Primary Responsibility: Federal Facilities
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: FEDERAL FACILITY REMEDIAL DESIGN
Date Started: 03/01/03
Date Completed: 05/31/05
Priority Level: Not reported
Operable Unit: BASEWIDE GROUNDWATER
Primary Responsibility: Federal Facilities
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 003
Action: FEDERAL FACILITY REMEDIAL DESIGN
Date Started: 07/12/00
Date Completed: 11/22/05
Priority Level: Not reported
Operable Unit: LANDFILLS: SITES 2 & 17
Primary Responsibility: Federal Facilities
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Action Code: 009
Action: FEDERAL FACILITY REMEDIAL INVESTIGATION/FEASIBILITY STUDY
Date Started: 10/25/04
Date Completed: 12/19/05
Priority Level: Not reported
Operable Unit: LANDFILLS: SITES 2 & 17
Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 009
Action: FEDERAL FACILITY REMEDIAL DESIGN
Date Started: 07/22/05
Date Completed: 01/20/06
Priority Level: Not reported
Operable Unit: BURN PITS: SITE 16
Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 005
Action: FEDERAL FACILITY REMEDIAL ACTION
Date Started: 03/24/05
Date Completed: 02/03/06
Priority Level: Final RA Report
Operable Unit: SOIL SITES: 8, 11, 12
Primary Responsibility: Federal Facilities
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 013
Action: RECORD OF DECISION
Date Started: / /
Date Completed: 03/14/06
Priority Level: Not reported
Operable Unit: SOIL VOC SOURCE AREA: SITE 24
Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: Explanation Of Significant Differences
Date Started: / /
Date Completed: 03/14/06
Priority Level: Not reported
Operable Unit: BASEWIDE GROUNDWATER
Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Action Anomaly: Not reported

Action Code: 010
Action: FEDERAL FACILITY REMEDIAL INVESTIGATION/FEASIBILITY STUDY
Date Started: 12/06/05
Date Completed: 12/01/06
Priority Level: Not reported
Operable Unit: LANDFILLS: SITES 3 & 5
Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 003
Action: FEDERAL FACILITY REMEDIAL INVESTIGATION
Date Started: 06/03/05
Date Completed: 12/29/06
Priority Level: Not reported
Operable Unit: EOD RANGE: SITE 1
Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 009
Action: RECORD OF DECISION
Date Started: / /
Date Completed: 05/08/07
Priority Level: Not reported
Operable Unit: SOIL SITES: 8, 11, 12
Primary Responsibility: Federal Facilities
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 009
Action: FEDERAL FACILITY REMEDIAL ACTION
Date Started: 01/20/06
Date Completed: 10/09/07
Priority Level: Interim RA Report
Operable Unit: BURN PITS: SITE 16
Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 010
Action: RECORD OF DECISION
Date Started: / /
Date Completed: 03/06/08
Priority Level: Not reported
Operable Unit: LANDFILLS: SITES 3 & 5

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Primary Responsibility: Federal Facilities
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: FEDERAL FACILITY REMEDIAL ACTION
Date Started: 03/21/05
Date Completed: 03/27/08
Priority Level: Interim RA Report
Operable Unit: BASEWIDE GROUNDWATER
Primary Responsibility: Federal Facilities
Planning Status: Primary
Urgency Indicator: Long Term Action
Action Anomaly: Not reported

Action Code: 001
Action: FEDERAL FACILITY FEASIBILITY STUDY
Date Started: 01/29/07
Date Completed: 08/29/08
Priority Level: Not reported
Operable Unit: EOD RANGE: SITE 1
Primary Responsibility: Federal Facilities
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 002
Action: Explanation Of Significant Differences
Date Started: / /
Date Completed: 12/15/08
Priority Level: Not reported
Operable Unit: BASEWIDE GROUNDWATER
Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 008
Action: FEDERAL FACILITY REMEDIAL DESIGN
Date Started: 09/12/07
Date Completed: 12/30/08
Priority Level: Not reported
Operable Unit: SOIL SITES: 8, 11, 12
Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 003
Action: FEDERAL FACILITY REMEDIAL ACTION
Date Started: 08/25/05

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Date Completed: 03/05/09
Priority Level: Not reported
Operable Unit: LANDFILLS: SITES 2 & 17
Primary Responsibility: Federal Facilities
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 003
Action: Explanation Of Significant Differences
Date Started: / /
Date Completed: 07/29/09
Priority Level: Not reported
Operable Unit: LANDFILLS: SITES 2 & 17
Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 004
Action: FEDERAL FACILITY REMEDIAL DESIGN
Date Started: 09/01/08
Date Completed: 08/13/09
Priority Level: Not reported
Operable Unit: LANDFILLS: SITES 3 & 5
Primary Responsibility: Federal Facilities
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 002
Action: FEDERAL FACILITY FIVE YEAR REVIEW
Date Started: / /
Date Completed: 09/28/09
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 015
Action: RECORD OF DECISION
Date Started: / /
Date Completed: 08/09/10
Priority Level: Not reported
Operable Unit: LANDFILLS: SITES 3 & 5
Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Action Code: 002
Action: FEDERAL FACILITY FEASIBILITY STUDY
Date Started: 01/29/07
Date Completed: 04/13/11
Priority Level: Not reported
Operable Unit: EOD RANGE: SITE 1
Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 012
Action: FEDERAL FACILITY REMEDIAL DESIGN
Date Started: 07/01/11
Date Completed: 07/19/11
Priority Level: Not reported
Operable Unit: LANDFILLS: SITES 3 & 5
Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 008
Action: RECORD OF DECISION
Date Started: / /
Date Completed: 02/09/12
Priority Level: Not reported
Operable Unit: EOD RANGE: SITE 1
Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 008
Action: FEDERAL FACILITY REMEDIAL ACTION
Date Started: 01/22/09
Date Completed: 04/30/12
Priority Level: Not reported
Operable Unit: SOIL SITES: 8, 11, 12
Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 007
Action: FEDERAL FACILITY REMEDIAL DESIGN
Date Started: 01/03/12
Date Completed: 12/19/12
Priority Level: Not reported
Operable Unit: EOD RANGE: SITE 1
Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Action Anomaly: Not reported

Action Code: 011
Action: FEDERAL FACILITY REMEDIAL ACTION
Date Started: 07/19/11
Date Completed: 01/22/13
Priority Level: Not reported
Operable Unit: LANDFILLS: SITES 3 & 5
Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 004
Action: FEDERAL FACILITY REMEDIAL ACTION
Date Started: 08/17/09
Date Completed: 06/10/13
Priority Level: Not reported
Operable Unit: LANDFILLS: SITES 3 & 5
Primary Responsibility: Federal Facilities
Planning Status: Primary
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: Restoration Advisory Board
Date Started: 04/01/94
Date Completed: / /
Priority Level: Not reported
Operable Unit: SITEWIDE
Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 001
Action: OPERATIONS AND MAINTENANCE
Date Started: 10/09/07
Date Completed: / /
Priority Level: Not reported
Operable Unit: BURN PITS: SITE 16
Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Action Code: 002
Action: OPERATIONS AND MAINTENANCE
Date Started: 03/27/08
Date Completed: / /
Priority Level: Not reported
Operable Unit: BASEWIDE GROUNDWATER

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Primary Responsibility: Federal Facilities
Planning Status: Not reported
Urgency Indicator: Not reported
Action Anomaly: Not reported

Federal Register Details:
Fed Register Date: 02/21/90
Fed Register Volume: 55
Page Number: 6154

Fed Register Date: 06/24/88
Fed Register Volume: 53
Page Number: 23988

CORRACTS:

EPA ID: CA6170023208
EPA Region: 09
Area Name: ENTIRE FACILITY
Actual Date: 19960501
Action: CA050 - RFA Completed
NAICS Code(s): 92811
National Security
Original schedule date: 19960501
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 09
Area Name: ENTIRE FACILITY
Actual Date: 19960501
Action: CA070YE - RFA Determination Of Need For An RFI, RFI is Necessary
NAICS Code(s): 92811
National Security
Original schedule date: 19960501
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 09
Area Name: ENTIRE FACILITY
Actual Date: 19980617
Action: CA725NO - Current Human Exposures Under Control, Current human exposures are NOT under control
NAICS Code(s): 92811
National Security
Original schedule date: 19980617
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 09
Area Name: ENTIRE FACILITY
Actual Date: 19980617
Action: CA750NO - Migration of Contaminated Groundwater under Control, Unacceptable migration of contaminated groundwater is observed or expected
NAICS Code(s): 92811

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

National Security
Original schedule date: 19980617
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 09
Area Name: OU2A - VADOSE ZONE SOILS
Actual Date: 19970123
Action: CA300 - CMS Workplan Approved
NAICS Code(s): 92811
National Security
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 09
Area Name: OU2A - VADOSE ZONE SOILS
Actual Date: 19970123
Action: CA200 - RFI Approved
NAICS Code(s): 92811
National Security
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 09
Area Name: OU2A - VADOSE ZONE SOILS
Actual Date: 19970123
Action: CA150 - RFI Workplan Approved
NAICS Code(s): 92811
National Security
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 09
Area Name: OU2A - VADOSE ZONE SOILS
Actual Date: 19970123
Action: CA350 - CMS Approved
NAICS Code(s): 92811
National Security
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 09
Area Name: OU2A - VADOSE ZONE SOILS
Actual Date: 20040723
Action: CA999 - Corrective Action Process Terminated
NAICS Code(s): 92811
National Security
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 09
Area Name: FOST 1

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Actual Date: 20040723
Action: CA999 - Corrective Action Process Terminated
NAICS Code(s): 92811
National Security
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 09
Area Name: FOST 1
Actual Date: 20040723
Action: CA999RM - Corrective Action Process Terminated, Remedial Activities Completed
NAICS Code(s): 92811
National Security
Original schedule date: 20040723
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 09
Area Name: FOST 2
Actual Date: 20050829
Action: CA999 - Corrective Action Process Terminated
NAICS Code(s): 92811
National Security
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 09
Area Name: OU2A - VADOSE ZONE SOILS
Actual Date: 19970930
Action: CA400 - Date For Remedy Selection (CM Imposed)
NAICS Code(s): 92811
National Security
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 09
Area Name: ENTIRE FACILITY
Actual Date: 19970930
Action: CA400 - Date For Remedy Selection (CM Imposed)
NAICS Code(s): 92811
National Security
Original schedule date: 19970930
Schedule end date: Not reported

RCRA-TSDF:
Date form received by agency: 01/29/2002
Facility name: MARINE CORPS AIR STATION, EL TORO
Facility address: MCAS EL TORO
EL TORO, CA 92709
EPA ID: CA6170023208
Mailing address: CARETAKER SITE OFFICE
PO BOX 444
EAST IRVINE, CA 92650

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Contact: EDWARD L NUNN
Contact address: Not reported
Not reported
Contact country: US
Contact telephone: (619) 572-1404
Contact email: Not reported
EPA Region: 09
Land type: Federal
Classification: TSDF
Description: Handler is engaged in the treatment, storage or disposal of hazardous waste

Owner/Operator Summary:
Owner/operator name: U.S. MARINE CORPS
Owner/operator address: Not reported
Not reported
Owner/operator country: US
Owner/operator telephone: Not reported
Legal status: Federal
Owner/Operator Type: Owner
Owner/Op start date: 03/17/1943
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Historical Generators:
Date form received by agency: 01/29/2002
Site name: MARINE CORPS AIR STATION, EL TORO
Classification: Large Quantity Generator

. Waste code: D040
. Waste name: TRICHLORETHYLENE

Date form received by agency: 10/12/2000
Site name: MCAS EL TORO
Classification: Large Quantity Generator

Date form received by agency: 04/15/1999
Site name: MCAS EL TORO
Classification: Large Quantity Generator

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Date form received by agency: 09/01/1996
Site name: USMC AIR STATION EL TORO
Classification: Large Quantity Generator

Date form received by agency: 01/31/1996
Site name: USMC MCAS EL TORO
Classification: Large Quantity Generator

Date form received by agency: 03/30/1994
Site name: USMC MCAS EL TORO
Classification: Large Quantity Generator

Date form received by agency: 10/26/1993
Site name: USMC AIR STATION EL TORO
Classification: Large Quantity Generator

Date form received by agency: 02/29/1992
Site name: MCAS EL TORO FMD 1JG B.368
Classification: Large Quantity Generator

Corrective Action Summary:

Event date: 10/01/1986
Event: CA029SF

Event date: 10/01/1986
Event: CA049PA

Event date: 06/01/1987
Event: CA049SI

Event date: 10/24/1990
Event: RFI Imposition

Event date: 10/24/1990
Event: CMS Imposition

Event date: 04/20/1991
Event: CA Prioritization, Facility or area was assigned a medium corrective action priority.

Event date: 01/01/1996
Event: CA Responsibility Referred To A Non-RCRA Federal Authority, Corrective Action at the facility or area referred to CERCLA.

Event date: 05/01/1996
Event: RFA Determination Of Need For An RFI, RFI is Necessary;

Event date: 05/01/1996
Event: RFA Completed

Event date: 05/01/1996
Event: RFA Completed, Assessment was an RFA.

Event date: 01/23/1997
Event: CMS Workplan Approved

Event date: 01/23/1997

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Event: RFI Workplan Approved

Event date: 01/23/1997
Event: CMS Approved

Event date: 01/23/1997
Event: RFI Approved

Event date: 09/30/1997
Event: Date For Remedy Selection (CM Imposed)

Event date: 09/30/1997
Event: Date For Remedy Selection (CM Imposed)

Event date: 06/17/1998
Event: CA Responsibility Referred To A Non-RCRA Federal Authority

Event date: 06/17/1998
Event: Stabilization Measures Evaluation,This facility is amenable to stabilization activity based on the status of corrective action work at the facility, technical factors, the degree of risk, timing considerations and administrative considerations.

Event date: 06/17/1998
Event: Igration of Contaminated Groundwater under Control, Unacceptable migration of contaminated groundwater is observed or expected.

Event date: 06/17/1998
Event: Igration of Contaminated Groundwater under Control, Unacceptable migration of contaminated groundwater is observed or expected.

Event date: 06/17/1998
Event: Current Human Exposures under Control, Current human exposures are NOT under control.

Event date: 06/17/1998
Event: Current Human Exposures under Control, Current human exposures are NOT under control.

Event date: 07/23/2004
Event: Corrective Action Process Terminated

Event date: 07/23/2004
Event: Corrective Action Process Terminated, Remedial Activities Completed

Event date: 08/29/2005
Event: Corrective Action Process Terminated

Facility Has Received Notices of Violations:
Regulation violated: FR - 262.50-60
Area of violation: Generators - General
Date violation determined: 05/20/1997
Date achieved compliance: 01/14/1998
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 05/20/1997
Enf. disposition status: Not reported

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.10-18.B
Area of violation: TSD - General
Date violation determined: 05/20/1997
Date achieved compliance: 01/14/1998
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 05/20/1997
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.170-177.I
Area of violation: TSD - General
Date violation determined: 05/20/1997
Date achieved compliance: 01/14/1998
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 05/20/1997
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 262.30-34.C
Area of violation: Generators - General
Date violation determined: 05/20/1997
Date achieved compliance: 01/14/1998
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 05/20/1997
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 262.20-23.B
Area of violation: Generators - General
Date violation determined: 03/27/1996
Date achieved compliance: 09/27/1996
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 03/27/1996
Enf. disposition status: Not reported
Enf. disp. status date: Not reported

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 262.50-60
Area of violation: Generators - General
Date violation determined: 03/27/1996
Date achieved compliance: 09/27/1996
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 03/27/1996
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 262.40-43.D
Area of violation: Generators - General
Date violation determined: 03/27/1996
Date achieved compliance: 09/27/1996
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 03/27/1996
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 261.5
Area of violation: Generators - General
Date violation determined: 03/27/1996
Date achieved compliance: 09/27/1996
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 03/27/1996
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: F - 262.30-34.C
Area of violation: Generators - General
Date violation determined: 03/26/1996
Date achieved compliance: 09/27/1996
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 03/27/1996
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.30-37.C
Area of violation: TSD - General
Date violation determined: 04/19/1995
Date achieved compliance: 05/01/1995
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 04/19/1995
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.50-56.D
Area of violation: TSD - General
Date violation determined: 04/19/1995
Date achieved compliance: 05/01/1995
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 04/19/1995
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.170-177.I
Area of violation: TSD - General
Date violation determined: 04/19/1995
Date achieved compliance: 05/01/1995
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 04/19/1995
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.10-18.B
Area of violation: TSD - General
Date violation determined: 04/19/1995
Date achieved compliance: 05/01/1995
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 04/19/1995
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.30-37.C
Area of violation: TSD - General
Date violation determined: 12/28/1993
Date achieved compliance: 01/17/1994
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 12/28/1993
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 268 ALL
Area of violation: LDR - General
Date violation determined: 12/09/1992
Date achieved compliance: 09/26/1994
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 03/10/1993
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 80500
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.10-18.B
Area of violation: TSD - General
Date violation determined: 12/09/1992
Date achieved compliance: 09/26/1994
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 12/09/1992
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.70-77.E
Area of violation: TSD - General
Date violation determined: 12/09/1992
Date achieved compliance: 09/26/1994
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 12/09/1992
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Paid penalty amount: Not reported

Regulation violated: FR - 264.70-77.E
Area of violation: TSD - General
Date violation determined: 12/09/1992
Date achieved compliance: 09/26/1994
Violation lead agency: State
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 04/26/1993
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: 42000
Paid penalty amount: 42000

Regulation violated: FR - 270
Area of violation: TSD - General
Date violation determined: 12/09/1992
Date achieved compliance: 09/26/1994
Violation lead agency: State
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 04/26/1993
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: 42000
Paid penalty amount: 42000

Regulation violated: FR - 262.40-43.D
Area of violation: Generators - General
Date violation determined: 12/09/1992
Date achieved compliance: 09/26/1994
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 03/10/1993
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 80500
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.10-18.B
Area of violation: TSD - General
Date violation determined: 12/09/1992
Date achieved compliance: 09/26/1994
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 03/10/1993
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 80500
Final penalty amount: Not reported
Paid penalty amount: Not reported

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Regulation violated: FR - 262.40-43.D
Area of violation: Generators - General
Date violation determined: 12/09/1992
Date achieved compliance: 09/26/1994
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 12/09/1992
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.30-37.C
Area of violation: TSD - General
Date violation determined: 12/09/1992
Date achieved compliance: 09/26/1994
Violation lead agency: State
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 04/26/1993
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: 42000
Paid penalty amount: 42000

Regulation violated: FR - 264.70-77.E
Area of violation: TSD - General
Date violation determined: 12/09/1992
Date achieved compliance: 09/26/1994
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 03/10/1993
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 80500
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 262.40-43.D
Area of violation: Generators - General
Date violation determined: 12/09/1992
Date achieved compliance: 09/26/1994
Violation lead agency: State
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 04/26/1993
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: 42000
Paid penalty amount: 42000

Regulation violated: FR - 270

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Area of violation: TSD - General
Date violation determined: 12/09/1992
Date achieved compliance: 09/26/1994
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 12/09/1992
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 268 ALL
Area of violation: LDR - General
Date violation determined: 12/09/1992
Date achieved compliance: 09/26/1994
Violation lead agency: State
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 04/26/1993
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: 42000
Paid penalty amount: 42000

Regulation violated: FR - 264.30-37.C
Area of violation: TSD - General
Date violation determined: 12/09/1992
Date achieved compliance: 09/26/1994
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 03/10/1993
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 80500
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.10-18.B
Area of violation: TSD - General
Date violation determined: 12/09/1992
Date achieved compliance: 09/26/1994
Violation lead agency: State
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 04/26/1993
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: 42000
Paid penalty amount: 42000

Regulation violated: FR - 264.30-37.C
Area of violation: TSD - General

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Date violation determined: 12/09/1992
Date achieved compliance: 09/26/1994
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 12/09/1992
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 270
Area of violation: TSD - General
Date violation determined: 12/09/1992
Date achieved compliance: 09/26/1994
Violation lead agency: State
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 03/10/1993
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: 80500
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 268 ALL
Area of violation: LDR - General
Date violation determined: 12/09/1992
Date achieved compliance: 09/26/1994
Violation lead agency: State
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 12/09/1992
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: State
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.170-177.I
Area of violation: TSD - General
Date violation determined: 10/05/1992
Date achieved compliance: 12/09/1992
Violation lead agency: EPA
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 10/09/1992
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 270
Area of violation: TSD - General
Date violation determined: 10/05/1992

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Date achieved compliance: 12/09/1992
Violation lead agency: EPA
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 10/09/1992
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 262.30-34.C
Area of violation: Generators - General
Date violation determined: 09/30/1991
Date achieved compliance: 11/25/1991
Violation lead agency: EPA
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 10/21/1991
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 262.40-43.D
Area of violation: Generators - General
Date violation determined: 09/30/1991
Date achieved compliance: 11/25/1991
Violation lead agency: EPA
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 10/21/1991
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.10-18.B
Area of violation: TSD - General
Date violation determined: 09/30/1991
Date achieved compliance: 11/25/1991
Violation lead agency: EPA
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 10/21/1991
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 262.20-23.B
Area of violation: Generators - General
Date violation determined: 09/30/1991
Date achieved compliance: 11/25/1991

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Violation lead agency: EPA
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 10/21/1991
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 262.50-60
Area of violation: Generators - General
Date violation determined: 09/30/1991
Date achieved compliance: 11/25/1991
Violation lead agency: EPA
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 10/21/1991
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.170-177.I
Area of violation: TSD - General
Date violation determined: 09/30/1991
Date achieved compliance: 11/25/1991
Violation lead agency: EPA
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 10/21/1991
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.30-37.C
Area of violation: TSD - General
Date violation determined: 09/30/1991
Date achieved compliance: 11/25/1991
Violation lead agency: EPA
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 10/21/1991
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 270
Area of violation: TSD - General
Date violation determined: 09/30/1991
Date achieved compliance: 11/25/1991
Violation lead agency: EPA

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Enforcement action: WRITTEN INFORMAL
Enforcement action date: 10/21/1991
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 270
Area of violation: TSD - General
Date violation determined: 06/13/1990
Date achieved compliance: 11/25/1991
Violation lead agency: EPA
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 09/28/1990
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 270
Area of violation: TSD - General
Date violation determined: 06/13/1990
Date achieved compliance: 11/25/1991
Violation lead agency: EPA
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 08/06/1990
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 268.7
Area of violation: LDR - General
Date violation determined: 07/11/1989
Date achieved compliance: 06/13/1990
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 268 ALL
Area of violation: LDR - General
Date violation determined: 07/11/1989
Date achieved compliance: 06/13/1990
Violation lead agency: EPA
Enforcement action: Not reported

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 268 ALL
Area of violation: LDR - General
Date violation determined: 07/11/1989
Date achieved compliance: 06/13/1990
Violation lead agency: EPA
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 08/17/1989
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.110-120.G
Area of violation: TSD - Closure/Post-Closure
Date violation determined: 07/11/1989
Date achieved compliance: 06/13/1990
Violation lead agency: EPA
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 08/17/1989
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 268.7
Area of violation: LDR - General
Date violation determined: 07/11/1989
Date achieved compliance: 06/13/1990
Violation lead agency: EPA
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 08/06/1990
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 268.7
Area of violation: LDR - General
Date violation determined: 07/11/1989
Date achieved compliance: 06/13/1990
Violation lead agency: EPA
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 09/28/1990

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 270
Area of violation: TSD - General
Date violation determined: 07/11/1989
Date achieved compliance: 11/25/1991
Violation lead agency: EPA
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 08/06/1990
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 270
Area of violation: TSD - General
Date violation determined: 07/11/1989
Date achieved compliance: 11/25/1991
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.110-120.G
Area of violation: TSD - Closure/Post-Closure
Date violation determined: 07/11/1989
Date achieved compliance: 06/13/1990
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 270
Area of violation: TSD - General
Date violation determined: 07/11/1989
Date achieved compliance: 11/25/1991
Violation lead agency: EPA
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 09/28/1990
Enf. disposition status: Not reported

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.110-120.G
Area of violation: TSD - Closure/Post-Closure
Date violation determined: 07/11/1989
Date achieved compliance: 06/13/1990
Violation lead agency: EPA
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 09/28/1990
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 268.7
Area of violation: LDR - General
Date violation determined: 07/11/1989
Date achieved compliance: 06/13/1990
Violation lead agency: EPA
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 08/17/1989
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.110-120.G
Area of violation: TSD - Closure/Post-Closure
Date violation determined: 07/11/1989
Date achieved compliance: 06/13/1990
Violation lead agency: EPA
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 08/06/1990
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 270
Area of violation: TSD - General
Date violation determined: 07/11/1989
Date achieved compliance: 11/25/1991
Violation lead agency: EPA
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 08/17/1989
Enf. disposition status: Not reported
Enf. disp. status date: Not reported

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 268 ALL
Area of violation: LDR - General
Date violation determined: 07/11/1989
Date achieved compliance: 06/13/1990
Violation lead agency: EPA
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 09/28/1990
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 268 ALL
Area of violation: LDR - General
Date violation determined: 07/11/1989
Date achieved compliance: 06/13/1990
Violation lead agency: EPA
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 08/06/1990
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 270
Area of violation: TSD - General
Date violation determined: 08/17/1988
Date achieved compliance: 07/11/1989
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 270
Area of violation: TSD - General
Date violation determined: 08/17/1988
Date achieved compliance: 07/11/1989
Violation lead agency: EPA
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 11/17/1988
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 270
Area of violation: TSD - General
Date violation determined: 08/17/1988
Date achieved compliance: 07/11/1989
Violation lead agency: EPA
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 08/06/1990
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.110-120.G
Area of violation: TSD - Closure/Post-Closure
Date violation determined: 08/17/1988
Date achieved compliance: 07/11/1989
Violation lead agency: EPA
Enforcement action: WRITTEN INFORMAL
Enforcement action date: 11/17/1988
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 270
Area of violation: TSD - General
Date violation determined: 08/17/1988
Date achieved compliance: 07/11/1989
Violation lead agency: EPA
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 09/28/1990
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.110-120.G
Area of violation: TSD - Closure/Post-Closure
Date violation determined: 08/17/1988
Date achieved compliance: 07/11/1989
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.110-120.G
Area of violation: TSD - Closure/Post-Closure
Date violation determined: 08/17/1988
Date achieved compliance: 07/11/1989
Violation lead agency: EPA
Enforcement action: FINAL 3008(A) COMPLIANCE ORDER
Enforcement action date: 09/28/1990
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 264.110-120.G
Area of violation: TSD - Closure/Post-Closure
Date violation determined: 08/17/1988
Date achieved compliance: 07/11/1989
Violation lead agency: EPA
Enforcement action: INITIAL 3008(A) COMPLIANCE
Enforcement action date: 08/06/1990
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: EPA
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 270
Area of violation: TSD - General
Date violation determined: 03/05/1987
Date achieved compliance: 08/17/1988
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Regulation violated: FR - 268.7
Area of violation: LDR - General
Date violation determined: 03/05/1987
Date achieved compliance: 08/17/1988
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Paid penalty amount: Not reported

Regulation violated: FR - 268 ALL
Area of violation: LDR - General
Date violation determined: 03/05/1987
Date achieved compliance: 08/17/1988
Violation lead agency: EPA
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:
Evaluation date: 01/14/1998
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State

Evaluation date: 05/20/1997
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - General
Date achieved compliance: 01/14/1998
Evaluation lead agency: State

Evaluation date: 05/20/1997
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 01/14/1998
Evaluation lead agency: State

Evaluation date: 03/26/1996
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 09/27/1996
Evaluation lead agency: State

Evaluation date: 03/30/1995
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - General
Date achieved compliance: 05/01/1995
Evaluation lead agency: State

Evaluation date: 11/17/1993
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - General
Date achieved compliance: 01/17/1994
Evaluation lead agency: State

Evaluation date: 10/26/1992
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - General
Date achieved compliance: 09/26/1994

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Evaluation lead agency: State

Evaluation date: 10/26/1992
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 09/26/1994
Evaluation lead agency: State

Evaluation date: 10/26/1992
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: LDR - General
Date achieved compliance: 09/26/1994
Evaluation lead agency: State

Evaluation date: 09/17/1992
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: EPA

Evaluation date: 06/17/1992
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - General
Date achieved compliance: 12/09/1992
Evaluation lead agency: EPA Contractor/Grantee

Evaluation date: 06/17/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - General
Date achieved compliance: 11/25/1991
Evaluation lead agency: EPA

Evaluation date: 06/17/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 11/25/1991
Evaluation lead agency: EPA

Evaluation date: 06/13/1990
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - General
Date achieved compliance: 11/25/1991
Evaluation lead agency: EPA

Evaluation date: 07/11/1989
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - Closure/Post-Closure
Date achieved compliance: 06/13/1990
Evaluation lead agency: EPA

Evaluation date: 07/11/1989
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: LDR - General
Date achieved compliance: 06/13/1990
Evaluation lead agency: EPA

Evaluation date: 07/11/1989

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - General
Date achieved compliance: 11/25/1991
Evaluation lead agency: EPA

Evaluation date: 08/17/1988
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - General
Date achieved compliance: 07/11/1989
Evaluation lead agency: EPA

Evaluation date: 08/17/1988
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - Closure/Post-Closure
Date achieved compliance: 07/11/1989
Evaluation lead agency: EPA

Evaluation date: 03/05/1987
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: LDR - General
Date achieved compliance: 08/17/1988
Evaluation lead agency: EPA

Evaluation date: 03/05/1987
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: TSD - General
Date achieved compliance: 08/17/1988
Evaluation lead agency: EPA

US ENG CONTROLS:
EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Address: EL TORO MARINE CORPS AIR STA
EL TORO M C A S
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Actual Date: 02/28/2012
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 001
Action Name: Explanation Of Significant Differences
Action Completion date: 03/14/2006
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Discharge
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 001
Action Name: Explanation Of Significant Differences

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Action Completion date: 03/14/2006
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Reinjection
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 002
Action Name: Explanation Of Significant Differences
Action Completion date: 12/15/2008
Operable Unit: 01
Contaminated Media : Soil Gas
Engineering Control: Sampling
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 003
Action Name: Explanation Of Significant Differences
Action Completion date: 07/29/2009
Operable Unit: 04
Contaminated Media : Groundwater
Engineering Control: Non-fundamental change (ESD)
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 003
Action Name: Explanation Of Significant Differences
Action Completion date: 07/29/2009
Operable Unit: 04
Contaminated Media : Soil
Engineering Control: Non-fundamental change (ESD)
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 06/27/2002
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Air Stripping
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 06/27/2002
Operable Unit: 01

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Contaminated Media : Groundwater
Engineering Control: Carbon Adsorption
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 06/27/2002
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Extraction
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 06/27/2002
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 002
Action Name: RECORD OF DECISION
Action Completion date: 09/29/1997
Operable Unit: 02
Contaminated Media : Soil
Engineering Control: Carbon Adsorption
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 002
Action Name: RECORD OF DECISION
Action Completion date: 09/29/1997
Operable Unit: 02
Contaminated Media : Soil
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 002
Action Name: RECORD OF DECISION
Action Completion date: 09/29/1997
Operable Unit: 02
Contaminated Media : Soil
Engineering Control: Soil Vapor Extraction (in-situ)

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 003
Action Name: RECORD OF DECISION
Action Completion date: 07/12/2000
Operable Unit: 04
Contaminated Media : Groundwater
Engineering Control: Leachate Control
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 003
Action Name: RECORD OF DECISION
Action Completion date: 07/12/2000
Operable Unit: 04
Contaminated Media : Groundwater
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 003
Action Name: RECORD OF DECISION
Action Completion date: 07/12/2000
Operable Unit: 04
Contaminated Media : Soil
Engineering Control: Cap
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 006
Action Name: RECORD OF DECISION
Action Completion date: 09/29/1997
Operable Unit: 06
Contaminated Media : Sediment
Engineering Control: No Action
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 006
Action Name: RECORD OF DECISION
Action Completion date: 09/29/1997
Operable Unit: 06
Contaminated Media : Soil
Engineering Control: No Action
Contact Name: Not reported
Contact Phone and Ext: Not reported

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Latitude: Not reported
Longitude: Not reported

Action ID: 006
Action Name: RECORD OF DECISION
Action Completion date: 09/29/1997
Operable Unit: 06
Contaminated Media : Surface Water
Engineering Control: No Action
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 007
Action Name: RECORD OF DECISION
Action Completion date: 06/06/2001
Operable Unit: 07
Contaminated Media : Soil
Engineering Control: No Action
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 008
Action Name: RECORD OF DECISION
Action Completion date: 02/09/2012
Operable Unit: 08
Contaminated Media : Groundwater
Engineering Control: Bioremediation (In-Situ)
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 008
Action Name: RECORD OF DECISION
Action Completion date: 02/09/2012
Operable Unit: 08
Contaminated Media : Groundwater
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 008
Action Name: RECORD OF DECISION
Action Completion date: 02/09/2012
Operable Unit: 08
Contaminated Media : Groundwater
Engineering Control: Natural Attenuation
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Action ID: 009
Action Name: RECORD OF DECISION
Action Completion date: 05/08/2007
Operable Unit: 03
Contaminated Media : Soil
Engineering Control: Disposal
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 009
Action Name: RECORD OF DECISION
Action Completion date: 05/08/2007
Operable Unit: 03
Contaminated Media : Soil
Engineering Control: Excavation
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 009
Action Name: RECORD OF DECISION
Action Completion date: 05/08/2007
Operable Unit: 03
Contaminated Media : Soil
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 009
Action Name: RECORD OF DECISION
Action Completion date: 05/08/2007
Operable Unit: 03
Contaminated Media : Soil
Engineering Control: No Action
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 009
Action Name: RECORD OF DECISION
Action Completion date: 05/08/2007
Operable Unit: 03
Contaminated Media : Soil
Engineering Control: Sampling
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 010
Action Name: RECORD OF DECISION

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Groundwater
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Groundwater
Engineering Control: No Action
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Landfill Gas
Engineering Control: Active Gas Collection System
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Landfill Gas
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Landfill Gas
Engineering Control: Passive Gas Collection System
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Contaminated Media : Soil
Engineering Control: Cap
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Soil
Engineering Control: No Action
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Solid Waste
Engineering Control: Cap
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Solid Waste
Engineering Control: Consolidate
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Solid Waste
Engineering Control: Engineering Control, (N.O.S.)
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Solid Waste
Engineering Control: Operations & Maintenance (O&M)

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 011
Action Name: RECORD OF DECISION
Action Completion date: 08/16/2003
Operable Unit: 09
Contaminated Media : Groundwater
Engineering Control: Liquid Phase Carbon Adsorption
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 011
Action Name: RECORD OF DECISION
Action Completion date: 08/16/2003
Operable Unit: 09
Contaminated Media : Groundwater
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 011
Action Name: RECORD OF DECISION
Action Completion date: 08/16/2003
Operable Unit: 09
Contaminated Media : Groundwater
Engineering Control: Natural Attenuation
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 011
Action Name: RECORD OF DECISION
Action Completion date: 08/16/2003
Operable Unit: 09
Contaminated Media : Soil
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 011
Action Name: RECORD OF DECISION
Action Completion date: 08/16/2003
Operable Unit: 09
Contaminated Media : Soil
Engineering Control: Surface Drainage Control
Contact Name: Not reported
Contact Phone and Ext: Not reported

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Latitude: Not reported
Longitude: Not reported

Action ID: 013
Action Name: RECORD OF DECISION
Action Completion date: 03/14/2006
Operable Unit: 02
Contaminated Media : Soil
Engineering Control: No Further Action
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Groundwater
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Landfill Gas
Engineering Control: Active Gas Collection System
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Landfill Gas
Engineering Control: Operations & Maintenance (O&M)
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Landfill Gas
Engineering Control: Passive Gas Collection System
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Soil
Engineering Control: Consolidate
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Soil
Engineering Control: Impermeable Barrier
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Soil
Engineering Control: Operations & Maintenance (O&M)
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Soil
Engineering Control: Slope Stabilization
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Solid Waste
Engineering Control: Consolidate
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 015
Action Name: RECORD OF DECISION

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Solid Waste
Engineering Control: Dike/Berm
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Solid Waste
Engineering Control: Operations & Maintenance (O&M)
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Solid Waste
Engineering Control: Slope Stabilization
Contact Name: Not reported
Contact Phone and Ext: Not reported
Latitude: Not reported
Longitude: Not reported

US INST CONTROL:
EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Covenant
Actual Date: 06/02/2002
Complet. Date: 06/27/2002
Operable Unit: 01
Contaminated Media : Groundwater
Contact Name : Not reported
Contact Phone and Ext : Not reported
Latitude : Not reported
Longitude : Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Institutional Controls, (N.O.S.)
Actual Date: 06/30/2000
Complet. Date: 07/12/2000
Operable Unit: 04
Contaminated Media : Groundwater
Contact Name : Not reported
Contact Phone and Ext : Not reported
Latitude : Not reported
Longitude : Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Land Use Restriction
Actual Date: 06/30/2000
Complet. Date: 07/12/2000
Operable Unit: 04
Contaminated Media : Soil
Contact Name : Not reported
Contact Phone and Ext : Not reported
Latitude : Not reported
Longitude : Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Access Restriction
Actual Date: 02/28/2012
Complet. Date: 02/09/2012
Operable Unit: 08
Contaminated Media : Groundwater
Contact Name : Not reported
Contact Phone and Ext : Not reported
Latitude : Not reported
Longitude : Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Groundwater use/well drilling regulation
Actual Date: 02/28/2012
Complet. Date: 02/09/2012
Operable Unit: 08
Contaminated Media : Groundwater
Contact Name : Not reported
Contact Phone and Ext : Not reported
Latitude : Not reported
Longitude : Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Institutional Controls, (N.O.S.)
Actual Date: 02/28/2012
Complet. Date: 02/09/2012
Operable Unit: 08
Contaminated Media : Groundwater
Contact Name : Not reported
Contact Phone and Ext : Not reported
Latitude : Not reported
Longitude : Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Building, demolition, or excavation regulation
Actual Date: 03/31/2008
Complet. Date: 03/06/2008
Operable Unit: 05
Contaminated Media : Soil
Contact Name : Not reported
Contact Phone and Ext : Not reported
Latitude : Not reported
Longitude : Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Deed Notices
Actual Date: 03/31/2008
Complet. Date: 03/06/2008
Operable Unit: 05
Contaminated Media : Soil
Contact Name : Not reported
Contact Phone and Ext : Not reported
Latitude : Not reported
Longitude : Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Zoning regulation
Actual Date: 03/31/2008
Complet. Date: 03/06/2008
Operable Unit: 05
Contaminated Media : Soil
Contact Name : Not reported
Contact Phone and Ext : Not reported
Latitude : Not reported
Longitude : Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Building, demolition, or excavation regulation
Actual Date: 03/31/2008
Complet. Date: 03/06/2008
Operable Unit: 05
Contaminated Media : Solid Waste
Contact Name : Not reported
Contact Phone and Ext : Not reported
Latitude : Not reported
Longitude : Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Zoning regulation
Actual Date: 03/31/2008
Complet. Date: 03/06/2008
Operable Unit: 05
Contaminated Media : Solid Waste
Contact Name : Not reported
Contact Phone and Ext : Not reported
Latitude : Not reported
Longitude : Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Covenant
Actual Date: 09/30/2010
Complet. Date: 08/09/2010
Operable Unit: 05
Contaminated Media : Soil
Contact Name : Not reported
Contact Phone and Ext : Not reported
Latitude : Not reported
Longitude : Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Covenant
Actual Date: 09/30/2010
Complet. Date: 08/09/2010
Operable Unit: 05
Contaminated Media : Solid Waste
Contact Name : Not reported
Contact Phone and Ext : Not reported
Latitude : Not reported
Longitude : Not reported

ROD:
Full-text of USEPA Record of Decision(s) is available from EDR.

PRP:

MARINE CORPS AIR STATION, EL TORO (Continued) **1000417911**

PRP name: NAVAL FACILITIES ENGINEERING COMMAND
STATE OF CALIFORNIA/DEPT. OF HEALTH SERVICES
STATE OF CALIFORNIA/DEPT. OF HEALTH SERVICES
STATE OF CALIFORNIA/DEPT. OF WATER QUALITY
STATE OF CALIFORNIA/DEPT. OF WATER QUALITY
USM CORP.
USM CORP.

B3 **EDR Hist Auto** **1015376904**
NNE **26721 RANCHO PKWY** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.037 mi.
195 ft. **Site 1 of 3 in cluster B**

Relative:
Lower

EDR Historical Auto Stations:
Name: LAKE FOREST SHELL GAS STATION
Year: 2001
Actual: Address: 26721 RANCHO PKWY
732 ft.

B4 **RANCHO PARKWAY SHELL #07** **UST** **U004051193**
NNE **26721 RANCHO PKWY** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.037 mi.
195 ft. **Site 2 of 3 in cluster B**

Relative:
Lower

ORANGE CO. UST:
Facility ID: FA0024028

Actual:
732 ft.

C5 **EDR Hist Auto** **1015314346**
SSW **20602 PASCAL WAY** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.044 mi.
233 ft. **Site 1 of 3 in cluster C**

Relative:
Lower

EDR Historical Auto Stations:
Name: EUROPEAN CAR COMPANY
Year: 1999
Actual: Address: 20602 PASCAL WAY
681 ft.

Name: SILVERSTONE MOTORCARS
Year: 2005
Address: 20602 PASCAL WAY

Name: ALICIA COMPLETE AUTO REPAIR
Year: 2006
Address: 20602 PASCAL WAY

Name: ALICIA COMPLETE AUTO REPAIR
Year: 2007
Address: 20602 PASCAL WAY

Name: ALICIA COMPLETE AUTO REPAIR
Year: 2008
Address: 20602 PASCAL WAY

(Continued) **1015314346**

Name: NISSAN AUTO SERVICE
Year: 2009
Address: 20602 PASCAL WAY

Name: NISSAN AUTO SVC
Year: 2010
Address: 20602 PASCAL WAY

Name: ALICIA COMPLETE AUTOMOTIVE
Year: 2011
Address: 20602 PASCAL WAY

Name: ALL AUTO PRO
Year: 2012
Address: 20602 PASCAL WAY

B6 **EDR Hist Auto** **1015376933**
NNE **26731 RANCHO PKWY** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.046 mi.
244 ft. **Site 3 of 3 in cluster B**

Relative:
Lower

Actual:
730 ft.

EDR Historical Auto Stations:

Name: EZ LUBE NO
Year: 2003
Address: 26731 RANCHO PKWY

Name: EZ LUBE NO
Year: 2004
Address: 26731 RANCHO PKWY

Name: EZ LUBE NO 49
Year: 2005
Address: 26731 RANCHO PKWY

Name: EZ LUBE
Year: 2006
Address: 26731 RANCHO PKWY

Name: EZ LUBE
Year: 2007
Address: 26731 RANCHO PKWY

Name: EZ LUBE
Year: 2008
Address: 26731 RANCHO PKWY

Name: EZ LUBE
Year: 2009
Address: 26731 RANCHO PKWY

Name: EZ LUBE LAKE FOREST
Year: 2010
Address: 26731 RANCHO PKWY

Name: EZ LUBE
Year: 2011
Address: 26731 RANCHO PKWY

(Continued) **1015376933**

Name: EZ LUBE
Year: 2012
Address: 26731 RANCHO PKWY

7
South
< 1/8
0.049 mi.
259 ft.

WESTERN DIGITAL CORP
20511 LAKE FOREST DR
LAKE FOREST, CA 92630

RCRA-SQG
FINDS
HAZNET
ECHO

1004676765
CAR000089235

Relative:
Lower

Actual:
692 ft.

RCRA-SQG:
Date form received by agency: 03/06/2013
Facility name: ALCON RESEARCH LTD
Facility address: 20511 LAKE FOREST DR
LAKE FOREST, CA 92630
EPA ID: CAR000089235
Mailing address: 15800 ALTON PKWY
IRVINE, CA 92618
Contact: ERIC QUACH
Contact address: 15800 ALTON PKWY
IRVINE, CA 92618
Contact country: US
Contact telephone: 949-453-7824
Contact email: ERIC.QUACH@ALCON.COM
EPA Region: 09
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: THE REALTY ASSOCIATES FUND VI
Owner/operator address: 23046 AVENIDA DE LA CARLOTA STE 150
LAGUNA HILLS, CA 92653
Owner/operator country: US
Owner/operator telephone: 949-752-2066
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: 08/01/2002
Owner/Op end date: Not reported

Owner/operator name: ALCON RESEARCH LTD
Owner/operator address: Not reported
Not reported
Owner/operator country: US
Owner/operator telephone: Not reported
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: 01/01/2012
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No

WESTERN DIGITAL CORP (Continued) **1004676765**

Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

. Waste code: 214
. Waste name: 214

. Waste code: 221
. Waste name: 221

. Waste code: 331
. Waste name: 331

. Waste code: 343
. Waste name: 343

. Waste code: 352
. Waste name: 352

. Waste code: 551
. Waste name: 551

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: D002
. Waste name: CORROSIVE WASTE

. Waste code: F003
. Waste name: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NONHALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS, AND A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: U080
. Waste name: METHANE, DICHLORO- (OR) METHYLENE CHLORIDE

. Waste code: U122
. Waste name: FORMALDEHYDE

Historical Generators:
Date form received by agency: 01/02/2001

WESTERN DIGITAL CORP (Continued) **1004676765**

Site name: WESTERN DIGITAL CORP
Classification: Small Quantity Generator

. Waste code: D000
. Waste name: Not Defined

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: D002
. Waste name: CORROSIVE WASTE

. Waste code: D006
. Waste name: CADMIUM

. Waste code: D008
. Waste name: LEAD

. Waste code: D009
. Waste name: MERCURY

. Waste code: F005
. Waste name: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Violation Status: No violations found

FINDS:

Registry ID: 110012221764

Environmental Interest/Information System

California Hazardous Waste Tracking System - Datamart (HWTS-DATAMART) provides California with information on hazardous waste shipments for generators, transporters, and treatment, storage, and disposal facilities.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

HAZNET:
envid: 1004676765
Year: 2014
GEPAID: CAR000089235
Contact: ERIC QUACH
Telephone: 9494537824
Mailing Name: Not reported

WESTERN DIGITAL CORP (Continued) **1004676765**

Mailing Address: 15800 ALTON PKWY
Mailing City,St,Zip: IRVINE, CA 926183818
Gen County: Orange
TSD EPA ID: CAD008302903
TSD County: Los Angeles
Waste Category: Off-specification, aged or surplus organics
Disposal Method: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Tons: 0.2
Cat Decode: Off-specification, aged or surplus organics
Method Decode: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Facility County: Orange

envid: 1004676765
Year: 2014
GEPAID: CAR000089235
Contact: ERIC QUACH
Telephone: 9494537824
Mailing Name: Not reported
Mailing Address: 15800 ALTON PKWY
Mailing City,St,Zip: IRVINE, CA 926183818
Gen County: Orange
TSD EPA ID: CAD008302903
TSD County: Los Angeles
Waste Category: Laboratory waste chemicals
Disposal Method: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Tons: 0.011
Cat Decode: Laboratory waste chemicals
Method Decode: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Facility County: Orange

envid: 1004676765
Year: 2014
GEPAID: CAR000089235
Contact: ERIC QUACH
Telephone: 9494537824
Mailing Name: Not reported
Mailing Address: 15800 ALTON PKWY
Mailing City,St,Zip: IRVINE, CA 926183818
Gen County: Orange
TSD EPA ID: CAD008302903
TSD County: Los Angeles
Waste Category: Alkaline solution without metals pH >= 12.5
Disposal Method: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Tons: 0.005
Cat Decode: Alkaline solution without metals pH >= 12.5
Method Decode: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Facility County: Orange

envid: 1004676765
Year: 2014
GEPAID: CAR000089235

WESTERN DIGITAL CORP (Continued) **1004676765**

Contact:	ERIC QUACH
Telephone:	9494537824
Mailing Name:	Not reported
Mailing Address:	15800 ALTON PKWY
Mailing City,St,Zip:	IRVINE, CA 926183818
Gen County:	Orange
TSD EPA ID:	CAD008302903
TSD County:	Los Angeles
Waste Category:	Off-specification, aged or surplus inorganics
Disposal Method:	Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Tons:	0.045
Cat Decode:	Off-specification, aged or surplus inorganics
Method Decode:	Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Facility County:	Orange

envid:	1004676765
Year:	2014
GEPAID:	CAR000089235
Contact:	ERIC QUACH
Telephone:	9494537824
Mailing Name:	Not reported
Mailing Address:	15800 ALTON PKWY
Mailing City,St,Zip:	IRVINE, CA 926183818
Gen County:	Orange
TSD EPA ID:	CAD008302903
TSD County:	Los Angeles
Waste Category:	Other inorganic solid waste
Disposal Method:	Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Tons:	0.005
Cat Decode:	Other inorganic solid waste
Method Decode:	Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Facility County:	Orange

Click this hyperlink while viewing on your computer to access
67 additional CA_HAZNET: record(s) in the EDR Site Report.

ECHO:

Envid:	1004676765
Registry ID:	110012221764
DFR URL:	http://echo.epa.gov/detailed_facility_report?fid=110012221764

C8 **EDR Hist Auto** **1015313562**
SSW **20591 PASCAL WAY** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.069 mi.
363 ft. **Site 2 of 3 in cluster C**

Relative:
Lower

Actual:
678 ft.

EDR Historical Auto Stations:

Name:	EURO AMERICAN COLLISION
Year:	2009
Address:	20591 PASCAL WAY
Name:	EURO AMERICAN COLLISION

(Continued) **1015313562**

Year: 2011
Address: 20591 PASCAL WAY

Name: EURO AMERICAN COLLISION
Year: 2012
Address: 20591 PASCAL WAY

---

9 **EDR Hist Auto** **1015310595**
SE **20371 LAKE FOREST DR** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.069 mi.
363 ft.

Relative:
Lower

Actual:
724 ft.

EDR Historical Auto Stations:

Name: JMEK ENGINEERING
Year: 2007
Address: 20371 LAKE FOREST DR

Name: JMEK ENGINEERING
Year: 2008
Address: 20371 LAKE FOREST DR

Name: JMEK ENGINEERING
Year: 2009
Address: 20371 LAKE FOREST DR

---

10 **EDR Hist Auto** **1015310342**
ESE **20331 LAKE FOREST DR** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.071 mi.
373 ft.

Relative:
Lower

Actual:
729 ft.

EDR Historical Auto Stations:

Name: AUTOSTYLZ
Year: 2002
Address: 20331 LAKE FOREST DR

Name: AUTOSTYLZ
Year: 2003
Address: 20331 LAKE FOREST DR

Name: JMEK ENGINEERING
Year: 2005
Address: 20331 LAKE FOREST DR

11
ENE
< 1/8
0.084 mi.
444 ft.

HOME DEPOT USA INC HD 6668
20021 LAKE FOREST DR
LAKE FOREST, CA 92630

RCRA-SQG
FINDS
ECHO

1004675991
CAR000079657

Relative:
Higher

Actual:
740 ft.

RCRA-SQG:

Date form received by agency:	06/22/2005
Facility name:	HOME DEPOT USA INC HD 6668
Facility address:	20021 LAKE FOREST DR LAKE FOREST, CA 92630
EPA ID:	CAR000079657
Mailing address:	1905 ASTON AVE STE 100 CARLSBAD, CA 92008
Contact:	ROBERT PERKINS
Contact address:	1905 ASTON AVE STE 100 CARLSBAD, CA 92008
Contact country:	US
Contact telephone:	760-602-8700
Contact email:	RPERKINS@3ECOMPANY.COM
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	HOME DEPOT USA
Owner/operator address:	Not reported Not reported
Owner/operator country:	US
Owner/operator telephone:	Not reported
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	06/01/2000
Owner/Op end date:	Not reported

Owner/operator name:	HOME DEPOT USA
Owner/operator address:	2455 PACES FERRY RD ATLANTA, GA 30339
Owner/operator country:	US
Owner/operator telephone:	Not reported
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	06/01/2000
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No

HOME DEPOT USA INC HD 6668 (Continued) **1004675991**

Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: D002
. Waste name: CORROSIVE WASTE

. Waste code: D009
. Waste name: MERCURY

. Waste code: D016
. Waste name: 2,4-D (2,4-DICHLOROPHENOXYACETIC ACID)

. Waste code: D018
. Waste name: BENZENE

. Waste code: D035
. Waste name: METHYL ETHYL KETONE

. Waste code: F003
. Waste name: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NONHALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS, AND A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: F005
. Waste name: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Historical Generators:
Date form received by agency: 08/01/2000
Site name: THE HOME DEPOT
Classification: Small Quantity Generator

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: D002

HOME DEPOT USA INC HD 6668 (Continued) **1004675991**

. Waste name: CORROSIVE WASTE

Violation Status: No violations found

FINDS:

Registry ID: 110002941416

Environmental Interest/Information System
California Hazardous Waste Tracking System - Datamart (HWTS-DATAMART) provides California with information on hazardous waste shipments for generators, transporters, and treatment, storage, and disposal facilities.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

ECHO:
Envid: 1004675991
Registry ID: 110002941416
DFR URL: http://echo.epa.gov/detailed_facility_report?fid=110002941416

---

12 **EDR Hist Auto** **1015318419**
North **21 RANCHO CIR** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.093 mi.
491 ft.

Relative:
Higher

Actual:
802 ft.

EDR Historical Auto Stations:
Name: MICHELANGELO MOTORWERKES
Year: 2006
Address: 21 RANCHO CIR

Name: MICHELANGELO MOTORWERKES
Year: 2007
Address: 21 RANCHO CIR

Name: MICHELANGELO MOTOR WERKES
Year: 2009
Address: 21 RANCHO CIR

C13 **EDR Hist Auto** **1015314450**
South **20622 PASCAL WAY** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.093 mi.
492 ft. **Site 3 of 3 in cluster C**

Relative:
Lower

Actual:
677 ft.

EDR Historical Auto Stations:
Name: RYANS TRANSMISSIONS
Year: 1999
Address: 20622 PASCAL WAY

(Continued) **1015314450**

Name: CARDINAL AUTO CARE XII
Year: 2001
Address: 20622 PASCAL WAY

Name: CARDINAL AUTO CARE XII
Year: 2002
Address: 20622 PASCAL WAY

Name: CARDINAL AUTO CARE XII
Year: 2003
Address: 20622 PASCAL WAY

Name: K & W AUTOMOTIVE INC
Year: 2004
Address: 20622 PASCAL WAY

Name: K & W AUTOMOTIVE INC
Year: 2005
Address: 20622 PASCAL WAY

Name: K & W AUTOMOTIVE INC
Year: 2006
Address: 20622 PASCAL WAY

Name: K & W AUTOMOTIVE INC
Year: 2008
Address: 20622 PASCAL WAY

Name: L & M AUTOMOTIVE
Year: 2009
Address: 20622 PASCAL WAY

Name: L & M AUTOMOTIVE
Year: 2010
Address: 20622 PASCAL WAY

Name: L & M AUTOMOTIVE
Year: 2011
Address: 20622 PASCAL WAY

Name: L & M AUTOMOTIVE
Year: 2012
Address: 20622 PASCAL WAY

D14 **BEACON BAY CAR WASH** **LUST** **S105774228**
South **20602 LAKE FOREST** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.107 mi.
565 ft. **Site 1 of 8 in cluster D**

Relative:
Lower

Actual:
699 ft.

LUST:
Region: STATE
Global Id: T0605999998
Latitude: 33.663041
Longitude: -117.666454
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 09/12/2002

BEACON BAY CAR WASH (Continued) **S105774228**

Lead Agency:	ORANGE COUNTY LOP
Case Worker:	KL
Local Agency:	ORANGE COUNTY LOP
RB Case Number:	083003899T
LOC Case Number:	02UT003
File Location:	Local Agency
Potential Media Affect:	Under Investigation
Potential Contaminants of Concern:	Gasoline
Site History:	Not reported

Click here to access the California GeoTracker records for this facility:

Contact:

Global Id:	T0605999998
Contact Type:	Local Agency Caseworker
Contact Name:	KEVIN LAMBERT
Organization Name:	ORANGE COUNTY LOP
Address:	1241 E DYER ROAD SUITE 120
City:	SANTA ANA
Email:	klambert@ochca.com
Phone Number:	7144336261

Global Id:	T0605999998
Contact Type:	Local Agency Caseworker
Contact Name:	JAMES STROZIER
Organization Name:	ORANGE COUNTY LOP
Address:	1241 E. DYER ROAD SUITE 120
City:	SANTA ANA
Email:	jstrozier@ochca.com
Phone Number:	7144336273

Global Id:	T0605999998
Contact Type:	Regional Board Caseworker
Contact Name:	NANCY OLSON-MARTIN
Organization Name:	SANTA ANA RWQCB (REGION 8)
Address:	3737 MAIN STREET, SUITE 500
City:	RIVERSIDE
Email:	nolson-martin@waterboards.ca.gov
Phone Number:	Not reported

Status History:

Global Id:	T0605999998
Status:	Completed - Case Closed
Status Date:	09/12/2002

Global Id:	T0605999998
Status:	Open - Case Begin Date
Status Date:	09/12/2002

ORANGE CO. LUST:

Region:	ORANGE
Facility Id:	02UT003
Current Status:	Certification (Case Closed)
Released Substance:	Gasoline-Automotive (motor gasoline and additives), leaded & unleaded
Date Closed:	09/12/2002
Case Type:	Undetermined

BEACON BAY CAR WASH (Continued) **S105774228**

Record ID: RO0003032

LUST REG 8:

Region:	8
County:	Orange
Regional Board:	Santa Ana Region
Facility Status:	Case Closed
Case Number:	083003899T
Local Case Num:	02UT003
Case Type:	Undefined
Substance:	Gasoline
Qty Leaked:	0
Abate Method:	Not reported
Cross Street:	Not reported
Enf Type:	Not reported
Funding:	Not reported
How Discovered:	Tank Closure
How Stopped:	Close Tank
Leak Cause:	Unknown
Leak Source:	Unknown
Global ID:	T0605999998
How Stopped Date:	9/9/9999
Enter Date:	Not reported
Date Confirmation of Leak Began:	Not reported
Date Preliminary Assessment Began:	Not reported
Discover Date:	1/1/1965
Enforcement Date:	Not reported
Close Date:	9/12/2002
Date Prelim Assessment Workplan Submitted:	Not reported
Date Pollution Characterization Began:	Not reported
Date Remediation Plan Submitted:	Not reported
Date Remedial Action Underway:	Not reported
Date Post Remedial Action Monitoring:	Not reported
Enter Date:	Not reported
GW Qualifies:	Not reported
Soil Qualifies:	Not reported
Operator:	Not reported
Facility Contact:	Not reported
Interim:	Not reported
Oversite Program:	LUST
Latitude:	33.662755
Longitude:	-117.667306
MTBE Date:	Not reported
Max MTBE GW:	Not reported
MTBE Concentration:	0
Max MTBE Soil:	Not reported
MTBE Fuel:	1
MTBE Tested:	Site NOT Tested for MTBE.Includes Unknown and Not Analyzed.
MTBE Class:	*
Staff:	NOM
Staff Initials:	JS
Lead Agency:	Local Agency
Local Agency:	30000L
Hydr Basin #:	Not reported
Beneficial:	MUN
Priority:	Not reported
Cleanup Fund Id:	Not reported

BEACON BAY CAR WASH (Continued) **S105774228**

Work Suspended: Not reported
Summary: Not reported

D15 **BEACON BAY FOOTHILL** **UST** **U003879615**
South **20602 LAKE FOREST DR** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.107 mi.
565 ft. **Site 2 of 8 in cluster D**

Relative:
Lower

Actual:
699 ft.

UST:
Facility ID: 19793
Permitting Agency: ORANGE COUNTY
Latitude: 33.664311
Longitude: -117.665085

D16 **CAR WASH EXPRESS** **SWEEPS UST** **S101589521**
South **20602 LAKE FOREST DR** **CA FID UST** **N/A**
< 1/8 **EL TORO, CA 92630**
0.107 mi.
565 ft. **Site 3 of 8 in cluster D**

Relative:
Lower

Actual:
699 ft.

SWEEPS UST:
Status: Not reported
Comp Number: 12655
Number: Not reported
Board Of Equalization: Not reported
Referral Date: Not reported
Action Date: Not reported
Created Date: Not reported
Owner Tank Id: Not reported
SWRCB Tank Id: 30-000-012655-000001
Tank Status: Not reported
Capacity: 10000
Active Date: Not reported
Tank Use: UNKNOWN
STG: PRODUCT
Content: Not reported
Number Of Tanks: 2

Status: Not reported
Comp Number: 12655
Number: Not reported
Board Of Equalization: Not reported
Referral Date: Not reported
Action Date: Not reported
Created Date: Not reported
Owner Tank Id: Not reported
SWRCB Tank Id: 30-000-012655-000002
Tank Status: Not reported
Capacity: 10000
Active Date: Not reported
Tank Use: UNKNOWN
STG: PRODUCT
Content: Not reported
Number Of Tanks: Not reported

CAR WASH EXPRESS (Continued) **S101589521**

CA FID UST:

Facility ID:	30017393
Regulated By:	UTNKI
Regulated ID:	Not reported
Cortese Code:	Not reported
SIC Code:	Not reported
Facility Phone:	Not reported
Mail To:	Not reported
Mailing Address:	Not reported
Mailing Address 2:	Not reported
Mailing City,St,Zip:	EL TORO 92630
Contact:	Not reported
Contact Phone:	Not reported
DUNs Number:	Not reported
NPDES Number:	Not reported
EPA ID:	Not reported
Comments:	Not reported
Status:	Inactive

---

17 **EDR Hist Auto** **1015362040**
WNW **25 ORCHARD** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.111 mi.
588 ft.

Relative:
Higher

Actual:
742 ft.

EDR Historical Auto Stations:

Name:	PINNACLE AUTO DETAIL
Year:	2007
Address:	25 ORCHARD
Name:	PINNACLE AUTO DETAIL
Year:	2008
Address:	25 ORCHARD

D18 **ARCO #81641** **UST** **U003913409**
SSE **20572 LAKE FOREST DR** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.112 mi.
589 ft. **Site 4 of 8 in cluster D**

Relative:
Lower

Actual:
700 ft.

UST:

Facility ID:	12020
Permitting Agency:	ORANGE COUNTY
Latitude:	33.664849
Longitude:	-117.664751

D19 **ARCO** **LUST** **U003937792**
SSE **20572 LAKE FOREST DR** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.112 mi.
589 ft. **Site 5 of 8 in cluster D**

Relative:
Lower

Actual:
700 ft.

LUST:

Region:	STATE
Global Id:	T0605947685
Latitude:	33.663244
Longitude:	-117.665983
Case Type:	LUST Cleanup Site
Status:	Completed - Case Closed
Status Date:	05/16/2003
Lead Agency:	ORANGE COUNTY LOP
Case Worker:	KL
Local Agency:	ORANGE COUNTY LOP
RB Case Number:	Not reported
LOC Case Number:	02UT008
File Location:	Local Agency Warehouse
Potential Media Affect:	Soil
Potential Contaminants of Concern:	Gasoline
Site History:	Not reported

Click here to access the California GeoTracker records for this facility:

Contact:

Global Id:	T0605947685
Contact Type:	Local Agency Caseworker
Contact Name:	JAMES STROZIER
Organization Name:	ORANGE COUNTY LOP
Address:	1241 E. DYER ROAD SUITE 120
City:	SANTA ANA
Email:	jstrozier@ochca.com
Phone Number:	7144336273

Global Id:	T0605947685
Contact Type:	Local Agency Caseworker
Contact Name:	KEVIN LAMBERT
Organization Name:	ORANGE COUNTY LOP
Address:	1241 E DYER ROAD SUITE 120
City:	SANTA ANA
Email:	klambert@ochca.com
Phone Number:	7144336261

Global Id:	T0605947685
Contact Type:	Regional Board Caseworker
Contact Name:	VALERIE JAHN-BULL
Organization Name:	SANTA ANA RWQCB (REGION 8)
Address:	3737 MAIN STREET, SUITE 500
City:	RIVERSIDE
Email:	vjahn-bull@waterboards.ca.gov
Phone Number:	9517824903

Status History:

Global Id:	T0605947685
Status:	Completed - Case Closed
Status Date:	05/16/2003

ARCO (Continued) **U003937792**

Global Id: T0605947685
Status: Open - Case Begin Date
Status Date: 02/26/2002

Global Id: T0605947685
Status: Open - Site Assessment
Status Date: 02/26/2002

Regulatory Activities:
Global Id: T0605947685
Action Type: REMEDIATION
Date: 07/30/2002
Action: Not reported

Global Id: T0605947685
Action Type: Other
Date: 02/26/2002
Action: Leak Discovery

Global Id: T0605947685
Action Type: Other
Date: 03/04/2002
Action: Leak Reported

Global Id: T0605947685
Action Type: ENFORCEMENT
Date: 05/16/2003
Action: Closure/No Further Action Letter

ORANGE CO. LUST:
Region: ORANGE
Facility Id: 02UT008
Current Status: Certification (Case Closed)
Released Substance: Gasoline-Automotive (motor gasoline and additives), leaded & unleaded
Date Closed: 05/16/2003
Case Type: Soil Only
Record ID: RO0003049

D20 **ARCO AM/PM** **LUST S105774214**
SSE **20572 LAKE FOREST DR** **SWEEPS UST N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.112 mi.
589 ft. **Site 6 of 8 in cluster D**

Relative:
Lower

Actual:
700 ft.

LUST REG 8:
Region: 8
County: Orange
Regional Board: Santa Ana Region
Facility Status: Case Closed
Case Number: Not reported
Local Case Num: 02UT008
Case Type: Soil only
Substance: Gasoline
Qty Leaked: 0
Abate Method: Not reported
Cross Street: Not reported

ARCO AM/PM (Continued) **S105774214**

Enf Type:	CLOS
Funding:	Not reported
How Discovered:	UM
How Stopped:	Other Means
Leak Cause:	Unknown
Leak Source:	Piping
Global ID:	T0605947685
How Stopped Date:	9/9/9999
Enter Date:	Not reported
Date Confirmation of Leak Began:	Not reported
Date Preliminary Assessment Began:	2/26/2002
Discover Date:	2/26/2002
Enforcement Date:	Not reported
Close Date:	5/16/2003
Date Prelim Assessment Workplan Submitted:	Not reported
Date Pollution Characterization Began:	Not reported
Date Remediation Plan Submitted:	Not reported
Date Remedial Action Underway:	Not reported
Date Post Remedial Action Monitoring:	Not reported
Enter Date:	Not reported
GW Qualifies:	Not reported
Soil Qualifies:	Not reported
Operator:	Not reported
Facility Contact:	Not reported
Interim:	Not reported
Oversite Program:	LUST
Latitude:	0
Longitude:	0
MTBE Date:	Not reported
Max MTBE GW:	Not reported
MTBE Concentration:	0
Max MTBE Soil:	Not reported
MTBE Fuel:	1
MTBE Tested:	Site NOT Tested for MTBE.Includes Unknown and Not Analyzed.
MTBE Class:	*
Staff:	VJJ
Staff Initials:	JS
Lead Agency:	Local Agency
Local Agency:	30000L
Hydr Basin #:	Not reported
Beneficial:	MUN
Priority:	Not reported
Cleanup Fund Id:	Not reported
Work Suspended:	Not reported

Summary: Not reported

SWEEPS UST:

Status:	Active
Comp Number:	12020
Number:	9
Board Of Equalization:	Not reported
Referral Date:	09-30-92
Action Date:	09-15-92
Created Date:	02-29-88
Owner Tank Id:	Not reported
SWRCB Tank Id:	30-000-012020-000001
Tank Status:	A

ARCO AM/PM (Continued) **S105774214**

Capacity:	10000
Active Date:	Not reported
Tank Use:	M.V. FUEL
STG:	P
Content:	LEADED
Number Of Tanks:	4
Status:	Active
Comp Number:	12020
Number:	9
Board Of Equalization:	Not reported
Referral Date:	09-30-92
Action Date:	09-15-92
Created Date:	02-29-88
Owner Tank Id:	Not reported
SWRCB Tank Id:	30-000-012020-000002
Tank Status:	A
Capacity:	10000
Active Date:	Not reported
Tank Use:	M.V. FUEL
STG:	P
Content:	DIESEL
Number Of Tanks:	Not reported
Status:	Active
Comp Number:	12020
Number:	9
Board Of Equalization:	Not reported
Referral Date:	09-30-92
Action Date:	09-15-92
Created Date:	02-29-88
Owner Tank Id:	Not reported
SWRCB Tank Id:	30-000-012020-000003
Tank Status:	A
Capacity:	10000
Active Date:	Not reported
Tank Use:	M.V. FUEL
STG:	P
Content:	REG UNLEADED
Number Of Tanks:	Not reported
Status:	Active
Comp Number:	12020
Number:	9
Board Of Equalization:	Not reported
Referral Date:	09-30-92
Action Date:	09-15-92
Created Date:	02-29-88
Owner Tank Id:	Not reported
SWRCB Tank Id:	30-000-012020-000004
Tank Status:	A
Capacity:	10000
Active Date:	Not reported
Tank Use:	M.V. FUEL
STG:	P
Content:	REG UNLEADED
Number Of Tanks:	Not reported

D21 **GRAB N GO 24/7** **UST** **U004200589**
SSE **20572 LAKE FOREST DR** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.112 mi.
589 ft. **Site 7 of 8 in cluster D**

Relative:
Lower

ORANGE CO. UST:
Facility ID: FA0024654

Actual:
700 ft.

D22 **ECONO LUBE N TUNE** **RCRA-SQG** **1000595001**
SSE **20572 LAKE FOREST DR** **FINDS** **CAD983588914**
< 1/8 **EL TORO, CA 92630** **ECHO**
0.112 mi.
589 ft. **Site 8 of 8 in cluster D**

Relative:
Lower

Actual:
700 ft.

RCRA-SQG:
Date form received by agency: 07/11/1991
Facility name: ECONO LUBE N TUNE
Facility address: 20572 LAKE FOREST DR
EL TORO, CA 92630
EPA ID: CAD983588914
Contact: TABATABI AL
Contact address: 20572 LAKE FOREST DR
EL TORO, CA 92630
Contact country: US
Contact telephone: (714) 457-0370
Contact email: Not reported
EPA Region: 09
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: AL TABATABI
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: NOT REQUIRED
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No

ECONO LUBE N TUNE (Continued) **1000595001**

Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No

Violation Status: No violations found

FINDS:

Registry ID: 110002848982

Environmental Interest/Information System

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

ECHO:

Envid:	1000595001
Registry ID:	110002848982
DFR URL:	http://echo.epa.gov/detailed_facility_report?fid=110002848982

E23 **FOOTHILL CLEANERS** **RCRA-SQG** **1000685968**
South **20651 LAKE FOREST DR A111** **Orange Co. Industrial Site** **CAD983629346**
< 1/8 **LAKE FOREST, CA 92630** **FINDS**
0.114 mi. **DRYCLEANERS**
601 ft. **Site 1 of 2 in cluster E** **HAZNET**
ECHO

Relative:
Lower

Actual:
726 ft.

RCRA-SQG:

Date form received by agency:	04/13/1992
Facility name:	FOOTHILL CLEANERS
Facility address:	20651 LAKE FOREST DR A111 LAKE FOREST, CA 92630
EPA ID:	CAD983629346
Contact:	HAN LEE
Contact address:	20651 LAKE FOREST DR A111 LAKE FOREST, CA 92630
Contact country:	US
Contact telephone:	(714) 951-5329
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous

FOOTHILL CLEANERS (Continued) **1000685968**

waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: LIZ AND HAN LEE
Owner/operator address: 20651 LAKE FOREST
LAKE FOREST, CA 92630
Owner/operator country: Not reported
Owner/operator telephone: (714) 951-5329
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Violation Status: No violations found

Orange Co. Industrial Site:
Case ID: 05IC008
Record ID: RO0003342
Current Status: CLOSED 2/9/2006
Closure Type: Closure certification issued
Released Chemical: PERCHLOROETHYLENE XYLENE TOLUENE

FINDS:

Registry ID: 110002873178

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

DRYCLEANERS:
EPA Id: CAL000298661
NAICS Code: 81232

FOOTHILL CLEANERS (Continued) **1000685968**

NAICS Description: Drycleaning and Laundry Services (except Coin-Operated)
SIC Code: 7211
SIC Description: Power Laundries, Family and Commercial
Create Date: 09/21/2005
Facility Active: No
Inactive Date: Not reported
Facility Addr2: Not reported
Owner Name: SUNG-KYU CHOI
Owner Address: 20651 LAKE FOREST DR STE A111
Owner Address 2: Not reported
Owner Telephone: 9518336460
Contact Name: SUNG-KYU CHOI
Contact Address: 4347 ALTIVO LN
Contact Address 2: Not reported
Contact Telephone: 9512770015
Mailing Name: Not reported
Mailing Address 1: 20651 LAKE FOREST DR STE A111
Mailing Address 2: Not reported
Mailing City: LAKE FOREST
Mailing State: CA
Mailing Zip: 926307750
Owner Fax: 1
Region Code: Not reported

EPA Id: CAL000323129
NAICS Code: 81232
NAICS Description: Drycleaning and Laundry Services (except Coin-Operated)
SIC Code: 7211
SIC Description: Power Laundries, Family and Commercial
Create Date: 08/06/2007
Facility Active: No
Inactive Date: Not reported
Facility Addr2: Not reported
Owner Name: SOON LEE
Owner Address: 20651 LAKE FOREST DR STE A111
Owner Address 2: Not reported
Owner Telephone: 9499515329
Contact Name: SOON LEE
Contact Address: 20651 LAKE FOREST DR STE A111
Contact Address 2: Not reported
Contact Telephone: 9499515329
Mailing Name: Not reported
Mailing Address 1: 20651 LAKE FOREST DR STE A111
Mailing Address 2: Not reported
Mailing City: LAKE FOREST
Mailing State: CA
Mailing Zip: 926307750
Owner Fax: 4
Region Code: Not reported

HAZNET:
envid: 1000685968
Year: 2005
GEPAID: CAD983629346
Contact: --
Telephone: 7145869945
Mailing Name: Not reported

FOOTHILL CLEANERS (Continued) **1000685968**

Mailing Address:	20651 LAKE FOREST DR STE A111
Mailing City,St,Zip:	LAKE FOREST, CA 926300000
Gen County:	Not reported
TSD EPA ID:	NVR000076158
TSD County:	Not reported
Waste Category:	Halogenated solvents (chloroforms, methyl chloride, perchloroethylene, etc)
Disposal Method:	Invalid Code
Tons:	0.37
Cat Decode:	Halogenated solvents (chloroforms, methyl chloride, perchloroethylene, etc)
Method Decode:	Invalid Code
Facility County:	Orange

envid:	1000685968
Year:	2005
GEPAID:	CAD983629346
Contact:	--
Telephone:	7145869945
Mailing Name:	Not reported
Mailing Address:	20651 LAKE FOREST DR STE A111
Mailing City,St,Zip:	LAKE FOREST, CA 926300000
Gen County:	Not reported
TSD EPA ID:	NVR000076158
TSD County:	Not reported
Waste Category:	Aqueous solution with total organic residues less than 10 percent
Disposal Method:	Not reported
Tons:	Not reported
Cat Decode:	Aqueous solution with total organic residues less than 10 percent
Method Decode:	Not reported
Facility County:	Orange

envid:	1000685968
Year:	2004
GEPAID:	CAD983629346
Contact:	--
Telephone:	7145869945
Mailing Name:	Not reported
Mailing Address:	20651 LAKE FOREST DR STE A111
Mailing City,St,Zip:	LAKE FOREST, CA 926300000
Gen County:	Not reported
TSD EPA ID:	NVR000076158
TSD County:	Not reported
Waste Category:	Not reported
Disposal Method:	Not reported
Tons:	Not reported
Cat Decode:	Not reported
Method Decode:	Not reported
Facility County:	Orange

envid:	1000685968
Year:	2004
GEPAID:	CAD983629346
Contact:	--
Telephone:	7145869945
Mailing Name:	Not reported
Mailing Address:	20651 LAKE FOREST DR STE A111
Mailing City,St,Zip:	LAKE FOREST, CA 926300000

FOOTHILL CLEANERS (Continued) **1000685968**

Gen County:	Not reported
TSD EPA ID:	NVR000076158
TSD County:	Not reported
Waste Category:	Aqueous solution with total organic residues less than 10 percent
Disposal Method:	Not reported
Tons:	Not reported
Cat Decode:	Aqueous solution with total organic residues less than 10 percent
Method Decode:	Not reported
Facility County:	Orange

envid:	1000685968
Year:	2004
GEPAID:	CAD983629346
Contact:	--
Telephone:	7145869945
Mailing Name:	Not reported
Mailing Address:	20651 LAKE FOREST DR STE A111
Mailing City,St,Zip:	LAKE FOREST, CA 926300000
Gen County:	Not reported
TSD EPA ID:	NVR000076158
TSD County:	Not reported
Waste Category:	Halogenated solvents (chloroforms, methyl chloride, perchloroethylene, etc)
Disposal Method:	Not reported
Tons:	0.17
Cat Decode:	Halogenated solvents (chloroforms, methyl chloride, perchloroethylene, etc)
Method Decode:	Not reported
Facility County:	Orange

Click this hyperlink while viewing on your computer to access
5 additional CA_HAZNET: record(s) in the EDR Site Report.

ECHO:

Envid:	1000685968
Registry ID:	110002873178
DFR URL:	http://echo.epa.gov/detailed_facility_report?fid=110002873178

E24 **EDR Hist Cleaner** **1015015513**
South **20651 LAKE FOREST DR** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.114 mi.
601 ft. **Site 2 of 2 in cluster E**

Relative:
Lower

Actual:
726 ft.

EDR Historical Cleaners:

Name:	FOOTHILL CLEANERS
Year:	1999
Address:	20651 LAKE FOREST DR
Name:	FOOTHILL CLEANERS
Year:	2001
Address:	20651 LAKE FOREST DR
Name:	FOOTHILL CLEANERS
Year:	2002
Address:	20651 LAKE FOREST DR
Name:	FOOTHILL CLEANERS

(Continued) **1015015513**

Year: 2003
Address: 20651 LAKE FOREST DR

Name: FOOTHILL CLEANERS
Year: 2004
Address: 20651 LAKE FOREST DR

Name: FOOTHILL CLEANERS
Year: 2005
Address: 20651 LAKE FOREST DR

Name: FOOTHILL CLEANERS
Year: 2006
Address: 20651 LAKE FOREST DR

Name: FOOTHILL CLEANERS
Year: 2007
Address: 20651 LAKE FOREST DR

Name: FOOTHILL CLEANERS
Year: 2008
Address: 20651 LAKE FOREST DR

Name: SONGS CLEANERS
Year: 2009
Address: 20651 LAKE FOREST DR

Name: SONGS CLEANERS
Year: 2010
Address: 20651 LAKE FOREST DR

Name: SONGS CLEANERS
Year: 2011
Address: 20651 LAKE FOREST DR

Name: SONGS CLEANERS
Year: 2012
Address: 20651 LAKE FOREST DR

25
ENE
< 1/8
0.123 mi.
652 ft.

20025 LAKE FOREST DR
LAKE FOREST, CA 92630

EDR Hist Cleaner **1015012876**
N/A

Relative:
Higher

Actual:
762 ft.

EDR Historical Cleaners:
Name: CLEANERS
Year: 2003
Address: 20025 LAKE FOREST DR

Name: CLEANERS
Year: 2004
Address: 20025 LAKE FOREST DR

Name: CLEANERS THE
Year: 2007
Address: 20025 LAKE FOREST DR

(Continued) **1015012876**

Name: CLEANERS THE
Year: 2008
Address: 20025 LAKE FOREST DR

Name: CLEANERS
Year: 2010
Address: 20025 LAKE FOREST DR

Name: THE CLEANERS
Year: 2011
Address: 20025 LAKE FOREST DR

Name: THE CLEANERS
Year: 2012
Address: 20025 LAKE FOREST DR

F26 **BAKER RANCH PLAZA** **Orange Co. Industrial Site** **S103982353**
SSE **20562 REGENCY LN** **DRYCLEANERS** **N/A**
1/8-1/4 **LAKE FOREST, CA 92630**
0.138 mi.
728 ft. **Site 1 of 2 in cluster F**

Relative:
Lower

Actual:
701 ft.

Orange Co. Industrial Site:
Case ID: 97IC004
Record ID: RO0000610
Current Status: CLOSED 5/29/1997
Closure Type: Closure certification issued
Released Chemical: PERCHLOROETHYLENE TRICHLOROETHANE

DRYCLEANERS:
EPA Id: CAD983617648
NAICS Code: 81232
NAICS Description: Drycleaning and Laundry Services (except Coin-Operated)
SIC Code: 7211
SIC Description: Power Laundries, Family and Commercial
Create Date: 02/04/1992
Facility Active: Yes
Inactive Date: Not reported
Facility Addr2: STE F
Owner Name: KHODER DOAIFI
Owner Address: 23749 RIDGEWAY
Owner Address 2: Not reported
Owner Telephone: 9494720393
Contact Name: KHODER DOAIFI
Contact Address: 20562 REGENCY LN
Contact Address 2: STE F
Contact Telephone: 9494720393
Mailing Name: KHODER DOAIFI
Mailing Address 1: 20562 REGENCY LN
Mailing Address 2: STE F
Mailing City: LAKE FOREST
Mailing State: CA
Mailing Zip: 926308146
Owner Fax: 4
Region Code: 0000000000

27
North
1/8-1/4
0.156 mi.
823 ft.

26642 TOWNE CENTRE DR
FOOTHILL RANCH, CA 92610

AST **A100336921**
N/A

Relative:
Higher

Actual:
774 ft.

AST:
Certified Unified Program Agencies: Orange
Owner: ARDEN REALTY
Total Gallons: 1,320

F28
SSE
1/8-1/4
0.162 mi.
854 ft.

ECONO LUBE N TUNE
20592 LAKE FOREST DR
LAKE FOREST, CA 92630

Site 2 of 2 in cluster F

SWEEPS UST **U003721264**
N/A

Relative:
Lower

Actual:
727 ft.

SWEEPS UST:
Status: Active
Comp Number: 12498
Number: 9
Board Of Equalization: Not reported
Referral Date: 09-30-92
Action Date: 09-15-92
Created Date: 02-29-88
Owner Tank Id: Not reported
SWRCB Tank Id: 30-000-012498-000001
Tank Status: A
Capacity: 550
Active Date: Not reported
Tank Use: PETROLEUM
STG: P
Content: Not reported
Number Of Tanks: 1

G29
South
1/8-1/4
0.166 mi.
878 ft.

G AND M OIL CO INC
20731 LAKE FOREST DR
LAKE FOREST, CA 92630

Site 1 of 2 in cluster G

UST **U003721265**
N/A

Relative:
Lower

Actual:
705 ft.

UST:
Facility ID: 20177
Permitting Agency: ORANGE COUNTY
Latitude: 33.662904
Longitude: -117.66715

ORANGE CO. UST:
Facility ID: FA0025150

G30 **CHEVRON** **LUST** **U003659611**
South **20731 LAKE FOREST** **SWEEPS UST** **N/A**
1/8-1/4 **LAKE FOREST, CA 92630** **HIST CORTESE**
0.166 mi.
878 ft. **Site 2 of 2 in cluster G**

Relative:
Lower

Actual:
705 ft.

LUST:

Region:	STATE
Global Id:	T0605902102
Latitude:	33.6458268
Longitude:	-117.6890547
Case Type:	LUST Cleanup Site
Status:	Completed - Case Closed
Status Date:	04/20/1998
Lead Agency:	ORANGE COUNTY LOP
Case Worker:	KL
Local Agency:	ORANGE COUNTY LOP
RB Case Number:	083003083T
LOC Case Number:	97UT037
File Location:	Local Agency
Potential Media Affect:	Soil
Potential Contaminants of Concern:	Gasoline
Site History:	Not reported

Click here to access the California GeoTracker records for this facility:

Contact:

Global Id:	T0605902102
Contact Type:	Local Agency Caseworker
Contact Name:	KEVIN LAMBERT
Organization Name:	ORANGE COUNTY LOP
Address:	1241 E DYER ROAD SUITE 120
City:	SANTA ANA
Email:	klambert@ochca.com
Phone Number:	7144336261

Global Id:	T0605902102
Contact Type:	Local Agency Caseworker
Contact Name:	JAMES STROZIER
Organization Name:	ORANGE COUNTY LOP
Address:	1241 E. DYER ROAD SUITE 120
City:	SANTA ANA
Email:	jstrozier@ochca.com
Phone Number:	7144336273

Global Id:	T0605902102
Contact Type:	Regional Board Caseworker
Contact Name:	TOM E. MBEKE-EKANEM
Organization Name:	SANTA ANA RWQCB (REGION 8)
Address:	3737 MAIN STREET, SUITE 500
City:	RIVERSIDE
Email:	tmbeke-ekanem@waterboards.ca.gov
Phone Number:	9513202007

Status History:

Global Id:	T0605902102
Status:	Completed - Case Closed
Status Date:	04/20/1998

CHEVRON (Continued) **U003659611**

Global Id: T0605902102
Status: Open - Case Begin Date
Status Date: 09/12/1997

Regulatory Activities:
Global Id: T0605902102
Action Type: Other
Date: 09/12/1997
Action: Leak Reported

Global Id: T0605902102
Action Type: Other
Date: 09/12/1997
Action: Leak Discovery

Global Id: T0605902102
Action Type: ENFORCEMENT
Date: 03/02/1998
Action: LOP Case Closure Summary to RB

ORANGE CO. LUST:
Region: ORANGE
Facility Id: 97UT037
Current Status: Certification (Case Closed)
Released Substance: Gasoline-Automotive (motor gasoline and additives), leaded & unleaded
Date Closed: 04/20/1998
Case Type: Soil Only
Record ID: RO0001932

LUST REG 8:
Region: 8
County: Orange
Regional Board: Santa Ana Region
Facility Status: Case Closed
Case Number: 083003083T
Local Case Num: 97UT037
Case Type: Soil only
Substance: Gasoline
Qty Leaked: 0
Abate Method: Not reported
Cross Street: Not reported
Enf Type: Not reported
Funding: Not reported
How Discovered: Tank Closure
How Stopped: Close Tank
Leak Cause: Unknown
Leak Source: Unknown
Global ID: T0605902102
How Stopped Date: 9/9/9999
Enter Date: Not reported
Date Confirmation of Leak Began: Not reported
Date Preliminary Assessment Began: Not reported
Discover Date: 9/12/1997
Enforcement Date: Not reported
Close Date: 4/20/1998

CHEVRON (Continued) **U003659611**

Date Prelim Assessment Workplan Submitted:	Not reported
Date Pollution Characterization Began:	Not reported
Date Remediation Plan Submitted:	Not reported
Date Remedial Action Underway:	Not reported
Date Post Remedial Action Monitoring:	Not reported
Enter Date:	Not reported
GW Qualifies:	Not reported
Soil Qualifies:	Not reported
Operator:	Not reported
Facility Contact:	Not reported
Interim:	Not reported
Oversite Program:	LUST
Latitude:	33.6458268
Longitude:	-117.6890547
MTBE Date:	Not reported
Max MTBE GW:	Not reported
MTBE Concentration:	0
Max MTBE Soil:	Not reported
MTBE Fuel:	1
MTBE Tested:	Site NOT Tested for MTBE.Includes Unknown and Not Analyzed.
MTBE Class:	*
Staff:	TME
Staff Initials:	JS
Lead Agency:	Local Agency
Local Agency:	30000L
Hydr Basin #:	Not reported
Beneficial:	MUN
Priority:	Not reported
Cleanup Fund Id:	Not reported
Work Suspended:	Not reported

Summary: Not reported

SWEEPS UST:

Status:	Active
Comp Number:	11761
Number:	9
Board Of Equalization:	Not reported
Referral Date:	09-30-92
Action Date:	09-15-92
Created Date:	02-29-88
Owner Tank Id:	Not reported
SWRCB Tank Id:	30-000-011761-000001
Tank Status:	A
Capacity:	12000
Active Date:	Not reported
Tank Use:	M.V. FUEL
STG:	P
Content:	REG UNLEADED
Number Of Tanks:	3

Status:	Active
Comp Number:	11761
Number:	9
Board Of Equalization:	Not reported
Referral Date:	09-30-92
Action Date:	09-15-92
Created Date:	02-29-88

CHEVRON (Continued) **U003659611**

Owner Tank Id: Not reported
SWRCB Tank Id: 30-000-011761-000002
Tank Status: A
Capacity: 12000
Active Date: Not reported
Tank Use: M.V. FUEL
STG: P
Content: REG UNLEADED
Number Of Tanks: Not reported

Status: Active
Comp Number: 11761
Number: 9
Board Of Equalization: Not reported
Referral Date: 09-30-92
Action Date: 09-15-92
Created Date: 02-29-88
Owner Tank Id: Not reported
SWRCB Tank Id: 30-000-011761-000003
Tank Status: A
Capacity: 12000
Active Date: Not reported
Tank Use: M.V. FUEL
STG: P
Content: DIESEL
Number Of Tanks: Not reported

HIST CORTESE:
Region: CORTESE
Facility County Code: 30
Reg By: LTNKA
Reg Id: 083003083T

H31 **POWER CLEANERS** **RCRA-SQG** **1000597738**
SSW **20562 CANADA RD** **FINDS** **CAD983617648**
1/8-1/4 **EL TORO, CA 92630** **ECHO**
0.167 mi.
884 ft. **Site 1 of 5 in cluster H**

Relative:
Lower

Actual:
669 ft.

RCRA-SQG:
Date form received by agency: 02/04/1992
Facility name: POWER CLEANERS
Facility address: 20562 CANADA RD
EL TORO, CA 92630
EPA ID: CAD983617648
Mailing address: CANADA RD
EL TORO, CA 92630
Contact: DOAIFI KHODER
Contact address: 20562 CANADA RD
EL TORO, CA 92630
Contact country: US
Contact telephone: (714) 472-6088
Contact email: Not reported
EPA Region: 09
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of

POWER CLEANERS (Continued) **1000597738**

hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	DOAIFI KHODER
Owner/operator address:	20562 CANADA RD EL TORO, CA 92630
Owner/operator country:	Not reported
Owner/operator telephone:	(714) 472-6088
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No

Violation Status: No violations found

FINDS:

Registry ID: 110002867951

Environmental Interest/Information System

California Hazardous Waste Tracking System - Datamart (HWTS-DATAMART) provides California with information on hazardous waste shipments for generators, transporters, and treatment, storage, and disposal facilities.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

ECHO:

Envid:	1000597738
Registry ID:	110002867951
DFR URL:	http://echo.epa.gov/detailed_facility_report?fid=110002867951

H32 **SALEEN ALLEN R R R SPEEDLAB INC** **RCRA-SQG** **1004676851**
SSW **20622 CANADA RD** **FINDS** **CAR000090308**
1/8-1/4 **LAKE FOREST, CA 92630** **ECHO**
0.172 mi.
908 ft. **Site 2 of 5 in cluster H**

Relative:
Lower

Actual:
668 ft.

RCRA-SQG:

Date form received by agency:	01/17/2001
Facility name:	SALEEN ALLEN R R R SPEEDLAB INC
Facility address:	20622 CANADA RD LAKE FOREST, CA 92630
EPA ID:	CAR000090308
Mailing address:	9 WHATNEY IRVINE, CA 92618
Contact:	MARNI JOHNSON
Contact address:	9 WHATNEY IRVINE, CA 92618
Contact country:	US
Contact telephone:	(949) 829-8704
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	SALEEN INC
Owner/operator address:	9 WHATNEY IRVINE, CA 92618
Owner/operator country:	Not reported
Owner/operator telephone:	(949) 597-4900
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No

. Waste code:	D001
. Waste name:	IGNITABLE WASTE

SALEEN ALLEN R R R SPEEDLAB INC (Continued) **1004676851**

. Waste code: D002
. Waste name: CORROSIVE WASTE

. Waste code: F001
. Waste name: THE FOLLOWING SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLORETHYLENE, METHYLENE CHLORIDE, 1,1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE AND CHLORINATED FLUOROCARBONS; ALL SPENT SOLVENT MIXTURES/BLENDS USED IN DEGREASING CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Violation Status: No violations found

FINDS:

Registry ID: 110012211748

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

ECHO:
Envid: 1004676851
Registry ID: 110012211748
DFR URL: http://echo.epa.gov/detailed_facility_report?fid=110012211748

H33 **LOS ALISOS RANCH** **HIST UST** **U001577229**
SSW **20571 CANADA RD** **N/A**
1/8-1/4 **EL TORO, CA 92646**
0.176 mi.
927 ft. **Site 3 of 5 in cluster H**

Relative:
Lower

Actual:
668 ft.

HIST UST:
File Number: 0002EBFF
URL: http://geotracker.waterboards.ca.gov/ustpdfs/pdf/0002EBFF.pdf
Region: STATE
Facility ID: 00000023543
Facility Type: Other
Other Type: NURSERY/FARMING
Contact Name: S. NAKASE
Telephone: 7149626604
Owner Name: NAKASE BROTHERS WHOLESALE NURS
Owner Address: 9441 KREPP DR.
Owner City,St,Zip: HUNTINGTON BEACH, CA 92646
Total Tanks: 0003

Tank Num: 001
Container Num: 001
Year Installed: Not reported
Tank Capacity: 00000200
Tank Used for: PRODUCT

LOS ALISOS RANCH (Continued) **U001577229**

Type of Fuel:	DIESEL
Container Construction Thickness:	Not reported
Leak Detection:	Stock Inventor
Tank Num:	002
Container Num:	G735150
Year Installed:	Not reported
Tank Capacity:	00001000
Tank Used for:	PRODUCT
Type of Fuel:	REGULAR
Container Construction Thickness:	10
Leak Detection:	Stock Inventor
Tank Num:	003
Container Num:	002
Year Installed:	Not reported
Tank Capacity:	00000280
Tank Used for:	PRODUCT
Type of Fuel:	DIESEL
Container Construction Thickness:	Not reported
Leak Detection:	Stock Inventor

Click here for Geo Tracker PDF:

H34 **FOREVER GREEN ART INC** **RCRA-SQG** **1001195438**
SSW **20611 CANADA RD** **FINDS** **CAR000020172**
1/8-1/4 **LAKE FOREST, CA 92630** **HAZNET**
0.177 mi. **ECHO**
932 ft. **Site 4 of 5 in cluster H**

Relative:
Lower

Actual:
667 ft.

RCRA-SQG:

Date form received by agency:	06/05/1997
Facility name:	FOREVER GREEN ART INC
Facility address:	20611 CANADA RD LAKE FOREST, CA 92630
EPA ID:	CAR000020172
Mailing address:	BARENTS SEA CIRCLE LAKE FOREST, CA 92630
Contact:	MIKE REEDER
Contact address:	20382 BARENTS SEA CIRCLE LAKE FOREST, CA 92630
Contact country:	US
Contact telephone:	(714) 768-3005
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	FOREVER GREEN ART INC
Owner/operator address:	20382 BARENTS SEA CIR LAKE FOREST, CA 92630
Owner/operator country:	Not reported

FOREVER GREEN ART INC (Continued) **1001195438**

Owner/operator telephone: (714) 768-3005
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Violation Status: No violations found

FINDS:

Registry ID: 110002917611

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

HAZNET:
envid: 1001195438
Year: 1999
GEPAID: CAR000020172
Contact: FOREVER GREEN ART INC
Telephone: 9497683005
Mailing Name: Not reported
Mailing Address: 20382 BARENTS SEA CIRCLE
Mailing City,St,Zip: LAKE FOREST, CA 926300000
Gen County: Not reported
TSD EPA ID: CAD008302903
TSD County: Not reported
Waste Category: Off-specification, aged or surplus organics
Disposal Method: Recycler
Tons: .2085
Cat Decode: Off-specification, aged or surplus organics
Method Decode: Recycler
Facility County: Orange

FOREVER GREEN ART INC (Continued) **1001195438**

envid: 1001195438
Year: 1997
GEPAID: CAR000020172
Contact: FOREVER GREEN ART INC
Telephone: 9497683005
Mailing Name: Not reported
Mailing Address: 20382 BARENTS SEA CIRCLE
Mailing City,St,Zip: LAKE FOREST, CA 926300000
Gen County: Not reported
TSD EPA ID: CAD000088252
TSD County: Not reported
Waste Category: Laboratory waste chemicals
Disposal Method: Transfer Station
Tons: 1.0980
Cat Decode: Laboratory waste chemicals
Method Decode: Transfer Station
Facility County: Orange

envid: 1001195438
Year: 1997
GEPAID: CAR000020172
Contact: FOREVER GREEN ART INC
Telephone: 9497683005
Mailing Name: Not reported
Mailing Address: 20382 BARENTS SEA CIRCLE
Mailing City,St,Zip: LAKE FOREST, CA 926300000
Gen County: Not reported
TSD EPA ID: CAD000088252
TSD County: Not reported
Waste Category: Liquids with pH <= 2
Disposal Method: Transfer Station
Tons: .0417
Cat Decode: Liquids with pH <= 2
Method Decode: Transfer Station
Facility County: Orange

envid: 1001195438
Year: 1997
GEPAID: CAR000020172
Contact: FOREVER GREEN ART INC
Telephone: 9497683005
Mailing Name: Not reported
Mailing Address: 20382 BARENTS SEA CIRCLE
Mailing City,St,Zip: LAKE FOREST, CA 926300000
Gen County: Not reported
TSD EPA ID: CAD000088252
TSD County: Not reported
Waste Category: Off-specification, aged or surplus organics
Disposal Method: Transfer Station
Tons: .1500
Cat Decode: Off-specification, aged or surplus organics
Method Decode: Transfer Station
Facility County: Orange

envid: 1001195438
Year: 1997
GEPAID: CAR000020172

FOREVER GREEN ART INC (Continued) **1001195438**

Contact:	FOREVER GREEN ART INC
Telephone:	9497683005
Mailing Name:	Not reported
Mailing Address:	20382 BARENTS SEA CIRCLE
Mailing City,St,Zip:	LAKE FOREST, CA 926300000
Gen County:	Not reported
TSD EPA ID:	CAD050806850
TSD County:	Not reported
Waste Category:	Laboratory waste chemicals
Disposal Method:	Not reported
Tons:	.0100
Cat Decode:	Laboratory waste chemicals
Method Decode:	Not reported
Facility County:	Orange

Click this hyperlink while viewing on your computer to access
1 additional CA_HAZNET: record(s) in the EDR Site Report.

ECHO:

Envid:	1001195438
Registry ID:	110002917611
DFR URL:	http://echo.epa.gov/detailed_facility_report?fid=110002917611

H35 **BOKKES IND MERCEDES SVC** **RCRA-SQG** **1000594482**
SSW **20591 CANADA RD** **FINDS** **CAD983583121**
1/8-1/4 **LAKE FOREST, CA 92630** **ECHO**
0.182 mi.
959 ft. **Site 5 of 5 in cluster H**

Relative:
Lower

Actual:
667 ft.

RCRA-SQG:

Date form received by agency:	05/20/1991
Facility name:	BOKKES IND MERCEDES SVC
Facility address:	20591 CANADA RD LAKE FOREST, CA 92630
EPA ID:	CAD983583121
Contact:	BOKKES TOM
Contact address:	20591 CANADA RD LAKE FOREST, CA 92630
Contact country:	US
Contact telephone:	(714) 830-3411
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	TOM J BOKKES
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Owner

BOKKES IND MERCEDES SVC (Continued) **1000594482**

Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: NOT REQUIRED
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: Yes
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Violation Status: No violations found

FINDS:

Registry ID: 110006481137

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

ECHO:
Envid: 1000594482
Registry ID: 110006481137
DFR URL: http://echo.epa.gov/detailed_facility_report?fid=110006481137

36
ESE
1/8-1/4
0.193 mi.
1021 ft.

SADDLE BACK VALLEY ORANMENTAL IRON INC
26891 VISTA TERRACE
LAKE FOREST, CA 92630

RCRA-SQG **1006930221**
HAZNET **CAR000146894**
NPDES

Relative:
Higher

Actual:
803 ft.

RCRA-SQG:

Date form received by agency:	08/04/2003
Facility name:	SADDLE BACK VALLEY ORANMENTAL IRON INC
Facility address:	26891 VISTA TERRACE LAKE FOREST, CA 92630
EPA ID:	CAR000146894
Contact:	JOHN RODRIGUEZ
Contact address:	26891 VISTA TERRACE LAKE FOREST, CA 92630
Contact country:	US
Contact telephone:	949-830-9513
Contact email:	Not reported
EPA Region:	09
Land type:	Private
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	PAM DICKIE
Owner/operator address:	Not reported Not reported
Owner/operator country:	Not reported
Owner/operator telephone:	Not reported
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	01/01/1991
Owner/Op end date:	Not reported

Owner/operator name:	SADDLE NACK VALLEY ORNAMENTAL INC
Owner/operator address:	Not reported Not reported
Owner/operator country:	Not reported
Owner/operator telephone:	Not reported
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	01/01/1992
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No

SADDLE BACK VALLEY ORANMENTAL IRON INC (Continued) **1006930221**

Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: D035
. Waste name: METHYL ETHYL KETONE

. Waste code: F003
. Waste name: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NONHALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS, AND A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: F005
. Waste name: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Historical Generators:
Date form received by agency: 08/04/2003
Site name: SADDLE BACK VALLEY ORANMENTAL IRON INC
Classification: Small Quantity Generator

Facility Has Received Notices of Violations:
Regulation violated: Not reported
Area of violation: Generators - General
Date violation determined: 03/08/2005
Date achieved compliance: Not reported
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:
Evaluation date: 05/31/2005

SADDLE BACK VALLEY ORANMENTAL IRON INC (Continued) **1006930221**

Evaluation: FOCUSED COMPLIANCE INSPECTION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State Contractor/Grantee

Evaluation date: 03/09/2005
Evaluation: FOCUSED COMPLIANCE INSPECTION
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State Contractor/Grantee

Evaluation date: 03/08/2005
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: Not reported
Evaluation lead agency: State Contractor/Grantee

HAZNET:
envid: 1006930221
Year: 2014
GEPAID: CAR000146894
Contact: TOM BUCHANAN
Telephone: 9498309513
Mailing Name: Not reported
Mailing Address: 26891 VISTA TERRACE
Mailing City,St,Zip: LAKE FOREST, CA 926300000
Gen County: Orange
TSD EPA ID: CAD008364432
TSD County: Los Angeles
Waste Category: Other inorganic solid waste
Disposal Method: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Tons: 3.675
Cat Decode: Other inorganic solid waste
Method Decode: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Facility County: Orange

envid: 1006930221
Year: 2014
GEPAID: CAR000146894
Contact: TOM BUCHANAN
Telephone: 9498309513
Mailing Name: Not reported
Mailing Address: 26891 VISTA TERRACE
Mailing City,St,Zip: LAKE FOREST, CA 926300000
Gen County: Orange
TSD EPA ID: CAD008364432
TSD County: Los Angeles
Waste Category: Latex waste
Disposal Method: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Tons: 0.1251
Cat Decode: Latex waste
Method Decode: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Facility County: Orange

SADDLE BACK VALLEY ORANMENTAL IRON INC (Continued) **1006930221**

envid: 1006930221
Year: 2013
GEPAID: CAR000146894
Contact: TOM BUCHANAN
Telephone: 9498309513
Mailing Name: Not reported
Mailing Address: 26891 VISTA TERRACE
Mailing City,St,Zip: LAKE FOREST, CA 926300000
Gen County: Orange
TSD EPA ID: CAD008364432
TSD County: Los Angeles
Waste Category: Not reported
Disposal Method: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Tons: 1.55
Cat Decode: Not reported
Method Decode: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Facility County: Not reported

envid: 1006930221
Year: 2013
GEPAID: CAR000146894
Contact: TOM BUCHANAN
Telephone: 9498309513
Mailing Name: Not reported
Mailing Address: 26891 VISTA TERRACE
Mailing City,St,Zip: LAKE FOREST, CA 926300000
Gen County: Orange
TSD EPA ID: CAD008364432
TSD County: Los Angeles
Waste Category: Not reported
Disposal Method: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Tons: 0.06255
Cat Decode: Not reported
Method Decode: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Facility County: Not reported

envid: 1006930221
Year: 2012
GEPAID: CAR000146894
Contact: TOM BUCHANAN
Telephone: 9498309513
Mailing Name: Not reported
Mailing Address: 26891 VISTA TERRACE
Mailing City,St,Zip: LAKE FOREST, CA 926300000
Gen County: Orange
TSD EPA ID: CAD008364432
TSD County: Los Angeles
Waste Category: Not reported
Disposal Method: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Tons: 1.754
Cat Decode: Not reported
Method Decode: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery

SADDLE BACK VALLEY ORANMENTAL IRON INC (Continued) **1006930221**

(H010-H129) Or (H131-H135)
Facility County: Orange

Click this hyperlink while viewing on your computer to access
33 additional CA_HAZNET: record(s) in the EDR Site Report.

NPDES:

Npdes Number:	Not reported
Facility Status:	Active
Agency Id:	0
Region:	8
Regulatory Measure Id:	465156
Order No:	Not reported
Regulatory Measure Type:	Enrollee
Place Id:	Not reported
WDID:	8 30NEC001180
Program Type:	No Exposure Certification
Adoption Date Of Regulatory Measure:	Not reported
Effective Date Of Regulatory Measure:	10/13/2015
Expiration Date Of Regulatory Measure:	Not reported
Termination Date Of Regulatory Measure:	Not reported
Discharge Name:	Saddleback Valley Ornamental Iron Inc
Discharge Address:	26891 Vista Terrace
Discharge City:	Lake Forest
Discharge State:	California
Discharge Zip:	92630
RECEIVED DATE:	Not reported
PROCESSED DATE:	Not reported
STATUS CODE NAME:	Not reported
STATUS DATE:	Not reported
PLACE SIZE:	Not reported
PLACE SIZE UNIT:	Not reported
FACILITY CONTACT NAME:	Not reported
FACILITY CONTACT TITLE:	Not reported
FACILITY CONTACT PHONE:	Not reported
FACILITY CONTACT PHONE EXT:	Not reported
FACILITY CONTACT EMAIL:	Not reported
OPERATOR NAME:	Not reported
OPERATOR ADDRESS:	Not reported
OPERATOR CITY:	Not reported
OPERATOR STATE:	Not reported
OPERATOR ZIP:	Not reported
OPERATOR CONTACT NAME:	Not reported
OPERATOR CONTACT TITLE:	Not reported
OPERATOR CONTACT PHONE:	Not reported
OPERATOR CONTACT PHONE EXT:	Not reported
OPERATOR CONTACT EMAIL:	Not reported
OPERATOR TYPE:	Not reported
DEVELOPER NAME:	Not reported
DEVELOPER ADDRESS:	Not reported
DEVELOPER CITY:	Not reported
DEVELOPER STATE:	Not reported
DEVELOPER ZIP:	Not reported
DEVELOPER CONTACT NAME:	Not reported
DEVELOPER CONTACT TITLE:	Not reported
CONSTYPE LINEAR UTILITY IND:	Not reported
EMERGENCY PHONE NO:	Not reported

SADDLE BACK VALLEY ORANMENTAL IRON INC (Continued) **1006930221**

EMERGENCY PHONE EXT:	Not reported
CONSTYPE ABOVE GROUND IND:	Not reported
CONSTYPE BELOW GROUND IND:	Not reported
CONSTYPE CABLE LINE IND:	Not reported
CONSTYPE COMM LINE IND:	Not reported
CONSTYPE COMMERTIAL IND:	Not reported
CONSTYPE ELECTRICAL LINE IND:	Not reported
CONSTYPE GAS LINE IND:	Not reported
CONSTYPE INDUSTRIAL IND:	Not reported
CONSTYPE OTHER DESRIPTION:	Not reported
CONSTYPE OTHER IND:	Not reported
CONSTYPE RECONS IND:	Not reported
CONSTYPE RESIDENTIAL IND:	Not reported
CONSTYPE TRANSPORT IND:	Not reported
CONSTYPE UTILITY DESCRIPTION:	Not reported
CONSTYPE UTILITY IND:	Not reported
CONSTYPE WATER SEWER IND:	Not reported
DIR DISCHARGE USWATER IND:	Not reported
RECEIVING WATER NAME:	Not reported
CERTIFIER NAME:	Not reported
CERTIFIER TITLE:	Not reported
CERTIFICATION DATE:	Not reported
PRIMARY SIC:	Not reported
SECONDARY SIC:	Not reported
TERTIARY SIC:	Not reported

I37 **TRABUCO CANYON WATER DISTRICT** **UST** **U003784547**
West **20904 DIMENSION** **N/A**
1/8-1/4 **LAKE FOREST, CA 92630**
0.204 mi.
1079 ft. **Site 1 of 2 in cluster I**

Relative:
Lower

Actual:
700 ft.

UST:

Facility ID:	8466
Permitting Agency:	ORANGE COUNTY
Latitude:	33.63787
Longitude:	-117.68592

I38 **TRABUCO CANYON WATER DISTRICT** **SWEEPS UST** **S101589570**
West **20904 DIMENSION DR** **CA FID UST** **N/A**
1/8-1/4 **EL TORO, CA 92630**
0.204 mi.
1079 ft. **Site 2 of 2 in cluster I**

Relative:
Lower

Actual:
700 ft.

SWEEPS UST:

Status:	Active
Comp Number:	8466
Number:	9
Board Of Equalization:	44-016687
Referral Date:	09-30-92
Action Date:	02-26-92
Created Date:	02-29-88
Owner Tank Id:	Not reported
SWRCB Tank Id:	30-000-008466-000001
Tank Status:	A
Capacity:	550

TRABUCO CANYON WATER DISTRICT (Continued) **S101589570**

Active Date: Not reported
Tank Use: M.V. FUEL
STG: P
Content: LEADED
Number Of Tanks: 1

CA FID UST:
Facility ID: 30017607
Regulated By: UTNKA
Regulated ID: Not reported
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 7148372195
Mail To: Not reported
Mailing Address: 30575 TRABUCO CYN RD 200 P
Mailing Address 2: Not reported
Mailing City,St,Zip: EL TORO 92630
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Active

J39 **CLEANERS 2000** **DRYCLEANERS** **S109611984**
South **20761 LAKE FOREST DR STE H** **N/A**
1/8-1/4 **LAKE FOREST, CA 92630**
0.209 mi.
1102 ft. **Site 1 of 4 in cluster J**

Relative:
Lower

Actual:
693 ft.

DRYCLEANERS:
EPA Id: CAD983581711
NAICS Code: 81232
NAICS Description: Drycleaning and Laundry Services (except Coin-Operated)
SIC Code: 7211
SIC Description: Power Laundries, Family and Commercial
Create Date: 05/07/1991
Facility Active: Yes
Inactive Date: Not reported
Facility Addr2: Not reported
Owner Name: SUSAN CHUNG
Owner Address: 20761 LAKE FOREST DR STE H
Owner Address 2: Not reported
Owner Telephone: 9495862972
Contact Name: PAUL J CHUNG
Contact Address: 20761 LAKE FOREST DR STE H
Contact Address 2: Not reported
Contact Telephone: 9495862972
Mailing Name: Not reported
Mailing Address 1: 20761 LAKE FOREST DR STE H
Mailing Address 2: Not reported
Mailing City: LAKE FOREST
Mailing State: CA
Mailing Zip: 926307739
Owner Fax: 4
Region Code: Not reported

J40 **SANTA MARGARITA TIRE** **RCRA-SQG** **1004675884**
South **20761 LAKE FOREST DR UNIT K** **FINDS** **CAR000078329**
1/8-1/4 **LAKE FOREST, CA 92630** **ECHO**
0.209 mi.
1102 ft. **Site 2 of 4 in cluster J**

Relative:
Lower

Actual:
693 ft.

RCRA-SQG:
Date form received by agency: 07/14/2000
Facility name: SANTA MARGARITA TIRE
Facility address: 20761 LAKE FOREST DR UNIT K
LAKE FOREST, CA 92630
EPA ID: CAR000078329
Contact: MIKE DEL RIO
Contact address: 20761 LAKE FOREST DE UNIT K
LAKE FOREST, CA 92630
Contact country: US
Contact telephone: (949) 589-9242
Contact email: Not reported
EPA Region: 09
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: SANTA MARGARITA AUTOMOTIVE
Owner/operator address: 20761 LAKE FOREST DR UNIT K
LAKE FOREST, CA 92630
Owner/operator country: Not reported
Owner/operator telephone: (949) 589-9242
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

. Waste code: D039
. Waste name: TETRACHLOROETHYLENE

Violation Status: No violations found

SANTA MARGARITA TIRE (Continued) **1004675884**

FINDS:

Registry ID: 110002940505

Environmental Interest/Information System

California Hazardous Waste Tracking System - Datamart (HWTS-DATAMART) provides California with information on hazardous waste shipments for generators, transporters, and treatment, storage, and disposal facilities.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

ECHO:

Envid: 1004675884
Registry ID: 110002940505
DFR URL: http://echo.epa.gov/detailed_facility_report?fid=110002940505

J41 **CLEANERS 2000** **RCRA-SQG** **1000594350**
South **20761 LAKEFOREST #H** **FINDS** **CAD983581711**
1/8-1/4 **EL TORO, CA 92630** **ECHO**
0.211 mi.
1112 ft. **Site 3 of 4 in cluster J**

Relative:
Lower

Actual:
697 ft.

RCRA-SQG:

Date form received by agency: 05/07/1991
Facility name: CLEANERS 2000
Facility address: 20761 LAKEFOREST #H
EL TORO, CA 92630
EPA ID: CAD983581711
Mailing address: LAKEFOREST #H
EL TORO, CA 92630
Contact: RICHARD KANG
Contact address: 20761 LAKEFOREST #H
EL TORO, CA 92630
Contact country: US
Contact telephone: (714) 586-2972
Contact email: Not reported
EPA Region: 09
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name: KANG RICHARD M
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported

CLEANERS 2000 (Continued) **1000594350**

Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: NOT REQUIRED
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: (415) 555-1212
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Violation Status: No violations found

FINDS:

Registry ID: 110002843889

Environmental Interest/Information System
California Hazardous Waste Tracking System - Datamart (HWTS-DATAMART) provides California with information on hazardous waste shipments for generators, transporters, and treatment, storage, and disposal facilities.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

ECHO:
Envid: 1000594350
Registry ID: 110002843889
DFR URL: http://echo.epa.gov/detailed_facility_report?fid=110002843889

J42
South
1/8-1/4
0.236 mi.
1246 ft.

JIFFY LUBE NO 1301
20781 LAKE FOREST DR
LAKE FOREST, CA 92630

Site 4 of 4 in cluster J

RCRA-SQG | **1000594445** / **CAD983582750**

Relative:
Lower

Actual:
710 ft.

RCRA-SQG:

Date form received by agency:	06/18/1997
Facility name:	JIFFY LUBE NO 1301
Facility address:	20781 LAKE FOREST DR LAKE FOREST, CA 926307738
EPA ID:	CAD983582750
Contact:	SUZAN PAEK
Contact address:	PO BOX 5709 DIAMOND BAR, CA 917659998
Contact country:	US
Contact telephone:	(909) 613-1772
Contact email:	Not reported
EPA Region:	09
Land type:	Private
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	ALLIED LUBE INC
Owner/operator address:	PO BOX 5709 DIAMOND BAR, CA 91765
Owner/operator country:	Not reported
Owner/operator telephone:	(909) 613-1772
Legal status:	Other
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Owner/operator name:	NOT REQUIRED
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No

JIFFY LUBE NO 1301 (Continued) **1000594445**

Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Historical Generators:
Date form received by agency: 09/01/1996
Site name: JIFFY LUBE NO 1301
Classification: Small Quantity Generator

Facility Has Received Notices of Violations:
Regulation violated: FR - 262.10-12.A
Area of violation: Generators - General
Date violation determined: 07/30/1991
Date achieved compliance: 10/05/1993
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:
Evaluation date: 10/05/1993
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported
Evaluation lead agency: State Contractor/Grantee

Evaluation date: 07/30/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 10/05/1993
Evaluation lead agency: State Contractor/Grantee

43
North
1/4-1/2
0.423 mi.
2236 ft.

USA STATION #824 **LUST** **S117038827**
26732 PORTOLA PKWY **N/A**
LAKE FOREST, CA 92610

Relative:
Higher

Actual:
863 ft.

ORANGE CO. LUST:
Region: ORANGE
Facility Id: 14UT002
Current Status: 3A
Released Substance: Not reported
Date Closed: Not reported
Case Type: Other Ground Water
Record ID: RO0003618

44
SW
1/4-1/2
0.459 mi.
2425 ft.

GREENWASTE COMPOSTING
20712 INDIAN OCEAN DR
LAKE FOREST CA, CA 92630

WMUDS/SWAT **S104384477**
N/A

Relative:
Lower

Actual:
686 ft.

WMUDS/SWAT:

Edit Date:	Not reported
Complexity:	Not reported
Primary Waste:	SLDWST
Primary Waste Type:	Nonhazardous Solid Wastes/Influent or Solid Wastes that contain nonhazardous putrescible and non putrescible solid, semisolid, and liquid wastes (E.G., garbage, trash, refuse, paper, demolition and construction wastes, manure, vegetable or animal solid and semisolid waste).
Secondary Waste:	Not reported
Secondary Waste Type:	Not reported
Base Meridian:	Not reported
NPID:	Not reported
Tonnage:	0
Regional Board ID:	Not reported
Municipal Solid Waste:	False
Superorder:	False
Open To Public:	False
Waste List:	False
Agency Type:	Private
Agency Name:	PACIFIC WASTE MANAGEMENT
Agency Department:	Not reported
Agency Address:	20712 INDIAN OCEAN DR.
Agency City,St,Zip:	LAKE FOREST CA 92630
Agency Contact:	GARY PLUMLEY
Agency Telephone:	7145988181
Land Owner Name:	Not reported
Land Owner Address:	Not reported
Land Owner City,St,Zip:	Not reported
Land Owner Contact:	Not reported
Land Owner Phone:	Not reported
Region:	8
Facility Type:	Other - Does not fall into the category of Municipal/Domestic, Industrial, Agricultural or Solid Waste (Class I, II or III)
Facility Description:	Not reported
Facility Telephone:	Not reported
SWAT Facility Name:	Not reported
Primary SIC:	2875
Secondary SIC:	Not reported
Comments:	Not reported
Last Facility Editors:	Not reported
Waste Discharge System:	True
Solid Waste Assessment Test Program:	False
Toxic Pits Cleanup Act Program:	False
Resource Conservation Recovery Act:	False
Department of Defence:	False
Solid Waste Assessment Test Program:	Not reported
Threat to Water Quality:	Not reported
Sub Chapter 15:	True
Regional Board Project Officer:	JPL
Number of WMUDS at Facility:	0
Section Range:	Not reported
RCRA Facility:	No

GREENWASTE COMPOSTING (Continued) **S104384477**

Waste Discharge Requirements: H
Self-Monitoring Rept. Frequency: No Reporting Requirements
Waste Discharge System ID: 8 303062001
Solid Waste Information ID: Not reported

Count: 0 records. ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
		NO SITES FOUND			

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 03/07/2016
Date Data Arrived at EDR: 04/05/2016
Date Made Active in Reports: 04/15/2016
Number of Days to Update: 10

Source: EPA
Telephone: N/A
Last EDR Contact: 07/07/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 03/07/2016
Date Data Arrived at EDR: 04/05/2016
Date Made Active in Reports: 04/15/2016
Number of Days to Update: 10

Source: EPA
Telephone: N/A
Last EDR Contact: 07/07/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal Delisted NPL site list

Delisted NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 03/07/2016
Date Data Arrived at EDR: 04/05/2016
Date Made Active in Reports: 04/15/2016
Number of Days to Update: 10

Source: EPA
Telephone: N/A
Last EDR Contact: 07/07/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Quarterly

Federal CERCLIS list

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 11/13/2015
Date Data Arrived at EDR: 01/06/2016
Date Made Active in Reports: 05/20/2016
Number of Days to Update: 135

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 07/06/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Varies

SEMS: Superfund Enterprise Management System

SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly know as CERCLIS, renamed to SEMS by the EPA in 2015. The list contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 03/07/2016
Date Data Arrived at EDR: 04/05/2016
Date Made Active in Reports: 04/15/2016
Number of Days to Update: 10

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 07/22/2016
Next Scheduled EDR Contact: 10/31/2016
Data Release Frequency: Quarterly

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that. based upon available information, the location is not judged to be potential NPL site.

Date of Government Version: 03/07/2016
Date Data Arrived at EDR: 04/05/2016
Date Made Active in Reports: 04/15/2016
Number of Days to Update: 10

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 07/22/2016
Next Scheduled EDR Contact: 10/31/2016
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 12/09/2015
Date Data Arrived at EDR: 03/02/2016
Date Made Active in Reports: 04/05/2016
Number of Days to Update: 34

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 06/30/2016
Next Scheduled EDR Contact: 10/10/2016
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 12/09/2015
Date Data Arrived at EDR: 03/02/2016
Date Made Active in Reports: 04/05/2016
Number of Days to Update: 34

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/30/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 12/09/2015
Date Data Arrived at EDR: 03/02/2016
Date Made Active in Reports: 04/05/2016
Number of Days to Update: 34

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/30/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 12/09/2015
Date Data Arrived at EDR: 03/02/2016
Date Made Active in Reports: 04/05/2016
Number of Days to Update: 34

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/30/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 12/09/2015
Date Data Arrived at EDR: 03/02/2016
Date Made Active in Reports: 04/05/2016
Number of Days to Update: 34

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/30/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Varies

Federal institutional controls / engineering controls registries

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 05/28/2015
Date Data Arrived at EDR: 05/29/2015
Date Made Active in Reports: 06/11/2015
Number of Days to Update: 13

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 08/12/2016
Next Scheduled EDR Contact: 11/28/2016
Data Release Frequency: Varies

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 09/10/2015
Date Data Arrived at EDR: 09/11/2015
Date Made Active in Reports: 11/03/2015
Number of Days to Update: 53

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 05/25/2016
Next Scheduled EDR Contact: 09/12/2016
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 09/10/2015
Date Data Arrived at EDR: 09/11/2015
Date Made Active in Reports: 11/03/2015
Number of Days to Update: 53

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 05/25/2016
Next Scheduled EDR Contact: 09/12/2016
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 03/28/2016
Date Data Arrived at EDR: 03/30/2016
Date Made Active in Reports: 05/20/2016
Number of Days to Update: 51

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 06/28/2016
Next Scheduled EDR Contact: 10/10/2016
Data Release Frequency: Annually

State- and tribal - equivalent NPL

RESPONSE: State Response Sites

Identifies confirmed release sites where DTSC is involved in remediation, either in a lead or oversight capacity. These confirmed release sites are generally high-priority and high potential risk.

Date of Government Version: 05/02/2016
Date Data Arrived at EDR: 05/04/2016
Date Made Active in Reports: 06/21/2016
Number of Days to Update: 48

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 08/02/2016
Next Scheduled EDR Contact: 11/14/2016
Data Release Frequency: Quarterly

State- and tribal - equivalent CERCLIS

ENVIROSTOR: EnviroStor Database

The Department of Toxic Substances Control's (DTSC's) Site Mitigation and Brownfields Reuse Program's (SMBRP's) EnviroStor database identifes sites that have known contamination or sites for which there may be reasons to investigate further. The database includes the following site types: Federal Superfund sites (National Priorities List (NPL)); State Response, including Military Facilities and State Superfund; Voluntary Cleanup; and School sites. EnviroStor provides similar information to the information that was available in CalSites, and provides additional site information, including, but not limited to, identification of formerly-contaminated properties that have been released for reuse, properties where environmental deed restrictions have been recorded to prevent inappropriate land uses, and risk characterization information that is used to assess potential impacts to public health and the environment at contaminated sites.

Date of Government Version: 05/02/2016
Date Data Arrived at EDR: 05/04/2016
Date Made Active in Reports: 06/21/2016
Number of Days to Update: 48

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 08/02/2016
Next Scheduled EDR Contact: 11/14/2016
Data Release Frequency: Quarterly

State and tribal landfill and/or solid waste disposal site lists

SWF/LF (SWIS): Solid Waste Information System

Active, Closed and Inactive Landfills. SWF/LF records typically contain an inve ntory of solid waste disposal facilities or landfills. These may be active or i nactive facilities or open dumps that failed to meet RCRA Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 05/16/2016
Date Data Arrived at EDR: 05/18/2016
Date Made Active in Reports: 06/21/2016
Number of Days to Update: 34

Source: Department of Resources Recycling and Recovery
Telephone: 916-341-6320
Last EDR Contact: 05/18/2016
Next Scheduled EDR Contact: 08/29/2016
Data Release Frequency: Quarterly

State and tribal leaking storage tank lists

LUST REG 5: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank locations. Alameda, Alpine, Amador, Butte, Colusa, Contra Costa, Calveras, El Dorado, Fresno, Glenn, Kern, Kings, Lake, Lassen, Madera, Mariposa, Merced, Modoc, Napa, Nevada, Placer, Plumas, Sacramento, San Joaquin, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Tuolumne, Yolo, Yuba counties.

Date of Government Version: 07/01/2008
Date Data Arrived at EDR: 07/22/2008
Date Made Active in Reports: 07/31/2008
Number of Days to Update: 9

Source: California Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-464-4834
Last EDR Contact: 07/01/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: No Update Planned

LUST REG 9: Leaking Underground Storage Tank Report

Orange, Riverside, San Diego counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 03/01/2001
Date Data Arrived at EDR: 04/23/2001
Date Made Active in Reports: 05/21/2001
Number of Days to Update: 28

Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-637-5595
Last EDR Contact: 09/26/2011
Next Scheduled EDR Contact: 01/09/2012
Data Release Frequency: No Update Planned

LUST REG 8: Leaking Underground Storage Tanks

California Regional Water Quality Control Board Santa Ana Region (8). For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/14/2005
Date Data Arrived at EDR: 02/15/2005
Date Made Active in Reports: 03/28/2005
Number of Days to Update: 41

Source: California Regional Water Quality Control Board Santa Ana Region (8)
Telephone: 909-782-4496
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: Varies

LUST REG 7: Leaking Underground Storage Tank Case Listing

Leaking Underground Storage Tank locations. Imperial, Riverside, San Diego, Santa Barbara counties.

Date of Government Version: 02/26/2004
Date Data Arrived at EDR: 02/26/2004
Date Made Active in Reports: 03/24/2004
Number of Days to Update: 27

Source: California Regional Water Quality Control Board Colorado River Basin Region (7)
Telephone: 760-776-8943
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

LUST REG 6V: Leaking Underground Storage Tank Case Listing

Leaking Underground Storage Tank locations. Inyo, Kern, Los Angeles, Mono, San Bernardino counties.

Date of Government Version: 06/07/2005
Date Data Arrived at EDR: 06/07/2005
Date Made Active in Reports: 06/29/2005
Number of Days to Update: 22

Source: California Regional Water Quality Control Board Victorville Branch Office (6)
Telephone: 760-241-7365
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

LUST REG 6L: Leaking Underground Storage Tank Case Listing

For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 09/09/2003
Date Data Arrived at EDR: 09/10/2003
Date Made Active in Reports: 10/07/2003
Number of Days to Update: 27

Source: California Regional Water Quality Control Board Lahontan Region (6)
Telephone: 530-542-5572
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

LUST: Geotracker's Leaking Underground Fuel Tank Report

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state. For more information on a particular leaking underground storage tank sites, please contact the appropriate regulatory agency.

Date of Government Version: 06/13/2016
Date Data Arrived at EDR: 06/14/2016
Date Made Active in Reports: 08/09/2016
Number of Days to Update: 56

Source: State Water Resources Control Board
Telephone: see region list
Last EDR Contact: 06/14/2016
Next Scheduled EDR Contact: 09/26/2016
Data Release Frequency: Quarterly

LUST REG 4: Underground Storage Tank Leak List

Los Angeles, Ventura counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 09/07/2004
Date Data Arrived at EDR: 09/07/2004
Date Made Active in Reports: 10/12/2004
Number of Days to Update: 35

Source: California Regional Water Quality Control Board Los Angeles Region (4)
Telephone: 213-576-6710
Last EDR Contact: 09/06/2011
Next Scheduled EDR Contact: 12/19/2011
Data Release Frequency: No Update Planned

LUST REG 3: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank locations. Monterey, San Benito, San Luis Obispo, Santa Barbara, Santa Cruz counties.

Date of Government Version: 05/19/2003
Date Data Arrived at EDR: 05/19/2003
Date Made Active in Reports: 06/02/2003
Number of Days to Update: 14

Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-542-4786
Last EDR Contact: 07/18/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: No Update Planned

LUST REG 2: Fuel Leak List

Leaking Underground Storage Tank locations. Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, Sonoma counties.

Date of Government Version: 09/30/2004
Date Data Arrived at EDR: 10/20/2004
Date Made Active in Reports: 11/19/2004
Number of Days to Update: 30

Source: California Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-622-2433
Last EDR Contact: 09/19/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Quarterly

LUST REG 1: Active Toxic Site Investigation

Del Norte, Humboldt, Lake, Mendocino, Modoc, Siskiyou, Sonoma, Trinity counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/01/2001
Date Data Arrived at EDR: 02/28/2001
Date Made Active in Reports: 03/29/2001
Number of Days to Update: 29

Source: California Regional Water Quality Control Board North Coast (1)
Telephone: 707-570-3769
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 12/11/2015
Date Data Arrived at EDR: 02/19/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 105

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 10/09/2015
Date Data Arrived at EDR: 02/12/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 112

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 10/13/2015
Date Data Arrived at EDR: 10/23/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 118
Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Quarterly

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 02/25/2016
Date Data Arrived at EDR: 04/27/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 37
Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Quarterly

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 01/07/2016
Date Data Arrived at EDR: 01/08/2016
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 41
Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Quarterly

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 10/27/2015
Date Data Arrived at EDR: 10/29/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 67
Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 07/29/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Varies

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land
Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 02/17/2016
Date Data Arrived at EDR: 04/27/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 37
Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 02/05/2016
Date Data Arrived at EDR: 04/29/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 35
Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 07/26/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Semi-Annually

SLIC: Statewide SLIC Cases
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 06/13/2016
Date Data Arrived at EDR: 06/14/2016
Date Made Active in Reports: 08/09/2016
Number of Days to Update: 56
Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 06/14/2016
Next Scheduled EDR Contact: 09/26/2016
Data Release Frequency: Varies

SLIC REG 1: Active Toxic Site Investigations
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/03/2003
Date Data Arrived at EDR: 04/07/2003
Date Made Active in Reports: 04/25/2003
Number of Days to Update: 18

Source: California Regional Water Quality Control Board, North Coast Region (1)
Telephone: 707-576-2220
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

SLIC REG 2: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/30/2004
Date Data Arrived at EDR: 10/20/2004
Date Made Active in Reports: 11/19/2004
Number of Days to Update: 30

Source: Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-286-0457
Last EDR Contact: 09/19/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Quarterly

SLIC REG 3: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 05/18/2006
Date Data Arrived at EDR: 05/18/2006
Date Made Active in Reports: 06/15/2006
Number of Days to Update: 28

Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-549-3147
Last EDR Contact: 07/18/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: Semi-Annually

SLIC REG 4: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 11/17/2004
Date Data Arrived at EDR: 11/18/2004
Date Made Active in Reports: 01/04/2005
Number of Days to Update: 47

Source: Region Water Quality Control Board Los Angeles Region (4)
Telephone: 213-576-6600
Last EDR Contact: 07/01/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Varies

SLIC REG 5: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/01/2005
Date Data Arrived at EDR: 04/05/2005
Date Made Active in Reports: 04/21/2005
Number of Days to Update: 16

Source: Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-464-3291
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Semi-Annually

SLIC REG 6V: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 05/24/2005
Date Data Arrived at EDR: 05/25/2005
Date Made Active in Reports: 06/16/2005
Number of Days to Update: 22

Source: Regional Water Quality Control Board, Victorville Branch
Telephone: 619-241-6583
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: Semi-Annually

SLIC REG 6L: SLIC Sites
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/07/2004
Date Data Arrived at EDR: 09/07/2004
Date Made Active in Reports: 10/12/2004
Number of Days to Update: 35
Source: California Regional Water Quality Control Board, Lahontan Region
Telephone: 530-542-5574
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

SLIC REG 7: SLIC List
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 11/24/2004
Date Data Arrived at EDR: 11/29/2004
Date Made Active in Reports: 01/04/2005
Number of Days to Update: 36
Source: California Regional Quality Control Board, Colorado River Basin Region
Telephone: 760-346-7491
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

SLIC REG 8: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/03/2008
Date Data Arrived at EDR: 04/03/2008
Date Made Active in Reports: 04/14/2008
Number of Days to Update: 11
Source: California Region Water Quality Control Board Santa Ana Region (8)
Telephone: 951-782-3298
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Semi-Annually

SLIC REG 9: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/10/2007
Date Data Arrived at EDR: 09/11/2007
Date Made Active in Reports: 09/28/2007
Number of Days to Update: 17
Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-467-2980
Last EDR Contact: 08/08/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: Annually

State and tribal registered storage tank lists

FEMA UST: Underground Storage Tank Listing
A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010
Date Data Arrived at EDR: 02/16/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 55
Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 07/07/2016
Next Scheduled EDR Contact: 10/24/2016
Data Release Frequency: Varies

UST: Active UST Facilities
Active UST facilities gathered from the local regulatory agencies

Date of Government Version: 06/13/2016
Date Data Arrived at EDR: 06/14/2016
Date Made Active in Reports: 08/08/2016
Number of Days to Update: 55
Source: SWRCB
Telephone: 916-341-5851
Last EDR Contact: 06/14/2016
Next Scheduled EDR Contact: 09/26/2016
Data Release Frequency: Semi-Annually

AST: Aboveground Petroleum Storage Tank Facilities
A listing of aboveground storage tank petroleum storage tank locations.

Date of Government Version: 08/01/2009
Date Data Arrived at EDR: 09/10/2009
Date Made Active in Reports: 10/01/2009
Number of Days to Update: 21

Source: California Environmental Protection Agency
Telephone: 916-327-5092
Last EDR Contact: 07/07/2016
Next Scheduled EDR Contact: 10/10/2016
Data Release Frequency: Quarterly

INDIAN UST R10: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 01/07/2016
Date Data Arrived at EDR: 01/08/2016
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 41

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Quarterly

INDIAN UST R9: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 02/25/2016
Date Data Arrived at EDR: 04/27/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 37

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Quarterly

INDIAN UST R8: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 01/26/2016
Date Data Arrived at EDR: 02/05/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 119

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Quarterly

INDIAN UST R7: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 09/23/2014
Date Data Arrived at EDR: 11/25/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 65

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Varies

INDIAN UST R1: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 10/20/2015
Date Data Arrived at EDR: 10/29/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 67

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 07/29/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 02/05/2016
Date Data Arrived at EDR: 04/29/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 35

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 07/26/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Semi-Annually

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 11/05/2015
Date Data Arrived at EDR: 11/13/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 52

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 12/03/2015
Date Data Arrived at EDR: 02/04/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 120

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Semi-Annually

State and tribal voluntary cleanup sites

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

INDIAN VCP R1: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 07/27/2015
Date Data Arrived at EDR: 09/29/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 142

Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 07/01/2016
Next Scheduled EDR Contact: 10/10/2016
Data Release Frequency: Varies

VCP: Voluntary Cleanup Program Properties

Contains low threat level properties with either confirmed or unconfirmed releases and the project proponents have request that DTSC oversee investigation and/or cleanup activities and have agreed to provide coverage for DTSC's costs.

Date of Government Version: 05/02/2016
Date Data Arrived at EDR: 05/04/2016
Date Made Active in Reports: 06/21/2016
Number of Days to Update: 48

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 08/02/2016
Next Scheduled EDR Contact: 11/14/2016
Data Release Frequency: Quarterly

State and tribal Brownfields sites

BROWNFIELDS: Considered Brownfieds Sites Listing
A listing of sites the SWRCB considers to be Brownfields since these are sites have come to them through the MOA Process.

Date of Government Version: 02/29/2016
Date Data Arrived at EDR: 03/07/2016
Date Made Active in Reports: 05/04/2016
Number of Days to Update: 58
Source: State Water Resources Control Board
Telephone: 916-323-7905
Last EDR Contact: 06/15/2016
Next Scheduled EDR Contact: 09/19/2016
Data Release Frequency: Varies

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites
Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 03/21/2016
Date Data Arrived at EDR: 03/22/2016
Date Made Active in Reports: 07/13/2016
Number of Days to Update: 113
Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 06/22/2016
Next Scheduled EDR Contact: 10/03/2016
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

WMUDS/SWAT: Waste Management Unit Database
Waste Management Unit Database System. WMUDS is used by the State Water Resources Control Board staff and the Regional Water Quality Control Boards for program tracking and inventory of waste management units. WMUDS is composed of the following databases: Facility Information, Scheduled Inspections Information, Waste Management Unit Information, SWAT Program Information, SWAT Report Summary Information, SWAT Report Summary Data, Chapter 15 (formerly Subchapter 15) Information, Chapter 15 Monitoring Parameters, TPCA Program Information, RCRA Program Information, Closure Information, and Interested Parties Information.

Date of Government Version: 04/01/2000
Date Data Arrived at EDR: 04/10/2000
Date Made Active in Reports: 05/10/2000
Number of Days to Update: 30
Source: State Water Resources Control Board
Telephone: 916-227-4448
Last EDR Contact: 08/03/2016
Next Scheduled EDR Contact: 11/21/2016
Data Release Frequency: No Update Planned

SWRCY: Recycler Database
A listing of recycling facilities in California.

Date of Government Version: 06/13/2016
Date Data Arrived at EDR: 06/14/2016
Date Made Active in Reports: 08/09/2016
Number of Days to Update: 56
Source: Department of Conservation
Telephone: 916-323-3836
Last EDR Contact: 06/14/2016
Next Scheduled EDR Contact: 09/26/2016
Data Release Frequency: Quarterly

HAULERS: Registered Waste Tire Haulers Listing
A listing of registered waste tire haulers.

Date of Government Version: 06/16/2016
Date Data Arrived at EDR: 06/16/2016
Date Made Active in Reports: 08/09/2016
Number of Days to Update: 54

Source: Integrated Waste Management Board
Telephone: 916-341-6422
Last EDR Contact: 08/10/2016
Next Scheduled EDR Contact: 11/28/2016
Data Release Frequency: Varies

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands

Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 08/05/2016
Next Scheduled EDR Contact: 11/14/2016
Data Release Frequency: Varies

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137

Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 07/20/2016
Next Scheduled EDR Contact: 10/07/2016
Data Release Frequency: No Update Planned

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations that have been removed from the DEAs National Clandestine Laboratory Register.

Date of Government Version: 05/04/2016
Date Data Arrived at EDR: 06/03/2016
Date Made Active in Reports: 07/13/2016
Number of Days to Update: 40

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 05/31/2016
Next Scheduled EDR Contact: 06/13/2016
Data Release Frequency: No Update Planned

HIST CAL-SITES: Calsites Database

The Calsites database contains potential or confirmed hazardous substance release properties. In 1996, California EPA reevaluated and significantly reduced the number of sites in the Calsites database. No longer updated by the state agency. It has been replaced by ENVIROSTOR.

Date of Government Version: 08/08/2005
Date Data Arrived at EDR: 08/03/2006
Date Made Active in Reports: 08/24/2006
Number of Days to Update: 21

Source: Department of Toxic Substance Control
Telephone: 916-323-3400
Last EDR Contact: 02/23/2009
Next Scheduled EDR Contact: 05/25/2009
Data Release Frequency: No Update Planned

SCH: School Property Evaluation Program

This category contains proposed and existing school sites that are being evaluated by DTSC for possible hazardous materials contamination. In some cases, these properties may be listed in the CalSites category depending on the level of threat to public health and safety or the environment they pose.

Date of Government Version: 05/02/2016
Date Data Arrived at EDR: 05/04/2016
Date Made Active in Reports: 06/21/2016
Number of Days to Update: 48

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 08/02/2016
Next Scheduled EDR Contact: 11/14/2016
Data Release Frequency: Quarterly

CDL: Clandestine Drug Labs

A listing of drug lab locations. Listing of a location in this database does not indicate that any illegal drug lab materials were or were not present there, and does not constitute a determination that the location either requires or does not require additional cleanup work.

Date of Government Version: 12/31/2015
Date Data Arrived at EDR: 05/10/2016
Date Made Active in Reports: 06/17/2016
Number of Days to Update: 38

Source: Department of Toxic Substances Control
Telephone: 916-255-6504
Last EDR Contact: 08/15/2016
Next Scheduled EDR Contact: 10/24/2016
Data Release Frequency: Varies

TOXIC PITS: Toxic Pits Cleanup Act Sites

Toxic PITS Cleanup Act Sites. TOXIC PITS identifies sites suspected of containing hazardous substances where cleanup has not yet been completed.

Date of Government Version: 07/01/1995
Date Data Arrived at EDR: 08/30/1995
Date Made Active in Reports: 09/26/1995
Number of Days to Update: 27

Source: State Water Resources Control Board
Telephone: 916-227-4364
Last EDR Contact: 01/26/2009
Next Scheduled EDR Contact: 04/27/2009
Data Release Frequency: No Update Planned

US CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 05/04/2016
Date Data Arrived at EDR: 06/03/2016
Date Made Active in Reports: 07/13/2016
Number of Days to Update: 40

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 05/31/2016
Next Scheduled EDR Contact: 09/12/2016
Data Release Frequency: Quarterly

Local Lists of Registered Storage Tanks

SWEEPS UST: SWEEPS UST Listing

Statewide Environmental Evaluation and Planning System. This underground storage tank listing was updated and maintained by a company contacted by the SWRCB in the early 1990's. The listing is no longer updated or maintained. The local agency is the contact for more information on a site on the SWEEPS list.

Date of Government Version: 06/01/1994
Date Data Arrived at EDR: 07/07/2005
Date Made Active in Reports: 08/11/2005
Number of Days to Update: 35

Source: State Water Resources Control Board
Telephone: N/A
Last EDR Contact: 06/03/2005
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

UST MENDOCINO: Mendocino County UST Database

A listing of underground storage tank locations in Mendocino County.

Date of Government Version: 06/07/2016
Date Data Arrived at EDR: 06/09/2016
Date Made Active in Reports: 06/23/2016
Number of Days to Update: 14

Source: Department of Public Health
Telephone: 707-463-4466
Last EDR Contact: 06/01/2016
Next Scheduled EDR Contact: 09/12/2016
Data Release Frequency: Annually

HIST UST: Hazardous Substance Storage Container Database

The Hazardous Substance Storage Container Database is a historical listing of UST sites. Refer to local/county source for current data.

Date of Government Version: 10/15/1990
Date Data Arrived at EDR: 01/25/1991
Date Made Active in Reports: 02/12/1991
Number of Days to Update: 18

Source: State Water Resources Control Board
Telephone: 916-341-5851
Last EDR Contact: 07/26/2001
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

CA FID UST: Facility Inventory Database

The Facility Inventory Database (FID) contains a historical listing of active and inactive underground storage tank locations from the State Water Resource Control Board. Refer to local/county source for current data.

Date of Government Version: 10/31/1994
Date Data Arrived at EDR: 09/05/1995
Date Made Active in Reports: 09/29/1995
Number of Days to Update: 24

Source: California Environmental Protection Agency
Telephone: 916-341-5851
Last EDR Contact: 12/28/1998
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Local Land Records

LIENS: Environmental Liens Listing

A listing of property locations with environmental liens for California where DTSC is a lien holder.

Date of Government Version: 06/02/2016
Date Data Arrived at EDR: 06/07/2016
Date Made Active in Reports: 07/20/2016
Number of Days to Update: 43

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 06/02/2016
Next Scheduled EDR Contact: 09/19/2016
Data Release Frequency: Varies

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 02/18/2014
Date Data Arrived at EDR: 03/18/2014
Date Made Active in Reports: 04/24/2014
Number of Days to Update: 37

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 07/29/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Varies

DEED: Deed Restriction Listing

Site Mitigation and Brownfields Reuse Program Facility Sites with Deed Restrictions & Hazardous Waste Management Program Facility Sites with Deed / Land Use Restriction. The DTSC Site Mitigation and Brownfields Reuse Program (SMBRP) list includes sites cleaned up under the program's oversight and generally does not include current or former hazardous waste facilities that required a hazardous waste facility permit. The list represents deed restrictions that are active. Some sites have multiple deed restrictions. The DTSC Hazardous Waste Management Program (HWMP) has developed a list of current or former hazardous waste facilities that have a recorded land use restriction at the local county recorder's office. The land use restrictions on this list were required by the DTSC HWMP as a result of the presence of hazardous substances that remain on site after the facility (or part of the facility) has been closed or cleaned up. The types of land use restriction include deed notice, deed restriction, or a land use restriction that binds current and future owners.

Date of Government Version: 06/06/2016
Date Data Arrived at EDR: 06/07/2016
Date Made Active in Reports: 07/20/2016
Number of Days to Update: 43

Source: DTSC and SWRCB
Telephone: 916-323-3400
Last EDR Contact: 06/07/2016
Next Scheduled EDR Contact: 09/19/2016
Data Release Frequency: Semi-Annually

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 06/24/2015
Date Data Arrived at EDR: 06/26/2015
Date Made Active in Reports: 09/02/2015
Number of Days to Update: 68

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 06/28/2016
Next Scheduled EDR Contact: 10/10/2016
Data Release Frequency: Annually

CHMIRS: California Hazardous Material Incident Report System

California Hazardous Material Incident Reporting System. CHMIRS contains information on reported hazardous material incidents (accidental releases or spills).

Date of Government Version: 04/11/2016
Date Data Arrived at EDR: 04/27/2016
Date Made Active in Reports: 06/17/2016
Number of Days to Update: 51

Source: Office of Emergency Services
Telephone: 916-845-8400
Last EDR Contact: 07/26/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Varies

LDS: Land Disposal Sites Listing

The Land Disposal program regulates of waste discharge to land for treatment, storage and disposal in waste management units.

Date of Government Version: 06/13/2016
Date Data Arrived at EDR: 06/14/2016
Date Made Active in Reports: 08/09/2016
Number of Days to Update: 56

Source: State Water Qualilty Control Board
Telephone: 866-480-1028
Last EDR Contact: 06/14/2016
Next Scheduled EDR Contact: 09/26/2016
Data Release Frequency: Quarterly

MCS: Military Cleanup Sites Listing

The State Water Resources Control Board and nine Regional Water Quality Control Boards partner with the Department of Defense (DoD) through the Defense and State Memorandum of Agreement (DSMOA) to oversee the investigation and remediation of water quality issues at military facilities.

Date of Government Version: 06/13/2016
Date Data Arrived at EDR: 06/14/2016
Date Made Active in Reports: 08/09/2016
Number of Days to Update: 56

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 06/14/2016
Next Scheduled EDR Contact: 09/26/2016
Data Release Frequency: Quarterly

SPILLS 90: SPILLS90 data from FirstSearch

Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

Date of Government Version: 06/06/2012
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 02/22/2013
Number of Days to Update: 50

Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 12/09/2015
Date Data Arrived at EDR: 03/02/2016
Date Made Active in Reports: 04/05/2016
Number of Days to Update: 34

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/30/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Varies

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 01/31/2015
Date Data Arrived at EDR: 07/08/2015
Date Made Active in Reports: 10/13/2015
Number of Days to Update: 97

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 06/10/2016
Next Scheduled EDR Contact: 09/19/2016
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 07/15/2016
Next Scheduled EDR Contact: 10/24/2016
Data Release Frequency: Semi-Annually

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 07/15/2016
Next Scheduled EDR Contact: 10/24/2016
Data Release Frequency: N/A

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 03/07/2011
Date Data Arrived at EDR: 03/09/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 54

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 08/15/2016
Next Scheduled EDR Contact: 11/28/2016
Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 09/01/2015
Date Data Arrived at EDR: 09/03/2015
Date Made Active in Reports: 11/03/2015
Number of Days to Update: 61

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 05/18/2016
Next Scheduled EDR Contact: 08/29/2016
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 08/08/2016
Next Scheduled EDR Contact: 11/21/2016
Data Release Frequency: Quarterly

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 04/22/2013
Date Data Arrived at EDR: 03/03/2015
Date Made Active in Reports: 03/09/2015
Number of Days to Update: 6

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 05/12/2016
Next Scheduled EDR Contact: 08/22/2016
Data Release Frequency: Varies

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 01/15/2015
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 14

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 06/24/2016
Next Scheduled EDR Contact: 10/03/2016
Data Release Frequency: Every 4 Years

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 11/24/2015
Date Made Active in Reports: 04/05/2016
Number of Days to Update: 133

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 05/24/2016
Next Scheduled EDR Contact: 09/05/2016
Data Release Frequency: Annually

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 07/25/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Annually

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 11/25/2013
Date Data Arrived at EDR: 12/12/2013
Date Made Active in Reports: 02/24/2014
Number of Days to Update: 74

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 06/07/2016
Next Scheduled EDR Contact: 09/19/2016
Data Release Frequency: Annually

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 08/01/2015
Date Data Arrived at EDR: 08/26/2015
Date Made Active in Reports: 11/03/2015
Number of Days to Update: 69

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 07/25/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Varies

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

PRP: Potentially Responsible Parties

A listing of verified Potentially Responsible Parties

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 10/17/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 3

Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 08/12/2016
Next Scheduled EDR Contact: 11/21/2016
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 07/01/2014
Date Data Arrived at EDR: 10/15/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 33

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 07/15/2016
Next Scheduled EDR Contact: 10/24/2016
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 01/23/2015
Date Data Arrived at EDR: 02/06/2015
Date Made Active in Reports: 03/09/2015
Number of Days to Update: 31

Source: Environmental Protection Agency
Telephone: 202-564-5088
Last EDR Contact: 07/07/2016
Next Scheduled EDR Contact: 10/24/2016
Data Release Frequency: Quarterly

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 05/20/2016
Next Scheduled EDR Contact: 09/05/2016
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 05/20/2016
Next Scheduled EDR Contact: 09/05/2016
Data Release Frequency: Quarterly

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 03/07/2016
Date Data Arrived at EDR: 03/18/2016
Date Made Active in Reports: 04/15/2016
Number of Days to Update: 28

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 09/05/2016
Next Scheduled EDR Contact: 11/21/2016
Data Release Frequency: Quarterly

COAL ASH DOE: Steam-Electric Plant Operation Data

A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76

Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 06/09/2016
Next Scheduled EDR Contact: 09/19/2016
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List

A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 07/01/2014
Date Data Arrived at EDR: 09/10/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 06/10/2016
Next Scheduled EDR Contact: 09/19/2016
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 02/01/2011
Date Data Arrived at EDR: 10/19/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 83
Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 07/29/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Varies

RADINFO: Radiation Information Database
The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 07/07/2015
Date Data Arrived at EDR: 07/09/2015
Date Made Active in Reports: 09/16/2015
Number of Days to Update: 69
Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 07/07/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing
A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing
A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

DOT OPS: Incident and Accident Data
Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 07/31/2012
Date Data Arrived at EDR: 08/07/2012
Date Made Active in Reports: 09/18/2012
Number of Days to Update: 42
Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 08/02/2016
Next Scheduled EDR Contact: 11/14/2016
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees
Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 04/17/2015
Date Made Active in Reports: 06/02/2015
Number of Days to Update: 46

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 07/15/2016
Next Scheduled EDR Contact: 10/10/2016
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 02/24/2015
Date Made Active in Reports: 09/30/2015
Number of Days to Update: 218

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 05/27/2016
Next Scheduled EDR Contact: 09/05/2016
Data Release Frequency: Biennially

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 12/08/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 34

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 07/15/2016
Next Scheduled EDR Contact: 10/24/2016
Data Release Frequency: Semi-Annually

FUSRAP: Formerly Utilized Sites Remedial Action Program

DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations.

Date of Government Version: 03/11/2016
Date Data Arrived at EDR: 03/15/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 80

Source: Department of Energy
Telephone: 202-586-3559
Last EDR Contact: 07/26/2016
Next Scheduled EDR Contact: 11/21/2016
Data Release Frequency: Varies

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 09/14/2010
Date Data Arrived at EDR: 10/07/2011
Date Made Active in Reports: 03/01/2012
Number of Days to Update: 146

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 05/23/2016
Next Scheduled EDR Contact: 09/05/2016
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 11/25/2014
Date Data Arrived at EDR: 11/26/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 64

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 07/08/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36

Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/20/2015
Date Data Arrived at EDR: 10/27/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 69

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 06/22/2016
Next Scheduled EDR Contact: 10/10/2016
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data

A listing of minor source facilities.

Date of Government Version: 10/20/2015
Date Data Arrived at EDR: 10/27/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 69

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 06/22/2016
Next Scheduled EDR Contact: 10/10/2016
Data Release Frequency: Annually

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 02/09/2016
Date Data Arrived at EDR: 03/02/2016
Date Made Active in Reports: 04/15/2016
Number of Days to Update: 44

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 06/02/2016
Next Scheduled EDR Contact: 09/12/2016
Data Release Frequency: Semi-Annually

US MINES 2: Ferrous and Nonferrous Metal Mines Database Listing

This map layer includes ferrous (ferrous metal mines are facilities that extract ferrous metals, such as iron ore or molybdenum) and nonferrous (Nonferrous metal mines are facilities that extract nonferrous metals, such as gold, silver, copper, zinc, and lead) metal mines in the United States.

Date of Government Version: 12/05/2005
Date Data Arrived at EDR: 02/29/2008
Date Made Active in Reports: 04/18/2008
Number of Days to Update: 49

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 06/03/2016
Next Scheduled EDR Contact: 09/12/2016
Data Release Frequency: Varies

US MINES 3: Active Mines & Mineral Plants Database Listing

Active Mines and Mineral Processing Plant operations for commodities monitored by the Minerals Information Team of the USGS.

Date of Government Version: 04/14/2011
Date Data Arrived at EDR: 06/08/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 97

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 06/03/2016
Next Scheduled EDR Contact: 09/12/2016
Data Release Frequency: Varies

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 07/20/2015
Date Data Arrived at EDR: 09/09/2015
Date Made Active in Reports: 11/03/2015
Number of Days to Update: 55

Source: EPA
Telephone: (415) 947-8000
Last EDR Contact: 06/08/2016
Next Scheduled EDR Contact: 09/19/2016
Data Release Frequency: Quarterly

DOCKET HWC: Hazardous Waste Compliance Docket Listing

A complete list of the Federal Agency Hazardous Waste Compliance Docket Facilities.

Date of Government Version: 03/01/2016
Date Data Arrived at EDR: 03/03/2016
Date Made Active in Reports: 04/05/2016
Number of Days to Update: 33

Source: Environmental Protection Agency
Telephone: 202-564-0527
Last EDR Contact: 05/25/2016
Next Scheduled EDR Contact: 09/12/2016
Data Release Frequency: Varies

UXO: Unexploded Ordnance Sites

A listing of unexploded ordnance site locations

Date of Government Version: 10/25/2015
Date Data Arrived at EDR: 01/29/2016
Date Made Active in Reports: 04/05/2016
Number of Days to Update: 67

Source: Department of Defense
Telephone: 571-373-0407
Last EDR Contact: 06/20/2016
Next Scheduled EDR Contact: 10/03/2016
Data Release Frequency: Varies

CA BOND EXP. PLAN: Bond Expenditure Plan

Department of Health Services developed a site-specific expenditure plan as the basis for an appropriation of Hazardous Substance Cleanup Bond Act funds. It is not updated.

Date of Government Version: 01/01/1989
Date Data Arrived at EDR: 07/27/1994
Date Made Active in Reports: 08/02/1994
Number of Days to Update: 6

Source: Department of Health Services
Telephone: 916-255-2118
Last EDR Contact: 05/31/1994
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

CORTESE: "Cortese" Hazardous Waste & Substances Sites List

The sites for the list are designated by the State Water Resource Control Board (LUST), the Integrated Waste Board (SWF/LS), and the Department of Toxic Substances Control (Cal-Sites).

Date of Government Version: 03/28/2016
Date Data Arrived at EDR: 03/30/2016
Date Made Active in Reports: 05/09/2016
Number of Days to Update: 40

Source: CAL EPA/Office of Emergency Information
Telephone: 916-323-3400
Last EDR Contact: 06/28/2016
Next Scheduled EDR Contact: 10/10/2016
Data Release Frequency: Quarterly

DRYCLEANERS: Cleaner Facilities

A list of drycleaner related facilities that have EPA ID numbers. These are facilities with certain SIC codes: power laundries, family and commercial; garment pressing and cleaner's agents; linen supply; coin-operated laundries and cleaning; drycleaning plants, except rugs; carpet and upholster cleaning; industrial launderers; laundry and garment services.

Date of Government Version: 02/08/2016
Date Data Arrived at EDR: 02/24/2016
Date Made Active in Reports: 04/01/2016
Number of Days to Update: 37

Source: Department of Toxic Substance Control
Telephone: 916-327-4498
Last EDR Contact: 06/02/2016
Next Scheduled EDR Contact: 09/19/2016
Data Release Frequency: Annually

EMI: Emissions Inventory Data

Toxics and criteria pollutant emissions data collected by the ARB and local air pollution agencies.

Date of Government Version: 12/31/2015
Date Data Arrived at EDR: 06/22/2016
Date Made Active in Reports: 08/09/2016
Number of Days to Update: 48

Source: California Air Resources Board
Telephone: 916-322-2990
Last EDR Contact: 06/22/2016
Next Scheduled EDR Contact: 10/03/2016
Data Release Frequency: Varies

ENF: Enforcement Action Listing

A listing of Water Board Enforcement Actions. Formal is everything except Oral/Verbal Communication, Notice of Violation, Expedited Payment Letter, and Staff Enforcement Letter.

Date of Government Version: 05/25/2016
Date Data Arrived at EDR: 05/27/2016
Date Made Active in Reports: 07/20/2016
Number of Days to Update: 54

Source: State Water Resoruces Control Board
Telephone: 916-445-9379
Last EDR Contact: 08/03/2016
Next Scheduled EDR Contact: 10/07/2016
Data Release Frequency: Varies

Financial Assurance 1: Financial Assurance Information Listing

Financial Assurance information

Date of Government Version: 04/25/2016
Date Data Arrived at EDR: 04/29/2016
Date Made Active in Reports: 06/21/2016
Number of Days to Update: 53

Source: Department of Toxic Substances Control
Telephone: 916-255-3628
Last EDR Contact: 07/20/2016
Next Scheduled EDR Contact: 10/07/2016
Data Release Frequency: Varies

Financial Assurance 2: Financial Assurance Information Listing

A listing of financial assurance information for solid waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 05/25/2016
Date Data Arrived at EDR: 06/01/2016
Date Made Active in Reports: 07/20/2016
Number of Days to Update: 49

Source: California Integrated Waste Management Board
Telephone: 916-341-6066
Last EDR Contact: 08/10/2016
Next Scheduled EDR Contact: 11/28/2016
Data Release Frequency: Varies

HAZNET: Facility and Manifest Data

Facility and Manifest Data. The data is extracted from the copies of hazardous waste manifests received each year by the DTSC. The annual volume of manifests is typically 700,000 - 1,000,000 annually, representing approximately 350,000 - 500,000 shipments. Data are from the manifests submitted without correction, and therefore many contain some invalid values for data elements such as generator ID, TSD ID, waste category, and disposal method. This database begins with calendar year 1993.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 10/14/2015
Date Made Active in Reports: 12/11/2015
Number of Days to Update: 58

Source: California Environmental Protection Agency
Telephone: 916-255-1136
Last EDR Contact: 07/15/2016
Next Scheduled EDR Contact: 10/24/2016
Data Release Frequency: Annually

HIST CORTESE: Hazardous Waste & Substance Site List

The sites for the list are designated by the State Water Resource Control Board [LUST], the Integrated Waste Board [SWF/LS], and the Department of Toxic Substances Control [CALSITES]. This listing is no longer updated by the state agency.

Date of Government Version: 04/01/2001
Date Data Arrived at EDR: 01/22/2009
Date Made Active in Reports: 04/08/2009
Number of Days to Update: 76

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 01/22/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

HWP: EnviroStor Permitted Facilities Listing
Detailed information on permitted hazardous waste facilities and corrective action ("cleanups") tracked in EnviroStor.

Date of Government Version: 05/23/2016
Date Data Arrived at EDR: 05/25/2016
Date Made Active in Reports: 07/20/2016
Number of Days to Update: 56
Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 05/25/2016
Next Scheduled EDR Contact: 09/05/2016
Data Release Frequency: Quarterly

HWT: Registered Hazardous Waste Transporter Database
A listing of hazardous waste transporters. In California, unless specifically exempted, it is unlawful for any person to transport hazardous wastes unless the person holds a valid registration issued by DTSC. A hazardous waste transporter registration is valid for one year and is assigned a unique registration number.

Date of Government Version: 04/11/2016
Date Data Arrived at EDR: 04/12/2016
Date Made Active in Reports: 06/01/2016
Number of Days to Update: 50
Source: Department of Toxic Substances Control
Telephone: 916-440-7145
Last EDR Contact: 07/13/2016
Next Scheduled EDR Contact: 10/24/2016
Data Release Frequency: Quarterly

MINES: Mines Site Location Listing
A listing of mine site locations from the Office of Mine Reclamation.

Date of Government Version: 06/13/2016
Date Data Arrived at EDR: 06/14/2016
Date Made Active in Reports: 08/09/2016
Number of Days to Update: 56
Source: Department of Conservation
Telephone: 916-322-1080
Last EDR Contact: 06/14/2016
Next Scheduled EDR Contact: 09/26/2016
Data Release Frequency: Varies

MWMP: Medical Waste Management Program Listing
The Medical Waste Management Program (MWMP) ensures the proper handling and disposal of medical waste by permitting and inspecting medical waste Offsite Treatment Facilities (PDF) and Transfer Stations (PDF) throughout the state. MWMP also oversees all Medical Waste Transporters.

Date of Government Version: 05/25/2016
Date Data Arrived at EDR: 06/07/2016
Date Made Active in Reports: 07/20/2016
Number of Days to Update: 43
Source: Department of Public Health
Telephone: 916-558-1784
Last EDR Contact: 06/07/2016
Next Scheduled EDR Contact: 09/19/2016
Data Release Frequency: Varies

NPDES: NPDES Permits Listing
A listing of NPDES permits, including stormwater.

Date of Government Version: 05/16/2016
Date Data Arrived at EDR: 05/18/2016
Date Made Active in Reports: 06/23/2016
Number of Days to Update: 36
Source: State Water Resources Control Board
Telephone: 916-445-9379
Last EDR Contact: 05/18/2016
Next Scheduled EDR Contact: 08/29/2016
Data Release Frequency: Quarterly

PEST LIC: Pesticide Regulation Licenses Listing
A listing of licenses and certificates issued by the Department of Pesticide Regulation. The DPR issues licenses and/or certificates to: Persons and businesses that apply or sell pesticides; Pest control dealers and brokers; Persons who advise on agricultural pesticide applications.

Date of Government Version: 06/06/2016
Date Data Arrived at EDR: 06/07/2016
Date Made Active in Reports: 07/20/2016
Number of Days to Update: 43
Source: Department of Pesticide Regulation
Telephone: 916-445-4038
Last EDR Contact: 06/07/2016
Next Scheduled EDR Contact: 09/19/2016
Data Release Frequency: Quarterly

PROC: Certified Processors Database
A listing of certified processors.

Date of Government Version: 06/13/2016
Date Data Arrived at EDR: 06/14/2016
Date Made Active in Reports: 08/09/2016
Number of Days to Update: 56
Source: Department of Conservation
Telephone: 916-323-3836
Last EDR Contact: 06/14/2016
Next Scheduled EDR Contact: 09/26/2016
Data Release Frequency: Quarterly

NOTIFY 65: Proposition 65 Records
Listings of all Proposition 65 incidents reported to counties by the State Water Resources Control Board and the Regional Water Quality Control Board. This database is no longer updated by the reporting agency.

Date of Government Version: 09/10/2015
Date Data Arrived at EDR: 01/05/2016
Date Made Active in Reports: 02/12/2016
Number of Days to Update: 38
Source: State Water Resources Control Board
Telephone: 916-445-3846
Last EDR Contact: 06/30/2016
Next Scheduled EDR Contact: 10/03/2016
Data Release Frequency: No Update Planned

UIC: UIC Listing
A listing of wells identified as underground injection wells, in the California Oil and Gas Wells database.

Date of Government Version: 02/12/2016
Date Data Arrived at EDR: 03/16/2016
Date Made Active in Reports: 06/13/2016
Number of Days to Update: 89
Source: Deaprtment of Conservation
Telephone: 916-445-2408
Last EDR Contact: 06/16/2016
Next Scheduled EDR Contact: 09/26/2016
Data Release Frequency: Varies

WASTEWATER PITS: Oil Wastewater Pits Listing
Water officials discovered that oil producers have been dumping chemical-laden wastewater into hundreds of unlined pits that are operating without proper permits. Inspections completed by the Central Valley Regional Water Quality Control Board revealed the existence of previously unidentified waste sites. The water board?s review found that more than one-third of the region?s active disposal pits are operating without permission.

Date of Government Version: 04/15/2015
Date Data Arrived at EDR: 04/17/2015
Date Made Active in Reports: 06/23/2015
Number of Days to Update: 67
Source: RWQCB, Central Valley Region
Telephone: 559-445-5577
Last EDR Contact: 07/15/2016
Next Scheduled EDR Contact: 10/24/2016
Data Release Frequency: Varies

WDS: Waste Discharge System
Sites which have been issued waste discharge requirements.

Date of Government Version: 06/19/2007
Date Data Arrived at EDR: 06/20/2007
Date Made Active in Reports: 06/29/2007
Number of Days to Update: 9
Source: State Water Resources Control Board
Telephone: 916-341-5227
Last EDR Contact: 05/20/2016
Next Scheduled EDR Contact: 09/05/2016
Data Release Frequency: Quarterly

WIP: Well Investigation Program Case List
Well Investigation Program case in the San Gabriel and San Fernando Valley area.

Date of Government Version: 07/03/2009
Date Data Arrived at EDR: 07/21/2009
Date Made Active in Reports: 08/03/2009
Number of Days to Update: 13
Source: Los Angeles Water Quality Control Board
Telephone: 213-576-6726
Last EDR Contact: 06/24/2016
Next Scheduled EDR Contact: 10/10/2016
Data Release Frequency: Varies

ECHO: Enforcement & Compliance History Information
ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

Date of Government Version: 09/20/2015
Date Data Arrived at EDR: 09/23/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 103

Source: Environmental Protection Agency
Telephone: 202-564-2280
Last EDR Contact: 06/22/2016
Next Scheduled EDR Contact: 10/03/2016
Data Release Frequency: Quarterly

FUELS PROGRAM: EPA Fuels Program Registered Listing

This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

Date of Government Version: 05/24/2016
Date Data Arrived at EDR: 05/25/2016
Date Made Active in Reports: 07/13/2016
Number of Days to Update: 49

Source: EPA
Telephone: 800-385-6164
Last EDR Contact: 05/25/2016
Next Scheduled EDR Contact: 09/05/2016
Data Release Frequency: Quarterly

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR Hist Auto: EDR Exclusive Historic Gas Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR Hist Cleaner: EDR Exclusive Historic Dry Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Resources Recycling and Recovery in California.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/13/2014
Number of Days to Update: 196

Source: Department of Resources Recycling and Recovery
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the State Water Resources Control Board in California.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 12/30/2013
Number of Days to Update: 182

Source: State Water Resources Control Board
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

COUNTY RECORDS

ALAMEDA COUNTY:

Contaminated Sites

A listing of contaminated sites overseen by the Toxic Release Program (oil and groundwater contamination from chemical releases and spills) and the Leaking Underground Storage Tank Program (soil and ground water contamination from leaking petroleum USTs).

Date of Government Version: 04/12/2016
Date Data Arrived at EDR: 04/14/2016
Date Made Active in Reports: 06/01/2016
Number of Days to Update: 48

Source: Alameda County Environmental Health Services
Telephone: 510-567-6700
Last EDR Contact: 07/07/2016
Next Scheduled EDR Contact: 10/24/2016
Data Release Frequency: Semi-Annually

Underground Tanks

Underground storage tank sites located in Alameda county.

Date of Government Version: 07/07/2016
Date Data Arrived at EDR: 07/12/2016
Date Made Active in Reports: 08/08/2016
Number of Days to Update: 27

Source: Alameda County Environmental Health Services
Telephone: 510-567-6700
Last EDR Contact: 07/07/2016
Next Scheduled EDR Contact: 10/24/2016
Data Release Frequency: Semi-Annually

AMADOR COUNTY:

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

CUPA Facility List
Cupa Facility List

Date of Government Version: 06/06/2016
Date Data Arrived at EDR: 06/09/2016
Date Made Active in Reports: 06/21/2016
Number of Days to Update: 12

Source: Amador County Environmental Health
Telephone: 209-223-6439
Last EDR Contact: 06/02/2016
Next Scheduled EDR Contact: 09/19/2016
Data Release Frequency: Varies

BUTTE COUNTY:

CUPA Facility Listing
Cupa facility list.

Date of Government Version: 06/02/2016
Date Data Arrived at EDR: 06/03/2016
Date Made Active in Reports: 06/21/2016
Number of Days to Update: 18

Source: Public Health Department
Telephone: 530-538-7149
Last EDR Contact: 07/07/2016
Next Scheduled EDR Contact: 10/24/2016
Data Release Frequency: No Update Planned

CALVERAS COUNTY:

CUPA Facility Listing
Cupa Facility Listing

Date of Government Version: 04/29/2016
Date Data Arrived at EDR: 05/03/2016
Date Made Active in Reports: 06/17/2016
Number of Days to Update: 45

Source: Calveras County Environmental Health
Telephone: 209-754-6399
Last EDR Contact: 06/27/2016
Next Scheduled EDR Contact: 10/10/2016
Data Release Frequency: Quarterly

COLUSA COUNTY:

CUPA Facility List
Cupa facility list.

Date of Government Version: 05/25/2016
Date Data Arrived at EDR: 05/26/2016
Date Made Active in Reports: 06/17/2016
Number of Days to Update: 22

Source: Health & Human Services
Telephone: 530-458-0396
Last EDR Contact: 08/03/2016
Next Scheduled EDR Contact: 11/21/2016
Data Release Frequency: Varies

CONTRA COSTA COUNTY:

Site List
List includes sites from the underground tank, hazardous waste generator and business plan/2185 programs.

Date of Government Version: 05/24/2016
Date Data Arrived at EDR: 05/26/2016
Date Made Active in Reports: 07/20/2016
Number of Days to Update: 55

Source: Contra Costa Health Services Department
Telephone: 925-646-2286
Last EDR Contact: 08/01/2016
Next Scheduled EDR Contact: 11/14/2016
Data Release Frequency: Semi-Annually

DEL NORTE COUNTY:

CUPA Facility List
Cupa Facility list

Date of Government Version: 04/08/2016
Date Data Arrived at EDR: 05/03/2016
Date Made Active in Reports: 06/22/2016
Number of Days to Update: 50

Source: Del Norte County Environmental Health Division
Telephone: 707-465-0426
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/14/2016
Data Release Frequency: Varies

EL DORADO COUNTY:

CUPA Facility List
CUPA facility list.

Date of Government Version: 05/24/2016
Date Data Arrived at EDR: 05/26/2016
Date Made Active in Reports: 08/09/2016
Number of Days to Update: 75

Source: El Dorado County Environmental Management Department
Telephone: 530-621-6623
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/14/2016
Data Release Frequency: Varies

FRESNO COUNTY:

CUPA Resources List
Certified Unified Program Agency. CUPA's are responsible for implementing a unified hazardous materials and hazardous waste management regulatory program. The agency provides oversight of businesses that deal with hazardous materials, operate underground storage tanks or aboveground storage tanks.

Date of Government Version: 07/13/2016
Date Data Arrived at EDR: 07/19/2016
Date Made Active in Reports: 08/09/2016
Number of Days to Update: 21

Source: Dept. of Community Health
Telephone: 559-445-3271
Last EDR Contact: 07/13/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Semi-Annually

HUMBOLDT COUNTY:

CUPA Facility List
CUPA facility list.

Date of Government Version: 03/16/2016
Date Data Arrived at EDR: 03/21/2016
Date Made Active in Reports: 05/04/2016
Number of Days to Update: 44

Source: Humboldt County Environmental Health
Telephone: N/A
Last EDR Contact: 05/23/2016
Next Scheduled EDR Contact: 09/05/2016
Data Release Frequency: Varies

IMPERIAL COUNTY:

CUPA Facility List
Cupa facility list.

Date of Government Version: 04/26/2016
Date Data Arrived at EDR: 04/28/2016
Date Made Active in Reports: 06/17/2016
Number of Days to Update: 50

Source: San Diego Border Field Office
Telephone: 760-339-2777
Last EDR Contact: 07/20/2016
Next Scheduled EDR Contact: 10/07/2016
Data Release Frequency: Varies

INYO COUNTY:

CUPA Facility List
Cupa facility list.

Date of Government Version: 09/10/2013
Date Data Arrived at EDR: 09/11/2013
Date Made Active in Reports: 10/14/2013
Number of Days to Update: 33

Source: Inyo County Environmental Health Services
Telephone: 760-878-0238
Last EDR Contact: 05/23/2016
Next Scheduled EDR Contact: 09/05/2016
Data Release Frequency: Varies

KERN COUNTY:

Underground Storage Tank Sites & Tank Listing
Kern County Sites and Tanks Listing.

Date of Government Version: 05/16/2016
Date Data Arrived at EDR: 05/20/2016
Date Made Active in Reports: 08/08/2016
Number of Days to Update: 80

Source: Kern County Environment Health Services Department
Telephone: 661-862-8700
Last EDR Contact: 08/03/2016
Next Scheduled EDR Contact: 11/21/2016
Data Release Frequency: Quarterly

KINGS COUNTY:

CUPA Facility List
A listing of sites included in the county's Certified Unified Program Agency database. California's Secretary for Environmental Protection established the unified hazardous materials and hazardous waste regulatory program as required by chapter 6.11 of the California Health and Safety Code. The Unified Program consolidates the administration, permits, inspections, and enforcement activities.

Date of Government Version: 05/25/2016
Date Data Arrived at EDR: 05/27/2016
Date Made Active in Reports: 06/22/2016
Number of Days to Update: 26

Source: Kings County Department of Public Health
Telephone: 559-584-1411
Last EDR Contact: 05/23/2016
Next Scheduled EDR Contact: 09/05/2016
Data Release Frequency: Varies

LAKE COUNTY:

CUPA Facility List
Cupa facility list

Date of Government Version: 04/26/2016
Date Data Arrived at EDR: 04/27/2016
Date Made Active in Reports: 06/17/2016
Number of Days to Update: 51

Source: Lake County Environmental Health
Telephone: 707-263-1164
Last EDR Contact: 04/18/2016
Next Scheduled EDR Contact: 08/01/2016
Data Release Frequency: Varies

LOS ANGELES COUNTY:

San Gabriel Valley Areas of Concern
San Gabriel Valley areas where VOC contamination is at or above the MCL as designated by region 9 EPA office.

Date of Government Version: 03/30/2009
Date Data Arrived at EDR: 03/31/2009
Date Made Active in Reports: 10/23/2009
Number of Days to Update: 206

Source: EPA Region 9
Telephone: 415-972-3178
Last EDR Contact: 06/15/2016
Next Scheduled EDR Contact: 07/04/2016
Data Release Frequency: No Update Planned

HMS: Street Number List
Industrial Waste and Underground Storage Tank Sites.

Date of Government Version: 03/30/2016
Date Data Arrived at EDR: 04/01/2016
Date Made Active in Reports: 05/09/2016
Number of Days to Update: 38
Source: Department of Public Works
Telephone: 626-458-3517
Last EDR Contact: 07/07/2016
Next Scheduled EDR Contact: 10/24/2016
Data Release Frequency: Semi-Annually

List of Solid Waste Facilities
Solid Waste Facilities in Los Angeles County.

Date of Government Version: 04/18/2016
Date Data Arrived at EDR: 04/20/2016
Date Made Active in Reports: 06/01/2016
Number of Days to Update: 42
Source: La County Department of Public Works
Telephone: 818-458-5185
Last EDR Contact: 07/19/2016
Next Scheduled EDR Contact: 10/31/2016
Data Release Frequency: Varies

City of Los Angeles Landfills
Landfills owned and maintained by the City of Los Angeles.

Date of Government Version: 01/01/2016
Date Data Arrived at EDR: 01/26/2016
Date Made Active in Reports: 03/22/2016
Number of Days to Update: 56
Source: Engineering & Construction Division
Telephone: 213-473-7869
Last EDR Contact: 07/18/2016
Next Scheduled EDR Contact: 10/31/2016
Data Release Frequency: Varies

Site Mitigation List
Industrial sites that have had some sort of spill or complaint.

Date of Government Version: 03/29/2016
Date Data Arrived at EDR: 04/06/2016
Date Made Active in Reports: 06/13/2016
Number of Days to Update: 68
Source: Community Health Services
Telephone: 323-890-7806
Last EDR Contact: 07/13/2016
Next Scheduled EDR Contact: 10/31/2016
Data Release Frequency: Annually

City of El Segundo Underground Storage Tank
Underground storage tank sites located in El Segundo city.

Date of Government Version: 03/30/2015
Date Data Arrived at EDR: 04/02/2015
Date Made Active in Reports: 04/13/2015
Number of Days to Update: 11
Source: City of El Segundo Fire Department
Telephone: 310-524-2236
Last EDR Contact: 07/13/2016
Next Scheduled EDR Contact: 10/31/2016
Data Release Frequency: Semi-Annually

City of Long Beach Underground Storage Tank
Underground storage tank sites located in the city of Long Beach.

Date of Government Version: 11/04/2015
Date Data Arrived at EDR: 11/13/2015
Date Made Active in Reports: 12/17/2015
Number of Days to Update: 34
Source: City of Long Beach Fire Department
Telephone: 562-570-2563
Last EDR Contact: 07/25/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Annually

City of Torrance Underground Storage Tank
Underground storage tank sites located in the city of Torrance.

Date of Government Version: 06/23/2016
Date Data Arrived at EDR: 07/12/2016
Date Made Active in Reports: 08/09/2016
Number of Days to Update: 28
Source: City of Torrance Fire Department
Telephone: 310-618-2973
Last EDR Contact: 07/07/2016
Next Scheduled EDR Contact: 10/24/2016
Data Release Frequency: Semi-Annually

MADERA COUNTY:

CUPA Facility List

A listing of sites included in the county's Certified Unified Program Agency database. California's Secretary for Environmental Protection established the unified hazardous materials and hazardous waste regulatory program as required by chapter 6.11 of the California Health and Safety Code. The Unified Program consolidates the administration, permits, inspections, and enforcement activities.

Date of Government Version: 06/02/2016
Date Data Arrived at EDR: 06/03/2016
Date Made Active in Reports: 08/09/2016
Number of Days to Update: 67

Source: Madera County Environmental Health
Telephone: 559-675-7823
Last EDR Contact: 05/23/2016
Next Scheduled EDR Contact: 09/05/2016
Data Release Frequency: Varies

MARIN COUNTY:

Underground Storage Tank Sites

Currently permitted USTs in Marin County.

Date of Government Version: 04/07/2016
Date Data Arrived at EDR: 04/26/2016
Date Made Active in Reports: 06/01/2016
Number of Days to Update: 36

Source: Public Works Department Waste Management
Telephone: 415-499-6647
Last EDR Contact: 06/30/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Semi-Annually

MERCED COUNTY:

CUPA Facility List

CUPA facility list.

Date of Government Version: 02/26/2016
Date Data Arrived at EDR: 03/01/2016
Date Made Active in Reports: 05/04/2016
Number of Days to Update: 64

Source: Merced County Environmental Health
Telephone: 209-381-1094
Last EDR Contact: 06/15/2016
Next Scheduled EDR Contact: 09/05/2016
Data Release Frequency: Varies

MONO COUNTY:

CUPA Facility List

CUPA Facility List

Date of Government Version: 05/25/2016
Date Data Arrived at EDR: 06/01/2016
Date Made Active in Reports: 06/22/2016
Number of Days to Update: 21

Source: Mono County Health Department
Telephone: 760-932-5580
Last EDR Contact: 05/25/2016
Next Scheduled EDR Contact: 09/12/2016
Data Release Frequency: Varies

MONTEREY COUNTY:

CUPA Facility Listing

CUPA Program listing from the Environmental Health Division.

Date of Government Version: 06/24/2016
Date Data Arrived at EDR: 06/27/2016
Date Made Active in Reports: 08/09/2016
Number of Days to Update: 43

Source: Monterey County Health Department
Telephone: 831-796-1297
Last EDR Contact: 05/23/2016
Next Scheduled EDR Contact: 09/05/2016
Data Release Frequency: Varies

NAPA COUNTY:

Sites With Reported Contamination
A listing of leaking underground storage tank sites located in Napa county.

Date of Government Version: 12/05/2011
Date Data Arrived at EDR: 12/06/2011
Date Made Active in Reports: 02/07/2012
Number of Days to Update: 63
Source: Napa County Department of Environmental Management
Telephone: 707-253-4269
Last EDR Contact: 05/25/2016
Next Scheduled EDR Contact: 09/12/2016
Data Release Frequency: No Update Planned

Closed and Operating Underground Storage Tank Sites
Underground storage tank sites located in Napa county.

Date of Government Version: 01/15/2008
Date Data Arrived at EDR: 01/16/2008
Date Made Active in Reports: 02/08/2008
Number of Days to Update: 23
Source: Napa County Department of Environmental Management
Telephone: 707-253-4269
Last EDR Contact: 05/25/2016
Next Scheduled EDR Contact: 09/12/2016
Data Release Frequency: No Update Planned

NEVADA COUNTY:

CUPA Facility List
CUPA facility list.

Date of Government Version: 04/18/2016
Date Data Arrived at EDR: 05/06/2016
Date Made Active in Reports: 06/17/2016
Number of Days to Update: 42
Source: Community Development Agency
Telephone: 530-265-1467
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/14/2016
Data Release Frequency: Varies

ORANGE COUNTY:

List of Industrial Site Cleanups
Petroleum and non-petroleum spills.

Date of Government Version: 05/01/2016
Date Data Arrived at EDR: 05/17/2016
Date Made Active in Reports: 06/21/2016
Number of Days to Update: 35
Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 08/08/2016
Next Scheduled EDR Contact: 11/21/2016
Data Release Frequency: Annually

List of Underground Storage Tank Cleanups
Orange County Underground Storage Tank Cleanups (LUST).

Date of Government Version: 05/01/2016
Date Data Arrived at EDR: 05/17/2016
Date Made Active in Reports: 06/21/2016
Number of Days to Update: 35
Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 08/08/2016
Next Scheduled EDR Contact: 11/21/2016
Data Release Frequency: Quarterly

List of Underground Storage Tank Facilities
Orange County Underground Storage Tank Facilities (UST).

Date of Government Version: 05/01/2016
Date Data Arrived at EDR: 05/11/2016
Date Made Active in Reports: 06/01/2016
Number of Days to Update: 21
Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 08/09/2016
Next Scheduled EDR Contact: 11/21/2016
Data Release Frequency: Quarterly

PLACER COUNTY:

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Master List of Facilities
List includes aboveground tanks, underground tanks and cleanup sites.

Date of Government Version: 06/16/2016
Date Data Arrived at EDR: 06/20/2016
Date Made Active in Reports: 08/09/2016
Number of Days to Update: 50
Source: Placer County Health and Human Services
Telephone: 530-745-2363
Last EDR Contact: 06/15/2016
Next Scheduled EDR Contact: 09/19/2016
Data Release Frequency: Semi-Annually

RIVERSIDE COUNTY:

Listing of Underground Tank Cleanup Sites
Riverside County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 04/13/2016
Date Data Arrived at EDR: 04/15/2016
Date Made Active in Reports: 05/09/2016
Number of Days to Update: 24
Source: Department of Environmental Health
Telephone: 951-358-5055
Last EDR Contact: 06/20/2016
Next Scheduled EDR Contact: 10/03/2016
Data Release Frequency: Quarterly

Underground Storage Tank Tank List
Underground storage tank sites located in Riverside county.

Date of Government Version: 07/13/2016
Date Data Arrived at EDR: 07/18/2016
Date Made Active in Reports: 08/08/2016
Number of Days to Update: 21
Source: Department of Environmental Health
Telephone: 951-358-5055
Last EDR Contact: 06/20/2016
Next Scheduled EDR Contact: 10/03/2016
Data Release Frequency: Quarterly

SACRAMENTO COUNTY:

Toxic Site Clean-Up List
List of sites where unauthorized releases of potentially hazardous materials have occurred.

Date of Government Version: 02/02/2016
Date Data Arrived at EDR: 04/06/2016
Date Made Active in Reports: 06/01/2016
Number of Days to Update: 56
Source: Sacramento County Environmental Management
Telephone: 916-875-8406
Last EDR Contact: 07/06/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Quarterly

Master Hazardous Materials Facility List
Any business that has hazardous materials on site - hazardous material storage sites, underground storage tanks, waste generators.

Date of Government Version: 02/02/2016
Date Data Arrived at EDR: 04/06/2016
Date Made Active in Reports: 06/01/2016
Number of Days to Update: 56
Source: Sacramento County Environmental Management
Telephone: 916-875-8406
Last EDR Contact: 07/05/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Quarterly

SAN BERNARDINO COUNTY:

Hazardous Material Permits
This listing includes underground storage tanks, medical waste handlers/generators, hazardous materials handlers, hazardous waste generators, and waste oil generators/handlers.

Date of Government Version: 06/09/2016
Date Data Arrived at EDR: 06/10/2016
Date Made Active in Reports: 07/20/2016
Number of Days to Update: 40

Source: San Bernardino County Fire Department Hazardous Materials Division
Telephone: 909-387-3041
Last EDR Contact: 08/08/2016
Next Scheduled EDR Contact: 11/21/2016
Data Release Frequency: Quarterly

SAN DIEGO COUNTY:

Hazardous Materials Management Division Database

The database includes: HE58 - This report contains the business name, site address, business phone number, establishment 'H' permit number, type of permit, and the business status. HE17 - In addition to providing the same information provided in the HE58 listing, HE17 provides inspection dates, violations received by the establishment, hazardous waste generated, the quantity, method of storage, treatment/disposal of waste and the hauler, and information on underground storage tanks. Unauthorized Release List - Includes a summary of environmental contamination cases in San Diego County (underground tank cases, non-tank cases, groundwater contamination, and soil contamination are included.)

Date of Government Version: 09/23/2013
Date Data Arrived at EDR: 09/24/2013
Date Made Active in Reports: 10/17/2013
Number of Days to Update: 23

Source: Hazardous Materials Management Division
Telephone: 619-338-2268
Last EDR Contact: 06/02/2016
Next Scheduled EDR Contact: 09/19/2016
Data Release Frequency: Quarterly

Solid Waste Facilities

San Diego County Solid Waste Facilities.

Date of Government Version: 10/31/2015
Date Data Arrived at EDR: 11/07/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 58

Source: Department of Health Services
Telephone: 619-338-2209
Last EDR Contact: 07/20/2016
Next Scheduled EDR Contact: 10/07/2016
Data Release Frequency: Varies

Environmental Case Listing

The listing contains all underground tank release cases and projects pertaining to properties contaminated with hazardous substances that are actively under review by the Site Assessment and Mitigation Program.

Date of Government Version: 03/23/2010
Date Data Arrived at EDR: 06/15/2010
Date Made Active in Reports: 07/09/2010
Number of Days to Update: 24

Source: San Diego County Department of Environmental Health
Telephone: 619-338-2371
Last EDR Contact: 06/02/2016
Next Scheduled EDR Contact: 09/19/2016
Data Release Frequency: No Update Planned

SAN FRANCISCO COUNTY:

Local Oversite Facilities

A listing of leaking underground storage tank sites located in San Francisco county.

Date of Government Version: 09/19/2008
Date Data Arrived at EDR: 09/19/2008
Date Made Active in Reports: 09/29/2008
Number of Days to Update: 10

Source: Department Of Public Health San Francisco County
Telephone: 415-252-3920
Last EDR Contact: 08/03/2016
Next Scheduled EDR Contact: 11/21/2016
Data Release Frequency: Quarterly

Underground Storage Tank Information

Underground storage tank sites located in San Francisco county.

Date of Government Version: 11/29/2010
Date Data Arrived at EDR: 03/10/2011
Date Made Active in Reports: 03/15/2011
Number of Days to Update: 5

Source: Department of Public Health
Telephone: 415-252-3920
Last EDR Contact: 08/03/2016
Next Scheduled EDR Contact: 11/21/2016
Data Release Frequency: Quarterly

SAN JOAQUIN COUNTY:

San Joaquin Co. UST
A listing of underground storage tank locations in San Joaquin county.

Date of Government Version: 06/16/2016
Date Data Arrived at EDR: 06/20/2016
Date Made Active in Reports: 08/08/2016
Number of Days to Update: 49

Source: Environmental Health Department
Telephone: N/A
Last EDR Contact: 06/15/2016
Next Scheduled EDR Contact: 10/03/2016
Data Release Frequency: Semi-Annually

SAN LUIS OBISPO COUNTY:

CUPA Facility List
Cupa Facility List.

Date of Government Version: 05/23/2016
Date Data Arrived at EDR: 05/24/2016
Date Made Active in Reports: 06/21/2016
Number of Days to Update: 28

Source: San Luis Obispo County Public Health Department
Telephone: 805-781-5596
Last EDR Contact: 05/23/2016
Next Scheduled EDR Contact: 09/05/2016
Data Release Frequency: Varies

SAN MATEO COUNTY:

Business Inventory
List includes Hazardous Materials Business Plan, hazardous waste generators, and underground storage tanks.

Date of Government Version: 06/02/2016
Date Data Arrived at EDR: 06/07/2016
Date Made Active in Reports: 06/22/2016
Number of Days to Update: 15

Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
Last EDR Contact: 05/27/2016
Next Scheduled EDR Contact: 09/26/2016
Data Release Frequency: Annually

Fuel Leak List
A listing of leaking underground storage tank sites located in San Mateo county.

Date of Government Version: 06/09/2016
Date Data Arrived at EDR: 06/13/2016
Date Made Active in Reports: 08/09/2016
Number of Days to Update: 57

Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
Last EDR Contact: 06/08/2016
Next Scheduled EDR Contact: 09/26/2016
Data Release Frequency: Semi-Annually

SANTA BARBARA COUNTY:

CUPA Facility Listing
CUPA Program Listing from the Environmental Health Services division.

Date of Government Version: 09/08/2011
Date Data Arrived at EDR: 09/09/2011
Date Made Active in Reports: 10/07/2011
Number of Days to Update: 28

Source: Santa Barbara County Public Health Department
Telephone: 805-686-8167
Last EDR Contact: 05/23/2016
Next Scheduled EDR Contact: 09/05/2016
Data Release Frequency: Varies

SANTA CLARA COUNTY:

Cupa Facility List
Cupa facility list

Date of Government Version: 05/25/2016
Date Data Arrived at EDR: 05/26/2016
Date Made Active in Reports: 06/22/2016
Number of Days to Update: 27

Source: Department of Environmental Health
Telephone: 408-918-1973
Last EDR Contact: 05/23/2016
Next Scheduled EDR Contact: 09/05/2016
Data Release Frequency: Varies

HIST LUST - Fuel Leak Site Activity Report
A listing of open and closed leaking underground storage tanks. This listing is no longer updated by the county. Leaking underground storage tanks are now handled by the Department of Environmental Health.

Date of Government Version: 03/29/2005
Date Data Arrived at EDR: 03/30/2005
Date Made Active in Reports: 04/21/2005
Number of Days to Update: 22

Source: Santa Clara Valley Water District
Telephone: 408-265-2600
Last EDR Contact: 03/23/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: No Update Planned

LOP Listing
A listing of leaking underground storage tanks located in Santa Clara county.

Date of Government Version: 03/03/2014
Date Data Arrived at EDR: 03/05/2014
Date Made Active in Reports: 03/18/2014
Number of Days to Update: 13

Source: Department of Environmental Health
Telephone: 408-918-3417
Last EDR Contact: 05/25/2016
Next Scheduled EDR Contact: 09/12/2016
Data Release Frequency: Annually

Hazardous Material Facilities
Hazardous material facilities, including underground storage tank sites.

Date of Government Version: 05/26/2016
Date Data Arrived at EDR: 06/01/2016
Date Made Active in Reports: 07/20/2016
Number of Days to Update: 49

Source: City of San Jose Fire Department
Telephone: 408-535-7694
Last EDR Contact: 08/03/2016
Next Scheduled EDR Contact: 11/21/2016
Data Release Frequency: Annually

SANTA CRUZ COUNTY:

CUPA Facility List
CUPA facility listing.

Date of Government Version: 05/31/2016
Date Data Arrived at EDR: 06/02/2016
Date Made Active in Reports: 06/21/2016
Number of Days to Update: 19

Source: Santa Cruz County Environmental Health
Telephone: 831-464-2761
Last EDR Contact: 05/23/2016
Next Scheduled EDR Contact: 09/05/2016
Data Release Frequency: Varies

SHASTA COUNTY:

CUPA Facility List
Cupa Facility List.

Date of Government Version: 06/14/2016
Date Data Arrived at EDR: 06/16/2016
Date Made Active in Reports: 08/09/2016
Number of Days to Update: 54

Source: Shasta County Department of Resource Management
Telephone: 530-225-5789
Last EDR Contact: 05/23/2016
Next Scheduled EDR Contact: 09/05/2016
Data Release Frequency: Varies

SOLANO COUNTY:

Leaking Underground Storage Tanks
A listing of leaking underground storage tank sites located in Solano county.

Date of Government Version: 06/09/2016
Date Data Arrived at EDR: 06/13/2016
Date Made Active in Reports: 08/09/2016
Number of Days to Update: 57

Source: Solano County Department of Environmental Management
Telephone: 707-784-6770
Last EDR Contact: 06/08/2016
Next Scheduled EDR Contact: 09/26/2016
Data Release Frequency: Quarterly

Underground Storage Tanks
Underground storage tank sites located in Solano county.

Date of Government Version: 06/09/2016
Date Data Arrived at EDR: 06/14/2016
Date Made Active in Reports: 08/08/2016
Number of Days to Update: 55

Source: Solano County Department of Environmental Management
Telephone: 707-784-6770
Last EDR Contact: 06/08/2016
Next Scheduled EDR Contact: 09/26/2016
Data Release Frequency: Quarterly

SONOMA COUNTY:

Cupa Facility List
Cupa Facility list

Date of Government Version: 07/10/2016
Date Data Arrived at EDR: 07/12/2016
Date Made Active in Reports: 08/09/2016
Number of Days to Update: 28

Source: County of Sonoma Fire & Emergency Services Department
Telephone: 707-565-1174
Last EDR Contact: 07/07/2016
Next Scheduled EDR Contact: 10/10/2016
Data Release Frequency: Varies

Leaking Underground Storage Tank Sites
A listing of leaking underground storage tank sites located in Sonoma county.

Date of Government Version: 04/01/2016
Date Data Arrived at EDR: 04/05/2016
Date Made Active in Reports: 05/09/2016
Number of Days to Update: 34

Source: Department of Health Services
Telephone: 707-565-6565
Last EDR Contact: 06/24/2016
Next Scheduled EDR Contact: 10/10/2016
Data Release Frequency: Quarterly

SUTTER COUNTY:

Underground Storage Tanks
Underground storage tank sites located in Sutter county.

Date of Government Version: 06/02/2016
Date Data Arrived at EDR: 06/07/2016
Date Made Active in Reports: 06/23/2016
Number of Days to Update: 16

Source: Sutter County Department of Agriculture
Telephone: 530-822-7500
Last EDR Contact: 06/02/2016
Next Scheduled EDR Contact: 09/19/2016
Data Release Frequency: Semi-Annually

TUOLUMNE COUNTY:

CUPA Facility List
Cupa facility list

Date of Government Version: 05/03/2016
Date Data Arrived at EDR: 05/10/2016
Date Made Active in Reports: 06/17/2016
Number of Days to Update: 38

Source: Divison of Environmental Health
Telephone: 209-533-5633
Last EDR Contact: 08/03/2016
Next Scheduled EDR Contact: 10/07/2016
Data Release Frequency: Varies

VENTURA COUNTY:

Business Plan, Hazardous Waste Producers, and Operating Underground Tanks

The BWT list indicates by site address whether the Environmental Health Division has Business Plan (B), Waste Producer (W), and/or Underground Tank (T) information.

Date of Government Version: 03/28/2016
Date Data Arrived at EDR: 04/29/2016
Date Made Active in Reports: 06/17/2016
Number of Days to Update: 49

Source: Ventura County Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 07/25/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Quarterly

Inventory of Illegal Abandoned and Inactive Sites

Ventura County Inventory of Closed, Illegal Abandoned, and Inactive Sites.

Date of Government Version: 12/01/2011
Date Data Arrived at EDR: 12/01/2011
Date Made Active in Reports: 01/19/2012
Number of Days to Update: 49

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 06/28/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Annually

Listing of Underground Tank Cleanup Sites

Ventura County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 05/29/2008
Date Data Arrived at EDR: 06/24/2008
Date Made Active in Reports: 07/31/2008
Number of Days to Update: 37

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 08/10/2016
Next Scheduled EDR Contact: 11/28/2016
Data Release Frequency: Quarterly

Medical Waste Program List

To protect public health and safety and the environment from potential exposure to disease causing agents, the Environmental Health Division Medical Waste Program regulates the generation, handling, storage, treatment and disposal of medical waste throughout the County.

Date of Government Version: 03/28/2016
Date Data Arrived at EDR: 04/29/2016
Date Made Active in Reports: 06/22/2016
Number of Days to Update: 54

Source: Ventura County Resource Management Agency
Telephone: 805-654-2813
Last EDR Contact: 07/25/2016
Next Scheduled EDR Contact: 11/07/2016
Data Release Frequency: Quarterly

Underground Tank Closed Sites List

Ventura County Operating Underground Storage Tank Sites (UST)/Underground Tank Closed Sites List.

Date of Government Version: 05/26/2016
Date Data Arrived at EDR: 06/16/2016
Date Made Active in Reports: 08/09/2016
Number of Days to Update: 54

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 06/16/2016
Next Scheduled EDR Contact: 09/26/2016
Data Release Frequency: Quarterly

YOLO COUNTY:

Underground Storage Tank Comprehensive Facility Report

Underground storage tank sites located in Yolo county.

Date of Government Version: 06/30/2016
Date Data Arrived at EDR: 07/05/2016
Date Made Active in Reports: 08/09/2016
Number of Days to Update: 35

Source: Yolo County Department of Health
Telephone: 530-666-8646
Last EDR Contact: 06/30/2016
Next Scheduled EDR Contact: 10/17/2016
Data Release Frequency: Annually

YUBA COUNTY:

CUPA Facility List
CUPA facility listing for Yuba County.

Date of Government Version: 04/29/2016
Date Data Arrived at EDR: 05/03/2016
Date Made Active in Reports: 06/17/2016
Number of Days to Update: 45

Source: Yuba County Environmental Health Department
Telephone: 530-749-7523
Last EDR Contact: 07/27/2016
Next Scheduled EDR Contact: 11/14/2016
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data
Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 07/30/2013
Date Data Arrived at EDR: 08/19/2013
Date Made Active in Reports: 10/03/2013
Number of Days to Update: 45

Source: Department of Energy & Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 08/10/2016
Next Scheduled EDR Contact: 11/28/2016
Data Release Frequency: No Update Planned

NJ MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 07/17/2015
Date Made Active in Reports: 08/12/2015
Number of Days to Update: 26

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 07/11/2016
Next Scheduled EDR Contact: 10/24/2016
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data
Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 05/01/2016
Date Data Arrived at EDR: 05/06/2016
Date Made Active in Reports: 06/17/2016
Number of Days to Update: 42

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 08/03/2016
Next Scheduled EDR Contact: 11/14/2016
Data Release Frequency: Annually

PA MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 07/24/2015
Date Made Active in Reports: 08/18/2015
Number of Days to Update: 25

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 07/18/2016
Next Scheduled EDR Contact: 10/31/2016
Data Release Frequency: Annually

RI MANIFEST: Manifest information
Hazardous waste manifest information

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 06/19/2015
Date Made Active in Reports: 07/15/2015
Number of Days to Update: 26

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 08/01/2016
Next Scheduled EDR Contact: 09/05/2016
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2015
Date Data Arrived at EDR: 04/14/2016
Date Made Active in Reports: 06/03/2016
Number of Days to Update: 50

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 06/13/2016
Next Scheduled EDR Contact: 09/26/2016
Data Release Frequency: Annually

Oil/Gas Pipelines
Source: PennWell Corporation
Petroleum Bundle (Crude Oil, Refined Products, Petrochemicals, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)) N = Natural Gas Bundle (Natural Gas, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)). This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Electric Power Transmission Line Data
Source: PennWell Corporation
This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Licensed Facilities
Source: Department of Social Services
Telephone: 916-657-4041

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetland Inventory
Source: Department of Fish & Game
Telephone: 916-445-0411

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

STREET AND ADDRESS INFORMATION

© 2015 TomTom North America, Inc. All rights reserved. This material is proprietary and the subject of copyright protection and other intellectual property rights owned by or licensed to Tele Atlas North America, Inc. The use of this material is subject to the terms of a license agreement. You will be held liable for any unauthorized copying or disclosure of this material.

GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

20621 LAKE FOREST
20621 LAKE FOREST
LAKE FOREST, CA 92630

TARGET PROPERTY COORDINATES

Latitude (North):	33.668467 - 33° 40' 6.48''
Longitude (West):	117.667749 - 117° 40' 3.90''
Universal Tranverse Mercator:	Zone 11
UTM X (Meters):	438094.4
UTM Y (Meters):	3725403.8
Elevation:	735 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	5636489 EL TORO, CA
Version Date:	2012

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principal investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

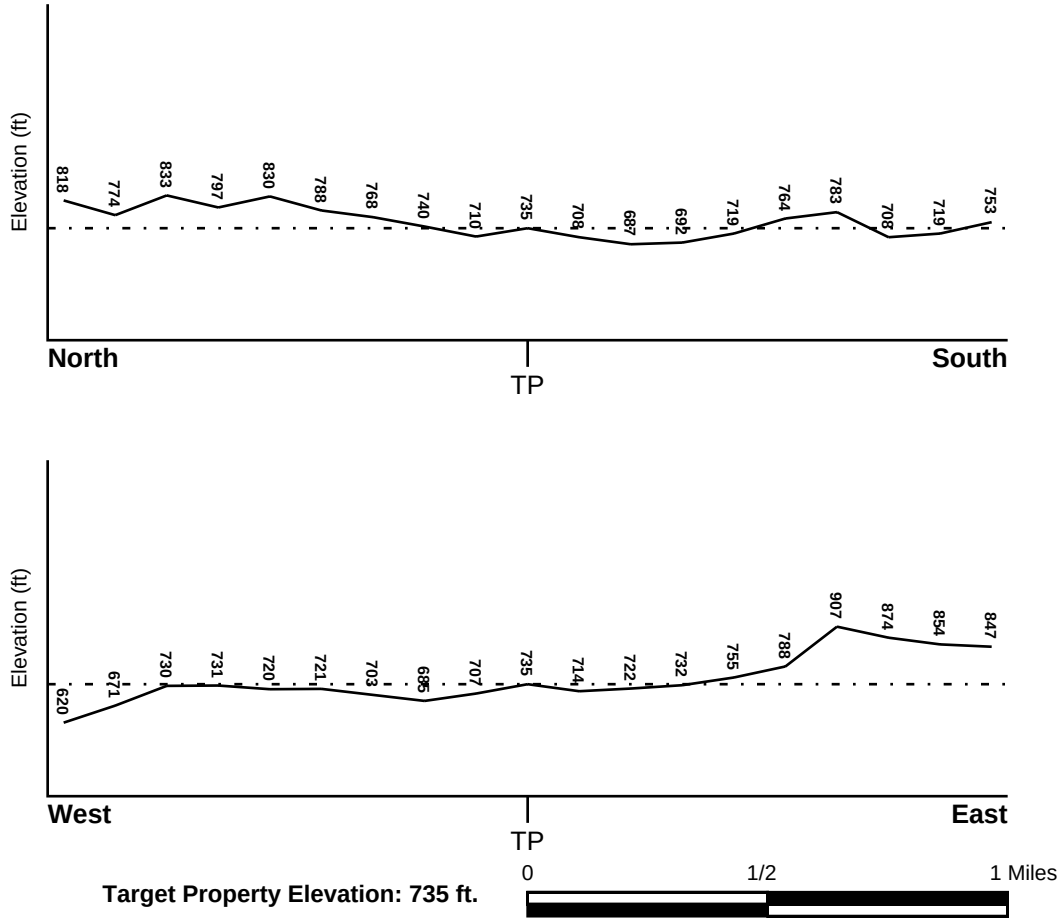
TOPOGRAPHIC INFORMATION

Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General SSW

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES



Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County	FEMA Flood Electronic Data
ORANGE, CA	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property: 06059C - FEMA DFIRM Flood data

Additional Panels in search area: Not Reported

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
EL TORO	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Site-Specific Hydrogeological Data*:

Search Radius:	1.25 miles
Status:	Not found

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

* ©1996 Site−specific hydrogeological data gathered by CERCLIS Alerts, Inc., Bainbridge Island, WA. All rights reserved. All of the information and opinions presented are those of the cited EPA report(s), which were completed under a Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) investigation.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

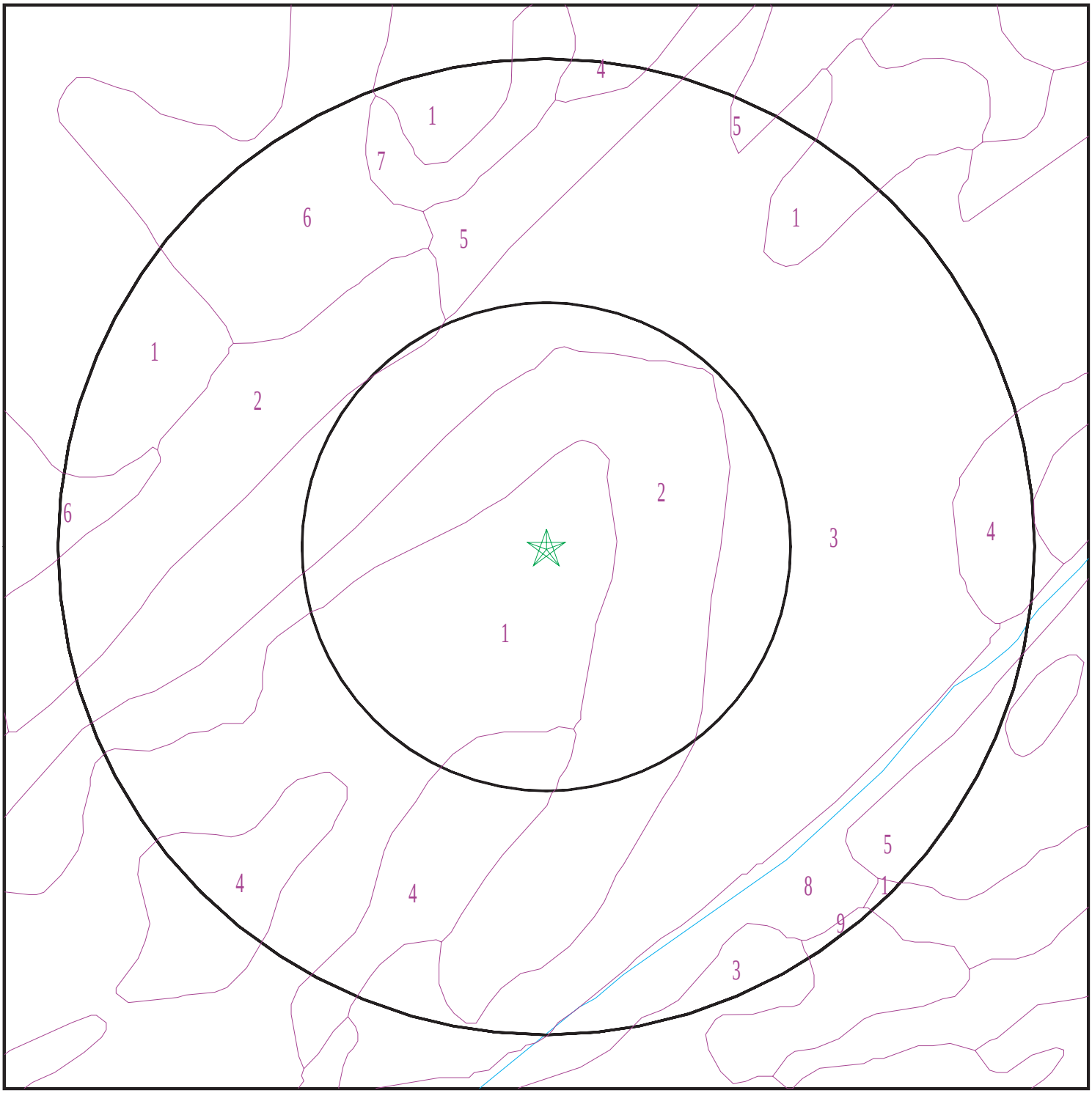
Era:	Cenozoic
System:	Tertiary
Series:	Eocene
Code:	Te *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Stratifed Sequence

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 04702716.2r



SITE NAME:	20621 Lake Forest	CLIENT:	Hillmann Environmental Co.
ADDRESS:	20621 Lake Forest Lake Forest CA 92630	CONTACT:	Kristine Savona
		INQUIRY #:	04702716.2r
LAT/LONG:	33.668467 / 117.667749	DATE:	August 16, 2016 8:56 pm

Copyright © 2016 EDR, Inc. © 2015 TomTom Rel. 2015.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: CIENEBA

Soil Surface Texture: sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Somewhat excessively drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 42 Min: 14	Max: 7.3 Min: 5.6
2	7 inches	11 inches	weathered bedrock	Not reported	Not reported	Max: 0.42 Min: 0	Max: Min:

Soil Map ID: 2

Soil Component Name: CROPLEY

Soil Surface Texture: clay

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	29 inches	clay	Not reported	Not reported	Max: 1.4 Min: 0.42	Max: 8.4 Min: 6.6
2	29 inches	59 inches	clay	Not reported	Not reported	Max: 1.4 Min: 0.42	Max: 8.4 Min: 6.6

Soil Map ID: 3

Soil Component Name: SORRENTO

Soil Surface Texture: loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	11 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay. FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 14 Min: 4	Max: 8.4 Min: 6.1

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	11 inches	61 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14.11 Min: 1	Max: 8.4 Min: 7.9
3	61 inches	72 inches	stratified loamy fine sand to silt loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 8.4 Min: 7.9

Soil Map ID: 4

Soil Component Name: MYFORD

Soil Surface Texture: sandy loam

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Moderately well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	11 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay. FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 42 Min: 14	Max: 6 Min: 5.1

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	11 inches	18 inches	sandy clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 0.42 Min: 0.01	Max: 8.4 Min: 5.6
3	18 inches	27 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 0.42 Min: 0.01	Max: 8.4 Min: 5.6
4	27 inches	70 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 0.42 Min: 0.01	Max: 8.4 Min: 6.1
5	70 inches	79 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay. FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 14 Min: 4	Max: 6.5 Min: 6.1

Soil Map ID: 5

Soil Component Name: CAPISTRANO

Soil Surface Texture: sandy loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	27 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.3 Min: 5.6
2	27 inches	64 inches	fine sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.3 Min: 5.6

Soil Map ID: 6

Soil Component Name: CAPISTRANO

Soil Surface Texture: sandy loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	27 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.3 Min: 5.6

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	27 inches	64 inches	fine sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.3 Min: 5.6

Soil Map ID: 7

Soil Component Name: MYFORD

Soil Surface Texture: sandy loam

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Moderately well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	11 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay. FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 42 Min: 14	Max: 6 Min: 5.1

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	11 inches	18 inches	sandy clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 0.42 Min: 0.01	Max: 8.4 Min: 5.6
3	18 inches	27 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 0.42 Min: 0.01	Max: 8.4 Min: 5.6
4	27 inches	70 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 0.42 Min: 0.01	Max: 8.4 Min: 6.1
5	70 inches	79 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay. FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 14 Min: 4	Max: 6.5 Min: 6.1

Soil Map ID: 8

Soil Component Name: RIVERWASH

Soil Surface Texture: sand

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class:
Hydric Status: All hydric

Corrosion Potential - Uncoated Steel: Not Reported

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 31 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	5 inches	sand	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Clean Sands, Poorly graded sand.	Max: 141 Min: 42	Max: Min:
2	5 inches	59 inches	stratified coarse sand to sandy loam	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 141 Min: 42	Max: Min:

Soil Map ID: 9

Soil Component Name: YORBA

Soil Surface Texture: cobbly sandy loam

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	cobbly sandy loam	Not reported	Not reported	Max: 42 Min: 4	Max: 6.5 Min: 5.6

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	7 inches	35 inches	very gravelly clay loam	Not reported	Not reported	Max: 1.4 Min: 0.42	Max: 8.4 Min: 5.6
3	35 inches	62 inches	very gravelly sandy loam	Not reported	Not reported	Max: 14 Min: 4	Max: 8.4 Min: 5.1

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 0.001 miles
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
4	USGS40000136558	1/4 - 1/2 Mile NW
B7	USGS40000136410	1/2 - 1 Mile SSE

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

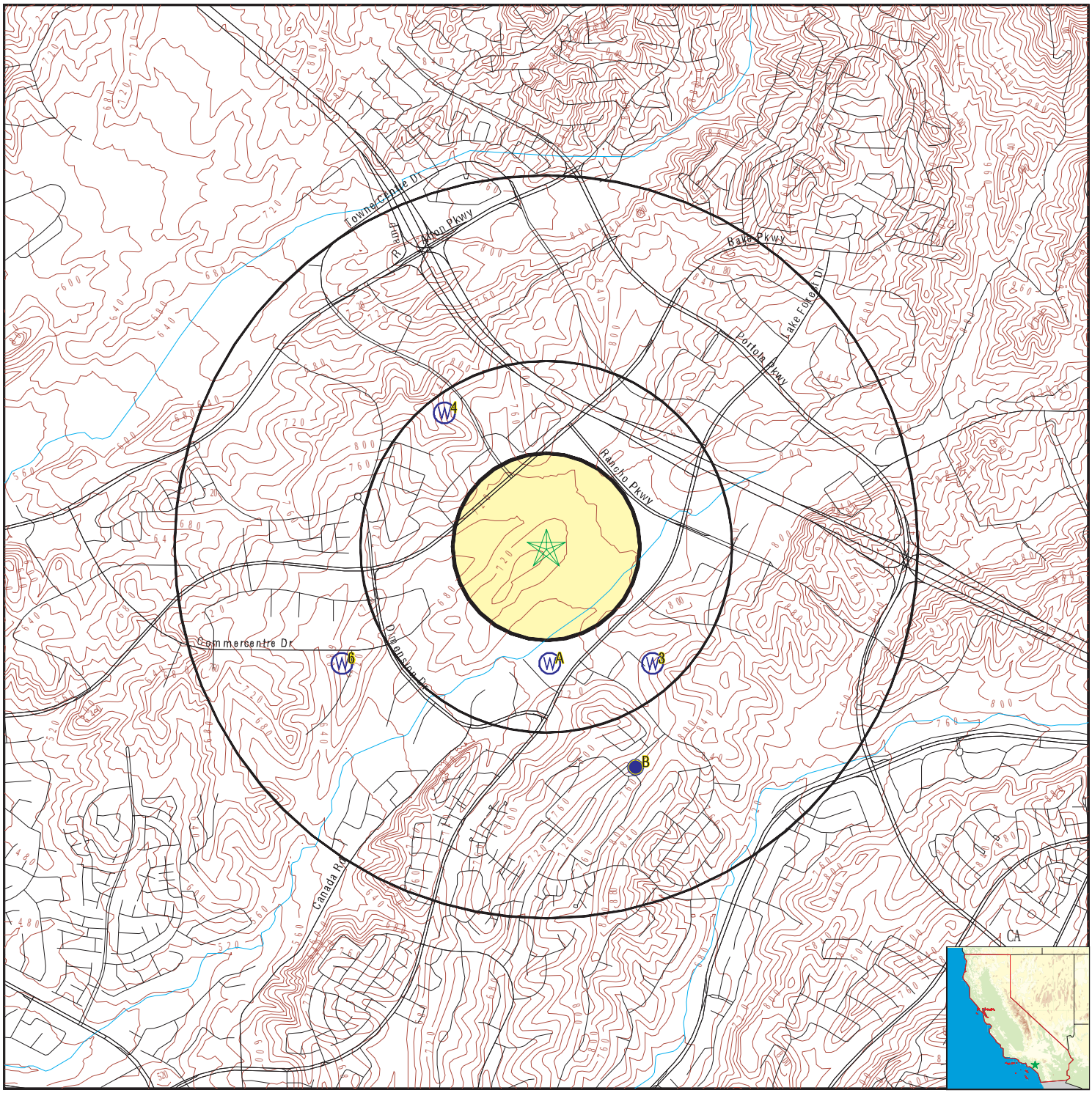
MAP ID	WELL ID	LOCATION FROM TP
A1	7045	1/4 - 1/2 Mile South
A2	7043	1/4 - 1/2 Mile South

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
3	7044	1/4 - 1/2 Mile SE
B5	7046	1/2 - 1 Mile SSE
6	6936	1/2 - 1 Mile WSW

PHYSICAL SETTING SOURCE MAP - 04702716.2r



- County Boundary
- Major Roads
- Contour Lines
- Earthquake Fault Lines
- Earthquake epicenter, Richter 5 or greater
- Water Wells
- Public Water Supply Wells
- Cluster of Multiple Icons
- Groundwater Flow Direction
- Indeterminate Groundwater Flow at Location
- Groundwater Flow Varies at Location
- Closest Hydrogeological Data
- Oil, gas or related wells

SITE NAME: 20621 Lake Forest	CLIENT: Hillmann Environmental Co.
ADDRESS: 20621 Lake Forest Lake Forest CA 92630	CONTACT: Kristine Savona
LAT/LONG: 33.668467 / 117.667749	INQUIRY #: 04702716.2r DATE: August 16, 2016 8:55 pm

Copyright © 2016 EDR, Inc. © 2015 TomTom Rel. 2015.

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

A1
South **CA WELLS** **7045**
1/4 - 1/2 Mile
Lower

Water System Information:

Prime Station Code:	06S/08W-12L02 S	User ID:	TEE
FRDS Number:	3010091004	County:	Orange
District Number:	08	Station Type:	WELL/AMBNT/MUN/INTAKE
Water Type:	Well/Groundwater	Well Status:	Active Untreated
Source Lat/Long:	333950.0 1174000.0	Precision:	10 Feet (1/10 Second)
Source Name:	WELL 04		
System Number:	3010091		
System Name:	LOS ALISOS WD		
Organization That Operates System:			
	P O BOX 699		
	EL TORO 92630		
Pop Served:	38000	Connections:	11645
Area Served:	EL TORO		

A2
South **CA WELLS** **7043**
1/4 - 1/2 Mile
Lower

Water System Information:

Prime Station Code:	06S/08W-01N01 S	User ID:	TEE
FRDS Number:	3010091005	County:	Orange
District Number:	08	Station Type:	WELL/AMBNT/MUN/INTAKE/SUPPLY
Water Type:	Well/Groundwater	Well Status:	Active Untreated
Source Lat/Long:	333950.0 1174000.0	Precision:	0.5 Mile (30 Seconds)
Source Name:	WELL 07		
System Number:	3010091		
System Name:	LOS ALISOS WD		
Organization That Operates System:			
	P O BOX 699		
	EL TORO 92630		
Pop Served:	38000	Connections:	11645
Area Served:	EL TORO		

3
SE **CA WELLS** **7044**
1/4 - 1/2 Mile
Higher

Water System Information:

Prime Station Code:	06S/08W-12J01 S	User ID:	TEE
FRDS Number:	3010091003	County:	Orange
District Number:	08	Station Type:	WELL/AMBNT/MUN/INTAKE
Water Type:	Well/Groundwater	Well Status:	Active Untreated
Source Lat/Long:	333950.0 1173943.0	Precision:	10 Feet (1/10 Second)
Source Name:	WELL 03		

System Number: 3010091
System Name: LOS ALISOS WD
Organization That Operates System:
P O BOX 699
EL TORO 92630
Pop Served: 38000 Connections: 11645
Area Served: EL TORO

4
NW **FED USGS** **USGS40000136558**
1/4 - 1/2 Mile
Higher

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-334025117402101		
Monloc name:	006S008W01N001S		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	Not Reported	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	33.6736944
Longitude:	-117.6725	Sourcemap scale:	24000
Horiz Acc measure:	.5	Horiz Acc measure units:	seconds
Horiz Collection method:	Global positioning system (GPS), uncorrected		
Horiz coord refsys:	NAD83	Vert measure val:	860
Vert measure units:	feet	Vertacc measure val:	2.5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Other aquifers		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	Not Reported	Welldepth:	1000
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

B5
SSE **CA WELLS** **7046**
1/2 - 1 Mile
Higher

Water System Information:

Prime Station Code:	06S/08W-12Q01 S	User ID:	TEE
FRDS Number:	3010091002	County:	Orange
District Number:	08	Station Type:	WELL/AMBNT/MUN/INTAKE
Water Type:	Well/Groundwater	Well Status:	Active Untreated
Source Lat/Long:	333936.0 1173946.0	Precision:	10 Feet (1/10 Second)
Source Name:	WELL 02		
System Number:	3010091		
System Name:	LOS ALISOS WD		
Organization That Operates System:			
	P O BOX 699		
	EL TORO 92630		
Pop Served:	38000	Connections:	11645
Area Served:	EL TORO		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

6
WSW
1/2 - 1 Mile
Lower

CA WELLS **6936**

Water System Information:

Prime Station Code:	06S/04W-09L04 S	User ID:	WAT
FRDS Number:	3310012015	County:	Riverside
District Number:	14	Station Type:	WELL/AMBNT/MUN/INTAKE
Water Type:	Well/Groundwater	Well Status:	Abandoned
Source Lat/Long:	333950.0 1174035.0	Precision:	100 Feet (one Second)
Source Name:	SAN JACINTO WELL - ABANDONED		
System Number:	3310012		
System Name:	ELSINORE VALLEY MWD		
Organization That Operates System:			
	P.O. BOX 3000		
	LAKE ELSINORE, CA 92531		
Pop Served:	59200	Connections:	21140
Area Served:	LAKE ELSINORE VICINITY		

B7
SSE
1/2 - 1 Mile
Higher

FED USGS **USGS40000136410**

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-333935117394901		
Monloc name:	006S008W12Q001S		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	Not Reported	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	33.6596944
Longitude:	-117.6634722	Sourcemap scale:	24000
Horiz Acc measure:	.5	Horiz Acc measure units:	seconds
Horiz Collection method:	Global positioning system (GPS), uncorrected		
Horiz coord refsys:	NAD83	Vert measure val:	760
Vert measure units:	feet	Vertacc measure val:	2.5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Other aquifers		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	1957	Welldepth:	740
Welldepth units:	ft	Wellholedepth:	800
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 0

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

State Database: CA Radon

Radon Test Results

Zipcode	Num Tests	> 4 pCi/L
92630	90	0

Federal EPA Radon Zone for ORANGE County: 3

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for Zip Code: 92630

Number of sites tested: 2

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.400 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	Not Reported	Not Reported	Not Reported	Not Reported

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetland Inventory
Source: Department of Fish & Game
Telephone: 916-445-0411

HYDROGEOLOGIC INFORMATION

AQUIFLOW^{R} Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Service, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Water Well Database
Source: Department of Water Resources
Telephone: 916-651-9648

California Drinking Water Quality Database
Source: Department of Public Health
Telephone: 916-324-2319
The database includes all drinking water compliance and special studies monitoring for the state of California since 1984. It consists of over 3,200,000 individual analyses along with well and water system information.

OTHER STATE DATABASE INFORMATION

California Oil and Gas Well Locations
Source: Department of Conservation
Telephone: 916-323-1779
Oil and Gas well locations in the state.

RADON

State Database: CA Radon
Source: Department of Health Services
Telephone: 916-324-2208
Radon Database for California

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

California Earthquake Fault Lines: The fault lines displayed on EDR's Topographic map are digitized quaternary fault lines, prepared in 1975 by the United State Geological Survey. Additional information (also from 1975) regarding activity at specific fault lines comes from California's Preliminary Fault Activity Map prepared by the California Division of Mines and Geology.

STREET AND ADDRESS INFORMATION

© 2015 TomTom North America, Inc. All rights reserved. This material is proprietary and the subject of copyright protection and other intellectual property rights owned by or licensed to Tele Atlas North America, Inc. The use of this material is subject to the terms of a license agreement. You will be held liable for any unauthorized copying or disclosure of this material.

APPENDIX F

OTHER DOCUMENTS
(where applicable)

DRAFT

South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 • www.aqmd.gov

Information Management
Public Records Unit

Direct Dial: (909) 396-3700
FAX: (909) 396-3330

PUBLIC RECORDS REQUEST FORM

PRU Office Use Only
CONTROL NUMBER

ATTENTION REQUESTOR: To expedite your request for District records, please fill out this form completely, and identify specifically the type of records you are requesting. Please limit your request to one facility or one site address for each request form filed, and three requested items per form. Additional forms or pages can be used if requesting information for more than one facility or for records not identified on this form. Requests should reasonably describe identifiable records prepared, owned, used, or retained by the District. Public Records Unit staff is available to assist you in identifying those records in the District's possession. The District is not required by law to create a new record or list from an existing record.

REQUESTOR INFORMATION

NAME: Kristine Savona		DATE: 8/16/2016
COMPANY: Hillmann Consulting, LLC		
MAILING ADDRESS: 1745 W. Orangewood Avenue, Suite 110		
CITY: Orange	STATE: CA	ZIP CODE: 92868
PHONE NUMBER: 714-634-9500	FAX NUMBER: 714-634-9507	
EMAIL ADDRESS: ksavona@hillmanngroup.com;		

REQUESTED RECORDS (*3 items per form*)

☐ Applications (APPLS)	X Complaints	X Asbestos Notifications/Records
☐ Permits to Operate (P/O)	X Site Inspection Reports (I/R)	☐ Facility Potential to Emit (PTE)
☐ Equipment List Report (EQL)	☐ Emissions Summary	☐ Facility Positive Balance (NSR)
X Notices of Violation (NOV)	☐ Source Test Reports (S/T RPTS)	☐ Toxic-Health Risk Assessment (HRA)
X Notices to Comply (N/C)	X Air Monitoring Data	☐ Other (describe below or on additional pages):

TIME PERIOD OF DOCUMENTS REQUESTED From: 1900 To: 2016

REQUESTED FACILITY INFORMATION (If Applicable)

FACILITY NAME:	
FACILITY ADDRESS: 20621 Lake Forest Drive	
CITY: Lake Forest STATE: CA	ZIP CODE: 92630
FACILITY I.D. NO. (if known):	APPL. AND/OR PERMIT NO. (if known):

***Direct cost of duplication**: $.15 per page for paper copies (first 10 pages free) and $5.00 per copied audio tape. No charge for copied Diskettes or CDs. Transfer of gathered electronic records onto CD or Diskette typically costs $10.00 each, but costs will vary (see Instructions for Requesting Records).*

X I wish to inspect the requested records, where applicable, or receive the requested records electronically at no charge. I do not want copies produced at this time.

X I request that the SCAQMD contact me prior to copying the requested records if the cost exceeds $20.00.

☐ I would like copies of the requested records and I hereby agree to reimburse the SCAQMD for the direct cost of duplication in accordance with Gov. Code Sec. 6253(b).

Signature of Requestor

Note: After a preliminary estimate, advance payment may be required.

(Rev. 06/17/08-lkoenig)

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

INSTRUCTIONS FOR REQUESTING RECORDS

(California Public Records Act, Govt. Code Sections 6250-6276.48)

1. In order to expedite your request, requests for records should be in writing. Requests will be processed in the order in which they are received. A Public Records Request Form can be faxed to you by calling (909) 396-3700 and following the menu options. A form is also available on the A.Q.M.D.'s web page at http://www.aqmd.gov. Select the "Contact Us" menu, followed by the "Public Records" menu. Requests may be submitted by facsimile to (909) 396-3330, or by email to PublicRecordsRequests@aqmd.gov.

2. Requests must be for records prepared, owned, used, or retained by the District (Gov. Code Sec. 6252(e)). Requests should be for clearly identifiable records. If necessary, the District will assist the requestor in making a request that describes reasonably identifiable records (Gov. Code Sec. 6253.1). Copies will not be provided if disclosure would infringe upon a copyright, trade secret, or is otherwise exempt in accordance with state law.

3. A search for facility records can only be conducted by one or all of the following:

   Facility Name, Address, or Identification Number;

   Facility Application Number, or Permit to Operate Number; or

   Facility Notice of Violation/Notice to Comply Number.

4. You will be notified by mail within ten (10) days whether your request seeks copies of disclosable public records prepared, owned, used, or retained by this agency. In most cases, your request will be completed within 3-4 weeks.

5. If the search for records finds the records voluminous, you will be notified of the approximate number of pages and/or length of time it will take to process your request.

6. If the records you requested have been marked confidential by the source of the record, you will be notified and given the option of continuing with the District's trade secret process.

7. If your request is to review records, rather than receive copies, the District will notify you once the records are gathered, and arrangements will be made for your review.

8. The charge for the direct cost of duplication is as follows: Paper Copies, $0.15/page each over 10 pages (first 10 pages are free); Copied CD's or Copied Diskettes, no charge; and Copied Audio Tapes, $5.00 each. When records are requested in electronic format, the requestor shall bear the cost of producing a copy of the record, including the cost to construct the record and the cost of programming and computer services necessary to produce a copy of the record when either of the following applies: (1) the District would be required to produce a copy of an electronic record and the record is one that is produced only at otherwise regularly scheduled intervals, or (2) the request would require data compilation, extraction, or programming to produce the record. (Gov. Code Sec. 6253.9(b)). The transfer of gathered electronic records onto CD or Diskette typically cost $10.00 each. An invoice will accompany your records when completed.

9. For further clarification please refer to the California Public Records Act (California Gov. Code Sec. 6250 et seq.) and/or the District's Guidelines for Implementing the California Public Records Act. The Guidelines are available in the lobby of the District Headquarters or on the District's web site at www.aqmd.gov.

If you have questions pertaining to the submittal of a Public Records Act request, you may contact the Public Records Unit, **(909) 396-3700, Tuesday through Friday, 7:00 a.m. to 5:30 p.m. Our Fax number is (909) 396-3330. Our email address is PublicRecordsRequests@aqmd.gov.**

(Rev. 10/05/06-lkoenig)

Kristine Savona

From: Jacob Allen <jallen2@aqmd.gov>
Sent: Tuesday, August 30, 2016 5:09 PM
To: Kristine Savona
Subject: Request for Records from the South Coast Air Quality Management District

KRISTINE SAVONA
1745 W ORANGEWOOD AVE
ORANGE, CA 92868-

RE: Request for Records
Control #: 87065
Request: NOV'S, N/C'S, COMPLAINTS, I/R'S, AIR MON, & ASBESTOS RECORDS FOR 20621 LAKE FOREST DRIVE, LAKE FOREST, CA 92630, FROM 1900 TO 2016.

Your request for records has been recieved by the Public Records Unit and has been assigned for processing.

Your request in whole or in part,seeks disclosable public records that are in the possession of this agency.

When your requested records are ready, they will be sent electronically to your email address unless other arrangements are made or necessary.

Should you have any questions or need additional information, please do not hesitate to contact me at (909) 396-3700, Tuesday through Friday, between the hours of 8:00 a.m. 4:30 p.m. Please reference your Control Number listed above in all communications and correspondence.

Sincerely,

JACOB ALLEN

For Colleen Paine
Public Records Coordinator

HILLMANN
CONSULTING

August 16, 2016

California Regional Water Quality Control Board – Santa Ana Region (8)
Underground Storage Tank (UST) File Review Division
3737 Main Street, Suite #500
Riverside, CA 92501-3348
Phone (951) 782-4499
Fax (951) 781-6288
FileReview8@waterboards.ca.gov

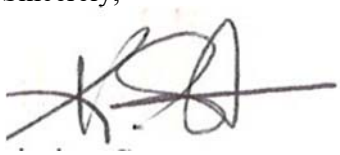
RE: Environmental Files:

20621 Lake Forest Drive
Lake Forest, California 92630

Dear Sir/Madam:

Hillmann Consulting, LLC is conducting an environmental investigation of the above referenced property. Under the Freedom of Information Act, we would like to request any information your office has regarding this property. If any records are located, we would like to obtain copies or schedule a file review. If no records are available, please contact me to confirm. Thank you for your assistance.

Sincerely,



Kristine Savona
Office Manager
Hillmann Consulting, LLC
ksavona@hillmanngroup.com

HILLMANN
CONSULTING

August 26, 216

Jeff Croy
Orange Public Works
OC Agricultural Commissioner
222 East Bristol Lane
Orange, CA 92865
Phone (714) 955-0100
Fax (714) 921-2713
http://ocagcomm.com/contact
oc.agri.commissioner@ocpw.ocgov.com

RE: Restircted Material Permits

20621 Lake Forest Drive
Lake Forest, CA

Dear Croy:

Hillmann Consulting, LLC is conducting an environmental investigation of the above referenced property. Under the Freedom of Information Act, we would like to request any information your office has regarding restricted material permits within the OCAC database. If any records are located, we would like to obtain copies or schedule a file review. If no records are available or this property is not within your jurisdiction, please contact me to confirm. Thank you for your assistance.

Sincerely,

Kristine Savona
Office Manager
Hillmann Consulting, LLC
ksavona@hillmanngroup.com

Scott Alburn

From: webmaster@ocsd.com
Sent: Monday, August 22, 2016 9:43 AM
To: Scott Alburn
Subject: Orange County Sanitation District California Public Records Act Request

A new entry to a form/survey has been submitted.

Form Name:	California Public Records Act Request Form
Date & Time:	08/22/2016 9:43 AM
Response #:	362
Submitter ID:	3684
IP address:	76.79.165.218
Time to complete:	1 min. , 18 sec.

Survey Details

Page 1

1. Name

Scott Alburn

2. Email

salburn@hillmanngroup.com

3. Phone

(714) 634-9500

4. Subject

Underground Storage Tanks/Hazardous Materials Files

5. Comments

20621 Lake Forest Drive,
Lake Forest, CA 92868

Dear Sir/Madam: We would like to request any information your office has regarding any environmental documents, underground storage tanks (USTs) or hazardous materials for the property listed below. If any records are located, we would like to obtain copies or schedule a file review. If no records are available, please contact me to confirm. Thank you for your assistance.

6. Attachments

Thank you,
Orange County Sanitation District

This is an automated message generated by the Vision Content Management System™. Please do not reply directly to this email.

Scott Alburn

From: Botzheim, Jana <JBOTZHEIM@OCSD.COM>
Sent: Thursday, August 25, 2016 7:30 AM
To: Scott Alburn
Subject: 20621 Lake Forest Drive, Lake Forest, CA 92868

In response to your request dated August 22, 2016, I am writing to notify you that no records were found on the above referenced property.
Thank you

Jana Botzheim
Administrative Assistant
Environmental Compliance
(714) 593-7451

HILLMANN
CONSULTING

August 16, 2016

Orange County Fire Authority
Clerk of the Authority
1 Fire Authority Road
Irvine, CA 92602
Phone (714) 573-6040
Fax (714) 368-8826

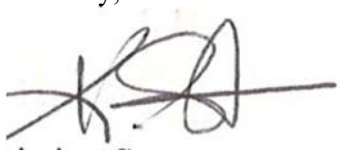
RE: Underground Storage Tanks/Hazardous Materials Files

20621 Lake Forest Drive
Lake Forest, California 92630

Dear Sir/Madam:

Hillmann Consulting, LLC is conducting an environmental investigation of the above referenced property. Under the Freedom of Information Act, we would like to request any information your office has regarding underground storage tanks (USTs), hazardous materials or other environmental concerns for this property. If any records are located, we would like to obtain copies or schedule a file review. If no records are available, please contact me to confirm. Thank you for your assistance.

Sincerely,



Kristine Savona
Office Manager
Hillmann Consulting, LLC
ksavona@hillmanngroup.com

COUNTY OF ORANGE
HEALTH CARE AGENCY

ENVIRONMENTAL HEALTH
www.ochealthinfo.com/regulatory/environ.htm

MAILING ADDRESS:
1241 E. DYER ROAD STE 120
SANTA ANA, CA 92702

TELEPHONE: (714) 433-6000
FAX: (714) 433-6424

REQUEST FOR ENVIRONMENTAL HEALTH RECORDS INSTRUCTION SHEET

1. Complete the "Request for Environmental Health Records" form

- ✓ Please **Print** all information on request forms.
- ✓ Describe the reason the records are being requested so that our staff may be able to narrow your search.
- ✓ If you require site-specific information, give the exact address of the site.
- ✓ If you are asking for information on multiple sites (for example, all sites on a street) you must give an address for each location (for example, 1001, 1003, 1009, etc.).
- ✓ Note that we cannot enter a "range" of addresses as search criteria.

2. Complete the appropriate "Information Checklist" form

- ✓ Check only the desired records associated with the site you have submitted.
- ✓ Remember that you will be charged for each page of copied records, so be sure to specify which records you want.
- ✓ Please note that lists of information can be very lengthy and therefore costly. You can ask about the length of the list before completing the request form to ensure a list is what you desire.

3. Return the completed forms to the Custodian of Records Representative at 1241 E. Dyer Road, Ste. 120, Santa Ana, CA 92705.

- ✓ Blank Records Request forms can be downloaded from the Records page on the Environmental Health website at *www.ochealthinfo.com/regulatory/environ/records.htm*.
- ✓ Please note that you can ask for an appointment to review multiple records.

4. Most requests take approximately ten (10) days to process. However, if your request requires more processing time, we will notify you of the extension and the estimated date.

5. Upon completion of the search, we will notify you by phone or by mail. You may return to the Environmental Health office to pick up the requested records, or arrange to have them mailed to your address.

6. RECORDS THAT HAVE NOT BEEN PICKED UP WITHIN 60 DAYS OF NOTIFICATION WILL BE DESTROYED.

COUNTY OF ORANGE
HEALTH CARE AGENCY

ENVIRONMENTAL HEALTH
www.ochealthinfo.com/regulatory/environ.htm

MAILING ADDRESS:
1241 E. DYER ROAD STE. 120
SANTA ANA, CA 92702

TELEPHONE: (714) 433-6000
FAX: (714) 433-6424

REQUEST FOR ENVIRONMENTAL HEALTH RECORDS

The undersigned hereby requests a copy of the records prepared and maintained by the Health Care Agency in the ordinary course of business, at or near the time of the act, condition, or event which they depict.

The records requested are maintained under the Public Records Act Government Code § 6250 – 6276.48. Some information held in the documents may be exempt from release pursuant to the Public Records Act.

The undersigned understands that the Health Care Agency will charge $0.15 per page copied. In the case of a request for a large number of copies, the Health Care Agency may provide the requestor an estimate of copy costs prior to making said copies. If any request is to be canceled, this office must be notified at the above number within ten (10) days of receipt of request, otherwise cost incurred will be charged to the undersigned.

In order to assist you, please describe the reason for your request:

Any documents pertaining to violations or concerns with regard to the property(s) listed

Please list addresses here (no more than 10 addresses per request):

20621 Lake Forest Drive
Lake Forest, CA 92630

Check here if you would like a review only or to review before copies are made ❒

SIGNATURE of Requester

Kristine Savona, Hillmann Consulting, LLC
PRINT Name of Requester (and Company Name - if applicable)

1745 W. Orangewood Ave., STE. 110
PRINT Street Address

714 634-9500
Area Code and Phone Number

Orange, CA 92868
PRINT City, State and Zip Code

8/29/16
Date

RECORDS THAT HAVE NOT BEEN PICKED UP WITHIN 60 DAYS OF NOTIFICATION WILL BE DESTROYED

COUNTY OF ORANGE
HEALTH CARE AGENCY

ENVIRONMENTAL HEALTH
www.ochealthinfo.com/regulatory/environ.htm

MAILING ADDRESS:
1241 E. DYER ROAD STE. 120
SANTA ANA, CA 92702

TELEPHONE: (714) 433-6000
FAX: (714) 433-6424

HAZARDOUS WASTE / OTHER PROGRAM INFORMATION CHECKLIST

Please check only the records you need. This will enable us to search only the actual files that pertain to your request, cutting down time spent on searching for records that you may not want.

Site Specific Information	
☒	Above Ground Petroleum Storage Tank File
☒	California Accidental Release Prevention Program File
☒	Certified Unified Program Agency (CUPA) records
☐	City of Brea Hazardous Materials Business Plan File
☐	Complaints regarding Hazardous Waste or Underground Storage Tank Facility
☒	Hazardous Waste Generator Facility File
☒	Hazardous Waste Industrial Cleanup Site File
☒	Hazardous Waste Spill Response Log (Emergency Incidents Log)
☒	Leaking Underground Storage Tank Cleanup Site File
☐	Medical Waste Facility Record
☐	Proposition 65 Notification
☐	Recycling Program
☐	Solid Waste Facility File (large files – need to be specific)
☐	Spill Prevention, Control and Countermeasure (SPCC) File
☐	Tiered Permit Facility File
☒	Underground Storage Tank File
☐	Water Quality Information

Available on Environmental Health Website (See www.ochealthinfo.com/regulatory/downloads/reports.htm)
List of Hazardous Waste Generator Facilities (HWFACILITIES.SRW)
List of Industrial Cleanup Sites (IC PROGRAM CASES BY CITY.SRW)
List of Underground Storage Tank Cleanup Sites
List of Underground Storage Tank Facilities (USTFACILITIES.SRW)
A list of Solid Waste landfills (which includes closed landfills) can be obtained through the California website: www.ciwmb.ca.gov/SWIS/

Other information:_____

Request Confirmation

Request Information

Tracking Number : *EPA-R9-2016-009458*

Requester Name : Ms. Kristine Savona

Date Submitted : 08/16/2016

Request Status : Submitted

Description :

20621 Lake Forest Drive, Lake Forest, CA 92630. Dear Sir/Madam: We would like to request any information your office has regarding any environmental documents, underground storage tanks (USTs) or hazardous materials for the property listed below. If any records are located, we would like to obtain copies or schedule a file review. If no records are available, please contact me to confirm. Thank you for your assistance.

HILLMANN
CONSULTING

August 16, 2016

State of California
Department of Toxic Substances Control
Region 4 – Cypress Office
5796 Corporate Avenue
Cypress, CA 90630-4732
Phone (714) 484-5337
Fax (714) 484-5318
PubReqAct@dtsc.ca.gov

RE: DTSC Files:

20621 Lake Forest Drive
Lake Forest, California 92630

Dear Sir/Madam:

Hillmann Consulting, LLC is conducting an environmental investigation of the above referenced property. Under the Freedom of Information Act, we would like to request any information your office has regarding this property. If any records are located, we would like to obtain copies or schedule a file review. If no records are available, please contact me to confirm. Thank you for your assistance.

Sincerely,

Kristine Savona
Office Manager
Hillmann Consulting, LLC
ksavona@hillmanngroup.com

Department of Toxic Substances Control

Matthew Rodriquez
Secretary for
Environmental Protection

Barbara A. Lee, Director
8800 Cal Center Drive
Sacramento, California 95826-3200

Edmund G. Brown Jr.
Governor

August 23, 2016

Ms. Kristine Savona
HIllmann Consulting
1745 W. Orangewood Avenue, Suite 110
Orange, California 92868

20621 Lake Forest Drive, Lake Forest, California 92630

PR 1-082216-02

Dear Ms. Savona:

We have received your Public Records Act Request for records from the Department of Toxic Substances Control.

After a thorough review of our files we have found that no such records exist at this office pertaining to the sites/facilities referenced above.

We would like to inform you about Envirostor, a database that provides information and documents on over 5,000 DTSC cleanup sites. EnviroStor can be accessed at: http://www.envirostor.dtsc.ca.gov/public. Also, a computer is available in the Central Files of each DTSC Regional Office for use by community members to view EnviroStor.

If you have any questions, would like further information regarding your request or would like an appointment to visit Sacramento's Central Files, please contact me at (916) 255-3758.

Sincerely,

Jan Papararo
Regional Records Coordinator

Printed on Recycled Paper

APPENDIX G

PROJECT PERSONNEL QUALIFICATIONS

DRAFT

HILLMANN
CONSULTING

David H. Rutherford

Director of Due Diligence Services

EDUCATION:

B.S. Environmental Sciences, Cook College, New Brunswick, NJ

CERTIFICATION:

40-hr HAZWOPER 29 CFR 1910.120

Certified Hazardous Materials Manager 1992-2003

Construction Procedures, Materials and Costs – a ten-week course at Rutgers Center for Continuing Professional Development

YEARS OF EXPERIENCE:

With Hillmann: 24 years

Total: 25 years

PROFESSIONAL EXPERIENCE:

Mr. Rutherford is the Corporate Director for Environmental Due Diligence services; and the Corporate Director of Quality Assurance. He has over 25 years of experience in the environmental consulting industry including over 23 years managing and performing environmental property assessments including USEPA and NJDEP Preliminary Assessments.

Mr. Rutherford has managed large national accounts for real estate due diligence services including a desktop review service that handled nearly five hundred properties per year. He has also performed and/or managed Phase II Site Assessments, Underground Storage Tank investigations/closures, Property Condition Assessments, Construction Monitoring inspections, Asbestos Surveys, Asbestos Abatement Project Monitoring services, Indoor Air Quality surveys, NPDES Discharge Monitoring, Community Right-to-Know surveys, and Environmental Risk Analysis for compliance with the Sarbanes-Oxley act.

Representative projects include:

Citigroup – Complete Environmental Program, Various locations nationwide: Since 1995, Hillmann has been providing complete environmental program including Phase I environmental site assessments, asbestos and lead surveys, air monitoring, bid administration and O&M programs, industrial hygiene and indoor air quality programs, geology services, radon testing and hazardous materials assessments. Mr. Rutherford is an Account Manager on this contract. Estimated cost to date: $8,250,000. This project is ongoing.

General Services Administration – Region II, NY/NJ: Hillmann, as part of a Joint Venture was awarded contract #GS-02P-09-PF-D-0007 to perform asbestos and lead surveys on GSA properties in the New York/New Jersey metropolitan area of Region II. Our services include sample collection and testing, evaluation of operational constraints, scheduling, cost estimation and preparation of reports. Mr. Rutherford is the Quality Assurance Director for the project. Estimated cost to date: $15,000. This contract is ongoing.

Tishman Speyer Properties, Various locations nationwide: Hillmann has provided the complete environmental program for Tishman Speyer's properties since 1987. Our services include Phase I environmental site assessments, asbestos surveys, air monitoring, bid administration, O&M programs, industrial hygiene, and indoor air quality programs. Mr. Rutherford is a Project Manager on this contract. Estimated annual contract value: $1,000,000. This contract is ongoing.

TD Bank Phase I ESAs, Various locations: Hillmann has performed Phase I Environmental Site Assessments (ESAs) at several properties on behalf of TD Bank, N.A. These assessments have been conducted utilizing generally accepted Phase I ESA industry standards in accordance with the ASTM Standard Practice E 1527-05 for Phase I Environmental Site Assessments, and the TD Bank, N.A. Scope of Services for Phase I Environmental Site Assessment. Mr. Rutherford is the Environmental Assessor for the contract, which is ongoing. Estimated costs to date: $280,681.

Cabrini Medical Center, New York, NY: Completed 2009. Mr. Rutherford was Project Manager for a Phase I Environmental Site Assessment (ESA) of this 400,000-square foot medical center. Cost: $3,450

Confidential Client, various locations nationwide: Completed 2008. Mr. Rutherford performed as Project Manager for Risk Assessment in 2007/2008 to project a cost estimate for potential environmental liabilities associated with over 3700 former drug store facilities for the purpose of compliance with the Sarbanes-Oxley act. Cost: $13,758

HILLMANN CONSULTING

HSBC Bank, Various locations nationwide/NYC Metro: Hillmann is providing the complete environmental program including Phase I environmental site assessments, asbestos surveys, air monitoring, bid administration, O&M programs, industrial hygiene and indoor air quality programs. Mr. Rutherford is a Project Manager on this contract, which is ongoing. Cost: $100,000.

Monday Properties, 575 Lexington, New York, NY: Hillmann is providing asbestos project design, investigation, phase 1 site investigation and project management services, including bulk sampling and analysis, for several commercial properties. Mr. Rutherford is a Project Manager on this contract, which is ongoing. Cost: $765,100.

Wachovia Bank ESAs, Various locations: Hillmann has performed Phase I Environmental Site Assessments (ESAs) at numerous properties on behalf of Wachovia Bank. These assessments have been conducted utilizing generally accepted Phase I ESA industry standards in accordance with the ASTM Standard Practice E 1527-05 for Phase I Environmental Site Assessments, and the Wachovia Bank Scope of Services for Phase I Environmental Site Assessment. Mr. Rutherford functions as an Environmental Assessor for the contract. Estimated costs to date: $443,710.

MDB Community Housing Corp, Phase I ESAs Portfolio Project: Mr. Rutherford was the Project Manager and Site Assessor for this portfolio of Phase I Environmental Site Assessment projects conducted on these multi-family residential buildings. Hillmann staff also performed brief evaluations for ASTM "Non-Scope" items, such as asbestos-containing materials, lead-based paint, radon and mold. This project was completed in 2009. Costs: $7,200.

Kevon Office Centers, Pennsauken, NJ: Hillmann performed a Phase I Environmental Site Assessment (ESA) of this property for Kevon Office Center, L.P. The assessment was conducted utilizing generally accepted Phase I ESA industry standards in accordance with the ASTM Standard Practice E 1527-05. Mr. Rutherford performed as the Project Manager and Site Assessor for this contract, which was completed in 2010. Cost: $4,200

Transaction Screen Environmental Site Assessments, Various locations, New York, NY: KDX Ventures tasked Hillmann with providing transaction screen environmental site assessments at nine different locations throughout New York City. Mr. Rutherford performed as the Project Manager and Site Assessor for this contract, which was completed in 2009. Cost: $8,700.

APPENDIX D

HISTORICAL RECORDS DOCUMENTATION

20621 Lake Forest

20621 Lake Forest

Lake Forest, CA 92630

Inquiry Number: 5352085.8

July 09, 2018

The EDR Aerial Photo Decade Package

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

07/09/18

Site Name:

20621 Lake Forest
20621 Lake Forest
Lake Forest, CA 92630
EDR Inquiry # 5352085.8

Client Name:

Hillmann Environmental Co.
1745 W Orangewood Avenue
Orange, CA 92868-0000
Contact: Kristine Savona

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

Search Results:

Year	*Scale*	*Details*	*Source*
2016	1"=500'	Flight Year: 2016	USDA/NAIP
2012	1"=500'	Flight Year: 2012	USDA/NAIP
2009	1"=500'	Flight Year: 2009	USDA/NAIP
2005	1"=500'	Flight Year: 2005	USDA/NAIP
1994	1"=500'	Acquisition Date: June 01, 1994	USGS/DOQQ
1990	1"=500'	Flight Date: August 29, 1990	USDA
1988	1"=500'	Flight Date: September 13, 1988	USDA
1980	1"=500'	Flight Date: January 01, 1980	USGS
1972	1"=500'	Flight Date: October 30, 1972	USGS
1967	1"=500'	Flight Date: May 07, 1967	USGS
1952	1"=500'	Flight Date: December 12, 1952	USDA
1949	1"=500'	Flight Date: May 05, 1949	USDA
1946	1"=500'	Flight Date: December 29, 1946	USGS
1938	1"=500'	Flight Date: June 14, 1938	USDA

When delivered electronically by EDR, the aerial photo images included with this report are for ONE TIME USE ONLY. Further reproduction of these aerial photo images is prohibited without permission from EDR. For more information contact your EDR Account Executive.

Disclaimer - Copyright and Trademark Notice

This Report contains certain information obtained from a variety of public and other sources reasonably available to Environmental Data Resources, Inc. It cannot be concluded from this Report that coverage information for the target and surrounding properties does not exist from other sources. NO WARRANTY EXPRESSED OR IMPLIED, IS MADE WHATSOEVER IN CONNECTION WITH THIS REPORT. ENVIRONMENTAL DATA RESOURCES, INC. SPECIFICALLY DISCLAIMS THE MAKING OF ANY SUCH WARRANTIES, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE. ALL RISK IS ASSUMED BY THE USER. IN NO EVENT SHALL ENVIRONMENTAL DATA RESOURCES, INC. BE LIABLE TO ANYONE, WHETHER ARISING OUT OF ERRORS OR OMISSIONS, NEGLIGENCE, ACCIDENT OR ANY OTHER CAUSE, FOR ANY LOSS OF DAMAGE, INCLUDING, WITHOUT LIMITATION, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES. ANY LIABILITY ON THE PART OF ENVIRONMENTAL DATA RESOURCES, INC. IS STRICTLY LIMITED TO A REFUND OF THE AMOUNT PAID FOR THIS REPORT. Purchaser accepts this Report "AS IS". Any analyses, estimates, ratings, environmental risk levels or risk codes provided in this Report are provided for illustrative purposes only, and are not intended to provide, nor should they be interpreted as providing any facts regarding, or prediction or forecast of, any environmental risk for any property. Only a Phase I Environmental Site Assessment performed by an environmental professional can provide information regarding the environmental risk for any property. Additionally, the information provided in this Report is not to be construed as legal advice.

Copyright 2018 by Environmental Data Resources, Inc. All rights reserved. Reproduction in any media or format, in whole or in part, of any report or map of Environmental Data Resources, Inc., or its affiliates, is prohibited without prior written permission.

EDR and its logos (including Sanborn and Sanborn Map) are trademarks of Environmental Data Resources, Inc. or its affiliates. All other trademarks used herein are the property of their respective owners.

INQUIRY #: 5352085.8
YEAR: 2016
= 500'
N
EDR

INQUIRY #: 5352085.8
YEAR: 2012
= 500'
N
EDR

INQUIRY #: 5352085.8
YEAR: 2009
= 500'
N
EDR

INQUIRY #: 5352085.8
YEAR: 2005
= 500'
N
EDR

INQUIRY #: 5352085.8
YEAR: 1994
= 500'
N
EDR

INQUIRY #: 5352085.8
YEAR: 1990
= 500'
N
EDR

INQUIRY #: 5352085.8

YEAR: 1988

= 500'

N

EDR

INQUIRY #: 5352085.8

YEAR: 1980

= 500'

N

EDR

Subject boundary not shown because it exceeds image extent or image is not georeferenced.

INQUIRY #: 5352085.8

YEAR: 1972

= 500'

N

EDR

INQUIRY #: 5352085.8
YEAR: 1967
= 500'
N
EDR

INQUIRY #: 5352085.8

YEAR: 1952

= 500'

N

EDR

INQUIRY #: 5352085.8

YEAR: 1949

= 500'

N

EDR

INQUIRY #: 5352085.8
YEAR: 1946
= 500'
N
EDR

INQUIRY #: 5352085.8

YEAR: 1938

= 500'

N

EDR

20621 Lake Forest
20621 Lake Forest
Lake Forest, CA 92630

Inquiry Number: 5352085.5
July 09, 2018

The EDR-City Directory Image Report

Environmental Data Resources Inc

6 Armstrong Road
Shelton, CT 06484
800.352.0050
www.edrnet.com

TABLE OF CONTENTS

SECTION

Executive Summary

Findings

City Directory Images

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Disclaimer - Copyright and Trademark Notice

This Report contains certain information obtained from a variety of public and other sources reasonably available to Environmental Data Resources, Inc. It cannot be concluded from this Report that coverage information for the target and surrounding properties does not exist from other sources. **NO WARRANTY EXPRESSED OR IMPLIED, IS MADE WHATSOEVER IN CONNECTION WITH THIS REPORT. ENVIRONMENTAL DATA RESOURCES, INC. SPECIFICALLY DISCLAIMS THE MAKING OF ANY SUCH WARRANTIES, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE. ALL RISK IS ASSUMED BY THE USER. IN NO EVENT SHALL ENVIRONMENTAL DATA RESOURCES, INC. BE LIABLE TO ANYONE, WHETHER ARISING OUT OF ERRORS OR OMISSIONS, NEGLIGENCE, ACCIDENT OR ANY OTHER CAUSE, FOR ANY LOSS OR DAMAGE, INCLUDING, WITHOUT LIMITATION, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES. ANY LIABILITY ON THE PART OF ENVIRONMENTAL DATA RESOURCES, INC. IS STRICTLY LIMITED TO A REFUND OF THE AMOUNT PAID FOR THIS REPORT.** Purchaser accepts this Report "AS IS". Any analyses, estimates, ratings, environmental risk levels or risk codes provided in this Report are provided for illustrative purposes only, and are not intended to provide, nor should they be interpreted as providing any facts regarding, or prediction orforecast of, any environmental risk for any property. Only a Phase I Environmental Site Assessment performed by an environmental professional can provide information regarding the environmental risk for any property. Additionally, the information provided in this Report is not to be construed as legal advice.

Copyright 2017 by Environmental Data Resources, Inc. All rights reserved. Reproduction in any media or format, in whole or in part, of any report or map of Environmental Data Resources, Inc. or its affiliates is prohibited without prior written permission.

EDR and its logos (including Sanborn and Sanborn Map) are trademarks of Environmental Data Resources, Inc. or its affiliates. All other trademarks used herein are the property of their respective owners.

EXECUTIVE SUMMARY

DESCRIPTION

Environmental Data Resources, Inc.'s (EDR) City Directory Report is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's City Directory Report includes a search of available city directory data at 5 year intervals.

RECORD SOURCES

EDR's Digital Archive combines historical directory listings from sources such as Cole Information and Dun & Bradstreet. These standard sources of property information complement and enhance each other to provide a more comprehensive report.

EDR is licensed to reproduce certain City Directory works by the copyright holders of those works. The purchaser of this EDR City Directory Report may include it in report(s) delivered to a customer. Reproduction of City Directories without permission of the publisher or licensed vendor may be a violation of copyright.

Data by
infoUSA®
Copyright©2008
All Rights Reserved

RESEARCH SUMMARY

The following research sources were consulted in the preparation of this report. A check mark indicates where information was identified in the source and provided in this report.

Year	Target Street	Cross Street	Source
2014	☑	☐	EDR Digital Archive
2010	☑	☐	EDR Digital Archive
2005	☑	☐	EDR Digital Archive
2000	☑	☐	EDR Digital Archive
1995	☑	☐	EDR Digital Archive
1992	☑	☐	EDR Digital Archive
1985	☐	☐	Haines Criss-Cross Directory
1980	☐	☐	Haines Criss-Cross Directory
1975	☐	☐	Haines Criss-Cross Directory
1972	☐	☐	Haines Criss-Cross Directory

FINDINGS

TARGET PROPERTY STREET

20621 Lake Forest
Lake Forest, CA 92630

Year	*CD Image*	*Source*	
LAKE FOREST DR			
2014	pg A1	EDR Digital Archive	
2010	pg A2	EDR Digital Archive	
2005	pg A4	EDR Digital Archive	
2000	pg A5	EDR Digital Archive	
1995	pg A7	EDR Digital Archive	
1992	pg A9	EDR Digital Archive	
1985	-	Haines Criss-Cross Directory	Target and Adjoining not listed in Source
1980	-	Haines Criss-Cross Directory	Target and Adjoining not listed in Source
1975	-	Haines Criss-Cross Directory	Street not listed in Source
1972	-	Haines Criss-Cross Directory	Street not listed in Source

FINDINGS

CROSS STREETS

No Cross Streets Identified

City Directory Images

Target Street	Cross Street	Source
✓	-	EDR Digital Archive

LAKE FOREST DR 2014

20511	CAMEO TECHNOLOGIES INC
20521	ALCON LABORATORIES INC
20552	CARL KARCHER ENTERPRISES INC
20572	ADAM NICK & ASSOCIATES INC
	GRAB-N-GO
20592	CROSSROADS AUTOMOTIVE
20602	HARVS EXPRESS CARWASH & DETAI
	POSHWASH LLC
20621	NAKASE BROTHERS WHOLESALE NURS
20651	A C E PRINTING & GRAPHICS LLC
	ADVANTAGE HAIR SALON
	H & H LIQUOR
	ITZ-A-DELI
	JIN SONG DRYCLEANING-ALTER INC
	KARS LLC
	RESTAURANT WASABE JAPANES
	SHIVAS RESTAURANT
	WASABI JAPANESE RESTAURANT
20652	DEL DOG ONE INC
	WENERSCHINTZEL 705
20671	BAJA FRESH MEXCIAN GRILL
	CHRISTIAN CHEE CHROPRACTIC INC
	ENTERPRISE RENT-A-CAR
	LIGHT BALANCE CHIROPRACTIC
	SMILE ON YOU DENTISTRY
	SOOJI H LEE DDS INC
20702	CARR, SUZANNE
	CULINARY INNOVATION
	FUJI GRILL INC
20731	AMERICA TIRE DEPOT
	CHEVRON STATIONS INC
	G & M OIL CO LLC
20732	ADVANCED AUTOMOTIVE
	ATTA & YANEZ INC
	K AND Z AUTO CENTER INC
	US SMOG TEST ONLY INC

Target Street	Cross Street	Source
✓	-	EDR Digital Archive

LAKE FOREST DR 2010

20511	CAMEO TECHNOLOGIES INC
	SAGE TREE INC
	WD FOUNDATION
	WESTERN DIGITAL CORPORATION
	WESTERN DIGITAL TECH INC
20552	CARL KARCHER ENTERPRISES INC
20572	ADAM NICK & ASSOCIATES INC
	FLEXIBLE MANUFACTURING
20592	CROSSROADS AUTOMOTIVE
20602	HARVS EXPRESS CARWASH & DETAI
20621	NAKASE BROTHERS WHOLESALE NURS
20651	A C E PRINTING & GRAPHICS LLC
	A LITTLE BAKERY AND CAFE
	ADVANTAGE HAIR SALON
	ADVANTAGE MANICURIST CARE
	CHARLES CAFE
	DELICIOUS BRUNCH INC
	FOOTHILL CLEANERS
	HOUSE OF KABOB
	ITZ-A-DELI
	JIN SONG DRYCLEANING-ALTER INC
	MKC
	PICOLLO CUCINA AND PIZZERIA
	RUSTIC PIZZERIA
	S&J TITHE INC
	SANGHOOY INC
	SPICE INDIA
	WASABI JAPANESE RESTAURANT
20652	DEL DOG ONE INC
	WENERSCHINTZEL 705
20671	BAJA FRESH MEXCIAN GRILL
	CHRISTIAN CHEE CHROPRACTIC INC
	ENTERPRISE RENT-A-CAR
	KUENNEMANN DAN T DDS
	LIGHT BALANCE CHIROPRACTIC
20702	ERIC JOSEPH BOGACKI
	EUROPEAN PERSONAL CHEF
	FANCY HAIR & NAILS
	FRANCO GABRIEL
	FUJI GRILL
	HOT TACO BAR & GRIL
	MADMG LLC
	MARKS CATERING
	MILTON TODDI AULT III
	RANCH CLEANERS
20722	INTEGRITY AUTO
20731	CHEVRON STATIONS INC
	G & M OIL CO LLC
20732	ATTA & YANEZ INC
	K AND Z AUTO CENTER INC

Target Street	Cross Street	Source
✓	-	EDR Digital Archive

LAKE FOREST DR 2010 (Cont'd)

20732 MEHDI FAKHARIZADH
US SMOG TEST ONLY INC
V TECH AUTOMOTIVE

Target Street	Cross Street	Source
✓	-	EDR Digital Archive

LAKE FOREST DR 2005

20381	CHARLES ANTHONY & ASSOCIATES
	GOLD COAST CAPITAL FUNDING
	GOLDEN CREST MORTGAGE INC
	JCH FINANCIAL
	JK BOOKKEEPING
	MISSION LANDSCAPE & DESIGN POO
	NOTARY BIZ
	PROMO PRODUCTIONS
	SCOTT & LINDA INC
20511	CAMEO TECHNOLOGIES INC
	WESTERN DIGITAL CORPORATION
	WESTERN DIGITAL TECHNOLOGIES
20552	CARL KARCHER ENTERPRISES INC
20561	COCO ENTERPRISE INC
20592	CROSSROADS AUTOMOTIVE
20602	HARVS EXPRESS CARWASH & DETAI
20621	NAKASE BROTHERS WHOLESALE NURS
20651	ADVANTAGE MANICURIST CARE
	APG ENTERPRISES INC
	AZAMI, FAHIM A
	CAFE COTELLESSE
	ITALIAN EXPRESS PIZZA PASTA IN
	KAMPUTERS
	KIM CHARLES HYUN
	PICOLLO CUCINA AND PIZZERIA
	SPICE INDIA
	WASABI JAPANESE RESTAURANT
20671	DANH, KUENNEMANN
	ENTERPRISE RENT-A-CAR CO OF LA
20702	EVERGREEN NATURAL CLEANERS
	LAKE FOREST LIQUOR
	MARKS CATERING
	MARKS RESTAURANT GROUP INC
	NEIGHBORHOOD CLEANERS
	TACO LOCO
20722	INTEGRITY AUTO
20731	CHEVRON STATIONS INC
20732	CA MUFFLER & BRAKE
	CALIFORNIA MUFFLER & BRAKE
	K AND Z AUTO CENTER INC
	ON THE MOVE STEREO
	TRIM AND BODY SHOP
	US SMOG TEST ONLY INC
	V TECH AUTOMOTIVE

Target Street	Cross Street	Source
✓	-	EDR Digital Archive

LAKE FOREST DR 2000

20331	AMERICAN YUTH TNNIS FOUNDATION
	APEX INSTRUMENTS
	BFG ASSOC
	CELEBRATION COMMUNITY CHURCH
	HARBOR POINTE AC CTRL SYSTEMS
	IMTRAN INC
	JMEK ENGINEERING
	KTBA INC
	LEFFEL VINTAGES LTD
	MIKE YOUNG ASSOCIATES
	MIKE, Y
	NAVATEK ENGINEERING CORP
	PLASTIC BONDING EQUIPMENT
	SLJ GROUP INC
20371	ANGLE AUDIO
	DATA SCAN
	IMAGIO
	JUDGEBUILT PROF FABR MAINT
	PURRSONALITY POTTERY
	SPECIALTY PHOTOS & VIDEOS
	TELEMATION
20381	ALLWAVES CRUISE & TRAVEL
	AMK LTD PARTNERSHIP
	BERNHARDT CHARLES
	COMMERCIAL COMPENSATION CSLTY
	DAWSON BUSINESS PRINTING LLP
	FINANCIAL PROFESSIONALS GROUP
	FOOTHILL TRAVEL
	HAMILTON LEATHER
	MARVEL AERO INTERNATIONAL
	MASS RESEARCH INC
	MCD ELECTRONICS INC
	MONOGRAM MAGIC
	NATURES IMAGE INC
	PACIFC-WSTERN BLDRS DEVELOPERS
	POLY FREEZE INC
	PRESTO SIGNS & GRAPHICS
	S P A GROUP LLC
	SAWITZ MICHAEL INC
	SHORELINE IMPORTS
	SYNTACE USA INC
20552	KARCHER CARL ENTERPRISES
20592	CROSSROADS AUTOMOTIVE
20602	BEACON BAY AUTO WASHES
20621	NAKASE BROTHERS WHOLESALE NURS
20651	A C E PRINTING & GRAPHICS
	ADVANTAGE HAIR SALON
	CLARK, DEANN
	FOOTHILL CLEANERS
	ITALIAN EXPRESS

Target Street	Cross Street	Source
✓	-	EDR Digital Archive

LAKE FOREST DR 2000 (Cont'd)

20651 JASMINE COUSINE OF PERSIA
LILIS BAKERY
REMEDYTEMP INC
SMITH MARK & ASSOCIATES
TREO
WILLIAMS LOCK & KEY
20671 DAN T KUENNEMANN DDS
ENTERPRISE RENT-A-CAR CO LA
LIGHT BALANCE CHIROPRACTIC
OCCUPANT UNKNOWN,
20702 FANCY HAIR & NAILS
LITTLE GYM
RANCH CLEANERS
20722 BAYWASH 24 HOUR CAR WASH
20731 CHEVRON STATIONS INC
20732 ADVANCED TRANSMISSION
ATTA & YANEZ INC
FRANCARE INC
K AND Z AUTO CENTER INC
TRIM AND BODY SHOP

Target Street	Cross Street	Source
✓	-	EDR Digital Archive

LAKE FOREST DR 1995

20331	AMERICAN YUTH TNNIS FOUNDATION
	C I S COMMUNICATIONS
	CALIFORNIA POOLS & SPAS
	ENVIRONMENTAL FRONTIERS INC
	GILBERT INTERNATIONAL
	KTBA INC
	LEFFEL VINTAGES LTD
	MUMONKAN-DO AIKIDO
	NICPAR CORP
	OCCUPANT UNKNOWNN
	ON CALL COMMUNICATIONS INC
	REYNOLDS DAN
	WINE EXCLUSIVES
20371	ANGLE AUDIO
	JUDGEBUILT PROF FABR MAINT
	LUMSDAINE C J COMPANY
	METROPOLITAN BLDG MAINTENANCE
	PERSONALIZED COMPUTERS
	PURRSONALITY POTTERY
	SIRBU, GEORGE
	TELEMATION
	TRS INTERNATIONAL
20381	AMAILCENTER FRANCHISE CORP
	AMERICAN FABRICATED GLASS
	COUTURE PHOTOGRAPHIC CONCEPTS
	FOOTHILL TCA F8
	INTECH DATA CORP (NOT INC)
	KAPASI, HATIM A
	LUZO ENTERPRISES INC
	MASS RESEARCH INC
	ONLY ONE CONNECTION
	PACIFIC TANNING CO
	PRESTO SIGNS & GRAPHICS
	SAWITZ MICHAEL INC
	SCS COMPUTERS
	SYMTRONICS
20552	CARLS JUNIOR RESTAURANT INC
20592	LAKE FOREST AUTOMOTIVE INC
20602	LAKE FOREST AUTO WASH INC
20621	NAKASE BROTHERS WHOLESALE NURS
20651	FOOTHILL CLEANERS
	FOOTHILL CYCLERY
	KALTENBACH, NANCY
	WILLIAMS LOCK & KEY
20702	LAKE FOREST LIQUOR
20731	CHEVRON STATIONS
20732	A & Y INC
	ABC AUTO REPAIR
	CALIFORNIA MUFFLER & BRAKE
	DIMENSION AUTOMOTIVE

Target Street	Cross Street	Source
✓	-	EDR Digital Archive

LAKE FOREST DR 1995 (Cont'd)

20732 K AND Z AUTO CENTER INC
20742 BIG O TIRES 613
INTERNATIONAL GENERAL TRANSM
SADDLEBACK AUTOMOTIVE INC
20751 OCCUPANT UNKNOWNN

Target Street	Cross Street	Source
✓	-	EDR Digital Archive

LAKE FOREST DR 1992

20321	AUSTIN/JOHNSON INTERIOR DESIGN
	BROWN MILENA
	CRAHAN MARCUS ENGINEERING CORP
	LEFFEL, CECIL
	SLJ GROUP INC
	ZONE IN
20331	AMERICAN YUTH TNNIS FOUNDATION
	BFG ASSOC
	ENVIRONMENTAL FRONTIERS INC
	EVENT TEES
	G O INDUSTRIES INC
	LARSON DESIGN
	OSBORNE PROPERTIES CORP
	UNITED DISTRIBUTORS INC
20371	JOHN MARINE CONSTRUCTION
	JUDGEBUILT PROF FABR MAINT
	KMS ELECTRIC
	OPTIMUM ELECTRONICS
	SCS COMPUTERS
	SHASTA GRAPHICS INC
	TOBAR INCORPORATED
20381	AMAILCENTER FRANCHISE CORP
	COUTURE PHOTOGRAPHIC CONCEPTS
	DIMAR PUBLISHING
	FOOTHILL TCA F8
	GENESIS TECHNOLOGY INC
	KEARBYS KREATOINS
	PACIFIC TANNING
	R&B AUTOMOTIVE PRODUCT INC
	SAWITZ MICHAEL INC
	SYMTRONICS
	TELECOM ADVANCED COMMUNIC
20592	ECONO LUBE N TUNE 83
20651	LORANGE CATERING
	VIDEO DOLLAR DAY
20732	DIMENSION AUTOMOTIVE
20742	SADDLEBACK AUTOMOTIVE III
20761	ALL POSTAL
	FREEDOM GOODYEAR TIRE CENTERS
	PEANUTS II
	SPIRIT ST GERMAIN LIQUOR DELI
	ST GERMAINES
	UNIQUE HAIR WEAVING
21362	FAUSNEAUCHT, S
	LEDSOME, MICHAEL
	MAY, RICHARD D
	MCGOWEN, BRONWYN
	RANDOLPH, MICHAEL E
21372	ERSHEK, JOHN
	MILNE, THOMAS

20621 Lake Forest

20621 Lake Forest

Lake Forest, CA 92630

Inquiry Number: 5352085.3

July 03, 2018

Certified Sanborn® Map Report

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

07/03/18

Site Name:

20621 Lake Forest
20621 Lake Forest
Lake Forest, CA 92630
EDR Inquiry # 5352085.3

Client Name:

Hillmann Environmental Co.
1745 W Orangewood Avenue
Orange, CA 92868-0000
Contact: Kristine Savona

The Sanborn Library has been searched by EDR and maps covering the target property location as provided by Hillmann Environmental Co. were identified for the years listed below. The Sanborn Library is the largest, most complete collection of fire insurance maps. The collection includes maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow, and others. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by the Sanborn Library LLC, the copyright holder for the collection. Results can be authenticated by visiting www.edrnet.com/sanborn.

The Sanborn Library is continually enhanced with newly identified map archives. This report accesses all maps in the collection as of the day this report was generated.

Certified Sanborn Results:

Certification # B554-4DC9-B74C

PO # NA

Project C3-7216

UNMAPPED PROPERTY

This report certifies that the complete holdings of the Sanborn Library, LLC collection have been searched based on client supplied target property information, and fire insurance maps covering the target property were not found.

Sanborn® Library search results

Certification #: B554-4DC9-B74C

The Sanborn Library includes more than 1.2 million fire insurance maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow and others which track historical property usage in approximately 12,000 American cities and towns. Collections searched:

- ☑ Library of Congress
- ☑ University Publications of America
- ☑ EDR Private Collection

The Sanborn Library LLC Since 1866™

Limited Permission To Make Copies

Hillmann Environmental Co. (the client) is permitted to make up to FIVE photocopies of this Sanborn Map transmittal and each fire insurance map accompanying this report solely for the limited use of its customer. No one other than the client is authorized to make copies. Upon request made directly to an EDR Account Executive, the client may be permitted to make a limited number of additional photocopies. This permission is conditioned upon compliance by the client, its customer and their agents with EDR's copyright policy; a copy of which is available upon request.

Disclaimer - Copyright and Trademark Notice

This Report contains certain information obtained from a variety of public and other sources reasonably available to Environmental Data Resources, Inc. It cannot be concluded from this Report that coverage information for the target and surrounding properties does not exist from other sources. NO WARRANTY EXPRESSED OR IMPLIED, IS MADE WHATSOEVER IN CONNECTION WITH THIS REPORT. ENVIRONMENTAL DATA RESOURCES, INC. SPECIFICALLY DISCLAIMS THE MAKING OF ANY SUCH WARRANTIES, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE. ALL RISK IS ASSUMED BY THE USER. IN NO EVENT SHALL ENVIRONMENTAL DATA RESOURCES, INC. BE LIABLE TO ANYONE, WHETHER ARISING OUT OF ERRORS OR OMISSIONS, NEGLIGENCE, ACCIDENT OR ANY OTHER CAUSE, FOR ANY LOSS OF DAMAGE, INCLUDING, WITHOUT LIMITATION, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES. ANY LIABILITY ON THE PART OF ENVIRONMENTAL DATA RESOURCES, INC. IS STRICTLY LIMITED TO A REFUND OF THE AMOUNT PAID FOR THIS REPORT. Purchaser accepts this Report "AS IS". Any analyses, estimates, ratings, environmental risk levels or risk codes provided in this Report are provided for illustrative purposes only, and are not intended to provide, nor should they be interpreted as providing any facts regarding, or prediction or forecast of, any environmental risk for any property. Only a Phase I Environmental Site Assessment performed by an environmental professional can provide information regarding the environmental risk for any property. Additionally, the information provided in this Report is not to be construed as legal advice.

Copyright 2018 by Environmental Data Resources, Inc. All rights reserved. Reproduction in any media or format, in whole or in part, of any report or map of Environmental Data Resources, Inc., or its affiliates, is prohibited without prior written permission.

EDR and its logos (including Sanborn and Sanborn Map) are trademarks of Environmental Data Resources, Inc. or its affiliates. All other trademarks used herein are the property of their respective owners.

20621 Lake Forest

20621 Lake Forest

Lake Forest, CA 92630

Inquiry Number: 5352085.4

July 03, 2018

EDR Historical Topo Map Report

with QuadMatch™

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Historical Topo Map Report

07/03/18

Site Name:

20621 Lake Forest
20621 Lake Forest
Lake Forest, CA 92630
EDR Inquiry # 5352085.4

Client Name:

Hillmann Environmental Co.
1745 W Orangewood Avenue
Orange, CA 92868-0000
Contact: Kristine Savona

EDR Topographic Map Library has been searched by EDR and maps covering the target property location as provided by Hillmann Environmental Co. were identified for the years listed below. EDR's Historical Topo Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topo Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the late 1800s.

Search Results:

P.O.# NA
Project: C3-7216

Coordinates:

Latitude:	33.668467 33° 40' 6" North
Longitude:	-117.667749 -117° 40' 4" West
UTM Zone:	Zone 11 North
UTM X Meters:	438095.75
UTM Y Meters:	3725597.24
Elevation:	736.13' above sea level

Maps Provided:

2012	1942
1997	1935
1982	1902
1981	
1978	
1968	
1950	
1949	

Disclaimer - Copyright and Trademark Notice

This Report contains certain information obtained from a variety of public and other sources reasonably available to Environmental Data Resources, Inc. It cannot be concluded from this Report that coverage information for the target and surrounding properties does not exist from other sources. NO WARRANTY EXPRESSED OR IMPLIED, IS MADE WHATSOEVER IN CONNECTION WITH THIS REPORT. ENVIRONMENTAL DATA RESOURCES, INC. SPECIFICALLY DISCLAIMS THE MAKING OF ANY SUCH WARRANTIES, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE. ALL RISK IS ASSUMED BY THE USER. IN NO EVENT SHALL ENVIRONMENTAL DATA RESOURCES, INC. BE LIABLE TO ANYONE, WHETHER ARISING OUT OF ERRORS OR OMISSIONS, NEGLIGENCE, ACCIDENT OR ANY OTHER CAUSE, FOR ANY LOSS OF DAMAGE, INCLUDING, WITHOUT LIMITATION, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES. ANY LIABILITY ON THE PART OF ENVIRONMENTAL DATA RESOURCES, INC. IS STRICTLY LIMITED TO A REFUND OF THE AMOUNT PAID FOR THIS REPORT. Purchaser accepts this Report "AS IS". Any analyses, estimates, ratings, environmental risk levels or risk codes provided in this Report are provided for illustrative purposes only, and are not intended to provide, nor should they be interpreted as providing any facts regarding, or prediction or forecast of, any environmental risk for any property. Only a Phase I Environmental Site Assessment performed by an environmental professional can provide information regarding the environmental risk for any property. Additionally, the information provided in this Report is not to be construed as legal advice.

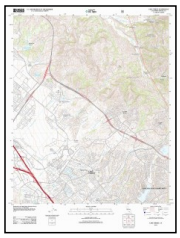
Copyright 2018 by Environmental Data Resources, Inc. All rights reserved. Reproduction in any media or format, in whole or in part, of any report or map of Environmental Data Resources, Inc., or its affiliates, is prohibited without prior written permission.

EDR and its logos (including Sanborn and Sanborn Map) are trademarks of Environmental Data Resources, Inc. or its affiliates. All other trademarks used herein are the property of their respective owners.

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

2012 Source Sheets



Lake Forest
2012
7.5-minute, 24000

1997 Source Sheets

El Toro
1997
7.5-minute, 24000
Aerial Photo Revised 1994

1982 Source Sheets

El Toro
1982
7.5-minute, 24000
Aerial Photo Revised 1980

1981 Source Sheets

El Toro
1981
7.5-minute, 24000
Aerial Photo Revised 1978

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

1978 Source Sheets

El Toro
1978
7.5-minute, 24000
Aerial Photo Revised 1974

1968 Source Sheets

El Toro
1968
7.5-minute, 24000
Aerial Photo Revised 1967

1950 Source Sheets

El Toro
1950
7.5-minute, 24000
Aerial Photo Revised 1946

1949 Source Sheets

El Toro
1949
7.5-minute, 24000
Aerial Photo Revised 1946

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

1942 Source Sheets

SANTIAGO PEAK
1942
15-minute, 50000

1935 Source Sheets

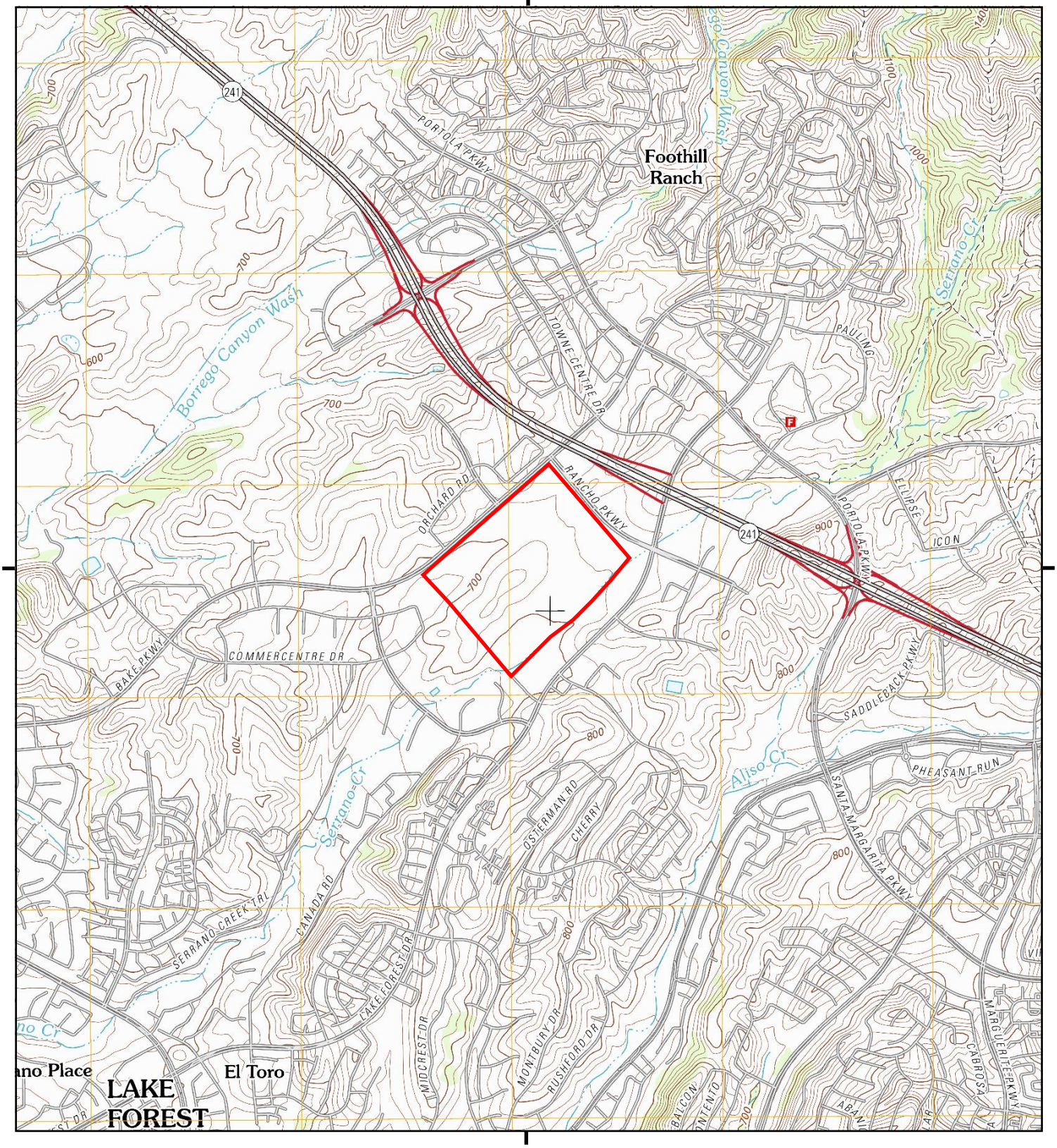
El Toro
1935
7.5-minute, 31680

1902 Source Sheets

Corona
1902
30-minute, 125000

Historical Topo Map

2012



This report includes information from the following map sheet(s).

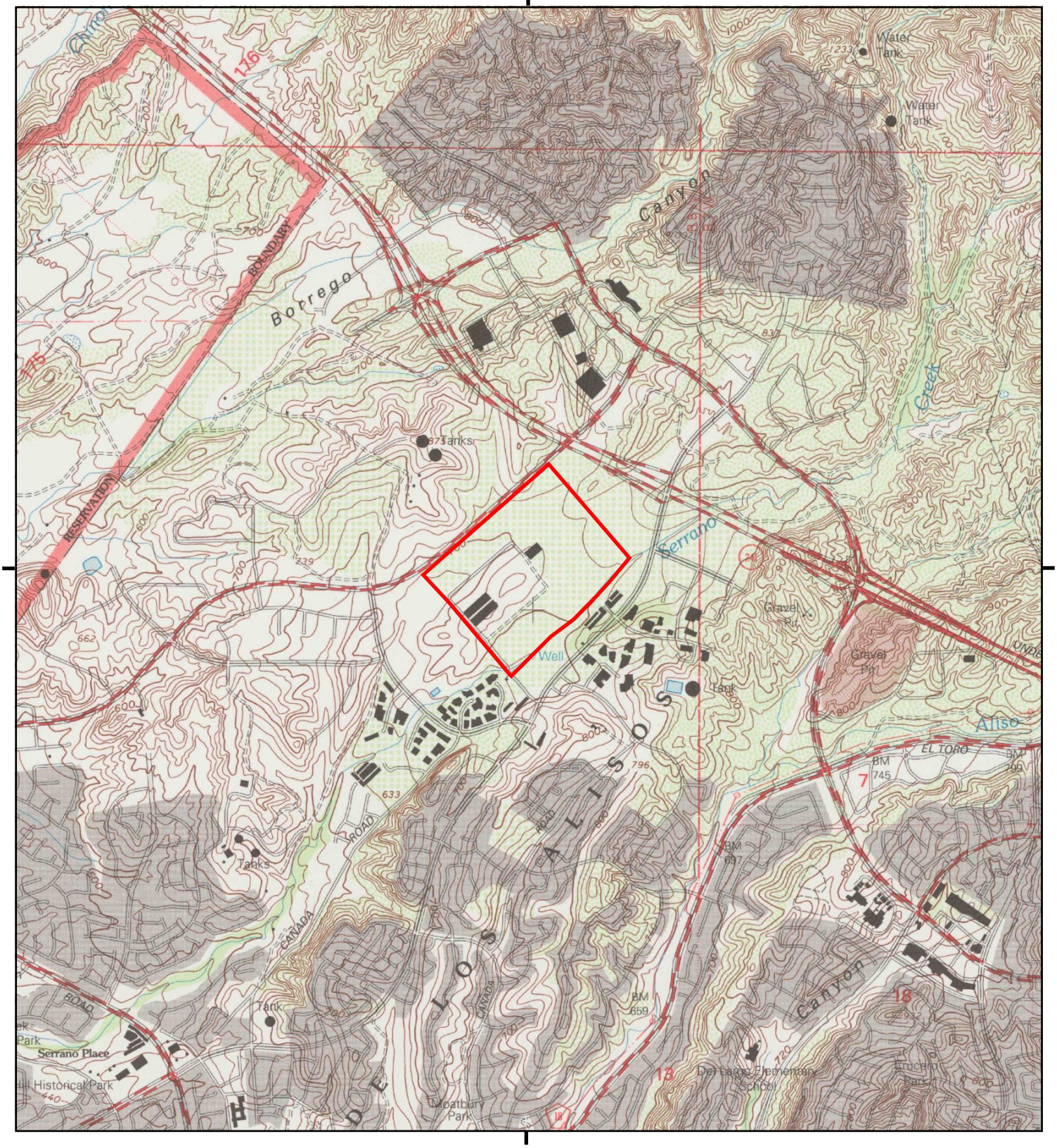
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Lake Forest, 2012, 7.5-minute

SITE NAME: 20621 Lake Forest
ADDRESS: 20621 Lake Forest
Lake Forest, CA 92630
CLIENT: Hillmann Environmental Co.

N



This report includes information from the following map sheet(s).

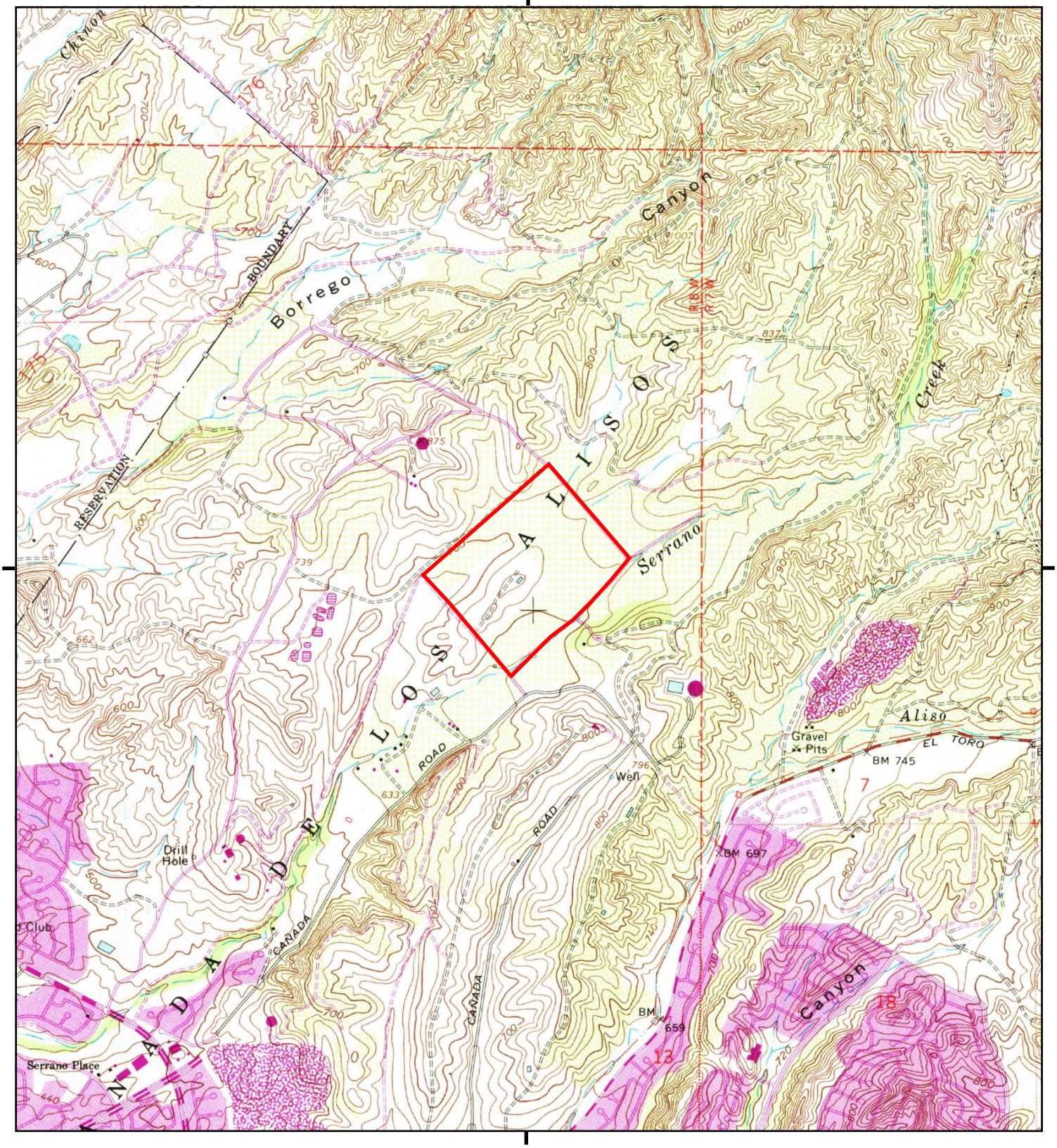
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, El Toro, 1997, 7.5-minute

SITE NAME: 20621 Lake Forest
ADDRESS: 20621 Lake Forest
Lake Forest, CA 92630
CLIENT: Hillmann Environmental Co.

N



This report includes information from the following map sheet(s).

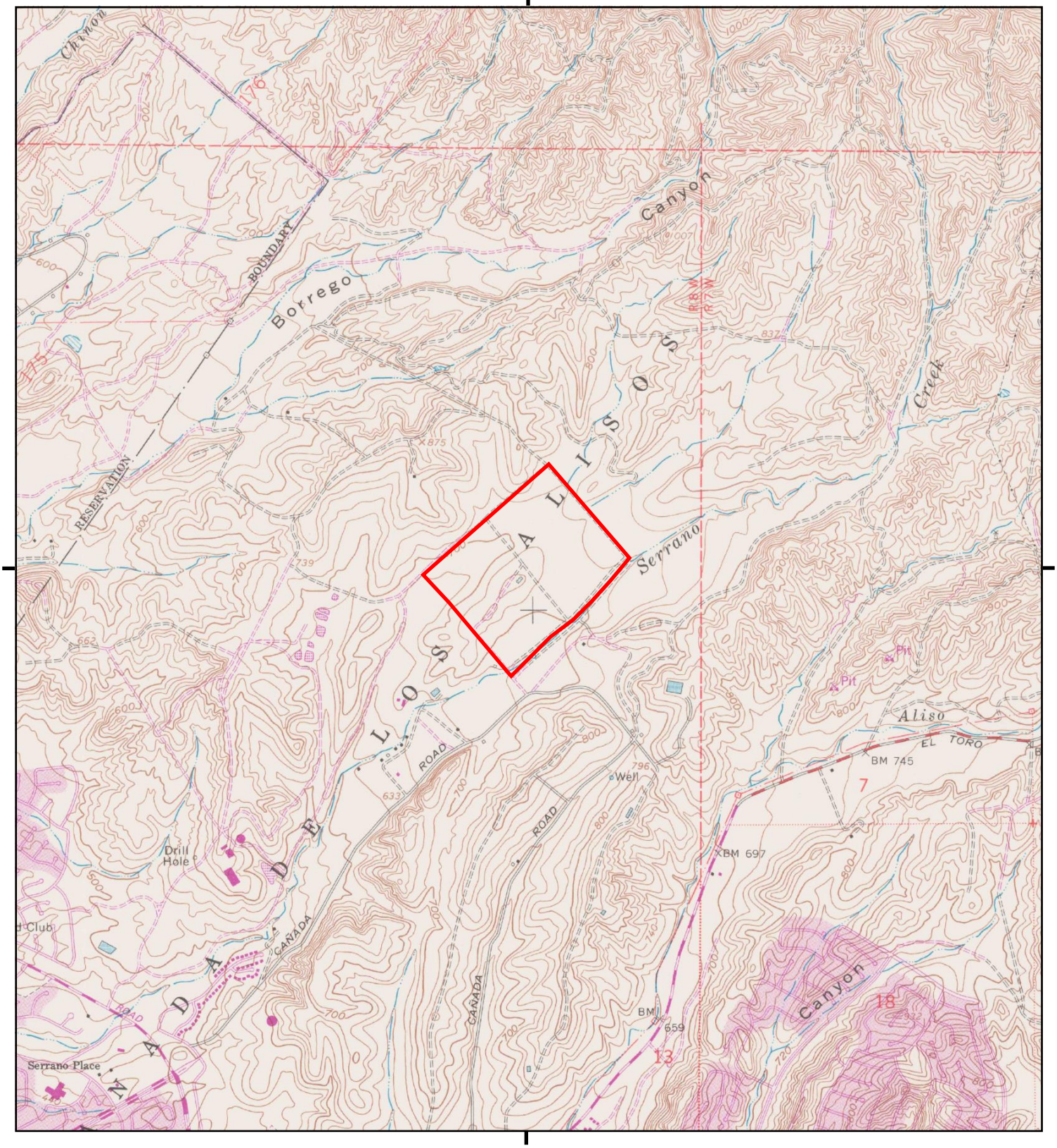
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, El Toro, 1982, 7.5-minute

SITE NAME: 20621 Lake Forest
ADDRESS: 20621 Lake Forest
Lake Forest, CA 92630
CLIENT: Hillmann Environmental Co.

N



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

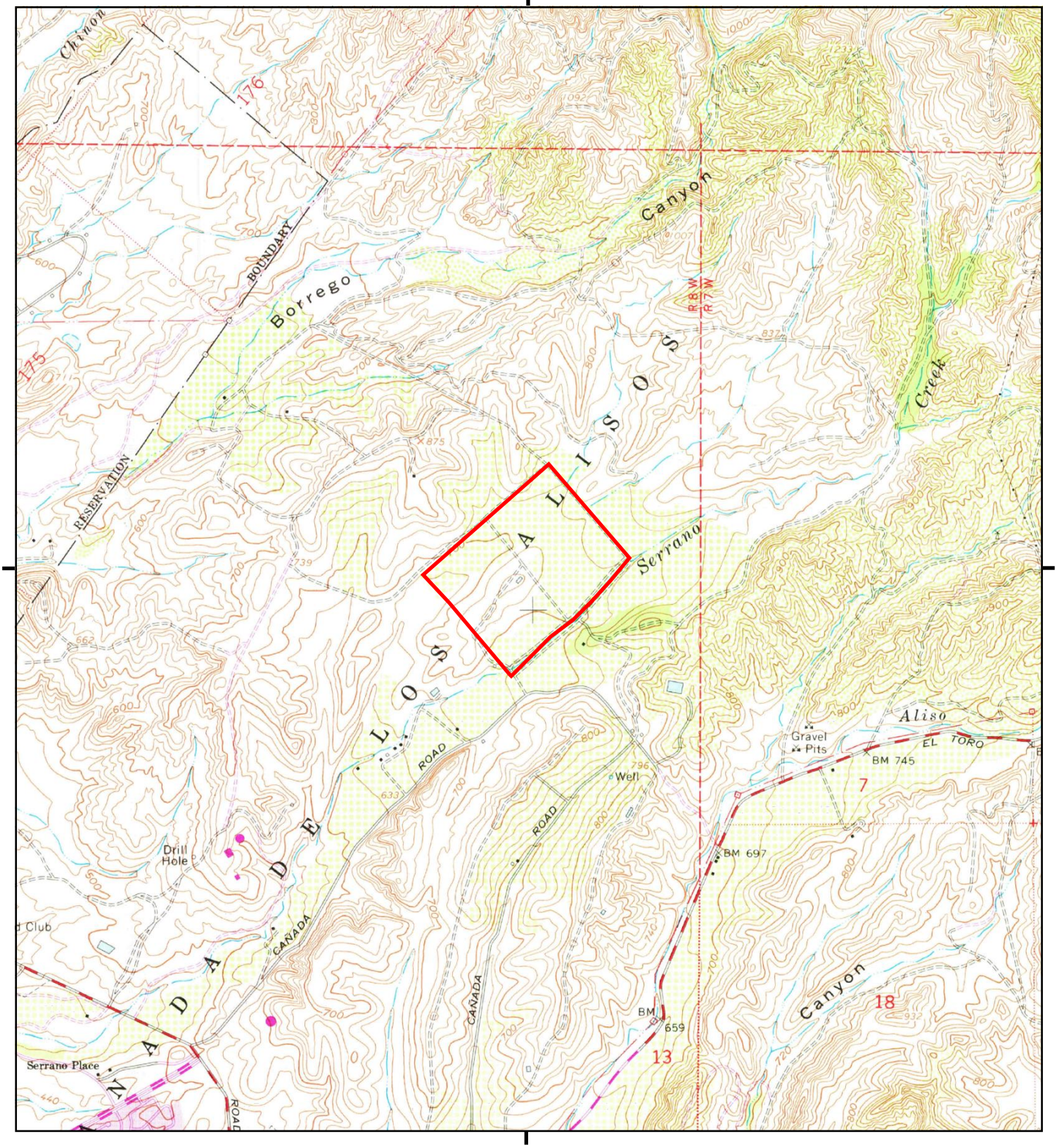
TP, El Toro, 1981, 7.5-minute

SITE NAME: 20621 Lake Forest
ADDRESS: 20621 Lake Forest
Lake Forest, CA 92630
CLIENT: Hillmann Environmental Co.

N

Historical Topo Map

1978



This report includes information from the following map sheet(s).

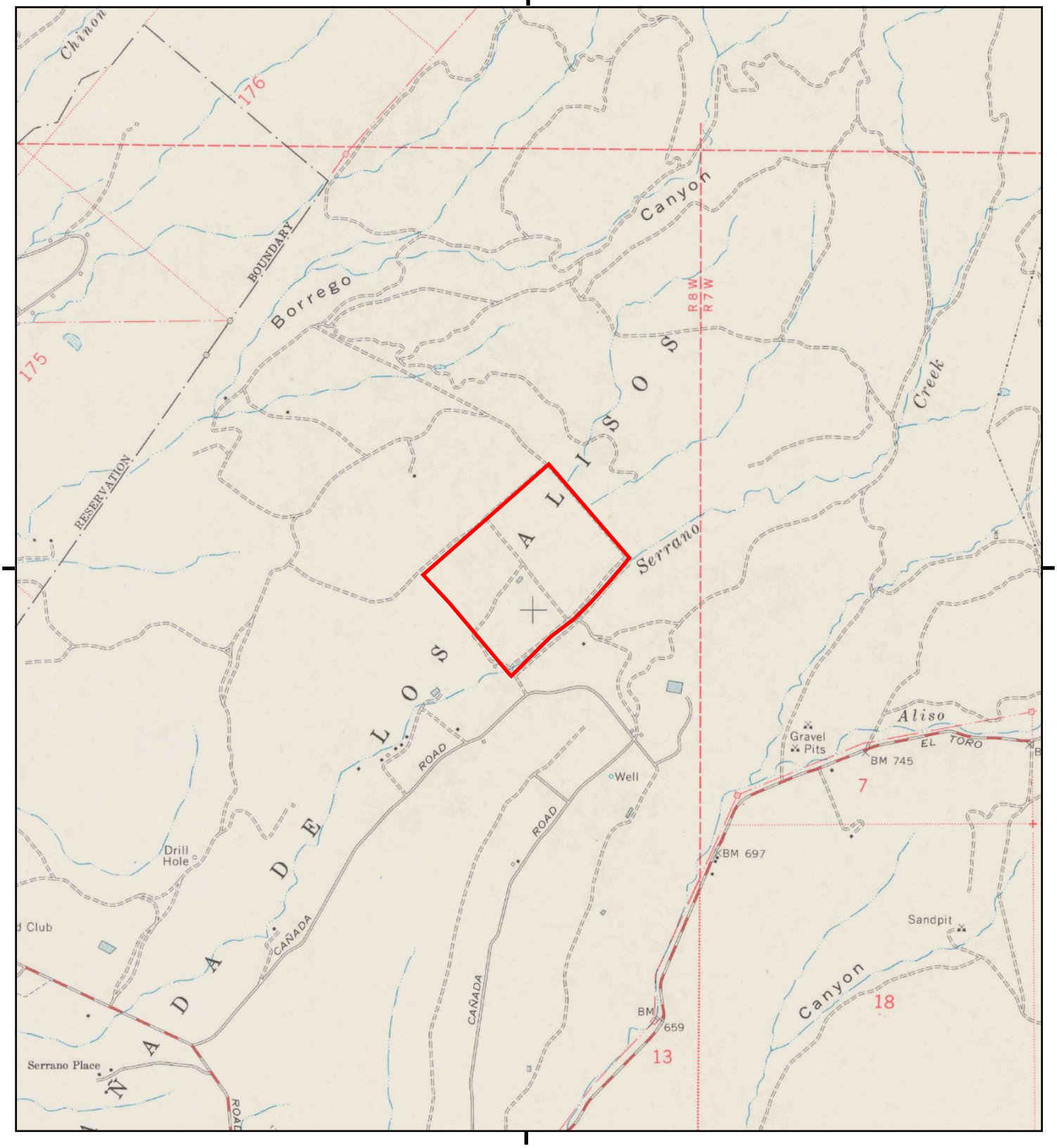
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, El Toro, 1978, 7.5-minute

SITE NAME: 20621 Lake Forest
ADDRESS: 20621 Lake Forest
Lake Forest, CA 92630
CLIENT: Hillmann Environmental Co.

N



This report includes information from the following map sheet(s).

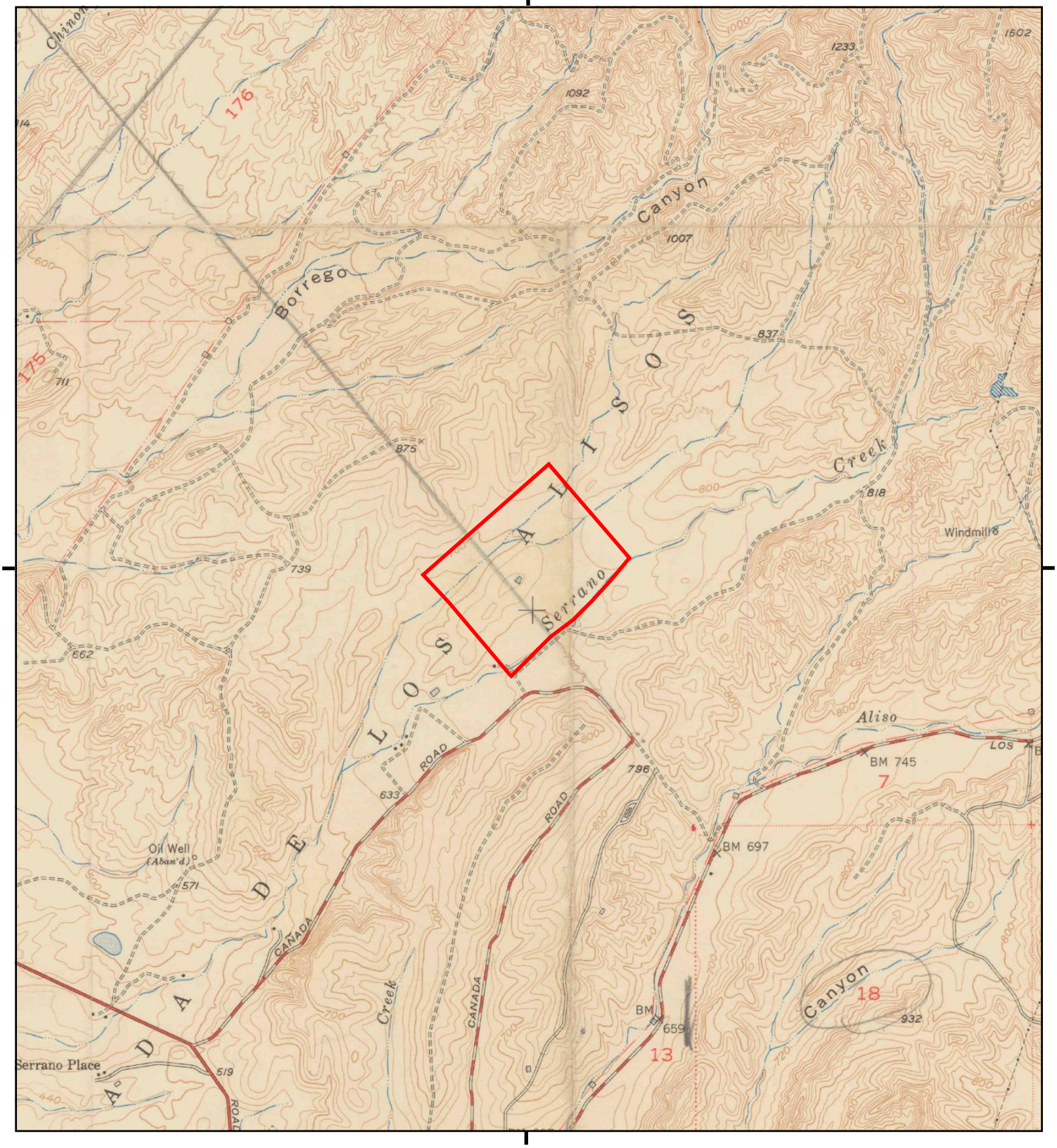
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, El Toro, 1968, 7.5-minute

SITE NAME: 20621 Lake Forest
ADDRESS: 20621 Lake Forest
Lake Forest, CA 92630
CLIENT: Hillmann Environmental Co.

N



This report includes information from the following map sheet(s).

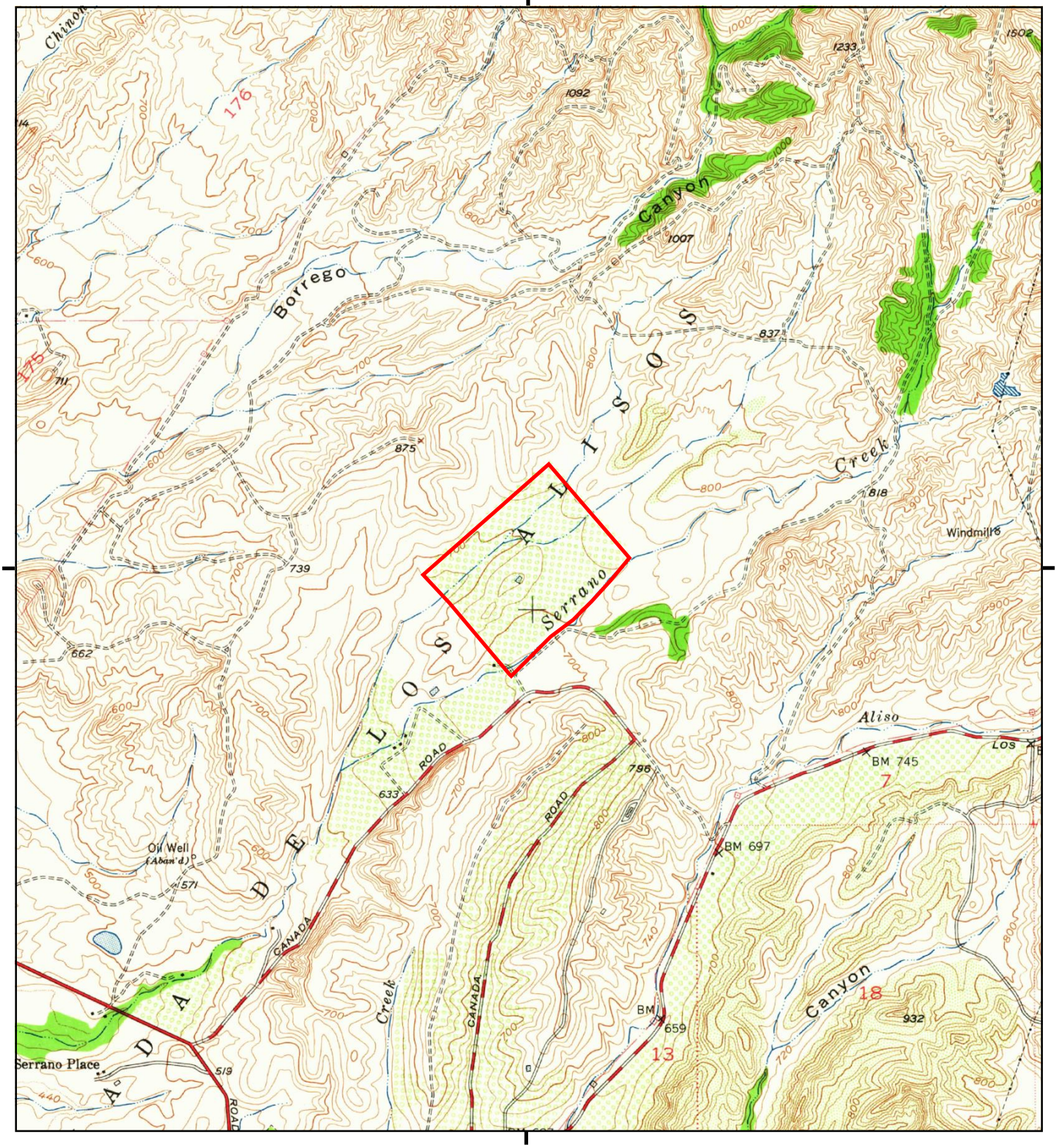
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, El Toro, 1950, 7.5-minute

SITE NAME: 20621 Lake Forest
ADDRESS: 20621 Lake Forest
Lake Forest, CA 92630
CLIENT: Hillmann Environmental Co.

N



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

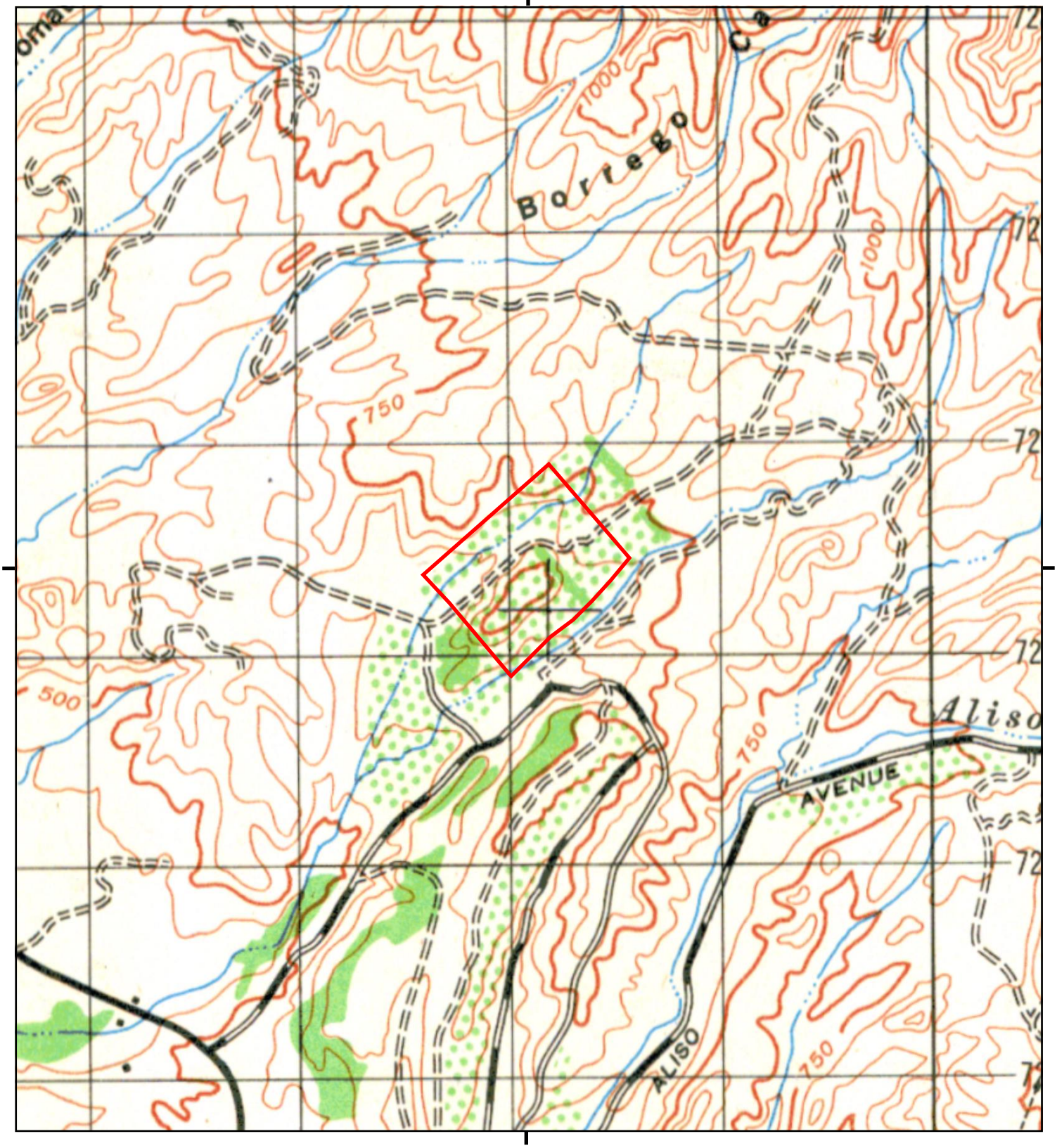
TP, El Toro, 1949, 7.5-minute

SITE NAME: 20621 Lake Forest
ADDRESS: 20621 Lake Forest
Lake Forest, CA 92630
CLIENT: Hillmann Environmental Co.

N

Historical Topo Map

1942



This report includes information from the following map sheet(s).

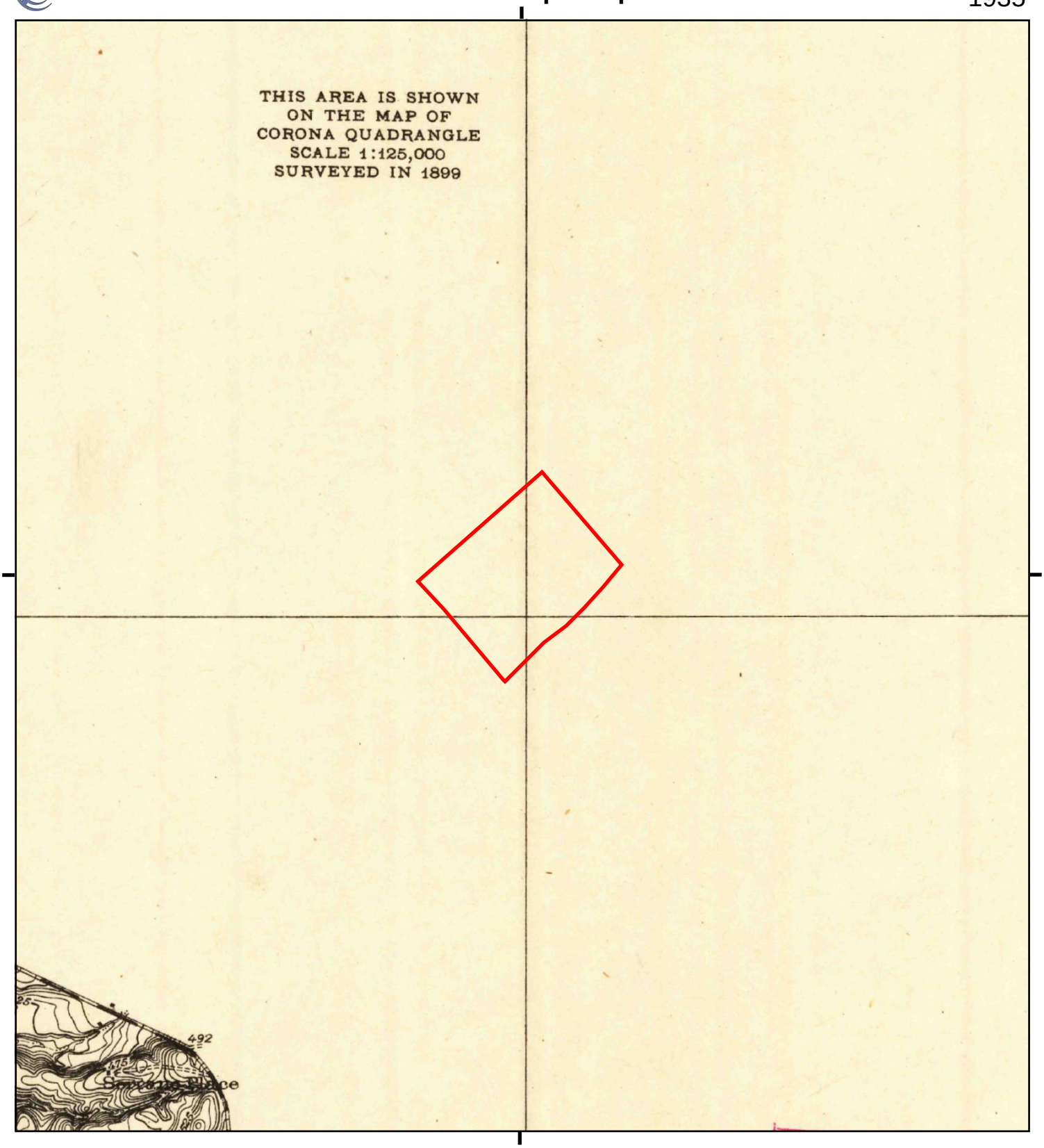
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, SANTIAGO PEAK, 1942, 15-minute

SITE NAME: 20621 Lake Forest
ADDRESS: 20621 Lake Forest
Lake Forest, CA 92630
CLIENT: Hillmann Environmental Co.

N



This report includes information from the following map sheet(s).

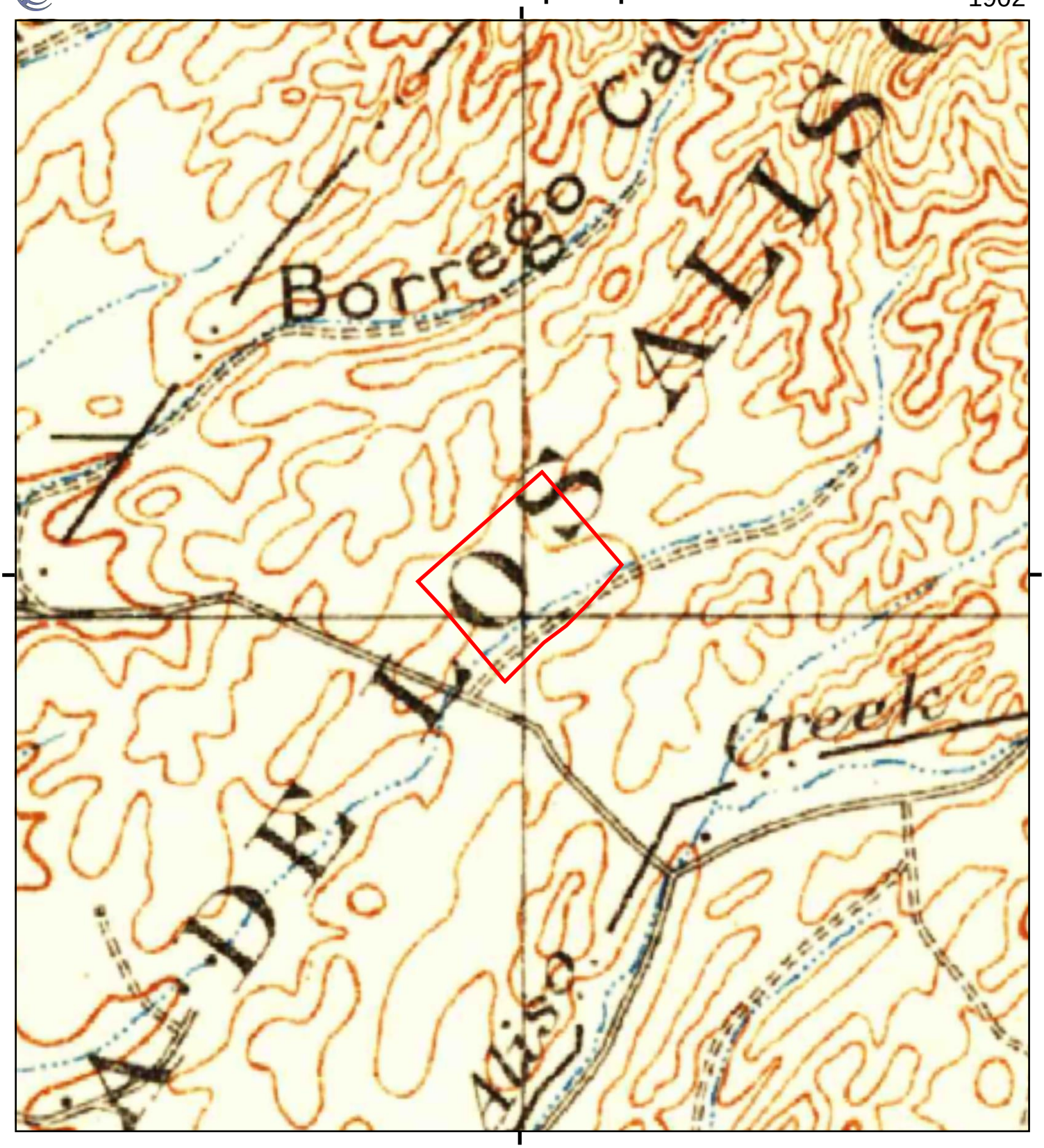
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, El Toro, 1935, 7.5-minute

SITE NAME: 20621 Lake Forest
ADDRESS: 20621 Lake Forest
Lake Forest, CA 92630
CLIENT: Hillmann Environmental Co.

N



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Corona, 1902, 30-minute

SITE NAME: 20621 Lake Forest
ADDRESS: 20621 Lake Forest
Lake Forest, CA 92630
CLIENT: Hillmann Environmental Co.

N

20621 Lake Forest
20621 Lake Forest
Lake Forest, CA 92630

Inquiry Number: 05352085.2r
July 05, 2018

The EDR Radius Map™ Report with GeoCheck®

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

SECTION	PAGE
Executive Summary	ES1
Overview Map	2
Detail Map	3
Map Findings Summary	4
Map Findings	8
Orphan Summary	107
Government Records Searched/Data Currency Tracking	GR-1

GEOCHECK ADDENDUM

Physical Setting Source Addendum	A-1
Physical Setting Source Summary	A-2
Physical Setting SSURGO Soil Map	A-5
Physical Setting Source Map	A-15
Physical Setting Source Map Findings	A-17
Physical Setting Source Records Searched	PSGR-1

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Disclaimer - Copyright and Trademark Notice

This Report contains certain information obtained from a variety of public and other sources reasonably available to Environmental Data Resources, Inc. It cannot be concluded from this Report that coverage information for the target and surrounding properties does not exist from other sources. **NO WARRANTY EXPRESSED OR IMPLIED, IS MADE WHATSOEVER IN CONNECTION WITH THIS REPORT. ENVIRONMENTAL DATA RESOURCES, INC. SPECIFICALLY DISCLAIMS THE MAKING OF ANY SUCH WARRANTIES, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE. ALL RISK IS ASSUMED BY THE USER. IN NO EVENT SHALL ENVIRONMENTAL DATA RESOURCES, INC. BE LIABLE TO ANYONE, WHETHER ARISING OUT OF ERRORS OR OMISSIONS, NEGLIGENCE, ACCIDENT OR ANY OTHER CAUSE, FOR ANY LOSS OF DAMAGE, INCLUDING, WITHOUT LIMITATION, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES. ANY LIABILITY ON THE PART OF ENVIRONMENTAL DATA RESOURCES, INC. IS STRICTLY LIMITED TO A REFUND OF THE AMOUNT PAID FOR THIS REPORT.** Purchaser accepts this Report "AS IS". Any analyses, estimates, ratings, environmental risk levels or risk codes provided in this Report are provided for illustrative purposes only, and are not intended to provide, nor should they be interpreted as providing any facts regarding, or prediction or forecast of, any environmental risk for any property. Only a Phase I Environmental Site Assessment performed by an environmental professional can provide information regarding the environmental risk for any property. Additionally, the information provided in this Report is not to be construed as legal advice.

Copyright 2018 by Environmental Data Resources, Inc. All rights reserved. Reproduction in any media or format, in whole or in part, of any report or map of Environmental Data Resources, Inc., or its affiliates, is prohibited without prior written permission.

EDR and its logos (including Sanborn and Sanborn Map) are trademarks of Environmental Data Resources, Inc. or its affiliates. All other trademarks used herein are the property of their respective owners.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13), the ASTM Standard Practice for Environmental Site Assessments for Forestland or Rural Property (E 2247-16), the ASTM Standard Practice for Limited Environmental Due Diligence: Transaction Screen Process (E 1528-14) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

20621 LAKE FOREST
LAKE FOREST, CA 92630

COORDINATES

Latitude (North):	33.6684670 - 33° 40' 6.48''
Longitude (West):	117.6677490 - 117° 40' 3.89''
Universal Tranverse Mercator:	Zone 11
UTM X (Meters):	438094.4
UTM Y (Meters):	3725403.8
Elevation:	735 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	5636489 EL TORO, CA
Version Date:	2012

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20140603, 20140515
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
20621 LAKE FOREST
LAKE FOREST, CA 92630

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
A1	NAKASE BROTHERS NURS	20621 LAKE FOREST	CIWQS		TP
A2	NAKASE BROTHERS NURS	20621 LAKE FOREST DR	UST		TP
A3	NURSERY LAKE FOREST	20621 LAKE FOREST DR	WDS		TP
A4	NAKASE BROTHERS NURS	20621 LAKE FOREST	FINDS		TP
Reg	EL TORO MARINE CORPS		DOD	Same	4906, 0.929, NW
Reg	EL TORO MARINE CORPS	EL TORO MARINE CORPS	NPL, SEMS, CORRACTS, US ENG CONTROLS, US INST...	Same	4736, 0.897, NW
B5	RANCHO PARKWAY SHELL	26721 RANCHO PKWY	UST	Lower	195, 0.037, NNE
B6	RANCHO PARKWAY SHELL	26721 RANCHO PKWY	EDR Hist Auto	Lower	235, 0.045, NNE
B7	VALVOLINE INSTANT OI	26731 RANCHO PKWY	AST	Lower	244, 0.046, NNE
8	WESTERN DIGITAL CORP	20511 LAKE FOREST DR	RCRA-SQG, FINDS, ECHO, HAZNET	Lower	259, 0.049, South
9	THE HOME DEPOT	20021 LAKE FOREST DR	RCRA-SQG, FINDS, ECHO	Higher	444, 0.084, ENE
10	AA SOUTH COUNTY TOWI	20622 PASCAL WAY STE	EDR Hist Auto	Lower	492, 0.093, South
C11	BEACON BAY FOOTHILL	20602 LAKE FOREST DR	UST	Lower	565, 0.107, South
C12	CAR WASH EXPRESS	20602 LAKE FOREST DR	SWEEPS UST, CA FID UST	Lower	565, 0.107, South
C13	BEACON BAY CAR WASH	20602 LAKE FOREST	LUST	Lower	565, 0.107, South
C14	ARCO AM/PM	20572 LAKE FOREST DR	LUST, SWEEPS UST	Lower	589, 0.112, SSE
C15	ARCO	20572 LAKE FOREST	LUST	Lower	589, 0.112, SSE
C16	ECONO LUBE N TUNE	20572 LAKE FOREST DR	RCRA-SQG, FINDS, ECHO	Lower	589, 0.112, SSE
C17	GRAB N GO 24/7	20572 LAKE FOREST DR	UST	Lower	589, 0.112, SSE
C18	LAKE FOREST ARCO	20572 LAKE FOREST DR	UST	Lower	589, 0.112, SSE
D19	FOOTHILL CLEANERS	20651 LAKE FOREST DR	EDR Hist Cleaner	Lower	601, 0.114, South
D20	COCO ENTERPRISE, INC	20651 LAKE FOREST DR	DRYCLEANERS	Lower	601, 0.114, South
D21	FOOTHILL CLEANERS	20651 LAKE FOREST DR	DRYCLEANERS	Lower	601, 0.114, South
D22	SONG'S CLEANERS SOON	20651 LAKE FOREST DR	DRYCLEANERS	Lower	601, 0.114, South
D23	FOOTHILL CLEANERS	20651 LAKE FOREST DR	RCRA-SQG, Orange Co. Industrial Site, FINDS, ECHO,...	Lower	601, 0.114, South
C24	LAKE FOREST AUTO WAS	20602 LAKE FOREST DR	EDR Hist Auto	Lower	628, 0.119, South
E25	POWER PROFESSIONAL C	20562 REGENCY LN F	DRYCLEANERS, EMI	Lower	728, 0.138, SSE
E26	POWER PROF CLEANERS	20562 REGENCY LN	Orange Co. Industrial Site, DRYCLEANERS	Lower	728, 0.138, SSE
27		26642 TOWNE CENTRE D	AST	Higher	823, 0.156, North
E28	ECONO LUBE N TUNE	20592 LAKE FOREST DR	SWEEPS UST	Lower	854, 0.162, SSE
F29	G&M OIL CO. #83	20731 LAKE FOREST DR	UST	Lower	878, 0.166, South
F30	CHEVRON	20731 LAKE FOREST DR	LUST, SWEEPS UST, HIST CORTESE	Lower	878, 0.166, South
G31	POWER CLEANERS	20562 CANADA RD	RCRA-SQG, FINDS, ECHO	Lower	884, 0.167, SSW
G32	SALEEN ALLEN R R R S	20622 CANADA RD	RCRA-SQG, FINDS, ECHO	Lower	908, 0.172, SSW
G33	LOS ALISOS RANCH	20571 CANADA RD	HIST UST	Lower	927, 0.176, SSW
G34	FOREVER GREEN ART IN	20611 CANADA RD	RCRA-SQG, FINDS, ECHO, HAZNET	Lower	932, 0.177, SSW
G35	BOKKES IND MERCEDES	20591 CANADA RD	RCRA-SQG, FINDS, ECHO	Lower	959, 0.182, SSW
36	SADDLE BACK VALLEY O	26891 VISTA TERRACE	RCRA-SQG, HAZNET, NPDES, CIWQS	Higher	1021, 0.193, ESE
H37	TRABUCO CANYON WATER	20904 DIMENSION	UST	Lower	1079, 0.204, West

MAPPED SITES SUMMARY

Target Property Address:
20621 LAKE FOREST
LAKE FOREST, CA 92630

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
H38	TRABUCO CANYON WATER	20904 DIMENSION DR	SWEEPS UST, CA FID UST	Lower	1079, 0.204, West
I39	CLEANERS 2000	20761 LAKE FOREST DR	DRYCLEANERS	Lower	1102, 0.209, South
I40	SANTA MARGARITA TIRE	20761 LAKE FOREST DR	RCRA-SQG, FINDS, ECHO	Lower	1102, 0.209, South
I41	CLEANERS 2000	20761 LAKEFOREST #H	RCRA-SQG, FINDS, ECHO	Lower	1112, 0.211, South
I42	CLEANERS 2000	20761 LAKE FOREST DR	DRYCLEANERS	Lower	1112, 0.211, South
I43	CLEANERS 2000	20761 LAKE FOREST DR	DRYCLEANERS	Lower	1112, 0.211, South
I44	JIFFY LUBE NO 1301	20781 LAKE FOREST DR	RCRA-SQG	Lower	1246, 0.236, South
45	GREENWASTE COMPOSTIN	20712 INDIAN OCEAN D	WMUDS/SWAT	Lower	2425, 0.459, SW

EXECUTIVE SUMMARY

TARGET PROPERTY SEARCH RESULTS

The target property was identified in the following records. For more information on this property see page 8 of the attached EDR Radius Map report:

Site	Database(s)	EPA ID
NAKASE BROTHERS NURS 20621 LAKE FOREST LAKE FOREST, CA 92630	CIWQS	N/A
NAKASE BROTHERS NURS 20621 LAKE FOREST DR LAKE FOREST, CA 92630	UST Database: UST, Date of Government Version: 03/12/2018 Facility Id: 11465	N/A
NURSERY LAKE FOREST 20621 LAKE FOREST DR LAKE FOREST, CA 0	WDS Facility Status: A Facility Id: 8 303229001	N/A
NAKASE BROTHERS NURS 20621 LAKE FOREST LAKE FOREST, CA 92630	FINDS Registry ID:: 110065304879	N/A

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

Proposed NPL ---------- Proposed National Priority List Sites
NPL LIENS ---------- Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ---------- National Priority List Deletions

Federal CERCLIS list

FEDERAL FACILITY ---------- Federal Facility Site Information listing

SEMS Superfund Enterprise Management System

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE Superfund Enterprise Management System Archive

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG RCRA - Large Quantity Generators
RCRA-CESQG RCRA - Conditionally Exempt Small Quantity Generator

Federal institutional controls / engineering controls registries

LUCIS Land Use Control Information System
US ENG CONTROLS Engineering Controls Sites List
US INST CONTROL Sites with Institutional Controls

Federal ERNS list

ERNS Emergency Response Notification System

State- and tribal - equivalent NPL

RESPONSE State Response Sites

State- and tribal - equivalent CERCLIS

ENVIROSTOR EnviroStor Database

State and tribal landfill and/or solid waste disposal site lists

SWF/LF Solid Waste Information System

State and tribal leaking storage tank lists

INDIAN LUST Leaking Underground Storage Tanks on Indian Land
CPS-SLIC Statewide SLIC Cases

State and tribal registered storage tank lists

FEMA UST Underground Storage Tank Listing
INDIAN UST Underground Storage Tanks on Indian Land

State and tribal voluntary cleanup sites

INDIAN VCP Voluntary Cleanup Priority Listing
VCP Voluntary Cleanup Program Properties

State and tribal Brownfields sites

BROWNFIELDS Considered Brownfieds Sites Listing

EXECUTIVE SUMMARY

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS ..... A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

SWRCY ..... Recycler Database
HAULERS ..... Registered Waste Tire Haulers Listing
INDIAN ODI ..... Report on the Status of Open Dumps on Indian Lands
ODI ..... Open Dump Inventory
DEBRIS REGION 9 ..... Torres Martinez Reservation Illegal Dump Site Locations
IHS OPEN DUMPS ..... Open Dumps on Indian Land

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL ..... Delisted National Clandestine Laboratory Register
HIST Cal-Sites ..... Historical Calsites Database
SCH ..... School Property Evaluation Program
CDL ..... Clandestine Drug Labs
Toxic Pits ..... Toxic Pits Cleanup Act Sites
US CDL ..... National Clandestine Laboratory Register
CERS HAZ WASTE ..... CERS HAZ WASTE

Local Lists of Registered Storage Tanks

CERS TANKS ..... California Environmental Reporting System (CERS) Tanks

Local Land Records

LIENS ..... Environmental Liens Listing
LIENS 2 ..... CERCLA Lien Information
DEED ..... Deed Restriction Listing

Records of Emergency Release Reports

HMIRS ..... Hazardous Materials Information Reporting System
CHMIRS ..... California Hazardous Material Incident Report System
LDS ..... Land Disposal Sites Listing
MCS ..... Military Cleanup Sites Listing
Orange Co. Industrial Site ..... List of Industrial Site Cleanups
SPILLS 90 ..... SPILLS 90 data from FirstSearch

Other Ascertainable Records

RCRA NonGen / NLR ..... RCRA - Non Generators / No Longer Regulated
FUDS ..... Formerly Used Defense Sites
SCRD DRYCLEANERS ..... State Coalition for Remediation of Drycleaners Listing
US FIN ASSUR ..... Financial Assurance Information
EPA WATCH LIST ..... EPA WATCH LIST
2020 COR ACTION ..... 2020 Corrective Action Program List
TSCA ..... Toxic Substances Control Act

EXECUTIVE SUMMARY

TRIS	Toxic Chemical Release Inventory System
SSTS	Section 7 Tracking Systems
RMP	Risk Management Plans
RAATS	RCRA Administrative Action Tracking System
PRP	Potentially Responsible Parties
PADS	PCB Activity Database System
ICIS	Integrated Compliance Information System
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
MLTS	Material Licensing Tracking System
COAL ASH DOE	Steam-Electric Plant Operation Data
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
PCB TRANSFORMER	PCB Transformer Registration Database
RADINFO	Radiation Information Database
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
DOT OPS	Incident and Accident Data
CONSENT	Superfund (CERCLA) Consent Decrees
INDIAN RESERV	Indian Reservations
FUSRAP	Formerly Utilized Sites Remedial Action Program
UMTRA	Uranium Mill Tailings Sites
LEAD SMELTERS	Lead Smelter Sites
US AIRS	Aerometric Information Retrieval System Facility Subsystem
US MINES	Mines Master Index File
ABANDONED MINES	Abandoned Mines
DOCKET HWC	Hazardous Waste Compliance Docket Listing
ECHO	Enforcement & Compliance History Information
UXO	Unexploded Ordnance Sites
FUELS PROGRAM	EPA Fuels Program Registered Listing
CA BOND EXP. PLAN	Bond Expenditure Plan
Cortese	"Cortese" Hazardous Waste & Substances Sites List
CUPA Listings	CUPA Resources List
EMI	Emissions Inventory Data
ENF	Enforcement Action Listing
Financial Assurance	Financial Assurance Information Listing
HAZNET	Facility and Manifest Data
ICE	ICE
HWP	EnviroStor Permitted Facilities Listing
HWT	Registered Hazardous Waste Transporter Database
MINES	Mines Site Location Listing
MWMP	Medical Waste Management Program Listing
NPDES	NPDES Permits Listing
PEST LIC	Pesticide Regulation Licenses Listing
PROC	Certified Processors Database
Notify 65	Proposition 65 Records
UIC	UIC Listing
WASTEWATER PITS	Oil Wastewater Pits Listing
WIP	Well Investigation Program Case List
UIC GEO	UIC GEO (GEOTRACKER)
WELL STIM PROJ	Well Stimulation Project (GEOTRACKER)
CERS	CERS
SAMPLING POINT	SAMPLING POINT (GEOTRACKER)
PROJECT	PROJECT (GEOTRACKER)
PROD WATER PONDS	PROD WATER PONDS (GEOTRACKER)
MILITARY PRIV SITES	MILITARY PRIV SITES (GEOTRACKER)
NON-CASE INFO	NON-CASE INFO (GEOTRACKER)

OTHER OIL GAS---------- OTHER OIL & GAS (GEOTRACKER)

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP---------- EDR Proprietary Manufactured Gas Plants

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF---------- Recovered Government Archive Solid Waste Facilities List
RGA LUST---------- Recovered Government Archive Leaking Underground Storage Tank

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: Also known as Superfund, the National Priority List database is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund program. The source of this database is the U.S. EPA.

A review of the NPL list, as provided by EDR, and dated 05/13/2018 has revealed that there is 1 NPL site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
EL TORO MARINE CORPS	***EL TORO MARINE CORPS***	***NW 1/2 - 1 (0.897 mi.)***	***0***	***10***

Federal RCRA CORRACTS facilities list

CORRACTS: CORRACTS is a list of handlers with RCRA Corrective Action Activity. This report shows which nationally-defined corrective action core events have occurred for every handler that has had corrective action activity.

A review of the CORRACTS list, as provided by EDR, and dated 03/01/2018 has revealed that there is 1

CORRACTS site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
EL TORO MARINE CORPS	***EL TORO MARINE CORPS***	***NW 1/2 - 1 (0.897 mi.)***	***0***	***10***

Federal RCRA generators list

RCRA-SQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

A review of the RCRA-SQG list, as provided by EDR, and dated 03/01/2018 has revealed that there are 12 RCRA-SQG sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
THE HOME DEPOT	***20021 LAKE FOREST DR***	***ENE 0 - 1/8 (0.084 mi.)***	***9***	***51***
SADDLE BACK VALLEY O	***26891 VISTA TERRACE***	***ESE 1/8 - 1/4 (0.193 mi.)***	***36***	***90***

Lower Elevation	Address	Direction / Distance	Map ID	Page
WESTERN DIGITAL CORP	***20511 LAKE FOREST DR***	***S 0 - 1/8 (0.049 mi.)***	***8***	***46***
ECONO LUBE N TUNE	***20572 LAKE FOREST DR***	***SSE 0 - 1/8 (0.112 mi.)***	***C16***	***63***
FOOTHILL CLEANERS	***20651 LAKE FOREST DR***	***S 0 - 1/8 (0.114 mi.)***	***D23***	***67***
POWER CLEANERS	***20562 CANADA RD***	***SSW 1/8 - 1/4 (0.167 mi.)***	***G31***	***81***
SALEEN ALLEN R R R S	***20622 CANADA RD***	***SSW 1/8 - 1/4 (0.172 mi.)***	***G32***	***82***
FOREVER GREEN ART IN	***20611 CANADA RD***	***SSW 1/8 - 1/4 (0.177 mi.)***	***G34***	***85***
BOKKES IND MERCEDES	***20591 CANADA RD***	***SSW 1/8 - 1/4 (0.182 mi.)***	***G35***	***88***
SANTA MARGARITA TIRE	***20761 LAKE FOREST DR***	***S 1/8 - 1/4 (0.209 mi.)***	***I40***	***99***
CLEANERS 2000	***20761 LAKEFOREST #H***	***S 1/8 - 1/4 (0.211 mi.)***	***I41***	***100***
JIFFY LUBE NO 1301	20781 LAKE FOREST DR	S 1/8 - 1/4 (0.236 mi.)	I44	103

State and tribal leaking storage tank lists

LUST: Leaking Underground Storage Tank (LUST) Sites included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

A review of the LUST list, as provided by EDR, has revealed that there are 4 LUST sites within approximately 0.5 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
BEACON BAY CAR WASH	20602 LAKE FOREST	S 0 - 1/8 (0.107 mi.)	C13	57

Database: LUST REG 8, Date of Government Version: 02/14/2005
Database: LUST, Date of Government Version: 03/12/2018
Database: ORANGE CO. LUST, Date of Government Version: 04/02/2018
Status: Completed - Case Closed
Facility Id: 02UT003
Facility Status: Case Closed

Global Id: T0605999998
Global ID: T0605999998

ARCO AM/PM ***20572 LAKE FOREST DR*** ***SSE 0 - 1/8 (0.112 mi.)*** ***C14*** ***59***
Database: LUST REG 8, Date of Government Version: 02/14/2005
Facility Status: Case Closed
Global ID: T0605947685

ARCO 20572 LAKE FOREST SSE 0 - 1/8 (0.112 mi.) C15 61
Database: LUST, Date of Government Version: 03/12/2018
Database: ORANGE CO. LUST, Date of Government Version: 04/02/2018
Status: Completed - Case Closed
Facility Id: 02UT008
Global Id: T0605947685

CHEVRON ***20731 LAKE FOREST DR*** ***S 1/8 - 1/4 (0.166 mi.)*** ***F30*** ***77***
Database: LUST REG 8, Date of Government Version: 02/14/2005
Database: LUST, Date of Government Version: 03/12/2018
Database: ORANGE CO. LUST, Date of Government Version: 04/02/2018
Status: Completed - Case Closed
Facility Id: 97UT037
Facility Status: Case Closed
Global Id: T0605902102
Global ID: T0605902102

State and tribal registered storage tank lists

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the State Water Resources Control Board's Hazardous Substance Storage Container Database.

A review of the UST list, as provided by EDR, has revealed that there are 6 UST sites within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
RANCHO PARKWAY SHELL Database: ORANGE CO. UST, Date of Government Version: 01/02/2018 Database: UST, Date of Government Version: 03/12/2018 Facility Id: FA0024028	26721 RANCHO PKWY	NNE 0 - 1/8 (0.037 mi.)	B5	45
BEACON BAY FOOTHILL Database: UST, Date of Government Version: 03/12/2018 Facility Id: 19793	20602 LAKE FOREST DR	S 0 - 1/8 (0.107 mi.)	C11	55
GRAB N GO 24/7 Database: ORANGE CO. UST, Date of Government Version: 01/02/2018 Facility Id: FA0024654	20572 LAKE FOREST DR	SSE 0 - 1/8 (0.112 mi.)	C17	65
LAKE FOREST ARCO Database: UST, Date of Government Version: 03/12/2018 Facility Id: 12020	20572 LAKE FOREST DR	SSE 0 - 1/8 (0.112 mi.)	C18	65
G&M OIL CO. #83 Database: ORANGE CO. UST, Date of Government Version: 01/02/2018 Database: UST, Date of Government Version: 03/12/2018 Facility Id: FA0025150	20731 LAKE FOREST DR	S 1/8 - 1/4 (0.166 mi.)	F29	77

Facility Id: 20177

TRABUCO CANYON WATER	20904 DIMENSION	W 1/8 - 1/4 (0.204 mi.)	H37	97

Database: UST, Date of Government Version: 03/12/2018
Facility Id: 8466

AST: A listing of aboveground storage tank petroleum storage tank locations.

A review of the AST list, as provided by EDR, has revealed that there are 2 AST sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
Not reported	26642 TOWNE CENTRE D	N 1/8 - 1/4 (0.156 mi.)	27	76

Database: AST, Date of Government Version: 07/06/2016

Lower Elevation	Address	Direction / Distance	Map ID	Page
VALVOLINE INSTANT OI	26731 RANCHO PKWY	NNE 0 - 1/8 (0.046 mi.)	B7	45

Database: AST, Date of Government Version: 07/06/2016

ADDITIONAL ENVIRONMENTAL RECORDS

Local Lists of Landfill / Solid Waste Disposal Sites

WMUDS/SWAT: The Waste Management Unit Database System is used for program tracking and inventory of waste management units. The source is the State Water Resources Control Board.

A review of the WMUDS/SWAT list, as provided by EDR, and dated 04/01/2000 has revealed that there is 1 WMUDS/SWAT site within approximately 0.5 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
GREENWASTE COMPOSTIN	20712 INDIAN OCEAN D	SW 1/4 - 1/2 (0.459 mi.)	45	105

Local Lists of Registered Storage Tanks

SWEEPS UST: Statewide Environmental Evaluation and Planning System. This underground storage tank listing was updated and maintained by a company contacted by the SWRCB in the early 1990's. The listing is no longer updated or maintained. The local agency is the contact for more information on a site on the SWEEPS list.

A review of the SWEEPS UST list, as provided by EDR, and dated 06/01/1994 has revealed that there are 5 SWEEPS UST sites within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
CAR WASH EXPRESS	***20602 LAKE FOREST DR***	***S 0 - 1/8 (0.107 mi.)***	***C12***	***56***
Comp Number: 12655				
ARCO AM/PM	***20572 LAKE FOREST DR***	***SSE 0 - 1/8 (0.112 mi.)***	***C14***	***59***

Status: A Tank Status: A Comp Number: 12020				
ECONO LUBE N TUNE Status: A Tank Status: A Comp Number: 12498	20592 LAKE FOREST DR	SSE 1/8 - 1/4 (0.162 mi.)	E28	76
CHEVRON Status: A Tank Status: A Comp Number: 11761	***20731 LAKE FOREST DR***	***S 1/8 - 1/4 (0.166 mi.)***	***F30***	***77***
TRABUCO CANYON WATER Status: A Tank Status: A Comp Number: 8466	***20904 DIMENSION DR***	***W 1/8 - 1/4 (0.204 mi.)***	***H38***	***97***

HIST UST: Historical UST Registered Database.

A review of the HIST UST list, as provided by EDR, and dated 10/15/1990 has revealed that there is 1 HIST UST site within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
LOS ALISOS RANCH Facility Id: 00000023543	20571 CANADA RD	SSW 1/8 - 1/4 (0.176 mi.)	G33	84

CA FID UST: The Facility Inventory Database contains active and inactive underground storage tank locations. The source is the State Water Resource Control Board.

A review of the CA FID UST list, as provided by EDR, and dated 10/31/1994 has revealed that there are 2 CA FID UST sites within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
CAR WASH EXPRESS Facility Id: 30017393 Status: I	***20602 LAKE FOREST DR***	***S 0 - 1/8 (0.107 mi.)***	***C12***	***56***
TRABUCO CANYON WATER Facility Id: 30017607 Status: A	***20904 DIMENSION DR***	***W 1/8 - 1/4 (0.204 mi.)***	***H38***	***97***

Other Ascertainable Records

DOD: Consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

A review of the DOD list, as provided by EDR, and dated 12/31/2005 has revealed that there is 1 DOD

site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
EL TORO MARINE CORPS		NW 1/2 - 1 (0.929 mi.)	0	10

ROD: Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid the cleanup.

A review of the ROD list, as provided by EDR, and dated 05/13/2018 has revealed that there is 1 ROD site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
EL TORO MARINE CORPS	***EL TORO MARINE CORPS***	***NW 1/2 - 1 (0.897 mi.)***	***0***	***10***

DRYCLEANERS: A list of drycleaner related facilities that have EPA ID numbers. These are facilities with certain SIC codes: power laundries, family and commercial; garment pressing and cleaners' agents; linen supply; coin-operated laundries and cleaning; drycleaning plants except rugs; carpet and upholster cleaning; industrial launderers; laundry and garment services.

A review of the DRYCLEANERS list, as provided by EDR, has revealed that there are 9 DRYCLEANERS sites within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
COCO ENTERPRISE, INC	20651 LAKE FOREST DR	S 0 - 1/8 (0.114 mi.)	D20	66
Database: DRYCLEAN SOUTH COAST, Date of Government Version: 03/16/2018				
FOOTHILL CLEANERS	20651 LAKE FOREST DR	S 0 - 1/8 (0.114 mi.)	D21	66
Database: DRYCLEAN SOUTH COAST, Date of Government Version: 03/16/2018				
SONG'S CLEANERS SOON	20651 LAKE FOREST DR	S 0 - 1/8 (0.114 mi.)	D22	67
Database: DRYCLEAN SOUTH COAST, Date of Government Version: 03/16/2018				
FOOTHILL CLEANERS	***20651 LAKE FOREST DR***	***S 0 - 1/8 (0.114 mi.)***	***D23***	***67***
Database: DRYCLEANERS, Date of Government Version: 03/27/2018				
EPA Id: CAL000298661				
EPA Id: CAL000323129				
POWER PROFESSIONAL C	***20562 REGENCY LN F***	***SSE 1/8 - 1/4 (0.138 mi.)***	***E25***	***72***
Database: DRYCLEAN SOUTH COAST, Date of Government Version: 03/16/2018				
POWER PROF CLEANERS	***20562 REGENCY LN***	***SSE 1/8 - 1/4 (0.138 mi.)***	***E26***	***75***
Database: DRYCLEANERS, Date of Government Version: 03/27/2018				
EPA Id: CAD983617648				
CLEANERS 2000	20761 LAKE FOREST DR	S 1/8 - 1/4 (0.209 mi.)	I39	98
Database: DRYCLEANERS, Date of Government Version: 03/27/2018				
EPA Id: CAD983581711				
CLEANERS 2000	20761 LAKE FOREST DR	S 1/8 - 1/4 (0.211 mi.)	I42	102
Database: DRYCLEAN SOUTH COAST, Date of Government Version: 03/16/2018				
CLEANERS 2000	20761 LAKE FOREST DR	S 1/8 - 1/4 (0.211 mi.)	I43	103
Database: DRYCLEAN SOUTH COAST, Date of Government Version: 03/16/2018				

HIST CORTESE: The sites for the list are designated by the State Water Resource Control Board [LUST], the Integrated Waste Board [SWF/LS], and the Department of Toxic Substances Control [CALSITES]. This listing is no longer updated by the state agency.

A review of the HIST CORTESE list, as provided by EDR, and dated 04/01/2001 has revealed that there is 1 HIST CORTESE site within approximately 0.5 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
CHEVRON Reg Id: 083003083T	***20731 LAKE FOREST DR***	***S 1/8 - 1/4 (0.166 mi.)***	***F30***	***77***

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR Hist Auto: EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

A review of the EDR Hist Auto list, as provided by EDR, has revealed that there are 3 EDR Hist Auto sites within approximately 0.125 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
RANCHO PARKWAY SHELL	26721 RANCHO PKWY	NNE 0 - 1/8 (0.045 mi.)	B6	45
AA SOUTH COUNTY TOWI	20622 PASCAL WAY STE	S 0 - 1/8 (0.093 mi.)	10	54
LAKE FOREST AUTO WAS	20602 LAKE FOREST DR	S 0 - 1/8 (0.119 mi.)	C24	71

EDR Hist Cleaner: EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

A review of the EDR Hist Cleaner list, as provided by EDR, has revealed that there is 1 EDR Hist Cleaner site within approximately 0.125 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
FOOTHILL CLEANERS	20651 LAKE FOREST DR	S 0 - 1/8 (0.114 mi.)	D19	65

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 5 records.

Site Name	Database(s)
NE CORNER LAKE FOREST & TOWNE	CIWQS
LAKE FOREST PUMP HOUSE ADDTION	CIWQS
REGENCY LAKE FOREST DR	CIWQS
GREENWASTENA LAKE FOREST	FINDS
LAKE FOREST PUMP HOUSE ADDTION	FINDS

OVERVIEW MAP - 05352085.2R

0 1/4 1/2 1 Miles

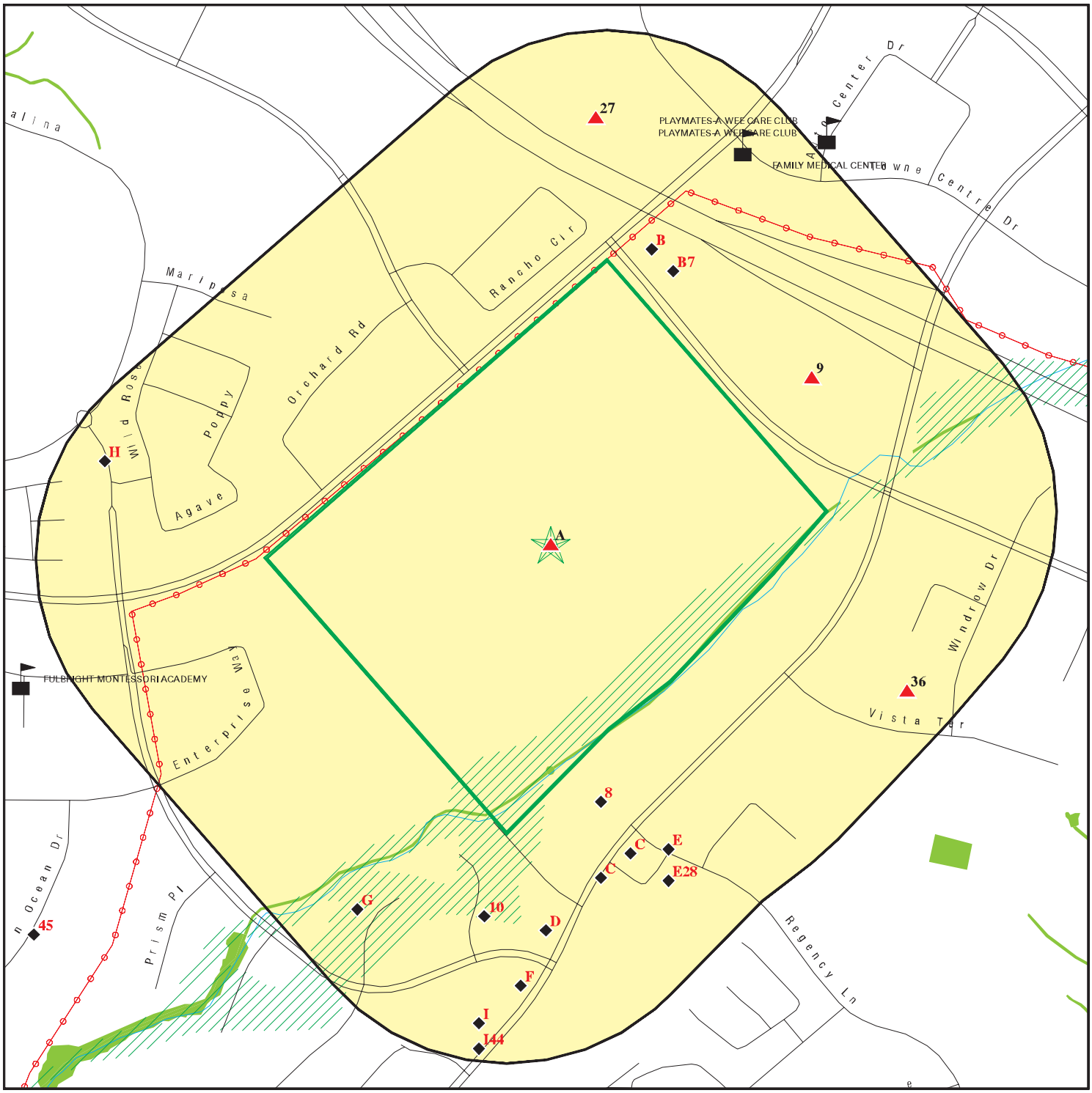
- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Power transmission lines
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory
- State Wetlands
- Upgradient Area
- Areas of Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: 20621 Lake Forest	CLIENT: Hillmann Environmental Co.
ADDRESS: 20621 Lake Forest Lake Forest CA 92630	CONTACT: Kristine Savona INQUIRY #: 05352085.2r
LAT/LONG: 33.668467 / 117.667749	DATE: July 05, 2018 3:01 pm

Copyright © 2018 EDR, Inc. © 2015 TomTom Rel. 2015.

DETAIL MAP - 05352085.2R



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Power transmission lines
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory
- State Wetlands
- Areas of Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: 20621 Lake Forest	CLIENT: Hillmann Environmental Co.
ADDRESS: 20621 Lake Forest Lake Forest CA 92630	CONTACT: Kristine Savona
LAT/LONG: 33.668467 / 117.667749	INQUIRY #: 05352085.2r DATE: July 05, 2018 3:05 pm

Copyright © 2018 EDR, Inc. © 2015 TomTom Rel. 2015.

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL	1.000		0	0	0	1	NR	1
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	0.001		0	NR	NR	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	0	NR	NR	0
Federal CERCLIS NFRAP site list								
SEMS-ARCHIVE	0.500		0	0	0	NR	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS	1.000		0	0	0	1	NR	1
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		4	8	NR	NR	NR	12
RCRA-CESQG	0.250		0	0	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROL	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	0.001		0	NR	NR	NR	NR	0
State- and tribal - equivalent NPL								
RESPONSE	1.000		0	0	0	0	NR	0
State- and tribal - equivalent CERCLIS								
ENVIROSTOR	1.000		0	0	0	0	NR	0
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	0.500		0	0	0	NR	NR	0
State and tribal leaking storage tank lists								
LUST	0.500		3	1	0	NR	NR	4

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
INDIAN LUST	0.500		0	0	0	NR	NR	0
CPS-SLIC	0.500		0	0	0	NR	NR	0
State and tribal registered storage tank lists								
FEMA UST	0.250		0	0	NR	NR	NR	0
UST	0.250	1	4	2	NR	NR	NR	7
AST	0.250		1	1	NR	NR	NR	2
INDIAN UST	0.250		0	0	NR	NR	NR	0
State and tribal voluntary cleanup sites								
INDIAN VCP	0.500		0	0	0	NR	NR	0
VCP	0.500		0	0	0	NR	NR	0
State and tribal Brownfields sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
WMUDS/SWAT	0.500		0	0	1	NR	NR	1
SWRCY	0.500		0	0	0	NR	NR	0
HAULERS	0.001		0	NR	NR	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
IHS OPEN DUMPS	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	0.001		0	NR	NR	NR	NR	0
HIST Cal-Sites	1.000		0	0	0	0	NR	0
SCH	0.250		0	0	NR	NR	NR	0
CDL	0.001		0	NR	NR	NR	NR	0
Toxic Pits	1.000		0	0	0	0	NR	0
US CDL	0.001		0	NR	NR	NR	NR	0
CERS HAZ WASTE	0.250		0	0	NR	NR	NR	0
Local Lists of Registered Storage Tanks								
SWEEPS UST	0.250		2	3	NR	NR	NR	5
HIST UST	0.250		0	1	NR	NR	NR	1
CA FID UST	0.250		1	1	NR	NR	NR	2
CERS TANKS	0.250		0	0	NR	NR	NR	0
Local Land Records								
LIENS	0.001		0	NR	NR	NR	NR	0
LIENS 2	0.001		0	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
DEED	0.500		0	0	0	NR	NR	0
Records of Emergency Release Reports								
HMIRS	0.001		0	NR	NR	NR	NR	0
CHMIRS	0.001		0	NR	NR	NR	NR	0
LDS	0.001		0	NR	NR	NR	NR	0
MCS	0.001		0	NR	NR	NR	NR	0
Orange Co. Industrial Site	0.001		0	NR	NR	NR	NR	0
SPILLS 90	0.001		0	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	0	NR	NR	NR	0
FUDS	1.000		0	0	0	0	NR	0
DOD	1.000		0	0	0	1	NR	1
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	0.001		0	NR	NR	NR	NR	0
EPA WATCH LIST	0.001		0	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	0.001		0	NR	NR	NR	NR	0
TRIS	0.001		0	NR	NR	NR	NR	0
SSTS	0.001		0	NR	NR	NR	NR	0
ROD	1.000		0	0	0	1	NR	1
RMP	0.001		0	NR	NR	NR	NR	0
RAATS	0.001		0	NR	NR	NR	NR	0
PRP	0.001		0	NR	NR	NR	NR	0
PADS	0.001		0	NR	NR	NR	NR	0
ICIS	0.001		0	NR	NR	NR	NR	0
FTTS	0.001		0	NR	NR	NR	NR	0
MLTS	0.001		0	NR	NR	NR	NR	0
COAL ASH DOE	0.001		0	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	0.001		0	NR	NR	NR	NR	0
RADINFO	0.001		0	NR	NR	NR	NR	0
HIST FTTS	0.001		0	NR	NR	NR	NR	0
DOT OPS	0.001		0	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	0.001		0	NR	NR	NR	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	0.001		0	NR	NR	NR	NR	0
US AIRS	0.001		0	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
ABANDONED MINES	0.001		0	NR	NR	NR	NR	0
FINDS	0.001	1	0	NR	NR	NR	NR	1
DOCKET HWC	0.001		0	NR	NR	NR	NR	0
ECHO	0.001		0	NR	NR	NR	NR	0
UXO	1.000		0	0	0	0	NR	0
FUELS PROGRAM	0.250		0	0	NR	NR	NR	0
CA BOND EXP. PLAN	1.000		0	0	0	0	NR	0
Cortese	0.500		0	0	0	NR	NR	0
CUPA Listings	0.250		0	0	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
DRYCLEANERS	0.250		4	5	NR	NR	NR	9
EMI	0.001		0	NR	NR	NR	NR	0
ENF	0.001		0	NR	NR	NR	NR	0
Financial Assurance	0.001		0	NR	NR	NR	NR	0
HAZNET	0.001		0	NR	NR	NR	NR	0
ICE	0.001		0	NR	NR	NR	NR	0
HIST CORTESE	0.500		0	1	0	NR	NR	1
HWP	1.000		0	0	0	0	NR	0
HWT	0.250		0	0	NR	NR	NR	0
MINES	0.001		0	NR	NR	NR	NR	0
MWMP	0.250		0	0	NR	NR	NR	0
NPDES	0.001		0	NR	NR	NR	NR	0
PEST LIC	0.001		0	NR	NR	NR	NR	0
PROC	0.500		0	0	0	NR	NR	0
Notify 65	1.000		0	0	0	0	NR	0
UIC	0.001		0	NR	NR	NR	NR	0
WASTEWATER PITS	0.500		0	0	0	NR	NR	0
WDS	0.001	1	0	NR	NR	NR	NR	1
WIP	0.250		0	0	NR	NR	NR	0
UIC GEO	0.001		0	NR	NR	NR	NR	0
WELL STIM PROJ	0.001		0	NR	NR	NR	NR	0
CERS	0.001		0	NR	NR	NR	NR	0
SAMPLING POINT	0.001		0	NR	NR	NR	NR	0
PROJECT	0.001		0	NR	NR	NR	NR	0
PROD WATER PONDS	0.001		0	NR	NR	NR	NR	0
CIWQS	0.001	1	0	NR	NR	NR	NR	1
MILITARY PRIV SITES	0.001		0	NR	NR	NR	NR	0
NON-CASE INFO	0.001		0	NR	NR	NR	NR	0
OTHER OIL GAS	0.001		0	NR	NR	NR	NR	0
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	0	NR	0
EDR Hist Auto	0.125		3	NR	NR	NR	NR	3
EDR Hist Cleaner	0.125		1	NR	NR	NR	NR	1
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA LF	0.001		0	NR	NR	NR	NR	0
RGA LUST	0.001		0	NR	NR	NR	NR	0
- Totals --		4	23	23	1	4	0	55

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

A1 **NAKASE BROTHERS NURSERY, LAKE FOREST** **CIWQS** **S120032261**
Target **20621 LAKE FOREST** **N/A**
Property **LAKE FOREST, CA 92630**

Site 1 of 4 in cluster A

Actual: **735 ft.**

CIWQS:

Agency:	Nakase Brothers Wholesale Nursery
Agency Address:	9441 Krepp Drive, Huntington Beach, CA 92646
Place/Project Type:	Nursery/Hydroponics
SIC/NAICS:	Not reported
Region:	8
Program:	IRRIINDIVWDR
Regulatory Measure Status:	Active
Regulatory Measure Type:	WDR
Order Number:	R8-2005-0006
WDID:	8 303229001
NPDES Number:	Not reported
Adoption Date:	02/03/2005
Effective Date:	02/03/2005
Termination Date:	Not reported
Expiration/Review Date:	02/03/2015
Design Flow:	Not reported
Major/Minor:	Not reported
Complexity:	C
TTWQ:	2
Enforcement Actions within 5 years:	0
Violations within 5 years:	0
Latitude:	Not reported
Longitude:	Not reported

A2 **NAKASE BROTHERS NURSERY** **UST** **U003778876**
Target **20621 LAKE FOREST DR** **N/A**
Property **LAKE FOREST, CA 92630**

Site 2 of 4 in cluster A

Actual: **735 ft.**

UST:

Facility ID:	11465
Permitting Agency:	ORANGE COUNTY
Latitude:	33.669816
Longitude:	-117.6664

A3 **NURSERY LAKE FOREST** **WDS** **S106800804**
Target **20621 LAKE FOREST DR** **N/A**
Property **LAKE FOREST, CA 0**

Site 3 of 4 in cluster A

Actual: **735 ft.**

WDS:

Facility ID:	Santa Ana River 303229001
Facility Type:	Agricultural - Facility that treats and/or disposes of the wastes associated with confined and concentrated animal feeding, confined animal feeding, confined animal holding, confined and concentrated aquatic animal production facilities, and aquaculture. the treatment and/or disposal of agricultural return water is included in this category.
Facility Status:	Active - Any facility with a continuous or seasonal discharge that is

NURSERY LAKE FOREST (Continued) **S106800804**

	under Waste Discharge Requirements.
NPDES Number:	Not reported
Subregion:	8
Facility Telephone:	Not reported
Facility Contact:	STEVE NAKASE
Agency Name:	NAKASE BROTHERS WHOLESALE NURE
Agency Address:	9441 KREPP DRIVE
Agency City,St,Zip:	HUNTINGTON BEACH 92646
Agency Contact:	STEVE NAKASE
Agency Telephone:	Not reported
Agency Type:	Private
SIC Code:	0
SIC Code 2:	Not reported
Primary Waste Type:	Designated/Influent or Solid Wastes that pose a significant threat to water quality because of their high concentrations (E.G., BOD, Hardness, TRF, Chloride). 'Manageable' hazardous wastes (E.G., inorganic salts and heavy metals) are included in this category.
Primary Waste:	IRRIGA
Waste Type2:	Not reported
Waste2:	Irrigation Runoff
Primary Waste Type:	Designated/Influent or Solid Wastes that pose a significant threat to water quality because of their high concentrations (E.G., BOD, Hardness, TRF, Chloride). 'Manageable' hazardous wastes (E.G., inorganic salts and heavy metals) are included in this category.
Secondary Waste:	Not reported
Secondary Waste Type:	Not reported
Design Flow:	0
Baseline Flow:	0
Reclamation:	No reclamation requirements associated with this facility.
POTW:	The facility is not a POTW.
Treat To Water:	Moderate Threat to Water Quality. A violation could have a major adverse impact on receiving biota, can cause aesthetic impairment to a significant human population, or render unusable a potential domestic or municipal water supply. Awsthetic impairment would include nuisance from a waste treatment facility.
Complexity:	Category C - Facilities having no waste treatment systems, such as cooling water dischargers or thosewho must comply through best management practices, facilities with passive waste treatment and disposal systems, such as septic systems with subsurface disposal, or dischargers having waste storage systems with land disposal such as dairy waste ponds.

A4 **NAKASE BROTHERS NURSERYNA LAKE FOREST** **FINDS** **1023242484**
Target **20621 LAKE FOREST** **N/A**
Property **LAKE FOREST, CA 92630**

Site 4 of 4 in cluster A

Actual:
735 ft.

FINDS:

Registry ID: 110065304879

Environmental Interest/Information System
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

DOD **EL TORO MARINE CORPS AIR STATION (CLOSED)** **DOD** **CUSA143948**
Region **N/A**
NW
1/2-1 **EL TORO MARINE CORPS AIR (County), CA**
4906 ft.

DOD:
- Feature 1: Marine Corps DOD
- Feature 2: Not reported
- Feature 3: Not reported
- URL: Not reported
- Name 1: El Toro Marine Corps Air Station (Closed)
- Name 2: Not reported
- Name 3: Not reported
- State: CA
- DOD Site: Yes
- Tile name: CAORANGE

NPL **EL TORO MARINE CORPS AIR STATION** **NPL** **1000417911**
Region **EL TORO MARINE CORPS AIR STA EL TORO M C A S** **SEMS** **CA6170023208**
NW **EL TORO, CA 92709** **CORRACTS**
1/2-1 **US ENG CONTROLS**
4736 ft. **US INST CONTROL**
ROD
RAATS
PRP

NPL:
- EPA ID: CA6170023208
- Cerclis ID: 902770
- EPA Region: 9
- Federal: Y
- Final Date: 1990-02-21 00:00:00
- Site Score: 37.43
- Latitude: 33.676669
- Longitude: -117.7176

Category Details:
- NPL Status: Currently on the Final NPL
- Category Description: Depth To Aquifer-> 50 And <= 100 Feet
- Category Value: 100

- NPL Status: Currently on the Final NPL
- Category Description: Distance To Nearest Population-> 0 And <= 1/4 Mile
- Category Value: 10

Site Details:
- Site Name: EL TORO MARINE CORPS AIR STATION
- Site Status: Final
- Site Zip: 92709
- Site City: EL TORO
- Site State: CA
- Federal Site: Yes
- Site County: ORANGE
- EPA Region: 09
- Date Proposed: 06/24/88
- Date Deleted: Not reported
- Date Finalized: 02/21/90

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Substance Details:

NPL Status:	Currently on the Final NPL
Substance ID:	Not reported
Substance:	Not reported
CAS #:	Not reported
Pathway:	Not reported
Scoring:	Not reported

NPL Status:	Currently on the Final NPL
Substance ID:	A046
Substance:	POLYCHLORINATED BIPHENYLS
CAS #:	1336-36-3
Pathway:	NO PATHWAY INDICATED
Scoring:	1

NPL Status:	Currently on the Final NPL
Substance ID:	D008
Substance:	LEAD (PB)
CAS #:	7439-92-1
Pathway:	GROUND WATER PATHWAY
Scoring:	3

NPL Status:	Currently on the Final NPL
Substance ID:	U044
Substance:	CHLOROFORM
CAS #:	67-66-3
Pathway:	GROUND WATER PATHWAY
Scoring:	4

NPL Status:	Currently on the Final NPL
Substance ID:	U210
Substance:	TETRACHLOROETHENE
CAS #:	127-18-4
Pathway:	GROUND WATER PATHWAY
Scoring:	2

NPL Status:	Currently on the Final NPL
Substance ID:	U211
Substance:	CARBON TETRACHLORIDE
CAS #:	56-23-5
Pathway:	GROUND WATER PATHWAY
Scoring:	4

NPL Status:	Currently on the Final NPL
Substance ID:	U228
Substance:	TRICHLOROETHYLENE (TCE)
CAS #:	79-01-6
Pathway:	NO PATHWAY INDICATED
Scoring:	1

Summary Details:

Conditions at proposal June 24, 1988): The El Toro Marine Corps Air Station covers approximately 4,700 acres southeast of Santa Ana in El Toro, Orange County, California. Commissioned in 1943, it supports the Fleet Marine Forces in the Pacific Ocean. The surrounding area, once primarily agricultural, is urbani ing rapidly. Station El Toro is participating

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

in the Installation Restoration Program IRP), established in 1978. Under the program, the Department of Defense seeksto identify, investigate, and clean up contamination from ha ardous materials. As part of IRP, the Navy identified 21 problem areas at the station, including three landfills containing both ha ardous and solid waste; buried drums of explosivesand low-level radioactive waste; and areas where PCBs, battery acids, leaded fuels, and other ha ardous substances were dumped or spilled. In tests conducted early in 1987, the Orange County Water District found trichloroethylene and tetrachloroethylene in shallow irrigation wells on and downgradient of the site. An estimated 1,100 acres of land are irrigated by wells within 3 miles of the site. Status February 21, 1990): In April 1989, Station El Toro prepared a Perimeter Investigation Interim Report which focused on four contaminated areas. Further studies are continuing to determine the extent and sources of contamination.

Site Status Details:

NPL Status:	Final
Proposed Date:	06/24/1988
Final Date:	02/21/1990
Deleted Date:	Not reported

Narratives Details:

NPL Name:	EL TORO MARINE CORPS AIR STATION
City:	EL TORO
State:	CA

SEMS:

Site ID:	902770
EPA ID:	CA6170023208
Cong District:	Not reported
FIPS Code:	6059
Latitude:	33.676668999999997
Longitude:	-117.7176
FF:	Y
NPL:	Currently on the Final NPL
Non NPL Status:	Not reported

SEMS Detail:

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	0
Action Code:	NF
Action Name:	NPL FINL
SEQ:	1
Start Date:	1990-02-21 00:00:00
Finish Date:	2/21/1990
Qual:	Not reported
Current Action Lead:	EPA Perf

Region:	9
Site ID:	902770
EPA ID:	CA6170023208

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	0
Action Code:	HR
Action Name:	HAZRANK
SEQ:	1
Start Date:	1987-06-01 00:00:00
Finish Date:	6/1/1987
Qual:	Not reported
Current Action Lead:	EPA Perf

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	0
Action Code:	AR
Action Name:	ADMIN REC
SEQ:	1
Start Date:	1990-02-21 00:00:00
Finish Date:	Not reported
Qual:	Not reported
Current Action Lead:	EPA Perf

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	0
Action Code:	NP
Action Name:	PROPOSED
SEQ:	1
Start Date:	1988-06-24 00:00:00
Finish Date:	6/24/1988
Qual:	Not reported
Current Action Lead:	EPA Perf

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	4
Action Code:	RO
Action Name:	ROD
SEQ:	3
Start Date:	2000-07-12 00:00:00
Finish Date:	7/12/2000
Qual:	Not reported
Current Action Lead:	Fed Fac

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	1
Action Code:	RO
Action Name:	ROD
SEQ:	1
Start Date:	2002-06-27 00:00:00
Finish Date:	6/27/2002
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	8
Action Code:	NH
Action Name:	FF RI
SEQ:	1
Start Date:	1990-09-28 00:00:00
Finish Date:	12/17/1993
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	5
Action Code:	LX
Action Name:	FF RD
SEQ:	4
Start Date:	2008-09-01 00:00:00
Finish Date:	8/13/2009
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	8
Action Code:	NI
Action Name:	FF FS
SEQ:	1
Start Date:	2007-01-29 00:00:00
Finish Date:	8/29/2008

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	4
Action Code:	LX
Action Name:	FF RD
SEQ:	3
Start Date:	2000-07-12 00:00:00
Finish Date:	11/22/2005
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	1
Action Code:	LY
Action Name:	FF RA
SEQ:	1
Start Date:	2005-03-21 00:00:00
Finish Date:	3/27/2008
Qual:	IR
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	8
Action Code:	LX
Action Name:	FF RD
SEQ:	7
Start Date:	2012-01-03 00:00:00
Finish Date:	12/19/2012
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	3
Action Code:	RO
Action Name:	ROD

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

SEQ: 5
Start Date: 1999-09-30 00:00:00
Finish Date: 9/30/1999
Qual: Not reported
Current Action Lead: Fed Fac

Region: 9
Site ID: 902770
EPA ID: CA6170023208
Site Name: EL TORO MARINE CORPS AIR STATION
NPL: F
FF: Y
OU: 0
Action Code: SI
Action Name: SI
SEQ: 1
Start Date: 1987-06-01 00:00:00
Finish Date: 6/1/1987
Qual: H
Current Action Lead: Fed Fac

Region: 9
Site ID: 902770
EPA ID: CA6170023208
Site Name: EL TORO MARINE CORPS AIR STATION
NPL: F
FF: Y
OU: 6
Action Code: RO
Action Name: ROD
SEQ: 6
Start Date: 1997-09-29 00:00:00
Finish Date: 9/29/1997
Qual: Not reported
Current Action Lead: Fed Fac

Region: 9
Site ID: 902770
EPA ID: CA6170023208
Site Name: EL TORO MARINE CORPS AIR STATION
NPL: F
FF: Y
OU: 3
Action Code: LY
Action Name: FF RA
SEQ: 5
Start Date: 2005-03-24 00:00:00
Finish Date: 2/3/2006
Qual: FR
Current Action Lead: Fed Fac

Region: 9
Site ID: 902770
EPA ID: CA6170023208
Site Name: EL TORO MARINE CORPS AIR STATION
NPL: F
FF: Y

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

OU:	1
Action Code:	LW
Action Name:	FF RI/FS
SEQ:	2
Start Date:	1990-09-28 00:00:00
Finish Date:	6/27/2002
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	3
Action Code:	LX
Action Name:	FF RD
SEQ:	5
Start Date:	2000-01-13 00:00:00
Finish Date:	3/31/2005
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	1
Action Code:	LX
Action Name:	FF RD
SEQ:	1
Start Date:	2003-03-01 00:00:00
Finish Date:	5/31/2005
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	0
Action Code:	DS
Action Name:	DISCVRY
SEQ:	1
Start Date:	1986-08-01 00:00:00
Finish Date:	8/1/1986
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	2
Action Code:	LW
Action Name:	FF RI/FS
SEQ:	7
Start Date:	1990-09-28 00:00:00
Finish Date:	9/29/1997
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	8
Action Code:	RO
Action Name:	ROD
SEQ:	8
Start Date:	2012-02-09 00:00:00
Finish Date:	2/9/2012
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	5
Action Code:	LW
Action Name:	FF RI/FS
SEQ:	1
Start Date:	1990-09-28 00:00:00
Finish Date:	3/7/2005
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	0
Action Code:	PA
Action Name:	PA
SEQ:	1
Start Date:	1986-10-01 00:00:00
Finish Date:	10/1/1986
Qual:	H
Current Action Lead:	Fed Fac

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	7
Action Code:	RO
Action Name:	ROD
SEQ:	7
Start Date:	2001-06-06 00:00:00
Finish Date:	6/6/2001
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	5
Action Code:	LY
Action Name:	FF RA
SEQ:	4
Start Date:	2009-08-17 00:00:00
Finish Date:	6/10/2013
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	2
Action Code:	RO
Action Name:	ROD
SEQ:	2
Start Date:	1997-09-29 00:00:00
Finish Date:	9/29/1997
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	8
Action Code:	NI
Action Name:	FF FS
SEQ:	2
Start Date:	2007-01-29 00:00:00
Finish Date:	4/13/2011

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	8
Action Code:	LX
Action Name:	FF RD
SEQ:	11
Start Date:	2014-04-30 00:00:00
Finish Date:	Not reported
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	8
Action Code:	RO
Action Name:	ROD
SEQ:	16
Start Date:	2014-04-30 00:00:00
Finish Date:	4/30/2014
Qual:	R
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	8
Action Code:	LY
Action Name:	FF RA
SEQ:	10
Start Date:	2013-09-14 00:00:00
Finish Date:	Not reported
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	5
Action Code:	LY
Action Name:	FF RA

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

SEQ:	11
Start Date:	2011-07-19 00:00:00
Finish Date:	1/22/2013
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	5
Action Code:	LX
Action Name:	FF RD
SEQ:	12
Start Date:	2011-07-01 00:00:00
Finish Date:	7/19/2011
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	1
Action Code:	OM
Action Name:	OM
SEQ:	2
Start Date:	2008-03-27 00:00:00
Finish Date:	Not reported
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	9
Action Code:	OM
Action Name:	OM
SEQ:	1
Start Date:	2007-10-09 00:00:00
Finish Date:	Not reported
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

OU:	3
Action Code:	RO
Action Name:	ROD
SEQ:	9
Start Date:	2007-05-08 00:00:00
Finish Date:	5/8/2007
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	0
Action Code:	LZ
Action Name:	FF CR
SEQ:	2
Start Date:	1990-02-21 00:00:00
Finish Date:	Not reported
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	9
Action Code:	TS
Action Name:	TRTSTUDY
SEQ:	1
Start Date:	2000-08-28 00:00:00
Finish Date:	8/28/2002
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	3
Action Code:	LY
Action Name:	FF RA
SEQ:	8
Start Date:	2009-01-22 00:00:00
Finish Date:	4/30/2012
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	3
Action Code:	LX
Action Name:	FF RD
SEQ:	8
Start Date:	2007-09-12 00:00:00
Finish Date:	12/30/2008
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	3
Action Code:	LW
Action Name:	FF RI/FS
SEQ:	5
Start Date:	1990-09-28 00:00:00
Finish Date:	6/30/2002
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	4
Action Code:	LW
Action Name:	FF RI/FS
SEQ:	4
Start Date:	1990-09-28 00:00:00
Finish Date:	7/12/2000
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	7
Action Code:	NH
Action Name:	FF RI
SEQ:	2
Start Date:	1997-09-30 00:00:00
Finish Date:	9/7/1999
Qual:	Not reported
Current Action Lead:	Fed Fac

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	5
Action Code:	RO
Action Name:	ROD
SEQ:	10
Start Date:	2008-03-06 00:00:00
Finish Date:	3/6/2008
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	8
Action Code:	NH
Action Name:	FF RI
SEQ:	3
Start Date:	2005-06-03 00:00:00
Finish Date:	12/29/2006
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	5
Action Code:	RO
Action Name:	ROD
SEQ:	15
Start Date:	2010-08-09 00:00:00
Finish Date:	8/9/2010
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	5
Action Code:	LW
Action Name:	FF RI/FS
SEQ:	10
Start Date:	2005-12-06 00:00:00
Finish Date:	12/1/2006

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	9
Action Code:	LW
Action Name:	FF RI/FS
SEQ:	8
Start Date:	1994-04-30 00:00:00
Finish Date:	8/30/2002
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	9
Action Code:	RO
Action Name:	ROD
SEQ:	11
Start Date:	2003-08-16 00:00:00
Finish Date:	8/16/2003
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	9
Action Code:	LY
Action Name:	FF RA
SEQ:	9
Start Date:	2006-01-20 00:00:00
Finish Date:	10/9/2007
Qual:	IR
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	9
Action Code:	LX
Action Name:	FF RD

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

SEQ: 9
Start Date: 2005-07-22 00:00:00
Finish Date: 1/20/2006
Qual: Not reported
Current Action Lead: Fed Fac

Region: 9
Site ID: 902770
EPA ID: CA6170023208
Site Name: EL TORO MARINE CORPS AIR STATION
NPL: F
FF: Y
OU: 2
Action Code: RO
Action Name: ROD
SEQ: 13
Start Date: 2006-03-14 00:00:00
Finish Date: 3/14/2006
Qual: Not reported
Current Action Lead: Fed Fac

Region: 9
Site ID: 902770
EPA ID: CA6170023208
Site Name: EL TORO MARINE CORPS AIR STATION
NPL: F
FF: Y
OU: 4
Action Code: LW
Action Name: FF RI/FS
SEQ: 9
Start Date: 2004-10-25 00:00:00
Finish Date: 12/19/2005
Qual: Not reported
Current Action Lead: Fed Fac

Region: 9
Site ID: 902770
EPA ID: CA6170023208
Site Name: EL TORO MARINE CORPS AIR STATION
NPL: F
FF: Y
OU: 2
Action Code: LY
Action Name: FF RA
SEQ: 2
Start Date: 1999-05-17 00:00:00
Finish Date: 6/30/2002
Qual: Not reported
Current Action Lead: Fed Fac

Region: 9
Site ID: 902770
EPA ID: CA6170023208
Site Name: EL TORO MARINE CORPS AIR STATION
NPL: F
FF: Y

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

OU:	0
Action Code:	LZ
Action Name:	FF CR
SEQ:	1
Start Date:	1990-09-28 00:00:00
Finish Date:	Not reported
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	2
Action Code:	LX
Action Name:	FF RD
SEQ:	2
Start Date:	1998-01-06 00:00:00
Finish Date:	1/20/1999
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	6
Action Code:	LW
Action Name:	FF RI/FS
SEQ:	6
Start Date:	1990-09-28 00:00:00
Finish Date:	9/29/1997
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	4
Action Code:	LY
Action Name:	FF RA
SEQ:	3
Start Date:	2005-08-25 00:00:00
Finish Date:	3/5/2009
Qual:	Not reported
Current Action Lead:	Fed Fac

CORRACTS:

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

EPA ID: CA6170023208
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 19960501
Action: CA050 - RFA Completed
NAICS Code(s): 92811
National Security
Original schedule date: 19960501
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 19960501
Action: CA070YE - RFA Determination Of Need For An RFI, RFI is Necessary
NAICS Code(s): 92811
National Security
Original schedule date: 19960501
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 19980617
Action: CA725NO - Current Human Exposures Under Control, Current human exposures are NOT under control
NAICS Code(s): 92811
National Security
Original schedule date: 19980617
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 19980617
Action: CA750NO - Migration of Contaminated Groundwater under Control, Unacceptable migration of contaminated groundwater is observed or expected
NAICS Code(s): 92811
National Security
Original schedule date: 19980617
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 9
Area Name: OU2A - VADOSE ZONE SOILS
Actual Date: 19970123
Action: CA300 - CMS Workplan Approved
NAICS Code(s): 92811
National Security
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 9
Area Name: OU2A - VADOSE ZONE SOILS

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Actual Date: 19970123
Action: CA200 - RFI Approved
NAICS Code(s): 92811
National Security
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 9
Area Name: OU2A - VADOSE ZONE SOILS
Actual Date: 19970123
Action: CA150 - RFI Workplan Approved
NAICS Code(s): 92811
National Security
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 9
Area Name: OU2A - VADOSE ZONE SOILS
Actual Date: 19970123
Action: CA350 - CMS Approved
NAICS Code(s): 92811
National Security
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 9
Area Name: OU2A - VADOSE ZONE SOILS
Actual Date: 20040723
Action: CA999 - Corrective Action Process Terminated
NAICS Code(s): 92811
National Security
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 9
Area Name: FOST 1
Actual Date: 20040723
Action: CA999 - Corrective Action Process Terminated
NAICS Code(s): 92811
National Security
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 9
Area Name: FOST 1
Actual Date: 20040723
Action: CA999RM - Corrective Action Process Terminated, Remedial Activities Completed
NAICS Code(s): 92811
National Security
Original schedule date: 20040723
Schedule end date: Not reported

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

EPA ID: CA6170023208
EPA Region: 9
Area Name: FOST 2
Actual Date: 20050829
Action: CA999 - Corrective Action Process Terminated
NAICS Code(s): 92811
National Security
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 9
Area Name: OU2A - VADOSE ZONE SOILS
Actual Date: 19970930
Action: CA400 - Date For Remedy Selection (CM Imposed)
NAICS Code(s): 92811
National Security
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 19970930
Action: CA400 - Date For Remedy Selection (CM Imposed)
NAICS Code(s): 92811
National Security
Original schedule date: 19970930
Schedule end date: Not reported

US ENG CONTROLS:
EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Address: EL TORO MARINE CORPS AIR STA
EL TORO M C A S
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Actual Date: 02/28/2012
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 001
Action Name: Explanation Of Significant Differences
Action Completion date: 03/14/2006
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Discharge
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 001
Action Name: Explanation Of Significant Differences

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Action Completion date: 03/14/2006
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Reinjection
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 002
Action Name: Explanation Of Significant Differences
Action Completion date: 12/15/2008
Operable Unit: 01
Contaminated Media : Soil Gas
Engineering Control: Sampling
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 003
Action Name: Explanation Of Significant Differences
Action Completion date: 07/29/2009
Operable Unit: 04
Contaminated Media : Groundwater
Engineering Control: Non-fundamental change (ESD)
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 003
Action Name: Explanation Of Significant Differences
Action Completion date: 07/29/2009
Operable Unit: 04
Contaminated Media : Soil
Engineering Control: Non-fundamental change (ESD)
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 06/27/2002
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Air Stripping
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 06/27/2002
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Carbon Adsorption
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 06/27/2002
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Extraction
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 06/27/2002
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 002
Action Name: RECORD OF DECISION
Action Completion date: 09/29/1997
Operable Unit: 02
Contaminated Media : Soil
Engineering Control: Carbon Adsorption
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 002
Action Name: RECORD OF DECISION
Action Completion date: 09/29/1997
Operable Unit: 02
Contaminated Media : Soil
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 002
Action Name: RECORD OF DECISION
Action Completion date: 09/29/1997
Operable Unit: 02
Contaminated Media : Soil
Engineering Control: Soil Vapor Extraction (in-situ)
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 003
Action Name: RECORD OF DECISION
Action Completion date: 07/12/2000
Operable Unit: 04
Contaminated Media : Groundwater
Engineering Control: Leachate Control
Contact Name: Not reported

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 003
Action Name: RECORD OF DECISION
Action Completion date: 07/12/2000
Operable Unit: 04
Contaminated Media : Groundwater
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 003
Action Name: RECORD OF DECISION
Action Completion date: 07/12/2000
Operable Unit: 04
Contaminated Media : Soil
Engineering Control: Cap
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 006
Action Name: RECORD OF DECISION
Action Completion date: 09/29/1997
Operable Unit: 06
Contaminated Media : Sediment
Engineering Control: No Action
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 006
Action Name: RECORD OF DECISION
Action Completion date: 09/29/1997
Operable Unit: 06
Contaminated Media : Soil
Engineering Control: No Action
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 006
Action Name: RECORD OF DECISION
Action Completion date: 09/29/1997
Operable Unit: 06
Contaminated Media : Surface Water
Engineering Control: No Action
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 007
Action Name: RECORD OF DECISION
Action Completion date: 06/06/2001
Operable Unit: 07

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Contaminated Media : Soil
Engineering Control: No Action
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 008
Action Name: RECORD OF DECISION
Action Completion date: 02/09/2012
Operable Unit: 08
Contaminated Media : Groundwater
Engineering Control: Bioremediation (In-Situ)
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 008
Action Name: RECORD OF DECISION
Action Completion date: 02/09/2012
Operable Unit: 08
Contaminated Media : Groundwater
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 008
Action Name: RECORD OF DECISION
Action Completion date: 02/09/2012
Operable Unit: 08
Contaminated Media : Groundwater
Engineering Control: Natural Attenuation
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 009
Action Name: RECORD OF DECISION
Action Completion date: 05/08/2007
Operable Unit: 03
Contaminated Media : Soil
Engineering Control: Disposal
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 009
Action Name: RECORD OF DECISION
Action Completion date: 05/08/2007
Operable Unit: 03
Contaminated Media : Soil
Engineering Control: Excavation
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 009

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Action Name: RECORD OF DECISION
Action Completion date: 05/08/2007
Operable Unit: 03
Contaminated Media : Soil
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 009
Action Name: RECORD OF DECISION
Action Completion date: 05/08/2007
Operable Unit: 03
Contaminated Media : Soil
Engineering Control: No Action
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 009
Action Name: RECORD OF DECISION
Action Completion date: 05/08/2007
Operable Unit: 03
Contaminated Media : Soil
Engineering Control: Sampling
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Groundwater
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Groundwater
Engineering Control: No Action
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Landfill Gas
Engineering Control: Active Gas Collection System
Contact Name: Not reported
Contact Phone and Ext: Not reported

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Event Code Description: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Landfill Gas
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Landfill Gas
Engineering Control: Passive Gas Collection System
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Soil
Engineering Control: Cap
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Soil
Engineering Control: No Action
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Solid Waste
Engineering Control: Cap
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Solid Waste

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Engineering Control: Consolidate
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Solid Waste
Engineering Control: Engineering Control, (N.O.S.)
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Solid Waste
Engineering Control: Operations & Maintenance (O&M)
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 011
Action Name: RECORD OF DECISION
Action Completion date: 08/16/2003
Operable Unit: 09
Contaminated Media : Groundwater
Engineering Control: Liquid Phase Carbon Adsorption
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 011
Action Name: RECORD OF DECISION
Action Completion date: 08/16/2003
Operable Unit: 09
Contaminated Media : Groundwater
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 011
Action Name: RECORD OF DECISION
Action Completion date: 08/16/2003
Operable Unit: 09
Contaminated Media : Groundwater
Engineering Control: Natural Attenuation
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 011
Action Name: RECORD OF DECISION

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Action Completion date: 08/16/2003
Operable Unit: 09
Contaminated Media : Soil
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 011
Action Name: RECORD OF DECISION
Action Completion date: 08/16/2003
Operable Unit: 09
Contaminated Media : Soil
Engineering Control: Surface Drainage Control
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 013
Action Name: RECORD OF DECISION
Action Completion date: 03/14/2006
Operable Unit: 02
Contaminated Media : Soil
Engineering Control: No Further Action
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Groundwater
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Landfill Gas
Engineering Control: Active Gas Collection System
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Landfill Gas
Engineering Control: Operations & Maintenance (O&M)
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Landfill Gas
Engineering Control: Passive Gas Collection System
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Soil
Engineering Control: Consolidate
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Soil
Engineering Control: Impermeable Barrier
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Soil
Engineering Control: Operations & Maintenance (O&M)
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Soil
Engineering Control: Slope Stabilization
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Solid Waste
Engineering Control: Consolidate
Contact Name: Not reported

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Solid Waste
Engineering Control: Dike/Berm
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Solid Waste
Engineering Control: Operations & Maintenance (O&M)
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Solid Waste
Engineering Control: Slope Stabilization
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

US INST CONTROL:
EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Covenant
Actual Date: 06/02/2002
Complet. Date: 06/27/2002
Operable Unit: 01
Contaminated Media : Groundwater
Contact Name : Not reported
Contact Phone and Ext : Not reported
Event Code Description: Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Institutional Controls, (N.O.S.)
Actual Date: 06/30/2000
Complet. Date: 07/12/2000
Operable Unit: 04
Contaminated Media : Groundwater
Contact Name : Not reported
Contact Phone and Ext : Not reported
Event Code Description: Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Land Use Restriction
Actual Date: 06/30/2000
Complet. Date: 07/12/2000
Operable Unit: 04
Contaminated Media : Soil
Contact Name : Not reported
Contact Phone and Ext : Not reported
Event Code Description: Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Access Restriction
Actual Date: 02/28/2012
Complet. Date: 02/09/2012
Operable Unit: 08
Contaminated Media : Groundwater
Contact Name : Not reported
Contact Phone and Ext : Not reported
Event Code Description: Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

County: ORANGE
Event Code: Not reported
Inst. Control: Groundwater use/well drilling regulation
Actual Date: 02/28/2012
Complet. Date: 02/09/2012
Operable Unit: 08
Contaminated Media : Groundwater
Contact Name : Not reported
Contact Phone and Ext : Not reported
Event Code Description: Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Institutional Controls, (N.O.S.)
Actual Date: 02/28/2012
Complet. Date: 02/09/2012
Operable Unit: 08
Contaminated Media : Groundwater
Contact Name : Not reported
Contact Phone and Ext : Not reported
Event Code Description: Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Building, demolition, or excavation regulation
Actual Date: 03/31/2008
Complet. Date: 03/06/2008
Operable Unit: 05
Contaminated Media : Soil
Contact Name : Not reported
Contact Phone and Ext : Not reported
Event Code Description: Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Deed Notices

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Actual Date: 03/31/2008
Complet. Date: 03/06/2008
Operable Unit: 05
Contaminated Media : Soil
Contact Name : Not reported
Contact Phone and Ext : Not reported
Event Code Description: Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Zoning regulation
Actual Date: 03/31/2008
Complet. Date: 03/06/2008
Operable Unit: 05
Contaminated Media : Soil
Contact Name : Not reported
Contact Phone and Ext : Not reported
Event Code Description: Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Building, demolition, or excavation regulation
Actual Date: 03/31/2008
Complet. Date: 03/06/2008
Operable Unit: 05
Contaminated Media : Solid Waste
Contact Name : Not reported
Contact Phone and Ext : Not reported
Event Code Description: Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Zoning regulation
Actual Date: 03/31/2008
Complet. Date: 03/06/2008
Operable Unit: 05

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Contaminated Media : Solid Waste
Contact Name : Not reported
Contact Phone and Ext : Not reported
Event Code Description: Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Covenant
Actual Date: 09/30/2010
Complet. Date: 08/09/2010
Operable Unit: 05
Contaminated Media : Soil
Contact Name : Not reported
Contact Phone and Ext : Not reported
Event Code Description: Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Covenant
Actual Date: 09/30/2010
Complet. Date: 08/09/2010
Operable Unit: 05
Contaminated Media : Solid Waste
Contact Name : Not reported
Contact Phone and Ext : Not reported
Event Code Description: Not reported

ROD:
Full-text of USEPA Record of Decision(s) is available from EDR.

PRP:
PRP name: NAVAL FACILITIES ENGINEERING COMMAND
STATE OF CALIFORNIA/DEPT. OF HEALTH SERVICES
STATE OF CALIFORNIA/DEPT. OF HEALTH SERVICES
STATE OF CALIFORNIA/DEPT. OF WATER QUALITY
STATE OF CALIFORNIA/DEPT. OF WATER QUALITY
USM CORP.
USM CORP.

B5 **RANCHO PARKWAY SHELL #07** **UST** **U004051193**
NNE **26721 RANCHO PKWY** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.037 mi.
195 ft. **Site 1 of 3 in cluster B**

Relative: UST:
Lower
Facility ID: Not reported
Actual: Permitting Agency: Orange County Environmental Health
732 ft. Latitude: 33.67311
Longitude: -117.66584

ORANGE CO. UST:
Facility ID: FA0024028

B6 **RANCHO PARKWAY SHELL** **EDR Hist Auto** **1021827143**
NNE **26721 RANCHO PKWY** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.045 mi.
235 ft. **Site 2 of 3 in cluster B**

Relative: EDR Hist Auto
Lower

Actual:
731 ft.

Year:	Name:	Type:
2001	RANCHO PARKWAY SHELL	Gasoline Service Stations
2002	RANCHO PARKWAY SHELL	Gasoline Service Stations
2003	RANCHO PARKWAY SHELL	Gasoline Service Stations
2004	RANCHO PARKWAY SHELL	Gasoline Service Stations
2005	RANCHO PARKWAY SHELL	Gasoline Service Stations
2006	RANCHO PARKWAY SHELL	Gasoline Service Stations
2007	RANCHO PARKWAY SHELL	Gasoline Service Stations
2008	RANCHO PARKWAY SHELL	Gasoline Service Stations
2009	RANCHO PARKWAY SHELL	Gasoline Service Stations
2010	RANCHO PARKWAY SHELL	Gasoline Service Stations
2011	RANCHO PARKWAY SHELL	Gasoline Service Stations
2012	RANCHO PARKWAY SHELL	Gasoline Service Stations
2013	RANCHO PARKWAY SHELL	Gasoline Service Stations
2014	RANCHO PARKWAY SHELL	Gasoline Service Stations

B7 **VALVOLINE INSTANT OIL CHANGE GN0049** **AST** **A100425780**
NNE **26731 RANCHO PKWY** **N/A**
< 1/8 **LAKE FORREST, CA 92630**
0.046 mi.
244 ft. **Site 3 of 3 in cluster B**

Relative: AST:
Lower
Certified Unified Program Agencies: Not reported
Actual: Owner: Henley Pacific LA LLC
730 ft. Total Gallons: Not reported
CERSID: 10160713
Facility ID: FA0059948
Business Name: Henley Pacific LA LLC dba Valvoline Instant Oil
Phone: 949-465-9912
Fax: Not reported
Mailing Address: 17802 Sky Park Circle Ste 104
Mailing Address City: Irvine
Mailing Address State: CA
Mailing Address Zip Code: Not reported

VALVOLINE INSTANT OIL CHANGE GN0049 (Continued) **A100425780**

Operator Name:	Henley Pacific LA LLC
Operator Phone:	617-243-0404
Owner Phone:	617-243-0404
Owner Mail Address:	54 Jaconnet Street, Suite 100
Owner State:	MA
Owner Zip Code:	2461
Owner Country:	United States
Property Owner Name:	1995 Robert and Francs Thorp Revocable Trust
Property Owner Phone:	Not reported
Property Owner Mailing Address:	P.O. Box 848
Property Owner City:	Greenfield
Property Owner Stat :	CA
Property Owner Zip Code:	93927
Property Owner Country:	United States
EPAID:	CAL000370627

8
South
< 1/8
0.049 mi.
259 ft.

WESTERN DIGITAL CORP
20511 LAKE FOREST DR
LAKE FOREST, CA 92630

RCRA-SQG **1004676765**
FINDS **CAR000089235**
ECHO
HAZNET

Relative:
Lower

Actual:
692 ft.

RCRA-SQG:

Date form received by agency:	03/06/2013
Facility name:	ALCON RESEARCH LTD
Facility address:	20511 LAKE FOREST DR LAKE FOREST, CA 92630
EPA ID:	CAR000089235
Mailing address:	15800 ALTON PKWY IRVINE, CA 92618
Contact:	ERIC QUACH
Contact address:	15800 ALTON PKWY IRVINE, CA 92618
Contact country:	US
Contact telephone:	949-453-7824
Contact email:	ERIC.QUACH@ALCON.COM
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	THE REALTY ASSOCIATES FUND VI
Owner/operator address:	23046 AVENIDA DE LA CARLOTA STE 150 LAGUNA HILLS, CA 92653
Owner/operator country:	US
Owner/operator telephone:	949-752-2066
Owner/operator email:	Not reported
Owner/operator fax:	Not reported
Owner/operator extension:	Not reported
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	08/01/2002
Owner/Op end date:	Not reported

WESTERN DIGITAL CORP (Continued) **1004676765**

Owner/operator name: ALCON RESEARCH LTD
Owner/operator address: Not reported
Not reported
Owner/operator country: US
Owner/operator telephone: Not reported
Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: 01/01/2012
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

. Waste code: 214
. Waste name: Unspecified solvent mixture

. Waste code: 221
. Waste name: Waste oil and mixed oil

. Waste code: 331
. Waste name: Off-specification, aged, or surplus organics

. Waste code: 343
. Waste name: Unspecified organic liquid mixture

. Waste code: 352
. Waste name: Other organic solids

. Waste code: 551
. Waste name: Laboratory waste chemicals

. Waste code: D001
. Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.

WESTERN DIGITAL CORP (Continued) **1004676765**

. Waste code: D002
. Waste name: A WASTE WHICH HAS A PH OF LESS THAN 2 OR GREATER THAN 12.5 IS CONSIDERED TO BE A CORROSIVE HAZARDOUS WASTE. SODIUM HYDROXIDE, A CAUSTIC SOLUTION WITH A HIGH PH, IS OFTEN USED BY INDUSTRIES TO CLEAN OR DEGREASE PARTS. HYDROCHLORIC ACID, A SOLUTION WITH A LOW PH, IS USED BY MANY INDUSTRIES TO CLEAN METAL PARTS PRIOR TO PAINTING. WHEN THESE CAUSTIC OR ACID SOLUTIONS BECOME CONTAMINATED AND MUST BE DISPOSED, THE WASTE WOULD BE A CORROSIVE HAZARDOUS WASTE.

. Waste code: F003
. Waste name: THE FOLLOWING SPENT NON-HALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NON-HALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NON-HALOGENATED SOLVENTS, AND, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005, AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: U080
. Waste name: METHANE, DICHLORO-

. Waste code: U122
. Waste name: FORMALDEHYDE

Historical Generators:
Date form received by agency: 01/02/2001
Site name: WESTERN DIGITAL CORP
Classification: Small Quantity Generator

. Waste code: D000
. Waste name: Not Defined

. Waste code: D001
. Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.

. Waste code: D002
. Waste name: A WASTE WHICH HAS A PH OF LESS THAN 2 OR GREATER THAN 12.5 IS CONSIDERED TO BE A CORROSIVE HAZARDOUS WASTE. SODIUM HYDROXIDE, A CAUSTIC SOLUTION WITH A HIGH PH, IS OFTEN USED BY INDUSTRIES TO CLEAN OR DEGREASE PARTS. HYDROCHLORIC ACID, A SOLUTION WITH A LOW PH, IS USED BY MANY INDUSTRIES TO CLEAN METAL PARTS PRIOR TO PAINTING. WHEN THESE CAUSTIC OR ACID SOLUTIONS BECOME CONTAMINATED AND MUST BE DISPOSED, THE WASTE WOULD BE A CORROSIVE HAZARDOUS WASTE.

. Waste code: D006
. Waste name: CADMIUM

. Waste code: D008

WESTERN DIGITAL CORP (Continued) **1004676765**

. Waste name: LEAD

. Waste code: D009
. Waste name: MERCURY

. Waste code: F005
. Waste name: THE FOLLOWING SPENT NON-HALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NON-HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Violation Status: No violations found

FINDS:

Registry ID: 110012221764

Environmental Interest/Information System

California Hazardous Waste Tracking System - Datamart (HWTS-DATAMART) provides California with information on hazardous waste shipments for generators, transporters, and treatment, storage, and disposal facilities.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1004676765
Registry ID:	110012221764
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110012221764

HAZNET:

envid:	1004676765
Year:	2016
GEPAID:	CAR000089235
Contact:	JOEL AZPURU
Telephone:	9495056793
Mailing Name:	Not reported
Mailing Address:	20411 LAKE FOREST DRIVE, M/S 215A
Mailing City,St,Zip:	LAKE FOREST, CA 92630
Gen County:	Orange
TSD EPA ID:	CAD008302903
TSD County:	Los Angeles
Waste Category:	Laboratory waste chemicals
Disposal Method:	Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)

WESTERN DIGITAL CORP (Continued) **1004676765**

Tons: 0.005
Cat Decode: Laboratory waste chemicals
Method Decode: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Facility County: Orange

envid: 1004676765
Year: 2016
GEPAID: CAR000089235
Contact: JOEL AZPURU
Telephone: 9495056793
Mailing Name: Not reported
Mailing Address: 20411 LAKE FOREST DRIVE, M/S 215A
Mailing City,St,Zip: LAKE FOREST, CA 92630
Gen County: Orange
TSD EPA ID: CAD008302903
TSD County: Los Angeles
Waste Category: Waste oil and mixed oil
Disposal Method: Fuel Blending Prior To Energy Recovery At Another Site
Tons: 0.02
Cat Decode: Waste oil and mixed oil
Method Decode: Fuel Blending Prior To Energy Recovery At Another Site
Facility County: Orange

envid: 1004676765
Year: 2016
GEPAID: CAR000089235
Contact: JOEL AZPURU
Telephone: 9495056793
Mailing Name: Not reported
Mailing Address: 20411 LAKE FOREST DRIVE, M/S 215A
Mailing City,St,Zip: LAKE FOREST, CA 92630
Gen County: Orange
TSD EPA ID: CAD008302903
TSD County: Los Angeles
Waste Category: Off-specification, aged or surplus organics
Disposal Method: Fuel Blending Prior To Energy Recovery At Another Site
Tons: 0.35
Cat Decode: Off-specification, aged or surplus organics
Method Decode: Fuel Blending Prior To Energy Recovery At Another Site
Facility County: Orange

envid: 1004676765
Year: 2016
GEPAID: CAR000089235
Contact: JOEL AZPURU
Telephone: 9495056793
Mailing Name: Not reported
Mailing Address: 20411 LAKE FOREST DRIVE, M/S 215A
Mailing City,St,Zip: LAKE FOREST, CA 92630
Gen County: Orange
TSD EPA ID: CAD008302903
TSD County: Los Angeles
Waste Category: Other inorganic solid waste
Disposal Method: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Tons: 0.0005

WESTERN DIGITAL CORP (Continued) **1004676765**

Cat Decode:	Other inorganic solid waste
Method Decode:	Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Facility County:	Orange
envid:	1004676765
Year:	2016
GEPAID:	CAR000089235
Contact:	JOEL AZPURU
Telephone:	9495056793
Mailing Name:	Not reported
Mailing Address:	20411 LAKE FOREST DRIVE, M/S 215A
Mailing City,St,Zip:	LAKE FOREST, CA 92630
Gen County:	Orange
TSD EPA ID:	CAD008302903
TSD County:	Los Angeles
Waste Category:	Alkaline solution without metals pH >= 12.5
Disposal Method:	Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Tons:	0.135
Cat Decode:	Alkaline solution without metals pH >= 12.5
Method Decode:	Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Facility County:	Orange

Click this hyperlink while viewing on your computer to access
82 additional CA_HAZNET: record(s) in the EDR Site Report.

---

9 **THE HOME DEPOT** **RCRA-SQG** **1004675991**
ENE **20021 LAKE FOREST DR** **FINDS** **CAR000079657**
< 1/8 **LAKE FOREST, CA 92630** **ECHO**
0.084 mi.
444 ft.

Relative:
Higher

Actual:
740 ft.

RCRA-SQG:

Date form received by agency:	06/22/2005
Facility name:	HOME DEPOT USA INC HD 6668
Facility address:	20021 LAKE FOREST DR LAKE FOREST, CA 92630
EPA ID:	CAR000079657
Mailing address:	1905 ASTON AVE STE 100 CARLSBAD, CA 92008
Contact:	ROBERT PERKINS
Contact address:	1905 ASTON AVE STE 100 CARLSBAD, CA 92008
Contact country:	US
Contact telephone:	760-602-8700
Contact email:	RPERKINS@3ECOMPANY.COM
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

THE HOME DEPOT (Continued) **1004675991**

Owner/Operator Summary:

Owner/operator name:	HOME DEPOT USA
Owner/operator address:	Not reported
	Not reported
Owner/operator country:	US
Owner/operator telephone:	Not reported
Owner/operator email:	Not reported
Owner/operator fax:	Not reported
Owner/operator extension:	Not reported
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	06/01/2000
Owner/Op end date:	Not reported

Owner/operator name:	HOME DEPOT USA
Owner/operator address:	2455 PACES FERRY RD
	ATLANTA, GA 30339
Owner/operator country:	US
Owner/operator telephone:	Not reported
Owner/operator email:	Not reported
Owner/operator fax:	Not reported
Owner/operator extension:	Not reported
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	06/01/2000
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No

. Waste code:	D001
. Waste name:	IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.

. Waste code:	D002
. Waste name:	A WASTE WHICH HAS A PH OF LESS THAN 2 OR GREATER THAN 12.5 IS CONSIDERED TO BE A CORROSIVE HAZARDOUS WASTE. SODIUM HYDROXIDE, A

THE HOME DEPOT (Continued) **1004675991**

CAUSTIC SOLUTION WITH A HIGH PH, IS OFTEN USED BY INDUSTRIES TO CLEAN OR DEGREASE PARTS. HYDROCHLORIC ACID, A SOLUTION WITH A LOW PH, IS USED BY MANY INDUSTRIES TO CLEAN METAL PARTS PRIOR TO PAINTING. WHEN THESE CAUSTIC OR ACID SOLUTIONS BECOME CONTAMINATED AND MUST BE DISPOSED, THE WASTE WOULD BE A CORROSIVE HAZARDOUS WASTE.

. Waste code: D009
. Waste name: MERCURY

. Waste code: D016
. Waste name: 2,4-D

. Waste code: D018
. Waste name: BENZENE

. Waste code: D035
. Waste name: METHYL ETHYL KETONE

. Waste code: F003
. Waste name: THE FOLLOWING SPENT NON-HALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NON-HALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NON-HALOGENATED SOLVENTS, AND, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005, AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: F005
. Waste name: THE FOLLOWING SPENT NON-HALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NON-HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Historical Generators:
Date form received by agency: 08/01/2000
Site name: THE HOME DEPOT
Classification: Small Quantity Generator

. Waste code: D001
. Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.

. Waste code: D002
. Waste name: A WASTE WHICH HAS A PH OF LESS THAN 2 OR GREATER THAN 12.5 IS CONSIDERED TO BE A CORROSIVE HAZARDOUS WASTE. SODIUM HYDROXIDE, A CAUSTIC SOLUTION WITH A HIGH PH, IS OFTEN USED BY INDUSTRIES TO CLEAN

THE HOME DEPOT (Continued) **1004675991**

OR DEGREASE PARTS. HYDROCHLORIC ACID, A SOLUTION WITH A LOW PH, IS USED BY MANY INDUSTRIES TO CLEAN METAL PARTS PRIOR TO PAINTING. WHEN THESE CAUSTIC OR ACID SOLUTIONS BECOME CONTAMINATED AND MUST BE DISPOSED, THE WASTE WOULD BE A CORROSIVE HAZARDOUS WASTE.

Violation Status: No violations found

FINDS:

Registry ID: 110002941416

Environmental Interest/Information System

California Hazardous Waste Tracking System - Datamart (HWTS-DATAMART) provides California with information on hazardous waste shipments for generators, transporters, and treatment, storage, and disposal facilities.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid: 1004675991
Registry ID: 110002941416
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110002941416

---

10 South < 1/8 0.093 mi. 492 ft.

AA SOUTH COUNTY TOWING INC
20622 PASCAL WAY STE B
LAKE FOREST, CA 92630

EDR Hist Auto **1020252362 N/A**

Relative: Lower

Actual: 677 ft.

EDR Hist Auto

Year:	Name:	Type:
1992	L & M AUTOMOTIVE	General Automotive Repair Shops
1993	L & M AUTOMOTIVE	General Automotive Repair Shops
1993	ALICIA COMPLETE AUTOMOTIVE	General Automotive Repair Shops
1994	L & M AUTOMOTIVE	General Automotive Repair Shops
1994	ALICIA COMPLETE AUTOMOTIVE	General Automotive Repair Shops
1995	ALICIA COMPLETE AUTOMOTIVE	General Automotive Repair Shops
1995	L & M AUTOMOTIVE	General Automotive Repair Shops
1995	MOTRA TRANSMISSION CENTER	Automotive Transmission Repair Shops
1996	ALICIA COMPLETE AUTOMOTIVE	General Automotive Repair Shops
1996	L & M AUTOMOTIVE	General Automotive Repair Shops
1997	MOTRA TRANSMISSION CENTER	Automotive Transmission Repair Shops
1997	MILLERS WHEEL ALIGNMENT 2	Automotive Repair Shops, NEC
1998	MILLERS WHEEL ALIGNMENT 2	Automotive Repair Shops, NEC
1999	MILLERS WHEEL ALIGNMENT 2	Automotive Repair Shops, NEC

AA SOUTH COUNTY TOWING INC (Continued) **1020252362**

1999	RYAN MIKE	Automotive Transmission Repair Shops
2000	IOLAR ENTERPRISES INC	Automotive Transmission Repair Shops
2000	HERGESHEIMER MOTORSPORTS	General Automotive Repair Shops
2001	HERGESHEIMER MOTORSPORTS	General Automotive Repair Shops
2001	IOLAR ENTERPRISES INC	Automotive Transmission Repair Shops
2001	BARNHOORN SKILES MERCEDES SVCS	General Automotive Repair Shops
2002	HERGESHEIMER MOTORSPORTS	General Automotive Repair Shops
2002	IOLAR ENTERPRISES INC	Automotive Transmission Repair Shops
2002	BARNHOORN SKILES MERCEDES SVCS	General Automotive Repair Shops
2003	IOLAR ENTERPRISES INC	Automotive Transmission Repair Shops
2003	BARNHOORN SKILES MERCEDES SVCS	General Automotive Repair Shops
2004	BARNHORN SKLES MRCDES SVCS LLP	General Automotive Repair Shops
2004	IOLAR ENTERPRISES INC	Automotive Transmission Repair Shops
2005	IOLAR ENTERPRISES INC	Automotive Transmission Repair Shops
2005	BARNHORN SKLES MRCDES SVCS LLP	General Automotive Repair Shops
2006	IOLAR ENTERPRISES INC	Automotive Transmission Repair Shops
2006	CARDINAL AUTO CARE XII	General Automotive Repair Shops
2006	BARNHORN SKLES MRCDES SVCS LLP	General Automotive Repair Shops
2007	CARDINAL AUTO CARE XII	General Automotive Repair Shops
2007	L & M AUTOMOTIVE INC	General Automotive Repair Shops
2009	L & M AUTOMOTIVE INC	General Automotive Repair Shops
2010	L & M AUTOMOTIVE INC	General Automotive Repair Shops
2010	CORNER 3 CORP	General Automotive Repair Shops
2010	CARDINAL AUTO CARE XII	General Automotive Repair Shops
2011	CORNER 3 CORP	General Automotive Repair Shops
2011	L & M AUTOMOTIVE INC	General Automotive Repair Shops
2011	CARDINAL AUTO CARE XII	General Automotive Repair Shops
2012	CORNER 3 CORP	General Automotive Repair Shops
2012	CARDINAL AUTO CARE XII	General Automotive Repair Shops
2012	L & M AUTOMOTIVE INC	General Automotive Repair Shops
2013	L & M AUTOMOTIVE INC	General Automotive Repair Shops
2013	CARDINAL AUTO CARE XII	General Automotive Repair Shops
2014	CARDINAL AUTO CARE XII	General Automotive Repair Shops
2014	L & M AUTOMOTIVE INC	General Automotive Repair Shops

C11 **BEACON BAY FOOTHILL** **UST** **U003879615**
South **20602 LAKE FOREST DR** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.107 mi.
565 ft. **Site 1 of 9 in cluster C**

Relative: UST:
Lower
Facility ID: 19793
Actual: Permitting Agency: ORANGE COUNTY
699 ft. Latitude: 33.664311
Longitude: -117.665085

C12
South
< 1/8
0.107 mi.
565 ft.

CAR WASH EXPRESS
20602 LAKE FOREST DR
EL TORO, CA 92630

Site 2 of 9 in cluster C

SWEEPS UST
CA FID UST

S101589521
N/A

Relative:
Lower

Actual:
699 ft.

SWEEPS UST:

Status:	Not reported
Comp Number:	12655
Number:	Not reported
Board Of Equalization:	Not reported
Referral Date:	Not reported
Action Date:	Not reported
Created Date:	Not reported
Owner Tank Id:	Not reported
SWRCB Tank Id:	30-000-012655-000001
Tank Status:	Not reported
Capacity:	10000
Active Date:	Not reported
Tank Use:	UNKNOWN
STG:	PRODUCT
Content:	Not reported
Number Of Tanks:	2

Status:	Not reported
Comp Number:	12655
Number:	Not reported
Board Of Equalization:	Not reported
Referral Date:	Not reported
Action Date:	Not reported
Created Date:	Not reported
Owner Tank Id:	Not reported
SWRCB Tank Id:	30-000-012655-000002
Tank Status:	Not reported
Capacity:	10000
Active Date:	Not reported
Tank Use:	UNKNOWN
STG:	PRODUCT
Content:	Not reported
Number Of Tanks:	Not reported

CA FID UST:

Facility ID:	30017393
Regulated By:	UTNKI
Regulated ID:	Not reported
Cortese Code:	Not reported
SIC Code:	Not reported
Facility Phone:	Not reported
Mail To:	Not reported
Mailing Address:	Not reported
Mailing Address 2:	Not reported
Mailing City,St,Zip:	EL TORO 92630
Contact:	Not reported
Contact Phone:	Not reported
DUNs Number:	Not reported
NPDES Number:	Not reported
EPA ID:	Not reported
Comments:	Not reported
Status:	Inactive

C13 **BEACON BAY CAR WASH** **LUST** **S105774228**
South **20602 LAKE FOREST** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.107 mi.
565 ft. **Site 3 of 9 in cluster C**

Relative:
Lower

Actual:
699 ft.

LUST:

Lead Agency:	ORANGE COUNTY LOP
Case Type:	LUST Cleanup Site
Geo Track:	http://geotracker.waterboards.ca.gov/profile_report.asp?global_id=T0605999998
Global Id:	T0605999998
Latitude:	33.663041
Longitude:	-117.666454
Status:	Completed - Case Closed
Status Date:	09/12/2002
Case Worker:	KL
RB Case Number:	083003899T
Local Agency:	ORANGE COUNTY LOP
File Location:	Local Agency
Local Case Number:	02UT003
Potential Media Affect:	Under Investigation
Potential Contaminants of Concern:	Gasoline
Site History:	Not reported

LUST:

Global Id:	T0605999998
Contact Type:	Local Agency Caseworker
Contact Name:	JAMES STROZIER
Organization Name:	ORANGE COUNTY LOP
Address:	1241 E. DYER ROAD SUITE 120
City:	SANTA ANA
Email:	jstrozier@ochca.com
Phone Number:	7144336273

Global Id:	T0605999998
Contact Type:	Local Agency Caseworker
Contact Name:	KEVIN LAMBERT
Organization Name:	ORANGE COUNTY LOP
Address:	1241 E DYER ROAD SUITE 120
City:	SANTA ANA
Email:	klambert@ochca.com
Phone Number:	7144336261

Global Id:	T0605999998
Contact Type:	Regional Board Caseworker
Contact Name:	NANCY OLSON-MARTIN
Organization Name:	SANTA ANA RWQCB (REGION 8)
Address:	3737 MAIN STREET, SUITE 500
City:	RIVERSIDE
Email:	nolson-martin@waterboards.ca.gov
Phone Number:	Not reported

LUST:

Global Id:	T0605999998
Action Type:	ENFORCEMENT
Date:	09/12/2002
Action:	Closure/No Further Action Letter

BEACON BAY CAR WASH (Continued) **S105774228**

LUST:
Global Id: T0605999998
Status: Completed - Case Closed
Status Date: 09/12/2002

Global Id: T0605999998
Status: Open - Case Begin Date
Status Date: 09/12/2002

ORANGE CO. LUST:
Region: ORANGE
Facility Id: 02UT003
Released Substance: Gasoline-Automotive (motor gasoline and additives), leaded & unleaded
Date Closed: 09/12/2002
Record ID: RO0003032

LUST REG 8:

Region:	8
County:	Orange
Regional Board:	Santa Ana Region
Facility Status:	Case Closed
Case Number:	083003899T
Local Case Num:	02UT003
Case Type:	Undefined
Substance:	Gasoline
Qty Leaked:	0
Abate Method:	Not reported
Cross Street:	Not reported
Enf Type:	Not reported
Funding:	Not reported
How Discovered:	Tank Closure
How Stopped:	Close Tank
Leak Cause:	Unknown
Leak Source:	Unknown
Global ID:	T0605999998
How Stopped Date:	9/9/9999
Enter Date:	Not reported
Date Confirmation of Leak Began:	Not reported
Date Preliminary Assessment Began:	Not reported
Discover Date:	1/1/1965
Enforcement Date:	Not reported
Close Date:	9/12/2002
Date Prelim Assessment Workplan Submitted:	Not reported
Date Pollution Characterization Began:	Not reported
Date Remediation Plan Submitted:	Not reported
Date Remedial Action Underway:	Not reported
Date Post Remedial Action Monitoring:	Not reported
Enter Date:	Not reported
GW Qualifies:	Not reported
Soil Qualifies:	Not reported
Operator:	Not reported
Facility Contact:	Not reported
Interim:	Not reported
Oversite Program:	LUST
Latitude:	33.662755

BEACON BAY CAR WASH (Continued) **S105774228**

Longitude:	-117.667306
MTBE Date:	Not reported
Max MTBE GW:	Not reported
MTBE Concentration:	0
Max MTBE Soil:	Not reported
MTBE Fuel:	1
MTBE Tested:	Site NOT Tested for MTBE.Includes Unknown and Not Analyzed.
MTBE Class:	*
Staff:	NOM
Staff Initials:	JS
Lead Agency:	Local Agency
Local Agency:	30000L
Hydr Basin #:	Not reported
Beneficial:	MUN
Priority:	Not reported
Cleanup Fund Id:	Not reported
Work Suspended:	Not reported

Summary: Not reported

C14 **ARCO AM/PM** **LUST S105774214**
SSE **20572 LAKE FOREST DR** **SWEEPS UST N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.112 mi.
589 ft. **Site 4 of 9 in cluster C**

Relative: **Lower**

Actual: **700 ft.**

LUST REG 8:

Region:	8
County:	Orange
Regional Board:	Santa Ana Region
Facility Status:	Case Closed
Case Number:	Not reported
Local Case Num:	02UT008
Case Type:	Soil only
Substance:	Gasoline
Qty Leaked:	0
Abate Method:	Not reported
Cross Street:	Not reported
Enf Type:	CLOS
Funding:	Not reported
How Discovered:	UM
How Stopped:	Other Means
Leak Cause:	Unknown
Leak Source:	Piping
Global ID:	T0605947685
How Stopped Date:	9/9/9999
Enter Date:	Not reported
Date Confirmation of Leak Began:	Not reported
Date Preliminary Assessment Began:	2/26/2002
Discover Date:	2/26/2002
Enforcement Date:	Not reported
Close Date:	5/16/2003
Date Prelim Assessment Workplan Submitted:	Not reported
Date Pollution Characterization Began:	Not reported
Date Remediation Plan Submitted:	Not reported
Date Remedial Action Underway:	Not reported
Date Post Remedial Action Monitoring:	Not reported
Enter Date:	Not reported
GW Qualifies:	Not reported

ARCO AM/PM (Continued) **S105774214**

Soil Qualifies:	Not reported
Operator:	Not reported
Facility Contact:	Not reported
Interim:	Not reported
Oversite Program:	LUST
Latitude:	0
Longitude:	0
MTBE Date:	Not reported
Max MTBE GW:	Not reported
MTBE Concentration:	0
Max MTBE Soil:	Not reported
MTBE Fuel:	1
MTBE Tested:	Site NOT Tested for MTBE.Includes Unknown and Not Analyzed.
MTBE Class:	*
Staff:	VJJ
Staff Initials:	JS
Lead Agency:	Local Agency
Local Agency:	30000L
Hydr Basin #:	Not reported
Beneficial:	MUN
Priority:	Not reported
Cleanup Fund Id:	Not reported
Work Suspended:	Not reported

Summary: Not reported

SWEEPS UST:

Status:	Active
Comp Number:	12020
Number:	9
Board Of Equalization:	Not reported
Referral Date:	09-30-92
Action Date:	09-15-92
Created Date:	02-29-88
Owner Tank Id:	Not reported
SWRCB Tank Id:	30-000-012020-000001
Tank Status:	A
Capacity:	10000
Active Date:	Not reported
Tank Use:	M.V. FUEL
STG:	P
Content:	LEADED
Number Of Tanks:	4

Status:	Active
Comp Number:	12020
Number:	9
Board Of Equalization:	Not reported
Referral Date:	09-30-92
Action Date:	09-15-92
Created Date:	02-29-88
Owner Tank Id:	Not reported
SWRCB Tank Id:	30-000-012020-000002
Tank Status:	A
Capacity:	10000
Active Date:	Not reported
Tank Use:	M.V. FUEL
STG:	P

ARCO AM/PM (Continued) **S105774214**

Content:	DIESEL
Number Of Tanks:	Not reported
Status:	Active
Comp Number:	12020
Number:	9
Board Of Equalization:	Not reported
Referral Date:	09-30-92
Action Date:	09-15-92
Created Date:	02-29-88
Owner Tank Id:	Not reported
SWRCB Tank Id:	30-000-012020-000003
Tank Status:	A
Capacity:	10000
Active Date:	Not reported
Tank Use:	M.V. FUEL
STG:	P
Content:	REG UNLEADED
Number Of Tanks:	Not reported
Status:	Active
Comp Number:	12020
Number:	9
Board Of Equalization:	Not reported
Referral Date:	09-30-92
Action Date:	09-15-92
Created Date:	02-29-88
Owner Tank Id:	Not reported
SWRCB Tank Id:	30-000-012020-000004
Tank Status:	A
Capacity:	10000
Active Date:	Not reported
Tank Use:	M.V. FUEL
STG:	P
Content:	REG UNLEADED
Number Of Tanks:	Not reported

C15 **ARCO** **LUST** **U003937792**
SSE **20572 LAKE FOREST** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.112 mi.
589 ft. **Site 5 of 9 in cluster C**

Relative: LUST:
Lower

Actual:
700 ft.

Lead Agency:	ORANGE COUNTY LOP
Case Type:	LUST Cleanup Site
Geo Track:	http://geotracker.waterboards.ca.gov/profile_report.asp?global_id=T0605947685
Global Id:	T0605947685
Latitude:	33.663244
Longitude:	-117.665983
Status:	Completed - Case Closed
Status Date:	05/16/2003
Case Worker:	KL
RB Case Number:	Not reported
Local Agency:	ORANGE COUNTY LOP
File Location:	Local Agency Warehouse
Local Case Number:	02UT008
Potential Media Affect:	Soil

ARCO (Continued) **U003937792**

Potential Contaminants of Concern: Gasoline
Site History: Not reported

LUST:
Global Id: T0605947685
Contact Type: Local Agency Caseworker
Contact Name: JAMES STROZIER
Organization Name: ORANGE COUNTY LOP
Address: 1241 E. DYER ROAD SUITE 120
City: SANTA ANA
Email: jstrozier@ochca.com
Phone Number: 7144336273

Global Id: T0605947685
Contact Type: Local Agency Caseworker
Contact Name: KEVIN LAMBERT
Organization Name: ORANGE COUNTY LOP
Address: 1241 E DYER ROAD SUITE 120
City: SANTA ANA
Email: klambert@ochca.com
Phone Number: 7144336261

Global Id: T0605947685
Contact Type: Regional Board Caseworker
Contact Name: VALERIE JAHN-BULL
Organization Name: SANTA ANA RWQCB (REGION 8)
Address: 3737 MAIN STREET, SUITE 500
City: RIVERSIDE
Email: valerie.jahn-bull@waterboards.ca.gov
Phone Number: 9517824903

LUST:
Global Id: T0605947685
Action Type: ENFORCEMENT
Date: 05/16/2003
Action: Closure/No Further Action Letter

Global Id: T0605947685
Action Type: Other
Date: 02/26/2002
Action: Leak Discovery

Global Id: T0605947685
Action Type: Other
Date: 03/04/2002
Action: Leak Reported

Global Id: T0605947685
Action Type: REMEDIATION
Date: 07/30/2002
Action: Not reported

LUST:
Global Id: T0605947685
Status: Open - Case Begin Date
Status Date: 02/26/2002

ARCO (Continued) **U003937792**

Global Id: T0605947685
Status: Open - Site Assessment
Status Date: 02/26/2002

Global Id: T0605947685
Status: Completed - Case Closed
Status Date: 05/16/2003

ORANGE CO. LUST:
Region: ORANGE
Facility Id: 02UT008
Released Substance: Gasoline-Automotive (motor gasoline and additives), leaded & unleaded
Date Closed: 05/16/2003
Record ID: RO0003049

C16 **ECONO LUBE N TUNE** **RCRA-SQG** **1000595001**
SSE **20572 LAKE FOREST DR** **FINDS** **CAD983588914**
< 1/8 **EL TORO, CA 92630** **ECHO**
0.112 mi.
589 ft. **Site 6 of 9 in cluster C**

Relative: **Lower**

Actual: **700 ft.**

RCRA-SQG:
Date form received by agency: 07/11/1991
Facility name: ECONO LUBE N TUNE
Facility address: 20572 LAKE FOREST DR
EL TORO, CA 92630
EPA ID: CAD983588914
Contact: TABATABI AL
Contact address: 20572 LAKE FOREST DR
EL TORO, CA 92630
Contact country: US
Contact telephone: 714-457-0370
Contact email: Not reported
EPA Region: 09
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: AL TABATABI
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: 415-555-1212
Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: NOT REQUIRED

ECONO LUBE N TUNE (Continued) **1000595001**

Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: 415-555-1212
Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Violation Status: No violations found

FINDS:

Registry ID: 110002848982

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1000595001
Registry ID: 110002848982
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110002848982

C17 **GRAB N GO 24/7** **UST** **U004200589**
SSE **20572 LAKE FOREST DR** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.112 mi.
589 ft. **Site 7 of 9 in cluster C**

Relative: ORANGE CO. UST:
Lower Facility ID: FA0024654

Actual:
700 ft.

C18 **LAKE FOREST ARCO** **UST** **U003913409**
SSE **20572 LAKE FOREST DR** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.112 mi.
589 ft. **Site 8 of 9 in cluster C**

Relative: UST:
Lower
Facility ID: 12020
Actual: Permitting Agency: ORANGE COUNTY
700 ft. Latitude: 33.664849
Longitude: -117.664751

Facility ID: Not reported
Permitting Agency: Orange County Environmental Health
Latitude: 33.6635
Longitude: -117.66608

D19 **FOOTHILL CLEANERS** **EDR Hist Cleaner** **1018584487**
South **20651 LAKE FOREST DR A111** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.114 mi.
601 ft. **Site 1 of 5 in cluster D**

Relative: EDR Hist Cleaner
Lower

Actual:
726 ft.

Year:	Name:	Type:
1995	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
1996	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
1997	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
1998	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
1999	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2000	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2001	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2002	FOOTHILL CLEANERS	Drycleaning Plants, Except Rugs, NEC
2002	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2003	FOOTHILL CLEANERS	Drycleaning Plants, Except Rugs, NEC
2003	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2004	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2005	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2006	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2007	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2008	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2009	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2010	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2011	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2012	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2013	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents

D20 **COCO ENTERPRISE, INC** **DRYCLEANERS** **S121695671**
South **20651 LAKE FOREST DR #111** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.114 mi.
601 ft. **Site 2 of 5 in cluster D**

Relative: DRYCLEAN SOUTH COAST:
Lower

Facility ID:	144152
Application Number:	442460
Permit Number:	F75301
Status:	S
Representative Name:	YOON SEAK CHOI
Representative Telephone:	949 9515329
Permit Status:	INACTIVE
BCAT Number:	000601
BCAT Description:	DRY CLEANING, DRY-TO-DRY NON-VENT, PERC
UTM East:	438.55801392
UTM North:	3725.2451172

Actual:
726 ft.

Facility ID:	144152
Application Number:	442462
Permit Number:	F75397
Status:	S
Representative Name:	YOON SEAK CHOI
Representative Telephone:	949 9515329
Permit Status:	INACTIVE
BCAT Number:	000233
BCAT Description:	DRY CLEANING EQUIP PETROLEUM SOLVENT
UTM East:	438.55801392
UTM North:	3725.2451172

D21 **FOOTHILL CLEANERS** **DRYCLEANERS** **S121700097**
South **20651 LAKE FOREST DR #111** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.114 mi.
601 ft. **Site 3 of 5 in cluster D**

Relative: DRYCLEAN SOUTH COAST:
Lower

Facility ID:	88102
Application Number:	255829
Permit Number:	D43128
Status:	S
Representative Name:	HAN SEUNG LEE
Representative Telephone:	213 3299292
Permit Status:	INACTIVE
BCAT Number:	000234
BCAT Description:	DRY CLEANING EQUIP PERCHLOROETHYLENE
UTM East:	438.55801392
UTM North:	3725.2451172

Actual:
726 ft.

D22
South
< 1/8
0.114 mi.
601 ft.

SONG'S CLEANERS SOON NAM LEE DBA
20651 LAKE FOREST DR #111
LAKE FOREST, CA 92630

Site 4 of 5 in cluster D

DRYCLEANERS

S121696146
N/A

Relative:
Lower

Actual:
726 ft.

DRYCLEAN SOUTH COAST:

Facility ID:	152129
Application Number:	469631
Permit Number:	F92397
Status:	A
Representative Name:	NAM SOON LEE
Representative Telephone:	949 9515329
Permit Status:	INACT_NR
BCAT Number:	000233
BCAT Description:	DRY CLEANING EQUIP PETROLEUM SOLVENT
UTM East:	438.10998535
UTM North:	3724.7299805

Facility ID:	152129
Application Number:	541087
Permit Number:	Not reported
Status:	A
Representative Name:	NAM SOON LEE
Representative Telephone:	949 9515329
Permit Status:	Not reported
BCAT Number:	000233
BCAT Description:	DRY CLEANING EQUIP PETROLEUM SOLVENT
UTM East:	438.10998535
UTM North:	3724.7299805

D23
South
< 1/8
0.114 mi.
601 ft.

FOOTHILL CLEANERS
20651 LAKE FOREST DR A111
LAKE FOREST, CA 92630

Site 5 of 5 in cluster D

RCRA-SQG
Orange Co. Industrial Site
FINDS
ECHO
DRYCLEANERS
HAZNET

1000685968
CAD983629346

Relative:
Lower

Actual:
726 ft.

RCRA-SQG:

Date form received by agency:	04/13/1992
Facility name:	FOOTHILL CLEANERS
Facility address:	20651 LAKE FOREST DR A111 LAKE FOREST, CA 92630
EPA ID:	CAD983629346
Contact:	HAN LEE
Contact address:	20651 LAKE FOREST DR A111 LAKE FOREST, CA 92630
Contact country:	US
Contact telephone:	714-951-5329
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

FOOTHILL CLEANERS (Continued) **1000685968**

Owner/operator name: LIZ AND HAN LEE
Owner/operator address: 20651 LAKE FOREST
LAKE FOREST, CA 92630
Owner/operator country: Not reported
Owner/operator telephone: 714-951-5329
Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Violation Status: No violations found

Orange Co. Industrial Site:
Case ID: 05IC008
Record ID: RO0003342
Current Status: CLOSED 2/9/2006
Closure Type: Closure certification issued
Released Chemical: PERCHLOROETHYLENE, XYLENE, TOLUENE

FINDS:

Registry ID: 110002873178

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

FOOTHILL CLEANERS (Continued) **1000685968**

Envid: 1000685968
Registry ID: 110002873178
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110002873178

DRYCLEANERS:
EPA Id: CAL000298661
NAICS Code: 81232
NAICS Description: Drycleaning and Laundry Services (except Coin-Operated)
SIC Code: 7211
SIC Description: Power Laundries, Family and Commercial
Create Date: 09/21/2005
Facility Active: No
Inactive Date: 06/30/2007
Facility Addr2: Not reported
Owner Name: SUNG-KYU CHOI
Owner Address: 20651 LAKE FOREST DR STE A111
Owner Address 2: Not reported
Owner Telephone: 9518336460
Contact Name: SUNG-KYU CHOI
Contact Address: 4347 ALTIVO LN
Contact Address 2: Not reported
Contact Telephone: 9512770015
Mailing Name: Not reported
Mailing Address 1: 20651 LAKE FOREST DR STE A111
Mailing Address 2: Not reported
Mailing City: LAKE FOREST
Mailing State: CA
Mailing Zip: 926307750
Owner Fax: Not reported
Region Code: 1

EPA Id: CAL000323129
NAICS Code: 81232
NAICS Description: Drycleaning and Laundry Services (except Coin-Operated)
SIC Code: 7211
SIC Description: Power Laundries, Family and Commercial
Create Date: 08/06/2007
Facility Active: No
Inactive Date: 06/30/2008
Facility Addr2: Not reported
Owner Name: SOON LEE
Owner Address: 20651 LAKE FOREST DR STE A111
Owner Address 2: Not reported
Owner Telephone: 9499515329
Contact Name: SOON LEE
Contact Address: 20651 LAKE FOREST DR STE A111
Contact Address 2: Not reported
Contact Telephone: 9499515329
Mailing Name: Not reported
Mailing Address 1: 20651 LAKE FOREST DR STE A111
Mailing Address 2: Not reported
Mailing City: LAKE FOREST
Mailing State: CA
Mailing Zip: 926307750
Owner Fax: Not reported
Region Code: 4

FOOTHILL CLEANERS (Continued) **1000685968**

HAZNET:

envid:	1000685968
Year:	2005
GEPAID:	CAD983629346
Contact:	--
Telephone:	7145869945
Mailing Name:	Not reported
Mailing Address:	20651 LAKE FOREST DR STE A111
Mailing City,St,Zip:	LAKE FOREST, CA 926300000
Gen County:	Not reported
TSD EPA ID:	NVR000076158
TSD County:	Not reported
Waste Category:	Aqueous solution with total organic residues less than 10 percent
Disposal Method:	Not reported
Tons:	Not reported
Cat Decode:	Not reported
Method Decode:	Not reported
Facility County:	Orange

envid:	1000685968
Year:	2005
GEPAID:	CAD983629346
Contact:	--
Telephone:	7145869945
Mailing Name:	Not reported
Mailing Address:	20651 LAKE FOREST DR STE A111
Mailing City,St,Zip:	LAKE FOREST, CA 926300000
Gen County:	Not reported
TSD EPA ID:	NVR000076158
TSD County:	Not reported
Waste Category:	Halogenated solvents (chloroforms, methyl chloride, perchloroethylene, etc)
Disposal Method:	Invalid Code
Tons:	0.37
Cat Decode:	Not reported
Method Decode:	Not reported
Facility County:	Orange

envid:	1000685968
Year:	2004
GEPAID:	CAD983629346
Contact:	--
Telephone:	7145869945
Mailing Name:	Not reported
Mailing Address:	20651 LAKE FOREST DR STE A111
Mailing City,St,Zip:	LAKE FOREST, CA 926300000
Gen County:	Not reported
TSD EPA ID:	NVR000076158
TSD County:	Not reported
Waste Category:	Aqueous solution with total organic residues less than 10 percent
Disposal Method:	Not reported
Tons:	Not reported
Cat Decode:	Not reported
Method Decode:	Not reported
Facility County:	Orange

envid:	1000685968

FOOTHILL CLEANERS (Continued) **1000685968**

Year:	2004
GEPAID:	CAD983629346
Contact:	--
Telephone:	7145869945
Mailing Name:	Not reported
Mailing Address:	20651 LAKE FOREST DR STE A111
Mailing City,St,Zip:	LAKE FOREST, CA 926300000
Gen County:	Not reported
TSD EPA ID:	NVR000076158
TSD County:	Not reported
Waste Category:	Not reported
Disposal Method:	Not reported
Tons:	Not reported
Cat Decode:	Not reported
Method Decode:	Not reported
Facility County:	Orange

envid:	1000685968
Year:	2004
GEPAID:	CAD983629346
Contact:	--
Telephone:	7145869945
Mailing Name:	Not reported
Mailing Address:	20651 LAKE FOREST DR STE A111
Mailing City,St,Zip:	LAKE FOREST, CA 926300000
Gen County:	Not reported
TSD EPA ID:	NVR000076158
TSD County:	Not reported
Waste Category:	Halogenated solvents (chloroforms, methyl chloride, perchloroethylene, etc)
Disposal Method:	Not reported
Tons:	0.17
Cat Decode:	Not reported
Method Decode:	Not reported
Facility County:	Orange

Click this hyperlink while viewing on your computer to access
5 additional CA_HAZNET: record(s) in the EDR Site Report.

C24 **LAKE FOREST AUTO WASH INC** **EDR Hist Auto** **1021488927**
South **20602 LAKE FOREST DR** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.119 mi.
628 ft. **Site 9 of 9 in cluster C**

Relative: EDR Hist Auto
Lower

Actual:
701 ft.

Year:	Name:	Type:
1995	LAKE FOREST AUTO WASH INC	Carwashes, NEC
1996	LAKE FOREST AUTO WASH INC	Carwashes, NEC
1997	LAKE FOREST AUTO WASH INC	Carwashes, NEC
1998	LAKE FOREST AUTO WASH INC	Carwashes, NEC

E25
SSE
1/8-1/4
0.138 mi.
728 ft.

POWER PROFESSIONAL CLEANERS CORPORATION
20562 REGENCY LN F
LAKE FOREST, CA 92630

Site 1 of 3 in cluster E

DRYCLEANERS
EMI

S106837610
N/A

Relative:
Lower

Actual:
701 ft.

DRYCLEAN SOUTH COAST:

Facility ID:	83232
Application Number:	242455
Permit Number:	D37125
Status:	A
Representative Name:	KHODER DOAIFI
Representative Telephone:	949 4720393
Permit Status:	INACTIVE
BCAT Number:	000234
BCAT Description:	DRY CLEANING EQUIP PERCHLOROETHYLENE
UTM East:	438.39700317
UTM North:	3724.8149414

Facility ID:	83232
Application Number:	304407
Permit Number:	D91875
Status:	A
Representative Name:	KHODER DOAIFI
Representative Telephone:	949 4720393
Permit Status:	INACTIVE
BCAT Number:	000601
BCAT Description:	DRY CLEANING, DRY-TO-DRY NON-VENT, PERC
UTM East:	438.39700317
UTM North:	3724.8149414

Facility ID:	83232
Application Number:	357894
Permit Number:	Not reported
Status:	A
Representative Name:	KHODER DOAIFI
Representative Telephone:	949 4720393
Permit Status:	Not reported
BCAT Number:	000601
BCAT Description:	DRY CLEANING, DRY-TO-DRY NON-VENT, PERC
UTM East:	438.39700317
UTM North:	3724.8149414

Facility ID:	83232
Application Number:	364569
Permit Number:	F31276
Status:	A
Representative Name:	KHODER DOAIFI
Representative Telephone:	949 4720393
Permit Status:	INACTIVE
BCAT Number:	000603
BCAT Description:	DRY CLEANING,DRY-TO-DRY NV,W/ SIC,PERC
UTM East:	438.39700317
UTM North:	3724.8149414

Facility ID:	83232
Application Number:	422229
Permit Number:	F64863
Status:	A

POWER PROFESSIONAL CLEANERS CORPORATION (Continued) **S106837610**

Representative Name: KHODER DOAIFI
Representative Telephone: 949 4720393
Permit Status: ACTIVE
BCAT Number: 000233
BCAT Description: DRY CLEANING EQUIP PETROLEUM SOLVENT
UTM East: 438.39700317
UTM North: 3724.8149414

Facility ID: 83232
Application Number: 467633
Permit Number: F89454
Status: A
Representative Name: KHODER DOAIFI
Representative Telephone: 949 4720393
Permit Status: INACTIVE
BCAT Number: 000603
BCAT Description: DRY CLEANING,DRY-TO-DRY NV,W/ SIC,PERC
UTM East: 438.39700317
UTM North: 3724.8149414

Facility ID: 83232
Application Number: 535660
Permit Number: G18369
Status: A
Representative Name: KHODER DOAIFI
Representative Telephone: 949 4720393
Permit Status: ACTIVE
BCAT Number: 000606
BCAT Description: Dry Cleaning K4 Solvent
UTM East: 438.39700317
UTM North: 3724.8149414

EMI:
Year: 2002
County Code: 30
Air Basin: SC
Facility ID: 83232
Air District Name: SC
SIC Code: 7216
Air District Name: SOUTH COAST AQMD
Community Health Air Pollution Info System: Not reported
Consolidated Emission Reporting Rule: Not reported
Total Organic Hydrocarbon Gases Tons/Yr: 0
Reactive Organic Gases Tons/Yr: 0
Carbon Monoxide Emissions Tons/Yr: 0
NOX - Oxides of Nitrogen Tons/Yr: 0
SOX - Oxides of Sulphur Tons/Yr: 0
Particulate Matter Tons/Yr: 0
Part. Matter 10 Micrometers and Smllr Tons/Yr: 0

Year: 2003
County Code: 30
Air Basin: SC
Facility ID: 83232
Air District Name: SC
SIC Code: 7216
Air District Name: SOUTH COAST AQMD

POWER PROFESSIONAL CLEANERS CORPORATION (Continued) **S106837610**

Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers and Smllr Tons/Yr:	0

Year:	2004
County Code:	30
Air Basin:	SC
Facility ID:	83232
Air District Name:	SC
SIC Code:	7216
Air District Name:	SOUTH COAST AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0.0182
Reactive Organic Gases Tons/Yr:	0.01
Carbon Monoxide Emissions Tons/Yr:	0.117
NOX - Oxides of Nitrogen Tons/Yr:	0.14
SOX - Oxides of Sulphur Tons/Yr:	0.000838
Particulate Matter Tons/Yr:	0.0106
Part. Matter 10 Micrometers and Smllr Tons/Yr:	0.01

Year:	2005
County Code:	30
Air Basin:	SC
Facility ID:	83232
Air District Name:	SC
SIC Code:	7216
Air District Name:	SOUTH COAST AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	.0177
Reactive Organic Gases Tons/Yr:	.00747294
Carbon Monoxide Emissions Tons/Yr:	.27
NOX - Oxides of Nitrogen Tons/Yr:	.321
SOX - Oxides of Sulphur Tons/Yr:	.00192
Particulate Matter Tons/Yr:	.0244
Part. Matter 10 Micrometers and Smllr Tons/Yr:	.0244

Year:	2006
County Code:	30
Air Basin:	SC
Facility ID:	83232
Air District Name:	SC
SIC Code:	7216
Air District Name:	SOUTH COAST AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	.7978021701106643982
Reactive Organic Gases Tons/Yr:	.4
Carbon Monoxide Emissions Tons/Yr:	.149
NOX - Oxides of Nitrogen Tons/Yr:	.177

POWER PROFESSIONAL CLEANERS CORPORATION (Continued) **S106837610**

SOX - Oxides of Sulphur Tons/Yr:	.001
Particulate Matter Tons/Yr:	.013
Part. Matter 10 Micrometers and Smllr Tons/Yr:	.013
Year:	2007
County Code:	30
Air Basin:	SC
Facility ID:	83232
Air District Name:	SC
SIC Code:	7216
Air District Name:	SOUTH COAST AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	.7978021701106643982
Reactive Organic Gases Tons/Yr:	.4
Carbon Monoxide Emissions Tons/Yr:	.149
NOX - Oxides of Nitrogen Tons/Yr:	.177
SOX - Oxides of Sulphur Tons/Yr:	.001
Particulate Matter Tons/Yr:	.013
Part. Matter 10 Micrometers and Smllr Tons/Yr:	.013

E26
SSE
1/8-1/4
0.138 mi.
728 ft.

POWER PROF CLEANERS CORP DBA POWER CLEAN **Orange Co. Industrial Site** **S103982353**
20562 REGENCY LN **DRYCLEANERS** **N/A**
LAKE FOREST, CA 92630

Site 2 of 3 in cluster E

Relative:
Lower

Actual:
701 ft.

Orange Co. Industrial Site:

Case ID:	97IC004
Record ID:	RO0000610
Current Status:	CLOSED 5/29/1997
Closure Type:	Closure certification issued
Released Chemical:	PERCHLOROETHYLENE, TRICHLOROETHANE

DRYCLEANERS:

EPA Id:	CAD983617648
NAICS Code:	81232
NAICS Description:	Drycleaning and Laundry Services (except Coin-Operated)
SIC Code:	7211
SIC Description:	Power Laundries, Family and Commercial
Create Date:	02/04/1992
Facility Active:	Yes
Inactive Date:	Not reported
Facility Addr2:	STE F
Owner Name:	KHODER DOAIFI
Owner Address:	23749 RIDGEWAY
Owner Address 2:	Not reported
Owner Telephone:	9494720393
Contact Name:	KHODER DOAIFI
Contact Address:	20562 REGENCY LN
Contact Address 2:	STE F
Contact Telephone:	9494720393
Mailing Name:	Not reported
Mailing Address 1:	20562 REGENCY LN
Mailing Address 2:	STE F
Mailing City:	LAKE FOREST
Mailing State:	CA

POWER PROF CLEANERS CORP DBA POWER CLEAN (Continued) **S103982353**

Mailing Zip: 926308146
Owner Fax: 0000000000
Region Code: 4

27
North
1/8-1/4
0.156 mi.
823 ft.

26642 TOWNE CENTRE DR
FOOTHILL RANCH, CA

AST **A100336921**
N/A

Relative:
Higher

Actual:
774 ft.

AST:

Certified Unified Program Agencies:	Orange
Owner:	ARDEN REALTY
Total Gallons:	1,320
CERSID:	Not reported
Facility ID:	Not reported
Business Name:	Not reported
Phone:	Not reported
Fax:	Not reported
Mailing Address:	Not reported
Mailing Address City:	Not reported
Mailing Address State:	Not reported
Mailing Address Zip Code:	Not reported
Operator Name:	Not reported
Operator Phone:	Not reported
Owner Phone:	Not reported
Owner Mail Address:	Not reported
Owner State:	Not reported
Owner Zip Code:	Not reported
Owner Country:	Not reported
Property Owner Name:	Not reported
Property Owner Phone:	Not reported
Property Owner Mailing Address:	Not reported
Property Owner City:	Not reported
Property Owner Stat :	Not reported
Property Owner Zip Code:	Not reported
Property Owner Country:	Not reported
EPAID:	Not reported

E28
SSE
1/8-1/4
0.162 mi.
854 ft.

ECONO LUBE N TUNE
20592 LAKE FOREST DR
LAKE FOREST, CA 92630

Site 3 of 3 in cluster E

SWEEPS UST **U003721264**
N/A

Relative:
Lower

Actual:
727 ft.

SWEEPS UST:

Status:	Active
Comp Number:	12498
Number:	9
Board Of Equalization:	Not reported
Referral Date:	09-30-92
Action Date:	09-15-92
Created Date:	02-29-88
Owner Tank Id:	Not reported
SWRCB Tank Id:	30-000-012498-000001
Tank Status:	A

ECONO LUBE N TUNE (Continued) **U003721264**

Capacity:	550
Active Date:	Not reported
Tank Use:	PETROLEUM
STG:	P
Content:	Not reported
Number Of Tanks:	1

F29 **G&M OIL CO. #83** **UST** **U003721265**
South **20731 LAKE FOREST DR** **N/A**
1/8-1/4 **LAKE FOREST, CA 92630**
0.166 mi.
878 ft. **Site 1 of 2 in cluster F**

Relative: **Lower**
Actual: **705 ft.**

UST:

Facility ID:	FA0025150
Permitting Agency:	Orange County Environmental Health
Latitude:	33.66158
Longitude:	-117.66854

Facility ID:	20177
Permitting Agency:	ORANGE COUNTY
Latitude:	33.662904
Longitude:	-117.66715

ORANGE CO. UST:
Facility ID: FA0025150

F30 **CHEVRON** **LUST** **U003659611**
South **20731 LAKE FOREST DR** **SWEEPS UST** **N/A**
1/8-1/4 **LAKE FOREST, CA 92630** **HIST CORTESE**
0.166 mi.
878 ft. **Site 2 of 2 in cluster F**

Relative: **Lower**
Actual: **705 ft.**

LUST:

Lead Agency:	ORANGE COUNTY LOP
Case Type:	LUST Cleanup Site
Geo Track:	http://geotracker.waterboards.ca.gov/profile_report.asp?global_id=T0605902102
Global Id:	T0605902102
Latitude:	33.6458268
Longitude:	-117.6890547
Status:	Completed - Case Closed
Status Date:	04/20/1998
Case Worker:	KL
RB Case Number:	083003083T
Local Agency:	ORANGE COUNTY LOP
File Location:	Local Agency
Local Case Number:	97UT037
Potential Media Affect:	Soil
Potential Contaminants of Concern:	Gasoline
Site History:	Not reported

LUST:

Global Id:	T0605902102
Contact Type:	Local Agency Caseworker
Contact Name:	JAMES STROZIER
Organization Name:	ORANGE COUNTY LOP

CHEVRON (Continued) **U003659611**

Address: 1241 E. DYER ROAD SUITE 120
City: SANTA ANA
Email: jstrozier@ochca.com
Phone Number: 7144336273

Global Id: T0605902102
Contact Type: Local Agency Caseworker
Contact Name: KEVIN LAMBERT
Organization Name: ORANGE COUNTY LOP
Address: 1241 E DYER ROAD SUITE 120
City: SANTA ANA
Email: klambert@ochca.com
Phone Number: 7144336261

Global Id: T0605902102
Contact Type: Regional Board Caseworker
Contact Name: TOM E. MBEKE-EKANEM
Organization Name: SANTA ANA RWQCB (REGION 8)
Address: 3737 MAIN STREET, SUITE 500
City: RIVERSIDE
Email: tmbeke-ekanem@waterboards.ca.gov
Phone Number: 9513202007

LUST:
Global Id: T0605902102
Action Type: Other
Date: 09/12/1997
Action: Leak Discovery

Global Id: T0605902102
Action Type: Other
Date: 09/12/1997
Action: Leak Reported

Global Id: T0605902102
Action Type: ENFORCEMENT
Date: 03/02/1998
Action: LOP Case Closure Summary to RB

LUST:
Global Id: T0605902102
Status: Open - Case Begin Date
Status Date: 09/12/1997

Global Id: T0605902102
Status: Completed - Case Closed
Status Date: 04/20/1998

ORANGE CO. LUST:
Region: ORANGE
Facility Id: 97UT037
Released Substance: Gasoline-Automotive (motor gasoline and additives), leaded & unleaded
Date Closed: 04/20/1998
Record ID: RO0001932

CHEVRON (Continued) **U003659611**

LUST REG 8:

Region:	8
County:	Orange
Regional Board:	Santa Ana Region
Facility Status:	Case Closed
Case Number:	083003083T
Local Case Num:	97UT037
Case Type:	Soil only
Substance:	Gasoline
Qty Leaked:	0
Abate Method:	Not reported
Cross Street:	Not reported
Enf Type:	Not reported
Funding:	Not reported
How Discovered:	Tank Closure
How Stopped:	Close Tank
Leak Cause:	Unknown
Leak Source:	Unknown
Global ID:	T0605902102
How Stopped Date:	9/9/9999
Enter Date:	Not reported
Date Confirmation of Leak Began:	Not reported
Date Preliminary Assessment Began:	Not reported
Discover Date:	9/12/1997
Enforcement Date:	Not reported
Close Date:	4/20/1998
Date Prelim Assessment Workplan Submitted:	Not reported
Date Pollution Characterization Began:	Not reported
Date Remediation Plan Submitted:	Not reported
Date Remedial Action Underway:	Not reported
Date Post Remedial Action Monitoring:	Not reported
Enter Date:	Not reported
GW Qualifies:	Not reported
Soil Qualifies:	Not reported
Operator:	Not reported
Facility Contact:	Not reported
Interim:	Not reported
Oversite Program:	LUST
Latitude:	33.6458268
Longitude:	-117.6890547
MTBE Date:	Not reported
Max MTBE GW:	Not reported
MTBE Concentration:	0
Max MTBE Soil:	Not reported
MTBE Fuel:	1
MTBE Tested:	Site NOT Tested for MTBE.Includes Unknown and Not Analyzed.
MTBE Class:	*
Staff:	TME
Staff Initials:	JS
Lead Agency:	Local Agency
Local Agency:	30000L
Hydr Basin #:	Not reported
Beneficial:	MUN
Priority:	Not reported
Cleanup Fund Id:	Not reported
Work Suspended:	Not reported

Summary: Not reported

CHEVRON (Continued) **U003659611**

SWEEPS UST:

Status:	Active
Comp Number:	11761
Number:	9
Board Of Equalization:	Not reported
Referral Date:	09-30-92
Action Date:	09-15-92
Created Date:	02-29-88
Owner Tank Id:	Not reported
SWRCB Tank Id:	30-000-011761-000001
Tank Status:	A
Capacity:	12000
Active Date:	Not reported
Tank Use:	M.V. FUEL
STG:	P
Content:	REG UNLEADED
Number Of Tanks:	3

Status:	Active
Comp Number:	11761
Number:	9
Board Of Equalization:	Not reported
Referral Date:	09-30-92
Action Date:	09-15-92
Created Date:	02-29-88
Owner Tank Id:	Not reported
SWRCB Tank Id:	30-000-011761-000002
Tank Status:	A
Capacity:	12000
Active Date:	Not reported
Tank Use:	M.V. FUEL
STG:	P
Content:	REG UNLEADED
Number Of Tanks:	Not reported

Status:	Active
Comp Number:	11761
Number:	9
Board Of Equalization:	Not reported
Referral Date:	09-30-92
Action Date:	09-15-92
Created Date:	02-29-88
Owner Tank Id:	Not reported
SWRCB Tank Id:	30-000-011761-000003
Tank Status:	A
Capacity:	12000
Active Date:	Not reported
Tank Use:	M.V. FUEL
STG:	P
Content:	DIESEL
Number Of Tanks:	Not reported

HIST CORTESE:

Region:	CORTESE
Facility County Code:	30
Reg By:	LTNKA

CHEVRON (Continued) **U003659611**

Reg Id: 083003083T

G31 **POWER CLEANERS** **RCRA-SQG** **1000597738**
SSW **20562 CANADA RD** **FINDS** **CAD983617648**
1/8-1/4 **EL TORO, CA 92630** **ECHO**
0.167 mi.
884 ft. **Site 1 of 5 in cluster G**

Relative:
Lower

Actual:
669 ft.

RCRA-SQG:

Date form received by agency:	02/04/1992
Facility name:	POWER CLEANERS
Facility address:	20562 CANADA RD EL TORO, CA 92630
EPA ID:	CAD983617648
Mailing address:	CANADA RD EL TORO, CA 92630
Contact:	DOAIFI KHODER
Contact address:	20562 CANADA RD EL TORO, CA 92630
Contact country:	US
Contact telephone:	714-472-6088
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	DOAIFI KHODER
Owner/operator address:	20562 CANADA RD EL TORO, CA 92630
Owner/operator country:	Not reported
Owner/operator telephone:	714-472-6088
Owner/operator email:	Not reported
Owner/operator fax:	Not reported
Owner/operator extension:	Not reported
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No

POWER CLEANERS (Continued) **1000597738**

Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Violation Status: No violations found

FINDS:

Registry ID: 110002867951

Environmental Interest/Information System
California Hazardous Waste Tracking System - Datamart (HWTS-DATAMART) provides California with information on hazardous waste shipments for generators, transporters, and treatment, storage, and disposal facilities.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1000597738
Registry ID: 110002867951
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110002867951

G32 **SALEEN ALLEN R R R SPEEDLAB INC** **RCRA-SQG** **1004676851**
SSW **20622 CANADA RD** **FINDS** **CAR000090308**
1/8-1/4 **LAKE FOREST, CA 92630** **ECHO**
0.172 mi.
908 ft. **Site 2 of 5 in cluster G**

Relative: **Lower**
Actual: **668 ft.**

RCRA-SQG:
Date form received by agency: 01/17/2001
Facility name: SALEEN ALLEN R R R SPEEDLAB INC
Facility address: 20622 CANADA RD
LAKE FOREST, CA 92630
EPA ID: CAR000090308
Mailing address: 9 WHATNEY
IRVINE, CA 92618
Contact: MARNI JOHNSON
Contact address: 9 WHATNEY
IRVINE, CA 92618
Contact country: US
Contact telephone: 949-829-8704
Contact email: Not reported
EPA Region: 09
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of

SALEEN ALLEN R R R SPEEDLAB INC (Continued) **1004676851**

hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: SALEEN INC
Owner/operator address: 9 WHATNEY
IRVINE, CA 92618
Owner/operator country: Not reported
Owner/operator telephone: 949-597-4900
Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

. Waste code: D001
. Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.

. Waste code: D002
. Waste name: A WASTE WHICH HAS A PH OF LESS THAN 2 OR GREATER THAN 12.5 IS CONSIDERED TO BE A CORROSIVE HAZARDOUS WASTE. SODIUM HYDROXIDE, A CAUSTIC SOLUTION WITH A HIGH PH, IS OFTEN USED BY INDUSTRIES TO CLEAN OR DEGREASE PARTS. HYDROCHLORIC ACID, A SOLUTION WITH A LOW PH, IS USED BY MANY INDUSTRIES TO CLEAN METAL PARTS PRIOR TO PAINTING. WHEN THESE CAUSTIC OR ACID SOLUTIONS BECOME CONTAMINATED AND MUST BE DISPOSED, THE WASTE WOULD BE A CORROSIVE HAZARDOUS WASTE.

. Waste code: F001
. Waste name: THE FOLLOWING SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLOROETHYLENE, METHYLENE CHLORIDE, 1,1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE, AND CHLORINATED FLUOROCARBONS; ALL SPENT SOLVENT MIXTURES/BLENDS USED IN DEGREASING

SALEEN ALLEN R R R SPEEDLAB INC (Continued) **1004676851**

CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F002, F004, AND F005, AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Violation Status: No violations found

FINDS:

Registry ID: 110012211748

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1004676851
Registry ID: 110012211748
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110012211748

G33 SSW 1/8-1/4 0.176 mi. 927 ft. **LOS ALISOS RANCH** **HIST UST** **U001577229**
20571 CANADA RD **N/A**
EL TORO, CA 92646
Site 3 of 5 in cluster G

Relative: Lower
Actual: 668 ft.

HIST UST:
File Number: 0002EBFF
URL: http://geotracker.waterboards.ca.gov/ustpdfs/pdf/0002EBFF.pdf
Region: STATE
Facility ID: 00000023543
Facility Type: Other
Other Type: NURSERY/FARMING
Contact Name: S. NAKASE
Telephone: 7149626604
Owner Name: NAKASE BROTHERS WHOLESALE NURS
Owner Address: 9441 KREPP DR.
Owner City,St,Zip: HUNTINGTON BEACH, CA 92646
Total Tanks: 0003

Tank Num: 001
Container Num: 001
Year Installed: Not reported
Tank Capacity: 00000200
Tank Used for: PRODUCT
Type of Fuel: DIESEL
Container Construction Thickness: Not reported
Leak Detection: Stock Inventor

Tank Num: 002

LOS ALISOS RANCH (Continued) **U001577229**

Container Num:	G735150
Year Installed:	Not reported
Tank Capacity:	00001000
Tank Used for:	PRODUCT
Type of Fuel:	REGULAR
Container Construction Thickness:	10
Leak Detection:	Stock Inventor

Tank Num:	003
Container Num:	002
Year Installed:	Not reported
Tank Capacity:	00000280
Tank Used for:	PRODUCT
Type of Fuel:	DIESEL
Container Construction Thickness:	Not reported
Leak Detection:	Stock Inventor

Click here for Geo Tracker PDF:

G34 **FOREVER GREEN ART INC** **RCRA-SQG** **1001195438**
SSW **20611 CANADA RD** **FINDS** **CAR000020172**
1/8-1/4 **LAKE FOREST, CA 92630** **ECHO**
0.177 mi. **HAZNET**
932 ft. **Site 4 of 5 in cluster G**

Relative:
Lower

Actual:
667 ft.

RCRA-SQG:

Date form received by agency:	06/05/1997
Facility name:	FOREVER GREEN ART INC
Facility address:	20611 CANADA RD LAKE FOREST, CA 92630
EPA ID:	CAR000020172
Mailing address:	BARENTS SEA CIRCLE LAKE FOREST, CA 92630
Contact:	MIKE REEDER
Contact address:	20382 BARENTS SEA CIRCLE LAKE FOREST, CA 92630
Contact country:	US
Contact telephone:	714-768-3005
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	FOREVER GREEN ART INC
Owner/operator address:	20382 BARENTS SEA CIR LAKE FOREST, CA 92630
Owner/operator country:	Not reported
Owner/operator telephone:	714-768-3005
Owner/operator email:	Not reported
Owner/operator fax:	Not reported
Owner/operator extension:	Not reported
Legal status:	Private

FOREVER GREEN ART INC (Continued) **1001195438**

Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Violation Status: No violations found

FINDS:

Registry ID: 110002917611

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1001195438
Registry ID: 110002917611
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110002917611

HAZNET:
envid: 1001195438
Year: 1999
GEPAID: CAR000020172
Contact: FOREVER GREEN ART INC
Telephone: 9497683005
Mailing Name: Not reported
Mailing Address: 20382 BARENTS SEA CIRCLE
Mailing City,St,Zip: LAKE FOREST, CA 926300000
Gen County: Not reported
TSD EPA ID: CAD008302903
TSD County: Not reported

FOREVER GREEN ART INC (Continued) **1001195438**

Waste Category: Off-specification, aged or surplus organics
Disposal Method: Recycler
Tons: .2085
Cat Decode: Not reported
Method Decode: Not reported
Facility County: Orange

envid: 1001195438
Year: 1997
GEPAID: CAR000020172
Contact: FOREVER GREEN ART INC
Telephone: 9497683005
Mailing Name: Not reported
Mailing Address: 20382 BARENTS SEA CIRCLE
Mailing City,St,Zip: LAKE FOREST, CA 926300000
Gen County: Not reported
TSD EPA ID: CAD000088252
TSD County: Not reported
Waste Category: Unspecified organic liquid mixture
Disposal Method: Transfer Station
Tons: .4587
Cat Decode: Not reported
Method Decode: Not reported
Facility County: Orange

envid: 1001195438
Year: 1997
GEPAID: CAR000020172
Contact: FOREVER GREEN ART INC
Telephone: 9497683005
Mailing Name: Not reported
Mailing Address: 20382 BARENTS SEA CIRCLE
Mailing City,St,Zip: LAKE FOREST, CA 926300000
Gen County: Not reported
TSD EPA ID: CAD000088252
TSD County: Not reported
Waste Category: Off-specification, aged or surplus organics
Disposal Method: Transfer Station
Tons: .1500
Cat Decode: Not reported
Method Decode: Not reported
Facility County: Orange

envid: 1001195438
Year: 1997
GEPAID: CAR000020172
Contact: FOREVER GREEN ART INC
Telephone: 9497683005
Mailing Name: Not reported
Mailing Address: 20382 BARENTS SEA CIRCLE
Mailing City,St,Zip: LAKE FOREST, CA 926300000
Gen County: Not reported
TSD EPA ID: CAD000088252
TSD County: Not reported
Waste Category: Laboratory waste chemicals
Disposal Method: Transfer Station
Tons: 1.0980

FOREVER GREEN ART INC (Continued) **1001195438**

Cat Decode:	Not reported
Method Decode:	Not reported
Facility County:	Orange
envid:	1001195438
Year:	1997
GEPAID:	CAR000020172
Contact:	FOREVER GREEN ART INC
Telephone:	9497683005
Mailing Name:	Not reported
Mailing Address:	20382 BARENTS SEA CIRCLE
Mailing City,St,Zip:	LAKE FOREST, CA 926300000
Gen County:	Not reported
TSD EPA ID:	CAD050806850
TSD County:	Not reported
Waste Category:	Laboratory waste chemicals
Disposal Method:	Not reported
Tons:	.0100
Cat Decode:	Not reported
Method Decode:	Not reported
Facility County:	Orange

Click this hyperlink while viewing on your computer to access
1 additional CA_HAZNET: record(s) in the EDR Site Report.

G35 **BOKKES IND MERCEDES SVC** **RCRA-SQG** **1000594482**
SSW **20591 CANADA RD** **FINDS** **CAD983583121**
1/8-1/4 **LAKE FOREST, CA 92630** **ECHO**
0.182 mi.
959 ft. **Site 5 of 5 in cluster G**

Relative:
Lower

Actual:
667 ft.

RCRA-SQG:

Date form received by agency:	05/20/1991
Facility name:	BOKKES IND MERCEDES SVC
Facility address:	20591 CANADA RD LAKE FOREST, CA 92630
EPA ID:	CAD983583121
Contact:	BOKKES TOM
Contact address:	20591 CANADA RD LAKE FOREST, CA 92630
Contact country:	US
Contact telephone:	714-830-3411
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	TOM J BOKKES
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	415-555-1212

BOKKES IND MERCEDES SVC (Continued) **1000594482**

Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: NOT REQUIRED
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: 415-555-1212
Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: Yes
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Violation Status: No violations found

FINDS:

Registry ID: 110006481137

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

BOKKES IND MERCEDES SVC (Continued) **1000594482**

ECHO:
Envid: 1000594482
Registry ID: 110006481137
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110006481137

36
ESE
1/8-1/4
0.193 mi.
1021 ft.

SADDLE BACK VALLEY ORANMENTAL IRON INC **RCRA-SQG** **1006930221**
26891 VISTA TERRACE **HAZNET** **CAR000146894**
LAKE FOREST, CA 92630 **NPDES**
CIWQS

Relative:
Higher

Actual:
803 ft.

RCRA-SQG:
Date form received by agency: 08/04/2003
Facility name: SADDLE BACK VALLEY ORANMENTAL IRON INC
Facility address: 26891 VISTA TERRACE
LAKE FOREST, CA 92630
EPA ID: CAR000146894
Contact: JOHN RODRIGUEZ
Contact address: 26891 VISTA TERRACE
LAKE FOREST, CA 92630
Contact country: US
Contact telephone: 949-830-9513
Contact email: Not reported
EPA Region: 09
Land type: Private
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: PAM DICKIE
Owner/operator address: Not reported
Not reported
Owner/operator country: Not reported
Owner/operator telephone: Not reported
Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: 01/01/1991
Owner/Op end date: Not reported

Owner/operator name: SADDLE NACK VALLEY ORNAMENTAL INC
Owner/operator address: Not reported
Not reported
Owner/operator country: Not reported
Owner/operator telephone: Not reported
Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: 01/01/1992

SADDLE BACK VALLEY ORANMENTAL IRON INC (Continued) **1006930221**

Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

. Waste code: D001
. Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.

. Waste code: D035
. Waste name: METHYL ETHYL KETONE

. Waste code: F003
. Waste name: THE FOLLOWING SPENT NON-HALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NON-HALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NON-HALOGENATED SOLVENTS, AND, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005, AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: F005
. Waste name: THE FOLLOWING SPENT NON-HALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NON-HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Historical Generators:
Date form received by agency: 08/04/2003
Site name: SADDLE BACK VALLEY ORANMENTAL IRON INC
Classification: Small Quantity Generator

SADDLE BACK VALLEY ORANMENTAL IRON INC (Continued) **1006930221**

Facility Has Received Notices of Violations:
- Regulation violated: Not reported
- Area of violation: Generators - General
- Date violation determined: 03/08/2005
- Date achieved compliance: Not reported
- Violation lead agency: State
  - Enforcement action: Not reported
  - Enforcement action date: Not reported
  - Enf. disposition status: Not reported
  - Enf. disp. status date: Not reported
  - Enforcement lead agency: Not reported
  - Proposed penalty amount: Not reported
  - Final penalty amount: Not reported
  - Paid penalty amount: Not reported

Evaluation Action Summary:
- Evaluation date: 05/31/2005
- Evaluation: FOCUSED COMPLIANCE INSPECTION
- Area of violation: Not reported
- Date achieved compliance: Not reported
- Evaluation lead agency: State Contractor/Grantee

- Evaluation date: 03/09/2005
- Evaluation: FOCUSED COMPLIANCE INSPECTION
- Area of violation: Not reported
- Date achieved compliance: Not reported
- Evaluation lead agency: State Contractor/Grantee

- Evaluation date: 03/08/2005
- Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
- Area of violation: Generators - General
- Date achieved compliance: Not reported
- Evaluation lead agency: State Contractor/Grantee

HAZNET:
- envid: 1006930221
- Year: 2016
- GEPAID: CAR000146894
- Contact: TOM BUCHANAN
- Telephone: 9498309513
- Mailing Name: Not reported
- Mailing Address: 26891 VISTA TERRACE
- Mailing City,St,Zip: LAKE FOREST, CA 926300000
- Gen County: Orange
- TSD EPA ID: CAD008364432
- TSD County: Los Angeles
- Waste Category: Latex waste
- Disposal Method: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
- Tons: 0.18765
- Cat Decode: Latex waste
- Method Decode: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
- Facility County: Orange

- envid: 1006930221
- Year: 2016

SADDLE BACK VALLEY ORANMENTAL IRON INC (Continued) **1006930221**

GEPAID: CAR000146894
Contact: TOM BUCHANAN
Telephone: 9498309513
Mailing Name: Not reported
Mailing Address: 26891 VISTA TERRACE
Mailing City,St,Zip: LAKE FOREST, CA 926300000
Gen County: Orange
TSD EPA ID: CAD008364432
TSD County: Los Angeles
Waste Category: Other inorganic solid waste
Disposal Method: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Tons: 10.071
Cat Decode: Other inorganic solid waste
Method Decode: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Facility County: Orange

envid: 1006930221
Year: 2015
GEPAID: CAR000146894
Contact: TOM BUCHANAN
Telephone: 9498309513
Mailing Name: Not reported
Mailing Address: 26891 VISTA TERRACE
Mailing City,St,Zip: LAKE FOREST, CA 926300000
Gen County: Orange
TSD EPA ID: CAD008364432
TSD County: Los Angeles
Waste Category: Other inorganic solid waste
Disposal Method: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Tons: 6.535
Cat Decode: Not reported
Method Decode: Not reported
Facility County: Orange

envid: 1006930221
Year: 2015
GEPAID: CAR000146894
Contact: TOM BUCHANAN
Telephone: 9498309513
Mailing Name: Not reported
Mailing Address: 26891 VISTA TERRACE
Mailing City,St,Zip: LAKE FOREST, CA 926300000
Gen County: Orange
TSD EPA ID: CAD008364432
TSD County: Los Angeles
Waste Category: Not reported
Disposal Method: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Tons: 0.075
Cat Decode: Not reported
Method Decode: Not reported
Facility County: Orange

envid: 1006930221

SADDLE BACK VALLEY ORANMENTAL IRON INC (Continued) **1006930221**

Year:	2014
GEPAID:	CAR000146894
Contact:	TOM BUCHANAN
Telephone:	9498309513
Mailing Name:	Not reported
Mailing Address:	26891 VISTA TERRACE
Mailing City,St,Zip:	LAKE FOREST, CA 926300000
Gen County:	Orange
TSD EPA ID:	CAD008364432
TSD County:	Los Angeles
Waste Category:	Other inorganic solid waste
Disposal Method:	Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Tons:	3.675
Cat Decode:	Not reported
Method Decode:	Not reported
Facility County:	Orange

Click this hyperlink while viewing on your computer to access
37 additional CA_HAZNET: record(s) in the EDR Site Report.

NPDES:

Npdes Number:	Not reported
Facility Status:	Not reported
Agency Id:	Not reported
Region:	8
Regulatory Measure Id:	465156
Order No:	Not reported
Regulatory Measure Type:	Industrial
Place Id:	Not reported
WDID:	8 30NEC001180
Program Type:	Not reported
Adoption Date Of Regulatory Measure:	Not reported
Effective Date Of Regulatory Measure:	Not reported
Expiration Date Of Regulatory Measure:	Not reported
Termination Date Of Regulatory Measure:	Not reported
Discharge Name:	Not reported
Discharge Address:	Not reported
Discharge City:	Not reported
Discharge State:	Not reported
Discharge Zip:	Not reported
RECEIVED DATE:	10/06/2015
PROCESSED DATE:	10/13/2015
STATUS CODE NAME:	Active
STATUS DATE:	10/13/2015
PLACE SIZE:	7500
PLACE SIZE UNIT:	SqFt
FACILITY CONTACT NAME:	Tom Buchanan
FACILITY CONTACT TITLE:	Shop Mgr.
FACILITY CONTACT PHONE:	949-830-9513
FACILITY CONTACT PHONE EXT:	Not reported
FACILITY CONTACT EMAIL:	tom@sviron.com
OPERATOR NAME:	Saddleback Valley Ornamental Iron Inc
OPERATOR ADDRESS:	26891 Vista Terrace
OPERATOR CITY:	Lake Forest
OPERATOR STATE:	California
OPERATOR ZIP:	92630

SADDLE BACK VALLEY ORANMENTAL IRON INC (Continued) **1006930221**

OPERATOR CONTACT NAME:	Tom Buchanan
OPERATOR CONTACT TITLE:	Shop Mgr.
OPERATOR CONTACT PHONE:	949-830-9513
OPERATOR CONTACT PHONE EXT:	Not reported
OPERATOR CONTACT EMAIL:	tom@sviron.com
OPERATOR TYPE:	Private Business
DEVELOPER NAME:	Not reported
DEVELOPER ADDRESS:	Not reported
DEVELOPER CITY:	Not reported
DEVELOPER STATE:	California
DEVELOPER ZIP:	Not reported
DEVELOPER CONTACT NAME:	Not reported
DEVELOPER CONTACT TITLE:	Not reported
CONSTYPE LINEAR UTILITY IND:	Not reported
EMERGENCY PHONE NO:	949-291-2477
EMERGENCY PHONE EXT:	Not reported
CONSTYPE ABOVE GROUND IND:	Not reported
CONSTYPE BELOW GROUND IND:	Not reported
CONSTYPE CABLE LINE IND:	Not reported
CONSTYPE COMM LINE IND:	Not reported
CONSTYPE COMMERTIAL IND:	Not reported
CONSTYPE ELECTRICAL LINE IND:	Not reported
CONSTYPE GAS LINE IND:	Not reported
CONSTYPE INDUSTRIAL IND:	Not reported
CONSTYPE OTHER DESRIPTION:	Not reported
CONSTYPE OTHER IND:	Not reported
CONSTYPE RECONS IND:	Not reported
CONSTYPE RESIDENTIAL IND:	Not reported
CONSTYPE TRANSPORT IND:	Not reported
CONSTYPE UTILITY DESCRIPTION:	Not reported
CONSTYPE UTILITY IND:	Not reported
CONSTYPE WATER SEWER IND:	Not reported
DIR DISCHARGE USWATER IND:	Not reported
RECEIVING WATER NAME:	Not reported
CERTIFIER NAME:	Michael Parsons
CERTIFIER TITLE:	Owner
CERTIFICATION DATE:	06-OCT-16
PRIMARY SIC:	3446-Architectural and Ornamental Metal Work
SECONDARY SIC:	Not reported
TERTIARY SIC:	Not reported

Npdes Number:	CAS000001
Facility Status:	Active
Agency Id:	0
Region:	8
Regulatory Measure Id:	465156
Order No:	97-03-DWQ
Regulatory Measure Type:	Enrollee
Place Id:	Not reported
WDID:	8 30NEC001180
Program Type:	Industrial
Adoption Date Of Regulatory Measure:	Not reported
Effective Date Of Regulatory Measure:	10/13/2015
Expiration Date Of Regulatory Measure:	Not reported
Termination Date Of Regulatory Measure:	Not reported
Discharge Name:	Saddleback Valley Ornamental Iron Inc
Discharge Address:	26891 Vista Terrace

SADDLE BACK VALLEY ORANMENTAL IRON INC (Continued) **1006930221**

Discharge City:	Lake Forest
Discharge State:	California
Discharge Zip:	92630
RECEIVED DATE:	Not reported
PROCESSED DATE:	Not reported
STATUS CODE NAME:	Not reported
STATUS DATE:	Not reported
PLACE SIZE:	Not reported
PLACE SIZE UNIT:	Not reported
FACILITY CONTACT NAME:	Not reported
FACILITY CONTACT TITLE:	Not reported
FACILITY CONTACT PHONE:	Not reported
FACILITY CONTACT PHONE EXT:	Not reported
FACILITY CONTACT EMAIL:	Not reported
OPERATOR NAME:	Not reported
OPERATOR ADDRESS:	Not reported
OPERATOR CITY:	Not reported
OPERATOR STATE:	Not reported
OPERATOR ZIP:	Not reported
OPERATOR CONTACT NAME:	Not reported
OPERATOR CONTACT TITLE:	Not reported
OPERATOR CONTACT PHONE:	Not reported
OPERATOR CONTACT PHONE EXT:	Not reported
OPERATOR CONTACT EMAIL:	Not reported
OPERATOR TYPE:	Not reported
DEVELOPER NAME:	Not reported
DEVELOPER ADDRESS:	Not reported
DEVELOPER CITY:	Not reported
DEVELOPER STATE:	Not reported
DEVELOPER ZIP:	Not reported
DEVELOPER CONTACT NAME:	Not reported
DEVELOPER CONTACT TITLE:	Not reported
CONSTYPE LINEAR UTILITY IND:	Not reported
EMERGENCY PHONE NO:	Not reported
EMERGENCY PHONE EXT:	Not reported
CONSTYPE ABOVE GROUND IND:	Not reported
CONSTYPE BELOW GROUND IND:	Not reported
CONSTYPE CABLE LINE IND:	Not reported
CONSTYPE COMM LINE IND:	Not reported
CONSTYPE COMMERTIAL IND:	Not reported
CONSTYPE ELECTRICAL LINE IND:	Not reported
CONSTYPE GAS LINE IND:	Not reported
CONSTYPE INDUSTRIAL IND:	Not reported
CONSTYPE OTHER DESRIPTION:	Not reported
CONSTYPE OTHER IND:	Not reported
CONSTYPE RECONS IND:	Not reported
CONSTYPE RESIDENTIAL IND:	Not reported
CONSTYPE TRANSPORT IND:	Not reported
CONSTYPE UTILITY DESCRIPTION:	Not reported
CONSTYPE UTILITY IND:	Not reported
CONSTYPE WATER SEWER IND:	Not reported
DIR DISCHARGE USWATER IND:	Not reported
RECEIVING WATER NAME:	Not reported
CERTIFIER NAME:	Not reported
CERTIFIER TITLE:	Not reported
CERTIFICATION DATE:	Not reported
PRIMARY SIC:	Not reported

SADDLE BACK VALLEY ORANMENTAL IRON INC (Continued) **1006930221**

SECONDARY SIC: Not reported
TERTIARY SIC: Not reported

CIWQS:
Agency: Saddleback Valley Ornamental Iron Inc
Agency Address: 26891 Vista Terrace, Lake Forest, CA 92630
Place/Project Type: Industrial - Architectural and Ornamental Metal Work
SIC/NAICS: 3446
Region: 8
Program: INDSTW
Regulatory Measure Status: Active
Regulatory Measure Type: Storm water industrial
Order Number: 2014-0057-DWQ
WDID: 8 30NEC001180
NPDES Number: CAS000001
Adoption Date: Not reported
Effective Date: 10/13/2015
Termination Date: Not reported
Expiration/Review Date: Not reported
Design Flow: Not reported
Major/Minor: Not reported
Complexity: Not reported
TTWQ: Not reported
Enforcement Actions within 5 years: 0
Violations within 5 years: 0
Latitude: 33.66615
Longitude: -117.66103

H37 **TRABUCO CANYON WATER DISTRICT** **UST** **U003784547**
West **20904 DIMENSION** **N/A**
1/8-1/4 **LAKE FOREST, CA 92630**
0.204 mi.
1079 ft. **Site 1 of 2 in cluster H**

Relative: UST:
Lower
Actual: Facility ID: 8466
700 ft. Permitting Agency: ORANGE COUNTY
Latitude: 33.63787
Longitude: -117.68592

H38 **TRABUCO CANYON WATER DISTRICT** **SWEEPS UST** **S101589570**
West **20904 DIMENSION DR** **CA FID UST** **N/A**
1/8-1/4 **EL TORO, CA 92630**
0.204 mi.
1079 ft. **Site 2 of 2 in cluster H**

Relative: SWEEPS UST:
Lower
Actual: Status: Active
700 ft. Comp Number: 8466
Number: 9
Board Of Equalization: 44-016687
Referral Date: 09-30-92
Action Date: 02-26-92
Created Date: 02-29-88
Owner Tank Id: Not reported
SWRCB Tank Id: 30-000-008466-000001

TRABUCO CANYON WATER DISTRICT (Continued) **S101589570**

Tank Status: A
Capacity: 550
Active Date: Not reported
Tank Use: M.V. FUEL
STG: P
Content: LEADED
Number Of Tanks: 1

CA FID UST:
Facility ID: 30017607
Regulated By: UTNKA
Regulated ID: Not reported
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 7148372195
Mail To: Not reported
Mailing Address: 30575 TRABUCO CYN RD 200 P
Mailing Address 2: Not reported
Mailing City,St,Zip: EL TORO 92630
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Active

I39 **CLEANERS 2000** **DRYCLEANERS** **S109611984**
South **20761 LAKE FOREST DR STE H** **N/A**
1/8-1/4 **LAKE FOREST, CA 92630**
0.209 mi.
1102 ft. **Site 1 of 6 in cluster I**

Relative: DRYCLEANERS:
Lower
Actual: EPA Id: CAD983581711
693 ft. NAICS Code: 81232
NAICS Description: Drycleaning and Laundry Services (except Coin-Operated)
SIC Code: 7211
SIC Description: Power Laundries, Family and Commercial
Create Date: 05/07/1991
Facility Active: Yes
Inactive Date: Not reported
Facility Addr2: Not reported
Owner Name: SUSAN CHUNG
Owner Address: 20761 LAKE FOREST DR STE H
Owner Address 2: Not reported
Owner Telephone: 9495862972
Contact Name: PAUL J CHUNG
Contact Address: 20761 LAKE FOREST DR STE H
Contact Address 2: Not reported
Contact Telephone: 9495862972
Mailing Name: Not reported
Mailing Address 1: 20761 LAKE FOREST DR STE H
Mailing Address 2: Not reported
Mailing City: LAKE FOREST
Mailing State: CA
Mailing Zip: 926307739

CLEANERS 2000 (Continued) **S109611984**

Owner Fax: Not reported
Region Code: 4

I40 **SANTA MARGARITA TIRE** **RCRA-SQG** **1004675884**
South **20761 LAKE FOREST DR UNIT K** **FINDS** **CAR000078329**
1/8-1/4 **LAKE FOREST, CA 92630** **ECHO**
0.209 mi.
1102 ft. **Site 2 of 6 in cluster I**

Relative:
Lower

Actual:
693 ft.

RCRA-SQG:
Date form received by agency: 07/14/2000
Facility name: SANTA MARGARITA TIRE
Facility address: 20761 LAKE FOREST DR UNIT K
LAKE FOREST, CA 92630
EPA ID: CAR000078329
Contact: MIKE DEL RIO
Contact address: 20761 LAKE FOREST DE UNIT K
LAKE FOREST, CA 92630
Contact country: US
Contact telephone: 949-589-9242
Contact email: Not reported
EPA Region: 09
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: SANTA MARGARITA AUTOMOTIVE
Owner/operator address: 20761 LAKE FOREST DR UNIT K
LAKE FOREST, CA 92630
Owner/operator country: Not reported
Owner/operator telephone: 949-589-9242
Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No

SANTA MARGARITA TIRE (Continued) **1004675884**

Used oil transfer facility: No
Used oil transporter: No

. Waste code: D039
. Waste name: TETRACHLOROETHYLENE

Violation Status: No violations found

FINDS:

Registry ID: 110002940505

Environmental Interest/Information System
California Hazardous Waste Tracking System - Datamart (HWTS-DATAMART) provides California with information on hazardous waste shipments for generators, transporters, and treatment, storage, and disposal facilities.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1004675884
Registry ID: 110002940505
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110002940505

I41 **CLEANERS 2000** **RCRA-SQG** **1000594350**
South **20761 LAKEFOREST #H** **FINDS** **CAD983581711**
1/8-1/4 **EL TORO, CA 92630** **ECHO**
0.211 mi.
1112 ft. **Site 3 of 6 in cluster I**

Relative:
Lower

Actual:
697 ft.

RCRA-SQG:
Date form received by agency: 05/07/1991
Facility name: CLEANERS 2000
Facility address: 20761 LAKEFOREST #H
EL TORO, CA 92630
EPA ID: CAD983581711
Mailing address: LAKEFOREST #H
EL TORO, CA 92630
Contact: RICHARD KANG
Contact address: 20761 LAKEFOREST #H
EL TORO, CA 92630
Contact country: US
Contact telephone: 714-586-2972
Contact email: Not reported
EPA Region: 09
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of

CLEANERS 2000 (Continued) **1000594350**

hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	NOT REQUIRED
Owner/operator address:	NOT REQUIRED
	NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	415-555-1212
Owner/operator email:	Not reported
Owner/operator fax:	Not reported
Owner/operator extension:	Not reported
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Owner/operator name:	KANG RICHARD M
Owner/operator address:	NOT REQUIRED
	NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	415-555-1212
Owner/operator email:	Not reported
Owner/operator fax:	Not reported
Owner/operator extension:	Not reported
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No

Violation Status: No violations found

FINDS:

Registry ID: 110002843889

Environmental Interest/Information System

California Hazardous Waste Tracking System - Datamart (HWTS-DATAMART) provides California with information on hazardous waste shipments for

CLEANERS 2000 (Continued) **1000594350**

generators, transporters, and treatment, storage, and disposal facilities.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1000594350
Registry ID:	110002843889
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110002843889

I42 **CLEANERS 2000** **DRYCLEANERS** **S121693286**
South **20761 LAKE FOREST DR #H** **N/A**
1/8-1/4 **LAKE FOREST, CA 92630**
0.211 mi.
1112 ft. **Site 4 of 6 in cluster I**

Relative: **Lower**

Actual: **697 ft.**

DRYCLEAN SOUTH COAST:

Facility ID:	100620
Application Number:	290412
Permit Number:	D81263
Status:	A
Representative Name:	PAUL CHUNG
Representative Telephone:	949 5862972
Permit Status:	INACTIVE
BCAT Number:	000601
BCAT Description:	DRY CLEANING, DRY-TO-DRY NON-VENT, PERC
UTM East:	438.31201172
UTM North:	3724.9980469

Facility ID:	100620
Application Number:	468549
Permit Number:	F90093
Status:	A
Representative Name:	PAUL CHUNG
Representative Telephone:	949 5862972
Permit Status:	ACTIVE
BCAT Number:	000233
BCAT Description:	DRY CLEANING EQUIP PETROLEUM SOLVENT
UTM East:	438.31201172
UTM North:	3724.9980469

I43 **CLEANERS 2000** **DRYCLEANERS** **S121699736**
South **20761 LAKE FOREST DR** **N/A**
1/8-1/4 **LAKE FOREST, CA 92630**
0.211 mi.
1112 ft. **Site 5 of 6 in cluster I**

Relative: **Lower**

Actual: **697 ft.**

DRYCLEAN SOUTH COAST:

Facility ID:	81979
Application Number:	239284
Permit Number:	D35666
Status:	O
Representative Name:	H.B. KANG
Representative Telephone:	714 5879000
Permit Status:	INACTIVE
BCAT Number:	000234
BCAT Description:	DRY CLEANING EQUIP PERCHLOROETHYLENE
UTM East:	436.20001221
UTM North:	3723.1000977

I44 **JIFFY LUBE NO 1301** **RCRA-SQG** **1000594445**
South **20781 LAKE FOREST DR** **CAD983582750**
1/8-1/4 **LAKE FOREST, CA 92630**
0.236 mi.
1246 ft. **Site 6 of 6 in cluster I**

Relative: **Lower**

Actual: **710 ft.**

RCRA-SQG:

Date form received by agency:	06/18/1997
Facility name:	JIFFY LUBE NO 1301
Facility address:	20781 LAKE FOREST DR LAKE FOREST, CA 92630-7738
EPA ID:	CAD983582750
Contact:	SUZAN PAEK
Contact address:	PO BOX 5709 DIAMOND BAR, CA 91765-9998
Contact country:	US
Contact telephone:	909-613-1772
Contact email:	Not reported
EPA Region:	09
Land type:	Private
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	NOT REQUIRED
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	415-555-1212
Owner/operator email:	Not reported
Owner/operator fax:	Not reported
Owner/operator extension:	Not reported
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

JIFFY LUBE NO 1301 (Continued) **1000594445**

Owner/operator name: ALLIED LUBE INC
Owner/operator address: PO BOX 5709
DIAMOND BAR, CA 91765
Owner/operator country: Not reported
Owner/operator telephone: 909-613-1772
Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Other
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Historical Generators:
Date form received by agency: 09/01/1996
Site name: JIFFY LUBE NO 1301
Classification: Small Quantity Generator

Facility Has Received Notices of Violations:
Regulation violated: FR - 262.10-12.A
Area of violation: Generators - General
Date violation determined: 07/30/1991
Date achieved compliance: 10/05/1993
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:
Evaluation date: 10/05/1993
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported

JIFFY LUBE NO 1301 (Continued) **1000594445**

Evaluation lead agency: State Contractor/Grantee

Evaluation date: 07/30/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 10/05/1993
Evaluation lead agency: State Contractor/Grantee

45
SW
1/4-1/2
0.459 mi.
2425 ft.

GREENWASTE COMPOSTING **WMUDS/SWAT** **S104384477**
20712 INDIAN OCEAN DR **N/A**
LAKE FOREST CA, CA 92630

Relative:
Lower

Actual:
686 ft.

WMUDS/SWAT:

Edit Date:	Not reported
Complexity:	Not reported
Primary Waste:	SLDWST
Primary Waste Type:	Nonhazardous Solid Wastes/Influent or Solid Wastes that contain nonhazardous putrescible and non putrescible solid, semisolid, and liquid wastes (E.G., garbage, trash, refuse, paper, demolition and construction wastes, manure, vegetable or animal solid and semisolid waste).
Secondary Waste:	Not reported
Secondary Waste Type:	Not reported
Base Meridian:	Not reported
NPID:	Not reported
Tonnage:	0
Regional Board ID:	Not reported
Municipal Solid Waste:	False
Superorder:	False
Open To Public:	False
Waste List:	False
Agency Type:	Private
Agency Name:	PACIFIC WASTE MANAGEMENT
Agency Department:	Not reported
Agency Address:	20712 INDIAN OCEAN DR.
Agency City,St,Zip:	LAKE FOREST CA 92630
Agency Contact:	GARY PLUMLEY
Agency Telephone:	7145988181
Land Owner Name:	Not reported
Land Owner Address:	Not reported
Land Owner City,St,Zip:	Not reported
Land Owner Contact:	Not reported
Land Owner Phone:	Not reported
Region:	8
Facility Type:	Other - Does not fall into the category of Municipal/Domestic, Industrial, Agricultural or Solid Waste (Class I, II or III)
Facility Description:	Not reported
Facility Telephone:	Not reported
SWAT Facility Name:	Not reported
Primary SIC:	2875
Secondary SIC:	Not reported
Comments:	Not reported
Last Facility Editors:	Not reported
Waste Discharge System:	True
Solid Waste Assessment Test Program:	False
Toxic Pits Cleanup Act Program:	False
Resource Conservation Recovery Act:	False

GREENWASTE COMPOSTING (Continued) **S104384477**

Department of Defence:	False
Solid Waste Assessment Test Program:	Not reported
Threat to Water Quality:	Not reported
Sub Chapter 15:	True
Regional Board Project Officer:	JPL
Number of WMUDS at Facility:	0
Section Range:	Not reported
RCRA Facility:	No
Waste Discharge Requirements:	H
Self-Monitoring Rept. Frequency:	No Reporting Requirements
Waste Discharge System ID:	8 303062001
Solid Waste Information ID:	Not reported

Count: 5 records.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
LAKE FOREST	1023265403	GREENWASTENA LAKE FOREST	20200 BAKE PARKWAY	92630	FINDS
LAKE FOREST	S121658260	NE CORNER LAKE FOREST & TOWNE	NE CORNER LAKE FOREST & TOWNE	92610	CIWQS
LAKE FOREST	S121649787	LAKE FOREST PUMP HOUSE ADDTION	3910 N LAKE BLVD		CIWQS
LAKE FOREST	1023304533	LAKE FOREST PUMP HOUSE ADDTION	3910 N LAKE BLVD	92630	FINDS
LAKE FOREST	S121667492	REGENCY LAKE FOREST DR	REGENCY LAKE FOREST DR		CIWQS

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 05/13/2018
Date Data Arrived at EDR: 05/30/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 23

Source: EPA
Telephone: N/A
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 07/16/2018
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 05/13/2018
Date Data Arrived at EDR: 05/30/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 23

Source: EPA
Telephone: N/A
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 07/16/2018
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal Delisted NPL site list

Delisted NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 05/13/2018
Date Data Arrived at EDR: 05/30/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 23

Source: EPA
Telephone: N/A
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 07/16/2018
Data Release Frequency: Quarterly

Federal CERCLIS list

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 11/07/2016
Date Data Arrived at EDR: 01/05/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 92

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 04/06/2018
Next Scheduled EDR Contact: 07/16/2018
Data Release Frequency: Varies

SEMS: Superfund Enterprise Management System

SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly know as CERCLIS, renamed to SEMS by the EPA in 2015. The list contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 05/18/2018
Date Data Arrived at EDR: 05/30/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 23

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 07/30/2018
Data Release Frequency: Quarterly

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that. based upon available information, the location is not judged to be potential NPL site.

Date of Government Version: 05/18/2018
Date Data Arrived at EDR: 05/30/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 23

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 07/30/2018
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/28/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 86

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 06/28/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/28/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 86

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/28/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/28/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 86

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/28/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/28/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 86

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/28/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/28/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 86

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/28/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

Federal institutional controls / engineering controls registries

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 02/16/2018
Date Data Arrived at EDR: 02/22/2018
Date Made Active in Reports: 05/11/2018
Number of Days to Update: 78

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 05/09/2018
Next Scheduled EDR Contact: 08/27/2018
Data Release Frequency: Varies

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 02/13/2018
Date Data Arrived at EDR: 02/27/2018
Date Made Active in Reports: 05/11/2018
Number of Days to Update: 73

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 05/29/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 02/13/2018
Date Data Arrived at EDR: 02/27/2018
Date Made Active in Reports: 05/11/2018
Number of Days to Update: 73

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 05/29/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 03/19/2018
Date Data Arrived at EDR: 03/27/2018
Date Made Active in Reports: 06/08/2018
Number of Days to Update: 73

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 06/27/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

State- and tribal - equivalent NPL

RESPONSE: State Response Sites

Identifies confirmed release sites where DTSC is involved in remediation, either in a lead or oversight capacity. These confirmed release sites are generally high-priority and high potential risk.

Date of Government Version: 04/30/2018
Date Data Arrived at EDR: 05/02/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 51

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 05/02/2018
Next Scheduled EDR Contact: 08/13/2018
Data Release Frequency: Quarterly

State- and tribal - equivalent CERCLIS

ENVIROSTOR: EnviroStor Database

The Department of Toxic Substances Control's (DTSC's) Site Mitigation and Brownfields Reuse Program's (SMBRP's) EnviroStor database identifes sites that have known contamination or sites for which there may be reasons to investigate further. The database includes the following site types: Federal Superfund sites (National Priorities List (NPL)); State Response, including Military Facilities and State Superfund; Voluntary Cleanup; and School sites. EnviroStor provides similar information to the information that was available in CalSites, and provides additional site information, including, but not limited to, identification of formerly-contaminated properties that have been released for reuse, properties where environmental deed restrictions have been recorded to prevent inappropriate land uses, and risk characterization information that is used to assess potential impacts to public health and the environment at contaminated sites.

Date of Government Version: 04/30/2018
Date Data Arrived at EDR: 05/02/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 51

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 05/02/2018
Next Scheduled EDR Contact: 08/13/2018
Data Release Frequency: Quarterly

State and tribal landfill and/or solid waste disposal site lists

SWF/LF (SWIS): Solid Waste Information System

Active, Closed and Inactive Landfills. SWF/LF records typically contain an inve ntory of solid waste disposal facilities or landfills. These may be active or i nactive facilities or open dumps that failed to meet RCRA Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 05/14/2018
Date Data Arrived at EDR: 05/16/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 37

Source: Department of Resources Recycling and Recovery
Telephone: 916-341-6320
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 08/27/2018
Data Release Frequency: Quarterly

State and tribal leaking storage tank lists

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

LUST REG 1: Active Toxic Site Investigation

Del Norte, Humboldt, Lake, Mendocino, Modoc, Siskiyou, Sonoma, Trinity counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/01/2001
Date Data Arrived at EDR: 02/28/2001
Date Made Active in Reports: 03/29/2001
Number of Days to Update: 29

Source: California Regional Water Quality Control Board North Coast (1)
Telephone: 707-570-3769
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

LUST REG 7: Leaking Underground Storage Tank Case Listing

Leaking Underground Storage Tank locations. Imperial, Riverside, San Diego, Santa Barbara counties.

Date of Government Version: 02/26/2004
Date Data Arrived at EDR: 02/26/2004
Date Made Active in Reports: 03/24/2004
Number of Days to Update: 27

Source: California Regional Water Quality Control Board Colorado River Basin Region (7)
Telephone: 760-776-8943
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

LUST REG 8: Leaking Underground Storage Tanks

California Regional Water Quality Control Board Santa Ana Region (8). For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/14/2005
Date Data Arrived at EDR: 02/15/2005
Date Made Active in Reports: 03/28/2005
Number of Days to Update: 41

Source: California Regional Water Quality Control Board Santa Ana Region (8)
Telephone: 909-782-4496
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: Varies

LUST: Leaking Underground Fuel Tank Report (GEOTRACKER)

Leaking Underground Storage Tank (LUST) Sites included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 03/21/2018
Number of Days to Update: 7

Source: State Water Resources Control Board
Telephone: see region list
Last EDR Contact: 06/13/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Quarterly

LUST REG 6V: Leaking Underground Storage Tank Case Listing

Leaking Underground Storage Tank locations. Inyo, Kern, Los Angeles, Mono, San Bernardino counties.

Date of Government Version: 06/07/2005
Date Data Arrived at EDR: 06/07/2005
Date Made Active in Reports: 06/29/2005
Number of Days to Update: 22

Source: California Regional Water Quality Control Board Victorville Branch Office (6)
Telephone: 760-241-7365
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

LUST REG 6L: Leaking Underground Storage Tank Case Listing

For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 09/09/2003
Date Data Arrived at EDR: 09/10/2003
Date Made Active in Reports: 10/07/2003
Number of Days to Update: 27

Source: California Regional Water Quality Control Board Lahontan Region (6)
Telephone: 530-542-5572
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

LUST REG 5: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank locations. Alameda, Alpine, Amador, Butte, Colusa, Contra Costa, Calveras, El Dorado, Fresno, Glenn, Kern, Kings, Lake, Lassen, Madera, Mariposa, Merced, Modoc, Napa, Nevada, Placer, Plumas, Sacramento, San Joaquin, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Tuolumne, Yolo, Yuba counties.

Date of Government Version: 07/01/2008
Date Data Arrived at EDR: 07/22/2008
Date Made Active in Reports: 07/31/2008
Number of Days to Update: 9

Source: California Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-464-4834
Last EDR Contact: 07/01/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: No Update Planned

LUST REG 2: Fuel Leak List

Leaking Underground Storage Tank locations. Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, Sonoma counties.

Date of Government Version: 09/30/2004
Date Data Arrived at EDR: 10/20/2004
Date Made Active in Reports: 11/19/2004
Number of Days to Update: 30

Source: California Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-622-2433
Last EDR Contact: 09/19/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Quarterly

LUST REG 3: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank locations. Monterey, San Benito, San Luis Obispo, Santa Barbara, Santa Cruz counties.

Date of Government Version: 05/19/2003
Date Data Arrived at EDR: 05/19/2003
Date Made Active in Reports: 06/02/2003
Number of Days to Update: 14

Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-542-4786
Last EDR Contact: 07/18/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: No Update Planned

LUST REG 4: Underground Storage Tank Leak List

Los Angeles, Ventura counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 09/07/2004
Date Data Arrived at EDR: 09/07/2004
Date Made Active in Reports: 10/12/2004
Number of Days to Update: 35

Source: California Regional Water Quality Control Board Los Angeles Region (4)
Telephone: 213-576-6710
Last EDR Contact: 09/06/2011
Next Scheduled EDR Contact: 12/19/2011
Data Release Frequency: No Update Planned

LUST REG 9: Leaking Underground Storage Tank Report

Orange, Riverside, San Diego counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 03/01/2001
Date Data Arrived at EDR: 04/23/2001
Date Made Active in Reports: 05/21/2001
Number of Days to Update: 28

Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-637-5595
Last EDR Contact: 09/26/2011
Next Scheduled EDR Contact: 01/09/2012
Data Release Frequency: No Update Planned

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 10/24/2017
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 09/30/2017
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 10/12/2017
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80
Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 10/12/2017
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80
Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 01/06/2018
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80
Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 10/14/2017
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80
Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 10/14/2017
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80
Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land
Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 10/16/2017
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80
Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

CPS-SLIC: Statewide SLIC Cases (GEOTRACKER)
Cleanup Program Sites (CPS; also known as Site Cleanups [SC] and formerly known as Spills, Leaks, Investigations, and Cleanups [SLIC] sites) included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 03/21/2018
Number of Days to Update: 7
Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Varies

SLIC REG 1: Active Toxic Site Investigations

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/03/2003
Date Data Arrived at EDR: 04/07/2003
Date Made Active in Reports: 04/25/2003
Number of Days to Update: 18

Source: California Regional Water Quality Control Board, North Coast Region (1)
Telephone: 707-576-2220
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

SLIC REG 2: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/30/2004
Date Data Arrived at EDR: 10/20/2004
Date Made Active in Reports: 11/19/2004
Number of Days to Update: 30

Source: Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-286-0457
Last EDR Contact: 09/19/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Quarterly

SLIC REG 3: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 05/18/2006
Date Data Arrived at EDR: 05/18/2006
Date Made Active in Reports: 06/15/2006
Number of Days to Update: 28

Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-549-3147
Last EDR Contact: 07/18/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: Semi-Annually

SLIC REG 4: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 11/17/2004
Date Data Arrived at EDR: 11/18/2004
Date Made Active in Reports: 01/04/2005
Number of Days to Update: 47

Source: Region Water Quality Control Board Los Angeles Region (4)
Telephone: 213-576-6600
Last EDR Contact: 07/01/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Varies

SLIC REG 5: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/01/2005
Date Data Arrived at EDR: 04/05/2005
Date Made Active in Reports: 04/21/2005
Number of Days to Update: 16

Source: Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-464-3291
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Semi-Annually

SLIC REG 6V: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 05/24/2005
Date Data Arrived at EDR: 05/25/2005
Date Made Active in Reports: 06/16/2005
Number of Days to Update: 22

Source: Regional Water Quality Control Board, Victorville Branch
Telephone: 619-241-6583
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: Semi-Annually

SLIC REG 6L: SLIC Sites
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/07/2004
Date Data Arrived at EDR: 09/07/2004
Date Made Active in Reports: 10/12/2004
Number of Days to Update: 35
Source: California Regional Water Quality Control Board, Lahontan Region
Telephone: 530-542-5574
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

SLIC REG 7: SLIC List
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 11/24/2004
Date Data Arrived at EDR: 11/29/2004
Date Made Active in Reports: 01/04/2005
Number of Days to Update: 36
Source: California Regional Quality Control Board, Colorado River Basin Region
Telephone: 760-346-7491
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

SLIC REG 8: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/03/2008
Date Data Arrived at EDR: 04/03/2008
Date Made Active in Reports: 04/14/2008
Number of Days to Update: 11
Source: California Region Water Quality Control Board Santa Ana Region (8)
Telephone: 951-782-3298
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Semi-Annually

SLIC REG 9: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/10/2007
Date Data Arrived at EDR: 09/11/2007
Date Made Active in Reports: 09/28/2007
Number of Days to Update: 17
Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-467-2980
Last EDR Contact: 08/08/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: Annually

State and tribal registered storage tank lists

FEMA UST: Underground Storage Tank Listing
A listing of all FEMA owned underground storage tanks.

Date of Government Version: 05/15/2017
Date Data Arrived at EDR: 05/30/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 136
Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 04/13/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: Varies

MILITARY UST SITES: Military UST Sites (GEOTRACKER)
Military ust sites

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51
Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

UST: Active UST Facilities

Active UST facilities gathered from the local regulatory agencies

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 03/29/2018
Number of Days to Update: 15

Source: SWRCB
Telephone: 916-341-5851
Last EDR Contact: 06/13/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Semi-Annually

UST CLOSURE: Proposed Closure of Underground Storage Tank (UST) Cases

UST cases that are being considered for closure by either the State Water Resources Control Board or the Executive Director have been posted for a 60-day public comment period. UST Case Closures being proposed for consideration by the State Water Resources Control Board. These are primarily UST cases that meet closure criteria under the decisional framework in State Water Board Resolution No. 92-49 and other Board orders. UST Case Closures proposed for consideration by the Executive Director pursuant to State Water Board Resolution No. 2012-0061. These are cases that meet the criteria of the Low-Threat UST Case Closure Policy. UST Case Closure Review Denials and Approved Orders.

Date of Government Version: 03/08/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: State Water Resources Control Board
Telephone: 916-327-7844
Last EDR Contact: 06/13/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Varies

AST: Aboveground Petroleum Storage Tank Facilities

A listing of aboveground storage tank petroleum storage tank locations.

Date of Government Version: 07/06/2016
Date Data Arrived at EDR: 07/12/2016
Date Made Active in Reports: 09/19/2016
Number of Days to Update: 69

Source: California Environmental Protection Agency
Telephone: 916-327-5092
Last EDR Contact: 06/21/2018
Next Scheduled EDR Contact: 10/01/2018
Data Release Frequency: Quarterly

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 10/24/2017
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 09/30/2017
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 10/12/2017
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 01/13/2018
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 04/24/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 12/08/2017
Number of Days to Update: 134

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 10/14/2017
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 10/14/2017
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 10/16/2017
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

State and tribal voluntary cleanup sites

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

INDIAN VCP R1: Voluntary Cleanup Priority Listing
A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 07/27/2015
Date Data Arrived at EDR: 09/29/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 142
Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 06/22/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Varies

VCP: Voluntary Cleanup Program Properties
Contains low threat level properties with either confirmed or unconfirmed releases and the project proponents have request that DTSC oversee investigation and/or cleanup activities and have agreed to provide coverage for DTSC's costs.

Date of Government Version: 04/30/2018
Date Data Arrived at EDR: 05/02/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 51
Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 05/02/2018
Next Scheduled EDR Contact: 08/13/2018
Data Release Frequency: Quarterly

State and tribal Brownfields sites

BROWNFIELDS: Considered Brownfieds Sites Listing
A listing of sites the SWRCB considers to be Brownfields since these are sites have come to them through the MOA Process.

Date of Government Version: 03/26/2018
Date Data Arrived at EDR: 03/27/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 38
Source: State Water Resources Control Board
Telephone: 916-323-7905
Last EDR Contact: 06/27/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites
Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 03/19/2018
Date Data Arrived at EDR: 03/21/2018
Date Made Active in Reports: 06/08/2018
Number of Days to Update: 79
Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 06/20/2018
Next Scheduled EDR Contact: 10/01/2018
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

WMUDS/SWAT: Waste Management Unit Database
Waste Management Unit Database System. WMUDS is used by the State Water Resources Control Board staff and the Regional Water Quality Control Boards for program tracking and inventory of waste management units. WMUDS is composed of the following databases: Facility Information, Scheduled Inspections Information, Waste Management Unit Information, SWAT Program Information, SWAT Report Summary Information, SWAT Report Summary Data, Chapter 15 (formerly Subchapter 15) Information, Chapter 15 Monitoring Parameters, TPCA Program Information, RCRA Program Information, Closure Information, and Interested Parties Information.

Date of Government Version: 04/01/2000
Date Data Arrived at EDR: 04/10/2000
Date Made Active in Reports: 05/10/2000
Number of Days to Update: 30

Source: State Water Resources Control Board
Telephone: 916-227-4448
Last EDR Contact: 05/03/2018
Next Scheduled EDR Contact: 08/13/2018
Data Release Frequency: No Update Planned

SWRCY: Recycler Database
A listing of recycling facilities in California.

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: Department of Conservation
Telephone: 916-323-3836
Last EDR Contact: 06/13/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Quarterly

HAULERS: Registered Waste Tire Haulers Listing
A listing of registered waste tire haulers.

Date of Government Version: 02/08/2018
Date Data Arrived at EDR: 02/09/2018
Date Made Active in Reports: 03/20/2018
Number of Days to Update: 39

Source: Integrated Waste Management Board
Telephone: 916-341-6422
Last EDR Contact: 05/22/2018
Next Scheduled EDR Contact: 08/27/2018
Data Release Frequency: Varies

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 01/30/2018
Next Scheduled EDR Contact: 05/14/2018
Data Release Frequency: Varies

ODI: Open Dump Inventory
An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations
A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137

Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 04/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: No Update Planned

IHS OPEN DUMPS: Open Dumps on Indian Land
A listing of all open dumps located on Indian Land in the United States.

Date of Government Version: 04/01/2014
Date Data Arrived at EDR: 08/06/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 176

Source: Department of Health & Human Serivces, Indian Health Service
Telephone: 301-443-1452
Last EDR Contact: 05/04/2018
Next Scheduled EDR Contact: 08/13/2018
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations that have been removed from the DEAs National Clandestine Laboratory Register.

Date of Government Version: 02/22/2018
Date Data Arrived at EDR: 03/01/2018
Date Made Active in Reports: 05/11/2018
Number of Days to Update: 71

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: No Update Planned

HIST CAL-SITES: Calsites Database

The Calsites database contains potential or confirmed hazardous substance release properties. In 1996, California EPA reevaluated and significantly reduced the number of sites in the Calsites database. No longer updated by the state agency. It has been replaced by ENVIROSTOR.

Date of Government Version: 08/08/2005
Date Data Arrived at EDR: 08/03/2006
Date Made Active in Reports: 08/24/2006
Number of Days to Update: 21

Source: Department of Toxic Substance Control
Telephone: 916-323-3400
Last EDR Contact: 02/23/2009
Next Scheduled EDR Contact: 05/25/2009
Data Release Frequency: No Update Planned

SCH: School Property Evaluation Program

This category contains proposed and existing school sites that are being evaluated by DTSC for possible hazardous materials contamination. In some cases, these properties may be listed in the CalSites category depending on the level of threat to public health and safety or the environment they pose.

Date of Government Version: 04/30/2018
Date Data Arrived at EDR: 05/02/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 51

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 05/02/2018
Next Scheduled EDR Contact: 08/13/2018
Data Release Frequency: Quarterly

CDL: Clandestine Drug Labs

A listing of drug lab locations. Listing of a location in this database does not indicate that any illegal drug lab materials were or were not present there, and does not constitute a determination that the location either requires or does not require additional cleanup work.

Date of Government Version: 06/30/2017
Date Data Arrived at EDR: 08/18/2017
Date Made Active in Reports: 09/21/2017
Number of Days to Update: 34

Source: Department of Toxic Substances Control
Telephone: 916-255-6504
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: Varies

TOXIC PITS: Toxic Pits Cleanup Act Sites

Toxic PITS Cleanup Act Sites. TOXIC PITS identifies sites suspected of containing hazardous substances where cleanup has not yet been completed.

Date of Government Version: 07/01/1995
Date Data Arrived at EDR: 08/30/1995
Date Made Active in Reports: 09/26/1995
Number of Days to Update: 27

Source: State Water Resources Control Board
Telephone: 916-227-4364
Last EDR Contact: 01/26/2009
Next Scheduled EDR Contact: 04/27/2009
Data Release Frequency: No Update Planned

US CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 02/22/2018
Date Data Arrived at EDR: 03/01/2018
Date Made Active in Reports: 05/11/2018
Number of Days to Update: 71

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Quarterly

CERS HAZ WASTE: CERS HAZ WASTE

List of sites in the California Environmental Protection Agency (CalEPA) Regulated Site Portal which fall under the Hazardous Chemical Management, Hazardous Waste Onsite Treatment, Household Hazardous Waste Collection, Hazardous Waste Generator, and RCRA LQ HW Generator programs.

Date of Government Version: 04/23/2018
Date Data Arrived at EDR: 04/24/2018
Date Made Active in Reports: 06/07/2018
Number of Days to Update: 44

Source: CalEPA
Telephone: 916-323-2514
Last EDR Contact: 04/24/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Quarterly

Local Lists of Registered Storage Tanks

SWEEPS UST: SWEEPS UST Listing

Statewide Environmental Evaluation and Planning System. This underground storage tank listing was updated and maintained by a company contacted by the SWRCB in the early 1990's. The listing is no longer updated or maintained. The local agency is the contact for more information on a site on the SWEEPS list.

Date of Government Version: 06/01/1994
Date Data Arrived at EDR: 07/07/2005
Date Made Active in Reports: 08/11/2005
Number of Days to Update: 35

Source: State Water Resources Control Board
Telephone: N/A
Last EDR Contact: 06/03/2005
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

UST MENDOCINO: Mendocino County UST Database

A listing of underground storage tank locations in Mendocino County.

Date of Government Version: 02/28/2018
Date Data Arrived at EDR: 03/01/2018
Date Made Active in Reports: 03/28/2018
Number of Days to Update: 27

Source: Department of Public Health
Telephone: 707-463-4466
Last EDR Contact: 05/22/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Annually

HIST UST: Hazardous Substance Storage Container Database

The Hazardous Substance Storage Container Database is a historical listing of UST sites. Refer to local/county source for current data.

Date of Government Version: 10/15/1990
Date Data Arrived at EDR: 01/25/1991
Date Made Active in Reports: 02/12/1991
Number of Days to Update: 18

Source: State Water Resources Control Board
Telephone: 916-341-5851
Last EDR Contact: 07/26/2001
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

SAN FRANCISCO AST: Aboveground Storage Tank Site Listing

Aboveground storage tank sites

Date of Government Version: 04/19/2018
Date Data Arrived at EDR: 04/24/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 10

Source: San Francisco County Department of Public Health
Telephone: 415-252-3896
Last EDR Contact: 05/02/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Varies

CA FID UST: Facility Inventory Database

The Facility Inventory Database (FID) contains a historical listing of active and inactive underground storage tank locations from the State Water Resource Control Board. Refer to local/county source for current data.

Date of Government Version: 10/31/1994
Date Data Arrived at EDR: 09/05/1995
Date Made Active in Reports: 09/29/1995
Number of Days to Update: 24

Source: California Environmental Protection Agency
Telephone: 916-341-5851
Last EDR Contact: 12/28/1998
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

CERS TANKS: California Environmental Reporting System (CERS) Tanks

List of sites in the California Environmental Protection Agency (CalEPA) Regulated Site Portal which fall under the Aboveground Petroleum Storage and Underground Storage Tank regulatory programs.

Date of Government Version: 04/23/2018
Date Data Arrived at EDR: 04/24/2018
Date Made Active in Reports: 06/07/2018
Number of Days to Update: 44

Source: California Environmental Protection Agency
Telephone: 916-323-2514
Last EDR Contact: 04/24/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Quarterly

Local Land Records

LIENS: Environmental Liens Listing

A listing of property locations with environmental liens for California where DTSC is a lien holder.

Date of Government Version: 01/28/2018
Date Data Arrived at EDR: 03/01/2018
Date Made Active in Reports: 04/16/2018
Number of Days to Update: 46

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 05/31/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Varies

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 05/13/2018
Date Data Arrived at EDR: 05/30/2018
Date Made Active in Reports: 06/29/2018
Number of Days to Update: 30

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Semi-Annually

DEED: Deed Restriction Listing

Site Mitigation and Brownfields Reuse Program Facility Sites with Deed Restrictions & Hazardous Waste Management Program Facility Sites with Deed / Land Use Restriction. The DTSC Site Mitigation and Brownfields Reuse Program (SMBRP) list includes sites cleaned up under the program's oversight and generally does not include current or former hazardous waste facilities that required a hazardous waste facility permit. The list represents deed restrictions that are active. Some sites have multiple deed restrictions. The DTSC Hazardous Waste Management Program (HWMP) has developed a list of current or former hazardous waste facilities that have a recorded land use restriction at the local county recorder's office. The land use restrictions on this list were required by the DTSC HWMP as a result of the presence of hazardous substances that remain on site after the facility (or part of the facility) has been closed or cleaned up. The types of land use restriction include deed notice, deed restriction, or a land use restriction that binds current and future owners.

Date of Government Version: 02/08/2018
Date Data Arrived at EDR: 02/08/2018
Date Made Active in Reports: 02/08/2018
Number of Days to Update: 0

Source: DTSC and SWRCB
Telephone: 916-323-3400
Last EDR Contact: 06/06/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Semi-Annually

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 03/26/2018
Date Data Arrived at EDR: 03/27/2018
Date Made Active in Reports: 06/08/2018
Number of Days to Update: 73

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 03/27/2018
Next Scheduled EDR Contact: 07/09/2018
Data Release Frequency: Quarterly

CHMIRS: California Hazardous Material Incident Report System

California Hazardous Material Incident Reporting System. CHMIRS contains information on reported hazardous material incidents (accidental releases or spills).

Date of Government Version: 04/06/2018
Date Data Arrived at EDR: 04/24/2018
Date Made Active in Reports: 06/14/2018
Number of Days to Update: 51

Source: Office of Emergency Services
Telephone: 916-845-8400
Last EDR Contact: 04/24/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Semi-Annually

LDS: Land Disposal Sites Listing (GEOTRACKER)

Land Disposal sites (Landfills) included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: State Water Qualilty Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Quarterly

MCS: Military Cleanup Sites Listing (GEOTRACKER)

Military sites (consisting of: Military UST sites; Military Privatized sites; and Military Cleanup sites [formerly known as DoD non UST]) included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 03/21/2018
Number of Days to Update: 7

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Quarterly

SPILLS 90: SPILLS90 data from FirstSearch

Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

Date of Government Version: 06/06/2012
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 02/22/2013
Number of Days to Update: 50

Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/28/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 86

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/28/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 01/31/2015
Date Data Arrived at EDR: 07/08/2015
Date Made Active in Reports: 10/13/2015
Number of Days to Update: 97

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 05/25/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 04/13/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: Semi-Annually

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 04/11/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: N/A

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 01/01/2017
Date Data Arrived at EDR: 02/03/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 63

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 05/15/2018
Next Scheduled EDR Contact: 08/27/2018
Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/27/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 87

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 06/27/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 05/07/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Quarterly

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 04/22/2013
Date Data Arrived at EDR: 03/03/2015
Date Made Active in Reports: 03/09/2015
Number of Days to Update: 6

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 05/08/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Varies

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 06/21/2017
Date Made Active in Reports: 01/05/2018
Number of Days to Update: 198

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 06/22/2018
Next Scheduled EDR Contact: 10/01/2018
Data Release Frequency: Every 4 Years

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 01/10/2018
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 2

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 05/25/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Annually

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 04/09/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Annually

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 05/13/2018
Date Data Arrived at EDR: 05/30/2018
Date Made Active in Reports: 06/29/2018
Number of Days to Update: 30

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Annually

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 11/02/2017
Date Data Arrived at EDR: 11/17/2017
Date Made Active in Reports: 12/08/2017
Number of Days to Update: 21

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 04/20/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

PRP: Potentially Responsible Parties

A listing of verified Potentially Responsible Parties

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 10/17/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 3

Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 06/01/2017
Date Data Arrived at EDR: 06/09/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 126

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 04/13/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 11/18/2016
Date Data Arrived at EDR: 11/23/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 79

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 04/09/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: Quarterly

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Quarterly

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 08/30/2016
Date Data Arrived at EDR: 09/08/2016
Date Made Active in Reports: 10/21/2016
Number of Days to Update: 43

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 05/03/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Quarterly

COAL ASH DOE: Steam-Electric Plant Operation Data

A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76

Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 06/07/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List

A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 07/01/2014
Date Data Arrived at EDR: 09/10/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 06/04/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 05/24/2017
Date Data Arrived at EDR: 11/30/2017
Date Made Active in Reports: 12/15/2017
Number of Days to Update: 15
Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 04/27/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

RADINFO: Radiation Information Database
The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 04/03/2018
Date Data Arrived at EDR: 04/05/2018
Date Made Active in Reports: 06/29/2018
Number of Days to Update: 85
Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 04/05/2018
Next Scheduled EDR Contact: 07/16/2018
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing
A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing
A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

DOT OPS: Incident and Accident Data
Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 07/31/2012
Date Data Arrived at EDR: 08/07/2012
Date Made Active in Reports: 09/18/2012
Number of Days to Update: 42
Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 05/03/2018
Next Scheduled EDR Contact: 08/13/2018
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees
Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 03/31/2018
Date Data Arrived at EDR: 04/16/2018
Date Made Active in Reports: 06/29/2018
Number of Days to Update: 74

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 06/22/2018
Next Scheduled EDR Contact: 10/01/2018
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2015
Date Data Arrived at EDR: 02/22/2017
Date Made Active in Reports: 09/28/2017
Number of Days to Update: 218

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 06/28/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Biennially

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 07/14/2015
Date Made Active in Reports: 01/10/2017
Number of Days to Update: 546

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 04/11/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: Semi-Annually

FUSRAP: Formerly Utilized Sites Remedial Action Program

DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations.

Date of Government Version: 12/23/2016
Date Data Arrived at EDR: 12/27/2016
Date Made Active in Reports: 02/17/2017
Number of Days to Update: 52

Source: Department of Energy
Telephone: 202-586-3559
Last EDR Contact: 05/07/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Varies

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 06/23/2017
Date Data Arrived at EDR: 10/11/2017
Date Made Active in Reports: 11/03/2017
Number of Days to Update: 23

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 05/13/2018
Date Data Arrived at EDR: 05/30/2018
Date Made Active in Reports: 06/29/2018
Number of Days to Update: 30

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 07/16/2018
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36

Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data

A listing of minor source facilities.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 05/03/2018
Date Data Arrived at EDR: 05/31/2018
Date Made Active in Reports: 06/29/2018
Number of Days to Update: 29

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 05/31/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Semi-Annually

US MINES 2: Ferrous and Nonferrous Metal Mines Database Listing

This map layer includes ferrous (ferrous metal mines are facilities that extract ferrous metals, such as iron ore or molybdenum) and nonferrous (Nonferrous metal mines are facilities that extract nonferrous metals, such as gold, silver, copper, zinc, and lead) metal mines in the United States.

Date of Government Version: 12/05/2005
Date Data Arrived at EDR: 02/29/2008
Date Made Active in Reports: 04/18/2008
Number of Days to Update: 49

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Varies

US MINES 3: Active Mines & Mineral Plants Database Listing

Active Mines and Mineral Processing Plant operations for commodities monitored by the Minerals Information Team of the USGS.

Date of Government Version: 04/14/2011
Date Data Arrived at EDR: 06/08/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 97

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

ABANDONED MINES: Abandoned Mines

An inventory of land and water impacted by past mining (primarily coal mining) is maintained by OSMRE to provide information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). The inventory contains information on the location, type, and extent of AML impacts, as well as, information on the cost associated with the reclamation of those problems. The inventory is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed.

Date of Government Version: 03/08/2018
Date Data Arrived at EDR: 03/13/2018
Date Made Active in Reports: 06/08/2018
Number of Days to Update: 87

Source: Department of Interior
Telephone: 202-208-2609
Last EDR Contact: 06/20/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 02/21/2018
Date Data Arrived at EDR: 02/23/2018
Date Made Active in Reports: 03/23/2018
Number of Days to Update: 28

Source: EPA
Telephone: (415) 947-8000
Last EDR Contact: 06/06/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Quarterly

DOCKET HWC: Hazardous Waste Compliance Docket Listing

A complete list of the Federal Agency Hazardous Waste Compliance Docket Facilities.

Date of Government Version: 01/04/2018
Date Data Arrived at EDR: 01/19/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 84

Source: Environmental Protection Agency
Telephone: 202-564-0527
Last EDR Contact: 06/01/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Varies

ECHO: Enforcement & Compliance History Information

ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

Date of Government Version: 02/25/2018
Date Data Arrived at EDR: 03/17/2018
Date Made Active in Reports: 06/08/2018
Number of Days to Update: 83

Source: Environmental Protection Agency
Telephone: 202-564-2280
Last EDR Contact: 06/06/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Quarterly

UXO: Unexploded Ordnance Sites

A listing of unexploded ordnance site locations

Date of Government Version: 09/30/2016
Date Data Arrived at EDR: 10/31/2017
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 73

Source: Department of Defense
Telephone: 703-704-1564
Last EDR Contact: 04/13/2018
Next Scheduled EDR Contact: 07/30/2018
Data Release Frequency: Varies

FUELS PROGRAM: EPA Fuels Program Registered Listing

This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

Date of Government Version: 02/20/2018
Date Data Arrived at EDR: 02/21/2018
Date Made Active in Reports: 03/23/2018
Number of Days to Update: 30

Source: EPA
Telephone: 800-385-6164
Last EDR Contact: 05/23/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Quarterly

CA BOND EXP. PLAN: Bond Expenditure Plan

Department of Health Services developed a site-specific expenditure plan as the basis for an appropriation of Hazardous Substance Cleanup Bond Act funds. It is not updated.

Date of Government Version: 01/01/1989
Date Data Arrived at EDR: 07/27/1994
Date Made Active in Reports: 08/02/1994
Number of Days to Update: 6

Source: Department of Health Services
Telephone: 916-255-2118
Last EDR Contact: 05/31/1994
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

CORTESE: "Cortese" Hazardous Waste & Substances Sites List

The sites for the list are designated by the State Water Resource Control Board (LUST), the Integrated Waste Board (SWF/LS), and the Department of Toxic Substances Control (Cal-Sites).

Date of Government Version: 03/26/2018
Date Data Arrived at EDR: 03/27/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 38

Source: CAL EPA/Office of Emergency Information
Telephone: 916-323-3400
Last EDR Contact: 06/27/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

CUPA LIVERMORE-PLEASANTON: CUPA Facility Listing

list of facilities associated with the various CUPA programs in Livermore-Pleasanton

Date of Government Version: 04/03/2018
Date Data Arrived at EDR: 05/07/2018
Date Made Active in Reports: 06/15/2018
Number of Days to Update: 39

Source: Livermore-Pleasanton Fire Department
Telephone: 925-454-2361
Last EDR Contact: 05/07/2018
Next Scheduled EDR Contact: 08/27/2018
Data Release Frequency: Varies

CUPA SAN FRANCISCO CO: CUPA SAN FRANCISCO CO

Cupa facilities

Date of Government Version: 04/20/2018
Date Data Arrived at EDR: 04/24/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 10

Source: San Francisco County Department of Environmental Health
Telephone: 415-252-3896
Last EDR Contact: 05/02/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Varies

DRYCLEANERS: Cleaner Facilities

A list of drycleaner related facilities that have EPA ID numbers. These are facilities with certain SIC codes: power laundries, family and commercial; garment pressing and cleaner's agents; linen supply; coin-operated laundries and cleaning; drycleaning plants, except rugs; carpet and upholster cleaning; industrial launderers; laundry and garment services.

Date of Government Version: 03/27/2018
Date Data Arrived at EDR: 03/29/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 36

Source: Department of Toxic Substance Control
Telephone: 916-327-4498
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Annually

DRYCLEAN AVAQMD: DRYCLEAN AVAQMD

A listing of dry cleaners in the Antelope Valley Air Quality Management District.

Date of Government Version: 03/08/2018
Date Data Arrived at EDR: 03/13/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 52

Source: Antelope Valley Air Quality Management District
Telephone: 661-723-8070
Last EDR Contact: 06/22/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Varies

DRYCLEAN SOUTH COAST: DRYCLEAN SOUTH COAST

A listing of dry cleaners in the South Coast Air Quality Management District

Date of Government Version: 03/16/2018
Date Data Arrived at EDR: 03/20/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 45

Source: South Coast Air Quality Management District
Telephone: 909-396-3211
Last EDR Contact: 06/11/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Varies

EMI: Emissions Inventory Data

Toxics and criteria pollutant emissions data collected by the ARB and local air pollution agencies.

Date of Government Version: 12/31/2015
Date Data Arrived at EDR: 03/21/2017
Date Made Active in Reports: 08/15/2017
Number of Days to Update: 147

Source: California Air Resources Board
Telephone: 916-322-2990
Last EDR Contact: 06/20/2018
Next Scheduled EDR Contact: 10/01/2018
Data Release Frequency: Varies

ENF: Enforcement Action Listing

A listing of Water Board Enforcement Actions. Formal is everything except Oral/Verbal Communication, Notice of Violation, Expedited Payment Letter, and Staff Enforcement Letter.

Date of Government Version: 01/22/2018
Date Data Arrived at EDR: 01/24/2018
Date Made Active in Reports: 03/19/2018
Number of Days to Update: 54

Source: State Water Resoruces Control Board
Telephone: 916-445-9379
Last EDR Contact: 04/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

Financial Assurance 1: Financial Assurance Information Listing

Financial Assurance information

Date of Government Version: 04/18/2018
Date Data Arrived at EDR: 04/20/2018
Date Made Active in Reports: 06/19/2018
Number of Days to Update: 60

Source: Department of Toxic Substances Control
Telephone: 916-255-3628
Last EDR Contact: 04/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

Financial Assurance 2: Financial Assurance Information Listing

A listing of financial assurance information for solid waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 05/14/2018
Date Data Arrived at EDR: 05/15/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 38

Source: California Integrated Waste Management Board
Telephone: 916-341-6066
Last EDR Contact: 05/09/2018
Next Scheduled EDR Contact: 08/27/2018
Data Release Frequency: Varies

HAZNET: Facility and Manifest Data

Facility and Manifest Data. The data is extracted from the copies of hazardous waste manifests received each year by the DTSC. The annual volume of manifests is typically 700,000 - 1,000,000 annually, representing approximately 350,000 - 500,000 shipments. Data are from the manifests submitted without correction, and therefore many contain some invalid values for data elements such as generator ID, TSD ID, waste category, and disposal method. This database begins with calendar year 1993.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 07/12/2017
Date Made Active in Reports: 10/17/2017
Number of Days to Update: 97

Source: California Environmental Protection Agency
Telephone: 916-255-1136
Last EDR Contact: 04/12/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: Annually

ICE: ICE

Contains data pertaining to the Permitted Facilities with Inspections / Enforcements sites tracked in Envirostor.

Date of Government Version: 02/20/2018
Date Data Arrived at EDR: 02/21/2018
Date Made Active in Reports: 04/03/2018
Number of Days to Update: 41

Source: Department of Toxic Subsances Control
Telephone: 877-786-9427
Last EDR Contact: 05/23/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Quarterly

HIST CORTESE: Hazardous Waste & Substance Site List

The sites for the list are designated by the State Water Resource Control Board [LUST], the Integrated Waste Board [SWF/LS], and the Department of Toxic Substances Control [CALSITES]. This listing is no longer updated by the state agency.

Date of Government Version: 04/01/2001
Date Data Arrived at EDR: 01/22/2009
Date Made Active in Reports: 04/08/2009
Number of Days to Update: 76

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 01/22/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

HWP: EnviroStor Permitted Facilities Listing

Detailed information on permitted hazardous waste facilities and corrective action ("cleanups") tracked in EnviroStor.

Date of Government Version: 02/20/2018
Date Data Arrived at EDR: 02/21/2018
Date Made Active in Reports: 04/03/2018
Number of Days to Update: 41

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 05/23/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Quarterly

HWT: Registered Hazardous Waste Transporter Database

A listing of hazardous waste transporters. In California, unless specifically exempted, it is unlawful for any person to transport hazardous wastes unless the person holds a valid registration issued by DTSC. A hazardous waste transporter registration is valid for one year and is assigned a unique registration number.

Date of Government Version: 04/09/2018
Date Data Arrived at EDR: 04/11/2018
Date Made Active in Reports: 06/19/2018
Number of Days to Update: 69

Source: Department of Toxic Substances Control
Telephone: 916-440-7145
Last EDR Contact: 04/11/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: Quarterly

MINES: Mines Site Location Listing

A listing of mine site locations from the Office of Mine Reclamation.

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: Department of Conservation
Telephone: 916-322-1080
Last EDR Contact: 06/13/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Quarterly

MWMP: Medical Waste Management Program Listing

The Medical Waste Management Program (MWMP) ensures the proper handling and disposal of medical waste by permitting and inspecting medical waste Offsite Treatment Facilities (PDF) and Transfer Stations (PDF) throughout the state. MWMP also oversees all Medical Waste Transporters.

Date of Government Version: 02/27/2018
Date Data Arrived at EDR: 03/05/2018
Date Made Active in Reports: 04/16/2018
Number of Days to Update: 42

Source: Department of Public Health
Telephone: 916-558-1784
Last EDR Contact: 06/06/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Varies

NPDES: NPDES Permits Listing
A listing of NPDES permits, including stormwater.

Date of Government Version: 03/14/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: State Water Resources Control Board
Telephone: 916-445-9379
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 08/27/2018
Data Release Frequency: Quarterly

PEST LIC: Pesticide Regulation Licenses Listing
A listing of licenses and certificates issued by the Department of Pesticide Regulation. The DPR issues licenses and/or certificates to: Persons and businesses that apply or sell pesticides; Pest control dealers and brokers; Persons who advise on agricultural pesticide applications.

Date of Government Version: 03/05/2018
Date Data Arrived at EDR: 03/05/2018
Date Made Active in Reports: 04/19/2018
Number of Days to Update: 45

Source: Department of Pesticide Regulation
Telephone: 916-445-4038
Last EDR Contact: 06/06/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Quarterly

PROC: Certified Processors Database
A listing of certified processors.

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: Department of Conservation
Telephone: 916-323-3836
Last EDR Contact: 06/13/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Quarterly

NOTIFY 65: Proposition 65 Records
Listings of all Proposition 65 incidents reported to counties by the State Water Resources Control Board and the Regional Water Quality Control Board. This database is no longer updated by the reporting agency.

Date of Government Version: 03/23/2018
Date Data Arrived at EDR: 03/27/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 38

Source: State Water Resources Control Board
Telephone: 916-445-3846
Last EDR Contact: 06/14/2018
Next Scheduled EDR Contact: 10/01/2018
Data Release Frequency: No Update Planned

UIC: UIC Listing
A listing of wells identified as underground injection wells, in the California Oil and Gas Wells database.

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: Deaprtment of Conservation
Telephone: 916-445-2408
Last EDR Contact: 06/13/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Varies

WASTEWATER PITS: Oil Wastewater Pits Listing
Water officials discovered that oil producers have been dumping chemical-laden wastewater into hundreds of unlined pits that are operating without proper permits. Inspections completed by the Central Valley Regional Water Quality Control Board revealed the existence of previously unidentified waste sites. The water boards review found that more than one-third of the region's active disposal pits are operating without permission.

Date of Government Version: 04/10/2018
Date Data Arrived at EDR: 04/13/2018
Date Made Active in Reports: 06/19/2018
Number of Days to Update: 67

Source: RWQCB, Central Valley Region
Telephone: 559-445-5577
Last EDR Contact: 04/13/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: Varies

WDS: Waste Discharge System
Sites which have been issued waste discharge requirements.

Date of Government Version: 06/19/2007
Date Data Arrived at EDR: 06/20/2007
Date Made Active in Reports: 06/29/2007
Number of Days to Update: 9

Source: State Water Resources Control Board
Telephone: 916-341-5227
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Quarterly

WIP: Well Investigation Program Case List
Well Investigation Program case in the San Gabriel and San Fernando Valley area.

Date of Government Version: 07/03/2009
Date Data Arrived at EDR: 07/21/2009
Date Made Active in Reports: 08/03/2009
Number of Days to Update: 13

Source: Los Angeles Water Quality Control Board
Telephone: 213-576-6726
Last EDR Contact: 06/25/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Varies

MILITARY PRIV SITES: Military Privatized Sites (GEOTRACKER)
Military privatized sites

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Varies

CERS: CalEPA Regulated Site Portal Data
The CalEPA Regulated Site Portal database combines data about environmentally regulated sites and facilities in California into a single database. It combines data from a variety of state and federal databases, and provides an overview of regulated activities across the spectrum of environmental programs for any given location in California. These activities include hazardous materials and waste, state and federal cleanups, impacted ground and surface waters, and toxic materials

Date of Government Version: 04/23/2018
Date Data Arrived at EDR: 04/24/2018
Date Made Active in Reports: 06/07/2018
Number of Days to Update: 44

Source: California Environmental Protection Agency
Telephone: 916-323-2514
Last EDR Contact: 04/24/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

OTHER OIL GAS: OTHER OIL & GAS (GEOTRACKER)
Other Oil & Gas Projects sites

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Varies

PROD WATER PONDS: PROD WATER PONDS (GEOTRACKER)
Produced water ponds sites

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

PROJECT: PROJECT (GEOTRACKER)
Projects sites

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Varies

NON-CASE INFO: NON-CASE INFO (GEOTRACKER)
Non-Case Information sites

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Varies

SAMPLING POINT: SAMPLING POINT (GEOTRACKER)
Sampling point - public sites

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Varies

WELL STIM PROJ: WELL SAMP PROJ (GEOTRACKER)
Includes areas of groundwater monitoring plans, a depiction of the monitoring network, and the facilities, boundaries, and subsurface characteristics of the oilfield and the features (oil and gas wells, produced water ponds, UIC wells, water supply wells, etc?) being monitored

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Varies

CIWQS: The California Integrated Water Quality System
The California Integrated Water Quality System (CIWQS) is a computer system used by the State and Regional Water Quality Control Boards to track information about places of environmental interest, manage permits and other orders, track inspections, and manage violations and enforcement activities.

Date of Government Version: 03/05/2018
Date Data Arrived at EDR: 03/05/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 60

Source: State Water Resources Control Board
Telephone: 866-794-4977
Last EDR Contact: 06/06/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Varies

UIC GEO: UIC GEO (GEOTRACKER)
Underground control injection sites

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: State Water Resource Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR Hist Auto: EDR Exclusive Historical Auto Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR Hist Cleaner: EDR Exclusive Historical Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Resources Recycling and Recovery in California.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/13/2014
Number of Days to Update: 196

Source: Department of Resources Recycling and Recovery
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the State Water Resources Control Board in California.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 12/30/2013
Number of Days to Update: 182

Source: State Water Resources Control Board
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

COUNTY RECORDS

ALAMEDA COUNTY:

Contaminated Sites

A listing of contaminated sites overseen by the Toxic Release Program (oil and groundwater contamination from chemical releases and spills) and the Leaking Underground Storage Tank Program (soil and ground water contamination from leaking petroleum USTs).

Date of Government Version: 04/05/2018
Date Data Arrived at EDR: 04/10/2018
Date Made Active in Reports: 06/14/2018
Number of Days to Update: 65

Source: Alameda County Environmental Health Services
Telephone: 510-567-6700
Last EDR Contact: 04/05/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: Semi-Annually

Underground Tanks

Underground storage tank sites located in Alameda county.

Date of Government Version: 04/05/2018
Date Data Arrived at EDR: 04/10/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 24

Source: Alameda County Environmental Health Services
Telephone: 510-567-6700
Last EDR Contact: 04/05/2018
Next Scheduled EDR Contact: 04/24/2047
Data Release Frequency: Semi-Annually

AMADOR COUNTY:

CUPA Facility List

Cupa Facility List

Date of Government Version: 03/31/2018
Date Data Arrived at EDR: 04/05/2018
Date Made Active in Reports: 06/14/2018
Number of Days to Update: 70

Source: Amador County Environmental Health
Telephone: 209-223-6439
Last EDR Contact: 06/14/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Varies

BUTTE COUNTY:

CUPA Facility Listing

Cupa facility list.

Date of Government Version: 04/21/2017
Date Data Arrived at EDR: 04/25/2017
Date Made Active in Reports: 08/09/2017
Number of Days to Update: 106

Source: Public Health Department
Telephone: 530-538-7149
Last EDR Contact: 04/05/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: No Update Planned

CALVERAS COUNTY:

CUPA Facility Listing
Cupa Facility Listing

Date of Government Version: 05/07/2018
Date Data Arrived at EDR: 05/09/2018
Date Made Active in Reports: 06/14/2018
Number of Days to Update: 36

Source: Calveras County Environmental Health
Telephone: 209-754-6399
Last EDR Contact: 06/25/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

COLUSA COUNTY:

CUPA Facility List
Cupa facility list.

Date of Government Version: 02/26/2018
Date Data Arrived at EDR: 03/01/2018
Date Made Active in Reports: 03/15/2018
Number of Days to Update: 14

Source: Health & Human Services
Telephone: 530-458-0396
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Semi-Annually

CONTRA COSTA COUNTY:

Site List
List includes sites from the underground tank, hazardous waste generator and business plan/2185 programs.

Date of Government Version: 02/22/2018
Date Data Arrived at EDR: 02/27/2018
Date Made Active in Reports: 04/16/2018
Number of Days to Update: 48

Source: Contra Costa Health Services Department
Telephone: 925-646-2286
Last EDR Contact: 04/30/2018
Next Scheduled EDR Contact: 08/13/2018
Data Release Frequency: Semi-Annually

DEL NORTE COUNTY:

CUPA Facility List
Cupa Facility list

Date of Government Version: 04/27/2018
Date Data Arrived at EDR: 05/02/2018
Date Made Active in Reports: 06/15/2018
Number of Days to Update: 44

Source: Del Norte County Environmental Health Division
Telephone: 707-465-0426
Last EDR Contact: 04/25/2018
Next Scheduled EDR Contact: 08/13/2018
Data Release Frequency: Varies

EL DORADO COUNTY:

CUPA Facility List
CUPA facility list.

Date of Government Version: 03/05/2018
Date Data Arrived at EDR: 03/08/2018
Date Made Active in Reports: 04/16/2018
Number of Days to Update: 39

Source: El Dorado County Environmental Management Department
Telephone: 530-621-6623
Last EDR Contact: 04/30/2018
Next Scheduled EDR Contact: 08/13/2018
Data Release Frequency: Varies

FRESNO COUNTY:

CUPA Resources List

Certified Unified Program Agency. CUPA's are responsible for implementing a unified hazardous materials and hazardous waste management regulatory program. The agency provides oversight of businesses that deal with hazardous materials, operate underground storage tanks or aboveground storage tanks.

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/05/2018
Date Made Active in Reports: 03/14/2018
Number of Days to Update: 9

Source: Dept. of Community Health
Telephone: 559-445-3271
Last EDR Contact: 06/26/2018
Next Scheduled EDR Contact: 10/15/2018
Data Release Frequency: Semi-Annually

GLENN COUNTY:

CUPA Facility List

Cupa facility list

Date of Government Version: 01/22/2018
Date Data Arrived at EDR: 01/24/2018
Date Made Active in Reports: 03/14/2018
Number of Days to Update: 49

Source: Glenn County Air Pollution Control District
Telephone: 830-934-6500
Last EDR Contact: 04/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

HUMBOLDT COUNTY:

CUPA Facility List

CUPA facility list.

Date of Government Version: 03/05/2018
Date Data Arrived at EDR: 03/08/2018
Date Made Active in Reports: 04/30/2018
Number of Days to Update: 53

Source: Humboldt County Environmental Health
Telephone: N/A
Last EDR Contact: 05/21/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Semi-Annually

IMPERIAL COUNTY:

CUPA Facility List

Cupa facility list.

Date of Government Version: 04/23/2018
Date Data Arrived at EDR: 04/25/2018
Date Made Active in Reports: 06/14/2018
Number of Days to Update: 50

Source: San Diego Border Field Office
Telephone: 760-339-2777
Last EDR Contact: 04/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INYO COUNTY:

CUPA Facility List
Cupa facility list.

Date of Government Version: 04/02/2018
Date Data Arrived at EDR: 04/03/2018
Date Made Active in Reports: 06/14/2018
Number of Days to Update: 72

Source: Inyo County Environmental Health Services
Telephone: 760-878-0238
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Varies

KERN COUNTY:

Underground Storage Tank Sites & Tank Listing
Kern County Sites and Tanks Listing.

Date of Government Version: 02/02/2018
Date Data Arrived at EDR: 02/02/2018
Date Made Active in Reports: 03/28/2018
Number of Days to Update: 54

Source: Kern County Environment Health Services Department
Telephone: 661-862-8700
Last EDR Contact: 05/02/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Quarterly

KINGS COUNTY:

CUPA Facility List
A listing of sites included in the county's Certified Unified Program Agency database. California's Secretary for Environmental Protection established the unified hazardous materials and hazardous waste regulatory program as required by chapter 6.11 of the California Health and Safety Code. The Unified Program consolidates the administration, permits, inspections, and enforcement activities.

Date of Government Version: 11/14/2017
Date Data Arrived at EDR: 11/17/2017
Date Made Active in Reports: 12/15/2017
Number of Days to Update: 28

Source: Kings County Department of Public Health
Telephone: 559-584-1411
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Varies

LAKE COUNTY:

CUPA Facility List
Cupa facility list

Date of Government Version: 05/09/2018
Date Data Arrived at EDR: 05/11/2018
Date Made Active in Reports: 06/14/2018
Number of Days to Update: 34

Source: Lake County Environmental Health
Telephone: 707-263-1164
Last EDR Contact: 04/16/2018
Next Scheduled EDR Contact: 07/30/2018
Data Release Frequency: Varies

LASSEN COUNTY:

CUPA Facility List
Cupa facility list

Date of Government Version: 01/22/2018
Date Data Arrived at EDR: 01/24/2018
Date Made Active in Reports: 03/14/2018
Number of Days to Update: 49

Source: Lassen County Environmental Health
Telephone: 530-251-8528
Last EDR Contact: 04/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

LOS ANGELES COUNTY:

San Gabriel Valley Areas of Concern
San Gabriel Valley areas where VOC contamination is at or above the MCL as designated by region 9 EPA office.

Date of Government Version: 03/30/2009
Date Data Arrived at EDR: 03/31/2009
Date Made Active in Reports: 10/23/2009
Number of Days to Update: 206
Source: EPA Region 9
Telephone: 415-972-3178
Last EDR Contact: 06/13/2018
Next Scheduled EDR Contact: 10/01/2018
Data Release Frequency: No Update Planned

HMS: Street Number List
Industrial Waste and Underground Storage Tank Sites.

Date of Government Version: 04/12/2018
Date Data Arrived at EDR: 04/16/2018
Date Made Active in Reports: 06/15/2018
Number of Days to Update: 60
Source: Department of Public Works
Telephone: 626-458-3517
Last EDR Contact: 04/05/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: Semi-Annually

List of Solid Waste Facilities
Solid Waste Facilities in Los Angeles County.

Date of Government Version: 04/16/2018
Date Data Arrived at EDR: 04/17/2018
Date Made Active in Reports: 06/19/2018
Number of Days to Update: 63
Source: La County Department of Public Works
Telephone: 818-458-5185
Last EDR Contact: 04/17/2018
Next Scheduled EDR Contact: 07/30/2018
Data Release Frequency: Varies

City of Los Angeles Landfills
Landfills owned and maintained by the City of Los Angeles.

Date of Government Version: 01/01/2018
Date Data Arrived at EDR: 05/01/2018
Date Made Active in Reports: 05/14/2018
Number of Days to Update: 13
Source: Engineering & Construction Division
Telephone: 213-473-7869
Last EDR Contact: 04/11/2018
Next Scheduled EDR Contact: 07/30/2018
Data Release Frequency: Varies

Site Mitigation List
Industrial sites that have had some sort of spill or complaint.

Date of Government Version: 04/01/2018
Date Data Arrived at EDR: 04/17/2018
Date Made Active in Reports: 06/19/2018
Number of Days to Update: 63
Source: Community Health Services
Telephone: 323-890-7806
Last EDR Contact: 04/17/2018
Next Scheduled EDR Contact: 07/30/2018
Data Release Frequency: Annually

City of El Segundo Underground Storage Tank
Underground storage tank sites located in El Segundo city.

Date of Government Version: 01/21/2017
Date Data Arrived at EDR: 04/19/2017
Date Made Active in Reports: 05/10/2017
Number of Days to Update: 21
Source: City of El Segundo Fire Department
Telephone: 310-524-2236
Last EDR Contact: 04/11/2018
Next Scheduled EDR Contact: 07/30/2018
Data Release Frequency: Semi-Annually

City of Long Beach Underground Storage Tank
Underground storage tank sites located in the city of Long Beach.

Date of Government Version: 03/09/2017
Date Data Arrived at EDR: 03/10/2017
Date Made Active in Reports: 05/03/2017
Number of Days to Update: 54
Source: City of Long Beach Fire Department
Telephone: 562-570-2563
Last EDR Contact: 04/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Annually

City of Torrance Underground Storage Tank
Underground storage tank sites located in the city of Torrance.

Date of Government Version: 01/04/2018
Date Data Arrived at EDR: 01/05/2018
Date Made Active in Reports: 01/18/2018
Number of Days to Update: 13

Source: City of Torrance Fire Department
Telephone: 310-618-2973
Last EDR Contact: 04/05/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: Semi-Annually

MADERA COUNTY:

CUPA Facility List
A listing of sites included in the county's Certified Unified Program Agency database. California's Secretary for Environmental Protection established the unified hazardous materials and hazardous waste regulatory program as required by chapter 6.11 of the California Health and Safety Code. The Unified Program consolidates the administration, permits, inspections, and enforcement activities.

Date of Government Version: 02/21/2018
Date Data Arrived at EDR: 02/22/2018
Date Made Active in Reports: 04/03/2018
Number of Days to Update: 40

Source: Madera County Environmental Health
Telephone: 559-675-7823
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Varies

MARIN COUNTY:

Underground Storage Tank Sites
Currently permitted USTs in Marin County.

Date of Government Version: 03/30/2018
Date Data Arrived at EDR: 04/06/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 28

Source: Public Works Department Waste Management
Telephone: 415-473-6647
Last EDR Contact: 06/27/2018
Next Scheduled EDR Contact: 10/15/2018
Data Release Frequency: Semi-Annually

MERCED COUNTY:

CUPA Facility List
CUPA facility list.

Date of Government Version: 01/11/2018
Date Data Arrived at EDR: 01/12/2018
Date Made Active in Reports: 02/08/2018
Number of Days to Update: 27

Source: Merced County Environmental Health
Telephone: 209-381-1094
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Varies

MONO COUNTY:

CUPA Facility List
CUPA Facility List

Date of Government Version: 02/22/2018
Date Data Arrived at EDR: 02/27/2018
Date Made Active in Reports: 03/14/2018
Number of Days to Update: 15

Source: Mono County Health Department
Telephone: 760-932-5580
Last EDR Contact: 05/22/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Varies

MONTEREY COUNTY:

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

CUPA Facility Listing
CUPA Program listing from the Environmental Health Division.

Date of Government Version: 03/27/2018
Date Data Arrived at EDR: 03/29/2018
Date Made Active in Reports: 04/16/2018
Number of Days to Update: 18

Source: Monterey County Health Department
Telephone: 831-796-1297
Last EDR Contact: 07/02/2018
Next Scheduled EDR Contact: 10/15/2018
Data Release Frequency: Varies

NAPA COUNTY:

Sites With Reported Contamination
A listing of leaking underground storage tank sites located in Napa county.

Date of Government Version: 01/09/2017
Date Data Arrived at EDR: 01/11/2017
Date Made Active in Reports: 03/02/2017
Number of Days to Update: 50

Source: Napa County Department of Environmental Management
Telephone: 707-253-4269
Last EDR Contact: 05/22/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: No Update Planned

Closed and Operating Underground Storage Tank Sites
Underground storage tank sites located in Napa county.

Date of Government Version: 02/22/2018
Date Data Arrived at EDR: 02/27/2018
Date Made Active in Reports: 03/29/2018
Number of Days to Update: 30

Source: Napa County Department of Environmental Management
Telephone: 707-253-4269
Last EDR Contact: 05/22/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: No Update Planned

NEVADA COUNTY:

CUPA Facility List
CUPA facility list.

Date of Government Version: 04/24/2018
Date Data Arrived at EDR: 05/01/2018
Date Made Active in Reports: 06/15/2018
Number of Days to Update: 45

Source: Community Development Agency
Telephone: 530-265-1467
Last EDR Contact: 04/25/2018
Next Scheduled EDR Contact: 08/13/2018
Data Release Frequency: Varies

ORANGE COUNTY:

List of Industrial Site Cleanups
Petroleum and non-petroleum spills.

Date of Government Version: 04/02/2018
Date Data Arrived at EDR: 05/11/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 42

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 05/07/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Annually

List of Underground Storage Tank Cleanups
Orange County Underground Storage Tank Cleanups (LUST).

Date of Government Version: 04/02/2018
Date Data Arrived at EDR: 05/11/2018
Date Made Active in Reports: 06/25/2018
Number of Days to Update: 45

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 05/07/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

List of Underground Storage Tank Facilities
Orange County Underground Storage Tank Facilities (UST).

Date of Government Version: 01/02/2018
Date Data Arrived at EDR: 02/07/2018
Date Made Active in Reports: 03/28/2018
Number of Days to Update: 49

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 05/08/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Quarterly

PLACER COUNTY:

Master List of Facilities
List includes aboveground tanks, underground tanks and cleanup sites.

Date of Government Version: 03/15/2018
Date Data Arrived at EDR: 03/19/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 46

Source: Placer County Health and Human Services
Telephone: 530-745-2363
Last EDR Contact: 05/31/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Semi-Annually

PLUMAS COUNTY:

CUPA Facility List
Plumas County CUPA Program facilities.

Date of Government Version: 01/22/2018
Date Data Arrived at EDR: 01/24/2018
Date Made Active in Reports: 03/15/2018
Number of Days to Update: 50

Source: Plumas County Environmental Health
Telephone: 530-283-6355
Last EDR Contact: 04/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

RIVERSIDE COUNTY:

Listing of Underground Tank Cleanup Sites
Riverside County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 04/05/2018
Date Data Arrived at EDR: 04/10/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 24

Source: Department of Environmental Health
Telephone: 951-358-5055
Last EDR Contact: 06/18/2018
Next Scheduled EDR Contact: 10/01/2018
Data Release Frequency: Quarterly

Underground Storage Tank Tank List
Underground storage tank sites located in Riverside county.

Date of Government Version: 04/05/2018
Date Data Arrived at EDR: 04/10/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 24

Source: Department of Environmental Health
Telephone: 951-358-5055
Last EDR Contact: 06/18/2018
Next Scheduled EDR Contact: 10/01/2018
Data Release Frequency: Quarterly

SACRAMENTO COUNTY:

Toxic Site Clean-Up List
List of sites where unauthorized releases of potentially hazardous materials have occurred.

Date of Government Version: 02/02/2018
Date Data Arrived at EDR: 04/04/2018
Date Made Active in Reports: 06/14/2018
Number of Days to Update: 71

Source: Sacramento County Environmental Management
Telephone: 916-875-8406
Last EDR Contact: 07/03/2018
Next Scheduled EDR Contact: 10/15/2018
Data Release Frequency: Quarterly

Master Hazardous Materials Facility List

Any business that has hazardous materials on site - hazardous material storage sites, underground storage tanks, waste generators.

Date of Government Version: 02/02/2018
Date Data Arrived at EDR: 04/04/2018
Date Made Active in Reports: 06/19/2018
Number of Days to Update: 76

Source: Sacramento County Environmental Management
Telephone: 916-875-8406
Last EDR Contact: 07/03/2018
Next Scheduled EDR Contact: 10/15/2018
Data Release Frequency: Quarterly

SAN BENITO COUNTY:

CUPA Facility List

Cupa facility list

Date of Government Version: 11/01/2017
Date Data Arrived at EDR: 11/03/2017
Date Made Active in Reports: 11/17/2017
Number of Days to Update: 14

Source: San Benito County Environmental Health
Telephone: N/A
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Varies

SAN BERNARDINO COUNTY:

Hazardous Material Permits

This listing includes underground storage tanks, medical waste handlers/generators, hazardous materials handlers, hazardous waste generators, and waste oil generators/handlers.

Date of Government Version: 04/09/2018
Date Data Arrived at EDR: 04/11/2018
Date Made Active in Reports: 06/19/2018
Number of Days to Update: 69

Source: San Bernardino County Fire Department Hazardous Materials Division
Telephone: 909-387-3041
Last EDR Contact: 04/06/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Quarterly

SAN DIEGO COUNTY:

Hazardous Materials Management Division Database

The database includes: HE58 - This report contains the business name, site address, business phone number, establishment 'H' permit number, type of permit, and the business status. HE17 - In addition to providing the same information provided in the HE58 listing, HE17 provides inspection dates, violations received by the establishment, hazardous waste generated, the quantity, method of storage, treatment/disposal of waste and the hauler, and information on underground storage tanks. Unauthorized Release List - Includes a summary of environmental contamination cases in San Diego County (underground tank cases, non-tank cases, groundwater contamination, and soil contamination are included.)

Date of Government Version: 03/05/2018
Date Data Arrived at EDR: 03/07/2018
Date Made Active in Reports: 04/16/2018
Number of Days to Update: 40

Source: Hazardous Materials Management Division
Telephone: 619-338-2268
Last EDR Contact: 06/06/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Quarterly

Solid Waste Facilities
San Diego County Solid Waste Facilities.

Date of Government Version: 04/18/2018
Date Data Arrived at EDR: 04/24/2018
Date Made Active in Reports: 06/19/2018
Number of Days to Update: 56
Source: Department of Health Services
Telephone: 619-338-2209
Last EDR Contact: 04/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

Local Oversight Program Listing
A listing of all LOP release sites that are or were under the County of San Diego's jurisdiction. Included are closed or transferred cases, open cases, and cases that did not have a case type indicated. The cases without a case type are mostly complaints; however, some of them could be LOP cases.

Date of Government Version: 04/18/2018
Date Data Arrived at EDR: 04/23/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 11
Source: Department of Environmental Health
Telephone: 858-505-6874
Last EDR Contact: 04/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

Environmental Case Listing
The listing contains all underground tank release cases and projects pertaining to properties contaminated with hazardous substances that are actively under review by the Site Assessment and Mitigation Program.

Date of Government Version: 03/23/2010
Date Data Arrived at EDR: 06/15/2010
Date Made Active in Reports: 07/09/2010
Number of Days to Update: 24
Source: San Diego County Department of Environmental Health
Telephone: 619-338-2371
Last EDR Contact: 05/31/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: No Update Planned

SAN FRANCISCO COUNTY:

Local Oversite Facilities
A listing of leaking underground storage tank sites located in San Francisco county.

Date of Government Version: 09/19/2008
Date Data Arrived at EDR: 09/19/2008
Date Made Active in Reports: 09/29/2008
Number of Days to Update: 10
Source: Department Of Public Health San Francisco County
Telephone: 415-252-3920
Last EDR Contact: 05/02/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Quarterly

Underground Storage Tank Information
Underground storage tank sites located in San Francisco county.

Date of Government Version: 11/02/2017
Date Data Arrived at EDR: 11/07/2017
Date Made Active in Reports: 12/19/2017
Number of Days to Update: 42
Source: Department of Public Health
Telephone: 415-252-3920
Last EDR Contact: 05/02/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Quarterly

SAN JOAQUIN COUNTY:

San Joaquin Co. UST
A listing of underground storage tank locations in San Joaquin county.

Date of Government Version: 03/20/2018
Date Data Arrived at EDR: 03/22/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 43
Source: Environmental Health Department
Telephone: N/A
Last EDR Contact: 06/14/2018
Next Scheduled EDR Contact: 10/01/2018
Data Release Frequency: Semi-Annually

SAN LUIS OBISPO COUNTY:

CUPA Facility List
Cupa Facility List.

Date of Government Version: 11/16/2017
Date Data Arrived at EDR: 11/17/2017
Date Made Active in Reports: 12/18/2017
Number of Days to Update: 31

Source: San Luis Obispo County Public Health Department
Telephone: 805-781-5596
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Varies

SAN MATEO COUNTY:

Business Inventory
List includes Hazardous Materials Business Plan, hazardous waste generators, and underground storage tanks.

Date of Government Version: 03/14/2018
Date Data Arrived at EDR: 03/20/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 45

Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
Last EDR Contact: 06/06/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Annually

Fuel Leak List
A listing of leaking underground storage tank sites located in San Mateo county.

Date of Government Version: 03/15/2018
Date Data Arrived at EDR: 03/20/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 45

Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
Last EDR Contact: 06/06/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Semi-Annually

SANTA BARBARA COUNTY:

CUPA Facility Listing
CUPA Program Listing from the Environmental Health Services division.

Date of Government Version: 09/08/2011
Date Data Arrived at EDR: 09/09/2011
Date Made Active in Reports: 10/07/2011
Number of Days to Update: 28

Source: Santa Barbara County Public Health Department
Telephone: 805-686-8167
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Varies

SANTA CLARA COUNTY:

Cupa Facility List
Cupa facility list

Date of Government Version: 02/20/2018
Date Data Arrived at EDR: 02/20/2018
Date Made Active in Reports: 03/19/2018
Number of Days to Update: 27

Source: Department of Environmental Health
Telephone: 408-918-1973
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Varies

HIST LUST - Fuel Leak Site Activity Report
A listing of open and closed leaking underground storage tanks. This listing is no longer updated by the county. Leaking underground storage tanks are now handled by the Department of Environmental Health.

Date of Government Version: 03/29/2005
Date Data Arrived at EDR: 03/30/2005
Date Made Active in Reports: 04/21/2005
Number of Days to Update: 22

Source: Santa Clara Valley Water District
Telephone: 408-265-2600
Last EDR Contact: 03/23/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: No Update Planned

LOP Listing
A listing of leaking underground storage tanks located in Santa Clara county.

Date of Government Version: 03/03/2014
Date Data Arrived at EDR: 03/05/2014
Date Made Active in Reports: 03/18/2014
Number of Days to Update: 13
Source: Department of Environmental Health
Telephone: 408-918-3417
Last EDR Contact: 05/22/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Annually

Hazardous Material Facilities
Hazardous material facilities, including underground storage tank sites.

Date of Government Version: 02/04/2018
Date Data Arrived at EDR: 02/06/2018
Date Made Active in Reports: 03/20/2018
Number of Days to Update: 42
Source: City of San Jose Fire Department
Telephone: 408-535-7694
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Annually

SANTA CRUZ COUNTY:

CUPA Facility List
CUPA facility listing.

Date of Government Version: 01/21/2017
Date Data Arrived at EDR: 02/22/2017
Date Made Active in Reports: 05/23/2017
Number of Days to Update: 90
Source: Santa Cruz County Environmental Health
Telephone: 831-464-2761
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Varies

SHASTA COUNTY:

CUPA Facility List
Cupa Facility List.

Date of Government Version: 06/15/2017
Date Data Arrived at EDR: 06/19/2017
Date Made Active in Reports: 08/09/2017
Number of Days to Update: 51
Source: Shasta County Department of Resource Management
Telephone: 530-225-5789
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Varies

SOLANO COUNTY:

Leaking Underground Storage Tanks
A listing of leaking underground storage tank sites located in Solano county.

Date of Government Version: 03/08/2018
Date Data Arrived at EDR: 03/13/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 52
Source: Solano County Department of Environmental Management
Telephone: 707-784-6770
Last EDR Contact: 05/31/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Quarterly

Underground Storage Tanks
Underground storage tank sites located in Solano county.

Date of Government Version: 03/08/2018
Date Data Arrived at EDR: 03/13/2018
Date Made Active in Reports: 03/29/2018
Number of Days to Update: 16
Source: Solano County Department of Environmental Management
Telephone: 707-784-6770
Last EDR Contact: 05/31/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Quarterly

SONOMA COUNTY:

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Cupa Facility List
Cupa Facility list

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/27/2018
Date Made Active in Reports: 04/16/2018
Number of Days to Update: 20

Source: County of Sonoma Fire & Emergency Services Department
Telephone: 707-565-1174
Last EDR Contact: 06/21/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Varies

Leaking Underground Storage Tank Sites
A listing of leaking underground storage tank sites located in Sonoma county.

Date of Government Version: 04/03/2018
Date Data Arrived at EDR: 04/06/2018
Date Made Active in Reports: 05/09/2018
Number of Days to Update: 33

Source: Department of Health Services
Telephone: 707-565-6565
Last EDR Contact: 06/21/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

STANISLAUS COUNTY:

CUPA Facility List
Cupa facility list

Date of Government Version: 05/08/2018
Date Data Arrived at EDR: 05/11/2018
Date Made Active in Reports: 06/15/2018
Number of Days to Update: 35

Source: Stanislaus County Department of Ennvironmental Protection
Telephone: 209-525-6751
Last EDR Contact: 04/16/2018
Next Scheduled EDR Contact: 07/30/2018
Data Release Frequency: Varies

SUTTER COUNTY:

Underground Storage Tanks
Underground storage tank sites located in Sutter county.

Date of Government Version: 01/08/2018
Date Data Arrived at EDR: 03/01/2018
Date Made Active in Reports: 03/30/2018
Number of Days to Update: 29

Source: Sutter County Department of Agriculture
Telephone: 530-822-7500
Last EDR Contact: 05/31/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Semi-Annually

TEHAMA COUNTY:

CUPA Facility List
Cupa facilities

Date of Government Version: 01/26/2018
Date Data Arrived at EDR: 02/02/2018
Date Made Active in Reports: 03/21/2018
Number of Days to Update: 47

Source: Tehama County Department of Environmental Health
Telephone: 530-527-8020
Last EDR Contact: 05/03/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Varies

TRINITY COUNTY:

CUPA Facility List
Cupa facility list

Date of Government Version: 04/23/2018
Date Data Arrived at EDR: 04/25/2018
Date Made Active in Reports: 06/15/2018
Number of Days to Update: 51

Source: Department of Toxic Substances Control
Telephone: 760-352-0381
Last EDR Contact: 04/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

TULARE COUNTY:

CUPA Facility List
Cupa program facilities

Date of Government Version: 03/19/2018
Date Data Arrived at EDR: 03/22/2018
Date Made Active in Reports: 04/17/2018
Number of Days to Update: 26

Source: Tulare County Environmental Health Services Division
Telephone: 559-624-7400
Last EDR Contact: 07/02/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Varies

TUOLUMNE COUNTY:

CUPA Facility List
Cupa facility list

Date of Government Version: 04/23/2018
Date Data Arrived at EDR: 04/25/2018
Date Made Active in Reports: 06/25/2018
Number of Days to Update: 61

Source: Divison of Environmental Health
Telephone: 209-533-5633
Last EDR Contact: 04/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

VENTURA COUNTY:

Business Plan, Hazardous Waste Producers, and Operating Underground Tanks
The BWT list indicates by site address whether the Environmental Health Division has Business Plan (B), Waste Producer (W), and/or Underground Tank (T) information.

Date of Government Version: 03/26/2018
Date Data Arrived at EDR: 04/25/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 58

Source: Ventura County Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 04/23/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Quarterly

Inventory of Illegal Abandoned and Inactive Sites
Ventura County Inventory of Closed, Illegal Abandoned, and Inactive Sites.

Date of Government Version: 12/01/2011
Date Data Arrived at EDR: 12/01/2011
Date Made Active in Reports: 01/19/2012
Number of Days to Update: 49

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 06/27/2018
Next Scheduled EDR Contact: 10/15/2018
Data Release Frequency: Annually

Listing of Underground Tank Cleanup Sites
Ventura County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 05/29/2008
Date Data Arrived at EDR: 06/24/2008
Date Made Active in Reports: 07/31/2008
Number of Days to Update: 37

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 05/09/2018
Next Scheduled EDR Contact: 08/27/2018
Data Release Frequency: Quarterly

Medical Waste Program List
To protect public health and safety and the environment from potential exposure to disease causing agents, the Environmental Health Division Medical Waste Program regulates the generation, handling, storage, treatment and disposal of medical waste throughout the County.

Date of Government Version: 03/26/2018
Date Data Arrived at EDR: 04/25/2018
Date Made Active in Reports: 06/25/2018
Number of Days to Update: 61
Source: Ventura County Resource Management Agency
Telephone: 805-654-2813
Last EDR Contact: 04/23/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Quarterly

Underground Tank Closed Sites List
Ventura County Operating Underground Storage Tank Sites (UST)/Underground Tank Closed Sites List.

Date of Government Version: 02/28/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 03/30/2018
Number of Days to Update: 16
Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 06/13/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Quarterly

YOLO COUNTY:

Underground Storage Tank Comprehensive Facility Report
Underground storage tank sites located in Yolo county.

Date of Government Version: 03/27/2018
Date Data Arrived at EDR: 04/03/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 31
Source: Yolo County Department of Health
Telephone: 530-666-8646
Last EDR Contact: 06/27/2018
Next Scheduled EDR Contact: 10/15/2018
Data Release Frequency: Annually

YUBA COUNTY:

CUPA Facility List
CUPA facility listing for Yuba County.

Date of Government Version: 05/10/2018
Date Data Arrived at EDR: 05/15/2018
Date Made Active in Reports: 06/15/2018
Number of Days to Update: 31
Source: Yuba County Environmental Health Department
Telephone: 530-749-7523
Last EDR Contact: 04/25/2018
Next Scheduled EDR Contact: 08/13/2018
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data
Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 01/03/2018
Date Data Arrived at EDR: 02/14/2018
Date Made Active in Reports: 03/22/2018
Number of Days to Update: 36
Source: Department of Energy & Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/27/2018
Data Release Frequency: No Update Planned

NJ MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 04/11/2017
Date Made Active in Reports: 07/27/2017
Number of Days to Update: 107

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 04/23/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data
Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 04/30/2018
Date Data Arrived at EDR: 05/03/2018
Date Made Active in Reports: 06/07/2018
Number of Days to Update: 35

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 05/03/2018
Next Scheduled EDR Contact: 08/13/2018
Data Release Frequency: Quarterly

PA MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 07/25/2017
Date Made Active in Reports: 09/25/2017
Number of Days to Update: 62

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 04/12/2018
Next Scheduled EDR Contact: 07/30/2018
Data Release Frequency: Annually

RI MANIFEST: Manifest information
Hazardous waste manifest information

Date of Government Version: 12/31/2017
Date Data Arrived at EDR: 02/23/2018
Date Made Active in Reports: 04/09/2018
Number of Days to Update: 45

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 05/21/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 04/13/2017
Date Made Active in Reports: 07/14/2017
Number of Days to Update: 92

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 06/11/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Annually

Oil/Gas Pipelines
Source: PennWell Corporation
Petroleum Bundle (Crude Oil, Refined Products, Petrochemicals, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)) N = Natural Gas Bundle (Natural Gas, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)). This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Electric Power Transmission Line Data
Source: PennWell Corporation
This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Licensed Facilities
Source: Department of Social Services
Telephone: 916-657-4041

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetland Inventory
Source: Department of Fish & Game
Telephone: 916-445-0411

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

STREET AND ADDRESS INFORMATION

© 2015 TomTom North America, Inc. All rights reserved. This material is proprietary and the subject of copyright protection and other intellectual property rights owned by or licensed to Tele Atlas North America, Inc. The use of this material is subject to the terms of a license agreement. You will be held liable for any unauthorized copying or disclosure of this material.

GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

20621 LAKE FOREST
20621 LAKE FOREST
LAKE FOREST, CA 92630

TARGET PROPERTY COORDINATES

Latitude (North):	33.668467 - 33° 40' 6.48''
Longitude (West):	117.667749 - 117° 40' 3.90''
Universal Tranverse Mercator:	Zone 11
UTM X (Meters):	438094.4
UTM Y (Meters):	3725403.8
Elevation:	735 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	5636489 EL TORO, CA
Version Date:	2012

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principal investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

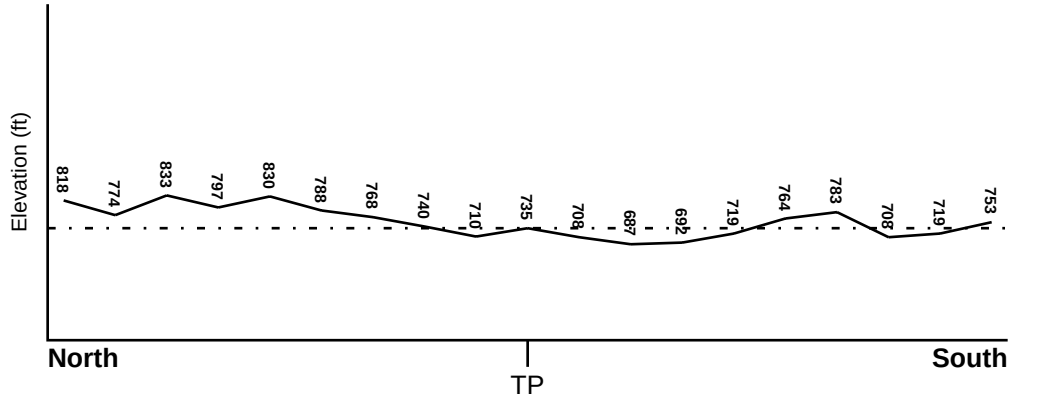
TOPOGRAPHIC INFORMATION

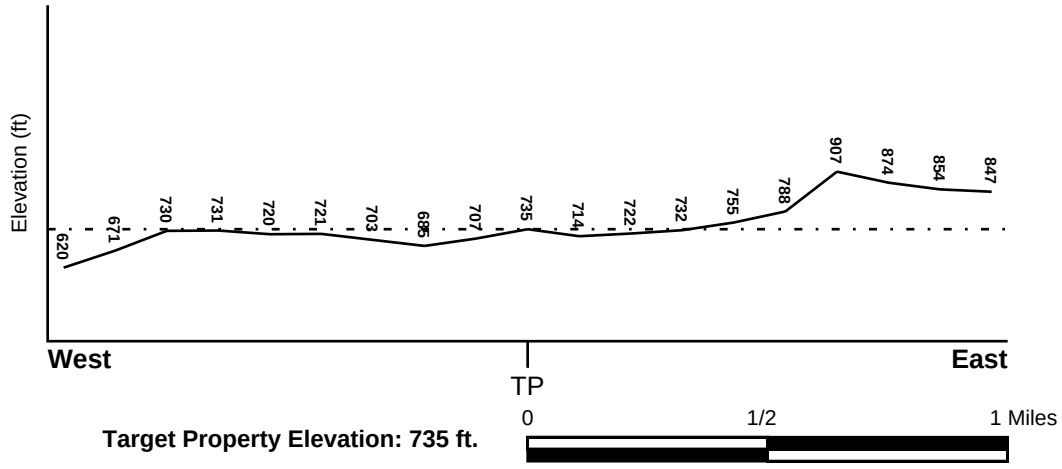
Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General SSW

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES





0 1/2 1 Miles

Target Property Elevation: 735 ft.

Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Flood Plain Panel at Target Property	FEMA Source Type
06059C0316J	FEMA FIRM Flood data

Additional Panels in search area:	FEMA Source Type
06059C0317J	FEMA FIRM Flood data
06059C0318J	FEMA FIRM Flood data

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
EL TORO	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Site-Specific Hydrogeological Data*:

Search Radius:	1.25 miles
Status:	Not found

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

* ©1996 Site−specific hydrogeological data gathered by CERCLIS Alerts, Inc., Bainbridge Island, WA. All rights reserved. All of the information and opinions presented are those of the cited EPA report(s), which were completed under a Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) investigation.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

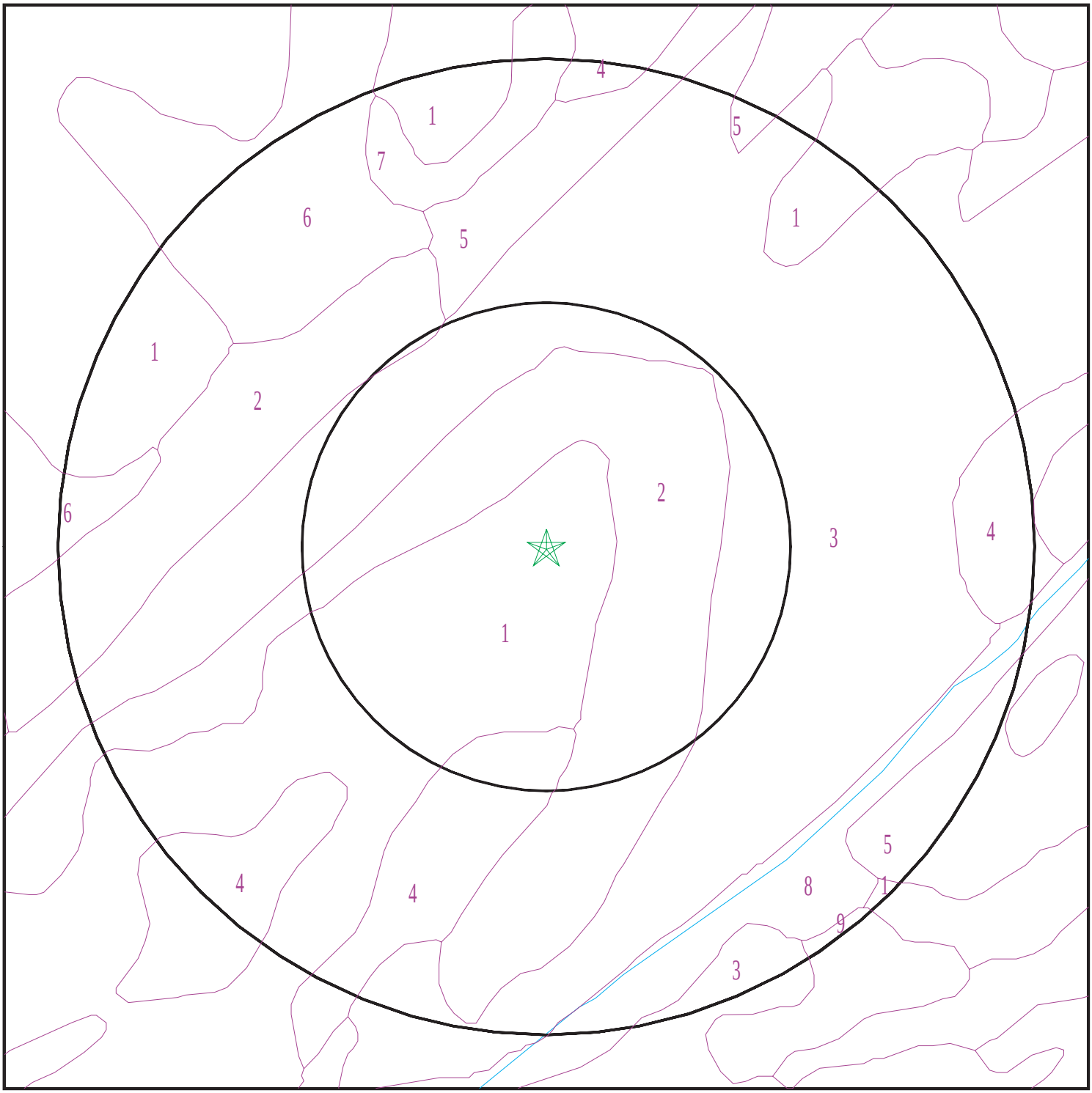
Era:	Cenozoic
System:	Tertiary
Series:	Eocene
Code:	Te *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Stratifed Sequence

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 05352085.2r



SITE NAME:	20621 Lake Forest	CLIENT:	Hillmann Environmental Co.
ADDRESS:	20621 Lake Forest Lake Forest CA 92630	CONTACT:	Kristine Savona
		INQUIRY #:	05352085.2r
LAT/LONG:	33.668467 / 117.667749	DATE:	July 05, 2018 3:06 pm

Copyright © 2018 EDR, Inc. © 2015 TomTom Rel. 2015.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: CIENEBA

Soil Surface Texture: sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Somewhat excessively drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 42 Min: 14	Max: 7.3 Min: 5.6
2	7 inches	11 inches	weathered bedrock	Not reported	Not reported	Max: 0.42 Min: 0	Max: Min:

Soil Map ID: 2

Soil Component Name: CROPLEY

Soil Surface Texture: clay

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	29 inches	clay	Not reported	Not reported	Max: 1.4 Min: 0.42	Max: 8.4 Min: 6.6
2	29 inches	59 inches	clay	Not reported	Not reported	Max: 1.4 Min: 0.42	Max: 8.4 Min: 6.6

Soil Map ID: 3

Soil Component Name: SORRENTO

Soil Surface Texture: loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	11 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay. FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 14 Min: 4	Max: 8.4 Min: 6.1

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	11 inches	61 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14.11 Min: 1	Max: 8.4 Min: 7.9
3	61 inches	72 inches	stratified loamy fine sand to silt loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 8.4 Min: 7.9

Soil Map ID: 4

Soil Component Name: MYFORD

Soil Surface Texture: sandy loam

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Moderately well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	11 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay. FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 42 Min: 14	Max: 6 Min: 5.1

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	11 inches	18 inches	sandy clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 0.42 Min: 0.01	Max: 8.4 Min: 5.6
3	18 inches	27 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 0.42 Min: 0.01	Max: 8.4 Min: 5.6
4	27 inches	70 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 0.42 Min: 0.01	Max: 8.4 Min: 6.1
5	70 inches	79 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay. FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 14 Min: 4	Max: 6.5 Min: 6.1

Soil Map ID: 5

Soil Component Name: CAPISTRANO

Soil Surface Texture: sandy loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	27 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.3 Min: 5.6
2	27 inches	64 inches	fine sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.3 Min: 5.6

Soil Map ID: 6

Soil Component Name: CAPISTRANO

Soil Surface Texture: sandy loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	27 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.3 Min: 5.6

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	27 inches	64 inches	fine sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.3 Min: 5.6

Soil Map ID: 7

Soil Component Name: MYFORD

Soil Surface Texture: sandy loam

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Moderately well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	11 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay. FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 42 Min: 14	Max: 6 Min: 5.1

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	11 inches	18 inches	sandy clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 0.42 Min: 0.01	Max: 8.4 Min: 5.6
3	18 inches	27 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 0.42 Min: 0.01	Max: 8.4 Min: 5.6
4	27 inches	70 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 0.42 Min: 0.01	Max: 8.4 Min: 6.1
5	70 inches	79 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay. FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 14 Min: 4	Max: 6.5 Min: 6.1

Soil Map ID: 8

Soil Component Name: RIVERWASH

Soil Surface Texture: sand

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class:
Hydric Status: All hydric

Corrosion Potential - Uncoated Steel: Not Reported

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 31 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	5 inches	sand	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Clean Sands, Poorly graded sand.	Max: 141 Min: 42	Max: Min:
2	5 inches	59 inches	stratified coarse sand to sandy loam	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 141 Min: 42	Max: Min:

Soil Map ID: 9

Soil Component Name: YORBA

Soil Surface Texture: cobbly sandy loam

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	cobbly sandy loam	Not reported	Not reported	Max: 42 Min: 4	Max: 6.5 Min: 5.6

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	7 inches	35 inches	very gravelly clay loam	Not reported	Not reported	Max: 1.4 Min: 0.42	Max: 8.4 Min: 5.6
3	35 inches	62 inches	very gravelly sandy loam	Not reported	Not reported	Max: 14 Min: 4	Max: 8.4 Min: 5.1

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 0.001 miles
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
4	USGS40000136558	1/4 - 1/2 Mile NW
B7	USGS40000136410	1/2 - 1 Mile SSE

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

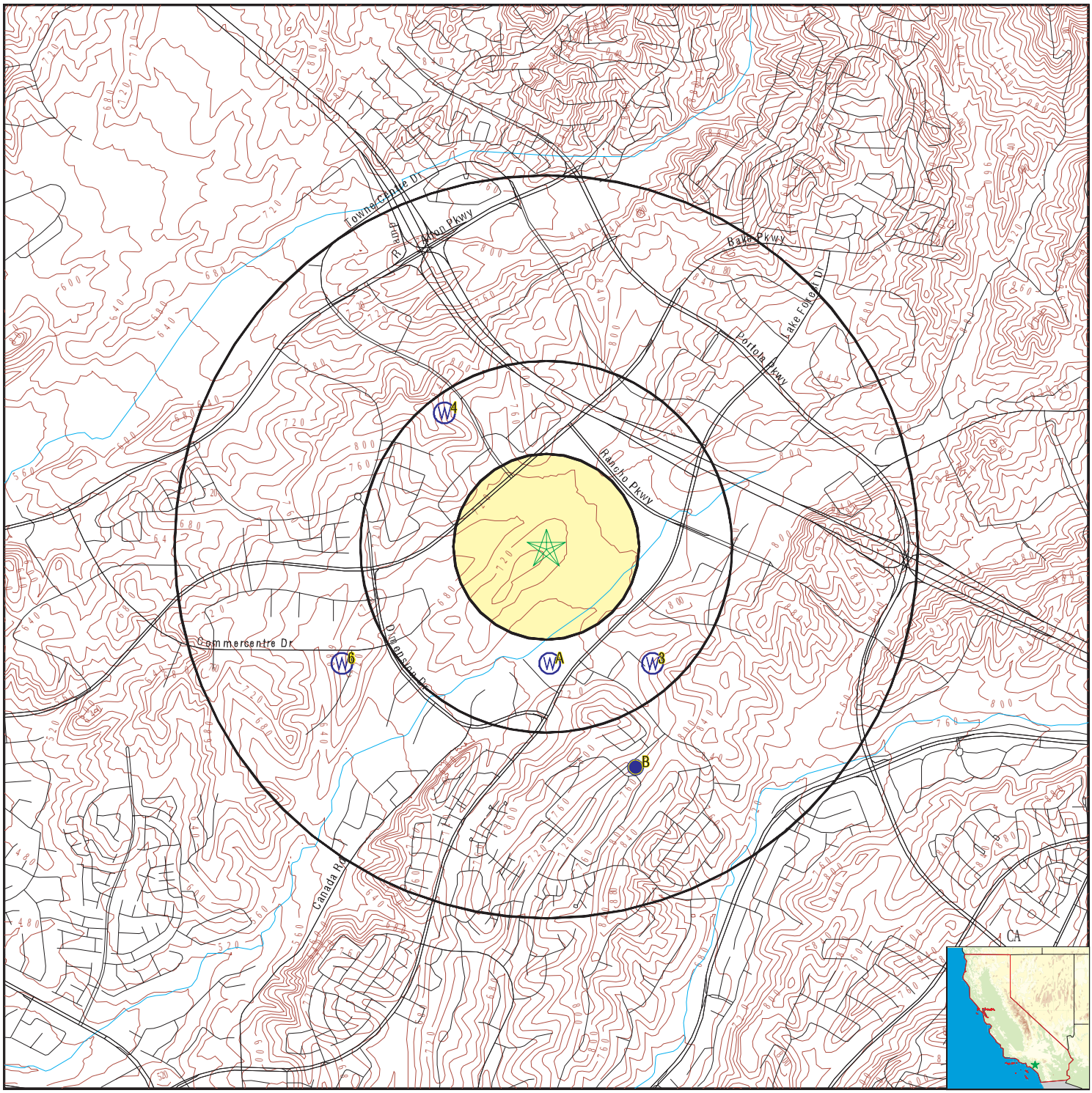
MAP ID	WELL ID	LOCATION FROM TP
A1	7045	1/4 - 1/2 Mile South
A2	7043	1/4 - 1/2 Mile South

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
3	7044	1/4 - 1/2 Mile SE
B5	7046	1/2 - 1 Mile SSE
6	6936	1/2 - 1 Mile WSW

PHYSICAL SETTING SOURCE MAP - 05352085.2r



- County Boundary
- Major Roads
- Contour Lines
- Earthquake Fault Lines
- Earthquake epicenter, Richter 5 or greater
- Water Wells
- Public Water Supply Wells
- Cluster of Multiple Icons

- Groundwater Flow Direction
- GI Indeterminate Groundwater Flow at Location
- GV Groundwater Flow Varies at Location
- HD Closest Hydrogeological Data
- Oil, gas or related wells

SITE NAME:	20621 Lake Forest	CLIENT:	Hillmann Environmental Co.
ADDRESS:	20621 Lake Forest Lake Forest CA 92630	CONTACT:	Kristine Savona
		INQUIRY #:	05352085.2r
LAT/LONG:	33.668467 / 117.667749	DATE:	July 05, 2018 3:06 pm

Copyright © 2018 EDR, Inc. © 2015 TomTom Rel. 2015.

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

A1
South **CA WELLS** **7045**
1/4 - 1/2 Mile
Lower

Water System Information:

Prime Station Code:	06S/08W-12L02 S	User ID:	TEE
FRDS Number:	3010091004	County:	Orange
District Number:	08	Station Type:	WELL/AMBNT/MUN/INTAKE
Water Type:	Well/Groundwater	Well Status:	Active Untreated
Source Lat/Long:	333950.0 1174000.0	Precision:	10 Feet (1/10 Second)
Source Name:	WELL 04		
System Number:	3010091		
System Name:	LOS ALISOS WD		
Organization That Operates System:			
	P O BOX 699		
	EL TORO 92630		
Pop Served:	38000	Connections:	11645
Area Served:	EL TORO		

A2
South **CA WELLS** **7043**
1/4 - 1/2 Mile
Lower

Water System Information:

Prime Station Code:	06S/08W-01N01 S	User ID:	TEE
FRDS Number:	3010091005	County:	Orange
District Number:	08	Station Type:	WELL/AMBNT/MUN/INTAKE/SUPPLY
Water Type:	Well/Groundwater	Well Status:	Active Untreated
Source Lat/Long:	333950.0 1174000.0	Precision:	0.5 Mile (30 Seconds)
Source Name:	WELL 07		
System Number:	3010091		
System Name:	LOS ALISOS WD		
Organization That Operates System:			
	P O BOX 699		
	EL TORO 92630		
Pop Served:	38000	Connections:	11645
Area Served:	EL TORO		

3
SE **CA WELLS** **7044**
1/4 - 1/2 Mile
Higher

Water System Information:

Prime Station Code:	06S/08W-12J01 S	User ID:	TEE
FRDS Number:	3010091003	County:	Orange
District Number:	08	Station Type:	WELL/AMBNT/MUN/INTAKE
Water Type:	Well/Groundwater	Well Status:	Active Untreated
Source Lat/Long:	333950.0 1173943.0	Precision:	10 Feet (1/10 Second)
Source Name:	WELL 03		

System Number: 3010091
System Name: LOS ALISOS WD
Organization That Operates System:
P O BOX 699
EL TORO 92630
Pop Served: 38000 Connections: 11645
Area Served: EL TORO

4
NW **FED USGS** **USGS40000136558**
1/4 - 1/2 Mile
Higher

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-334025117402101		
Monloc name:	006S008W01N001S		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	Not Reported	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	33.6736944
Longitude:	-117.6725	Sourcemap scale:	24000
Horiz Acc measure:	.5	Horiz Acc measure units:	seconds
Horiz Collection method:	Global positioning system (GPS), uncorrected		
Horiz coord refsys:	NAD83	Vert measure val:	860
Vert measure units:	feet	Vertacc measure val:	2.5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Other aquifers		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	Not Reported	Welldepth:	1000
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

B5
SSE **CA WELLS** **7046**
1/2 - 1 Mile
Higher

Water System Information:

Prime Station Code:	06S/08W-12Q01 S	User ID:	TEE
FRDS Number:	3010091002	County:	Orange
District Number:	08	Station Type:	WELL/AMBNT/MUN/INTAKE
Water Type:	Well/Groundwater	Well Status:	Active Untreated
Source Lat/Long:	333936.0 1173946.0	Precision:	10 Feet (1/10 Second)
Source Name:	WELL 02		
System Number:	3010091		
System Name:	LOS ALISOS WD		
Organization That Operates System:			
	P O BOX 699		
	EL TORO 92630		
Pop Served:	38000	Connections:	11645
Area Served:	EL TORO		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

6
WSW
1/2 - 1 Mile
Lower

CA WELLS **6936**

Water System Information:

Prime Station Code:	06S/04W-09L04 S	User ID:	WAT
FRDS Number:	3310012015	County:	Riverside
District Number:	14	Station Type:	WELL/AMBNT/MUN/INTAKE
Water Type:	Well/Groundwater	Well Status:	Abandoned
Source Lat/Long:	333950.0 1174035.0	Precision:	100 Feet (one Second)
Source Name:	SAN JACINTO WELL - ABANDONED		
System Number:	3310012		
System Name:	ELSINORE VALLEY MWD		
Organization That Operates System:			
	P.O. BOX 3000		
	LAKE ELSINORE, CA 92531		
Pop Served:	59200	Connections:	21140
Area Served:	LAKE ELSINORE VICINITY		

B7
SSE
1/2 - 1 Mile
Higher

FED USGS **USGS40000136410**

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-333935117394901		
Monloc name:	006S008W12Q001S		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	Not Reported	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	33.6596944
Longitude:	-117.6634722	Sourcemap scale:	24000
Horiz Acc measure:	.5	Horiz Acc measure units:	seconds
Horiz Collection method:	Global positioning system (GPS), uncorrected		
Horiz coord refsys:	NAD83	Vert measure val:	760
Vert measure units:	feet	Vertacc measure val:	2.5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Other aquifers		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	1957	Welldepth:	740
Welldepth units:	ft	Wellholedepth:	800
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 0

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

State Database: CA Radon

Radon Test Results

Zipcode	Num Tests	> 4 pCi/L
92630	90	0

Federal EPA Radon Zone for ORANGE County: 3

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for Zip Code: 92630

Number of sites tested: 2

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.400 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	Not Reported	Not Reported	Not Reported	Not Reported

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

HYDROLOGIC INFORMATION

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetland Inventory
Source: Department of Fish & Game
Telephone: 916-445-0411

HYDROGEOLOGIC INFORMATION

AQUIFLOW^{R} Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Service, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Water Well Database
Source: Department of Water Resources
Telephone: 916-651-9648

California Drinking Water Quality Database
Source: Department of Public Health
Telephone: 916-324-2319
The database includes all drinking water compliance and special studies monitoring for the state of California since 1984. It consists of over 3,200,000 individual analyses along with well and water system information.

OTHER STATE DATABASE INFORMATION

California Oil and Gas Well Locations
Source: Department of Conservation
Telephone: 916-323-1779
Oil and Gas well locations in the state.

RADON

State Database: CA Radon
Source: Department of Health Services
Telephone: 916-324-2208
Radon Database for California

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

California Earthquake Fault Lines: The fault lines displayed on EDR's Topographic map are digitized quaternary fault lines, prepared in 1975 by the United State Geological Survey. Additional information (also from 1975) regarding activity at specific fault lines comes from California's Preliminary Fault Activity Map prepared by the California Division of Mines and Geology.

STREET AND ADDRESS INFORMATION

© 2015 TomTom North America, Inc. All rights reserved. This material is proprietary and the subject of copyright protection and other intellectual property rights owned by or licensed to Tele Atlas North America, Inc. The use of this material is subject to the terms of a license agreement. You will be held liable for any unauthorized copying or disclosure of this material.

APPENDIX E

REGULATORY RECORDS DOCUMENTATION

20621 Lake Forest
20621 Lake Forest
Lake Forest, CA 92630

Inquiry Number: 05352085.2r
July 05, 2018

The EDR Radius Map™ Report with GeoCheck®

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

SECTION	PAGE
Executive Summary	ES1
Overview Map	2
Detail Map	3
Map Findings Summary	4
Map Findings	8
Orphan Summary	107
Government Records Searched/Data Currency Tracking	GR-1

GEOCHECK ADDENDUM

Physical Setting Source Addendum	A-1
Physical Setting Source Summary	A-2
Physical Setting SSURGO Soil Map	A-5
Physical Setting Source Map	A-15
Physical Setting Source Map Findings	A-17
Physical Setting Source Records Searched	PSGR-1

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Disclaimer - Copyright and Trademark Notice

This Report contains certain information obtained from a variety of public and other sources reasonably available to Environmental Data Resources, Inc. It cannot be concluded from this Report that coverage information for the target and surrounding properties does not exist from other sources. **NO WARRANTY EXPRESSED OR IMPLIED, IS MADE WHATSOEVER IN CONNECTION WITH THIS REPORT. ENVIRONMENTAL DATA RESOURCES, INC. SPECIFICALLY DISCLAIMS THE MAKING OF ANY SUCH WARRANTIES, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE. ALL RISK IS ASSUMED BY THE USER. IN NO EVENT SHALL ENVIRONMENTAL DATA RESOURCES, INC. BE LIABLE TO ANYONE, WHETHER ARISING OUT OF ERRORS OR OMISSIONS, NEGLIGENCE, ACCIDENT OR ANY OTHER CAUSE, FOR ANY LOSS OF DAMAGE, INCLUDING, WITHOUT LIMITATION, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES. ANY LIABILITY ON THE PART OF ENVIRONMENTAL DATA RESOURCES, INC. IS STRICTLY LIMITED TO A REFUND OF THE AMOUNT PAID FOR THIS REPORT.** Purchaser accepts this Report "AS IS". Any analyses, estimates, ratings, environmental risk levels or risk codes provided in this Report are provided for illustrative purposes only, and are not intended to provide, nor should they be interpreted as providing any facts regarding, or prediction or forecast of, any environmental risk for any property. Only a Phase I Environmental Site Assessment performed by an environmental professional can provide information regarding the environmental risk for any property. Additionally, the information provided in this Report is not to be construed as legal advice.

Copyright 2018 by Environmental Data Resources, Inc. All rights reserved. Reproduction in any media or format, in whole or in part, of any report or map of Environmental Data Resources, Inc., or its affiliates, is prohibited without prior written permission.

EDR and its logos (including Sanborn and Sanborn Map) are trademarks of Environmental Data Resources, Inc. or its affiliates. All other trademarks used herein are the property of their respective owners.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13), the ASTM Standard Practice for Environmental Site Assessments for Forestland or Rural Property (E 2247-16), the ASTM Standard Practice for Limited Environmental Due Diligence: Transaction Screen Process (E 1528-14) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

20621 LAKE FOREST
LAKE FOREST, CA 92630

COORDINATES

Latitude (North):	33.6684670 - 33° 40' 6.48''
Longitude (West):	117.6677490 - 117° 40' 3.89''
Universal Tranverse Mercator:	Zone 11
UTM X (Meters):	438094.4
UTM Y (Meters):	3725403.8
Elevation:	735 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	5636489 EL TORO, CA
Version Date:	2012

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20140603, 20140515
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
20621 LAKE FOREST
LAKE FOREST, CA 92630

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
A1	NAKASE BROTHERS NURS	20621 LAKE FOREST	CIWQS		TP
A2	NAKASE BROTHERS NURS	20621 LAKE FOREST DR	UST		TP
A3	NURSERY LAKE FOREST	20621 LAKE FOREST DR	WDS		TP
A4	NAKASE BROTHERS NURS	20621 LAKE FOREST	FINDS		TP
Reg	EL TORO MARINE CORPS		DOD	Same	4906, 0.929, NW
Reg	EL TORO MARINE CORPS	EL TORO MARINE CORPS	NPL, SEMS, CORRACTS, US ENG CONTROLS, US INST...	Same	4736, 0.897, NW
B5	RANCHO PARKWAY SHELL	26721 RANCHO PKWY	UST	Lower	195, 0.037, NNE
B6	RANCHO PARKWAY SHELL	26721 RANCHO PKWY	EDR Hist Auto	Lower	235, 0.045, NNE
B7	VALVOLINE INSTANT OI	26731 RANCHO PKWY	AST	Lower	244, 0.046, NNE
8	WESTERN DIGITAL CORP	20511 LAKE FOREST DR	RCRA-SQG, FINDS, ECHO, HAZNET	Lower	259, 0.049, South
9	THE HOME DEPOT	20021 LAKE FOREST DR	RCRA-SQG, FINDS, ECHO	Higher	444, 0.084, ENE
10	AA SOUTH COUNTY TOWI	20622 PASCAL WAY STE	EDR Hist Auto	Lower	492, 0.093, South
C11	BEACON BAY FOOTHILL	20602 LAKE FOREST DR	UST	Lower	565, 0.107, South
C12	CAR WASH EXPRESS	20602 LAKE FOREST DR	SWEEPS UST, CA FID UST	Lower	565, 0.107, South
C13	BEACON BAY CAR WASH	20602 LAKE FOREST	LUST	Lower	565, 0.107, South
C14	ARCO AM/PM	20572 LAKE FOREST DR	LUST, SWEEPS UST	Lower	589, 0.112, SSE
C15	ARCO	20572 LAKE FOREST	LUST	Lower	589, 0.112, SSE
C16	ECONO LUBE N TUNE	20572 LAKE FOREST DR	RCRA-SQG, FINDS, ECHO	Lower	589, 0.112, SSE
C17	GRAB N GO 24/7	20572 LAKE FOREST DR	UST	Lower	589, 0.112, SSE
C18	LAKE FOREST ARCO	20572 LAKE FOREST DR	UST	Lower	589, 0.112, SSE
D19	FOOTHILL CLEANERS	20651 LAKE FOREST DR	EDR Hist Cleaner	Lower	601, 0.114, South
D20	COCO ENTERPRISE, INC	20651 LAKE FOREST DR	DRYCLEANERS	Lower	601, 0.114, South
D21	FOOTHILL CLEANERS	20651 LAKE FOREST DR	DRYCLEANERS	Lower	601, 0.114, South
D22	SONG'S CLEANERS SOON	20651 LAKE FOREST DR	DRYCLEANERS	Lower	601, 0.114, South
D23	FOOTHILL CLEANERS	20651 LAKE FOREST DR	RCRA-SQG, Orange Co. Industrial Site, FINDS, ECHO,...	Lower	601, 0.114, South
C24	LAKE FOREST AUTO WAS	20602 LAKE FOREST DR	EDR Hist Auto	Lower	628, 0.119, South
E25	POWER PROFESSIONAL C	20562 REGENCY LN F	DRYCLEANERS, EMI	Lower	728, 0.138, SSE
E26	POWER PROF CLEANERS	20562 REGENCY LN	Orange Co. Industrial Site, DRYCLEANERS	Lower	728, 0.138, SSE
27		26642 TOWNE CENTRE D	AST	Higher	823, 0.156, North
E28	ECONO LUBE N TUNE	20592 LAKE FOREST DR	SWEEPS UST	Lower	854, 0.162, SSE
F29	G&M OIL CO. #83	20731 LAKE FOREST DR	UST	Lower	878, 0.166, South
F30	CHEVRON	20731 LAKE FOREST DR	LUST, SWEEPS UST, HIST CORTESE	Lower	878, 0.166, South
G31	POWER CLEANERS	20562 CANADA RD	RCRA-SQG, FINDS, ECHO	Lower	884, 0.167, SSW
G32	SALEEN ALLEN R R R S	20622 CANADA RD	RCRA-SQG, FINDS, ECHO	Lower	908, 0.172, SSW
G33	LOS ALISOS RANCH	20571 CANADA RD	HIST UST	Lower	927, 0.176, SSW
G34	FOREVER GREEN ART IN	20611 CANADA RD	RCRA-SQG, FINDS, ECHO, HAZNET	Lower	932, 0.177, SSW
G35	BOKKES IND MERCEDES	20591 CANADA RD	RCRA-SQG, FINDS, ECHO	Lower	959, 0.182, SSW
36	SADDLE BACK VALLEY O	26891 VISTA TERRACE	RCRA-SQG, HAZNET, NPDES, CIWQS	Higher	1021, 0.193, ESE
H37	TRABUCO CANYON WATER	20904 DIMENSION	UST	Lower	1079, 0.204, West

MAPPED SITES SUMMARY

Target Property Address:
20621 LAKE FOREST
LAKE FOREST, CA 92630

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
H38	TRABUCO CANYON WATER	20904 DIMENSION DR	SWEEPS UST, CA FID UST	Lower	1079, 0.204, West
I39	CLEANERS 2000	20761 LAKE FOREST DR	DRYCLEANERS	Lower	1102, 0.209, South
I40	SANTA MARGARITA TIRE	20761 LAKE FOREST DR	RCRA-SQG, FINDS, ECHO	Lower	1102, 0.209, South
I41	CLEANERS 2000	20761 LAKEFOREST #H	RCRA-SQG, FINDS, ECHO	Lower	1112, 0.211, South
I42	CLEANERS 2000	20761 LAKE FOREST DR	DRYCLEANERS	Lower	1112, 0.211, South
I43	CLEANERS 2000	20761 LAKE FOREST DR	DRYCLEANERS	Lower	1112, 0.211, South
I44	JIFFY LUBE NO 1301	20781 LAKE FOREST DR	RCRA-SQG	Lower	1246, 0.236, South
45	GREENWASTE COMPOSTIN	20712 INDIAN OCEAN D	WMUDS/SWAT	Lower	2425, 0.459, SW

EXECUTIVE SUMMARY

TARGET PROPERTY SEARCH RESULTS

The target property was identified in the following records. For more information on this property see page 8 of the attached EDR Radius Map report:

Site	Database(s)	EPA ID
NAKASE BROTHERS NURS 20621 LAKE FOREST LAKE FOREST, CA 92630	CIWQS	N/A
NAKASE BROTHERS NURS 20621 LAKE FOREST DR LAKE FOREST, CA 92630	UST Database: UST, Date of Government Version: 03/12/2018 Facility Id: 11465	N/A
NURSERY LAKE FOREST 20621 LAKE FOREST DR LAKE FOREST, CA 0	WDS Facility Status: A Facility Id: 8 303229001	N/A
NAKASE BROTHERS NURS 20621 LAKE FOREST LAKE FOREST, CA 92630	FINDS Registry ID:: 110065304879	N/A

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

Proposed NPL ---------- Proposed National Priority List Sites
NPL LIENS ---------- Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ---------- National Priority List Deletions

Federal CERCLIS list

FEDERAL FACILITY ---------- Federal Facility Site Information listing

SEMS Superfund Enterprise Management System

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE Superfund Enterprise Management System Archive

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG RCRA - Large Quantity Generators
RCRA-CESQG RCRA - Conditionally Exempt Small Quantity Generator

Federal institutional controls / engineering controls registries

LUCIS Land Use Control Information System
US ENG CONTROLS Engineering Controls Sites List
US INST CONTROL Sites with Institutional Controls

Federal ERNS list

ERNS Emergency Response Notification System

State- and tribal - equivalent NPL

RESPONSE State Response Sites

State- and tribal - equivalent CERCLIS

ENVIROSTOR EnviroStor Database

State and tribal landfill and/or solid waste disposal site lists

SWF/LF Solid Waste Information System

State and tribal leaking storage tank lists

INDIAN LUST Leaking Underground Storage Tanks on Indian Land
CPS-SLIC Statewide SLIC Cases

State and tribal registered storage tank lists

FEMA UST Underground Storage Tank Listing
INDIAN UST Underground Storage Tanks on Indian Land

State and tribal voluntary cleanup sites

INDIAN VCP Voluntary Cleanup Priority Listing
VCP Voluntary Cleanup Program Properties

State and tribal Brownfields sites

BROWNFIELDS Considered Brownfieds Sites Listing

EXECUTIVE SUMMARY

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS ..... A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

SWRCY ..... Recycler Database
HAULERS ..... Registered Waste Tire Haulers Listing
INDIAN ODI ..... Report on the Status of Open Dumps on Indian Lands
ODI ..... Open Dump Inventory
DEBRIS REGION 9 ..... Torres Martinez Reservation Illegal Dump Site Locations
IHS OPEN DUMPS ..... Open Dumps on Indian Land

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL ..... Delisted National Clandestine Laboratory Register
HIST Cal-Sites ..... Historical Calsites Database
SCH ..... School Property Evaluation Program
CDL ..... Clandestine Drug Labs
Toxic Pits ..... Toxic Pits Cleanup Act Sites
US CDL ..... National Clandestine Laboratory Register
CERS HAZ WASTE ..... CERS HAZ WASTE

Local Lists of Registered Storage Tanks

CERS TANKS ..... California Environmental Reporting System (CERS) Tanks

Local Land Records

LIENS ..... Environmental Liens Listing
LIENS 2 ..... CERCLA Lien Information
DEED ..... Deed Restriction Listing

Records of Emergency Release Reports

HMIRS ..... Hazardous Materials Information Reporting System
CHMIRS ..... California Hazardous Material Incident Report System
LDS ..... Land Disposal Sites Listing
MCS ..... Military Cleanup Sites Listing
Orange Co. Industrial Site ..... List of Industrial Site Cleanups
SPILLS 90 ..... SPILLS 90 data from FirstSearch

Other Ascertainable Records

RCRA NonGen / NLR ..... RCRA - Non Generators / No Longer Regulated
FUDS ..... Formerly Used Defense Sites
SCRD DRYCLEANERS ..... State Coalition for Remediation of Drycleaners Listing
US FIN ASSUR ..... Financial Assurance Information
EPA WATCH LIST ..... EPA WATCH LIST
2020 COR ACTION ..... 2020 Corrective Action Program List
TSCA ..... Toxic Substances Control Act

EXECUTIVE SUMMARY

TRIS	Toxic Chemical Release Inventory System
SSTS	Section 7 Tracking Systems
RMP	Risk Management Plans
RAATS	RCRA Administrative Action Tracking System
PRP	Potentially Responsible Parties
PADS	PCB Activity Database System
ICIS	Integrated Compliance Information System
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
MLTS	Material Licensing Tracking System
COAL ASH DOE	Steam-Electric Plant Operation Data
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
PCB TRANSFORMER	PCB Transformer Registration Database
RADINFO	Radiation Information Database
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
DOT OPS	Incident and Accident Data
CONSENT	Superfund (CERCLA) Consent Decrees
INDIAN RESERV	Indian Reservations
FUSRAP	Formerly Utilized Sites Remedial Action Program
UMTRA	Uranium Mill Tailings Sites
LEAD SMELTERS	Lead Smelter Sites
US AIRS	Aerometric Information Retrieval System Facility Subsystem
US MINES	Mines Master Index File
ABANDONED MINES	Abandoned Mines
DOCKET HWC	Hazardous Waste Compliance Docket Listing
ECHO	Enforcement & Compliance History Information
UXO	Unexploded Ordnance Sites
FUELS PROGRAM	EPA Fuels Program Registered Listing
CA BOND EXP. PLAN	Bond Expenditure Plan
Cortese	"Cortese" Hazardous Waste & Substances Sites List
CUPA Listings	CUPA Resources List
EMI	Emissions Inventory Data
ENF	Enforcement Action Listing
Financial Assurance	Financial Assurance Information Listing
HAZNET	Facility and Manifest Data
ICE	ICE
HWP	EnviroStor Permitted Facilities Listing
HWT	Registered Hazardous Waste Transporter Database
MINES	Mines Site Location Listing
MWMP	Medical Waste Management Program Listing
NPDES	NPDES Permits Listing
PEST LIC	Pesticide Regulation Licenses Listing
PROC	Certified Processors Database
Notify 65	Proposition 65 Records
UIC	UIC Listing
WASTEWATER PITS	Oil Wastewater Pits Listing
WIP	Well Investigation Program Case List
UIC GEO	UIC GEO (GEOTRACKER)
WELL STIM PROJ	Well Stimulation Project (GEOTRACKER)
CERS	CERS
SAMPLING POINT	SAMPLING POINT (GEOTRACKER)
PROJECT	PROJECT (GEOTRACKER)
PROD WATER PONDS	PROD WATER PONDS (GEOTRACKER)
MILITARY PRIV SITES	MILITARY PRIV SITES (GEOTRACKER)
NON-CASE INFO	NON-CASE INFO (GEOTRACKER)

OTHER OIL GAS---------- OTHER OIL & GAS (GEOTRACKER)

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP---------- EDR Proprietary Manufactured Gas Plants

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF---------- Recovered Government Archive Solid Waste Facilities List
RGA LUST---------- Recovered Government Archive Leaking Underground Storage Tank

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: Also known as Superfund, the National Priority List database is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund program. The source of this database is the U.S. EPA.

A review of the NPL list, as provided by EDR, and dated 05/13/2018 has revealed that there is 1 NPL site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
EL TORO MARINE CORPS	***EL TORO MARINE CORPS***	***NW 1/2 - 1 (0.897 mi.)***	***0***	***10***

Federal RCRA CORRACTS facilities list

CORRACTS: CORRACTS is a list of handlers with RCRA Corrective Action Activity. This report shows which nationally-defined corrective action core events have occurred for every handler that has had corrective action activity.

A review of the CORRACTS list, as provided by EDR, and dated 03/01/2018 has revealed that there is 1

CORRACTS site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
EL TORO MARINE CORPS	***EL TORO MARINE CORPS***	***NW 1/2 - 1 (0.897 mi.)***	***0***	***10***

Federal RCRA generators list

RCRA-SQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

A review of the RCRA-SQG list, as provided by EDR, and dated 03/01/2018 has revealed that there are 12 RCRA-SQG sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
THE HOME DEPOT	***20021 LAKE FOREST DR***	***ENE 0 - 1/8 (0.084 mi.)***	***9***	***51***
SADDLE BACK VALLEY O	***26891 VISTA TERRACE***	***ESE 1/8 - 1/4 (0.193 mi.)***	***36***	***90***

Lower Elevation	Address	Direction / Distance	Map ID	Page
WESTERN DIGITAL CORP	***20511 LAKE FOREST DR***	***S 0 - 1/8 (0.049 mi.)***	***8***	***46***
ECONO LUBE N TUNE	***20572 LAKE FOREST DR***	***SSE 0 - 1/8 (0.112 mi.)***	***C16***	***63***
FOOTHILL CLEANERS	***20651 LAKE FOREST DR***	***S 0 - 1/8 (0.114 mi.)***	***D23***	***67***
POWER CLEANERS	***20562 CANADA RD***	***SSW 1/8 - 1/4 (0.167 mi.)***	***G31***	***81***
SALEEN ALLEN R R R S	***20622 CANADA RD***	***SSW 1/8 - 1/4 (0.172 mi.)***	***G32***	***82***
FOREVER GREEN ART IN	***20611 CANADA RD***	***SSW 1/8 - 1/4 (0.177 mi.)***	***G34***	***85***
BOKKES IND MERCEDES	***20591 CANADA RD***	***SSW 1/8 - 1/4 (0.182 mi.)***	***G35***	***88***
SANTA MARGARITA TIRE	***20761 LAKE FOREST DR***	***S 1/8 - 1/4 (0.209 mi.)***	***I40***	***99***
CLEANERS 2000	***20761 LAKEFOREST #H***	***S 1/8 - 1/4 (0.211 mi.)***	***I41***	***100***
JIFFY LUBE NO 1301	20781 LAKE FOREST DR	S 1/8 - 1/4 (0.236 mi.)	I44	103

State and tribal leaking storage tank lists

LUST: Leaking Underground Storage Tank (LUST) Sites included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

A review of the LUST list, as provided by EDR, has revealed that there are 4 LUST sites within approximately 0.5 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
BEACON BAY CAR WASH	20602 LAKE FOREST	S 0 - 1/8 (0.107 mi.)	C13	57

Database: LUST REG 8, Date of Government Version: 02/14/2005
Database: LUST, Date of Government Version: 03/12/2018
Database: ORANGE CO. LUST, Date of Government Version: 04/02/2018
Status: Completed - Case Closed
Facility Id: 02UT003
Facility Status: Case Closed

Global Id: T0605999998
Global ID: T0605999998

ARCO AM/PM ***20572 LAKE FOREST DR*** ***SSE 0 - 1/8 (0.112 mi.)*** ***C14*** ***59***
Database: LUST REG 8, Date of Government Version: 02/14/2005
Facility Status: Case Closed
Global ID: T0605947685

ARCO 20572 LAKE FOREST SSE 0 - 1/8 (0.112 mi.) C15 61
Database: LUST, Date of Government Version: 03/12/2018
Database: ORANGE CO. LUST, Date of Government Version: 04/02/2018
Status: Completed - Case Closed
Facility Id: 02UT008
Global Id: T0605947685

CHEVRON ***20731 LAKE FOREST DR*** ***S 1/8 - 1/4 (0.166 mi.)*** ***F30*** ***77***
Database: LUST REG 8, Date of Government Version: 02/14/2005
Database: LUST, Date of Government Version: 03/12/2018
Database: ORANGE CO. LUST, Date of Government Version: 04/02/2018
Status: Completed - Case Closed
Facility Id: 97UT037
Facility Status: Case Closed
Global Id: T0605902102
Global ID: T0605902102

State and tribal registered storage tank lists

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the State Water Resources Control Board's Hazardous Substance Storage Container Database.

A review of the UST list, as provided by EDR, has revealed that there are 6 UST sites within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
RANCHO PARKWAY SHELL Database: ORANGE CO. UST, Date of Government Version: 01/02/2018 Database: UST, Date of Government Version: 03/12/2018 Facility Id: FA0024028	26721 RANCHO PKWY	NNE 0 - 1/8 (0.037 mi.)	B5	45
BEACON BAY FOOTHILL Database: UST, Date of Government Version: 03/12/2018 Facility Id: 19793	20602 LAKE FOREST DR	S 0 - 1/8 (0.107 mi.)	C11	55
GRAB N GO 24/7 Database: ORANGE CO. UST, Date of Government Version: 01/02/2018 Facility Id: FA0024654	20572 LAKE FOREST DR	SSE 0 - 1/8 (0.112 mi.)	C17	65
LAKE FOREST ARCO Database: UST, Date of Government Version: 03/12/2018 Facility Id: 12020	20572 LAKE FOREST DR	SSE 0 - 1/8 (0.112 mi.)	C18	65
G&M OIL CO. #83 Database: ORANGE CO. UST, Date of Government Version: 01/02/2018 Database: UST, Date of Government Version: 03/12/2018 Facility Id: FA0025150	20731 LAKE FOREST DR	S 1/8 - 1/4 (0.166 mi.)	F29	77

Facility Id: 20177

TRABUCO CANYON WATER	20904 DIMENSION	W 1/8 - 1/4 (0.204 mi.)	H37	97

Database: UST, Date of Government Version: 03/12/2018
Facility Id: 8466

AST: A listing of aboveground storage tank petroleum storage tank locations.

A review of the AST list, as provided by EDR, has revealed that there are 2 AST sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
Not reported	26642 TOWNE CENTRE D	N 1/8 - 1/4 (0.156 mi.)	27	76

Database: AST, Date of Government Version: 07/06/2016

Lower Elevation	Address	Direction / Distance	Map ID	Page
VALVOLINE INSTANT OI	26731 RANCHO PKWY	NNE 0 - 1/8 (0.046 mi.)	B7	45

Database: AST, Date of Government Version: 07/06/2016

ADDITIONAL ENVIRONMENTAL RECORDS

Local Lists of Landfill / Solid Waste Disposal Sites

WMUDS/SWAT: The Waste Management Unit Database System is used for program tracking and inventory of waste management units. The source is the State Water Resources Control Board.

A review of the WMUDS/SWAT list, as provided by EDR, and dated 04/01/2000 has revealed that there is 1 WMUDS/SWAT site within approximately 0.5 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
GREENWASTE COMPOSTIN	20712 INDIAN OCEAN D	SW 1/4 - 1/2 (0.459 mi.)	45	105

Local Lists of Registered Storage Tanks

SWEEPS UST: Statewide Environmental Evaluation and Planning System. This underground storage tank listing was updated and maintained by a company contacted by the SWRCB in the early 1990's. The listing is no longer updated or maintained. The local agency is the contact for more information on a site on the SWEEPS list.

A review of the SWEEPS UST list, as provided by EDR, and dated 06/01/1994 has revealed that there are 5 SWEEPS UST sites within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
CAR WASH EXPRESS	***20602 LAKE FOREST DR***	***S 0 - 1/8 (0.107 mi.)***	***C12***	***56***
Comp Number: 12655				
ARCO AM/PM	***20572 LAKE FOREST DR***	***SSE 0 - 1/8 (0.112 mi.)***	***C14***	***59***

Status: A Tank Status: A Comp Number: 12020				
ECONO LUBE N TUNE Status: A Tank Status: A Comp Number: 12498	20592 LAKE FOREST DR	SSE 1/8 - 1/4 (0.162 mi.)	E28	76
CHEVRON Status: A Tank Status: A Comp Number: 11761	***20731 LAKE FOREST DR***	***S 1/8 - 1/4 (0.166 mi.)***	***F30***	***77***
TRABUCO CANYON WATER Status: A Tank Status: A Comp Number: 8466	***20904 DIMENSION DR***	***W 1/8 - 1/4 (0.204 mi.)***	***H38***	***97***

HIST UST: Historical UST Registered Database.

A review of the HIST UST list, as provided by EDR, and dated 10/15/1990 has revealed that there is 1 HIST UST site within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
LOS ALISOS RANCH Facility Id: 00000023543	20571 CANADA RD	SSW 1/8 - 1/4 (0.176 mi.)	G33	84

CA FID UST: The Facility Inventory Database contains active and inactive underground storage tank locations. The source is the State Water Resource Control Board.

A review of the CA FID UST list, as provided by EDR, and dated 10/31/1994 has revealed that there are 2 CA FID UST sites within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
CAR WASH EXPRESS Facility Id: 30017393 Status: I	***20602 LAKE FOREST DR***	***S 0 - 1/8 (0.107 mi.)***	***C12***	***56***
TRABUCO CANYON WATER Facility Id: 30017607 Status: A	***20904 DIMENSION DR***	***W 1/8 - 1/4 (0.204 mi.)***	***H38***	***97***

Other Ascertainable Records

DOD: Consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

A review of the DOD list, as provided by EDR, and dated 12/31/2005 has revealed that there is 1 DOD

site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
EL TORO MARINE CORPS		NW 1/2 - 1 (0.929 mi.)	0	10

ROD: Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid the cleanup.

A review of the ROD list, as provided by EDR, and dated 05/13/2018 has revealed that there is 1 ROD site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
EL TORO MARINE CORPS	***EL TORO MARINE CORPS***	***NW 1/2 - 1 (0.897 mi.)***	***0***	***10***

DRYCLEANERS: A list of drycleaner related facilities that have EPA ID numbers. These are facilities with certain SIC codes: power laundries, family and commercial; garment pressing and cleaners' agents; linen supply; coin-operated laundries and cleaning; drycleaning plants except rugs; carpet and upholster cleaning; industrial launderers; laundry and garment services.

A review of the DRYCLEANERS list, as provided by EDR, has revealed that there are 9 DRYCLEANERS sites within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
COCO ENTERPRISE, INC	20651 LAKE FOREST DR	S 0 - 1/8 (0.114 mi.)	D20	66
Database: DRYCLEAN SOUTH COAST, Date of Government Version: 03/16/2018				
FOOTHILL CLEANERS	20651 LAKE FOREST DR	S 0 - 1/8 (0.114 mi.)	D21	66
Database: DRYCLEAN SOUTH COAST, Date of Government Version: 03/16/2018				
SONG'S CLEANERS SOON	20651 LAKE FOREST DR	S 0 - 1/8 (0.114 mi.)	D22	67
Database: DRYCLEAN SOUTH COAST, Date of Government Version: 03/16/2018				
FOOTHILL CLEANERS	***20651 LAKE FOREST DR***	***S 0 - 1/8 (0.114 mi.)***	***D23***	***67***
Database: DRYCLEANERS, Date of Government Version: 03/27/2018				
EPA Id: CAL000298661				
EPA Id: CAL000323129				
POWER PROFESSIONAL C	***20562 REGENCY LN F***	***SSE 1/8 - 1/4 (0.138 mi.)***	***E25***	***72***
Database: DRYCLEAN SOUTH COAST, Date of Government Version: 03/16/2018				
POWER PROF CLEANERS	***20562 REGENCY LN***	***SSE 1/8 - 1/4 (0.138 mi.)***	***E26***	***75***
Database: DRYCLEANERS, Date of Government Version: 03/27/2018				
EPA Id: CAD983617648				
CLEANERS 2000	20761 LAKE FOREST DR	S 1/8 - 1/4 (0.209 mi.)	I39	98
Database: DRYCLEANERS, Date of Government Version: 03/27/2018				
EPA Id: CAD983581711				
CLEANERS 2000	20761 LAKE FOREST DR	S 1/8 - 1/4 (0.211 mi.)	I42	102
Database: DRYCLEAN SOUTH COAST, Date of Government Version: 03/16/2018				
CLEANERS 2000	20761 LAKE FOREST DR	S 1/8 - 1/4 (0.211 mi.)	I43	103
Database: DRYCLEAN SOUTH COAST, Date of Government Version: 03/16/2018				

HIST CORTESE: The sites for the list are designated by the State Water Resource Control Board [LUST], the Integrated Waste Board [SWF/LS], and the Department of Toxic Substances Control [CALSITES]. This listing is no longer updated by the state agency.

A review of the HIST CORTESE list, as provided by EDR, and dated 04/01/2001 has revealed that there is 1 HIST CORTESE site within approximately 0.5 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
CHEVRON Reg Id: 083003083T	***20731 LAKE FOREST DR***	***S 1/8 - 1/4 (0.166 mi.)***	***F30***	***77***

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR Hist Auto: EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

A review of the EDR Hist Auto list, as provided by EDR, has revealed that there are 3 EDR Hist Auto sites within approximately 0.125 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
RANCHO PARKWAY SHELL	26721 RANCHO PKWY	NNE 0 - 1/8 (0.045 mi.)	B6	45
AA SOUTH COUNTY TOWI	20622 PASCAL WAY STE	S 0 - 1/8 (0.093 mi.)	10	54
LAKE FOREST AUTO WAS	20602 LAKE FOREST DR	S 0 - 1/8 (0.119 mi.)	C24	71

EDR Hist Cleaner: EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

A review of the EDR Hist Cleaner list, as provided by EDR, has revealed that there is 1 EDR Hist Cleaner site within approximately 0.125 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
FOOTHILL CLEANERS	20651 LAKE FOREST DR	S 0 - 1/8 (0.114 mi.)	D19	65

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 5 records.

Site Name	Database(s)
NE CORNER LAKE FOREST & TOWNE	CIWQS
LAKE FOREST PUMP HOUSE ADDTION	CIWQS
REGENCY LAKE FOREST DR	CIWQS
GREENWASTENA LAKE FOREST	FINDS
LAKE FOREST PUMP HOUSE ADDTION	FINDS

OVERVIEW MAP - 05352085.2R

0 1/4 1/2 1 Miles

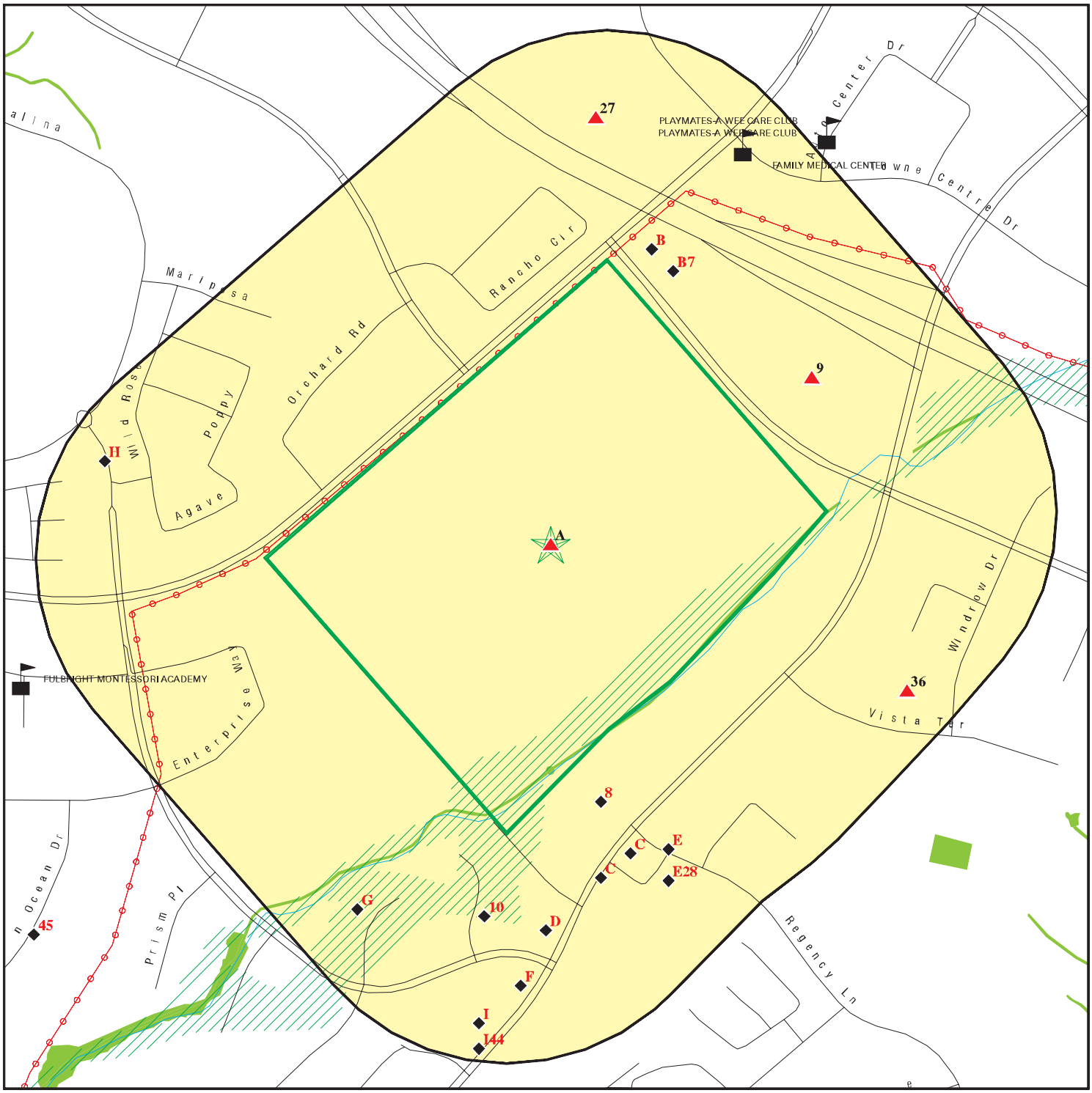
- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Power transmission lines
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory
- State Wetlands
- Upgradient Area
- Areas of Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: 20621 Lake Forest	CLIENT: Hillmann Environmental Co.
ADDRESS: 20621 Lake Forest Lake Forest CA 92630	CONTACT: Kristine Savona INQUIRY #: 05352085.2r
LAT/LONG: 33.668467 / 117.667749	DATE: July 05, 2018 3:01 pm

Copyright © 2018 EDR, Inc. © 2015 TomTom Rel. 2015.

DETAIL MAP - 05352085.2R



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Power transmission lines
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory
- State Wetlands
- Areas of Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: 20621 Lake Forest	CLIENT: Hillmann Environmental Co.
ADDRESS: 20621 Lake Forest Lake Forest CA 92630	CONTACT: Kristine Savona
LAT/LONG: 33.668467 / 117.667749	INQUIRY #: 05352085.2r DATE: July 05, 2018 3:05 pm

Copyright © 2018 EDR, Inc. © 2015 TomTom Rel. 2015.

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL	1.000		0	0	0	1	NR	1
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	0.001		0	NR	NR	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	0	NR	NR	0
Federal CERCLIS NFRAP site list								
SEMS-ARCHIVE	0.500		0	0	0	NR	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS	1.000		0	0	0	1	NR	1
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		4	8	NR	NR	NR	12
RCRA-CESQG	0.250		0	0	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROL	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	0.001		0	NR	NR	NR	NR	0
State- and tribal - equivalent NPL								
RESPONSE	1.000		0	0	0	0	NR	0
State- and tribal - equivalent CERCLIS								
ENVIROSTOR	1.000		0	0	0	0	NR	0
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	0.500		0	0	0	NR	NR	0
State and tribal leaking storage tank lists								
LUST	0.500		3	1	0	NR	NR	4

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
INDIAN LUST	0.500		0	0	0	NR	NR	0
CPS-SLIC	0.500		0	0	0	NR	NR	0
State and tribal registered storage tank lists								
FEMA UST	0.250		0	0	NR	NR	NR	0
UST	0.250	1	4	2	NR	NR	NR	7
AST	0.250		1	1	NR	NR	NR	2
INDIAN UST	0.250		0	0	NR	NR	NR	0
State and tribal voluntary cleanup sites								
INDIAN VCP	0.500		0	0	0	NR	NR	0
VCP	0.500		0	0	0	NR	NR	0
State and tribal Brownfields sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
WMUDS/SWAT	0.500		0	0	1	NR	NR	1
SWRCY	0.500		0	0	0	NR	NR	0
HAULERS	0.001		0	NR	NR	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
IHS OPEN DUMPS	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	0.001		0	NR	NR	NR	NR	0
HIST Cal-Sites	1.000		0	0	0	0	NR	0
SCH	0.250		0	0	NR	NR	NR	0
CDL	0.001		0	NR	NR	NR	NR	0
Toxic Pits	1.000		0	0	0	0	NR	0
US CDL	0.001		0	NR	NR	NR	NR	0
CERS HAZ WASTE	0.250		0	0	NR	NR	NR	0
Local Lists of Registered Storage Tanks								
SWEEPS UST	0.250		2	3	NR	NR	NR	5
HIST UST	0.250		0	1	NR	NR	NR	1
CA FID UST	0.250		1	1	NR	NR	NR	2
CERS TANKS	0.250		0	0	NR	NR	NR	0
Local Land Records								
LIENS	0.001		0	NR	NR	NR	NR	0
LIENS 2	0.001		0	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
DEED	0.500		0	0	0	NR	NR	0
Records of Emergency Release Reports								
HMIRS	0.001		0	NR	NR	NR	NR	0
CHMIRS	0.001		0	NR	NR	NR	NR	0
LDS	0.001		0	NR	NR	NR	NR	0
MCS	0.001		0	NR	NR	NR	NR	0
Orange Co. Industrial Site	0.001		0	NR	NR	NR	NR	0
SPILLS 90	0.001		0	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	0	NR	NR	NR	0
FUDS	1.000		0	0	0	0	NR	0
DOD	1.000		0	0	0	1	NR	1
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	0.001		0	NR	NR	NR	NR	0
EPA WATCH LIST	0.001		0	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	0.001		0	NR	NR	NR	NR	0
TRIS	0.001		0	NR	NR	NR	NR	0
SSTS	0.001		0	NR	NR	NR	NR	0
ROD	1.000		0	0	0	1	NR	1
RMP	0.001		0	NR	NR	NR	NR	0
RAATS	0.001		0	NR	NR	NR	NR	0
PRP	0.001		0	NR	NR	NR	NR	0
PADS	0.001		0	NR	NR	NR	NR	0
ICIS	0.001		0	NR	NR	NR	NR	0
FTTS	0.001		0	NR	NR	NR	NR	0
MLTS	0.001		0	NR	NR	NR	NR	0
COAL ASH DOE	0.001		0	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	0.001		0	NR	NR	NR	NR	0
RADINFO	0.001		0	NR	NR	NR	NR	0
HIST FTTS	0.001		0	NR	NR	NR	NR	0
DOT OPS	0.001		0	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	0.001		0	NR	NR	NR	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	0.001		0	NR	NR	NR	NR	0
US AIRS	0.001		0	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
ABANDONED MINES	0.001		0	NR	NR	NR	NR	0
FINDS	0.001	1	0	NR	NR	NR	NR	1
DOCKET HWC	0.001		0	NR	NR	NR	NR	0
ECHO	0.001		0	NR	NR	NR	NR	0
UXO	1.000		0	0	0	0	NR	0
FUELS PROGRAM	0.250		0	0	NR	NR	NR	0
CA BOND EXP. PLAN	1.000		0	0	0	0	NR	0
Cortese	0.500		0	0	0	NR	NR	0
CUPA Listings	0.250		0	0	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
DRYCLEANERS	0.250		4	5	NR	NR	NR	9
EMI	0.001		0	NR	NR	NR	NR	0
ENF	0.001		0	NR	NR	NR	NR	0
Financial Assurance	0.001		0	NR	NR	NR	NR	0
HAZNET	0.001		0	NR	NR	NR	NR	0
ICE	0.001		0	NR	NR	NR	NR	0
HIST CORTESE	0.500		0	1	0	NR	NR	1
HWP	1.000		0	0	0	0	NR	0
HWT	0.250		0	0	NR	NR	NR	0
MINES	0.001		0	NR	NR	NR	NR	0
MWMP	0.250		0	0	NR	NR	NR	0
NPDES	0.001		0	NR	NR	NR	NR	0
PEST LIC	0.001		0	NR	NR	NR	NR	0
PROC	0.500		0	0	0	NR	NR	0
Notify 65	1.000		0	0	0	0	NR	0
UIC	0.001		0	NR	NR	NR	NR	0
WASTEWATER PITS	0.500		0	0	0	NR	NR	0
WDS	0.001	1	0	NR	NR	NR	NR	1
WIP	0.250		0	0	NR	NR	NR	0
UIC GEO	0.001		0	NR	NR	NR	NR	0
WELL STIM PROJ	0.001		0	NR	NR	NR	NR	0
CERS	0.001		0	NR	NR	NR	NR	0
SAMPLING POINT	0.001		0	NR	NR	NR	NR	0
PROJECT	0.001		0	NR	NR	NR	NR	0
PROD WATER PONDS	0.001		0	NR	NR	NR	NR	0
CIWQS	0.001	1	0	NR	NR	NR	NR	1
MILITARY PRIV SITES	0.001		0	NR	NR	NR	NR	0
NON-CASE INFO	0.001		0	NR	NR	NR	NR	0
OTHER OIL GAS	0.001		0	NR	NR	NR	NR	0
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	0	NR	0
EDR Hist Auto	0.125		3	NR	NR	NR	NR	3
EDR Hist Cleaner	0.125		1	NR	NR	NR	NR	1
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA LF	0.001		0	NR	NR	NR	NR	0
RGA LUST	0.001		0	NR	NR	NR	NR	0
- Totals --		4	23	23	1	4	0	55

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

A1 **NAKASE BROTHERS NURSERY, LAKE FOREST** **CIWQS** **S120032261**
Target **20621 LAKE FOREST** **N/A**
Property **LAKE FOREST, CA 92630**

Site 1 of 4 in cluster A

Actual: **735 ft.**

CIWQS:

Agency:	Nakase Brothers Wholesale Nursery
Agency Address:	9441 Krepp Drive, Huntington Beach, CA 92646
Place/Project Type:	Nursery/Hydroponics
SIC/NAICS:	Not reported
Region:	8
Program:	IRRIINDIVWDR
Regulatory Measure Status:	Active
Regulatory Measure Type:	WDR
Order Number:	R8-2005-0006
WDID:	8 303229001
NPDES Number:	Not reported
Adoption Date:	02/03/2005
Effective Date:	02/03/2005
Termination Date:	Not reported
Expiration/Review Date:	02/03/2015
Design Flow:	Not reported
Major/Minor:	Not reported
Complexity:	C
TTWQ:	2
Enforcement Actions within 5 years:	0
Violations within 5 years:	0
Latitude:	Not reported
Longitude:	Not reported

A2 **NAKASE BROTHERS NURSERY** **UST** **U003778876**
Target **20621 LAKE FOREST DR** **N/A**
Property **LAKE FOREST, CA 92630**

Site 2 of 4 in cluster A

Actual: **735 ft.**

UST:

Facility ID:	11465
Permitting Agency:	ORANGE COUNTY
Latitude:	33.669816
Longitude:	-117.6664

A3 **NURSERY LAKE FOREST** **WDS** **S106800804**
Target **20621 LAKE FOREST DR** **N/A**
Property **LAKE FOREST, CA 0**

Site 3 of 4 in cluster A

Actual: **735 ft.**

WDS:

Facility ID:	Santa Ana River 303229001
Facility Type:	Agricultural - Facility that treats and/or disposes of the wastes associated with confined and concentrated animal feeding, confined animal feeding, confined animal holding, confined and concentrated aquatic animal production facilities, and aquaculture. the treatment and/or disposal of agricultural return water is included in this category.
Facility Status:	Active - Any facility with a continuous or seasonal discharge that is

NURSERY LAKE FOREST (Continued) **S106800804**

	under Waste Discharge Requirements.
NPDES Number:	Not reported
Subregion:	8
Facility Telephone:	Not reported
Facility Contact:	STEVE NAKASE
Agency Name:	NAKASE BROTHERS WHOLESALE NURE
Agency Address:	9441 KREPP DRIVE
Agency City,St,Zip:	HUNTINGTON BEACH 92646
Agency Contact:	STEVE NAKASE
Agency Telephone:	Not reported
Agency Type:	Private
SIC Code:	0
SIC Code 2:	Not reported
Primary Waste Type:	Designated/Influent or Solid Wastes that pose a significant threat to water quality because of their high concentrations (E.G., BOD, Hardness, TRF, Chloride). 'Manageable' hazardous wastes (E.G., inorganic salts and heavy metals) are included in this category.
Primary Waste:	IRRIGA
Waste Type2:	Not reported
Waste2:	Irrigation Runoff
Primary Waste Type:	Designated/Influent or Solid Wastes that pose a significant threat to water quality because of their high concentrations (E.G., BOD, Hardness, TRF, Chloride). 'Manageable' hazardous wastes (E.G., inorganic salts and heavy metals) are included in this category.
Secondary Waste:	Not reported
Secondary Waste Type:	Not reported
Design Flow:	0
Baseline Flow:	0
Reclamation:	No reclamation requirements associated with this facility.
POTW:	The facility is not a POTW.
Treat To Water:	Moderate Threat to Water Quality. A violation could have a major adverse impact on receiving biota, can cause aesthetic impairment to a significant human population, or render unusable a potential domestic or municipal water supply. Awsthetic impairment would include nuisance from a waste treatment facility.
Complexity:	Category C - Facilities having no waste treatment systems, such as cooling water dischargers or thosewho must comply through best management practices, facilities with passive waste treatment and disposal systems, such as septic systems with subsurface disposal, or dischargers having waste storage systems with land disposal such as dairy waste ponds.

A4 **NAKASE BROTHERS NURSERYNA LAKE FOREST** **FINDS** **1023242484**
Target **20621 LAKE FOREST** **N/A**
Property **LAKE FOREST, CA 92630**

Site 4 of 4 in cluster A

Actual:
735 ft.

FINDS:

Registry ID: 110065304879

Environmental Interest/Information System
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

DOD **EL TORO MARINE CORPS AIR STATION (CLOSED)** **DOD** **CUSA143948**
Region **N/A**
NW
1/2-1 **EL TORO MARINE CORPS AIR (County), CA**
4906 ft.

DOD:
- Feature 1: Marine Corps DOD
- Feature 2: Not reported
- Feature 3: Not reported
- URL: Not reported
- Name 1: El Toro Marine Corps Air Station (Closed)
- Name 2: Not reported
- Name 3: Not reported
- State: CA
- DOD Site: Yes
- Tile name: CAORANGE

NPL **EL TORO MARINE CORPS AIR STATION** **NPL** **1000417911**
Region **EL TORO MARINE CORPS AIR STA EL TORO M C A S** **SEMS** **CA6170023208**
NW **EL TORO, CA 92709** **CORRACTS**
1/2-1 **US ENG CONTROLS**
4736 ft. **US INST CONTROL**
ROD
RAATS
PRP

NPL:
- EPA ID: CA6170023208
- Cerclis ID: 902770
- EPA Region: 9
- Federal: Y
- Final Date: 1990-02-21 00:00:00
- Site Score: 37.43
- Latitude: 33.676669
- Longitude: -117.7176

Category Details:
- NPL Status: Currently on the Final NPL
- Category Description: Depth To Aquifer-> 50 And <= 100 Feet
- Category Value: 100

- NPL Status: Currently on the Final NPL
- Category Description: Distance To Nearest Population-> 0 And <= 1/4 Mile
- Category Value: 10

Site Details:
- Site Name: EL TORO MARINE CORPS AIR STATION
- Site Status: Final
- Site Zip: 92709
- Site City: EL TORO
- Site State: CA
- Federal Site: Yes
- Site County: ORANGE
- EPA Region: 09
- Date Proposed: 06/24/88
- Date Deleted: Not reported
- Date Finalized: 02/21/90

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Substance Details:

NPL Status:	Currently on the Final NPL
Substance ID:	Not reported
Substance:	Not reported
CAS #:	Not reported
Pathway:	Not reported
Scoring:	Not reported

NPL Status:	Currently on the Final NPL
Substance ID:	A046
Substance:	POLYCHLORINATED BIPHENYLS
CAS #:	1336-36-3
Pathway:	NO PATHWAY INDICATED
Scoring:	1

NPL Status:	Currently on the Final NPL
Substance ID:	D008
Substance:	LEAD (PB)
CAS #:	7439-92-1
Pathway:	GROUND WATER PATHWAY
Scoring:	3

NPL Status:	Currently on the Final NPL
Substance ID:	U044
Substance:	CHLOROFORM
CAS #:	67-66-3
Pathway:	GROUND WATER PATHWAY
Scoring:	4

NPL Status:	Currently on the Final NPL
Substance ID:	U210
Substance:	TETRACHLOROETHENE
CAS #:	127-18-4
Pathway:	GROUND WATER PATHWAY
Scoring:	2

NPL Status:	Currently on the Final NPL
Substance ID:	U211
Substance:	CARBON TETRACHLORIDE
CAS #:	56-23-5
Pathway:	GROUND WATER PATHWAY
Scoring:	4

NPL Status:	Currently on the Final NPL
Substance ID:	U228
Substance:	TRICHLOROETHYLENE (TCE)
CAS #:	79-01-6
Pathway:	NO PATHWAY INDICATED
Scoring:	1

Summary Details:

Conditions at proposal June 24, 1988): The El Toro Marine Corps Air Station covers approximately 4,700 acres southeast of Santa Ana in El Toro, Orange County, California. Commissioned in 1943, it supports the Fleet Marine Forces in the Pacific Ocean. The surrounding area, once primarily agricultural, is urbani ing rapidly. Station El Toro is participating

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

in the Installation Restoration Program IRP), established in 1978. Under the program, the Department of Defense seeksto identify, investigate, and clean up contamination from ha ardous materials. As part of IRP, the Navy identified 21 problem areas at the station, including three landfills containing both ha ardous and solid waste; buried drums of explosivesand low-level radioactive waste; and areas where PCBs, battery acids, leaded fuels, and other ha ardous substances were dumped or spilled. In tests conducted early in 1987, the Orange County Water District found trichloroethylene and tetrachloroethylene in shallow irrigation wells on and downgradient of the site. An estimated 1,100 acres of land are irrigated by wells within 3 miles of the site. Status February 21, 1990): In April 1989, Station El Toro prepared a Perimeter Investigation Interim Report which focused on four contaminated areas. Further studies are continuing to determine the extent and sources of contamination.

Site Status Details:

NPL Status:	Final
Proposed Date:	06/24/1988
Final Date:	02/21/1990
Deleted Date:	Not reported

Narratives Details:

NPL Name:	EL TORO MARINE CORPS AIR STATION
City:	EL TORO
State:	CA

SEMS:

Site ID:	902770
EPA ID:	CA6170023208
Cong District:	Not reported
FIPS Code:	6059
Latitude:	33.676668999999997
Longitude:	-117.7176
FF:	Y
NPL:	Currently on the Final NPL
Non NPL Status:	Not reported

SEMS Detail:

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	0
Action Code:	NF
Action Name:	NPL FINL
SEQ:	1
Start Date:	1990-02-21 00:00:00
Finish Date:	2/21/1990
Qual:	Not reported
Current Action Lead:	EPA Perf

Region:	9
Site ID:	902770
EPA ID:	CA6170023208

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	0
Action Code:	HR
Action Name:	HAZRANK
SEQ:	1
Start Date:	1987-06-01 00:00:00
Finish Date:	6/1/1987
Qual:	Not reported
Current Action Lead:	EPA Perf

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	0
Action Code:	AR
Action Name:	ADMIN REC
SEQ:	1
Start Date:	1990-02-21 00:00:00
Finish Date:	Not reported
Qual:	Not reported
Current Action Lead:	EPA Perf

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	0
Action Code:	NP
Action Name:	PROPOSED
SEQ:	1
Start Date:	1988-06-24 00:00:00
Finish Date:	6/24/1988
Qual:	Not reported
Current Action Lead:	EPA Perf

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	4
Action Code:	RO
Action Name:	ROD
SEQ:	3
Start Date:	2000-07-12 00:00:00
Finish Date:	7/12/2000
Qual:	Not reported
Current Action Lead:	Fed Fac

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	1
Action Code:	RO
Action Name:	ROD
SEQ:	1
Start Date:	2002-06-27 00:00:00
Finish Date:	6/27/2002
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	8
Action Code:	NH
Action Name:	FF RI
SEQ:	1
Start Date:	1990-09-28 00:00:00
Finish Date:	12/17/1993
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	5
Action Code:	LX
Action Name:	FF RD
SEQ:	4
Start Date:	2008-09-01 00:00:00
Finish Date:	8/13/2009
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	8
Action Code:	NI
Action Name:	FF FS
SEQ:	1
Start Date:	2007-01-29 00:00:00
Finish Date:	8/29/2008

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	4
Action Code:	LX
Action Name:	FF RD
SEQ:	3
Start Date:	2000-07-12 00:00:00
Finish Date:	11/22/2005
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	1
Action Code:	LY
Action Name:	FF RA
SEQ:	1
Start Date:	2005-03-21 00:00:00
Finish Date:	3/27/2008
Qual:	IR
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	8
Action Code:	LX
Action Name:	FF RD
SEQ:	7
Start Date:	2012-01-03 00:00:00
Finish Date:	12/19/2012
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	3
Action Code:	RO
Action Name:	ROD

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

SEQ: 5
Start Date: 1999-09-30 00:00:00
Finish Date: 9/30/1999
Qual: Not reported
Current Action Lead: Fed Fac

Region: 9
Site ID: 902770
EPA ID: CA6170023208
Site Name: EL TORO MARINE CORPS AIR STATION
NPL: F
FF: Y
OU: 0
Action Code: SI
Action Name: SI
SEQ: 1
Start Date: 1987-06-01 00:00:00
Finish Date: 6/1/1987
Qual: H
Current Action Lead: Fed Fac

Region: 9
Site ID: 902770
EPA ID: CA6170023208
Site Name: EL TORO MARINE CORPS AIR STATION
NPL: F
FF: Y
OU: 6
Action Code: RO
Action Name: ROD
SEQ: 6
Start Date: 1997-09-29 00:00:00
Finish Date: 9/29/1997
Qual: Not reported
Current Action Lead: Fed Fac

Region: 9
Site ID: 902770
EPA ID: CA6170023208
Site Name: EL TORO MARINE CORPS AIR STATION
NPL: F
FF: Y
OU: 3
Action Code: LY
Action Name: FF RA
SEQ: 5
Start Date: 2005-03-24 00:00:00
Finish Date: 2/3/2006
Qual: FR
Current Action Lead: Fed Fac

Region: 9
Site ID: 902770
EPA ID: CA6170023208
Site Name: EL TORO MARINE CORPS AIR STATION
NPL: F
FF: Y

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

OU:	1
Action Code:	LW
Action Name:	FF RI/FS
SEQ:	2
Start Date:	1990-09-28 00:00:00
Finish Date:	6/27/2002
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	3
Action Code:	LX
Action Name:	FF RD
SEQ:	5
Start Date:	2000-01-13 00:00:00
Finish Date:	3/31/2005
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	1
Action Code:	LX
Action Name:	FF RD
SEQ:	1
Start Date:	2003-03-01 00:00:00
Finish Date:	5/31/2005
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	0
Action Code:	DS
Action Name:	DISCVRY
SEQ:	1
Start Date:	1986-08-01 00:00:00
Finish Date:	8/1/1986
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	2
Action Code:	LW
Action Name:	FF RI/FS
SEQ:	7
Start Date:	1990-09-28 00:00:00
Finish Date:	9/29/1997
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	8
Action Code:	RO
Action Name:	ROD
SEQ:	8
Start Date:	2012-02-09 00:00:00
Finish Date:	2/9/2012
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	5
Action Code:	LW
Action Name:	FF RI/FS
SEQ:	1
Start Date:	1990-09-28 00:00:00
Finish Date:	3/7/2005
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	0
Action Code:	PA
Action Name:	PA
SEQ:	1
Start Date:	1986-10-01 00:00:00
Finish Date:	10/1/1986
Qual:	H
Current Action Lead:	Fed Fac

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	7
Action Code:	RO
Action Name:	ROD
SEQ:	7
Start Date:	2001-06-06 00:00:00
Finish Date:	6/6/2001
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	5
Action Code:	LY
Action Name:	FF RA
SEQ:	4
Start Date:	2009-08-17 00:00:00
Finish Date:	6/10/2013
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	2
Action Code:	RO
Action Name:	ROD
SEQ:	2
Start Date:	1997-09-29 00:00:00
Finish Date:	9/29/1997
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	8
Action Code:	NI
Action Name:	FF FS
SEQ:	2
Start Date:	2007-01-29 00:00:00
Finish Date:	4/13/2011

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	8
Action Code:	LX
Action Name:	FF RD
SEQ:	11
Start Date:	2014-04-30 00:00:00
Finish Date:	Not reported
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	8
Action Code:	RO
Action Name:	ROD
SEQ:	16
Start Date:	2014-04-30 00:00:00
Finish Date:	4/30/2014
Qual:	R
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	8
Action Code:	LY
Action Name:	FF RA
SEQ:	10
Start Date:	2013-09-14 00:00:00
Finish Date:	Not reported
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	5
Action Code:	LY
Action Name:	FF RA

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

SEQ:	11
Start Date:	2011-07-19 00:00:00
Finish Date:	1/22/2013
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	5
Action Code:	LX
Action Name:	FF RD
SEQ:	12
Start Date:	2011-07-01 00:00:00
Finish Date:	7/19/2011
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	1
Action Code:	OM
Action Name:	OM
SEQ:	2
Start Date:	2008-03-27 00:00:00
Finish Date:	Not reported
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	9
Action Code:	OM
Action Name:	OM
SEQ:	1
Start Date:	2007-10-09 00:00:00
Finish Date:	Not reported
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

OU:	3
Action Code:	RO
Action Name:	ROD
SEQ:	9
Start Date:	2007-05-08 00:00:00
Finish Date:	5/8/2007
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	0
Action Code:	LZ
Action Name:	FF CR
SEQ:	2
Start Date:	1990-02-21 00:00:00
Finish Date:	Not reported
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	9
Action Code:	TS
Action Name:	TRTSTUDY
SEQ:	1
Start Date:	2000-08-28 00:00:00
Finish Date:	8/28/2002
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	3
Action Code:	LY
Action Name:	FF RA
SEQ:	8
Start Date:	2009-01-22 00:00:00
Finish Date:	4/30/2012
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	3
Action Code:	LX
Action Name:	FF RD
SEQ:	8
Start Date:	2007-09-12 00:00:00
Finish Date:	12/30/2008
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	3
Action Code:	LW
Action Name:	FF RI/FS
SEQ:	5
Start Date:	1990-09-28 00:00:00
Finish Date:	6/30/2002
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	4
Action Code:	LW
Action Name:	FF RI/FS
SEQ:	4
Start Date:	1990-09-28 00:00:00
Finish Date:	7/12/2000
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	7
Action Code:	NH
Action Name:	FF RI
SEQ:	2
Start Date:	1997-09-30 00:00:00
Finish Date:	9/7/1999
Qual:	Not reported
Current Action Lead:	Fed Fac

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	5
Action Code:	RO
Action Name:	ROD
SEQ:	10
Start Date:	2008-03-06 00:00:00
Finish Date:	3/6/2008
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	8
Action Code:	NH
Action Name:	FF RI
SEQ:	3
Start Date:	2005-06-03 00:00:00
Finish Date:	12/29/2006
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	5
Action Code:	RO
Action Name:	ROD
SEQ:	15
Start Date:	2010-08-09 00:00:00
Finish Date:	8/9/2010
Qual:	Not reported
Current Action Lead:	Fed Fac

Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	5
Action Code:	LW
Action Name:	FF RI/FS
SEQ:	10
Start Date:	2005-12-06 00:00:00
Finish Date:	12/1/2006

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	9
Action Code:	LW
Action Name:	FF RI/FS
SEQ:	8
Start Date:	1994-04-30 00:00:00
Finish Date:	8/30/2002
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	9
Action Code:	RO
Action Name:	ROD
SEQ:	11
Start Date:	2003-08-16 00:00:00
Finish Date:	8/16/2003
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	9
Action Code:	LY
Action Name:	FF RA
SEQ:	9
Start Date:	2006-01-20 00:00:00
Finish Date:	10/9/2007
Qual:	IR
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	9
Action Code:	LX
Action Name:	FF RD

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

SEQ: 9
Start Date: 2005-07-22 00:00:00
Finish Date: 1/20/2006
Qual: Not reported
Current Action Lead: Fed Fac

Region: 9
Site ID: 902770
EPA ID: CA6170023208
Site Name: EL TORO MARINE CORPS AIR STATION
NPL: F
FF: Y
OU: 2
Action Code: RO
Action Name: ROD
SEQ: 13
Start Date: 2006-03-14 00:00:00
Finish Date: 3/14/2006
Qual: Not reported
Current Action Lead: Fed Fac

Region: 9
Site ID: 902770
EPA ID: CA6170023208
Site Name: EL TORO MARINE CORPS AIR STATION
NPL: F
FF: Y
OU: 4
Action Code: LW
Action Name: FF RI/FS
SEQ: 9
Start Date: 2004-10-25 00:00:00
Finish Date: 12/19/2005
Qual: Not reported
Current Action Lead: Fed Fac

Region: 9
Site ID: 902770
EPA ID: CA6170023208
Site Name: EL TORO MARINE CORPS AIR STATION
NPL: F
FF: Y
OU: 2
Action Code: LY
Action Name: FF RA
SEQ: 2
Start Date: 1999-05-17 00:00:00
Finish Date: 6/30/2002
Qual: Not reported
Current Action Lead: Fed Fac

Region: 9
Site ID: 902770
EPA ID: CA6170023208
Site Name: EL TORO MARINE CORPS AIR STATION
NPL: F
FF: Y

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

OU:	0
Action Code:	LZ
Action Name:	FF CR
SEQ:	1
Start Date:	1990-09-28 00:00:00
Finish Date:	Not reported
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	2
Action Code:	LX
Action Name:	FF RD
SEQ:	2
Start Date:	1998-01-06 00:00:00
Finish Date:	1/20/1999
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	6
Action Code:	LW
Action Name:	FF RI/FS
SEQ:	6
Start Date:	1990-09-28 00:00:00
Finish Date:	9/29/1997
Qual:	Not reported
Current Action Lead:	Fed Fac
Region:	9
Site ID:	902770
EPA ID:	CA6170023208
Site Name:	EL TORO MARINE CORPS AIR STATION
NPL:	F
FF:	Y
OU:	4
Action Code:	LY
Action Name:	FF RA
SEQ:	3
Start Date:	2005-08-25 00:00:00
Finish Date:	3/5/2009
Qual:	Not reported
Current Action Lead:	Fed Fac

CORRACTS:

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

EPA ID: CA6170023208
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 19960501
Action: CA050 - RFA Completed
NAICS Code(s): 92811
National Security
Original schedule date: 19960501
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 19960501
Action: CA070YE - RFA Determination Of Need For An RFI, RFI is Necessary
NAICS Code(s): 92811
National Security
Original schedule date: 19960501
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 19980617
Action: CA725NO - Current Human Exposures Under Control, Current human exposures are NOT under control
NAICS Code(s): 92811
National Security
Original schedule date: 19980617
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 19980617
Action: CA750NO - Migration of Contaminated Groundwater under Control, Unacceptable migration of contaminated groundwater is observed or expected
NAICS Code(s): 92811
National Security
Original schedule date: 19980617
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 9
Area Name: OU2A - VADOSE ZONE SOILS
Actual Date: 19970123
Action: CA300 - CMS Workplan Approved
NAICS Code(s): 92811
National Security
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 9
Area Name: OU2A - VADOSE ZONE SOILS

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Actual Date: 19970123
Action: CA200 - RFI Approved
NAICS Code(s): 92811
National Security
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 9
Area Name: OU2A - VADOSE ZONE SOILS
Actual Date: 19970123
Action: CA150 - RFI Workplan Approved
NAICS Code(s): 92811
National Security
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 9
Area Name: OU2A - VADOSE ZONE SOILS
Actual Date: 19970123
Action: CA350 - CMS Approved
NAICS Code(s): 92811
National Security
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 9
Area Name: OU2A - VADOSE ZONE SOILS
Actual Date: 20040723
Action: CA999 - Corrective Action Process Terminated
NAICS Code(s): 92811
National Security
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 9
Area Name: FOST 1
Actual Date: 20040723
Action: CA999 - Corrective Action Process Terminated
NAICS Code(s): 92811
National Security
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 9
Area Name: FOST 1
Actual Date: 20040723
Action: CA999RM - Corrective Action Process Terminated, Remedial Activities Completed
NAICS Code(s): 92811
National Security
Original schedule date: 20040723
Schedule end date: Not reported

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

EPA ID: CA6170023208
EPA Region: 9
Area Name: FOST 2
Actual Date: 20050829
Action: CA999 - Corrective Action Process Terminated
NAICS Code(s): 92811
National Security
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 9
Area Name: OU2A - VADOSE ZONE SOILS
Actual Date: 19970930
Action: CA400 - Date For Remedy Selection (CM Imposed)
NAICS Code(s): 92811
National Security
Original schedule date: Not reported
Schedule end date: Not reported

EPA ID: CA6170023208
EPA Region: 9
Area Name: ENTIRE FACILITY
Actual Date: 19970930
Action: CA400 - Date For Remedy Selection (CM Imposed)
NAICS Code(s): 92811
National Security
Original schedule date: 19970930
Schedule end date: Not reported

US ENG CONTROLS:
EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Address: EL TORO MARINE CORPS AIR STA
EL TORO M C A S
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Actual Date: 02/28/2012
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 001
Action Name: Explanation Of Significant Differences
Action Completion date: 03/14/2006
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Discharge
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 001
Action Name: Explanation Of Significant Differences

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Action Completion date: 03/14/2006
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Reinjection
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 002
Action Name: Explanation Of Significant Differences
Action Completion date: 12/15/2008
Operable Unit: 01
Contaminated Media : Soil Gas
Engineering Control: Sampling
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 003
Action Name: Explanation Of Significant Differences
Action Completion date: 07/29/2009
Operable Unit: 04
Contaminated Media : Groundwater
Engineering Control: Non-fundamental change (ESD)
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 003
Action Name: Explanation Of Significant Differences
Action Completion date: 07/29/2009
Operable Unit: 04
Contaminated Media : Soil
Engineering Control: Non-fundamental change (ESD)
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 06/27/2002
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Air Stripping
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 06/27/2002
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Carbon Adsorption
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 06/27/2002
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Extraction
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 001
Action Name: RECORD OF DECISION
Action Completion date: 06/27/2002
Operable Unit: 01
Contaminated Media : Groundwater
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 002
Action Name: RECORD OF DECISION
Action Completion date: 09/29/1997
Operable Unit: 02
Contaminated Media : Soil
Engineering Control: Carbon Adsorption
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 002
Action Name: RECORD OF DECISION
Action Completion date: 09/29/1997
Operable Unit: 02
Contaminated Media : Soil
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 002
Action Name: RECORD OF DECISION
Action Completion date: 09/29/1997
Operable Unit: 02
Contaminated Media : Soil
Engineering Control: Soil Vapor Extraction (in-situ)
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 003
Action Name: RECORD OF DECISION
Action Completion date: 07/12/2000
Operable Unit: 04
Contaminated Media : Groundwater
Engineering Control: Leachate Control
Contact Name: Not reported

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 003
Action Name: RECORD OF DECISION
Action Completion date: 07/12/2000
Operable Unit: 04
Contaminated Media : Groundwater
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 003
Action Name: RECORD OF DECISION
Action Completion date: 07/12/2000
Operable Unit: 04
Contaminated Media : Soil
Engineering Control: Cap
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 006
Action Name: RECORD OF DECISION
Action Completion date: 09/29/1997
Operable Unit: 06
Contaminated Media : Sediment
Engineering Control: No Action
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 006
Action Name: RECORD OF DECISION
Action Completion date: 09/29/1997
Operable Unit: 06
Contaminated Media : Soil
Engineering Control: No Action
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 006
Action Name: RECORD OF DECISION
Action Completion date: 09/29/1997
Operable Unit: 06
Contaminated Media : Surface Water
Engineering Control: No Action
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 007
Action Name: RECORD OF DECISION
Action Completion date: 06/06/2001
Operable Unit: 07

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Contaminated Media : Soil
Engineering Control: No Action
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 008
Action Name: RECORD OF DECISION
Action Completion date: 02/09/2012
Operable Unit: 08
Contaminated Media : Groundwater
Engineering Control: Bioremediation (In-Situ)
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 008
Action Name: RECORD OF DECISION
Action Completion date: 02/09/2012
Operable Unit: 08
Contaminated Media : Groundwater
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 008
Action Name: RECORD OF DECISION
Action Completion date: 02/09/2012
Operable Unit: 08
Contaminated Media : Groundwater
Engineering Control: Natural Attenuation
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 009
Action Name: RECORD OF DECISION
Action Completion date: 05/08/2007
Operable Unit: 03
Contaminated Media : Soil
Engineering Control: Disposal
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 009
Action Name: RECORD OF DECISION
Action Completion date: 05/08/2007
Operable Unit: 03
Contaminated Media : Soil
Engineering Control: Excavation
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 009

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Action Name: RECORD OF DECISION
Action Completion date: 05/08/2007
Operable Unit: 03
Contaminated Media : Soil
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 009
Action Name: RECORD OF DECISION
Action Completion date: 05/08/2007
Operable Unit: 03
Contaminated Media : Soil
Engineering Control: No Action
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 009
Action Name: RECORD OF DECISION
Action Completion date: 05/08/2007
Operable Unit: 03
Contaminated Media : Soil
Engineering Control: Sampling
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Groundwater
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Groundwater
Engineering Control: No Action
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Landfill Gas
Engineering Control: Active Gas Collection System
Contact Name: Not reported
Contact Phone and Ext: Not reported

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Event Code Description: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Landfill Gas
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Landfill Gas
Engineering Control: Passive Gas Collection System
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Soil
Engineering Control: Cap
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Soil
Engineering Control: No Action
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Solid Waste
Engineering Control: Cap
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Solid Waste

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Engineering Control: Consolidate
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Solid Waste
Engineering Control: Engineering Control, (N.O.S.)
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 010
Action Name: RECORD OF DECISION
Action Completion date: 03/06/2008
Operable Unit: 05
Contaminated Media : Solid Waste
Engineering Control: Operations & Maintenance (O&M)
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 011
Action Name: RECORD OF DECISION
Action Completion date: 08/16/2003
Operable Unit: 09
Contaminated Media : Groundwater
Engineering Control: Liquid Phase Carbon Adsorption
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 011
Action Name: RECORD OF DECISION
Action Completion date: 08/16/2003
Operable Unit: 09
Contaminated Media : Groundwater
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 011
Action Name: RECORD OF DECISION
Action Completion date: 08/16/2003
Operable Unit: 09
Contaminated Media : Groundwater
Engineering Control: Natural Attenuation
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 011
Action Name: RECORD OF DECISION

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Action Completion date: 08/16/2003
Operable Unit: 09
Contaminated Media : Soil
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 011
Action Name: RECORD OF DECISION
Action Completion date: 08/16/2003
Operable Unit: 09
Contaminated Media : Soil
Engineering Control: Surface Drainage Control
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 013
Action Name: RECORD OF DECISION
Action Completion date: 03/14/2006
Operable Unit: 02
Contaminated Media : Soil
Engineering Control: No Further Action
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Groundwater
Engineering Control: Monitoring
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Landfill Gas
Engineering Control: Active Gas Collection System
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Landfill Gas
Engineering Control: Operations & Maintenance (O&M)
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Landfill Gas
Engineering Control: Passive Gas Collection System
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Soil
Engineering Control: Consolidate
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Soil
Engineering Control: Impermeable Barrier
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Soil
Engineering Control: Operations & Maintenance (O&M)
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Soil
Engineering Control: Slope Stabilization
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Solid Waste
Engineering Control: Consolidate
Contact Name: Not reported

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Solid Waste
Engineering Control: Dike/Berm
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Solid Waste
Engineering Control: Operations & Maintenance (O&M)
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

Action ID: 015
Action Name: RECORD OF DECISION
Action Completion date: 08/09/2010
Operable Unit: 05
Contaminated Media : Solid Waste
Engineering Control: Slope Stabilization
Contact Name: Not reported
Contact Phone and Ext: Not reported
Event Code Description: Not reported

US INST CONTROL:
EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Covenant
Actual Date: 06/02/2002
Complet. Date: 06/27/2002
Operable Unit: 01
Contaminated Media : Groundwater
Contact Name : Not reported
Contact Phone and Ext : Not reported
Event Code Description: Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Institutional Controls, (N.O.S.)
Actual Date: 06/30/2000
Complet. Date: 07/12/2000
Operable Unit: 04
Contaminated Media : Groundwater
Contact Name : Not reported
Contact Phone and Ext : Not reported
Event Code Description: Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Land Use Restriction
Actual Date: 06/30/2000
Complet. Date: 07/12/2000
Operable Unit: 04
Contaminated Media : Soil
Contact Name : Not reported
Contact Phone and Ext : Not reported
Event Code Description: Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Access Restriction
Actual Date: 02/28/2012
Complet. Date: 02/09/2012
Operable Unit: 08
Contaminated Media : Groundwater
Contact Name : Not reported
Contact Phone and Ext : Not reported
Event Code Description: Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

County: ORANGE
Event Code: Not reported
Inst. Control: Groundwater use/well drilling regulation
Actual Date: 02/28/2012
Complet. Date: 02/09/2012
Operable Unit: 08
Contaminated Media : Groundwater
Contact Name : Not reported
Contact Phone and Ext : Not reported
Event Code Description: Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Institutional Controls, (N.O.S.)
Actual Date: 02/28/2012
Complet. Date: 02/09/2012
Operable Unit: 08
Contaminated Media : Groundwater
Contact Name : Not reported
Contact Phone and Ext : Not reported
Event Code Description: Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Building, demolition, or excavation regulation
Actual Date: 03/31/2008
Complet. Date: 03/06/2008
Operable Unit: 05
Contaminated Media : Soil
Contact Name : Not reported
Contact Phone and Ext : Not reported
Event Code Description: Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Deed Notices

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Actual Date: 03/31/2008
Complet. Date: 03/06/2008
Operable Unit: 05
Contaminated Media : Soil
Contact Name : Not reported
Contact Phone and Ext : Not reported
Event Code Description: Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Zoning regulation
Actual Date: 03/31/2008
Complet. Date: 03/06/2008
Operable Unit: 05
Contaminated Media : Soil
Contact Name : Not reported
Contact Phone and Ext : Not reported
Event Code Description: Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Building, demolition, or excavation regulation
Actual Date: 03/31/2008
Complet. Date: 03/06/2008
Operable Unit: 05
Contaminated Media : Solid Waste
Contact Name : Not reported
Contact Phone and Ext : Not reported
Event Code Description: Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Zoning regulation
Actual Date: 03/31/2008
Complet. Date: 03/06/2008
Operable Unit: 05

EL TORO MARINE CORPS AIR STATION (Continued) **1000417911**

Contaminated Media : Solid Waste
Contact Name : Not reported
Contact Phone and Ext : Not reported
Event Code Description: Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Covenant
Actual Date: 09/30/2010
Complet. Date: 08/09/2010
Operable Unit: 05
Contaminated Media : Soil
Contact Name : Not reported
Contact Phone and Ext : Not reported
Event Code Description: Not reported

EPA ID: CA6170023208
Site ID: 0902770
Name: EL TORO MARINE CORPS AIR STATION
Action Name: RECORD OF DECISION
Address: EL TORO MARINE CORPS AIR STA
EL TORO, CA 92709
EPA Region: 09
County: ORANGE
Event Code: Not reported
Inst. Control: Covenant
Actual Date: 09/30/2010
Complet. Date: 08/09/2010
Operable Unit: 05
Contaminated Media : Solid Waste
Contact Name : Not reported
Contact Phone and Ext : Not reported
Event Code Description: Not reported

ROD:
Full-text of USEPA Record of Decision(s) is available from EDR.

PRP:
PRP name: NAVAL FACILITIES ENGINEERING COMMAND
STATE OF CALIFORNIA/DEPT. OF HEALTH SERVICES
STATE OF CALIFORNIA/DEPT. OF HEALTH SERVICES
STATE OF CALIFORNIA/DEPT. OF WATER QUALITY
STATE OF CALIFORNIA/DEPT. OF WATER QUALITY
USM CORP.
USM CORP.

B5 **RANCHO PARKWAY SHELL #07** **UST** **U004051193**
NNE **26721 RANCHO PKWY** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.037 mi.
195 ft. **Site 1 of 3 in cluster B**

Relative: UST:
Lower
Facility ID: Not reported
Actual: Permitting Agency: Orange County Environmental Health
732 ft. Latitude: 33.67311
Longitude: -117.66584

ORANGE CO. UST:
Facility ID: FA0024028

B6 **RANCHO PARKWAY SHELL** **EDR Hist Auto** **1021827143**
NNE **26721 RANCHO PKWY** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.045 mi.
235 ft. **Site 2 of 3 in cluster B**

Relative: EDR Hist Auto
Lower

Actual:
731 ft.

Year:	Name:	Type:
2001	RANCHO PARKWAY SHELL	Gasoline Service Stations
2002	RANCHO PARKWAY SHELL	Gasoline Service Stations
2003	RANCHO PARKWAY SHELL	Gasoline Service Stations
2004	RANCHO PARKWAY SHELL	Gasoline Service Stations
2005	RANCHO PARKWAY SHELL	Gasoline Service Stations
2006	RANCHO PARKWAY SHELL	Gasoline Service Stations
2007	RANCHO PARKWAY SHELL	Gasoline Service Stations
2008	RANCHO PARKWAY SHELL	Gasoline Service Stations
2009	RANCHO PARKWAY SHELL	Gasoline Service Stations
2010	RANCHO PARKWAY SHELL	Gasoline Service Stations
2011	RANCHO PARKWAY SHELL	Gasoline Service Stations
2012	RANCHO PARKWAY SHELL	Gasoline Service Stations
2013	RANCHO PARKWAY SHELL	Gasoline Service Stations
2014	RANCHO PARKWAY SHELL	Gasoline Service Stations

B7 **VALVOLINE INSTANT OIL CHANGE GN0049** **AST** **A100425780**
NNE **26731 RANCHO PKWY** **N/A**
< 1/8 **LAKE FORREST, CA 92630**
0.046 mi.
244 ft. **Site 3 of 3 in cluster B**

Relative: AST:
Lower
Certified Unified Program Agencies: Not reported
Actual: Owner: Henley Pacific LA LLC
730 ft. Total Gallons: Not reported
CERSID: 10160713
Facility ID: FA0059948
Business Name: Henley Pacific LA LLC dba Valvoline Instant Oil
Phone: 949-465-9912
Fax: Not reported
Mailing Address: 17802 Sky Park Circle Ste 104
Mailing Address City: Irvine
Mailing Address State: CA
Mailing Address Zip Code: Not reported

VALVOLINE INSTANT OIL CHANGE GN0049 (Continued) **A100425780**

Operator Name:	Henley Pacific LA LLC
Operator Phone:	617-243-0404
Owner Phone:	617-243-0404
Owner Mail Address:	54 Jaconnet Street, Suite 100
Owner State:	MA
Owner Zip Code:	2461
Owner Country:	United States
Property Owner Name:	1995 Robert and Francs Thorp Revocable Trust
Property Owner Phone:	Not reported
Property Owner Mailing Address:	P.O. Box 848
Property Owner City:	Greenfield
Property Owner Stat :	CA
Property Owner Zip Code:	93927
Property Owner Country:	United States
EPAID:	CAL000370627

8
South
< 1/8
0.049 mi.
259 ft.

WESTERN DIGITAL CORP
20511 LAKE FOREST DR
LAKE FOREST, CA 92630

RCRA-SQG **1004676765**
FINDS **CAR000089235**
ECHO
HAZNET

Relative:
Lower

Actual:
692 ft.

RCRA-SQG:

Date form received by agency:	03/06/2013
Facility name:	ALCON RESEARCH LTD
Facility address:	20511 LAKE FOREST DR LAKE FOREST, CA 92630
EPA ID:	CAR000089235
Mailing address:	15800 ALTON PKWY IRVINE, CA 92618
Contact:	ERIC QUACH
Contact address:	15800 ALTON PKWY IRVINE, CA 92618
Contact country:	US
Contact telephone:	949-453-7824
Contact email:	ERIC.QUACH@ALCON.COM
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	THE REALTY ASSOCIATES FUND VI
Owner/operator address:	23046 AVENIDA DE LA CARLOTA STE 150 LAGUNA HILLS, CA 92653
Owner/operator country:	US
Owner/operator telephone:	949-752-2066
Owner/operator email:	Not reported
Owner/operator fax:	Not reported
Owner/operator extension:	Not reported
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	08/01/2002
Owner/Op end date:	Not reported

WESTERN DIGITAL CORP (Continued) **1004676765**

Owner/operator name: ALCON RESEARCH LTD
Owner/operator address: Not reported
Not reported
Owner/operator country: US
Owner/operator telephone: Not reported
Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: 01/01/2012
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

. Waste code: 214
. Waste name: Unspecified solvent mixture

. Waste code: 221
. Waste name: Waste oil and mixed oil

. Waste code: 331
. Waste name: Off-specification, aged, or surplus organics

. Waste code: 343
. Waste name: Unspecified organic liquid mixture

. Waste code: 352
. Waste name: Other organic solids

. Waste code: 551
. Waste name: Laboratory waste chemicals

. Waste code: D001
. Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.

WESTERN DIGITAL CORP (Continued) **1004676765**

. Waste code: D002
. Waste name: A WASTE WHICH HAS A PH OF LESS THAN 2 OR GREATER THAN 12.5 IS CONSIDERED TO BE A CORROSIVE HAZARDOUS WASTE. SODIUM HYDROXIDE, A CAUSTIC SOLUTION WITH A HIGH PH, IS OFTEN USED BY INDUSTRIES TO CLEAN OR DEGREASE PARTS. HYDROCHLORIC ACID, A SOLUTION WITH A LOW PH, IS USED BY MANY INDUSTRIES TO CLEAN METAL PARTS PRIOR TO PAINTING. WHEN THESE CAUSTIC OR ACID SOLUTIONS BECOME CONTAMINATED AND MUST BE DISPOSED, THE WASTE WOULD BE A CORROSIVE HAZARDOUS WASTE.

. Waste code: F003
. Waste name: THE FOLLOWING SPENT NON-HALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NON-HALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NON-HALOGENATED SOLVENTS, AND, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005, AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: U080
. Waste name: METHANE, DICHLORO-

. Waste code: U122
. Waste name: FORMALDEHYDE

Historical Generators:
Date form received by agency: 01/02/2001
Site name: WESTERN DIGITAL CORP
Classification: Small Quantity Generator

. Waste code: D000
. Waste name: Not Defined

. Waste code: D001
. Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.

. Waste code: D002
. Waste name: A WASTE WHICH HAS A PH OF LESS THAN 2 OR GREATER THAN 12.5 IS CONSIDERED TO BE A CORROSIVE HAZARDOUS WASTE. SODIUM HYDROXIDE, A CAUSTIC SOLUTION WITH A HIGH PH, IS OFTEN USED BY INDUSTRIES TO CLEAN OR DEGREASE PARTS. HYDROCHLORIC ACID, A SOLUTION WITH A LOW PH, IS USED BY MANY INDUSTRIES TO CLEAN METAL PARTS PRIOR TO PAINTING. WHEN THESE CAUSTIC OR ACID SOLUTIONS BECOME CONTAMINATED AND MUST BE DISPOSED, THE WASTE WOULD BE A CORROSIVE HAZARDOUS WASTE.

. Waste code: D006
. Waste name: CADMIUM

. Waste code: D008

WESTERN DIGITAL CORP (Continued) **1004676765**

. Waste name: LEAD

. Waste code: D009
. Waste name: MERCURY

. Waste code: F005
. Waste name: THE FOLLOWING SPENT NON-HALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NON-HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Violation Status: No violations found

FINDS:

Registry ID: 110012221764

Environmental Interest/Information System

California Hazardous Waste Tracking System - Datamart (HWTS-DATAMART) provides California with information on hazardous waste shipments for generators, transporters, and treatment, storage, and disposal facilities.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1004676765
Registry ID:	110012221764
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110012221764

HAZNET:

envid:	1004676765
Year:	2016
GEPAID:	CAR000089235
Contact:	JOEL AZPURU
Telephone:	9495056793
Mailing Name:	Not reported
Mailing Address:	20411 LAKE FOREST DRIVE, M/S 215A
Mailing City,St,Zip:	LAKE FOREST, CA 92630
Gen County:	Orange
TSD EPA ID:	CAD008302903
TSD County:	Los Angeles
Waste Category:	Laboratory waste chemicals
Disposal Method:	Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)

WESTERN DIGITAL CORP (Continued) **1004676765**

Tons: 0.005
Cat Decode: Laboratory waste chemicals
Method Decode: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Facility County: Orange

envid: 1004676765
Year: 2016
GEPAID: CAR000089235
Contact: JOEL AZPURU
Telephone: 9495056793
Mailing Name: Not reported
Mailing Address: 20411 LAKE FOREST DRIVE, M/S 215A
Mailing City,St,Zip: LAKE FOREST, CA 92630
Gen County: Orange
TSD EPA ID: CAD008302903
TSD County: Los Angeles
Waste Category: Waste oil and mixed oil
Disposal Method: Fuel Blending Prior To Energy Recovery At Another Site
Tons: 0.02
Cat Decode: Waste oil and mixed oil
Method Decode: Fuel Blending Prior To Energy Recovery At Another Site
Facility County: Orange

envid: 1004676765
Year: 2016
GEPAID: CAR000089235
Contact: JOEL AZPURU
Telephone: 9495056793
Mailing Name: Not reported
Mailing Address: 20411 LAKE FOREST DRIVE, M/S 215A
Mailing City,St,Zip: LAKE FOREST, CA 92630
Gen County: Orange
TSD EPA ID: CAD008302903
TSD County: Los Angeles
Waste Category: Off-specification, aged or surplus organics
Disposal Method: Fuel Blending Prior To Energy Recovery At Another Site
Tons: 0.35
Cat Decode: Off-specification, aged or surplus organics
Method Decode: Fuel Blending Prior To Energy Recovery At Another Site
Facility County: Orange

envid: 1004676765
Year: 2016
GEPAID: CAR000089235
Contact: JOEL AZPURU
Telephone: 9495056793
Mailing Name: Not reported
Mailing Address: 20411 LAKE FOREST DRIVE, M/S 215A
Mailing City,St,Zip: LAKE FOREST, CA 92630
Gen County: Orange
TSD EPA ID: CAD008302903
TSD County: Los Angeles
Waste Category: Other inorganic solid waste
Disposal Method: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Tons: 0.0005

WESTERN DIGITAL CORP (Continued) **1004676765**

Cat Decode:	Other inorganic solid waste
Method Decode:	Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Facility County:	Orange
envid:	1004676765
Year:	2016
GEPAID:	CAR000089235
Contact:	JOEL AZPURU
Telephone:	9495056793
Mailing Name:	Not reported
Mailing Address:	20411 LAKE FOREST DRIVE, M/S 215A
Mailing City,St,Zip:	LAKE FOREST, CA 92630
Gen County:	Orange
TSD EPA ID:	CAD008302903
TSD County:	Los Angeles
Waste Category:	Alkaline solution without metals pH >= 12.5
Disposal Method:	Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Tons:	0.135
Cat Decode:	Alkaline solution without metals pH >= 12.5
Method Decode:	Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Facility County:	Orange

Click this hyperlink while viewing on your computer to access
82 additional CA_HAZNET: record(s) in the EDR Site Report.

---

9 **THE HOME DEPOT** **RCRA-SQG** **1004675991**
ENE **20021 LAKE FOREST DR** **FINDS** **CAR000079657**
< 1/8 **LAKE FOREST, CA 92630** **ECHO**
0.084 mi.
444 ft.

Relative:
Higher

Actual:
740 ft.

RCRA-SQG:

Date form received by agency:	06/22/2005
Facility name:	HOME DEPOT USA INC HD 6668
Facility address:	20021 LAKE FOREST DR LAKE FOREST, CA 92630
EPA ID:	CAR000079657
Mailing address:	1905 ASTON AVE STE 100 CARLSBAD, CA 92008
Contact:	ROBERT PERKINS
Contact address:	1905 ASTON AVE STE 100 CARLSBAD, CA 92008
Contact country:	US
Contact telephone:	760-602-8700
Contact email:	RPERKINS@3ECOMPANY.COM
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

THE HOME DEPOT (Continued) **1004675991**

Owner/Operator Summary:

Owner/operator name:	HOME DEPOT USA
Owner/operator address:	Not reported
	Not reported
Owner/operator country:	US
Owner/operator telephone:	Not reported
Owner/operator email:	Not reported
Owner/operator fax:	Not reported
Owner/operator extension:	Not reported
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	06/01/2000
Owner/Op end date:	Not reported

Owner/operator name:	HOME DEPOT USA
Owner/operator address:	2455 PACES FERRY RD
	ATLANTA, GA 30339
Owner/operator country:	US
Owner/operator telephone:	Not reported
Owner/operator email:	Not reported
Owner/operator fax:	Not reported
Owner/operator extension:	Not reported
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	06/01/2000
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No

. Waste code:	D001
. Waste name:	IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.

. Waste code:	D002
. Waste name:	A WASTE WHICH HAS A PH OF LESS THAN 2 OR GREATER THAN 12.5 IS CONSIDERED TO BE A CORROSIVE HAZARDOUS WASTE. SODIUM HYDROXIDE, A

THE HOME DEPOT (Continued) **1004675991**

CAUSTIC SOLUTION WITH A HIGH PH, IS OFTEN USED BY INDUSTRIES TO CLEAN OR DEGREASE PARTS. HYDROCHLORIC ACID, A SOLUTION WITH A LOW PH, IS USED BY MANY INDUSTRIES TO CLEAN METAL PARTS PRIOR TO PAINTING. WHEN THESE CAUSTIC OR ACID SOLUTIONS BECOME CONTAMINATED AND MUST BE DISPOSED, THE WASTE WOULD BE A CORROSIVE HAZARDOUS WASTE.

. Waste code: D009
. Waste name: MERCURY

. Waste code: D016
. Waste name: 2,4-D

. Waste code: D018
. Waste name: BENZENE

. Waste code: D035
. Waste name: METHYL ETHYL KETONE

. Waste code: F003
. Waste name: THE FOLLOWING SPENT NON-HALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NON-HALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NON-HALOGENATED SOLVENTS, AND, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005, AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: F005
. Waste name: THE FOLLOWING SPENT NON-HALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NON-HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Historical Generators:
Date form received by agency: 08/01/2000
Site name: THE HOME DEPOT
Classification: Small Quantity Generator

. Waste code: D001
. Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.

. Waste code: D002
. Waste name: A WASTE WHICH HAS A PH OF LESS THAN 2 OR GREATER THAN 12.5 IS CONSIDERED TO BE A CORROSIVE HAZARDOUS WASTE. SODIUM HYDROXIDE, A CAUSTIC SOLUTION WITH A HIGH PH, IS OFTEN USED BY INDUSTRIES TO CLEAN

THE HOME DEPOT (Continued) **1004675991**

OR DEGREASE PARTS. HYDROCHLORIC ACID, A SOLUTION WITH A LOW PH, IS USED BY MANY INDUSTRIES TO CLEAN METAL PARTS PRIOR TO PAINTING. WHEN THESE CAUSTIC OR ACID SOLUTIONS BECOME CONTAMINATED AND MUST BE DISPOSED, THE WASTE WOULD BE A CORROSIVE HAZARDOUS WASTE.

Violation Status: No violations found

FINDS:

Registry ID: 110002941416

Environmental Interest/Information System

California Hazardous Waste Tracking System - Datamart (HWTS-DATAMART) provides California with information on hazardous waste shipments for generators, transporters, and treatment, storage, and disposal facilities.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid: 1004675991
Registry ID: 110002941416
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110002941416

---

10 South < 1/8 0.093 mi. 492 ft.

AA SOUTH COUNTY TOWING INC
20622 PASCAL WAY STE B
LAKE FOREST, CA 92630

EDR Hist Auto **1020252362 N/A**

Relative: Lower

Actual: 677 ft.

EDR Hist Auto

Year:	Name:	Type:
1992	L & M AUTOMOTIVE	General Automotive Repair Shops
1993	L & M AUTOMOTIVE	General Automotive Repair Shops
1993	ALICIA COMPLETE AUTOMOTIVE	General Automotive Repair Shops
1994	L & M AUTOMOTIVE	General Automotive Repair Shops
1994	ALICIA COMPLETE AUTOMOTIVE	General Automotive Repair Shops
1995	ALICIA COMPLETE AUTOMOTIVE	General Automotive Repair Shops
1995	L & M AUTOMOTIVE	General Automotive Repair Shops
1995	MOTRA TRANSMISSION CENTER	Automotive Transmission Repair Shops
1996	ALICIA COMPLETE AUTOMOTIVE	General Automotive Repair Shops
1996	L & M AUTOMOTIVE	General Automotive Repair Shops
1997	MOTRA TRANSMISSION CENTER	Automotive Transmission Repair Shops
1997	MILLERS WHEEL ALIGNMENT 2	Automotive Repair Shops, NEC
1998	MILLERS WHEEL ALIGNMENT 2	Automotive Repair Shops, NEC
1999	MILLERS WHEEL ALIGNMENT 2	Automotive Repair Shops, NEC

AA SOUTH COUNTY TOWING INC (Continued) **1020252362**

1999	RYAN MIKE	Automotive Transmission Repair Shops
2000	IOLAR ENTERPRISES INC	Automotive Transmission Repair Shops
2000	HERGESHEIMER MOTORSPORTS	General Automotive Repair Shops
2001	HERGESHEIMER MOTORSPORTS	General Automotive Repair Shops
2001	IOLAR ENTERPRISES INC	Automotive Transmission Repair Shops
2001	BARNHOORN SKILES MERCEDES SVCS	General Automotive Repair Shops
2002	HERGESHEIMER MOTORSPORTS	General Automotive Repair Shops
2002	IOLAR ENTERPRISES INC	Automotive Transmission Repair Shops
2002	BARNHOORN SKILES MERCEDES SVCS	General Automotive Repair Shops
2003	IOLAR ENTERPRISES INC	Automotive Transmission Repair Shops
2003	BARNHOORN SKILES MERCEDES SVCS	General Automotive Repair Shops
2004	BARNHORN SKLES MRCDES SVCS LLP	General Automotive Repair Shops
2004	IOLAR ENTERPRISES INC	Automotive Transmission Repair Shops
2005	IOLAR ENTERPRISES INC	Automotive Transmission Repair Shops
2005	BARNHORN SKLES MRCDES SVCS LLP	General Automotive Repair Shops
2006	IOLAR ENTERPRISES INC	Automotive Transmission Repair Shops
2006	CARDINAL AUTO CARE XII	General Automotive Repair Shops
2006	BARNHORN SKLES MRCDES SVCS LLP	General Automotive Repair Shops
2007	CARDINAL AUTO CARE XII	General Automotive Repair Shops
2007	L & M AUTOMOTIVE INC	General Automotive Repair Shops
2009	L & M AUTOMOTIVE INC	General Automotive Repair Shops
2010	L & M AUTOMOTIVE INC	General Automotive Repair Shops
2010	CORNER 3 CORP	General Automotive Repair Shops
2010	CARDINAL AUTO CARE XII	General Automotive Repair Shops
2011	CORNER 3 CORP	General Automotive Repair Shops
2011	L & M AUTOMOTIVE INC	General Automotive Repair Shops
2011	CARDINAL AUTO CARE XII	General Automotive Repair Shops
2012	CORNER 3 CORP	General Automotive Repair Shops
2012	CARDINAL AUTO CARE XII	General Automotive Repair Shops
2012	L & M AUTOMOTIVE INC	General Automotive Repair Shops
2013	L & M AUTOMOTIVE INC	General Automotive Repair Shops
2013	CARDINAL AUTO CARE XII	General Automotive Repair Shops
2014	CARDINAL AUTO CARE XII	General Automotive Repair Shops
2014	L & M AUTOMOTIVE INC	General Automotive Repair Shops

C11 **BEACON BAY FOOTHILL** **UST** **U003879615**
South **20602 LAKE FOREST DR** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.107 mi.
565 ft. **Site 1 of 9 in cluster C**

Relative: UST:
Lower
Facility ID: 19793
Actual: Permitting Agency: ORANGE COUNTY
699 ft. Latitude: 33.664311
Longitude: -117.665085

C12
South
< 1/8
0.107 mi.
565 ft.

CAR WASH EXPRESS
20602 LAKE FOREST DR
EL TORO, CA 92630

Site 2 of 9 in cluster C

SWEEPS UST
CA FID UST

S101589521
N/A

Relative:
Lower

Actual:
699 ft.

SWEEPS UST:

Status:	Not reported
Comp Number:	12655
Number:	Not reported
Board Of Equalization:	Not reported
Referral Date:	Not reported
Action Date:	Not reported
Created Date:	Not reported
Owner Tank Id:	Not reported
SWRCB Tank Id:	30-000-012655-000001
Tank Status:	Not reported
Capacity:	10000
Active Date:	Not reported
Tank Use:	UNKNOWN
STG:	PRODUCT
Content:	Not reported
Number Of Tanks:	2

Status:	Not reported
Comp Number:	12655
Number:	Not reported
Board Of Equalization:	Not reported
Referral Date:	Not reported
Action Date:	Not reported
Created Date:	Not reported
Owner Tank Id:	Not reported
SWRCB Tank Id:	30-000-012655-000002
Tank Status:	Not reported
Capacity:	10000
Active Date:	Not reported
Tank Use:	UNKNOWN
STG:	PRODUCT
Content:	Not reported
Number Of Tanks:	Not reported

CA FID UST:

Facility ID:	30017393
Regulated By:	UTNKI
Regulated ID:	Not reported
Cortese Code:	Not reported
SIC Code:	Not reported
Facility Phone:	Not reported
Mail To:	Not reported
Mailing Address:	Not reported
Mailing Address 2:	Not reported
Mailing City,St,Zip:	EL TORO 92630
Contact:	Not reported
Contact Phone:	Not reported
DUNs Number:	Not reported
NPDES Number:	Not reported
EPA ID:	Not reported
Comments:	Not reported
Status:	Inactive

C13 **BEACON BAY CAR WASH** **LUST** **S105774228**
South **20602 LAKE FOREST** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.107 mi.
565 ft. **Site 3 of 9 in cluster C**

Relative:
Lower

Actual:
699 ft.

LUST:

Lead Agency:	ORANGE COUNTY LOP
Case Type:	LUST Cleanup Site
Geo Track:	http://geotracker.waterboards.ca.gov/profile_report.asp?global_id=T0605999998
Global Id:	T0605999998
Latitude:	33.663041
Longitude:	-117.666454
Status:	Completed - Case Closed
Status Date:	09/12/2002
Case Worker:	KL
RB Case Number:	083003899T
Local Agency:	ORANGE COUNTY LOP
File Location:	Local Agency
Local Case Number:	02UT003
Potential Media Affect:	Under Investigation
Potential Contaminants of Concern:	Gasoline
Site History:	Not reported

LUST:

Global Id:	T0605999998
Contact Type:	Local Agency Caseworker
Contact Name:	JAMES STROZIER
Organization Name:	ORANGE COUNTY LOP
Address:	1241 E. DYER ROAD SUITE 120
City:	SANTA ANA
Email:	jstrozier@ochca.com
Phone Number:	7144336273

Global Id:	T0605999998
Contact Type:	Local Agency Caseworker
Contact Name:	KEVIN LAMBERT
Organization Name:	ORANGE COUNTY LOP
Address:	1241 E DYER ROAD SUITE 120
City:	SANTA ANA
Email:	klambert@ochca.com
Phone Number:	7144336261

Global Id:	T0605999998
Contact Type:	Regional Board Caseworker
Contact Name:	NANCY OLSON-MARTIN
Organization Name:	SANTA ANA RWQCB (REGION 8)
Address:	3737 MAIN STREET, SUITE 500
City:	RIVERSIDE
Email:	nolson-martin@waterboards.ca.gov
Phone Number:	Not reported

LUST:

Global Id:	T0605999998
Action Type:	ENFORCEMENT
Date:	09/12/2002
Action:	Closure/No Further Action Letter

BEACON BAY CAR WASH (Continued) **S105774228**

LUST:
Global Id: T0605999998
Status: Completed - Case Closed
Status Date: 09/12/2002

Global Id: T0605999998
Status: Open - Case Begin Date
Status Date: 09/12/2002

ORANGE CO. LUST:
Region: ORANGE
Facility Id: 02UT003
Released Substance: Gasoline-Automotive (motor gasoline and additives), leaded & unleaded
Date Closed: 09/12/2002
Record ID: RO0003032

LUST REG 8:

Region:	8
County:	Orange
Regional Board:	Santa Ana Region
Facility Status:	Case Closed
Case Number:	083003899T
Local Case Num:	02UT003
Case Type:	Undefined
Substance:	Gasoline
Qty Leaked:	0
Abate Method:	Not reported
Cross Street:	Not reported
Enf Type:	Not reported
Funding:	Not reported
How Discovered:	Tank Closure
How Stopped:	Close Tank
Leak Cause:	Unknown
Leak Source:	Unknown
Global ID:	T0605999998
How Stopped Date:	9/9/9999
Enter Date:	Not reported
Date Confirmation of Leak Began:	Not reported
Date Preliminary Assessment Began:	Not reported
Discover Date:	1/1/1965
Enforcement Date:	Not reported
Close Date:	9/12/2002
Date Prelim Assessment Workplan Submitted:	Not reported
Date Pollution Characterization Began:	Not reported
Date Remediation Plan Submitted:	Not reported
Date Remedial Action Underway:	Not reported
Date Post Remedial Action Monitoring:	Not reported
Enter Date:	Not reported
GW Qualifies:	Not reported
Soil Qualifies:	Not reported
Operator:	Not reported
Facility Contact:	Not reported
Interim:	Not reported
Oversite Program:	LUST
Latitude:	33.662755

BEACON BAY CAR WASH (Continued) **S105774228**

Longitude:	-117.667306
MTBE Date:	Not reported
Max MTBE GW:	Not reported
MTBE Concentration:	0
Max MTBE Soil:	Not reported
MTBE Fuel:	1
MTBE Tested:	Site NOT Tested for MTBE.Includes Unknown and Not Analyzed.
MTBE Class:	*
Staff:	NOM
Staff Initials:	JS
Lead Agency:	Local Agency
Local Agency:	30000L
Hydr Basin #:	Not reported
Beneficial:	MUN
Priority:	Not reported
Cleanup Fund Id:	Not reported
Work Suspended:	Not reported

Summary: Not reported

C14 **ARCO AM/PM** **LUST S105774214**
SSE **20572 LAKE FOREST DR** **SWEEPS UST N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.112 mi.
589 ft. **Site 4 of 9 in cluster C**

Relative: **Lower**

Actual: **700 ft.**

LUST REG 8:

Region:	8
County:	Orange
Regional Board:	Santa Ana Region
Facility Status:	Case Closed
Case Number:	Not reported
Local Case Num:	02UT008
Case Type:	Soil only
Substance:	Gasoline
Qty Leaked:	0
Abate Method:	Not reported
Cross Street:	Not reported
Enf Type:	CLOS
Funding:	Not reported
How Discovered:	UM
How Stopped:	Other Means
Leak Cause:	Unknown
Leak Source:	Piping
Global ID:	T0605947685
How Stopped Date:	9/9/9999
Enter Date:	Not reported
Date Confirmation of Leak Began:	Not reported
Date Preliminary Assessment Began:	2/26/2002
Discover Date:	2/26/2002
Enforcement Date:	Not reported
Close Date:	5/16/2003
Date Prelim Assessment Workplan Submitted:	Not reported
Date Pollution Characterization Began:	Not reported
Date Remediation Plan Submitted:	Not reported
Date Remedial Action Underway:	Not reported
Date Post Remedial Action Monitoring:	Not reported
Enter Date:	Not reported
GW Qualifies:	Not reported

ARCO AM/PM (Continued) **S105774214**

Soil Qualifies:	Not reported
Operator:	Not reported
Facility Contact:	Not reported
Interim:	Not reported
Oversite Program:	LUST
Latitude:	0
Longitude:	0
MTBE Date:	Not reported
Max MTBE GW:	Not reported
MTBE Concentration:	0
Max MTBE Soil:	Not reported
MTBE Fuel:	1
MTBE Tested:	Site NOT Tested for MTBE.Includes Unknown and Not Analyzed.
MTBE Class:	*
Staff:	VJJ
Staff Initials:	JS
Lead Agency:	Local Agency
Local Agency:	30000L
Hydr Basin #:	Not reported
Beneficial:	MUN
Priority:	Not reported
Cleanup Fund Id:	Not reported
Work Suspended:	Not reported

Summary: Not reported

SWEEPS UST:

Status:	Active
Comp Number:	12020
Number:	9
Board Of Equalization:	Not reported
Referral Date:	09-30-92
Action Date:	09-15-92
Created Date:	02-29-88
Owner Tank Id:	Not reported
SWRCB Tank Id:	30-000-012020-000001
Tank Status:	A
Capacity:	10000
Active Date:	Not reported
Tank Use:	M.V. FUEL
STG:	P
Content:	LEADED
Number Of Tanks:	4

Status:	Active
Comp Number:	12020
Number:	9
Board Of Equalization:	Not reported
Referral Date:	09-30-92
Action Date:	09-15-92
Created Date:	02-29-88
Owner Tank Id:	Not reported
SWRCB Tank Id:	30-000-012020-000002
Tank Status:	A
Capacity:	10000
Active Date:	Not reported
Tank Use:	M.V. FUEL
STG:	P

ARCO AM/PM (Continued) **S105774214**

Content:	DIESEL
Number Of Tanks:	Not reported
Status:	Active
Comp Number:	12020
Number:	9
Board Of Equalization:	Not reported
Referral Date:	09-30-92
Action Date:	09-15-92
Created Date:	02-29-88
Owner Tank Id:	Not reported
SWRCB Tank Id:	30-000-012020-000003
Tank Status:	A
Capacity:	10000
Active Date:	Not reported
Tank Use:	M.V. FUEL
STG:	P
Content:	REG UNLEADED
Number Of Tanks:	Not reported
Status:	Active
Comp Number:	12020
Number:	9
Board Of Equalization:	Not reported
Referral Date:	09-30-92
Action Date:	09-15-92
Created Date:	02-29-88
Owner Tank Id:	Not reported
SWRCB Tank Id:	30-000-012020-000004
Tank Status:	A
Capacity:	10000
Active Date:	Not reported
Tank Use:	M.V. FUEL
STG:	P
Content:	REG UNLEADED
Number Of Tanks:	Not reported

C15 **ARCO** **LUST** **U003937792**
SSE **20572 LAKE FOREST** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.112 mi.
589 ft. **Site 5 of 9 in cluster C**

Relative: LUST:
Lower

Actual:
700 ft.

Lead Agency:	ORANGE COUNTY LOP
Case Type:	LUST Cleanup Site
Geo Track:	http://geotracker.waterboards.ca.gov/profile_report.asp?global_id=T0605947685
Global Id:	T0605947685
Latitude:	33.663244
Longitude:	-117.665983
Status:	Completed - Case Closed
Status Date:	05/16/2003
Case Worker:	KL
RB Case Number:	Not reported
Local Agency:	ORANGE COUNTY LOP
File Location:	Local Agency Warehouse
Local Case Number:	02UT008
Potential Media Affect:	Soil

ARCO (Continued) **U003937792**

Potential Contaminants of Concern: Gasoline
Site History: Not reported

LUST:
Global Id: T0605947685
Contact Type: Local Agency Caseworker
Contact Name: JAMES STROZIER
Organization Name: ORANGE COUNTY LOP
Address: 1241 E. DYER ROAD SUITE 120
City: SANTA ANA
Email: jstrozier@ochca.com
Phone Number: 7144336273

Global Id: T0605947685
Contact Type: Local Agency Caseworker
Contact Name: KEVIN LAMBERT
Organization Name: ORANGE COUNTY LOP
Address: 1241 E DYER ROAD SUITE 120
City: SANTA ANA
Email: klambert@ochca.com
Phone Number: 7144336261

Global Id: T0605947685
Contact Type: Regional Board Caseworker
Contact Name: VALERIE JAHN-BULL
Organization Name: SANTA ANA RWQCB (REGION 8)
Address: 3737 MAIN STREET, SUITE 500
City: RIVERSIDE
Email: valerie.jahn-bull@waterboards.ca.gov
Phone Number: 9517824903

LUST:
Global Id: T0605947685
Action Type: ENFORCEMENT
Date: 05/16/2003
Action: Closure/No Further Action Letter

Global Id: T0605947685
Action Type: Other
Date: 02/26/2002
Action: Leak Discovery

Global Id: T0605947685
Action Type: Other
Date: 03/04/2002
Action: Leak Reported

Global Id: T0605947685
Action Type: REMEDIATION
Date: 07/30/2002
Action: Not reported

LUST:
Global Id: T0605947685
Status: Open - Case Begin Date
Status Date: 02/26/2002

ARCO (Continued) **U003937792**

Global Id: T0605947685
Status: Open - Site Assessment
Status Date: 02/26/2002

Global Id: T0605947685
Status: Completed - Case Closed
Status Date: 05/16/2003

ORANGE CO. LUST:
Region: ORANGE
Facility Id: 02UT008
Released Substance: Gasoline-Automotive (motor gasoline and additives), leaded & unleaded
Date Closed: 05/16/2003
Record ID: RO0003049

C16 **ECONO LUBE N TUNE** **RCRA-SQG** **1000595001**
SSE **20572 LAKE FOREST DR** **FINDS** **CAD983588914**
< 1/8 **EL TORO, CA 92630** **ECHO**
0.112 mi.
589 ft. **Site 6 of 9 in cluster C**

Relative: **Lower**

Actual: **700 ft.**

RCRA-SQG:
Date form received by agency: 07/11/1991
Facility name: ECONO LUBE N TUNE
Facility address: 20572 LAKE FOREST DR
EL TORO, CA 92630
EPA ID: CAD983588914
Contact: TABATABI AL
Contact address: 20572 LAKE FOREST DR
EL TORO, CA 92630
Contact country: US
Contact telephone: 714-457-0370
Contact email: Not reported
EPA Region: 09
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: AL TABATABI
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: 415-555-1212
Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: NOT REQUIRED

ECONO LUBE N TUNE (Continued) **1000595001**

Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: 415-555-1212
Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Violation Status: No violations found

FINDS:

Registry ID: 110002848982

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1000595001
Registry ID: 110002848982
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110002848982

C17 **GRAB N GO 24/7** **UST** **U004200589**
SSE **20572 LAKE FOREST DR** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.112 mi.
589 ft. **Site 7 of 9 in cluster C**

Relative: ORANGE CO. UST:
Lower Facility ID: FA0024654

Actual:
700 ft.

C18 **LAKE FOREST ARCO** **UST** **U003913409**
SSE **20572 LAKE FOREST DR** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.112 mi.
589 ft. **Site 8 of 9 in cluster C**

Relative: UST:
Lower
Facility ID: 12020
Actual: Permitting Agency: ORANGE COUNTY
700 ft. Latitude: 33.664849
Longitude: -117.664751

Facility ID: Not reported
Permitting Agency: Orange County Environmental Health
Latitude: 33.6635
Longitude: -117.66608

D19 **FOOTHILL CLEANERS** **EDR Hist Cleaner** **1018584487**
South **20651 LAKE FOREST DR A111** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.114 mi.
601 ft. **Site 1 of 5 in cluster D**

Relative: EDR Hist Cleaner
Lower

Actual:
726 ft.

Year:	Name:	Type:
1995	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
1996	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
1997	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
1998	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
1999	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2000	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2001	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2002	FOOTHILL CLEANERS	Drycleaning Plants, Except Rugs, NEC
2002	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2003	FOOTHILL CLEANERS	Drycleaning Plants, Except Rugs, NEC
2003	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2004	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2005	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2006	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2007	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2008	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2009	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2010	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2011	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2012	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents
2013	FOOTHILL CLEANERS	Garment Pressing And Cleaners' Agents

D20 **COCO ENTERPRISE, INC** **DRYCLEANERS** **S121695671**
South **20651 LAKE FOREST DR #111** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.114 mi.
601 ft. **Site 2 of 5 in cluster D**

Relative: DRYCLEAN SOUTH COAST:
Lower

Facility ID:	144152
Application Number:	442460
Permit Number:	F75301
Status:	S
Representative Name:	YOON SEAK CHOI
Representative Telephone:	949 9515329
Permit Status:	INACTIVE
BCAT Number:	000601
BCAT Description:	DRY CLEANING, DRY-TO-DRY NON-VENT, PERC
UTM East:	438.55801392
UTM North:	3725.2451172

Actual:
726 ft.

Facility ID:	144152
Application Number:	442462
Permit Number:	F75397
Status:	S
Representative Name:	YOON SEAK CHOI
Representative Telephone:	949 9515329
Permit Status:	INACTIVE
BCAT Number:	000233
BCAT Description:	DRY CLEANING EQUIP PETROLEUM SOLVENT
UTM East:	438.55801392
UTM North:	3725.2451172

D21 **FOOTHILL CLEANERS** **DRYCLEANERS** **S121700097**
South **20651 LAKE FOREST DR #111** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.114 mi.
601 ft. **Site 3 of 5 in cluster D**

Relative: DRYCLEAN SOUTH COAST:
Lower

Facility ID:	88102
Application Number:	255829
Permit Number:	D43128
Status:	S
Representative Name:	HAN SEUNG LEE
Representative Telephone:	213 3299292
Permit Status:	INACTIVE
BCAT Number:	000234
BCAT Description:	DRY CLEANING EQUIP PERCHLOROETHYLENE
UTM East:	438.55801392
UTM North:	3725.2451172

Actual:
726 ft.

D22
South
< 1/8
0.114 mi.
601 ft.

SONG'S CLEANERS SOON NAM LEE DBA
20651 LAKE FOREST DR #111
LAKE FOREST, CA 92630

Site 4 of 5 in cluster D

DRYCLEANERS

S121696146
N/A

Relative:
Lower

Actual:
726 ft.

DRYCLEAN SOUTH COAST:

Facility ID:	152129
Application Number:	469631
Permit Number:	F92397
Status:	A
Representative Name:	NAM SOON LEE
Representative Telephone:	949 9515329
Permit Status:	INACT_NR
BCAT Number:	000233
BCAT Description:	DRY CLEANING EQUIP PETROLEUM SOLVENT
UTM East:	438.10998535
UTM North:	3724.7299805

Facility ID:	152129
Application Number:	541087
Permit Number:	Not reported
Status:	A
Representative Name:	NAM SOON LEE
Representative Telephone:	949 9515329
Permit Status:	Not reported
BCAT Number:	000233
BCAT Description:	DRY CLEANING EQUIP PETROLEUM SOLVENT
UTM East:	438.10998535
UTM North:	3724.7299805

D23
South
< 1/8
0.114 mi.
601 ft.

FOOTHILL CLEANERS
20651 LAKE FOREST DR A111
LAKE FOREST, CA 92630

Site 5 of 5 in cluster D

RCRA-SQG
Orange Co. Industrial Site
FINDS
ECHO
DRYCLEANERS
HAZNET

1000685968
CAD983629346

Relative:
Lower

Actual:
726 ft.

RCRA-SQG:

Date form received by agency:	04/13/1992
Facility name:	FOOTHILL CLEANERS
Facility address:	20651 LAKE FOREST DR A111 LAKE FOREST, CA 92630
EPA ID:	CAD983629346
Contact:	HAN LEE
Contact address:	20651 LAKE FOREST DR A111 LAKE FOREST, CA 92630
Contact country:	US
Contact telephone:	714-951-5329
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

FOOTHILL CLEANERS (Continued) **1000685968**

Owner/operator name: LIZ AND HAN LEE
Owner/operator address: 20651 LAKE FOREST
LAKE FOREST, CA 92630
Owner/operator country: Not reported
Owner/operator telephone: 714-951-5329
Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Violation Status: No violations found

Orange Co. Industrial Site:
Case ID: 05IC008
Record ID: RO0003342
Current Status: CLOSED 2/9/2006
Closure Type: Closure certification issued
Released Chemical: PERCHLOROETHYLENE, XYLENE, TOLUENE

FINDS:

Registry ID: 110002873178

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

FOOTHILL CLEANERS (Continued) **1000685968**

Envid: 1000685968
Registry ID: 110002873178
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110002873178

DRYCLEANERS:
EPA Id: CAL000298661
NAICS Code: 81232
NAICS Description: Drycleaning and Laundry Services (except Coin-Operated)
SIC Code: 7211
SIC Description: Power Laundries, Family and Commercial
Create Date: 09/21/2005
Facility Active: No
Inactive Date: 06/30/2007
Facility Addr2: Not reported
Owner Name: SUNG-KYU CHOI
Owner Address: 20651 LAKE FOREST DR STE A111
Owner Address 2: Not reported
Owner Telephone: 9518336460
Contact Name: SUNG-KYU CHOI
Contact Address: 4347 ALTIVO LN
Contact Address 2: Not reported
Contact Telephone: 9512770015
Mailing Name: Not reported
Mailing Address 1: 20651 LAKE FOREST DR STE A111
Mailing Address 2: Not reported
Mailing City: LAKE FOREST
Mailing State: CA
Mailing Zip: 926307750
Owner Fax: Not reported
Region Code: 1

EPA Id: CAL000323129
NAICS Code: 81232
NAICS Description: Drycleaning and Laundry Services (except Coin-Operated)
SIC Code: 7211
SIC Description: Power Laundries, Family and Commercial
Create Date: 08/06/2007
Facility Active: No
Inactive Date: 06/30/2008
Facility Addr2: Not reported
Owner Name: SOON LEE
Owner Address: 20651 LAKE FOREST DR STE A111
Owner Address 2: Not reported
Owner Telephone: 9499515329
Contact Name: SOON LEE
Contact Address: 20651 LAKE FOREST DR STE A111
Contact Address 2: Not reported
Contact Telephone: 9499515329
Mailing Name: Not reported
Mailing Address 1: 20651 LAKE FOREST DR STE A111
Mailing Address 2: Not reported
Mailing City: LAKE FOREST
Mailing State: CA
Mailing Zip: 926307750
Owner Fax: Not reported
Region Code: 4

FOOTHILL CLEANERS (Continued) **1000685968**

HAZNET:

envid:	1000685968
Year:	2005
GEPAID:	CAD983629346
Contact:	--
Telephone:	7145869945
Mailing Name:	Not reported
Mailing Address:	20651 LAKE FOREST DR STE A111
Mailing City,St,Zip:	LAKE FOREST, CA 926300000
Gen County:	Not reported
TSD EPA ID:	NVR000076158
TSD County:	Not reported
Waste Category:	Aqueous solution with total organic residues less than 10 percent
Disposal Method:	Not reported
Tons:	Not reported
Cat Decode:	Not reported
Method Decode:	Not reported
Facility County:	Orange

envid:	1000685968
Year:	2005
GEPAID:	CAD983629346
Contact:	--
Telephone:	7145869945
Mailing Name:	Not reported
Mailing Address:	20651 LAKE FOREST DR STE A111
Mailing City,St,Zip:	LAKE FOREST, CA 926300000
Gen County:	Not reported
TSD EPA ID:	NVR000076158
TSD County:	Not reported
Waste Category:	Halogenated solvents (chloroforms, methyl chloride, perchloroethylene, etc)
Disposal Method:	Invalid Code
Tons:	0.37
Cat Decode:	Not reported
Method Decode:	Not reported
Facility County:	Orange

envid:	1000685968
Year:	2004
GEPAID:	CAD983629346
Contact:	--
Telephone:	7145869945
Mailing Name:	Not reported
Mailing Address:	20651 LAKE FOREST DR STE A111
Mailing City,St,Zip:	LAKE FOREST, CA 926300000
Gen County:	Not reported
TSD EPA ID:	NVR000076158
TSD County:	Not reported
Waste Category:	Aqueous solution with total organic residues less than 10 percent
Disposal Method:	Not reported
Tons:	Not reported
Cat Decode:	Not reported
Method Decode:	Not reported
Facility County:	Orange

envid:	1000685968

FOOTHILL CLEANERS (Continued) **1000685968**

Year:	2004
GEPAID:	CAD983629346
Contact:	--
Telephone:	7145869945
Mailing Name:	Not reported
Mailing Address:	20651 LAKE FOREST DR STE A111
Mailing City,St,Zip:	LAKE FOREST, CA 926300000
Gen County:	Not reported
TSD EPA ID:	NVR000076158
TSD County:	Not reported
Waste Category:	Not reported
Disposal Method:	Not reported
Tons:	Not reported
Cat Decode:	Not reported
Method Decode:	Not reported
Facility County:	Orange

envid:	1000685968
Year:	2004
GEPAID:	CAD983629346
Contact:	--
Telephone:	7145869945
Mailing Name:	Not reported
Mailing Address:	20651 LAKE FOREST DR STE A111
Mailing City,St,Zip:	LAKE FOREST, CA 926300000
Gen County:	Not reported
TSD EPA ID:	NVR000076158
TSD County:	Not reported
Waste Category:	Halogenated solvents (chloroforms, methyl chloride, perchloroethylene, etc)
Disposal Method:	Not reported
Tons:	0.17
Cat Decode:	Not reported
Method Decode:	Not reported
Facility County:	Orange

Click this hyperlink while viewing on your computer to access
5 additional CA_HAZNET: record(s) in the EDR Site Report.

C24 **LAKE FOREST AUTO WASH INC** **EDR Hist Auto** **1021488927**
South **20602 LAKE FOREST DR** **N/A**
< 1/8 **LAKE FOREST, CA 92630**
0.119 mi.
628 ft. **Site 9 of 9 in cluster C**

Relative: EDR Hist Auto
Lower

Actual:
701 ft.

Year:	Name:	Type:
1995	LAKE FOREST AUTO WASH INC	Carwashes, NEC
1996	LAKE FOREST AUTO WASH INC	Carwashes, NEC
1997	LAKE FOREST AUTO WASH INC	Carwashes, NEC
1998	LAKE FOREST AUTO WASH INC	Carwashes, NEC

E25
SSE
1/8-1/4
0.138 mi.
728 ft.

POWER PROFESSIONAL CLEANERS CORPORATION
20562 REGENCY LN F
LAKE FOREST, CA 92630

Site 1 of 3 in cluster E

DRYCLEANERS
EMI

S106837610
N/A

Relative:
Lower

Actual:
701 ft.

DRYCLEAN SOUTH COAST:

Facility ID:	83232
Application Number:	242455
Permit Number:	D37125
Status:	A
Representative Name:	KHODER DOAIFI
Representative Telephone:	949 4720393
Permit Status:	INACTIVE
BCAT Number:	000234
BCAT Description:	DRY CLEANING EQUIP PERCHLOROETHYLENE
UTM East:	438.39700317
UTM North:	3724.8149414

Facility ID:	83232
Application Number:	304407
Permit Number:	D91875
Status:	A
Representative Name:	KHODER DOAIFI
Representative Telephone:	949 4720393
Permit Status:	INACTIVE
BCAT Number:	000601
BCAT Description:	DRY CLEANING, DRY-TO-DRY NON-VENT, PERC
UTM East:	438.39700317
UTM North:	3724.8149414

Facility ID:	83232
Application Number:	357894
Permit Number:	Not reported
Status:	A
Representative Name:	KHODER DOAIFI
Representative Telephone:	949 4720393
Permit Status:	Not reported
BCAT Number:	000601
BCAT Description:	DRY CLEANING, DRY-TO-DRY NON-VENT, PERC
UTM East:	438.39700317
UTM North:	3724.8149414

Facility ID:	83232
Application Number:	364569
Permit Number:	F31276
Status:	A
Representative Name:	KHODER DOAIFI
Representative Telephone:	949 4720393
Permit Status:	INACTIVE
BCAT Number:	000603
BCAT Description:	DRY CLEANING,DRY-TO-DRY NV,W/ SIC,PERC
UTM East:	438.39700317
UTM North:	3724.8149414

Facility ID:	83232
Application Number:	422229
Permit Number:	F64863
Status:	A

POWER PROFESSIONAL CLEANERS CORPORATION (Continued) **S106837610**

Representative Name: KHODER DOAIFI
Representative Telephone: 949 4720393
Permit Status: ACTIVE
BCAT Number: 000233
BCAT Description: DRY CLEANING EQUIP PETROLEUM SOLVENT
UTM East: 438.39700317
UTM North: 3724.8149414

Facility ID: 83232
Application Number: 467633
Permit Number: F89454
Status: A
Representative Name: KHODER DOAIFI
Representative Telephone: 949 4720393
Permit Status: INACTIVE
BCAT Number: 000603
BCAT Description: DRY CLEANING,DRY-TO-DRY NV,W/ SIC,PERC
UTM East: 438.39700317
UTM North: 3724.8149414

Facility ID: 83232
Application Number: 535660
Permit Number: G18369
Status: A
Representative Name: KHODER DOAIFI
Representative Telephone: 949 4720393
Permit Status: ACTIVE
BCAT Number: 000606
BCAT Description: Dry Cleaning K4 Solvent
UTM East: 438.39700317
UTM North: 3724.8149414

EMI:
Year: 2002
County Code: 30
Air Basin: SC
Facility ID: 83232
Air District Name: SC
SIC Code: 7216
Air District Name: SOUTH COAST AQMD
Community Health Air Pollution Info System: Not reported
Consolidated Emission Reporting Rule: Not reported
Total Organic Hydrocarbon Gases Tons/Yr: 0
Reactive Organic Gases Tons/Yr: 0
Carbon Monoxide Emissions Tons/Yr: 0
NOX - Oxides of Nitrogen Tons/Yr: 0
SOX - Oxides of Sulphur Tons/Yr: 0
Particulate Matter Tons/Yr: 0
Part. Matter 10 Micrometers and Smllr Tons/Yr: 0

Year: 2003
County Code: 30
Air Basin: SC
Facility ID: 83232
Air District Name: SC
SIC Code: 7216
Air District Name: SOUTH COAST AQMD

POWER PROFESSIONAL CLEANERS CORPORATION (Continued) **S106837610**

Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	0
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers and Smllr Tons/Yr:	0

Year:	2004
County Code:	30
Air Basin:	SC
Facility ID:	83232
Air District Name:	SC
SIC Code:	7216
Air District Name:	SOUTH COAST AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0.0182
Reactive Organic Gases Tons/Yr:	0.01
Carbon Monoxide Emissions Tons/Yr:	0.117
NOX - Oxides of Nitrogen Tons/Yr:	0.14
SOX - Oxides of Sulphur Tons/Yr:	0.000838
Particulate Matter Tons/Yr:	0.0106
Part. Matter 10 Micrometers and Smllr Tons/Yr:	0.01

Year:	2005
County Code:	30
Air Basin:	SC
Facility ID:	83232
Air District Name:	SC
SIC Code:	7216
Air District Name:	SOUTH COAST AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	.0177
Reactive Organic Gases Tons/Yr:	.00747294
Carbon Monoxide Emissions Tons/Yr:	.27
NOX - Oxides of Nitrogen Tons/Yr:	.321
SOX - Oxides of Sulphur Tons/Yr:	.00192
Particulate Matter Tons/Yr:	.0244
Part. Matter 10 Micrometers and Smllr Tons/Yr:	.0244

Year:	2006
County Code:	30
Air Basin:	SC
Facility ID:	83232
Air District Name:	SC
SIC Code:	7216
Air District Name:	SOUTH COAST AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	.7978021701106643982
Reactive Organic Gases Tons/Yr:	.4
Carbon Monoxide Emissions Tons/Yr:	.149
NOX - Oxides of Nitrogen Tons/Yr:	.177

POWER PROFESSIONAL CLEANERS CORPORATION (Continued) **S106837610**

SOX - Oxides of Sulphur Tons/Yr:	.001
Particulate Matter Tons/Yr:	.013
Part. Matter 10 Micrometers and Smllr Tons/Yr:	.013
Year:	2007
County Code:	30
Air Basin:	SC
Facility ID:	83232
Air District Name:	SC
SIC Code:	7216
Air District Name:	SOUTH COAST AQMD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	.7978021701106643982
Reactive Organic Gases Tons/Yr:	.4
Carbon Monoxide Emissions Tons/Yr:	.149
NOX - Oxides of Nitrogen Tons/Yr:	.177
SOX - Oxides of Sulphur Tons/Yr:	.001
Particulate Matter Tons/Yr:	.013
Part. Matter 10 Micrometers and Smllr Tons/Yr:	.013

E26
SSE
1/8-1/4
0.138 mi.
728 ft.

POWER PROF CLEANERS CORP DBA POWER CLEAN **Orange Co. Industrial Site** **S103982353**
20562 REGENCY LN **DRYCLEANERS** **N/A**
LAKE FOREST, CA 92630

Site 2 of 3 in cluster E

Relative:
Lower

Actual:
701 ft.

Orange Co. Industrial Site:

Case ID:	97IC004
Record ID:	RO0000610
Current Status:	CLOSED 5/29/1997
Closure Type:	Closure certification issued
Released Chemical:	PERCHLOROETHYLENE, TRICHLOROETHANE

DRYCLEANERS:

EPA Id:	CAD983617648
NAICS Code:	81232
NAICS Description:	Drycleaning and Laundry Services (except Coin-Operated)
SIC Code:	7211
SIC Description:	Power Laundries, Family and Commercial
Create Date:	02/04/1992
Facility Active:	Yes
Inactive Date:	Not reported
Facility Addr2:	STE F
Owner Name:	KHODER DOAIFI
Owner Address:	23749 RIDGEWAY
Owner Address 2:	Not reported
Owner Telephone:	9494720393
Contact Name:	KHODER DOAIFI
Contact Address:	20562 REGENCY LN
Contact Address 2:	STE F
Contact Telephone:	9494720393
Mailing Name:	Not reported
Mailing Address 1:	20562 REGENCY LN
Mailing Address 2:	STE F
Mailing City:	LAKE FOREST
Mailing State:	CA

POWER PROF CLEANERS CORP DBA POWER CLEAN (Continued) **S103982353**

Mailing Zip: 926308146
Owner Fax: 0000000000
Region Code: 4

27
North
1/8-1/4
0.156 mi.
823 ft.

26642 TOWNE CENTRE DR
FOOTHILL RANCH, CA

AST **A100336921**
N/A

Relative:
Higher

Actual:
774 ft.

AST:

Certified Unified Program Agencies:	Orange
Owner:	ARDEN REALTY
Total Gallons:	1,320
CERSID:	Not reported
Facility ID:	Not reported
Business Name:	Not reported
Phone:	Not reported
Fax:	Not reported
Mailing Address:	Not reported
Mailing Address City:	Not reported
Mailing Address State:	Not reported
Mailing Address Zip Code:	Not reported
Operator Name:	Not reported
Operator Phone:	Not reported
Owner Phone:	Not reported
Owner Mail Address:	Not reported
Owner State:	Not reported
Owner Zip Code:	Not reported
Owner Country:	Not reported
Property Owner Name:	Not reported
Property Owner Phone:	Not reported
Property Owner Mailing Address:	Not reported
Property Owner City:	Not reported
Property Owner Stat :	Not reported
Property Owner Zip Code:	Not reported
Property Owner Country:	Not reported
EPAID:	Not reported

E28
SSE
1/8-1/4
0.162 mi.
854 ft.

ECONO LUBE N TUNE
20592 LAKE FOREST DR
LAKE FOREST, CA 92630

Site 3 of 3 in cluster E

SWEEPS UST **U003721264**
N/A

Relative:
Lower

Actual:
727 ft.

SWEEPS UST:

Status:	Active
Comp Number:	12498
Number:	9
Board Of Equalization:	Not reported
Referral Date:	09-30-92
Action Date:	09-15-92
Created Date:	02-29-88
Owner Tank Id:	Not reported
SWRCB Tank Id:	30-000-012498-000001
Tank Status:	A

ECONO LUBE N TUNE (Continued) **U003721264**

Capacity:	550
Active Date:	Not reported
Tank Use:	PETROLEUM
STG:	P
Content:	Not reported
Number Of Tanks:	1

F29 **G&M OIL CO. #83** **UST** **U003721265**
South **20731 LAKE FOREST DR** **N/A**
1/8-1/4 **LAKE FOREST, CA 92630**
0.166 mi.
878 ft. **Site 1 of 2 in cluster F**

Relative: **Lower**
Actual: **705 ft.**

UST:

Facility ID:	FA0025150
Permitting Agency:	Orange County Environmental Health
Latitude:	33.66158
Longitude:	-117.66854

Facility ID:	20177
Permitting Agency:	ORANGE COUNTY
Latitude:	33.662904
Longitude:	-117.66715

ORANGE CO. UST:
Facility ID: FA0025150

F30 **CHEVRON** **LUST** **U003659611**
South **20731 LAKE FOREST DR** **SWEEPS UST** **N/A**
1/8-1/4 **LAKE FOREST, CA 92630** **HIST CORTESE**
0.166 mi.
878 ft. **Site 2 of 2 in cluster F**

Relative: **Lower**
Actual: **705 ft.**

LUST:

Lead Agency:	ORANGE COUNTY LOP
Case Type:	LUST Cleanup Site
Geo Track:	http://geotracker.waterboards.ca.gov/profile_report.asp?global_id=T0605902102
Global Id:	T0605902102
Latitude:	33.6458268
Longitude:	-117.6890547
Status:	Completed - Case Closed
Status Date:	04/20/1998
Case Worker:	KL
RB Case Number:	083003083T
Local Agency:	ORANGE COUNTY LOP
File Location:	Local Agency
Local Case Number:	97UT037
Potential Media Affect:	Soil
Potential Contaminants of Concern:	Gasoline
Site History:	Not reported

LUST:

Global Id:	T0605902102
Contact Type:	Local Agency Caseworker
Contact Name:	JAMES STROZIER
Organization Name:	ORANGE COUNTY LOP

CHEVRON (Continued) **U003659611**

Address: 1241 E. DYER ROAD SUITE 120
City: SANTA ANA
Email: jstrozier@ochca.com
Phone Number: 7144336273

Global Id: T0605902102
Contact Type: Local Agency Caseworker
Contact Name: KEVIN LAMBERT
Organization Name: ORANGE COUNTY LOP
Address: 1241 E DYER ROAD SUITE 120
City: SANTA ANA
Email: klambert@ochca.com
Phone Number: 7144336261

Global Id: T0605902102
Contact Type: Regional Board Caseworker
Contact Name: TOM E. MBEKE-EKANEM
Organization Name: SANTA ANA RWQCB (REGION 8)
Address: 3737 MAIN STREET, SUITE 500
City: RIVERSIDE
Email: tmbeke-ekanem@waterboards.ca.gov
Phone Number: 9513202007

LUST:
Global Id: T0605902102
Action Type: Other
Date: 09/12/1997
Action: Leak Discovery

Global Id: T0605902102
Action Type: Other
Date: 09/12/1997
Action: Leak Reported

Global Id: T0605902102
Action Type: ENFORCEMENT
Date: 03/02/1998
Action: LOP Case Closure Summary to RB

LUST:
Global Id: T0605902102
Status: Open - Case Begin Date
Status Date: 09/12/1997

Global Id: T0605902102
Status: Completed - Case Closed
Status Date: 04/20/1998

ORANGE CO. LUST:
Region: ORANGE
Facility Id: 97UT037
Released Substance: Gasoline-Automotive (motor gasoline and additives), leaded & unleaded
Date Closed: 04/20/1998
Record ID: RO0001932

CHEVRON (Continued) **U003659611**

LUST REG 8:

Region:	8
County:	Orange
Regional Board:	Santa Ana Region
Facility Status:	Case Closed
Case Number:	083003083T
Local Case Num:	97UT037
Case Type:	Soil only
Substance:	Gasoline
Qty Leaked:	0
Abate Method:	Not reported
Cross Street:	Not reported
Enf Type:	Not reported
Funding:	Not reported
How Discovered:	Tank Closure
How Stopped:	Close Tank
Leak Cause:	Unknown
Leak Source:	Unknown
Global ID:	T0605902102
How Stopped Date:	9/9/9999
Enter Date:	Not reported
Date Confirmation of Leak Began:	Not reported
Date Preliminary Assessment Began:	Not reported
Discover Date:	9/12/1997
Enforcement Date:	Not reported
Close Date:	4/20/1998
Date Prelim Assessment Workplan Submitted:	Not reported
Date Pollution Characterization Began:	Not reported
Date Remediation Plan Submitted:	Not reported
Date Remedial Action Underway:	Not reported
Date Post Remedial Action Monitoring:	Not reported
Enter Date:	Not reported
GW Qualifies:	Not reported
Soil Qualifies:	Not reported
Operator:	Not reported
Facility Contact:	Not reported
Interim:	Not reported
Oversite Program:	LUST
Latitude:	33.6458268
Longitude:	-117.6890547
MTBE Date:	Not reported
Max MTBE GW:	Not reported
MTBE Concentration:	0
Max MTBE Soil:	Not reported
MTBE Fuel:	1
MTBE Tested:	Site NOT Tested for MTBE.Includes Unknown and Not Analyzed.
MTBE Class:	*
Staff:	TME
Staff Initials:	JS
Lead Agency:	Local Agency
Local Agency:	30000L
Hydr Basin #:	Not reported
Beneficial:	MUN
Priority:	Not reported
Cleanup Fund Id:	Not reported
Work Suspended:	Not reported

Summary: Not reported

CHEVRON (Continued) **U003659611**

SWEEPS UST:

Status:	Active
Comp Number:	11761
Number:	9
Board Of Equalization:	Not reported
Referral Date:	09-30-92
Action Date:	09-15-92
Created Date:	02-29-88
Owner Tank Id:	Not reported
SWRCB Tank Id:	30-000-011761-000001
Tank Status:	A
Capacity:	12000
Active Date:	Not reported
Tank Use:	M.V. FUEL
STG:	P
Content:	REG UNLEADED
Number Of Tanks:	3

Status:	Active
Comp Number:	11761
Number:	9
Board Of Equalization:	Not reported
Referral Date:	09-30-92
Action Date:	09-15-92
Created Date:	02-29-88
Owner Tank Id:	Not reported
SWRCB Tank Id:	30-000-011761-000002
Tank Status:	A
Capacity:	12000
Active Date:	Not reported
Tank Use:	M.V. FUEL
STG:	P
Content:	REG UNLEADED
Number Of Tanks:	Not reported

Status:	Active
Comp Number:	11761
Number:	9
Board Of Equalization:	Not reported
Referral Date:	09-30-92
Action Date:	09-15-92
Created Date:	02-29-88
Owner Tank Id:	Not reported
SWRCB Tank Id:	30-000-011761-000003
Tank Status:	A
Capacity:	12000
Active Date:	Not reported
Tank Use:	M.V. FUEL
STG:	P
Content:	DIESEL
Number Of Tanks:	Not reported

HIST CORTESE:

Region:	CORTESE
Facility County Code:	30
Reg By:	LTNKA

CHEVRON (Continued) **U003659611**

Reg Id: 083003083T

G31 **POWER CLEANERS** **RCRA-SQG** **1000597738**
SSW **20562 CANADA RD** **FINDS** **CAD983617648**
1/8-1/4 **EL TORO, CA 92630** **ECHO**
0.167 mi.
884 ft. **Site 1 of 5 in cluster G**

Relative:
Lower

Actual:
669 ft.

RCRA-SQG:

Date form received by agency:	02/04/1992
Facility name:	POWER CLEANERS
Facility address:	20562 CANADA RD EL TORO, CA 92630
EPA ID:	CAD983617648
Mailing address:	CANADA RD EL TORO, CA 92630
Contact:	DOAIFI KHODER
Contact address:	20562 CANADA RD EL TORO, CA 92630
Contact country:	US
Contact telephone:	714-472-6088
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	DOAIFI KHODER
Owner/operator address:	20562 CANADA RD EL TORO, CA 92630
Owner/operator country:	Not reported
Owner/operator telephone:	714-472-6088
Owner/operator email:	Not reported
Owner/operator fax:	Not reported
Owner/operator extension:	Not reported
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No

POWER CLEANERS (Continued) **1000597738**

Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Violation Status: No violations found

FINDS:

Registry ID: 110002867951

Environmental Interest/Information System
California Hazardous Waste Tracking System - Datamart (HWTS-DATAMART) provides California with information on hazardous waste shipments for generators, transporters, and treatment, storage, and disposal facilities.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1000597738
Registry ID: 110002867951
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110002867951

G32 **SALEEN ALLEN R R R SPEEDLAB INC** **RCRA-SQG** **1004676851**
SSW **20622 CANADA RD** **FINDS** **CAR000090308**
1/8-1/4 **LAKE FOREST, CA 92630** **ECHO**
0.172 mi.
908 ft. **Site 2 of 5 in cluster G**

Relative: **Lower**
Actual: **668 ft.**

RCRA-SQG:
Date form received by agency: 01/17/2001
Facility name: SALEEN ALLEN R R R SPEEDLAB INC
Facility address: 20622 CANADA RD
LAKE FOREST, CA 92630
EPA ID: CAR000090308
Mailing address: 9 WHATNEY
IRVINE, CA 92618
Contact: MARNI JOHNSON
Contact address: 9 WHATNEY
IRVINE, CA 92618
Contact country: US
Contact telephone: 949-829-8704
Contact email: Not reported
EPA Region: 09
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of

SALEEN ALLEN R R R SPEEDLAB INC (Continued) **1004676851**

hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: SALEEN INC
Owner/operator address: 9 WHATNEY
IRVINE, CA 92618
Owner/operator country: Not reported
Owner/operator telephone: 949-597-4900
Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

. Waste code: D001
. Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.

. Waste code: D002
. Waste name: A WASTE WHICH HAS A PH OF LESS THAN 2 OR GREATER THAN 12.5 IS CONSIDERED TO BE A CORROSIVE HAZARDOUS WASTE. SODIUM HYDROXIDE, A CAUSTIC SOLUTION WITH A HIGH PH, IS OFTEN USED BY INDUSTRIES TO CLEAN OR DEGREASE PARTS. HYDROCHLORIC ACID, A SOLUTION WITH A LOW PH, IS USED BY MANY INDUSTRIES TO CLEAN METAL PARTS PRIOR TO PAINTING. WHEN THESE CAUSTIC OR ACID SOLUTIONS BECOME CONTAMINATED AND MUST BE DISPOSED, THE WASTE WOULD BE A CORROSIVE HAZARDOUS WASTE.

. Waste code: F001
. Waste name: THE FOLLOWING SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLOROETHYLENE, METHYLENE CHLORIDE, 1,1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE, AND CHLORINATED FLUOROCARBONS; ALL SPENT SOLVENT MIXTURES/BLENDS USED IN DEGREASING

SALEEN ALLEN R R R SPEEDLAB INC (Continued) **1004676851**

CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F002, F004, AND F005, AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Violation Status: No violations found

FINDS:

Registry ID: 110012211748

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1004676851
Registry ID: 110012211748
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110012211748

G33 SSW 1/8-1/4 0.176 mi. 927 ft. **LOS ALISOS RANCH** **HIST UST** **U001577229**
20571 CANADA RD **N/A**
EL TORO, CA 92646
Site 3 of 5 in cluster G

Relative: Lower
Actual: 668 ft.

HIST UST:
File Number: 0002EBFF
URL: http://geotracker.waterboards.ca.gov/ustpdfs/pdf/0002EBFF.pdf
Region: STATE
Facility ID: 00000023543
Facility Type: Other
Other Type: NURSERY/FARMING
Contact Name: S. NAKASE
Telephone: 7149626604
Owner Name: NAKASE BROTHERS WHOLESALE NURS
Owner Address: 9441 KREPP DR.
Owner City,St,Zip: HUNTINGTON BEACH, CA 92646
Total Tanks: 0003

Tank Num: 001
Container Num: 001
Year Installed: Not reported
Tank Capacity: 00000200
Tank Used for: PRODUCT
Type of Fuel: DIESEL
Container Construction Thickness: Not reported
Leak Detection: Stock Inventor

Tank Num: 002

LOS ALISOS RANCH (Continued) **U001577229**

Container Num:	G735150
Year Installed:	Not reported
Tank Capacity:	00001000
Tank Used for:	PRODUCT
Type of Fuel:	REGULAR
Container Construction Thickness:	10
Leak Detection:	Stock Inventor

Tank Num:	003
Container Num:	002
Year Installed:	Not reported
Tank Capacity:	00000280
Tank Used for:	PRODUCT
Type of Fuel:	DIESEL
Container Construction Thickness:	Not reported
Leak Detection:	Stock Inventor

Click here for Geo Tracker PDF:

G34 **FOREVER GREEN ART INC** **RCRA-SQG** **1001195438**
SSW **20611 CANADA RD** **FINDS** **CAR000020172**
1/8-1/4 **LAKE FOREST, CA 92630** **ECHO**
0.177 mi. **HAZNET**
932 ft. **Site 4 of 5 in cluster G**

Relative:
Lower

Actual:
667 ft.

RCRA-SQG:

Date form received by agency:	06/05/1997
Facility name:	FOREVER GREEN ART INC
Facility address:	20611 CANADA RD LAKE FOREST, CA 92630
EPA ID:	CAR000020172
Mailing address:	BARENTS SEA CIRCLE LAKE FOREST, CA 92630
Contact:	MIKE REEDER
Contact address:	20382 BARENTS SEA CIRCLE LAKE FOREST, CA 92630
Contact country:	US
Contact telephone:	714-768-3005
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	FOREVER GREEN ART INC
Owner/operator address:	20382 BARENTS SEA CIR LAKE FOREST, CA 92630
Owner/operator country:	Not reported
Owner/operator telephone:	714-768-3005
Owner/operator email:	Not reported
Owner/operator fax:	Not reported
Owner/operator extension:	Not reported
Legal status:	Private

FOREVER GREEN ART INC (Continued) **1001195438**

Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Violation Status: No violations found

FINDS:

Registry ID: 110002917611

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1001195438
Registry ID: 110002917611
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110002917611

HAZNET:
envid: 1001195438
Year: 1999
GEPAID: CAR000020172
Contact: FOREVER GREEN ART INC
Telephone: 9497683005
Mailing Name: Not reported
Mailing Address: 20382 BARENTS SEA CIRCLE
Mailing City,St,Zip: LAKE FOREST, CA 926300000
Gen County: Not reported
TSD EPA ID: CAD008302903
TSD County: Not reported

FOREVER GREEN ART INC (Continued) **1001195438**

Waste Category: Off-specification, aged or surplus organics
Disposal Method: Recycler
Tons: .2085
Cat Decode: Not reported
Method Decode: Not reported
Facility County: Orange

envid: 1001195438
Year: 1997
GEPAID: CAR000020172
Contact: FOREVER GREEN ART INC
Telephone: 9497683005
Mailing Name: Not reported
Mailing Address: 20382 BARENTS SEA CIRCLE
Mailing City,St,Zip: LAKE FOREST, CA 926300000
Gen County: Not reported
TSD EPA ID: CAD000088252
TSD County: Not reported
Waste Category: Unspecified organic liquid mixture
Disposal Method: Transfer Station
Tons: .4587
Cat Decode: Not reported
Method Decode: Not reported
Facility County: Orange

envid: 1001195438
Year: 1997
GEPAID: CAR000020172
Contact: FOREVER GREEN ART INC
Telephone: 9497683005
Mailing Name: Not reported
Mailing Address: 20382 BARENTS SEA CIRCLE
Mailing City,St,Zip: LAKE FOREST, CA 926300000
Gen County: Not reported
TSD EPA ID: CAD000088252
TSD County: Not reported
Waste Category: Off-specification, aged or surplus organics
Disposal Method: Transfer Station
Tons: .1500
Cat Decode: Not reported
Method Decode: Not reported
Facility County: Orange

envid: 1001195438
Year: 1997
GEPAID: CAR000020172
Contact: FOREVER GREEN ART INC
Telephone: 9497683005
Mailing Name: Not reported
Mailing Address: 20382 BARENTS SEA CIRCLE
Mailing City,St,Zip: LAKE FOREST, CA 926300000
Gen County: Not reported
TSD EPA ID: CAD000088252
TSD County: Not reported
Waste Category: Laboratory waste chemicals
Disposal Method: Transfer Station
Tons: 1.0980

FOREVER GREEN ART INC (Continued) **1001195438**

Cat Decode:	Not reported
Method Decode:	Not reported
Facility County:	Orange
envid:	1001195438
Year:	1997
GEPAID:	CAR000020172
Contact:	FOREVER GREEN ART INC
Telephone:	9497683005
Mailing Name:	Not reported
Mailing Address:	20382 BARENTS SEA CIRCLE
Mailing City,St,Zip:	LAKE FOREST, CA 926300000
Gen County:	Not reported
TSD EPA ID:	CAD050806850
TSD County:	Not reported
Waste Category:	Laboratory waste chemicals
Disposal Method:	Not reported
Tons:	.0100
Cat Decode:	Not reported
Method Decode:	Not reported
Facility County:	Orange

Click this hyperlink while viewing on your computer to access
1 additional CA_HAZNET: record(s) in the EDR Site Report.

G35 **BOKKES IND MERCEDES SVC** **RCRA-SQG** **1000594482**
SSW **20591 CANADA RD** **FINDS** **CAD983583121**
1/8-1/4 **LAKE FOREST, CA 92630** **ECHO**
0.182 mi.
959 ft. **Site 5 of 5 in cluster G**

Relative:
Lower

Actual:
667 ft.

RCRA-SQG:

Date form received by agency:	05/20/1991
Facility name:	BOKKES IND MERCEDES SVC
Facility address:	20591 CANADA RD LAKE FOREST, CA 92630
EPA ID:	CAD983583121
Contact:	BOKKES TOM
Contact address:	20591 CANADA RD LAKE FOREST, CA 92630
Contact country:	US
Contact telephone:	714-830-3411
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	TOM J BOKKES
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	415-555-1212

BOKKES IND MERCEDES SVC (Continued) **1000594482**

Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Owner/operator name: NOT REQUIRED
Owner/operator address: NOT REQUIRED
NOT REQUIRED, ME 99999
Owner/operator country: Not reported
Owner/operator telephone: 415-555-1212
Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: Yes
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Violation Status: No violations found

FINDS:

Registry ID: 110006481137

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

BOKKES IND MERCEDES SVC (Continued) **1000594482**

ECHO:
Envid: 1000594482
Registry ID: 110006481137
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110006481137

36
ESE
1/8-1/4
0.193 mi.
1021 ft.

SADDLE BACK VALLEY ORANMENTAL IRON INC **RCRA-SQG** **1006930221**
26891 VISTA TERRACE **HAZNET** **CAR000146894**
LAKE FOREST, CA 92630 **NPDES**
CIWQS

Relative:
Higher

Actual:
803 ft.

RCRA-SQG:
Date form received by agency: 08/04/2003
Facility name: SADDLE BACK VALLEY ORANMENTAL IRON INC
Facility address: 26891 VISTA TERRACE
LAKE FOREST, CA 92630
EPA ID: CAR000146894
Contact: JOHN RODRIGUEZ
Contact address: 26891 VISTA TERRACE
LAKE FOREST, CA 92630
Contact country: US
Contact telephone: 949-830-9513
Contact email: Not reported
EPA Region: 09
Land type: Private
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: PAM DICKIE
Owner/operator address: Not reported
Not reported
Owner/operator country: Not reported
Owner/operator telephone: Not reported
Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: 01/01/1991
Owner/Op end date: Not reported

Owner/operator name: SADDLE NACK VALLEY ORNAMENTAL INC
Owner/operator address: Not reported
Not reported
Owner/operator country: Not reported
Owner/operator telephone: Not reported
Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: 01/01/1992

SADDLE BACK VALLEY ORANMENTAL IRON INC (Continued) **1006930221**

Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

. Waste code: D001
. Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.

. Waste code: D035
. Waste name: METHYL ETHYL KETONE

. Waste code: F003
. Waste name: THE FOLLOWING SPENT NON-HALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NON-HALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NON-HALOGENATED SOLVENTS, AND, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005, AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: F005
. Waste name: THE FOLLOWING SPENT NON-HALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NON-HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Historical Generators:
Date form received by agency: 08/04/2003
Site name: SADDLE BACK VALLEY ORANMENTAL IRON INC
Classification: Small Quantity Generator

SADDLE BACK VALLEY ORANMENTAL IRON INC (Continued) **1006930221**

Facility Has Received Notices of Violations:
- Regulation violated: Not reported
- Area of violation: Generators - General
- Date violation determined: 03/08/2005
- Date achieved compliance: Not reported
- Violation lead agency: State
  - Enforcement action: Not reported
  - Enforcement action date: Not reported
  - Enf. disposition status: Not reported
  - Enf. disp. status date: Not reported
  - Enforcement lead agency: Not reported
  - Proposed penalty amount: Not reported
  - Final penalty amount: Not reported
  - Paid penalty amount: Not reported

Evaluation Action Summary:
- Evaluation date: 05/31/2005
- Evaluation: FOCUSED COMPLIANCE INSPECTION
- Area of violation: Not reported
- Date achieved compliance: Not reported
- Evaluation lead agency: State Contractor/Grantee

- Evaluation date: 03/09/2005
- Evaluation: FOCUSED COMPLIANCE INSPECTION
- Area of violation: Not reported
- Date achieved compliance: Not reported
- Evaluation lead agency: State Contractor/Grantee

- Evaluation date: 03/08/2005
- Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
- Area of violation: Generators - General
- Date achieved compliance: Not reported
- Evaluation lead agency: State Contractor/Grantee

HAZNET:
- envid: 1006930221
- Year: 2016
- GEPAID: CAR000146894
- Contact: TOM BUCHANAN
- Telephone: 9498309513
- Mailing Name: Not reported
- Mailing Address: 26891 VISTA TERRACE
- Mailing City,St,Zip: LAKE FOREST, CA 926300000
- Gen County: Orange
- TSD EPA ID: CAD008364432
- TSD County: Los Angeles
- Waste Category: Latex waste
- Disposal Method: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
- Tons: 0.18765
- Cat Decode: Latex waste
- Method Decode: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
- Facility County: Orange

- envid: 1006930221
- Year: 2016

SADDLE BACK VALLEY ORANMENTAL IRON INC (Continued) **1006930221**

GEPAID: CAR000146894
Contact: TOM BUCHANAN
Telephone: 9498309513
Mailing Name: Not reported
Mailing Address: 26891 VISTA TERRACE
Mailing City,St,Zip: LAKE FOREST, CA 926300000
Gen County: Orange
TSD EPA ID: CAD008364432
TSD County: Los Angeles
Waste Category: Other inorganic solid waste
Disposal Method: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Tons: 10.071
Cat Decode: Other inorganic solid waste
Method Decode: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Facility County: Orange

envid: 1006930221
Year: 2015
GEPAID: CAR000146894
Contact: TOM BUCHANAN
Telephone: 9498309513
Mailing Name: Not reported
Mailing Address: 26891 VISTA TERRACE
Mailing City,St,Zip: LAKE FOREST, CA 926300000
Gen County: Orange
TSD EPA ID: CAD008364432
TSD County: Los Angeles
Waste Category: Other inorganic solid waste
Disposal Method: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Tons: 6.535
Cat Decode: Not reported
Method Decode: Not reported
Facility County: Orange

envid: 1006930221
Year: 2015
GEPAID: CAR000146894
Contact: TOM BUCHANAN
Telephone: 9498309513
Mailing Name: Not reported
Mailing Address: 26891 VISTA TERRACE
Mailing City,St,Zip: LAKE FOREST, CA 926300000
Gen County: Orange
TSD EPA ID: CAD008364432
TSD County: Los Angeles
Waste Category: Not reported
Disposal Method: Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Tons: 0.075
Cat Decode: Not reported
Method Decode: Not reported
Facility County: Orange

envid: 1006930221

SADDLE BACK VALLEY ORANMENTAL IRON INC (Continued) **1006930221**

Year:	2014
GEPAID:	CAR000146894
Contact:	TOM BUCHANAN
Telephone:	9498309513
Mailing Name:	Not reported
Mailing Address:	26891 VISTA TERRACE
Mailing City,St,Zip:	LAKE FOREST, CA 926300000
Gen County:	Orange
TSD EPA ID:	CAD008364432
TSD County:	Los Angeles
Waste Category:	Other inorganic solid waste
Disposal Method:	Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Tons:	3.675
Cat Decode:	Not reported
Method Decode:	Not reported
Facility County:	Orange

Click this hyperlink while viewing on your computer to access
37 additional CA_HAZNET: record(s) in the EDR Site Report.

NPDES:

Npdes Number:	Not reported
Facility Status:	Not reported
Agency Id:	Not reported
Region:	8
Regulatory Measure Id:	465156
Order No:	Not reported
Regulatory Measure Type:	Industrial
Place Id:	Not reported
WDID:	8 30NEC001180
Program Type:	Not reported
Adoption Date Of Regulatory Measure:	Not reported
Effective Date Of Regulatory Measure:	Not reported
Expiration Date Of Regulatory Measure:	Not reported
Termination Date Of Regulatory Measure:	Not reported
Discharge Name:	Not reported
Discharge Address:	Not reported
Discharge City:	Not reported
Discharge State:	Not reported
Discharge Zip:	Not reported
RECEIVED DATE:	10/06/2015
PROCESSED DATE:	10/13/2015
STATUS CODE NAME:	Active
STATUS DATE:	10/13/2015
PLACE SIZE:	7500
PLACE SIZE UNIT:	SqFt
FACILITY CONTACT NAME:	Tom Buchanan
FACILITY CONTACT TITLE:	Shop Mgr.
FACILITY CONTACT PHONE:	949-830-9513
FACILITY CONTACT PHONE EXT:	Not reported
FACILITY CONTACT EMAIL:	tom@sviron.com
OPERATOR NAME:	Saddleback Valley Ornamental Iron Inc
OPERATOR ADDRESS:	26891 Vista Terrace
OPERATOR CITY:	Lake Forest
OPERATOR STATE:	California
OPERATOR ZIP:	92630

SADDLE BACK VALLEY ORANMENTAL IRON INC (Continued) **1006930221**

OPERATOR CONTACT NAME:	Tom Buchanan
OPERATOR CONTACT TITLE:	Shop Mgr.
OPERATOR CONTACT PHONE:	949-830-9513
OPERATOR CONTACT PHONE EXT:	Not reported
OPERATOR CONTACT EMAIL:	tom@sviron.com
OPERATOR TYPE:	Private Business
DEVELOPER NAME:	Not reported
DEVELOPER ADDRESS:	Not reported
DEVELOPER CITY:	Not reported
DEVELOPER STATE:	California
DEVELOPER ZIP:	Not reported
DEVELOPER CONTACT NAME:	Not reported
DEVELOPER CONTACT TITLE:	Not reported
CONSTYPE LINEAR UTILITY IND:	Not reported
EMERGENCY PHONE NO:	949-291-2477
EMERGENCY PHONE EXT:	Not reported
CONSTYPE ABOVE GROUND IND:	Not reported
CONSTYPE BELOW GROUND IND:	Not reported
CONSTYPE CABLE LINE IND:	Not reported
CONSTYPE COMM LINE IND:	Not reported
CONSTYPE COMMERTIAL IND:	Not reported
CONSTYPE ELECTRICAL LINE IND:	Not reported
CONSTYPE GAS LINE IND:	Not reported
CONSTYPE INDUSTRIAL IND:	Not reported
CONSTYPE OTHER DESRIPTION:	Not reported
CONSTYPE OTHER IND:	Not reported
CONSTYPE RECONS IND:	Not reported
CONSTYPE RESIDENTIAL IND:	Not reported
CONSTYPE TRANSPORT IND:	Not reported
CONSTYPE UTILITY DESCRIPTION:	Not reported
CONSTYPE UTILITY IND:	Not reported
CONSTYPE WATER SEWER IND:	Not reported
DIR DISCHARGE USWATER IND:	Not reported
RECEIVING WATER NAME:	Not reported
CERTIFIER NAME:	Michael Parsons
CERTIFIER TITLE:	Owner
CERTIFICATION DATE:	06-OCT-16
PRIMARY SIC:	3446-Architectural and Ornamental Metal Work
SECONDARY SIC:	Not reported
TERTIARY SIC:	Not reported

Npdes Number:	CAS000001
Facility Status:	Active
Agency Id:	0
Region:	8
Regulatory Measure Id:	465156
Order No:	97-03-DWQ
Regulatory Measure Type:	Enrollee
Place Id:	Not reported
WDID:	8 30NEC001180
Program Type:	Industrial
Adoption Date Of Regulatory Measure:	Not reported
Effective Date Of Regulatory Measure:	10/13/2015
Expiration Date Of Regulatory Measure:	Not reported
Termination Date Of Regulatory Measure:	Not reported
Discharge Name:	Saddleback Valley Ornamental Iron Inc
Discharge Address:	26891 Vista Terrace

SADDLE BACK VALLEY ORANMENTAL IRON INC (Continued) **1006930221**

Discharge City:	Lake Forest
Discharge State:	California
Discharge Zip:	92630
RECEIVED DATE:	Not reported
PROCESSED DATE:	Not reported
STATUS CODE NAME:	Not reported
STATUS DATE:	Not reported
PLACE SIZE:	Not reported
PLACE SIZE UNIT:	Not reported
FACILITY CONTACT NAME:	Not reported
FACILITY CONTACT TITLE:	Not reported
FACILITY CONTACT PHONE:	Not reported
FACILITY CONTACT PHONE EXT:	Not reported
FACILITY CONTACT EMAIL:	Not reported
OPERATOR NAME:	Not reported
OPERATOR ADDRESS:	Not reported
OPERATOR CITY:	Not reported
OPERATOR STATE:	Not reported
OPERATOR ZIP:	Not reported
OPERATOR CONTACT NAME:	Not reported
OPERATOR CONTACT TITLE:	Not reported
OPERATOR CONTACT PHONE:	Not reported
OPERATOR CONTACT PHONE EXT:	Not reported
OPERATOR CONTACT EMAIL:	Not reported
OPERATOR TYPE:	Not reported
DEVELOPER NAME:	Not reported
DEVELOPER ADDRESS:	Not reported
DEVELOPER CITY:	Not reported
DEVELOPER STATE:	Not reported
DEVELOPER ZIP:	Not reported
DEVELOPER CONTACT NAME:	Not reported
DEVELOPER CONTACT TITLE:	Not reported
CONSTYPE LINEAR UTILITY IND:	Not reported
EMERGENCY PHONE NO:	Not reported
EMERGENCY PHONE EXT:	Not reported
CONSTYPE ABOVE GROUND IND:	Not reported
CONSTYPE BELOW GROUND IND:	Not reported
CONSTYPE CABLE LINE IND:	Not reported
CONSTYPE COMM LINE IND:	Not reported
CONSTYPE COMMERTIAL IND:	Not reported
CONSTYPE ELECTRICAL LINE IND:	Not reported
CONSTYPE GAS LINE IND:	Not reported
CONSTYPE INDUSTRIAL IND:	Not reported
CONSTYPE OTHER DESRIPTION:	Not reported
CONSTYPE OTHER IND:	Not reported
CONSTYPE RECONS IND:	Not reported
CONSTYPE RESIDENTIAL IND:	Not reported
CONSTYPE TRANSPORT IND:	Not reported
CONSTYPE UTILITY DESCRIPTION:	Not reported
CONSTYPE UTILITY IND:	Not reported
CONSTYPE WATER SEWER IND:	Not reported
DIR DISCHARGE USWATER IND:	Not reported
RECEIVING WATER NAME:	Not reported
CERTIFIER NAME:	Not reported
CERTIFIER TITLE:	Not reported
CERTIFICATION DATE:	Not reported
PRIMARY SIC:	Not reported

SADDLE BACK VALLEY ORANMENTAL IRON INC (Continued) **1006930221**

SECONDARY SIC: Not reported
TERTIARY SIC: Not reported

CIWQS:
Agency: Saddleback Valley Ornamental Iron Inc
Agency Address: 26891 Vista Terrace, Lake Forest, CA 92630
Place/Project Type: Industrial - Architectural and Ornamental Metal Work
SIC/NAICS: 3446
Region: 8
Program: INDSTW
Regulatory Measure Status: Active
Regulatory Measure Type: Storm water industrial
Order Number: 2014-0057-DWQ
WDID: 8 30NEC001180
NPDES Number: CAS000001
Adoption Date: Not reported
Effective Date: 10/13/2015
Termination Date: Not reported
Expiration/Review Date: Not reported
Design Flow: Not reported
Major/Minor: Not reported
Complexity: Not reported
TTWQ: Not reported
Enforcement Actions within 5 years: 0
Violations within 5 years: 0
Latitude: 33.66615
Longitude: -117.66103

H37 **TRABUCO CANYON WATER DISTRICT** **UST** **U003784547**
West **20904 DIMENSION** **N/A**
1/8-1/4 **LAKE FOREST, CA 92630**
0.204 mi.
1079 ft. **Site 1 of 2 in cluster H**

Relative: UST:
Lower
Actual: Facility ID: 8466
700 ft. Permitting Agency: ORANGE COUNTY
Latitude: 33.63787
Longitude: -117.68592

H38 **TRABUCO CANYON WATER DISTRICT** **SWEEPS UST** **S101589570**
West **20904 DIMENSION DR** **CA FID UST** **N/A**
1/8-1/4 **EL TORO, CA 92630**
0.204 mi.
1079 ft. **Site 2 of 2 in cluster H**

Relative: SWEEPS UST:
Lower
Actual: Status: Active
700 ft. Comp Number: 8466
Number: 9
Board Of Equalization: 44-016687
Referral Date: 09-30-92
Action Date: 02-26-92
Created Date: 02-29-88
Owner Tank Id: Not reported
SWRCB Tank Id: 30-000-008466-000001

TRABUCO CANYON WATER DISTRICT (Continued) **S101589570**

Tank Status: A
Capacity: 550
Active Date: Not reported
Tank Use: M.V. FUEL
STG: P
Content: LEADED
Number Of Tanks: 1

CA FID UST:
Facility ID: 30017607
Regulated By: UTNKA
Regulated ID: Not reported
Cortese Code: Not reported
SIC Code: Not reported
Facility Phone: 7148372195
Mail To: Not reported
Mailing Address: 30575 TRABUCO CYN RD 200 P
Mailing Address 2: Not reported
Mailing City,St,Zip: EL TORO 92630
Contact: Not reported
Contact Phone: Not reported
DUNs Number: Not reported
NPDES Number: Not reported
EPA ID: Not reported
Comments: Not reported
Status: Active

I39 **CLEANERS 2000** **DRYCLEANERS** **S109611984**
South **20761 LAKE FOREST DR STE H** **N/A**
1/8-1/4 **LAKE FOREST, CA 92630**
0.209 mi.
1102 ft. **Site 1 of 6 in cluster I**

Relative: DRYCLEANERS:
Lower
Actual: EPA Id: CAD983581711
693 ft. NAICS Code: 81232
NAICS Description: Drycleaning and Laundry Services (except Coin-Operated)
SIC Code: 7211
SIC Description: Power Laundries, Family and Commercial
Create Date: 05/07/1991
Facility Active: Yes
Inactive Date: Not reported
Facility Addr2: Not reported
Owner Name: SUSAN CHUNG
Owner Address: 20761 LAKE FOREST DR STE H
Owner Address 2: Not reported
Owner Telephone: 9495862972
Contact Name: PAUL J CHUNG
Contact Address: 20761 LAKE FOREST DR STE H
Contact Address 2: Not reported
Contact Telephone: 9495862972
Mailing Name: Not reported
Mailing Address 1: 20761 LAKE FOREST DR STE H
Mailing Address 2: Not reported
Mailing City: LAKE FOREST
Mailing State: CA
Mailing Zip: 926307739

CLEANERS 2000 (Continued) **S109611984**

Owner Fax: Not reported
Region Code: 4

I40 **SANTA MARGARITA TIRE** **RCRA-SQG** **1004675884**
South **20761 LAKE FOREST DR UNIT K** **FINDS** **CAR000078329**
1/8-1/4 **LAKE FOREST, CA 92630** **ECHO**
0.209 mi.
1102 ft. **Site 2 of 6 in cluster I**

Relative:
Lower

Actual:
693 ft.

RCRA-SQG:
Date form received by agency: 07/14/2000
Facility name: SANTA MARGARITA TIRE
Facility address: 20761 LAKE FOREST DR UNIT K
LAKE FOREST, CA 92630
EPA ID: CAR000078329
Contact: MIKE DEL RIO
Contact address: 20761 LAKE FOREST DE UNIT K
LAKE FOREST, CA 92630
Contact country: US
Contact telephone: 949-589-9242
Contact email: Not reported
EPA Region: 09
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:
Owner/operator name: SANTA MARGARITA AUTOMOTIVE
Owner/operator address: 20761 LAKE FOREST DR UNIT K
LAKE FOREST, CA 92630
Owner/operator country: Not reported
Owner/operator telephone: 949-589-9242
Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No

SANTA MARGARITA TIRE (Continued) **1004675884**

Used oil transfer facility: No
Used oil transporter: No

. Waste code: D039
. Waste name: TETRACHLOROETHYLENE

Violation Status: No violations found

FINDS:

Registry ID: 110002940505

Environmental Interest/Information System
California Hazardous Waste Tracking System - Datamart (HWTS-DATAMART) provides California with information on hazardous waste shipments for generators, transporters, and treatment, storage, and disposal facilities.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1004675884
Registry ID: 110002940505
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110002940505

I41 **CLEANERS 2000** **RCRA-SQG** **1000594350**
South **20761 LAKEFOREST #H** **FINDS** **CAD983581711**
1/8-1/4 **EL TORO, CA 92630** **ECHO**
0.211 mi.
1112 ft. **Site 3 of 6 in cluster I**

Relative:
Lower

Actual:
697 ft.

RCRA-SQG:
Date form received by agency: 05/07/1991
Facility name: CLEANERS 2000
Facility address: 20761 LAKEFOREST #H
EL TORO, CA 92630
EPA ID: CAD983581711
Mailing address: LAKEFOREST #H
EL TORO, CA 92630
Contact: RICHARD KANG
Contact address: 20761 LAKEFOREST #H
EL TORO, CA 92630
Contact country: US
Contact telephone: 714-586-2972
Contact email: Not reported
EPA Region: 09
Classification: Small Small Quantity Generator
Description: Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of

CLEANERS 2000 (Continued) **1000594350**

hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	NOT REQUIRED
Owner/operator address:	NOT REQUIRED
	NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	415-555-1212
Owner/operator email:	Not reported
Owner/operator fax:	Not reported
Owner/operator extension:	Not reported
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Owner/operator name:	KANG RICHARD M
Owner/operator address:	NOT REQUIRED
	NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	415-555-1212
Owner/operator email:	Not reported
Owner/operator fax:	Not reported
Owner/operator extension:	Not reported
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No

Violation Status: No violations found

FINDS:

Registry ID: 110002843889

Environmental Interest/Information System

California Hazardous Waste Tracking System - Datamart (HWTS-DATAMART) provides California with information on hazardous waste shipments for

CLEANERS 2000 (Continued) **1000594350**

generators, transporters, and treatment, storage, and disposal facilities.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1000594350
Registry ID:	110002843889
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110002843889

I42 **CLEANERS 2000** **DRYCLEANERS** **S121693286**
South **20761 LAKE FOREST DR #H** **N/A**
1/8-1/4 **LAKE FOREST, CA 92630**
0.211 mi.
1112 ft. **Site 4 of 6 in cluster I**

Relative: **Lower**

Actual: **697 ft.**

DRYCLEAN SOUTH COAST:

Facility ID:	100620
Application Number:	290412
Permit Number:	D81263
Status:	A
Representative Name:	PAUL CHUNG
Representative Telephone:	949 5862972
Permit Status:	INACTIVE
BCAT Number:	000601
BCAT Description:	DRY CLEANING, DRY-TO-DRY NON-VENT, PERC
UTM East:	438.31201172
UTM North:	3724.9980469

Facility ID:	100620
Application Number:	468549
Permit Number:	F90093
Status:	A
Representative Name:	PAUL CHUNG
Representative Telephone:	949 5862972
Permit Status:	ACTIVE
BCAT Number:	000233
BCAT Description:	DRY CLEANING EQUIP PETROLEUM SOLVENT
UTM East:	438.31201172
UTM North:	3724.9980469

I43 **CLEANERS 2000** **DRYCLEANERS** **S121699736**
South **20761 LAKE FOREST DR** **N/A**
1/8-1/4 **LAKE FOREST, CA 92630**
0.211 mi.
1112 ft. **Site 5 of 6 in cluster I**

Relative: **Lower**

Actual: **697 ft.**

DRYCLEAN SOUTH COAST:

Facility ID:	81979
Application Number:	239284
Permit Number:	D35666
Status:	O
Representative Name:	H.B. KANG
Representative Telephone:	714 5879000
Permit Status:	INACTIVE
BCAT Number:	000234
BCAT Description:	DRY CLEANING EQUIP PERCHLOROETHYLENE
UTM East:	436.20001221
UTM North:	3723.1000977

I44 **JIFFY LUBE NO 1301** **RCRA-SQG** **1000594445**
South **20781 LAKE FOREST DR** **CAD983582750**
1/8-1/4 **LAKE FOREST, CA 92630**
0.236 mi.
1246 ft. **Site 6 of 6 in cluster I**

Relative: **Lower**

Actual: **710 ft.**

RCRA-SQG:

Date form received by agency:	06/18/1997
Facility name:	JIFFY LUBE NO 1301
Facility address:	20781 LAKE FOREST DR LAKE FOREST, CA 92630-7738
EPA ID:	CAD983582750
Contact:	SUZAN PAEK
Contact address:	PO BOX 5709 DIAMOND BAR, CA 91765-9998
Contact country:	US
Contact telephone:	909-613-1772
Contact email:	Not reported
EPA Region:	09
Land type:	Private
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	NOT REQUIRED
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	415-555-1212
Owner/operator email:	Not reported
Owner/operator fax:	Not reported
Owner/operator extension:	Not reported
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

JIFFY LUBE NO 1301 (Continued) **1000594445**

Owner/operator name: ALLIED LUBE INC
Owner/operator address: PO BOX 5709
DIAMOND BAR, CA 91765
Owner/operator country: Not reported
Owner/operator telephone: 909-613-1772
Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Other
Owner/Operator Type: Owner
Owner/Op start date: Not reported
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

Historical Generators:
Date form received by agency: 09/01/1996
Site name: JIFFY LUBE NO 1301
Classification: Small Quantity Generator

Facility Has Received Notices of Violations:
Regulation violated: FR - 262.10-12.A
Area of violation: Generators - General
Date violation determined: 07/30/1991
Date achieved compliance: 10/05/1993
Violation lead agency: State
Enforcement action: Not reported
Enforcement action date: Not reported
Enf. disposition status: Not reported
Enf. disp. status date: Not reported
Enforcement lead agency: Not reported
Proposed penalty amount: Not reported
Final penalty amount: Not reported
Paid penalty amount: Not reported

Evaluation Action Summary:
Evaluation date: 10/05/1993
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Not reported
Date achieved compliance: Not reported

JIFFY LUBE NO 1301 (Continued) **1000594445**

Evaluation lead agency: State Contractor/Grantee

Evaluation date: 07/30/1991
Evaluation: COMPLIANCE EVALUATION INSPECTION ON-SITE
Area of violation: Generators - General
Date achieved compliance: 10/05/1993
Evaluation lead agency: State Contractor/Grantee

45
SW
1/4-1/2
0.459 mi.
2425 ft.

GREENWASTE COMPOSTING **WMUDS/SWAT** **S104384477**
20712 INDIAN OCEAN DR **N/A**
LAKE FOREST CA, CA 92630

Relative:
Lower

Actual:
686 ft.

WMUDS/SWAT:

Edit Date:	Not reported
Complexity:	Not reported
Primary Waste:	SLDWST
Primary Waste Type:	Nonhazardous Solid Wastes/Influent or Solid Wastes that contain nonhazardous putrescible and non putrescible solid, semisolid, and liquid wastes (E.G., garbage, trash, refuse, paper, demolition and construction wastes, manure, vegetable or animal solid and semisolid waste).
Secondary Waste:	Not reported
Secondary Waste Type:	Not reported
Base Meridian:	Not reported
NPID:	Not reported
Tonnage:	0
Regional Board ID:	Not reported
Municipal Solid Waste:	False
Superorder:	False
Open To Public:	False
Waste List:	False
Agency Type:	Private
Agency Name:	PACIFIC WASTE MANAGEMENT
Agency Department:	Not reported
Agency Address:	20712 INDIAN OCEAN DR.
Agency City,St,Zip:	LAKE FOREST CA 92630
Agency Contact:	GARY PLUMLEY
Agency Telephone:	7145988181
Land Owner Name:	Not reported
Land Owner Address:	Not reported
Land Owner City,St,Zip:	Not reported
Land Owner Contact:	Not reported
Land Owner Phone:	Not reported
Region:	8
Facility Type:	Other - Does not fall into the category of Municipal/Domestic, Industrial, Agricultural or Solid Waste (Class I, II or III)
Facility Description:	Not reported
Facility Telephone:	Not reported
SWAT Facility Name:	Not reported
Primary SIC:	2875
Secondary SIC:	Not reported
Comments:	Not reported
Last Facility Editors:	Not reported
Waste Discharge System:	True
Solid Waste Assessment Test Program:	False
Toxic Pits Cleanup Act Program:	False
Resource Conservation Recovery Act:	False

GREENWASTE COMPOSTING (Continued) **S104384477**

Department of Defence:	False
Solid Waste Assessment Test Program:	Not reported
Threat to Water Quality:	Not reported
Sub Chapter 15:	True
Regional Board Project Officer:	JPL
Number of WMUDS at Facility:	0
Section Range:	Not reported
RCRA Facility:	No
Waste Discharge Requirements:	H
Self-Monitoring Rept. Frequency:	No Reporting Requirements
Waste Discharge System ID:	8 303062001
Solid Waste Information ID:	Not reported

Count: 5 records.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
LAKE FOREST	1023265403	GREENWASTENA LAKE FOREST	20200 BAKE PARKWAY	92630	FINDS
LAKE FOREST	S121658260	NE CORNER LAKE FOREST & TOWNE	NE CORNER LAKE FOREST & TOWNE	92610	CIWQS
LAKE FOREST	S121649787	LAKE FOREST PUMP HOUSE ADDTION	3910 N LAKE BLVD		CIWQS
LAKE FOREST	1023304533	LAKE FOREST PUMP HOUSE ADDTION	3910 N LAKE BLVD	92630	FINDS
LAKE FOREST	S121667492	REGENCY LAKE FOREST DR	REGENCY LAKE FOREST DR		CIWQS

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 05/13/2018
Date Data Arrived at EDR: 05/30/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 23

Source: EPA
Telephone: N/A
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 07/16/2018
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 05/13/2018
Date Data Arrived at EDR: 05/30/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 23

Source: EPA
Telephone: N/A
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 07/16/2018
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal Delisted NPL site list

Delisted NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 05/13/2018
Date Data Arrived at EDR: 05/30/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 23

Source: EPA
Telephone: N/A
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 07/16/2018
Data Release Frequency: Quarterly

Federal CERCLIS list

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 11/07/2016
Date Data Arrived at EDR: 01/05/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 92

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 04/06/2018
Next Scheduled EDR Contact: 07/16/2018
Data Release Frequency: Varies

SEMS: Superfund Enterprise Management System

SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly know as CERCLIS, renamed to SEMS by the EPA in 2015. The list contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 05/18/2018
Date Data Arrived at EDR: 05/30/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 23

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 07/30/2018
Data Release Frequency: Quarterly

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that. based upon available information, the location is not judged to be potential NPL site.

Date of Government Version: 05/18/2018
Date Data Arrived at EDR: 05/30/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 23

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 07/30/2018
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/28/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 86

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 06/28/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/28/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 86

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/28/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/28/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 86

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/28/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/28/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 86

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/28/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/28/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 86

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/28/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

Federal institutional controls / engineering controls registries

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 02/16/2018
Date Data Arrived at EDR: 02/22/2018
Date Made Active in Reports: 05/11/2018
Number of Days to Update: 78

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 05/09/2018
Next Scheduled EDR Contact: 08/27/2018
Data Release Frequency: Varies

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 02/13/2018
Date Data Arrived at EDR: 02/27/2018
Date Made Active in Reports: 05/11/2018
Number of Days to Update: 73

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 05/29/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 02/13/2018
Date Data Arrived at EDR: 02/27/2018
Date Made Active in Reports: 05/11/2018
Number of Days to Update: 73

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 05/29/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 03/19/2018
Date Data Arrived at EDR: 03/27/2018
Date Made Active in Reports: 06/08/2018
Number of Days to Update: 73

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 06/27/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

State- and tribal - equivalent NPL

RESPONSE: State Response Sites

Identifies confirmed release sites where DTSC is involved in remediation, either in a lead or oversight capacity. These confirmed release sites are generally high-priority and high potential risk.

Date of Government Version: 04/30/2018
Date Data Arrived at EDR: 05/02/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 51

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 05/02/2018
Next Scheduled EDR Contact: 08/13/2018
Data Release Frequency: Quarterly

State- and tribal - equivalent CERCLIS

ENVIROSTOR: EnviroStor Database

The Department of Toxic Substances Control's (DTSC's) Site Mitigation and Brownfields Reuse Program's (SMBRP's) EnviroStor database identifes sites that have known contamination or sites for which there may be reasons to investigate further. The database includes the following site types: Federal Superfund sites (National Priorities List (NPL)); State Response, including Military Facilities and State Superfund; Voluntary Cleanup; and School sites. EnviroStor provides similar information to the information that was available in CalSites, and provides additional site information, including, but not limited to, identification of formerly-contaminated properties that have been released for reuse, properties where environmental deed restrictions have been recorded to prevent inappropriate land uses, and risk characterization information that is used to assess potential impacts to public health and the environment at contaminated sites.

Date of Government Version: 04/30/2018
Date Data Arrived at EDR: 05/02/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 51

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 05/02/2018
Next Scheduled EDR Contact: 08/13/2018
Data Release Frequency: Quarterly

State and tribal landfill and/or solid waste disposal site lists

SWF/LF (SWIS): Solid Waste Information System

Active, Closed and Inactive Landfills. SWF/LF records typically contain an inve ntory of solid waste disposal facilities or landfills. These may be active or i nactive facilities or open dumps that failed to meet RCRA Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 05/14/2018
Date Data Arrived at EDR: 05/16/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 37

Source: Department of Resources Recycling and Recovery
Telephone: 916-341-6320
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 08/27/2018
Data Release Frequency: Quarterly

State and tribal leaking storage tank lists

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

LUST REG 1: Active Toxic Site Investigation

Del Norte, Humboldt, Lake, Mendocino, Modoc, Siskiyou, Sonoma, Trinity counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/01/2001
Date Data Arrived at EDR: 02/28/2001
Date Made Active in Reports: 03/29/2001
Number of Days to Update: 29

Source: California Regional Water Quality Control Board North Coast (1)
Telephone: 707-570-3769
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

LUST REG 7: Leaking Underground Storage Tank Case Listing

Leaking Underground Storage Tank locations. Imperial, Riverside, San Diego, Santa Barbara counties.

Date of Government Version: 02/26/2004
Date Data Arrived at EDR: 02/26/2004
Date Made Active in Reports: 03/24/2004
Number of Days to Update: 27

Source: California Regional Water Quality Control Board Colorado River Basin Region (7)
Telephone: 760-776-8943
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

LUST REG 8: Leaking Underground Storage Tanks

California Regional Water Quality Control Board Santa Ana Region (8). For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/14/2005
Date Data Arrived at EDR: 02/15/2005
Date Made Active in Reports: 03/28/2005
Number of Days to Update: 41

Source: California Regional Water Quality Control Board Santa Ana Region (8)
Telephone: 909-782-4496
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: Varies

LUST: Leaking Underground Fuel Tank Report (GEOTRACKER)

Leaking Underground Storage Tank (LUST) Sites included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 03/21/2018
Number of Days to Update: 7

Source: State Water Resources Control Board
Telephone: see region list
Last EDR Contact: 06/13/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Quarterly

LUST REG 6V: Leaking Underground Storage Tank Case Listing

Leaking Underground Storage Tank locations. Inyo, Kern, Los Angeles, Mono, San Bernardino counties.

Date of Government Version: 06/07/2005
Date Data Arrived at EDR: 06/07/2005
Date Made Active in Reports: 06/29/2005
Number of Days to Update: 22

Source: California Regional Water Quality Control Board Victorville Branch Office (6)
Telephone: 760-241-7365
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

LUST REG 6L: Leaking Underground Storage Tank Case Listing

For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 09/09/2003
Date Data Arrived at EDR: 09/10/2003
Date Made Active in Reports: 10/07/2003
Number of Days to Update: 27

Source: California Regional Water Quality Control Board Lahontan Region (6)
Telephone: 530-542-5572
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

LUST REG 5: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank locations. Alameda, Alpine, Amador, Butte, Colusa, Contra Costa, Calveras, El Dorado, Fresno, Glenn, Kern, Kings, Lake, Lassen, Madera, Mariposa, Merced, Modoc, Napa, Nevada, Placer, Plumas, Sacramento, San Joaquin, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Tuolumne, Yolo, Yuba counties.

Date of Government Version: 07/01/2008
Date Data Arrived at EDR: 07/22/2008
Date Made Active in Reports: 07/31/2008
Number of Days to Update: 9

Source: California Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-464-4834
Last EDR Contact: 07/01/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: No Update Planned

LUST REG 2: Fuel Leak List

Leaking Underground Storage Tank locations. Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, Sonoma counties.

Date of Government Version: 09/30/2004
Date Data Arrived at EDR: 10/20/2004
Date Made Active in Reports: 11/19/2004
Number of Days to Update: 30

Source: California Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-622-2433
Last EDR Contact: 09/19/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Quarterly

LUST REG 3: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank locations. Monterey, San Benito, San Luis Obispo, Santa Barbara, Santa Cruz counties.

Date of Government Version: 05/19/2003
Date Data Arrived at EDR: 05/19/2003
Date Made Active in Reports: 06/02/2003
Number of Days to Update: 14

Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-542-4786
Last EDR Contact: 07/18/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: No Update Planned

LUST REG 4: Underground Storage Tank Leak List

Los Angeles, Ventura counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 09/07/2004
Date Data Arrived at EDR: 09/07/2004
Date Made Active in Reports: 10/12/2004
Number of Days to Update: 35

Source: California Regional Water Quality Control Board Los Angeles Region (4)
Telephone: 213-576-6710
Last EDR Contact: 09/06/2011
Next Scheduled EDR Contact: 12/19/2011
Data Release Frequency: No Update Planned

LUST REG 9: Leaking Underground Storage Tank Report

Orange, Riverside, San Diego counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 03/01/2001
Date Data Arrived at EDR: 04/23/2001
Date Made Active in Reports: 05/21/2001
Number of Days to Update: 28

Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-637-5595
Last EDR Contact: 09/26/2011
Next Scheduled EDR Contact: 01/09/2012
Data Release Frequency: No Update Planned

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 10/24/2017
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 09/30/2017
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 10/12/2017
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80
Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 10/12/2017
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80
Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 01/06/2018
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80
Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 10/14/2017
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80
Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 10/14/2017
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80
Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land
Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 10/16/2017
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80
Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

CPS-SLIC: Statewide SLIC Cases (GEOTRACKER)
Cleanup Program Sites (CPS; also known as Site Cleanups [SC] and formerly known as Spills, Leaks, Investigations, and Cleanups [SLIC] sites) included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 03/21/2018
Number of Days to Update: 7
Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Varies

SLIC REG 1: Active Toxic Site Investigations

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/03/2003
Date Data Arrived at EDR: 04/07/2003
Date Made Active in Reports: 04/25/2003
Number of Days to Update: 18

Source: California Regional Water Quality Control Board, North Coast Region (1)
Telephone: 707-576-2220
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

SLIC REG 2: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/30/2004
Date Data Arrived at EDR: 10/20/2004
Date Made Active in Reports: 11/19/2004
Number of Days to Update: 30

Source: Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-286-0457
Last EDR Contact: 09/19/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Quarterly

SLIC REG 3: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 05/18/2006
Date Data Arrived at EDR: 05/18/2006
Date Made Active in Reports: 06/15/2006
Number of Days to Update: 28

Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-549-3147
Last EDR Contact: 07/18/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: Semi-Annually

SLIC REG 4: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 11/17/2004
Date Data Arrived at EDR: 11/18/2004
Date Made Active in Reports: 01/04/2005
Number of Days to Update: 47

Source: Region Water Quality Control Board Los Angeles Region (4)
Telephone: 213-576-6600
Last EDR Contact: 07/01/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Varies

SLIC REG 5: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/01/2005
Date Data Arrived at EDR: 04/05/2005
Date Made Active in Reports: 04/21/2005
Number of Days to Update: 16

Source: Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-464-3291
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Semi-Annually

SLIC REG 6V: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 05/24/2005
Date Data Arrived at EDR: 05/25/2005
Date Made Active in Reports: 06/16/2005
Number of Days to Update: 22

Source: Regional Water Quality Control Board, Victorville Branch
Telephone: 619-241-6583
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: Semi-Annually

SLIC REG 6L: SLIC Sites
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/07/2004
Date Data Arrived at EDR: 09/07/2004
Date Made Active in Reports: 10/12/2004
Number of Days to Update: 35
Source: California Regional Water Quality Control Board, Lahontan Region
Telephone: 530-542-5574
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

SLIC REG 7: SLIC List
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 11/24/2004
Date Data Arrived at EDR: 11/29/2004
Date Made Active in Reports: 01/04/2005
Number of Days to Update: 36
Source: California Regional Quality Control Board, Colorado River Basin Region
Telephone: 760-346-7491
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

SLIC REG 8: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/03/2008
Date Data Arrived at EDR: 04/03/2008
Date Made Active in Reports: 04/14/2008
Number of Days to Update: 11
Source: California Region Water Quality Control Board Santa Ana Region (8)
Telephone: 951-782-3298
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Semi-Annually

SLIC REG 9: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/10/2007
Date Data Arrived at EDR: 09/11/2007
Date Made Active in Reports: 09/28/2007
Number of Days to Update: 17
Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-467-2980
Last EDR Contact: 08/08/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: Annually

State and tribal registered storage tank lists

FEMA UST: Underground Storage Tank Listing
A listing of all FEMA owned underground storage tanks.

Date of Government Version: 05/15/2017
Date Data Arrived at EDR: 05/30/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 136
Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 04/13/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: Varies

MILITARY UST SITES: Military UST Sites (GEOTRACKER)
Military ust sites

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51
Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

UST: Active UST Facilities

Active UST facilities gathered from the local regulatory agencies

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 03/29/2018
Number of Days to Update: 15

Source: SWRCB
Telephone: 916-341-5851
Last EDR Contact: 06/13/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Semi-Annually

UST CLOSURE: Proposed Closure of Underground Storage Tank (UST) Cases

UST cases that are being considered for closure by either the State Water Resources Control Board or the Executive Director have been posted for a 60-day public comment period. UST Case Closures being proposed for consideration by the State Water Resources Control Board. These are primarily UST cases that meet closure criteria under the decisional framework in State Water Board Resolution No. 92-49 and other Board orders. UST Case Closures proposed for consideration by the Executive Director pursuant to State Water Board Resolution No. 2012-0061. These are cases that meet the criteria of the Low-Threat UST Case Closure Policy. UST Case Closure Review Denials and Approved Orders.

Date of Government Version: 03/08/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: State Water Resources Control Board
Telephone: 916-327-7844
Last EDR Contact: 06/13/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Varies

AST: Aboveground Petroleum Storage Tank Facilities

A listing of aboveground storage tank petroleum storage tank locations.

Date of Government Version: 07/06/2016
Date Data Arrived at EDR: 07/12/2016
Date Made Active in Reports: 09/19/2016
Number of Days to Update: 69

Source: California Environmental Protection Agency
Telephone: 916-327-5092
Last EDR Contact: 06/21/2018
Next Scheduled EDR Contact: 10/01/2018
Data Release Frequency: Quarterly

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 10/24/2017
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 09/30/2017
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 10/12/2017
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 01/13/2018
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 04/24/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 12/08/2017
Number of Days to Update: 134

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 10/14/2017
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 10/14/2017
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 10/16/2017
Date Data Arrived at EDR: 01/23/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 80

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

State and tribal voluntary cleanup sites

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

INDIAN VCP R1: Voluntary Cleanup Priority Listing
A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 07/27/2015
Date Data Arrived at EDR: 09/29/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 142
Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 06/22/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Varies

VCP: Voluntary Cleanup Program Properties
Contains low threat level properties with either confirmed or unconfirmed releases and the project proponents have request that DTSC oversee investigation and/or cleanup activities and have agreed to provide coverage for DTSC's costs.

Date of Government Version: 04/30/2018
Date Data Arrived at EDR: 05/02/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 51
Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 05/02/2018
Next Scheduled EDR Contact: 08/13/2018
Data Release Frequency: Quarterly

State and tribal Brownfields sites

BROWNFIELDS: Considered Brownfieds Sites Listing
A listing of sites the SWRCB considers to be Brownfields since these are sites have come to them through the MOA Process.

Date of Government Version: 03/26/2018
Date Data Arrived at EDR: 03/27/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 38
Source: State Water Resources Control Board
Telephone: 916-323-7905
Last EDR Contact: 06/27/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites
Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 03/19/2018
Date Data Arrived at EDR: 03/21/2018
Date Made Active in Reports: 06/08/2018
Number of Days to Update: 79
Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 06/20/2018
Next Scheduled EDR Contact: 10/01/2018
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

WMUDS/SWAT: Waste Management Unit Database
Waste Management Unit Database System. WMUDS is used by the State Water Resources Control Board staff and the Regional Water Quality Control Boards for program tracking and inventory of waste management units. WMUDS is composed of the following databases: Facility Information, Scheduled Inspections Information, Waste Management Unit Information, SWAT Program Information, SWAT Report Summary Information, SWAT Report Summary Data, Chapter 15 (formerly Subchapter 15) Information, Chapter 15 Monitoring Parameters, TPCA Program Information, RCRA Program Information, Closure Information, and Interested Parties Information.

Date of Government Version: 04/01/2000
Date Data Arrived at EDR: 04/10/2000
Date Made Active in Reports: 05/10/2000
Number of Days to Update: 30

Source: State Water Resources Control Board
Telephone: 916-227-4448
Last EDR Contact: 05/03/2018
Next Scheduled EDR Contact: 08/13/2018
Data Release Frequency: No Update Planned

SWRCY: Recycler Database
A listing of recycling facilities in California.

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: Department of Conservation
Telephone: 916-323-3836
Last EDR Contact: 06/13/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Quarterly

HAULERS: Registered Waste Tire Haulers Listing
A listing of registered waste tire haulers.

Date of Government Version: 02/08/2018
Date Data Arrived at EDR: 02/09/2018
Date Made Active in Reports: 03/20/2018
Number of Days to Update: 39

Source: Integrated Waste Management Board
Telephone: 916-341-6422
Last EDR Contact: 05/22/2018
Next Scheduled EDR Contact: 08/27/2018
Data Release Frequency: Varies

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 01/30/2018
Next Scheduled EDR Contact: 05/14/2018
Data Release Frequency: Varies

ODI: Open Dump Inventory
An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations
A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137

Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 04/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: No Update Planned

IHS OPEN DUMPS: Open Dumps on Indian Land
A listing of all open dumps located on Indian Land in the United States.

Date of Government Version: 04/01/2014
Date Data Arrived at EDR: 08/06/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 176

Source: Department of Health & Human Serivces, Indian Health Service
Telephone: 301-443-1452
Last EDR Contact: 05/04/2018
Next Scheduled EDR Contact: 08/13/2018
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations that have been removed from the DEAs National Clandestine Laboratory Register.

Date of Government Version: 02/22/2018
Date Data Arrived at EDR: 03/01/2018
Date Made Active in Reports: 05/11/2018
Number of Days to Update: 71

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: No Update Planned

HIST CAL-SITES: Calsites Database

The Calsites database contains potential or confirmed hazardous substance release properties. In 1996, California EPA reevaluated and significantly reduced the number of sites in the Calsites database. No longer updated by the state agency. It has been replaced by ENVIROSTOR.

Date of Government Version: 08/08/2005
Date Data Arrived at EDR: 08/03/2006
Date Made Active in Reports: 08/24/2006
Number of Days to Update: 21

Source: Department of Toxic Substance Control
Telephone: 916-323-3400
Last EDR Contact: 02/23/2009
Next Scheduled EDR Contact: 05/25/2009
Data Release Frequency: No Update Planned

SCH: School Property Evaluation Program

This category contains proposed and existing school sites that are being evaluated by DTSC for possible hazardous materials contamination. In some cases, these properties may be listed in the CalSites category depending on the level of threat to public health and safety or the environment they pose.

Date of Government Version: 04/30/2018
Date Data Arrived at EDR: 05/02/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 51

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 05/02/2018
Next Scheduled EDR Contact: 08/13/2018
Data Release Frequency: Quarterly

CDL: Clandestine Drug Labs

A listing of drug lab locations. Listing of a location in this database does not indicate that any illegal drug lab materials were or were not present there, and does not constitute a determination that the location either requires or does not require additional cleanup work.

Date of Government Version: 06/30/2017
Date Data Arrived at EDR: 08/18/2017
Date Made Active in Reports: 09/21/2017
Number of Days to Update: 34

Source: Department of Toxic Substances Control
Telephone: 916-255-6504
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: Varies

TOXIC PITS: Toxic Pits Cleanup Act Sites

Toxic PITS Cleanup Act Sites. TOXIC PITS identifies sites suspected of containing hazardous substances where cleanup has not yet been completed.

Date of Government Version: 07/01/1995
Date Data Arrived at EDR: 08/30/1995
Date Made Active in Reports: 09/26/1995
Number of Days to Update: 27

Source: State Water Resources Control Board
Telephone: 916-227-4364
Last EDR Contact: 01/26/2009
Next Scheduled EDR Contact: 04/27/2009
Data Release Frequency: No Update Planned

US CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 02/22/2018
Date Data Arrived at EDR: 03/01/2018
Date Made Active in Reports: 05/11/2018
Number of Days to Update: 71

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Quarterly

CERS HAZ WASTE: CERS HAZ WASTE

List of sites in the California Environmental Protection Agency (CalEPA) Regulated Site Portal which fall under the Hazardous Chemical Management, Hazardous Waste Onsite Treatment, Household Hazardous Waste Collection, Hazardous Waste Generator, and RCRA LQ HW Generator programs.

Date of Government Version: 04/23/2018
Date Data Arrived at EDR: 04/24/2018
Date Made Active in Reports: 06/07/2018
Number of Days to Update: 44

Source: CalEPA
Telephone: 916-323-2514
Last EDR Contact: 04/24/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Quarterly

Local Lists of Registered Storage Tanks

SWEEPS UST: SWEEPS UST Listing

Statewide Environmental Evaluation and Planning System. This underground storage tank listing was updated and maintained by a company contacted by the SWRCB in the early 1990's. The listing is no longer updated or maintained. The local agency is the contact for more information on a site on the SWEEPS list.

Date of Government Version: 06/01/1994
Date Data Arrived at EDR: 07/07/2005
Date Made Active in Reports: 08/11/2005
Number of Days to Update: 35

Source: State Water Resources Control Board
Telephone: N/A
Last EDR Contact: 06/03/2005
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

UST MENDOCINO: Mendocino County UST Database

A listing of underground storage tank locations in Mendocino County.

Date of Government Version: 02/28/2018
Date Data Arrived at EDR: 03/01/2018
Date Made Active in Reports: 03/28/2018
Number of Days to Update: 27

Source: Department of Public Health
Telephone: 707-463-4466
Last EDR Contact: 05/22/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Annually

HIST UST: Hazardous Substance Storage Container Database

The Hazardous Substance Storage Container Database is a historical listing of UST sites. Refer to local/county source for current data.

Date of Government Version: 10/15/1990
Date Data Arrived at EDR: 01/25/1991
Date Made Active in Reports: 02/12/1991
Number of Days to Update: 18

Source: State Water Resources Control Board
Telephone: 916-341-5851
Last EDR Contact: 07/26/2001
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

SAN FRANCISCO AST: Aboveground Storage Tank Site Listing

Aboveground storage tank sites

Date of Government Version: 04/19/2018
Date Data Arrived at EDR: 04/24/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 10

Source: San Francisco County Department of Public Health
Telephone: 415-252-3896
Last EDR Contact: 05/02/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Varies

CA FID UST: Facility Inventory Database

The Facility Inventory Database (FID) contains a historical listing of active and inactive underground storage tank locations from the State Water Resource Control Board. Refer to local/county source for current data.

Date of Government Version: 10/31/1994
Date Data Arrived at EDR: 09/05/1995
Date Made Active in Reports: 09/29/1995
Number of Days to Update: 24

Source: California Environmental Protection Agency
Telephone: 916-341-5851
Last EDR Contact: 12/28/1998
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

CERS TANKS: California Environmental Reporting System (CERS) Tanks

List of sites in the California Environmental Protection Agency (CalEPA) Regulated Site Portal which fall under the Aboveground Petroleum Storage and Underground Storage Tank regulatory programs.

Date of Government Version: 04/23/2018
Date Data Arrived at EDR: 04/24/2018
Date Made Active in Reports: 06/07/2018
Number of Days to Update: 44

Source: California Environmental Protection Agency
Telephone: 916-323-2514
Last EDR Contact: 04/24/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Quarterly

Local Land Records

LIENS: Environmental Liens Listing

A listing of property locations with environmental liens for California where DTSC is a lien holder.

Date of Government Version: 01/28/2018
Date Data Arrived at EDR: 03/01/2018
Date Made Active in Reports: 04/16/2018
Number of Days to Update: 46

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 05/31/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Varies

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 05/13/2018
Date Data Arrived at EDR: 05/30/2018
Date Made Active in Reports: 06/29/2018
Number of Days to Update: 30

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Semi-Annually

DEED: Deed Restriction Listing

Site Mitigation and Brownfields Reuse Program Facility Sites with Deed Restrictions & Hazardous Waste Management Program Facility Sites with Deed / Land Use Restriction. The DTSC Site Mitigation and Brownfields Reuse Program (SMBRP) list includes sites cleaned up under the program's oversight and generally does not include current or former hazardous waste facilities that required a hazardous waste facility permit. The list represents deed restrictions that are active. Some sites have multiple deed restrictions. The DTSC Hazardous Waste Management Program (HWMP) has developed a list of current or former hazardous waste facilities that have a recorded land use restriction at the local county recorder's office. The land use restrictions on this list were required by the DTSC HWMP as a result of the presence of hazardous substances that remain on site after the facility (or part of the facility) has been closed or cleaned up. The types of land use restriction include deed notice, deed restriction, or a land use restriction that binds current and future owners.

Date of Government Version: 02/08/2018
Date Data Arrived at EDR: 02/08/2018
Date Made Active in Reports: 02/08/2018
Number of Days to Update: 0

Source: DTSC and SWRCB
Telephone: 916-323-3400
Last EDR Contact: 06/06/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Semi-Annually

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 03/26/2018
Date Data Arrived at EDR: 03/27/2018
Date Made Active in Reports: 06/08/2018
Number of Days to Update: 73

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 03/27/2018
Next Scheduled EDR Contact: 07/09/2018
Data Release Frequency: Quarterly

CHMIRS: California Hazardous Material Incident Report System

California Hazardous Material Incident Reporting System. CHMIRS contains information on reported hazardous material incidents (accidental releases or spills).

Date of Government Version: 04/06/2018
Date Data Arrived at EDR: 04/24/2018
Date Made Active in Reports: 06/14/2018
Number of Days to Update: 51

Source: Office of Emergency Services
Telephone: 916-845-8400
Last EDR Contact: 04/24/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Semi-Annually

LDS: Land Disposal Sites Listing (GEOTRACKER)

Land Disposal sites (Landfills) included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: State Water Qualilty Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Quarterly

MCS: Military Cleanup Sites Listing (GEOTRACKER)

Military sites (consisting of: Military UST sites; Military Privatized sites; and Military Cleanup sites [formerly known as DoD non UST]) included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 03/21/2018
Number of Days to Update: 7

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Quarterly

SPILLS 90: SPILLS90 data from FirstSearch

Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

Date of Government Version: 06/06/2012
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 02/22/2013
Number of Days to Update: 50

Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/28/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 86

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/28/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 01/31/2015
Date Data Arrived at EDR: 07/08/2015
Date Made Active in Reports: 10/13/2015
Number of Days to Update: 97

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 05/25/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 04/13/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: Semi-Annually

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 04/11/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: N/A

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 01/01/2017
Date Data Arrived at EDR: 02/03/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 63

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 05/15/2018
Next Scheduled EDR Contact: 08/27/2018
Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/27/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 87

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 06/27/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 05/07/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Quarterly

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 04/22/2013
Date Data Arrived at EDR: 03/03/2015
Date Made Active in Reports: 03/09/2015
Number of Days to Update: 6

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 05/08/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Varies

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 06/21/2017
Date Made Active in Reports: 01/05/2018
Number of Days to Update: 198

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 06/22/2018
Next Scheduled EDR Contact: 10/01/2018
Data Release Frequency: Every 4 Years

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 01/10/2018
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 2

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 05/25/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Annually

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 04/09/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Annually

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 05/13/2018
Date Data Arrived at EDR: 05/30/2018
Date Made Active in Reports: 06/29/2018
Number of Days to Update: 30

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Annually

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 11/02/2017
Date Data Arrived at EDR: 11/17/2017
Date Made Active in Reports: 12/08/2017
Number of Days to Update: 21

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 04/20/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

PRP: Potentially Responsible Parties

A listing of verified Potentially Responsible Parties

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 10/17/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 3

Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 06/01/2017
Date Data Arrived at EDR: 06/09/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 126

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 04/13/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 11/18/2016
Date Data Arrived at EDR: 11/23/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 79

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 04/09/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: Quarterly

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Quarterly

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 08/30/2016
Date Data Arrived at EDR: 09/08/2016
Date Made Active in Reports: 10/21/2016
Number of Days to Update: 43

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 05/03/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Quarterly

COAL ASH DOE: Steam-Electric Plant Operation Data

A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76

Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 06/07/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List

A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 07/01/2014
Date Data Arrived at EDR: 09/10/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 06/04/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 05/24/2017
Date Data Arrived at EDR: 11/30/2017
Date Made Active in Reports: 12/15/2017
Number of Days to Update: 15
Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 04/27/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

RADINFO: Radiation Information Database
The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 04/03/2018
Date Data Arrived at EDR: 04/05/2018
Date Made Active in Reports: 06/29/2018
Number of Days to Update: 85
Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 04/05/2018
Next Scheduled EDR Contact: 07/16/2018
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing
A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing
A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

DOT OPS: Incident and Accident Data
Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 07/31/2012
Date Data Arrived at EDR: 08/07/2012
Date Made Active in Reports: 09/18/2012
Number of Days to Update: 42
Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 05/03/2018
Next Scheduled EDR Contact: 08/13/2018
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees
Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 03/31/2018
Date Data Arrived at EDR: 04/16/2018
Date Made Active in Reports: 06/29/2018
Number of Days to Update: 74

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 06/22/2018
Next Scheduled EDR Contact: 10/01/2018
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2015
Date Data Arrived at EDR: 02/22/2017
Date Made Active in Reports: 09/28/2017
Number of Days to Update: 218

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 06/28/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Biennially

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 07/14/2015
Date Made Active in Reports: 01/10/2017
Number of Days to Update: 546

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 04/11/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: Semi-Annually

FUSRAP: Formerly Utilized Sites Remedial Action Program

DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations.

Date of Government Version: 12/23/2016
Date Data Arrived at EDR: 12/27/2016
Date Made Active in Reports: 02/17/2017
Number of Days to Update: 52

Source: Department of Energy
Telephone: 202-586-3559
Last EDR Contact: 05/07/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Varies

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 06/23/2017
Date Data Arrived at EDR: 10/11/2017
Date Made Active in Reports: 11/03/2017
Number of Days to Update: 23

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 05/13/2018
Date Data Arrived at EDR: 05/30/2018
Date Made Active in Reports: 06/29/2018
Number of Days to Update: 30

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 07/16/2018
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36

Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data

A listing of minor source facilities.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 05/03/2018
Date Data Arrived at EDR: 05/31/2018
Date Made Active in Reports: 06/29/2018
Number of Days to Update: 29

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 05/31/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Semi-Annually

US MINES 2: Ferrous and Nonferrous Metal Mines Database Listing

This map layer includes ferrous (ferrous metal mines are facilities that extract ferrous metals, such as iron ore or molybdenum) and nonferrous (Nonferrous metal mines are facilities that extract nonferrous metals, such as gold, silver, copper, zinc, and lead) metal mines in the United States.

Date of Government Version: 12/05/2005
Date Data Arrived at EDR: 02/29/2008
Date Made Active in Reports: 04/18/2008
Number of Days to Update: 49

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Varies

US MINES 3: Active Mines & Mineral Plants Database Listing

Active Mines and Mineral Processing Plant operations for commodities monitored by the Minerals Information Team of the USGS.

Date of Government Version: 04/14/2011
Date Data Arrived at EDR: 06/08/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 97

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

ABANDONED MINES: Abandoned Mines

An inventory of land and water impacted by past mining (primarily coal mining) is maintained by OSMRE to provide information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). The inventory contains information on the location, type, and extent of AML impacts, as well as, information on the cost associated with the reclamation of those problems. The inventory is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed.

Date of Government Version: 03/08/2018
Date Data Arrived at EDR: 03/13/2018
Date Made Active in Reports: 06/08/2018
Number of Days to Update: 87

Source: Department of Interior
Telephone: 202-208-2609
Last EDR Contact: 06/20/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 02/21/2018
Date Data Arrived at EDR: 02/23/2018
Date Made Active in Reports: 03/23/2018
Number of Days to Update: 28

Source: EPA
Telephone: (415) 947-8000
Last EDR Contact: 06/06/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Quarterly

DOCKET HWC: Hazardous Waste Compliance Docket Listing

A complete list of the Federal Agency Hazardous Waste Compliance Docket Facilities.

Date of Government Version: 01/04/2018
Date Data Arrived at EDR: 01/19/2018
Date Made Active in Reports: 04/13/2018
Number of Days to Update: 84

Source: Environmental Protection Agency
Telephone: 202-564-0527
Last EDR Contact: 06/01/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Varies

ECHO: Enforcement & Compliance History Information

ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

Date of Government Version: 02/25/2018
Date Data Arrived at EDR: 03/17/2018
Date Made Active in Reports: 06/08/2018
Number of Days to Update: 83

Source: Environmental Protection Agency
Telephone: 202-564-2280
Last EDR Contact: 06/06/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Quarterly

UXO: Unexploded Ordnance Sites

A listing of unexploded ordnance site locations

Date of Government Version: 09/30/2016
Date Data Arrived at EDR: 10/31/2017
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 73

Source: Department of Defense
Telephone: 703-704-1564
Last EDR Contact: 04/13/2018
Next Scheduled EDR Contact: 07/30/2018
Data Release Frequency: Varies

FUELS PROGRAM: EPA Fuels Program Registered Listing

This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

Date of Government Version: 02/20/2018
Date Data Arrived at EDR: 02/21/2018
Date Made Active in Reports: 03/23/2018
Number of Days to Update: 30

Source: EPA
Telephone: 800-385-6164
Last EDR Contact: 05/23/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Quarterly

CA BOND EXP. PLAN: Bond Expenditure Plan

Department of Health Services developed a site-specific expenditure plan as the basis for an appropriation of Hazardous Substance Cleanup Bond Act funds. It is not updated.

Date of Government Version: 01/01/1989
Date Data Arrived at EDR: 07/27/1994
Date Made Active in Reports: 08/02/1994
Number of Days to Update: 6

Source: Department of Health Services
Telephone: 916-255-2118
Last EDR Contact: 05/31/1994
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

CORTESE: "Cortese" Hazardous Waste & Substances Sites List

The sites for the list are designated by the State Water Resource Control Board (LUST), the Integrated Waste Board (SWF/LS), and the Department of Toxic Substances Control (Cal-Sites).

Date of Government Version: 03/26/2018
Date Data Arrived at EDR: 03/27/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 38

Source: CAL EPA/Office of Emergency Information
Telephone: 916-323-3400
Last EDR Contact: 06/27/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

CUPA LIVERMORE-PLEASANTON: CUPA Facility Listing

list of facilities associated with the various CUPA programs in Livermore-Pleasanton

Date of Government Version: 04/03/2018
Date Data Arrived at EDR: 05/07/2018
Date Made Active in Reports: 06/15/2018
Number of Days to Update: 39

Source: Livermore-Pleasanton Fire Department
Telephone: 925-454-2361
Last EDR Contact: 05/07/2018
Next Scheduled EDR Contact: 08/27/2018
Data Release Frequency: Varies

CUPA SAN FRANCISCO CO: CUPA SAN FRANCISCO CO

Cupa facilities

Date of Government Version: 04/20/2018
Date Data Arrived at EDR: 04/24/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 10

Source: San Francisco County Department of Environmental Health
Telephone: 415-252-3896
Last EDR Contact: 05/02/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Varies

DRYCLEANERS: Cleaner Facilities

A list of drycleaner related facilities that have EPA ID numbers. These are facilities with certain SIC codes: power laundries, family and commercial; garment pressing and cleaner's agents; linen supply; coin-operated laundries and cleaning; drycleaning plants, except rugs; carpet and upholster cleaning; industrial launderers; laundry and garment services.

Date of Government Version: 03/27/2018
Date Data Arrived at EDR: 03/29/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 36

Source: Department of Toxic Substance Control
Telephone: 916-327-4498
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Annually

DRYCLEAN AVAQMD: DRYCLEAN AVAQMD

A listing of dry cleaners in the Antelope Valley Air Quality Management District.

Date of Government Version: 03/08/2018
Date Data Arrived at EDR: 03/13/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 52

Source: Antelope Valley Air Quality Management District
Telephone: 661-723-8070
Last EDR Contact: 06/22/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Varies

DRYCLEAN SOUTH COAST: DRYCLEAN SOUTH COAST

A listing of dry cleaners in the South Coast Air Quality Management District

Date of Government Version: 03/16/2018
Date Data Arrived at EDR: 03/20/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 45

Source: South Coast Air Quality Management District
Telephone: 909-396-3211
Last EDR Contact: 06/11/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Varies

EMI: Emissions Inventory Data

Toxics and criteria pollutant emissions data collected by the ARB and local air pollution agencies.

Date of Government Version: 12/31/2015
Date Data Arrived at EDR: 03/21/2017
Date Made Active in Reports: 08/15/2017
Number of Days to Update: 147

Source: California Air Resources Board
Telephone: 916-322-2990
Last EDR Contact: 06/20/2018
Next Scheduled EDR Contact: 10/01/2018
Data Release Frequency: Varies

ENF: Enforcement Action Listing

A listing of Water Board Enforcement Actions. Formal is everything except Oral/Verbal Communication, Notice of Violation, Expedited Payment Letter, and Staff Enforcement Letter.

Date of Government Version: 01/22/2018
Date Data Arrived at EDR: 01/24/2018
Date Made Active in Reports: 03/19/2018
Number of Days to Update: 54

Source: State Water Resoruces Control Board
Telephone: 916-445-9379
Last EDR Contact: 04/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

Financial Assurance 1: Financial Assurance Information Listing

Financial Assurance information

Date of Government Version: 04/18/2018
Date Data Arrived at EDR: 04/20/2018
Date Made Active in Reports: 06/19/2018
Number of Days to Update: 60

Source: Department of Toxic Substances Control
Telephone: 916-255-3628
Last EDR Contact: 04/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

Financial Assurance 2: Financial Assurance Information Listing

A listing of financial assurance information for solid waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 05/14/2018
Date Data Arrived at EDR: 05/15/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 38

Source: California Integrated Waste Management Board
Telephone: 916-341-6066
Last EDR Contact: 05/09/2018
Next Scheduled EDR Contact: 08/27/2018
Data Release Frequency: Varies

HAZNET: Facility and Manifest Data

Facility and Manifest Data. The data is extracted from the copies of hazardous waste manifests received each year by the DTSC. The annual volume of manifests is typically 700,000 - 1,000,000 annually, representing approximately 350,000 - 500,000 shipments. Data are from the manifests submitted without correction, and therefore many contain some invalid values for data elements such as generator ID, TSD ID, waste category, and disposal method. This database begins with calendar year 1993.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 07/12/2017
Date Made Active in Reports: 10/17/2017
Number of Days to Update: 97

Source: California Environmental Protection Agency
Telephone: 916-255-1136
Last EDR Contact: 04/12/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: Annually

ICE: ICE

Contains data pertaining to the Permitted Facilities with Inspections / Enforcements sites tracked in Envirostor.

Date of Government Version: 02/20/2018
Date Data Arrived at EDR: 02/21/2018
Date Made Active in Reports: 04/03/2018
Number of Days to Update: 41

Source: Department of Toxic Subsances Control
Telephone: 877-786-9427
Last EDR Contact: 05/23/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Quarterly

HIST CORTESE: Hazardous Waste & Substance Site List

The sites for the list are designated by the State Water Resource Control Board [LUST], the Integrated Waste Board [SWF/LS], and the Department of Toxic Substances Control [CALSITES]. This listing is no longer updated by the state agency.

Date of Government Version: 04/01/2001
Date Data Arrived at EDR: 01/22/2009
Date Made Active in Reports: 04/08/2009
Number of Days to Update: 76

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 01/22/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

HWP: EnviroStor Permitted Facilities Listing

Detailed information on permitted hazardous waste facilities and corrective action ("cleanups") tracked in EnviroStor.

Date of Government Version: 02/20/2018
Date Data Arrived at EDR: 02/21/2018
Date Made Active in Reports: 04/03/2018
Number of Days to Update: 41

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 05/23/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Quarterly

HWT: Registered Hazardous Waste Transporter Database

A listing of hazardous waste transporters. In California, unless specifically exempted, it is unlawful for any person to transport hazardous wastes unless the person holds a valid registration issued by DTSC. A hazardous waste transporter registration is valid for one year and is assigned a unique registration number.

Date of Government Version: 04/09/2018
Date Data Arrived at EDR: 04/11/2018
Date Made Active in Reports: 06/19/2018
Number of Days to Update: 69

Source: Department of Toxic Substances Control
Telephone: 916-440-7145
Last EDR Contact: 04/11/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: Quarterly

MINES: Mines Site Location Listing

A listing of mine site locations from the Office of Mine Reclamation.

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: Department of Conservation
Telephone: 916-322-1080
Last EDR Contact: 06/13/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Quarterly

MWMP: Medical Waste Management Program Listing

The Medical Waste Management Program (MWMP) ensures the proper handling and disposal of medical waste by permitting and inspecting medical waste Offsite Treatment Facilities (PDF) and Transfer Stations (PDF) throughout the state. MWMP also oversees all Medical Waste Transporters.

Date of Government Version: 02/27/2018
Date Data Arrived at EDR: 03/05/2018
Date Made Active in Reports: 04/16/2018
Number of Days to Update: 42

Source: Department of Public Health
Telephone: 916-558-1784
Last EDR Contact: 06/06/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Varies

NPDES: NPDES Permits Listing
A listing of NPDES permits, including stormwater.

Date of Government Version: 03/14/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: State Water Resources Control Board
Telephone: 916-445-9379
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 08/27/2018
Data Release Frequency: Quarterly

PEST LIC: Pesticide Regulation Licenses Listing
A listing of licenses and certificates issued by the Department of Pesticide Regulation. The DPR issues licenses and/or certificates to: Persons and businesses that apply or sell pesticides; Pest control dealers and brokers; Persons who advise on agricultural pesticide applications.

Date of Government Version: 03/05/2018
Date Data Arrived at EDR: 03/05/2018
Date Made Active in Reports: 04/19/2018
Number of Days to Update: 45

Source: Department of Pesticide Regulation
Telephone: 916-445-4038
Last EDR Contact: 06/06/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Quarterly

PROC: Certified Processors Database
A listing of certified processors.

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: Department of Conservation
Telephone: 916-323-3836
Last EDR Contact: 06/13/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Quarterly

NOTIFY 65: Proposition 65 Records
Listings of all Proposition 65 incidents reported to counties by the State Water Resources Control Board and the Regional Water Quality Control Board. This database is no longer updated by the reporting agency.

Date of Government Version: 03/23/2018
Date Data Arrived at EDR: 03/27/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 38

Source: State Water Resources Control Board
Telephone: 916-445-3846
Last EDR Contact: 06/14/2018
Next Scheduled EDR Contact: 10/01/2018
Data Release Frequency: No Update Planned

UIC: UIC Listing
A listing of wells identified as underground injection wells, in the California Oil and Gas Wells database.

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: Deaprtment of Conservation
Telephone: 916-445-2408
Last EDR Contact: 06/13/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Varies

WASTEWATER PITS: Oil Wastewater Pits Listing
Water officials discovered that oil producers have been dumping chemical-laden wastewater into hundreds of unlined pits that are operating without proper permits. Inspections completed by the Central Valley Regional Water Quality Control Board revealed the existence of previously unidentified waste sites. The water boards review found that more than one-third of the region's active disposal pits are operating without permission.

Date of Government Version: 04/10/2018
Date Data Arrived at EDR: 04/13/2018
Date Made Active in Reports: 06/19/2018
Number of Days to Update: 67

Source: RWQCB, Central Valley Region
Telephone: 559-445-5577
Last EDR Contact: 04/13/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: Varies

WDS: Waste Discharge System
Sites which have been issued waste discharge requirements.

Date of Government Version: 06/19/2007
Date Data Arrived at EDR: 06/20/2007
Date Made Active in Reports: 06/29/2007
Number of Days to Update: 9

Source: State Water Resources Control Board
Telephone: 916-341-5227
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Quarterly

WIP: Well Investigation Program Case List
Well Investigation Program case in the San Gabriel and San Fernando Valley area.

Date of Government Version: 07/03/2009
Date Data Arrived at EDR: 07/21/2009
Date Made Active in Reports: 08/03/2009
Number of Days to Update: 13

Source: Los Angeles Water Quality Control Board
Telephone: 213-576-6726
Last EDR Contact: 06/25/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Varies

MILITARY PRIV SITES: Military Privatized Sites (GEOTRACKER)
Military privatized sites

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Varies

CERS: CalEPA Regulated Site Portal Data
The CalEPA Regulated Site Portal database combines data about environmentally regulated sites and facilities in California into a single database. It combines data from a variety of state and federal databases, and provides an overview of regulated activities across the spectrum of environmental programs for any given location in California. These activities include hazardous materials and waste, state and federal cleanups, impacted ground and surface waters, and toxic materials

Date of Government Version: 04/23/2018
Date Data Arrived at EDR: 04/24/2018
Date Made Active in Reports: 06/07/2018
Number of Days to Update: 44

Source: California Environmental Protection Agency
Telephone: 916-323-2514
Last EDR Contact: 04/24/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

OTHER OIL GAS: OTHER OIL & GAS (GEOTRACKER)
Other Oil & Gas Projects sites

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Varies

PROD WATER PONDS: PROD WATER PONDS (GEOTRACKER)
Produced water ponds sites

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

PROJECT: PROJECT (GEOTRACKER)
Projects sites

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Varies

NON-CASE INFO: NON-CASE INFO (GEOTRACKER)
Non-Case Information sites

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Varies

SAMPLING POINT: SAMPLING POINT (GEOTRACKER)
Sampling point - public sites

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Varies

WELL STIM PROJ: WELL SAMP PROJ (GEOTRACKER)
Includes areas of groundwater monitoring plans, a depiction of the monitoring network, and the facilities, boundaries, and subsurface characteristics of the oilfield and the features (oil and gas wells, produced water ponds, UIC wells, water supply wells, etc?) being monitored

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Varies

CIWQS: The California Integrated Water Quality System
The California Integrated Water Quality System (CIWQS) is a computer system used by the State and Regional Water Quality Control Boards to track information about places of environmental interest, manage permits and other orders, track inspections, and manage violations and enforcement activities.

Date of Government Version: 03/05/2018
Date Data Arrived at EDR: 03/05/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 60

Source: State Water Resources Control Board
Telephone: 866-794-4977
Last EDR Contact: 06/06/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Varies

UIC GEO: UIC GEO (GEOTRACKER)
Underground control injection sites

Date of Government Version: 03/12/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 51

Source: State Water Resource Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR Hist Auto: EDR Exclusive Historical Auto Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR Hist Cleaner: EDR Exclusive Historical Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Resources Recycling and Recovery in California.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/13/2014
Number of Days to Update: 196

Source: Department of Resources Recycling and Recovery
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the State Water Resources Control Board in California.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 12/30/2013
Number of Days to Update: 182

Source: State Water Resources Control Board
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

COUNTY RECORDS

ALAMEDA COUNTY:

Contaminated Sites

A listing of contaminated sites overseen by the Toxic Release Program (oil and groundwater contamination from chemical releases and spills) and the Leaking Underground Storage Tank Program (soil and ground water contamination from leaking petroleum USTs).

Date of Government Version: 04/05/2018
Date Data Arrived at EDR: 04/10/2018
Date Made Active in Reports: 06/14/2018
Number of Days to Update: 65

Source: Alameda County Environmental Health Services
Telephone: 510-567-6700
Last EDR Contact: 04/05/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: Semi-Annually

Underground Tanks

Underground storage tank sites located in Alameda county.

Date of Government Version: 04/05/2018
Date Data Arrived at EDR: 04/10/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 24

Source: Alameda County Environmental Health Services
Telephone: 510-567-6700
Last EDR Contact: 04/05/2018
Next Scheduled EDR Contact: 04/24/2047
Data Release Frequency: Semi-Annually

AMADOR COUNTY:

CUPA Facility List

Cupa Facility List

Date of Government Version: 03/31/2018
Date Data Arrived at EDR: 04/05/2018
Date Made Active in Reports: 06/14/2018
Number of Days to Update: 70

Source: Amador County Environmental Health
Telephone: 209-223-6439
Last EDR Contact: 06/14/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Varies

BUTTE COUNTY:

CUPA Facility Listing

Cupa facility list.

Date of Government Version: 04/21/2017
Date Data Arrived at EDR: 04/25/2017
Date Made Active in Reports: 08/09/2017
Number of Days to Update: 106

Source: Public Health Department
Telephone: 530-538-7149
Last EDR Contact: 04/05/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: No Update Planned

CALVERAS COUNTY:

CUPA Facility Listing
Cupa Facility Listing

Date of Government Version: 05/07/2018
Date Data Arrived at EDR: 05/09/2018
Date Made Active in Reports: 06/14/2018
Number of Days to Update: 36

Source: Calveras County Environmental Health
Telephone: 209-754-6399
Last EDR Contact: 06/25/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

COLUSA COUNTY:

CUPA Facility List
Cupa facility list.

Date of Government Version: 02/26/2018
Date Data Arrived at EDR: 03/01/2018
Date Made Active in Reports: 03/15/2018
Number of Days to Update: 14

Source: Health & Human Services
Telephone: 530-458-0396
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Semi-Annually

CONTRA COSTA COUNTY:

Site List
List includes sites from the underground tank, hazardous waste generator and business plan/2185 programs.

Date of Government Version: 02/22/2018
Date Data Arrived at EDR: 02/27/2018
Date Made Active in Reports: 04/16/2018
Number of Days to Update: 48

Source: Contra Costa Health Services Department
Telephone: 925-646-2286
Last EDR Contact: 04/30/2018
Next Scheduled EDR Contact: 08/13/2018
Data Release Frequency: Semi-Annually

DEL NORTE COUNTY:

CUPA Facility List
Cupa Facility list

Date of Government Version: 04/27/2018
Date Data Arrived at EDR: 05/02/2018
Date Made Active in Reports: 06/15/2018
Number of Days to Update: 44

Source: Del Norte County Environmental Health Division
Telephone: 707-465-0426
Last EDR Contact: 04/25/2018
Next Scheduled EDR Contact: 08/13/2018
Data Release Frequency: Varies

EL DORADO COUNTY:

CUPA Facility List
CUPA facility list.

Date of Government Version: 03/05/2018
Date Data Arrived at EDR: 03/08/2018
Date Made Active in Reports: 04/16/2018
Number of Days to Update: 39

Source: El Dorado County Environmental Management Department
Telephone: 530-621-6623
Last EDR Contact: 04/30/2018
Next Scheduled EDR Contact: 08/13/2018
Data Release Frequency: Varies

FRESNO COUNTY:

CUPA Resources List

Certified Unified Program Agency. CUPA's are responsible for implementing a unified hazardous materials and hazardous waste management regulatory program. The agency provides oversight of businesses that deal with hazardous materials, operate underground storage tanks or aboveground storage tanks.

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/05/2018
Date Made Active in Reports: 03/14/2018
Number of Days to Update: 9

Source: Dept. of Community Health
Telephone: 559-445-3271
Last EDR Contact: 06/26/2018
Next Scheduled EDR Contact: 10/15/2018
Data Release Frequency: Semi-Annually

GLENN COUNTY:

CUPA Facility List

Cupa facility list

Date of Government Version: 01/22/2018
Date Data Arrived at EDR: 01/24/2018
Date Made Active in Reports: 03/14/2018
Number of Days to Update: 49

Source: Glenn County Air Pollution Control District
Telephone: 830-934-6500
Last EDR Contact: 04/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

HUMBOLDT COUNTY:

CUPA Facility List

CUPA facility list.

Date of Government Version: 03/05/2018
Date Data Arrived at EDR: 03/08/2018
Date Made Active in Reports: 04/30/2018
Number of Days to Update: 53

Source: Humboldt County Environmental Health
Telephone: N/A
Last EDR Contact: 05/21/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Semi-Annually

IMPERIAL COUNTY:

CUPA Facility List

Cupa facility list.

Date of Government Version: 04/23/2018
Date Data Arrived at EDR: 04/25/2018
Date Made Active in Reports: 06/14/2018
Number of Days to Update: 50

Source: San Diego Border Field Office
Telephone: 760-339-2777
Last EDR Contact: 04/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

INYO COUNTY:

CUPA Facility List
Cupa facility list.

Date of Government Version: 04/02/2018
Date Data Arrived at EDR: 04/03/2018
Date Made Active in Reports: 06/14/2018
Number of Days to Update: 72

Source: Inyo County Environmental Health Services
Telephone: 760-878-0238
Last EDR Contact: 05/30/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Varies

KERN COUNTY:

Underground Storage Tank Sites & Tank Listing
Kern County Sites and Tanks Listing.

Date of Government Version: 02/02/2018
Date Data Arrived at EDR: 02/02/2018
Date Made Active in Reports: 03/28/2018
Number of Days to Update: 54

Source: Kern County Environment Health Services Department
Telephone: 661-862-8700
Last EDR Contact: 05/02/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Quarterly

KINGS COUNTY:

CUPA Facility List
A listing of sites included in the county's Certified Unified Program Agency database. California's Secretary for Environmental Protection established the unified hazardous materials and hazardous waste regulatory program as required by chapter 6.11 of the California Health and Safety Code. The Unified Program consolidates the administration, permits, inspections, and enforcement activities.

Date of Government Version: 11/14/2017
Date Data Arrived at EDR: 11/17/2017
Date Made Active in Reports: 12/15/2017
Number of Days to Update: 28

Source: Kings County Department of Public Health
Telephone: 559-584-1411
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Varies

LAKE COUNTY:

CUPA Facility List
Cupa facility list

Date of Government Version: 05/09/2018
Date Data Arrived at EDR: 05/11/2018
Date Made Active in Reports: 06/14/2018
Number of Days to Update: 34

Source: Lake County Environmental Health
Telephone: 707-263-1164
Last EDR Contact: 04/16/2018
Next Scheduled EDR Contact: 07/30/2018
Data Release Frequency: Varies

LASSEN COUNTY:

CUPA Facility List
Cupa facility list

Date of Government Version: 01/22/2018
Date Data Arrived at EDR: 01/24/2018
Date Made Active in Reports: 03/14/2018
Number of Days to Update: 49

Source: Lassen County Environmental Health
Telephone: 530-251-8528
Last EDR Contact: 04/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

LOS ANGELES COUNTY:

San Gabriel Valley Areas of Concern
San Gabriel Valley areas where VOC contamination is at or above the MCL as designated by region 9 EPA office.

Date of Government Version: 03/30/2009
Date Data Arrived at EDR: 03/31/2009
Date Made Active in Reports: 10/23/2009
Number of Days to Update: 206
Source: EPA Region 9
Telephone: 415-972-3178
Last EDR Contact: 06/13/2018
Next Scheduled EDR Contact: 10/01/2018
Data Release Frequency: No Update Planned

HMS: Street Number List
Industrial Waste and Underground Storage Tank Sites.

Date of Government Version: 04/12/2018
Date Data Arrived at EDR: 04/16/2018
Date Made Active in Reports: 06/15/2018
Number of Days to Update: 60
Source: Department of Public Works
Telephone: 626-458-3517
Last EDR Contact: 04/05/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: Semi-Annually

List of Solid Waste Facilities
Solid Waste Facilities in Los Angeles County.

Date of Government Version: 04/16/2018
Date Data Arrived at EDR: 04/17/2018
Date Made Active in Reports: 06/19/2018
Number of Days to Update: 63
Source: La County Department of Public Works
Telephone: 818-458-5185
Last EDR Contact: 04/17/2018
Next Scheduled EDR Contact: 07/30/2018
Data Release Frequency: Varies

City of Los Angeles Landfills
Landfills owned and maintained by the City of Los Angeles.

Date of Government Version: 01/01/2018
Date Data Arrived at EDR: 05/01/2018
Date Made Active in Reports: 05/14/2018
Number of Days to Update: 13
Source: Engineering & Construction Division
Telephone: 213-473-7869
Last EDR Contact: 04/11/2018
Next Scheduled EDR Contact: 07/30/2018
Data Release Frequency: Varies

Site Mitigation List
Industrial sites that have had some sort of spill or complaint.

Date of Government Version: 04/01/2018
Date Data Arrived at EDR: 04/17/2018
Date Made Active in Reports: 06/19/2018
Number of Days to Update: 63
Source: Community Health Services
Telephone: 323-890-7806
Last EDR Contact: 04/17/2018
Next Scheduled EDR Contact: 07/30/2018
Data Release Frequency: Annually

City of El Segundo Underground Storage Tank
Underground storage tank sites located in El Segundo city.

Date of Government Version: 01/21/2017
Date Data Arrived at EDR: 04/19/2017
Date Made Active in Reports: 05/10/2017
Number of Days to Update: 21
Source: City of El Segundo Fire Department
Telephone: 310-524-2236
Last EDR Contact: 04/11/2018
Next Scheduled EDR Contact: 07/30/2018
Data Release Frequency: Semi-Annually

City of Long Beach Underground Storage Tank
Underground storage tank sites located in the city of Long Beach.

Date of Government Version: 03/09/2017
Date Data Arrived at EDR: 03/10/2017
Date Made Active in Reports: 05/03/2017
Number of Days to Update: 54
Source: City of Long Beach Fire Department
Telephone: 562-570-2563
Last EDR Contact: 04/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Annually

City of Torrance Underground Storage Tank
Underground storage tank sites located in the city of Torrance.

Date of Government Version: 01/04/2018
Date Data Arrived at EDR: 01/05/2018
Date Made Active in Reports: 01/18/2018
Number of Days to Update: 13

Source: City of Torrance Fire Department
Telephone: 310-618-2973
Last EDR Contact: 04/05/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: Semi-Annually

MADERA COUNTY:

CUPA Facility List
A listing of sites included in the county's Certified Unified Program Agency database. California's Secretary for Environmental Protection established the unified hazardous materials and hazardous waste regulatory program as required by chapter 6.11 of the California Health and Safety Code. The Unified Program consolidates the administration, permits, inspections, and enforcement activities.

Date of Government Version: 02/21/2018
Date Data Arrived at EDR: 02/22/2018
Date Made Active in Reports: 04/03/2018
Number of Days to Update: 40

Source: Madera County Environmental Health
Telephone: 559-675-7823
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Varies

MARIN COUNTY:

Underground Storage Tank Sites
Currently permitted USTs in Marin County.

Date of Government Version: 03/30/2018
Date Data Arrived at EDR: 04/06/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 28

Source: Public Works Department Waste Management
Telephone: 415-473-6647
Last EDR Contact: 06/27/2018
Next Scheduled EDR Contact: 10/15/2018
Data Release Frequency: Semi-Annually

MERCED COUNTY:

CUPA Facility List
CUPA facility list.

Date of Government Version: 01/11/2018
Date Data Arrived at EDR: 01/12/2018
Date Made Active in Reports: 02/08/2018
Number of Days to Update: 27

Source: Merced County Environmental Health
Telephone: 209-381-1094
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Varies

MONO COUNTY:

CUPA Facility List
CUPA Facility List

Date of Government Version: 02/22/2018
Date Data Arrived at EDR: 02/27/2018
Date Made Active in Reports: 03/14/2018
Number of Days to Update: 15

Source: Mono County Health Department
Telephone: 760-932-5580
Last EDR Contact: 05/22/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Varies

MONTEREY COUNTY:

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

CUPA Facility Listing
CUPA Program listing from the Environmental Health Division.

Date of Government Version: 03/27/2018
Date Data Arrived at EDR: 03/29/2018
Date Made Active in Reports: 04/16/2018
Number of Days to Update: 18

Source: Monterey County Health Department
Telephone: 831-796-1297
Last EDR Contact: 07/02/2018
Next Scheduled EDR Contact: 10/15/2018
Data Release Frequency: Varies

NAPA COUNTY:

Sites With Reported Contamination
A listing of leaking underground storage tank sites located in Napa county.

Date of Government Version: 01/09/2017
Date Data Arrived at EDR: 01/11/2017
Date Made Active in Reports: 03/02/2017
Number of Days to Update: 50

Source: Napa County Department of Environmental Management
Telephone: 707-253-4269
Last EDR Contact: 05/22/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: No Update Planned

Closed and Operating Underground Storage Tank Sites
Underground storage tank sites located in Napa county.

Date of Government Version: 02/22/2018
Date Data Arrived at EDR: 02/27/2018
Date Made Active in Reports: 03/29/2018
Number of Days to Update: 30

Source: Napa County Department of Environmental Management
Telephone: 707-253-4269
Last EDR Contact: 05/22/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: No Update Planned

NEVADA COUNTY:

CUPA Facility List
CUPA facility list.

Date of Government Version: 04/24/2018
Date Data Arrived at EDR: 05/01/2018
Date Made Active in Reports: 06/15/2018
Number of Days to Update: 45

Source: Community Development Agency
Telephone: 530-265-1467
Last EDR Contact: 04/25/2018
Next Scheduled EDR Contact: 08/13/2018
Data Release Frequency: Varies

ORANGE COUNTY:

List of Industrial Site Cleanups
Petroleum and non-petroleum spills.

Date of Government Version: 04/02/2018
Date Data Arrived at EDR: 05/11/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 42

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 05/07/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Annually

List of Underground Storage Tank Cleanups
Orange County Underground Storage Tank Cleanups (LUST).

Date of Government Version: 04/02/2018
Date Data Arrived at EDR: 05/11/2018
Date Made Active in Reports: 06/25/2018
Number of Days to Update: 45

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 05/07/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

List of Underground Storage Tank Facilities
Orange County Underground Storage Tank Facilities (UST).

Date of Government Version: 01/02/2018
Date Data Arrived at EDR: 02/07/2018
Date Made Active in Reports: 03/28/2018
Number of Days to Update: 49

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 05/08/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Quarterly

PLACER COUNTY:

Master List of Facilities
List includes aboveground tanks, underground tanks and cleanup sites.

Date of Government Version: 03/15/2018
Date Data Arrived at EDR: 03/19/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 46

Source: Placer County Health and Human Services
Telephone: 530-745-2363
Last EDR Contact: 05/31/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Semi-Annually

PLUMAS COUNTY:

CUPA Facility List
Plumas County CUPA Program facilities.

Date of Government Version: 01/22/2018
Date Data Arrived at EDR: 01/24/2018
Date Made Active in Reports: 03/15/2018
Number of Days to Update: 50

Source: Plumas County Environmental Health
Telephone: 530-283-6355
Last EDR Contact: 04/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

RIVERSIDE COUNTY:

Listing of Underground Tank Cleanup Sites
Riverside County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 04/05/2018
Date Data Arrived at EDR: 04/10/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 24

Source: Department of Environmental Health
Telephone: 951-358-5055
Last EDR Contact: 06/18/2018
Next Scheduled EDR Contact: 10/01/2018
Data Release Frequency: Quarterly

Underground Storage Tank Tank List
Underground storage tank sites located in Riverside county.

Date of Government Version: 04/05/2018
Date Data Arrived at EDR: 04/10/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 24

Source: Department of Environmental Health
Telephone: 951-358-5055
Last EDR Contact: 06/18/2018
Next Scheduled EDR Contact: 10/01/2018
Data Release Frequency: Quarterly

SACRAMENTO COUNTY:

Toxic Site Clean-Up List
List of sites where unauthorized releases of potentially hazardous materials have occurred.

Date of Government Version: 02/02/2018
Date Data Arrived at EDR: 04/04/2018
Date Made Active in Reports: 06/14/2018
Number of Days to Update: 71

Source: Sacramento County Environmental Management
Telephone: 916-875-8406
Last EDR Contact: 07/03/2018
Next Scheduled EDR Contact: 10/15/2018
Data Release Frequency: Quarterly

Master Hazardous Materials Facility List

Any business that has hazardous materials on site - hazardous material storage sites, underground storage tanks, waste generators.

Date of Government Version: 02/02/2018
Date Data Arrived at EDR: 04/04/2018
Date Made Active in Reports: 06/19/2018
Number of Days to Update: 76

Source: Sacramento County Environmental Management
Telephone: 916-875-8406
Last EDR Contact: 07/03/2018
Next Scheduled EDR Contact: 10/15/2018
Data Release Frequency: Quarterly

SAN BENITO COUNTY:

CUPA Facility List

Cupa facility list

Date of Government Version: 11/01/2017
Date Data Arrived at EDR: 11/03/2017
Date Made Active in Reports: 11/17/2017
Number of Days to Update: 14

Source: San Benito County Environmental Health
Telephone: N/A
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Varies

SAN BERNARDINO COUNTY:

Hazardous Material Permits

This listing includes underground storage tanks, medical waste handlers/generators, hazardous materials handlers, hazardous waste generators, and waste oil generators/handlers.

Date of Government Version: 04/09/2018
Date Data Arrived at EDR: 04/11/2018
Date Made Active in Reports: 06/19/2018
Number of Days to Update: 69

Source: San Bernardino County Fire Department Hazardous Materials Division
Telephone: 909-387-3041
Last EDR Contact: 04/06/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Quarterly

SAN DIEGO COUNTY:

Hazardous Materials Management Division Database

The database includes: HE58 - This report contains the business name, site address, business phone number, establishment 'H' permit number, type of permit, and the business status. HE17 - In addition to providing the same information provided in the HE58 listing, HE17 provides inspection dates, violations received by the establishment, hazardous waste generated, the quantity, method of storage, treatment/disposal of waste and the hauler, and information on underground storage tanks. Unauthorized Release List - Includes a summary of environmental contamination cases in San Diego County (underground tank cases, non-tank cases, groundwater contamination, and soil contamination are included.)

Date of Government Version: 03/05/2018
Date Data Arrived at EDR: 03/07/2018
Date Made Active in Reports: 04/16/2018
Number of Days to Update: 40

Source: Hazardous Materials Management Division
Telephone: 619-338-2268
Last EDR Contact: 06/06/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Quarterly

Solid Waste Facilities
San Diego County Solid Waste Facilities.

Date of Government Version: 04/18/2018
Date Data Arrived at EDR: 04/24/2018
Date Made Active in Reports: 06/19/2018
Number of Days to Update: 56
Source: Department of Health Services
Telephone: 619-338-2209
Last EDR Contact: 04/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

Local Oversight Program Listing
A listing of all LOP release sites that are or were under the County of San Diego's jurisdiction. Included are closed or transferred cases, open cases, and cases that did not have a case type indicated. The cases without a case type are mostly complaints; however, some of them could be LOP cases.

Date of Government Version: 04/18/2018
Date Data Arrived at EDR: 04/23/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 11
Source: Department of Environmental Health
Telephone: 858-505-6874
Last EDR Contact: 04/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

Environmental Case Listing
The listing contains all underground tank release cases and projects pertaining to properties contaminated with hazardous substances that are actively under review by the Site Assessment and Mitigation Program.

Date of Government Version: 03/23/2010
Date Data Arrived at EDR: 06/15/2010
Date Made Active in Reports: 07/09/2010
Number of Days to Update: 24
Source: San Diego County Department of Environmental Health
Telephone: 619-338-2371
Last EDR Contact: 05/31/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: No Update Planned

SAN FRANCISCO COUNTY:

Local Oversite Facilities
A listing of leaking underground storage tank sites located in San Francisco county.

Date of Government Version: 09/19/2008
Date Data Arrived at EDR: 09/19/2008
Date Made Active in Reports: 09/29/2008
Number of Days to Update: 10
Source: Department Of Public Health San Francisco County
Telephone: 415-252-3920
Last EDR Contact: 05/02/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Quarterly

Underground Storage Tank Information
Underground storage tank sites located in San Francisco county.

Date of Government Version: 11/02/2017
Date Data Arrived at EDR: 11/07/2017
Date Made Active in Reports: 12/19/2017
Number of Days to Update: 42
Source: Department of Public Health
Telephone: 415-252-3920
Last EDR Contact: 05/02/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Quarterly

SAN JOAQUIN COUNTY:

San Joaquin Co. UST
A listing of underground storage tank locations in San Joaquin county.

Date of Government Version: 03/20/2018
Date Data Arrived at EDR: 03/22/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 43
Source: Environmental Health Department
Telephone: N/A
Last EDR Contact: 06/14/2018
Next Scheduled EDR Contact: 10/01/2018
Data Release Frequency: Semi-Annually

SAN LUIS OBISPO COUNTY:

CUPA Facility List
Cupa Facility List.

Date of Government Version: 11/16/2017
Date Data Arrived at EDR: 11/17/2017
Date Made Active in Reports: 12/18/2017
Number of Days to Update: 31

Source: San Luis Obispo County Public Health Department
Telephone: 805-781-5596
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Varies

SAN MATEO COUNTY:

Business Inventory
List includes Hazardous Materials Business Plan, hazardous waste generators, and underground storage tanks.

Date of Government Version: 03/14/2018
Date Data Arrived at EDR: 03/20/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 45

Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
Last EDR Contact: 06/06/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Annually

Fuel Leak List
A listing of leaking underground storage tank sites located in San Mateo county.

Date of Government Version: 03/15/2018
Date Data Arrived at EDR: 03/20/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 45

Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
Last EDR Contact: 06/06/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Semi-Annually

SANTA BARBARA COUNTY:

CUPA Facility Listing
CUPA Program Listing from the Environmental Health Services division.

Date of Government Version: 09/08/2011
Date Data Arrived at EDR: 09/09/2011
Date Made Active in Reports: 10/07/2011
Number of Days to Update: 28

Source: Santa Barbara County Public Health Department
Telephone: 805-686-8167
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Varies

SANTA CLARA COUNTY:

Cupa Facility List
Cupa facility list

Date of Government Version: 02/20/2018
Date Data Arrived at EDR: 02/20/2018
Date Made Active in Reports: 03/19/2018
Number of Days to Update: 27

Source: Department of Environmental Health
Telephone: 408-918-1973
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Varies

HIST LUST - Fuel Leak Site Activity Report
A listing of open and closed leaking underground storage tanks. This listing is no longer updated by the county. Leaking underground storage tanks are now handled by the Department of Environmental Health.

Date of Government Version: 03/29/2005
Date Data Arrived at EDR: 03/30/2005
Date Made Active in Reports: 04/21/2005
Number of Days to Update: 22

Source: Santa Clara Valley Water District
Telephone: 408-265-2600
Last EDR Contact: 03/23/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: No Update Planned

LOP Listing
A listing of leaking underground storage tanks located in Santa Clara county.

Date of Government Version: 03/03/2014
Date Data Arrived at EDR: 03/05/2014
Date Made Active in Reports: 03/18/2014
Number of Days to Update: 13
Source: Department of Environmental Health
Telephone: 408-918-3417
Last EDR Contact: 05/22/2018
Next Scheduled EDR Contact: 09/10/2018
Data Release Frequency: Annually

Hazardous Material Facilities
Hazardous material facilities, including underground storage tank sites.

Date of Government Version: 02/04/2018
Date Data Arrived at EDR: 02/06/2018
Date Made Active in Reports: 03/20/2018
Number of Days to Update: 42
Source: City of San Jose Fire Department
Telephone: 408-535-7694
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Annually

SANTA CRUZ COUNTY:

CUPA Facility List
CUPA facility listing.

Date of Government Version: 01/21/2017
Date Data Arrived at EDR: 02/22/2017
Date Made Active in Reports: 05/23/2017
Number of Days to Update: 90
Source: Santa Cruz County Environmental Health
Telephone: 831-464-2761
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Varies

SHASTA COUNTY:

CUPA Facility List
Cupa Facility List.

Date of Government Version: 06/15/2017
Date Data Arrived at EDR: 06/19/2017
Date Made Active in Reports: 08/09/2017
Number of Days to Update: 51
Source: Shasta County Department of Resource Management
Telephone: 530-225-5789
Last EDR Contact: 05/16/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Varies

SOLANO COUNTY:

Leaking Underground Storage Tanks
A listing of leaking underground storage tank sites located in Solano county.

Date of Government Version: 03/08/2018
Date Data Arrived at EDR: 03/13/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 52
Source: Solano County Department of Environmental Management
Telephone: 707-784-6770
Last EDR Contact: 05/31/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Quarterly

Underground Storage Tanks
Underground storage tank sites located in Solano county.

Date of Government Version: 03/08/2018
Date Data Arrived at EDR: 03/13/2018
Date Made Active in Reports: 03/29/2018
Number of Days to Update: 16
Source: Solano County Department of Environmental Management
Telephone: 707-784-6770
Last EDR Contact: 05/31/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Quarterly

SONOMA COUNTY:

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Cupa Facility List
Cupa Facility list

Date of Government Version: 03/01/2018
Date Data Arrived at EDR: 03/27/2018
Date Made Active in Reports: 04/16/2018
Number of Days to Update: 20

Source: County of Sonoma Fire & Emergency Services Department
Telephone: 707-565-1174
Last EDR Contact: 06/21/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Varies

Leaking Underground Storage Tank Sites
A listing of leaking underground storage tank sites located in Sonoma county.

Date of Government Version: 04/03/2018
Date Data Arrived at EDR: 04/06/2018
Date Made Active in Reports: 05/09/2018
Number of Days to Update: 33

Source: Department of Health Services
Telephone: 707-565-6565
Last EDR Contact: 06/21/2018
Next Scheduled EDR Contact: 10/08/2018
Data Release Frequency: Quarterly

STANISLAUS COUNTY:

CUPA Facility List
Cupa facility list

Date of Government Version: 05/08/2018
Date Data Arrived at EDR: 05/11/2018
Date Made Active in Reports: 06/15/2018
Number of Days to Update: 35

Source: Stanislaus County Department of Ennvironmental Protection
Telephone: 209-525-6751
Last EDR Contact: 04/16/2018
Next Scheduled EDR Contact: 07/30/2018
Data Release Frequency: Varies

SUTTER COUNTY:

Underground Storage Tanks
Underground storage tank sites located in Sutter county.

Date of Government Version: 01/08/2018
Date Data Arrived at EDR: 03/01/2018
Date Made Active in Reports: 03/30/2018
Number of Days to Update: 29

Source: Sutter County Department of Agriculture
Telephone: 530-822-7500
Last EDR Contact: 05/31/2018
Next Scheduled EDR Contact: 09/17/2018
Data Release Frequency: Semi-Annually

TEHAMA COUNTY:

CUPA Facility List
Cupa facilities

Date of Government Version: 01/26/2018
Date Data Arrived at EDR: 02/02/2018
Date Made Active in Reports: 03/21/2018
Number of Days to Update: 47

Source: Tehama County Department of Environmental Health
Telephone: 530-527-8020
Last EDR Contact: 05/03/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Varies

TRINITY COUNTY:

CUPA Facility List
Cupa facility list

Date of Government Version: 04/23/2018
Date Data Arrived at EDR: 04/25/2018
Date Made Active in Reports: 06/15/2018
Number of Days to Update: 51

Source: Department of Toxic Substances Control
Telephone: 760-352-0381
Last EDR Contact: 04/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

TULARE COUNTY:

CUPA Facility List
Cupa program facilities

Date of Government Version: 03/19/2018
Date Data Arrived at EDR: 03/22/2018
Date Made Active in Reports: 04/17/2018
Number of Days to Update: 26

Source: Tulare County Environmental Health Services Division
Telephone: 559-624-7400
Last EDR Contact: 07/02/2018
Next Scheduled EDR Contact: 08/20/2018
Data Release Frequency: Varies

TUOLUMNE COUNTY:

CUPA Facility List
Cupa facility list

Date of Government Version: 04/23/2018
Date Data Arrived at EDR: 04/25/2018
Date Made Active in Reports: 06/25/2018
Number of Days to Update: 61

Source: Divison of Environmental Health
Telephone: 209-533-5633
Last EDR Contact: 04/18/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Varies

VENTURA COUNTY:

Business Plan, Hazardous Waste Producers, and Operating Underground Tanks
The BWT list indicates by site address whether the Environmental Health Division has Business Plan (B), Waste Producer (W), and/or Underground Tank (T) information.

Date of Government Version: 03/26/2018
Date Data Arrived at EDR: 04/25/2018
Date Made Active in Reports: 06/22/2018
Number of Days to Update: 58

Source: Ventura County Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 04/23/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Quarterly

Inventory of Illegal Abandoned and Inactive Sites
Ventura County Inventory of Closed, Illegal Abandoned, and Inactive Sites.

Date of Government Version: 12/01/2011
Date Data Arrived at EDR: 12/01/2011
Date Made Active in Reports: 01/19/2012
Number of Days to Update: 49

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 06/27/2018
Next Scheduled EDR Contact: 10/15/2018
Data Release Frequency: Annually

Listing of Underground Tank Cleanup Sites
Ventura County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 05/29/2008
Date Data Arrived at EDR: 06/24/2008
Date Made Active in Reports: 07/31/2008
Number of Days to Update: 37

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 05/09/2018
Next Scheduled EDR Contact: 08/27/2018
Data Release Frequency: Quarterly

Medical Waste Program List
To protect public health and safety and the environment from potential exposure to disease causing agents, the Environmental Health Division Medical Waste Program regulates the generation, handling, storage, treatment and disposal of medical waste throughout the County.

Date of Government Version: 03/26/2018
Date Data Arrived at EDR: 04/25/2018
Date Made Active in Reports: 06/25/2018
Number of Days to Update: 61
Source: Ventura County Resource Management Agency
Telephone: 805-654-2813
Last EDR Contact: 04/23/2018
Next Scheduled EDR Contact: 08/06/2018
Data Release Frequency: Quarterly

Underground Tank Closed Sites List
Ventura County Operating Underground Storage Tank Sites (UST)/Underground Tank Closed Sites List.

Date of Government Version: 02/28/2018
Date Data Arrived at EDR: 03/14/2018
Date Made Active in Reports: 03/30/2018
Number of Days to Update: 16
Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 06/13/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Quarterly

YOLO COUNTY:

Underground Storage Tank Comprehensive Facility Report
Underground storage tank sites located in Yolo county.

Date of Government Version: 03/27/2018
Date Data Arrived at EDR: 04/03/2018
Date Made Active in Reports: 05/04/2018
Number of Days to Update: 31
Source: Yolo County Department of Health
Telephone: 530-666-8646
Last EDR Contact: 06/27/2018
Next Scheduled EDR Contact: 10/15/2018
Data Release Frequency: Annually

YUBA COUNTY:

CUPA Facility List
CUPA facility listing for Yuba County.

Date of Government Version: 05/10/2018
Date Data Arrived at EDR: 05/15/2018
Date Made Active in Reports: 06/15/2018
Number of Days to Update: 31
Source: Yuba County Environmental Health Department
Telephone: 530-749-7523
Last EDR Contact: 04/25/2018
Next Scheduled EDR Contact: 08/13/2018
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data
Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 01/03/2018
Date Data Arrived at EDR: 02/14/2018
Date Made Active in Reports: 03/22/2018
Number of Days to Update: 36
Source: Department of Energy & Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 05/18/2018
Next Scheduled EDR Contact: 08/27/2018
Data Release Frequency: No Update Planned

NJ MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 04/11/2017
Date Made Active in Reports: 07/27/2017
Number of Days to Update: 107

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 04/23/2018
Next Scheduled EDR Contact: 07/23/2018
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data
Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 04/30/2018
Date Data Arrived at EDR: 05/03/2018
Date Made Active in Reports: 06/07/2018
Number of Days to Update: 35

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 05/03/2018
Next Scheduled EDR Contact: 08/13/2018
Data Release Frequency: Quarterly

PA MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 07/25/2017
Date Made Active in Reports: 09/25/2017
Number of Days to Update: 62

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 04/12/2018
Next Scheduled EDR Contact: 07/30/2018
Data Release Frequency: Annually

RI MANIFEST: Manifest information
Hazardous waste manifest information

Date of Government Version: 12/31/2017
Date Data Arrived at EDR: 02/23/2018
Date Made Active in Reports: 04/09/2018
Number of Days to Update: 45

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 05/21/2018
Next Scheduled EDR Contact: 09/03/2018
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 04/13/2017
Date Made Active in Reports: 07/14/2017
Number of Days to Update: 92

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 06/11/2018
Next Scheduled EDR Contact: 09/24/2018
Data Release Frequency: Annually

Oil/Gas Pipelines
Source: PennWell Corporation
Petroleum Bundle (Crude Oil, Refined Products, Petrochemicals, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)) N = Natural Gas Bundle (Natural Gas, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)). This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Electric Power Transmission Line Data
Source: PennWell Corporation
This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Licensed Facilities
Source: Department of Social Services
Telephone: 916-657-4041

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetland Inventory
Source: Department of Fish & Game
Telephone: 916-445-0411

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

STREET AND ADDRESS INFORMATION

© 2015 TomTom North America, Inc. All rights reserved. This material is proprietary and the subject of copyright protection and other intellectual property rights owned by or licensed to Tele Atlas North America, Inc. The use of this material is subject to the terms of a license agreement. You will be held liable for any unauthorized copying or disclosure of this material.

GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

20621 LAKE FOREST
20621 LAKE FOREST
LAKE FOREST, CA 92630

TARGET PROPERTY COORDINATES

Latitude (North):	33.668467 - 33° 40' 6.48''
Longitude (West):	117.667749 - 117° 40' 3.90''
Universal Tranverse Mercator:	Zone 11
UTM X (Meters):	438094.4
UTM Y (Meters):	3725403.8
Elevation:	735 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	5636489 EL TORO, CA
Version Date:	2012

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principal investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

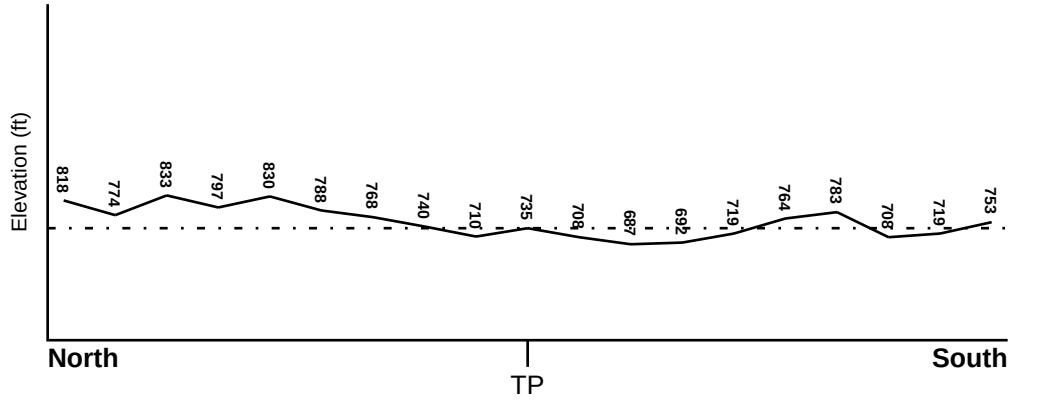
TOPOGRAPHIC INFORMATION

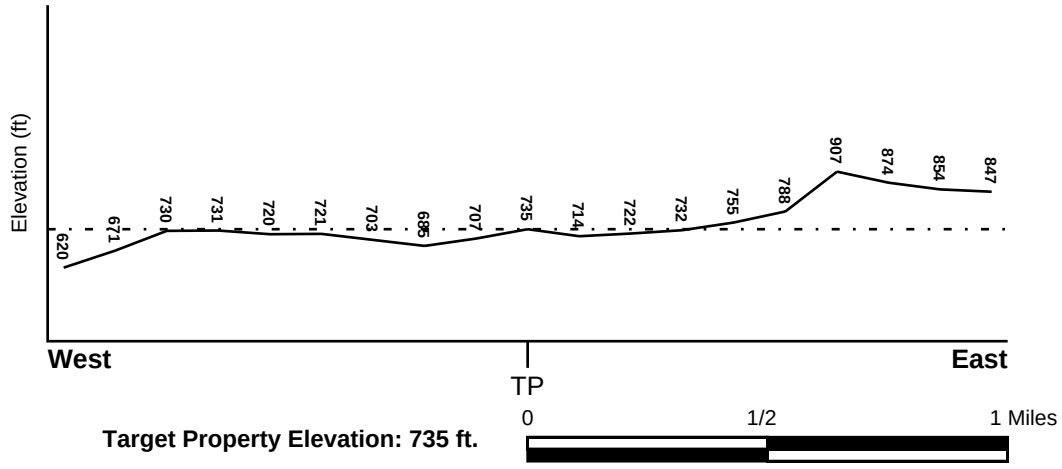
Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General SSW

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES





0 1/2 1 Miles

Target Property Elevation: 735 ft.

Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Flood Plain Panel at Target Property	FEMA Source Type
06059C0316J	FEMA FIRM Flood data

Additional Panels in search area:	FEMA Source Type
06059C0317J	FEMA FIRM Flood data
06059C0318J	FEMA FIRM Flood data

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
EL TORO	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Site-Specific Hydrogeological Data*:

Search Radius:	1.25 miles
Status:	Not found

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

* ©1996 Site−specific hydrogeological data gathered by CERCLIS Alerts, Inc., Bainbridge Island, WA. All rights reserved. All of the information and opinions presented are those of the cited EPA report(s), which were completed under a Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) investigation.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

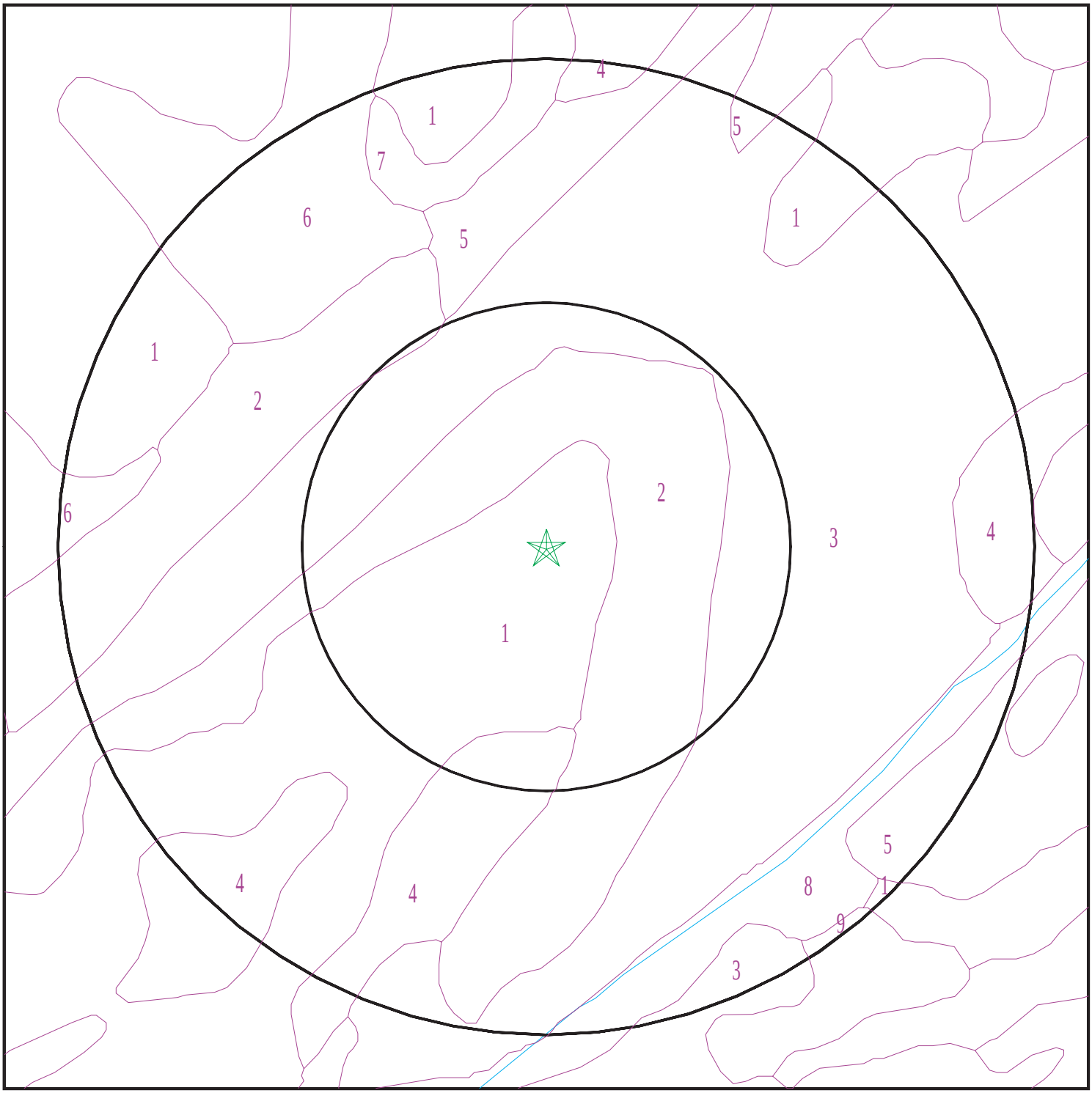
Era:	Cenozoic
System:	Tertiary
Series:	Eocene
Code:	Te *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Stratifed Sequence

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 05352085.2r



SITE NAME:	20621 Lake Forest	CLIENT:	Hillmann Environmental Co.
ADDRESS:	20621 Lake Forest Lake Forest CA 92630	CONTACT:	Kristine Savona
		INQUIRY #:	05352085.2r
LAT/LONG:	33.668467 / 117.667749	DATE:	July 05, 2018 3:06 pm

Copyright © 2018 EDR, Inc. © 2015 TomTom Rel. 2015.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: CIENEBA

Soil Surface Texture: sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Somewhat excessively drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 42 Min: 14	Max: 7.3 Min: 5.6
2	7 inches	11 inches	weathered bedrock	Not reported	Not reported	Max: 0.42 Min: 0	Max: Min:

Soil Map ID: 2

Soil Component Name: CROPLEY

Soil Surface Texture: clay

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	29 inches	clay	Not reported	Not reported	Max: 1.4 Min: 0.42	Max: 8.4 Min: 6.6
2	29 inches	59 inches	clay	Not reported	Not reported	Max: 1.4 Min: 0.42	Max: 8.4 Min: 6.6

Soil Map ID: 3

Soil Component Name: SORRENTO

Soil Surface Texture: loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	11 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay. FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 14 Min: 4	Max: 8.4 Min: 6.1

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	11 inches	61 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14.11 Min: 1	Max: 8.4 Min: 7.9
3	61 inches	72 inches	stratified loamy fine sand to silt loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 8.4 Min: 7.9

Soil Map ID: 4

Soil Component Name: MYFORD

Soil Surface Texture: sandy loam

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Moderately well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	11 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay. FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 42 Min: 14	Max: 6 Min: 5.1

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	11 inches	18 inches	sandy clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 0.42 Min: 0.01	Max: 8.4 Min: 5.6
3	18 inches	27 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 0.42 Min: 0.01	Max: 8.4 Min: 5.6
4	27 inches	70 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 0.42 Min: 0.01	Max: 8.4 Min: 6.1
5	70 inches	79 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay. FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 14 Min: 4	Max: 6.5 Min: 6.1

Soil Map ID: 5

Soil Component Name: CAPISTRANO

Soil Surface Texture: sandy loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	27 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.3 Min: 5.6
2	27 inches	64 inches	fine sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.3 Min: 5.6

Soil Map ID: 6

Soil Component Name: CAPISTRANO

Soil Surface Texture: sandy loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	27 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.3 Min: 5.6

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	27 inches	64 inches	fine sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.3 Min: 5.6

Soil Map ID: 7

Soil Component Name: MYFORD

Soil Surface Texture: sandy loam

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Moderately well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	11 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay. FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 42 Min: 14	Max: 6 Min: 5.1

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	11 inches	18 inches	sandy clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 0.42 Min: 0.01	Max: 8.4 Min: 5.6
3	18 inches	27 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 0.42 Min: 0.01	Max: 8.4 Min: 5.6
4	27 inches	70 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 0.42 Min: 0.01	Max: 8.4 Min: 6.1
5	70 inches	79 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay. FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 14 Min: 4	Max: 6.5 Min: 6.1

Soil Map ID: 8

Soil Component Name: RIVERWASH

Soil Surface Texture: sand

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class:
Hydric Status: All hydric

Corrosion Potential - Uncoated Steel: Not Reported

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 31 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	5 inches	sand	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Clean Sands, Poorly graded sand.	Max: 141 Min: 42	Max: Min:
2	5 inches	59 inches	stratified coarse sand to sandy loam	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 141 Min: 42	Max: Min:

Soil Map ID: 9

Soil Component Name: YORBA

Soil Surface Texture: cobbly sandy loam

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	cobbly sandy loam	Not reported	Not reported	Max: 42 Min: 4	Max: 6.5 Min: 5.6

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	7 inches	35 inches	very gravelly clay loam	Not reported	Not reported	Max: 1.4 Min: 0.42	Max: 8.4 Min: 5.6
3	35 inches	62 inches	very gravelly sandy loam	Not reported	Not reported	Max: 14 Min: 4	Max: 8.4 Min: 5.1

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 0.001 miles
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
4	USGS40000136558	1/4 - 1/2 Mile NW
B7	USGS40000136410	1/2 - 1 Mile SSE

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

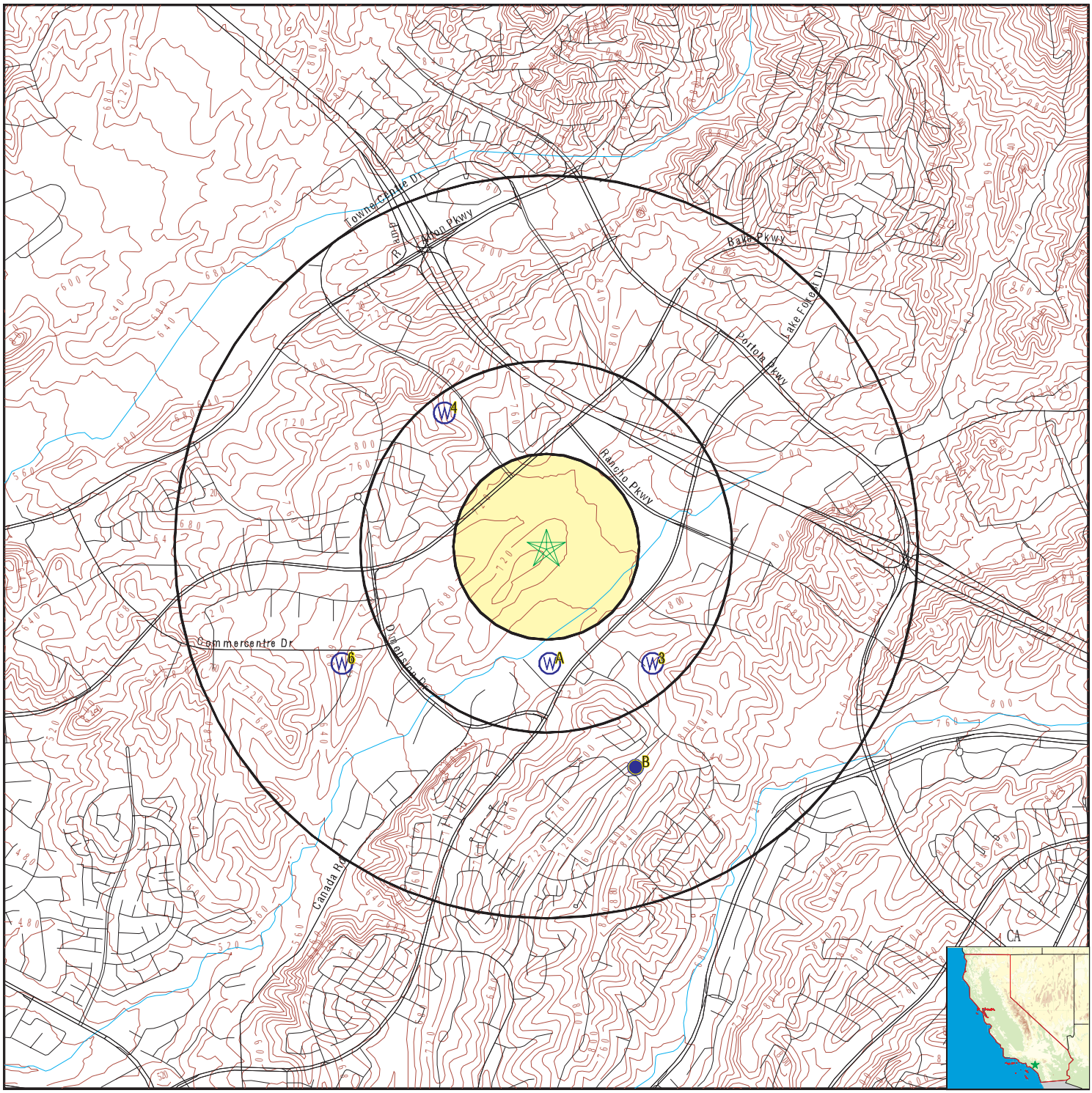
MAP ID	WELL ID	LOCATION FROM TP
A1	7045	1/4 - 1/2 Mile South
A2	7043	1/4 - 1/2 Mile South

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
3	7044	1/4 - 1/2 Mile SE
B5	7046	1/2 - 1 Mile SSE
6	6936	1/2 - 1 Mile WSW

PHYSICAL SETTING SOURCE MAP - 05352085.2r



- County Boundary
- Major Roads
- Contour Lines
- Earthquake Fault Lines
- Earthquake epicenter, Richter 5 or greater
- Water Wells
- Public Water Supply Wells
- Cluster of Multiple Icons

- Groundwater Flow Direction
- GI Indeterminate Groundwater Flow at Location
- GV Groundwater Flow Varies at Location
- HD Closest Hydrogeological Data
- Oil, gas or related wells

SITE NAME:	20621 Lake Forest	CLIENT:	Hillmann Environmental Co.
ADDRESS:	20621 Lake Forest Lake Forest CA 92630	CONTACT:	Kristine Savona
		INQUIRY #:	05352085.2r
LAT/LONG:	33.668467 / 117.667749	DATE:	July 05, 2018 3:06 pm

Copyright © 2018 EDR, Inc. © 2015 TomTom Rel. 2015.

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

A1
South **CA WELLS** **7045**
1/4 - 1/2 Mile
Lower

Water System Information:

Prime Station Code:	06S/08W-12L02 S	User ID:	TEE
FRDS Number:	3010091004	County:	Orange
District Number:	08	Station Type:	WELL/AMBNT/MUN/INTAKE
Water Type:	Well/Groundwater	Well Status:	Active Untreated
Source Lat/Long:	333950.0 1174000.0	Precision:	10 Feet (1/10 Second)
Source Name:	WELL 04		
System Number:	3010091		
System Name:	LOS ALISOS WD		
Organization That Operates System:			
	P O BOX 699		
	EL TORO 92630		
Pop Served:	38000	Connections:	11645
Area Served:	EL TORO		

A2
South **CA WELLS** **7043**
1/4 - 1/2 Mile
Lower

Water System Information:

Prime Station Code:	06S/08W-01N01 S	User ID:	TEE
FRDS Number:	3010091005	County:	Orange
District Number:	08	Station Type:	WELL/AMBNT/MUN/INTAKE/SUPPLY
Water Type:	Well/Groundwater	Well Status:	Active Untreated
Source Lat/Long:	333950.0 1174000.0	Precision:	0.5 Mile (30 Seconds)
Source Name:	WELL 07		
System Number:	3010091		
System Name:	LOS ALISOS WD		
Organization That Operates System:			
	P O BOX 699		
	EL TORO 92630		
Pop Served:	38000	Connections:	11645
Area Served:	EL TORO		

3
SE **CA WELLS** **7044**
1/4 - 1/2 Mile
Higher

Water System Information:

Prime Station Code:	06S/08W-12J01 S	User ID:	TEE
FRDS Number:	3010091003	County:	Orange
District Number:	08	Station Type:	WELL/AMBNT/MUN/INTAKE
Water Type:	Well/Groundwater	Well Status:	Active Untreated
Source Lat/Long:	333950.0 1173943.0	Precision:	10 Feet (1/10 Second)
Source Name:	WELL 03		

System Number: 3010091
System Name: LOS ALISOS WD
Organization That Operates System:
P O BOX 699
EL TORO 92630
Pop Served: 38000 Connections: 11645
Area Served: EL TORO

4
NW **FED USGS** **USGS40000136558**
1/4 - 1/2 Mile
Higher

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-334025117402101		
Monloc name:	006S008W01N001S		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	Not Reported	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	33.6736944
Longitude:	-117.6725	Sourcemap scale:	24000
Horiz Acc measure:	.5	Horiz Acc measure units:	seconds
Horiz Collection method:	Global positioning system (GPS), uncorrected		
Horiz coord refsys:	NAD83	Vert measure val:	860
Vert measure units:	feet	Vertacc measure val:	2.5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Other aquifers		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	Not Reported	Welldepth:	1000
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

B5
SSE **CA WELLS** **7046**
1/2 - 1 Mile
Higher

Water System Information:

Prime Station Code:	06S/08W-12Q01 S	User ID:	TEE
FRDS Number:	3010091002	County:	Orange
District Number:	08	Station Type:	WELL/AMBNT/MUN/INTAKE
Water Type:	Well/Groundwater	Well Status:	Active Untreated
Source Lat/Long:	333936.0 1173946.0	Precision:	10 Feet (1/10 Second)
Source Name:	WELL 02		
System Number:	3010091		
System Name:	LOS ALISOS WD		
Organization That Operates System:			
	P O BOX 699		
	EL TORO 92630		
Pop Served:	38000	Connections:	11645
Area Served:	EL TORO		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

6
WSW
1/2 - 1 Mile
Lower

CA WELLS **6936**

Water System Information:

Prime Station Code:	06S/04W-09L04 S	User ID:	WAT
FRDS Number:	3310012015	County:	Riverside
District Number:	14	Station Type:	WELL/AMBNT/MUN/INTAKE
Water Type:	Well/Groundwater	Well Status:	Abandoned
Source Lat/Long:	333950.0 1174035.0	Precision:	100 Feet (one Second)
Source Name:	SAN JACINTO WELL - ABANDONED		
System Number:	3310012		
System Name:	ELSINORE VALLEY MWD		
Organization That Operates System:			
	P.O. BOX 3000		
	LAKE ELSINORE, CA 92531		
Pop Served:	59200	Connections:	21140
Area Served:	LAKE ELSINORE VICINITY		

B7
SSE
1/2 - 1 Mile
Higher

FED USGS **USGS40000136410**

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-333935117394901		
Monloc name:	006S008W12Q001S		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	Not Reported	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	33.6596944
Longitude:	-117.6634722	Sourcemap scale:	24000
Horiz Acc measure:	.5	Horiz Acc measure units:	seconds
Horiz Collection method:	Global positioning system (GPS), uncorrected		
Horiz coord refsys:	NAD83	Vert measure val:	760
Vert measure units:	feet	Vertacc measure val:	2.5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Other aquifers		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	1957	Welldepth:	740
Welldepth units:	ft	Wellholedepth:	800
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 0

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

State Database: CA Radon

Radon Test Results

Zipcode	Num Tests	> 4 pCi/L
92630	90	0

Federal EPA Radon Zone for ORANGE County: 3

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for Zip Code: 92630

Number of sites tested: 2

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.400 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	Not Reported	Not Reported	Not Reported	Not Reported

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

HYDROLOGIC INFORMATION

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetland Inventory
Source: Department of Fish & Game
Telephone: 916-445-0411

HYDROGEOLOGIC INFORMATION

AQUIFLOW^{R} Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Service, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Water Well Database
Source: Department of Water Resources
Telephone: 916-651-9648

California Drinking Water Quality Database
Source: Department of Public Health
Telephone: 916-324-2319
The database includes all drinking water compliance and special studies monitoring for the state of California since 1984. It consists of over 3,200,000 individual analyses along with well and water system information.

OTHER STATE DATABASE INFORMATION

California Oil and Gas Well Locations
Source: Department of Conservation
Telephone: 916-323-1779
Oil and Gas well locations in the state.

RADON

State Database: CA Radon
Source: Department of Health Services
Telephone: 916-324-2208
Radon Database for California

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

California Earthquake Fault Lines: The fault lines displayed on EDR's Topographic map are digitized quaternary fault lines, prepared in 1975 by the United State Geological Survey. Additional information (also from 1975) regarding activity at specific fault lines comes from California's Preliminary Fault Activity Map prepared by the California Division of Mines and Geology.

STREET AND ADDRESS INFORMATION

© 2015 TomTom North America, Inc. All rights reserved. This material is proprietary and the subject of copyright protection and other intellectual property rights owned by or licensed to Tele Atlas North America, Inc. The use of this material is subject to the terms of a license agreement. You will be held liable for any unauthorized copying or disclosure of this material.

APPENDIX F

OTHER DOCUMENTS
(where applicable)

COUNTY OF ORANGE
HEALTH CARE AGENCY

ENVIRONMENTAL HEALTH
www.ochealthinfo.com/regulatory/environ.htm

MAILING ADDRESS:
1241 E. DYER ROAD STE 120
SANTA ANA, CA 92702

TELEPHONE: (714) 433-6000
FAX: (714) 433-6424

REQUEST FOR ENVIRONMENTAL HEALTH RECORDS INSTRUCTION SHEET

1. Complete the "Request for Environmental Health Records" form

- ✓ Please **Print** all information on request forms.
- ✓ Describe the reason the records are being requested so that our staff may be able to narrow your search.
- ✓ If you require site-specific information, give the exact address of the site.
- ✓ If you are asking for information on multiple sites (for example, all sites on a street) you must give an address for each location (for example, 1001, 1003, 1009, etc.).
- ✓ Note that we cannot enter a "range" of addresses as search criteria.

2. Complete the appropriate "Information Checklist" form

- ✓ Check only the desired records associated with the site you have submitted.
- ✓ Remember that you will be charged for each page of copied records, so be sure to specify which records you want.
- ✓ Please note that lists of information can be very lengthy and therefore costly. You can ask about the length of the list before completing the request form to ensure a list is what you desire.

3. Return the completed forms to the Custodian of Records Representative at 1241 E. Dyer Road, Ste. 120, Santa Ana, CA 92705.

- ✓ Blank Records Request forms can be downloaded from the Records page on the Environmental Health website at *www.ochealthinfo.com/regulatory/environ/records.htm*.
- ✓ Please note that you can ask for an appointment to review multiple records.

4. Most requests take approximately ten (10) days to process. However, if your request requires more processing time, we will notify you of the extension and the estimated date.

5. Upon completion of the search, we will notify you by phone or by mail. You may return to the Environmental Health office to pick up the requested records, or arrange to have them mailed to your address.

6. RECORDS THAT HAVE NOT BEEN PICKED UP WITHIN 60 DAYS OF NOTIFICATION WILL BE DESTROYED.

COUNTY OF ORANGE
HEALTH CARE AGENCY

ENVIRONMENTAL HEALTH
www.ochealthinfo.com/regulatory/environ.htm

MAILING ADDRESS:
1241 E. DYER ROAD STE. 120
SANTA ANA, CA 92702

TELEPHONE: (714) 433-6000
FAX: (714) 433-6424

REQUEST FOR ENVIRONMENTAL HEALTH RECORDS

The undersigned hereby requests a copy of the records prepared and maintained by the Health Care Agency in the ordinary course of business, at or near the time of the act, condition, or event which they depict.

The records requested are maintained under the Public Records Act Government Code § 6250 – 6276.48. Some information held in the documents may be exempt from release pursuant to the Public Records Act.

The undersigned understands that the Health Care Agency will charge $0.15 per page copied. In the case of a request for a large number of copies, the Health Care Agency may provide the requestor an estimate of copy costs prior to making said copies. If any request is to be canceled, this office must be notified at the above number within ten (10) days of receipt of request, otherwise cost incurred will be charged to the undersigned.

In order to assist you, please describe the reason for your request:

Any documents pertaining to violations or concerns with regard to the property(s) listed

Please list addresses here (no more than 10 addresses per request):

20621 Lake Forest Drive
Lake Forest, CA 92630

Check here if you would like a review only or to review before copies are made ☐

SIGNATURE of Requester

Kristine Savona, Hillmann Consulting, LLC
PRINT Name of Requester (and Company Name - if applicable)

1745 W. Orangewood Ave., STE. 110
PRINT Street Address

714 634-9500
Area Code and Phone Number

Orange, CA 92868
PRINT City, State and Zip Code

7/10/18
Date

RECORDS THAT HAVE NOT BEEN PICKED UP WITHIN 60 DAYS OF NOTIFICATION WILL BE DESTROYED

COUNTY OF ORANGE
HEALTH CARE AGENCY

ENVIRONMENTAL HEALTH
www.ochealthinfo.com/regulatory/environ.htm

MAILING ADDRESS:
1241 E. DYER ROAD STE. 120
SANTA ANA, CA 92702

TELEPHONE: (714) 433-6000
FAX: (714) 433-6424

HAZARDOUS WASTE / OTHER PROGRAM INFORMATION CHECKLIST

Please check only the records you need. This will enable us to search only the actual files that pertain to your request, cutting down time spent on searching for records that you may not want.

Site Specific Information	
☒	Above Ground Petroleum Storage Tank File
☒	California Accidental Release Prevention Program File
☒	Certified Unified Program Agency (CUPA) records
☐	City of Brea Hazardous Materials Business Plan File
☐	Complaints regarding Hazardous Waste or Underground Storage Tank Facility
☒	Hazardous Waste Generator Facility File
☒	Hazardous Waste Industrial Cleanup Site File
☒	Hazardous Waste Spill Response Log (Emergency Incidents Log)
☒	Leaking Underground Storage Tank Cleanup Site File
☐	Medical Waste Facility Record
☐	Proposition 65 Notification
☐	Recycling Program
☐	Solid Waste Facility File (large files – need to be specific)
☐	Spill Prevention, Control and Countermeasure (SPCC) File
☐	Tiered Permit Facility File
☒	Underground Storage Tank File
☐	Water Quality Information

Available on Environmental Health Website (See www.ochealthinfo.com/regulatory/downloads/reports.htm)
List of Hazardous Waste Generator Facilities (HWFACILITIES.SRW)
List of Industrial Cleanup Sites (IC PROGRAM CASES BY CITY.SRW)
List of Underground Storage Tank Cleanup Sites
List of Underground Storage Tank Facilities (USTFACILITIES.SRW)
A list of Solid Waste landfills (which includes closed landfills) can be obtained through the California website: www.ciwmb.ca.gov/SWIS/

Other information:_____

HILLMANN
CONSULTING

July 10, 2018

State of California
Department of Toxic Substances Control
Region 4 – Cypress Office
5796 Corporate Avenue
Cypress, CA 90630-4732
Phone (714) 484-5337
Fax (714) 484-5318
PubReqAct@dtsc.ca.gov

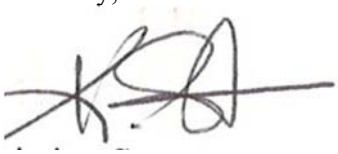
RE: DTSC Files:

20621 Lake Forest Drive
Lake Forest, CA 92630

Dear Sir/Madam:

Hillmann Consulting, LLC is conducting an environmental investigation of the above referenced property. Under the Freedom of Information Act, we would like to request any information your office has regarding this property. If any records are located, we would like to obtain copies or schedule a file review. If no records are available, please contact me to confirm. Thank you for your assistance.

Sincerely,



Kristine Savona
Office Manager
Hillmann Consulting, LLC
ksavona@hillmanngroup.com

Preview Request

The Freedom of Information Act (FOIA) is a federal law that gives the public the right to make requests for federal agency records. Agencies may withhold information according to nine exemptions contained in the statute. The FOIA applies only to federal agencies. It does not apply to records held by Congress, the courts, or by state or local government agencies. Each state has its own public access laws that should be consulted for access to state and local records.

* indicates a required field.

Agency Selection

Agency	Environmental Protection Agency Region 9 (AZ, CA, HI, NV, AS, GU)

If you are looking for information regarding a specific property, you may obtain this information immediately without filing a FOIA request by using the MyProperty portal, accessible at http://www.epa.gov/myproperty

Request Type

Request Type	FOIA

Contact Information

Salutation	Ms.
First Name	Kristine
Middle Initial	
Last Name	Savona
Email Address	ksavona@hillmanngroup.com
Organization	
Phone Number	7146349500
Fax Number	7146349507
Mailing Address Location	United States/US Territories
Address Line 1	1745 W. Orangewood Avenue
Address Line 2	Suite 110
City	Orange
State/Province	
Zip Code/Postal Code	92868

Processing Fees

Will Pay Up To	$25.00

Description

Description	20621 Lake Forest Drive Lake Forest, CA 92630 Dear Sir/Madam: We would like to request any information your office has regarding any environmental documents, underground storage tanks (USTs) or hazardous materials for the property listed below. If any records are located, we would like to obtain copies or schedule a file review. If no records are available, please contact me to confirm. Thank you for your assistance

Request Expedited Processing

Make Request?	No

Request a Fee Waiver

Make Request?	No

Attach Supporting Files

No supporting files have been uploaded.

I Agree.
I have read the Privacy and Security Notice and agree to the terms set forth.

I Agree.
Affirmation. Pursuant to 28 USC § 1746, I declare and affirm that under penalty of perjury under the laws of the United States of America that all of the foregoing information, statements, and signatures submitted in connection with this request and in any supporting documents are true and correct to the best of my knowledge.

Department of Toxic Substances Control

Matthew Rodriquez
Secretary for
Environmental Protection

Barbara A. Lee, Director
8800 Cal Center Drive
Sacramento, California 95826-3200

Edmund G. Brown Jr.
Governor

July 11, 2018

Kristine Savona
Hillmann Consulting
ksavona@hillmanngroup.com

Public Records Request Number: 1-071018-01
Location(s): 20621 Lake Forest Dr., Lake Forest, CA 92630

Dear Requestor:

We have received your Public Records Act Request for records from the Department of Toxic Substances Control (DTSC). After a thorough review of our files we have found that no such records exist at this office pertaining to the sites/facilities referenced above.

Records for both sites may exist within DTSC's Hazardous Waste Tracking System (HWTS). This unit tracks toxic waste generators, transporters, and disposal facilities. If you are interested in this type of information, it can be identified by accessing the HWTS database at http://hwts.dtsc.ca.gov/report_search.cfm?id=5. If you are interested in retrieving detailed reports, additional charges may apply. Please contact the HWTS unit by email at hwtsreports@dtsc.ca.gov or by phone at (916) 324-2444 for further information.

We would like to inform you about Envirostor, a database that provides information and documents on over 5,000 DTSC cleanup sites. EnviroStor can be accessed at: http://www.envirostor.dtsc.ca.gov/public. Also, a computer is available in the Central Files of each DTSC Regional Office for use by community members to view EnviroStor.

If you have any questions, would like further information regarding your request or would like an appointment to visit Sacramento's Central Files, please contact me at (916) 255-6449.

Sincerely,

Ruth J. Saroian
Regional Central Files

HILLMANN
CONSULTING

July 10, 2018

California Regional Water Quality Control Board – Santa Ana Region (8)
Underground Storage Tank (UST) File Review Division
3737 Main Street, Suite #500
Riverside, CA 92501-3348
Phone (951) 782-4499
Fax (951) 781-6288
FileReview8@waterboards.ca.gov

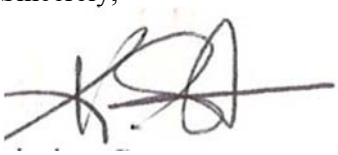
RE: Environmental Files:

20621 Lake Forest Drive
Lake Forest, CA 92630

Dear Sir/Madam:

Hillmann Consulting, LLC is conducting an environmental investigation of the above referenced property. Under the Freedom of Information Act, we would like to request any information your office has regarding this property. If any records are located, we would like to obtain copies or schedule a file review. If no records are available, please contact me to confirm. Thank you for your assistance.

Sincerely,



Kristine Savona
Office Manager
Hillmann Consulting, LLC
ksavona@hillmanngroup.com

SOUTH COAST AQMD

PUBLIC RECORDS REQUEST FORM

Request Information

Date Stored

Time Stored

Public Record Request Nbr

Public Record Request Tracking Nbr
98305

Attention Requestor

Please fill out this form completely. You may include an attachment to the form, if necessary.

Requestor Information

Requestor Name
Stephen Bartlett

Requestor Address
1745 W. Orangewood Avenue

Requestor Company
Hillmann Consulting

Requestor City
Orange

Requestor Email *
SBARTLETT@HILLMANNGROUP.COM

Requestor State
CA

Requestor Phone
(714)634-9500

Requestor Zip Code
92868

Type of Requested Record(s).

REQUESTED RECORDS. **Please be as specific as possible in describing the records you are seeking.** The more specific you are, the easier it will be to determine if such records exist in District files. Please contact the Public Records Unit if you need assistance in identifying District records.

Note: Permits to Operate, Equipment Lists, Notices of Violation, Notices to Comply, and Emissions Summaries are available through SCAQMD's FIND page at http://www3.aqmd.gov/webappl/fim/prog/search.aspx (you need to copy and paste this link into your browser).

Please Enter a description of the records you are requesting here: *
Notices of violation, notices to comply, complaints, site inspection records, asbestos notifications/records

Time Period of Documents Requested

Start Date *
1/1/1918

End Date *
7/10/2018

Requested Facility or Site Information (if applicable)

Note: You may only include one Facility or Site per Form.

Facility ID (if known)

Address
20621 Lake Forest Drive

Facility Name (if known)

City
Lake Forest

Zip Code
92630

Requested Application or Permit List. (if applicable)

Please click the Add Button to the right to enter a Application/Permit Number

Supplemental Attachments

Supplemental Documents

Note: Please use the above button for attaching additional documents that will help define your public records request.

Print

INSTRUCTIONS FOR REQUESTING RECORDS

(California Public Records Act, Govt. Code Sections 6250-6276.48)

1. In order to expedite your request, please fill out the form completely. Requests may also be submitted by phone at (909) 396-3700, by facsimile to (909) 396-3330, or by email to PublicRecordsRequests@aqmd.gov.

2. Requests must be for records prepared, owned, used, or retained by the District (Gov. Code Sec. 6252(e)). Requests should be for clearly identifiable records. The District is not required to create a new record in response to a request. The District will assist the requestor in making a request that describes reasonably identifiable records (Gov. Code Sec. 6253.1). Documents will not be provided if disclosure would infringe upon a copyright, trade secret, or is otherwise exempt in accordance with state law.

3. A search for facility records can only be conducted by one or all of the following:

-- a) Facility Name, Address, or Identification Number

-- b) Facility Application Number, or Permit to Operate Number; or

-- c) Facility Notice of Violation/Notice to Comply Number.

4. You will be notified within ten (10) days whether your request seeks copies of disclosable public records prepared, owned, used, or retained by this agency. In some cases, the District may need an additional 14 days to respond. If so, you will be notified in writing. You will also be provided an estimated date of when the records will be made available.

5. Communications regarding your request, and any records, will be provided by email, unless specified otherwise.

6. If the search for records finds the records voluminous, you will be notified of the approximate number of pages and/or length of time it will take to process your request.

7. If the records you requested have been marked confidential by the source of the record, you will be notified and given the option of continuing with the District's Trade Secret process.

8. If your request is to review records, rather than receive copies, the District will notify you once the records are gathered, and arrangements will be made for your review.

9. The charge for the direct cost of duplication is as follows: Paper Copies, $0.15/page each over 10 pages (first 10 pages are free); Copied CD's or flash drives, no charge; and Copied Audio Tapes, $5.00 each. After a preliminary estimate, advance payment may be required.

10. If the request is for information in an electronic format, the requestor shall bear the cost of producing a copy of the record, including the cost to construct the record and the cost of programming and computer services necessary to produce a copy of the record, when either of the following applies: (1) the District would be required to produce a copy of an electronic record and the record is one that is produced only at otherwise regularly scheduled intervals, or (2) the request would require data compilation, extraction, or programming to produce the record. (Gov. Code Sec. 6253.9(b)). The transfer of gathered electronic records onto CD, DVD or flash drive typically costs $10.00 each. An invoice will accompany your records when completed.

Note: For further information, please refer to the District's Guidelines for Implementing the California Public Records Act. The Guidelines are available in the lobby of the District Headquarters or on the District's web site at www.aqmd.gov.

Note: If you have questions pertaining to the submittal of a Public Records Act request, you may contact the Public Records Unit, (909) 396-3700, Tuesday through Friday, 7:00 a.m. to 5:30 p.m. Our Fax number is (909) 396-3330. Our email address is PublicRecordsRequests@aqmd.gov.

Submit Your Public Records Request

Information Management
Public Records Unit

Direct Dial (909) 396-3700
Fax:(909) 396-3330

COMPLETION LETTER

July 13, 2018

STEPHEN BARTLETT
HILLMANN CONSULTING
1745W. ORANGEWOOD AVE.# SUITE 110
ORANGE, CA 92868

Ref.: CONTROL NO. 96042
Received 7/10/2018

Re: EQL'S, NOV'S, N/C'S, COMPLAINTS, I/R'S, & ASBESTOS RECORDS FOR 20621 LAKE FOREST DR., LAKE FOREST, CA.

After a thorough search of this agency's records, the following records were found:
EQL'S, NOV'S, N/C'S, COMPLAINTS, & I/R'S FOR 20621 LAKE FOREST DR., LAKE FOREST, CA.

The following records were not found:
ASBESTOS RECORDS FOR 20621 LAKE FOREST DR., LAKE FOREST, CA.

YOUR REQUESTED RECORDS WERE PROVIDED ELECTRONICALLY ON 07/13/2018

If you have any questions, please do not hesitate to contact me, Tuesday through Friday, **8:00 a.m**. to **4:30 p.m.**

Sincerely,

STACEY WALKOWIAK x2383
For COLLEEN PAINE
Public Records Coordinator

:sw

SCAQMD Facility Equipment List Report

Facility: 106708 NAKASE BROTHERS WHOLESALE NURSERY Status: Active MR: SIC: Team: I
Last Inspection: 05/27/2016 On Hold: Suspended: TS: TS-11 Industrial: Sector-based Inspections Quarter: 0003 - inspect in 4th quarter, every three years
Contact: STEVE NAKASE (714) 8554388 RECLAIM: N TITLE V: N AIRS ID: Assignment: 1564635
Location Address: 20621 LAKE FOREST DR, LAKE FOREST 92630 Sector:OM Inspector: PC02 PETER CAMPBELL
Mailing Address: 9441 KREPP DR, HUNTINGTON BEACH 92646 Sector:OH Inspection Date: 05/27/2016
Instruction: Disposition: Notice Of Violation

Application No.	Permit No.	Permit Issue Date	Permit Status	Equipment Category	BCAT/CCAT Description	Application Date	Application Status
310229	N03666	03/13/1996	ACTIVE	248900 BCAT	STORAGE TANK GASOLINE	12/01/1995	PERMIT TO OPERATE GRANTED

REPORT: 05/27/16: At 1015 hours I arrived at the facility, a plant nursery. I met with Mr. Eliazar Najera, Maintenance Manager (714-317-8313) who accompanied me on the compliance inspection.

I observed:

1. P/O N03666 - A 1,000 gallon gasoline aboveground storage tank (AST) with dispensing station and 3 diesel ASTs with dispensing stations. Permit was posted (Rule 206 compliant) and equipment matched the permit description. Permit allowed no more than 1,000 gallons of gasoline dispensing and 2,000 gallons of diesel. On the gas dispensing station, the totalizing meter read 8036.5 gallons.
SLC - Tank was painted white and was equipped with a Husky 5885 PV valve. SLC compliant.
Phase I - Tank was not equipped with Phase I enhanced vapor recovery (EVR). Product coupling did not have a spill bucket or poppet valve, I was able to directly observe liquid in the tank which had an odor consistent with gasoline. Vapor coupling and emergency vent were also not EVR approved fittings.
Phase II - Emco Wheaton nozzle in good condition. Hoses, retractor and breakaway were in good condition.

Mr. Najera provided me with reverification tests dated 05/19/14 and 05/20/15 as well as throughput records indicating the facility used between 500 and 550 gallons of gasoline per month and between 550 and 600 gallons of diesel per month, in compliance with permit limits. I asked Mr. Najera if he was aware of the EVR requirements to which he said no. I explained the requirements to him after which he stated he had heard of the requirement from the last inspector. He stated he had been told by a previous inspector that if they were operating the tank during the next inspection they would be told to shut it down. He stated he was not aware they would be issued a Notice of Violation for continuing to operate. I requested that he provide fueling invoices for the year 2014.
Mr. Najera was unable to find the fueling invoices, so I issued NC E35172 to provide fueling invoices for the gasoline storage tank for the year 2014 under H&S 42303. I advised Mr. Najera that a Notice of Violation would be issued for failing to conduct the Phase I EVR upgrades. I also spoke with Mr. Steve Nakase, Owner, by telephone, who stated he believed the tank was exempt because it was used for agricultural purposes. I stated I would research Rule 461 applicability while I awaited the records. I departed the facility at 1125 hours.

Later that day, I received a fax from the facility with all fueling invoices from 2014. From these I determined 08/05/14 was the first day after the Phase I EVR deadline of 07/01/14 that the facility pumped gasoline into the tank. Facility is in compliance with NC E35172.

05/31/16: At 0905 hours I conducted a follow-up inspection. I spoke with Mr. Najera and explained that NOV would be issued. I then issued NOV P64066 for operating an AST without a CARB certified vapor recovery system.

At 0930 hours I departed the facility.

P. Campbell 06/01/16

Reviewed by F Gonzalez 07/01/16

Inspector: _____ Date: _____ Reviewed By: _____ Date: _____

User: swalko

SCAQMD Facility Equipment List Report

Run Date : 07/10/2018 02:03 PM

Facility: 106708 NAKASE BROTHERS WHOLESALE NURSERY
Status: Active
MR: SIC: Team: I
Last Inspection: 05/27/2016 On Hold: Suspended: TS: TS-11 Industrial: Sector-based Inspections
Quarter: 0003 - inspect in 4th quarter, every three years
Contact: STEVE NAKASE (714) 8554388 RECLAIM: N TITLE V: N AIRS ID:
Assignment: 1415171
Location Address: 20621 LAKE FOREST DR, LAKE FOREST 92630 Sector:OM
Inspector: NV02 NICK VOLPONE
Mailing Address: 9441 KREPP DR, HUNTINGTON BEACH 92646 Sector:OH
Inspection Date: 02/13/2014
Instruction:
Disposition: Operating in Compliance at time of inspection

Application No.	Permit No.	Permit Issue Date	Permit Status	Equipment Category	BCAT/CCAT Description	Application Date	Application Status
310229	N03666	03/13/1996	ACTIVE	248900 BCAT	STORAGE TANK GASOLINE	12/01/1995	PERMIT TO OPERATE GRANTED

Inspector: _____ Date: _____ Reviewed By: _____ Date: _____

User: swalko

SCAQMD Facility Equipment List Report

Run Date : 07/10/2018 02:03 PM

Facility: 106708 NAKASE BROTHERS WHOLESALE NURSERY
Status: Active
MR: SIC: Team: I
Last Inspection: 05/27/2016 On Hold: Suspended: TS: TS-11 Industrial: Sector-based Inspections
Quarter: 0003 - inspect in 4th quarter, every three years
Contact: STEVE NAKASE (714) 8554388 RECLAIM: N TITLE V: N AIRS ID:
Assignment: 1415171
Location Address: 20621 LAKE FOREST DR, LAKE FOREST 92630 Sector:OM
Inspector: NV02 NICK VOLPONE
Mailing Address: 9441 KREPP DR, HUNTINGTON BEACH 92646 Sector:OH
Inspection Date: 02/13/2014
Instruction:
Disposition: Operating in Compliance at time of inspection

Application No.	Permit No.	Permit Issue Date	Permit Status	Equipment Category	BCAT/CCAT Description	Application Date	Application Status

REPORT: On 2/13/14 at 0935 hours I conducted an annual compliance inspection of Nakase Brothers Wholesale Nursery located at 20621 Lake Forest Dr., Lake Forest. I met with Mr. Eliazar Najera (cell 714.317.8313/949.855.4388), Maintenance Manager. He escorted me on the inspection and is the individual responsible for the gasoline dispensing system.

The facility has a single permit, N03666, for a gasoline dispensing system.

P/O N03666, I observed the following;

"1,000-gallon gasoline balance system AST, Phase I vapor recovery (G-70-116-E) matching the permit description dimensions. No manufacture's/specification plate was available.

"1 dispenser dispensing 1 product (87), Phase II Emco Weaton nozzle with a hose retractor.

"AQMD decals are present, hose, nozzle/gaskets in good condition.

"Depth of fill tube measured at 1"

"PV valve correct and in good condition.

The permit and associated records were available at this time. I observed and smelled gasoline in the tank.

"Daily dispensing records and purchase invoices showed approximately 650-800 gallons of gasoline are dispensed each month, in compliance with permit throughput limit of gallons/month and gallons/year.

"The most recent reverification tests were available and showed passing test results (conducted by Belshire Environmental) dated 5/31/12 and 5/24/13.

I discussed SCAQMD Rule 461 Phase I EVR and SLC requirements with Mr. Najera. The facility was operating in compliance at the time of inspection. I completed my inspection and departed at 1025 hours.

Reviewed by FG0302/28/14

Inspector: _____ Date: _____ Reviewed By: _____ Date: _____

SCAQMD Facility Equipment List Report

Facility: 106708 NAKASE BROTHERS WHOLESALE NURSERY Status: Active MR: SIC: Team: I
Last Inspection: 05/27/2016 On Hold: Suspended: TS: TS-11 Industrial: Sector-based Inspections Quarter: 0003 - inspect in 4th quarter, every three years
Contact: STEVE NAKASE (714) 8554388 RECLAIM: N TITLE V: N AIRS ID: Assignment: 1279259
Location Address: 20621 LAKE FOREST DR, LAKE FOREST 92630 Sector:OM Inspector: NV02 NICK VOLPONE
Mailing Address: 9441 KREPP DR, HUNTINGTON BEACH 92646 Sector:OH Inspection Date: 01/04/2012
Instruction: Disposition: Notice To Comply

Application No.	Permit No.	Permit Issue Date	Permit Status	Equipment Category	BCAT/CCAT Description	Application Date	Application Status
310229	N03666	03/13/1996	ACTIVE	248900 BCAT	STORAGE TANK GASOLINE	12/01/1995	PERMIT TO OPERATE GRANTED

Inspector: _____ Date: _____ Reviewed By: _____ Date: _____

SCAQMD Facility Equipment List Report

Facility: 106708 NAKASE BROTHERS WHOLESALE NURSERY Status: Active MR: SIC: Team: I
Last Inspection: 05/27/2016 On Hold: Suspended: TS: TS-11 Industrial: Sector-based Inspections Quarter: 0003 - inspect in 4th quarter, every three years
Contact: STEVE NAKASE (714) 8554388 RECLAIM: N TITLE V: N AIRS ID: Assignment: 1279259
Location Address: 20621 LAKE FOREST DR, LAKE FOREST 92630 Sector:OM Inspector: NV02 NICK VOLPONE
Mailing Address: 9441 KREPP DR, HUNTINGTON BEACH 92646 Sector:OH Inspection Date: 01/04/2012
Instruction: Disposition: Notice To Comply

Application No.	Permit No.	Permit Issue Date	Permit Status	Equipment Category	BCAT/CCAT Description	Application Date	Application Status

REPORT: On 1/4/12 at 0955 hours I conducted an annual compliance inspection of Nakase Brothers Wholesale Nursery located at 20621 Lake Forest Dr., Lake Forest. I found the office (follow office/trucking signs) and was introduced to Mr. Eliazar Najera (cell 714.317.8313/949.855.4388), Maintenance Manager. He escorted me on the inspection and is the individual responsible for the gasoline dispensing system.

The facility has a single permit, N03666, for a gasoline dispensing system.

P/O N03666, I observed the following;

"1,000-gallon gasoline balance system AST, Phase I vapor recovery (G-70-116-E) matching the permit description dimensions. No manufacture's/specification plate was available.

"1 dispenser dispensing 1 product (87), Phase II Emco Weaton nozzle with a hose retractor.

"AQMD decals are present, holes in hose, nozzle/gaskets in good condition.

"Depth of fill tube measured at 1"

"PV valve correct and in good condition.

The permit and associated records were available at this time. I observed, smelled, and measured the amount (using the facility's fill stick) gasoline in the tank.

"Daily dispensing records and purchase invoices showed approximately 700-900 gallons of gasoline are dispensed each month, in compliance with permit throughput limit of 1,000 gallons/month and 12,000 gallons/year.

"The most recent reverification tests were available and showed passing test results (conducted by Belshire Environmental) dated 5/5/10 and 5/27/11.

I inspected a LPG tank located on the property (435 gallons, SN 01898), R219(m)(2)(A) exempt.

I also inspected a portable Miller Big 40 (ICE model TM20, SN 890827) welder with an hour meter reading of 1689.3. I will research this model to see if the engine is greater than 50 Hp.

I issued NC E12073 to Nakase Brothers Wholesale Nursery for AQMD Rule 461. The NC stated; Replace torn gasoline hose on AST (permit # N03666). The NC was served to Mr. Eliazar Najera. I departed the

Inspector: _____ Date: _____ Reviewed By: _____ Date: _____

SCAQMD Facility Equipment List Report

Facility: 106708 NAKASE BROTHERS WHOLESALE NURSERY Status: Active MR: SIC: Team: I
Last Inspection: 05/27/2016 On Hold: Suspended: TS: TS-11 Industrial: Sector-based Inspections Quarter: 0003 - inspect in 4th quarter, every three years
Contact: STEVE NAKASE (714) 8554388 RECLAIM: N TITLE V: N AIRS ID: Assignment: 1279259
Location Address: 20621 LAKE FOREST DR, LAKE FOREST 92630 Sector:OM Inspector: NV02 NICK VOLPONE
Mailing Address: 9441 KREPP DR, HUNTINGTON BEACH 92646 Sector:OH Inspection Date: 01/04/2012
Instruction: Disposition: Notice To Comply

Application No.	Permit No.	Permit Issue Date	Permit Status	Equipment Category	BCAT/CCAT Description	Application Date	Application Status

facility at 1110 hours.

N.Volpone 1/4/11

[Reviewed by K. Melville 1/17/12]

NC Follow-up

On 1/9/12 via facsimile I was provided an invoice (California Fuels and Lubricants 714.530.4795, invoice # 22145, dated 1/9/12) showing that the gasoline hose has been replaced. I have put NC E12073 into compliance.

N.Volpone 2/15/12

[Reviewed by K.Melville 3/9/12]

Inspector: _____ Date: _____ Reviewed By: _____ Date: _____

SCAQMD Facility Equipment List Report

Facility: 106708 NAKASE BROTHERS WHOLESALE NURSERY Status: Active MR: SIC: Team: I
Last Inspection: 05/27/2016 On Hold: Suspended: TS: TS-11 Industrial: Sector-based Inspections Quarter: 0003 - inspect in 4th quarter, every three years
Contact: STEVE NAKASE (714) 8554388 RECLAIM: N TITLE V: N AIRS ID: Assignment: 1001201
Location Address: 20621 LAKE FOREST DR, LAKE FOREST 92630 Sector:OM Inspector: AS02 AHMAD SOLTANI
Mailing Address: 9441 KREPP DR, HUNTINGTON BEACH 92646 Sector:OH Inspection Date: 06/28/2007
Instruction: Disposition: Operating in Compliance at time of inspection

Application No.	Permit No.	Permit Issue Date	Permit Status	Equipment Category	BCAT/CCAT Description	Application Date	Application Status
310229	N03666	03/13/1996	ACTIVE	248900 BCAT	STORAGE TANK GASOLINE	12/01/1995	PERMIT TO OPERATE GRANTED

REPORT: 06/28/2007 (09:15 AM - 09:55 AM), I arrived at the nursery for an annual inspection and contacted Misters Yosh Kubota and Eliazar Najera. The last time the nursery was inspected was 1999 and the nursery has an above ground permitted gasoline tank with phase I & II vapor recovery system. Next three days the husbandry fueling facilities are not going to be exempt from Rule 461. The facility was in compliance with Rule 461 requirements but didn't have the original and the annual reverification vapor recovery tests. The disposition for the inspection was operating in compliance but I need to inform the facility with a Notice to Comply that they need to perform the annual test.

Inspector: _____ Date: _____ Reviewed By: _____ Date: _____

South Coast Air Quality Management District

NOV P64066

Run Date : 7/10/2018 14:04:02

Company

Facility:	NAKASE BROTHERS WHOLESALE NURSERY (ID: 106708)
Location Address:	20621 LAKE FOREST, DR LAKE FOREST, CA 92630
Mailing Address:	9441 KREPP, DR HUNTINGTON BEACH, CA 92646
AIRS ID	

Violation

Notice Issued Date:	5/31/2016
Violation Date:	8/5/2014
Serve To:	ELIAZAR NAJERA
Title:	MAINTENANCE MANAGER
Issue By:	PETER CAMPBELL (Team: I)
Assignment No.:	1564650
Equipment Description:	

Violation: Operating an aboveground storage tank (AST) without CARB certified vapor recovery system.

Disposition

Final Action Code:	CLO 5/19/2017 00:00:00
Achieved Date:	08/12/2016
Due Date:	
Violation Days:	0

Rule/Comment

461

Emittent

Follow-Up

Status: INCOMP Inspector ID: PC02 Inspection Date: 08/12/16 00:00 Number:

Lap Sample Numbers

Device IDs.

Inspector Comment

08/12/16: At 1445 hours I arrived at the facility to conduct a follow-up to NOV P64066. I met with Mr. Najera who accompanied me on the inspection. I observed the non-compliant gasoline AST had been drained by looking directly down the fill coupling. The facility had installed a 240 gallon Containment Solutions gasoline AST, Rule 461 exempt. I determined the facility was in compliance with NOV P64066.

INSPECTOR: _____ DATE: _____
signature

SUPERVISOR: _____ DATE: _____
signature

User ID: swalko

South Coast Air Quality Management District

NOV P24583

Run Date : 7/10/2018 14:04:15

Company

Facility:	NAKASE BROTHERS WHOLESALE NURSERY (ID: 106708)
Location Address:	20621 LAKE FOREST, DR LAKE FOREST, CA 92630
Mailing Address:	9441 KREPP, DR HUNTINGTON BEACH, CA 92646
AIRS ID	

Violation

Notice Issued Date:	7/16/1999
Violation Date:	7/16/1999
Serve To:	ELIAZAR NASERA
Title:	SUPERVISOR
Issue By:	THOMAS C FRAZIER (Team: I)
Assignment No.:	594699
Equipment Description:	AS ABOVE
Violation:	USING A GAS DISPENSING NOZZLE WITH NO BUILT-IN CHECK VALVE (EMCO WHEATON 4001).

Disposition

Final Action Code:	CLO 12/14/1999 00:00:00
Achieved Date:	
Due Date:	
Violation Days:	0

Rule/Comment

461 c2C & E

Emittent

Follow-Up

Status: Inspector ID: Inspection Date: Number:

Lap Sample Numbers

Device IDs.

Inspector Comment

I met with Mr. Eliazar Najera, Supevisor (949-855-4388), for the inspection of Nakase Brothers Wholesale Nursery's gasoline storage and dispensing facility on July 16, 1999. The main purpose of the inspection was to check the facility's compliance with S.C.A.Q.M.D. Rule 461.

The facility does not sell gasoline and has the primary purpose of fueling maintenance vehicles.

During my inspection, I observed that the one (1) nozzle dedicated to dispensing gasoline did not have a built-in check valve. I noted the nozzle to be an Emco Wheaton, model 4001. I explained to Mr. Najera that the equipment was in violation with S.C.A.Q.M.D. Rule 461 (c)(2)(C) & (E) because the nozzle was not certified with CARB Executive Orders (operating a nozzle with no built-in check valve in a vapor balance system). I issued Mr. Najera Notice of Violation (NOV) # P24582 for violating S.C.A.Q.M.D. Rule 461 (c)(2)(C) & (E). Mr. Najera told me that he would replace the nozzle with a compliant model as soon as possible.

INSPECTOR: _____ DATE: _____
signature

SUPERVISOR: _____ DATE: _____
signature

User ID: swalko

I received a phone call from Mr. Najera on July 20, 1999. Mr. Najera told me that the violating nozzle had been replaced with a compliant model (Emco Wheaton 4005).

I inspected the facility on August 8, 1999 and found that a compliant nozzle had been installed (Emco Wheaton, model 4005). The facility was in compliance with Rule 461 (c)(2)(C) & (E).

ATTACHMENTS: (1)
1. Copy of Permit to Operate #N03666

INSPECTOR: _____ DATE: _____
signature

SUPERVISOR: _____ DATE: _____
signature

User ID: swalko

South Coast Air Quality Management District

NC E35172

Run Date : 7/10/2018 14:04:32

Company

Facility:	NAKASE BROTHERS WHOLESALE NURSERY (ID: 106708)
Location Address:	20621 LAKE FOREST, DR LAKE FOREST, CA 92630
Mailing Address:	9441 KREPP, DR HUNTINGTON BEACH, CA 92646
AIRS ID	

Violation

Notice Issued Date:	5/27/2016
Violation Date:	5/27/2016
Serve To:	ELIAZAR NAJERA
Title:	MAINTENANCE MANAGER
Issue By:	PETER CAMPBELL (Team: I)
Assignment No.:	1564640
Compliance Achieved Date:	05/27/2016
Equipment Description:	
Compliance Requirements:	Provide fueling invoicees for gasoline storage tank for 2014.

Disposition

Final Action Code:	CLO 6/1/2016 00:00:00
Due Date:	6/3/2016
Violation Days:	0

Rule/Comment

42303

Emittent

Follow-Up

Status: INCOMP Inspector ID: PC02 Inspection Date: 05/27/16 00:00 Number:

Device IDs.

Inspector Comment

INSPECTOR: _____ DATE: _____

signature

SUPERVISOR: _____ DATE: _____

signature

User ID: swalko

South Coast Air Quality Management District

NC D09991

Run Date : 7/10/2018 14:04:45

Company

Facility:	NAKASE BROTHERS WHOLESALE NURSERY (ID: 106708)
Location Address:	20621 LAKE FOREST, DR LAKE FOREST, CA 92630
Mailing Address:	9441 KREPP, DR HUNTINGTON BEACH, CA 92646
AIRS ID	

Violation

Notice Issued Date:	7/17/2007
Violation Date:	7/17/2007
Serve To:	ELIAZAR KUBOTA
Title:	MAINTENANCE MGR.
Issue By:	AHMAD SOLTANI (Team: L)
Assignment No.:	1006992
Compliance Achieved Date:	08/24/2007
Equipment Description:	
Compliance Requirements:	PERFORM REVERIFICATION TESTS AND PROVIDE THE TEST RESULTS.

Disposition

Final Action Code:	CLO 8/24/2007 00:00:00
Due Date:	7/31/2007
Violation Days:	0

Rule/Comment

461

Emittent

Follow-Up

Status: INCOMP Inspector ID: AS02 Inspection Date: 08/24/07 00:00 Number:

Device IDs.

Inspector Comment

INSPECTOR: _____ DATE: _____

signature

SUPERVISOR: _____ DATE: _____

signature

User ID: swalko

South Coast Air Quality Management District

NC A20446

Run Date : 7/10/2018 14:04:53

Company

Facility:	NAKASE BROTHERS WHOLESALE NURSERY (ID: 106708)
Location Address:	20621 LAKE FOREST, DR LAKE FOREST
Mailing Address:	20621 LAKE FOREST, DR, CA 92630
AIRS ID	

Violation

Notice Issued Date:	11/16/1995
Violation Date:	11/16/1995
Serve To:	NAKASE BROTHERS WHOLESALE NURSERY
Title:	
Issue By:	AHMAD SOLTANI (Team: L)
Assignment No.:	488409
Compliance Achieved Date:	01/03/1996
Equipment Description:	FUEL DISPENSING
Compliance Requirements:	SUBMIT APPL FOR P/O FOR GAS & DIESEL FUELING FACILITY. 203a *A/N 310229

Disposition

Final Action Code:	
Due Date:	11/30/1995
Violation Days:	0

Rule/Comment

203 PERMIT OPERATE OR CONDITIONS

Emittent

Follow-Up

Status: Inspector ID: Inspection Date: 01/03/96 00:00 Number:

Device IDs.

Inspector Comment

INSPECTOR: _____ DATE: _____

signature

SUPERVISOR: _____ DATE: _____

signature

User ID: swalko

South Coast Air Quality Management District

NC E12073

Run Date : 7/10/2018 14:06:18

Company

Facility:	NAKASE BROTHERS WHOLESALE NURSERY (ID: 106708)
Location Address:	20261 LAKE FOREST, DR LAKE FOREST, CA 92630
Mailing Address:	9441 KREPP, DR HUNTINGTN BCH, CA 92646
AIRS ID	

Violation

Notice Issued Date:	1/4/2012
Violation Date:	1/4/2012
Serve To:	ELIAZAR NAJERA
Title:	MAINTENANCE MANAGER
Issue By:	NICK VOLPONE (Team: I)
Assignment No.:	1279276
Compliance Achieved Date:	02/15/2012
Equipment Description:	AST
Compliance Requirements:	Replace torn gasoline hose on AST (permit N03666).

Disposition

Final Action Code:	CLO 2/15/2012 00:00:00
Due Date:	1/11/2012
Violation Days:	0

Rule/Comment

461

Emittent

Follow-Up

Status: INCOMP Inspector ID: NV02 Inspection Date: 02/15/12 00:00 Number:

Device IDs.

Inspector Comment

INSPECTOR: _____ DATE: _____

signature

SUPERVISOR: _____ DATE: _____

signature

User ID: swalko

SCAQMD Complaint Report

Complaint 116585

Run Date: 7/10/2018 14:07:17

Receive By:	YVONNEC on 7/24/1998 13:17:09	Assignment No:	577071
Assign By:	EDNAB on 7/24/1998 14:30:59	Inspector:	(AS02)
Dispatch On:	7/24/1998	Instruction:	
Team:	K		
Type:	SMOKE		

Inspection Date

Description: SMOKE FROM BURNING NOW

Instance Start Date: Instance End Date:

Complainant

First Name: Last Name:

Address:

Phone:

Alleged Source

Name: UNK (NURSERY)

Address: BAKE/TOWNE CTR, EL TORO, CA 92610 (Sector OM)

Actual Source

Name: NAKASE BROTHERS WHOLESALE NURSERY ID: 106708

Address: 20621 LAKE FOREST DR, LAKE FOREST, CA 92630 (Sector OM)

Facility TS: TS-11 Industrial: Sector-based Inspections

Disposition

OC on 8/6/1998 15:42:23

Inspector Comment

07/24/98, 16:05 PM, I SPOKE TO THE COMPLAINANT OVER THE CEL. PHONE. I ARRIVED AT THE NURSERY CALLED NAKASE BROTHERS WHOLESALE NURSERY. I CONTACTED LEO CAMADINI & ELIAZAR NAJERA. THE CO. OBTAINED AN OPEN BURN PERMIT FROM THE FIRE DEPT. AND AQMD AND CALLED ON 07/24/98 WITH VERIFICATION NO. OF 590. THERE WAS NO OPEN BURNING DURING THE INSPECTION.

INSPECTOR: signature _____ DATE: _____

SUPERVISOR: signature _____ DATE: _____

SCAQMD Complaint Report

Complaint 143522

Run Date: 7/10/2018 14:07:30

Receive By:	MARYLYNG on 7/28/2001 10:33:00	Assignment No:	664614
Assign By:	sharonf on 7/31/2001 07:50:27	Inspector:	(AS02)
Dispatch On:	7/31/2001	Instruction:	
Team:	I		
Type:	SMOKE		
Inspection Date			
Description:	SMOKE FROM BURNING		
Instance Start Date:		Instance End Date:	

Complainant

First Name: Last Name:

Address:

Phone:

Alleged Source

Name: NAKASE NURSERY

Address: LAS ALITA, FOOTHILL RANCH, CA 92610 (Sector OM)

Actual Source

Name: NAKASE BROTHERS WHOLESALE NURSERY ID: 106708

Address: 20621 LAKE FOREST DR, LAKE FOREST, CA 92630 (Sector OM)

Facility TS: TS-11 Industrial: Sector-based Inspections

Disposition

OC on 8/1/2001 17:57:21

Inspector Comment

INSPECTOR: signature _____ DATE: _____

SUPERVISOR: signature _____ DATE: _____

User ID: swalko

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

JUL 19 2018

Ms. Kristine Savona
1745 West Orangewood Avenue Suite 110
Orange, California 92868

Re: Freedom of Information Act Request EPA-R9-2018-009397

Dear Ms. Kristine Savona:

This is in response to your Freedom of Information Act request regarding:

20621 Lake Forest Drive, Lake Forest, California 92630.

I wish to advise you that Region 9 has no records responsive to your request.

All FOIA related documents, including this letter (invoice if applicable), have been uploaded to EPA's FOIAOnline system found at https://foiaonline.regulations.gov/foia/action/public/home. Please be sure to reference your FOIA request as EPA-R9-2018-009397 to access this record.

This letter concludes our response to your request. You may appeal this response by email at hq.foia@epa.gov, or by mail to the National Freedom of Information Office, U.S. EPA, 1200 Pennsylvania Avenue, N.W. (2822T), Washington, DC 20460 (U.S. Postal Service Only). Only items mailed through the United States Postal Service may be delivered to 1200 Pennsylvania Avenue, N.W. If you are submitting your appeal via hand delivery, courier service, or overnight delivery, you must address your correspondence to 1301 Constitution Avenue, N.W., Room 6416J, Washington, DC 20004. Your appeal must be made in writing, and it must be received no later than 90 calendar days from the date of this letter. The Agency will not consider appeals received after the 90 calendar day limit. Appeals received after 5:00 pm EST will be considered received the next business day. The appeal letter should include the FOIA tracking number listed above. For quickest possible handling, the subject line of your email, the appeal letter, and its envelope, if applicable, should be marked "Freedom of Information Act Appeal." Additionally, you may seek resolution services from EPA's FOIA Public Liaison at hq.foia@epa.gov or (202)566-1667, or from the Office of Government Information Services (OGIS). You may contact OGIS in any of the following ways: by mail, Office of Government Information Services, National Archives and Records Administration, Room 2510, 8610 Adelphi Road, College Park, MD 20740-6001; e-mail, ogis@nara.gov; telephone, 202-741-5770 or 1-877-684-6448; and facsimile, 202-741-5769.

The Land Division's RCRA Records Center is maintained by Toeroek Associates Inc., under contract to EPA Region 9. If you have any questions, please contact Colin Lee of Tetra Tech, Incorporated at 415-947-4597.

Sincerely,

Jeff Scott, Director
Land Division

FOIA Contact Information for State Offices
Region IX

Arizona

Arizona Department of Environmental Quality
1110 W. Washington St.
Phoenix, AZ 85007
Phone: (602) 771-4380

California

California EPA
Department of Toxic Substances Control
1001 I Street
P.O. Box 806
Sacramento, CA 95812-0806
Phone: (916) 322-0476

Hawaii

Hawaii Department of Health
Solid and Hazardous Waste Branch
919 Ala Moana Boulevard, Room #212
Honolulu, HI 96814
Phone: (808) 586-4226

Nevada

Department of Conservation & Natural Resources
Division of Environmental Protection
Bureau of Waste Management
901 South Stewart Street, Suite 4001
Carson City, NV 89701
Phone: (775) 687-9459

Guam

GUAM EPA
P.O. Box 22439 GMF
Barrigada, GU 96921
Phone: +1 (671) 475-1658

APPENDIX G

PROJECT PERSONNEL QUALIFICATIONS

HILLMANN
CONSULTING

James M. Riggs, MS, CHMM

Project Manager

EDUCATION:

M.S. Environmental Management, University of Maryland University College

B.S. Environmental Science, Unity College

CERTIFICATIONS:

Certified Hazardous Materials Manager #14391

OSHA 40-Hour HAZWOPER 29 CFR 1910.120

Annual 8-Hour HAZWOPER Refresher

EPA AHERA Asbestos Inspector, Maryland and Virginia

EPA AHERA Management Planner, Maryland

Maryland 40-Hour Lead Inspector/Risk Assessor Training Certificate

Virginia 40-Hour Lead Inspector/Risk Assessor Training Certificate

Maryland Department of the Environment, Drinking Water Sampler Certificate

Niton Radiation Safety Training Course

PROFESSIONAL EXPERIENCE:

Mr. Riggs is an experienced environmental scientist and project manager who has managed and performed environmental investigation, remediation and on-site health and safety projects at various sites throughout Maryland, Virginia, District of Columbia, Pennsylvania, South Carolina, Massachusetts, and Illinois. He is responsible for supervising work practices and controls in accordance with job specifications, current EPA, OSHA and state regulations.

Mr. Riggs assists in developing action plans to address industrial hygiene recommendations where required for protection of drinking water systems; respiratory protection; job safety analysis; work permits; and compliance with company-specified lead and asbestos action control programs. He also conducts occupational health and safety monitoring including petroleum, welding fume, chromium, and construction dust exposures.

As an Environmental Scientist, Mr. Riggs has assisted in the design of comprehensive health and safety compliance programs, conducted process hazard analyses, and performed facility-wide inspections for compliance and hazards including radon, lead, asbestos, and indoor air quality. Mr. Riggs is also an experienced Project Manager, working on national accounts for which Hillmann is responsible for conducting site-wide and process-wide industrial hygiene audits encompassing regulatory compliance, employer liability, and worker satisfaction. He has presented training courses on industrial hygiene, safety, and environmental issues.

His work has included Phase I Environmental Site Assessments (ESAs); Phase II ESAs; supervising the removal of underground storage tanks (USTs) and associated contaminated soil; performing site investigations to characterize the extent and severity of soil and groundwater contamination; managing the remediation of site contamination; coordinating remedial strategies with regulatory agencies; regulatory reporting; managing hazardous waste characterization and disposal; and performing asbestos inspections for demolition and renovation purposes.

In addition to ESAs and site characterizations, Mr. Riggs has extensive experience with underground storage tank (UST) assessments and is familiar with MD, VA, DC, PA, and SC UST programs. Mr. Riggs is experienced with various investigative techniques including geophysical investigations, multi-media sampling, direct-push drilling, and groundwater monitoring well installations.

Mr. Riggs is also well versed in various analytical procedures, techniques, QA/QC requirements, and sampling practices. Furthermore, Mr. Riggs has experience with various field-screening methods for a variety of contaminants, using

HILLMANN CONSULTING

monitoring instruments such as photoionization detectors, x-ray fluorescence analyzers, and confined space meters.

Mr. Riggs has also performed numerous indoor air quality studies and mold assessments at a variety of facilities in Maryland, Virginia, and the District of Columbia.

Some of Mr. Riggs' relevant project experience includes:

With Hillmann Consulting:

Tishman Speyer Properties, Various locations nationwide: Hillmann has provided the complete environmental program for Tishman Speyer's properties since 1987. Our services include environmental health and safety, industrial hygiene, phase I environmental site assessments, asbestos surveys, air monitoring, bid administration, O&M programs and indoor air quality programs on various commercial, industrial and multi-family residential properties. Mr. Riggs is an Environmental Scientist on this contract, conducting on-site environmental services including hazardous materials assessment, monitoring, and project management.

Citigroup – Complete Environmental Program, Various locations nationwide: Since 1995, Hillmann has been providing complete environmental program encompassing environmental health and safety, Phase I environmental site assessments, asbestos and lead surveys, air monitoring, bid administration and O&M programs, SPCC Plans, industrial hygiene and indoor air quality programs, geology services, radon testing and hazardous materials assessments on commercial, industrial and multi-family residential sites around the country. Mr. Riggs is an Environmental Scientist on this contract performing industrial hygiene services that include indoor air quality monitoring, water intrusion investigations and microbial assessments.

Fairfax County Public Schools, Fairfax County, VA: As Project Manager for this contract, Mr. Riggs provides oversight and management for this asbestos, lead, and mold consulting as well as various Indoor Air Quality projects. Mr. Riggs has also provided on-site health and safety services including occupational exposure monitoring. A total of 236 projects were completed in over 50 different school/center/office buildings without incident.

Diocese of Arlington, Fairfax, & Arlington Counties, VA: Mr. Riggs is the Project Manager overseeing hazardous materials and on-site environmental health and safety services including asbestos and lead assessments, indoor air quality investigations, and microbial consulting. Over 150 projects have been completed in 39 different buildings.

Tyson's Corner Center, McLean, VA: Hillmann provided asbestos and lead surveys, UST services, IAQ and mold services,

HILLMANN CONSULTING

and Phase I environmental site assessments. Mr. Riggs functioned as the Project Manager and Field Technician.

Tishman Speyer Properties: Subsurface Investigation and Soil Segregation on a City Block, Washington, DC: Hillmann was retained to perform subsurface investigations and soil segregation on a city block slated for construction. Several Phase II subsurface investigations were conducted on the site to determine environmental impacts to soil and groundwater. Subsurface investigations were conducted with both direct push and hollow stem auger technology. Analytical results indicated soil and groundwater contamination from metals and PAH compounds. Hillmann performed the process of advancing borings within the footprint of the planned excavation to pre-classify soils for regulatory disposal. Our team was then responsible for complete oversight of the segregation and disposal of impacted soil. Based on semi-volatile compounds identified in the soil from past use, Hillmann designed an injection program whereby a reagent was introduced into the excavation footprint. The injection program was 100% successful in removing all compounds above regulatory criteria. Metals were successfully removed and all residual PAH compounds remediated with a no further action letter received from the regulating agency. Mr. Riggs served as Environmental Assessor for this project.

<u>With previous firms:</u>

Montgomery General Hospital, Olney, MD: Completed 2008. Mr. Riggs completed a Phase I ESA of the hospital property. As a result, three areas of concern were identified; two areas with existing fuel oil USTs and one area suspected of having former USTs. Prior to performing the subsurface investigation, a private utility marker was retained to ensure the proposed soil boring locations were clear of any subsurface utilities. Soil borings were advanced in the vicinity of the existing and former USTs. During drilling, Mr. Riggs collected soil samples for field screening of relative levels of volatile organic compounds. Where there was evidence of petroleum impact, he would collect soil samples from that location; otherwise he collected soil samples from the soil-groundwater interface. Additionally, groundwater samples were collected from each boring location. The samples were submitted to a laboratory for chemical analysis.

Dry Cleaner Assessment and Remediation, Arlington, Virginia - Mr. Riggs performed a direct-push assessment, and subsequent well installation, at a former dry cleaner facility. Historic use of the site resulted in impacts to the soil and groundwater at the site by volatile organic compounds, most notably PCE and TCE. The site was subsequently entered into Virginia's Voluntary Remediation Program, and Mr. Riggs oversaw the design, installation, and operation of an air sparging remediation system at the site. After approximately 12

HILLMANN CONSULTING

months of operation, the groundwater quality at the site had significantly improved and the air sparging system was shut down.

Dewatering at Construction Sites - Maryland, Virginia, and District of Columbia - Mr. Riggs has both participated in field activities and managed subcontractors to recover petroleum-impacted groundwater from excavations at construction sites. Services included the recovery of the contaminated groundwater, the temporary on-site storage of recovered groundwater, and disposal of impacted groundwater either by on-site treatment, or off-site disposal at licensed facilities. These services were performed during the construction of parking garages, multi-story residential and office buildings, and at gasoline stations during the installation/repair of underground storage tanks.

Asbestos Surveys - Mr. Riggs has performed asbestos inspections and surveys on several buildings in Maryland, D.C. and Virginia. The buildings that have been inspected have included office buildings, retail buildings, churches, and various occupied and abandoned residences. Mr. Riggs has also performed asbestos inspections that were limited to specific areas that would be disturbed during remodeling activities.

Indoor Air Quality Investigations - Maryland, Virginia, and District of Columbia - Mr. Riggs has responded to numerous indoor air quality complaints. Mr. Riggs is familiar with the mechanical operations of building systems, allowing effective assessment of IAQ complaints as they relate to unusual odors, extreme humidity, poor air circulation, and mold. Mr. Riggs numerous IAQ investigations for building tenants, property management companies, and construction contractors.

Fuel Oil Release Evaluations - Maryland, Virginia, and District of Columbia - Mr. Riggs managed and supervised the implementation of groundwater assessments at apartment complexes and commercial office buildings in Maryland, Virginia, and the District of Columbia. The projects involved the installation of groundwater wells, groundwater sampling and analysis for petroleum constituents, and groundwater flow characterization tests.

Army Facility, Arlington, Virginia – Mr. Riggs performed subsurface sampling to assess soil conditions following a release of ethylene glycol from storage tanks associated with the air conditioning system at a military facility in Virginia. The extent of the contamination was delineated and the impacted soil was subsequently excavated and removed from the site.

Non-Permitted Landfill Assessment, Fairfax County, Virginia - Mr. Riggs performed a subsurface evaluation quantifying the nature and extent of soil and groundwater contamination at a former non-permitted landfill site. The evaluation included the installation and sampling of shallow

HILLMANN CONSULTING

and deep groundwater monitoring well clusters, groundwater flow analysis, and exposure pathway analyses. Based on the results of the evaluation, Mr. Riggs was able to quantify the amount of soil requiring excavation from the former landfill area, and present a remedial work plan to contractors in order to solicit bids for cleanup of the site.

Underground Storage Tank Removal – Maryland, Virginia, and District of Columbia – Mr. Riggs has participated in many aspects of UST removal projects ranging from collecting environmental samples and screening soil samples with a PID, to soliciting bids from removal contractors and managing UST removal/replacement projects on behalf of property owners. Mr. Riggs has successfully worked with the appropriate environmental regulatory authority to provide the necessary UST closure documentation, and if necessary, to develop and implement a remedial action strategy to evaluation petroleum releases identified during the UST removal activities.

Hazardous Waste Disposal Projects - Mr. Riggs has supervised various projects that have included the identification and characterization of waste streams, profiling with disposal facilities, preparation of wastes for shipments, and final reporting.

Firing Range Projects – Mr. Riggs has managed environmental assessment activities at former firing range sites in Virginia and Maryland. Mr. Riggs successfully developed sampling plans to characterize residual lead impact to firing lanes, impact berms, and shot fall-out zones. Sampling techniques included in-situ soil screening of lead concentrations using an XRF instrument, along with collecting soil samples for laboratory analysis.

HILLMANN
CONSULTING

LIMITED PHASE II SUBSURFACE INVESTIGATION REPORT

20621 LAKE FOREST DRIVE, LAKE FOREST, CALIFORNIA

Prepared For:

Toll Brothers
725 Town and Country Road, Suite 200
Orange, California 92868

Hillmann Project Number C3-7330

November 26, 2018

Written By:
Hillmann Consulting, LLC

Dan Louks
Professional Geologist 4883

PROFESSIONAL GEOLOGIST
DANIEL R. LOUKS
NO. 4883
EXP. NOV. 30, 2019
STATE OF CALIFORNIA

HILLMANN
CONSULTING

November 26, 2018

Mr. Ilan Feingold
Toll Brothers
725 Town and Country Road, Suite 200
Orange, California 92868

RE: Limited Phase II Subsurface Investigation Report
20621 Lake Forest Drive
Lake Forest, California
Hillmann Project Number: C3-7330

Dear Mr. Feingold:

Hillmann Consulting, LLC, is pleased to provide this Limited Phase II Subsurface Investigation Report prepared for the above referenced property.

This report is for the exclusive use of the entities named on the front cover, its affiliates, designates and assignees, rating agencies, prospective bond holders and bond holders, and no other party shall have any right to rely on any service provided by Hillmann Consulting, LLC, without prior written consent.

We appreciate the opportunity to provide environmental due diligence services. If you have any questions concerning this report, or if we can assist you in any other matter, please contact the Project Manager at 714-634-9500.

Very Truly Yours,
Hillmann Consulting, LLC

Brandon Clements
Partner; Western Regional Director

TABLE OF CONTENTS

1.0 INTRODUCTION / BACKGROUND 1
2.0 GEOLOGY/HYDROGEOLOGY 1
3.0 SITE INVESTIGATION 2
3.1 Laboratory Results 3
4.0 CONCLUSIONS AND RECOMMENDATIONS 3
5.0 LIMITATIONS 3

LIST OF TABLES

TABLE 1 - Summary of Soil Gas Sampling Results

LIST OF FIGURES

FIGURE 1 - Site Vicinity Map

FIGURE 2 - Site Diagram

FIGURE 3 - Maintenance Area Detail

LIST OF APPENDICES

APPENDIX A - Site Photos

APPENDIX B - Laboratory Report

APPENDIX C - Drilling Logs

APPENDIX D - Soil Gas Monitoring Data

1.0 INTRODUCTION / BACKGROUND

Hillmann Consulting, LLC (Hillmann) conducted a Limited Phase II Subsurface Investigation at 20621 Lake Forest Drive, Lake Forest, California (**Figure 1**). The subject Property is located between Lake Forest Drive and Bake Parkway, just southwest of Rancho Parkway, in a mixed use commercial-residential section of Lake Forest. The Property occupies approximately 122 acres and is being considered for residential development.

In August 2018, Hillmann completed a Phase I Environmental Site Assessment for the Property. The Property has historically been used for agricultural purposes and is currently operated as a nursery. Records indicate there had been an underground tank located in the southeast portion of the Property in the maintenance area, and there are no records of its removal. Based on these results, Hillmann recommended conducting a geophysical survey to investigate this portion of the site for evidence of existing or former USTs and conducting a preliminary subsurface investigation to address possible vapor intrusion concerns. These results are presented in Hillmann's *"Phase I Environmental Site Assessment Report"* dated July 13, 2018 and updated September 10, 2018.

In November 2018, Hillmann completed a Limited Phase II Subsurface Investigation at the Property that included conducting a geophysical study to identify potential UST locations, followed by soil gas sampling to identify potential contamination from targeted locations in the maintenance area. The current investigation is an independent assessment of the site that was constrained by time and cost factors as part of a self-directed effort. The objective of this work was to determine the current representative subsurface conditions in accessible areas of the site.

The investigation featured soil gas sampling which was considered very important in determining possible vapor intrusion impacts. Results from soil gas sampling indicated no detectable levels of VOC in any of the soil gas samples, indicating no significant vapor intrusion threat from these areas.

2.0 GEOLOGY/HYDROGEOLOGY

Based on the drilling logs, shallow soils beneath the site consist primarily of silty sand and silt from near surface to 12 feet below grade, the deepest interval explored by drilling in this investigation. Groundwater was not encountered during drilling to 12 feet below grade. Descriptions of the sediments encountered during drilling are presented in the drilling logs (**Appendix C**).

Based on information available on the GeoTracker website, groundwater is present at about 75-100 feet below grade at a site located about 1.6 miles west of the Property (Musick Branch Jail, 13502 Musick Road, Irvine, CA, Global ID-T0605901583).

3.0 SITE INVESTIGATION

On November 13, 2018, Hillmann oversaw a geophysical survey performed by Pacific Coast Locators to locate an existing UST or target the location of a former UST if it had been removed in the past. Results of the ground penetrating radar work identified a rectangular area that indicated it was recently backfilled, suggesting the location of the former UST. Maintenance personnel also confirmed that the UST was removed from that targeted area in the southeast portion of the Site.

On November 14, 2018, Hillmann installed 4 soil gas probes (SG1-SG4) in accessible areas of the maintenance area. Probes SG1 and SG2 were installed in the garage area to 5 feet below grade where tools and equipment was maintained. Probes SG3 and SG4 were installed in the former UST area identified by the geophysical study to total depths of 12 and 8 feet below grade. The probes were installed using hand auger tools. During drilling, the soil column was logged by a California Professional Geologist. The locations of the borings are indicated on **Figure 3**.

The probes consist of plastic micro-porous vapor implants that are approximately 2 inches long with a 0.5-inch outside diameter, connected to 0.25-inch outside diameter nylaflow tubing that extended above the surface. The annulus around the vapor implants was backfilled with approximately 0.5 feet of screen-washed #3 sand. The probes were sealed using bentonite placed immediately above the sand pack to provide a secure borehole seal. The probes were finished with gas-tight fittings at the surface pending vapor purging and sampling.

The soil gas sampling probes were allowed to equilibrate for at least 48 hours before collecting vapor samples. Prior to vapor sampling, shut-in and leak tests were conducted on the probes. The probe head was attached to the sampling train assembly of Nylaflow tubing, valves, and fittings and connected to a purge pump. The pump was used to evacuate the sealed system using an applied vacuum of 100 inches of water column (in. WC). The vacuum on each probe was monitored for 90 seconds with the sampling train system sealed. After the shut-in test was validated, the sampling train was leak tested. Liquid isobutylene was applied around all connections in the sampling train to evaluate whether the system was sealed from ambient air leaks. A detection of 10 times the reporting limit of this compound might suggest that ambient air leakage had occurred.

The purpose of purging is to remove stagnant air from the vapor sampling train to ensure representative samples are obtained. The probes were purged using an adjustable vacuum pump set at 200 mL/minute. During purging, the soil gas was monitored for VOC, oxygen, and carbon dioxide content using a Mini-Rae 2000 multi gas detector to ensure that non-atmospheric formation air was being sampled (**Appendix D**).

After purging three volumes through the system, vapor samples were collected from the probes on November 16, 2018. During sampling, the purge pump was operated at 200 mL/minute, and the vacuum was monitored to ensure it was below 100 in. WC. Vacuum applied below this level helps ensure chemical partitioning from pore water to soil gas and the stress on the air seals are both minimized. The samples were containerized in Tedlar bags which were delivered to the laboratory for analysis. Fresh tubing was used on each sampling train between holes.

The soil gas samples were tested for VOC using EPA Method 8260B by A&R Laboratories of Ontario, California.

3.1 Laboratory Results

Results from soil gas sampling indicated none of the samples had detectable levels of VOC. These results are summarized in **Table 1**. The laboratory report from soil gas sampling is included in **Appendix B**.

4.0 CONCLUSIONS AND RECOMMENDATIONS

The Property has historically been used for agricultural purposes and is currently operated as a nursery. Records indicate there had been an underground tank located in the southeast portion of the Property in the maintenance area, and there are no records of its removal. Based on these results, Hillmann recommended conducting a geophysical survey to investigate this portion of the site for evidence of existing or former USTs and conducting preliminary subsurface investigation to address possible vapor intrusion concerns.

In November 2018, Hillmann installed 4 soil gas probes in accessible locations at the site. Results from soil gas sampling indicated no detectable levels of VOC indicating no significant vapor intrusion threat potential.

Based on these results, we recommended no further sampling at the portion of the site investigated.

5.0 LIMITATIONS

This Subsurface Investigation was performed in accordance with generally and currently accepted engineering practices and principles; however, the procedures and methodologies used in this investigation are not intended to meet all specific regulatory guidelines as this work was completed as a self-directed effort. Although the data in this report is indicative of subsurface conditions in areas investigated, no further conclusions regarding the absence or presence of subsurface contamination in other areas of the site should be construed or inferred other than those expressly stated in this report. The conclusions made are based on information obtained from field observations, independent laboratory analytical results, and from current and relevant Federal, State, regional, and local agencies.

TABLE 1
Summary of Soil Gas Sampling Results (ug/L)

Sample ID	Benzene	Toluene	Ethylbenzene	Xylenes	TCE	PCE	Other VOC
Sampled November 16, 2018							
SG1-5	ND<0.05	ND<0.1	ND<0.1	ND<0.2	ND<0.1	ND<0.1	ND
SG2-5	ND<0.05	ND<0.1	ND<0.1	ND<0.2	ND<0.1	ND<0.1	ND
SG3-12	ND<0.05	ND<0.1	ND<0.1	ND<0.2	ND<0.1	ND<0.1	ND
SG4-8	ND<0.05	ND<0.1	ND<0.1	ND<0.2	ND<0.1	ND<0.1	ND
Residential RSL	***0.0485****	***155****	***0.55***	***50***	***0.24***	***0.23****	*--*
Commercial RSL	***0.42****	***1,300****	***4.9***	***440***	***3.0***	***2.0****	*--*

*Notes: ND - Not Detected. EPA Regional Screening Levels (RSLs) are human health risk based screening levels used by EPA and DTSC to determine Health Risk in residential and commercial settings. *-Values modified for California by DTSC HERO Note 3. Screening levels for soil gas calculated using indoor air values and attenuation factors provided by DTSC. Please refer to laboratory report for complete results.*

FIGURES

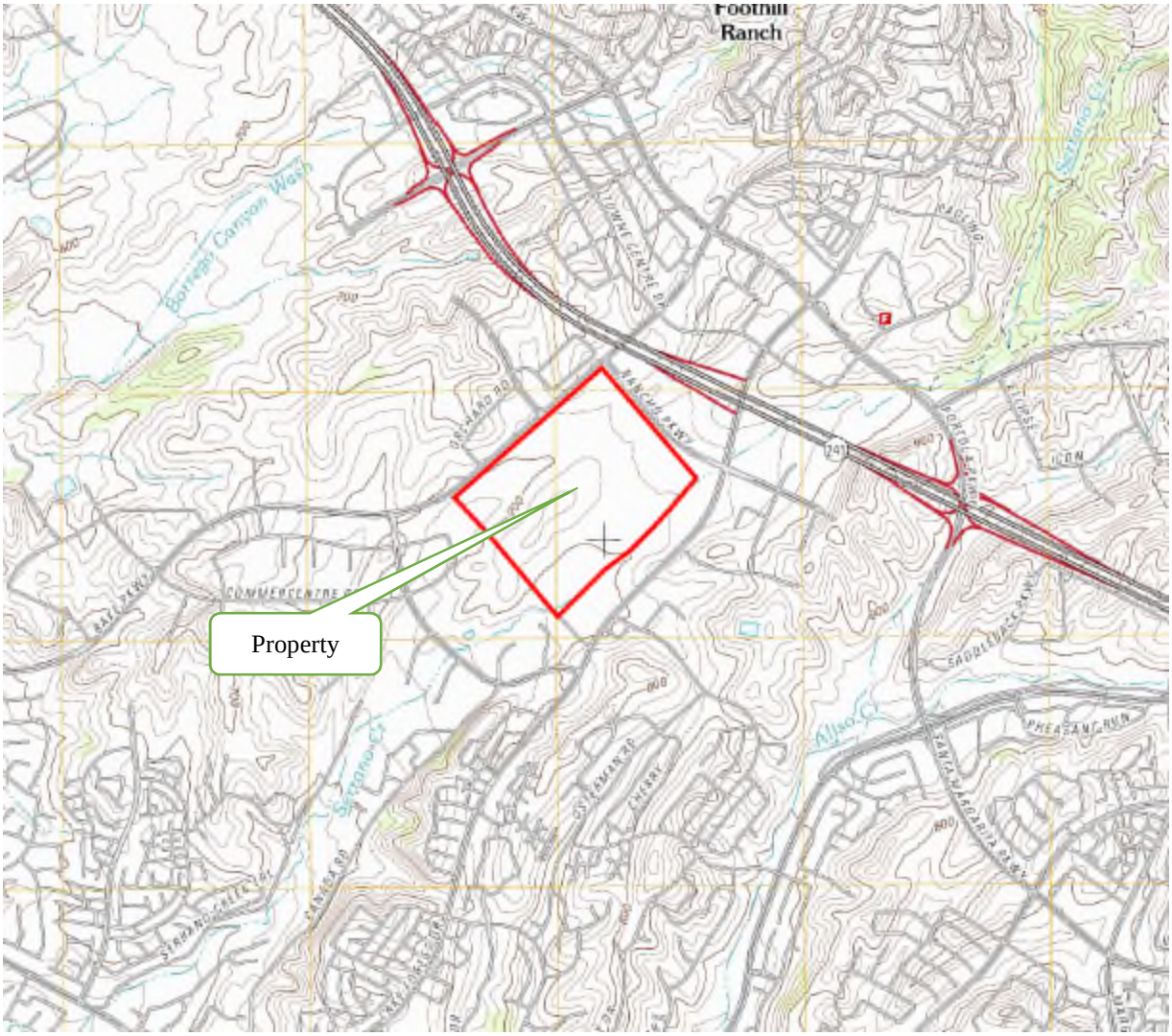


Figure 1: SITE VICINITY MAP	SCALE: (Not to Scale)	N

HILLMANN CONSULTING

Project Location:	20621 Lake Forest Drive Lake Forest, CA 92630
Project No.:	C3-7216

Figure 2: SITE DIAGRAM	SCALE: (Not to Scale)	N ↑

HILLMANN CONSULTING

Project Location:	20621 Lake Forest Drive Lake Forest, CA 92630
Project No.:	C3-7216

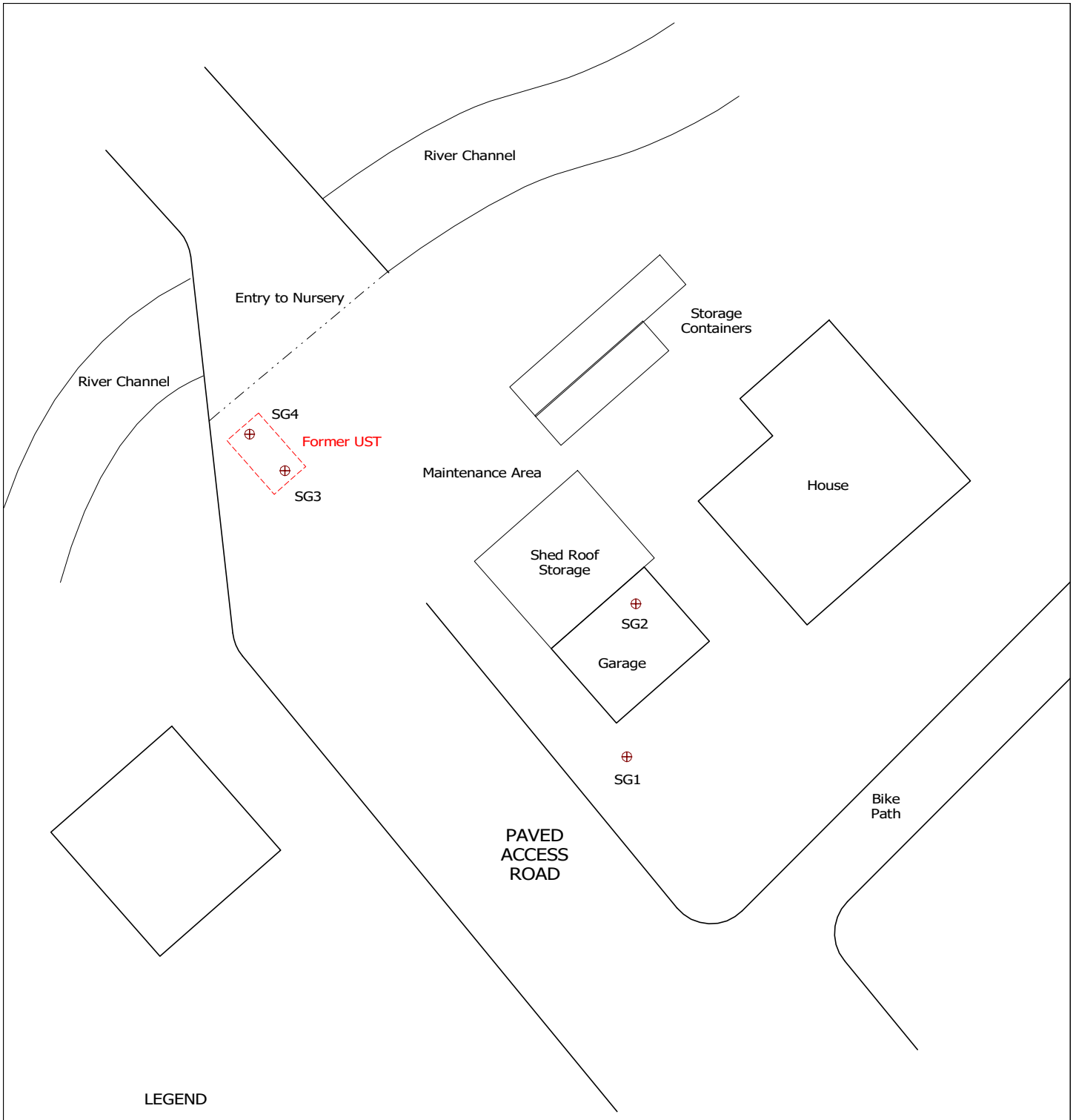


FIGURE 3
MAINTENANCE AREA DETAIL
20621 Lake Forest Drive
Lake Forest, California

HILLMANN CONSULTING

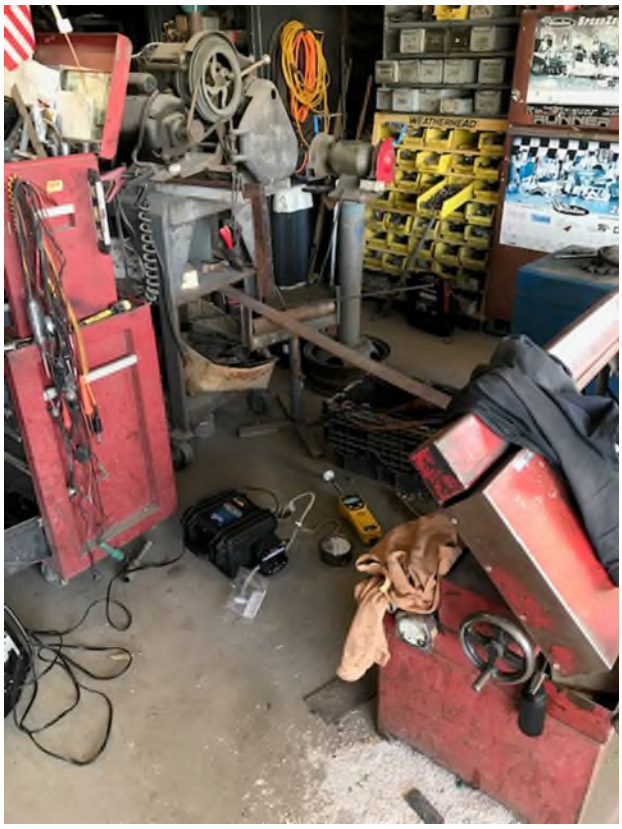
N

APPROXIMATE SCALE IN FEET

0 30 60

APPENDIX A
Site Photos

SG1



SG2

SG3

SG4

APPENDIX B
Laboratory Reports

A & R Laboratories, Inc.

1650 S. GROVE AVE., SUITE C
ONTARIO, CA 91761
951-779-0310 FAX 951-779-0344
www.arlaboratories.com office@arlaboratories.com

FDA#	2030513
LA City#	10261
ELAP#'s	2789
	2790
	2122

CHEMISTRY · MICROBIOLOGY · FOOD SAFETY · MOBILE LABORATORIES
FOOD · COSMETICS · WATER · SOIL · SOIL VAPOR · WASTES

CASE NARRATIVE

Authorized Signature Name / Title (print)	Ken Zheng, President
Signature / Date	Ken Zheng, President 11/18/2018 8:14:09
Laboratory Job No. (Certificate of Analysis No.)	1811-00149
Project Name / No.	20621 LAKE FOREST DR., LAKE FOREST
Dates Sampled (from/to)	11/16/18 To 11/16/18
Dates Received (from/to)	11/16/18 To 11/16/18
Dates Reported (from/to)	11/18/18 To 11/18/2018
Chains of Custody Received	Yes

Comments:

Subcontracting

Organic Analyses

No analyses sub-contracted

Sample Condition(s)

All samples intact

Positive Results (Organic Compounds)

None

The data and information on this, and other accompanying documents, represent only the sample(s) analyzed and is rendered upon condition that it is not to be reproduced, wholly or in part, for advertising or other purposes without approval from the laboratory.

A & R Laboratories, Inc.

1650 S. GROVE AVE., SUITE C
ONTARIO, CA 91761
951-779-0310 FAX 951-779-0344
www.arlaboratories.com office@arlaboratories.com

FDA#	2030513
LA City#	10261
ELAP#'s	2789
	2790
	2122

CHEMISTRY · MICROBIOLOGY · FOOD SAFETY · MOBILE LABORATORIES
FOOD · COSMETICS · WATER · SOIL · SOIL VAPOR · WASTES

CERTIFICATE OF ANALYSIS

1811-00149

HILLMANN CONSULTING
DAN LOUKS
1745 ORANGEWOOD AVE., #110
ORANGE, CA 92868

Date Reported	11/18/18
Date Received	11/16/18
Invoice No.	84029
Cust #	G073
Permit Number	
Customer P.O.	

Project: 20621 LAKE FOREST DR., LAKE FOREST

Sample: 001 **SG1-5** Date & Time Sampled: 11/16/18 @ 10:30
Sample Matrix: **Soil Vapor**

Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
[VOCs by GCMS]								
Acetone	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
t-Amyl Methyl Ether (TAME)	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Benzene	<0.050		µg/L	EPA 8260B	1.0	0.050	11/16/18	AL
Bromobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Bromochloromethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Bromodichloromethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Bromoform	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Bromomethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
t-Butanol (TBA)	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
2-Butanone (MEK)	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
n-Butylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
sec-Butylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
tert-Butylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Carbon Disulfide	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
Carbon Tetrachloride	<0.050		µg/L	EPA 8260B	1.0	0.050	11/16/18	AL
Chlorobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Chloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Chloroform	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Chloromethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
2-Chlorotoluene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
4-Chlorotoluene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Dibromochloromethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2-Dibromoethane (EDB)	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2-Dibromo-3-Chloropropane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Dibromomethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2-Dichlorobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,3-Dichlorobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,4-Dichlorobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Dichlorodifluoromethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,1-Dichloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2-Dichloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL

The data and information on this, and other accompanying documents, represent only the sample(s) analyzed and is rendered upon condition that it is not to be reproduced, wholly or in part, for advertising or other purposes without approval from the laboratory.

A & R Laboratories, Inc.

1650 S. GROVE AVE., SUITE C
ONTARIO, CA 91761
951-779-0310 FAX 951-779-0344
www.arlaboratories.com office@arlaboratories.com

FDA#	2030513
LA City#	10261
ELAP#'s	2789
	2790
	2122

CHEMISTRY · MICROBIOLOGY · FOOD SAFETY · MOBILE LABORATORIES
FOOD · COSMETICS · WATER · SOIL · SOIL VAPOR · WASTES

CERTIFICATE OF ANALYSIS

1811-00149

HILLMANN CONSULTING
DAN LOUKS
1745 ORANGEWOOD AVE., #110
ORANGE, CA 92868

Date Reported	11/18/18
Date Received	11/16/18
Invoice No.	84029
Cust #	G073
Permit Number	
Customer P.O.	

Project: 20621 LAKE FOREST DR., LAKE FOREST

Sample: 001 **SG1-5** Date & Time Sampled: 11/16/18 @ 10:30
Sample Matrix: **Soil Vapor**
.....continued

Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
1,1-Dichloroethene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
cis-1,2-Dichloroethene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
trans-1,2-Dichloroethene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2-Dichloropropane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,3-Dichloropropane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
2,2-Dichloropropane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,1-Dichloropropene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
cis-1,3-Dichloropropene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
trans-1,3-Dichloropropene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Diisopropyl Ether (DiPE)	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Ethylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Ethyl-t-Butyl Ether (EtBE)	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Hexachlorobutadiene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
2-Hexanone	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
Isopropylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
4-Isopropyltoluene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Methylene Chloride	<0.1		µg/L	EPA 8260B	1.0	0.1	11/16/18	AL
4-Methyl-2-Pentanone (MIBK)	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
Methyl-t-butyl Ether (MtBE)	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Naphthalene	<0.050		µg/L	EPA 8260B	1.0	0.050	11/16/18	AL
n-Propylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Styrene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,1,1,2-Tetrachloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,1,2,2-Tetrachloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Tetrachloroethene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Toluene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2,3-Trichlorobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2,4-Trichlorobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,1,1-Trichloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,1,2-Trichloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Trichloroethene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL

The data and information on this, and other accompanying documents, represent only the sample(s) analyzed and is rendered upon condition that it is not to be reproduced, wholly or in part, for advertising or other purposes without approval from the laboratory.

A & R Laboratories, Inc.

1650 S. GROVE AVE., SUITE C
ONTARIO, CA 91761
951-779-0310 FAX 951-779-0344
www.arlaboratories.com office@arlaboratories.com

FDA#	2030513
LA City#	10261
ELAP#'s	2789
	2790
	2122

CHEMISTRY · MICROBIOLOGY · FOOD SAFETY · MOBILE LABORATORIES
FOOD · COSMETICS · WATER · SOIL · SOIL VAPOR · WASTES

CERTIFICATE OF ANALYSIS

1811-00149

HILLMANN CONSULTING
DAN LOUKS
1745 ORANGEWOOD AVE., #110
ORANGE, CA 92868

Date Reported	11/18/18
Date Received	11/16/18
Invoice No.	84029
Cust #	G073
Permit Number	
Customer P.O.	

Project: 20621 LAKE FOREST DR., LAKE FOREST

Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
Sample: 001 **SG1-5**					Date & Time Sampled:		11/16/18 @ 10:30	
Sample Matrix: **Soil Vapor**								
.....continued								
1,2,3-Trichloropropane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Trichlorofluoromethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Trichlorotrifluoroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2,4-Trimethylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,3,5-Trimethylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Vinyl Chloride	<0.050		µg/L	EPA 8260B	1.0	0.050	11/16/18	AL
m,p-Xylenes	<0.20		µg/L	EPA 8260B	1.0	0.20	11/16/18	AL
o-Xylene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
[VOC Vapor Sampling Tracer]								
Isopropanol (IPA)	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
[VOC Surrogates]								
Dibromofluoromethane	103		%REC	EPA 8260B		70-130	11/16/18	AL
Toluene-D8	102		%REC	EPA 8260B		70-130	11/16/18	AL
Bromofluorobenzene	100		%REC	EPA 8260B		70-130	11/16/18	AL
Sample: 002 **SG2-5**					Date & Time Sampled:		11/16/18 @ 10:40	
Sample Matrix: **Soil Vapor**								
[VOCs by GCMS]								
Acetone	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
t-Amyl Methyl Ether (TAME)	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Benzene	<0.050		µg/L	EPA 8260B	1.0	0.050	11/16/18	AL
Bromobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Bromochloromethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Bromodichloromethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Bromoform	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Bromomethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
t-Butanol (TBA)	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
2-Butanone (MEK)	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
n-Butylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
sec-Butylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
tert-Butylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL

The data and information on this, and other accompanying documents, represent only the sample(s) analyzed and is rendered upon condition that it is not to be reproduced, wholly or in part, for advertising or other purposes without approval from the laboratory.

A & R Laboratories, Inc.

1650 S. GROVE AVE., SUITE C
ONTARIO, CA 91761
951-779-0310 FAX 951-779-0344
www.arlaboratories.com office@arlaboratories.com

FDA#	2030513
LA City#	10261
ELAP#'s	2789
	2790
	2122

CHEMISTRY · MICROBIOLOGY · FOOD SAFETY · MOBILE LABORATORIES
FOOD · COSMETICS · WATER · SOIL · SOIL VAPOR · WASTES

CERTIFICATE OF ANALYSIS

1811-00149

HILLMANN CONSULTING
DAN LOUKS
1745 ORANGEWOOD AVE., #110
ORANGE, CA 92868

Date Reported	11/18/18
Date Received	11/16/18
Invoice No.	84029
Cust #	G073
Permit Number	
Customer P.O.	

Project: 20621 LAKE FOREST DR., LAKE FOREST

Sample: 002 **SG2-5** Date & Time Sampled: 11/16/18 @ 10:40
Sample Matrix: **Soil Vapor**
.....continued

Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
Carbon Disulfide	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
Carbon Tetrachloride	<0.050		µg/L	EPA 8260B	1.0	0.050	11/16/18	AL
Chlorobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Chloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Chloroform	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Chloromethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
2-Chlorotoluene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
4-Chlorotoluene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Dibromochloromethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2-Dibromoethane (EDB)	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2-Dibromo-3-Chloropropane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Dibromomethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2-Dichlorobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,3-Dichlorobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,4-Dichlorobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Dichlorodifluoromethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,1-Dichloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2-Dichloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,1-Dichloroethene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
cis-1,2-Dichloroethene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
trans-1,2-Dichloroethene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2-Dichloropropane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,3-Dichloropropane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
2,2-Dichloropropane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,1-Dichloropropene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
cis-1,3-Dichloropropene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
trans-1,3-Dichloropropene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Diisopropyl Ether (DiPE)	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Ethylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Ethyl-t-Butyl Ether (EtBE)	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Hexachlorobutadiene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL

The data and information on this, and other accompanying documents, represent only the sample(s) analyzed and is rendered upon condition that it is not to be reproduced, wholly or in part, for advertising or other purposes without approval from the laboratory.

A & R Laboratories, Inc.

1650 S. GROVE AVE., SUITE C
ONTARIO, CA 91761
951-779-0310 FAX 951-779-0344
www.arlaboratories.com office@arlaboratories.com

FDA#	2030513
LA City#	10261
ELAP#'s	2789
	2790
	2122

CHEMISTRY · MICROBIOLOGY · FOOD SAFETY · MOBILE LABORATORIES
FOOD · COSMETICS · WATER · SOIL · SOIL VAPOR · WASTES

CERTIFICATE OF ANALYSIS

1811-00149

HILLMANN CONSULTING
DAN LOUKS
1745 ORANGEWOOD AVE., #110
ORANGE, CA 92868

Date Reported	11/18/18
Date Received	11/16/18
Invoice No.	84029
Cust #	G073
Permit Number	
Customer P.O.	

Project: 20621 LAKE FOREST DR., LAKE FOREST

Sample: 002 **SG2-5** Date & Time Sampled: 11/16/18 @ 10:40
Sample Matrix: **Soil Vapor**
.....continued

Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
2-Hexanone	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
Isopropylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
4-Isopropyltoluene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Methylene Chloride	<0.1		µg/L	EPA 8260B	1.0	0.1	11/16/18	AL
4-Methyl-2-Pentanone (MIBK)	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
Methyl-t-butyl Ether (MtBE)	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Naphthalene	<0.050		µg/L	EPA 8260B	1.0	0.050	11/16/18	AL
n-Propylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Styrene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,1,1,2-Tetrachloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,1,2,2-Tetrachloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Tetrachloroethene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Toluene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2,3-Trichlorobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2,4-Trichlorobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,1,1-Trichloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,1,2-Trichloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Trichloroethene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2,3-Trichloropropane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Trichlorofluoromethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Trichlorotrifluoroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2,4-Trimethylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,3,5-Trimethylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Vinyl Chloride	<0.050		µg/L	EPA 8260B	1.0	0.050	11/16/18	AL
m,p-Xylenes	<0.20		µg/L	EPA 8260B	1.0	0.20	11/16/18	AL
o-Xylene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
[VOC Vapor Sampling Tracer]								
Isopropanol (IPA)	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
[VOC Surrogates]								
Dibromofluoromethane	103		%REC	EPA 8260B		70-130	11/16/18	AL
Toluene-D8	100		%REC	EPA 8260B		70-130	11/16/18	AL

The data and information on this, and other accompanying documents, represent only the sample(s) analyzed and is rendered upon condition that it is not to be reproduced, wholly or in part, for advertising or other purposes without approval from the laboratory.

A & R Laboratories, Inc.

1650 S. GROVE AVE., SUITE C
ONTARIO, CA 91761
951-779-0310 FAX 951-779-0344
www.arlaboratories.com office@arlaboratories.com

FDA#	2030513
LA City#	10261
ELAP#'s	2789
	2790
	2122

CHEMISTRY · MICROBIOLOGY · FOOD SAFETY · MOBILE LABORATORIES
FOOD · COSMETICS · WATER · SOIL · SOIL VAPOR · WASTES

CERTIFICATE OF ANALYSIS

1811-00149

HILLMANN CONSULTING
DAN LOUKS
1745 ORANGEWOOD AVE., #110
ORANGE, CA 92868

Date Reported	11/18/18
Date Received	11/16/18
Invoice No.	84029
Cust #	G073
Permit Number	
Customer P.O.	

Project: 20621 LAKE FOREST DR., LAKE FOREST

Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
Sample: 002 **SG2-5** Sample Matrix: **Soil Vapor**					Date & Time Sampled:		11/16/18 @ 10:40	
.....continued								
Bromofluorobenzene	99		%REC	EPA 8260B		70-130	11/16/18	AL
Sample: 003 **SG3-12** Sample Matrix: **Soil Vapor**					Date & Time Sampled:		11/16/18 @ 10:50	
[TPH Gasoline by GCMS]								
C4-C12	<50		µg/L	LUFT GCMS	5.0	50	11/16/18	AL
[VOCs by GCMS]								
Acetone	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
t-Amyl Methyl Ether (TAME)	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Benzene	<0.050		µg/L	EPA 8260B	1.0	0.050	11/16/18	AL
Bromobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Bromochloromethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Bromodichloromethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Bromoform	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Bromomethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
t-Butanol (TBA)	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
2-Butanone (MEK)	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
n-Butylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
sec-Butylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
tert-Butylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Carbon Disulfide	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
Carbon Tetrachloride	<0.050		µg/L	EPA 8260B	1.0	0.050	11/16/18	AL
Chlorobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Chloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Chloroform	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Chloromethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
2-Chlorotoluene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
4-Chlorotoluene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Dibromochloromethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2-Dibromoethane (EDB)	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2-Dibromo-3-Chloropropane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL

The data and information on this, and other accompanying documents, represent only the sample(s) analyzed and is rendered upon condition that it is not to be reproduced, wholly or in part, for advertising or other purposes without approval from the laboratory.

A & R Laboratories, Inc.

1650 S. GROVE AVE., SUITE C
ONTARIO, CA 91761
951-779-0310 FAX 951-779-0344
www.arlaboratories.com office@arlaboratories.com

FDA#	2030513
LA City#	10261
ELAP#'s	2789
	2790
	2122

CHEMISTRY · MICROBIOLOGY · FOOD SAFETY · MOBILE LABORATORIES
FOOD · COSMETICS · WATER · SOIL · SOIL VAPOR · WASTES

CERTIFICATE OF ANALYSIS

1811-00149

HILLMANN CONSULTING
DAN LOUKS
1745 ORANGEWOOD AVE., #110
ORANGE, CA 92868

Date Reported	11/18/18
Date Received	11/16/18
Invoice No.	84029
Cust #	G073
Permit Number	
Customer P.O.	

Project: 20621 LAKE FOREST DR., LAKE FOREST

Sample: 003 **SG3-12** Date & Time Sampled: 11/16/18 @ 10:50
Sample Matrix: **Soil Vapor**
.....continued

Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
Dibromomethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2-Dichlorobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,3-Dichlorobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,4-Dichlorobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Dichlorodifluoromethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,1-Dichloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2-Dichloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,1-Dichloroethene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
cis-1,2-Dichloroethene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
trans-1,2-Dichloroethene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2-Dichloropropane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,3-Dichloropropane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
2,2-Dichloropropane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,1-Dichloropropene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
cis-1,3-Dichloropropene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
trans-1,3-Dichloropropene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Diisopropyl Ether (DiPE)	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Ethylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Ethyl-t-Butyl Ether (EtBE)	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Hexachlorobutadiene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
2-Hexanone	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
Isopropylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
4-Isopropyltoluene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Methylene Chloride	<0.1		µg/L	EPA 8260B	1.0	0.1	11/16/18	AL
4-Methyl-2-Pentanone (MIBK)	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
Methyl-t-butyl Ether (MtBE)	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Naphthalene	<0.050		µg/L	EPA 8260B	1.0	0.050	11/16/18	AL
n-Propylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Styrene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,1,1,2-Tetrachloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,1,2,2-Tetrachloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL

The data and information on this, and other accompanying documents, represent only the sample(s) analyzed and is rendered upon condition that it is not to be reproduced, wholly or in part, for advertising or other purposes without approval from the laboratory.

A & R Laboratories, Inc.

1650 S. GROVE AVE., SUITE C
ONTARIO, CA 91761
951-779-0310 FAX 951-779-0344
www.arlaboratories.com office@arlaboratories.com

FDA#	2030513
LA City#	10261
ELAP#'s	2789
	2790
	2122

CHEMISTRY · MICROBIOLOGY · FOOD SAFETY · MOBILE LABORATORIES
FOOD · COSMETICS · WATER · SOIL · SOIL VAPOR · WASTES

CERTIFICATE OF ANALYSIS

1811-00149

HILLMANN CONSULTING
DAN LOUKS
1745 ORANGEWOOD AVE., #110
ORANGE, CA 92868

Date Reported	11/18/18
Date Received	11/16/18
Invoice No.	84029
Cust #	G073
Permit Number	
Customer P.O.	

Project: 20621 LAKE FOREST DR., LAKE FOREST

Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
Sample: 003 **SG3-12**					Date & Time Sampled:		11/16/18 @ 10:50	
Sample Matrix: **Soil Vapor**								
.....continued								
Tetrachloroethene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Toluene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2,3-Trichlorobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2,4-Trichlorobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,1,1-Trichloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,1,2-Trichloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Trichloroethene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2,3-Trichloropropane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Trichlorofluoromethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Trichlorotrifluoroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2,4-Trimethylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,3,5-Trimethylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Vinyl Chloride	<0.050		µg/L	EPA 8260B	1.0	0.050	11/16/18	AL
m,p-Xylenes	<0.20		µg/L	EPA 8260B	1.0	0.20	11/16/18	AL
o-Xylene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
[VOC Vapor Sampling Tracer]								
Isopropanol (IPA)	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
[VOC Surrogates]								
Dibromofluoromethane	105		%REC	EPA 8260B		70-130	11/16/18	AL
Toluene-D8	102		%REC	EPA 8260B		70-130	11/16/18	AL
Bromofluorobenzene	97		%REC	EPA 8260B		70-130	11/16/18	AL
Sample: 004 **SG4-8**					Date & Time Sampled:		11/16/18 @ 11:00	
Sample Matrix: **Soil Vapor**								
[TPH Gasoline by GCMS]								
C4-C12	<50		µg/L	LUFT GCMS	5.0	50	11/16/18	AL
[VOCs by GCMS]								
Acetone	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
t-Amyl Methyl Ether (TAME)	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Benzene	<0.050		µg/L	EPA 8260B	1.0	0.050	11/16/18	AL
Bromobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL

The data and information on this, and other accompanying documents, represent only the sample(s) analyzed and is rendered upon condition that it is not to be reproduced, wholly or in part, for advertising or other purposes without approval from the laboratory.
USDA-EPA-NIOSH Testing Food Sanitation Consulting Chemical and Microbiological Analyses and Research

A & R Laboratories, Inc.

1650 S. GROVE AVE., SUITE C
ONTARIO, CA 91761
951-779-0310 FAX 951-779-0344
www.arlaboratories.com office@arlaboratories.com

FDA#	2030513
LA City#	10261
ELAP#'s	2789
	2790
	2122

CHEMISTRY · MICROBIOLOGY · FOOD SAFETY · MOBILE LABORATORIES
FOOD · COSMETICS · WATER · SOIL · SOIL VAPOR · WASTES

CERTIFICATE OF ANALYSIS

1811-00149

HILLMANN CONSULTING
DAN LOUKS
1745 ORANGEWOOD AVE., #110
ORANGE, CA 92868

Date Reported	11/18/18
Date Received	11/16/18
Invoice No.	84029
Cust #	G073
Permit Number	
Customer P.O.	

Project: 20621 LAKE FOREST DR., LAKE FOREST

Sample: 004 **SG4-8** Date & Time Sampled: 11/16/18 @ 11:00
Sample Matrix: **Soil Vapor**
.....continued

Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
Bromochloromethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Bromodichloromethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Bromoform	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Bromomethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
t-Butanol (TBA)	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
2-Butanone (MEK)	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
n-Butylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
sec-Butylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
tert-Butylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Carbon Disulfide	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
Carbon Tetrachloride	<0.050		µg/L	EPA 8260B	1.0	0.050	11/16/18	AL
Chlorobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Chloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Chloroform	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Chloromethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
2-Chlorotoluene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
4-Chlorotoluene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Dibromochloromethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2-Dibromoethane (EDB)	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2-Dibromo-3-Chloropropane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Dibromomethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2-Dichlorobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,3-Dichlorobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,4-Dichlorobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Dichlorodifluoromethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,1-Dichloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2-Dichloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,1-Dichloroethene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
cis-1,2-Dichloroethene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
trans-1,2-Dichloroethene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2-Dichloropropane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL

The data and information on this, and other accompanying documents, represent only the sample(s) analyzed and is rendered upon condition that it is not to be reproduced, wholly or in part, for advertising or other purposes without approval from the laboratory.

A & R Laboratories, Inc.

1650 S. GROVE AVE., SUITE C
ONTARIO, CA 91761
951-779-0310 FAX 951-779-0344
www.arlaboratories.com office@arlaboratories.com

FDA#	2030513
LA City#	10261
ELAP#'s	2789
	2790
	2122

CHEMISTRY · MICROBIOLOGY · FOOD SAFETY · MOBILE LABORATORIES
FOOD · COSMETICS · WATER · SOIL · SOIL VAPOR · WASTES

CERTIFICATE OF ANALYSIS

1811-00149

HILLMANN CONSULTING
DAN LOUKS
1745 ORANGEWOOD AVE., #110
ORANGE, CA 92868

Date Reported	11/18/18
Date Received	11/16/18
Invoice No.	84029
Cust #	G073
Permit Number	
Customer P.O.	

Project: 20621 LAKE FOREST DR., LAKE FOREST

Sample: 004 **SG4-8** Date & Time Sampled: 11/16/18 @ 11:00
Sample Matrix: **Soil Vapor**
.....continued

Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
1,3-Dichloropropane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
2,2-Dichloropropane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,1-Dichloropropene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
cis-1,3-Dichloropropene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
trans-1,3-Dichloropropene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Diisopropyl Ether (DiPE)	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Ethylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Ethyl-t-Butyl Ether (EtBE)	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Hexachlorobutadiene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
2-Hexanone	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
Isopropylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
4-Isopropyltoluene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Methylene Chloride	<0.1		µg/L	EPA 8260B	1.0	0.1	11/16/18	AL
4-Methyl-2-Pentanone (MIBK)	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
Methyl-t-butyl Ether (MtBE)	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Naphthalene	<0.050		µg/L	EPA 8260B	1.0	0.050	11/16/18	AL
n-Propylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Styrene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,1,1,2-Tetrachloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,1,2,2-Tetrachloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Tetrachloroethene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Toluene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2,3-Trichlorobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2,4-Trichlorobenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,1,1-Trichloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,1,2-Trichloroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Trichloroethene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2,3-Trichloropropane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Trichlorofluoromethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Trichlorotrifluoroethane	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
1,2,4-Trimethylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL

The data and information on this, and other accompanying documents, represent only the sample(s) analyzed and is rendered upon condition that it is not to be reproduced, wholly or in part, for advertising or other purposes without approval from the laboratory.

A & R Laboratories, Inc.

1650 S. GROVE AVE., SUITE C
ONTARIO, CA 91761
951-779-0310 FAX 951-779-0344
www.arlaboratories.com office@arlaboratories.com

FDA#	2030513
LA City#	10261
ELAP#'s	2789
	2790
	2122

CHEMISTRY · MICROBIOLOGY · FOOD SAFETY · MOBILE LABORATORIES
FOOD · COSMETICS · WATER · SOIL · SOIL VAPOR · WASTES

CERTIFICATE OF ANALYSIS

1811-00149

HILLMANN CONSULTING
DAN LOUKS
1745 ORANGEWOOD AVE., #110
ORANGE, CA 92868

Date Reported	11/18/18
Date Received	11/16/18
Invoice No.	84029
Cust #	G073
Permit Number	
Customer P.O.	

Project: 20621 LAKE FOREST DR., LAKE FOREST

Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
Sample: 004 **SG4-8**					Date & Time Sampled:		11/16/18 @ 11:00	
Sample Matrix: **Soil Vapor**								
.....continued								
1,3,5-Trimethylbenzene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
Vinyl Chloride	<0.050		µg/L	EPA 8260B	1.0	0.050	11/16/18	AL
m,p-Xylenes	<0.20		µg/L	EPA 8260B	1.0	0.20	11/16/18	AL
o-Xylene	<0.10		µg/L	EPA 8260B	1.0	0.10	11/16/18	AL
[VOC Vapor Sampling Tracer]								
Isopropanol (IPA)	<1.0		µg/L	EPA 8260B	1.0	1.0	11/16/18	AL
[VOC Surrogates]								
Dibromofluoromethane	106		%REC	EPA 8260B		70-130	11/16/18	AL
Toluene-D8	100		%REC	EPA 8260B		70-130	11/16/18	AL
Bromofluorobenzene	97		%REC	EPA 8260B		70-130	11/16/18	AL

Respectfully Submitted: Ken Zheng

Ken Zheng - Lab Director

QUALIFIERS

B = Detected in the associated Method Blank at a concentration above the routine RL.
B1 = BOD dilution water is over specifications . The reported result may be biased high.
D = Surrogate recoveries are not calculated due to sample dilution.
E = Estimated value; Value exceeds calibration level of instrument.
H = Analyte was prepared and/or analyzed outside of the analytical method holding time
I = Matrix Interference.
J = Analyte concentration detected between RL and MDL.
Q = One or more quality control criteria did not meet specifications. See Comments for further explanation.
S = Customer provided specification limit exceeded.

ABBREVIATIONS

DF = Dilution Factor
RL = Reporting Limit, Adjusted by DF
MDL = Method Detection Limit, Adjusted by DF
Qual = Qualifier
Tech = Technician

As regulatory limits change frequently, A & R Laboratories advises the recipient of this report to confirm such limits with the appropriate federal, state, or local authorities before acting in reliance on the regulatory limits provided.

For any feedback concerning our services, please contact Jenny Jiang, Project Manager at 951.779.0310. You may also contact Ken Zheng, President at office@arlaboratories.com.

The data and information on this, and other accompanying documents, represent only the sample(s) analyzed and is rendered upon condition that it is not to be reproduced, wholly or in part, for advertising or other purposes without approval from the laboratory.
USDA-EPA-NIOSH Testing Food Sanitation Consulting Chemical and Microbiological Analyses and Research

A & R Laboratories, Inc.

1650 S. GROVE AVE., SUITE C
ONTARIO, CA 91761
951-779-0310 FAX 951-779-0344
www.arlaboratories.com office@arlaboratories.com

FDA#	2030513
LA City#	10261
ELAP#'s	2789
	2790
	2122

CHEMISTRY · MICROBIOLOGY · FOOD SAFETY · MOBILE LABORATORIES
FOOD · COSMETICS · WATER · SOIL · SOIL VAPOR · WASTES

QUALITY CONTROL DATA REPORT

1811-00149

HILLMANN CONSULTING
PACIFIC PALISADES, CA 90272

Date Reported	**11/18/2018**
Date Received	**11/16/2018**
Date Sampled	**11/16/2018**
Invoice No.	**84029**
Customer #	**G073**
Customer P.O.	

Project: 20621 LAKE FOREST DR., LAKE FOREST

Method # EPA 8260B
QC Reference # 77565 **Date Analyzed:** 11/16/2018 **Technician:** AL
Samples 001 002 003 004

Results	LCS %REC	Control Ranges LCS %REC
1,1-Dichloroethene	90	70 - 130
Benzene	100	70 - 130
Chlorobenzene	105	70 - 130
Toluene	125	70 - 130
Trichloroethene	100	70 - 130

Method # LUFT GCMS
QC Reference # 77566 **Date Analyzed:** 11/16/2018 **Technician:** AL
Samples 003 004

Results	LCS %REC	Control Ranges LCS %REC
C4-C12	93	70 - 130

No method blank results were above reporting limit

Respectfully Submitted: Ken Zheng

Ken Zheng - President

For any feedback concerning our services, please contact Jenny Jiang, Project Manager at 951.779.0310. You may also contact Ken Zheng, President at office@arlaboratories.com.

ARL
A & R Laboratories
1650 S. Grove Ave., Ste C, Ontario, CA 91761
Tel: 951-779-0310 / 909-781-6335 Fax: 951-779-0344
E-mail: office@arlaboratories.com

CHAIN OF CUSTODY

A & R Work Order #: 1811-149

Page 1 of 1

HSDS

Client Name: HILLMAN CONSULTING
E-mail: DAN@GSAENGINEERING.NET
Address: 1745 ORANGEWOOD #110 CITY OF ORANGE
Report Attention: DAN L
Phone # 714 906 3916
Fax: #
Sampled By: DL
Project No./ Name:
Project Site: 20621 LAKE FOREST DR LAKE FOREST

☐ Chilled ☒ Intact ☐ Seal

Turn Around Time Requested: ☒ Rush 8 12 24 48 Hours ☐ Normal (6 HOUR)

Lab # (Lab use)	Client Sample ID	Sample Collection Date	Sample Collection Time	Matrix Type	Sample Preserve	No., type* & size of container	EPA8260B (VOCs & Oxygenates)	EPA8260B(BTEX & Oxygenates)	LUFT / 8015 (Gasoline)	LUFT / 8015 (Diesel)	EPA8081A (Organochlorine Pesticides)	EPA 8082 (PCBs)	EPA 8015M (Carbon Chain C4-C40)	EPA 6010B/7000 (CAM 17 Metals)	Micro: Plate Cnt., Coliform, E-Coli	Remarks
1	SG1-5	11-16-18	10:30	VAPOR		1	X									MAINTANCE
2	SG2-5	↓	10:40	↓		1	X									MAINTANCE
3	SG3-12		10:50			1	X		X							FORMER UST
4	SG4-8		11:00			1	X		X							FORMER UST

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Don D Lacks	AR	11/16/18	11:00			11-16-18	11:00
Relinquished By	Company	Date	Time	Received By	Company	Date	Time
	AR	11-16-18	15:00			11-16-18	15:00

Note: Samples are discarded 30 days after results are reported unless other arrangements are made.

Matrix Code: DW=Drinking Water, GW=Ground Water, WW=Waste Water, SD=Solid Waste, SL=Sludge, SO=Soil/Sediment, AR=Air, PP=Pure Product

Preservative Code: IC=Ice, HC=HCl, HN=HNO_3, SH=NaOH, ST=$Na_2S_2O_3$, HS=H_2SO_4

Sample Container Types: T=Tedlar Air Bag, G=Glass Container, ST= Steel Tube, B= Brass Tube, P=Plastic Bottle, V=VOA Vial, E= EnCore

APPENDIX C
Drilling Logs

HILLMANN CONSULTING

DRILL/LITHOLOGIC LOG

BORING/WELL NUMBER SG1

PROJECT Nakase Nursery-Maintenance Area
OWNER
LOCATION 20621 Lake Forest Drive, Lake Forest, CA
PROJECT NUMBER
DATE DRILLED November 14, 2018
TOTAL DEPTH OF HOLE 5 Feet
SURFACE ELEVATION
DEPTH TO WATER
SCREEN: DIA. **LENGTH** **SLOT SIZE**
CASING: DIA. **LENGTH** **TYPE**
DRILLING COMPANY Hillmann
DRILL METHOD Hand Auger
DRILLER Dan/Neil
LOG BY Dan Louks

DEPTH (FEET)	WELL CONST		PID (PPM)	SAMPLES		SOIL CLASS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
	PIPE	FILL		NUMBER	BLOW	(USCS)	
0-4			0.0			SM	Silty SAND; light brown, very fine sand, loose, no odor.
5			0.0			ML	Clayey SILT; brown, low plasticity, some very fine sand, no odor.
							Install Probe SG1 at 5 feet. Seal with bentonite and remove after soil gas sampling.

HILLMANN CONSULTING

DRILL/LITHOLOGIC LOG

BORING/WELL NUMBER SG2

PROJECT Nakase Nursery-Maintenance Area
OWNER
LOCATION 20621 Lake Forest Drive, Lake Forest, CA
PROJECT NUMBER
DATE DRILLED November 14, 2018
TOTAL DEPTH OF HOLE 5 Feet
SURFACE ELEVATION
DEPTH TO WATER
SCREEN: DIA. **LENGTH** **SLOT SIZE**
CASING: DIA. **LENGTH** **TYPE**
DRILLING COMPANY Hillmann
DRILL METHOD Hand Auger
DRILLER Dan/Neil
LOG BY Dan Louks

DEPTH (FEET)	WELL CONST		PID (PPM)	SAMPLES		SOIL CLASS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
	PIPE	FILL		NUMBER	BLOW	(USCS)	
0-4			0.0			SM	Silty SAND; brown, very fine sand, loose, no odor.
5			0.0			ML	SILT; brown, low plasticity, some very fine sand and clay, no odor.
							Install Probe SG2 at 5 feet. Seal with bentonite and remove after soil gas sampling.

HILLMANN CONSULTING

DRILL/LITHOLOGIC LOG

BORING/WELL NUMBER SG3

PROJECT Nakase Nursery-UST Area
OWNER
LOCATION 20621 Lake Forest Drive, Lake Forest, CA
PROJECT NUMBER
DATE DRILLED November 14, 2018
TOTAL DEPTH OF HOLE 12 Feet
SURFACE ELEVATION
DEPTH TO WATER
SCREEN: DIA. **LENGTH** **SLOT SIZE**
CASING: DIA. **LENGTH** **TYPE**
DRILLING COMPANY Hillmann
DRILL METHOD Hand Auger
DRILLER Dan/Neil
LOG BY Dan Louks

DEPTH (FEET)	WELL CONST		PID (PPM)	SAMPLES		SOIL CLASS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
	PIPE	FILL		NUMBER	BLOW	(USCS)	
0-4			0.0			SM	Silty SAND; brown, very fine sand, loose, no odor.
4-8			0.0			ML	Clayey SILT; brown, low plasticity, some very fine sand, no odor.
8-12			0.0			SM	Silty SAND; brown, very fine sand, loose, no odor. Refusal at 12 feet Bedrock. Install Probe SG3 at 12 feet. Seal with bentonite and remove after soil gas sampling.

HILLMANN CONSULTING

DRILL/LITHOLOGIC LOG

BORING/WELL NUMBER SG4

PROJECT Nakase Nursery-UST Area
OWNER
LOCATION 20621 Lake Forest Drive, Lake Forest, CA
PROJECT NUMBER
DATE DRILLED November 14, 2018
TOTAL DEPTH OF HOLE 8 Feet
SURFACE ELEVATION
DEPTH TO WATER
SCREEN: DIA. **LENGTH** **SLOT SIZE**
CASING: DIA. **LENGTH** **TYPE**
DRILLING COMPANY Hillmann
DRILL METHOD Hand Auger
DRILLER Dan/Neil
LOG BY Dan Louks

DEPTH (FEET)	WELL CONST		PID (PPM)	SAMPLES		SOIL CLASS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
	PIPE	FILL		NUMBER	BLOW	(USCS)	
0-4			0.0			SM	Silty SAND; brown, very fine sand, loose, no odor.
4-8			0.0			ML	Clayey SILT; brown, low plasticity, some very fine sand, no odor. Refusal at 8 feet Concrete. Channel Conduit? Install Probe SG4 at 8 feet. Seal with bentonite and remove after soil gas sampling.

APPENDIX D
Soil Gas Monitoring Data

SOIL GAS MONITORING DATA FORM

PROJECT: Nakase Nursery Maintenance Area

LOCATION: 20621 Lake Forest Drive, Lake Forest, California

DATE: November 16, 2018

	VAPOR PROBE INFO							
PROBE ID	**SG1**	**SG2**	**SG3**	**SG4**				
PROBE DEPTH (ft)	5	5	12	8				
	EXTRACTION DATA							
Applied Vacuum (in. WC)	<5	<5	<5	<5				
FLOW (L/min)	0.2	0.2	0.2	0.2				
Pore Volumes (borehole - sand pack)	3	3	3	3				
	MONITORING DATA							
OXYGEN (%)	18.2	16.8	14.3	15.8				
CARBON DIOXIDE (%)	0.56	0.45	0.6	0.5				
VOC by PID (ppm)	0.0	0.0	0.0	0.0				

	VAPOR PROBE INFO							
PROBE ID								
PROBE DEPTH (ft)								
	EXTRACTION DATA							
Applied Vacuum (in. WC)								
FLOW (L/min)								
Pore Volumes (borehole - sand pack)								
	MONITORING DATA							
OXYGEN (%)								
CARBON DIOXIDE (%)								
VOC by PID (ppm)								

REMARKS:

SAMPLED BY: DL

PRELIMINARY/CONCEPTUAL DRAFT WATER QUALITY MANAGEMENT PLAN

"NAKASE PROPERTY"
VESTING TENTATIVE TRACT MAP NO. 18142

Project Address:
20621 Lake Forest Drive
Lake Forest, CA

Prepared For:
Toll Brothers, Inc.
725 Town & Country Road, Suite 200
Orange, CA 92868
(714) 347-1300

Prepared By:
Hunsaker & Associates Irvine, Inc.
3 Hughes
Irvine, CA 92618
(949) 583-1010

WQMP Preparation/Revision Date:
June 10, 2019

W.O. 1443-135X

PRELIMINARY/CONCEPTUAL DRAFT WATER QUALITY MANAGEMENT PLAN

"NAKASE PROPERTY"

Vesting Tentative Tract Map No. 18142

City of Lake Forest, California

PRELIMINARY/CONCEPTUAL DRAFT WATER QUALITY MANAGEMENT PLAN (WQMP)

Project Name:

"NAKASE PROPERTY"
VESTING TENTATIVE TRACT MAP NO. 18142

PERMIT NO. TBD

20621 Lake Forest Drive
Lake Forest, California

Prepared for:

Toll Brothers, Inc.
725 Town & Country Road, Suite 200
Orange, CA 92868
(714) 347-1300

Prepared by:

Hunsaker and Associates Irvine, Inc.
Engineer: Fred Graylee Registration No.: 49118
Three Hughes
Irvine, CA 92618
(949) 583-1010

Prepared: June 10, 2019

Project Owner's Certification			
Permit/Planning Application No.	TBD	Grading Permit No.	N/A
Tract/Parcel Map No.	VTTM 18142	Building Permit No.	N/A
CUP, SUP and/or APN (Specify Lot Numbers if Portions of Tract)			APN 612-221-01

This Water Quality Management Plan (WQMP) has been prepared for Toll Brothers, Inc. by Hunsaker and Associates Irvine, Inc. The WQMP is intended to comply with the requirements of the local NPDES Stormwater Program requiring the preparation of the plan.

The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with the current Orange County Drainage Area Management Plan (DAMP) and the intent of the non-point source NPDES Permit for Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and the incorporated Cities of Orange County within the Santa Ana Region. Once the undersigned transfers its interest in the property, its successors-in-interest shall bear the aforementioned responsibility to implement and amend the WQMP. An appropriate number of approved and signed copies of this document shall be available on the subject site in perpetuity.

Owner: Toll Brothers, Inc.			
Name/Title	Peter Kim, Vice President – Land Development		
Company	Toll Brothers, Inc.		
Address	725 Town & Country Road, Suite 200 Orange, CA 92868		
Email	pkim@TollBrothers.com		
Telephone #	(714) 347-1300		
I understand my responsibility to implement the provisions of this WQMP including the ongoing operation and maintenance of the best management practices (BMPs) described herein.			
Signature		Date	

Contents

Section I Discretionary Permit(s) and Water Quality Conditions 1
Section II Project Description 3
II.1 PROJECT DESCRIPTION 3
II.2 POTENTIAL STORMWATER POLLUTANTS 9
II.3 HYDROLOGIC CONDITIONS OF CONCERN 10
II.4 POST DEVELOPMENT DRAINAGE CHARACTERISTICS 10
II.5 PROPERTY OWNERSHIP/MANAGEMENT 12
Section III Site Description 13
III.1 PHYSICAL SETTING 13
III.2 SITE CHARACTERISTICS 14
III.3 WATERSHED DESCRIPTION 16
Section IV Best Management Practices (BMPs) 18
IV. 1 PROJECT PERFORMANCE CRITERIA 18
IV.2 SITE DESIGN AND DRAINAGE PLAN 19
IV.3 LID BMP SELECTION AND PROJECT CONFORMANCE ANALYSIS 20
IV.4 ALTERNATIVE COMPLIANCE PLAN (IF APPLICABLE) 29
Section V Inspection/Maintenance Responsibility for BMPs 31
Section VI Site Plan and Drainage Plan 37
Section VII Educational Materials Included 38

Attachments
Attachment A ..... Educational Materials
Attachment B ..... BMP Worksheets/Calculations & BMP Details
Attachment C ..... Hydromodification Analysis (incorporated by reference)
Attachment D ..... Supporting Project Information

SECTION I DISCRETIONARY PERMIT(S) AND WATER QUALITY CONDITIONS

The project's discretionary permit and water quality information are provided in the following:

PROJECT INFOMATION			
Permit/Application No.	TBD	Tract/Parcel Map No.	VTTM 18142
Additional Information/ Comments:	This Preliminary Water Quality Management Plan has been developed in accordance with Section 7.II-1.5 of the Model Water Quality Management Plan and provides the basic framework to address the water quality component for each anticipated phase of the Nakase Property Project.		
WATER QUALITY CONDITIONS			
Water Quality Conditions (list verbatim.)	The project is considered a priority project under the City of Lake Forest Local Implementation Plan and Water Quality Ordinance (LFMC Chapter 15.14). Therefore, the project is subject to the requirements of a Water Quality Management Plan (WQMP) to minimize the adverse effects of urbanization on site hydrology, runoff flow rates and pollutant loads. The project is in the preliminary planning phase of development, with this preliminary document prepared to support the Area Plan for the Nakase Property. There are currently no site-specific water quality conditions of approval for the project.		
WATERSHED-BASED PLAN CONDITIONS			
Provide applicable conditions from watershed-based plans including WIHMPs and TMDLs	The project is located within the San Diego Creek Watershed. 303(d) List impairments for the project's receiving waters are as follows: Serrano Creek – Ammonia, Indicator Bacteria, pH, Benthic Community Effects, Toxicity. San Diego Creek (Reach 2) – Indicator Bacteria, Nutrients, Sedimentation/Siltation, Unknown Toxicity. San Diego Creek (Reach 1) – Fecal Coliform, Selenium, Toxaphene, Nutrients, Pesticides, Sedimentation/Siltation, Benthic Community Effects, DDT, Malathion, Toxicity. Newport Bay (Upper) – Chlordane, Copper, DDT, Indicator Bacteria, Metals, Nutrients, PCBs, Pesticides, Sediment Toxicity, Sedimentation Siltation, Malathion. Newport Bay (Lower) – Chlordane, Copper, DDT, Indicator Bacteria, Nutrients, PCBs, Pesticides, Sediment Toxicity.		

	Established TMDLs for the project's receiving waters are as follows: Serrano Creek – None. San Diego Creek Reach 2 – Nutrients, Sedimentation/Siltation, Unknown Toxicity, Metals. San Diego Creek Reach 1 – Nutrients, Pesticides, Sedimentation/Siltation, Metals Upper Newport Bay – Indicator Bacteria, Nutrients, Pesticides, Sedimentation/Siltation, Metals. Lower Newport Bay – Indicator Bacteria, Nutrients, Pesticides, Metals, Siltation The WIHMP for San Diego Creek has been submitted to the RWQCB for review and is currently awaiting approval.

SECTION II PROJECT DESCRIPTION

II.1 PROJECT DESCRIPTION

<table>
<tr><th colspan="3">DESCRIPTION OF PROPOSED PROJECT</th></tr>
<tr><td>Development Category (Verbatim from WQMP):</td><td colspan="2">This project is considered a priority project under the following categories:

Priority Project, Category 1 – New development projects that create 10,000 square feet or more of impervious surface. This category includes commercial, industrial, residential housing subdivisions, mixed-use, and public projects on private or public property that falls under the planning and building authority or the Permittees.

Priority Project, Category 5 – Impervious surface of 2,500 square feet or more located within, directly adjacent to (within 200 feet), or discharging directly into receiving waters within Environmentally Sensitive Areas (ESAs).

Priority Project, Category 7 – Streets, road, highways and freeways. This Category includes any paved surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles and other vehicles.</td></tr>
<tr><td>Project Area (ft^2):
5,314,320 ft^2
(122.0 Ac.)[1]</td><td>Number of Dwelling Units: <u>up to 675 single family residential; up to 101 senior affordable rental units</u></td><td>SIC Code: <u>Related SIC include 8211 (elementary school); 6513 (Operators of Apartment Buildings)</u></td></tr>
<tr><td>Narrative Project Description:</td><td colspan="2">The proposed "Nakase Property" project (the Project) is a mixed-use development consisting of approximately 122.0 acres of land located centrally within the northern portion of the City of Lake Forest.

The site is bounded to the north by Rancho Parkway and an existing shopping center ("Corridor Center") beyond; to the east by Serrano Creek, business centers and Lake Forest Drive beyond; to the south by business centers and Enterprise Way beyond; and to the west by Bake Parkway and business centers beyond. Current address for the site is 20621 Lake Forest Drive.

The project will include the following land uses:

Residential (Single-Family, Multi-Family)

Up to 675 total homes arranged in two and three-story configurations, with an optional fourth story rooftop deck at three-story configurations, ranging from low medium to medium density on approximately 51.0 (±) net acres.

The residential community will be comprised of five residential neighborhoods:</td></tr>
</table>

[1] Project gross area based on property/tract limits. Net improvement areas, hydrological boundaries and BMP Drainage Management Areas will differ based on project grading, proposed improvements areas, developed drainage areas and BMP management areas.

DESCRIPTION OF PROPOSED PROJECT

Neighborhood	Unit Count	Acres (Net)
1 – Garden Clusters	159	12.8
2 – Sky Terraces	73	5.6
3 – Cottage Homes	123	12.3
4 – Traditional Single Family	114	13.0
5 – Estate Homes	74	7.3
Total	543	51.0

Senior Affordable Rental Community

The project proposes to provide an inclusionary senior rental affordable housing in the southwestern portion of the site, meeting the City of Lake Forest affordability requirements.

- The affordable site would include medium-high density product sufficient to provide up to 101 units, surface parking and amenities on 2.53 acres.
- The product is anticipated to be 2-3 story elevator accessed building with surface parking and amenities.

Elementary School

A 10-acre public school site (11.7 gross acres) is proposed at the northwestern portion of the site to accommodate up to 1,000 students from kindergarten through sixth grade. The elementary school conceptual site plan includes the following: campus hub, kindergarten building, grades 1-2 building, grades 3-6 building, outdoor learning area, active play area and field, parking for staff, teachers, and visitors, as well as a drop off area.

The elementary school site will be located at the corner of Bake and Rancho Parkways. Two points of access will be provided to the school site: one through the main entrance at Bake and the other through Rancho Parkway. "BB" Street will be the primary road leading to the school with a two-lane street allowing for drop off and pick up along with parking on both sides.

Open Space

The community provides approximately 25 acres of parks, open space, and trails located throughout the project site, consisting of the following:

- A 4.79 acre Central Park with community gathering elements such as areas for farmers markets as well as a community private clubhouse and recreational facility;

DESCRIPTION OF PROPOSED PROJECT	
	• 2.62 acres of neighborhood mini parks (5 total), open for public use, allowing each community to host a centrally located park; • A 3.59 acre Neighborhood Park with active play areas such as dog park, open lawn areas that can be used for field sports; • 10.4 acres of open space habitat and restoration area bordering Serrano Creek, as well as trails connecting the walking trails within the community to the Serrano Creek Regional Trail System; and • 3.2 acres contained within slopes, parkways, paseos and other miscellaneous landscaping areas. *Community Clubhouse* The project proposes a private community clubhouse and recreational facility on an approximately two and a half acres of the Central Park located on the eastern side of the project site to accommodate residential uses. Clubhouse amenities will include: pools, cabanas, multi-purpose rooms, and barbecue and entertainment areas. *Circulation* Access to the site will be provided from three new proposed entries; two at Bake Parkway, and one from Rancho Parkway. The main community entrance will align with existing Rancho Parkway South, while the secondary entry on Bake will line up with existing Orchard Street. The third access point will be on Rancho Parkway and will connect the existing commercial center located north of the project. Together these access points will provide connectivity to arterial highways such as Alton, Lake Forest Drive, and Irvine Boulevard while regional access will be provided through the Foothill Transportation Corridor (State Road 241). An internal road system will provide circulation through the site connecting it to the surrounding communities and the development via three collector roads: "A" Street (from Bake to "B" Street with 2 travel lanes in each direction); "B" Street (from north to south connecting "A" and "C" Streets with one lane in each direction); and "C" Street (from a right-in / right-out intersection on the southern part of Bake with no median break to "B" Street with one lane in each direction). "BB" Street will provide access to school site, allowing full access from "B" Street while access from "A" Street is restricted through the median to avoid queues stretching into Bake Parkway. The Project would include the widening of Bake Parkway at the two project entries to provide right turn lanes. The Project also proposes to widen Rancho Parkway at the project entry to provide a separate eastbound turn lane.

DESCRIPTION OF PROPOSED PROJECT	
	Infrastructure Water – Irvine Ranch Water District (IRWD) serves the project site with domestic and recycled water facilities. Water service (domestic and fire water supply) will be provided for the project as part of the backbone infrastructure improvement. Existing 12" domestic and 12" recycled water mains located along the southern property boundary, which traverse the project site west to east, are proposed to be relocated. Consequently all, or portions of the existing system may be rerouted with a new water line facilities aligned within the project circulation streets and lots. In addition, the mains will have a new easement right to IRWD. All rerouting of water facilities will be reviewed and approved by the City and IRWD. Sewer – Service will be extended into the project as part of the backbone infrastructure improvement. A project gravity sewer system is proposed to connect to the existing sewer system in Bake Parkway, which has adequate in capacity to serve the entire developed site. Utilities – Electric service will be provided through Southern California Edison (SCE). The project proposes to underground the existing overhead power lines along the easterly side of Bake Parkway. In addition, gas, cable, and telephone utilities will also be constructed to serve the needs of the development and school. Drainage – The Project's entire developed site grading will direct runoff flows to the southwest area of the project site to eventually discharge into an existing 10.5' x 10.5' box culvert. The drainage system will utilize project detention facilities to reduce increased peak flows and discharge rates to the Serrano Creek watershed. *Parking* Parking will be provided via residential garage spaces, un-covered street parking and covered/uncovered parking lots. All dwelling units will have a two-car garage, with uncovered parking spaces provided in private driveways or project streets. Covered and uncovered parking areas are anticipated for the project parks, the senior rental community and the school site. Total parking shall be consistent with City of Lake Forest requirements. *Pervious/Impervious Areas* Project pervious areas include designated open space lots, natural areas, park, trails, slopes, parkways and common landscaping areas, as well as within private areas of each residential unit. Total landscaping/pervious area is anticipated to consist of approximately 41.6 acres, or 34.2% of the site. Anticipated paved areas include project streets, sidewalks and hardscape, parking areas, building footprints and

<table>
<tr><th colspan="5">DESCRIPTION OF PROPOSED PROJECT</th></tr>
<tr><td></td><td colspan="4">other impervious improvements. These improvements are anticipated to consist of approximately 80.3 acres, or 65.8% of the project site.

Trash

Typical household wastes are anticipated to be generated daily from the residential, parks and school sites. Each single-family residential unit will have trash bins located/stored within the private residence of each home. Designated trash enclosures (and receptacles) are anticipated to address trash from the senior housing community, the school site and the clubhouse. It is also anticipated that receptacles will be provided throughout the project's trails and parks for community use. All trash will be collected on a weekly basis (at minimum) by the contracted local waste disposal company.

Design information and locations of site-specific improvements for the project are not available at this time. Additional information for these improvements will be provided in future WQMP submittals to the City. All currently known improvements are shown in the WQMP Site Plan in Section VI.</td></tr>
<tr><td rowspan="2">Project Area</td><td colspan="2">Pervious Surface</td><td colspan="2">Impervious Surface</td></tr>
<tr><td>Area
(acres or sq ft)</td><td>Percentage</td><td>Area
(acres or sq ft)</td><td>Percentage</td></tr>
<tr><td>Pre-Project Conditions</td><td>109.9</td><td>90.1%</td><td>12.1</td><td>9.9%</td></tr>
<tr><td>Post-Project Conditions</td><td>41.7</td><td>34.2%</td><td>80.3</td><td>65.8%</td></tr>
<tr><td>Drainage Patterns/Connections</td><td colspan="4">In the pre-project condition, onsite drainage is divided into two drainages:

Drainage "A" consists of the western/northwestern portion of site (approximately 76.6 acres) and drains southwesterly via sheet flow to channelized flow (onsite natural and partly paved drainage system) to an existing 10.5' x 10.5' reinforced concrete box and the existing storm drain (OCFCD Facility No. F19-P07), which confluences with Serrano Creek approximately 0.6 miles to the southwest. Run-on to Drainage "A" consists of offsite areas to the north (approximately 227.9 acre) that discharge into the site via an existing 84" reinforced concrete pipe (RCP) at Rancho Parkway and Corridor Center. Total tributary area (onsite and offsite) to F19-P07 connection is 304.45 acres.

Drainage "B" consists of the eastern/southeastern portion of the site (approximately 43.4 acres) and drains southeasterly via sheet flow to channelized flow (natural and partly paved drainage) prior to discharging to Serrano Creek (OCFCD Facility No. F19), which is located within the eastern/southeastern edge of property limits. There is no offsite run-on to Drainage "B".</td></tr>
</table>

DESCRIPTION OF PROPOSED PROJECT	
	All runoff is then conveyed southwesterly prior to discharging to San Diego Creek (Reach 1), San Diego Creek (Reach 2), Newport Bay (Upper and Lower) and the Pacific Ocean. The discrepancy between total onsite drainage area (120.0 acres) and project area (122.0 acres) is due to approximately 2.0 acres of natural Serrano Creek area located along the easterly edge of the property. Serrano Creek itself does not drain into the site. The flows within Serrano Creek are not impacted by the development.

II.2 POTENTIAL STORMWATER POLLUTANTS

Table 2.1, Anticipated and Potential Pollutants Generated by Land Use Type, from the Technical Guidance Document (December 2013) lists the following Pollutants of Concern (POC's) associated with the proposed development:

POLLUTANTS OF CONCERN			
Pollutant	Check One: E=Expected to be of concern N=Not Expected to be of concern		Additional Information and Comments
Suspended Solids/Sediment	E ☒	N ☐	Pollutant is a Primary POC. Potential sources of sediment include disturbed or unstabilized landscaping areas and disturbed earth surfaces.
Nutrients	E ☒	N ☐	Pollutant is Primary POC as downstream water is impaired for Nutrients. Potential sources of nutrients include fertilizers, sediment and trash/debris.
Heavy Metals	E ☒	N ☐	Pollutant is a Primary POC. Potential sources for the project include automobiles and uncovered parking areas.
Pathogens (Bacteria/Virus)	E ☒	N ☐	Pollutant is a Primary POC. Potential sources for the project include food wastes, pet wastes, sediment and landscaping areas.
Pesticides	E ☒	N ☐	Pollutant is a Primary POC. Potential sources of pesticides include landscaping and open space areas.
Oil and Grease	E ☒	N ☐	Potential sources include project streets and parked vehicles.
Toxic Organic Compounds	E ☒	N ☐	Pollutant is a Primary POC. Potential sources for the project include automobiles and uncovered parking areas.
Trash and Debris	E ☒	N ☐	Potential sources of trash and debris include landscaping activities, food wrappers and food wastes.

II.3 Hydrologic Conditions of Concern

The purpose of this section is to identify any hydrologic conditions of concern (HCOC) with respect to downstream flooding, erosion potential of natural channels downstream, impacts of increased flows on natural habitat, etc. that may occur as the result of project implementation. As specified in Section 2.3.3 of the Model WQMP, projects must identify and mitigate any HCOCs. An HCOC is a combination of upland hydrologic conditions and stream biological and physical conditions that present a condition of concern for physical and/or biological degradation of streams.

The project resides within the jurisdiction of the Santa Ana RWQCB and is subject to the requirements of the North Orange County WQMP TGD, in which HCOCs are considered to exist if the volume for the 2-year runoff event for post-development condition exceeds pre-development condition by more than 5% or the time of concentration is less than the pre-development condition by greater than 5%.

Is the proposed project potentially susceptible to hydromodification impacts?

☐ No – Show map and/or describe and reference supporting documentation in the space below

☒ Yes – Describe applicable hydrologic conditions of concern in the space below.

The proposed project will increase the amount of impervious area located within the project site, thereby increasing runoff volume and rate. Therefore, the project is subject to the hydromodification requirements prescribed in the TGD for North Orange County.

A summary of the analysis is provided in the following table:

HCOC Analysis Summary (2-year event)									
Total Drainage Area [1]	Existing Condition			Proposed Condition			Δ Acres	Δ Q_2 (cfs)	Δ Tc (min)
	Acres	Q_2 (cfs)	Tc (min)	Acres[3]	Q_2 (cfs)	Tc (min)			
A	304.45 [2]	208.6	27.74	339.75	284.8	23	+35.30	+76.2	+4.75
B	43.4	19.6	33.75	7.3	3.3	33.75	-36.1	-16.3	0
Total	347.85	228.2	--	347.05	288.1	--	-1.0	+59.9	--

1. *Consists of onsite runoff and any offsite run-on areas*
2. *Consists of 76.6 onsite acres and 227.9 offsite acres*
3. *Discrepancy in proposed condition Drainage A of 0.8 acres resulting from edge grading effects.*

Please note that in the proposed condition, Drainage A includes a portion of Drainage B in order to reduce the amount of flow tributary to Serrano Creek. Based on the project's hydrology analysis, project implementation would result in downstream HCOC impacts to Drainage Area A, as both peak flows and time of concentration for the 2-year storm event is changed by greater than 5% (increase Q and decreased Tc).

To address the project's HCOC as well as overall increase in runoff (larger storm events), a subsurface detention facility is proposed in the northern side of Central Park to detain the volume required to mitigate the difference between the project's pre- and post-development peak runoff and change in time of concentration at the project's point of compliance (outlet) to the existing downstream drainage system for Drainage A. With implementation of the detention facility, runoff is mitigated as follows:

Flood Volume Summary – Drainage A (with Detention)									
Storm Event (yr)	$Area_{EXIST}$ (acres)	Q_{EXIST} (cfs)	Tc_{EXIST} (min)	V_{EXIST} (ac-ft)	$Area_{DEV}$ (acres)	Q_{DEV} (cfs)	Tc_{DEV} (min)	V_{DEV} (ac-ft)	ΔQ_2 (cfs/%)
2	304.45	208.6	27.74	27.52	339.75	202.16	23.43	36.29	-6.44 -3.13%
25	304.45	508.7	23.90	77.74	339.75	369.01	20.80	93.09	-139.69 27.46%
100	304.45	671.2	22.88	112.17	339.75	453.85	20.07	127.42	-217.35 32.38%

II.4 POST DEVELOPMENT DRAINAGE CHARACTERISTICS

The project's post-development drainage characteristics are described as follows:

In the developed condition the project's two onsite drainage areas in the pre-project condition are combined to form one larger drainage area. Onsite runoff is generally conveyed to the backbone storm drain system via a system of area drains, curb and gutters and catch basin inlets. Runoff is then discharged to the existing 10.5'x10.5' RCB (County Facility Number F19-P07) located at the southwestern project limits and conveyed southerly approximately 0.6 miles prior to discharging to Serrano Creek, San Diego Creek, Newport Bay and the Pacific Ocean.

Offsite storm run-on from the north, which consists of approximately 227.9 acres entering the site just south of the intersection of Rancho Parkway and Corridor Center via an existing 84" RCP, will be conveyed through the project site (via a parallel storm drain line) and also discharged to the project's southwestern discharge point. To mitigate for the increase in peak runoff flows discharged to the existing F19-P07 facility, a subsurface detention basin will be provided within the northern portion of Central Park to detain run-on flows to the north, prior to discharging to the south.

Low Impact Development

To satisfy the project's requirements for Low Impact Development (LID) requirements and water quality treatment, water qualify runoff from each of the project's Drainage Management Areas (DMAs) are addressed as follows. Please note that the proposed bioretention facilities (with the exception of DMA1) are non-infiltration type facilities (designed with a sub-drain to convey treated runoff to the storm drain system).

DMA 1 (10.99 acres) – Consists of the proposed school site. Runoff will be treated within the school site via infiltration BMPs (if feasible) or bioretention BMPs.

DMA 2 (26.29 acres) – Consists of Neighborhood 3, Central Park, "T" Street and northern portions of "B" Street and "M" Street. Majority of runoff from this DMA will be conveyed to a linear bioretention facility located within the open space area between Serrano Creek and the project's onsite development areas, with a small amount of runoff from areas immediately adjacent to the neighborhood mini park will be conveyed to a bioretention facility within the park.

DMA 3 totals 70.54 acres and consists of non-continuous DMAs (3.1 and 3.2) that will discharge to a multi-purpose bioretention facility located at the southwestern portion of the project site. Specifically, the DMA consists of the following areas:

- DMA 3.1 (61.49 acres) – Consists of Neighborhoods 1, 4 and 5, and project areas located south of "A" Street and Central Park area. This DMA also includes 3 bioretention facilities located within each of the neighborhood mini parks.
- DMA 3.2 (9.87 acres) – Consists of Neighborhood 2, located in northern central portion of the project site. This DMA also includes a bioretention facility within the neighborhood mini park.

DMA A1 through A5 (2.78 acres) – Consists of "A" Street that provides access from Bake Parkway. Runoff from each "A" Street DMA will be addressed via linear bioretention facilities in the parkways.

In the event that the BMP located within each mini park within DMAs 2 and 3 does not have capacity to address the required tributary treatment volume, the unmet volume will be conveyed to the larger downstream facility for each DMA. The locations and sizes of the proposed BMPs are preliminary and provided in the WQMP Site Plan (Section 6).

II.5 PROPERTY OWNERSHIP/MANAGEMENT

The project proponent, Toll Brothers, Inc., shall assume all onsite BMP maintenance, inspection and funding responsibilities until such time, these activities have been turned over to the Homeowners Association (HOA), or the City of Lake Forest, as appropriate. Inspection and maintenance activities are in Section V of this WQMP.

SECTION III SITE DESCRIPTION

III.1 PHYSICAL SETTING

General descriptions of the project area are provided below:

PHYSICAL SETTING	
Planning Area/ Community Name	Planning Area – Currently not located within Planning Area. Proposed "Nakase Property" Area Plan Community Name – "Nakase Property"
Location/Address	South of Bake Parkway and Rancho Parkway 20621 Lake Forest Drive, Lake Forest, CA The site is bounded to the north by Rancho Parkway and an existing shopping center ("Corridor Center") beyond; to the east by Serrano Creek, business centers and Lake Forest Drive beyond; to the south by business centers and Enterprise Way beyond; and to the west by Bake Parkway and business centers beyond. Current address for the site is 20621 Lake Forest Drive. The project site has historically been used for nursery operations.
Land Use	Existing: Commercial Nursery/General Plan – "Business Park" Proposed: Low-Medium Density & High Density Residential, Public Facilities, Community Park and Open Space, Institution (School)
Zoning	Existing: A1 (Agriculture) Proposed: Planned Community/Area Plan
Acreage	122.0 acres
Predominant Soil Type	Hydrologic Soil Type C and D

III.2 SITE CHARACTERISTICS

The following table summarizes general characteristics of the project site:

SITE CHARACTERISTICS	
Precipitation Zone	0.95 in.
Topography	The existing nursery operations previously modified the project site's natural topography. Its present uses have resulted in a generally gently sloping pad with the exception of a central mounded area to the southwest. The site falls approximately 65' from the northeast along Rancho Parkway to the southwest, towards Bake Parkway. The property is mostly below the elevation of Rancho Parkway until the intersection of Bake Parkway. As the property falls to the south along Bake Parkway, grades generally follow that of Bake Parkway. The site is lower than the adjacent property along the southern property line. The eastern property line follows the existing grades of Serrano Creek.
Drainage Patterns/Connections	In the pre-project condition, onsite drainage is divided into two drainage: Drainage "A" consist of the western/northwestern portion of site (approximately 76.6 acres) and drains southwesterly via sheet flow to channelized flow (onsite natural and partly paved drainage system) to an existing 10.5' x 10.5' reinforced concrete box and the existing storm drain (OCFCD Facility No. F19-P07), which confluences with Serrano Creek approximately 0.6 miles to the southwest. Run-on to Drainage "A" consists of offsite areas to the north (approximately 227.9 acre) that discharge into the site via an existing 84" reinforced concrete pipe (RCP). Drainage "B" consists of the eastern/southeastern portion of the site (approximately 43.4 acres) and drains southeasterly via sheet flow to channelized flow (natural and partly paved drainage) prior to discharging to Serrano Creek (OCFCD Facility No. F19), which is located within the eastern/southeastern edge of property limits. There is no offsite run-on to Drainage "B". All runoff is then conveyed southwesterly within Serrano Creek prior to discharging to San Diego Creek (Reach 1), San Diego Creek (Reach 2), Newport Bay (Upper and Lower) and the Pacific Ocean. The discrepancy between total onsite drainage area (120.0 acres) and project area (122.0 acres) is due to approximately 2.0 acres of natural Serrano Creek area located along the easterly edge of the

SITE CHARACTERISTICS	
	property. Serrano Creek itself does not drain into the site. The flows within Serrano Creek are not impacted by the development.
Soil Type, Geology, and Infiltration Properties	Geologically, the site is located within the foothills of the Santa Ana Mountains, part of the Peninsular Ranges Geomorphic Province. The region consists of dissected foothills bordering the Los Angeles Basin to the northwest and the granite-core Santa Ana Mountains to the east. The Southern California Batholith forms the core of the Santa Ana Mountains, which is overlain by a thick sequence of sedimentary units, which comprise the foothills. The foothills have been tilted, folded, and faulted since deposition as a result of regional uplift. Drainage from the nearby mountains has dissected the subject area and the alluvial deposits within the subject region are ultimately connected to alluvium of the Tustin Plain to the southwest of the site. Late Miocene to Early Pliocene bedrock materials of the Capistrano Formation that underlie the subject site are primarily composed of sandstone and silty sandstone. The Nakase Property site is located in a natural canyon area with adjoining gentle topographic ridges. The geologic earth units underlying the site include sandstone bedrock of the Oso Member of the Capistrano Formation in the ridges, slope wash deposits on the lower flanks of the ridges, and Quaternary alluvium in the canyon areas. A majority of the former canyon areas is capped by a substantial volume of undocumented fill that resulted in creating a relatively flat working surface for the nursery. Based on the County of Orange Technical Guidance Document (TGD) for Preparation of WQMPs and the geotechnical investigation, onsite soils consist primarily of Hydrologic Group C and D Soils, characterized as having slow to very slow infiltration rates when thoroughly wet. These soils are not favorable for infiltration. Soils in the northern central portion of the site also include some Group B soils, which are considered favorable for infiltration. See WQMP Attachment D for soils information.
Hydrogeologic (Groundwater) Conditions	Project site is not located within a shallow groundwater zone, as defined by the TGD. Groundwater is expected to be greater than 10' below existing surface.

SITE CHARACTERISTICS	
Geotechnical Conditions (relevant to infiltration)	Based on the TGD, majority of underlying soils consist primarily of Group "C" and "D" soils, which are not favorable for infiltration. Location of Group "B" soil is located in the upstream portion of the project site. Infiltration will be considered if existing soil is to remain, per geotechnical professional's recommendations. However, as previously stated, the presence of undocumented fill requires remedial grading to remove all of the undocumented fill and the upper portion of the slope wash and alluvium that is dry, porous and relatively loose. The structural areas within the bedrock ridges will be over excavated and capped with compacted fill. The design cut slopes will be provided with stabilization fills to mitigate erosion potential of the friable sandstone. Along the Serrano Creek side of the project, a shear key will be constructed within project limits to mitigate lateral earth movement during the design earthquake event.
Off-Site Drainage	The project site receives run-on from upstream areas north of Rancho Parkway. In the developed condition, storm water run-on from areas to the north will be conveyed through the project site via onsite storm drain improvements (bypassing the multi-purpose bioretention facility), prior to discharging to Facility F19-P07 (Pre-development Drainage "A").
Utility and Infrastructure Information	There are no major utilities currently on the project site. Wet and dry utilities are proposed for this project and will connect to existing facilities located in Rancho Parkway and Bake Parkway.

III.3 WATERSHED DESCRIPTION

The following table provides descriptions of the project's receiving waters.

WATERSHED DESCRIPTION	
Receiving Waters	Serrano Creek, San Diego Creek (Reach 2), San Diego Creek (Reach 1), Upper and Lower Newport Bay.
303(d) Listed Impairments	Serrano Creek – Ammonia, Indicator Bacteria, pH, Benthic Community Effects, Toxicity San Diego Creek (Reach 2) – Indicator Bacteria, Nutrients, Sedimentation/Siltation, Unknown Toxicity San Diego Creek (Reach 1) – Fecal Coliform, Selenium, Toxaphene, Nutrients, Pesticides, Sedimentation/Siltation, Benthic Community Effects, DDT, Malathion, Toxicity Newport Bay (Upper) – Chlordane, Copper, DDT, Indicator Bacteria, Metals, Nutrients, PCBs, Pesticides, Sediment Toxicity, Sedimentation Siltation, Malathion

WATERSHED DESCRIPTION	
	Newport Bay (Lower) – Chlordane, Copper, DDT, Indicator Bacteria, Nutrients, PCBs, Pesticides, Sediment Toxicity
Applicable TMDLs	San Diego Creek (Reach 2) – Nutrients, Sedimentation/Siltation, Unknown Toxicity, Metals San Diego Creek (Reach 1) – Indicator Bacteria, Nutrients, Pesticides, Sedimentation/Siltation, Metals Newport Bay (Upper) – Indicator Bacteria, Nutrients, Pesticides, Sedimentation/Siltation, Metals, Siltation Newport Bay (Lower) – Indicator Bacteria, Nutrients, Pesticides, Metals, Siltation
Pollutants of Concern for the Project	Pollutants of Concern for the project include: Suspended Solids/Sediment, Nutrients, Metals, Pathogens, Pesticides, Oil & Grease, Toxic Organic Compounds and Trash & Debris. Primary Pollutants of Concern for the project include: Suspended Solids/Sediment, Nutrients, Metals, Pathogens, Pesticides and Toxic Organic Compounds.
Environmentally Sensitive and Special Biological Significant Areas	The project site is located within 200' of 303(d) listed water body (Serrano Creek), which is defined as an Environmentally Sensitive Area (ESA) under Section 2.3.3.4 of the Technical Guidance Document.

SECTION IV BEST MANAGEMENT PRACTICES (BMPS)

IV. 1 PROJECT PERFORMANCE CRITERIA

The project's performance criteria for HCOCs and LID BMPs are provided in the following table:

PROJECT PERFORMANCE CRITERIA		
Is there an approved WIHMP or equivalent for the project area that includes more stringent LID feasibility criteria or if there are opportunities identified for implanting LID on regional or sub-regional basis?	YES ☐	NO ☒
If yes, describe WIHMP feasibility criteria or regional/sub-regional LID opportunities.	The WIHMP for San Diego Creek has been submitted to the RWQCB for review and is currently awaiting approval.	
If HCOC exists, list applicable hydromodification control performance criteria (Section 7.II-2.4.2.2 in MWQMP)	Post-project runoff discharge volume for the 2-year frequency storm does not exceed that of the predevelopment condition by more than 5% and time of concentration of post-development runoff for the 2-year storm event is not less than that for the predevelopment condition by more than 5%.	
List applicable LID performance criteria (Section 7.II-2.4.3 from MWQMP)	• LID BMPs must be designed to retain, on-site, (infiltrate, harvest and use, or evapotranspire) storm water runoff up to 80 percent average annual capture efficiency. • LID BMPs must be designed to: - Retain, onsite, (infiltrate, harvest and use, or evapotranspire) stormwater runoff as feasible up to the Design Capture Volume, and - Recover (i.e., draw down) the storage volume as soon as possible after a storm event, and if necessary - Biotreat, on-site, additional runoff, as feasible, up to 80 percent average annual capture efficiency (cumulative, retention plus biotreatment), and, if necessary - Retain or biotreat, in a regional facility, the remaining runoff up to 80 percent annual capture efficiency (cumulative, retention plus biotreatment, onsite plus offsite), and, if necessary - Fulfill alternative compliance obligations for runoff volume not retained or biotreated up to 80 percent average annual capture efficiency using treatment controls or other alternative approaches as described in Section 7.II-3.	

PROJECT PERFORMANCE CRITERIA	
List applicable treatment control BMP performance criteria (Section 7.II-3.2.2 from MWQMP)	Not applicable. Project will conform to LID requirements onsite.
Calculate LID design storm capture volume for Project.	DCV = C x D x A x 43560 sf/ac x 1ft/12in Where: DCV = design storm capture volume, cu-ft C = runoff coefficient = (0.75 x imp + 0.15) Imp = impervious fraction of drainage area (ranges from 0 to 1) D = storm depth (inches) A = tributary area (acres) *Imp = 0.658* *D = 0.95 inches (See Attachment D)* *A = 122.0 acres* *DCV[1] = [(0.658*0.75)+0.15](0.95)(122.0)(43560)(1/12)* *=279,250.9 cu-ft*

[1]DCV shown based on property limits. For actual DCV based on DMA limits, see Section IV.2.2.

IV.2 Site Design and Drainage Plan

The primary goal of site design principles and techniques is to reduce land development impacts on water quality and downstream hydrologic conditions. Benefits of site design include reductions in the size of downstream BMPs, conveyance systems, pollutant loading and hydromodification impacts.

IV.2.1 Site Design BMPs

The following section describes the site design BMPs that have been incorporated into this project.

Minimize Impervious Area

Landscaping will be provided throughout the site, along project streets, within private lots as well as common lettered lots and recreation lot to minimize the amount of impervious area onsite.

Maximize Natural Infiltration Capacity

The project site consists primarily of HSG C and D soils, which are not feasible for infiltration. However, the project will utilize some retention of runoff in the project's landscaping areas to allow for some incidental infiltration and evapotranspiration processes. These areas include depressed parkways and landscaping areas.

Preserve Existing Drainage Patterns and Time of Concentration

In the developed condition, runoff from the project's development areas will be collected and discharged to the existing drainage to the southwest of the project site. Changes in the time of concentration and peak flows from natural/pre-project conditions will be controlled via the project's hydromodification controls/detention facilities.

Disconnect Impervious Areas

Landscaping will be provided within the project's development areas to minimize the amount of directly connected impervious areas.

Protect Existing Vegetation and Sensitive Areas, and Revegetate Disturbed Areas

Project site will include natural conservation areas and mitigation areas.

Revegetate Disturbed Areas and Xeriscape Landscaping

Native and/or tolerant landscaping will be incorporated into site design, consistent with City guidelines, in proposed landscaping areas.

IV.2.2 Drainage Management Areas (DMAs)

Per the TGD, the project site has been divided into Drainage Management Areas (DMAs) to be utilized for defining drainage areas tributary to the project's BMPs. DMA limits have been delineated based on the tributary drainage area for each BMP.

The design capture volume (DCV) utilizing the "Simple Method" described in TGD Section III.1.1 is provided below. Locations of DMAs and associated LID BMPs are provided on the exhibits in Section VI. Calculations and TGD Worksheets are provided in Appendix B of this WQMP.

DMA	Area (Ac.)	Imp.	C-value	Design Storm Depth (in.)	DCV_{SIMPLE} (cu-ft)
1	10.99	0.65	0.6375	0.95	24,160.6
2	26.29	0.7	0.6750	0.95	61,196.2
3.1	61.49	0.737	0.7028	0.95	149,016.9
3.2	9.87	0.55	0.5625	0.95	19,145.6
A1	0.75	0.7	0.6750	0.95	1,745.8
A2	0.59	0.85	0.7875	0.95	1,602.3
A3	0.53	0.7	0.6750	0.95	1,233.7
A4	0.52	0.85	0.7875	0.95	1,412.2
A5	0.39	0.85	0.7875	0.95	1,059.1

IV.3 LID BMP Selection and Project Conformance Analysis

Per the TGD, Low Impact Development (LID) BMPs must be incorporated into design features and source controls to reduce project related storm water pollutants. The incorporation of LID BMPs into project design requires evaluation of LID measures in the following treatment hierarchy: infiltration, evapotranspiration, harvest/reuse and biotreatment.

IV.3.1 Hydrologic Source Controls (HSC)

Hydrologic source controls (HSCs) can be considered to be an integration of site design practices and LID BMPs. The goal of HSCs is to reduce runoff volume for a given drainage area without reducing the site's true impervious area.

Name	Included?
Localized on-lot infiltration	☐
Impervious area dispersion (e.g. roof top disconnection)	☒
Street trees (canopy interception)	☒
Residential rain barrels (not actively managed)	☐
Green roofs/Brown roofs	☐
Blue roofs	☐
Impervious area reduction (e.g. permeable pavers, site design)	☐

HSC-2 Impervious Area Dispersion

Where feasible, runoff from the project's roof and walkway areas will be directed to adjacent landscaping areas for filtration, evapotranspiration and incidental infiltration of runoff and volume reduction, prior to discharging to the storm drain system.

HSC-3 Street Trees

Trees will be planted along the project's parkways and within common lot areas to intercept rainfall and provide some volume reduction benefits for the project.

At current, DCV reduction credits have not been determined for these areas as the project is in the planning phase of development. As such their benefits are incidental at the moment, as the areas have not been specifically designed to retain runoff.

IV.3.2 Infiltration BMPs

Infiltration BMPs are LID BMPs that capture, store and infiltrate storm water runoff. These BMPs are engineered to store a specified volume of water and have no design surface discharge (underdrain or outlet structure) until this volume is exceeded. Examples of infiltration BMPs include infiltration trenches, bioretention without underdrains, drywells, permeable pavement, and underground infiltration galleries.

Name	Included?
Bioretention without underdrains	☒
Rain gardens	☐
Porous landscaping	☐
Infiltration planters	☐
Retention swales	☐
Infiltration trenches	☐
Infiltration basins	☒

Name	Included?
Drywells	☐
Subsurface infiltration galleries	☒
French drains	☐
Permeable asphalt	☐
Permeable concrete	☐
Permeable concrete pavers	☐
Other:	☐

Infiltration BMPs will be considered for use at the school site, where more favorable soils may be present. Since the project is the preliminary stages of design, the simple DCV will be used in this WQMP. However, as designs approach final, routing of runoff will be accounted in the DCV volume, and BMP sizes defined.

INFILTRATION DESIGN SUMMARY				
DMA	DCV_{SIMPLE} (cu-ft)	BMP	DCV Storage Provided (cu-ft)	Footprint Provided (ft^2)
1	26,666.8	Infiltration (TBD)	TBD	TBD

Due to the presence of undocumented fill and unfavorable soil types (HSG Type C & D) in the remaining project areas, BMPs that employ infiltration as the primary mechanism for pollutant removal are not feasible.

IV.3.3 Evapotranspiration, Rainwater Harvesting BMPs

Name	Included?
EVAPOTRANSPIRATION	
All HSCs; *See Section IV.3.1*	☐
Surface-based infiltration BMPs	☐
Biotreatment BMPs	☐
HARVEST & REUSE/ RAINWATER HARVESTING	
Above-ground cisterns and basins	☐
Underground detention	☐

Evapotranspiration

Evapotranspiration BMPs are a class of retention BMPs that discharges stored volume predominately to ET, through some infiltration may occur. ET includes both evaporation and transpiration, and ET BMPs may incorporate one or more of these processes. BMPs must be designed to achieve the maximum feasible ET, where required to demonstrate that the maximum amount of water has been retained on-site. Since ET is not the sole process in these BMPs, specific design and sizing criteria have not been developed for ET-based BMPs.

Harvest and Reuse

Harvest and Reuse (aka. Rainwater Harvesting) BMPs are LID BMPs that capture and store storm water runoff for later use. These BMPs are engineered to store a specified volume of water and have no design surface discharge until this volume is exceeded. Harvest and use BMPs include both above-ground and below-ground cisterns. Examples of uses for harvested water include irrigation, toilet and urinal flushing, vehicle washing, evaporative cooling, industrial processes and other non-potable uses.

The project does not propose the use of harvesting BMPs, as sources of reclaimed water are available for irrigation of the project's opens space areas. Based on Section X.2.8 of the TGD, if sufficient reclaimed water supply is available to meet the project's demand for use, then the project proponent is allowed to consider harvest and use to be infeasible.

Biofiltration BMPs will be employed to address low flow (irrigation and other non-storm water runoff) and storm water runoff from project areas.

IV.3.4 Biotreatment BMPs

Biotreatment BMPs are a class of structural LID BMPs that treat suspended solids and dissolved pollutants in storm water using mechanisms characteristic of biologically active systems. These BMPs are considered treat and release facilities and include treatment mechanisms that employ soil microbes and plants. Additional benefits of these BMPs may include aesthetic enjoyment, recreational use, wildlife habitat and reduction in storm water volume.

BIOTREATMENT	
Name	Included?
Bioretention with underdrains	☒
Stormwater planter boxes with underdrains	☐
Rain gardens with underdrains	☐
Constructed wetlands	☐
Vegetated swales	☐
Vegetated filter strips	☐
Proprietary vegetated biotreatment systems	☒
Wet extended detention basin	☐
Dry extended detention basins	☐
Other: Underground Bioretention with Underdrains	☒

The project proposes the use of underground bioretention facilities as the primary water quality treatment feature in the Neighborhood Park. Similar facilities, along with modular devices (BIO-7 - proprietary biotreatment BMPs), will be utilized in combination within the Neighborhood Mini Parks. Other proposed bioretention facilities include a traditional (BIO-1) basin type bioretention facility along Serrano Creek and linear bioretention facilities (configured as swales but functioning as bioretention BMPs) along "A" Street.

Each bioretention facility will be designed with a nutrient sensitive media, which would allow the units to provide a medium to high level of effectiveness at removing the project's storm water pollutants, as well as sub-drains to convey treated runoff to the storm drain system. A variety of plants and trees will be used in conjunction with these structures resulting in effective on-site stormwater management through absorption, evapotranspiration and interception.

BIOTREATMENT BMP DESIGN SUMMARY				
DMA	DCV_{SIMPLE} (cu-ft)	BMP	DCV Storage Provided (cu-ft)	Footprint Provided (ft^2)
2	61,196.2	BIORETENTION BASIN	TBD	TBD
3.1	149,016.9	UNDERGROUND BIORETENTION		
3.2	19,145.6			
A1	1,745.8	LINEAR BIORETENTION		
A2	1,602.3	LINEAR BIORETENTION		
A3	1,233.7	LINEAR BIORETENTION		
A4	1,412.2	LINEAR BIORETENTION		
A5	1,059.1	LINEAR BIORETENTION		

IV.3.5 Hydromodification Control BMPs

The project is subject to hydromodification. The following BMP will be employed to address project impacts.

HYDROMODIFICATION CONTROL BMPS	
BMP Name	BMP Description
Subsurface Detention System	Subsurface detention vault located beneath Central Park to detain the difference in runoff for the 2-year event and up to the 100-year event, as well as larger storm events. See Section II.3.

IV.3.6 Regional/Sub-Regional LID BMPs

Not applicable to project. Project is not part of any regional or sub-regional BMP programs. Project will employ use of onsite LID BMPs to address project runoff.

IV.3.7 Treatment Control BMPs

Not applicable to project. Project will employ use of onsite LID BMPs to address project runoff.

Source Control BMPs

In accordance with the County DAMP and City of Lake Forest Local Implementation Plan (LIP), both structural and non-structural source control BMPs are required for all priority projects unless

deemed not applicable based on project characteristics. The following tables summarize the source control BMPs (Non-Structural and Structural) specified in the County DAMP and City's LIP.

The following tables show source control BMPs (routine non-structural and routine structural) included in this project and those that were not included.

IV.3.8 Non-Structural Source Control BMPs

The table below indicates all Non-Structural Source Control BMPs to be utilized in the project. Additional discussions of the selected BMPs are provided in the BMP Inspection and Maintenance Responsibility Matrix provided in Section V of this WQMP.

NON-STRUCTURAL SOURCE CONTROL BMPS				
Identifier	Name	Check One		If not applicable, state brief reason
		Included	Not Applicable	
N1	Education for Property Owners, Tenants and Occupants	☒	☐	
N2	Activity Restrictions	☒	☐	
N3	Common Area Landscape Management	☒	☐	
N4	BMP Maintenance	☒	☐	
N5	Title 22 CCR Compliance (How development will comply)	☐	☒	Proposed facility will not generate waste subject to Title 22 CCR compliance.
N6	Local Industrial Permit Compliance	☐	☒	Project is not subject to industrial permit.
N7	Spill Contingency Plan	☐	☒	Proposed facility will not generate waste or store materials subject to the requirements of Chapter 6.95 of the CA Health and Safety Code.
N8	Underground Storage Tank Compliance	☐	☒	No underground storage tanks proposed for the project.
N9	Hazardous Materials Disclosure Compliance	☐	☒	Proposed facility will not store or generate hazardous materials subject to agency requirements.
N10	Uniform Fire Code Implementation	☐	☒	Proposed facility does not propose to store toxic or highly toxic compressed gases.
N11	Common Area Litter Control	☒	☐	
N12	Employee Training	☒	☐	
N13	Housekeeping of Loading Docks	☒	☐	
N14	Common Area Catch Basin Inspection	☒	☐	

NON-STRUCTURAL SOURCE CONTROL BMPS				
Identifier	Name	Check One		If not applicable, state brief reason
		Included	Not Applicable	
N15	Street Sweeping Public Streets and Parking Lots	☒	☐	
N16	Retail Gasoline Outlets	☐	☒	Not in project scope.

N1 – Education for Property Owners

Educational materials will be provided to homeowners at close of escrow by owner/developer and periodically thereafter by the HOA to inform them of their actions and the potential impacts to downstream water quality. Materials include those described in Section VII of this WQMP and any updates to educational materials.

N2 – Activity Restrictions

Activity restrictions to minimize potential impacts to water quality and with the purpose of protecting water quality will be prescribed by the project's Covenant, Conditions and Restrictions (CC&Rs), or other equally effective measure.

N3 – Common Area Landscape Management

Maintenance activities for landscape areas shall be consistent with City and manufacturer guidelines for fertilizer and pesticide use (OC DAMP Section 5.5). Maintenance includes trimming, weeding and debris removal and vegetation planting and replacement and shall be consistent with the City's Landscape Ordinance. Stockpiled materials during maintenance activities shall be placed away from drain inlets and runoff conveyance devices. Wastes shall be properly disposed of or recycled.

N4 – BMP Maintenance

The project proponent shall be responsible for implementation of each applicable non-structural, structural and LID BMPs as well as scheduling inspection and maintenance cleaning of all applicable structural BMP facilities. The proponent shall be responsible for inspection and maintenance activities in landscape areas (see WQMP Site Plan).

N11 – Common Area Litter Control

Litter control onsite will include the use of litter patrols, violation reporting and clean up during landscaping maintenance activities and as needed to ensure good housekeeping of the project's common areas.

N12 – Employee Training

All employees and any contractors will require training to ensure that employees are aware of maintenance activities that may result in pollutants reaching the storm drain. Training will include, but not limited to, spoil clean up procedures, proper waste disposal, housekeeping practices, etc.

N13 – Housekeeping of Loading Docks

Housekeeping measures will be implemented at the school site to keep the proposed loading dock and delivery areas clean and orderly condition. Includes sweeping, removal of trash & debris on a weekly basis, and use of dry methods for cleanup (e.g., sweeping).

N14 – Common Area Catch Basin Inspection

As required by the TGD, at least 80% of all drainage facilities shall be inspected each year and, if necessary, cleaned and maintained prior to the storm season, no later than October 15th each year; with 100% of all drainage facilities inspected, cleaned and maintained within a two year period. Drainage facilities include catch basins and inlets, detention vaults and the project's LID BMPs.

N15 – Street Sweeping Public Streets and Parking Lots

All project streets shall be vacuum swept on a weekly basis, consistent with City's sweeping schedule.

Refer to Section V for implementation frequency and maintenance responsibilities.

IV.3.9 Structural Source Control BMPs

The source control BMPs have been selected in the following table to address the anticipated pollutants generated by the proposed project. These BMPs are designed to work in conjunction with the project's LID BMPs to minimize potential impacts to the site's receiving waters.

STRUCTURAL SOURCE CONTROL BMPS				
Identifier	Name	Check One		If not applicable, state brief reason
		Included	Not Applicable	
S1	Provide storm drain system stenciling and signage	☒	☐	
S2	Design and construct outdoor material storage areas to reduce pollution introduction	☐	☒	No outdoor storage areas proposed for park.
S3	Design and construct trash and waste storage areas to reduce pollution introduction	☒	☐	
S4	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	☒	☐	
S5	Protect slopes and channels and provide energy dissipation	☒	☐	
	Incorporate requirements applicable to individual priority project categories (from SDRWQCB NPDES Permit)	☒	☐	
S6	Dock areas	☒	☐	
S7	Maintenance bays	☐	☒	No maintenance bays proposed for project.

STRUCTURAL SOURCE CONTROL BMPS				
Identifier	Name	Check One		If not applicable, state brief reason
		Included	Not Applicable	
S8	Vehicle wash areas	☐	☒	No vehicle washing allowed onsite.
S9	Outdoor processing areas	☐	☒	No outdoor processing of goods required for project.
S10	Equipment wash areas	☐	☒	No wash areas onsite.
S11	Fueling areas	☐	☒	No fueling areas in project scope.
S12	Hillside landscaping	☐	☒	Project is not hillside development with large slopes.
S13	Wash water control for food preparation areas	☒	☐	
S14	Community car wash racks	☐	☒	Not in project scope.

S1 – Provide Storm Drain System Stenciling and Signage (CASQA SD-13)

Storm drain stenciling with a brief message or graphical icons with symbols, prohibiting the dumping of improper materials into the storm drain system shall be placed in highly visible areas adjacent to all storm drain inlets. The BMP is designed to alert and educate homeowners and guests of the destination of pollutants discharged into storm drain systems. Legibility of stencils and signs shall be maintained.

S3 – Trash Enclosure (CASQA SD-32)

All trash and waste shall be stored in containers that have lids or tarps to minimize direct precipitation into the containers. The trash storage areas will be designed to City standards, and will be walled, roofed, have gates and proper drainage per City standards. Trash enclosure locations are not known at this time. Locations will be identified as project designs approach final.

S4 – Efficient Irrigation System & Landscape Design (CASQA SD-10 & SD-12)

Landscaping will be designed to consist of native species or drought tolerant, water conserving landscaping. Irrigation system will be designed, constructed and adjusted to eliminate overspray to hardscape areas, with timing and cycle lengths adjusted in accordance with water demands, given time of year, weather, day or night time temperatures based on system specifications and local climate patterns.

S6 – Dock Areas (CASQA SD-31)

Runoff from dock areas shall be prohibited from entering the storm drain system. Dock area shall be designed to be precluded from rain and storm water run-on, and be kept in a clean and orderly manner (BMP N13).

S13 – Waste Water Controls for Food Preparation Areas

All wash water from food prep areas will be controlled and proper staff training conducted by the Owner. Food preparation facilities shall meet all health and safety, building and safety and any other applicable regulations, codes requirements, including installation of a grease interceptor where required. Sinks shall be contained with sanitary sewer connections for disposal of wash waters containing kitchen and food wastes.

IV.4 ALTERNATIVE COMPLIANCE PLAN (IF APPLICABLE)

The project is able to fully address the design capture volume via onsite LID BMPs. Therefore, an alternative compliance plan is not applicable to this project.

IV.4.1 Water Quality Credits

Not applicable to project. Project will utilize LID BMPs onsite to address storm water.

DESCRIPTION OF PROPOSED PROJECT		
Project Types that Qualify for Water Quality Credits (Select all that apply):		
☐ Redevelopment projects that reduce the overall impervious footprint of the project site.	☐ Brownfield redevelopment, meaning redevelopment, expansion, or reuse of real property which may be complicated by the presence or potential presence of hazardous substances, pollutants or contaminants, and which have the potential to contribute to adverse ground or surface WQ if not redeveloped.	☐ Higher density development projects which include two distinct categories (credits can only be taken for one category): those with more than seven units per acre of development (lower credit allowance); vertical density developments, for example, those with a Floor to Area Ratio (FAR) of 2 or those having more than 18 units per acre (greater credit allowance).
☐ Mixed use development, such as a combination of residential, commercial, industrial, office, institutional, or other land uses which incorporate design principles that can demonstrate environmental benefits that would not be realized through single use projects (e.g. reduced vehicle trip traffic with the potential to reduce sources of water or air pollution).	☐ Transit-oriented developments, such as a mixed use residential or commercial area designed to maximize access to public transportation; similar to above criterion, but where the development center is within one half mile of a mass transit center (e.g. bus, rail, light rail or commuter train station). Such projects would not be able to take credit for both categories, but may have greater credit assigned	☐ Redevelopment projects in an established historic district, historic preservation area, or similar significant city area including core City Center areas (to be defined through mapping).

DESCRIPTION OF PROPOSED PROJECT				
Project Types that Qualify for Water Quality Credits (Select all that apply):				
☐Developments with dedication of undeveloped portions to parks, preservation areas and other pervious uses.	☐ Developments in a city center area.	☐ Developments in historic districts or historic preservation areas.	☐ Live-work developments, a variety of developments designed to support residential and vocational needs together – similar to criteria to mixed use development; would not be able to take credit for both categories.	☐ In-fill projects, the conversion of empty lots and other underused spaces into more beneficially used spaces, such as residential or commercial areas.
Calculation of Water Quality Credits (if applicable)	N/A			

IV.4.2 Alternative Compliance Plan Information

Not applicable to project. Project will utilize LID BMPs onsite to address storm water pollutants.

SECTION V INSPECTION/MAINTENANCE RESPONSIBILITY FOR BMPS

It has been determined that the Owner shall assume all BMP funding, inspection and maintenance responsibilities for the Nakase Property project, until such time, site ownership, maintenance and funding responsibilities have been transferred to the HOA and the City of Lake Forest, as appropriate.

Contact/Title	Peter Kim, Vice President of Land Development
Company	Toll Brothers, Inc.
Address	725 Town & Country Road, Suite 200 Orange, CA 92868
Email	pkim@tollbrothersinc.com
Telephone #	(714) 347-1300

The Owner shall verify BMP implementation and ongoing maintenance through inspection, self-certification or other equally effective measure. The certification shall verify that the inspection and maintenance of all BMPs are performed in accordance to the requirements of this WQMP.

The BMP Inspection and Maintenance Responsibility Matrix is provided in the following table. An Operations and Maintenance (O&M) Plan is also included as an attachment to this WQMP.

BMP INSPECTION/MAINTENANCE			
BMP	**Responsible Party(s)**	**Inspection/ Maintenance Activities Required**	**Minimum Frequency of Activities**
HYDROLOGIC SOURCE CONTROL BMPs			
HSC-2 Impervious Area Dispersion	Owner/HOA	Inspect for standing water and that water infiltrates into underlying soil completely. Remove accumulated sediment or repair eroded areas as needed.	After qualifying storm events of 0.5" or greater and monthly with landscaping maintenance
HSC-3 Street Trees	Owner/HOA	Conduct general inspection and maintenance monthly per routine landscaping maintenance activities. Trim trees as needed. Conduct bi-annual tree health evaluations.	After qualifying storm events of 0.5" or greater and monthly with landscaping maintenance

BMP INSPECTION/MAINTENANCE			
BMP	**Responsible Party(s)**	**Inspection/ Maintenance Activities Required**	**Minimum Frequency of Activities**
INFILTRATION BMPs			
TBD	Owner	TBD	TBD
BIOTREATMENT BMPs			
BIO-1 Bioretention with Underdrains & Underground Bioretention with Underdrains	Owner/HOA	Conduct general inspection and maintenance per routine landscaping maintenance activities. Inspect surface area for debris, trash and vegetation accumulation. Inspect for general plant health. Inspect for sediment, build up on planting surface and in area drain inlet. Inspect for sediment or debris clogging inlet. Clean/repair items as necessary.	Monthly
		Remove vegetation, permeable soil and drain rock. Replace in kind. Check sub-drain pipe and inlet. Repair if necessary.	Every 5 to 7 years, or as needed
BIO-7 Proprietary Biotreatment	Owner/HOA	Inspect unit for accumulated debris and sediment and plant health; remove trash; trim vegetation. Remove sediment, replace mulch (if included), replace media as needed.	2-4 weeks during rainy season or after significant events. Frequency to be customized after 1-2 years observation.
DETENTION BMP			
Subsurface Detention Vault	Owner/HOA	Inspect for standing water and that water is discharged to the downstream storm drain system completely in no greater than 72 hours. Inspect and remove accumulated sediment and debris in settling chamber (first few modules of system).	Storms exceeding 2-year event (greater than 2" within 24 hours), semi-annual
NON-STRUCTURAL SOURCE CONTROL BMPs			
N1 Education for Property Owners, Tenants and Occupants	Owner/HOA	Educational materials will be provided to homeowners at close of escrow by the developer and thereafter on an annual basis by the HOA. Materials shall include those shown in Section VII of this WQMP.	At close of escrow and Annually

BMP INSPECTION/MAINTENANCE			
BMP	**Responsible Party(s)**	**Inspection/ Maintenance Activities Required**	**Minimum Frequency of Activities**
N2 Activity Restrictions	Owner/HOA	Owner will prescribe activity restrictions to protect surface water quality, through a Covenant, Conditions and Restrictions (CC&Rs) agreement, or other equally effective measure, for the property. Upon takeover of site responsibilities by the HOA. The HOA shall be responsible for ensuring residents compliance.	Ongoing
N3 Common Area Landscape Management	Owner/HOA	Maintenance shall be consistent with City requirements; any fertilizer and/or pesticide usages shall be consistent with City and manufacturer guidelines for use of fertilizers and pesticides. Maintenance includes mowing, weeding, and debris removal on a weekly basis. Trimming, replanting and replacement of mulch shall be performed on an as-needed basis. Trimmings, clippings, and other waste shall be properly disposed of off-site in accordance with local regulations. Materials temporarily stockpiled during maintenance activities shall be placed away from water courses and drain inlets.	Monthly and as needed
N4 BMP Maintenance	Owner/HOA	Maintenance of BMPs implemented at the project site shall be performed at the frequency prescribed in this WQMP. Records of inspections and BMP maintenance shall be maintained by the City and documented with the WQMP.	Ongoing
N11 Common Area Litter control	Owner/HOA	Litter patrol, violations investigation, reporting and other litter control activities shall be performed by the owner/HOA as needed and in conjunction with maintenance activities for common areas.	Ongoing

BMP INSPECTION/MAINTENANCE			
BMP	**Responsible Party(s)**	**Inspection/ Maintenance Activities Required**	**Minimum Frequency of Activities**
N12 Employee Training	Owner (School Site and Senior Rental Site)	All employees and any contractors will require training to ensure that employees are aware of maintenance activities that may result in pollutants reaching the storm drain. Training will include, but not limited to, spoil clean up procedures, proper waste disposal, housekeeping practices, etc.	Upon hire and annually thereafter
N13 Housekeeping of Loading Docks	Owner (School Site)	Housekeeping measures will be implemented at the school site to keep the proposed loading dock and delivery areas clean and orderly condition. Includes sweeping, removal of trash & debris on a weekly basis, and use of dry methods for cleanup (e.g., sweeping).	Ongoing
N14 Common Area Catch Basin Inspection	Owner/HOA and City, as appropriate	Catch basin inlets, area drains, curb-and-gutter systems and other drainage systems shall be inspected prior to October 1st of each year and after large storm events. If necessary, drains shall be cleaned prior to any succeeding rain events. 80% of private facilities shall be inspected and cleaned annually, with 100% of facilities inspected and maintained within a 2-year period.	Annually
N15 Street Sweeping	Owner/HOA and City, as appropriate	Project streets and parking areas shall be vacuum swept at a minimum, weekly basis, consistent with City schedules.	Weekly

BMP INSPECTION/MAINTENANCE			
BMP	**Responsible Party(s)**	**Inspection/ Maintenance Activities Required**	**Minimum Frequency of Activities**
STRUCTURAL SOURCE CONTROL BMPs			
S1 Provide storm drain system stencilling and signage	Owner/HOA and City, as appropriate	As a part of the Preliminary civil engineering drawings, it will be required by the Developer to stencil on all of the project's catch basins, where applicable in paved areas, the words, "No Dumping - Drains to Ocean." Storm drain stencils shall be inspected for legibility, at minimum, once prior to the storm season, no later than October 1st each year. Those determined to be illegible will be re-stenciled as soon as possible.	Annually
S3 Trash Enclosure	Owner/HOA, Owner (School Site), Owner (Senior Rental)	All trash and waste shall be stored in containers that have lids or tarps to minimize direct precipitation into the containers. The trash storage areas will be designed to City standards, and will be walled, roofed, have gates and proper drainage per City standards. Trash enclosure locations are not known at this time. Locations will be identified as project designs approach final.	Daily
S4 Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	Owner/HOA, Owner (School Site), Owner (Senior Rental)	In conjunction with routine maintenance activities, verify that landscape design continues to function properly by adjusting properly to eliminate overspray to hardscape areas, and to verify that irrigation timing and cycle lengths are adjusted in accordance with water demands, given time of year, weather, day or night time temperatures based on system specifications and local climate patterns.	Monthly

BMP INSPECTION/MAINTENANCE			
BMP	**Responsible Party(s)**	**Inspection/ Maintenance Activities Required**	**Minimum Frequency of Activities**
S5 Dock Areas	Owner (School Site)	Runoff from dock areas shall be prohibited from entering the storm drain system. Dock area shall be designed to be precluded from rain and storm water run-on, and be kept in a clean and orderly manner (BMP N13).	Ongoing
S13 Waste Water Controls for Food Preparation Areas	Owner (School Site)	All wash water from food prep areas will be controlled and proper staff training conducted by the Owner. Food preparation facilities shall meet all health and safety, building and safety and any other applicable regulations, codes requirements, including installation of a grease interceptor where required. Sinks shall be contained with sanitary sewer connections for disposal of wash waters containing kitchen and food wastes.	Ongoing

SECTION VI SITE PLAN AND DRAINAGE PLAN

The exhibits provided in this section are to illustrate the post construction BMPs prescribed within this WQMP. Drainage flow information of the proposed project, such as general surface flow lines, concrete or other surface drainage conveyances, and storm drain facilities are also depicted. All structural source control and LID BMPs are shown as well.

Exhibits

- Vicinity Map
- WQMP Site Plan Exhibit

SECTION VII EDUCATIONAL MATERIALS INCLUDED

The following table contains a list of applicable educational materials to be included in the project's Final WQMP.

EDUCATION MATERIALS			
Residential Material (http://www.ocwatersheds.com)	**Check If Applicable**	**Business Material (http://www.ocwatersheds.com)**	**Check If Applicable**
The Ocean Begins at Your Front Door	☒	Tips for the Automotive Industry	☐
Tips for Car Wash Fund-raisers	☐	Tips for Using Concrete and Mortar	☐
Tips for the Home Mechanic	☒	Tips for the Food Service Industry	☒
Homeowners Guide for Sustainable Water Use	☒	Proper Maintenance Practices for Your Business	☒
Household Tips	☒	**Other Material**	**Check If Attached**
Proper Disposal of Household Hazardous Waste	☒		
Recycle at Your Local Used Oil Collection Center (North County)	☐		☐
Recycle at Your Local Used Oil Collection Center (Central County)	☐		☐
Recycle at Your Local Used Oil Collection Center (South County)	☒		☐
Tips for Maintaining a Septic Tank System	☐		☐
Responsible Pest Control	☒		☐
Sewer Spill	☒		☐
Tips for the Home Improvement Projects	☒		☐
Tips for Horse Care	☐		☐
Tips for Landscaping and Gardening	☒		☐
Tips for Pet Care	☒		☐
Tips for Pool Maintenance	☒		☐
Tips for Residential Pool, Landscape and Hardscape Drains	☒		☐
Tips for Projects Using Paint	☒		☐

Attachment A

Educational Materials

(Provided at Final WQMP)

Attachment B

BMP Worksheets/Calculations

BMP Details

BIO-1 – Bioretention with Underdrains

Table 2.7: Infiltration BMP Feasibility Worksheet			
	Infeasibility Criteria	*Yes*	*No*
1	**Would Infiltration BMPs pose significant risk for groundwater related concerns?** Refer to Appendix VII (Worksheet I) for guidance on groundwater-related infiltration feasibility criteria.		X
Provide basis: No. Based on TGD data, there are no restrictions for groundwater infiltration or known plumes within project area.			
2	Would Infiltration BMPs **pose significant risk of increasing risk of geotechnical hazards that cannot be mitigated to an acceptable level**? (Yes if the answer to any of the following questions is yes, as established by a geotechnical expert):	X	
Provide basis: Per geotechnical professional, the presence of undocumented fill onsite requires remedial grading to remove all of the undocumented fill and the upper portion of the slope wash and alluvium that is dry, porous and relatively loose. The structural areas within the bedrock ridges will be over excavated and capped with compacted fill. The design cut slopes will be provided with stabilization fills to mitigate erosion potential of the friable sandstone. Along the Serrano Creek edge, a shear key will be constructed to mitigate lateral earth movement during the design earthquake event. Infiltration will not be feasible in over excavated areas.			
3	Would infiltration of the DCV from drainage area **violate downstream water rights**?		X
Provide basis: Per County TGD Maps, no restrictions on infiltration due to water rights.			

Table 2.7: Infiltration BMP Feasibility Worksheet (continued)			
	Partial Infeasibility Criteria	*Yes*	*No*
4	Is proposed infiltration facility **located on HSG D soils** or the site geotechnical investigation identifies presence of soil characteristics which support categorization as D soils?	X	
Provide basis: Based on project's geotechnical investigation as well as TGD maps, majority of site contains HSG D soils. Infiltration opportunities in the northwestern project area will be reviewed, with infiltration BMPs employed if feasible.			
5	Is **measured infiltration rate below proposed facility less than 0.3 inches per hour**? This calculation shall be based on the methods described in Appendix VII.	Not available	Not available
Provide basis: Not known. Percolation test were not conducted onsite.			
6	Would **reduction of over pre-developed conditions cause impairments to downstream beneficial uses, such as change of seasonality of ephemeral washes or increased discharge of contaminated groundwater to surface waters?**		X
Provide citation to applicable study and summarize findings relative to the amount of infiltration that is permissible: Project discharges to storm channel that is not ephemeral.			
7	Would **an increase in infiltration over pre-developed conditions cause impairments to downstream beneficial uses, such as change of seasonality of ephemeral washes or increased discharge of contaminated groundwater to surface waters?**		X
Provide citation to applicable study and summarize findings relative to the amount of infiltration that is permissible: Based on TGD and County GIS records, no restrictions on infiltration due to ephemeral washes or groundwater concerns.			

Table 2.7: Infiltration BMP Feasibility Worksheet (continued)		
Infiltration Screening Results (check box corresponding to result):		
8	Is there substantial evidence that infiltration from the project would result in a significant increase in I&I to the sanitary sewer that cannot be sufficiently mitigated? (See Appendix XVII)? Provide narrative discussion and supporting evidence: Per TGD and County of Orange GIS data, project is not located in an area where increase in I&I to the sanitary sewer is of concern.	No
9	If any answer from row 1-3 is yes: infiltration of any volume is **not feasible** within the DMA or equivalent. Provide basis: Item 2 is yes. Per geotechnical professional, the presence of undocumented fill onsite requires remedial grading to remove all of the undocumented fill and the upper portion of the slope wash and alluvium that is dry, porous and relatively loose. The structural areas within the bedrock ridges will be over excavated and capped with compacted fill. The design cut slopes will be provided with stabilization fills to mitigate erosion potential of the friable sandstone. Along the Serrano Creek edge, a shear key will be constructed to mitigate lateral earth movement during the design earthquake event. Infiltration will not be feasible in over excavated areas. Areas residing outside of the remedial grading zone and within favorable soils, such as the school site, will be examined further for feasibility.	Item 2 is yes.
10	If any answer from row 4-7 is yes, infiltration is **permissible but is not presumed to be feasible for the entire DCV.** Criteria for designing biotreatment BMPs to achieve the maximum feasible infiltration and ET shall apply. Provide basis:	
11	If all answers to rows 1 through 11 are no, infiltration of the full DCV is potentially feasible, BMPs must be designed to infiltrate the full DCV to the maximum extent practicable.	

Worksheet B: Simple Design Capture Volume Sizing Method

Step 1: Determine the design capture storm depth used for calculating volume				
1	Enter design capture storm depth from Figure III.1, *d* (inches)	d=	0.95	inches
2	Enter the effect of provided HSCs, d_{HSC} (inches) (Worksheet A)	d_{HSC}=	0	inches
3	Calculate the remainder of the design capture storm depth, $d_{remainder}$ (inches) (Line 1 – Line 2)	$d_{remainder}$=	0.95	inches
Step 2: Calculate the DCV				
1	Enter Project area tributary to BMP (s), *A* (acres)	A=	See table below	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=		
3	Calculate runoff coefficient, *C= (0.75 x imp) + 0.15*	C=		
4	Calculate runoff volume, V_{design}= *(C x* $d_{remainder}$ *x A x 43560 x (1/12))*	V_{design}=		cu-ft
Step 3: Design BMPs to ensure full retention of the DCV				
Step 3a: Determine design infiltration rate				
1	Enter measured infiltration rate, $K_{measured}$ (in/hr) (Appendix VII)	$K_{measured}$=	N/A	In/hr
2	Enter combined safety factor from Worksheet H, $S_{Preliminary}$ (unitless)	$S_{Preliminary}$=	N/A	
3	Calculate design infiltration rate, $K_{design} = K_{measured} / S_{Preliminary}$	K_{design}=	N/A	In/hr
Step 3b: Determine minimum BMP footprint				
4	Enter drawdown time, *T* (max 48 hours)	T=	N/A	Hours
5	Calculate max retention depth that can be drawn down within the drawdown time (feet), $D_{max} = K_{design} \times T \times (1/12)$	D_{max}=	N/A	feet
6	Calculate minimum area required for BMP (sq-ft), $A_{min} = V_{design} / d_{max}$	A_{min}=	N/A	sq-ft
Calculations				

DMA	Area (Ac.)	Imp.	C-value	Design Storm Depth (in.)	DCV_{SIMPLE} (cu-ft)
1	10.99	0.65	0.6375	0.95	24,160.6
2	26.29	0.7	0.6750	0.95	61,196.2
3.1	61.49	0.737	0.7028	0.95	149,016.9
3.2	9.87	0.55	0.5625	0.95	19,145.6
A1	0.75	0.7	0.6750	0.95	1,745.8
A2	0.59	0.85	0.7875	0.95	1,602.3
A3	0.53	0.7	0.6750	0.95	1,233.7
A4	0.52	0.85	0.7875	0.95	1,412.2
A5	0.39	0.85	0.7875	0.95	1,059.1

XIV.5. Biotreatment BMP Fact Sheets (BIO)

Conceptual criteria for biotreatment BMP selection, design, and maintenance are contained in **Appendix XII**. These criteria are generally applicable to the design of biotreatment BMPs in Orange County and BMP-specific guidance is provided in the following fact sheets.

Note: Biotreatment BMPs shall be designed to provide the maximum feasible infiltration and ET based on criteria contained in ***Appendix*** **XI.2**.

BIO-1: Bioretention with Underdrains

Also known as:

- *Rain gardens with underdrains*
- *Vegetated media filter*
- *Downspout planter boxes*

Bioretention
Source: Geosyntec Consultants

Bioretention stormwater treatment facilities are landscaped shallow depressions that capture and filter stormwater runoff. These facilities function as a soil and plant-based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes. The facilities normally consist of a ponding area, mulch layer, planting soils, and plants. As stormwater passes down through the planting soil, pollutants are filtered, adsorbed, biodegraded, and sequestered by the soil and plants. Bioretention with an underdrain are utilized for areas with low permeability native soils or steep slopes where the underdrain system that routes the treated runoff to the storm drain system rather than depending entirely on infiltration. **Bioretention must be designed without an underdrain** in areas of high soil permeability.

Feasibility Screening Considerations

- If there are no hazards associated with infiltration (such as groundwater concerns, contaminant plumes or geotechnical concerns), **bioinfiltration facilities**, which achieve partial infiltration, should be used to maximize infiltration.
- Bioretention with underdrain facilities should be lined if contaminant plumes or geotechnical concerns exist. If high groundwater is the reason for infiltration infeasibility, bioretention facilities with underdrains do not need to be lined.

Opportunity Criteria

- Land use may include commercial, residential, mixed use, institutional, and subdivisions. Bioretention may also be applied in parking lot islands, cul-de-sacs, traffic circles, road shoulders, road medians, and next to buildings in planter boxes.
- Drainage area is ≤ 5 acres.
- Area is available for infiltration.

- Site must have adequate relief between land surface and the stormwater conveyance system to permit vertical percolation through the soil media and collection and conveyance in underdrain to stormwater conveyance system.

OC-Specific Design Criteria and Considerations

- ☐ Ponding depth should not exceed 18 inches; fencing may be required if ponding depth is greater than 6 inches to mitigate drowning.
- ☐ The minimum soil depth is 2 feet (3 feet is preferred).
- ☐ The maximum drawdown time of the bioretention ponding area is 48 hours. The maximum drawdown time of the planting media and gravel drainage layer is 96 hours, if applicable.
- ☐ Infiltration pathways may need to be restricted due to the close proximity of roads, foundations, or other infrastructure. A geomembrane liner, or other equivalent water proofing, may be placed along the vertical walls to reduce lateral flows. This liner should have a minimum thickness of 30 mils.
- ☐ If infiltration in bioretention location is hazardous due to groundwater or geotechnical concerns, a geomembrane liner must be installed at the base of the bioretention facility. This liner should have a minimum thickness of 30 mils.
- ☐ The planting media placed in the cell shall be designed per the recommendations contained in MISC-1: Planting/Storage Media
- ☐ Plant materials should be tolerant of summer drought, ponding fluctuations, and saturated soil conditions for 48 hours; native place species and/or hardy cultivars that are not invasive and do not require chemical inputs should be used to the maximum extent feasible
- ☐ The bioretention area should be covered with 2-4 inches (average 3 inches) or mulch at the start and an additional placement of 1-2 inches of mulch should be added annually.
- ☐ Underdrain should be sized with a 6 inch minimum diameter and have a 0.5% minimum slope. Underdrain should be slotted polyvinyl chloride (PVC) pipe; underdrain pipe should be more than 5 feet from tree locations (if space allows).
- ☐ A gravel blanket or bedding is required for the underdrain pipe(s). At least 0.5 feet of washed aggregate must be placed below, to the top, and to the sides of the underdrain pipe(s).
- ☐ An overflow device is required at the top of the bioretention area ponding depth.
- ☐ Dispersed flow or energy dissipation (i.e. splash rocks) for piped inlets should be provided at basin inlet to prevent erosion.
- ☐ Ponding area side slopes shall be no steeper than 3:1 (H:V) unless designed as a planter box BMP with appropriate consideration for trip and fall hazards.

Simple Sizing Method for Bioretention with Underdrain

If the Simple Design Capture Volume Sizing Method described in **Appendix III.3.1** is used to size a bioretention with underdrain facility, the user selects the basin depth and then determines the appropriate surface area to capture the DCV. The sizing steps are as follows:

Step 1: Determine DCV

Calculate the DCV using the Simple Design Capture Volume Sizing Method described in **Appendix III.3.1**.

Step 2: Verify that the Ponding Depth will Draw Down within 48 Hours

The ponding area drawdown time can be calculated using the following equation:

$DD_P = (d_P / K_{MEDIA}) \times 12$ in/ft

Where:

DD_P = time to drain ponded water, hours

d_P = depth of ponding above bioretention area, ft (not to exceed 1.5 ft)

K_{MEDIA} = media design infiltration rate, in/hr (equivalent to the media hydraulic conductivity with a factor of safety of 2; K_{MEDIA} of 2.5 in/hr should be used unless other information is available)

If the drawdown time exceeds 48 hours, adjust ponding depth and/or media infiltration rate until 48 hour drawdown time is achieved.

Step 3: Determine the Depth of Water Filtered During Design Capture Storm

The depth of water filtered during the design capture storm can be estimated as the amount routed through the media during the storm, or the ponding depth, whichever is smaller.

$d_{FILTERED}$ = Minimum [$((K_{MEDIA} \times T_{ROUTING})/12)$, d_P]

Where:

$d_{FILTERED}$ = depth of water that may be considered to be filtered during the design storm event, ft

K_{MEDIA} = media design infiltration rate, in/hr (equivalent to the media hydraulic conductivity with a factor of safety of 2; K_{MEDIA} of 2.5 in/hr should be used unless other information is available)

$T_{ROUTING}$ = storm duration that may be assumed for routing calculations; this should be assumed to be no greater than 3 hours. If the designer desires to account for further routing effects, the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs (See **Appendix III.3.2**) should be used.

d_P = depth of ponding above bioretention area, ft (not to exceed 1.5 ft)

Step 4: Determine the Facility Surface Area

$A = DCV / (d_P + d_{FILTERED})$

Where:

A = required area of bioretention facility, sq-ft

DCV = design capture volume, cu-ft

$d_{FILTERED}$ = depth of water that may be considered to be filtered during the design storm event, ft

d_P = depth of ponding above bioretention area, ft (not to exceed 1.5 ft)

Capture Efficiency Method for Bioretention with Underdrains

If the bioretention geometry has already been defined and the user wishes to account more explicitly for routing, the user can determine the required footprint area using the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs (See **Appendix III.3.2**) to determine the fraction of the DCV that must be provided to manage 80 percent of average annual runoff volume. This method accounts for drawdown time different than 48 hours.

Step 1: Determine the drawdown time associated with the selected basin geometry

$DD = (d_p / K_{DESIGN}) \times 12$ in/ft

Where:

DD = time to completely drain infiltration basin ponding depth, hours

d_P = bioretention ponding depth, ft (should be less than or equal to 1.5 ft)

K_{DESIGN} = design media infiltration rate, in/hr (assume 2.5 inches per hour unless otherwise proposed)

If drawdown is less than 3 hours, the drawdown time should be rounded to 3 hours or the Capture Efficiency Method for Flow-based BMPs (See **Appendix III.3.3**) shall be used.

Step 2: Determine the Required Adjusted DCV for this Drawdown Time

Use the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs (See **Appendix III.3.2**) to calculate the fraction of the DCV the basin must hold to achieve 80 percent capture of average annual stormwater runoff volume based on the basin drawdown time calculated above.

Step 3: Determine the Basin Infiltrating Area Needed

The required infiltrating area (i.e. the surface area of the top of the media layer) can be calculated using the following equation:

A = Design Volume / d_p

Where:

A = required infiltrating area, sq-ft (measured at the media surface)

Design Volume = fraction of DCV, adjusted for drawdown, cu-ft (see Step 2)

d_p = ponding depth of water stored in bioretention area, ft (from Step 1)

This does not include the side slopes, access roads, etc. which would increase bioretention footprint. If the area required is greater than the selected basin area, adjust surface area or adjust ponding depth and recalculate required area until the required area is achieved.

Configuration for Use in a Treatment Train

- Bioretention areas may be preceeded in a treatment train by HSCs in the drainage area, which would reduce the required design volume of the bioretention cell. For example, bioretention could be used to manage overflow from a cistern.
- Bioretention areas can be used to provide pretreatment for underground infiltration systems.

Additional References for Design Guidance

- CASQA BMP Handbook for New and Redevelopment: **http://www.cabmphandbooks.com/Documents/Development/TC-32.pdf**
- SMC LID Manual (pp 68): **http://www.lowimpactdevelopment.org/guest75/pub/All_Projects/SoCal_LID_Manual/SoCalLID_Manual_FINAL_040910.pdf**
- Los Angeles County Stormwater BMP Design and Maintenance Manual, Chapter 5: **http://dpw.lacounty.gov/DES/design_manuals/StormwaterBMPDesignandMaintenance.pdf**
- San Diego County LID Handbook Appendix 4 (Factsheet 7): **http://www.sdcounty.ca.gov/dplu/docs/LID-Appendices.pdf**

  Los Angeles Unified School District (LAUSD) Stormwater Technical Manual, Chapter 4: **http://www.laschools.org/employee/design/fs-studies-and-reports/download/white_paper_report_material/Storm_Water_Technical_Manual_2009-opt-red.pdf?version_id=76975850**
- County of Los Angeles Low Impact Development Standards Manual, Chapter 5: **http://dpw.lacounty.gov/wmd/LA_County_LID_Manual.pdf**

BIO-7: Proprietary Biotreatment

Proprietary biotreatment devices are devices that are manufactured to mimic natural systems such as bioretention areas by incorporating plants, soil, and microbes engineered to provide treatment at higher flow rates or volumes and with smaller footprints than their natural counterparts. Incoming flows are typically filtered through a planting media (mulch, compost, soil, plants, microbes, etc.) and either infiltrated or collected by an underdrain and delivered to the storm water conveyance system. Tree box filters are an increasingly common type of proprietary biotreatment device that are installed at curb level and filled with a bioretention type soil. For low to moderate flows they operate similarly to bioretention systems and are bypassed during high flows. Tree box filters are highly adaptable solutions that can be used in all types of development and in all types of soils but are especially applicable to dense urban parking lots, street, and roadways.

Also known as:

- *Catch basin planter box*
- *Bioretention vault*
- *Tree box filter*

Proprietary biotreatment
Source:
http://www.americastusa.com/index.php/filterra/

Feasibility Screening Considerations

- Proprietary biotreatment devices that are unlined may cause incidental infiltration. Therefore, an evaluation of site conditions should be conducted to evaluate whether the BMP should include an impermeable liner to avoid infiltration into the subsurface.

Opportunity Criteria

- Drainage areas of 0.25 to 1.0 acres.
- Land use may include commercial, residential, mixed use, institutional, and subdivisions. Proprietary biotreatment facilities may also be applied in parking lot islands, traffic circles, road shoulders, and road medians.
- Must not adversely affect the level of flood protection provided by the drainage system.

OC-Specific Design Criteria and Considerations

☐ Frequent maintenance and the use of screens and grates to keep trash out may decrease the likelihood of clogging and prevent obstruction and bypass of incoming flows.

☐ Consult proprietors for specific criteria concerning the design and performance.

☐ Proprietary biotreatment may include specific media to address pollutants of concern. However, for proprietary device to be considered a biotreatment device the media must be capable of supporting rigorous growth of vegetation.

☐ Proprietary systems must be acceptable to the reviewing agency. Reviewing agencies shall have the discretion to request performance information. Reviewing agencies shall have the discretion to deny the use of a proprietary BMP on the grounds of performance, maintenance considerations, or other relevant factors.

☐ In right of way areas, plant selection should not impair traffic lines of site. Local jurisdictions may also limit plant selection in keeping with landscaping themes.

Computing Sizing Criteria for Proprietary Biotreatment Device

- Proprietary biotreatment devices can be volume based or flow-based BMPs.
- Volume-based proprietary devices should be sized using the Simple Design Capture Volume Sizing Method described in **Appendix III.3.1** or the Capture Efficiency Method for Volume-Based, Constant Drawdown BMPs described in **Appendix III.3.2**.
- The required design flowrate for flow-based proprietary devices should be computed using the Capture Efficiency Method for Flow-based BMPs described in **Appendix III.3.3)**.

Additional References for Design Guidance

- Los Angeles Unified School District (LAUSD) Stormwater Technical Manual, Chapter 4: **http://www.laschools.org/employee/design/fs-studies-and-reports/download/white_paper_report_material/Storm_Water_Technical_Manual_2009-opt-red.pdf?version_id=76975850**
- Los Angeles County Stormwater BMP Design and Maintenance Manual, Chapter 9: **http://dpw.lacounty.gov/DES/design_manuals/StormwaterBMPDesignandMaintenance.pdf**
- Santa Barbara BMP Guidance Manual, Chapter 6: **http://www.santabarbaraca.gov/NR/rdonlyres/91D1FA75-C185-491E-A882-49EE17789DF8/0/Manual_071008_Final.pdf**

Attachment C

Hydromodification Analysis

(Incorporated by Reference. See project Hydrology Report)

EXIST. DBL 12'X8' RCB
(F19) SERRANO CREEK
Q100=2,100 CFS

RANCHO PARKWAY

EXISTING 84"RCP
F19–P07

Q_2 =200.1cfs
Q_{25} =475.9cfs
Q_{100}=621.0cfs
t=16.7, EL=718.6
Area=227.90 acres

L=110'

24

24.1

Q_2 = 0.6cfs
Q_{25} = 1.5cfs
Q_{100} = 1.9cfs
t=13.2, EL=731.0
Area=0.65 acre

A 0.65

L=300'

10

10.1

21.1

Q_2 = 0.5cfs
Q_{25} = 1.3cfs
Q_{100} = 1.7cfs
t=13.0, EL=730.0
Area=0.58 acre

B 0.58

L=300'

11

Q_2 =200.1cfs
Q_{25} =475.9cfs
Q_{100}=621.0cfs
t=16.7, EL=718.2
Area=227.90 acres

A 1.97

L=280'

B 1.41

L=280'

22.1

12

Q_2 = 2.0cfs
Q_{25} = 5.3cfs
Q_{100} = 7.0cfs
t=15.6, EL=725.5
Area=2.62 acres

Q_2 = 1.5cfs
Q_{25} = 4.0cfs
Q_{100} = 5.3cfs
t=15.7, EL=724.5
Area=1.99 acre

L=898'

Existing Earth Channel

A 12.76

L=415'

A 1.95

L=410'

B 3.31

Q_2 = 2.8cfs
Q_{25} = 8.1cfs
Q_{100} =10.8cfs
t=18.8, EL=720.0
Area=4.57 acres

L=670'

23.1

13

Q_2 = 3.4cfs
Q_{25} = 9.5cfs
Q_{100}=12.7cfs
t=18.5, EL=717.0
Area=5.30 acre

BAKE PARKWAY

A 18.94

Q_2 =208.6cfs
Q_{25} =501.6cfs
Q_{100}=655.6cfs
t=18.9, EL=709.0
Area=245.23 acres

Existing Earth Channel

Q_2 =208.6cfs
Q_{25} =501.6cfs
Q_{100}=655.6cfs
t=19.9, EL=704.0
Area=264.17 acres

24.2

25.1

L=480'

Q_2 = 8.8cfs
Q_{25} =27.2cfs
Q_{100} =36.7cfs
t=22.2, EL=709.0
Area=17.33 acres

RANCHO PARKWAY S.

Q_2 =11.1cfs
Q_{25} =32.1cfs
Q_{100} =43.0cfs
t=19.9, EL=704.0
Area=18.94 acres

B 12.11

L=505'

14

Q_2 = 9.5cfs
Q_{25} =28.3cfs
Q_{100} =38.0cfs
t=21.3, EL=711.2
Area=17.41 acres

SERRANO CREEK

A 21.60

Existing Earth Channel

L=975'

Q_2 =208.6cfs
Q_{25} =501.6cfs
Q_{100}=655.6cfs
t=21.6, EL=684.5
Area=285.77 acres

Q_2 =12.3cfs
Q_{25} =35.2cfs
Q_{100}=47.2cfs
t=21.6, EL=684.5
Area=21.60 acres

26.1

B 25.99

L=1,330'

ORCHARD

EXISTING 90" PIPE
Q25=808 CFS

Existing Earth Channel

L=660'

Q_2 =10.1cfs
Q_{25} =29.3cfs
Q_{100}=39.3cfs
t=22.9, EL=675.2
Area=18.68 acres

A 18.68

Q_2 =208.6cfs
Q_{25} =508.7cfs
Q_{100}=671.2cfs
t=22.9, EL=684.5
Area=304.45 acres

61

15

EXIST. 84" PIPE

EXISTING 90" PIPE (F19–P06)
Q25=808 CFS

EXISTING 10.5'X10.5' RCB (F19–P07)
Q100=729.2 CFS

(F19) SERRANO CREEK
Q100=2350 CFS
TOTAL AREA=1281 ACRES

Q_2 =19.6cfs
Q_{25} =62.2cfs
Q_{100} =84.2cfs
t=25.9
Total Area=43.40 acres

EXISTING 10.5'X10.5' RCB (F19–S02)
Q100=1916 CFS

EXISTING 10.5'X10.5' RCB (F19–P07)
Q100=1747.3 CFS

LEGEND

- MAJOR DRAINAGE BOUNDARY
- MINOR DRAINAGE BOUNDARY
- 100 — NODE NUMBER
- A / 1.0 — AREA DESIGNATION / AREA ACREAGE (IN ACRES)
- Q_{100}=8.0cfs, t=15.0 — PEAK FLOW RATE / TIME OF CONCENTRATION
- TQ_{100}=10.0cfs, t=15.0 — PEAK CONFLUENCE FLOW RATE / TIME OF CONCENTRATION
- A — SOIL GROUP

1" = 100'

100 50 0 100 300

MAP DATE IDENTIFIER
DATE OF LATEST CHANGE TO THIS MAP
10/06/17 BY: HTC
DATE OF THIS PLOT
06/29/18

EXHIBIT 2

HYDROLOGY MAP
NAKASE RANCH NURSERY
EXISTING CONIDITION
CITY OF LAKE FOREST

PREPARED FOR:
TOLL BROTHERS, INC.
725 W. TOWN & COUNTRY
ROAD, SUITE 200
ORANGE, CA 92686

PREPARED BY:
HUNSAKER & ASSOCIATES
IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes ▪ Irvine, CA 92618 ▪ PH: (949) 583-1010 ▪ FX: (949) 583-0759

PLOTTED BY: Ha To Chau DATE: Jun. 29, 2018 06:09:29 PM FILE: F:\0894\Engineering\SY_Hydrology\Onsite\Hydrology – Existing with offsite.dwg

WO: 1443-136X
HYDROLOGY MAP FOR NAKASE NURSERY

LEGEND

- MAJOR DRAINAGE BOUNDARY
- MINOR DRAINAGE BOUNDARY
- NODE NUMBER
- AREA DESIGNATION / AREA ACREAGE (IN ACRES)
- PEAK FLOW RATE / TIME OF CONCENTRATION
- PEAK CONFLUENCE FLOW RATE / TIME OF CONCENTRATION
- PROPOSED STORM DRAIN
- SOIL GROUP

PREPARED FOR:

TOLL BROTHERS, INC.
725 W. TOWN & COUNTRY ROAD, SUITE 200
ORANGE, CA 92686

PREPARED BY:

HUNSAKER & ASSOCIATES IRVINE, INC.
PLANNING • ENGINEERING • SURVEYING
Three Hughes • Irvine, CA 92618 • PH: (949) 583-1010 • FX: (949) 583-0759

MAP DATE IDENTIFIER 06/10/19

EXHIBIT 3

HYDROLOGY MAP VTM 18142 (PROPOSED CONDITION)

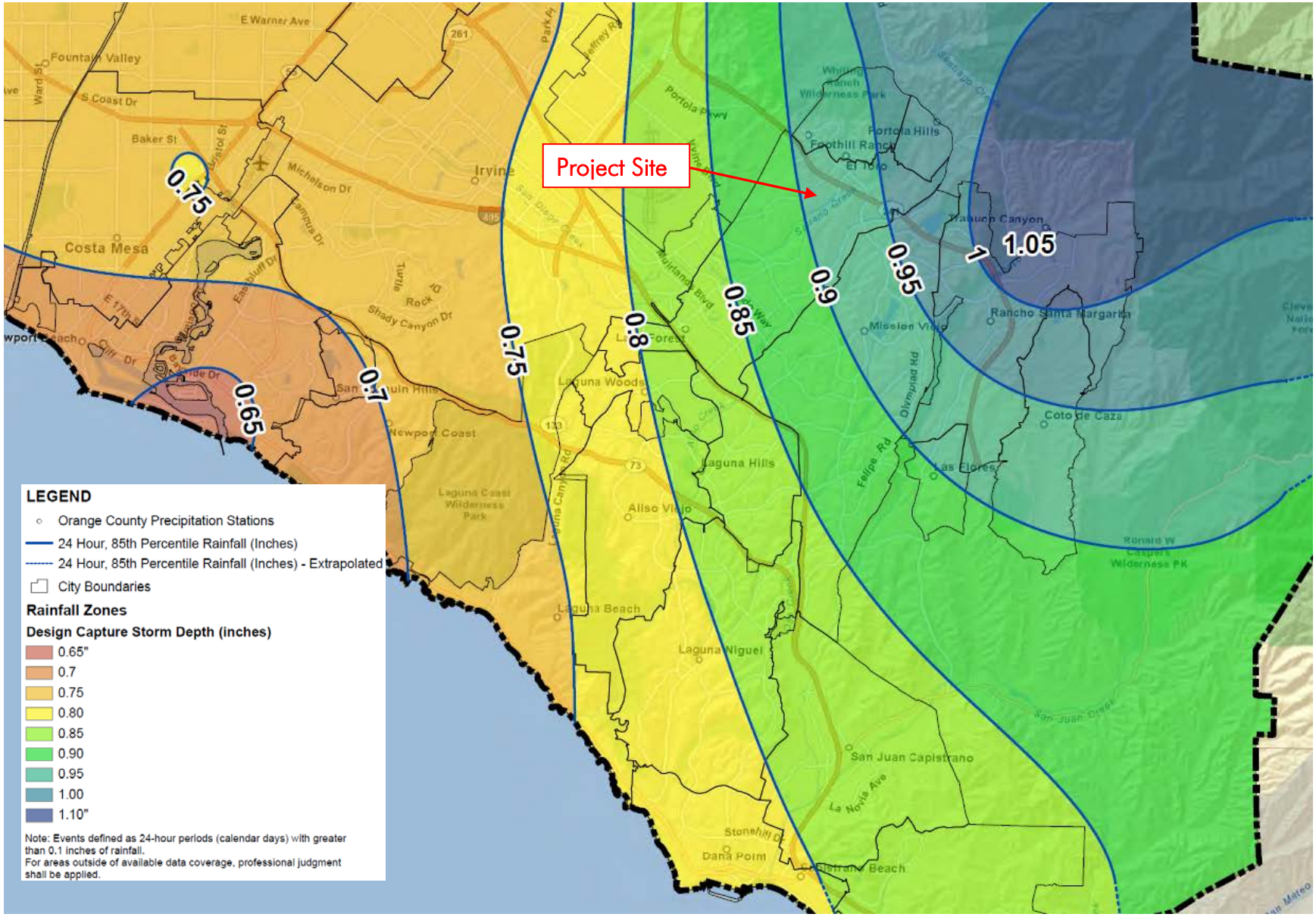
CITY OF LAKE FOREST

WO. 1443-136X HYDROLOGY MAP FOR NAKASE NURSERY

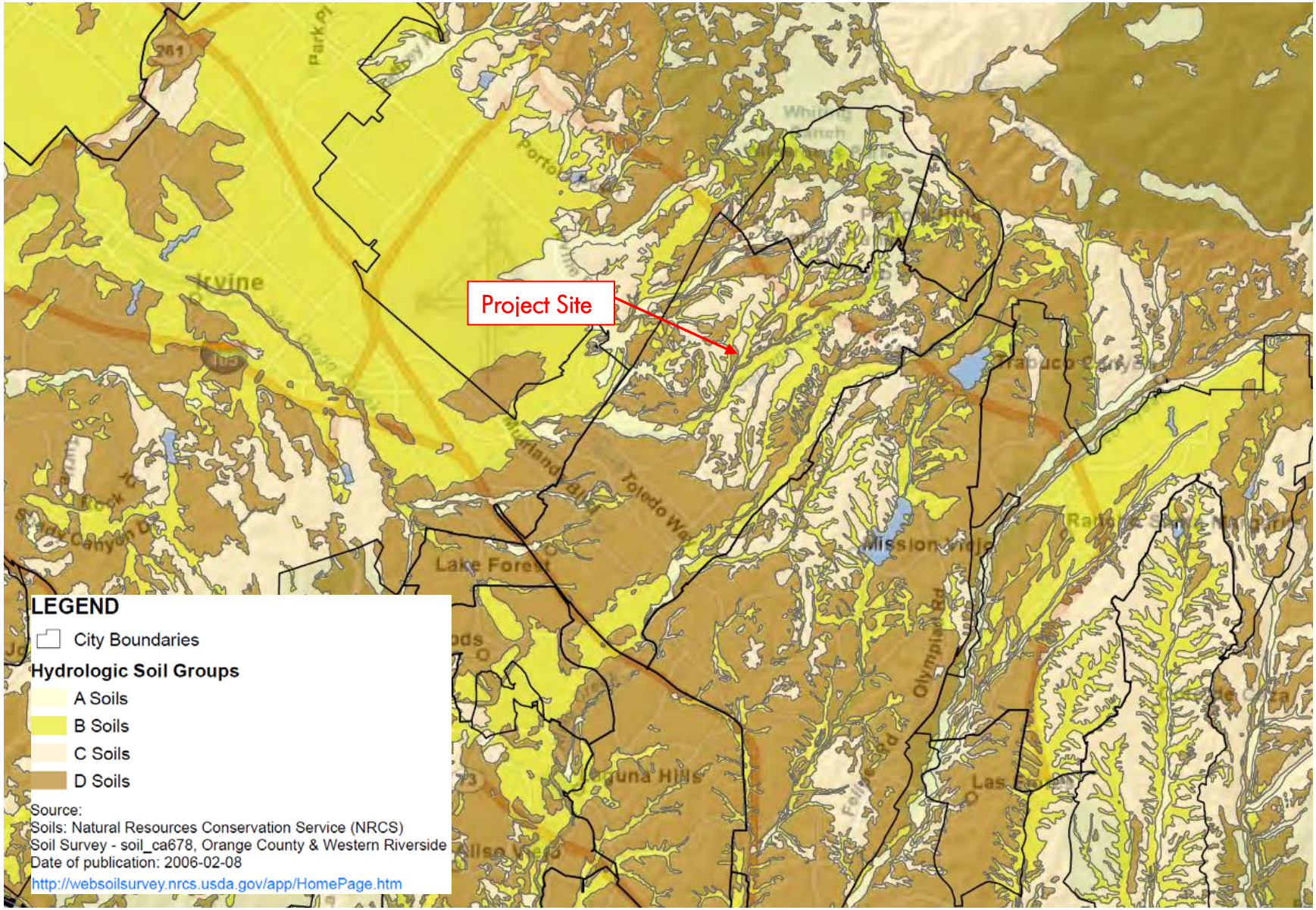
PLOTTED BY: Ha To Chau DATE: Jun. 10, 2019 12:43:56 PM

Attachment D

Supporting Project Information



Source: County of Orange TGD – Figure XVI-1 Rainfall Zones



Source: County of Orange TGD – Figure XVI-2a NRCS Hydrologic Soils Group Map

LEGEND

- REGIONAL DRAINAGE AREA BOUNDARY
- SUBAREA DRAINAGE BOUNDARY
- FLOWPATH
- 1.23 — CONCENTRATION POINT AND NUMBER
- 5,100 cfs — 100-YEAR HIGH CONFIDENCE PEAK DISCHARGE
- 4,332 ac — ACCUMLATED ACREAGE
- LAND USE
  - COMMERCIAL
  - APARTMENTS
  - 8-10 DWELLING UNITS / ACRE
  - 5-7 DWELLING UNITS / ACRE
  - PUBLIC PARK
  - NATURAL - OPEN BRUSH
- D — SOIL GROUP BOUNDARY AND DESIGNATION
- 420 — CONTOUR LINE AND ELEVATION

0' 1000'

766.1
766.2
765
1.01
1.02
1.03
1.04
1.05
1.06
1.07
1.08
1.09
1.10
1,850 cfs
857 ac
1.11
1,950 cfs
1,020 ac
2,150 cfs
1,139 ac
1.12
1.13
1.14
2,350 cfs
1,281 ac
2,350 cfs
1,299 ac
3,550 cfs
2,213 ac
1.15
1.16
3,900 cfs
2,452 ac
1.17
3,950 cfs
2,612 ac
1.18
4,000 cfs
2,835 ac
1.19
4,700 cfs
3,643 ac
1.20
4,850 cfs
3,885 ac
1.21
4,850 cfs
3,932 ac
1.22
5,100 cfs
4,332 ac
1.23
5,100 cfs
4,332 ac

F19
F19S02
F19S
F05

SANTIAGO CANYON ROAD
SERRANO CREEK
ALTON FOOTHILL PKWY
PORTOLA PKWY
TRANSPORTATION CORRIDOR
GLENN RANCH RD
BAKE PKWY
RANCHO DIMENSION DR
FOREST VISTA TERRACE
LAKE REGENCY LN
LAKE FOREST DR
TRABUCO RD
TOLEDO PKWY
JERONIMO BLVD
MUIRLANDS BLVD
RICKENBACKER BLVD
RESEARCH CENTER PKWY
IRVINE BLVD
SAN DIEGO FRWY
SANTA ANA FRWY
BARRANCA PKWY
OCTA METROLINK RR
MARINE CORPS AIR STATION
RIDGE ROUTE DR

COUNTY OF ORANGE
OC PUBLIC WORKS / FLOOD CONTROL

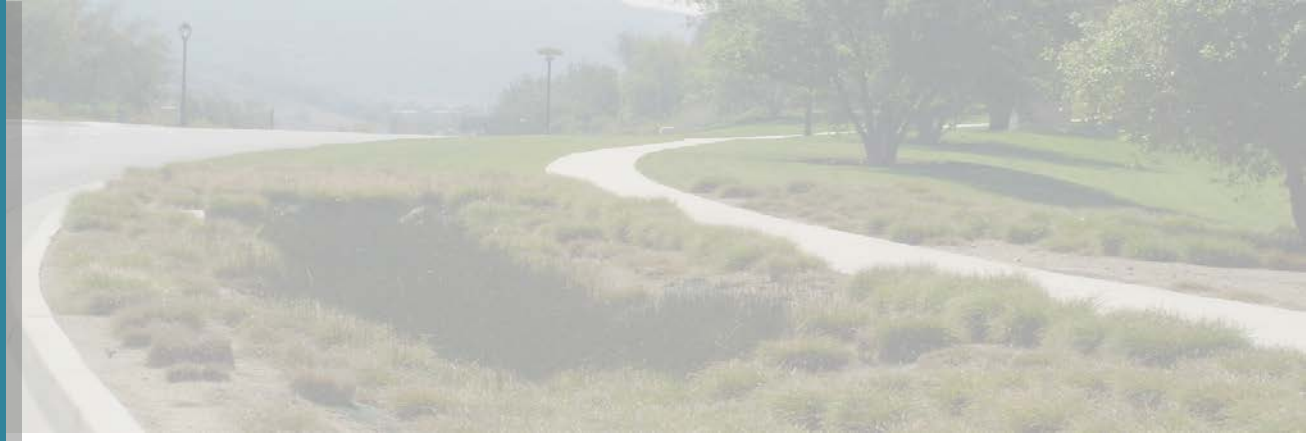
HYDROLOGY REPORT NO. F19-3

SERRANO CREEK FACILITY NO. F19

ENTIRE DRAINAGE SYSTEM

DRAINAGE AREA, LAND USE, AND SOIL GROUPS MAP

JULY 2014 | EXHIBIT 1



LEGEND

- PROJECT LIMITS
- NAP — NOT A PART
- DRAINAGE MANAGEMENT AREA (DMA) LIMITS
- DMA / ACRE — DMA DESIGNATION AND ACREAGE
- GENERAL FLOW DIRECTION (ONSITE)
- GENERAL FLOW DIRECTION (OFFSITE)
- PROJECT STORM DRAIN SYSTEM
- LOW FLOW DRAINAGE SYSTEM
- EXISTING/OFFSITE STORM DRAIN SYSTEM
- UNDERGROUND BIORETENTION FACILITY WITH UNDERDRAINS
- BIORETENTION FACILITY WITH UNDERDRAINS (BIO-1)
- PARKWAY LINEAR BIORETENTION FACILITY WITH UNDERDRAINS (BIO-1)
- PARK AREA UNDERGROUND BIORETENTION FACILITY WITH UNDERDRAINS AND PROPRIETARY BIOTREATMENT (BIO-7)
- PARK AREA
- PROJECT PHASE AREA (ALL INTERNAL STREETS PRIVATE)
- DISCHARGE POINT
- DIVERSION STRUCTURE
- UNDERGROUND DETENTION

GRAPHIC SCALE
0 75 150 300
(IN FEET)
1 INCH = 150 FT.

BMP SUMMARY

DMA	ACRES	IMP	DCV_{SIMPLE} (ft^3)	BMP	DCVx1.5
1	10.99	0.65	24,160.6	INFILTRATION	N/A
2	26.29	0.7	61,196.2	BIORETENTION BASIN	91,794.3
3.1	61.49	0.737	149,016.9	UNDERGROUND BIORETENTION	223,525.4
3.2	9.87	0.55	19,145.6		28,718.5
A1	0.75	0.7	1,745.8	LINEAR BIORETENTION	2,618.7
A2	0.59	0.85	1,602.3	LINEAR BIORETENTION	2,403.4
A3	0.53	0.7	1,233.7	LINEAR BIORETENTION	1,850.6
A4	0.52	0.85	1,412.2	LINEAR BIORETENTION	2,118.2
A5	0.39	0.85	1,059.1	LINEAR BIORETENTION	1,588.7

PRELIMINARY WATER QUALITY MANAGEMENT PLAN (WQMP) - SITE PLAN

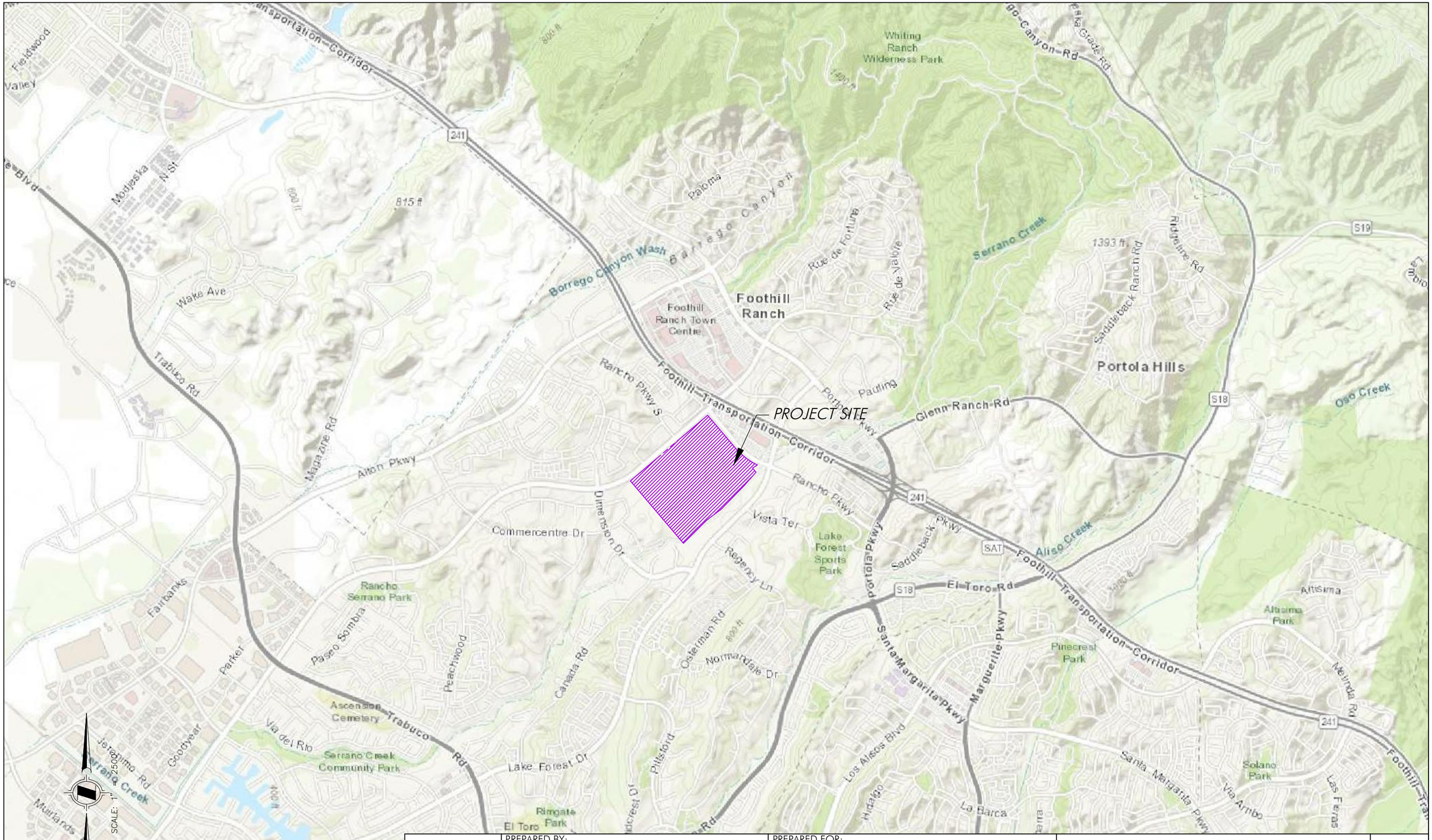
APPLICANT:
TOLL BROTHERS, INC.
725 W. TOWN & COUNTRY ROAD, SUITE 200
ORANGE, CA 92686
(714) 347-1300

PREPARED BY:
HUNSAKER & ASSOCIATES IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes ▪ Irvine, CA 92618 ▪ PH: (949) 583-1010 ▪ FX: (949) 583-0759

"NAKASE RANCH"
VESTING TENTATIVE TRACT MAP NO. 18142
SOUTH OF BAKE PARKWAY AND RANCHO PARKWAY
CITY OF LAKE FOREST, COUNTY OF ORANGE, CA

DRAFTED BY: TIH | DATE: 06/10/2019 | W.O. NO: 1443-135 | SHEET NO: 1 OF 1

DATE: Jun. 10, 2019 03:10:01 PM FILE: F:\0894\Planning\SY_WQ\EXHIBITS\PWQMP_SP Nakase_AP.dwg



DRAWN BY: TIH	PREPARED BY: HUNSAKER & ASSOCIATES IRVINE, INC. PLANNING ■ ENGINEERING ■ SURVEYING Three Hughes, Irvine, CA 92618 ■ PH: (949) 583-1010 ■ FX: (949) 583-0759	PREPARED FOR: TOLL BROTHERS 725 W. TOWN & COUNTRY ROAD, SUITE 200 ORANGE, CA 92686 (714) 347-1300	"NAKASE RANCH" VESTING TENTATIVE TRACT MAP NO. 18142 SOUTH OF BAKE PARKWAY & RANCHO PARKWAY CITY OF LAKE FOREST, CA	PRELIMINARY WQMP VICINITY MAP
DATE: 06/12/2018				
W.O.: 1443-135X				

DATE: Jun. 12, 2018 11:33:34 AM FILE: C:\Users\tommyh\Documents\01_Projects\Wickshire\Nakase\Exhibits\PWQMP_VIC Nakase.dwg

South Central Coastal Information Center
California State University, Fullerton
Department of Anthropology MH-426
800 North State College Boulevard
Fullerton, CA 92834-6846
657.278.5395 / FAX 657.278.5542
sccic@fullerton.edu
California Historical Resources Information System
Orange, Los Angeles, and Ventura Counties

2/28/2018 Records Search File No.: 18633.4648

Kerrie Collison
LSA
20 Executive Park, Suite 200
Irvine, CA 92614

Re: Records Search Results from the Nakase Nursery/Toll Brothers EIR (CLF1801) Project

The South Central Coastal Information Center received your records search request for the project area referenced above, located on the El Toro, CA USGS 7.5' quadrangle. The following reflects the results of the records search for the project area and a ½-mile radius:

As indicated on the data request form, the locations of archaeological resources and reports are provided in the following format: ☒ custom GIS maps ☐ shape files ☐ hand-drawn maps

Archaeological Resources within project area: 0	None
Archaeological Resources within ½-mile radius: 25	SEE ATTACHED MAP or LIST
Reports within project area: 4	OR-00611, OR-00748, OR-00970, OR-01679
Reports within ½-mile radius: 45	SEE ATTACHED MAP or LIST

Resource Database Printout (list):	☒ enclosed	☐ not requested	☐ nothing listed
Resource Database Printout (details):	☐ enclosed	☒ not requested	☐ nothing listed
Resource Digital Database (spreadsheet):	☐ enclosed	☒ not requested	☐ nothing listed
Report Database Printout (list):	☒ enclosed	☐ not requested	☐ nothing listed
Report Database Printout (details):	☐ enclosed	☒ not requested	☐ nothing listed
Report Digital Database (spreadsheet):	☐ enclosed	☒ not requested	☐ nothing listed
Resource Record Copies:	☐ enclosed	☐ not requested	☒ nothing listed
Report Copies:	☐ enclosed	☒ not requested	☐ nothing listed
OHP Historic Properties Directory:	☐ enclosed	☐ not requested	☒ nothing listed
Archaeological Determinations of Eligibility:	☐ enclosed	☐ not requested	☒ nothing listed
Historical Maps:	☒ enclosed	☐ not requested	☐ nothing listed
Ethnographic Information:	☒ not available at SCCIC		

Historical Literature: ☒ not available at SCCIC
GLO and/or Rancho Plat Maps: ☒ not available at SCCIC
Caltrans Bridge Survey: ☒ not available at SCCIC; please go to http://www.dot.ca.gov/hq/structur/strmaint/historic.htm
Shipwreck Inventory: ☒ not available at SCCIC; please go to http://shipwrecks.slc.ca.gov/ShipwrecksDatabase/Shipwrecks_Database.asp
Soil Survey Maps: (see below) ☒ not available at SCCIC; please go to http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

Please forward a copy of any resulting reports from this project to the office as soon as possible. Due to the sensitive nature of archaeological site location data, we ask that you do not include resource location maps and resource location descriptions in your report if the report is for public distribution. If you have any questions regarding the results presented herein, please contact the office at the phone number listed above.

The provision of CHRIS Data via this records search response does not in any way constitute public disclosure of records otherwise exempt from disclosure under the California Public Records Act or any other law, including, but not limited to, records related to archeological site information maintained by or on behalf of, or in the possession of, the State of California, Department of Parks and Recreation, State Historic Preservation Officer, Office of Historic Preservation, or the State Historical Resources Commission.

Due to processing delays and other factors, not all of the historical resource reports and resource records that have been submitted to the Office of Historic Preservation are available via this records search. Additional information may be available through the federal, state, and local agencies that produced or paid for historical resource management work in the search area. Additionally, Native American tribes have historical resource information not in the CHRIS Inventory, and you should contact the California Native American Heritage Commission for information on local/regional tribal contacts.

Should you require any additional information for the above referenced project, reference the record search number listed above when making inquiries. Requests made after initial invoicing will result in the preparation of a separate invoice.

Thank you for using the California Historical Resources Information System,

Michelle Galaz
Assistant Coordinator

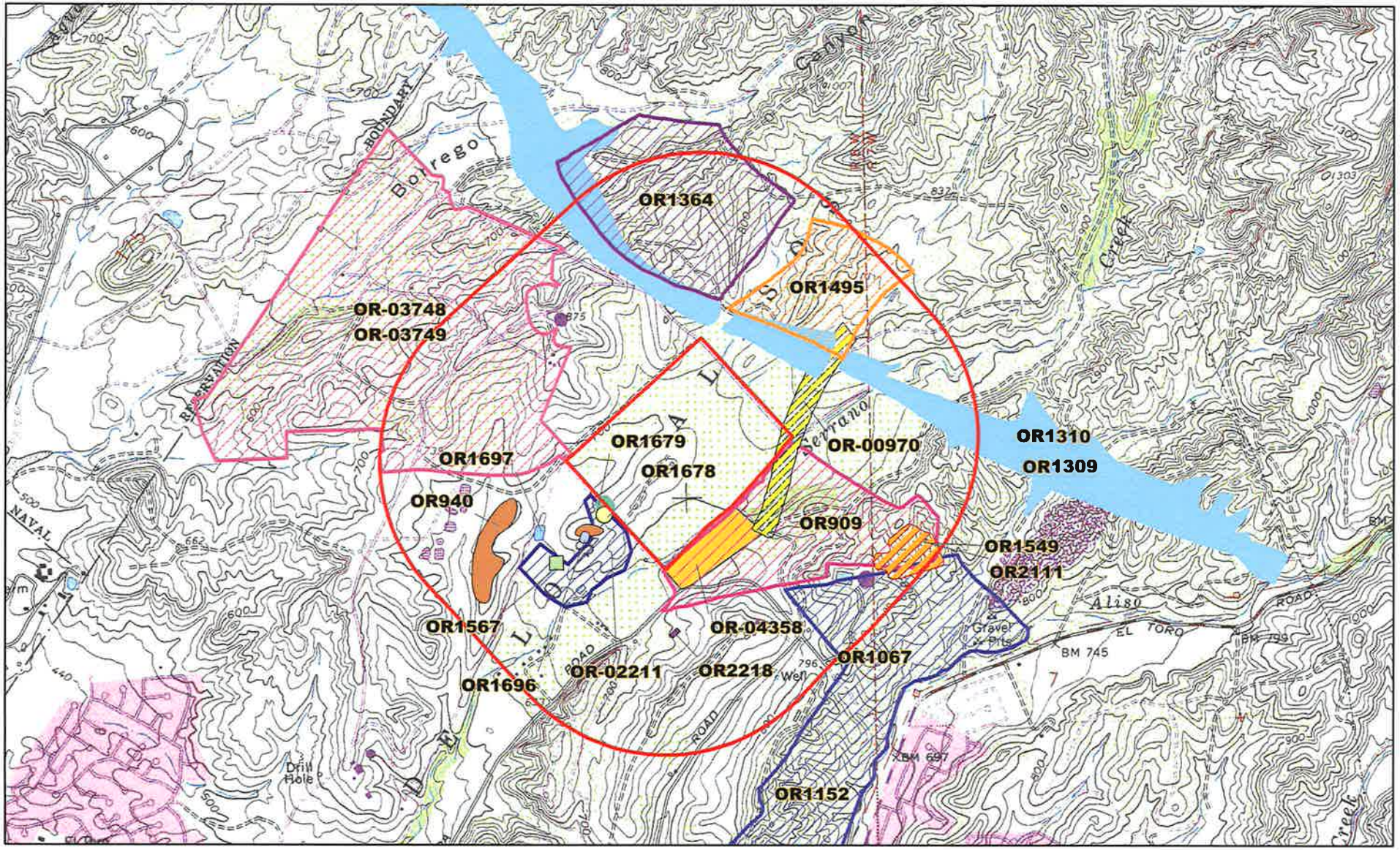
Enclosures:

(X) Custom Maps – 3 pages

(X) Resource Database Printout (list) – 2 pages

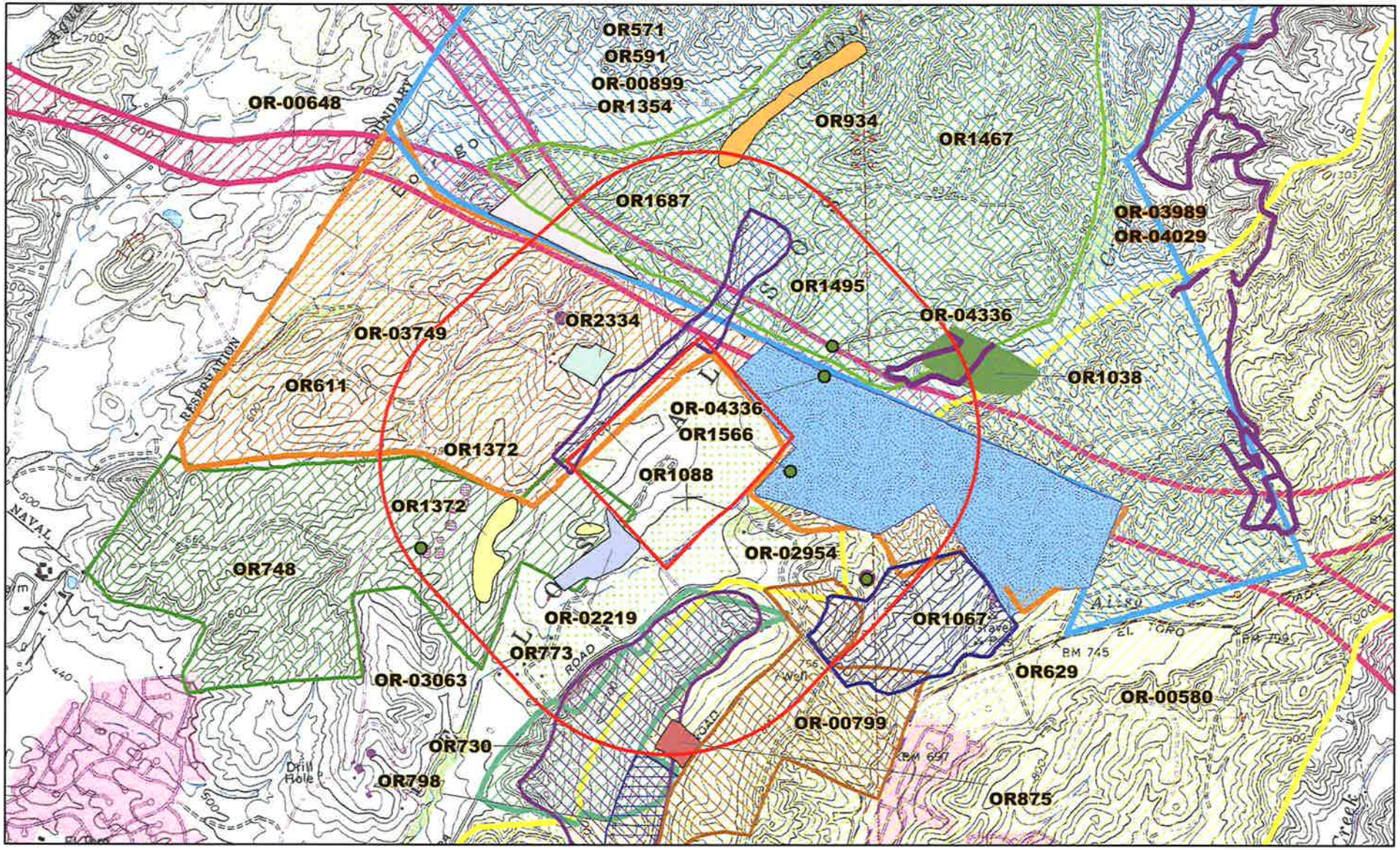
(X) Report Database Printout (list) – 6 pages

(X) Historical Maps – 4 pages



Reports within project area: OR-00970, OR-01679
18 additional reports within 1/2-mile radius

El Toro, CA
USGS 7.5'
PR: 1982 1:24,000
SCCIC #18633
FEB 2018



N
W E
S

Miles
0 0.25 0.5 1

Reports within project area: OR-00611, OR-00748
27 additional reports within 1/2-mile radius

El Toro, CA
USGS 7.5'
PR: 1982 1:24,000
SCCIC #18633
FEB 2018

Resource List

Primary No.	Trinomial	Other IDs	Type	Age	Attribute codes	Recorded by	Reports
P-30-000037	CA-ORA-000037	Resource Name - CAMP 37 OCAS		Unknown	AP01 (Unknown)	1949	OR-00286, OR-01995, OR-02218, OR-02219, OR-03770
P-30-000040	CA-ORA-000040	Resource Name - CAMP 40 OCAS	Site, Other	Prehistoric	AP02 (Lithic scatter) - Mortars	1949	OR-00255, OR-00611, OR-01995, OR-02219, OR-03749
P-30-000042	CA-ORA-000042	Resource Name - CAMP 42 OCAS	Site	Prehistoric	AP02 (Lithic scatter)	1949; 1980 (Cooley, T.)	OR-00591, OR-00899, OR-00934, OR-01467, OR-01995, OR-03052, OR-04111, OR-04336
P-30-000489	CA-ORA-000489	Resource Name - A-1	Site	Prehistoric	AP02 (Lithic scatter)	1973 (REEVES, Archaeological Research, Inc); 1980 (Cooley, T., Archaeological Resource Management Corp.); 2004 (L. Sample, LSA)	OR-00571, OR-00591, OR-00899, OR-00934, OR-01364, OR-01467, OR-01995, OR-04111
P-30-001004	CA-ORA-001004		Site	Prehistoric	AP02 (Lithic scatter)	1981 (K. Del Chario, Archaeological Resource Management Corp.)	OR-00611, OR-00629, OR-02219, OR-03748, OR-03749
P-30-001057	CA-ORA-001057	Resource Name - Signal Landmark I	Site	Prehistoric	AP02 (Lithic scatter); AP08 (Cairns/rock features)	1984 (Bissell, Ron, RMW Paleo Associates, Inc.)	OR-00730, OR-00773, OR-02218, OR-02219, OR-03747, OR-03770, OR-04336
P-30-001062	CA-ORA-001062	Resource Name - Signal Landmark III	Site	Prehistoric	AP02 (Lithic scatter)	1984 (Bissell, Ron); 1994 (Brown, J., RMW Paleo Associates)	OR-00748, OR-00940, OR-01372, OR-02218, OR-02219, OR-02985
P-30-001146	CA-ORA-001146	Resource Name - Baker 2	Site	Prehistoric	AP02 (Lithic scatter); AP15 (Habitation debris)	1988 (JOAN BROWN, RON BISSELL, RMW Paleo Associates)	OR-02112, OR-02219, OR-04336
P-30-001147	CA-ORA-001147	Resource Name - Baker 3	Site	Prehistoric	AP02 (Lithic scatter); AP12 (Quarry)	1988 (JOAN BROWN, RON BISSELL, RMW Paleo Associates)	OR-02112, OR-02218, OR-02219, OR-04336
P-30-001148	CA-ORA-001148	Resource Name - Baker 4	Site	Prehistoric	AP02 (Lithic scatter)	1988 (JOAN BROWN, RON BISSELL, RMW Paleo Associates)	OR-01309, OR-02219, OR-04336

Resource List

Primary No.	Trinomial	Other IDs	Type	Age	Attribute codes	Recorded by	Reports
P-30-001149	CA-ORA-001149	Resource Name - Baker 5	Site	Prehistoric	AP02 (Lithic scatter); AP15 (Habitation debris)	1988 (JOAN BROWN, RON BISSELL, RMW Paleo Associates)	OR-01309, OR-02219, OR-04336
P-30-001171	CA-ORA-001171	Resource Name - Site Z	Site	Prehistoric	AP02 (Lithic scatter)	1988 (BISSELL, RMW Paleo Associates); 1994 (Brown, J., RMW Paleo Associates)	OR-00940, OR-01372, OR-02218, OR-02219
P-30-001496		Resource Name - H-7	Site	Historic	AH16 (Other)	1980 (J. Munoz, Archaeological Resources Management Corp.)	OR-01354, OR-02219, OR-03052
P-30-001581	CA-ORA-001581	Resource Name - PCC-1	Site	Prehistoric	AP02 (Lithic scatter); AP15 (Habitation debris)	2000 (R. Bissell, RMW Paleo Associates)	OR-02211, OR-03747
P-30-100279		Resource Name - #4 Mano	Other	Prehistoric	AP02 (Lithic scatter)	1980 (M. Cotrell)	OR-00591, OR-03052
P-30-100280		Resource Name - #5 Core	Other	Prehistoric	AP02 (Lithic scatter)	1980 (M. Cotrell)	OR-00591, OR-03052
P-30-100281		Resource Name - #6 Flake Tool	Other	Prehistoric	AP02 (Lithic scatter)	1980 (M. Cotrell)	OR-00591, OR-03052
P-30-100282		Resource Name - #7 Mano	Other	Prehistoric	AP02 (Lithic scatter)	1980 (M. Cotrell)	OR-00591, OR-03052
P-30-100283		Resource Name - #8 Core Tool	Other	Prehistoric	AP02 (Lithic scatter)	1980 (M. Cotrell)	OR-00591, OR-03052
P-30-100286		Resource Name - #11 Milling stone	Other	Prehistoric	AP02 (Lithic scatter)	1980 (M. Cotrell)	OR-00591, OR-03052, OR-04336
P-30-100287		Resource Name - #12 Mano	Other	Prehistoric	AP02 (Lithic scatter)	1980 (M. Cotrell)	OR-00591, OR-03052, OR-04336
P-30-100313		Resource Name - FR6-1; Voided - 30-100016	Other	Prehistoric	AP02 (Lithic scatter)	1993 (J. Brock, Archaeological Advisory Group)	OR-03052
P-30-100438		Resource Name - Signal Landmark Isolate I	Other	Prehistoric	AP02 (Lithic scatter)	1984 (R. Bissell)	OR-00730, OR-03747, OR-04336
P-30-100444			Other	Prehistoric	AP02 (Lithic scatter)	1989 (J. Brock, Archaeological Advisory Group)	OR-01088
P-30-100449		Resource Name - P.E. 4	Other	Prehistoric	AP02 (Lithic scatter)	1991 (J. Brown, RMW Paleo Associates)	OR-01067, OR-04308, OR-04336

Report List

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
OR-00571		1973	Ahlering, Michael L.	Report of Findings of a Scientific Resources Survey and Study: Conducted on a Portion of the Whiting Ranch, Orange County, California	Archaeological Planning Collaborative	30-000489, 30-000490, 30-000491
OR-00580		1977	Anonymous	The Aliso Creek Watershed, Orange County, California a Proposal for Creating an Archaeological District for the National Register of Historic Places and a Suggested Research and Study Design	Scientific Resource Surveys, Inc.	
OR-00591		1980	Cooley, Theodore G. and Marie G. Cottrell	Archaeological Assessment of the Whiting Ranch		30-000042, 30-000447, 30-000489, 30-000490, 30-000491, 30-000825, 30-000826, 30-000827, 30-000828, 30-000832, 30-000905, 30-000949, 30-000950, 30-000951, 30-000952, 30-000953, 30-000954, 30-000955, 30-000956, 30-000957, 30-000958, 30-000959, 30-000960, 30-000961, 30-100276, 30-100277, 30-100278, 30-100279, 30-100280, 30-100281, 30-100282, 30-100283, 30-100284, 30-100286, 30-100287, 30-100288, 30-100289, 30-100290, 30-100291, 30-100292, 30-100293, 30-100294, 30-100295, 30-100296
OR-00611		1988	Bissell, Ronald M.	Cultural Resources Reconnaissance of the Baker Ranch Property, El Toro Orange County,	RMW Paleo Associates, Inc.	30-000040, 30-000758, 30-001004, 30-001145, 30-001150
OR-00629		1981	Cottrell, Marie G.	Archaeological Resource Assessment for Two Parcels Near El Toro, California		30-000758, 30-001004
OR-00648		1982	Breece, Bill and Beth Padon	Cultural Resource Survey: Archaeological Resources: Foothill Transportation Corridor, Phase Ii	LSA Associates, Inc.	30-000244, 30-000304, 30-000361, 30-000442, 30-000450, 30-000451, 30-000458, 30-000479, 30-000485, 30-000486, 30-000487, 30-000488, 30-000507, 30-000545, 30-000564, 30-000601, 30-000629, 30-000630, 30-000641, 30-000649, 30-000650, 30-000651, 30-000710, 30-000711, 30-000712, 30-000713, 30-000719, 30-000725, 30-000726, 30-000853, 30-000864, 30-000865, 30-000866
OR-00730		1984	Bissell, Ronald M.	Cultural Resources Assessment Tentative Tract 12110 Orange County, California	RMW Paleo Associates, Inc.	30-001057, 30-100438, 30-100439

Report List

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
OR-00748		1984	Bissell, Ronald M.	Cultural Resources Assessment Los Alisos Research and Development Park El Toro, Orange County, California	RMW Paleo Associates, Inc.	30-000570, 30-000647, 30-000648, 30-001062, 30-001063, 30-001064, 30-001065, 30-001066
OR-00773		1985	Bissell, Ronald M.	Archaeological Site CA-ORA-1057, a Late Prehistoric Period Hunting Camp in El Toro, Orange County, California	RMW Paleo Associates, Inc.	30-001057
OR-00798		1985	Bissell, Ronald M.	Archaeological Survey of the Canada Apartments Property in El Toro, Orange County, California	RMW Paleo Associates, Inc.	
OR-00799		1985	Bissell, Ronald M.	Archaeological Survey of Property Belonging to the William Lyon Company El Toro, Orange County, California	RMW Paleo Associates, Inc.	30-000176, 30-001100
OR-00875		1987	Bissell, Ronald M.	Cultural Resources Reconnaissance of the Canada Ridge Lane Property, El Toro, Orange County, California	RMW Paleo Associates, Inc.	
OR-00899		1987	Anonymous	Draft Environmental Impact Report No. 481 Foothill Ranch (formerly Whiting Ranch) Planned Community Area Plan, General Plan Amendment and Zone Change	MICHAEL BRANDMAN Associates, Inc.	30-000042, 30-000489, 30-000490, 30-000491, 30-000825, 30-000826, 30-000827, 30-000828, 30-000832, 30-000905, 30-000949, 30-000961
OR-00909		1988	Bissell, Ronald M.	Cultural Resources Reconnaissance of Tentative Parcel 83-110, El Toro, Orange County	RMW Paleo Associates, Inc.	
OR-00934		1982	Drover, Christopher E. and Henry C. Koerper	Archaeological Test Investigations: the Phase I Development of the Whiting Ranch	RMW Paleo Associates, Inc.	30-000042, 30-000489, 30-000490, 30-000952, 30-000956
OR-00940		1988	Bissell, Ronald M.	Interim Report Test Excavation of Nine Archaeological Sites on the Pacific Commercentre Property, El Toro Area, Orange County California	RMW Paleo Associates, Inc.	30-000510, 30-000647, 30-000648, 30-001062, 30-001063, 30-001064, 30-001065, 30-001066, 30-001171
OR-00970		1989	Brock, James P.	Report on Archaeological Monitoring of Rough Grading for the Baker Extension of Lake Forest Drive, El Toro, California	Archaeological Advisory Group	
OR-01038		1990	Brock, James P.	Report on Archaeological Monitoring of Rough Grading for Sta. 55+20.64 to Sta. 70+00.00 of Portola Parkway, El Toro, California	Archaeological Advisory Group	
OR-01067		1991	Brown, Joan C.	Cultural Resources Reconnaissance of the 72 Acre El Toro Industrial Park	RMW Paleo Associates, Inc.	30-000176, 30-001100, 30-100446, 30-100447, 30-100448, 30-100449

Report List

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
OR-01088		1990	Brock, James P.	Report on Archaeological Monitoring of Rough Grading of Bake Parkway From Portola Parkway to Station 159+40.81, El Toro, California	Archaeological Advisory Group	30-100444
OR-01152		1978	Sire, Joan, Edward Johnstone, and Doren Desautels	Archaeological Test Report on the Archaeological Resources Contained on a 279+ Acre Parcel of Land Located in the Canada De Los Alisos Area of the County of Orange	Scientific Resource Surveys, Inc.	19-000741, 19-000742, 19-000743
OR-01309		1993	Macko, Michael E.	Final Report Summmary of Archaeological Monitoring, Test Excavations, and Data Recovery for the Foothill Transportation Corridor Northern Segment	Macko Archaeological Consulting	30-000469, 30-000725, 30-000853, 30-000905, 30-000961, 30-001070, 30-001145, 30-001148, 30-001149, 30-001297, 30-001298, 30-001299, 30-001300
OR-01310		1992	Macko, Michael E. and Gary Hurd	Results of Archaeological Test Excavations for the Foothill Transportation Corridor Northern Segment, Construction Section F8 and F9	Macko Archaeological Consulting	30-001070, 30-001298, 30-001299, 30-001300
OR-01354		1980	Munoz, Jeanne	History and Historical Resources of the Whiting Ranch	Archaeological Resource Management Corp.	30-001496, 30-001497, 30-001498, 30-001499, 30-100312
OR-01364		1993	Brock, James P.	Report on Archaeological Monitoring of Rough Grading of Planning Area 6, Foothill Ranch, El Toro, California	Archaeological Advisory Group	30-000489
OR-01372		1994	Brown, Joan C.	Mitigation and Monitoring of Eight Prehistoric Archaeological Sites, CA-ORA-510, CA-ORA-647, CA-ORA-648, CA-ORA-1062, CA-ORA-1063, CA-ORA-1065, CA-ORA-1066, CA-ORA-1171, Located in Southern Orange County, California	RMW Paleo Associates, Inc.	30-000510, 30-000647, 30-000648, 30-001062, 30-001063, 30-001065, 30-001066, 30-001171
OR-01467		1992	Anonymous	Final Report on Archaeological Investigations for Tracts 11725 and 13419: Phase 1 the Foothill Ranch Development Orange County, California	Scientific Resource Surveys, Inc.	30-000042, 30-000489, 30-000490, 30-000952, 30-000953, 30-000956
OR-01495		1996	Brock, James P.	Report on Archaeological Monitoring of Rough Grading of Planning Area 8, Foothill Ranch, El Toro, California	Archaeological Advisory Group	
OR-01549		1997	Brock, James P.	Cultural Resources Assessment of an Approximately 11-acre Property in Lake Forest California	El Toro Materials Company	

Report List

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
OR-01566	Paleo -	1997	Jertberg, Patricia R.	Archaeological and Paleontological Services for Extended Stay America, 20251 Lake Forest Drive, Lake Forest (permit #7917), California	Petra Resources Inc.	
OR-01567		1997	Jertberg, Patricia R.	Archaeological Services for 25781 Atlantic Ocean Drive, Lake Forest (permit #w007506)	Petra Resources Inc.	
OR-01678		1998	Jertberg, Patricia R.	Archaeological Services for Tract 13344, Lot 6, 25741 Atlantic Ocean Drive, Pacific Commercentre, Lake Forest, Orange County, California	Petra Resources Inc.	
OR-01679		1998	Jertberg, Patricia R.	Archaeological Services for Tract 13343, Lot 5, Pacific Commercentre, Lake Forest	Petra Resources Inc.	
OR-01687		1998	Brock, James P.	Report on Archaeological Monitoring of Rough Grading of Planning Area 16, Tentative Tract 13419, Foothill Ranch, El Toro, California	Archaeological Advisory Group	
OR-01696		1998	Jertberg, Patricia R.	Archaeological Services for Tract 13344, Lot 13, 26012 Atlantic Ocean Drive, and Lot 39, 26021 Commercentre Drive, Lake Forest	Petra Resources, Inc.	
OR-01697		1998	Jertberg, Patricia R.	Archaeological Services for Tract 13343, Lot 1, 20571 Crescent Bay Drive, Lake Forest	Petra Resources, Inc.	
OR-02111		2000	Brock, James P.	Cultural Resources Assessment of a 13.2 Acre Property in Lake Forest	Archaeological Advisory Group	
OR-02211		2001	Hoover, Anne M.	Cultural Resources Reconnaissance and Monitoring of Pacific Commercentre, and Mitigation of CA-ORA-1581, City of Lake Forest, County of Orange, Ca	RMW Paleo Associates, Inc.	30-001581
OR-02218		2000	Brock, James P.	Archaeological Assessment for the Proposed Comfort Inn Project, 20768 Lake Forest Drive, Orange County, Ca	Archaeological Advisory Group	30-000037, 30-001057, 30-001062, 30-001100, 30-001147, 30-001171
OR-02219	Paleo -	2000	White, Robert S., White, Laurie, and Minch, John	Archaeological and Paleontological Assessments of a 12.05 Acre Parcel Located Just East of Dimension Drive and Enterprise Way in Lake Forest, Orange County	Archaeological Associates, Ltd.	30-000037, 30-000039, 30-000040, 30-000176, 30-000510, 30-000647, 30-000648, 30-000758, 30-000773, 30-001004, 30-001057, 30-001058, 30-001062, 30-001063, 30-001064, 30-001065, 30-001066, 30-001100, 30-001146, 30-001147, 30-001148, 30-001149, 30-001150, 30-001171, 30-001496

Report List

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
OR-02334	Paleo -	2001	Hoover, Anna M.	Archaeological and Paleontological Monitoring at Lots 9 and 10, Tract 15753, Lake Forest , Orange County, California	RMW Paleo Associates, Inc.	
OR-02954		2004	Wlodarski, Robert J.	Records Search Results for the Proposed Mountain Union Telecom Regency Lane Cell Site (po/ref# Sfc4001), Located at 20595 Regency Lane, City of Lake Forest, County of Orange, California	Cellular, Archaeological Resource, Evaluations	
OR-03063		2001	Bonner, Wayne H.	Records Search Results for Sprint Pcs Facility Og65xc417d (the Pacific World Site), Located at 25791 Commercentre Drive, El Toro in Orange County, California	Michael Brandman Associates	
OR-03748		2009	Patrick O. Maxon	Phase II Archaeological Evaluation CA-ORA-1004 & CA-ORA-1150	Bonterra Consulting	30-001004, 30-001150
OR-03749		2008	Patrick O. Maxon	Phase I Cultural Resources Reconnaissance Survey- Proposed Alton Parkway Extension Project, Including Baker Ranch, Lake Forest, CA	BonTerra Consulting	30-000040, 30-000758, 30-001004, 30-001150
OR-03989		2011	Deering, Mark and Mason, Roger D.	Cultural Resources Documentation and Monitoring of Southern California Edison Access Roads During Maintenance by the Orange County Fire Authority, 2010 Orange County, California	ECORP Consulting, Inc	30-000161, 30-000328, 30-000330, 30-000331, 30-000370, 30-000438, 30-000446, 30-000447, 30-000495, 30-000588, 30-000590, 30-000591, 30-000708, 30-000779, 30-000785, 30-000787, 30-000825, 30-000826, 30-000827, 30-000829, 30-000830, 30-000831, 30-000847, 30-000897, 30-000898, 30-000941, 30-000969, 30-001032, 30-001282, 30-001404, 30-001410, 30-001412, 30-001428, 30-001430, 30-001532, 30-001533

Report List

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
OR-04029		2010	Deering, Mark and Roger Mason	Cultural Resources Monitoring of Southern California Edison Access Roads Maintained by Orange County Fire Authority, Orange County, California (JPA E6088-0031; I.O. 305869)	ECORP Consulting	30-000007, 30-000072, 30-000077, 30-000161, 30-000291, 30-000292, 30-000325, 30-000326, 30-000327, 30-000328, 30-000329, 30-000330, 30-000331, 30-000370, 30-000438, 30-000446, 30-000447, 30-000456, 30-000495, 30-000588, 30-000590, 30-000591, 30-000592, 30-000640, 30-000700, 30-000708, 30-000724, 30-000767, 30-000779, 30-000781, 30-000784, 30-000785, 30-000787, 30-000805, 30-000825, 30-000826, 30-000827, 30-000828, 30-000829, 30-000830, 30-000831, 30-000832, 30-000847, 30-000892, 30-000897, 30-000898, 30-000909, 30-000941, 30-000957, 30-000967, 30-000968, 30-000969, 30-001032, 30-001055, 30-001087, 30-001162, 30-001201, 30-001228, 30-001281, 30-001282, 30-001293, 30-001398, 30-001404, 30-001410, 30-001411, 30-001412, 30-001428, 30-001430, 30-001532, 30-001533, 30-001618, 30-001619, 30-100137
OR-04336		2012	O'Neil, Stephen	Identification and Evaluation of Historic Properties ADA Wheelchair Access Ramp Improevment Project, City fo Lake Forest Orange County, California	UltraSystems Environmental	30-000042, 30-000176, 30-000431, 30-000460, 30-000536, 30-000541, 30-000694, 30-000695, 30-000696, 30-000697, 30-000698, 30-000699, 30-000739, 30-000742, 30-000743, 30-000858, 30-000859, 30-001057, 30-001058, 30-001110, 30-001145, 30-001146, 30-001147, 30-001148, 30-001149, 30-100186, 30-100189, 30-100286, 30-100287, 30-100311, 30-100430, 30-100438, 30-100445, 30-100446, 30-100447, 30-100448, 30-100449, 30-100464
OR-04358	Paleo -	1999	Gust, Sherrl	Archaeological and Paleontological Monitoring Report for Serrano Creek Business Center, Lake Forest, California	RMW Paleo Associates, Inc.	

WAR DEPARTMENT
CORPS OF ENGINEERS, U. S. ARMY

CALIFORNIA

SANTIAGO PEAK QUADRANGLE
CALIFORNIA
15 MINUTE SERIES

(ANAHEIM)

(CORONA)

(RIVERSIDE)

(SANTA ANA)

(ALBERHILL 1:24 000)

117°45' 431000m E. 40 35 1 610 000 FEET 117°30' 33°45'

3734000m N.

570 000 FEET

Silverado Canyon

Limestone Canyon

Modjeska

Williams Canyon

Bear Flat

Modjeska Peak

Riverside Drive

Cañada

SANTA ANA MTNS

SANTIAGO PEAK

CLEVELAND NATIONAL FOREST

Bonito Canyon

Tomato Springs

Lemon Reservoir

Irvine Boulevard

Central Avenue

Seaboard

Atchison, Topeka & Santa Fe Railroad

Portola

Aliso

Trabuco

Plano

Trabuco Canyon

Santiago Canyon

Fremont Cabin

State Forest Station

El Toro

Tech Regervation

Irvine Road

SCALE 1:62500

1 0 1 2 3 MILES

3000 0 3000 6000 9000 12000 15000 18000 21000 FEET

1 5 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 50 FEET

DATUM IS MEAN SEA LEVEL (1929 ADJ.)

TRANSVERSE MERCATOR PROJECTION

1927 NORTH AMERICAN DATUM

10,000-FOOT GRID TICKS, CALIFORNIA PLANE COORDINATE SYSTEM, ZONE 6, SHOWN IN BLACK
1000-METER GRID TICKS, UNIVERSAL TRANSVERSE MERCATOR SYSTEM, ZONE 11, SHOWN IN BLUE

15° TRUE NORTH MAGNETIC NORTH

APPROXIMATE MEAN DECLINATION, 1942

Prepared under the direction of the Chief of Engineers by the Army Map Service (AMS), U.S. Army, Washington, D.C. Scale changed, marginal data revised and Universal Transverse Mercator Grid added, 1947. Copied in 1947 from California, 1:62,500, AMS, Santiago Peak, 1942. Original map compiled by aerophotogrammetric methods for the Army Map Service by the 29th Engineer Battalion, U.S. Army. Horizontal control by USC&GS, USGS, Rancho Santa Margarita Survey and the 29th Engineer Battalion, U.S. Army. Vertical control by USC&GS, USGS and the 29th Engineer Battalion, U.S. Army. Aerial photography by U.S. Army Air Force, 1939.

LEGEND

ROAD DATA 1942

Hard surface, heavy duty road, more than two lanes wide
Hard surface, heavy duty road, two lanes wide; Federal route marker
Secondary, hard surface, all weather road, two lanes wide; State route marker
Loose surface, graded, dry weather road
Trail; Dirt road
Railroad in street; Car line in street

RAILROADS — Single track — Double track — UNDER CONSTRUCTION: Single track, Double track — ABANDONED: Single track, Double track
Standard gauge
Narrow gauge
Single track car line
Double track car line

BOUNDARIES
International
State
County (with monuments)
County subdivision
Reservation
Military installation — MIL RES
School; Church
Cemetery
Churchyard

Mine
Horizontal control sta.
Bench mark
Spot elevation
Woods
Woods-brushwood
Brushwood
Orchard
Vineyard

Intermittent lake
Intermittent stream
Dam
Rapids; Falls
Large rapids and falls
Swamp, marsh
Rocks awash at low tide
Wharf, pier
Man-made shoreline

REPRINTED FROM MILITARY EDITION FOR CIVIL USE

FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER 25, COLORADO OR WASHINGTON 25, D.C.

A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

Santiago Peak
1942

SANTIAGO PEAK, CALIFORNIA

N3330-W11730/15

1942

SENATE BILL 18 NATIVE AMERICAN CONSULTATION RECORD
Nakase Nursery/Toll Brothers Project EIR, Lake Forest, Orange County, California

Date the Sacred Lands File Search request was submitted to the Native American Heritage Commission (NAHC): February 8, 2018

Date the NAHC responded: February 9, 2018

Results of the NAHC Sacred Lands File Search: The Sacred Lands File search was completed with **negative** results for the presence of Native American cultural resources in the Area of Potential Effect (APE); however the NAHC recommended that the 20 Native American individuals listed in the table below be contacted for information regarding cultural resources that could be affected by the project.

Groups/Individuals Contacted	Date of Project Notification Letter	Date of Tribal Response to Letter	Date and Results of Follow-up Telephone Calls and/or Emails
Campo Band of Mission Indians Ralph Goff, Chairperson *Kumeyaay*	04/19/2018	No response received.	05/15/2018: A follow-up email was sent to Mr. Goff. No response was received.
Ewiiaapaayp Tribal Office Michael Garcia, Vice Chairperson *Kumeyaay*	04/19/2018	No response received.	05/15/2018: A follow-up email was sent to Mr. Garcia. No response was received.
Ewiiaapaayp Tribal Office Robert Pinto, Chairperson *Kumeyaay*	04/19/2018	No response received.	05/15/2018: A follow-up phone call was made to Mr. Pinto. The phone was answered by a different individual, who was not sure what SB 18 meant, and asked to be emailed more information about the reason for the phone call and the project being called about. An email was sent to dvela@leaningrock.net to follow up. No response was received.
Gabrieleno Band of Mission Indians – Kizh Nation Andrew Salas, Chairperson *Gabrieleno*	04/19/2018	05/04/2018: Mr. Salas's group responded to the City of Lake Forest directly via email, stating that the project falls within their tribal territory and they would like to consult with the agency.	No follow-up phone call or email was made since Mr. Salas' group already reached out to the City of Lake Forest for AB 52.
Gabrieleno/Tongva San Gabriel Band of Mission Indians Anthony Morales, Chairperson *Gabrieleno*	04/19/2018	No response received.	05/15/2018: A follow-up email was sent to Mr. Morales. No response was received.

SENATE BILL 18 NATIVE AMERICAN CONSULTATION RECORD
Nakase Nursery/Toll Brothers Project EIR, Lake Forest, Orange County, California

Groups/Individuals Contacted	Date of Project Notification Letter	Date of Tribal Response to Letter	Date and Results of Follow-up Telephone Calls and/or Emails
Gabrielino/Tongva Nation Sandonne Goad, Chairperson *Gabrielino*	04/19/2018	No response received.	05/15/2018: A follow-up email was sent to Ms. Goad. No response was received.
Gabrielino Tongva Indians of California Tribal Council Robert Dorame, Chairperson *Gabrielino*	04/19/2018	No response received.	05/15/2018: A follow-up email was sent to Mr. Dorame. No response was received.
Gabrielino-Tongva Tribe Charles Alvarez *Gabrielino*	04/19/2018	No response received.	05/15/2018: A follow-up email was sent to Mr. Alvarez. No response was received.
Jamul Indian Village Erica Pinto, Chairperson *Kumeyaay*	04/19/2018	No response received.	05/15/2018: A follow-up phone call was made to Ms. Pinto. The call was not answered and was forwarded to the voice mailbox of Marci O'Husky. A message was left for Ms. O'Husky. No response was received.
Juaneño Band of Mission Indians Sonia Johnston, Chairperson *Juaneño*	04/19/2018	No response received.	05/15/2018: A follow-up email was sent to Ms. Johnston. No response was received.
Juaneño Band of Mission Indians Acjachemen Nation – Belardes Matias Belardes, Chairperson *Juaneño*	04/19/2018	No response received.	05/15/2018: The phone number provided on the NAHC consultation list is for Joyce Perry, who is with the same group. A follow-up phone call was made to Ms. Perry; the call went to voicemail. A message was left. No response was received.
Juaneño Band of Mission Indians Acjachemen Nation – Romero Teresa Romero, Chairperson *Juaneño*	04/19/2018	No response received.	05/15/2018: A follow-up email was sent to Ms. Romero. No response was received.

SENATE BILL 18 NATIVE AMERICAN CONSULTATION RECORD
Nakase Nursery/Toll Brothers Project EIR, Lake Forest, Orange County, California

Groups/Individuals Contacted	Date of Project Notification Letter	Date of Tribal Response to Letter	Date and Results of Follow-up Telephone Calls and/or Emails
La Posta Band of Mission Indians Javaughn Miller, Tribal Administrator Kumeyaay	04/19/2018	No response received.	05/15/2018: A follow-up email was sent to Mr. Miller. No response was received.
La Posta Band of Mission Indians Gwendolyn Parada, Chairperson *Kumeyaay*	04/19/2018	No response received.	05/15/2018: A follow-up email was sent to Ms. Parada. No response was received.
Manzanita Band of Kumeyaay Nation Angela Elliott Santos, Chairperson *Kumeyaay*	04/19/2018	No response received.	05/15/2018: A follow-up phone call was made to Ms. Santos. The call went to voicemail for the office general mailbox; a message was left. No response was received.
Pauma Band of Luiseño Indians – Pauma & Yuima Reservation Temet Aguilar, Chairperson *Luiseño*	04/19/2018	No response received.	05/15/2018: A follow-up phone call was made to Mr. Aguilar. The call went to the voicemail for the Pauma Band office. A message was left. No response was received.
San Fernando Band of Mission Indians John Valenzuela, Chairperson *Kitanemuk Serrano Tataviam*	04/19/2018	No response received.	05/15/2018: A follow-up email was sent to Mr. Valenzuela.
San Pasqual Band of Mission Indians Allen E. Lawson, Chairperson *Kumeyaay*	04/19/2018	No response received.	05/15/2018: A follow-up email was sent to Mr. Lawson. No response was received.
Sycuan Band of the Kumeyaay Nation Cody J. Martinez, Chairperson *Kumeyaay*	04/19/2018	No response received.	05/15/2018: A follow-up email was sent to Mr. Martinez. No response was received.
Viejas Band of Kumeyaay Indians Robert Welch, Chairperson *Kumeyaay*	04/19/2018	No response received.	05/15/2018: A follow-up email was sent to Mr. Welch. No response was received.

LSA

BERKELEY
CARLSBAD
FRESNO
IRVINE
LOS ANGELES
PALM SPRINGS
POINT RICHMOND
RIVERSIDE
ROSEVILLE
SAN LUIS OBISPO

February 8, 2018

Gayle Totton, M.A., PhD.
Associate Governmental Program Analyst
Native American Heritage Commission
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691

Subject: Senate Bill 18 and Assembly Bill 52 Consultation Lists and Sacred Lands File Search Request for the proposed Nakase Nursery/Toll Brothers EIR Project in Lake Forest, Orange County, California

Dear Dr. Totton:

Attached please find a Local Government Tribal Consultation List Request and a map showing the location of the proposed Nakase Nursey/Toll Brothers EIR Project (project) in Lake Forest, Orange County, California. Specifically, the project is depicted on the United States Geological Survey *El Toro, California* 7.5-minute topographic quadrangle map in Township 06 South, Range 08 West, Sections 1 and 12, San Bernardino Baseline and Meridian.

LSA is assisting Marie Luna (mluna@lakeforestca.gov), Senior Planner for the City of Lake Forest, in preparing for Native American consultation for the project per Senate Bill 18 and Assembly Bill 52. As indicated on the attached request, please conduct a Sacred Lands File search, notify us of any Native American cultural resources that might be impacted, and include a consultation list of Native Americans that may be contacted for the Senate Bill 18 and Assembly Bill 52 Native American consultation processes.

Thank you very much for your assistance. If you have any questions or comments, please contact me at (949) 553-0666, or at kerrie.collison@lsa.net.

Best Regards,

LSA Associates, Inc.

Kerrie Collison, RPA
Archaeologist

Attachments: Local Government Tribal Consultation List Request
Figure 1 – Project Location Map

20 Executive Park, Suite 200, Irvine, California 92614 949.553.0666 www.lsa.net

Local Government Tribal Consultation List Request

Native American Heritage Commission
1550 Harbor Blvd, Suite 100
West Sacramento, CA 95691
916-373-3710
916-373-5471 – Fax
nahc@nahc.ca.gov

Type of List Requested

☒ **CEQA Tribal Consultation List (AB 52)** – ***Per Public Resources Code § 21080.3.1, subs. (b), (d), (e) and 21080.3.2***

☒ **General Plan (SB 18)** - ***Per Government Code § 65352.3.***

Local Action Type:

___ General Plan ___ General Plan Element _x_ General Plan Amendment

___ Specific Plan ___ Specific Plan Amendment ___ Pre-planning Outreach Activity

Required Information

Project Title: Nakase Nursery/Toll Brothers EIR

Local Government/Lead Agency: City of Lake Forest

Contact Person: Marie Luna, Senior Planner

Street Address: 25550 Commercentre Drive, Suite 100

City: Lake Forest **Zip:** 92630

Phone: (949) 461-3466 **Fax:**

Email: mluna@lakeforestca.gov

Specific Area Subject to Proposed Action

County: Orange **City/Community:** Lake Forest

Project Description:

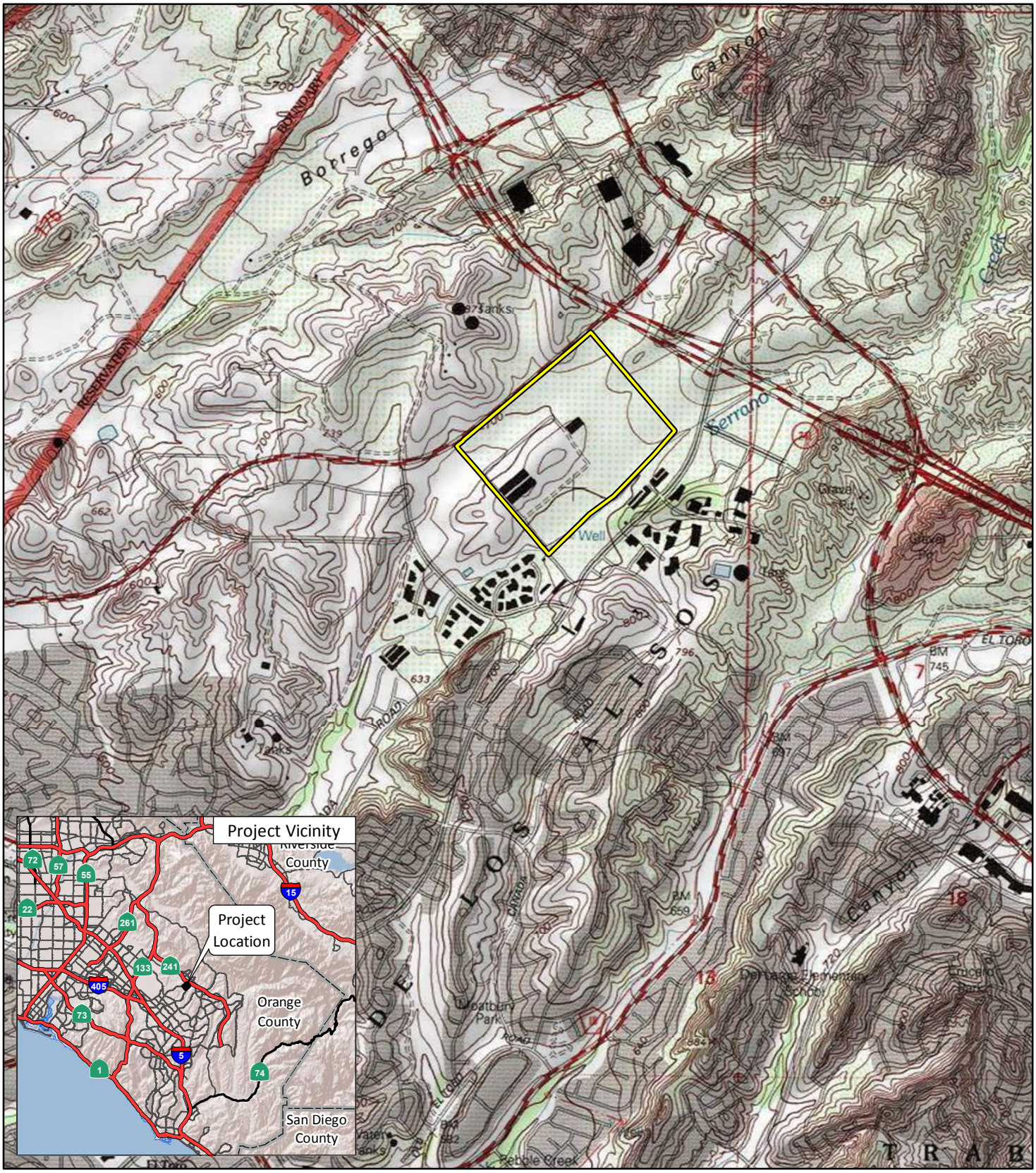
The proposed Project includes a Development Agreement, Area Plan, Master Tentative Tract Map, General Plan Amendment, and Zone Change for a parcel encompassing 122 acres on what is currently known as the Nakase Nursery (APN #612-221-01). If approved, the proposed Project would allow the development of: (1) approximately 600 to 800 residential units at a density ranging between 6 to 18 units per acre, (2) a senior affordable rental community, (3) parks, (4) open space and walking trails, (5) a recreation facility, and (6) an elementary school for approximately 1,000 kindergarten through sixth grade students. (School site locations are currently under review with the Saddleback Unified School District and California Department of Education. The school site may be located along either Bake or Rancho Parkways or a combination thereof.)

Additional Request

☒ **Sacred Lands File Search** - ***Required Information:***

USGS Quadrangle Name(s): El Toro, California

Township: 6 South **Range:** 8 West **Section(s):** 1, 12



LSA

LEGEND

Project Location

FIGURE 1

SOURCE: USGS (2017)

\\vcorp12\images\CLF1801\GIS\ProjectLocation.mxd (2/6/2018)

Nakase Nursery/Toll Brothers EIR

Project Location

NATIVE AMERICAN HERITAGE COMMISSION
Cultural and Environmental Department
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691
(916) 373-3710

February 9, 2018

Marie Luna, Senior Planner
City of Lake Forest

Sent via e-mail: mluna@lakeforestca.gov

RE: Proposed Nakase Nursery/ Toll Brothers Project, City of Lake Forest; El Toro USGS Quadrangle, Orange County, California

Dear Ms. Luna:

Attached is a Consultation List of tribes with traditional lands or cultural places located within the boundaries of the above referenced project.

Government Code §65352.3 (SB-18) **requires local governments** to consult with California Native American tribes identified by the Native American Heritage Commission (NAHC) for the purpose of avoiding, protecting, and/or mitigating impacts to cultural places in creating or amending general plans, including specific plans. As of July 1, 2015, Public Resources Code Sections 21080.3.1 and 21080.3.2 (AB-52) require **public agencies to consult** with California Native American tribes identified by the NAHC for the purpose mitigating impacts to tribal cultural resources:

> Within 14 days of determining that an application for a project is complete or a decision by a public agency to undertake a project, **the lead agency** shall provide formal notification to the designated contact of, or a tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, which shall be accomplished by means of at least one written notification that includes a brief description of the proposed project and its location, the lead agency contact information, and a notification that the California Native American tribe has 30 days to request consultation pursuant to this section. (Public Resources Code Section 21080.1(d))

The law does not preclude agencies from initiating consultation with the tribes that are culturally and traditionally affiliated with their jurisdictions. The NAHC believes that in fact that this is the best practice to ensure that tribes are consulted commensurate with the intent of the law.

In accordance with Public Resources Code Section 21080.1(d), formal notification must include a brief description of the proposed project and its location, the lead agency contact information, and a notification that the California Native American tribe has 30 days to request consultation. The NAHC requests that lead agencies include in their notifications information regarding any cultural resources assessment that has been completed on a potential "area of project affect" (APE), such as:

1. The results of any record search that may have been conducted at an Information Center of the California Historical Resources Information System (CHRIS), including, but not limited to:

   - A listing of any and all known cultural resources have already been recorded on or adjacent to the APE;
   - Copies of any and all cultural resource records and study reports that may have been provided by the Information Center as part of the records search response;
   - If the probability is low, moderate, or high that cultural resources are located in the APE.

- Whether the records search indicates a low, moderate or high probability that unrecorded cultural resources are located in the potential APE; and
- If a survey is recommended by the Information Center to determine whether previously unrecorded cultural resources are present.

2. The results of any archaeological inventory survey that was conducted, including:

   - Any report that may contain site forms, site significance, and suggested mitigation measurers.

     All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for pubic disclosure in accordance with Government Code Section 6254.10.

3. The results of any Sacred Lands File (SFL) check conducted through Native American Heritage Commission. A search of the SFL was completed with negative results.

4. Any ethnographic studies conducted for any area including all or part of the potential APE; and

5. Any geotechnical reports regarding all or part of the potential APE.

Lead agencies should be aware that records maintained by the NAHC and CHRIS is not exhaustive, and a negative response to these searches does not preclude the existence of a cultural place. A tribe may be the only source of information regarding the existence of a tribal cultural resource.

This information will aid tribes in determining whether to request formal consultation. In the case that they do, having the information beforehand well help to facilitate the consultation process.

Lead agencies or agencies potentially undertaking a project are encouraged to send more than one written notice to tribes that are traditionally and culturally affiliated to a potential APE during the 30-day notification period to ensure that the information has been received.

If you receive notification of change of addresses and phone numbers from tribes, please notify me. With your assistance we are able to assure that our consultation list contains current information.

If you have any questions, please contact me at my email address: gayle.totton@nahc.ca.gov.

Sincerely,

Gayle Totton

Gayle Totton, M.A., PhD.
Associate Government Planning Analyst
(916) 373-3714

Native American Heritage Commission
Tribal Consultation List
Orange County
2/9/2018

Campo Band of Mission Indians
Ralph Goff, Chairperson
36190 Church Road, Suite 1 — Kumeyaay
Campo, CA, 91906
Phone: (619) 478 - 9046
Fax: (619) 478-5818
rgoff@campo-nsn.gov

Ewiiaapaayp Tribal Office
Michael Garcia, Vice Chairperson
4054 Willows Road — Kumeyaay
Alpine, CA, 91901
Phone: (619) 445 - 6315
Fax: (619) 445-9126
michaelg@leaningrock.net

Ewiiaapaayp Tribal Office
Robert Pinto, Chairperson
4054 Willows Road — Kumeyaay
Alpine, CA, 91901
Phone: (619) 445 - 6315
Fax: (619) 445-9126

Gabrieleno Band of Mission Indians - Kizh Nation
Andrew Salas, Chairperson
P.O. Box 393 — Gabrieleno
Covina, CA, 91723
Phone: (626) 926 - 4131
admin@gabrielenoindians.org

Gabrieleno/Tongva San Gabriel Band of Mission Indians
Anthony Morales, Chairperson
P.O. Box 693 — Gabrieleno
San Gabriel, CA, 91778
Phone: (626) 483 - 3564
Fax: (626) 286-1262
GTTribalcouncil@aol.com

Gabrielino /Tongva Nation
Sandonne Goad, Chairperson
106 1/2 Judge John Aiso St., #231 — Gabrielino
Los Angeles, CA, 90012
Phone: (951) 807 - 0479
sgoad@gabrielino-tongva.com

Gabrielino Tongva Indians of California Tribal Council
Robert Dorame, Chairperson
P.O. Box 490 — Gabrielino
Bellflower, CA, 90707
Phone: (562) 761 - 6417
Fax: (562) 761-6417
gtongva@gmail.com

Gabrielino-Tongva Tribe
Charles Alvarez,
23454 Vanowen Street — Gabrielino
West Hills, CA, 91307
Phone: (310) 403 - 6048
roadkingcharles@aol.com

Jamul Indian Village
Erica Pinto, Chairperson
P.O. Box 612 — Kumeyaay
Jamul, CA, 91935
Phone: (619) 669 - 4785
Fax: (619) 669-4817

Juaneno Band of Mission Indians
Sonia Johnston, Chairperson
P.O. Box 25628 — Juaneno
Santa Ana, CA, 92799
sonia.johnston@sbcglobal.net

Juaneno Band of Mission Indians Acjachemen Nation - Belardes
Matias Belardes, Chairperson
32161 Avenida Los Amigos — Juaneno
San Juan Capisttrano, CA, 92675
Phone: (949) 293 - 8522

Juaneno Band of Mission Indians Acjachemen Nation - Romero
Teresa Romero, Chairperson
31411-A La Matanza Street — Juaneno
San Juan Capistrano, CA, 92675
Phone: (949) 488 - 3484
Fax: (949) 488-3294
tromero@juaneno.com

This list is current only as of the date of this document and is based on the information available to the Commission on the date it was produced. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is applicable only for consultation with Native American tribes under Government Code Sections 65352.3, 65362.4 et seq. and Public Resources Code Sections 21080.3.1 for the proposed Nakase Nursery/ Toll Brothers Project, Orange County.

Native American Heritage Commission
Tribal Consultation List
Orange County
2/9/2018

La Posta Band of Mission Indians
Javaughn Miller, Tribal Administrator
8 Crestwood Road
Boulevard, CA, 91905
Phone: (619) 478 - 2113
Fax: (619) 478-2125
jmiller@LPtribe.net
Kumeyaay

La Posta Band of Mission Indians
Gwendolyn Parada, Chairperson
8 Crestwood Road
Boulevard, CA, 91905
Phone: (619) 478 - 2113
Fax: (619) 478-2125
LP13boots@aol.com
Kumeyaay

Manzanita Band of Kumeyaay Nation
Angela Elliott Santos, Chairperson
P.O. Box 1302
Boulevard, CA, 91905
Phone: (619) 766 - 4930
Fax: (619) 766-4957
Kumeyaay

Pauma Band of Luiseno Indians - Pauma & Yuima Reservation
Temet Aguilar, Chairperson
P.O. Box 369
Pauma Valley, CA, 92061
Phone: (760) 742 - 1289
Fax: (760) 742-3422
Luiseno

San Fernando Band of Mission Indians
John Valenzuela, Chairperson
P.O. Box 221838
Newhall, CA, 91322
Phone: (760) 885 - 0955
tsen2u@hotmail.com
Kitanemuk
Serrano
Tataviam

San Pasqual Band of Mission Indians
Allen E. Lawson, Chairperson
P.O. Box 365
Valley Center, CA, 92082
Phone: (760) 749 - 3200
Fax: (760) 749-3876
allenl@sanpasqualtribe.org
Kumeyaay

Sycuan Band of the Kumeyaay Nation
Cody J. Martinez, Chairperson
1 Kwaaypaay Court
El Cajon, CA, 92019
Phone: (619) 445 - 2613
Fax: (619) 445-1927
ssilva@sycuan-nsn.gov
Kumeyaay

Viejas Band of Kumeyaay Indians
Robert Welch, Chairperson
1 Viejas Grade Road
Alpine, CA, 91901
Phone: (619) 445 - 3810
Fax: (619) 445-5337
jhagen@viejas-nsn.gov
Kumeyaay

This list is current only as of the date of this document and is based on the information available to the Commission on the date it was produced. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is applicable only for consultation with Native American tribes under Government Code Sections 65352.3, 65362.4 et seq. and Public Resources Code Sections 21080.3.1 for the proposed Nakase Nursery/ Toll Brothers Project, Orange County.

LSA

BERKELEY
CARLSBAD
FRESNO
IRVINE
LOS ANGELES
PALM SPRINGS
POINT RICHMOND
RIVERSIDE
ROSEVILLE
SAN LUIS OBISPO

April 19, 2018

Allen E. Lawson, Chairperson
San Pasqual Band of Mission Indians
P.O. Box 365
Valley Center, CA 92082

Subject: Invitation to Consult Under Senate Bill 18, General Plan Amendment for the Proposed Nakase Nursery/Toll Brothers Project Environmental Impact Report, Lake Forest, Orange County, California

Dear Mr. Lawson:

This letter is to notify you of the proposed Nakase Nursery/Toll Brothers Project (project) Environmental Impact Report in Lake Forest, Orange County, California, and to formally invite you to request consultation with the City of Lake Forest (City) regarding the project pursuant to Senate Bill 18 ([SB 18] Burton 2004).

SB 18 became effective on March 1, 2005, and requires local governments to invite Native American tribes identified by the Native American Heritage Commission (NAHC) to participate in consultation about proposed General and Specific Plan adoptions or amendments for the purpose of preserving or mitigating potential impacts from a project to Native American cultural places. Although the Sacred Lands File search results for the project area were negative, the NAHC has identified your tribe as having traditional lands or cultural places in the project vicinity. The proposed project would necessitate amendments to the City's General Plan and is therefore subject to the requirements of SB 18.

The proposed project will include a Development Agreement, an Area Plan, a Master Tentative Tract Map, a General Plan Amendment, and a Zone Change for a parcel encompassing 122 acres on what is currently known as the Nakase Nursery in Lake Forest, Orange County, California. Please see Figure 1 (attached) for the project's location.

If approved, the project would allow the development of: (1) approximately 600 to 800 residential units at a density ranging between 6 to 18 units per acre; (2) a senior affordable rental community; (3) parks; (4) open space and walking trails; (5) a recreation facility; and (6) an elementary school for approximately 1,000 Kindergarten through sixth-grade students. School site locations are currently under review with the Saddleback Unified School District and the California Department of Education. The school site may be located along either Bake or Rancho Parkways or a combination thereof.

A records search for the project area was completed at the South Central Coastal Information Center of the California Historical Resources Information System at California State University, Fullerton. The records search indicated there are no known prehistoric sites within the proposed project area. Twenty-five cultural resources are located within 0.25 mile of the project. A Sacred Lands File search requested from the NAHC was negative for the project area.

If you would like to participate in formal SB 18 consultation for this proposed project, please direct your request in writing by letter or email to Marie Luna, Senior Planner for the City of Lake Forest, at 25550 Commercentre Drive, Suite 100, Lake Forest, CA 92630, or mluna@lakeforestca.gov. You may also call Ms. Luna at (949) 461-3466 for additional information. A response to Ms. Luna by May 23, 2018, would be appreciated.

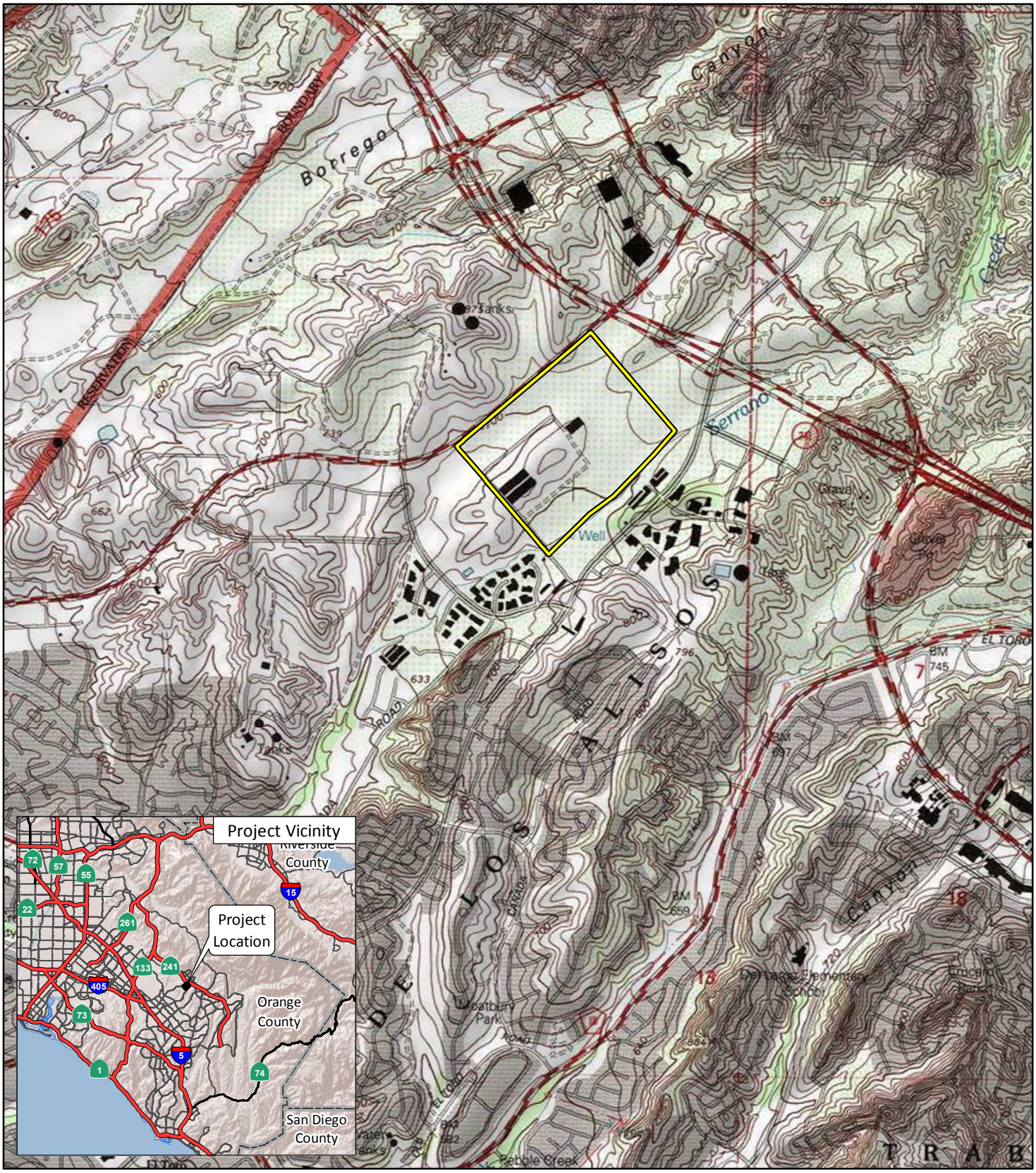
Should your tribe participate in the consultation process, please know that at your request, any sensitive information you share with the City regarding cultural places and/or sacred sites will be kept strictly confidential and will not be divulged to the public. Thank you for your participation in this process.

Respectfully,

LSA Associates, Inc.

Kerrie Collison, RPA
Cultural Resources Manager

Attachment: Figure 1: Project Location Map



LSA

LEGEND

Project Location

FIGURE 1

SOURCE: USGS (2017)

\\vcorp12\images\CLF1801\GIS\ProjectLocation.mxd (2/6/2018)

Nakase Nursery/Toll Brothers EIR

Project Location

Kerrie Collison

From: Kerrie Collison
Sent: Tuesday, May 15, 2018 3:47 PM
To: 'dvela@leaningrock.net'
Subject: Senate Bill 18 Consultation for the proposed Nakase Nursery/Toll Brothers Project EIR, Orange County
Attachments: Robert Pinto SB 18 letter.pdf

Good afternoon. I just spoke with you on the phone regarding SB 18 (Senate Bill 18) consultation for the Nakase Nursery project in Orange County, and wanted to follow up with an email to send a copy of the letter. Please see the attached PDF for the letter that was originally sent to Chairperson Robert Pinto. A similar letter and follow-up message have also been sent to Vice Chairperson Michael Garcia.

Please review the attached letter and let me know if your group has any concerns about the project and the potential to impact cultural resources. Thank you! Have a great rest of your day.

Kerrie Collison, RPA | Cultural Resources Manager
LSA | 285 South Street, Suite P
San Luis Obispo, CA 93401
805-782-0796 Tel
805-801-4533 Mobile
Website

Kerrie Collison

From: Kerrie Collison
Sent: Tuesday, May 15, 2018 2:33 PM
To: jhagen@viejas-nsn.gov
Subject: Senate Bill 18 Consultation for the proposed Nakase Nursery/Toll Brothers Project EIR, Orange County
Attachments: Robert Welch SB 18 letter.pdf

Good afternoon, Chairperson Welch. I wanted to follow up on a Senate Bill 18 consultation invitation letter dated April 19, 2018, for the proposed Nakase Nursery/Toll Brothers Project EIR in Orange County. I've attached a copy of the letter for your reference. Please respond to either me or Ms. Luna (contact information in the attached letter) if you have concerns about the project and the potential to impact cultural resources. Thank you in advance for your input, and have a great day!

Best,
Kerrie Collison

Kerrie Collison, RPA | Cultural Resources Manager
LSA | 285 South Street, Suite P
San Luis Obispo, CA 93401
805-782-0796 Tel
805-801-4533 Mobile
Website

Kerrie Collison

From: Kerrie Collison
Sent: Tuesday, May 15, 2018 2:33 PM
To: ssilva@sycuan-nsn.gov
Subject: Senate Bill 18 Consultation for the proposed Nakase Nursery/Toll Brothers Project EIR, Orange County
Attachments: Cody Martinez SB 18 letter.pdf

Good afternoon, Chairperson Martinez. I wanted to follow up on a Senate Bill 18 consultation invitation letter dated April 19, 2018, for the proposed Nakase Nursery/Toll Brothers Project EIR in Orange County. I've attached a copy of the letter for your reference. Please respond to either me or Ms. Luna (contact information in the attached letter) if you have concerns about the project and the potential to impact cultural resources. Thank you in advance for your input, and have a great day!

Best,
Kerrie Collison

Kerrie Collison, RPA | Cultural Resources Manager
LSA | 285 South Street, Suite P
San Luis Obispo, CA 93401
805-782-0796 Tel
805-801-4533 Mobile
Website

Kerrie Collison

From: Kerrie Collison
Sent: Tuesday, May 15, 2018 2:32 PM
To: allenl@sanpasqualtribe.org
Subject: Senate Bill 18 Consultation for the proposed Nakase Nursery/Toll Brothers Project EIR, Orange County
Attachments: Allen Lawson SB 18 letter.pdf

Good afternoon, Chairperson Lawson. I wanted to follow up on a Senate Bill 18 consultation invitation letter dated April 19, 2018, for the proposed Nakase Nursery/Toll Brothers Project EIR in Orange County. I've attached a copy of the letter for your reference. Please respond to either me or Ms. Luna (contact information in the attached letter) if you have concerns about the project and the potential to impact cultural resources. Thank you in advance for your input, and have a great day!

Best,
Kerrie Collison

Kerrie Collison, RPA | Cultural Resources Manager
LSA | 285 South Street, Suite P
San Luis Obispo, CA 93401
805-782-0796 Tel
805-801-4533 Mobile
Website

Kerrie Collison

From: Kerrie Collison
Sent: Tuesday, May 15, 2018 2:30 PM
To: tsen2u@hotmail.com
Subject: Senate Bill 18 Consultation for the proposed Nakase Nursery/Toll Brothers Project EIR, Orange County
Attachments: John Valenzuela SB 18 letter.pdf

Good afternoon, Chairperson Valenzuela. I wanted to follow up on a Senate Bill 18 consultation invitation letter dated April 19, 2018, for the proposed Nakase Nursery/Toll Brothers Project EIR in Orange County. I've attached a copy of the letter for your reference. Please respond to either me or Ms. Luna (contact information in the attached letter) if you have concerns about the project and the potential to impact cultural resources. Thank you in advance for your input, and have a great day!

Best,
Kerrie Collison

Kerrie Collison, RPA | Cultural Resources Manager
LSA | 285 South Street, Suite P
San Luis Obispo, CA 93401
805-782-0796 Tel
805-801-4533 Mobile
Website

Kerrie Collison

From: Kerrie Collison
Sent: Tuesday, May 15, 2018 2:28 PM
To: LP13boots@aol.com
Subject: Senate Bill 18 Consultation for the proposed Nakase Nursery/Toll Brothers Project EIR, Orange County
Attachments: Gwendolyn Parada SB 18 letter.pdf

Good afternoon, Chairperson Parada. I wanted to follow up on a Senate Bill 18 consultation invitation letter dated April 19, 2018, for the proposed Nakase Nursery/Toll Brothers Project EIR in Orange County. I've attached a copy of the letter for your reference. Please respond to either me or Ms. Luna (contact information in the attached letter) if you have concerns about the project and the potential to impact cultural resources. Thank you in advance for your input, and have a great day!

Best,
Kerrie Collison

Kerrie Collison, RPA | Cultural Resources Manager
LSA | 285 South Street, Suite P
San Luis Obispo, CA 93401
805-782-0796 Tel
805-801-4533 Mobile
Website

Kerrie Collison

From: Kerrie Collison
Sent: Tuesday, May 15, 2018 2:27 PM
To: jmiller@lptribe.net
Subject: Senate Bill 18 Consultation for the proposed Nakase Nursery/Toll Brothers Project EIR, Orange County
Attachments: Javaughn Miller SB 18 letter.pdf

Good afternoon, Mr. Miller. I wanted to follow up on a Senate Bill 18 consultation invitation letter dated April 19, 2018, for the proposed Nakase Nursery/Toll Brothers Project EIR in Orange County. I've attached a copy of the letter for your reference. Please respond to either me or Ms. Luna (contact information in the attached letter) if you have concerns about the project and the potential to impact cultural resources. Thank you in advance for your input, and have a great day!

Best,
Kerrie Collison

Kerrie Collison, RPA | Cultural Resources Manager
LSA | 285 South Street, Suite P
San Luis Obispo, CA 93401
805-782-0796 Tel
805-801-4533 Mobile
Website

Kerrie Collison

From: Kerrie Collison
Sent: Tuesday, May 15, 2018 2:25 PM
To: 'tromero@juaneno.com'
Subject: Senate Bill 18 Consultation for the proposed Nakase Nursery/Toll Brothers Project EIR, Orange County
Attachments: Teresa Romero SB 18 letter.pdf

Good afternoon, Chairperson Romero. I wanted to follow up on a Senate Bill 18 consultation invitation letter dated April 19, 2018, for the proposed Nakase Nursery/Toll Brothers Project EIR in Orange County. I've attached a copy of the letter for your reference. Please respond to either me or Ms. Luna (contact information in the attached letter) if you have concerns about the project and the potential to impact cultural resources. Thank you in advance for your input, and have a great day!

Best,
Kerrie Collison

Kerrie Collison, RPA | Cultural Resources Manager
LSA | 285 South Street, Suite P
San Luis Obispo, CA 93401
805-782-0796 Tel
805-801-4533 Mobile
Website

Kerrie Collison

From: Kerrie Collison
Sent: Tuesday, May 15, 2018 2:15 PM
To: 'Sonia.Johnston@sbcglobal.net'
Subject: Senate Bill 18 Consultation for the proposed Nakase Nursery/Toll Brothers Project EIR, Orange County
Attachments: Sonia Johnston SB 18 letter.pdf

Good afternoon, Chairperson Johnston. I wanted to follow up on a Senate Bill 18 consultation invitation letter dated April 19, 2018, for the proposed Nakase Nursery/Toll Brothers Project EIR in Orange County. I've attached a copy of the letter for your reference. Please respond to either me or Ms. Luna (contact information in the attached letter) if you have concerns about the project and the potential to impact cultural resources. Thank you in advance for your input, and have a great day!

Best,
Kerrie Collison

Kerrie Collison, RPA | Cultural Resources Manager
LSA | 285 South Street, Suite P
San Luis Obispo, CA 93401
805-782-0796 Tel
805-801-4533 Mobile
Website

Kerrie Collison

From: Kerrie Collison
Sent: Tuesday, May 15, 2018 2:13 PM
To: 'roadkingcharles@aol.com'
Subject: Senate Bill 18 Consultation for the proposed Nakase Nursery/Toll Brothers Project EIR, Orange County
Attachments: Charles Alvarez SB 18 letter.pdf

Good afternoon, Mr. Alvarez. I wanted to follow up on a Senate Bill 18 consultation invitation letter dated April 19, 2018, for the proposed Nakase Nursery/Toll Brothers Project EIR in Orange County. I've attached a copy of the letter for your reference. Please respond to either me or Ms. Luna (contact information in the attached letter) if you have concerns about the project and the potential to impact cultural resources. Thank you in advance for your input, and have a great day!

Best,
Kerrie Collison

Kerrie Collison, RPA | Cultural Resources Manager
LSA | 285 South Street, Suite P
San Luis Obispo, CA 93401
805-782-0796 Tel
805-801-4533 Mobile
Website

Kerrie Collison

From: Kerrie Collison
Sent: Tuesday, May 15, 2018 2:12 PM
To: Robert Dorame (gtongva@gmail.com)
Subject: Senate Bill 18 Consultation for the proposed Nakase Nursery/Toll Brothers Project EIR, Orange County
Attachments: Robert Dorame SB 18 letter.pdf

Good afternoon, Chairperson Dorame. I wanted to follow up on a Senate Bill 18 consultation invitation letter dated April 19, 2018, for the proposed Nakase Nursery/Toll Brothers Project EIR in Orange County. I've attached a copy of the letter for your reference. Please respond to either me or Ms. Luna (contact information in the attached letter) if you have concerns about the project and the potential to impact cultural resources. Thank you in advance for your input, and have a great day!

Best,
Kerrie Collison

Kerrie Collison, RPA | Cultural Resources Manager
LSA | 285 South Street, Suite P
San Luis Obispo, CA 93401
- - - - - - - - - - - -
805-782-0796 Tel
805-801-4533 Mobile
Website

Kerrie Collison

From: Kerrie Collison
Sent: Tuesday, May 15, 2018 2:11 PM
To: Sandonne Goad (sgoad@gabrielino-tongva.com)
Subject: Senate Bill 18 Consultation for the proposed Nakase Nursery/Toll Brothers Project EIR, Orange County
Attachments: Sandonne Goad SB 18 letter.pdf

Good afternoon, Chairperson Goad. I wanted to follow up on a Senate Bill 18 consultation invitation letter dated April 19, 2018, for the proposed Nakase Nursery/Toll Brothers Project EIR in Orange County. I've attached a copy of the letter for your reference. Please respond to either me or Ms. Luna (contact information in the attached letter) if you have concerns about the project and the potential to impact cultural resources. Thank you in advance for your input, and have a great day!

Best,
Kerrie Collison

Kerrie Collison, RPA | Cultural Resources Manager
LSA | 285 South Street, Suite P
San Luis Obispo, CA 93401
805-782-0796 Tel
805-801-4533 Mobile
Website

Kerrie Collison

From: Kerrie Collison
Sent: Tuesday, May 15, 2018 2:10 PM
To: Anthony Morales (GTTribalcouncil@aol.com)
Subject: Senate Bill 18 Consultation for the proposed Nakase Nursery/Toll Brothers Project EIR, Orange County
Attachments: Anthony Morales SB 18 letter.pdf

Good afternoon, Chairperson Morales. I wanted to follow up on a Senate Bill 18 consultation invitation letter dated April 19, 2018, for the proposed Nakase Nursery/Toll Brothers Project EIR in Orange County. I've attached a copy of the letter for your reference. Please respond to either me or Ms. Luna (contact information in the attached letter) if you have concerns about the project and the potential to impact cultural resources. Thank you in advance for your input, and have a great day!

Best,
Kerrie Collison

Kerrie Collison, RPA | Cultural Resources Manager
LSA | 285 South Street, Suite P
San Luis Obispo, CA 93401
- - - - - - - - - - - -
805-782-0796 Tel
805-801-4533 Mobile
Website

Kerrie Collison

From: Kerrie Collison
Sent: Tuesday, May 15, 2018 2:08 PM
To: michaelg@leaningrock.net
Subject: Senate Bill 18 Consultation for the proposed Nakase Nursery/Toll Brothers Project EIR, Orange County
Attachments: Michael Garcia SB 18 letter.pdf

Good afternoon, Vice Chairperson Garcia. I wanted to follow up on a Senate Bill 18 consultation invitation letter dated April 19, 2018, for the proposed Nakase Nursery/Toll Brothers Project EIR in Orange County. I've attached a copy of the letter for your reference. Please respond to either me or Ms. Luna (contact information in the attached letter) if you have concerns about the project and the potential to impact cultural resources. Thank you in advance for your input, and have a great day!

Best,
Kerrie Collison

Kerrie Collison, RPA | Cultural Resources Manager
LSA | 285 South Street, Suite P
San Luis Obispo, CA 93401
805-782-0796 Tel
805-801-4533 Mobile
Website

Kerrie Collison

From: Kerrie Collison
Sent: Tuesday, May 15, 2018 2:06 PM
To: rgoff@campo-nsn.gov
Subject: Senate Bill 18 Consultation for the proposed Nakase Nursery/Toll Brothers Project EIR, Orange County
Attachments: Ralph Goff SB 18 letter.pdf

Good afternoon, Chairperson Goff. I wanted to follow up on a Senate Bill 18 consultation invitation letter dated April 19, 2018, for the proposed Nakase Nursery/Toll Brothers Project EIR in Orange County. I've attached a copy of the letter for your reference. Please respond to either me or Ms. Luna (contact information in the attached letter) if you have concerns about the project and the potential to impact cultural resources. Thank you in advance for your input, and have a great day!

Best,
Kerrie Collison

Kerrie Collison, RPA | Cultural Resources Manager
LSA | 285 South Street, Suite P
San Luis Obispo, CA 93401
805-782-0796 Tel
805-801-4533 Mobile
Website

Saddleback Valley
Unified School District

25631 Peter A. Hartman Way · Mission Viejo, California 92691
(949) 586-1234 · www.svusd.org

Board of Education
Dolores Winchell, President · Dennis Walsh, Vice President · Amanda Morrell, Clerk
Suzie R. Swartz, Member · Dr. Edward Wong, Member

Crystal Turner, Ed.D.
Superintendent

September 21, 2017

Gayle Ackerman
Director of Development Services
City of Lake Forest Planning Division
25550 Commercentre Drive, Suite 100
Lake Forest, CA 92630

Re: Nakase Property Proposed School Site

The Saddleback Valley Unified School District (District) thanks the City of Lake Forest (City) for considering a portion of the Nakase Nursery property for a school site. The following is a summary of the school site activities and discussions with Toll Brother (Developer).

The Developer has met with the District several times to discuss the property and the District's interest in potentially locating a new school on the property. Three sites were identified and an experienced school architectural firm was hired by the Developer based on the District's recommendation to provide schematic plans in compliance with California Department of Education (CDE) design guidelines for an elementary school at each site. The Developer also hired a planning and environmental firm to review compliance with CDE Site Selection and Approval Guide. After review of the options, two sites were submitted to the CDE for review. The CDE Field Representative reviewed the CDE 4.0 submittal and visited the sites. The sites comply with CDE guidelines and the initial site evaluation recommended that the District proceed with the sites for further evaluation.

A Letter of Intent was presented to the District by the Developer. After various meetings and discussions, the District provided a draft mitigation agreement currently in negotiations by both parties.

If you have any questions regarding the proposed school site, please contact me at 949-580-3250.

Sincerely,

Stella Escario-Doiron
Chief of Facilities, Maintenance, Operations and Construction

C: Crystal Turner, Ed.D., Superintendent

Saddleback Valley
Unified School District

25631 Peter A. Hartman Way · Mission Viejo, California 92691
(949) 586-1234 · www.svusd.org

Board of Education
Amanda Morrell, President · Suzie R. Swartz, Vice President · Dr. Edward Wong, Clerk
Dennis Walsh, Member · Dolores Winchell, Member

Crystal Turner, Ed.D.
Superintendent

July 25, 2018

Marie Luna
Community Development Department
City of Lake Forest
25550 Commercentre Drive, Suite 100
Lake Forest, CA 92630

Subject: Response to Notice of Preparation of the Nakase Property Area Plan Environmental Impact Report

Dear Ms. Luna:

Thank you for the opportunity to comment on the NOP and Initial Study for the upcoming Nakase Property Area Plan Environmental Impact Report.

The Nakase Property Area Plan proposes to create a planned community consisting of single-family residential units in five distinct neighborhoods, affordable housing for senior citizens, an elementary school, parks and open space, an internal circulation system, and multipurpose water quality basin. The project would provide a maximum of 675 two- and three-story single-family residences and a maximum of 101 senior affordable housing units. The Area Plan also includes a school site and adjacent park designed to accommodate 1,000 K–6 students.

The District requests that the Nakase Area Plan EIR address the ability of the District's existing elementary, intermediate, and high schools to accommodate the additional students generated by the 675 dwelling units based on current enrollment and school capacities. The analysis should address elementary school impacts following two scenarios: the first is based on completion of the elementary school as proposed, and the second is based on the potential for the elementary school to be delayed or not built so that K–6 students are housed at existing elementary schools.

Table 1 presents the student generation rates that should be applied to the 675 dwelling units in the Area Plan. Table 2 provides current enrollment and capacity data for district schools.

Table 1. Adjusted Student Generation Rates

SCHOOL LEVEL	STUDENT GENERATION FACTORS
Elementary School	0.1994
Intermediate School	0.0674
High School	0.1505
Total	0.4173

Source: Cooperative Strategies, SVUSD, Residential Development School Fee Justification Study, Table 5, page 11.

Table 2. Enrollment and Capacity Analysis

SCHOOL FACILITY	CAPACITY	ENROLLMENT	SURPLUS (SHORTAGE) OF SEATS
Foothill Elementary	932	1,194	(262)
La Madera Elementary	609	610	(1)
Lake Forest Elementary	755	864	(109)
Olivewood Elementary	455	519	(64)
Portola Hills Elementary	664	653	11
Rancho Canada Elementary	872	565	307
Santiago Elementary	520	368	152
Total Elementary School Capacity	**4,807**	**4,771**	**34**
Serrano Intermediate	1,458	1,169	289
Total Intermediate School Capacity	**1,458**	**1,169**	**289**
El Toro High School	2,754	2,435	319
Trabuco Hills High School	2,943	2,831	112
Total High School Capacity	**5,697**	**5,266**	**431**

Source: Cooperative Strategies, SVUSD, Residential Development School Fee Justification Study, Exhibit B.

The District requests that the Nakase Area Plan EIR address all relevant direct and indirect environmental impacts of the project on District schools. The major environmental issues for any receiving school include traffic, pedestrian and bike safety, parking, air pollution, and noise.

The District is especially interested in ensuring that the elementary school site proposed within the Area Plan is suitable from an environmental perspective. For the proposed school site, the EIR should address: 1) traffic conditions during peak hours; 2) vehicle queuing along "BB" Street and access points; 3) pedestrian/bike safety and safe routes to school; 4) noise levels along Bake Parkway and Rancho Parkway; 5) and air quality.

Please clarify whether vehicular access to Neighborhood 2 is limited exclusively via "A" and "B" streets, and "BB" street is intended for school and park access only.

The District also requests that the suitability of the selected school site be reviewed pursuant the State's school siting requirements, which are addressed in detail below.

California School Siting Requirements

At the request of Saddleback Valley Unified School District, Toll Brothers engaged an environmental consulting firm to prepare a Geological and Environmental Hazards Assessment (GEHA) of the entire 12.83-acre Nakase property. The intent of the study was to inform the site planning process and ensure an appropriate site was selected for the school. The GEHA evaluates potential environmental hazards per the State's school siting standards, Title 5 of the California Code of Regulations (CCR) Section 14010, and additional codes and regulations applicable to school facilities that are found in the Education, Government and Public Resources Codes (Ed. Code, Gov't Code, and PRC, respectively).

Based on the GEHA, there are three detailed studies that are required to ensure the selected school site will satisfy the above-referenced standards and be eligible to receive approval of the California Department of Education (CDE):

- **Water Pipeline Risk Assessment (WPRA).** A WPRA is needed to address potential impacts from the 19 large volume (>12-inch diameter) pipelines within 1,500 feet of the project site. Although the school site appears to be more than 1,500 feet from two water tanks west of the site, confirmation that the tanks do not represent a hazard is recommended.

- **EMF Study.** The proximity of the school site to the 66-kV power line in Bake Parkway triggers the need to address EMF exposure and Title 5's 100-foot setback requirement.

- **Health Risk Assessment**. Based on the search conducted in 2017, there are 56 permitted or nonpermitted facilities within a quarter mile of the whole Nakase Area Plan. A refined search using a quarter-mile radius around the selected school site should be conducted and a Health Risk Assessment prepared covering the facilities within that radius. The HRA must also address emissions associated with the site's proximity to the SR-241 freeway.

Based on a review of Figures 2.7 and 2.8 in the Initial Study, the school and park are shown as separate and distinct. However, for the purposes of any review under Title 5 requirements, any measurements from the perimeter of the school boundaries to potential hazards must include both school and park. The school must comply with State requirements for school size, and it appears that the park would also be required to satisfy site size requirements. Additionally, if the park is to be operated under a joint-use agreement to satisfy the school's physical education requirements, CDE will require that the park satisfy all Title 5 requirements as well. For example, although the school site appears to be farther than 1,500 feet from the water tanks to the west, the park appears to be within that zone; if this is so, it triggers the requirement for a water tank inundation study.

The District requests that the EIR address the issues identified above to ensure that the school site will meet all state school site standards.

Thank you for the opportunity to comment on the scope of the upcoming Nakase Area Plan EIR. We look forward to reviewing the Draft EIR and working closely with the City to ensure development of a safe and environmentally-sensitive community.

If you have any questions or need clarification concerning our comments, please call the undersigned.

Sincerely,

SADDLEBACK VALLEY UNIFIED SCHOOL DISTRICT

Stella Escario-Doiron
Chief of Facilities, Maintenance, Operations, Construction and Transportation

c: Crystal Turner, Ed.D, Superintendent
Connie Cavanaugh, Assistant Superintendent, Business Services
Mark Perez, Director, Communications & Administrative Services

Nakase Property

TRAFFIC IMPACT ANALYSIS

CITY OF LAKE FOREST

PREPARED BY:

John Kain, AICP
jkain@urbanxroads.com
(949) 336-5990

Marlie Whiteman, P.E.
mwhiteman@urbanxroads.com
(949) 336-5991

Janette Cachola
jcachola@urbanxroads.com
(949) 336-5989

MAY 16, 2018
NOVEMBER 29, 2018 (REVISED)
FEBRUARY 5, 2019 (REVISED)
MAY 21, 2019 (REVISED)
JULY 12, 2019 (REVISED)
AUGUST 6, 2019 (REVISED)

TABLE OF CONTENTS

TABLE OF CONTENTS ..... **III**
APPENDICES ..... **V**
LIST OF EXHIBITS ..... **VII**
LIST OF TABLES ..... **XI**
LIST OF ABBREVIATED TERMS ..... **XIII**
1 EXECUTIVE SUMMARY **1**
1.1 Proposed Project 1
1.2 Analysis Scenarios 1
1.3 Site Access and On-Site Circulation 3
1.4 Construction Traffic Mitigation 4
2 PROPOSED DEVELOPMENT **5**
2.1 Location 5
2.2 Land Use and Project Access 5
2.3 Vehicular Circulation Plan 10
3 TRAFFIC IMPACT ASSESSMENT METHODOLOGY **13**
3.1 Analysis Scenarios and Study Area 13
3.2 Intersection Capacity Utilization (ICU) Methodology 14
3.3 Highway Capacity Manual 6th Edition (HCM) Methodology 16
3.4 Potentially Significant Traffic Impact Criteria 16
4 AREA CONDITIONS **19**
4.1 Area Roadway System 19
4.2 Transit Service 19
4.3 Pedestrian and Bicycle Facilities 19
4.4 Traffic Volumes and Conditions 19
4.5 Existing Intersection Level of Service 35
5 PROJECTED-RELATED FUTURE TRAFFIC **37**
5.1 Project Trip Generation 37
5.2 Project Trip Distribution 37
5.3 Modal Split 47
5.4 Trip Assignment 47
5.5 Construction Traffic 47
6 NEAR TERM CONDITIONS TRAFFIC ANALYSIS **57**
6.1 E+P Conditions 57
6.2 Interim Year Cumulative 2020 Without Project Conditions 65
6.3 Interim Year Cumulative 2020 With Project Conditions 65
7 YEAR 2040 CONDITIONS TRAFFIC ANALYSIS **79**
7.1 2040 General Plan Cumulative With Current Approved Business Park Land Use, Without Portola Westerly Extension 79
7.2 2040 General Plan Cumulative With Project Land Use, Without Portola Westerly Extension 79
7.3 2040 General Plan Cumulative With Current Approved Business Park Land Use, With Portola Westerly Extension 93
7.4 2040 General Plan Cumulative With Project Land Use, With Portola Westerly Extension 101

8 INTERSECTION IMPROVEMENT ALTERNATIVES 109
8.1 Scenario Descriptions 109
8.2 Level of Service Comparisons 109
9 IMPROVEMENT RECOMMENDATIONS..... 119
9.1 On-Site Conditions 119
9.2 Off-Site Conditions..... 134

APPENDICES

APPENDIX 1.1: APPROVED TRAFFIC STUDY SCOPING AGREEMENT
APPENDIX 4.1: EXISTING TRAFFIC COUNTS – FEBRUARY, MAY, & JUNE 2017
APPENDIX 4.2: EXISTING (2017) AND EXISTING PLUS PROJECT CONDITIONS INTERSECTION OPERATIONS ANALYSIS WORKSHEETS
APPENDIX 5.1: EXISTING NAKASE PROPERTY TRIP GENERATION ESTIMATES
APPENDIX 6.1: INTERIM YEAR CUMULATIVE 2020 CONDITIONS INTERSECTION OPERATIONS ANALYSIS WORKSHEETS
APPENDIX 7.1: 2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITHOUT AND WITH PORTOLA WESTERLY EXTENSION (SCENARIO 1) INTERSECTION OPERATIONS ANALYSIS WORKSHEETS
APPENDIX 8.1: 2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITHOUT AND WITH PORTOLA WESTERLY EXTENSION WITH SCENARIO 2 IMPROVEMENT ALTERNATIVE INTERSECTION OPERATIONS ANALYSIS WORKSHEETS
APPENDIX 8.2: 2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITHOUT AND WITH PORTOLA WESTERLY EXTENSION WITH SCENARIO 3 IMPROVEMENT ALTERNATIVE INTERSECTION OPERATIONS ANALYSIS WORKSHEETS
APPENDIX 8.3: 2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITHOUT AND WITH PORTOLA WESTERLY EXTENSION WITH SCENARIO 4 IMPROVEMENT ALTERNATIVE INTERSECTION OPERATIONS ANALYSIS WORKSHEETS
APPENDIX 8.4: 2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITHOUT AND WITH PORTOLA WESTERLY EXTENSION WITH SCENARIO 5 IMPROVEMENT ALTERNATIVE INTERSECTION OPERATIONS ANALYSIS WORKSHEETS
APPENDIX 9.1: ON-SITE INTERSECTION AND QUEUING ANALYSIS WORKSHEETS

This Page Intentionally Left Blank

LIST OF EXHIBITS

EXHIBIT 2-1: TRAFFIC ANALYSIS STUDY AREA 6
EXHIBIT 2-2: CONCEPTUAL LAND USE PLAN 7
EXHIBIT 2-3: NAKASE PROPERTY TRAFFIC ANALYSIS ZONES (TAZS) 8
EXHIBIT 2-4: PROJECT ZONES AND FOCUSED ANALYSIS AREA 9
EXHIBIT 2-5: CIRCULATION PLAN 11
EXHIBIT 4-1: EXISTING FOCUSED ANALYSIS AREA LANE GEOMETRICS AND TRAFFIC CONTROLS 20
EXHIBIT 4-2: EXISTING EXPANDED AREA LANE GEOMETRICS AND TRAFFIC CONTROLS 21
EXHIBIT 4-3: CITY OF LAKE FOREST ARTERIAL HIGHWAY PLAN 22
EXHIBIT 4-4: CITY OF LAKE FOREST TYPICAL CROSS-SECTIONS 23
EXHIBIT 4-5: EXISTING OCTA TRANSIT ROUTES 24
EXHIBIT 4-6: CITY OF LAKE FOREST PLANNED BIKEWAYS 25
EXHIBIT 4-7: ORANGE COUNTY MAJOR RIDING AND HIKING TRAILS AND OFF-ROAD PAVED BIKEWAYS 26
EXHIBIT 4-8: ORANGE COUNTY EXISTING AND PROPOSED BIKEWAYS 27
EXHIBIT 4-9: EXISTING (2017) FOCUSED ANALYSIS AREA AM PEAK HOUR INTERSECTION VOLUMES 29
EXHIBIT 4-10: EXISTING (2017) FOCUSED ANALYSIS AREA PM PEAK HOUR INTERSECTION VOLUMES 30
EXHIBIT 4-11: EXISTING (2017) EXPANDED AREA AM PEAK HOUR INTERSECTION VOLUMES 31
EXHIBIT 4-12: EXISTING (2017) EXPANDED AREA PM PEAK HOUR INTERSECTION VOLUMES 32
EXHIBIT 4-13: EXISTING (2017) FOCUSED AREA AVERAGE DAILY TRAFFIC (ADT) 33
EXHIBIT 4-14: EXISTING (2017) EXPANDED AREA AVERAGE DAILY TRAFFIC (ADT) 34
EXHIBIT 5-1: RESIDENTIAL EXTERNAL TRAFFIC PEAK HOUR PROJECT TRIP DISTRIBUTION (BEYOND FOCUSED STUDY AREA) 40
EXHIBIT 5-2: RESIDENTIAL TAZ 1 PROJECT PEAK HOUR TRIP DISTRIBUTION 41
EXHIBIT 5-3: RESIDENTIAL TAZ 2 PROJECT PEAK HOUR TRIP DISTRIBUTION 42
EXHIBIT 5-4: RESIDENTIAL TAZ 3 PROJECT PEAK HOUR TRIP DISTRIBUTION 43
EXHIBIT 5-5: RESIDENTIAL TAZ 4 PROJECT PEAK HOUR TRIP DISTRIBUTION 44
EXHIBIT 5-6: SCHOOL EXTERNAL TRAFFIC PROJECT PEAK HOUR TRIP DISTRIBUTION (BEYOND FOCUSED STUDY AREA) 45
EXHIBIT 5-7: SCHOOL TAZ 2 PROJECT PEAK HOUR TRIP DISTRIBUTION 46
EXHIBIT 5-8: PROJECT ONLY FOCUSED ANALYSIS AREA AM PEAK HOUR INTERSECTION VOLUMES 48
EXHIBIT 5-9: PROJECT ONLY FOCUSED ANALYSIS AREA PM PEAK HOUR INTERSECTION VOLUMES 49
EXHIBIT 5-10: PROJECT ONLY EXPANDED AREA AM PEAK HOUR INTERSECTION VOLUMES 50
EXHIBIT 5-11: PROJECT ONLY EXPANDED AREA PM PEAK HOUR INTERSECTION VOLUMES 51
EXHIBIT 5-12: PROJECT ONLY FOCUSED AREA AVERAGE DAILY TRAFFIC (ADT) 52
EXHIBIT 5-13: PROJECT ONLY EXPANDED AREA AVERAGE DAILY TRAFFIC (ADT) 53
EXHIBIT 6-1: EXISTING PLUS PROJECT FOCUSED ANALYSIS AREA AM PEAK HOUR INTERSECTION VOLUMES 58
EXHIBIT 6-2: EXISTING PLUS PROJECT FOCUSED ANALYSIS AREA PM PEAK HOUR INTERSECTION VOLUMES 59
EXHIBIT 6-3: EXISTING PLUS PROJECT EXPANDED AREA AM PEAK HOUR INTERSECTION VOLUMES 60
EXHIBIT 6-4: EXISTING PLUS PROJECT EXPANDED AREA PM PEAK HOUR INTERSECTION VOLUMES 61
EXHIBIT 6-5: EXISTING PLUS PROJECT FOCUSED AREA AVERAGE DAILY TRAFFIC (ADT) 62
EXHIBIT 6-6: EXISTING PLUS PROJECT EXPANDED AREA AVERAGE DAILY TRAFFIC (ADT) 63
EXHIBIT 6-7: INTERIM YEAR CUMULATIVE 2020 WITHOUT PROJECT FOCUSED ANALYSIS AREA AM PEAK HOUR INTERSECTION VOLUMES 66

EXHIBIT 6-8: INTERIM YEAR CUMULATIVE 2020 WITHOUT PROJECT FOCUSED ANALYSIS AREA PM PEAK HOUR INTERSECTION VOLUMES 67
EXHIBIT 6-9: INTERIM YEAR CUMULATIVE 2020 WITHOUT PROJECT EXPANDED AREA AM PEAK HOUR INTERSECTION VOLUMES 68
EXHIBIT 6-10: INTERIM YEAR CUMULATIVE 2020 WITHOUT PROJECT EXPANDED AREA PM PEAK HOUR INTERSECTION VOLUMES 69
EXHIBIT 6-11: INTERIM YEAR CUMULATIVE 2020 WITHOUT PROJECT FOCUSED AREA AVERAGE DAILY TRAFFIC (ADT) 70
EXHIBIT 6-12: INTERIM YEAR CUMULATIVE 2020 WITHOUT PROJECT EXPANDED AREA AVERAGE DAILY TRAFFIC (ADT) 71
EXHIBIT 6-13: INTERIM YEAR CUMULATIVE 2020 WITH PROJECT FOCUSED ANALYSIS AREA AM PEAK HOUR INTERSECTION VOLUMES 73
EXHIBIT 6-14: INTERIM YEAR CUMULATIVE 2020 WITH PROJECT FOCUSED ANALYSIS AREA PM PEAK HOUR INTERSECTION VOLUMES 74
EXHIBIT 6-15: INTERIM YEAR CUMULATIVE 2020 WITH PROJECT EXPANDED AREA AM PEAK HOUR INTERSECTION VOLUMES 75
EXHIBIT 6-16: INTERIM YEAR CUMULATIVE 2020 WITH PROJECT EXPANDED AREA PM PEAK HOUR INTERSECTION VOLUMES 76
EXHIBIT 6-17: INTERIM YEAR CUMULATIVE 2020 WITH PROJECT FOCUSED AREA AVERAGE DAILY TRAFFIC (ADT) 77
EXHIBIT 6-18: INTERIM YEAR CUMULATIVE 2020 WITH PROJECT EXPANDED AREA AVERAGE DAILY TRAFFIC (ADT) 78
EXHIBIT 7-1: 2040 GENERAL PLAN CUMULATIVE WITH CURRENT APPROVED BUSINESS PARK LAND USE, WITHOUT PORTOLA WESTERLY EXTENSION FOCUSED ANALYSIS AREA AM PEAK HOUR INTERSECTION VOLUMES 80
EXHIBIT 7-2: 2040 GENERAL PLAN CUMULATIVE WITH CURRENT APPROVED BUSINESS PARK LAND USE, WITHOUT PORTOLA WESTERLY EXTENSION FOCUSED ANALYSIS AREA PM PEAK HOUR INTERSECTION VOLUMES 81
EXHIBIT 7-3: 2040 GENERAL PLAN CUMULATIVE WITH CURRENT APPROVED BUSINESS PARK LAND USE, WITHOUT PORTOLA WESTERLY EXTENSION EXPANDED AREA AM PEAK HOUR INTERSECTION VOLUMES 82
EXHIBIT 7-4: 2040 GENERAL PLAN CUMULATIVE WITH CURRENT APPROVED BUSINESS PARK LAND USE, WITHOUT PORTOLA WESTERLY EXTENSION EXPANDED AREA PM PEAK HOUR INTERSECTION VOLUMES 83
EXHIBIT 7-5: 2040 GENERAL PLAN CUMULATIVE WITH CURRENT APPROVED BUSINESS PARK LAND USE, WITHOUT PORTOLA WESTERLY EXTENSION FOCUSED AREA AVERAGE DAILY TRAFFIC (ADT) 84
EXHIBIT 7-6: 2040 GENERAL PLAN CUMULATIVE WITH CURRENT APPROVED BUSINESS PARK LAND USE, WITHOUT PORTOLA WESTERLY EXTENSION EXPANDED AREA AVERAGE DAILY TRAFFIC (ADT) 85
EXHIBIT 7-7: 2040 GENERAL PLAN CUMULATIVE WITH PROJECT LAND USE, WITHOUT PORTOLA WESTERLY EXTENSION FOCUSED ANALYSIS AREA AM PEAK HOUR INTERSECTION VOLUMES 87
EXHIBIT 7-8: 2040 GENERAL PLAN CUMULATIVE WITH PROJECT LAND USE, WITHOUT PORTOLA WESTERLY EXTENSION FOCUSED ANALYSIS AREA PM PEAK HOUR INTERSECTION VOLUMES 88

EXHIBIT 7-9: 2040 GENERAL PLAN CUMULATIVE WITH PROJECT LAND USE, WITHOUT PORTOLA WESTERLY EXTENSION EXPANDED AREA AM PEAK HOUR INTERSECTION VOLUMES 89
EXHIBIT 7-10: 2040 GENERAL PLAN CUMULATIVE WITH PROJECT LAND USE, WITHOUT PORTOLA WESTERLY EXTENSION EXPANDED AREA PM PEAK HOUR INTERSECTION VOLUMES 90
EXHIBIT 7-11: 2040 GENERAL PLAN CUMULATIVE WITH PROJECT LAND USE, WITHOUT PORTOLA WESTERLY EXTENSION FOCUSED AREA AVERAGE DAILY TRAFFIC (ADT) 91
EXHIBIT 7-12: 2040 GENERAL PLAN CUMULATIVE WITH PROJECT LAND USE, WITHOUT PORTOLA WESTERLY EXTENSION EXPANDED AREA AVERAGE DAILY TRAFFIC (ADT) 92
EXHIBIT 7-13: 2040 GENERAL PLAN CUMULATIVE WITH CURRENT APPROVED BUSINESS PARK LAND USE, WITH PORTOLA WESTERLY EXTENSION FOCUSED ANALYSIS AREA AM PEAK HOUR INTERSECTION VOLUMES 94
EXHIBIT 7-14: 2040 GENERAL PLAN CUMULATIVE WITH CURRENT APPROVED BUSINESS PARK LAND USE, WITH PORTOLA WESTERLY EXTENSION FOCUSED ANALYSIS AREA PM PEAK HOUR INTERSECTION VOLUMES 95
EXHIBIT 7-15: 2040 GENERAL PLAN CUMULATIVE WITH CURRENT APPROVED BUSINESS PARK LAND USE, WITH PORTOLA WESTERLY EXTENSION EXPANDED AREA AM PEAK HOUR INTERSECTION VOLUMES 96
EXHIBIT 7-16: 2040 GENERAL PLAN CUMULATIVE WITH CURRENT APPROVED BUSINESS PARK LAND USE, WITH PORTOLA WESTERLY EXTENSION EXPANDED AREA PM PEAK HOUR INTERSECTION VOLUMES 97
EXHIBIT 7-17: 2040 GENERAL PLAN CUMULATIVE WITH CURRENT APPROVED BUSINESS PARK LAND USE, WITH PORTOLA WESTERLY EXTENSION FOCUSED AREA AVERAGE DAILY TRAFFIC (ADT) 98
EXHIBIT 7-18: 2040 GENERAL PLAN CUMULATIVE WITH CURRENT APPROVED BUSINESS PARK LAND USE, WITH PORTOLA WESTERLY EXTENSION EXPANDED AREA AVERAGE DAILY TRAFFIC (ADT) 99
EXHIBIT 7-19: 2040 GENERAL PLAN CUMULATIVE WITH PROJECT LAND USE, WITH PORTOLA WESTERLY EXTENSION FOCUSED ANALYSIS AREA AM PEAK HOUR INTERSECTION VOLUMES 102
EXHIBIT 7-20: 2040 GENERAL PLAN CUMULATIVE WITH PROJECT LAND USE, WITH PORTOLA WESTERLY EXTENSION FOCUSED ANALYSIS AREA PM PEAK HOUR INTERSECTION VOLUMES 103
EXHIBIT 7-21: 2040 GENERAL PLAN CUMULATIVE WITH PROJECT LAND USE, WITH PORTOLA WESTERLY EXTENSION EXPANDED AREA AM PEAK HOUR INTERSECTION VOLUMES 104
EXHIBIT 7-22: 2040 GENERAL PLAN CUMULATIVE WITH PROJECT LAND USE, WITH PORTOLA WESTERLY EXTENSION EXPANDED AREA PM PEAK HOUR INTERSECTION VOLUMES 105
EXHIBIT 7-23: 2040 GENERAL PLAN CUMULATIVE WITH PROJECT LAND USE, WITH PORTOLA WESTERLY EXTENSION FOCUSED AREA AVERAGE DAILY TRAFFIC (ADT) 106
EXHIBIT 7-24: 2040 GENERAL PLAN CUMULATIVE WITH CURRENT APPROVED PROJECT LAND USE, WITH PORTOLA WESTERLY EXTENSION EXPANDED AREA AVERAGE DAILY TRAFFIC (ADT) 107

EXHIBIT 9-1: MORNING PEAK HOUR NEIGHBORHOOD TRAFFIC VOLUMES 120
EXHIBIT 9-2: EVENING PEAK HOUR NEIGHBORHOOD TRAFFIC VOLUMES 121
EXHIBIT 9-3: PROJECT ENTRY LANE GEOMETRICS, BAKE PARKWAY / RANCHO PARKWAY SOUTH..... 124
EXHIBIT 9-4: PROJECT ENTRY LANE GEOMETRICS, BAKE PARKWAY / C STREET 125
EXHIBIT 9-5: PROJECT ENTRY LANE GEOMETRICS, B STREET / RANCHO PARKWAY 128
EXHIBIT 9-6: PROJECT ENTRY LANE GEOMETRICS, B STREET / A STREET..... 129
EXHIBIT 9-7: INTERSECTION CURB EXTENSIONS AND CROSSWALKS..... 130
EXHIBIT 9-8: ON-STREET PARKING PROVISIONS 131
EXHIBIT 9-9: ACCOMMODATIONS FOR BICYCLES AND TRAILS..... 132
EXHIBIT 9-10: PEDESTRIAN FACILITIES 133

LIST OF TABLES

TABLE 3-1: INTERSECTION ANALYSIS LOCATIONS 15
TABLE 4-1: INTERSECTION ANALYSIS SUMMARY FOR EXISTING (2017) CONDITIONS 36
TABLE 5-1: PROPOSED PROJECT TRIP GENERATION SUMMARY 38
TABLE 5-2: TRIP GENERATION COMPARISON BETWEEN GENERAL PLAN LAND USE DESIGNATIONS FOR THE SITE AND NAKASE PROPERTY AREA PLAN 39
TABLE 6-1: INTERSECTION ANALYSIS FOR EXISTING PLUS PROJECT CONDITIONS 64
TABLE 6-2: INTERSECTION ANALYSIS FOR INTERIM YEAR CUMULATIVE 2020 CONDITIONS 66
TABLE 7-1: INTERSECTION ANALYSIS SUMMARY FOR 2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITHOUT PORTOLA WESTERLY EXTENSION 86
TABLE 7-2: INTERSECTION ANALYSIS SUMMARY FOR 2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITH PORTOLA WESTERLY EXTENSION 100
TABLE 8-1: INTERSECTION ANALYSIS SUMMARY FOR 2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITHOUT PORTOLA WESTERLY EXTENSION WITH SCENARIO 2 IMPROVEMENT ALTERNATIVE 111
TABLE 8-2: INTERSECTION ANALYSIS SUMMARY FOR 2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITH PORTOLA WESTERLY EXTENSION WITH SCENARIO 2 IMPROVEMENT ALTERNATIVE 112
TABLE 8-3: INTERSECTION ANALYSIS SUMMARY FOR 2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITHOUT PORTOLA WESTERLY EXTENSION WITH SCENARIO 3 IMPROVEMENT ALTERNATIVE 113
TABLE 8-4: INTERSECTION ANALYSIS SUMMARY FOR 2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITH PORTOLA WESTERLY EXTENSION WITH SCENARIO 3 IMPROVEMENT ALTERNATIVE 114
TABLE 8-5: INTERSECTION ANALYSIS SUMMARY FOR 2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITHOUT PORTOLA WESTERLY EXTENSION WITH SCENARIO 4 IMPROVEMENT ALTERNATIVE 115
TABLE 8-6: INTERSECTION ANALYSIS SUMMARY FOR 2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITH PORTOLA WESTERLY EXTENSION WITH SCENARIO 4 IMPROVEMENT ALTERNATIVE 116
TABLE 8-7: INTERSECTION ANALYSIS SUMMARY FOR 2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITHOUT PORTOLA WESTERLY EXTENSION WITH SCENARIO 5 IMPROVEMENT ALTERNATIVE 117
TABLE 8-8: INTERSECTION ANALYSIS SUMMARY FOR 2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITH PORTOLA WESTERLY EXTENSION WITH SCENARIO 5 IMPROVEMENT ALTERNATIVE 118
TABLE 9-1: NEIGHBORHOOD INTERSECTION ANALYSIS SUMMARY 122
TABLE 9-2: PROJECT ACCESS AND NEIGHBORHOOD QUEUING ANALYSIS SUMMARY FOR EXISTING PLUS PROJECT CONDITIONS 123

This Page Intentionally Left Blank

LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
Caltrans	California Department of Transportation
CIP	Capital Improvement Program
E+P	Existing Plus Project
HCM	Highway Capacity Manual
ICU	Intersection Capacity Utilization
ITAM	Irvine Traffic Analysis Model
ITE	Institute of Transportation Engineers
LFTAM	Lake Forest Traffic Analysis Model
LFTM	Lake Forest Transportation Mitigation
LOS	Level of Service
MUTCD	Manual on Uniform Traffic Control Devices
NITM	North Irvine Transportation Mitigation
OCTA	Orange County Transportation Authority
PHF	Peak Hour Factor
Project	Nakase Property
sf	Square Feet
TAZ	Traffic Analysis Zone
TIA	Traffic Impact Analysis
V/C	Volume-to-Capacity
VPH	Vehicles per Hour

This Page Intentionally Left Blank

1 EXECUTIVE SUMMARY

This report presents the results of the traffic impact analysis (TIA) for the proposed Nakase Property ("Project"), located east of Bake Parkway and south of Rancho Parkway in the City of Lake Forest.

The purpose of this TIA is to evaluate the potential traffic and circulation impacts of the Project on the surrounding roadway system, and determine appropriate traffic-related improvement measures and circulation design features for the Project.

1.1 PROPOSED PROJECT

The proposed Project consists of 675 single-family dwelling units, 101 senior affordable residential units, an elementary school with athletic/sports fields which could accommodate up to 1,000 students, and park/open space uses. The proposed residences would predominantly consist of single-family detached units. Any single-family attached units would be located in Neighborhoods 2 and 5 (see Exhibit 2-2).

The proposed Project is anticipated to generate a net total of approximately 8,789 trip-ends per day on a typical weekday, with 1,202 vehicles per hour (VPH) during the weekday AM peak hour and 879 VPH during the weekday PM peak hour.

The Nakase Property residential and school land uses are anticipated to generate 14,122 fewer trips per day with 1,377 fewer vehicles per hour during the AM peak hour and 1,442 fewer vehicles per hour during the PM peak hour in comparison to the approved General Plan designation of business park land use for the site.

1.2 ANALYSIS SCENARIOS

To ensure that this TIA satisfies the City of Lake Forest's traffic study requirements, Urban Crossroads, Inc. prepared a traffic study scoping package for review by City staff prior to the preparation of this report. The Agreement provides an outline of the Project study area, trip generation, trip distribution, and analysis methodology. The Agreement approved by the City is included in Appendix 1.1. Traffic volume forecasts are prepared by Stantec Consulting as directed by the City using the Lake Forest Traffic Analysis Model (LFTAM).

1.2.1 EXISTING (2017) CONDITIONS

The analysis of traffic operations for existing conditions indicates that most of the 38 existing study area intersections are currently operating at an acceptable LOS during peak hours. The intersection of Bake Parkway & Jeronimo Road currently experiences an unacceptable LOS.

1.2.2 EXISTING + PROJECT (E+P) CONDITIONS

The existing-plus-project analysis is purely hypothetical for a project of this scale due to the fact that it assumes all development within the project occurring instantaneously, and does not

portray a realistic analysis of cumulative growth which includes various on-site and off-site infrastructure improvements in conjunction with cumulative growth in the study area.

As evaluated in Section 6 *Near Term Conditions Traffic Analysis*, buildout of the proposed Project is anticipated to result in a theoretical E+P impact at the intersection of Bake Parkway & Jeronimo Road. The addition of a second northbound left turn lane addresses this impact, and this improvement is included in the Lake Forest Transportation Mitigation (LFTM) program. The Project will be responsible to mitigate the E+P theoretical impact at this location without reliance on other transportation projects. Traffic projections for all future scenarios at this location with this improvement result in acceptable levels of service.

As buildout of the Project as an overlay to existing volumes would contribute to an existing AM peak hour deficiency at the intersection of Bake Parkway & Jeronimo Road, the Project's proportionate share of the improvement costs may be indicated as potential mitigation by the City of Lake Forest. Project mitigation may include a combination of fee payments to established programs, construction of specific improvements, payment of a fair share contribution toward future improvements or a combination of these approaches. Improvements constructed by development should be eligible for a fee credit or reimbursement through the program where appropriate (to be determined at the City's discretion).

1.2.3 INTERIM YEAR 2020 CUMULATIVE CONDITIONS

For Interim Year 2020 conditions, one study area intersection (Bake Parkway & Trabuco Road) is anticipated to operate at an unacceptable level of service during peak hours for both Without Project and With Project conditions. However, Project-related traffic does not trigger the City's impact criteria at Bake Parkway & Trabuco Road. Changes in travel patterns from existing conditions may lower LOS and are generally related to the evolving interaction between existing and future complementary land uses (such as residential being added to a job-rich area, or a school being added to a residential area). New roadway connections also contribute to changes in travel patterns by providing alternate routes or congestion relief. For Interim Year 2020 scenarios, no Project impacts are anticipated.

1.2.4 YEAR 2040 CONDITIONS

For 2040 conditions, study area intersections are evaluated with LFTM and NITM improvements for Current Approved Business Park scenarios and Residential / School Project scenarios. The Residential / School Project scenario results are compared to the Current Approved Business Park scenario results to determine whether or not Project impacts occur.

For the Current Approved Business Park scenarios without or with the planned future Portola westerly extension, study area intersections are anticipated to experience acceptable levels of service.

For scenarios with the Project (residential and school land uses), without or with the planned future Portola westerly extension, study area intersections are anticipated to experience acceptable levels of service.

Based on comparisons to current approved business park uses at the project site, the proposed Project residential / school land uses do not degrade intersection peak hour operations at off-site intersections. The Project will be responsible to mitigate its theoretical impacts without reliance on other transportation projects to off-site locations, and no Project impacts are identified.

Five (5) off-site intersection improvement scenarios are addressed in Section 8 *Intersection Improvement Alternatives.* Scenario #1 represents the baseline future 2040 conditions that are evaluated in Section 7 (and presented above). Scenario #2 adjusts intersection lane configurations in the City of Irvine at intersections of Alton Parkway & Irvine Boulevard (#25), Bake Parkway & Rockfield Boulevard (#31), and Lake Forest Drive & I-5 SB Ramps / Avenida de la Carlota. Scenario #3 includes Scenario #2, but also adjusts El Toro Road & Portola Parkway / Santa Margarita Parkway (#22). Scenario #4 includes Scenario #2, but also adjusts Bake Parkway & Trabuco Road / Irvine Boulevard (#27). Scenario #5 includes Scenario #2, but also adjusts El Toro Road & Portola / Santa Margarita Parkway (#22) and Bake Parkway & Trabuco Road / Irvine Boulevard (#27). Intersection improvement Scenarios #1 through #5 are intended to provide a basis for identification of Project effects on various likely improvement options that are under review by City staff and officials. For each of the intersection improvement scenarios, the inclusion of the Nakase Property residential / school project results in the same or better intersection operations in comparison to the Current Approved Business Park conditions. For 2040 scenarios, no Project impacts are anticipated.

1.3 SITE ACCESS AND ON-SITE CIRCULATION

The internal circulation roads allow entrance and exit to and from the site using the three new proposed entries, connecting all on-site neighborhoods and the school site via four collector roads. The main community entrance from Bake Parkway will be opposite the existing Rancho Parkway South intersection as a new east leg, while the secondary entry on Bake Parkway will be restricted to right-turns only (no median break), across from the existing Orchard Street/Bake Parkway intersection. The third access point will be located on Rancho Parkway at the existing Corridor Center/Rancho Parkway intersection, which serves the existing commercial center located north of the project. Bake Parkway will be widened at the two project entries to provide separate northbound right turn lanes. Rancho Parkway will also be widened at the project entry to provide a separate eastbound right turn lane.

Section 4 documents transit that serves the Project area. Transit service is reviewed and updated by OCTA periodically to address ridership, budget and community demand needs. Changes in land use can affect these periodic adjustments which may lead to either enhanced or reduced service where appropriate.

Section 9 provides explicit descriptions of roadway geometrics and lane requirements at Project access points and along key on-site collector roadways. Accommodations for pedestrians and bicyclists are also presented. One of the essential design concepts of the Project is to generate a walkable environment that encourages and enhances the mobility experience at pedestrian and bicycling levels throughout the site. Trails and walks will provide the connection between the neighborhoods, the parks, the school, and the adjacent Serrano Creek Regional Trail.

1.4 CONSTRUCTION TRAFFIC MITIGATION

In comparison to a single car, a truck affects roadway operations based upon several variables (such as headway, speed, density). In order to account for these effects, truck volume is converted to passenger car equivalent (PCE), to represent traffic-flow. The most intense level of traffic activity generated by the Project construction phases is estimated to occur in conjunction with infrastructure, building construction, and architectural coating, which could amount to the following amounts of daily travel:

INFRASTRUCTURE, BUILDING CONSTRUCTION, AND ARCHITECTURAL COATING

Trip Category	Daily Vehicle Trips	PCE Factor	PCE Daily Trips
Medium Truck	143	2	286
Heavy Truck	143	3	429
Worker	1,034	1	1,034
Total	**1,320**		**1,749**

These estimated daily construction traffic levels exceed the traffic generated by the existing nursery, which ranges from 127 to 332 trip-ends per day. However, traffic operations during the proposed construction phases of the Project (including vehicle trips associated with construction employees, export of soil, import of construction materials, etc.) are anticipated to occur during off-peak periods. If construction activity were to occur outside of normal off-peak construction hours, study area intersections may potentially be impacted by worker and trucks during the various construction phases.

The following mitigation measures would ensure that traffic impacts at the study area intersections would be less than significant for the morning and evening peak periods (7:00 AM – 9:00 AM and 4:00 PM – 6:00 PM) during construction phases:

- The Project Applicant will be required to develop and implement a City-approved Construction Traffic Management Plan addressing potential construction-related traffic detours and disruptions. In general, the Construction Traffic Management Plan would ensure that to the extent practical, construction traffic would access the Project site during off-peak hours or limited access during the peak hours; and that construction traffic would be routed to avoid travel through, or proximate to, sensitive land uses.
- The delivery and removal of heavy equipment is recommended to eliminate any heavy truck activity during the morning and evening peak periods (7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM) in order to have nominal impacts to traffic and circulation near the vicinity of the Project.
- During the site grading, soil export activity from the Project site will not be permitted during the hours of 7:00 AM – 9:00 AM (morning peak period) and 4:00 PM – 6:00 PM (evening peak period).

2 PROPOSED DEVELOPMENT

2.1 LOCATION

Exhibit 2-1 depicts the traffic analysis study area and Project location south of the Foothill Transportation Corridor (State Rte. 241) tollway in the City of Lake Forest. Bordered by Bake and Rancho Parkways to the west and north respectively with Serrano Creek to the east, the Nakase Property master planned community spans 122 acres, redeveloping the land currently occupied by containers and nursery buildings as part of existing commercial nursery operations.

Exhibit 2-2 illustrates the Project conceptual land use plan. The Project is anticipated to include development of 675 single family dwelling units and 101 attached senior residential units, for a total of 776 residential units. The site will be organized into a grid and block system, echoing the refined edges and container rows of past orchestrated plantings. Additional land uses include neighborhood parks and an elementary grade school that can accommodate up to 1,000 students.

For traffic analysis purposes, the project has been allocated into four project traffic analysis zones (TAZs) as indicated on Exhibits 2-3 and 2-4. TAZ 2 includes the area where the potential school site is located, with access directly to Rancho Parkway opposite the existing Corridor Center driveway (main entry at signal). Project access from Bake Parkway is proposed to be located opposite the Rancho Parkway South intersection, supplemented by a right-turn-only access across from the Orchard intersection (no median break).

2.2 LAND USE AND PROJECT ACCESS

The Project residential areas are divided into five neighborhoods, organized into a grid and block system which echoes the refined edges and container rows of the existing nursery at the site. The Project land use plan establishes individuality amongst its various neighborhoods, which are further defined by landscape character, their own neighborhood parks, and trails. Edging the western and southern borders of the site, Neighborhoods One. Two, and Five feature higher density product types, while Neighborhoods Three and Four circle the Central Park with larger lots and lower density product. Exhibit 2-2 illustrates these boundaries in the context of the full development plan.

The City of Lake Forest General Plan designated the property as Business Park similar to the commercial and light industrial properties bordering the Nakase Property to the southwest. Residential projects such as Portola Center and Baker Ranch have been developed north and west of the site. A vacant land opportunities study was performed in the early 2000s; Nakase property was a non-participating landowner.

The Project includes a General Plan amendment to change the General Plan land use designation for the entire 122-acre site from Business Park to Low-Medium Density Residential and Institutional. The Nakase Area Plan will accompany the Nakase Property Planned Community Supplemental Text and Development Plan (PC Text) as part of a corresponding Zone Change. The Zone Change will establish the Planned Community zoning over the entire Nakase Property.

EXHIBIT 2-1: TRAFFIC ANALYSIS STUDY AREA

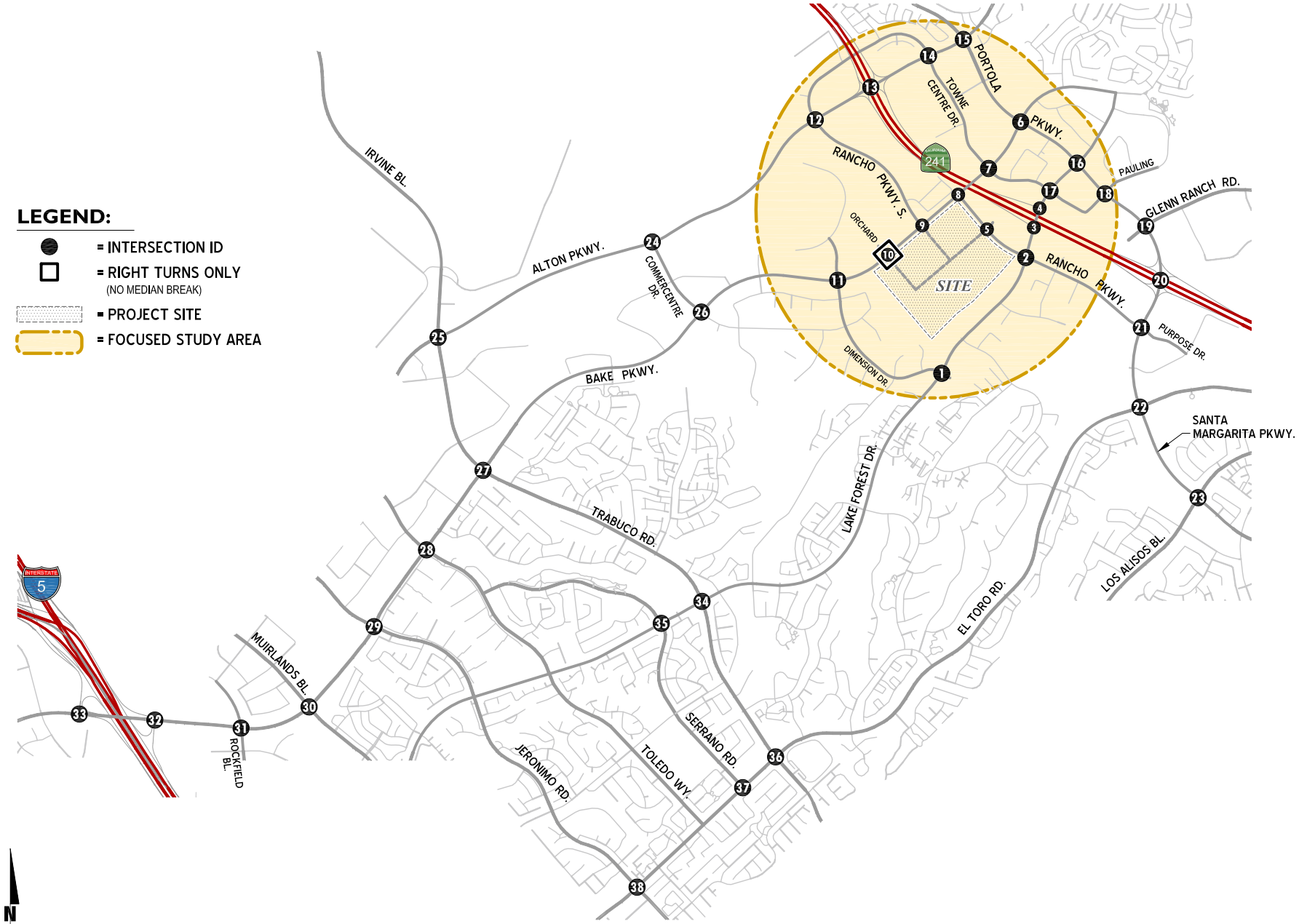


EXHIBIT 2-2: CONCEPTUAL LAND USE PLAN

EXHIBIT 2-3: NAKASE PROPERTY TRAFFIC ANALYSIS ZONES (TAZs)

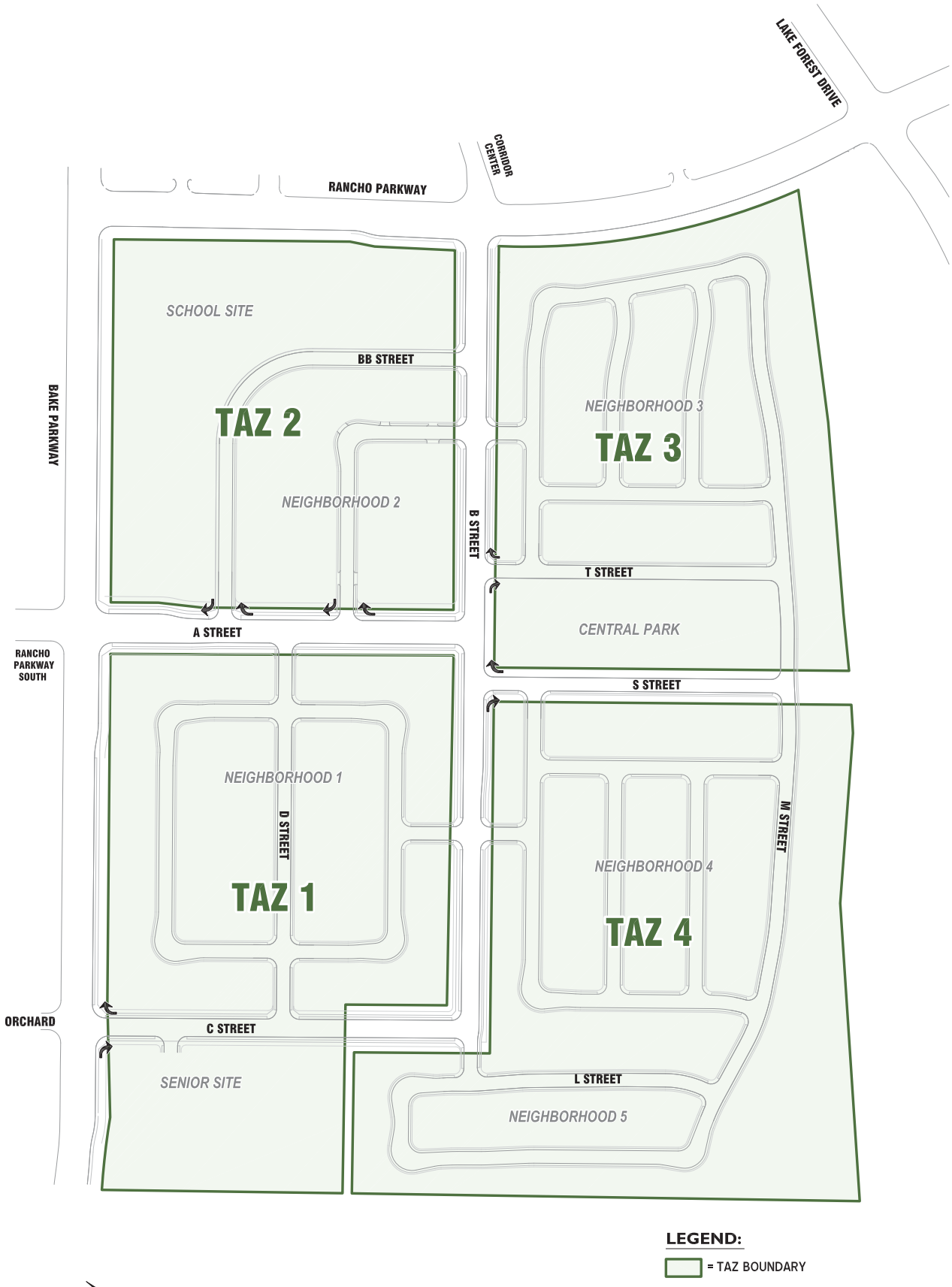
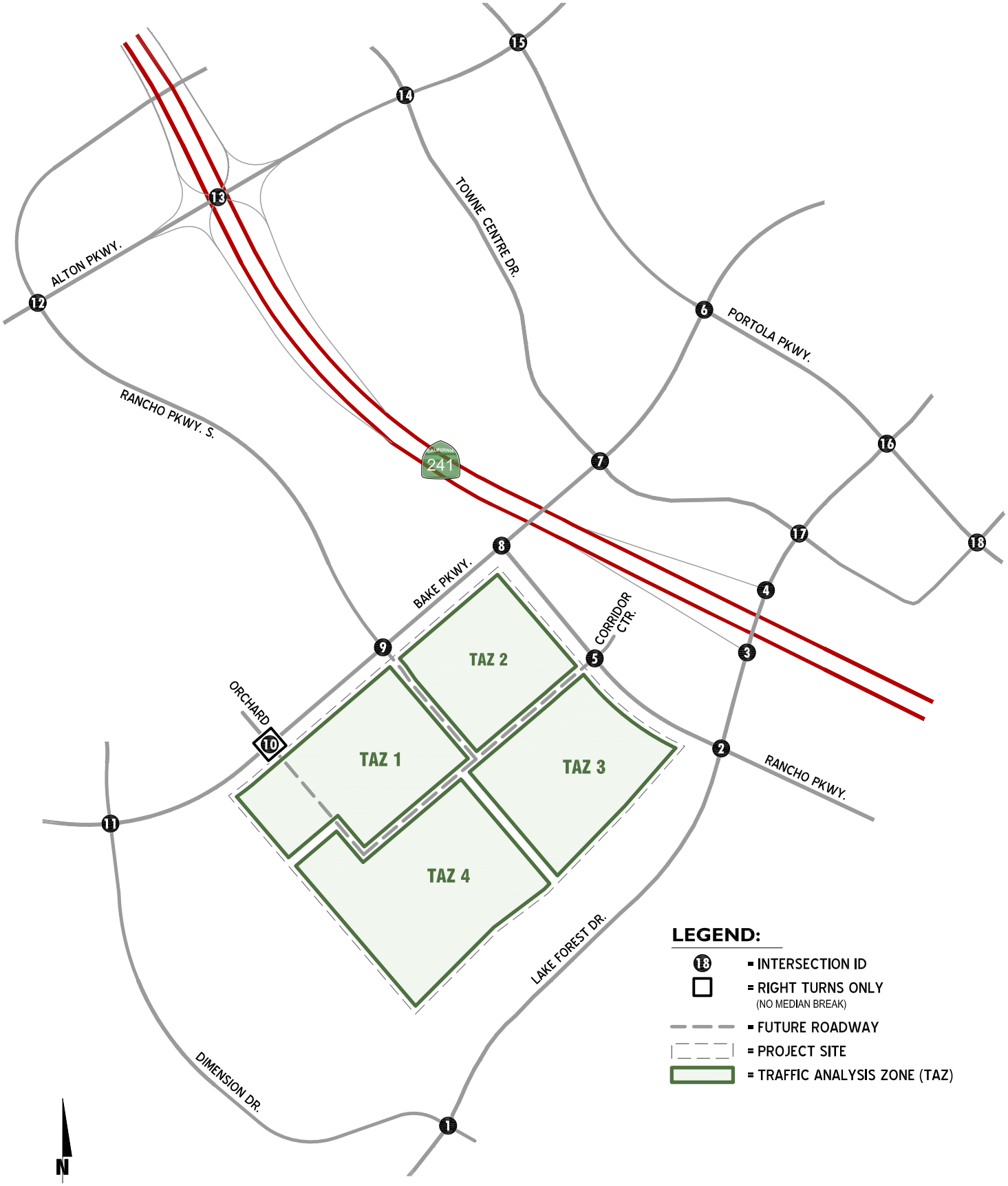


EXHIBIT 2-4: PROJECT ZONES AND FOCUSED ANALYSIS AREA



The Nakase Property is currently designated in long term future analysis scenarios based upon the Lake Forest Traffic Analysis Model (LFTAM) for approximately 1,841,700 square feet of business park use, consistent with the City of Lake Forest General Plan.

Access to the site will be provided via three new proposed entries, two from Bake Parkway and one from Rancho Parkway. The main community entrance from Bake Parkway will be opposite the existing Rancho Parkway South intersection as a new east leg, while the secondary entry on Bake Parkway will be restricted to right-turns only (no median break), across from the existing Orchard Street/Bake Parkway intersection.

The third access point will be located on Rancho Parkway at the existing Corridor Center/Rancho Parkway intersection, which serves the existing commercial center located north of the project. Together these access points will provide connectivity to arterial highways such as Alton Parkway (via Rancho Parkway South), Lake Forest Drive and Portola Parkway (via Rancho Parkway), and Irvine Boulevard/Trabuco Road (via Bake Parkway). Other significant nearby roadways include Towne Center Drive (northeast of the SR-241 toll road) and El Toro Road (southeast of Lake Forest Drive).

2.3 VEHICULAR CIRCULATION PLAN

The circulation plan for Nakase is illustrated on Exhibit 2-5. Adjacent to the site, Bake Parkway and Rancho Parkway South are designated on the City of Lake Forest Arterial Highway Plan as Primary roadways (4 Lane Divided Roadways). Rancho Parkway is a Commercial Street along the northeasterly project boundary.

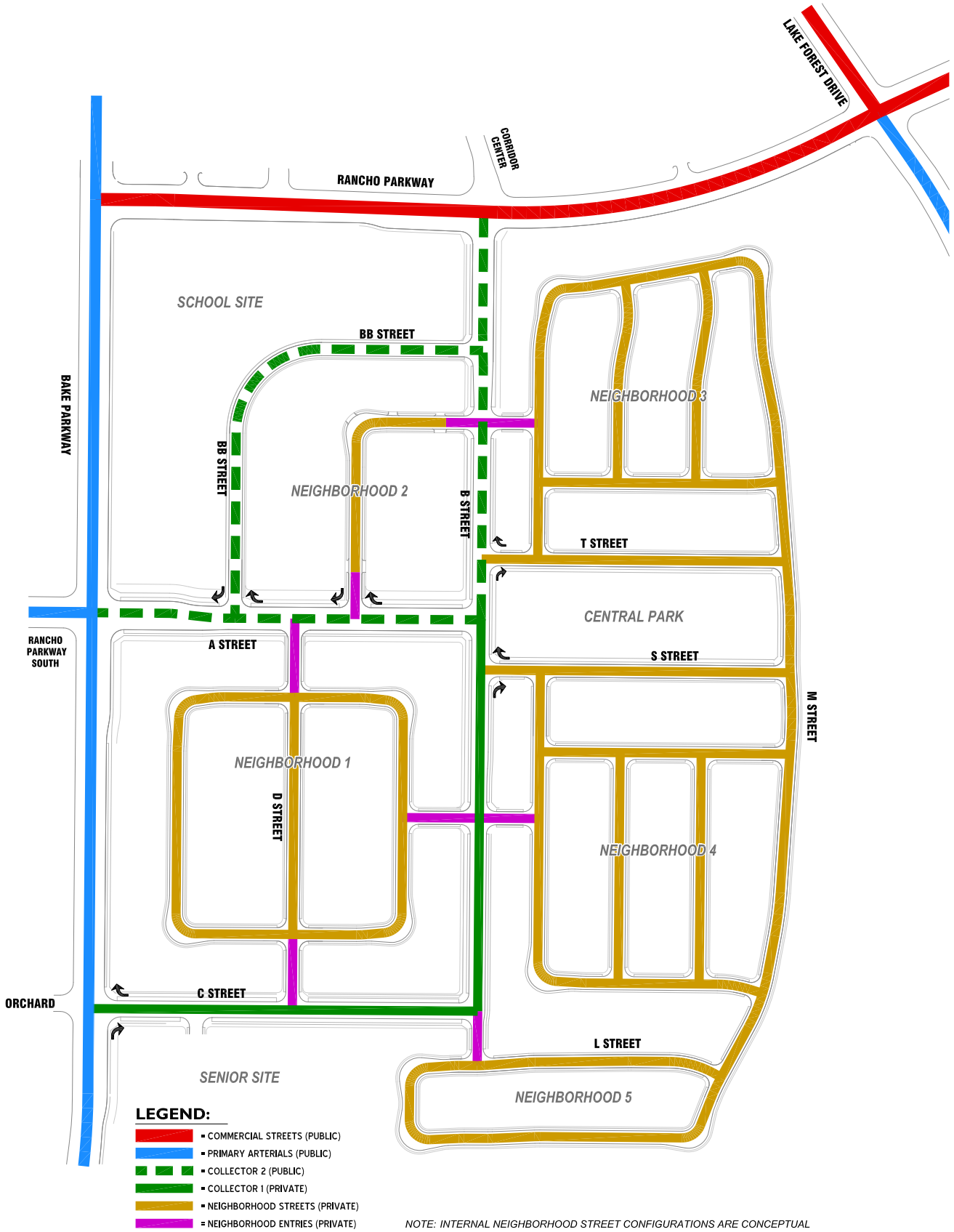
As part of the Nakase Property project, Bake Parkway will be widened at the two project entries to provide separate northbound right turn lanes. Rancho Parkway will also be widened at the project entry to provide a separate eastbound right turn lane.

The internal circulation roads allow entrance and exit to and from the site using the three new proposed entries, connecting all on-site neighborhoods and the school site via four collector roads:

- "A" Street (from Bake Parkway to "B" Street with 2 travel lanes in each direction and a raised median);
- "B" Street (from north to south connecting "A" Street and "C" Street with Rancho Parkway, with one to two lanes in each direction);
- "C" Street (from a right-in/right-out intersection at Bake Parkway to "B" Street within the southwestern part of the project, with one lane in each direction), and
- "BB" Street (providing exclusive access to school site from a full-access intersection with "B" Street to a restricted-access intersection with "A" Street, with one lane in each direction).

The intersection of "BB" Street at "A" Street is restricted to right-turns only (no median break on "A" Street) to avoid morning inbound left turn queues associated with the school traffic.

EXHIBIT 2-5: ILLUSTRATIVE CIRCULATION PLAN



The main community entry from Bake Parkway is planned as the east leg of the existing Bake Parkway/Rancho Parkway South intersection. Rancho Parkway South extends westerly from Bake Parkway to Alton Parkway. This provides an access route to the Foothill Transportation Corridor (State Route 241 toll road) from the main community entry using the existing SR-241 interchange ramp connections at Alton Parkway.

Access to SR-241 from the project site is also available via Rancho Parkway at the Lake Forest Drive (to and from the northwest) and Portola Parkway interchanges.

It should be noted that privately owned streets ("A" Street, "B" Street, "C" Street, and neighborhood streets/entries) will be maintained by the homeowners association (HOA), with the exception of the public streets providing access to the school ("BB" Street, "A" Street from Bake Parkway to "B" Street and on "B" Street from Rancho Parkway to "A" Street) as shown on Exhibit 2-5.

3 TRAFFIC IMPACT ASSESSMENT METHODOLOGY

This section documents the methodologies and assumptions used to perform this traffic impact analysis. Levels of service at study intersections are calculated using the Intersection Capacity Utilization (ICU) methodology for signalized intersections and the Highway Capacity Manual 6th Edition (HCM 6) methodology for unsignalized intersections.

3.1 ANALYSIS SCENARIOS AND STUDY AREA

The traffic analysis has evaluated weekday AM peak hour (7AM-9AM) and weekday PM peak hour (4PM-6PM) traffic conditions at study area intersections for the following analysis scenarios, which are further described below:

- Existing (2017) Conditions
- Existing plus Project Conditions
- Interim Year Cumulative 2020 Without Project
- Interim Year Cumulative 2020 With Project
- 2040 General Plan Cumulative With current approved project land use, Without Portola westerly extension (including 5 intersection improvement scenarios listed below)
- 2040 General Plan Cumulative With Project, Without Portola westerly extension (including 5 intersection improvement scenarios listed below)
- 2040 General Plan Cumulative With current approved project land use, With Portola westerly extension (including 5 intersection improvement scenarios listed below)
- 2040 General Plan Cumulative With Project, With Portola westerly extension (including 5 intersection improvement scenarios listed below)

In addition, all of the 2040 General Plan scenarios include analysis of these five intersection improvement alternatives:

- Intersection Alternative Scenario #1 - The City's current baseline model including all of the LFTM improvements, NITM improvements, and FCPP Improvements.
- Intersection Alternative Scenario #2 - Scenario #1 without three (3) improvements in the City of Irvine at intersections of Alton Parkway & Irvine Boulevard (#25), Bake Parkway & Rockfield Boulevard (#31), and Lake Forest Drive & I-5 SB Ramps / Avenida de la Carlota (outside study area).
- Intersection Alternative Scenario #3 - Scenario #2 without the 2nd SB Right-turn on El Toro Road & Portola Parkway / Santa Margarita Parkway (#22).
- Intersection Alternative Scenario #4 - Scenario #2 without the 4th WB thru lane on Bake Parkway & Trabuco Road / Irvine Boulevard (#27).

- Intersection Alternative Scenario #5: Scenario #2 without both the 2nd SB Right-turn on El Toro Road & Portola / Santa Margarita Parkway (#22) and the 4th WB thru lane on Bake Parkway & Trabuco Road / Irvine Boulevard (#27).

Study area intersections are listed on Table 3-1. Off-site study area intersections are generally signalized, except for the intersection of Orchard at Bake Parkway.

3.2 INTERSECTION CAPACITY UTILIZATION (ICU) METHODOLOGY

Traffic volume forecasts are prepared by Stantec Consulting using the Lake Forest Traffic Analysis Model (LFTAM). For signalized intersections in the City of Lake Forest and nearby jurisdictions (City of Irvine and City of Mission Viejo), the Intersection Capacity Utilization (ICU) method is used to determine intersection performance. To calculate the ICU value for an intersection, the volume of traffic using the intersection is compared with the capacity of the intersection.

The ICU value is usually expressed as a decimal percent (e.g., 0.861). The decimal percent represents that portion of the hour required to provide sufficient capacity to accommodate all intersection traffic if all approaches operate at capacity.

Traffic operations of roadway facilities are described using the term "Level of Service" (LOS). LOS is a qualitative description of traffic flow based on several factors such as speed, travel time, delay, and freedom to maneuver. Six levels are typically defined ranging from LOS A, representing completely free-flow conditions, to LOS F, representing breakdown in flow resulting in stop-and-go conditions. LOS E represents operations at or near capacity, an unstable level where vehicles are operating with the minimum spacing for maintaining uniform flow. For signalized intersections LOS is directly related to the volume to capacity (v/c) ratios and is correlated to a LOS designation as described in Table 3-2.

TABLE 3-2: SIGNALIZED INTERSECTION V/C RATIO AND LOS RANGES

V/C Ratio	Level of Service
≤ 0.60	A
0.61 to ≤ 0.70	B
0.71 to ≤ 0.80	C
0.81 to ≤ 0.90	D
0.91 to ≤ 1.00	E
> 1.00	F

A number of assumptions are required regarding specific input values to the ICU methodology. The specific assumptions include the use of a saturation flow rate of 1,700 vehicles per lane per hour. No capacity adjustments are applied for protected movements with dedicated lanes (including both right and left turns). A lost time factor of 5 percent is applied to the ICU calculations. Finally, a "de facto" right turn lane is assumed to exist when the outermost through lane is 19 feet or greater in width and parking is prohibited.

TABLE 3-1: INTERSECTION ANALYSIS LOCATIONS

ID	Intersection[1]	Jurisdiction[2]	LOS Criteria
1	Lake Forest Dr. (NS) & Dimension Dr. (EW)	Lake Forest	D
2	Lake Forest Dr. (NS) & Rancho Pkwy. (EW)	Lake Forest - **LFTM**	D
3	Lake Forest Dr. (NS) & SR-241 SB Off-Ramp (EW)	Caltrans	D
4	Lake Forest Dr. (NS) & SR-241 NB On-Ramp (EW)	Caltrans	D
5	Corridor Center (NS) & Rancho Pkwy. (EW)	Lake Forest	D
6	Bake Parkway (NS) & Portola Pkwy. (EW)	Lake Forest - **LFTM**	D
7	Bake Parkway (NS) & Towne Center Dr. (EW)	Lake Forest	D
8	Bake Parkway (NS) & Rancho Pkwy. (EW)	Lake Forest	D
9	Bake Parkway (NS) & Rancho Pkwy. S. (EW)	Lake Forest	D
10	Bake Parkway (NS) & Orchard (EW) - *Non Signalized Intersection*	Lake Forest	D
11	Dimension Dr. (NS) & Bake Parkway (EW)	Lake Forest	D
12	Alton Pkwy. (NS) & Rancho Pkwy. S. (EW)	Lake Forest	D
13	Alton Pkwy. (NS) & SR-241 Ramps (EW)	Caltrans	D
14	Alton Pkwy. (NS) & Towne Centre Dr. (EW)	Lake Forest	D
15	Alton Pkwy. (NS) & Portola Pkwy. (EW)	Lake Forest	D
16	Lake Forest Dr. (NS) & Portola Pkwy. (EW)	Lake Forest	D
17	Lake Forest Dr. (NS) & Towne Centre Dr. (EW)	Lake Forest	D
18	Towne Centre Dr. (NS) & Portola Pkwy. (EW)	Lake Forest	D
19	Glenn Ranch Rd. (NS) & Portola Pkwy. (EW)	Lake Forest	D
20	Portola Pkwy. (NS) & SR-241 Ramps (EW)	Caltrans	D
21	Portola Pkwy. (NS) & Rancho Pkwy. (EW)	Lake Forest	D
22	El Toro Rd. (NS) & Portola Pkwy. (EW)	Lake Forest - **LFTM**	D
23	Los Alisos Bl. (NS) & Santa Margarita Pkwy. (EW)	Mission Viejo	D
24	Alton Pkwy. (NS) & Commercentre Dr. (EW)	Lake Forest	D
25	Alton Pkwy. (NS) & Irvine Bl. (EW)	Irvine - **NITM/LFTM**	E
26	Bake Pkwy. (NS) & Commercentre Dr. (EW)	Lake Forest	D
27	Bake Pkwy. (NS) & Irvine Bl. - Trabuco Rd. (EW)	Irvine / Lake Forest - **NITM/LFTM**	E
28	Bake Pkwy. (NS) & Toledo Wy. (EW)	Irvine / Lake Forest	D
29	Bake Pkwy. (NS) & Jeronimo Rd. (EW)	Irvine / Lake Forest - **NITM/LFTM**	D
30	Bake Pkwy. (NS) & Muirlands Bl. (EW)	Irvine	D
31	Bake Pkwy. (NS) & Rockfield Bl. (EW)	Irvine	D
32	Bake Pkwy. (NS) & I-5 NB Ramps (EW)	Caltrans	E
33	Bake Pkwy. (NS) & I-5 SB Ramps (EW)	Caltrans	E
34	Lake Forest Dr. (NS) & Trabuco Rd. (EW)	Lake Forest	D
35	Lake Forest Dr. (NS) & Serrano Rd. (EW)	Lake Forest	D
36	El Toro Rd. (NS) & Trabuco Rd. (EW)	Lake Forest - **CMP**	E
37	El Toro Rd. (NS) & Serrano Rd. (EW)	Lake Forest	D
38	El Toro Rd. (NS) & Jeronimo Rd. (EW)	Lake Forest	D

[1] NS = North/South Roadway; EW = East/West Roadway;

CMP = Congestion Management Program Intersection; **LFTM** = Lake Forest Transportation Mitigation Program

NITM = North Irvine Transportation Mitigation Program

R:\UXRjobs_10600-11000\10820\Excel\[10820-05 - Report.xlsx]3-1

3.3 HIGHWAY CAPACITY MANUAL 6TH EDITION (HCM) METHODOLOGY

The Highway Capacity Manual (HCM) methodology expresses the LOS at an intersection in terms of delay time for the various intersection approaches. The HCM uses different procedures depending on the type of intersection control.

For the unsignalized intersections, HCM methodology is utilized. Intersection LOS operations are based on an intersection's average control delay. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The LOS rating is based on the weighted average control delay expressed in seconds per vehicle (see Table 3-3).

TABLE 3-3: UNSIGNALIZED INTERSECTION DESCRIPTION OF LOS

Description	Average Control Delay Per Vehicle (Seconds)	Level of Service, V/C ≤ 1.0	Level of Service, V/C > 1.0
Little or no delays.	0 to 10.00	A	F
Short traffic delays.	10.01 to 15.00	B	F
Average traffic delays.	15.01 to 25.00	C	F
Long traffic delays.	25.01 to 35.00	D	F
Very long traffic delays.	35.01 to 50.00	E	F
Extreme traffic delays with intersection capacity exceeded.	> 50.00	F	F

Source: HCM, 6th Edition

At two-way or side-street stop-controlled intersections, LOS is calculated for each controlled movement and for the left turn movement from the major street, as well as for the intersection as a whole. For approaches composed of a single lane, the delay is computed as the average of all movements in that lane. For all-way stop controlled intersections, LOS is computed for the intersection as a whole.

3.4 POTENTIALLY SIGNIFICANT TRAFFIC IMPACT CRITERIA

Per the City of Lake Forest General Plan, LOS "D" (peak hour ICU less than or equal to 0.90) or better is generally considered acceptable at intersections. However, at Critical Intersections, LOS "E" (peak hour ICU less than or equal to 1.00) is acceptable with the requirement that regular monitoring take place. Critical Intersections are a set of identified intersections that are either deficient today or are estimated to be deficient in the future even with reasonable improvements, but are considered Principal Intersections, critical to the function of the overall roadway network.

Per City of Lake Forest General Plan, a project impact occurs when a study area intersection exceeds the acceptable LOS and the impact of the development is greater than 0.01. Project mitigation will be required to bring back the intersection v/c to 0.90 or baseline, if the baseline is greater than 0.90 (or 1.00 at Critical Intersections).

For nearby jurisdictions (City of Irvine, City of Mission Viejo, and Caltrans), LOS "D" (peak hour ICU less than or equal to 0.90) or better is generally considered acceptable at intersections with

the exception of the following locations where Level of Service E (peak hour ICU less than or equal to 1.00) is acceptable: Bake Parkway/I-5 ramp intersections (#32 & #33), Alton Parkway at Irvine Boulevard (#25), Bake Parkway at Irvine Boulevard – Trabuco Road (#27), and El Toro Road at Trabuco Road (#36 - CMP intersection).

For ICU greater than the acceptable level of service, mitigation of the project contribution is required to bring intersection back to acceptable level of service or to no project conditions if project contribution is greater than .03 at CMP locations outside the City of Irvine (the impact threshold specified in the CMP), .02 or greater at locations in the Cities of Irvine and Mission Viejo, and greater than .01 in the City of Lake Forest.

This Page Intentionally Left Blank

4 AREA CONDITIONS

Existing conditions data has been compiled for the study area illustrated previously on Exhibit 2-1, including peak hour and daily traffic counts, intersection controls and lane configurations, roadway levels of service, existing bikeways and trails, and transit features.

This section also provides a summary of the existing City of Lake Forest General Plan components, including roadway classifications and typical cross-sections.

4.1 AREA ROADWAY SYSTEM

Exhibits 4-1 and 4-2 illustrates the study area intersections located near the proposed Project and identifies the lane geometrics and intersection traffic controls.

Exhibit 4-3 shows the City of Lake Forest Arterial Highway Plan, and Exhibit 4-4 illustrates the City of Lake Forest Typical Cross-Sections. In the study area, Bake Parkway and Lake Forest Drive are shown as Primary Arterials (4 Lane Divided Roadways). Rancho Parkway is a Commercial Street along the northern Project boundary.

4.2 TRANSIT SERVICE

The study area is currently served by the Orange County Transportation Authority (OCTA), a public transit agency serving the City of Lake Forest with bus service along Bake Parkway and a portion of Dimension Drive (Route 206). As shown on Exhibit 4-5, Lake Forest Drive is served by Route 177. Transit service is reviewed and updated by OCTA periodically to address ridership, budget and community demand needs. Changes in land use can affect these periodic adjustments which may lead to either enhanced or reduced service where appropriate.

4.3 PEDESTRIAN AND BICYCLE FACILITIES

Designated Bikeways included in the City of Lake Forest General Plan are shown on Exhibit 4-6. As shown on Exhibit 4-6, Class II bike lanes are shown along Bake Parkway, Lake Forest Drive, Rancho Parkway and Rancho Parkway South in the study area.

Exhibits 4-7 and 4-8 illustrate the Orange County Major Hiking Riding & Hiking Trails/Off-Road Paved Bikeways and Existing/Proposed Bikeways, respectively. As shown on Exhibit 4-7, the off-site Serrano Creek Trail starts at Serrano Creek Park, southerly of the Nakase Property site, and extends northerly to the Whiting Ranch Wilderness Park. This multi-purpose trail accommodates running, walking and biking.

4.4 TRAFFIC VOLUMES AND CONDITIONS

The intersection LOS analysis is based on the traffic volumes observed during the peak hour conditions using traffic count data collected in the months of February, May, and June 2017 while school is in session. Based on discussions with City staff, the following peak hours were selected for analysis:

- Weekday AM Peak Hour (peak hour between 7:00 AM and 9:00 AM)
- Weekday PM Peak Hour (peak hour between 4:00 PM and 6:00 PM)

EXHIBIT 4-1: EXISTING FOCUSED ANALYSIS AREA LANE GEOMETRICS AND TRAFFIC CONTROLS

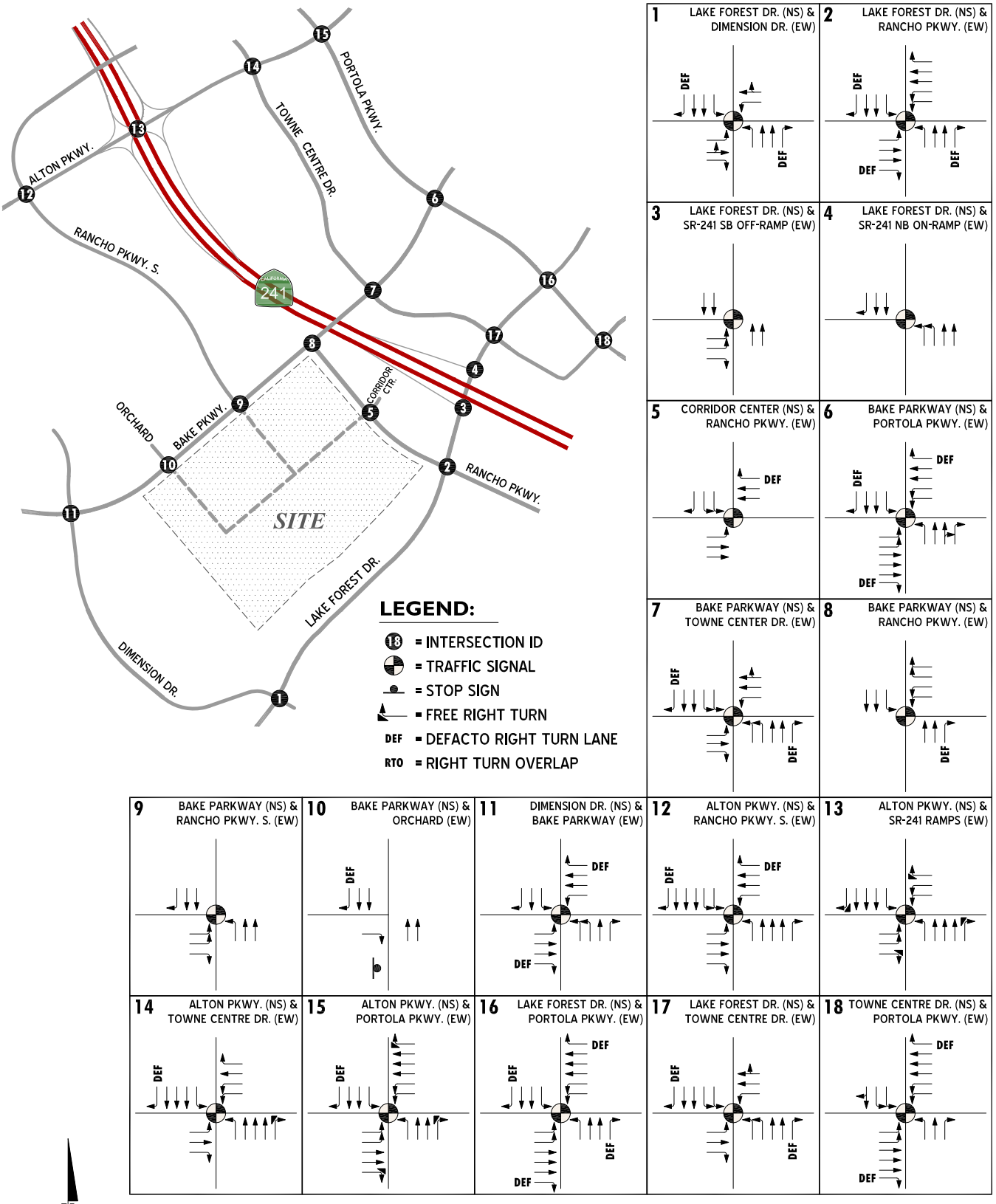


EXHIBIT 4-2: EXISTING EXPANDED AREA LANE GEOMETRICS AND TRAFFIC CONTROLS

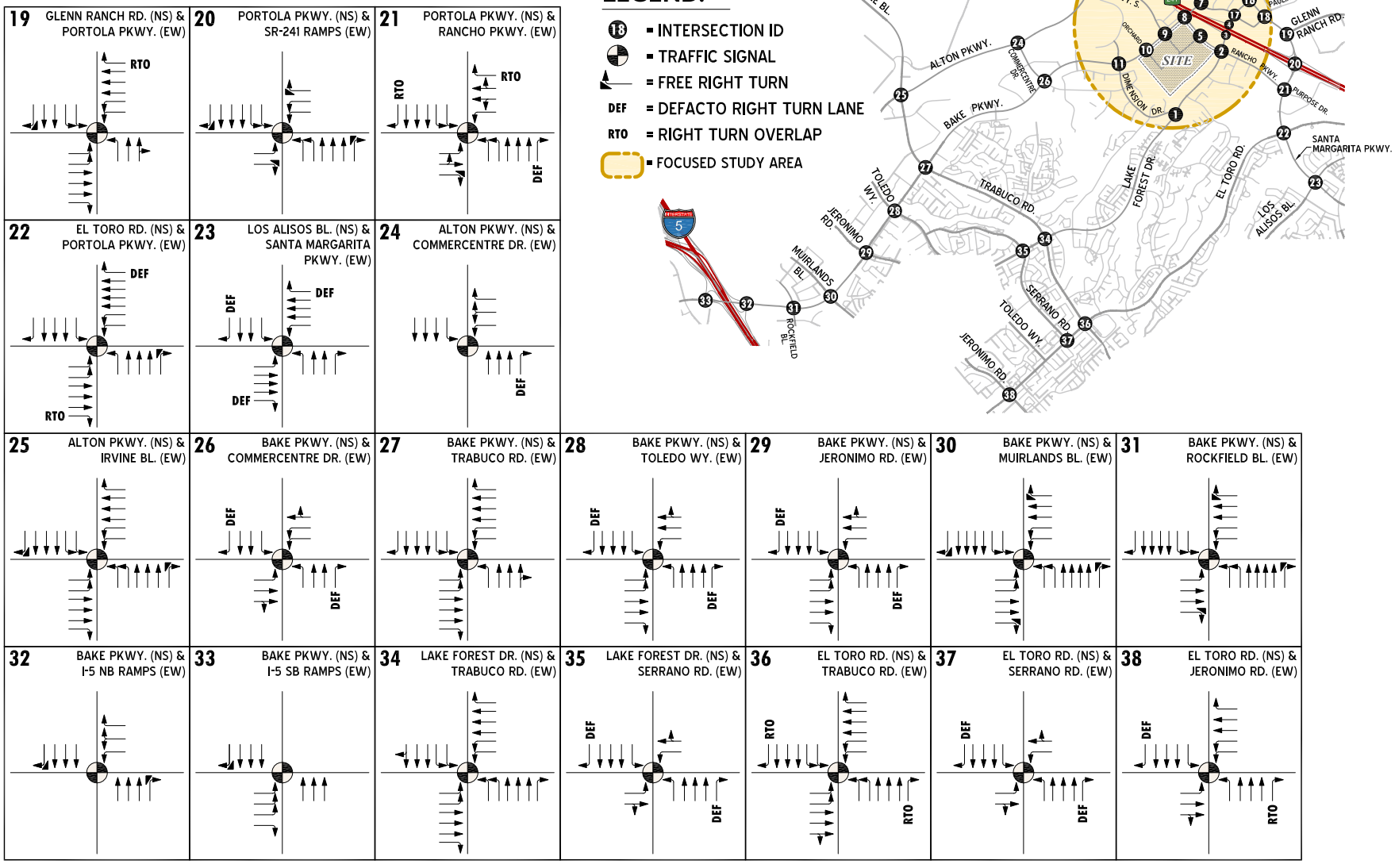


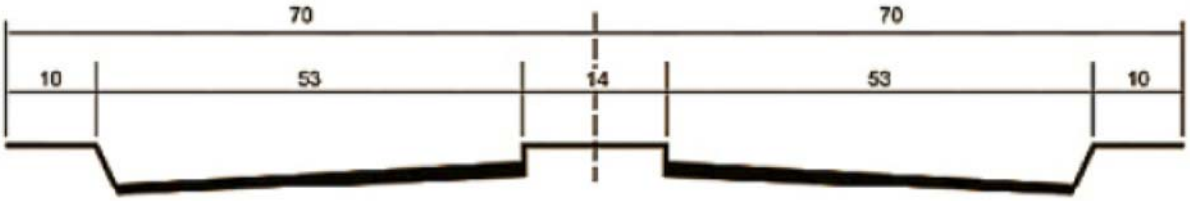
EXHIBIT 4-3: CITY OF LAKE FOREST ARTERIAL HIGHWAY PLAN

Source: City of Lake Forest General Plan (2008)

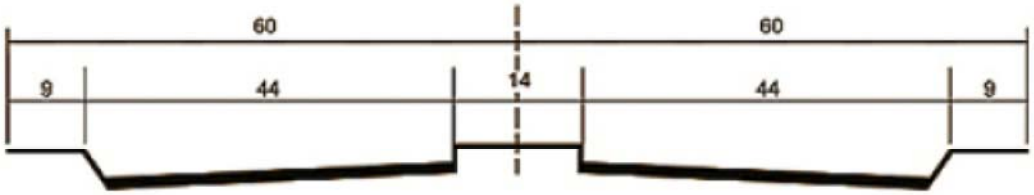
LEGEND:

- City Boundary
- 8 Lane Divided Roadway = Principal Arterial
- 6 Lane Divided Roadway = Major Arterial
- 4 Lane Divided Roadway = Primary Arterial
- 4 Lane Undivided Roadway = Secondary Arterial
- Commercial Street

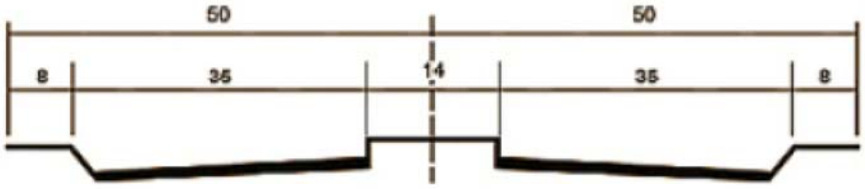
EXHIBIT 4-4: CITY OF LAKE FOREST TYPICAL CROSS-SECTIONS



Eight-Lane Divided Roadway 140' R/W
Principal Arterial

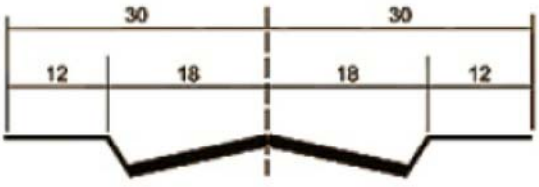


Six-Lane Divided Roadway 120' R/W
Major Arterial



Four-Lane Divided Roadway 100' R/W
Primary Arterial

Four-Lane Undivided Roadway 80' R/W
Secondary Arterial



Two-Lane Undivided Roadway 60' R/W

Source: City of Lake Forest General Plan (2008)

EXHIBIT 4-5: EXISTING OCTA TRANSIT ROUTES

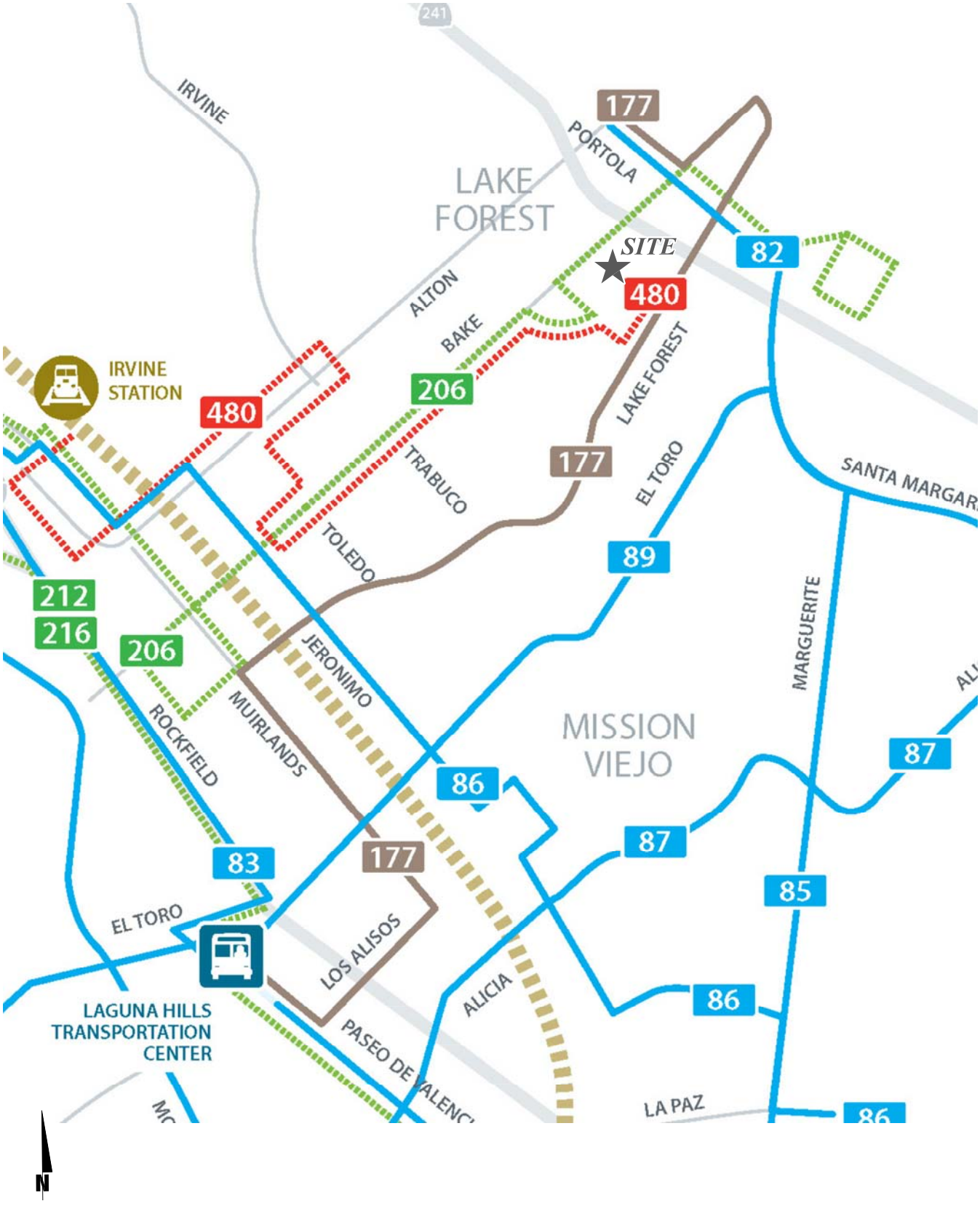
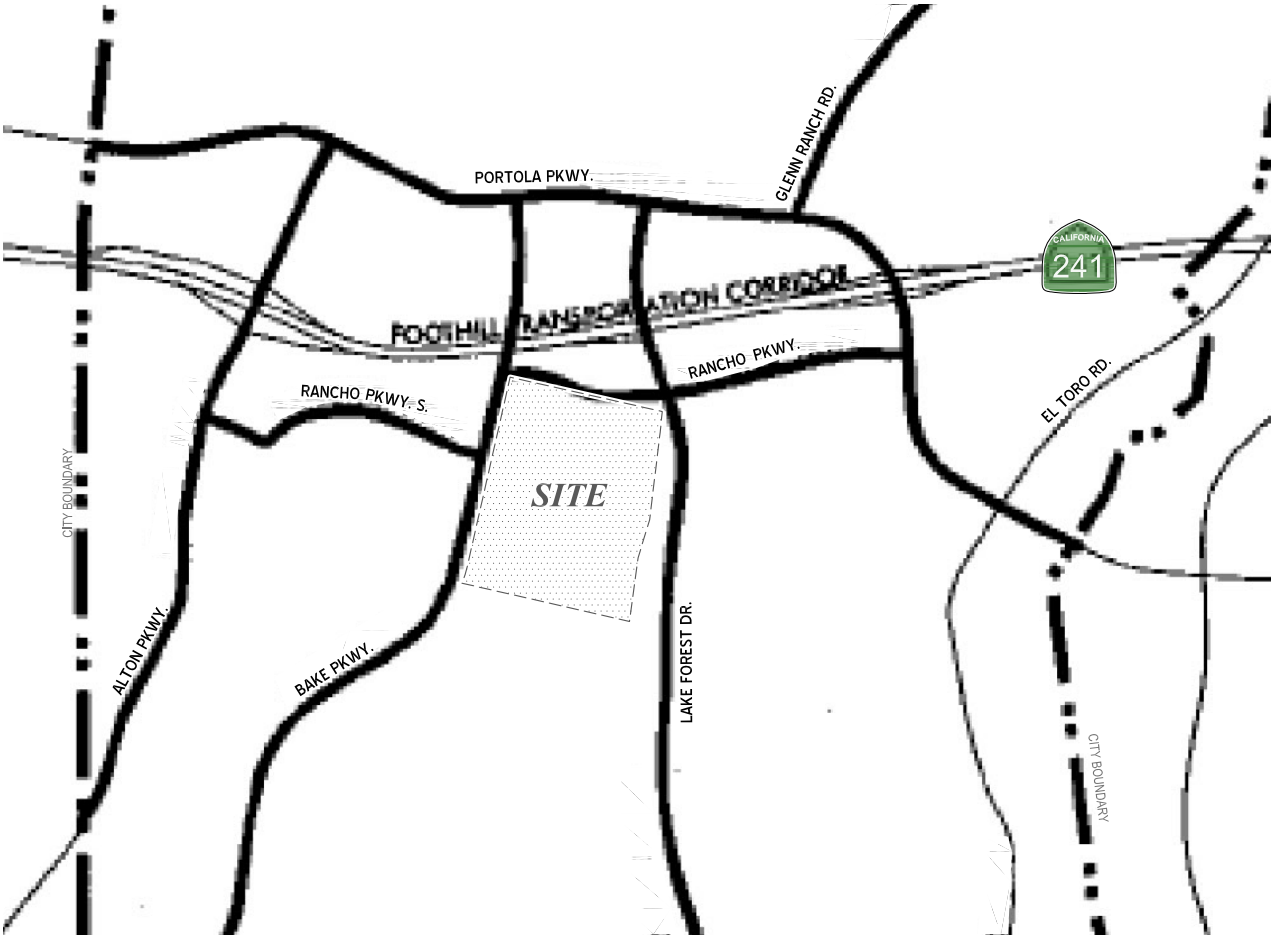


EXHIBIT 4-6: CITY OF LAKE FOREST PLANNED BIKEWAYS



Source: City of Lake Forest General Plan (2008)

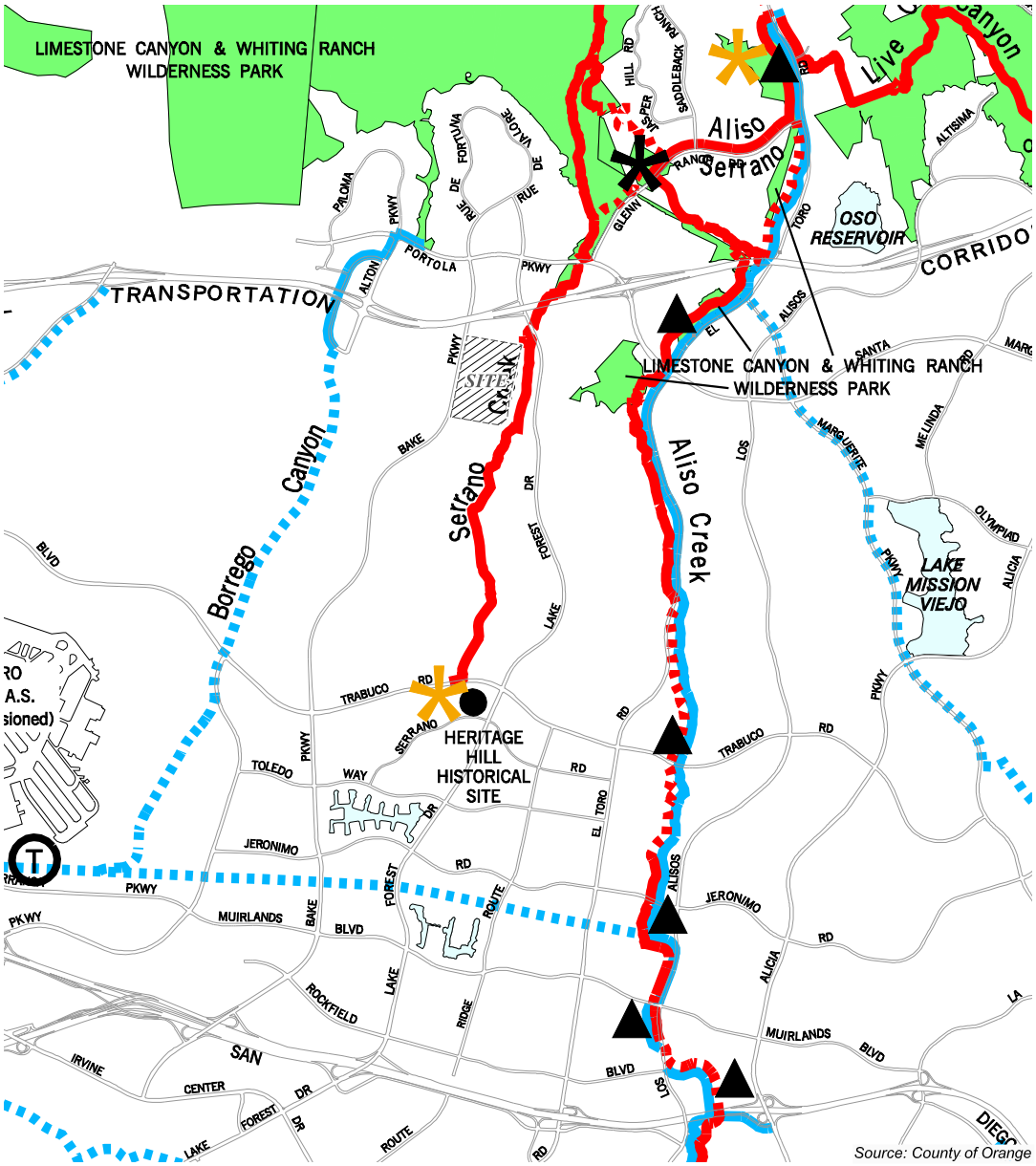
LEGEND:

Class II (Bike Lane)

City Boundary

NOTE: Class I Bikeways are shown in Figure RR-1 in the Recreation and Resource Element.

EXHIBIT 4-7: ORANGE COUNTY MAJOR RIDING & HIKING TRAILS AND OFF-ROAD PAVED BIKEWAYS



Riding and Hiking Trails
- Existing
- Proposed

Off–Road Paved Bikeways
- Existing
- Proposed

Open Space Categories
- County Regional Park

Additional Features
- Historical Sites
- Rest Areas
- Existing Staging Areas
- Proposed Staging Areas
- Train Stations

RESOURCES & DEVELOPMENT MANAGEMENT DEPT.
GEOMATICS /LAND INFORMATION SYSTEMS DIVISION
GIS MAPPING UNIT – Bob Helman
MARCH 2008
Originator:
County of Orange
Resources & Development Management Dept.
Harbors, Beaches & Parks Division

The County of Orange, RDMD/Harbors, Beaches & Parks & Geomatics /LIS /GIS make no representations or warranties regarding the accuracy of the data from which this map was derived. Neither the County nor HBP,Geomatics /LIS /GIS shall be liable under any circumstances for any direct, indirect, special, incidental or consequential damages with respect to any claim by any user or any third party on account from use of this map.

EXHIBIT 4-8: ORANGE COUNTY
EXISTING AND PROPOSED BIKEWAYS

Source: OCTA

Study area intersections are generally signalized, except for the intersection of Orchard at Bake Parkway. Peak hour turn movement counts have been collected at the following intersection locations:

ID	Intersection	ID	Intersection
1	Lake Forest Dr. (NS) & Dimension Dr. (EW)	20	Portola Pkwy. (NS) & SR-241 Ramps (EW)
2	Lake Forest Dr. (NS) & Rancho Pkwy. (EW)	21	Portola Pkwy. (NS) & Rancho Pkwy. (EW)
3	Lake Forest Dr. (NS) & SR-241 SB Off-Ramp (EW)	22	El Toro Rd. (NS) & Portola Pkwy. (EW)
4	Lake Forest Dr. (NS) & SR-241 NB On-Ramp (EW)	23	Los Alisos Bl. (NS) & Santa Margarita Pkwy. (EW)
5	Corridor Center (NS) & Rancho Pkwy. (EW)	24	Alton Pkwy. (NS) & Commercentre Dr. (EW)
6	Bake Parkway (NS) & Portola Pkwy. (EW)	25	Alton Pkwy. (NS) & Irvine Bl. (EW)
7	Bake Parkway (NS) & Towne Center Dr. (EW)	26	Bake Pkwy. (NS) & Commercentre Dr. (EW)
8	Bake Parkway (NS) & Rancho Pkwy. (EW)	27	Bake Pkwy. (NS) & Trabuco Rd. (EW)
9	Bake Parkway (NS) & Rancho Pkwy. S. (EW)	28	Bake Pkwy. (NS) & Toledo Wy. (EW)
10	Bake Parkway (NS) & Orchard (EW)	29	Bake Pkwy. (NS) & Jeronimo Rd. (EW)
11	Dimension Dr. (NS) & Bake Parkway (EW)	30	Bake Pkwy. (NS) & Muirlands Bl. (EW)
12	Alton Pkwy. (NS) & Rancho Pkwy. S. (EW)	31	Bake Pkwy. (NS) & Rockfield Bl. (EW)
13	Alton Pkwy. (NS) & SR-241 Ramps (EW)	32	Bake Pkwy. (NS) & I-5 NB Ramps (EW)
14	Alton Pkwy. (NS) & Towne Centre Dr. (EW)	33	Bake Pkwy. (NS) & I-5 SB Ramps (EW)
15	Alton Pkwy. (NS) & Portola Pkwy. (EW)	34	Lake Forest Dr. (NS) & Trabuco Rd. (EW)
16	Lake Forest Dr. (NS) & Portola Pkwy. (EW)	35	Lake Forest Dr. (NS) & Serrano Rd. (EW)
17	Lake Forest Dr. (NS) & Towne Centre Dr. (EW)	36	El Toro Rd. (NS) & Trabuco Rd. (EW)
18	Towne Centre Dr. (NS) & Portola Pkwy. (EW)	37	El Toro Rd. (NS) & Serrano Rd. (EW)
19	Glenn Ranch Rd. (NS) & Portola Pkwy. (EW)	38	El Toro Rd. (NS) & Jeronimo Rd. (EW)

NS = North/South Roadway; EW = East/West Roadway

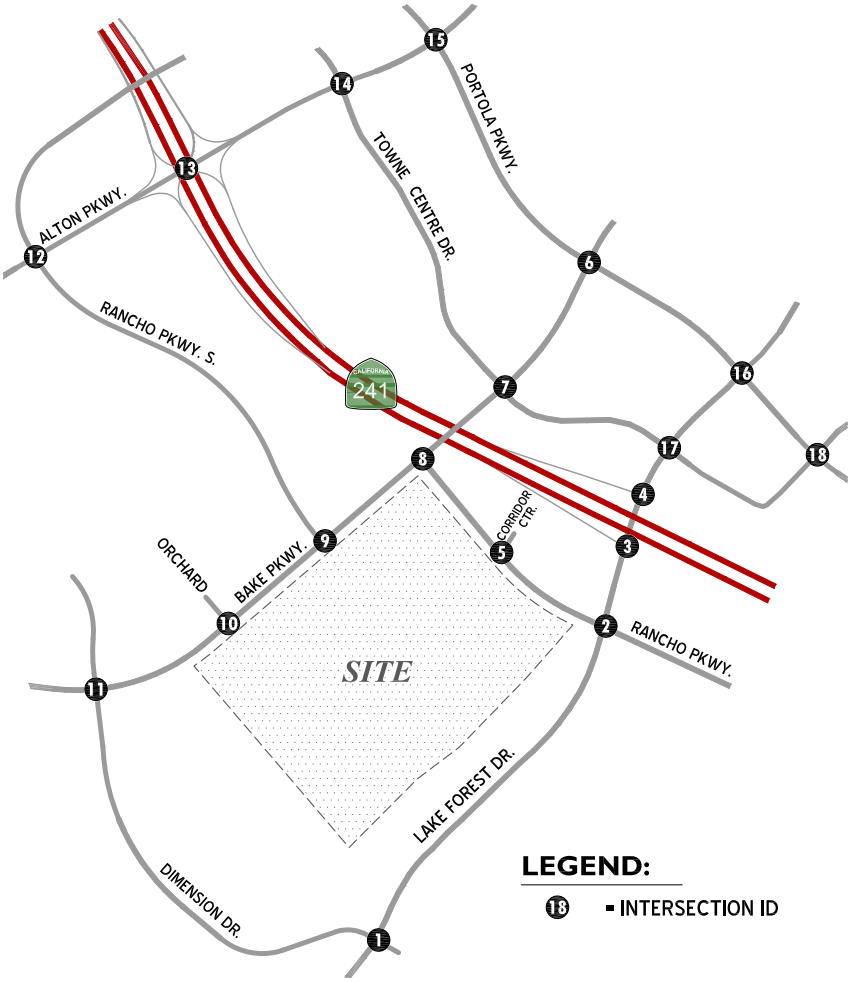
The raw manual peak hour turning movement traffic count data sheets are included in Appendix 4.1. Existing peak hour traffic volumes are shown on Exhibits 4-9 through 4-12.

Existing average daily traffic (ADT) directional counts have been collected for midblock arterial roadway segments. ADT midblock traffic count worksheets for each location analyzed on the arterial roadway system in the study area are also included in Appendix 4.1. 24-hour roadway directional counts were collected at twenty-three roadway segments within the study area:

#	Roadway Segment	#	Roadway Segment
1	Bake Pkwy., between Dimension Dr. & Orchard	13	Bake Pkwy., between I-5 NB Ramps & Rockfield
2	Bake Pkwy., between Rancho Pkwy. S. & Rancho Pkwy.	14	Trabuco Rd., between Bake & Lake Forest
3	Bake Pkwy., between Rancho Pkwy. & Towne Centre Dr.	15	Lake Forest Dr., between Rancho Pkwy. & SR-241 SB ramp
4	Orchard, north of Bake Pkwy.	16	Lake Forest Dr., between Dimension & Rancho Pkwy.
5	Rancho Pkwy. S., north of Bake Pkwy.	17	Rancho Pkwy., between Lake Forest & El Toro
6	Rancho Pkwy., between Bake Pkwy. & Corridor Ctr.	18	Portola Pkwy., between SR-241 & Rancho Pkwy.
7	Rancho Pkwy., between Corridor Ctr. & Lake Forest Dr.	19	El Toro Rd., south of Portola Pkwy.
8	Alton Pkwy., between Rancho Pkwy. S. & SR-241	20	Portola Pkwy. – Santa Margarita Pkwy., between El Toro Rd. & Los Alisos Bl.
9	Alton Pkwy., between Irvine Bl. & Commercentre Dr.		
10	Irvine Bl., between Alton Pkwy. & Bake Pkwy	21	Los Alisos Bl., south of Santa Margarita Pkwy.
11	Bake Pkwy., between Trabuco & Commercentre Dr.	22	Trabuco Rd., west of El Toro Rd.
12	Bake Pkwy., between Toledo Wy. & Trabuco Rd.	23	El Toro Rd., between Serrano Rd. & Trabuco Rd.

Existing weekday average daily traffic (ADT) volumes, based on counts on the arterial roadway system in the study area are illustrated on Exhibits 4-13 and 4-14.

EXHIBIT 4-9: EXISTING (2017) FOCUSED ANALYSIS AREA AM PEAK HOUR INTERSECTION VOLUMES



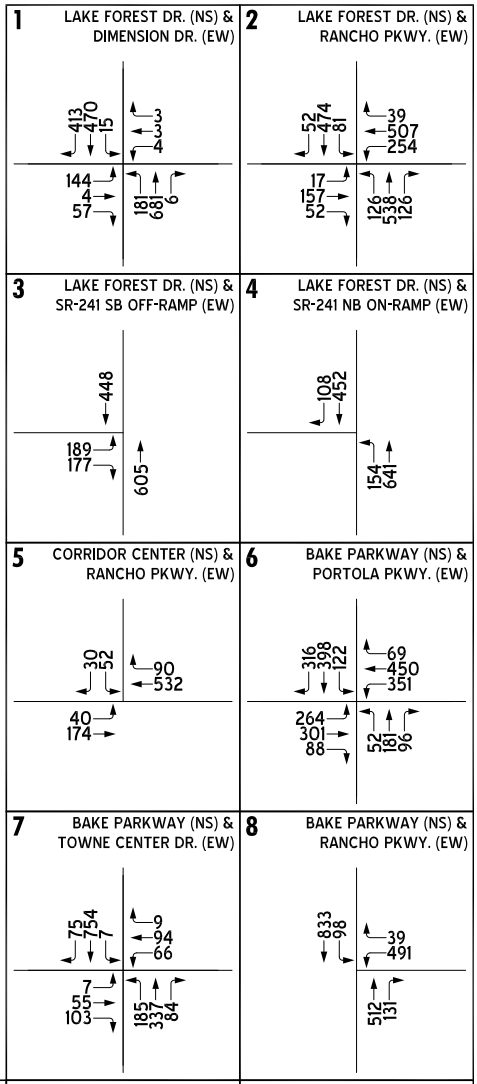
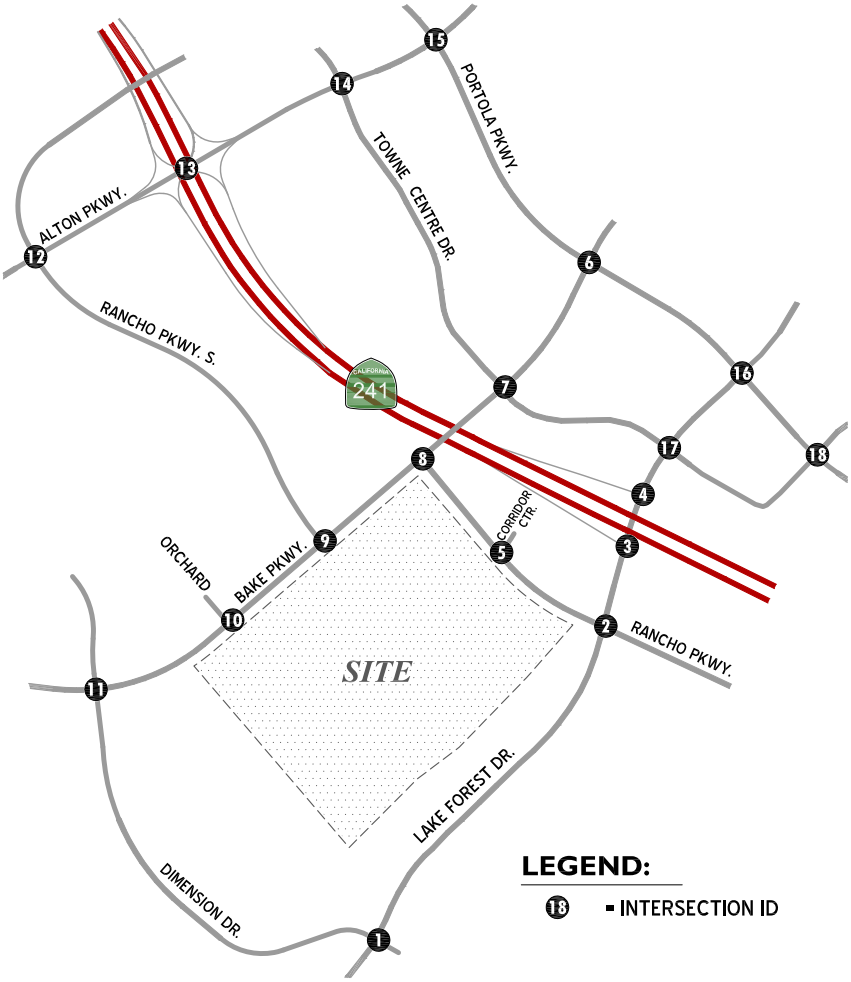


EXHIBIT 4-10: EXISTING (2017) FOCUSED ANALYSIS AREA
PM PEAK HOUR INTERSECTION VOLUMES



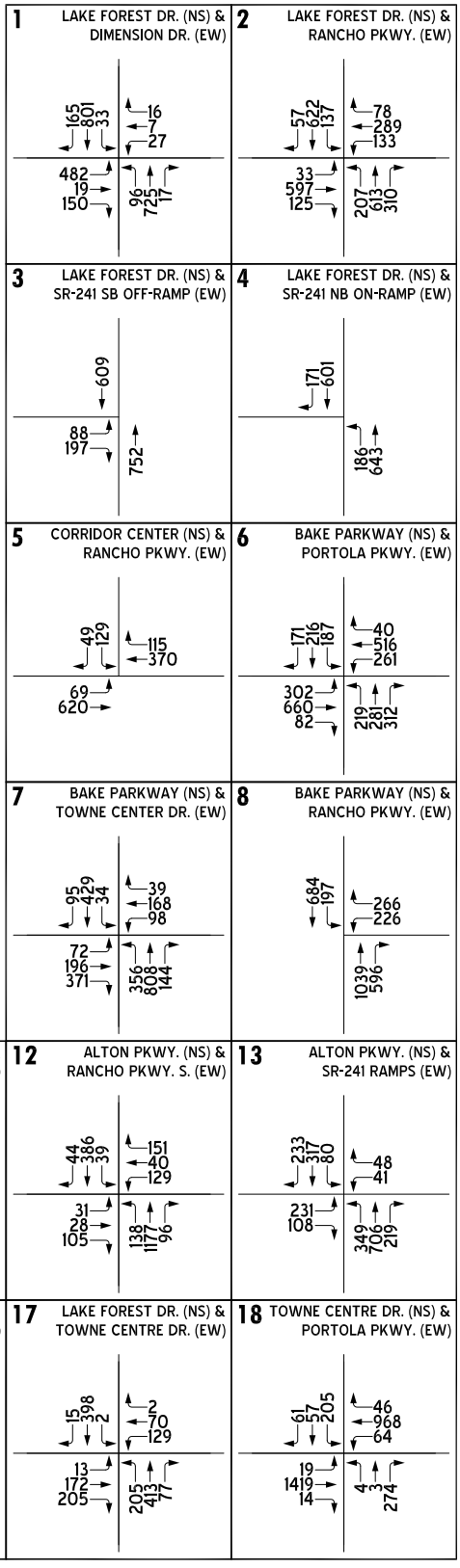
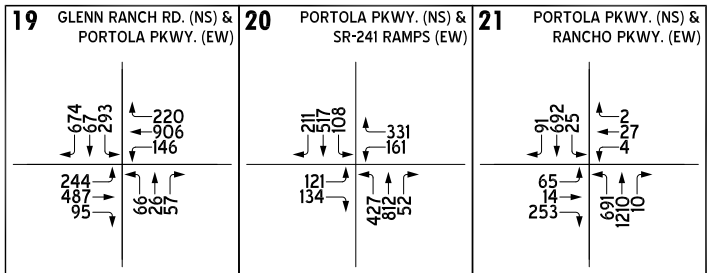
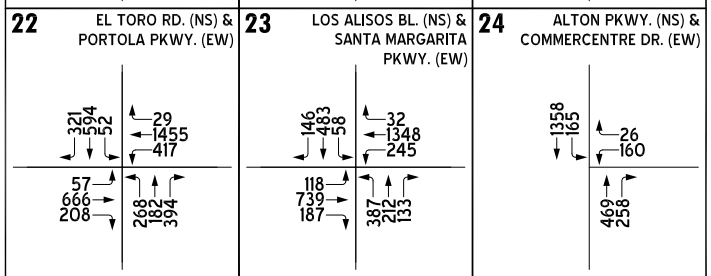
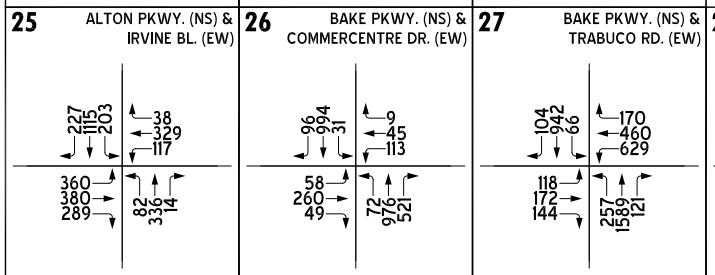
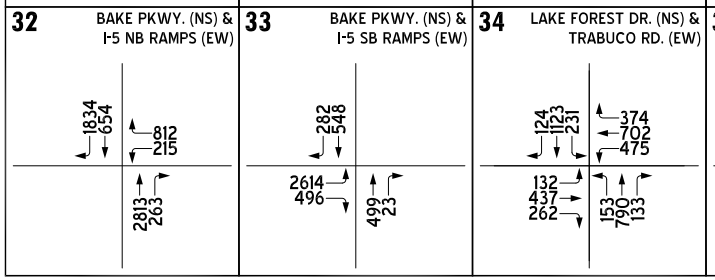


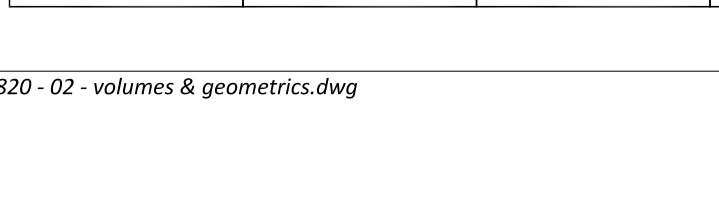
EXHIBIT 4-11: EXISTING (2017) EXPANDED AREA
AM PEAK HOUR INTERSECTION VOLUMES











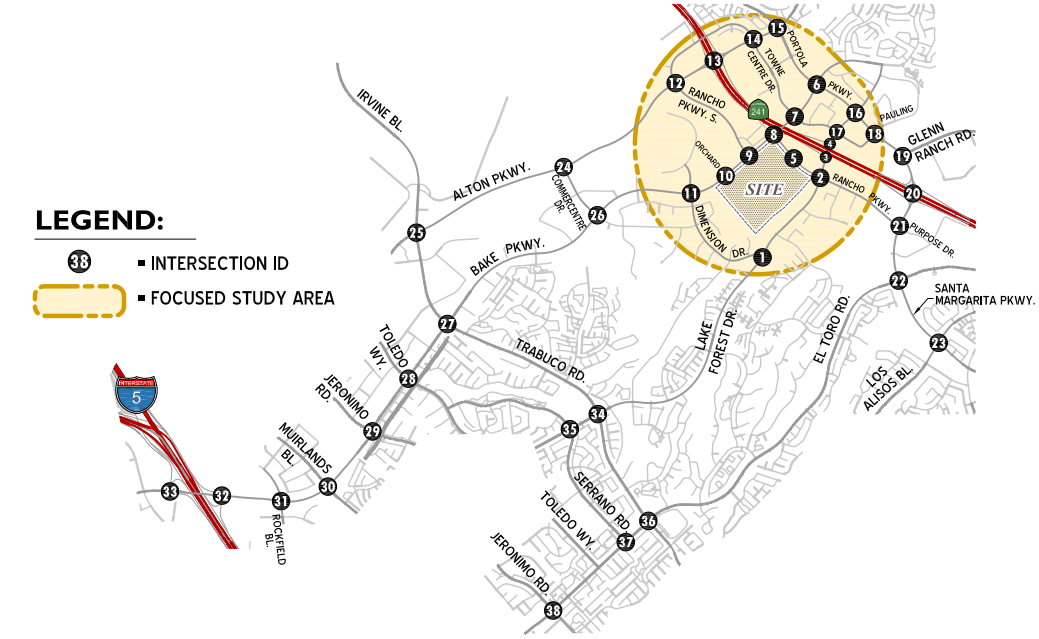
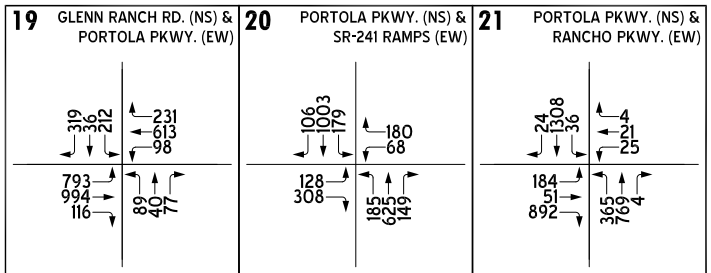
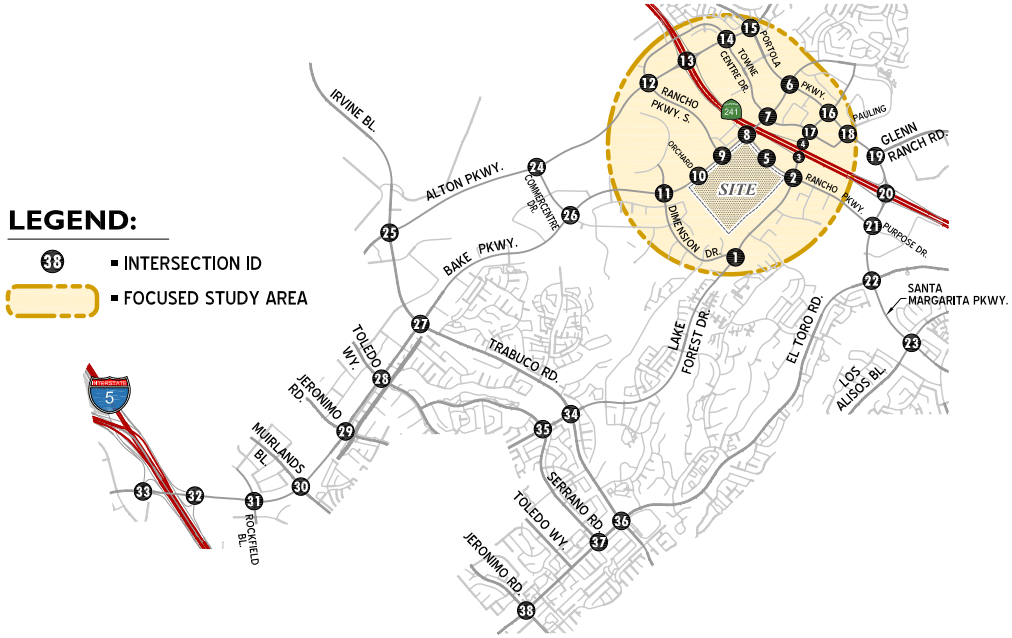


EXHIBIT 4-12: EXISTING (2017) EXPANDED AREA
PM PEAK HOUR INTERSECTION VOLUMES





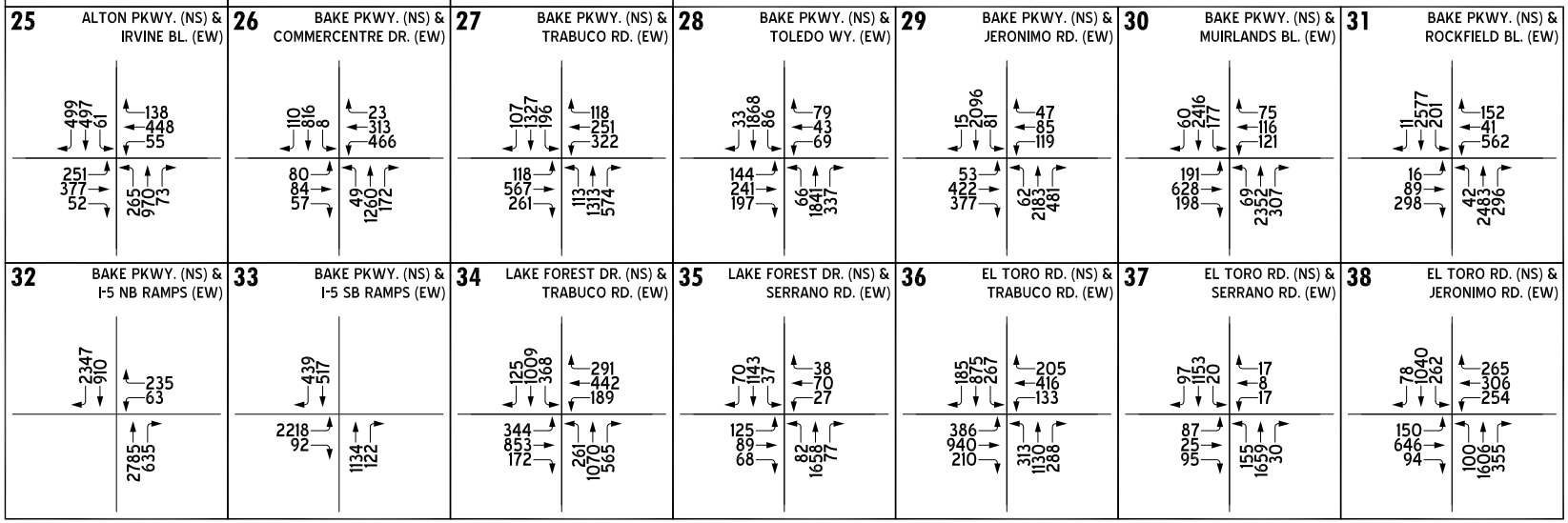


EXHIBIT 4-13: EXISTING (2017) FOCUSED ANALYSIS AREA AVERAGE DAILY TRAFFIC (ADT)

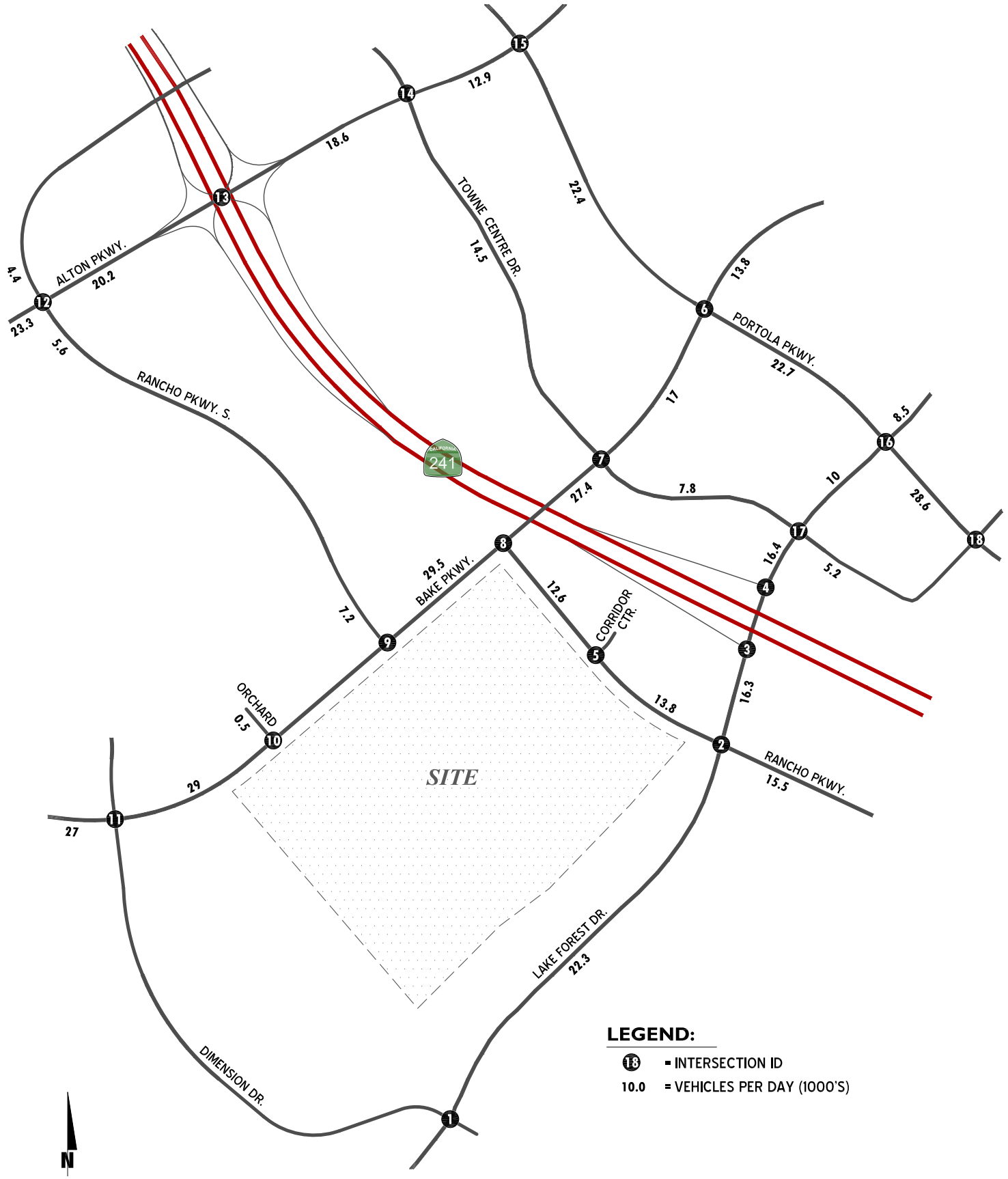
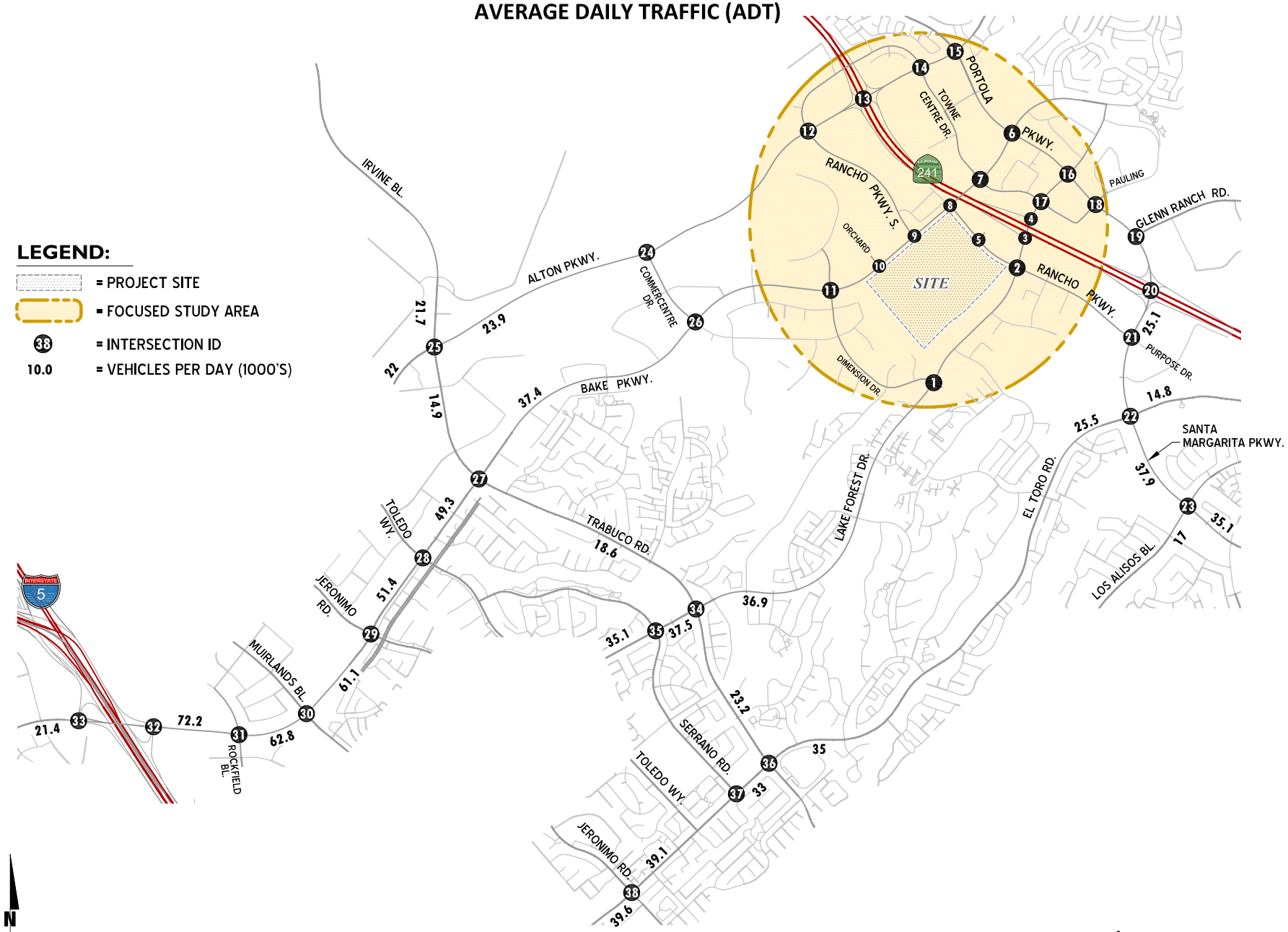


EXHIBIT 4-14: EXISTING (2017) EXPANDED AREA AVERAGE DAILY TRAFFIC (ADT)



4.5 EXISTING INTERSECTION LEVEL OF SERVICE

Existing peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 3.0 *Traffic Assessment Methodologies* of this report. As mentioned in Section 3.0, level of service (LOS) at study intersections have been calculated using the Intersection Capacity Utilization (ICU) methodology for signalized intersections and the Highway Capacity Manual 6th Edition (HCM6) methodology for unsignalized intersections.

Analysis of existing traffic operations has been performed for the intersections illustrated in Exhibit 2-1 using peak hour traffic count data in combination with the existing lane configuration of each location. Existing AM and PM peak hour analysis results are summarized in Table 4-1. The intersection operations analysis worksheets are included in Appendix 4.2 of this TIA.

One study area intersection (#29 - Bake Parkway & Jeronimo Road) is currently operating at an unacceptable level of service (LOS "E" or worse) during peak hours.

TABLE 4-1: INTERSECTION ANALYSIS SUMMARY
FOR EXISTING (2017) CONDITIONS

#	Intersection	Traffic Control[4]	Intersection Approach Lanes[1]												ICU[2] (v/c)		Level of Service[2]	
			Northbound			Southbound			Eastbound			Westbound						
			L	T	R	L	T	R	L	T	R	L	T	R	AM	PM	AM	PM
1	Lake Forest Dr. (NS) & Dimension Dr. (EW)	TS	1	2	d	1	2	d	1.5	0.5	1	1	1	0	0.41	0.52	A	A
2	Lake Forest Dr. (NS) & Rancho Pkwy. (EW)	TS	1	2	d	1	2	d	1	2	d	2	2	1	0.42	0.57	A	A
3	Lake Forest Dr. (NS) & SR-241 SB Off-Ramp (EW)	TS	0	2	0	0	2	0	2	0	1	0	0	0	0.29	0.36	A	A
4	Lake Forest Dr. (NS) & SR-241 NB On-Ramp (EW)	TS	2	2	0	0	2	1	0	0	0	0	0	0	0.24	0.28	A	A
5	Corridor Center (NS) & Rancho Pkwy. (EW)	TS	0	0	0	2	0	1	1	2	0	0	2	d	0.25	0.27	A	A
6	Bake Parkway (NS) & Portola Pkwy. (EW)	TS	1	1.5	1.5	1	2	d	2	3	d	2	2	d	0.42	0.49	A	A
7	Bake Parkway (NS) & Towne Center Dr. (EW)	TS	2	2	d	2	2	d	1	1	1	1	2	0	0.39	0.49	A	A
8	Bake Parkway (NS) & Rancho Pkwy. (EW)	TS	0	2	d	1	2	0	0	0	0	2	0	2	0.44	0.55	A	A
9	Bake Parkway (NS) & Rancho Pkwy. S. (EW)	TS	1	2	0	0	2	1	2	0	1	0	0	0	0.51	0.52	A	A
10	Bake Parkway (NS) & Orchard (EW)	CSS	0	2	0	0	2	d	0	0	1	0	0	0	0.41	0.50	A	A
	- *HCM6 Delay (Seconds) / LOS* [3]	CSS	0	2	0	0	2	d	0	0	1	0	0	0	14.0	13.0	B	B
11	Dimension Dr. (NS) & Bake Parkway (EW)	TS	2	1	1	1	1	1	1	2	d	1	2	d	0.40	0.56	A	A
12	Alton Pkwy. (NS) & Rancho Pkwy. S. (EW)	TS	1	3	1	2	3	d	1	2	1	1	2	d	0.48	0.39	A	A
13	Alton Pkwy. (NS) & SR-241 Ramps (EW)	TS	1	3	1>>	1	3	1>>	2	0	1>>	2	0	1>>	0.32	0.39	A	A
14	Alton Pkwy. (NS) & Towne Centre Dr. (EW)	TS	1	3	1>>	1	3	d	1	1	1	2	1	1	0.25	0.31	A	A
15	Alton Pkwy. (NS) & Portola Pkwy. (EW)	TS	1	2	1>>	1	2	d	2	2	1>>	2	3	1>>	0.41	0.27	A	A
16	Lake Forest Dr. (NS) & Portola Pkwy. (EW)	TS	1	2	d	1	2	d	2	3	d	2	3	d	0.36	0.49	A	A
17	Lake Forest Dr. (NS) & Towne Centre Dr. (EW)	TS	2	2	d	2	2	d	1	1	1	1	2	0	0.30	0.41	A	A
18	Towne Centre Dr. (NS) & Portola Pkwy. (EW)	TS	1	1	1	2	1	0	2	3	d	2	3	d	0.38	0.55	A	A
19	Glenn Ranch Rd. (NS) & Portola Pkwy. (EW)	TS	1	2	0	2	2	1>>	2	3	1	2	3	1>	0.41	0.48	A	A
20	Portola Pkwy. (NS) & SR-241 Ramps (EW)	TS	2	3	1>>	2	3	1>>	1	0	1>>	2	0	1>>	0.35	0.38	A	A
21	Portola Pkwy. (NS) & Rancho Pkwy. (EW)	TS	2	3	d	2	3	1>	1.5	0.5	1>>	1.5	1	1.5>	0.42	0.50	A	A
22	El Toro Rd. (NS) & Portola Pkwy. (EW)	TS	1	3	1>>	1	3	1	2	3	1>	2	4	d	0.62	0.65	B	B
23	Los Alisos Bl. (NS) & Santa Margarita Pkwy. (EW)	TS	1	2	1	1	2	d	1	3	d	1	3	d	0.75	0.73	C	C
24	Alton Pkwy. (NS) & Commercentre Dr. (EW)	TS	0	3	d	1	3	0	0	0	0	1.5	0	1.5	0.37	0.43	A	A
25	Alton Pkwy. (NS) & Irvine Bl. (EW)	TS	2	3	1>>	2	3	1>>	2	3	1	2	3	1	0.47	0.42	A	A
26	Bake Pkwy. (NS) & Commercentre Dr. (EW)	TS	1	2	d	1	2	d	1	2	0	2	1	0	0.50	0.67	A	B
27	Bake Pkwy. (NS) & Trabuco Rd. (EW)	TS	1	3	0	2	3	1	2	3	1	2	3	1	0.63	0.68	B	B
28	Bake Pkwy. (NS) & Toledo Wy. (EW)	TS	1	3	d	1	3	d	2	2	1	1	2	0	0.70	0.59	B	A
29	Bake Pkwy. (NS) & Jeronimo Rd. (EW)	TS	1	3	d	1	3	d	2	2	1	1	2	0	**0.94**	0.77	**E**	C
30	Bake Pkwy. (NS) & Muirlands Bl. (EW)	TS	2	4	1>>	2	4	1>>	2	2	1>>	2	2	1>>	0.56	0.67	A	B
31	Bake Pkwy. (NS) & Rockfield Bl. (EW)	TS	2	4	1>>	2	4	1	1	2	1>>	2	2	1>>	0.56	0.68	A	B
32	Bake Pkwy. (NS) & I-5 NB Ramps (EW)	TS	0	3	1>>	0	3	1>>	0	0	0	1.5	0	1.5	0.84	0.67	D	B
33	Bake Pkwy. (NS) & I-5 SB Ramps (EW)	TS	0	3	0	0	3	1>>	3	0	1	0	0	0	0.67	0.73	B	C
34	Lake Forest Dr. (NS) & Trabuco Rd. (EW)	TS	2	3	1	2	3	0	2	3	1	2	3	1	0.59	0.67	A	B
35	Lake Forest Dr. (NS) & Serrano Rd. (EW)	TS	1	3	d	1	3	d	1	1	0	1	1	0	0.54	0.53	A	A
36	El Toro Rd. (NS) & Trabuco Rd. (EW)	TS	2	3	1>	2	3	1>	2	3	0	2	3	1	0.64	0.62	B	B
37	El Toro Rd. (NS) & Serrano Rd. (EW)	TS	1	3	d	1	3	d	1	1	0	1	1	0	0.53	0.47	A	A
38	El Toro Rd. (NS) & Jeronimo Rd. (EW)	TS	1	3	1>	1	3	d	1	2	0	2	2	1	0.69	0.80	B	C

[1] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.
L = Left; T = Through; R = Right; ! = Shared Left/Through/Right Lane; d = Defacto Right Turn Lane; > = Right Turn Overlap; >> Free-Right Turn

[2] For signalized intersections, Volume/Capacity Ratio and Level of Service are presented based on the Intersection Capacity Utilization (ICU) method

[3] For the unsignalized intersection of Bake Parkway / Orchard (#10), Delay (in seconds) and Level of Service is also calculated using Synchro 10 analysis software based on the Highway Capacity Manual 6th Edition (HCM6) method.

[4] TS = Traffic Signal; Cross-Street Stop

R:\UXRjobs_10600-11000\10820\Excel\[10820-05 - Report.xlsx]4-1

5 PROJECTED-RELATED FUTURE TRAFFIC

This section presents the traffic volumes estimated to be generated by the Project, as well as the Project's trip assignment onto the study area roadway network. The Nakase Property Project is proposed to be served by three access points: two at Bake Parkway, and one at Rancho Parkway.

5.1 PROJECT TRIP GENERATION

Trip generation represents the amount of traffic which is both attracted to and produced by a development. Determining traffic generation for a specific project is therefore based upon forecasting the amount of traffic that is expected to be both attracted to and produced by the specific land uses being proposed for a given development. The Nakase Property is currently designated in the City of Lake Forest General Plan for approximately 1,841,700 square feet of business park use.

ITE-based trip generation rates used to estimate Project traffic and a summary of the Project's trip generation are shown in Table 5-1. The trip generation rates are based upon data collected by the Institute of Transportation Engineers (ITE) for single family detached (ITE Land Use Code 210), senior adult housing - attached (ITE Land Use Code 252), elementary school (ITE Land Use Code 520), and neighborhood park (ITE Land Use Code 411) land uses in their *Trip Generation* manual, 10th Edition, 2017.

Table 5-1 presents the trip generation total for each project TAZ. As shown in Table 5-1, the proposed development is anticipated to generate a total of approximately 8,789 trip-ends per day with 1,202 vehicles per hour (VPH) during the AM peak hour, and 879 VPH during the PM peak hour.

Table 5-2 indicates that the Nakase Property residential and school land uses are anticipated to generate 14,122 fewer trips per day with 1,377 fewer vehicles per hour during the AM peak hour and 1,442 fewer vehicles per hour during the PM peak hour in comparison to the currently adopted City of Lake Forest General Plan business park land use for the site.

For information purposes, two sources of information regarding trip generation for the existing Nakase Nursery site are provided in Appendix 5.1. As shown in Tables 5.1 and 5.2, the existing Nakase site is estimated to generate a range of approximately 127 to 332 trip-ends per day, with between 21 and 33 vehicles per hour (VPH) during the AM peak hour, and between 33 and 44 VPH during the PM peak hour.

5.2 PROJECT TRIP DISTRIBUTION

The trip distribution patterns for the proposed Project are graphically depicted on Exhibits 5-1 through 5-7. Trip distribution patterns were determined in conjunction with the City traffic modeling consultant and City staff, during the traffic study scoping process. They are based upon the LFTAM, combined with project land use access characteristics and local knowledge of traffic patterns, and project access considerations, such as the locations of right turn in/out only driveways. The trip distributions have been developed based upon the Lake Forest Traffic Analysis Model (LFTAM), and reflect local access provisions for each of the four project TAZs. Five percent (5%) of trips are anticipated to remain internal to the Nakase Property Project site because of interactions between residential, park and school uses.

TABLE 5-1: PROJECT TRIP GENERATION SUMMARY

Project Trip Generation Rates[1]									
Land Use	ITE LU Code	Units[2]	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Elementary School	520	STU	0.36	0.31	0.67	0.08	0.09	0.17	1.89
Single Family Detached	210	DU	0.19	0.55	0.74	0.62	0.37	0.99	9.44
Senior Adult Housing - Attached	252	DU	0.07	0.13	0.20	0.14	0.12	0.26	3.70
Neighborhood Park[3]	411	AC	0.30	0.21	0.51	0.28	0.23	0.51	5.00
Central Park[3]	411	AC	1.18	0.82	2.00	1.65	1.35	3.00	30.00

Project Trip Generation Results										
TAZ	Land Use	ITE LU Code	Quantity[2]	AM Peak Hour			PM Peak Hour			Daily
				In	Out	Total	In	Out	Total	
1	Single Family Detached	210	182 DU	35	100	135	113	67	180	1,718
	Senior Adult Housing - Attached	252	101 DU	7	13	20	14	12	26	374
	Neighborhood Park	411	0.5 AC	0.2	0.1	0.3	0.1	0.1	0.3	3
	Subtotal			42	113	155	127	79	206	2,095
2	Elementary School	520	1000 STU	360	310	670	80	90	170	1,890
	Single Family Detached	210	110 DU	21	61	82	68	41	109	1,038
	Neighborhood Park	411	0.3 AC	0.1	0.1	0.2	0.1	0.1	0.2	2
	Subtotal			381	371	752	148	131	279	2,930
3	Single Family Detached	210	142 DU	27	78	105	88	53	141	1,340
	Neighborhood Park	411	0.4 AC	0.1	0.1	0.2	0.1	0.1	0.2	2
	Central Park	411	4.8 AC	6	4	10	8	6	14	144
	Subtotal			33	82	115	96	59	155	1,486
4	Single Family Detached	210	241 DU	46	133	179	149	89	238	2,275
	Neighborhood Park	411	0.6 AC	0.2	0.1	0.3	0.2	0.1	0.3	3
	Subtotal			46	133	179	149	89	238	2,278
Total Project Trips				**503**	**699**	**1,202**	**521**	**358**	**879**	**8,789**

[1] Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, 10th Edition (2017).

[2] DU = Dwelling Unit, STU = Students; AC = Acres

[3] Derivation of Park Rates:

	AM	PM	Daily
ITE 411 Rates Range	0.00 - 4.50	0.05 - 3.50	0.55-34.0
Neighborhood Park Rate	0.5	0.5	5
Central Park Rate	2	3	30

	AM		PM		Daily
	IN	OUT	IN	OUT	
Peak Directionality	59%	41%	55%	45%	
Neighborhood Park Rate	0.3	0.21	0.28	0.23	5
Central Park Rate	1.18	0.82	1.65	1.35	30

R:\UXRjobs_10600-11000\10820\Excel\[10820-05 - Report (20180516).xlsx]5-1

TABLE 5-2: TRIP GENERATION COMPARISON BETWEEN THE GENERAL PLAN LAND USE DESIGNATION FOR THE SITE AND THE NAKASE PROPERTY AREA PLAN

Trip Generation Rates (Approved GP Land Use)[1]									
			AM Peak Hour			PM Peak Hour			
Land Use	ITE LU Code	Quantity[2]	In	Out	Total	In	Out	Total	Daily
Business Park	770	1841.72 TSF	1.19	0.21	1.40	0.33	0.93	1.26	12.44

Trip Generation, General Plan Land Use Designation for the Site									
Business Park	770	1841.72 TSF	2,192	387	2,579	608	1,713	2,321	22,911
TOTAL			**2,192**	**387**	**2,579**	**608**	**1,713**	**2,321**	**22,911**

Trip Generation Comparison							
	AM Peak Hour			PM Peak Hour			
Land Use	In	Out	Total	In	Out	Total	Daily
Project Draft Area Plan	503	699	1,202	521	358	879	8,789
General Plan Land Use Designation for the Site	2,192	387	2,579	608	1,713	2,321	22,911
Delta (Project Draft Area Plan - General Plan)	**-1,689**	**312**	**-1,377**	**-88**	**-1,355**	**-1,442**	**-14,122**

[1] Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, 10th Edition (2017).

[2] TSF = Thousand Square Feet

R:\UXRjobs_10600-11000\10820\Excel\[10820-05 - Report (20180516).xlsx]5-2

EXHIBIT 5-1: RESIDENTIAL EXTERNAL TRAFFIC PEAK HOUR DISTRIBUTION (BEYOND FOCUSED STUDY AREA)

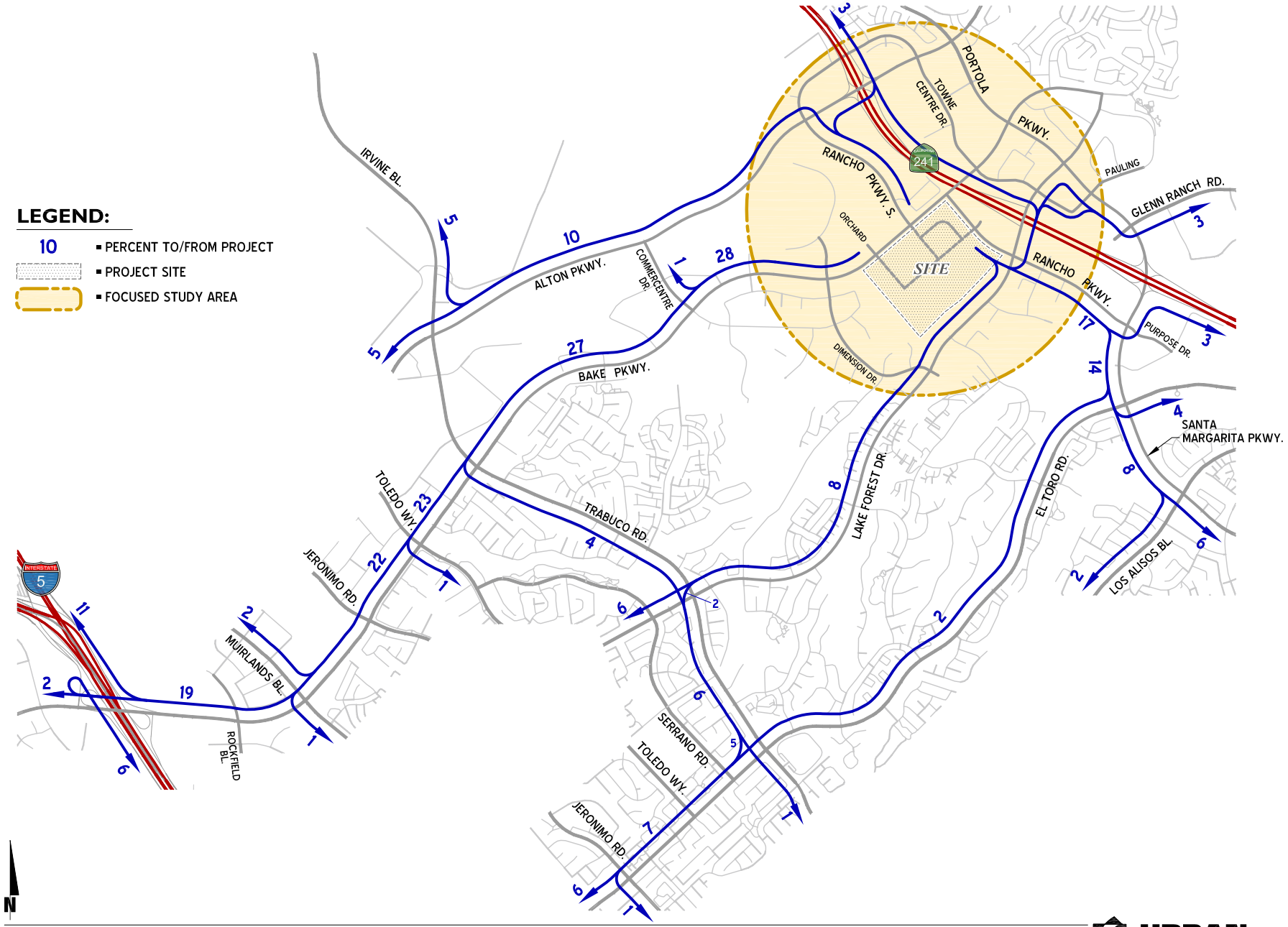


EXHIBIT 5-2: RESIDENTIAL TAZ 1 PROJECT PEAK HOUR TRIP DISTRIBUTION

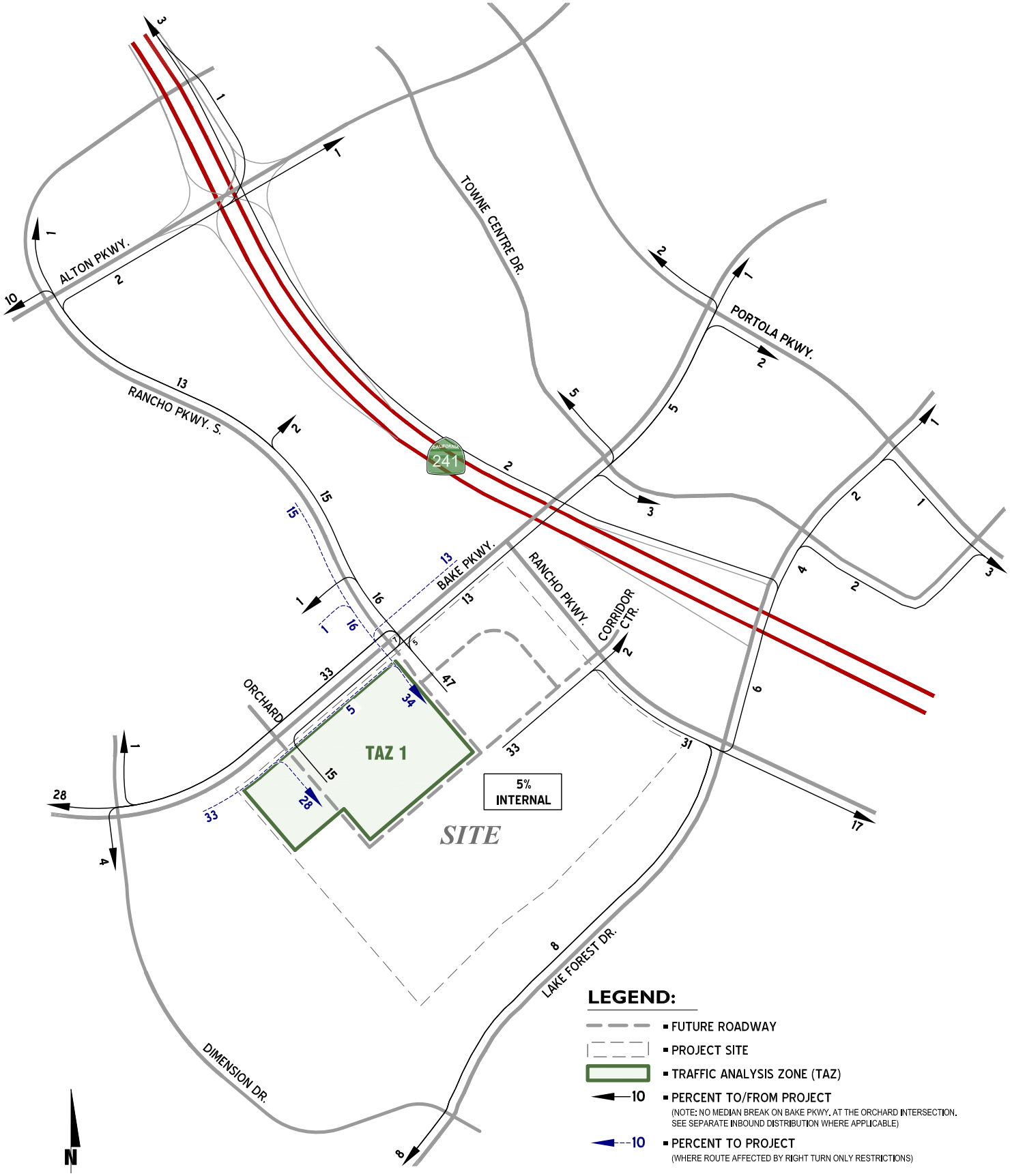


EXHIBIT 5-3: RESIDENTIAL TAZ 2 PROJECT PEAK HOUR TRIP DISTRIBUTION

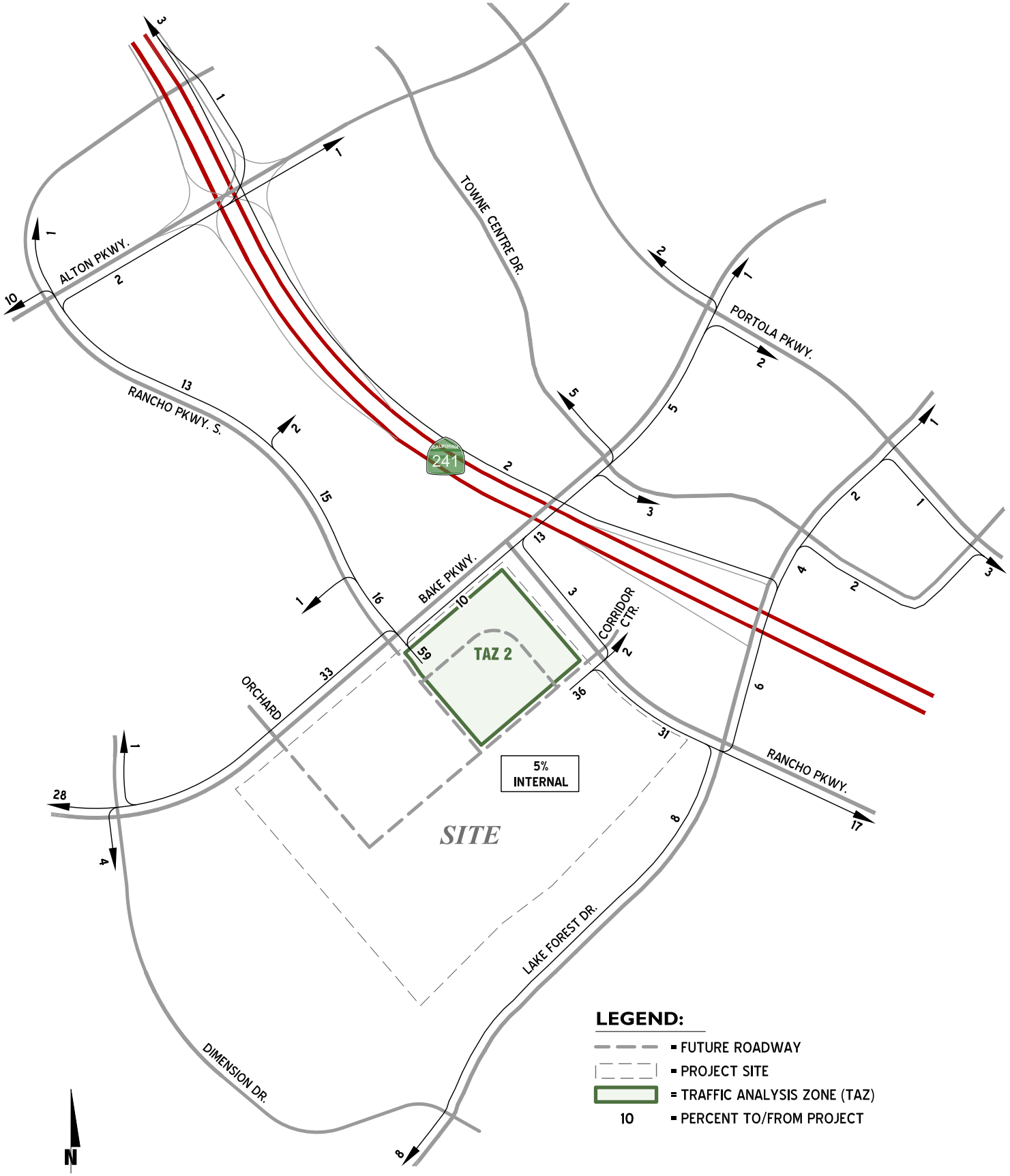


EXHIBIT 5-4: RESIDENTIAL TAZ 3 PROJECT PEAK HOUR TRIP DISTRIBUTION

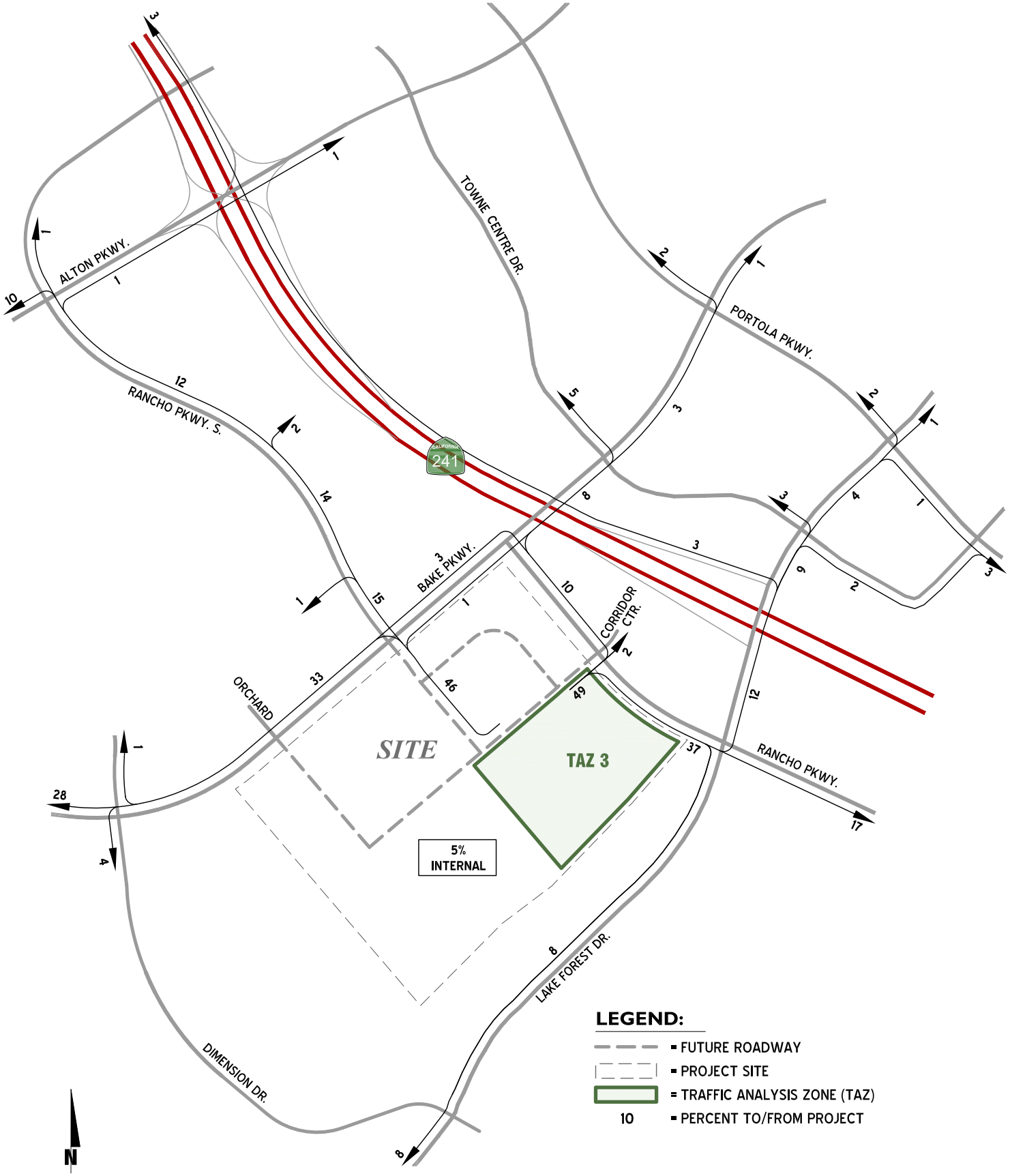


EXHIBIT 5-5: RESIDENTIAL TAZ 4 PROJECT PEAK HOUR TRIP DISTRIBUTION

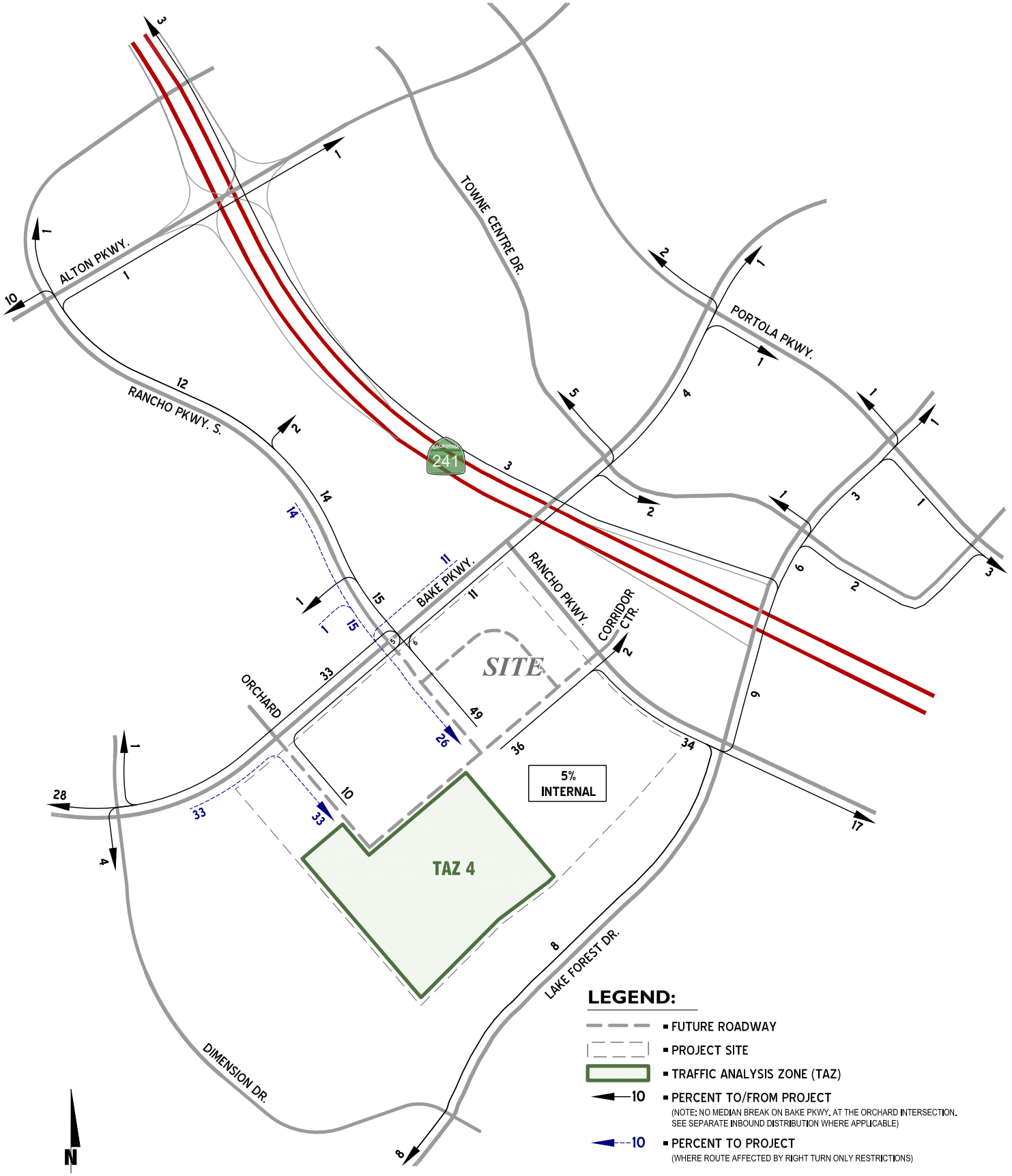


EXHIBIT 5-6: SCHOOL EXTERNAL TRAFFIC PEAK HOUR DISTRIBUTION (BEYOND FOCUSED STUDY AREA)

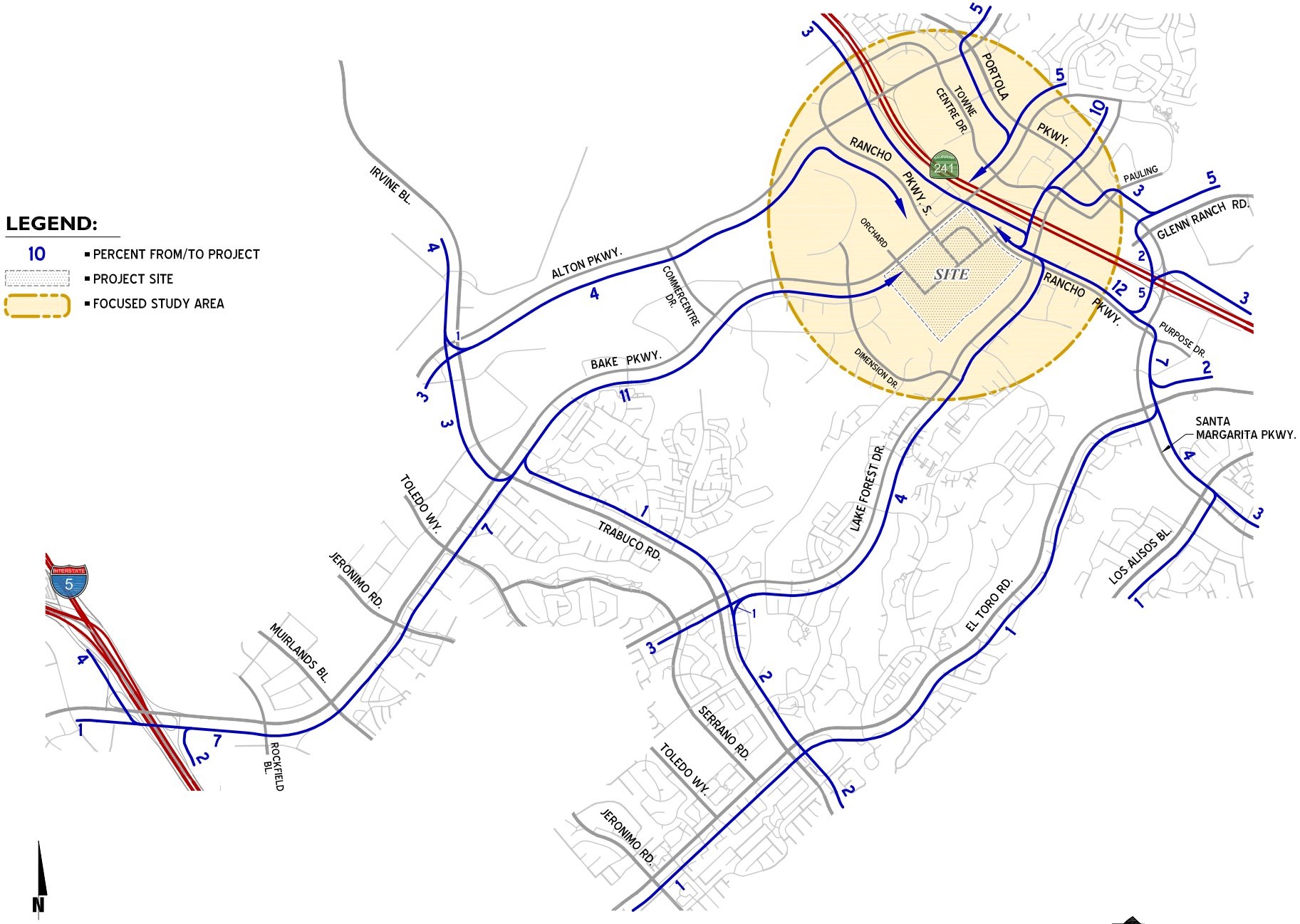
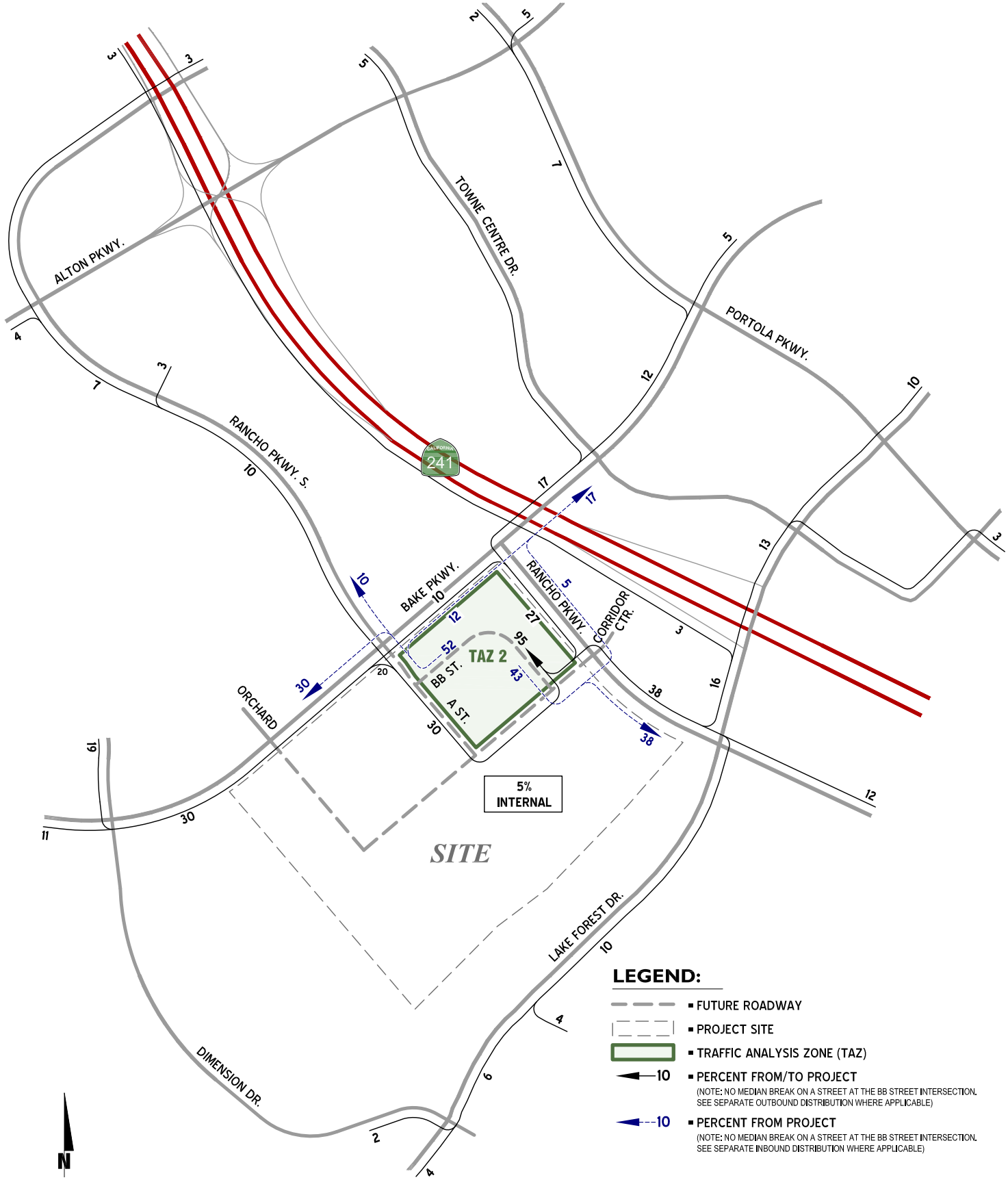


EXHIBIT 5-7: SCHOOL TAZ 2 PROJECT PEAK HOUR TRIP DISTRIBUTION



5.3 MODAL SPLIT

Although the use of public transit, walking, and/or bicycling have the potential to reduce Project-related traffic, such reductions have not been taken into considerations in this traffic study in order to provide a conservative analysis of the Project's potential to contribute to circulation system deficiencies.

5.4 TRIP ASSIGNMENT

The assignment of traffic from the Project area to the adjoining roadway system is based upon the Project trip generation, trip distribution, and the arterial highway and local street system improvements that would be in place by the time of initial occupancy of the Project. Based on the identified Project traffic generation and trip distribution patterns, Project traffic volumes are shown on Exhibits 5-8 through 5-13.

5.5 CONSTRUCTION TRAFFIC

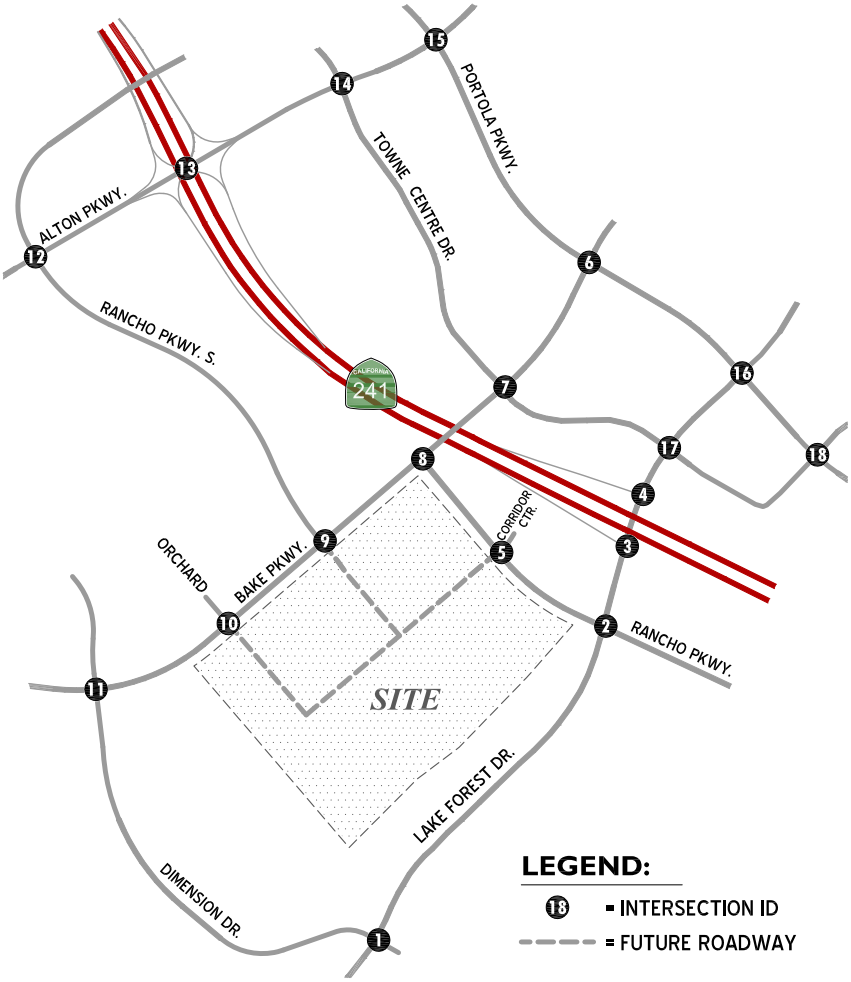
Estimates of the duration and amount of construction activity and associated equipment are provided below. The site-specific construction fleet will vary due to actual construction needs. The duration of construction activity and quantity of materials is based on information provided by the Project applicant, Toll Brothers. Construction traffic is generally documented in terms of "trips per day", which includes two trip-ends per vehicle - one inbound trip-end (arrival at site), and one outbound trip-end (departure from site) - on a typical weekday.

5.5.1 DEMOLITION AND GRADING

The project site is currently developed with a 1,744 square foot (80.22 tons) structure which will be demolished prior to construction. The project site will reportedly require the demolition of approximately 2,848 tons of asphalt and 1,161 tons of concrete. The total amount of demolished material that is expected for the Project is approximately 4,089 tons of debris. Trip quantities which involve transport of materials are based on the assumption that a truck can haul 20 tons (16 cubic yards) of material per load and assumes that one haul truck exporting material will also have an inbound trip. Over a 66-day period, the Project demolition activity therefore equates to approximately 3 trucks daily (for a total of 6 hauling trips per day) and 15 worker trips per day.

Although the project is designed to balance on site, there is a potential for up to approximately 150,000 CY of exports due to irregularities in the remedial shrinkage factors during grading as well as the uncertainties of the quantity of excess spoils generated from retaining walls, infrastructure, and homebuilding activities post grading operation. Hauling trips are based on the assumption that a truck can haul 20 tons (16 cubic yards) of material per load and assumes that one haul truck exporting material will also have an inbound trip, as noted above. As such, the Project is expected to generate 18,750 hauling trips in order to export 150,000 cubic yards of soil. This potential grading activity equates to approximately 70 hauling trips per day and 20 worker trips per day over a 269-day period. Soil export activity will not be permitted during peak commute hours of 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM.

EXHIBIT 5-8: PROJECT ONLY FOCUSED ANALYSIS AREA
AM PEAK HOUR INTERSECTION VOLUMES



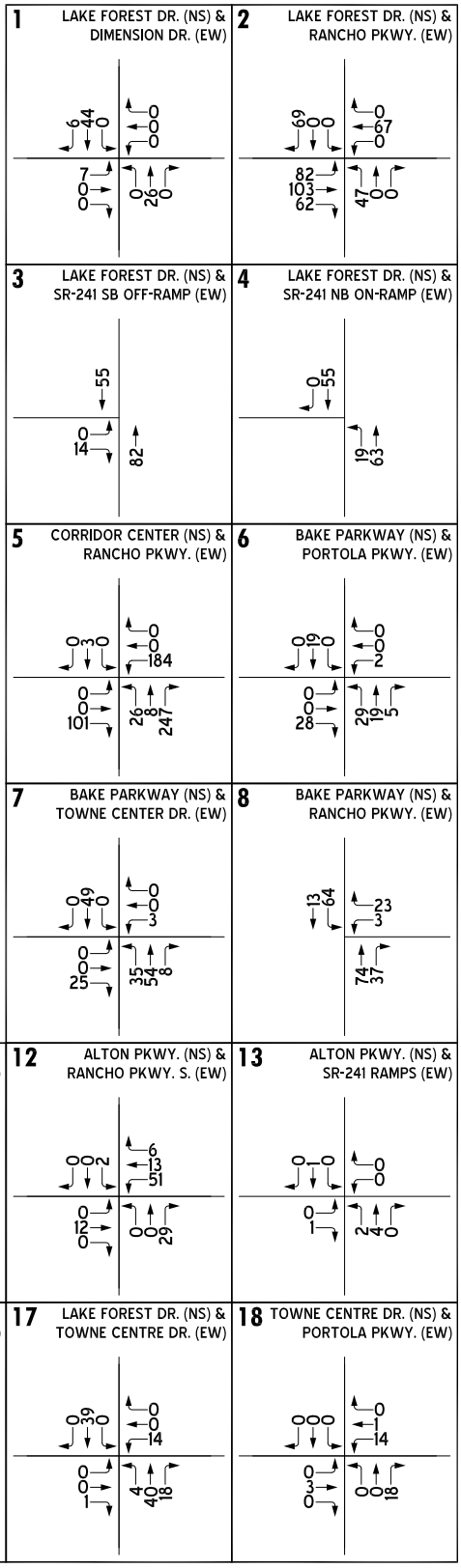
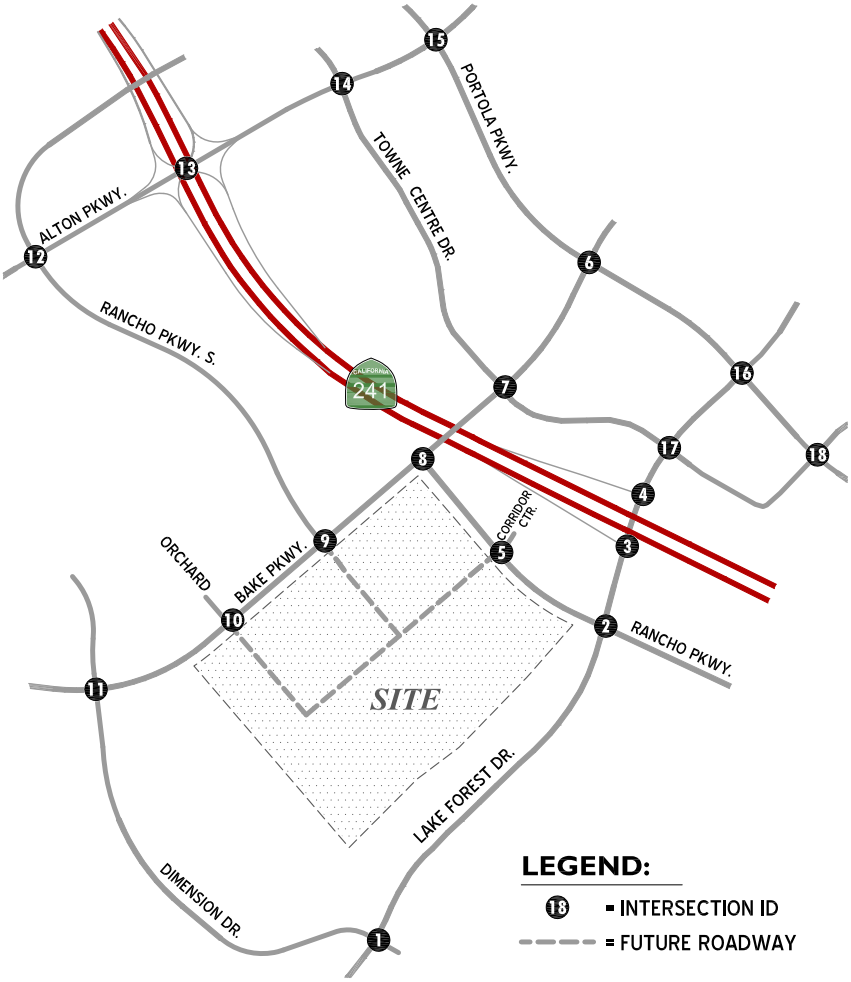
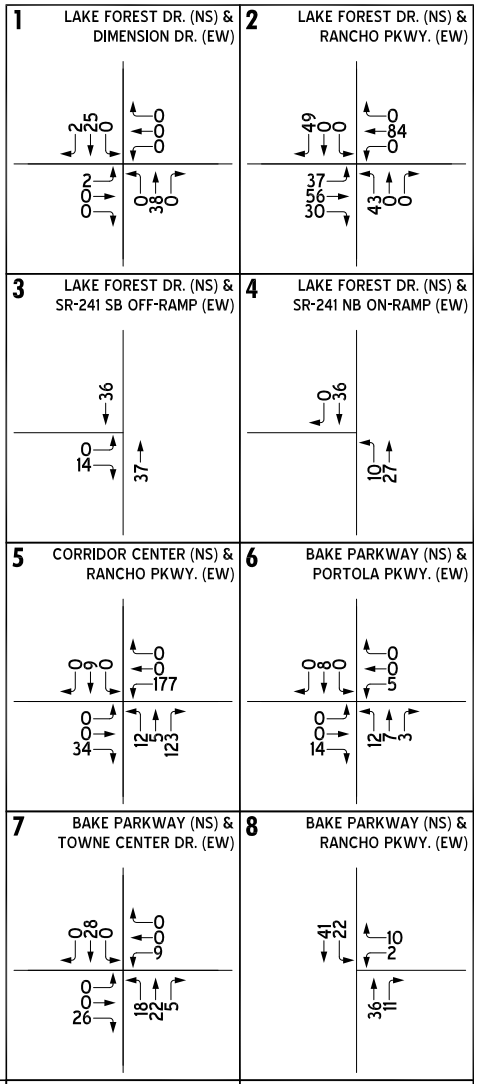


EXHIBIT 5-9: PROJECT ONLY FOCUSED ANALYSIS AREA
PM PEAK HOUR INTERSECTION VOLUMES





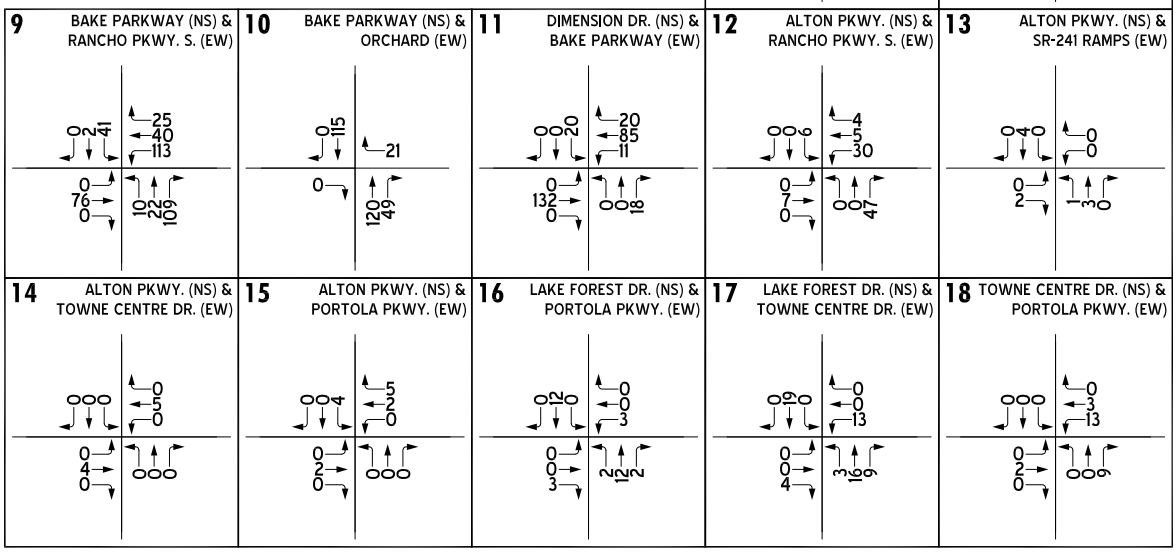


EXHIBIT 5-10: PROJECT ONLY EXPANDED AREA
AM PEAK HOUR INTERSECTION VOLUMES

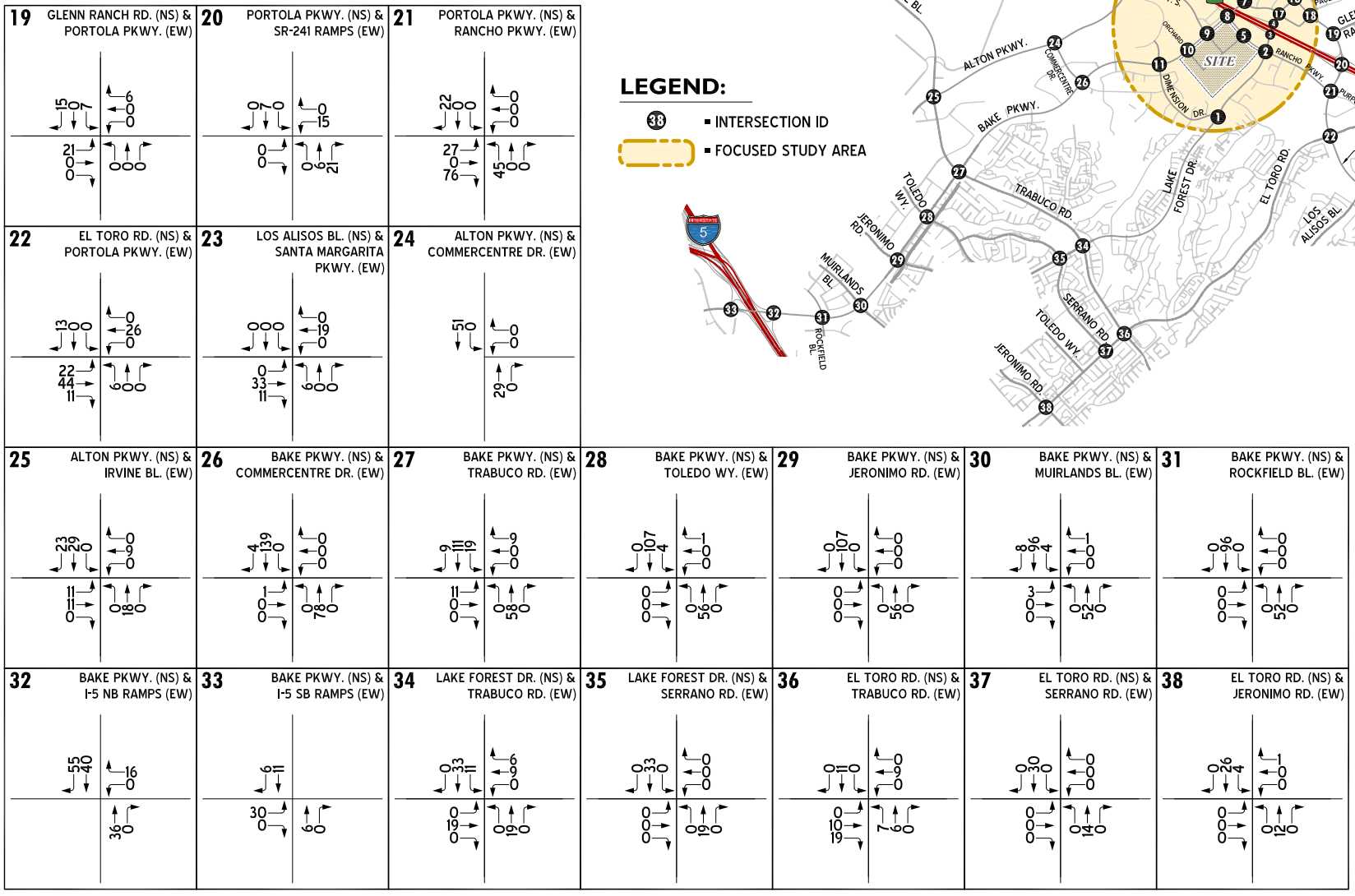


EXHIBIT 5-11: PROJECT ONLY EXPANDED AREA
PM PEAK HOUR INTERSECTION VOLUMES

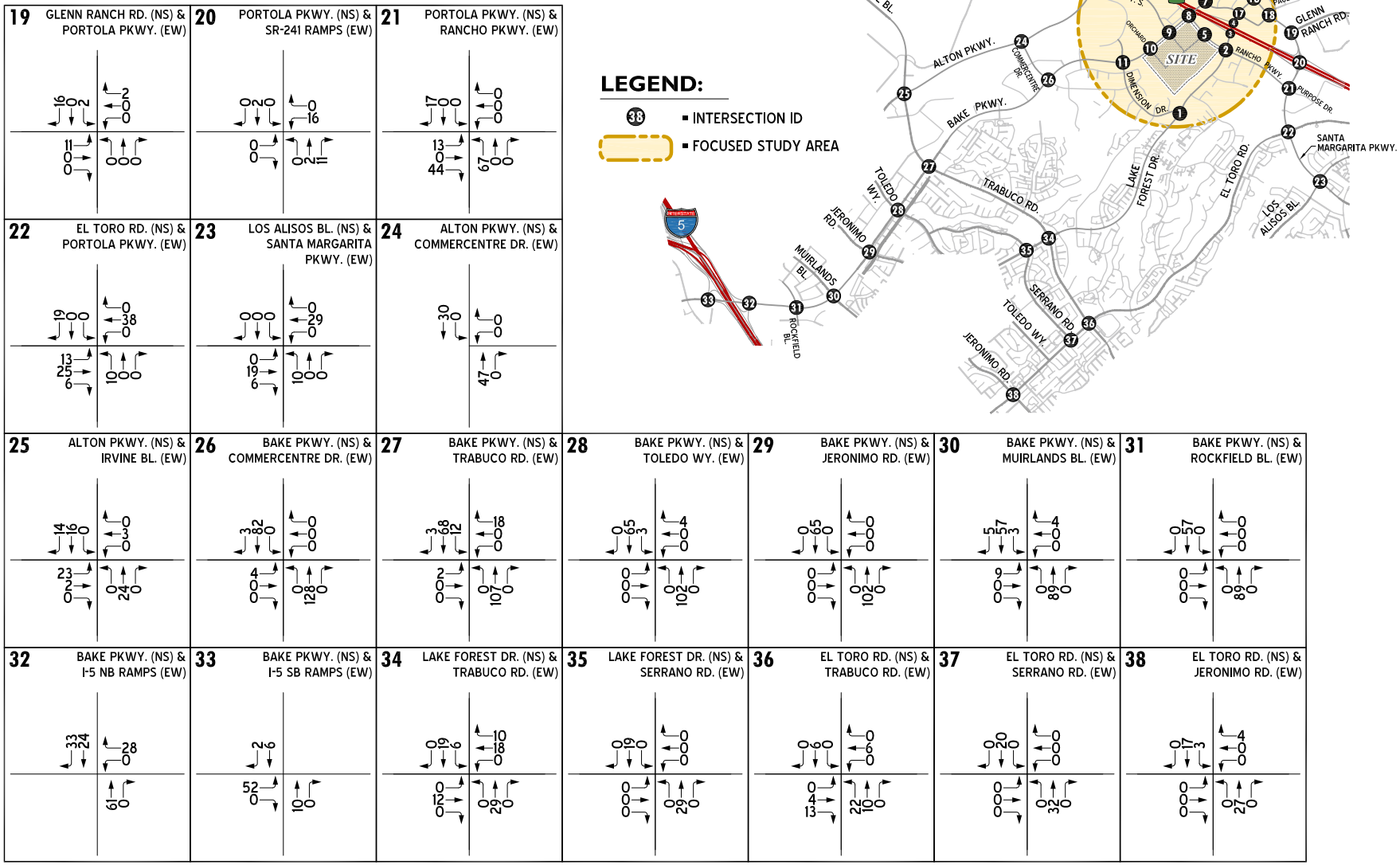


EXHIBIT 5-12: PROJECT ONLY FOCUSED ANALYSIS AREA
AVERAGE DAILY TRAFFIC (ADT)

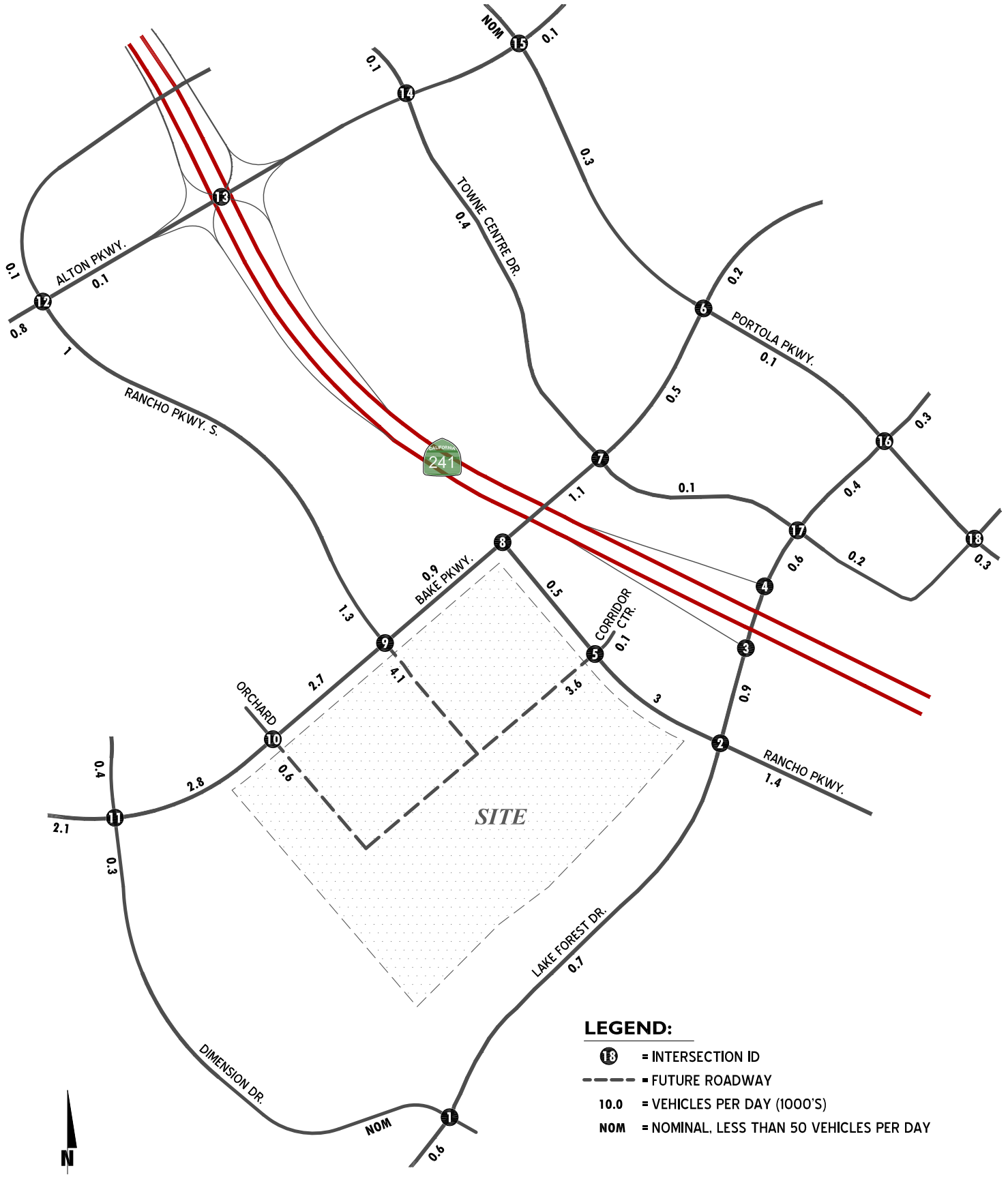
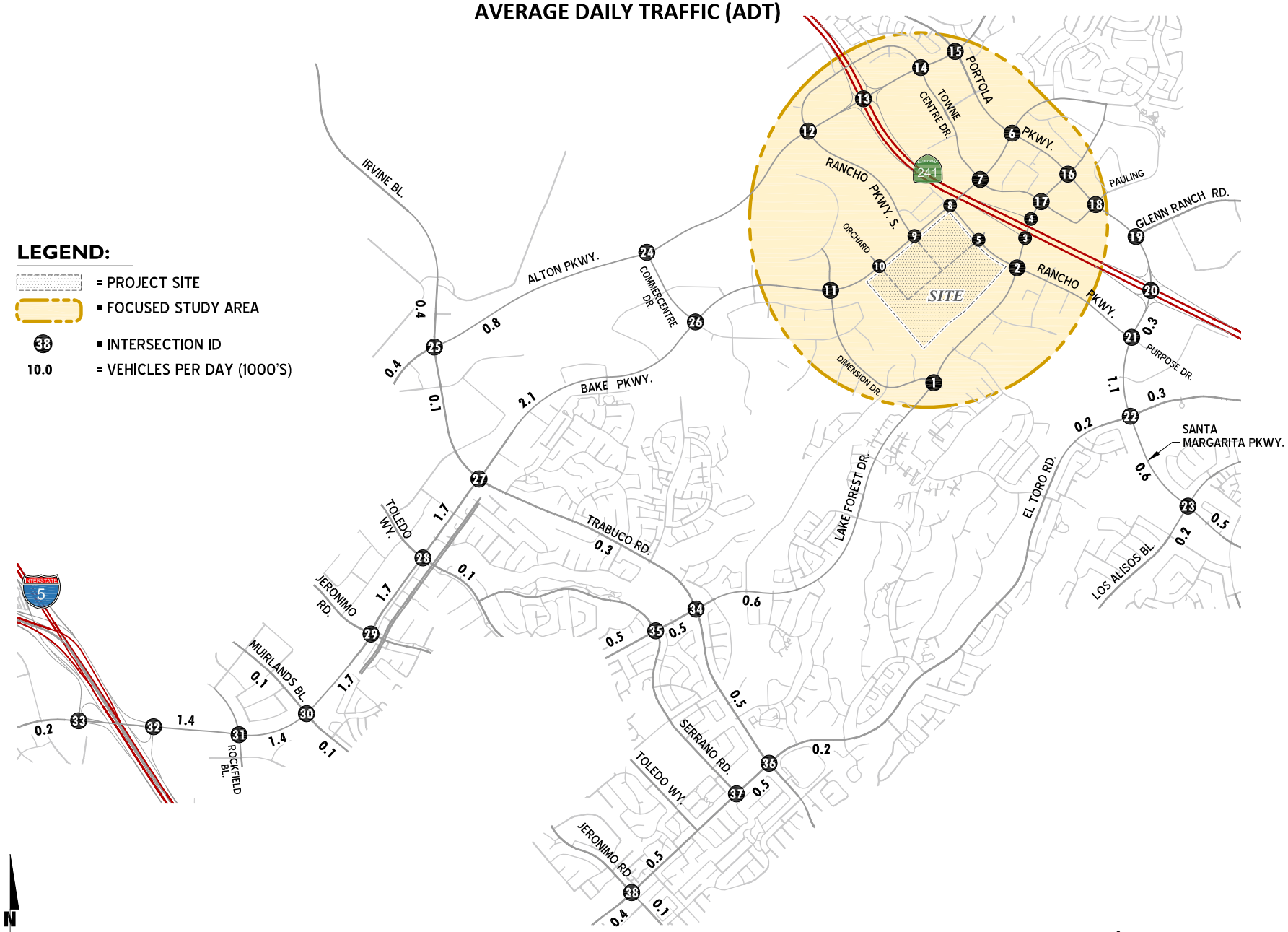


EXHIBIT 5-13: PROJECT ONLY EXPANDED AREA
AVERAGE DAILY TRAFFIC (ADT)



5.5.2 INFRASTRUCTURE, BUILDING CONSTRUCTION, AND ARCHITECTURAL COATING

Heavy equipment will be delivered and removed from the site throughout the infrastructure, building construction, and architectural coating phases. Heavy equipment to be utilized on-site during construction include, but is not limited to: cement trucks, water trucks, excavators, rubber tired dozers, graders, scrapers, tractors/loaders/backhoes, rollers, pavers, cranes, and forklifts. As most heavy equipment is typically not an authorized vehicle to be driven on a public roadway, most of the equipment will be delivered and removed from the site via large flatbed trucks.

It is anticipated that delivery of heavy equipment would not occur on a daily basis, but rather periodically throughout the construction phase based on need.

The infrastructure, building construction, and architectural coating activity equates to approximately 143 medium duty truck trips per day, 143 heavy duty truck trips per day, and 1,034 worker trips per day over a 1,001-day period. The delivery and removal of heavy equipment is recommended to occur outside of the morning and evening peak hours in order to have nominal impacts to traffic and circulation near the vicinity of the Project. With time-of-day restrictions, it is anticipated that traffic impacts associated with the delivery and removal of heavy equipment are less than significant.

Construction employee trips are estimated based on the number of employees anticipated to be on-site throughout the various stages of construction. Each employee is assumed to drive to and from the construction site each day. It has been assumed that employees will arrive up to 30 minutes prior to the workday and will leave up to 30 minutes after the workday ends. Initially, parking for employees and non-employee vehicles can be accommodated on-site near the construction staging area. Once the on-site roadway network is constructed, employee parking can be accommodated on-site.

It is anticipated that the majority of construction employees would arrive between 6:00 and 7:00 AM, and depart between 3:30 and 4:30 PM. The potential impacts resulting from construction-related parking and employee trips are considered less than significant during the peak hours.

5.5.3 CONSTRUCTION TRAFFIC MITIGATION

In summary, the most intense level of traffic activity generated by the Project construction phases is estimated to occur in conjunction with infrastructure, building construction, and architectural coating. In comparison to a single car, a truck affects roadway operations based upon several variables (such as headway, speed, density). In order to account for these effects, truck volume is converted to passenger car equivalent (PCE), to represent traffic-flow. The Project construction activities associated with infrastructure, building construction, and architectural coating could amount to the following amounts of daily travel:

INFRASTRUCTURE, BUILDING CONSTRUCTION, AND ARCHITECTURAL COATING

Trip Category	Daily Vehicle Trips	PCE Factor	PCE Daily Trips
Medium Truck	143	2	286
Heavy Truck	143	3	429
Worker	1,034	1	1,034
Total	**1,320**		**1,749**

These estimated daily construction traffic levels exceed the traffic generated by the existing nursery which ranges from 127 to 332 trip-ends per day. However, traffic operations during the proposed construction phases of the Project (including vehicle trips associated with construction employees, export of soil, import of construction materials, etc.) are anticipated to occur during off-peak periods. If construction activity were to occur outside of normal off-peak construction hours, study area intersections may potentially be impacted by worker and trucks during the various construction phases.

The following mitigation measures would ensure that construction traffic impacts at the study area intersections would be less than significant for the morning and evening peak periods (7:00 AM – 9:00 AM and 4:00 PM – 6:00 PM):

- The Project Applicant will be required to develop and implement a City-approved Construction Traffic Management Plan addressing potential construction-related traffic detours and disruptions. In general, the Construction Traffic Management Plan would ensure that to the extent practical, construction traffic would access the Project site during off-peak hours or limited access during the peak hours; and that construction traffic would be routed to avoid travel through, or proximate to, sensitive land uses.
- The delivery and removal of heavy equipment is recommended to eliminate any heavy truck activity during the morning and evening peak periods (7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM) in order to have nominal impacts to traffic and circulation near the vicinity of the Project.
- During the site grading, soil export activity from the Project site will not be permitted during the hours of 7:00 AM – 9:00 AM (morning peak period) and 4:00 PM – 6:00 PM (evening peak period).

This Page Intentionally Left Blank

6 NEAR TERM CONDITIONS TRAFFIC ANALYSIS

This section discusses the results of the near-term (Existing Plus Project or Interim Year) ICU and HCM intersection analysis results. This section also identifies any potentially significant near term traffic impacts to the study area intersections.

6.1 E+P CONDITIONS

This section analyzes the impacts on existing traffic conditions of a hypothetical scenario involving occupancy of the entire Nakase Property, without surrounding development activity that includes programmed infrastructure improvements. E+P traffic volumes are shown on Exhibits 6-1 through 6-6. A comparative traffic analysis of the impacts associated with full buildout of the Nakase Property, as assessed against existing traffic conditions, is an unrealistic scenario for a project of this magnitude. The Nakase Property Project is not a near-term construction project. For traffic analysis purposes an interim year is used, which is labeled "2020" in the City traffic model datasets. However, full occupancy of the project will not occur until sometime between 2020 and 2035. Therefore, the traffic generated by the entire Nakase Property Project is not a simple addition to the existing, present day volumes.

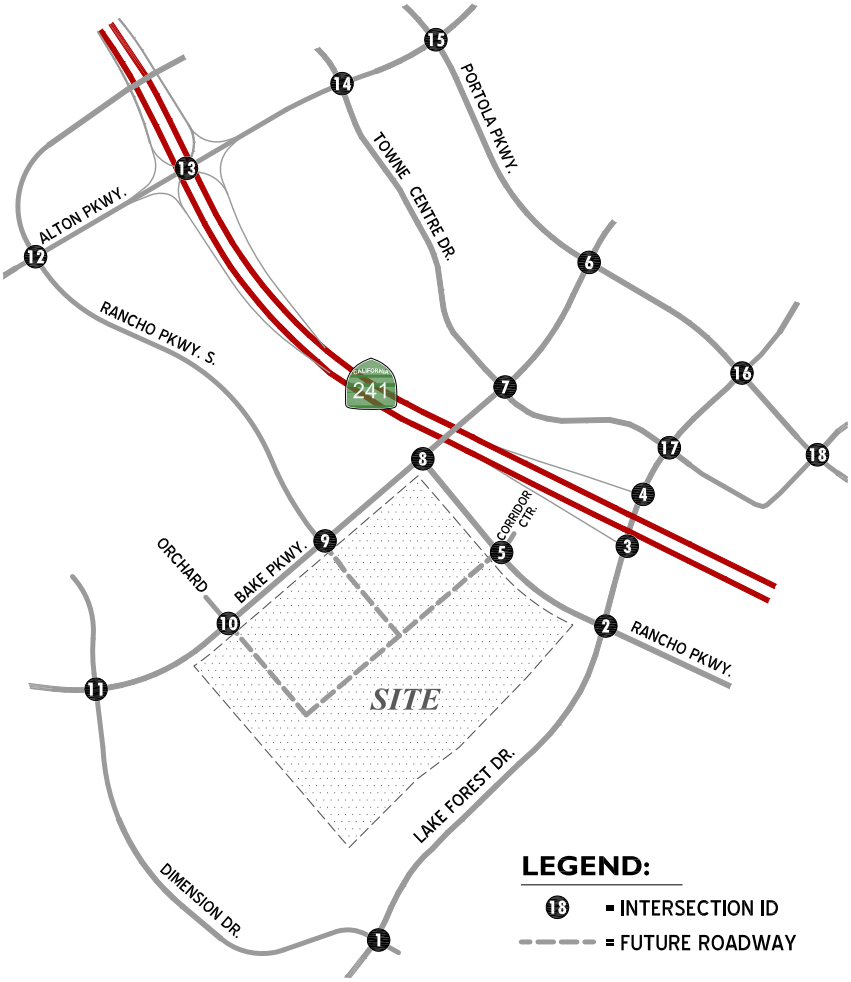
The existing-plus-project scenario does not account for other projected developments that will also be conditioned to provide for, or contribute to, needed traffic improvements to the circulation system in the study area. It also does not account for anticipated circulation system improvements in the City of Lake Forest and surrounding jurisdictions. The circulation system is projected to change over time, with or without the Nakase Property. These circulation system changes include the improvement of existing roadways through established programs such as the Lake Forest Transportation Mitigation Program, the City of Lake Forest Capital Improvement Program (CIP), and Orange County Transportation Authority (OCTA) Measure M projects.

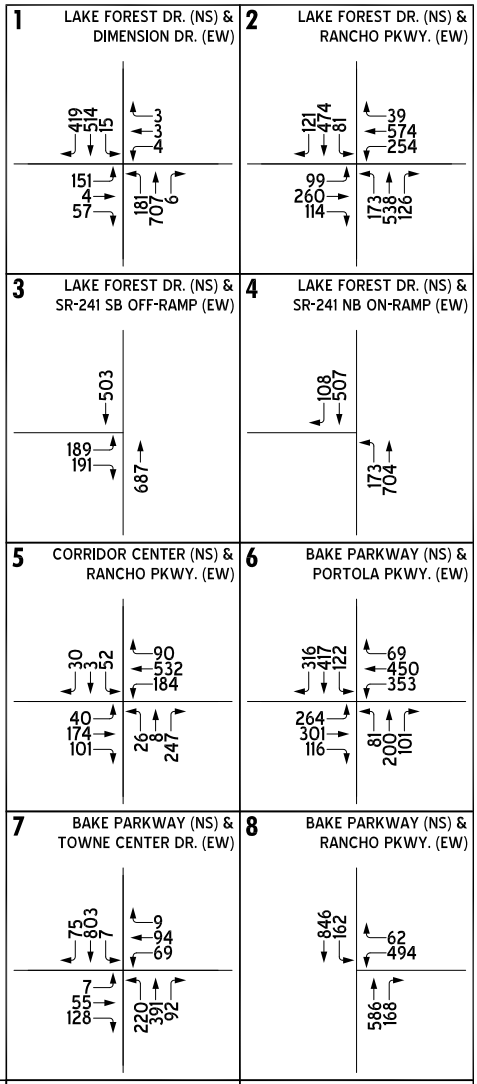
LOS calculations were conducted for the study intersections to evaluate their operations under E+P traffic conditions with existing off-site roadway and intersection geometrics. The intersection operations analysis worksheets for E+P traffic conditions are included in Appendix 4.2 of this TIA.

As discussed above, the existing conditions plus project analysis is purely hypothetical in this case due to the fact that it assumes development of the project would occur instantaneously, which is not a realistic portrayal of traffic impacts caused by the Nakase Property Project. Nonetheless, traffic forecasts were prepared for a scenario in which traffic generated by the Proposed Project is added to the existing present-day traffic conditions that were summarized in Chapter 4.0.

The intersection analysis results are summarized in Table 6-1, which indicates that the intersection of Bake Parkway & Jeronimo Road is anticipated to continue to operate at an unacceptable level of service (LOS "E" or worse) during peak hours, with the addition of Project traffic. A change in ICU value of 0.02 indicates a theoretical E+P impact at this intersection.

EXHIBIT 6-1: EXISTING PLUS PROJECT FOCUSED ANALYSIS AREA AM PEAK HOUR INTERSECTION VOLUMES





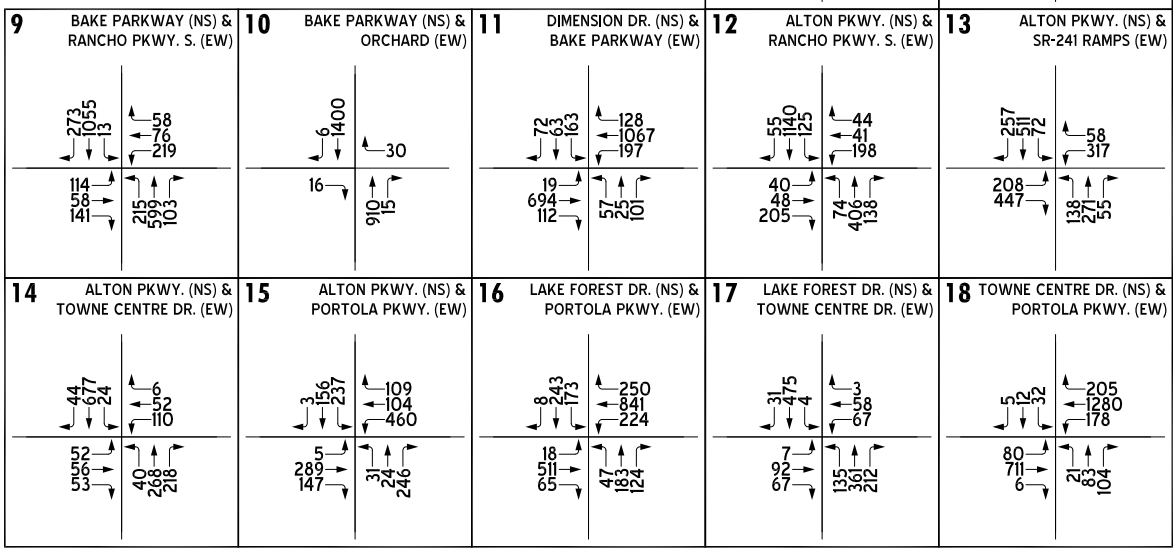
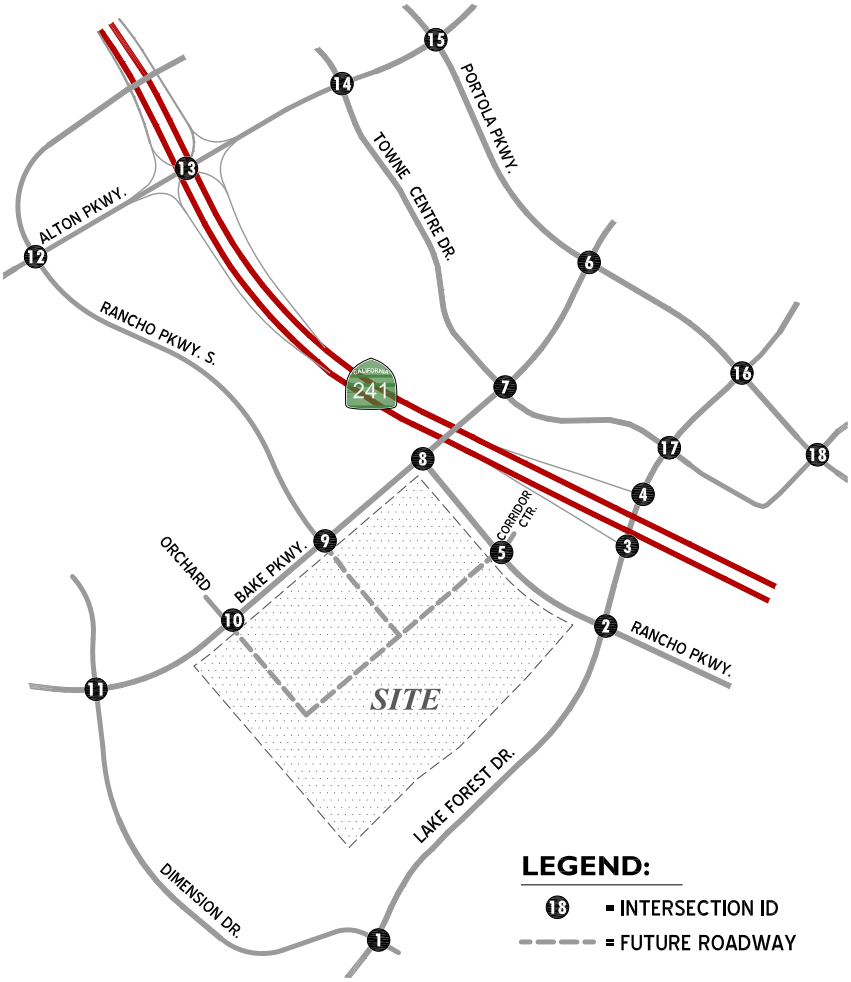
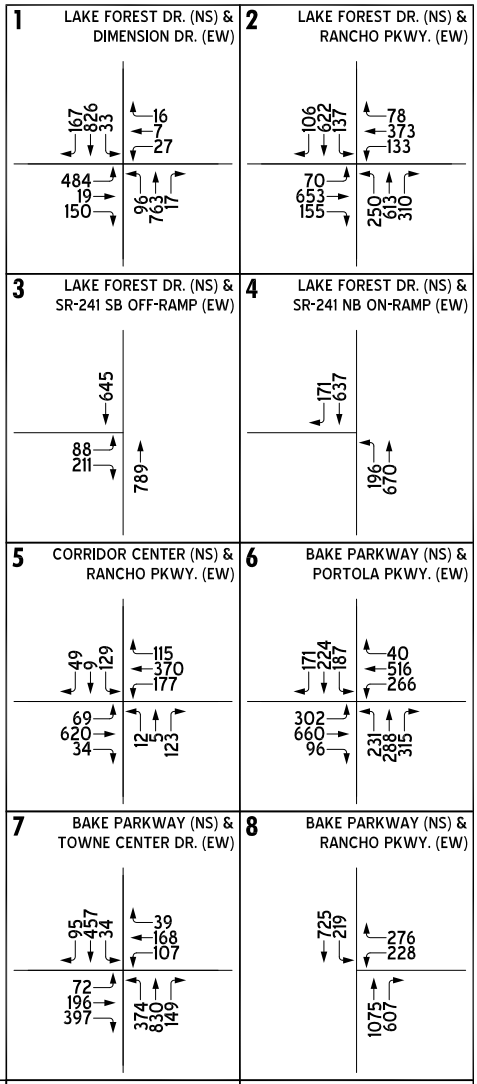


EXHIBIT 6-2: EXISTING PLUS PROJECT FOCUSED ANALYSIS AREA PM PEAK HOUR INTERSECTION VOLUMES





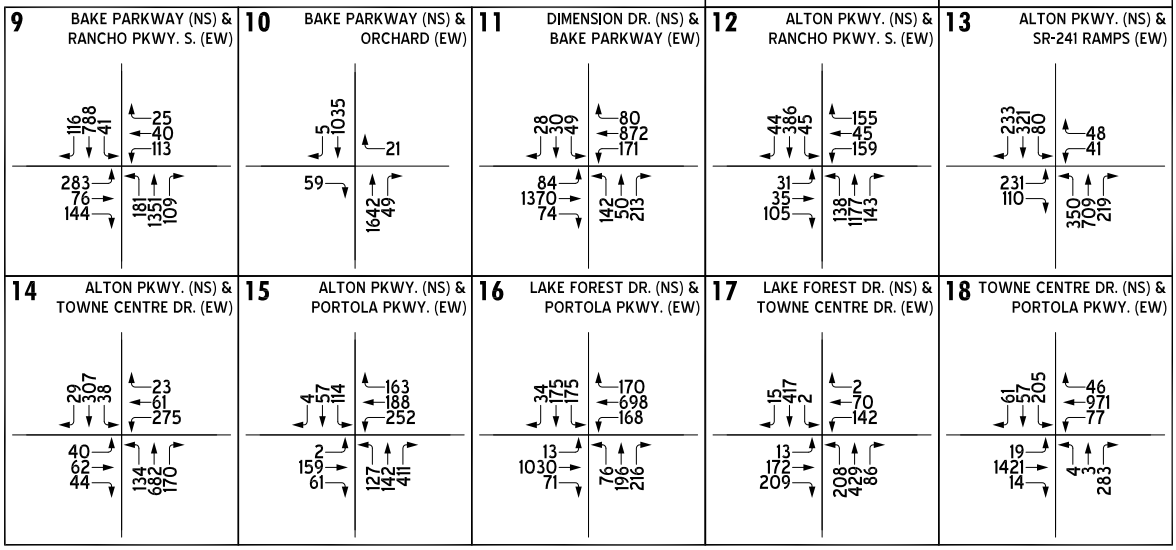
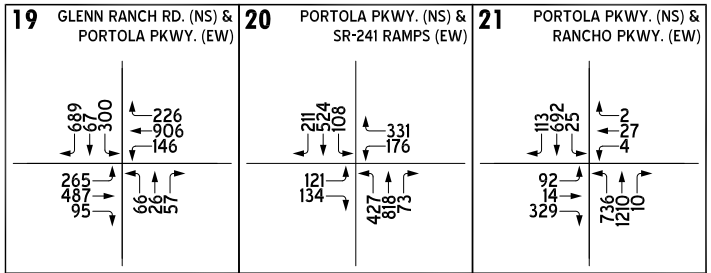
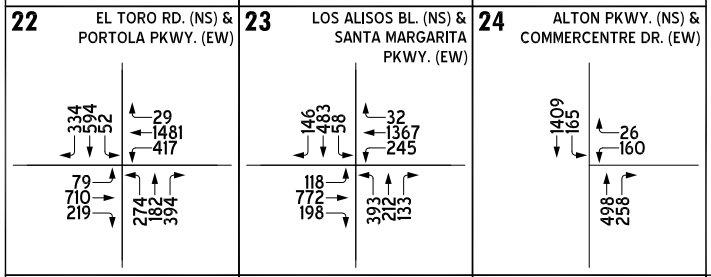
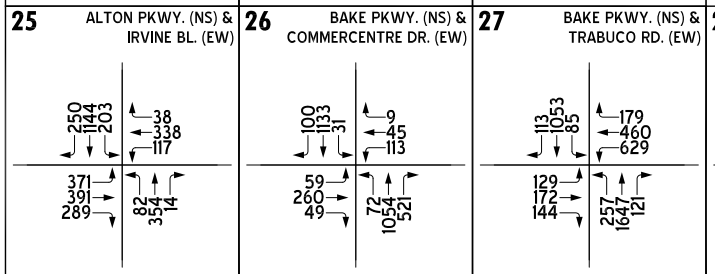
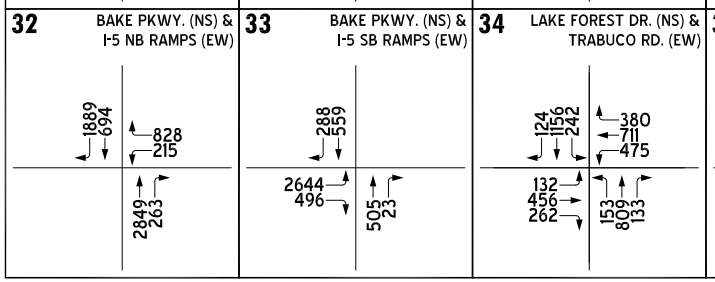


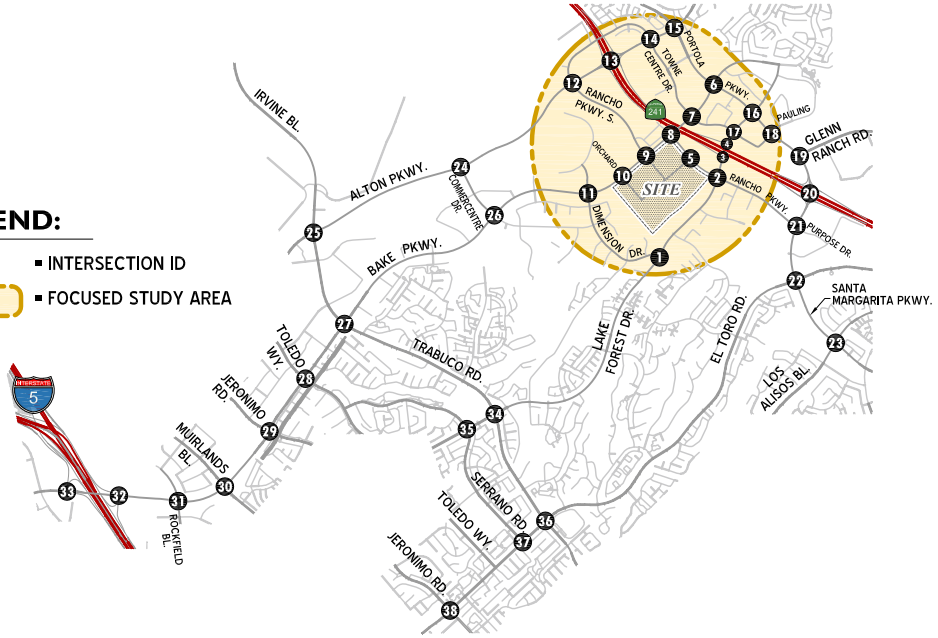
EXHIBIT 6-3: EXISTING PLUS PROJECT EXPANDED AREA
AM PEAK HOUR INTERSECTION VOLUMES











N

EXHIBIT 6-4: EXISTING PLUS PROJECT EXPANDED AREA
PM PEAK HOUR INTERSECTION VOLUMES

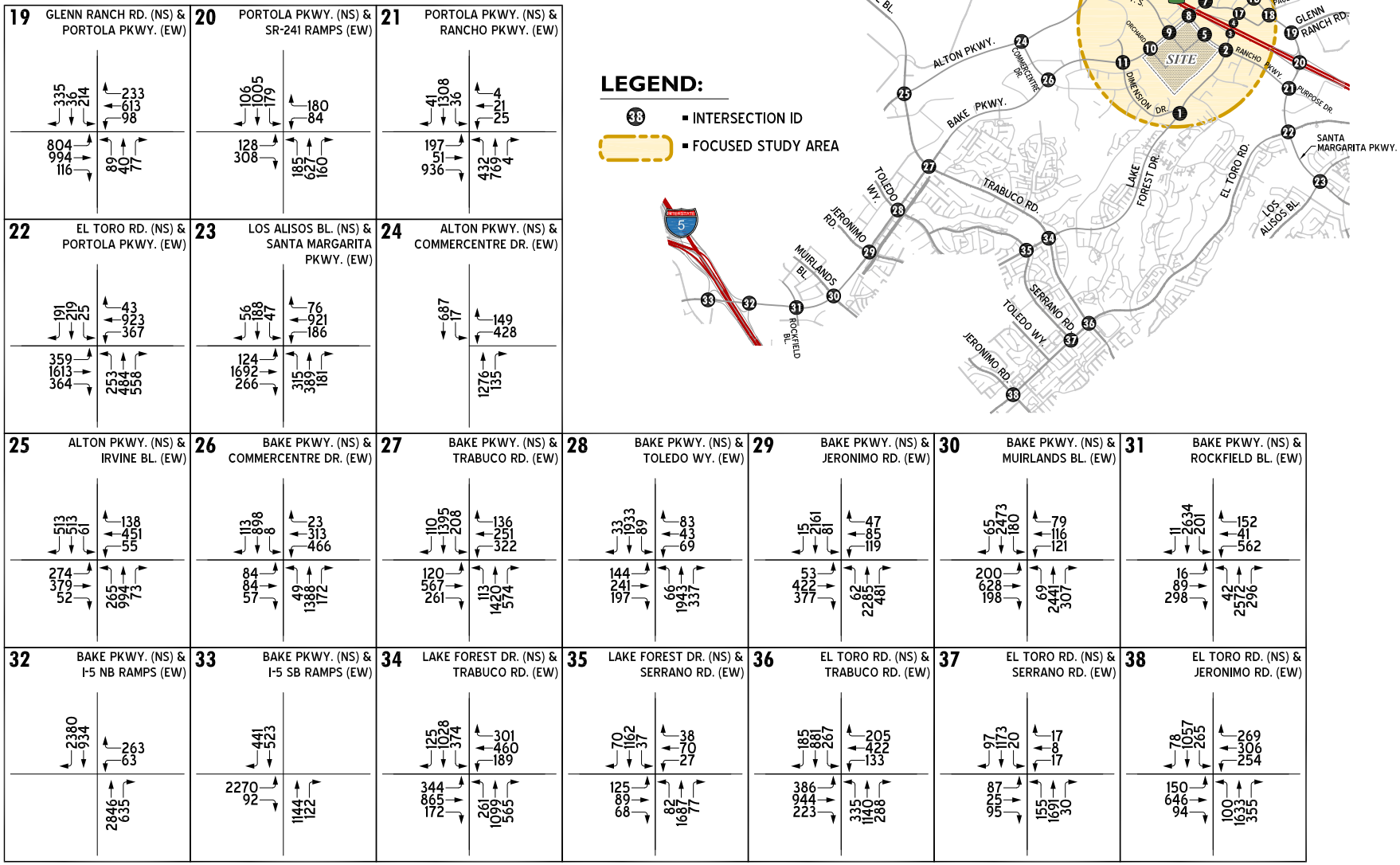


EXHIBIT 6-5: EXISTING PLUS PROJECT FOCUSED ANALYSIS AREA AVERAGE DAILY TRAFFIC (ADT)

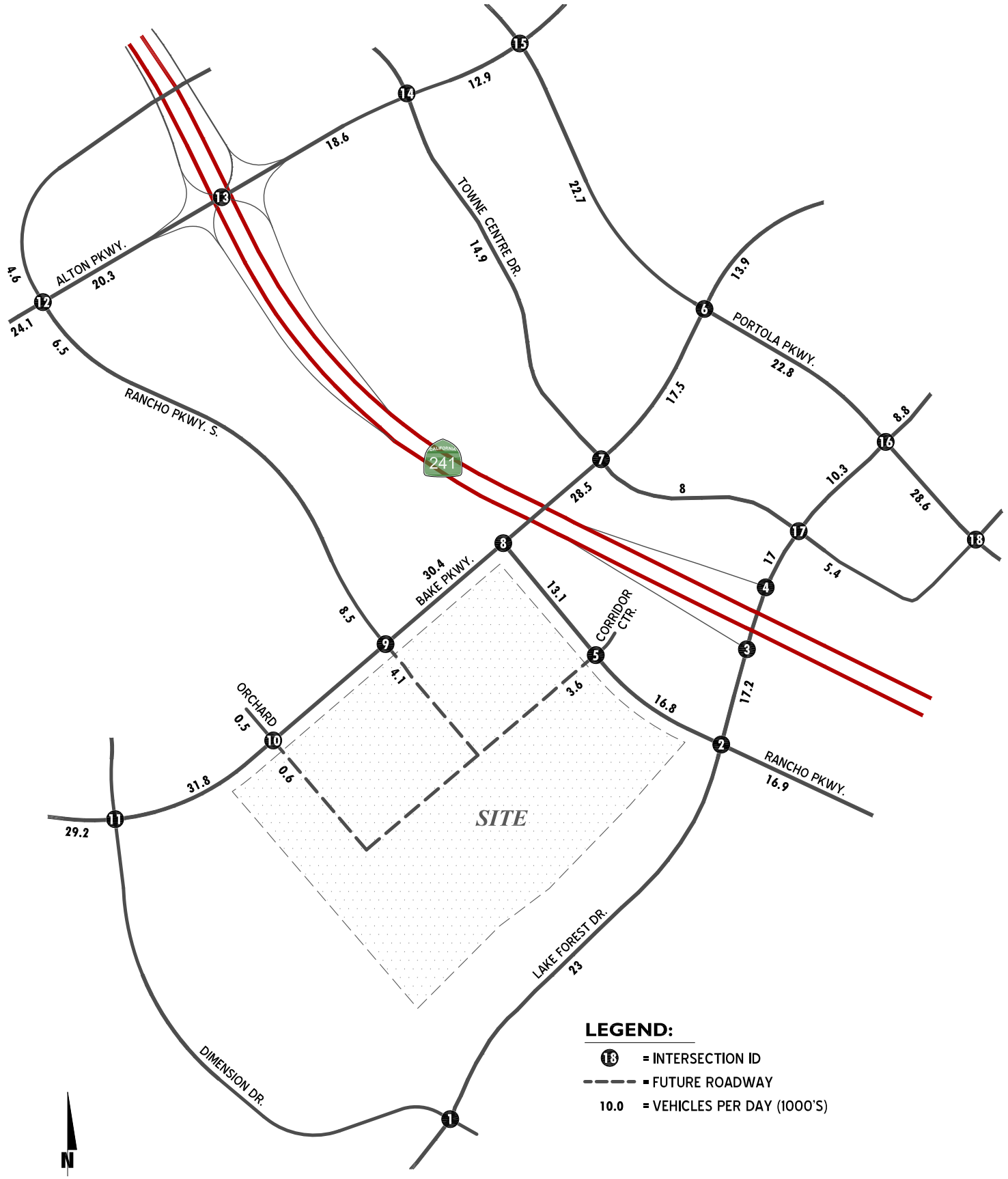


EXHIBIT 6-6: EXISTING PLUS PROJECT EXPANDED AREA AVERAGE DAILY TRAFFIC (ADT)

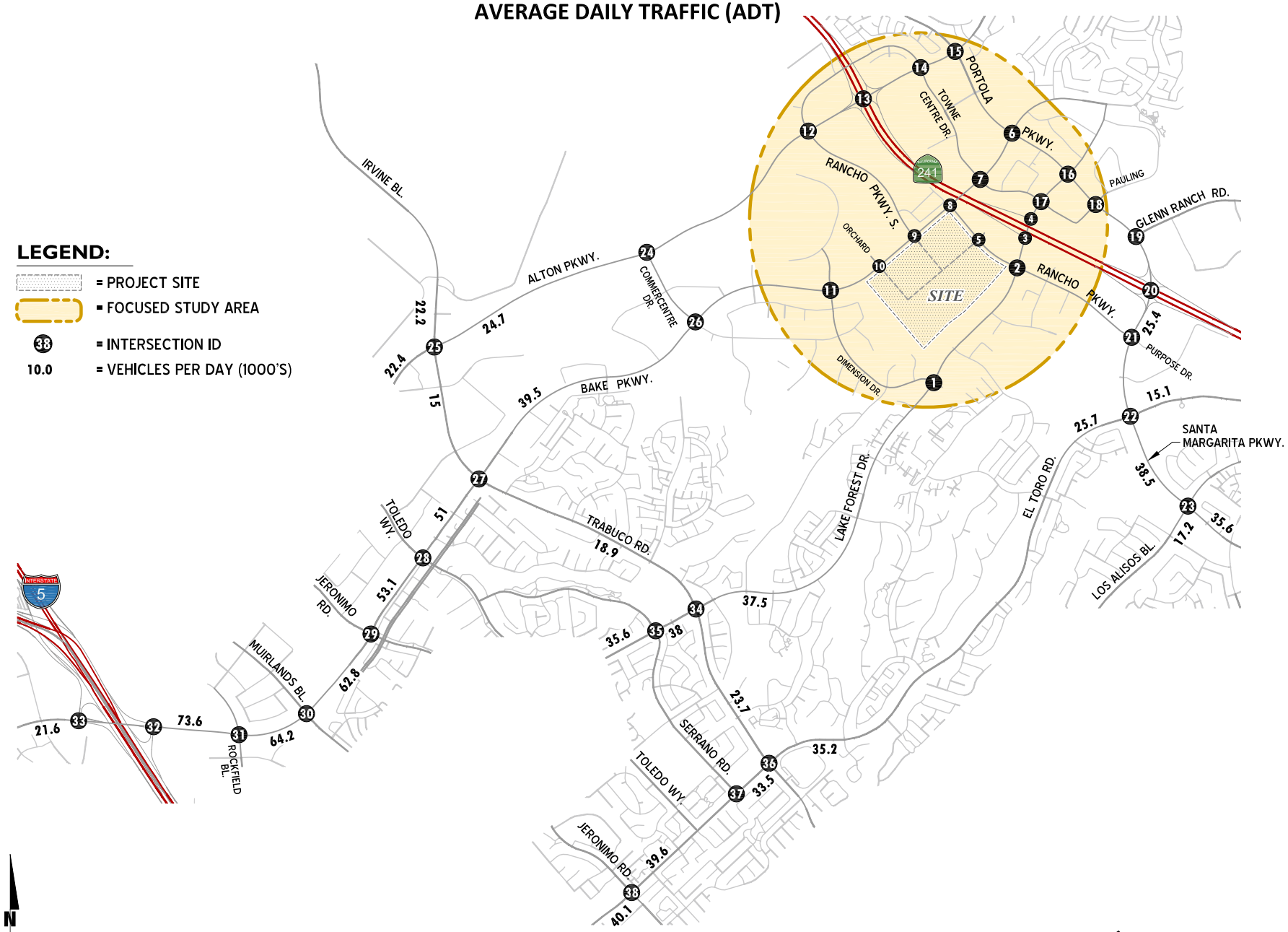


TABLE 6-1: INTERSECTION ANALYSIS
FOR EXISTING PLUS PROJECT CONDITIONS

#	Intersection	Traffic Control[4]	Intersection Approach Lanes[1]												Existing				Existing + Project			
			Northbound			Southbound			Eastbound			Westbound			ICU[2] (v/c)		Level of Service[2]		ICU[2] (v/c)		Level of Service[2]	
			L	T	R	L	T	R	L	T	R	L	T	R	AM	PM	AM	PM	AM	PM	AM	PM
1	Lake Forest Dr. (NS) & Dimension Dr. (EW)	TS	1	2	d	1	2	d	1.5	0.5	1	1	1	0	0.41	0.52	A	A	0.42	0.52	A	A
2	Lake Forest Dr. (NS) & Rancho Pkwy. (EW)	TS	1	2	d	1	2	d	1	2	d	2	2	1	0.42	0.57	A	A	0.52	0.61	A	B
3	Lake Forest Dr. (NS) & SR-241 SB Off-Ramp (EW)	TS	0	2	0	0	2	0	2	0	1	0	0	0	0.29	0.36	A	A	0.32	0.37	A	A
4	Lake Forest Dr. (NS) & SR-241 NB On-Ramp (EW)	TS	2	2	0	0	2	1	0	0	0	0	0	0	0.24	0.28	A	A	0.26	0.30	A	A
5	Corridor Center (NS) & Rancho Pkwy. (EW)	TS	**1**	**1**	0	**1**	**1**	1	1	2	**1**	**1**	2	d	0.25	0.27	A	A	0.41	0.49	A	A
6	Bake Parkway (NS) & Portola Pkwy. (EW)	TS	1	1.5	1.5	1	2	d	2	3	d	2	2	d	0.42	0.49	A	A	0.44	0.50	A	A
7	Bake Parkway (NS) & Towne Center Dr. (EW)	TS	2	2	d	2	2	d	1	1	1	1	2	0	0.39	0.49	A	A	0.42	0.50	A	A
8	Bake Parkway (NS) & Rancho Pkwy. (EW)	TS	0	2	d	1	2	0	0	0	0	2	0	2	0.44	0.55	A	A	0.47	0.57	A	A
9	Bake Parkway (NS) & Rancho Pkwy. S. (EW)	TS	1	2	**1**	**1**	2	1	2	**1**	0	**2**	**1**	**1**	0.51	0.52	A	A	0.58	0.57	A	A
10	Bake Parkway (NS) & Orchard (EW)	CSS	0	2	0	0	2	d	0	0	1	0	0	**1**	0.41	0.50	A	A	0.47	0.54	A	A
	- *HCM6 Delay (Seconds) / LOS* [3]	CSS	0	2	0	0	2	d	0	0	1	0	0	**1**	14.0	13.0	B	B	15.9	18.3	C	C
11	Dimension Dr. (NS) & Bake Parkway (EW)	TS	2	1	1	1	1	1	1	2	d	1	2	d	0.40	0.56	A	A	0.48	0.63	A	B
12	Alton Pkwy. (NS) & Rancho Pkwy. S. (EW)	TS	1	3	1	2	3	d	1	2	1	1	2	d	0.48	0.39	A	A	0.51	0.39	A	A
13	Alton Pkwy. (NS) & SR-241 Ramps (EW)	TS	1	3	1>>	1	3	1>>	2	0	1>>	2	0	1>>	0.32	0.39	A	A	0.32	0.39	A	A
14	Alton Pkwy. (NS) & Towne Centre Dr. (EW)	TS	1	3	1>>	1	3	d	1	1	1	2	1	1	0.25	0.31	A	A	0.26	0.32	A	A
15	Alton Pkwy. (NS) & Portola Pkwy. (EW)	TS	1	2	1>>	1	2	d	2	2	1>>	2	3	1>>	0.41	0.27	A	A	0.43	0.28	A	A
16	Lake Forest Dr. (NS) & Portola Pkwy. (EW)	TS	1	2	d	1	2	d	2	3	d	2	3	d	0.36	0.49	A	A	0.37	0.49	A	A
17	Lake Forest Dr. (NS) & Towne Centre Dr. (EW)	TS	2	2	d	2	2	d	1	1	1	1	2	0	0.30	0.41	A	A	0.32	0.41	A	A
18	Towne Centre Dr. (NS) & Portola Pkwy. (EW)	TS	1	1	1	2	1	0	2	3	d	2	3	d	0.38	0.55	A	A	0.38	0.56	A	A
19	Glenn Ranch Rd. (NS) & Portola Pkwy. (EW)	TS	1	2	0	2	2	1>>	2	3	1	2	3	1>	0.41	0.48	A	A	0.42	0.49	A	A
20	Portola Pkwy. (NS) & SR-241 Ramps (EW)	TS	2	3	1>>	2	3	1>>	1	0	1>>	2	0	1>>	0.35	0.38	A	A	0.35	0.38	A	A
21	Portola Pkwy. (NS) & Rancho Pkwy. (EW)	TS	2	3	d	2	3	1>	1.5	0.5	1>>	1.5	1	1.5>	0.42	0.50	A	A	0.45	0.52	A	A
22	El Toro Rd. (NS) & Portola Pkwy. (EW)	TS	1	3	1>>	1	3	1	2	3	1>	2	4	d	0.62	0.65	B	B	0.64	0.67	B	B
23	Los Alisos Bl. (NS) & Santa Margarita Pkwy. (EW)	TS	1	2	1	1	2	d	1	3	d	1	3	d	0.75	0.73	C	C	0.76	0.74	C	C
24	Alton Pkwy. (NS) & Commercentre Dr. (EW)	TS	0	3	d	1	3	0	0	0	0	1.5	0	1.5	0.37	0.43	A	A	0.38	0.44	A	A
25	Alton Pkwy. (NS) & Irvine Bl. (EW)	TS	2	3	1>>	2	3	1>>	2	3	1	2	3	1	0.47	0.42	A	A	0.47	0.43	A	A
26	Bake Pkwy. (NS) & Commercentre Dr. (EW)	TS	1	2	d	1	2	d	1	2	0	2	1	0	0.50	0.67	A	B	0.54	0.71	A	C
27	Bake Pkwy. (NS) & Trabuco Rd. (EW)	TS	1	3	0	2	3	1	2	3	1	2	3	1	0.63	0.68	B	B	0.65	0.70	B	B
28	Bake Pkwy. (NS) & Toledo Wy. (EW)	TS	1	3	d	1	3	d	2	2	1	1	2	0	0.70	0.59	B	A	0.72	0.60	C	A
29	Bake Pkwy. (NS) & Jeronimo Rd. (EW)																					
	- Without Improvements	TS	1	3	d	1	3	d	2	2	1	1	2	0	**0.94**	0.77	**E**	C	**0.96**	0.78	**E**	C
	- With Improvements	TS	**2**	3	d	1	3	d	2	2	1	1	2	0	-	-	-	-	0.83	0.78	D	C
30	Bake Pkwy. (NS) & Muirlands Bl. (EW)	TS	2	4	1>>	2	4	1>>	2	2	1>>	2	2	1>>	0.56	0.67	A	B	0.56	0.68	A	B
31	Bake Pkwy. (NS) & Rockfield Bl. (EW)	TS	2	4	1>>	2	4	1	1	2	1>>	2	2	1>>	0.56	0.68	A	B	0.56	0.69	A	B
32	Bake Pkwy. (NS) & I-5 NB Ramps (EW)	TS	0	3	1>>	0	3	1>>	0	0	0	1.5	0	1.5	0.84	0.67	D	B	0.85	0.69	D	B
33	Bake Pkwy. (NS) & I-5 SB Ramps (EW)	TS	0	3	0	0	3	1>>	3	0	1	0	0	0	0.67	0.73	B	C	0.68	0.76	B	C
34	Lake Forest Dr. (NS) & Trabuco Rd. (EW)	TS	2	3	1	2	3	0	2	3	1	2	3	1	0.59	0.67	A	B	0.60	0.68	A	B
35	Lake Forest Dr. (NS) & Serrano Rd. (EW)	TS	1	3	d	1	3	d	1	1	0	1	1	0	0.54	0.53	A	A	0.54	0.53	A	A
36	El Toro Rd. (NS) & Trabuco Rd. (EW)	TS	2	3	1>	2	3	1>	2	3	0	2	3	1	0.64	0.62	B	B	0.65	0.62	B	B
37	El Toro Rd. (NS) & Serrano Rd. (EW)	TS	1	3	d	1	3	d	1	1	0	1	1	0	0.53	0.47	A	A	0.53	0.47	A	A
38	El Toro Rd. (NS) & Jeronimo Rd. (EW)	TS	1	3	1>	1	3	d	1	2	0	2	2	1	0.69	0.80	B	C	0.70	0.82	B	D

[1] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.
L = Left; T = Through; R = Right; ! = Shared Left/Through/Right Lane; d = Defacto Right Turn Lane; > = Right Turn Overlap; >> Free-Right Turn; **1** = Improvement

[2] For signalized intersections, Volume/Capacity Ratio and Level of Service are presented based on the Intersection Capacity Utilization (ICU) method.

[3] For the unsignalized intersection of Bake Parkway / Orchard (#10), Delay (in seconds) and Level of Service is calculated using Synchro 10 analysis software based on the Highway Capacity Manual 6th Edition (HCM6) method.

[4] TS = Traffic Signal; Cross-Street Stop

The addition of a second northbound left turn lane at the intersection of Bake Parkway & Jeronimo Road is included in the Lake Forest Transportation Mitigation (LFTM) program and North Irvine Transportation Mitigation (NITM) program. The Project will be responsible to mitigate the E+P theoretical impact at this location to acceptable levels without reliance on other transportation projects.

As buildout of the Project as an overlay to existing volumes would contribute to an existing AM peak hour deficiency at the intersection of Bake Parkway & Jeronimo Road, the Project's proportionate share of the improvement costs may be indicated as potential mitigation by the City of Lake Forest. Project mitigation may include a combination of fee payments to established programs, construction of specific improvements, payment of a fair share contribution toward future improvements or a combination of these approaches. Improvements constructed by development should be eligible for a fee credit or reimbursement through the program where appropriate (to be determined at the City's discretion).

6.2 INTERIM YEAR CUMULATIVE 2020 WITHOUT PROJECT CONDITIONS

Interim Year Cumulative 2020 Without Project traffic volumes are shown on Exhibits 6-7 through 6-12.

LOS calculations were conducted for the study intersections to evaluate their operations under Interim Year Cumulative 2020 Without Project traffic conditions with existing off-site roadway and intersection geometrics.

The 2020 Without Project intersection analysis results are summarized in Table 6-2, which indicates that one study area intersection (Bake Parkway & Trabuco Road) is anticipated to operate at an unacceptable level of service during peak hours, for 2020 No Project conditions.

The intersection operations analysis worksheets for Interim Year Cumulative 2020 Without Project traffic conditions are included in Appendix 6.1 of this TIA.

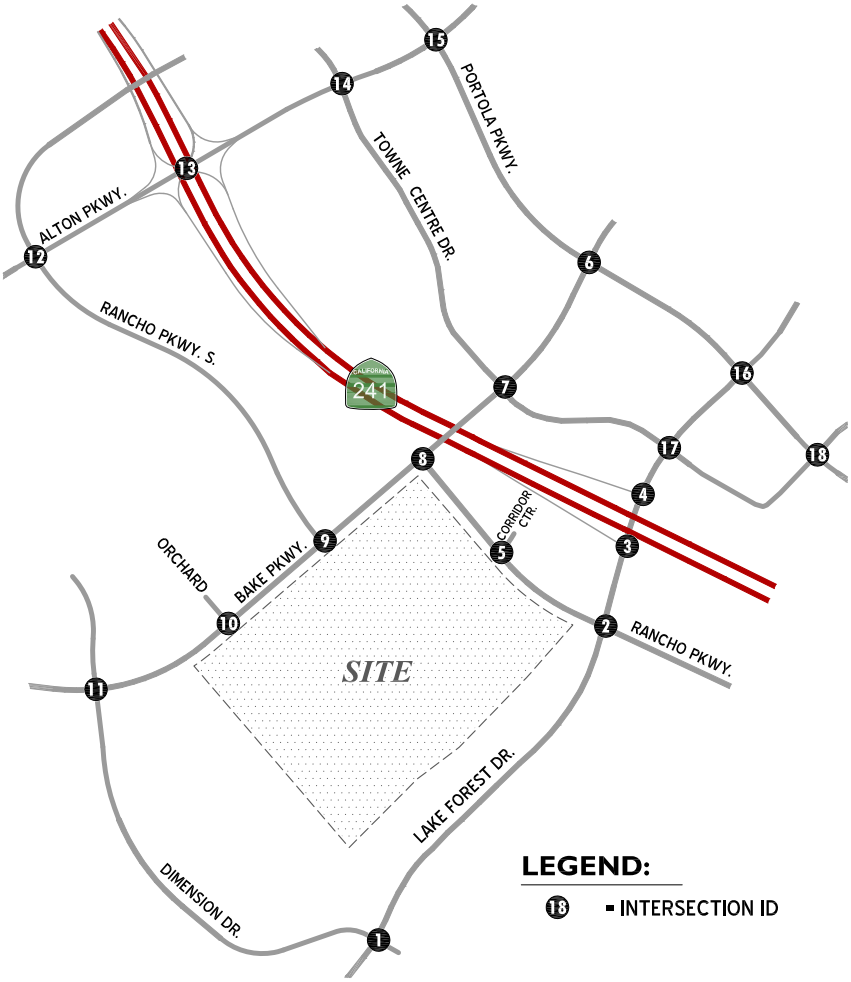
6.3 INTERIM YEAR CUMULATIVE 2020 WITH PROJECT CONDITIONS

Interim Year Cumulative 2020 With Project traffic volumes are shown on Exhibits 6-13 through 6-18.

LOS calculations were conducted for the study intersections to evaluate their operations under Interim Year Cumulative 2020 With Project traffic conditions with existing roadway and intersection geometrics. The intersection analysis results are also summarized in Table 6-2, which indicates that the same one study area intersection (Bake Parkway & Trabuco Road) is anticipated to operate at an unacceptable level of service (LOS "E" or worse) during peak hours, for 2020 With Project conditions.

The Project does not cause an increase in ICU of greater than 0.01, so a Project impact would not occur. The intersection operations analysis worksheets for Interim Year Cumulative 2020 With Project traffic conditions are included in Appendix 6.1 of this TIA.

EXHIBIT 6-7: INTERIM YEAR CUMULATIVE 2020 WITHOUT PROJECT FOCUSED ANALYSIS AREA AM PEAK HOUR INTERSECTION VOLUMES



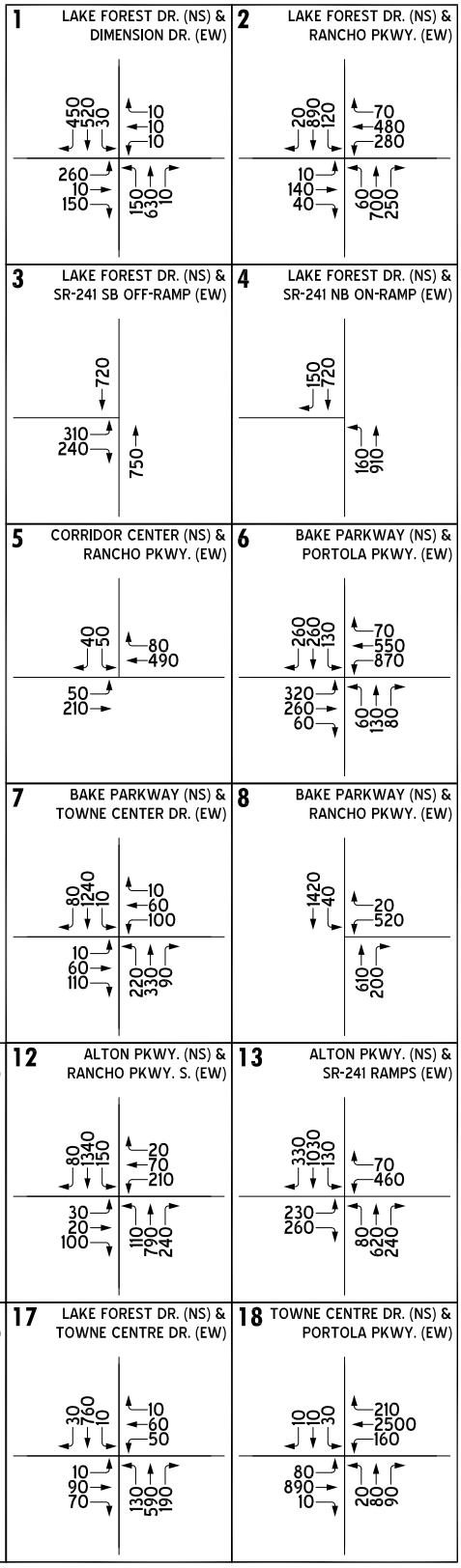
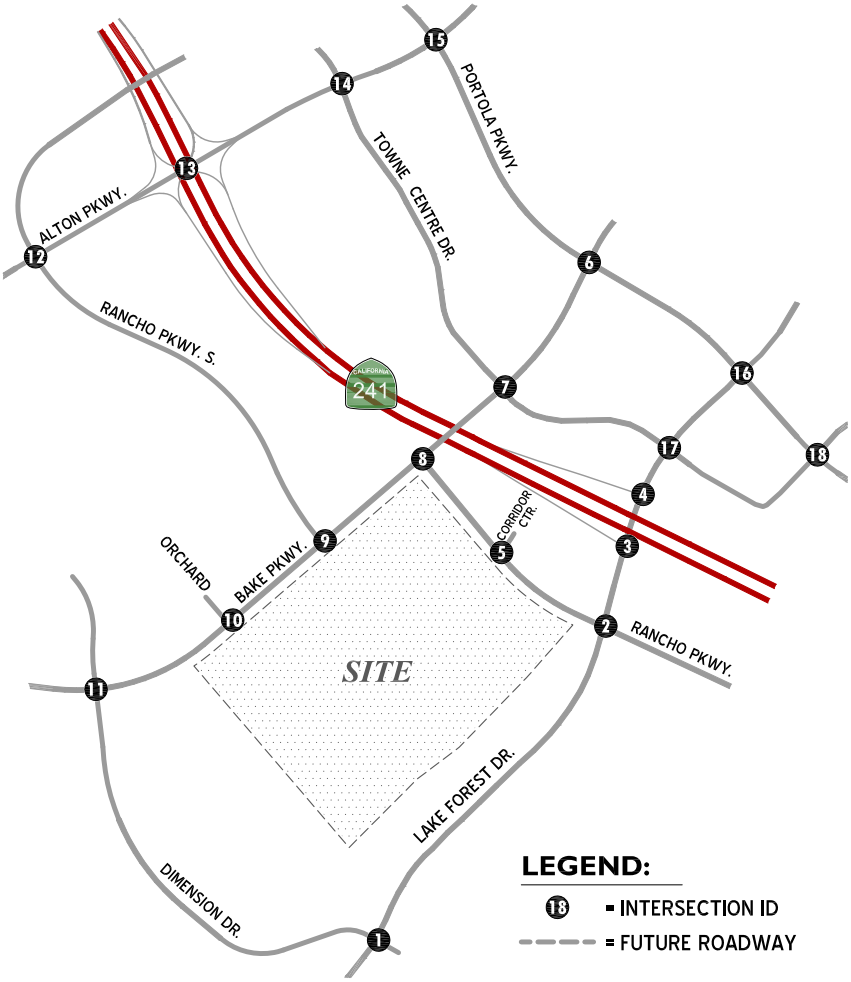
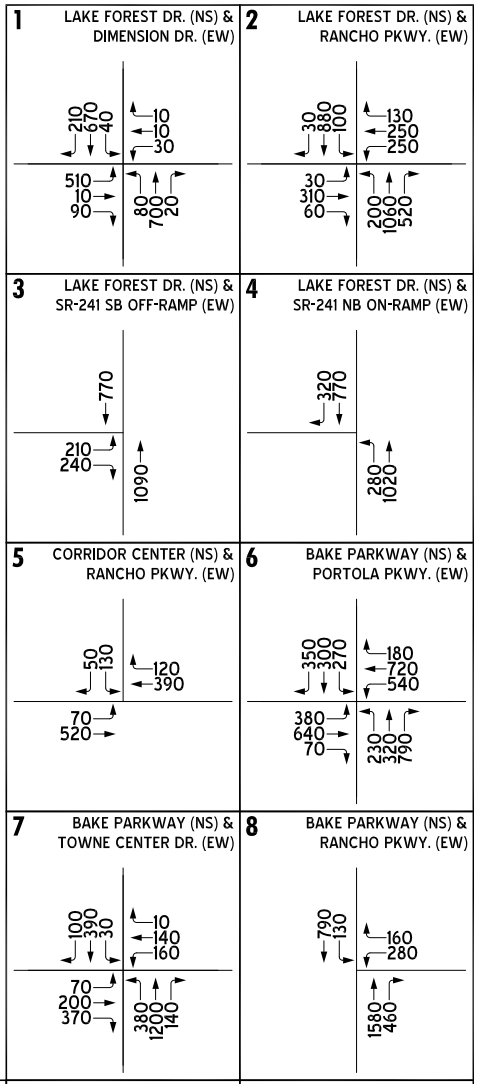


EXHIBIT 6-8: INTERIM YEAR CUMULATIVE 2020 WITHOUT PROJECT FOCUSED ANALYSIS AREA PM PEAK HOUR INTERSECTION VOLUMES





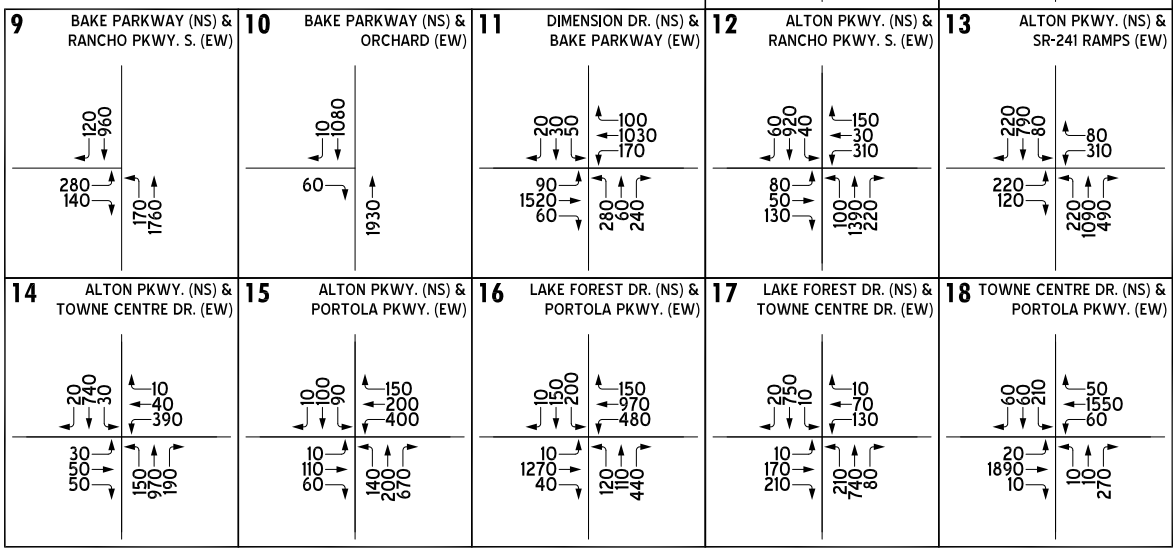


EXHIBIT 6-9: INTERIM YEAR CUMULATIVE 2020 WITHOUT PROJECT EXPANDED AREA AM PEAK HOUR INTERSECTION VOLUMES

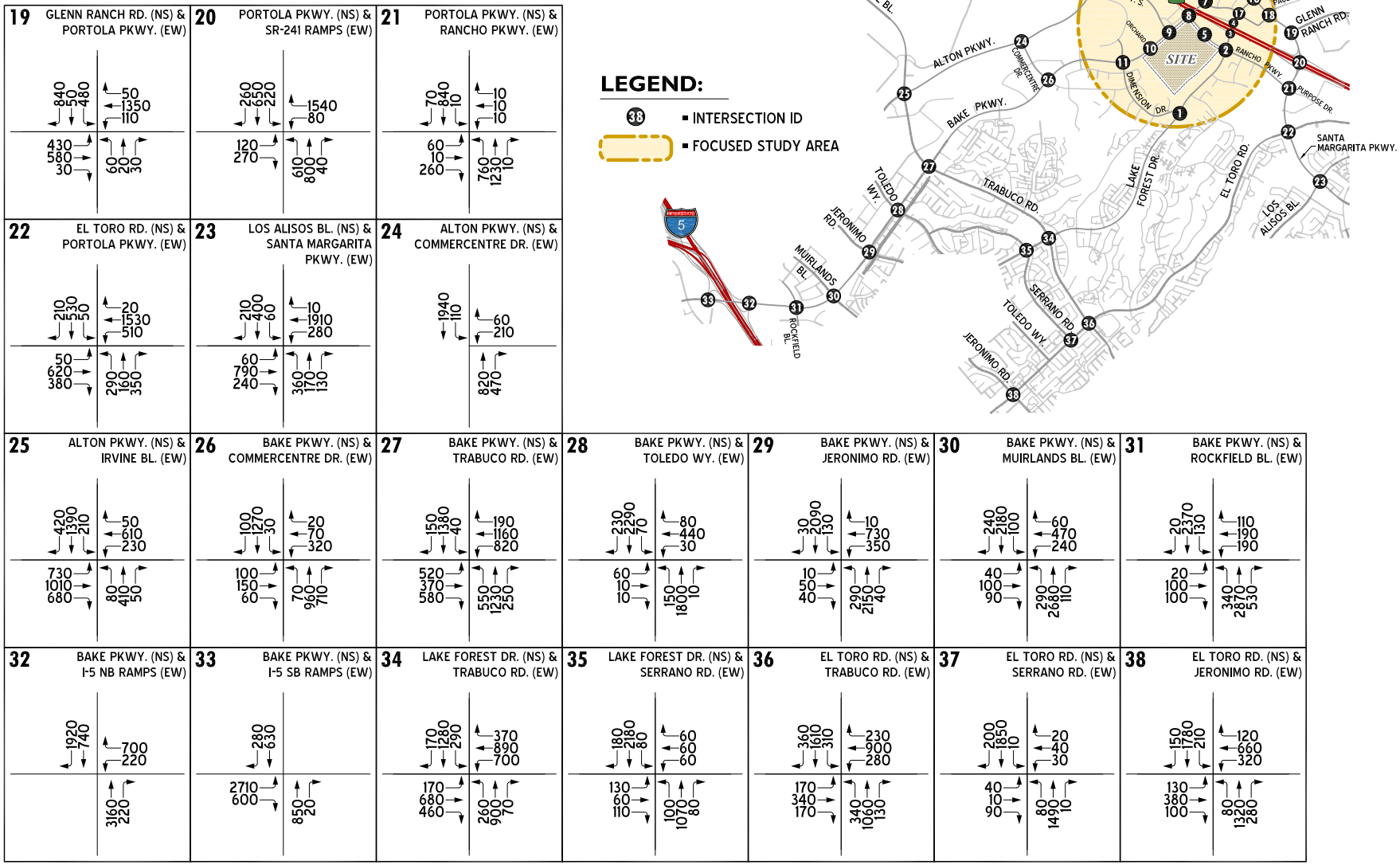


EXHIBIT 6-10: INTERIM YEAR CUMULATIVE 2020 WITHOUT PROJECT EXPANDED AREA PM PEAK HOUR INTERSECTION VOLUMES

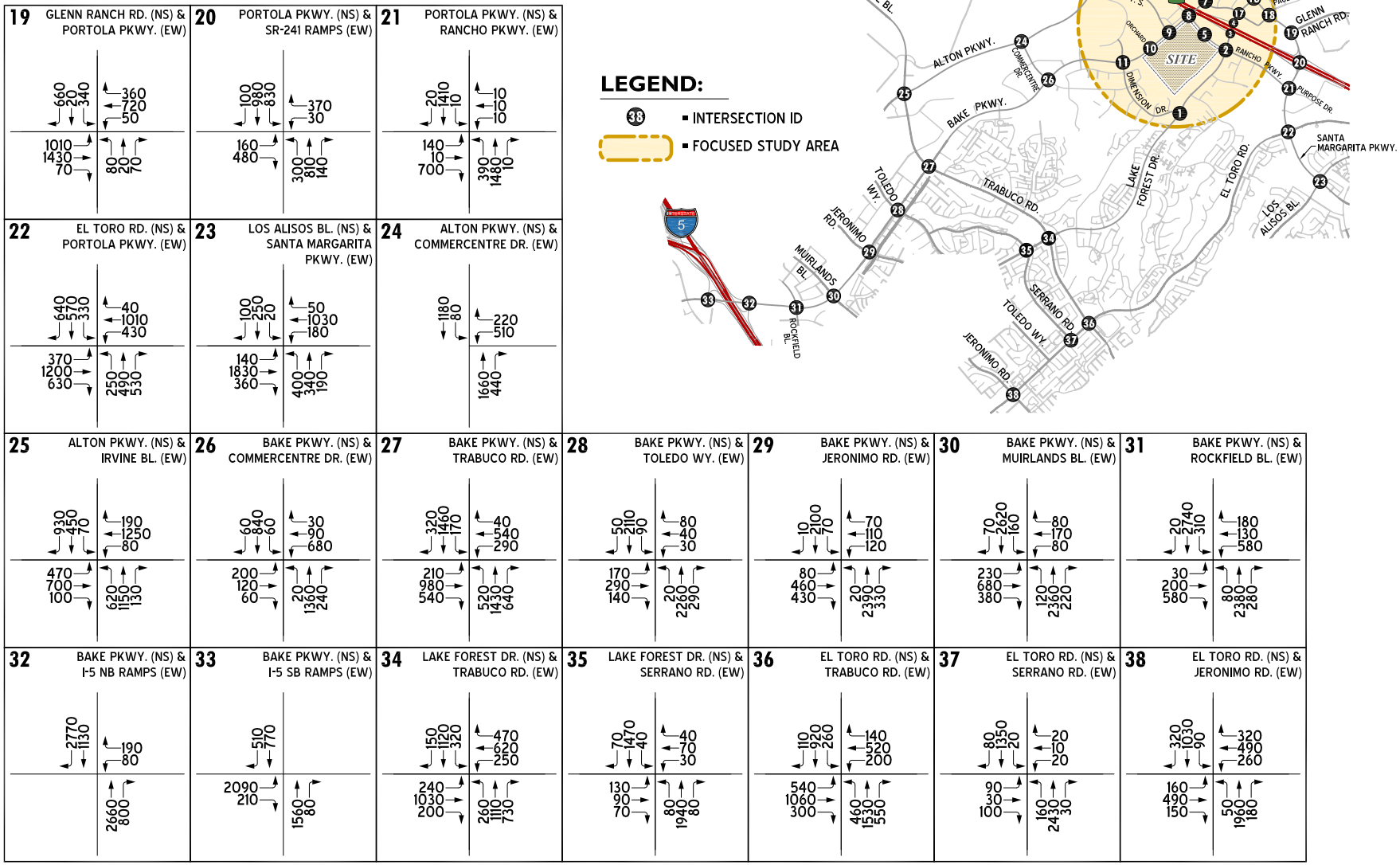


EXHIBIT 6-11: INTERIM YEAR CUMULATIVE 2020 WITHOUT PROJECT FOCUSED ANALYSIS AREA AVERAGE DAILY TRAFFIC (ADT)

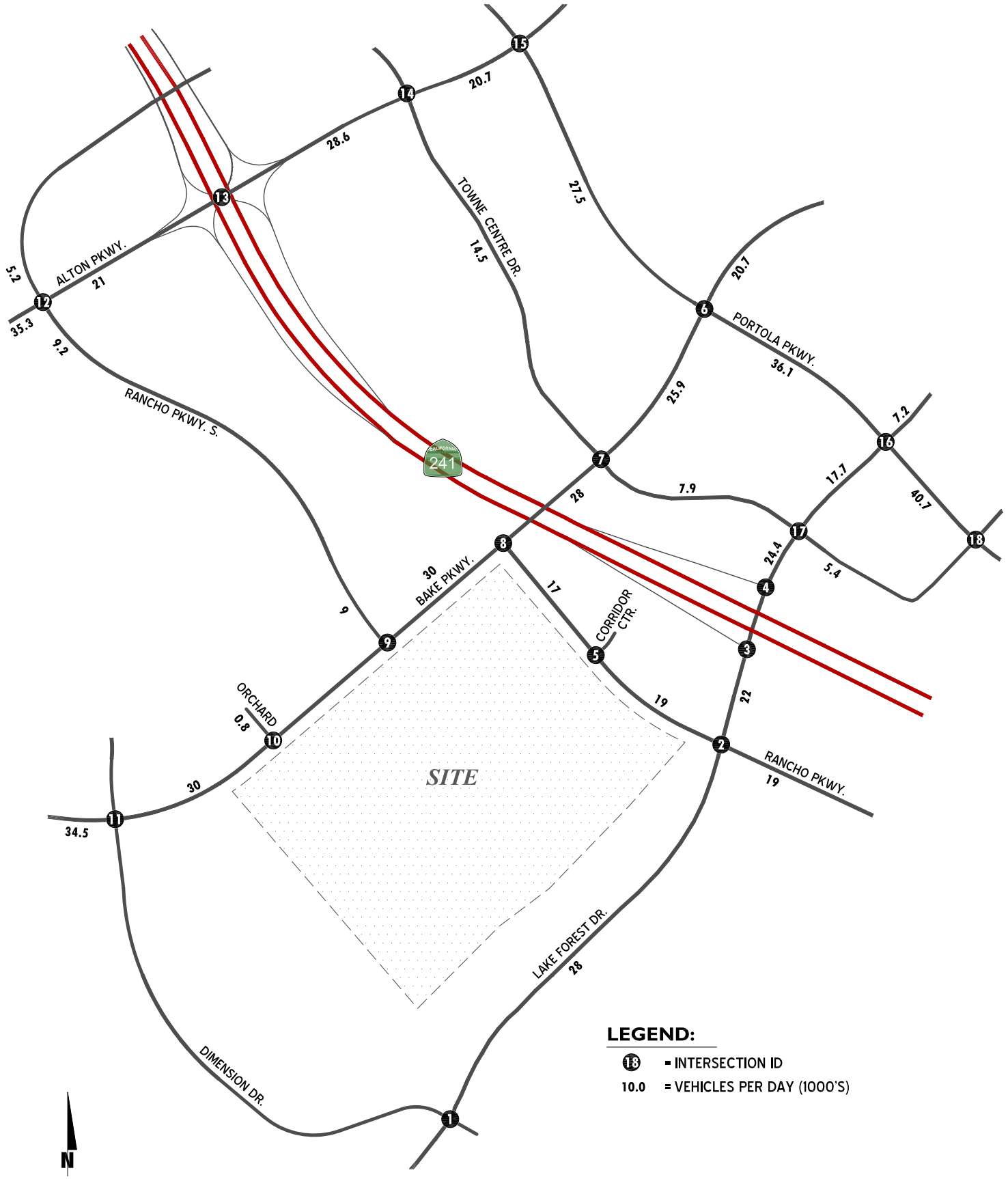


EXHIBIT 6-12: INTERIM YEAR CUMULATIVE 2020 WITHOUT PROJECT EXPANDED AREA AVERAGE DAILY TRAFFIC (ADT)

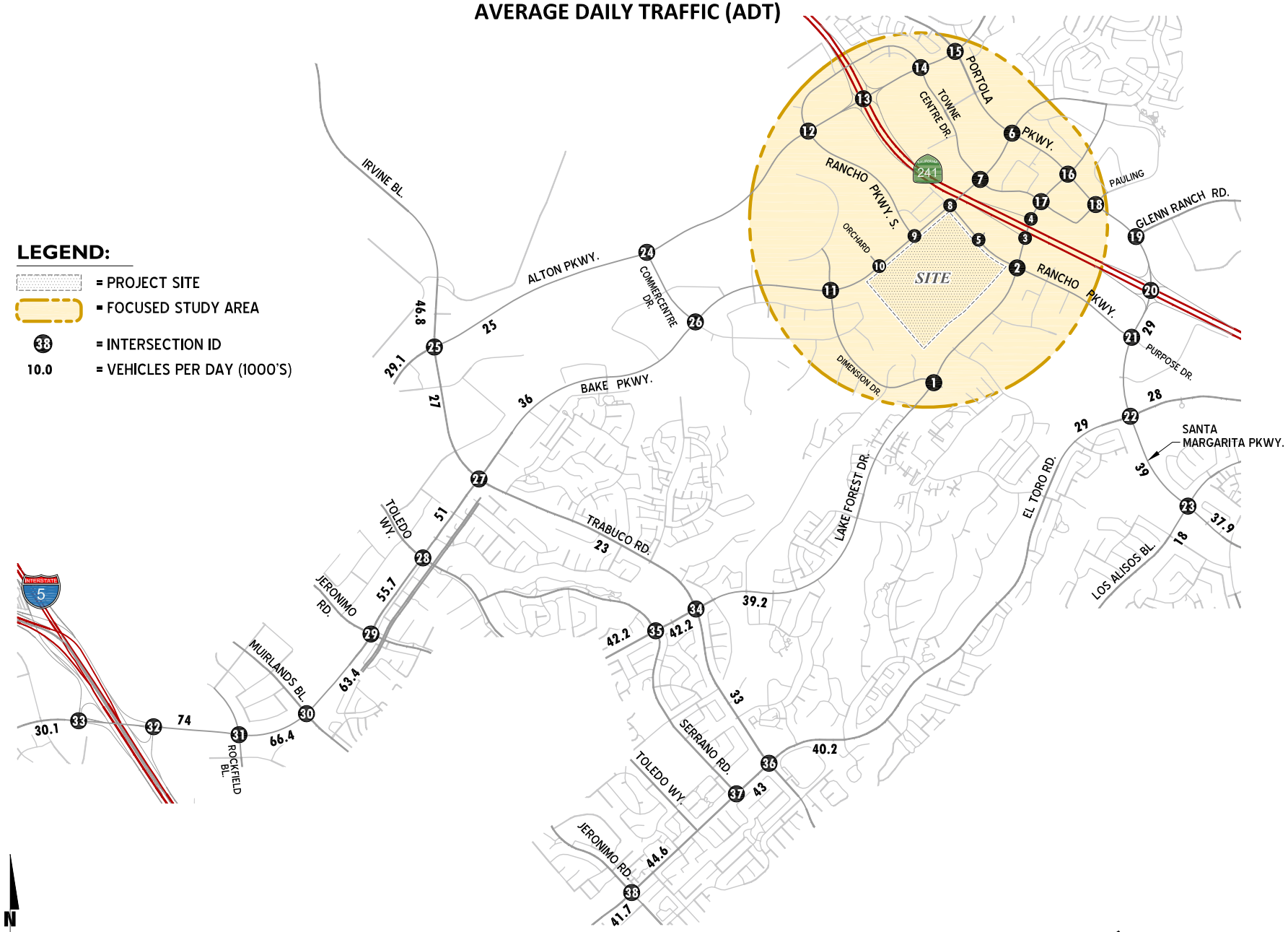


TABLE 6-2: INTERSECTION ANALYSIS SUMMARY FOR INTERIM YEAR CUMULATIVE 2020 CONDITIONS

#	Intersection	Traffic Control[4]	2020 Without Project				2020 With Project			
			ICU[2] (v/c)		Level of Service[2]		ICU[2] (v/c)		Level of Service[2]	
			AM	PM	AM	PM	AM	PM	AM	PM
1	Lake Forest Dr. (NS) & Dimension Dr. (EW)	TS	0.43	0.47	A	A	0.44	0.47	A	A
2	Lake Forest Dr. (NS) & Rancho Pkwy. (EW)	TS	0.50	0.59	A	A	0.63	0.73	B	C
3	Lake Forest Dr. (NS) & SR-241 SB Off-Ramp (EW)	TS	0.40	0.44	A	A	0.41	0.46	A	A
4	Lake Forest Dr. (NS) & SR-241 NB On-Ramp (EW)	TS	0.32	0.36	A	A	0.32	0.37	A	A
5	Corridor Center (NS) & Rancho Pkwy. (EW)	TS	0.23	0.25	A	A	0.39	0.49	A	A
6	Bake Parkway (NS) & Portola Pkwy. (EW)	TS	0.48	0.70	A	B	0.47	0.68	A	B
7	Bake Parkway (NS) & Towne Center Dr. (EW)	TS	0.57	0.62	A	B	0.60	0.63	A	B
8	Bake Parkway (NS) & Rancho Pkwy. (EW)	TS	0.62	0.67	B	B	0.58	0.67	A	B
9	Bake Parkway (NS) & Rancho Pkwy. S. (EW)	TS	0.69	0.65	B	B	0.71	0.68	C	B
10	Bake Parkway (NS) & Orchard (EW)	CSS	0.59	0.62	A	A	0.61	0.64	A	A
	- HCM6 Delay (Seconds) / LOS [3]	CSS	20.5	14.3	C	B	21.8	22.8	C	C
11	Dimension Dr. (NS) & Bake Parkway (EW)	TS	0.56	0.70	A	B	0.59	0.73	A	C
12	Alton Pkwy. (NS) & Rancho Pkwy. S. (EW)	TS	0.50	0.52	A	A	0.58	0.53	A	A
13	Alton Pkwy. (NS) & SR-241 Ramps (EW)	TS	0.44	0.42	A	A	0.44	0.42	A	A
14	Alton Pkwy. (NS) & Towne Centre Dr. (EW)	TS	0.38	0.43	A	A	0.38	0.43	A	A
15	Alton Pkwy. (NS) & Portola Pkwy. (EW)	TS	0.44	0.31	A	A	0.43	0.32	A	A
16	Lake Forest Dr. (NS) & Portola Pkwy. (EW)	TS	0.55	0.71	A	C	0.55	0.73	A	C
17	Lake Forest Dr. (NS) & Towne Centre Dr. (EW)	TS	0.39	0.51	A	A	0.40	0.52	A	A
18	Towne Centre Dr. (NS) & Portola Pkwy. (EW)	TS	0.62	0.64	B	B	0.61	0.64	B	B
19	Glenn Ranch Rd. (NS) & Portola Pkwy. (EW)	TS	0.59	0.60	A	A	0.59	0.59	A	A
20	Portola Pkwy. (NS) & SR-241 Ramps (EW)	TS	0.43	0.54	A	A	0.43	0.55	A	A
21	Portola Pkwy. (NS) & Rancho Pkwy. (EW)	TS	0.45	0.48	A	A	0.45	0.48	A	A
22	El Toro Rd. (NS) & Portola Pkwy. (EW)	TS	0.59	0.78	A	C	0.62	0.78	B	C
23	Los Alisos Bl. (NS) & Santa Margarita Pkwy. (EW)	TS	0.79	0.83	C	D	0.77	0.83	C	D
24	Alton Pkwy. (NS) & Commercentre Dr. (EW)	TS	0.49	0.58	A	A	0.52	0.60	A	A
25	Alton Pkwy. (NS) & Irvine Bl. (EW)	TS	0.79	0.71	C	C	0.79	0.71	C	C
26	Bake Pkwy. (NS) & Commercentre Dr. (EW)	TS	0.61	0.74	B	C	0.64	0.75	B	C
27	Bake Pkwy. (NS) & Trabuco Rd. (EW)	TS	**1.02**	**0.93**	**F**	**E**	**1.03**	**0.92**	**F**	**E**
28	Bake Pkwy. (NS) & Toledo Wy. (EW)	TS	0.76	0.65	C	B	0.76	0.66	C	B
29	Bake Pkwy. (NS) & Jeronimo Rd. (EW)	TS	0.85	0.80	D	C	0.87	0.80	D	C
30	Bake Pkwy. (NS) & Muirlands Bl. (EW)	TS	0.62	0.70	B	B	0.62	0.70	B	B
31	Bake Pkwy. (NS) & Rockfield Bl. (EW)	TS	0.60	0.72	A	C	0.61	0.72	B	C
32	Bake Pkwy. (NS) & I-5 NB Ramps (EW)	TS	0.88	0.63	D	B	0.88	0.64	D	B
33	Bake Pkwy. (NS) & I-5 SB Ramps (EW)	TS	0.75	0.78	C	C	0.76	0.79	C	C
34	Lake Forest Dr. (NS) & Trabuco Rd. (EW)	TS	0.83	0.79	D	C	0.82	0.82	D	D
35	Lake Forest Dr. (NS) & Serrano Rd. (EW)	TS	0.69	0.59	B	A	0.69	0.61	B	B
36	El Toro Rd. (NS) & Trabuco Rd. (EW)	TS	0.70	0.76	B	C	0.69	0.75	B	C
37	El Toro Rd. (NS) & Serrano Rd. (EW)	TS	0.54	0.63	A	B	0.54	0.62	A	B
38	El Toro Rd. (NS) & Jeronimo Rd. (EW)	TS	0.72	0.75	C	C	0.70	0.76	B	C

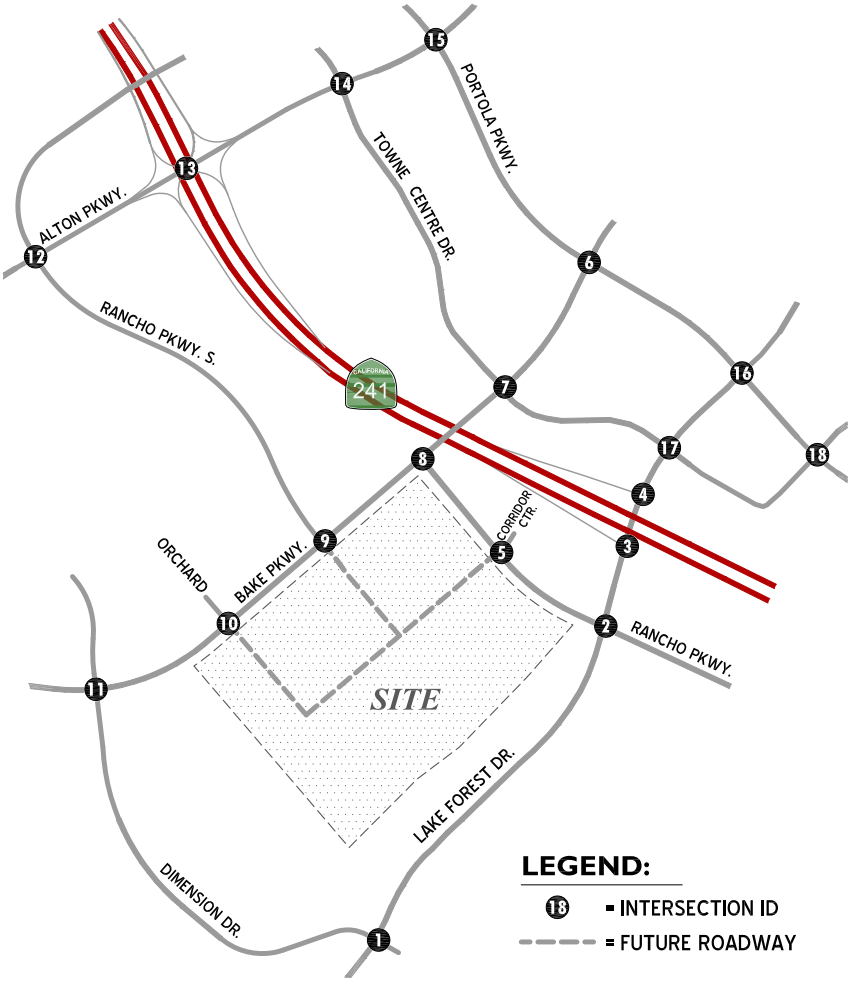
[1] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.
L = Left; T = Through; R = Right; ! = Shared Left/Through/Right Lane; d = Defacto Right Turn Lane; > = Right Turn Overlap; >> Free-Right Turn

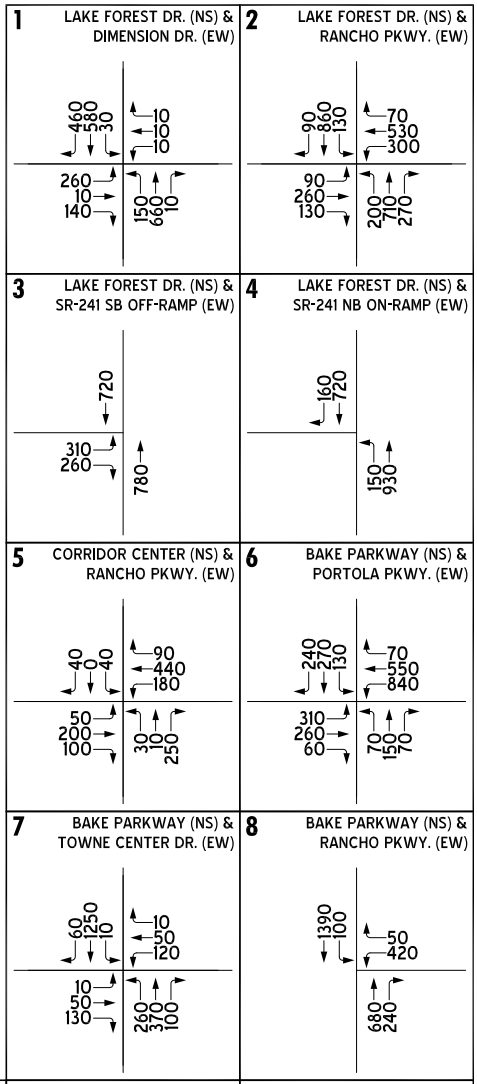
[2] For signalized intersections, Volume/Capacity Ratio and Level of Service are presented based on the Intersection Capacity Utilization (ICU) method

[3] For the unsignalized intersection of Bake Parkway / Orchard (#10), Delay (in seconds) and Level of Service is also calculated using Synchro 10 analysis software based on the Highway Capacity Manual 6th Edition (HCM6) method.

[4] TS = Traffic Signal; Cross-Street Stop

EXHIBIT 6-13: INTERIM YEAR CUMULATIVE 2020 WITH PROJECT FOCUSED ANALYSIS AREA AM PEAK HOUR INTERSECTION VOLUMES





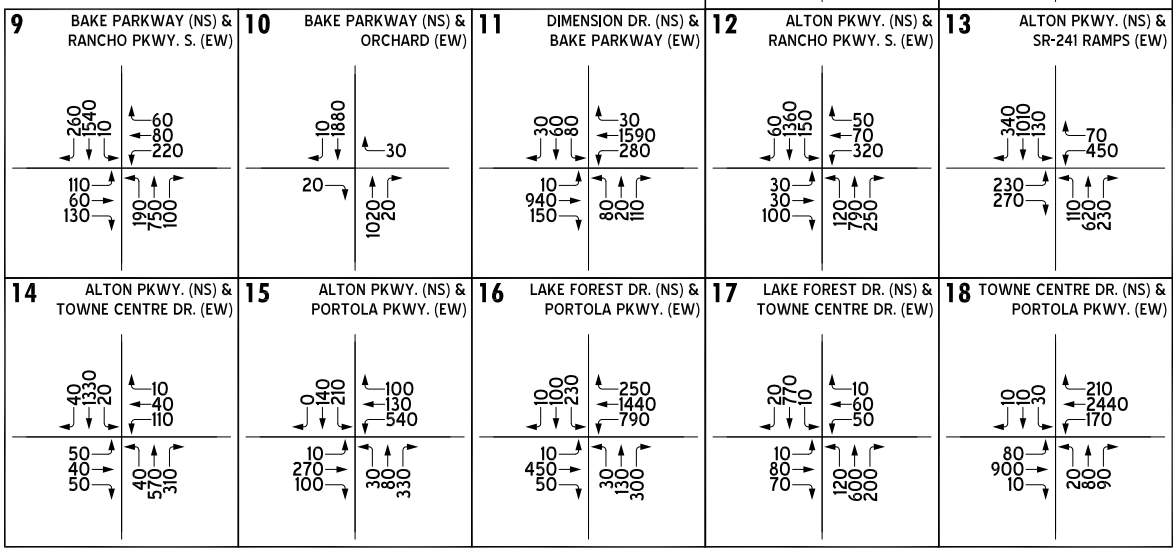
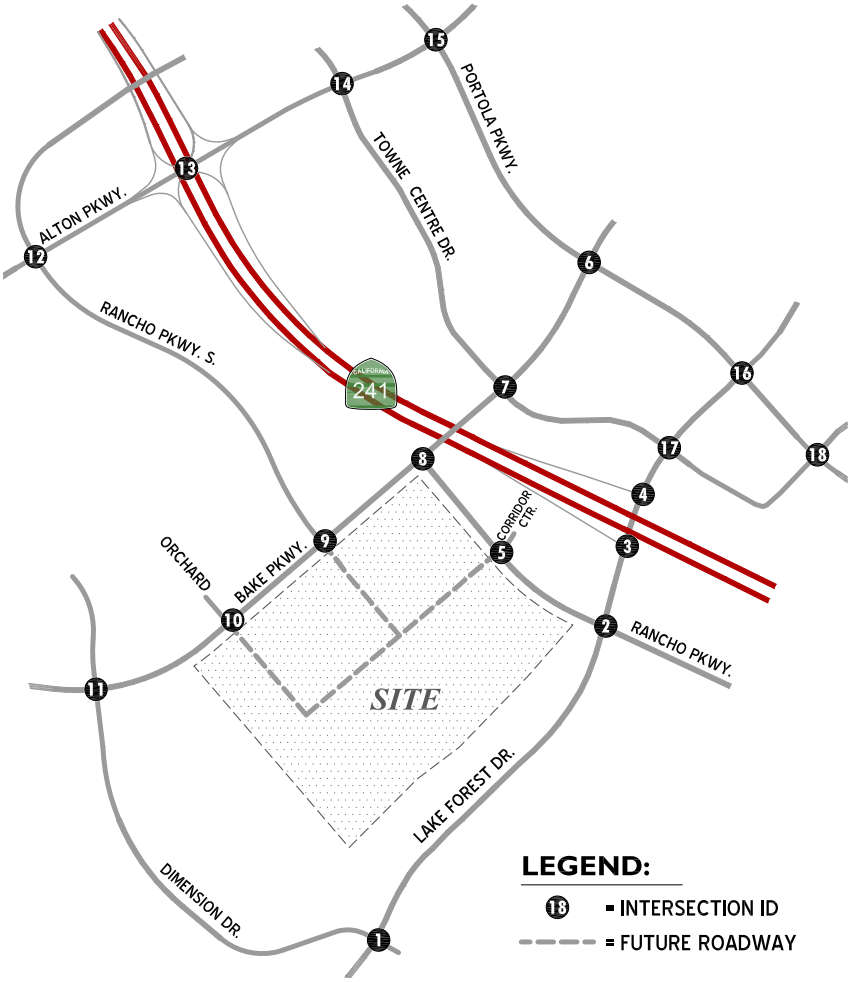
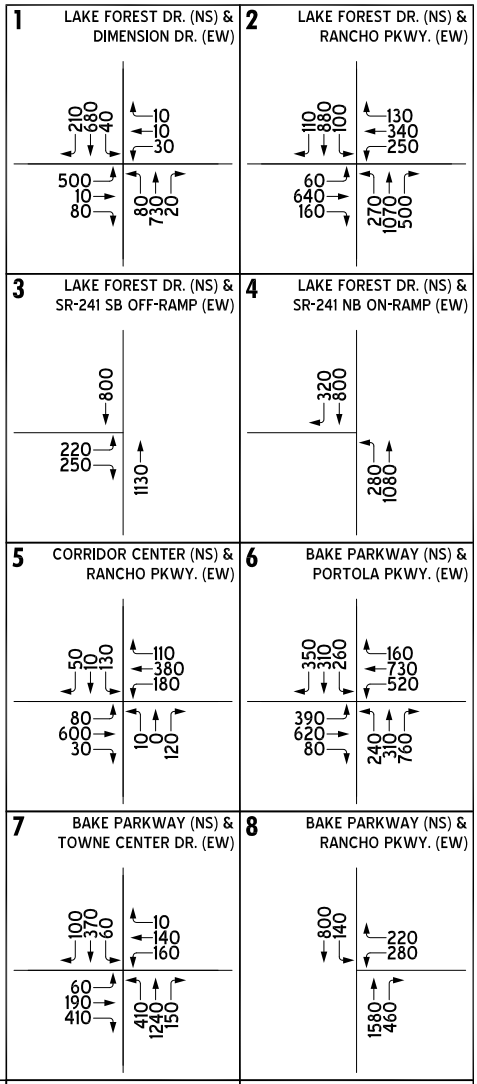


EXHIBIT 6-14: INTERIM YEAR CUMULATIVE 2020 WITH PROJECT FOCUSED ANALYSIS AREA PM PEAK HOUR INTERSECTION VOLUMES





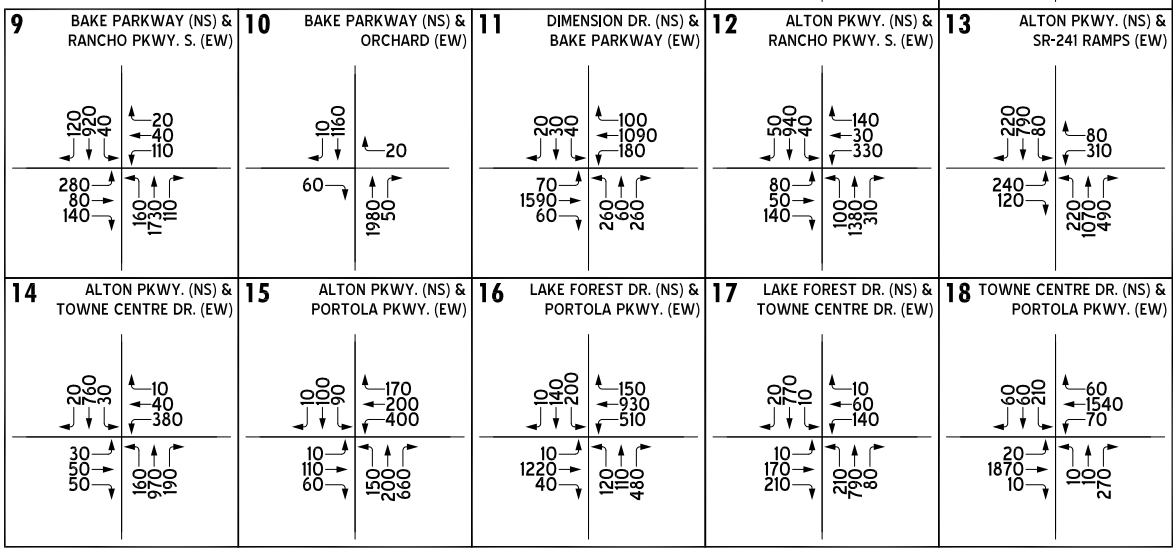


EXHIBIT 6-15: INTERIM YEAR CUMULATIVE 2020 WITH PROJECT EXPANDED AREA AM PEAK HOUR INTERSECTION VOLUMES

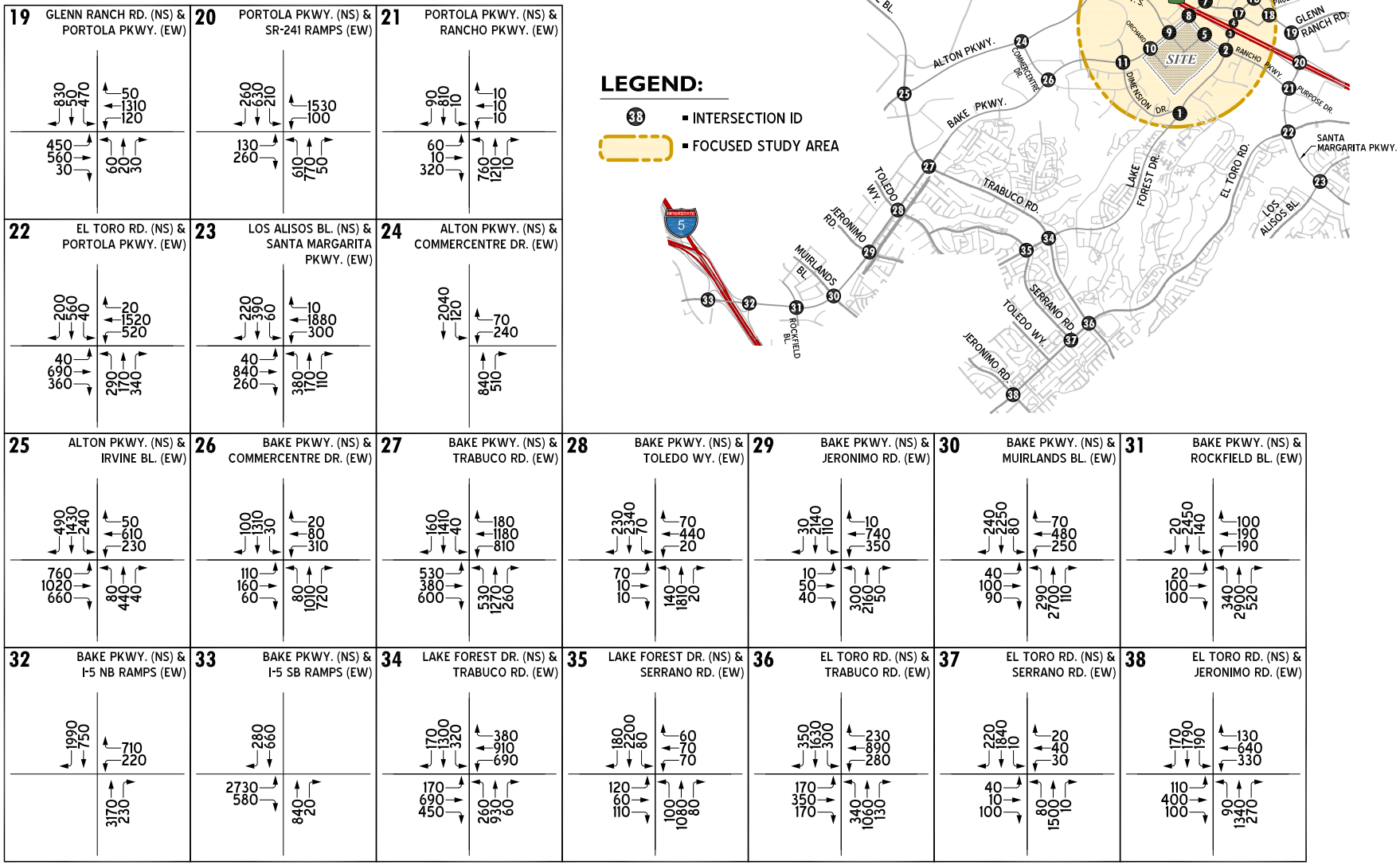


EXHIBIT 6-16: INTERIM YEAR CUMULATIVE 2020 WITH PROJECT EXPANDED AREA PM PEAK HOUR INTERSECTION VOLUMES

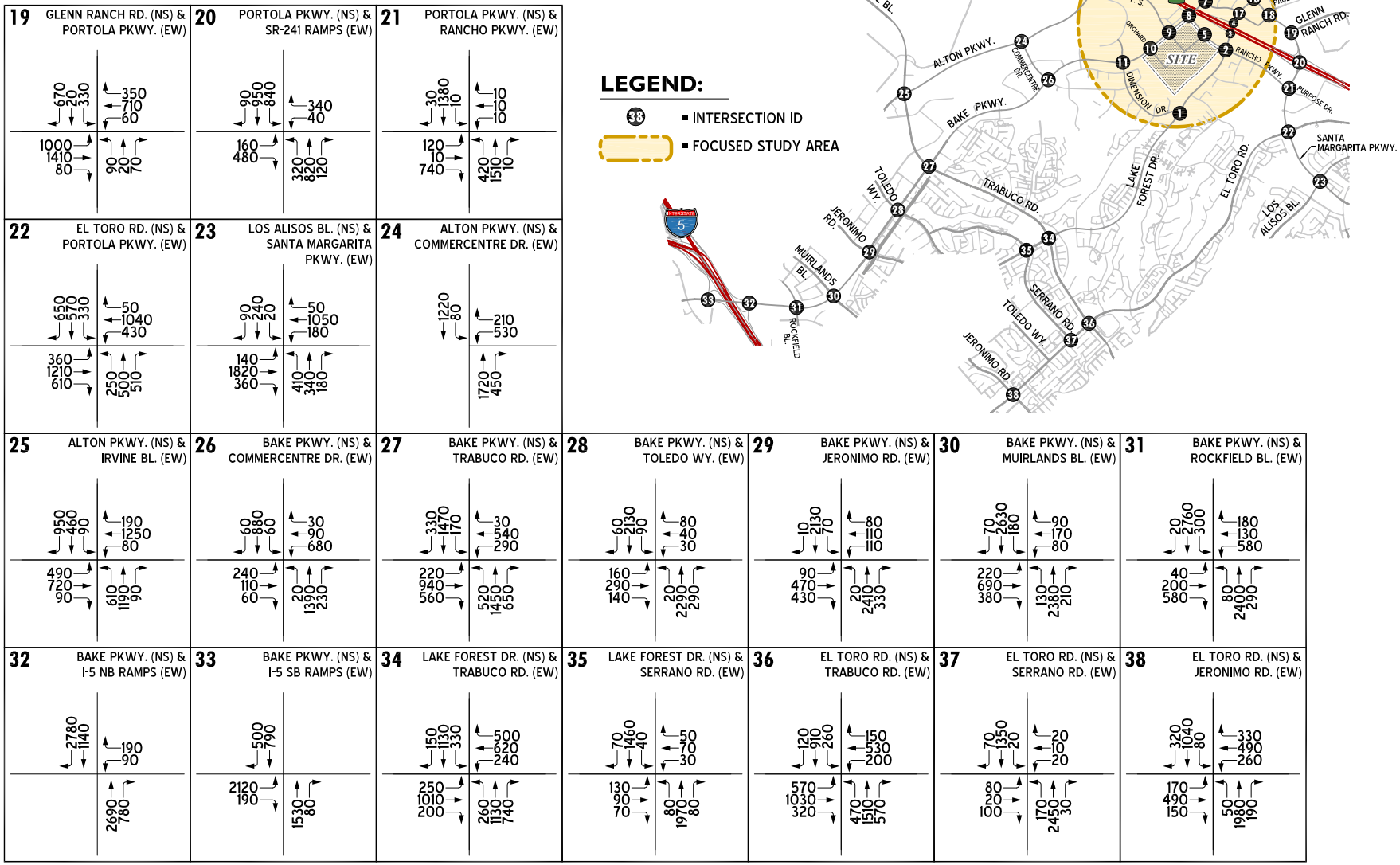


EXHIBIT 6-17: INTERIM YEAR CUMULATIVE 2020 WITH PROJECT FOCUSED ANALYSIS AREA AVERAGE DAILY TRAFFIC (ADT)

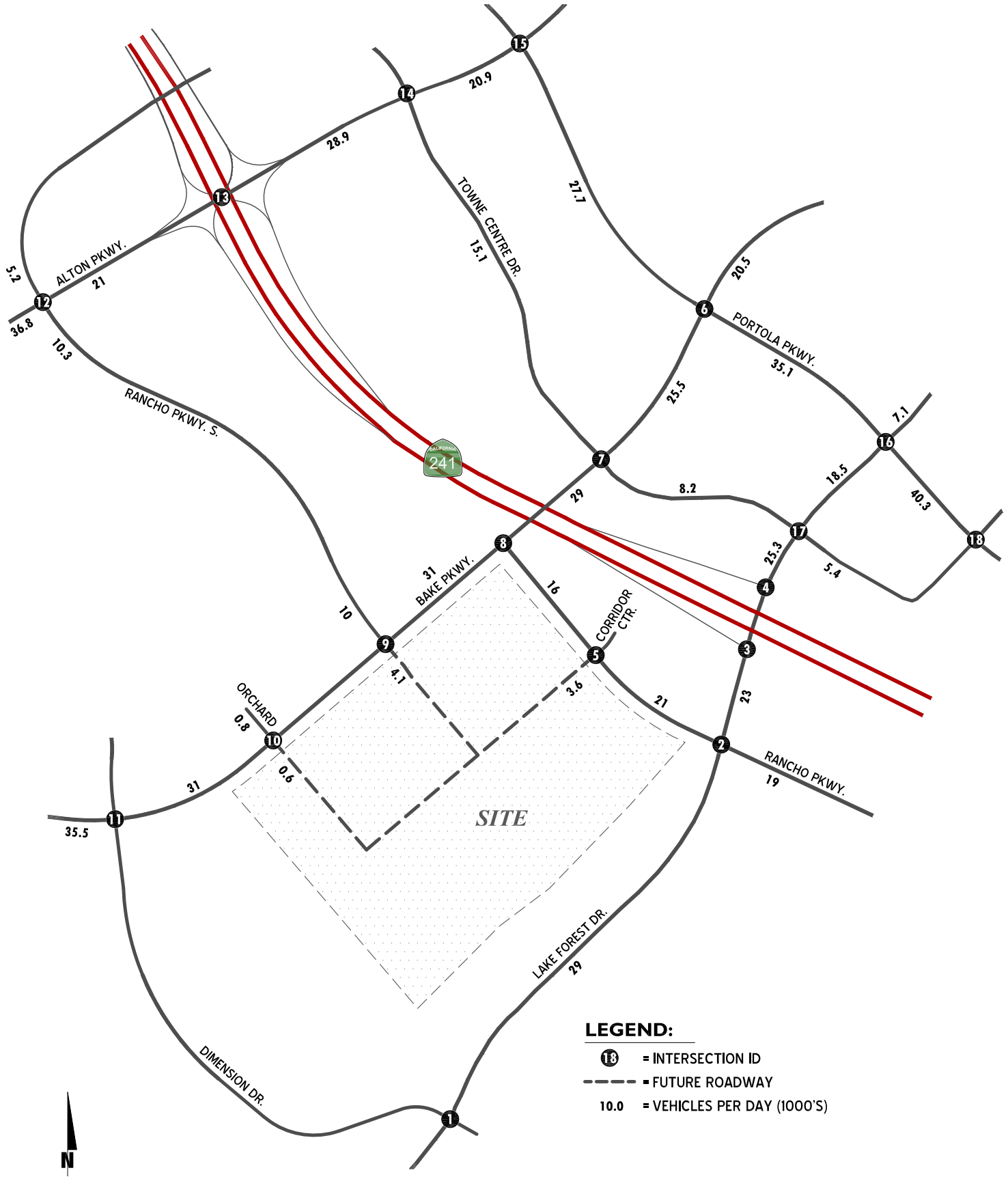
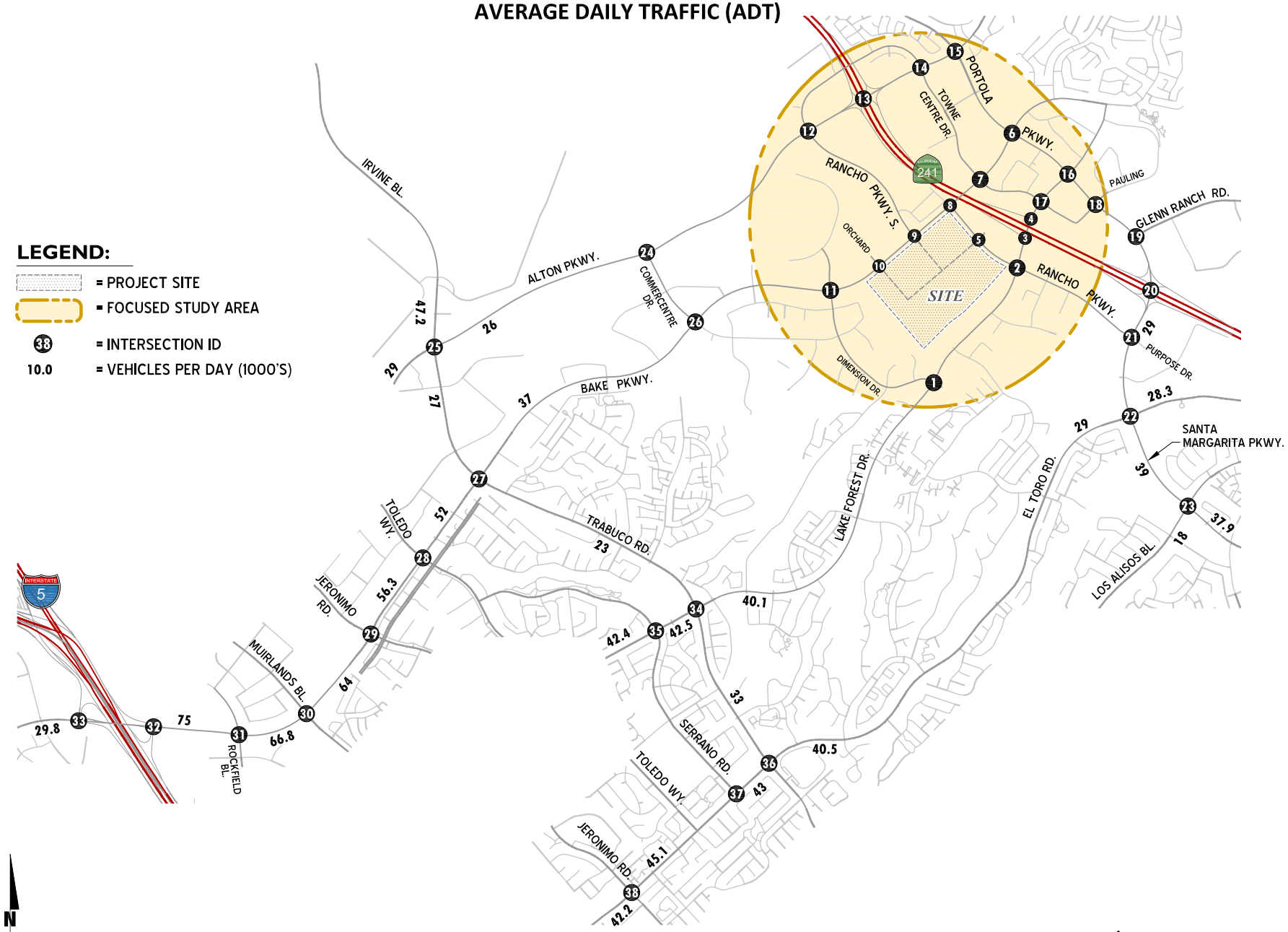


EXHIBIT 6-18: INTERIM YEAR CUMULATIVE 2020 WITH PROJECT EXPANDED AREA AVERAGE DAILY TRAFFIC (ADT)



10820 - 02 - volumes & geometrics.dwg

URBAN CROSSROADS

7 YEAR 2040 CONDITIONS TRAFFIC ANALYSIS

Year 2040 scenarios focus on the comparison of two development scenarios for the project site: (1) current approved business park uses, and (2) the proposed Project residential / school uses. The 2040 Project condition is compared to the current approved business park uses because the current approved business park uses are anticipated to be built prior to or during buildout of the City of Lake Forest General Plan, should no other change be made. Therefore, the current approved business park uses are part of the background condition.

In addition, two roadway network scenarios are evaluated (without and with the extension of Portola Parkway from west of Paloma to northeast of SR-241).

7.1 2040 General Plan Cumulative With Current Approved Business Park Land Use, Without Portola Westerly Extension

2040 General Plan Cumulative With Current Approved Business Park Land Use, Without Portola Westerly Extension traffic volumes are shown on Exhibits 7-1 through 7-6.

The lane configurations and traffic controls assumed to be in place for 2040 General Plan Cumulative With Current Approved Business Park Land Use, Without Portola Westerly Extension are consistent with LFTM (refer to Section 9.2.3 of this report for the relevant LFTM intersection improvement list).

LOS calculations were conducted for the study intersections to evaluate their operations under 2040 General Plan Cumulative With Current Approved Business Park Land Use, Without Portola Westerly Extension. The intersection analysis results are summarized in Table 7-1.

The intersection operations analysis worksheets for 2040 General Plan Cumulative With Current Approved Business Park Land Use, Without Portola Westerly Extension traffic conditions are included in Appendix 7.1 of this TIA.

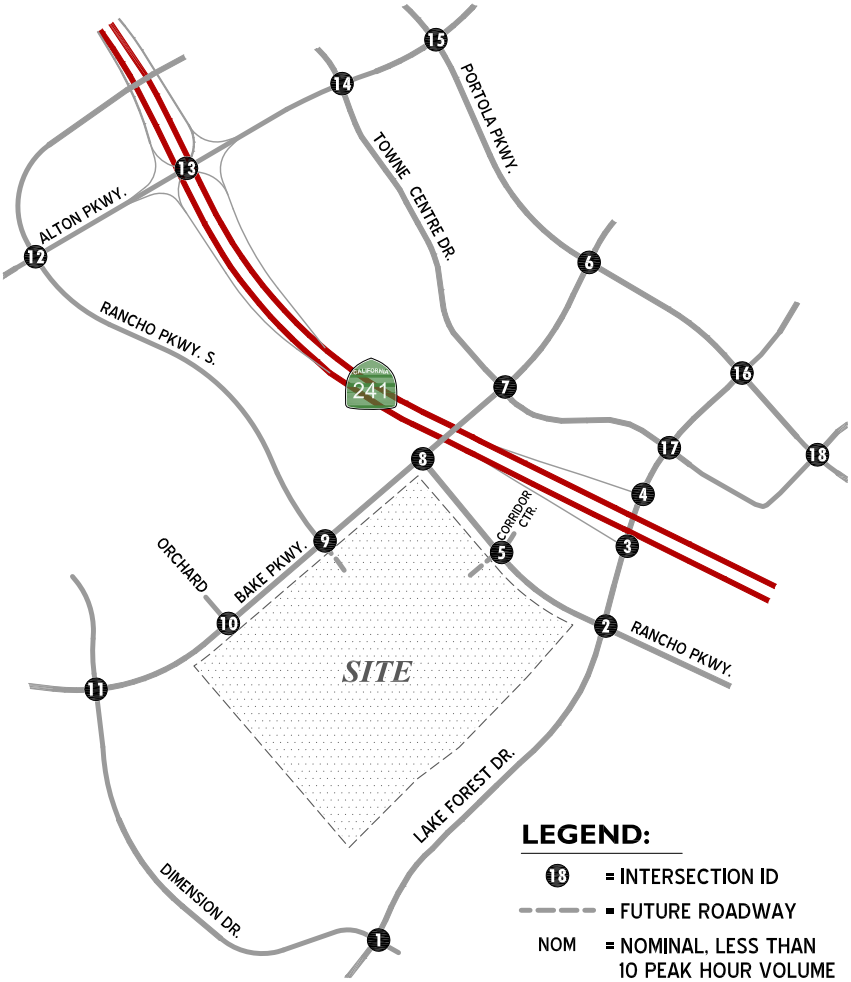
Study area intersections are anticipated to experience acceptable operations under 2040 General Plan Cumulative With Current Approved Business Park Land Use, Without Portola Westerly Extension with LFTM improvements.

7.2 2040 General Plan Cumulative With Project Land Use, Without Portola Westerly Extension

2040 General Plan Cumulative With Project Land Use, Without Portola Westerly Extension traffic volumes are shown on Exhibits 7-7 through 7-12.

The lane configurations and traffic controls assumed to be in place for 2040 General Plan Cumulative With Project Land Use, Without Portola Westerly Extension are consistent with LFTM.

EXHIBIT 7-1: 2040 GENERAL PLAN CUMULATIVE WITH CURRENT APPROVED BUSINESS PARK LAND USE, WITHOUT PORTOLA WESTERLY EXTENSION FOCUSED ANALYSIS AREA AM PEAK HOUR INTERSECTION VOLUMES



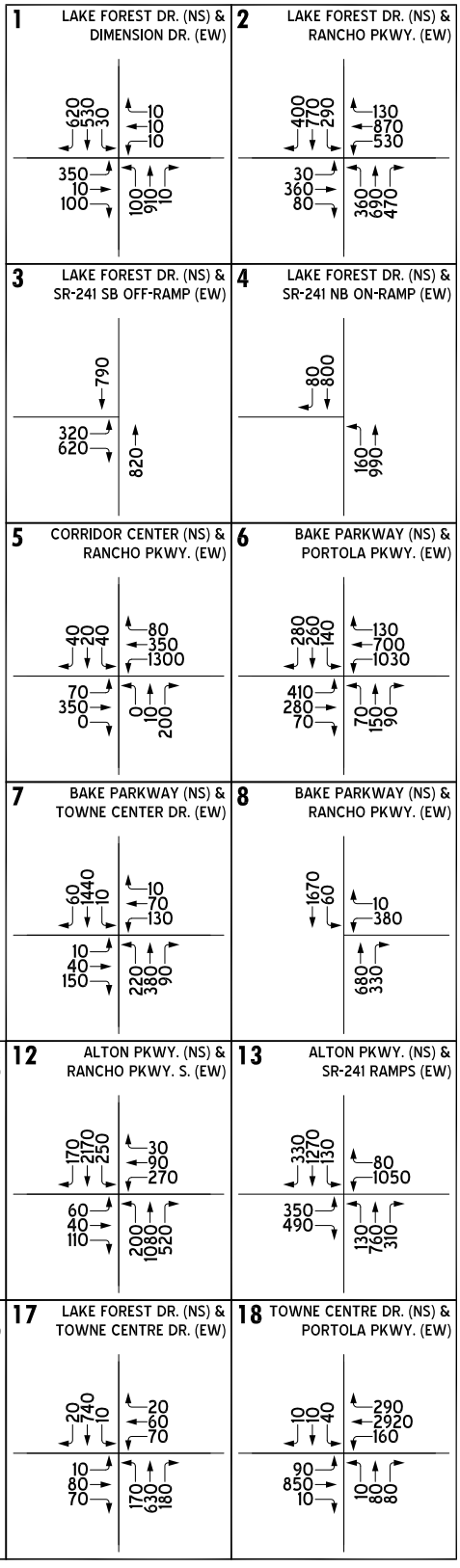
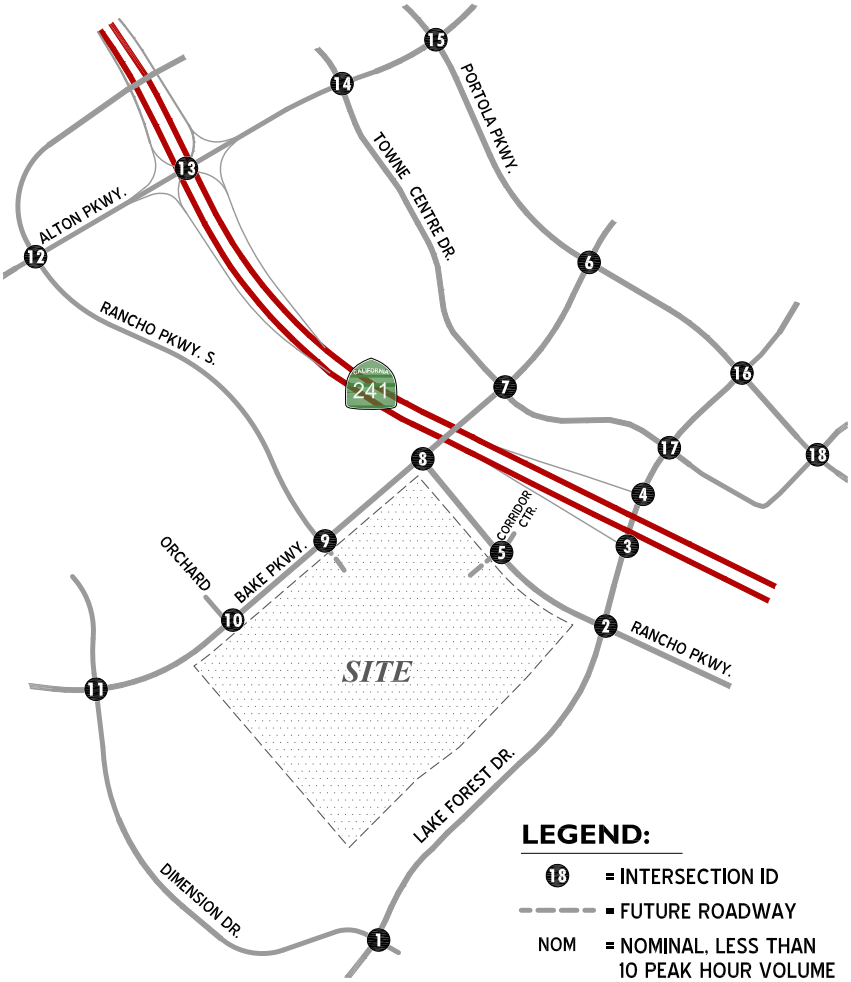


EXHIBIT 7-2: 2040 GENERAL PLAN CUMULATIVE WITH CURRENT APPROVED BUSINESS PARK LAND USE, WITHOUT PORTOLA WESTERLY EXTENSION FOCUSED ANALYSIS AREA PM PEAK HOUR INTERSECTION VOLUMES



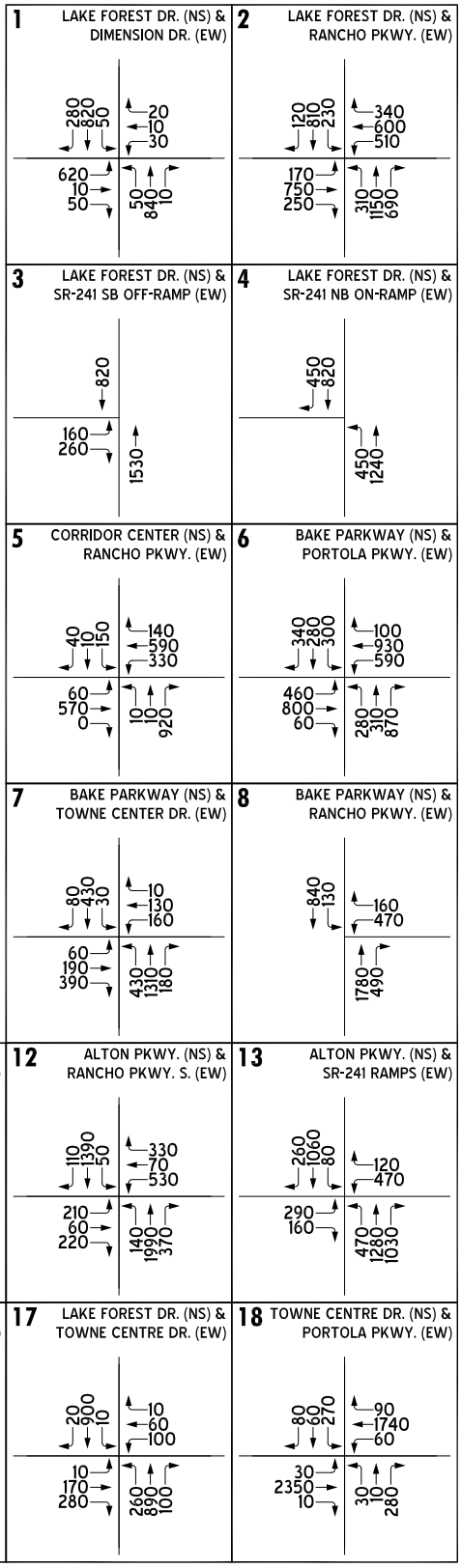
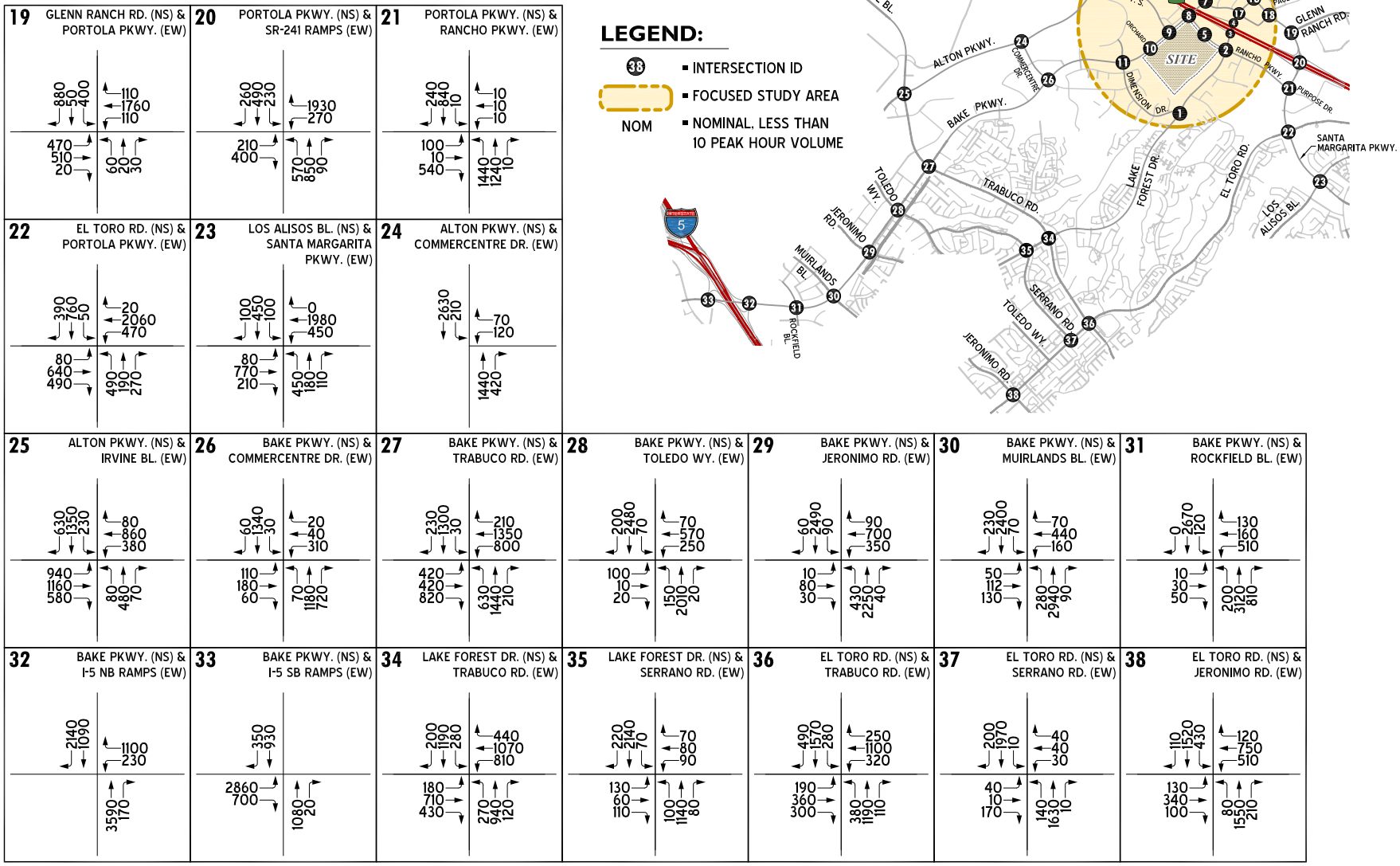


EXHIBIT 7-3: 2040 GENERAL PLAN CUMULATIVE WITH CURRENT APPROVED BUSINESS PARK LAND USE, WITHOUT PORTOLA WESTERLY EXTENSION EXPANDED AREA AM PEAK HOUR INTERSECTION VOLUMES



10820 - 02 - volumes & geometrics.dwg

URBAN CROSSROADS

EXHIBIT 7-4: 2040 GENERAL PLAN CUMULATIVE WITH CURRENT APPROVED BUSINESS PARK LAND USE, WITHOUT PORTOLA WESTERLY EXTENSION EXPANDED AREA PM PEAK HOUR INTERSECTION VOLUMES

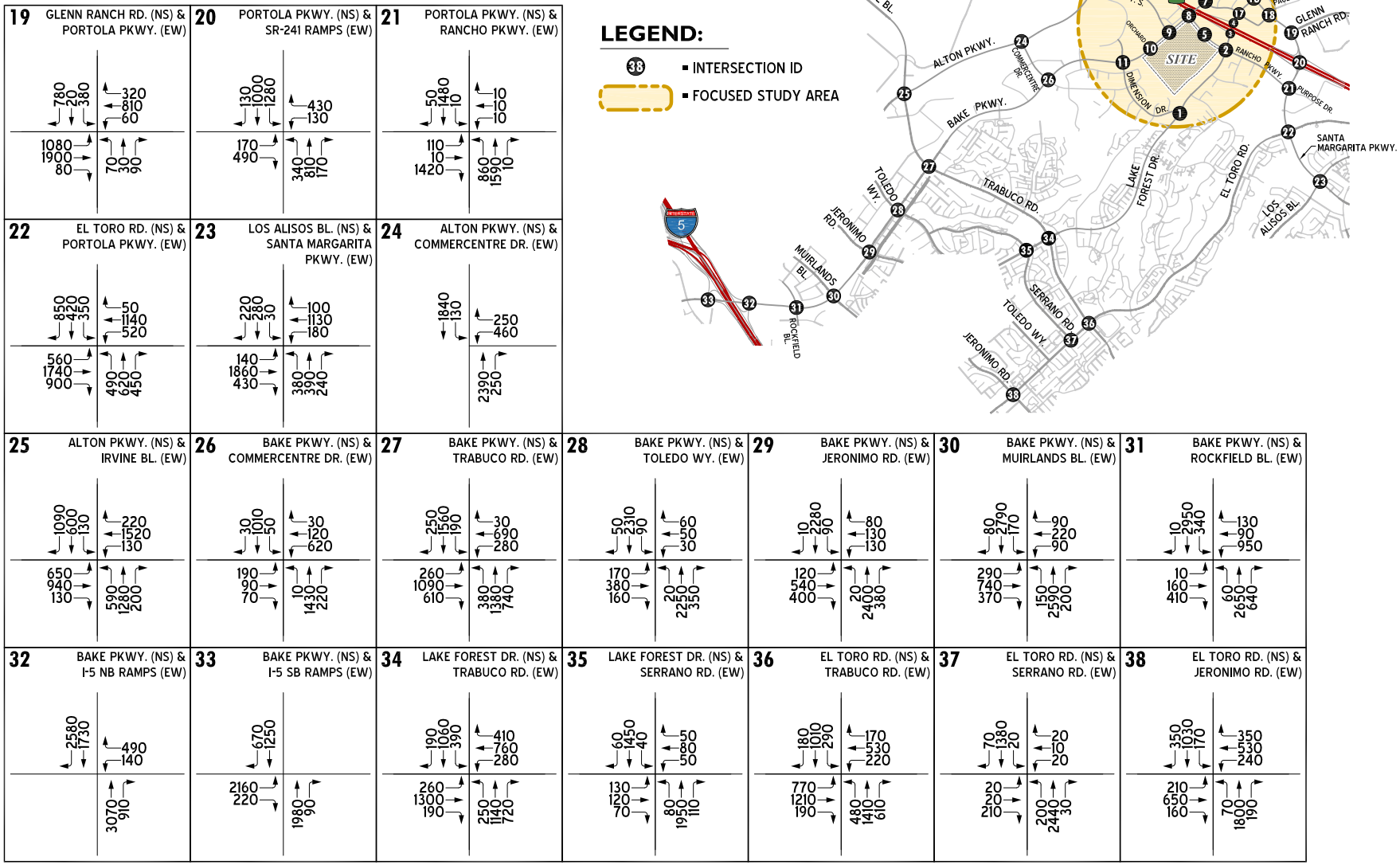


EXHIBIT 7-5: 2040 GENERAL PLAN CUMULATIVE WITH CURRENT APPROVED BUSINESS PARK LAND USE, WITHOUT PORTOLA WESTERLY EXTENSION FOCUSED ANALYSIS AREA AVERAGE DAILY TRAFFIC (ADT)

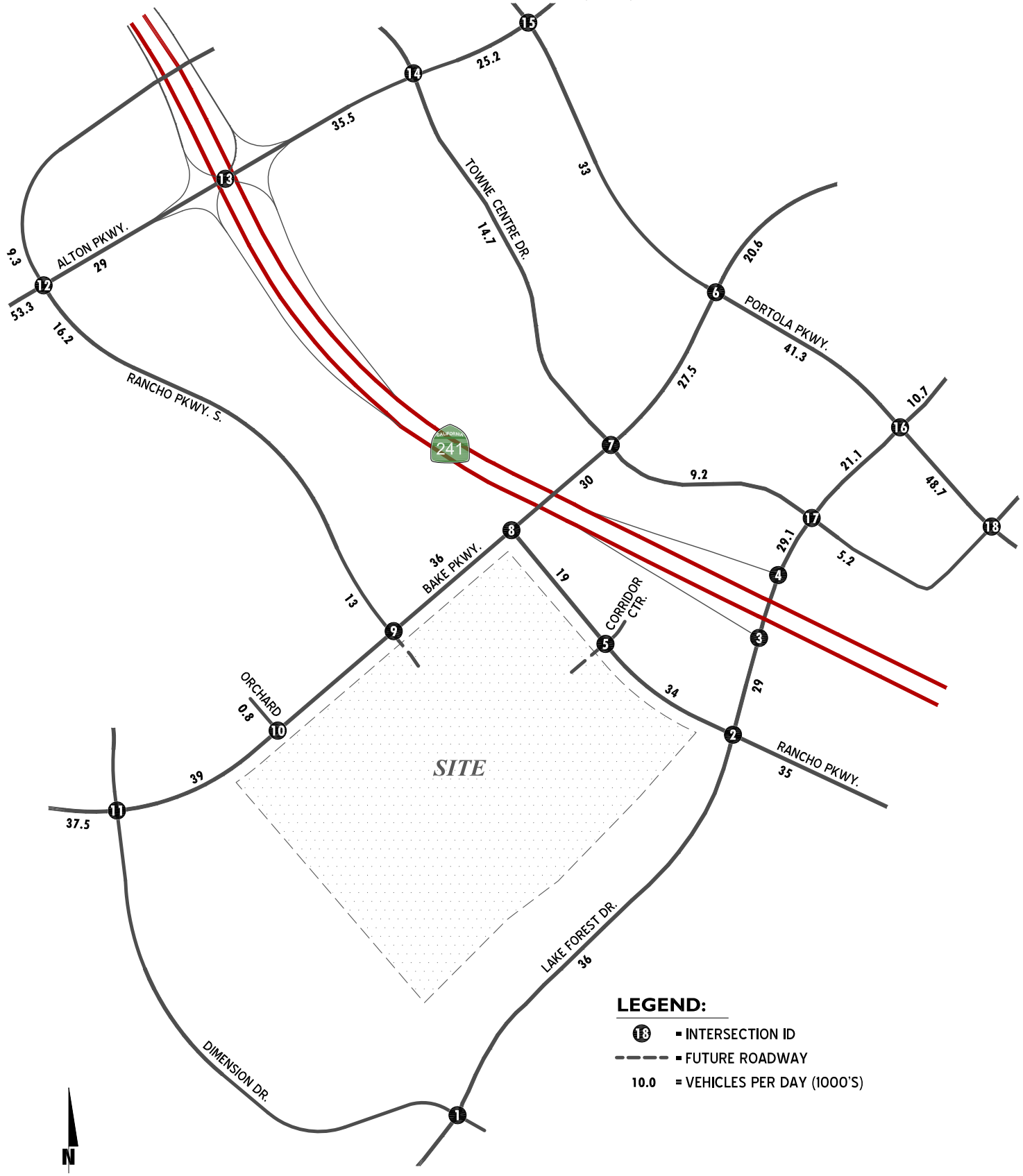


EXHIBIT 7-6: 2040 GENERAL PLAN CUMULATIVE WITH CURRENT APPROVED BUSINESS PARK LAND USE, WITHOUT PORTOLA WESTERLY EXTENSION EXPANDED AREA AVERAGE DAILY TRAFFIC (ADT)

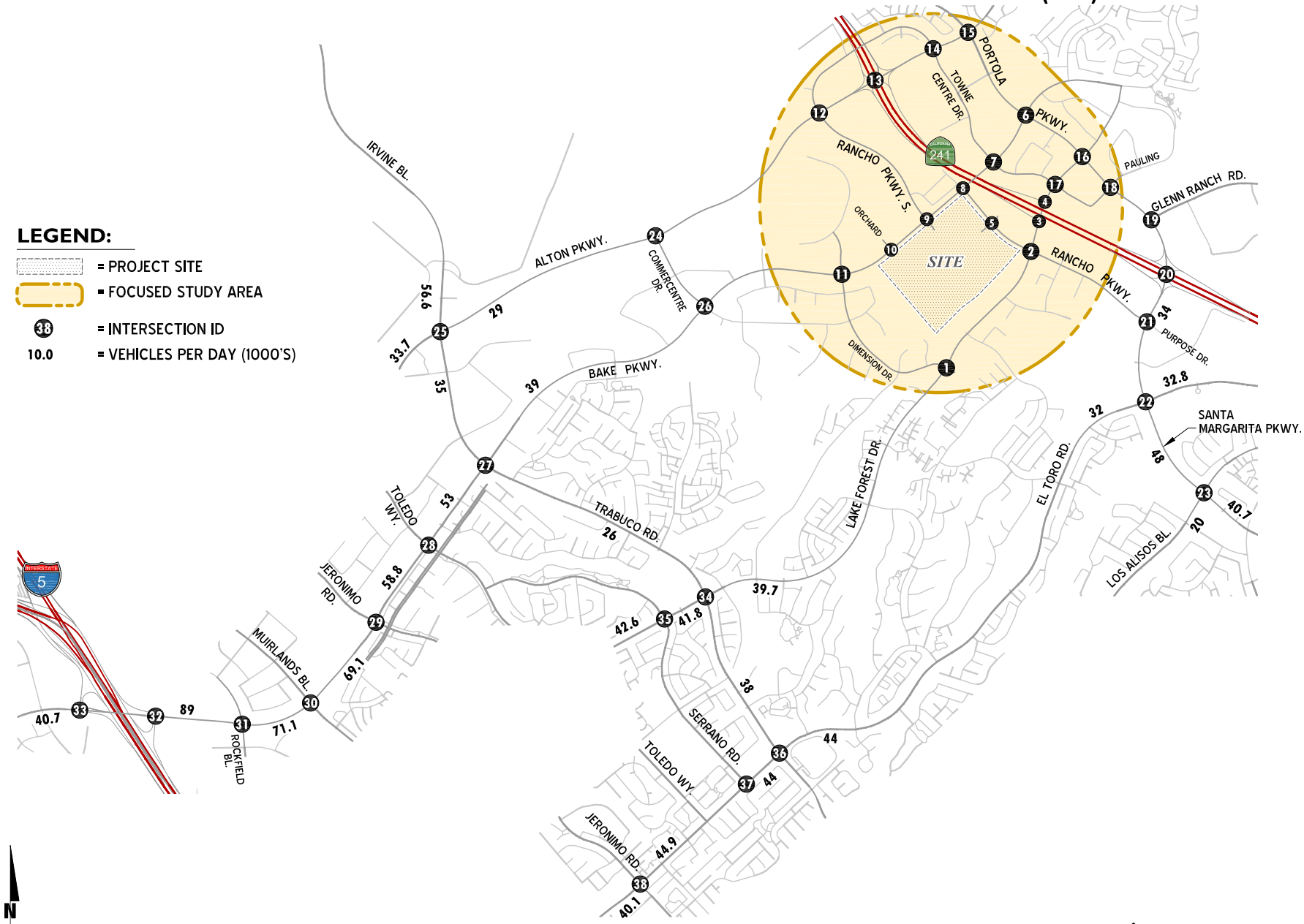


TABLE 7-1: INTERSECTION ANALYSIS SUMMARY FOR 2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITHOUT PORTOLA WESTERLY EXTENSION

#	Intersection	Traffic Control[4]	With Current Land Use				With Project			
			ICU[2] (v/c)		Level of Service[2]		ICU[2] (v/c)		Level of Service[2]	
			AM	PM	AM	PM	AM	PM	AM	PM
1	Lake Forest Dr. (NS) & Dimension Dr. (EW)	TS	0.51	0.54	A	A	0.50	0.52	A	A
2	Lake Forest Dr. (NS) & Rancho Pkwy. (EW)	TS	0.77	0.90	C	D	0.68	0.85	B	D
3	Lake Forest Dr. (NS) & SR-241 SB Off-Ramp (EW)	TS	0.64	0.55	B	A	0.51	0.50	A	A
4	Lake Forest Dr. (NS) & SR-241 NB On-Ramp (EW)	TS	0.34	0.44	A	A	0.35	0.42	A	A
5	Corridor Center (NS) & Rancho Pkwy. (EW)	TS	0.56	0.87	A	D	0.44	0.51	A	A
	- *HCM6 Delay (Seconds) / LOS* [5]	TS	-	-	-	-	22.1	22.5	C	C
6	Bake Parkway (NS) & Portola Pkwy. (EW)	TS	0.52	0.74	A	C	0.52	0.72	A	C
7	Bake Parkway (NS) & Towne Center Dr. (EW)	TS	0.65	0.65	B	B	0.61	0.67	B	B
8	Bake Parkway (NS) & Rancho Pkwy. (EW)	TS	0.65	0.79	B	C	0.65	0.79	B	C
9	Bake Parkway (NS) & Rancho Pkwy. S. (EW)	TS	0.85	0.86	D	D	0.78	0.77	C	C
10	Bake Parkway (NS) & Orchard (EW)	CSS	0.61	0.69	A	A	0.67	0.72	A	A
	- *HCM6 Delay (Seconds) / LOS* [3]	CSS	21.6	18.5	C	C	24.8	28.0	C	D
11	Dimension Dr. (NS) & Bake Parkway (EW)	TS	0.68	0.80	B	C	0.61	0.83	B	D
12	Alton Pkwy. (NS) & Rancho Pkwy. S. (EW)	TS	0.71	0.79	C	C	0.75	0.73	C	C
13	Alton Pkwy. (NS) & SR-241 Ramps (EW)	TS	0.69	0.68	B	B	0.68	0.60	B	A
14	Alton Pkwy. (NS) & Towne Centre Dr. (EW)	TS	0.44	0.50	A	A	0.44	0.50	A	A
15	Alton Pkwy. (NS) & Portola Pkwy. (EW)	TS	0.47	0.36	A	A	0.47	0.37	A	A
16	Lake Forest Dr. (NS) & Portola Pkwy. (EW)	TS	0.61	0.89	B	D	0.60	0.79	A	C
17	Lake Forest Dr. (NS) & Towne Centre Dr. (EW)	TS	0.41	0.55	A	A	0.36	0.55	A	A
18	Towne Centre Dr. (NS) & Portola Pkwy. (EW)	TS	0.71	0.75	C	C	0.66	0.71	B	C
19	Glenn Ranch Rd. (NS) & Portola Pkwy. (EW)	TS	0.67	0.66	B	B	0.65	0.63	B	B
20	Portola Pkwy. (NS) & SR-241 Ramps (EW)	TS	0.44	0.69	A	B	0.42	0.63	A	B
21	Portola Pkwy. (NS) & Rancho Pkwy. (EW)	TS	0.66	0.63	B	B	0.61	0.62	B	B
22	El Toro Rd. (NS) & Portola Pkwy. (EW)	TS	0.66	0.87	B	D	0.64	0.87	B	D
23	Los Alisos Bl. (NS) & Santa Margarita Pkwy. (EW)	TS	0.88	0.82	D	D	0.85	0.83	D	D
24	Alton Pkwy. (NS) & Commercentre Dr. (EW)	TS	0.61	0.74	B	C	0.62	0.75	B	C
25	Alton Pkwy. (NS) & Irvine Bl. (EW)	TS	0.76	0.77	C	C	0.77	0.78	C	C
26	Bake Pkwy. (NS) & Commercentre Dr. (EW)	TS	0.64	0.73	B	C	0.67	0.75	B	C
27	Bake Pkwy. (NS) & Irvine Bl. - Trabuco Rd. (EW)	TS	0.85	0.82	D	D	0.88	0.82	D	D
28	Bake Pkwy. (NS) & Toledo Wy. (EW)	TS	0.85	0.67	D	B	0.86	0.69	D	B
29	Bake Pkwy. (NS) & Jeronimo Rd. (EW)	TS	0.79	0.81	C	D	0.78	0.81	C	D
30	Bake Pkwy. (NS) & Muirlands Bl. (EW)	TS	0.64	0.75	B	C	0.64	0.74	B	C
31	Bake Pkwy. (NS) & Rockfield Bl. (EW)	TS	0.66	0.78	B	C	0.64	0.78	B	C
32	Bake Pkwy. (NS) & I-5 NB Ramps (EW)	TS	0.80	0.60	C	A	0.77	0.60	C	A
33	Bake Pkwy. (NS) & I-5 SB Ramps (EW)	TS	0.83	0.88	D	D	0.82	0.89	D	D
34	Lake Forest Dr. (NS) & Trabuco Rd. (EW)	TS	0.83	0.85	D	D	0.87	0.85	D	D
35	Lake Forest Dr. (NS) & Serrano Rd. (EW)	TS	0.70	0.61	B	B	0.72	0.63	C	B
36	El Toro Rd. (NS) & Trabuco Rd. (EW)	TS	0.75	0.77	C	C	0.77	0.77	C	C
37	El Toro Rd. (NS) & Serrano Rd. (EW)	TS	0.65	0.69	B	B	0.63	0.71	B	C
38	El Toro Rd. (NS) & Jeronimo Rd. (EW)	TS	0.90	0.81	D	D	0.85	0.83	D	D

[1] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.
L = Left; T = Through; R = Right; ! = Shared Left/Through/Right Lane; d = Defacto Right Turn Lane; > = Right Turn Overlap; >> Free-Right Turn

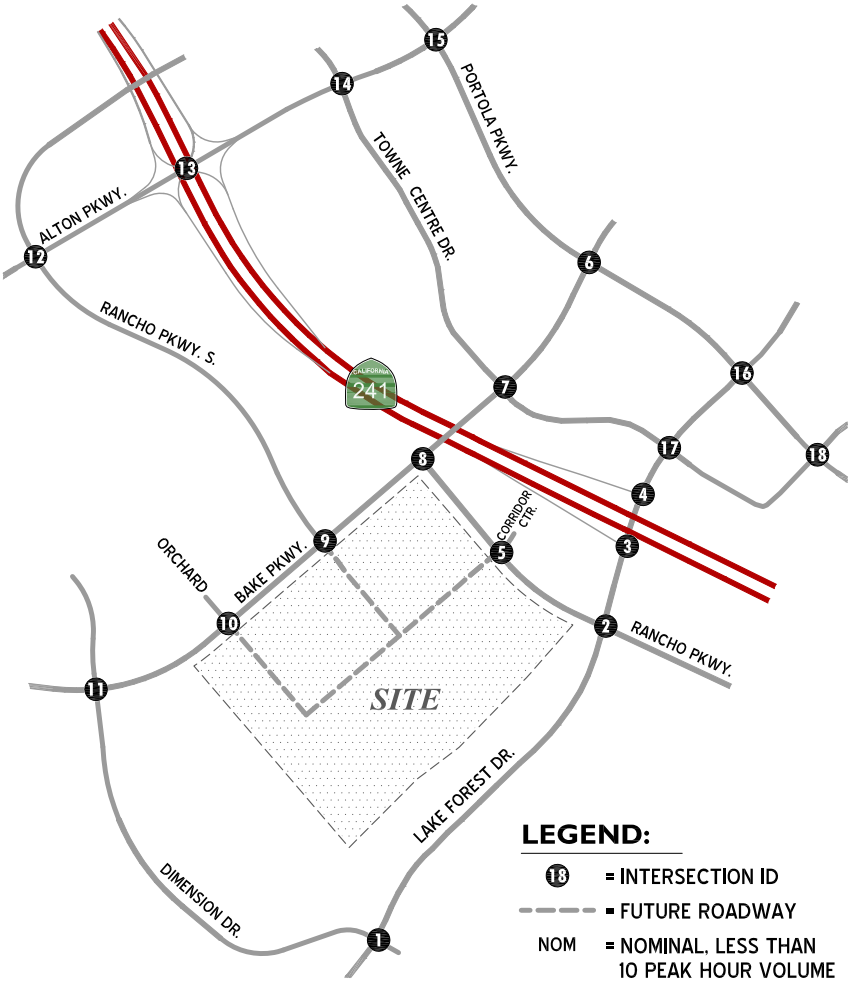
[2] For signalized intersections, Volume/Capacity Ratio and Level of Service are presented based on the Intersection Capacity Utilization (ICU) method.

[3] For the unsignalized intersection of Bake Parkway / Orchard (#10), Delay (in seconds) and Level of Service is also calculated using Synchro 10 analysis software based on the Highway Capacity Manual 6th Edition (HCM6) method.

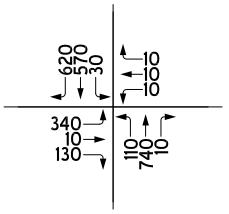
[4] TS = Traffic Signal; Cross-Street Stop

[5] Permitted-Protected Left Turn Phasing Option for the NB/SB approach at the intersection of Corridor Center/Rancho Parkway (#5) has been evaluated using Syncho 10 analysis software (HCM6 methodology).

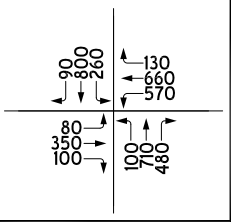
EXHIBIT 7-7: 2040 GENERAL PLAN CUMULATIVE WITH PROJECT, WITHOUT PORTOLA WESTERLY EXTENSION FOCUSED ANALYSIS AREA AM PEAK HOUR INTERSECTION VOLUMES



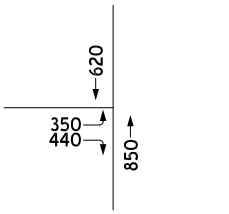
1 LAKE FOREST DR. (NS) & DIMENSION DR. (EW)



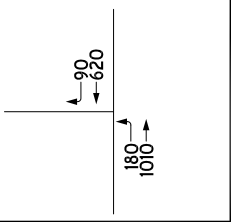
2 LAKE FOREST DR. (NS) & RANCHO PKWY. (EW)



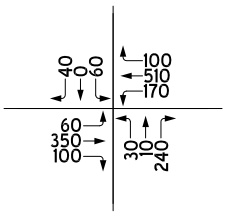
3 LAKE FOREST DR. (NS) & SR-241 SB OFF-RAMP (EW)



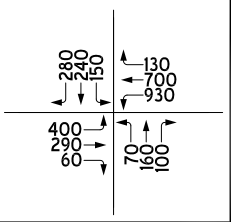
4 LAKE FOREST DR. (NS) & SR-241 NB ON-RAMP (EW)



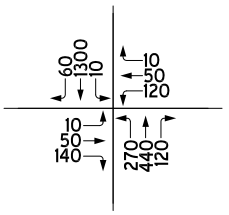
5 CORRIDOR CENTER (NS) & RANCHO PKWY. (EW)



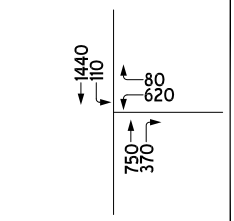
6 BAKE PARKWAY (NS) & PORTOLA PKWY. (EW)



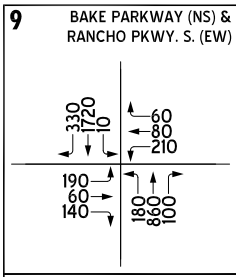
7 BAKE PARKWAY (NS) & TOWNE CENTER DR. (EW)



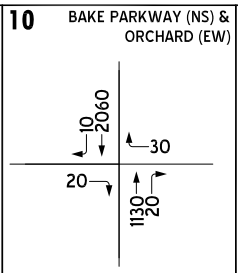
8 BAKE PARKWAY (NS) & RANCHO PKWY. (EW)



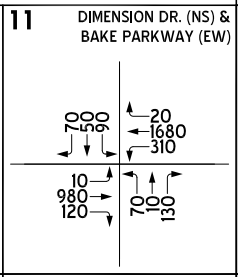
9 BAKE PARKWAY (NS) & RANCHO PKWY. S. (EW)



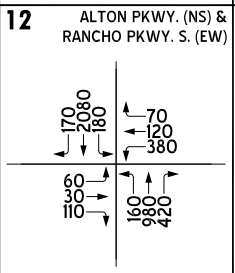
10 BAKE PARKWAY (NS) & ORCHARD (EW)



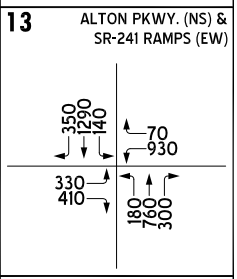
11 DIMENSION DR. (NS) & BAKE PARKWAY (EW)



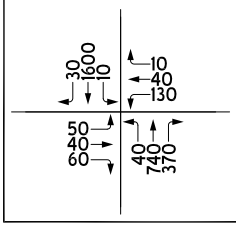
12 ALTON PKWY. (NS) & RANCHO PKWY. S. (EW)



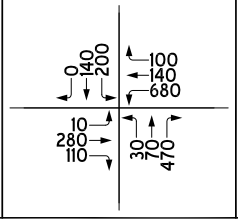
13 ALTON PKWY. (NS) & SR-241 RAMPS (EW)



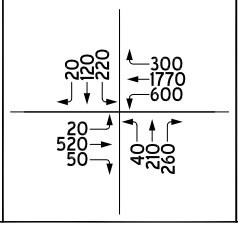
14 ALTON PKWY. (NS) & TOWNE CENTRE DR. (EW)



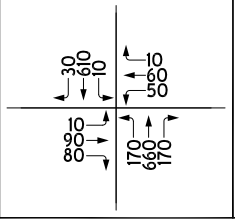
15 ALTON PKWY. (NS) & PORTOLA PKWY. (EW)



16 LAKE FOREST DR. (NS) & PORTOLA PKWY. (EW)



17 LAKE FOREST DR. (NS) & TOWNE CENTRE DR. (EW)



18 TOWNE CENTRE DR. (NS) & PORTOLA PKWY. (EW)

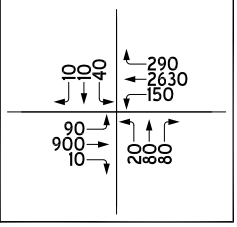
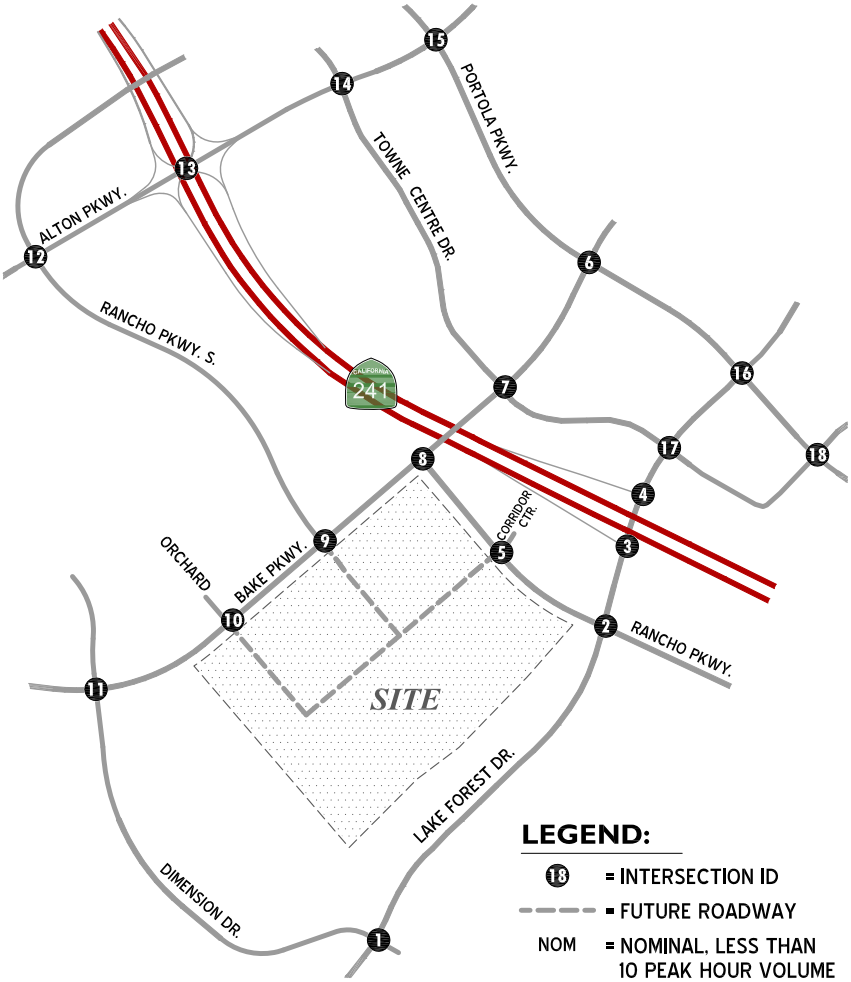


EXHIBIT 7-8: 2040 GENERAL PLAN CUMULATIVE WITH PROJECT, WITHOUT PORTOLA WESTERLY EXTENSION FOCUSED ANALYSIS AREA PM PEAK HOUR INTERSECTION VOLUMES



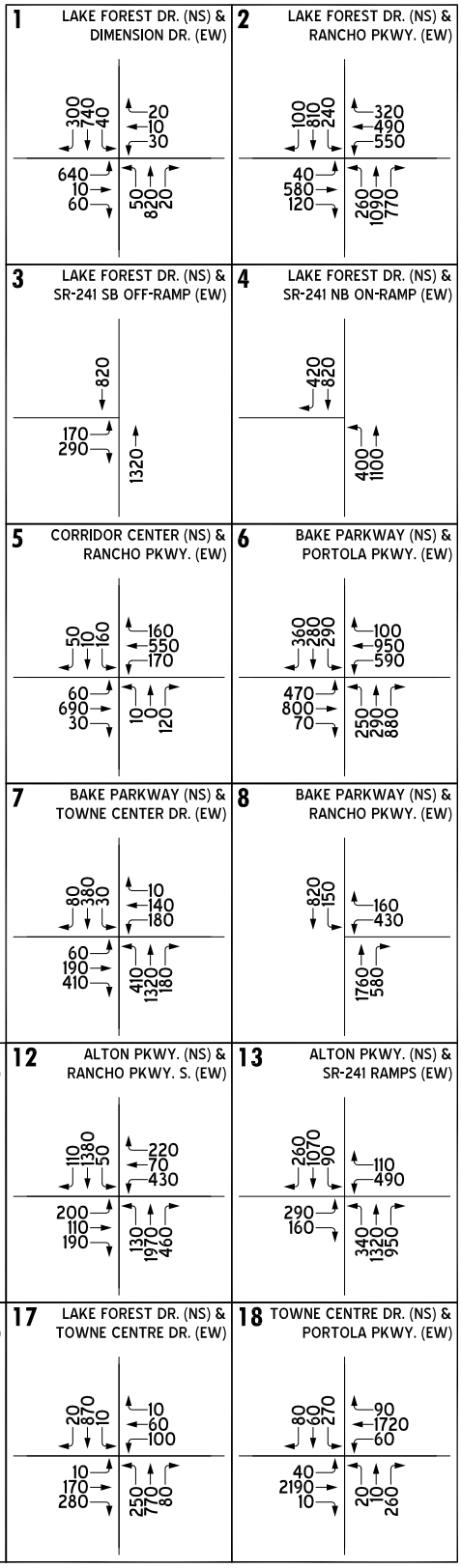
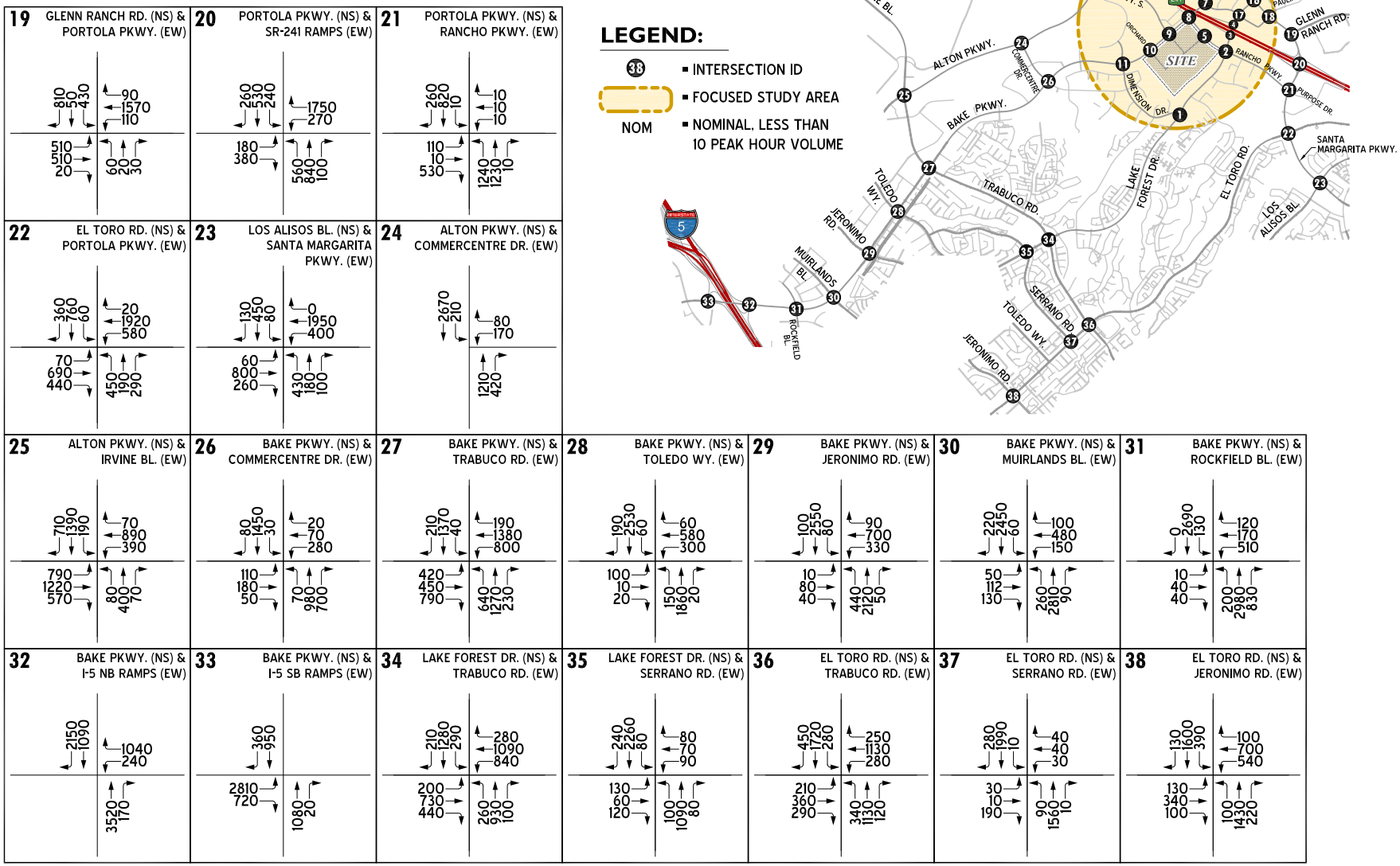


EXHIBIT 7-9: 2040 GENERAL PLAN CUMULATIVE WITH PROJECT, WITHOUT PORTOLA WESTERLY EXTENSION EXPANDED AREA AM PEAK HOUR INTERSECTION VOLUMES



10820 - 02 - volumes & geometrics.dwg

EXHIBIT 7-10: 2040 GENERAL PLAN CUMULATIVE WITH PROJECT, WITHOUT PORTOLA WESTERLY EXTENSION EXPANDED AREA PM PEAK HOUR INTERSECTION VOLUMES

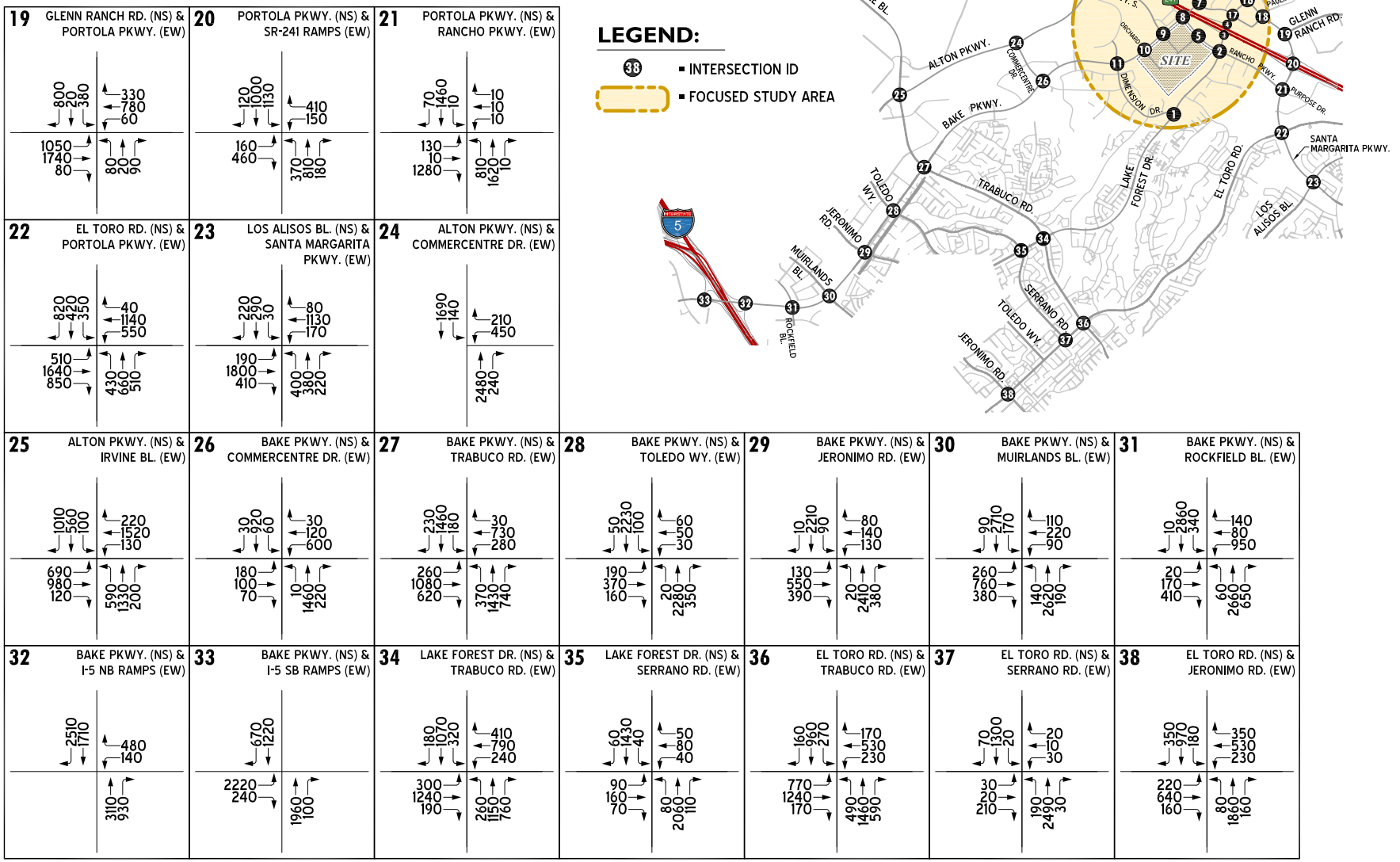


EXHIBIT 7-11: 2040 GENERAL PLAN CUMULATIVE WITH PROJECT, WITHOUT PORTOLA WESTERLY EXTENSION FOCUSED ANALYSIS AREA AVERAGE DAILY TRAFFIC (ADT)

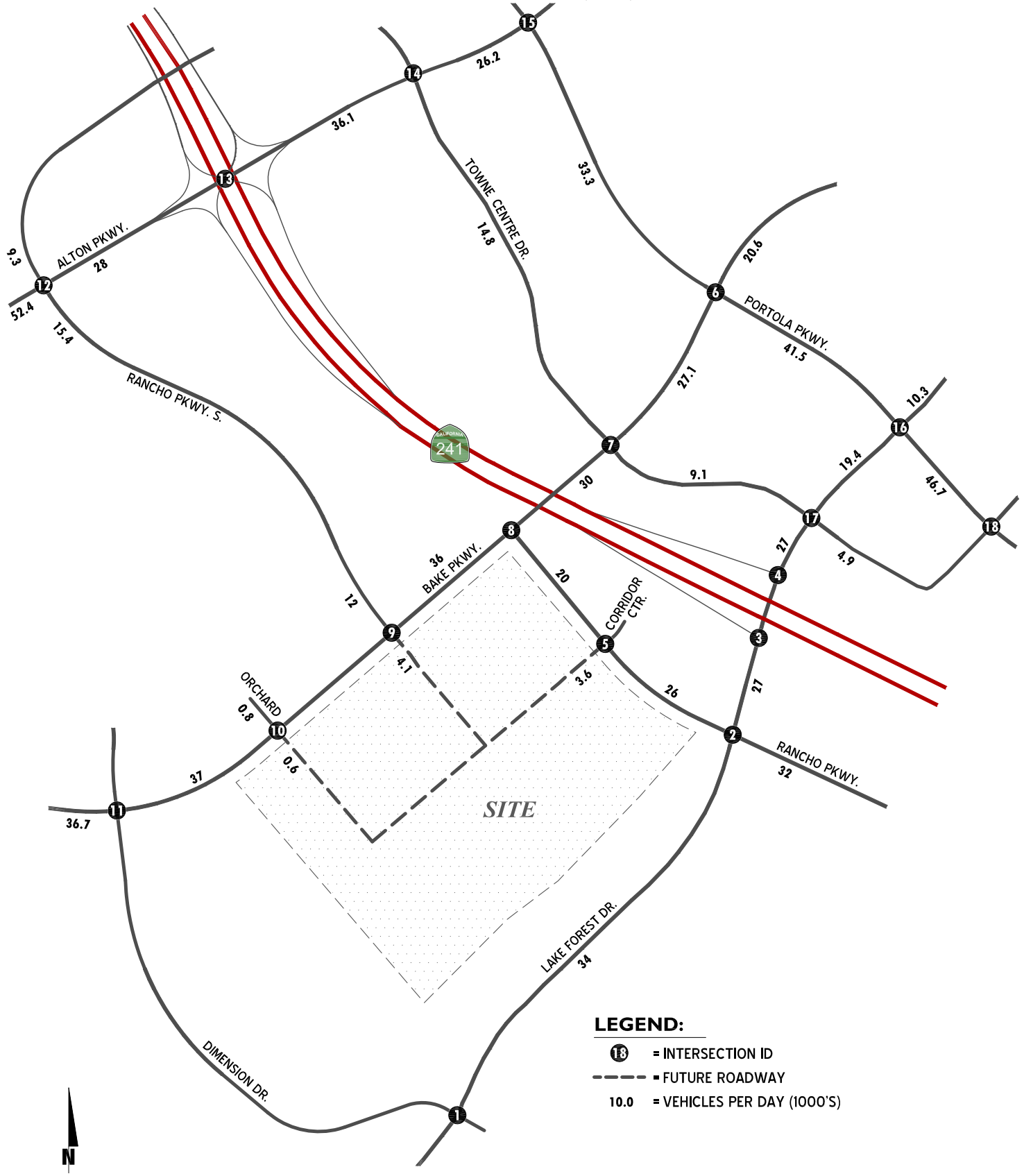
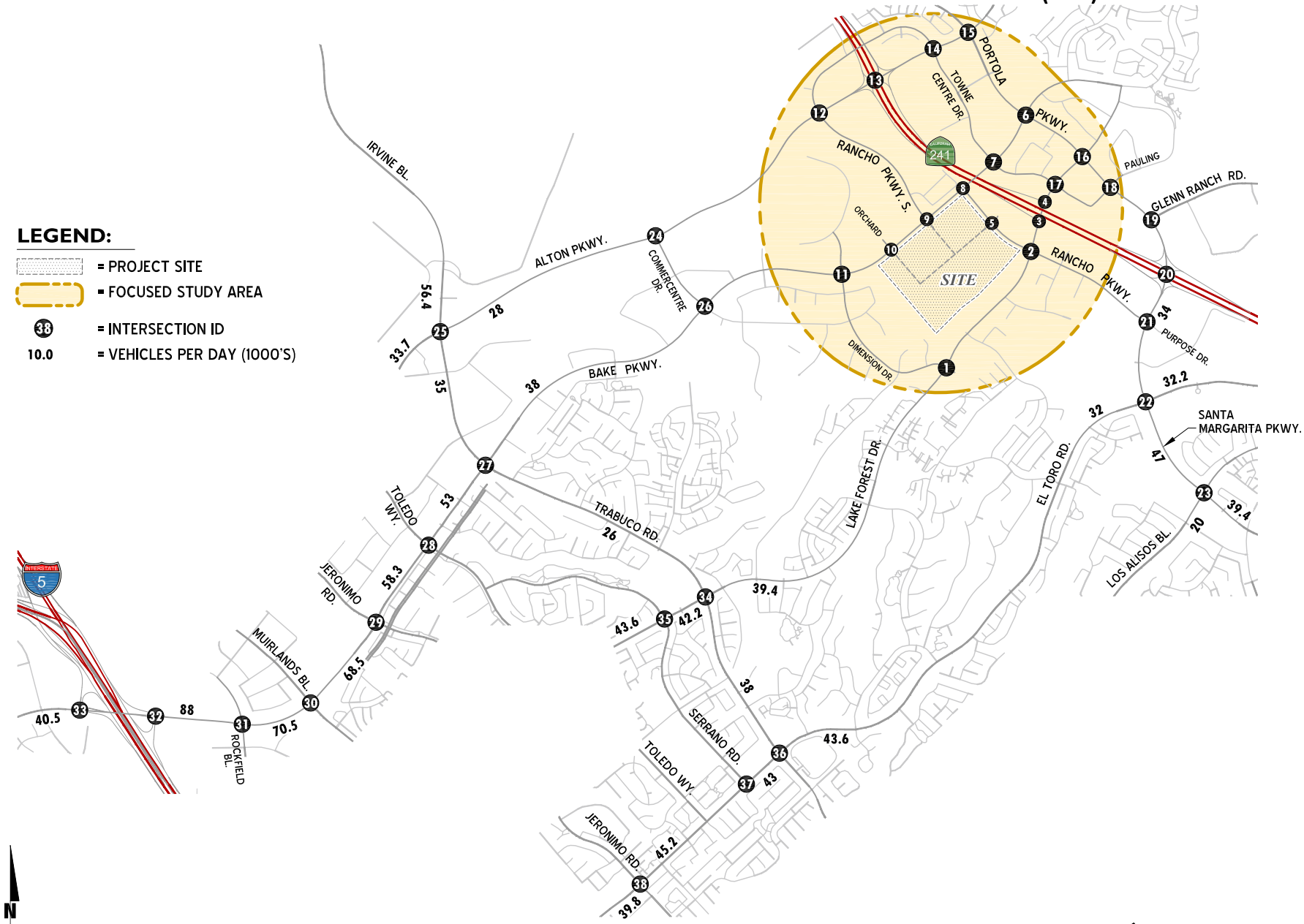


EXHIBIT 7-12: 2040 GENERAL PLAN CUMULATIVE WITH PROJECT, WITHOUT PORTOLA WESTERLY EXTENSION EXPANDED AREA AVERAGE DAILY TRAFFIC (ADT)



LOS calculations were conducted for the study intersections to evaluate their operations under 2040 General Plan Cumulative With Project Land Use, Without Portola Westerly Extension. The intersection analysis results are also summarized in Table 7-1.

The intersection operations analysis worksheets for 2040 General Plan Cumulative With Current Approved Project Land Use, Without Portola Westerly Extension traffic conditions are included in Appendix 7.1 of this TIA.

Study area intersections are anticipated to experience acceptable operations under 2040 General Plan Cumulative With Project Land Use, Without Portola Westerly Extension with LFTM improvements.

7.3 2040 General Plan Cumulative With Current Approved Business Park Land Use, With Portola Westerly Extension

2040 General Plan Cumulative With Current Approved Business Park Land Use, With Portola Westerly Extension traffic volumes are shown on Exhibits 7-13 through 7-18.

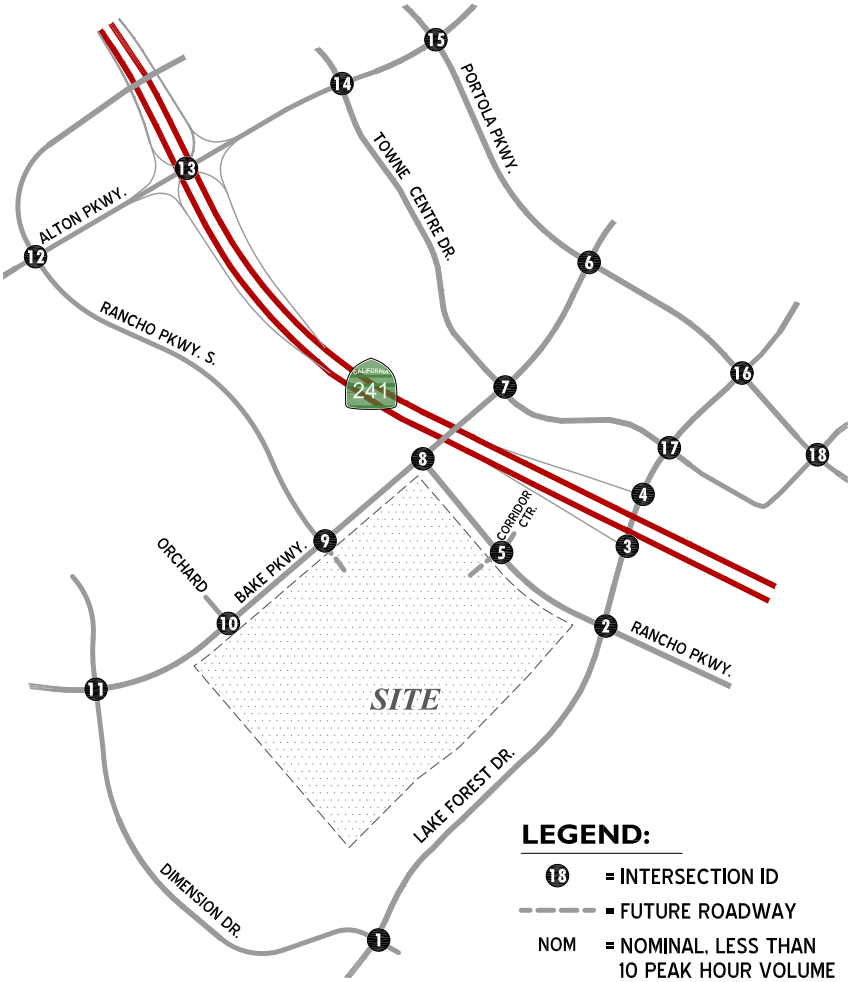
The lane configurations and traffic controls assumed to be in place for 2040 General Plan Cumulative With Current Approved Business Park Land Use, With Portola Westerly Extension are consistent with LFTM.

LOS calculations were conducted for the study intersections to evaluate their operations under 2040 General Plan Cumulative With Current Approved Business Park Land Use, With Portola Westerly Extension. The intersection analysis results are summarized in Table 7-2.

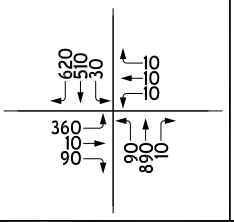
The intersection operations analysis worksheets for 2040 General Plan Cumulative With Current Approved Business Park Land Use, With Portola Westerly Extension traffic conditions are included in Appendix 7.1 of this TIA.

Study area intersections are anticipated to experience acceptable operations under 2040 General Plan Cumulative With Current Approved Business Park Land Use, **With** Portola Westerly Extension and with LFTM improvements.

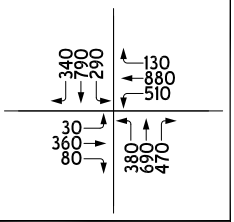
EXHIBIT 7-13: 2040 GENERAL PLAN CUMULATIVE WITH CURRENT APPROVED BUSINESS PARK LAND USE, WITH PORTOLA WESTERLY EXTENSION FOCUSED ANALYSIS AREA AM PEAK HOUR INTERSECTION VOLUMES



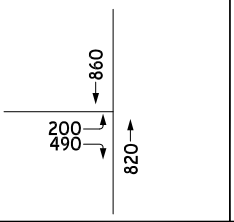
1 LAKE FOREST DR. (NS) & DIMENSION DR. (EW)



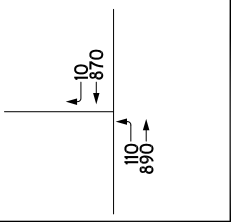
2 LAKE FOREST DR. (NS) & RANCHO PKWY. (EW)



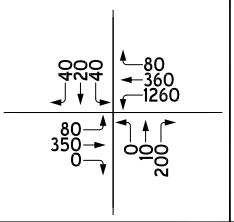
3 LAKE FOREST DR. (NS) & SR-241 SB OFF-RAMP (EW)



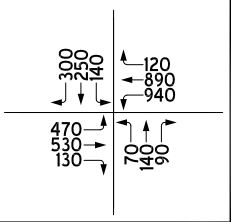
4 LAKE FOREST DR. (NS) & SR-241 NB ON-RAMP (EW)



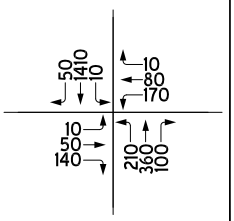
5 CORRIDOR CENTER (NS) & RANCHO PKWY. (EW)



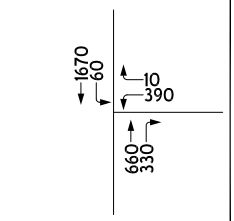
6 BAKE PARKWAY (NS) & PORTOLA PKWY. (EW)



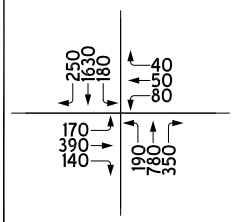
7 BAKE PARKWAY (NS) & TOWNE CENTER DR. (EW)



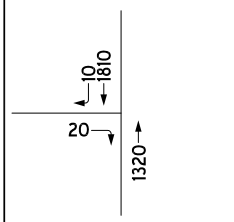
8 BAKE PARKWAY (NS) & RANCHO PKWY. (EW)



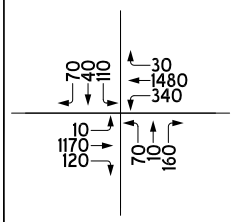
9 BAKE PARKWAY (NS) & RANCHO PKWY. S. (EW)



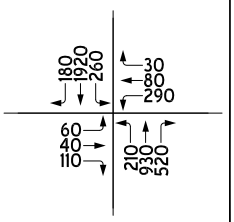
10 BAKE PARKWAY (NS) & ORCHARD (EW)



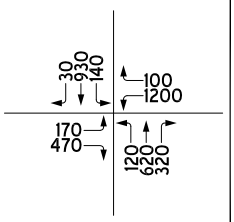
11 DIMENSION DR. (NS) & BAKE PARKWAY (EW)



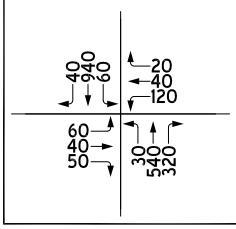
12 ALTON PKWY. (NS) & RANCHO PKWY. S. (EW)



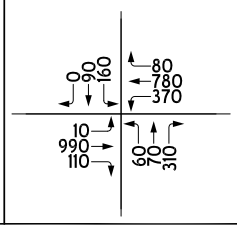
13 ALTON PKWY. (NS) & SR-241 RAMPS (EW)



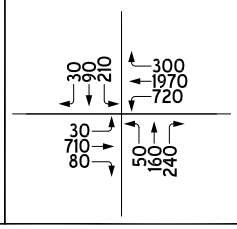
14 ALTON PKWY. (NS) & TOWNE CENTRE DR. (EW)



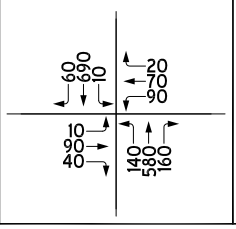
15 ALTON PKWY. (NS) & PORTOLA PKWY. (EW)



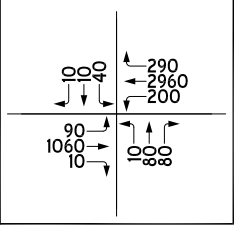
16 LAKE FOREST DR. (NS) & PORTOLA PKWY. (EW)



17 LAKE FOREST DR. (NS) & TOWNE CENTRE DR. (EW)

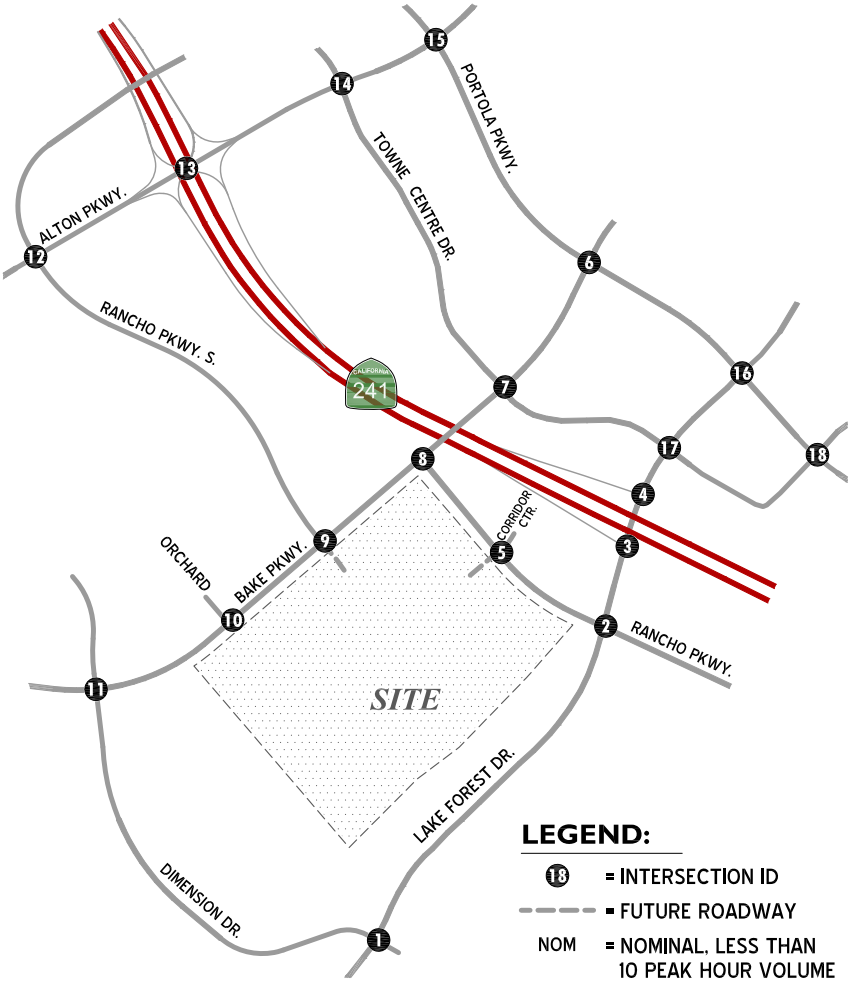


18 TOWNE CENTRE DR. (NS) & PORTOLA PKWY. (EW)

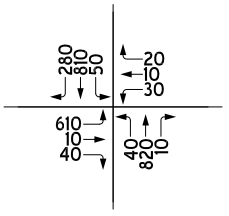


N

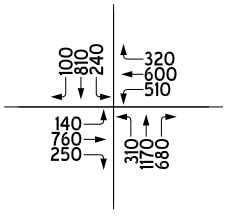
EXHIBIT 7-14: 2040 GENERAL PLAN CUMULATIVE WITH CURRENT APPROVED BUSINESS PARK LAND USE, WITH PORTOLA WESTERLY EXTENSION FOCUSED ANALYSIS AREA PM PEAK HOUR INTERSECTION VOLUMES



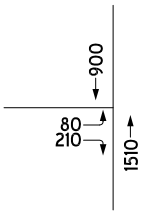
1 LAKE FOREST DR. (NS) & DIMENSION DR. (EW)



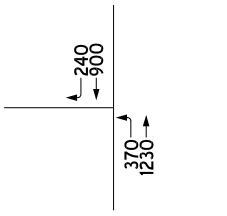
2 LAKE FOREST DR. (NS) & RANCHO PKWY. (EW)



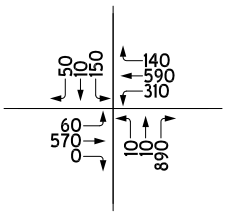
3 LAKE FOREST DR. (NS) & SR-241 SB OFF-RAMP (EW)



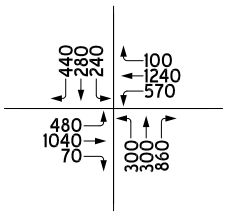
4 LAKE FOREST DR. (NS) & SR-241 NB ON-RAMP (EW)



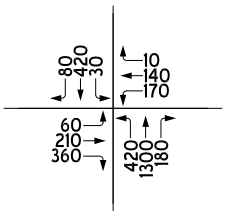
5 CORRIDOR CENTER (NS) & RANCHO PKWY. (EW)



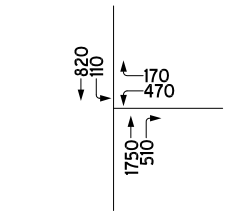
6 BAKE PARKWAY (NS) & PORTOLA PKWY. (EW)



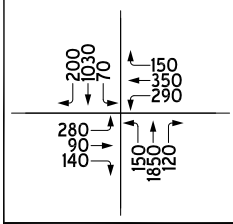
7 BAKE PARKWAY (NS) & TOWNE CENTER DR. (EW)



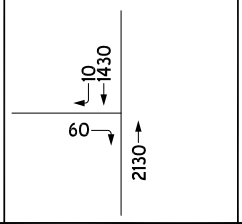
8 BAKE PARKWAY (NS) & RANCHO PKWY. (EW)



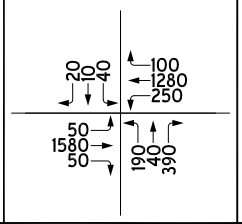
9 BAKE PARKWAY (NS) & RANCHO PKWY. S. (EW)



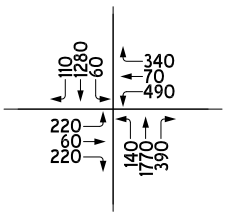
10 BAKE PARKWAY (NS) & ORCHARD (EW)



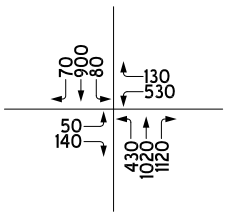
11 DIMENSION DR. (NS) & BAKE PARKWAY (EW)



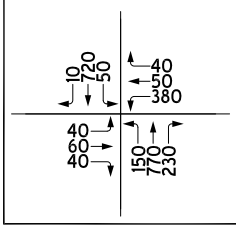
12 ALTON PKWY. (NS) & RANCHO PKWY. S. (EW)



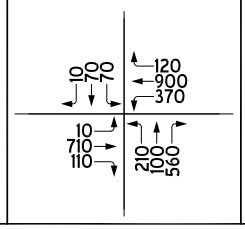
13 ALTON PKWY. (NS) & SR-241 RAMPS (EW)



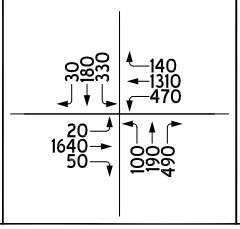
14 ALTON PKWY. (NS) & TOWNE CENTRE DR. (EW)



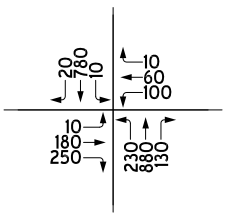
15 ALTON PKWY. (NS) & PORTOLA PKWY. (EW)



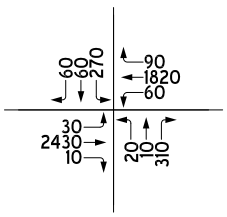
16 LAKE FOREST DR. (NS) & PORTOLA PKWY. (EW)



17 LAKE FOREST DR. (NS) & TOWNE CENTRE DR. (EW)

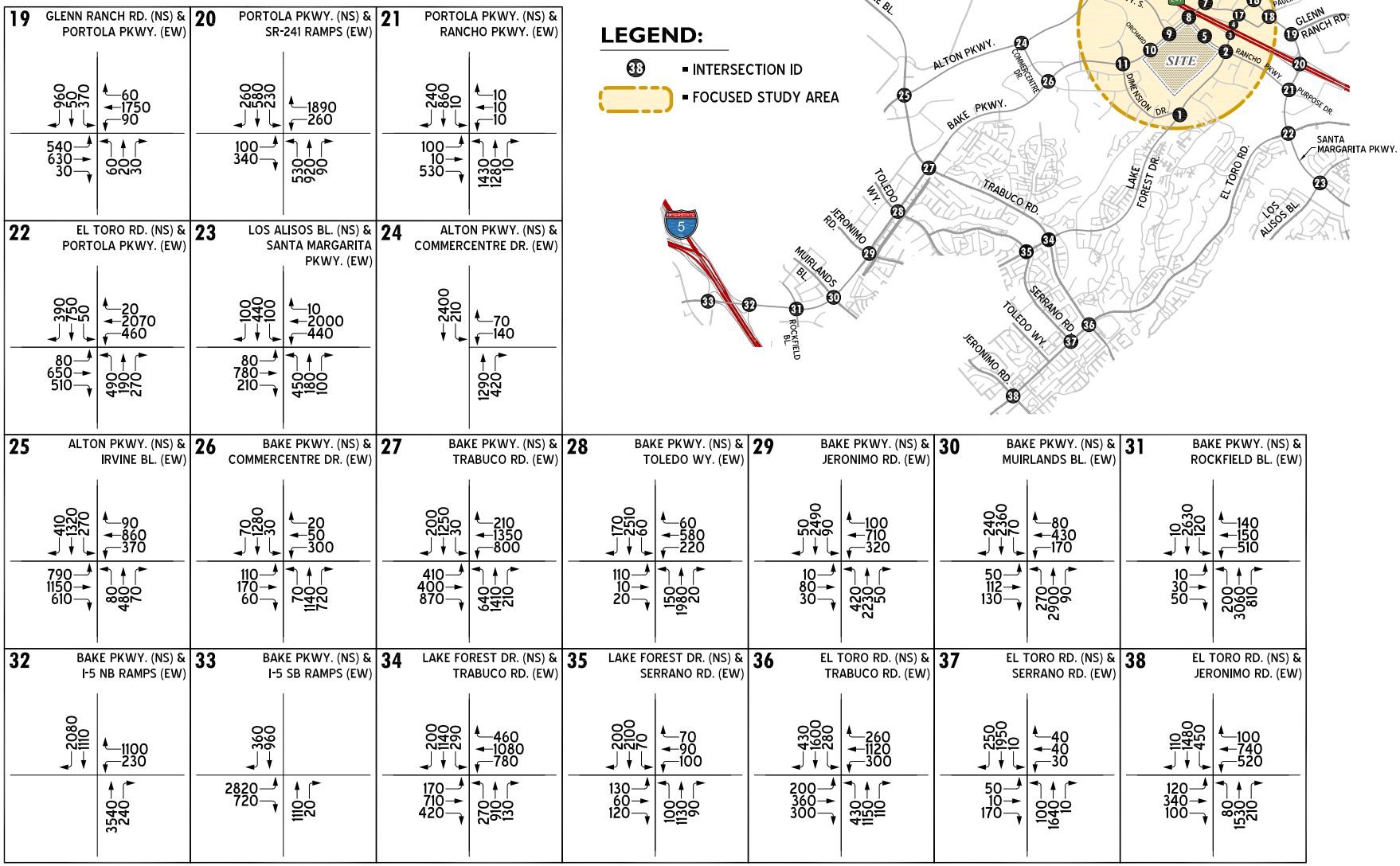


18 TOWNE CENTRE DR. (NS) & PORTOLA PKWY. (EW)



N

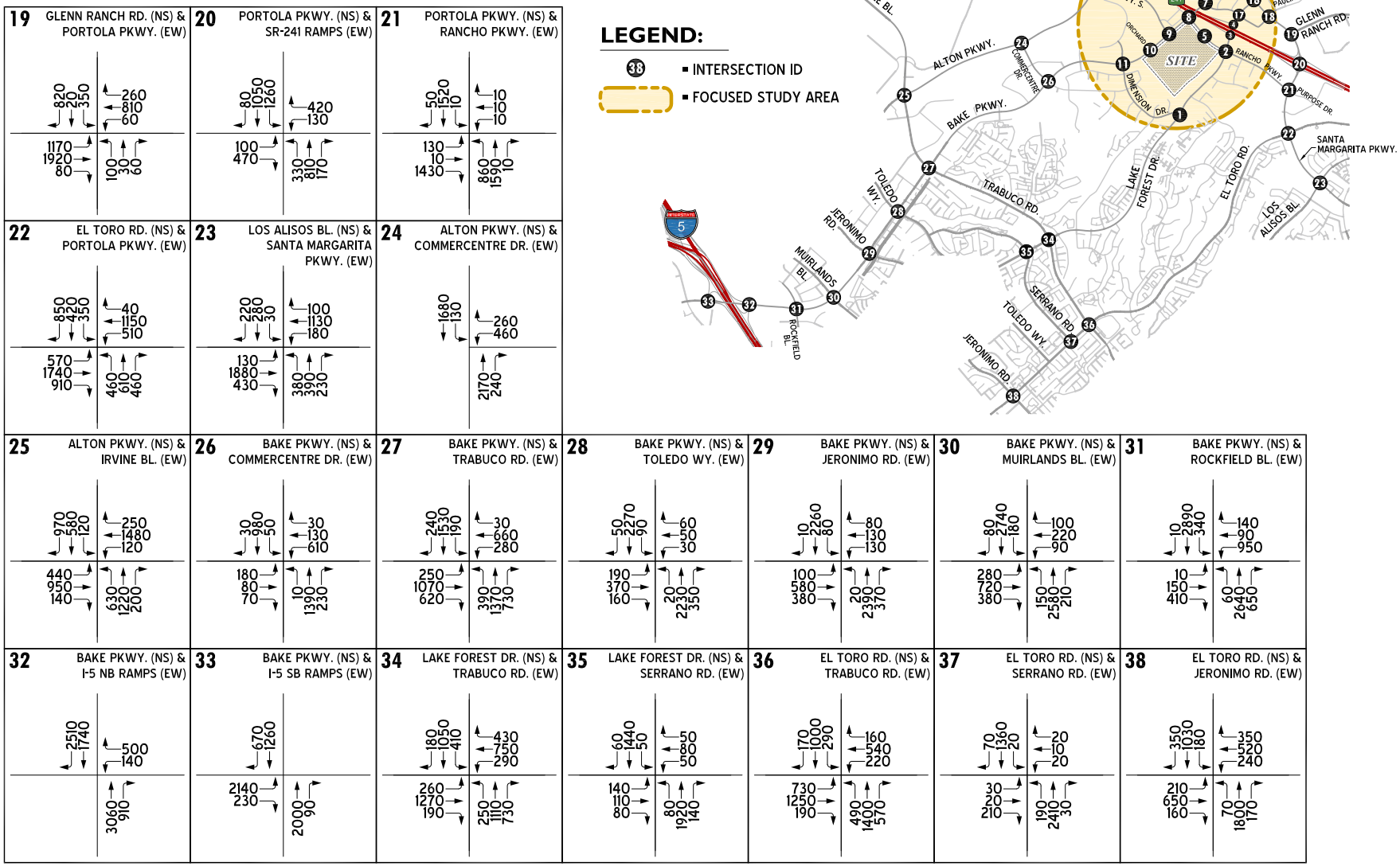
EXHIBIT 7-15: 2040 GENERAL PLAN CUMULATIVE WITH CURRENT APPROVED BUSINESS PARK LAND USE, WITH PORTOLA WESTERLY EXTENSION EXPANDED AREA AM PEAK HOUR INTERSECTION VOLUMES



10820 - 02 - volumes & geometrics.dwg

URBAN CROSSROADS

EXHIBIT 7-16: 2040 GENERAL PLAN CUMULATIVE WITH CURRENT APPROVED BUSINESS PARK LAND USE, WITH PORTOLA WESTERLY EXTENSION EXPANDED AREA PM PEAK HOUR INTERSECTION VOLUMES



10820 - 02 - volumes & geometrics.dwg

URBAN CROSSROADS

EXHIBIT 7-17: 2040 GENERAL PLAN CUMULATIVE WITH CURRENT APPROVED BUSINESS PARK LAND USE, WITH PORTOLA WESTERLY EXTENSION FOCUSED ANALYSIS AREA AVERAGE DAILY TRAFFIC (ADT)

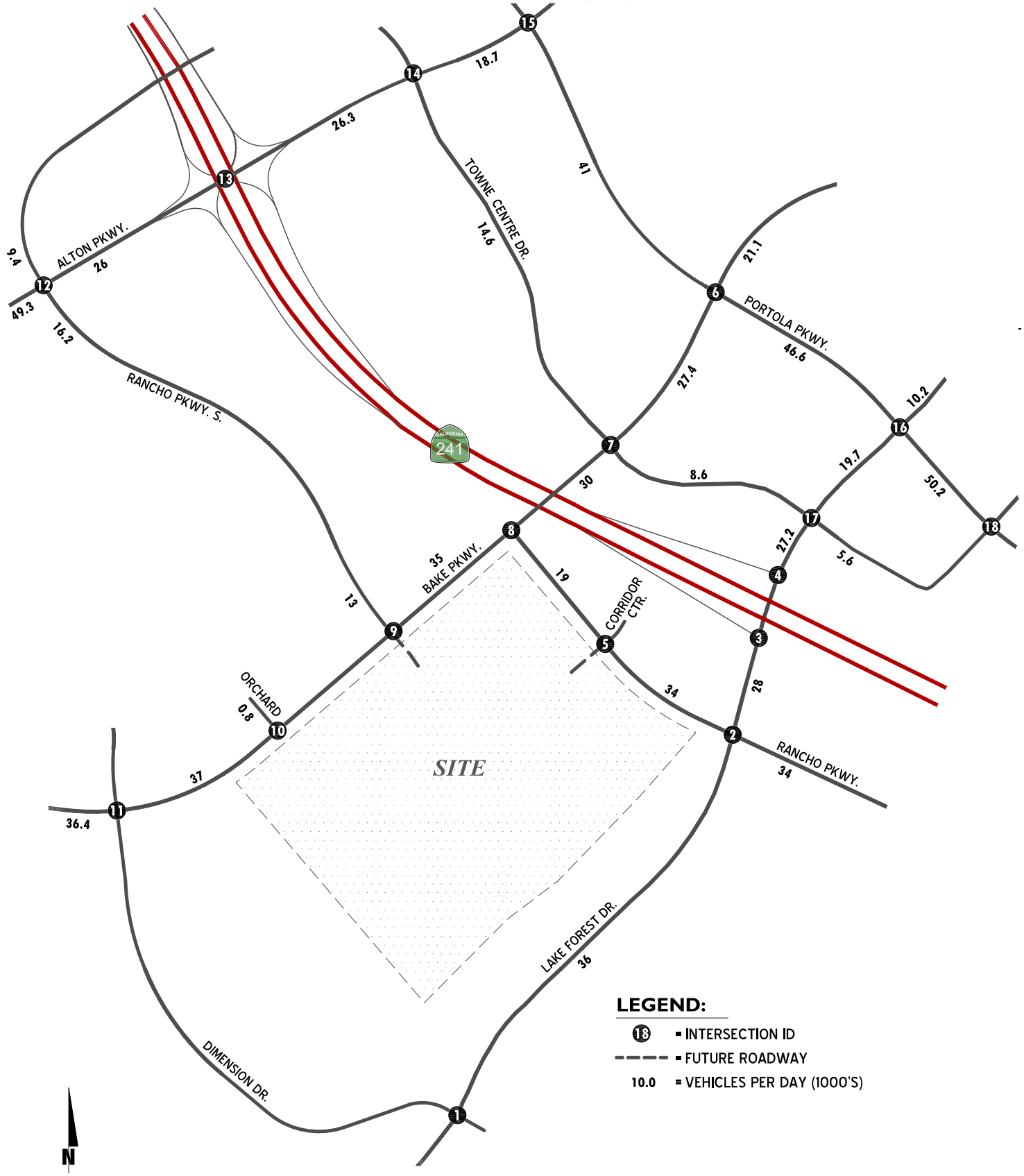


EXHIBIT 7-18: 2040 GENERAL PLAN CUMULATIVE WITH CURRENT APPROVED BUSINESS PARK LAND USE, WITH PORTOLA WESTERLY EXTENSION EXPANDED AREA AVERAGE DAILY TRAFFIC (ADT)

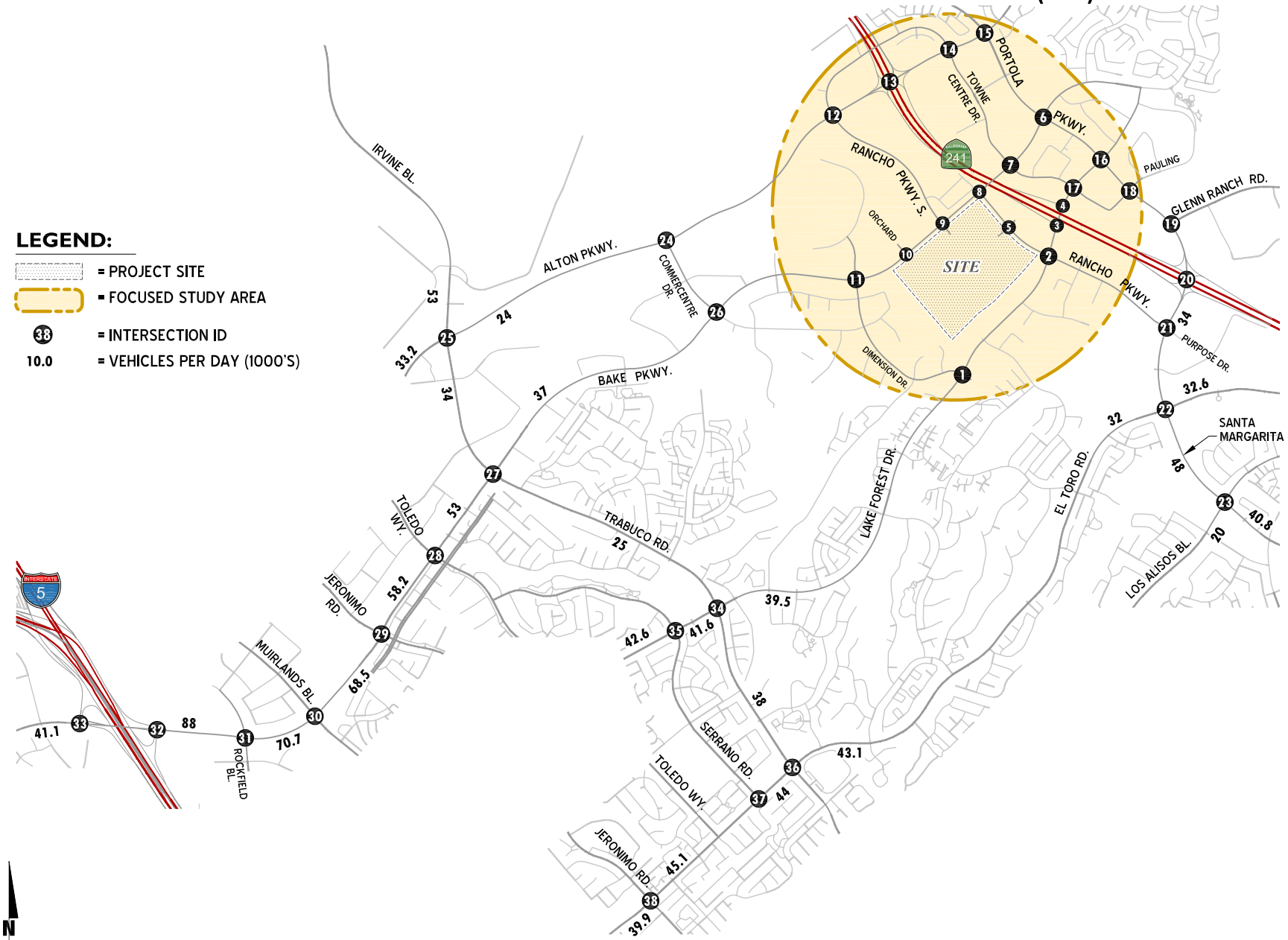


TABLE 7-2: INTERSECTION ANALYSIS SUMMARY FOR 2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITH PORTOLA WESTERLY EXTENSION

#	Intersection	Traffic Control[4]	With Current Land Use				With Project			
			ICU[2] (v/c)		Level of Service[2]		ICU[2] (v/c)		Level of Service[2]	
			AM	PM	AM	PM	AM	PM	AM	PM
1	Lake Forest Dr. (NS) & Dimension Dr. (EW)	TS	0.50	0.52	A	A	0.50	0.52	A	A
2	Lake Forest Dr. (NS) & Rancho Pkwy. (EW)	TS	0.78	0.90	C	D	0.69	0.85	B	D
3	Lake Forest Dr. (NS) & SR-241 SB Off-Ramp (EW)	TS	0.59	0.51	A	A	0.46	0.49	A	A
4	Lake Forest Dr. (NS) & SR-241 NB On-Ramp (EW)	TS	0.34	0.42	A	A	0.31	0.41	A	A
5	Corridor Center (NS) & Rancho Pkwy. (EW)	TS	0.55	0.85	A	D	0.44	0.50	A	A
	- *HCM6 Delay (Seconds) / LOS* [5]	TS	-	-	-	-	22.1	22.7	C	C
6	Bake Parkway (NS) & Portola Pkwy. (EW)	TS	0.55	0.76	A	C	0.55	0.75	A	C
7	Bake Parkway (NS) & Towne Center Dr. (EW)	TS	0.65	0.66	B	B	0.63	0.66	B	B
8	Bake Parkway (NS) & Rancho Pkwy. (EW)	TS	0.65	0.76	B	C	0.66	0.77	B	C
9	Bake Parkway (NS) & Rancho Pkwy. S. (EW)	TS	0.82	0.86	D	D	0.77	0.76	C	C
10	Bake Parkway (NS) & Orchard (EW)	CSS	0.59	0.68	A	A	0.66	0.71	A	A
	- *HCM6 Delay (Seconds) / LOS* [3]	CSS	20.7	18.0	C	C	24.4	27.2	C	D
11	Dimension Dr. (NS) & Bake Parkway (EW)	TS	0.66	0.80	B	C	0.60	0.80	A	C
12	Alton Pkwy. (NS) & Rancho Pkwy. S. (EW)	TS	0.67	0.75	B	C	0.75	0.69	C	B
13	Alton Pkwy. (NS) & SR-241 Ramps (EW)	TS	0.65	0.64	B	B	0.66	0.56	B	A
14	Alton Pkwy. (NS) & Towne Centre Dr. (EW)	TS	0.31	0.43	A	A	0.32	0.43	A	A
15	Alton Pkwy. (NS) & Portola Pkwy. (EW)	TS	0.56	0.51	A	A	0.54	0.51	A	A
16	Lake Forest Dr. (NS) & Portola Pkwy. (EW)	TS	0.62	0.88	B	D	0.63	0.83	B	D
17	Lake Forest Dr. (NS) & Towne Centre Dr. (EW)	TS	0.39	0.52	A	A	0.33	0.51	A	A
18	Towne Centre Dr. (NS) & Portola Pkwy. (EW)	TS	0.72	0.79	C	C	0.68	0.74	B	C
19	Glenn Ranch Rd. (NS) & Portola Pkwy. (EW)	TS	0.67	0.67	B	B	0.66	0.66	B	B
20	Portola Pkwy. (NS) & SR-241 Ramps (EW)	TS	0.40	0.64	A	B	0.40	0.60	A	A
21	Portola Pkwy. (NS) & Rancho Pkwy. (EW)	TS	0.67	0.64	B	B	0.63	0.63	B	B
22	El Toro Rd. (NS) & Portola Pkwy. (EW)	TS	0.66	0.87	B	D	0.63	0.88	B	D
23	Los Alisos Bl. (NS) & Santa Margarita Pkwy. (EW)	TS	0.88	0.83	D	D	0.85	0.81	D	D
24	Alton Pkwy. (NS) & Commercentre Dr. (EW)	TS	0.56	0.70	A	B	0.60	0.72	A	C
25	Alton Pkwy. (NS) & Irvine Bl. (EW)	TS	0.78	0.73	C	C	0.80	0.74	C	C
26	Bake Pkwy. (NS) & Commercentre Dr. (EW)	TS	0.63	0.71	B	C	0.66	0.73	B	C
27	Bake Pkwy. (NS) & Irvine Bl. - Trabuco Rd. (EW)	TS	0.85	0.81	D	D	0.87	0.81	D	D
28	Bake Pkwy. (NS) & Toledo Wy. (EW)	TS	0.85	0.67	D	B	0.85	0.69	D	B
29	Bake Pkwy. (NS) & Jeronimo Rd. (EW)	TS	0.75	0.82	C	D	0.74	0.82	C	D
30	Bake Pkwy. (NS) & Muirlands Bl. (EW)	TS	0.64	0.73	B	C	0.62	0.73	B	C
31	Bake Pkwy. (NS) & Rockfield Bl. (EW)	TS	0.65	0.77	B	C	0.64	0.77	B	C
32	Bake Pkwy. (NS) & I-5 NB Ramps (EW)	TS	0.79	0.60	C	A	0.78	0.60	C	A
33	Bake Pkwy. (NS) & I-5 SB Ramps (EW)	TS	0.82	0.88	D	D	0.82	0.89	D	D
34	Lake Forest Dr. (NS) & Trabuco Rd. (EW)	TS	0.81	0.87	D	D	0.84	0.87	D	D
35	Lake Forest Dr. (NS) & Serrano Rd. (EW)	TS	0.69	0.62	B	B	0.73	0.62	C	B
36	El Toro Rd. (NS) & Trabuco Rd. (EW)	TS	0.77	0.76	C	C	0.76	0.76	C	C
37	El Toro Rd. (NS) & Serrano Rd. (EW)	TS	0.62	0.68	B	B	0.64	0.68	B	B
38	El Toro Rd. (NS) & Jeronimo Rd. (EW)	TS	0.90	0.82	D	D	0.87	0.82	D	D

[1] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.
L = Left; T = Through; R = Right; ! = Shared Left/Through/Right Lane; d = Defacto Right Turn Lane; > = Right Turn Overlap; >> Free-Right Turn

[2] For signalized intersections, Volume/Capacity Ratio and Level of Service are presented based on the Intersection Capacity Utilization (ICU) method.

[3] For the unsignalized intersection of Bake Parkway / Orchard (#10), Delay (in seconds) and Level of Service is also calculated using Synchro 10 analysis software based on the Highway Capacity Manual 6th Edition (HCM6) method.

[4] TS = Traffic Signal; Cross-Street Stop

[5] Permitted-Protected Left Turn Phasing Option for the NB/SB approach at the intersection of Corridor Center/Rancho Parkway (#5) has been evaluated using Syncho 10 analysis software (HCM6 methodology).

7.4 2040 GENERAL PLAN CUMULATIVE WITH PROJECT LAND USE, WITH PORTOLA WESTERLY EXTENSION

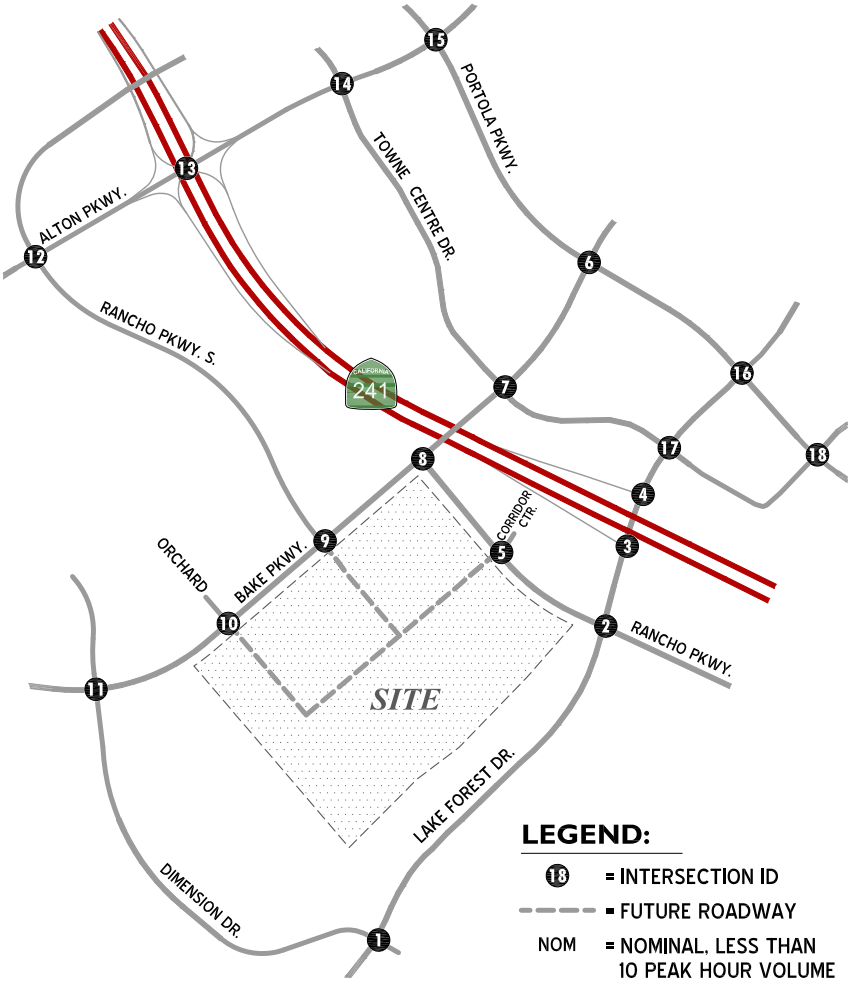
2040 General Plan Cumulative With Project Land Use, With Portola Westerly Extension traffic volumes are shown on Exhibits 7-19 through 7-24, respectively.

The lane configurations and traffic controls assumed to be in place for 2040 General Plan Cumulative With Project Land Use, With Portola Westerly Extension are consistent with LFTM.

LOS calculations were conducted for the study intersections to evaluate their operations under 2040 General Plan Cumulative With Project Land Use, With Portola Westerly Extension. The intersection analysis results are also summarized in Table 7-2.

The intersection operations analysis worksheets for 2040 General Plan Cumulative With Current Approved Project Land Use, With Portola Westerly Extension traffic conditions are included in Appendix 7.1 of this TIA. Study area intersections are anticipated to continue to experience acceptable operations under 2040 General Plan Cumulative With Project Land Use, With Portola Westerly Extension with LFTM improvements.

EXHIBIT 7-19: 2040 GENERAL PLAN CUMULATIVE WITH PROJECT, WITH PORTOLA WESTERLY EXTENSION FOCUSED ANALYSIS AREA AM PEAK HOUR INTERSECTION VOLUMES



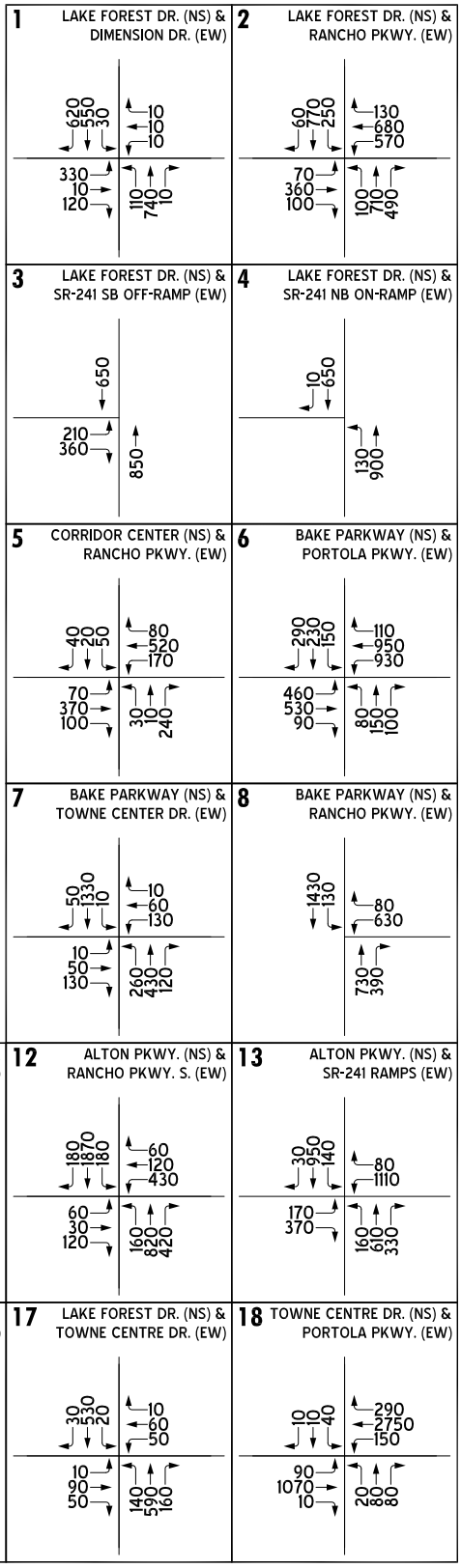
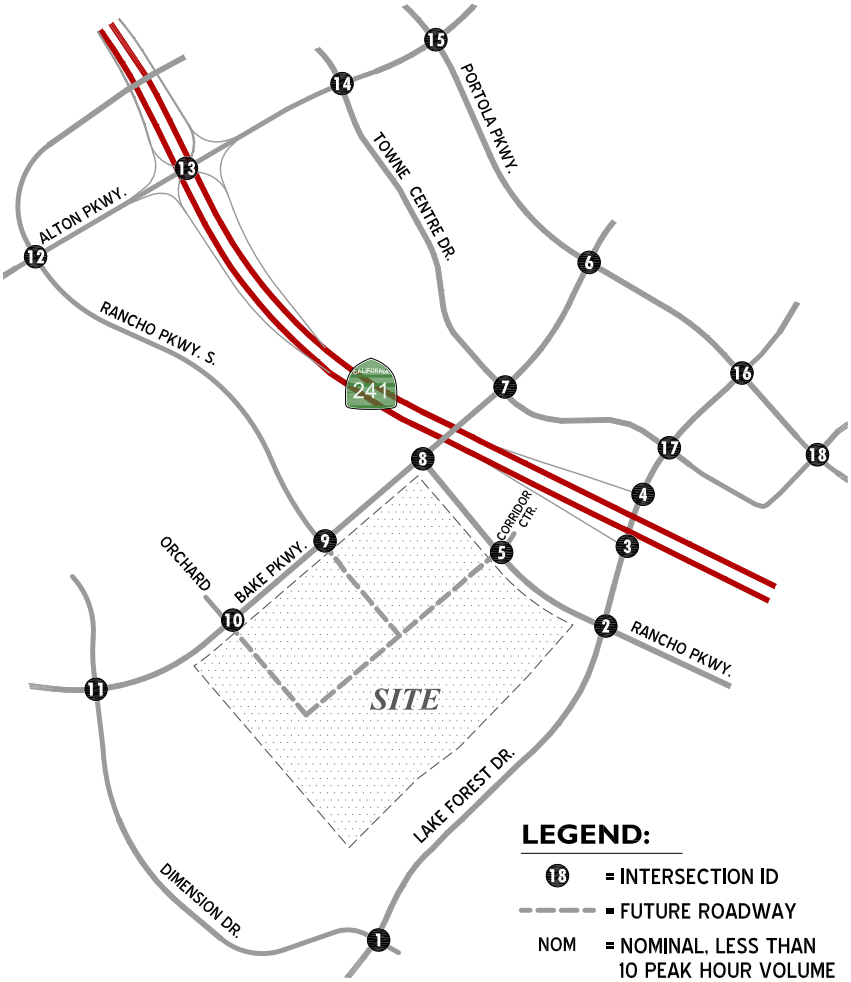


EXHIBIT 7-20: 2040 GENERAL PLAN CUMULATIVE WITH PROJECT, WITH PORTOLA WESTERLY EXTENSION FOCUSED ANALYSIS AREA PM PEAK HOUR INTERSECTION VOLUMES



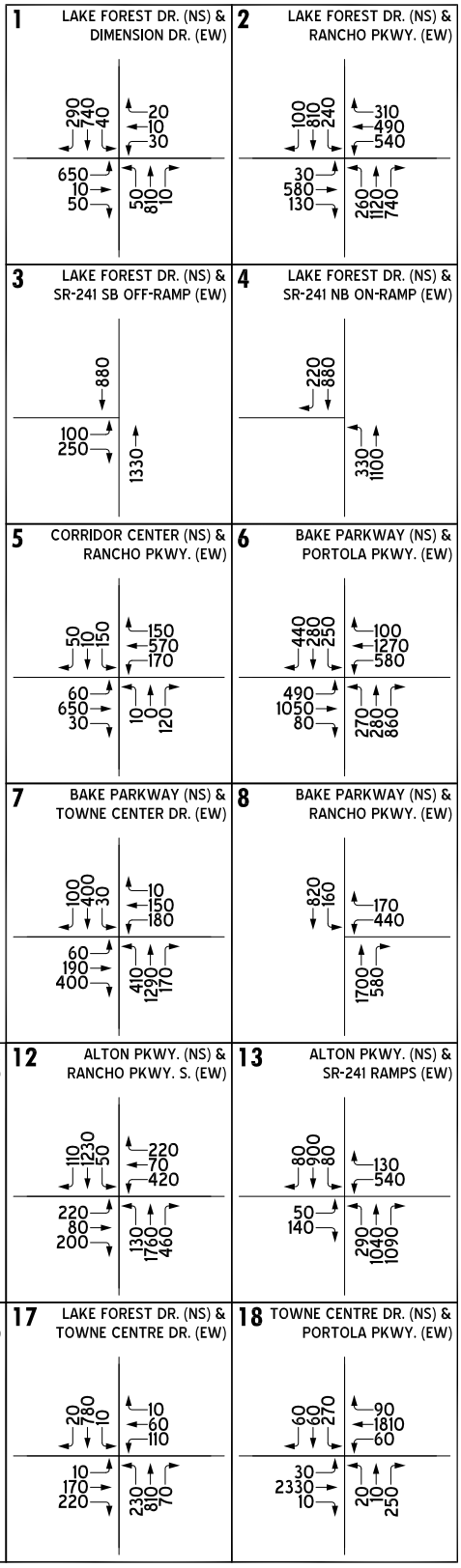


EXHIBIT 7-21: 2040 GENERAL PLAN CUMULATIVE WITH PROJECT, WITH PORTOLA WESTERLY EXTENSION EXPANDED AREA AM PEAK HOUR INTERSECTION VOLUMES

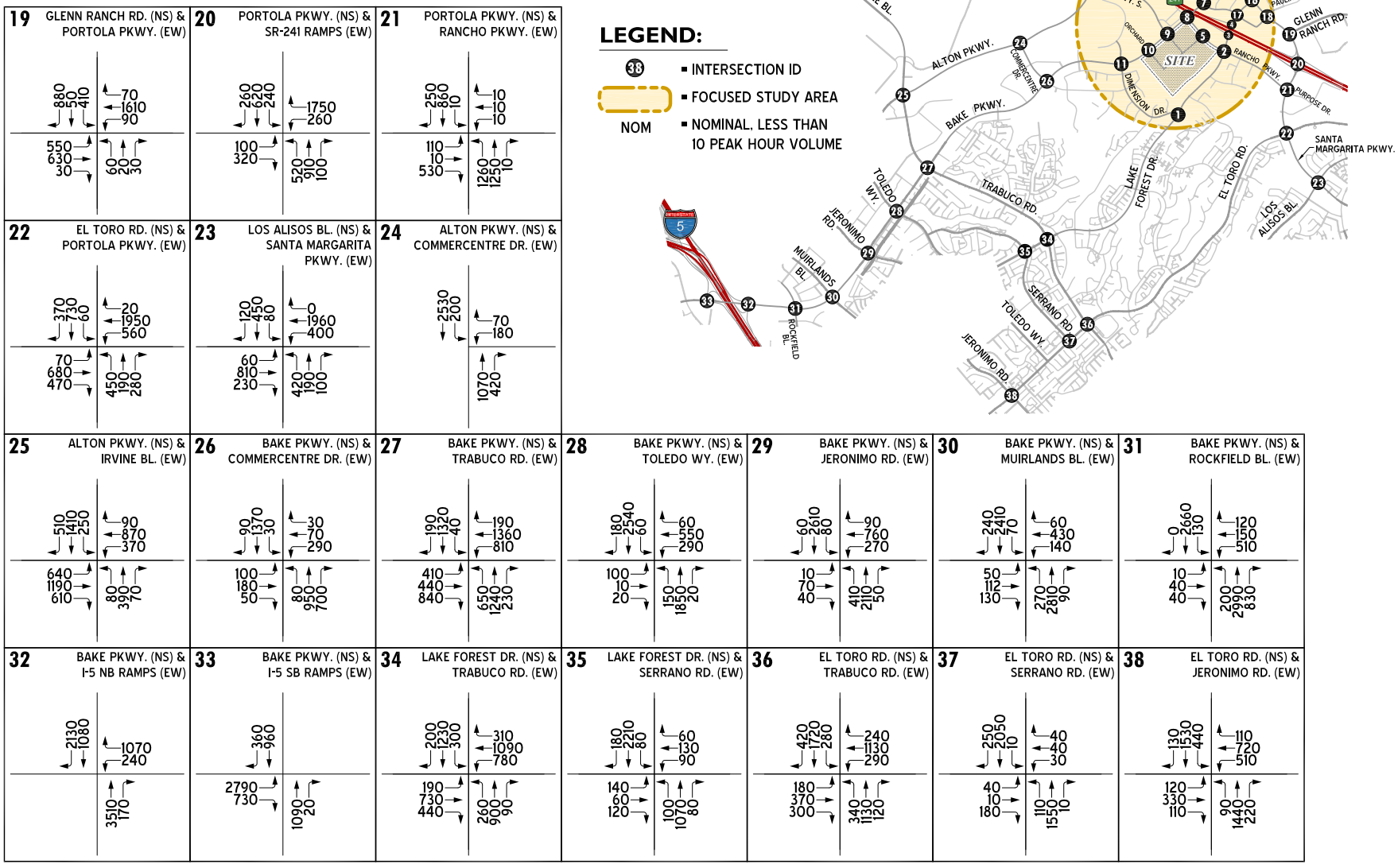


EXHIBIT 7-22: 2040 GENERAL PLAN CUMULATIVE WITH PROJECT, WITH PORTOLA WESTERLY EXTENSION EXPANDED AREA PM PEAK HOUR INTERSECTION VOLUMES

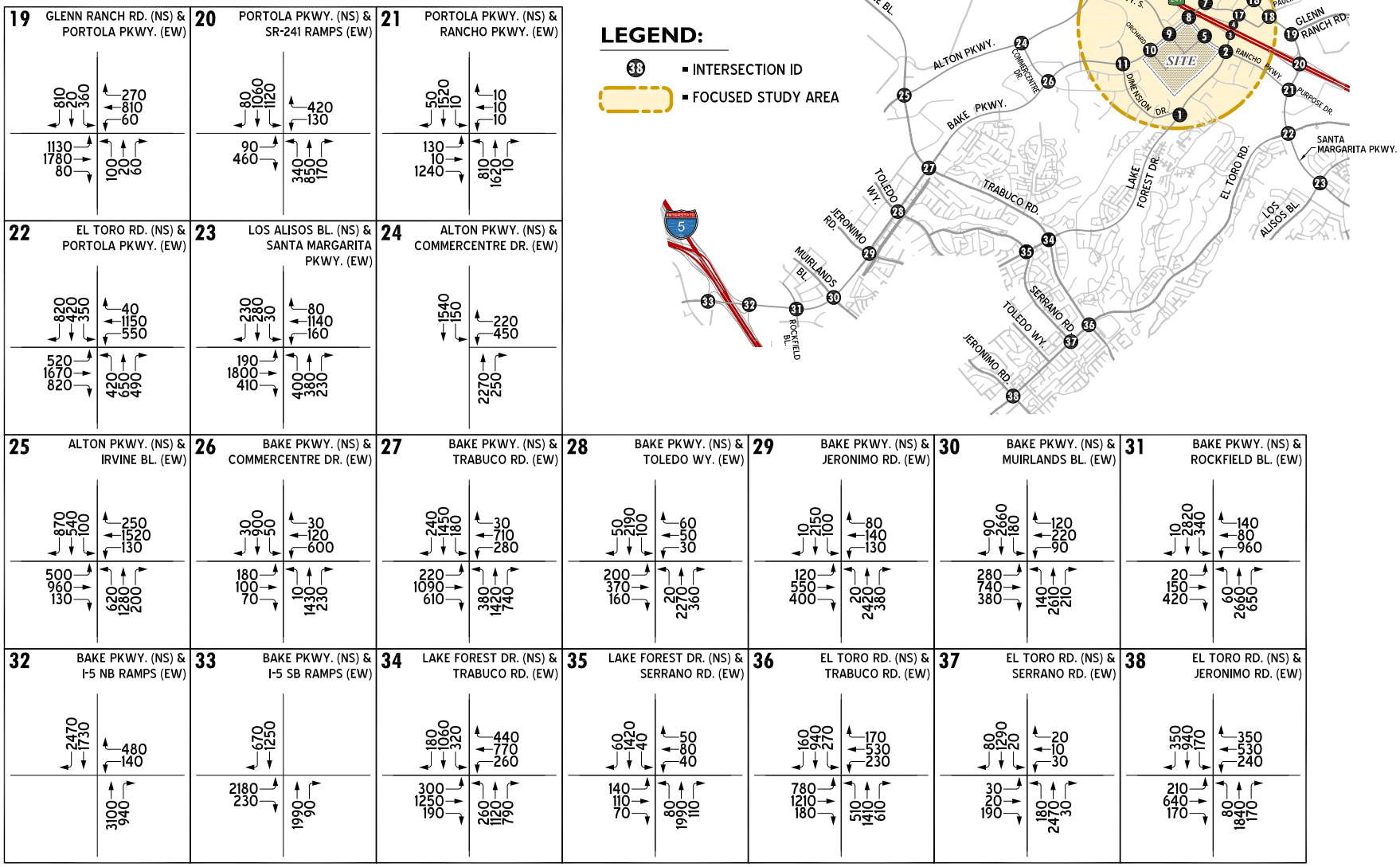


EXHIBIT 7-23: 2040 GENERAL PLAN CUMULATIVE WITH PROJECT, WITH PORTOLA WESTERLY EXTENSION FOCUSED ANALYSIS AREA AVERAGE DAILY TRAFFIC (ADT)

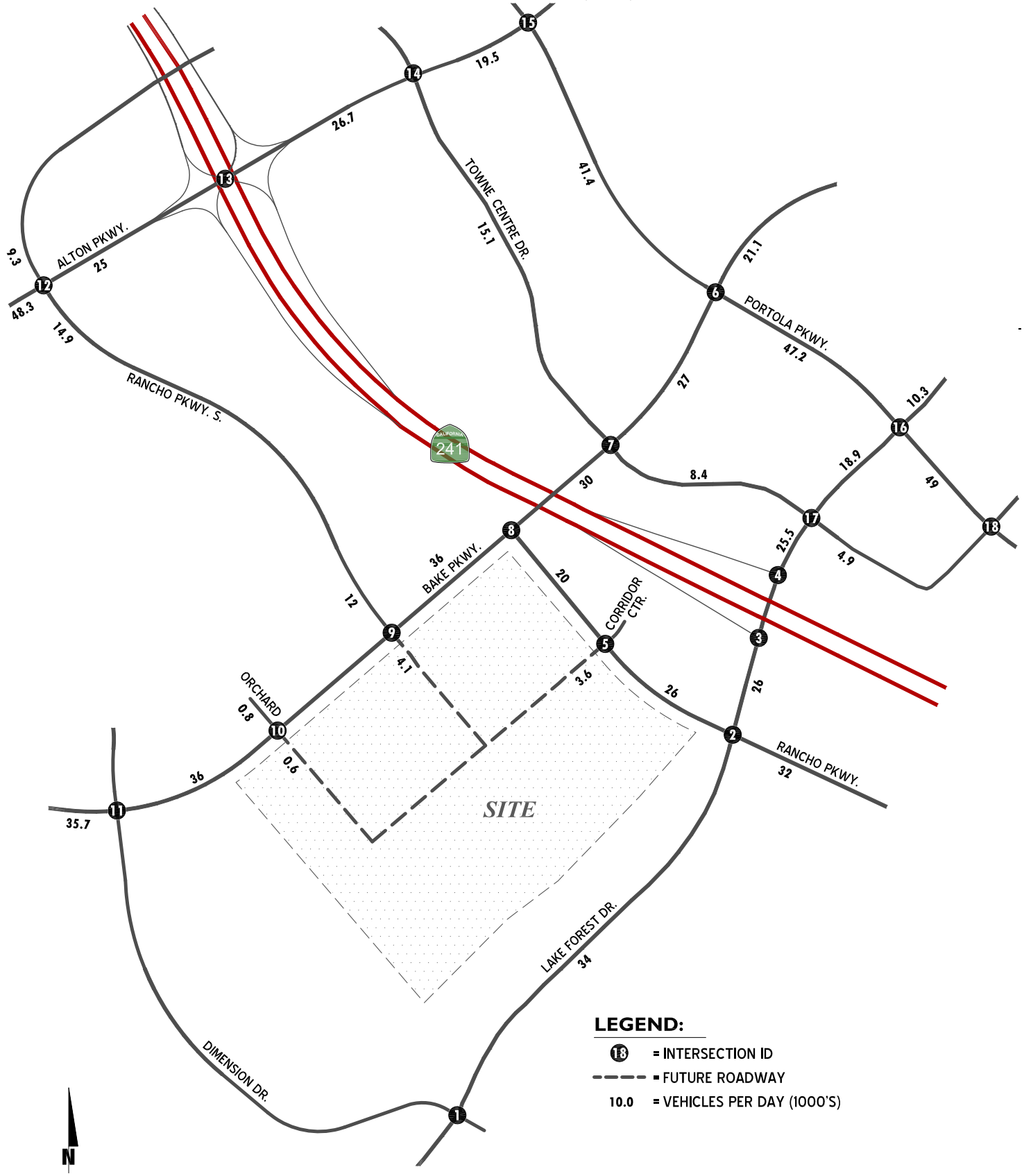


EXHIBIT 7-24: 2040 GENERAL PLAN CUMULATIVE WITH PROJECT, WITH PORTOLA WESTERLY EXTENSION EXPANDED AREA AVERAGE DAILY TRAFFIC (ADT)

This Page Intentionally Left Blank

8 INTERSECTION IMPROVEMENT ALTERNATIVES

During the scoping process, the City of Lake Forest requested examination of five alternative intersection improvement scenarios in the Project Traffic Impact Analysis. The five scenarios represent the most likely possibilities for the final base model, and are described below.

8.1 SCENARIO DESCRIPTIONS

The 2040 General Plan scenarios without and with the Portola extension, for No Project and With Project conditions, include analysis of these five intersection improvement alternatives:

- Scenario #1 - The City's current baseline model including all of the LFTM improvements, NITM improvements, and FCPP Improvements. The assumed 2040 improvements are further described in Section 9.2 of this TIA.
- Scenario #2 - Scenario #1 without three (3) improvements in the City of Irvine at intersections of Alton Parkway & Irvine Boulevard (#25), Bake Parkway & Rockfield Boulevard (#31), and Lake Forest Drive & I-5 SB Ramps / Avenida de la Carlota.
    - For the intersection of Alton Parkway & Irvine Boulevard, the third eastbound left turn lane would be eliminated, and the third eastbound through lane would be a shared left-through lane. Eastbound right turn overlap phasing would be provided. In addition east/west split phasing would be necessary.
    - For the intersection of Bake Parkway & Rockfield Boulevard, the westbound approach would remain as it exists, and the improvements (convert 2nd WB through lane to 3rd left turn lane, convert WB free right turn lane to defacto right turn lane) would not be implemented.
    - Note that the intersection of Lake Forest Drive & I-5 SB Ramps / Avenida de la Carlota is outside the Nakase Property study area.
- Scenario #3 - Scenario #2 without the 2nd SB Right-turn on El Toro Road & Portola Parkway / Santa Margarita Parkway (#22).
- Scenario #4 - Scenario #2 without the 4th WB thru lane on Bake Parkway & Trabuco Road / Irvine Boulevard (#27).
- Scenario #5: Scenario #2 without both the 2nd SB Right-turn on El Toro Road & Portola / Santa Margarita Parkway (#22) and the 4th WB thru lane on Bake Parkway & Trabuco Road / Irvine Boulevard (#27).

8.2 LEVEL OF SERVICE COMPARISONS

The intersection analysis results for Scenario 2 Without and With Portola Westerly Extension are summarized in Tables 8-1 and 8-2, respectively. The intersection operations analysis

worksheets for 2040 General Plan Cumulative Conditions with Scenario 2 Improvement Alternative are included in Appendix 8.1 of this TIA.

The intersection analysis results for Scenario 3 Without and With Portola Westerly Extension are summarized in Tables 8-3 and 8-4, respectively. The intersection operations analysis worksheets for 2040 General Plan Cumulative Conditions with Scenario 3 Improvement Alternative are included in Appendix 8.2 of this TIA.

The intersection analysis results for Scenario 4 Without and With Portola Westerly Extension are summarized in Tables 8-5 and 8-6, respectively. The intersection operations analysis worksheets for 2040 General Plan Cumulative Conditions with Scenario 4 Improvement Alternative are included in Appendix 8.3 of this TIA.

The intersection analysis results for Scenario 5 Without and With Portola Westerly Extension are summarized in Tables 8-7 and 8-8, respectively. The intersection operations analysis worksheets for 2040 General Plan Cumulative Conditions with Scenario 5 Improvement Alternative are included in Appendix 8.4 of this TIA.

For each of the alternative Scenarios, the analysis results are generally consistent with Scenario 1. In each case, acceptable Level of Service is provided.

Intersection improvement Scenarios #1 through #5 are intended to provide a basis for identification of Project effects on various likely improvement options that are under review by City staff and officials. For each of the intersection improvement scenarios, the inclusion of the Nakase Property residential / school project results in the same or better intersection operations in comparison to the Current Approved Business Park conditions, due to reductions in peak hour trip generation associated with the Project site. For 2040 scenarios, no Project impacts are anticipated.

TABLE 8-1: INTERSECTION ANALYSIS SUMMARY FOR 2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITHOUT PORTOLA WESTERLY EXTENSION WITH SCENARIO 2 IMPROVEMENT ALTERNATIVE

#	Intersection	Traffic Control[2]	With Current Land Use				With Project			
			ICU[1] (v/c)		Level of Service[1]		ICU[1] (v/c)		Level of Service[1]	
			AM	PM	AM	PM	AM	PM	AM	PM
1	Lake Forest Dr. (NS) & Dimension Dr. (EW)	TS	0.51	0.54	A	A	0.50	0.52	A	A
2	Lake Forest Dr. (NS) & Rancho Pkwy. (EW)	TS	0.77	0.90	C	D	0.68	0.85	B	D
3	Lake Forest Dr. (NS) & SR-241 SB Off-Ramp (EW)	TS	0.64	0.55	B	A	0.51	0.50	A	A
4	Lake Forest Dr. (NS) & SR-241 NB On-Ramp (EW)	TS	0.34	0.44	A	A	0.35	0.42	A	A
5	Corridor Center (NS) & Rancho Pkwy. (EW)	TS	0.56	0.87	A	D	0.44	0.51	A	A
6	Bake Parkway (NS) & Portola Pkwy. (EW)	TS	0.52	0.74	A	C	0.52	0.72	A	C
7	Bake Parkway (NS) & Towne Center Dr. (EW)	TS	0.65	0.65	B	B	0.61	0.67	B	B
8	Bake Parkway (NS) & Rancho Pkwy. (EW)	TS	0.65	0.79	B	C	0.65	0.79	B	C
9	Bake Parkway (NS) & Rancho Pkwy. S. (EW)	TS	0.85	0.86	D	D	0.78	0.77	C	C
10	Bake Parkway (NS) & Orchard (EW)	CSS	0.61	0.69	A	A	0.67	0.72	A	A
11	Dimension Dr. (NS) & Bake Parkway (EW)	TS	0.68	0.80	B	C	0.61	0.83	B	D
12	Alton Pkwy. (NS) & Rancho Pkwy. S. (EW)	TS	0.71	0.79	C	C	0.75	0.73	C	C
13	Alton Pkwy. (NS) & SR-241 Ramps (EW)	TS	0.69	0.68	B	B	0.68	0.60	B	A
14	Alton Pkwy. (NS) & Towne Centre Dr. (EW)	TS	0.44	0.50	A	A	0.44	0.50	A	A
15	Alton Pkwy. (NS) & Portola Pkwy. (EW)	TS	0.47	0.36	A	A	0.47	0.37	A	A
16	Lake Forest Dr. (NS) & Portola Pkwy. (EW)	TS	0.61	0.89	B	D	0.60	0.79	A	C
17	Lake Forest Dr. (NS) & Towne Centre Dr. (EW)	TS	0.41	0.55	A	A	0.36	0.55	A	A
18	Towne Centre Dr. (NS) & Portola Pkwy. (EW)	TS	0.71	0.75	C	C	0.66	0.71	B	C
19	Glenn Ranch Rd. (NS) & Portola Pkwy. (EW)	TS	0.67	0.66	B	B	0.65	0.63	B	B
20	Portola Pkwy. (NS) & SR-241 Ramps (EW)	TS	0.44	0.69	A	B	0.42	0.63	A	B
21	Portola Pkwy. (NS) & Rancho Pkwy. (EW)	TS	0.66	0.63	B	B	0.61	0.62	B	B
22	El Toro Rd. (NS) & Portola Pkwy. (EW)	TS	0.66	0.87	B	D	0.64	0.87	B	D
23	Los Alisos Bl. (NS) & Santa Margarita Pkwy. (EW)	TS	0.88	0.82	D	D	0.85	0.83	D	D
24	Alton Pkwy. (NS) & Commercentre Dr. (EW)	TS	0.61	0.74	B	C	0.62	0.75	B	C
25	Alton Pkwy. (NS) & Irvine Bl. (EW)	TS	0.82	0.83	D	D	0.83	0.84	D	D
26	Bake Pkwy. (NS) & Commercentre Dr. (EW)	TS	0.64	0.73	B	C	0.67	0.75	B	C
27	Bake Pkwy. (NS) & Trabuco Rd. (EW)	TS	0.85	0.82	D	D	0.88	0.82	D	D
28	Bake Pkwy. (NS) & Toledo Wy. (EW)	TS	0.85	0.67	D	B	0.86	0.69	D	B
29	Bake Pkwy. (NS) & Jeronimo Rd. (EW)	TS	0.79	0.81	C	D	0.78	0.81	C	D
30	Bake Pkwy. (NS) & Muirlands Bl. (EW)	TS	0.64	0.75	B	C	0.64	0.74	B	C
31	Bake Pkwy. (NS) & Rockfield Bl. (EW)	TS	0.71	0.87	C	D	0.69	0.87	B	D
32	Bake Pkwy. (NS) & I-5 NB Ramps (EW)	TS	0.80	0.60	C	A	0.77	0.60	C	A
33	Bake Pkwy. (NS) & I-5 SB Ramps (EW)	TS	0.83	0.88	D	D	0.82	0.89	D	D
34	Lake Forest Dr. (NS) & Trabuco Rd. (EW)	TS	0.83	0.85	D	D	0.87	0.85	D	D
35	Lake Forest Dr. (NS) & Serrano Rd. (EW)	TS	0.70	0.61	B	B	0.72	0.63	C	B
36	El Toro Rd. (NS) & Trabuco Rd. (EW)	TS	0.75	0.77	C	C	0.77	0.77	C	C
37	El Toro Rd. (NS) & Serrano Rd. (EW)	TS	0.65	0.69	B	B	0.63	0.71	B	C
38	El Toro Rd. (NS) & Jeronimo Rd. (EW)	TS	0.90	0.81	D	D	0.85	0.83	D	D

[1] Volume/Capacity Ratio and Level of Service are presented based on the Intersection Capacity Utilization (ICU) method
[2] TS = Traffic Signal; Cross-Street Stop

R:\UXRjobs_10600-11000\10820\Excel\[10820-05 - Report.xlsx]8-1

TABLE 8-2: INTERSECTION ANALYSIS SUMMARY FOR 2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITH PORTOLA WESTERLY EXTENSION WITH SCENARIO 2 IMPROVEMENT ALTERNATIVE

#	Intersection	Traffic Control[2]	With Current Land Use				With Project			
			ICU[1] (v/c)		Level of Service[1]		ICU[1] (v/c)		Level of Service[1]	
			AM	PM	AM	PM	AM	PM	AM	PM
1	Lake Forest Dr. (NS) & Dimension Dr. (EW)	TS	0.50	0.52	A	A	0.50	0.52	A	A
2	Lake Forest Dr. (NS) & Rancho Pkwy. (EW)	TS	0.78	0.90	C	D	0.69	0.85	B	D
3	Lake Forest Dr. (NS) & SR-241 SB Off-Ramp (EW)	TS	0.59	0.51	A	A	0.46	0.49	A	A
4	Lake Forest Dr. (NS) & SR-241 NB On-Ramp (EW)	TS	0.34	0.42	A	A	0.31	0.41	A	A
5	Corridor Center (NS) & Rancho Pkwy. (EW)	TS	0.55	0.85	A	D	0.44	0.50	A	A
6	Bake Parkway (NS) & Portola Pkwy. (EW)	TS	0.55	0.76	A	C	0.55	0.75	A	C
7	Bake Parkway (NS) & Towne Center Dr. (EW)	TS	0.65	0.66	B	B	0.63	0.66	B	B
8	Bake Parkway (NS) & Rancho Pkwy. (EW)	TS	0.65	0.76	B	C	0.66	0.77	B	C
9	Bake Parkway (NS) & Rancho Pkwy. S. (EW)	TS	0.82	0.86	D	D	0.77	0.76	C	C
10	Bake Parkway (NS) & Orchard (EW)	CSS	0.59	0.68	A	A	0.66	0.71	A	A
11	Dimension Dr. (NS) & Bake Parkway (EW)	TS	0.66	0.80	B	C	0.60	0.80	A	C
12	Alton Pkwy. (NS) & Rancho Pkwy. S. (EW)	TS	0.67	0.75	B	C	0.75	0.69	C	B
13	Alton Pkwy. (NS) & SR-241 Ramps (EW)	TS	0.65	0.64	B	B	0.66	0.56	B	A
14	Alton Pkwy. (NS) & Towne Centre Dr. (EW)	TS	0.31	0.43	A	A	0.32	0.43	A	A
15	Alton Pkwy. (NS) & Portola Pkwy. (EW)	TS	0.56	0.51	A	A	0.54	0.51	A	A
16	Lake Forest Dr. (NS) & Portola Pkwy. (EW)	TS	0.62	0.88	B	D	0.63	0.83	B	D
17	Lake Forest Dr. (NS) & Towne Centre Dr. (EW)	TS	0.39	0.52	A	A	0.33	0.51	A	A
18	Towne Centre Dr. (NS) & Portola Pkwy. (EW)	TS	0.72	0.79	C	C	0.68	0.74	B	C
19	Glenn Ranch Rd. (NS) & Portola Pkwy. (EW)	TS	0.67	0.67	B	B	0.66	0.66	B	B
20	Portola Pkwy. (NS) & SR-241 Ramps (EW)	TS	0.40	0.64	A	B	0.40	0.60	A	A
21	Portola Pkwy. (NS) & Rancho Pkwy. (EW)	TS	0.67	0.64	B	B	0.63	0.63	B	B
22	El Toro Rd. (NS) & Portola Pkwy. (EW)	TS	0.66	0.87	B	D	0.63	0.88	B	D
23	Los Alisos Bl. (NS) & Santa Margarita Pkwy. (EW)	TS	0.88	0.83	D	D	0.85	0.81	D	D
24	Alton Pkwy. (NS) & Commercentre Dr. (EW)	TS	0.56	0.70	A	B	0.60	0.72	A	C
25	Alton Pkwy. (NS) & Irvine Bl. (EW)	TS	0.84	0.83	D	D	0.86	0.83	D	D
26	Bake Pkwy. (NS) & Commercentre Dr. (EW)	TS	0.63	0.71	B	C	0.66	0.73	B	C
27	Bake Pkwy. (NS) & Trabuco Rd. (EW)	TS	0.85	0.81	D	D	0.87	0.81	D	D
28	Bake Pkwy. (NS) & Toledo Wy. (EW)	TS	0.85	0.67	D	B	0.85	0.69	D	B
29	Bake Pkwy. (NS) & Jeronimo Rd. (EW)	TS	0.75	0.82	C	D	0.74	0.82	C	D
30	Bake Pkwy. (NS) & Muirlands Bl. (EW)	TS	0.64	0.73	B	C	0.62	0.73	B	C
31	Bake Pkwy. (NS) & Rockfield Bl. (EW)	TS	0.70	0.86	B	D	0.69	0.86	B	D
32	Bake Pkwy. (NS) & I-5 NB Ramps (EW)	TS	0.79	0.60	C	A	0.78	0.60	C	A
33	Bake Pkwy. (NS) & I-5 SB Ramps (EW)	TS	0.82	0.88	D	D	0.82	0.89	D	D
34	Lake Forest Dr. (NS) & Trabuco Rd. (EW)	TS	0.81	0.87	D	D	0.84	0.87	D	D
35	Lake Forest Dr. (NS) & Serrano Rd. (EW)	TS	0.69	0.62	B	B	0.73	0.62	C	B
36	El Toro Rd. (NS) & Trabuco Rd. (EW)	TS	0.77	0.76	C	C	0.76	0.76	C	C
37	El Toro Rd. (NS) & Serrano Rd. (EW)	TS	0.62	0.68	B	B	0.64	0.68	B	B
38	El Toro Rd. (NS) & Jeronimo Rd. (EW)	TS	0.90	0.82	D	D	0.87	0.82	D	D

[1] Volume/Capacity Ratio and Level of Service are presented based on the Intersection Capacity Utilization (ICU) method
[2] TS = Traffic Signal; Cross-Street Stop

R:\UXRjobs_10600-11000\10820\Excel\[10820-05 - Report.xlsx]8-2

TABLE 8-3: INTERSECTION ANALYSIS SUMMARY FOR 2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITHOUT PORTOLA WESTERLY EXTENSION WITH SCENARIO 3 IMPROVEMENT ALTERNATIVE

#	Intersection	Traffic Control[2]	With Current Land Use				With Project			
			ICU[1] (v/c)		Level of Service[1]		ICU[1] (v/c)		Level of Service[1]	
			AM	PM	AM	PM	AM	PM	AM	PM
1	Lake Forest Dr. (NS) & Dimension Dr. (EW)	TS	0.51	0.53	A	A	0.50	0.52	A	A
2	Lake Forest Dr. (NS) & Rancho Pkwy. (EW)	TS	0.77	0.90	C	D	0.68	0.85	B	D
3	Lake Forest Dr. (NS) & SR-241 SB Off-Ramp (EW)	TS	0.64	0.54	B	A	0.51	0.50	A	A
4	Lake Forest Dr. (NS) & SR-241 NB On-Ramp (EW)	TS	0.34	0.44	A	A	0.35	0.42	A	A
5	Corridor Center (NS) & Rancho Pkwy. (EW)	TS	0.57	0.87	A	D	0.44	0.51	A	A
6	Bake Parkway (NS) & Portola Pkwy. (EW)	TS	0.54	0.74	A	C	0.53	0.73	A	C
7	Bake Parkway (NS) & Towne Center Dr. (EW)	TS	0.66	0.66	B	B	0.62	0.67	B	B
8	Bake Parkway (NS) & Rancho Pkwy. (EW)	TS	0.65	0.79	B	C	0.66	0.78	B	C
9	Bake Parkway (NS) & Rancho Pkwy. S. (EW)	TS	0.84	0.86	D	D	0.78	0.77	C	C
10	Bake Parkway (NS) & Orchard (EW)	CSS	0.61	0.69	A	A	0.67	0.72	A	A
11	Dimension Dr. (NS) & Bake Parkway (EW)	TS	0.68	0.80	B	C	0.62	0.83	B	D
12	Alton Pkwy. (NS) & Rancho Pkwy. S. (EW)	TS	0.70	0.79	B	C	0.75	0.72	C	C
13	Alton Pkwy. (NS) & SR-241 Ramps (EW)	TS	0.68	0.68	B	B	0.68	0.60	B	A
14	Alton Pkwy. (NS) & Towne Centre Dr. (EW)	TS	0.44	0.50	A	A	0.44	0.50	A	A
15	Alton Pkwy. (NS) & Portola Pkwy. (EW)	TS	0.48	0.36	A	A	0.47	0.37	A	A
16	Lake Forest Dr. (NS) & Portola Pkwy. (EW)	TS	0.61	0.88	B	D	0.60	0.79	A	C
17	Lake Forest Dr. (NS) & Towne Centre Dr. (EW)	TS	0.41	0.56	A	A	0.36	0.55	A	A
18	Towne Centre Dr. (NS) & Portola Pkwy. (EW)	TS	0.71	0.75	C	C	0.66	0.71	B	C
19	Glenn Ranch Rd. (NS) & Portola Pkwy. (EW)	TS	0.66	0.66	B	B	0.63	0.63	B	B
20	Portola Pkwy. (NS) & SR-241 Ramps (EW)	TS	0.44	0.69	A	B	0.42	0.63	A	B
21	Portola Pkwy. (NS) & Rancho Pkwy. (EW)	TS	0.65	0.63	B	B	0.60	0.61	A	B
22	El Toro Rd. (NS) & Portola Pkwy. (EW)	TS	0.72	0.86	C	D	0.69	0.84	B	D
23	Los Alisos Bl. (NS) & Santa Margarita Pkwy. (EW)	TS	0.90	0.84	D	D	0.87	0.83	D	D
24	Alton Pkwy. (NS) & Commercentre Dr. (EW)	TS	0.60	0.74	A	C	0.62	0.74	B	C
25	Alton Pkwy. (NS) & Irvine Bl. (EW)	TS	0.82	0.84	D	D	0.83	0.84	D	D
26	Bake Pkwy. (NS) & Commercentre Dr. (EW)	TS	0.65	0.72	B	C	0.68	0.75	B	C
27	Bake Pkwy. (NS) & Trabuco Rd. (EW)	TS	0.84	0.82	D	D	0.89	0.81	D	D
28	Bake Pkwy. (NS) & Toledo Wy. (EW)	TS	0.85	0.67	D	B	0.84	0.69	D	B
29	Bake Pkwy. (NS) & Jeronimo Rd. (EW)	TS	0.77	0.80	C	C	0.78	0.81	C	D
30	Bake Pkwy. (NS) & Muirlands Bl. (EW)	TS	0.65	0.77	B	C	0.64	0.76	B	C
31	Bake Pkwy. (NS) & Rockfield Bl. (EW)	TS	0.71	0.87	C	D	0.70	0.87	B	D
32	Bake Pkwy. (NS) & I-5 NB Ramps (EW)	TS	0.79	0.60	C	A	0.78	0.60	C	A
33	Bake Pkwy. (NS) & I-5 SB Ramps (EW)	TS	0.83	0.88	D	D	0.82	0.89	D	D
34	Lake Forest Dr. (NS) & Trabuco Rd. (EW)	TS	0.82	0.85	D	D	0.87	0.86	D	D
35	Lake Forest Dr. (NS) & Serrano Rd. (EW)	TS	0.72	0.63	C	B	0.73	0.62	C	B
36	El Toro Rd. (NS) & Trabuco Rd. (EW)	TS	0.78	0.76	C	C	0.77	0.77	C	C
37	El Toro Rd. (NS) & Serrano Rd. (EW)	TS	0.60	0.68	A	B	0.64	0.71	B	C
38	El Toro Rd. (NS) & Jeronimo Rd. (EW)	TS	0.89	0.80	D	C	0.86	0.83	D	D

[1] Volume/Capacity Ratio and Level of Service are presented based on the Intersection Capacity Utilization (ICU) method
[2] TS = Traffic Signal; Cross-Street Stop

R:\UXRjobs_10600-11000\10820\Excel\[10820-05 - Report.xlsx]8-3

TABLE 8-4: INTERSECTION ANALYSIS SUMMARY FOR 2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITH PORTOLA WESTERLY EXTENSION WITH SCENARIO 3 IMPROVEMENT ALTERNATIVE

#	Intersection	Traffic Control[2]	With Current Land Use				With Project			
			ICU[1] (v/c)		Level of Service[1]		ICU[1] (v/c)		Level of Service[1]	
			AM	PM	AM	PM	AM	PM	AM	PM
1	Lake Forest Dr. (NS) & Dimension Dr. (EW)	TS	0.51	0.52	A	A	0.50	0.52	A	A
2	Lake Forest Dr. (NS) & Rancho Pkwy. (EW)	TS	0.78	0.90	C	D	0.67	0.85	B	D
3	Lake Forest Dr. (NS) & SR-241 SB Off-Ramp (EW)	TS	0.59	0.51	A	A	0.46	0.49	A	A
4	Lake Forest Dr. (NS) & SR-241 NB On-Ramp (EW)	TS	0.33	0.42	A	A	0.32	0.41	A	A
5	Corridor Center (NS) & Rancho Pkwy. (EW)	TS	0.55	0.85	A	D	0.44	0.50	A	A
6	Bake Parkway (NS) & Portola Pkwy. (EW)	TS	0.56	0.76	A	C	0.55	0.74	A	C
7	Bake Parkway (NS) & Towne Center Dr. (EW)	TS	0.65	0.67	B	B	0.63	0.66	B	B
8	Bake Parkway (NS) & Rancho Pkwy. (EW)	TS	0.65	0.78	B	C	0.66	0.77	B	C
9	Bake Parkway (NS) & Rancho Pkwy. S. (EW)	TS	0.83	0.86	D	D	0.77	0.76	C	C
10	Bake Parkway (NS) & Orchard (EW)	CSS	0.60	0.68	A	A	0.66	0.72	A	A
11	Dimension Dr. (NS) & Bake Parkway (EW)	TS	0.67	0.80	B	C	0.60	0.81	A	D
12	Alton Pkwy. (NS) & Rancho Pkwy. S. (EW)	TS	0.66	0.75	B	C	0.75	0.69	C	B
13	Alton Pkwy. (NS) & SR-241 Ramps (EW)	TS	0.66	0.64	B	B	0.66	0.56	B	A
14	Alton Pkwy. (NS) & Towne Centre Dr. (EW)	TS	0.31	0.43	A	A	0.32	0.43	A	A
15	Alton Pkwy. (NS) & Portola Pkwy. (EW)	TS	0.56	0.51	A	A	0.54	0.51	A	A
16	Lake Forest Dr. (NS) & Portola Pkwy. (EW)	TS	0.62	0.89	B	D	0.63	0.83	B	D
17	Lake Forest Dr. (NS) & Towne Centre Dr. (EW)	TS	0.39	0.52	A	A	0.33	0.52	A	A
18	Towne Centre Dr. (NS) & Portola Pkwy. (EW)	TS	0.72	0.79	C	C	0.68	0.74	B	C
19	Glenn Ranch Rd. (NS) & Portola Pkwy. (EW)	TS	0.67	0.68	B	B	0.65	0.66	B	B
20	Portola Pkwy. (NS) & SR-241 Ramps (EW)	TS	0.40	0.64	A	B	0.39	0.60	A	A
21	Portola Pkwy. (NS) & Rancho Pkwy. (EW)	TS	0.66	0.64	B	B	0.61	0.62	B	B
22	El Toro Rd. (NS) & Portola Pkwy. (EW)	TS	0.73	0.87	C	D	0.70	0.84	B	D
23	Los Alisos Bl. (NS) & Santa Margarita Pkwy. (EW)	TS	0.89	0.83	D	D	0.86	0.83	D	D
24	Alton Pkwy. (NS) & Commercentre Dr. (EW)	TS	0.56	0.70	A	B	0.60	0.71	A	C
25	Alton Pkwy. (NS) & Irvine Bl. (EW)	TS	0.83	0.83	D	D	0.85	0.83	D	D
26	Bake Pkwy. (NS) & Commercentre Dr. (EW)	TS	0.63	0.71	B	C	0.67	0.74	B	C
27	Bake Pkwy. (NS) & Trabuco Rd. (EW)	TS	0.85	0.81	D	D	0.86	0.81	D	D
28	Bake Pkwy. (NS) & Toledo Wy. (EW)	TS	0.86	0.67	D	B	0.88	0.68	D	B
29	Bake Pkwy. (NS) & Jeronimo Rd. (EW)	TS	0.75	0.82	C	D	0.74	0.81	C	D
30	Bake Pkwy. (NS) & Muirlands Bl. (EW)	TS	0.63	0.74	B	C	0.64	0.74	B	C
31	Bake Pkwy. (NS) & Rockfield Bl. (EW)	TS	0.70	0.86	B	D	0.69	0.86	B	D
32	Bake Pkwy. (NS) & I-5 NB Ramps (EW)	TS	0.78	0.60	C	A	0.77	0.60	C	A
33	Bake Pkwy. (NS) & I-5 SB Ramps (EW)	TS	0.82	0.88	D	D	0.82	0.89	D	D
34	Lake Forest Dr. (NS) & Trabuco Rd. (EW)	TS	0.80	0.88	C	D	0.84	0.86	D	D
35	Lake Forest Dr. (NS) & Serrano Rd. (EW)	TS	0.70	0.61	B	B	0.73	0.62	C	B
36	El Toro Rd. (NS) & Trabuco Rd. (EW)	TS	0.78	0.76	C	C	0.78	0.77	C	C
37	El Toro Rd. (NS) & Serrano Rd. (EW)	TS	0.63	0.69	B	B	0.63	0.70	B	B
38	El Toro Rd. (NS) & Jeronimo Rd. (EW)	TS	0.89	0.82	D	D	0.85	0.81	D	D

[1] Volume/Capacity Ratio and Level of Service are presented based on the Intersection Capacity Utilization (ICU) method

[2] TS = Traffic Signal; Cross-Street Stop

R:\UXRjobs_10600-11000\10820\Excel\[10820-05 - Report.xlsx]8-4

TABLE 8-5: INTERSECTION ANALYSIS SUMMARY FOR 2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITHOUT PORTOLA WESTERLY EXTENSION WITH SCENARIO 4 IMPROVEMENT ALTERNATIVE

#	Intersection	Traffic Control[2]	With Current Land Use				With Project			
			ICU[1] (v/c)		Level of Service[1]		ICU[1] (v/c)		Level of Service[1]	
			AM	PM	AM	PM	AM	PM	AM	PM
1	Lake Forest Dr. (NS) & Dimension Dr. (EW)	TS	0.51	0.53	A	A	0.50	0.52	A	A
2	Lake Forest Dr. (NS) & Rancho Pkwy. (EW)	TS	0.78	0.89	C	D	0.67	0.85	B	D
3	Lake Forest Dr. (NS) & SR-241 SB Off-Ramp (EW)	TS	0.64	0.54	B	A	0.51	0.51	A	A
4	Lake Forest Dr. (NS) & SR-241 NB On-Ramp (EW)	TS	0.34	0.44	A	A	0.35	0.42	A	A
5	Corridor Center (NS) & Rancho Pkwy. (EW)	TS	0.57	0.87	A	D	0.45	0.51	A	A
6	Bake Parkway (NS) & Portola Pkwy. (EW)	TS	0.53	0.73	A	C	0.52	0.71	A	C
7	Bake Parkway (NS) & Towne Center Dr. (EW)	TS	0.65	0.65	B	B	0.60	0.67	A	B
8	Bake Parkway (NS) & Rancho Pkwy. (EW)	TS	0.65	0.79	B	C	0.66	0.79	B	C
9	Bake Parkway (NS) & Rancho Pkwy. S. (EW)	TS	0.84	0.87	D	D	0.77	0.77	C	C
10	Bake Parkway (NS) & Orchard (EW)	CSS	0.60	0.70	A	A	0.66	0.72	A	A
11	Dimension Dr. (NS) & Bake Parkway (EW)	TS	0.68	0.82	B	D	0.61	0.82	B	D
12	Alton Pkwy. (NS) & Rancho Pkwy. S. (EW)	TS	0.71	0.78	C	C	0.75	0.74	C	C
13	Alton Pkwy. (NS) & SR-241 Ramps (EW)	TS	0.69	0.68	B	B	0.70	0.60	B	A
14	Alton Pkwy. (NS) & Towne Centre Dr. (EW)	TS	0.44	0.50	A	A	0.45	0.50	A	A
15	Alton Pkwy. (NS) & Portola Pkwy. (EW)	TS	0.48	0.36	A	A	0.47	0.38	A	A
16	Lake Forest Dr. (NS) & Portola Pkwy. (EW)	TS	0.61	0.89	B	D	0.60	0.79	A	C
17	Lake Forest Dr. (NS) & Towne Centre Dr. (EW)	TS	0.40	0.55	A	A	0.36	0.55	A	A
18	Towne Centre Dr. (NS) & Portola Pkwy. (EW)	TS	0.71	0.75	C	C	0.66	0.71	B	C
19	Glenn Ranch Rd. (NS) & Portola Pkwy. (EW)	TS	0.66	0.66	B	B	0.64	0.63	B	B
20	Portola Pkwy. (NS) & SR-241 Ramps (EW)	TS	0.44	0.69	A	B	0.43	0.63	A	B
21	Portola Pkwy. (NS) & Rancho Pkwy. (EW)	TS	0.66	0.63	B	B	0.61	0.62	B	B
22	El Toro Rd. (NS) & Portola Pkwy. (EW)	TS	0.66	0.87	B	D	0.64	0.87	B	D
23	Los Alisos Bl. (NS) & Santa Margarita Pkwy. (EW)	TS	0.88	0.83	D	D	0.85	0.83	D	D
24	Alton Pkwy. (NS) & Commercentre Dr. (EW)	TS	0.61	0.74	B	C	0.63	0.77	B	C
25	Alton Pkwy. (NS) & Irvine Bl. (EW)	TS	0.82	0.81	D	D	0.84	0.81	D	D
26	Bake Pkwy. (NS) & Commercentre Dr. (EW)	TS	0.64	0.73	B	C	0.68	0.74	B	C
27	Bake Pkwy. (NS) & Trabuco Rd. (EW)	TS	0.84	0.79	D	C	0.86	0.79	D	C
28	Bake Pkwy. (NS) & Toledo Wy. (EW)	TS	0.84	0.67	D	B	0.85	0.69	D	B
29	Bake Pkwy. (NS) & Jeronimo Rd. (EW)	TS	0.78	0.82	C	D	0.76	0.81	C	D
30	Bake Pkwy. (NS) & Muirlands Bl. (EW)	TS	0.65	0.75	B	C	0.63	0.73	B	C
31	Bake Pkwy. (NS) & Rockfield Bl. (EW)	TS	0.70	0.87	B	D	0.68	0.87	B	D
32	Bake Pkwy. (NS) & I-5 NB Ramps (EW)	TS	0.80	0.61	C	B	0.78	0.61	C	B
33	Bake Pkwy. (NS) & I-5 SB Ramps (EW)	TS	0.83	0.89	D	D	0.82	0.89	D	D
34	Lake Forest Dr. (NS) & Trabuco Rd. (EW)	TS	0.83	0.85	D	D	0.85	0.84	D	D
35	Lake Forest Dr. (NS) & Serrano Rd. (EW)	TS	0.71	0.59	C	A	0.76	0.62	C	B
36	El Toro Rd. (NS) & Trabuco Rd. (EW)	TS	0.81	0.76	D	C	0.77	0.77	C	C
37	El Toro Rd. (NS) & Serrano Rd. (EW)	TS	0.61	0.70	B	B	0.64	0.69	B	B
38	El Toro Rd. (NS) & Jeronimo Rd. (EW)	TS	0.89	0.80	D	C	0.88	0.83	D	D

[1] Volume/Capacity Ratio and Level of Service are presented based on the Intersection Capacity Utilization (ICU) method

[2] TS = Traffic Signal; Cross-Street Stop

R:\UXRjobs_10600-11000\10820\Excel\[10820-05 - Report.xlsx]8-5

TABLE 8-6: INTERSECTION ANALYSIS SUMMARY FOR 2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITH PORTOLA WESTERLY EXTENSION WITH SCENARIO 4 IMPROVEMENT ALTERNATIVE

#	Intersection	Traffic Control[2]	With Current Land Use				With Project			
			ICU[1] (v/c)		Level of Service[1]		ICU[1] (v/c)		Level of Service[1]	
			AM	PM	AM	PM	AM	PM	AM	PM
1	Lake Forest Dr. (NS) & Dimension Dr. (EW)	TS	0.51	0.53	A	A	0.50	0.52	A	A
2	Lake Forest Dr. (NS) & Rancho Pkwy. (EW)	TS	0.77	0.90	C	D	0.68	0.84	B	D
3	Lake Forest Dr. (NS) & SR-241 SB Off-Ramp (EW)	TS	0.60	0.52	A	A	0.46	0.49	A	A
4	Lake Forest Dr. (NS) & SR-241 NB On-Ramp (EW)	TS	0.34	0.42	A	A	0.32	0.41	A	A
5	Corridor Center (NS) & Rancho Pkwy. (EW)	TS	0.55	0.85	A	D	0.44	0.50	A	A
6	Bake Parkway (NS) & Portola Pkwy. (EW)	TS	0.55	0.76	A	C	0.55	0.74	A	C
7	Bake Parkway (NS) & Towne Center Dr. (EW)	TS	0.66	0.66	B	B	0.63	0.67	B	B
8	Bake Parkway (NS) & Rancho Pkwy. (EW)	TS	0.65	0.78	B	C	0.65	0.78	B	C
9	Bake Parkway (NS) & Rancho Pkwy. S. (EW)	TS	0.83	0.86	D	D	0.77	0.76	C	C
10	Bake Parkway (NS) & Orchard (EW)	CSS	0.59	0.68	A	A	0.65	0.71	A	A
11	Dimension Dr. (NS) & Bake Parkway (EW)	TS	0.68	0.81	B	D	0.59	0.81	A	D
12	Alton Pkwy. (NS) & Rancho Pkwy. S. (EW)	TS	0.67	0.75	B	C	0.75	0.69	C	B
13	Alton Pkwy. (NS) & SR-241 Ramps (EW)	TS	0.66	0.64	B	B	0.65	0.56	B	A
14	Alton Pkwy. (NS) & Towne Centre Dr. (EW)	TS	0.31	0.43	A	A	0.32	0.43	A	A
15	Alton Pkwy. (NS) & Portola Pkwy. (EW)	TS	0.56	0.51	A	A	0.54	0.51	A	A
16	Lake Forest Dr. (NS) & Portola Pkwy. (EW)	TS	0.62	0.88	B	D	0.63	0.83	B	D
17	Lake Forest Dr. (NS) & Towne Centre Dr. (EW)	TS	0.39	0.52	A	A	0.32	0.51	A	A
18	Towne Centre Dr. (NS) & Portola Pkwy. (EW)	TS	0.72	0.79	C	C	0.68	0.74	B	C
19	Glenn Ranch Rd. (NS) & Portola Pkwy. (EW)	TS	0.68	0.67	B	B	0.66	0.66	B	B
20	Portola Pkwy. (NS) & SR-241 Ramps (EW)	TS	0.40	0.64	A	B	0.39	0.60	A	A
21	Portola Pkwy. (NS) & Rancho Pkwy. (EW)	TS	0.67	0.64	B	B	0.63	0.63	B	B
22	El Toro Rd. (NS) & Portola Pkwy. (EW)	TS	0.67	0.87	B	D	0.64	0.88	B	D
23	Los Alisos Bl. (NS) & Santa Margarita Pkwy. (EW)	TS	0.89	0.83	D	D	0.86	0.81	D	D
24	Alton Pkwy. (NS) & Commercentre Dr. (EW)	TS	0.56	0.70	A	B	0.60	0.73	A	C
25	Alton Pkwy. (NS) & Irvine Bl. (EW)	TS	0.83	0.82	D	D	0.86	0.81	D	D
26	Bake Pkwy. (NS) & Commercentre Dr. (EW)	TS	0.62	0.71	B	C	0.66	0.72	B	C
27	Bake Pkwy. (NS) & Trabuco Rd. (EW)	TS	0.84	0.79	D	C	0.86	0.79	D	C
28	Bake Pkwy. (NS) & Toledo Wy. (EW)	TS	0.85	0.67	D	B	0.84	0.69	D	B
29	Bake Pkwy. (NS) & Jeronimo Rd. (EW)	TS	0.74	0.80	C	C	0.77	0.82	C	D
30	Bake Pkwy. (NS) & Muirlands Bl. (EW)	TS	0.62	0.74	B	C	0.64	0.74	B	C
31	Bake Pkwy. (NS) & Rockfield Bl. (EW)	TS	0.70	0.86	B	D	0.68	0.87	B	D
32	Bake Pkwy. (NS) & I-5 NB Ramps (EW)	TS	0.79	0.60	C	A	0.77	0.61	C	B
33	Bake Pkwy. (NS) & I-5 SB Ramps (EW)	TS	0.82	0.88	D	D	0.81	0.89	D	D
34	Lake Forest Dr. (NS) & Trabuco Rd. (EW)	TS	0.83	0.86	D	D	0.85	0.87	D	D
35	Lake Forest Dr. (NS) & Serrano Rd. (EW)	TS	0.71	0.61	C	B	0.71	0.63	C	B
36	El Toro Rd. (NS) & Trabuco Rd. (EW)	TS	0.78	0.77	C	C	0.77	0.76	C	C
37	El Toro Rd. (NS) & Serrano Rd. (EW)	TS	0.62	0.69	B	B	0.64	0.69	B	B
38	El Toro Rd. (NS) & Jeronimo Rd. (EW)	TS	0.89	0.82	D	D	0.88	0.82	D	D

[1] Volume/Capacity Ratio and Level of Service are presented based on the Intersection Capacity Utilization (ICU) method

[2] TS = Traffic Signal; Cross-Street Stop

R:\UXRjobs_10600-11000\10820\Excel\[10820-05 - Report.xlsx]8-6

TABLE 8-7: INTERSECTION ANALYSIS SUMMARY FOR 2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITHOUT PORTOLA WESTERLY EXTENSION WITH SCENARIO 5 IMPROVEMENT ALTERNATIVE

#	Intersection	Traffic Control[2]	With Current Land Use				With Project			
			ICU[1] (v/c)		Level of Service[1]		ICU[1] (v/c)		Level of Service[1]	
			AM	PM	AM	PM	AM	PM	AM	PM
1	Lake Forest Dr. (NS) & Dimension Dr. (EW)	TS	0.51	0.52	A	A	0.51	0.52	A	A
2	Lake Forest Dr. (NS) & Rancho Pkwy. (EW)	TS	0.78	0.89	C	D	0.68	0.85	B	D
3	Lake Forest Dr. (NS) & SR-241 SB Off-Ramp (EW)	TS	0.65	0.54	B	A	0.51	0.51	A	A
4	Lake Forest Dr. (NS) & SR-241 NB On-Ramp (EW)	TS	0.34	0.44	A	A	0.35	0.42	A	A
5	Corridor Center (NS) & Rancho Pkwy. (EW)	TS	0.58	0.87	A	D	0.44	0.51	A	A
6	Bake Parkway (NS) & Portola Pkwy. (EW)	TS	0.53	0.73	A	C	0.52	0.72	A	C
7	Bake Parkway (NS) & Towne Center Dr. (EW)	TS	0.65	0.65	B	B	0.60	0.67	A	B
8	Bake Parkway (NS) & Rancho Pkwy. (EW)	TS	0.65	0.79	B	C	0.66	0.79	B	C
9	Bake Parkway (NS) & Rancho Pkwy. S. (EW)	TS	0.84	0.87	D	D	0.78	0.77	C	C
10	Bake Parkway (NS) & Orchard (EW)	CSS	0.61	0.69	A	A	0.66	0.72	A	A
11	Dimension Dr. (NS) & Bake Parkway (EW)	TS	0.68	0.82	B	D	0.61	0.82	B	D
12	Alton Pkwy. (NS) & Rancho Pkwy. S. (EW)	TS	0.71	0.78	C	C	0.75	0.74	C	C
13	Alton Pkwy. (NS) & SR-241 Ramps (EW)	TS	0.69	0.67	B	B	0.68	0.60	B	A
14	Alton Pkwy. (NS) & Towne Centre Dr. (EW)	TS	0.44	0.50	A	A	0.44	0.50	A	A
15	Alton Pkwy. (NS) & Portola Pkwy. (EW)	TS	0.48	0.36	A	A	0.47	0.38	A	A
16	Lake Forest Dr. (NS) & Portola Pkwy. (EW)	TS	0.62	0.88	B	D	0.60	0.79	A	C
17	Lake Forest Dr. (NS) & Towne Centre Dr. (EW)	TS	0.40	0.57	A	A	0.36	0.55	A	A
18	Towne Centre Dr. (NS) & Portola Pkwy. (EW)	TS	0.71	0.75	C	C	0.66	0.71	B	C
19	Glenn Ranch Rd. (NS) & Portola Pkwy. (EW)	TS	0.66	0.66	B	B	0.63	0.63	B	B
20	Portola Pkwy. (NS) & SR-241 Ramps (EW)	TS	0.44	0.69	A	B	0.42	0.64	A	B
21	Portola Pkwy. (NS) & Rancho Pkwy. (EW)	TS	0.65	0.63	B	B	0.60	0.61	A	B
22	El Toro Rd. (NS) & Portola Pkwy. (EW)	TS	0.72	0.86	C	D	0.68	0.84	B	D
23	Los Alisos Bl. (NS) & Santa Margarita Pkwy. (EW)	TS	0.90	0.83	D	D	0.87	0.83	D	D
24	Alton Pkwy. (NS) & Commercentre Dr. (EW)	TS	0.61	0.74	B	C	0.63	0.77	B	C
25	Alton Pkwy. (NS) & Irvine Bl. (EW)	TS	0.82	0.81	D	D	0.84	0.81	D	D
26	Bake Pkwy. (NS) & Commercentre Dr. (EW)	TS	0.64	0.73	B	C	0.67	0.74	B	C
27	Bake Pkwy. (NS) & Trabuco Rd. (EW)	TS	0.84	0.78	D	C	0.87	0.79	D	C
28	Bake Pkwy. (NS) & Toledo Wy. (EW)	TS	0.84	0.67	D	B	0.84	0.69	D	B
29	Bake Pkwy. (NS) & Jeronimo Rd. (EW)	TS	0.78	0.81	C	D	0.79	0.81	C	D
30	Bake Pkwy. (NS) & Muirlands Bl. (EW)	TS	0.64	0.76	B	C	0.64	0.74	B	C
31	Bake Pkwy. (NS) & Rockfield Bl. (EW)	TS	0.71	0.86	C	D	0.69	0.87	B	D
32	Bake Pkwy. (NS) & I-5 NB Ramps (EW)	TS	0.79	0.61	C	B	0.78	0.61	C	B
33	Bake Pkwy. (NS) & I-5 SB Ramps (EW)	TS	0.83	0.89	D	D	0.82	0.88	D	D
34	Lake Forest Dr. (NS) & Trabuco Rd. (EW)	TS	0.82	0.84	D	D	0.85	0.85	D	D
35	Lake Forest Dr. (NS) & Serrano Rd. (EW)	TS	0.70	0.59	B	A	0.71	0.61	C	B
36	El Toro Rd. (NS) & Trabuco Rd. (EW)	TS	0.77	0.78	C	C	0.76	0.77	C	C
37	El Toro Rd. (NS) & Serrano Rd. (EW)	TS	0.63	0.68	B	B	0.65	0.71	B	C
38	El Toro Rd. (NS) & Jeronimo Rd. (EW)	TS	0.89	0.81	D	D	0.87	0.82	D	D

[1] Volume/Capacity Ratio and Level of Service are presented based on the Intersection Capacity Utilization (ICU) method

[2] TS = Traffic Signal; Cross-Street Stop

R:\UXRjobs_10600-11000\10820\Excel\[10820-05 - Report.xlsx]8-7

TABLE 8-8: INTERSECTION ANALYSIS SUMMARY FOR 2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITH PORTOLA WESTERLY EXTENSION WITH SCENARIO 5 IMPROVEMENT ALTERNATIVE

#	Intersection	Traffic Control[2]	With Current Land Use				With Project			
			ICU[1] (v/c)		Level of Service[1]		ICU[1] (v/c)		Level of Service[1]	
			AM	PM	AM	PM	AM	PM	AM	PM
1	Lake Forest Dr. (NS) & Dimension Dr. (EW)	TS	0.51	0.53	A	A	0.50	0.52	A	A
2	Lake Forest Dr. (NS) & Rancho Pkwy. (EW)	TS	0.78	0.90	C	D	0.67	0.84	B	D
3	Lake Forest Dr. (NS) & SR-241 SB Off-Ramp (EW)	TS	0.60	0.51	A	A	0.46	0.49	A	A
4	Lake Forest Dr. (NS) & SR-241 NB On-Ramp (EW)	TS	0.33	0.42	A	A	0.32	0.41	A	A
5	Corridor Center (NS) & Rancho Pkwy. (EW)	TS	0.55	0.85	A	D	0.44	0.50	A	A
6	Bake Parkway (NS) & Portola Pkwy. (EW)	TS	0.56	0.76	A	C	0.55	0.74	A	C
7	Bake Parkway (NS) & Towne Center Dr. (EW)	TS	0.65	0.66	B	B	0.63	0.67	B	B
8	Bake Parkway (NS) & Rancho Pkwy. (EW)	TS	0.65	0.78	B	C	0.66	0.78	B	C
9	Bake Parkway (NS) & Rancho Pkwy. S. (EW)	TS	0.82	0.86	D	D	0.77	0.77	C	C
10	Bake Parkway (NS) & Orchard (EW)	CSS	0.59	0.67	A	A	0.65	0.72	A	A
11	Dimension Dr. (NS) & Bake Parkway (EW)	TS	0.68	0.81	B	D	0.59	0.80	A	C
12	Alton Pkwy. (NS) & Rancho Pkwy. S. (EW)	TS	0.67	0.75	B	C	0.75	0.69	C	B
13	Alton Pkwy. (NS) & SR-241 Ramps (EW)	TS	0.65	0.64	B	B	0.65	0.56	B	A
14	Alton Pkwy. (NS) & Towne Centre Dr. (EW)	TS	0.31	0.43	A	A	0.32	0.43	A	A
15	Alton Pkwy. (NS) & Portola Pkwy. (EW)	TS	0.56	0.51	A	A	0.54	0.51	A	A
16	Lake Forest Dr. (NS) & Portola Pkwy. (EW)	TS	0.62	0.88	B	D	0.63	0.83	B	D
17	Lake Forest Dr. (NS) & Towne Centre Dr. (EW)	TS	0.39	0.52	A	A	0.32	0.51	A	A
18	Towne Centre Dr. (NS) & Portola Pkwy. (EW)	TS	0.72	0.79	C	C	0.68	0.74	B	C
19	Glenn Ranch Rd. (NS) & Portola Pkwy. (EW)	TS	0.67	0.67	B	B	0.65	0.66	B	B
20	Portola Pkwy. (NS) & SR-241 Ramps (EW)	TS	0.39	0.64	A	B	0.39	0.60	A	A
21	Portola Pkwy. (NS) & Rancho Pkwy. (EW)	TS	0.66	0.63	B	B	0.61	0.62	B	B
22	El Toro Rd. (NS) & Portola Pkwy. (EW)	TS	0.73	0.87	C	D	0.69	0.83	B	D
23	Los Alisos Bl. (NS) & Santa Margarita Pkwy. (EW)	TS	0.89	0.83	D	D	0.87	0.82	D	D
24	Alton Pkwy. (NS) & Commercentre Dr. (EW)	TS	0.56	0.70	A	B	0.60	0.73	A	C
25	Alton Pkwy. (NS) & Irvine Bl. (EW)	TS	0.83	0.82	D	D	0.86	0.82	D	D
26	Bake Pkwy. (NS) & Commercentre Dr. (EW)	TS	0.62	0.71	B	C	0.66	0.73	B	C
27	Bake Pkwy. (NS) & Trabuco Rd. (EW)	TS	0.84	0.78	D	C	0.86	0.79	D	C
28	Bake Pkwy. (NS) & Toledo Wy. (EW)	TS	0.84	0.67	D	B	0.87	0.68	D	B
29	Bake Pkwy. (NS) & Jeronimo Rd. (EW)	TS	0.77	0.81	C	D	0.76	0.83	C	D
30	Bake Pkwy. (NS) & Muirlands Bl. (EW)	TS	0.63	0.73	B	C	0.64	0.74	B	C
31	Bake Pkwy. (NS) & Rockfield Bl. (EW)	TS	0.69	0.86	B	D	0.68	0.87	B	D
32	Bake Pkwy. (NS) & I-5 NB Ramps (EW)	TS	0.79	0.60	C	A	0.77	0.61	C	B
33	Bake Pkwy. (NS) & I-5 SB Ramps (EW)	TS	0.82	0.88	D	D	0.81	0.89	D	D
34	Lake Forest Dr. (NS) & Trabuco Rd. (EW)	TS	0.83	0.86	D	D	0.85	0.86	D	D
35	Lake Forest Dr. (NS) & Serrano Rd. (EW)	TS	0.69	0.61	B	B	0.71	0.61	C	B
36	El Toro Rd. (NS) & Trabuco Rd. (EW)	TS	0.78	0.77	C	C	0.77	0.76	C	C
37	El Toro Rd. (NS) & Serrano Rd. (EW)	TS	0.62	0.68	B	B	0.63	0.70	B	B
38	El Toro Rd. (NS) & Jeronimo Rd. (EW)	TS	0.88	0.82	D	D	0.87	0.82	D	D

[1] Volume/Capacity Ratio and Level of Service are presented based on the Intersection Capacity Utilization (ICU) method

[2] TS = Traffic Signal; Cross-Street Stop

R:\UXRjobs_10600-11000\10820\Excel\[10820-05 - Report.xlsx]8-8

9 IMPROVEMENT RECOMMENDATIONS

9.1 ON-SITE CONDITIONS

This site access evaluation documents anticipated peak hour traffic volumes at on-site intersections, and provides recommendations regarding lane geometrics for level of service and to serve anticipated queue lengths. This effort involves a review of ITE-based trip generation for the project in order to calculate peak hour turning movements at local intersections, evaluation of LOS and queuing at appropriate on-site intersection analysis locations, and determination of ultimate intersection lane configurations and traffic controls.

AM and PM peak hour traffic volumes are shown on Exhibits 9-1 and 9-2, respectively. Intersection analysis of on-site intersections has been performed and is summarized on Table 9-1. Each on-site intersection is anticipated to experience LOS C or better during the AM and PM peak hours, with planned lanes (and will therefore experience acceptable operations). Queuing analysis (summarized in Table 9-2) indicates that adequate storage is provided for anticipated AM and PM peak hour queues. Intersection and queuing analysis worksheets for on-site intersections are included in Appendix 9.1.

9.1.1 INTERNAL STREET LANE CONFIGURATIONS

Exhibits 9-3 through 9-6 illustrate the vehicular lane geometrics, medians, and crosswalks at key Nakase Property project area intersections. "A" Street is essentially the easterly extension of Rancho Parkway South, serving as the Project main entrance. At the intersection of Bake Parkway/Rancho Parkway South, northbound traffic entering the site is accommodated by a separate right turn lane, and two eastbound travel lanes accommodate traffic inbound to the site along "A" Street.

"A" Street includes two travel lanes in each direction divided by a raised median. To efficiently serve residential traffic entering and exiting the site, the landscaped median on "A" Street prohibits eastbound traffic from making left turns onto "BB" Street (see Exhibit 9-3). Traffic exiting the site is served by westbound dual left turn lanes, a single westbound through lane, and a separate westbound right turn lane on "A" Street approaching Bake Parkway.

"C" Street extends into the site from a right-in/right out intersection (no median break) with Bake Parkway which provides one travel lane in each direction through to "B" Street. At the Bake Parkway/"C" Street intersection, northbound traffic entering the site is served by a separate right turn lane (see Exhibit 9-4).

"B" Street includes two lanes in each direction between the Corridor Center/Rancho Parkway intersection and the "BB" Street intersection. At the Corridor Center/Rancho Parkway intersection, the northbound approach on "B" Street is configured with one left turn lane, and one shared through right lane. Between "BB" Street and "A" Street, the cross section for "B" Street consists of one southbound lane and two northbound lanes to accommodate turning movements related to the school site. Southwest of "A" Street, "B" Street then transitions into a cross section that accommodates one lane in each direction.

EXHIBIT 9-1: MORNING PEAK HOUR NEIGHBORHOOD TRAFFIC VOLUMES

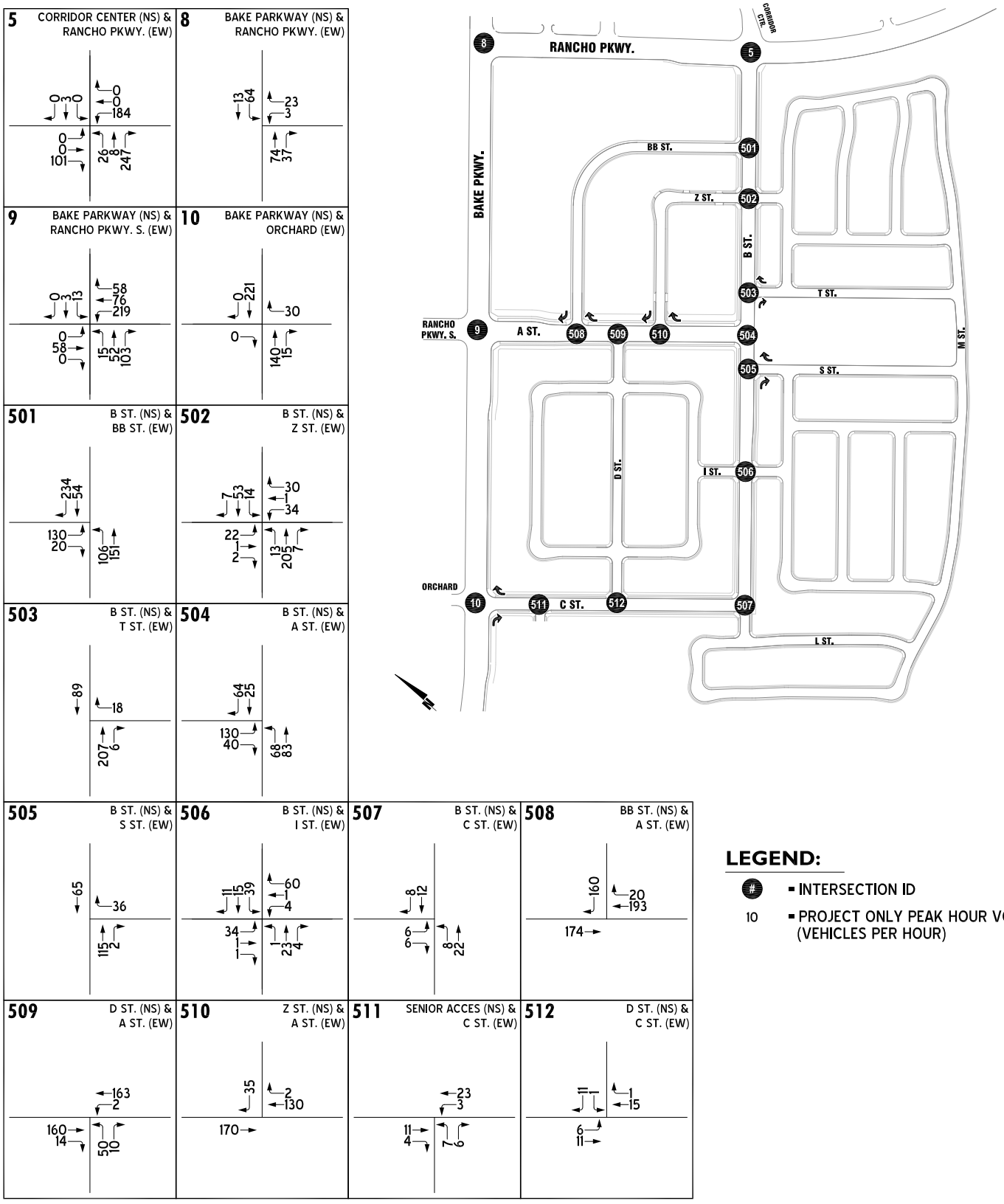
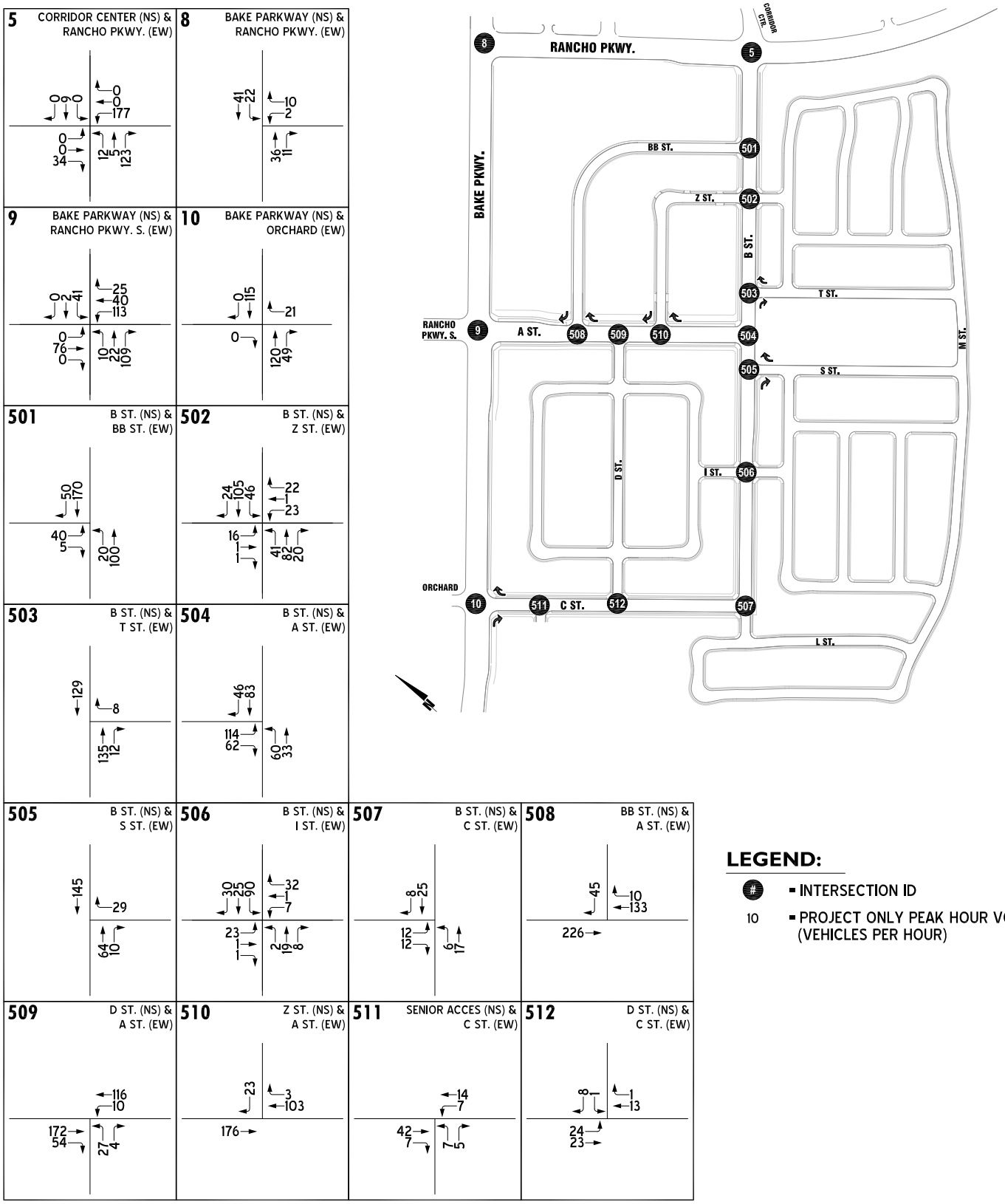


EXHIBIT 9-2: EVENING PEAK HOUR NEIGHBORHOOD TRAFFIC VOLUMES



LEGEND:

- (#) = INTERSECTION ID
- 10 = PROJECT ONLY PEAK HOUR VOLUMES (VEHICLES PER HOUR)

TABLE 9-1: NEIGHBORHOOD INTERSECTION ANALYSIS SUMMARY

#	Intersection	Traffic Control[3]	Intersection Approach Lanes[1]												Delay[2] (Secs)		Level of Service[2]	
			Northbound			Southbound			Eastbound			Westbound						
			L	T	R	L	T	R	L	T	R	L	T	R	AM	PM	AM	PM
501	B St. (NS) & BB St. (EW)	CSS	0	2	0	0	1	1	0	1!	0	0	0	0	16.1	10.5	C	B
502	B St. (NS) & Z St. (EW)	CSS	0	2	0	0	1	0	0	1!	0	0	1!	0	11.1	11.9	B	B
503	B St. (NS) & T St. (EW)	CSS	0	2	0	0	1	0	0	0	0	0	0	1	9.1	8.8	A	A
504	B St. (NS) & A St. (EW)	AWS	0	2	0	0	1	0	1	0	1	0	0	0	9.3	8.9	A	A
505	B St. (NS) & S St. (EW)	CSS	0	2	0	0	1	0	0	0	0	0	0	1	8.8	8.6	A	A
506	B St. (NS) & I St. (EW)	CSS	0	1	0	0	1	0	0	1!	0	0	1!	0	10.2	11.1	B	B
507	B St. (NS) & C St. (EW)	AWS	0	1	0	0	1	0	0	1!	0	0	0	0	7.0	7.1	A	A
508	BB St. (NS) & A St. (EW)	CSS	0	0	0	0	0	1	0	2	0	0	2	0	10.4	8.9	B	A
509	D St. (NS) & A St. (EW)	CSS	0	1!	0	0	0	0	0	2	0	0	2	0	10.8	10.5	B	B
510	Z St. (NS) & A St. (EW)	CSS	0	0	0	0	0	1	0	2	0	0	2	0	8.9	8.7	A	A
511	Senior Access (NS) & C St. (EW)	CSS	0	1!	0	0	0	0	0	1	0	0	1	0	8.6	8.8	A	A
512	D St. (NS) & C St. (EW)	CSS	0	0	0	0	1!	0	0	1	0	0	1	0	8.5	8.5	A	A

[1] When a right turn is designated, the lane can either be striped or unstriped.
To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.
L = Left; T = Through; R = Right

[2] Per the Highway Capacity Manual 6th Edition (HCM6), overall average intersection delay and level of service are shown for intersections with all way stop control.
For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.
Delay and level of service is calculated using Synchro 10.1 analysis software.

[3] CSS = Cross-street Stop; AWS = All-Way Stop

R:\UXRjobs_10600-11000\10820\Excel\[10820-05 - Report (20180516).xlsx]9-1

TABLE 9-2: PROJECT ACCESS AND NEIGHBORHOOD QUEUING ANALYSIS SUMMARY FOR EXISTING PLUS PROJECT CONDITIONS

ID	Intersection	Turning Movement Lane	Storage Length Provided[1] (feet)	95th Percentile Queue Length Per Lane (feet)[2]		Acceptable?[3]	
				AM	PM	AM	PM
5	Corridor Center (NS) & Rancho Pkwy. (EW)	NBL	270	26	20	YES	YES
		NBT/R	270	176	64	YES	YES
		EBR	200	78	20	YES	YES
		WBL	200	123	124	YES	YES
9	Bake Parkway (NS) & Rancho Pkwy. S. (EW)	NBR	200	57	33	YES	YES
		SBL	200	33	108	YES	YES
		EBT/R	400	163	255	YES	YES
		WBL	125	113	66	YES	YES
		WBT	310	93	104	YES	YES
		WBR	150	46	60	YES	YES
10	Bake Parkway (NS) & Orchard (EW)	NBR	180	0	0	YES	YES
		WBR	160	27	29	YES	YES
501	B St. (NS) & BB St. (EW)	NBL/T	130	43	0	YES	YES
		SBR	270	17	0	YES	YES
		EBL/R	≥100	96	43	YES	YES
502	B St. (NS) & Z St. (EW)	NBL/T	315	26	0	YES	YES
		NBT/R	315	0	0	YES	YES
		SBL/T/R	130	0	26	YES	YES
		EBL/T/R	≥60	42	25	YES	YES
		WBL/T/R	≥60	31	44	YES	YES
503	B St. (NS) & T St. (EW)	NBT/R	100	0	0	YES	YES
		WBR	≥60	44	0	YES	YES
504	B St. (NS) & A St. (EW)	NBL/T	70	32	57	YES	YES
		SBT/R	450	45	72	YES	YES
		EBL	430	57	51	YES	YES
		EBR	430	32	31	YES	YES
505	B St. (NS) & S St. (EW)	NBT/R	340	0	0	YES	YES
		WBR	≥60	50	54	YES	YES
506	B St. (NS) & I St. (EW)	NBL/T/R	460	0	0	YES	YES
		SBL/T/R	460	24	26	YES	YES
		EBL/T/R	≥60	42	33	YES	YES
		WBL/T/R	≥60	44	57	YES	YES
507	B St. (NS) & C St. (EW)	NBL/T	≥60	36	44	YES	YES
		SBT/R	460	44	32	YES	YES
		EBL/R	430	27	43	YES	YES
508	BB St. (NS) & A St. (EW)	SBR	≥100	77	43	YES	YES
		WBT/R	100	0	0	YES	YES
509	D St. (NS) & A St. (EW)	NBL/R	≥100	66	35	YES	YES
		EBT/R	450	0	0	YES	YES
		WBL/T	110	0	0	YES	YES
510	Z St. (NS) & A St. (EW)	SBR	≥60	43	43	YES	YES
		WBT/R	280	0	0	YES	YES
511	Senior Access (NS) & C St. (EW)	NBL/R	≥60	37	24	YES	YES
		EBT/R	160	0	0	YES	YES
		WBL/T	230	0	0	YES	YES
512	D St. (NS) & C St. (EW)	SBL/R	≥60	36	26	YES	YES
		EBL/T	230	0	0	YES	YES
		WBT/R	430	0	0	YES	YES

[1] Future pocket length storage (for turning movements) or link distance (for through movements).

[2] Queue length calculated using Synchro 10.1 with SimTraffic.

[3] Storage Length is acceptable if the required queuing length is less than or equal to the storage length provided.

R:\UXRjobs_10600-11000\10820\Excel\[10820-05 - Report (20180516).xlsx]9-2

EXHIBIT 9-3: PROJECT ENTRY LANE GEOMETRICS, BAKE PKWY. / RANCHO PKWY. S.

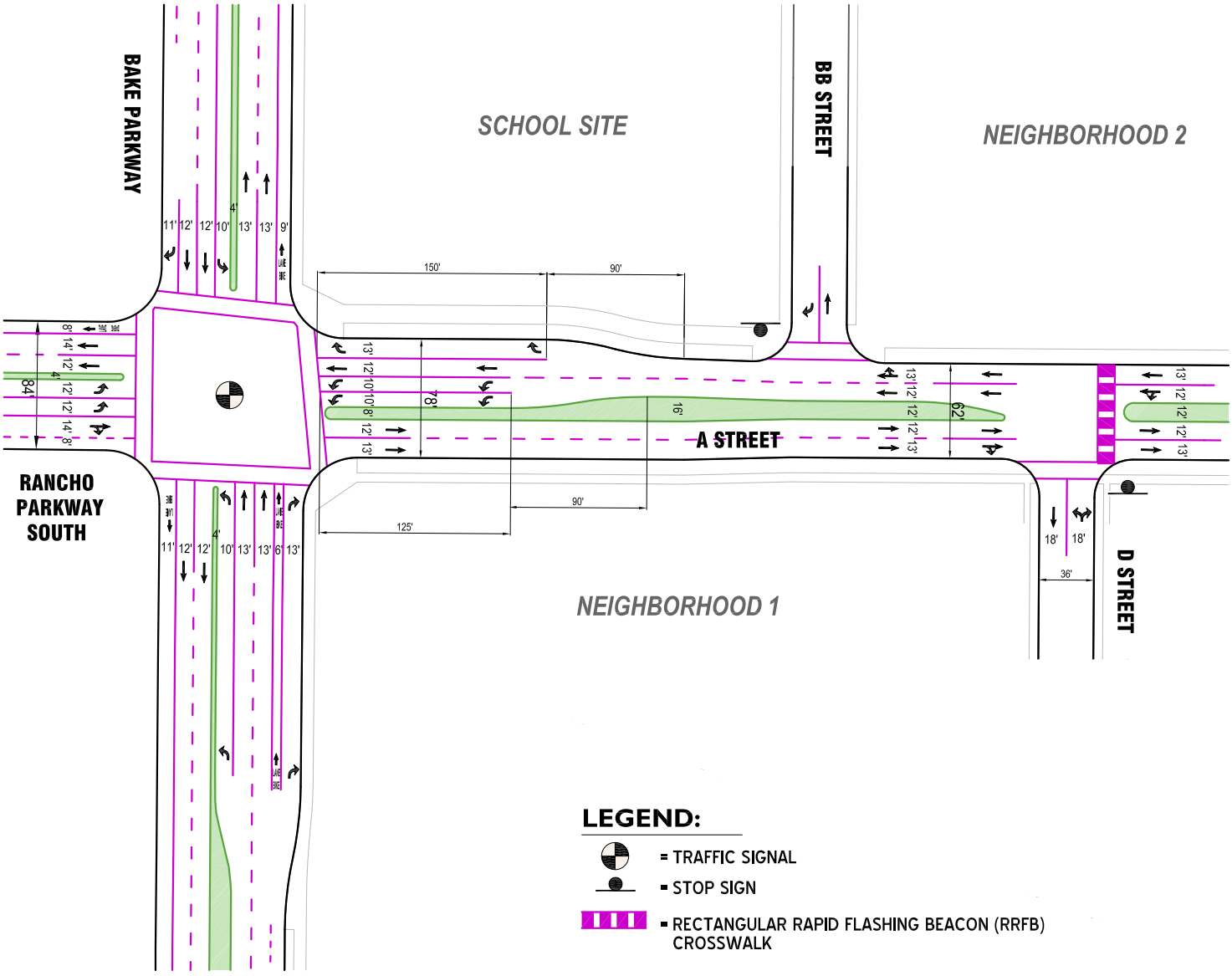
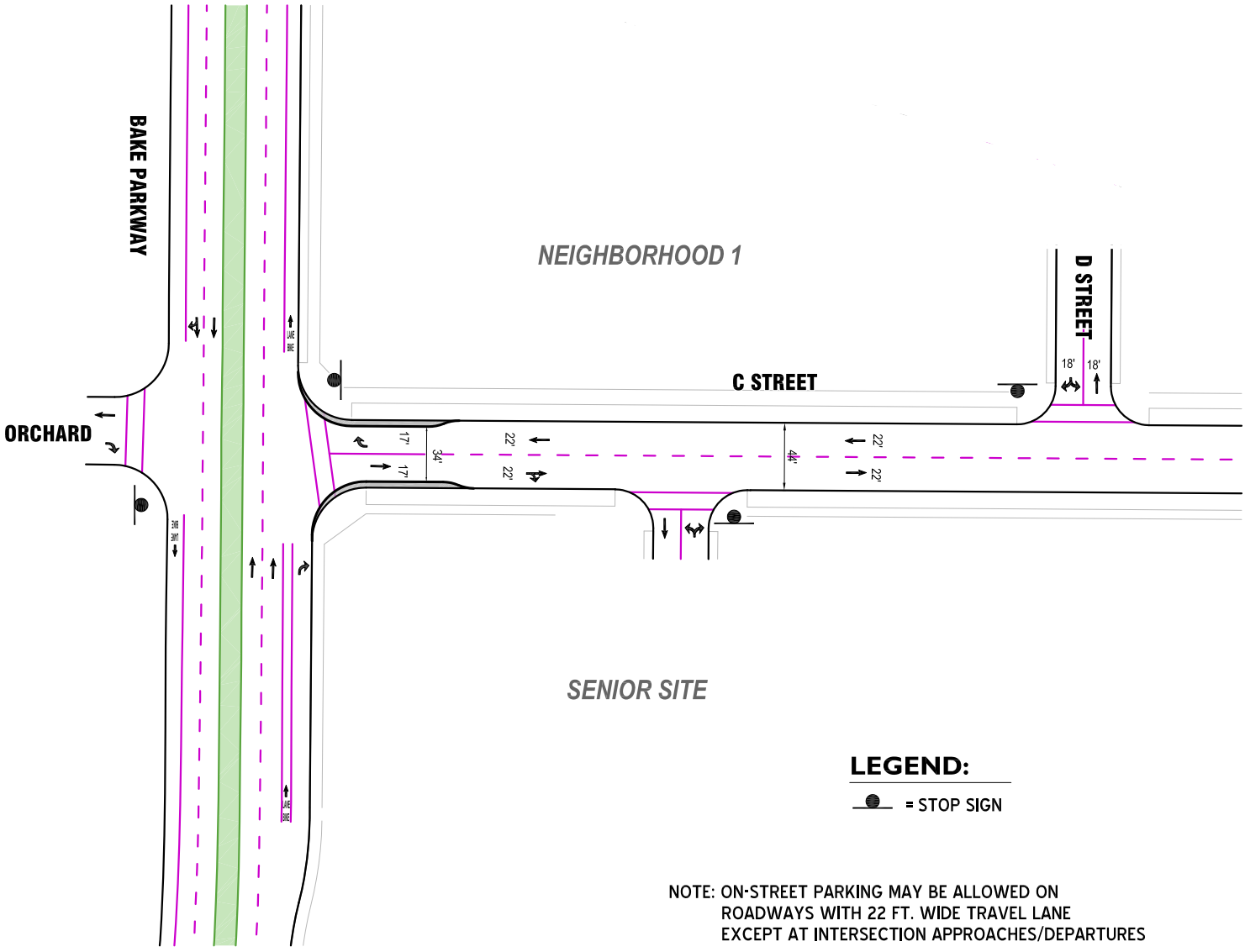


EXHIBIT 9-4: PROJECT ENTRY LANE GEOMETRICS, BAKE PKWY. / C STREET



At the intersection of "B" Street/Rancho Parkway South, eastbound traffic entering the site is served by a separate right turn lane, and two southbound travel lanes accommodate traffic inbound to the site along "B" Street (see Exhibit 9-5). Traffic exiting the site is served by a northbound left turn lane as well as a northbound shared through/right turn lane on "B" Street approaching Rancho Parkway at the existing Corridor Center driveway. Because "BB" Street provides exclusive access to the school site, a separate southbound right turn lane is provided on "B" Street approaching the "B" Street/"BB" Street intersection. At the "B" Street/"BB" Street intersection, a northbound shared through/left turn lane is provided in addition to a separate northbound through lane.

"B" Street intersects "A" Street at the center of the Nakase Property development. At the "B" Street/"A" Street intersection, separate eastbound left and right turn lanes are provided on "A" Street (see Exhibit 9-6). In the vicinity of the "B" Street/"A" Street intersection, "B" Street includes one southbound lane and two northbound lanes in order to provide flexibility for left turn movements. The intersections of "B" Street/"T" Street and "B" Street/"S" Street are restricted to right-turns only (no median break) near the "B" Street/"A" Street intersection.

On-street parking is not allowed on "A" Street as shown on Exhibit 9-8. Along "T" Street and "S" Street adjacent to the park, on-street parking is accommodated for community and public events. Along "BB" Street adjacent to the school, on-street parking is accommodated for student drop-off and pick-up purposes. Along "B" Street and "C" Street, on-street parking can be accommodated within 22 ft. wide single travel lanes as shown on Exhibit 9-8.

Sight distance at each project intersection should be reviewed with respect to standard Caltrans and City of Lake Forest sight distance standards at the time of preparation of final grading, landscape and street improvement plans.

It should be noted that privately owned streets ("A" Street, "B" Street, "C" Street, and neighborhood streets/entries) will be maintained by the HOA, with the exception of the public streets providing access to the school ("BB" Street, "A" Street from Bake Parkway to "B" Street and on "B" Street from Rancho Parkway to "A" Street) as shown previously on Exhibit 2-5.

9.1.2 TRAFFIC CALMING

Residential streets within Nakase Property include curb extensions/chokers at intersections as shown on Exhibit 9-7, to both visually enhance the look and feel of the intersection and to promote pedestrian activity. At key local street intersections, curb extensions have the combined benefits of aesthetic appeal and accommodations for non-motorized travelers. Pedestrian safety is enhanced through the use of landscaped curb extensions/chokers which project into the street four- to six-feet at street corners to promote vehicle slowing and to shorten the street-crossing distance for pedestrians.

Rectangular Rapid Flashing Beacons (RRFBs) at uncontrolled crosswalks are recommended at two key locations within the Project (see Exhibit 9-7) in order to enhance driver's awareness of crosswalks needed for efficient school access. They can be activated by pedestrians manually by a push button or passively by a pedestrian detection system. RRFB control at a crosswalk has the potential to be an effective traffic control device since it fulfills a need, commands

attention, conveys a clear meaning, commands respect of road users, and gives adequate time for proper response.

On-street parking is allowed on neighborhood streets and segments of "BB" Street, "C" Street, and "B" Street, as indicated on Exhibit 9-8. On-street parking, in effect, reduces the width of the street, leading to slower driving. Parking also separates traveling cars from the sidewalk, helping to improve pedestrian safety

9.1.3 PEDESTRIAN/BICYCLE ACCOMMODATIONS

To assist in reducing the number of vehicle miles traveled, and to promote converting some automobile trips into non-vehicular trips, a network of bicycle and pedestrian connections is provided in Nakase Property. Additionally, public transit service is available adjacent to the community.

BIKEWAYS

Class II bikeways are located on both sides of Bake Parkway, Rancho Parkway South and Rancho Parkway as shown on Exhibit 9-9, consistent with the Circulation Element of the City's General Plan. Bike lanes are also located on both sides of Lake Forest Drive and Alton Parkway in the project area. These bikeways connect to regional connections illustrated on the City's Planned Bikeways Map.

Within the site, off-street shared bicycle/pedestrian paths are located adjacent to "A" Street, "B" Street, "C" Street, and "S" Street. These bicycle/pedestrian trails connect through the site to the adjacent on-street bike lanes. The proposed Nakase Property paths also connect to an on-site trail from the "S" Street/"M" Street intersection, which then runs parallel to Serrano Creek to the southeast corner of the site. At that point it uses an existing service road crossing of Serrano Creek to provide access to the existing Serrano Creek Trail on the east side of the creek. The service road is currently owned by Nakase, and is private property that will be privately owned and maintained by the HOA. Nakase has an easement from southeastern portion (Serrano Creek culvert) of property to Lake Forest.

PEDESTRIAN CONNECTIONS

Bake Parkway and Rancho Parkway South are arterials providing pedestrian access via sidewalks. On Rancho Parkway frontage adjacent to the site, a sidewalk will be constructed adjacent to the existing curb. In addition to those pedestrian connections, streets within Nakase Property provide sidewalks as indicated in Exhibit 9-10.

Within the site, off-street shared bicycle/pedestrian paths are located adjacent to "A" Street, "B" Street, "C" Street, and "S" Street. Two additional off-street pedestrian trails are also provided.

At the northeast corner of the site, a sidewalk connection will be provided from the Nakase Property to the existing Serrano Creek Trail. From the "S" Street / "M" Street intersection, a shared bicycle/pedestrian path is aligned parallel to Serrano Creek to the southeast corner of the site. At that point it uses an existing service road crossing of Serrano Creek to provide access to the existing Serrano Creek Trail as indicated above.

EXHIBIT 9-5: PROJECT ENTRY LANE GEOMETRICS, B STREET / RANCHO PKWY.

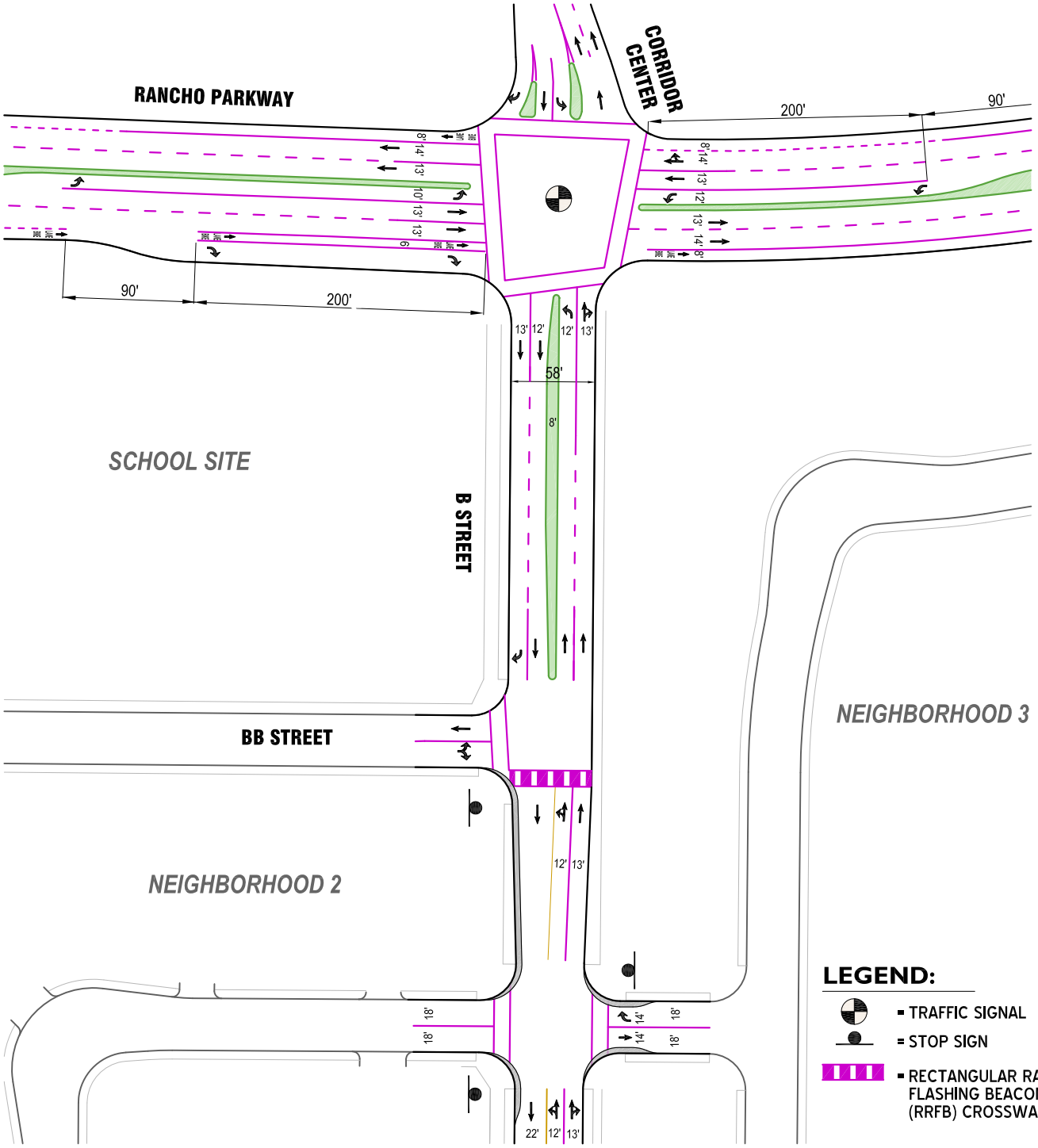
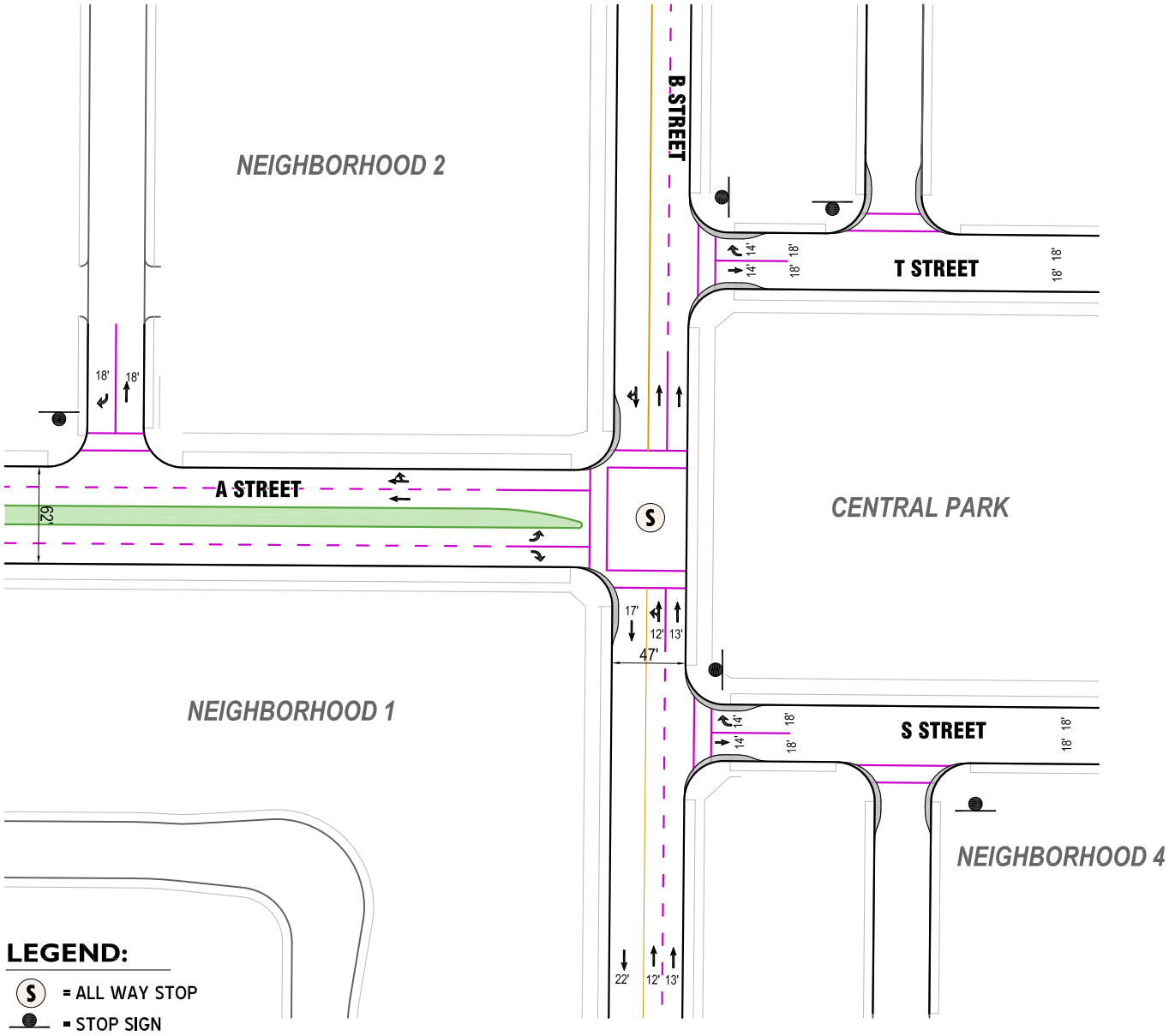
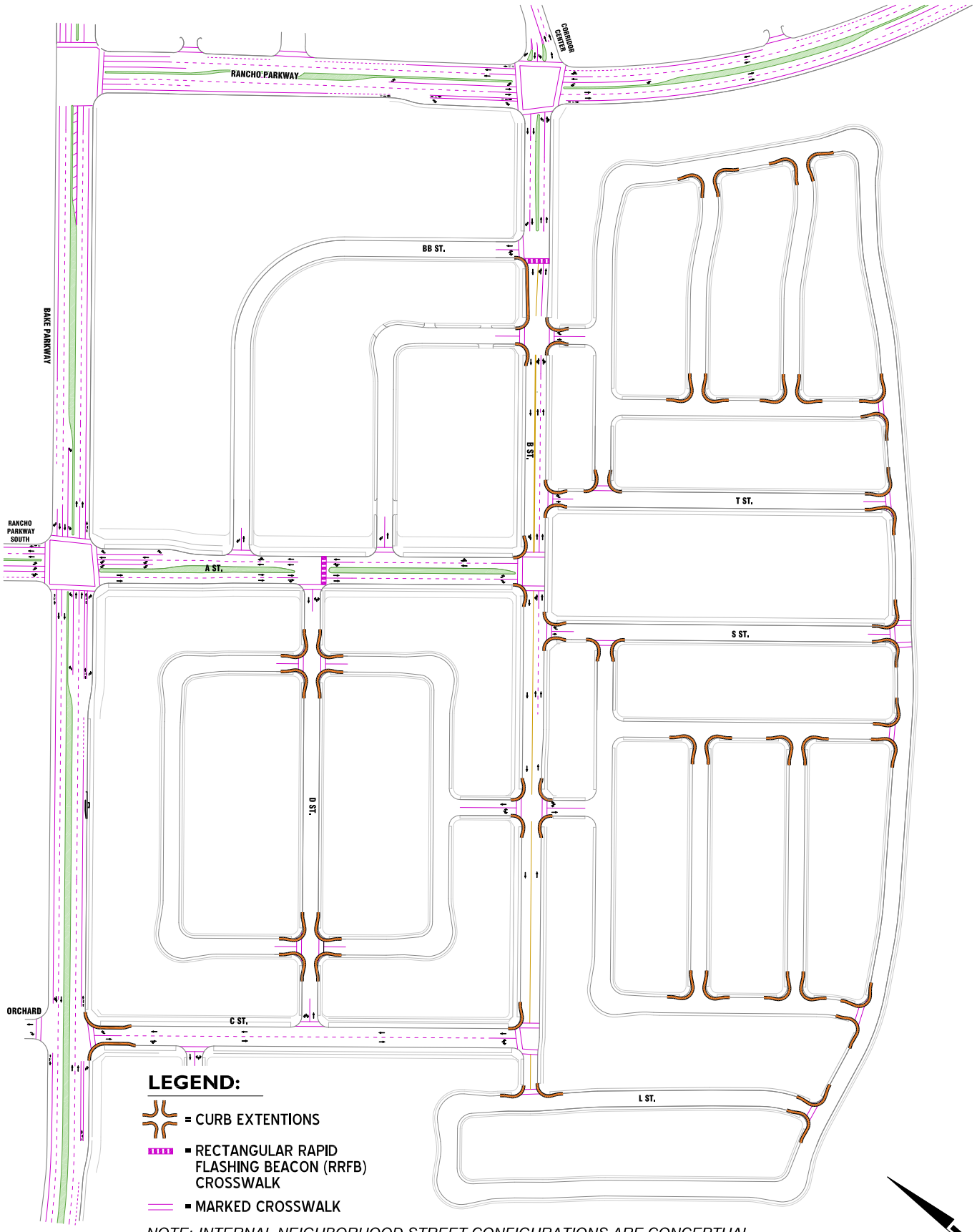


EXHIBIT 9-6: PROJECT LANE GEOMETRICS, B STREET / A STREET



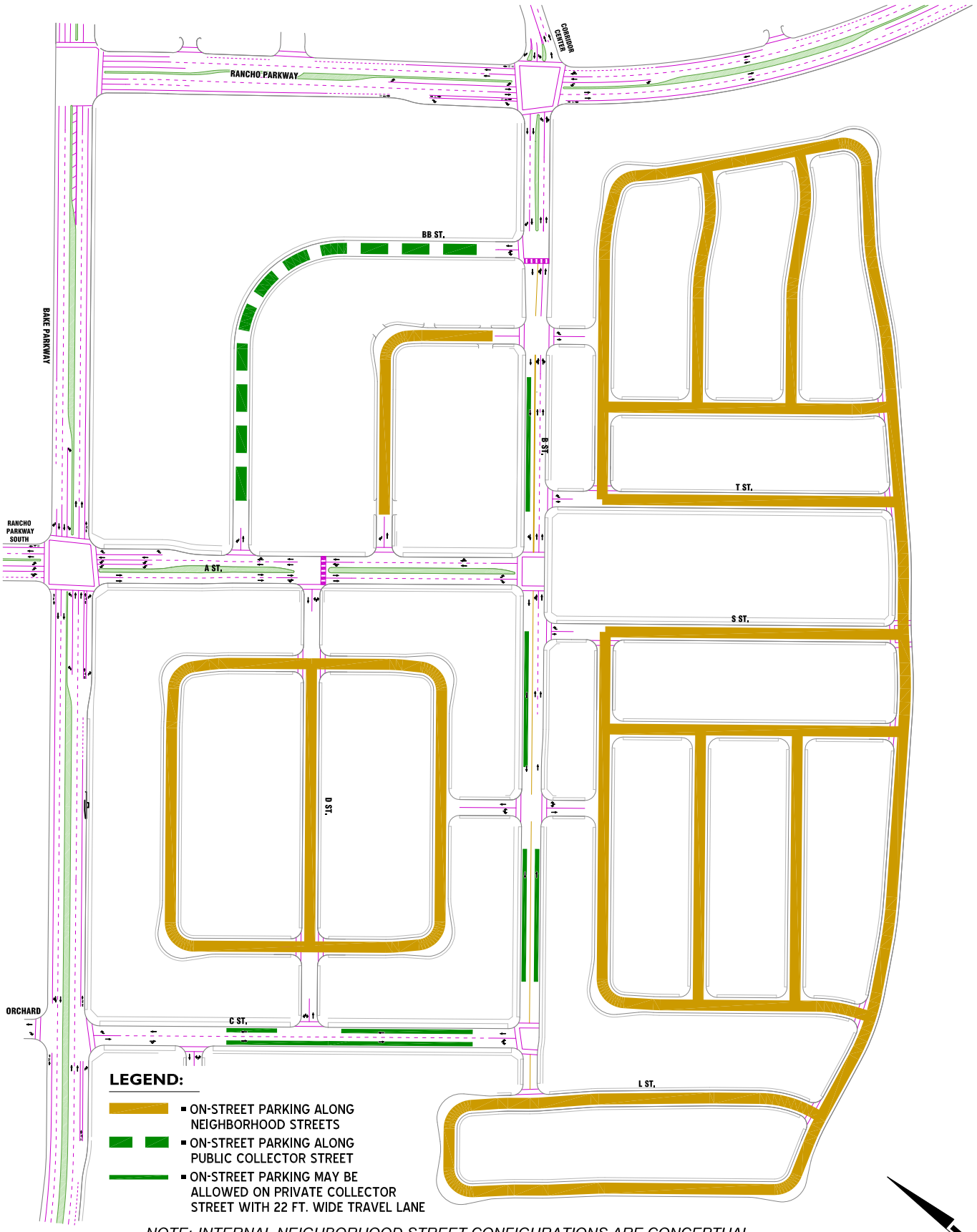
NOTE: ON-STREET PARKING MAY BE ALLOWED ON ROADWAYS WITH 22 FT. WIDE TRAVEL LANE EXCEPT AT INTERSECTION APPROACHES/DEPARTURES

EXHIBIT 9-7: INTERSECTION CURB EXTENSIONS AND CROSSWALKS



NOTE: INTERNAL NEIGHBORHOOD STREET CONFIGURATIONS ARE CONCEPTUAL

EXHIBIT 9-8: ON-STREET PARKING PROVISIONS



NOTE: INTERNAL NEIGHBORHOOD STREET CONFIGURATIONS ARE CONCEPTUAL

EXHIBIT 9-9: ACCOMMODATIONS FOR BICYCLES AND TRAILS

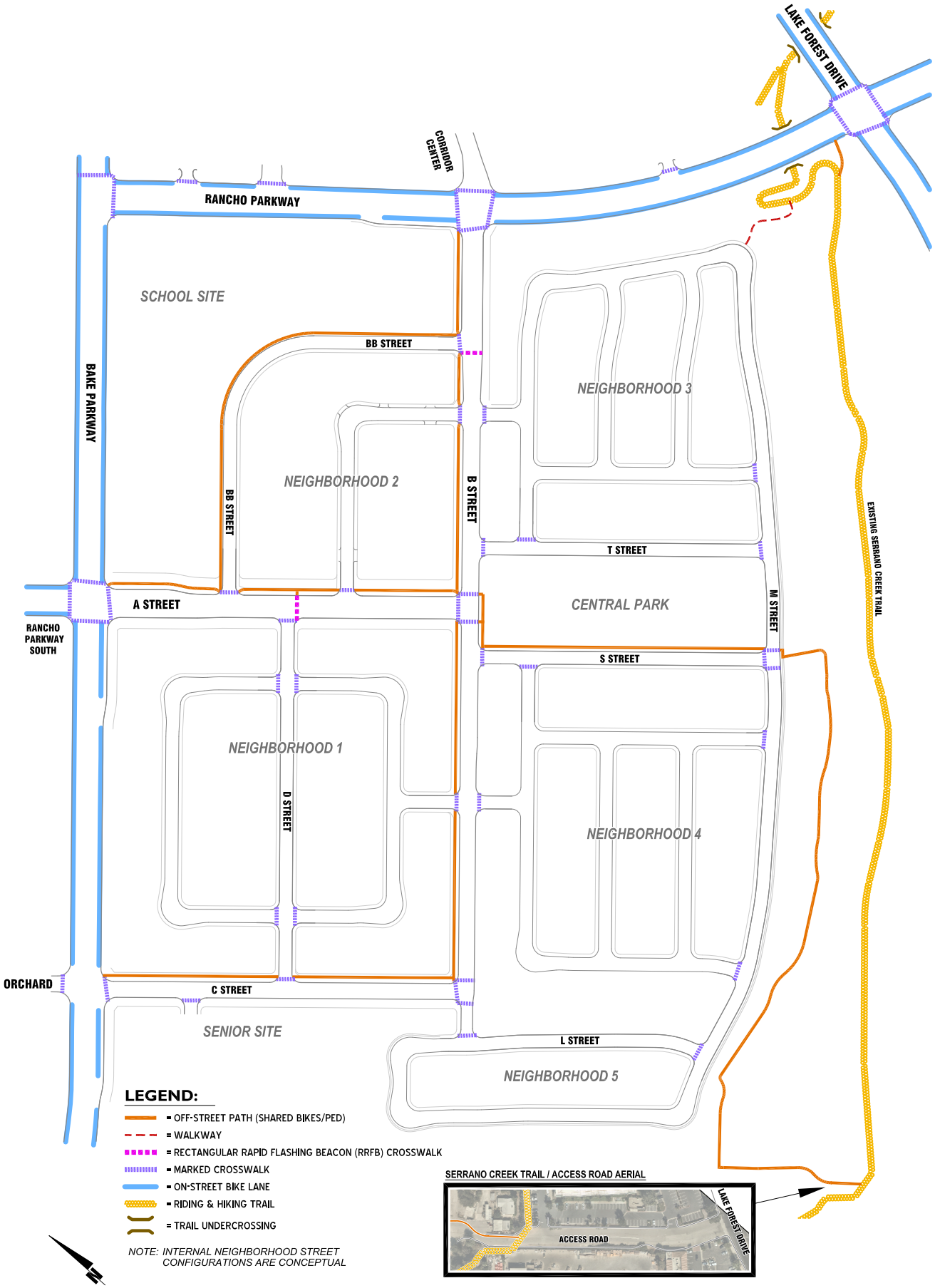
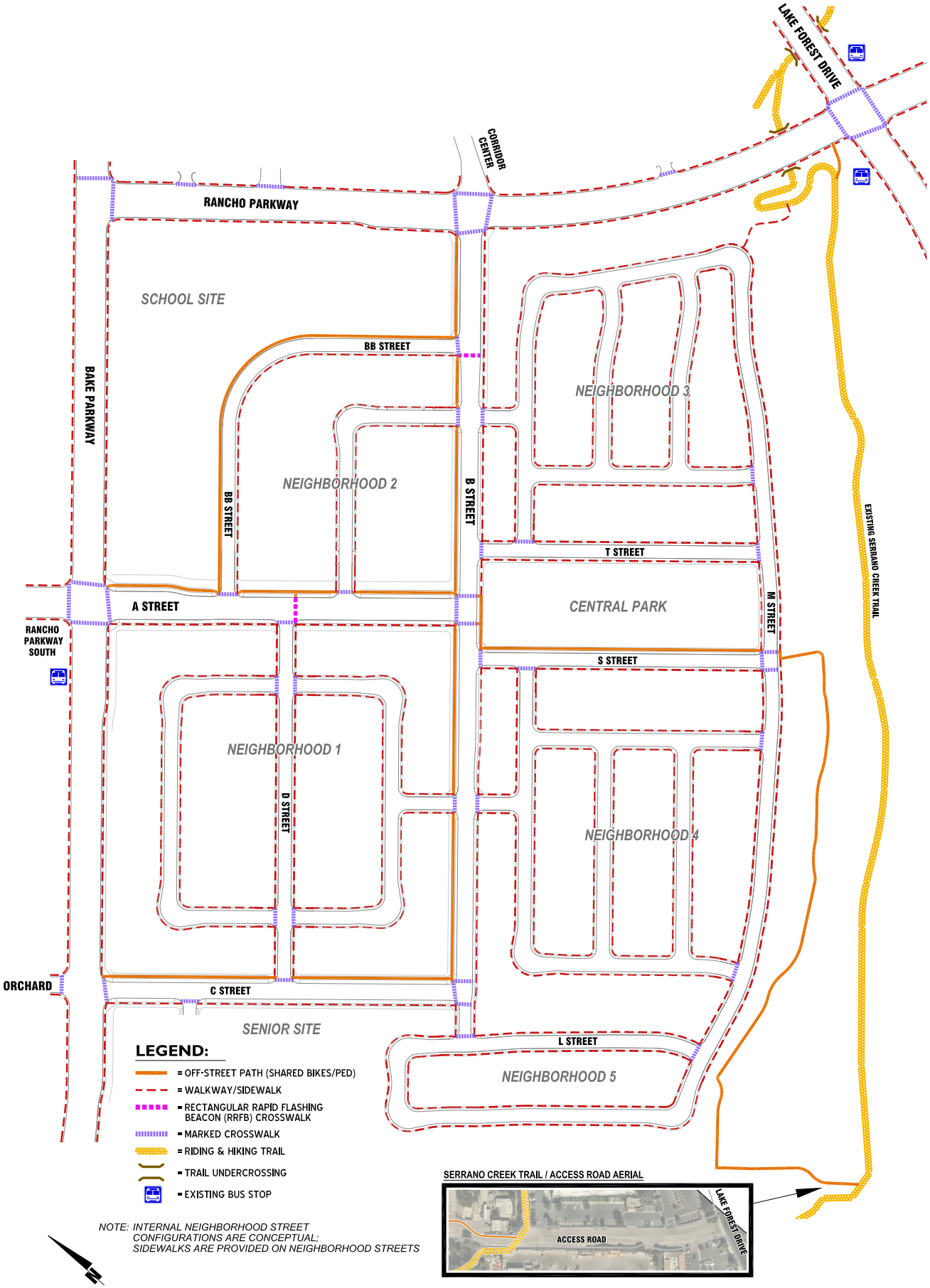


EXHIBIT 9-10: PEDESTRIAN FACILITIES



9.2 OFF-SITE CONDITIONS

Off-site intersection improvements necessary for each scenario are documented below. This section summarizes the recommendations resulting from the traffic impact analysis performed in Sections 5 through 7 of this TIA.

9.2.1 E+P CONDITIONS

Existing plus project (E+P) traffic volumes are developed by adding the project traffic assignment to the existing traffic conditions. E+P traffic analysis is documented in Section 6 *Near Term Conditions Traffic Analysis*. The existing-plus-project analysis is purely hypothetical for a project of this scale due to the fact that it assumes all development within the project occurring instantaneously, and does not portray a realistic analysis of cumulative growth which includes various on-site and off-site infrastructure improvements in conjunction with cumulative growth in the study area. The proposed Project is anticipated to result in a theoretical E+P impact at the intersection of Bake Parkway & Jeronimo Road. This impact is addressed by the addition of a second northbound left turn lane, which is included in the Lake Forest Transportation Mitigation (LFTM) program. The Project will be responsible to mitigate the E+P theoretical impact at this location without reliance on other transportation projects. Traffic projections for all future scenarios at this location with this improvement result in acceptable levels of service.

9.2.2 INTERIM YEAR 2020 CUMULATIVE CONDITIONS

Interim Year 2020 scenarios with and without the Project are evaluated in Section 6 *Near Term Conditions Traffic Analysis*, based upon volume forecasts developed by Stantec using the City of Lake Forest Traffic Analysis Model (LFTAM).

One study area intersection (Bake Parkway & Trabuco Road) is anticipated to operate at an unacceptable level of service during peak hours, for both 2020 No Project and 2020 With Project conditions. However, Project-related traffic does not trigger the City's impact criteria at Bake Parkway & Trabuco Road.

9.2.3 YEAR 2040 CONDITIONS

Various project development and off-site network scenarios are evaluated in Section 7 *Year 2040 Conditions Traffic Analysis*, based upon traffic volumes developed by Stantec using LFTAM.

Year 2040 scenarios focus on the comparison of two development scenarios for the project site: (1) current approved business park uses, and (2) the proposed Project residential / school uses. In addition, two off-site roadway network scenarios are also evaluated: (1) without the planned future Portola Westerly Extension and (2) with the Portola Westerly Extension.

For 2040 conditions, study area intersections are evaluated with the following LFTM and NITM improvements (along with project access improvements) for the Current Approved Business Park scenarios and Residential / School Project scenarios:

Corridor Center / Rancho (#5), project access

- construct 1 NB left turn lane
- construct 1 NB shared through-right lane
- convert 2nd SB left turn lane into through lane
- construct EB right turn lane
- construct WB left turn lane

Bake / Portola (#6), LFTM

- construct 3rd WB through lane

Bake / Rancho South (#9), project access

- construct NB right turn lane
- construct SB left turn lane
- construct EB through lane
- convert EB right turn lane to defacto right turn lane
- construct 2 WB left turn lanes
- construct WB through lane
- construct WB right turn lane

Bake / Orchard (#10), project access

- construct NB right turn lane
- construct WB right turn lane

El Toro / Portola (#22), LFTM

- construct 2nd NB left turn lane
- construct 2nd SB right turn lane

Alton / Irvine (#25), NITM/LFTM

- construct 3rd EB left turn lane

Bake / Trabuco (#27), NITM/LFTM

- construct 2nd NB left turn lane
- convert EB 3rd through lane to shared through-right lane
- convert WB right turn lane to 4th WB through lane
- construct defacto right turn lane

Bake / Jeronimo (#29), NITM / LFTM

- construct 2nd NB left turn lane (NITM/LFTM)
- convert SB defacto right turn lane to 4th through lane (NITM)
- construct 3rd WB through lane (NITM)

Bake / Rockfield (#31), LFTM

- convert 2nd WB through lane to 3rd left turn lane
- convert WB free right turn lane to defacto right turn lane

Bake / I-5 NB Ramps (#32), Bake at Marine MPAH amendment

- construct 4th NB through lane
- convert WB shared left-right lane to 2nd right turn lane
- construct 3rd WB right turn lane

The Project will be responsible to mitigate its theoretical impacts without reliance on other transportation projects to these locations. Based on comparisons to current approved business park uses at the project site, the proposed Project residential / school land uses do not degrade intersection peak hour operations at off-site intersections.

Five (5) off-site intersection improvement scenarios are addressed in Section 8 *Intersection Improvement Alternatives.* Scenario #1 represents the baseline future 2040 conditions that are evaluated in Section 7 (and presented above). Scenario #2 adjusts intersection lane configurations in the City of Irvine at intersections of Alton Parkway & Irvine Boulevard (#25), Bake Parkway & Rockfield Boulevard (#31), and Lake Forest Drive & I-5 SB Ramps / Avenida de la Carlota. Scenario #3 includes Scenario #2, but also adjusts El Toro Road & Portola Parkway / Santa Margarita Parkway (#22). Scenario #4 includes Scenario #2, but also adjusts Bake Parkway & Trabuco Road / Irvine Boulevard (#27). Scenario #5 includes Scenario #2, but also adjusts El Toro Road & Portola / Santa Margarita Parkway (#22) and Bake Parkway & Trabuco Road / Irvine Boulevard (#27).

For each of the alternative Scenarios, the analysis results are generally consistent with Scenario 1. In each case, acceptable Level of Service is provided.

Intersection improvement Scenarios #1 through #5 are intended to provide a basis for identification of Project effects on various likely improvement options that are under review by City staff and officials. For each of the intersection improvement scenarios, the inclusion of the Nakase Property residential / school project results in the same or better intersection operations in comparison to the Current Approved Business Park conditions, due to reductions in peak hour trip generation associated with the Project site. For 2040 scenarios, no Project impacts are anticipated.

APPENDIX 1.1:

APPROVED TRAFFIC STUDY SCOPING AGREEMENT

This Page Intentionally Left Blank

URBAN CROSSROADS

Ofc: 1001 Dove St. | Suite 260 | Newport Beach, CA 92660
Main: 260 E. Baker St. | Suite 200 | Costa Mesa, CA 92626
urbanxroads.com

February 20, 2018

Mr. Doug Anderson
City of Lake Forest
25550 Commercentre Drive
Lake Forest, CA 92630

SUBJECT: NAKASE PROJECT TRAFFIC IMPACT ANALYSIS, UPDATED SCOPING AGREEMENT

Dear Mr. Anderson:

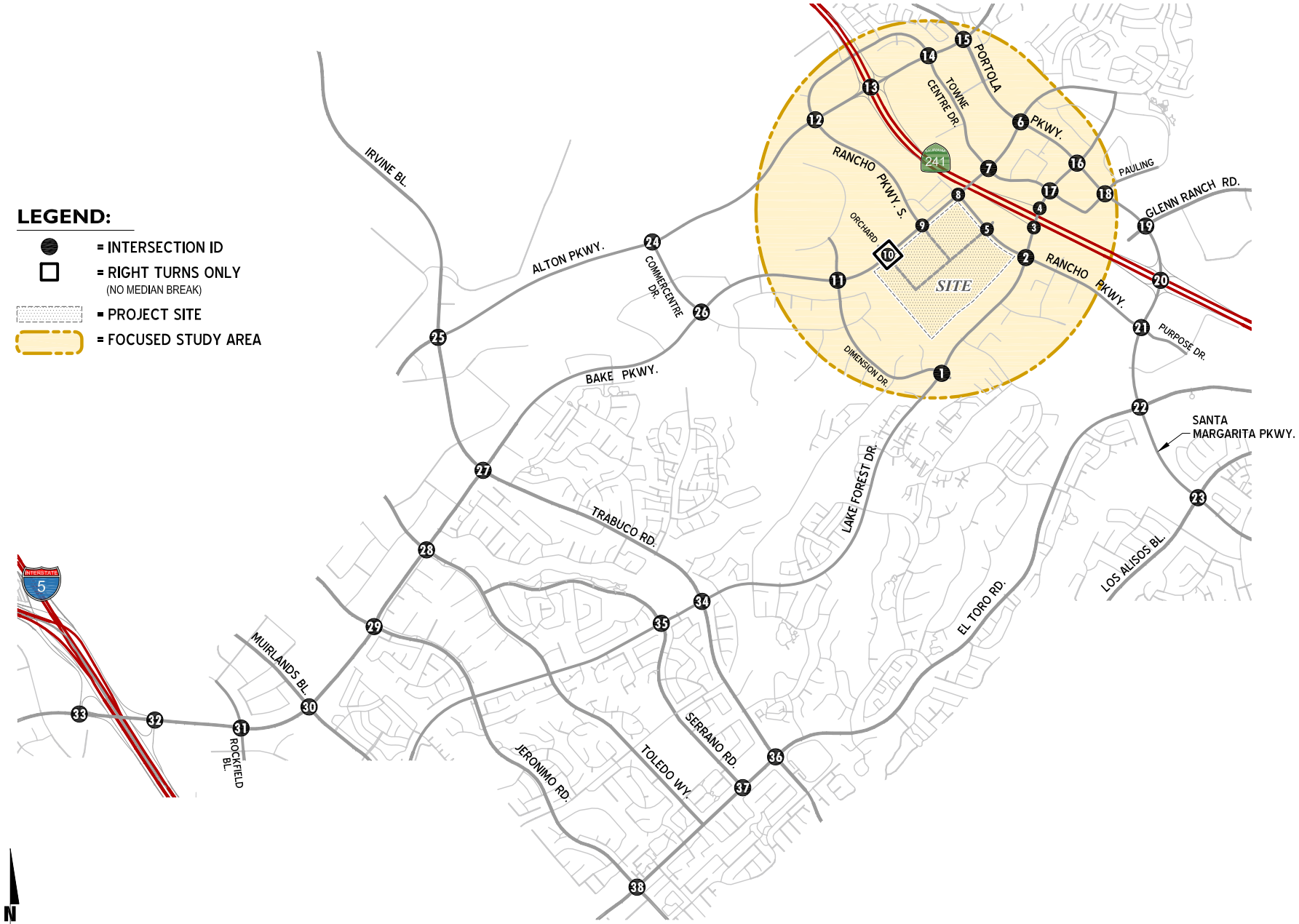
This is the 3rd submittal of the draft Traffic Impact Analysis (TIA) Scoping Agreement for the Nakase Property, and activities to date include the following:

- May 17, 2017 - 1st submittal of TIA Scope for review by City of Lake Forest technical staff members.
- May 30, 2017 - Doug Anderson email accepted the analysis approach, but expanded the study area intersections to cover El Toro Road between Trabuco and Jeronimo and also the intersections of Los Alisos/Portola and Lake Forest/Serrano.
- December 12, 2017 - David Rogers sent a list of five intersection improvement alternatives to be added to the TIA horizon year traffic scenarios.
- January 3, 2018 - 2nd submittal of TIA Scope for review by City of Lake Forest technical staff members.
- January 16, 2018 – Doug Anderson email requested further review of initial project trip distribution patterns contained in the 1.3.2018 submittal, particularly related to SR-241.
- January 25, 2018 – John Kain email contained revised project trip distribution patterns, and requesting further review of the revised percentages on surrounding roadways.
- February 15, 2018 – Doug Anderson email requesting further adjustment (based on Stantec preliminary datasets) to retain no more than 3% assignment of project traffic to SR-241 in either direction.

This 3rd submittal of the TIA scope includes the following two modifications: (1) project trip distribution patterns have been further adjusted based upon the 2.15.2018 email request from Doug Anderson, and (2) the project land use data and trip generation calculations have been adjusted to match the February 2018 Nakase Property Draft Area Plan.

Exhibit 1 illustrates the expanded analysis study area which has been previously accepted by City technical staff. The proposed Nakase Property ("Project"), which is located southeast of Bake Parkway and southwest of Rancho Parkway, is currently anticipated to include development of 675 single family detached homes and 101 attached senior residential units, for a total of 776 residential units. Additional

EXHIBIT 1: EXPANDED ANALYSIS STUDY AREA



land uses include neighborhood parks and elementary grade school that can accommodate up to 1000 students.

For traffic analysis purposes, the project has initially been allocated into four project traffic analysis zones (TAZs) as indicated on Exhibits 2 and 3. TAZ 2 includes the area where a potential school site is located, with access directly to Rancho Parkway opposite the existing Corridor Center driveway (main entry at signal). Project access from Bake Parkway is proposed to be located opposite the Rancho Parkway South intersection, supplemented by a right-turn-only access across from the Orchard intersection (no median break).

The traffic analysis will evaluate weekday AM peak hour (7AM-9AM) and weekday PM peak hour (4PM-6PM) traffic conditions at study area intersections for the following analysis scenarios:

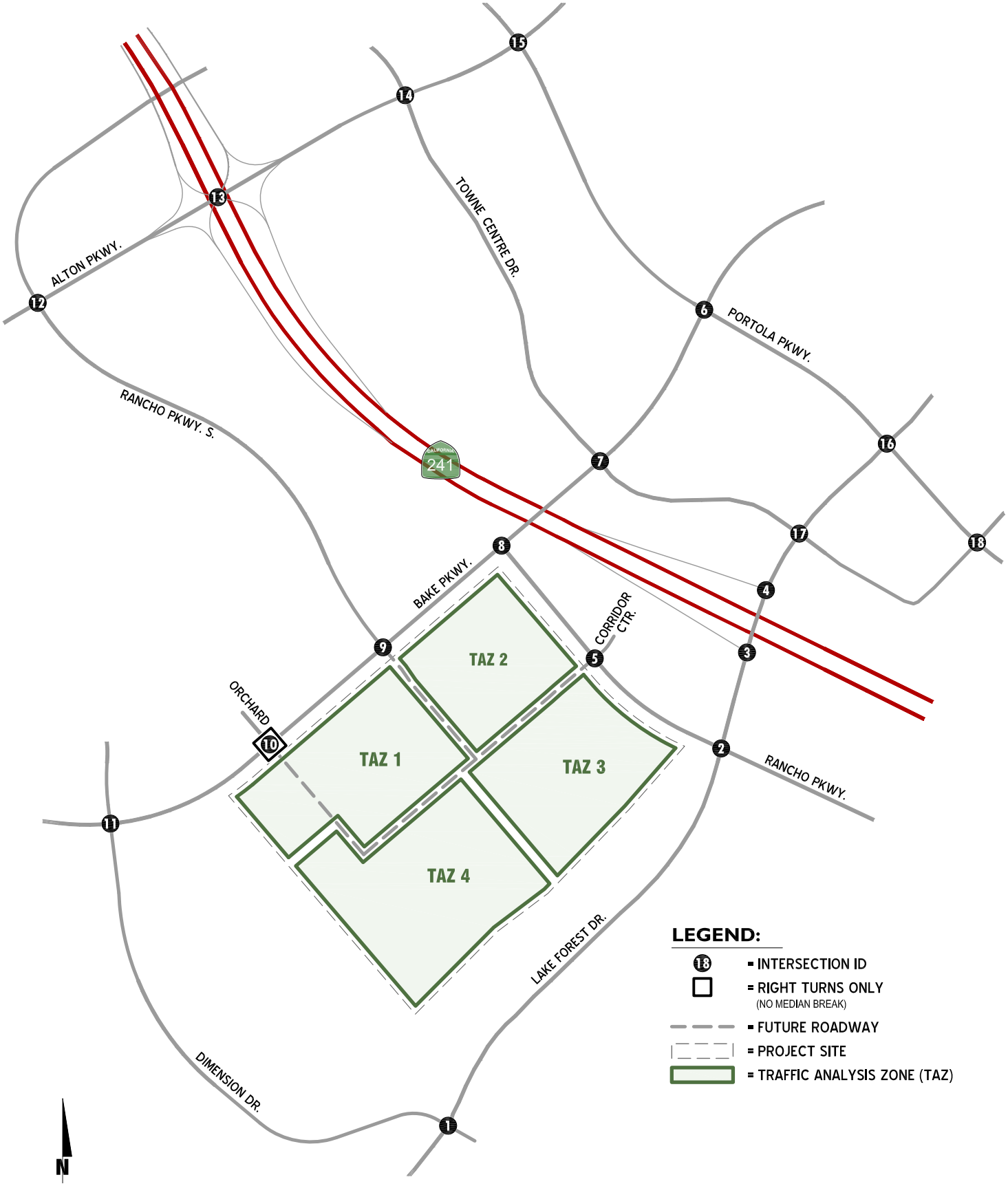
- Existing (2017) Conditions
- Existing Plus Project Conditions
- Interim Year Cumulative 2020 Without Project
- Interim Year Cumulative 2020 With Project
- 2040 General Plan Cumulative With current approved project land use, Without Portola westerly extension (including 5 intersection improvement scenarios listed below)
- 2040 General Plan Cumulative With Project, Without Portola westerly extension (including 5 intersection improvement scenarios listed below)
- 2040 General Plan Cumulative With current approved project land use, With Portola westerly extension (including 5 intersection improvement scenarios listed below)
- 2040 General Plan Cumulative With Project, With Portola westerly extension (including 5 intersection improvement scenarios listed below)

All of the 2040 scenarios (and the Interim Year scenarios as needed) will include analysis of these five intersection improvement alternatives:

1. Scenario #1: The City's current baseline model including all of the LFTM improvements, NITM improvements, and FCPP Improvements.
2. Scenario #2: Scenario #1 without three (3) LFTM improvements in the City of Irvine at the intersections of Alton Parkway & Irvine Boulevard, Bake Parkway & Rockfield Boulevard, and Lake Forest Drive & I-5 SB Ramps / Avenida de la Carlota.
3. Scenario #3: Scenario #2 without the 2nd SB Right-turn on El Toro Road at Portola / Santa Margarita Parkway.
4. Scenario #4: Scenario #2 without the 4th WB thru lane on Trabuco/Irvine at Bake Parkway.
5. Scenario #5: Scenario #2 without both the 2nd SB Right-turn on El Toro Road at Portola / Santa Margarita Parkway and the 4th WB thru lane on Trabuco / Irvine at Bake Parkway.

EXHIBIT 2: NAKASE PROPERTY TRAFFIC ANALYSIS ZONES (TAZ)

EXHIBIT 3: PROJECT ZONES AND FOCUSED ANALYSIS AREA



PROJECT TRIP GENERATION (UXR)

The Nakase Property is currently designated in the City of Lake Forest General Plan for approximately 1,841,700 square feet of business park use.

ITE-based trip generation rates used to estimate Project traffic and a summary of the Project's trip generation are shown in Table 1, based upon the February 2018 Nakase Property Draft Area Plan. The trip generation rates are based upon data collected by the Institute of Transportation Engineers (ITE) for single family detached (ITE Land Use Code 210), senior adult housing - attached (ITE Land Use Code 252), elementary school (ITE Land Use Code 520), and neighborhood park (ITE Land Use Code 411) land uses in their *Trip Generation* manual, 10th Edition, 2017.

Table 1 presents the trip generation total for each project TAZ. As shown in Table 1, the proposed development is anticipated to generate a total of approximately 8,789 trip-ends per day with 1,202 vehicles per hour (VPH) during the AM peak hour, and 879 VPH during the PM peak hour.

Table 2 indicates that the draft Nakase Property area plan is anticipated to generate 14,122 fewer trips per day with 1,377 fewer vehicles per hour during the AM peak hour and 1,442 fewer vehicles per hour during the PM peak hour in comparison to the currently adopted City of Lake Forest General Plan land use.

PROJECT TRIP DISTRIBUTION (STANTEC FOR OVERALL LFTAM RESULTS, UXR FOR PROJECT REFINEMENTS)

Project trip distribution patterns have been modified by Urban Crossroads, Inc. in response to the most recent staff request regarding interactions with SR-241, based upon preliminary Stantec datasets. Attachment 1 includes graphic representations of these distribution patterns on Exhibits 4 through 10, reflecting local access provisions for each of the four project TAZs.

Project traffic distribution patterns may be further refined based upon select zone model runs to be provided by Stantec, using the Lake Forest Traffic Analysis Model (LFTAM).

TRAFFIC COUNTS (UXR)

Based on the project trip generation and distribution, counts were conducted at the following intersection analysis locations which comprise the study area (see Exhibit 1):

ID	Intersection Location	Jurisdiction	Count Date
1	Lake Forest Dr. (NS) & Dimension Dr. (EW)	Lake Forest	2/16/2017
2	Lake Forest Dr. (NS) & Rancho Pkwy. (EW)	Lake Forest	2/16/2017
3	Lake Forest Dr. (NS) & SR-241 SB Off-Ramp (EW)	Lake Forest	2/16/2017
4	Lake Forest Dr. (NS) & SR-241 NB On-Ramp (EW)	Lake Forest	2/16/2017
5	Corridor Center (NS) & Rancho Pkwy. (EW)	Lake Forest	2/16/2017
6	Bake Parkway (NS) & Portola Pkwy. (EW)	Lake Forest	2/16/2017

ID	Intersection Location	Jurisdiction	Count Date
7	Bake Parkway (NS) & Towne Center Dr. (EW)	Lake Forest	2/16/2017
8	Bake Parkway (NS) & Rancho Pkwy. (EW)	Lake Forest	2/16/2017
9	Bake Parkway (NS) & Rancho Pkwy. S. (EW)	Lake Forest	2/16/2017
10	Bake Parkway (NS) & Orchard (EW)	Lake Forest	2/16/2017
11	Dimension Dr. (NS) & Bake Parkway (EW)	Lake Forest	2/16/2017
12	Alton Pkwy. (NS) & Rancho Pkwy. S. (EW)	Lake Forest	2/16/2017
13	Alton Pkwy. (NS) / SR-241 Ramps (EW)	Lake Forest	5/24/2017
14	Alton Pkwy. (NS) / Towne Centre Dr. (EW)	Lake Forest	5/24/2017
15	Alton Pkwy. (NS) / Portola Pkwy. (EW)	Lake Forest	5/24/2017
16	Lake Forest Dr. (NS) / Portola Pkwy. (EW)	Lake Forest	5/24/2017
17	Lake Forest Dr. (NS) / Towne Centre Dr. (EW)	Lake Forest	5/24/2017
18	Towne Centre Dr. (NS) / Portola Pkwy. (EW)	Lake Forest	5/24/2017
19	Glenn Ranch Rd. (NS) / Portola Pkwy. (EW)	Lake Forest	5/24/2017
20	Portola Pkwy. (NS) / SR-241 Ramps (EW)	Lake Forest	5/24/2017
21	Portola Pkwy. (NS) / Rancho Pkwy. (EW)	Lake Forest	5/24/2017
22	El Toro Rd. (NS) / Portola Pkwy. (EW)	Lake Forest	5/24/2017
23	Los Alisos Bl. (NS) / Santa Margarita Pkwy. (EW)	Mission Viejo	5/24/2017
24	Alton Pkwy. (NS) / Commercentre Dr. (EW)	Lake Forest	5/24/2017
25	Alton Pkwy. (NS) / Irvine Bl. (EW)	Irvine	5/24/2017
26	Bake Pkwy. (NS) / Commercentre Dr. (EW)	Lake Forest	5/24/2017
27	Bake Pkwy. (NS) / Trabuco Rd. (EW)	Irvine / Lake Forest	5/24/2017
28	Bake Pkwy. (NS) / Toledo Wy. (EW)	Irvine / Lake Forest	5/24/2017
29	Bake Pkwy. (NS) / Jeronimo Rd. (EW)	Irvine / Lake Forest	5/24/2017
30	Bake Pkwy. (NS) / Muirlands Bl. (EW)	Irvine	5/24/2017
31	Bake Pkwy. (NS) / Rockfield Bl. (EW)	Irvine	5/24/2017
32	Bake Pkwy. (NS) / I-5 NB Ramps (EW)	Caltrans	5/24/2017
33	Bake Pkwy. (NS) / I-5 SB Ramps (EW)	Caltrans	5/24/2017
34	Lake Forest Dr. (NS) / Trabuco Rd. (EW)	Lake Forest	5/24/2017
35	Lake Forest Dr. (NS) / Serrano Rd. (EW)	Lake Forest	6/1/2017
36	El Toro Rd. (NS) / Trabuco Rd. (EW)	Lake Forest	6/1/2017
37	El Toro Rd. (NS) / Serrano Rd. (EW)	Lake Forest	6/1/2017
38	El Toro Rd. (NS) / Jeronimo Rd. (EW)	Lake Forest	6/1/2017

Peak hour traffic volume data sets for these locations were previously provided to the City of Lake Forest.

TRAFFIC VOLUME FORECASTS AND ANALYSIS SCENARIOS (STANTEC AND UXR AS INDICATED BELOW)

Traffic volume forecasts will be prepared by Stantec Consulting using the Lake Forest Traffic Analysis Model (LFTAM). Levels of service at study intersections will be calculated by Urban Crossroads, Inc.

TABLE 1: PROJECT TRIP GENERATION SUMMARY
FEBRUARY 2018 PROJECT AREA PLAN

Project Trip Generation Rates[1]									
Land Use	ITE LU Code	Units[2]	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Elementary School	520	STU	0.36	0.31	0.67	0.08	0.09	0.17	1.89
Single Family Detached	210	DU	0.19	0.55	0.74	0.62	0.37	0.99	9.44
Senior Adult Housing - Attached	252	DU	0.07	0.13	0.20	0.14	0.12	0.26	3.70
Neighborhood Park[3]	411	AC	0.30	0.21	0.51	0.28	0.23	0.51	5.00
Central Park[3]	411	AC	1.18	0.82	2.00	1.65	1.35	3.00	30.00

Project Trip Generation Results										
TAZ	Land Use	ITE LU Code	Quantity[2]	AM Peak Hour			PM Peak Hour			Daily
				In	Out	Total	In	Out	Total	
1	Single Family Detached	210	182 DU	35	100	135	113	67	180	1,718
	Senior Adult Housing - Attached	252	101 DU	7	13	20	14	12	26	374
	Neighborhood Park	411	0.5 AC	0.2	0.1	0.3	0.1	0.1	0.3	3
	Subtotal			42	113	155	127	79	206	2,095
2	Elementary School	520	1000 STU	360	310	670	80	90	170	1,890
	Single Family Detached	210	110 DU	21	61	82	68	41	109	1,038
	Neighborhood Park	411	0.3 AC	0.1	0.1	0.2	0.1	0.1	0.2	2
	Subtotal			381	371	752	148	131	279	2,930
3	Single Family Detached	210	142 DU	27	78	105	88	53	141	1,340
	Neighborhood Park	411	0.4 AC	0.1	0.1	0.2	0.1	0.1	0.2	2
	Central Park	411	4.8 AC	6	4	10	8	6	14	144
	Subtotal			33	82	115	96	59	155	1,486
4	Single Family Detached	210	241 DU	46	133	179	149	89	238	2,275
	Neighborhood Park	411	0.6 AC	0.2	0.1	0.3	0.2	0.1	0.3	3
	Subtotal			46	133	179	149	89	238	2,278
Total Project Trips				**503**	**699**	**1,202**	**521**	**358**	**879**	**8,789**

[1] Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, 10th Edition (2017).

[2] DU = Dwelling Unit, STU = Students; AC = Acres

[3] Derivation of Park Rates:

	AM	PM	Daily
ITE 411 Rates Range	0.00 - 4.50	0.05 - 3.50	0.55-34.0
Neighborhood Park Rate	0.5	0.5	5
Central Park Rate	2	3	30

	AM		PM		Daily
	IN	OUT	IN	OUT	
Peak Directionality	59%	41%	55%	45%	
Neighborhood Park Rate	0.3	0.21	0.28	0.23	5
Central Park Rate	1.18	0.82	1.65	1.35	30

R:\UXRjobs_10600-11000\10820\Excel\[10820-04 - TG (20180205).xlsx]TG

TABLE 2: TRIP GENERATION COMPARISON BETWEEN THE GENERAL PLAN LAND USE DESIGNATION FOR THE SITE AND THE FEBRUARY 2018 PROJECT DRAFT AREA PLAN

Trip Generation Rates (Approved GP Land Use)[1]									
			AM Peak Hour			PM Peak Hour			
Land Use	ITE LU Code	Quantity[2]	In	Out	Total	In	Out	Total	Daily
Business Park	770	1841.72 TSF	1.19	0.21	1.40	0.33	0.93	1.26	12.44

Trip Generation, General Plan Land Use Designation for the Site									
Business Park	770	1841.72 TSF	2,192	387	2,579	608	1,713	2,321	22,911
TOTAL			**2,192**	**387**	**2,579**	**608**	**1,713**	**2,321**	**22,911**

Trip Generation Comparison							
	AM Peak Hour			PM Peak Hour			
Land Use	In	Out	Total	In	Out	Total	Daily
Project Draft Area Plan	503	699	1,202	521	358	879	8,789
General Plan Land Use Designation for the Site	2,192	387	2,579	608	1,713	2,321	22,911
Delta (Project Draft Area Plan - General Plan)	**-1,689**	**312**	**-1,377**	**-88**	**-1,355**	**-1,442**	**-14,122**
	-336%	45%	-115%	-17%	-378%	-164%	-161%

[1] Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, 10th Edition (2017).

[2] TSF = Thousand Square Feet

R:\UXRjobs_10600-11000\10820\Excel\[10820-04 - TG (20180205).xlsx]Scope_Comp

using the Intersection Capacity Utilization (ICU) methodology for signalized intersections and the Highway Capacity Manual 6th Edition (HCM 6) methodology for unsignalized intersections. The traffic study will include the following analysis scenarios:

- Existing Conditions (UXR)

  This scenario will reflect existing (2017) weekday AM and PM peak- period intersection counts for the study intersections. The counts were collected in February, May, and June 2017, as reflected above.

- Existing plus Project Conditions (UXR)

  Existing plus project traffic volumes will be developed by adding the project traffic assignment to the existing traffic conditions. Preliminary distribution patterns for Nakase Property residential and school components are attached to this submittal, and are subject to review by the City technical review team.

- Interim Year Cumulative 2020 Without Project (Forecasts – Stantec, Analysis – UXR)

  Interim Year 2020 volume forecasts will be developed by Stantec using the Lake Forest Traffic Analysis Model (LFTAM) without the Project land uses (assuming existing commercial nursery operations).

- Interim Year Cumulative 2020 With Project (Forecasts – Stantec, Analysis – UXR)

  Interim Year 2020 volume forecasts with the Nakase Property residential/school project will be developed by Stantec using LFTAM. The interim year model will be run with 675 single family detached homes, 101 attached senior housing units, 6.6 acres of neighborhood parks, as well as an elementary school.

- 2040 General Plan Cumulative With current approved project land use, Without Portola westerly extension (Forecasts – Stantec, Analysis – UXR)

  Year 2040 conditions will be developed by Stantec using LFTAM with the current land use designation for the project site, which includes 1,841,720 square feet of Business Park (without the Portola westerly extension). The 5 intersection improvement scenarios listed on page 2 of this updated scope will be evaluated by UXR as part of this modeling scenario.

- 2040 General Plan Cumulative With Project, Without Portola westerly extension (Forecasts – Stantec, Analysis – UXR)

  Year 2040 conditions will be developed by Stantec using LFTAM. The model will be run with 675 single family detached homes, 101 attached senior housing units, 6.6 acres of neighborhood parks, as well as an elementary school (without the Portola westerly extension). The 5 intersection improvement scenarios listed on page 2 of this updated scope will be evaluated as part of this modeling scenario.

- 2040 General Plan Cumulative With current approved project land use, With Portola westerly extension (Forecasts – Stantec, Analysis – UXR)

  Year 2040 conditions will be developed by Stantec using LFTAM with the current land use designation for the project site which includes 1,841,720 square feet of Business Park (with the

Portola westerly extension). The 5 intersection improvement scenarios listed on page 2 of this updated scope will be evaluated as part of this modeling scenario.

- 2040 General Plan Cumulative With Project, With Portola westerly extension
  (Forecasts – Stantec, Analysis – UXR)

  Year 2040 conditions will be forecast using LFTAM. The model will be run with 675 single family detached homes, 101 attached senior housing units, 6.6 acres of neighborhood parks, as well as an elementary school (with the Portola westerly extension). The 5 intersection improvement scenarios listed on page 2 of this updated scope will be evaluated as part of this modeling scenario.

SITE PLAN CIRCULATION (UXR)

A site plan review will be included as part of the UXR project impact assessment. Issues to be examined include queuing at the proposed access points, driveway spacing, and tum lane requirements. A discussion of transit serving the site as well as any other alternative transportation facilities (e.g., bicycle and/or pedestrian) in the vicinity of the project will be provided by UXR.

MITIGATION MEASURES (UXR)

At significantly affected intersections, as determined based on the LOS analysis, mitigation measures will be recommended and the LOS recalculated to verify that the required LOS has been achieved. The 5 intersection improvement scenarios listed on page 2 of this updated scope will be evaluated for all the 2040 modeling scenarios, and for the Interim Year scenarios as needed.

If you have any questions, please contact John Kain at (949) 336-5990 or Marlie Whiteman (949) 336-5991.

Respectfully submitted,

URBAN CROSSROADS, INC.

John Kain
John Kain, AICP
Principal

Marlie Whiteman
Marlie Whiteman, PE
Senior Associate

Attachments

ec: David Rogers, City of Lake Forest
Daryl Zerfass, Stantec

This Page Intentionally Left Blank

ATTACHMENT 1

PRELIMINARY PROJECT TRIP DISTRIBUTION PATTERNS

EXHIBIT 4: PRELIMINARY RESIDENTIAL EXTERNAL TRAFFIC DISTRIBUTION (BEYOND FOCUSED STUDY AREA)

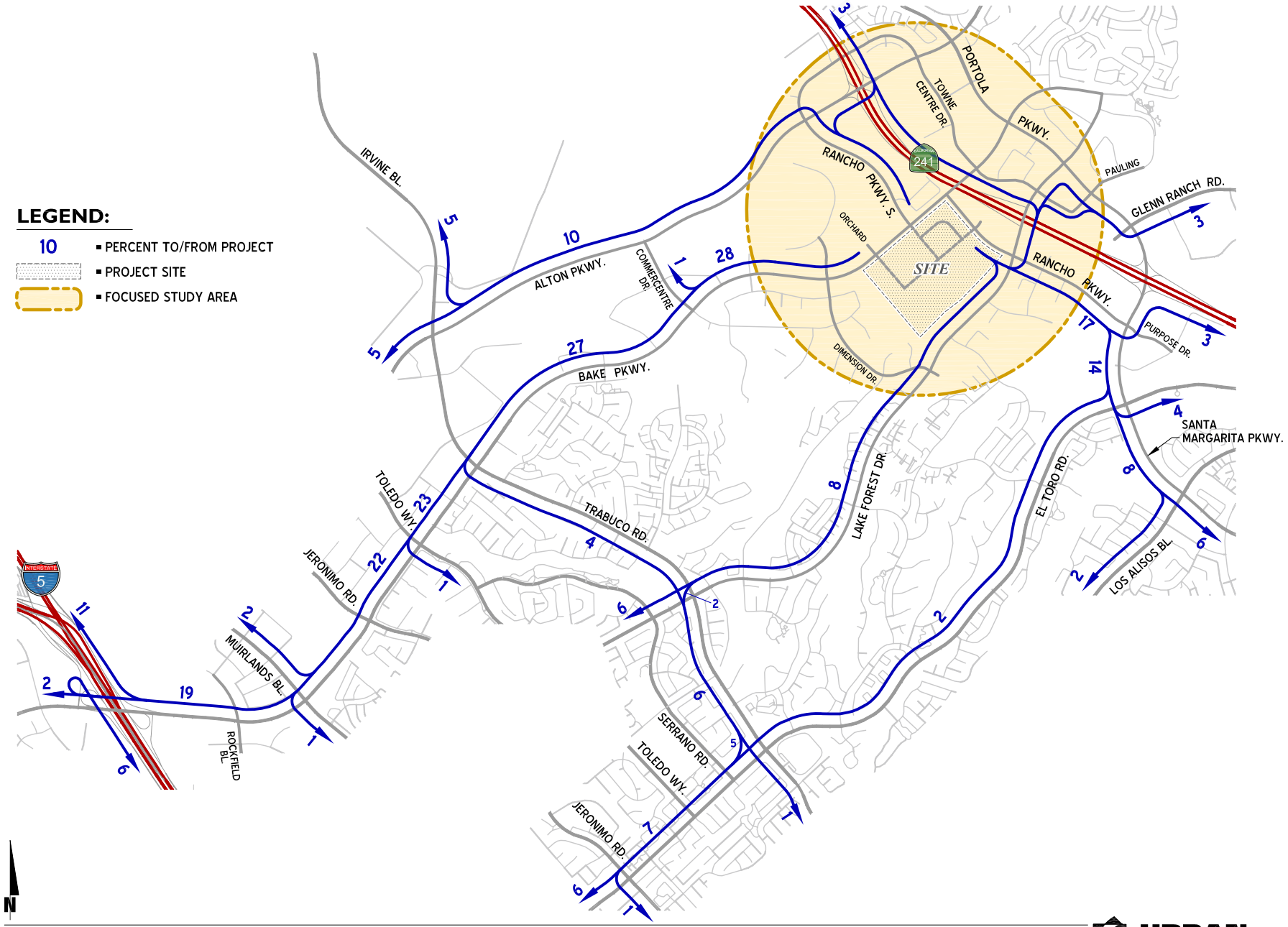
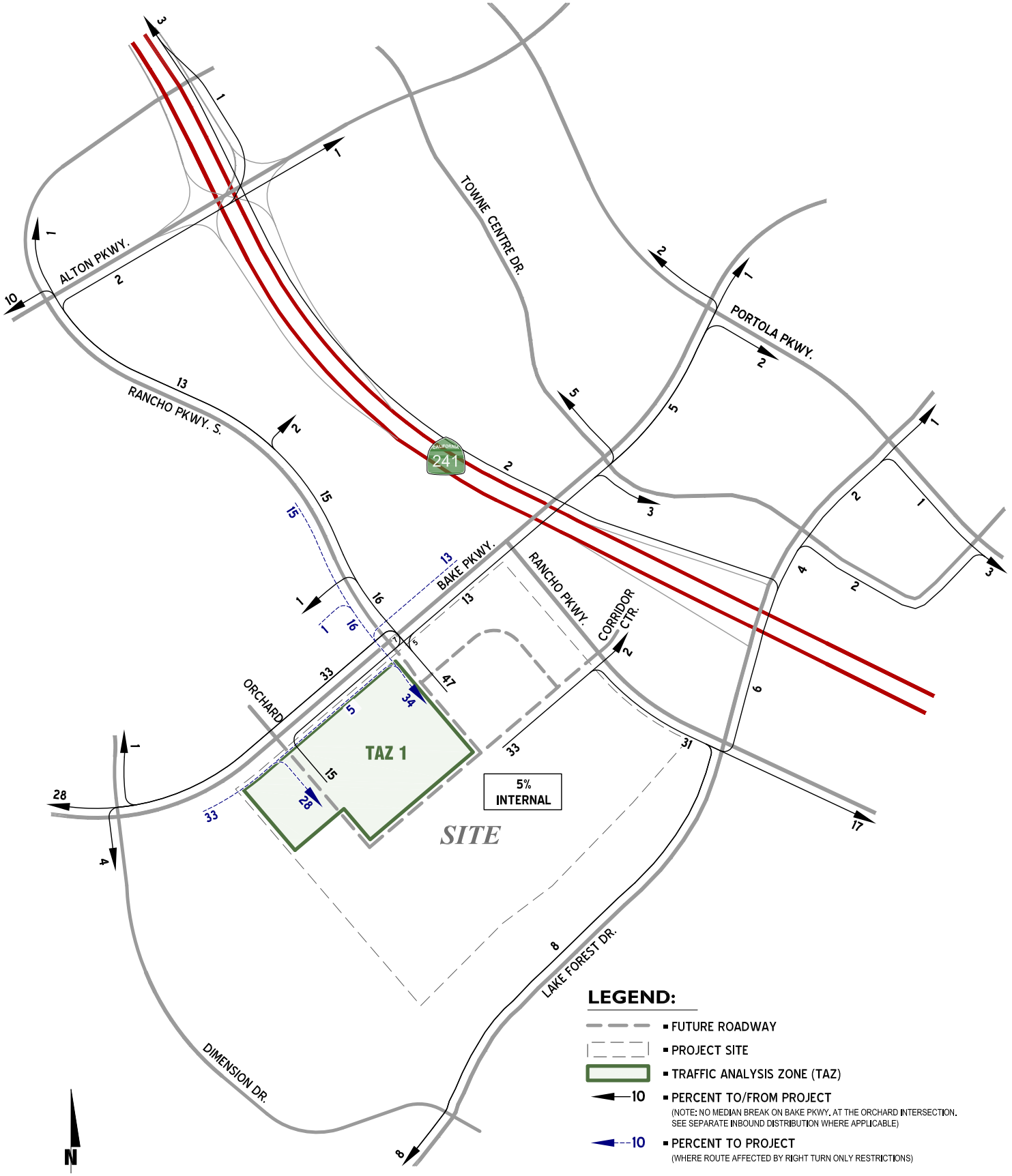


EXHIBIT 5: RESIDENTIAL TAZ 1 PROJECT PEAK HOUR TRIP DISTRIBUTION



10820 - 04 - sp & td (20180220).dwg

URBAN CROSSROADS

EXHIBIT 6: RESIDENTIAL TAZ 2 PROJECT PEAK HOUR TRIP DISTRIBUTION

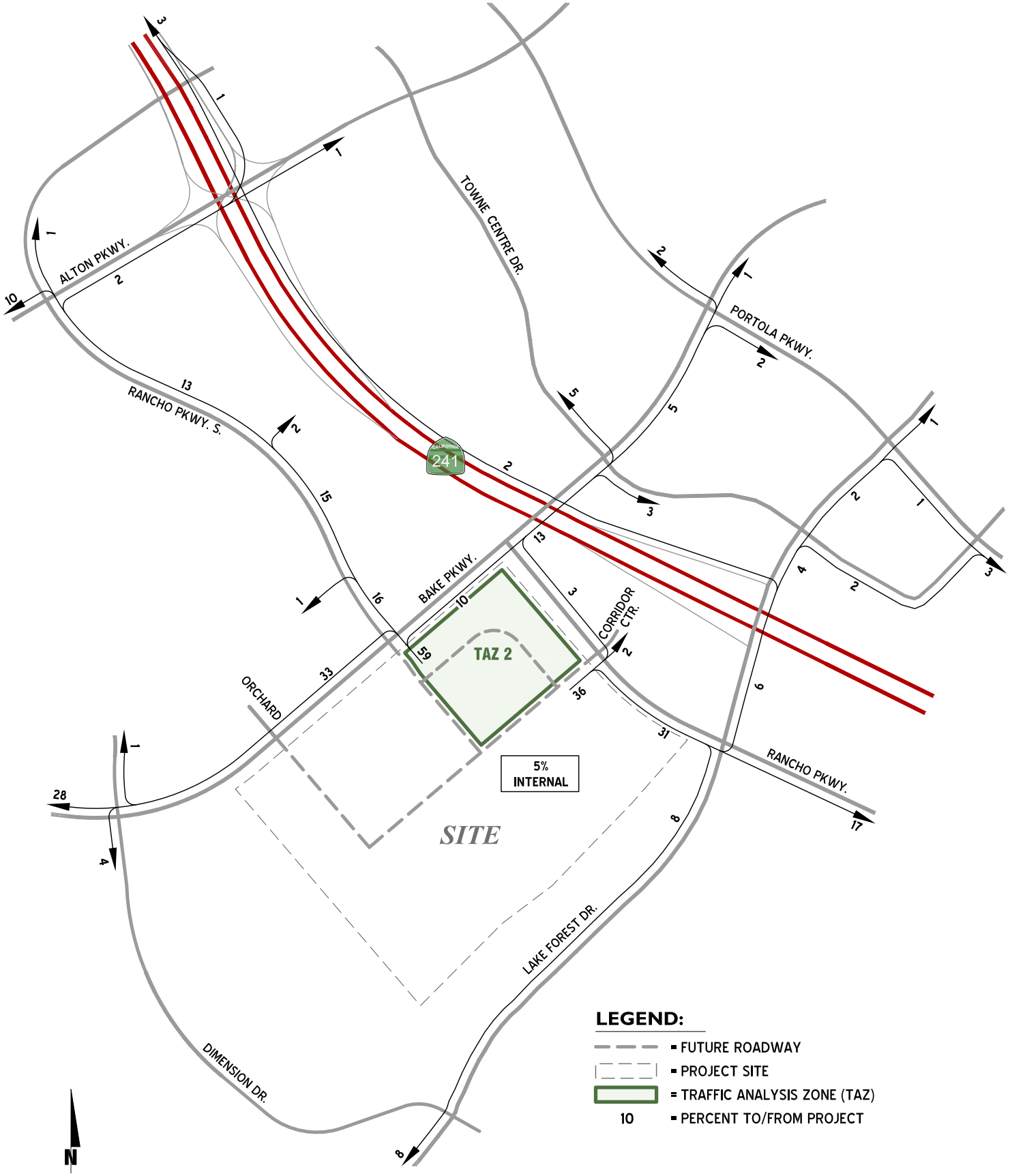


EXHIBIT 7: RESIDENTIAL TAZ 3 PROJECT PEAK HOUR TRIP DISTRIBUTION

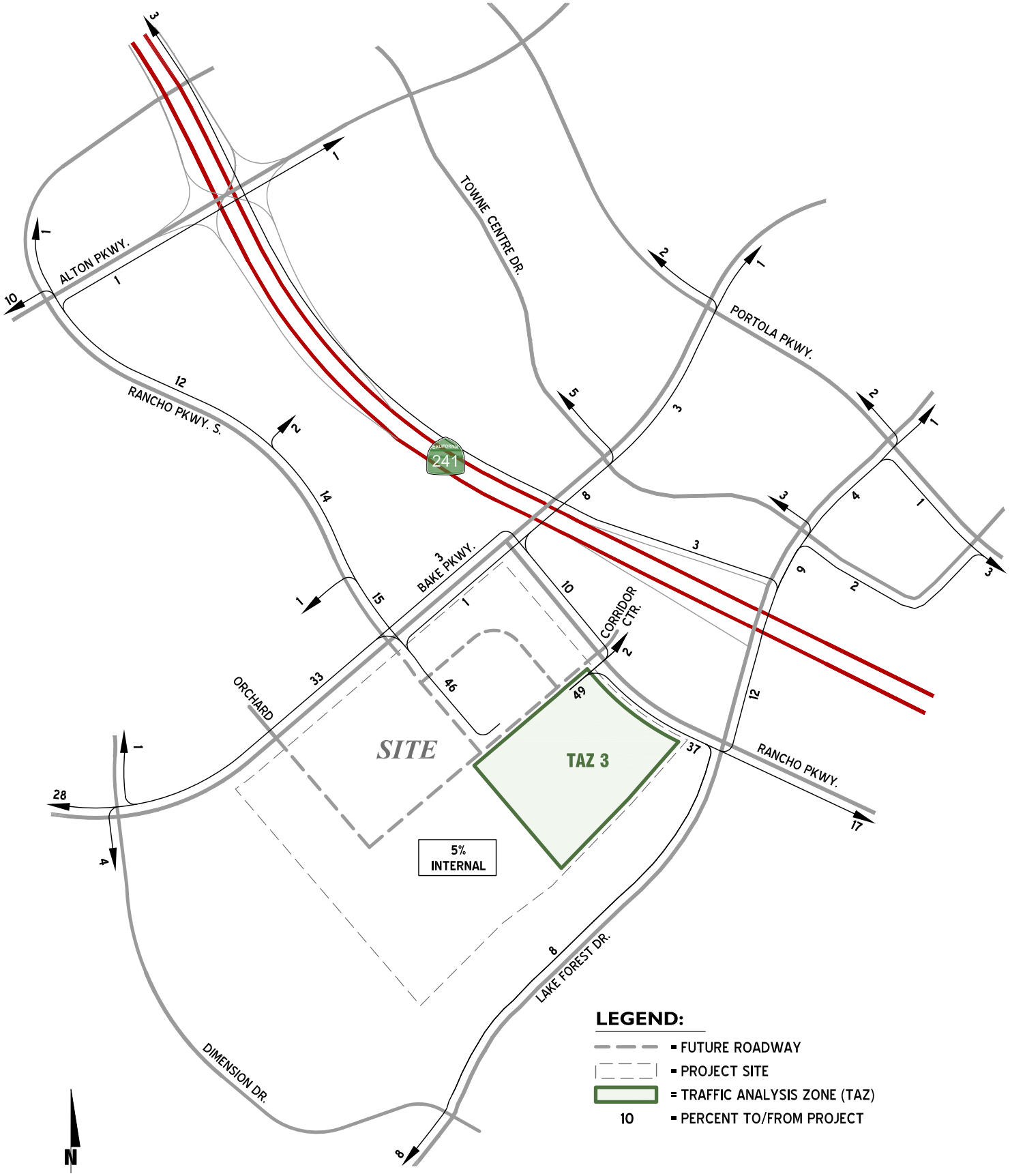
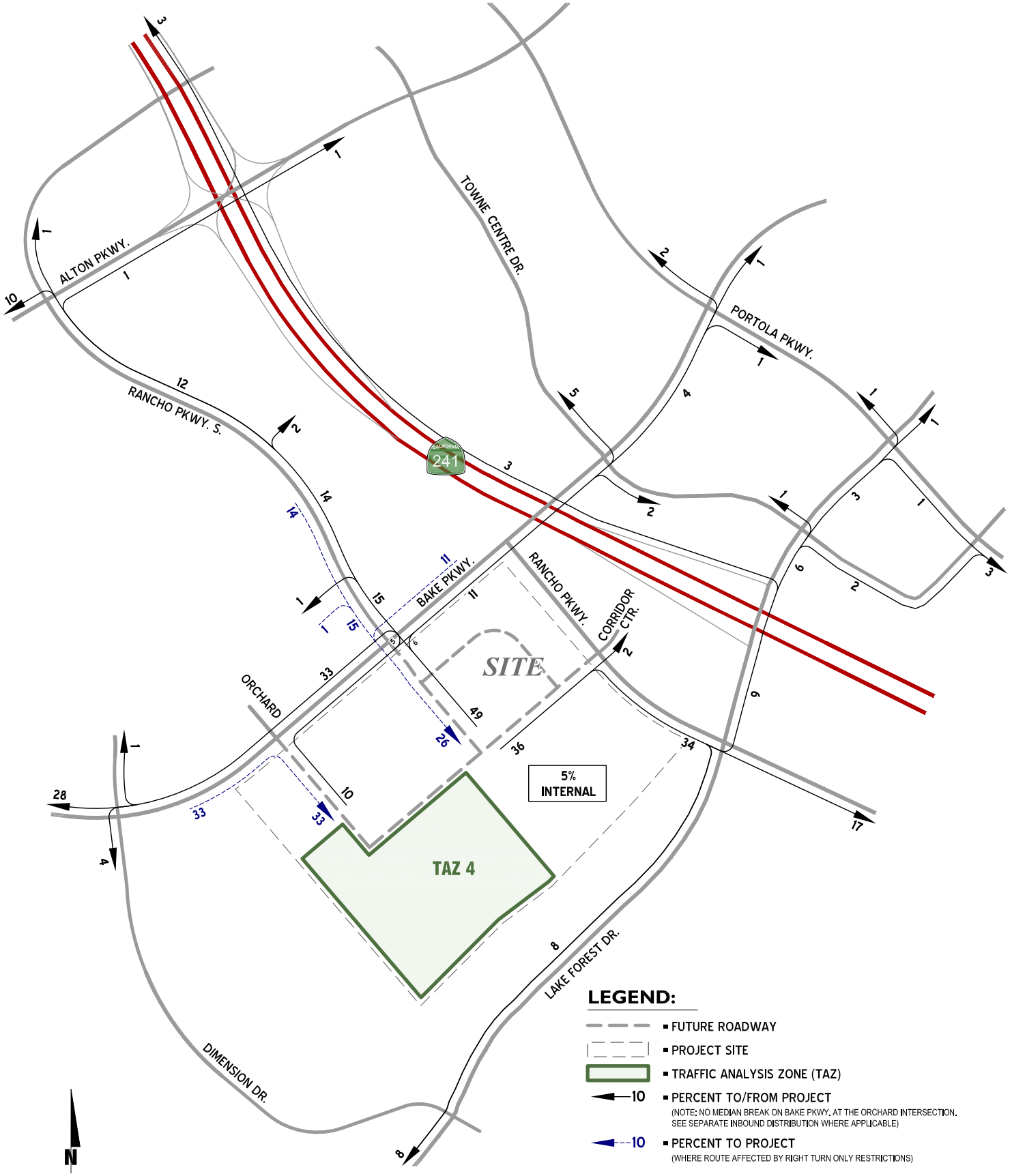


EXHIBIT 8: RESIDENTIAL TAZ 4 PROJECT PEAK HOUR TRIP DISTRIBUTION



10820 - 04 - sp & td (20180220).dwg

URBAN CROSSROADS

EXHIBIT 9: SCHOOL EXTERNAL TRAFFIC PEAK HOUR DISTRIBUTION (BEYOND FOCUSED STUDY AREA)

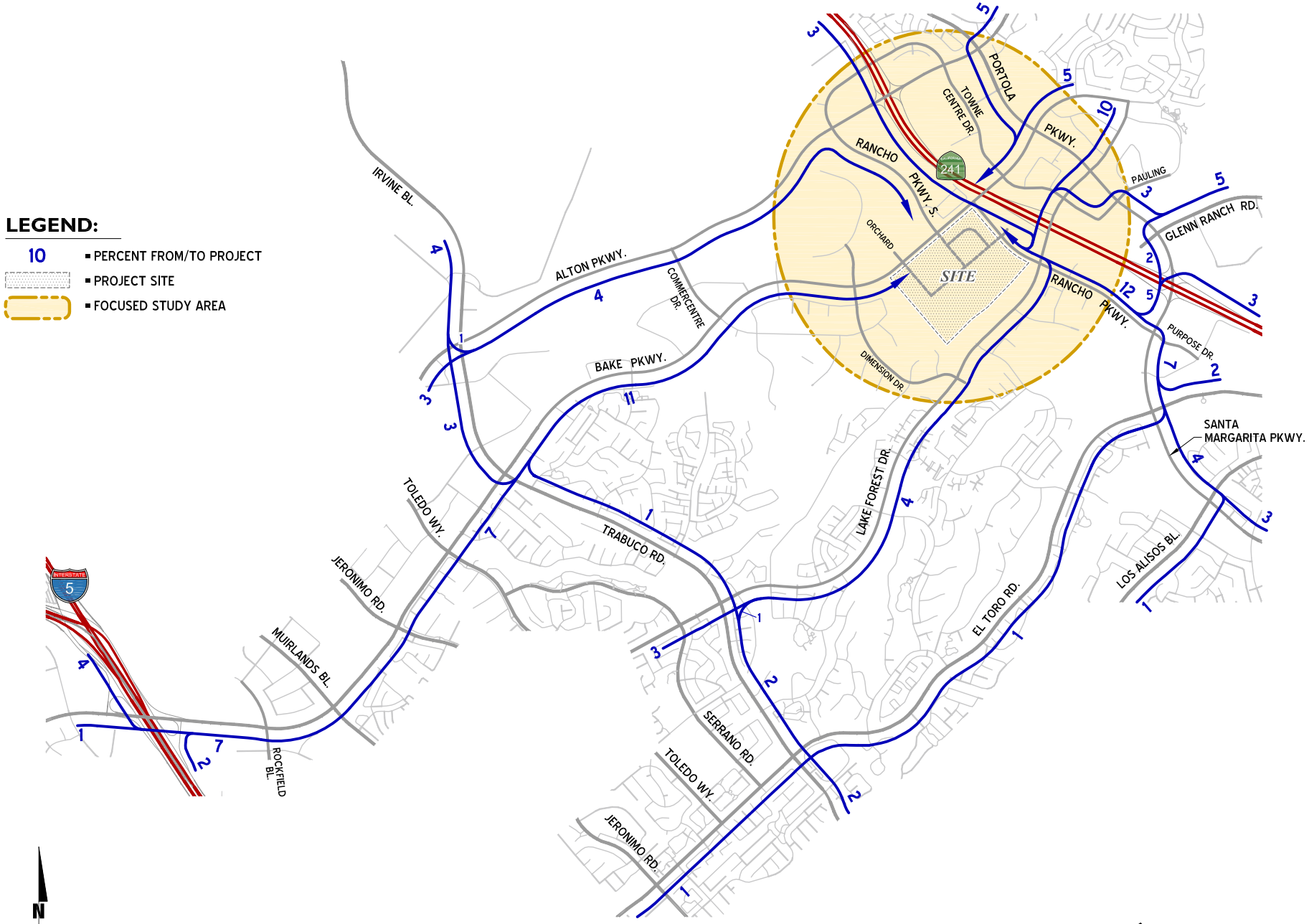
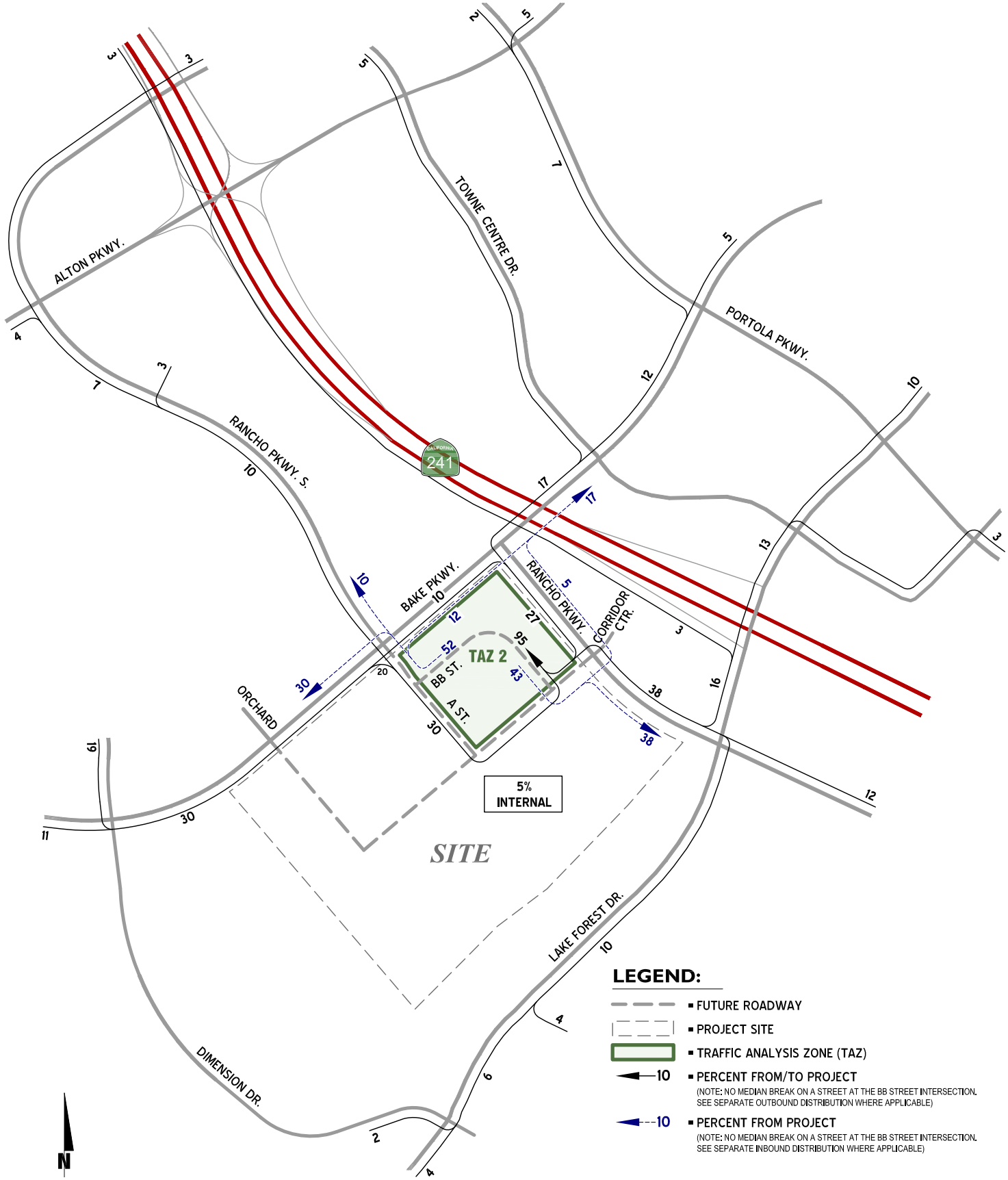


EXHIBIT 10: SCHOOL TAZ 2 PROJECT PEAK HOUR TRIP DISTRIBUTION



This Page Intentionally Left Blank

APPENDIX 4.1:

EXISTING TRAFFIC COUNTS – FEBRUARY, MAY, & JUNE 2017

This Page Intentionally Left Blank

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Dimension Drive
E/W: Lake Forest Drive
Weather: Clear

File Name : LKFDILAAM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 1

Groups Printed- Total Volume

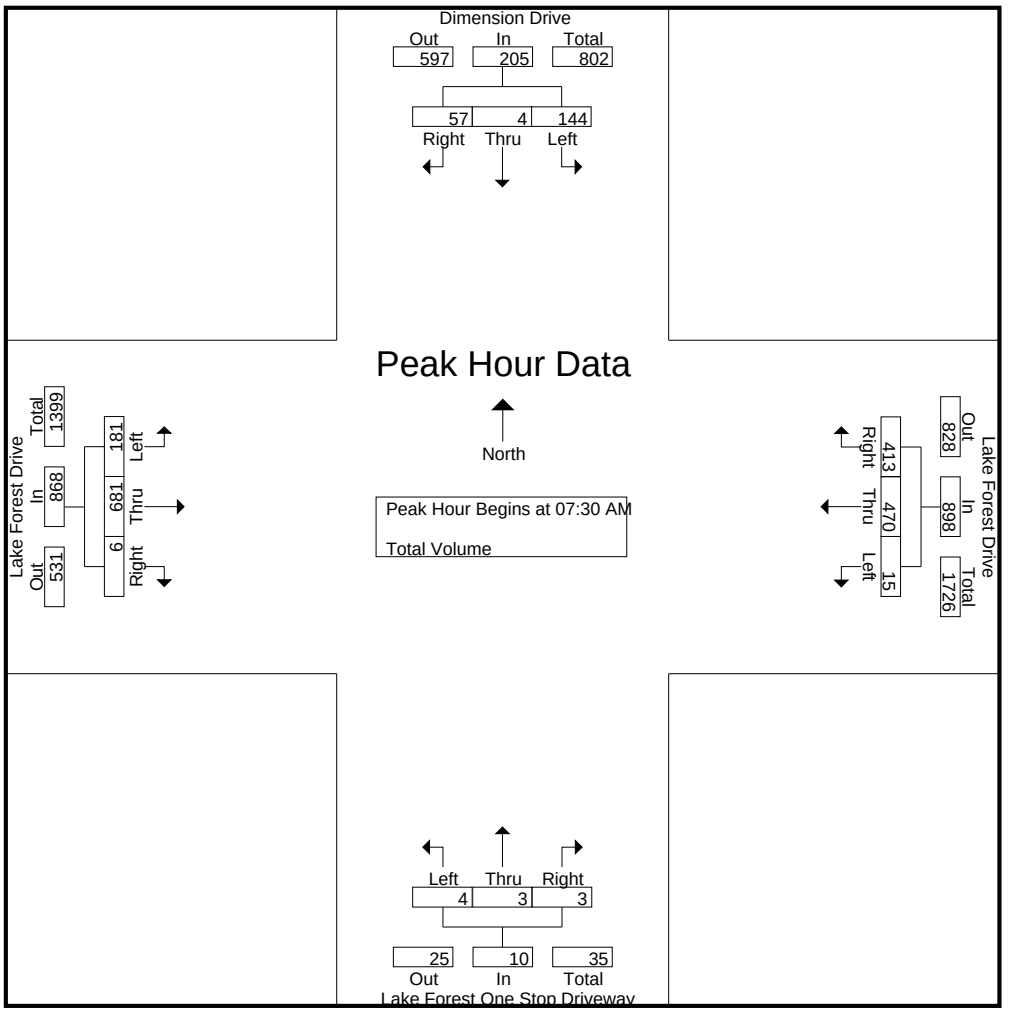
	Dimension Drive Southbound				Lake Forest Drive Westbound				Lake Forest One Stop Driveway Northbound				Lake Forest Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	28	0	11	39	1	82	67	150	1	0	0	1	29	107	2	138	328
07:15 AM	43	0	15	58	3	88	74	165	1	0	0	1	35	115	0	150	374
07:30 AM	22	1	14	37	2	117	89	208	2	1	1	4	54	137	0	191	440
07:45 AM	46	1	13	60	7	129	119	255	0	2	0	2	33	191	1	225	542
Total	139	2	53	194	13	416	349	778	4	3	1	8	151	550	3	704	1684
08:00 AM	31	2	15	48	1	121	103	225	1	0	0	1	50	158	1	209	483
08:15 AM	45	0	15	60	5	103	102	210	1	0	2	3	44	195	4	243	516
08:30 AM	38	1	11	50	3	88	102	193	1	0	0	1	33	144	2	179	423
08:45 AM	46	1	13	60	5	102	85	192	1	1	1	3	50	171	1	222	477
Total	160	4	54	218	14	414	392	820	4	1	3	8	177	668	8	853	1899
Grand Total	299	6	107	412	27	830	741	1598	8	4	4	16	328	1218	11	1557	3583
Apprch %	72.6	1.5	26		1.7	51.9	46.4		50	25	25		21.1	78.2	0.7		
Total %	8.3	0.2	3	11.5	0.8	23.2	20.7	44.6	0.2	0.1	0.1	0.4	9.2	34	0.3	43.5	

	Dimension Drive Southbound				Lake Forest Drive Westbound				Lake Forest One Stop Driveway Northbound				Lake Forest Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	22	1	14	37	2	117	89	208	**2**	1	1	**4**	**54**	137	0	191	440
07:45 AM	**46**	1	13	**60**	**7**	**129**	**119**	**255**	0	**2**	0	2	33	191	1	225	**542**
08:00 AM	31	**2**	**15**	48	1	121	103	225	1	0	0	1	50	158	1	209	483
08:15 AM	45	0	15	60	5	103	102	210	1	0	**2**	3	44	**195**	**4**	**243**	516
Total Volume	144	4	57	205	15	470	413	898	4	3	3	10	181	681	6	868	1981
% App. Total	70.2	2	27.8		1.7	52.3	46		40	30	30		20.9	78.5	0.7		
PHF	.783	.500	.950	.854	.536	.911	.868	.880	.500	.375	.375	.625	.838	.873	.375	.893	.914

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Dimension Drive
E/W: Lake Forest Drive
Weather: Clear

File Name : LKFDILAAM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:45 AM				07:30 AM				07:30 AM				07:30 AM			
+0 mins.	**46**	1	13	**60**	2	117	89	208	**2**	1	1	**4**	**54**	137	0	191
+15 mins.	31	**2**	**15**	48	**7**	**129**	**119**	**255**	0	**2**	0	2	33	191	1	225
+30 mins.	45	0	15	60	1	121	103	225	1	0	0	1	50	158	1	209
+45 mins.	38	1	11	50	5	103	102	210	1	0	**2**	3	44	**195**	**4**	**243**
Total Volume	160	4	54	218	15	470	413	898	4	3	3	10	181	681	6	868
% App. Total	73.4	1.8	24.8		1.7	52.3	46		40	30	30		20.9	78.5	0.7	
PHF	.870	.500	.900	.908	.536	.911	.868	.880	.500	.375	.375	.625	.838	.873	.375	.893

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Dimension Drive
E/W: Lake Forest Drive
Weather: Clear

File Name : LKFDILAPM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 1

Groups Printed- Total Volume

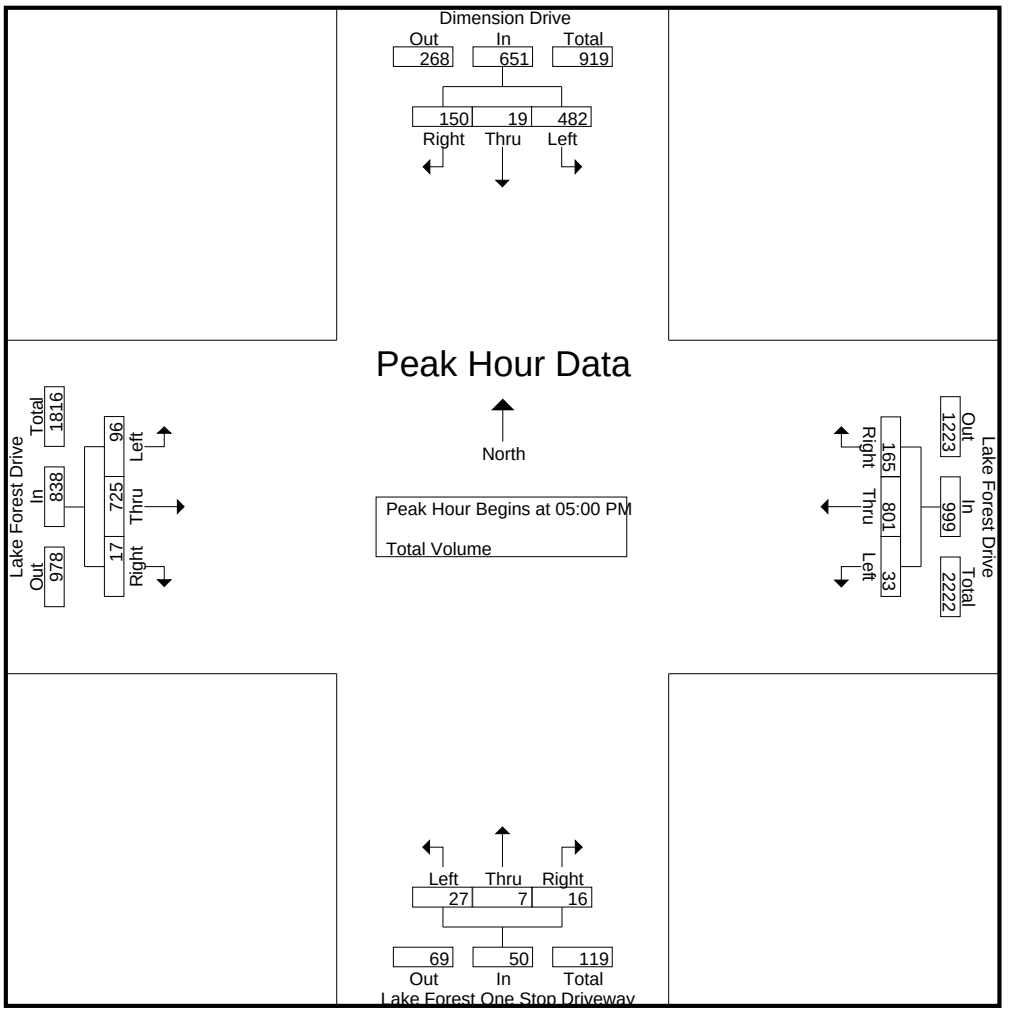
	Dimension Drive Southbound				Lake Forest Drive Westbound				Lake Forest One Stop Driveway Northbound				Lake Forest Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	86	3	28	117	7	185	46	238	3	1	3	7	26	189	3	218	580
04:15 PM	70	4	28	102	4	148	36	188	5	2	2	9	28	173	9	210	509
04:30 PM	96	0	39	135	9	169	39	217	1	2	5	8	32	173	8	213	573
04:45 PM	89	0	29	118	5	162	49	216	2	0	2	4	25	182	3	210	548
Total	341	7	124	472	25	664	170	859	11	5	12	28	111	717	23	851	2210
05:00 PM	166	5	57	228	8	195	34	237	3	1	2	6	16	156	4	176	647
05:15 PM	112	7	34	153	15	195	54	264	8	2	5	15	28	198	3	229	661
05:30 PM	122	4	34	160	8	228	42	278	7	1	6	14	29	180	5	214	666
05:45 PM	82	3	25	110	2	183	35	220	9	3	3	15	23	191	5	219	564
Total	482	19	150	651	33	801	165	999	27	7	16	50	96	725	17	838	2538
Grand Total	823	26	274	1123	58	1465	335	1858	38	12	28	78	207	1442	40	1689	4748
Apprch %	73.3	2.3	24.4		3.1	78.8	18		48.7	15.4	35.9		12.3	85.4	2.4		
Total %	17.3	0.5	5.8	23.7	1.2	30.9	7.1	39.1	0.8	0.3	0.6	1.6	4.4	30.4	0.8	35.6	

	Dimension Drive Southbound				Lake Forest Drive Westbound				Lake Forest One Stop Driveway Northbound				Lake Forest Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	**166**	5	**57**	**228**	8	195	34	237	3	1	2	6	16	156	4	176	647
05:15 PM	112	**7**	34	153	**15**	195	**54**	264	8	2	5	**15**	28	**198**	3	**229**	661
05:30 PM	122	4	34	160	8	**228**	42	**278**	7	1	**6**	14	**29**	180	**5**	214	**666**
05:45 PM	82	3	25	110	2	183	35	220	**9**	**3**	3	15	23	191	5	219	564
Total Volume	482	19	150	651	33	801	165	999	27	7	16	50	96	725	17	838	2538
% App. Total	74	2.9	23		3.3	80.2	16.5		54	14	32		11.5	86.5	2		
PHF	.726	.679	.658	.714	.550	.878	.764	.898	.750	.583	.667	.833	.828	.915	.850	.915	.953

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Dimension Drive
E/W: Lake Forest Drive
Weather: Clear

File Name : LKFDILAPM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:45 PM				05:00 PM				05:00 PM				04:00 PM			
+0 mins.	89	0	29	118	8	195	34	237	3	1	2	6	26	**189**	3	**218**
+15 mins.	**166**	5	**57**	**228**	**15**	195	**54**	264	8	2	5	**15**	28	173	**9**	210
+30 mins.	112	**7**	34	153	8	**228**	42	**278**	7	1	**6**	14	**32**	173	8	213
+45 mins.	122	4	34	160	2	183	35	220	**9**	**3**	3	15	25	182	3	210
Total Volume	489	16	154	659	33	801	165	999	27	7	16	50	111	717	23	851
% App. Total	74.2	2.4	23.4		3.3	80.2	16.5		54	14	32		13	84.3	2.7	
PHF	.736	.571	.675	.723	.550	.878	.764	.898	.750	.583	.667	.833	.867	.948	.639	.976

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Rancho Parkway
E/W: Lake Forest Drive
Weather: Clear

File Name : LKFRALAAM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 1

Groups Printed- Total Volume

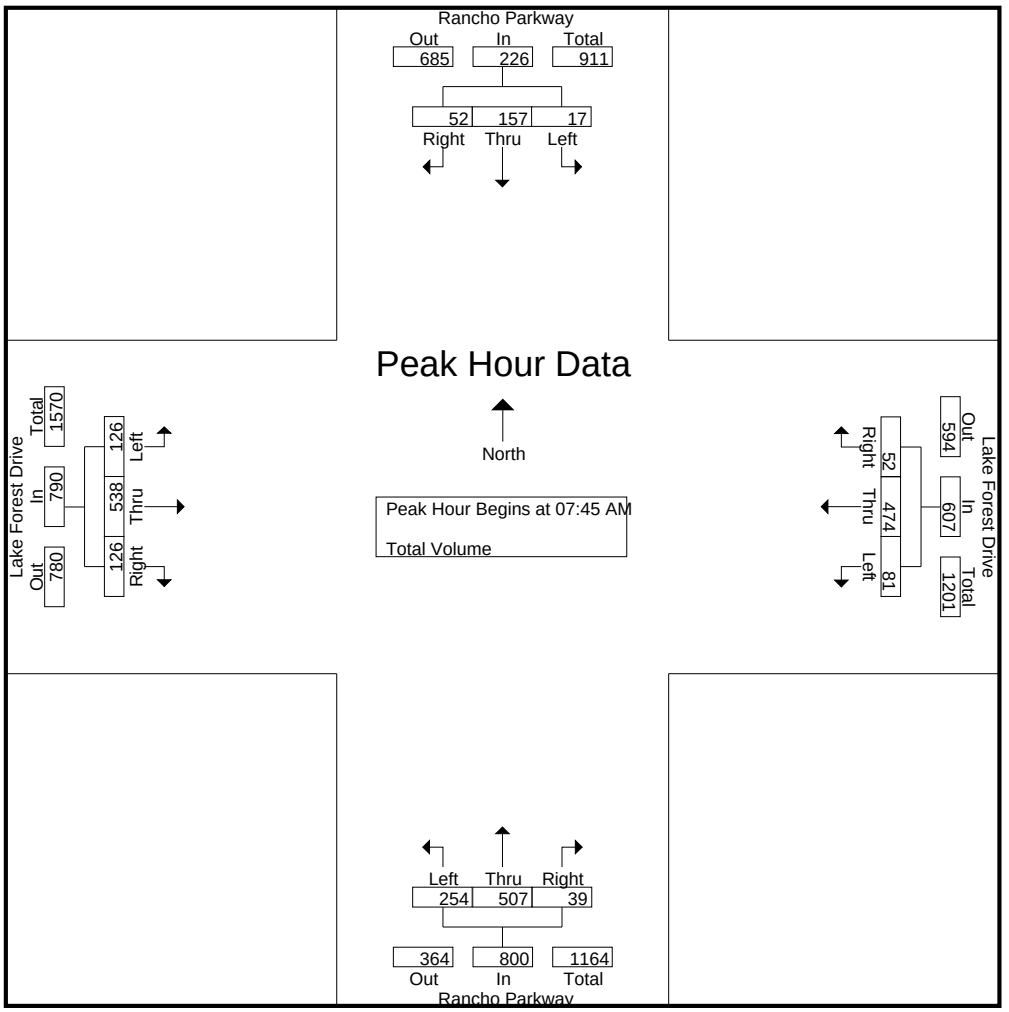
	Rancho Parkway Southbound				Lake Forest Drive Westbound				Rancho Parkway Northbound				Lake Forest Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	1	31	7	39	13	86	7	106	46	91	8	145	26	92	21	139	429
07:15 AM	11	35	17	63	13	82	12	107	43	98	9	150	18	98	19	135	455
07:30 AM	7	46	12	65	14	116	9	139	53	93	8	154	21	98	23	142	500
07:45 AM	2	42	15	59	21	118	11	150	92	137	6	235	27	165	36	228	672
Total	21	154	51	226	61	402	39	502	234	419	31	684	92	453	99	644	2056
08:00 AM	3	40	7	50	19	130	14	163	59	111	15	185	37	121	26	184	582
08:15 AM	7	36	13	56	24	116	15	155	48	143	13	204	35	135	26	196	611
08:30 AM	5	39	17	61	17	110	12	139	55	116	5	176	27	117	38	182	558
08:45 AM	6	40	16	62	18	119	11	148	52	77	10	139	50	94	40	184	533
Total	21	155	53	229	78	475	52	605	214	447	43	704	149	467	130	746	2284
Grand Total	42	309	104	455	139	877	91	1107	448	866	74	1388	241	920	229	1390	4340
Apprch %	9.2	67.9	22.9		12.6	79.2	8.2		32.3	62.4	5.3		17.3	66.2	16.5		
Total %	1	7.1	2.4	10.5	3.2	20.2	2.1	25.5	10.3	20	1.7	32	5.6	21.2	5.3	32	

	Rancho Parkway Southbound				Lake Forest Drive Westbound				Rancho Parkway Northbound				Lake Forest Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	2	**42**	15	59	21	118	11	150	**92**	137	6	**235**	27	**165**	36	**228**	**672**
08:00 AM	3	40	7	50	19	**130**	14	**163**	59	111	**15**	185	**37**	121	26	184	582
08:15 AM	**7**	36	13	56	**24**	116	**15**	155	48	**143**	13	204	35	135	26	196	611
08:30 AM	5	39	**17**	**61**	17	110	12	139	55	116	5	176	27	117	**38**	182	558
Total Volume	17	157	52	226	81	474	52	607	254	507	39	800	126	538	126	790	2423
% App. Total	7.5	69.5	23		13.3	78.1	8.6		31.8	63.4	4.9		15.9	68.1	15.9		
PHF	.607	.935	.765	.926	.844	.912	.867	.931	.690	.886	.650	.851	.851	.815	.829	.866	.901

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Rancho Parkway
E/W: Lake Forest Drive
Weather: Clear

File Name : LKFRALAAM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:15 AM				07:30 AM				07:45 AM				07:45 AM			
+0 mins.	**11**	35	**17**	63	14	116	9	139	**92**	137	6	**235**	27	**165**	36	**228**
+15 mins.	7	**46**	12	**65**	21	118	11	150	59	111	**15**	185	**37**	121	26	184
+30 mins.	2	42	15	59	19	**130**	14	**163**	48	**143**	13	204	35	135	26	196
+45 mins.	3	40	7	50	**24**	116	**15**	155	55	116	5	176	27	117	**38**	182
Total Volume	23	163	51	237	78	480	49	607	254	507	39	800	126	538	126	790
% App. Total	9.7	68.8	21.5		12.9	79.1	8.1		31.8	63.4	4.9		15.9	68.1	15.9	
PHF	.523	.886	.750	.912	.813	.923	.817	.931	.690	.886	.650	.851	.851	.815	.829	.866

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Rancho Parkway
E/W: Lake Forest Drive
Weather: Clear

File Name : LKFRALAPM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 1

Groups Printed- Total Volume

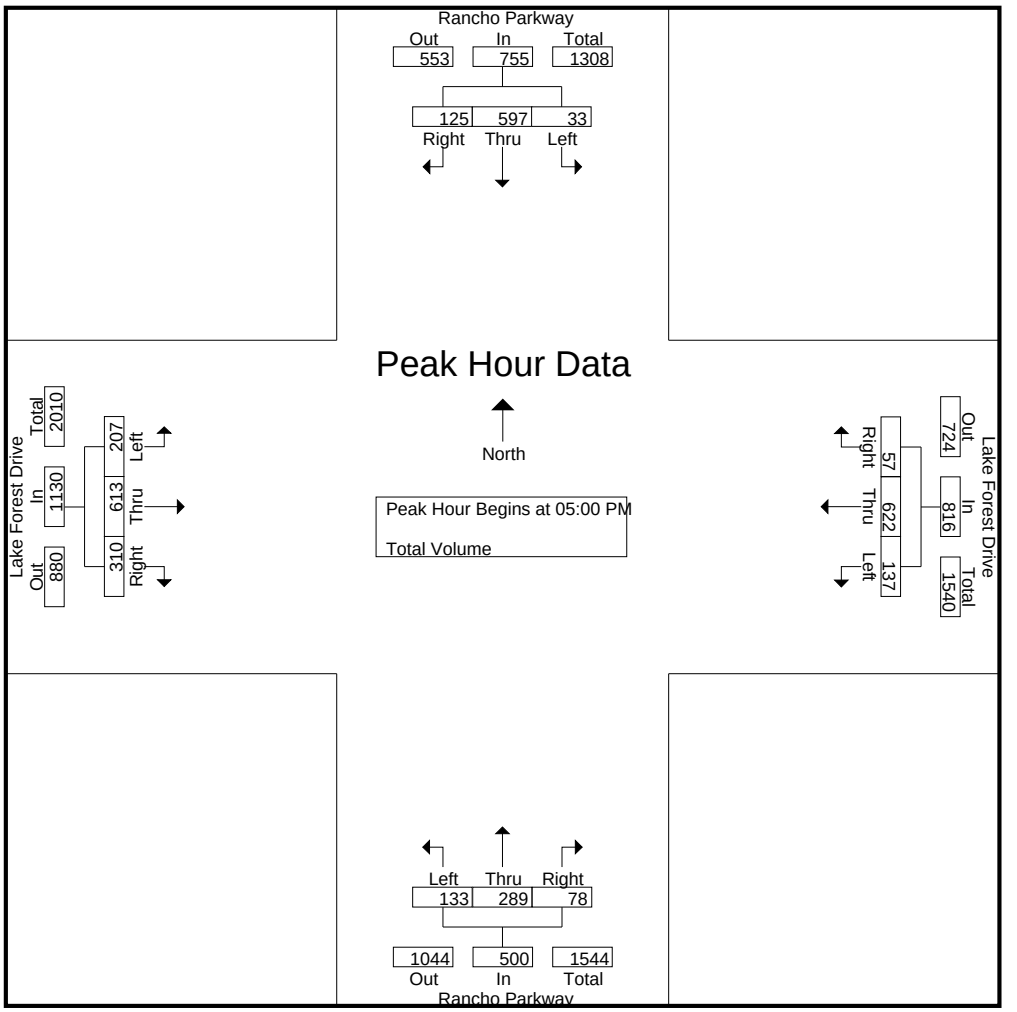
	Rancho Parkway Southbound				Lake Forest Drive Westbound				Rancho Parkway Northbound				Lake Forest Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	4	86	30	120	33	148	7	188	27	67	19	113	35	155	72	262	683
04:15 PM	13	85	22	120	23	121	9	153	27	72	9	108	37	132	62	231	612
04:30 PM	12	111	25	148	33	127	10	170	37	64	18	119	43	149	63	255	692
04:45 PM	12	142	29	183	27	122	9	158	25	60	18	103	47	136	75	258	702
Total	41	424	106	571	116	518	35	669	116	263	64	443	162	572	272	1006	2689
05:00 PM	6	159	28	193	32	151	16	199	33	83	26	142	48	136	73	257	791
05:15 PM	15	157	38	210	25	168	18	211	36	69	10	115	56	172	90	318	854
05:30 PM	6	151	30	187	29	163	14	206	37	79	15	131	53	138	84	275	799
05:45 PM	6	130	29	165	51	140	9	200	27	58	27	112	50	167	63	280	757
Total	33	597	125	755	137	622	57	816	133	289	78	500	207	613	310	1130	3201
Grand Total	74	1021	231	1326	253	1140	92	1485	249	552	142	943	369	1185	582	2136	5890
Apprch %	5.6	77	17.4		17	76.8	6.2		26.4	58.5	15.1		17.3	55.5	27.2		
Total %	1.3	17.3	3.9	22.5	4.3	19.4	1.6	25.2	4.2	9.4	2.4	16	6.3	20.1	9.9	36.3	

	Rancho Parkway Southbound				Lake Forest Drive Westbound				Rancho Parkway Northbound				Lake Forest Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	6	**159**	28	193	32	151	16	199	33	**83**	26	**142**	48	136	73	257	791
05:15 PM	**15**	157	**38**	**210**	25	**168**	**18**	**211**	36	69	10	115	**56**	**172**	**90**	**318**	**854**
05:30 PM	6	151	30	187	29	163	14	206	**37**	79	15	131	53	138	84	275	799
05:45 PM	6	130	29	165	**51**	140	9	200	27	58	**27**	112	50	167	63	280	757
Total Volume	33	597	125	755	137	622	57	816	133	289	78	500	207	613	310	1130	3201
% App. Total	4.4	79.1	16.6		16.8	76.2	7		26.6	57.8	15.6		18.3	54.2	27.4		
PHF	.550	.939	.822	.899	.672	.926	.792	.967	.899	.870	.722	.880	.924	.891	.861	.888	.937

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Rancho Parkway
E/W: Lake Forest Drive
Weather: Clear

File Name : LKFRALAPM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:45 PM				05:00 PM				05:00 PM				05:00 PM			
+0 mins.	12	142	29	183	32	151	16	199	33	**83**	26	**142**	48	136	73	257
+15 mins.	6	**159**	28	193	25	**168**	**18**	**211**	36	69	10	115	**56**	**172**	**90**	**318**
+30 mins.	**15**	157	**38**	**210**	29	163	14	206	**37**	79	15	131	53	138	84	275
+45 mins.	6	151	30	187	**51**	140	9	200	27	58	**27**	112	50	167	63	280
Total Volume	39	609	125	773	137	622	57	816	133	289	78	500	207	613	310	1130
% App. Total	5	78.8	16.2		16.8	76.2	7		26.6	57.8	15.6		18.3	54.2	27.4	
PHF	.650	.958	.822	.920	.672	.926	.792	.967	.899	.870	.722	.880	.924	.891	.861	.888

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: SR-241 Southbound Off Ramp
E/W: Lake Forest Drive
Weather: Clear

File Name : LKF241SLAAM
Site Code : 05117097
Start Date : 2/16/2017

Groups Printed- Total Volume

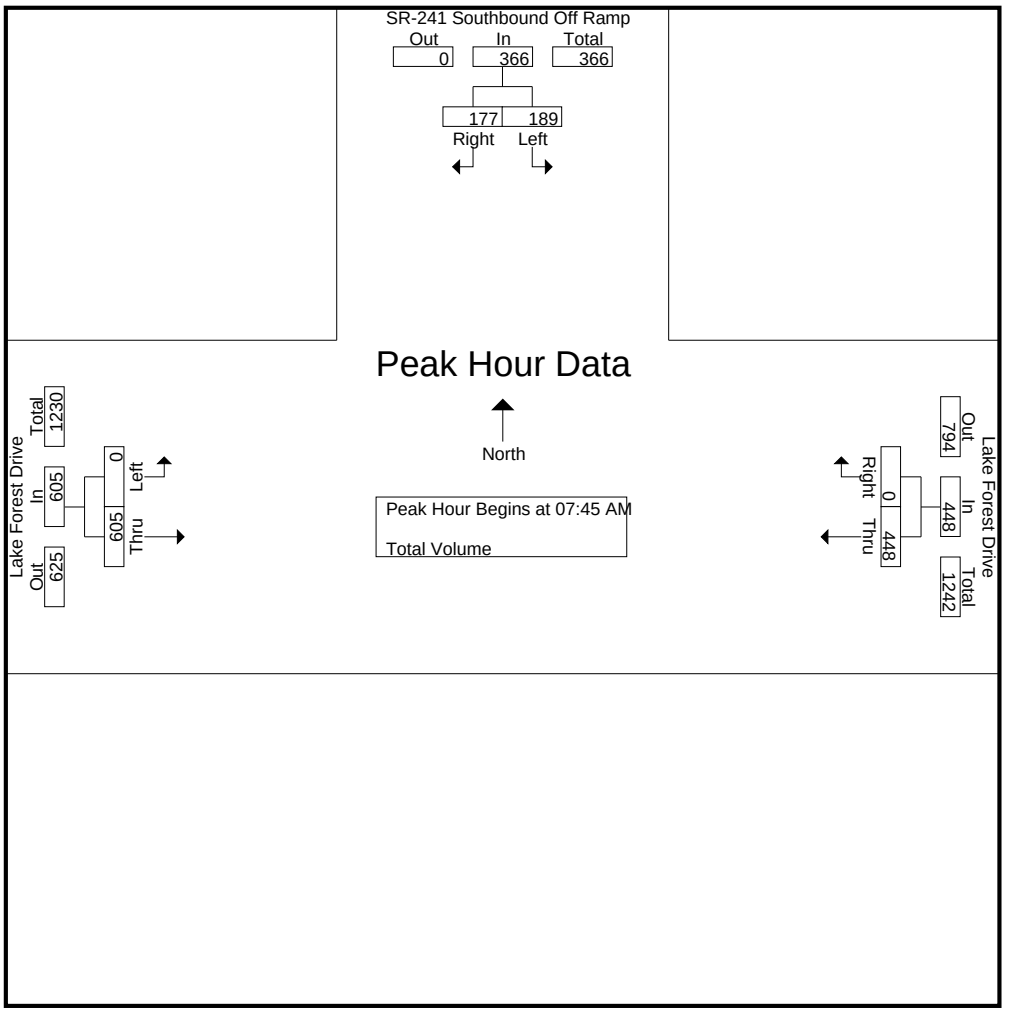
	SR-241 Southbound Off Ramp Southbound			Lake Forest Drive Westbound			Lake Forest Drive Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
07:00 AM	18	34	52	72	0	72	0	88	88	212
07:15 AM	31	34	65	79	0	79	0	134	134	278
07:30 AM	36	42	78	103	0	103	0	127	127	308
07:45 AM	59	49	108	104	0	104	0	176	176	388
Total	144	159	303	358	0	358	0	525	525	1186
08:00 AM	42	43	85	125	0	125	0	137	137	347
08:15 AM	48	41	89	118	0	118	0	155	155	362
08:30 AM	40	44	84	101	0	101	0	137	137	322
08:45 AM	47	55	102	89	0	89	0	123	123	314
Total	177	183	360	433	0	433	0	552	552	1345
Grand Total	321	342	663	791	0	791	0	1077	1077	2531
Apprch %	48.4	51.6		100	0		0	100		
Total %	12.7	13.5	26.2	31.3	0	31.3	0	42.6	42.6	

	SR-241 Southbound Off Ramp Southbound			Lake Forest Drive Westbound			Lake Forest Drive Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:45 AM										
07:45 AM	**59**	**49**	**108**	104	0	104	0	**176**	**176**	**388**
08:00 AM	42	43	85	**125**	0	**125**	0	137	137	347
08:15 AM	48	41	89	118	0	118	0	155	155	362
08:30 AM	40	44	84	101	0	101	0	137	137	322
Total Volume	189	177	366	448	0	448	0	605	605	1419
% App. Total	51.6	48.4		100	0		0	100		
PHF	.801	.903	.847	.896	.000	.896	.000	.859	.859	.914

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: SR-241 Southbound Off Ramp
E/W: Lake Forest Drive
Weather: Clear

File Name : LKF241SLAAM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:45 AM			07:30 AM			07:45 AM		
+0 mins.	**59**	**49**	**108**	103	0	103	0	**176**	**176**
+15 mins.	42	43	85	104	0	104	0	137	137
+30 mins.	48	41	89	**125**	0	**125**	0	155	155
+45 mins.	40	44	84	118	0	118	0	137	137
Total Volume	189	177	366	450	0	450	0	605	605
% App. Total	51.6	48.4		100	0		0	100	
PHF	.801	.903	.847	.900	.000	.900	.000	.859	.859

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: SR-241 Southbound Off Ramp
E/W: Lake Forest Drive
Weather: Clear

File Name : LKF241SLAPM
Site Code : 05117097
Start Date : 2/16/2017

Groups Printed- Total Volume

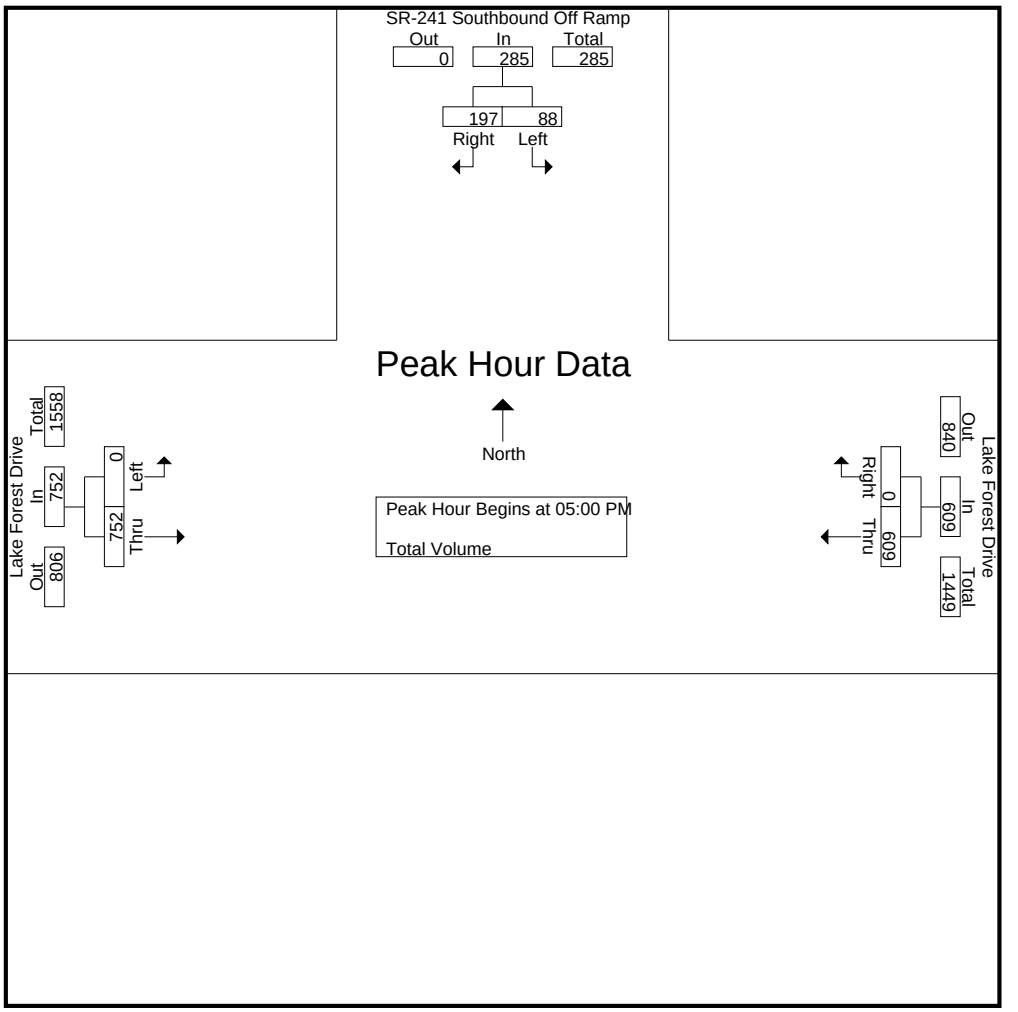
	SR-241 Southbound Off Ramp Southbound			Lake Forest Drive Westbound			Lake Forest Drive Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
04:00 PM	21	30	51	142	0	142	0	175	175	368
04:15 PM	29	38	67	112	0	112	0	152	152	331
04:30 PM	16	35	51	141	0	141	0	184	184	376
04:45 PM	26	43	69	125	0	125	0	166	166	360
Total	92	146	238	520	0	520	0	677	677	1435
05:00 PM	18	40	58	159	0	159	0	171	171	388
05:15 PM	23	45	68	168	0	168	0	201	201	437
05:30 PM	23	56	79	138	0	138	0	172	172	389
05:45 PM	24	56	80	144	0	144	0	208	208	432
Total	88	197	285	609	0	609	0	752	752	1646
Grand Total	180	343	523	1129	0	1129	0	1429	1429	3081
Apprch %	34.4	65.6		100	0		0	100		
Total %	5.8	11.1	17	36.6	0	36.6	0	46.4	46.4	

	SR-241 Southbound Off Ramp Southbound			Lake Forest Drive Westbound			Lake Forest Drive Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	18	40	58	159	0	159	0	171	171	388
05:15 PM	23	45	68	**168**	0	**168**	0	201	201	**437**
05:30 PM	23	**56**	79	138	0	138	0	172	172	389
05:45 PM	**24**	56	**80**	144	0	144	0	**208**	**208**	432
Total Volume	88	197	285	609	0	609	0	752	752	1646
% App. Total	30.9	69.1		100	0		0	100		
PHF	.917	.879	.891	.906	.000	.906	.000	.904	.904	.942

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: SR-241 Southbound Off Ramp
E/W: Lake Forest Drive
Weather: Clear

File Name : LKF241SLAPM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	05:00 PM			05:00 PM			05:00 PM		
+0 mins.	18	40	58	159	0	159	0	171	171
+15 mins.	23	45	68	**168**	0	**168**	0	201	201
+30 mins.	23	**56**	79	138	0	138	0	172	172
+45 mins.	**24**	56	**80**	144	0	144	0	**208**	**208**
Total Volume	88	197	285	609	0	609	0	752	752
% App. Total	30.9	69.1		100	0		0	100	
PHF	.917	.879	.891	.906	.000	.906	.000	.904	.904

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: SR-241 Northbound On Ramp
E/W: Lake Forest Drive
Weather: Clear

File Name : LKF241NLAAM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 1

Groups Printed- Total Volume

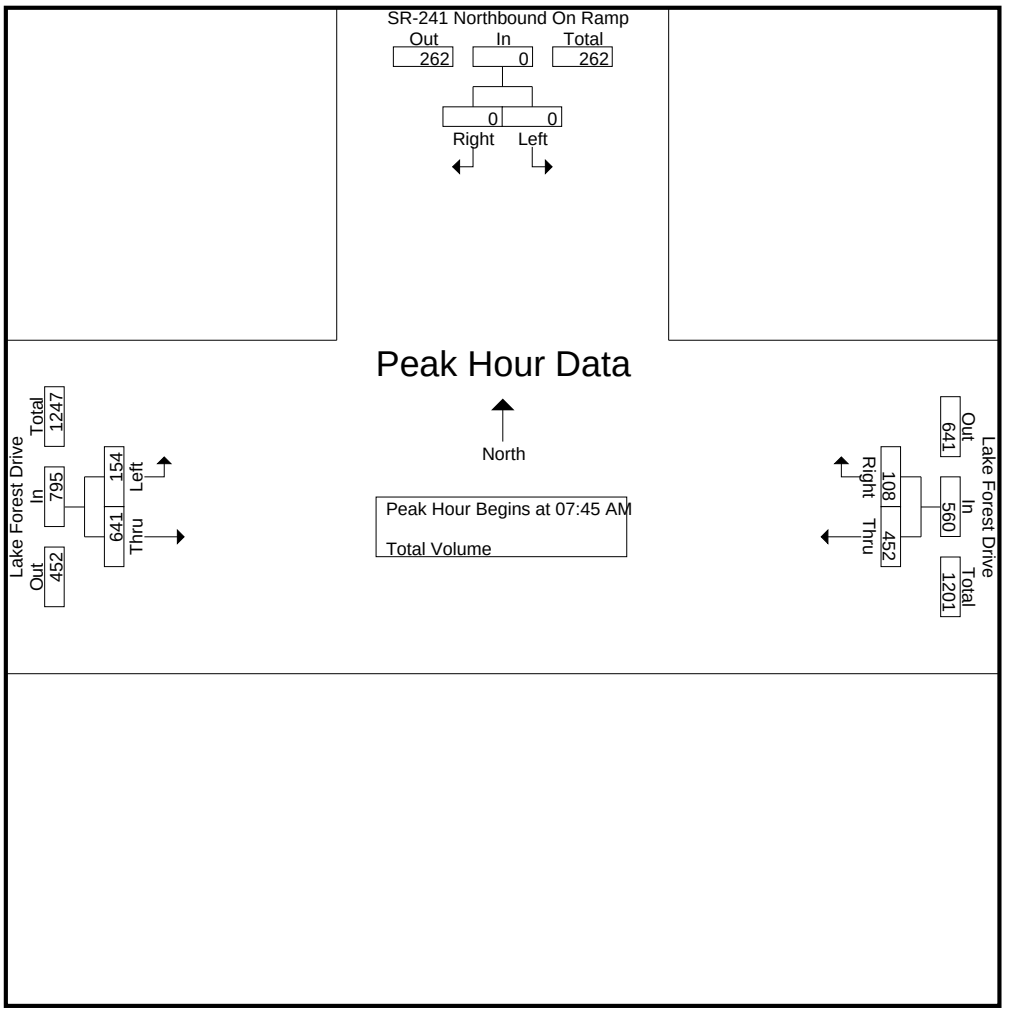
	SR-241 Northbound On Ramp Southbound			Lake Forest Drive Westbound			Lake Forest Drive Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
07:00 AM	0	0	0	69	20	89	34	74	108	197
07:15 AM	0	0	0	81	30	111	62	103	165	276
07:30 AM	0	0	0	103	37	140	53	108	161	301
07:45 AM	0	0	0	106	18	124	42	193	235	359
Total	0	0	0	359	105	464	191	478	669	1133
08:00 AM	0	0	0	124	38	162	36	152	188	350
08:15 AM	0	0	0	116	22	138	40	160	200	338
08:30 AM	0	0	0	106	30	136	36	136	172	308
08:45 AM	0	0	0	89	18	107	29	139	168	275
Total	0	0	0	435	108	543	141	587	728	1271
Grand Total	0	0	0	794	213	1007	332	1065	1397	2404
Apprch %	0	0		78.8	21.2		23.8	76.2		
Total %	0	0	0	33	8.9	41.9	13.8	44.3	58.1	

	SR-241 Northbound On Ramp Southbound			Lake Forest Drive Westbound			Lake Forest Drive Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:45 AM										
07:45 AM	0	0	0	106	18	124	**42**	**193**	**235**	**359**
08:00 AM	0	0	0	**124**	**38**	**162**	36	152	188	350
08:15 AM	0	0	0	116	22	138	40	160	200	338
08:30 AM	0	0	0	106	30	136	36	136	172	308
Total Volume	0	0	0	452	108	560	154	641	795	1355
% App. Total	0	0		80.7	19.3		19.4	80.6		
PHF	.000	.000	.000	.911	.711	.864	.917	.830	.846	.944

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: SR-241 Northbound On Ramp
E/W: Lake Forest Drive
Weather: Clear

File Name : LKF241NLAAM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM			07:30 AM			07:45 AM		
+0 mins.	0	0	0	103	37	140	**42**	**193**	**235**
+15 mins.	0	0	0	106	18	124	36	152	188
+30 mins.	0	0	0	**124**	**38**	**162**	40	160	200
+45 mins.	0	0	0	116	22	138	36	136	172
Total Volume	0	0	0	449	115	564	154	641	795
% App. Total	0	0		79.6	20.4		19.4	80.6	
PHF	.000	.000	.000	.905	.757	.870	.917	.830	.846

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: SR-241 Northbound On Ramp
E/W: Lake Forest Drive
Weather: Clear

File Name : LKF241NLAPM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 1

Groups Printed- Total Volume

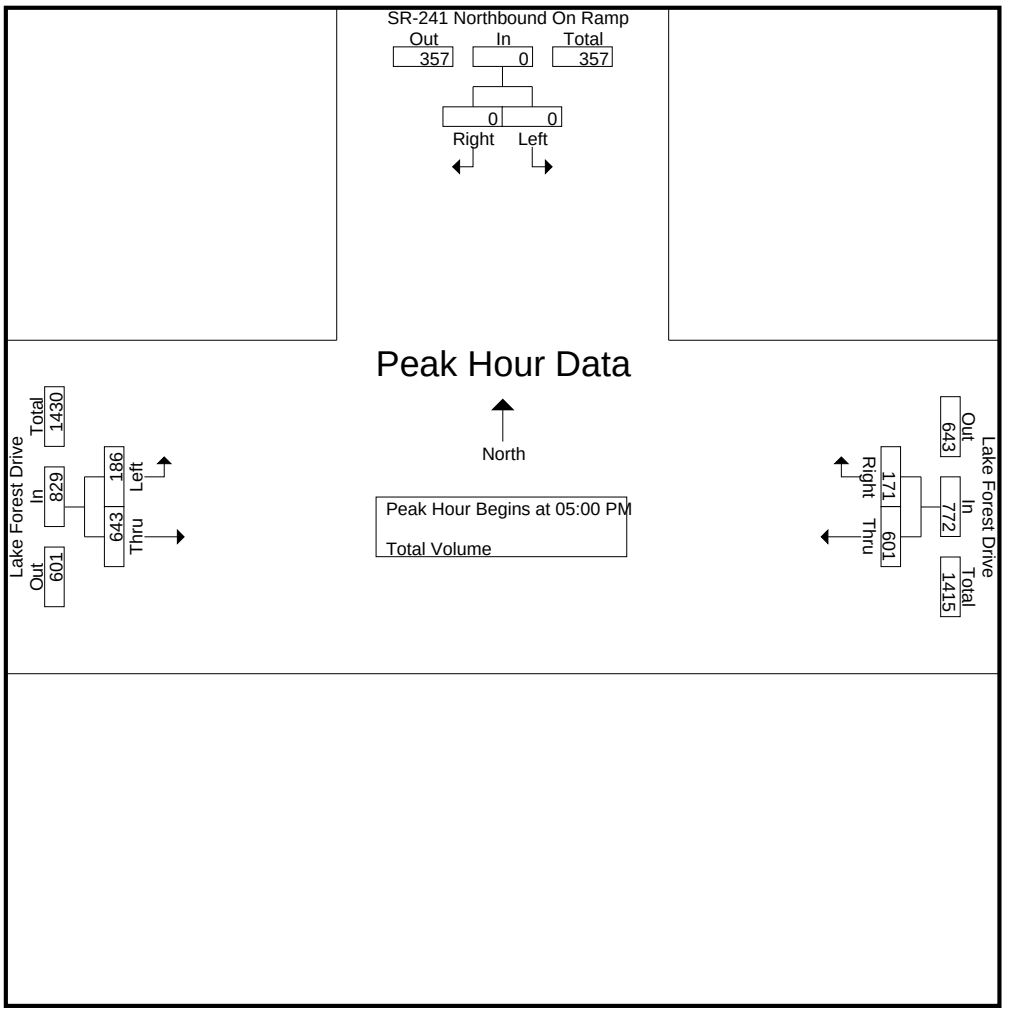
	SR-241 Northbound On Ramp Southbound			Lake Forest Drive Westbound			Lake Forest Drive Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
04:00 PM	0	0	0	141	36	177	40	153	193	370
04:15 PM	0	0	0	120	26	146	26	151	177	323
04:30 PM	0	0	0	136	40	176	49	153	202	378
04:45 PM	0	0	0	123	39	162	36	155	191	353
Total	0	0	0	520	141	661	151	612	763	1424
05:00 PM	0	0	0	156	64	220	55	131	186	406
05:15 PM	0	0	0	171	44	215	45	181	226	441
05:30 PM	0	0	0	133	43	176	36	151	187	363
05:45 PM	0	0	0	141	20	161	50	180	230	391
Total	0	0	0	601	171	772	186	643	829	1601
Grand Total	0	0	0	1121	312	1433	337	1255	1592	3025
Apprch %	0	0		78.2	21.8		21.2	78.8		
Total %	0	0	0	37.1	10.3	47.4	11.1	41.5	52.6	

	SR-241 Northbound On Ramp Southbound			Lake Forest Drive Westbound			Lake Forest Drive Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	0	0	0	156	**64**	**220**	**55**	131	186	406
05:15 PM	0	0	0	**171**	44	215	45	**181**	226	**441**
05:30 PM	0	0	0	133	43	176	36	151	187	363
05:45 PM	0	0	0	141	20	161	50	180	**230**	391
Total Volume	0	0	0	601	171	772	186	643	829	1601
% App. Total	0	0		77.8	22.2		22.4	77.6		
PHF	.000	.000	.000	.879	.668	.877	.845	.888	.901	.908

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: SR-241 Northbound On Ramp
E/W: Lake Forest Drive
Weather: Clear

File Name : LKF241NLAPM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:00 PM			04:30 PM			05:00 PM		
+0 mins.	0	0	0	136	40	176	**55**	131	186
+15 mins.	0	0	0	123	39	162	45	**181**	226
+30 mins.	0	0	0	156	**64**	**220**	36	151	187
+45 mins.	0	0	0	**171**	44	215	50	180	**230**
Total Volume	0	0	0	586	187	773	186	643	829
% App. Total	0	0		75.8	24.2		22.4	77.6	
PHF	.000	.000	.000	.857	.730	.878	.845	.888	.901

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Rancho Parkway
E/W: Corridor Center
Weather: Clear

File Name : LKFRACOAM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 1

Groups Printed- Total Volume

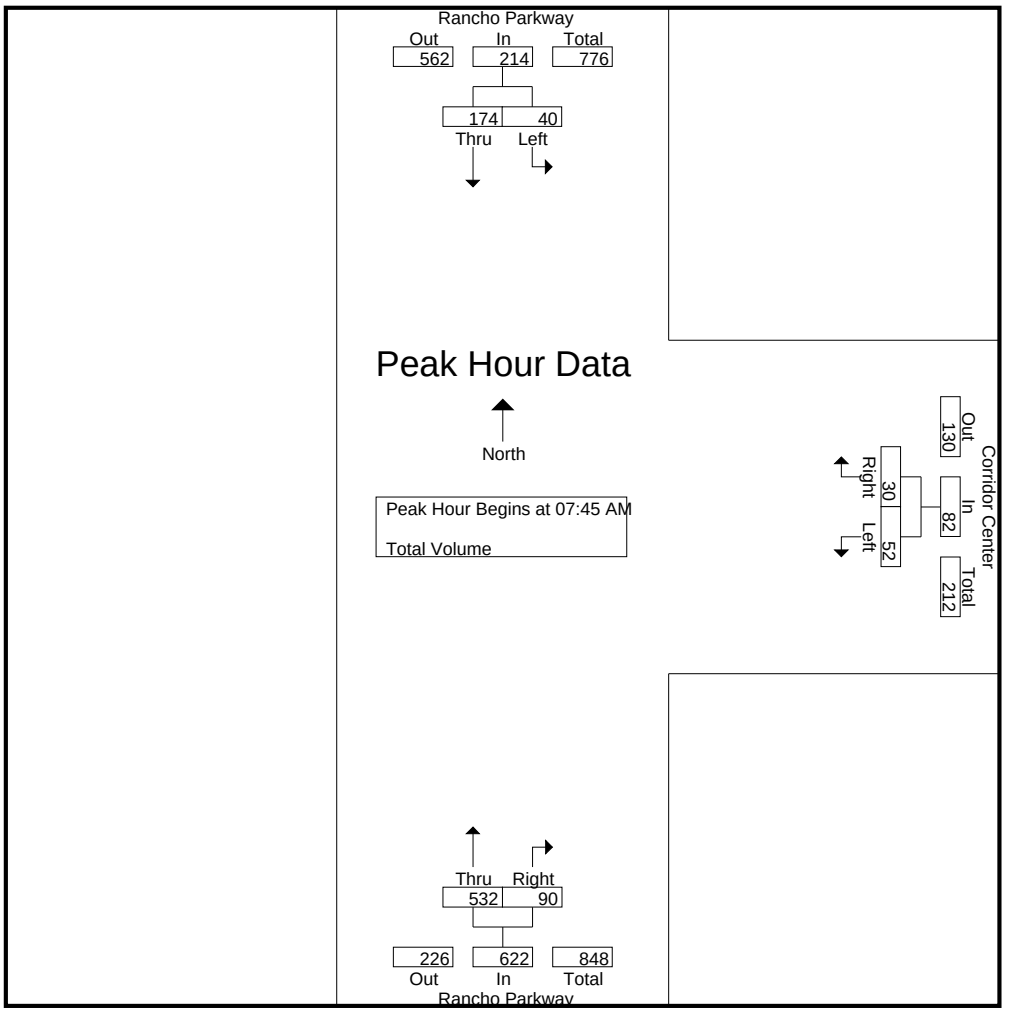
	Rancho Parkway Southbound			Corridor Center Westbound			Rancho Parkway Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
07:00 AM	5	25	30	16	8	24	104	6	110	164
07:15 AM	5	43	48	20	9	29	109	9	118	195
07:30 AM	9	49	58	18	6	24	107	11	118	200
07:45 AM	4	48	52	5	10	15	149	17	166	233
Total	23	165	188	59	33	92	469	43	512	792
08:00 AM	9	43	52	13	2	15	113	21	134	201
08:15 AM	9	42	51	10	11	21	145	32	177	249
08:30 AM	18	41	59	24	7	31	125	20	145	235
08:45 AM	15	47	62	16	14	30	91	19	110	202
Total	51	173	224	63	34	97	474	92	566	887
Grand Total	74	338	412	122	67	189	943	135	1078	1679
Apprch %	18	82		64.6	35.4		87.5	12.5		
Total %	4.4	20.1	24.5	7.3	4	11.3	56.2	8	64.2	

	Rancho Parkway Southbound			Corridor Center Westbound			Rancho Parkway Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:45 AM										
07:45 AM	4	**48**	52	5	10	15	**149**	17	166	233
08:00 AM	9	43	52	13	2	15	113	21	134	201
08:15 AM	9	42	51	10	**11**	21	145	**32**	**177**	**249**
08:30 AM	**18**	41	**59**	**24**	7	**31**	125	20	145	235
Total Volume	40	174	214	52	30	82	532	90	622	918
% App. Total	18.7	81.3		63.4	36.6		85.5	14.5		
PHF	.556	.906	.907	.542	.682	.661	.893	.703	.879	.922

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Rancho Parkway
E/W: Corridor Center
Weather: Clear

File Name : LKFRACOAM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	08:00 AM			08:00 AM			07:45 AM		
+0 mins.	9	43	52	13	2	15	**149**	17	166
+15 mins.	9	42	51	10	11	21	113	21	134
+30 mins.	**18**	41	59	**24**	7	**31**	145	**32**	**177**
+45 mins.	15	**47**	**62**	16	**14**	30	125	20	145
Total Volume	51	173	224	63	34	97	532	90	622
% App. Total	22.8	77.2		64.9	35.1		85.5	14.5	
PHF	.708	.920	.903	.656	.607	.782	.893	.703	.879

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Rancho Parkway
E/W: Corridor Center
Weather: Clear

File Name : LKFRACOPM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 1

Groups Printed- Total Volume

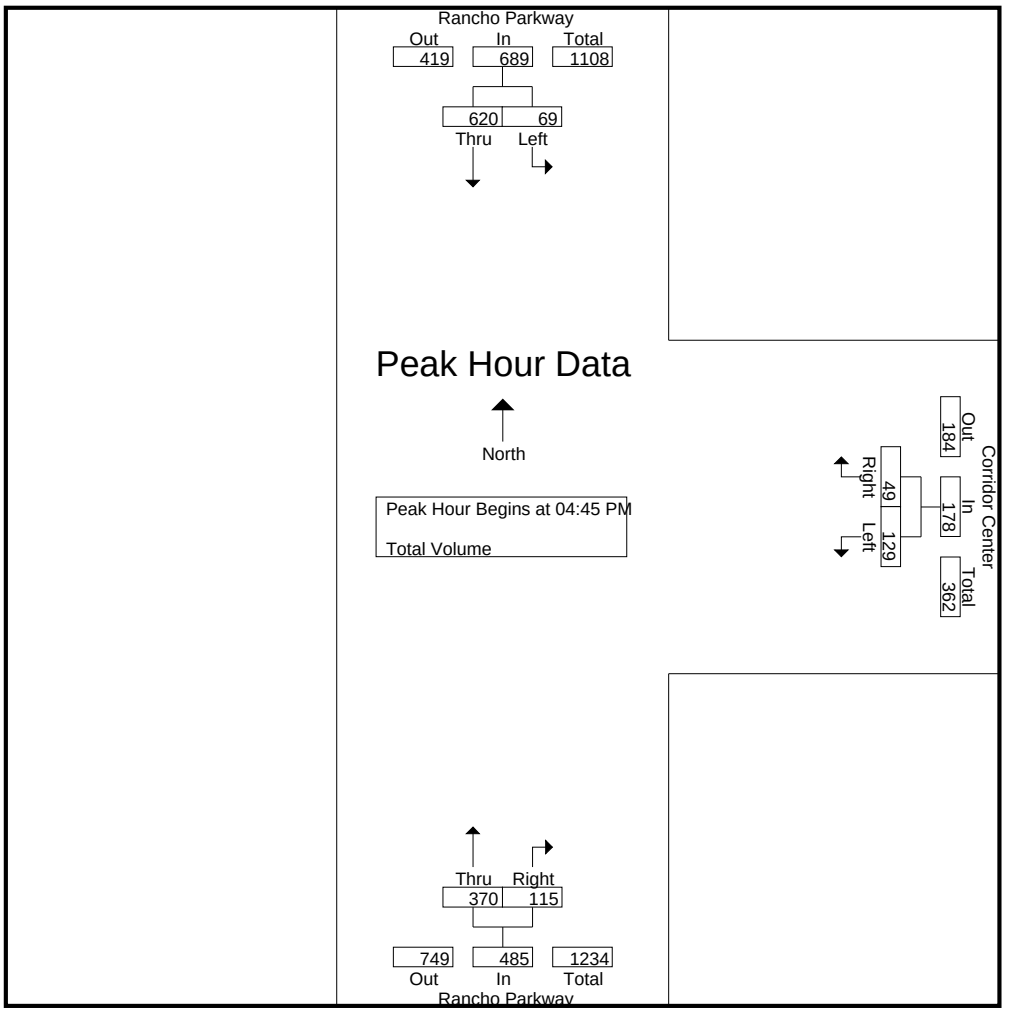
	Rancho Parkway Southbound			Corridor Center Westbound			Rancho Parkway Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
04:00 PM	21	103	124	24	7	31	81	19	100	255
04:15 PM	14	93	107	21	7	28	75	21	96	231
04:30 PM	21	137	158	35	13	48	83	21	104	310
04:45 PM	20	143	163	29	14	43	84	19	103	309
Total	76	476	552	109	41	150	323	80	403	1105
05:00 PM	22	164	186	29	10	39	91	29	120	345
05:15 PM	12	167	179	47	14	61	92	43	135	375
05:30 PM	15	146	161	24	11	35	103	24	127	323
05:45 PM	18	145	163	26	17	43	75	17	92	298
Total	67	622	689	126	52	178	361	113	474	1341
Grand Total	143	1098	1241	235	93	328	684	193	877	2446
Apprch %	11.5	88.5		71.6	28.4		78	22		
Total %	5.8	44.9	50.7	9.6	3.8	13.4	28	7.9	35.9	

	Rancho Parkway Southbound			Corridor Center Westbound			Rancho Parkway Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:45 PM										
04:45 PM	20	143	163	29	**14**	43	84	19	103	309
05:00 PM	**22**	164	**186**	29	10	39	91	29	120	345
05:15 PM	12	**167**	179	**47**	14	**61**	92	**43**	**135**	**375**
05:30 PM	15	146	161	24	11	35	**103**	24	127	323
Total Volume	69	620	689	129	49	178	370	115	485	1352
% App. Total	10	90		72.5	27.5		76.3	23.7		
PHF	.784	.928	.926	.686	.875	.730	.898	.669	.898	.901

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Rancho Parkway
E/W: Corridor Center
Weather: Clear

File Name : LKFRACOPM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:45 PM			04:30 PM			04:45 PM		
+0 mins.	20	143	163	35	13	48	84	19	103
+15 mins.	**22**	164	**186**	29	**14**	43	91	29	120
+30 mins.	12	**167**	179	29	10	39	92	**43**	**135**
+45 mins.	15	146	161	**47**	14	**61**	**103**	24	127
Total Volume	69	620	689	140	51	191	370	115	485
% App. Total	10	90		73.3	26.7		76.3	23.7	
PHF	.784	.928	.926	.745	.911	.783	.898	.669	.898

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Portola Parkway
E/W: Bake Parkway
Weather: Clear

File Name : LKFPOBAAM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 1

Groups Printed- Total Volume

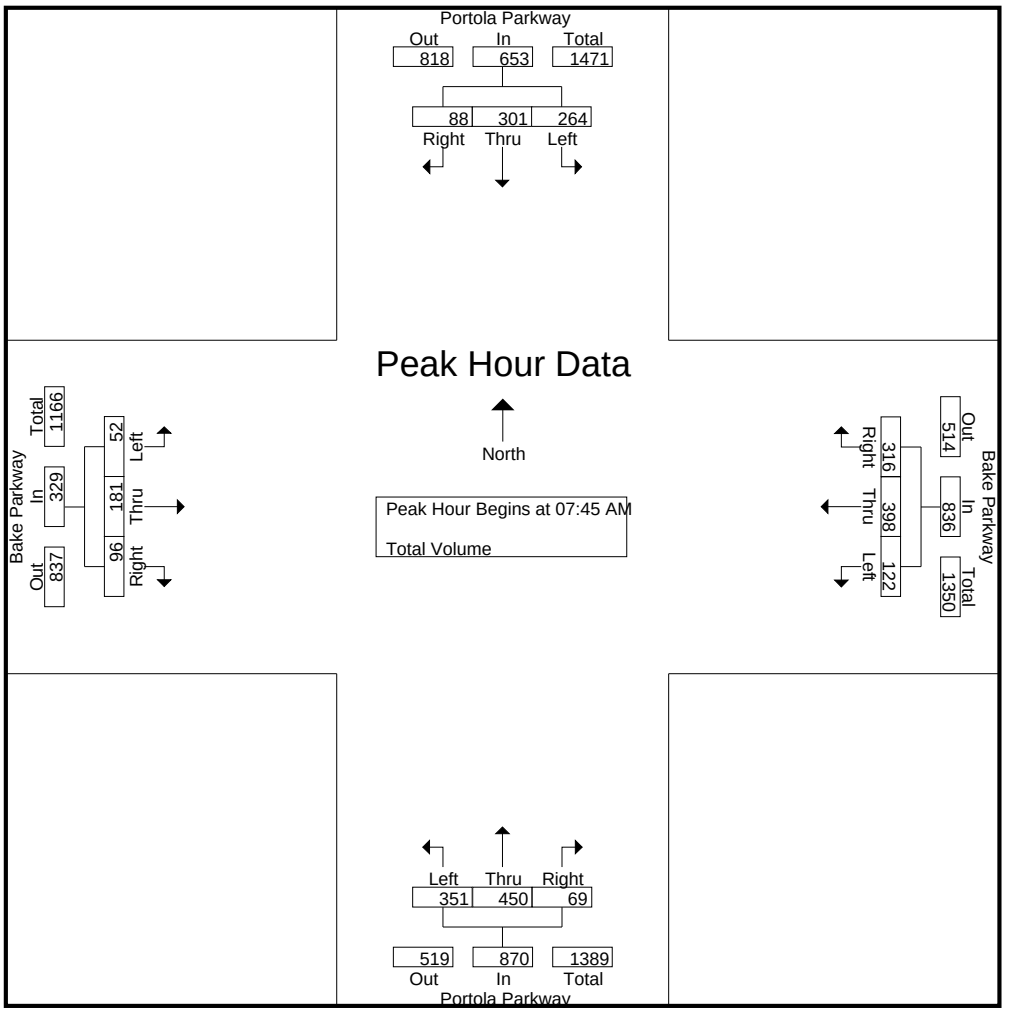
	Portola Parkway Southbound				Bake Parkway Westbound				Portola Parkway Northbound				Bake Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	32	60	12	104	13	55	55	123	75	110	7	192	7	19	20	46	465
07:15 AM	27	74	15	116	20	63	63	146	71	89	8	168	13	15	18	46	476
07:30 AM	34	114	21	169	28	59	54	141	93	108	18	219	13	23	21	57	586
07:45 AM	58	94	23	175	30	78	44	152	91	106	13	210	12	45	36	93	630
Total	151	342	71	564	91	255	216	562	330	413	46	789	45	102	95	242	2157
08:00 AM	86	68	24	178	30	95	96	221	125	108	22	255	15	64	21	100	754
08:15 AM	79	76	20	175	24	117	80	221	67	142	22	231	5	40	17	62	689
08:30 AM	41	63	21	125	38	108	96	242	68	94	12	174	20	32	22	74	615
08:45 AM	28	88	21	137	20	52	50	122	80	90	8	178	12	15	17	44	481
Total	234	295	86	615	112	372	322	806	340	434	64	838	52	151	77	280	2539
Grand Total	385	637	157	1179	203	627	538	1368	670	847	110	1627	97	253	172	522	4696
Apprch %	32.7	54	13.3		14.8	45.8	39.3		41.2	52.1	6.8		18.6	48.5	33		
Total %	8.2	13.6	3.3	25.1	4.3	13.4	11.5	29.1	14.3	18	2.3	34.6	2.1	5.4	3.7	11.1	

	Portola Parkway Southbound				Bake Parkway Westbound				Portola Parkway Northbound				Bake Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	58	**94**	23	175	30	78	44	152	91	106	13	210	12	45	**36**	93	630
08:00 AM	**86**	68	**24**	**178**	30	95	**96**	221	**125**	108	**22**	**255**	15	**64**	21	**100**	**754**
08:15 AM	79	76	20	175	24	**117**	80	221	67	**142**	22	231	5	40	17	62	689
08:30 AM	41	63	21	125	**38**	108	96	**242**	68	94	12	174	**20**	32	22	74	615
Total Volume	264	301	88	653	122	398	316	836	351	450	69	870	52	181	96	329	2688
% App. Total	40.4	46.1	13.5		14.6	47.6	37.8		40.3	51.7	7.9		15.8	55	29.2		
PHF	.767	.801	.917	.917	.803	.850	.823	.864	.702	.792	.784	.853	.650	.707	.667	.823	.891

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Portola Parkway
E/W: Bake Parkway
Weather: Clear

File Name : LKFPOBAAM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:30 AM				07:45 AM				07:30 AM				07:45 AM			
+0 mins.	34	**114**	21	169	30	78	44	152	93	108	18	219	12	45	**36**	93
+15 mins.	58	94	23	175	30	95	**96**	221	91	106	13	210	15	**64**	21	**100**
+30 mins.	**86**	68	**24**	**178**	24	**117**	80	221	**125**	108	**22**	**255**	5	40	17	62
+45 mins.	79	76	20	175	**38**	108	96	**242**	67	**142**	22	231	**20**	32	22	74
Total Volume	257	352	88	697	122	398	316	836	376	464	75	915	52	181	96	329
% App. Total	36.9	50.5	12.6		14.6	47.6	37.8		41.1	50.7	8.2		15.8	55	29.2	
PHF	.747	.772	.917	.979	.803	.850	.823	.864	.752	.817	.852	.897	.650	.707	.667	.823

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Portola Parkway
E/W: Bake Parkway
Weather: Clear

File Name : LKFPOBAPM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 1

Groups Printed- Total Volume

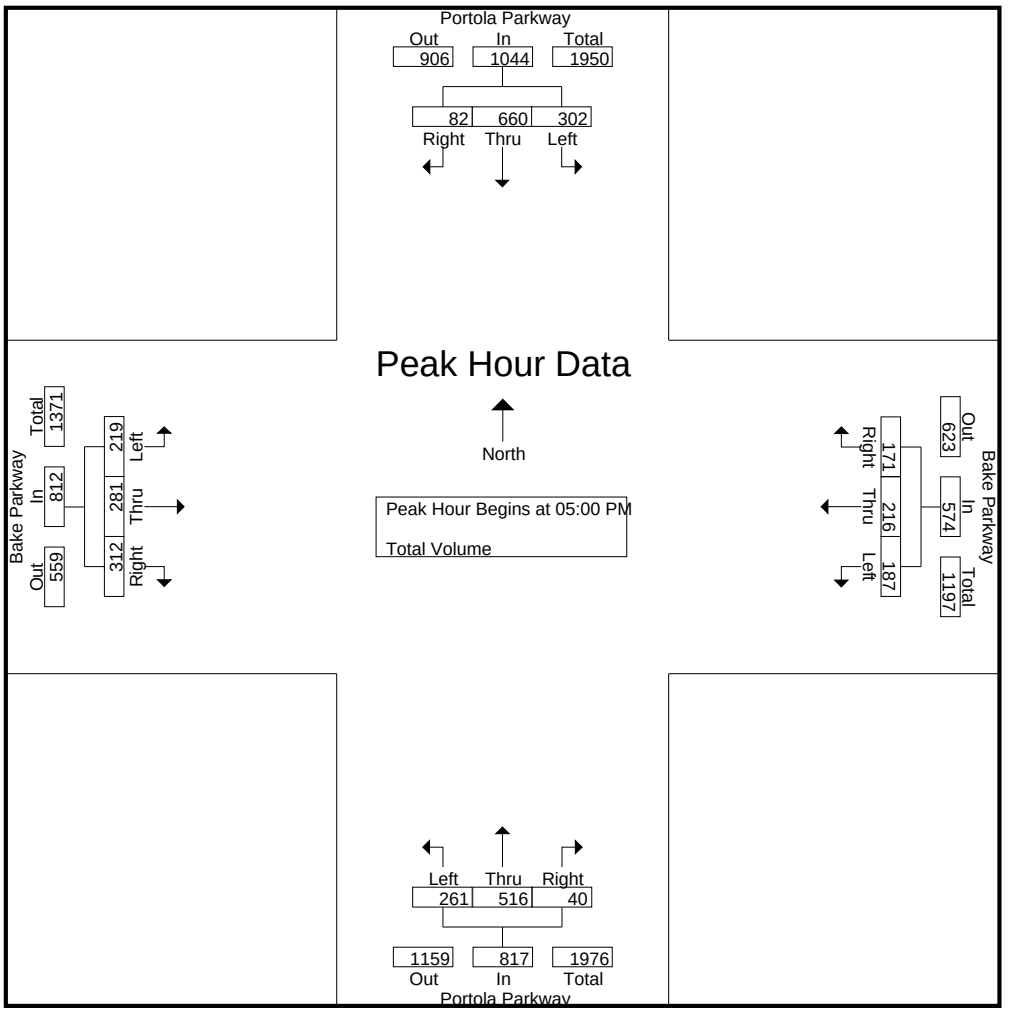
	Portola Parkway Southbound				Bake Parkway Westbound				Portola Parkway Northbound				Bake Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	55	124	19	198	30	32	27	89	53	106	6	165	35	38	60	133	585
04:15 PM	43	146	21	210	35	46	37	118	59	130	14	203	34	33	49	116	647
04:30 PM	60	130	18	208	35	49	62	146	66	112	8	186	45	33	53	131	671
04:45 PM	53	117	24	194	43	63	50	156	55	114	7	176	45	63	55	163	689
Total	211	517	82	810	143	190	176	509	233	462	35	730	159	167	217	543	2592
05:00 PM	70	149	15	234	47	61	37	145	71	152	11	234	59	69	78	206	819
05:15 PM	66	157	27	250	42	61	56	159	71	119	9	199	48	78	78	204	812
05:30 PM	90	176	24	290	49	52	45	146	62	146	10	218	56	65	82	203	857
05:45 PM	76	178	16	270	49	42	33	124	57	99	10	166	56	69	74	199	759
Total	302	660	82	1044	187	216	171	574	261	516	40	817	219	281	312	812	3247
Grand Total	513	1177	164	1854	330	406	347	1083	494	978	75	1547	378	448	529	1355	5839
Apprch %	27.7	63.5	8.8		30.5	37.5	32		31.9	63.2	4.8		27.9	33.1	39		
Total %	8.8	20.2	2.8	31.8	5.7	7	5.9	18.5	8.5	16.7	1.3	26.5	6.5	7.7	9.1	23.2	

	Portola Parkway Southbound				Bake Parkway Westbound				Portola Parkway Northbound				Bake Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	70	149	15	234	47	**61**	37	145	**71**	**152**	**11**	**234**	**59**	69	78	**206**	819
05:15 PM	66	157	**27**	250	42	61	**56**	**159**	71	119	9	199	48	**78**	78	204	812
05:30 PM	**90**	176	24	**290**	**49**	52	45	146	62	146	10	218	56	65	**82**	203	**857**
05:45 PM	76	**178**	16	270	49	42	33	124	57	99	10	166	56	69	74	199	759
Total Volume	302	660	82	1044	187	216	171	574	261	516	40	817	219	281	312	812	3247
% App. Total	28.9	63.2	7.9		32.6	37.6	29.8		31.9	63.2	4.9		27	34.6	38.4		
PHF	.839	.927	.759	.900	.954	.885	.763	.903	.919	.849	.909	.873	.928	.901	.951	.985	.947

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Portola Parkway
E/W: Bake Parkway
Weather: Clear

File Name : LKFPOBAPM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	05:00 PM				04:30 PM				04:45 PM				05:00 PM			
+0 mins.	70	149	15	234	35	49	**62**	146	55	114	7	176	**59**	69	78	**206**
+15 mins.	66	157	**27**	250	43	**63**	50	156	**71**	**152**	**11**	**234**	48	**78**	78	204
+30 mins.	**90**	176	24	**290**	**47**	61	37	145	71	119	9	199	56	65	**82**	203
+45 mins.	76	**178**	16	270	42	61	56	**159**	62	146	10	218	56	69	74	199
Total Volume	302	660	82	1044	167	234	205	606	259	531	37	827	219	281	312	812
% App. Total	28.9	63.2	7.9		27.6	38.6	33.8		31.3	64.2	4.5		27	34.6	38.4	
PHF	.839	.927	.759	.900	.888	.929	.827	.953	.912	.873	.841	.884	.928	.901	.951	.985

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Towne Centre Drive
E/W: Bake Parkway
Weather: Clear

File Name : LKFTOBAAM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 1

Groups Printed- Total Volume

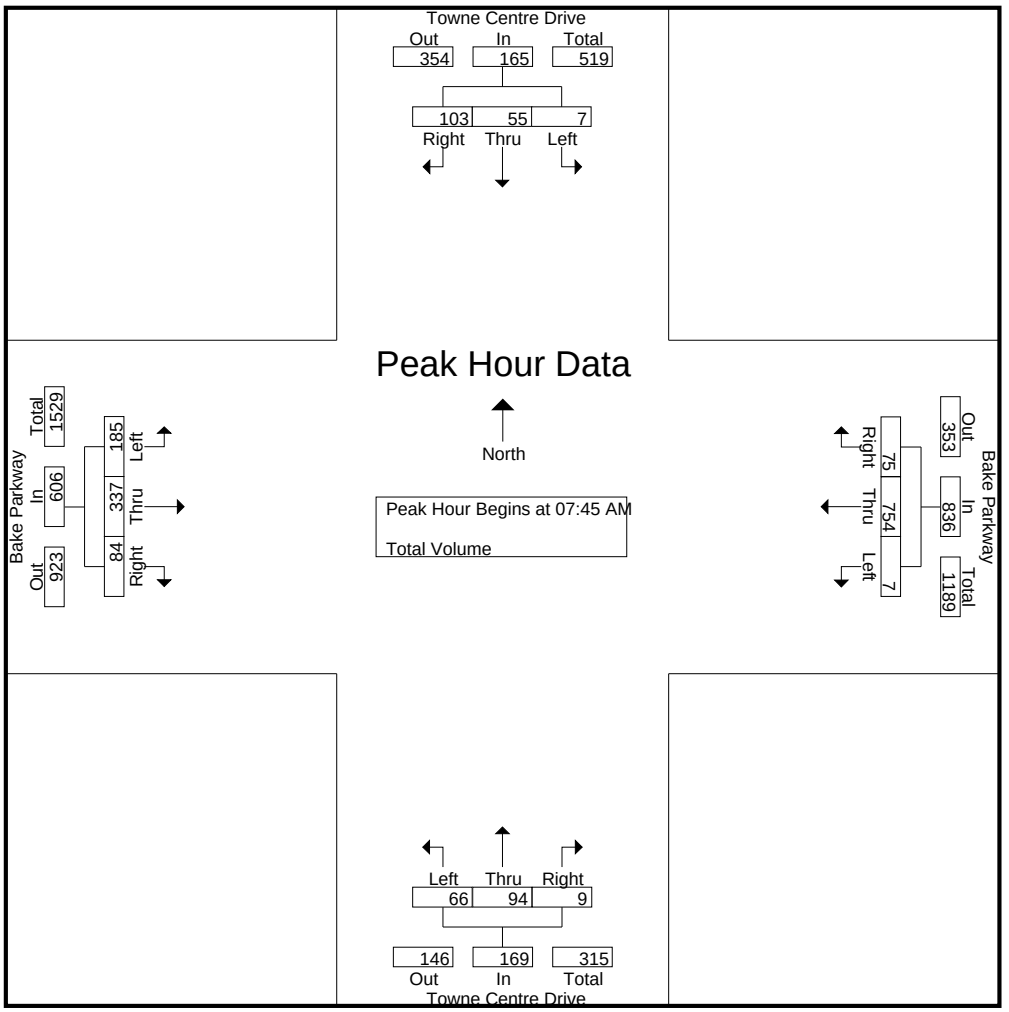
	Towne Centre Drive Southbound				Bake Parkway Westbound				Towne Centre Drive Northbound				Bake Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	1	9	17	27	1	133	9	143	6	13	5	24	37	44	10	91	285
07:15 AM	1	5	20	26	0	135	6	141	16	18	0	34	39	46	14	99	300
07:30 AM	4	7	11	22	0	151	15	166	14	13	2	29	35	53	20	108	325
07:45 AM	1	17	29	47	0	177	18	195	17	26	2	45	54	95	19	168	455
Total	7	38	77	122	1	596	48	645	53	70	9	132	165	238	63	466	1365
08:00 AM	2	11	20	33	1	221	19	241	15	22	1	38	40	103	23	166	478
08:15 AM	4	9	27	40	2	173	21	196	22	27	3	52	44	64	23	131	419
08:30 AM	0	18	27	45	4	183	17	204	12	19	3	34	47	75	19	141	424
08:45 AM	0	11	30	41	4	134	10	148	10	18	2	30	56	69	16	141	360
Total	6	49	104	159	11	711	67	789	59	86	9	154	187	311	81	579	1681
Grand Total	13	87	181	281	12	1307	115	1434	112	156	18	286	352	549	144	1045	3046
Apprch %	4.6	31	64.4		0.8	91.1	8		39.2	54.5	6.3		33.7	52.5	13.8		
Total %	0.4	2.9	5.9	9.2	0.4	42.9	3.8	47.1	3.7	5.1	0.6	9.4	11.6	18	4.7	34.3	

	Towne Centre Drive Southbound				Bake Parkway Westbound				Towne Centre Drive Northbound				Bake Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	1	17	**29**	**47**	0	177	18	195	17	26	2	45	**54**	95	19	**168**	455
08:00 AM	2	11	20	33	1	**221**	19	**241**	15	22	1	38	40	**103**	**23**	166	**478**
08:15 AM	**4**	9	27	40	2	173	**21**	196	**22**	**27**	**3**	**52**	44	64	23	131	419
08:30 AM	0	**18**	27	45	**4**	183	17	204	12	19	3	34	47	75	19	141	424
Total Volume	7	55	103	165	7	754	75	836	66	94	9	169	185	337	84	606	1776
% App. Total	4.2	33.3	62.4		0.8	90.2	9		39.1	55.6	5.3		30.5	55.6	13.9		
PHF	.438	.764	.888	.878	.438	.853	.893	.867	.750	.870	.750	.813	.856	.818	.913	.902	.929

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Towne Centre Drive
E/W: Bake Parkway
Weather: Clear

File Name : LKFTOBAAM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:45 AM				07:45 AM				07:45 AM				07:45 AM			
+0 mins.	1	17	**29**	**47**	0	177	18	195	17	26	2	45	**54**	95	19	**168**
+15 mins.	2	11	20	33	1	**221**	19	**241**	15	22	1	38	40	**103**	**23**	166
+30 mins.	**4**	9	27	40	2	173	**21**	196	**22**	**27**	**3**	**52**	44	64	23	131
+45 mins.	0	**18**	27	45	**4**	183	17	204	12	19	3	34	47	75	19	141
Total Volume	7	55	103	165	7	754	75	836	66	94	9	169	185	337	84	606
% App. Total	4.2	33.3	62.4		0.8	90.2	9		39.1	55.6	5.3		30.5	55.6	13.9	
PHF	.438	.764	.888	.878	.438	.853	.893	.867	.750	.870	.750	.813	.856	.818	.913	.902

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Towne Centre Drive
E/W: Bake Parkway
Weather: Clear

File Name : LKFTOBAPM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 1

Groups Printed- Total Volume

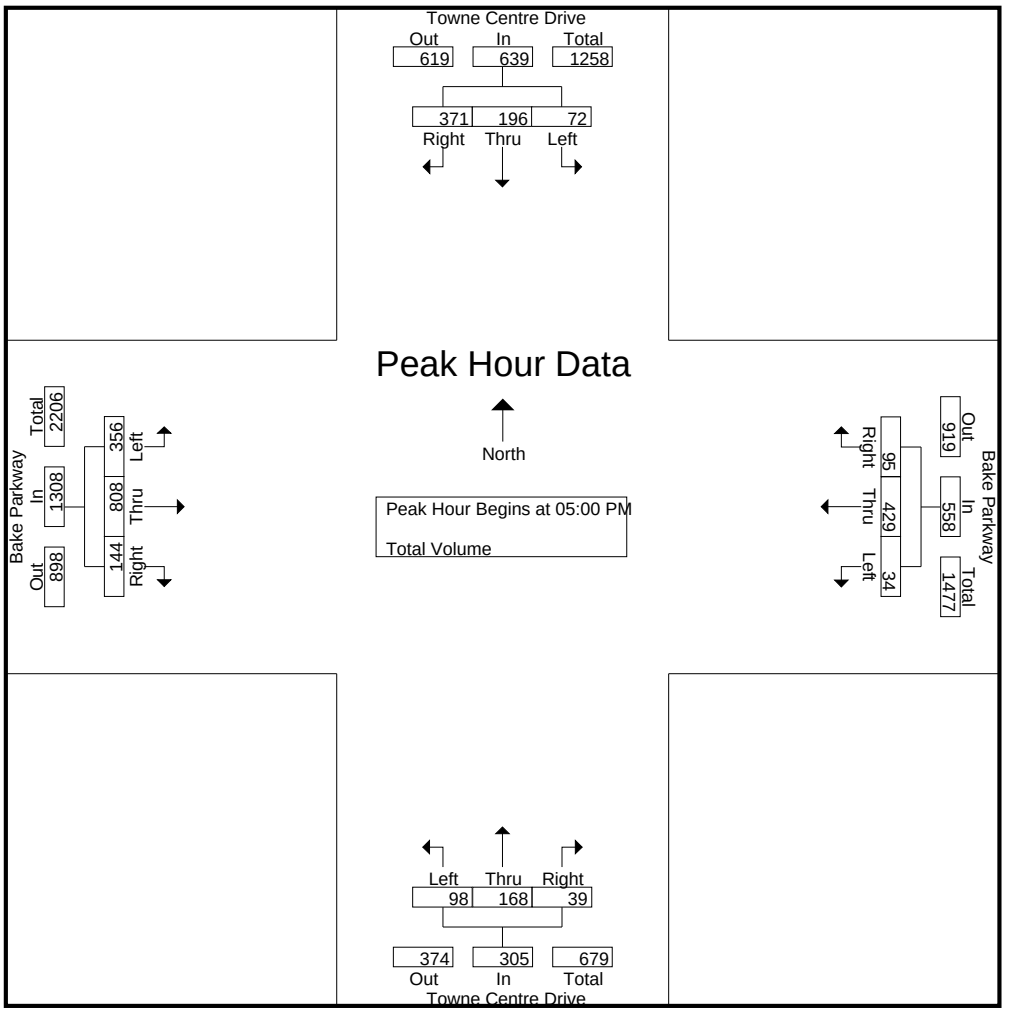
	Towne Centre Drive Southbound				Bake Parkway Westbound				Towne Centre Drive Northbound				Bake Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	14	25	99	138	8	104	17	129	20	40	7	67	60	139	31	230	564
04:15 PM	13	41	75	129	4	110	14	128	11	30	10	51	63	120	17	200	508
04:30 PM	12	38	83	133	9	116	15	140	20	36	11	67	76	138	25	239	579
04:45 PM	13	39	86	138	8	120	22	150	17	38	8	63	60	152	28	240	591
Total	52	143	343	538	29	450	68	547	68	144	36	248	259	549	101	909	2242
05:00 PM	17	49	98	164	6	109	25	140	29	45	9	83	91	212	33	336	723
05:15 PM	14	54	82	150	8	113	28	149	24	37	7	68	93	194	38	325	692
05:30 PM	24	53	100	177	8	105	23	136	21	43	7	71	100	199	51	350	734
05:45 PM	17	40	91	148	12	102	19	133	24	43	16	83	72	203	22	297	661
Total	72	196	371	639	34	429	95	558	98	168	39	305	356	808	144	1308	2810
Grand Total	124	339	714	1177	63	879	163	1105	166	312	75	553	615	1357	245	2217	5052
Apprch %	10.5	28.8	60.7		5.7	79.5	14.8		30	56.4	13.6		27.7	61.2	11.1		
Total %	2.5	6.7	14.1	23.3	1.2	17.4	3.2	21.9	3.3	6.2	1.5	10.9	12.2	26.9	4.8	43.9	

	Towne Centre Drive Southbound				Bake Parkway Westbound				Towne Centre Drive Northbound				Bake Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	17	49	98	164	6	109	25	140	**29**	**45**	9	**83**	91	**212**	33	336	723
05:15 PM	14	**54**	82	150	8	**113**	**28**	**149**	24	37	7	68	93	194	38	325	692
05:30 PM	**24**	53	**100**	**177**	8	105	23	136	21	43	7	71	**100**	199	**51**	**350**	**734**
05:45 PM	17	40	91	148	**12**	102	19	133	24	43	**16**	83	72	203	22	297	661
Total Volume	72	196	371	639	34	429	95	558	98	168	39	305	356	808	144	1308	2810
% App. Total	11.3	30.7	58.1		6.1	76.9	17		32.1	55.1	12.8		27.2	61.8	11		
PHF	.750	.907	.928	.903	.708	.949	.848	.936	.845	.933	.609	.919	.890	.953	.706	.934	.957

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Towne Centre Drive
E/W: Bake Parkway
Weather: Clear

File Name : LKFTOBAPM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	05:00 PM				04:30 PM				05:00 PM				05:00 PM			
+0 mins.	17	49	98	164	**9**	116	15	140	**29**	**45**	9	**83**	91	**212**	33	336
+15 mins.	14	**54**	82	150	8	**120**	22	**150**	24	37	7	68	93	194	38	325
+30 mins.	**24**	53	**100**	**177**	6	109	25	140	21	43	7	71	**100**	199	**51**	**350**
+45 mins.	17	40	91	148	8	113	**28**	149	24	43	**16**	83	72	203	22	297
Total Volume	72	196	371	639	31	458	90	579	98	168	39	305	356	808	144	1308
% App. Total	11.3	30.7	58.1		5.4	79.1	15.5		32.1	55.1	12.8		27.2	61.8	11	
PHF	.750	.907	.928	.903	.861	.954	.804	.965	.845	.933	.609	.919	.890	.953	.706	.934

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Rancho Parkway
E/W: Bake Parkway
Weather: Clear

File Name : LKFRABAAM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 1

Groups Printed- Total Volume

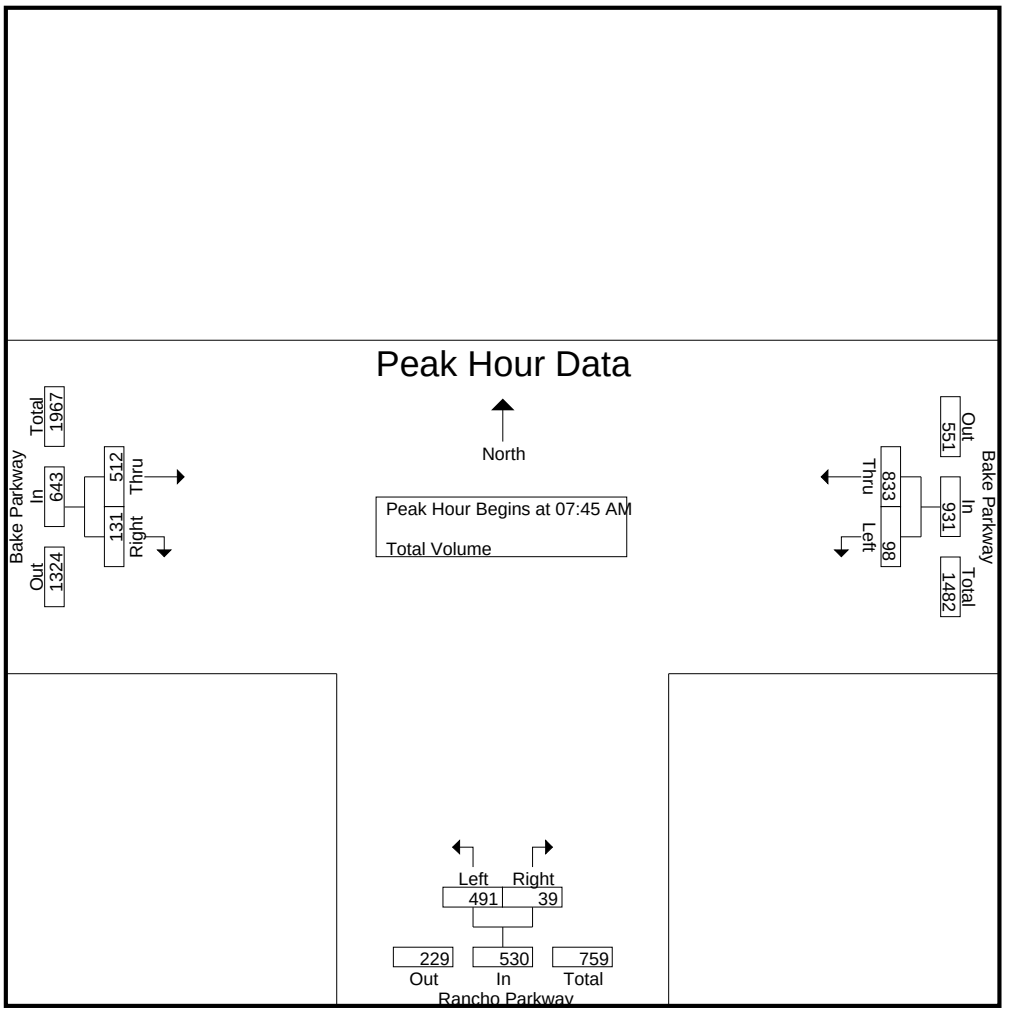
	Bake Parkway Westbound			Rancho Parkway Northbound			Bake Parkway Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
07:00 AM	9	144	153	92	5	97	67	25	92	342
07:15 AM	18	151	169	102	12	114	85	35	120	403
07:30 AM	15	163	178	101	7	108	87	48	135	421
07:45 AM	15	213	228	133	18	151	134	40	174	553
Total	57	671	728	428	42	470	373	148	521	1719
08:00 AM	21	237	258	114	5	119	148	38	186	563
08:15 AM	26	186	212	140	9	149	112	27	139	500
08:30 AM	36	197	233	104	7	111	118	26	144	488
08:45 AM	22	146	168	88	15	103	116	42	158	429
Total	105	766	871	446	36	482	494	133	627	1980
Grand Total	162	1437	1599	874	78	952	867	281	1148	3699
Apprch %	10.1	89.9		91.8	8.2		75.5	24.5		
Total %	4.4	38.8	43.2	23.6	2.1	25.7	23.4	7.6	31	

	Bake Parkway Westbound			Rancho Parkway Northbound			Bake Parkway Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:45 AM										
07:45 AM	15	213	228	133	**18**	**151**	134	**40**	174	553
08:00 AM	21	**237**	**258**	114	5	119	**148**	38	**186**	**563**
08:15 AM	26	186	212	**140**	9	149	112	27	139	500
08:30 AM	**36**	197	233	104	7	111	118	26	144	488
Total Volume	98	833	931	491	39	530	512	131	643	2104
% App. Total	10.5	89.5		92.6	7.4		79.6	20.4		
PHF	.681	.879	.902	.877	.542	.877	.865	.819	.864	.934

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Rancho Parkway
E/W: Bake Parkway
Weather: Clear

File Name : LKFRABAAM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:45 AM			07:45 AM			07:45 AM		
+0 mins.	15	213	228	133	**18**	**151**	134	**40**	174
+15 mins.	21	**237**	**258**	114	5	119	**148**	38	**186**
+30 mins.	26	186	212	**140**	9	149	112	27	139
+45 mins.	**36**	197	233	104	7	111	118	26	144
Total Volume	98	833	931	491	39	530	512	131	643
% App. Total	10.5	89.5		92.6	7.4		79.6	20.4	
PHF	.681	.879	.902	.877	.542	.877	.865	.819	.864

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Rancho Parkway
E/W: Bake Parkway
Weather: Clear

File Name : LKFRABAPM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 1

Groups Printed- Total Volume

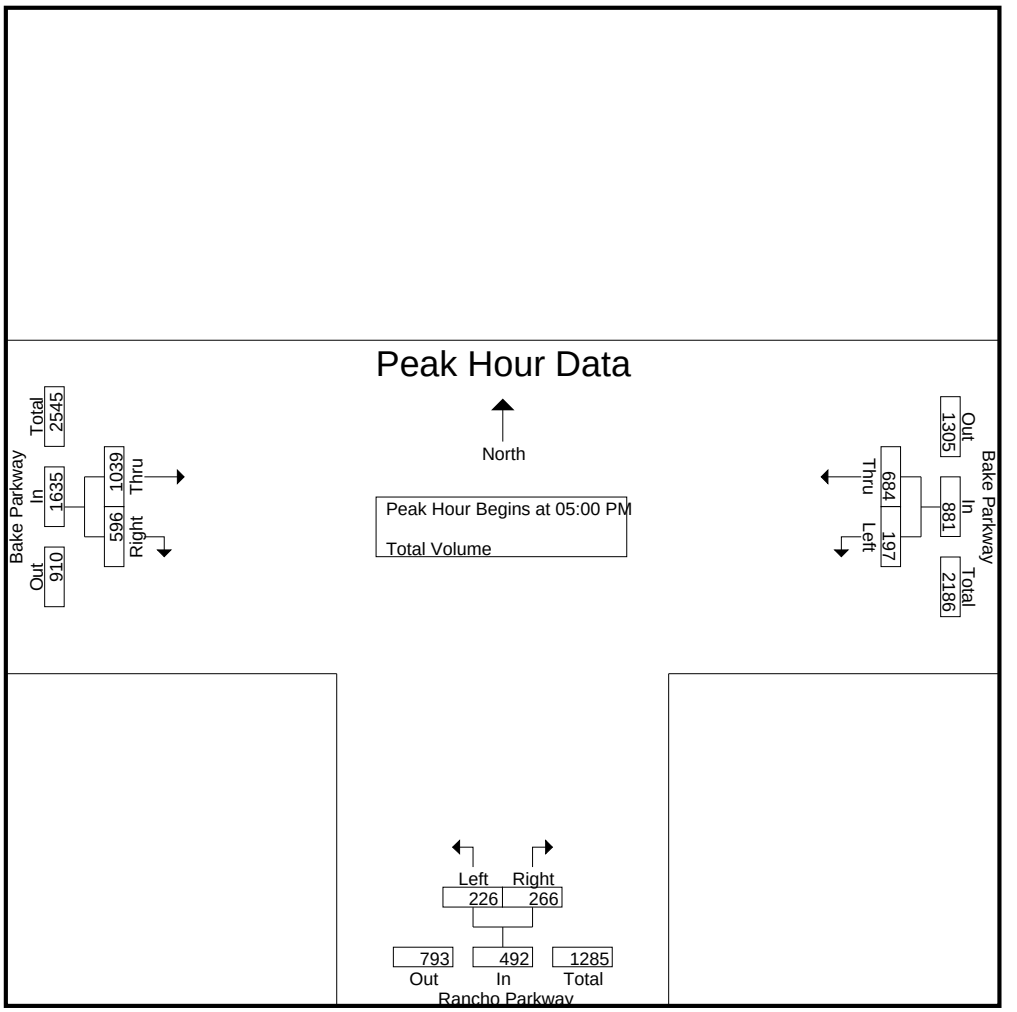
	Bake Parkway Westbound			Rancho Parkway Northbound			Bake Parkway Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
04:00 PM	63	157	220	65	42	107	178	84	262	589
04:15 PM	47	149	196	58	42	100	165	90	255	551
04:30 PM	49	163	212	68	58	126	192	139	331	669
04:45 PM	51	165	216	55	56	111	202	139	341	668
Total	210	634	844	246	198	444	737	452	1189	2477
05:00 PM	53	182	235	47	71	118	266	158	424	777
05:15 PM	45	168	213	65	65	130	268	168	436	779
05:30 PM	53	173	226	57	70	127	265	135	400	753
05:45 PM	46	161	207	57	60	117	240	135	375	699
Total	197	684	881	226	266	492	1039	596	1635	3008
Grand Total	407	1318	1725	472	464	936	1776	1048	2824	5485
Apprch %	23.6	76.4		50.4	49.6		62.9	37.1		
Total %	7.4	24	31.4	8.6	8.5	17.1	32.4	19.1	51.5	

	Bake Parkway Westbound			Rancho Parkway Northbound			Bake Parkway Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	**53**	**182**	**235**	47	**71**	118	266	158	424	777
05:15 PM	45	168	213	**65**	65	**130**	**268**	**168**	**436**	**779**
05:30 PM	53	173	226	57	70	127	265	135	400	753
05:45 PM	46	161	207	57	60	117	240	135	375	699
Total Volume	197	684	881	226	266	492	1039	596	1635	3008
% App. Total	22.4	77.6		45.9	54.1		63.5	36.5		
PHF	.929	.940	.937	.869	.937	.946	.969	.887	.938	.965

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Rancho Parkway
E/W: Bake Parkway
Weather: Clear

File Name : LKFRABAPM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:45 PM			05:00 PM			05:00 PM		
+0 mins.	51	165	216	47	**71**	118	266	158	424
+15 mins.	**53**	**182**	**235**	**65**	65	**130**	**268**	**168**	**436**
+30 mins.	45	168	213	57	70	127	265	135	400
+45 mins.	53	173	226	57	60	117	240	135	375
Total Volume	202	688	890	226	266	492	1039	596	1635
% App. Total	22.7	77.3		45.9	54.1		63.5	36.5	
PHF	.953	.945	.947	.869	.937	.946	.969	.887	.938

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Rancho Parkway South
E/W: Bake Parkway
Weather: Clear

File Name : LKFRSBAAM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 1

Groups Printed- Total Volume

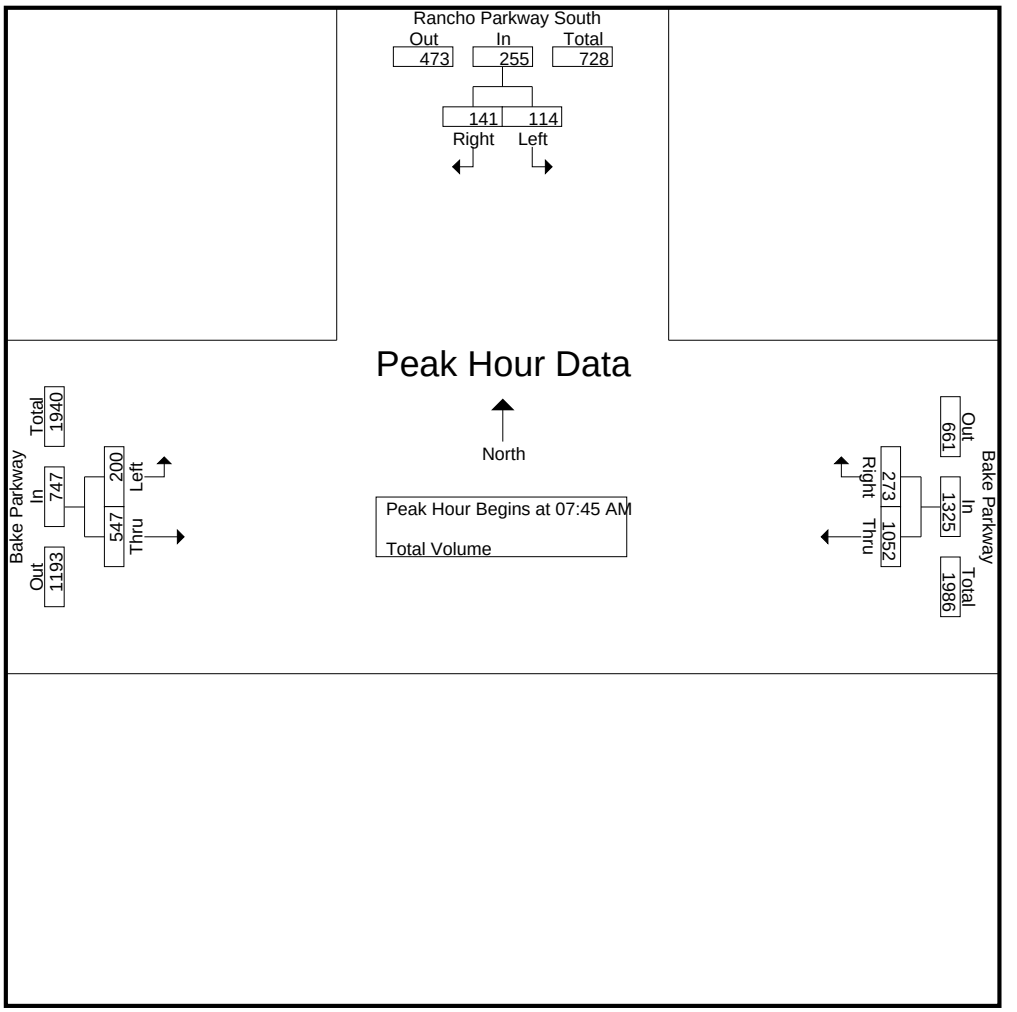
	Rancho Parkway South Southbound			Bake Parkway Westbound			Bake Parkway Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
07:00 AM	13	23	36	205	25	230	32	80	112	378
07:15 AM	16	30	46	216	40	256	29	108	137	439
07:30 AM	16	34	50	219	47	266	34	126	160	476
07:45 AM	36	36	72	275	71	346	53	138	191	609
Total	81	123	204	915	183	1098	148	452	600	1902
08:00 AM	28	39	67	275	76	351	35	165	200	618
08:15 AM	21	32	53	261	66	327	58	122	180	560
08:30 AM	29	34	63	241	60	301	54	122	176	540
08:45 AM	28	36	64	196	40	236	45	135	180	480
Total	106	141	247	973	242	1215	192	544	736	2198
Grand Total	187	264	451	1888	425	2313	340	996	1336	4100
Apprch %	41.5	58.5		81.6	18.4		25.4	74.6		
Total %	4.6	6.4	11	46	10.4	56.4	8.3	24.3	32.6	

	Rancho Parkway South Southbound			Bake Parkway Westbound			Bake Parkway Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:45 AM										
07:45 AM	**36**	36	**72**	**275**	71	346	53	138	191	609
08:00 AM	28	**39**	67	275	**76**	**351**	35	**165**	**200**	**618**
08:15 AM	21	32	53	261	66	327	**58**	122	180	560
08:30 AM	29	34	63	241	60	301	54	122	176	540
Total Volume	114	141	255	1052	273	1325	200	547	747	2327
% App. Total	44.7	55.3		79.4	20.6		26.8	73.2		
PHF	.792	.904	.885	.956	.898	.944	.862	.829	.934	.941

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Rancho Parkway South
E/W: Bake Parkway
Weather: Clear

File Name : LKFRSBAAM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:45 AM			07:45 AM			07:45 AM		
+0 mins.	**36**	36	**72**	**275**	71	346	53	138	191
+15 mins.	28	**39**	67	275	**76**	**351**	35	**165**	**200**
+30 mins.	21	32	53	261	66	327	**58**	122	180
+45 mins.	29	34	63	241	60	301	54	122	176
Total Volume	114	141	255	1052	273	1325	200	547	747
% App. Total	44.7	55.3		79.4	20.6		26.8	73.2	
PHF	.792	.904	.885	.956	.898	.944	.862	.829	.934

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Rancho Parkway South
E/W: Bake Parkway
Weather: Clear

File Name : LKFRSBAPM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 1

Groups Printed- Total Volume

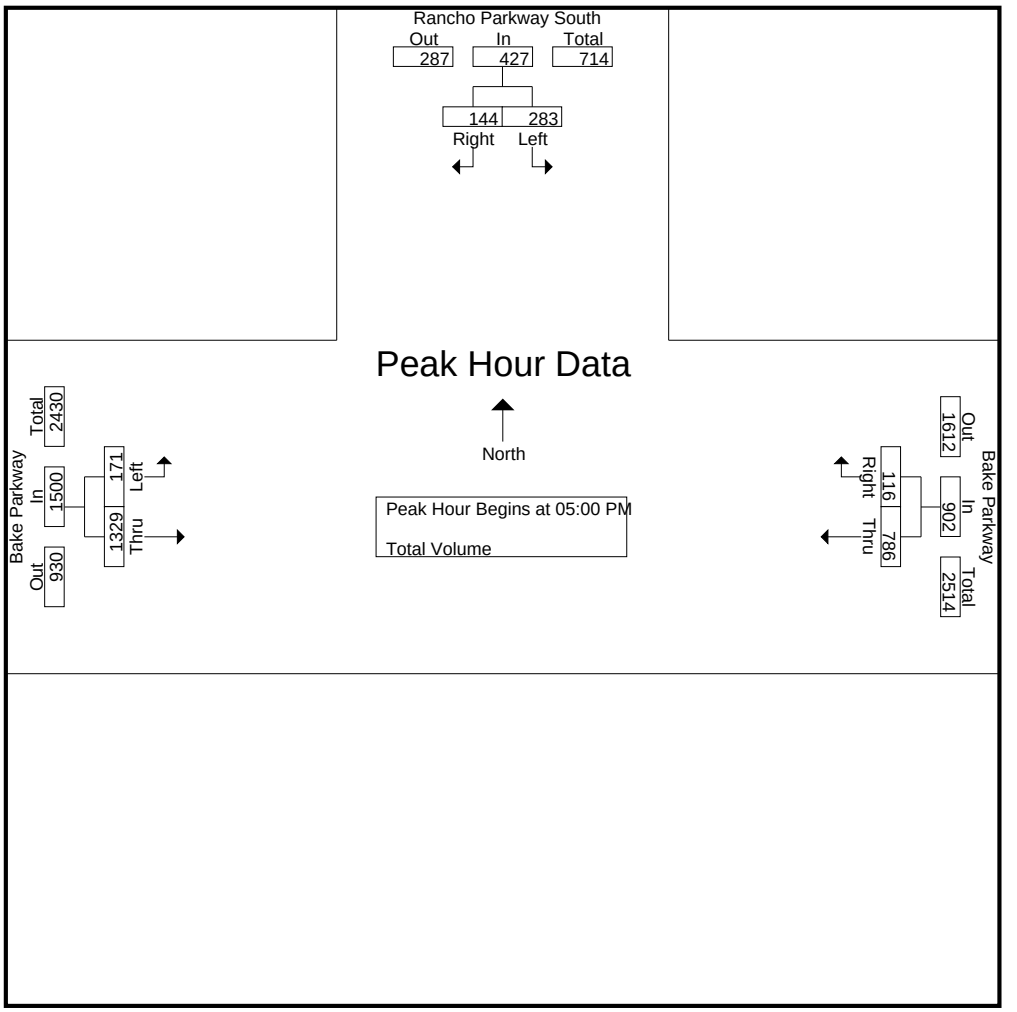
	Rancho Parkway South Southbound			Bake Parkway Westbound			Bake Parkway Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
04:00 PM	26	35	61	204	22	226	25	230	255	542
04:15 PM	33	31	64	183	22	205	30	216	246	515
04:30 PM	54	48	102	213	25	238	40	273	313	653
04:45 PM	64	35	99	190	27	217	47	271	318	634
Total	177	149	326	790	96	886	142	990	1132	2344
05:00 PM	82	46	128	195	29	224	57	338	395	747
05:15 PM	82	42	124	201	28	229	47	347	394	747
05:30 PM	70	30	100	204	31	235	36	323	359	694
05:45 PM	49	26	75	186	28	214	31	321	352	641
Total	283	144	427	786	116	902	171	1329	1500	2829
Grand Total	460	293	753	1576	212	1788	313	2319	2632	5173
Apprch %	61.1	38.9		88.1	11.9		11.9	88.1		
Total %	8.9	5.7	14.6	30.5	4.1	34.6	6.1	44.8	50.9	

	Rancho Parkway South Southbound			Bake Parkway Westbound			Bake Parkway Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	**82**	**46**	**128**	195	29	224	**57**	338	**395**	**747**
05:15 PM	82	42	124	201	28	229	47	**347**	394	747
05:30 PM	70	30	100	**204**	**31**	**235**	36	323	359	694
05:45 PM	49	26	75	186	28	214	31	321	352	641
Total Volume	283	144	427	786	116	902	171	1329	1500	2829
% App. Total	66.3	33.7		87.1	12.9		11.4	88.6		
PHF	.863	.783	.834	.963	.935	.960	.750	.957	.949	.947

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Rancho Parkway South
E/W: Bake Parkway
Weather: Clear

File Name : LKFRSBAPM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:30 PM			04:30 PM			05:00 PM		
+0 mins.	54	**48**	102	**213**	25	**238**	**57**	338	**395**
+15 mins.	64	35	99	190	27	217	47	**347**	394
+30 mins.	**82**	46	**128**	195	**29**	224	36	323	359
+45 mins.	82	42	124	201	28	229	31	321	352
Total Volume	282	171	453	799	109	908	171	1329	1500
% App. Total	62.3	37.7		88	12		11.4	88.6	
PHF	.860	.891	.885	.938	.940	.954	.750	.957	.949

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Orchard Road
E/W: Bake Parkway
Weather: Clear

File Name : LKFORBAAM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 1

Groups Printed- Total Volume

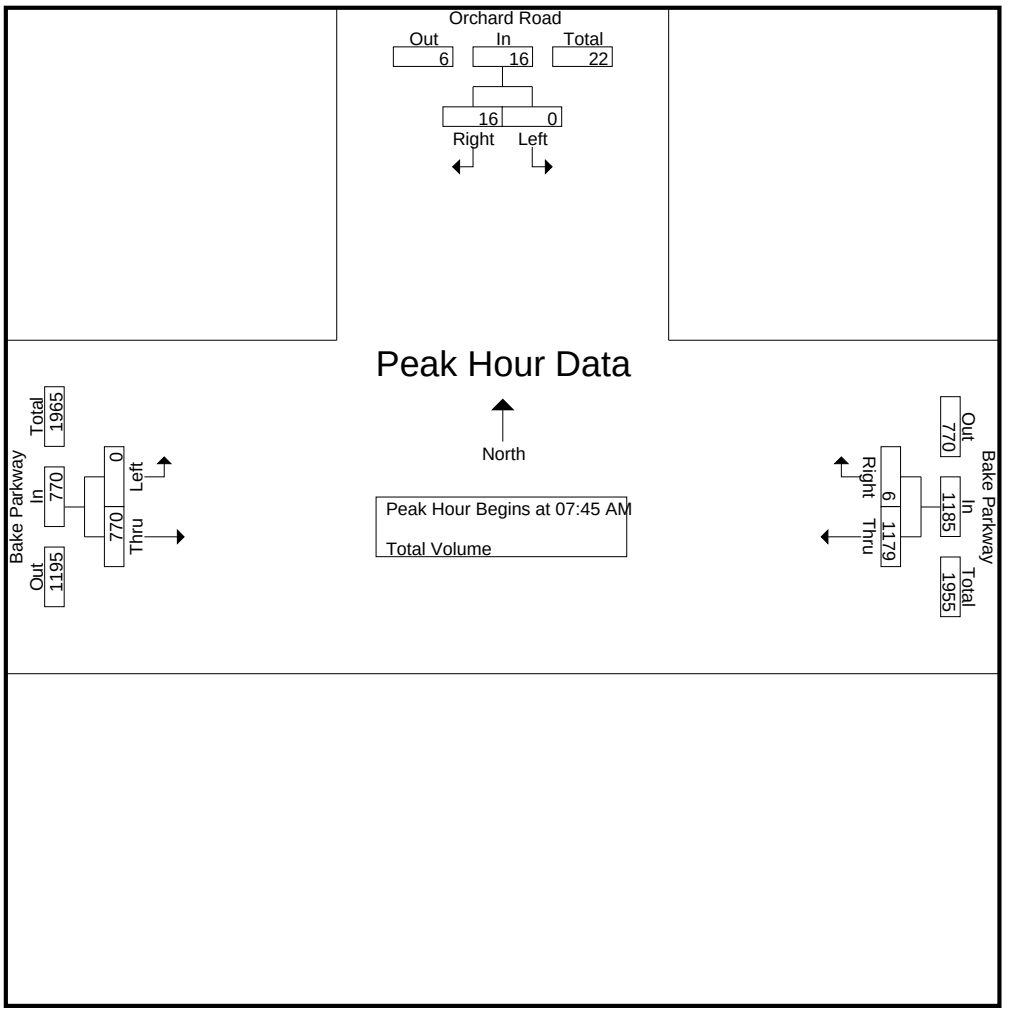
	Orchard Road Southbound			Bake Parkway Westbound			Bake Parkway Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
07:00 AM	0	1	1	223	2	225	0	112	112	338
07:15 AM	0	3	3	246	2	248	0	146	146	397
07:30 AM	0	6	6	248	1	249	0	159	159	414
07:45 AM	0	2	2	301	1	302	0	191	191	495
Total	0	12	12	1018	6	1024	0	608	608	1644
08:00 AM	0	8	8	305	1	306	0	208	208	522
08:15 AM	0	2	2	296	1	297	0	187	187	486
08:30 AM	0	4	4	277	3	280	0	184	184	468
08:45 AM	0	2	2	228	0	228	0	180	180	410
Total	0	16	16	1106	5	1111	0	759	759	1886
Grand Total	0	28	28	2124	11	2135	0	1367	1367	3530
Apprch %	0	100		99.5	0.5		0	100		
Total %	0	0.8	0.8	60.2	0.3	60.5	0	38.7	38.7	

	Orchard Road Southbound			Bake Parkway Westbound			Bake Parkway Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:45 AM										
07:45 AM	0	2	2	301	1	302	0	191	191	495
08:00 AM	0	**8**	**8**	**305**	1	**306**	0	**208**	**208**	**522**
08:15 AM	0	2	2	296	1	297	0	187	187	486
08:30 AM	0	4	4	277	**3**	280	0	184	184	468
Total Volume	0	16	16	1179	6	1185	0	770	770	1971
% App. Total	0	100		99.5	0.5		0	100		
PHF	.000	.500	.500	.966	.500	.968	.000	.925	.925	.944

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Orchard Road
E/W: Bake Parkway
Weather: Clear

File Name : LKFORBAAM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:15 AM			07:45 AM			07:45 AM		
+0 mins.	0	3	3	301	1	302	0	191	191
+15 mins.	0	6	6	**305**	1	**306**	0	**208**	**208**
+30 mins.	0	2	2	296	1	297	0	187	187
+45 mins.	0	**8**	**8**	277	**3**	280	0	184	184
Total Volume	0	19	19	1179	6	1185	0	770	770
% App. Total	0	100		99.5	0.5		0	100	
PHF	.000	.594	.594	.966	.500	.968	.000	.925	.925

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Orchard Road
E/W: Bake Parkway
Weather: Clear

File Name : LKFORBAPM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 1

Groups Printed- Total Volume

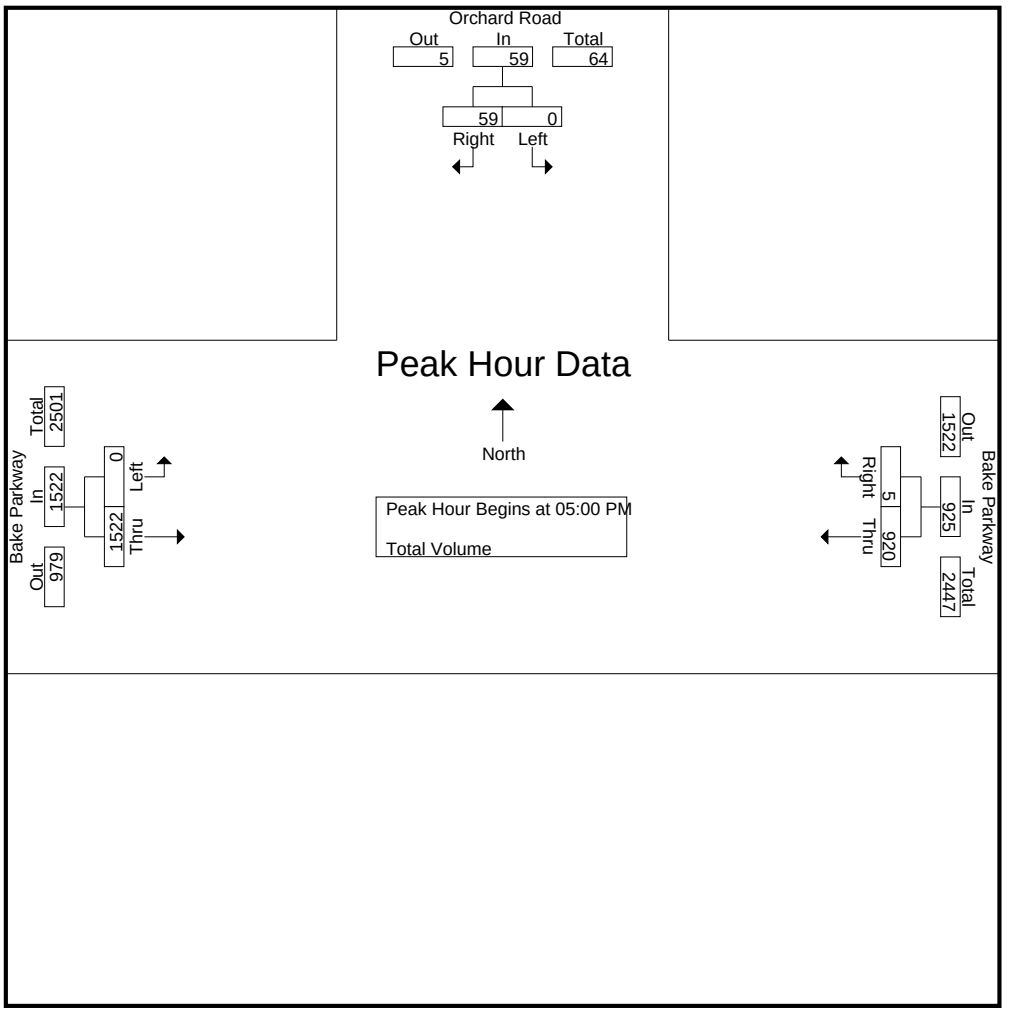
	Orchard Road Southbound			Bake Parkway Westbound			Bake Parkway Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
04:00 PM	0	8	8	239	0	239	0	258	258	505
04:15 PM	0	9	9	216	0	216	0	244	244	469
04:30 PM	0	21	21	256	2	258	0	308	308	587
04:45 PM	0	13	13	222	1	223	0	322	322	558
Total	0	51	51	933	3	936	0	1132	1132	2119
05:00 PM	0	18	18	243	3	246	0	403	403	667
05:15 PM	0	11	11	239	1	240	0	398	398	649
05:30 PM	0	19	19	227	1	228	0	366	366	613
05:45 PM	0	11	11	211	0	211	0	355	355	577
Total	0	59	59	920	5	925	0	1522	1522	2506
Grand Total	0	110	110	1853	8	1861	0	2654	2654	4625
Apprch %	0	100		99.6	0.4		0	100		
Total %	0	2.4	2.4	40.1	0.2	40.2	0	57.4	57.4	

	Orchard Road Southbound			Bake Parkway Westbound			Bake Parkway Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	0	18	18	**243**	**3**	**246**	0	**403**	**403**	**667**
05:15 PM	0	11	11	239	1	240	0	398	398	649
05:30 PM	0	**19**	**19**	227	1	228	0	366	366	613
05:45 PM	0	11	11	211	0	211	0	355	355	577
Total Volume	0	59	59	920	5	925	0	1522	1522	2506
% App. Total	0	100		99.5	0.5		0	100		
PHF	.000	.776	.776	.947	.417	.940	.000	.944	.944	.939

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Orchard Road
E/W: Bake Parkway
Weather: Clear

File Name : LKFORBAPM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:30 PM			04:30 PM			05:00 PM		
+0 mins.	0	**21**	**21**	**256**	2	**258**	0	**403**	**403**
+15 mins.	0	13	13	222	1	223	0	398	398
+30 mins.	0	18	18	243	**3**	246	0	366	366
+45 mins.	0	11	11	239	1	240	0	355	355
Total Volume	0	63	63	960	7	967	0	1522	1522
% App. Total	0	100		99.3	0.7		0	100	
PHF	.000	.750	.750	.938	.583	.937	.000	.944	.944

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Dimension Drive
E/W: Bake Parkway
Weather: Clear

File Name : LKFDIBAAM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 1

Groups Printed- Total Volume

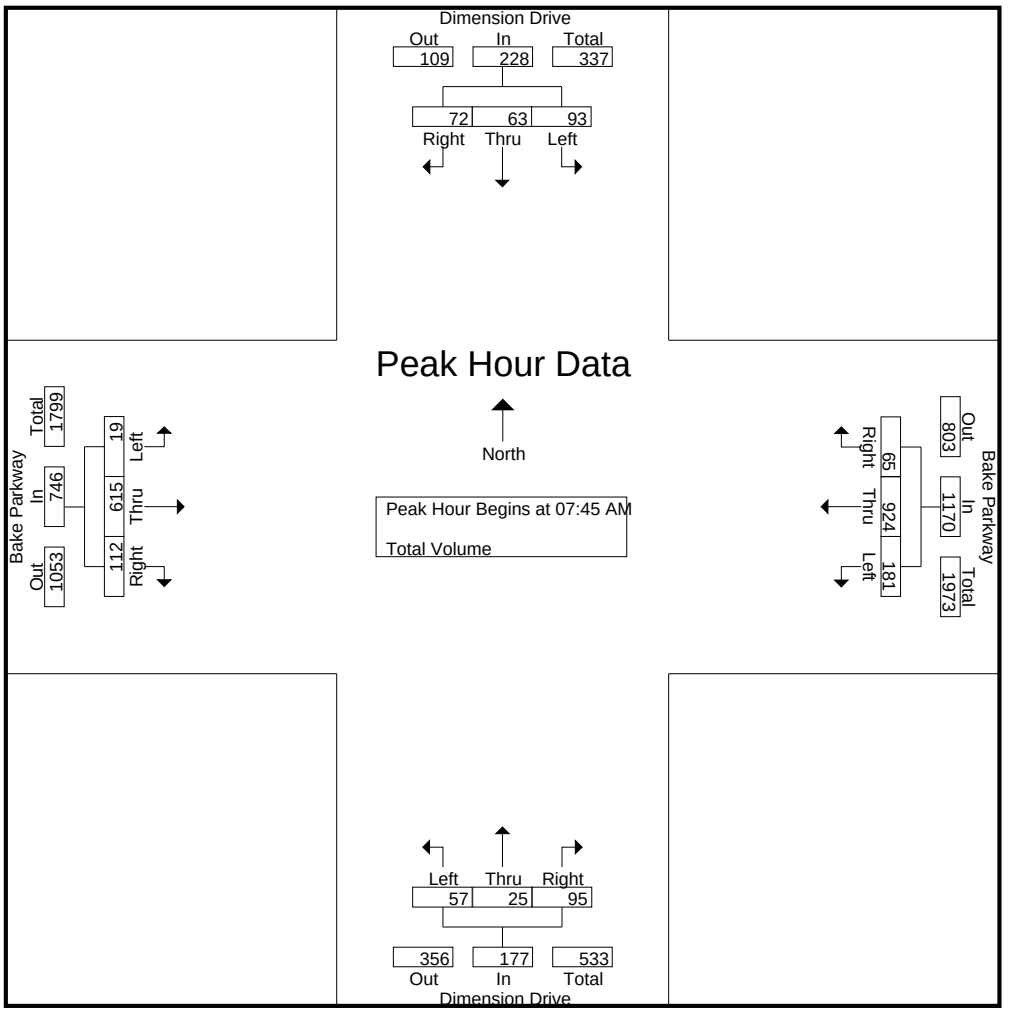
	Dimension Drive Southbound				Bake Parkway Westbound				Dimension Drive Northbound				Bake Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	4	6	24	34	15	230	5	250	16	4	14	34	8	104	13	125	443
07:15 AM	8	13	17	38	28	203	8	239	10	4	16	30	8	120	18	146	453
07:30 AM	16	17	23	56	33	221	6	260	12	1	17	30	5	126	25	156	502
07:45 AM	26	12	21	59	47	246	6	299	11	5	21	37	2	155	33	190	585
Total	54	48	85	187	123	900	25	1048	49	14	68	131	23	505	89	617	1983
08:00 AM	30	19	26	75	54	242	11	307	16	5	19	40	8	161	27	196	618
08:15 AM	17	19	13	49	47	245	24	316	17	9	27	53	3	148	20	171	589
08:30 AM	20	13	12	45	33	191	24	248	13	6	28	47	6	151	32	189	529
08:45 AM	13	9	18	40	46	184	9	239	19	4	22	45	8	159	23	190	514
Total	80	60	69	209	180	862	68	1110	65	24	96	185	25	619	102	746	2250
Grand Total	134	108	154	396	303	1762	93	2158	114	38	164	316	48	1124	191	1363	4233
Apprch %	33.8	27.3	38.9		14	81.6	4.3		36.1	12	51.9		3.5	82.5	14		
Total %	3.2	2.6	3.6	9.4	7.2	41.6	2.2	51	2.7	0.9	3.9	7.5	1.1	26.6	4.5	32.2	

	Dimension Drive Southbound				Bake Parkway Westbound				Dimension Drive Northbound				Bake Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	26	12	21	59	47	**246**	6	299	11	5	21	37	2	155	**33**	190	585
08:00 AM	**30**	**19**	**26**	**75**	**54**	242	11	307	16	5	19	40	**8**	**161**	27	**196**	**618**
08:15 AM	17	19	13	49	47	245	**24**	**316**	**17**	**9**	27	**53**	3	148	20	171	589
08:30 AM	20	13	12	45	33	191	24	248	13	6	**28**	47	6	151	32	189	529
Total Volume	93	63	72	228	181	924	65	1170	57	25	95	177	19	615	112	746	2321
% App. Total	40.8	27.6	31.6		15.5	79	5.6		32.2	14.1	53.7		2.5	82.4	15		
PHF	.775	.829	.692	.760	.838	.939	.677	.926	.838	.694	.848	.835	.594	.955	.848	.952	.939

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Dimension Drive
E/W: Bake Parkway
Weather: Clear

File Name : LKFDIBAAM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:30 AM				07:30 AM				08:00 AM				07:45 AM			
+0 mins.	16	17	23	56	33	221	6	260	16	5	19	40	2	155	**33**	190
+15 mins.	26	12	21	59	47	**246**	6	299	17	**9**	27	**53**	**8**	**161**	27	**196**
+30 mins.	**30**	**19**	**26**	**75**	**54**	242	11	307	13	6	**28**	47	3	148	20	171
+45 mins.	17	19	13	49	47	245	**24**	**316**	**19**	4	22	45	6	151	32	189
Total Volume	89	67	83	239	181	954	47	1182	65	24	96	185	19	615	112	746
% App. Total	37.2	28	34.7		15.3	80.7	4		35.1	13	51.9		2.5	82.4	15	
PHF	.742	.882	.798	.797	.838	.970	.490	.935	.855	.667	.857	.873	.594	.955	.848	.952

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Dimension Drive
E/W: Bake Parkway
Weather: Clear

File Name : LKFDIBAPM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 1

Groups Printed- Total Volume

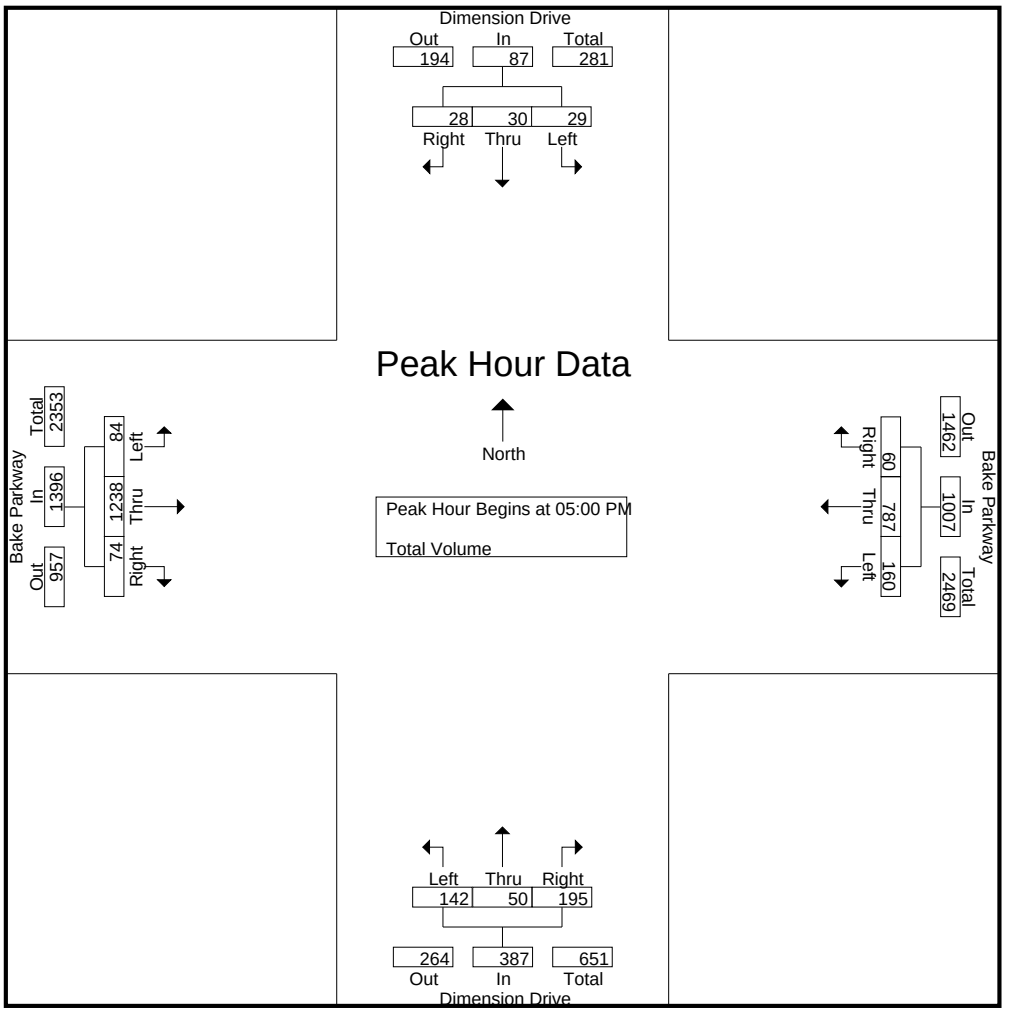
	Dimension Drive Southbound				Bake Parkway Westbound				Dimension Drive Northbound				Bake Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	7	3	13	23	24	190	9	223	32	10	32	74	17	208	6	231	551
04:15 PM	9	6	5	20	31	183	32	246	22	12	26	60	20	193	7	220	546
04:30 PM	8	8	4	20	43	194	7	244	46	10	42	98	10	241	11	262	624
04:45 PM	13	4	8	25	38	174	14	226	35	16	47	98	10	241	8	259	608
Total	37	21	30	88	136	741	62	939	135	48	147	330	57	883	32	972	2329
05:00 PM	8	9	12	29	46	221	7	274	45	12	65	122	20	299	19	338	763
05:15 PM	10	5	3	18	48	193	18	259	35	13	42	90	25	340	22	387	754
05:30 PM	5	11	8	24	36	194	21	251	35	17	48	100	16	296	20	332	707
05:45 PM	6	5	5	16	30	179	14	223	27	8	40	75	23	303	13	339	653
Total	29	30	28	87	160	787	60	1007	142	50	195	387	84	1238	74	1396	2877
Grand Total	66	51	58	175	296	1528	122	1946	277	98	342	717	141	2121	106	2368	5206
Apprch %	37.7	29.1	33.1		15.2	78.5	6.3		38.6	13.7	47.7		6	89.6	4.5		
Total %	1.3	1	1.1	3.4	5.7	29.4	2.3	37.4	5.3	1.9	6.6	13.8	2.7	40.7	2	45.5	

	Dimension Drive Southbound				Bake Parkway Westbound				Dimension Drive Northbound				Bake Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	8	9	**12**	**29**	46	**221**	7	**274**	**45**	12	**65**	**122**	20	299	19	338	**763**
05:15 PM	**10**	5	3	18	**48**	193	18	259	35	13	42	90	**25**	**340**	**22**	**387**	754
05:30 PM	5	**11**	8	24	36	194	**21**	251	35	**17**	48	100	16	296	20	332	707
05:45 PM	6	5	5	16	30	179	14	223	27	8	40	75	23	303	13	339	653
Total Volume	29	30	28	87	160	787	60	1007	142	50	195	387	84	1238	74	1396	2877
% App. Total	33.3	34.5	32.2		15.9	78.2	6		36.7	12.9	50.4		6	88.7	5.3		
PHF	.725	.682	.583	.750	.833	.890	.714	.919	.789	.735	.750	.793	.840	.910	.841	.902	.943

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Dimension Drive
E/W: Bake Parkway
Weather: Clear

File Name : LKFDIBAPM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:45 PM				04:45 PM				04:45 PM				05:00 PM			
+0 mins.	**13**	4	8	25	38	174	14	226	35	16	47	98	20	299	19	338
+15 mins.	8	9	**12**	**29**	46	**221**	7	**274**	**45**	12	**65**	**122**	**25**	**340**	**22**	**387**
+30 mins.	10	5	3	18	**48**	193	18	259	35	13	42	90	16	296	20	332
+45 mins.	5	**11**	8	24	36	194	**21**	251	35	**17**	48	100	23	303	13	339
Total Volume	36	29	31	96	168	782	60	1010	150	58	202	410	84	1238	74	1396
% App. Total	37.5	30.2	32.3		16.6	77.4	5.9		36.6	14.1	49.3		6	88.7	5.3	
PHF	.692	.659	.646	.828	.875	.885	.714	.922	.833	.853	.777	.840	.840	.910	.841	.902

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Towne Centre Dr S/Rancho Pkwy S
E/W: Alton Parkway
Weather: Clear

File Name : LKFRSALAM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 1

Groups Printed- Total Volume

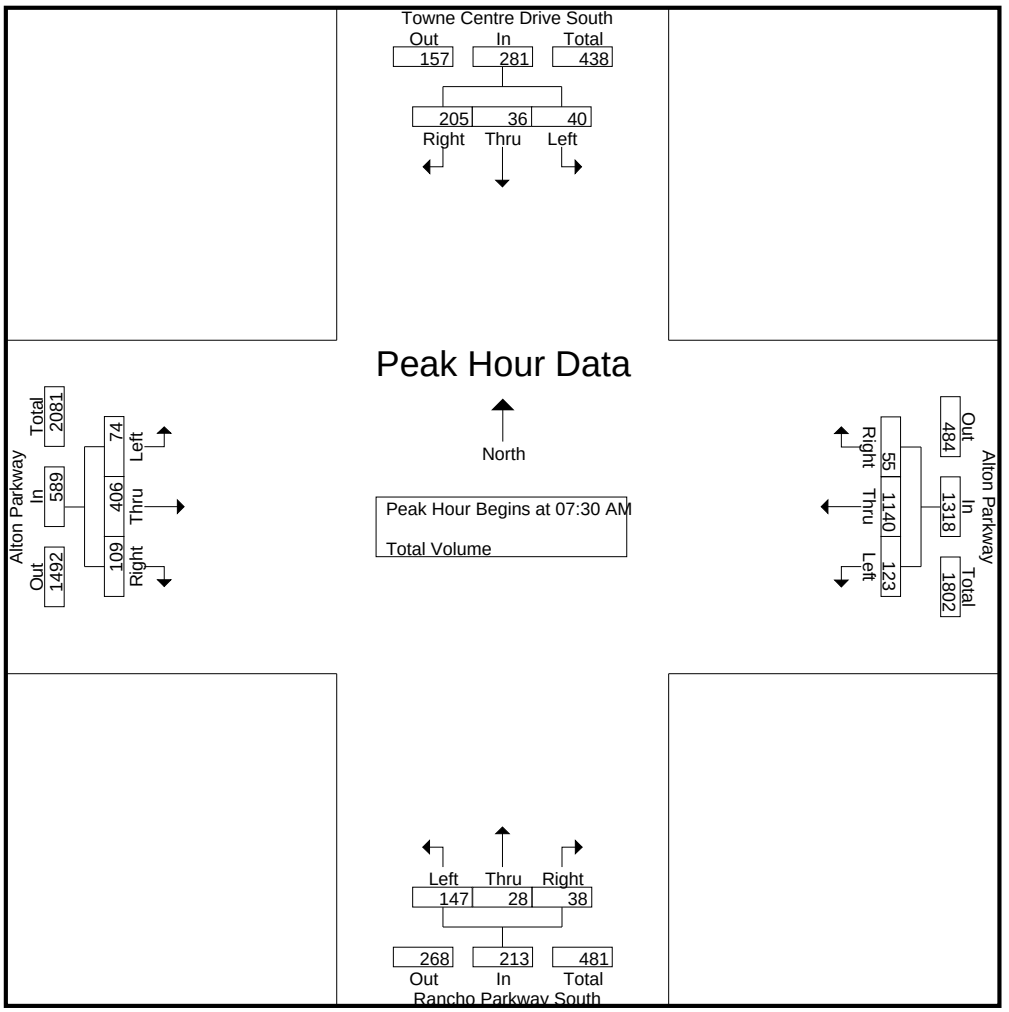
	Towne Centre Drive South Southbound				Alton Parkway Westbound				Rancho Parkway South Northbound				Alton Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	9	3	48	60	18	224	9	251	21	4	4	29	13	76	13	102	442
07:15 AM	9	6	56	71	15	239	13	267	30	8	6	44	16	69	14	99	481
07:30 AM	11	11	56	78	24	288	15	327	41	2	11	54	27	96	19	142	601
07:45 AM	5	8	50	63	35	298	17	350	37	10	11	58	22	111	32	165	636
Total	34	28	210	272	92	1049	54	1195	129	24	32	185	78	352	78	508	2160
08:00 AM	13	8	51	72	36	285	13	334	34	10	6	50	13	109	29	151	607
08:15 AM	11	9	48	68	28	269	10	307	35	6	10	51	12	90	29	131	557
08:30 AM	3	6	46	55	31	221	13	265	45	10	7	62	23	93	30	146	528
08:45 AM	12	5	32	49	45	213	17	275	37	3	9	49	22	101	32	155	528
Total	39	28	177	244	140	988	53	1181	151	29	32	212	70	393	120	583	2220
Grand Total	73	56	387	516	232	2037	107	2376	280	53	64	397	148	745	198	1091	4380
Apprch %	14.1	10.9	75		9.8	85.7	4.5		70.5	13.4	16.1		13.6	68.3	18.1		
Total %	1.7	1.3	8.8	11.8	5.3	46.5	2.4	54.2	6.4	1.2	1.5	9.1	3.4	17	4.5	24.9	

	Towne Centre Drive South Southbound				Alton Parkway Westbound				Rancho Parkway South Northbound				Alton Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	11	**11**	**56**	**78**	24	288	15	327	**41**	2	**11**	54	**27**	96	19	142	601
07:45 AM	5	8	50	63	35	**298**	**17**	**350**	37	**10**	11	**58**	22	**111**	**32**	**165**	**636**
08:00 AM	**13**	8	51	72	**36**	285	13	334	34	10	6	50	13	109	29	151	607
08:15 AM	11	9	48	68	28	269	10	307	35	6	10	51	12	90	29	131	557
Total Volume	40	36	205	281	123	1140	55	1318	147	28	38	213	74	406	109	589	2401
% App. Total	14.2	12.8	73		9.3	86.5	4.2		69	13.1	17.8		12.6	68.9	18.5		
PHF	.769	.818	.915	.901	.854	.956	.809	.941	.896	.700	.864	.918	.685	.914	.852	.892	.944

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Towne Centre Dr S/Rancho Pkwy S
E/W: Alton Parkway
Weather: Clear

File Name : LKFRSALAM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:15 AM				07:30 AM				07:45 AM				07:45 AM			
+0 mins.	9	6	**56**	71	24	288	15	327	37	**10**	**11**	58	22	**111**	**32**	**165**
+15 mins.	11	**11**	56	**78**	35	**298**	**17**	**350**	34	10	6	50	13	109	29	151
+30 mins.	5	8	50	63	**36**	285	13	334	35	6	10	51	12	90	29	131
+45 mins.	**13**	8	51	72	28	269	10	307	**45**	10	7	**62**	**23**	93	30	146
Total Volume	38	33	213	284	123	1140	55	1318	151	36	34	221	70	403	120	593
% App. Total	13.4	11.6	75		9.3	86.5	4.2		68.3	16.3	15.4		11.8	68	20.2	
PHF	.731	.750	.951	.910	.854	.956	.809	.941	.839	.900	.773	.891	.761	.908	.938	.898

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Towne Centre Dr S/Rancho Pkwy S
E/W: Alton Parkway
Weather: Clear

File Name : LKFRSALPM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 1

Groups Printed- Total Volume

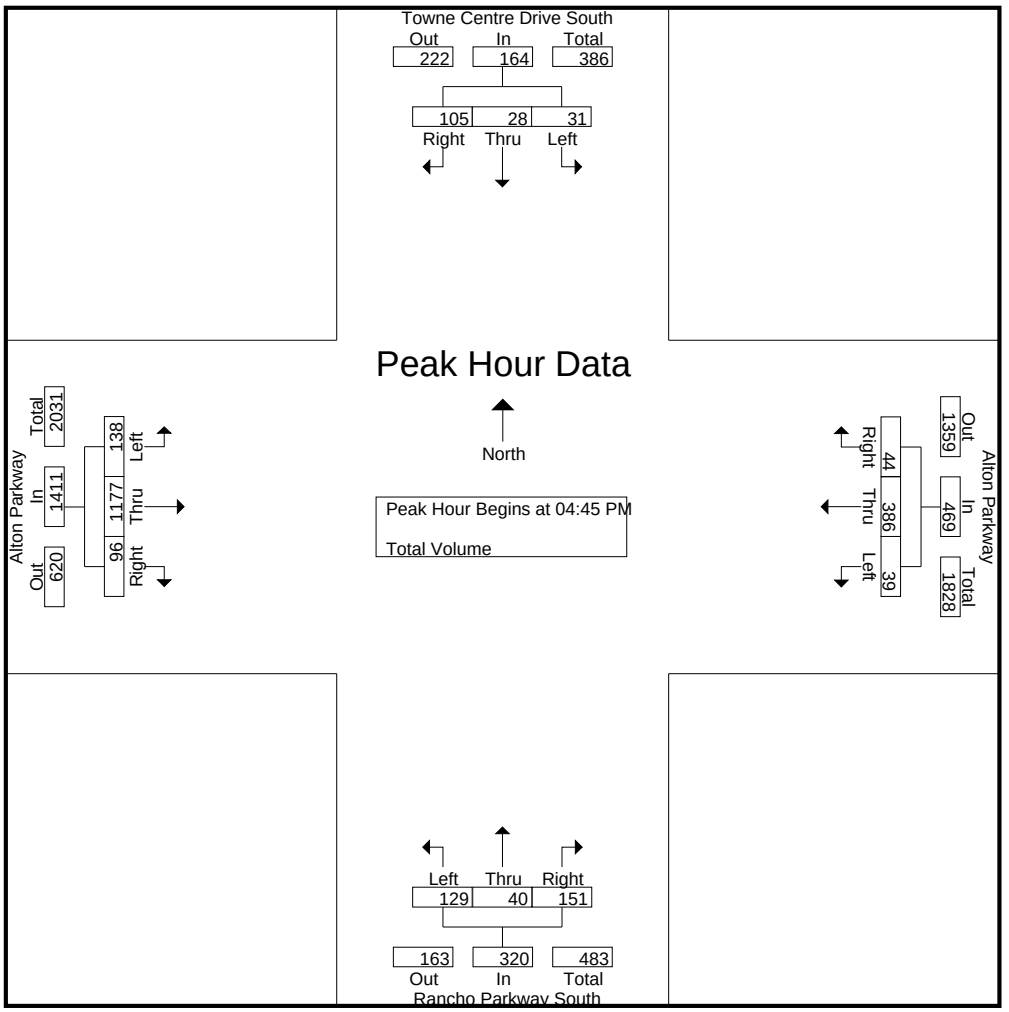
	Towne Centre Drive South Southbound				Alton Parkway Westbound				Rancho Parkway South Northbound				Alton Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	8	8	33	49	4	101	12	117	21	5	23	49	20	222	22	264	479
04:15 PM	10	4	18	32	5	104	14	123	15	6	29	50	30	221	17	268	473
04:30 PM	5	4	37	46	9	90	11	110	26	10	45	81	18	265	23	306	543
04:45 PM	5	7	27	39	19	105	9	133	30	8	31	69	31	233	23	287	528
Total	28	23	115	166	37	400	46	483	92	29	128	249	99	941	85	1125	2023
05:00 PM	6	8	32	46	9	103	8	120	37	7	57	101	32	310	18	360	627
05:15 PM	11	5	19	35	9	88	19	116	40	10	39	89	31	321	31	383	623
05:30 PM	9	8	27	44	2	90	8	100	22	15	24	61	44	313	24	381	586
05:45 PM	4	6	23	33	4	83	5	92	28	13	37	78	43	263	17	323	526
Total	30	27	101	158	24	364	40	428	127	45	157	329	150	1207	90	1447	2362
Grand Total	58	50	216	324	61	764	86	911	219	74	285	578	249	2148	175	2572	4385
Apprch %	17.9	15.4	66.7		6.7	83.9	9.4		37.9	12.8	49.3		9.7	83.5	6.8		
Total %	1.3	1.1	4.9	7.4	1.4	17.4	2	20.8	5	1.7	6.5	13.2	5.7	49	4	58.7	

	Towne Centre Drive South Southbound				Alton Parkway Westbound				Rancho Parkway South Northbound				Alton Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	5	7	27	39	**19**	**105**	9	**133**	30	8	31	69	31	233	23	287	528
05:00 PM	6	**8**	**32**	**46**	9	103	8	120	37	7	**57**	**101**	32	310	18	360	**627**
05:15 PM	**11**	5	19	35	9	88	**19**	116	**40**	10	39	89	31	**321**	**31**	**383**	623
05:30 PM	9	8	27	44	2	90	8	100	22	**15**	24	61	**44**	313	24	381	586
Total Volume	31	28	105	164	39	386	44	469	129	40	151	320	138	1177	96	1411	2364
% App. Total	18.9	17.1	64		8.3	82.3	9.4		40.3	12.5	47.2		9.8	83.4	6.8		
PHF	.705	.875	.820	.891	.513	.919	.579	.882	.806	.667	.662	.792	.784	.917	.774	.921	.943

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Towne Centre Dr S/Rancho Pkwy S
E/W: Alton Parkway
Weather: Clear

File Name : LKFRSALPM
Site Code : 05117097
Start Date : 2/16/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:00 PM				04:15 PM				04:30 PM				05:00 PM			
+0 mins.	8	**8**	33	**49**	5	104	**14**	123	26	**10**	45	81	32	310	18	360
+15 mins.	**10**	4	18	32	9	90	11	110	30	8	31	69	31	**321**	**31**	**383**
+30 mins.	5	4	**37**	46	**19**	**105**	9	**133**	37	7	**57**	**101**	**44**	313	24	381
+45 mins.	5	7	27	39	9	103	8	120	**40**	10	39	89	43	263	17	323
Total Volume	28	23	115	166	42	402	42	486	133	35	172	340	150	1207	90	1447
% App. Total	16.9	13.9	69.3		8.6	82.7	8.6		39.1	10.3	50.6		10.4	83.4	6.2	
PHF	.700	.719	.777	.847	.553	.957	.750	.914	.831	.875	.754	.842	.852	.940	.726	.945

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Alton Parkway
E/W: SR-241 Ramps
Weather: Clear

File Name : LKFAL241AM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

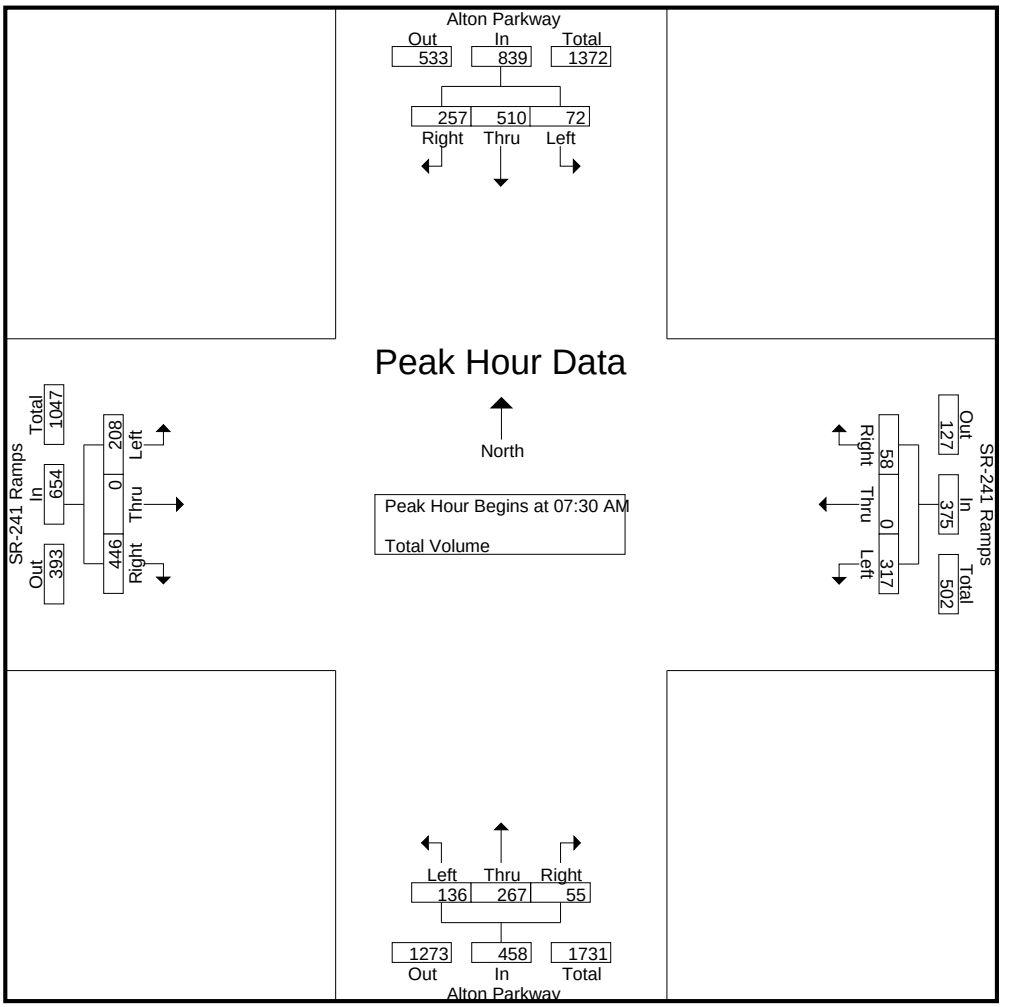
	Alton Parkway Southbound				SR-241 Ramps Westbound				Alton Parkway Northbound				SR-241 Ramps Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	19	86	50	155	46	0	14	60	29	44	12	85	35	0	97	132	432
07:15 AM	6	132	82	220	55	0	7	62	21	45	14	80	45	0	74	119	481
07:30 AM	5	126	82	213	69	0	10	79	42	81	9	132	52	0	68	120	544
07:45 AM	35	139	56	230	93	0	12	105	33	71	17	121	54	0	125	179	635
Total	65	483	270	818	263	0	43	306	125	241	52	418	186	0	364	550	2092
08:00 AM	24	120	51	195	76	0	20	96	26	53	15	94	50	0	128	178	563
08:15 AM	8	125	68	201	79	0	16	95	35	62	14	111	52	0	125	177	584
08:30 AM	11	106	46	163	68	0	11	79	23	75	11	109	44	0	104	148	499
08:45 AM	14	101	45	160	48	0	11	59	27	70	16	113	55	0	121	176	508
Total	57	452	210	719	271	0	58	329	111	260	56	427	201	0	478	679	2154
Grand Total	122	935	480	1537	534	0	101	635	236	501	108	845	387	0	842	1229	4246
Apprch %	7.9	60.8	31.2		84.1	0	15.9		27.9	59.3	12.8		31.5	0	68.5		
Total %	2.9	22	11.3	36.2	12.6	0	2.4	15	5.6	11.8	2.5	19.9	9.1	0	19.8	28.9	

	Alton Parkway Southbound				SR-241 Ramps Westbound				Alton Parkway Northbound				SR-241 Ramps Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	5	126	**82**	213	69	0	10	79	**42**	**81**	9	**132**	52	0	68	120	544
07:45 AM	**35**	**139**	56	**230**	**93**	0	12	**105**	33	71	**17**	121	**54**	0	125	**179**	**635**
08:00 AM	24	120	51	195	76	0	**20**	96	26	53	15	94	50	0	**128**	178	563
08:15 AM	8	125	68	201	79	0	16	95	35	62	14	111	52	0	125	177	584
Total Volume	72	510	257	839	317	0	58	375	136	267	55	458	208	0	446	654	2326
% App. Total	8.6	60.8	30.6		84.5	0	15.5		29.7	58.3	12		31.8	0	68.2		
PHF	.514	.917	.784	.912	.852	.000	.725	.893	.810	.824	.809	.867	.963	.000	.871	.913	.916

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Alton Parkway
E/W: SR-241 Ramps
Weather: Clear

File Name : LKFAL241AM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:15 AM				07:30 AM				07:30 AM				07:45 AM			
+0 mins.	6	132	**82**	220	69	0	10	79	**42**	**81**	9	**132**	**54**	0	125	**179**
+15 mins.	5	126	82	213	**93**	0	12	**105**	33	71	**17**	121	50	0	**128**	178
+30 mins.	**35**	**139**	56	**230**	76	0	**20**	96	26	53	15	94	52	0	125	177
+45 mins.	24	120	51	195	79	0	16	95	35	62	14	111	44	0	104	148
Total Volume	70	517	271	858	317	0	58	375	136	267	55	458	200	0	482	682
% App. Total	8.2	60.3	31.6		84.5	0	15.5		29.7	58.3	12		29.3	0	70.7	
PHF	.500	.930	.826	.933	.852	.000	.725	.893	.810	.824	.809	.867	.926	.000	.941	.953

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Alton Parkway
E/W: SR-241 Ramps
Weather: Clear

File Name : LKFAL241PM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

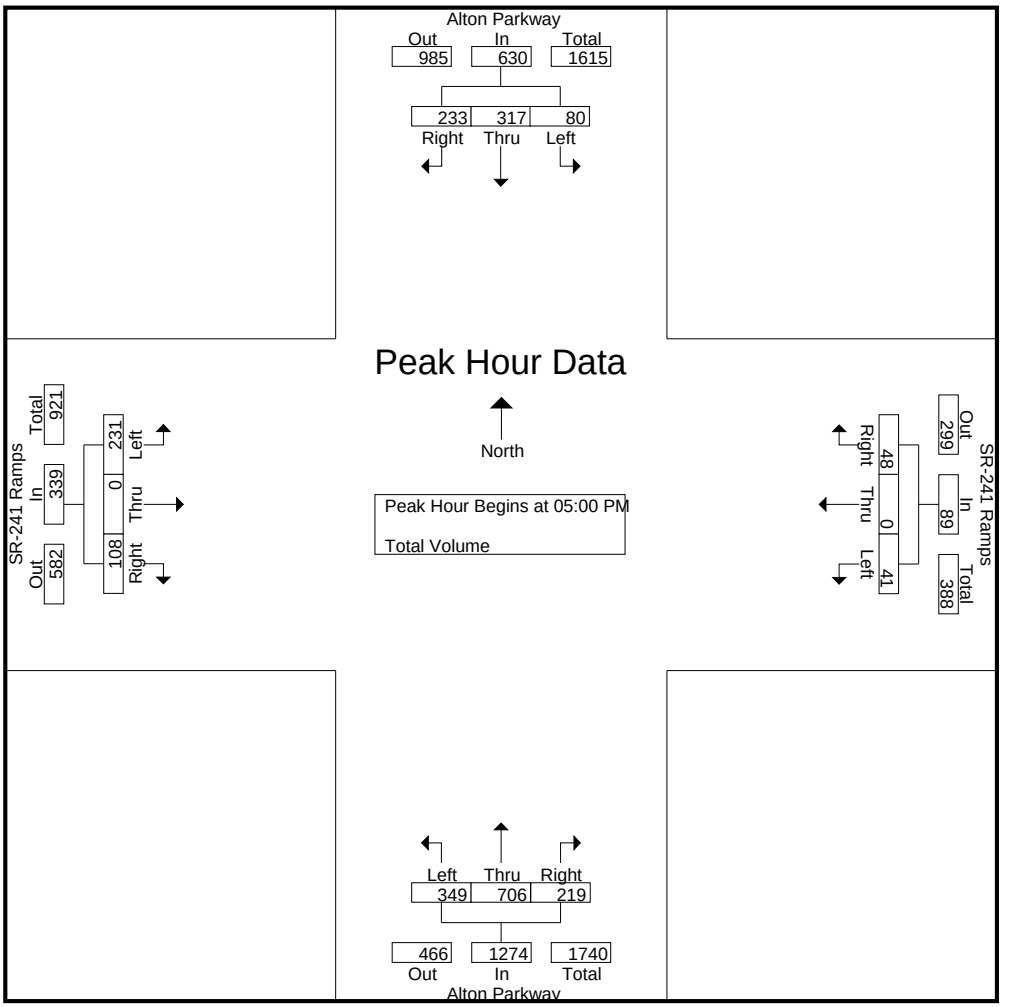
	Alton Parkway Southbound				SR-241 Ramps Westbound				Alton Parkway Northbound				SR-241 Ramps Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	13	87	51	151	13	0	12	25	80	108	28	216	37	0	16	53	445
04:15 PM	15	77	49	141	7	0	14	21	81	151	32	264	44	0	25	69	495
04:30 PM	15	75	34	124	9	0	8	17	75	139	52	266	56	0	24	80	487
04:45 PM	14	72	45	131	6	0	12	18	96	133	37	266	61	0	21	82	497
Total	57	311	179	547	35	0	46	81	332	531	149	1012	198	0	86	284	1924
05:00 PM	22	71	53	146	12	0	9	21	94	165	54	313	54	0	30	84	564
05:15 PM	21	74	55	150	13	0	22	35	88	177	65	330	46	0	28	74	589
05:30 PM	16	83	62	161	6	0	12	18	94	184	52	330	69	0	32	101	610
05:45 PM	21	89	63	173	10	0	5	15	73	180	48	301	62	0	18	80	569
Total	80	317	233	630	41	0	48	89	349	706	219	1274	231	0	108	339	2332
Grand Total	137	628	412	1177	76	0	94	170	681	1237	368	2286	429	0	194	623	4256
Apprch %	11.6	53.4	35		44.7	0	55.3		29.8	54.1	16.1		68.9	0	31.1		
Total %	3.2	14.8	9.7	27.7	1.8	0	2.2	4	16	29.1	8.6	53.7	10.1	0	4.6	14.6	

	Alton Parkway Southbound				SR-241 Ramps Westbound				Alton Parkway Northbound				SR-241 Ramps Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	**22**	71	53	146	12	0	9	21	**94**	165	54	313	54	0	30	84	564
05:15 PM	21	74	55	150	**13**	0	**22**	**35**	88	177	**65**	**330**	46	0	28	74	589
05:30 PM	16	83	62	161	6	0	12	18	94	**184**	52	330	**69**	0	**32**	**101**	**610**
05:45 PM	21	**89**	**63**	**173**	10	0	5	15	73	180	48	301	62	0	18	80	569
Total Volume	80	317	233	630	41	0	48	89	349	706	219	1274	231	0	108	339	2332
% App. Total	12.7	50.3	37		46.1	0	53.9		27.4	55.4	17.2		68.1	0	31.9		
PHF	.909	.890	.925	.910	.788	.000	.545	.636	.928	.959	.842	.965	.837	.000	.844	.839	.956

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Alton Parkway
E/W: SR-241 Ramps
Weather: Clear

File Name : LKFAL241PM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	05:00 PM				04:45 PM				05:00 PM				04:45 PM			
+0 mins.	**22**	71	53	146	6	0	12	18	**94**	165	54	313	61	0	21	82
+15 mins.	21	74	55	150	12	0	9	21	88	177	**65**	**330**	54	0	30	84
+30 mins.	16	83	62	161	**13**	0	**22**	**35**	94	**184**	52	330	46	0	28	74
+45 mins.	21	**89**	**63**	**173**	6	0	12	18	73	180	48	301	**69**	0	**32**	**101**
Total Volume	80	317	233	630	37	0	55	92	349	706	219	1274	230	0	111	341
% App. Total	12.7	50.3	37		40.2	0	59.8		27.4	55.4	17.2		67.4	0	32.6	
PHF	.909	.890	.925	.910	.712	.000	.625	.657	.928	.959	.842	.965	.833	.000	.867	.844

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Alton Parkway
E/W: Towne Centre Drive
Weather: Clear

File Name : LKFALTCAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

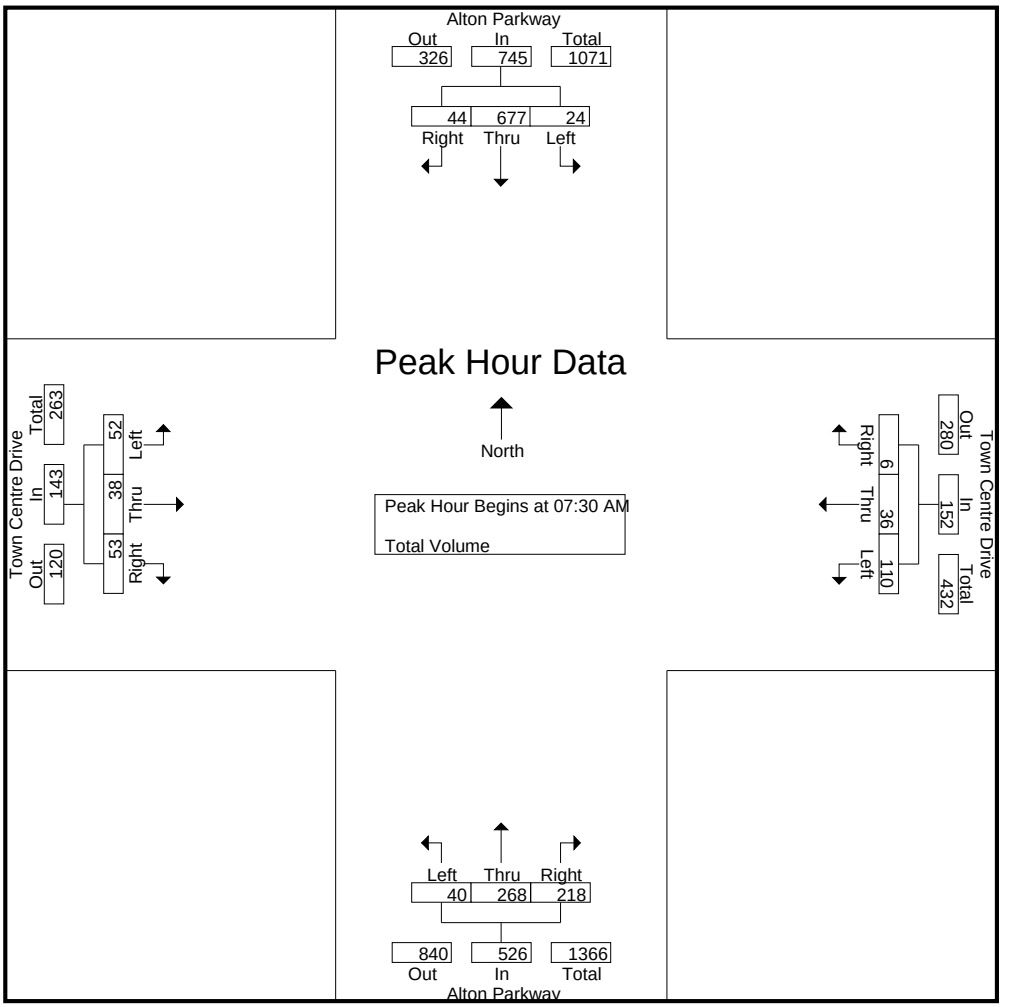
	Alton Parkway Southbound				Town Centre Drive Westbound				Alton Parkway Northbound				Town Centre Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	2	124	5	131	22	3	1	26	9	48	36	93	4	5	13	22	272
07:15 AM	9	171	8	188	28	7	0	35	10	45	38	93	5	10	12	27	343
07:30 AM	8	187	10	205	31	8	2	41	11	70	57	138	9	8	17	34	418
07:45 AM	3	167	14	184	23	9	1	33	8	69	60	137	16	8	13	37	391
Total	22	649	37	708	104	27	4	135	38	232	191	461	34	31	55	120	1424
08:00 AM	7	168	9	184	26	4	0	30	8	55	58	121	12	10	11	33	368
08:15 AM	6	155	11	172	30	15	3	48	13	74	43	130	15	12	12	39	389
08:30 AM	4	124	9	137	26	8	2	36	12	60	52	124	9	9	7	25	322
08:45 AM	12	104	6	122	22	7	3	32	19	52	61	132	4	11	11	26	312
Total	29	551	35	615	104	34	8	146	52	241	214	507	40	42	41	123	1391
Grand Total	51	1200	72	1323	208	61	12	281	90	473	405	968	74	73	96	243	2815
Apprch %	3.9	90.7	5.4		74	21.7	4.3		9.3	48.9	41.8		30.5	30	39.5		
Total %	1.8	42.6	2.6	47	7.4	2.2	0.4	10	3.2	16.8	14.4	34.4	2.6	2.6	3.4	8.6	

	Alton Parkway Southbound				Town Centre Drive Westbound				Alton Parkway Northbound				Town Centre Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	**8**	**187**	10	**205**	**31**	8	2	41	11	70	57	**138**	9	8	**17**	34	**418**
07:45 AM	3	167	**14**	184	23	9	1	33	8	69	**60**	137	**16**	8	13	37	391
08:00 AM	7	168	9	184	26	4	0	30	8	55	58	121	12	10	11	33	368
08:15 AM	6	155	11	172	30	**15**	**3**	**48**	**13**	**74**	43	130	15	**12**	12	**39**	389
Total Volume	24	677	44	745	110	36	6	152	40	268	218	526	52	38	53	143	1566
% App. Total	3.2	90.9	5.9		72.4	23.7	3.9		7.6	51	41.4		36.4	26.6	37.1		
PHF	.750	.905	.786	.909	.887	.600	.500	.792	.769	.905	.908	.953	.813	.792	.779	.917	.937

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Alton Parkway
E/W: Towne Centre Drive
Weather: Clear

File Name : LKFALTCAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:15 AM				07:30 AM				07:30 AM				07:30 AM			
+0 mins.	**9**	171	8	188	**31**	8	2	41	11	70	57	**138**	9	8	**17**	34
+15 mins.	8	**187**	10	**205**	23	9	1	33	8	69	**60**	137	**16**	8	13	37
+30 mins.	3	167	**14**	184	26	4	0	30	8	55	58	121	12	10	11	33
+45 mins.	7	168	9	184	30	**15**	**3**	**48**	**13**	**74**	43	130	15	**12**	12	**39**
Total Volume	27	693	41	761	110	36	6	152	40	268	218	526	52	38	53	143
% App. Total	3.5	91.1	5.4		72.4	23.7	3.9		7.6	51	41.4		36.4	26.6	37.1	
PHF	.750	.926	.732	.928	.887	.600	.500	.792	.769	.905	.908	.953	.813	.792	.779	.917

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Alton Parkway
E/W: Towne Centre Drive
Weather: Clear

File Name : LKFALTCPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

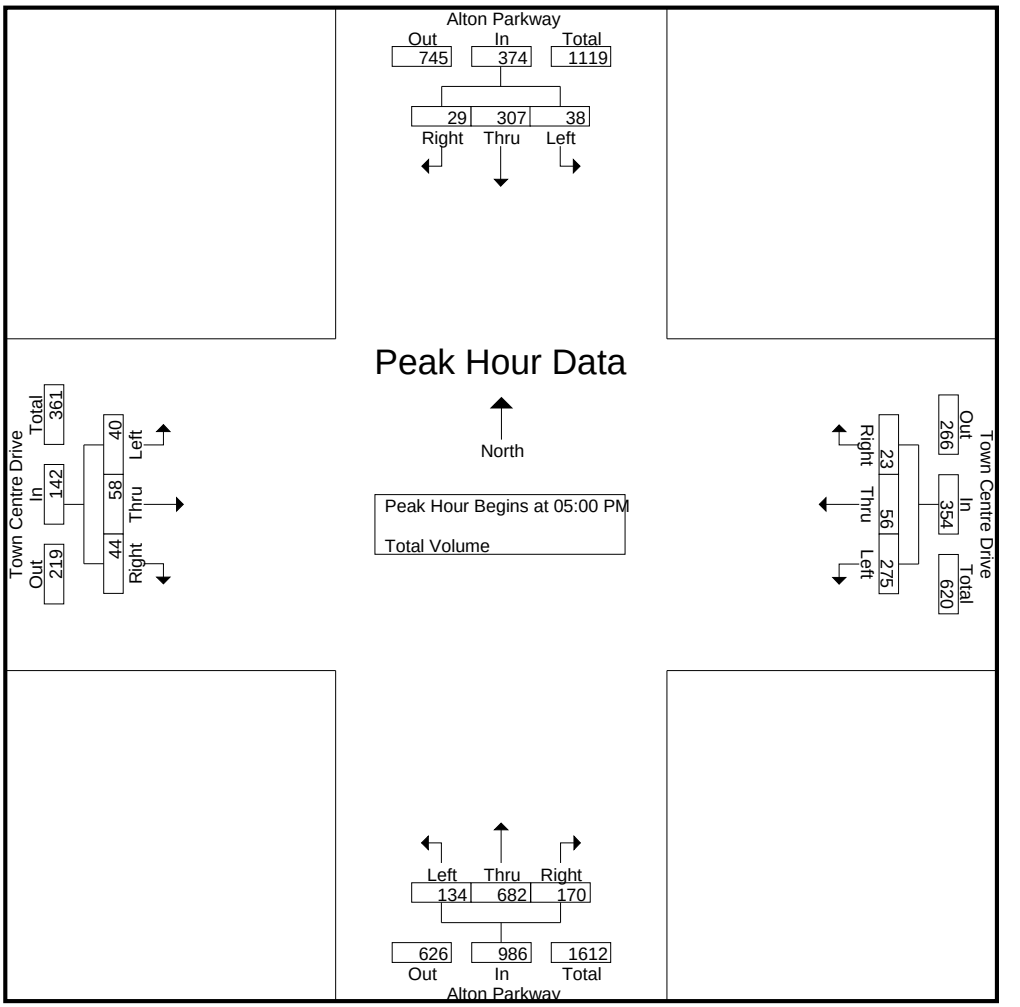
	Alton Parkway Southbound				Town Centre Drive Westbound				Alton Parkway Northbound				Town Centre Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	4	79	4	87	49	10	5	64	25	103	35	163	9	11	16	36	350
04:15 PM	10	70	2	82	53	7	2	62	33	134	39	206	9	12	9	30	380
04:30 PM	8	62	5	75	51	19	6	76	37	136	33	206	12	11	7	30	387
04:45 PM	11	80	3	94	47	15	0	62	27	145	40	212	13	13	9	35	403
Total	33	291	14	338	200	51	13	264	122	518	147	787	43	47	41	131	1520
05:00 PM	11	76	9	96	61	17	4	82	35	149	46	230	14	14	14	42	450
05:15 PM	8	72	7	87	56	10	8	74	35	174	32	241	6	20	14	40	442
05:30 PM	12	81	8	101	65	18	8	91	31	184	49	264	9	11	8	28	484
05:45 PM	7	78	5	90	93	11	3	107	33	175	43	251	11	13	8	32	480
Total	38	307	29	374	275	56	23	354	134	682	170	986	40	58	44	142	1856
Grand Total	71	598	43	712	475	107	36	618	256	1200	317	1773	83	105	85	273	3376
Apprch %	10	84	6		76.9	17.3	5.8		14.4	67.7	17.9		30.4	38.5	31.1		
Total %	2.1	17.7	1.3	21.1	14.1	3.2	1.1	18.3	7.6	35.5	9.4	52.5	2.5	3.1	2.5	8.1	

	Alton Parkway Southbound				Town Centre Drive Westbound				Alton Parkway Northbound				Town Centre Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	11	76	**9**	96	61	17	4	82	**35**	149	46	230	**14**	14	**14**	**42**	450
05:15 PM	8	72	7	87	56	10	**8**	74	35	174	32	241	6	**20**	14	40	442
05:30 PM	**12**	**81**	8	**101**	65	**18**	8	91	31	**184**	**49**	**264**	9	11	8	28	**484**
05:45 PM	7	78	5	90	**93**	11	3	**107**	33	175	43	251	11	13	8	32	480
Total Volume	38	307	29	374	275	56	23	354	134	682	170	986	40	58	44	142	1856
% App. Total	10.2	82.1	7.8		77.7	15.8	6.5		13.6	69.2	17.2		28.2	40.8	31		
PHF	.792	.948	.806	.926	.739	.778	.719	.827	.957	.927	.867	.934	.714	.725	.786	.845	.959

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Alton Parkway
E/W: Towne Centre Drive
Weather: Clear

File Name : LKFALTCPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:45 PM				05:00 PM				05:00 PM				04:30 PM			
+0 mins.	11	80	3	94	61	17	4	82	**35**	149	46	230	12	11	7	30
+15 mins.	11	76	**9**	96	56	10	**8**	74	35	174	32	241	13	13	9	35
+30 mins.	8	72	7	87	65	**18**	8	91	31	**184**	**49**	**264**	**14**	14	**14**	**42**
+45 mins.	**12**	**81**	8	**101**	**93**	11	3	**107**	33	175	43	251	6	**20**	14	40
Total Volume	42	309	27	378	275	56	23	354	134	682	170	986	45	58	44	147
% App. Total	11.1	81.7	7.1		77.7	15.8	6.5		13.6	69.2	17.2		30.6	39.5	29.9	
PHF	.875	.954	.750	.936	.739	.778	.719	.827	.957	.927	.867	.934	.804	.725	.786	.875

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Alton Parkway
E/W: Portola Parkway
Weather: Clear

File Name : LKFALPOAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

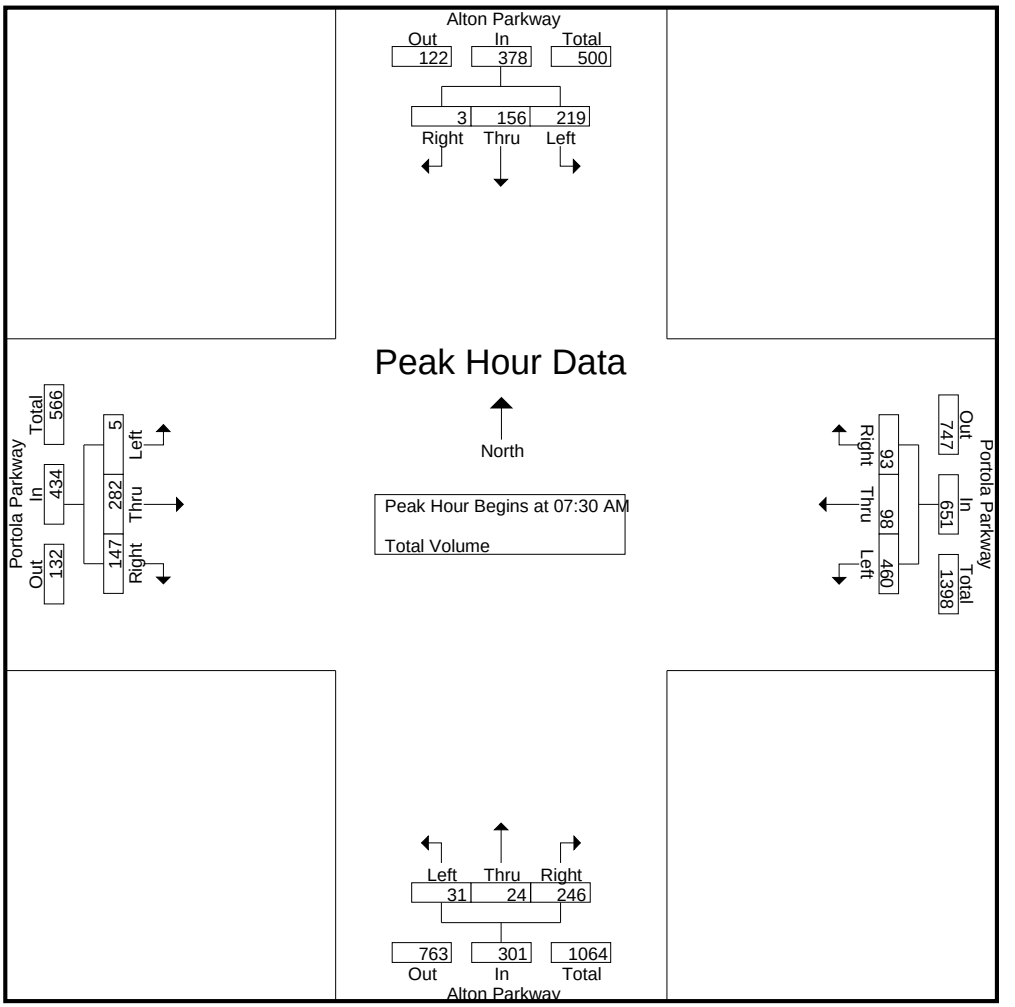
	Alton Parkway Southbound				Portola Parkway Westbound				Alton Parkway Northbound				Portola Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	20	43	0	63	67	28	19	114	10	7	33	50	0	32	27	59	286
07:15 AM	22	41	1	64	110	15	17	142	4	9	39	52	0	44	25	69	327
07:30 AM	56	37	2	95	134	16	18	168	7	1	64	72	4	63	35	102	437
07:45 AM	57	43	0	100	104	21	17	142	6	6	69	81	1	74	47	122	445
Total	155	164	3	322	415	80	71	566	27	23	205	255	5	213	134	352	1495
08:00 AM	48	46	1	95	106	30	33	169	5	6	55	66	0	64	40	104	434
08:15 AM	58	30	0	88	116	31	25	172	13	11	58	82	0	81	25	106	448
08:30 AM	27	34	0	61	87	43	27	157	6	15	57	78	0	40	20	60	356
08:45 AM	24	30	0	54	82	22	19	123	10	10	36	56	2	39	15	56	289
Total	157	140	1	298	391	126	104	621	34	42	206	282	2	224	100	326	1527
Grand Total	312	304	4	620	806	206	175	1187	61	65	411	537	7	437	234	678	3022
Apprch %	50.3	49	0.6		67.9	17.4	14.7		11.4	12.1	76.5		1	64.5	34.5		
Total %	10.3	10.1	0.1	20.5	26.7	6.8	5.8	39.3	2	2.2	13.6	17.8	0.2	14.5	7.7	22.4	

	Alton Parkway Southbound				Portola Parkway Westbound				Alton Parkway Northbound				Portola Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	56	37	**2**	95	**134**	16	18	168	7	1	64	72	**4**	63	35	102	437
07:45 AM	57	43	0	**100**	104	21	17	142	6	6	**69**	81	1	74	**47**	**122**	445
08:00 AM	48	**46**	1	95	106	30	**33**	169	5	6	55	66	0	64	40	104	434
08:15 AM	**58**	30	0	88	116	**31**	25	**172**	**13**	**11**	58	**82**	0	**81**	25	106	**448**
Total Volume	219	156	3	378	460	98	93	651	31	24	246	301	5	282	147	434	1764
% App. Total	57.9	41.3	0.8		70.7	15.1	14.3		10.3	8	81.7		1.2	65	33.9		
PHF	.944	.848	.375	.945	.858	.790	.705	.946	.596	.545	.891	.918	.313	.870	.782	.889	.984

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Alton Parkway
E/W: Portola Parkway
Weather: Clear

File Name : LKFALPOAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:30 AM				07:30 AM				07:45 AM				07:30 AM			
+0 mins.	56	37	**2**	95	**134**	16	18	168	6	6	**69**	81	**4**	63	35	102
+15 mins.	57	43	0	**100**	104	21	17	142	5	6	55	66	1	74	**47**	**122**
+30 mins.	48	**46**	1	95	106	30	**33**	169	**13**	11	58	**82**	0	64	40	104
+45 mins.	**58**	30	0	88	116	**31**	25	**172**	6	**15**	57	78	0	**81**	25	106
Total Volume	219	156	3	378	460	98	93	651	30	38	239	307	5	282	147	434
% App. Total	57.9	41.3	0.8		70.7	15.1	14.3		9.8	12.4	77.9		1.2	65	33.9	
PHF	.944	.848	.375	.945	.858	.790	.705	.946	.577	.633	.866	.936	.313	.870	.782	.889

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Alton Parkway
E/W: Portola Parkway
Weather: Clear

File Name : LKFALPOPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

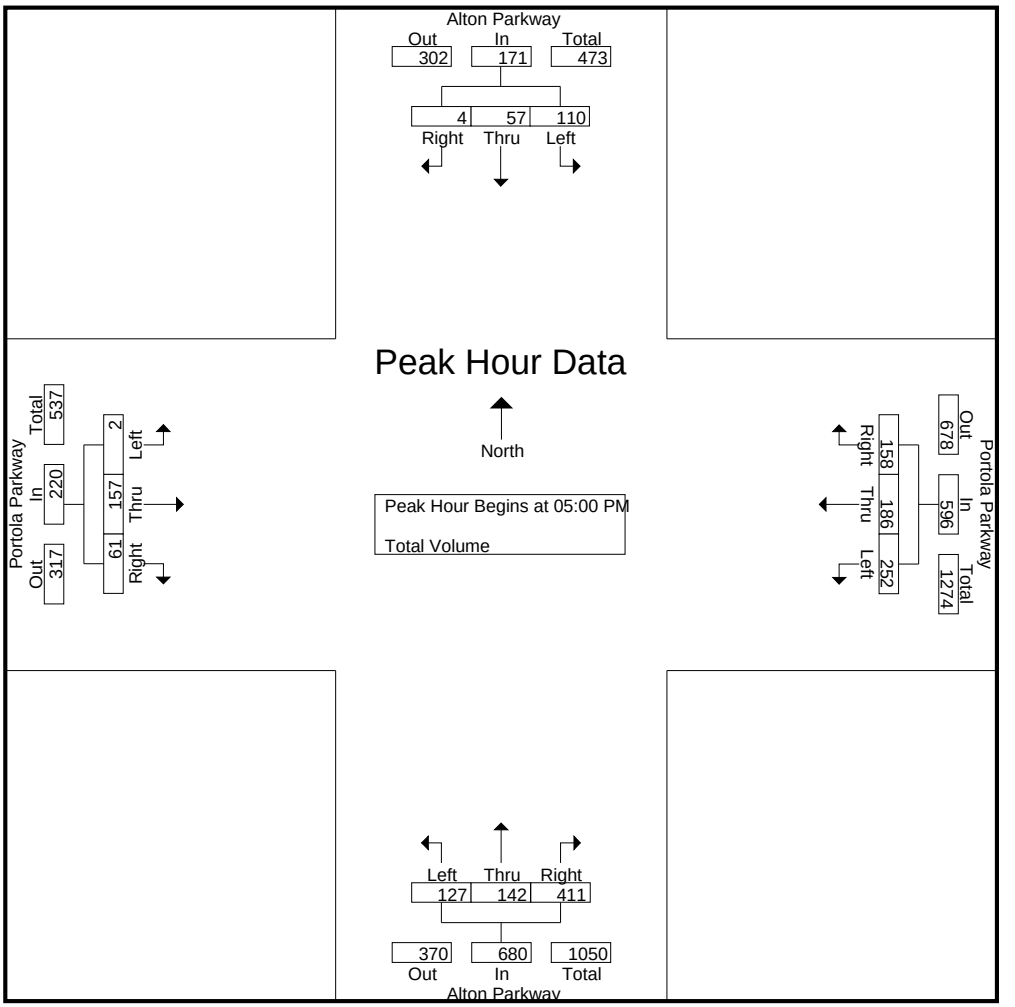
	Alton Parkway Southbound				Portola Parkway Westbound				Alton Parkway Northbound				Portola Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	24	15	0	39	61	34	37	132	15	25	58	98	0	31	8	39	308
04:15 PM	25	11	1	37	59	33	25	117	26	30	80	136	2	39	8	49	339
04:30 PM	39	14	0	53	51	40	41	132	23	34	90	147	0	26	9	35	367
04:45 PM	21	11	1	33	59	41	31	131	27	35	98	160	0	31	22	53	377
Total	109	51	2	162	230	148	134	512	91	124	326	541	2	127	47	176	1391
05:00 PM	25	12	0	37	68	42	41	151	27	26	108	161	0	29	14	43	392
05:15 PM	18	12	2	32	61	51	36	148	33	43	85	161	2	41	13	56	397
05:30 PM	30	18	0	48	67	46	42	155	33	32	113	178	0	54	13	67	448
05:45 PM	37	15	2	54	56	47	39	142	34	41	105	180	0	33	21	54	430
Total	110	57	4	171	252	186	158	596	127	142	411	680	2	157	61	220	1667
Grand Total	219	108	6	333	482	334	292	1108	218	266	737	1221	4	284	108	396	3058
Apprch %	65.8	32.4	1.8		43.5	30.1	26.4		17.9	21.8	60.4		1	71.7	27.3		
Total %	7.2	3.5	0.2	10.9	15.8	10.9	9.5	36.2	7.1	8.7	24.1	39.9	0.1	9.3	3.5	12.9	

	Alton Parkway Southbound				Portola Parkway Westbound				Alton Parkway Northbound				Portola Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	25	12	0	37	**68**	42	41	151	27	26	108	161	0	29	14	43	392
05:15 PM	18	12	**2**	32	61	**51**	36	148	33	**43**	85	161	**2**	41	13	56	397
05:30 PM	30	**18**	0	48	67	46	**42**	**155**	33	32	**113**	178	0	**54**	13	**67**	**448**
05:45 PM	**37**	15	2	**54**	56	47	39	142	**34**	41	105	**180**	0	33	**21**	54	430
Total Volume	110	57	4	171	252	186	158	596	127	142	411	680	2	157	61	220	1667
% App. Total	64.3	33.3	2.3		42.3	31.2	26.5		18.7	20.9	60.4		0.9	71.4	27.7		
PHF	.743	.792	.500	.792	.926	.912	.940	.961	.934	.826	.909	.944	.250	.727	.726	.821	.930

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Alton Parkway
E/W: Portola Parkway
Weather: Clear

File Name : LKFALPOPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	05:00 PM				05:00 PM				05:00 PM				05:00 PM			
+0 mins.	25	12	0	37	**68**	42	41	151	27	26	108	161	0	29	14	43
+15 mins.	18	12	**2**	32	61	**51**	36	148	33	**43**	85	161	**2**	41	13	56
+30 mins.	30	**18**	0	48	67	46	**42**	**155**	33	32	**113**	178	0	**54**	13	**67**
+45 mins.	**37**	15	2	**54**	56	47	39	142	**34**	41	105	**180**	0	33	**21**	54
Total Volume	110	57	4	171	252	186	158	596	127	142	411	680	2	157	61	220
% App. Total	64.3	33.3	2.3		42.3	31.2	26.5		18.7	20.9	60.4		0.9	71.4	27.7	
PHF	.743	.792	.500	.792	.926	.912	.940	.961	.934	.826	.909	.944	.250	.727	.726	.821

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Lake Forest Drive
E/W: Portola Parkway
Weather: Clear

File Name : LKFLFPOAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

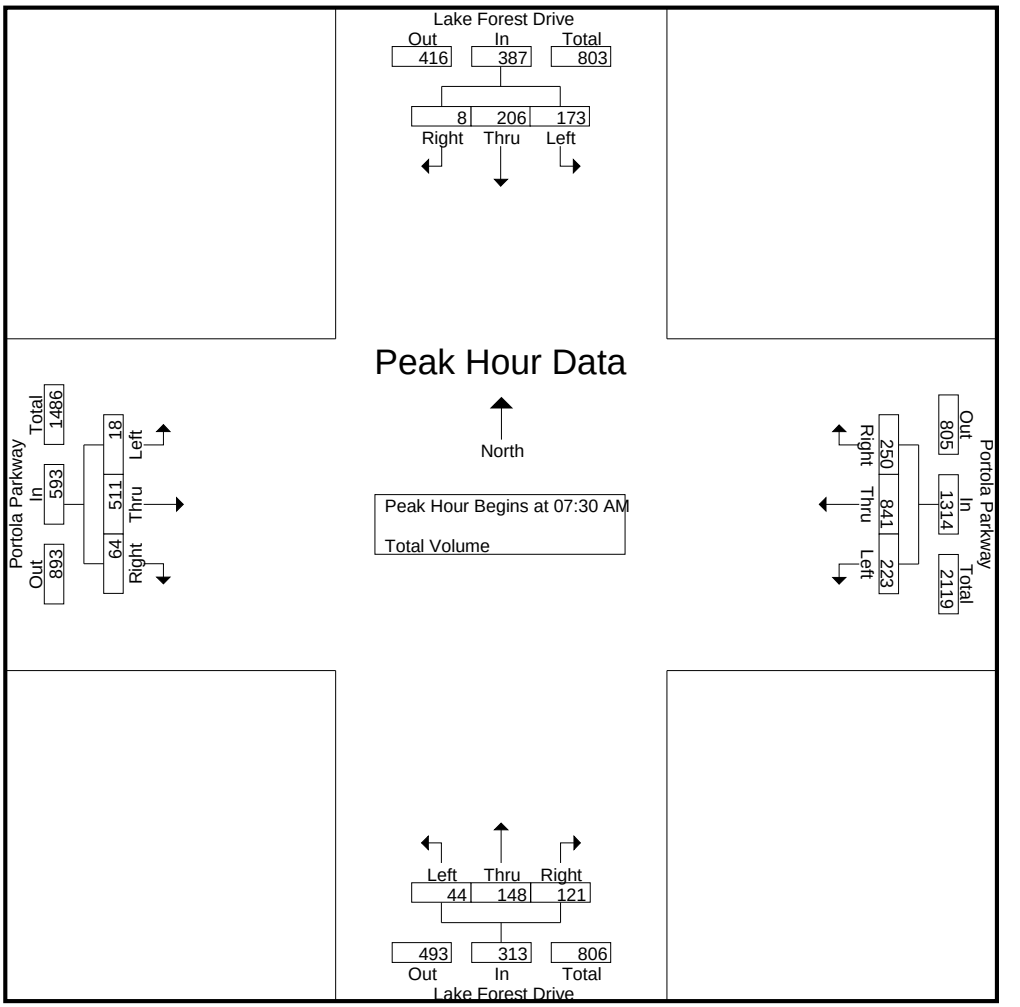
	Lake Forest Drive Southbound				Portola Parkway Westbound				Lake Forest Drive Northbound				Portola Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	31	40	3	74	39	156	43	238	2	24	27	53	1	96	5	102	467
07:15 AM	25	39	1	65	47	163	37	247	4	26	29	59	2	95	15	112	483
07:30 AM	41	48	1	90	42	182	38	262	9	28	18	55	2	142	21	165	572
07:45 AM	73	63	2	138	52	210	54	316	8	49	34	91	5	157	12	174	719
Total	170	190	7	367	180	711	172	1063	23	127	108	258	10	490	53	553	2241
08:00 AM	30	54	3	87	71	263	91	425	12	33	35	80	4	119	9	132	724
08:15 AM	29	41	2	72	58	186	67	311	15	38	34	87	7	93	22	122	592
08:30 AM	33	44	0	77	45	178	32	255	10	45	28	83	5	129	8	142	557
08:45 AM	31	36	0	67	52	166	30	248	14	21	31	66	3	121	6	130	511
Total	123	175	5	303	226	793	220	1239	51	137	128	316	19	462	45	526	2384
Grand Total	293	365	12	670	406	1504	392	2302	74	264	236	574	29	952	98	1079	4625
Apprch %	43.7	54.5	1.8		17.6	65.3	17		12.9	46	41.1		2.7	88.2	9.1		
Total %	6.3	7.9	0.3	14.5	8.8	32.5	8.5	49.8	1.6	5.7	5.1	12.4	0.6	20.6	2.1	23.3	

	Lake Forest Drive Southbound				Portola Parkway Westbound				Lake Forest Drive Northbound				Portola Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	41	48	1	90	42	182	38	262	9	28	18	55	2	142	21	165	572
07:45 AM	**73**	**63**	2	**138**	52	210	54	316	8	**49**	34	**91**	5	**157**	12	**174**	719
08:00 AM	30	54	**3**	87	**71**	**263**	**91**	**425**	12	33	**35**	80	4	119	9	132	**724**
08:15 AM	29	41	2	72	58	186	67	311	**15**	38	34	87	**7**	93	**22**	122	592
Total Volume	173	206	8	387	223	841	250	1314	44	148	121	313	18	511	64	593	2607
% App. Total	44.7	53.2	2.1		17	64	19		14.1	47.3	38.7		3	86.2	10.8		
PHF	.592	.817	.667	.701	.785	.799	.687	.773	.733	.755	.864	.860	.643	.814	.727	.852	.900

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Lake Forest Drive
E/W: Portola Parkway
Weather: Clear

File Name : LKFLFPOAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:30 AM				07:30 AM				07:45 AM				07:30 AM			
+0 mins.	41	48	1	90	42	182	38	262	8	**49**	34	**91**	2	142	21	165
+15 mins.	**73**	**63**	2	**138**	52	210	54	316	12	33	**35**	80	5	**157**	12	**174**
+30 mins.	30	54	**3**	87	**71**	**263**	**91**	**425**	**15**	38	34	87	4	119	9	132
+45 mins.	29	41	2	72	58	186	67	311	10	45	28	83	**7**	93	**22**	122
Total Volume	173	206	8	387	223	841	250	1314	45	165	131	341	18	511	64	593
% App. Total	44.7	53.2	2.1		17	64	19		13.2	48.4	38.4		3	86.2	10.8	
PHF	.592	.817	.667	.701	.785	.799	.687	.773	.750	.842	.936	.937	.643	.814	.727	.852

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Lake Forest Drive
E/W: Portola Parkway
Weather: Clear

File Name : LKFLFPOPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

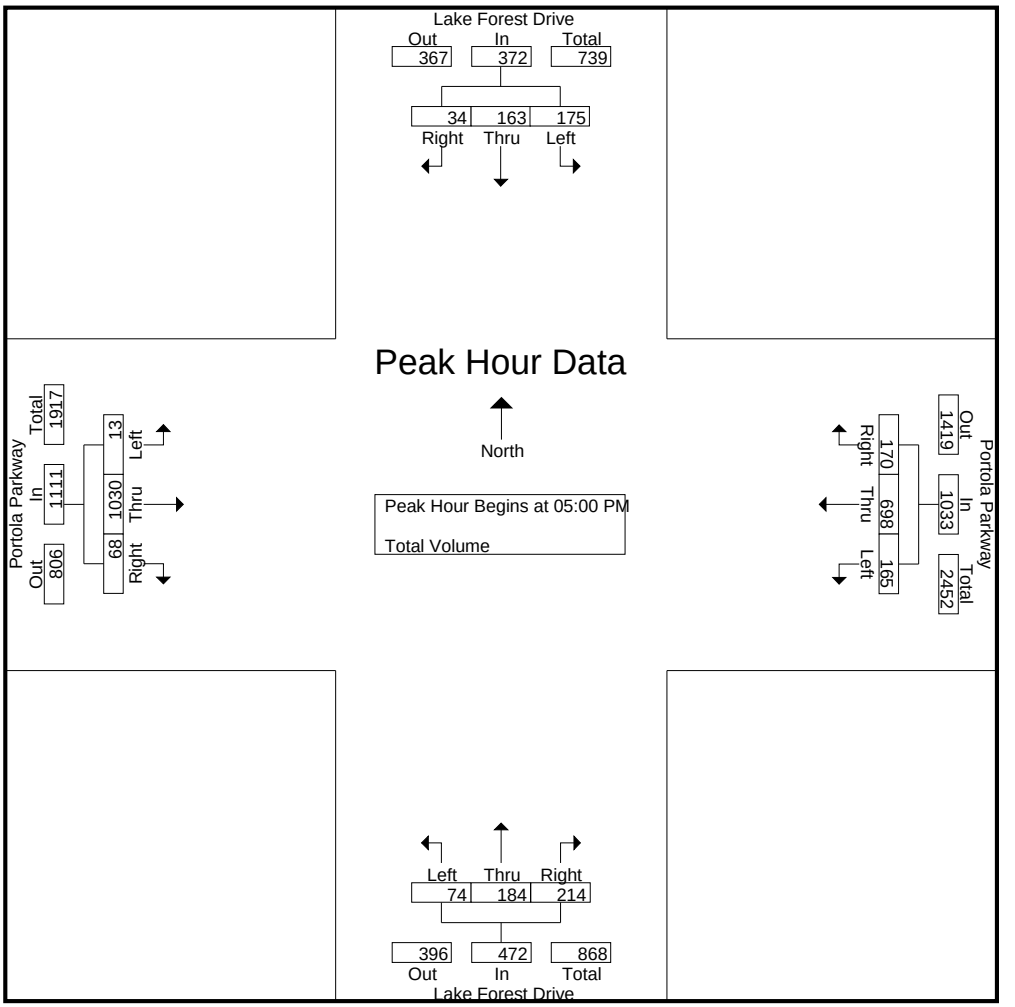
	Lake Forest Drive Southbound				Portola Parkway Westbound				Lake Forest Drive Northbound				Portola Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	35	43	9	87	45	165	32	242	9	33	31	73	2	206	16	224	626
04:15 PM	35	37	2	74	27	134	20	181	15	42	40	97	6	180	21	207	559
04:30 PM	39	45	3	87	36	185	26	247	18	33	44	95	2	242	15	259	688
04:45 PM	35	41	5	81	50	132	29	211	16	28	37	81	8	202	16	226	599
Total	144	166	19	329	158	616	107	881	58	136	152	346	18	830	68	916	2472
05:00 PM	45	67	19	131	50	166	37	253	20	46	45	111	3	299	17	319	814
05:15 PM	43	33	6	82	50	181	48	279	24	41	64	129	1	247	17	265	755
05:30 PM	43	33	5	81	34	188	43	265	17	51	48	116	4	238	19	261	723
05:45 PM	44	30	4	78	31	163	42	236	13	46	57	116	5	246	15	266	696
Total	175	163	34	372	165	698	170	1033	74	184	214	472	13	1030	68	1111	2988
Grand Total	319	329	53	701	323	1314	277	1914	132	320	366	818	31	1860	136	2027	5460
Apprch %	45.5	46.9	7.6		16.9	68.7	14.5		16.1	39.1	44.7		1.5	91.8	6.7		
Total %	5.8	6	1	12.8	5.9	24.1	5.1	35.1	2.4	5.9	6.7	15	0.6	34.1	2.5	37.1	

	Lake Forest Drive Southbound				Portola Parkway Westbound				Lake Forest Drive Northbound				Portola Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	**45**	**67**	**19**	**131**	**50**	166	37	253	20	46	45	111	3	**299**	17	**319**	**814**
05:15 PM	43	33	6	82	50	181	**48**	**279**	**24**	41	**64**	**129**	1	247	17	265	755
05:30 PM	43	33	5	81	34	**188**	43	265	17	**51**	48	116	4	238	**19**	261	723
05:45 PM	44	30	4	78	31	163	42	236	13	46	57	116	**5**	246	15	266	696
Total Volume	175	163	34	372	165	698	170	1033	74	184	214	472	13	1030	68	1111	2988
% App. Total	47	43.8	9.1		16	67.6	16.5		15.7	39	45.3		1.2	92.7	6.1		
PHF	.972	.608	.447	.710	.825	.928	.885	.926	.771	.902	.836	.915	.650	.861	.895	.871	.918

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Lake Forest Drive
E/W: Portola Parkway
Weather: Clear

File Name : LKFLFPOPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:30 PM				05:00 PM				05:00 PM				05:00 PM			
+0 mins.	39	45	3	87	**50**	166	37	253	20	46	45	111	3	**299**	17	**319**
+15 mins.	35	41	5	81	50	181	**48**	**279**	**24**	41	**64**	**129**	1	247	17	265
+30 mins.	**45**	**67**	**19**	**131**	34	**188**	43	265	17	**51**	48	116	4	238	**19**	261
+45 mins.	43	33	6	82	31	163	42	236	13	46	57	116	**5**	246	15	266
Total Volume	162	186	33	381	165	698	170	1033	74	184	214	472	13	1030	68	1111
% App. Total	42.5	48.8	8.7		16	67.6	16.5		15.7	39	45.3		1.2	92.7	6.1	
PHF	.900	.694	.434	.727	.825	.928	.885	.926	.771	.902	.836	.915	.650	.861	.895	.871

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Lake Forest Drive
E/W: Towne Centre Drive
Weather: Clear

File Name : LKFLFTCAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

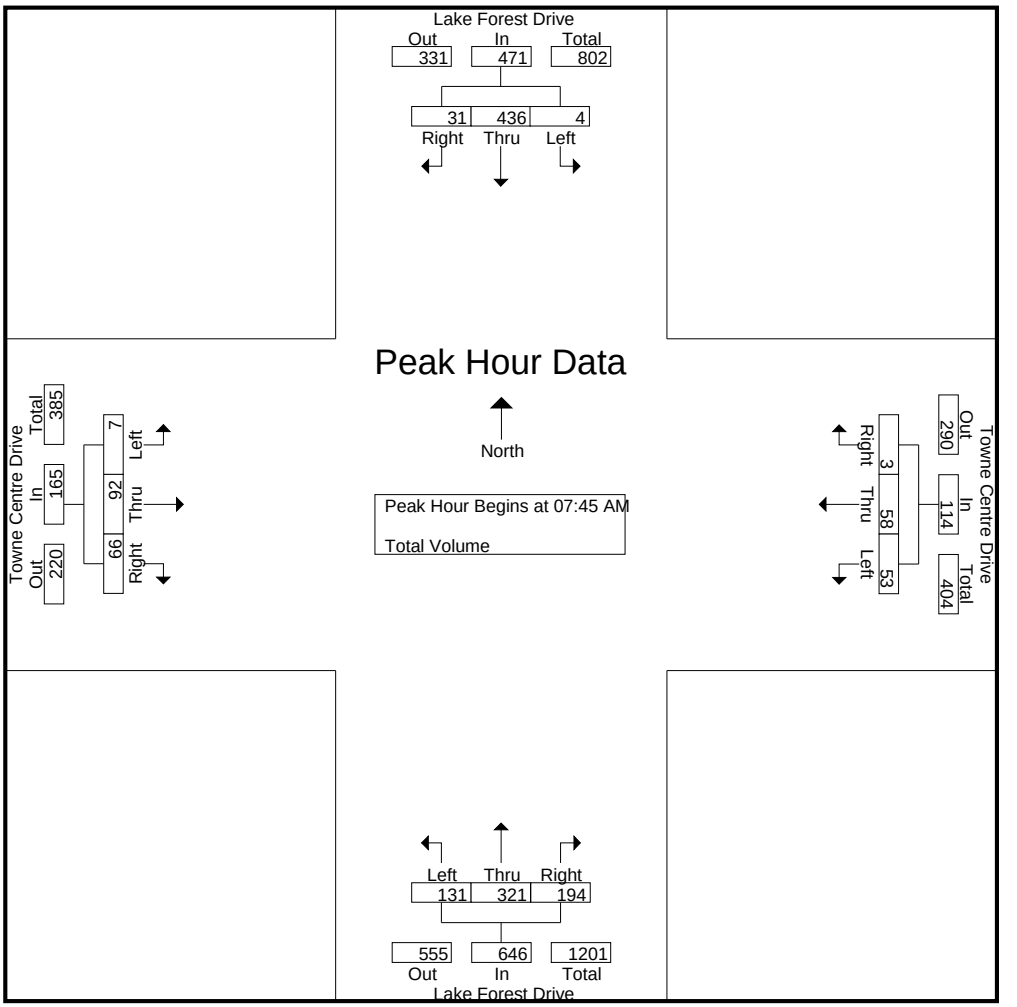
	Lake Forest Drive Southbound				Towne Centre Drive Westbound				Lake Forest Drive Northbound				Towne Centre Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	1	83	3	87	10	9	2	21	16	54	24	94	0	13	12	25	227
07:15 AM	2	101	7	110	9	12	0	21	17	60	17	94	1	13	13	27	252
07:30 AM	0	104	1	105	10	7	2	19	21	53	29	103	0	12	13	25	252
07:45 AM	2	112	5	119	15	18	1	34	35	89	58	182	3	23	12	38	373
Total	5	400	16	421	44	46	5	95	89	256	128	473	4	61	50	115	1104
08:00 AM	1	128	10	139	13	13	1	27	31	77	62	170	1	23	21	45	381
08:15 AM	0	106	11	117	13	16	0	29	36	78	37	151	2	18	11	31	328
08:30 AM	1	90	5	96	12	11	1	24	29	77	37	143	1	28	22	51	314
08:45 AM	1	85	11	97	13	8	0	21	33	63	35	131	3	23	18	44	293
Total	3	409	37	449	51	48	2	101	129	295	171	595	7	92	72	171	1316
Grand Total	8	809	53	870	95	94	7	196	218	551	299	1068	11	153	122	286	2420
Apprch %	0.9	93	6.1		48.5	48	3.6		20.4	51.6	28		3.8	53.5	42.7		
Total %	0.3	33.4	2.2	36	3.9	3.9	0.3	8.1	9	22.8	12.4	44.1	0.5	6.3	5	11.8	

	Lake Forest Drive Southbound				Towne Centre Drive Westbound				Lake Forest Drive Northbound				Towne Centre Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	**2**	112	5	119	**15**	**18**	**1**	**34**	35	**89**	58	**182**	**3**	23	12	38	373
08:00 AM	1	**128**	10	**139**	13	13	1	27	31	77	**62**	170	1	23	21	45	**381**
08:15 AM	0	106	**11**	117	13	16	0	29	**36**	78	37	151	2	18	11	31	328
08:30 AM	1	90	5	96	12	11	1	24	29	77	37	143	1	**28**	**22**	**51**	314
Total Volume	4	436	31	471	53	58	3	114	131	321	194	646	7	92	66	165	1396
% App. Total	0.8	92.6	6.6		46.5	50.9	2.6		20.3	49.7	30		4.2	55.8	40		
PHF	.500	.852	.705	.847	.883	.806	.750	.838	.910	.902	.782	.887	.583	.821	.750	.809	.916

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Lake Forest Drive
E/W: Towne Centre Drive
Weather: Clear

File Name : LKFLFTCAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:30 AM				07:45 AM				07:45 AM				08:00 AM			
+0 mins.	0	104	1	105	**15**	**18**	**1**	**34**	35	**89**	58	**182**	1	23	21	45
+15 mins.	**2**	112	5	119	13	13	1	27	31	77	**62**	170	2	18	11	31
+30 mins.	1	**128**	10	**139**	13	16	0	29	**36**	78	37	151	1	**28**	**22**	**51**
+45 mins.	0	106	**11**	117	12	11	1	24	29	77	37	143	**3**	23	18	44
Total Volume	3	450	27	480	53	58	3	114	131	321	194	646	7	92	72	171
% App. Total	0.6	93.8	5.6		46.5	50.9	2.6		20.3	49.7	30		4.1	53.8	42.1	
PHF	.375	.879	.614	.863	.883	.806	.750	.838	.910	.902	.782	.887	.583	.821	.818	.838

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Lake Forest Drive
E/W: Towne Centre Drive
Weather: Clear

File Name : LKFLFTCPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

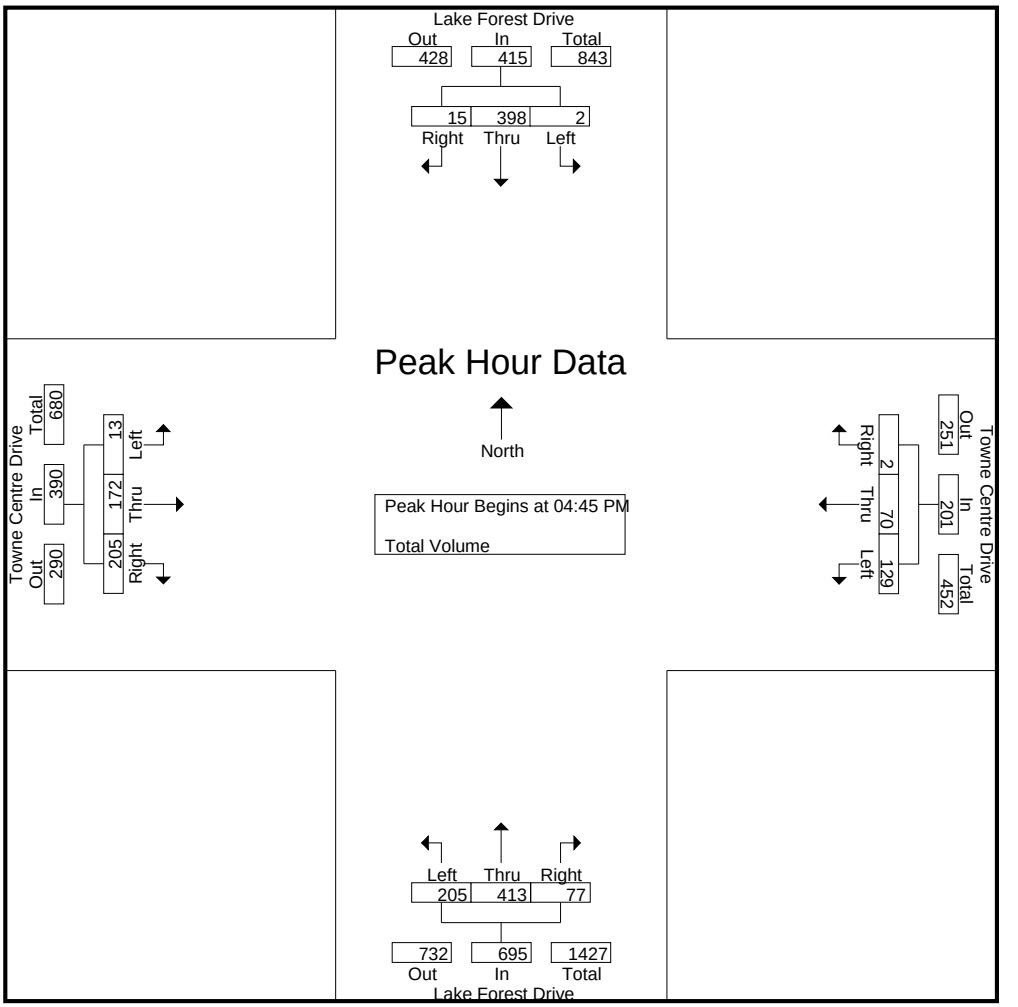
	Lake Forest Drive Southbound				Towne Centre Drive Westbound				Lake Forest Drive Northbound				Towne Centre Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	2	101	7	110	36	12	0	48	40	74	21	135	4	34	34	72	365
04:15 PM	3	74	5	82	33	16	0	49	22	90	21	133	5	36	33	74	338
04:30 PM	0	94	2	96	24	30	0	54	42	97	21	160	4	42	27	73	383
04:45 PM	1	106	5	112	25	15	0	40	59	80	18	157	2	28	53	83	392
Total	6	375	19	400	118	73	0	191	163	341	81	585	15	140	147	302	1478
05:00 PM	0	124	5	129	48	24	1	73	36	113	21	170	4	49	61	114	486
05:15 PM	1	87	3	91	34	14	1	49	51	109	22	182	6	49	52	107	429
05:30 PM	0	81	2	83	22	17	0	39	59	111	16	186	1	46	39	86	394
05:45 PM	1	71	5	77	18	9	0	27	42	103	16	161	3	42	35	80	345
Total	2	363	15	380	122	64	2	188	188	436	75	699	14	186	187	387	1654
Grand Total	8	738	34	780	240	137	2	379	351	777	156	1284	29	326	334	689	3132
Apprch %	1	94.6	4.4		63.3	36.1	0.5		27.3	60.5	12.1		4.2	47.3	48.5		
Total %	0.3	23.6	1.1	24.9	7.7	4.4	0.1	12.1	11.2	24.8	5	41	0.9	10.4	10.7	22	

	Lake Forest Drive Southbound				Towne Centre Drive Westbound				Lake Forest Drive Northbound				Towne Centre Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	**1**	106	**5**	112	25	15	0	40	**59**	80	18	157	2	28	53	83	392
05:00 PM	0	**124**	5	**129**	**48**	**24**	**1**	**73**	36	**113**	21	170	4	**49**	**61**	**114**	**486**
05:15 PM	1	87	3	91	34	14	1	49	51	109	**22**	182	**6**	49	52	107	429
05:30 PM	0	81	2	83	22	17	0	39	59	111	16	**186**	1	46	39	86	394
Total Volume	2	398	15	415	129	70	2	201	205	413	77	695	13	172	205	390	1701
% App. Total	0.5	95.9	3.6		64.2	34.8	1		29.5	59.4	11.1		3.3	44.1	52.6		
PHF	.500	.802	.750	.804	.672	.729	.500	.688	.869	.914	.875	.934	.542	.878	.840	.855	.875

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Lake Forest Drive
E/W: Towne Centre Drive
Weather: Clear

File Name : LKFLFTCPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:30 PM				04:15 PM				05:00 PM				04:45 PM			
+0 mins.	0	94	2	96	33	16	0	49	36	**113**	21	170	2	28	53	83
+15 mins.	**1**	106	**5**	112	24	**30**	0	54	51	109	**22**	182	4	**49**	**61**	**114**
+30 mins.	0	**124**	5	**129**	25	15	0	40	**59**	111	16	**186**	**6**	49	52	107
+45 mins.	1	87	3	91	**48**	24	**1**	**73**	42	103	16	161	1	46	39	86
Total Volume	2	411	15	428	130	85	1	216	188	436	75	699	13	172	205	390
% App. Total	0.5	96	3.5		60.2	39.4	0.5		26.9	62.4	10.7		3.3	44.1	52.6	
PHF	.500	.829	.750	.829	.677	.708	.250	.740	.797	.965	.852	.940	.542	.878	.840	.855

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Towne Centre Drive
E/W: Portola Parkway
Weather: Clear

File Name : LKFTCPOAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

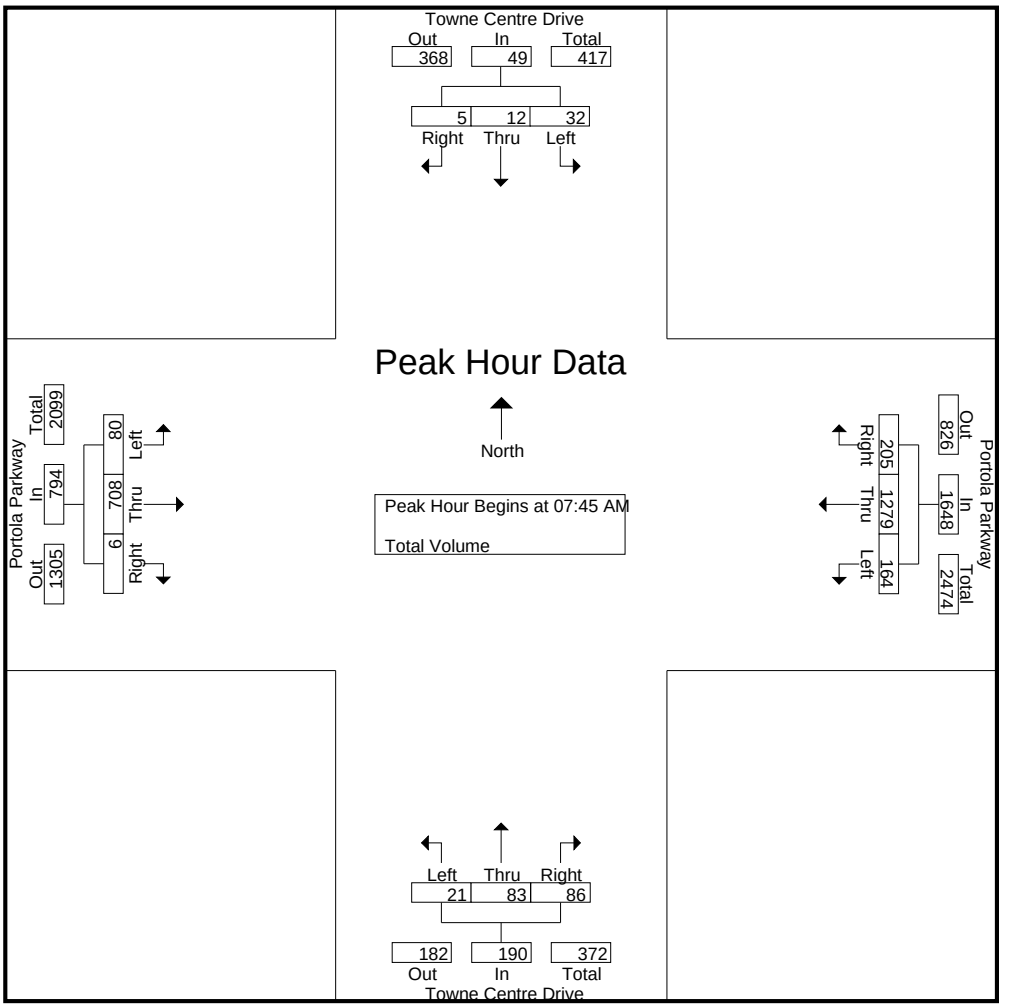
	Towne Centre Drive Southbound				Portola Parkway Westbound				Towne Centre Drive Northbound				Portola Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	7	3	4	14	19	234	31	284	1	16	12	29	24	128	3	155	482
07:15 AM	6	0	3	9	30	252	32	314	2	12	12	26	23	119	2	144	493
07:30 AM	5	0	0	5	29	247	43	319	2	20	14	36	17	192	0	209	569
07:45 AM	10	3	0	13	48	331	51	430	4	20	12	36	24	237	1	262	741
Total	28	6	7	41	126	1064	157	1347	9	68	50	127	88	676	6	770	2285
08:00 AM	8	4	4	16	45	398	75	518	4	31	24	59	21	162	1	184	777
08:15 AM	6	3	1	10	40	299	40	379	7	16	19	42	23	131	2	156	587
08:30 AM	8	2	0	10	31	251	39	321	6	16	31	53	12	178	2	192	576
08:45 AM	4	3	3	10	20	238	30	288	2	16	21	39	14	165	3	182	519
Total	26	12	8	46	136	1186	184	1506	19	79	95	193	70	636	8	714	2459
Grand Total	54	18	15	87	262	2250	341	2853	28	147	145	320	158	1312	14	1484	4744
Apprch %	62.1	20.7	17.2		9.2	78.9	12		8.8	45.9	45.3		10.6	88.4	0.9		
Total %	1.1	0.4	0.3	1.8	5.5	47.4	7.2	60.1	0.6	3.1	3.1	6.7	3.3	27.7	0.3	31.3	

	Towne Centre Drive Southbound				Portola Parkway Westbound				Towne Centre Drive Northbound				Portola Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	**10**	3	0	13	**48**	331	51	430	4	20	12	36	**24**	**237**	1	**262**	741
08:00 AM	8	**4**	**4**	**16**	45	**398**	**75**	**518**	4	**31**	24	**59**	21	162	1	184	**777**
08:15 AM	6	3	1	10	40	299	40	379	**7**	16	19	42	23	131	**2**	156	587
08:30 AM	8	2	0	10	31	251	39	321	6	16	**31**	53	12	178	2	192	576
Total Volume	32	12	5	49	164	1279	205	1648	21	83	86	190	80	708	6	794	2681
% App. Total	65.3	24.5	10.2		10	77.6	12.4		11.1	43.7	45.3		10.1	89.2	0.8		
PHF	.800	.750	.313	.766	.854	.803	.683	.795	.750	.669	.694	.805	.833	.747	.750	.758	.863

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Towne Centre Drive
E/W: Portola Parkway
Weather: Clear

File Name : LKFTCPOAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:45 AM				07:45 AM				08:00 AM				07:30 AM			
+0 mins.	**10**	3	0	13	**48**	331	51	430	4	**31**	24	**59**	17	192	0	209
+15 mins.	8	**4**	**4**	**16**	45	**398**	**75**	**518**	**7**	16	19	42	**24**	**237**	1	**262**
+30 mins.	6	3	1	10	40	299	40	379	6	16	**31**	53	21	162	1	184
+45 mins.	8	2	0	10	31	251	39	321	2	16	21	39	23	131	**2**	156
Total Volume	32	12	5	49	164	1279	205	1648	19	79	95	193	85	722	4	811
% App. Total	65.3	24.5	10.2		10	77.6	12.4		9.8	40.9	49.2		10.5	89	0.5	
PHF	.800	.750	.313	.766	.854	.803	.683	.795	.679	.637	.766	.818	.885	.762	.500	.774

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Towne Centre Drive
E/W: Portola Parkway
Weather: Clear

File Name : LKFTCPOPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

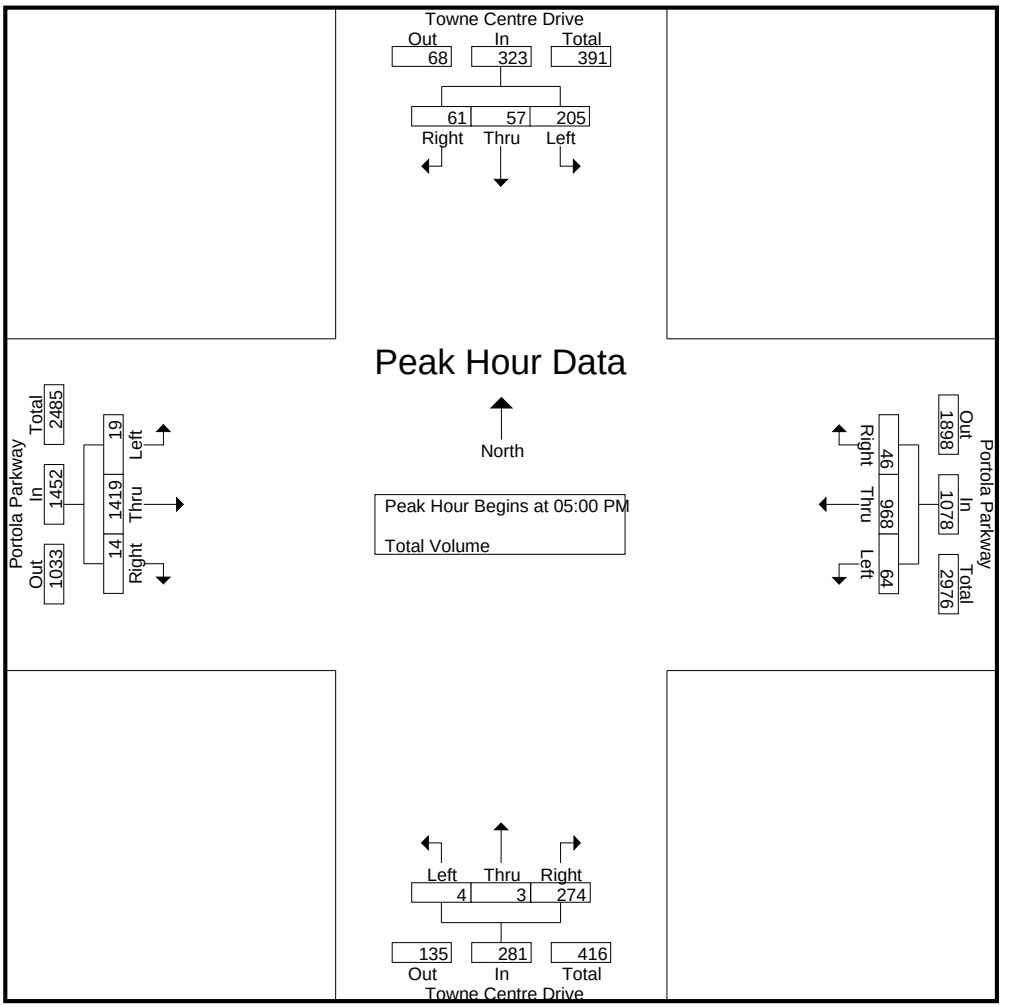
	Towne Centre Drive Southbound				Portola Parkway Westbound				Towne Centre Drive Northbound				Portola Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	40	12	21	73	24	207	12	243	5	4	57	66	4	271	4	279	661
04:15 PM	36	18	19	73	13	153	6	172	2	7	56	65	6	255	2	263	573
04:30 PM	69	24	36	129	26	212	8	246	2	10	65	77	8	333	3	344	796
04:45 PM	48	19	21	88	14	174	17	205	3	8	46	57	4	265	3	272	622
Total	193	73	97	363	77	746	43	866	12	29	224	265	22	1124	12	1158	2652
05:00 PM	73	16	23	112	18	237	12	267	0	0	75	75	5	385	4	394	848
05:15 PM	66	23	11	100	17	254	6	277	1	2	67	70	6	333	4	343	790
05:30 PM	36	10	17	63	19	248	11	278	1	0	78	79	5	352	5	362	782
05:45 PM	30	8	10	48	10	229	17	256	2	1	54	57	3	349	1	353	714
Total	205	57	61	323	64	968	46	1078	4	3	274	281	19	1419	14	1452	3134
Grand Total	398	130	158	686	141	1714	89	1944	16	32	498	546	41	2543	26	2610	5786
Apprch %	58	19	23		7.3	88.2	4.6		2.9	5.9	91.2		1.6	97.4	1		
Total %	6.9	2.2	2.7	11.9	2.4	29.6	1.5	33.6	0.3	0.6	8.6	9.4	0.7	44	0.4	45.1	

	Towne Centre Drive Southbound				Portola Parkway Westbound				Towne Centre Drive Northbound				Portola Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	**73**	16	**23**	**112**	18	237	12	267	0	0	75	75	5	**385**	4	**394**	**848**
05:15 PM	66	**23**	11	100	17	**254**	6	277	1	**2**	67	70	**6**	333	4	343	790
05:30 PM	36	10	17	63	**19**	248	11	**278**	1	0	**78**	**79**	5	352	**5**	362	782
05:45 PM	30	8	10	48	10	229	**17**	256	**2**	1	54	57	3	349	1	353	714
Total Volume	205	57	61	323	64	968	46	1078	4	3	274	281	19	1419	14	1452	3134
% App. Total	63.5	17.6	18.9		5.9	89.8	4.3		1.4	1.1	97.5		1.3	97.7	1		
PHF	.702	.620	.663	.721	.842	.953	.676	.969	.500	.375	.878	.889	.792	.921	.700	.921	.924

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Towne Centre Drive
E/W: Portola Parkway
Weather: Clear

File Name : LKFTCPOPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:30 PM				05:00 PM				04:45 PM				05:00 PM			
+0 mins.	69	**24**	**36**	**129**	18	237	12	267	**3**	**8**	46	57	5	**385**	4	**394**
+15 mins.	48	19	21	88	17	**254**	6	277	0	0	75	75	**6**	333	4	343
+30 mins.	**73**	16	23	112	**19**	248	11	**278**	1	2	67	70	5	352	**5**	362
+45 mins.	66	23	11	100	10	229	**17**	256	1	0	**78**	**79**	3	349	1	353
Total Volume	256	82	91	429	64	968	46	1078	5	10	266	281	19	1419	14	1452
% App. Total	59.7	19.1	21.2		5.9	89.8	4.3		1.8	3.6	94.7		1.3	97.7	1	
PHF	.877	.854	.632	.831	.842	.953	.676	.969	.417	.313	.853	.889	.792	.921	.700	.921

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Glenn Ranch Road
E/W: Portola Parkway
Weather: Clear

File Name : LKFGRPOAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

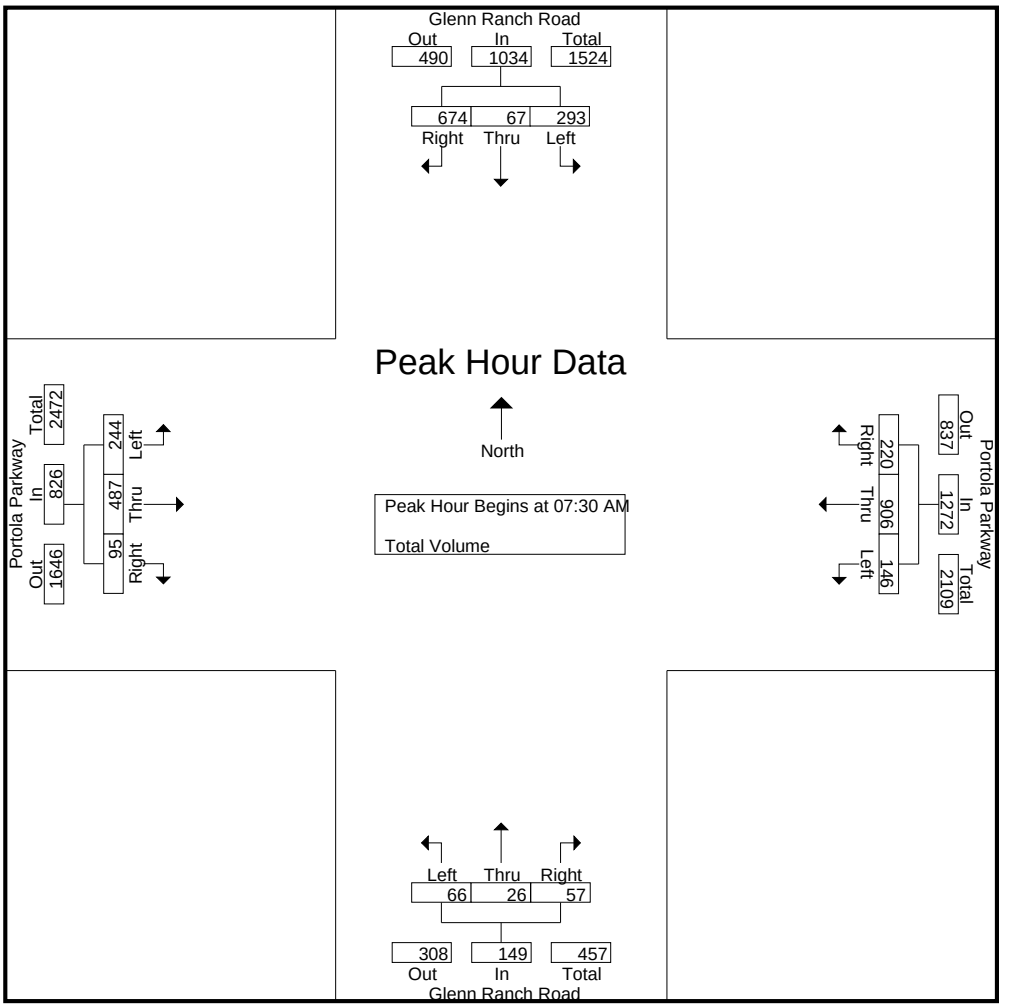
	Glenn Ranch Road Southbound				Portola Parkway Westbound				Glenn Ranch Road Northbound				Portola Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	49	18	117	184	31	158	44	233	10	10	5	25	43	82	14	139	581
07:15 AM	72	17	132	221	15	160	34	209	14	6	17	37	55	68	18	141	608
07:30 AM	71	16	126	213	26	176	62	264	12	4	12	28	52	124	13	189	694
07:45 AM	73	20	211	304	39	256	69	364	18	5	15	38	67	186	25	278	984
Total	265	71	586	922	111	750	209	1070	54	25	49	128	217	460	70	747	2867
08:00 AM	94	18	179	291	37	260	44	341	16	9	14	39	55	80	29	164	835
08:15 AM	55	13	158	226	44	214	45	303	20	8	16	44	70	97	28	195	768
08:30 AM	48	10	130	188	30	163	34	227	13	6	15	34	57	109	30	196	645
08:45 AM	49	9	115	173	46	168	45	259	13	5	10	28	57	113	36	206	666
Total	246	50	582	878	157	805	168	1130	62	28	55	145	239	399	123	761	2914
Grand Total	511	121	1168	1800	268	1555	377	2200	116	53	104	273	456	859	193	1508	5781
Apprch %	28.4	6.7	64.9		12.2	70.7	17.1		42.5	19.4	38.1		30.2	57	12.8		
Total %	8.8	2.1	20.2	31.1	4.6	26.9	6.5	38.1	2	0.9	1.8	4.7	7.9	14.9	3.3	26.1	

	Glenn Ranch Road Southbound				Portola Parkway Westbound				Glenn Ranch Road Northbound				Portola Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	71	16	126	213	26	176	62	264	12	4	12	28	52	124	13	189	694
07:45 AM	73	**20**	**211**	**304**	39	256	**69**	**364**	18	5	15	38	67	**186**	25	**278**	**984**
08:00 AM	**94**	18	179	291	37	**260**	44	341	16	**9**	14	39	55	80	**29**	164	835
08:15 AM	55	13	158	226	**44**	214	45	303	**20**	8	**16**	**44**	**70**	97	28	195	768
Total Volume	293	67	674	1034	146	906	220	1272	66	26	57	149	244	487	95	826	3281
% App. Total	28.3	6.5	65.2		11.5	71.2	17.3		44.3	17.4	38.3		29.5	59	11.5		
PHF	.779	.838	.799	.850	.830	.871	.797	.874	.825	.722	.891	.847	.871	.655	.819	.743	.834

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Glenn Ranch Road
E/W: Portola Parkway
Weather: Clear

File Name : LKFGRPOAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:30 AM				07:30 AM				07:45 AM				07:45 AM			
+0 mins.	71	16	126	213	26	176	62	264	18	5	15	38	67	**186**	25	**278**
+15 mins.	73	**20**	**211**	**304**	39	256	**69**	**364**	16	**9**	14	39	55	80	29	164
+30 mins.	**94**	18	179	291	37	**260**	44	341	**20**	8	**16**	**44**	**70**	97	28	195
+45 mins.	55	13	158	226	**44**	214	45	303	13	6	15	34	57	109	**30**	196
Total Volume	293	67	674	1034	146	906	220	1272	67	28	60	155	249	472	112	833
% App. Total	28.3	6.5	65.2		11.5	71.2	17.3		43.2	18.1	38.7		29.9	56.7	13.4	
PHF	.779	.838	.799	.850	.830	.871	.797	.874	.838	.778	.938	.881	.889	.634	.933	.749

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Glenn Ranch Road
E/W: Portola Parkway
Weather: Clear

File Name : LKFGRPOPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

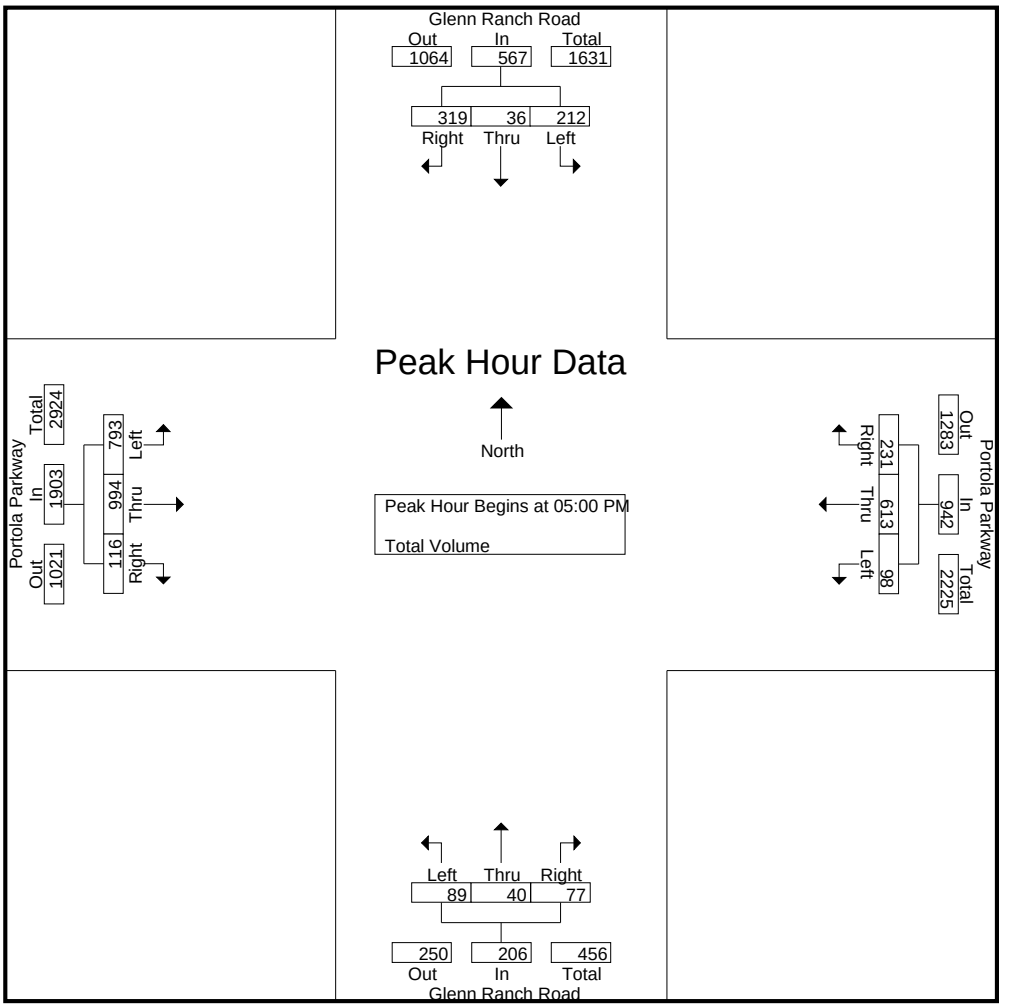
	Glenn Ranch Road Southbound				Portola Parkway Westbound				Glenn Ranch Road Northbound				Portola Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	58	3	100	161	16	136	49	201	14	8	14	36	132	198	16	346	744
04:15 PM	39	5	57	101	12	114	41	167	12	4	12	28	165	199	16	380	676
04:30 PM	51	5	72	128	16	136	47	199	15	6	21	42	170	230	25	425	794
04:45 PM	36	6	85	127	18	114	54	186	20	11	18	49	142	212	20	374	736
Total	184	19	314	517	62	500	191	753	61	29	65	155	609	839	77	1525	2950
05:00 PM	65	10	74	149	17	134	55	206	28	9	24	61	195	268	37	500	916
05:15 PM	45	8	100	153	36	161	78	275	20	13	20	53	213	258	27	498	979
05:30 PM	52	8	82	142	24	155	48	227	18	11	21	50	191	232	24	447	866
05:45 PM	50	10	63	123	21	163	50	234	23	7	12	42	194	236	28	458	857
Total	212	36	319	567	98	613	231	942	89	40	77	206	793	994	116	1903	3618
Grand Total	396	55	633	1084	160	1113	422	1695	150	69	142	361	1402	1833	193	3428	6568
Apprch %	36.5	5.1	58.4		9.4	65.7	24.9		41.6	19.1	39.3		40.9	53.5	5.6		
Total %	6	0.8	9.6	16.5	2.4	16.9	6.4	25.8	2.3	1.1	2.2	5.5	21.3	27.9	2.9	52.2	

	Glenn Ranch Road Southbound				Portola Parkway Westbound				Glenn Ranch Road Northbound				Portola Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	**65**	**10**	74	149	17	134	55	206	**28**	9	**24**	**61**	195	**268**	**37**	**500**	916
05:15 PM	45	8	**100**	**153**	**36**	161	**78**	**275**	20	**13**	20	53	**213**	258	27	498	**979**
05:30 PM	52	8	82	142	24	155	48	227	18	11	21	50	191	232	24	447	866
05:45 PM	50	10	63	123	21	**163**	50	234	23	7	12	42	194	236	28	458	857
Total Volume	212	36	319	567	98	613	231	942	89	40	77	206	793	994	116	1903	3618
% App. Total	37.4	6.3	56.3		10.4	65.1	24.5		43.2	19.4	37.4		41.7	52.2	6.1		
PHF	.815	.900	.798	.926	.681	.940	.740	.856	.795	.769	.802	.844	.931	.927	.784	.952	.924

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Glenn Ranch Road
E/W: Portola Parkway
Weather: Clear

File Name : LKFGRPOPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:45 PM				05:00 PM				04:45 PM				05:00 PM			
+0 mins.	36	6	85	127	17	134	55	206	20	11	18	49	195	**268**	**37**	**500**
+15 mins.	**65**	**10**	74	149	**36**	161	**78**	**275**	**28**	9	**24**	**61**	**213**	258	27	498
+30 mins.	45	8	**100**	**153**	24	155	48	227	20	**13**	20	53	191	232	24	447
+45 mins.	52	8	82	142	21	**163**	50	234	18	11	21	50	194	236	28	458
Total Volume	198	32	341	571	98	613	231	942	86	44	83	213	793	994	116	1903
% App. Total	34.7	5.6	59.7		10.4	65.1	24.5		40.4	20.7	39		41.7	52.2	6.1	
PHF	.762	.800	.853	.933	.681	.940	.740	.856	.768	.846	.865	.873	.931	.927	.784	.952

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Portola Parkway
E/W: SR-241 Ramps
Weather: Clear

File Name : LKFPO241AM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

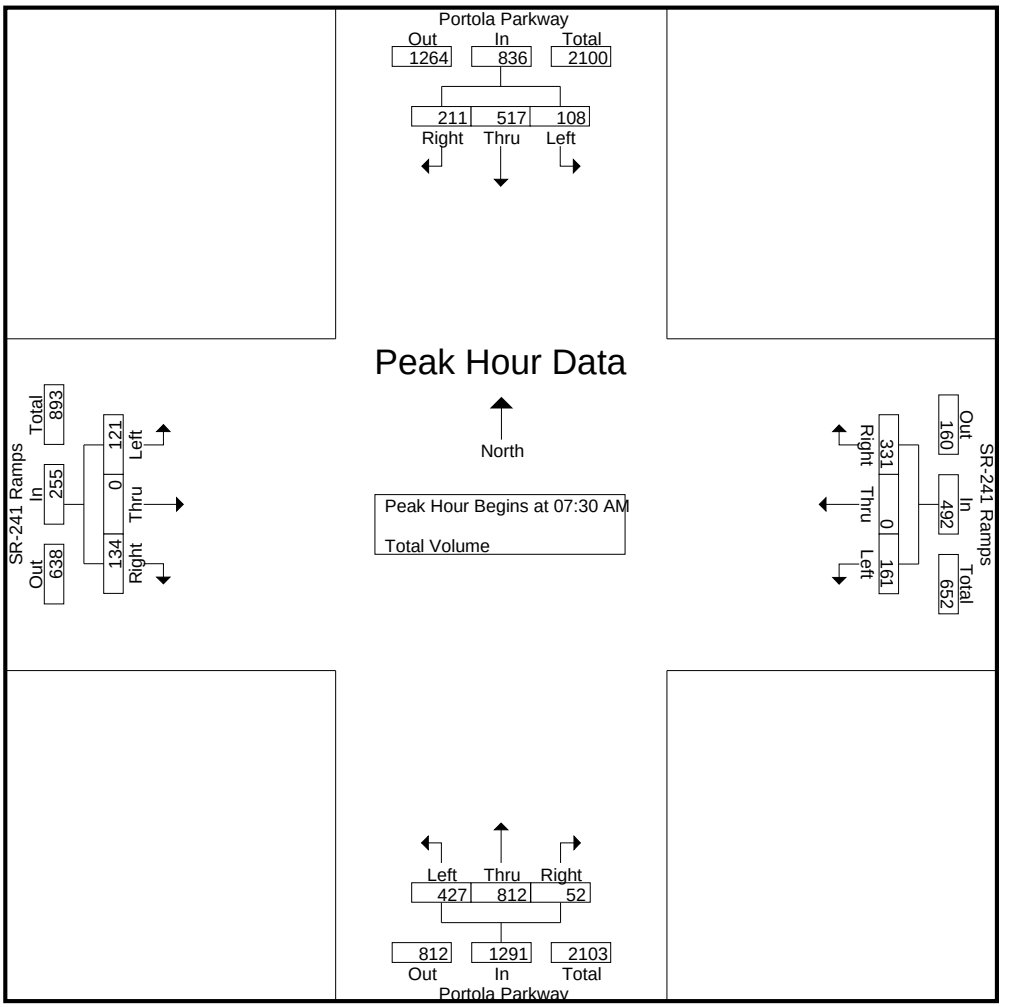
	Portola Parkway Southbound				SR-241 Ramps Westbound				Portola Parkway Northbound				SR-241 Ramps Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	25	71	45	141	19	0	40	59	91	158	8	257	23	0	18	41	498
07:15 AM	17	90	67	174	25	0	55	80	103	147	16	266	17	0	24	41	561
07:30 AM	21	137	57	215	30	0	72	102	139	138	11	288	33	0	23	56	661
07:45 AM	35	163	55	253	43	0	102	145	100	225	16	341	29	0	42	71	810
Total	98	461	224	783	117	0	269	386	433	668	51	1152	102	0	107	209	2530
08:00 AM	29	117	52	198	45	0	97	142	102	241	15	358	28	0	30	58	756
08:15 AM	23	100	47	170	43	0	60	103	86	208	10	304	31	0	39	70	647
08:30 AM	19	124	36	179	38	0	48	86	102	151	13	266	29	0	37	66	597
08:45 AM	17	117	40	174	30	0	61	91	81	142	12	235	43	0	55	98	598
Total	88	458	175	721	156	0	266	422	371	742	50	1163	131	0	161	292	2598
Grand Total	186	919	399	1504	273	0	535	808	804	1410	101	2315	233	0	268	501	5128
Apprch %	12.4	61.1	26.5		33.8	0	66.2		34.7	60.9	4.4		46.5	0	53.5		
Total %	3.6	17.9	7.8	29.3	5.3	0	10.4	15.8	15.7	27.5	2	45.1	4.5	0	5.2	9.8	

	Portola Parkway Southbound				SR-241 Ramps Westbound				Portola Parkway Northbound				SR-241 Ramps Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	21	137	**57**	215	30	0	72	102	**139**	138	11	288	**33**	0	23	56	661
07:45 AM	**35**	**163**	55	**253**	43	0	**102**	**145**	100	225	**16**	341	29	0	**42**	**71**	**810**
08:00 AM	29	117	52	198	**45**	0	97	142	102	**241**	15	**358**	28	0	30	58	756
08:15 AM	23	100	47	170	43	0	60	103	86	208	10	304	31	0	39	70	647
Total Volume	108	517	211	836	161	0	331	492	427	812	52	1291	121	0	134	255	2874
% App. Total	12.9	61.8	25.2		32.7	0	67.3		33.1	62.9	4		47.5	0	52.5		
PHF	.771	.793	.925	.826	.894	.000	.811	.848	.768	.842	.813	.902	.917	.000	.798	.898	.887

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Portola Parkway
E/W: SR-241 Ramps
Weather: Clear

File Name : LKFPO241AM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:15 AM				07:30 AM				07:30 AM				08:00 AM			
+0 mins.	17	90	**67**	174	30	0	72	102	**139**	138	11	288	28	0	30	58
+15 mins.	21	137	57	215	43	0	**102**	**145**	100	225	**16**	341	31	0	39	70
+30 mins.	**35**	**163**	55	**253**	**45**	0	97	142	102	**241**	15	**358**	29	0	37	66
+45 mins.	29	117	52	198	43	0	60	103	86	208	10	304	**43**	0	**55**	**98**
Total Volume	102	507	231	840	161	0	331	492	427	812	52	1291	131	0	161	292
% App. Total	12.1	60.4	27.5		32.7	0	67.3		33.1	62.9	4		44.9	0	55.1	
PHF	.729	.778	.862	.830	.894	.000	.811	.848	.768	.842	.813	.902	.762	.000	.732	.745

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Portola Parkway
E/W: SR-241 Ramps
Weather: Clear

File Name : LKFPO241PM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

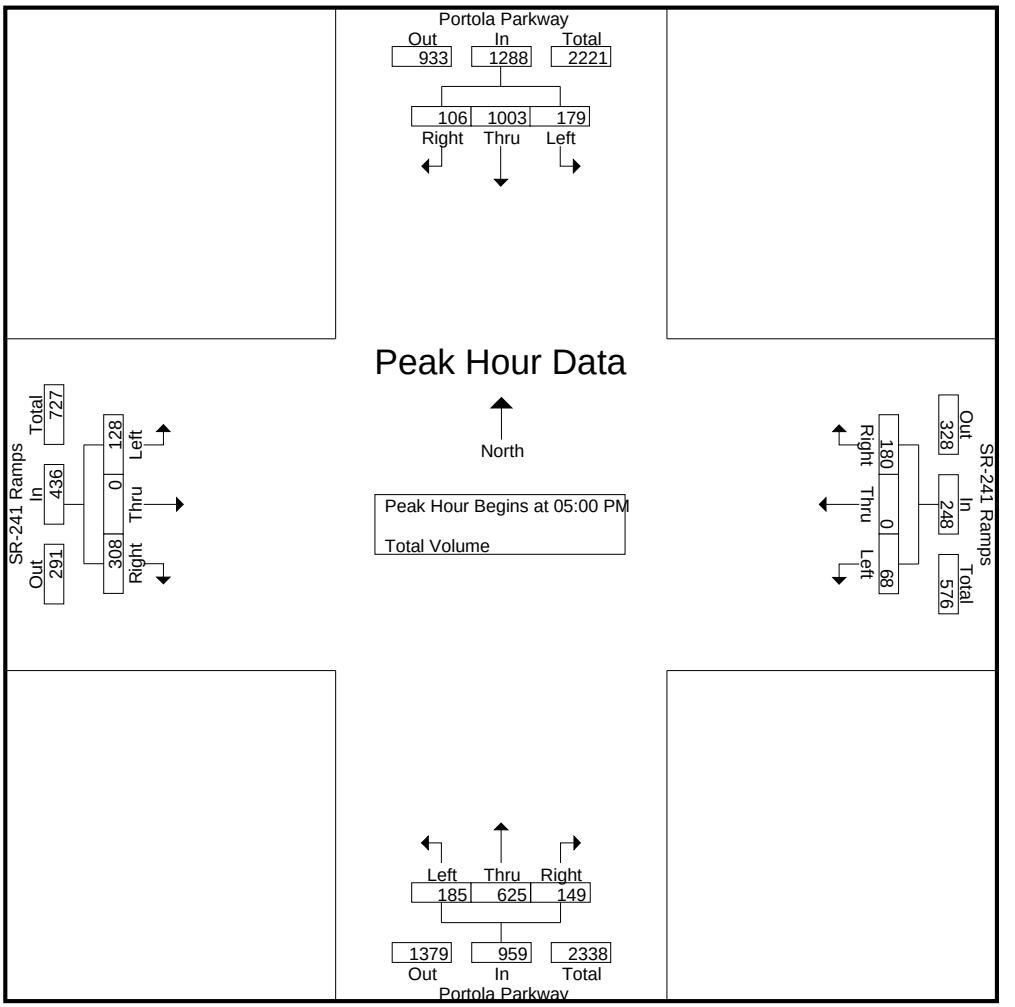
	Portola Parkway Southbound				SR-241 Ramps Westbound				Portola Parkway Northbound				SR-241 Ramps Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	48	178	19	245	17	0	42	59	42	135	21	198	21	0	59	80	582
04:15 PM	37	215	22	274	17	0	32	49	30	119	32	181	19	0	62	81	585
04:30 PM	49	231	35	315	15	0	31	46	34	142	36	212	23	0	67	90	663
04:45 PM	56	192	21	269	27	0	33	60	55	120	30	205	27	0	63	90	624
Total	190	816	97	1103	76	0	138	214	161	516	119	796	90	0	251	341	2454
05:00 PM	53	274	37	364	14	0	45	59	44	143	30	217	21	0	65	86	726
05:15 PM	44	251	23	318	17	0	56	73	50	161	44	255	39	0	81	120	766
05:30 PM	35	239	27	301	18	0	37	55	48	167	45	260	31	0	83	114	730
05:45 PM	47	239	19	305	19	0	42	61	43	154	30	227	37	0	79	116	709
Total	179	1003	106	1288	68	0	180	248	185	625	149	959	128	0	308	436	2931
Grand Total	369	1819	203	2391	144	0	318	462	346	1141	268	1755	218	0	559	777	5385
Apprch %	15.4	76.1	8.5		31.2	0	68.8		19.7	65	15.3		28.1	0	71.9		
Total %	6.9	33.8	3.8	44.4	2.7	0	5.9	8.6	6.4	21.2	5	32.6	4	0	10.4	14.4	

	Portola Parkway Southbound				SR-241 Ramps Westbound				Portola Parkway Northbound				SR-241 Ramps Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	**53**	**274**	**37**	**364**	14	0	45	59	44	143	30	217	21	0	65	86	726
05:15 PM	44	251	23	318	17	0	**56**	**73**	**50**	161	44	255	**39**	0	81	**120**	**766**
05:30 PM	35	239	27	301	18	0	37	55	48	**167**	**45**	**260**	31	0	**83**	114	730
05:45 PM	47	239	19	305	**19**	0	42	61	43	154	30	227	37	0	79	116	709
Total Volume	179	1003	106	1288	68	0	180	248	185	625	149	959	128	0	308	436	2931
% App. Total	13.9	77.9	8.2		27.4	0	72.6		19.3	65.2	15.5		29.4	0	70.6		
PHF	.844	.915	.716	.885	.895	.000	.804	.849	.925	.936	.828	.922	.821	.000	.928	.908	.957

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Portola Parkway
E/W: SR-241 Ramps
Weather: Clear

File Name : LKFPO241PM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	05:00 PM				05:00 PM				05:00 PM				05:00 PM			
+0 mins.	**53**	**274**	**37**	**364**	14	0	45	59	44	143	30	217	21	0	65	86
+15 mins.	44	251	23	318	17	0	**56**	**73**	**50**	161	44	255	**39**	0	81	**120**
+30 mins.	35	239	27	301	18	0	37	55	48	**167**	**45**	**260**	31	0	**83**	114
+45 mins.	47	239	19	305	**19**	0	42	61	43	154	30	227	37	0	79	116
Total Volume	179	1003	106	1288	68	0	180	248	185	625	149	959	128	0	308	436
% App. Total	13.9	77.9	8.2		27.4	0	72.6		19.3	65.2	15.5		29.4	0	70.6	
PHF	.844	.915	.716	.885	.895	.000	.804	.849	.925	.936	.828	.922	.821	.000	.928	.908

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Portola Parkway
E/W: Rancho Parkway
Weather: Clear

File Name : LKFPORAAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

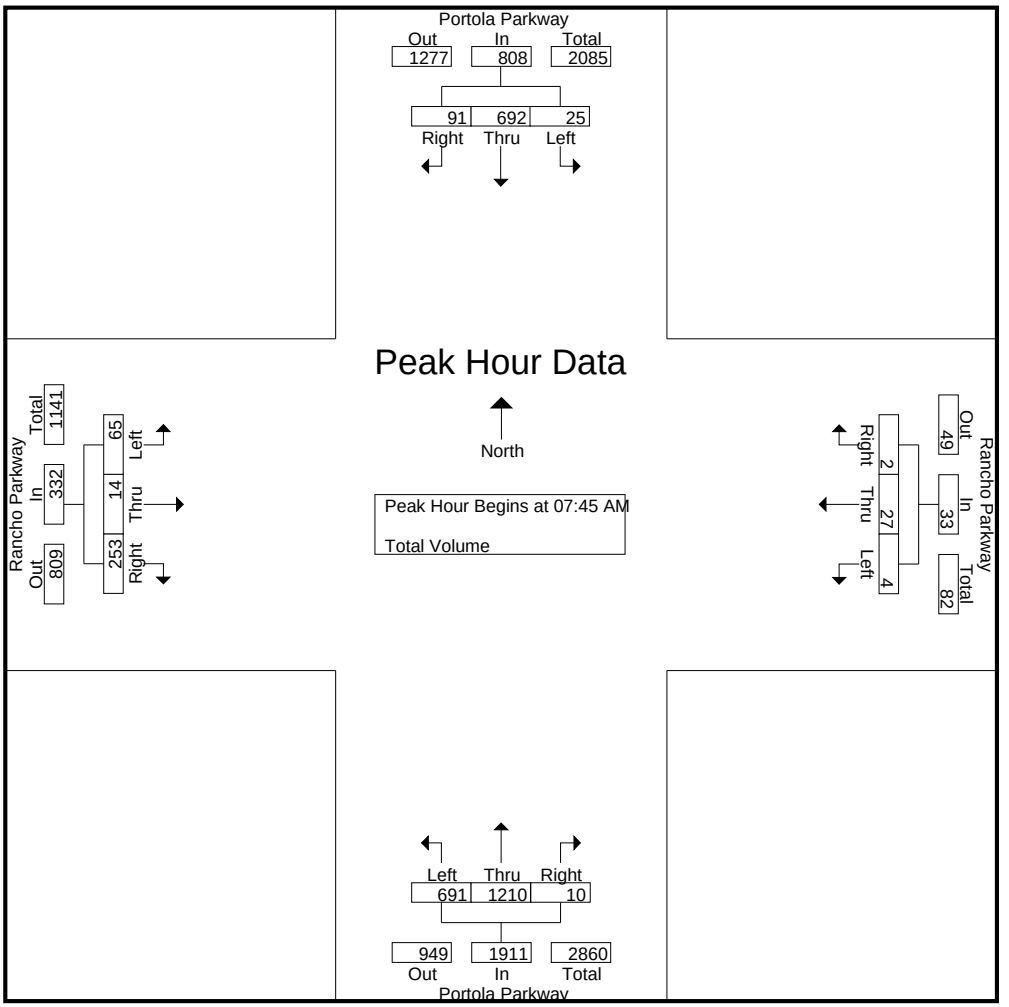
	Portola Parkway Southbound				Rancho Parkway Westbound				Portola Parkway Northbound				Rancho Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	3	88	11	102	1	1	0	2	144	259	4	407	8	1	38	47	558
07:15 AM	0	102	18	120	0	1	0	1	153	273	2	428	13	0	42	55	604
07:30 AM	4	151	12	167	0	0	0	0	140	278	1	419	13	7	43	63	649
07:45 AM	2	231	21	254	1	7	1	9	189	345	1	535	20	4	68	92	890
Total	9	572	62	643	2	9	1	12	626	1155	8	1789	54	12	191	257	2701
08:00 AM	3	161	30	194	0	10	1	11	183	330	0	513	14	3	57	74	792
08:15 AM	9	141	24	174	0	6	0	6	165	300	4	469	13	5	61	79	728
08:30 AM	11	159	16	186	3	4	0	7	154	235	5	394	18	2	67	87	674
08:45 AM	25	143	8	176	1	3	0	4	148	236	1	385	14	13	73	100	665
Total	48	604	78	730	4	23	1	28	650	1101	10	1761	59	23	258	340	2859
Grand Total	57	1176	140	1373	6	32	2	40	1276	2256	18	3550	113	35	449	597	5560
Apprch %	4.2	85.7	10.2		15	80	5		35.9	63.5	0.5		18.9	5.9	75.2		
Total %	1	21.2	2.5	24.7	0.1	0.6	0	0.7	22.9	40.6	0.3	63.8	2	0.6	8.1	10.7	

	Portola Parkway Southbound				Rancho Parkway Westbound				Portola Parkway Northbound				Rancho Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	2	**231**	21	**254**	1	7	**1**	9	**189**	**345**	1	**535**	**20**	4	**68**	**92**	**890**
08:00 AM	3	161	**30**	194	0	**10**	1	**11**	183	330	0	513	14	3	57	74	792
08:15 AM	9	141	24	174	0	6	0	6	165	300	4	469	13	**5**	61	79	728
08:30 AM	**11**	159	16	186	**3**	4	0	7	154	235	**5**	394	18	2	67	87	674
Total Volume	25	692	91	808	4	27	2	33	691	1210	10	1911	65	14	253	332	3084
% App. Total	3.1	85.6	11.3		12.1	81.8	6.1		36.2	63.3	0.5		19.6	4.2	76.2		
PHF	.568	.749	.758	.795	.333	.675	.500	.750	.914	.877	.500	.893	.813	.700	.930	.902	.866

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Portola Parkway
E/W: Rancho Parkway
Weather: Clear

File Name : LKFPORAAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:45 AM				07:45 AM				07:30 AM				08:00 AM			
+0 mins.	2	**231**	21	**254**	1	7	**1**	9	140	278	1	419	14	3	57	74
+15 mins.	3	161	**30**	194	0	**10**	1	**11**	**189**	**345**	1	**535**	13	5	61	79
+30 mins.	9	141	24	174	0	6	0	6	183	330	0	513	**18**	2	67	87
+45 mins.	**11**	159	16	186	**3**	4	0	7	165	300	**4**	469	14	**13**	**73**	**100**
Total Volume	25	692	91	808	4	27	2	33	677	1253	6	1936	59	23	258	340
% App. Total	3.1	85.6	11.3		12.1	81.8	6.1		35	64.7	0.3		17.4	6.8	75.9	
PHF	.568	.749	.758	.795	.333	.675	.500	.750	.896	.908	.375	.905	.819	.442	.884	.850

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Portola Parkway
E/W: Rancho Parkway
Weather: Clear

File Name : LKFPORAPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

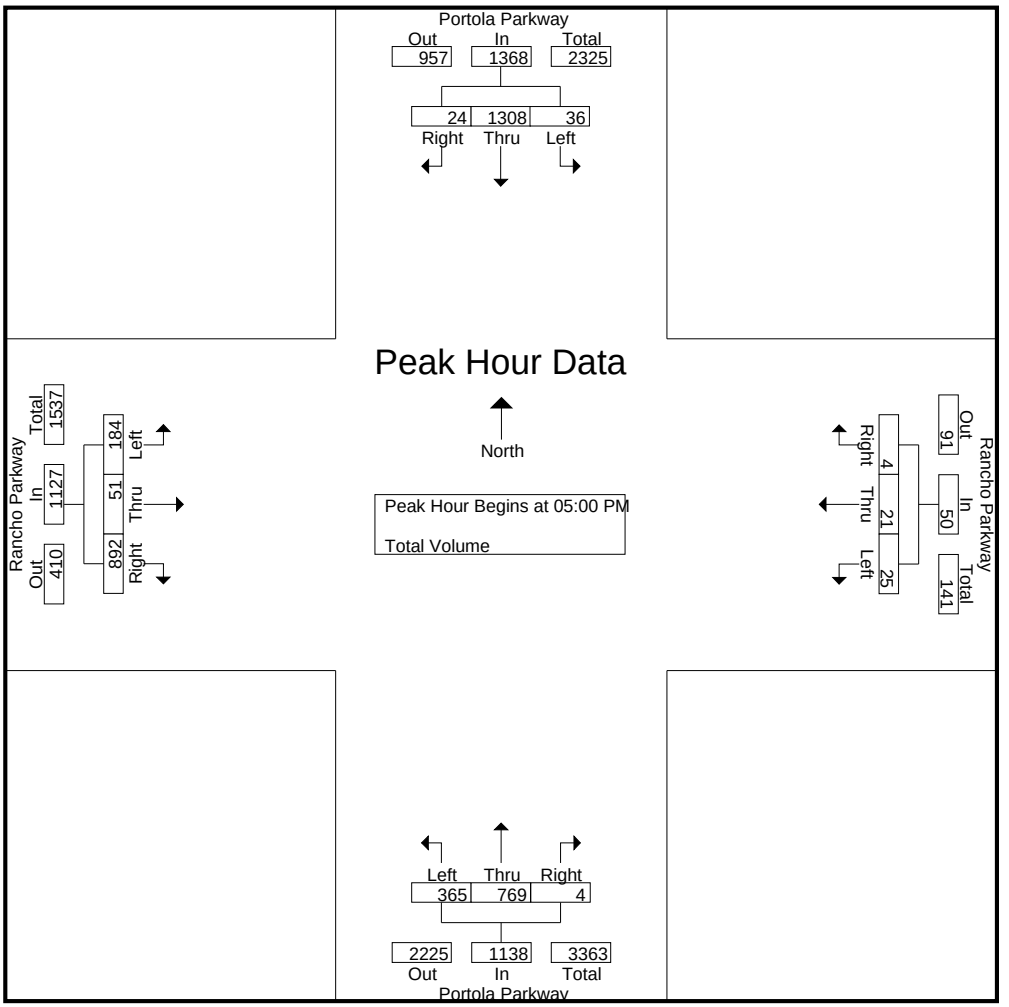
	Portola Parkway Southbound				Rancho Parkway Westbound				Portola Parkway Northbound				Rancho Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	3	256	6	265	4	3	0	7	79	170	1	250	24	5	179	208	730
04:15 PM	0	272	5	277	5	9	1	15	93	145	0	238	27	3	171	201	731
04:30 PM	3	301	4	308	4	5	2	11	76	181	1	258	31	6	204	241	818
04:45 PM	10	253	7	270	5	5	1	11	94	162	0	256	32	7	183	222	759
Total	16	1082	22	1120	18	22	4	44	342	658	2	1002	114	21	737	872	3038
05:00 PM	5	312	8	325	11	7	3	21	77	161	1	239	50	11	227	288	873
05:15 PM	10	364	4	378	5	4	0	9	82	214	1	297	45	9	241	295	979
05:30 PM	7	311	7	325	7	4	1	12	100	206	1	307	44	12	226	282	926
05:45 PM	14	321	5	340	2	6	0	8	106	188	1	295	45	19	198	262	905
Total	36	1308	24	1368	25	21	4	50	365	769	4	1138	184	51	892	1127	3683
Grand Total	52	2390	46	2488	43	43	8	94	707	1427	6	2140	298	72	1629	1999	6721
Apprch %	2.1	96.1	1.8		45.7	45.7	8.5		33	66.7	0.3		14.9	3.6	81.5		
Total %	0.8	35.6	0.7	37	0.6	0.6	0.1	1.4	10.5	21.2	0.1	31.8	4.4	1.1	24.2	29.7	

	Portola Parkway Southbound				Rancho Parkway Westbound				Portola Parkway Northbound				Rancho Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	5	312	**8**	325	**11**	**7**	**3**	**21**	77	161	**1**	239	**50**	11	227	288	873
05:15 PM	10	**364**	4	**378**	5	4	0	9	82	**214**	1	297	45	9	**241**	**295**	**979**
05:30 PM	7	311	7	325	7	4	1	12	100	206	1	**307**	44	12	226	282	926
05:45 PM	**14**	321	5	340	2	6	0	8	**106**	188	1	295	45	**19**	198	262	905
Total Volume	36	1308	24	1368	25	21	4	50	365	769	4	1138	184	51	892	1127	3683
% App. Total	2.6	95.6	1.8		50	42	8		32.1	67.6	0.4		16.3	4.5	79.1		
PHF	.643	.898	.750	.905	.568	.750	.333	.595	.861	.898	1.00	.927	.920	.671	.925	.955	.941

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Portola Parkway
E/W: Rancho Parkway
Weather: Clear

File Name : LKFPORAPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	05:00 PM				04:15 PM				05:00 PM				05:00 PM			
+0 mins.	5	312	**8**	325	5	**9**	1	15	77	161	**1**	239	**50**	11	227	288
+15 mins.	10	**364**	4	**378**	4	5	2	11	82	**214**	1	297	45	9	**241**	**295**
+30 mins.	7	311	7	325	5	5	1	11	100	206	1	**307**	44	12	226	282
+45 mins.	**14**	321	5	340	**11**	7	**3**	**21**	**106**	188	1	295	45	**19**	198	262
Total Volume	36	1308	24	1368	25	26	7	58	365	769	4	1138	184	51	892	1127
% App. Total	2.6	95.6	1.8		43.1	44.8	12.1		32.1	67.6	0.4		16.3	4.5	79.1	
PHF	.643	.898	.750	.905	.568	.722	.583	.690	.861	.898	1.000	.927	.920	.671	.925	.955

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: El Toro Road
E/W: Portola Pkwy / Santa Margarita Pkwy
Weather: Clear

File Name : LKFETPOAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

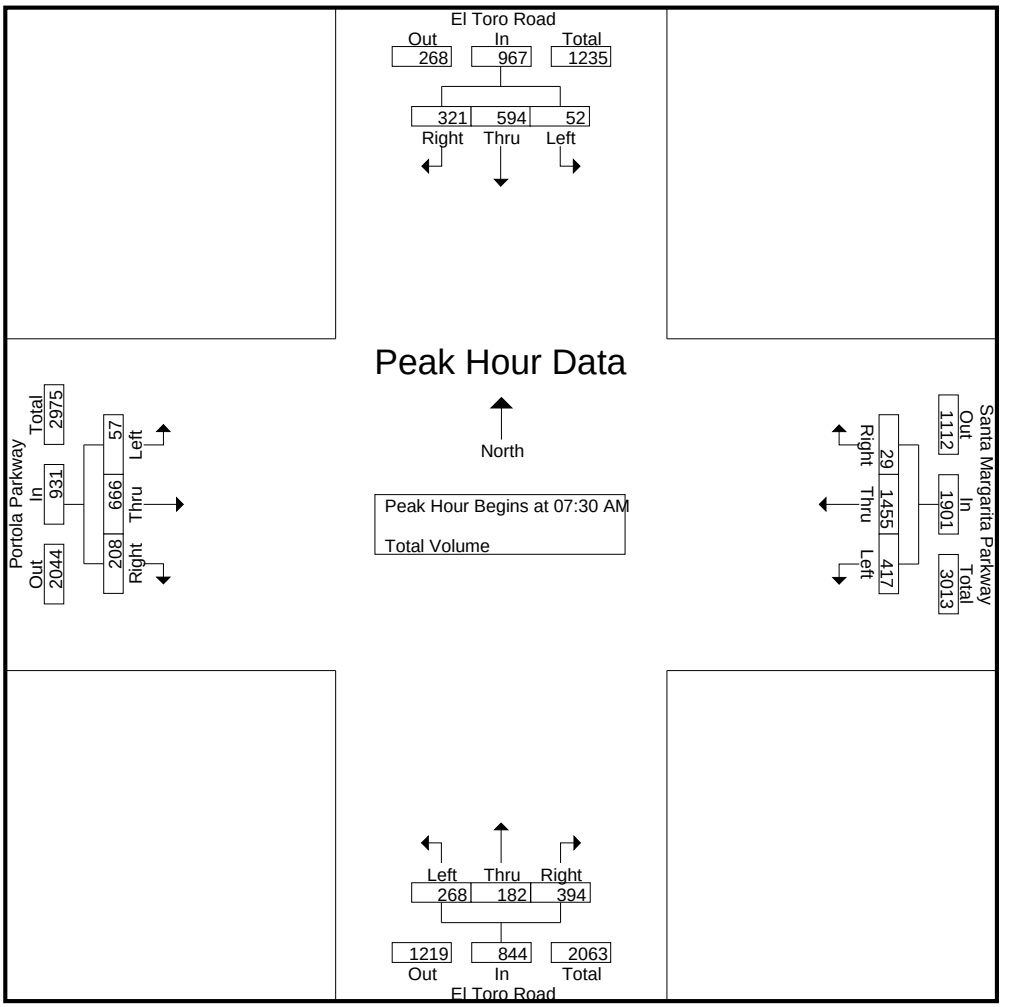
	El Toro Road Southbound				Santa Margarita Parkway Westbound				El Toro Road Northbound				Portola Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	9	125	73	207	94	280	8	382	46	42	59	147	10	95	24	129	865
07:15 AM	2	87	84	173	98	305	3	406	56	44	91	191	15	86	40	141	911
07:30 AM	15	158	76	249	102	312	5	419	47	37	76	160	9	130	34	173	1001
07:45 AM	25	174	111	310	114	374	10	498	73	52	133	258	12	277	59	348	1414
Total	51	544	344	939	408	1271	26	1705	222	175	359	756	46	588	157	791	4191
08:00 AM	5	139	69	213	111	411	9	531	76	46	102	224	18	142	57	217	1185
08:15 AM	7	123	65	195	90	358	5	453	72	47	83	202	18	117	58	193	1043
08:30 AM	2	72	71	145	111	331	4	446	68	44	78	190	22	126	52	200	981
08:45 AM	5	90	72	167	77	284	4	365	87	47	93	227	26	151	42	219	978
Total	19	424	277	720	389	1384	22	1795	303	184	356	843	84	536	209	829	4187
Grand Total	70	968	621	1659	797	2655	48	3500	525	359	715	1599	130	1124	366	1620	8378
Apprch %	4.2	58.3	37.4		22.8	75.9	1.4		32.8	22.5	44.7		8	69.4	22.6		
Total %	0.8	11.6	7.4	19.8	9.5	31.7	0.6	41.8	6.3	4.3	8.5	19.1	1.6	13.4	4.4	19.3	

	El Toro Road Southbound				Santa Margarita Parkway Westbound				El Toro Road Northbound				Portola Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	15	158	76	249	102	312	5	419	47	37	76	160	9	130	34	173	1001
07:45 AM	**25**	**174**	**111**	**310**	**114**	374	**10**	498	73	**52**	**133**	**258**	12	**277**	**59**	**348**	**1414**
08:00 AM	5	139	69	213	111	**411**	9	**531**	**76**	46	102	224	**18**	142	57	217	1185
08:15 AM	7	123	65	195	90	358	5	453	72	47	83	202	18	117	58	193	1043
Total Volume	52	594	321	967	417	1455	29	1901	268	182	394	844	57	666	208	931	4643
% App. Total	5.4	61.4	33.2		21.9	76.5	1.5		31.8	21.6	46.7		6.1	71.5	22.3		
PHF	.520	.853	.723	.780	.914	.885	.725	.895	.882	.875	.741	.818	.792	.601	.881	.669	.821

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: El Toro Road
E/W: Portola Pkwy / Santa Margarita Pkwy
Weather: Clear

File Name : LKFETPOAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:30 AM				07:45 AM				07:45 AM				07:45 AM			
+0 mins.	15	158	76	249	**114**	374	**10**	498	73	**52**	**133**	**258**	12	**277**	**59**	**348**
+15 mins.	**25**	**174**	**111**	**310**	111	**411**	9	**531**	**76**	46	102	224	18	142	57	217
+30 mins.	5	139	69	213	90	358	5	453	72	47	83	202	18	117	58	193
+45 mins.	7	123	65	195	111	331	4	446	68	44	78	190	**22**	126	52	200
Total Volume	52	594	321	967	426	1474	28	1928	289	189	396	874	70	662	226	958
% App. Total	5.4	61.4	33.2		22.1	76.5	1.5		33.1	21.6	45.3		7.3	69.1	23.6	
PHF	.520	.853	.723	.780	.934	.897	.700	.908	.951	.909	.744	.847	.795	.597	.958	.688

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: El Toro Road
E/W: Portola Pkwy / Santa Margarita Pkwy
Weather: Clear

File Name : LKFETPOPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

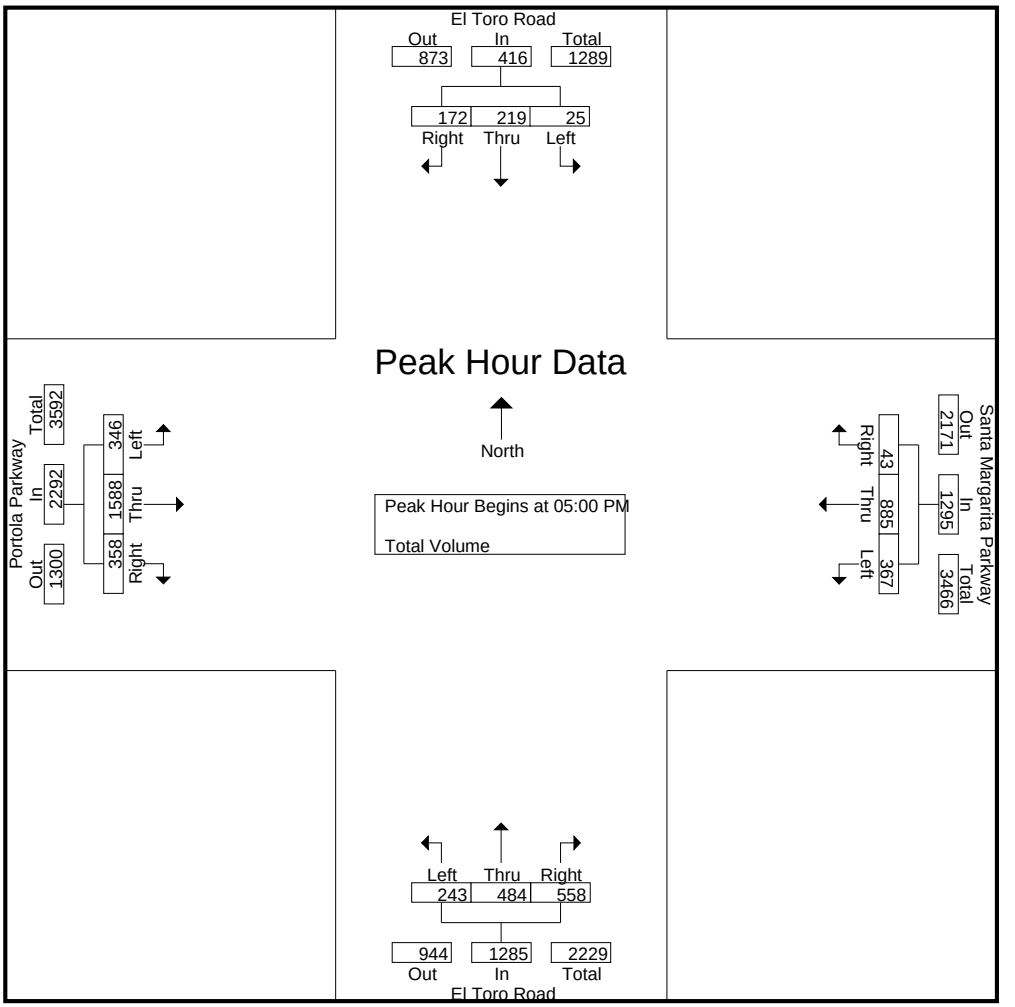
	El Toro Road Southbound				Santa Margarita Parkway Westbound				El Toro Road Northbound				Portola Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	7	50	36	93	95	184	5	284	51	82	96	229	59	278	69	406	1012
04:15 PM	3	47	26	76	81	184	19	284	43	91	121	255	61	367	63	491	1106
04:30 PM	2	63	35	100	100	179	15	294	54	91	107	252	60	353	62	475	1121
04:45 PM	5	60	36	101	99	181	11	291	56	80	117	253	61	326	84	471	1116
Total	17	220	133	370	375	728	50	1153	204	344	441	989	241	1324	278	1843	4355
05:00 PM	3	52	43	98	80	181	5	266	48	102	128	278	78	375	85	538	1180
05:15 PM	10	61	31	102	103	227	16	346	74	131	147	352	110	448	93	651	1451
05:30 PM	9	47	54	110	98	233	8	339	53	135	154	342	81	395	96	572	1363
05:45 PM	3	59	44	106	86	244	14	344	68	116	129	313	77	370	84	531	1294
Total	25	219	172	416	367	885	43	1295	243	484	558	1285	346	1588	358	2292	5288
Grand Total	42	439	305	786	742	1613	93	2448	447	828	999	2274	587	2912	636	4135	9643
Apprch %	5.3	55.9	38.8		30.3	65.9	3.8		19.7	36.4	43.9		14.2	70.4	15.4		
Total %	0.4	4.6	3.2	8.2	7.7	16.7	1	25.4	4.6	8.6	10.4	23.6	6.1	30.2	6.6	42.9	

	El Toro Road Southbound				Santa Margarita Parkway Westbound				El Toro Road Northbound				Portola Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	3	52	43	98	80	181	5	266	48	102	128	278	78	375	85	538	1180
05:15 PM	**10**	**61**	31	102	**103**	227	**16**	**346**	**74**	131	147	**352**	**110**	**448**	93	**651**	**1451**
05:30 PM	9	47	**54**	**110**	98	233	8	339	53	**135**	**154**	342	81	395	**96**	572	1363
05:45 PM	3	59	44	106	86	**244**	14	344	68	116	129	313	77	370	84	531	1294
Total Volume	25	219	172	416	367	885	43	1295	243	484	558	1285	346	1588	358	2292	5288
% App. Total	6	52.6	41.3		28.3	68.3	3.3		18.9	37.7	43.4		15.1	69.3	15.6		
PHF	.625	.898	.796	.945	.891	.907	.672	.936	.821	.896	.906	.913	.786	.886	.932	.880	.911

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: El Toro Road
E/W: Portola Pkwy / Santa Margarita Pkwy
Weather: Clear

File Name : LKFETPOPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	05:00 PM				05:00 PM				05:00 PM				05:00 PM			
+0 mins.	3	52	43	98	80	181	5	266	48	102	128	278	78	375	85	538
+15 mins.	**10**	**61**	31	102	**103**	227	**16**	**346**	**74**	131	147	**352**	**110**	**448**	93	**651**
+30 mins.	9	47	**54**	**110**	98	233	8	339	53	**135**	**154**	342	81	395	**96**	572
+45 mins.	3	59	44	106	86	**244**	14	344	68	116	129	313	77	370	84	531
Total Volume	25	219	172	416	367	885	43	1295	243	484	558	1285	346	1588	358	2292
% App. Total	6	52.6	41.3		28.3	68.3	3.3		18.9	37.7	43.4		15.1	69.3	15.6	
PHF	.625	.898	.796	.945	.891	.907	.672	.936	.821	.896	.906	.913	.786	.886	.932	.880

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Los Alisos Boulevard
E/W: Portola Parkway
Weather: Clear

File Name : LKFLAPOAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

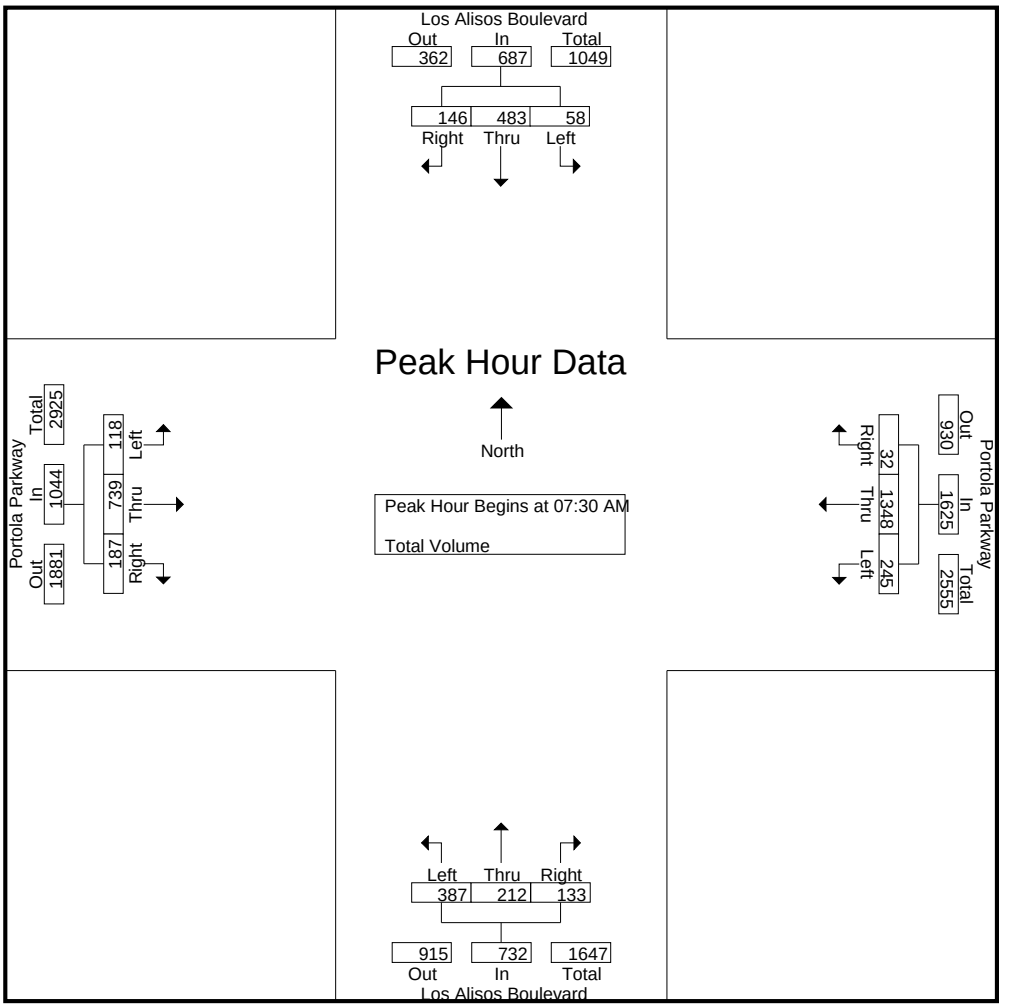
	Los Alisos Boulevard Southbound				Portola Parkway Westbound				Los Alisos Boulevard Northbound				Portola Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	15	88	30	133	53	281	3	337	76	45	18	139	48	137	27	212	821
07:15 AM	14	69	31	114	39	290	4	333	71	23	21	115	10	168	31	209	771
07:30 AM	9	121	23	153	79	358	5	442	73	28	24	125	20	162	33	215	935
07:45 AM	21	187	57	265	85	329	11	425	98	65	43	206	42	202	51	295	1191
Total	59	465	141	665	256	1258	23	1537	318	161	106	585	120	669	142	931	3718
08:00 AM	13	97	26	136	40	335	6	381	104	67	36	207	48	207	64	319	1043
08:15 AM	15	78	40	133	41	326	10	377	112	52	30	194	8	168	39	215	919
08:30 AM	13	53	27	93	28	305	8	341	69	33	31	133	15	188	33	236	803
08:45 AM	11	61	22	94	27	276	4	307	47	30	25	102	9	166	33	208	711
Total	52	289	115	456	136	1242	28	1406	332	182	122	636	80	729	169	978	3476
Grand Total	111	754	256	1121	392	2500	51	2943	650	343	228	1221	200	1398	311	1909	7194
Apprch %	9.9	67.3	22.8		13.3	84.9	1.7		53.2	28.1	18.7		10.5	73.2	16.3		
Total %	1.5	10.5	3.6	15.6	5.4	34.8	0.7	40.9	9	4.8	3.2	17	2.8	19.4	4.3	26.5	

	Los Alisos Boulevard Southbound				Portola Parkway Westbound				Los Alisos Boulevard Northbound				Portola Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	9	121	23	153	79	**358**	5	**442**	73	28	24	125	20	162	33	215	935
07:45 AM	**21**	**187**	**57**	**265**	**85**	329	**11**	425	98	65	**43**	206	42	202	51	295	**1191**
08:00 AM	13	97	26	136	40	335	6	381	104	**67**	36	**207**	**48**	**207**	**64**	**319**	1043
08:15 AM	15	78	40	133	41	326	10	377	**112**	52	30	194	8	168	39	215	919
Total Volume	58	483	146	687	245	1348	32	1625	387	212	133	732	118	739	187	1044	4088
% App. Total	8.4	70.3	21.3		15.1	83	2		52.9	29	18.2		11.3	70.8	17.9		
PHF	.690	.646	.640	.648	.721	.941	.727	.919	.864	.791	.773	.884	.615	.893	.730	.818	.858

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Los Alisos Boulevard
E/W: Portola Parkway
Weather: Clear

File Name : LKFLAPOAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:30 AM				07:30 AM				07:45 AM				07:45 AM			
+0 mins.	9	121	23	153	79	**358**	5	**442**	98	65	**43**	206	42	202	51	295
+15 mins.	**21**	**187**	**57**	**265**	**85**	329	**11**	425	104	**67**	36	**207**	**48**	**207**	**64**	**319**
+30 mins.	13	97	26	136	40	335	6	381	**112**	52	30	194	8	168	39	215
+45 mins.	15	78	40	133	41	326	10	377	69	33	31	133	15	188	33	236
Total Volume	58	483	146	687	245	1348	32	1625	383	217	140	740	113	765	187	1065
% App. Total	8.4	70.3	21.3		15.1	83	2		51.8	29.3	18.9		10.6	71.8	17.6	
PHF	.690	.646	.640	.648	.721	.941	.727	.919	.855	.810	.814	.894	.589	.924	.730	.835

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Los Alisos Boulevard
E/W: Portola Parkway
Weather: Clear

File Name : LKFLAPOPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

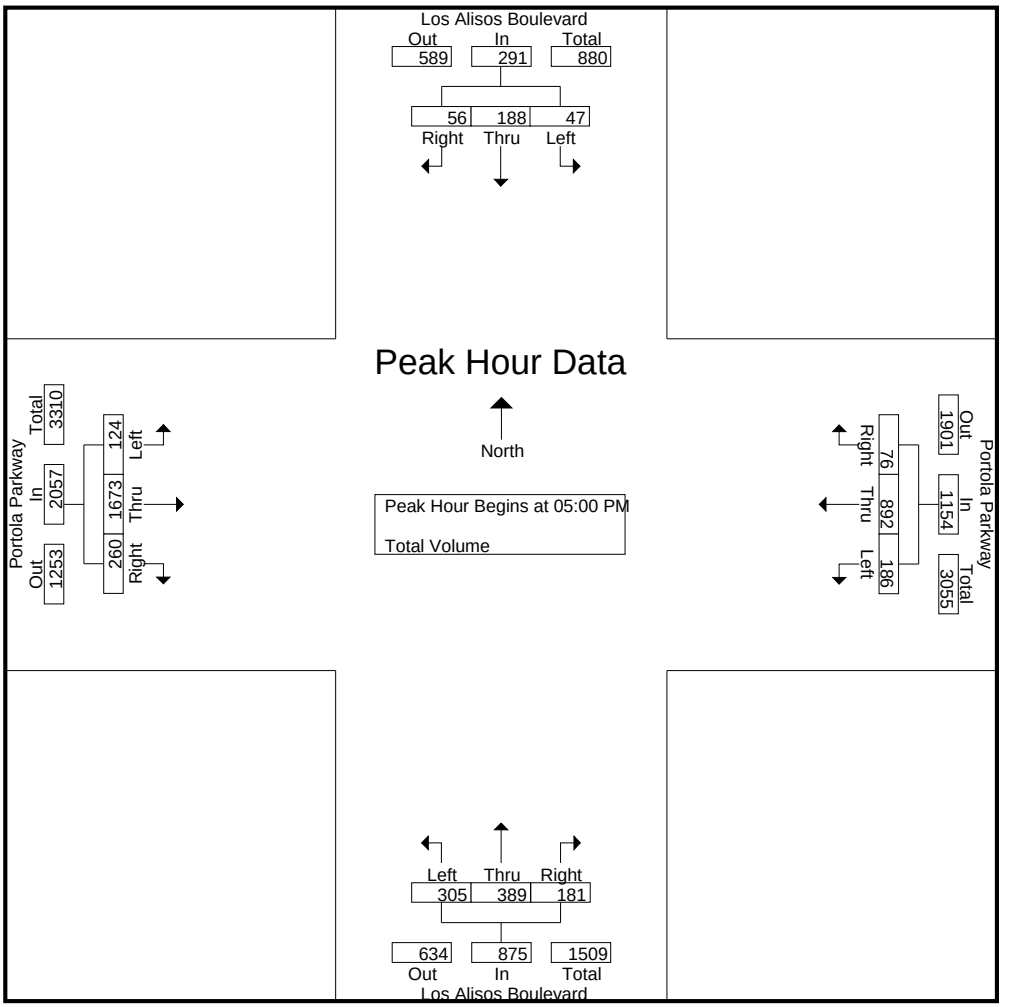
	Los Alisos Boulevard Southbound				Portola Parkway Westbound				Los Alisos Boulevard Northbound				Portola Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	10	43	11	64	32	225	14	271	71	54	34	159	23	361	58	442	936
04:15 PM	8	40	17	65	44	191	21	256	59	64	38	161	23	388	58	469	951
04:30 PM	8	32	17	57	23	219	12	254	70	70	42	182	25	386	50	461	954
04:45 PM	12	27	14	53	36	237	25	298	76	94	43	213	28	378	58	464	1028
Total	38	142	59	239	135	872	72	1079	276	282	157	715	99	1513	224	1836	3869
05:00 PM	9	47	11	67	27	214	19	260	63	83	34	180	32	391	66	489	996
05:15 PM	10	34	17	61	51	238	18	307	78	88	54	220	24	466	67	557	1145
05:30 PM	13	43	9	65	59	212	17	288	77	108	46	231	32	446	56	534	1118
05:45 PM	15	64	19	98	49	228	22	299	87	110	47	244	36	370	71	477	1118
Total	47	188	56	291	186	892	76	1154	305	389	181	875	124	1673	260	2057	4377
Grand Total	85	330	115	530	321	1764	148	2233	581	671	338	1590	223	3186	484	3893	8246
Apprch %	16	62.3	21.7		14.4	79	6.6		36.5	42.2	21.3		5.7	81.8	12.4		
Total %	1	4	1.4	6.4	3.9	21.4	1.8	27.1	7	8.1	4.1	19.3	2.7	38.6	5.9	47.2	

	Los Alisos Boulevard Southbound				Portola Parkway Westbound				Los Alisos Boulevard Northbound				Portola Parkway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	9	47	11	67	27	214	19	260	63	83	34	180	32	391	66	489	996
05:15 PM	10	34	17	61	51	**238**	18	**307**	78	88	**54**	220	24	**466**	67	**557**	**1145**
05:30 PM	13	43	9	65	**59**	212	17	288	77	108	46	231	32	446	56	534	1118
05:45 PM	**15**	**64**	**19**	**98**	49	228	**22**	299	**87**	**110**	47	**244**	**36**	370	**71**	477	1118
Total Volume	47	188	56	291	186	892	76	1154	305	389	181	875	124	1673	260	2057	4377
% App. Total	16.2	64.6	19.2		16.1	77.3	6.6		34.9	44.5	20.7		6	81.3	12.6		
PHF	.783	.734	.737	.742	.788	.937	.864	.940	.876	.884	.838	.897	.861	.898	.915	.923	.956

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Los Alisos Boulevard
E/W: Portola Parkway
Weather: Clear

File Name : LKFLAPOPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	05:00 PM				05:00 PM				05:00 PM				05:00 PM			
+0 mins.	9	47	11	67	27	214	19	260	63	83	34	180	32	391	66	489
+15 mins.	10	34	17	61	51	**238**	18	**307**	78	88	**54**	220	24	**466**	67	**557**
+30 mins.	13	43	9	65	**59**	212	17	288	77	108	46	231	32	446	56	534
+45 mins.	**15**	**64**	**19**	**98**	49	228	**22**	299	**87**	**110**	47	**244**	**36**	370	**71**	477
Total Volume	47	188	56	291	186	892	76	1154	305	389	181	875	124	1673	260	2057
% App. Total	16.2	64.6	19.2		16.1	77.3	6.6		34.9	44.5	20.7		6	81.3	12.6	
PHF	.783	.734	.737	.742	.788	.937	.864	.940	.876	.884	.838	.897	.861	.898	.915	.923

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Alton Parkway
E/W: Commercentre Drive
Weather: Clear

File Name : LKFALCOAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

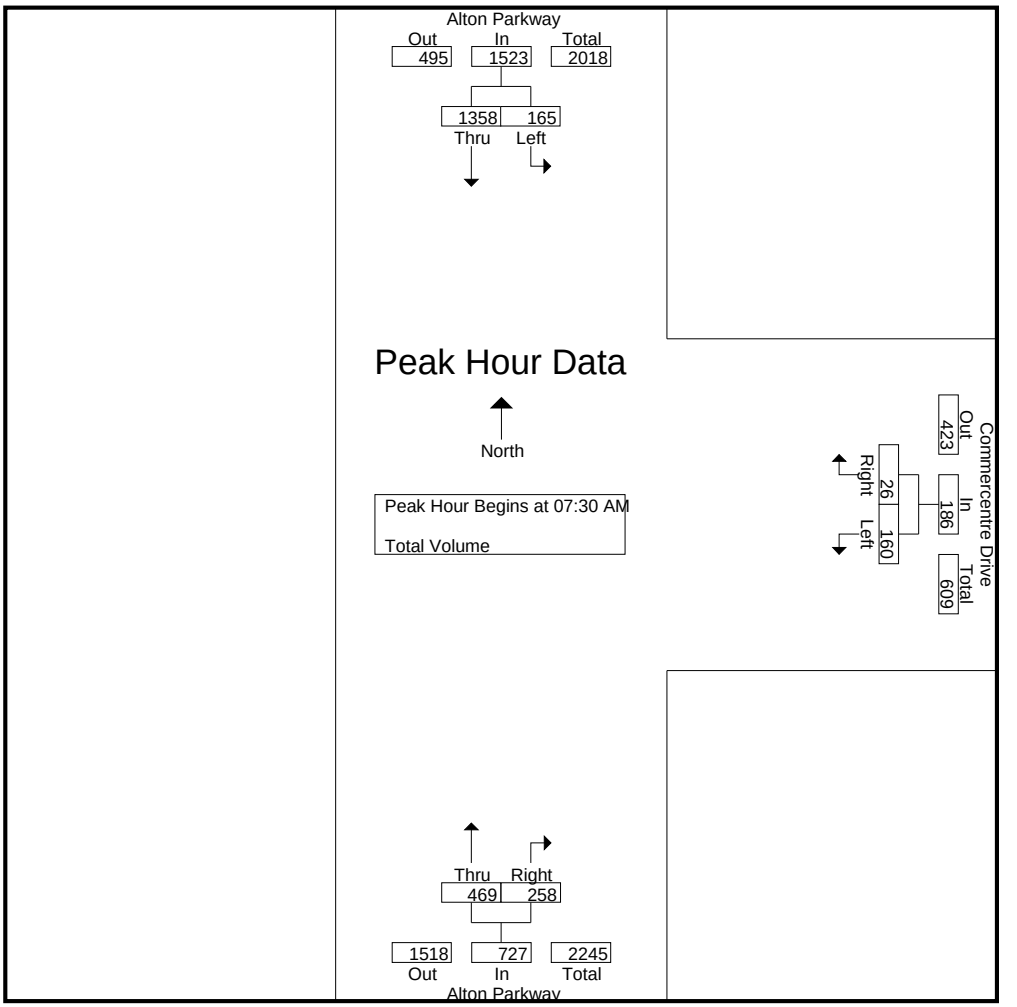
	Alton Parkway Southbound			Commercentre Drive Westbound			Alton Parkway Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
07:00 AM	25	269	294	36	7	43	144	64	208	545
07:15 AM	31	323	354	36	2	38	107	62	169	561
07:30 AM	38	298	336	48	7	55	144	63	207	598
07:45 AM	37	361	398	44	11	55	124	50	174	627
Total	131	1251	1382	164	27	191	519	239	758	2331
08:00 AM	47	351	398	31	3	34	103	59	162	594
08:15 AM	43	348	391	37	5	42	98	86	184	617
08:30 AM	45	297	342	38	10	48	113	76	189	579
08:45 AM	32	247	279	28	2	30	116	76	192	501
Total	167	1243	1410	134	20	154	430	297	727	2291
Grand Total	298	2494	2792	298	47	345	949	536	1485	4622
Apprch %	10.7	89.3		86.4	13.6		63.9	36.1		
Total %	6.4	54	60.4	6.4	1	7.5	20.5	11.6	32.1	

	Alton Parkway Southbound			Commercentre Drive Westbound			Alton Parkway Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30 AM										
07:30 AM	38	298	336	**48**	7	**55**	**144**	63	**207**	598
07:45 AM	37	**361**	**398**	44	**11**	55	124	50	174	**627**
08:00 AM	**47**	351	398	31	3	34	103	59	162	594
08:15 AM	43	348	391	37	5	42	98	**86**	184	617
Total Volume	165	1358	1523	160	26	186	469	258	727	2436
% App. Total	10.8	89.2		86	14		64.5	35.5		
PHF	.878	.940	.957	.833	.591	.845	.814	.750	.878	.971

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Alton Parkway
E/W: Commercentre Drive
Weather: Clear

File Name : LKFALCOAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:45 AM			07:00 AM			07:00 AM		
+0 mins.	37	**361**	**398**	36	7	43	**144**	**64**	**208**
+15 mins.	**47**	351	398	36	2	38	107	62	169
+30 mins.	43	348	391	**48**	7	**55**	144	63	207
+45 mins.	45	297	342	44	**11**	55	124	50	174
Total Volume	172	1357	1529	164	27	191	519	239	758
% App. Total	11.2	88.8		85.9	14.1		68.5	31.5	
PHF	.915	.940	.960	.854	.614	.868	.901	.934	.911

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Alton Parkway
E/W: Commercentre Drive
Weather: Clear

File Name : LKFALCOPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

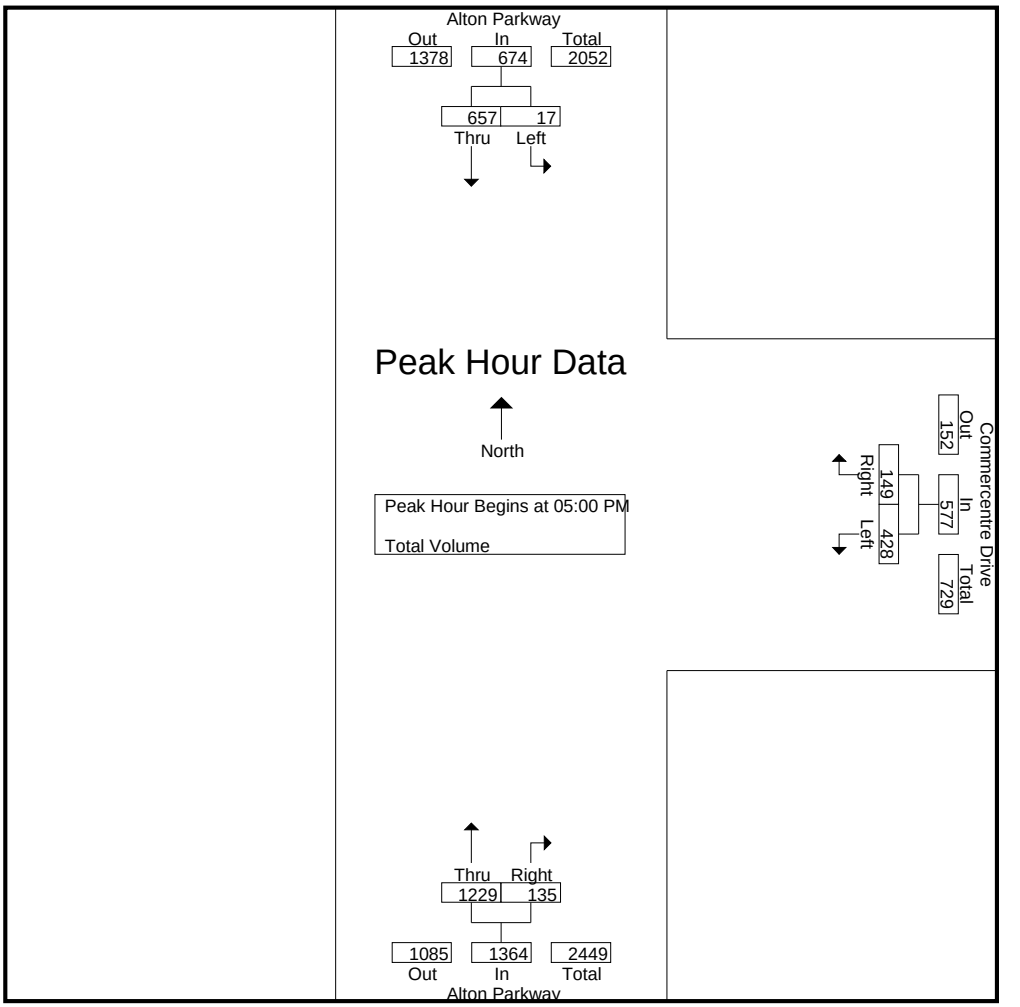
	Alton Parkway Southbound			Commercentre Drive Westbound			Alton Parkway Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
04:00 PM	6	169	175	90	23	113	170	24	194	482
04:15 PM	5	143	148	55	27	82	221	27	248	478
04:30 PM	5	173	178	134	28	162	247	29	276	616
04:45 PM	6	164	170	76	36	112	261	26	287	569
Total	22	649	671	355	114	469	899	106	1005	2145
05:00 PM	4	175	179	148	46	194	273	28	301	674
05:15 PM	7	180	187	93	36	129	329	41	370	686
05:30 PM	4	136	140	121	34	155	316	37	353	648
05:45 PM	2	166	168	66	33	99	311	29	340	607
Total	17	657	674	428	149	577	1229	135	1364	2615
Grand Total	39	1306	1345	783	263	1046	2128	241	2369	4760
Apprch %	2.9	97.1		74.9	25.1		89.8	10.2		
Total %	0.8	27.4	28.3	16.4	5.5	22	44.7	5.1	49.8	

	Alton Parkway Southbound			Commercentre Drive Westbound			Alton Parkway Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	4	175	179	**148**	**46**	**194**	273	28	301	674
05:15 PM	**7**	**180**	**187**	93	36	129	**329**	**41**	**370**	**686**
05:30 PM	4	136	140	121	34	155	316	37	353	648
05:45 PM	2	166	168	66	33	99	311	29	340	607
Total Volume	17	657	674	428	149	577	1229	135	1364	2615
% App. Total	2.5	97.5		74.2	25.8		90.1	9.9		
PHF	.607	.913	.901	.723	.810	.744	.934	.823	.922	.953

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Alton Parkway
E/W: Commercentre Drive
Weather: Clear

File Name : LKFALCOPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:30 PM			04:30 PM			05:00 PM		
+0 mins.	5	173	178	134	28	162	273	28	301
+15 mins.	6	164	170	76	36	112	**329**	**41**	**370**
+30 mins.	4	175	179	**148**	**46**	**194**	316	37	353
+45 mins.	**7**	**180**	**187**	93	36	129	311	29	340
Total Volume	22	692	714	451	146	597	1229	135	1364
% App. Total	3.1	96.9		75.5	24.5		90.1	9.9	
PHF	.786	.961	.955	.762	.793	.769	.934	.823	.922

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Alton Parkway
E/W: Irvine Boulevard
Weather: Clear

File Name : LKFALIRAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

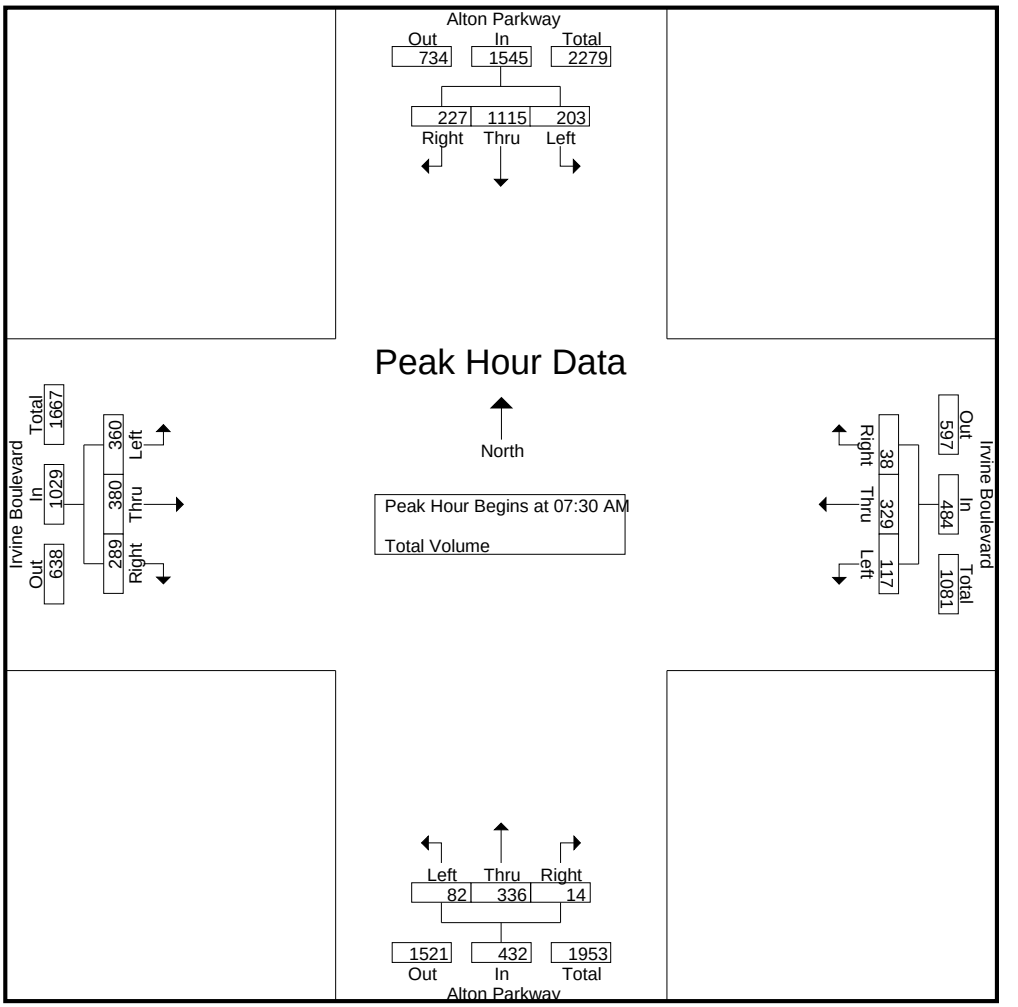
	Alton Parkway Southbound				Irvine Boulevard Westbound				Alton Parkway Northbound				Irvine Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	31	199	54	284	19	71	11	101	33	109	6	148	78	52	24	154	687
07:15 AM	35	234	70	339	26	81	12	119	20	89	4	113	89	69	29	187	758
07:30 AM	34	278	56	368	29	90	13	132	17	85	6	108	97	79	55	231	839
07:45 AM	44	312	66	422	27	81	8	116	30	91	3	124	87	96	56	239	901
Total	144	1023	246	1413	101	323	44	468	100	374	19	493	351	296	164	811	3185
08:00 AM	69	259	50	378	33	91	9	133	16	87	2	105	67	81	89	237	853
08:15 AM	56	266	55	377	28	67	8	103	19	73	3	95	109	124	89	322	897
08:30 AM	46	244	48	338	27	87	11	125	18	75	11	104	92	99	79	270	837
08:45 AM	26	193	46	265	23	76	7	106	20	74	7	101	120	124	60	304	776
Total	197	962	199	1358	111	321	35	467	73	309	23	405	388	428	317	1133	3363
Grand Total	341	1985	445	2771	212	644	79	935	173	683	42	898	739	724	481	1944	6548
Apprch %	12.3	71.6	16.1		22.7	68.9	8.4		19.3	76.1	4.7		38	37.2	24.7		
Total %	5.2	30.3	6.8	42.3	3.2	9.8	1.2	14.3	2.6	10.4	0.6	13.7	11.3	11.1	7.3	29.7	

	Alton Parkway Southbound				Irvine Boulevard Westbound				Alton Parkway Northbound				Irvine Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	34	278	56	368	29	90	**13**	132	17	85	**6**	108	97	79	55	231	839
07:45 AM	44	**312**	**66**	**422**	27	81	8	116	**30**	**91**	3	**124**	87	96	56	239	**901**
08:00 AM	**69**	259	50	378	**33**	**91**	9	**133**	16	87	2	105	67	81	**89**	237	853
08:15 AM	56	266	55	377	28	67	8	103	19	73	3	95	**109**	**124**	89	**322**	897
Total Volume	203	1115	227	1545	117	329	38	484	82	336	14	432	360	380	289	1029	3490
% App. Total	13.1	72.2	14.7		24.2	68	7.9		19	77.8	3.2		35	36.9	28.1		
PHF	.736	.893	.860	.915	.886	.904	.731	.910	.683	.923	.583	.871	.826	.766	.812	.799	.968

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Alton Parkway
E/W: Irvine Boulevard
Weather: Clear

File Name : LKFALIRAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:30 AM				07:15 AM				07:00 AM				08:00 AM			
+0 mins.	34	278	56	368	26	81	12	119	**33**	**109**	**6**	**148**	67	81	**89**	237
+15 mins.	44	**312**	**66**	**422**	29	90	**13**	132	20	89	4	113	109	**124**	89	**322**
+30 mins.	**69**	259	50	378	27	81	8	116	17	85	6	108	92	99	79	270
+45 mins.	56	266	55	377	**33**	**91**	9	**133**	30	91	3	124	**120**	124	60	304
Total Volume	203	1115	227	1545	115	343	42	500	100	374	19	493	388	428	317	1133
% App. Total	13.1	72.2	14.7		23	68.6	8.4		20.3	75.9	3.9		34.2	37.8	28	
PHF	.736	.893	.860	.915	.871	.942	.808	.940	.758	.858	.792	.833	.808	.863	.890	.880

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Alton Parkway
E/W: Irvine Boulevard
Weather: Clear

File Name : LKFALIRPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

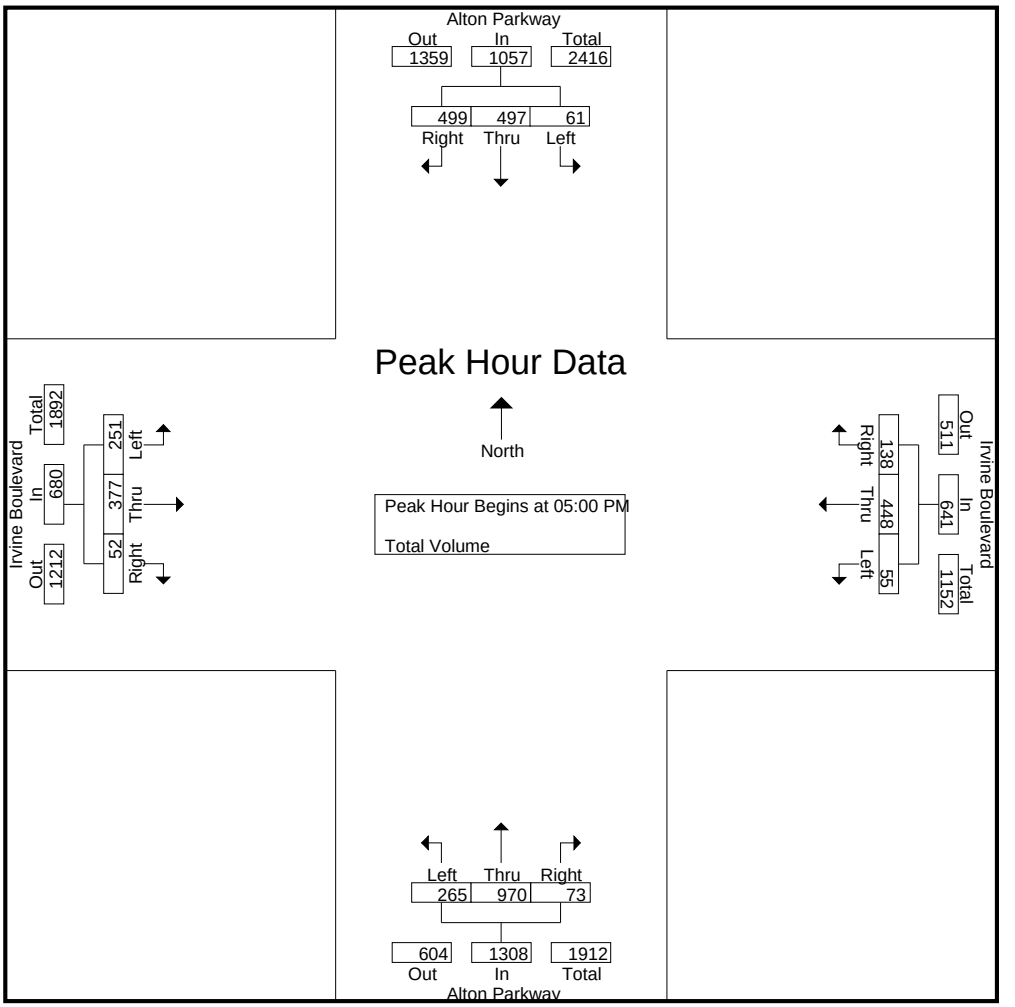
	Alton Parkway Southbound				Irvine Boulevard Westbound				Alton Parkway Northbound				Irvine Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	15	109	120	244	9	108	22	139	67	145	21	233	44	77	26	147	763
04:15 PM	5	100	112	217	6	94	30	130	32	186	25	243	51	79	11	141	731
04:30 PM	21	142	128	291	18	127	36	181	90	194	22	306	46	93	22	161	939
04:45 PM	16	112	109	237	13	107	40	160	51	210	12	273	56	87	14	157	827
Total	57	463	469	989	46	436	128	610	240	735	80	1055	197	336	73	606	3260
05:00 PM	13	136	156	305	11	131	33	175	77	229	24	330	45	93	9	147	957
05:15 PM	13	127	123	263	12	101	37	150	65	233	18	316	82	96	8	186	915
05:30 PM	19	113	115	247	17	116	31	164	78	261	18	357	65	87	19	171	939
05:45 PM	16	121	105	242	15	100	37	152	45	247	13	305	59	101	16	176	875
Total	61	497	499	1057	55	448	138	641	265	970	73	1308	251	377	52	680	3686
Grand Total	118	960	968	2046	101	884	266	1251	505	1705	153	2363	448	713	125	1286	6946
Apprch %	5.8	46.9	47.3		8.1	70.7	21.3		21.4	72.2	6.5		34.8	55.4	9.7		
Total %	1.7	13.8	13.9	29.5	1.5	12.7	3.8	18	7.3	24.5	2.2	34	6.4	10.3	1.8	18.5	

	Alton Parkway Southbound				Irvine Boulevard Westbound				Alton Parkway Northbound				Irvine Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	13	**136**	**156**	**305**	11	**131**	33	**175**	77	229	**24**	330	45	93	9	147	**957**
05:15 PM	13	127	123	263	12	101	**37**	150	65	233	18	316	**82**	96	8	**186**	915
05:30 PM	**19**	113	115	247	**17**	116	31	164	**78**	**261**	18	**357**	65	87	**19**	171	939
05:45 PM	16	121	105	242	15	100	37	152	45	247	13	305	59	**101**	16	176	875
Total Volume	61	497	499	1057	55	448	138	641	265	970	73	1308	251	377	52	680	3686
% App. Total	5.8	47	47.2		8.6	69.9	21.5		20.3	74.2	5.6		36.9	55.4	7.6		
PHF	.803	.914	.800	.866	.809	.855	.932	.916	.849	.929	.760	.916	.765	.933	.684	.914	.963

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Alton Parkway
E/W: Irvine Boulevard
Weather: Clear

File Name : LKFALIRPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:30 PM				04:30 PM				05:00 PM				05:00 PM			
+0 mins.	**21**	**142**	128	291	**18**	127	36	**181**	77	229	**24**	330	45	93	9	147
+15 mins.	16	112	109	237	13	107	**40**	160	65	233	18	316	**82**	96	8	**186**
+30 mins.	13	136	**156**	**305**	11	**131**	33	175	**78**	**261**	18	**357**	65	87	**19**	171
+45 mins.	13	127	123	263	12	101	37	150	45	247	13	305	59	**101**	16	176
Total Volume	63	517	516	1096	54	466	146	666	265	970	73	1308	251	377	52	680
% App. Total	5.7	47.2	47.1		8.1	70	21.9		20.3	74.2	5.6		36.9	55.4	7.6	
PHF	.750	.910	.827	.898	.750	.889	.913	.920	.849	.929	.760	.916	.765	.933	.684	.914

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Bake Parkway
E/W: Commercentre Drive
Weather: Clear

File Name : LKFBACOAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

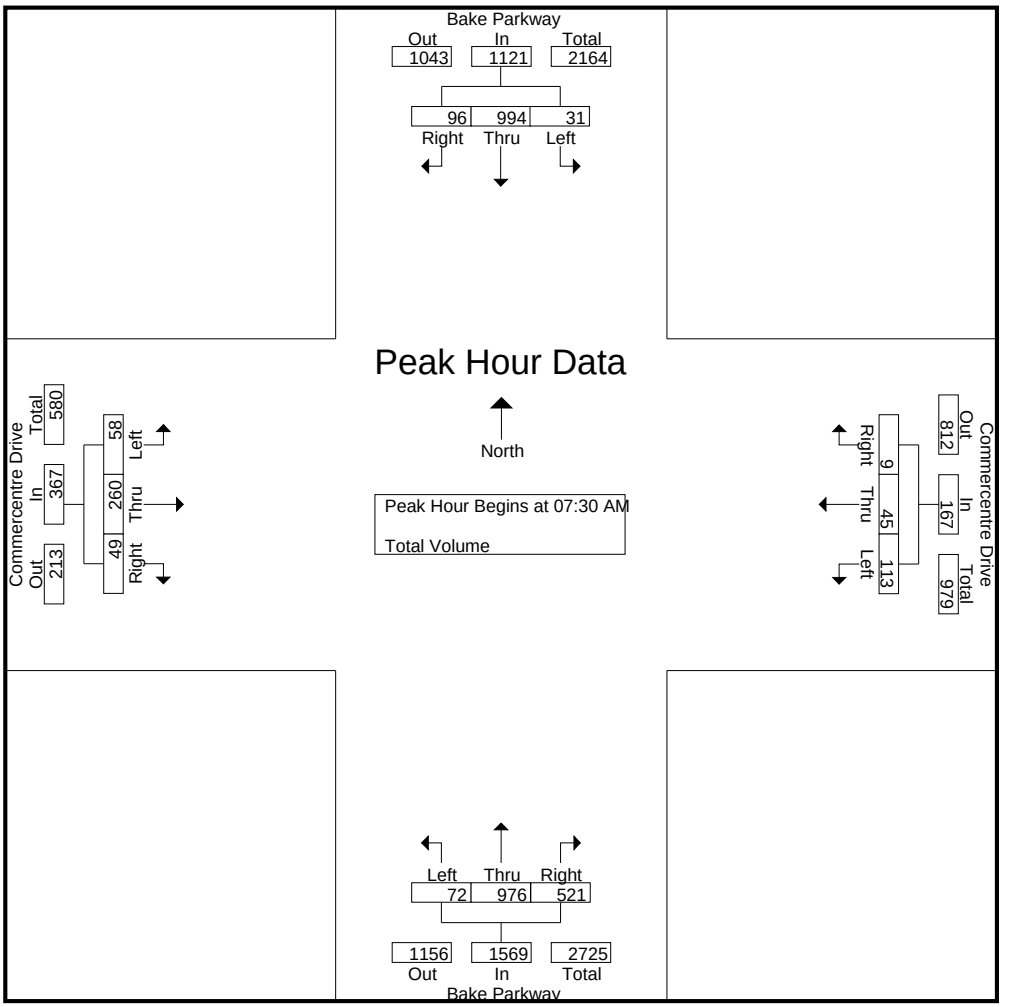
	Bake Parkway Southbound				Commercentre Drive Westbound				Bake Parkway Northbound				Commercentre Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	3	232	21	256	12	11	2	25	24	234	120	378	6	37	9	52	711
07:15 AM	2	166	19	187	26	14	0	40	8	193	119	320	15	43	12	70	617
07:30 AM	7	236	25	268	31	9	3	43	18	211	129	358	13	58	7	78	747
07:45 AM	10	247	26	283	29	12	3	44	24	266	150	440	19	61	16	96	863
Total	22	881	91	994	98	46	8	152	74	904	518	1496	53	199	44	296	2938
08:00 AM	5	278	24	307	27	10	2	39	17	221	125	363	8	62	14	84	793
08:15 AM	9	233	21	263	26	14	1	41	13	278	117	408	18	79	12	109	821
08:30 AM	4	183	21	208	26	20	2	48	18	214	111	343	26	77	9	112	711
08:45 AM	6	169	15	190	21	15	2	38	20	255	130	405	17	70	12	99	732
Total	24	863	81	968	100	59	7	166	68	968	483	1519	69	288	47	404	3057
Grand Total	46	1744	172	1962	198	105	15	318	142	1872	1001	3015	122	487	91	700	5995
Apprch %	2.3	88.9	8.8		62.3	33	4.7		4.7	62.1	33.2		17.4	69.6	13		
Total %	0.8	29.1	2.9	32.7	3.3	1.8	0.3	5.3	2.4	31.2	16.7	50.3	2	8.1	1.5	11.7	

	Bake Parkway Southbound				Commercentre Drive Westbound				Bake Parkway Northbound				Commercentre Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	7	236	25	268	**31**	9	**3**	43	18	211	129	358	13	58	7	78	747
07:45 AM	**10**	247	**26**	283	29	12	3	**44**	**24**	266	**150**	**440**	**19**	61	**16**	96	**863**
08:00 AM	5	**278**	24	**307**	27	10	2	39	17	221	125	363	8	62	14	84	793
08:15 AM	9	233	21	263	26	**14**	1	41	13	**278**	117	408	18	**79**	12	**109**	821
Total Volume	31	994	96	1121	113	45	9	167	72	976	521	1569	58	260	49	367	3224
% App. Total	2.8	88.7	8.6		67.7	26.9	5.4		4.6	62.2	33.2		15.8	70.8	13.4		
PHF	.775	.894	.923	.913	.911	.804	.750	.949	.750	.878	.868	.891	.763	.823	.766	.842	.934

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Bake Parkway
E/W: Commercentre Drive
Weather: Clear

File Name : LKFBACOAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:30 AM				07:45 AM				07:30 AM				08:00 AM			
+0 mins.	7	236	25	268	**29**	12	**3**	44	18	211	129	358	8	62	**14**	84
+15 mins.	**10**	247	**26**	283	27	10	2	39	**24**	266	**150**	**440**	18	**79**	12	109
+30 mins.	5	**278**	24	**307**	26	14	1	41	17	221	125	363	**26**	77	9	**112**
+45 mins.	9	233	21	263	26	**20**	2	**48**	13	**278**	117	408	17	70	12	99
Total Volume	31	994	96	1121	108	56	8	172	72	976	521	1569	69	288	47	404
% App. Total	2.8	88.7	8.6		62.8	32.6	4.7		4.6	62.2	33.2		17.1	71.3	11.6	
PHF	.775	.894	.923	.913	.931	.700	.667	.896	.750	.878	.868	.891	.663	.911	.839	.902

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Bake Parkway
E/W: Commercentre Drive
Weather: Clear

File Name : LKFBACOPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

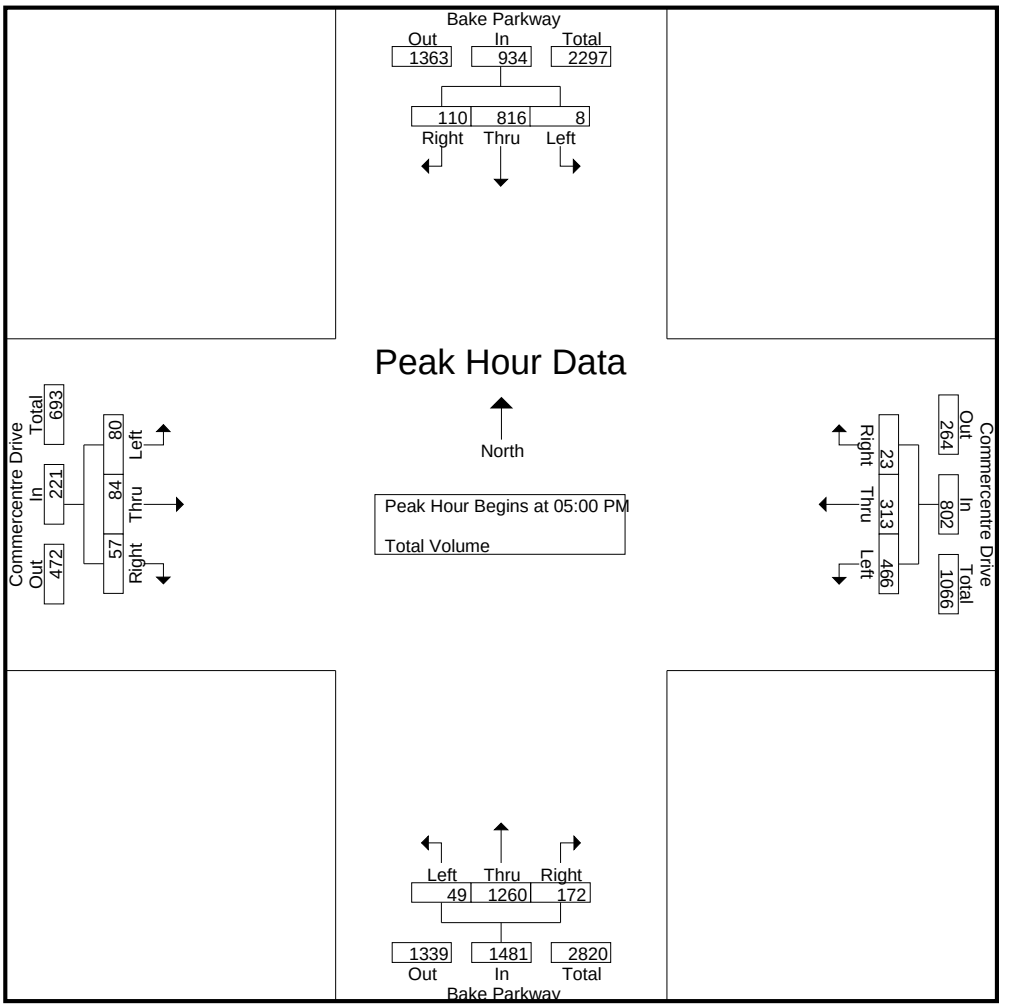
	Bake Parkway Southbound				Commercentre Drive Westbound				Bake Parkway Northbound				Commercentre Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	5	185	18	208	105	60	4	169	19	222	45	286	24	21	20	65	728
04:15 PM	6	181	16	203	80	52	4	136	14	258	30	302	14	21	12	47	688
04:30 PM	3	208	39	250	114	73	8	195	16	247	45	308	19	14	13	46	799
04:45 PM	3	185	13	201	93	54	3	150	10	268	37	315	17	13	16	46	712
Total	17	759	86	862	392	239	19	650	59	995	157	1211	74	69	61	204	2927
05:00 PM	3	197	35	235	138	89	6	233	13	315	41	369	22	25	21	68	905
05:15 PM	2	213	20	235	122	82	9	213	14	304	41	359	25	23	11	59	866
05:30 PM	1	211	33	245	112	86	7	205	11	304	48	363	17	20	19	56	869
05:45 PM	2	195	22	219	94	56	1	151	11	337	42	390	16	16	6	38	798
Total	8	816	110	934	466	313	23	802	49	1260	172	1481	80	84	57	221	3438
Grand Total	25	1575	196	1796	858	552	42	1452	108	2255	329	2692	154	153	118	425	6365
Apprch %	1.4	87.7	10.9		59.1	38	2.9		4	83.8	12.2		36.2	36	27.8		
Total %	0.4	24.7	3.1	28.2	13.5	8.7	0.7	22.8	1.7	35.4	5.2	42.3	2.4	2.4	1.9	6.7	

	Bake Parkway Southbound				Commercentre Drive Westbound				Bake Parkway Northbound				Commercentre Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	**3**	197	**35**	235	**138**	**89**	6	**233**	13	315	41	369	22	**25**	**21**	**68**	**905**
05:15 PM	2	**213**	20	235	122	82	**9**	213	**14**	304	41	359	**25**	23	11	59	866
05:30 PM	1	211	33	**245**	112	86	7	205	11	304	**48**	363	17	20	19	56	869
05:45 PM	2	195	22	219	94	56	1	151	11	**337**	42	**390**	16	16	6	38	798
Total Volume	8	816	110	934	466	313	23	802	49	1260	172	1481	80	84	57	221	3438
% App. Total	0.9	87.4	11.8		58.1	39	2.9		3.3	85.1	11.6		36.2	38	25.8		
PHF	.667	.958	.786	.953	.844	.879	.639	.861	.875	.935	.896	.949	.800	.840	.679	.813	.950

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Bake Parkway
E/W: Commercentre Drive
Weather: Clear

File Name : LKFBACOPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	05:00 PM				05:00 PM				05:00 PM				04:45 PM			
+0 mins.	**3**	197	**35**	235	**138**	**89**	6	**233**	13	315	41	369	17	13	16	46
+15 mins.	2	**213**	20	235	122	82	**9**	213	**14**	304	41	359	22	**25**	**21**	**68**
+30 mins.	1	211	33	**245**	112	86	7	205	11	304	**48**	363	**25**	23	11	59
+45 mins.	2	195	22	219	94	56	1	151	11	**337**	42	**390**	17	20	19	56
Total Volume	8	816	110	934	466	313	23	802	49	1260	172	1481	81	81	67	229
% App. Total	0.9	87.4	11.8		58.1	39	2.9		3.3	85.1	11.6		35.4	35.4	29.3	
PHF	.667	.958	.786	.953	.844	.879	.639	.861	.875	.935	.896	.949	.810	.810	.798	.842

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Bake Parkway
E/W: Irvine Boulevard / Trabuco Road
Weather: Clear

File Name : LKFBAIRAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

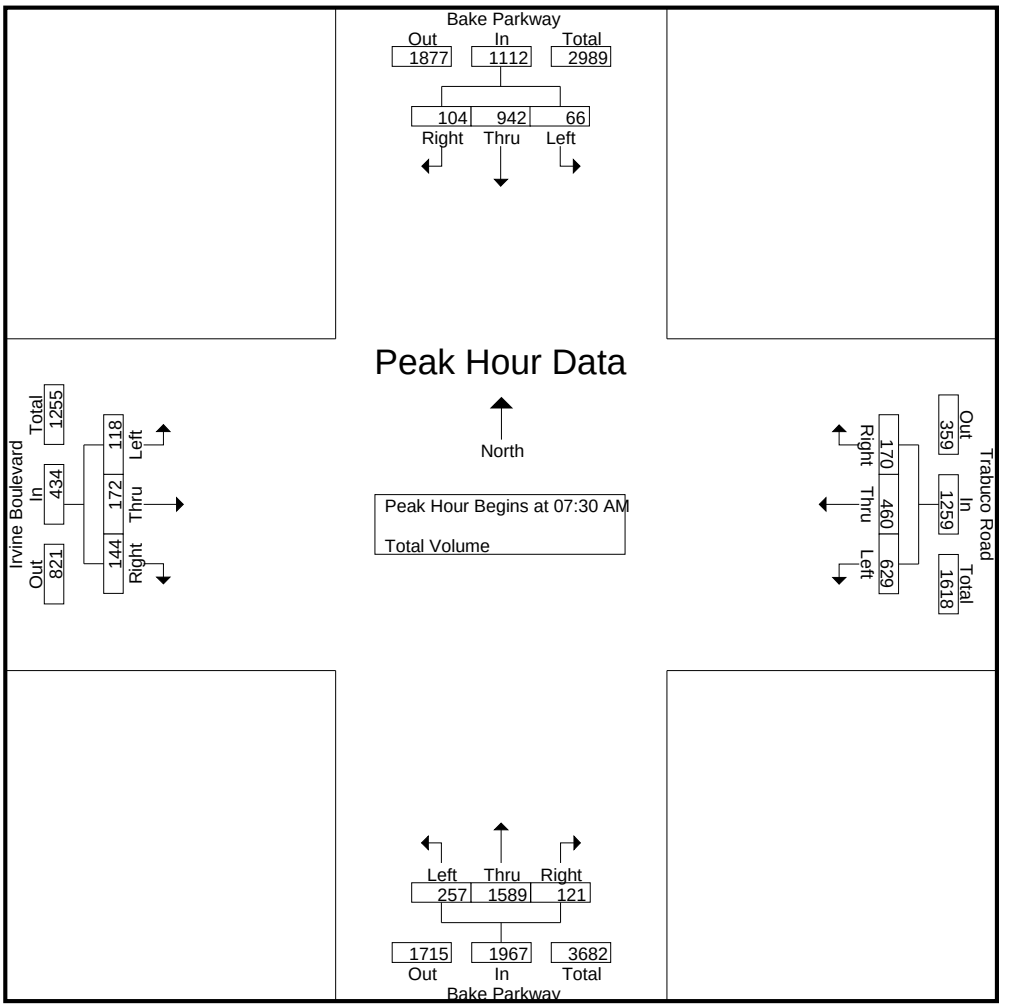
	Bake Parkway Southbound				Trabuco Road Westbound				Bake Parkway Northbound				Irvine Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	15	231	16	262	164	106	25	295	57	342	39	438	20	18	25	63	1058
07:15 AM	13	182	12	207	186	147	31	364	37	322	16	375	25	28	32	85	1031
07:30 AM	12	244	20	276	153	127	30	310	65	425	35	525	30	36	40	106	1217
07:45 AM	17	232	24	273	176	129	52	357	62	425	25	512	43	38	27	108	1250
Total	57	889	72	1018	679	509	138	1326	221	1514	115	1850	118	120	124	362	4556
08:00 AM	17	257	27	301	154	108	41	303	71	380	25	476	21	25	41	87	1167
08:15 AM	20	209	33	262	146	96	47	289	59	359	36	454	24	73	36	133	1138
08:30 AM	11	187	21	219	166	144	45	355	47	391	37	475	25	27	34	86	1135
08:45 AM	18	170	15	203	123	86	42	251	44	410	34	488	31	41	18	90	1032
Total	66	823	96	985	589	434	175	1198	221	1540	132	1893	101	166	129	396	4472
Grand Total	123	1712	168	2003	1268	943	313	2524	442	3054	247	3743	219	286	253	758	9028
Apprch %	6.1	85.5	8.4		50.2	37.4	12.4		11.8	81.6	6.6		28.9	37.7	33.4		
Total %	1.4	19	1.9	22.2	14	10.4	3.5	28	4.9	33.8	2.7	41.5	2.4	3.2	2.8	8.4	

	Bake Parkway Southbound				Trabuco Road Westbound				Bake Parkway Northbound				Irvine Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	12	244	20	276	153	127	30	310	65	**425**	35	**525**	30	36	40	106	1217
07:45 AM	17	232	24	273	**176**	**129**	**52**	**357**	62	425	25	512	**43**	38	27	108	**1250**
08:00 AM	17	**257**	27	**301**	154	108	41	303	**71**	380	25	476	21	25	**41**	87	1167
08:15 AM	**20**	209	**33**	262	146	96	47	289	59	359	**36**	454	24	**73**	36	**133**	1138
Total Volume	66	942	104	1112	629	460	170	1259	257	1589	121	1967	118	172	144	434	4772
% App. Total	5.9	84.7	9.4		50	36.5	13.5		13.1	80.8	6.2		27.2	39.6	33.2		
PHF	.825	.916	.788	.924	.893	.891	.817	.882	.905	.935	.840	.937	.686	.589	.878	.816	.954

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Bake Parkway
E/W: Irvine Boulevard / Trabuco Road
Weather: Clear

File Name : LKFBAIRAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:30 AM				07:15 AM				07:30 AM				07:30 AM			
+0 mins.	12	244	20	276	**186**	**147**	31	**364**	65	**425**	35	**525**	30	36	40	106
+15 mins.	17	232	24	273	153	127	30	310	62	425	25	512	**43**	38	27	108
+30 mins.	17	**257**	27	**301**	176	129	**52**	357	**71**	380	25	476	21	25	**41**	87
+45 mins.	**20**	209	**33**	262	154	108	41	303	59	359	**36**	454	24	**73**	36	**133**
Total Volume	66	942	104	1112	669	511	154	1334	257	1589	121	1967	118	172	144	434
% App. Total	5.9	84.7	9.4		50.1	38.3	11.5		13.1	80.8	6.2		27.2	39.6	33.2	
PHF	.825	.916	.788	.924	.899	.869	.740	.916	.905	.935	.840	.937	.686	.589	.878	.816

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Bake Parkway
E/W: Irvine Boulevard / Trabuco Road
Weather: Clear

File Name : LKFBAIRPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

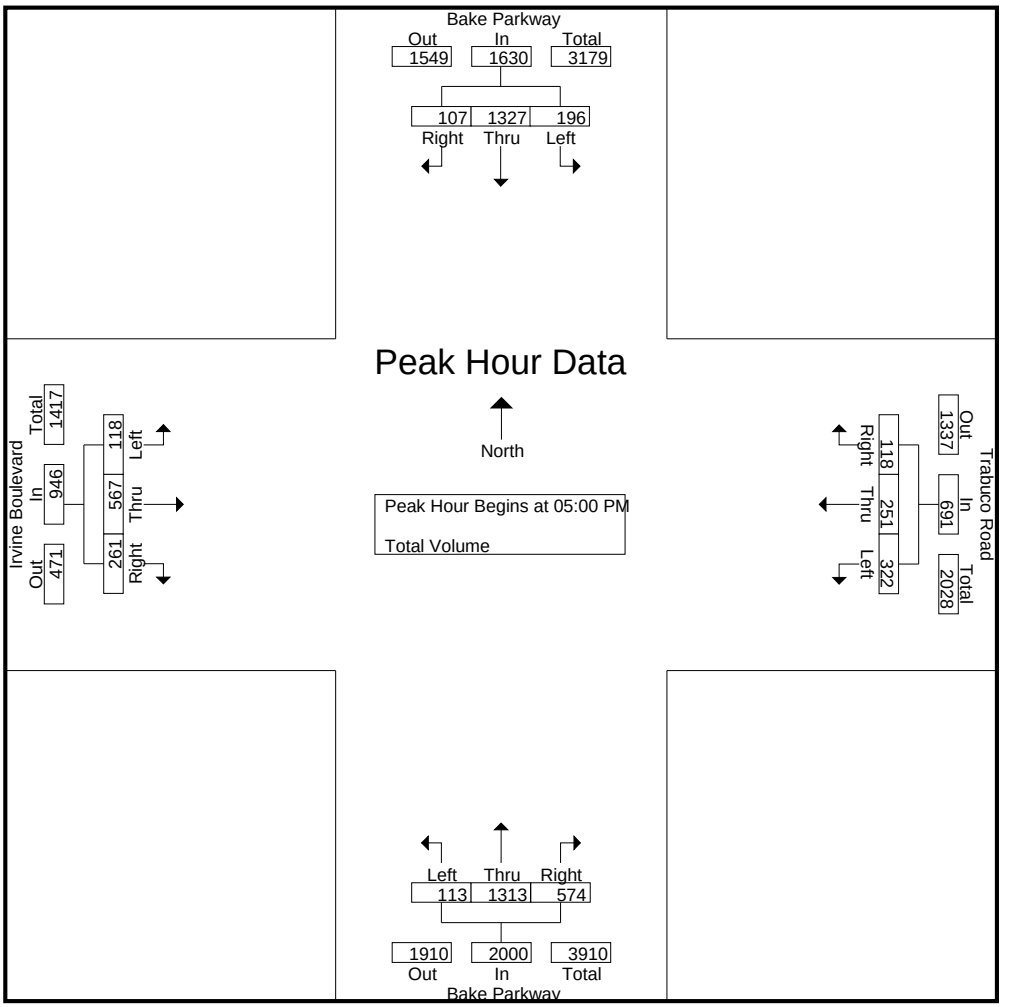
	Bake Parkway Southbound				Trabuco Road Westbound				Bake Parkway Northbound				Irvine Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	40	300	24	364	87	48	16	151	31	253	123	407	28	122	66	216	1138
04:15 PM	31	255	24	310	96	70	23	189	21	287	121	429	32	92	45	169	1097
04:30 PM	44	332	28	404	79	65	16	160	32	233	135	400	29	134	86	249	1213
04:45 PM	34	286	16	336	91	73	25	189	29	311	131	471	28	133	66	227	1223
Total	149	1173	92	1414	353	256	80	689	113	1084	510	1707	117	481	263	861	4671
05:00 PM	63	385	34	482	74	52	23	149	26	311	153	490	28	154	73	255	1376
05:15 PM	48	346	26	420	82	51	25	158	36	341	152	529	32	150	51	233	1340
05:30 PM	46	320	26	392	75	66	34	175	27	320	132	479	28	139	81	248	1294
05:45 PM	39	276	21	336	91	82	36	209	24	341	137	502	30	124	56	210	1257
Total	196	1327	107	1630	322	251	118	691	113	1313	574	2000	118	567	261	946	5267
Grand Total	345	2500	199	3044	675	507	198	1380	226	2397	1084	3707	235	1048	524	1807	9938
Apprch %	11.3	82.1	6.5		48.9	36.7	14.3		6.1	64.7	29.2		13	58	29		
Total %	3.5	25.2	2	30.6	6.8	5.1	2	13.9	2.3	24.1	10.9	37.3	2.4	10.5	5.3	18.2	

	Bake Parkway Southbound				Trabuco Road Westbound				Bake Parkway Northbound				Irvine Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	**63**	**385**	**34**	**482**	74	52	23	149	26	311	**153**	490	28	**154**	73	**255**	**1376**
05:15 PM	48	346	26	420	82	51	25	158	**36**	**341**	152	**529**	**32**	150	51	233	1340
05:30 PM	46	320	26	392	75	66	34	175	27	320	132	479	28	139	**81**	248	1294
05:45 PM	39	276	21	336	**91**	**82**	**36**	**209**	24	341	137	502	30	124	56	210	1257
Total Volume	196	1327	107	1630	322	251	118	691	113	1313	574	2000	118	567	261	946	5267
% App. Total	12	81.4	6.6		46.6	36.3	17.1		5.7	65.7	28.7		12.5	59.9	27.6		
PHF	.778	.862	.787	.845	.885	.765	.819	.827	.785	.963	.938	.945	.922	.920	.806	.927	.957

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Bake Parkway
E/W: Irvine Boulevard / Trabuco Road
Weather: Clear

File Name : LKFBAIRPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:30 PM				05:00 PM				05:00 PM				04:30 PM			
+0 mins.	44	332	28	404	74	52	23	149	26	311	**153**	490	29	134	**86**	249
+15 mins.	34	286	16	336	82	51	25	158	**36**	**341**	152	**529**	28	133	66	227
+30 mins.	**63**	**385**	**34**	**482**	75	66	34	175	27	320	132	479	28	**154**	73	**255**
+45 mins.	48	346	26	420	**91**	**82**	**36**	**209**	24	341	137	502	**32**	150	51	233
Total Volume	189	1349	104	1642	322	251	118	691	113	1313	574	2000	117	571	276	964
% App. Total	11.5	82.2	6.3		46.6	36.3	17.1		5.7	65.7	28.7		12.1	59.2	28.6	
PHF	.750	.876	.765	.852	.885	.765	.819	.827	.785	.963	.938	.945	.914	.927	.802	.945

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Bake Parkway
E/W: Toledo Way
Weather: Clear

File Name : LKFBATOAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

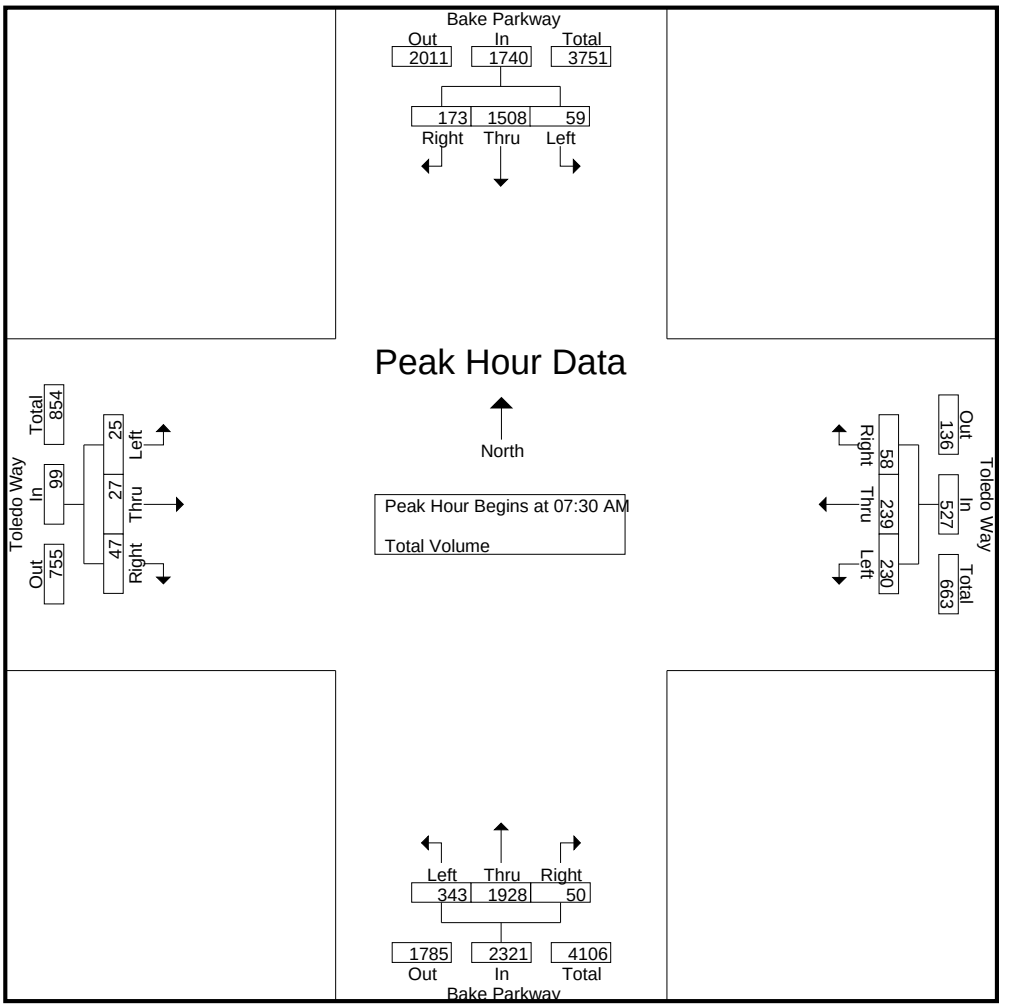
	Bake Parkway Southbound				Toledo Way Westbound				Bake Parkway Northbound				Toledo Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	8	348	28	384	73	48	9	130	71	425	9	505	5	8	9	22	1041
07:15 AM	4	336	24	364	84	62	7	153	79	410	6	495	5	4	3	12	1024
07:30 AM	9	445	39	493	62	46	7	115	73	423	9	505	9	4	7	20	1133
07:45 AM	12	332	52	396	62	80	15	157	83	517	12	612	4	10	14	28	1193
Total	33	1461	143	1637	281	236	38	555	306	1775	36	2117	23	26	33	82	4391
08:00 AM	8	399	47	454	60	65	22	147	89	455	16	560	4	6	11	21	1182
08:15 AM	30	332	35	397	46	48	14	108	98	533	13	644	8	7	15	30	1179
08:30 AM	6	334	48	388	56	40	19	115	69	430	15	514	9	7	15	31	1048
08:45 AM	5	327	37	369	38	27	21	86	82	492	13	587	4	5	17	26	1068
Total	49	1392	167	1608	200	180	76	456	338	1910	57	2305	25	25	58	108	4477
Grand Total	82	2853	310	3245	481	416	114	1011	644	3685	93	4422	48	51	91	190	8868
Apprch %	2.5	87.9	9.6		47.6	41.1	11.3		14.6	83.3	2.1		25.3	26.8	47.9		
Total %	0.9	32.2	3.5	36.6	5.4	4.7	1.3	11.4	7.3	41.6	1	49.9	0.5	0.6	1	2.1	

	Bake Parkway Southbound				Toledo Way Westbound				Bake Parkway Northbound				Toledo Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	9	**445**	39	**493**	**62**	46	7	115	73	423	9	505	**9**	4	7	20	1133
07:45 AM	12	332	**52**	396	62	**80**	15	**157**	83	517	12	612	4	**10**	14	28	**1193**
08:00 AM	8	399	47	454	60	65	**22**	147	89	455	**16**	560	4	6	11	21	1182
08:15 AM	**30**	332	35	397	46	48	14	108	**98**	**533**	13	**644**	8	7	**15**	**30**	1179
Total Volume	59	1508	173	1740	230	239	58	527	343	1928	50	2321	25	27	47	99	4687
% App. Total	3.4	86.7	9.9		43.6	45.4	11		14.8	83.1	2.2		25.3	27.3	47.5		
PHF	.492	.847	.832	.882	.927	.747	.659	.839	.875	.904	.781	.901	.694	.675	.783	.825	.982

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Bake Parkway
E/W: Toledo Way
Weather: Clear

File Name : LKFBATOAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:30 AM				07:15 AM				07:45 AM				07:45 AM			
+0 mins.	9	**445**	39	**493**	**84**	62	7	153	83	517	12	612	4	**10**	14	28
+15 mins.	12	332	**52**	396	62	46	7	115	89	455	**16**	560	4	6	11	21
+30 mins.	8	399	47	454	62	**80**	15	**157**	**98**	**533**	13	**644**	8	7	**15**	30
+45 mins.	**30**	332	35	397	60	65	**22**	147	69	430	15	514	**9**	7	15	**31**
Total Volume	59	1508	173	1740	268	253	51	572	339	1935	56	2330	25	30	55	110
% App. Total	3.4	86.7	9.9		46.9	44.2	8.9		14.5	83	2.4		22.7	27.3	50	
PHF	.492	.847	.832	.882	.798	.791	.580	.911	.865	.908	.875	.905	.694	.750	.917	.887

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Bake Parkway
E/W: Toledo Way
Weather: Clear

File Name : LKFBATOPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

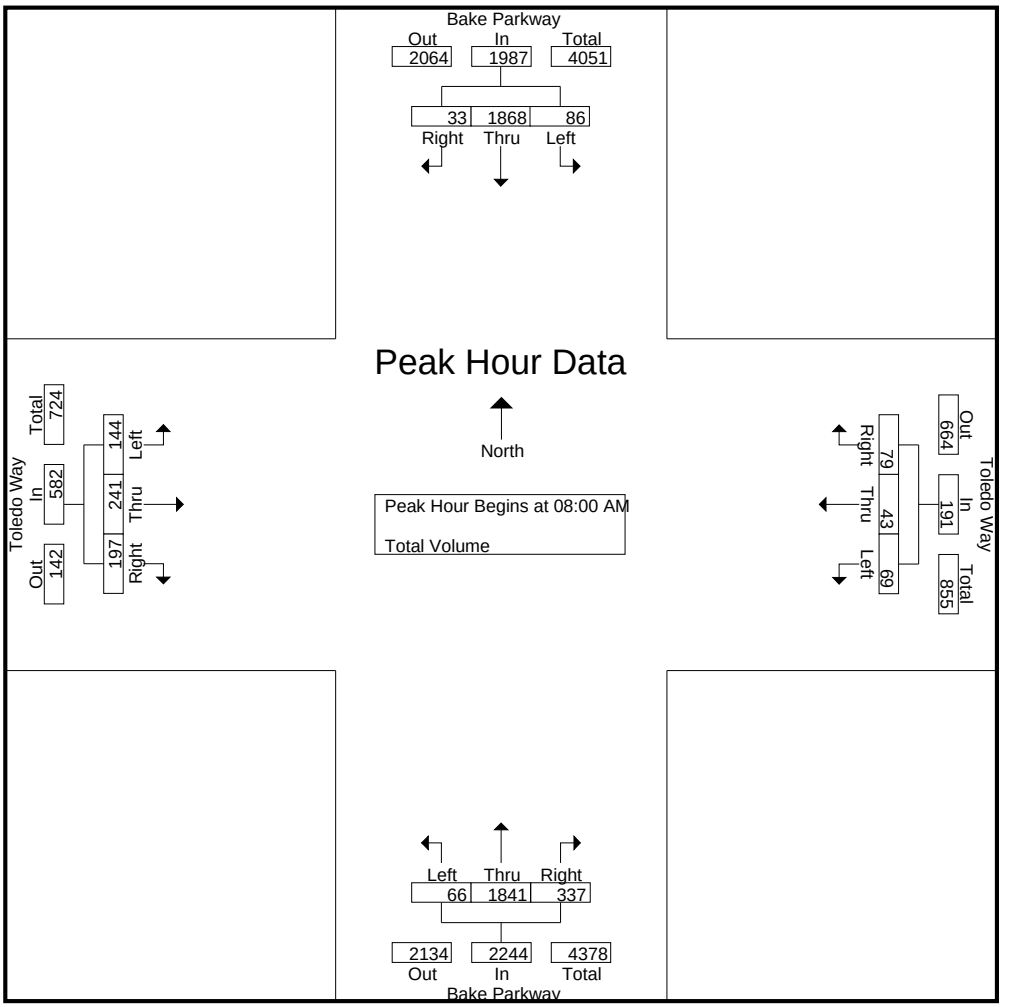
	Bake Parkway Southbound				Toledo Way Westbound				Bake Parkway Northbound				Toledo Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	20	393	13	426	17	8	12	37	26	377	49	452	23	38	70	131	1046
07:15 AM	7	394	12	413	21	10	17	48	13	405	55	473	22	30	31	83	1017
07:30 AM	20	469	6	495	15	12	13	40	13	438	62	513	29	48	68	145	1193
07:45 AM	16	424	13	453	11	12	20	43	17	445	86	548	14	47	43	104	1148
Total	63	1680	44	1787	64	42	62	168	69	1665	252	1986	88	163	212	463	4404
08:00 AM	18	537	9	564	21	7	14	42	19	439	87	545	47	62	64	173	1324
08:15 AM	29	480	9	518	15	10	22	47	13	486	73	572	35	73	65	173	1310
08:30 AM	18	416	6	440	13	12	22	47	22	433	94	549	34	64	35	133	1169
08:45 AM	21	435	9	465	20	14	21	55	12	483	83	578	28	42	33	103	1201
Total	86	1868	33	1987	69	43	79	191	66	1841	337	2244	144	241	197	582	5004
Grand Total	149	3548	77	3774	133	85	141	359	135	3506	589	4230	232	404	409	1045	9408
Apprch %	3.9	94	2		37	23.7	39.3		3.2	82.9	13.9		22.2	38.7	39.1		
Total %	1.6	37.7	0.8	40.1	1.4	0.9	1.5	3.8	1.4	37.3	6.3	45	2.5	4.3	4.3	11.1	

	Bake Parkway Southbound				Toledo Way Westbound				Bake Parkway Northbound				Toledo Way Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	18	**537**	**9**	**564**	**21**	7	14	42	19	439	87	545	**47**	62	64	**173**	**1324**
08:15 AM	**29**	480	9	518	15	10	**22**	47	13	**486**	73	572	35	**73**	**65**	173	1310
08:30 AM	18	416	6	440	13	12	22	47	**22**	433	**94**	549	34	64	35	133	1169
08:45 AM	21	435	9	465	20	**14**	21	**55**	12	483	83	**578**	28	42	33	103	1201
Total Volume	86	1868	33	1987	69	43	79	191	66	1841	337	2244	144	241	197	582	5004
% App. Total	4.3	94	1.7		36.1	22.5	41.4		2.9	82	15		24.7	41.4	33.8		
PHF	.741	.870	.917	.881	.821	.768	.898	.868	.750	.947	.896	.971	.766	.825	.758	.841	.945

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Bake Parkway
E/W: Toledo Way
Weather: Clear

File Name : LKFBATOPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:30 AM				08:00 AM				08:00 AM				07:30 AM			
+0 mins.	20	469	6	495	**21**	7	14	42	19	439	87	545	29	48	**68**	145
+15 mins.	16	424	**13**	453	15	10	**22**	47	13	**486**	73	572	14	47	43	104
+30 mins.	18	**537**	9	**564**	13	12	22	47	**22**	433	**94**	549	**47**	62	64	**173**
+45 mins.	**29**	480	9	518	20	**14**	21	**55**	12	483	83	**578**	35	**73**	65	173
Total Volume	83	1910	37	2030	69	43	79	191	66	1841	337	2244	125	230	240	595
% App. Total	4.1	94.1	1.8		36.1	22.5	41.4		2.9	82	15		21	38.7	40.3	
PHF	.716	.889	.712	.900	.821	.768	.898	.868	.750	.947	.896	.971	.665	.788	.882	.860

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Bake Parkway
E/W: Jeronimo Road
Weather: Clear

File Name : LKFBAJEAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

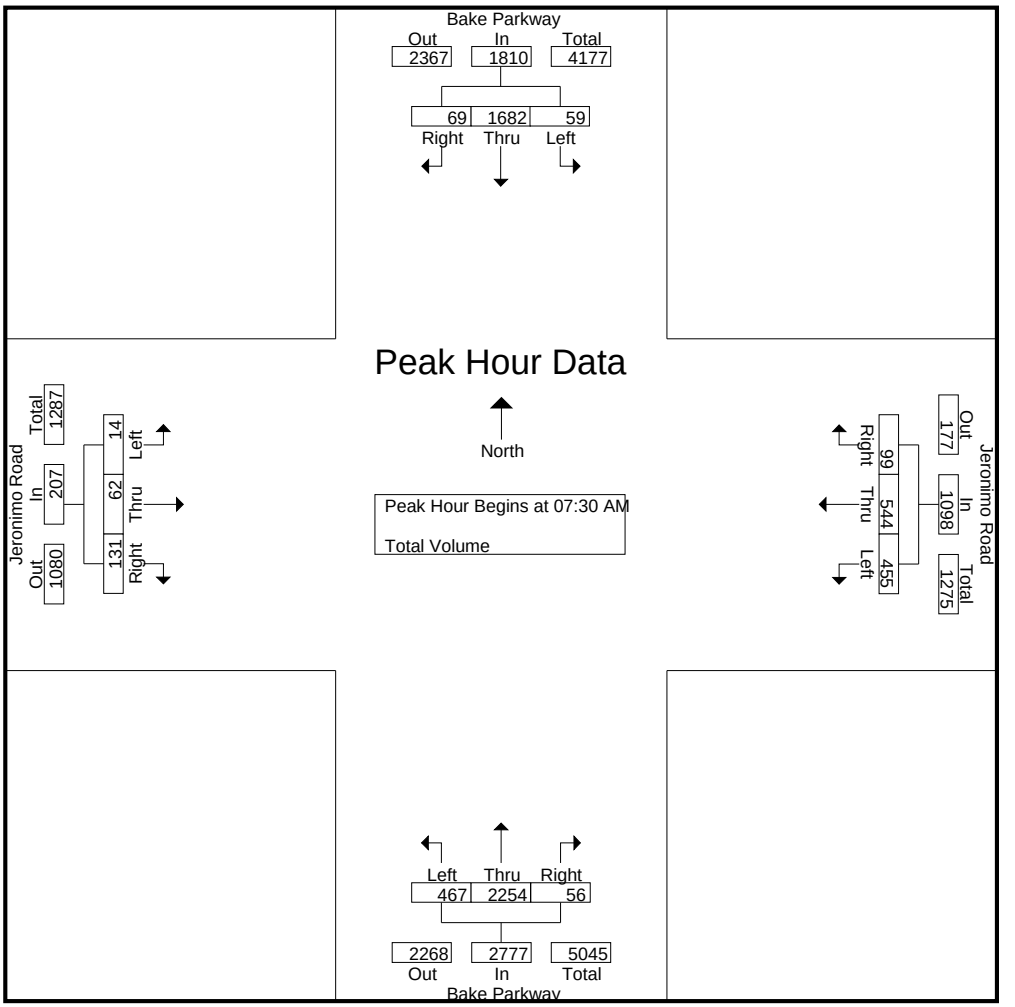
	Bake Parkway Southbound				Jeronimo Road Westbound				Bake Parkway Northbound				Jeronimo Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	5	436	9	450	103	73	12	188	81	471	6	558	4	5	18	27	1223
07:15 AM	10	406	12	428	146	98	13	257	94	465	17	576	4	9	25	38	1299
07:30 AM	8	465	11	484	114	114	15	243	97	592	12	701	4	10	31	45	1473
07:45 AM	16	395	25	436	118	155	31	304	128	571	15	714	2	12	29	43	1497
Total	39	1702	57	1798	481	440	71	992	400	2099	50	2549	14	36	103	153	5492
08:00 AM	27	404	17	448	109	127	23	259	134	584	14	732	1	25	35	61	1500
08:15 AM	8	418	16	442	114	148	30	292	108	507	15	630	7	15	36	58	1422
08:30 AM	11	371	24	406	125	143	12	280	131	542	12	685	1	12	42	55	1426
08:45 AM	9	384	16	409	87	112	21	220	101	533	14	648	6	13	35	54	1331
Total	55	1577	73	1705	435	530	86	1051	474	2166	55	2695	15	65	148	228	5679
Grand Total	94	3279	130	3503	916	970	157	2043	874	4265	105	5244	29	101	251	381	11171
Apprch %	2.7	93.6	3.7		44.8	47.5	7.7		16.7	81.3	2		7.6	26.5	65.9		
Total %	0.8	29.4	1.2	31.4	8.2	8.7	1.4	18.3	7.8	38.2	0.9	46.9	0.3	0.9	2.2	3.4	

	Bake Parkway Southbound				Jeronimo Road Westbound				Bake Parkway Northbound				Jeronimo Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	8	**465**	11	**484**	114	114	15	243	97	**592**	12	701	4	10	31	45	1473
07:45 AM	16	395	**25**	436	**118**	**155**	**31**	**304**	128	571	**15**	714	2	12	29	43	1497
08:00 AM	**27**	404	17	448	109	127	23	259	**134**	584	14	**732**	1	**25**	35	**61**	**1500**
08:15 AM	8	418	16	442	114	148	30	292	108	507	15	630	**7**	15	**36**	58	1422
Total Volume	59	1682	69	1810	455	544	99	1098	467	2254	56	2777	14	62	131	207	5892
% App. Total	3.3	92.9	3.8		41.4	49.5	9		16.8	81.2	2		6.8	30	63.3		
PHF	.546	.904	.690	.935	.964	.877	.798	.903	.871	.952	.933	.948	.500	.620	.910	.848	.982

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Bake Parkway
E/W: Jeronimo Road
Weather: Clear

File Name : LKFBAJEAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:30 AM				07:45 AM				07:30 AM				08:00 AM			
+0 mins.	8	**465**	11	**484**	118	**155**	**31**	**304**	97	**592**	12	701	1	**25**	35	**61**
+15 mins.	16	395	**25**	436	109	127	23	259	128	571	**15**	714	**7**	15	36	58
+30 mins.	**27**	404	17	448	114	148	30	292	**134**	584	14	**732**	1	12	**42**	55
+45 mins.	8	418	16	442	**125**	143	12	280	108	507	15	630	6	13	35	54
Total Volume	59	1682	69	1810	466	573	96	1135	467	2254	56	2777	15	65	148	228
% App. Total	3.3	92.9	3.8		41.1	50.5	8.5		16.8	81.2	2		6.6	28.5	64.9	
PHF	.546	.904	.690	.935	.932	.924	.774	.933	.871	.952	.933	.948	.536	.650	.881	.934

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Bake Parkway
E/W: Jeronimo Road
Weather: Clear

File Name : LKFBAJEPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

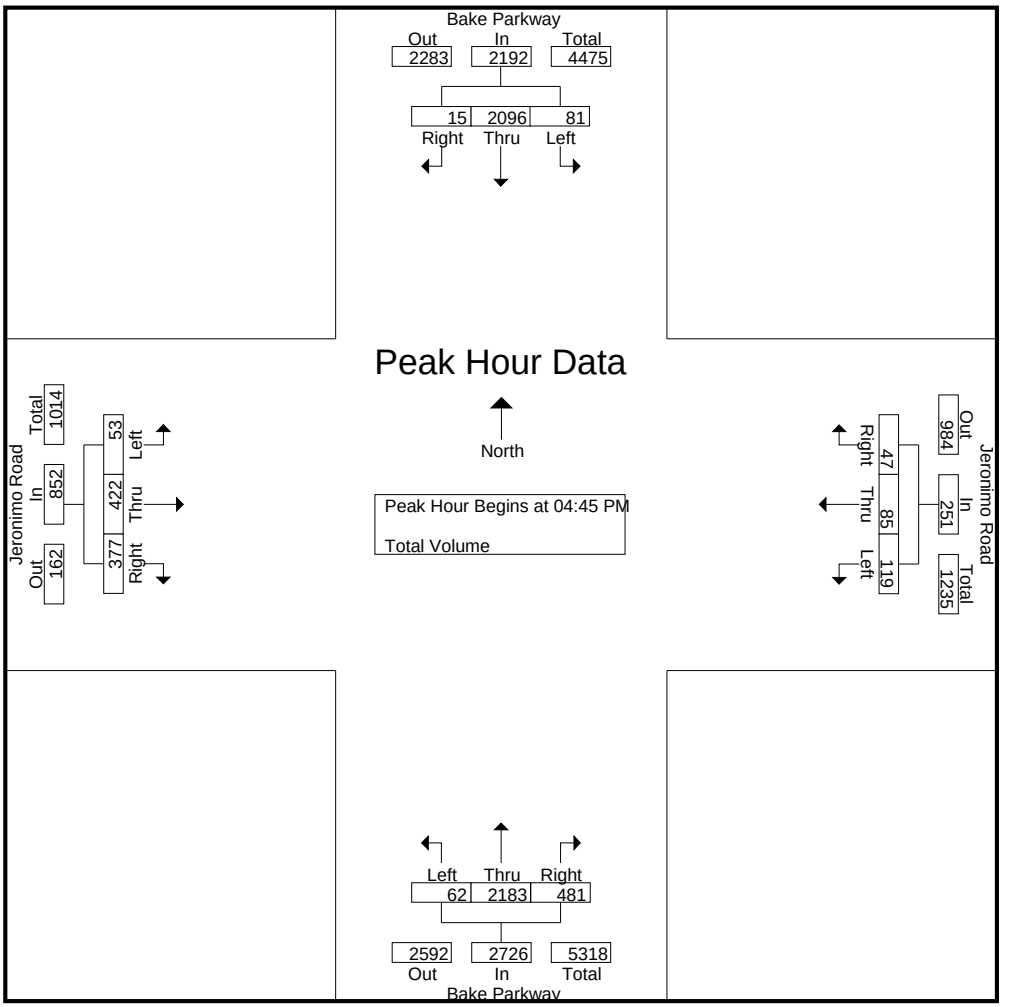
	Bake Parkway Southbound				Jeronimo Road Westbound				Bake Parkway Northbound				Jeronimo Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	15	450	5	470	32	18	13	63	10	456	87	553	9	101	116	226	1312
04:15 PM	16	496	2	514	40	24	13	77	14	450	96	560	16	88	89	193	1344
04:30 PM	22	493	4	519	31	24	10	65	14	457	124	595	13	79	122	214	1393
04:45 PM	26	502	4	532	28	21	9	58	20	516	111	647	13	92	92	197	1434
Total	79	1941	15	2035	131	87	45	263	58	1879	418	2355	51	360	419	830	5483
05:00 PM	19	544	2	565	24	29	11	64	14	522	118	654	11	116	115	242	1525
05:15 PM	27	565	5	597	37	16	9	62	15	581	127	723	18	122	85	225	1607
05:30 PM	9	485	4	498	30	19	18	67	13	564	125	702	11	92	85	188	1455
05:45 PM	18	470	2	490	28	22	9	59	12	565	119	696	12	76	52	140	1385
Total	73	2064	13	2150	119	86	47	252	54	2232	489	2775	52	406	337	795	5972
Grand Total	152	4005	28	4185	250	173	92	515	112	4111	907	5130	103	766	756	1625	11455
Apprch %	3.6	95.7	0.7		48.5	33.6	17.9		2.2	80.1	17.7		6.3	47.1	46.5		
Total %	1.3	35	0.2	36.5	2.2	1.5	0.8	4.5	1	35.9	7.9	44.8	0.9	6.7	6.6	14.2	

	Bake Parkway Southbound				Jeronimo Road Westbound				Bake Parkway Northbound				Jeronimo Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	26	502	4	532	28	21	9	58	**20**	516	111	647	13	92	92	197	1434
05:00 PM	19	544	2	565	24	**29**	11	64	14	522	118	654	11	116	**115**	**242**	1525
05:15 PM	**27**	**565**	**5**	**597**	**37**	16	9	62	15	**581**	**127**	**723**	**18**	**122**	85	225	**1607**
05:30 PM	9	485	4	498	30	19	**18**	**67**	13	564	125	702	11	92	85	188	1455
Total Volume	81	2096	15	2192	119	85	47	251	62	2183	481	2726	53	422	377	852	6021
% App. Total	3.7	95.6	0.7		47.4	33.9	18.7		2.3	80.1	17.6		6.2	49.5	44.2		
PHF	.750	.927	.750	.918	.804	.733	.653	.937	.775	.939	.947	.943	.736	.865	.820	.880	.937

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Bake Parkway
E/W: Jeronimo Road
Weather: Clear

File Name : LKFBAJEPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:30 PM				04:15 PM				05:00 PM				04:30 PM			
+0 mins.	22	493	4	519	**40**	24	**13**	**77**	14	522	118	654	13	79	**122**	214
+15 mins.	26	502	4	532	31	24	10	65	**15**	**581**	**127**	**723**	13	92	92	197
+30 mins.	19	544	2	565	28	21	9	58	13	564	125	702	11	116	115	**242**
+45 mins.	**27**	**565**	**5**	**597**	24	**29**	11	64	12	565	119	696	**18**	**122**	85	225
Total Volume	94	2104	15	2213	123	98	43	264	54	2232	489	2775	55	409	414	878
% App. Total	4.2	95.1	0.7		46.6	37.1	16.3		1.9	80.4	17.6		6.3	46.6	47.2	
PHF	.870	.931	.750	.927	.769	.845	.827	.857	.900	.960	.963	.960	.764	.838	.848	.907

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Irvine
N/S: Bake Parkway
E/W: Muirlands Boulevard
Weather: Clear

File Name : IRVBAMUAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

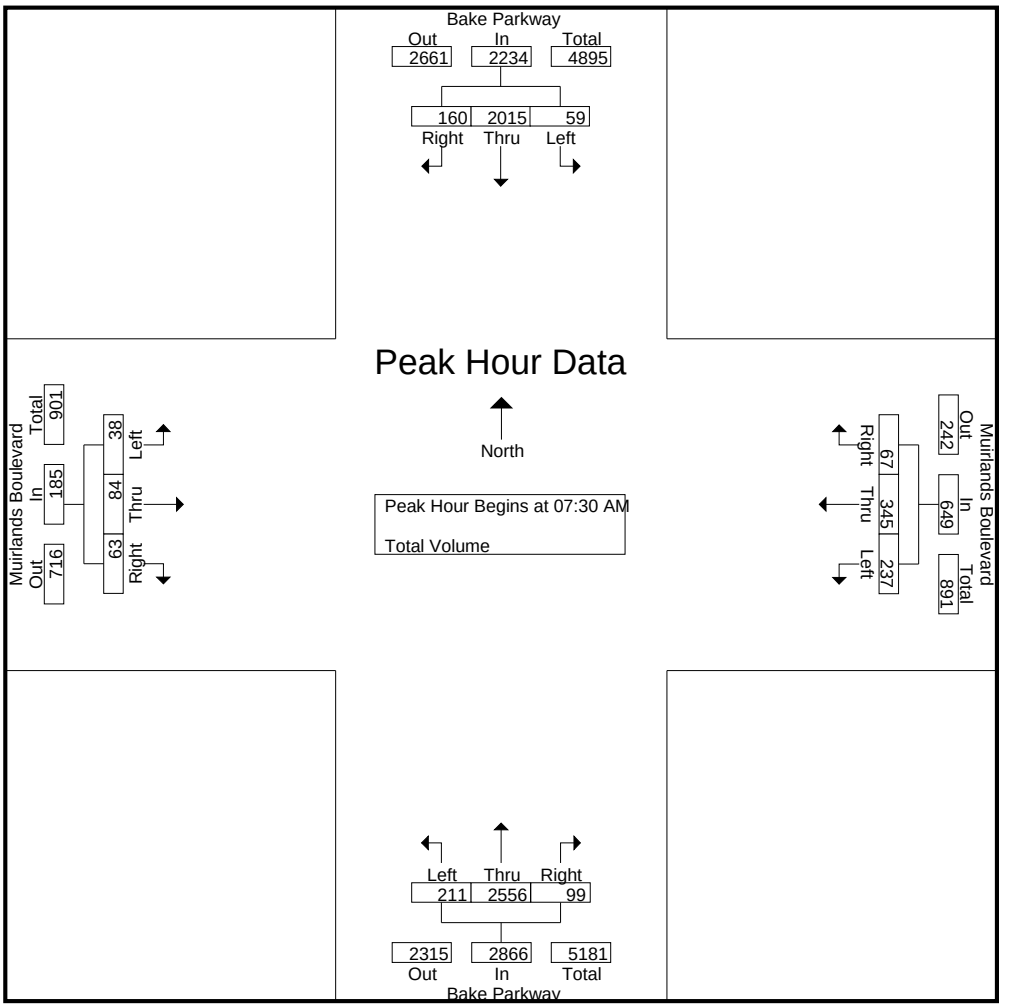
	Bake Parkway Southbound				Muirlands Boulevard Westbound				Bake Parkway Northbound				Muirlands Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	9	528	23	560	42	60	26	128	51	559	28	638	6	17	18	41	1367
07:15 AM	6	518	21	545	57	43	16	116	34	561	28	623	4	16	13	33	1317
07:30 AM	13	555	42	610	70	81	14	165	36	621	21	678	9	24	14	47	1500
07:45 AM	14	477	38	529	60	81	20	161	44	677	24	745	6	16	10	32	1467
Total	42	2078	124	2244	229	265	76	570	165	2418	101	2684	25	73	55	153	5651
08:00 AM	7	463	43	513	57	104	19	180	83	673	25	781	14	28	21	63	1537
08:15 AM	25	520	37	582	50	79	14	143	48	585	29	662	9	16	18	43	1430
08:30 AM	20	426	42	488	69	96	24	189	50	599	13	662	9	37	14	60	1399
08:45 AM	22	443	46	511	54	83	25	162	46	605	23	674	8	26	22	56	1403
Total	74	1852	168	2094	230	362	82	674	227	2462	90	2779	40	107	75	222	5769
Grand Total	116	3930	292	4338	459	627	158	1244	392	4880	191	5463	65	180	130	375	11420
Apprch %	2.7	90.6	6.7		36.9	50.4	12.7		7.2	89.3	3.5		17.3	48	34.7		
Total %	1	34.4	2.6	38	4	5.5	1.4	10.9	3.4	42.7	1.7	47.8	0.6	1.6	1.1	3.3	

	Bake Parkway Southbound				Muirlands Boulevard Westbound				Bake Parkway Northbound				Muirlands Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	13	**555**	42	**610**	**70**	81	14	165	36	621	21	678	9	24	14	47	1500
07:45 AM	14	477	38	529	60	81	**20**	161	44	**677**	24	745	6	16	10	32	1467
08:00 AM	7	463	**43**	513	57	**104**	19	**180**	**83**	673	25	**781**	**14**	**28**	**21**	**63**	**1537**
08:15 AM	**25**	520	37	582	50	79	14	143	48	585	**29**	662	9	16	18	43	1430
Total Volume	59	2015	160	2234	237	345	67	649	211	2556	99	2866	38	84	63	185	5934
% App. Total	2.6	90.2	7.2		36.5	53.2	10.3		7.4	89.2	3.5		20.5	45.4	34.1		
PHF	.590	.908	.930	.916	.846	.829	.838	.901	.636	.944	.853	.917	.679	.750	.750	.734	.965

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Irvine
N/S: Bake Parkway
E/W: Muirlands Boulevard
Weather: Clear

File Name : IRVBAMUAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM				08:00 AM				07:30 AM				08:00 AM			
+0 mins.	9	528	23	560	57	**104**	19	180	36	621	21	678	**14**	28	21	**63**
+15 mins.	6	518	21	545	50	79	14	143	44	**677**	24	745	9	16	18	43
+30 mins.	13	**555**	**42**	**610**	**69**	96	24	**189**	**83**	673	25	**781**	9	**37**	14	60
+45 mins.	**14**	477	38	529	54	83	**25**	162	48	585	**29**	662	8	26	**22**	56
Total Volume	42	2078	124	2244	230	362	82	674	211	2556	99	2866	40	107	75	222
% App. Total	1.9	92.6	5.5		34.1	53.7	12.2		7.4	89.2	3.5		18	48.2	33.8	
PHF	.750	.936	.738	.920	.833	.870	.820	.892	.636	.944	.853	.917	.714	.723	.852	.881

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Irvine
N/S: Bake Parkway
E/W: Muirlands Boulevard
Weather: Clear

File Name : IRVBAMUPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

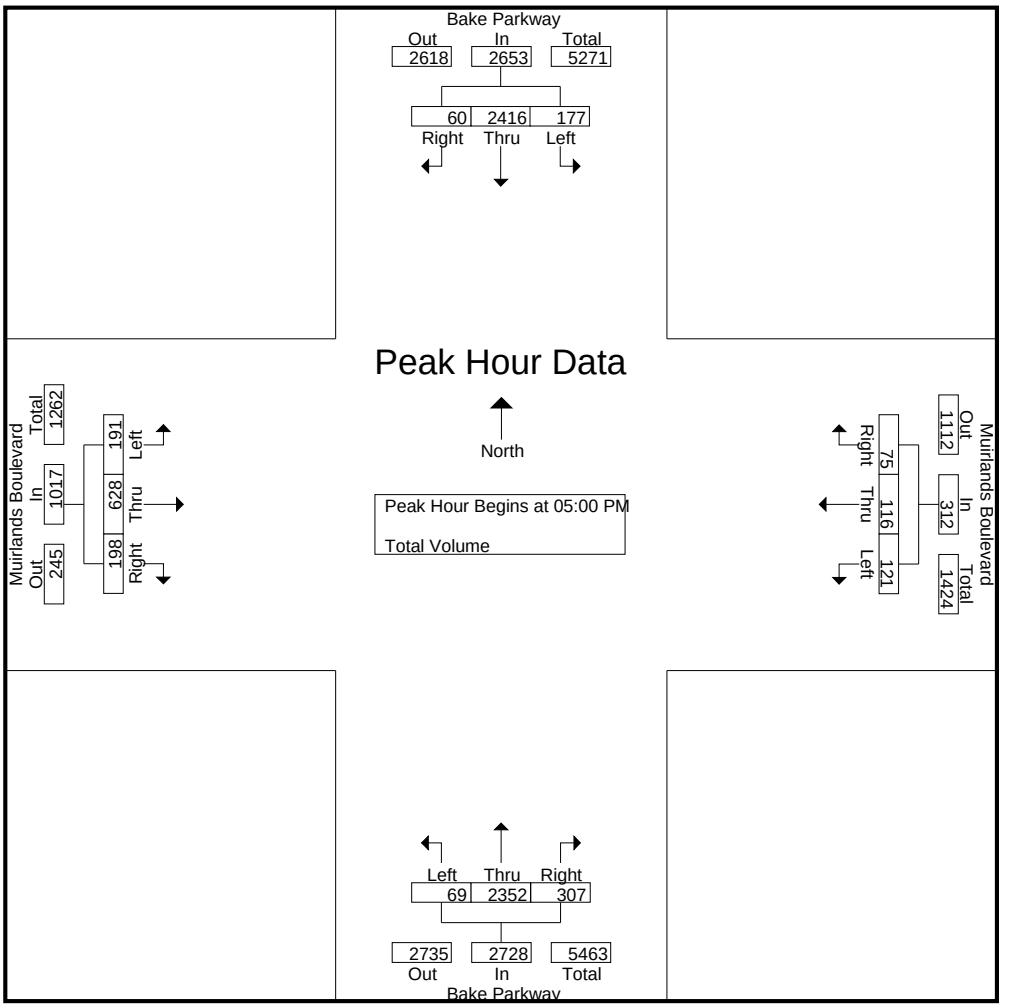
	Bake Parkway Southbound				Muirlands Boulevard Westbound				Bake Parkway Northbound				Muirlands Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	33	523	19	575	26	22	18	66	27	465	67	559	22	114	43	179	1379
04:15 PM	36	565	11	612	17	26	22	65	19	471	48	538	33	133	48	214	1429
04:30 PM	34	589	17	640	18	24	24	66	19	520	81	620	37	137	39	213	1539
04:45 PM	52	563	13	628	18	25	8	51	19	585	67	671	37	154	52	243	1593
Total	155	2240	60	2455	79	97	72	248	84	2041	263	2388	129	538	182	849	5940
05:00 PM	46	622	19	687	35	23	23	81	16	572	88	676	40	140	43	223	1667
05:15 PM	38	682	11	731	36	48	20	104	21	608	71	700	57	162	53	272	1807
05:30 PM	45	563	22	630	18	23	12	53	17	597	71	685	35	171	44	250	1618
05:45 PM	48	549	8	605	32	22	20	74	15	575	77	667	59	155	58	272	1618
Total	177	2416	60	2653	121	116	75	312	69	2352	307	2728	191	628	198	1017	6710
Grand Total	332	4656	120	5108	200	213	147	560	153	4393	570	5116	320	1166	380	1866	12650
Apprch %	6.5	91.2	2.3		35.7	38	26.2		3	85.9	11.1		17.1	62.5	20.4		
Total %	2.6	36.8	0.9	40.4	1.6	1.7	1.2	4.4	1.2	34.7	4.5	40.4	2.5	9.2	3	14.8	

	Bake Parkway Southbound				Muirlands Boulevard Westbound				Bake Parkway Northbound				Muirlands Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	46	622	19	687	35	23	**23**	81	16	572	**88**	676	40	140	43	223	1667
05:15 PM	38	**682**	11	**731**	**36**	**48**	20	**104**	**21**	**608**	71	**700**	57	162	53	**272**	**1807**
05:30 PM	45	563	**22**	630	18	23	12	53	17	597	71	685	35	**171**	44	250	1618
05:45 PM	**48**	549	8	605	32	22	20	74	15	575	77	667	**59**	155	**58**	272	1618
Total Volume	177	2416	60	2653	121	116	75	312	69	2352	307	2728	191	628	198	1017	6710
% App. Total	6.7	91.1	2.3		38.8	37.2	24		2.5	86.2	11.3		18.8	61.8	19.5		
PHF	.922	.886	.682	.907	.840	.604	.815	.750	.821	.967	.872	.974	.809	.918	.853	.935	.928

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Irvine
N/S: Bake Parkway
E/W: Muirlands Boulevard
Weather: Clear

File Name : IRVBAMUPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:30 PM				05:00 PM				04:45 PM				05:00 PM			
+0 mins.	34	589	17	640	35	23	**23**	81	19	585	67	671	40	140	43	223
+15 mins.	**52**	563	13	628	**36**	**48**	20	**104**	16	572	**88**	676	57	162	53	**272**
+30 mins.	46	622	**19**	687	18	23	12	53	**21**	**608**	71	**700**	35	**171**	44	250
+45 mins.	38	**682**	11	**731**	32	22	20	74	17	597	71	685	**59**	155	**58**	272
Total Volume	170	2456	60	2686	121	116	75	312	73	2362	297	2732	191	628	198	1017
% App. Total	6.3	91.4	2.2		38.8	37.2	24		2.7	86.5	10.9		18.8	61.8	19.5	
PHF	.817	.900	.789	.919	.840	.604	.815	.750	.869	.971	.844	.976	.809	.918	.853	.935

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Irvine
N/S: Bake Parkway
E/W: Rockfield Boulevard
Weather: Clear

File Name : IRVBAROAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

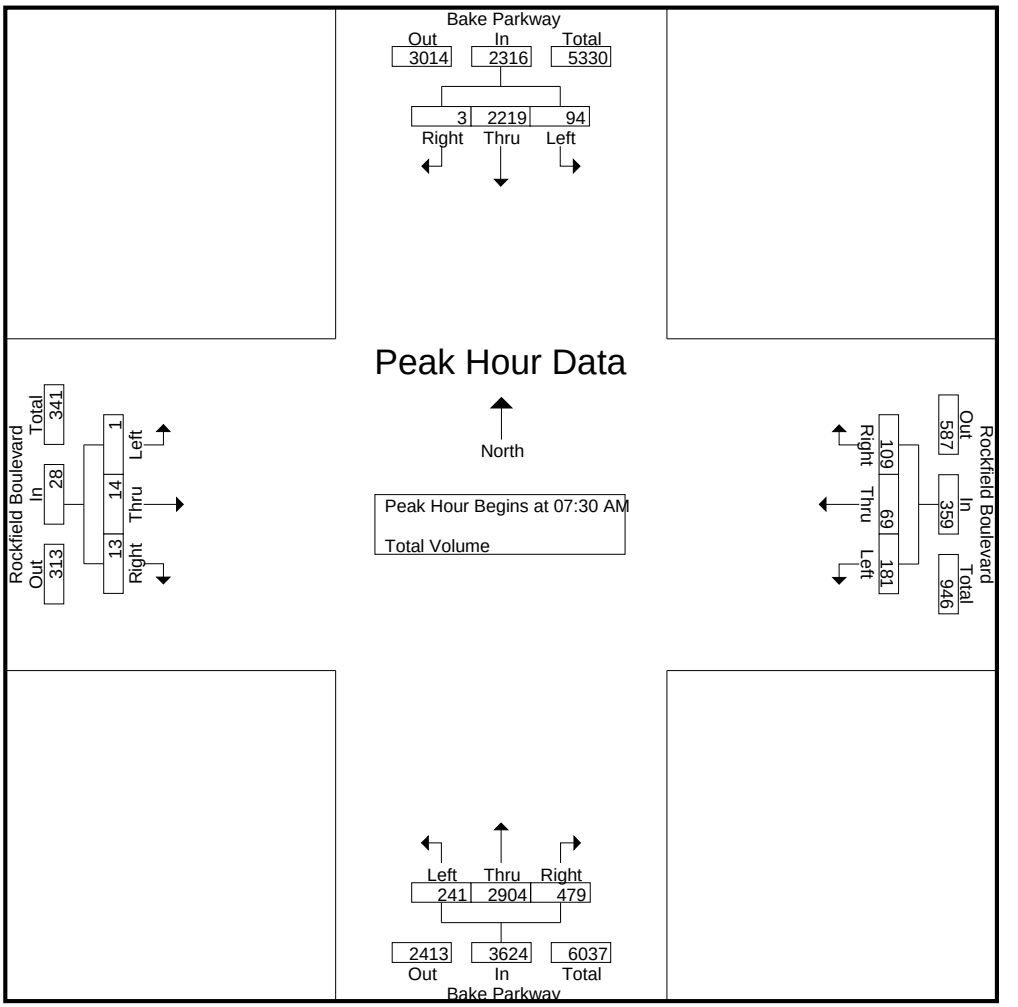
	Bake Parkway Southbound				Rockfield Boulevard Westbound				Bake Parkway Northbound				Rockfield Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	23	522	1	546	28	12	20	60	63	595	92	750	0	5	2	7	1363
07:15 AM	22	557	0	579	42	15	17	74	41	578	113	732	1	2	2	5	1390
07:30 AM	15	589	0	604	52	12	21	85	54	735	117	906	0	0	2	2	1597
07:45 AM	25	560	2	587	41	21	34	96	76	785	116	977	0	3	6	9	1669
Total	85	2228	3	2316	163	60	92	315	234	2693	438	3365	1	10	12	23	6019
08:00 AM	26	523	0	549	51	13	27	91	66	666	127	859	0	5	3	8	1507
08:15 AM	28	547	1	576	37	23	27	87	45	718	119	882	1	6	2	9	1554
08:30 AM	37	535	3	575	45	13	23	81	49	631	140	820	0	8	4	12	1488
08:45 AM	33	491	5	529	46	7	35	88	49	702	139	890	0	3	2	5	1512
Total	124	2096	9	2229	179	56	112	347	209	2717	525	3451	1	22	11	34	6061
Grand Total	209	4324	12	4545	342	116	204	662	443	5410	963	6816	2	32	23	57	12080
Apprch %	4.6	95.1	0.3		51.7	17.5	30.8		6.5	79.4	14.1		3.5	56.1	40.4		
Total %	1.7	35.8	0.1	37.6	2.8	1	1.7	5.5	3.7	44.8	8	56.4	0	0.3	0.2	0.5	

	Bake Parkway Southbound				Rockfield Boulevard Westbound				Bake Parkway Northbound				Rockfield Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	15	**589**	0	**604**	**52**	12	21	85	54	735	117	906	0	0	2	2	1597
07:45 AM	25	560	**2**	587	41	21	**34**	**96**	**76**	**785**	116	**977**	0	3	**6**	**9**	**1669**
08:00 AM	26	523	0	549	51	13	27	91	66	666	**127**	859	0	5	3	8	1507
08:15 AM	**28**	547	1	576	37	**23**	27	87	45	718	119	882	**1**	**6**	2	9	1554
Total Volume	94	2219	3	2316	181	69	109	359	241	2904	479	3624	1	14	13	28	6327
% App. Total	4.1	95.8	0.1		50.4	19.2	30.4		6.7	80.1	13.2		3.6	50	46.4		
PHF	.839	.942	.375	.959	.870	.750	.801	.935	.793	.925	.943	.927	.250	.583	.542	.778	.948

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Irvine
N/S: Bake Parkway
E/W: Rockfield Boulevard
Weather: Clear

File Name : IRVBAROAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:15 AM				07:30 AM				07:30 AM				07:45 AM			
+0 mins.	22	557	0	579	**52**	12	21	85	54	735	117	906	0	3	**6**	9
+15 mins.	15	**589**	0	**604**	41	21	**34**	**96**	**76**	**785**	116	**977**	0	5	3	8
+30 mins.	25	560	**2**	587	51	13	27	91	66	666	**127**	859	**1**	6	2	9
+45 mins.	**26**	523	0	549	37	**23**	27	87	45	718	119	882	0	**8**	4	**12**
Total Volume	88	2229	2	2319	181	69	109	359	241	2904	479	3624	1	22	15	38
% App. Total	3.8	96.1	0.1		50.4	19.2	30.4		6.7	80.1	13.2		2.6	57.9	39.5	
PHF	.846	.946	.250	.960	.870	.750	.801	.935	.793	.925	.943	.927	.250	.688	.625	.792

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Irvine
N/S: Bake Parkway
E/W: Rockfield Boulevard
Weather: Clear

File Name : IRVBAROPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

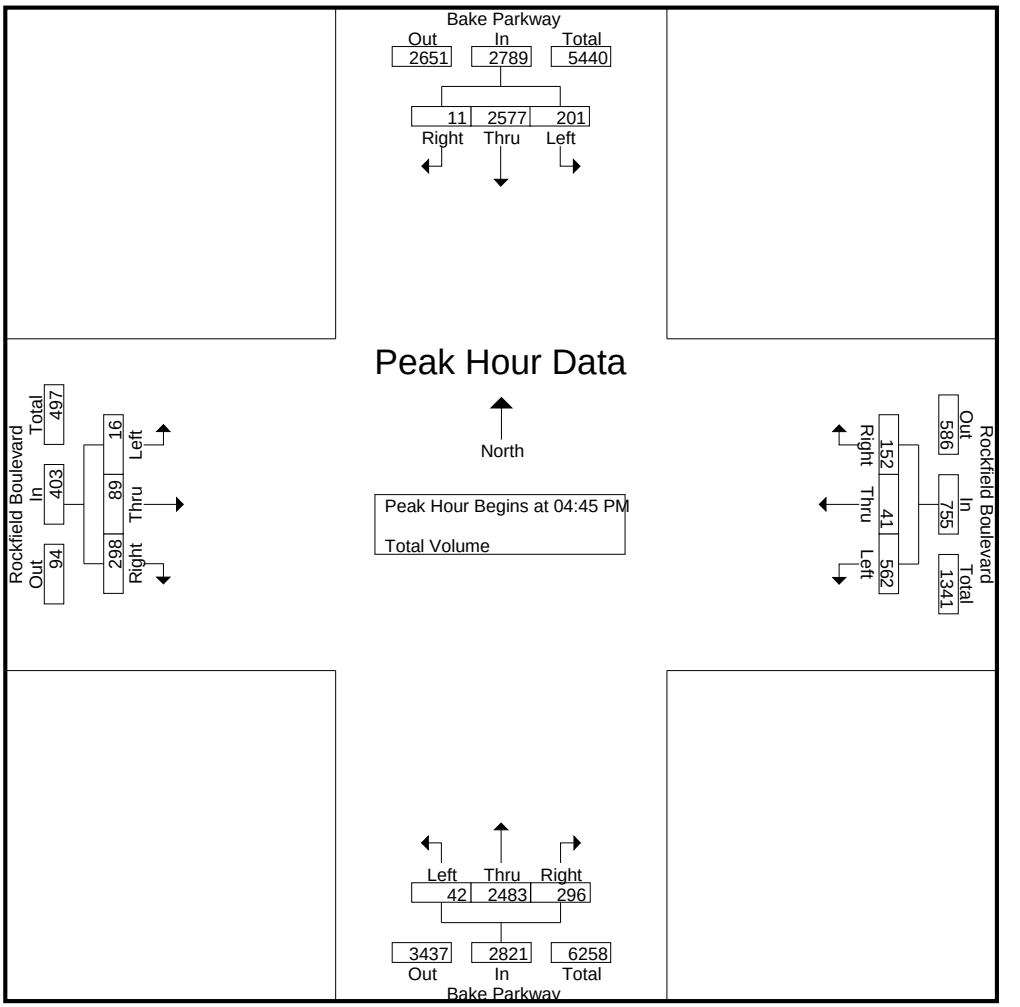
	Bake Parkway Southbound				Rockfield Boulevard Westbound				Bake Parkway Northbound				Rockfield Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	41	574	1	616	144	15	34	193	18	492	93	603	6	10	66	82	1494
04:15 PM	42	609	1	652	114	11	34	159	11	508	94	613	2	12	44	58	1482
04:30 PM	45	604	1	650	125	17	32	174	12	546	73	631	3	23	94	120	1575
04:45 PM	63	632	1	696	99	8	39	146	13	597	63	673	3	24	74	101	1616
Total	191	2419	4	2614	482	51	139	672	54	2143	323	2520	14	69	278	361	6167
05:00 PM	39	624	3	666	160	20	46	226	14	594	72	680	1	27	119	147	1719
05:15 PM	51	744	2	797	149	8	32	189	9	646	85	740	4	18	61	83	1809
05:30 PM	48	577	5	630	154	5	35	194	6	646	76	728	8	20	44	72	1624
05:45 PM	42	527	1	570	113	6	32	151	10	643	69	722	2	14	41	57	1500
Total	180	2472	11	2663	576	39	145	760	39	2529	302	2870	15	79	265	359	6652
Grand Total	371	4891	15	5277	1058	90	284	1432	93	4672	625	5390	29	148	543	720	12819
Apprch %	7	92.7	0.3		73.9	6.3	19.8		1.7	86.7	11.6		4	20.6	75.4		
Total %	2.9	38.2	0.1	41.2	8.3	0.7	2.2	11.2	0.7	36.4	4.9	42	0.2	1.2	4.2	5.6	

	Bake Parkway Southbound				Rockfield Boulevard Westbound				Bake Parkway Northbound				Rockfield Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	**63**	632	1	696	99	8	39	146	13	597	63	673	3	24	74	101	1616
05:00 PM	39	624	3	666	**160**	**20**	**46**	**226**	**14**	594	72	680	1	**27**	**119**	**147**	1719
05:15 PM	51	**744**	2	**797**	149	8	32	189	9	**646**	**85**	**740**	4	18	61	83	**1809**
05:30 PM	48	577	**5**	630	154	5	35	194	6	646	76	728	**8**	20	44	72	1624
Total Volume	201	2577	11	2789	562	41	152	755	42	2483	296	2821	16	89	298	403	6768
% App. Total	7.2	92.4	0.4		74.4	5.4	20.1		1.5	88	10.5		4	22.1	73.9		
PHF	.798	.866	.550	.875	.878	.513	.826	.835	.750	.961	.871	.953	.500	.824	.626	.685	.935

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Irvine
N/S: Bake Parkway
E/W: Rockfield Boulevard
Weather: Clear

File Name : IRVBAROPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:30 PM				05:00 PM				05:00 PM				04:30 PM			
+0 mins.	45	604	1	650	**160**	**20**	**46**	**226**	**14**	594	72	680	3	23	94	120
+15 mins.	**63**	632	1	696	149	8	32	189	9	**646**	**85**	**740**	3	24	74	101
+30 mins.	39	624	**3**	666	154	5	35	194	6	646	76	728	1	**27**	**119**	**147**
+45 mins.	51	**744**	2	**797**	113	6	32	151	10	643	69	722	**4**	18	61	83
Total Volume	198	2604	7	2809	576	39	145	760	39	2529	302	2870	11	92	348	451
% App. Total	7	92.7	0.2		75.8	5.1	19.1		1.4	88.1	10.5		2.4	20.4	77.2	
PHF	.786	.875	.583	.881	.900	.488	.788	.841	.696	.979	.888	.970	.688	.852	.731	.767

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Irvine
N/S: Bake Parkway
E/W: I-5 Northbound Ramps
Weather: Clear

File Name : IRVBA5NAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

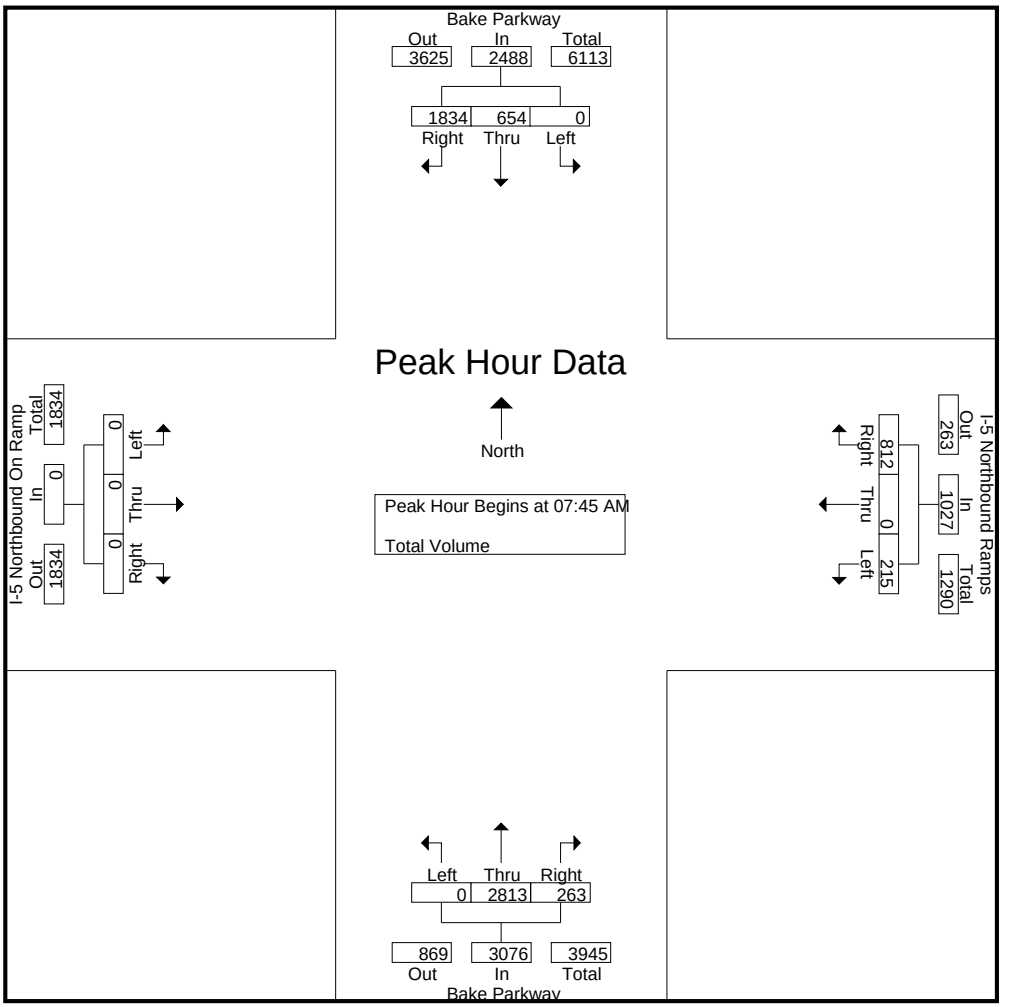
	Bake Parkway Southbound				I-5 Northbound Ramps Westbound				Bake Parkway Northbound				I-5 Northbound On Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	0	98	368	466	26	0	165	191	0	550	58	608	0	0	0	0	1265
07:15 AM	0	126	472	598	15	0	160	175	0	588	57	645	0	0	0	0	1418
07:30 AM	0	168	421	589	37	0	192	229	0	680	62	742	0	0	0	0	1560
07:45 AM	0	151	444	595	99	0	318	417	0	688	81	769	0	0	0	0	1781
Total	0	543	1705	2248	177	0	835	1012	0	2506	258	2764	0	0	0	0	6024
08:00 AM	0	173	463	636	33	0	161	194	0	734	70	804	0	0	0	0	1634
08:15 AM	0	153	433	586	38	0	161	199	0	686	62	748	0	0	0	0	1533
08:30 AM	0	177	494	671	45	0	172	217	0	705	50	755	0	0	0	0	1643
08:45 AM	0	144	388	532	50	0	168	218	0	726	67	793	0	0	0	0	1543
Total	0	647	1778	2425	166	0	662	828	0	2851	249	3100	0	0	0	0	6353
Grand Total	0	1190	3483	4673	343	0	1497	1840	0	5357	507	5864	0	0	0	0	12377
Apprch %	0	25.5	74.5		18.6	0	81.4		0	91.4	8.6		0	0	0		
Total %	0	9.6	28.1	37.8	2.8	0	12.1	14.9	0	43.3	4.1	47.4	0	0	0	0	

	Bake Parkway Southbound				I-5 Northbound Ramps Westbound				Bake Parkway Northbound				I-5 Northbound On Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	0	151	444	595	**99**	0	**318**	**417**	0	688	**81**	769	0	0	0	0	**1781**
08:00 AM	0	173	463	636	33	0	161	194	0	**734**	70	**804**	0	0	0	0	1634
08:15 AM	0	153	433	586	38	0	161	199	0	686	62	748	0	0	0	0	1533
08:30 AM	0	**177**	**494**	**671**	45	0	172	217	0	705	50	755	0	0	0	0	1643
Total Volume	0	654	1834	2488	215	0	812	1027	0	2813	263	3076	0	0	0	0	6591
% App. Total	0	26.3	73.7		20.9	0	79.1		0	91.4	8.6		0	0	0		
PHF	.000	.924	.928	.927	.543	.000	.638	.616	.000	.958	.812	.956	.000	.000	.000	.000	.925

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Irvine
N/S: Bake Parkway
E/W: I-5 Northbound Ramps
Weather: Clear

File Name : IRVBA5NAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:45 AM				07:30 AM				08:00 AM				07:00 AM			
+0 mins.	0	151	444	595	37	0	192	229	0	**734**	**70**	**804**	0	0	0	0
+15 mins.	0	173	463	636	**99**	0	**318**	**417**	0	686	62	748	0	0	0	0
+30 mins.	0	153	433	586	33	0	161	194	0	705	50	755	0	0	0	0
+45 mins.	0	**177**	**494**	**671**	38	0	161	199	0	726	67	793	0	0	0	0
Total Volume	0	654	1834	2488	207	0	832	1039	0	2851	249	3100	0	0	0	0
% App. Total	0	26.3	73.7		19.9	0	80.1		0	92	8		0	0	0	
PHF	.000	.924	.928	.927	.523	.000	.654	.623	.000	.971	.889	.964	.000	.000	.000	.000

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Irvine
N/S: Bake Parkway
E/W: I-5 Northbound Ramps
Weather: Clear

File Name : IRVBA5NPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

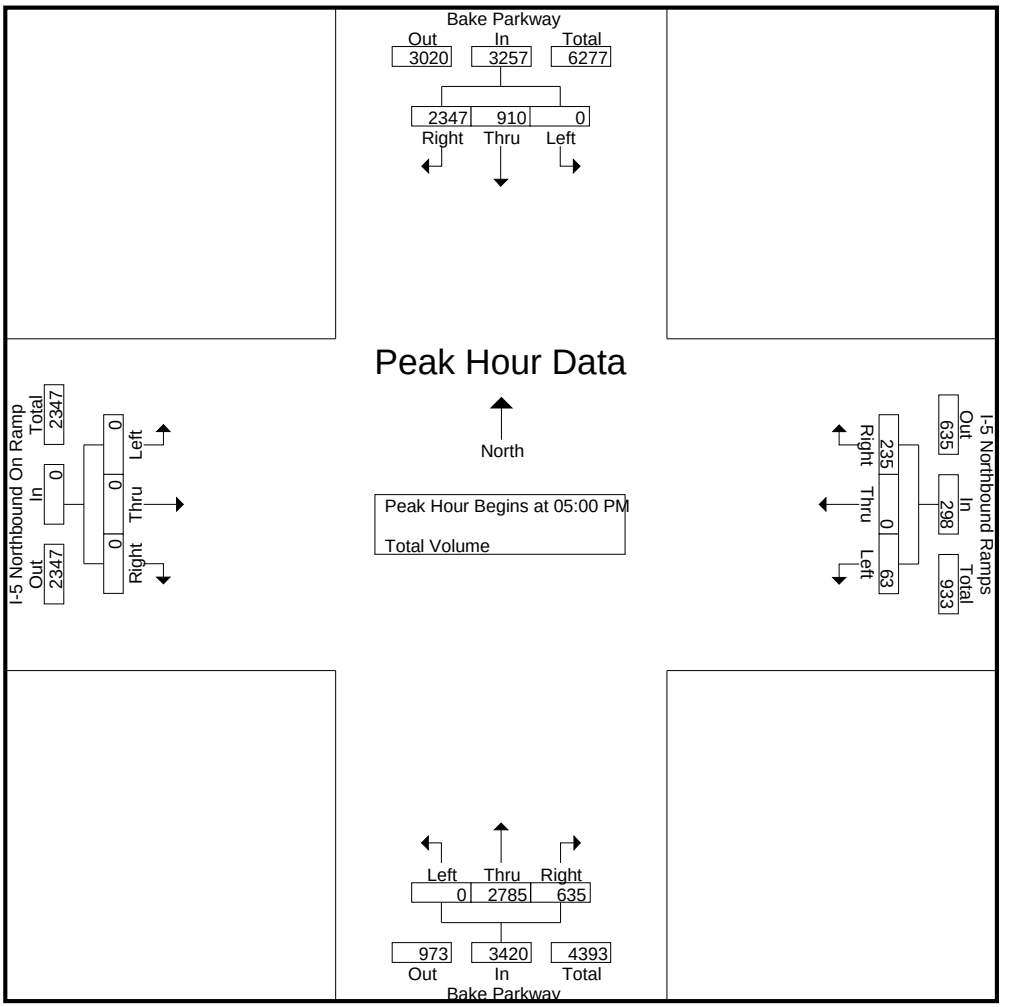
	Bake Parkway Southbound				I-5 Northbound Ramps Westbound				Bake Parkway Northbound				I-5 Northbound On Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	0	177	563	740	18	0	56	74	0	468	146	614	0	0	0	0	1428
04:15 PM	0	175	568	743	12	0	59	71	0	485	120	605	0	0	0	0	1419
04:30 PM	0	187	657	844	20	0	47	67	0	527	151	678	0	0	0	0	1589
04:45 PM	0	190	622	812	25	0	59	84	0	561	140	701	0	0	0	0	1597
Total	0	729	2410	3139	75	0	221	296	0	2041	557	2598	0	0	0	0	6033
05:00 PM	0	225	618	843	20	0	58	78	0	667	195	862	0	0	0	0	1783
05:15 PM	0	246	707	953	16	0	58	74	0	722	155	877	0	0	0	0	1904
05:30 PM	0	223	548	771	13	0	58	71	0	680	132	812	0	0	0	0	1654
05:45 PM	0	216	474	690	14	0	61	75	0	716	153	869	0	0	0	0	1634
Total	0	910	2347	3257	63	0	235	298	0	2785	635	3420	0	0	0	0	6975
Grand Total	0	1639	4757	6396	138	0	456	594	0	4826	1192	6018	0	0	0	0	13008
Apprch %	0	25.6	74.4		23.2	0	76.8		0	80.2	19.8		0	0	0		
Total %	0	12.6	36.6	49.2	1.1	0	3.5	4.6	0	37.1	9.2	46.3	0	0	0	0	

	Bake Parkway Southbound				I-5 Northbound Ramps Westbound				Bake Parkway Northbound				I-5 Northbound On Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	225	618	843	**20**	0	58	**78**	0	667	**195**	862	0	0	0	0	1783
05:15 PM	0	**246**	**707**	**953**	16	0	58	74	0	**722**	155	**877**	0	0	0	0	**1904**
05:30 PM	0	223	548	771	13	0	58	71	0	680	132	812	0	0	0	0	1654
05:45 PM	0	216	474	690	14	0	**61**	75	0	716	153	869	0	0	0	0	1634
Total Volume	0	910	2347	3257	63	0	235	298	0	2785	635	3420	0	0	0	0	6975
% App. Total	0	27.9	72.1		21.1	0	78.9		0	81.4	18.6		0	0	0		
PHF	.000	.925	.830	.854	.788	.000	.963	.955	.000	.964	.814	.975	.000	.000	.000	.000	.916

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Irvine
N/S: Bake Parkway
E/W: I-5 Northbound Ramps
Weather: Clear

File Name : IRVBA5NPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:30 PM				04:45 PM				05:00 PM				04:00 PM			
+0 mins.	0	187	657	844	**25**	0	**59**	**84**	0	667	**195**	862	0	0	0	0
+15 mins.	0	190	622	812	20	0	58	78	0	**722**	155	**877**	0	0	0	0
+30 mins.	0	225	618	843	16	0	58	74	0	680	132	812	0	0	0	0
+45 mins.	0	**246**	**707**	**953**	13	0	58	71	0	716	153	869	0	0	0	0
Total Volume	0	848	2604	3452	74	0	233	307	0	2785	635	3420	0	0	0	0
% App. Total	0	24.6	75.4		24.1	0	75.9		0	81.4	18.6		0	0	0	
PHF	.000	.862	.921	.906	.740	.000	.987	.914	.000	.964	.814	.975	.000	.000	.000	.000

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Irvine
N/S: Bake Parkway
E/W: I-5 Southbound Ramps
Weather: Clear

File Name : IRVBA5SAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

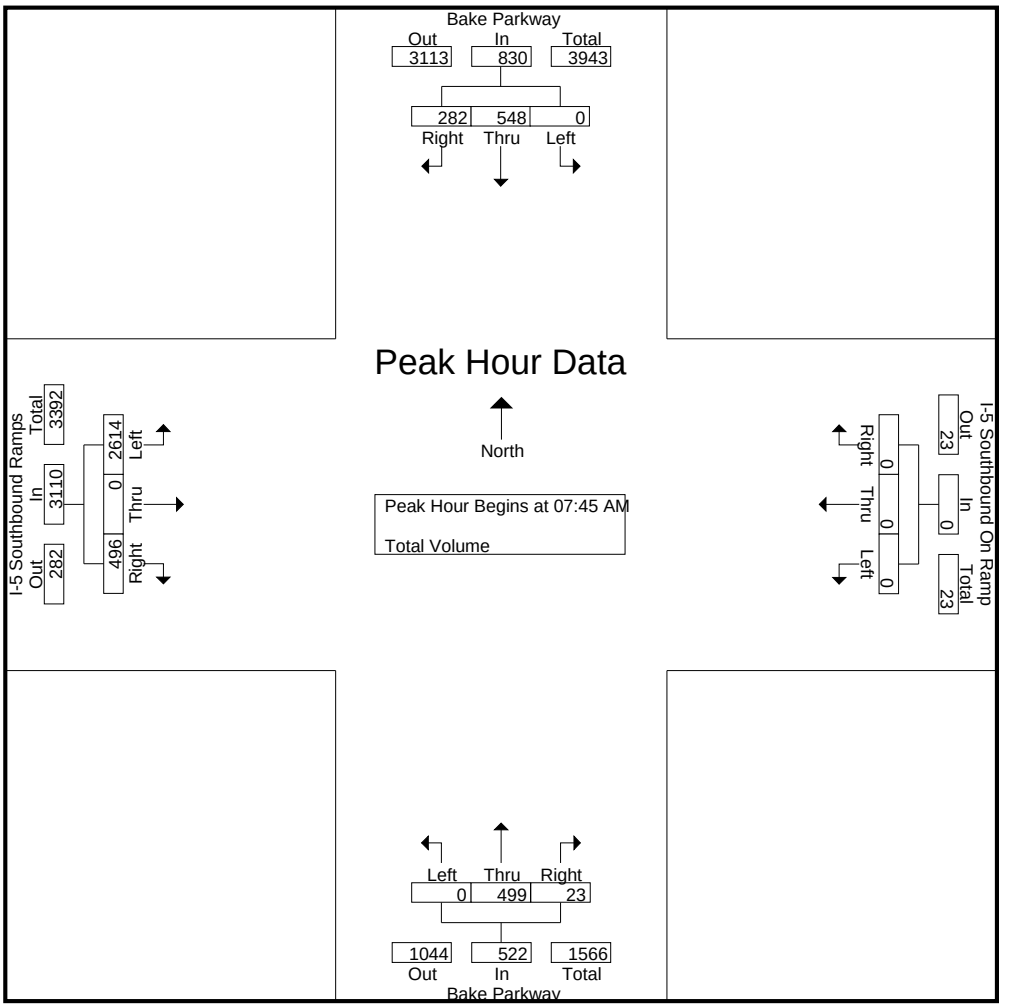
	Bake Parkway Southbound				I-5 Southbound On Ramp Westbound				Bake Parkway Northbound				I-5 Southbound Ramps Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	0	77	49	126	0	0	0	0	0	70	4	74	556	0	59	615	815
07:15 AM	0	85	48	133	0	0	0	0	0	96	1	97	577	0	83	660	890
07:30 AM	0	100	77	177	0	0	0	0	0	111	6	117	686	0	106	792	1086
07:45 AM	0	133	86	219	0	0	0	0	0	116	4	120	701	0	111	812	1151
Total	0	395	260	655	0	0	0	0	0	393	15	408	2520	0	359	2879	3942
08:00 AM	0	148	71	219	0	0	0	0	0	124	3	127	696	0	129	825	1171
08:15 AM	0	116	67	183	0	0	0	0	0	126	9	135	582	0	130	712	1030
08:30 AM	0	151	58	209	0	0	0	0	0	133	7	140	635	0	126	761	1110
08:45 AM	0	148	71	219	0	0	0	0	0	136	9	145	634	0	144	778	1142
Total	0	563	267	830	0	0	0	0	0	519	28	547	2547	0	529	3076	4453
Grand Total	0	958	527	1485	0	0	0	0	0	912	43	955	5067	0	888	5955	8395
Apprch %	0	64.5	35.5		0	0	0		0	95.5	4.5		85.1	0	14.9		
Total %	0	11.4	6.3	17.7	0	0	0	0	0	10.9	0.5	11.4	60.4	0	10.6	70.9	

	Bake Parkway Southbound				I-5 Southbound On Ramp Westbound				Bake Parkway Northbound				I-5 Southbound Ramps Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	0	133	**86**	**219**	0	0	0	0	0	116	4	120	**701**	0	111	812	1151
08:00 AM	0	148	71	219	0	0	0	0	0	124	3	127	696	0	129	**825**	**1171**
08:15 AM	0	116	67	183	0	0	0	0	0	126	**9**	135	582	0	**130**	712	1030
08:30 AM	0	**151**	58	209	0	0	0	0	0	**133**	7	**140**	635	0	126	761	1110
Total Volume	0	548	282	830	0	0	0	0	0	499	23	522	2614	0	496	3110	4462
% App. Total	0	66	34		0	0	0		0	95.6	4.4		84.1	0	15.9		
PHF	.000	.907	.820	.947	.000	.000	.000	.000	.000	.938	.639	.932	.932	.000	.954	.942	.953

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Irvine
N/S: Bake Parkway
E/W: I-5 Southbound Ramps
Weather: Clear

File Name : IRVBA5SAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:45 AM				07:00 AM				08:00 AM				07:30 AM			
+0 mins.	0	133	**86**	**219**	0	0	0	0	0	124	3	127	686	0	106	792
+15 mins.	0	148	71	219	0	0	0	0	0	126	**9**	135	**701**	0	111	812
+30 mins.	0	116	67	183	0	0	0	0	0	133	7	140	696	0	129	**825**
+45 mins.	0	**151**	58	209	0	0	0	0	0	**136**	9	**145**	582	0	**130**	712
Total Volume	0	548	282	830	0	0	0	0	0	519	28	547	2665	0	476	3141
% App. Total	0	66	34		0	0	0		0	94.9	5.1		84.8	0	15.2	
PHF	.000	.907	.820	.947	.000	.000	.000	.000	.000	.954	.778	.943	.950	.000	.915	.952

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Irvine
N/S: Bake Parkway
E/W: I-5 Southbound Ramps
Weather: Clear

File Name : IRVBA5SPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

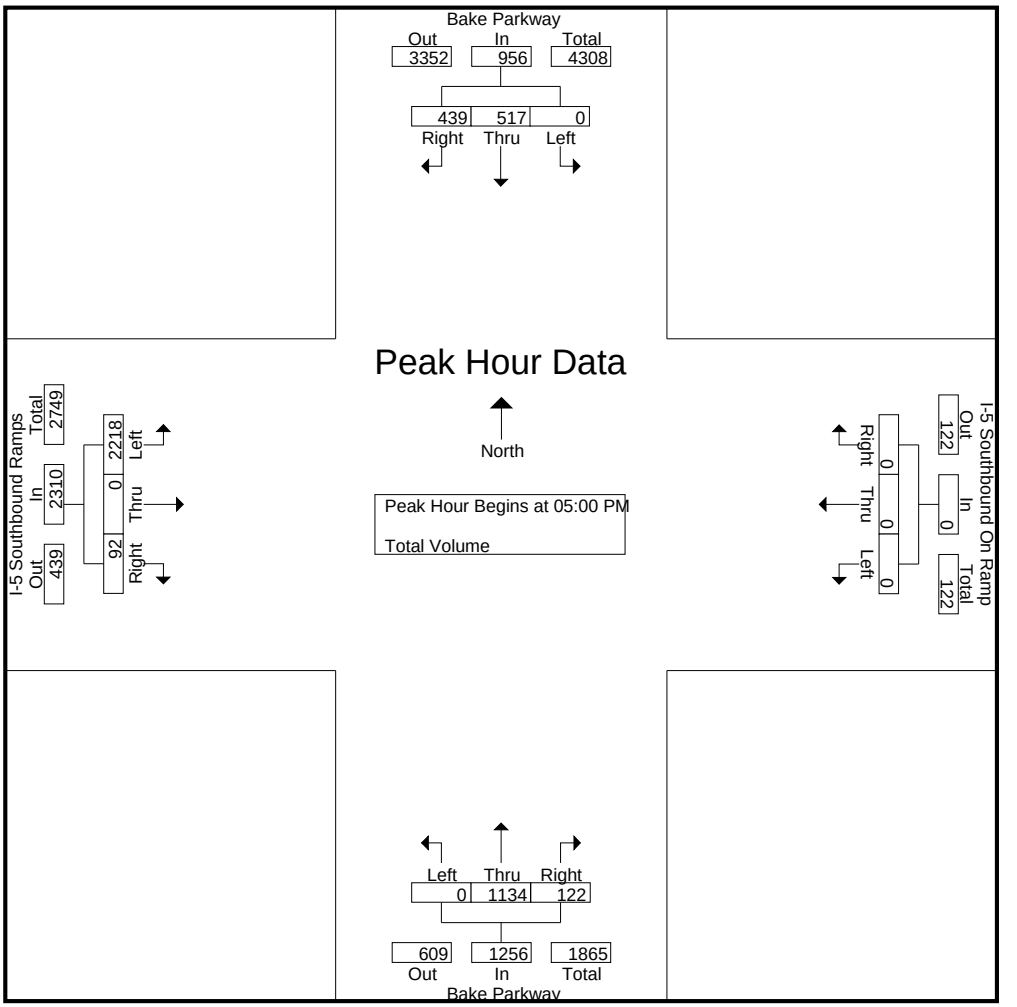
	Bake Parkway Southbound				I-5 Southbound On Ramp Westbound				Bake Parkway Northbound				I-5 Southbound Ramps Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	0	106	69	175	0	0	0	0	0	218	29	247	418	0	37	455	877
04:15 PM	0	127	93	220	0	0	0	0	0	203	32	235	435	0	42	477	932
04:30 PM	0	120	99	219	0	0	0	0	0	254	26	280	448	0	37	485	984
04:45 PM	0	134	100	234	0	0	0	0	0	232	18	250	440	0	25	465	949
Total	0	487	361	848	0	0	0	0	0	907	105	1012	1741	0	141	1882	3742
05:00 PM	0	114	116	230	0	0	0	0	0	321	21	342	536	0	35	571	1143
05:15 PM	0	140	109	249	0	0	0	0	0	309	24	333	542	0	24	566	1148
05:30 PM	0	140	106	246	0	0	0	0	0	261	39	300	565	0	17	582	1128
05:45 PM	0	123	108	231	0	0	0	0	0	243	38	281	575	0	16	591	1103
Total	0	517	439	956	0	0	0	0	0	1134	122	1256	2218	0	92	2310	4522
Grand Total	0	1004	800	1804	0	0	0	0	0	2041	227	2268	3959	0	233	4192	8264
Apprch %	0	55.7	44.3		0	0	0		0	90	10		94.4	0	5.6		
Total %	0	12.1	9.7	21.8	0	0	0	0	0	24.7	2.7	27.4	47.9	0	2.8	50.7	

	Bake Parkway Southbound				I-5 Southbound On Ramp Westbound				Bake Parkway Northbound				I-5 Southbound Ramps Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	114	**116**	230	0	0	0	0	0	**321**	21	**342**	536	0	**35**	571	1143
05:15 PM	0	**140**	109	**249**	0	0	0	0	0	309	24	333	542	0	24	566	**1148**
05:30 PM	0	140	106	246	0	0	0	0	0	261	**39**	300	565	0	17	582	1128
05:45 PM	0	123	108	231	0	0	0	0	0	243	38	281	**575**	0	16	**591**	1103
Total Volume	0	517	439	956	0	0	0	0	0	1134	122	1256	2218	0	92	2310	4522
% App. Total	0	54.1	45.9		0	0	0		0	90.3	9.7		96	0	4		
PHF	.000	.923	.946	.960	.000	.000	.000	.000	.000	.883	.782	.918	.964	.000	.657	.977	.985

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Irvine
N/S: Bake Parkway
E/W: I-5 Southbound Ramps
Weather: Clear

File Name : IRVBA5SPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:45 PM				04:00 PM				05:00 PM				05:00 PM			
+0 mins.	0	134	100	234	0	0	0	0	0	**321**	21	**342**	536	0	**35**	571
+15 mins.	0	114	**116**	230	0	0	0	0	0	309	24	333	542	0	24	566
+30 mins.	0	**140**	109	**249**	0	0	0	0	0	261	**39**	300	565	0	17	582
+45 mins.	0	140	106	246	0	0	0	0	0	243	38	281	**575**	0	16	**591**
Total Volume	0	528	431	959	0	0	0	0	0	1134	122	1256	2218	0	92	2310
% App. Total	0	55.1	44.9		0	0	0		0	90.3	9.7		96	0	4	
PHF	.000	.943	.929	.963	.000	.000	.000	.000	.000	.883	.782	.918	.964	.000	.657	.977

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Lake Forest Drive
E/W: Trabuco Road
Weather: Clear

File Name : LKFLFTRAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

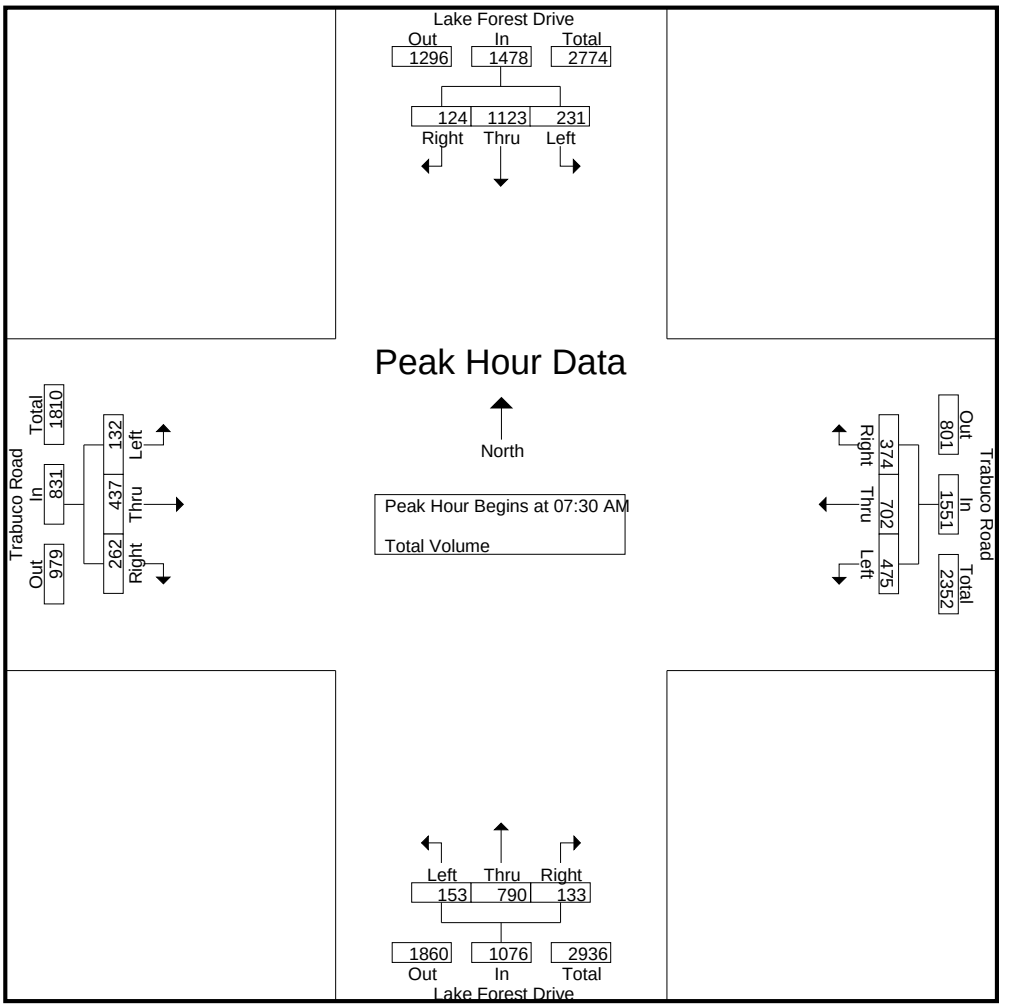
	Lake Forest Drive Southbound				Trabuco Road Westbound				Lake Forest Drive Northbound				Trabuco Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	42	210	30	282	110	163	66	339	22	115	21	158	28	54	32	114	893
07:15 AM	26	261	38	325	80	153	71	304	22	122	18	162	34	74	24	132	923
07:30 AM	69	267	35	371	112	145	55	312	24	156	26	206	35	110	47	192	1081
07:45 AM	80	292	36	408	132	211	129	472	30	198	20	248	33	136	66	235	1363
Total	217	1030	139	1386	434	672	321	1427	98	591	85	774	130	374	169	673	4260
08:00 AM	43	327	24	394	107	152	98	357	47	246	41	334	26	82	60	168	1253
08:15 AM	39	237	29	305	124	194	92	410	52	190	46	288	38	109	89	236	1239
08:30 AM	46	217	35	298	92	175	72	339	57	176	28	261	28	82	45	155	1053
08:45 AM	38	208	31	277	84	154	57	295	31	152	23	206	30	74	30	134	912
Total	166	989	119	1274	407	675	319	1401	187	764	138	1089	122	347	224	693	4457
Grand Total	383	2019	258	2660	841	1347	640	2828	285	1355	223	1863	252	721	393	1366	8717
Apprch %	14.4	75.9	9.7		29.7	47.6	22.6		15.3	72.7	12		18.4	52.8	28.8		
Total %	4.4	23.2	3	30.5	9.6	15.5	7.3	32.4	3.3	15.5	2.6	21.4	2.9	8.3	4.5	15.7	

	Lake Forest Drive Southbound				Trabuco Road Westbound				Lake Forest Drive Northbound				Trabuco Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	69	267	35	371	112	145	55	312	24	156	26	206	35	110	47	192	1081
07:45 AM	**80**	292	**36**	**408**	**132**	**211**	**129**	**472**	30	198	20	248	33	**136**	66	235	**1363**
08:00 AM	43	**327**	24	394	107	152	98	357	47	**246**	41	**334**	26	82	60	168	1253
08:15 AM	39	237	29	305	124	194	92	410	**52**	190	**46**	288	**38**	109	**89**	**236**	1239
Total Volume	231	1123	124	1478	475	702	374	1551	153	790	133	1076	132	437	262	831	4936
% App. Total	15.6	76	8.4		30.6	45.3	24.1		14.2	73.4	12.4		15.9	52.6	31.5		
PHF	.722	.859	.861	.906	.900	.832	.725	.822	.736	.803	.723	.805	.868	.803	.736	.880	.905

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Lake Forest Drive
E/W: Trabuco Road
Weather: Clear

File Name : LKFLFTRAM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:15 AM				07:45 AM				07:45 AM				07:30 AM			
+0 mins.	26	261	**38**	325	**132**	**211**	**129**	**472**	30	198	20	248	35	110	47	192
+15 mins.	69	267	35	371	107	152	98	357	47	**246**	41	**334**	33	**136**	66	235
+30 mins.	**80**	292	36	**408**	124	194	92	410	52	190	**46**	288	26	82	60	168
+45 mins.	43	**327**	24	394	92	175	72	339	**57**	176	28	261	**38**	109	**89**	**236**
Total Volume	218	1147	133	1498	455	732	391	1578	186	810	135	1131	132	437	262	831
% App. Total	14.6	76.6	8.9		28.8	46.4	24.8		16.4	71.6	11.9		15.9	52.6	31.5	
PHF	.681	.877	.875	.918	.862	.867	.758	.836	.816	.823	.734	.847	.868	.803	.736	.880

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Lake Forest Drive
E/W: Trabuco Road
Weather: Clear

File Name : LKFLFTRPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 1

Groups Printed- Total Volume

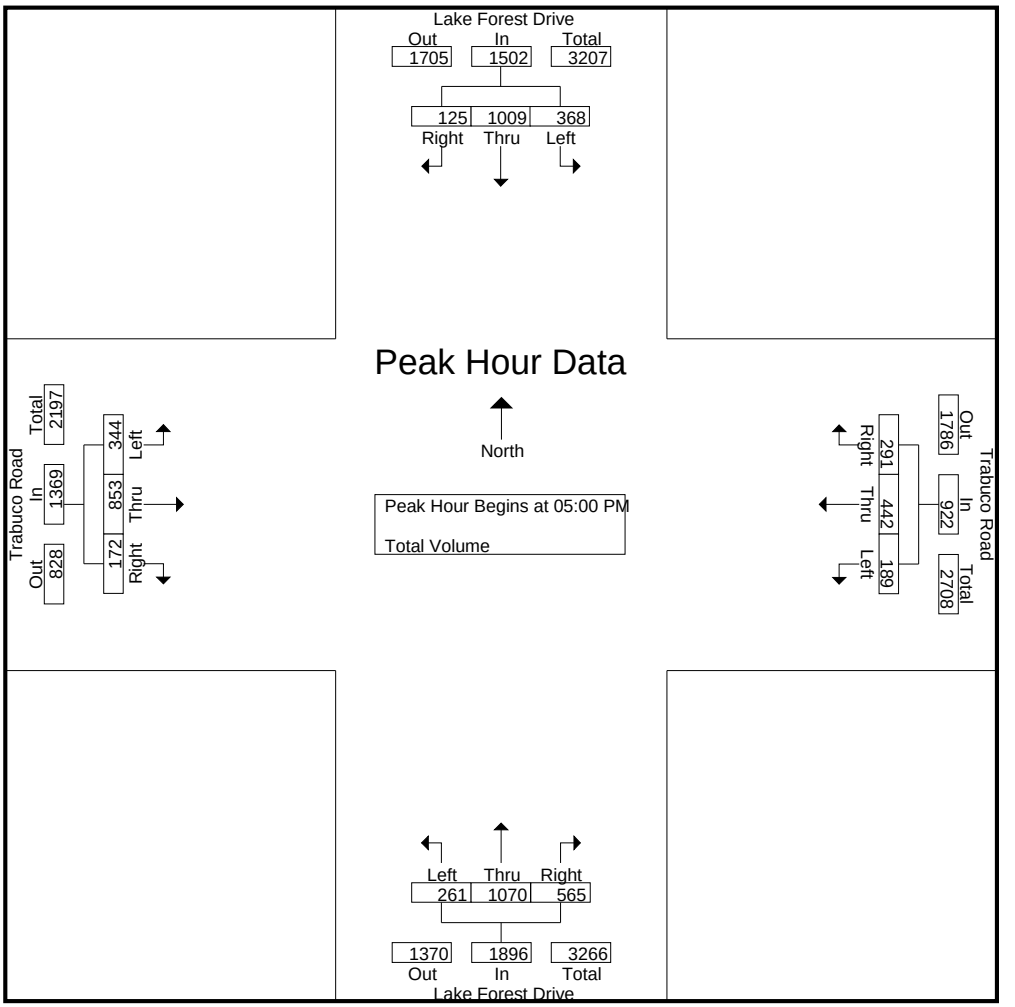
	Lake Forest Drive Southbound				Trabuco Road Westbound				Lake Forest Drive Northbound				Trabuco Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	58	246	23	327	35	88	42	165	47	182	93	322	72	172	31	275	1089
04:15 PM	70	195	36	301	66	113	58	237	51	217	116	384	78	175	41	294	1216
04:30 PM	66	189	18	273	41	95	55	191	62	211	119	392	92	224	38	354	1210
04:45 PM	75	200	23	298	53	94	62	209	68	221	134	423	70	172	41	283	1213
Total	269	830	100	1199	195	390	217	802	228	831	462	1521	312	743	151	1206	4728
05:00 PM	83	253	25	361	58	97	75	230	52	242	145	439	80	245	51	376	1406
05:15 PM	108	310	31	449	44	103	80	227	58	267	131	456	81	218	36	335	1467
05:30 PM	87	213	32	332	54	131	68	253	92	313	154	559	81	171	45	297	1441
05:45 PM	90	233	37	360	33	111	68	212	59	248	135	442	102	219	40	361	1375
Total	368	1009	125	1502	189	442	291	922	261	1070	565	1896	344	853	172	1369	5689
Grand Total	637	1839	225	2701	384	832	508	1724	489	1901	1027	3417	656	1596	323	2575	10417
Apprch %	23.6	68.1	8.3		22.3	48.3	29.5		14.3	55.6	30.1		25.5	62	12.5		
Total %	6.1	17.7	2.2	25.9	3.7	8	4.9	16.5	4.7	18.2	9.9	32.8	6.3	15.3	3.1	24.7	

	Lake Forest Drive Southbound				Trabuco Road Westbound				Lake Forest Drive Northbound				Trabuco Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	83	253	25	361	**58**	97	75	230	52	242	145	439	80	**245**	**51**	**376**	1406
05:15 PM	**108**	**310**	31	**449**	44	103	**80**	227	58	267	131	456	81	218	36	335	**1467**
05:30 PM	87	213	32	332	54	**131**	68	**253**	**92**	**313**	**154**	**559**	81	171	45	297	1441
05:45 PM	90	233	**37**	360	33	111	68	212	59	248	135	442	**102**	219	40	361	1375
Total Volume	368	1009	125	1502	189	442	291	922	261	1070	565	1896	344	853	172	1369	5689
% App. Total	24.5	67.2	8.3		20.5	47.9	31.6		13.8	56.4	29.8		25.1	62.3	12.6		
PHF	.852	.814	.845	.836	.815	.844	.909	.911	.709	.855	.917	.848	.843	.870	.843	.910	.969

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Lake Forest Drive
E/W: Trabuco Road
Weather: Clear

File Name : LKFLFTRPM
Site Code : 05117332
Start Date : 5/24/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	05:00 PM				05:00 PM				05:00 PM				05:00 PM			
+0 mins.	83	253	25	361	**58**	97	75	230	52	242	145	439	80	**245**	**51**	**376**
+15 mins.	**108**	**310**	31	**449**	44	103	**80**	227	58	267	131	456	81	218	36	335
+30 mins.	87	213	32	332	54	**131**	68	**253**	**92**	**313**	**154**	**559**	81	171	45	297
+45 mins.	90	233	**37**	360	33	111	68	212	59	248	135	442	**102**	219	40	361
Total Volume	368	1009	125	1502	189	442	291	922	261	1070	565	1896	344	853	172	1369
% App. Total	24.5	67.2	8.3		20.5	47.9	31.6		13.8	56.4	29.8		25.1	62.3	12.6	
PHF	.852	.814	.845	.836	.815	.844	.909	.911	.709	.855	.917	.848	.843	.870	.843	.910

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Lake Forest Drive
E/W: Serrano Road
Weather: Clear

File Name : LKFLFSEAM
Site Code : 05117332
Start Date : 6/1/2017
Page No : 1

Groups Printed- Total Volume

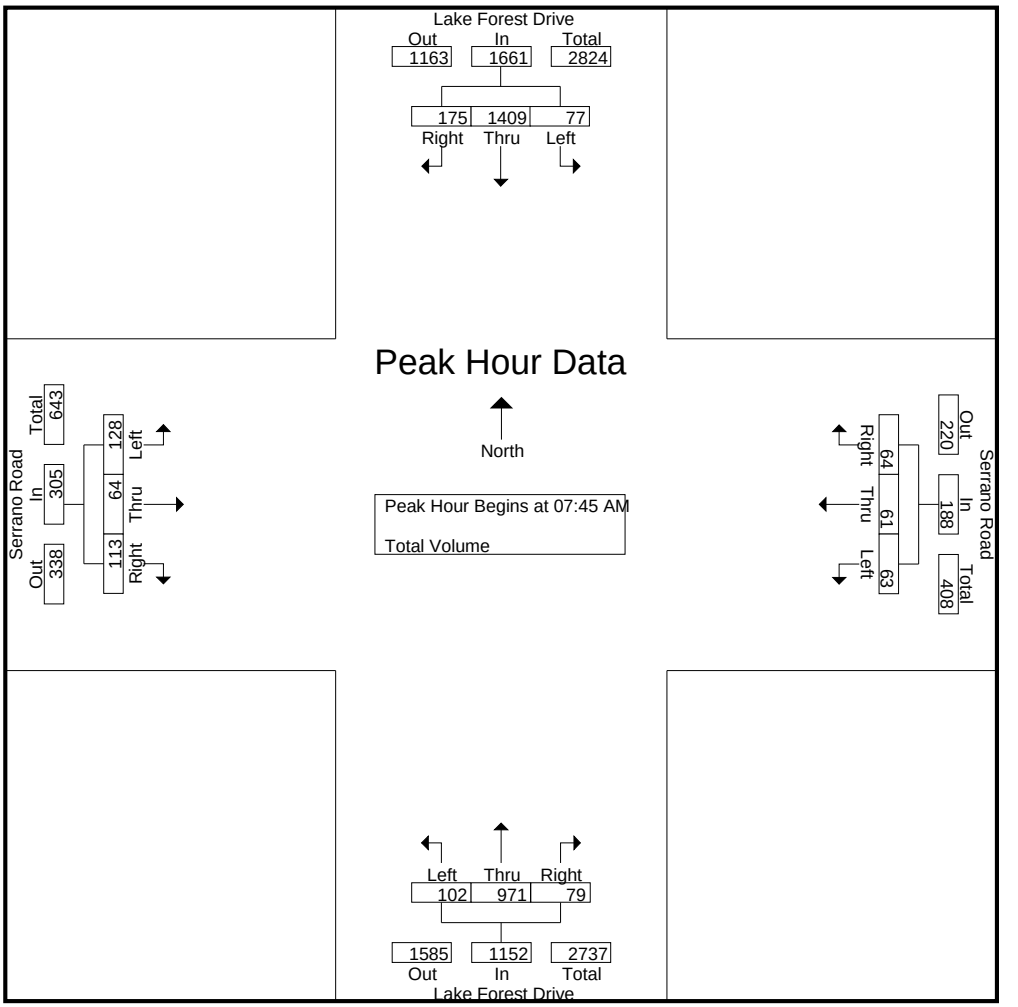
	Lake Forest Drive Southbound				Serrano Road Westbound				Lake Forest Drive Northbound				Serrano Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	6	347	27	380	18	19	4	41	14	140	5	159	6	5	23	34	614
07:15 AM	9	319	18	346	15	15	9	39	13	140	8	161	3	5	13	21	567
07:30 AM	12	366	26	404	12	24	11	47	19	147	7	173	14	13	13	40	664
07:45 AM	23	392	26	441	20	22	17	59	19	249	19	287	18	25	14	57	844
Total	50	1424	97	1571	65	80	41	186	65	676	39	780	41	48	63	152	2689
08:00 AM	11	386	51	448	20	23	22	65	33	302	20	355	15	9	21	45	913
08:15 AM	37	290	78	405	14	11	13	38	37	209	34	280	55	11	47	113	836
08:30 AM	6	341	20	367	9	5	12	26	13	211	6	230	40	19	31	90	713
08:45 AM	4	275	15	294	11	17	7	35	16	166	2	184	10	5	15	30	543
Total	58	1292	164	1514	54	56	54	164	99	888	62	1049	120	44	114	278	3005
Grand Total	108	2716	261	3085	119	136	95	350	164	1564	101	1829	161	92	177	430	5694
Apprch %	3.5	88	8.5		34	38.9	27.1		9	85.5	5.5		37.4	21.4	41.2		
Total %	1.9	47.7	4.6	54.2	2.1	2.4	1.7	6.1	2.9	27.5	1.8	32.1	2.8	1.6	3.1	7.6	

	Lake Forest Drive Southbound				Serrano Road Westbound				Lake Forest Drive Northbound				Serrano Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	23	**392**	26	441	**20**	22	17	59	19	249	19	287	18	**25**	14	57	844
08:00 AM	11	386	51	**448**	20	**23**	**22**	**65**	33	**302**	20	**355**	15	9	21	45	**913**
08:15 AM	**37**	290	**78**	405	14	11	13	38	**37**	209	**34**	280	**55**	11	**47**	**113**	836
08:30 AM	6	341	20	367	9	5	12	26	13	211	6	230	40	19	31	90	713
Total Volume	77	1409	175	1661	63	61	64	188	102	971	79	1152	128	64	113	305	3306
% App. Total	4.6	84.8	10.5		33.5	32.4	34		8.9	84.3	6.9		42	21	37		
PHF	.520	.899	.561	.927	.788	.663	.727	.723	.689	.804	.581	.811	.582	.640	.601	.675	.905

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Lake Forest Drive
E/W: Serrano Road
Weather: Clear

File Name : LKFLFSEAM
Site Code : 05117332
Start Date : 6/1/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:30 AM				07:15 AM				07:45 AM				07:45 AM			
+0 mins.	12	366	26	404	15	15	9	39	19	249	19	287	18	**25**	14	57
+15 mins.	23	**392**	26	441	12	**24**	11	47	33	**302**	20	**355**	15	9	21	45
+30 mins.	11	386	51	**448**	**20**	22	17	59	**37**	209	**34**	280	**55**	11	**47**	**113**
+45 mins.	**37**	290	**78**	405	20	23	**22**	**65**	13	211	6	230	40	19	31	90
Total Volume	83	1434	181	1698	67	84	59	210	102	971	79	1152	128	64	113	305
% App. Total	4.9	84.5	10.7		31.9	40	28.1		8.9	84.3	6.9		42	21	37	
PHF	.561	.915	.580	.948	.838	.875	.670	.808	.689	.804	.581	.811	.582	.640	.601	.675

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Lake Forest Drive
E/W: Serrano Road
Weather: Clear

File Name : LKFLFSEPM
Site Code : 05117332
Start Date : 6/1/2017
Page No : 1

Groups Printed- Total Volume

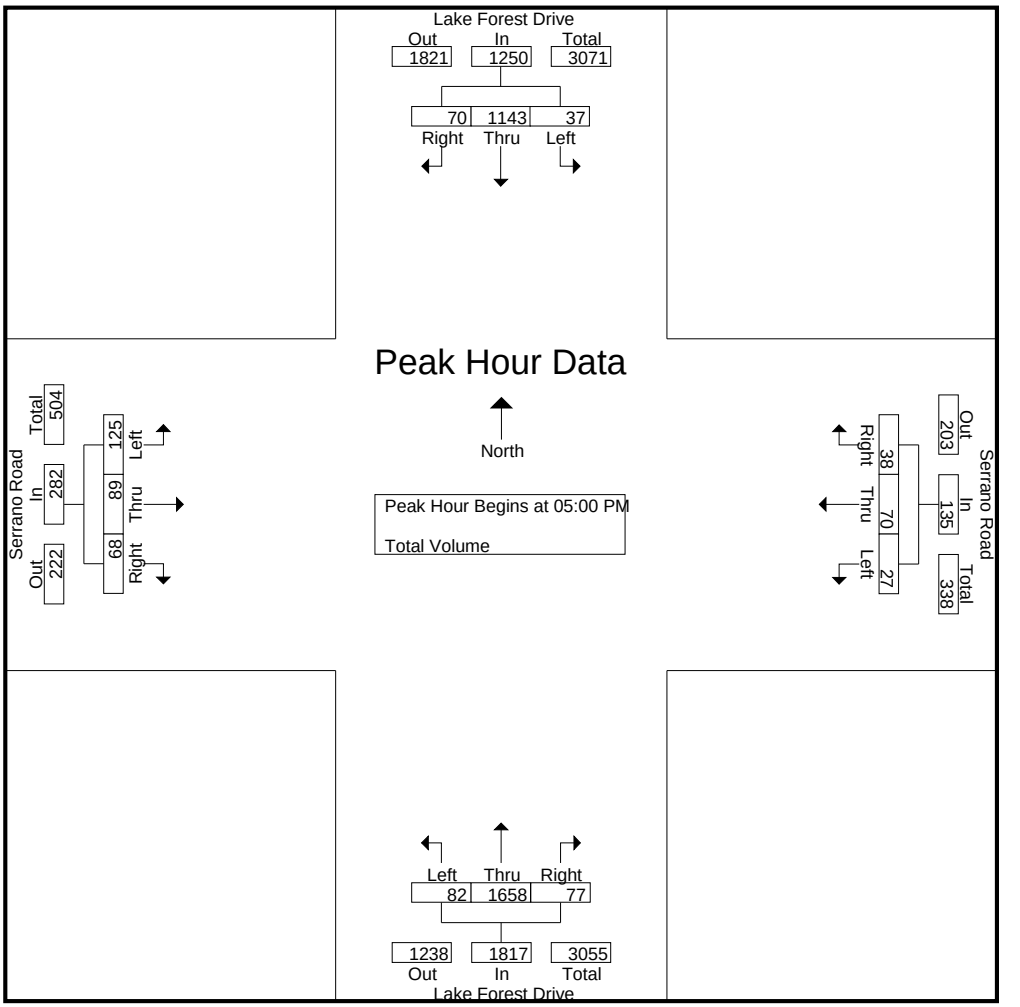
	Lake Forest Drive Southbound				Serrano Road Westbound				Lake Forest Drive Northbound				Serrano Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	14	251	20	285	4	16	12	32	23	275	21	319	20	6	23	49	685
04:15 PM	8	246	15	269	6	12	11	29	26	329	18	373	14	16	17	47	718
04:30 PM	8	197	14	219	5	17	9	31	17	304	17	338	32	18	21	71	659
04:45 PM	16	262	14	292	7	14	11	32	19	397	20	436	19	17	15	51	811
Total	46	956	63	1065	22	59	43	124	85	1305	76	1466	85	57	76	218	2873
05:00 PM	10	289	13	312	7	20	15	42	11	358	13	382	27	25	19	71	807
05:15 PM	7	326	20	353	4	20	8	32	22	447	24	493	39	21	16	76	954
05:30 PM	7	289	19	315	6	12	5	23	23	460	22	505	26	21	19	66	909
05:45 PM	13	239	18	270	10	18	10	38	26	393	18	437	33	22	14	69	814
Total	37	1143	70	1250	27	70	38	135	82	1658	77	1817	125	89	68	282	3484
Grand Total	83	2099	133	2315	49	129	81	259	167	2963	153	3283	210	146	144	500	6357
Apprch %	3.6	90.7	5.7		18.9	49.8	31.3		5.1	90.3	4.7		42	29.2	28.8		
Total %	1.3	33	2.1	36.4	0.8	2	1.3	4.1	2.6	46.6	2.4	51.6	3.3	2.3	2.3	7.9	

	Lake Forest Drive Southbound				Serrano Road Westbound				Lake Forest Drive Northbound				Serrano Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	10	289	13	312	7	**20**	**15**	**42**	11	358	13	382	27	**25**	**19**	71	807
05:15 PM	7	**326**	**20**	**353**	4	20	8	32	22	447	**24**	493	**39**	21	16	**76**	**954**
05:30 PM	7	289	19	315	6	12	5	23	23	**460**	22	**505**	26	21	19	66	909
05:45 PM	**13**	239	18	270	**10**	18	10	38	**26**	393	18	437	33	22	14	69	814
Total Volume	37	1143	70	1250	27	70	38	135	82	1658	77	1817	125	89	68	282	3484
% App. Total	3	91.4	5.6		20	51.9	28.1		4.5	91.2	4.2		44.3	31.6	24.1		
PHF	.712	.877	.875	.885	.675	.875	.633	.804	.788	.901	.802	.900	.801	.890	.895	.928	.913

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: Lake Forest Drive
E/W: Serrano Road
Weather: Clear

File Name : LKFLFSEPM
Site Code : 05117332
Start Date : 6/1/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:45 PM				04:30 PM				05:00 PM				05:00 PM			
+0 mins.	**16**	262	14	292	5	17	9	31	11	358	13	382	27	**25**	**19**	71
+15 mins.	10	289	13	312	**7**	14	11	32	22	447	**24**	493	**39**	21	16	**76**
+30 mins.	7	**326**	**20**	**353**	7	**20**	**15**	**42**	23	**460**	22	**505**	26	21	19	66
+45 mins.	7	289	19	315	4	20	8	32	**26**	393	18	437	33	22	14	69
Total Volume	40	1166	66	1272	23	71	43	137	82	1658	77	1817	125	89	68	282
% App. Total	3.1	91.7	5.2		16.8	51.8	31.4		4.5	91.2	4.2		44.3	31.6	24.1	
PHF	.625	.894	.825	.901	.821	.888	.717	.815	.788	.901	.802	.900	.801	.890	.895	.928

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: El Toro Road
E/W: Trabuco Road
Weather: Clear

File Name : LKFETTRAM
Site Code : 05117332
Start Date : 6/1/2017
Page No : 1

Groups Printed- Total Volume

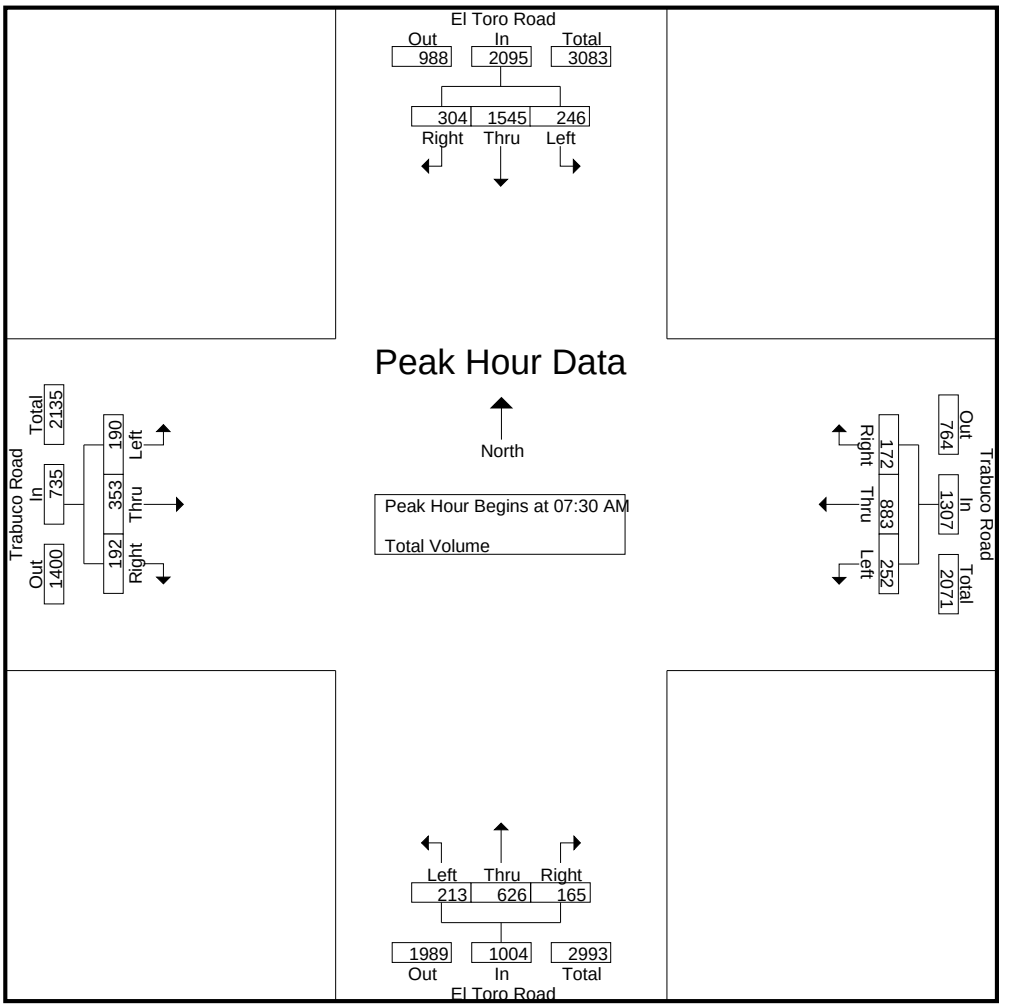
	El Toro Road Southbound				Trabuco Road Westbound				El Toro Road Northbound				Trabuco Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	36	342	69	447	51	134	35	220	26	118	20	164	37	34	25	96	927
07:15 AM	31	308	64	403	50	165	34	249	53	122	22	197	20	54	41	115	964
07:30 AM	41	338	61	440	70	231	35	336	40	100	26	166	35	71	48	154	1096
07:45 AM	58	495	83	636	65	229	52	346	50	199	42	291	54	87	62	203	1476
Total	166	1483	277	1926	236	759	156	1151	169	539	110	818	146	246	176	568	4463
08:00 AM	71	371	68	510	53	221	46	320	54	181	48	283	66	80	45	191	1304
08:15 AM	76	341	92	509	64	202	39	305	69	146	49	264	35	115	37	187	1265
08:30 AM	49	275	54	378	87	213	42	342	38	122	32	192	40	73	30	143	1055
08:45 AM	28	231	63	322	47	150	41	238	50	116	24	190	42	62	31	135	885
Total	224	1218	277	1719	251	786	168	1205	211	565	153	929	183	330	143	656	4509
Grand Total	390	2701	554	3645	487	1545	324	2356	380	1104	263	1747	329	576	319	1224	8972
Apprch %	10.7	74.1	15.2		20.7	65.6	13.8		21.8	63.2	15.1		26.9	47.1	26.1		
Total %	4.3	30.1	6.2	40.6	5.4	17.2	3.6	26.3	4.2	12.3	2.9	19.5	3.7	6.4	3.6	13.6	

	El Toro Road Southbound				Trabuco Road Westbound				El Toro Road Northbound				Trabuco Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	41	338	61	440	**70**	**231**	35	336	40	100	26	166	35	71	48	154	1096
07:45 AM	58	**495**	83	**636**	65	229	**52**	**346**	50	**199**	42	**291**	54	87	**62**	**203**	**1476**
08:00 AM	71	371	68	510	53	221	46	320	54	181	48	283	**66**	80	45	191	1304
08:15 AM	**76**	341	**92**	509	64	202	39	305	**69**	146	**49**	264	35	**115**	37	187	1265
Total Volume	246	1545	304	2095	252	883	172	1307	213	626	165	1004	190	353	192	735	5141
% App. Total	11.7	73.7	14.5		19.3	67.6	13.2		21.2	62.4	16.4		25.9	48	26.1		
PHF	.809	.780	.826	.824	.900	.956	.827	.944	.772	.786	.842	.863	.720	.767	.774	.905	.871

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: El Toro Road
E/W: Trabuco Road
Weather: Clear

File Name : LKFETTRAM
Site Code : 05117332
Start Date : 6/1/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:30 AM				07:45 AM				07:45 AM				07:30 AM			
+0 mins.	41	338	61	440	65	**229**	**52**	**346**	50	**199**	42	**291**	35	71	48	154
+15 mins.	58	**495**	83	**636**	53	221	46	320	54	181	48	283	54	87	**62**	**203**
+30 mins.	71	371	68	510	64	202	39	305	**69**	146	**49**	264	**66**	80	45	191
+45 mins.	**76**	341	**92**	509	**87**	213	42	342	38	122	32	192	35	**115**	37	187
Total Volume	246	1545	304	2095	269	865	179	1313	211	648	171	1030	190	353	192	735
% App. Total	11.7	73.7	14.5		20.5	65.9	13.6		20.5	62.9	16.6		25.9	48	26.1	
PHF	.809	.780	.826	.824	.773	.944	.861	.949	.764	.814	.872	.885	.720	.767	.774	.905

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: El Toro Road
E/W: Trabuco Road
Weather: Clear

File Name : LKFETTRPM
Site Code : 05117332
Start Date : 6/1/2017
Page No : 1

Groups Printed- Total Volume

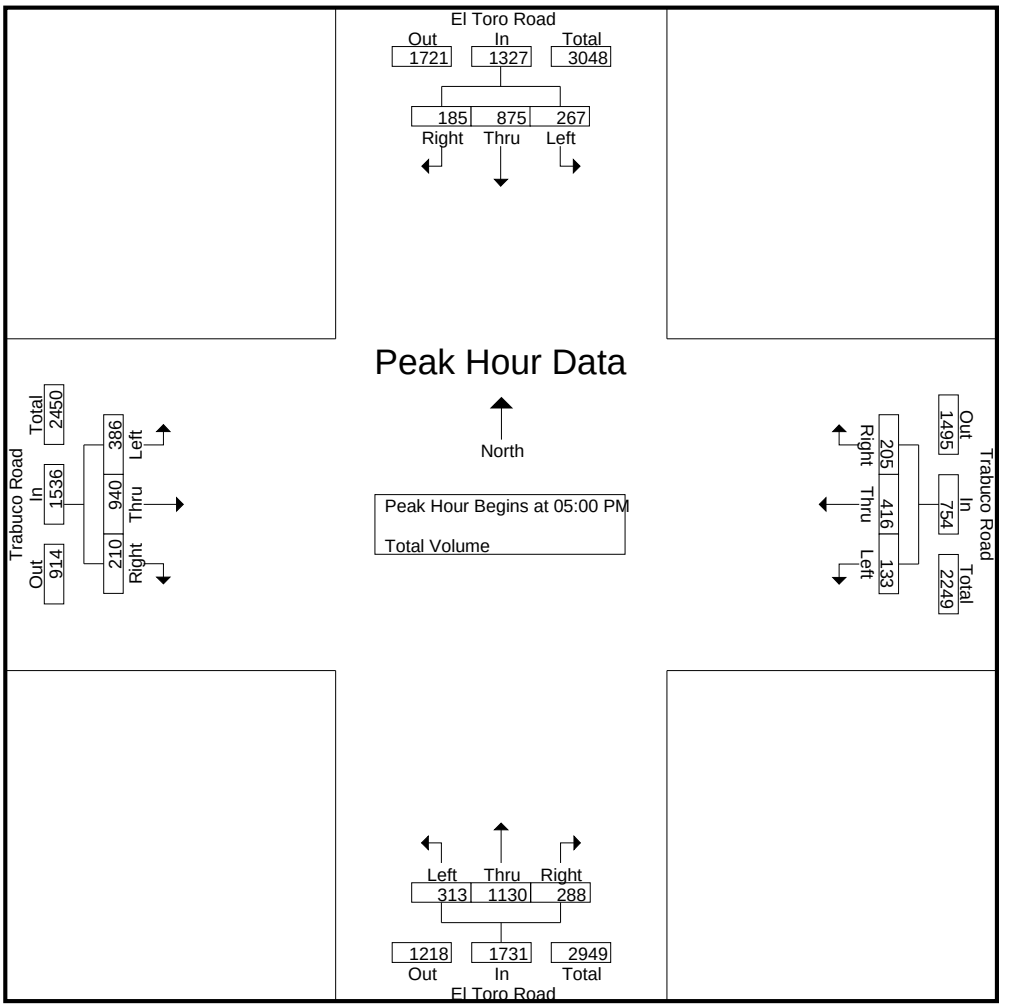
	El Toro Road Southbound				Trabuco Road Westbound				El Toro Road Northbound				Trabuco Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	50	208	40	298	36	85	36	157	83	214	65	362	74	163	47	284	1101
04:15 PM	56	202	33	291	36	73	53	162	82	259	62	403	80	145	42	267	1123
04:30 PM	43	206	31	280	43	96	47	186	73	245	48	366	58	196	54	308	1140
04:45 PM	65	214	34	313	53	93	50	196	77	262	70	409	95	229	48	372	1290
Total	214	830	138	1182	168	347	186	701	315	980	245	1540	307	733	191	1231	4654
05:00 PM	75	228	50	353	25	103	48	176	75	266	64	405	94	212	56	362	1296
05:15 PM	65	217	53	335	40	101	47	188	79	297	85	461	118	261	52	431	1415
05:30 PM	66	222	42	330	34	125	62	221	71	281	64	416	79	247	53	379	1346
05:45 PM	61	208	40	309	34	87	48	169	88	286	75	449	95	220	49	364	1291
Total	267	875	185	1327	133	416	205	754	313	1130	288	1731	386	940	210	1536	5348
Grand Total	481	1705	323	2509	301	763	391	1455	628	2110	533	3271	693	1673	401	2767	10002
Apprch %	19.2	68	12.9		20.7	52.4	26.9		19.2	64.5	16.3		25	60.5	14.5		
Total %	4.8	17	3.2	25.1	3	7.6	3.9	14.5	6.3	21.1	5.3	32.7	6.9	16.7	4	27.7	

	El Toro Road Southbound				Trabuco Road Westbound				El Toro Road Northbound				Trabuco Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	**75**	**228**	50	**353**	25	103	48	176	75	266	64	405	94	212	**56**	362	1296
05:15 PM	65	217	**53**	335	**40**	101	47	188	79	**297**	**85**	**461**	**118**	**261**	52	**431**	**1415**
05:30 PM	66	222	42	330	34	**125**	**62**	**221**	71	281	64	416	79	247	53	379	1346
05:45 PM	61	208	40	309	34	87	48	169	**88**	286	75	449	95	220	49	364	1291
Total Volume	267	875	185	1327	133	416	205	754	313	1130	288	1731	386	940	210	1536	5348
% App. Total	20.1	65.9	13.9		17.6	55.2	27.2		18.1	65.3	16.6		25.1	61.2	13.7		
PHF	.890	.959	.873	.940	.831	.832	.827	.853	.889	.951	.847	.939	.818	.900	.938	.891	.945

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: El Toro Road
E/W: Trabuco Road
Weather: Clear

File Name : LKFETTRPM
Site Code : 05117332
Start Date : 6/1/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:45 PM				04:45 PM				05:00 PM				04:45 PM			
+0 mins.	65	214	34	313	**53**	93	50	196	75	266	64	405	95	229	48	372
+15 mins.	**75**	**228**	50	**353**	25	103	48	176	79	**297**	**85**	**461**	94	212	**56**	362
+30 mins.	65	217	**53**	335	40	101	47	188	71	281	64	416	**118**	**261**	52	**431**
+45 mins.	66	222	42	330	34	**125**	**62**	**221**	**88**	286	75	449	79	247	53	379
Total Volume	271	881	179	1331	152	422	207	781	313	1130	288	1731	386	949	209	1544
% App. Total	20.4	66.2	13.4		19.5	54	26.5		18.1	65.3	16.6		25	61.5	13.5	
PHF	.903	.966	.844	.943	.717	.844	.835	.883	.889	.951	.847	.939	.818	.909	.933	.896

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: El Toro Road
E/W: Serrano Road
Weather: Clear

File Name : LKFETSEAM
Site Code : 05117332
Start Date : 6/1/2017
Page No : 1

Groups Printed- Total Volume

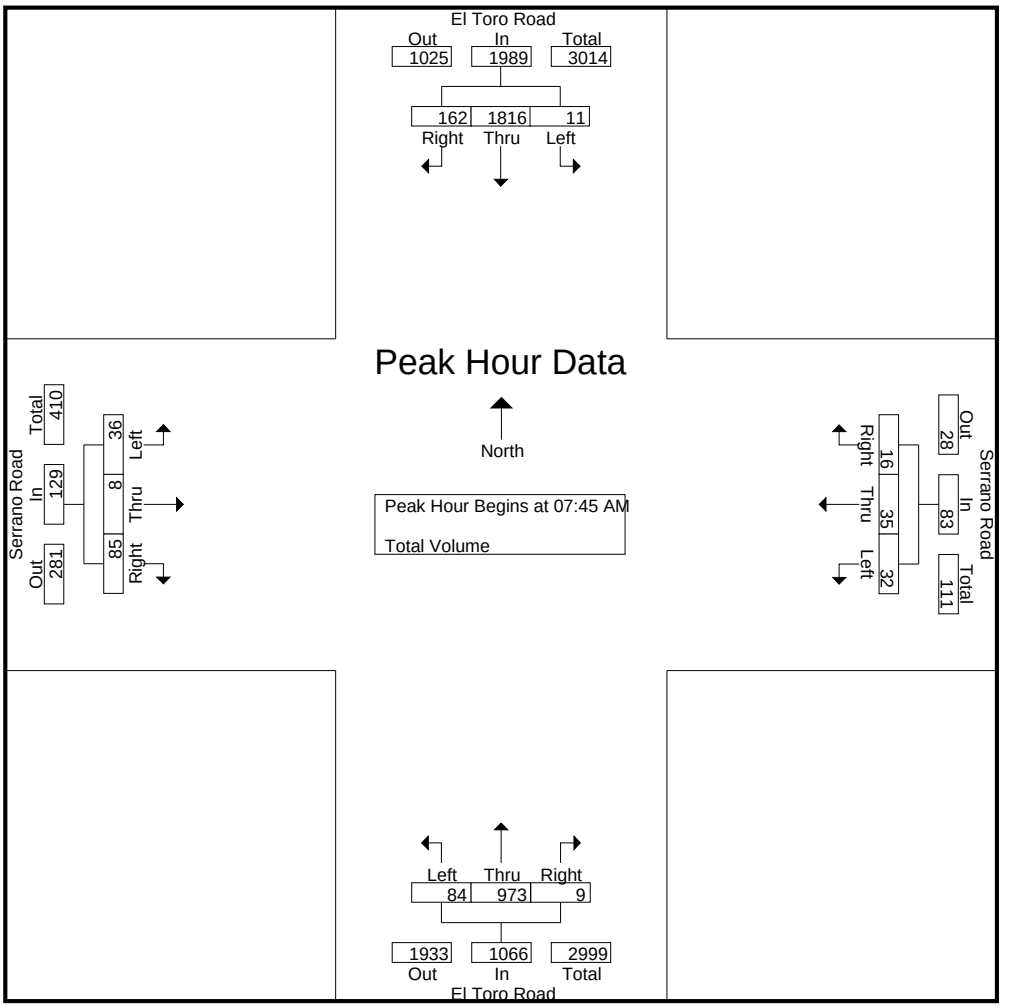
	El Toro Road Southbound				Serrano Road Westbound				El Toro Road Northbound				Serrano Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	0	389	106	495	10	9	7	26	23	160	2	185	7	1	7	15	721
07:15 AM	3	334	26	363	9	3	8	20	10	140	1	151	5	4	7	16	550
07:30 AM	1	382	13	396	10	4	6	20	15	173	1	189	4	0	15	19	624
07:45 AM	1	526	56	583	9	5	3	17	21	234	1	256	7	0	12	19	875
Total	5	1631	201	1837	38	21	24	83	69	707	5	781	23	5	41	69	2770
08:00 AM	4	501	84	589	13	10	4	27	29	269	5	303	15	2	36	53	972
08:15 AM	2	346	14	362	7	8	7	22	11	223	0	234	8	5	16	29	647
08:30 AM	4	443	8	455	3	12	2	17	23	247	3	273	6	1	21	28	773
08:45 AM	2	368	7	377	6	0	3	9	15	195	5	215	11	6	23	40	641
Total	12	1658	113	1783	29	30	16	75	78	934	13	1025	40	14	96	150	3033
Grand Total	17	3289	314	3620	67	51	40	158	147	1641	18	1806	63	19	137	219	5803
Apprch %	0.5	90.9	8.7		42.4	32.3	25.3		8.1	90.9	1		28.8	8.7	62.6		
Total %	0.3	56.7	5.4	62.4	1.2	0.9	0.7	2.7	2.5	28.3	0.3	31.1	1.1	0.3	2.4	3.8	

	El Toro Road Southbound				Serrano Road Westbound				El Toro Road Northbound				Serrano Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	1	**526**	56	583	9	5	3	17	21	234	1	256	7	0	12	19	875
08:00 AM	**4**	501	**84**	**589**	**13**	10	4	**27**	**29**	**269**	**5**	**303**	**15**	2	**36**	**53**	**972**
08:15 AM	2	346	14	362	7	8	**7**	22	11	223	0	234	8	**5**	16	29	647
08:30 AM	4	443	8	455	3	**12**	2	17	23	247	3	273	6	1	21	28	773
Total Volume	11	1816	162	1989	32	35	16	83	84	973	9	1066	36	8	85	129	3267
% App. Total	0.6	91.3	8.1		38.6	42.2	19.3		7.9	91.3	0.8		27.9	6.2	65.9		
PHF	.688	.863	.482	.844	.615	.729	.571	.769	.724	.904	.450	.880	.600	.400	.590	.608	.840

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: El Toro Road
E/W: Serrano Road
Weather: Clear

File Name : LKFETSEAM
Site Code : 05117332
Start Date : 6/1/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:45 AM				07:30 AM				07:45 AM				08:00 AM			
+0 mins.	1	**526**	56	583	10	4	6	20	21	234	1	256	**15**	2	**36**	**53**
+15 mins.	**4**	501	**84**	**589**	9	5	3	17	**29**	**269**	**5**	**303**	8	5	16	29
+30 mins.	2	346	14	362	**13**	**10**	4	**27**	11	223	0	234	6	1	21	28
+45 mins.	4	443	8	455	7	8	**7**	22	23	247	3	273	11	**6**	23	40
Total Volume	11	1816	162	1989	39	27	20	86	84	973	9	1066	40	14	96	150
% App. Total	0.6	91.3	8.1		45.3	31.4	23.3		7.9	91.3	0.8		26.7	9.3	64	
PHF	.688	.863	.482	.844	.750	.675	.714	.796	.724	.904	.450	.880	.667	.583	.667	.708

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: El Toro Road
E/W: Serrano Road
Weather: Clear

File Name : LKFETSEPM
Site Code : 05117332
Start Date : 6/1/2017
Page No : 1

Groups Printed- Total Volume

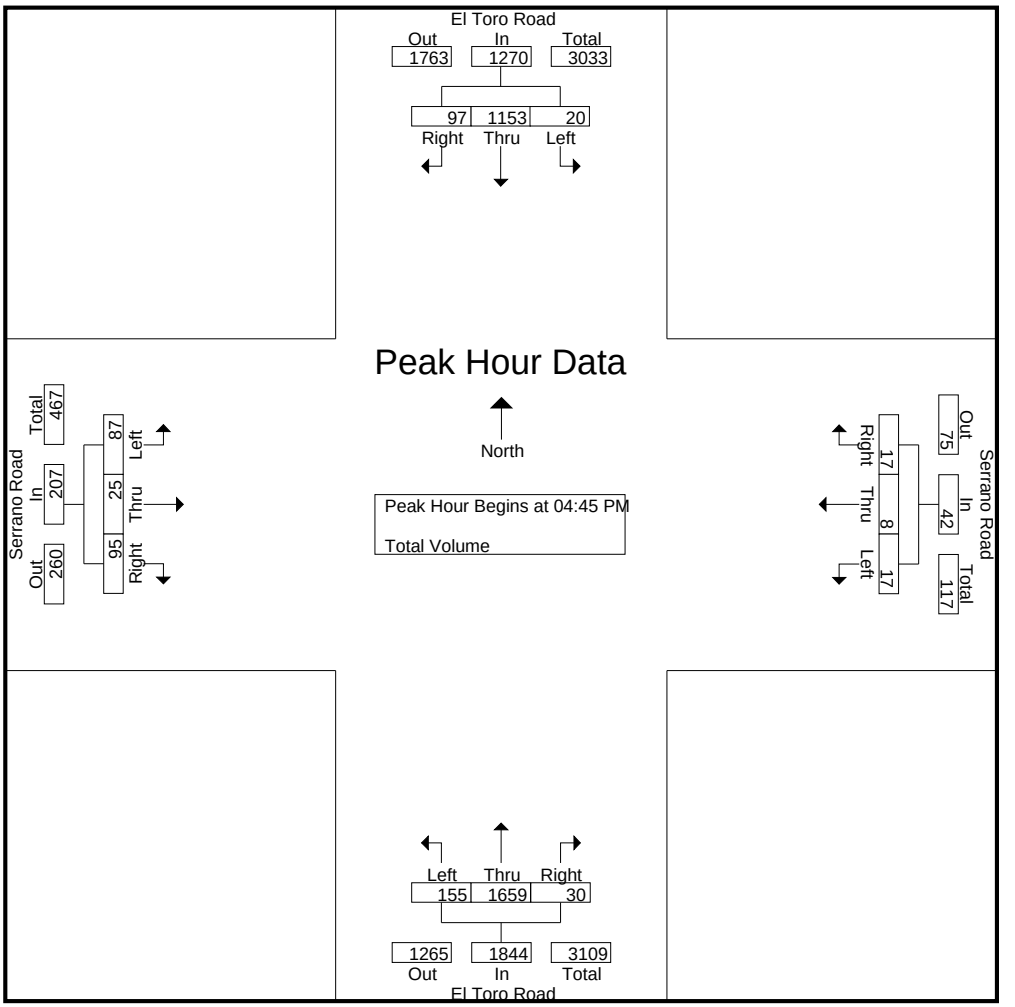
	El Toro Road Southbound				Serrano Road Westbound				El Toro Road Northbound				Serrano Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	7	353	26	386	4	7	4	15	34	352	8	394	20	4	19	43	838
04:15 PM	8	263	19	290	7	5	1	13	29	363	6	398	29	6	20	55	756
04:30 PM	6	217	12	235	1	3	5	9	27	333	7	367	9	2	9	20	631
04:45 PM	5	255	15	275	3	2	3	8	34	334	5	373	17	6	26	49	705
Total	26	1088	72	1186	15	17	13	45	124	1382	26	1532	75	18	74	167	2930
05:00 PM	5	305	32	342	4	0	3	7	48	464	11	523	31	4	32	67	939
05:15 PM	5	327	28	360	7	2	4	13	38	405	5	448	19	5	19	43	864
05:30 PM	5	266	22	293	3	4	7	14	35	456	9	500	20	10	18	48	855
05:45 PM	7	236	20	263	2	2	3	7	21	326	7	354	17	5	24	46	670
Total	22	1134	102	1258	16	8	17	41	142	1651	32	1825	87	24	93	204	3328
Grand Total	48	2222	174	2444	31	25	30	86	266	3033	58	3357	162	42	167	371	6258
Apprch %	2	90.9	7.1		36	29.1	34.9		7.9	90.3	1.7		43.7	11.3	45		
Total %	0.8	35.5	2.8	39.1	0.5	0.4	0.5	1.4	4.3	48.5	0.9	53.6	2.6	0.7	2.7	5.9	

	El Toro Road Southbound				Serrano Road Westbound				El Toro Road Northbound				Serrano Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	**5**	255	15	275	3	2	3	8	34	334	5	373	17	6	26	49	705
05:00 PM	5	305	**32**	342	4	0	3	7	**48**	**464**	**11**	**523**	**31**	4	**32**	**67**	**939**
05:15 PM	5	**327**	28	**360**	**7**	2	4	13	38	405	5	448	19	5	19	43	864
05:30 PM	5	266	22	293	3	**4**	**7**	**14**	35	456	9	500	20	**10**	18	48	855
Total Volume	20	1153	97	1270	17	8	17	42	155	1659	30	1844	87	25	95	207	3363
% App. Total	1.6	90.8	7.6		40.5	19	40.5		8.4	90	1.6		42	12.1	45.9		
PHF	1.00	.881	.758	.882	.607	.500	.607	.750	.807	.894	.682	.881	.702	.625	.742	.772	.895

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: El Toro Road
E/W: Serrano Road
Weather: Clear

File Name : LKFETSEPM
Site Code : 05117332
Start Date : 6/1/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:45 PM				04:00 PM				04:45 PM				04:45 PM			
+0 mins.	**5**	255	15	275	4	**7**	4	**15**	34	334	5	373	17	6	26	49
+15 mins.	5	305	**32**	342	**7**	5	1	13	**48**	**464**	**11**	**523**	**31**	4	**32**	**67**
+30 mins.	5	**327**	28	**360**	1	3	**5**	9	38	405	5	448	19	5	19	43
+45 mins.	5	266	22	293	3	2	3	8	35	456	9	500	20	**10**	18	48
Total Volume	20	1153	97	1270	15	17	13	45	155	1659	30	1844	87	25	95	207
% App. Total	1.6	90.8	7.6		33.3	37.8	28.9		8.4	90	1.6		42	12.1	45.9	
PHF	1.000	.881	.758	.882	.536	.607	.650	.750	.807	.894	.682	.881	.702	.625	.742	.772

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: El Toro Road
E/W: Jeronimo Road
Weather: Clear

File Name : LKFETJEAM
Site Code : 05117332
Start Date : 6/1/2017
Page No : 1

Groups Printed- Total Volume

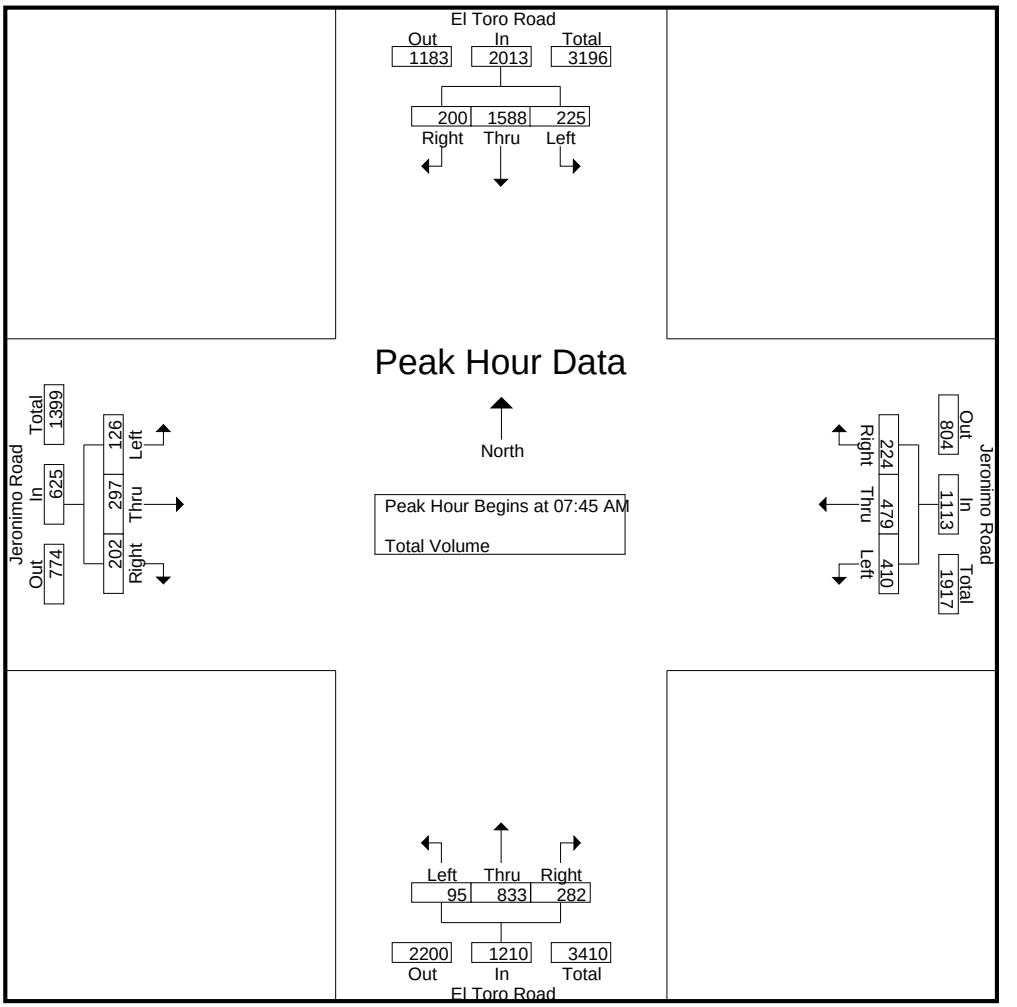
	El Toro Road Southbound				Jeronimo Road Westbound				El Toro Road Northbound				Jeronimo Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	32	324	36	392	83	83	33	199	12	142	44	198	14	18	26	58	847
07:15 AM	60	453	30	543	70	105	46	221	11	179	55	245	15	39	21	75	1084
07:30 AM	52	320	38	410	68	101	43	212	15	152	56	223	13	29	22	64	909
07:45 AM	74	331	63	468	125	154	78	357	17	223	92	332	26	78	61	165	1322
Total	218	1428	167	1813	346	443	200	989	55	696	247	998	68	164	130	362	4162
08:00 AM	66	410	76	552	97	95	57	249	34	182	61	277	33	65	53	151	1229
08:15 AM	50	514	39	603	103	130	54	287	32	262	76	370	47	82	58	187	1447
08:30 AM	35	333	22	390	85	100	35	220	12	166	53	231	20	72	30	122	963
08:45 AM	49	277	20	346	57	76	22	155	8	156	41	205	6	40	21	67	773
Total	200	1534	157	1891	342	401	168	911	86	766	231	1083	106	259	162	527	4412
Grand Total	418	2962	324	3704	688	844	368	1900	141	1462	478	2081	174	423	292	889	8574
Apprch %	11.3	80	8.7		36.2	44.4	19.4		6.8	70.3	23		19.6	47.6	32.8		
Total %	4.9	34.5	3.8	43.2	8	9.8	4.3	22.2	1.6	17.1	5.6	24.3	2	4.9	3.4	10.4	

	El Toro Road Southbound				Jeronimo Road Westbound				El Toro Road Northbound				Jeronimo Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	**74**	331	63	468	**125**	**154**	**78**	**357**	17	223	**92**	332	26	78	**61**	165	1322
08:00 AM	66	410	**76**	552	97	95	57	249	**34**	182	61	277	33	65	53	151	1229
08:15 AM	50	**514**	39	**603**	103	130	54	287	32	**262**	76	**370**	**47**	**82**	58	**187**	**1447**
08:30 AM	35	333	22	390	85	100	35	220	12	166	53	231	20	72	30	122	963
Total Volume	225	1588	200	2013	410	479	224	1113	95	833	282	1210	126	297	202	625	4961
% App. Total	11.2	78.9	9.9		36.8	43	20.1		7.9	68.8	23.3		20.2	47.5	32.3		
PHF	.760	.772	.658	.835	.820	.778	.718	.779	.699	.795	.766	.818	.670	.905	.828	.836	.857

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: El Toro Road
E/W: Jeronimo Road
Weather: Clear

File Name : LKFETJEAM
Site Code : 05117332
Start Date : 6/1/2017
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:30 AM				07:45 AM				07:45 AM				07:45 AM			
+0 mins.	52	320	38	410	**125**	**154**	**78**	**357**	17	223	**92**	332	26	78	**61**	165
+15 mins.	**74**	331	63	468	97	95	57	249	**34**	182	61	277	33	65	53	151
+30 mins.	66	410	**76**	552	103	130	54	287	32	**262**	76	**370**	**47**	**82**	58	**187**
+45 mins.	50	**514**	39	**603**	85	100	35	220	12	166	53	231	20	72	30	122
Total Volume	242	1575	216	2033	410	479	224	1113	95	833	282	1210	126	297	202	625
% App. Total	11.9	77.5	10.6		36.8	43	20.1		7.9	68.8	23.3		20.2	47.5	32.3	
PHF	.818	.766	.711	.843	.820	.778	.718	.779	.699	.795	.766	.818	.670	.905	.828	.836

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: El Toro Road
E/W: Jeronimo Road
Weather: Clear

File Name : LKFETJEPM
Site Code : 05117332
Start Date : 6/1/2017
Page No : 1

Groups Printed- Total Volume

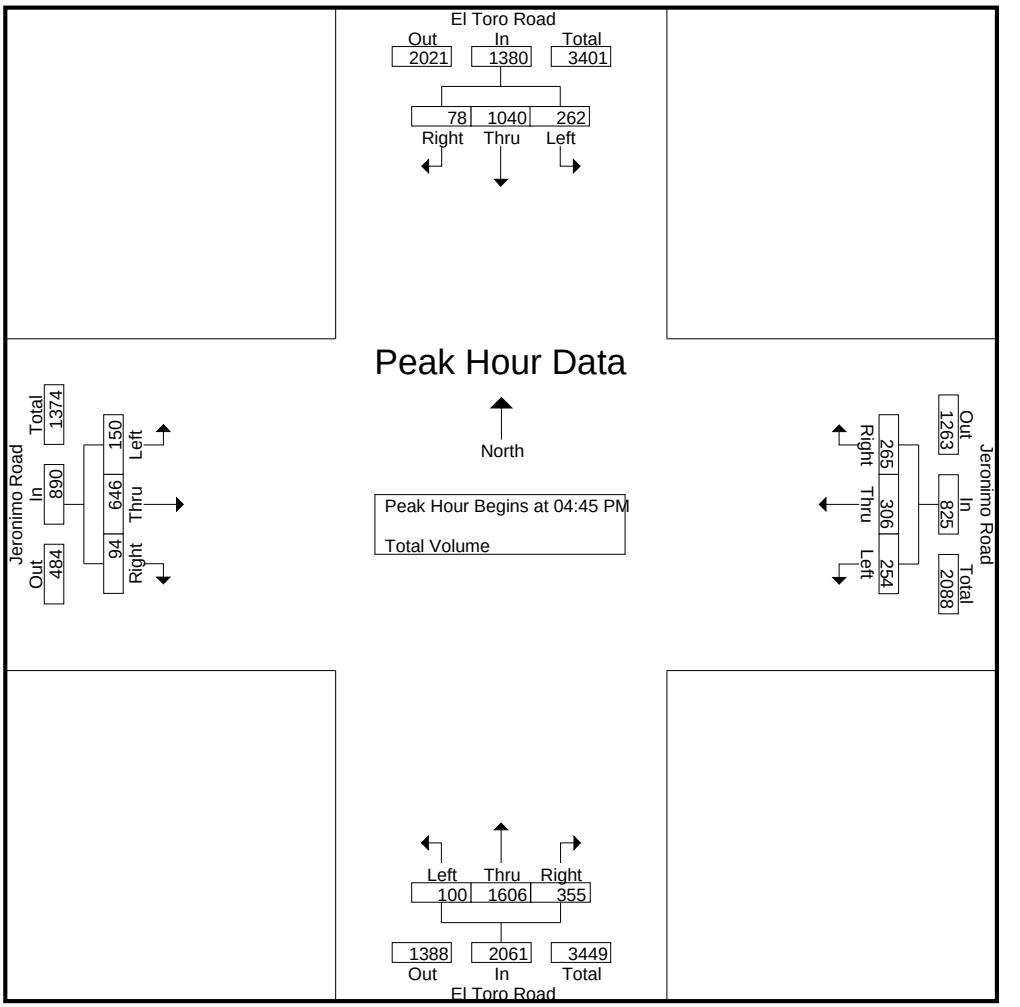
	El Toro Road Southbound				Jeronimo Road Westbound				El Toro Road Northbound				Jeronimo Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	54	232	17	303	61	72	64	197	33	361	106	500	31	146	24	201	1201
04:15 PM	46	243	13	302	58	44	48	150	20	338	69	427	33	94	21	148	1027
04:30 PM	58	231	8	297	61	69	70	200	24	352	73	449	20	142	19	181	1127
04:45 PM	71	244	20	335	46	63	59	168	26	383	79	488	32	121	18	171	1162
Total	229	950	58	1237	226	248	241	715	103	1434	327	1864	116	503	82	701	4517
05:00 PM	53	253	16	322	66	80	55	201	19	404	88	511	36	159	19	214	1248
05:15 PM	64	240	15	319	74	68	67	209	24	363	87	474	36	162	27	225	1227
05:30 PM	74	303	27	404	68	95	84	247	31	456	101	588	46	204	30	280	1519
05:45 PM	47	196	17	260	53	68	48	169	23	298	59	380	29	120	16	165	974
Total	238	992	75	1305	261	311	254	826	97	1521	335	1953	147	645	92	884	4968
Grand Total	467	1942	133	2542	487	559	495	1541	200	2955	662	3817	263	1148	174	1585	9485
Apprch %	18.4	76.4	5.2		31.6	36.3	32.1		5.2	77.4	17.3		16.6	72.4	11		
Total %	4.9	20.5	1.4	26.8	5.1	5.9	5.2	16.2	2.1	31.2	7	40.2	2.8	12.1	1.8	16.7	

	El Toro Road Southbound				Jeronimo Road Westbound				El Toro Road Northbound				Jeronimo Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	71	244	20	335	46	63	59	168	26	383	79	488	32	121	18	171	1162
05:00 PM	53	253	16	322	66	80	55	201	19	404	88	511	36	159	19	214	1248
05:15 PM	64	240	15	319	**74**	68	67	209	24	363	87	474	36	162	27	225	1227
05:30 PM	**74**	**303**	**27**	**404**	68	**95**	**84**	**247**	**31**	**456**	**101**	**588**	**46**	**204**	**30**	**280**	**1519**
Total Volume	262	1040	78	1380	254	306	265	825	100	1606	355	2061	150	646	94	890	5156
% App. Total	19	75.4	5.7		30.8	37.1	32.1		4.9	77.9	17.2		16.9	72.6	10.6		
PHF	.885	.858	.722	.854	.858	.805	.789	.835	.806	.880	.879	.876	.815	.792	.783	.795	.849

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Lake Forest
N/S: El Toro Road
E/W: Jeronimo Road
Weather: Clear

File Name : LKFETJEPM
Site Code : 05117332
Start Date : 6/1/2017
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:45 PM				05:00 PM				04:45 PM				04:45 PM			
+0 mins.	71	244	20	335	66	80	55	201	26	383	79	488	32	121	18	171
+15 mins.	53	253	16	322	**74**	68	67	209	19	404	88	511	36	159	19	214
+30 mins.	64	240	15	319	68	**95**	**84**	**247**	24	363	87	474	36	162	27	225
+45 mins.	**74**	**303**	**27**	**404**	53	68	48	169	**31**	**456**	**101**	**588**	**46**	**204**	**30**	**280**
Total Volume	262	1040	78	1380	261	311	254	826	100	1606	355	2061	150	646	94	890
% App. Total	19	75.4	5.7		31.6	37.7	30.8		4.9	77.9	17.2		16.9	72.6	10.6	
PHF	.885	.858	.722	.854	.882	.818	.756	.836	.806	.880	.879	.876	.815	.792	.783	.795

Counts Unlimited, Inc.

PO Box 1178
Corona, CA 92878
Phone: 951-268-6268
email: counts@countsunlimited.com

City of Lake Forest
Bake Parkway
B/ Dimension Drive - Orchard Road
24 Hour Directional Volume Count

LKF001
Site Code: 051-17097

Start Time	2/16/2017 Thu	Eastbound Morning	Eastbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Westbound Morning	Westbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		15	290			53	238				
12:15		11	269			56	253				
12:30		10	286			14	242				
12:45		10	289	46	1134	15	**305**	138	1038	184	2172
01:00		7	233			10	**346**				
01:15		11	202			15	**327**				
01:30		5	189			13	**288**				
01:45		9	235	32	859	5	230	43	1191	75	2050
02:00		6	181			22	207				
02:15		10	225			8	227				
02:30		12	214			10	239				
02:45		17	201	45	821	7	237	47	910	92	1731
03:00		10	218			12	241				
03:15		22	231			13	192				
03:30		28	210			3	228				
03:45		39	227	99	886	12	217	40	878	139	1764
04:00		17	252			24	237				
04:15		33	227			19	228				
04:30		82	287			28	269				
04:45		101	299	233	1065	38	221	109	955	342	2020
05:00		47	**369**			108	263				
05:15		59	**379**			96	248				
05:30		130	**347**			105	243				
05:45		167	**345**	403	1440	100	226	409	980	812	2420
06:00		84	350			126	260				
06:15		125	288			127	210				
06:30		86	301			205	221				
06:45		123	242	418	1181	218	206	676	897	1094	2078
07:00		114	205			227	215				
07:15		151	169			257	185				
07:30		161	172			253	163				
07:45		206	143	632	689	**292**	133	1029	696	1661	1385
08:00		214	135			**308**	145				
08:15		197	131			**295**	113				
08:30		208	171			**273**	98				
08:45		194	127	813	564	221	98	1097	454	1910	1018
09:00		155	96			186	139				
09:15		163	97			168	123				
09:30		178	91			166	112				
09:45		166	87	662	371	181	74	701	448	1363	819
10:00		143	64			189	93				
10:15		177	68			161	61				
10:30		166	45			175	53				
10:45		210	49	696	226	159	38	684	245	1380	471
11:00		**218**	38			148	51				
11:15		**217**	35			189	54				
11:30		**229**	26			201	29				
11:45		**286**	27	950	126	225	26	763	160	1713	286
Total		5029	9362	5029	9362	5736	8852	5736	8852	10765	18214
Combined Total		14391		14391		14588		14588		28979	
AM Peak	-	11:00	-	-	-	07:45	-	-	-	-	-
Vol.	-	950	-	-	-	1168	-	-	-	-	-
P.H.F.		0.830				0.948					
PM Peak	-	-	05:00	-	-	-	00:45	-	-	-	-
Vol.	-	-	1440	-	-	-	1266	-	-	-	-
P.H.F.			0.950				0.915				
Percentage		34.9%	65.1%			39.3%	60.7%				
ADT/AADT		ADT 28,979		AADT 28,979							

Counts Unlimited, Inc.

PO Box 1178
Corona, CA 92878
Phone: 951-268-6268
email: counts@countsunlimited.com

City of Lake Forest
Bake Parkway
B/ Rancho Parkway South - Rancho Parkway
24 Hour Directional Volume Count

LKF002
Site Code: 051-17097

Start Time	2/16/2017 Thu	Eastbound Morning	Eastbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Westbound Morning	Westbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		18	355			58	257				
12:15		10	315			52	260				
12:30		9	320			13	290				
12:45		7	281	44	1271	13	**342**	136	1149	180	2420
01:00		8	272			9	**374**				
01:15		10	189			17	**349**				
01:30		6	205			12	**309**				
01:45		7	224	31	890	4	230	42	1262	73	2152
02:00		7	216			20	240				
02:15		9	218			8	220				
02:30		12	235			10	242				
02:45		16	199	44	868	5	242	43	944	87	1812
03:00		12	220			12	250				
03:15		23	228			14	189				
03:30		28	230			3	190				
03:45		40	258	103	936	12	200	41	829	144	1765
04:00		16	260			25	216				
04:15		27	246			18	207				
04:30		82	327			33	228				
04:45		96	329	221	1162	28	214	104	865	325	2027
05:00		40	**415**			99	228				
05:15		58	**429**			100	222				
05:30		118	**394**			102	223				
05:45		159	**369**	375	1607	98	217	399	890	774	2497
06:00		73	385			132	247				
06:15		101	313			133	212				
06:30		93	320			204	201				
06:45		120	265	387	1283	214	191	683	851	1070	2134
07:00		103	235			235	199				
07:15		128	188			254	179				
07:30		148	180			256	162				
07:45		182	156	561	759	**337**	127	1082	667	1643	1426
08:00		190	137			**342**	151				
08:15		165	127			**323**	125				
08:30		146	169			**297**	109				
08:45		172	127	673	560	234	107	1196	492	1869	1052
09:00		142	101			201	128				
09:15		153	94			181	122				
09:30		153	78			178	116				
09:45		160	96	608	369	197	76	757	442	1365	811
10:00		149	66			186	90				
10:15		156	64			160	67				
10:30		154	42			178	49				
10:45		202	47	661	219	160	43	684	249	1345	468
11:00		**223**	38			140	56				
11:15		**224**	32			187	51				
11:30		**273**	16			214	33				
11:45		**349**	28	1069	114	225	21	766	161	1835	275
Total		4777	10038	4777	10038	5933	8801	5933	8801	10710	18839
Combined Total		14815		14815		14734		14734		29549	
AM Peak	-	11:00	-	-	-	07:45	-	-	-	-	-
Vol.	-	1069	-	-	-	1299	-	-	-	-	-
P.H.F.		0.766				0.950					
PM Peak	-	-	05:00	-	-	-	00:45	-	-	-	-
Vol.	-	-	1607	-	-	-	1374	-	-	-	-
P.H.F.			0.936				0.918				
Percentage		32.2%	67.8%			40.3%	59.7%				
ADT/AADT		ADT 29,549		AADT 29,549							

Counts Unlimited, Inc.

PO Box 1178
Corona, CA 92878
Phone: 951-268-6268
email: counts@countsunlimited.com

City of Lake Forest
Bake Parkway
B/ Rancho Parkway - Towne Centre Drive
24 Hour Directional Volume Count

LKF003
Site Code: 051-17097

Start Time	2/16/2017 Thu	Eastbound Morning	Eastbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Westbound Morning	Westbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		14	331			47	252				
12:15		12	327			50	262				
12:30		7	323			13	281				
12:45		6	319	39	1300	10	**335**	120	1130	159	2430
01:00		7	284			7	**365**				
01:15		8	235			10	**315**				
01:30		3	203			11	**319**				
01:45		5	229	23	951	3	219	31	1218	54	2169
02:00		6	213			9	237				
02:15		7	207			4	192				
02:30		10	213			4	236				
02:45		15	198	38	831	3	234	20	899	58	1730
03:00		9	176			12	229				
03:15		20	206			9	188				
03:30		25	188			3	191				
03:45		36	225	90	795	8	188	32	796	122	1591
04:00		12	236			24	228				
04:15		21	211			15	196				
04:30		78	243			27	225				
04:45		86	271	197	961	24	224	90	873	287	1834
05:00		31	**338**			86	241				
05:15		36	**334**			87	217				
05:30		87	**356**			84	225				
05:45		155	**305**	309	1333	63	218	320	901	629	2234
06:00		73	310			97	277				
06:15		83	296			91	223				
06:30		82	318			147	226				
06:45		100	255	338	1179	157	200	492	926	830	2105
07:00		84	227			161	218				
07:15		115	197			164	188				
07:30		124	150			171	185				
07:45		177	158	500	732	**231**	156	727	747	1227	1479
08:00		182	148			**244**	146				
08:15		141	168			**221**	124				
08:30		151	181			**222**	129				
08:45		170	124	644	621	171	112	858	511	1502	1132
09:00		137	90			140	132				
09:15		141	93			155	109				
09:30		150	74			137	134				
09:45		151	84	579	341	202	91	634	466	1213	807
10:00		154	59			180	87				
10:15		168	70			171	56				
10:30		159	41			176	48				
10:45		181	43	662	213	155	43	682	234	1344	447
11:00		**230**	30			142	66				
11:15		**236**	27			166	48				
11:30		**280**	17			195	36				
11:45		**310**	15	1056	89	221	24	724	174	1780	263
Total		4475	9346	4475	9346	4730	8875	4730	8875	9205	18221
Combined Total		13821		13821		13605		13605		27426	
AM Peak	-	11:00	-	-	-	07:45	-	-	-	-	-
Vol.	-	1056	-	-	-	918	-	-	-	-	-
P.H.F.		0.852				0.941					
PM Peak	-	-	05:00	-	-	-	00:45	-	-	-	-
Vol.	-	-	1333	-	-	-	1334	-	-	-	-
P.H.F.			0.936				0.914				
Percentage		32.4%	67.6%			34.8%	65.2%				
ADT/AADT		ADT 27,426		AADT 27,426							

Counts Unlimited, Inc.

PO Box 1178
Corona, CA 92878
Phone: 951-268-6268
email: counts@countsunlimited.com

City of Lake Forest
Rancho Parkway
B/ Bake Parkway - Corridor Center
24 Hour Directional Volume Count

LKF006
Site Code: 051-17097

Start	2/16/2017	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
Time	Thu	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		16	92			9	104				
12:15		4	114			2	120				
12:30		1	**121**			3	107				
12:45		3	**141**	24	468	4	106	18	437	42	905
01:00		2	**128**			1	100				
01:15		7	**143**			3	97				
01:30		0	100			4	112				
01:45		4	89	13	460	3	95	11	404	24	864
02:00		11	88			2	83				
02:15		4	106			2	96				
02:30		5	103			1	111				
02:45		1	98	21	395	1	95	6	385	27	780
03:00		1	91			2	101				
03:15		7	78			3	96				
03:30		1	86			3	112				
03:45		6	99	15	354	6	129	14	438	29	792
04:00		4	86			1	123				
04:15		4	84			3	104				
04:30		11	98			7	158				
04:45		14	100	33	368	15	**164**	26	549	59	917
05:00		20	98			11	**183**				
05:15		28	107			21	**181**				
05:30		37	115			33	**166**				
05:45		42	91	127	411	22	160	87	690	214	1101
06:00		47	109			18	178				
06:15		54	114			33	171				
06:30		83	90			35	158				
06:45		73	102	257	415	49	123	135	630	392	1045
07:00		114	82			32	124				
07:15		117	89			50	108				
07:30		113	53			60	109				
07:45		**158**	58	502	282	50	97	192	438	694	720
08:00		**117**	71			53	72				
08:15		**158**	70			54	62				
08:30		**133**	56			57	80				
08:45		107	41	515	238	63	58	227	272	742	510
09:00		106	54			55	62				
09:15		91	40			64	54				
09:30		90	38			66	47				
09:45		102	28	389	160	103	57	288	220	677	380
10:00		72	33			75	52				
10:15		83	39			59	32				
10:30		71	21			79	19				
10:45		77	18	303	111	69	21	282	124	585	235
11:00		88	14			**80**	25				
11:15		85	13			**64**	26				
11:30		107	11			**93**	14				
11:45		120	2	400	40	**117**	19	354	84	754	124
Total		2599	3702	2599	3702	1640	4671	1640	4671	4239	8373
Combined Total		6301		6301		6311		6311		12612	
AM Peak	-	07:45	-	-	-	11:00	-	-	-	-	-
Vol.	-	566	-	-	-	354	-	-	-	-	-
P.H.F.		0.896				0.756					
PM Peak	-	-	00:30	-	-	-	04:45	-	-	-	-
Vol.	-	-	533	-	-	-	694	-	-	-	-
P.H.F.			0.932				0.948				
Percentage		41.2%	58.8%			26.0%	74.0%				
ADT/AADT		ADT 12,612		AADT 12,612							

Counts Unlimited, Inc.

PO Box 1178
Corona, CA 92878
Phone: 951-268-6268
email: counts@countsunlimited.com

City of Lake Forest
Rancho Parkway
B/ Corridor Center - Lake Forest Drive
24 Hour Directional Volume Count

LKF007
Site Code: 051-17097

Start Time	2/16/2017 Thu	Northbound Morning	Northbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Southbound Morning	Southbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		14	94			16	90				
12:15		5	115			6	120				
12:30		1	**118**			8	114				
12:45		3	**135**	23	462	6	129	36	453	59	915
01:00		3	**129**			5	108				
01:15		10	**133**			4	101				
01:30		1	92			9	119				
01:45		3	82	17	436	5	113	23	441	40	877
02:00		12	89			6	97				
02:15		4	110			3	103				
02:30		7	107			1	116				
02:45		1	97	24	403	2	103	12	419	36	822
03:00		2	92			2	104				
03:15		6	79			4	109				
03:30		7	88			3	129				
03:45		9	105	24	364	6	131	15	473	39	837
04:00		8	101			2	127				
04:15		14	96			3	114				
04:30		23	107			10	**170**				
04:45		30	103	75	407	15	**173**	30	584	105	991
05:00		45	119			19	**192**				
05:15		39	136			24	**211**				
05:30		47	125			32	169				
05:45		49	93	180	473	30	171	105	743	285	1216
06:00		54	116			30	188				
06:15		63	119			40	192				
06:30		91	86			58	183				
06:45		83	95	291	416	56	142	184	705	475	1121
07:00		113	93			42	146				
07:15		114	81			65	130				
07:30		120	58			69	122				
07:45		**163**	55	510	287	55	106	231	504	741	791
08:00		**136**	71			57	86				
08:15		**180**	76			54	71				
08:30		**144**	68			63	94				
08:45		112	45	572	260	64	65	238	316	810	576
09:00		111	58			63	81				
09:15		102	51			76	61				
09:30		92	41			84	52				
09:45		106	30	411	180	89	68	312	262	723	442
10:00		73	44			96	58				
10:15		79	41			66	44				
10:30		82	28			86	26				
10:45		76	21	310	134	80	30	328	158	638	292
11:00		94	16			**85**	33				
11:15		89	14			**63**	31				
11:30		112	10			**97**	25				
11:45		129	3	424	43	**103**	24	348	113	772	156
Total		2861	3865	2861	3865	1862	5171	1862	5171	4723	9036
Combined Total		6726		6726		7033		7033		13759	
AM Peak	-	07:45	-	-	-	11:00	-	-	-	-	-
Vol.	-	623	-	-	-	348	-	-	-	-	-
P.H.F.		0.865				0.845					
PM Peak	-	-	00:30	-	-	-	04:30	-	-	-	-
Vol.	-	-	515	-	-	-	746	-	-	-	-
P.H.F.			0.954				0.884				
Percentage		42.5%	57.5%			26.5%	73.5%				
ADT/AADT		ADT 13,759		AADT 13,759							

Counts Unlimited, Inc.

PO Box 1178
Corona, CA 92878
Phone: 951-268-6268
email: counts@countsunlimited.com

City of Lake Forest
Rancho Parkway South
N/ Bake Parkway
24 Hour Directional Volume Count

LKF005
Site Code: 051-17097

Start Time	2/16/2017 Thu	Northbound Morning	Northbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Southbound Morning	Southbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		5	59			9	66				
12:15		8	71			6	73				
12:30		1	63			1	72				
12:45		0	**66**	14	259	0	66	16	277	30	536
01:00		1	**88**			2	52				
01:15		0	**89**			1	64				
01:30		3	**80**			1	53				
01:45		2	62	6	319	5	62	9	231	15	550
02:00		1	80			2	71				
02:15		0	60			1	41				
02:30		1	55			0	61				
02:45		0	63	2	258	1	64	4	237	6	495
03:00		1	66			1	50				
03:15		0	57			1	52				
03:30		0	57			3	59				
03:45		1	32	2	212	1	77	6	238	8	450
04:00		0	36			2	70				
04:15		1	39			1	67				
04:30		1	50			4	80				
04:45		5	58	7	183	2	91	9	308	16	491
05:00		6	85			13	**105**				
05:15		4	77			12	**129**				
05:30		15	67			13	**102**				
05:45		11	54	36	283	9	**96**	47	432	83	715
06:00		17	59			16	75				
06:15		14	71			11	71				
06:30		28	48			13	67				
06:45		35	41	94	219	37	72	77	285	171	504
07:00		43	32			57	58				
07:15		55	40			33	38				
07:30		82	27			48	33				
07:45		85	29	265	128	**61**	31	199	160	464	288
08:00		**129**	31			**68**	29				
08:15		**102**	21			**72**	24				
08:30		**110**	28			**51**	21				
08:45		**106**	25	447	105	47	16	238	90	685	195
09:00		81	19			56	12				
09:15		44	15			51	36				
09:30		56	21			36	11				
09:45		60	20	241	75	54	11	197	70	438	145
10:00		55	16			42	14				
10:15		38	11			41	10				
10:30		51	15			28	8				
10:45		47	6	191	48	41	5	152	37	343	85
11:00		52	13			39	8				
11:15		37	11			53	5				
11:30		60	6			54	9				
11:45		45	12	194	42	67	4	213	26	407	68
Total		1499	2131	1499	2131	1167	2391	1167	2391	2666	4522
Combined Total		3630		3630		3558		3558		7188	
AM Peak	-	08:00	-	-	-	07:45	-	-	-	-	-
Vol.	-	447	-	-	-	252	-	-	-	-	-
P.H.F.		0.866				0.875					
PM Peak	-	-	00:45	-	-	-	05:00	-	-	-	-
Vol.	-	-	323	-	-	-	432	-	-	-	-
P.H.F.			0.907				0.837				
Percentage		41.3%	58.7%			32.8%	67.2%				
ADT/AADT		ADT 7,188		AADT 7,188							

Counts Unlimited, Inc.

PO Box 1178
Corona, CA 92878
Phone: 951-268-6268
email: counts@countsunlimited.com

City of Lake Forest
Orchard Road
N/ Bake Parkway
24 Hour Directional Volume Count

LKF004
Site Code: 051-17097

Start	2/16/2017	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
Time	Thu	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		0	1			1	7				
12:15		0	**5**			0	13				
12:30		0	**3**			0	2				
12:45		0	**6**	0	15	0	5	1	27	1	42
01:00		0	**2**			2	7				
01:15		0	3			0	6				
01:30		0	5			0	8				
01:45		1	2	1	12	0	7	2	28	3	40
02:00		0	1			1	7				
02:15		0	0			0	4				
02:30		0	1			1	13				
02:45		0	2	0	4	0	10	2	34	2	38
03:00		0	0			1	5				
03:15		0	0			0	10				
03:30		1	0			0	11				
03:45		0	1	1	1	0	7	1	33	2	34
04:00		0	0			0	5				
04:15		0	0			0	**23**				
04:30		0	2			0	**14**				
04:45		0	1	0	3	3	**13**	3	55	3	58
05:00		0	3			3	**17**				
05:15		0	2			0	15				
05:30		0	0			0	20				
05:45		0	0	0	5	1	9	4	61	4	66
06:00		0	0			0	10				
06:15		0	0			1	8				
06:30		0	0			3	11				
06:45		2	0	2	0	1	5	5	34	7	34
07:00		1	0			2	16				
07:15		3	0			4	5				
07:30		0	0			5	5				
07:45		**1**	0	5	0	6	1	17	27	22	27
08:00		**2**	0			5	3				
08:15		**2**	0			2	2				
08:30		**2**	0			4	2				
08:45		1	0	7	0	1	3	12	10	19	10
09:00		1	0			1	3				
09:15		0	0			3	3				
09:30		5	0			1	1				
09:45		0	1	6	1	3	1	8	8	14	9
10:00		0	0			2	0				
10:15		0	0			4	2				
10:30		3	0			4	1				
10:45		1	0	4	0	6	0	16	3	20	3
11:00		1	0			**7**	1				
11:15		2	0			**9**	0				
11:30		1	0			**6**	0				
11:45		1	0	5	0	**10**	0	32	1	37	1
Total		31	41	31	41	103	321	103	321	134	362
Combined Total		72		72		424		424		496	
AM Peak	-	07:45	-	-	-	11:00	-	-	-	-	-
Vol.	-	7	-	-	-	32	-	-	-	-	-
P.H.F.		0.583				0.800					
PM Peak	-	-	00:15	-	-	-	04:15	-	-	-	-
Vol.	-	-	16	-	-	-	67	-	-	-	-
P.H.F.			0.667				0.728				
Percentage		43.1%	56.9%			24.3%	75.7%				
ADT/AADT		ADT 496		AADT 496							

Counts Unlimited, Inc.

PO Box 1178
Corona, CA 92878
Phone: (951) 268-6268
email: counts@countsunlimited.com

City of Lake Forest
Alton Parkway
B/ Rancho Parkway - State Route 241
24 Hour Directional Volume Count

LKF001
Site Code: 051-17332

Start Time	5/24/2017 Wed	Northbound Morning	Northbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Southbound Morning	Southbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		17	222			11	133				
12:15		17	188			7	122				
12:30		6	171			14	**155**				
12:45		6	149	46	730	6	**165**	38	575	84	1305
01:00		11	159			2	**138**				
01:15		7	125			5	**145**				
01:30		12	136			5	143				
01:45		3	146	33	566	5	106	17	532	50	1098
02:00		4	135			4	124				
02:15		3	154			5	120				
02:30		2	170			0	127				
02:45		11	205	20	664	5	137	14	508	34	1172
03:00		5	176			6	141				
03:15		7	194			3	119				
03:30		10	201			10	120				
03:45		7	215	29	786	11	130	30	510	59	1296
04:00		6	236			28	108				
04:15		15	275			27	117				
04:30		32	264			25	127				
04:45		49	274	102	1049	38	116	118	468	220	1517
05:00		15	**333**			68	131				
05:15		21	**338**			57	128				
05:30		39	**330**			91	120				
05:45		52	**305**	127	1306	120	151	336	530	463	1836
06:00		42	255			97	122				
06:15		72	253			104	101				
06:30		88	179			167	96				
06:45		86	147	288	834	272	94	640	413	928	1247
07:00		98	152			220	93				
07:15		98	134			282	89				
07:30		120	129			**293**	84				
07:45		133	105	449	520	**360**	62	1155	328	1604	848
08:00		118	115			**339**	69				
08:15		132	113			**362**	70				
08:30		111	107			288	70				
08:45		112	86	473	421	280	60	1269	269	1742	690
09:00		100	74			228	67				
09:15		109	74			165	72				
09:30		115	45			158	48				
09:45		108	48	432	241	162	47	713	234	1145	475
10:00		102	48			135	34				
10:15		101	41			120	31				
10:30		110	27			131	28				
10:45		118	25	431	141	100	20	486	113	917	254
11:00		**150**	15			128	18				
11:15		**143**	15			107	11				
11:30		**164**	12			115	10				
11:45		**162**	17	619	59	144	10	494	49	1113	108
Total		3049	7317	3049	7317	5310	4529	5310	4529	8359	11846
Combined Total		10366		10366		9839		9839		20205	
AM Peak	-	11:00	-	-	-	07:30	-	-	-	-	-
Vol.	-	619	-	-	-	1354	-	-	-	-	-
P.H.F.		0.944				0.935					
PM Peak	-	-	05:00	-	-	-	00:30	-	-	-	-
Vol.	-	-	1306	-	-	-	603	-	-	-	-
P.H.F.			0.966				0.914				
Percentage		29.4%	70.6%			54.0%	46.0%				
ADT/AADT		ADT 20,205		AADT 20,205							

Counts Unlimited, Inc.

PO Box 1178
Corona, CA 92878
Phone: (951) 268-6268
email: counts@countsunlimited.com

City of Irvine
Alton Parkway
B/ Irvine Boulevard - Commercentre Drive
24 Hour Directional Volume Count

IRV002
Site Code: 051-17332

Start Time	3/29/2017 Wed	Eastbound Morning	Eastbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Westbound Morning	Westbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		17	164			16	142				
12:15		15	201			9	147				
12:30		15	143			2	180				
12:45		9	151	56	659	7	168	34	637	90	1296
01:00		8	143			2	168				
01:15		6	122			1	173				
01:30		6	153			7	161				
01:45		8	158	28	576	0	134	10	636	38	1212
02:00		7	149			3	135				
02:15		6	114			1	137				
02:30		2	169			7	220				
02:45		7	145	22	577	5	188	16	680	38	1257
03:00		4	165			2	192				
03:15		7	174			6	188				
03:30		14	215			10	291				
03:45		17	183	42	737	7	197	25	868	67	1605
04:00		10	221			18	246				
04:15		35	240			25	197				
04:30		47	258			24	**271**				
04:45		60	258	152	977	36	**211**	103	925	255	1902
05:00		29	**323**			49	**294**				
05:15		35	**333**			68	**242**				
05:30		63	**334**			75	208				
05:45		100	**305**	227	1295	98	186	290	930	517	2225
06:00		87	286			115	200				
06:15		128	279			139	166				
06:30		180	183			195	172				
06:45		243	215	638	963	232	134	681	672	1319	1635
07:00		152	191			269	132				
07:15		155	152			314	132				
07:30		186	119			**344**	96				
07:45		173	136	666	598	**438**	80	1365	440	2031	1038
08:00		**190**	154			**353**	84				
08:15		**210**	114			**380**	84				
08:30		**180**	129			316	63				
08:45		**213**	103	793	500	282	56	1331	287	2124	787
09:00		156	90			236	79				
09:15		137	99			183	84				
09:30		119	82			157	76				
09:45		130	94	542	365	134	39	710	278	1252	643
10:00		123	71			121	48				
10:15		115	67			143	37				
10:30		106	44			125	33				
10:45		138	37	482	219	124	23	513	141	995	360
11:00		98	37			116	31				
11:15		153	29			106	15				
11:30		147	16			135	17				
11:45		158	21	556	103	140	11	497	74	1053	177
Total		4204	7569	4204	7569	5575	6568	5575	6568	9779	14137
Combined Total		11773		11773		12143		12143		23916	
AM Peak	-	08:00	-	-	-	07:30	-	-	-	-	-
Vol.	-	793	-	-	-	1515	-	-	-	-	-
P.H.F.		0.931				0.865					
PM Peak	-	-	05:00	-	-	-	04:30	-	-	-	-
Vol.	-	-	1295	-	-	-	1018	-	-	-	-
P.H.F.			0.969				0.866				
Percentage		35.7%	64.3%			45.9%	54.1%				
ADT/AADT		ADT 23,916		AADT 23,916							

Counts Unlimited, Inc.

PO Box 1178
Corona, CA 92878
Phone: (951) 268-6268
email: counts@countsunlimited.com

City of Irvine
Irvine Boulevard
B/ Alton Parkway - Bake Parkway
24 Hour Directional Volume Count

IRV003
Site Code: 051-17332

Start Time	5/17/2017 Wed	Northbound Morning	Northbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Southbound Morning	Southbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		12	126			10	145				
12:15		4	112			8	138				
12:30		7	148			1	102				
12:45		2	144	25	530	8	112	27	497	52	1027
01:00		2	158			5	94				
01:15		4	126			6	73				
01:30		3	133			3	97				
01:45		3	126	12	543	3	101	17	365	29	908
02:00		2	131			5	93				
02:15		3	121			2	89				
02:30		4	164			4	122				
02:45		1	165	10	581	4	112	15	416	25	997
03:00		3	130			1	138				
03:15		2	120			4	114				
03:30		3	142			5	128				
03:45		8	143	16	535	10	139	20	519	36	1054
04:00		7	143			3	179				
04:15		13	148			8	141				
04:30		12	**210**			14	182				
04:45		27	**139**	59	640	26	145	51	647	110	1287
05:00		30	**176**			19	**255**				
05:15		43	**164**			26	**178**				
05:30		55	152			39	**182**				
05:45		82	141	210	633	65	**179**	149	794	359	1427
06:00		84	136			37	157				
06:15		95	126			54	131				
06:30		117	106			74	97				
06:45		108	98	404	466	94	91	259	476	663	942
07:00		166	86			69	82				
07:15		164	80			83	71				
07:30		168	80			97	61				
07:45		**195**	77	693	323	**115**	57	364	271	1057	594
08:00		**199**	53			**125**	71				
08:15		**168**	56			**109**	41				
08:30		**172**	55			**109**	54				
08:45		163	55	702	219	97	55	440	221	1142	440
09:00		136	43			104	38				
09:15		93	38			95	38				
09:30		107	43			91	31				
09:45		88	25	424	149	80	34	370	141	794	290
10:00		66	24			74	26				
10:15		76	19			62	22				
10:30		79	28			78	20				
10:45		73	19	294	90	73	22	287	90	581	180
11:00		83	11			91	29				
11:15		100	9			98	14				
11:30		113	8			120	25				
11:45		110	10	406	38	91	10	400	78	806	116
Total		3255	4747	3255	4747	2399	4515	2399	4515	5654	9262
Combined Total		8002		8002		6914		6914		14916	
AM Peak	-	07:45	-	-	-	07:45	-	-	-	-	-
Vol.	-	734	-	-	-	458	-	-	-	-	-
P.H.F.		0.922				0.916					
PM Peak	-	-	04:30	-	-	-	05:00	-	-	-	-
Vol.	-	-	689	-	-	-	794	-	-	-	-
P.H.F.			0.820				0.778				
Percentage		40.7%	59.3%			34.7%	65.3%				
ADT/AADT		ADT 14,916		AADT 14,916							

Counts Unlimited, Inc.

PO Box 1178
Corona, CA 92878
Phone: (951) 268-6268
email: counts@countsunlimited.com

City of Lake Forest
Bake Parkway
B/ Trabuco Road - Commercentre Drive
24 Hour Directional Volume Count

LKF004
Site Code: 051-17332

Start Time	5/24/2017 Wed	Northbound Morning	Northbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Souhtbound Morning	Souhtbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		23	259			53	280				
12:15		15	256			24	298				
12:30		13	228			33	219				
12:45		13	324	64	1067	24	281	134	1078	198	2145
01:00		17	242			28	273				
01:15		17	220			16	291				
01:30		10	226			35	294				
01:45		10	309	54	997	19	286	98	1144	152	2141
02:00		13	260			22	252				
02:15		8	256			19	301				
02:30		11	274			18	311				
02:45		7	231	39	1021	4	269	63	1133	102	2154
03:00		15	246			6	304				
03:15		23	295			6	262				
03:30		61	285			14	395				
03:45		55	306	154	1132	23	321	49	1282	203	2414
04:00		28	277			22	372				
04:15		52	336			22	328				
04:30		138	239			40	403				
04:45		193	348	411	1200	35	331	119	1434	530	2634
05:00		128	**341**			57	**500**				
05:15		120	**364**			93	**405**				
05:30		214	**368**			95	**402**				
05:45		344	**394**	806	1467	110	**338**	355	1645	1161	3112
06:00		206	276			108	382				
06:15		251	311			148	336				
06:30		311	265			202	308				
06:45		413	265	1181	1117	229	293	687	1319	1868	2436
07:00		354	217			239	257				
07:15		371	223			250	230				
07:30		**437**	201			**263**	214				
07:45		**493**	221	1655	862	**295**	156	1047	857	2702	1719
08:00		**440**	153			**301**	207				
08:15		**408**	159			**277**	180				
08:30		435	175			240	151				
08:45		444	156	1727	643	191	155	1009	693	2736	1336
09:00		332	97			191	145				
09:15		340	119			219	170				
09:30		305	115			181	119				
09:45		268	108	1245	439	222	136	813	570	2058	1009
10:00		267	90			173	109				
10:15		234	66			216	77				
10:30		217	55			209	80				
10:45		260	67	978	278	206	65	804	331	1782	609
11:00		202	52			171	86				
11:15		226	38			213	49				
11:30		239	38			209	60				
11:45		253	18	920	146	270	41	863	236	1783	382
Total		9234	10369	9234	10369	6041	11722	6041	11722	15275	22091
Combined Total		19603		19603		17763		17763		37366	
AM Peak	-	07:30	-	-	-	07:30	-	-	-	-	-
Vol.	-	1778	-	-	-	1136	-	-	-	-	-
P.H.F.		0.902				0.944					
PM Peak	-	-	05:00	-	-	-	05:00	-	-	-	-
Vol.	-	-	1467	-	-	-	1645	-	-	-	-
P.H.F.			0.931				0.823				
Percentage		47.1%	52.9%			34.0%	66.0%				
ADT/AADT		ADT 37,366		AADT 37,366							

Counts Unlimited, Inc.

PO Box 1178
Corona, CA 92878
Phone: (951) 268-6268
email: counts@countsunlimited.com

City of Lake Forest
Bake Parkway
B/ Toledo Way - Trabuco Road
24 Hour Directional Volume Count

LKF005
Site Code: 051-17332

Start Time	5/24/2017 Wed	Northbound Morning	Northbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Southbound Morning	Southbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		41	344			58	338				
12:15		25	315			27	365				
12:30		13	345			43	293				
12:45		20	323	99	1327	24	359	152	1355	251	2682
01:00		19	301			39	350				
01:15		26	279			25	371				
01:30		15	332			30	446				
01:45		17	338	77	1250	31	358	125	1525	202	2775
02:00		18	352			33	382				
02:15		14	319			19	390				
02:30		17	348			29	502				
02:45		8	325	57	1344	13	353	94	1627	151	2971
03:00		23	353			12	428				
03:15		33	370			13	322				
03:30		67	364			18	523				
03:45		58	425	181	1512	28	383	71	1656	252	3168
04:00		38	411			41	476				
04:15		59	421			34	420				
04:30		157	387			68	**528**				
04:45		209	459	463	1678	52	**453**	195	1877	658	3555
05:00		133	**469**			98	**552**				
05:15		151	**489**			128	**505**				
05:30		313	**494**			141	469				
05:45		446	**504**	1043	1956	153	421	520	1947	1563	3903
06:00		277	383			200	475				
06:15		303	417			239	426				
06:30		355	388			364	360				
06:45		478	398	1413	1586	361	367	1164	1628	2577	3214
07:00		410	335			435	324				
07:15		426	271			**437**	310				
07:30		454	278			**508**	234				
07:45		**539**	266	1829	1150	**471**	223	1851	1091	3680	2241
08:00		**485**	225			**523**	238				
08:15		**457**	242			414	203				
08:30		**512**	213			408	198				
08:45		437	228	1891	908	318	182	1663	821	3554	1729
09:00		435	190			340	153				
09:15		374	187			336	224				
09:30		372	168			340	129				
09:45		296	146	1477	691	306	148	1322	654	2799	1345
10:00		324	132			284	142				
10:15		264	97			298	106				
10:30		274	93			274	81				
10:45		294	107	1156	429	279	92	1135	421	2291	850
11:00		265	71			255	102				
11:15		253	69			320	61				
11:30		321	65			321	74				
11:45		284	42	1123	247	351	50	1247	287	2370	534
Total		10809	14078	10809	14078	9539	14889	9539	14889	20348	28967
Combined Total		24887		24887		24428		24428		49315	
AM Peak	-	07:45	-	-	-	07:15	-	-	-	-	-
Vol.	-	1993	-	-	-	1939	-	-	-	-	-
P.H.F.		0.924				0.927					
PM Peak	-	-	05:00	-	-	-	04:30	-	-	-	-
Vol.	-	-	1956	-	-	-	2038	-	-	-	-
P.H.F.			0.970				0.923				
Percentage		43.4%	56.6%			39.0%	61.0%				
ADT/AADT		ADT 49,315		AADT 49,315							

Counts Unlimited, Inc.

PO Box 1178
Corona, CA 92878
Phone: (951) 268-6268
email: counts@countsunlimited.com

City of Irvine
Bake Parkway
B/ Interstate 5 - Rockfield Boulevard
24 Hour Directional Volume Count

IRV006
Site Code: 051-17332

Start Time	5/24/2017 Wed	Eastbound Morning	Eastbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Westbound Morning	Westbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		46	437			70	524				
12:15		43	477			44	483				
12:30		30	486			64	475				
12:45		37	497	156	1897	34	480	212	1962	368	3859
01:00		38	422			36	522				
01:15		39	474			31	521				
01:30		20	496			42	623				
01:45		24	551	121	1943	45	507	154	2173	275	4116
02:00		21	475			53	540				
02:15		33	470			44	586				
02:30		43	490			40	806				
02:45		30	484	127	1919	23	596	160	2528	287	4447
03:00		32	474			30	702				
03:15		48	528			43	583				
03:30		105	530			42	746				
03:45		112	639	297	2171	42	667	157	2698	454	4869
04:00		70	563			57	709				
04:15		129	619			55	691				
04:30		274	620			74	**744**				
04:45		362	**675**	835	2477	84	**747**	270	2891	1105	5368
05:00		240	**668**			116	**818**				
05:15		309	**682**			183	**830**				
05:30		489	**681**			232	707				
05:45		678	631	1716	2662	226	625	757	2980	2473	5642
06:00		453	552			287	660				
06:15		521	534			287	634				
06:30		592	480			481	551				
06:45		758	455	2324	2021	501	511	1556	2356	3880	4377
07:00		677	383			**579**	412				
07:15		702	438			**571**	424				
07:30		**815**	316			**613**	311				
07:45		**898**	380	3092	1517	**512**	306	2275	1453	5367	2970
08:00		**804**	274			554	324				
08:15		**769**	307			544	296				
08:30		739	279			528	243				
08:45		773	257	3085	1117	519	243	2145	1106	5230	2223
09:00		658	252			434	249				
09:15		633	239			447	256				
09:30		595	218			460	209				
09:45		548	182	2434	891	421	182	1762	896	4196	1787
10:00		467	178			422	174				
10:15		413	138			446	173				
10:30		432	133			424	120				
10:45		393	145	1705	594	433	100	1725	567	3430	1161
11:00		373	115			438	133				
11:15		346	102			511	108				
11:30		442	89			481	133				
11:45		433	60	1594	366	532	53	1962	427	3556	793
Total		17486	19575	17486	19575	13135	22037	13135	22037	30621	41612
Combined Total		37061		37061		35172		35172		72233	
AM Peak	-	07:30	-	-	-	07:00	-	-	-	-	-
Vol.	-	3286	-	-	-	2275	-	-	-	-	-
P.H.F.		0.915				0.928					
PM Peak	-	-	04:45	-	-	-	04:30	-	-	-	-
Vol.	-	-	2706	-	-	-	3139	-	-	-	-
P.H.F.			0.992				0.945				
Percentage		47.2%	52.8%			37.3%	62.7%				
ADT/AADT		ADT 72,233		AADT 72,233							

Counts Unlimited, Inc.

PO Box 1178
Corona, CA 92878
Phone: (951) 268-6268
email: counts@countsunlimited.com

City of Lake Forest
Trabuco Road
B/ Bake Parkway - Lake Forest Drive
24 Hour Directional Volume Count

LKF007
Site Code: 051-17332

Start Time	5/17/2017 Wed	Northbound Morning	Northbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Southbound Morning	Southbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		8	119			23	158				
12:15		7	145			19	163				
12:30		3	139			13	122				
12:45		3	**150**	21	553	12	142	67	585	88	1138
01:00		2	**159**			8	149				
01:15		6	**155**			4	110				
01:30		2	**143**			11	121				
01:45		3	118	13	575	1	130	24	510	37	1085
02:00		2	113			7	139				
02:15		4	133			6	136				
02:30		2	122			3	148				
02:45		2	136	10	504	6	172	22	595	32	1099
03:00		5	92			3	162				
03:15		3	111			1	166				
03:30		8	121			4	190				
03:45		15	122	31	446	8	195	16	713	47	1159
04:00		12	114			6	257				
04:15		18	110			3	244				
04:30		38	126			7	281				
04:45		45	128	113	478	18	274	34	1056	147	1534
05:00		54	108			5	**308**				
05:15		59	116			16	**315**				
05:30		77	123			14	**291**				
05:45		127	138	317	485	18	**288**	53	1202	370	1687
06:00		113	101			33	263				
06:15		138	124			32	236				
06:30		200	97			33	208				
06:45		213	99	664	421	64	175	162	882	826	1303
07:00		253	83			63	182				
07:15		**291**	114			58	150				
07:30		**285**	84			65	135				
07:45		**310**	75	1139	356	84	128	270	595	1409	951
08:00		**298**	65			85	133				
08:15		270	56			96	107				
08:30		247	45			66	97				
08:45		212	52	1027	218	85	123	332	460	1359	678
09:00		199	38			70	90				
09:15		166	36			79	97				
09:30		171	44			71	88				
09:45		136	31	672	149	73	79	293	354	965	503
10:00		140	40			64	73				
10:15		94	17			76	73				
10:30		107	18			75	60				
10:45		99	15	440	90	84	49	299	255	739	345
11:00		94	15			**106**	42				
11:15		113	10			**110**	31				
11:30		113	11			**140**	35				
11:45		119	15	439	51	**122**	28	478	136	917	187
Total		4886	4326	4886	4326	2050	7343	2050	7343	6936	11669
Combined Total		9212		9212		9393		9393		18605	
AM Peak	-	07:15	-	-	-	11:00	-	-	-	-	-
Vol.	-	1184	-	-	-	478	-	-	-	-	-
P.H.F.		0.955				0.854					
PM Peak	-	-	00:45	-	-	-	05:00	-	-	-	-
Vol.	-	-	607	-	-	-	1202	-	-	-	-
P.H.F.			0.954				0.954				
Percentage		53.0%	47.0%			21.8%	78.2%				
ADT/AADT		ADT 18,605		AADT 18,605							

Counts Unlimited, Inc.

PO Box 1178
Corona, CA 92878
Phone: (951) 268-6268
email: counts@countsunlimited.com

City of Lake Forest
Lake Forest Drive
B/ Rancho Parkway - State Route 241 Southbound
24 Hour Directional Volume Count

LKF009
Site Code: 051-17332

Start Time	5/24/2017 Wed	Northbound Morning	Northbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Southbound Morning	Southbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		9	129			7	170				
12:15		7	126			4	125				
12:30		5	126			7	175				
12:45		11	120	32	501	6	158	24	628	56	1129
01:00		7	142			7	131				
01:15		6	95			5	128				
01:30		5	133			7	154				
01:45		3	120	21	490	3	120	22	533	43	1023
02:00		6	132			3	138				
02:15		1	136			2	124				
02:30		5	115			3	128				
02:45		6	131	18	514	6	136	14	526	32	1040
03:00		3	114			4	171				
03:15		2	124			3	129				
03:30		6	146			3	163				
03:45		11	134	22	518	5	142	15	605	37	1123
04:00		3	144			9	170				
04:15		4	140			11	145				
04:30		12	159			12	155				
04:45		42	**182**	61	625	34	**169**	66	639	127	1264
05:00		15	**186**			27	**228**				
05:15		13	**206**			36	**178**				
05:30		33	**202**			32	**185**				
05:45		61	152	122	746	51	145	146	736	268	1482
06:00		51	163			57	142				
06:15		47	138			55	148				
06:30		79	127			88	141				
06:45		118	106	295	534	101	97	301	528	596	1062
07:00		97	119			115	103				
07:15		116	99			120	102				
07:30		**120**	117			**142**	91				
07:45		**168**	71	501	406	**164**	118	541	414	1042	820
08:00		**153**	91			**172**	86				
08:15		**152**	83			**152**	93				
08:30		117	71			142	66				
08:45		110	74	532	319	139	77	605	322	1137	641
09:00		100	89			125	67				
09:15		71	49			119	74				
09:30		91	35			108	49				
09:45		89	32	351	205	136	38	488	228	839	433
10:00		93	44			82	32				
10:15		87	25			106	27				
10:30		80	16			93	26				
10:45		108	16	368	101	114	15	395	100	763	201
11:00		105	24			127	24				
11:15		96	14			118	13				
11:30		134	8			140	15				
11:45		116	11	451	57	149	14	534	66	985	123
Total		2774	5016	2774	5016	3151	5325	3151	5325	5925	10341
Combined Total		7790		7790		8476		8476		16266	
AM Peak	-	07:30	-	-	-	07:30	-	-	-	-	-
Vol.	-	593	-	-	-	630	-	-	-	-	-
P.H.F.		0.882				0.916					
PM Peak	-	-	04:45	-	-	-	04:45	-	-	-	-
Vol.	-	-	776	-	-	-	760	-	-	-	-
P.H.F.			0.942				0.833				
Percentage		35.6%	64.4%			37.2%	62.8%				
ADT/AADT		ADT 16,266		AADT 16,266							

Counts Unlimited, Inc.

PO Box 1178
Corona, CA 92878
Phone: (951) 268-6268
email: counts@countsunlimited.com

City of Lake Forest
Lake Forest Drive
B/ Dimmension Drive - Rancho Parkway
24 Hour Directional Volume Count

LKF008
Site Code: 051-17332

Start Time	5/24/2017 Wed	Northbound Morning	Northbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Southbound Morning	Southbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		10	167			16	191				
12:15		8	184			13	161				
12:30		12	192			11	179				
12:45		12	174	42	717	15	186	55	717	97	1434
01:00		9	174			8	188				
01:15		8	187			5	167				
01:30		12	175			4	206				
01:45		8	168	37	704	7	140	24	701	61	1405
02:00		8	204			7	188				
02:15		4	166			9	162				
02:30		6	185			6	168				
02:45		9	173	27	728	4	164	26	682	53	1410
03:00		6	161			4	205				
03:15		2	206			6	189				
03:30		15	183			5	198				
03:45		15	236	38	786	6	176	21	768	59	1554
04:00		5	196			9	210				
04:15		15	243			13	197				
04:30		18	225			9	208				
04:45		75	264	113	928	24	**224**	55	839	168	1767
05:00		38	**274**			30	**270**				
05:15		41	**259**			34	**218**				
05:30		51	**303**			29	**217**				
05:45		104	**267**	234	1103	64	181	157	886	391	1989
06:00		74	240			71	197				
06:15		87	206			77	179				
06:30		104	202			85	156				
06:45		158	203	423	851	108	133	341	665	764	1516
07:00		150	182			132	146				
07:15		159	158			154	149				
07:30		164	147			161	138				
07:45		**239**	132	712	619	163	148	610	581	1322	1200
08:00		**230**	123			**210**	145				
08:15		**209**	131			**176**	140				
08:30		**180**	110			**187**	89				
08:45		181	98	800	462	**172**	136	745	510	1545	972
09:00		154	107			147	108				
09:15		127	66			147	118				
09:30		131	67			114	84				
09:45		148	40	560	280	164	68	572	378	1132	658
10:00		138	38			124	65				
10:15		120	44			142	44				
10:30		110	26			127	46				
10:45		150	19	518	127	139	31	532	186	1050	313
11:00		157	40			131	38				
11:15		164	28			148	27				
11:30		163	21			145	24				
11:45		163	14	647	103	170	22	594	111	1241	214
Total		4151	7408	4151	7408	3732	7024	3732	7024	7883	14432
Combined Total		11559		11559		10756		10756		22315	
AM Peak	-	07:45	-	-	-	08:00	-	-	-	-	-
Vol.	-	858	-	-	-	745	-	-	-	-	-
P.H.F.		0.897				0.887					
PM Peak	-	-	05:00	-	-	-	04:45	-	-	-	-
Vol.	-	-	1103	-	-	-	929	-	-	-	-
P.H.F.			0.910				0.860				
Percentage		35.9%	64.1%			34.7%	65.3%				
ADT/AADT		ADT 22,315		AADT 22,315							

Counts Unlimited, Inc.

PO Box 1178
Corona, CA 92878
Phone: (951) 268-6268
email: counts@countsunlimited.com

City of Lake Forest
Rancho Parkway
B/ Lake Forest Drive - El Toro Road
24 Hour Directional Volume Count

LKF010
Site Code: 051-17332

Start Time	5/24/2017 Wed	Eastbound Morning	Eastbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Westbound Morning	Westbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		14	134			6	117				
12:15		9	133			7	103				
12:30		12	109			4	114				
12:45		6	129	41	505	3	**113**	20	447	61	952
01:00		3	116			1	**120**				
01:15		6	115			3	**126**				
01:30		3	107			3	**135**				
01:45		5	122	17	460	4	101	11	482	28	942
02:00		3	122			3	76				
02:15		2	123			2	105				
02:30		3	157			4	89				
02:45		0	146	8	548	1	90	10	360	18	908
03:00		6	148			6	89				
03:15		2	149			7	100				
03:30		9	161			4	103				
03:45		3	174	20	632	12	114	29	406	49	1038
04:00		4	209			12	96				
04:15		4	205			10	89				
04:30		7	215			15	99				
04:45		13	216	28	845	35	101	72	385	100	1230
05:00		11	**262**			33	95				
05:15		12	**262**			47	115				
05:30		9	**279**			58	106				
05:45		18	**259**	50	1062	67	112	205	428	255	1490
06:00		25	239			69	111				
06:15		40	254			76	75				
06:30		64	192			119	84				
06:45		80	177	209	862	124	70	388	340	597	1202
07:00		50	147			155	76				
07:15		69	125			163	90				
07:30		77	127			141	79				
07:45		100	91	296	490	**220**	93	679	338	975	828
08:00		85	111			**224**	68				
08:15		91	104			**203**	60				
08:30		99	90			**160**	53				
08:45		90	67	365	372	155	57	742	238	1107	610
09:00		77	75			113	52				
09:15		88	76			104	59				
09:30		79	56			109	40				
09:45		94	51	338	258	113	44	439	195	777	453
10:00		80	45			94	33				
10:15		67	52			93	25				
10:30		61	35			82	16				
10:45		85	33	293	165	90	10	359	84	652	249
11:00		**111**	28			77	15				
11:15		**101**	26			81	7				
11:30		**114**	24			116	4				
11:45		**126**	16	452	94	106	6	380	32	832	126
Total		2117	6293	2117	6293	3334	3735	3334	3735	5451	10028
Combined Total		8410		8410		7069		7069		15479	
AM Peak	-	11:00	-	-	-	07:45	-	-	-	-	-
Vol.	-	452	-	-	-	807	-	-	-	-	-
P.H.F.		0.897				0.901					
PM Peak	-	-	05:00	-	-	-	00:45	-	-	-	-
Vol.	-	-	1062	-	-	-	494	-	-	-	-
P.H.F.			0.952				0.915				
Percentage		25.2%	74.8%			47.2%	52.8%				
ADT/AADT		ADT 15,479		AADT 15,479							

Counts Unlimited, Inc.

PO Box 1178
Corona, CA 92878
Phone: (951) 268-6268
email: counts@countsunlimited.com

City of Lake Forest
Portola Parkway
B/ State Route 241 - Rancho Parkway
24 Hour Directional Volume Count

LKF011
Site Code: 051-17332

Start Time	5/24/2017 Wed	Northbound Morning	Northbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Southbound Morning	Southbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		15	193			8	180				
12:15		10	176			11	216				
12:30		6	221			5	163				
12:45		12	203	43	793	6	219	30	778	73	1571
01:00		11	196			10	195				
01:15		3	177			7	183				
01:30		5	176			12	179				
01:45		5	160	24	709	2	196	31	753	55	1462
02:00		4	191			5	179				
02:15		8	190			10	201				
02:30		4	196			6	201				
02:45		4	145	20	722	4	231	25	812	45	1534
03:00		1	192			7	225				
03:15		6	278			4	219				
03:30		7	174			5	236				
03:45		15	207	29	851	6	243	22	923	51	1774
04:00		11	172			3	225				
04:15		15	176			8	260				
04:30		33	213			15	293				
04:45		53	184	112	745	15	254	41	1032	153	1777
05:00		33	**223**			24	**365**				
05:15		54	**245**			20	**318**				
05:30		66	**244**			31	**336**				
05:45		90	**235**	243	947	34	**319**	109	1338	352	2285
06:00		97	205			69	286				
06:15		100	199			70	270				
06:30		145	174			110	276				
06:45		231	175	573	753	202	226	451	1058	1024	1811
07:00		270	182			101	217				
07:15		250	164			133	166				
07:30		**299**	152			182	171				
07:45		**318**	126	1137	624	**252**	170	668	724	1805	1348
08:00		**329**	129			**192**	163				
08:15		**265**	150			**164**	157				
08:30		231	139			**184**	113				
08:45		242	130	1067	548	201	102	741	535	1808	1083
09:00		172	84			163	129				
09:15		198	117			139	117				
09:30		147	85			141	84				
09:45		153	55	670	341	144	69	587	399	1257	740
10:00		137	78			145	57				
10:15		183	50			125	52				
10:30		143	33			123	42				
10:45		175	27	638	188	158	39	551	190	1189	378
11:00		182	19			141	39				
11:15		172	17			144	25				
11:30		185	18			180	22				
11:45		218	14	757	68	180	14	645	100	1402	168
Total		5313	7289	5313	7289	3901	8642	3901	8642	9214	15931
Combined Total		12602		12602		12543		12543		25145	
AM Peak	-	07:30	-	-	-	07:45	-	-	-	-	-
Vol.	-	1211	-	-	-	792	-	-	-	-	-
P.H.F.		0.920				0.786					
PM Peak	-	-	05:00	-	-	-	05:00	-	-	-	-
Vol.	-	-	947	-	-	-	1338	-	-	-	-
P.H.F.			0.966				0.916				
Percentage		42.2%	57.8%			31.1%	68.9%				
ADT/AADT		ADT 25,145		AADT 25,145							

Counts Unlimited, Inc.

PO Box 1178
Corona, CA 92878
Phone: (951) 268-6268
email: counts@countsunlimited.com

City of Lake Forest
El Toro Road
S/ Portola Parkway
24 Hour Directional Volume Count

LKF002
Site Code: 051-17332B

Start Time	6/1/2017 Thu	Northbound Morning	Northbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Southbound Morning	Southbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		24	156			24	186				
12:15		25	164			13	163				
12:30		17	156			13	193				
12:45		28	194	94	670	18	165	68	707	162	1377
01:00		18	167			11	186				
01:15		18	179			22	178				
01:30		16	159			5	175				
01:45		10	165	62	670	5	190	43	729	105	1399
02:00		12	191			4	156				
02:15		4	197			7	205				
02:30		6	190			6	197				
02:45		11	192	33	770	9	227	26	785	59	1555
03:00		4	208			6	218				
03:15		4	287			7	214				
03:30		9	275			14	177				
03:45		15	220	32	990	9	225	36	834	68	1824
04:00		10	240			15	202				
04:15		12	239			21	197				
04:30		36	237			38	211				
04:45		41	285	99	1001	38	**224**	112	834	211	1835
05:00		26	277			44	**248**				
05:15		27	**346**			56	**252**				
05:30		46	**300**			62	**244**				
05:45		83	**314**	182	1237	98	223	260	967	442	2204
06:00		63	**283**			93	205				
06:15		84	231			128	186				
06:30		91	246			192	179				
06:45		143	225	381	985	262	162	675	732	1056	1717
07:00		161	201			221	168				
07:15		181	206			212	157				
07:30		143	172			**280**	145				
07:45		**269**	158	754	737	**322**	128	1035	598	1789	1335
08:00		**235**	166			**311**	133				
08:15		**186**	141			**259**	143				
08:30		**190**	154			225	118				
08:45		176	132	787	593	210	111	1005	505	1792	1098
09:00		151	132			197	120				
09:15		124	127			180	110				
09:30		139	125			171	81				
09:45		133	109	547	493	150	86	698	397	1245	890
10:00		110	86			151	113				
10:15		114	91			149	103				
10:30		139	65			164	77				
10:45		138	70	501	312	147	69	611	362	1112	674
11:00		133	65			154	51				
11:15		136	58			154	43				
11:30		146	39			172	27				
11:45		170	35	585	197	159	27	639	148	1224	345
Total		4057	8655	4057	8655	5208	7598	5208	7598	9265	16253
Combined Total		12712		12712		12806		12806		25518	
AM Peak	-	07:45	-	-	-	07:30	-	-	-	-	-
Vol.	-	880	-	-	-	1172	-	-	-	-	-
P.H.F.		0.818				0.910					
PM Peak	-	-	05:15	-	-	-	04:45	-	-	-	-
Vol.	-	-	1243	-	-	-	968	-	-	-	-
P.H.F.			0.898				0.960				
Percentage		31.9%	68.1%			40.7%	59.3%				
ADT/AADT		ADT 25,518		AADT 25,518							

Counts Unlimited, Inc.

PO Box 1178
Corona, CA 92878
Phone: (951) 268-6268
email: counts@countsunlimited.com

City of Lake Forest
Portola Parkway
B/ El Toro Road - Los Alisos Boulevard
24 Hour Directional Volume Count

LKF004
Site Code: 051-17332B

Start Time	6/1/2017 Thu	Eastbound Morning	Eastbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Westbound Morning	Westbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		36	253			30	262				
12:15		26	279			14	282				
12:30		27	257			10	300				
12:45		24	289	113	1078	25	272	79	1116	192	2194
01:00		20	273			16	304				
01:15		22	255			4	281				
01:30		15	245			6	283				
01:45		13	305	70	1078	6	248	32	1116	102	2194
02:00		9	319			7	273				
02:15		6	293			11	326				
02:30		12	308			8	283				
02:45		10	361	37	1281	9	**286**	35	1168	72	2449
03:00		6	394			8	**323**				
03:15		8	349			13	**356**				
03:30		11	354			22	**299**				
03:45		12	320	37	1417	25	279	68	1257	105	2674
04:00		10	415			17	279				
04:15		11	415			32	258				
04:30		33	421			56	302				
04:45		37	422	91	1673	90	304	195	1143	286	2816
05:00		24	**456**			71	285				
05:15		30	**528**			82	317				
05:30		46	**486**			140	280				
05:45		80	**518**	180	1988	135	306	428	1188	608	3176
06:00		74	440			136	313				
06:15		98	409			221	306				
06:30		160	383			257	271				
06:45		323	382	655	1614	344	231	958	1121	1613	2735
07:00		159	341			397	239				
07:15		**193**	321			371	215				
07:30		**247**	247			**411**	178				
07:45		**366**	243	965	1152	**510**	192	1689	824	2654	1976
08:00		**224**	309			**427**	171				
08:15		191	254			**456**	192				
08:30		224	224			355	182				
08:45		212	208	851	995	337	177	1575	722	2426	1717
09:00		192	194			325	141				
09:15		165	198			309	134				
09:30		209	192			275	124				
09:45		196	152	762	736	261	106	1170	505	1932	1241
10:00		178	161			199	96				
10:15		175	135			248	83				
10:30		208	114			221	85				
10:45		204	100	765	510	233	76	901	340	1666	850
11:00		188	104			192	44				
11:15		247	65			229	34				
11:30		241	53			251	29				
11:45		261	52	937	274	227	26	899	133	1836	407
Total		5463	13796	5463	13796	8029	10633	8029	10633	13492	24429
Combined Total		19259		19259		18662		18662		37921	
AM Peak	-	07:15	-	-	-	07:30	-	-	-	-	-
Vol.	-	1030	-	-	-	1804	-	-	-	-	-
P.H.F.		0.704				0.884					
PM Peak	-	-	05:00	-	-	-	02:45	-	-	-	-
Vol.	-	-	1988	-	-	-	1264	-	-	-	-
P.H.F.			0.941				0.888				
Percentage		28.4%	71.6%			43.0%	57.0%				
ADT/AADT		ADT 37,921		AADT 37,921							

Counts Unlimited, Inc.

PO Box 1178
Corona, CA 92878
Phone: (951) 268-6268
email: counts@countsunlimited.com

City of Lake Forest
Los Alisos Boulevard
S/ Portola Parkway
24 Hour Directional Volume Count

LKF005
Site Code: 051-17332B

Start Time	6/1/2017 Thu	Northbound Morning	Northbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Southbound Morning	Southbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		15	104			7	88				
12:15		7	150			7	142				
12:30		4	159			5	153				
12:45		4	135	30	548	6	107	25	490	55	1038
01:00		6	118			3	91				
01:15		1	117			5	85				
01:30		1	103			0	92				
01:45		1	112	9	450	2	130	10	398	19	848
02:00		4	167			3	187				
02:15		2	209			1	143				
02:30		2	127			3	106				
02:45		1	117	9	620	1	132	8	568	17	1188
03:00		4	174			0	196				
03:15		3	211			3	169				
03:30		3	155			2	115				
03:45		2	146	12	686	7	111	12	591	24	1277
04:00		2	137			6	125				
04:15		3	160			6	139				
04:30		20	166			6	103				
04:45		17	174	42	637	8	110	26	477	68	1114
05:00		16	176			14	**138**				
05:15		16	**193**			22	**163**				
05:30		33	**204**			15	**158**				
05:45		38	**227**	103	800	36	**179**	87	638	190	1438
06:00		34	**197**			61	136				
06:15		47	172			80	140				
06:30		67	153			114	147				
06:45		150	138	298	660	261	144	516	567	814	1227
07:00		122	152			133	113				
07:15		106	100			**156**	93				
07:30		**139**	135			**219**	96				
07:45		**186**	145	553	532	**302**	91	810	393	1363	925
08:00		**212**	136			**228**	98				
08:15		**158**	126			134	90				
08:30		127	138			123	82				
08:45		97	95	594	495	108	92	593	362	1187	857
09:00		103	117			96	78				
09:15		106	91			85	61				
09:30		100	81			97	58				
09:45		94	49	403	338	80	52	358	249	761	587
10:00		85	58			77	40				
10:15		76	46			81	102				
10:30		84	40			73	53				
10:45		102	44	347	188	84	37	315	232	662	420
11:00		80	26			75	23				
11:15		113	14			101	21				
11:30		119	18			100	15				
11:45		100	12	412	70	95	7	371	66	783	136
Total		2812	6024	2812	6024	3131	5031	3131	5031	5943	11055
Combined Total		8836		8836		8162		8162		16998	
AM Peak	-	07:30	-	-	-	07:15	-	-	-	-	-
Vol.	-	695	-	-	-	905	-	-	-	-	-
P.H.F.		0.820				0.749					
PM Peak	-	-	05:15	-	-	-	05:00	-	-	-	-
Vol.	-	-	821	-	-	-	638	-	-	-	-
P.H.F.			0.904				0.814				
Percentage		31.8%	68.2%			38.4%	61.6%				
ADT/AADT		ADT 16,998		AADT 16,998							

Counts Unlimited, Inc.

PO Box 1178
Corona, CA 92878
Phone: (951) 268-6268
email: counts@countsunlimited.com

City of Lake Forest
Trabuco Road
B/ Lake Forest Drive - El Toro Road
24 Hour Directional Volume Count

LKF001
Site Code: 051-17332B

Start Time	6/1/2017 Thu	Eastbound Morning	Eastbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Westbound Morning	Westbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		21	181			17	161				
12:15		26	157			13	145				
12:30		11	179			7	158				
12:45		9	148	67	665	10	189	47	653	114	1318
01:00		10	160			9	195				
01:15		11	144			10	159				
01:30		9	173			7	163				
01:45		5	171	35	648	2	154	28	671	63	1319
02:00		8	161			5	142				
02:15		7	195			4	197				
02:30		6	210			1	184				
02:45		6	208	27	774	6	191	16	714	43	1488
03:00		2	216			2	197				
03:15		3	243			7	208				
03:30		4	264			9	206				
03:45		3	254	12	977	14	191	32	802	44	1779
04:00		11	255			6	177				
04:15		11	232			8	164				
04:30		8	300			26	170				
04:45		18	**332**	48	1119	36	164	76	675	124	1794
05:00		10	**339**			40	**196**				
05:15		24	**359**			51	**206**				
05:30		20	**339**			54	**215**				
05:45		25	323	79	1360	81	**190**	226	807	305	2167
06:00		42	304			79	175				
06:15		46	292			112	176				
06:30		45	246			166	160				
06:45		93	202	226	1044	172	160	529	671	755	1715
07:00		93	171			210	137				
07:15		113	160			291	130				
07:30		132	151			275	122				
07:45		**199**	143	537	625	**321**	112	1097	501	1634	1126
08:00		**170**	137			**295**	122				
08:15		**189**	117			**320**	80				
08:30		**148**	101			**279**	109				
08:45		107	100	614	455	227	101	1121	412	1735	867
09:00		115	106			183	89				
09:15		127	113			184	82				
09:30		132	96			192	92				
09:45		111	68	485	383	163	65	722	328	1207	711
10:00		112	79			123	61				
10:15		89	64			157	61				
10:30		118	43			156	41				
10:45		113	50	432	236	143	50	579	213	1011	449
11:00		145	41			122	34				
11:15		152	35			114	21				
11:30		155	29			161	23				
11:45		155	18	607	123	178	17	575	95	1182	218
Total		3169	8409	3169	8409	5048	6542	5048	6542	8217	14951
Combined Total		11578		11578		11590		11590		23168	
AM Peak	-	07:45	-	-	-	07:45	-	-	-	-	-
Vol.	-	706	-	-	-	1215	-	-	-	-	-
P.H.F.		0.887				0.946					
PM Peak	-	-	04:45	-	-	-	05:00	-	-	-	-
Vol.	-	-	1369	-	-	-	807	-	-	-	-
P.H.F.			0.953				0.938				
Percentage		27.4%	72.6%			43.6%	56.4%				
ADT/AADT		ADT 23,168		AADT 23,168							

Counts Unlimited, Inc.

PO Box 1178
Corona, CA 92878
Phone: (951) 268-6268
email: counts@countsunlimited.com

City of Lake Forest
El Toro Road
B/ Trabuco Road - Serrano Road
24 Hour Directional Volume Count

LKF003
Site Code: 051-17332B

Start Time	6/1/2017 Thu	Northbound Morning	Northbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Southbound Morning	Southbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		43	215			29	223				
12:15		34	246			25	239				
12:30		22	264			21	218				
12:45		27	295	126	1020	11	236	86	916	212	1936
01:00		27	240			13	235				
01:15		19	256			17	223				
01:30		25	272			7	250				
01:45		13	250	84	1018	7	252	44	960	128	1978
02:00		17	312			9	214				
02:15		10	262			12	232				
02:30		13	291			8	**275**				
02:45		5	296	45	1161	10	**295**	39	1016	84	2177
03:00		11	296			7	**251**				
03:15		12	345			11	**233**				
03:30		12	337			16	270				
03:45		13	313	48	1291	16	256	50	1010	98	2301
04:00		10	350			25	226				
04:15		19	328			29	232				
04:30		43	365			41	226				
04:45		40	350	112	1393	61	263	156	947	268	2340
05:00		26	356			63	262				
05:15		36	**435**			76	240				
05:30		66	**432**			98	276				
05:45		65	**412**	193	1635	118	248	355	1026	548	2661
06:00		55	**373**			138	250				
06:15		96	335			158	233				
06:30		118	296			253	219				
06:45		138	299	407	1303	361	205	910	907	1317	2210
07:00		153	328			314	175				
07:15		164	272			295	165				
07:30		191	246			**438**	149				
07:45		**234**	212	742	1058	**489**	140	1536	629	2278	1687
08:00		**250**	241			**359**	137				
08:15		**256**	217			**352**	130				
08:30		**212**	201			315	129				
08:45		169	242	887	901	246	108	1272	504	2159	1405
09:00		181	182			251	112				
09:15		202	187			238	114				
09:30		188	157			236	96				
09:45		159	141	730	667	239	92	964	414	1694	1081
10:00		177	126			201	96				
10:15		187	119			196	80				
10:30		200	121			217	63				
10:45		191	114	755	480	203	59	817	298	1572	778
11:00		183	77			210	54				
11:15		211	58			225	42				
11:30		212	53			208	33				
11:45		217	52	823	240	224	22	867	151	1690	391
Total		4952	12167	4952	12167	7096	8778	7096	8778	12048	20945
Combined Total		17119		17119		15874		15874		32993	
AM Peak	-	07:45	-	-	-	07:30	-	-	-	-	-
Vol.	-	952	-	-	-	1638	-	-	-	-	-
P.H.F.		0.930				0.837					
PM Peak	-	-	05:15	-	-	-	02:30	-	-	-	-
Vol.	-	-	1652	-	-	-	1054	-	-	-	-
P.H.F.			0.949				0.893				
Percentage		28.9%	71.1%			44.7%	55.3%				
ADT/AADT		ADT 32,993		AADT 32,993							

This Page Intentionally Left Blank

APPENDIX 4.2:

EXISTING (2017) AND EXISTING PLUS PROJECT CONDITIONS INTERSECTION OPERATIONS ANALYSIS WORKSHEETS

This Page Intentionally Left Blank

1. Lake Forest & Dimension

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	181	.11*	96	.06*
NBT	2	3400	681	.20	725	.21
NBR	d	1700	6	.00	17	.01
SBL	1	1700	15	.01	33	.02
SBT	2	3400	470	.14*	801	.24*
SBR	d	1700	413	.24	165	.10
EBL	1.5		144	{.04}*	482	
EBT	0.5	3400	4	.04	19	.15*
EBR	1	1700	57	.03	150	.09
WBL	1	1700	4	.00	27	.02*
WBT	1	1700	3	.00*	7	.01
WBR	0	0	3		16	
Right Turn Adjustment			SBR	.07*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.41**		**.52**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	181	.11*	96	.06*
NBT	2	3400	707	.21	763	.22
NBR	d	1700	6	.00	17	.01
SBL	1	1700	15	.01	33	.02
SBT	2	3400	514	.15*	826	.24*
SBR	d	1700	419	.25	167	.10
EBL	1.5		151	{.05}*	484	
EBT	0.5	3400	4	.05	19	.15*
EBR	1	1700	57	.03	150	.09
WBL	1	1700	4	.00	27	.02*
WBT	1	1700	3	.00*	7	.01
WBR	0	0	3		16	
Right Turn Adjustment			SBR	.06*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.42**		**.52**

2. Lake Forest & Rancho

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	126	.07*	207	.12*
NBT	2	3400	538	.16	613	.18
NBR	d	1700	126	.07	310	.18
SBL	1	1700	81	.05	137	.08
SBT	2	3400	474	.14*	622	.18*
SBR	d	1700	52	.03	57	.03
EBL	1	1700	17	.01*	33	.02
EBT	2	3400	157	.05	597	.18*
EBR	1	1700	52	.03	125	.07
WBL	2	3400	254	.07	133	.04*
WBT	2	3400	507	.15*	289	.09
WBR	1	1700	39	.02	78	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.42**		**.57**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	173	.10*	250	.15*
NBT	2	3400	538	.16	613	.18
NBR	d	1700	126	.07	310	.18
SBL	1	1700	81	.05	137	.08
SBT	2	3400	474	.14*	622	.18*
SBR	d	1700	121	.07	106	.06
EBL	1	1700	99	.06*	70	.04
EBT	2	3400	260	.08	653	.19*
EBR	1	1700	114	.07	155	.09
WBL	2	3400	254	.07	133	.04*
WBT	2	3400	574	.17*	373	.11
WBR	1	1700	39	.02	78	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.52**		**.61**

3. Lake Forest & SR-241 SB Off-Ramp

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	605	.18*	752	.22*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	448	.13	609	.18
SBR	0	0	0		0	
EBL	2	3400	189	.06*	88	.03*
EBT	0	0	0		0	
EBR	1	1700	177	.10	197	.12
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					EBR	.06*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.29**		**.36**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	687	.20*	789	.23*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	503	.15	645	.19
SBR	0	0	0		0	
EBL	2	3400	189	.06*	88	.03*
EBT	0	0	0		0	
EBR	1	1700	191	.11	211	.12
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.01*	EBR	.06*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.32**		**.37**

4. Lake Forest & SR-241 NB On-Ramp

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	154	.05	186	.05*
NBT	2	3400	641	.19*	643	.19
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	452	.13	601	.18*
SBR	1	1700	108	.06	171	.10
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.24**		**.28**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	173	.05	196	.06*
NBT	2	3400	704	.21*	670	.20
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	507	.15	637	.19*
SBR	1	1700	108	.06	171	.10
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.26**		**.30**

5. Corridor Center & Rancho

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	52	.02*	129	.04*
SBT	0	0	0		0	
SBR	1	1700	30	.02	49	.03
EBL	1	1700	40	.02*	69	.04
EBT	2	3400	174	.05	620	.18*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3400	532	.16*	370	.11
WBR	d	1700	90	.05	115	.07
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.25**		**.27**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	26	.02	12	.01
NBT	1	1700	8	.15*	5	.08*
NBR	0	0	247		123	
SBL	1	1700	52	.03*	129	.08*
SBT	1	1700	3	.00	9	.01
SBR	1	1700	30	.02	49	.03
EBL	1	1700	40	.02*	69	.04
EBT	2	3400	174	.05	620	.18*
EBR	1	1700	101	.06	34	.02
WBL	1	1700	184	.11	177	.10*
WBT	2	3400	532	.16*	370	.11
WBR	d	1700	90	.05	115	.07
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.41**		**.49**

6. Bake & Portola

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	52	.03*	219	.13
NBT	1.5	5100	181	.05	281	{.09}*
NBR	1.5		96		312	
SBL	1	1700	122	.07	187	.11*
SBT	2	3400	398	.12*	216	.06
SBR	d	1700	316	.19	171	.10
EBL	2	3400	264	.08*	302	.09*
EBT	3	5100	301	.06	660	.13
EBR	d	1700	88	.05	82	.05
WBL	2	3400	351	.10	261	.08
WBT	2	3400	450	.13*	516	.15*
WBR	d	1700	69	.04	40	.02
Right Turn Adjustment			SBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.42**		**.49**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	81	.05*	231	.14*
NBT	1.5	5100	200	.06	288	{.09}
NBR	1.5		101		315	
SBL	1	1700	122	.07	187	.11
SBT	2	3400	417	.12*	224	.07*
SBR	d	1700	316	.19	171	.10
EBL	2	3400	264	.08*	302	.09*
EBT	3	5100	301	.06	660	.13
EBR	d	1700	116	.07	96	.06
WBL	2	3400	353	.10	266	.08
WBT	2	3400	450	.13*	516	.15*
WBR	d	1700	69	.04	40	.02
Right Turn Adjustment			SBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.50**

7. Bake & Towne Centre

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	185	.05*	356	.10
NBT	2	3400	337	.10	808	.24*
NBR	d	1700	84	.05	144	.08
SBL	2	3400	7	.00	34	.01*
SBT	2	3400	754	.22*	429	.13
SBR	d	1700	75	.04	95	.06
EBL	1	1700	7	.00	72	.04
EBT	1	1700	55	.03*	196	.12*
EBR	1	1700	103	.06	371	.22
WBL	1	1700	66	.04*	98	.06*
WBT	2	3400	94	.03	168	.06
WBR	0	0	9		39	
Right Turn Adjustment					EBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.39**		**.49**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	220	.06*	374	.11
NBT	2	3400	391	.12	830	.24*
NBR	d	1700	92	.05	149	.09
SBL	2	3400	7	.00	34	.01*
SBT	2	3400	803	.24*	457	.13
SBR	d	1700	75	.04	95	.06
EBL	1	1700	7	.00	72	.04
EBT	1	1700	55	.03*	196	.12*
EBR	1	1700	128	.08	397	.23
WBL	1	1700	69	.04*	107	.06*
WBT	2	3400	94	.03	168	.06
WBR	0	0	9		39	
Right Turn Adjustment					EBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.42**		**.50**

8. Bake & Rancho North

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	512	.15	1039	.31*
NBR	d	1700	131	.08	596	.35
SBL	1	1700	98	.06	197	.12*
SBT	2	3400	833	.25*	684	.20
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	491	.14*	226	.07*
WBT	0	0	0		0	
WBR	2	3400	39	.01	266	.08
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.55**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	586	.17*	1075	.32*
NBR	d	1700	168	.10	607	.36
SBL	1	1700	162	.10*	219	.13*
SBT	2	3400	846	.25	725	.21
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	494	.15*	228	.07*
WBT	0	0	0		0	
WBR	2	3400	62	.02	276	.08
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.47**		**.57**

9. Bake & Rancho South

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	200	.12*	171	.10
NBT	2	3400	547	.16	1329	.39*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	1052	.31*	786	.23
SBR	1	1700	273	.16	116	.07
EBL	2	3400	114	.03*	283	.08*
EBT	0	0	0		0	
EBR	1	1700	141	.08	144	.08
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.51** **.52**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	215	.13*	181	.11
NBT	2	3400	599	.18	1351	.40*
NBR	1	1700	103	.06	109	.06
SBL	1	1700	13	.01	41	.02*
SBT	2	3400	1055	.31*	788	.23
SBR	1	1700	273	.16	116	.07
EBL	2	3400	114	.03	283	.08*
EBT	1	1700	58	.03*	76	.04
EBR	d	1700	141	.08	144	.08
WBL	2	3400	219	.06*	113	.03
WBT	1	1700	76	.04	40	.02*
WBR	1	1700	58	.03	25	.01
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.58** **.57**

10. Bake & Orchard

Existing

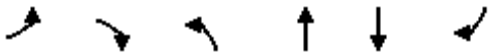
	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	770	.23	1522	.45*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	1179	.35*	920	.27
SBR	d	1700	6	.00	5	.00
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1700	16	.01	59	.03
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.41** **.50**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	910	.27	1642	.48*
NBR	1	1700	15	.01	49	.03
SBL	0	0	0		0	
SBT	2	3400	1400	.41*	1035	.30
SBR	d	1700	6	.00	5	.00
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1700	16	.01	59	.03
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	1	1700	30	.02	21	.01
Right Turn Adjustment			EBR	.01*	WBR	.01*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.47** **.54**



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	16	0	770	1179	6
Future Volume (vph)	0	16	0	770	1179	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150	150	150			150
Storage Lanes	0	0	0			1
Taper Length (ft)	90		90			
Link Speed (mph)	30			50	50	
Link Distance (ft)	362			1352	1059	
Travel Time (s)	8.2			18.4	14.4	
Confl. Peds. (#/hr)	5	5	5			5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

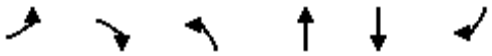
Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	16	0	770	1179	6
Future Vol, veh/h	0	16	0	770	1179	6
Conflicting Peds, #/hr	5	5	5	0	0	5
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	17	0	819	1254	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	637	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	420	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	416	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	416	-	-
HCM Lane V/C Ratio	-	0.041	-	-
HCM Control Delay (s)	-	14	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.1	-	-



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	59	0	1522	920	5
Future Volume (vph)	0	59	0	1522	920	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150	150	150			150
Storage Lanes	0	0	0			1
Taper Length (ft)	90		90			
Link Speed (mph)	30			50	50	
Link Distance (ft)	362			1352	1059	
Travel Time (s)	8.2			18.4	14.4	
Confl. Peds. (#/hr)	5	5	5			5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

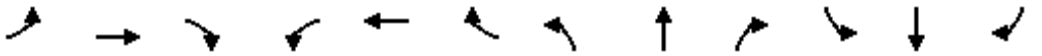
Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	59	0	1522	920	5
Future Vol, veh/h	0	59	0	1522	920	5
Conflicting Peds, #/hr	5	5	5	0	0	5
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	63	0	1619	979	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	500	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	516	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	511	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	511	-	-
HCM Lane V/C Ratio	-	0.123	-	-
HCM Control Delay (s)	-	13	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.4	-	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	16	0	0	30	0	910	15	0	1400	6
Future Volume (vph)	0	0	16	0	0	30	0	910	15	0	1400	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		150	0		0	150		180	0		150
Storage Lanes	0		0	0		1	0		1	0		1
Taper Length (ft)	90			90			90			0		
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		362			257			1352			1059	
Travel Time (s)		8.2			5.8			18.4			14.4	
Confl. Peds. (#/hr)	5		5				5					5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↱			↱		↑↑	↱		↑↑	↱
Traffic Vol, veh/h	0	0	16	0	0	30	0	910	15	0	1400	6
Future Vol, veh/h	0	0	16	0	0	30	0	910	15	0	1400	6
Conflicting Peds, #/hr	5	0	5	0	0	0	5	0	0	0	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	-	-	180	-	-	150
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	17	0	0	32	0	968	16	0	1489	6

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	755	-	-	484	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	6.94	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.32	-	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	351	0	0	529	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	348	-	-	529	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.9	12.2	0	0
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	348	529	-	-
HCM Lane V/C Ratio	-	-	0.049	0.06	-	-
HCM Control Delay (s)	-	-	15.9	12.2	-	-
HCM Lane LOS	-	-	C	B	-	-
HCM 95th %tile Q(veh)	-	-	0.2	0.2	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	59	0	0	21	0	1642	49	0	1035	5
Future Vol, veh/h	0	0	59	0	0	21	0	1642	49	0	1035	5
Conflicting Peds, #/hr	5	0	5	0	0	0	5	0	0	0	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	-	-	180	-	-	150
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	63	0	0	22	0	1747	52	0	1101	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	561	-	-	874	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	6.94	-	-	10	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	10	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	10	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.32	-	-	10	-	-	-
Pot Cap-1 Maneuver	0	0	471	0	0	293	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	467	-	-	293	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.9	18.3	0	0
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	467	293	-	-
HCM Lane V/C Ratio	-	-	0.134	0.076	-	-
HCM Control Delay (s)	-	-	13.9	18.3	-	-
HCM Lane LOS	-	-	B	C	-	-
HCM 95th %tile Q(veh)	-	-	0.5	0.2	-	-

11. Dimension & Bake

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	57	.02	142	.04*
NBT	1	1700	25	.01*	50	.03
NBR	1	1700	95	.06	195	.11
SBL	1	1700	93	.05*	29	.02
SBT	1	1700	63	.04	30	.02*
SBR	1	1700	72	.04	28	.02
EBL	1	1700	19	.01	84	.05
EBT	2	3400	615	.18*	1238	.36*
EBR	d	1700	112	.07	74	.04
WBL	1	1700	181	.11*	160	.09*
WBT	2	3400	924	.27	787	.23
WBR	d	1700	65	.04	60	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.40**		**.56**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	57	.02	142	.04*
NBT	1	1700	25	.01*	50	.03
NBR	1	1700	101	.06	213	.13
SBL	1	1700	163	.10*	49	.03
SBT	1	1700	63	.04	30	.02*
SBR	1	1700	72	.04	28	.02
EBL	1	1700	19	.01*	84	.05
EBT	2	3400	694	.20	1370	.40*
EBR	d	1700	112	.07	74	.04
WBL	1	1700	197	.12	171	.10*
WBT	2	3400	1067	.31*	872	.26
WBR	d	1700	128	.08	80	.05
Right Turn Adjustment					NBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.48**		**.63**

12. Alton & Rancho South

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	74	.02*	138	.04
NBT	3	5100	406	.08	1177	.23*
NBR	1	1700	109	.06	96	.06
SBL	2	3400	123	.04	39	.01*
SBT	3	5100	1140	.22*	386	.08
SBR	d	1700	55	.03	44	.03
EBL	1	1700	40	.02	31	.02
EBT	2	3400	36	.01*	28	.01*
EBR	1	1700	205	.12	105	.06
WBL	1	1700	147	.09*	129	.08*
WBT	2	3400	28	.01	40	.01
WBR	d	1700	38	.02	151	.09
Right Turn Adjustment			EBR	.09*	WBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.48**		**.39**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	74	.02*	138	.04
NBT	3	5100	406	.08	1177	.23*
NBR	1	1700	138	.08	143	.08
SBL	2	3400	125	.04	45	.01*
SBT	3	5100	1140	.22*	386	.08
SBR	d	1700	55	.03	44	.03
EBL	1	1700	40	.02	31	.02
EBT	2	3400	48	.01*	35	.01*
EBR	1	1700	205	.12	105	.06
WBL	1	1700	198	.12*	159	.09*
WBT	2	3400	41	.01	45	.01
WBR	d	1700	44	.03	155	.09
Right Turn Adjustment			EBR	.09*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.51**		**.39**

13. Alton & SR-241

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	136	.08*	349	.21*
NBT	3	5100	267	.05	706	.14
NBR	f		55		219	
SBL	1	1700	72	.04	80	.05
SBT	3	5100	510	.10*	317	.06*
SBR	f		257		233	
EBL	2	3400	208	.06	231	.07*
EBT	0	0	0		0	
EBR	f		446		108	
WBL	2	3400	317	.09*	41	.01
WBT	0	0	0		0	
WBR	f		58		48	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.32**		**.39**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	138	.08*	350	.21*
NBT	3	5100	271	.05	709	.14
NBR	f		55		219	
SBL	1	1700	72	.04	80	.05
SBT	3	5100	511	.10*	321	.06*
SBR	f		257		233	
EBL	2	3400	208	.06	231	.07*
EBT	0	0	14		14	
EBR	f		447		110	
WBL	2	3400	317	.09*	41	.01
WBT	0	0	19		10	
WBR	f		58		48	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.32**		**.39**

14. Alton & Towne Centre

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02*	134	.08
NBT	3	5100	268	.05	682	.13*
NBR	f		218		170	
SBL	1	1700	24	.01	38	.02*
SBT	3	5100	677	.13*	307	.06
SBR	1	1700	44	.03	29	.02
EBL	1	1700	52	.03*	40	.02
EBT	1	1700	38	.02	58	.03*
EBR	1	1700	53	.03	44	.03
WBL	2	3400	110	.03	275	.08*
WBT	1	1700	36	.02*	56	.03
WBR	1	1700	6	.00	23	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.25**		**.31**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02*	134	.08
NBT	3	5100	268	.05	682	.13*
NBR	f		218		170	
SBL	1	1700	24	.01	38	.02*
SBT	3	5100	677	.13*	307	.06
SBR	1	1700	44	.03	29	.02
EBL	1	1700	52	.03*	40	.02
EBT	1	1700	56	.03	62	.04*
EBR	1	1700	53	.03	44	.03
WBL	2	3400	110	.03	275	.08*
WBT	1	1700	52	.03*	61	.04
WBR	1	1700	6	.00	23	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.26**		**.32**

15. Alton & Portola

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	31	.02	127	.07
NBT	2	3400	24	.01*	142	.04*
NBR	f		246		411	
SBL	1	1700	219	.13*	110	.06*
SBT	2	3400	156	.05	57	.02
SBR	d	1700	3	.00	4	.00
EBL	2	3400	5	.00	2	.00
EBT	2	3400	282	.08*	157	.05*
EBR	f		147		61	
WBL	2	3400	460	.14*	252	.07*
WBT	3	5100	98	.02	186	.04
WBR	f		93		158	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.41**		**.27**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	31	.02	127	.07
NBT	2	3400	24	.01*	142	.04*
NBR	f		246		411	
SBL	1	1700	237	.14*	114	.07*
SBT	2	3400	156	.05	57	.02
SBR	d	1700	3	.00	4	.00
EBL	2	3400	5	.00	2	.00
EBT	2	3400	289	.09*	159	.05*
EBR	f		147		61	
WBL	2	3400	460	.14*	252	.07*
WBT	3	5100	104	.02	188	.04
WBR	f		109		163	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.43**		**.28**

16. Lake Forest & Portola

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	44	.03	74	.04
NBT	2	3400	148	.04*	184	.05*
NBR	d	1700	121	.07	214	.13
SBL	1	1700	173	.10*	175	.10*
SBT	2	3400	206	.06	163	.05
SBR	d	1700	8	.00	34	.02
EBL	2	3400	18	.01	13	.00
EBT	3	5100	511	.10*	1030	.20*
EBR	d	1700	64	.04	68	.04
WBL	2	3400	223	.07*	165	.05*
WBT	3	5100	841	.16	698	.14
WBR	d	1700	250	.15	170	.10
Right Turn Adjustment					NBR	.04*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.36**		**.49**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	47	.03	76	.04
NBT	2	3400	183	.05*	196	.06*
NBR	d	1700	124	.07	216	.13
SBL	1	1700	173	.10*	175	.10*
SBT	2	3400	243	.07	175	.05
SBR	d	1700	8	.00	34	.02
EBL	2	3400	18	.01	13	.00
EBT	3	5100	511	.10*	1030	.20*
EBR	d	1700	65	.04	71	.04
WBL	2	3400	224	.07*	168	.05*
WBT	3	5100	841	.16	698	.14
WBR	d	1700	250	.15	170	.10
Right Turn Adjustment					NBR	.03*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.37**		**.49**

17. Lake Forest & Towne Centre

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	131	.04*	205	.06*
NBT	2	3400	321	.09	413	.12
NBR	d	1700	194	.11	77	.05
SBL	2	3400	4	.00	2	.00
SBT	2	3400	436	.13*	398	.12*
SBR	d	1700	31	.02	15	.01
EBL	1	1700	7	.00	13	.01
EBT	1	1700	92	.05*	172	.10*
EBR	1	1700	66	.04	205	.12
WBL	1	1700	53	.03*	129	.08*
WBT	2	3400	58	.02	70	.02
WBR	0	0	3		2	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.30**		**.41**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	135	.04*	208	.06*
NBT	2	3400	361	.11	429	.13
NBR	d	1700	212	.12	86	.05
SBL	2	3400	4	.00	2	.00
SBT	2	3400	475	.14*	417	.12*
SBR	d	1700	31	.02	15	.01
EBL	1	1700	7	.00	13	.01
EBT	1	1700	92	.05*	172	.10*
EBR	1	1700	67	.04	209	.12
WBL	1	1700	67	.04*	142	.08*
WBT	2	3400	58	.02	70	.02
WBR	0	0	3		2	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.32**		**.41**

18. Towne Centre & Portola

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	21	.01	4	.00
NBT	1	1700	83	.05*	3	.00
NBR	1	1700	86	.05	274	.16
SBL	2	3400	32	.01*	205	.06
SBT	1	1700	12	.01	57	.07*
SBR	0	0	5		61	
EBL	2	3400	80	.02*	19	.01
EBT	3	5100	708	.14	1419	.28*
EBR	d	1700	6	.00	14	.01
WBL	2	3400	164	.05	64	.02*
WBT	3	5100	1279	.25*	968	.19
WBR	d	1700	205	.12	46	.03
Right Turn Adjustment					NBR	.13*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.38**		**.55**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	21	.01	4	.00
NBT	1	1700	83	.05*	3	.00
NBR	1	1700	104	.06	283	.17
SBL	2	3400	32	.01*	205	.06
SBT	1	1700	12	.01	57	.07*
SBR	0	0	5		61	
EBL	2	3400	80	.02*	19	.01
EBT	3	5100	711	.14	1421	.28*
EBR	d	1700	6	.00	14	.01
WBL	2	3400	178	.05	77	.02*
WBT	3	5100	1280	.25*	971	.19
WBR	d	1700	205	.12	46	.03
Right Turn Adjustment					NBR	.14*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.38**		**.56**

19. Glenn Ranch & Portola

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	66	.04	89	.05
NBT	2	3400	26	.02*	40	.02*
NBR	0	0	57	.03	77	.05
SBL	2	3400	293	.09*	212	.06*
SBT	2	3400	67	.02	36	.01
SBR	f		674		319	
EBL	2	3400	244	.07*	793	.23*
EBT	3	5100	487	.10	994	.19
EBR	1	1700	95	.06	116	.07
WBL	2	3400	146	.04	98	.03
WBT	3	5100	906	.18*	613	.12*
WBR	1	1700	220	.13	231	.14
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION **.41** **.48**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	66	.04	89	.05
NBT	2	3400	26	.02*	40	.02*
NBR	0	0	57	.03	77	.05
SBL	2	3400	300	.09*	214	.06*
SBT	2	3400	67	.02	36	.01
SBR	f		689		335	
EBL	2	3400	265	.08*	804	.24*
EBT	3	5100	487	.10	994	.19
EBR	1	1700	95	.06	116	.07
WBL	2	3400	146	.04	98	.03
WBT	3	5100	906	.18*	613	.12*
WBR	1	1700	226	.13	233	.14
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION **.42** **.49**

20. Portola & SR-241

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	427	.13*	185	.05*
NBT	3	5100	812	.16	625	.12
NBR	f		52		149	
SBL	2	3400	108	.03	179	.05
SBT	3	5100	517	.10*	1003	.20*
SBR	f		211		106	
EBL	1	1700	121	.07*	128	.08*
EBT	0	0	0		0	
EBR	f		134		308	
WBL	2	3400	161	.05	68	.02
WBT	0	0	0		0	
WBR	f		331		180	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.35** **.38**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	427	.13*	185	.05*
NBT	3	5100	818	.16	627	.12
NBR	f		73		160	
SBL	2	3400	108	.03	179	.05
SBT	3	5100	524	.10*	1005	.20*
SBR	f		211		106	
EBL	1	1700	121	.07*	128	.08*
EBT	0	0	0		0	
EBR	f		134		308	
WBL	2	3400	176	.05	84	.02
WBT	0	0	0		0	
WBR	f		331		180	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.35** **.38**

21. Portola & Rancho

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	691	.20*	365	.11*
NBT	3	5100	1210	.24	769	.15
NBR	d	1700	10	.01	4	.00
SBL	2	3400	25	.01	36	.01
SBT	3	5100	692	.14*	1308	.26*
SBR	1	1700	91	.05	24	.01
EBL	1.5		65		184	
EBT	0.5	3400	14	.02*	51	.07*
EBR	f		253		892	
WBL	1.5		4		25	.01
WBT	1	6800	27	.01*	21	.01*
WBR	1.5		2		4	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION **.42** **.50**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	736	.22*	432	.13*
NBT	3	5100	1210	.24	769	.15
NBR	d	1700	10	.01	4	.00
SBL	2	3400	25	.01	36	.01
SBT	3	5100	692	.14*	1308	.26*
SBR	1	1700	113	.07	41	.02
EBL	1.5		92		197	
EBT	0.5	3400	14	.03*	51	.07*
EBR	f		329		936	
WBL	1.5		4		25	.01
WBT	1	6800	27	.01*	21	.01*
WBR	1.5		2		4	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION **.45** **.52**

22. El Toro & Portola

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	268	.16*	243	.14*
NBT	3	5100	182	.04	484	.09
NBR	f		394		558	
SBL	1	1700	52	.03	25	.01
SBT	3	5100	594	.12*	219	.04*
SBR	1	1700	321	.19	172	.10
EBL	2	3400	57	.02	346	.10
EBT	3	5100	666	.13*	1588	.31*
EBR	1	1700	208	.12	358	.21
WBL	2	3400	417	.12*	367	.11*
WBT	4	6800	1455	.21	885	.13
WBR	d	1700	29	.02	43	.03
Right Turn Adjustment		SBR		.04*		
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION **.62** **.65**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	274	.16*	253	.15*
NBT	3	5100	182	.04	484	.09
NBR	f		394		558	
SBL	1	1700	52	.03	25	.01
SBT	3	5100	594	.12*	219	.04*
SBR	1	1700	334	.20	191	.11
EBL	2	3400	79	.02	359	.11
EBT	3	5100	710	.14*	1613	.32*
EBR	1	1700	219	.13	364	.21
WBL	2	3400	417	.12*	367	.11*
WBT	4	6800	1481	.22	923	.14
WBR	d	1700	29	.02	43	.03
Right Turn Adjustment		SBR		.05*		
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION **.64** **.67**

23. Los Alisos & Santa Margarita

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	387	.23*	305	.18*
NBT	2	3400	212	.06	389	.11
NBR	1	1700	133	.08	181	.11
SBL	1	1700	58	.03	47	.03
SBT	2	3400	483	.14*	188	.06*
SBR	d	1700	146	.09	56	.03
EBL	1	1700	118	.07*	124	.07
EBT	3	5100	739	.14	1673	.33*
EBR	d	1700	187	.11	260	.15
WBL	1	1700	245	.14	186	.11*
WBT	3	5100	1348	.26*	892	.17
WBR	d	1700	32	.02	76	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.75**		**.73**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	393	.23*	315	.19*
NBT	2	3400	212	.06	389	.11
NBR	1	1700	133	.08	181	.11
SBL	1	1700	58	.03	47	.03
SBT	2	3400	483	.14*	188	.06*
SBR	d	1700	146	.09	56	.03
EBL	1	1700	118	.07*	124	.07
EBT	3	5100	772	.15	1692	.33*
EBR	d	1700	198	.12	266	.16
WBL	1	1700	245	.14	186	.11*
WBT	3	5100	1367	.27*	921	.18
WBR	d	1700	32	.02	76	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.76**		**.74**

24. Alton & Commercentre

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	469	.09	1229	.24*
NBR	d	1700	258	.15	135	.08
SBL	1	1700	165	.10	17	.01*
SBT	3	5100	1358	.27*	657	.13
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		160	.05*	428	.13*
WBT	0	5100	0		0	
WBR	1.5		26		149	.09
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.37**		**.43**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	498	.10	1276	.25*
NBR	d	1700	258	.15	135	.08
SBL	1	1700	165	.10	17	.01*
SBT	3	5100	1409	.28*	687	.13
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		160	.05*	428	.13*
WBT	0	5100	0		0	
WBR	1.5		26		149	.09
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.38**		**.44**

25. Alton & Irvine

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	82	.02*	265	.08
NBT	3	5100	336	.07	970	.19*
NBR	f		14		73	
SBL	2	3400	203	.06	61	.02*
SBT	3	5100	1115	.22*	497	.10
SBR	f		227		499	
EBL	2	3400	360	.11*	251	.07*
EBT	3	5100	380	.07	377	.07
EBR	1	1700	289	.17	52	.03
WBL	2	3400	117	.03	55	.02
WBT	3	5100	329	.06*	448	.09*
WBR	1	1700	38	.02	138	.08
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.47**		**.42**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	82	.02*	265	.08
NBT	3	5100	354	.07	994	.19*
NBR	f		14		73	
SBL	2	3400	203	.06	61	.02*
SBT	3	5100	1144	.22*	513	.10
SBR	f		250		513	
EBL	2	3400	371	.11*	274	.08*
EBT	3	5100	391	.08	379	.07
EBR	1	1700	289	.17	52	.03
WBL	2	3400	117	.03	55	.02
WBT	3	5100	338	.07*	451	.09*
WBR	1	1700	38	.02	138	.08
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.47**		**.43**

26. Bake & Commercentre

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	72	.04*	49	.03
NBT	2	3400	976	.29	1260	.37*
NBR	d	1700	521	.31	172	.10
SBL	1	1700	31	.02	8	.00
SBT	2	3400	994	.29*	816	.24
SBR	d	1700	96	.06	110	.06
EBL	1	1700	58	.03	80	.05*
EBT	2	3400	260	.09*	84	.04
EBR	0	0	49		57	
WBL	2	3400	113	.03*	466	.14
WBT	1	1700	45	.03	313	.20*
WBR	0	0	9		23	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.50**		**.67**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	72	.04*	49	.03
NBT	2	3400	1054	.31	1388	.41*
NBR	d	1700	521	.31	172	.10
SBL	1	1700	31	.02	8	.00
SBT	2	3400	1133	.33*	898	.26
SBR	d	1700	100	.06	113	.07
EBL	1	1700	59	.03	84	.05*
EBT	2	3400	260	.09*	84	.04
EBR	0	0	49		57	
WBL	2	3400	113	.03*	466	.14
WBT	1	1700	45	.03	313	.20*
WBR	0	0	9		23	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.54**		**.71**

27. Bake & Trabuco

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	257	.15	113	.07
NBT	3	5100	1589	.34*	1313	.37*
NBR	0	0	121		574	
SBL	2	3400	66	.02*	196	.06*
SBT	3	5100	942	.18	1327	.26
SBR	1	1700	104	.06	107	.06
EBL	2	3400	118	.03	118	.03
EBT	3	5100	172	.03*	567	.11*
EBR	1	1700	144	.08	261	.15
WBL	2	3400	629	.19*	322	.09*
WBT	3	5100	460	.09	251	.05
WBR	1	1700	170	.10	118	.07
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.63**		**.68**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	257	.15	113	.07
NBT	3	5100	1647	.35*	1420	.39*
NBR	0	0	121		574	
SBL	2	3400	85	.03*	208	.06*
SBT	3	5100	1053	.21	1395	.27
SBR	1	1700	113	.07	110	.06
EBL	2	3400	129	.04	120	.04
EBT	3	5100	172	.03*	567	.11*
EBR	1	1700	144	.08	261	.15
WBL	2	3400	629	.19*	322	.09*
WBT	3	5100	460	.09	251	.05
WBR	1	1700	179	.11	136	.08
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.70**

28. Bake & Toledo

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	343	.20*	66	.04
NBT	3	5100	1928	.38	1841	.36*
NBR	d	1700	50	.03	337	.20
SBL	1	1700	59	.03	86	.05*
SBT	3	5100	1508	.30*	1868	.37
SBR	d	1700	173	.10	33	.02
EBL	2	3400	25	.01	144	.04
EBT	2	3400	27	.01*	241	.07*
EBR	1	1700	47	.03	197	.12
WBL	1	1700	230	.14*	69	.04*
WBT	2	3400	239	.09	43	.03
WBR	0	0	58		79	.05
Right Turn Adjustment					EBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.70**		**.59**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	343	.20*	66	.04
NBT	3	5100	1984	.39	1943	.38*
NBR	d	1700	50	.03	337	.20
SBL	1	1700	63	.04	89	.05*
SBT	3	5100	1615	.32*	1933	.38
SBR	d	1700	173	.10	33	.02
EBL	2	3400	25	.01	144	.04
EBT	2	3400	27	.01*	241	.07*
EBR	1	1700	47	.03	197	.12
WBL	1	1700	230	.14*	69	.04*
WBT	2	3400	239	.09	43	.03
WBR	0	0	59		83	.05
Right Turn Adjustment					EBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.72**		**.60**

29. Bake & Jeronimo

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	467	.27*	62	.04
NBT	3	5100	2254	.44	2183	.43*
NBR	d	1700	56	.03	481	.28
SBL	1	1700	59	.03	81	.05*
SBT	3	5100	1682	.33*	2096	.41
SBR	d	1700	69	.04	15	.01
EBL	2	3400	14	.00	53	.02
EBT	2	3400	62	.02*	422	.12*
EBR	1	1700	131	.08	377	.22
WBL	1	1700	455	.27*	119	.07*
WBT	2	3400	544	.19	85	.04
WBR	0	0	99		47	
Right Turn Adjustment					EBR	.05*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.94**		**.77**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	467	.27*	62	.04
NBT	3	5100	2310	.45	2285	.45*
NBR	d	1700	56	.03	481	.28
SBL	1	1700	59	.03	81	.05*
SBT	3	5100	1789	.35*	2161	.42
SBR	d	1700	69	.04	15	.01
EBL	2	3400	14	.00	53	.02
EBT	2	3400	62	.02*	422	.12*
EBR	1	1700	131	.08	377	.22
WBL	1	1700	455	.27*	119	.07*
WBT	2	3400	544	.19	85	.04
WBR	0	0	99		47	
Right Turn Adjustment					EBR	.04*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.96**		**.78**

Existing-Plus-Project With Improvements

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	467	.14*	62	.02
NBT	3	5100	2310	.45	2285	.45*
NBR	d	1700	56	.03	481	.28
SBL	1	1700	59	.03	81	.05*
SBT	3	5100	1789	.35*	2161	.42
SBR	d	1700	69	.04	15	.01
EBL	2	3400	14	.00	53	.02
EBT	2	3400	62	.02*	422	.12*
EBR	1	1700	131	.08	377	.22
WBL	1	1700	455	.27*	119	.07*
WBT	2	3400	544	.19	85	.04
WBR	0	0	99		47	
Right Turn Adjustment					EBR	.04*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.83**		**.78**

30. Bake & Muirlands

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	211	.06	69	.02
NBT	4	6800	2556	.38*	2352	.35*
NBR	f		99		307	
SBL	2	3400	59	.02*	177	.05*
SBT	4	6800	2015	.30	2416	.36
SBR	f		160		60	
EBL	2	3400	38	.01*	191	.06
EBT	2	3400	84	.02	628	.18*
EBR	f		63		198	
WBL	2	3400	237	.07	121	.04*
WBT	2	3400	345	.10*	116	.03
WBR	f		67		75	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.56**		**.67**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	211	.06	69	.02
NBT	4	6800	2608	.38*	2441	.36*
NBR	f		99		307	
SBL	2	3400	63	.02*	180	.05*
SBT	4	6800	2111	.31	2473	.36
SBR	f		168		65	
EBL	2	3400	41	.01*	200	.06
EBT	2	3400	84	.02	628	.18*
EBR	f		63		198	
WBL	2	3400	237	.07	121	.04*
WBT	2	3400	345	.10*	116	.03
WBR	f		68		79	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.56**		**.68**

31. Bake & Rockfield

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	241	.07	42	.01
NBT	4	6800	2904	.43*	2483	.37*
NBR	f		479		296	
SBL	2	3400	94	.03*	201	.06*
SBT	4	6800	2219	.33	2577	.38
SBR	1	1700	3	.00	11	.01
EBL	1	1700	1	.00	16	.01
EBT	2	3400	14	.00*	89	.03*
EBR	f		13		298	
WBL	2	3400	181	.05*	562	.17*
WBT	2	3400	69	.02	41	.01
WBR	f		109		152	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.56**		**.68**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	241	.07	42	.01
NBT	4	6800	2956	.43*	2572	.38*
NBR	f		479		296	
SBL	2	3400	94	.03*	201	.06*
SBT	4	6800	2315	.34	2634	.39
SBR	1	1700	3	.00	11	.01
EBL	1	1700	1	.00	16	.01
EBT	2	3400	14	.00*	89	.03*
EBR	f		13		298	
WBL	2	3400	181	.05*	562	.17*
WBT	2	3400	69	.02	41	.01
WBR	f		109		152	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.56**		**.69**

32. Bake & I-5 NB Ramps

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	2813	.55*	2785	.55*
NBR	f		263		635	
SBL	0	0	0		0	
SBT	3	5100	654	.13	910	.18
SBR	f		1834		2347	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		215	.13*	63	.04*
WBT	0	5100	0		0	
WBR	1.5		812	.24	235	.07
Right Turn Adjustment			WBR	.11*	WBR	.03*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.84**		**.67**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	2849	.56*	2846	.56*
NBR	f		263		635	
SBL	0	0	0		0	
SBT	3	5100	694	.14	934	.18
SBR	f		1889		2380	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		215	.13*	63	.04*
WBT	0	5100	0		0	
WBR	1.5		828	.24	263	.08
Right Turn Adjustment			WBR	.11*	WBR	.04*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.85**		**.69**

33. Bake & I-5 SB Ramps

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	499	.10	1134	.25*
NBR	0	0	23		122	
SBL	0	0	0		0	
SBT	3	5100	548	.11*	517	.10
SBR	f		282		439	
EBL	3	5100	2614	.51*	2218	.43*
EBT	0	0	0		0	
EBR	1	1700	496	.29	92	.05
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.67**		**.73**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	505	.10*	1144	.25*
NBR	0	0	23		122	
SBL	0	0	23	{.01}*	16	{.01}*
SBT	3	5100	559	.11	523	.11
SBR	f		288		441	
EBL	3	5100	2644	.52*	2270	.45*
EBT	0	0	0		0	
EBR	1	1700	496	.29	92	.05
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.76**

34. Lake Forest & Trabuco

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	153	.05*	261	.08
NBT	3	5100	790	.15	1070	.21*
NBR	1	1700	133	.08	565	.33
SBL	2	3400	231	.07	368	.11*
SBT	3	5100	1123	.24*	1009	.22
SBR	0	0	124		125	
EBL	2	3400	132	.04	344	.10
EBT	3	5100	437	.09*	853	.17*
EBR	1	1700	262	.15	172	.10
WBL	2	3400	475	.14*	189	.06*
WBT	3	5100	702	.14	442	.09
WBR	1	1700	374	.22	291	.17
Right Turn Adjustment			EBR	.02*	NBR	.07*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.59**		**.67**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	153	.05*	261	.08
NBT	3	5100	809	.16	1099	.22*
NBR	1	1700	133	.08	565	.33
SBL	2	3400	242	.07	374	.11*
SBT	3	5100	1156	.25*	1028	.23
SBR	0	0	124		125	
EBL	2	3400	132	.04	344	.10
EBT	3	5100	456	.09*	865	.17*
EBR	1	1700	262	.15	172	.10
WBL	2	3400	475	.14*	189	.06*
WBT	3	5100	711	.14	460	.09
WBR	1	1700	380	.22	301	.18
Right Turn Adjustment			EBR	.02*	NBR	.07*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.60**		**.68**

35. Lake Forest & Serrano

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	102	.06*	82	.05
NBT	3	5100	971	.19	1658	.33*
NBR	d	1700	79	.05	77	.05
SBL	1	1700	77	.05	37	.02*
SBT	3	5100	1409	.28*	1143	.22
SBR	d	1700	175	.10	70	.04
EBL	1	1700	128	.08*	125	.07*
EBT	1	1700	64	.10	89	.09
EBR	0	0	113		68	
WBL	1	1700	63	.04	27	.02
WBT	1	1700	61	.07*	70	.06*
WBR	0	0	64		38	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.54**		**.53**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	102	.06*	82	.05
NBT	3	5100	990	.19	1687	.33*
NBR	d	1700	79	.05	77	.05
SBL	1	1700	77	.05	37	.02*
SBT	3	5100	1442	.28*	1162	.23
SBR	d	1700	175	.10	70	.04
EBL	1	1700	128	.08*	125	.07*
EBT	1	1700	64	.10	89	.09
EBR	0	0	113		68	
WBL	1	1700	63	.04	27	.02
WBT	1	1700	61	.07*	70	.06*
WBR	0	0	64		38	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.54**		**.53**

36. El Toro & Trabuco

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	213	.06*	313	.09
NBT	3	5100	626	.12	1130	.22*
NBR	1	1700	165	.10	288	.17
SBL	2	3400	246	.07	267	.08*
SBT	3	5100	1545	.30*	875	.17
SBR	1	1700	304	.18	185	.11
EBL	2	3400	190	.06*	386	.11
EBT	3	5100	353	.10	940	.23*
EBR	0	0	192	.11	210	
WBL	2	3400	252	.07	133	.04*
WBT	3	5100	883	.17*	416	.08
WBR	1	1700	172	.10	205	.12
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for SBR NBR

TOTAL CAPACITY UTILIZATION **.64** **.62**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	220	.06*	335	.10
NBT	3	5100	632	.12	1140	.22*
NBR	1	1700	165	.10	288	.17
SBL	2	3400	246	.07	267	.08*
SBT	3	5100	1556	.31*	881	.17
SBR	1	1700	304	.18	185	.11
EBL	2	3400	190	.06*	386	.11
EBT	3	5100	363	.11	944	.23*
EBR	0	0	211	.12	223	
WBL	2	3400	252	.07	133	.04*
WBT	3	5100	892	.17*	422	.08
WBR	1	1700	172	.10	205	.12
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for SBR NBR

TOTAL CAPACITY UTILIZATION **.65** **.62**

37. El Toro & Serrano

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	84	.05*	155	.09
NBT	3	5100	973	.19	1659	.33*
NBR	d	1700	9	.01	30	.02
SBL	1	1700	11	.01	20	.01*
SBT	3	5100	1816	.36*	1153	.23
SBR	d	1700	162	.10	97	.06
EBL	1	1700	36	.02	87	.05
EBT	1	1700	8	.05*	25	.07*
EBR	0	0	85		95	
WBL	1	1700	32	.02*	17	.01*
WBT	1	1700	35	.03	8	.01
WBR	0	0	16		17	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.53** **.47**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	84	.05*	155	.09
NBT	3	5100	987	.19	1691	.33*
NBR	d	1700	9	.01	30	.02
SBL	1	1700	11	.01	20	.01*
SBT	3	5100	1846	.36*	1173	.23
SBR	d	1700	162	.10	97	.06
EBL	1	1700	36	.02	87	.05
EBT	1	1700	8	.05*	25	.07*
EBR	0	0	85		95	
WBL	1	1700	32	.02*	17	.01*
WBT	1	1700	35	.03	8	.01
WBR	0	0	16		17	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.53** **.47**

38. El Toro & Jeronimo

Existing

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	95	.06*	100	.06
NBT	3	5100	833	.16	1606	.31*
NBR	1	1700	282	.17	355	.21
SBL	1	1700	225	.13	262	.15*
SBT	3	5100	1588	.31*	1040	.20
SBR	d	1700	200	.12	78	.05
EBL	1	1700	126	.07	150	.09
EBT	2	3400	297	.15*	646	.22*
EBR	0	0	202		94	
WBL	2	3400	410	.12*	254	.07*
WBT	2	3400	479	.14	306	.09
WBR	1	1700	224	.13	265	.16
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION **.69** **.80**

Existing-Plus-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	95	.06*	100	.06
NBT	3	5100	845	.17	1633	.32*
NBR	1	1700	282	.17	355	.21
SBL	1	1700	229	.13	265	.16*
SBT	3	5100	1614	.32*	1057	.21
SBR	d	1700	200	.12	78	.05
EBL	1	1700	126	.07	150	.09
EBT	2	3400	297	.15*	646	.22*
EBR	0	0	202		94	
WBL	2	3400	410	.12*	254	.07*
WBT	2	3400	479	.14	306	.09
WBR	1	1700	225	.13	269	.16
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION **.70** **.82**

This Page Intentionally Left Blank

APPENDIX 5.1:

EXISTING NAKASE PROPERTY TRIP GENERATION ESTIMATES

This Page Intentionally Left Blank

TABLE 5.1: EXISTING NAKASE PROPERTY ITE-BASED TRIP GENERATION

Trip Generation Rates[1]									
	ITE LU		AM Peak Hour			PM Peak Hour			
Land Use	Code	Quantity[2]	In	Out	Total	In	Out	Total	Daily
Nursery (Wholesale)	818	8.5 TSF	1.25	1.15	2.40	2.54	2.64	5.18	39.00

Trip Generation Summary									
	ITE LU		AM Peak Hour			PM Peak Hour			
Land Use	Code	Quantity[2]	In	Out	Total	In	Out	Total	Daily
Nursery (Wholesale)	818	8.5 TSF	11	10	21	22	22	44	332

[1] Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, 10th Edition (2017).
For ITE LU Code 818 (Nursery Wholesale), peak directional distribution for ITE LU Code 817 (Nursery Garden Center) has been considered.

[2] TSF = Thousand Square Feet

R:\UXRjobs_10600-11000\10820\Excel\[10820-08 - Construction Trip Gen.xlsx]TG Existing

TABLE 5.2: EXISTING NAKASE PROPERTY LOW-SEASON COUNTED TRIP GENERATION

	AM Peak Hour			PM Peak Hour			
	In	Out	Total	In	Out	Total	Daily
TUE (5/7/19)	27	3	30	5	24	29	97
WED (5/8/19)	31	4	35	13	24	37	142
THU (5/9/19)	29	5	34	8	24	32	143
Average	**29**	**4**	**33**	**9**	**24**	**33**	**127**

R:\UXRjobs_10600-11000\10820\Excel\[10820-08 - Construction Trip Gen.xlsx]AVG

Counts Unlimited, Inc

PO Box 1178
Corona, CA 92878
Phone: 951-268-6268
email: counts@countsunlimited.com

City of Lake Forest
Driveway at Gate
N/ Lake Forest Drive
24 Hour Directional Volume Count

LKFDGNLF
Site Code: 051-19314

Start	5/7/2019	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
Time	Tue	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		0	1			0	0				
12:15		0	0			0	0				
12:30		0	0			0	0				
12:45		0	0	0	1	0	0	0	0	0	1
01:00		0	0			0	0				
01:15		0	0			0	0				
01:30		0	0			0	0				
01:45		0	0	0	0	0	0	0	0	0	0
02:00		0	0			0	1				
02:15		0	0			0	1				
02:30		0	0			0	3				
02:45		0	0	0	0	0	0	0	5	0	5
03:00		0	1			0	3				
03:15		0	0			0	0				
03:30		0	**2**			0	**18**				
03:45		0	**1**	0	4	0	**1**	0	22	0	26
04:00		0	**1**			0	**4**				
04:15		0	**1**			0	**1**				
04:30		0	0			0	1				
04:45		0	0	0	2	0	0	0	6	0	8
05:00		0	1			0	0				
05:15		0	0			0	1				
05:30		2	2			1	2				
05:45		0	0	2	3	0	0	1	3	3	6
06:00		1	0			0	0				
06:15		**2**	0			0	0				
06:30		**17**	0			0	0				
06:45		**6**	0	26	0	2	0	2	0	28	0
07:00		**2**	0			0	0				
07:15		1	0			1	0				
07:30		0	2			0	1				
07:45		0	0	3	2	0	0	1	1	4	3
08:00		0	0			0	0				
08:15		0	0			0	0				
08:30		0	0			0	0				
08:45		1	0	1	0	0	0	0	0	1	0
09:00		0	0			0	0				
09:15		0	0			0	0				
09:30		1	0			0	0				
09:45		0	0	1	0	0	1	0	1	1	1
10:00		1	0			1	0				
10:15		1	0			0	0				
10:30		0	0			0	0				
10:45		0	0	2	0	**0**	0	1	0	3	0
11:00		1	0			**0**	0				
11:15		0	0			**2**	0				
11:30		2	0			**2**	0				
11:45		0	0	3	0	0	0	4	0	7	0
Total		38	12	38	12	9	38	9	38	47	50
Combined Total		50		50		47		47		97	
AM Peak	-	06:15	-	-	-	10:45	-	-	-	-	-
Vol.	-	27	-	-	-	4	-	-	-	-	-
P.H.F.		0.397				0.500					
PM Peak	-	-	03:30	-	-	-	03:30	-	-	-	-
Vol.	-	-	5	-	-	-	24	-	-	-	-
P.H.F.			0.625				0.333				
Percentage		76.0%	24.0%			19.1%	80.9%				

Counts Unlimited, Inc

PO Box 1178
Corona, CA 92878
Phone: 951-268-6268
email: counts@countsunlimited.com

City of Lake Forest
Driveway at Gate
N/ Lake Forest Drive
24 Hour Directional Volume Count

LKFDGNLF
Site Code: 051-19314

Start Time	5/8/2019 Wed	Northbound Morning	Northbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Southbound Morning	Southbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		0	0			0	0				
12:15		0	0			0	0				
12:30		0	0			0	0				
12:45		0	0	0	0	0	0	0	0	0	0
01:00		0	0			0	0				
01:15		0	0			0	0				
01:30		0	0			0	0				
01:45		0	0	0	0	0	0	0	0	0	0
02:00		0	0			0	1				
02:15		0	0			0	0				
02:30		0	0			0	3				
02:45		0	0	0	0	0	0	0	4	0	4
03:00		0	0			0	**3**				
03:15		0	1			0	**1**				
03:30		0	**2**			0	**17**				
03:45		0	**9**	0	12	0	**3**	0	24	0	36
04:00		0	**0**			0	1				
04:15		0	**2**			0	3				
04:30		1	0			1	2				
04:45		0	0	1	2	0	1	1	7	2	9
05:00		1	0			1	1				
05:15		1	1			0	1				
05:30		1	3			1	1				
05:45		0	0	3	4	0	0	2	3	5	7
06:00		**2**	0			0	0				
06:15		**6**	0			1	0				
06:30		**16**	1			1	0				
06:45		**7**	1	31	2	1	2	3	2	34	4
07:00		2	0			0	0				
07:15		1	0			1	0				
07:30		1	0			0	0				
07:45		3	0	7	0	3	0	4	0	11	0
08:00		0	1			0	0				
08:15		0	0			0	0				
08:30		1	0			0	0				
08:45		1	0	2	1	0	0	0	0	2	1
09:00		1	0			3	0				
09:15		0	0			1	0				
09:30		1	0			0	0				
09:45		1	0	3	0	0	0	4	0	7	0
10:00		0	1			1	1				
10:15		2	0			2	0				
10:30		0	0			0	0				
10:45		0	0	2	1	**0**	0	3	1	5	2
11:00		0	0			**1**	0				
11:15		0	0			**2**	0				
11:30		4	0			**4**	0				
11:45		2	0	6	0	0	0	7	0	13	0
Total		55	22	55	22	24	41	24	41	79	63
Combined Total		77		77		65		65		142	
AM Peak	-	06:00	-	-	-	10:45	-	-	-	-	-
Vol.	-	31	-	-	-	7	-	-	-	-	-
P.H.F.		0.484				0.438					
PM Peak	-	-	03:30	-	-	-	03:00	-	-	-	-
Vol.	-	-	13	-	-	-	24	-	-	-	-
P.H.F.			0.361				0.353				
Percentage		71.4%	28.6%			36.9%	63.1%				

Counts Unlimited, Inc

PO Box 1178
Corona, CA 92878
Phone: 951-268-6268
email: counts@countsunlimited.com

City of Lake Forest
Driveway at Gate
N/ Lake Forest Drive
24 Hour Directional Volume Count

LKFDGNLF
Site Code: 051-19314

Start	5/9/2019	Northbound		Hour Totals		Southbound		Hour Totals		Combined Totals	
Time	Thu	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		0	3			0	2				
12:15		0	1			0	1				
12:30		0	0			0	0				
12:45		1	2	1	6	0	3	0	6	1	12
01:00		0	2			0	1				
01:15		0	1			0	3				
01:30		0	0			0	0				
01:45		0	0	0	3	0	1	0	5	0	8
02:00		0	1			0	1				
02:15		0	0			0	3				
02:30		0	0			0	1				
02:45		0	0	0	1	0	**0**	0	5	0	6
03:00		0	0			0	**2**				
03:15		0	**2**			0	**5**				
03:30		0	**5**			0	**18**				
03:45		0	**0**	0	7	0	0	0	25	0	32
04:00		0	**1**			0	1				
04:15		0	0			0	0				
04:30		0	0			0	1				
04:45		0	0	0	1	0	0	0	2	0	3
05:00		0	3			0	0				
05:15		1	0			0	0				
05:30		2	0			1	1				
05:45		1	0	4	3	**2**	0	3	1	7	4
06:00		**2**	0			**0**	0				
06:15		**4**	0			**1**	0				
06:30		**15**	0			**3**	0				
06:45		**8**	0	29	0	1	0	5	0	34	0
07:00		2	0			0	0				
07:15		1	0			1	0				
07:30		0	1			0	1				
07:45		0	1	3	2	0	0	1	1	4	3
08:00		0	0			0	0				
08:15		0	0			0	0				
08:30		1	0			0	0				
08:45		1	0	2	0	0	0	0	0	2	0
09:00		0	0			1	0				
09:15		1	0			0	0				
09:30		1	0			1	0				
09:45		0	0	2	0	0	0	2	0	4	0
10:00		0	0			0	0				
10:15		1	0			0	1				
10:30		0	1			0	0				
10:45		2	0	3	1	1	0	1	1	4	2
11:00		0	0			0	0				
11:15		0	0			3	0				
11:30		4	0			1	0				
11:45		4	2	8	2	0	3	4	3	12	5
Total		52	26	52	26	16	49	16	49	68	75
Combined Total		78		78		65		65		143	
AM Peak	-	06:00	-	-	-	05:45	-	-	-	-	-
Vol.	-	29	-	-	-	6	-	-	-	-	-
P.H.F.		0.483				0.500					
PM Peak	-	-	03:15	-	-	-	02:45	-	-	-	-
Vol.	-	-	8	-	-	-	25	-	-	-	-
P.H.F.			0.400				0.347				
Percentage		66.7%	33.3%			24.6%	75.4%				

This Page Intentionally Left Blank

APPENDIX 6.1:

INTERIM YEAR CUMULATIVE 2020 CONDITIONS INTERSECTION OPERATIONS ANALYSIS WORKSHEETS

This Page Intentionally Left Blank

1. Lake Forest & Dimension

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	150	.09*	80	.05*
NBT	2	3400	630	.19	700	.21
NBR	d	1700	10	.01	20	.01
SBL	1	1700	30	.02	40	.02
SBT	2	3400	520	.15*	670	.20*
SBR	d	1700	450	.26	210	.12
EBL	1.5		260	{.08}*	510	
EBT	0.5	3400	10	.08	10	.15*
EBR	1	1700	150	.09	90	.05
WBL	1	1700	10	.01	30	.02*
WBT	1	1700	10	.01*	10	.01
WBR	0	0	10		10	
Right Turn Adjustment			SBR	.05*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.43** **.47**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	150	.09*	80	.05*
NBT	2	3400	660	.19	730	.21
NBR	d	1700	10	.01	20	.01
SBL	1	1700	30	.02	40	.02
SBT	2	3400	580	.17*	680	.20*
SBR	d	1700	460	.27	210	.12
EBL	1.5		260	{.08}*	500	
EBT	0.5	3400	10	.08	10	.15*
EBR	1	1700	140	.08	80	.05
WBL	1	1700	10	.01	30	.02*
WBT	1	1700	10	.01*	10	.01
WBR	0	0	10		10	
Right Turn Adjustment			SBR	.04*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.44** **.47**

2. Lake Forest & Rancho

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04*	200	.12*
NBT	2	3400	700	.21	1060	.31
NBR	d	1700	250	.15	520	.31
SBL	1	1700	120	.07	100	.06
SBT	2	3400	890	.26*	880	.26*
SBR	d	1700	20	.01	30	.02
EBL	1	1700	10	.01*	30	.02
EBT	2	3400	140	.04	310	.09*
EBR	1	1700	40	.02	60	.04
WBL	2	3400	280	.08	250	.07*
WBT	2	3400	480	.14*	250	.07
WBR	1	1700	70	.04	130	.08
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.50** **.59**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	200	.12*	270	.16*
NBT	2	3400	710	.21	1070	.31
NBR	d	1700	270	.16	500	.29
SBL	1	1700	130	.08	100	.06
SBT	2	3400	860	.25*	880	.26*
SBR	d	1700	90	.05	110	.06
EBL	1	1700	90	.05*	60	.04
EBT	2	3400	260	.08	640	.19*
EBR	1	1700	130	.08	160	.09
WBL	2	3400	300	.09	250	.07*
WBT	2	3400	530	.16*	340	.10
WBR	1	1700	70	.04	130	.08
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.63** **.73**

3. Lake Forest & SR-241 SB Off-Ramp

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	750	.22*	1090	.32*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	720	.21	770	.23
SBR	0	0	0		0	
EBL	2	3400	310	.09*	210	.06*
EBT	0	0	0		0	
EBR	1	1700	240	.14	240	.14
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.04*	EBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.40**		**.44**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	780	.23*	1130	.33*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	720	.21	800	.24
SBR	0	0	0		0	
EBL	2	3400	310	.09*	220	.06*
EBT	0	0	0		0	
EBR	1	1700	260	.15	250	.15
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.04*	EBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.41**		**.46**

4. Lake Forest & SR-241 NB On-Ramp

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	160	.05	280	.08*
NBT	2	3400	910	.27*	1020	.30
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	720	.21	770	.23*
SBR	1	1700	150	.09	320	.19
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.32**		**.36**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	150	.04	280	.08*
NBT	2	3400	930	.27*	1080	.32
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	720	.21	800	.24*
SBR	1	1700	160	.09	320	.19
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.32**		**.37**

5. Corridor Center & Rancho

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		10	
SBL	2	3400	50	.01*	130	.04*
SBT	0	0	0		0	
SBR	1	1700	40	.02	50	.03
EBL	1	1700	50	.03*	70	.04
EBT	2	3400	210	.06	520	.15*
EBR	0	0	0		0	
WBL	0	0	0		10	{.01}*
WBT	2	3400	490	.14*	390	.12
WBR	d	1700	80	.05	120	.07
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.23**		**.25**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02	10	.01
NBT	1	1700	10	.15*	0	.07*
NBR	0	0	250		120	
SBL	1	1700	40	.02*	130	.08*
SBT	1	1700	0	.00	10	.01
SBR	1	1700	40	.02	50	.03
EBL	1	1700	50	.03	80	.05
EBT	2	3400	200	.06*	600	.18*
EBR	1	1700	100	.06	30	.02
WBL	1	1700	180	.11*	180	.11*
WBT	2	3400	440	.13	380	.11
WBR	d	1700	90	.05	110	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.39**		**.49**

6. Bake & Portola

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04*	230	.14
NBT	1.5	5100	130	.04	320	{.17}*
NBR	1.5		80		790	
SBL	1	1700	130	.08	270	.16*
SBT	2	3400	260	.08*	300	.09
SBR	d	1700	260	.15	350	.21
EBL	2	3400	320	.09	380	.11*
EBT	3	5100	260	.05*	640	.13
EBR	d	1700	60	.04	70	.04
WBL	2	3400	870	.26*	540	.16
WBT	2	3400	550	.16	720	.21*
WBR	d	1700	70	.04	180	.11
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.48**		**.70**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04*	240	.14
NBT	1.5	5100	150	.04	310	{.16}*
NBR	1.5		70		760	
SBL	1	1700	130	.08	260	.15*
SBT	2	3400	270	.08*	310	.09
SBR	d	1700	240	.14	350	.21
EBL	2	3400	310	.09	390	.11*
EBT	3	5100	260	.05*	620	.12
EBR	d	1700	60	.04	80	.05
WBL	2	3400	840	.25*	520	.15
WBT	2	3400	550	.16	730	.21*
WBR	d	1700	70	.04	160	.09
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.47**		**.68**

7. Bake & Towne Centre

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	220	.06*	380	.11
NBT	2	3400	330	.10	1200	.35*
NBR	d	1700	90	.05	140	.08
SBL	2	3400	10	.00	30	.01*
SBT	2	3400	1240	.36*	390	.11
SBR	d	1700	80	.05	100	.06
EBL	1	1700	10	.01	70	.04
EBT	1	1700	60	.04*	200	.12*
EBR	1	1700	110	.06	370	.22
WBL	1	1700	100	.06*	160	.09*
WBT	2	3400	60	.02	140	.04
WBR	0	0	10		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.57**		**.62**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	260	.08*	410	.12
NBT	2	3400	370	.11	1240	.36*
NBR	d	1700	100	.06	150	.09
SBL	2	3400	10	.00	60	.02*
SBT	2	3400	1250	.37*	370	.11
SBR	d	1700	60	.04	100	.06
EBL	1	1700	10	.01	60	.04
EBT	1	1700	50	.03*	190	.11*
EBR	1	1700	130	.08	410	.24
WBL	1	1700	120	.07*	160	.09*
WBT	2	3400	50	.02	140	.04
WBR	0	0	10		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.60**		**.63**

8. Bake & Rancho North

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	610	.18	1580	.46*
NBR	d	1700	200	.12	460	.27
SBL	1	1700	40	.02	130	.08*
SBT	2	3400	1420	.42*	790	.23
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	520	.15*	280	.08*
WBT	0	0	0		0	
WBR	2	3400	20	.01	160	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.62**		**.67**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	680	.20	1580	.46*
NBR	d	1700	240	.14	460	.27
SBL	1	1700	100	.06	140	.08*
SBT	2	3400	1390	.41*	800	.24
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	420	.12*	280	.08*
WBT	0	0	0		0	
WBR	2	3400	50	.01	220	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.58**		**.67**

9. Bake & Rancho South

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	200	.12*	170	.10
NBT	2	3400	710	.21	1760	.52*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	1660	.49*	960	.28
SBR	1	1700	270	.16	120	.07
EBL	2	3400	110	.03*	280	.08*
EBT	0	0	0		0	
EBR	1	1700	140	.08	140	.08
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.69**		**.65**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	190	.11*	160	.09
NBT	2	3400	750	.22	1730	.51*
NBR	1	1700	100	.06	110	.06
SBL	1	1700	10	.01	40	.02*
SBT	2	3400	1540	.45*	920	.27
SBR	1	1700	260	.15	120	.07
EBL	2	3400	110	.03	280	.08*
EBT	1	1700	60	.04*	80	.05
EBR	d	1700	130	.08	140	.08
WBL	2	3400	220	.06*	110	.03
WBT	1	1700	80	.05	40	.02*
WBR	1	1700	60	.04	20	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.71**		**.68**

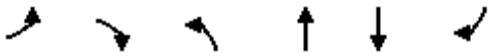
10. Bake & Orchard

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	910	.27	1930	.57*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	1790	.53*	1080	.32
SBR	d	1700	10	.01	10	.01
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1700	20	.01	60	.04
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.59**		**.62**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	1020	.30	1980	.58*
NBR	1	1700	20	.01	50	.03
SBL	0	0	0		0	
SBT	2	3400	1880	.55*	1160	.34
SBR	d	1700	10	.01	10	.01
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1700	20	.01	60	.04
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	1	1700	30	.02	20	.01
Right Turn Adjustment			EBR	.01*	WBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.61**		**.64**



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	20	0	910	1790	10
Future Volume (vph)	0	20	0	910	1790	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150	150	150			150
Storage Lanes	0	0	0			1
Taper Length (ft)	90		90			
Link Speed (mph)	30			50	50	
Link Distance (ft)	362			1352	1059	
Travel Time (s)	8.2			18.4	14.4	
Confl. Peds. (#/hr)	5	5	5			5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

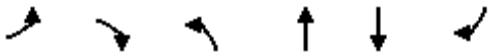
Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	20	0	910	1790	10
Future Vol, veh/h	0	20	0	910	1790	10
Conflicting Peds, #/hr	5	5	5	0	0	5
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	21	0	968	1904	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	962	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	256	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	254	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	20.5	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	254	-	-
HCM Lane V/C Ratio	-	0.084	-	-
HCM Control Delay (s)	-	20.5	-	-
HCM Lane LOS	-	C	-	-
HCM 95th %tile Q(veh)	-	0.3	-	-



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	60	0	1930	1080	10
Future Volume (vph)	0	60	0	1930	1080	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150	150	150			150
Storage Lanes	0	0	0			1
Taper Length (ft)	90		90			
Link Speed (mph)	30			50	50	
Link Distance (ft)	362			1352	1059	
Travel Time (s)	8.2			18.4	14.4	
Confl. Peds. (#/hr)	5	5	5			5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

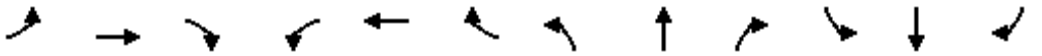
Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	60	0	1930	1080	10
Future Vol, veh/h	0	60	0	1930	1080	10
Conflicting Peds, #/hr	5	5	5	0	0	5
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	64	0	2053	1149	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	585	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	454	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	450	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.3	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	450	-	-
HCM Lane V/C Ratio	-	0.142	-	-
HCM Control Delay (s)	-	14.3	-	-
HCM Lane LOS	-	B	-	-
HCM 95th %tile Q(veh)	-	0.5	-	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	20	0	0	30	0	1020	20	0	1880	10
Future Volume (vph)	0	0	20	0	0	30	0	1020	20	0	1880	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		150	0		0	150		180	0		150
Storage Lanes	0		0	0		1	0		1	0		1
Taper Length (ft)	90			90			90			0		
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		362			257			1352			1059	
Travel Time (s)		8.2			5.8			18.4			14.4	
Confl. Peds. (#/hr)	5		5				5					5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

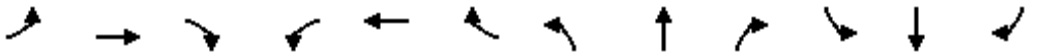
Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	20	0	0	30	0	1020	20	0	1880	10
Future Vol, veh/h	0	0	20	0	0	30	0	1020	20	0	1880	10
Conflicting Peds, #/hr	5	0	5	0	0	0	5	0	0	0	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	-	-	180	-	-	150
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	21	0	0	32	0	1085	21	0	2000	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	1010	-	-	543	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	6.94	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.32	-	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	238	0	0	484	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	236	-	-	484	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	21.8	13	0	0
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	236	484	-	-
HCM Lane V/C Ratio	-	-	0.09	0.066	-	-
HCM Control Delay (s)	-	-	21.8	13	-	-
HCM Lane LOS	-	-	C	B	-	-
HCM 95th %tile Q(veh)	-	-	0.3	0.2	-	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	60	0	0	20	0	1980	50	0	1160	10
Future Volume (vph)	0	0	60	0	0	20	0	1980	50	0	1160	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		150	0		0	150		180	0		150
Storage Lanes	0		0	0		1	0		1	0		1
Taper Length (ft)	90			90			90			0		
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		362			257			1352			1059	
Travel Time (s)		8.2			5.8			18.4			14.4	
Confl. Peds. (#/hr)	5		5				5					5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	60	0	0	20	0	1980	50	0	1160	10
Future Vol, veh/h	0	0	60	0	0	20	0	1980	50	0	1160	10
Conflicting Peds, #/hr	5	0	5	0	0	0	5	0	0	0	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	-	-	180	-	-	150
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	64	0	0	21	0	2106	53	0	1234	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	627	-	-	1053	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	6.94	-	-	10	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	10	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	10	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.32	-	-	10	-	-	-
Pot Cap-1 Maneuver	0	0	426	0	0	223	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	422	-	-	223	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15	22.8	0	0
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	422	223	-	-
HCM Lane V/C Ratio	-	-	0.151	0.095	-	-
HCM Control Delay (s)	-	-	15	22.8	-	-
HCM Lane LOS	-	-	C	C	-	-
HCM 95th %tile Q(veh)	-	-	0.5	0.3	-	-

11. Dimension & Bake

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	90	.03	280	.08*
NBT	1	1700	10	.01*	60	.04
NBR	1	1700	100	.06	240	.14
SBL	1	1700	80	.05*	50	.03
SBT	1	1700	50	.03	30	.02*
SBR	1	1700	40	.02	20	.01
EBL	1	1700	10	.01*	90	.05
EBT	2	3400	840	.25	1520	.45*
EBR	d	1700	180	.11	60	.04
WBL	1	1700	280	.16	170	.10*
WBT	2	3400	1510	.44*	1030	.30
WBR	d	1700	30	.02	100	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.56**		**.70**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	80	.02	260	.08*
NBT	1	1700	20	.01*	60	.04
NBR	1	1700	110	.06	260	.15
SBL	1	1700	80	.05*	40	.02
SBT	1	1700	60	.04	30	.02*
SBR	1	1700	30	.02	20	.01
EBL	1	1700	10	.01*	70	.04
EBT	2	3400	940	.28	1590	.47*
EBR	d	1700	150	.09	60	.04
WBL	1	1700	280	.16	180	.11*
WBT	2	3400	1590	.47*	1090	.32
WBR	d	1700	30	.02	100	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.59**		**.73**

12. Alton & Rancho South

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	110	.03*	100	.03
NBT	3	5100	790	.15	1390	.27*
NBR	1	1700	240	.14	220	.13
SBL	2	3400	150	.04	40	.01*
SBT	3	5100	1340	.26*	920	.18
SBR	d	1700	80	.05	60	.04
EBL	1	1700	30	.02	80	.05
EBT	2	3400	20	.01*	50	.01*
EBR	1	1700	100	.06	130	.08
WBL	1	1700	210	.12*	310	.18*
WBT	2	3400	70	.02	30	.01
WBR	d	1700	20	.01	150	.09
Right Turn Adjustment			EBR	.03*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.50**		**.52**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	120	.04*	100	.03
NBT	3	5100	790	.15	1380	.27*
NBR	1	1700	250	.15	310	.18
SBL	2	3400	150	.04	40	.01*
SBT	3	5100	1360	.27*	940	.18
SBR	d	1700	60	.04	50	.03
EBL	1	1700	30	.02	80	.05
EBT	2	3400	30	.01*	50	.01*
EBR	1	1700	100	.06	140	.08
WBL	1	1700	320	.19*	330	.19*
WBT	2	3400	70	.02	30	.01
WBR	d	1700	50	.03	140	.08
Right Turn Adjustment			EBR	.02*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.58**		**.53**

13. Alton & SR-241

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05*	220	.13*
NBT	3	5100	620	.12	1090	.21
NBR	f		240		490	
SBL	1	1700	130	.08	80	.05
SBT	3	5100	1030	.20*	790	.15*
SBR	f		330		220	
EBL	2	3400	230	.07	220	.06
EBT	0	0	0		0	
EBR	f		260		120	
WBL	2	3400	460	.14*	310	.09*
WBT	0	0	0		0	
WBR	f		70		80	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.42**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	110	.06*	220	.13*
NBT	3	5100	620	.12	1070	.21
NBR	f		230		490	
SBL	1	1700	130	.08	80	.05
SBT	3	5100	1010	.20*	790	.15*
SBR	f		340		220	
EBL	2	3400	230	.07	240	.07
EBT	0	0	0		0	
EBR	f		270		120	
WBL	2	3400	450	.13*	310	.09*
WBT	0	0	0		0	
WBR	f		70		80	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.42**

14. Alton & Towne Centre

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02*	150	.09*
NBT	3	5100	550	.11	970	.19
NBR	f		320		190	
SBL	1	1700	20	.01	30	.02
SBT	3	5100	1350	.26*	740	.15*
SBR	1	1700	40	.02	20	.01
EBL	1	1700	50	.03*	30	.02
EBT	1	1700	40	.02	50	.03*
EBR	1	1700	50	.03	50	.03
WBL	2	3400	110	.03	390	.11*
WBT	1	1700	40	.02*	40	.02
WBR	1	1700	10	.01	10	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.38**		**.43**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02*	160	.09*
NBT	3	5100	570	.11	970	.19
NBR	f		310		190	
SBL	1	1700	20	.01	30	.02
SBT	3	5100	1330	.26*	760	.15*
SBR	1	1700	40	.02	20	.01
EBL	1	1700	50	.03*	30	.02
EBT	1	1700	40	.02	50	.03*
EBR	1	1700	50	.03	50	.03
WBL	2	3400	110	.03	380	.11*
WBT	1	1700	40	.02*	40	.02
WBR	1	1700	10	.01	10	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.38**		**.43**

15. Alton & Portola

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02	140	.08
NBT	2	3400	80	.02*	200	.06*
NBR	f		320		670	
SBL	1	1700	220	.13*	90	.05*
SBT	2	3400	130	.04	100	.03
SBR	d	1700	0	.00	10	.01
EBL	2	3400	10	.00	10	.00
EBT	2	3400	270	.08*	110	.03*
EBR	f		90		60	
WBL	2	3400	560	.16*	400	.12*
WBT	3	5100	140	.03	200	.04
WBR	f		90		150	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.31**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02	150	.09*
NBT	2	3400	80	.02*	200	.06
NBR	f		330		660	
SBL	1	1700	210	.12*	90	.05
SBT	2	3400	140	.04	100	.03*
SBR	d	1700	0	.00	10	.01
EBL	2	3400	10	.00	10	.00
EBT	2	3400	270	.08*	110	.03*
EBR	f		100		60	
WBL	2	3400	540	.16*	400	.12*
WBT	3	5100	130	.03	200	.04
WBR	f		100		170	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.43**		**.32**

16. Lake Forest & Portola

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02	120	.07
NBT	2	3400	130	.04*	110	.03*
NBR	d	1700	290	.17	440	.26
SBL	1	1700	230	.14*	200	.12*
SBT	2	3400	90	.03	150	.04
SBR	d	1700	10	.01	10	.01
EBL	2	3400	20	.01	10	.00
EBT	3	5100	470	.09*	1270	.25*
EBR	d	1700	50	.03	40	.02
WBL	2	3400	790	.23*	480	.14*
WBT	3	5100	1470	.29	970	.19
WBR	d	1700	260	.15	150	.09
Right Turn Adjustment					NBR	.12*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.55**		**.71**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02	120	.07
NBT	2	3400	130	.04*	110	.03*
NBR	d	1700	300	.18	480	.28
SBL	1	1700	230	.14*	200	.12*
SBT	2	3400	100	.03	140	.04
SBR	d	1700	10	.01	10	.01
EBL	2	3400	10	.00	10	.00
EBT	3	5100	450	.09*	1220	.24*
EBR	d	1700	50	.03	40	.02
WBL	2	3400	790	.23*	510	.15*
WBT	3	5100	1440	.28	930	.18
WBR	d	1700	250	.15	150	.09
Right Turn Adjustment					NBR	.14*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.55**		**.73**

17. Lake Forest & Towne Centre

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	130	.04*	210	.06*
NBT	2	3400	590	.17	740	.22
NBR	d	1700	190	.11	80	.05
SBL	2	3400	10	.00	10	.00
SBT	2	3400	760	.22*	750	.22*
SBR	d	1700	30	.02	20	.01
EBL	1	1700	10	.01	10	.01
EBT	1	1700	90	.05*	170	.10*
EBR	1	1700	70	.04	210	.12
WBL	1	1700	50	.03*	130	.08*
WBT	2	3400	60	.02	70	.02
WBR	0	0	10		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.39**		**.51**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	120	.04*	210	.06*
NBT	2	3400	600	.18	790	.23
NBR	d	1700	200	.12	80	.05
SBL	2	3400	10	.00	10	.00
SBT	2	3400	770	.23*	770	.23*
SBR	d	1700	20	.01	20	.01
EBL	1	1700	10	.01	10	.01
EBT	1	1700	80	.05*	170	.10*
EBR	1	1700	70	.04	210	.12
WBL	1	1700	50	.03*	140	.08*
WBT	2	3400	60	.02	60	.02
WBR	0	0	10		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.40**		**.52**

18. Towne Centre & Portola

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	20	.01	10	.01*
NBT	1	1700	80	.05*	10	.01
NBR	1	1700	90	.05	270	.16
SBL	2	3400	30	.01*	210	.06
SBT	1	1700	10	.01	60	.07*
SBR	0	0	10		60	
EBL	2	3400	80	.02*	20	.01
EBT	3	5100	890	.17	1890	.37*
EBR	d	1700	10	.01	10	.01
WBL	2	3400	160	.05	60	.02*
WBT	3	5100	2500	.49*	1550	.30
WBR	d	1700	210	.12	50	.03
Right Turn Adjustment					NBR	.12*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.62**		**.64**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	20	.01	10	.01*
NBT	1	1700	80	.05*	10	.01
NBR	1	1700	90	.05	270	.16
SBL	2	3400	30	.01*	210	.06
SBT	1	1700	10	.01	60	.07*
SBR	0	0	10		60	
EBL	2	3400	80	.02*	20	.01
EBT	3	5100	900	.18	1870	.37*
EBR	d	1700	10	.01	10	.01
WBL	2	3400	170	.05	70	.02*
WBT	3	5100	2440	.48*	1540	.30
WBR	d	1700	210	.12	60	.04
Right Turn Adjustment					NBR	.12*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.61**		**.64**

19. Glenn Ranch & Portola

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	80	.05
NBT	2	3400	20	.01*	20	.01*
NBR	0	0	30	.02	70	.04
SBL	2	3400	480	.14*	340	.10*
SBT	2	3400	50	.01	20	.01
SBR	f		840		660	
EBL	2	3400	430	.13*	1010	.30*
EBT	3	5100	580	.11	1430	.28
EBR	1	1700	30	.02	70	.04
WBL	2	3400	110	.03	50	.01
WBT	3	5100	1350	.26*	720	.14*
WBR	1	1700	50	.03	360	.21
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION **.59** **.60**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	90	.05
NBT	2	3400	20	.01*	20	.01*
NBR	0	0	30	.02	70	.04
SBL	2	3400	470	.14*	330	.10*
SBT	2	3400	50	.01	20	.01
SBR	f		830		670	
EBL	2	3400	450	.13*	1000	.29*
EBT	3	5100	560	.11	1410	.28
EBR	1	1700	30	.02	80	.05
WBL	2	3400	120	.04	60	.02
WBT	3	5100	1310	.26*	710	.14*
WBR	1	1700	50	.03	350	.21
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION **.59** **.59**

20. Portola & SR-241

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	610	.18*	300	.09
NBT	3	5100	800	.16	810	.16*
NBR	f		40		140	
SBL	2	3400	220	.06	830	.24*
SBT	3	5100	650	.13*	980	.19
SBR	f		260		100	
EBL	1	1700	120	.07*	160	.09*
EBT	0	0	0		0	
EBR	f		270		480	
WBL	2	3400	80	.02	30	.01
WBT	0	0	0		0	
WBR	f		1540		370	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.43** **.54**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	610	.18*	320	.09
NBT	3	5100	770	.15	820	.16*
NBR	f		50		120	
SBL	2	3400	210	.06	840	.25*
SBT	3	5100	630	.12*	950	.19
SBR	f		260		90	
EBL	1	1700	130	.08*	160	.09*
EBT	0	0	0		0	
EBR	f		260		480	
WBL	2	3400	100	.03	40	.01
WBT	0	0	0		0	
WBR	f		1530		340	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.43** **.55**

21. Portola & Rancho

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	760	.22*	390	.11*
NBT	3	5100	1230	.24	1480	.29
NBR	d	1700	10	.01	10	.01
SBL	2	3400	10	.00	10	.00
SBT	3	5100	840	.16*	1410	.28*
SBR	1	1700	70	.04	20	.01
EBL	1.5		60		140	
EBT	0.5	3400	10	.02*	10	.04*
EBR	f		260		700	
WBL	1.5		10		10	
WBT	1	6800	10	.00*	10	.00*
WBR	1.5		10		10	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION **.45** **.48**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	760	.22*	420	.12*
NBT	3	5100	1210	.24	1510	.30
NBR	d	1700	10	.01	10	.01
SBL	2	3400	10	.00	10	.00
SBT	3	5100	810	.16*	1380	.27*
SBR	1	1700	90	.05	30	.02
EBL	1.5		60		120	
EBT	0.5	3400	10	.02*	10	.04*
EBR	f		320		740	
WBL	1.5		10		10	
WBT	1	6800	10	.00*	10	.00*
WBR	1.5		10		10	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION **.45** **.48**

22. El Toro & Portola

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	290	.17*	250	.15
NBT	3	5100	160	.03	490	.10*
NBR	f		350		530	
SBL	1	1700	50	.03	330	.19*
SBT	3	5100	530	.10*	570	.11
SBR	1	1700	210	.12	640	.38
EBL	2	3400	50	.01	370	.11
EBT	3	5100	620	.12*	1200	.24*
EBR	1	1700	380	.22	630	.37
WBL	2	3400	510	.15*	430	.13*
WBT	4	6800	1530	.23	1010	.15
WBR	d	1700	20	.01	40	.02
Right Turn Adjustment				SBR		.07*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION **.59** **.78**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	290	.17*	250	.15
NBT	3	5100	170	.03	500	.10*
NBR	f		340		510	
SBL	1	1700	40	.02	330	.19*
SBT	3	5100	560	.11*	570	.11
SBR	1	1700	200	.12	650	.38
EBL	2	3400	40	.01	360	.11
EBT	3	5100	690	.14*	1210	.24*
EBR	1	1700	360	.21	610	.36
WBL	2	3400	520	.15*	430	.13*
WBT	4	6800	1520	.22	1040	.15
WBR	d	1700	20	.01	50	.03
Right Turn Adjustment				SBR		.07*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION **.62** **.78**

23. Los Alisos & Santa Margarita

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	360	.21*	400	.24*
NBT	2	3400	170	.05	340	.10
NBR	1	1700	130	.08	190	.11
SBL	1	1700	60	.04	20	.01
SBT	2	3400	400	.12*	250	.07*
SBR	d	1700	210	.12	100	.06
EBL	1	1700	60	.04*	140	.08
EBT	3	5100	790	.15	1830	.36*
EBR	d	1700	240	.14	360	.21
WBL	1	1700	280	.16	180	.11*
WBT	3	5100	1910	.37*	1030	.20
WBR	d	1700	10	.01	50	.03
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.79**		**.83**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	380	.22*	410	.24*
NBT	2	3400	170	.05	340	.10
NBR	1	1700	110	.06	180	.11
SBL	1	1700	60	.04	20	.01
SBT	2	3400	390	.11*	240	.07*
SBR	d	1700	220	.13	90	.05
EBL	1	1700	40	.02*	140	.08
EBT	3	5100	840	.16	1820	.36*
EBR	d	1700	260	.15	360	.21
WBL	1	1700	300	.18	180	.11*
WBT	3	5100	1880	.37*	1050	.21
WBR	d	1700	10	.01	50	.03
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.77**		**.83**

24. Alton & Commercentre

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	820	.16	1660	.33*
NBR	d	1700	470	.28	440	.26
SBL	1	1700	110	.06	80	.05*
SBT	3	5100	1940	.38*	1180	.23
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		210	.06*	510	.15*
WBT	0	5100	0		0	
WBR	1.5		60		220	.13
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.49**		**.58**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	840	.16	1720	.34*
NBR	d	1700	510	.30	450	.26
SBL	1	1700	120	.07	80	.05*
SBT	3	5100	2040	.40*	1220	.24
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		240	.07*	530	.16*
WBT	0	5100	0		0	
WBR	1.5		70		210	.12
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.52**		**.60**

25. Alton & Irvine

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	80	.02*	620	.18*
NBT	3	5100	410	.08	1150	.23
NBR	f		50		130	
SBL	2	3400	210	.06	70	.02
SBT	3	5100	1390	.27*	450	.09*
SBR	f		420		930	
EBL	2	3400	730	.21*	470	.14*
EBT	3	5100	1010	.20	700	.14
EBR	1	1700	680	.40	100	.06
WBL	2	3400	230	.07	80	.02
WBT	3	5100	610	.12*	1250	.25*
WBR	1	1700	50	.03	190	.11
Right Turn Adjustment			EBR	.12*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.79**		**.71**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	80	.02*	610	.18*
NBT	3	5100	440	.09	1190	.23
NBR	f		40		90	
SBL	2	3400	240	.07	90	.03
SBT	3	5100	1430	.28*	460	.09*
SBR	f		490		950	
EBL	2	3400	760	.22*	490	.14*
EBT	3	5100	1020	.20	720	.14
EBR	1	1700	660	.39	90	.05
WBL	2	3400	230	.07	80	.02
WBT	3	5100	610	.12*	1250	.25*
WBR	1	1700	50	.03	190	.11
Right Turn Adjustment			EBR	.10*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.79**		**.71**

26. Bake & Commercentre

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04*	20	.01
NBT	2	3400	960	.28	1360	.40*
NBR	d	1700	710	.42	240	.14
SBL	1	1700	30	.02	60	.04*
SBT	2	3400	1270	.37*	840	.25
SBR	d	1700	100	.06	60	.04
EBL	1	1700	100	.06	200	.12
EBT	2	3400	150	.06*	120	.05*
EBR	0	0	60		60	
WBL	2	3400	320	.09*	680	.20*
WBT	1	1700	70	.05	90	.07
WBR	0	0	20		30	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.61**		**.74**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05*	20	.01
NBT	2	3400	1010	.30	1390	.41*
NBR	d	1700	720	.42	230	.14
SBL	1	1700	30	.02	60	.04*
SBT	2	3400	1310	.39*	880	.26
SBR	d	1700	100	.06	60	.04
EBL	1	1700	110	.06	240	.14
EBT	2	3400	160	.06*	110	.05*
EBR	0	0	60		60	
WBL	2	3400	310	.09*	680	.20*
WBT	1	1700	80	.06	90	.07
WBR	0	0	20		30	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.75**

27. Bake & Trabuco

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	550	.32*	520	.31*
NBT	3	5100	1230	.29	1430	.41
NBR	0	0	250		640	
SBL	2	3400	40	.01	170	.05
SBT	3	5100	1380	.27*	1460	.29*
SBR	1	1700	150	.09	320	.19
EBL	2	3400	520	.15*	210	.06
EBT	3	5100	370	.07	980	.19*
EBR	1	1700	580	.34	540	.32
WBL	2	3400	820	.24	290	.09*
WBT	3	5100	1160	.23*	540	.11
WBR	1	1700	190	.11	40	.02
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**1.02**		**.93**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	530	.31*	520	.31*
NBT	3	5100	1270	.30	1450	.41
NBR	0	0	260		650	
SBL	2	3400	40	.01	170	.05
SBT	3	5100	1410	.28*	1470	.29*
SBR	1	1700	160	.09	330	.19
EBL	2	3400	530	.16*	220	.06
EBT	3	5100	380	.07	940	.18*
EBR	1	1700	600	.35	560	.33
WBL	2	3400	810	.24	290	.09*
WBT	3	5100	1180	.23*	540	.11
WBR	1	1700	180	.11	30	.02
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**1.03**		**.92**

28. Bake & Toledo

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	150	.09*	20	.01
NBT	3	5100	1800	.35	2260	.44*
NBR	d	1700	10	.01	290	.17
SBL	1	1700	70	.04	90	.05*
SBT	3	5100	2290	.45*	2110	.41
SBR	d	1700	230	.14	50	.03
EBL	2	3400	60	.02*	170	.05
EBT	2	3400	10	.00	290	.09*
EBR	1	1700	10	.01	140	.08
WBL	1	1700	30	.02	30	.02*
WBT	2	3400	440	.15*	40	.02
WBR	0	0	80		80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.76**		**.65**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	140	.08*	20	.01
NBT	3	5100	1810	.35	2290	.45*
NBR	d	1700	20	.01	290	.17
SBL	1	1700	70	.04	90	.05*
SBT	3	5100	2340	.46*	2130	.42
SBR	d	1700	230	.14	60	.04
EBL	2	3400	70	.02*	160	.05
EBT	2	3400	10	.00	290	.09*
EBR	1	1700	10	.01	140	.08
WBL	1	1700	20	.01	30	.02*
WBT	2	3400	440	.15*	40	.02
WBR	0	0	70		80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.76**		**.66**

29. Bake & Jeronimo

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	290	.17*	20	.01
NBT	3	5100	2150	.42	2390	.47*
NBR	d	1700	40	.02	330	.19
SBL	1	1700	130	.08	70	.04*
SBT	3	5100	2090	.41*	2100	.41
SBR	d	1700	30	.02	10	.01
EBL	2	3400	10	.00	80	.02
EBT	2	3400	50	.01	460	.14*
EBR	1	1700	40	.02	430	.25
WBL	1	1700	350	.21	120	.07*
WBT	2	3400	730	.22*	110	.05
WBR	0	0	10		70	
Right Turn Adjustment					EBR	.03*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.85**		**.80**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	300	.18*	20	.01
NBT	3	5100	2160	.42	2410	.47*
NBR	d	1700	50	.03	330	.19
SBL	1	1700	110	.06	70	.04*
SBT	3	5100	2140	.42*	2130	.42
SBR	d	1700	30	.02	10	.01
EBL	2	3400	10	.00	90	.03
EBT	2	3400	50	.01	470	.14*
EBR	1	1700	40	.02	430	.25
WBL	1	1700	350	.21	110	.06*
WBT	2	3400	740	.22*	110	.06
WBR	0	0	10		80	
Right Turn Adjustment					EBR	.04*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.87**		**.80**

30. Bake & Muirlands

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	290	.09	120	.04*
NBT	4	6800	2680	.39*	2360	.35
NBR	f		110		220	
SBL	2	3400	100	.03*	160	.05
SBT	4	6800	2180	.32	2620	.39*
SBR	f		240		70	
EBL	2	3400	40	.01*	230	.07
EBT	2	3400	100	.03	680	.20*
EBR	f		90		380	
WBL	2	3400	240	.07	80	.02*
WBT	2	3400	470	.14*	170	.05
WBR	f		60		80	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.62**		**.70**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	290	.09*	130	.04*
NBT	4	6800	2700	.40	2380	.35
NBR	f		110		210	
SBL	2	3400	80	.02	180	.05
SBT	4	6800	2250	.33*	2630	.39*
SBR	f		240		70	
EBL	2	3400	40	.01*	220	.06
EBT	2	3400	100	.03	690	.20*
EBR	f		90		380	
WBL	2	3400	250	.07	80	.02*
WBT	2	3400	480	.14*	170	.05
WBR	f		70		90	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.62**		**.70**

31. Bake & Rockfield

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	340	.10	80	.02
NBT	4	6800	2870	.42*	2380	.35*
NBR	f		530		280	
SBL	2	3400	130	.04*	310	.09*
SBT	4	6800	2370	.35	2740	.40
SBR	1	1700	20	.01	20	.01
EBL	1	1700	20	.01	30	.02
EBT	2	3400	100	.03*	200	.06*
EBR	f		100		580	
WBL	2	3400	190	.06*	580	.17*
WBT	2	3400	190	.06	130	.04
WBR	f		110		180	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.60**		**.72**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	340	.10	80	.02
NBT	4	6800	2900	.43*	2400	.35*
NBR	f		520		290	
SBL	2	3400	140	.04*	300	.09*
SBT	4	6800	2450	.36	2760	.41
SBR	1	1700	20	.01	20	.01
EBL	1	1700	20	.01	40	.02
EBT	2	3400	100	.03*	200	.06*
EBR	f		100		580	
WBL	2	3400	190	.06*	580	.17*
WBT	2	3400	190	.06	130	.04
WBR	f		100		180	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.61**		**.72**

32. Bake & I-5 NB Ramps

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	3160	.62*	2660	.52*
NBR	f		220		800	
SBL	0	0	0		0	
SBT	3	5100	740	.15	1130	.22
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		220	.13*	80	.05*
WBT	0	5100	0		0	
WBR	1.5		700	.21	190	.06
Right Turn Adjustment			WBR	.08*	WBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.88**		**.63**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	3170	.62*	2690	.53*
NBR	f		230		780	
SBL	0	0	0		0	
SBT	3	5100	750	.15	1140	.22
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		220	.13*	90	.05*
WBT	0	5100	0		0	
WBR	1.5		710	.21	190	.06
Right Turn Adjustment			WBR	.08*	WBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.88**		**.64**

33. Bake & I-5 SB Ramps

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	850	.17*	1560	.32*
NBR	0	0	20		80	
SBL	0	0	0		0	
SBT	3	5100	630	.12	770	.15
SBR	f		280		510	
EBL	3	5100	2710	.53*	2090	.41*
EBT	0	0	0		0	
EBR	1	1700	600	.35	210	.12
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.75**		**.78**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	840	.17*	1530	.32*
NBR	0	0	20		80	
SBL	0	0	0		0	
SBT	3	5100	660	.13	790	.15
SBR	f		280		500	
EBL	3	5100	2730	.54*	2120	.42*
EBT	0	0	0		0	
EBR	1	1700	580	.34	190	.11
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.76**		**.79**

34. Lake Forest & Trabuco

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	260	.08*	260	.08*
NBT	3	5100	900	.18	1110	.22
NBR	1	1700	70	.04	730	.43
SBL	2	3400	290	.09	320	.09
SBT	3	5100	1280	.28*	1120	.25*
SBR	0	0	170		150	
EBL	2	3400	170	.05	240	.07
EBT	3	5100	680	.13*	1030	.20*
EBR	1	1700	460	.27	200	.12
WBL	2	3400	700	.21*	250	.07*
WBT	3	5100	890	.17	620	.12
WBR	1	1700	370	.22	470	.28
Right Turn Adjustment			EBR	.08*	NBR	.14*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.83**		**.79**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	260	.08*	260	.08*
NBT	3	5100	930	.18	1130	.22
NBR	1	1700	60	.04	740	.44
SBL	2	3400	320	.09	330	.10
SBT	3	5100	1300	.29*	1130	.25*
SBR	0	0	170		150	
EBL	2	3400	170	.05	250	.07
EBT	3	5100	690	.14*	1010	.20*
EBR	1	1700	450	.26	200	.12
WBL	2	3400	690	.20*	240	.07*
WBT	3	5100	910	.18	620	.12
WBR	1	1700	380	.22	500	.29
Right Turn Adjustment			EBR	.06*	Multi	.17*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.82**		**.82**

35. Lake Forest & Serrano

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	80	.05
NBT	3	5100	1070	.21	1940	.38*
NBR	d	1700	80	.05	80	.05
SBL	1	1700	80	.05	40	.02*
SBT	3	5100	2180	.43*	1470	.29
SBR	d	1700	180	.11	70	.04
EBL	1	1700	130	.08*	130	.08*
EBT	1	1700	60	.10	90	.09
EBR	0	0	110		70	
WBL	1	1700	60	.04	30	.02
WBT	1	1700	60	.07*	70	.06*
WBR	0	0	60		40	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.69**		**.59**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	80	.05
NBT	3	5100	1080	.21	1970	.39*
NBR	d	1700	80	.05	80	.05
SBL	1	1700	80	.05	40	.02*
SBT	3	5100	2200	.43*	1460	.29
SBR	d	1700	180	.11	70	.04
EBL	1	1700	120	.07*	130	.08*
EBT	1	1700	60	.10	90	.09
EBR	0	0	110		70	
WBL	1	1700	70	.04	30	.02
WBT	1	1700	70	.08*	70	.07*
WBR	0	0	60		50	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.69**		**.61**

36. El Toro & Trabuco

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	340	.10*	460	.14
NBT	3	5100	1060	.21	1530	.30*
NBR	1	1700	130	.08	550	.32
SBL	2	3400	310	.09	260	.08*
SBT	3	5100	1610	.32*	920	.18
SBR	1	1700	360	.21	110	.06
EBL	2	3400	170	.05*	540	.16
EBT	3	5100	340	.10	1060	.27*
EBR	0	0	170		300	
WBL	2	3400	280	.08	200	.06*
WBT	3	5100	900	.18*	520	.10
WBR	1	1700	230	.14	140	.08
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for SBR NBR						
TOTAL CAPACITY UTILIZATION				**.70**		**.76**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	340	.10*	470	.14
NBT	3	5100	1060	.21	1510	.30*
NBR	1	1700	130	.08	570	.34
SBL	2	3400	300	.09	260	.08*
SBT	3	5100	1630	.32*	910	.18
SBR	1	1700	350	.21	120	.07
EBL	2	3400	170	.05*	570	.17
EBT	3	5100	350	.10	1030	.26*
EBR	0	0	170		320	
WBL	2	3400	280	.08	200	.06*
WBT	3	5100	890	.17*	530	.10
WBR	1	1700	230	.14	150	.09
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for SBR NBR						
TOTAL CAPACITY UTILIZATION				**.69**		**.75**

37. El Toro & Serrano

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05*	160	.09
NBT	3	5100	1490	.29	2430	.48*
NBR	d	1700	10	.01	30	.02
SBL	1	1700	10	.01	20	.01*
SBT	3	5100	1850	.36*	1350	.26
SBR	d	1700	200	.12	80	.05
EBL	1	1700	40	.02	90	.05
EBT	1	1700	10	.06*	30	.08*
EBR	0	0	90		100	
WBL	1	1700	30	.02*	20	.01*
WBT	1	1700	40	.04	10	.02
WBR	0	0	20		20	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.54** **.63**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05*	170	.10
NBT	3	5100	1500	.29	2450	.48*
NBR	d	1700	10	.01	30	.02
SBL	1	1700	10	.01	20	.01*
SBT	3	5100	1840	.36*	1350	.26
SBR	d	1700	220	.13	70	.04
EBL	1	1700	40	.02	80	.05
EBT	1	1700	10	.06*	20	.07*
EBR	0	0	100		100	
WBL	1	1700	30	.02*	20	.01*
WBT	1	1700	40	.04	10	.02
WBR	0	0	20		20	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.54** **.62**

38. El Toro & Jeronimo

2020 No-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05*	50	.03
NBT	3	5100	1320	.26	1960	.38*
NBR	1	1700	280	.16	180	.11
SBL	1	1700	210	.12	90	.05*
SBT	3	5100	1780	.35*	1030	.20
SBR	d	1700	150	.09	320	.19
EBL	1	1700	130	.08*	160	.09
EBT	2	3400	380	.14	490	.19*
EBR	0	0	100		150	
WBL	2	3400	320	.09	260	.08*
WBT	2	3400	660	.19*	490	.14
WBR	1	1700	120	.07	320	.19
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION **.72** **.75**

2020 With-Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	90	.05*	50	.03
NBT	3	5100	1340	.26	1980	.39*
NBR	1	1700	270	.16	190	.11
SBL	1	1700	190	.11	80	.05*
SBT	3	5100	1790	.35*	1040	.20
SBR	d	1700	170	.10	320	.19
EBL	1	1700	110	.06	170	.10
EBT	2	3400	400	.15*	490	.19*
EBR	0	0	100		150	
WBL	2	3400	330	.10*	260	.08*
WBT	2	3400	640	.19	490	.14
WBR	1	1700	130	.08	330	.19
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION **.70** **.76**

This Page Intentionally Left Blank

APPENDIX 7.1:

2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITHOUT AND WITH PORTOLA WESTERLY EXTENSION (SCENARIO 1) INTERSECTION OPERATIONS ANALYSIS WORKSHEETS

This Page Intentionally Left Blank

1. Lake Forest & Dimension

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06	50	.03
NBT	2	3400	910	.27*	840	.25*
NBR	d	1700	10	.01	10	.01
SBL	1	1700	30	.02*	50	.03*
SBT	2	3400	530	.16	820	.24
SBR	d	1700	620	.36	280	.16
EBL	1.5		350	{.11}*	620	{.19}*
EBT	0.5	3400	10	.11	10	.19
EBR	1	1700	100	.06	50	.03
WBL	1	1700	10	.01	30	.02
WBT	1	1700	10	.01*	10	.02*
WBR	0	0	10		20	
Right Turn Adjustment			SBR	.05*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.51**		**.54**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	110	.06	50	.03
NBT	2	3400	740	.22*	820	.24*
NBR	d	1700	10	.01	20	.01
SBL	1	1700	30	.02*	40	.02*
SBT	2	3400	570	.17	740	.22
SBR	d	1700	620	.36	300	.18
EBL	1.5		340	{.10}*	640	{.19}*
EBT	0.5	3400	10	.10	10	.19
EBR	1	1700	130	.08	60	.04
WBL	1	1700	10	.01	30	.02
WBT	1	1700	10	.01*	10	.02*
WBR	0	0	10		20	
Right Turn Adjustment			SBR	.10*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.50**		**.52**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	90	.05	40	.02
NBT	2	3400	890	.26*	820	.24*
NBR	d	1700	10	.01	10	.01
SBL	1	1700	30	.02*	50	.03*
SBT	2	3400	510	.15	810	.24
SBR	d	1700	620	.36	280	.16
EBL	1.5		360	{.11}*	610	{.18}*
EBT	0.5	3400	10	.11	10	.18
EBR	1	1700	90	.05	40	.02
WBL	1	1700	10	.01	30	.02
WBT	1	1700	10	.01*	10	.02*
WBR	0	0	10		20	
Right Turn Adjustment			SBR	.05*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.50**		**.52**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	110	.06	50	.03
NBT	2	3400	740	.22*	810	.24*
NBR	d	1700	10	.01	10	.01
SBL	1	1700	30	.02*	40	.02*
SBT	2	3400	550	.16	740	.22
SBR	d	1700	620	.36	290	.17
EBL	1.5		330	{.10}*	650	{.19}*
EBT	0.5	3400	10	.10	10	.19
EBR	1	1700	120	.07	50	.03
WBL	1	1700	10	.01	30	.02
WBT	1	1700	10	.01*	10	.02*
WBR	0	0	10		20	
Right Turn Adjustment			SBR	.10*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.50**		**.52**

2. Lake Forest & Rancho

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	360	.21*	310	.18
NBT	2	3400	690	.20	1150	.34*
NBR	d	1700	470	.28	690	.41
SBL	1	1700	290	.17	230	.14*
SBT	2	3400	770	.23*	810	.24
SBR	d	1700	400	.24	120	.07
EBL	1	1700	30	.02*	170	.10
EBT	2	3400	360	.11	750	.22*
EBR	1	1700	80	.05	250	.15
WBL	2	3400	530	.16	510	.15*
WBT	2	3400	870	.26*	600	.18
WBR	1	1700	130	.08	340	.20
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.77**		**.90**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06	260	.15
NBT	2	3400	710	.21*	1090	.32*
NBR	d	1700	480	.28	770	.45
SBL	1	1700	260	.15*	240	.14*
SBT	2	3400	800	.24	810	.24
SBR	d	1700	90	.05	100	.06
EBL	1	1700	80	.05	40	.02
EBT	2	3400	350	.10*	580	.17*
EBR	1	1700	100	.06	120	.07
WBL	2	3400	570	.17*	550	.16*
WBT	2	3400	660	.19	490	.14
WBR	1	1700	130	.08	320	.19
Right Turn Adjustment				NBR		.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.85**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	380	.22*	310	.18
NBT	2	3400	690	.20	1170	.34*
NBR	d	1700	470	.28	680	.40
SBL	1	1700	290	.17	240	.14*
SBT	2	3400	790	.23*	810	.24
SBR	d	1700	340	.20	100	.06
EBL	1	1700	30	.02*	140	.08
EBT	2	3400	360	.11	760	.22*
EBR	1	1700	80	.05	250	.15
WBL	2	3400	510	.15	510	.15*
WBT	2	3400	880	.26*	600	.18
WBR	1	1700	130	.08	320	.19
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.78**		**.90**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06	260	.15
NBT	2	3400	710	.21*	1120	.33*
NBR	d	1700	490	.29	740	.44
SBL	1	1700	250	.15*	240	.14*
SBT	2	3400	770	.23	810	.24
SBR	d	1700	60	.04	100	.06
EBL	1	1700	70	.04	30	.02
EBT	2	3400	360	.11*	580	.17*
EBR	1	1700	100	.06	130	.08
WBL	2	3400	570	.17*	540	.16*
WBT	2	3400	680	.20	490	.14
WBR	1	1700	130	.08	310	.18
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.69**		**.85**

3. Lake Forest & SR-241 SB Off-Ramp

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	820	.24*	1530	.45*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	790	.23	820	.24
SBR	0	0	0		0	
EBL	2	3400	320	.09*	160	.05*
EBT	0	0	0		0	
EBR	1	1700	620	.36	260	.15
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.26*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.55**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	850	.25*	1320	.39*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	620	.18	820	.24
SBR	0	0	0		0	
EBL	2	3400	350	.10*	170	.05*
EBT	0	0	0		0	
EBR	1	1700	440	.26	290	.17
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.11*	EBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.51**		**.50**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	820	.24	1510	.44*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	860	.25*	900	.26
SBR	0	0	0		0	
EBL	2	3400	200	.06*	80	.02*
EBT	0	0	0		0	
EBR	1	1700	490	.29	210	.12
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.23*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.59**		**.51**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	850	.25*	1330	.39*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	650	.19	880	.26
SBR	0	0	0		0	
EBL	2	3400	210	.06*	100	.03*
EBT	0	0	0		0	
EBR	1	1700	360	.21	250	.15
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.10*	EBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.46**		**.49**

4. Lake Forest & SR-241 NB On-Ramp

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	160	.05*	450	.13*
NBT	2	3400	990	.29	1240	.36
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	800	.24*	820	.24*
SBR	1	1700	80	.05	450	.26
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					SBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.34**		**.44**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	180	.05	400	.12*
NBT	2	3400	1010	.30*	1100	.32
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	620	.18	820	.24*
SBR	1	1700	90	.05	420	.25
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					SBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.35**		**.42**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	110	.03*	370	.11*
NBT	2	3400	890	.26	1230	.36
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	870	.26*	900	.26*
SBR	1	1700	10	.01	240	.14
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.34**		**.42**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	130	.04	330	.10*
NBT	2	3400	900	.26*	1100	.32
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	650	.19	880	.26*
SBR	1	1700	10	.01	220	.13
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.31**		**.41**

5. Corridor Center & Rancho

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	0	.00	10	.01
NBT	1	1700	10	.01*	10	.01*
NBR	1	1700	200	.12	920	.54
SBL	1	1700	40	.02*	150	.09*
SBT	1	1700	20	.01	10	.01
SBR	1	1700	40	.02	40	.02
EBL	1	1700	70	.04	60	.04
EBT	2	3400	350	.10*	570	.17*
EBR	1	1700	0	.00	0	.00
WBL	2	3400	1300	.38*	330	.10*
WBT	2	3400	350	.10	590	.17
WBR	d	1700	80	.05	140	.08
Right Turn Adjustment					NBR	.45*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.56**		**.87**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02	10	.01
NBT	1	1700	10	.15*	0	.07*
NBR	0	0	240		120	
SBL	1	1700	60	.04*	160	.09*
SBT	1	1700	0	.00	10	.01
SBR	1	1700	40	.02	50	.03
EBL	1	1700	60	.04	60	.04
EBT	2	3400	350	.10*	690	.20*
EBR	1	1700	100	.06	30	.02
WBL	1	1700	170	.10*	170	.10*
WBT	2	3400	510	.15	550	.16
WBR	d	1700	100	.06	160	.09
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.51**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	0	.00	10	.01
NBT	1	1700	10	.01*	10	.01*
NBR	1	1700	200	.12	890	.52
SBL	1	1700	40	.02*	150	.09*
SBT	1	1700	20	.01	10	.01
SBR	1	1700	40	.02	50	.03
EBL	1	1700	80	.05	60	.04
EBT	2	3400	350	.10*	570	.17*
EBR	1	1700	0	.00	0	.00
WBL	2	3400	1260	.37*	310	.09*
WBT	2	3400	360	.11	590	.17
WBR	d	1700	80	.05	140	.08
Right Turn Adjustment					NBR	.44*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.55**		**.85**

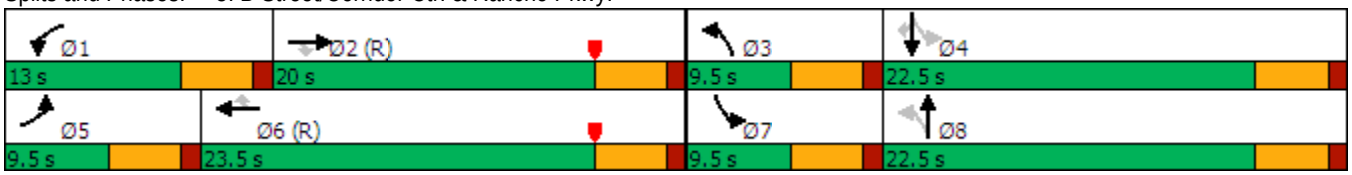
2040 With-Project With Portola Ext. (Scenario 1)

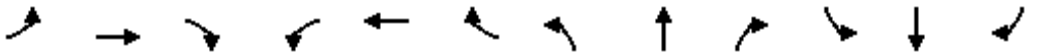
	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02	10	.01
NBT	1	1700	10	.15*	0	.07*
NBR	0	0	240		120	
SBL	1	1700	50	.03*	150	.09*
SBT	1	1700	20	.01	10	.01
SBR	1	1700	40	.02	50	.03
EBL	1	1700	70	.04	60	.04
EBT	2	3400	370	.11*	650	.19*
EBR	1	1700	100	.06	30	.02
WBL	1	1700	170	.10*	170	.10*
WBT	2	3400	520	.15	570	.17
WBR	d	1700	80	.05	150	.09
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.50**

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	350	100	170	510	100	30	10	240	60	0	40
Future Volume (vph)	60	350	100	170	510	100	30	10	240	60	0	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	280		200	200		100	0		0	0		0
Storage Lanes	1		1	1		1	1		0	1		1
Taper Length (ft)	90			90			90			90		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1058			1104			356			221	
Travel Time (s)		24.0			25.1			8.1			5.0	
Confl. Peds. (#/hr)	5					5				5		5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	4%	4%	2%	2%	4%	2%	4%	2%	2%	2%
Shared Lane Traffic (%)												
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA		pm+pt		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6	8			4		4
Detector Phase	5	2	2	1	6	6	3	8		7	4	4
Switch Phase												
Minimum Initial (s)	5.0	4.0	4.0	5.0	4.0	4.0	5.0	5.0		5.0	4.0	4.0
Minimum Split (s)	9.5	20.0	20.0	9.5	22.5	22.5	9.5	22.5		9.5	22.5	22.5
Total Split (s)	9.5	20.0	20.0	13.0	23.5	23.5	9.5	22.5		9.5	22.5	22.5
Total Split (%)	14.6%	30.8%	30.8%	20.0%	36.2%	36.2%	14.6%	34.6%		14.6%	34.6%	34.6%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	Max	Max

Intersection Summary	
Area Type:	Other
Cycle Length: 65	
Actuated Cycle Length: 65	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	

Splits and Phases: 5: B Street/Corridor Ctr. & Rancho Pkwy.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	350	100	170	510	100	30	10	240	60	0	40
Future Volume (veh/h)	60	350	100	170	510	100	30	10	240	60	0	40
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	0.99		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1841	1841	1870	1870	1841	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	65	380	109	185	554	109	33	11	261	65	0	43
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	4	4	2	2	4	2	2	2	2	2
Cap, veh/h	95	1005	439	226	1274	566	516	17	395	323	518	437
Arrive On Green	0.05	0.28	0.28	0.13	0.36	0.36	0.03	0.26	0.26	0.05	0.00	0.28
Sat Flow, veh/h	1781	3554	1552	1753	3554	1578	1753	64	1530	1781	1870	1576
Grp Volume(v), veh/h	65	380	109	185	554	109	33	0	272	65	0	43
Grp Sat Flow(s),veh/h/ln	1781	1777	1552	1753	1777	1578	1753	0	1595	1781	1870	1576
Q Serve(g_s), s	2.3	5.6	3.5	6.7	7.7	3.1	0.9	0.0	9.9	1.7	0.0	1.3
Cycle Q Clear(g_c), s	2.3	5.6	3.5	6.7	7.7	3.1	0.9	0.0	9.9	1.7	0.0	1.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.96	1.00		1.00
Lane Grp Cap(c), veh/h	95	1005	439	226	1274	566	516	0	412	323	518	437
V/C Ratio(X)	0.69	0.38	0.25	0.82	0.43	0.19	0.06	0.00	0.66	0.20	0.00	0.10
Avail Cap(c_a), veh/h	137	1005	439	229	1274	566	590	0	442	365	518	437
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.88	0.88	0.88	0.75	0.75	0.75	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	30.2	18.7	18.0	27.6	15.8	14.4	16.6	0.0	21.6	16.8	0.0	17.5
Incr Delay (d2), s/veh	7.5	1.0	1.2	15.8	0.8	0.6	0.1	0.0	3.3	0.3	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	2.3	1.3	3.6	3.0	1.1	0.3	0.0	3.8	0.7	0.0	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.8	19.7	19.2	43.4	16.7	14.9	16.6	0.0	24.9	17.1	0.0	17.9
LnGrp LOS	D	B	B	D	B	B	B	A	C	B	A	B
Approach Vol, veh/h		554			848			305			108	
Approach Delay, s/veh		21.7			22.3			24.0			17.4	
Approach LOS		C			C			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.9	22.9	6.7	22.5	8.0	27.8	8.0	21.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	8.5	15.5	5.0	18.0	5.0	19.0	5.0	18.0
Max Q Clear Time (g_c+I1), s	8.7	7.6	2.9	3.3	4.3	9.7	3.7	11.9
Green Ext Time (p_c), s	0.0	1.8	0.0	0.1	0.0	2.8	0.0	0.8

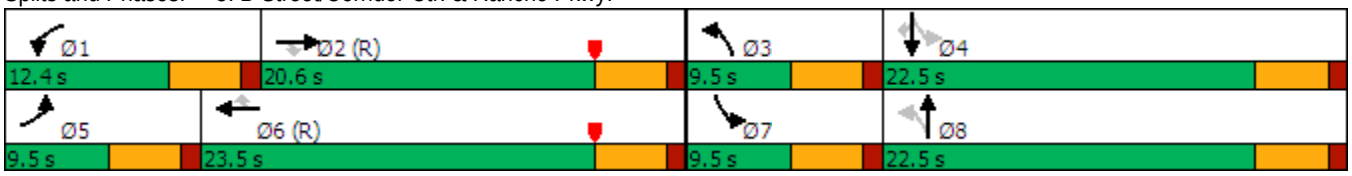
Intersection Summary	
HCM 6th Ctrl Delay	22.1
HCM 6th LOS	C

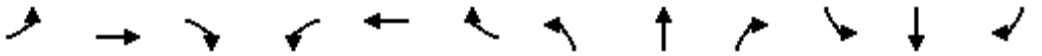
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	690	30	170	550	160	10	0	120	160	10	50
Future Volume (vph)	60	690	30	170	550	160	10	0	120	160	10	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	280		200	200		100	0		0	0		0
Storage Lanes	1		1	1		1	1		0	1		1
Taper Length (ft)	90			90			90			90		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1058			1104			356			221	
Travel Time (s)		24.0			25.1			8.1			5.0	
Confl. Peds. (#/hr)	5					5				5		5
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Shared Lane Traffic (%)												
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6	8			4		4
Detector Phase	5	2	2	1	6	6	3	8		7	4	4
Switch Phase												
Minimum Initial (s)	5.0	4.0	4.0	5.0	4.0	4.0	5.0	5.0		5.0	4.0	4.0
Minimum Split (s)	9.5	20.0	20.0	9.5	22.5	22.5	9.5	22.5		9.5	22.5	22.5
Total Split (s)	9.5	20.6	20.6	12.4	23.5	23.5	9.5	22.5		9.5	22.5	22.5
Total Split (%)	14.6%	31.7%	31.7%	19.1%	36.2%	36.2%	14.6%	34.6%		14.6%	34.6%	34.6%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	Max	Max

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 65
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 70
Control Type: Actuated-Coordinated

Splits and Phases: 5: B Street/Corridor Ctr. & Rancho Pkwy.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	690	30	170	550	160	10	0	120	160	10	50
Future Volume (veh/h)	60	690	30	170	550	160	10	0	120	160	10	50
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	0.99		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	67	767	33	189	611	178	11	0	133	178	11	56
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	96	1104	490	216	1344	597	419	0	339	426	518	437
Arrive On Green	0.05	0.31	0.31	0.12	0.38	0.38	0.01	0.00	0.21	0.08	0.28	0.28
Sat Flow, veh/h	1781	3554	1577	1781	3554	1579	1781	0	1585	1781	1870	1576
Grp Volume(v), veh/h	67	767	33	189	611	178	11	0	133	178	11	56
Grp Sat Flow(s),veh/h/ln	1781	1777	1577	1781	1777	1579	1781	0	1585	1781	1870	1576
Q Serve(g_s), s	2.4	12.3	1.0	6.8	8.4	5.1	0.3	0.0	4.7	4.9	0.3	1.7
Cycle Q Clear(g_c), s	2.4	12.3	1.0	6.8	8.4	5.1	0.3	0.0	4.7	4.9	0.3	1.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	96	1104	490	216	1344	597	419	0	339	426	518	437
V/C Ratio(X)	0.70	0.69	0.07	0.87	0.45	0.30	0.03	0.00	0.39	0.42	0.02	0.13
Avail Cap(c_a), veh/h	137	1104	490	216	1344	597	531	0	439	426	518	437
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.75	0.75	0.75	0.79	0.79	0.79	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.2	19.7	15.8	28.1	15.2	14.2	19.5	0.0	21.9	17.3	17.1	17.6
Incr Delay (d2), s/veh	6.6	2.7	0.2	25.1	0.9	1.0	0.0	0.0	0.7	0.7	0.1	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	5.1	0.3	4.3	3.2	1.8	0.1	0.0	1.7	1.9	0.1	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.9	22.4	16.0	53.2	16.0	15.2	19.5	0.0	22.7	17.9	17.2	18.2
LnGrp LOS	D	C	B	D	B	B	B	A	C	B	B	B
Approach Vol, veh/h		867			978			144			245	
Approach Delay, s/veh		23.3			23.1			22.4			18.0	
Approach LOS		C			C			C			B	

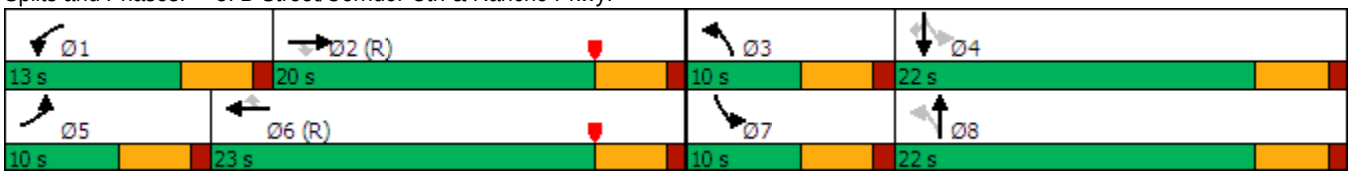
Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.4	24.7	5.4	22.5	8.0	29.1	9.5	18.4
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	7.9	16.1	5.0	18.0	5.0	19.0	5.0	18.0
Max Q Clear Time (g_c+I1), s	8.8	14.3	2.3	3.7	4.4	10.4	6.9	6.7
Green Ext Time (p_c), s	0.0	0.9	0.0	0.1	0.0	3.1	0.0	0.5

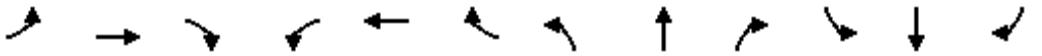
Intersection Summary	
HCM 6th Ctrl Delay	22.5
HCM 6th LOS	C

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	370	100	170	520	80	30	10	240	50	20	40
Future Volume (vph)	70	370	100	170	520	80	30	10	240	50	20	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	280		200	200		100	0		0	0		0
Storage Lanes	1		1	1		1	1		0	1		1
Taper Length (ft)	90			90			90			90		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1058			1104			356			221	
Travel Time (s)		24.0			25.1			8.1			5.0	
Confl. Peds. (#/hr)	5					5				5		5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	4%	4%	2%	2%	4%	2%	4%	2%	2%	2%
Shared Lane Traffic (%)												
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6	8			4		4
Detector Phase	5	2	2	1	6	6	3	8		7	4	4
Switch Phase												
Minimum Initial (s)	5.0	4.0	4.0	5.0	4.0	4.0	5.0	5.0		5.0	4.0	4.0
Minimum Split (s)	9.5	8.5	8.5	9.5	22.5	22.5	9.5	22.5		9.5	22.5	22.5
Total Split (s)	10.0	20.0	20.0	13.0	23.0	23.0	10.0	22.0		10.0	22.0	22.0
Total Split (%)	15.4%	30.8%	30.8%	20.0%	35.4%	35.4%	15.4%	33.8%		15.4%	33.8%	33.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	Max	Max

Intersection Summary	
Area Type:	Other
Cycle Length: 65	
Actuated Cycle Length: 65	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	

Splits and Phases: 5: B Street/Corridor Ctr. & Rancho Pkwy.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	370	100	170	520	80	30	10	240	50	20	40
Future Volume (veh/h)	70	370	100	170	520	80	30	10	240	50	20	40
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	0.99		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1841	1841	1870	1870	1841	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	76	402	109	185	565	87	33	11	261	54	22	43
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	4	4	2	2	4	2	2	2	2	2
Cap, veh/h	102	1032	451	226	1286	571	506	17	392	310	504	424
Arrive On Green	0.06	0.29	0.29	0.13	0.36	0.36	0.03	0.26	0.26	0.05	0.27	0.27
Sat Flow, veh/h	1781	3554	1552	1753	3554	1578	1753	64	1530	1781	1870	1576
Grp Volume(v), veh/h	76	402	109	185	565	87	33	0	272	54	22	43
Grp Sat Flow(s),veh/h/ln	1781	1777	1552	1753	1777	1578	1753	0	1595	1781	1870	1576
Q Serve(g_s), s	2.7	5.9	3.5	6.7	7.8	2.4	0.9	0.0	9.9	1.4	0.6	1.3
Cycle Q Clear(g_c), s	2.7	5.9	3.5	6.7	7.8	2.4	0.9	0.0	9.9	1.4	0.6	1.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.96	1.00		1.00
Lane Grp Cap(c), veh/h	102	1032	451	226	1286	571	506	0	408	310	504	424
V/C Ratio(X)	0.74	0.39	0.24	0.82	0.44	0.15	0.07	0.00	0.67	0.17	0.04	0.10
Avail Cap(c_a), veh/h	151	1032	451	229	1286	571	594	0	429	375	504	424
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.86	0.86	0.86	0.69	0.69	0.69	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.2	18.4	17.6	27.6	15.7	14.0	16.7	0.0	21.7	17.0	17.6	17.8
Incr Delay (d2), s/veh	9.0	1.0	1.1	14.7	0.8	0.4	0.1	0.0	3.7	0.3	0.2	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	2.4	1.3	3.6	3.0	0.9	0.3	0.0	3.9	0.6	0.3	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	39.2	19.4	18.7	42.3	16.5	14.4	16.7	0.0	25.4	17.3	17.7	18.3
LnGrp LOS	D	B	B	D	B	B	B	A	C	B	B	B
Approach Vol, veh/h		587			837			305			119	
Approach Delay, s/veh		21.8			22.0			24.4			17.8	
Approach LOS		C			C			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.9	23.4	6.7	22.0	8.2	28.0	7.6	21.1
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	8.5	15.5	5.5	17.5	5.5	18.5	5.5	17.5
Max Q Clear Time (g_c+I1), s	8.7	7.9	2.9	3.3	4.7	9.8	3.4	11.9
Green Ext Time (p_c), s	0.0	1.8	0.0	0.1	0.0	2.7	0.0	0.8

Intersection Summary	
HCM 6th Ctrl Delay	22.1
HCM 6th LOS	C

Notes

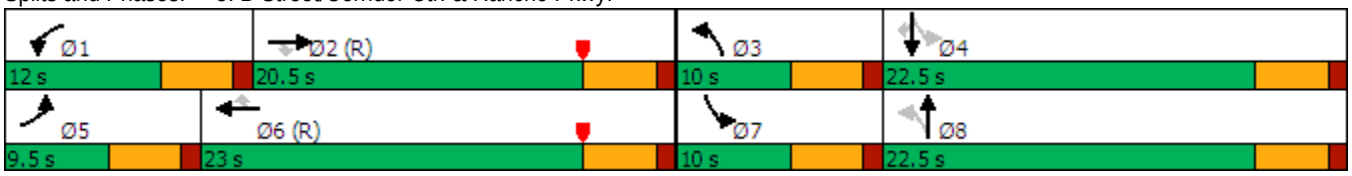
User approved pedestrian interval to be less than phase max green.

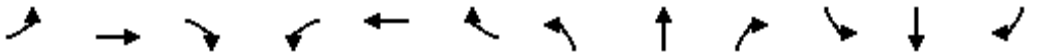
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	650	30	170	570	150	10	0	120	150	10	50
Future Volume (vph)	60	650	30	170	570	150	10	0	120	150	10	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	280		200	200		100	0		0	0		0
Storage Lanes	1		1	1		1	1		0	1		1
Taper Length (ft)	90			90			90			90		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1058			1104			356			221	
Travel Time (s)		24.0			25.1			8.1			5.0	
Confl. Peds. (#/hr)	5					5				5		5
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Shared Lane Traffic (%)												
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6	8			4		4
Detector Phase	5	2	2	1	6	6	3	8		7	4	4
Switch Phase												
Minimum Initial (s)	5.0	4.0	4.0	5.0	4.0	4.0	5.0	5.0		5.0	4.0	4.0
Minimum Split (s)	9.5	20.0	20.0	9.5	22.5	22.5	9.5	22.5		9.5	22.5	22.5
Total Split (s)	9.5	20.5	20.5	12.0	23.0	23.0	10.0	22.5		10.0	22.5	22.5
Total Split (%)	14.6%	31.5%	31.5%	18.5%	35.4%	35.4%	15.4%	34.6%		15.4%	34.6%	34.6%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	Max	Max

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 65
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 65
Control Type: Actuated-Coordinated

Splits and Phases: 5: B Street/Corridor Ctr. & Rancho Pkwy.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	650	30	170	570	150	10	0	120	150	10	50
Future Volume (veh/h)	60	650	30	170	570	150	10	0	120	150	10	50
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	0.99		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	67	722	33	189	633	167	11	0	133	167	11	56
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	96	1126	500	206	1344	597	409	0	327	429	518	437
Arrive On Green	0.05	0.32	0.32	0.12	0.38	0.38	0.01	0.00	0.21	0.08	0.28	0.28
Sat Flow, veh/h	1781	3554	1578	1781	3554	1579	1781	0	1585	1781	1870	1576
Grp Volume(v), veh/h	67	722	33	189	633	167	11	0	133	167	11	56
Grp Sat Flow(s),veh/h/ln	1781	1777	1578	1781	1777	1579	1781	0	1585	1781	1870	1576
Q Serve(g_s), s	2.4	11.3	0.9	6.8	8.8	4.8	0.3	0.0	4.7	4.6	0.3	1.7
Cycle Q Clear(g_c), s	2.4	11.3	0.9	6.8	8.8	4.8	0.3	0.0	4.7	4.6	0.3	1.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	96	1126	500	206	1344	597	409	0	327	429	518	437
V/C Ratio(X)	0.70	0.64	0.07	0.92	0.47	0.28	0.03	0.00	0.41	0.39	0.02	0.13
Avail Cap(c_a), veh/h	137	1126	500	206	1344	597	535	0	439	429	518	437
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.75	0.75	0.75	0.67	0.67	0.67	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.2	19.0	15.5	28.5	15.3	14.0	19.9	0.0	22.4	16.9	17.1	17.6
Incr Delay (d2), s/veh	6.6	2.1	0.2	31.4	0.8	0.8	0.0	0.0	0.8	0.6	0.1	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	4.6	0.3	4.6	3.4	1.7	0.1	0.0	1.7	1.8	0.1	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.9	21.1	15.7	59.8	16.1	14.8	19.9	0.0	23.2	17.5	17.2	18.2
LnGrp LOS	D	C	B	E	B	B	B	A	C	B	B	B
Approach Vol, veh/h		822			989			144			234	
Approach Delay, s/veh		22.2			24.2			22.9			17.6	
Approach LOS		C			C			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.0	25.1	5.4	22.5	8.0	29.1	10.0	17.9
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	7.5	16.0	5.5	18.0	5.0	18.5	5.5	18.0
Max Q Clear Time (g_c+I1), s	8.8	13.3	2.3	3.7	4.4	10.8	6.6	6.7
Green Ext Time (p_c), s	0.0	1.3	0.0	0.1	0.0	3.0	0.0	0.5

Intersection Summary	
HCM 6th Ctrl Delay	22.7
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

6. Bake & Portola

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04*	280	.16
NBT	1.5	5100	150	{.04}	310	.18*
NBR	1.5		90		870	.26
SBL	1	1700	140	.08	300	.18*
SBT	2	3400	260	.08*	280	.08
SBR	d	1700	280	.16	340	.20
EBL	2	3400	410	.12	460	.14
EBT	3	5100	280	.05*	800	.16*
EBR	d	1700	70	.04	60	.04
WBL	2	3400	1030	.30*	590	.17*
WBT	3	5100	700	.14	930	.18
WBR	d	1700	130	.08	100	.06
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.52** **.74**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04	250	.15
NBT	1.5	5100	160	.05*	290	.17*
NBR	1.5		100		880	.26
SBL	1	1700	150	.09*	290	.17*
SBT	2	3400	240	.07	280	.08
SBR	d	1700	280	.16	360	.21
EBL	2	3400	400	.12	470	.14*
EBT	3	5100	290	.06*	800	.16
EBR	d	1700	60	.04	70	.04
WBL	2	3400	930	.27*	590	.17
WBT	3	5100	700	.14	950	.19*
WBR	d	1700	130	.08	100	.06
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.52** **.72**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04	300	.18
NBT	1.5	5100	140	{.04}*	300	.18*
NBR	1.5		90		860	.25
SBL	1	1700	140	.08*	240	.14*
SBT	2	3400	250	.07	280	.08
SBR	d	1700	300	.18	440	.26
EBL	2	3400	470	.14	480	.14*
EBT	3	5100	530	.10*	1040	.20
EBR	d	1700	130	.08	70	.04
WBL	2	3400	940	.28*	570	.17
WBT	3	5100	890	.17	1240	.24*
WBR	d	1700	120	.07	100	.06
Right Turn Adjustment					SBR	.01*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.55** **.76**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05	270	.16
NBT	1.5	5100	150	{.04}*	280	.16*
NBR	1.5		100		860	.25
SBL	1	1700	150	.09*	250	.15*
SBT	2	3400	230	.07	280	.08
SBR	d	1700	290	.17	440	.26
EBL	2	3400	460	.14	490	.14*
EBT	3	5100	530	.10*	1050	.21
EBR	d	1700	90	.05	80	.05
WBL	2	3400	930	.27*	580	.17
WBT	3	5100	950	.19	1270	.25*
WBR	d	1700	110	.06	100	.06
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.55** **.75**

7. Bake & Towne Centre

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	220	.06*	430	.13
NBT	2	3400	380	.11	1310	.39*
NBR	d	1700	90	.05	180	.11
SBL	2	3400	10	.00	30	.01*
SBT	2	3400	1440	.42*	430	.13
SBR	d	1700	60	.04	80	.05
EBL	1	1700	10	.01	60	.04
EBT	1	1700	40	.02*	190	.11*
EBR	1	1700	150	.09	390	.23
WBL	1	1700	130	.08*	160	.09*
WBT	2	3400	70	.02	130	.04
WBR	0	0	10		10	
Right Turn Adjustment			EBR	.02*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.65** **.65**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	270	.08*	410	.12
NBT	2	3400	440	.13	1320	.39*
NBR	d	1700	120	.07	180	.11
SBL	2	3400	10	.00	30	.01*
SBT	2	3400	1300	.38*	380	.11
SBR	d	1700	60	.04	80	.05
EBL	1	1700	10	.01	60	.04
EBT	1	1700	50	.03*	190	.11*
EBR	1	1700	140	.08	410	.24
WBL	1	1700	120	.07*	180	.11*
WBT	2	3400	50	.02	140	.04
WBR	0	0	10		10	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.61** **.67**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	210	.06*	420	.12
NBT	2	3400	360	.11	1300	.38*
NBR	d	1700	100	.06	180	.11
SBL	2	3400	10	.00	30	.01*
SBT	2	3400	1410	.41*	420	.12
SBR	d	1700	50	.03	80	.05
EBL	1	1700	10	.01	60	.04
EBT	1	1700	50	.03*	210	.12*
EBR	1	1700	140	.08	360	.21
WBL	1	1700	170	.10*	170	.10*
WBT	2	3400	80	.03	140	.04
WBR	0	0	10		10	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.65** **.66**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	260	.08*	410	.12
NBT	2	3400	430	.13	1290	.38*
NBR	d	1700	120	.07	170	.10
SBL	2	3400	10	.00	30	.01*
SBT	2	3400	1330	.39*	400	.12
SBR	d	1700	50	.03	100	.06
EBL	1	1700	10	.01	60	.04
EBT	1	1700	50	.03*	190	.11*
EBR	1	1700	130	.08	400	.24
WBL	1	1700	130	.08*	180	.11*
WBT	2	3400	60	.02	150	.05
WBR	0	0	10		10	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.63** **.66**

8. Bake & Rancho North

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	680	.20	1780	.52*
NBR	d	1700	330	.19	490	.29
SBL	1	1700	60	.04	130	.08*
SBT	2	3400	1670	.49*	840	.25
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	380	.11*	470	.14*
WBT	0	0	0		0	
WBR	2	3400	10	.00	160	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.79**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	750	.22	1760	.52*
NBR	d	1700	370	.22	580	.34
SBL	1	1700	110	.06	150	.09*
SBT	2	3400	1440	.42*	820	.24
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	620	.18*	430	.13*
WBT	0	0	0		0	
WBR	2	3400	80	.02	160	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.79**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	660	.19	1750	.51*
NBR	d	1700	330	.19	510	.30
SBL	1	1700	60	.04	110	.06*
SBT	2	3400	1670	.49*	820	.24
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	390	.11*	470	.14*
WBT	0	0	0		0	
WBR	2	3400	10	.00	170	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.76**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	730	.21	1700	.50*
NBR	d	1700	390	.23	580	.34
SBL	1	1700	130	.08	160	.09*
SBT	2	3400	1430	.42*	820	.24
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	630	.19*	440	.13*
WBT	0	0	0		0	
WBR	2	3400	80	.02	170	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.77**

9. Bake & Rancho South

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	200	.12*	170	.10
NBT	2	3400	810	.24	1880	.55*
NBR	1	1700	360	.21	120	.07
SBL	1	1700	130	.08	60	.04*
SBT	2	3400	1660	.49*	1050	.31
SBR	1	1700	270	.16	200	.12
EBL	2	3400	170	.05	280	.08*
EBT	2	3400	380	.16*	70	.04
EBR	0	0	150		150	.09
WBL	2	3400	90	.03*	290	.09
WBT	2	3400	50	.03	350	.14*
WBR	0	0	40		120	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.85**		**.86**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	180	.11*	180	.11
NBT	2	3400	860	.25	1980	.58*
NBR	1	1700	100	.06	110	.06
SBL	1	1700	10	.01	40	.02*
SBT	2	3400	1720	.51*	1010	.30
SBR	1	1700	330	.19	200	.12
EBL	2	3400	190	.06*	330	.10*
EBT	1	1700	60	.04	80	.05
EBR	d	1700	140	.08	180	.11
WBL	2	3400	210	.06	110	.03
WBT	1	1700	80	.05*	40	.02*
WBR	1	1700	60	.04	20	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.78**		**.77**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	190	.11*	150	.09
NBT	2	3400	780	.23	1850	.54*
NBR	1	1700	350	.21	120	.07
SBL	1	1700	180	.11	70	.04*
SBT	2	3400	1630	.48*	1030	.30
SBR	1	1700	250	.15	200	.12
EBL	2	3400	170	.05	280	.08*
EBT	2	3400	390	.16*	90	.05
EBR	0	0	140		140	.08
WBL	2	3400	80	.02*	290	.09
WBT	2	3400	50	.03	350	.15*
WBR	0	0	40		150	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.82**		**.86**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	180	.11*	170	.10
NBT	2	3400	850	.25	1960	.58*
NBR	1	1700	100	.06	110	.06
SBL	1	1700	10	.01	40	.02*
SBT	2	3400	1710	.50*	1020	.30
SBR	1	1700	340	.20	200	.12
EBL	2	3400	200	.06*	290	.09*
EBT	1	1700	60	.04	80	.05
EBR	d	1700	130	.08	160	.09
WBL	2	3400	210	.06	110	.03
WBT	1	1700	80	.05*	40	.02*
WBR	1	1700	60	.04	20	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.77**		**.76**

10. Bake & Orchard

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	1370	.40	2190	.64*
NBR	1	1700	0	.00	0	.00
SBL	0	0	0		0	
SBT	2	3400	1870	.55*	1460	.43
SBR	d	1700	10	.01	10	.01
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1700	20	.01	60	.04
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	1	1700	0	.00	0	.00
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.61**		**.69**

2040 With-Project Without Portola Ext. (Scenario 1)

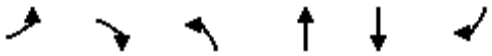
	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	1130	.33	2250	.66*
NBR	1	1700	20	.01	50	.03
SBL	0	0	0		0	
SBT	2	3400	2060	.61*	1290	.38
SBR	d	1700	10	.01	10	.01
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1700	20	.01	60	.04
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	1	1700	30	.02	20	.01
Right Turn Adjustment			EBR	.01*	WBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.67**		**.72**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	1320	.39	2130	.63*
NBR	1	1700	0	.00	0	.00
SBL	0	0	0		0	
SBT	2	3400	1810	.53*	1430	.42
SBR	d	1700	10	.01	10	.01
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1700	20	.01	60	.04
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	1	1700	0	.00	0	.00
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.59**		**.68**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	1120	.33	2220	.65*
NBR	1	1700	20	.01	50	.03
SBL	0	0	0		0	
SBT	2	3400	2040	.60*	1270	.37
SBR	d	1700	10	.01	10	.01
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1700	20	.01	60	.04
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	1	1700	30	.02	20	.01
Right Turn Adjustment			EBR	.01*	WBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.71**



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	20	0	1370	1870	10
Future Volume (vph)	0	20	0	1370	1870	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150	150	150			150
Storage Lanes	0	0	0			1
Taper Length (ft)	90		90			
Link Speed (mph)	30			50	50	
Link Distance (ft)	362			1352	1059	
Travel Time (s)	8.2			18.4	14.4	
Confl. Peds. (#/hr)	5	5	5			5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

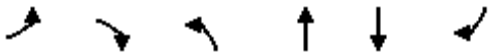
Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	20	0	1370	1870	10
Future Vol, veh/h	0	20	0	1370	1870	10
Conflicting Peds, #/hr	5	5	5	0	0	5
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	21	0	1457	1989	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	1005	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	240	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	238	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	21.6	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	238	-	-
HCM Lane V/C Ratio	-	0.089	-	-
HCM Control Delay (s)	-	21.6	-	-
HCM Lane LOS	-	C	-	-
HCM 95th %tile Q(veh)	-	0.3	-	-



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	60	0	2190	1460	10
Future Volume (vph)	0	60	0	2190	1460	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150	150	150			150
Storage Lanes	0	0	0			1
Taper Length (ft)	90		90			
Link Speed (mph)	30			50	50	
Link Distance (ft)	362			1352	1059	
Travel Time (s)	8.2			18.4	14.4	
Confl. Peds. (#/hr)	5	5	5			5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

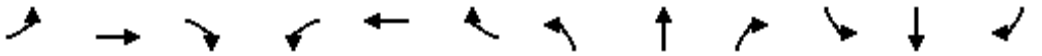
Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	60	0	2190	1460	10
Future Vol, veh/h	0	60	0	2190	1460	10
Conflicting Peds, #/hr	5	5	5	0	0	5
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	64	0	2330	1553	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	787	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	334	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	331	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18.5	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	331	-	-
HCM Lane V/C Ratio	-	0.193	-	-
HCM Control Delay (s)	-	18.5	-	-
HCM Lane LOS	-	C	-	-
HCM 95th %tile Q(veh)	-	0.7	-	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	20	0	0	30	0	1130	20	0	2060	10
Future Volume (vph)	0	0	20	0	0	30	0	1130	20	0	2060	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		150	0		0	150		180	0		150
Storage Lanes	0		0	0		1	0		1	0		1
Taper Length (ft)	90			90			90			0		
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		362			257			1352			1059	
Travel Time (s)		8.2			5.8			18.4			14.4	
Confl. Peds. (#/hr)	5		5				5					5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	20	0	0	30	0	1130	20	0	2060	10
Future Vol, veh/h	0	0	20	0	0	30	0	1130	20	0	2060	10
Conflicting Peds, #/hr	5	0	5	0	0	0	5	0	0	0	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	-	-	180	-	-	150
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	21	0	0	32	0	1202	21	0	2191	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	1106	-	-	601	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	6.94	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.32	-	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	205	0	0	443	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	203	-	-	443	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	24.8	13.8	0	0
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	203	443	-	-
HCM Lane V/C Ratio	-	-	0.105	0.072	-	-
HCM Control Delay (s)	-	-	24.8	13.8	-	-
HCM Lane LOS	-	-	C	B	-	-
HCM 95th %tile Q(veh)	-	-	0.3	0.2	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	60	0	0	20	0	2250	50	0	1290	10
Future Volume (vph)	0	0	60	0	0	20	0	2250	50	0	1290	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		150	0		0	150		180	0		150
Storage Lanes	0		0	0		1	0		1	0		1
Taper Length (ft)	90			90			90			0		
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		362			257			1352			1059	
Travel Time (s)		8.2			5.8			18.4			14.4	
Confl. Peds. (#/hr)	5		5				5					5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

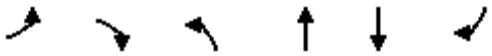
Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	60	0	0	20	0	2250	50	0	1290	10
Future Vol, veh/h	0	0	60	0	0	20	0	2250	50	0	1290	10
Conflicting Peds, #/hr	5	0	5	0	0	0	5	0	0	0	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	-	-	180	-	-	150
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	64	0	0	21	0	2394	53	0	1372	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	696	-	-	1197	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	6.94	-	-	10	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	10	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	10	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.32	-	-	10	-	-	-
Pot Cap-1 Maneuver	0	0	384	0	0	178	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	380	-	-	178	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.4	28	0	0
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	380	178	-	-
HCM Lane V/C Ratio	-	-	0.168	0.12	-	-
HCM Control Delay (s)	-	-	16.4	28	-	-
HCM Lane LOS	-	-	C	D	-	-
HCM 95th %tile Q(veh)	-	-	0.6	0.4	-	-



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	20	0	1320	1810	10
Future Volume (vph)	0	20	0	1320	1810	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150	150	150			150
Storage Lanes	0	0	0			1
Taper Length (ft)	90		90			
Link Speed (mph)	30			50	50	
Link Distance (ft)	362			1352	1059	
Travel Time (s)	8.2			18.4	14.4	
Confl. Peds. (#/hr)	5	5	5			5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

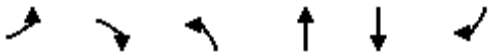
Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	20	0	1320	1810	10
Future Vol, veh/h	0	20	0	1320	1810	10
Conflicting Peds, #/hr	5	5	5	0	0	5
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	21	0	1404	1926	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	973	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	252	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	250	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	20.7	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	250	-	-
HCM Lane V/C Ratio	-	0.085	-	-
HCM Control Delay (s)	-	20.7	-	-
HCM Lane LOS	-	C	-	-
HCM 95th %tile Q(veh)	-	0.3	-	-



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	60	0	2130	1430	10
Future Volume (vph)	0	60	0	2130	1430	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150	150	150			150
Storage Lanes	0	0	0			1
Taper Length (ft)	90		90			
Link Speed (mph)	30			50	50	
Link Distance (ft)	362			1352	1059	
Travel Time (s)	8.2			18.4	14.4	
Confl. Peds. (#/hr)	5	5	5			5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

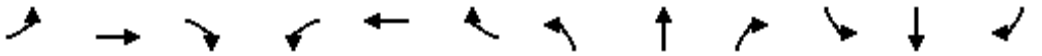
Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	60	0	2130	1430	10
Future Vol, veh/h	0	60	0	2130	1430	10
Conflicting Peds, #/hr	5	5	5	0	0	5
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	64	0	2266	1521	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	771	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	343	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	340	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	340	-	-
HCM Lane V/C Ratio	-	0.188	-	-
HCM Control Delay (s)	-	18	-	-
HCM Lane LOS	-	C	-	-
HCM 95th %tile Q(veh)	-	0.7	-	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	20	0	0	30	0	1120	20	0	2040	10
Future Volume (vph)	0	0	20	0	0	30	0	1120	20	0	2040	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		150	0		0	150		180	0		150
Storage Lanes	0		0	0		1	0		1	0		1
Taper Length (ft)	90			90			90			0		
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		362			257			1352			1059	
Travel Time (s)		8.2			5.8			18.4			14.4	
Confl. Peds. (#/hr)	5		5				5					5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

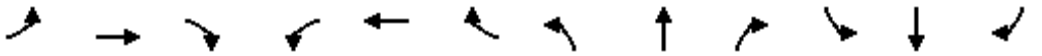
Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	20	0	0	30	0	1120	20	0	2040	10
Future Vol, veh/h	0	0	20	0	0	30	0	1120	20	0	2040	10
Conflicting Peds, #/hr	5	0	5	0	0	0	5	0	0	0	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	-	-	180	-	-	150
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	21	0	0	32	0	1191	21	0	2170	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	1095	-	-	596	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	6.94	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.32	-	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	209	0	0	447	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	207	-	-	447	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	24.4	13.7	0	0
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	207	447	-	-
HCM Lane V/C Ratio	-	-	0.103	0.071	-	-
HCM Control Delay (s)	-	-	24.4	13.7	-	-
HCM Lane LOS	-	-	C	B	-	-
HCM 95th %tile Q(veh)	-	-	0.3	0.2	-	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	60	0	0	20	0	2220	50	0	1270	10
Future Volume (vph)	0	0	60	0	0	20	0	2220	50	0	1270	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		150	0		0	150		180	0		150
Storage Lanes	0		0	0		1	0		1	0		1
Taper Length (ft)	90			90			90			0		
Link Speed (mph)		30			30			50			50	
Link Distance (ft)		362			257			1352			1059	
Travel Time (s)		8.2			5.8			18.4			14.4	
Confl. Peds. (#/hr)	5		5				5					5
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	60	0	0	20	0	2220	50	0	1270	10
Future Vol, veh/h	0	0	60	0	0	20	0	2220	50	0	1270	10
Conflicting Peds, #/hr	5	0	5	0	0	0	5	0	0	0	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	-	-	180	-	-	150
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	64	0	0	21	0	2362	53	0	1351	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	686	-	-	1181	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	6.94	-	-	10	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	10	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	10	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	3.32	-	-	10	-	-	-
Pot Cap-1 Maneuver	0	0	390	0	0	183	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	386	-	-	183	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.2	27.2	0	0
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	386	183	-	-
HCM Lane V/C Ratio	-	-	0.165	0.116	-	-
HCM Control Delay (s)	-	-	16.2	27.2	-	-
HCM Lane LOS	-	-	C	D	-	-
HCM 95th %tile Q(veh)	-	-	0.6	0.4	-	-

11. Dimension & Bake

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	70	.02	190	.06*
NBT	1	1700	10	.01*	40	.02
NBR	1	1700	160	.09	380	.22
SBL	1	1700	110	.06*	40	.02
SBT	1	1700	40	.02	10	.01*
SBR	1	1700	70	.04	20	.01
EBL	1	1700	10	.01	50	.03
EBT	2	3400	1210	.36*	1640	.48*
EBR	d	1700	110	.06	50	.03
WBL	1	1700	340	.20*	240	.14*
WBT	2	3400	1550	.46	1310	.39
WBR	d	1700	30	.02	100	.06
Right Turn Adjustment					NBR	.06*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.80**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	70	.02	210	.06*
NBT	1	1700	10	.01*	40	.02
NBR	1	1700	130	.08	370	.22
SBL	1	1700	90	.05*	50	.03
SBT	1	1700	50	.03	20	.01*
SBR	1	1700	70	.04	20	.01
EBL	1	1700	10	.01*	50	.03
EBT	2	3400	980	.29	1690	.50*
EBR	d	1700	120	.07	50	.03
WBL	1	1700	310	.18	210	.12*
WBT	2	3400	1680	.49*	1170	.34
WBR	d	1700	20	.01	80	.05
Right Turn Adjustment					NBR	.09*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.61**		**.83**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	70	.02	190	.06*
NBT	1	1700	10	.01*	40	.02
NBR	1	1700	160	.09	390	.23
SBL	1	1700	110	.06*	40	.02
SBT	1	1700	40	.02	10	.01*
SBR	1	1700	70	.04	20	.01
EBL	1	1700	10	.01	50	.03
EBT	2	3400	1170	.34*	1580	.46*
EBR	d	1700	120	.07	50	.03
WBL	1	1700	340	.20*	250	.15*
WBT	2	3400	1480	.44	1280	.38
WBR	d	1700	30	.02	100	.06
Right Turn Adjustment					NBR	.07*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.80**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	70	.02	210	.06*
NBT	1	1700	10	.01*	40	.02
NBR	1	1700	140	.08	370	.22
SBL	1	1700	100	.06*	40	.02
SBT	1	1700	40	.02	20	.01*
SBR	1	1700	60	.04	20	.01
EBL	1	1700	10	.01*	50	.03
EBT	2	3400	960	.28	1640	.48*
EBR	d	1700	110	.06	50	.03
WBL	1	1700	330	.19	210	.12*
WBT	2	3400	1610	.47*	1140	.34
WBR	d	1700	30	.02	80	.05
Right Turn Adjustment					NBR	.08*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.60**		**.80**

12. Alton & Rancho South

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	200	.06*	140	.04
NBT	3	5100	1080	.21	1990	.39*
NBR	1	1700	520	.31	370	.22
SBL	2	3400	250	.07	50	.01*
SBT	3	5100	2170	.43*	1390	.27
SBR	d	1700	170	.10	110	.06
EBL	1	1700	60	.04	210	.12
EBT	2	3400	40	.01*	60	.02*
EBR	1	1700	110	.06	220	.13
WBL	1	1700	270	.16*	530	.31*
WBT	2	3400	90	.03	70	.02
WBR	d	1700	30	.02	330	.19
Right Turn Adjustment					EBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.71**		**.79**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	160	.05*	130	.04
NBT	3	5100	980	.19	1970	.39*
NBR	1	1700	420	.25	460	.27
SBL	2	3400	180	.05	50	.01*
SBT	3	5100	2080	.41*	1380	.27
SBR	d	1700	170	.10	110	.06
EBL	1	1700	60	.04	200	.12
EBT	2	3400	30	.01*	110	.03*
EBR	1	1700	110	.06	190	.11
WBL	1	1700	380	.22*	430	.25*
WBT	2	3400	120	.04	70	.02
WBR	d	1700	70	.04	220	.13
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.75**		**.73**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	210	.06*	140	.04
NBT	3	5100	930	.18	1770	.35*
NBR	1	1700	520	.31	390	.23
SBL	2	3400	260	.08	60	.02*
SBT	3	5100	1920	.38*	1280	.25
SBR	d	1700	180	.11	110	.06
EBL	1	1700	60	.04	220	.13
EBT	2	3400	40	.01*	60	.02*
EBR	1	1700	110	.06	220	.13
WBL	1	1700	290	.17*	490	.29*
WBT	2	3400	80	.02	70	.02
WBR	d	1700	30	.02	340	.20
Right Turn Adjustment					EBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.67**		**.75**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	160	.05*	130	.04
NBT	3	5100	820	.16	1760	.35*
NBR	1	1700	420	.25	460	.27
SBL	2	3400	180	.05	50	.01*
SBT	3	5100	1870	.37*	1230	.24
SBR	d	1700	180	.11	110	.06
EBL	1	1700	60	.04	220	.13
EBT	2	3400	30	.01*	80	.02*
EBR	1	1700	120	.07	200	.12
WBL	1	1700	430	.25*	420	.25*
WBT	2	3400	120	.04	70	.02
WBR	d	1700	60	.04	220	.13
Right Turn Adjustment			EBR	.02*	EBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.75**		**.69**

13. Alton & SR-241

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	130	.08*	470	.28*
NBT	3	5100	760	.15	1280	.25
NBR	f		310		1030	
SBL	1	1700	130	.08	80	.05
SBT	3	5100	1270	.25*	1060	.21*
SBR	f		330		260	
EBL	2	3400	350	.10	290	.09
EBT	0	0	0		0	
EBR	f		490		160	
WBL	2	3400	1050	.31*	470	.14*
WBT	0	0	0		0	
WBR	f		80		120	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.69**		**.68**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	180	.11*	340	.20*
NBT	3	5100	760	.15	1320	.26
NBR	f		300		950	
SBL	1	1700	140	.08	90	.05
SBT	3	5100	1290	.25*	1070	.21*
SBR	f		350		260	
EBL	2	3400	330	.10	290	.09
EBT	0	0	0		0	
EBR	f		410		160	
WBL	2	3400	930	.27*	490	.14*
WBT	0	0	0		0	
WBR	f		70		110	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.60**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	120	.07*	430	.25*
NBT	3	5100	620	.12	1020	.20
NBR	f		320		1120	
SBL	1	1700	140	.08	80	.05
SBT	3	5100	930	.18*	900	.18*
SBR	f		30		70	
EBL	2	3400	170	.05	50	.01
EBT	0	0	0		0	
EBR	f		470		140	
WBL	2	3400	1200	.35*	530	.16*
WBT	0	0	0		0	
WBR	f		100		130	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.64**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	160	.09*	290	.17*
NBT	3	5100	610	.12	1040	.20
NBR	f		330		1090	
SBL	1	1700	140	.08	80	.05
SBT	3	5100	950	.19*	900	.18*
SBR	f		30		80	
EBL	2	3400	170	.05	50	.01
EBT	0	0	0		0	
EBR	f		370		140	
WBL	2	3400	1110	.33*	540	.16*
WBT	0	0	0		0	
WBR	f		80		130	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.56**

14. Alton & Towne Centre

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02*	160	.09*
NBT	3	5100	740	.15	1140	.22
NBR	f		400		280	
SBL	1	1700	10	.01	20	.01
SBT	3	5100	1560	.31*	980	.19*
SBR	1	1700	30	.02	10	.01
EBL	1	1700	50	.03	30	.02
EBT	1	1700	40	.02*	50	.03*
EBR	1	1700	60	.04	60	.04
WBL	2	3400	130	.04*	460	.14*
WBT	1	1700	40	.02	40	.02
WBR	1	1700	10	.01	10	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.50**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02*	160	.09*
NBT	3	5100	740	.15	1180	.23
NBR	f		370		280	
SBL	1	1700	10	.01	20	.01
SBT	3	5100	1600	.31*	1020	.20*
SBR	1	1700	30	.02	20	.01
EBL	1	1700	50	.03	30	.02
EBT	1	1700	40	.02*	50	.03*
EBR	1	1700	60	.04	60	.04
WBL	2	3400	130	.04*	440	.13*
WBT	1	1700	40	.02	40	.02
WBR	1	1700	10	.01	10	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.50**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02*	150	.09*
NBT	3	5100	540	.11	770	.15
NBR	f		320		230	
SBL	1	1700	60	.04	50	.03
SBT	3	5100	940	.18*	720	.14*
SBR	1	1700	40	.02	10	.01
EBL	1	1700	60	.04*	40	.02
EBT	1	1700	40	.02	60	.04*
EBR	1	1700	50	.03	40	.02
WBL	2	3400	120	.04	380	.11*
WBT	1	1700	40	.02*	50	.03
WBR	1	1700	20	.01	40	.02
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.31**		**.43**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02*	140	.08*
NBT	3	5100	540	.11	800	.16
NBR	f		280		230	
SBL	1	1700	70	.04	60	.04
SBT	3	5100	950	.19*	740	.15*
SBR	1	1700	40	.02	20	.01
EBL	1	1700	60	.04*	40	.02
EBT	1	1700	40	.02	60	.04*
EBR	1	1700	50	.03	40	.02
WBL	2	3400	120	.04	370	.11*
WBT	1	1700	40	.02*	50	.03
WBR	1	1700	10	.01	40	.02
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.32**		**.43**

15. Alton & Portola

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02	160	.09*
NBT	2	3400	80	.02*	190	.06
NBR	f		470		840	
SBL	1	1700	210	.12*	80	.05
SBT	2	3400	140	.04	110	.03*
SBR	d	1700	0	.00	10	.01
EBL	2	3400	10	.00	10	.00
EBT	2	3400	290	.09*	110	.03*
EBR	f		100		80	
WBL	2	3400	660	.19*	550	.16*
WBT	3	5100	140	.03	240	.05
WBR	f		100		170	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.47**		**.36**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02	160	.09*
NBT	2	3400	70	.02*	190	.06
NBR	f		470		870	
SBL	1	1700	200	.12*	80	.05
SBT	2	3400	140	.04	110	.03*
SBR	d	1700	0	.00	10	.01
EBL	2	3400	10	.00	10	.00
EBT	2	3400	280	.08*	110	.03*
EBR	f		110		80	
WBL	2	3400	680	.20*	580	.17*
WBT	3	5100	140	.03	240	.05
WBR	f		100		150	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.47**		**.37**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	210	.12*
NBT	2	3400	70	.02*	100	.03
NBR	f		310		560	
SBL	1	1700	160	.09*	70	.04
SBT	2	3400	90	.03	70	.02*
SBR	d	1700	0	.00	10	.01
EBL	2	3400	10	.00	10	.00
EBT	2	3400	990	.29*	710	.21*
EBR	f		110		110	
WBL	2	3400	370	.11*	370	.11*
WBT	3	5100	780	.15	900	.18
WBR	f		80		120	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.56**		**.51**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	210	.12*
NBT	2	3400	60	.02*	90	.03
NBR	f		320		600	
SBL	1	1700	160	.09*	60	.04
SBT	2	3400	80	.02	80	.02*
SBR	d	1700	0	.00	10	.01
EBL	2	3400	10	.00	10	.00
EBT	2	3400	930	.27*	710	.21*
EBR	f		110		120	
WBL	2	3400	390	.11*	380	.11*
WBT	3	5100	870	.17	880	.17
WBR	f		90		110	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.54**		**.51**

16. Lake Forest & Portola

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02	60	.04
NBT	2	3400	210	.06*	180	.05*
NBR	d	1700	230	.14	560	.33
SBL	1	1700	220	.13*	290	.17*
SBT	2	3400	100	.03	250	.07
SBR	d	1700	20	.01	20	.01
EBL	2	3400	10	.00	20	.01
EBT	3	5100	490	.10	1520	.30*
EBR	d	1700	40	.02	40	.02
WBL	2	3400	760	.22	510	.15*
WBT	3	5100	1870	.37*	1150	.23
WBR	d	1700	300	.18	170	.10
Right Turn Adjustment					NBR	.17*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.61**		**.89**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02	70	.04
NBT	2	3400	210	.06*	200	.06*
NBR	d	1700	260	.15	420	.25
SBL	1	1700	220	.13*	280	.16*
SBT	2	3400	120	.04	230	.07
SBR	d	1700	20	.01	20	.01
EBL	2	3400	20	.01*	20	.01
EBT	3	5100	520	.10	1510	.30*
EBR	d	1700	50	.03	40	.02
WBL	2	3400	600	.18	490	.14*
WBT	3	5100	1770	.35*	1150	.23
WBR	d	1700	300	.18	150	.09
Right Turn Adjustment					NBR	.08*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.60**		**.79**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	50	.03	100	.06
NBT	2	3400	160	.05*	190	.06*
NBR	d	1700	240	.14	490	.29
SBL	1	1700	210	.12*	330	.19*
SBT	2	3400	90	.03	180	.05
SBR	d	1700	30	.02	30	.02
EBL	2	3400	30	.01*	20	.01
EBT	3	5100	710	.14	1640	.32*
EBR	d	1700	80	.05	50	.03
WBL	2	3400	720	.21	470	.14*
WBT	3	5100	1970	.39*	1310	.26
WBR	d	1700	300	.18	140	.08
Right Turn Adjustment					NBR	.12*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.62**		**.88**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	50	.03	120	.07
NBT	2	3400	160	.05*	200	.06*
NBR	d	1700	250	.15	410	.24
SBL	1	1700	210	.12*	320	.19*
SBT	2	3400	100	.03	190	.06
SBR	d	1700	20	.01	30	.02
EBL	2	3400	30	.01*	20	.01
EBT	3	5100	720	.14	1630	.32*
EBR	d	1700	90	.05	60	.04
WBL	2	3400	490	.14	450	.13*
WBT	3	5100	2020	.40*	1320	.26
WBR	d	1700	310	.18	140	.08
Right Turn Adjustment					NBR	.08*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.63**		**.83**

17. Lake Forest & Towne Centre

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	170	.05*	260	.08*
NBT	2	3400	630	.19	890	.26
NBR	d	1700	180	.11	100	.06
SBL	2	3400	10	.00	10	.00
SBT	2	3400	740	.22*	900	.26*
SBR	d	1700	20	.01	20	.01
EBL	1	1700	10	.01	10	.01
EBT	1	1700	80	.05*	170	.10*
EBR	1	1700	70	.04	280	.16
WBL	1	1700	70	.04*	100	.06*
WBT	2	3400	60	.02	60	.02
WBR	0	0	20		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.41**		**.55**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	170	.05*	250	.07*
NBT	2	3400	660	.19	770	.23
NBR	d	1700	170	.10	80	.05
SBL	2	3400	10	.00	10	.00
SBT	2	3400	610	.18*	870	.26*
SBR	d	1700	30	.02	20	.01
EBL	1	1700	10	.01	10	.01
EBT	1	1700	90	.05*	170	.10*
EBR	1	1700	80	.05	280	.16
WBL	1	1700	50	.03*	100	.06*
WBT	2	3400	60	.02	60	.02
WBR	0	0	10		10	
Right Turn Adjustment					EBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.36**		**.55**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	140	.04*	230	.07*
NBT	2	3400	580	.17	880	.26
NBR	d	1700	160	.09	130	.08
SBL	2	3400	10	.00	10	.00
SBT	2	3400	690	.20*	780	.23*
SBR	d	1700	60	.04	20	.01
EBL	1	1700	10	.01	10	.01
EBT	1	1700	90	.05*	180	.11*
EBR	1	1700	40	.02	250	.15
WBL	1	1700	90	.05*	100	.06*
WBT	2	3400	70	.03	60	.02
WBR	0	0	20		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.39**		**.52**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	140	.04*	230	.07*
NBT	2	3400	590	.17	810	.24
NBR	d	1700	160	.09	70	.04
SBL	2	3400	20	.01	10	.00
SBT	2	3400	530	.16*	780	.23*
SBR	d	1700	30	.02	20	.01
EBL	1	1700	10	.01	10	.01
EBT	1	1700	90	.05*	170	.10*
EBR	1	1700	50	.03	220	.13
WBL	1	1700	50	.03*	110	.06*
WBT	2	3400	60	.02	60	.02
WBR	0	0	10		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.33**		**.51**

18. Towne Centre & Portola

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	10	.01	30	.02*
NBT	1	1700	80	.05*	10	.01
NBR	1	1700	80	.05	280	.16
SBL	2	3400	40	.01*	270	.08
SBT	1	1700	10	.01	60	.08*
SBR	0	0	10		80	
EBL	2	3400	90	.03*	30	.01
EBT	3	5100	850	.17	2350	.46*
EBR	d	1700	10	.01	10	.01
WBL	2	3400	160	.05	60	.02*
WBT	3	5100	2920	.57*	1740	.34
WBR	d	1700	290	.17	90	.05
Right Turn Adjustment					NBR	.12*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.71**		**.75**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	20	.01	20	.01*
NBT	1	1700	80	.05*	10	.01
NBR	1	1700	80	.05	260	.15
SBL	2	3400	40	.01*	270	.08
SBT	1	1700	10	.01	60	.08*
SBR	0	0	10		80	
EBL	2	3400	90	.03*	40	.01
EBT	3	5100	900	.18	2190	.43*
EBR	d	1700	10	.01	10	.01
WBL	2	3400	150	.04	60	.02*
WBT	3	5100	2630	.52*	1720	.34
WBR	d	1700	290	.17	90	.05
Right Turn Adjustment					NBR	.12*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.71**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	10	.01	20	.01
NBT	1	1700	80	.05*	10	.01*
NBR	1	1700	80	.05	310	.18
SBL	2	3400	40	.01*	270	.08*
SBT	1	1700	10	.01	60	.07
SBR	0	0	10		60	
EBL	2	3400	90	.03*	30	.01
EBT	3	5100	1060	.21	2430	.48*
EBR	d	1700	10	.01	10	.01
WBL	2	3400	200	.06	60	.02*
WBT	3	5100	2960	.58*	1820	.36
WBR	d	1700	290	.17	90	.05
Right Turn Adjustment					NBR	.15*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.72**		**.79**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	20	.01	20	.01
NBT	1	1700	80	.05*	10	.01*
NBR	1	1700	80	.05	250	.15
SBL	2	3400	40	.01*	270	.08*
SBT	1	1700	10	.01	60	.07
SBR	0	0	10		60	
EBL	2	3400	90	.03*	30	.01
EBT	3	5100	1070	.21	2330	.46*
EBR	d	1700	10	.01	10	.01
WBL	2	3400	150	.04	60	.02*
WBT	3	5100	2750	.54*	1810	.35
WBR	d	1700	290	.17	90	.05
Right Turn Adjustment					NBR	.12*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.74**

19. Glenn Ranch & Portola

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	70	.04
NBT	2	3400	20	.01*	30	.02*
NBR	0	0	30	.02	90	.05
SBL	2	3400	400	.12*	380	.11*
SBT	2	3400	50	.01	20	.01
SBR	f		880		780	
EBL	2	3400	470	.14*	1080	.32*
EBT	3	5100	510	.10	1900	.37
EBR	1	1700	20	.01	80	.05
WBL	2	3400	110	.03	60	.02
WBT	3	5100	1760	.35*	810	.16*
WBR	1	1700	110	.06	320	.19
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION **.67** **.66**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	80	.05
NBT	2	3400	20	.01*	20	.01*
NBR	0	0	30	.02	90	.05
SBL	2	3400	430	.13*	380	.11*
SBT	2	3400	50	.01	20	.01
SBR	f		810		800	
EBL	2	3400	510	.15*	1050	.31*
EBT	3	5100	510	.10	1740	.34
EBR	1	1700	20	.01	80	.05
WBL	2	3400	110	.03	60	.02
WBT	3	5100	1570	.31*	780	.15*
WBR	1	1700	90	.05	330	.19
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION **.65** **.63**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	100	.06
NBT	2	3400	20	.01*	30	.02*
NBR	0	0	30	.02	60	.04
SBL	2	3400	370	.11*	350	.10*
SBT	2	3400	50	.01	20	.01
SBR	f		960		820	
EBL	2	3400	540	.16*	1170	.34*
EBT	3	5100	630	.12	1920	.38
EBR	1	1700	30	.02	80	.05
WBL	2	3400	90	.03	60	.02
WBT	3	5100	1750	.34*	810	.16*
WBR	1	1700	60	.04	260	.15
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION **.67** **.67**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	100	.06
NBT	2	3400	20	.01*	20	.01*
NBR	0	0	30	.02	60	.04
SBL	2	3400	410	.12*	360	.11*
SBT	2	3400	50	.01	20	.01
SBR	f		880		810	
EBL	2	3400	550	.16*	1130	.33*
EBT	3	5100	630	.12	1780	.35
EBR	1	1700	30	.02	80	.05
WBL	2	3400	90	.03	60	.02
WBT	3	5100	1610	.32*	810	.16*
WBR	1	1700	70	.04	270	.16
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION **.66** **.66**

20. Portola & SR-241

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	570	.17*	340	.10
NBT	3	5100	850	.17	810	.16*
NBR	f		90		170	
SBL	2	3400	230	.07	1280	.38*
SBT	3	5100	490	.10*	1000	.20
SBR	f		260		130	
EBL	1	1700	210	.12*	170	.10*
EBT	0	0	0		0	
EBR	f		400		490	
WBL	2	3400	270	.08	130	.04
WBT	0	0	0		0	
WBR	f		1930		430	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.69**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	560	.16*	370	.11
NBT	3	5100	840	.16	810	.16*
NBR	f		100		180	
SBL	2	3400	240	.07	1130	.33*
SBT	3	5100	530	.10*	1000	.20
SBR	f		260		120	
EBL	1	1700	180	.11*	160	.09*
EBT	0	0	0		0	
EBR	f		380		460	
WBL	2	3400	270	.08	150	.04
WBT	0	0	0		0	
WBR	f		1750		410	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.42**		**.63**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	530	.16*	330	.10
NBT	3	5100	920	.18	810	.16*
NBR	f		90		170	
SBL	2	3400	230	.07	1260	.37*
SBT	3	5100	580	.11*	1050	.21
SBR	f		260		80	
EBL	1	1700	100	.06	100	.06*
EBT	0	0	0		0	
EBR	f		340		470	
WBL	2	3400	260	.08*	130	.04
WBT	0	0	0		0	
WBR	f		1890		420	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.40**		**.64**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	520	.15*	340	.10
NBT	3	5100	910	.18	850	.17*
NBR	f		100		170	
SBL	2	3400	240	.07	1120	.33*
SBT	3	5100	620	.12*	1060	.21
SBR	f		260		80	
EBL	1	1700	100	.06	90	.05*
EBT	0	0	0		0	
EBR	f		320		460	
WBL	2	3400	260	.08*	130	.04
WBT	0	0	0		0	
WBR	f		1750		420	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.40**		**.60**

21. Portola & Rancho

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	1440	.42*	860	.25*
NBT	3	5100	1240	.24	1590	.31
NBR	d	1700	10	.01	10	.01
SBL	2	3400	10	.00	10	.00
SBT	3	5100	840	.16*	1480	.29*
SBR	1	1700	240	.14	50	.03
EBL	1.5		100		110	
EBT	0.5	3400	10	.03*	10	.04*
EBR	f		540		1420	
WBL	1.5		10		10	
WBT	1	6800	10	.00*	10	.00*
WBR	1.5		10		10	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION **.66** **.63**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	1240	.36*	810	.24*
NBT	3	5100	1230	.24	1620	.32
NBR	d	1700	10	.01	10	.01
SBL	2	3400	10	.00	10	.00
SBT	3	5100	820	.16*	1460	.29*
SBR	1	1700	260	.15	70	.04
EBL	1.5		110		130	
EBT	0.5	3400	10	.04*	10	.04*
EBR	f		530		1280	
WBL	1.5		10		10	
WBT	1	6800	10	.00*	10	.00*
WBR	1.5		10		10	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION **.61** **.62**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	1430	.42*	860	.25*
NBT	3	5100	1280	.25	1590	.31
NBR	d	1700	10	.01	10	.01
SBL	2	3400	10	.00	10	.00
SBT	3	5100	860	.17*	1520	.30*
SBR	1	1700	240	.14	50	.03
EBL	1.5		100		130	
EBT	0.5	3400	10	.03*	10	.04*
EBR	f		530		1430	
WBL	1.5		10		10	
WBT	1	6800	10	.00*	10	.00*
WBR	1.5		10		10	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION **.67** **.64**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	1260	.37*	810	.24*
NBT	3	5100	1250	.25	1620	.32
NBR	d	1700	10	.01	10	.01
SBL	2	3400	10	.00	10	.00
SBT	3	5100	860	.17*	1520	.30*
SBR	1	1700	250	.15	50	.03
EBL	1.5		110		130	
EBT	0.5	3400	10	.04*	10	.04*
EBR	f		530		1240	
WBL	1.5		10		10	
WBT	1	6800	10	.00*	10	.00*
WBR	1.5		10		10	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION **.63** **.63**

22. El Toro & Portola

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	490	.14*	490	.14
NBT	3	5100	190	.04	620	.12*
NBR	f		270		450	
SBL	1	1700	50	.03	350	.21*
SBT	3	5100	760	.15*	420	.08
SBR	2	3400	390	.11	850	.25
EBL	2	3400	80	.02*	560	.16
EBT	3	5100	640	.13	1740	.34*
EBR	1	1700	490	.29	900	.53
WBL	2	3400	470	.14	520	.15*
WBT	4	6800	2060	.30*	1140	.17
WBR	d	1700	20	.01	50	.03
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION **.66** **.87**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	450	.13*	430	.13
NBT	3	5100	190	.04	660	.13*
NBR	f		290		510	
SBL	1	1700	60	.04	350	.21*
SBT	3	5100	760	.15*	420	.08
SBR	2	3400	360	.11	820	.24
EBL	2	3400	70	.02	510	.15
EBT	3	5100	690	.14*	1640	.32*
EBR	1	1700	440	.26	850	.50
WBL	2	3400	580	.17*	550	.16*
WBT	4	6800	1920	.28	1140	.17
WBR	d	1700	20	.01	40	.02
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION **.64** **.87**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	490	.14*	460	.14
NBT	3	5100	190	.04	610	.12*
NBR	f		270		460	
SBL	1	1700	50	.03	350	.21*
SBT	3	5100	750	.15*	420	.08
SBR	2	3400	390	.11	850	.25
EBL	2	3400	80	.02*	570	.17
EBT	3	5100	650	.13	1740	.34*
EBR	1	1700	510	.30	910	.54
WBL	2	3400	460	.14	510	.15*
WBT	4	6800	2070	.30*	1150	.17
WBR	d	1700	20	.01	40	.02
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION **.66** **.87**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	450	.13*	420	.12
NBT	3	5100	190	.04	650	.13*
NBR	f		280		490	
SBL	1	1700	60	.04	350	.21*
SBT	3	5100	730	.14*	420	.08
SBR	2	3400	370	.11	820	.24
EBL	2	3400	70	.02*	520	.15
EBT	3	5100	680	.13	1670	.33*
EBR	1	1700	470	.28	820	.48
WBL	2	3400	560	.16	550	.16*
WBT	4	6800	1950	.29*	1150	.17
WBR	d	1700	20	.01	40	.02
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION **.63** **.88**

23. Los Alisos & Santa Margarita

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	450	.26*	380	.22*
NBT	2	3400	180	.05	390	.11
NBR	1	1700	110	.06	240	.14
SBL	1	1700	100	.06	30	.02
SBT	2	3400	450	.13*	280	.08*
SBR	d	1700	100	.06	220	.13
EBL	1	1700	80	.05*	140	.08
EBT	3	5100	770	.15	1860	.36*
EBR	d	1700	210	.12	430	.25
WBL	1	1700	450	.26	180	.11*
WBT	3	5100	1980	.39*	1130	.22
WBR	d	1700	0	.00	100	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.88**		**.82**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	430	.25*	400	.24*
NBT	2	3400	180	.05	380	.11
NBR	1	1700	100	.06	220	.13
SBL	1	1700	80	.05	30	.02
SBT	2	3400	450	.13*	290	.09*
SBR	d	1700	130	.08	220	.13
EBL	1	1700	60	.04*	190	.11
EBT	3	5100	800	.16	1800	.35*
EBR	d	1700	260	.15	410	.24
WBL	1	1700	400	.24	170	.10*
WBT	3	5100	1950	.38*	1130	.22
WBR	d	1700	0	.00	80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.85**		**.83**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	450	.26*	380	.22*
NBT	2	3400	180	.05	390	.11
NBR	1	1700	100	.06	230	.14
SBL	1	1700	100	.06	30	.02
SBT	2	3400	440	.13*	280	.08*
SBR	d	1700	100	.06	220	.13
EBL	1	1700	80	.05*	130	.08
EBT	3	5100	780	.15	1880	.37*
EBR	d	1700	210	.12	430	.25
WBL	1	1700	440	.26	180	.11*
WBT	3	5100	2000	.39*	1130	.22
WBR	d	1700	10	.01	100	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.88**		**.83**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	420	.25*	400	.24*
NBT	2	3400	190	.06	380	.11
NBR	1	1700	100	.06	230	.14
SBL	1	1700	80	.05	30	.02
SBT	2	3400	450	.13*	280	.08*
SBR	d	1700	120	.07	230	.14
EBL	1	1700	60	.04*	190	.11
EBT	3	5100	810	.16	1800	.35*
EBR	d	1700	230	.14	410	.24
WBL	1	1700	400	.24	160	.09*
WBT	3	5100	1960	.38*	1140	.22
WBR	d	1700	0	.00	80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.85**		**.81**

24. Alton & Commercentre

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1440	.28	2390	.47*
NBR	d	1700	420	.25	250	.15
SBL	1	1700	210	.12	130	.08*
SBT	3	5100	2630	.52*	1840	.36
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		120	.04*	460	.14*
WBT	0	5100	0		0	
WBR	1.5		70	{.00}	250	{.09}
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.61**		**.74**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1210	.24	2480	.49*
NBR	d	1700	420	.25	240	.14
SBL	1	1700	210	.12	140	.08*
SBT	3	5100	2670	.52*	1690	.33
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		170	.05*	450	.13*
WBT	0	5100	0		0	
WBR	1.5		80		210	.12
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.62**		**.75**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1290	.25	2170	.43*
NBR	d	1700	420	.25	240	.14
SBL	1	1700	210	.12	130	.08*
SBT	3	5100	2400	.47*	1680	.33
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		140	.04*	460	.14*
WBT	0	5100	0		0	
WBR	1.5		70		260	{.09}
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.56**		**.70**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1070	.21	2270	.45*
NBR	d	1700	420	.25	250	.15
SBL	1	1700	200	.12	150	.09*
SBT	3	5100	2530	.50*	1540	.30
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		180	.05*	450	.13*
WBT	0	5100	0		0	
WBR	1.5		70		220	.13
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.60**		**.72**

25. Alton & Irvine

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	80	.02*	590	.17*
NBT	3	5100	480	.09	1280	.25
NBR	f		70		200	
SBL	2	3400	230	.07	130	.04
SBT	3	5100	1350	.26*	600	.12*
SBR	f		630		1090	
EBL	3	5100	940	.18*	650	.13*
EBT	3	5100	1160	.23	940	.18
EBR	d	1700	580	.34	130	.08
WBL	2	3400	380	.11	130	.04
WBT	3	5100	860	.17*	1520	.30*
WBR	1	1700	80	.05	220	.13
Right Turn Adjustment			EBR	.08*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.76**		**.77**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	80	.02*	590	.17
NBT	3	5100	400	.08	1330	.26*
NBR	f		70		200	
SBL	2	3400	190	.06	100	.03*
SBT	3	5100	1390	.27*	560	.11
SBR	f		710		1010	
EBL	3	5100	790	.15	690	.14*
EBT	3	5100	1220	.24*	980	.19
EBR	d	1700	570	.34	120	.07
WBL	2	3400	390	.11*	130	.04
WBT	3	5100	890	.17	1520	.30*
WBR	1	1700	70	.04	220	.13
Right Turn Adjustment			EBR	.08*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.77**		**.78**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	80	.02*	630	.19*
NBT	3	5100	480	.09	1220	.24
NBR	f		70		200	
SBL	2	3400	270	.08	120	.04
SBT	3	5100	1320	.26*	580	.11*
SBR	f		410		970	
EBL	3	5100	790	.15	440	.09*
EBT	3	5100	1150	.23*	950	.19
EBR	d	1700	610	.36	140	.08
WBL	2	3400	370	.11*	120	.04
WBT	3	5100	860	.17	1480	.29*
WBR	1	1700	90	.05	250	.15
Right Turn Adjustment			EBR	.11*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.78**		**.73**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	80	.02*	620	.18*
NBT	3	5100	390	.08	1280	.25
NBR	f		70		200	
SBL	2	3400	250	.07	100	.03
SBT	3	5100	1410	.28*	540	.11*
SBR	f		510		870	
EBL	3	5100	640	.13	500	.10*
EBT	3	5100	1190	.23*	960	.19
EBR	d	1700	610	.36	130	.08
WBL	2	3400	370	.11*	130	.04
WBT	3	5100	870	.17	1520	.30*
WBR	1	1700	90	.05	250	.15
Right Turn Adjustment			EBR	.11*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.80**		**.74**

26. Bake & Commercentre

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04*	10	.01
NBT	2	3400	1180	.35	1430	.42*
NBR	d	1700	720	.42	220	.13
SBL	1	1700	30	.02	50	.03*
SBT	2	3400	1340	.39*	1010	.30
SBR	d	1700	60	.04	30	.02
EBL	1	1700	110	.06	190	.11
EBT	2	3400	180	.07*	90	.05*
EBR	0	0	60		70	
WBL	2	3400	310	.09*	620	.18*
WBT	1	1700	40	.04	120	.09
WBR	0	0	20		30	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.73**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04*	10	.01
NBT	2	3400	980	.29	1460	.43*
NBR	d	1700	700	.41	220	.13
SBL	1	1700	30	.02	60	.04*
SBT	2	3400	1450	.43*	920	.27
SBR	d	1700	80	.05	30	.02
EBL	1	1700	110	.06	180	.11
EBT	2	3400	180	.07*	100	.05*
EBR	0	0	50		70	
WBL	2	3400	280	.08*	600	.18*
WBT	1	1700	70	.05	120	.09
WBR	0	0	20		30	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.67**		**.75**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04*	10	.01
NBT	2	3400	1140	.34	1390	.41*
NBR	d	1700	720	.42	230	.14
SBL	1	1700	30	.02	50	.03*
SBT	2	3400	1280	.38*	980	.29
SBR	d	1700	70	.04	30	.02
EBL	1	1700	110	.06	180	.11
EBT	2	3400	170	.07*	80	.04*
EBR	0	0	60		70	
WBL	2	3400	300	.09*	610	.18*
WBT	1	1700	50	.04	130	.09
WBR	0	0	20		30	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.63**		**.71**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05*	10	.01
NBT	2	3400	950	.28	1430	.42*
NBR	d	1700	700	.41	230	.14
SBL	1	1700	30	.02	50	.03*
SBT	2	3400	1370	.40*	900	.26
SBR	d	1700	90	.05	30	.02
EBL	1	1700	100	.06	180	.11
EBT	2	3400	180	.07*	100	.05*
EBR	0	0	50		70	
WBL	2	3400	290	.09*	600	.18*
WBT	1	1700	70	.06	120	.09
WBR	0	0	30		30	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.73**

27. Bake & Trabuco

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	630	.19*	380	.11
NBT	3	5100	1440	.32	1380	.41*
NBR	0	0	210		740	.44
SBL	2	3400	30	.01	190	.06*
SBT	3	5100	1300	.25*	1560	.31
SBR	1	1700	230	.14	250	.15
EBL	2	3400	420	.12	260	.08
EBT	2.5	6800	420	.12*	1090	{.22}*
EBR	1.5		820	.24	610	
WBL	2	3400	800	.24*	280	.08*
WBT	4	6800	1350	.20	690	.10
WBR	d	1700	210	.12	30	.02
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.85**		**.82**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	640	.19*	370	.11
NBT	3	5100	1270	.29	1430	.42*
NBR	0	0	230		740	.44
SBL	2	3400	40	.01	180	.05*
SBT	3	5100	1370	.27*	1460	.29
SBR	1	1700	210	.12	230	.14
EBL	2	3400	420	.12	260	.08
EBT	2.5	6800	450	.13*	1080	{.22}*
EBR	1.5		790	.23	620	
WBL	2	3400	800	.24*	280	.08*
WBT	4	6800	1380	.20	730	.11
WBR	d	1700	190	.11	30	.02
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.88**		**.82**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	640	.19*	390	.11
NBT	3	5100	1410	.32	1370	.40*
NBR	0	0	210		730	.43
SBL	2	3400	30	.01	190	.06*
SBT	3	5100	1250	.25*	1530	.30
SBR	1	1700	200	.12	240	.14
EBL	2	3400	410	.12	250	.07
EBT	2.5	6800	400	.12*	1070	{.22}*
EBR	1.5		870	.26	620	
WBL	2	3400	800	.24*	280	.08*
WBT	4	6800	1350	.20	660	.10
WBR	d	1700	210	.12	30	.02
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.85**		**.81**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	650	.19*	380	.11
NBT	3	5100	1240	.29	1420	.42*
NBR	0	0	230		740	.44
SBL	2	3400	40	.01	180	.05*
SBT	3	5100	1320	.26*	1450	.28
SBR	1	1700	190	.11	240	.14
EBL	2	3400	410	.12	220	.06
EBT	2.5	6800	440	.13*	1090	{.21}*
EBR	1.5		840	.25	610	
WBL	2	3400	810	.24*	280	.08*
WBT	4	6800	1360	.20	710	.10
WBR	d	1700	190	.11	30	.02
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.87**		**.81**

28. Bake & Toledo

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	150	.09*	20	.01
NBT	3	5100	2010	.39	2250	.44*
NBR	d	1700	20	.01	350	.21
SBL	1	1700	70	.04	90	.05*
SBT	3	5100	2480	.49*	2310	.45
SBR	d	1700	200	.12	50	.03
EBL	2	3400	100	.03*	170	.05
EBT	2	3400	10	.00	380	.11*
EBR	1	1700	20	.01	160	.09
WBL	1	1700	250	.15	30	.02*
WBT	2	3400	570	.19*	50	.03
WBR	0	0	70		60	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.85**		**.67**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	150	.09*	20	.01
NBT	3	5100	1860	.36	2280	.45*
NBR	d	1700	20	.01	350	.21
SBL	1	1700	60	.04	100	.06*
SBT	3	5100	2530	.50*	2230	.44
SBR	d	1700	190	.11	50	.03
EBL	2	3400	100	.03*	190	.06
EBT	2	3400	10	.00	370	.11*
EBR	1	1700	20	.01	160	.09
WBL	1	1700	300	.18	30	.02*
WBT	2	3400	580	.19*	50	.03
WBR	0	0	60		60	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.86**		**.69**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	150	.09*	20	.01
NBT	3	5100	1980	.39	2230	.44*
NBR	d	1700	20	.01	350	.21
SBL	1	1700	60	.04	90	.05*
SBT	3	5100	2510	.49*	2270	.45
SBR	d	1700	170	.10	50	.03
EBL	2	3400	110	.03*	190	.06
EBT	2	3400	10	.00	370	.11*
EBR	1	1700	20	.01	160	.09
WBL	1	1700	220	.13	30	.02*
WBT	2	3400	580	.19*	50	.03
WBR	0	0	60		60	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.85**		**.67**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	150	.09*	20	.01
NBT	3	5100	1850	.36	2270	.45*
NBR	d	1700	20	.01	360	.21
SBL	1	1700	60	.04	100	.06*
SBT	3	5100	2540	.50*	2190	.43
SBR	d	1700	180	.11	50	.03
EBL	2	3400	100	.03*	200	.06
EBT	2	3400	10	.00	370	.11*
EBR	1	1700	20	.01	160	.09
WBL	1	1700	290	.17	30	.02*
WBT	2	3400	550	.18*	50	.03
WBR	0	0	60		60	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.85**		**.69**

29. Bake & Jeronimo

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	430	.13*	20	.01
NBT	3	5100	2250	.44	2400	.47*
NBR	d	1700	40	.02	380	.22
SBL	1	1700	90	.05	90	.05*
SBT	4	6800	2490	.38*	2280	.34
SBR	0	0	60		10	
EBL	2	3400	10	.00	120	.04
EBT	2	3400	80	.02*	540	.16*
EBR	1	1700	30	.02	400	.24
WBL	1	1700	350	.21*	130	.08*
WBT	3	5100	700	.15	130	.04
WBR	0	0	90		80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.79**		**.81**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	440	.13*	20	.01
NBT	3	5100	2120	.42	2410	.47*
NBR	d	1700	50	.03	380	.22
SBL	1	1700	80	.05	90	.05*
SBT	4	6800	2550	.39*	2210	.33
SBR	0	0	100		10	
EBL	2	3400	10	.00	130	.04
EBT	2	3400	80	.02*	550	.16*
EBR	1	1700	40	.02	390	.23
WBL	1	1700	330	.19*	130	.08*
WBT	3	5100	700	.15	140	.04
WBR	0	0	90		80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.78**		**.81**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	420	.12*	20	.01
NBT	3	5100	2230	.44	2390	.47*
NBR	d	1700	50	.03	370	.22
SBL	1	1700	90	.05	80	.05*
SBT	4	6800	2490	.37*	2260	.33
SBR	0	0	50		10	
EBL	2	3400	10	.00	100	.03
EBT	2	3400	80	.02*	580	.17*
EBR	1	1700	30	.02	380	.22
WBL	1	1700	320	.19*	130	.08*
WBT	3	5100	710	.16	130	.04
WBR	0	0	100		80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.75**		**.82**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	410	.12*	20	.01
NBT	3	5100	2110	.41	2420	.47*
NBR	d	1700	50	.03	380	.22
SBL	1	1700	80	.05	100	.06*
SBT	4	6800	2610	.39*	2150	.32
SBR	0	0	60		10	
EBL	2	3400	10	.00	120	.04
EBT	2	3400	70	.02*	550	.16*
EBR	1	1700	40	.02	400	.24
WBL	1	1700	270	.16*	130	.08*
WBT	3	5100	760	.17	140	.04
WBR	0	0	90		80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.74**		**.82**

30. Bake & Muirlands

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	280	.08	150	.04*
NBT	4	6800	2940	.43*	2590	.38
NBR	f		90		200	
SBL	2	3400	70	.02*	170	.05
SBT	4	6800	2400	.35	2790	.41*
SBR	f		230		80	
EBL	2	3400	50	.01*	290	.09
EBT	2	3400	112	.03	740	.22*
EBR	f		130		370	
WBL	2	3400	160	.05	90	.03*
WBT	2	3400	440	.13*	220	.06
WBR	f		70		90	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.75**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	260	.08*	140	.04*
NBT	4	6800	2810	.41	2620	.39
NBR	f		90		190	
SBL	2	3400	60	.02	170	.05
SBT	4	6800	2450	.36*	2710	.40*
SBR	f		220		90	
EBL	2	3400	50	.01*	260	.08
EBT	2	3400	112	.03	760	.22*
EBR	f		130		380	
WBL	2	3400	150	.04	90	.03*
WBT	2	3400	480	.14*	220	.06
WBR	f		100		110	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.74**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	270	.08	150	.04*
NBT	4	6800	2900	.43*	2580	.38
NBR	f		90		210	
SBL	2	3400	70	.02*	180	.05
SBT	4	6800	2360	.35	2740	.40*
SBR	f		240		80	
EBL	2	3400	50	.01*	280	.08
EBT	2	3400	112	.03	720	.21*
EBR	f		130		380	
WBL	2	3400	170	.05	90	.03*
WBT	2	3400	430	.13*	220	.06
WBR	f		80		100	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.73**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	270	.08	140	.04
NBT	4	6800	2810	.41*	2610	.38*
NBR	f		90		210	
SBL	2	3400	70	.02*	180	.05*
SBT	4	6800	2410	.35	2660	.39
SBR	f		240		90	
EBL	2	3400	50	.01*	280	.08
EBT	2	3400	112	.03	740	.22*
EBR	f		130		380	
WBL	2	3400	140	.04	90	.03*
WBT	2	3400	430	.13*	220	.06
WBR	f		60		120	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.62**		**.73**

31. Bake & Rockfield

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	200	.06	60	.02
NBT	4	6800	3120	.46*	2650	.39*
NBR	f		810		640	
SBL	2	3400	120	.04*	340	.10*
SBT	4	6800	2670	.39	2950	.43
SBR	1	1700	0	.00	10	.01
EBL	1	1700	10	.01	10	.01
EBT	2	3400	30	.01*	160	.05*
EBR	f		50		410	
WBL	3	5100	510	.10*	950	.19*
WBT	1	1700	160	.09	90	.05
WBR	d	1700	130	.08	130	.08
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.78**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	200	.06	60	.02
NBT	4	6800	2980	.44*	2660	.39*
NBR	f		830		650	
SBL	2	3400	130	.04*	340	.10*
SBT	4	6800	2690	.40	2860	.42
SBR	1	1700	0	.00	10	.01
EBL	1	1700	10	.01*	20	.01
EBT	2	3400	40	.01	170	.05*
EBR	f		40		410	
WBL	3	5100	510	.10	950	.19*
WBT	1	1700	170	.10*	80	.05
WBR	d	1700	120	.07	140	.08
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.78**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	200	.06	60	.02
NBT	4	6800	3060	.45*	2640	.39*
NBR	f		810		650	
SBL	2	3400	120	.04*	340	.10*
SBT	4	6800	2630	.39	2890	.43
SBR	1	1700	10	.01	10	.01
EBL	1	1700	10	.01	10	.01
EBT	2	3400	30	.01*	150	.04*
EBR	f		50		410	
WBL	3	5100	510	.10*	950	.19*
WBT	1	1700	150	.09	90	.05
WBR	d	1700	140	.08	140	.08
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.77**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	200	.06	60	.02
NBT	4	6800	2990	.44*	2660	.39*
NBR	f		830		650	
SBL	2	3400	130	.04*	340	.10*
SBT	4	6800	2660	.39	2820	.41
SBR	1	1700	0	.00	10	.01
EBL	1	1700	10	.01	20	.01
EBT	2	3400	40	.01*	150	.04*
EBR	f		40		420	
WBL	3	5100	510	.10*	960	.19*
WBT	1	1700	150	.09	80	.05
WBR	d	1700	120	.07	140	.08
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.77**

32. Bake & I-5 NB Ramps

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	3590	.53*	3070	.45*
NBR	f		170		910	
SBL	0	0	0		0	
SBT	3	5100	1090	.21	1730	.34
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	230	.14*	140	.08*
WBT	0	0	0		0	
WBR	3	5100	1100	.22	490	.10
Right Turn Adjustment			WBR	.08*	WBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.80**		**.60**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	3520	.52*	3110	.46*
NBR	f		170		930	
SBL	0	0	0		0	
SBT	3	5100	1090	.21	1710	.34
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	240	.14*	140	.08*
WBT	0	0	0		0	
WBR	3	5100	1040	.20	480	.09
Right Turn Adjustment			WBR	.06*	WBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.77**		**.60**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	3540	.52*	3060	.45*
NBR	f		240		910	
SBL	0	0	0		0	
SBT	3	5100	1110	.22	1740	.34
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	230	.14*	140	.08*
WBT	0	0	0		0	
WBR	3	5100	1100	.22	500	.10
Right Turn Adjustment			WBR	.08*	WBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.79**		**.60**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	3510	.52*	3100	.46*
NBR	f		170		940	
SBL	0	0	0		0	
SBT	3	5100	1080	.21	1730	.34
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	240	.14*	140	.08*
WBT	0	0	0		0	
WBR	3	5100	1070	.21	480	.09
Right Turn Adjustment			WBR	.07*	WBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.78**		**.60**

33. Bake & I-5 SB Ramps

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1080	.22*	1980	.41*
NBR	0	0	20		90	
SBL	0	0	0		0	
SBT	3	5100	930	.18	1250	.25
SBR	f		350		670	
EBL	3	5100	2860	.56*	2160	.42*
EBT	0	0	0		0	
EBR	1	1700	700	.41	220	.13
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.83** **.88**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1080	.22*	1960	.40*
NBR	0	0	20		100	
SBL	0	0	0		0	
SBT	3	5100	950	.19	1220	.24
SBR	f		360		670	
EBL	3	5100	2810	.55*	2220	.44*
EBT	0	0	0		0	
EBR	1	1700	720	.42	240	.14
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.82** **.89**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1110	.22*	2000	.41*
NBR	0	0	20		90	
SBL	0	0	0		0	
SBT	3	5100	960	.19	1260	.25
SBR	f		360		670	
EBL	3	5100	2820	.55*	2140	.42*
EBT	0	0	0		0	
EBR	1	1700	720	.42	230	.14
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.82** **.88**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1090	.22*	1990	.41*
NBR	0	0	20		90	
SBL	0	0	0		0	
SBT	3	5100	960	.19	1250	.25
SBR	f		360		670	
EBL	3	5100	2790	.55*	2180	.43*
EBT	0	0	0		0	
EBR	1	1700	730	.43	230	.14
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.82** **.89**

34. Lake Forest & Trabuco

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	270	.08*	250	.07
NBT	3	5100	940	.18	1140	.22*
NBR	1	1700	120	.07	720	.42
SBL	2	3400	280	.08	390	.11*
SBT	3	5100	1190	.27*	1060	.25
SBR	0	0	200		190	
EBL	2	3400	180	.05	260	.08
EBT	3	5100	710	.14*	1300	.25*
EBR	1	1700	430	.25	190	.11
WBL	2	3400	810	.24*	280	.08*
WBT	3	5100	1070	.21	760	.15
WBR	1	1700	440	.26	410	.24
Right Turn Adjustment			EBR	.05*	NBR	.14*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.83**		**.85**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	260	.08*	260	.08*
NBT	3	5100	930	.18	1150	.23
NBR	1	1700	100	.06	760	.45
SBL	2	3400	290	.09	320	.09
SBT	3	5100	1280	.29*	1070	.25*
SBR	0	0	210		180	
EBL	2	3400	200	.06	300	.09
EBT	3	5100	730	.14*	1240	.24*
EBR	1	1700	440	.26	190	.11
WBL	2	3400	840	.25*	240	.07*
WBT	3	5100	1090	.21	790	.15
WBR	1	1700	280	.16	410	.24
Right Turn Adjustment			EBR	.06*	NBR	.16*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.87**		**.85**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	270	.08*	250	.07
NBT	3	5100	910	.18	1110	.22*
NBR	1	1700	130	.08	730	.43
SBL	2	3400	290	.09	410	.12*
SBT	3	5100	1140	.26*	1050	.24
SBR	0	0	200		180	
EBL	2	3400	170	.05	260	.08
EBT	3	5100	710	.14*	1270	.25*
EBR	1	1700	420	.25	190	.11
WBL	2	3400	780	.23*	290	.09*
WBT	3	5100	1080	.21	750	.15
WBR	1	1700	460	.27	430	.25
Right Turn Adjustment			EBR	.05*	NBR	.14*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.81**		**.87**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	260	.08*	260	.08*
NBT	3	5100	900	.18	1120	.22
NBR	1	1700	90	.05	790	.46
SBL	2	3400	300	.09	320	.09
SBT	3	5100	1230	.28*	1060	.24*
SBR	0	0	200		180	
EBL	2	3400	190	.06	300	.09
EBT	3	5100	730	.14*	1250	.25*
EBR	1	1700	440	.26	190	.11
WBL	2	3400	780	.23*	260	.08*
WBT	3	5100	1090	.21	770	.15
WBR	1	1700	310	.18	440	.26
Right Turn Adjustment			EBR	.06*	NBR	.17*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.84**		**.87**

35. Lake Forest & Serrano

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	80	.05
NBT	3	5100	1140	.22	1950	.38*
NBR	d	1700	80	.05	110	.06
SBL	1	1700	70	.04	40	.02*
SBT	3	5100	2140	.42*	1450	.28
SBR	d	1700	220	.13	60	.04
EBL	1	1700	130	.08*	130	.08*
EBT	1	1700	60	.10	120	.11
EBR	0	0	110		70	
WBL	1	1700	90	.05	50	.03
WBT	1	1700	80	.09*	80	.08*
WBR	0	0	70		50	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.70**		**.61**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	80	.05
NBT	3	5100	1090	.21	2060	.40*
NBR	d	1700	80	.05	110	.06
SBL	1	1700	80	.05	40	.02*
SBT	3	5100	2260	.44*	1430	.28
SBR	d	1700	240	.14	60	.04
EBL	1	1700	130	.08*	90	.05
EBT	1	1700	60	.11	160	.14*
EBR	0	0	120		70	
WBL	1	1700	90	.05	40	.02*
WBT	1	1700	70	.09*	80	.08
WBR	0	0	80		50	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.72**		**.63**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	80	.05
NBT	3	5100	1130	.22	1920	.38*
NBR	d	1700	90	.05	140	.08
SBL	1	1700	70	.04	50	.03*
SBT	3	5100	2100	.41*	1440	.28
SBR	d	1700	200	.12	60	.04
EBL	1	1700	130	.08*	140	.08*
EBT	1	1700	60	.11	110	.11
EBR	0	0	120		80	
WBL	1	1700	100	.06	50	.03
WBT	1	1700	90	.09*	80	.08*
WBR	0	0	70		50	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.69**		**.62**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	80	.05
NBT	3	5100	1070	.21	1990	.39*
NBR	d	1700	80	.05	110	.06
SBL	1	1700	80	.05	40	.02*
SBT	3	5100	2210	.43*	1420	.28
SBR	d	1700	180	.11	60	.04
EBL	1	1700	140	.08*	140	.08*
EBT	1	1700	60	.11	110	.11
EBR	0	0	120		70	
WBL	1	1700	90	.05	40	.02
WBT	1	1700	130	.11*	80	.08*
WBR	0	0	60		50	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.73**		**.62**

36. El Toro & Trabuco

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	380	.11*	480	.14
NBT	3	5100	1190	.23	1410	.28*
NBR	1	1700	110	.06	610	.36
SBL	2	3400	280	.08	290	.09*
SBT	3	5100	1570	.31*	1010	.20
SBR	1	1700	490	.29	180	.11
EBL	2	3400	190	.06*	770	.23
EBT	3	5100	360	.11	1210	.27*
EBR	0	0	300	.18	190	
WBL	2	3400	320	.09	220	.06*
WBT	3	5100	1100	.22*	530	.10
WBR	1	1700	250	.15	170	.10
Right Turn Adjustment					NBR	.02*
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for SBR NBR						

TOTAL CAPACITY UTILIZATION **.75** **.77**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	340	.10*	490	.14
NBT	3	5100	1130	.22	1460	.29*
NBR	1	1700	120	.07	590	.35
SBL	2	3400	280	.08	270	.08*
SBT	3	5100	1720	.34*	960	.19
SBR	1	1700	450	.26	160	.09
EBL	2	3400	210	.06*	770	.23
EBT	3	5100	360	.11	1240	.28*
EBR	0	0	290	.17	170	
WBL	2	3400	280	.08	230	.07*
WBT	3	5100	1130	.22*	530	.10
WBR	1	1700	250	.15	170	.10
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for SBR NBR						

TOTAL CAPACITY UTILIZATION **.77** **.77**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	430	.13*	490	.14
NBT	3	5100	1150	.23	1400	.27*
NBR	1	1700	110	.06	570	.34
SBL	2	3400	280	.08	290	.09*
SBT	3	5100	1600	.31*	1000	.20
SBR	1	1700	430	.25	170	.10
EBL	2	3400	200	.06*	730	.21
EBT	3	5100	360	.11	1250	.28*
EBR	0	0	300	.18	190	
WBL	2	3400	300	.09	220	.06*
WBT	3	5100	1120	.22*	540	.11
WBR	1	1700	260	.15	160	.09
Right Turn Adjustment					NBR	.01*
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for SBR NBR						

TOTAL CAPACITY UTILIZATION **.77** **.76**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	340	.10*	510	.15
NBT	3	5100	1130	.22	1410	.28*
NBR	1	1700	120	.07	610	.36
SBL	2	3400	280	.08	270	.08*
SBT	3	5100	1720	.34*	940	.18
SBR	1	1700	420	.25	160	.09
EBL	2	3400	180	.05*	780	.23
EBT	3	5100	370	.11	1210	.27*
EBR	0	0	300	.18	180	
WBL	2	3400	290	.09	230	.07*
WBT	3	5100	1130	.22*	530	.10
WBR	1	1700	240	.14	170	.10
Right Turn Adjustment					NBR	.01*
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for SBR NBR						

TOTAL CAPACITY UTILIZATION **.76** **.76**

37. El Toro & Serrano

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	140	.08*	200	.12
NBT	3	5100	1630	.32	2440	.48*
NBR	d	1700	10	.01	30	.02
SBL	1	1700	10	.01	20	.01*
SBT	3	5100	1970	.39*	1380	.27
SBR	d	1700	200	.12	70	.04
EBL	1	1700	40	.02	20	.01
EBT	1	1700	10	.11*	20	.14*
EBR	0	0	170		210	
WBL	1	1700	30	.02*	20	.01*
WBT	1	1700	40	.05	10	.02
WBR	0	0	40		20	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.69**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	90	.05*	190	.11
NBT	3	5100	1560	.31	2490	.49*
NBR	d	1700	10	.01	30	.02
SBL	1	1700	10	.01	20	.01*
SBT	3	5100	1990	.39*	1300	.25
SBR	d	1700	280	.16	70	.04
EBL	1	1700	30	.02	30	.02
EBT	1	1700	10	.12*	20	.14*
EBR	0	0	190		210	
WBL	1	1700	30	.02*	30	.02*
WBT	1	1700	40	.05	10	.02
WBR	0	0	40		20	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.63**		**.71**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	190	.11
NBT	3	5100	1640	.32	2410	.47*
NBR	d	1700	10	.01	30	.02
SBL	1	1700	10	.01	20	.01*
SBT	3	5100	1950	.38*	1360	.27
SBR	d	1700	250	.15	70	.04
EBL	1	1700	50	.03	30	.02
EBT	1	1700	10	.11*	20	.14*
EBR	0	0	170		210	
WBL	1	1700	30	.02*	20	.01*
WBT	1	1700	40	.05	10	.02
WBR	0	0	40		20	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.62**		**.68**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	110	.06*	180	.11
NBT	3	5100	1550	.30	2470	.48*
NBR	d	1700	10	.01	30	.02
SBL	1	1700	10	.01	20	.01*
SBT	3	5100	2050	.40*	1290	.25
SBR	d	1700	250	.15	80	.05
EBL	1	1700	40	.02	30	.02
EBT	1	1700	10	.11*	20	.12*
EBR	0	0	180		190	
WBL	1	1700	30	.02*	30	.02*
WBT	1	1700	40	.05	10	.02
WBR	0	0	40		20	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.68**

38. El Toro & Jeronimo

2040 No-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05	70	.04
NBT	3	5100	1550	.30*	1800	.35*
NBR	1	1700	210	.12	190	.11
SBL	1	1700	430	.25*	170	.10*
SBT	3	5100	1520	.30	1030	.20
SBR	d	1700	110	.06	350	.21
EBL	1	1700	130	.08*	210	.12
EBT	2	3400	340	.13	650	.24*
EBR	0	0	100		160	
WBL	2	3400	510	.15	240	.07*
WBT	2	3400	750	.22*	530	.16
WBR	1	1700	120	.07	350	.21
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION **.90** **.81**

2040 With-Project Without Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06	80	.05
NBT	3	5100	1430	.28*	1860	.36*
NBR	1	1700	220	.13	160	.09
SBL	1	1700	390	.23*	180	.11*
SBT	3	5100	1600	.31	970	.19
SBR	d	1700	130	.08	350	.21
EBL	1	1700	130	.08*	220	.13
EBT	2	3400	340	.13	640	.24*
EBR	0	0	100		160	
WBL	2	3400	540	.16	230	.07*
WBT	2	3400	700	.21*	530	.16
WBR	1	1700	100	.06	350	.21
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION **.85** **.83**

2040 No-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05	70	.04
NBT	3	5100	1530	.30*	1800	.35*
NBR	1	1700	210	.12	170	.10
SBL	1	1700	450	.26*	180	.11*
SBT	3	5100	1480	.29	1030	.20
SBR	d	1700	110	.06	350	.21
EBL	1	1700	120	.07*	210	.12
EBT	2	3400	340	.13	650	.24*
EBR	0	0	100		160	
WBL	2	3400	520	.15	240	.07*
WBT	2	3400	740	.22*	520	.15
WBR	1	1700	100	.06	350	.21
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION **.90** **.82**

2040 With-Project With Portola Ext. (Scenario 1)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	90	.05	80	.05
NBT	3	5100	1440	.28*	1840	.36*
NBR	1	1700	220	.13	170	.10
SBL	1	1700	440	.26*	170	.10*
SBT	3	5100	1530	.30	940	.18
SBR	d	1700	130	.08	350	.21
EBL	1	1700	120	.07	210	.12
EBT	2	3400	330	.13*	640	.24*
EBR	0	0	110		170	
WBL	2	3400	510	.15*	240	.07*
WBT	2	3400	720	.21	530	.16
WBR	1	1700	110	.06	350	.21
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION **.87** **.82**

APPENDIX 8.1:

2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITHOUT AND WITH PORTOLA WESTERLY EXTENSION WITH SCENARIO 2 IMPROVEMENT ALTERNATIVE INTERSECTION OPERATIONS ANALYSIS WORKSHEETS

This Page Intentionally Left Blank

1. Lake Forest & Dimension

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06	50	.03
NBT	2	3400	910	.27*	840	.25*
NBR	d	1700	10	.01	10	.01
SBL	1	1700	30	.02*	50	.03*
SBT	2	3400	530	.16	820	.24
SBR	d	1700	620	.36	280	.16
EBL	1.5		350	{.11}*	620	{.19}*
EBT	0.5	3400	10	.11	10	.19
EBR	1	1700	100	.06	50	.03
WBL	1	1700	10	.01	30	.02
WBT	1	1700	10	.01*	10	.02*
WBR	0	0	10		20	
Right Turn Adjustment			SBR	.05*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.51**		**.54**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	110	.06	50	.03
NBT	2	3400	740	.22*	820	.24*
NBR	d	1700	10	.01	20	.01
SBL	1	1700	30	.02*	40	.02*
SBT	2	3400	570	.17	740	.22
SBR	d	1700	620	.36	300	.18
EBL	1.5		340	{.10}*	640	{.19}*
EBT	0.5	3400	10	.10	10	.19
EBR	1	1700	130	.08	60	.04
WBL	1	1700	10	.01	30	.02
WBT	1	1700	10	.01*	10	.02*
WBR	0	0	10		20	
Right Turn Adjustment			SBR	.10*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.50**		**.52**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	90	.05	40	.02
NBT	2	3400	890	.26*	820	.24*
NBR	d	1700	10	.01	10	.01
SBL	1	1700	30	.02*	50	.03*
SBT	2	3400	510	.15	810	.24
SBR	d	1700	620	.36	280	.16
EBL	1.5		360	{.11}*	610	{.18}*
EBT	0.5	3400	10	.11	10	.18
EBR	1	1700	90	.05	40	.02
WBL	1	1700	10	.01	30	.02
WBT	1	1700	10	.01*	10	.02*
WBR	0	0	10		20	
Right Turn Adjustment			SBR	.05*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.50**		**.52**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	110	.06	50	.03
NBT	2	3400	740	.22*	810	.24*
NBR	d	1700	10	.01	10	.01
SBL	1	1700	30	.02*	40	.02*
SBT	2	3400	550	.16	740	.22
SBR	d	1700	620	.36	290	.17
EBL	1.5		330	{.10}*	650	{.19}*
EBT	0.5	3400	10	.10	10	.19
EBR	1	1700	120	.07	50	.03
WBL	1	1700	10	.01	30	.02
WBT	1	1700	10	.01*	10	.02*
WBR	0	0	10		20	
Right Turn Adjustment			SBR	.10*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.50**		**.52**

2. Lake Forest & Rancho

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	360	.21*	310	.18
NBT	2	3400	690	.20	1150	.34*
NBR	d	1700	470	.28	690	.41
SBL	1	1700	290	.17	230	.14*
SBT	2	3400	770	.23*	810	.24
SBR	d	1700	400	.24	120	.07
EBL	1	1700	30	.02*	170	.10
EBT	2	3400	360	.11	750	.22*
EBR	1	1700	80	.05	250	.15
WBL	2	3400	530	.16	510	.15*
WBT	2	3400	870	.26*	600	.18
WBR	1	1700	130	.08	340	.20
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.77**		**.90**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06	260	.15
NBT	2	3400	710	.21*	1090	.32*
NBR	d	1700	480	.28	770	.45
SBL	1	1700	260	.15*	240	.14*
SBT	2	3400	800	.24	810	.24
SBR	d	1700	90	.05	100	.06
EBL	1	1700	80	.05	40	.02
EBT	2	3400	350	.10*	580	.17*
EBR	1	1700	100	.06	120	.07
WBL	2	3400	570	.17*	550	.16*
WBT	2	3400	660	.19	490	.14
WBR	1	1700	130	.08	320	.19
Right Turn Adjustment				NBR		.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.85**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	380	.22*	310	.18
NBT	2	3400	690	.20	1170	.34*
NBR	d	1700	470	.28	680	.40
SBL	1	1700	290	.17	240	.14*
SBT	2	3400	790	.23*	810	.24
SBR	d	1700	340	.20	100	.06
EBL	1	1700	30	.02*	140	.08
EBT	2	3400	360	.11	760	.22*
EBR	1	1700	80	.05	250	.15
WBL	2	3400	510	.15	510	.15*
WBT	2	3400	880	.26*	600	.18
WBR	1	1700	130	.08	320	.19
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.78**		**.90**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06	260	.15
NBT	2	3400	710	.21*	1120	.33*
NBR	d	1700	490	.29	740	.44
SBL	1	1700	250	.15*	240	.14*
SBT	2	3400	770	.23	810	.24
SBR	d	1700	60	.04	100	.06
EBL	1	1700	70	.04	30	.02
EBT	2	3400	360	.11*	580	.17*
EBR	1	1700	100	.06	130	.08
WBL	2	3400	570	.17*	540	.16*
WBT	2	3400	680	.20	490	.14
WBR	1	1700	130	.08	310	.18
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.69**		**.85**

3. Lake Forest & SR-241 SB Off-Ramp

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	820	.24*	1530	.45*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	790	.23	820	.24
SBR	0	0	0		0	
EBL	2	3400	320	.09*	160	.05*
EBT	0	0	0		0	
EBR	1	1700	620	.36	260	.15
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.26*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.55**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	850	.25*	1320	.39*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	620	.18	820	.24
SBR	0	0	0		0	
EBL	2	3400	350	.10*	170	.05*
EBT	0	0	0		0	
EBR	1	1700	440	.26	290	.17
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.11*	EBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.51**		**.50**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	820	.24	1510	.44*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	860	.25*	900	.26
SBR	0	0	0		0	
EBL	2	3400	200	.06*	80	.02*
EBT	0	0	0		0	
EBR	1	1700	490	.29	210	.12
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.23*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.59**		**.51**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	850	.25*	1330	.39*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	650	.19	880	.26
SBR	0	0	0		0	
EBL	2	3400	210	.06*	100	.03*
EBT	0	0	0		0	
EBR	1	1700	360	.21	250	.15
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.10*	EBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.46**		**.49**

4. Lake Forest & SR-241 NB On-Ramp

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	160	.05*	450	.13*
NBT	2	3400	990	.29	1240	.36
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	800	.24*	820	.24*
SBR	1	1700	80	.05	450	.26
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					SBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.34**		**.44**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	180	.05	400	.12*
NBT	2	3400	1010	.30*	1100	.32
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	620	.18	820	.24*
SBR	1	1700	90	.05	420	.25
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					SBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.35**		**.42**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	110	.03*	370	.11*
NBT	2	3400	890	.26	1230	.36
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	870	.26*	900	.26*
SBR	1	1700	10	.01	240	.14
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.34**		**.42**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	130	.04	330	.10*
NBT	2	3400	900	.26*	1100	.32
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	650	.19	880	.26*
SBR	1	1700	10	.01	220	.13
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.31**		**.41**

5. Corridor Center & Rancho

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	0	.00	10	.01
NBT	1	1700	10	.01*	10	.01*
NBR	1	1700	200	.12	920	.54
SBL	1	1700	40	.02*	150	.09*
SBT	1	1700	20	.01	10	.01
SBR	1	1700	40	.02	40	.02
EBL	1	1700	70	.04	60	.04
EBT	2	3400	350	.10*	570	.17*
EBR	1	1700	0	.00	0	.00
WBL	2	3400	1300	.38*	330	.10*
WBT	2	3400	350	.10	590	.17
WBR	d	1700	80	.05	140	.08
Right Turn Adjustment					NBR	.45*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.56**		**.87**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02	10	.01
NBT	1	1700	10	.15*	0	.07*
NBR	0	0	240		120	
SBL	1	1700	60	.04*	160	.09*
SBT	1	1700	0	.00	10	.01
SBR	1	1700	40	.02	50	.03
EBL	1	1700	60	.04	60	.04
EBT	2	3400	350	.10*	690	.20*
EBR	1	1700	100	.06	30	.02
WBL	1	1700	170	.10*	170	.10*
WBT	2	3400	510	.15	550	.16
WBR	d	1700	100	.06	160	.09
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.51**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	0	.00	10	.01
NBT	1	1700	10	.01*	10	.01*
NBR	1	1700	200	.12	890	.52
SBL	1	1700	40	.02*	150	.09*
SBT	1	1700	20	.01	10	.01
SBR	1	1700	40	.02	50	.03
EBL	1	1700	80	.05	60	.04
EBT	2	3400	350	.10*	570	.17*
EBR	1	1700	0	.00	0	.00
WBL	2	3400	1260	.37*	310	.09*
WBT	2	3400	360	.11	590	.17
WBR	d	1700	80	.05	140	.08
Right Turn Adjustment					NBR	.44*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.55**		**.85**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02	10	.01
NBT	1	1700	10	.15*	0	.07*
NBR	0	0	240		120	
SBL	1	1700	50	.03*	150	.09*
SBT	1	1700	20	.01	10	.01
SBR	1	1700	40	.02	50	.03
EBL	1	1700	70	.04	60	.04
EBT	2	3400	370	.11*	650	.19*
EBR	1	1700	100	.06	30	.02
WBL	1	1700	170	.10*	170	.10*
WBT	2	3400	520	.15	570	.17
WBR	d	1700	80	.05	150	.09
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.50**

6. Bake & Portola

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04*	280	.16
NBT	1.5	5100	150	{.04}	310	.18*
NBR	1.5		90		870	.26
SBL	1	1700	140	.08	300	.18*
SBT	2	3400	260	.08*	280	.08
SBR	d	1700	280	.16	340	.20
EBL	2	3400	410	.12	460	.14
EBT	3	5100	280	.05*	800	.16*
EBR	d	1700	70	.04	60	.04
WBL	2	3400	1030	.30*	590	.17*
WBT	3	5100	700	.14	930	.18
WBR	d	1700	130	.08	100	.06
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.52** **.74**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04	250	.15
NBT	1.5	5100	160	.05*	290	.17*
NBR	1.5		100		880	.26
SBL	1	1700	150	.09*	290	.17*
SBT	2	3400	240	.07	280	.08
SBR	d	1700	280	.16	360	.21
EBL	2	3400	400	.12	470	.14*
EBT	3	5100	290	.06*	800	.16
EBR	d	1700	60	.04	70	.04
WBL	2	3400	930	.27*	590	.17
WBT	3	5100	700	.14	950	.19*
WBR	d	1700	130	.08	100	.06
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.52** **.72**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04	300	.18
NBT	1.5	5100	140	{.04}*	300	.18*
NBR	1.5		90		860	.25
SBL	1	1700	140	.08*	240	.14*
SBT	2	3400	250	.07	280	.08
SBR	d	1700	300	.18	440	.26
EBL	2	3400	470	.14	480	.14*
EBT	3	5100	530	.10*	1040	.20
EBR	d	1700	130	.08	70	.04
WBL	2	3400	940	.28*	570	.17
WBT	3	5100	890	.17	1240	.24*
WBR	d	1700	120	.07	100	.06
Right Turn Adjustment					SBR	.01*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.55** **.76**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05	270	.16
NBT	1.5	5100	150	{.04}*	280	.16*
NBR	1.5		100		860	.25
SBL	1	1700	150	.09*	250	.15*
SBT	2	3400	230	.07	280	.08
SBR	d	1700	290	.17	440	.26
EBL	2	3400	460	.14	490	.14*
EBT	3	5100	530	.10*	1050	.21
EBR	d	1700	90	.05	80	.05
WBL	2	3400	930	.27*	580	.17
WBT	3	5100	950	.19	1270	.25*
WBR	d	1700	110	.06	100	.06
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.55** **.75**

7. Bake & Towne Centre

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	220	.06*	430	.13
NBT	2	3400	380	.11	1310	.39*
NBR	d	1700	90	.05	180	.11
SBL	2	3400	10	.00	30	.01*
SBT	2	3400	1440	.42*	430	.13
SBR	d	1700	60	.04	80	.05
EBL	1	1700	10	.01	60	.04
EBT	1	1700	40	.02*	190	.11*
EBR	1	1700	150	.09	390	.23
WBL	1	1700	130	.08*	160	.09*
WBT	2	3400	70	.02	130	.04
WBR	0	0	10		10	
Right Turn Adjustment			EBR	.02*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.65**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	270	.08*	410	.12
NBT	2	3400	440	.13	1320	.39*
NBR	d	1700	120	.07	180	.11
SBL	2	3400	10	.00	30	.01*
SBT	2	3400	1300	.38*	380	.11
SBR	d	1700	60	.04	80	.05
EBL	1	1700	10	.01	60	.04
EBT	1	1700	50	.03*	190	.11*
EBR	1	1700	140	.08	410	.24
WBL	1	1700	120	.07*	180	.11*
WBT	2	3400	50	.02	140	.04
WBR	0	0	10		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.61**		**.67**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	210	.06*	420	.12
NBT	2	3400	360	.11	1300	.38*
NBR	d	1700	100	.06	180	.11
SBL	2	3400	10	.00	30	.01*
SBT	2	3400	1410	.41*	420	.12
SBR	d	1700	50	.03	80	.05
EBL	1	1700	10	.01	60	.04
EBT	1	1700	50	.03*	210	.12*
EBR	1	1700	140	.08	360	.21
WBL	1	1700	170	.10*	170	.10*
WBT	2	3400	80	.03	140	.04
WBR	0	0	10		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.66**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	260	.08*	410	.12
NBT	2	3400	430	.13	1290	.38*
NBR	d	1700	120	.07	170	.10
SBL	2	3400	10	.00	30	.01*
SBT	2	3400	1330	.39*	400	.12
SBR	d	1700	50	.03	100	.06
EBL	1	1700	10	.01	60	.04
EBT	1	1700	50	.03*	190	.11*
EBR	1	1700	130	.08	400	.24
WBL	1	1700	130	.08*	180	.11*
WBT	2	3400	60	.02	150	.05
WBR	0	0	10		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.63**		**.66**

8. Bake & Rancho North

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	680	.20	1780	.52*
NBR	d	1700	330	.19	490	.29
SBL	1	1700	60	.04	130	.08*
SBT	2	3400	1670	.49*	840	.25
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	380	.11*	470	.14*
WBT	0	0	0		0	
WBR	2	3400	10	.00	160	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.79**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	750	.22	1760	.52*
NBR	d	1700	370	.22	580	.34
SBL	1	1700	110	.06	150	.09*
SBT	2	3400	1440	.42*	820	.24
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	620	.18*	430	.13*
WBT	0	0	0		0	
WBR	2	3400	80	.02	160	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.79**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	660	.19	1750	.51*
NBR	d	1700	330	.19	510	.30
SBL	1	1700	60	.04	110	.06*
SBT	2	3400	1670	.49*	820	.24
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	390	.11*	470	.14*
WBT	0	0	0		0	
WBR	2	3400	10	.00	170	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.76**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	730	.21	1700	.50*
NBR	d	1700	390	.23	580	.34
SBL	1	1700	130	.08	160	.09*
SBT	2	3400	1430	.42*	820	.24
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	630	.19*	440	.13*
WBT	0	0	0		0	
WBR	2	3400	80	.02	170	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.77**

9. Bake & Rancho South

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	200	.12*	170	.10
NBT	2	3400	810	.24	1880	.55*
NBR	1	1700	360	.21	120	.07
SBL	1	1700	130	.08	60	.04*
SBT	2	3400	1660	.49*	1050	.31
SBR	1	1700	270	.16	200	.12
EBL	2	3400	170	.05	280	.08*
EBT	2	3400	380	.16*	70	.04
EBR	0	0	150		150	.09
WBL	2	3400	90	.03*	290	.09
WBT	2	3400	50	.03	350	.14*
WBR	0	0	40		120	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.85**		**.86**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	180	.11*	180	.11
NBT	2	3400	860	.25	1980	.58*
NBR	1	1700	100	.06	110	.06
SBL	1	1700	10	.01	40	.02*
SBT	2	3400	1720	.51*	1010	.30
SBR	1	1700	330	.19	200	.12
EBL	2	3400	190	.06*	330	.10*
EBT	1	1700	60	.04	80	.05
EBR	d	1700	140	.08	180	.11
WBL	2	3400	210	.06	110	.03
WBT	1	1700	80	.05*	40	.02*
WBR	1	1700	60	.04	20	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.78**		**.77**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	190	.11*	150	.09
NBT	2	3400	780	.23	1850	.54*
NBR	1	1700	350	.21	120	.07
SBL	1	1700	180	.11	70	.04*
SBT	2	3400	1630	.48*	1030	.30
SBR	1	1700	250	.15	200	.12
EBL	2	3400	170	.05	280	.08*
EBT	2	3400	390	.16*	90	.05
EBR	0	0	140		140	.08
WBL	2	3400	80	.02*	290	.09
WBT	2	3400	50	.03	350	.15*
WBR	0	0	40		150	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.82**		**.86**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	180	.11*	170	.10
NBT	2	3400	850	.25	1960	.58*
NBR	1	1700	100	.06	110	.06
SBL	1	1700	10	.01	40	.02*
SBT	2	3400	1710	.50*	1020	.30
SBR	1	1700	340	.20	200	.12
EBL	2	3400	200	.06*	290	.09*
EBT	1	1700	60	.04	80	.05
EBR	d	1700	130	.08	160	.09
WBL	2	3400	210	.06	110	.03
WBT	1	1700	80	.05*	40	.02*
WBR	1	1700	60	.04	20	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.77**		**.76**

10. Bake & Orchard

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	1370	.40	2190	.64*
NBR	1	1700	0	.00	0	.00
SBL	0	0	0		0	
SBT	2	3400	1870	.55*	1460	.43
SBR	d	1700	10	.01	10	.01
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1700	20	.01	60	.04
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	1	1700	0	.00	0	.00
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.61**		**.69**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	1130	.33	2250	.66*
NBR	1	1700	20	.01	50	.03
SBL	0	0	0		0	
SBT	2	3400	2060	.61*	1290	.38
SBR	d	1700	10	.01	10	.01
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1700	20	.01	60	.04
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	1	1700	30	.02	20	.01
Right Turn Adjustment			EBR	.01*	WBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.67**		**.72**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	1320	.39	2130	.63*
NBR	1	1700	0	.00	0	.00
SBL	0	0	0		0	
SBT	2	3400	1810	.53*	1430	.42
SBR	d	1700	10	.01	10	.01
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1700	20	.01	60	.04
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	1	1700	0	.00	0	.00
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.59**		**.68**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	1120	.33	2220	.65*
NBR	1	1700	20	.01	50	.03
SBL	0	0	0		0	
SBT	2	3400	2040	.60*	1270	.37
SBR	d	1700	10	.01	10	.01
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1700	20	.01	60	.04
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	1	1700	30	.02	20	.01
Right Turn Adjustment			EBR	.01*	WBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.71**

11. Dimension & Bake

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	70	.02	190	.06*
NBT	1	1700	10	.01*	40	.02
NBR	1	1700	160	.09	380	.22
SBL	1	1700	110	.06*	40	.02
SBT	1	1700	40	.02	10	.01*
SBR	1	1700	70	.04	20	.01
EBL	1	1700	10	.01	50	.03
EBT	2	3400	1210	.36*	1640	.48*
EBR	d	1700	110	.06	50	.03
WBL	1	1700	340	.20*	240	.14*
WBT	2	3400	1550	.46	1310	.39
WBR	d	1700	30	.02	100	.06
Right Turn Adjustment					NBR	.06*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.80**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	70	.02	210	.06*
NBT	1	1700	10	.01*	40	.02
NBR	1	1700	130	.08	370	.22
SBL	1	1700	90	.05*	50	.03
SBT	1	1700	50	.03	20	.01*
SBR	1	1700	70	.04	20	.01
EBL	1	1700	10	.01*	50	.03
EBT	2	3400	980	.29	1690	.50*
EBR	d	1700	120	.07	50	.03
WBL	1	1700	310	.18	210	.12*
WBT	2	3400	1680	.49*	1170	.34
WBR	d	1700	20	.01	80	.05
Right Turn Adjustment					NBR	.09*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.61**		**.83**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	70	.02	190	.06*
NBT	1	1700	10	.01*	40	.02
NBR	1	1700	160	.09	390	.23
SBL	1	1700	110	.06*	40	.02
SBT	1	1700	40	.02	10	.01*
SBR	1	1700	70	.04	20	.01
EBL	1	1700	10	.01	50	.03
EBT	2	3400	1170	.34*	1580	.46*
EBR	d	1700	120	.07	50	.03
WBL	1	1700	340	.20*	250	.15*
WBT	2	3400	1480	.44	1280	.38
WBR	d	1700	30	.02	100	.06
Right Turn Adjustment					NBR	.07*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.80**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	70	.02	210	.06*
NBT	1	1700	10	.01*	40	.02
NBR	1	1700	140	.08	370	.22
SBL	1	1700	100	.06*	40	.02
SBT	1	1700	40	.02	20	.01*
SBR	1	1700	60	.04	20	.01
EBL	1	1700	10	.01*	50	.03
EBT	2	3400	960	.28	1640	.48*
EBR	d	1700	110	.06	50	.03
WBL	1	1700	330	.19	210	.12*
WBT	2	3400	1610	.47*	1140	.34
WBR	d	1700	30	.02	80	.05
Right Turn Adjustment					NBR	.08*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.60**		**.80**

12. Alton & Rancho South

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	200	.06*	140	.04
NBT	3	5100	1080	.21	1990	.39*
NBR	1	1700	520	.31	370	.22
SBL	2	3400	250	.07	50	.01*
SBT	3	5100	2170	.43*	1390	.27
SBR	d	1700	170	.10	110	.06
EBL	1	1700	60	.04	210	.12
EBT	2	3400	40	.01*	60	.02*
EBR	1	1700	110	.06	220	.13
WBL	1	1700	270	.16*	530	.31*
WBT	2	3400	90	.03	70	.02
WBR	d	1700	30	.02	330	.19
Right Turn Adjustment					EBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.71**		**.79**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	160	.05*	130	.04
NBT	3	5100	980	.19	1970	.39*
NBR	1	1700	420	.25	460	.27
SBL	2	3400	180	.05	50	.01*
SBT	3	5100	2080	.41*	1380	.27
SBR	d	1700	170	.10	110	.06
EBL	1	1700	60	.04	200	.12
EBT	2	3400	30	.01*	110	.03*
EBR	1	1700	110	.06	190	.11
WBL	1	1700	380	.22*	430	.25*
WBT	2	3400	120	.04	70	.02
WBR	d	1700	70	.04	220	.13
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.75**		**.73**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	210	.06*	140	.04
NBT	3	5100	930	.18	1770	.35*
NBR	1	1700	520	.31	390	.23
SBL	2	3400	260	.08	60	.02*
SBT	3	5100	1920	.38*	1280	.25
SBR	d	1700	180	.11	110	.06
EBL	1	1700	60	.04	220	.13
EBT	2	3400	40	.01*	60	.02*
EBR	1	1700	110	.06	220	.13
WBL	1	1700	290	.17*	490	.29*
WBT	2	3400	80	.02	70	.02
WBR	d	1700	30	.02	340	.20
Right Turn Adjustment					EBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.67**		**.75**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	160	.05*	130	.04
NBT	3	5100	820	.16	1760	.35*
NBR	1	1700	420	.25	460	.27
SBL	2	3400	180	.05	50	.01*
SBT	3	5100	1870	.37*	1230	.24
SBR	d	1700	180	.11	110	.06
EBL	1	1700	60	.04	220	.13
EBT	2	3400	30	.01*	80	.02*
EBR	1	1700	120	.07	200	.12
WBL	1	1700	430	.25*	420	.25*
WBT	2	3400	120	.04	70	.02
WBR	d	1700	60	.04	220	.13
Right Turn Adjustment			EBR	.02*	EBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.75**		**.69**

13. Alton & SR-241

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	130	.08*	470	.28*
NBT	3	5100	760	.15	1280	.25
NBR	f		310		1030	
SBL	1	1700	130	.08	80	.05
SBT	3	5100	1270	.25*	1060	.21*
SBR	f		330		260	
EBL	2	3400	350	.10	290	.09
EBT	0	0	0		0	
EBR	f		490		160	
WBL	2	3400	1050	.31*	470	.14*
WBT	0	0	0		0	
WBR	f		80		120	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.69**		**.68**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	180	.11*	340	.20*
NBT	3	5100	760	.15	1320	.26
NBR	f		300		950	
SBL	1	1700	140	.08	90	.05
SBT	3	5100	1290	.25*	1070	.21*
SBR	f		350		260	
EBL	2	3400	330	.10	290	.09
EBT	0	0	0		0	
EBR	f		410		160	
WBL	2	3400	930	.27*	490	.14*
WBT	0	0	0		0	
WBR	f		70		110	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.60**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	120	.07*	430	.25*
NBT	3	5100	620	.12	1020	.20
NBR	f		320		1120	
SBL	1	1700	140	.08	80	.05
SBT	3	5100	930	.18*	900	.18*
SBR	f		30		70	
EBL	2	3400	170	.05	50	.01
EBT	0	0	0		0	
EBR	f		470		140	
WBL	2	3400	1200	.35*	530	.16*
WBT	0	0	0		0	
WBR	f		100		130	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.64**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	160	.09*	290	.17*
NBT	3	5100	610	.12	1040	.20
NBR	f		330		1090	
SBL	1	1700	140	.08	80	.05
SBT	3	5100	950	.19*	900	.18*
SBR	f		30		80	
EBL	2	3400	170	.05	50	.01
EBT	0	0	0		0	
EBR	f		370		140	
WBL	2	3400	1110	.33*	540	.16*
WBT	0	0	0		0	
WBR	f		80		130	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.56**

14. Alton & Towne Centre

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02*	160	.09*
NBT	3	5100	740	.15	1140	.22
NBR	f		400		280	
SBL	1	1700	10	.01	20	.01
SBT	3	5100	1560	.31*	980	.19*
SBR	1	1700	30	.02	10	.01
EBL	1	1700	50	.03	30	.02
EBT	1	1700	40	.02*	50	.03*
EBR	1	1700	60	.04	60	.04
WBL	2	3400	130	.04*	460	.14*
WBT	1	1700	40	.02	40	.02
WBR	1	1700	10	.01	10	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.50**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02*	160	.09*
NBT	3	5100	740	.15	1180	.23
NBR	f		370		280	
SBL	1	1700	10	.01	20	.01
SBT	3	5100	1600	.31*	1020	.20*
SBR	1	1700	30	.02	20	.01
EBL	1	1700	50	.03	30	.02
EBT	1	1700	40	.02*	50	.03*
EBR	1	1700	60	.04	60	.04
WBL	2	3400	130	.04*	440	.13*
WBT	1	1700	40	.02	40	.02
WBR	1	1700	10	.01	10	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.50**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02*	150	.09*
NBT	3	5100	540	.11	770	.15
NBR	f		320		230	
SBL	1	1700	60	.04	50	.03
SBT	3	5100	940	.18*	720	.14*
SBR	1	1700	40	.02	10	.01
EBL	1	1700	60	.04*	40	.02
EBT	1	1700	40	.02	60	.04*
EBR	1	1700	50	.03	40	.02
WBL	2	3400	120	.04	380	.11*
WBT	1	1700	40	.02*	50	.03
WBR	1	1700	20	.01	40	.02
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.31**		**.43**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02*	140	.08*
NBT	3	5100	540	.11	800	.16
NBR	f		280		230	
SBL	1	1700	70	.04	60	.04
SBT	3	5100	950	.19*	740	.15*
SBR	1	1700	40	.02	20	.01
EBL	1	1700	60	.04*	40	.02
EBT	1	1700	40	.02	60	.04*
EBR	1	1700	50	.03	40	.02
WBL	2	3400	120	.04	370	.11*
WBT	1	1700	40	.02*	50	.03
WBR	1	1700	10	.01	40	.02
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.32**		**.43**

15. Alton & Portola

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02	160	.09*
NBT	2	3400	80	.02*	190	.06
NBR	f		470		840	
SBL	1	1700	210	.12*	80	.05
SBT	2	3400	140	.04	110	.03*
SBR	d	1700	0	.00	10	.01
EBL	2	3400	10	.00	10	.00
EBT	2	3400	290	.09*	110	.03*
EBR	f		100		80	
WBL	2	3400	660	.19*	550	.16*
WBT	3	5100	140	.03	240	.05
WBR	f		100		170	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.47**		**.36**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02	160	.09*
NBT	2	3400	70	.02*	190	.06
NBR	f		470		870	
SBL	1	1700	200	.12*	80	.05
SBT	2	3400	140	.04	110	.03*
SBR	d	1700	0	.00	10	.01
EBL	2	3400	10	.00	10	.00
EBT	2	3400	280	.08*	110	.03*
EBR	f		110		80	
WBL	2	3400	680	.20*	580	.17*
WBT	3	5100	140	.03	240	.05
WBR	f		100		150	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.47**		**.37**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	210	.12*
NBT	2	3400	70	.02*	100	.03
NBR	f		310		560	
SBL	1	1700	160	.09*	70	.04
SBT	2	3400	90	.03	70	.02*
SBR	d	1700	0	.00	10	.01
EBL	2	3400	10	.00	10	.00
EBT	2	3400	990	.29*	710	.21*
EBR	f		110		110	
WBL	2	3400	370	.11*	370	.11*
WBT	3	5100	780	.15	900	.18
WBR	f		80		120	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.56**		**.51**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	210	.12*
NBT	2	3400	60	.02*	90	.03
NBR	f		320		600	
SBL	1	1700	160	.09*	60	.04
SBT	2	3400	80	.02	80	.02*
SBR	d	1700	0	.00	10	.01
EBL	2	3400	10	.00	10	.00
EBT	2	3400	930	.27*	710	.21*
EBR	f		110		120	
WBL	2	3400	390	.11*	380	.11*
WBT	3	5100	870	.17	880	.17
WBR	f		90		110	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.54**		**.51**

16. Lake Forest & Portola

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02	60	.04
NBT	2	3400	210	.06*	180	.05*
NBR	d	1700	230	.14	560	.33
SBL	1	1700	220	.13*	290	.17*
SBT	2	3400	100	.03	250	.07
SBR	d	1700	20	.01	20	.01
EBL	2	3400	10	.00	20	.01
EBT	3	5100	490	.10	1520	.30*
EBR	d	1700	40	.02	40	.02
WBL	2	3400	760	.22	510	.15*
WBT	3	5100	1870	.37*	1150	.23
WBR	d	1700	300	.18	170	.10
Right Turn Adjustment					NBR	.17*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.61**		**.89**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02	70	.04
NBT	2	3400	210	.06*	200	.06*
NBR	d	1700	260	.15	420	.25
SBL	1	1700	220	.13*	280	.16*
SBT	2	3400	120	.04	230	.07
SBR	d	1700	20	.01	20	.01
EBL	2	3400	20	.01*	20	.01
EBT	3	5100	520	.10	1510	.30*
EBR	d	1700	50	.03	40	.02
WBL	2	3400	600	.18	490	.14*
WBT	3	5100	1770	.35*	1150	.23
WBR	d	1700	300	.18	150	.09
Right Turn Adjustment					NBR	.08*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.60**		**.79**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	50	.03	100	.06
NBT	2	3400	160	.05*	190	.06*
NBR	d	1700	240	.14	490	.29
SBL	1	1700	210	.12*	330	.19*
SBT	2	3400	90	.03	180	.05
SBR	d	1700	30	.02	30	.02
EBL	2	3400	30	.01*	20	.01
EBT	3	5100	710	.14	1640	.32*
EBR	d	1700	80	.05	50	.03
WBL	2	3400	720	.21	470	.14*
WBT	3	5100	1970	.39*	1310	.26
WBR	d	1700	300	.18	140	.08
Right Turn Adjustment					NBR	.12*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.62**		**.88**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	50	.03	120	.07
NBT	2	3400	160	.05*	200	.06*
NBR	d	1700	250	.15	410	.24
SBL	1	1700	210	.12*	320	.19*
SBT	2	3400	100	.03	190	.06
SBR	d	1700	20	.01	30	.02
EBL	2	3400	30	.01*	20	.01
EBT	3	5100	720	.14	1630	.32*
EBR	d	1700	90	.05	60	.04
WBL	2	3400	490	.14	450	.13*
WBT	3	5100	2020	.40*	1320	.26
WBR	d	1700	310	.18	140	.08
Right Turn Adjustment					NBR	.08*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.63**		**.83**

17. Lake Forest & Towne Centre

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	170	.05*	260	.08*
NBT	2	3400	630	.19	890	.26
NBR	d	1700	180	.11	100	.06
SBL	2	3400	10	.00	10	.00
SBT	2	3400	740	.22*	900	.26*
SBR	d	1700	20	.01	20	.01
EBL	1	1700	10	.01	10	.01
EBT	1	1700	80	.05*	170	.10*
EBR	1	1700	70	.04	280	.16
WBL	1	1700	70	.04*	100	.06*
WBT	2	3400	60	.02	60	.02
WBR	0	0	20		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.41**		**.55**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	170	.05*	250	.07*
NBT	2	3400	660	.19	770	.23
NBR	d	1700	170	.10	80	.05
SBL	2	3400	10	.00	10	.00
SBT	2	3400	610	.18*	870	.26*
SBR	d	1700	30	.02	20	.01
EBL	1	1700	10	.01	10	.01
EBT	1	1700	90	.05*	170	.10*
EBR	1	1700	80	.05	280	.16
WBL	1	1700	50	.03*	100	.06*
WBT	2	3400	60	.02	60	.02
WBR	0	0	10		10	
Right Turn Adjustment					EBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.36**		**.55**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	140	.04*	230	.07*
NBT	2	3400	580	.17	880	.26
NBR	d	1700	160	.09	130	.08
SBL	2	3400	10	.00	10	.00
SBT	2	3400	690	.20*	780	.23*
SBR	d	1700	60	.04	20	.01
EBL	1	1700	10	.01	10	.01
EBT	1	1700	90	.05*	180	.11*
EBR	1	1700	40	.02	250	.15
WBL	1	1700	90	.05*	100	.06*
WBT	2	3400	70	.03	60	.02
WBR	0	0	20		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.39**		**.52**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	140	.04*	230	.07*
NBT	2	3400	590	.17	810	.24
NBR	d	1700	160	.09	70	.04
SBL	2	3400	20	.01	10	.00
SBT	2	3400	530	.16*	780	.23*
SBR	d	1700	30	.02	20	.01
EBL	1	1700	10	.01	10	.01
EBT	1	1700	90	.05*	170	.10*
EBR	1	1700	50	.03	220	.13
WBL	1	1700	50	.03*	110	.06*
WBT	2	3400	60	.02	60	.02
WBR	0	0	10		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.33**		**.51**

18. Towne Centre & Portola

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	10	.01	30	.02*
NBT	1	1700	80	.05*	10	.01
NBR	1	1700	80	.05	280	.16
SBL	2	3400	40	.01*	270	.08
SBT	1	1700	10	.01	60	.08*
SBR	0	0	10		80	
EBL	2	3400	90	.03*	30	.01
EBT	3	5100	850	.17	2350	.46*
EBR	d	1700	10	.01	10	.01
WBL	2	3400	160	.05	60	.02*
WBT	3	5100	2920	.57*	1740	.34
WBR	d	1700	290	.17	90	.05
Right Turn Adjustment					NBR	.12*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.71**		**.75**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	20	.01	20	.01*
NBT	1	1700	80	.05*	10	.01
NBR	1	1700	80	.05	260	.15
SBL	2	3400	40	.01*	270	.08
SBT	1	1700	10	.01	60	.08*
SBR	0	0	10		80	
EBL	2	3400	90	.03*	40	.01
EBT	3	5100	900	.18	2190	.43*
EBR	d	1700	10	.01	10	.01
WBL	2	3400	150	.04	60	.02*
WBT	3	5100	2630	.52*	1720	.34
WBR	d	1700	290	.17	90	.05
Right Turn Adjustment					NBR	.12*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.71**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	10	.01	20	.01
NBT	1	1700	80	.05*	10	.01*
NBR	1	1700	80	.05	310	.18
SBL	2	3400	40	.01*	270	.08*
SBT	1	1700	10	.01	60	.07
SBR	0	0	10		60	
EBL	2	3400	90	.03*	30	.01
EBT	3	5100	1060	.21	2430	.48*
EBR	d	1700	10	.01	10	.01
WBL	2	3400	200	.06	60	.02*
WBT	3	5100	2960	.58*	1820	.36
WBR	d	1700	290	.17	90	.05
Right Turn Adjustment					NBR	.15*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.72**		**.79**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	20	.01	20	.01
NBT	1	1700	80	.05*	10	.01*
NBR	1	1700	80	.05	250	.15
SBL	2	3400	40	.01*	270	.08*
SBT	1	1700	10	.01	60	.07
SBR	0	0	10		60	
EBL	2	3400	90	.03*	30	.01
EBT	3	5100	1070	.21	2330	.46*
EBR	d	1700	10	.01	10	.01
WBL	2	3400	150	.04	60	.02*
WBT	3	5100	2750	.54*	1810	.35
WBR	d	1700	290	.17	90	.05
Right Turn Adjustment					NBR	.12*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.74**

19. Glenn Ranch & Portola

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	70	.04
NBT	2	3400	20	.01*	30	.02*
NBR	0	0	30	.02	90	.05
SBL	2	3400	400	.12*	380	.11*
SBT	2	3400	50	.01	20	.01
SBR	f		880		780	
EBL	2	3400	470	.14*	1080	.32*
EBT	3	5100	510	.10	1900	.37
EBR	1	1700	20	.01	80	.05
WBL	2	3400	110	.03	60	.02
WBT	3	5100	1760	.35*	810	.16*
WBR	1	1700	110	.06	320	.19
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION **.67** **.66**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	80	.05
NBT	2	3400	20	.01*	20	.01*
NBR	0	0	30	.02	90	.05
SBL	2	3400	430	.13*	380	.11*
SBT	2	3400	50	.01	20	.01
SBR	f		810		800	
EBL	2	3400	510	.15*	1050	.31*
EBT	3	5100	510	.10	1740	.34
EBR	1	1700	20	.01	80	.05
WBL	2	3400	110	.03	60	.02
WBT	3	5100	1570	.31*	780	.15*
WBR	1	1700	90	.05	330	.19
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION **.65** **.63**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	100	.06
NBT	2	3400	20	.01*	30	.02*
NBR	0	0	30	.02	60	.04
SBL	2	3400	370	.11*	350	.10*
SBT	2	3400	50	.01	20	.01
SBR	f		960		820	
EBL	2	3400	540	.16*	1170	.34*
EBT	3	5100	630	.12	1920	.38
EBR	1	1700	30	.02	80	.05
WBL	2	3400	90	.03	60	.02
WBT	3	5100	1750	.34*	810	.16*
WBR	1	1700	60	.04	260	.15
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION **.67** **.67**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	100	.06
NBT	2	3400	20	.01*	20	.01*
NBR	0	0	30	.02	60	.04
SBL	2	3400	410	.12*	360	.11*
SBT	2	3400	50	.01	20	.01
SBR	f		880		810	
EBL	2	3400	550	.16*	1130	.33*
EBT	3	5100	630	.12	1780	.35
EBR	1	1700	30	.02	80	.05
WBL	2	3400	90	.03	60	.02
WBT	3	5100	1610	.32*	810	.16*
WBR	1	1700	70	.04	270	.16
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION **.66** **.66**

20. Portola & SR-241

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	570	.17*	340	.10
NBT	3	5100	850	.17	810	.16*
NBR	f		90		170	
SBL	2	3400	230	.07	1280	.38*
SBT	3	5100	490	.10*	1000	.20
SBR	f		260		130	
EBL	1	1700	210	.12*	170	.10*
EBT	0	0	0		0	
EBR	f		400		490	
WBL	2	3400	270	.08	130	.04
WBT	0	0	0		0	
WBR	f		1930		430	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.69**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	560	.16*	370	.11
NBT	3	5100	840	.16	810	.16*
NBR	f		100		180	
SBL	2	3400	240	.07	1130	.33*
SBT	3	5100	530	.10*	1000	.20
SBR	f		260		120	
EBL	1	1700	180	.11*	160	.09*
EBT	0	0	0		0	
EBR	f		380		460	
WBL	2	3400	270	.08	150	.04
WBT	0	0	0		0	
WBR	f		1750		410	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.42**		**.63**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	530	.16*	330	.10
NBT	3	5100	920	.18	810	.16*
NBR	f		90		170	
SBL	2	3400	230	.07	1260	.37*
SBT	3	5100	580	.11*	1050	.21
SBR	f		260		80	
EBL	1	1700	100	.06	100	.06*
EBT	0	0	0		0	
EBR	f		340		470	
WBL	2	3400	260	.08*	130	.04
WBT	0	0	0		0	
WBR	f		1890		420	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.40**		**.64**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	520	.15*	340	.10
NBT	3	5100	910	.18	850	.17*
NBR	f		100		170	
SBL	2	3400	240	.07	1120	.33*
SBT	3	5100	620	.12*	1060	.21
SBR	f		260		80	
EBL	1	1700	100	.06	90	.05*
EBT	0	0	0		0	
EBR	f		320		460	
WBL	2	3400	260	.08*	130	.04
WBT	0	0	0		0	
WBR	f		1750		420	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.40**		**.60**

21. Portola & Rancho

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	1440	.42*	860	.25*
NBT	3	5100	1240	.24	1590	.31
NBR	d	1700	10	.01	10	.01
SBL	2	3400	10	.00	10	.00
SBT	3	5100	840	.16*	1480	.29*
SBR	1	1700	240	.14	50	.03
EBL	1.5		100		110	
EBT	0.5	3400	10	.03*	10	.04*
EBR	f		540		1420	
WBL	1.5		10		10	
WBT	1	6800	10	.00*	10	.00*
WBR	1.5		10		10	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION **.66** **.63**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	1240	.36*	810	.24*
NBT	3	5100	1230	.24	1620	.32
NBR	d	1700	10	.01	10	.01
SBL	2	3400	10	.00	10	.00
SBT	3	5100	820	.16*	1460	.29*
SBR	1	1700	260	.15	70	.04
EBL	1.5		110		130	
EBT	0.5	3400	10	.04*	10	.04*
EBR	f		530		1280	
WBL	1.5		10		10	
WBT	1	6800	10	.00*	10	.00*
WBR	1.5		10		10	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION **.61** **.62**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	1430	.42*	860	.25*
NBT	3	5100	1280	.25	1590	.31
NBR	d	1700	10	.01	10	.01
SBL	2	3400	10	.00	10	.00
SBT	3	5100	860	.17*	1520	.30*
SBR	1	1700	240	.14	50	.03
EBL	1.5		100		130	
EBT	0.5	3400	10	.03*	10	.04*
EBR	f		530		1430	
WBL	1.5		10		10	
WBT	1	6800	10	.00*	10	.00*
WBR	1.5		10		10	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION **.67** **.64**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	1260	.37*	810	.24*
NBT	3	5100	1250	.25	1620	.32
NBR	d	1700	10	.01	10	.01
SBL	2	3400	10	.00	10	.00
SBT	3	5100	860	.17*	1520	.30*
SBR	1	1700	250	.15	50	.03
EBL	1.5		110		130	
EBT	0.5	3400	10	.04*	10	.04*
EBR	f		530		1240	
WBL	1.5		10		10	
WBT	1	6800	10	.00*	10	.00*
WBR	1.5		10		10	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION **.63** **.63**

22. El Toro & Portola

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	490	.14*	490	.14
NBT	3	5100	190	.04	620	.12*
NBR	f		270		450	
SBL	1	1700	50	.03	350	.21*
SBT	3	5100	760	.15*	420	.08
SBR	2	3400	390	.11	850	.25
EBL	2	3400	80	.02*	560	.16
EBT	3	5100	640	.13	1740	.34*
EBR	1	1700	490	.29	900	.53
WBL	2	3400	470	.14	520	.15*
WBT	4	6800	2060	.30*	1140	.17
WBR	d	1700	20	.01	50	.03
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION **.66** **.87**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	450	.13*	430	.13
NBT	3	5100	190	.04	660	.13*
NBR	f		290		510	
SBL	1	1700	60	.04	350	.21*
SBT	3	5100	760	.15*	420	.08
SBR	2	3400	360	.11	820	.24
EBL	2	3400	70	.02	510	.15
EBT	3	5100	690	.14*	1640	.32*
EBR	1	1700	440	.26	850	.50
WBL	2	3400	580	.17*	550	.16*
WBT	4	6800	1920	.28	1140	.17
WBR	d	1700	20	.01	40	.02
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION **.64** **.87**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	490	.14*	460	.14
NBT	3	5100	190	.04	610	.12*
NBR	f		270		460	
SBL	1	1700	50	.03	350	.21*
SBT	3	5100	750	.15*	420	.08
SBR	2	3400	390	.11	850	.25
EBL	2	3400	80	.02*	570	.17
EBT	3	5100	650	.13	1740	.34*
EBR	1	1700	510	.30	910	.54
WBL	2	3400	460	.14	510	.15*
WBT	4	6800	2070	.30*	1150	.17
WBR	d	1700	20	.01	40	.02
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION **.66** **.87**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	450	.13*	420	.12
NBT	3	5100	190	.04	650	.13*
NBR	f		280		490	
SBL	1	1700	60	.04	350	.21*
SBT	3	5100	730	.14*	420	.08
SBR	2	3400	370	.11	820	.24
EBL	2	3400	70	.02*	520	.15
EBT	3	5100	680	.13	1670	.33*
EBR	1	1700	470	.28	820	.48
WBL	2	3400	560	.16	550	.16*
WBT	4	6800	1950	.29*	1150	.17
WBR	d	1700	20	.01	40	.02
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION **.63** **.88**

23. Los Alisos & Santa Margarita

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	450	.26*	380	.22*
NBT	2	3400	180	.05	390	.11
NBR	1	1700	110	.06	240	.14
SBL	1	1700	100	.06	30	.02
SBT	2	3400	450	.13*	280	.08*
SBR	d	1700	100	.06	220	.13
EBL	1	1700	80	.05*	140	.08
EBT	3	5100	770	.15	1860	.36*
EBR	d	1700	210	.12	430	.25
WBL	1	1700	450	.26	180	.11*
WBT	3	5100	1980	.39*	1130	.22
WBR	d	1700	0	.00	100	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.88**		**.82**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	430	.25*	400	.24*
NBT	2	3400	180	.05	380	.11
NBR	1	1700	100	.06	220	.13
SBL	1	1700	80	.05	30	.02
SBT	2	3400	450	.13*	290	.09*
SBR	d	1700	130	.08	220	.13
EBL	1	1700	60	.04*	190	.11
EBT	3	5100	800	.16	1800	.35*
EBR	d	1700	260	.15	410	.24
WBL	1	1700	400	.24	170	.10*
WBT	3	5100	1950	.38*	1130	.22
WBR	d	1700	0	.00	80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.85**		**.83**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	450	.26*	380	.22*
NBT	2	3400	180	.05	390	.11
NBR	1	1700	100	.06	230	.14
SBL	1	1700	100	.06	30	.02
SBT	2	3400	440	.13*	280	.08*
SBR	d	1700	100	.06	220	.13
EBL	1	1700	80	.05*	130	.08
EBT	3	5100	780	.15	1880	.37*
EBR	d	1700	210	.12	430	.25
WBL	1	1700	440	.26	180	.11*
WBT	3	5100	2000	.39*	1130	.22
WBR	d	1700	10	.01	100	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.88**		**.83**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	420	.25*	400	.24*
NBT	2	3400	190	.06	380	.11
NBR	1	1700	100	.06	230	.14
SBL	1	1700	80	.05	30	.02
SBT	2	3400	450	.13*	280	.08*
SBR	d	1700	120	.07	230	.14
EBL	1	1700	60	.04*	190	.11
EBT	3	5100	810	.16	1800	.35*
EBR	d	1700	230	.14	410	.24
WBL	1	1700	400	.24	160	.09*
WBT	3	5100	1960	.38*	1140	.22
WBR	d	1700	0	.00	80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.85**		**.81**

24. Alton & Commercentre

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1440	.28	2390	.47*
NBR	d	1700	420	.25	250	.15
SBL	1	1700	210	.12	130	.08*
SBT	3	5100	2630	.52*	1840	.36
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		120	.04*	460	.14*
WBT	0	5100	0		0	
WBR	1.5		70	{.00}	250	{.09}
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.61**		**.74**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1210	.24	2480	.49*
NBR	d	1700	420	.25	240	.14
SBL	1	1700	210	.12	140	.08*
SBT	3	5100	2670	.52*	1690	.33
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		170	.05*	450	.13*
WBT	0	5100	0		0	
WBR	1.5		80		210	.12
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.62**		**.75**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1290	.25	2170	.43*
NBR	d	1700	420	.25	240	.14
SBL	1	1700	210	.12	130	.08*
SBT	3	5100	2400	.47*	1680	.33
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		140	.04*	460	.14*
WBT	0	5100	0		0	
WBR	1.5		70		260	{.09}
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.56**		**.70**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1070	.21	2270	.45*
NBR	d	1700	420	.25	250	.15
SBL	1	1700	200	.12	150	.09*
SBT	3	5100	2530	.50*	1540	.30
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		180	.05*	450	.13*
WBT	0	5100	0		0	
WBR	1.5		70		220	.13
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.60**		**.72**

25. Alton & Irvine

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	80	.02*	590	.17*
NBT	3	5100	480	.09	1280	.25
NBR	f		70		200	
SBL	2	3400	230	.07	130	.04
SBT	3	5100	1350	.26*	600	.12*
SBR	f		630		1090	
EBL	2.5		940		650	
EBT	2.5	8500	1160	.25*	940	.19*
EBR	1	1700	580	.34	130	.08
WBL	2	3400	380	.11	130	.04
WBT	3	5100	860	.17*	1520	.30*
WBR	1	1700	80	.05	220	.13
Right Turn Adjustment			EBR .07*			
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .82 .83

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	80	.02*	590	.17
NBT	3	5100	400	.08	1330	.26*
NBR	f		70		200	
SBL	2	3400	190	.06	100	.03*
SBT	3	5100	1390	.27*	560	.11
SBR	f		710		1010	
EBL	2.5		790	.23	690	
EBT	2.5	8500	1220	.24*	980	.20*
EBR	1	1700	570	.34	120	.07
WBL	2	3400	390	.11	130	.04
WBT	3	5100	890	.17*	1520	.30*
WBR	1	1700	70	.04	220	.13
Right Turn Adjustment			EBR .08*			
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .83 .84

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	80	.02*	630	.19*
NBT	3	5100	480	.09	1220	.24
NBR	f		70		200	
SBL	2	3400	270	.08	120	.04
SBT	3	5100	1320	.26*	580	.11*
SBR	f		410		970	
EBL	2.5		790		440	.13
EBT	2.5	8500	1150	.23*	950	.19*
EBR	1	1700	610	.36	140	.08
WBL	2	3400	370	.11	120	.04
WBT	3	5100	860	.17*	1480	.29*
WBR	1	1700	90	.05	250	.15
Right Turn Adjustment			EBR .11*			
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .84 .83

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	80	.02*	620	.18*
NBT	3	5100	390	.08	1280	.25
NBR	f		70		200	
SBL	2	3400	250	.07	100	.03
SBT	3	5100	1410	.28*	540	.11*
SBR	f		510		870	
EBL	2.5		640	.19	500	.15
EBT	2.5	8500	1190	.23*	960	.19*
EBR	1	1700	610	.36	130	.08
WBL	2	3400	370	.11	130	.04
WBT	3	5100	870	.17*	1520	.30*
WBR	1	1700	90	.05	250	.15
Right Turn Adjustment			EBR .11*			
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .86 .83

26. Bake & Commercentre

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04*	10	.01
NBT	2	3400	1180	.35	1430	.42*
NBR	d	1700	720	.42	220	.13
SBL	1	1700	30	.02	50	.03*
SBT	2	3400	1340	.39*	1010	.30
SBR	d	1700	60	.04	30	.02
EBL	1	1700	110	.06	190	.11
EBT	2	3400	180	.07*	90	.05*
EBR	0	0	60		70	
WBL	2	3400	310	.09*	620	.18*
WBT	1	1700	40	.04	120	.09
WBR	0	0	20		30	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.73**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04*	10	.01
NBT	2	3400	980	.29	1460	.43*
NBR	d	1700	700	.41	220	.13
SBL	1	1700	30	.02	60	.04*
SBT	2	3400	1450	.43*	920	.27
SBR	d	1700	80	.05	30	.02
EBL	1	1700	110	.06	180	.11
EBT	2	3400	180	.07*	100	.05*
EBR	0	0	50		70	
WBL	2	3400	280	.08*	600	.18*
WBT	1	1700	70	.05	120	.09
WBR	0	0	20		30	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.67**		**.75**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04*	10	.01
NBT	2	3400	1140	.34	1390	.41*
NBR	d	1700	720	.42	230	.14
SBL	1	1700	30	.02	50	.03*
SBT	2	3400	1280	.38*	980	.29
SBR	d	1700	70	.04	30	.02
EBL	1	1700	110	.06	180	.11
EBT	2	3400	170	.07*	80	.04*
EBR	0	0	60		70	
WBL	2	3400	300	.09*	610	.18*
WBT	1	1700	50	.04	130	.09
WBR	0	0	20		30	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.63**		**.71**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05*	10	.01
NBT	2	3400	950	.28	1430	.42*
NBR	d	1700	700	.41	230	.14
SBL	1	1700	30	.02	50	.03*
SBT	2	3400	1370	.40*	900	.26
SBR	d	1700	90	.05	30	.02
EBL	1	1700	100	.06	180	.11
EBT	2	3400	180	.07*	100	.05*
EBR	0	0	50		70	
WBL	2	3400	290	.09*	600	.18*
WBT	1	1700	70	.06	120	.09
WBR	0	0	30		30	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.73**

27. Bake & Trabuco

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	630	.19*	380	.11
NBT	3	5100	1440	.32	1380	.41*
NBR	0	0	210		740	.44
SBL	2	3400	30	.01	190	.06*
SBT	3	5100	1300	.25*	1560	.31
SBR	1	1700	230	.14	250	.15
EBL	2	3400	420	.12	260	.08
EBT	2.5	6800	420	.12*	1090	{.22}*
EBR	1.5		820	.24	610	
WBL	2	3400	800	.24*	280	.08*
WBT	4	6800	1350	.20	690	.10
WBR	d	1700	210	.12	30	.02
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.85** **.82**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	640	.19*	370	.11
NBT	3	5100	1270	.29	1430	.42*
NBR	0	0	230		740	.44
SBL	2	3400	40	.01	180	.05*
SBT	3	5100	1370	.27*	1460	.29
SBR	1	1700	210	.12	230	.14
EBL	2	3400	420	.12	260	.08
EBT	2.5	6800	450	.13*	1080	{.22}*
EBR	1.5		790	.23	620	
WBL	2	3400	800	.24*	280	.08*
WBT	4	6800	1380	.20	730	.11
WBR	d	1700	190	.11	30	.02
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.88** **.82**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	640	.19*	390	.11
NBT	3	5100	1410	.32	1370	.40*
NBR	0	0	210		730	.43
SBL	2	3400	30	.01	190	.06*
SBT	3	5100	1250	.25*	1530	.30
SBR	1	1700	200	.12	240	.14
EBL	2	3400	410	.12	250	.07
EBT	2.5	6800	400	.12*	1070	{.22}*
EBR	1.5		870	.26	620	
WBL	2	3400	800	.24*	280	.08*
WBT	4	6800	1350	.20	660	.10
WBR	d	1700	210	.12	30	.02
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.85** **.81**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	650	.19*	380	.11
NBT	3	5100	1240	.29	1420	.42*
NBR	0	0	230		740	.44
SBL	2	3400	40	.01	180	.05*
SBT	3	5100	1320	.26*	1450	.28
SBR	1	1700	190	.11	240	.14
EBL	2	3400	410	.12	220	.06
EBT	2.5	6800	440	.13*	1090	{.21}*
EBR	1.5		840	.25	610	
WBL	2	3400	810	.24*	280	.08*
WBT	4	6800	1360	.20	710	.10
WBR	d	1700	190	.11	30	.02
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.87** **.81**

28. Bake & Toledo

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	150	.09*	20	.01
NBT	3	5100	2010	.39	2250	.44*
NBR	d	1700	20	.01	350	.21
SBL	1	1700	70	.04	90	.05*
SBT	3	5100	2480	.49*	2310	.45
SBR	d	1700	200	.12	50	.03
EBL	2	3400	100	.03*	170	.05
EBT	2	3400	10	.00	380	.11*
EBR	1	1700	20	.01	160	.09
WBL	1	1700	250	.15	30	.02*
WBT	2	3400	570	.19*	50	.03
WBR	0	0	70		60	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.85**		**.67**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	150	.09*	20	.01
NBT	3	5100	1860	.36	2280	.45*
NBR	d	1700	20	.01	350	.21
SBL	1	1700	60	.04	100	.06*
SBT	3	5100	2530	.50*	2230	.44
SBR	d	1700	190	.11	50	.03
EBL	2	3400	100	.03*	190	.06
EBT	2	3400	10	.00	370	.11*
EBR	1	1700	20	.01	160	.09
WBL	1	1700	300	.18	30	.02*
WBT	2	3400	580	.19*	50	.03
WBR	0	0	60		60	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.86**		**.69**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	150	.09*	20	.01
NBT	3	5100	1980	.39	2230	.44*
NBR	d	1700	20	.01	350	.21
SBL	1	1700	60	.04	90	.05*
SBT	3	5100	2510	.49*	2270	.45
SBR	d	1700	170	.10	50	.03
EBL	2	3400	110	.03*	190	.06
EBT	2	3400	10	.00	370	.11*
EBR	1	1700	20	.01	160	.09
WBL	1	1700	220	.13	30	.02*
WBT	2	3400	580	.19*	50	.03
WBR	0	0	60		60	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.85**		**.67**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	150	.09*	20	.01
NBT	3	5100	1850	.36	2270	.45*
NBR	d	1700	20	.01	360	.21
SBL	1	1700	60	.04	100	.06*
SBT	3	5100	2540	.50*	2190	.43
SBR	d	1700	180	.11	50	.03
EBL	2	3400	100	.03*	200	.06
EBT	2	3400	10	.00	370	.11*
EBR	1	1700	20	.01	160	.09
WBL	1	1700	290	.17	30	.02*
WBT	2	3400	550	.18*	50	.03
WBR	0	0	60		60	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.85**		**.69**

29. Bake & Jeronimo

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	430	.13*	20	.01
NBT	3	5100	2250	.44	2400	.47*
NBR	d	1700	40	.02	380	.22
SBL	1	1700	90	.05	90	.05*
SBT	4	6800	2490	.38*	2280	.34
SBR	0	0	60		10	
EBL	2	3400	10	.00	120	.04
EBT	2	3400	80	.02*	540	.16*
EBR	1	1700	30	.02	400	.24
WBL	1	1700	350	.21*	130	.08*
WBT	3	5100	700	.15	130	.04
WBR	0	0	90		80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.79**		**.81**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	440	.13*	20	.01
NBT	3	5100	2120	.42	2410	.47*
NBR	d	1700	50	.03	380	.22
SBL	1	1700	80	.05	90	.05*
SBT	4	6800	2550	.39*	2210	.33
SBR	0	0	100		10	
EBL	2	3400	10	.00	130	.04
EBT	2	3400	80	.02*	550	.16*
EBR	1	1700	40	.02	390	.23
WBL	1	1700	330	.19*	130	.08*
WBT	3	5100	700	.15	140	.04
WBR	0	0	90		80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.78**		**.81**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	420	.12*	20	.01
NBT	3	5100	2230	.44	2390	.47*
NBR	d	1700	50	.03	370	.22
SBL	1	1700	90	.05	80	.05*
SBT	4	6800	2490	.37*	2260	.33
SBR	0	0	50		10	
EBL	2	3400	10	.00	100	.03
EBT	2	3400	80	.02*	580	.17*
EBR	1	1700	30	.02	380	.22
WBL	1	1700	320	.19*	130	.08*
WBT	3	5100	710	.16	130	.04
WBR	0	0	100		80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.75**		**.82**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	410	.12*	20	.01
NBT	3	5100	2110	.41	2420	.47*
NBR	d	1700	50	.03	380	.22
SBL	1	1700	80	.05	100	.06*
SBT	4	6800	2610	.39*	2150	.32
SBR	0	0	60		10	
EBL	2	3400	10	.00	120	.04
EBT	2	3400	70	.02*	550	.16*
EBR	1	1700	40	.02	400	.24
WBL	1	1700	270	.16*	130	.08*
WBT	3	5100	760	.17	140	.04
WBR	0	0	90		80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.74**		**.82**

30. Bake & Muirlands

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	280	.08	150	.04*
NBT	4	6800	2940	.43*	2590	.38
NBR	f		90		200	
SBL	2	3400	70	.02*	170	.05
SBT	4	6800	2400	.35	2790	.41*
SBR	f		230		80	
EBL	2	3400	50	.01*	290	.09
EBT	2	3400	112	.03	740	.22*
EBR	f		130		370	
WBL	2	3400	160	.05	90	.03*
WBT	2	3400	440	.13*	220	.06
WBR	f		70		90	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.75**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	260	.08*	140	.04*
NBT	4	6800	2810	.41	2620	.39
NBR	f		90		190	
SBL	2	3400	60	.02	170	.05
SBT	4	6800	2450	.36*	2710	.40*
SBR	f		220		90	
EBL	2	3400	50	.01*	260	.08
EBT	2	3400	112	.03	760	.22*
EBR	f		130		380	
WBL	2	3400	150	.04	90	.03*
WBT	2	3400	480	.14*	220	.06
WBR	f		100		110	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.74**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	270	.08	150	.04*
NBT	4	6800	2900	.43*	2580	.38
NBR	f		90		210	
SBL	2	3400	70	.02*	180	.05
SBT	4	6800	2360	.35	2740	.40*
SBR	f		240		80	
EBL	2	3400	50	.01*	280	.08
EBT	2	3400	112	.03	720	.21*
EBR	f		130		380	
WBL	2	3400	170	.05	90	.03*
WBT	2	3400	430	.13*	220	.06
WBR	f		80		100	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.73**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	270	.08	140	.04
NBT	4	6800	2810	.41*	2610	.38*
NBR	f		90		210	
SBL	2	3400	70	.02*	180	.05*
SBT	4	6800	2410	.35	2660	.39
SBR	f		240		90	
EBL	2	3400	50	.01*	280	.08
EBT	2	3400	112	.03	740	.22*
EBR	f		130		380	
WBL	2	3400	140	.04	90	.03*
WBT	2	3400	430	.13*	220	.06
WBR	f		60		120	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.62**		**.73**

31. Bake & Rockfield

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	200	.06	60	.02
NBT	4	6800	3120	.46*	2650	.39*
NBR	f		810		640	
SBL	2	3400	120	.04*	340	.10*
SBT	4	6800	2670	.39	2950	.43
SBR	1	1700	0	.00	10	.01
EBL	1	1700	10	.01	10	.01
EBT	2	3400	30	.01*	160	.05*
EBR	f		50		410	
WBL	2	3400	510	.15*	950	.28*
WBT	2	3400	160	.05	90	.03
WBR	f		130		130	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.71**		**.87**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	200	.06	60	.02
NBT	4	6800	2980	.44*	2660	.39*
NBR	f		830		650	
SBL	2	3400	130	.04*	340	.10*
SBT	4	6800	2690	.40	2860	.42
SBR	1	1700	0	.00	10	.01
EBL	1	1700	10	.01	20	.01
EBT	2	3400	40	.01*	170	.05*
EBR	f		40		410	
WBL	2	3400	510	.15*	950	.28*
WBT	2	3400	170	.05	80	.02
WBR	f		120		140	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.69**		**.87**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	200	.06	60	.02
NBT	4	6800	3060	.45*	2640	.39*
NBR	f		810		650	
SBL	2	3400	120	.04*	340	.10*
SBT	4	6800	2630	.39	2890	.43
SBR	1	1700	10	.01	10	.01
EBL	1	1700	10	.01	10	.01
EBT	2	3400	30	.01*	150	.04*
EBR	f		50		410	
WBL	2	3400	510	.15*	950	.28*
WBT	2	3400	150	.04	90	.03
WBR	f		140		140	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.70**		**.86**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	200	.06	60	.02
NBT	4	6800	2990	.44*	2660	.39*
NBR	f		830		650	
SBL	2	3400	130	.04*	340	.10*
SBT	4	6800	2660	.39	2820	.41
SBR	1	1700	0	.00	10	.01
EBL	1	1700	10	.01	20	.01
EBT	2	3400	40	.01*	150	.04*
EBR	f		40		420	
WBL	2	3400	510	.15*	960	.28*
WBT	2	3400	150	.04	80	.02
WBR	f		120		140	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.69**		**.86**

32. Bake & I-5 NB Ramps

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	3590	.53*	3070	.45*
NBR	f		170		910	
SBL	0	0	0		0	
SBT	3	5100	1090	.21	1730	.34
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	230	.14*	140	.08*
WBT	0	0	0		0	
WBR	3	5100	1100	.22	490	.10
Right Turn Adjustment			WBR	.08*	WBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.80**		**.60**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	3520	.52*	3110	.46*
NBR	f		170		930	
SBL	0	0	0		0	
SBT	3	5100	1090	.21	1710	.34
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	240	.14*	140	.08*
WBT	0	0	0		0	
WBR	3	5100	1040	.20	480	.09
Right Turn Adjustment			WBR	.06*	WBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.77**		**.60**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	3540	.52*	3060	.45*
NBR	f		240		910	
SBL	0	0	0		0	
SBT	3	5100	1110	.22	1740	.34
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	230	.14*	140	.08*
WBT	0	0	0		0	
WBR	3	5100	1100	.22	500	.10
Right Turn Adjustment			WBR	.08*	WBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.79**		**.60**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	3510	.52*	3100	.46*
NBR	f		170		940	
SBL	0	0	0		0	
SBT	3	5100	1080	.21	1730	.34
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	240	.14*	140	.08*
WBT	0	0	0		0	
WBR	3	5100	1070	.21	480	.09
Right Turn Adjustment			WBR	.07*	WBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.78**		**.60**

33. Bake & I-5 SB Ramps

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1080	.22*	1980	.41*
NBR	0	0	20		90	
SBL	0	0	0		0	
SBT	3	5100	930	.18	1250	.25
SBR	f		350		670	
EBL	3	5100	2860	.56*	2160	.42*
EBT	0	0	0		0	
EBR	1	1700	700	.41	220	.13
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.83**		**.88**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1080	.22*	1960	.40*
NBR	0	0	20		100	
SBL	0	0	0		0	
SBT	3	5100	950	.19	1220	.24
SBR	f		360		670	
EBL	3	5100	2810	.55*	2220	.44*
EBT	0	0	0		0	
EBR	1	1700	720	.42	240	.14
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.82**		**.89**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1110	.22*	2000	.41*
NBR	0	0	20		90	
SBL	0	0	0		0	
SBT	3	5100	960	.19	1260	.25
SBR	f		360		670	
EBL	3	5100	2820	.55*	2140	.42*
EBT	0	0	0		0	
EBR	1	1700	720	.42	230	.14
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.82**		**.88**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1090	.22*	1990	.41*
NBR	0	0	20		90	
SBL	0	0	0		0	
SBT	3	5100	960	.19	1250	.25
SBR	f		360		670	
EBL	3	5100	2790	.55*	2180	.43*
EBT	0	0	0		0	
EBR	1	1700	730	.43	230	.14
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.82**		**.89**

34. Lake Forest & Trabuco

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	270	.08*	250	.07
NBT	3	5100	940	.18	1140	.22*
NBR	1	1700	120	.07	720	.42
SBL	2	3400	280	.08	390	.11*
SBT	3	5100	1190	.27*	1060	.25
SBR	0	0	200		190	
EBL	2	3400	180	.05	260	.08
EBT	3	5100	710	.14*	1300	.25*
EBR	1	1700	430	.25	190	.11
WBL	2	3400	810	.24*	280	.08*
WBT	3	5100	1070	.21	760	.15
WBR	1	1700	440	.26	410	.24
Right Turn Adjustment			EBR	.05*	NBR	.14*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.83**		**.85**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	260	.08*	260	.08*
NBT	3	5100	930	.18	1150	.23
NBR	1	1700	100	.06	760	.45
SBL	2	3400	290	.09	320	.09
SBT	3	5100	1280	.29*	1070	.25*
SBR	0	0	210		180	
EBL	2	3400	200	.06	300	.09
EBT	3	5100	730	.14*	1240	.24*
EBR	1	1700	440	.26	190	.11
WBL	2	3400	840	.25*	240	.07*
WBT	3	5100	1090	.21	790	.15
WBR	1	1700	280	.16	410	.24
Right Turn Adjustment			EBR	.06*	NBR	.16*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.87**		**.85**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	270	.08*	250	.07
NBT	3	5100	910	.18	1110	.22*
NBR	1	1700	130	.08	730	.43
SBL	2	3400	290	.09	410	.12*
SBT	3	5100	1140	.26*	1050	.24
SBR	0	0	200		180	
EBL	2	3400	170	.05	260	.08
EBT	3	5100	710	.14*	1270	.25*
EBR	1	1700	420	.25	190	.11
WBL	2	3400	780	.23*	290	.09*
WBT	3	5100	1080	.21	750	.15
WBR	1	1700	460	.27	430	.25
Right Turn Adjustment			EBR	.05*	NBR	.14*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.81**		**.87**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	260	.08*	260	.08*
NBT	3	5100	900	.18	1120	.22
NBR	1	1700	90	.05	790	.46
SBL	2	3400	300	.09	320	.09
SBT	3	5100	1230	.28*	1060	.24*
SBR	0	0	200		180	
EBL	2	3400	190	.06	300	.09
EBT	3	5100	730	.14*	1250	.25*
EBR	1	1700	440	.26	190	.11
WBL	2	3400	780	.23*	260	.08*
WBT	3	5100	1090	.21	770	.15
WBR	1	1700	310	.18	440	.26
Right Turn Adjustment			EBR	.06*	NBR	.17*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.84**		**.87**

35. Lake Forest & Serrano

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	80	.05
NBT	3	5100	1140	.22	1950	.38*
NBR	d	1700	80	.05	110	.06
SBL	1	1700	70	.04	40	.02*
SBT	3	5100	2140	.42*	1450	.28
SBR	d	1700	220	.13	60	.04
EBL	1	1700	130	.08*	130	.08*
EBT	1	1700	60	.10	120	.11
EBR	0	0	110		70	
WBL	1	1700	90	.05	50	.03
WBT	1	1700	80	.09*	80	.08*
WBR	0	0	70		50	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.70**		**.61**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	80	.05
NBT	3	5100	1090	.21	2060	.40*
NBR	d	1700	80	.05	110	.06
SBL	1	1700	80	.05	40	.02*
SBT	3	5100	2260	.44*	1430	.28
SBR	d	1700	240	.14	60	.04
EBL	1	1700	130	.08*	90	.05
EBT	1	1700	60	.11	160	.14*
EBR	0	0	120		70	
WBL	1	1700	90	.05	40	.02*
WBT	1	1700	70	.09*	80	.08
WBR	0	0	80		50	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.72**		**.63**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	80	.05
NBT	3	5100	1130	.22	1920	.38*
NBR	d	1700	90	.05	140	.08
SBL	1	1700	70	.04	50	.03*
SBT	3	5100	2100	.41*	1440	.28
SBR	d	1700	200	.12	60	.04
EBL	1	1700	130	.08*	140	.08*
EBT	1	1700	60	.11	110	.11
EBR	0	0	120		80	
WBL	1	1700	100	.06	50	.03
WBT	1	1700	90	.09*	80	.08*
WBR	0	0	70		50	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.69**		**.62**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	80	.05
NBT	3	5100	1070	.21	1990	.39*
NBR	d	1700	80	.05	110	.06
SBL	1	1700	80	.05	40	.02*
SBT	3	5100	2210	.43*	1420	.28
SBR	d	1700	180	.11	60	.04
EBL	1	1700	140	.08*	140	.08*
EBT	1	1700	60	.11	110	.11
EBR	0	0	120		70	
WBL	1	1700	90	.05	40	.02
WBT	1	1700	130	.11*	80	.08*
WBR	0	0	60		50	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.73**		**.62**

36. El Toro & Trabuco

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	380	.11*	480	.14
NBT	3	5100	1190	.23	1410	.28*
NBR	1	1700	110	.06	610	.36
SBL	2	3400	280	.08	290	.09*
SBT	3	5100	1570	.31*	1010	.20
SBR	1	1700	490	.29	180	.11
EBL	2	3400	190	.06*	770	.23
EBT	3	5100	360	.11	1210	.27*
EBR	0	0	300	.18	190	
WBL	2	3400	320	.09	220	.06*
WBT	3	5100	1100	.22*	530	.10
WBR	1	1700	250	.15	170	.10
Right Turn Adjustment					NBR	.02*
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for SBR NBR						

TOTAL CAPACITY UTILIZATION .75 .77

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	340	.10*	490	.14
NBT	3	5100	1130	.22	1460	.29*
NBR	1	1700	120	.07	590	.35
SBL	2	3400	280	.08	270	.08*
SBT	3	5100	1720	.34*	960	.19
SBR	1	1700	450	.26	160	.09
EBL	2	3400	210	.06*	770	.23
EBT	3	5100	360	.11	1240	.28*
EBR	0	0	290	.17	170	
WBL	2	3400	280	.08	230	.07*
WBT	3	5100	1130	.22*	530	.10
WBR	1	1700	250	.15	170	.10
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for SBR NBR						

TOTAL CAPACITY UTILIZATION .77 .77

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	430	.13*	490	.14
NBT	3	5100	1150	.23	1400	.27*
NBR	1	1700	110	.06	570	.34
SBL	2	3400	280	.08	290	.09*
SBT	3	5100	1600	.31*	1000	.20
SBR	1	1700	430	.25	170	.10
EBL	2	3400	200	.06*	730	.21
EBT	3	5100	360	.11	1250	.28*
EBR	0	0	300	.18	190	
WBL	2	3400	300	.09	220	.06*
WBT	3	5100	1120	.22*	540	.11
WBR	1	1700	260	.15	160	.09
Right Turn Adjustment					NBR	.01*
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for SBR NBR						

TOTAL CAPACITY UTILIZATION .77 .76

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	340	.10*	510	.15
NBT	3	5100	1130	.22	1410	.28*
NBR	1	1700	120	.07	610	.36
SBL	2	3400	280	.08	270	.08*
SBT	3	5100	1720	.34*	940	.18
SBR	1	1700	420	.25	160	.09
EBL	2	3400	180	.05*	780	.23
EBT	3	5100	370	.11	1210	.27*
EBR	0	0	300	.18	180	
WBL	2	3400	290	.09	230	.07*
WBT	3	5100	1130	.22*	530	.10
WBR	1	1700	240	.14	170	.10
Right Turn Adjustment					NBR	.01*
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for SBR NBR						

TOTAL CAPACITY UTILIZATION .76 .76

37. El Toro & Serrano

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	140	.08*	200	.12
NBT	3	5100	1630	.32	2440	.48*
NBR	d	1700	10	.01	30	.02
SBL	1	1700	10	.01	20	.01*
SBT	3	5100	1970	.39*	1380	.27
SBR	d	1700	200	.12	70	.04
EBL	1	1700	40	.02	20	.01
EBT	1	1700	10	.11*	20	.14*
EBR	0	0	170		210	
WBL	1	1700	30	.02*	20	.01*
WBT	1	1700	40	.05	10	.02
WBR	0	0	40		20	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.69**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	90	.05*	190	.11
NBT	3	5100	1560	.31	2490	.49*
NBR	d	1700	10	.01	30	.02
SBL	1	1700	10	.01	20	.01*
SBT	3	5100	1990	.39*	1300	.25
SBR	d	1700	280	.16	70	.04
EBL	1	1700	30	.02	30	.02
EBT	1	1700	10	.12*	20	.14*
EBR	0	0	190		210	
WBL	1	1700	30	.02*	30	.02*
WBT	1	1700	40	.05	10	.02
WBR	0	0	40		20	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.63**		**.71**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	190	.11
NBT	3	5100	1640	.32	2410	.47*
NBR	d	1700	10	.01	30	.02
SBL	1	1700	10	.01	20	.01*
SBT	3	5100	1950	.38*	1360	.27
SBR	d	1700	250	.15	70	.04
EBL	1	1700	50	.03	30	.02
EBT	1	1700	10	.11*	20	.14*
EBR	0	0	170		210	
WBL	1	1700	30	.02*	20	.01*
WBT	1	1700	40	.05	10	.02
WBR	0	0	40		20	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.62**		**.68**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	110	.06*	180	.11
NBT	3	5100	1550	.30	2470	.48*
NBR	d	1700	10	.01	30	.02
SBL	1	1700	10	.01	20	.01*
SBT	3	5100	2050	.40*	1290	.25
SBR	d	1700	250	.15	80	.05
EBL	1	1700	40	.02	30	.02
EBT	1	1700	10	.11*	20	.12*
EBR	0	0	180		190	
WBL	1	1700	30	.02*	30	.02*
WBT	1	1700	40	.05	10	.02
WBR	0	0	40		20	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.68**

38. El Toro & Jeronimo

2040 No-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05	70	.04
NBT	3	5100	1550	.30*	1800	.35*
NBR	1	1700	210	.12	190	.11
SBL	1	1700	430	.25*	170	.10*
SBT	3	5100	1520	.30	1030	.20
SBR	d	1700	110	.06	350	.21
EBL	1	1700	130	.08*	210	.12
EBT	2	3400	340	.13	650	.24*
EBR	0	0	100		160	
WBL	2	3400	510	.15	240	.07*
WBT	2	3400	750	.22*	530	.16
WBR	1	1700	120	.07	350	.21
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION **.90** **.81**

2040 With-Project Without Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06	80	.05
NBT	3	5100	1430	.28*	1860	.36*
NBR	1	1700	220	.13	160	.09
SBL	1	1700	390	.23*	180	.11*
SBT	3	5100	1600	.31	970	.19
SBR	d	1700	130	.08	350	.21
EBL	1	1700	130	.08*	220	.13
EBT	2	3400	340	.13	640	.24*
EBR	0	0	100		160	
WBL	2	3400	540	.16	230	.07*
WBT	2	3400	700	.21*	530	.16
WBR	1	1700	100	.06	350	.21
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION **.85** **.83**

2040 No-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05	70	.04
NBT	3	5100	1530	.30*	1800	.35*
NBR	1	1700	210	.12	170	.10
SBL	1	1700	450	.26*	180	.11*
SBT	3	5100	1480	.29	1030	.20
SBR	d	1700	110	.06	350	.21
EBL	1	1700	120	.07*	210	.12
EBT	2	3400	340	.13	650	.24*
EBR	0	0	100		160	
WBL	2	3400	520	.15	240	.07*
WBT	2	3400	740	.22*	520	.15
WBR	1	1700	100	.06	350	.21
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION **.90** **.82**

2040 With-Project With Portola Ext. (Scenario 2)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	90	.05	80	.05
NBT	3	5100	1440	.28*	1840	.36*
NBR	1	1700	220	.13	170	.10
SBL	1	1700	440	.26*	170	.10*
SBT	3	5100	1530	.30	940	.18
SBR	d	1700	130	.08	350	.21
EBL	1	1700	120	.07	210	.12
EBT	2	3400	330	.13*	640	.24*
EBR	0	0	110		170	
WBL	2	3400	510	.15*	240	.07*
WBT	2	3400	720	.21	530	.16
WBR	1	1700	110	.06	350	.21
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION **.87** **.82**

APPENDIX 8.2:

2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITHOUT AND WITH PORTOLA WESTERLY EXTENSION WITH SCENARIO 3 IMPROVEMENT ALTERNATIVE INTERSECTION OPERATIONS ANALYSIS WORKSHEETS

This Page Intentionally Left Blank

1. Lake Forest & Dimension

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06	50	.03*
NBT	2	3400	910	.27*	820	.24
NBR	d	1700	10	.01	10	.01
SBL	1	1700	30	.02*	50	.03
SBT	2	3400	530	.16	820	.24*
SBR	d	1700	620	.36	280	.16
EBL	1.5		350	{.11}*	620	{.19}*
EBT	0.5	3400	10	.11	10	.19
EBR	1	1700	100	.06	50	.03
WBL	1	1700	10	.01	30	.02
WBT	1	1700	10	.01*	10	.02*
WBR	0	0	10		20	
Right Turn Adjustment			SBR	.05*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.51**		**.53**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	110	.06	50	.03
NBT	2	3400	750	.22*	820	.24*
NBR	d	1700	10	.01	20	.01
SBL	1	1700	30	.02*	40	.02*
SBT	2	3400	580	.17	740	.22
SBR	d	1700	620	.36	290	.17
EBL	1.5		340	{.10}*	650	{.19}*
EBT	0.5	3400	10	.10	10	.19
EBR	1	1700	130	.08	60	.04
WBL	1	1700	10	.01	30	.02
WBT	1	1700	10	.01*	10	.02*
WBR	0	0	10		20	
Right Turn Adjustment			SBR	.10*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.50**		**.52**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06	40	.02
NBT	2	3400	890	.26*	820	.24*
NBR	d	1700	10	.01	10	.01
SBL	1	1700	30	.02*	50	.03*
SBT	2	3400	520	.15	810	.24
SBR	d	1700	610	.36	270	.16
EBL	1.5		360	{.11}*	610	{.18}*
EBT	0.5	3400	10	.11	10	.18
EBR	1	1700	100	.06	50	.03
WBL	1	1700	10	.01	30	.02
WBT	1	1700	10	.01*	10	.02*
WBR	0	0	10		20	
Right Turn Adjustment			SBR	.06*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.51**		**.52**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	110	.06	50	.03
NBT	2	3400	750	.22*	810	.24*
NBR	d	1700	10	.01	10	.01
SBL	1	1700	30	.02*	40	.02*
SBT	2	3400	550	.16	750	.22
SBR	d	1700	620	.36	290	.17
EBL	1.5		340	{.10}*	650	{.19}*
EBT	0.5	3400	10	.10	10	.19
EBR	1	1700	120	.07	50	.03
WBL	1	1700	10	.01	30	.02
WBT	1	1700	10	.01*	10	.02*
WBR	0	0	10		20	
Right Turn Adjustment			SBR	.10*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.50**		**.52**

2. Lake Forest & Rancho

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	370	.22*	310	.18
NBT	2	3400	700	.21	1140	.34*
NBR	d	1700	480	.28	700	.41
SBL	1	1700	290	.17	230	.14*
SBT	2	3400	780	.23*	810	.24
SBR	d	1700	400	.24	120	.07
EBL	1	1700	30	.02*	170	.10
EBT	2	3400	360	.11	750	.22*
EBR	1	1700	80	.05	260	.15
WBL	2	3400	540	.16	510	.15*
WBT	2	3400	860	.25*	590	.17
WBR	1	1700	130	.08	330	.19
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.77**		**.90**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	110	.06	260	.15
NBT	2	3400	720	.21*	1100	.32*
NBR	d	1700	480	.28	760	.45
SBL	1	1700	260	.15*	240	.14*
SBT	2	3400	780	.23	810	.24
SBR	d	1700	90	.05	100	.06
EBL	1	1700	80	.05	40	.02
EBT	2	3400	350	.10*	580	.17*
EBR	1	1700	100	.06	120	.07
WBL	2	3400	590	.17*	560	.16*
WBT	2	3400	640	.19	510	.15
WBR	1	1700	130	.08	320	.19
Right Turn Adjustment				NBR		.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.85**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	370	.22*	310	.18
NBT	2	3400	700	.21	1170	.34*
NBR	d	1700	480	.28	680	.40
SBL	1	1700	290	.17	240	.14*
SBT	2	3400	790	.23*	810	.24
SBR	d	1700	340	.20	110	.06
EBL	1	1700	30	.02*	140	.08
EBT	2	3400	360	.11	750	.22*
EBR	1	1700	80	.05	250	.15
WBL	2	3400	510	.15	510	.15*
WBT	2	3400	890	.26*	590	.17
WBR	1	1700	130	.08	320	.19
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.78**		**.90**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	110	.06	260	.15
NBT	2	3400	730	.21*	1120	.33*
NBR	d	1700	480	.28	750	.44
SBL	1	1700	240	.14*	240	.14*
SBT	2	3400	790	.23	820	.24
SBR	d	1700	60	.04	100	.06
EBL	1	1700	70	.04	30	.02
EBT	2	3400	360	.11*	580	.17*
EBR	1	1700	100	.06	130	.08
WBL	2	3400	560	.16*	550	.16*
WBT	2	3400	660	.19	490	.14
WBR	1	1700	130	.08	310	.18
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.67**		**.85**

3. Lake Forest & SR-241 SB Off-Ramp

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	820	.24*	1520	.45*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	790	.23	850	.25
SBR	0	0	0		0	
EBL	2	3400	310	.09*	150	.04*
EBT	0	0	0		0	
EBR	1	1700	620	.36	260	.15
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.26*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.54**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	860	.25*	1320	.39*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	610	.18	820	.24
SBR	0	0	0		0	
EBL	2	3400	340	.10*	170	.05*
EBT	0	0	0		0	
EBR	1	1700	440	.26	290	.17
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.11*	EBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.51**		**.50**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	820	.24	1510	.44*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	860	.25*	900	.26
SBR	0	0	0		0	
EBL	2	3400	210	.06*	80	.02*
EBT	0	0	0		0	
EBR	1	1700	490	.29	210	.12
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.23*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.59**		**.51**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	860	.25*	1330	.39*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	660	.19	900	.26
SBR	0	0	0		0	
EBL	2	3400	210	.06*	100	.03*
EBT	0	0	0		0	
EBR	1	1700	360	.21	250	.15
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.10*	EBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.46**		**.49**

4. Lake Forest & SR-241 NB On-Ramp

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	160	.05	440	.13*
NBT	2	3400	980	.29*	1240	.36
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	790	.23	850	.25*
SBR	1	1700	80	.05	450	.26
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					SBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.34**		**.44**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	190	.06	400	.12*
NBT	2	3400	1010	.30*	1100	.32
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	610	.18	820	.24*
SBR	1	1700	100	.06	420	.25
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					SBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.35**		**.42**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	110	.03*	370	.11*
NBT	2	3400	890	.26	1230	.36
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	860	.25*	900	.26*
SBR	1	1700	10	.01	240	.14
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.33**		**.42**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	130	.04	330	.10*
NBT	2	3400	910	.27*	1100	.32
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	660	.19	900	.26*
SBR	1	1700	10	.01	220	.13
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.32**		**.41**

5. Corridor Center & Rancho

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	0	.00	10	.01
NBT	1	1700	10	.01*	10	.01*
NBR	1	1700	200	.12	920	.54
SBL	1	1700	40	.02*	150	.09*
SBT	1	1700	20	.01	10	.01
SBR	1	1700	40	.02	40	.02
EBL	1	1700	70	.04	60	.04
EBT	2	3400	350	.10*	570	.17*
EBR	1	1700	0	.00	0	.00
WBL	2	3400	1310	.39*	320	.09*
WBT	2	3400	340	.10	590	.17
WBR	d	1700	80	.05	140	.08
Right Turn Adjustment					NBR	.46*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.57**		**.87**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02	10	.01
NBT	1	1700	10	.15*	0	.07*
NBR	0	0	240		120	
SBL	1	1700	60	.04*	160	.09*
SBT	1	1700	0	.00	10	.01
SBR	1	1700	40	.02	50	.03
EBL	1	1700	60	.04	60	.04
EBT	2	3400	350	.10*	690	.20*
EBR	1	1700	100	.06	30	.02
WBL	1	1700	170	.10*	170	.10*
WBT	2	3400	500	.15	560	.16
WBR	d	1700	100	.06	160	.09
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.51**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	0	.00	10	.01
NBT	1	1700	10	.01*	10	.01*
NBR	1	1700	200	.12	890	.52
SBL	1	1700	40	.02*	150	.09*
SBT	1	1700	20	.01	10	.01
SBR	1	1700	40	.02	50	.03
EBL	1	1700	80	.05	60	.04
EBT	2	3400	350	.10*	570	.17*
EBR	1	1700	0	.00	0	.00
WBL	2	3400	1250	.37*	310	.09*
WBT	2	3400	360	.11	590	.17
WBR	d	1700	80	.05	140	.08
Right Turn Adjustment					NBR	.44*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.55**		**.85**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02	10	.01
NBT	1	1700	10	.15*	0	.07*
NBR	0	0	240		120	
SBL	1	1700	50	.03*	150	.09*
SBT	1	1700	20	.01	10	.01
SBR	1	1700	40	.02	50	.03
EBL	1	1700	70	.04	60	.04
EBT	2	3400	370	.11*	640	.19*
EBR	1	1700	100	.06	30	.02
WBL	1	1700	170	.10*	170	.10*
WBT	2	3400	520	.15	570	.17
WBR	d	1700	80	.05	150	.09
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.50**

6. Bake & Portola

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04	290	.17
NBT	1.5	5100	160	.05*	310	.18*
NBR	1.5		90		870	.26
SBL	1	1700	140	.08*	300	.18*
SBT	2	3400	260	.08	280	.08
SBR	d	1700	290	.17	340	.20
EBL	2	3400	410	.12	460	.14
EBT	3	5100	280	.05*	800	.16*
EBR	d	1700	70	.04	60	.04
WBL	2	3400	1040	.31*	590	.17*
WBT	3	5100	700	.14	930	.18
WBR	d	1700	130	.08	100	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.54**		**.74**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04	250	.15
NBT	1.5	5100	160	.05*	290	.17*
NBR	1.5		90		880	.26
SBL	1	1700	150	.09*	290	.17*
SBT	2	3400	240	.07	280	.08
SBR	d	1700	280	.16	360	.21
EBL	2	3400	400	.12	470	.14
EBT	3	5100	290	.06*	800	.16*
EBR	d	1700	60	.04	70	.04
WBL	2	3400	940	.28*	600	.18*
WBT	3	5100	700	.14	950	.19
WBR	d	1700	130	.08	100	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.53**		**.73**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04	310	.18
NBT	1.5	5100	140	{.04}*	300	.18*
NBR	1.5		90		870	.26
SBL	1	1700	140	.08*	250	.15*
SBT	2	3400	250	.07	280	.08
SBR	d	1700	300	.18	440	.26
EBL	2	3400	470	.14	480	.14*
EBT	3	5100	530	.10*	1040	.20
EBR	d	1700	130	.08	70	.04
WBL	2	3400	970	.29*	580	.17
WBT	3	5100	890	.17	1220	.24*
WBR	d	1700	120	.07	100	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.56**		**.76**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05	260	.15
NBT	1.5	5100	150	{.04}*	280	.16*
NBR	1.5		100		870	.26
SBL	1	1700	150	.09*	240	.14*
SBT	2	3400	240	.07	280	.08
SBR	d	1700	300	.18	440	.26
EBL	2	3400	460	.14	490	.14*
EBT	3	5100	530	.10*	1060	.21
EBR	d	1700	90	.05	80	.05
WBL	2	3400	930	.27*	580	.17
WBT	3	5100	950	.19	1270	.25*
WBR	d	1700	110	.06	100	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.55**		**.74**

7. Bake & Towne Centre

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	220	.06*	430	.13
NBT	2	3400	370	.11	1310	.39*
NBR	d	1700	100	.06	180	.11
SBL	2	3400	10	.00	30	.01*
SBT	2	3400	1450	.43*	430	.13
SBR	d	1700	60	.04	80	.05
EBL	1	1700	10	.01	60	.04
EBT	1	1700	50	.03*	190	.11*
EBR	1	1700	150	.09	390	.23
WBL	1	1700	130	.08*	170	.10*
WBT	2	3400	70	.02	130	.04
WBR	0	0	10		10	
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.66**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	270	.08*	410	.12
NBT	2	3400	440	.13	1310	.39*
NBR	d	1700	120	.07	180	.11
SBL	2	3400	10	.00	30	.01*
SBT	2	3400	1310	.39*	380	.11
SBR	d	1700	60	.04	80	.05
EBL	1	1700	10	.01	60	.04
EBT	1	1700	50	.03*	190	.11*
EBR	1	1700	140	.08	410	.24
WBL	1	1700	120	.07*	180	.11*
WBT	2	3400	50	.02	140	.04
WBR	0	0	10		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.62**		**.67**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	210	.06*	420	.12
NBT	2	3400	360	.11	1310	.39*
NBR	d	1700	100	.06	180	.11
SBL	2	3400	20	.01	30	.01*
SBT	2	3400	1430	.42*	420	.12
SBR	d	1700	60	.04	80	.05
EBL	1	1700	10	.01	60	.04
EBT	1	1700	50	.03*	210	.12*
EBR	1	1700	140	.08	360	.21
WBL	1	1700	160	.09*	170	.10*
WBT	2	3400	80	.03	140	.04
WBR	0	0	10		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.67**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	260	.08*	400	.12
NBT	2	3400	430	.13	1300	.38*
NBR	d	1700	130	.08	170	.10
SBL	2	3400	10	.00	30	.01*
SBT	2	3400	1330	.39*	400	.12
SBR	d	1700	50	.03	100	.06
EBL	1	1700	10	.01	60	.04
EBT	1	1700	50	.03*	190	.11*
EBR	1	1700	130	.08	400	.24
WBL	1	1700	130	.08*	180	.11*
WBT	2	3400	60	.02	150	.05
WBR	0	0	10		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.63**		**.66**

8. Bake & Rancho North

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	680	.20	1780	.52*
NBR	d	1700	340	.20	480	.28
SBL	1	1700	60	.04	130	.08*
SBT	2	3400	1680	.49*	840	.25
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	370	.11*	470	.14*
WBT	0	0	0		0	
WBR	2	3400	10	.00	160	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.79**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	750	.22	1750	.51*
NBR	d	1700	370	.22	590	.35
SBL	1	1700	110	.06	150	.09*
SBT	2	3400	1460	.43*	830	.24
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	610	.18*	440	.13*
WBT	0	0	0		0	
WBR	2	3400	80	.02	160	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.78**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	660	.19	1760	.52*
NBR	d	1700	330	.19	490	.29
SBL	1	1700	60	.04	120	.07*
SBT	2	3400	1680	.49*	820	.24
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	390	.11*	470	.14*
WBT	0	0	0		0	
WBR	2	3400	10	.00	160	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.78**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	730	.21	1710	.50*
NBR	d	1700	390	.23	570	.34
SBL	1	1700	130	.08	160	.09*
SBT	2	3400	1440	.42*	820	.24
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	630	.19*	450	.13*
WBT	0	0	0		0	
WBR	2	3400	80	.02	170	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.77**

9. Bake & Rancho South

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	200	.12*	170	.10
NBT	2	3400	810	.24	1880	.55*
NBR	1	1700	360	.21	120	.07
SBL	1	1700	130	.08	60	.04*
SBT	2	3400	1660	.49*	1050	.31
SBR	1	1700	260	.15	200	.12
EBL	2	3400	170	.05	280	.08*
EBT	2	3400	370	.15*	70	.04
EBR	0	0	150		150	.09
WBL	2	3400	90	.03*	290	.09
WBT	2	3400	50	.03	350	.14*
WBR	0	0	40		120	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.84**		**.86**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	190	.11*	180	.11
NBT	2	3400	860	.25	1980	.58*
NBR	1	1700	100	.06	110	.06
SBL	1	1700	10	.01	40	.02*
SBT	2	3400	1720	.51*	1020	.30
SBR	1	1700	330	.19	200	.12
EBL	2	3400	190	.06*	330	.10*
EBT	1	1700	60	.04	80	.05
EBR	d	1700	140	.08	180	.11
WBL	2	3400	210	.06	110	.03
WBT	1	1700	80	.05*	40	.02*
WBR	1	1700	60	.04	20	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.78**		**.77**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	190	.11*	150	.09
NBT	2	3400	780	.23	1850	.54*
NBR	1	1700	360	.21	120	.07
SBL	1	1700	170	.10	70	.04*
SBT	2	3400	1650	.49*	1030	.30
SBR	1	1700	250	.15	200	.12
EBL	2	3400	170	.05	270	.08*
EBT	2	3400	390	.16*	90	.05
EBR	0	0	140		140	.08
WBL	2	3400	80	.02*	290	.09
WBT	2	3400	50	.03	350	.15*
WBR	0	0	40		150	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.83**		**.86**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	180	.11*	170	.10
NBT	2	3400	860	.25	1970	.58*
NBR	1	1700	100	.06	110	.06
SBL	1	1700	10	.01	40	.02*
SBT	2	3400	1710	.50*	1020	.30
SBR	1	1700	340	.20	200	.12
EBL	2	3400	200	.06*	290	.09*
EBT	1	1700	60	.04	80	.05
EBR	d	1700	130	.08	160	.09
WBL	2	3400	210	.06	110	.03
WBT	1	1700	80	.05*	40	.02*
WBR	1	1700	60	.04	20	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.77**		**.76**

10. Bake & Orchard

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	1370	.40	2190	.64*
NBR	1	1700	0	.00	0	.00
SBL	0	0	0		0	
SBT	2	3400	1880	.55*	1460	.43
SBR	d	1700	10	.01	10	.01
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1700	20	.01	60	.04
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	1	1700	0	.00	0	.00
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.61**		**.69**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	1130	.33	2250	.66*
NBR	1	1700	20	.01	50	.03
SBL	0	0	0		0	
SBT	2	3400	2060	.61*	1300	.38
SBR	d	1700	10	.01	10	.01
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1700	20	.01	60	.04
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	1	1700	30	.02	20	.01
Right Turn Adjustment			EBR	.01*	WBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.67**		**.72**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	1330	.39	2130	.63*
NBR	1	1700	0	.00	0	.00
SBL	0	0	0		0	
SBT	2	3400	1840	.54*	1440	.42
SBR	d	1700	10	.01	10	.01
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1700	20	.01	60	.04
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	1	1700	0	.00	0	.00
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.60**		**.68**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	1120	.33	2230	.66*
NBR	1	1700	20	.01	50	.03
SBL	0	0	0		0	
SBT	2	3400	2040	.60*	1270	.37
SBR	d	1700	10	.01	10	.01
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1700	20	.01	60	.04
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	1	1700	30	.02	20	.01
Right Turn Adjustment			EBR	.01*	WBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.72**

11. Dimension & Bake

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	70	.02	190	.06*
NBT	1	1700	10	.01*	40	.02
NBR	1	1700	170	.10	380	.22
SBL	1	1700	110	.06*	40	.02
SBT	1	1700	40	.02	10	.01*
SBR	1	1700	60	.04	20	.01
EBL	1	1700	10	.01	50	.03
EBT	2	3400	1210	.36*	1640	.48*
EBR	d	1700	120	.07	50	.03
WBL	1	1700	340	.20*	240	.14*
WBT	2	3400	1560	.46	1310	.39
WBR	d	1700	30	.02	100	.06
Right Turn Adjustment					NBR	.06*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.80**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	70	.02	210	.06*
NBT	1	1700	10	.01*	40	.02
NBR	1	1700	130	.08	370	.22
SBL	1	1700	90	.05*	50	.03
SBT	1	1700	50	.03	20	.01*
SBR	1	1700	70	.04	20	.01
EBL	1	1700	10	.01*	50	.03
EBT	2	3400	990	.29	1700	.50*
EBR	d	1700	120	.07	50	.03
WBL	1	1700	310	.18	220	.13*
WBT	2	3400	1690	.50*	1180	.35
WBR	d	1700	20	.01	80	.05
Right Turn Adjustment					NBR	.08*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.62**		**.83**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	70	.02	190	.06*
NBT	1	1700	10	.01*	40	.02
NBR	1	1700	160	.09	390	.23
SBL	1	1700	110	.06*	40	.02
SBT	1	1700	40	.02	10	.01*
SBR	1	1700	70	.04	20	.01
EBL	1	1700	10	.01	50	.03
EBT	2	3400	1170	.34*	1580	.46*
EBR	d	1700	120	.07	50	.03
WBL	1	1700	350	.21*	250	.15*
WBT	2	3400	1490	.44	1290	.38
WBR	d	1700	30	.02	100	.06
Right Turn Adjustment					NBR	.07*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.67**		**.80**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	70	.02	210	.06*
NBT	1	1700	10	.01*	40	.02
NBR	1	1700	130	.08	370	.22
SBL	1	1700	90	.05*	40	.02
SBT	1	1700	40	.02	20	.01*
SBR	1	1700	60	.04	20	.01
EBL	1	1700	10	.01*	50	.03
EBT	2	3400	960	.28	1650	.49*
EBR	d	1700	120	.07	50	.03
WBL	1	1700	330	.19	220	.13*
WBT	2	3400	1620	.48*	1140	.34
WBR	d	1700	30	.02	80	.05
Right Turn Adjustment					NBR	.07*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.60**		**.81**

12. Alton & Rancho South

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	200	.06*	140	.04
NBT	3	5100	1070	.21	2000	.39*
NBR	1	1700	520	.31	370	.22
SBL	2	3400	250	.07	50	.01*
SBT	3	5100	2140	.42*	1390	.27
SBR	d	1700	180	.11	110	.06
EBL	1	1700	60	.04	210	.12
EBT	2	3400	40	.01*	60	.02*
EBR	1	1700	110	.06	220	.13
WBL	1	1700	270	.16*	530	.31*
WBT	2	3400	90	.03	70	.02
WBR	d	1700	30	.02	330	.19
Right Turn Adjustment					EBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.70**		**.79**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	160	.05*	130	.04
NBT	3	5100	980	.19	1960	.38*
NBR	1	1700	420	.25	460	.27
SBL	2	3400	180	.05	50	.01*
SBT	3	5100	2080	.41*	1390	.27
SBR	d	1700	170	.10	110	.06
EBL	1	1700	60	.04	200	.12
EBT	2	3400	30	.01*	110	.03*
EBR	1	1700	110	.06	190	.11
WBL	1	1700	370	.22*	430	.25*
WBT	2	3400	120	.04	70	.02
WBR	d	1700	70	.04	220	.13
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.75**		**.72**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	210	.06*	140	.04
NBT	3	5100	930	.18	1780	.35*
NBR	1	1700	520	.31	390	.23
SBL	2	3400	260	.08	60	.02*
SBT	3	5100	1930	.38*	1270	.25
SBR	d	1700	180	.11	110	.06
EBL	1	1700	60	.04	220	.13
EBT	2	3400	40	.01*	60	.02*
EBR	1	1700	110	.06	220	.13
WBL	1	1700	280	.16*	490	.29*
WBT	2	3400	70	.02	70	.02
WBR	d	1700	30	.02	340	.20
Right Turn Adjustment					EBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.75**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	160	.05*	130	.04
NBT	3	5100	820	.16	1760	.35*
NBR	1	1700	420	.25	460	.27
SBL	2	3400	180	.05	50	.01*
SBT	3	5100	1860	.36*	1230	.24
SBR	d	1700	180	.11	110	.06
EBL	1	1700	60	.04	220	.13
EBT	2	3400	30	.01*	80	.02*
EBR	1	1700	120	.07	200	.12
WBL	1	1700	440	.26*	420	.25*
WBT	2	3400	120	.04	70	.02
WBR	d	1700	60	.04	220	.13
Right Turn Adjustment			EBR	.02*	EBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.75**		**.69**

13. Alton & SR-241

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	140	.08*	470	.28*
NBT	3	5100	760	.15	1290	.25
NBR	f		310		1030	
SBL	1	1700	130	.08	80	.05
SBT	3	5100	1280	.25*	1060	.21*
SBR	f		330		260	
EBL	2	3400	360	.11	290	.09
EBT	0	0	0		0	
EBR	f		490		160	
WBL	2	3400	1030	.30*	470	.14*
WBT	0	0	0		0	
WBR	f		80		120	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.68**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	180	.11*	340	.20*
NBT	3	5100	760	.15	1320	.26
NBR	f		300		950	
SBL	1	1700	140	.08	90	.05
SBT	3	5100	1300	.25*	1070	.21*
SBR	f		340		260	
EBL	2	3400	330	.10	300	.09
EBT	0	0	0		0	
EBR	f		410		160	
WBL	2	3400	930	.27*	490	.14*
WBT	0	0	0		0	
WBR	f		70		110	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.60**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	120	.07*	430	.25*
NBT	3	5100	630	.12	1020	.20
NBR	f		320		1120	
SBL	1	1700	140	.08	80	.05
SBT	3	5100	930	.18*	900	.18*
SBR	f		30		70	
EBL	2	3400	170	.05	50	.01
EBT	0	0	0		0	
EBR	f		470		140	
WBL	2	3400	1210	.36*	530	.16*
WBT	0	0	0		0	
WBR	f		90		130	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.64**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	160	.09*	290	.17*
NBT	3	5100	610	.12	1050	.21
NBR	f		330		1090	
SBL	1	1700	140	.08	80	.05
SBT	3	5100	950	.19*	900	.18*
SBR	f		30		80	
EBL	2	3400	170	.05	50	.01
EBT	0	0	0		0	
EBR	f		370		140	
WBL	2	3400	1110	.33*	540	.16*
WBT	0	0	0		0	
WBR	f		80		130	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.56**

14. Alton & Towne Centre

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02*	160	.09*
NBT	3	5100	750	.15	1140	.22
NBR	f		400		280	
SBL	1	1700	10	.01	20	.01
SBT	3	5100	1560	.31*	980	.19*
SBR	1	1700	30	.02	10	.01
EBL	1	1700	50	.03	30	.02
EBT	1	1700	40	.02*	50	.03*
EBR	1	1700	60	.04	60	.04
WBL	2	3400	130	.04*	460	.14*
WBT	1	1700	40	.02	40	.02
WBR	1	1700	10	.01	10	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.50**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02*	160	.09*
NBT	3	5100	740	.15	1180	.23
NBR	f		370		280	
SBL	1	1700	10	.01	20	.01
SBT	3	5100	1600	.31*	1020	.20*
SBR	1	1700	30	.02	20	.01
EBL	1	1700	50	.03	30	.02
EBT	1	1700	40	.02*	50	.03*
EBR	1	1700	60	.04	60	.04
WBL	2	3400	130	.04*	440	.13*
WBT	1	1700	40	.02	40	.02
WBR	1	1700	10	.01	10	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.50**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02*	150	.09*
NBT	3	5100	540	.11	770	.15
NBR	f		320		230	
SBL	1	1700	60	.04	50	.03
SBT	3	5100	940	.18*	720	.14*
SBR	1	1700	40	.02	10	.01
EBL	1	1700	60	.04*	50	.03
EBT	1	1700	40	.02	60	.04*
EBR	1	1700	50	.03	40	.02
WBL	2	3400	120	.04	390	.11*
WBT	1	1700	40	.02*	50	.03
WBR	1	1700	20	.01	40	.02
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.31**		**.43**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02*	140	.08*
NBT	3	5100	540	.11	800	.16
NBR	f		280		230	
SBL	1	1700	70	.04	60	.04
SBT	3	5100	950	.19*	740	.15*
SBR	1	1700	40	.02	20	.01
EBL	1	1700	60	.04*	40	.02
EBT	1	1700	40	.02	60	.04*
EBR	1	1700	50	.03	40	.02
WBL	2	3400	120	.04	370	.11*
WBT	1	1700	40	.02*	50	.03
WBR	1	1700	10	.01	40	.02
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.32**		**.43**

15. Alton & Portola

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02	160	.09*
NBT	2	3400	80	.02*	190	.06
NBR	f		470		840	
SBL	1	1700	210	.12*	80	.05
SBT	2	3400	140	.04	110	.03*
SBR	d	1700	0	.00	10	.01
EBL	2	3400	10	.00	10	.00
EBT	2	3400	290	.09*	110	.03*
EBR	f		100		80	
WBL	2	3400	670	.20*	550	.16*
WBT	3	5100	140	.03	240	.05
WBR	f		100		170	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.48**		**.36**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02	160	.09*
NBT	2	3400	70	.02*	190	.06
NBR	f		470		870	
SBL	1	1700	200	.12*	80	.05
SBT	2	3400	140	.04	110	.03*
SBR	d	1700	0	.00	10	.01
EBL	2	3400	10	.00	10	.00
EBT	2	3400	280	.08*	110	.03*
EBR	f		110		80	
WBL	2	3400	680	.20*	580	.17*
WBT	3	5100	140	.03	240	.05
WBR	f		100		150	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.47**		**.37**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	210	.12*
NBT	2	3400	70	.02*	100	.03
NBR	f		310		560	
SBL	1	1700	160	.09*	70	.04
SBT	2	3400	90	.03	80	.02*
SBR	d	1700	0	.00	10	.01
EBL	2	3400	10	.00	10	.00
EBT	2	3400	1000	.29*	710	.21*
EBR	f		110		110	
WBL	2	3400	370	.11*	370	.11*
WBT	3	5100	780	.15	890	.17
WBR	f		80		120	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.56**		**.51**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	210	.12*
NBT	2	3400	70	.02*	90	.03
NBR	f		320		600	
SBL	1	1700	160	.09*	60	.04
SBT	2	3400	80	.02	80	.02*
SBR	d	1700	0	.00	10	.01
EBL	2	3400	10	.00	10	.00
EBT	2	3400	930	.27*	710	.21*
EBR	f		110		120	
WBL	2	3400	390	.11*	380	.11*
WBT	3	5100	870	.17	880	.17
WBR	f		90		110	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.54**		**.51**

16. Lake Forest & Portola

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02	60	.04
NBT	2	3400	210	.06*	180	.05*
NBR	d	1700	230	.14	560	.33
SBL	1	1700	220	.13*	280	.16*
SBT	2	3400	100	.03	250	.07
SBR	d	1700	20	.01	20	.01
EBL	2	3400	10	.00	20	.01
EBT	3	5100	490	.10	1520	.30*
EBR	d	1700	40	.02	40	.02
WBL	2	3400	750	.22	520	.15*
WBT	3	5100	1890	.37*	1150	.23
WBR	d	1700	300	.18	170	.10
Right Turn Adjustment					NBR	.17*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.61**		**.88**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02	70	.04
NBT	2	3400	210	.06*	200	.06*
NBR	d	1700	250	.15	430	.25
SBL	1	1700	220	.13*	280	.16*
SBT	2	3400	120	.04	240	.07
SBR	d	1700	20	.01	20	.01
EBL	2	3400	20	.01*	20	.01
EBT	3	5100	520	.10	1510	.30*
EBR	d	1700	50	.03	40	.02
WBL	2	3400	580	.17	490	.14*
WBT	3	5100	1780	.35*	1170	.23
WBR	d	1700	300	.18	150	.09
Right Turn Adjustment					NBR	.08*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.60**		**.79**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	50	.03	100	.06
NBT	2	3400	160	.05*	190	.06*
NBR	d	1700	240	.14	510	.30
SBL	1	1700	210	.12*	320	.19*
SBT	2	3400	90	.03	190	.06
SBR	d	1700	30	.02	30	.02
EBL	2	3400	30	.01*	20	.01
EBT	3	5100	710	.14	1640	.32*
EBR	d	1700	80	.05	50	.03
WBL	2	3400	720	.21	470	.14*
WBT	3	5100	2000	.39*	1300	.25
WBR	d	1700	300	.18	140	.08
Right Turn Adjustment					NBR	.13*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.62**		**.89**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	50	.03	120	.07
NBT	2	3400	160	.05*	190	.06*
NBR	d	1700	250	.15	410	.24
SBL	1	1700	210	.12*	320	.19*
SBT	2	3400	100	.03	190	.06
SBR	d	1700	20	.01	30	.02
EBL	2	3400	30	.01*	20	.01
EBT	3	5100	710	.14	1630	.32*
EBR	d	1700	90	.05	60	.04
WBL	2	3400	490	.14	460	.14*
WBT	3	5100	2020	.40*	1320	.26
WBR	d	1700	310	.18	140	.08
Right Turn Adjustment					NBR	.07*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.63**		**.83**

17. Lake Forest & Towne Centre

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	170	.05*	260	.08*
NBT	2	3400	620	.18	890	.26
NBR	d	1700	180	.11	100	.06
SBL	2	3400	10	.00	10	.00
SBT	2	3400	740	.22*	910	.27*
SBR	d	1700	20	.01	20	.01
EBL	1	1700	10	.01	10	.01
EBT	1	1700	80	.05*	170	.10*
EBR	1	1700	70	.04	280	.16
WBL	1	1700	60	.04*	100	.06*
WBT	2	3400	60	.02	60	.02
WBR	0	0	10		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.41**		**.56**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	170	.05*	260	.08*
NBT	2	3400	650	.19	770	.23
NBR	d	1700	170	.10	80	.05
SBL	2	3400	10	.00	10	.00
SBT	2	3400	600	.18*	870	.26*
SBR	d	1700	30	.02	20	.01
EBL	1	1700	10	.01	10	.01
EBT	1	1700	90	.05*	170	.10*
EBR	1	1700	80	.05	280	.16
WBL	1	1700	50	.03*	110	.06*
WBT	2	3400	60	.02	60	.02
WBR	0	0	10		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.36**		**.55**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	140	.04*	230	.07*
NBT	2	3400	580	.17	880	.26
NBR	d	1700	170	.10	120	.07
SBL	2	3400	10	.00	10	.00
SBT	2	3400	690	.20*	790	.23*
SBR	d	1700	50	.03	20	.01
EBL	1	1700	10	.01	10	.01
EBT	1	1700	80	.05*	180	.11*
EBR	1	1700	40	.02	250	.15
WBL	1	1700	80	.05*	100	.06*
WBT	2	3400	60	.02	60	.02
WBR	0	0	20		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.39**		**.52**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	150	.04*	230	.07*
NBT	2	3400	590	.17	800	.24
NBR	d	1700	160	.09	70	.04
SBL	2	3400	20	.01	10	.00
SBT	2	3400	530	.16*	800	.24*
SBR	d	1700	30	.02	20	.01
EBL	1	1700	10	.01	10	.01
EBT	1	1700	90	.05*	170	.10*
EBR	1	1700	50	.03	220	.13
WBL	1	1700	50	.03*	110	.06*
WBT	2	3400	60	.02	60	.02
WBR	0	0	10		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.33**		**.52**

18. Towne Centre & Portola

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	10	.01	30	.02*
NBT	1	1700	80	.05*	10	.01
NBR	1	1700	80	.05	280	.16
SBL	2	3400	40	.01*	270	.08
SBT	1	1700	10	.01	60	.08*
SBR	0	0	10		80	
EBL	2	3400	90	.03*	30	.01
EBT	3	5100	840	.16	2340	.46*
EBR	d	1700	10	.01	10	.01
WBL	2	3400	160	.05	60	.02*
WBT	3	5100	2930	.57*	1750	.34
WBR	d	1700	290	.17	90	.05
Right Turn Adjustment					NBR	.12*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.71**		**.75**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	20	.01	20	.01*
NBT	1	1700	80	.05*	10	.01
NBR	1	1700	80	.05	260	.15
SBL	2	3400	40	.01*	270	.08
SBT	1	1700	10	.01	60	.08*
SBR	0	0	10		80	
EBL	2	3400	90	.03*	40	.01
EBT	3	5100	900	.18	2180	.43*
EBR	d	1700	10	.01	10	.01
WBL	2	3400	150	.04	60	.02*
WBT	3	5100	2640	.52*	1720	.34
WBR	d	1700	290	.17	90	.05
Right Turn Adjustment					NBR	.12*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.71**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	10	.01	20	.01
NBT	1	1700	80	.05*	10	.01*
NBR	1	1700	80	.05	300	.18
SBL	2	3400	40	.01*	270	.08*
SBT	1	1700	10	.01	60	.07
SBR	0	0	10		60	
EBL	2	3400	90	.03*	30	.01
EBT	3	5100	1060	.21	2440	.48*
EBR	d	1700	10	.01	10	.01
WBL	2	3400	180	.05	60	.02*
WBT	3	5100	2980	.58*	1820	.36
WBR	d	1700	290	.17	90	.05
Right Turn Adjustment					NBR	.15*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.72**		**.79**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	20	.01	20	.01
NBT	1	1700	80	.05*	10	.01*
NBR	1	1700	80	.05	250	.15
SBL	2	3400	40	.01*	270	.08*
SBT	1	1700	10	.01	60	.07
SBR	0	0	10		60	
EBL	2	3400	90	.03*	30	.01
EBT	3	5100	1070	.21	2340	.46*
EBR	d	1700	10	.01	10	.01
WBL	2	3400	150	.04	60	.02*
WBT	3	5100	2760	.54*	1820	.36
WBR	d	1700	290	.17	90	.05
Right Turn Adjustment					NBR	.12*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.74**

19. Glenn Ranch & Portola

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	70	.04
NBT	2	3400	20	.01*	30	.02*
NBR	0	0	30	.02	90	.05
SBL	2	3400	400	.12*	380	.11*
SBT	2	3400	50	.01	20	.01
SBR	f		900		780	
EBL	2	3400	460	.14*	1080	.32*
EBT	3	5100	490	.10	1880	.37
EBR	1	1700	20	.01	80	.05
WBL	2	3400	110	.03	60	.02
WBT	3	5100	1750	.34*	820	.16*
WBR	1	1700	110	.06	320	.19
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION **.66** **.66**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	80	.05
NBT	2	3400	20	.01*	20	.01*
NBR	0	0	30	.02	90	.05
SBL	2	3400	430	.13*	380	.11*
SBT	2	3400	50	.01	20	.01
SBR	f		820		800	
EBL	2	3400	490	.14*	1050	.31*
EBT	3	5100	510	.10	1730	.34
EBR	1	1700	20	.01	80	.05
WBL	2	3400	110	.03	60	.02
WBT	3	5100	1550	.30*	780	.15*
WBR	1	1700	90	.05	330	.19
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION **.63** **.63**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	100	.06
NBT	2	3400	20	.01*	30	.02*
NBR	0	0	30	.02	60	.04
SBL	2	3400	370	.11*	350	.10*
SBT	2	3400	50	.01	20	.01
SBR	f		970		820	
EBL	2	3400	540	.16*	1180	.35*
EBT	3	5100	630	.12	1920	.38
EBR	1	1700	30	.02	80	.05
WBL	2	3400	90	.03	60	.02
WBT	3	5100	1740	.34*	810	.16*
WBR	1	1700	60	.04	260	.15
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION **.67** **.68**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	100	.06
NBT	2	3400	20	.01*	20	.01*
NBR	0	0	30	.02	60	.04
SBL	2	3400	400	.12*	360	.11*
SBT	2	3400	50	.01	20	.01
SBR	f		900		810	
EBL	2	3400	550	.16*	1130	.33*
EBT	3	5100	630	.12	1780	.35
EBR	1	1700	30	.02	80	.05
WBL	2	3400	90	.03	60	.02
WBT	3	5100	1600	.31*	820	.16*
WBR	1	1700	60	.04	260	.15
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION **.65** **.66**

20. Portola & SR-241

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	550	.16*	330	.10
NBT	3	5100	820	.16	810	.16*
NBR	f		90		180	
SBL	2	3400	230	.07	1280	.38*
SBT	3	5100	490	.10*	990	.19
SBR	f		250		130	
EBL	1	1700	220	.13*	170	.10*
EBT	0	0	0		0	
EBR	f		390		490	
WBL	2	3400	280	.08	140	.04
WBT	0	0	0		0	
WBR	f		1930		440	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.69**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	550	.16*	370	.11
NBT	3	5100	810	.16	810	.16*
NBR	f		100		180	
SBL	2	3400	240	.07	1130	.33*
SBT	3	5100	530	.10*	990	.19
SBR	f		260		120	
EBL	1	1700	190	.11*	160	.09*
EBT	0	0	0		0	
EBR	f		370		460	
WBL	2	3400	300	.09	160	.05
WBT	0	0	0		0	
WBR	f		1730		410	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.42**		**.63**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	520	.15*	340	.10
NBT	3	5100	890	.17	810	.16*
NBR	f		90		190	
SBL	2	3400	230	.07	1260	.37*
SBT	3	5100	590	.12*	1050	.21
SBR	f		260		80	
EBL	1	1700	100	.06	100	.06*
EBT	0	0	0		0	
EBR	f		330		460	
WBL	2	3400	280	.08*	140	.04
WBT	0	0	0		0	
WBR	f		1900		430	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.40**		**.64**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	490	.14*	330	.10
NBT	3	5100	880	.17	850	.17*
NBR	f		100		180	
SBL	2	3400	240	.07	1130	.33*
SBT	3	5100	620	.12*	1050	.21
SBR	f		260		80	
EBL	1	1700	100	.06	90	.05*
EBT	0	0	0		0	
EBR	f		320		460	
WBL	2	3400	270	.08*	140	.04
WBT	0	0	0		0	
WBR	f		1760		430	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.39**		**.60**

21. Portola & Rancho

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	1410	.41*	840	.25*
NBT	3	5100	1210	.24	1590	.31
NBR	d	1700	10	.01	10	.01
SBL	2	3400	10	.00	10	.00
SBT	3	5100	820	.16*	1470	.29*
SBR	1	1700	250	.15	60	.04
EBL	1.5		100		130	
EBT	0.5	3400	10	.03*	10	.04*
EBR	f		530		1410	
WBL	1.5		10		10	
WBT	1	6800	10	.00*	10	.00*
WBR	1.5		10		10	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION .65 .63

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	1200	.35*	810	.24*
NBT	3	5100	1200	.24	1620	.32
NBR	d	1700	10	.01	10	.01
SBL	2	3400	10	.00	10	.00
SBT	3	5100	810	.16*	1450	.28*
SBR	1	1700	280	.16	90	.05
EBL	1.5		110		130	
EBT	0.5	3400	10	.04*	10	.04*
EBR	f		530		1270	
WBL	1.5		10		10	
WBT	1	6800	10	.00*	10	.00*
WBR	1.5		10		10	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION .60 .61

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	1410	.41*	840	.25*
NBT	3	5100	1240	.24	1590	.31
NBR	d	1700	10	.01	10	.01
SBL	2	3400	10	.00	10	.00
SBT	3	5100	850	.17*	1510	.30*
SBR	1	1700	260	.15	60	.04
EBL	1.5		100		140	
EBT	0.5	3400	10	.03*	10	.04*
EBR	f		530		1410	
WBL	1.5		10		10	
WBT	1	6800	10	.00*	10	.00*
WBR	1.5		10		10	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION .66 .64

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	1220	.36*	810	.24*
NBT	3	5100	1220	.24	1620	.32
NBR	d	1700	10	.01	10	.01
SBL	2	3400	10	.00	10	.00
SBT	3	5100	840	.16*	1490	.29*
SBR	1	1700	270	.16	60	.04
EBL	1.5		110		130	
EBT	0.5	3400	10	.04*	10	.04*
EBR	f		530		1240	
WBL	1.5		10		10	
WBT	1	6800	10	.00*	10	.00*
WBR	1.5		10		10	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION .61 .62

22. El Toro & Portola

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	480	.14*	490	.14
NBT	3	5100	190	.04	590	.12*
NBR	f		270		460	
SBL	1	1700	50	.03	350	.21*
SBT	3	5100	720	.14*	510	.10
SBR	1	1700	400	.24	710	.42
EBL	2	3400	50	.01	590	.17
EBT	3	5100	720	.14*	1700	.33*
EBR	1	1700	430	.25	890	.52
WBL	2	3400	550	.16*	400	.12*
WBT	4	6800	1990	.29	1250	.18
WBR	d	1700	20	.01	40	.02
Right Turn Adjustment			SBR	.09*	SBR	.03*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION **.72** **.86**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	440	.13*	440	.13
NBT	3	5100	180	.04	640	.13*
NBR	f		290		490	
SBL	1	1700	60	.04	340	.20*
SBT	3	5100	710	.14*	520	.10
SBR	1	1700	370	.22	710	.42
EBL	2	3400	50	.01	540	.16
EBT	3	5100	740	.15*	1610	.32*
EBR	1	1700	390	.23	820	.48
WBL	2	3400	660	.19*	410	.12*
WBT	4	6800	1840	.27	1240	.18
WBR	d	1700	20	.01	40	.02
Right Turn Adjustment			SBR	.03*	SBR	.02*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION **.69** **.84**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	490	.14*	480	.14
NBT	3	5100	190	.04	580	.11*
NBR	f		260		440	
SBL	1	1700	50	.03	350	.21*
SBT	3	5100	710	.14*	510	.10
SBR	1	1700	400	.24	710	.42
EBL	2	3400	60	.02*	610	.18
EBT	3	5100	730	.14	1710	.34*
EBR	1	1700	430	.25	880	.52
WBL	2	3400	530	.16	400	.12*
WBT	4	6800	2010	.30*	1270	.19
WBR	d	1700	20	.01	40	.02
Right Turn Adjustment			SBR	.08*	SBR	.04*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION **.73** **.87**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	440	.13*	430	.13
NBT	3	5100	180	.04	620	.12*
NBR	f		280		490	
SBL	1	1700	60	.04	340	.20*
SBT	3	5100	670	.13*	520	.10
SBR	1	1700	390	.23	720	.42
EBL	2	3400	50	.01	560	.16
EBT	3	5100	750	.15*	1630	.32*
EBR	1	1700	400	.24	800	.47
WBL	2	3400	650	.19*	420	.12*
WBT	4	6800	1860	.27	1250	.18
WBR	d	1700	20	.01	40	.02
Right Turn Adjustment			SBR	.05*	SBR	.03*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION **.70** **.84**

23. Los Alisos & Santa Margarita

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	450	.26*	380	.22*
NBT	2	3400	180	.05	400	.12
NBR	1	1700	100	.06	240	.14
SBL	1	1700	100	.06	30	.02
SBT	2	3400	450	.13*	300	.09*
SBR	d	1700	100	.06	220	.13
EBL	1	1700	120	.07*	110	.06
EBT	3	5100	780	.15	1860	.36*
EBR	d	1700	250	.15	430	.25
WBL	1	1700	430	.25	200	.12*
WBT	3	5100	1980	.39*	1120	.22
WBR	d	1700	10	.01	100	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.90**		**.84**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	420	.25*	390	.23*
NBT	2	3400	180	.05	390	.11
NBR	1	1700	100	.06	230	.14
SBL	1	1700	90	.05	30	.02
SBT	2	3400	440	.13*	300	.09*
SBR	d	1700	130	.08	200	.12
EBL	1	1700	100	.06*	170	.10
EBT	3	5100	790	.15	1780	.35*
EBR	d	1700	280	.16	400	.24
WBL	1	1700	380	.22	180	.11*
WBT	3	5100	1960	.38*	1130	.22
WBR	d	1700	0	.00	80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.87**		**.83**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	440	.26*	380	.22*
NBT	2	3400	180	.05	400	.12
NBR	1	1700	110	.06	240	.14
SBL	1	1700	100	.06	30	.02
SBT	2	3400	440	.13*	290	.09*
SBR	d	1700	100	.06	240	.14
EBL	1	1700	110	.06*	100	.06
EBT	3	5100	780	.15	1850	.36*
EBR	d	1700	260	.15	440	.26
WBL	1	1700	410	.24	190	.11*
WBT	3	5100	2000	.39*	1120	.22
WBR	d	1700	0	.00	110	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.89**		**.83**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	410	.24*	400	.24*
NBT	2	3400	180	.05	390	.11
NBR	1	1700	100	.06	230	.14
SBL	1	1700	90	.05	40	.02
SBT	2	3400	440	.13*	290	.09*
SBR	d	1700	130	.08	200	.12
EBL	1	1700	90	.05*	150	.09
EBT	3	5100	810	.16	1800	.35*
EBR	d	1700	280	.16	410	.24
WBL	1	1700	360	.21	170	.10*
WBT	3	5100	1980	.39*	1130	.22
WBR	d	1700	0	.00	80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.86**		**.83**

24. Alton & Commercentre

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1440	.28	2400	.47*
NBR	d	1700	420	.25	250	.15
SBL	1	1700	210	.12	130	.08*
SBT	3	5100	2620	.51*	1840	.36
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		130	.04*	460	.14*
WBT	0	5100	0		0	
WBR	1.5		70	{.00}	240	{.08}
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.60**		**.74**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1210	.24	2470	.48*
NBR	d	1700	420	.25	260	.15
SBL	1	1700	210	.12	140	.08*
SBT	3	5100	2670	.52*	1700	.33
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		180	.05*	450	.13*
WBT	0	5100	0		0	
WBR	1.5		80		220	.13
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.62**		**.74**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1300	.25	2170	.43*
NBR	d	1700	420	.25	240	.14
SBL	1	1700	220	.13	130	.08*
SBT	3	5100	2400	.47*	1680	.33
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		150	.04*	460	.14*
WBT	0	5100	0		0	
WBR	1.5		70		260	{.09}
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.56**		**.70**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1070	.21	2280	.45*
NBR	d	1700	420	.25	250	.15
SBL	1	1700	210	.12	140	.08*
SBT	3	5100	2530	.50*	1540	.30
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		180	.05*	450	.13*
WBT	0	5100	0		0	
WBR	1.5		70		220	.13
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.60**		**.71**

25. Alton & Irvine

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	70	.02*	600	.18*
NBT	3	5100	490	.10	1270	.25
NBR	f		70		200	
SBL	2	3400	220	.06	130	.04
SBT	3	5100	1350	.26*	600	.12*
SBR	f		640		1090	
EBL	2.5		940		660	
EBT	2.5	8500	1170	.25*	940	.19*
EBR	1	1700	570	.34	130	.08
WBL	2	3400	390	.11	130	.04
WBT	3	5100	860	.17*	1510	.30*
WBR	1	1700	80	.05	220	.13
Right Turn Adjustment			EBR .07*			
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .82 .84

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	80	.02*	600	.18*
NBT	3	5100	400	.08	1330	.26
NBR	f		70		200	
SBL	2	3400	180	.05	100	.03
SBT	3	5100	1390	.27*	560	.11*
SBR	f		720		1010	
EBL	2.5		790	.23	690	
EBT	2.5	8500	1220	.24*	970	.20*
EBR	1	1700	570	.34	120	.07
WBL	2	3400	390	.11	130	.04
WBT	3	5100	880	.17*	1510	.30*
WBR	1	1700	80	.05	220	.13
Right Turn Adjustment			EBR .08*			
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .83 .84

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	80	.02*	630	.19*
NBT	3	5100	470	.09	1230	.24
NBR	f		60		200	
SBL	2	3400	270	.08	120	.04
SBT	3	5100	1320	.26*	580	.11*
SBR	f		410		970	
EBL	2.5		790		430	.13
EBT	2.5	8500	1160	.23*	950	.19*
EBR	1	1700	600	.35	140	.08
WBL	2	3400	370	.11	120	.04
WBT	3	5100	850	.17*	1490	.29*
WBR	1	1700	100	.06	240	.14
Right Turn Adjustment			EBR .10*			
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .83 .83

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	80	.02*	620	.18*
NBT	3	5100	400	.08	1280	.25
NBR	f		70		200	
SBL	2	3400	250	.07	100	.03
SBT	3	5100	1400	.27*	550	.11*
SBR	f		510		870	
EBL	2.5		640	.19	500	.15
EBT	2.5	8500	1180	.23*	960	.19*
EBR	1	1700	620	.36	130	.08
WBL	2	3400	400	.12	130	.04
WBT	3	5100	870	.17*	1520	.30*
WBR	1	1700	90	.05	250	.15
Right Turn Adjustment			EBR .11*			
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .85 .83

26. Bake & Commercentre

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04*	10	.01
NBT	2	3400	1180	.35	1440	.42*
NBR	d	1700	720	.42	220	.13
SBL	1	1700	30	.02	50	.03*
SBT	2	3400	1350	.40*	1010	.30
SBR	d	1700	60	.04	30	.02
EBL	1	1700	110	.06	180	.11
EBT	2	3400	180	.07*	80	.04*
EBR	0	0	60		70	
WBL	2	3400	310	.09*	620	.18*
WBT	1	1700	50	.04	130	.09
WBR	0	0	20		30	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.72**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05*	10	.01
NBT	2	3400	980	.29	1470	.43*
NBR	d	1700	700	.41	220	.13
SBL	1	1700	30	.02	60	.04*
SBT	2	3400	1450	.43*	920	.27
SBR	d	1700	90	.05	30	.02
EBL	1	1700	110	.06	180	.11
EBT	2	3400	180	.07*	100	.05*
EBR	0	0	50		70	
WBL	2	3400	280	.08*	600	.18*
WBT	1	1700	70	.06	120	.09
WBR	0	0	30		30	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.75**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04*	10	.01
NBT	2	3400	1140	.34	1390	.41*
NBR	d	1700	720	.42	230	.14
SBL	1	1700	30	.02	50	.03*
SBT	2	3400	1290	.38*	990	.29
SBR	d	1700	70	.04	30	.02
EBL	1	1700	110	.06	180	.11
EBT	2	3400	170	.07*	80	.04*
EBR	0	0	60		70	
WBL	2	3400	300	.09*	610	.18*
WBT	1	1700	60	.05	130	.09
WBR	0	0	20		30	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.63**		**.71**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05*	10	.01
NBT	2	3400	950	.28	1430	.42*
NBR	d	1700	700	.41	230	.14
SBL	1	1700	30	.02	60	.04*
SBT	2	3400	1380	.41*	890	.26
SBR	d	1700	90	.05	30	.02
EBL	1	1700	100	.06	180	.11
EBT	2	3400	180	.07*	100	.05*
EBR	0	0	50		70	
WBL	2	3400	290	.09*	600	.18*
WBT	1	1700	70	.06	120	.09
WBR	0	0	30		30	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.67**		**.74**

27. Bake & Trabuco

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	620	.18*	380	.11
NBT	3	5100	1440	.32	1390	.41*
NBR	0	0	210		710	.42
SBL	2	3400	30	.01	190	.06*
SBT	3	5100	1310	.26*	1560	.31
SBR	1	1700	220	.13	240	.14
EBL	2	3400	420	.12	260	.08
EBT	2.5	6800	420	.12*	1090	{.22}*
EBR	1.5		810	.24	610	
WBL	2	3400	790	.23*	280	.08*
WBT	4	6800	1360	.20	690	.10
WBR	d	1700	210	.12	30	.02
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.84**		**.82**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	640	.19*	360	.11
NBT	3	5100	1270	.29	1430	.42*
NBR	0	0	230		750	.44
SBL	2	3400	40	.01	180	.05*
SBT	3	5100	1380	.27*	1470	.29
SBR	1	1700	210	.12	240	.14
EBL	2	3400	420	.12	260	.08
EBT	2.5	6800	460	.14*	1080	{.21}*
EBR	1.5		780	.23	610	
WBL	2	3400	810	.24*	280	.08*
WBT	4	6800	1370	.20	710	.10
WBR	d	1700	190	.11	30	.02
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.89**		**.81**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	630	.19*	380	.11
NBT	3	5100	1410	.32	1370	.40*
NBR	0	0	210		730	.43
SBL	2	3400	30	.01	190	.06*
SBT	3	5100	1260	.25*	1540	.30
SBR	1	1700	200	.12	250	.15
EBL	2	3400	410	.12	250	.07
EBT	2.5	6800	400	.12*	1070	{.22}*
EBR	1.5		860	.25	610	
WBL	2	3400	800	.24*	280	.08*
WBT	4	6800	1360	.20	660	.10
WBR	d	1700	200	.12	30	.02
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.85**		**.81**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	650	.19*	380	.11
NBT	3	5100	1250	.29	1430	.42*
NBR	0	0	230		720	.42
SBL	2	3400	40	.01	180	.05*
SBT	3	5100	1330	.26*	1450	.28
SBR	1	1700	190	.11	240	.14
EBL	2	3400	420	.12	220	.06
EBT	2.5	6800	440	.13*	1090	{.21}*
EBR	1.5		850	.25	610	
WBL	2	3400	790	.23*	280	.08*
WBT	4	6800	1390	.20	710	.10
WBR	d	1700	190	.11	30	.02
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.86**		**.81**

28. Bake & Toledo

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	150	.09*	30	.02
NBT	3	5100	2000	.39	2230	.44*
NBR	d	1700	20	.01	350	.21
SBL	1	1700	70	.04	90	.05*
SBT	3	5100	2480	.49*	2310	.45
SBR	d	1700	190	.11	50	.03
EBL	2	3400	110	.03*	170	.05
EBT	2	3400	10	.00	370	.11*
EBR	1	1700	20	.01	160	.09
WBL	1	1700	270	.16	30	.02*
WBT	2	3400	570	.19*	50	.03
WBR	0	0	70		60	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.85**		**.67**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	160	.09*	20	.01
NBT	3	5100	1860	.36	2280	.45*
NBR	d	1700	20	.01	360	.21
SBL	1	1700	60	.04	100	.06*
SBT	3	5100	2490	.49*	2240	.44
SBR	d	1700	220	.13	50	.03
EBL	2	3400	100	.03*	200	.06
EBT	2	3400	10	.00	370	.11*
EBR	1	1700	20	.01	150	.09
WBL	1	1700	290	.17	30	.02*
WBT	2	3400	550	.18*	50	.03
WBR	0	0	60		60	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.84**		**.69**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	150	.09*	30	.02
NBT	3	5100	1980	.39	2220	.44*
NBR	d	1700	20	.01	350	.21
SBL	1	1700	60	.04	90	.05*
SBT	3	5100	2510	.49*	2280	.45
SBR	d	1700	180	.11	50	.03
EBL	2	3400	110	.03*	180	.05
EBT	2	3400	10	.00	380	.11*
EBR	1	1700	20	.01	160	.09
WBL	1	1700	200	.12	30	.02*
WBT	2	3400	610	.20*	50	.03
WBR	0	0	70		60	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.86**		**.67**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	150	.09*	20	.01
NBT	3	5100	1850	.36	2260	.44*
NBR	d	1700	20	.01	350	.21
SBL	1	1700	60	.04	100	.06*
SBT	3	5100	2580	.51*	2200	.43
SBR	d	1700	150	.09	50	.03
EBL	2	3400	100	.03*	200	.06
EBT	2	3400	10	.00	370	.11*
EBR	1	1700	20	.01	160	.09
WBL	1	1700	220	.13	30	.02*
WBT	2	3400	610	.20*	50	.03
WBR	0	0	60		60	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.88**		**.68**

29. Bake & Jeronimo

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	430	.13*	20	.01
NBT	3	5100	2240	.44	2380	.47*
NBR	d	1700	50	.03	390	.23
SBL	1	1700	90	.05	70	.04*
SBT	4	6800	2520	.38*	2290	.34
SBR	0	0	60		10	
EBL	2	3400	10	.00	120	.04
EBT	2	3400	80	.02*	550	.16*
EBR	1	1700	30	.02	400	.24
WBL	1	1700	330	.19*	130	.08*
WBT	3	5100	690	.15	130	.04
WBR	0	0	100		80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.77**		**.80**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	440	.13*	20	.01
NBT	3	5100	2110	.41	2410	.47*
NBR	d	1700	50	.03	360	.21
SBL	1	1700	80	.05	90	.05*
SBT	4	6800	2530	.39*	2210	.33
SBR	0	0	90		10	
EBL	2	3400	10	.00	140	.04
EBT	2	3400	80	.02*	530	.16*
EBR	1	1700	40	.02	390	.23
WBL	1	1700	330	.19*	130	.08*
WBT	3	5100	690	.16	140	.04
WBR	0	0	110		80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.78**		**.81**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	420	.12*	20	.01
NBT	3	5100	2240	.44	2380	.47*
NBR	d	1700	50	.03	380	.22
SBL	1	1700	90	.05	100	.06*
SBT	4	6800	2490	.37*	2250	.33
SBR	0	0	40		10	
EBL	2	3400	10	.00	110	.03
EBT	2	3400	80	.02*	550	.16*
EBR	1	1700	30	.02	390	.23
WBL	1	1700	320	.19*	130	.08*
WBT	3	5100	700	.15	130	.04
WBR	0	0	80		80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.75**		**.82**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	420	.12*	20	.01
NBT	3	5100	2100	.41	2410	.47*
NBR	d	1700	60	.04	380	.22
SBL	1	1700	70	.04	90	.05*
SBT	4	6800	2610	.39*	2170	.32
SBR	0	0	40		10	
EBL	2	3400	10	.00	120	.04
EBT	2	3400	70	.02*	550	.16*
EBR	1	1700	40	.02	390	.23
WBL	1	1700	270	.16*	130	.08*
WBT	3	5100	730	.16	140	.04
WBR	0	0	90		80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.74**		**.81**

30. Bake & Muirlands

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	280	.08	150	.04*
NBT	4	6800	2930	.43*	2650	.39
NBR	f		90		140	
SBL	2	3400	70	.02*	180	.05
SBT	4	6800	2410	.35	2800	.41*
SBR	f		210		80	
EBL	2	3400	50	.01*	230	.07
EBT	2	3400	112	.03	820	.24*
EBR	f		130		370	
WBL	2	3400	110	.03	90	.03*
WBT	2	3400	460	.14*	220	.06
WBR	f		70		90	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.77**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	270	.08*	150	.04*
NBT	4	6800	2820	.41	2660	.39
NBR	f		90		150	
SBL	2	3400	70	.02	170	.05
SBT	4	6800	2430	.36*	2710	.40*
SBR	f		220		90	
EBL	2	3400	50	.01*	210	.06
EBT	2	3400	122	.04	810	.24*
EBR	f		130		380	
WBL	2	3400	170	.05	90	.03*
WBT	2	3400	480	.14*	220	.06
WBR	f		60		100	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.76**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	270	.08	150	.04*
NBT	4	6800	2890	.43*	2580	.38
NBR	f		90		230	
SBL	2	3400	70	.02*	170	.05
SBT	4	6800	2360	.35	2750	.40*
SBR	f		240		80	
EBL	2	3400	50	.01*	280	.08
EBT	2	3400	112	.03	740	.22*
EBR	f		130		370	
WBL	2	3400	120	.04	90	.03*
WBT	2	3400	420	.12*	220	.06
WBR	f		100		100	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.63**		**.74**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	270	.08*	150	.04
NBT	4	6800	2790	.41	2620	.39*
NBR	f		90		190	
SBL	2	3400	70	.02	180	.05*
SBT	4	6800	2440	.36*	2660	.39
SBR	f		230		90	
EBL	2	3400	50	.01*	260	.08
EBT	2	3400	112	.03	760	.22*
EBR	f		130		380	
WBL	2	3400	120	.04	90	.03*
WBT	2	3400	460	.14*	210	.06
WBR	f		80		110	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.74**

31. Bake & Rockfield

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	200	.06	60	.02
NBT	4	6800	3110	.46*	2650	.39*
NBR	f		810		640	
SBL	2	3400	120	.04*	340	.10*
SBT	4	6800	2620	.39	2940	.43
SBR	1	1700	0	.00	10	.01
EBL	1	1700	10	.01	10	.01
EBT	2	3400	30	.01*	160	.05*
EBR	f		50		410	
WBL	2	3400	510	.15*	950	.28*
WBT	2	3400	160	.05	90	.03
WBR	f		130		130	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.71**		**.87**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	200	.06	60	.02
NBT	4	6800	3000	.44*	2660	.39*
NBR	f		830		660	
SBL	2	3400	120	.04*	340	.10*
SBT	4	6800	2700	.40	2860	.42
SBR	1	1700	0	.00	10	.01
EBL	1	1700	10	.01	20	.01
EBT	2	3400	40	.01*	170	.05*
EBR	f		50		410	
WBL	2	3400	530	.16*	950	.28*
WBT	2	3400	170	.05	80	.02
WBR	f		120		140	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.70**		**.87**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	200	.06	60	.02
NBT	4	6800	3060	.45*	2660	.39*
NBR	f		810		670	
SBL	2	3400	120	.04*	340	.10*
SBT	4	6800	2590	.38	2910	.43
SBR	1	1700	10	.01	10	.01
EBL	1	1700	10	.01	10	.01
EBT	2	3400	30	.01*	130	.04*
EBR	f		50		410	
WBL	2	3400	500	.15*	950	.28*
WBT	2	3400	150	.04	90	.03
WBR	f		140		140	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.70**		**.86**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	200	.06	60	.02
NBT	4	6800	2980	.44*	2660	.39*
NBR	f		830		650	
SBL	2	3400	130	.04*	340	.10*
SBT	4	6800	2660	.39	2810	.41
SBR	1	1700	0	.00	10	.01
EBL	1	1700	10	.01	20	.01
EBT	2	3400	40	.01*	150	.04*
EBR	f		40		420	
WBL	2	3400	510	.15*	960	.28*
WBT	2	3400	160	.05	80	.02
WBR	f		120		140	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.69**		**.86**

32. Bake & I-5 NB Ramps

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	3590	.53*	3070	.45*
NBR	f		170		930	
SBL	0	0	0		0	
SBT	3	5100	1100	.22	1720	.34
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	230	.14*	140	.08*
WBT	0	0	0		0	
WBR	3	5100	1090	.21	500	.10
Right Turn Adjustment			WBR	.07*	WBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.79**		**.60**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	3520	.52*	3110	.46*
NBR	f		170		920	
SBL	0	0	0		0	
SBT	3	5100	1070	.21	1710	.34
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	240	.14*	140	.08*
WBT	0	0	0		0	
WBR	3	5100	1060	.21	480	.09
Right Turn Adjustment			WBR	.07*	WBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.78**		**.60**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	3540	.52*	3080	.45*
NBR	f		240		930	
SBL	0	0	0		0	
SBT	3	5100	1120	.22	1750	.34
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	230	.14*	140	.08*
WBT	0	0	0		0	
WBR	3	5100	1090	.21	500	.10
Right Turn Adjustment			WBR	.07*	WBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.78**		**.60**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	3500	.51*	3100	.46*
NBR	f		170		930	
SBL	0	0	0		0	
SBT	3	5100	1090	.21	1720	.34
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	240	.14*	140	.08*
WBT	0	0	0		0	
WBR	3	5100	1060	.21	480	.09
Right Turn Adjustment			WBR	.07*	WBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.77**		**.60**

33. Bake & I-5 SB Ramps

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1080	.22*	1990	.41*
NBR	0	0	20		90	
SBL	0	0	0		0	
SBT	3	5100	930	.18	1230	.24
SBR	f		360		680	
EBL	3	5100	2860	.56*	2160	.42*
EBT	0	0	0		0	
EBR	1	1700	710	.42	240	.14
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.83**		**.88**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1080	.22*	1980	.41*
NBR	0	0	20		90	
SBL	0	0	0		0	
SBT	3	5100	940	.18	1230	.24
SBR	f		360		660	
EBL	3	5100	2810	.55*	2200	.43*
EBT	0	0	0		0	
EBR	1	1700	720	.42	230	.14
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.82**		**.89**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1120	.22*	2000	.41*
NBR	0	0	20		90	
SBL	0	0	0		0	
SBT	3	5100	960	.19	1250	.25
SBR	f		360		680	
EBL	3	5100	2820	.55*	2160	.42*
EBT	0	0	0		0	
EBR	1	1700	720	.42	230	.14
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.82**		**.88**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1100	.22*	2000	.41*
NBR	0	0	20		90	
SBL	0	0	0		0	
SBT	3	5100	970	.19	1240	.24
SBR	f		360		680	
EBL	3	5100	2780	.55*	2180	.43*
EBT	0	0	0		0	
EBR	1	1700	740	.44	230	.14
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.82**		**.89**

34. Lake Forest & Trabuco

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	270	.08*	250	.07
NBT	3	5100	940	.18	1130	.22*
NBR	1	1700	120	.07	720	.42
SBL	2	3400	280	.08	370	.11*
SBT	3	5100	1180	.27*	1070	.25
SBR	0	0	200		190	
EBL	2	3400	180	.05	270	.08
EBT	3	5100	720	.14*	1270	.25*
EBR	1	1700	430	.25	190	.11
WBL	2	3400	780	.23*	280	.08*
WBT	3	5100	1080	.21	760	.15
WBR	1	1700	470	.28	410	.24
Right Turn Adjustment			EBR	.05*	NBR	.14*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.82**		**.85**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	260	.08*	260	.08*
NBT	3	5100	930	.18	1150	.23
NBR	1	1700	100	.06	760	.45
SBL	2	3400	290	.09	320	.09
SBT	3	5100	1280	.29*	1070	.25*
SBR	0	0	210		180	
EBL	2	3400	190	.06	300	.09
EBT	3	5100	730	.14*	1250	.25*
EBR	1	1700	440	.26	190	.11
WBL	2	3400	840	.25*	250	.07*
WBT	3	5100	1100	.22	780	.15
WBR	1	1700	300	.18	410	.24
Right Turn Adjustment			EBR	.06*	NBR	.16*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.87**		**.86**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	270	.08*	250	.07
NBT	3	5100	910	.18	1120	.22*
NBR	1	1700	120	.07	740	.44
SBL	2	3400	290	.09	400	.12*
SBT	3	5100	1150	.26*	1040	.24
SBR	0	0	200		180	
EBL	2	3400	170	.05	260	.08
EBT	3	5100	720	.14*	1270	.25*
EBR	1	1700	430	.25	190	.11
WBL	2	3400	750	.22*	280	.08*
WBT	3	5100	1090	.21	750	.15
WBR	1	1700	470	.28	430	.25
Right Turn Adjustment			EBR	.05*	NBR	.16*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.80**		**.88**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	260	.08*	260	.08*
NBT	3	5100	890	.17	1120	.22
NBR	1	1700	100	.06	780	.46
SBL	2	3400	300	.09	310	.09
SBT	3	5100	1230	.28*	1060	.24*
SBR	0	0	210		180	
EBL	2	3400	180	.05	300	.09
EBT	3	5100	740	.15*	1230	.24*
EBR	1	1700	440	.26	190	.11
WBL	2	3400	790	.23*	240	.07*
WBT	3	5100	1090	.21	770	.15
WBR	1	1700	320	.19	440	.26
Right Turn Adjustment			EBR	.05*	NBR	.18*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.84**		**.86**

35. Lake Forest & Serrano

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	80	.05
NBT	3	5100	1140	.22	1970	.39*
NBR	d	1700	80	.05	160	.09
SBL	1	1700	70	.04	50	.03*
SBT	3	5100	2150	.42*	1460	.29
SBR	d	1700	180	.11	60	.04
EBL	1	1700	130	.08*	130	.08*
EBT	1	1700	60	.11	100	.10
EBR	0	0	120		70	
WBL	1	1700	100	.06	40	.02
WBT	1	1700	110	.11*	80	.08*
WBR	0	0	70		50	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.72**		**.63**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	80	.05
NBT	3	5100	1100	.22	2010	.39*
NBR	d	1700	80	.05	120	.07
SBL	1	1700	80	.05	40	.02*
SBT	3	5100	2270	.45*	1430	.28
SBR	d	1700	230	.14	60	.04
EBL	1	1700	130	.08*	130	.08*
EBT	1	1700	60	.10	130	.12
EBR	0	0	110		70	
WBL	1	1700	80	.05	40	.02
WBT	1	1700	80	.09*	80	.08*
WBR	0	0	70		50	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.73**		**.62**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	80	.05
NBT	3	5100	1130	.22	1950	.38*
NBR	d	1700	80	.05	110	.06
SBL	1	1700	70	.04	40	.02*
SBT	3	5100	2080	.41*	1430	.28
SBR	d	1700	200	.12	60	.04
EBL	1	1700	130	.08*	130	.08*
EBT	1	1700	60	.11	120	.11
EBR	0	0	120		70	
WBL	1	1700	90	.05	40	.02
WBT	1	1700	100	.10*	80	.08*
WBR	0	0	70		50	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.70**		**.61**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	80	.05
NBT	3	5100	1070	.21	1980	.39*
NBR	d	1700	80	.05	130	.08
SBL	1	1700	80	.05	40	.02*
SBT	3	5100	2210	.43*	1420	.28
SBR	d	1700	180	.11	60	.04
EBL	1	1700	140	.08*	130	.08*
EBT	1	1700	60	.10	120	.11
EBR	0	0	110		70	
WBL	1	1700	70	.04	40	.02
WBT	1	1700	120	.11*	80	.08*
WBR	0	0	60		50	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.73**		**.62**

36. El Toro & Trabuco

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	450	.13*	480	.14
NBT	3	5100	1170	.23	1410	.28*
NBR	1	1700	110	.06	580	.34
SBL	2	3400	280	.08	290	.09*
SBT	3	5100	1620	.32*	990	.19
SBR	1	1700	420	.25	180	.11
EBL	2	3400	190	.06*	750	.22
EBT	3	5100	360	.11	1230	.28*
EBR	0	0	290	.17	200	
WBL	2	3400	310	.09	220	.06*
WBT	3	5100	1100	.22*	530	.10
WBR	1	1700	250	.15	170	.10
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for SBR NBR

TOTAL CAPACITY UTILIZATION .78 .76

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	360	.11*	490	.14
NBT	3	5100	1130	.22	1460	.29*
NBR	1	1700	120	.07	610	.36
SBL	2	3400	280	.08	270	.08*
SBT	3	5100	1680	.33*	930	.18
SBR	1	1700	480	.28	160	.09
EBL	2	3400	190	.06*	740	.22
EBT	3	5100	380	.11	1220	.28*
EBR	0	0	290	.17	190	
WBL	2	3400	320	.09	230	.07*
WBT	3	5100	1100	.22*	520	.10
WBR	1	1700	240	.14	170	.10
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for SBR NBR

TOTAL CAPACITY UTILIZATION .77 .77

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	440	.13*	490	.14
NBT	3	5100	1150	.23	1370	.27*
NBR	1	1700	110	.06	580	.34
SBL	2	3400	280	.08	290	.09*
SBT	3	5100	1630	.32*	980	.19
SBR	1	1700	370	.22	160	.09
EBL	2	3400	190	.06*	740	.22
EBT	3	5100	370	.11	1240	.28*
EBR	0	0	270	.16	180	
WBL	2	3400	310	.09	220	.06*
WBT	3	5100	1130	.22*	540	.11
WBR	1	1700	250	.15	170	.10
Right Turn Adjustment					NBR	.01*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for SBR NBR

TOTAL CAPACITY UTILIZATION .78 .76

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	370	.11*	510	.15
NBT	3	5100	1120	.22	1440	.28*
NBR	1	1700	120	.07	610	.36
SBL	2	3400	280	.08	270	.08*
SBT	3	5100	1710	.34*	920	.18
SBR	1	1700	390	.23	150	.09
EBL	2	3400	190	.06*	730	.21
EBT	3	5100	370	.11	1220	.28*
EBR	0	0	290	.17	210	
WBL	2	3400	290	.09	230	.07*
WBT	3	5100	1140	.22*	530	.10
WBR	1	1700	240	.14	170	.10
Right Turn Adjustment					NBR	.01*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for SBR NBR

TOTAL CAPACITY UTILIZATION .78 .77

37. El Toro & Serrano

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	190	.11
NBT	3	5100	1670	.33	2420	.47*
NBR	d	1700	10	.01	30	.02
SBL	1	1700	10	.01	20	.01*
SBT	3	5100	1910	.37*	1350	.26
SBR	d	1700	290	.17	70	.04
EBL	1	1700	40	.02	30	.02
EBT	1	1700	10	.11*	20	.14*
EBR	0	0	170		210	
WBL	1	1700	20	.01*	20	.01*
WBT	1	1700	40	.05	10	.02
WBR	0	0	40		20	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.60**		**.68**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	190	.11
NBT	3	5100	1570	.31	2520	.49*
NBR	d	1700	10	.01	30	.02
SBL	1	1700	10	.01	30	.02*
SBT	3	5100	2030	.40*	1280	.25
SBR	d	1700	250	.15	80	.05
EBL	1	1700	30	.02	30	.02
EBT	1	1700	10	.11*	20	.13*
EBR	0	0	180		200	
WBL	1	1700	30	.02*	30	.02*
WBT	1	1700	40	.05	10	.02
WBR	0	0	40		20	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.71**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	200	.12
NBT	3	5100	1660	.33	2400	.47*
NBR	d	1700	10	.01	30	.02
SBL	1	1700	10	.01	20	.01*
SBT	3	5100	1920	.38*	1340	.26
SBR	d	1700	270	.16	70	.04
EBL	1	1700	30	.02	20	.01
EBT	1	1700	10	.12*	20	.14*
EBR	0	0	190		220	
WBL	1	1700	30	.02*	30	.02*
WBT	1	1700	40	.05	10	.02
WBR	0	0	40		20	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.63**		**.69**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	90	.05*	180	.11
NBT	3	5100	1570	.31	2480	.49*
NBR	d	1700	10	.01	30	.02
SBL	1	1700	10	.01	30	.02*
SBT	3	5100	2010	.39*	1280	.25
SBR	d	1700	270	.16	80	.05
EBL	1	1700	40	.02	50	.03
EBT	1	1700	10	.12*	30	.13*
EBR	0	0	200		190	
WBL	1	1700	30	.02*	20	.01*
WBT	1	1700	40	.05	10	.02
WBR	0	0	40		20	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.63**		**.70**

38. El Toro & Jeronimo

2040 No-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05	60	.04
NBT	3	5100	1550	.30*	1790	.35*
NBR	1	1700	220	.13	180	.11
SBL	1	1700	410	.24*	160	.09*
SBT	3	5100	1530	.30	1020	.20
SBR	d	1700	100	.06	360	.21
EBL	1	1700	130	.08*	190	.11
EBT	2	3400	330	.13	660	.24*
EBR	0	0	100		170	
WBL	2	3400	480	.14	230	.07*
WBT	2	3400	750	.22*	530	.16
WBR	1	1700	120	.07	350	.21
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION **.89** **.80**

2040 With-Project Without Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06	80	.05
NBT	3	5100	1430	.28*	1850	.36*
NBR	1	1700	220	.13	170	.10
SBL	1	1700	410	.24*	180	.11*
SBT	3	5100	1590	.31	950	.19
SBR	d	1700	110	.06	340	.20
EBL	1	1700	130	.08*	200	.12
EBT	2	3400	340	.13	640	.24*
EBR	0	0	100		160	
WBL	2	3400	510	.15	230	.07*
WBT	2	3400	720	.21*	530	.16
WBR	1	1700	120	.07	360	.21
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION **.86** **.83**

2040 No-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05	70	.04
NBT	3	5100	1510	.30*	1780	.35*
NBR	1	1700	210	.12	190	.11
SBL	1	1700	410	.24*	190	.11*
SBT	3	5100	1490	.29	1000	.20
SBR	d	1700	100	.06	350	.21
EBL	1	1700	130	.08*	210	.12
EBT	2	3400	320	.13	630	.24*
EBR	0	0	110		170	
WBL	2	3400	470	.14	230	.07*
WBT	2	3400	740	.22*	530	.16
WBR	1	1700	150	.09	350	.21
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION **.89** **.82**

2040 With-Project With Portola Ext. (Scenario 3)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06	80	.05
NBT	3	5100	1440	.28*	1810	.35*
NBR	1	1700	210	.12	180	.11
SBL	1	1700	410	.24*	180	.11*
SBT	3	5100	1560	.31	930	.18
SBR	d	1700	110	.06	350	.21
EBL	1	1700	120	.07*	210	.12
EBT	2	3400	330	.13	630	.23*
EBR	0	0	100		160	
WBL	2	3400	480	.14	250	.07*
WBT	2	3400	730	.21*	530	.16
WBR	1	1700	110	.06	360	.21
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION **.85** **.81**

APPENDIX 8.3:

2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITHOUT AND WITH PORTOLA WESTERLY EXTENSION WITH SCENARIO 4 IMPROVEMENT ALTERNATIVE INTERSECTION OPERATIONS ANALYSIS WORKSHEETS

This Page Intentionally Left Blank

1. Lake Forest & Dimension

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	110	.06	50	.03
NBT	2	3400	900	.26*	840	.25*
NBR	d	1700	10	.01	10	.01
SBL	1	1700	30	.02*	40	.02*
SBT	2	3400	530	.16	810	.24
SBR	d	1700	620	.36	290	.17
EBL	1.5		360	{.11}*	620	{.19}*
EBT	0.5	3400	10	.11	10	.19
EBR	1	1700	110	.06	50	.03
WBL	1	1700	10	.01	30	.02
WBT	1	1700	10	.01*	10	.02*
WBR	0	0	10		20	
Right Turn Adjustment			SBR	.06*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.51**		**.53**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	110	.06	50	.03
NBT	2	3400	740	.22*	820	.24*
NBR	d	1700	10	.01	20	.01
SBL	1	1700	30	.02*	40	.02*
SBT	2	3400	580	.17	730	.21
SBR	d	1700	610	.36	300	.18
EBL	1.5		340	{.10}*	640	{.19}*
EBT	0.5	3400	10	.10	10	.19
EBR	1	1700	140	.08	60	.04
WBL	1	1700	10	.01	30	.02
WBT	1	1700	10	.01*	10	.02*
WBR	0	0	10		20	
Right Turn Adjustment			SBR	.10*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.50**		**.52**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06	50	.03*
NBT	2	3400	890	.26*	810	.24
NBR	d	1700	10	.01	10	.01
SBL	1	1700	30	.02*	40	.02
SBT	2	3400	520	.15	810	.24*
SBR	d	1700	610	.36	280	.16
EBL	1.5		360	{.11}*	620	{.19}*
EBT	0.5	3400	10	.11	10	.19
EBR	1	1700	100	.06	50	.03
WBL	1	1700	10	.01	30	.02
WBT	1	1700	10	.01*	10	.02*
WBR	0	0	10		20	
Right Turn Adjustment			SBR	.06*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.51**		**.53**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	110	.06	50	.03
NBT	2	3400	730	.21*	810	.24*
NBR	d	1700	10	.01	10	.01
SBL	1	1700	30	.02*	40	.02*
SBT	2	3400	550	.16	730	.21
SBR	d	1700	620	.36	300	.18
EBL	1.5		340	{.10}*	640	{.19}*
EBT	0.5	3400	10	.10	10	.19
EBR	1	1700	120	.07	60	.04
WBL	1	1700	10	.01	30	.02
WBT	1	1700	10	.01*	10	.02*
WBR	0	0	10		20	
Right Turn Adjustment			SBR	.11*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.50**		**.52**

2. Lake Forest & Rancho

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	370	.22*	310	.18
NBT	2	3400	690	.20	1140	.34*
NBR	d	1700	470	.28	700	.41
SBL	1	1700	290	.17	230	.14*
SBT	2	3400	780	.23*	810	.24
SBR	d	1700	380	.22	120	.07
EBL	1	1700	30	.02*	160	.09
EBT	2	3400	360	.11	750	.22*
EBR	1	1700	80	.05	250	.15
WBL	2	3400	520	.15	490	.14*
WBT	2	3400	880	.26*	610	.18
WBR	1	1700	130	.08	340	.20
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.78**		**.89**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06	260	.15
NBT	2	3400	710	.21*	1080	.32*
NBR	d	1700	480	.28	770	.45
SBL	1	1700	250	.15*	240	.14*
SBT	2	3400	810	.24	810	.24
SBR	d	1700	90	.05	90	.05
EBL	1	1700	80	.05	40	.02
EBT	2	3400	350	.10*	570	.17*
EBR	1	1700	100	.06	120	.07
WBL	2	3400	560	.16*	540	.16*
WBT	2	3400	660	.19	510	.15
WBR	1	1700	130	.08	320	.19
Right Turn Adjustment					NBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.67**		**.85**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	360	.21*	310	.18
NBT	2	3400	700	.21	1170	.34*
NBR	d	1700	470	.28	690	.41
SBL	1	1700	290	.17	240	.14*
SBT	2	3400	780	.23*	810	.24
SBR	d	1700	350	.21	100	.06
EBL	1	1700	30	.02*	140	.08
EBT	2	3400	360	.11	760	.22*
EBR	1	1700	80	.05	250	.15
WBL	2	3400	510	.15	510	.15*
WBT	2	3400	880	.26*	600	.18
WBR	1	1700	130	.08	320	.19
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.77**		**.90**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	110	.06	260	.15
NBT	2	3400	710	.21*	1110	.33*
NBR	d	1700	480	.28	750	.44
SBL	1	1700	240	.14*	240	.14*
SBT	2	3400	780	.23	810	.24
SBR	d	1700	60	.04	100	.06
EBL	1	1700	70	.04	30	.02
EBT	2	3400	360	.11*	560	.16*
EBR	1	1700	110	.06	130	.08
WBL	2	3400	570	.17*	550	.16*
WBT	2	3400	670	.20	490	.14
WBR	1	1700	130	.08	310	.18
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.84**

3. Lake Forest & SR-241 SB Off-Ramp

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	820	.24*	1530	.45*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	790	.23	840	.25
SBR	0	0	0		0	
EBL	2	3400	320	.09*	150	.04*
EBT	0	0	0		0	
EBR	1	1700	610	.36	270	.16
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.26*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.54**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	850	.25*	1310	.39*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	630	.19	820	.24
SBR	0	0	0		0	
EBL	2	3400	350	.10*	170	.05*
EBT	0	0	0		0	
EBR	1	1700	450	.26	300	.18
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.11*	EBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.51**		**.51**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	820	.24	1510	.44*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	870	.26*	880	.26
SBR	0	0	0		0	
EBL	2	3400	210	.06*	90	.03*
EBT	0	0	0		0	
EBR	1	1700	490	.29	210	.12
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.23*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.60**		**.52**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	850	.25*	1330	.39*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	650	.19	880	.26
SBR	0	0	0		0	
EBL	2	3400	220	.06*	100	.03*
EBT	0	0	0		0	
EBR	1	1700	360	.21	250	.15
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.10*	EBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.46**		**.49**

4. Lake Forest & SR-241 NB On-Ramp

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	160	.05	440	.13*
NBT	2	3400	990	.29*	1240	.36
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	790	.23	840	.25*
SBR	1	1700	80	.05	450	.26
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					SBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.34**		**.44**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	180	.05	400	.12*
NBT	2	3400	1010	.30*	1090	.32
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	630	.19	820	.24*
SBR	1	1700	100	.06	420	.25
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					SBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.35**		**.42**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	110	.03*	370	.11*
NBT	2	3400	890	.26	1230	.36
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	870	.26*	880	.26*
SBR	1	1700	10	.01	240	.14
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.34**		**.42**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	130	.04	330	.10*
NBT	2	3400	910	.27*	1090	.32
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	650	.19	880	.26*
SBR	1	1700	10	.01	220	.13
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.32**		**.41**

5. Corridor Center & Rancho

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	0	.00	10	.01
NBT	1	1700	10	.01*	10	.01*
NBR	1	1700	200	.12	910	.54
SBL	1	1700	40	.02*	150	.09*
SBT	1	1700	20	.01	10	.01
SBR	1	1700	40	.02	40	.02
EBL	1	1700	70	.04	60	.04
EBT	2	3400	360	.11*	570	.17*
EBR	1	1700	0	.00	0	.00
WBL	2	3400	1290	.38*	330	.10*
WBT	2	3400	350	.10	590	.17
WBR	d	1700	80	.05	140	.08
Right Turn Adjustment					NBR	.45*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.57**		**.87**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02	10	.01
NBT	1	1700	10	.15*	0	.07*
NBR	0	0	240		120	
SBL	1	1700	60	.04*	160	.09*
SBT	1	1700	0	.00	10	.01
SBR	1	1700	40	.02	50	.03
EBL	1	1700	60	.04	60	.04
EBT	2	3400	360	.11*	690	.20*
EBR	1	1700	100	.06	30	.02
WBL	1	1700	170	.10*	170	.10*
WBT	2	3400	530	.16	560	.16
WBR	d	1700	100	.06	160	.09
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.45**		**.51**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	0	.00	10	.01
NBT	1	1700	10	.01*	10	.01*
NBR	1	1700	200	.12	890	.52
SBL	1	1700	40	.02*	150	.09*
SBT	1	1700	20	.01	10	.01
SBR	1	1700	40	.02	50	.03
EBL	1	1700	80	.05	60	.04
EBT	2	3400	350	.10*	570	.17*
EBR	1	1700	0	.00	0	.00
WBL	2	3400	1250	.37*	310	.09*
WBT	2	3400	360	.11	590	.17
WBR	d	1700	80	.05	140	.08
Right Turn Adjustment					NBR	.44*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.55**		**.85**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02	10	.01
NBT	1	1700	10	.15*	0	.07*
NBR	0	0	240		120	
SBL	1	1700	50	.03*	150	.09*
SBT	1	1700	20	.01	10	.01
SBR	1	1700	40	.02	40	.02
EBL	1	1700	70	.04	60	.04
EBT	2	3400	380	.11*	640	.19*
EBR	1	1700	100	.06	30	.02
WBL	1	1700	170	.10*	170	.10*
WBT	2	3400	520	.15	570	.17
WBR	d	1700	80	.05	150	.09
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.50**

6. Bake & Portola

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04*	280	.16
NBT	1.5	5100	150	{.04}	310	.18*
NBR	1.5		90		880	.26
SBL	1	1700	140	.08	290	.17*
SBT	2	3400	260	.08*	280	.08
SBR	d	1700	290	.17	340	.20
EBL	2	3400	410	.12	460	.14
EBT	3	5100	290	.06*	800	.16*
EBR	d	1700	70	.04	60	.04
WBL	2	3400	1020	.30*	590	.17*
WBT	3	5100	700	.14	930	.18
WBR	d	1700	130	.08	100	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.53**		**.73**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04	240	.14
NBT	1.5	5100	160	.05*	290	.17*
NBR	1.5		100		890	.26
SBL	1	1700	150	.09*	280	.16*
SBT	2	3400	240	.07	280	.08
SBR	d	1700	280	.16	370	.22
EBL	2	3400	400	.12	470	.14*
EBT	3	5100	290	.06*	800	.16
EBR	d	1700	50	.03	70	.04
WBL	2	3400	920	.27*	590	.17
WBT	3	5100	710	.14	950	.19*
WBR	d	1700	130	.08	100	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.52**		**.71**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04*	300	.18
NBT	1.5	5100	140	{.04}	300	.18*
NBR	1.5		90		860	.25
SBL	1	1700	140	.08	240	.14*
SBT	2	3400	260	.08*	280	.08
SBR	d	1700	290	.17	440	.26
EBL	2	3400	470	.14	480	.14*
EBT	3	5100	530	.10*	1040	.20
EBR	d	1700	130	.08	70	.04
WBL	2	3400	940	.28*	580	.17
WBT	3	5100	900	.18	1230	.24*
WBR	d	1700	120	.07	100	.06
Right Turn Adjustment					SBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.55**		**.76**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05	260	.15
NBT	1.5	5100	150	{.04}*	280	.16*
NBR	1.5		100		870	.26
SBL	1	1700	150	.09*	230	.14*
SBT	2	3400	240	.07	280	.08
SBR	d	1700	290	.17	440	.26
EBL	2	3400	460	.14	490	.14*
EBT	3	5100	530	.10*	1050	.21
EBR	d	1700	90	.05	80	.05
WBL	2	3400	920	.27*	580	.17
WBT	3	5100	960	.19	1270	.25*
WBR	d	1700	110	.06	100	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.55**		**.74**

7. Bake & Towne Centre

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	220	.06*	430	.13
NBT	2	3400	380	.11	1320	.39*
NBR	d	1700	100	.06	180	.11
SBL	2	3400	10	.00	30	.01*
SBT	2	3400	1420	.42*	420	.12
SBR	d	1700	60	.04	80	.05
EBL	1	1700	10	.01	70	.04
EBT	1	1700	40	.02*	190	.11*
EBR	1	1700	150	.09	390	.23
WBL	1	1700	130	.08*	160	.09*
WBT	2	3400	70	.02	130	.04
WBR	0	0	10		10	
Right Turn Adjustment			EBR	.02*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.65**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	270	.08*	410	.12
NBT	2	3400	440	.13	1310	.39*
NBR	d	1700	120	.07	180	.11
SBL	2	3400	10	.00	30	.01*
SBT	2	3400	1280	.38*	380	.11
SBR	d	1700	60	.04	80	.05
EBL	1	1700	10	.01	60	.04
EBT	1	1700	40	.02*	190	.11*
EBR	1	1700	140	.08	410	.24
WBL	1	1700	120	.07*	180	.11*
WBT	2	3400	50	.02	140	.04
WBR	0	0	10		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.60**		**.67**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	210	.06*	420	.12
NBT	2	3400	360	.11	1300	.38*
NBR	d	1700	100	.06	180	.11
SBL	2	3400	20	.01	30	.01*
SBT	2	3400	1410	.41*	420	.12
SBR	d	1700	50	.03	80	.05
EBL	1	1700	10	.01	60	.04
EBT	1	1700	50	.03*	210	.12*
EBR	1	1700	150	.09	360	.21
WBL	1	1700	170	.10*	170	.10*
WBT	2	3400	80	.03	140	.04
WBR	0	0	10		10	
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.66**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	260	.08*	410	.12
NBT	2	3400	430	.13	1310	.39*
NBR	d	1700	130	.08	180	.11
SBL	2	3400	10	.00	30	.01*
SBT	2	3400	1320	.39*	400	.12
SBR	d	1700	50	.03	100	.06
EBL	1	1700	10	.01	60	.04
EBT	1	1700	50	.03*	190	.11*
EBR	1	1700	130	.08	400	.24
WBL	1	1700	130	.08*	180	.11*
WBT	2	3400	60	.02	150	.05
WBR	0	0	10		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.63**		**.67**

8. Bake & Rancho North

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	680	.20	1780	.52*
NBR	d	1700	330	.19	490	.29
SBL	1	1700	60	.04	130	.08*
SBT	2	3400	1650	.49*	840	.25
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	380	.11*	480	.14*
WBT	0	0	0		0	
WBR	2	3400	10	.00	160	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.65** **.79**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	750	.22	1760	.52*
NBR	d	1700	380	.22	580	.34
SBL	1	1700	120	.07	150	.09*
SBT	2	3400	1430	.42*	830	.24
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	630	.19*	440	.13*
WBT	0	0	0		0	
WBR	2	3400	80	.02	160	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.66** **.79**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	660	.19	1760	.52*
NBR	d	1700	330	.19	490	.29
SBL	1	1700	60	.04	120	.07*
SBT	2	3400	1670	.49*	820	.24
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	390	.11*	470	.14*
WBT	0	0	0		0	
WBR	2	3400	10	.00	160	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.65** **.78**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	730	.21	1720	.51*
NBR	d	1700	390	.23	570	.34
SBL	1	1700	130	.08	160	.09*
SBT	2	3400	1410	.41*	820	.24
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	630	.19*	440	.13*
WBT	0	0	0		0	
WBR	2	3400	80	.02	170	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.65** **.78**

9. Bake & Rancho South

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	210	.12*	170	.10
NBT	2	3400	810	.24	1890	.56*
NBR	1	1700	360	.21	120	.07
SBL	1	1700	130	.08	60	.04*
SBT	2	3400	1640	.48*	1050	.31
SBR	1	1700	260	.15	200	.12
EBL	2	3400	170	.05	280	.08*
EBT	2	3400	390	.16*	70	.04
EBR	0	0	150		160	.09
WBL	2	3400	90	.03*	290	.09
WBT	2	3400	50	.03	360	.14*
WBR	0	0	40		120	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.84**		**.87**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	190	.11*	180	.11
NBT	2	3400	880	.26	1970	.58*
NBR	1	1700	100	.06	110	.06
SBL	1	1700	10	.01	40	.02*
SBT	2	3400	1710	.50*	1020	.30
SBR	1	1700	330	.19	200	.12
EBL	2	3400	190	.06*	330	.10*
EBT	1	1700	60	.04	80	.05
EBR	d	1700	150	.09	180	.11
WBL	2	3400	200	.06	110	.03
WBT	1	1700	90	.05*	40	.02*
WBR	1	1700	60	.04	30	.02
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.77**		**.77**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	200	.12*	160	.09
NBT	2	3400	780	.23	1840	.54*
NBR	1	1700	360	.21	120	.07
SBL	1	1700	170	.10	70	.04*
SBT	2	3400	1630	.48*	1030	.30
SBR	1	1700	260	.15	200	.12
EBL	2	3400	180	.05	280	.08*
EBT	2	3400	390	.16*	90	.05
EBR	0	0	140		140	.08
WBL	2	3400	80	.02*	290	.09
WBT	2	3400	50	.03	350	.15*
WBR	0	0	40		150	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.83**		**.86**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	180	.11*	170	.10
NBT	2	3400	860	.25	1970	.58*
NBR	1	1700	100	.06	110	.06
SBL	1	1700	10	.01	40	.02*
SBT	2	3400	1690	.50*	1020	.30
SBR	1	1700	350	.21	200	.12
EBL	2	3400	200	.06*	300	.09*
EBT	1	1700	60	.04	80	.05
EBR	d	1700	130	.08	170	.10
WBL	2	3400	210	.06	110	.03
WBT	1	1700	80	.05*	40	.02*
WBR	1	1700	60	.04	20	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.77**		**.76**

10. Bake & Orchard

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	1380	.41	2200	.65*
NBR	1	1700	0	.00	0	.00
SBL	0	0	0		0	
SBT	2	3400	1850	.54*	1460	.43
SBR	d	1700	10	.01	10	.01
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1700	20	.01	60	.04
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	1	1700	0	.00	0	.00
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.60**		**.70**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	1130	.33	2240	.66*
NBR	1	1700	20	.01	50	.03
SBL	0	0	0		0	
SBT	2	3400	2040	.60*	1310	.39
SBR	d	1700	10	.01	10	.01
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1700	20	.01	60	.04
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	1	1700	30	.02	20	.01
Right Turn Adjustment			EBR	.01*	WBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.72**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	1340	.39	2130	.63*
NBR	1	1700	0	.00	0	.00
SBL	0	0	0		0	
SBT	2	3400	1810	.53*	1440	.42
SBR	d	1700	10	.01	10	.01
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1700	20	.01	60	.04
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	1	1700	0	.00	0	.00
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.59**		**.68**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	1130	.33	2220	.65*
NBR	1	1700	20	.01	50	.03
SBL	0	0	0		0	
SBT	2	3400	2020	.59*	1280	.38
SBR	d	1700	10	.01	10	.01
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1700	20	.01	60	.04
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	1	1700	30	.02	20	.01
Right Turn Adjustment			EBR	.01*	WBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.71**

11. Dimension & Bake

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	70	.02	200	.06*
NBT	1	1700	10	.01*	40	.02
NBR	1	1700	170	.10	390	.23
SBL	1	1700	110	.06*	40	.02
SBT	1	1700	40	.02	20	.01*
SBR	1	1700	70	.04	20	.01
EBL	1	1700	10	.01	50	.03
EBT	2	3400	1220	.36*	1640	.48*
EBR	d	1700	120	.07	50	.03
WBL	1	1700	340	.20*	250	.15*
WBT	2	3400	1530	.45	1310	.39
WBR	d	1700	30	.02	100	.06
Right Turn Adjustment					NBR	.07*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.82**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	70	.02	220	.06*
NBT	1	1700	10	.01*	40	.02
NBR	1	1700	130	.08	380	.22
SBL	1	1700	90	.05*	50	.03
SBT	1	1700	50	.03	20	.01*
SBR	1	1700	70	.04	20	.01
EBL	1	1700	10	.01*	50	.03
EBT	2	3400	990	.29	1680	.49*
EBR	d	1700	130	.08	50	.03
WBL	1	1700	320	.19	220	.13*
WBT	2	3400	1660	.49*	1190	.35
WBR	d	1700	20	.01	80	.05
Right Turn Adjustment					NBR	.08*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.61**		**.82**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	70	.02	200	.06*
NBT	1	1700	10	.01*	40	.02
NBR	1	1700	170	.10	400	.24
SBL	1	1700	110	.06*	40	.02
SBT	1	1700	40	.02	10	.01*
SBR	1	1700	70	.04	20	.01
EBL	1	1700	10	.01	50	.03
EBT	2	3400	1180	.35*	1570	.46*
EBR	d	1700	120	.07	60	.04
WBL	1	1700	350	.21*	250	.15*
WBT	2	3400	1470	.43	1280	.38
WBR	d	1700	30	.02	90	.05
Right Turn Adjustment					NBR	.08*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.81**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	70	.02	220	.06*
NBT	1	1700	10	.01*	40	.02
NBR	1	1700	140	.08	390	.23
SBL	1	1700	90	.05*	40	.02
SBT	1	1700	40	.02	20	.01*
SBR	1	1700	60	.04	20	.01
EBL	1	1700	10	.01*	50	.03
EBT	2	3400	960	.28	1630	.48*
EBR	d	1700	120	.07	50	.03
WBL	1	1700	330	.19	220	.13*
WBT	2	3400	1590	.47*	1150	.34
WBR	d	1700	30	.02	80	.05
Right Turn Adjustment					NBR	.08*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.59**		**.81**

12. Alton & Rancho South

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	190	.06*	140	.04
NBT	3	5100	1080	.21	1990	.39*
NBR	1	1700	530	.31	370	.22
SBL	2	3400	260	.08	50	.01*
SBT	3	5100	2170	.43*	1390	.27
SBR	d	1700	180	.11	110	.06
EBL	1	1700	60	.04	210	.12
EBT	2	3400	40	.01*	70	.02*
EBR	1	1700	110	.06	210	.12
WBL	1	1700	270	.16*	530	.31*
WBT	2	3400	100	.03	70	.02
WBR	d	1700	30	.02	340	.20
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.71**		**.78**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	160	.05*	140	.04
NBT	3	5100	980	.19	1970	.39*
NBR	1	1700	420	.25	460	.27
SBL	2	3400	180	.05	50	.01*
SBT	3	5100	2100	.41*	1380	.27
SBR	d	1700	170	.10	110	.06
EBL	1	1700	60	.04	200	.12
EBT	2	3400	30	.01*	120	.04*
EBR	1	1700	110	.06	180	.11
WBL	1	1700	380	.22*	430	.25*
WBT	2	3400	130	.04	70	.02
WBR	d	1700	70	.04	220	.13
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.75**		**.74**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	190	.06*	140	.04
NBT	3	5100	920	.18	1780	.35*
NBR	1	1700	520	.31	390	.23
SBL	2	3400	260	.08	60	.02*
SBT	3	5100	1930	.38*	1270	.25
SBR	d	1700	180	.11	110	.06
EBL	1	1700	60	.04	220	.13
EBT	2	3400	40	.01*	60	.02*
EBR	1	1700	110	.06	220	.13
WBL	1	1700	290	.17*	490	.29*
WBT	2	3400	90	.03	70	.02
WBR	d	1700	30	.02	340	.20
Right Turn Adjustment					EBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.67**		**.75**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	160	.05*	130	.04
NBT	3	5100	820	.16	1760	.35*
NBR	1	1700	420	.25	460	.27
SBL	2	3400	190	.06	50	.01*
SBT	3	5100	1860	.36*	1230	.24
SBR	d	1700	180	.11	110	.06
EBL	1	1700	60	.04	220	.13
EBT	2	3400	30	.01*	90	.03*
EBR	1	1700	120	.07	180	.11
WBL	1	1700	450	.26*	430	.25*
WBT	2	3400	120	.04	70	.02
WBR	d	1700	60	.04	220	.13
Right Turn Adjustment			EBR	.02*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.75**		**.69**

13. Alton & SR-241

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	130	.08*	470	.28*
NBT	3	5100	760	.15	1280	.25
NBR	f		310		1030	
SBL	1	1700	130	.08	80	.05
SBT	3	5100	1290	.25*	1060	.21*
SBR	f		310		260	
EBL	2	3400	350	.10	290	.09
EBT	0	0	0		0	
EBR	f		510		160	
WBL	2	3400	1040	.31*	480	.14*
WBT	0	0	0		0	
WBR	f		90		120	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.69**		**.68**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	180	.11*	340	.20*
NBT	3	5100	760	.15	1330	.26
NBR	f		300		940	
SBL	1	1700	140	.08	90	.05
SBT	3	5100	1310	.26*	1070	.21*
SBR	f		350		260	
EBL	2	3400	330	.10	290	.09
EBT	0	0	0		0	
EBR	f		410		160	
WBL	2	3400	940	.28*	490	.14*
WBT	0	0	0		0	
WBR	f		70		110	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.70**		**.60**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	120	.07*	420	.25*
NBT	3	5100	620	.12	1020	.20
NBR	f		320		1130	
SBL	1	1700	140	.08	80	.05
SBT	3	5100	930	.18*	900	.18*
SBR	f		30		80	
EBL	2	3400	170	.05	50	.01
EBT	0	0	0		0	
EBR	f		470		140	
WBL	2	3400	1210	.36*	530	.16*
WBT	0	0	0		0	
WBR	f		100		130	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.64**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	160	.09*	290	.17*
NBT	3	5100	610	.12	1040	.20
NBR	f		330		1090	
SBL	1	1700	140	.08	80	.05
SBT	3	5100	950	.19*	900	.18*
SBR	f		30		80	
EBL	2	3400	170	.05	50	.01
EBT	0	0	0		0	
EBR	f		370		130	
WBL	2	3400	1100	.32*	540	.16*
WBT	0	0	0		0	
WBR	f		70		130	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.56**

14. Alton & Towne Centre

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02*	160	.09*
NBT	3	5100	750	.15	1140	.22
NBR	f		400		280	
SBL	1	1700	10	.01	20	.01
SBT	3	5100	1560	.31*	980	.19*
SBR	1	1700	30	.02	10	.01
EBL	1	1700	50	.03	30	.02
EBT	1	1700	40	.02*	50	.03*
EBR	1	1700	60	.04	60	.04
WBL	2	3400	130	.04*	460	.14*
WBT	1	1700	40	.02	40	.02
WBR	1	1700	10	.01	10	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.50**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02*	160	.09*
NBT	3	5100	740	.15	1190	.23
NBR	f		370		280	
SBL	1	1700	10	.01	20	.01
SBT	3	5100	1620	.32*	1010	.20*
SBR	1	1700	30	.02	20	.01
EBL	1	1700	50	.03	30	.02
EBT	1	1700	40	.02*	50	.03*
EBR	1	1700	60	.04	60	.04
WBL	2	3400	130	.04*	440	.13*
WBT	1	1700	40	.02	40	.02
WBR	1	1700	10	.01	10	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.45**		**.50**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02*	150	.09*
NBT	3	5100	540	.11	770	.15
NBR	f		320		230	
SBL	1	1700	60	.04	50	.03
SBT	3	5100	940	.18*	720	.14*
SBR	1	1700	40	.02	10	.01
EBL	1	1700	60	.04*	40	.02
EBT	1	1700	40	.02	60	.04*
EBR	1	1700	50	.03	40	.02
WBL	2	3400	120	.04	390	.11*
WBT	1	1700	40	.02*	50	.03
WBR	1	1700	20	.01	40	.02
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.31**		**.43**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02*	140	.08*
NBT	3	5100	540	.11	800	.16
NBR	f		280		230	
SBL	1	1700	70	.04	60	.04
SBT	3	5100	960	.19*	740	.15*
SBR	1	1700	40	.02	20	.01
EBL	1	1700	60	.04*	40	.02
EBT	1	1700	40	.02	60	.04*
EBR	1	1700	50	.03	40	.02
WBL	2	3400	120	.04	380	.11*
WBT	1	1700	40	.02*	50	.03
WBR	1	1700	10	.01	40	.02
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.32**		**.43**

15. Alton & Portola

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02	160	.09*
NBT	2	3400	80	.02*	190	.06
NBR	f		470		840	
SBL	1	1700	210	.12*	80	.05
SBT	2	3400	140	.04	110	.03*
SBR	d	1700	0	.00	10	.01
EBL	2	3400	10	.00	10	.00
EBT	2	3400	290	.09*	110	.03*
EBR	f		100		80	
WBL	2	3400	670	.20*	550	.16*
WBT	3	5100	140	.03	240	.05
WBR	f		100		170	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.48**		**.36**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02	170	.10*
NBT	2	3400	70	.02*	190	.06
NBR	f		470		870	
SBL	1	1700	200	.12*	80	.05
SBT	2	3400	150	.04	110	.03*
SBR	d	1700	0	.00	10	.01
EBL	2	3400	10	.00	10	.00
EBT	2	3400	280	.08*	110	.03*
EBR	f		110		70	
WBL	2	3400	680	.20*	580	.17*
WBT	3	5100	140	.03	230	.05
WBR	f		100		150	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.47**		**.38**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	210	.12*
NBT	2	3400	70	.02*	100	.03
NBR	f		320		560	
SBL	1	1700	160	.09*	70	.04
SBT	2	3400	90	.03	70	.02*
SBR	d	1700	0	.00	10	.01
EBL	2	3400	10	.00	10	.00
EBT	2	3400	1000	.29*	710	.21*
EBR	f		110		110	
WBL	2	3400	370	.11*	370	.11*
WBT	3	5100	790	.15	890	.17
WBR	f		80		120	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.56**		**.51**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	200	.12*
NBT	2	3400	70	.02*	90	.03
NBR	f		320		600	
SBL	1	1700	160	.09*	60	.04
SBT	2	3400	80	.02	80	.02*
SBR	d	1700	0	.00	10	.01
EBL	2	3400	10	.00	10	.00
EBT	2	3400	930	.27*	710	.21*
EBR	f		110		120	
WBL	2	3400	380	.11*	380	.11*
WBT	3	5100	880	.17	880	.17
WBR	f		90		110	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.54**		**.51**

16. Lake Forest & Portola

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02	60	.04
NBT	2	3400	210	.06*	180	.05*
NBR	d	1700	230	.14	560	.33
SBL	1	1700	220	.13*	290	.17*
SBT	2	3400	100	.03	250	.07
SBR	d	1700	20	.01	20	.01
EBL	2	3400	20	.01*	20	.01
EBT	3	5100	510	.10	1530	.30*
EBR	d	1700	40	.02	40	.02
WBL	2	3400	750	.22	510	.15*
WBT	3	5100	1860	.36*	1140	.22
WBR	d	1700	300	.18	170	.10
Right Turn Adjustment					NBR	.17*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.61**		**.89**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02	70	.04
NBT	2	3400	210	.06*	200	.06*
NBR	d	1700	260	.15	410	.24
SBL	1	1700	220	.13*	290	.17*
SBT	2	3400	110	.03	230	.07
SBR	d	1700	20	.01	20	.01
EBL	2	3400	20	.01*	20	.01
EBT	3	5100	530	.10	1520	.30*
EBR	d	1700	50	.03	40	.02
WBL	2	3400	610	.18	490	.14*
WBT	3	5100	1780	.35*	1150	.23
WBR	d	1700	300	.18	150	.09
Right Turn Adjustment					NBR	.07*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.60**		**.79**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	50	.03	100	.06
NBT	2	3400	160	.05*	190	.06*
NBR	d	1700	240	.14	490	.29
SBL	1	1700	210	.12*	330	.19*
SBT	2	3400	90	.03	180	.05
SBR	d	1700	30	.02	30	.02
EBL	2	3400	30	.01*	20	.01
EBT	3	5100	710	.14	1640	.32*
EBR	d	1700	80	.05	50	.03
WBL	2	3400	720	.21	460	.14*
WBT	3	5100	1980	.39*	1310	.26
WBR	d	1700	300	.18	140	.08
Right Turn Adjustment					NBR	.12*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.62**		**.88**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	50	.03	120	.07
NBT	2	3400	160	.05*	200	.06*
NBR	d	1700	250	.15	400	.24
SBL	1	1700	210	.12*	320	.19*
SBT	2	3400	100	.03	190	.06
SBR	d	1700	20	.01	30	.02
EBL	2	3400	30	.01*	20	.01
EBT	3	5100	710	.14	1640	.32*
EBR	d	1700	90	.05	60	.04
WBL	2	3400	490	.14	450	.13*
WBT	3	5100	2020	.40*	1320	.26
WBR	d	1700	310	.18	130	.08
Right Turn Adjustment					NBR	.08*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.63**		**.83**

17. Lake Forest & Towne Centre

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	170	.05*	250	.07*
NBT	2	3400	630	.19	900	.26
NBR	d	1700	180	.11	100	.06
SBL	2	3400	10	.00	10	.00
SBT	2	3400	730	.21*	900	.26*
SBR	d	1700	20	.01	20	.01
EBL	1	1700	10	.01	10	.01
EBT	1	1700	80	.05*	170	.10*
EBR	1	1700	70	.04	280	.16
WBL	1	1700	70	.04*	100	.06*
WBT	2	3400	60	.02	60	.02
WBR	0	0	10		10	
Right Turn Adjustment					EBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.40**		**.55**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	170	.05*	260	.08*
NBT	2	3400	650	.19	760	.22
NBR	d	1700	170	.10	80	.05
SBL	2	3400	10	.00	10	.00
SBT	2	3400	610	.18*	870	.26*
SBR	d	1700	30	.02	20	.01
EBL	1	1700	10	.01	10	.01
EBT	1	1700	90	.05*	170	.10*
EBR	1	1700	80	.05	280	.16
WBL	1	1700	50	.03*	100	.06*
WBT	2	3400	60	.02	60	.02
WBR	0	0	10		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.36**		**.55**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	140	.04*	230	.07*
NBT	2	3400	580	.17	880	.26
NBR	d	1700	170	.10	120	.07
SBL	2	3400	10	.00	10	.00
SBT	2	3400	690	.20*	780	.23*
SBR	d	1700	60	.04	20	.01
EBL	1	1700	10	.01	10	.01
EBT	1	1700	80	.05*	180	.11*
EBR	1	1700	40	.02	250	.15
WBL	1	1700	90	.05*	100	.06*
WBT	2	3400	70	.03	60	.02
WBR	0	0	20		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.39**		**.52**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	140	.04*	230	.07*
NBT	2	3400	590	.17	800	.24
NBR	d	1700	160	.09	70	.04
SBL	2	3400	20	.01	10	.00
SBT	2	3400	530	.16*	780	.23*
SBR	d	1700	30	.02	20	.01
EBL	1	1700	10	.01	10	.01
EBT	1	1700	90	.05*	170	.10*
EBR	1	1700	50	.03	220	.13
WBL	1	1700	40	.02*	110	.06*
WBT	2	3400	60	.02	60	.02
WBR	0	0	10		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.32**		**.51**

18. Towne Centre & Portola

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	10	.01	30	.02*
NBT	1	1700	80	.05*	10	.01
NBR	1	1700	80	.05	270	.16
SBL	2	3400	40	.01*	270	.08
SBT	1	1700	10	.01	60	.08*
SBR	0	0	10		80	
EBL	2	3400	90	.03*	30	.01
EBT	3	5100	860	.17	2360	.46*
EBR	d	1700	10	.01	10	.01
WBL	2	3400	160	.05	60	.02*
WBT	3	5100	2900	.57*	1740	.34
WBR	d	1700	290	.17	90	.05
Right Turn Adjustment					NBR	.12*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.71**		**.75**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	20	.01	20	.01*
NBT	1	1700	80	.05*	10	.01
NBR	1	1700	80	.05	260	.15
SBL	2	3400	40	.01*	270	.08
SBT	1	1700	10	.01	60	.08*
SBR	0	0	10		80	
EBL	2	3400	90	.03*	40	.01
EBT	3	5100	900	.18	2180	.43*
EBR	d	1700	10	.01	10	.01
WBL	2	3400	150	.04	60	.02*
WBT	3	5100	2650	.52*	1720	.34
WBR	d	1700	290	.17	90	.05
Right Turn Adjustment					NBR	.12*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.71**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	10	.01	20	.01
NBT	1	1700	80	.05*	10	.01*
NBR	1	1700	80	.05	300	.18
SBL	2	3400	40	.01*	270	.08*
SBT	1	1700	10	.01	60	.07
SBR	0	0	10		60	
EBL	2	3400	90	.03*	30	.01
EBT	3	5100	1060	.21	2440	.48*
EBR	d	1700	10	.01	10	.01
WBL	2	3400	210	.06	60	.02*
WBT	3	5100	2960	.58*	1810	.35
WBR	d	1700	290	.17	90	.05
Right Turn Adjustment					NBR	.15*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.72**		**.79**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	20	.01	20	.01
NBT	1	1700	80	.05*	10	.01*
NBR	1	1700	80	.05	250	.15
SBL	2	3400	40	.01*	270	.08*
SBT	1	1700	10	.01	60	.07
SBR	0	0	10		60	
EBL	2	3400	90	.03*	30	.01
EBT	3	5100	1070	.21	2330	.46*
EBR	d	1700	10	.01	10	.01
WBL	2	3400	150	.04	60	.02*
WBT	3	5100	2760	.54*	1810	.35
WBR	d	1700	290	.17	90	.05
Right Turn Adjustment					NBR	.12*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.74**

19. Glenn Ranch & Portola

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	70	.04
NBT	2	3400	20	.01*	30	.02*
NBR	0	0	30	.02	90	.05
SBL	2	3400	400	.12*	380	.11*
SBT	2	3400	50	.01	20	.01
SBR	f		880		780	
EBL	2	3400	470	.14*	1090	.32*
EBT	3	5100	510	.10	1890	.37
EBR	1	1700	20	.01	80	.05
WBL	2	3400	110	.03	60	.02
WBT	3	5100	1750	.34*	810	.16*
WBR	1	1700	100	.06	310	.18
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION **.66** **.66**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	80	.05
NBT	2	3400	20	.01*	20	.01*
NBR	0	0	30	.02	90	.05
SBL	2	3400	430	.13*	370	.11*
SBT	2	3400	50	.01	20	.01
SBR	f		810		800	
EBL	2	3400	490	.14*	1050	.31*
EBT	3	5100	520	.10	1740	.34
EBR	1	1700	20	.01	80	.05
WBL	2	3400	110	.03	60	.02
WBT	3	5100	1580	.31*	780	.15*
WBR	1	1700	90	.05	330	.19
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION **.64** **.63**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	100	.06
NBT	2	3400	20	.01*	30	.02*
NBR	0	0	30	.02	60	.04
SBL	2	3400	370	.11*	350	.10*
SBT	2	3400	50	.01	20	.01
SBR	f		960		820	
EBL	2	3400	540	.16*	1170	.34*
EBT	3	5100	630	.12	1930	.38
EBR	1	1700	30	.02	80	.05
WBL	2	3400	90	.03	60	.02
WBT	3	5100	1760	.35*	810	.16*
WBR	1	1700	60	.04	250	.15
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION **.68** **.67**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	100	.06
NBT	2	3400	20	.01*	20	.01*
NBR	0	0	30	.02	60	.04
SBL	2	3400	410	.12*	370	.11*
SBT	2	3400	50	.01	20	.01
SBR	f		870		810	
EBL	2	3400	550	.16*	1130	.33*
EBT	3	5100	630	.12	1780	.35
EBR	1	1700	30	.02	80	.05
WBL	2	3400	90	.03	60	.02
WBT	3	5100	1620	.32*	810	.16*
WBR	1	1700	70	.04	270	.16
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION **.66** **.66**

20. Portola & SR-241

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	570	.17*	350	.10
NBT	3	5100	850	.17	800	.16*
NBR	f		90		180	
SBL	2	3400	230	.07	1280	.38*
SBT	3	5100	490	.10*	1000	.20
SBR	f		250		130	
EBL	1	1700	200	.12*	170	.10*
EBT	0	0	0		0	
EBR	f		400		490	
WBL	2	3400	270	.08	130	.04
WBT	0	0	0		0	
WBR	f		1920		430	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.69**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	570	.17*	380	.11
NBT	3	5100	820	.16	810	.16*
NBR	f		100		170	
SBL	2	3400	240	.07	1130	.33*
SBT	3	5100	530	.10*	990	.19
SBR	f		250		120	
EBL	1	1700	180	.11*	160	.09*
EBT	0	0	0		0	
EBR	f		390		470	
WBL	2	3400	260	.08	150	.04
WBT	0	0	0		0	
WBR	f		1770		410	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.43**		**.63**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	530	.16*	340	.10
NBT	3	5100	930	.18	810	.16*
NBR	f		90		170	
SBL	2	3400	230	.07	1260	.37*
SBT	3	5100	590	.12*	1050	.21
SBR	f		260		80	
EBL	1	1700	100	.06	100	.06*
EBT	0	0	0		0	
EBR	f		340		470	
WBL	2	3400	250	.07*	130	.04
WBT	0	0	0		0	
WBR	f		1890		420	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.40**		**.64**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	520	.15*	340	.10
NBT	3	5100	910	.18	850	.17*
NBR	f		100		170	
SBL	2	3400	240	.07	1120	.33*
SBT	3	5100	620	.12*	1060	.21
SBR	f		260		80	
EBL	1	1700	90	.05	90	.05*
EBT	0	0	0		0	
EBR	f		320		460	
WBL	2	3400	250	.07*	130	.04
WBT	0	0	0		0	
WBR	f		1770		420	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.39**		**.60**

21. Portola & Rancho

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	1430	.42*	860	.25*
NBT	3	5100	1250	.25	1600	.31
NBR	d	1700	10	.01	10	.01
SBL	2	3400	10	.00	10	.00
SBT	3	5100	840	.16*	1490	.29*
SBR	1	1700	240	.14	50	.03
EBL	1.5		100		110	
EBT	0.5	3400	10	.03*	10	.04*
EBR	f		530		1420	
WBL	1.5		10		10	
WBT	1	6800	10	.00*	10	.00*
WBR	1.5		10		10	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION **.66** **.63**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	1240	.36*	810	.24*
NBT	3	5100	1230	.24	1630	.32
NBR	d	1700	10	.01	10	.01
SBL	2	3400	10	.00	10	.00
SBT	3	5100	840	.16*	1460	.29*
SBR	1	1700	250	.15	80	.05
EBL	1.5		110		120	
EBT	0.5	3400	10	.04*	10	.04*
EBR	f		530		1280	
WBL	1.5		10		10	
WBT	1	6800	10	.00*	10	.00*
WBR	1.5		10		10	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION **.61** **.62**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	1430	.42*	860	.25*
NBT	3	5100	1280	.25	1600	.31
NBR	d	1700	10	.01	10	.01
SBL	2	3400	10	.00	10	.00
SBT	3	5100	860	.17*	1520	.30*
SBR	1	1700	230	.14	50	.03
EBL	1.5		100		130	
EBT	0.5	3400	10	.03*	10	.04*
EBR	f		530		1430	
WBL	1.5		10		10	
WBT	1	6800	10	.00*	10	.00*
WBR	1.5		10		10	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION **.67** **.64**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	1260	.37*	810	.24*
NBT	3	5100	1250	.25	1620	.32
NBR	d	1700	10	.01	10	.01
SBL	2	3400	10	.00	10	.00
SBT	3	5100	860	.17*	1530	.30*
SBR	1	1700	250	.15	50	.03
EBL	1.5		110		130	
EBT	0.5	3400	10	.04*	10	.04*
EBR	f		530		1250	
WBL	1.5		10		10	
WBT	1	6800	10	.00*	10	.00*
WBR	1.5		10		10	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION **.63** **.63**

22. El Toro & Portola

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	490	.14*	480	.14
NBT	3	5100	190	.04	610	.12*
NBR	f		270		460	
SBL	1	1700	50	.03	350	.21*
SBT	3	5100	770	.15*	420	.08
SBR	2	3400	390	.11	850	.25
EBL	2	3400	80	.02*	570	.17
EBT	3	5100	630	.12	1730	.34*
EBR	1	1700	510	.30	900	.53
WBL	2	3400	460	.14	510	.15*
WBT	4	6800	2070	.30*	1140	.17
WBR	d	1700	20	.01	50	.03
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION **.66** **.87**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	450	.13*	430	.13
NBT	3	5100	190	.04	660	.13*
NBR	f		290		490	
SBL	1	1700	60	.04	350	.21*
SBT	3	5100	770	.15*	420	.08
SBR	2	3400	350	.10	820	.24
EBL	2	3400	70	.02	510	.15
EBT	3	5100	690	.14*	1650	.32*
EBR	1	1700	440	.26	850	.50
WBL	2	3400	580	.17*	540	.16*
WBT	4	6800	1920	.28	1140	.17
WBR	d	1700	20	.01	50	.03
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION **.64** **.87**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	490	.14*	470	.14
NBT	3	5100	180	.04	610	.12*
NBR	f		270		450	
SBL	1	1700	50	.03	350	.21*
SBT	3	5100	740	.15*	420	.08
SBR	2	3400	380	.11	850	.25
EBL	2	3400	80	.02*	580	.17
EBT	3	5100	630	.12	1750	.34*
EBR	1	1700	520	.31	900	.53
WBL	2	3400	440	.13	510	.15*
WBT	4	6800	2090	.31*	1150	.17
WBR	d	1700	20	.01	40	.02
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION **.67** **.87**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	440	.13*	420	.12
NBT	3	5100	190	.04	660	.13*
NBR	f		280		490	
SBL	1	1700	60	.04	350	.21*
SBT	3	5100	740	.15*	420	.08
SBR	2	3400	360	.11	820	.24
EBL	2	3400	70	.02*	530	.16
EBT	3	5100	680	.13	1670	.33*
EBR	1	1700	470	.28	840	.49
WBL	2	3400	540	.16	540	.16*
WBT	4	6800	1960	.29*	1150	.17
WBR	d	1700	20	.01	30	.02
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION **.64** **.88**

23. Los Alisos & Santa Margarita

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	450	.26*	390	.23*
NBT	2	3400	180	.05	390	.11
NBR	1	1700	110	.06	240	.14
SBL	1	1700	100	.06	30	.02
SBT	2	3400	450	.13*	280	.08*
SBR	d	1700	100	.06	220	.13
EBL	1	1700	80	.05*	140	.08
EBT	3	5100	770	.15	1860	.36*
EBR	d	1700	200	.12	430	.25
WBL	1	1700	450	.26	180	.11*
WBT	3	5100	1980	.39*	1130	.22
WBR	d	1700	0	.00	100	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.88**		**.83**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	420	.25*	400	.24*
NBT	2	3400	190	.06	380	.11
NBR	1	1700	100	.06	230	.14
SBL	1	1700	80	.05	30	.02
SBT	2	3400	440	.13*	290	.09*
SBR	d	1700	140	.08	230	.14
EBL	1	1700	60	.04*	190	.11
EBT	3	5100	800	.16	1790	.35*
EBR	d	1700	260	.15	410	.24
WBL	1	1700	400	.24	170	.10*
WBT	3	5100	1950	.38*	1130	.22
WBR	d	1700	0	.00	90	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.85**		**.83**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	460	.27*	380	.22*
NBT	2	3400	180	.05	390	.11
NBR	1	1700	100	.06	240	.14
SBL	1	1700	100	.06	30	.02
SBT	2	3400	440	.13*	280	.08*
SBR	d	1700	100	.06	220	.13
EBL	1	1700	80	.05*	130	.08
EBT	3	5100	780	.15	1870	.37*
EBR	d	1700	190	.11	430	.25
WBL	1	1700	460	.27	180	.11*
WBT	3	5100	1970	.39*	1130	.22
WBR	d	1700	10	.01	100	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.89**		**.83**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	430	.25*	400	.24*
NBT	2	3400	190	.06	380	.11
NBR	1	1700	100	.06	230	.14
SBL	1	1700	80	.05	30	.02
SBT	2	3400	440	.13*	280	.08*
SBR	d	1700	120	.07	230	.14
EBL	1	1700	60	.04*	180	.11
EBT	3	5100	800	.16	1810	.35*
EBR	d	1700	230	.14	410	.24
WBL	1	1700	400	.24	160	.09*
WBT	3	5100	1970	.39*	1130	.22
WBR	d	1700	0	.00	80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.86**		**.81**

24. Alton & Commercentre

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1440	.28	2420	.47*
NBR	d	1700	430	.25	230	.14
SBL	1	1700	220	.13	140	.08*
SBT	3	5100	2640	.52*	1820	.36
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		120	.04*	490	.14*
WBT	0	5100	0		0	
WBR	1.5		80	{.00}	220	.13
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.61**		**.74**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1210	.24	2490	.49*
NBR	d	1700	430	.25	240	.14
SBL	1	1700	210	.12	150	.09*
SBT	3	5100	2700	.53*	1680	.33
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		160	.05*	460	.14*
WBT	0	5100	0		0	
WBR	1.5		80		210	.12
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.63**		**.77**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1280	.25	2200	.43*
NBR	d	1700	420	.25	220	.13
SBL	1	1700	210	.12	140	.08*
SBT	3	5100	2420	.47*	1670	.33
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		130	.04*	470	.14*
WBT	0	5100	0		0	
WBR	1.5		80	{.00}	240	{.08}
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.56**		**.70**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1060	.21	2300	.45*
NBR	d	1700	420	.25	240	.14
SBL	1	1700	200	.12	150	.09*
SBT	3	5100	2540	.50*	1520	.30
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		170	.05*	470	.14*
WBT	0	5100	0		0	
WBR	1.5		70		200	.12
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.60**		**.73**

25. Alton & Irvine

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	80	.02*	580	.17*
NBT	3	5100	490	.10	1290	.25
NBR	f		60		210	
SBL	2	3400	210	.06	110	.03
SBT	3	5100	1360	.27*	610	.12*
SBR	f		640		1120	
EBL	2.5		960		630	
EBT	2.5	8500	1140	.25*	940	.18*
EBR	1	1700	580	.34	130	.08
WBL	2	3400	350	.10	130	.04
WBT	3	5100	830	.16*	1490	.29*
WBR	1	1700	60	.04	230	.14
Right Turn Adjustment			EBR .07*			
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .82 .81

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	80	.02*	570	.17*
NBT	3	5100	420	.08	1350	.26
NBR	f		70		220	
SBL	2	3400	160	.05	80	.02
SBT	3	5100	1430	.28*	560	.11*
SBR	f		720		1030	
EBL	2.5		800		670	
EBT	2.5	8500	1190	.23*	960	.19*
EBR	1	1700	580	.34	120	.07
WBL	2	3400	340	.10	130	.04
WBT	3	5100	870	.17*	1500	.29*
WBR	1	1700	60	.04	230	.14
Right Turn Adjustment			EBR .09*			
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .84 .81

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	80	.02*	620	.18*
NBT	3	5100	490	.10	1250	.25
NBR	f		60		210	
SBL	2	3400	250	.07	100	.03
SBT	3	5100	1340	.26*	580	.11*
SBR	f		410		980	
EBL	2.5		780		410	.12
EBT	2.5	8500	1140	.23*	950	.19*
EBR	1	1700	610	.36	140	.08
WBL	2	3400	340	.10	130	.04
WBT	3	5100	830	.16*	1480	.29*
WBR	1	1700	70	.04	260	.15
Right Turn Adjustment			EBR .11*			
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .83 .82

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	80	.02*	620	.18*
NBT	3	5100	420	.08	1300	.25
NBR	f		60		210	
SBL	2	3400	210	.06	80	.02
SBT	3	5100	1450	.28*	550	.11*
SBR	f		510		890	
EBL	2.5		650	.19	480	.14
EBT	2.5	8500	1180	.23*	940	.18*
EBR	1	1700	610	.36	130	.08
WBL	2	3400	310	.09	120	.04
WBT	3	5100	850	.17*	1490	.29*
WBR	1	1700	60	.04	260	.15
Right Turn Adjustment			EBR .11*			
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .86 .81

26. Bake & Commercentre

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04*	10	.01
NBT	2	3400	1190	.35	1430	.42*
NBR	d	1700	710	.42	220	.13
SBL	1	1700	30	.02	60	.04*
SBT	2	3400	1330	.39*	1010	.30
SBR	d	1700	60	.04	40	.02
EBL	1	1700	120	.07	190	.11
EBT	2	3400	180	.07*	80	.04*
EBR	0	0	60		70	
WBL	2	3400	310	.09*	610	.18*
WBT	1	1700	40	.04	130	.09
WBR	0	0	20		30	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.73**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05*	10	.01
NBT	2	3400	980	.29	1450	.43*
NBR	d	1700	700	.41	220	.13
SBL	1	1700	30	.02	60	.04*
SBT	2	3400	1440	.42*	930	.27
SBR	d	1700	80	.05	30	.02
EBL	1	1700	110	.06	180	.11
EBT	2	3400	180	.07*	100	.05*
EBR	0	0	50		70	
WBL	2	3400	290	.09*	590	.17*
WBT	1	1700	60	.05	120	.09
WBR	0	0	20		30	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.74**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04*	10	.01
NBT	2	3400	1140	.34	1380	.41*
NBR	d	1700	720	.42	220	.13
SBL	1	1700	30	.02	50	.03*
SBT	2	3400	1270	.37*	990	.29
SBR	d	1700	60	.04	30	.02
EBL	1	1700	110	.06	180	.11
EBT	2	3400	170	.07*	80	.04*
EBR	0	0	60		70	
WBL	2	3400	310	.09*	610	.18*
WBT	1	1700	40	.04	130	.10
WBR	0	0	20		40	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.62**		**.71**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05*	10	.01
NBT	2	3400	950	.28	1410	.41*
NBR	d	1700	700	.41	220	.13
SBL	1	1700	30	.02	60	.04*
SBT	2	3400	1360	.40*	910	.27
SBR	d	1700	80	.05	30	.02
EBL	1	1700	110	.06	180	.11
EBT	2	3400	180	.07*	100	.05*
EBR	0	0	50		70	
WBL	2	3400	290	.09*	590	.17*
WBT	1	1700	70	.06	120	.09
WBR	0	0	30		30	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.72**

27. Bake & Trabuco

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	590	.17*	430	.13*
NBT	3	5100	1440	.32	1300	.38
NBR	0	0	210		790	.46
SBL	2	3400	40	.01	180	.05
SBT	3	5100	1270	.25*	1570	.31*
SBR	1	1700	250	.15	250	.15
EBL	2	3400	420	.12*	340	.10
EBT	2.5	6800	380	.11	1020	{.21}*
EBR	1.5		800	.24	590	
WBL	2	3400	810	.24	280	.08*
WBT	3	5100	1270	.25*	620	.12
WBR	1	1700	210	.12	40	.02
Right Turn Adjustment					NBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.84**		**.79**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	620	.18*	410	.12
NBT	3	5100	1270	.30	1340	.39*
NBR	0	0	240		790	.46
SBL	2	3400	40	.01	170	.05*
SBT	3	5100	1340	.26*	1480	.29
SBR	1	1700	240	.14	240	.14
EBL	2	3400	420	.12*	320	.09
EBT	2.5	6800	420	.12	1040	{.21}*
EBR	1.5		760	.22	580	
WBL	2	3400	840	.25	280	.08*
WBT	3	5100	1300	.25*	660	.13
WBR	1	1700	200	.12	30	.02
Right Turn Adjustment					NBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.86**		**.79**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	610	.18*	440	.13*
NBT	3	5100	1410	.32	1260	.37
NBR	0	0	220		790	.46
SBL	2	3400	40	.01	180	.05
SBT	3	5100	1220	.24*	1550	.30*
SBR	1	1700	220	.13	250	.15
EBL	2	3400	410	.12*	340	.10
EBT	2.5	6800	380	.11	1010	{.21}*
EBR	1.5		860	.25	570	
WBL	2	3400	810	.24	280	.08*
WBT	3	5100	1280	.25*	610	.12
WBR	1	1700	210	.12	40	.02
Right Turn Adjustment					NBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.84**		**.79**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	620	.18*	430	.13
NBT	3	5100	1250	.29	1330	.39*
NBR	0	0	240		780	.46
SBL	2	3400	40	.01	180	.05*
SBT	3	5100	1290	.25*	1460	.29
SBR	1	1700	210	.12	240	.14
EBL	2	3400	410	.12	290	.09
EBT	2.5	6800	400	.12*	1020	{.21}*
EBR	1.5		800	.24	570	
WBL	2	3400	870	.26*	280	.08*
WBT	3	5100	1270	.25	630	.12
WBR	1	1700	180	.11	30	.02
Right Turn Adjustment					NBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.86**		**.79**

28. Bake & Toledo

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	150	.09*	20	.01
NBT	3	5100	1980	.39	2250	.44*
NBR	d	1700	20	.01	350	.21
SBL	1	1700	60	.04	90	.05*
SBT	3	5100	2450	.48*	2290	.45
SBR	d	1700	180	.11	50	.03
EBL	2	3400	100	.03*	170	.05
EBT	2	3400	10	.00	360	.11*
EBR	1	1700	20	.01	160	.09
WBL	1	1700	230	.14	30	.02*
WBT	2	3400	590	.19*	50	.03
WBR	0	0	60		60	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.84**		**.67**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	160	.09*	20	.01
NBT	3	5100	1860	.36	2280	.45*
NBR	d	1700	20	.01	350	.21
SBL	1	1700	60	.04	100	.06*
SBT	3	5100	2480	.49*	2210	.43
SBR	d	1700	200	.12	40	.02
EBL	2	3400	100	.03*	170	.05
EBT	2	3400	10	.00	360	.11*
EBR	1	1700	20	.01	170	.10
WBL	1	1700	280	.16	30	.02*
WBT	2	3400	570	.19*	50	.03
WBR	0	0	60		60	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.85**		**.69**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	140	.08*	20	.01
NBT	3	5100	1960	.38	2230	.44*
NBR	d	1700	20	.01	350	.21
SBL	1	1700	60	.04	90	.05*
SBT	3	5100	2490	.49*	2250	.44
SBR	d	1700	150	.09	50	.03
EBL	2	3400	110	.03*	180	.05
EBT	2	3400	10	.00	360	.11*
EBR	1	1700	20	.01	160	.09
WBL	1	1700	200	.12	30	.02*
WBT	2	3400	620	.20*	50	.03
WBR	0	0	60		60	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.85**		**.67**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	150	.09*	20	.01
NBT	3	5100	1820	.36	2280	.45*
NBR	d	1700	20	.01	360	.21
SBL	1	1700	60	.04	100	.06*
SBT	3	5100	2520	.49*	2180	.43
SBR	d	1700	180	.11	40	.02
EBL	2	3400	100	.03*	180	.05
EBT	2	3400	10	.00	360	.11*
EBR	1	1700	20	.01	160	.09
WBL	1	1700	310	.18	30	.02*
WBT	2	3400	560	.18*	50	.03
WBR	0	0	60		60	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.84**		**.69**

29. Bake & Jeronimo

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	430	.13*	20	.01
NBT	3	5100	2230	.44	2390	.47*
NBR	d	1700	40	.02	390	.23
SBL	1	1700	100	.06	100	.06*
SBT	4	6800	2450	.37*	2260	.33
SBR	0	0	60		10	
EBL	2	3400	10	.00	120	.04
EBT	2	3400	80	.02*	550	.16*
EBR	1	1700	30	.02	400	.24
WBL	1	1700	350	.21*	130	.08*
WBT	3	5100	670	.15	130	.04
WBR	0	0	90		80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.78**		**.82**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	410	.12*	20	.01
NBT	3	5100	2130	.42	2410	.47*
NBR	d	1700	50	.03	390	.23
SBL	1	1700	90	.05	90	.05*
SBT	4	6800	2530	.38*	2200	.33
SBR	0	0	70		10	
EBL	2	3400	10	.00	130	.04
EBT	2	3400	80	.02*	560	.16*
EBR	1	1700	40	.02	390	.23
WBL	1	1700	330	.19*	130	.08*
WBT	3	5100	740	.16	140	.04
WBR	0	0	80		80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.76**		**.81**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	410	.12*	20	.01
NBT	3	5100	2220	.44	2370	.46*
NBR	d	1700	50	.03	400	.24
SBL	1	1700	90	.05	80	.05*
SBT	4	6800	2480	.37*	2240	.33
SBR	0	0	40		10	
EBL	2	3400	10	.00	120	.04
EBT	2	3400	80	.02*	540	.16*
EBR	1	1700	40	.02	410	.24
WBL	1	1700	310	.18*	130	.08*
WBT	3	5100	710	.15	130	.04
WBR	0	0	80		80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.74**		**.80**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	430	.13*	20	.01
NBT	3	5100	2100	.41	2430	.48*
NBR	d	1700	50	.03	360	.21
SBL	1	1700	90	.05	90	.05*
SBT	4	6800	2580	.39*	2150	.32
SBR	0	0	80		10	
EBL	2	3400	10	.00	120	.04
EBT	2	3400	70	.02*	560	.16*
EBR	1	1700	40	.02	380	.22
WBL	1	1700	300	.18*	130	.08*
WBT	3	5100	730	.16	140	.04
WBR	0	0	90		80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.77**		**.82**

30. Bake & Muirlands

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	280	.08	150	.04*
NBT	4	6800	2940	.43*	2620	.39
NBR	f		90		220	
SBL	2	3400	60	.02*	170	.05
SBT	4	6800	2360	.35	2780	.41*
SBR	f		220		80	
EBL	2	3400	50	.01*	270	.08
EBT	2	3400	112	.03	750	.22*
EBR	f		130		370	
WBL	2	3400	190	.06	90	.03*
WBT	2	3400	480	.14*	220	.06
WBR	f		60		90	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.75**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	270	.08	140	.04*
NBT	4	6800	2810	.41*	2610	.38
NBR	f		90		230	
SBL	2	3400	60	.02*	180	.05
SBT	4	6800	2410	.35	2690	.40*
SBR	f		240		90	
EBL	2	3400	50	.01*	280	.08
EBT	2	3400	112	.03	720	.21*
EBR	f		130		380	
WBL	2	3400	150	.04	90	.03*
WBT	2	3400	490	.14*	220	.06
WBR	f		70		110	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.63**		**.73**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	290	.09	150	.04*
NBT	4	6800	2910	.43*	2610	.38
NBR	f		90		170	
SBL	2	3400	70	.02*	210	.06
SBT	4	6800	2300	.34	2720	.40*
SBR	f		260		80	
EBL	2	3400	50	.01*	260	.08
EBT	2	3400	112	.03	740	.22*
EBR	f		130		370	
WBL	2	3400	250	.07	100	.03*
WBT	2	3400	390	.11*	220	.06
WBR	f		80		90	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.62**		**.74**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	260	.08*	140	.04
NBT	4	6800	2780	.41	2630	.39*
NBR	f		90		210	
SBL	2	3400	70	.02	160	.05*
SBT	4	6800	2420	.36*	2660	.39
SBR	f		240		90	
EBL	2	3400	50	.01*	250	.07
EBT	2	3400	112	.03	760	.22*
EBR	f		130		380	
WBL	2	3400	120	.04	90	.03*
WBT	2	3400	460	.14*	220	.06
WBR	f		80		120	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.74**

31. Bake & Rockfield

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	200	.06	60	.02
NBT	4	6800	3110	.46*	2690	.40*
NBR	f		810		640	
SBL	2	3400	110	.03*	340	.10*
SBT	4	6800	2660	.39	2930	.43
SBR	1	1700	10	.01	10	.01
EBL	1	1700	10	.01	10	.01
EBT	2	3400	30	.01*	150	.04*
EBR	f		50		410	
WBL	2	3400	510	.15*	950	.28*
WBT	2	3400	150	.04	90	.03
WBR	f		140		130	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.70**		**.87**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	200	.06	60	.02
NBT	4	6800	2980	.44*	2680	.39*
NBR	f		830		660	
SBL	2	3400	120	.04*	340	.10*
SBT	4	6800	2660	.39	2850	.42
SBR	1	1700	0	.00	10	.01
EBL	1	1700	10	.01	20	.01
EBT	2	3400	40	.01*	160	.05*
EBR	f		40		400	
WBL	2	3400	490	.14*	960	.28*
WBT	2	3400	180	.05	90	.03
WBR	f		130		140	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.87**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	200	.06	60	.02
NBT	4	6800	3080	.45*	2630	.39*
NBR	f		810		660	
SBL	2	3400	120	.04*	340	.10*
SBT	4	6800	2660	.39	2880	.42
SBR	1	1700	10	.01	10	.01
EBL	1	1700	10	.01	20	.01
EBT	2	3400	30	.01*	150	.04*
EBR	f		50		410	
WBL	2	3400	520	.15*	950	.28*
WBT	2	3400	150	.04	90	.03
WBR	f		140		140	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.70**		**.86**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	200	.06	60	.02
NBT	4	6800	2940	.43*	2680	.39*
NBR	f		830		650	
SBL	2	3400	130	.04*	350	.10*
SBT	4	6800	2630	.39	2810	.41
SBR	1	1700	10	.01	10	.01
EBL	1	1700	10	.01	20	.01
EBT	2	3400	30	.01*	160	.05*
EBR	f		40		420	
WBL	2	3400	500	.15*	960	.28*
WBT	2	3400	160	.05	80	.02
WBR	f		130		140	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.87**

32. Bake & I-5 NB Ramps

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	3580	.53*	3100	.46*
NBR	f		170		920	
SBL	0	0	0		0	
SBT	3	5100	1090	.21	1730	.34
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	230	.14*	140	.08*
WBT	0	0	0		0	
WBR	3	5100	1110	.22	510	.10
Right Turn Adjustment			WBR	.08*	WBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.80**		**.61**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	3510	.52*	3120	.46*
NBR	f		160		920	
SBL	0	0	0		0	
SBT	3	5100	1060	.21	1710	.34
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	240	.14*	140	.08*
WBT	0	0	0		0	
WBR	3	5100	1050	.21	490	.10
Right Turn Adjustment			WBR	.07*	WBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.78**		**.61**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	3570	.52*	3050	.45*
NBR	f		150		920	
SBL	0	0	0		0	
SBT	3	5100	1110	.22	1730	.34
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	230	.14*	140	.08*
WBT	0	0	0		0	
WBR	3	5100	1100	.22	520	.10
Right Turn Adjustment			WBR	.08*	WBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.79**		**.60**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	3470	.51*	3100	.46*
NBR	f		240		920	
SBL	0	0	0		0	
SBT	3	5100	1090	.21	1730	.34
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	240	.14*	140	.08*
WBT	0	0	0		0	
WBR	3	5100	1050	.21	500	.10
Right Turn Adjustment			WBR	.07*	WBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.77**		**.61**

33. Bake & I-5 SB Ramps

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1080	.22*	1980	.41*
NBR	0	0	20		100	
SBL	0	0	0		0	
SBT	3	5100	930	.18	1240	.24
SBR	f		350		680	
EBL	3	5100	2850	.56*	2200	.43*
EBT	0	0	0		0	
EBR	1	1700	710	.42	240	.14
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.83**		**.89**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1090	.22*	1960	.40*
NBR	0	0	20		90	
SBL	0	0	0		0	
SBT	3	5100	930	.18	1220	.24
SBR	f		360		680	
EBL	3	5100	2810	.55*	2240	.44*
EBT	0	0	0		0	
EBR	1	1700	730	.43	230	.14
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.82**		**.89**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1080	.22*	2000	.41*
NBR	0	0	20		90	
SBL	0	0	0		0	
SBT	3	5100	950	.19	1250	.25
SBR	f		350		670	
EBL	3	5100	2830	.55*	2120	.42*
EBT	0	0	0		0	
EBR	1	1700	720	.42	240	.14
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.82**		**.88**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1120	.22*	1980	.41*
NBR	0	0	20		90	
SBL	0	0	0		0	
SBT	3	5100	970	.19	1230	.24
SBR	f		360		670	
EBL	3	5100	2770	.54*	2190	.43*
EBT	0	0	0		0	
EBR	1	1700	740	.44	230	.14
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.81**		**.89**

34. Lake Forest & Trabuco

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	270	.08*	250	.07
NBT	3	5100	930	.18	1150	.23*
NBR	1	1700	140	.08	700	.41
SBL	2	3400	280	.08	410	.12*
SBT	3	5100	1210	.27*	1070	.24
SBR	0	0	180		170	
EBL	2	3400	170	.05	260	.08
EBT	3	5100	700	.14*	1280	.25*
EBR	1	1700	430	.25	190	.11
WBL	2	3400	810	.24*	310	.09*
WBT	3	5100	1030	.20	730	.14
WBR	1	1700	480	.28	410	.24
Right Turn Adjustment			EBR	.05*	NBR	.11*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.83**		**.85**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	260	.08*	260	.08
NBT	3	5100	930	.18	1170	.23*
NBR	1	1700	100	.06	730	.43
SBL	2	3400	300	.09	320	.09*
SBT	3	5100	1290	.29*	1070	.24
SBR	0	0	210		170	
EBL	2	3400	180	.05	290	.09
EBT	3	5100	720	.14*	1250	.25*
EBR	1	1700	440	.26	190	.11
WBL	2	3400	780	.23*	270	.08*
WBT	3	5100	1060	.21	740	.15
WBR	1	1700	310	.18	430	.25
Right Turn Adjustment			EBR	.06*	NBR	.14*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.85**		**.84**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	270	.08*	250	.07
NBT	3	5100	920	.18	1130	.22*
NBR	1	1700	130	.08	710	.42
SBL	2	3400	280	.08	400	.12*
SBT	3	5100	1170	.27*	1040	.24
SBR	0	0	190		170	
EBL	2	3400	170	.05	240	.07
EBT	3	5100	710	.14*	1290	.25*
EBR	1	1700	420	.25	190	.11
WBL	2	3400	810	.24*	290	.09*
WBT	3	5100	1030	.20	710	.14
WBR	1	1700	450	.26	440	.26
Right Turn Adjustment			EBR	.05*	NBR	.13*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.83**		**.86**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	260	.08*	250	.07
NBT	3	5100	900	.18	1130	.22*
NBR	1	1700	100	.06	780	.46
SBL	2	3400	310	.09	340	.10*
SBT	3	5100	1240	.28*	1070	.24
SBR	0	0	200		160	
EBL	2	3400	170	.05	280	.08
EBT	3	5100	720	.14*	1230	.24*
EBR	1	1700	440	.26	190	.11
WBL	2	3400	800	.24*	260	.08*
WBT	3	5100	1040	.20	730	.14
WBR	1	1700	320	.19	450	.26
Right Turn Adjustment			EBR	.06*	NBR	.18*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.85**		**.87**

35. Lake Forest & Serrano

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	80	.05
NBT	3	5100	1170	.23	1960	.38*
NBR	d	1700	70	.04	110	.06
SBL	1	1700	80	.05	40	.02*
SBT	3	5100	2180	.43*	1470	.29
SBR	d	1700	220	.13	70	.04
EBL	1	1700	130	.08*	120	.07*
EBT	1	1700	60	.10	120	.11
EBR	0	0	110		70	
WBL	1	1700	80	.05	40	.02
WBT	1	1700	80	.09*	70	.07*
WBR	0	0	70		50	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.71**		**.59**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	80	.05
NBT	3	5100	1100	.22	1980	.39*
NBR	d	1700	80	.05	120	.07
SBL	1	1700	80	.05	40	.02*
SBT	3	5100	2280	.45*	1450	.28
SBR	d	1700	170	.10	60	.04
EBL	1	1700	130	.08*	150	.09*
EBT	1	1700	60	.11	100	.10
EBR	0	0	120		70	
WBL	1	1700	90	.05	40	.02
WBT	1	1700	140	.12*	70	.07*
WBR	0	0	70		50	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.76**		**.62**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	80	.05
NBT	3	5100	1130	.22	1930	.38*
NBR	d	1700	90	.05	120	.07
SBL	1	1700	70	.04	40	.02*
SBT	3	5100	2140	.42*	1450	.28
SBR	d	1700	210	.12	60	.04
EBL	1	1700	130	.08*	130	.08*
EBT	1	1700	60	.10	120	.11
EBR	0	0	110		70	
WBL	1	1700	80	.05	40	.02
WBT	1	1700	90	.10*	80	.08*
WBR	0	0	80		50	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.71**		**.61**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	80	.05
NBT	3	5100	1070	.21	2010	.39*
NBR	d	1700	80	.05	100	.06
SBL	1	1700	70	.04	50	.03*
SBT	3	5100	2170	.43*	1430	.28
SBR	d	1700	240	.14	60	.04
EBL	1	1700	130	.08*	130	.08*
EBT	1	1700	60	.11	110	.11
EBR	0	0	120		70	
WBL	1	1700	110	.06	40	.02
WBT	1	1700	80	.09*	80	.08*
WBR	0	0	70		50	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.71**		**.63**

36. El Toro & Trabuco

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	470	.14*	470	.14
NBT	3	5100	1130	.22	1440	.28*
NBR	1	1700	110	.06	600	.35
SBL	2	3400	280	.08	290	.09*
SBT	3	5100	1710	.34*	990	.19
SBR	1	1700	360	.21	190	.11
EBL	2	3400	220	.06*	730	.21
EBT	3	5100	360	.11	1220	.27*
EBR	0	0	250	.15	180	
WBL	2	3400	280	.08	220	.06*
WBT	3	5100	1140	.22*	530	.10
WBR	1	1700	250	.15	170	.10
Right Turn Adjustment				NBR		.01*
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for SBR NBR						

TOTAL CAPACITY UTILIZATION **.81** **.76**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	350	.10*	490	.14
NBT	3	5100	1120	.22	1460	.29*
NBR	1	1700	120	.07	610	.36
SBL	2	3400	280	.08	270	.08*
SBT	3	5100	1750	.34*	950	.19
SBR	1	1700	420	.25	160	.09
EBL	2	3400	200	.06*	740	.22
EBT	3	5100	370	.11	1210	.28*
EBR	0	0	290	.17	200	
WBL	2	3400	300	.09	230	.07*
WBT	3	5100	1110	.22*	520	.10
WBR	1	1700	250	.15	170	.10
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for SBR NBR						

TOTAL CAPACITY UTILIZATION **.77** **.77**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	450	.13*	480	.14
NBT	3	5100	1140	.22	1400	.27*
NBR	1	1700	110	.06	590	.35
SBL	2	3400	280	.08	290	.09*
SBT	3	5100	1620	.32*	1000	.20
SBR	1	1700	410	.24	170	.10
EBL	2	3400	200	.06*	740	.22
EBT	3	5100	370	.11	1230	.28*
EBR	0	0	270	.16	180	
WBL	2	3400	300	.09	220	.06*
WBT	3	5100	1110	.22*	530	.10
WBR	1	1700	260	.15	160	.09
Right Turn Adjustment				NBR		.02*
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for SBR NBR						

TOTAL CAPACITY UTILIZATION **.78** **.77**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	360	.11*	490	.14
NBT	3	5100	1100	.22	1450	.28*
NBR	1	1700	120	.07	590	.35
SBL	2	3400	280	.08	270	.08*
SBT	3	5100	1700	.33*	930	.18
SBR	1	1700	420	.25	160	.09
EBL	2	3400	200	.06*	750	.22
EBT	3	5100	370	.11	1230	.28*
EBR	0	0	270	.16	180	
WBL	2	3400	310	.09	230	.07*
WBT	3	5100	1100	.22*	530	.10
WBR	1	1700	250	.15	170	.10
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for SBR NBR						

TOTAL CAPACITY UTILIZATION **.77** **.76**

37. El Toro & Serrano

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04*	190	.11
NBT	3	5100	1680	.33	2440	.48*
NBR	d	1700	10	.01	30	.02
SBL	1	1700	10	.01	20	.01*
SBT	3	5100	1960	.38*	1340	.26
SBR	d	1700	270	.16	60	.04
EBL	1	1700	30	.02	30	.02
EBT	1	1700	10	.12*	20	.15*
EBR	0	0	200		230	
WBL	1	1700	30	.02*	20	.01*
WBT	1	1700	40	.05	10	.02
WBR	0	0	40		20	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.61**		**.70**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	180	.11
NBT	3	5100	1550	.30	2510	.49*
NBR	d	1700	10	.01	30	.02
SBL	1	1700	10	.01	30	.02*
SBT	3	5100	2030	.40*	1300	.25
SBR	d	1700	290	.17	80	.05
EBL	1	1700	40	.02	40	.02
EBT	1	1700	10	.11*	20	.12*
EBR	0	0	180		190	
WBL	1	1700	30	.02*	20	.01*
WBT	1	1700	40	.04	10	.02
WBR	0	0	30		20	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.69**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	110	.06*	200	.12
NBT	3	5100	1650	.32	2420	.47*
NBR	d	1700	10	.01	30	.02
SBL	1	1700	10	.01	20	.01*
SBT	3	5100	1950	.38*	1350	.26
SBR	d	1700	230	.14	70	.04
EBL	1	1700	40	.02	20	.01
EBT	1	1700	10	.11*	20	.14*
EBR	0	0	180		220	
WBL	1	1700	30	.02*	30	.02*
WBT	1	1700	40	.05	10	.02
WBR	0	0	40		20	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.62**		**.69**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	190	.11
NBT	3	5100	1550	.30	2470	.48*
NBR	d	1700	10	.01	40	.02
SBL	1	1700	10	.01	20	.01*
SBT	3	5100	2010	.39*	1280	.25
SBR	d	1700	260	.15	70	.04
EBL	1	1700	30	.02	20	.01
EBT	1	1700	10	.12*	20	.14*
EBR	0	0	200		210	
WBL	1	1700	30	.02*	20	.01*
WBT	1	1700	40	.04	10	.02
WBR	0	0	30		20	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.69**

38. El Toro & Jeronimo

2040 No-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05	70	.04
NBT	3	5100	1540	.30*	1800	.35*
NBR	1	1700	220	.13	190	.11
SBL	1	1700	420	.25*	160	.09*
SBT	3	5100	1580	.31	1060	.21
SBR	d	1700	110	.06	350	.21
EBL	1	1700	120	.07*	230	.14
EBT	2	3400	350	.13	640	.24*
EBR	0	0	100		160	
WBL	2	3400	490	.14	240	.07*
WBT	2	3400	750	.22*	530	.16
WBR	1	1700	120	.07	350	.21
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION **.89** **.80**

2040 With-Project Without Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	90	.05	80	.05
NBT	3	5100	1450	.28*	1840	.36*
NBR	1	1700	210	.12	160	.09
SBL	1	1700	440	.26*	180	.11*
SBT	3	5100	1570	.31	970	.19
SBR	d	1700	120	.07	350	.21
EBL	1	1700	130	.08*	220	.13
EBT	2	3400	330	.13	640	.24*
EBR	0	0	110		160	
WBL	2	3400	560	.16	230	.07*
WBT	2	3400	720	.21*	520	.15
WBR	1	1700	80	.05	360	.21
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION **.88** **.83**

2040 No-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	90	.05	70	.04
NBT	3	5100	1550	.30*	1810	.35*
NBR	1	1700	210	.12	170	.10
SBL	1	1700	440	.26*	180	.11*
SBT	3	5100	1520	.30	1020	.20
SBR	d	1700	100	.06	350	.21
EBL	1	1700	120	.07	200	.12
EBT	2	3400	340	.13*	650	.24*
EBR	0	0	110		170	
WBL	2	3400	520	.15*	240	.07*
WBT	2	3400	730	.21	530	.16
WBR	1	1700	120	.07	350	.21
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION **.89** **.82**

2040 With-Project With Portola Ext. (Scenario 4)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	90	.05	80	.05
NBT	3	5100	1440	.28*	1850	.36*
NBR	1	1700	220	.13	150	.09
SBL	1	1700	440	.26*	170	.10*
SBT	3	5100	1580	.31	950	.19
SBR	d	1700	100	.06	340	.20
EBL	1	1700	120	.07*	200	.12
EBT	2	3400	340	.13	650	.24*
EBR	0	0	110		160	
WBL	2	3400	510	.15	240	.07*
WBT	2	3400	740	.22*	530	.16
WBR	1	1700	100	.06	360	.21
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION **.88** **.82**

APPENDIX 8.4:

2040 GENERAL PLAN CUMULATIVE CONDITIONS, WITHOUT AND WITH PORTOLA WESTERLY EXTENSION WITH SCENARIO 5 IMPROVEMENT ALTERNATIVE INTERSECTION OPERATIONS ANALYSIS WORKSHEETS

This Page Intentionally Left Blank

1. Lake Forest & Dimension

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	110	.06	50	.03
NBT	2	3400	900	.26*	840	.25*
NBR	d	1700	10	.01	10	.01
SBL	1	1700	30	.02*	40	.02*
SBT	2	3400	530	.16	810	.24
SBR	d	1700	610	.36	290	.17
EBL	1.5		360	{.11}*	610	{.18}*
EBT	0.5	3400	10	.11	10	.18
EBR	1	1700	110	.06	50	.03
WBL	1	1700	10	.01	30	.02
WBT	1	1700	10	.01*	10	.02*
WBR	0	0	10		20	
Right Turn Adjustment			SBR	.06*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.51**		**.52**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	110	.06	50	.03
NBT	2	3400	740	.22*	820	.24*
NBR	d	1700	10	.01	20	.01
SBL	1	1700	30	.02*	40	.02*
SBT	2	3400	580	.17	740	.22
SBR	d	1700	610	.36	300	.18
EBL	1.5		350	{.11}*	640	{.19}*
EBT	0.5	3400	10	.11	10	.19
EBR	1	1700	140	.08	60	.04
WBL	1	1700	10	.01	30	.02
WBT	1	1700	10	.01*	10	.02*
WBR	0	0	10		20	
Right Turn Adjustment			SBR	.10*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.51**		**.52**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06	50	.03*
NBT	2	3400	890	.26*	810	.24
NBR	d	1700	10	.01	10	.01
SBL	1	1700	30	.02*	40	.02
SBT	2	3400	520	.15	810	.24*
SBR	d	1700	610	.36	280	.16
EBL	1.5		360	{.11}*	620	{.19}*
EBT	0.5	3400	10	.11	10	.19
EBR	1	1700	100	.06	50	.03
WBL	1	1700	10	.01	30	.02
WBT	1	1700	10	.01*	10	.02*
WBR	0	0	10		20	
Right Turn Adjustment			SBR	.06*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.51**		**.53**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	110	.06	50	.03
NBT	2	3400	740	.22*	810	.24*
NBR	d	1700	10	.01	10	.01
SBL	1	1700	30	.02*	40	.02*
SBT	2	3400	550	.16	740	.22
SBR	d	1700	620	.36	300	.18
EBL	1.5		340	{.10}*	640	{.19}*
EBT	0.5	3400	10	.10	10	.19
EBR	1	1700	120	.07	60	.04
WBL	1	1700	10	.01	30	.02
WBT	1	1700	10	.01*	10	.02*
WBR	0	0	10		20	
Right Turn Adjustment			SBR	.10*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.50**		**.52**

2. Lake Forest & Rancho

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	370	.22*	310	.18
NBT	2	3400	700	.21	1150	.34*
NBR	d	1700	480	.28	700	.41
SBL	1	1700	290	.17	240	.14*
SBT	2	3400	780	.23*	810	.24
SBR	d	1700	400	.24	120	.07
EBL	1	1700	30	.02*	170	.10
EBT	2	3400	360	.11	750	.22*
EBR	1	1700	80	.05	250	.15
WBL	2	3400	530	.16	490	.14*
WBT	2	3400	880	.26*	600	.18
WBR	1	1700	130	.08	330	.19
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.78**		**.89**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	110	.06	260	.15
NBT	2	3400	720	.21*	1090	.32*
NBR	d	1700	480	.28	770	.45
SBL	1	1700	250	.15*	240	.14*
SBT	2	3400	800	.24	810	.24
SBR	d	1700	90	.05	100	.06
EBL	1	1700	80	.05	40	.02
EBT	2	3400	350	.10*	570	.17*
EBR	1	1700	100	.06	120	.07
WBL	2	3400	570	.17*	550	.16*
WBT	2	3400	640	.19	510	.15
WBR	1	1700	130	.08	320	.19
Right Turn Adjustment					NBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.85**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	370	.22*	310	.18
NBT	2	3400	700	.21	1170	.34*
NBR	d	1700	480	.28	690	.41
SBL	1	1700	290	.17	240	.14*
SBT	2	3400	780	.23*	810	.24
SBR	d	1700	350	.21	110	.06
EBL	1	1700	30	.02*	140	.08
EBT	2	3400	360	.11	750	.22*
EBR	1	1700	80	.05	260	.15
WBL	2	3400	520	.15	510	.15*
WBT	2	3400	870	.26*	590	.17
WBR	1	1700	130	.08	320	.19
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.78**		**.90**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	110	.06	260	.15
NBT	2	3400	730	.21*	1110	.33*
NBR	d	1700	490	.29	750	.44
SBL	1	1700	240	.14*	230	.14*
SBT	2	3400	790	.23	820	.24
SBR	d	1700	60	.04	100	.06
EBL	1	1700	70	.04	30	.02
EBT	2	3400	360	.11*	560	.16*
EBR	1	1700	110	.06	130	.08
WBL	2	3400	560	.16*	550	.16*
WBT	2	3400	660	.19	490	.14
WBR	1	1700	130	.08	310	.18
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.67**		**.84**

3. Lake Forest & SR-241 SB Off-Ramp

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	820	.24*	1530	.45*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	780	.23	860	.25
SBR	0	0	0		0	
EBL	2	3400	310	.09*	150	.04*
EBT	0	0	0		0	
EBR	1	1700	630	.37	270	.16
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.27*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.54**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	860	.25*	1310	.39*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	610	.18	820	.24
SBR	0	0	0		0	
EBL	2	3400	340	.10*	170	.05*
EBT	0	0	0		0	
EBR	1	1700	450	.26	300	.18
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.11*	EBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.51**		**.51**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	820	.24	1510	.44*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	860	.25*	900	.26
SBR	0	0	0		0	
EBL	2	3400	210	.06*	80	.02*
EBT	0	0	0		0	
EBR	1	1700	510	.30	210	.12
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.24*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.60**		**.51**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	860	.25*	1330	.39*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	660	.19	900	.26
SBR	0	0	0		0	
EBL	2	3400	210	.06*	100	.03*
EBT	0	0	0		0	
EBR	1	1700	360	.21	250	.15
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.10*	EBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.46**		**.49**

4. Lake Forest & SR-241 NB On-Ramp

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	160	.05	450	.13*
NBT	2	3400	980	.29*	1230	.36
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	780	.23	860	.25*
SBR	1	1700	80	.05	440	.26
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					SBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.34**		**.44**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	190	.06	400	.12*
NBT	2	3400	1010	.30*	1090	.32
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	610	.18	820	.24*
SBR	1	1700	100	.06	420	.25
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					SBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.35**		**.42**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	110	.03*	370	.11*
NBT	2	3400	890	.26	1230	.36
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	860	.25*	900	.26*
SBR	1	1700	10	.01	240	.14
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.33**		**.42**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	130	.04	330	.10*
NBT	2	3400	910	.27*	1090	.32
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	660	.19	900	.26*
SBR	1	1700	10	.01	220	.13
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.32**		**.41**

5. Corridor Center & Rancho

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	0	.00	10	.01
NBT	1	1700	10	.01*	10	.01*
NBR	1	1700	200	.12	920	.54
SBL	1	1700	40	.02*	150	.09*
SBT	1	1700	20	.01	10	.01
SBR	1	1700	40	.02	40	.02
EBL	1	1700	70	.04	60	.04
EBT	2	3400	360	.11*	570	.17*
EBR	1	1700	0	.00	0	.00
WBL	2	3400	1310	.39*	330	.10*
WBT	2	3400	350	.10	590	.17
WBR	d	1700	80	.05	140	.08
Right Turn Adjustment					NBR	.45*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.58**		**.87**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02	10	.01
NBT	1	1700	10	.15*	0	.07*
NBR	0	0	240		120	
SBL	1	1700	60	.04*	160	.09*
SBT	1	1700	0	.00	10	.01
SBR	1	1700	40	.02	50	.03
EBL	1	1700	60	.04	60	.04
EBT	2	3400	350	.10*	680	.20*
EBR	1	1700	100	.06	30	.02
WBL	1	1700	170	.10*	170	.10*
WBT	2	3400	510	.15	570	.17
WBR	d	1700	100	.06	160	.09
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.51**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	0	.00	10	.01
NBT	1	1700	10	.01*	10	.01*
NBR	1	1700	200	.12	890	.52
SBL	1	1700	40	.02*	150	.09*
SBT	1	1700	20	.01	10	.01
SBR	1	1700	40	.02	50	.03
EBL	1	1700	80	.05	60	.04
EBT	2	3400	350	.10*	570	.17*
EBR	1	1700	0	.00	0	.00
WBL	2	3400	1260	.37*	310	.09*
WBT	2	3400	350	.10	590	.17
WBR	d	1700	80	.05	140	.08
Right Turn Adjustment					NBR	.44*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.55**		**.85**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02	10	.01
NBT	1	1700	10	.15*	0	.07*
NBR	0	0	240		120	
SBL	1	1700	50	.03*	150	.09*
SBT	1	1700	20	.01	10	.01
SBR	1	1700	40	.02	50	.03
EBL	1	1700	70	.04	60	.04
EBT	2	3400	380	.11*	640	.19*
EBR	1	1700	100	.06	30	.02
WBL	1	1700	170	.10*	170	.10*
WBT	2	3400	510	.15	570	.17
WBR	d	1700	80	.05	150	.09
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.50**

6. Bake & Portola

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04*	270	.16
NBT	1.5	5100	150	{.04}	310	.18*
NBR	1.5		90		880	.26
SBL	1	1700	140	.08	290	.17*
SBT	2	3400	260	.08*	280	.08
SBR	d	1700	290	.17	340	.20
EBL	2	3400	410	.12	460	.14
EBT	3	5100	290	.06*	800	.16*
EBR	d	1700	70	.04	60	.04
WBL	2	3400	1030	.30*	580	.17*
WBT	3	5100	700	.14	930	.18
WBR	d	1700	130	.08	100	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.53**		**.73**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04	240	.14
NBT	1.5	5100	160	.05*	290	.17*
NBR	1.5		100		890	.26
SBL	1	1700	150	.09*	270	.16*
SBT	2	3400	240	.07	280	.08
SBR	d	1700	280	.16	370	.22
EBL	2	3400	400	.12	470	.14
EBT	3	5100	290	.06*	800	.16*
EBR	d	1700	60	.04	70	.04
WBL	2	3400	930	.27*	600	.18*
WBT	3	5100	700	.14	950	.19
WBR	d	1700	130	.08	100	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.52**		**.72**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04	300	.18
NBT	1.5	5100	140	{.04}*	300	.18*
NBR	1.5		90		870	.26
SBL	1	1700	140	.08*	240	.14*
SBT	2	3400	250	.07	280	.08
SBR	d	1700	300	.18	440	.26
EBL	2	3400	470	.14	480	.14*
EBT	3	5100	520	.10*	1040	.20
EBR	d	1700	140	.08	70	.04
WBL	2	3400	970	.29*	580	.17
WBT	3	5100	900	.18	1230	.24*
WBR	d	1700	120	.07	100	.06
Right Turn Adjustment					SBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.56**		**.76**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05	260	.15
NBT	1.5	5100	150	{.04}*	280	.16*
NBR	1.5		100		880	.26
SBL	1	1700	150	.09*	240	.14*
SBT	2	3400	240	.07	280	.08
SBR	d	1700	290	.17	440	.26
EBL	2	3400	460	.14	490	.14*
EBT	3	5100	530	.10*	1050	.21
EBR	d	1700	90	.05	80	.05
WBL	2	3400	920	.27*	580	.17
WBT	3	5100	950	.19	1270	.25*
WBR	d	1700	110	.06	100	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.55**		**.74**

7. Bake & Towne Centre

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	220	.06*	430	.13
NBT	2	3400	370	.11	1310	.39*
NBR	d	1700	100	.06	180	.11
SBL	2	3400	10	.00	30	.01*
SBT	2	3400	1430	.42*	420	.12
SBR	d	1700	60	.04	80	.05
EBL	1	1700	10	.01	70	.04
EBT	1	1700	50	.03*	190	.11*
EBR	1	1700	150	.09	390	.23
WBL	1	1700	130	.08*	160	.09*
WBT	2	3400	70	.02	130	.04
WBR	0	0	10		10	
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.65**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	270	.08*	410	.12
NBT	2	3400	440	.13	1320	.39*
NBR	d	1700	120	.07	180	.11
SBL	2	3400	10	.00	30	.01*
SBT	2	3400	1300	.38*	390	.11
SBR	d	1700	60	.04	80	.05
EBL	1	1700	10	.01	60	.04
EBT	1	1700	40	.02*	190	.11*
EBR	1	1700	140	.08	410	.24
WBL	1	1700	120	.07*	180	.11*
WBT	2	3400	50	.02	140	.04
WBR	0	0	10		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.60**		**.67**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	210	.06*	410	.12
NBT	2	3400	360	.11	1300	.38*
NBR	d	1700	100	.06	180	.11
SBL	2	3400	10	.00	30	.01*
SBT	2	3400	1430	.42*	420	.12
SBR	d	1700	60	.04	80	.05
EBL	1	1700	10	.01	60	.04
EBT	1	1700	50	.03*	210	.12*
EBR	1	1700	140	.08	360	.21
WBL	1	1700	160	.09*	170	.10*
WBT	2	3400	70	.02	150	.05
WBR	0	0	10		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.66**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	260	.08*	410	.12
NBT	2	3400	440	.13	1310	.39*
NBR	d	1700	130	.08	180	.11
SBL	2	3400	10	.00	30	.01*
SBT	2	3400	1320	.39*	400	.12
SBR	d	1700	50	.03	90	.05
EBL	1	1700	10	.01	60	.04
EBT	1	1700	50	.03*	190	.11*
EBR	1	1700	130	.08	400	.24
WBL	1	1700	130	.08*	180	.11*
WBT	2	3400	60	.02	150	.05
WBR	0	0	10		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.63**		**.67**

8. Bake & Rancho North

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	680	.20	1780	.52*
NBR	d	1700	340	.20	480	.28
SBL	1	1700	60	.04	130	.08*
SBT	2	3400	1660	.49*	840	.25
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	380	.11*	480	.14*
WBT	0	0	0		0	
WBR	2	3400	10	.00	160	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.65** **.79**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	750	.22	1760	.52*
NBR	d	1700	380	.22	570	.34
SBL	1	1700	110	.06	150	.09*
SBT	2	3400	1460	.43*	830	.24
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	620	.18*	450	.13*
WBT	0	0	0		0	
WBR	2	3400	80	.02	160	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.66** **.79**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	660	.19	1760	.52*
NBR	d	1700	330	.19	490	.29
SBL	1	1700	60	.04	120	.07*
SBT	2	3400	1670	.49*	820	.24
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	380	.11*	470	.14*
WBT	0	0	0		0	
WBR	2	3400	10	.00	160	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.65** **.78**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	730	.21	1720	.51*
NBR	d	1700	390	.23	570	.34
SBL	1	1700	130	.08	160	.09*
SBT	2	3400	1430	.42*	820	.24
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	630	.19*	450	.13*
WBT	0	0	0		0	
WBR	2	3400	80	.02	170	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION **.66** **.78**

9. Bake & Rancho South

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	210	.12*	170	.10
NBT	2	3400	810	.24	1890	.56*
NBR	1	1700	360	.21	120	.07
SBL	1	1700	130	.08	60	.04*
SBT	2	3400	1650	.49*	1050	.31
SBR	1	1700	260	.15	200	.12
EBL	2	3400	180	.05	270	.08*
EBT	2	3400	370	.15*	70	.04
EBR	0	0	150		160	.09
WBL	2	3400	90	.03*	290	.09
WBT	2	3400	50	.03	350	.14*
WBR	0	0	40		120	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.84**		**.87**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	190	.11*	180	.11
NBT	2	3400	880	.26	1970	.58*
NBR	1	1700	100	.06	110	.06
SBL	1	1700	10	.01	40	.02*
SBT	2	3400	1720	.51*	1030	.30
SBR	1	1700	330	.19	200	.12
EBL	2	3400	190	.06*	330	.10*
EBT	1	1700	60	.04	80	.05
EBR	d	1700	140	.08	180	.11
WBL	2	3400	200	.06	110	.03
WBT	1	1700	80	.05*	40	.02*
WBR	1	1700	60	.04	30	.02
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.78**		**.77**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	200	.12*	160	.09
NBT	2	3400	780	.23	1840	.54*
NBR	1	1700	360	.21	120	.07
SBL	1	1700	170	.10	70	.04*
SBT	2	3400	1630	.48*	1030	.30
SBR	1	1700	260	.15	200	.12
EBL	2	3400	180	.05	280	.08*
EBT	2	3400	380	.15*	90	.05
EBR	0	0	140		140	.08
WBL	2	3400	80	.02*	290	.09
WBT	2	3400	50	.03	350	.15*
WBR	0	0	40		150	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.82**		**.86**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	180	.11*	170	.10
NBT	2	3400	860	.25	1980	.58*
NBR	1	1700	100	.06	110	.06
SBL	1	1700	10	.01	40	.02*
SBT	2	3400	1690	.50*	1030	.30
SBR	1	1700	360	.21	200	.12
EBL	2	3400	200	.06*	300	.09*
EBT	1	1700	60	.04	80	.05
EBR	d	1700	130	.08	170	.10
WBL	2	3400	210	.06	110	.03
WBT	1	1700	80	.05*	50	.03*
WBR	1	1700	60	.04	20	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.77**		**.77**

10. Bake & Orchard

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	1380	.41	2190	.64*
NBR	1	1700	0	.00	0	.00
SBL	0	0	0		0	
SBT	2	3400	1860	.55*	1460	.43
SBR	d	1700	10	.01	10	.01
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1700	20	.01	60	.04
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	1	1700	0	.00	0	.00
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.61**		**.69**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	1130	.33	2240	.66*
NBR	1	1700	20	.01	50	.03
SBL	0	0	0		0	
SBT	2	3400	2050	.60*	1310	.39
SBR	d	1700	10	.01	10	.01
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1700	20	.01	60	.04
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	1	1700	30	.02	20	.01
Right Turn Adjustment			EBR	.01*	WBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.72**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	1340	.39	2120	.62*
NBR	1	1700	0	.00	0	.00
SBL	0	0	0		0	
SBT	2	3400	1810	.53*	1440	.42
SBR	d	1700	10	.01	10	.01
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1700	20	.01	60	.04
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	1	1700	0	.00	0	.00
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.59**		**.67**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	1130	.33	2230	.66*
NBR	1	1700	20	.01	50	.03
SBL	0	0	0		0	
SBT	2	3400	2020	.59*	1290	.38
SBR	d	1700	10	.01	10	.01
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	1	1700	20	.01	60	.04
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	1	1700	30	.02	20	.01
Right Turn Adjustment			EBR	.01*	WBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.72**

11. Dimension & Bake

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	70	.02	200	.06*
NBT	1	1700	10	.01*	40	.02
NBR	1	1700	170	.10	390	.23
SBL	1	1700	110	.06*	40	.02
SBT	1	1700	40	.02	20	.01*
SBR	1	1700	70	.04	20	.01
EBL	1	1700	10	.01	50	.03
EBT	2	3400	1220	.36*	1640	.48*
EBR	d	1700	120	.07	50	.03
WBL	1	1700	340	.20*	250	.15*
WBT	2	3400	1540	.45	1310	.39
WBR	d	1700	30	.02	100	.06
Right Turn Adjustment					NBR	.07*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.82**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	70	.02	210	.06*
NBT	1	1700	10	.01*	40	.02
NBR	1	1700	130	.08	370	.22
SBL	1	1700	90	.05*	50	.03
SBT	1	1700	40	.02	20	.01*
SBR	1	1700	60	.04	20	.01
EBL	1	1700	10	.01*	50	.03
EBT	2	3400	990	.29	1680	.49*
EBR	d	1700	130	.08	50	.03
WBL	1	1700	320	.19	220	.13*
WBT	2	3400	1660	.49*	1190	.35
WBR	d	1700	20	.01	80	.05
Right Turn Adjustment					NBR	.08*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.61**		**.82**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	70	.02	200	.06*
NBT	1	1700	10	.01*	40	.02
NBR	1	1700	170	.10	400	.24
SBL	1	1700	110	.06*	40	.02
SBT	1	1700	40	.02	10	.01*
SBR	1	1700	60	.04	20	.01
EBL	1	1700	10	.01	50	.03
EBT	2	3400	1180	.35*	1570	.46*
EBR	d	1700	120	.07	60	.04
WBL	1	1700	360	.21*	250	.15*
WBT	2	3400	1460	.43	1280	.38
WBR	d	1700	30	.02	90	.05
Right Turn Adjustment					NBR	.08*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.81**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	70	.02	220	.06*
NBT	1	1700	10	.01*	40	.02
NBR	1	1700	140	.08	380	.22
SBL	1	1700	90	.05*	40	.02
SBT	1	1700	40	.02	20	.01*
SBR	1	1700	60	.04	20	.01
EBL	1	1700	10	.01*	50	.03
EBT	2	3400	960	.28	1640	.48*
EBR	d	1700	120	.07	50	.03
WBL	1	1700	330	.19	220	.13*
WBT	2	3400	1590	.47*	1150	.34
WBR	d	1700	30	.02	80	.05
Right Turn Adjustment					NBR	.07*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.59**		**.80**

12. Alton & Rancho South

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	200	.06*	140	.04
NBT	3	5100	1070	.21	2000	.39*
NBR	1	1700	530	.31	360	.21
SBL	2	3400	240	.07	50	.01*
SBT	3	5100	2170	.43*	1400	.27
SBR	d	1700	170	.10	110	.06
EBL	1	1700	60	.04	210	.12
EBT	2	3400	40	.01*	70	.02*
EBR	1	1700	110	.06	210	.12
WBL	1	1700	280	.16*	520	.31*
WBT	2	3400	100	.03	70	.02
WBR	d	1700	30	.02	330	.19
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.71**		**.78**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	160	.05*	140	.04
NBT	3	5100	980	.19	1970	.39*
NBR	1	1700	420	.25	460	.27
SBL	2	3400	180	.05	50	.01*
SBT	3	5100	2090	.41*	1390	.27
SBR	d	1700	170	.10	110	.06
EBL	1	1700	60	.04	200	.12
EBT	2	3400	30	.01*	120	.04*
EBR	1	1700	110	.06	180	.11
WBL	1	1700	380	.22*	430	.25*
WBT	2	3400	120	.04	70	.02
WBR	d	1700	70	.04	220	.13
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.75**		**.74**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	190	.06*	140	.04
NBT	3	5100	920	.18	1770	.35*
NBR	1	1700	520	.31	390	.23
SBL	2	3400	250	.07	60	.02*
SBT	3	5100	1930	.38*	1270	.25
SBR	d	1700	180	.11	110	.06
EBL	1	1700	60	.04	220	.13
EBT	2	3400	40	.01*	60	.02*
EBR	1	1700	110	.06	220	.13
WBL	1	1700	290	.17*	490	.29*
WBT	2	3400	90	.03	70	.02
WBR	d	1700	30	.02	340	.20
Right Turn Adjustment					EBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.67**		**.75**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	150	.04*	130	.04
NBT	3	5100	820	.16	1760	.35*
NBR	1	1700	420	.25	460	.27
SBL	2	3400	180	.05	50	.01*
SBT	3	5100	1860	.36*	1230	.24
SBR	d	1700	180	.11	110	.06
EBL	1	1700	60	.04	220	.13
EBT	2	3400	30	.01*	90	.03*
EBR	1	1700	120	.07	180	.11
WBL	1	1700	450	.26*	430	.25*
WBT	2	3400	120	.04	70	.02
WBR	d	1700	60	.04	220	.13
Right Turn Adjustment			EBR	.03*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.75**		**.69**

13. Alton & SR-241

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	140	.08*	460	.27*
NBT	3	5100	760	.15	1290	.25
NBR	f		310		1020	
SBL	1	1700	130	.08	80	.05
SBT	3	5100	1280	.25*	1060	.21*
SBR	f		330		260	
EBL	2	3400	360	.11	290	.09
EBT	0	0	0		0	
EBR	f		490		160	
WBL	2	3400	1040	.31*	480	.14*
WBT	0	0	0		0	
WBR	f		80		120	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.69**		**.67**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	180	.11*	340	.20*
NBT	3	5100	760	.15	1320	.26
NBR	f		300		950	
SBL	1	1700	140	.08	90	.05
SBT	3	5100	1300	.25*	1070	.21*
SBR	f		350		260	
EBL	2	3400	330	.10	290	.09
EBT	0	0	0		0	
EBR	f		410		160	
WBL	2	3400	930	.27*	490	.14*
WBT	0	0	0		0	
WBR	f		70		110	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.60**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	120	.07*	420	.25*
NBT	3	5100	620	.12	1020	.20
NBR	f		320		1130	
SBL	1	1700	140	.08	80	.05
SBT	3	5100	930	.18*	900	.18*
SBR	f		30		80	
EBL	2	3400	170	.05	50	.01
EBT	0	0	0		0	
EBR	f		460		140	
WBL	2	3400	1200	.35*	530	.16*
WBT	0	0	0		0	
WBR	f		90		130	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.64**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	160	.09*	290	.17*
NBT	3	5100	610	.12	1040	.20
NBR	f		320		1090	
SBL	1	1700	140	.08	80	.05
SBT	3	5100	950	.19*	900	.18*
SBR	f		30		80	
EBL	2	3400	170	.05	50	.01
EBT	0	0	0		0	
EBR	f		370		140	
WBL	2	3400	1100	.32*	540	.16*
WBT	0	0	0		0	
WBR	f		80		130	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.56**

14. Alton & Towne Centre

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02*	160	.09*
NBT	3	5100	750	.15	1150	.23
NBR	f		400		280	
SBL	1	1700	10	.01	20	.01
SBT	3	5100	1570	.31*	980	.19*
SBR	1	1700	30	.02	10	.01
EBL	1	1700	50	.03	30	.02
EBT	1	1700	40	.02*	50	.03*
EBR	1	1700	60	.04	60	.04
WBL	2	3400	130	.04*	460	.14*
WBT	1	1700	40	.02	40	.02
WBR	1	1700	10	.01	10	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.50**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02*	160	.09*
NBT	3	5100	740	.15	1190	.23
NBR	f		370		280	
SBL	1	1700	10	.01	20	.01
SBT	3	5100	1600	.31*	1020	.20*
SBR	1	1700	30	.02	20	.01
EBL	1	1700	50	.03	30	.02
EBT	1	1700	40	.02*	50	.03*
EBR	1	1700	60	.04	60	.04
WBL	2	3400	130	.04*	440	.13*
WBT	1	1700	40	.02	40	.02
WBR	1	1700	10	.01	10	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.50**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02*	150	.09*
NBT	3	5100	540	.11	770	.15
NBR	f		320		230	
SBL	1	1700	60	.04	50	.03
SBT	3	5100	940	.18*	720	.14*
SBR	1	1700	40	.02	10	.01
EBL	1	1700	60	.04*	40	.02
EBT	1	1700	40	.02	60	.04*
EBR	1	1700	50	.03	40	.02
WBL	2	3400	120	.04	380	.11*
WBT	1	1700	40	.02*	50	.03
WBR	1	1700	20	.01	40	.02
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.31**		**.43**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02*	140	.08*
NBT	3	5100	540	.11	800	.16
NBR	f		280		230	
SBL	1	1700	70	.04	60	.04
SBT	3	5100	960	.19*	740	.15*
SBR	1	1700	40	.02	20	.01
EBL	1	1700	60	.04*	40	.02
EBT	1	1700	40	.02	60	.04*
EBR	1	1700	50	.03	40	.02
WBL	2	3400	120	.04	370	.11*
WBT	1	1700	40	.02*	50	.03
WBR	1	1700	10	.01	40	.02
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.32**		**.43**

15. Alton & Portola

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02	160	.09*
NBT	2	3400	80	.02*	190	.06
NBR	f		470		840	
SBL	1	1700	210	.12*	80	.05
SBT	2	3400	140	.04	110	.03*
SBR	d	1700	0	.00	10	.01
EBL	2	3400	10	.00	10	.00
EBT	2	3400	290	.09*	110	.03*
EBR	f		100		80	
WBL	2	3400	670	.20*	550	.16*
WBT	3	5100	140	.03	240	.05
WBR	f		100		170	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.48**		**.36**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02	170	.10*
NBT	2	3400	70	.02*	190	.06
NBR	f		470		870	
SBL	1	1700	200	.12*	80	.05
SBT	2	3400	140	.04	110	.03*
SBR	d	1700	0	.00	10	.01
EBL	2	3400	10	.00	10	.00
EBT	2	3400	280	.08*	110	.03*
EBR	f		110		70	
WBL	2	3400	680	.20*	580	.17*
WBT	3	5100	140	.03	240	.05
WBR	f		110		150	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.47**		**.38**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	210	.12*
NBT	2	3400	70	.02*	100	.03
NBR	f		320		560	
SBL	1	1700	160	.09*	70	.04
SBT	2	3400	90	.03	70	.02*
SBR	d	1700	0	.00	10	.01
EBL	2	3400	10	.00	10	.00
EBT	2	3400	1000	.29*	710	.21*
EBR	f		110		110	
WBL	2	3400	370	.11*	380	.11*
WBT	3	5100	790	.15	880	.17
WBR	f		80		120	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.56**		**.51**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	200	.12*
NBT	2	3400	60	.02*	90	.03
NBR	f		320		600	
SBL	1	1700	160	.09*	60	.04
SBT	2	3400	80	.02	80	.02*
SBR	d	1700	0	.00	10	.01
EBL	2	3400	10	.00	10	.00
EBT	2	3400	930	.27*	710	.21*
EBR	f		110		120	
WBL	2	3400	390	.11*	380	.11*
WBT	3	5100	870	.17	880	.17
WBR	f		90		110	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.54**		**.51**

16. Lake Forest & Portola

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02	60	.04
NBT	2	3400	210	.06*	180	.05*
NBR	d	1700	230	.14	550	.32
SBL	1	1700	220	.13*	290	.17*
SBT	2	3400	100	.03	250	.07
SBR	d	1700	20	.01	20	.01
EBL	2	3400	20	.01*	20	.01
EBT	3	5100	490	.10	1520	.30*
EBR	d	1700	40	.02	40	.02
WBL	2	3400	750	.22	520	.15*
WBT	3	5100	1880	.37*	1140	.22
WBR	d	1700	300	.18	170	.10
Right Turn Adjustment					NBR	.16*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.62**		**.88**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02	70	.04
NBT	2	3400	210	.06*	200	.06*
NBR	d	1700	250	.15	410	.24
SBL	1	1700	220	.13*	290	.17*
SBT	2	3400	110	.03	230	.07
SBR	d	1700	20	.01	20	.01
EBL	2	3400	20	.01*	20	.01
EBT	3	5100	520	.10	1510	.30*
EBR	d	1700	50	.03	40	.02
WBL	2	3400	590	.17	490	.14*
WBT	3	5100	1770	.35*	1170	.23
WBR	d	1700	300	.18	150	.09
Right Turn Adjustment					NBR	.07*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.60**		**.79**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	50	.03	100	.06
NBT	2	3400	160	.05*	190	.06*
NBR	d	1700	240	.14	490	.29
SBL	1	1700	210	.12*	330	.19*
SBT	2	3400	90	.03	190	.06
SBR	d	1700	30	.02	30	.02
EBL	2	3400	30	.01*	20	.01
EBT	3	5100	710	.14	1640	.32*
EBR	d	1700	80	.05	50	.03
WBL	2	3400	710	.21	470	.14*
WBT	3	5100	2010	.39*	1300	.25
WBR	d	1700	300	.18	140	.08
Right Turn Adjustment					NBR	.12*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.62**		**.88**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	50	.03	120	.07
NBT	2	3400	160	.05*	200	.06*
NBR	d	1700	250	.15	410	.24
SBL	1	1700	210	.12*	320	.19*
SBT	2	3400	100	.03	190	.06
SBR	d	1700	20	.01	30	.02
EBL	2	3400	30	.01*	20	.01
EBT	3	5100	710	.14	1640	.32*
EBR	d	1700	90	.05	60	.04
WBL	2	3400	510	.15	460	.14*
WBT	3	5100	2020	.40*	1320	.26
WBR	d	1700	310	.18	140	.08
Right Turn Adjustment					NBR	.07*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.63**		**.83**

17. Lake Forest & Towne Centre

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	170	.05*	260	.08*
NBT	2	3400	620	.18	890	.26
NBR	d	1700	180	.11	100	.06
SBL	2	3400	10	.00	10	.00
SBT	2	3400	730	.21*	910	.27*
SBR	d	1700	20	.01	20	.01
EBL	1	1700	10	.01	10	.01
EBT	1	1700	80	.05*	170	.10*
EBR	1	1700	70	.04	290	.17
WBL	1	1700	60	.04*	100	.06*
WBT	2	3400	60	.02	60	.02
WBR	0	0	10		10	
Right Turn Adjustment					EBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.40**		**.57**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	170	.05*	260	.08*
NBT	2	3400	650	.19	760	.22
NBR	d	1700	170	.10	80	.05
SBL	2	3400	10	.00	10	.00
SBT	2	3400	600	.18*	870	.26*
SBR	d	1700	30	.02	20	.01
EBL	1	1700	10	.01	10	.01
EBT	1	1700	90	.05*	170	.10*
EBR	1	1700	80	.05	280	.16
WBL	1	1700	50	.03*	100	.06*
WBT	2	3400	50	.02	60	.02
WBR	0	0	10		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.36**		**.55**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	140	.04*	230	.07*
NBT	2	3400	580	.17	870	.26
NBR	d	1700	170	.10	130	.08
SBL	2	3400	10	.00	10	.00
SBT	2	3400	690	.20*	790	.23*
SBR	d	1700	40	.02	20	.01
EBL	1	1700	10	.01	10	.01
EBT	1	1700	80	.05*	180	.11*
EBR	1	1700	50	.03	250	.15
WBL	1	1700	80	.05*	100	.06*
WBT	2	3400	70	.03	60	.02
WBR	0	0	20		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.39**		**.52**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	150	.04*	230	.07*
NBT	2	3400	590	.17	800	.24
NBR	d	1700	160	.09	70	.04
SBL	2	3400	20	.01	10	.00
SBT	2	3400	540	.16*	790	.23*
SBR	d	1700	30	.02	20	.01
EBL	1	1700	10	.01	10	.01
EBT	1	1700	90	.05*	170	.10*
EBR	1	1700	50	.03	220	.13
WBL	1	1700	40	.02*	110	.06*
WBT	2	3400	60	.02	60	.02
WBR	0	0	10		10	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.32**		**.51**

18. Towne Centre & Portola

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	10	.01	30	.02*
NBT	1	1700	80	.05*	10	.01
NBR	1	1700	80	.05	270	.16
SBL	2	3400	40	.01*	270	.08
SBT	1	1700	10	.01	60	.08*
SBR	0	0	10		80	
EBL	2	3400	90	.03*	30	.01
EBT	3	5100	850	.17	2350	.46*
EBR	d	1700	10	.01	10	.01
WBL	2	3400	160	.05	60	.02*
WBT	3	5100	2910	.57*	1750	.34
WBR	d	1700	290	.17	90	.05
Right Turn Adjustment					NBR	.12*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.71**		**.75**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	20	.01	20	.01*
NBT	1	1700	80	.05*	10	.01
NBR	1	1700	80	.05	260	.15
SBL	2	3400	40	.01*	270	.08
SBT	1	1700	10	.01	60	.08*
SBR	0	0	10		80	
EBL	2	3400	90	.03*	40	.01
EBT	3	5100	890	.17	2180	.43*
EBR	d	1700	10	.01	10	.01
WBL	2	3400	150	.04	60	.02*
WBT	3	5100	2630	.52*	1730	.34
WBR	d	1700	290	.17	90	.05
Right Turn Adjustment					NBR	.12*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.71**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	10	.01	20	.01
NBT	1	1700	80	.05*	10	.01*
NBR	1	1700	80	.05	310	.18
SBL	2	3400	40	.01*	270	.08*
SBT	1	1700	10	.01	60	.07
SBR	0	0	10		60	
EBL	2	3400	90	.03*	30	.01
EBT	3	5100	1060	.21	2430	.48*
EBR	d	1700	10	.01	10	.01
WBL	2	3400	190	.06	60	.02*
WBT	3	5100	2980	.58*	1820	.36
WBR	d	1700	290	.17	90	.05
Right Turn Adjustment					NBR	.15*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.72**		**.79**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	20	.01	20	.01
NBT	1	1700	80	.05*	10	.01*
NBR	1	1700	80	.05	250	.15
SBL	2	3400	40	.01*	270	.08*
SBT	1	1700	10	.01	60	.07
SBR	0	0	10		60	
EBL	2	3400	90	.03*	30	.01
EBT	3	5100	1070	.21	2340	.46*
EBR	d	1700	10	.01	10	.01
WBL	2	3400	150	.04	60	.02*
WBT	3	5100	2760	.54*	1820	.36
WBR	d	1700	290	.17	90	.05
Right Turn Adjustment					NBR	.12*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.74**

19. Glenn Ranch & Portola

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	80	.05
NBT	2	3400	20	.01*	30	.02*
NBR	0	0	30	.02	90	.05
SBL	2	3400	410	.12*	380	.11*
SBT	2	3400	50	.01	20	.01
SBR	f		880		780	
EBL	2	3400	460	.14*	1080	.32*
EBT	3	5100	490	.10	1890	.37
EBR	1	1700	20	.01	80	.05
WBL	2	3400	110	.03	60	.02
WBT	3	5100	1750	.34*	820	.16*
WBR	1	1700	110	.06	320	.19
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION **.66** **.66**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	80	.05
NBT	2	3400	20	.01*	20	.01*
NBR	0	0	30	.02	90	.05
SBL	2	3400	430	.13*	380	.11*
SBT	2	3400	50	.01	20	.01
SBR	f		810		800	
EBL	2	3400	490	.14*	1050	.31*
EBT	3	5100	510	.10	1730	.34
EBR	1	1700	20	.01	80	.05
WBL	2	3400	110	.03	60	.02
WBT	3	5100	1550	.30*	780	.15*
WBR	1	1700	90	.05	330	.19
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION **.63** **.63**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	100	.06
NBT	2	3400	20	.01*	30	.02*
NBR	0	0	30	.02	60	.04
SBL	2	3400	370	.11*	350	.10*
SBT	2	3400	50	.01	20	.01
SBR	f		970		820	
EBL	2	3400	540	.16*	1170	.34*
EBT	3	5100	630	.12	1930	.38
EBR	1	1700	30	.02	80	.05
WBL	2	3400	90	.03	60	.02
WBT	3	5100	1750	.34*	810	.16*
WBR	1	1700	60	.04	260	.15
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION **.67** **.67**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04	100	.06
NBT	2	3400	20	.01*	20	.01*
NBR	0	0	30	.02	60	.04
SBL	2	3400	410	.12*	360	.11*
SBT	2	3400	50	.01	20	.01
SBR	f		890		810	
EBL	2	3400	550	.16*	1130	.33*
EBT	3	5100	630	.12	1780	.35
EBR	1	1700	30	.02	80	.05
WBL	2	3400	90	.03	60	.02
WBT	3	5100	1600	.31*	820	.16*
WBR	1	1700	60	.04	270	.16
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION **.65** **.66**

20. Portola & SR-241

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	560	.16*	340	.10
NBT	3	5100	820	.16	810	.16*
NBR	f		90		180	
SBL	2	3400	230	.07	1280	.38*
SBT	3	5100	490	.10*	990	.19
SBR	f		260		130	
EBL	1	1700	220	.13*	170	.10*
EBT	0	0	0		0	
EBR	f		390		490	
WBL	2	3400	290	.09	140	.04
WBT	0	0	0		0	
WBR	f		1930		440	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.44**		**.69**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	550	.16*	370	.11
NBT	3	5100	810	.16	810	.16*
NBR	f		100		180	
SBL	2	3400	240	.07	1140	.34*
SBT	3	5100	530	.10*	990	.19
SBR	f		260		120	
EBL	1	1700	190	.11*	160	.09*
EBT	0	0	0		0	
EBR	f		370		460	
WBL	2	3400	300	.09	170	.05
WBT	0	0	0		0	
WBR	f		1740		410	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.42**		**.64**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	520	.15*	340	.10
NBT	3	5100	890	.17	810	.16*
NBR	f		90		180	
SBL	2	3400	230	.07	1260	.37*
SBT	3	5100	580	.11*	1050	.21
SBR	f		260		80	
EBL	1	1700	100	.06	100	.06*
EBT	0	0	0		0	
EBR	f		340		460	
WBL	2	3400	270	.08*	140	.04
WBT	0	0	0		0	
WBR	f		1910		430	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.39**		**.64**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	490	.14*	340	.10
NBT	3	5100	880	.17	850	.17*
NBR	f		100		170	
SBL	2	3400	240	.07	1130	.33*
SBT	3	5100	620	.12*	1050	.21
SBR	f		260		80	
EBL	1	1700	100	.06	90	.05*
EBT	0	0	0		0	
EBR	f		310		450	
WBL	2	3400	280	.08*	140	.04
WBT	0	0	0		0	
WBR	f		1760		430	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.39**		**.60**

21. Portola & Rancho

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	1410	.41*	840	.25*
NBT	3	5100	1220	.24	1590	.31
NBR	d	1700	10	.01	10	.01
SBL	2	3400	10	.00	10	.00
SBT	3	5100	820	.16*	1470	.29*
SBR	1	1700	260	.15	60	.04
EBL	1.5		100		130	
EBT	0.5	3400	10	.03*	10	.04*
EBR	f		530		1420	
WBL	1.5		10		10	
WBT	1	6800	10	.00*	10	.00*
WBR	1.5		10		10	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION .65 .63

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	1200	.35*	810	.24*
NBT	3	5100	1200	.24	1620	.32
NBR	d	1700	10	.01	10	.01
SBL	2	3400	10	.00	10	.00
SBT	3	5100	810	.16*	1450	.28*
SBR	1	1700	290	.17	90	.05
EBL	1.5		110		130	
EBT	0.5	3400	10	.04*	10	.04*
EBR	f		530		1270	
WBL	1.5		10		10	
WBT	1	6800	10	.00*	10	.00*
WBR	1.5		10		10	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION .60 .61

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	1410	.41*	840	.25*
NBT	3	5100	1240	.24	1590	.31
NBR	d	1700	10	.01	10	.01
SBL	2	3400	10	.00	10	.00
SBT	3	5100	850	.17*	1490	.29*
SBR	1	1700	250	.15	60	.04
EBL	1.5		100		130	
EBT	0.5	3400	10	.03*	10	.04*
EBR	f		530		1420	
WBL	1.5		10		10	
WBT	1	6800	10	.00*	10	.00*
WBR	1.5		10		10	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION .66 .63

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	1210	.36*	810	.24*
NBT	3	5100	1220	.24	1620	.32
NBR	d	1700	10	.01	10	.01
SBL	2	3400	10	.00	10	.00
SBT	3	5100	840	.16*	1490	.29*
SBR	1	1700	280	.16	60	.04
EBL	1.5		110		130	
EBT	0.5	3400	10	.04*	10	.04*
EBR	f		530		1240	
WBL	1.5		10		10	
WBT	1	6800	10	.00*	10	.00*
WBR	1.5		10		10	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for SBR WBR

TOTAL CAPACITY UTILIZATION .61 .62

22. El Toro & Portola

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	490	.14*	490	.14
NBT	3	5100	190	.04	590	.12*
NBR	f		270		450	
SBL	1	1700	50	.03	350	.21*
SBT	3	5100	730	.14*	510	.10
SBR	1	1700	400	.24	710	.42
EBL	2	3400	50	.01	590	.17
EBT	3	5100	720	.14*	1700	.33*
EBR	1	1700	430	.25	880	.52
WBL	2	3400	550	.16*	400	.12*
WBT	4	6800	1990	.29	1250	.18
WBR	d	1700	20	.01	40	.02
Right Turn Adjustment			SBR	.09*	SBR	.03*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION **.72** **.86**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	440	.13*	440	.13
NBT	3	5100	180	.04	640	.13*
NBR	f		290		490	
SBL	1	1700	60	.04	340	.20*
SBT	3	5100	720	.14*	520	.10
SBR	1	1700	360	.21	720	.42
EBL	2	3400	50	.01	550	.16
EBT	3	5100	740	.15*	1610	.32*
EBR	1	1700	390	.23	810	.48
WBL	2	3400	650	.19*	410	.12*
WBT	4	6800	1850	.27	1240	.18
WBR	d	1700	20	.01	40	.02
Right Turn Adjustment			SBR	.02*	SBR	.02*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION **.68** **.84**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	490	.14*	480	.14
NBT	3	5100	180	.04	590	.12*
NBR	f		260		440	
SBL	1	1700	50	.03	350	.21*
SBT	3	5100	710	.14*	490	.10
SBR	1	1700	400	.24	710	.42
EBL	2	3400	60	.02*	600	.18
EBT	3	5100	740	.15	1720	.34*
EBR	1	1700	430	.25	880	.52
WBL	2	3400	550	.16	400	.12*
WBT	4	6800	2010	.30*	1270	.19
WBR	d	1700	20	.01	40	.02
Right Turn Adjustment			SBR	.08*	SBR	.03*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION **.73** **.87**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	440	.13*	420	.12
NBT	3	5100	190	.04	630	.12*
NBR	f		290		480	
SBL	1	1700	60	.04	340	.20*
SBT	3	5100	680	.13*	520	.10
SBR	1	1700	380	.22	720	.42
EBL	2	3400	60	.02	560	.16
EBT	3	5100	740	.15*	1630	.32*
EBR	1	1700	410	.24	800	.47
WBL	2	3400	650	.19*	420	.12*
WBT	4	6800	1870	.28	1250	.18
WBR	d	1700	20	.01	40	.02
Right Turn Adjustment			SBR	.04*	SBR	.02*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION **.69** **.83**

23. Los Alisos & Santa Margarita

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	450	.26*	380	.22*
NBT	2	3400	180	.05	400	.12
NBR	1	1700	110	.06	250	.15
SBL	1	1700	100	.06	30	.02
SBT	2	3400	450	.13*	300	.09*
SBR	d	1700	100	.06	220	.13
EBL	1	1700	120	.07*	110	.06
EBT	3	5100	780	.15	1850	.36*
EBR	d	1700	260	.15	430	.25
WBL	1	1700	420	.25	190	.11*
WBT	3	5100	1990	.39*	1120	.22
WBR	d	1700	0	.00	100	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.90**		**.83**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	420	.25*	390	.23*
NBT	2	3400	180	.05	400	.12
NBR	1	1700	100	.06	230	.14
SBL	1	1700	90	.05	40	.02
SBT	2	3400	450	.13*	300	.09*
SBR	d	1700	150	.09	190	.11
EBL	1	1700	100	.06*	160	.09
EBT	3	5100	800	.16	1780	.35*
EBR	d	1700	280	.16	410	.24
WBL	1	1700	380	.22	180	.11*
WBT	3	5100	1960	.38*	1130	.22
WBR	d	1700	0	.00	80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.87**		**.83**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	440	.26*	380	.22*
NBT	2	3400	180	.05	400	.12
NBR	1	1700	110	.06	240	.14
SBL	1	1700	110	.06	30	.02
SBT	2	3400	440	.13*	290	.09*
SBR	d	1700	110	.06	240	.14
EBL	1	1700	110	.06*	110	.06
EBT	3	5100	780	.15	1850	.36*
EBR	d	1700	270	.16	430	.25
WBL	1	1700	410	.24	190	.11*
WBT	3	5100	2000	.39*	1110	.22
WBR	d	1700	10	.01	100	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.89**		**.83**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	420	.25*	390	.23*
NBT	2	3400	180	.05	390	.11
NBR	1	1700	100	.06	240	.14
SBL	1	1700	90	.05	40	.02
SBT	2	3400	440	.13*	290	.09*
SBR	d	1700	120	.07	210	.12
EBL	1	1700	80	.05*	150	.09
EBT	3	5100	810	.16	1790	.35*
EBR	d	1700	280	.16	420	.25
WBL	1	1700	370	.22	170	.10*
WBT	3	5100	1980	.39*	1130	.22
WBR	d	1700	0	.00	80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.87**		**.82**

24. Alton & Commercentre

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1440	.28	2410	.47*
NBR	d	1700	430	.25	220	.13
SBL	1	1700	220	.13	140	.08*
SBT	3	5100	2640	.52*	1820	.36
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		120	.04*	490	.14*
WBT	0	5100	0		0	
WBR	1.5		80	{.00}	230	.14
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.61**		**.74**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1210	.24	2510	.49*
NBR	d	1700	430	.25	230	.14
SBL	1	1700	200	.12	150	.09*
SBT	3	5100	2700	.53*	1690	.33
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		160	.05*	460	.14*
WBT	0	5100	0		0	
WBR	1.5		80		200	.12
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.63**		**.77**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1280	.25	2200	.43*
NBR	d	1700	420	.25	210	.12
SBL	1	1700	210	.12	140	.08*
SBT	3	5100	2410	.47*	1670	.33
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		120	.04*	480	.14*
WBT	0	5100	0		0	
WBR	1.5		80	{.00}	240	.14
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.56**		**.70**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1060	.21	2300	.45*
NBR	d	1700	420	.25	230	.14
SBL	1	1700	200	.12	150	.09*
SBT	3	5100	2540	.50*	1520	.30
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		170	.05*	480	.14*
WBT	0	5100	0		0	
WBR	1.5		80		200	.12
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.60**		**.73**

25. Alton & Irvine

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	80	.02*	590	.17*
NBT	3	5100	490	.10	1290	.25
NBR	f		60		220	
SBL	2	3400	190	.06	110	.03
SBT	3	5100	1380	.27*	610	.12*
SBR	f		640		1120	
EBL	2.5		950		620	.18
EBT	2.5	8500	1140	.25*	940	.18*
EBR	1	1700	580	.34	130	.08
WBL	2	3400	340	.10	130	.04
WBT	3	5100	830	.16*	1480	.29*
WBR	1	1700	60	.04	230	.14
Right Turn Adjustment			EBR .07*			
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .82 .81

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	80	.02*	580	.17*
NBT	3	5100	420	.08	1340	.26
NBR	f		70		220	
SBL	2	3400	160	.05	80	.02
SBT	3	5100	1430	.28*	560	.11*
SBR	f		710		1030	
EBL	2.5		800		670	
EBT	2.5	8500	1190	.23*	960	.19*
EBR	1	1700	580	.34	120	.07
WBL	2	3400	340	.10	130	.04
WBT	3	5100	880	.17*	1490	.29*
WBR	1	1700	60	.04	230	.14
Right Turn Adjustment			EBR .09*			
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .84 .81

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	80	.02*	620	.18*
NBT	3	5100	480	.09	1240	.24
NBR	f		60		220	
SBL	2	3400	250	.07	100	.03
SBT	3	5100	1350	.26*	580	.11*
SBR	f		400		990	
EBL	2.5		790		410	.12
EBT	2.5	8500	1130	.23*	960	.19*
EBR	1	1700	620	.36	150	.09
WBL	2	3400	330	.10	130	.04
WBT	3	5100	840	.16*	1480	.29*
WBR	1	1700	70	.04	260	.15
Right Turn Adjustment			EBR .11*			
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .83 .82

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	80	.02*	620	.18*
NBT	3	5100	410	.08	1300	.25
NBR	f		60		210	
SBL	2	3400	220	.06	80	.02
SBT	3	5100	1440	.28*	550	.11*
SBR	f		510		890	
EBL	2.5		650	.19	470	.14
EBT	2.5	8500	1180	.23*	950	.19*
EBR	1	1700	610	.36	140	.08
WBL	2	3400	330	.10	120	.04
WBT	3	5100	850	.17*	1500	.29*
WBR	1	1700	60	.04	260	.15
Right Turn Adjustment			EBR .11*			
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing
Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .86 .82

26. Bake & Commercentre

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04*	10	.01
NBT	2	3400	1190	.35	1430	.42*
NBR	d	1700	710	.42	220	.13
SBL	1	1700	30	.02	60	.04*
SBT	2	3400	1330	.39*	1010	.30
SBR	d	1700	60	.04	40	.02
EBL	1	1700	120	.07	180	.11
EBT	2	3400	180	.07*	80	.04*
EBR	0	0	60		70	
WBL	2	3400	310	.09*	610	.18*
WBT	1	1700	40	.04	130	.09
WBR	0	0	20		30	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.73**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04*	10	.01
NBT	2	3400	990	.29	1460	.43*
NBR	d	1700	690	.41	220	.13
SBL	1	1700	30	.02	60	.04*
SBT	2	3400	1430	.42*	930	.27
SBR	d	1700	80	.05	30	.02
EBL	1	1700	120	.07	180	.11
EBT	2	3400	180	.07*	90	.05*
EBR	0	0	50		70	
WBL	2	3400	290	.09*	590	.17*
WBT	1	1700	60	.05	120	.09
WBR	0	0	20		30	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.67**		**.74**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04*	10	.01
NBT	2	3400	1140	.34	1390	.41*
NBR	d	1700	720	.42	220	.13
SBL	1	1700	30	.02	50	.03*
SBT	2	3400	1260	.37*	980	.29
SBR	d	1700	60	.04	30	.02
EBL	1	1700	110	.06	180	.11
EBT	2	3400	170	.07*	80	.04*
EBR	0	0	60		70	
WBL	2	3400	310	.09*	610	.18*
WBT	1	1700	40	.04	130	.09
WBR	0	0	20		30	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.62**		**.71**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05*	10	.01
NBT	2	3400	950	.28	1420	.42*
NBR	d	1700	700	.41	220	.13
SBL	1	1700	30	.02	60	.04*
SBT	2	3400	1360	.40*	910	.27
SBR	d	1700	90	.05	30	.02
EBL	1	1700	110	.06	180	.11
EBT	2	3400	180	.07*	100	.05*
EBR	0	0	50		70	
WBL	2	3400	290	.09*	590	.17*
WBT	1	1700	70	.06	120	.09
WBR	0	0	30		30	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.66**		**.73**

27. Bake & Trabuco

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	590	.17*	430	.13*
NBT	3	5100	1440	.32	1300	.38
NBR	0	0	210		770	.45
SBL	2	3400	40	.01	180	.05
SBT	3	5100	1270	.25*	1570	.31*
SBR	1	1700	250	.15	250	.15
EBL	2	3400	420	.12*	340	.10
EBT	2.5	6800	380	.11	1030	{.21}*
EBR	1.5		780	.23	580	
WBL	2	3400	800	.24	280	.08*
WBT	3	5100	1270	.25*	620	.12
WBR	1	1700	210	.12	40	.02
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.84**		**.78**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	610	.18*	410	.12
NBT	3	5100	1270	.30	1350	.40*
NBR	0	0	240		780	.46
SBL	2	3400	40	.01	170	.05*
SBT	3	5100	1330	.26*	1480	.29
SBR	1	1700	250	.15	240	.14
EBL	2	3400	420	.12*	320	.09
EBT	2.5	6800	410	.12	1050	{.21}*
EBR	1.5		760	.22	580	
WBL	2	3400	820	.24	280	.08*
WBT	3	5100	1310	.26*	660	.13
WBR	1	1700	190	.11	30	.02
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.87**		**.79**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	600	.18*	440	.13*
NBT	3	5100	1410	.32	1260	.37
NBR	0	0	210		770	.45
SBL	2	3400	40	.01	180	.05
SBT	3	5100	1210	.24*	1540	.30*
SBR	1	1700	230	.14	240	.14
EBL	2	3400	410	.12*	350	.10
EBT	2.5	6800	380	.11	1020	{.21}*
EBR	1.5		840	.25	570	
WBL	2	3400	820	.24	280	.08*
WBT	3	5100	1270	.25*	610	.12
WBR	1	1700	210	.12	40	.02
Right Turn Adjustment					NBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.84**		**.78**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	630	.19*	430	.13
NBT	3	5100	1250	.29	1340	.39*
NBR	0	0	240		780	.46
SBL	2	3400	40	.01	180	.05*
SBT	3	5100	1290	.25*	1460	.29
SBR	1	1700	210	.12	240	.14
EBL	2	3400	420	.12*	290	.09
EBT	2.5	6800	410	.12	1030	{.21}*
EBR	1.5		800	.24	570	
WBL	2	3400	850	.25	290	.09*
WBT	3	5100	1270	.25*	630	.12
WBR	1	1700	190	.11	30	.02
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.86**		**.79**

28. Bake & Toledo

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	150	.09*	20	.01
NBT	3	5100	1990	.39	2260	.44*
NBR	d	1700	20	.01	340	.20
SBL	1	1700	70	.04	90	.05*
SBT	3	5100	2440	.48*	2280	.45
SBR	d	1700	180	.11	50	.03
EBL	2	3400	100	.03*	160	.05
EBT	2	3400	10	.00	370	.11*
EBR	1	1700	20	.01	170	.10
WBL	1	1700	240	.14	30	.02*
WBT	2	3400	590	.19*	50	.03
WBR	0	0	60		60	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.84**		**.67**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	160	.09*	20	.01
NBT	3	5100	1850	.36	2280	.45*
NBR	d	1700	20	.01	350	.21
SBL	1	1700	60	.04	100	.06*
SBT	3	5100	2450	.48*	2210	.43
SBR	d	1700	230	.14	40	.02
EBL	2	3400	100	.03*	180	.05
EBT	2	3400	10	.00	370	.11*
EBR	1	1700	20	.01	170	.10
WBL	1	1700	280	.16	30	.02*
WBT	2	3400	590	.19*	50	.03
WBR	0	0	60		60	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.84**		**.69**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	140	.08*	20	.01
NBT	3	5100	1960	.38	2220	.44*
NBR	d	1700	20	.01	350	.21
SBL	1	1700	60	.04	90	.05*
SBT	3	5100	2470	.48*	2240	.44
SBR	d	1700	180	.11	50	.03
EBL	2	3400	110	.03*	160	.05
EBT	2	3400	10	.00	370	.11*
EBR	1	1700	20	.01	170	.10
WBL	1	1700	270	.16	30	.02*
WBT	2	3400	600	.20*	50	.03
WBR	0	0	70		60	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.84**		**.67**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	150	.09*	20	.01
NBT	3	5100	1840	.36	2290	.45*
NBR	d	1700	20	.01	350	.21
SBL	1	1700	60	.04	100	.06*
SBT	3	5100	2540	.50*	2150	.42
SBR	d	1700	160	.09	40	.02
EBL	2	3400	100	.03*	190	.06
EBT	2	3400	10	.00	350	.10*
EBR	1	1700	20	.01	170	.10
WBL	1	1700	240	.14	30	.02*
WBT	2	3400	620	.20*	50	.03
WBR	0	0	60		60	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.87**		**.68**

29. Bake & Jeronimo

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	420	.12	20	.01
NBT	3	5100	2240	.44*	2400	.47*
NBR	d	1700	50	.03	380	.22
SBL	1	1700	100	.06*	90	.05*
SBT	4	6800	2440	.37	2260	.33
SBR	0	0	60		10	
EBL	2	3400	10	.00	120	.04
EBT	2	3400	80	.02*	540	.16*
EBR	1	1700	30	.02	400	.24
WBL	1	1700	360	.21*	130	.08*
WBT	3	5100	710	.16	130	.04
WBR	0	0	90		80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.78**		**.81**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	430	.13*	20	.01
NBT	3	5100	2110	.41	2420	.47*
NBR	d	1700	50	.03	370	.22
SBL	1	1700	90	.05	80	.05*
SBT	4	6800	2490	.38*	2200	.33
SBR	0	0	70		10	
EBL	2	3400	10	.00	120	.04
EBT	2	3400	80	.02*	560	.16*
EBR	1	1700	40	.02	390	.23
WBL	1	1700	350	.21*	130	.08*
WBT	3	5100	710	.15	140	.04
WBR	0	0	80		80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.79**		**.81**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	430	.13*	20	.01
NBT	3	5100	2200	.43	2380	.47*
NBR	d	1700	40	.02	360	.21
SBL	1	1700	110	.06	90	.05*
SBT	4	6800	2460	.37*	2220	.33
SBR	0	0	80		10	
EBL	2	3400	10	.00	110	.03
EBT	2	3400	80	.02*	540	.16*
EBR	1	1700	30	.02	410	.24
WBL	1	1700	340	.20*	130	.08*
WBT	3	5100	680	.15	130	.04
WBR	0	0	90		80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.77**		**.81**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	420	.12*	20	.01
NBT	3	5100	2100	.41	2430	.48*
NBR	d	1700	50	.03	360	.21
SBL	1	1700	80	.05	100	.06*
SBT	4	6800	2550	.39*	2120	.31
SBR	0	0	70		10	
EBL	2	3400	10	.00	130	.04
EBT	2	3400	80	.02*	540	.16*
EBR	1	1700	40	.02	390	.23
WBL	1	1700	300	.18*	130	.08*
WBT	3	5100	710	.16	140	.04
WBR	0	0	90		80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.76**		**.83**

30. Bake & Muirlands

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	280	.08	150	.04*
NBT	4	6800	2930	.43*	2630	.39
NBR	f		90		180	
SBL	2	3400	70	.02*	180	.05
SBT	4	6800	2350	.35	2770	.41*
SBR	f		240		80	
EBL	2	3400	50	.01*	260	.08
EBT	2	3400	112	.03	780	.23*
EBR	f		130		370	
WBL	2	3400	190	.06	90	.03*
WBT	2	3400	440	.13*	220	.06
WBR	f		70		90	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.76**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	270	.08*	140	.04*
NBT	4	6800	2810	.41	2640	.39
NBR	f		90		190	
SBL	2	3400	70	.02	170	.05
SBT	4	6800	2420	.36*	2700	.40*
SBR	f		220		90	
EBL	2	3400	50	.01*	260	.08
EBT	2	3400	112	.03	760	.22*
EBR	f		130		390	
WBL	2	3400	150	.04	90	.03*
WBT	2	3400	460	.14*	220	.06
WBR	f		70		110	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.74**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	290	.09	150	.04*
NBT	4	6800	2900	.43*	2570	.38
NBR	f		90		230	
SBL	2	3400	70	.02*	190	.06
SBT	4	6800	2350	.35	2720	.40*
SBR	f		230		80	
EBL	2	3400	50	.01*	280	.08
EBT	2	3400	112	.03	720	.21*
EBR	f		130		380	
WBL	2	3400	150	.04	100	.03*
WBT	2	3400	400	.12*	220	.06
WBR	f		60		90	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.63**		**.73**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	270	.08*	140	.04
NBT	4	6800	2770	.41	2630	.39*
NBR	f		90		210	
SBL	2	3400	70	.02	160	.05*
SBT	4	6800	2430	.36*	2650	.39
SBR	f		210		90	
EBL	2	3400	50	.01*	250	.07
EBT	2	3400	112	.03	760	.22*
EBR	f		130		390	
WBL	2	3400	140	.04	90	.03*
WBT	2	3400	470	.14*	220	.06
WBR	f		90		120	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.64**		**.74**

31. Bake & Rockfield

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	200	.06	60	.02
NBT	4	6800	3100	.46*	2670	.39*
NBR	f		810		660	
SBL	2	3400	120	.04*	340	.10*
SBT	4	6800	2660	.39	2920	.43
SBR	1	1700	0	.00	10	.01
EBL	1	1700	10	.01	20	.01
EBT	2	3400	30	.01*	140	.04*
EBR	f		50		410	
WBL	2	3400	500	.15*	950	.28*
WBT	2	3400	150	.04	90	.03
WBR	f		140		130	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.71**		**.86**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	200	.06	60	.02
NBT	4	6800	2990	.44*	2670	.39*
NBR	f		830		650	
SBL	2	3400	120	.04*	350	.10*
SBT	4	6800	2670	.39	2850	.42
SBR	1	1700	0	.00	10	.01
EBL	1	1700	10	.01	20	.01
EBT	2	3400	40	.01*	170	.05*
EBR	f		40		410	
WBL	2	3400	520	.15*	960	.28*
WBT	2	3400	170	.05	80	.02
WBR	f		120		140	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.69**		**.87**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	200	.06	50	.01
NBT	4	6800	3070	.45*	2650	.39*
NBR	f		810		650	
SBL	2	3400	120	.04*	340	.10*
SBT	4	6800	2590	.38	2880	.42
SBR	1	1700	10	.01	10	.01
EBL	1	1700	10	.01	20	.01
EBT	2	3400	40	.01*	150	.04*
EBR	f		50		410	
WBL	2	3400	490	.14*	950	.28*
WBT	2	3400	150	.04	90	.03
WBR	f		150		140	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.69**		**.86**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	200	.06	60	.02
NBT	4	6800	2940	.43*	2680	.39*
NBR	f		830		670	
SBL	2	3400	130	.04*	340	.10*
SBT	4	6800	2670	.39	2800	.41
SBR	1	1700	10	.01	10	.01
EBL	1	1700	10	.01	20	.01
EBT	2	3400	30	.01*	160	.05*
EBR	f		40		420	
WBL	2	3400	500	.15*	960	.28*
WBT	2	3400	160	.05	80	.02
WBR	f		140		140	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.68**		**.87**

32. Bake & I-5 NB Ramps

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	3590	.53*	3100	.46*
NBR	f		170		930	
SBL	0	0	0		0	
SBT	3	5100	1090	.21	1720	.34
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	230	.14*	140	.08*
WBT	0	0	0		0	
WBR	3	5100	1090	.21	510	.10
Right Turn Adjustment			WBR	.07*	WBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.79**		**.61**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	3520	.52*	3100	.46*
NBR	f		170		920	
SBL	0	0	0		0	
SBT	3	5100	1090	.21	1710	.34
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	240	.14*	140	.08*
WBT	0	0	0		0	
WBR	3	5100	1050	.21	490	.10
Right Turn Adjustment			WBR	.07*	WBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.78**		**.61**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	3530	.52*	3070	.45*
NBR	f		250		930	
SBL	0	0	0		0	
SBT	3	5100	1110	.22	1740	.34
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	230	.14*	140	.08*
WBT	0	0	0		0	
WBR	3	5100	1110	.22	510	.10
Right Turn Adjustment			WBR	.08*	WBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.79**		**.60**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	3470	.51*	3120	.46*
NBR	f		240		930	
SBL	0	0	0		0	
SBT	3	5100	1120	.22	1730	.34
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	240	.14*	140	.08*
WBT	0	0	0		0	
WBR	3	5100	1060	.21	500	.10
Right Turn Adjustment			WBR	.07*	WBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.77**		**.61**

33. Bake & I-5 SB Ramps

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1080	.22*	1990	.41*
NBR	0	0	20		90	
SBL	0	0	0		0	
SBT	3	5100	920	.18	1240	.24
SBR	f		360		680	
EBL	3	5100	2850	.56*	2180	.43*
EBT	0	0	0		0	
EBR	1	1700	710	.42	240	.14
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.83**		**.89**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1090	.22*	1970	.40*
NBR	0	0	20		90	
SBL	0	0	0		0	
SBT	3	5100	960	.19	1220	.24
SBR	f		360		680	
EBL	3	5100	2810	.55*	2200	.43*
EBT	0	0	0		0	
EBR	1	1700	730	.43	240	.14
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.82**		**.88**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1120	.22*	2000	.41*
NBR	0	0	20		90	
SBL	0	0	0		0	
SBT	3	5100	950	.19	1250	.25
SBR	f		360		670	
EBL	3	5100	2810	.55*	2140	.42*
EBT	0	0	0		0	
EBR	1	1700	720	.42	230	.14
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.82**		**.88**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1120	.22*	1990	.41*
NBR	0	0	20		90	
SBL	0	0	0		0	
SBT	3	5100	990	.19	1240	.24
SBR	f		360		670	
EBL	3	5100	2770	.54*	2200	.43*
EBT	0	0	0		0	
EBR	1	1700	740	.44	240	.14
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.81**		**.89**

34. Lake Forest & Trabuco

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	270	.08*	250	.07
NBT	3	5100	930	.18	1150	.23*
NBR	1	1700	120	.07	680	.40
SBL	2	3400	290	.09	400	.12*
SBT	3	5100	1200	.27*	1060	.24
SBR	0	0	190		170	
EBL	2	3400	170	.05	260	.08
EBT	3	5100	710	.14*	1270	.25*
EBR	1	1700	430	.25	190	.11
WBL	2	3400	780	.23*	310	.09*
WBT	3	5100	1030	.20	720	.14
WBR	1	1700	470	.28	410	.24
Right Turn Adjustment			EBR	.05*	NBR	.10*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.82**		**.84**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	260	.08*	260	.08*
NBT	3	5100	920	.18	1180	.23
NBR	1	1700	90	.05	740	.44
SBL	2	3400	300	.09	320	.09
SBT	3	5100	1290	.29*	1070	.25*
SBR	0	0	200		180	
EBL	2	3400	180	.05	290	.09
EBT	3	5100	720	.14*	1260	.25*
EBR	1	1700	440	.26	190	.11
WBL	2	3400	790	.23*	270	.08*
WBT	3	5100	1060	.21	740	.15
WBR	1	1700	330	.19	420	.25
Right Turn Adjustment			EBR	.06*	NBR	.14*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.85**		**.85**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	270	.08*	240	.07
NBT	3	5100	930	.18	1130	.22*
NBR	1	1700	120	.07	720	.42
SBL	2	3400	290	.09	410	.12*
SBT	3	5100	1170	.27*	1040	.24
SBR	0	0	190		170	
EBL	2	3400	170	.05	230	.07
EBT	3	5100	700	.14*	1280	.25*
EBR	1	1700	420	.25	190	.11
WBL	2	3400	810	.24*	290	.09*
WBT	3	5100	1050	.21	710	.14
WBR	1	1700	470	.28	430	.25
Right Turn Adjustment			EBR	.05*	NBR	.13*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.83**		**.86**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	260	.08*	250	.07
NBT	3	5100	910	.18	1130	.22*
NBR	1	1700	90	.05	740	.44
SBL	2	3400	300	.09	340	.10*
SBT	3	5100	1250	.28*	1060	.24
SBR	0	0	200		160	
EBL	2	3400	170	.05	280	.08
EBT	3	5100	720	.14*	1250	.25*
EBR	1	1700	440	.26	190	.11
WBL	2	3400	820	.24*	260	.08*
WBT	3	5100	1050	.21	730	.14
WBR	1	1700	330	.19	440	.26
Right Turn Adjustment			EBR	.06*	NBR	.16*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.85**		**.86**

35. Lake Forest & Serrano

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	80	.05
NBT	3	5100	1140	.22	1920	.38*
NBR	d	1700	80	.05	150	.09
SBL	1	1700	70	.04	40	.02*
SBT	3	5100	2140	.42*	1460	.29
SBR	d	1700	210	.12	70	.04
EBL	1	1700	130	.08*	140	.08*
EBT	1	1700	60	.11	100	.10
EBR	0	0	120		70	
WBL	1	1700	100	.06	40	.02
WBT	1	1700	80	.09*	70	.06*
WBR	0	0	70		40	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.70**		**.59**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	80	.05
NBT	3	5100	1090	.21	2010	.39*
NBR	d	1700	80	.05	140	.08
SBL	1	1700	80	.05	40	.02*
SBT	3	5100	2210	.43*	1450	.28
SBR	d	1700	250	.15	60	.04
EBL	1	1700	130	.08*	130	.08*
EBT	1	1700	60	.11	120	.11
EBR	0	0	120		70	
WBL	1	1700	90	.05	40	.02
WBT	1	1700	90	.09*	70	.07*
WBR	0	0	60		50	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.71**		**.61**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	80	.05
NBT	3	5100	1130	.22	1940	.38*
NBR	d	1700	80	.05	130	.08
SBL	1	1700	80	.05	40	.02*
SBT	3	5100	2100	.41*	1440	.28
SBR	d	1700	240	.14	60	.04
EBL	1	1700	130	.08*	130	.08*
EBT	1	1700	60	.10	100	.10
EBR	0	0	110		70	
WBL	1	1700	80	.05	50	.03
WBT	1	1700	70	.09*	80	.08*
WBR	0	0	80		50	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.69**		**.61**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	80	.05
NBT	3	5100	1070	.21	1960	.38*
NBR	d	1700	80	.05	120	.07
SBL	1	1700	80	.05	40	.02*
SBT	3	5100	2200	.43*	1430	.28
SBR	d	1700	240	.14	60	.04
EBL	1	1700	130	.08*	140	.08*
EBT	1	1700	60	.10	110	.11
EBR	0	0	110		70	
WBL	1	1700	80	.05	40	.02
WBT	1	1700	80	.09*	80	.08*
WBR	0	0	80		50	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.71**		**.61**

36. El Toro & Trabuco

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	420	.12*	460	.14
NBT	3	5100	1190	.23	1460	.29*
NBR	1	1700	110	.06	570	.34
SBL	2	3400	280	.08	290	.09*
SBT	3	5100	1650	.32*	970	.19
SBR	1	1700	380	.22	180	.11
EBL	2	3400	190	.06*	690	.20
EBT	3	5100	370	.11	1230	.29*
EBR	0	0	290	.17	230	
WBL	2	3400	300	.09	210	.06*
WBT	3	5100	1120	.22*	540	.11
WBR	1	1700	250	.15	170	.10
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for SBR NBR

TOTAL CAPACITY UTILIZATION **.77** **.78**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	360	.11*	480	.14
NBT	3	5100	1130	.22	1490	.29*
NBR	1	1700	120	.07	620	.36
SBL	2	3400	280	.08	270	.08*
SBT	3	5100	1700	.33*	910	.18
SBR	1	1700	460	.27	170	.10
EBL	2	3400	180	.05*	720	.21
EBT	3	5100	380	.11	1210	.28*
EBR	0	0	300	.18	200	
WBL	2	3400	290	.09	240	.07*
WBT	3	5100	1120	.22*	520	.10
WBR	1	1700	240	.14	170	.10
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for SBR NBR

TOTAL CAPACITY UTILIZATION **.76** **.77**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	450	.13*	480	.14
NBT	3	5100	1140	.22	1410	.28*
NBR	1	1700	100	.06	600	.35
SBL	2	3400	280	.08	290	.09*
SBT	3	5100	1620	.32*	970	.19
SBR	1	1700	390	.23	160	.09
EBL	2	3400	210	.06*	720	.21
EBT	3	5100	370	.11	1220	.28*
EBR	0	0	270	.16	230	
WBL	2	3400	310	.09	220	.06*
WBT	3	5100	1120	.22*	530	.10
WBR	1	1700	250	.15	170	.10
Right Turn Adjustment					NBR	.01*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for SBR NBR

TOTAL CAPACITY UTILIZATION **.78** **.77**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	380	.11*	490	.14
NBT	3	5100	1100	.22	1460	.29*
NBR	1	1700	120	.07	610	.36
SBL	2	3400	280	.08	270	.08*
SBT	3	5100	1700	.33*	900	.18
SBR	1	1700	410	.24	160	.09
EBL	2	3400	190	.06*	710	.21
EBT	3	5100	370	.11	1210	.27*
EBR	0	0	280	.16	190	
WBL	2	3400	290	.09	230	.07*
WBT	3	5100	1110	.22*	520	.10
WBR	1	1700	240	.14	170	.10
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for SBR NBR

TOTAL CAPACITY UTILIZATION **.77** **.76**

37. El Toro & Serrano

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	110	.06*	190	.11
NBT	3	5100	1660	.33	2430	.48*
NBR	d	1700	10	.01	30	.02
SBL	1	1700	10	.01	20	.01*
SBT	3	5100	1980	.39*	1360	.27
SBR	d	1700	250	.15	60	.04
EBL	1	1700	40	.02	30	.02
EBT	1	1700	10	.11*	20	.13*
EBR	0	0	170		200	
WBL	1	1700	30	.02*	20	.01*
WBT	1	1700	40	.05	10	.02
WBR	0	0	40		20	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.63**		**.68**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	110	.06*	180	.11
NBT	3	5100	1570	.31	2520	.49*
NBR	d	1700	10	.01	30	.02
SBL	1	1700	10	.01	30	.02*
SBT	3	5100	2070	.41*	1270	.25
SBR	d	1700	230	.14	80	.05
EBL	1	1700	40	.02	40	.02
EBT	1	1700	10	.11*	30	.14*
EBR	0	0	170		210	
WBL	1	1700	30	.02*	20	.01*
WBT	1	1700	30	.04	10	.02
WBR	0	0	40		20	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.65**		**.71**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	190	.11
NBT	3	5100	1660	.33	2430	.48*
NBR	d	1700	10	.01	30	.02
SBL	1	1700	10	.01	20	.01*
SBT	3	5100	1950	.38*	1350	.26
SBR	d	1700	240	.14	80	.05
EBL	1	1700	30	.02	40	.02
EBT	1	1700	10	.11*	20	.13*
EBR	0	0	180		200	
WBL	1	1700	30	.02*	20	.01*
WBT	1	1700	40	.05	10	.02
WBR	0	0	40		20	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.62**		**.68**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	90	.05*	190	.11
NBT	3	5100	1560	.31	2510	.49*
NBR	d	1700	10	.01	30	.02
SBL	1	1700	10	.01	30	.02*
SBT	3	5100	2010	.39*	1260	.25
SBR	d	1700	260	.15	80	.05
EBL	1	1700	30	.02	30	.02
EBT	1	1700	10	.12*	20	.13*
EBR	0	0	190		200	
WBL	1	1700	30	.02*	20	.01*
WBT	1	1700	40	.05	10	.02
WBR	0	0	40		20	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				**.63**		**.70**

38. El Toro & Jeronimo

2040 No-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	90	.05	70	.04
NBT	3	5100	1540	.30*	1820	.36*
NBR	1	1700	210	.12	180	.11
SBL	1	1700	420	.25*	150	.09*
SBT	3	5100	1520	.30	1040	.20
SBR	d	1700	120	.07	350	.21
EBL	1	1700	130	.08*	200	.12
EBT	2	3400	330	.13	670	.24*
EBR	0	0	100		160	
WBL	2	3400	510	.15	230	.07*
WBT	2	3400	730	.21*	530	.16
WBR	1	1700	130	.08	350	.21
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION **.89** **.81**

2040 With-Project Without Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	90	.05	80	.05
NBT	3	5100	1460	.29*	1820	.36*
NBR	1	1700	210	.12	170	.10
SBL	1	1700	400	.24*	170	.10*
SBT	3	5100	1650	.32	960	.19
SBR	d	1700	110	.06	340	.20
EBL	1	1700	130	.08*	200	.12
EBT	2	3400	340	.13	630	.24*
EBR	0	0	110		170	
WBL	2	3400	520	.15	240	.07*
WBT	2	3400	710	.21*	530	.16
WBR	1	1700	100	.06	350	.21
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION **.87** **.82**

2040 No-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05	60	.04
NBT	3	5100	1530	.30*	1790	.35*
NBR	1	1700	210	.12	180	.11
SBL	1	1700	390	.23*	180	.11*
SBT	3	5100	1560	.31	1000	.20
SBR	d	1700	110	.06	350	.21
EBL	1	1700	120	.07*	200	.12
EBT	2	3400	350	.14	630	.24*
EBR	0	0	110		180	
WBL	2	3400	470	.14	230	.07*
WBT	2	3400	770	.23*	530	.16
WBR	1	1700	130	.08	360	.21
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION **.88** **.82**

2040 With-Project With Portola Ext. (Scenario 5)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06	80	.05
NBT	3	5100	1440	.28*	1820	.36*
NBR	1	1700	210	.12	180	.11
SBL	1	1700	410	.24*	180	.11*
SBT	3	5100	1610	.32	930	.18
SBR	d	1700	120	.07	350	.21
EBL	1	1700	130	.08*	220	.13
EBT	2	3400	330	.13	630	.23*
EBR	0	0	110		160	
WBL	2	3400	490	.14	230	.07*
WBT	2	3400	740	.22*	530	.16
WBR	1	1700	100	.06	360	.21
Clearance Interval				.05*		.05*

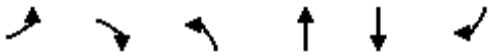
Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION **.87** **.82**

APPENDIX 9.1:

ON-SITE INTERSECTION AND QUEUING ANALYSIS WORKSHEETS

This Page Intentionally Left Blank



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	130	20	106	151	54	234
Future Volume (vph)	130	20	106	151	54	234
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	30			30	30	
Link Distance (ft)	312			201	356	
Travel Time (s)	7.1			4.6	8.1	
Peak Hour Factor	0.70	0.80	0.80	0.92	0.92	0.70
Heavy Vehicles (%)	6%	6%	6%	2%	2%	6%
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

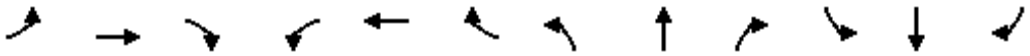
Intersection	
Int Delay, s/veh	5.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	130	20	106	151	54	234
Future Vol, veh/h	130	20	106	151	54	234
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	70	80	80	92	92	70
Heavy Vehicles, %	6	6	6	2	2	6
Mvmt Flow	186	25	133	164	59	334

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	407	59	393	0	-	0
Stage 1	59	-	-	-	-	-
Stage 2	348	-	-	-	-	-
Critical Hdwy	6.69	6.29	4.19	-	-	-
Critical Hdwy Stg 1	5.49	-	-	-	-	-
Critical Hdwy Stg 2	5.89	-	-	-	-	-
Follow-up Hdwy	3.557	3.357	2.257	-	-	-
Pot Cap-1 Maneuver	577	994	1139	-	-	-
Stage 1	952	-	-	-	-	-
Stage 2	677	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	503	994	1139	-	-	-
Mov Cap-2 Maneuver	503	-	-	-	-	-
Stage 1	830	-	-	-	-	-
Stage 2	677	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.1	3.9	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1139	-	534	-	-
HCM Lane V/C Ratio	0.116	-	0.395	-	-
HCM Control Delay (s)	8.6	0.2	16.1	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.4	-	1.9	-	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	1	2	34	1	30	13	205	7	14	53	7
Future Volume (vph)	22	1	2	34	1	30	13	205	7	14	53	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		286			157			367			201	
Travel Time (s)		6.5			3.6			8.3			4.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.80	0.92	0.92	0.80	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	4%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

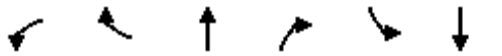
Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	22	1	2	34	1	30	13	205	7	14	53	7
Future Vol, veh/h	22	1	2	34	1	30	13	205	7	14	53	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	80	92	92	80	92
Heavy Vehicles, %	2	2	2	2	2	2	2	4	2	2	2	2
Mvmt Flow	24	1	2	37	1	33	14	256	8	15	66	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	257	392	70	390	392	132	74	0	0	264	0	0
Stage 1	100	100	-	288	288	-	-	-	-	-	-	-
Stage 2	157	292	-	102	104	-	-	-	-	-	-	-
Critical Hdwy	7.33	6.53	6.23	7.33	6.53	6.93	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.53	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.53	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.519	4.019	3.319	3.519	4.019	3.319	2.219	-	-	2.219	-	-
Pot Cap-1 Maneuver	686	543	992	556	543	894	1525	-	-	1299	-	-
Stage 1	906	812	-	696	673	-	-	-	-	-	-	-
Stage 2	830	670	-	903	809	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	648	531	992	544	531	894	1525	-	-	1299	-	-
Mov Cap-2 Maneuver	648	531	-	544	531	-	-	-	-	-	-	-
Stage 1	896	802	-	688	666	-	-	-	-	-	-	-
Stage 2	790	663	-	889	799	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.7	11.1	0.4	1.3
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1525	-	-	661	664	1299	-	-
HCM Lane V/C Ratio	0.009	-	-	0.041	0.106	0.012	-	-
HCM Control Delay (s)	7.4	0	-	10.7	11.1	7.8	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.4	0	-	-



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	18	207	6	0	89
Future Volume (vph)	0	18	207	6	0	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	30		30			30
Link Distance (ft)	255		171			367
Travel Time (s)	5.8		3.9			8.3
Peak Hour Factor	0.92	0.92	0.80	0.92	0.92	0.80
Heavy Vehicles (%)	2%	2%	4%	2%	2%	2%
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

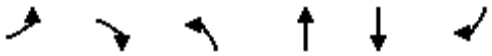
Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	18	207	6	0	89
Future Vol, veh/h	0	18	207	6	0	89
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	80	92	92	80
Heavy Vehicles, %	2	2	4	2	2	2
Mvmt Flow	0	20	259	7	0	111

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	133	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.93	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.319	-	-	-	-
Pot Cap-1 Maneuver	0	892	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	892	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.1	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	892	-
HCM Lane V/C Ratio	-	-	0.022	-
HCM Control Delay (s)	-	-	9.1	-
HCM Lane LOS	-	-	A	-
HCM 95th %tile Q(veh)	-	-	0.1	-



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	130	40	68	83	25	64
Future Volume (vph)	130	40	68	83	25	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	30			30	30	
Link Distance (ft)	327			137	171	
Travel Time (s)	7.4			3.1	3.9	
Peak Hour Factor	0.80	0.92	0.92	0.92	0.92	0.80
Heavy Vehicles (%)	4%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)						
Sign Control	Stop			Stop	Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Intersection Delay, s/veh	9.3
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	130	40	68	83	25	64
Future Vol, veh/h	130	40	68	83	25	64
Peak Hour Factor	0.80	0.92	0.92	0.92	0.92	0.80
Heavy Vehicles, %	4	2	2	2	2	2
Mvmt Flow	163	43	74	90	27	80
Number of Lanes	1	1	0	2	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	2
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	2	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	2	0	2
HCM Control Delay	9.9	9	8.5
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	EBLn1	EBLn2	SBLn1
Vol Left, %	71%	0%	100%	0%	0%
Vol Thru, %	29%	100%	0%	0%	28%
Vol Right, %	0%	0%	0%	100%	72%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	96	55	130	40	89
LT Vol	68	0	130	0	0
Through Vol	28	55	0	0	25
RT Vol	0	0	0	40	64
Lane Flow Rate	104	60	162	43	107
Geometry Grp	7	7	7	7	4
Degree of Util (X)	0.161	0.087	0.259	0.054	0.139
Departure Headway (Hd)	5.562	5.205	5.745	4.505	4.68
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	645	689	626	793	765
Service Time	3.293	2.935	3.482	2.242	2.713
HCM Lane V/C Ratio	0.161	0.087	0.259	0.054	0.14
HCM Control Delay	9.4	8.4	10.5	7.5	8.5
HCM Lane LOS	A	A	B	A	A
HCM 95th-tile Q	0.6	0.3	1	0.2	0.5

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	36	115	2	0	65
Future Volume (vph)	0	36	115	2	0	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		170	0	
Storage Lanes	0	1		1	0	
Taper Length (ft)	90				90	
Link Speed (mph)	30		30			30
Link Distance (ft)	232		394			137
Travel Time (s)	5.3		9.0			3.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

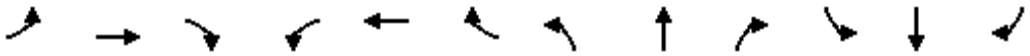
Intersection	
Int Delay, s/veh	1.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	36	115	2	0	65
Future Vol, veh/h	0	36	115	2	0	65
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	170	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	39	125	2	0	71

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	64	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.93	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.319	-	-	-	-
Pot Cap-1 Maneuver	0	988	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	988	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.8	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	988	-
HCM Lane V/C Ratio	-	-	0.04	-
HCM Control Delay (s)	-	-	8.8	-
HCM Lane LOS	-	-	A	-
HCM 95th %tile Q(veh)	-	-	0.1	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	1	1	4	1	60	1	23	4	39	15	11
Future Volume (vph)	34	1	1	4	1	60	1	23	4	39	15	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		176			160			518			394	
Travel Time (s)		4.0			3.6			11.8			9.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

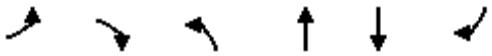
Intersection	
Int Delay, s/veh	6.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	34	1	1	4	1	60	1	23	4	39	15	11
Future Vol, veh/h	34	1	1	4	1	60	1	23	4	39	15	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	37	1	1	4	1	65	1	25	4	42	16	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	168	137	22	136	141	27	28	0	0	29	0	0
Stage 1	106	106	-	29	29	-	-	-	-	-	-	-
Stage 2	62	31	-	107	112	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	796	754	1055	835	750	1048	1585	-	-	1584	-	-
Stage 1	900	807	-	988	871	-	-	-	-	-	-	-
Stage 2	949	869	-	898	803	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	730	733	1055	816	729	1048	1585	-	-	1584	-	-
Mov Cap-2 Maneuver	730	733	-	816	729	-	-	-	-	-	-	-
Stage 1	899	785	-	987	870	-	-	-	-	-	-	-
Stage 2	888	868	-	872	781	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.2	8.8	0.3	4.4
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1585	-	-	736	1023	1584	-	-
HCM Lane V/C Ratio	0.001	-	-	0.053	0.069	0.027	-	-
HCM Control Delay (s)	7.3	0	-	10.2	8.8	7.3	0	-
HCM Lane LOS	A	A	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.2	0.1	-	-



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	6	6	8	22	12	8
Future Volume (vph)	6	6	8	22	12	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	30			30	30	
Link Distance (ft)	512			153	518	
Travel Time (s)	11.6			3.5	11.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control	Stop			Stop	Stop	

Intersection Summary	
Area Type:	Other

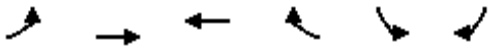
Control Type: Unsignalized

Intersection	
Intersection Delay, s/veh	7
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	6	6	8	22	12	8
Future Vol, veh/h	6	6	8	22	12	8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	7	9	24	13	9
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	6.9	7.2	6.8
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	27%	50%	0%
Vol Thru, %	73%	0%	60%
Vol Right, %	0%	50%	40%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	30	12	20
LT Vol	8	6	0
Through Vol	22	0	12
RT Vol	0	6	8
Lane Flow Rate	33	13	22
Geometry Grp	1	1	1
Degree of Util (X)	0.036	0.014	0.023
Departure Headway (Hd)	4.027	3.827	3.742
Convergence, Y/N	Yes	Yes	Yes
Cap	893	935	960
Service Time	2.034	1.849	1.752
HCM Lane V/C Ratio	0.037	0.014	0.023
HCM Control Delay	7.2	6.9	6.8
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0	0.1



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	174	193	20	0	160
Future Volume (vph)	0	174	193	20	0	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)		30	30		30	
Link Distance (ft)		405	169		209	
Travel Time (s)		9.2	3.8		4.8	
Peak Hour Factor	0.92	0.92	0.92	0.80	0.92	0.70
Heavy Vehicles (%)	2%	4%	2%	2%	2%	6%
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	174	193	20	0	160
Future Vol, veh/h	0	174	193	20	0	160
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	80	92	70
Heavy Vehicles, %	2	4	2	2	2	6
Mvmt Flow	0	189	210	25	0	229

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	118
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.02
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.36
Pot Cap-1 Maneuver	0	-	-	-	0	899
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	899
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	10.4
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	899
HCM Lane V/C Ratio	-	-	-	0.254
HCM Control Delay (s)	-	-	-	10.4
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	1

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	160	14	2	163	50	10
Future Volume (vph)	160	14	2	163	50	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	30			30	30	
Link Distance (ft)	169			171	217	
Travel Time (s)	3.8			3.9	4.9	
Peak Hour Factor	0.80	0.92	0.92	0.80	0.92	0.92
Heavy Vehicles (%)	4%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

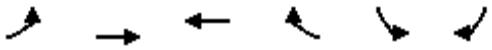
Intersection	
Int Delay, s/veh	1.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	160	14	2	163	50	10
Future Vol, veh/h	160	14	2	163	50	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	80	92	92	80	92	92
Heavy Vehicles, %	4	2	2	2	2	2
Mvmt Flow	200	15	2	204	54	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	215	0	314	108
Stage 1	-	-	-	-	208	-
Stage 2	-	-	-	-	106	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	1352	-	654	925
Stage 1	-	-	-	-	807	-
Stage 2	-	-	-	-	907	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1352	-	653	925
Mov Cap-2 Maneuver	-	-	-	-	653	-
Stage 1	-	-	-	-	805	-
Stage 2	-	-	-	-	907	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	10.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	687	-	-	1352	-
HCM Lane V/C Ratio	0.095	-	-	0.002	-
HCM Control Delay (s)	10.8	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	170	130	2	0	35
Future Volume (vph)	0	170	130	2	0	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)		30	30		30	
Link Distance (ft)		171	327		280	
Travel Time (s)		3.9	7.4		6.4	
Peak Hour Factor	0.92	0.80	0.80	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	2%	2%	2%	2%
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	170	130	2	0	35
Future Vol, veh/h	0	170	130	2	0	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	80	80	92	92	92
Heavy Vehicles, %	2	4	2	2	2	2
Mvmt Flow	0	213	163	2	0	38

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	83
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	-	0	960
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	960
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	8.9
HCM LOS			A

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	960
HCM Lane V/C Ratio	-	-	-	0.04
HCM Control Delay (s)	-	-	-	8.9
HCM Lane LOS	-	-	-	A
HCM 95th %tile Q(veh)	-	-	-	0.1

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	11	4	3	23	7	6
Future Volume (vph)	11	4	3	23	7	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	30			30	30	
Link Distance (ft)	257			299	206	
Travel Time (s)	5.8			6.8	4.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

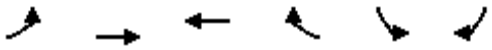
Intersection	
Int Delay, s/veh	2.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	11	4	3	23	7	6
Future Vol, veh/h	11	4	3	23	7	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	12	4	3	25	8	7

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	16	0	45	14
Stage 1	-	-	-	-	14	-
Stage 2	-	-	-	-	31	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1602	-	965	1066
Stage 1	-	-	-	-	1009	-
Stage 2	-	-	-	-	992	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1602	-	963	1066
Mov Cap-2 Maneuver	-	-	-	-	963	-
Stage 1	-	-	-	-	1007	-
Stage 2	-	-	-	-	992	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.8	8.6
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	1008	-	-	1602	-
HCM Lane V/C Ratio	0.014	-	-	0.002	-
HCM Control Delay (s)	8.6	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	6	11	15	1	1	11
Future Volume (vph)	6	11	15	1	1	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)		30	30		30	
Link Distance (ft)		299	512		212	
Travel Time (s)		6.8	11.6		4.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	6	11	15	1	1	11
Future Vol, veh/h	6	11	15	1	1	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	12	16	1	1	12

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	17	0	-	0	43	17
Stage 1	-	-	-	-	17	-
Stage 2	-	-	-	-	26	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1600	-	-	-	968	1062
Stage 1	-	-	-	-	1006	-
Stage 2	-	-	-	-	997	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1600	-	-	-	964	1062
Mov Cap-2 Maneuver	-	-	-	-	964	-
Stage 1	-	-	-	-	1002	-
Stage 2	-	-	-	-	997	-

Approach	EB	WB	SB
HCM Control Delay, s	2.6	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1600	-	-	-	1053
HCM Lane V/C Ratio	0.004	-	-	-	0.012
HCM Control Delay (s)	7.3	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	40	5	20	100	170	50
Future Volume (vph)	40	5	20	100	170	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	30			30	30	
Link Distance (ft)	312			201	356	
Travel Time (s)	7.1			4.6	8.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

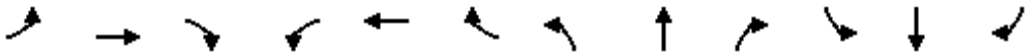
Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	40	5	20	100	170	50
Future Vol, veh/h	40	5	20	100	170	50
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	43	5	22	109	185	54

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	284	185	239	0	-	0
Stage 1	185	-	-	-	-	-
Stage 2	99	-	-	-	-	-
Critical Hdwy	6.63	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.83	-	-	-	-	-
Follow-up Hdwy	3.519	3.319	2.219	-	-	-
Pot Cap-1 Maneuver	694	857	1326	-	-	-
Stage 1	846	-	-	-	-	-
Stage 2	914	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	682	857	1326	-	-	-
Mov Cap-2 Maneuver	682	-	-	-	-	-
Stage 1	831	-	-	-	-	-
Stage 2	914	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.5	1.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1326	-	698	-	-
HCM Lane V/C Ratio	0.016	-	0.07	-	-
HCM Control Delay (s)	7.8	0	10.5	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	1	1	23	1	22	41	82	20	46	105	24
Future Volume (vph)	16	1	1	23	1	22	41	82	20	46	105	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		286			157			367			201	
Travel Time (s)		6.5			3.6			8.3			4.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	16	1	1	23	1	22	41	82	20	46	105	24
Future Vol, veh/h	16	1	1	23	1	22	41	82	20	46	105	24
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	17	1	1	25	1	24	45	89	22	50	114	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	362	428	127	418	430	56	140	0	0	111	0	0
Stage 1	227	227	-	190	190	-	-	-	-	-	-	-
Stage 2	135	201	-	228	240	-	-	-	-	-	-	-
Critical Hdwy	7.33	6.53	6.23	7.33	6.53	6.93	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.53	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.53	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.519	4.019	3.319	3.519	4.019	3.319	2.219	-	-	2.219	-	-
Pot Cap-1 Maneuver	581	518	923	532	517	999	1442	-	-	1478	-	-
Stage 1	775	716	-	794	742	-	-	-	-	-	-	-
Stage 2	855	734	-	774	706	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	536	482	923	503	481	999	1442	-	-	1478	-	-
Mov Cap-2 Maneuver	536	482	-	503	481	-	-	-	-	-	-	-
Stage 1	749	690	-	768	718	-	-	-	-	-	-	-
Stage 2	806	710	-	743	680	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.9	10.9	2.2	2
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1442	-	-	545	659	1478	-	-
HCM Lane V/C Ratio	0.031	-	-	0.036	0.076	0.034	-	-
HCM Control Delay (s)	7.6	0.1	-	11.9	10.9	7.5	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	0.2	0.1	-	-

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	8	135	12	0	129
Future Volume (vph)	0	8	135	12	0	129
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	30		30			30
Link Distance (ft)	255		171			367
Travel Time (s)	5.8		3.9			8.3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

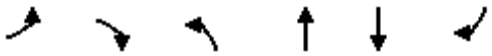
Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	8	135	12	0	129
Future Vol, veh/h	0	8	135	12	0	129
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	9	147	13	0	140

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	80	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.93	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.319	-	-	-	-
Pot Cap-1 Maneuver	0	965	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	965	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.8	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	965	-
HCM Lane V/C Ratio	-	-	0.009	-
HCM Control Delay (s)	-	-	8.8	-
HCM Lane LOS	-	-	A	-
HCM 95th %tile Q(veh)	-	-	0	-



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	114	62	60	33	83	46
Future Volume (vph)	114	62	60	33	83	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	30			30	30	
Link Distance (ft)	327			137	171	
Travel Time (s)	7.4			3.1	3.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control	Stop			Stop	Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Intersection Delay, s/veh	8.9
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	114	62	60	33	83	46
Future Vol, veh/h	114	62	60	33	83	46
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	124	67	65	36	90	50
Number of Lanes	1	1	0	2	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	2
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	2	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	2	0	2
HCM Control Delay	9	8.9	8.9
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	EBLn1	EBLn2	SBLn1
Vol Left, %	85%	0%	100%	0%	0%
Vol Thru, %	15%	100%	0%	0%	64%
Vol Right, %	0%	0%	0%	100%	36%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	71	22	114	62	129
LT Vol	60	0	114	0	0
Through Vol	11	22	0	0	83
RT Vol	0	0	0	62	46
Lane Flow Rate	77	24	124	67	140
Geometry Grp	7	7	7	7	4
Degree of Util (X)	0.12	0.034	0.194	0.083	0.185
Departure Headway (Hd)	5.589	5.164	5.642	4.437	4.749
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	642	694	637	807	756
Service Time	3.317	2.891	3.369	2.164	2.774
HCM Lane V/C Ratio	0.12	0.035	0.195	0.083	0.185
HCM Control Delay	9.1	8.1	9.7	7.6	8.9
HCM Lane LOS	A	A	A	A	A
HCM 95th-tile Q	0.4	0.1	0.7	0.3	0.7

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	29	64	10	0	145
Future Volume (vph)	0	29	64	10	0	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		170	0	
Storage Lanes	0	1		1	0	
Taper Length (ft)	90				90	
Link Speed (mph)	30		30			30
Link Distance (ft)	232		394			137
Travel Time (s)	5.3		9.0			3.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

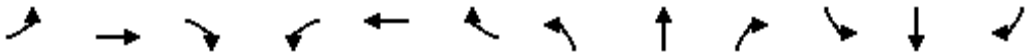
Intersection	
Int Delay, s/veh	1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	29	64	10	0	145
Future Vol, veh/h	0	29	64	10	0	145
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	170	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	32	70	11	0	158

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	41	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.93	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.319	-	-	-	-
Pot Cap-1 Maneuver	0	1021	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	1021	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.6	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	1021	-
HCM Lane V/C Ratio	-	-	0.031	-
HCM Control Delay (s)	-	-	8.6	-
HCM Lane LOS	-	-	A	-
HCM 95th %tile Q(veh)	-	-	0.1	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	1	1	7	1	32	2	19	8	90	25	30
Future Volume (vph)	23	1	1	7	1	32	2	19	8	90	25	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		176			160			518			394	
Travel Time (s)		4.0			3.6			11.8			9.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

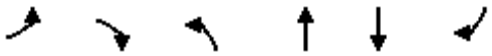
Intersection	
Int Delay, s/veh	5.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	23	1	1	7	1	32	2	19	8	90	25	30
Future Vol, veh/h	23	1	1	7	1	32	2	19	8	90	25	30
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	25	1	1	8	1	35	2	21	9	98	27	33

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	288	274	44	271	286	26	60	0	0	30	0	0
Stage 1	240	240	-	30	30	-	-	-	-	-	-	-
Stage 2	48	34	-	241	256	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	664	633	1026	682	623	1050	1544	-	-	1583	-	-
Stage 1	763	707	-	987	870	-	-	-	-	-	-	-
Stage 2	965	867	-	762	696	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	610	592	1026	647	583	1050	1544	-	-	1583	-	-
Mov Cap-2 Maneuver	610	592	-	647	583	-	-	-	-	-	-	-
Stage 1	762	662	-	986	869	-	-	-	-	-	-	-
Stage 2	931	866	-	711	651	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.1	9.1	0.5	4.6
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1544	-	-	619	930	1583	-	-
HCM Lane V/C Ratio	0.001	-	-	0.044	0.047	0.062	-	-
HCM Control Delay (s)	7.3	0	-	11.1	9.1	7.4	0	-
HCM Lane LOS	A	A	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.1	0.2	-	-



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	12	12	6	17	25	8
Future Volume (vph)	12	12	6	17	25	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	30			30	30	
Link Distance (ft)	512			153	518	
Travel Time (s)	11.6			3.5	11.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control	Stop			Stop	Stop	

Intersection Summary	
Area Type:	Other

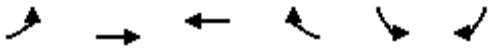
Control Type: Unsignalized

Intersection	
Intersection Delay, s/veh	7.1
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	12	6	17	25	8
Future Vol, veh/h	12	12	6	17	25	8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	13	13	7	18	27	9
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7	7.2	7
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	26%	50%	0%
Vol Thru, %	74%	0%	76%
Vol Right, %	0%	50%	24%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	23	24	33
LT Vol	6	12	0
Through Vol	17	0	25
RT Vol	0	12	8
Lane Flow Rate	25	26	36
Geometry Grp	1	1	1
Degree of Util (X)	0.028	0.028	0.038
Departure Headway (Hd)	4.059	3.839	3.852
Convergence, Y/N	Yes	Yes	Yes
Cap	884	933	932
Service Time	2.074	1.862	1.867
HCM Lane V/C Ratio	0.028	0.028	0.039
HCM Control Delay	7.2	7	7
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0.1	0.1



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	226	133	10	0	45
Future Volume (vph)	0	226	133	10	0	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)		30	30		30	
Link Distance (ft)		405	169		209	
Travel Time (s)		9.2	3.8		4.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	226	133	10	0	45
Future Vol, veh/h	0	226	133	10	0	45
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	246	145	11	0	49

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	78
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	-	0	967
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	967
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	8.9
HCM LOS			A

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	967
HCM Lane V/C Ratio	-	-	-	0.051
HCM Control Delay (s)	-	-	-	8.9
HCM Lane LOS	-	-	-	A
HCM 95th %tile Q(veh)	-	-	-	0.2

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	172	54	10	116	27	4
Future Volume (vph)	172	54	10	116	27	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	30			30	30	
Link Distance (ft)	169			171	217	
Travel Time (s)	3.8			3.9	4.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

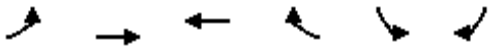
Intersection	
Int Delay, s/veh	1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	172	54	10	116	27	4
Future Vol, veh/h	172	54	10	116	27	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	187	59	11	126	29	4

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	246	0	302	123
Stage 1	-	-	-	-	217	-
Stage 2	-	-	-	-	85	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	1317	-	665	905
Stage 1	-	-	-	-	798	-
Stage 2	-	-	-	-	929	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1317	-	659	905
Mov Cap-2 Maneuver	-	-	-	-	659	-
Stage 1	-	-	-	-	791	-
Stage 2	-	-	-	-	929	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	10.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	683	-	-	1317	-
HCM Lane V/C Ratio	0.049	-	-	0.008	-
HCM Control Delay (s)	10.5	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	176	103	3	0	23
Future Volume (vph)	0	176	103	3	0	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)		30	30		30	
Link Distance (ft)		171	327		280	
Travel Time (s)		3.9	7.4		6.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	176	103	3	0	23
Future Vol, veh/h	0	176	103	3	0	23
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	191	112	3	0	25

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	58
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	-	0	996
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	996
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	8.7
HCM LOS			A

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	996
HCM Lane V/C Ratio	-	-	-	0.025
HCM Control Delay (s)	-	-	-	8.7
HCM Lane LOS	-	-	-	A
HCM 95th %tile Q(veh)	-	-	-	0.1

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	42	7	7	14	7	5
Future Volume (vph)	42	7	7	14	7	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	30			30	30	
Link Distance (ft)	257			299	206	
Travel Time (s)	5.8			6.8	4.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

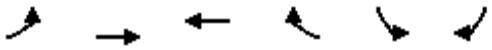
Intersection	
Int Delay, s/veh	1.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	42	7	7	14	7	5
Future Vol, veh/h	42	7	7	14	7	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	46	8	8	15	8	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	54	0	81	50
Stage 1	-	-	-	-	50	-
Stage 2	-	-	-	-	31	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1551	-	921	1018
Stage 1	-	-	-	-	972	-
Stage 2	-	-	-	-	992	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1551	-	916	1018
Mov Cap-2 Maneuver	-	-	-	-	916	-
Stage 1	-	-	-	-	967	-
Stage 2	-	-	-	-	992	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.4	8.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	956	-	-	1551	-
HCM Lane V/C Ratio	0.014	-	-	0.005	-
HCM Control Delay (s)	8.8	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	24	23	13	1	1	8
Future Volume (vph)	24	23	13	1	1	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)		30	30		30	
Link Distance (ft)		299	512		212	
Travel Time (s)		6.8	11.6		4.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	24	23	13	1	1	8
Future Vol, veh/h	24	23	13	1	1	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	26	25	14	1	1	9

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	15	0	-	0	92	15
Stage 1	-	-	-	-	15	-
Stage 2	-	-	-	-	77	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1603	-	-	-	908	1065
Stage 1	-	-	-	-	1008	-
Stage 2	-	-	-	-	946	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1603	-	-	-	893	1065
Mov Cap-2 Maneuver	-	-	-	-	893	-
Stage 1	-	-	-	-	992	-
Stage 2	-	-	-	-	946	-

Approach	EB	WB	SB
HCM Control Delay, s	3.7	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1603	-	-	-	1043
HCM Lane V/C Ratio	0.016	-	-	-	0.009
HCM Control Delay (s)	7.3	0	-	-	8.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0

Intersection: 5: B Street/Corridor Ctr. & Rancho Pkwy.

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	TR	L	R
Maximum Queue (ft)	48	42	63	61	91	114	73	54	22	169	48	53
Average Queue (ft)	38	26	37	43	70	87	41	28	9	75	29	22
95th Queue (ft)	57	39	70	78	108	123	81	57	26	176	58	56
Link Distance (ft)		931	931			998	998		263	263	159	159
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	280			200	200			100				
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 9: Bake Pkwy. & Rancho Pkwy. S./A Street

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB	SB
Directions Served	L	L	TR	L	L	T	R	L	T	T	R	L
Maximum Queue (ft)	90	87	146	76	86	87	42	272	91	106	53	28
Average Queue (ft)	54	62	115	45	62	41	29	158	61	77	39	11
95th Queue (ft)	91	95	163	86	103	93	46	280	103	110	57	33
Link Distance (ft)		513	513		317	317			977	977		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	195			125			150	195			150	200
Storage Blk Time (%)								8				
Queuing Penalty (veh)								24				

Intersection: 9: Bake Pkwy. & Rancho Pkwy. S./A Street

Movement	SB	SB	SB
Directions Served	T	T	R
Maximum Queue (ft)	346	332	140
Average Queue (ft)	210	212	82
95th Queue (ft)	349	330	163
Link Distance (ft)	1003	1003	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			50
Storage Blk Time (%)	8	35	6
Queuing Penalty (veh)	1	96	31

Intersection: 10: Bake Pkwy. & Orchard/C Street

Movement	EB	WB	NB	NB	SB
Directions Served	R	R	T	T	T
Maximum Queue (ft)	22	22	51	31	29
Average Queue (ft)	12	9	10	6	6
95th Queue (ft)	29	27	44	27	25
Link Distance (ft)	301	164	1273	1273	977
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Zone Summary

Zone wide Queuing Penalty: 152

5: B Street/Corridor Ctr. & Rancho Pkwy.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	43	189	110	200	578	98	28	277	57	3	33
v/c Ratio	0.26	0.18	0.19	0.63	0.34	0.12	0.07	0.42	0.21	0.01	0.06
Control Delay	29.4	17.1	1.4	32.0	11.5	3.2	15.7	5.1	18.2	15.0	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.4	17.1	1.4	32.0	11.5	3.2	15.7	5.1	18.2	15.0	0.2
Queue Length 50th (ft)	15	27	0	66	53	0	7	2	15	1	0
Queue Length 95th (ft)	41	50	8	123	117	21	23	48	41	6	0
Internal Link Dist (ft)		978			1024			276		141	
Turn Bay Length (ft)	280		200	200		100					
Base Capacity (vph)	168	1038	590	361	1705	807	414	656	271	558	600
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.18	0.19	0.55	0.34	0.12	0.07	0.42	0.21	0.01	0.06

Intersection Summary

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	121	212	233	81	62	229	637	110	14	1122	290
v/c Ratio	0.28	0.68	0.62	0.33	0.16	0.71	0.30	0.11	0.14	0.80	0.39
Control Delay	41.5	29.5	50.0	41.2	0.9	47.3	20.9	10.1	43.5	34.6	13.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.5	29.5	50.0	41.2	0.9	47.3	20.9	10.1	43.5	34.6	13.6
Queue Length 50th (ft)	38	59	73	47	0	145	101	0	9	253	41
Queue Length 95th (ft)	59	118	113	88	0	#307	282	m68	m22	#503	138
Internal Link Dist (ft)		492		325			979			1029	
Turn Bay Length (ft)	195		125		150	195		150	200		50
Base Capacity (vph)	623	479	404	328	454	322	2143	1005	101	1405	744
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.44	0.58	0.25	0.14	0.71	0.30	0.11	0.14	0.80	0.39

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Intersection: 501: B Street & BB St.

Movement	EB	NB	SB
Directions Served	LR	LT	R
Maximum Queue (ft)	90	31	20
Average Queue (ft)	53	18	4
95th Queue (ft)	96	43	17
Link Distance (ft)	271	150	263
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 502: B Street & Z St.

Movement	EB	WB	NB
Directions Served	LTR	LTR	LT
Maximum Queue (ft)	31	31	31
Average Queue (ft)	18	30	6
95th Queue (ft)	42	31	26
Link Distance (ft)	258	117	310
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 503: B Street & T St.

Movement	WB
Directions Served	R
Maximum Queue (ft)	31
Average Queue (ft)	24
95th Queue (ft)	44
Link Distance (ft)	214
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 504: B Street & A Street

Movement	EB	EB	NB	NB	SB
Directions Served	L	R	LT	T	TR
Maximum Queue (ft)	53	30	32	49	31
Average Queue (ft)	39	29	31	29	25
95th Queue (ft)	57	32	32	55	45
Link Distance (ft)	271	271	69	69	91
Upstream Blk Time (%)				0	
Queuing Penalty (veh)				0	
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 505: B Street & S St.

Movement	WB
Directions Served	R
Maximum Queue (ft)	54
Average Queue (ft)	34
95th Queue (ft)	50
Link Distance (ft)	191
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 506: B Street & I St.

Movement	EB	WB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	30	31	28
Average Queue (ft)	18	24	6
95th Queue (ft)	42	44	24
Link Distance (ft)	148	132	338
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 507: B Street & C Street

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	31	30	31
Average Queue (ft)	6	12	24
95th Queue (ft)	27	36	44
Link Distance (ft)	450	131	456
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 508: A Street & BB St.

Movement	SB
Directions Served	R
Maximum Queue (ft)	75
Average Queue (ft)	48
95th Queue (ft)	77
Link Distance (ft)	162
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 509: D St. & A Street

Movement	NB
Directions Served	LR
Maximum Queue (ft)	67
Average Queue (ft)	41
95th Queue (ft)	66
Link Distance (ft)	170
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 510: A Street & Z St.

Movement	SB
Directions Served	R
Maximum Queue (ft)	31
Average Queue (ft)	24
95th Queue (ft)	43
Link Distance (ft)	233
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 511: Senior Access & C Street

Movement	NB
Directions Served	LR
Maximum Queue (ft)	30
Average Queue (ft)	12
95th Queue (ft)	37
Link Distance (ft)	177
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 512: C Street & D St.

Movement	SB
Directions Served	LR
Maximum Queue (ft)	30
Average Queue (ft)	12
95th Queue (ft)	36
Link Distance (ft)	183
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 0

Intersection: 5: B Street/Corridor Ctr. & Rancho Pkwy.

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	TR	L	T
Maximum Queue (ft)	90	138	170	17	115	94	89	56	22	64	68	28
Average Queue (ft)	46	88	106	7	92	62	71	40	6	36	42	6
95th Queue (ft)	86	133	165	20	124	104	91	60	20	64	68	24
Link Distance (ft)		931	931			998	998		263	263	159	159
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	280			200	200			100				
Storage Blk Time (%)							0					
Queuing Penalty (veh)							0					

Intersection: 5: B Street/Corridor Ctr. & Rancho Pkwy.

Movement	SB
Directions Served	R
Maximum Queue (ft)	51
Average Queue (ft)	27
95th Queue (ft)	54
Link Distance (ft)	159
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 9: Bake Pkwy. & Rancho Pkwy. S./A Street

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB	SB
Directions Served	L	L	TR	L	L	T	R	L	T	T	R	L
Maximum Queue (ft)	114	167	236	63	46	88	55	152	242	305	28	92
Average Queue (ft)	64	138	126	36	33	61	20	131	199	260	11	52
95th Queue (ft)	140	186	255	66	58	104	60	164	273	312	33	108
Link Distance (ft)		513	513		317	317			977	977		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	195			125			150	195			150	200
Storage Blk Time (%)									6	23		
Queuing Penalty (veh)									11	25		

Intersection: 9: Bake Pkwy. & Rancho Pkwy. S./A Street

Movement	SB	SB	SB
Directions Served	T	T	R
Maximum Queue (ft)	159	187	126
Average Queue (ft)	98	95	48
95th Queue (ft)	169	189	118
Link Distance (ft)	1003	1003	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			50
Storage Blk Time (%)		36	2
Queuing Penalty (veh)		42	8

Intersection: 10: Bake Pkwy. & Orchard/C Street

Movement	EB	WB	NB	NB	SB
Directions Served	R	R	T	T	T
Maximum Queue (ft)	44	22	73	52	53
Average Queue (ft)	30	16	26	21	11
95th Queue (ft)	47	29	78	62	45
Link Distance (ft)	301	164	1273	1273	977
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Zone Summary

Zone wide Queuing Penalty: 87

Intersection: 501: B Street & BB St.

Movement	EB
Directions Served	LR
Maximum Queue (ft)	46
Average Queue (ft)	27
95th Queue (ft)	43
Link Distance (ft)	271
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 502: B Street & Z St.

Movement	EB	WB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	29	30	31
Average Queue (ft)	6	24	6
95th Queue (ft)	25	44	26
Link Distance (ft)	258	117	150
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 503: B Street & T St.

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 504: B Street & A Street

Movement	EB	EB	NB	NB	SB
Directions Served	L	R	LT	T	TR
Maximum Queue (ft)	54	30	32	55	68
Average Queue (ft)	35	30	30	23	47
95th Queue (ft)	51	31	32	57	72
Link Distance (ft)	271	271	69	69	91
Upstream Blk Time (%)				0	
Queuing Penalty (veh)				0	
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 505: B Street & S St.

Movement	WB
Directions Served	R
Maximum Queue (ft)	50
Average Queue (ft)	22
95th Queue (ft)	54
Link Distance (ft)	191
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 506: B Street & I St.

Movement	EB	WB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	28	54	30
Average Queue (ft)	11	28	6
95th Queue (ft)	33	57	26
Link Distance (ft)	148	132	338
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 507: B Street & C Street

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	32	30	31
Average Queue (ft)	18	24	29
95th Queue (ft)	43	44	32
Link Distance (ft)	450	131	456
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 508: A Street & BB St.

Movement	SB
Directions Served	R
Maximum Queue (ft)	30
Average Queue (ft)	24
95th Queue (ft)	43
Link Distance (ft)	162
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 509: D St. & A Street

Movement	NB
Directions Served	LR
Maximum Queue (ft)	30
Average Queue (ft)	12
95th Queue (ft)	35
Link Distance (ft)	170
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 510: A Street & Z St.

Movement	SB
Directions Served	R
Maximum Queue (ft)	31
Average Queue (ft)	18
95th Queue (ft)	43
Link Distance (ft)	233
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 511: Senior Access & C Street

Movement	NB
Directions Served	LR
Maximum Queue (ft)	28
Average Queue (ft)	6
95th Queue (ft)	24
Link Distance (ft)	177
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 512: C Street & D St.

Movement	SB
Directions Served	LR
Maximum Queue (ft)	30
Average Queue (ft)	6
95th Queue (ft)	26
Link Distance (ft)	183
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 0

NAKASE PROPERTY AREA PLAN VISUAL ANALYSIS

Purpose

This technical memorandum has been prepared for use by the City of Lake Forest in its preparation of the Aesthetics and Visual Resources section of the Nakase Property Area Plan Environmental Impact Report (EIR).

Introduction

The *City of Lake Forest CEQA Significance Threshold Criteria* (2009) notes that "An aesthetic resource is any element, or group of elements, that embodies a sense of beauty. The aesthetic resources of a city include its natural setting, the architectural quality of its buildings, the vitality of its landscaping, the spatial relationships they create, and the views afforded by each."

Aesthetics may be defined as visual qualities within a given field of view, and may include such considerations as size, shape, color, contextual/ general composition and the relationships between these elements; the potential aesthetic impacts of a project can be evaluated by considering such factors as scale and mass, landscaping, and setbacks. It is recognized in performing this analysis that visual resources are subjective and based on the interpretation of individual viewers.

Thresholds of Significance

The City of Lake Forest has prepared an Initial Study for the proposed Nakase Property Area Plan Project and has identified that, with respect to the CEQA topic of Aesthetics, the proposed project may have a potentially significant impact with respect to the following topics:

- Threshold 1: Create a new source of substantial night lighting that would result in "sky glow" (i.e., illumination of the night sky in urban areas) or "spill light" (i.e. light that falls outside of the area intended to be lighted) onto adjacent sensitive land uses.
- Threshold 2: Substantially damage scenic resources, including scenic vistas from public parks and views from designated scenic highways or arterial roadways.
- Threshold 3: Substantially degrade the existing visual character or quality of the site and its surroundings where the project exceeds the allowed height or bulk regulations, or exceeds the prevailing height and bulk of existing structures.

The City's Significance Threshold Criteria states:

> The visual impacts of a project include both the objective visual resource changes created by the project and the subjective viewer response to that change. Distance from the project, frequency of view, length of view, viewer activity, viewer perception, and viewing conditions contribute to the assessment of a visual impact. The physical limits and changes of the views and the quantity of the viewers are objective. Viewer perception is subjective.
>
> The perception of different viewer groups to the visual environment and its elements varies based on viewer activity and awareness. Activities such as commuting in heavy traffic can distract an observer from many aspects of the visual environment. Conversely, pleasure driving or relaxing in a scenic environment can encourage an observer to look at the view more closely and at greater length, thereby increasing the observer's attention to detail. Sensitivity is also

determined by how much the viewer has at stake in the viewshed. Typically, people who reside or work in an area are more sensitive to change than those just passing through.

As such, the following assessment takes into consideration both the objective visual resource changes and the subjective viewer response to that change.

Methodology

With respect to Threshold 1, the visual analysis evaluates the proposed project against the City's lighting requirements.

With respect to Threshold 2, "Substantially damage scenic resources, including scenic vistas from public parks and views from designated scenic highways or arterial roadways", the project site is not adjacent to or visible from any designated scenic highways or arterial roadways. Sand Canyon Road and El Toro Road between Santa Margarita Parkway and Live Oak Canyon Road are identified in the City of Lake Forest General Plan Circulation Element as being included in the County of Orange's Scenic Highway Master Plan. No other highways or roadways are identified in the City's General Plan as a scenic highway or roadway. Threshold 2 is addressed in this memorandum where a viewpoint is adjacent to or visible from a public park based on the simulations.

With respect to Threshold 3, the visual analysis for the proposed Nakase Property Area Plan Project in the City of Lake Forest has been prepared based on the land use concepts and conceptual architectural guidelines outlined in the *Draft Nakase Property Area Plan* (March 21, 2018). The assessment of potential aesthetic and visual changes is based on field reconnaissance and an evaluation of the proposed site development in comparison to the existing conditions.

As part of this visual analysis, a series of visual simulations which illustrate "before" and "after" conditions were created. The simulations illustrate the location, scale and appearance of the proposed project elements as seen from five public viewpoints. These viewpoints were selected through on-site investigations and approved by the City. Kimley-Horn used computer modeling and rendering techniques to produce the visual simulation images. The computer-generated simulations are the result of an objective analytical and computer modeling process and are accurate within the constraints of available site and project data.

Existing GIS topographic and site data was used as the basis for developing an initial digital model. Three–dimensional models of the proposed roadways, conceptual housing product types, and the elementary school and community center were developed using design data supplied by Toll Brothers, Woodley Architecture and C2 Collaborative. To finalize the simulations, computer "wireframe" perspective images were overlaid on photographs to verify scale and viewpoint location. Digital visual simulation images were then produced based on computer renderings of the 3-D model combined with digital versions of the previously selected site photographs.

Threshold 1: Create a new source of substantial night lighting that would result in "sky glow" (i.e. illumination of the night sky in urban areas) or "spill light" (i.e. light that falls outside of the area intended to be lighted) onto adjacent sensitive land uses.

The Initial Study notes that the project site is currently a commercial nursery and the majority of the site is not illuminated at night. Adjacent to the project site, street lighting is provided along Bake Parkway and Rancho Parkway. Additionally, the site is bordered by existing and surrounding developed properties with

light sources including but not limited to street lighting, parking lot lighting, illuminated building and freestanding signage, and internal illumination of buildings. Project implementation would result in new lighting sources on the site similar to existing development proximate to the site. The Initial Study states that "Spill light occurs when lighting fixtures such as streetlights, parking lot lighting, exterior building lighting, and landscape lighting are not properly aimed or shielded to direct light to the desired location, and light escapes and partially illuminates a surrounding location. Sensitive uses (e.g., Serrano Creek Trail and Nature Park) surrounding the Project Site could be impacted by the light from development within the boundaries of the Project Site."

The City's Municipal Code sets forth exterior lighting requirements in order to minimize light spillage. The Nakase Property Area Plan would be required to comply with applicable City requirements. The Area Plan notes that lighting should be unobtrusive to and "low-level to ensure safety for the residents and reinforce the pedestrian scale of the community. All lighting should use warm colored white LED light sources with a high color-rendering index (CRI)." With respect to trail lighting, the Area Plan notes that "Trails should be lit using bollards where feasible and appropriate. Lighting along trails should be understated and not call undue attention." To minimize glare and spill-over onto adjacent properties, all exterior lighting would be shielded. In common areas, low voltage lighting would be used whenever possible on photocells, or timers. With respect to the school site, the Area Plan states that the playfields will not have overhead lighting.

Based on the significance criteria set forth by the City of Lake Forest, no significant night lighting impacts would occur.

Threshold 2: Substantially damage scenic resources, including scenic vistas from public parks and views from designated scenic highways or arterial roadways.

Threshold 3: Substantially degrade the existing visual character or quality of the site and its surroundings where the project exceeds the allowed height or bulk regulations, or exceeds the prevailing height and bulk of existing structures.

Exhibit 1 identifies the viewpoints chosen, with concurrence by the City, as the most representative areas where the project site is visible from public locations. Exhibits 2 through 6 provide an existing view of the project site from these various viewpoints as well as visual simulations to depict the anticipated change from these viewpoints that would occur with project implementation.

Development of the project would convert existing agricultural land to residential, recreational, and institutional uses thereby substantially changing the visual character of the project site. Visual simulations conceptually illustrate how the Nakase Nursery site is expected to look upon project completion to identify whether the project would "substantially degrade the visual character or quality of the site and its surroundings". The analysis focuses largely on what is, and would be, visible from the location of publicly accessible viewpoints, rather than a subjective determination of what is or is not an impact based on the inherent character and quality of the land uses proposed on the project site. The photograph simulations are provided from the same locations as existing conditions.

EXHIBIT 1: Key Map
Nakase Property Area Plan Visual Analysis

Kimley»Horn

View 1: Without Project – View from the Foothill Transportation Corridor Looking South. Exhibit 2A is the view from the southbound shoulder of the Foothill Transportation Corridor (State Route 241 [SR-241]) just west of Bake Parkway. SR-241 is not a designated scenic highway.[1]

View 1 is representative of views of the project site as seen by motorists traveling southbound on SR-241 as it passes over Bake Parkway. The posted speed limit is 65 miles per hour (mph). In this location, SR-241 is approximately 775 feet above mean sea level (msl). Adjacent to the project site, the elevation of the southeast corner of the intersection of Bake Parkway at Rancho Parkway is approximately 745 feet above msl.

In the foreground and middleground is Bake Parkway, which traverses north to south, and the signalized T-intersection of Bake Parkway at Rancho Parkway. Bake Parkway is a four-lane divided roadway (two lanes in each direction) with a raised median and left-turn pockets. In the foreground of the photograph from left to right is the corner of the Lake Forest Corridor Center, a neighborhood shopping center located on Rancho Parkway; the intersection of Bake Parkway at Rancho Parkway; and the landscaped slope of the Rancho Business Center, which is accessed from Rancho Parkway South. The slope is landscaped with groundcover, shrubs and trees. Overhead utility lines are located along the east side (northbound lanes) of Bake Parkway.

In the middle of the photograph (southeast of the intersection) is the project site. The on-site shade structures used as a part of the nursery operations are the prominent feature. Behind the shade structures are other nursery features including truck parking and plantings.

In the background, there are limited views of land uses and undeveloped hillside east of Lake Forest Drive on the left side of the photograph, and business parks on Dimension Drive in the middle and right sides of the photograph.

View 1: With Project – View from the Foothill Transportation Corridor Looking South. With respect to Threshold 2, the project site is not adjacent to a scenic highway or roadway and is not visible from a public park scenic vista. No impact would occur.

Exhibit 2B conceptually illustrates how the project site would appear as viewed by persons traveling southbound on SR-241 as it passes over Bake Parkway. The project would be designed following the Contemporary, Modern, and Spanish architectural styles that would blend with existing commercial and residential development and is intended to provide a visually appealing residential development. The Area Plan notes that the historical use of the site as a nursery plays a large role in developing the landscape character of the Nakase property. A goal of the development is to elaborate the beauty of the botanical and physical features of the property. As shown in Exhibit 2B, the view of the project site would include landscaping with mature accent trees. Trees would line the on-site corner of the intersection of Rancho Parkway at Bake Parkway.

[1] http://www.dot.ca.gov/d12/planning/pdf/SR133_Toll_Final.pdf. Accessed December 28, 2018.

EXHIBIT 2A: View 1: Without Project - View from the Foothill Transportation Corridor Looking South

Nakase Property Area Plan Visual Analysis

Kimley»Horn

EXHIBIT 2B: View 1: With Project - View from the Foothill Transportation Corridor Looking South

Nakase Property Area Plan Visual Analysis

Kimley»Horn

The elementary school site, proposed for the northwest corner of the project site, would be visible to motorists on Rancho Parkway, Bake Parkway, and southbound on SR-241. The elementary school would be constructed on 10 acres and is proposed to accommodate 800 to 1,000 students from kindergarten through sixth grade. The elementary school conceptual site plan includes the following uses: campus hub, kindergarten building, a grades 1-2 building, a grades 3-6 building, an outdoor learning area, active play area and field, and parking for staff, teachers, and visitors, as well as a drop off area. This view would be a prominent focal point because the entirety of the project site and its proposed uses would be visible from this viewpoint. It should be noted that the school site would be dedicated to the Saddleback Valley Unified School District (SVUSD) and would be designed and implemented by the SVUSD. The objective of the Nakase Nursery Area Plan is that the elementary school be designed complementary to the Nakase architectural character.

Proposed two- to three-story residential development is visible behind the school site. Exhibit 2B also includes an inset photograph showing the conceptual architecture for Neighborhood 2 located immediately behind the school sites. As proposed, Neighborhood 2 includes up to 111 three-story residences on 5.2 net acres with a density range of 16.0 dwelling units per acre (du/ac) to 21.3 du/ac. The senior housing site is visible in the background (right side of exhibit) along Bake Parkway. No major landform alteration would be required to implement the elementary school and various proposed residential neighborhoods within the project site.

As a part of the project, on-site utility lines and poles located at the sidewalk adjacent to the northbound lanes of Bake Parkway would be placed under ground as well as the power lines at the northeast corner of the intersection of Bake Parkway at Rancho Parkway.

It is important to note that Exhibit 2B reflects a static view of the project site from SR-241. In reality, the duration of motorist exposure to the viewshed would be very short. The posted speed limit is 65 mph and there is a difference in elevation from SR-241 and the project site. The City's significance criteria note that "Commuting in heavy traffic distracts a motorist from many visual aspects of their surroundings. Pleasure driving would encourage a motorist to be more aware of the attention to detail in their visual surroundings. In addition, sensitivity is also determined by how much the motorist has at stake (e.g., people who live or work in the area are more sensitive to visual change)." Because most motorists along this segment of SR-241 would have a very brief view of the project site and would likely be characterized as commuters with lower sensitivity to off-site land uses, the project would not constitute a substantial change to the visual character of the area. Therefore, with respect to Threshold 3, the project would not substantially degrade the existing visual character or quality of the site and its surroundings.

View 2: Without Project –View from Rancho Parkway South Looking South. As shown in Exhibit 3A, this view is from the Rancho Parkway South just northwest of the intersection of Rancho Parkway South at Bake Parkway intersection. View 2 is representative of views of the project site as seen by motorists traveling southbound on Bake Parkway. The posted speed limit on Bake Parkway is 50 mph and the posted speed limit on Ranch Parkway South is 40 mph. In this location, the elevation of Rancho Parkway South is approximately 709 feet above msl. In the foreground is the intersection of Bake Parkway at Rancho Parkway South. In the middleground, the project site's nursery operations including shade structures, nursery plantings, and farm equipment are visible. A chain-link fence, nursery plants, truck beds, storage, and utility lines and poles on the project site are visible to the southeast. Limited background views of development are provided east of Lake Forest Drive.

EXHIBIT 3A: View 2: Without Project - View from Rancho Parkway South Looking South

Nakase Property Area Plan Visual Analysis

Kimley»Horn

View 2: With Project – View from Rancho Parkway South Looking South. With respect to Threshold 2, the project site is not adjacent to a scenic highway or roadway and is not visible from a public park scenic vista. No impact would occur.

Exhibit 3B conceptually illustrates how the project site would appear as viewed at street level by persons traveling southbound on Bake Parkway at Rancho Parkway South after the completion of Neighborhood 1.

The proposed neighborhood development is a prominent focal point and would be visible to motorists and pedestrians eastbound on Rancho Parkway South and northbound and southbound on Bake Parkway. As proposed, the neighborhood would construct up to 182 two-story residences on 12.9 net acres with a density range of 10.6 du/ac to 14.1 du/ac. Within Neighborhood 1, two residences would face the street and the two rear units would be accessed from a shared motor court. Exhibit 3B includes an inset photograph showing the conceptual architecture for Neighborhood 1.

As shown in Exhibit 3B, the entrance into the project site from Rancho Parkway South would include a center median landscaped with landscaping including mature accent trees. Trees would line both sides of the roadway into the site with additional landscaping and monumentation at the on-site corner of the intersection of Rancho Parkway South at Bake Parkway.

The motorist currently sees a gradual slope down into the property site. From View 2 at the street level, the proposed development would obscure views across the project site and of off-site background land uses. By nature, the duration of motorist exposure to a viewshed is short due to the speed of a moving vehicle and the need to limit distractions while driving. However, as noted in the City's significance criteria, sensitivity to one's surroundings can vary depending on how much the motorist has at stake (e.g., people who live or work in the area are more sensitive to visual change) as well as the purpose of a motorist's trip (commuting compared to pleasure driving). It is expected that motorists on Rancho Parkway South would include individuals who both live or work near the site and motorists commuting to further destinations. Although project implementation would be a substantial change to the visual character of the area, it would not be considered to substantially degrade the existing visual character or quality of the site and its surroundings. The project would be implemented consistent with the Architectural Design Guidelines and Landscape Design Guidelines set forth in the proposed Area Plan to establish a unique mixed-use community which is also compatible with the diverse architectural styles of development near the project site. The project is considered compatible with the existing community and therefore compliant with the City of Lake Forest Municipal Code Policies 3.1, 3.2, and 3.4. Further, as set forth in Threshold 3, the project would not exceed the allowed height or bulk regulations or exceed the prevailing height and bulk of existing structures. Therefore, with respect to Threshold 3, the project would not substantially degrade the existing visual character or quality of the site and its surroundings.

View 3: Without Project – View from Bake Parkway Looking Northeast. Exhibit 4A shows the southwest corner of the project site from just west of the business park on Dimension Drive. View 3 is representative of views of the project site as seen by motorists traveling northbound on Bake Parkway. In this location, the elevation of Bake Parkway is approximately 704 feet above msl.

EXHIBIT 3B: View 2: With Project - View from Rancho Parkway South Looking South

Nakase Property Area Plan Visual Analysis

Kimley»Horn

EXHIBIT 4A: View 3: Without Project - View from Bake Parkway Looking Northeast
Nakase Property Area Plan Visual Analysis

Kimley»Horn

In the foreground, Bake Parkway, including an on-street bike lane and the sidewalk, are visible on the left-side of the photograph. Overhead utility poles are located along the east side of Bake Parkway. The project site, including vacant land and a chain link fence are visible in the middle and right sides of the photograph. In the middleground, the project site's nursery operations are visible including but not limited to chain-link fences parallel to Bake Parkway, nursery plantings, shade structures, and truck trailer parking. Santiago Peak is visible in the background.

View 3: With Project – View from Bake Parkway Looking Northeast. With respect to Threshold 2, the project site is not adjacent to a scenic highway or roadway and is not visible from a public park scenic vista. No impact would occur.

From this vantage point, Exhibit 4B conceptually illustrates how the project site would appear as viewed by persons traveling northbound on Bake Parkway after project completion of the senior affordable housing development. As proposed, the two- to three-story senior development would include up to 101 units on 3.9 acres at a density of 31 du/ac. The existing sidewalk on Bake Parkway would be reconstructed to allow for a landscaped strip between Bake Parkway and the sidewalk. A 20-foot- wide landscaped area would be provided between the sidewalk and the solid wall dividing the area from the proposed senior housing. The area would be landscaped with groundcover, shrubs, and mature accent trees (Exhibit 4B). The utility lines and poles seen in the existing conditions (Exhibit 4A) would be placed underground as a part of the project.

As illustrated in this view, the proposed neighborhood development is a prominent focal point and would be visible to northbound and southbound travelers on Bake Parkway. Views across the site would be blocked by the proposed residential development. From this location, view of Santiago Peak in the background could be obscured. However, it should be noted that Bake Parkway is not a scenic roadway and the City does not identify any scenic corridors. The posted speed limit is 50 mph and therefore views from this location would be limited by the duration of motorist exposure. Although development from this location would change the character of the site, this change would be compatible with the existing community and therefore compliant with the City of Lake Forest Municipal Code Policies 3.1, 3.2, and 3.4. The project would be implemented consistent with the Architectural Design Guidelines and Landscape Design Guidelines set forth in the proposed Area Plan to establish a unique mixed-use community which is also compatible with the diverse architectural styles of development near the project site. Therefore, with respect to Threshold 3, the project would not substantially degrade the existing visual character or quality of the site and its surroundings.

View 4: Without Project -- View from the North End of Serrano Creek Trail (Adjacent to Staybridge Suites Irvine East/Lake Forest Hotel) Looking Northwest. Exhibit 5A shows a view of the project site as seen by pedestrians and bicyclists on Serrano Creek Trail. In this location, the elevation of Serrano Creek Trail is approximately 732 feet above msl. The Serrano Creek Trail is considered an Open Space/Recreation Resource according to the City's General Plan Recreation and Resources Element (1991, revised 2015). The Staybridge Suites Irvine East/Lake Forest Hotel is located to the northwest of the project site and is bordered by Rancho Parkway South to the north, mixed commercial development to the south, Bake Parkway to the east, and Orchard Road to the west. In the foreground, vegetation along the trail and in the creek is visible. The project site is in the middleground; nursery plants and shade structures are visible. Land uses west of Bake Parkway are visible in the background and include residential and office uses, as well the two water towers located adjacent to Baker Ranch Community Park. It should be noted that most views of the project site from Serrano Creek Trail are obscured by existing vegetation.

EXHIBIT 4B: View 3: With Project - View from Bake Parkway Looking Northeast

Nakase Property Area Plan Visual Analysis

Kimley»Horn

EXHIBIT 5A: View 4: Without Project - View from the North End of Serrano Creek Trail Looking Northwest

Nakase Property Area Plan Visual Analysis

Kimley»Horn

View 4: With Project – View from the North End of Serrano Creek Trail (Adjacent to Extended Stay America) Looking Northwest. Exhibit 5B conceptually illustrates how the project site would appear as viewed by persons walking or biking along Serrano Creek Trail after the completion of Neighborhood 3. As proposed, Neighborhood 3 would include up to 141 two-story residences on 12.3 net acres, with a density range of 8.6 du/ac to 11.5 du/ac. The Area Plan characterizes this neighborhood as traditional single-family homes with modest front yards and more expansive back yards. Exhibit 5B includes an inset photograph showing the conceptual architecture for Neighborhood 3.

As illustrated in this view, the proposed neighborhood development is a prominent focal point. Existing vegetation in the creek and along the trail would remain in the foreground. Where there are "breaks" in the vegetation in the creek and along the trail, residential development would be very visible and would obscure views across the project site. With respect to Threshold 2, although views into the site are limited because of existing vegetation in the creek and along the trail, there is a potentially significant impact to scenic resources from Serrano Creek Trail; which is designated as an Open Space/Recreation resource. Although the existing conditions include dense vegetation, a goal of the development is to elaborate the beauty of the botanical and physical features of the property. As shown in Exhibit 5B, the view of the project site from Serrano Creek Trail would include landscaping including mature accent trees. Due to the speed of travel, the duration of views for pedestrians and bicyclists is typically longer than for motorists. Nevertheless, views of the project site associated with pedestrian and bicycle travel along the trail would be limited and infrequent due to dense vegetation, which significantly blocks views of the project site. View 4 is one of the few viewpoints where the project site would be visible from Serrano Creek Trail and is not representative of the typical views that would be seen along the trail. Therefore, with respect to Threshold 2 and Threshold 3, the project would not substantially damage scenic views from a public park or constitute a substantial change to the visual character of the area. Therefore, it would not be considered to substantially degrade the existing visual character or quality of the site and its surroundings.

With respect to the hotel, the proposed project's neighborhood development would be visible by the hotel visitors because the hotel is at a higher elevation than the project site. Very minimal views of the project site are accessible by motorists traveling northbound and southbound on Lake Forest Drive because of existing office development located between Lake Forest Drive and the project site. With respect to Threshold 3, the visibility of the project site from hotel visitors, which are considered a transient use, is not a significant impact.

View 5: Without Project – View from Corridor Center Looking Southwest. Exhibit 6A shows the project site when viewed from the Corridor Center Shopping Center at the intersection of Corridor Center at Rancho Parkway. View 5 is representative of views of the project site as seen by motorists leaving the shopping center, as well as motorists along Rancho Parkway. In this location, the elevation of Corridor Center is 736 feet above msl. In the foreground, the outbound lanes of Corridor Center at Rancho Parkway are visible. Behind the intersection crosswalk is Rancho Parkway. The intersection is signalized. The south side of Rancho Parkway has a sidewalk and landscaping with trees and shrubs along the sidewalk. The project site is visible in the background. Existing office developments are visible south of the project site because of higher elevation in this area.

View 5: With Project – View from Corridor Center Looking Southwest. With respect to Threshold 2, the project site is not adjacent to a scenic highway or roadway and is not visible from a public park scenic vista. No impact would occur.

EXHIBIT 5B: View 4: With Project - View from the North End of Serrano Creek Trail Looking Northwest

Nakase Property Area Plan Visual Analysis

Kimley»Horn

EXHIBIT 6A: View 5: Without Project - View from Corridor Center Looking Southwest

Nakase Property Area Plan Visual Analysis

Kimley»Horn

Exhibit 6B conceptually illustrates how the project site would appear as viewed by persons from Corridor Center and along Rancho Parkway upon development of Neighborhood 2, Neighborhood 3, and the elementary school site. As shown in Exhibit 6B, the entrance road (B Street) into the project site from Corridor Center would include a center median landscaped with landscaping including mature accent trees. Trees would line both sides of the roadway into the site with additional landscaping and monumentation at the on-site corners of the intersection of Rancho Parkway at Corridor Center. Neighborhood 3 is located east of B Street (left side of the visual simulation); Neighborhood 2 and the school site are located west of B Street (right side of the visual simulation).

The motorist currently sees a gradual slope down into the property site. Upon development, Neighborhood 3 would be the prominent focal point from this viewpoint, including patrons of the existing shopping center. The elementary school site would be on the west side (right side of the visual simulation) of the entrance into the project site. Street level and long-range views would be blocked by project development. It is expected that motorists on Rancho Parkway South would include individuals who both live or work near the site and motorists commuting to further destinations. Although development from this location would change the character of the site, this change would be compatible with the existing community and therefore compliant with the City of Lake Forest Municipal Code Policies 3.1, 3.2, and 3.4. The project would be implemented consistent with the Architectural Design Guidelines and Landscape Design Guidelines set forth in the proposed Area Plan to establish a unique mixed-use community which is also compatible with the diverse architectural styles of development near the project site. Therefore, with respect to Threshold 3, the project would not be considered to substantially degrade the existing visual character or quality of the site and its surroundings.

EXHIBIT 6B: View 5: With Project - View from Corridor Center Looking Southwest

Nakase Property Area Plan Visual Analysis

Kimley»Horn

June 2019 | Water Pipeline and Tank Safety Hazard Assessment

NAKASE ELEMENTARY SCHOOL

Toll Brothers

Prepared for:

Toll Brothers
Contact: Ilan P. Feingold, Sr. Project Manager
715 W. Town & Country Road, Suite 200
Orange, California 92868
714.347.1300

Prepared by:

PlaceWorks
Contact: Steve Bush, PE, Senior Engineer
1625 Shattuck Avenue, Suite 300
Berkeley, California 94709
510.848.3815
info@placeworks.com
www.placeworks.com

PLACEWORKS

Table of Contents

1. Introduction **1**
1.1 PURPOSE 1
1.2 SCHOOL SITE LOCATION 1
1.3 REGULATORY REQUIREMENTS 1
1.4 REPORT OBJECTIVES 2
1.5 ASSESSMENT METHODOLOGY 2
2. Hazard Assessment **3**
2.1 PIPELINE IDENTIFICATION 3
2.2 WATER TANK LOCATION AND OPERATIONAL DATA 4
2.3 LAND USE AND TERRAIN 4
2.4 WATER TANK FAILURE RATES 5
3. Consequence Analysis **9**
3.1 WATER PIPELINE FLOODING ANALYSIS 9
3.2 WATER TANK FLOODING ANALYSIS 10
4. Summary and Recommendations **13**
4.1 SUMMARY 13
4.2 RECOMMENDATIONS 14
5. References **15**

Table of Contents

List of Figures

Figure

Figure 1 Site Location and Pipeline Map 18

List of Tables

Table **Page**

Table 1 Water Pipelines 3
Table 2 Water Pipeline Flooding Analysis – Street Flow 9

List of Appendices

Appendix A. Agency Correspondence
Appendix B. Water Storage Tank Release Calculations

1. Introduction

1.1 PURPOSE

This report presents the results of a Water Pipeline and Water Tank Safety Hazard Assessment prepared for the proposed Nakase Elementary School. This assessment evaluates the potential risk of flooding at the school site from large volume (≥ 12 inches in diameter) water pipelines and from two existing water storage tanks located approximately 1,250 feet and 1,530 northwest of the project site.

1.2 SCHOOL SITE LOCATION

Toll Brother (the project developer) is working to gain approval for construction of an elementary school on 10-acres of the 120.83-acre Nakase Property Area Plan located at 20621 Lake Forest Drive, Lake Forest, California. The project developer will dedicate the elementary school site to the Saddleback Valley Unified School District (SVUSD) following the City of Lake Forest certification of the Nakase Property Area Plan Final Environmental Impact Report, general plan amendment, zone change, development agreement, and subject to SVUSD's environmental review and approval of the school site, California Department of Education's (CDE) final approval, as well as completion and approval of grading and infrastructure plans. The school site would accommodate up to 1,000 students from kindergarten through sixth grade. The Nakase Property Area Plan is bounded by Bake Parkway to the northwest, nursery operations and commercial/office buildings to the southwest, Serrano Creek to the southeast, and Rancho Parkway to the northeast. The proposed elementary school and play fields and active use areas (project site) are in the northeast corner of the Nakase Nursery site. Figure 1 shows the school site location, water pipeline locations within 1,500 feet of the site, and the two existing water tanks.

1.3 REGULATORY REQUIREMENTS

Under Education Code Section 17251, the California Department of Education (CDE) has authority to approve the acquisition of school sites. The District must obtain CDE approval for sites to receive state funds under the state's School Facilities Program administered by the State Allocation Board. CDE standards and regulations for this process are presented in California Code of Regulations, Title 5, Sections 14010, 14011, and 14012. Information on assessing safety hazard related to water storage tanks is discussed in Section 14010 (h):

> *The site shall not be located near an above-ground water or fuel storage tank or within 1,500 feet of the easement of an above-ground or underground pipeline that can pose a safety hazard as determined by a risk analysis study, conducted by a competent professional, which may include certification from a local public utility commission.*

No high pressure natural gas pipelines or hazardous liquid pipelines were identified within 1,500 feet of the project site (National Pipeline Mapping System, 2019). The CDE's School Site Selection and Approval Guide also contain provisions for evaluating high-pressure water pipelines:

To ensure the protection of students, faculty, and school property if the proposed school site is within 1,500 feet of the easement of an aboveground or underground pipeline that can pose a safety hazard, the school district should obtain the following information from the pipeline owner and operator:

- *Pipeline alignment, size, type of pipe, depth of cover*
- *Operating water pressures in pipelines near the proposed school site*
- *Estimated volume of water that might be released from the pipeline should a rupture occur on the site*
- *Owner's assessment of the structural condition of the pipeline.*

1.4 REPORT OBJECTIVES

To meet the requirements of CCR Title 5 Sections 14010 (d) and (h) and CDE's policy on pipelines, this report is designed to meet the following objectives:

- Identify all high pressure/large volume water pipelines within 1,500 feet of the proposed school site and evaluate the potential for flooding
- Identify all nearby large volume water tanks that have the potential for releases to impact the school site and evaluate the potential for flooding
- Where appropriate, identify and develop mitigation measures to reduce flooding impacts to acceptable levels.

1.5 ASSESSMENT METHODOLOGY

The CDE also has developed risk analysis procedures for evaluating flooding associated with releases from large diameter water pipelines, as described in CDE's *Guidance Protocol for School Site Pipeline Risk Analysis* (CDE, 2007). A safety issue associated with large diameter water pipelines is the potential for flooding. Also, releases from underground water pipelines can cause subterranean erosion of saturated soil, leading to subsidence or formation of a sinkhole. The most likely cause of failure is a large magnitude earthquake and associated strong ground shaking. Although no specific criteria have been established by the CDE as a threshold of significance for flooding at a school site, a water depth of 12 inches or greater is a trigger that could warrant further evaluation (CDE, 2007).

The CDE has not yet developed a protocol for evaluating safety hazards associated with releases from water storage tanks or reservoirs. Therefore, the procedures described in CDE's *Guidance Protocol for School Site Pipeline Risk Analysis* were used to evaluate flooding associated with releases from the water storage tanks (CDE, 2007). A potential safety issue associated with the siting of a new school down-gradient from a dam, reservoir, or water storage tank is the potential for flood inundation of the school site due to failure of these structures. The most probable cause of failure is a large magnitude earthquake and associated strong ground shaking, which can cause structural damage and a release of impounded water. The analysis will evaluate the potential for flooding and estimated depth of water at the school site if the identified tanks were to catastrophically fail.

2. Hazard Assessment

2.1 PIPELINE IDENTIFICATION

Based on plans provided from the Irvine Ranch Water District (IRWD), there are 16 high volume (≥12 inch diameter) water pipelines within 1,500 feet of the project site. The pipeline locations are shown on Figure 1 and summarized in Table 1.

There are two additional water pipelines within the 1,500-foot radius. There is a 12-inch water pipeline that originates at the IRWD reclaimed water tank and connects to the 12-inch reclaimed water main along Rancho Parkway South. In addition, there is an 18-inch overflow pipeline from the IRWD potable water tank that discharges into a drainage area south of the tank. These additional water pipelines are discussed in further detail in Sections 2.2 and 3.2.

Table 1 Water Pipelines

Pipeline Diameter	Pipeline Location	Material of Construction	Type
24-inch	Bake Parkway	Cement Mortar Lined & Coated (CML&C)	Domestic Main
18-inch	Bake Parkway, west of Rancho Parkway South	Polyvinyl Chloride (PVC)	Domestic Main
16-inch	Bake Parkway, between Rancho Parkway South and Rancho Parkway	PVC	Domestic Main
12-inch	Bake Parkway, between Rancho Parkway South and Rancho Parkway	PVC	Domestic Main
12-inch	Orchard Road	PVC	Domestic Main
18-inch	Rancho Parkway South	PVC	Domestic Main
16-inch	Rancho Parkway South	PVC	Domestic Main
16-inch	Rancho Parkway	PVC	Domestic Main
12-inch	Rancho Parkway	PVC	Domestic Main
12-inch	Lake Forest Drive	PVC	Domestic Main
12-inch	Towne Centre Drive	PVC	Domestic Main
12-inch	Bake Parkway	PVC	Recycled Water
12-inch	Orchard Road	PVC	Recycled Water
12-inch	Rancho Parkway South	PVC	Recycled Water
12-inch	Rancho Parkway	PVC	Recycled Water
12-inch	Lake Forest Drive	PVC	Recycled Water

2.2 WATER TANK LOCATION AND OPERATIONAL DATA

The IRWD owns and operates two 7.8-million-gallon aboveground water storage tanks located approximately 1,250 feet and 1,530 feet northwest of the proposed school site. The tank locations and school site are shown on Figure 1. These tanks provide potable water and recycled water to IRWD customers within Central Orange County. Water tank information was provided by Mr. Eric Akiyoshi, P.E., Principal Engineer (IRWD, 2019). Agency correspondence is provided in Appendix A.

The Lake Forest Zone "II" West Reservoir storage tank was installed in 1978 and is constructed of welded steel with a diameter of 200 feet and a height of 35 feet. The Zone "II" West Reservoir tank stores domestic water with a maximum high water level of 33 feet (IRWD, 2019). The Lake Forest Zone "B" West Reservoir storage tank is approximately 80 feet southeast of the Zone "II" West Reservoir tank. The Zone "B" West Reservoir storage tank was installed in 1984 and is also constructed of welded steel with a diameter of 200 feet and a height of 35 feet. The Zone "B" West Reservoir tank stores recycled water with a maximum high water level of 33 feet (IRWD, 2019).

The IRWD have owned and operated the tanks since January 2001. The tanks are inspected weekly by on-site personnel and are monitored continuously with automated supervisory control and data acquisition (SCADA) computer system. Additionally, the tanks are inspected approximately every 2 years via underwater camera and SCUBA inspections. The IRWD reports the tanks have not had any leaks during the time IRWD has owned the tanks (i.e., since 2001), and there is no reported history of leakage prior to IRWD's acquisition of the tanks (IRWD, 2019).

The inlet/outlet piping to the Zone "II" West Reservoir tank is 24 inches in diameter. The inlet/outlet piping to the Zone "B" West Reservoir tank is 12 inches in diameter and has a flexible pipe coupling to resist the stress produced by ground motion from large earthquakes. Therefore, the worst-case catastrophic release scenario for this analysis is assumed to be a break in the tank's inlet/outlet pipe during a maximum credible earthquake as a result of differential movement. This would result in a 24-inch diameter hole where the inlet/outlet piping connects to the side of the Zone "II" West Reservoir tank and a 12-inch diameter hole where the inlet or outlet piping connects to the side of the Zone "B" West Reservoir tank. It is assumed that a break in the inlet/outlet connection to the tank would result in the release of the entire contents of the tank and the tank would be at its maximum volume.

2.3 LAND USE AND TERRAIN

Although a nursery currently exists on the property, the proposed school will not be in operation concurrently with the nursery. The current plans call for mainly residential land uses to be constructed around the future school. Commercial uses are located north of Bake Parkway and east of Rancho Parkway. The project site terrain is relatively flat with a gradual slope toward the southwest although the area to the north is relatively hilly.

The Zone "B" West Reservoir tank facility is bermed on the south, west, and east sides, with an access driveway to the tank facilities, east of the Zone "II" West Reservoir tank. The tanks are situated atop an

elevated knoll, as shown in the topographic map in Appendix B. According to the tank as-built drawings provided in Appendix B, the bermed areas along the south side of the tanks range from 5 to 20 feet above the tank ground level. If a release were to occur at the tank facility, the water would drain to the east towards the access driveway and towards Rancho Parkway South, drain to the north towards Baker Ranch Community Park, and drain to the southwest. Commercial and industrial land uses are located between the tank facilities and the proposed school site. A more detailed analysis is presented in Section 3.2.

2.4 WATER TANK FAILURE RATES

Large water storage tanks typically do not fail catastrophically, even when subject to very strong ground shaking associated with an earthquake. But failure of these tanks could have consequences in terms of flooding at downstream locations. The most likely failure scenario is a piping break at the connection to the tanks. The following section reviews how steel storage tanks have fared during California earthquakes and potential failure modes.

Failure Modes for Steel Storage Tanks

Potential failure modes specific to steel storage tanks include:

Shell Buckling Mode – One of the most common causes of damage in steel tanks, this involves the outward buckling of the bottom shell course, a phenomenon known as "elephant foot". This has occasionally resulted in the loss of tank contents and, in some cases, total collapse of the tank.

Anchorage Failure – Many steel tanks have hold-down bolts, straps, or chairs that may result in anchor pullout, stretching, or failure during an earthquake. However, failure of an anchor does not necessarily lead to loss of tank contents.

Hydrostatic Pressure Failure – Tensile hoop stresses can increase due to shaking-induced pressures between the fluid and the tank, leading to splitting and leakage. Although no welded steel tanks have actually ruptured, large tensile hoop stresses can contribute to the likelihood of elephant foot buckling near the base of the tank.

Roof and Miscellaneous Steel Damage – A sloshing motion of the tank contents during an earthquake (known as a seiche) can cause upward pressure on the roof for full or nearly full tanks. New seismic codes that require a significant amount of freeboard reduce this potential impact. In past earthquakes, damage has occurred to the joints between the walls and the cone foots, with spillage of tank contents over the top of the wall. Lateral movement and rotation from ground shaking can also result in broken guides, ladders, or other appurtenances attached between the roof and the bottom plate. However, roof damage or broken appurtenances usually do not lead to a loss of more than one third of the tank's contents.

Foundation Failure – Soil failure due to liquefaction, slope instability, or excessive differential settlement as a result of an earthquake can cause severe distortion, cracking, or leakage at the tank bottom or foundation.

Connecting Pipe Failure – One of the more common causes of loss of tank contents during earthquakes is the fracture of piping at connections to the tank. This generally results from large vertical displacements of

the tank caused by tank buckling, wall uplift, or foundation failure, but can also occur with horizontal displacement of the tanks. Piping failure can also lead to extensive scour of the foundation materials. The recent seismic requirement for flexible piping connections reduces this potential impact.

Failure Rates of Tanks During Earthquakes

American Lifelines Alliance (ALA, 2001) evaluated the seismic performance of 424 tanks during the following earthquakes:

- 1933 Long Beach
- 1952 Kern County
- 1964 Alaska
- 1971 San Fernando
- 1979 Imperial Valley
- 1983 Coalinga
- 1989 Loma Prieta
- 1992 Landers
- 1994 Northridge

Each tank was assigned one of five damage states:

- Damage State 1: No damage
- Damage State 2: Slight damage – damage to roof, minor loss of content, minor shell damage, damage to attached pipes, no elephant foot failure
- Damage State 3: Moderate damage – elephant foot buckling with no leak or minor loss of contents
- Damage State 4: Extensive damage – elephant foot buckling with major loss of contents, severe damage
- Damage State 5: Complete (collapse) damage – total failure, tank collapse

The peak ground acceleration (PGA) for each earthquake also was reported and fragility curves were developed, which relate PGA to the probability of reaching or exceeding a particular damage state. For this analysis, a damage state of 4 or 5 was considered to be relevant for the catastrophic release scenario, because damage states of 1 through 3 would result in leakage that would be released slowly without causing significant flooding.

According to the United States Geological Survey Interactive Aggregation Website (2019), the maximum credible earthquake (i.e., 2% exceedance probability in 50 years) at the site was determined to have a peak ground acceleration (PGA) of 0.53g. This corresponds with an earthquake that has the potential to cause severe damage to water facilities (PGA$\geq$0.5g). The site is not located in an Alquist Priolo fault rupture hazard zone. The nearest known active earthquake fault is the San Joaquin Hills Thrust Fault, which is approximately 3.9 miles southwest of the school site.

For a PGA value of 0.53g, the ALA damage matrix showed that for 53 steel water tanks exposed to this level of ground shaking, only 5 tanks showed a Damage State of 4 or 5 (extensive damage or complete failure). However, it should be noted that most of the storage tanks in the database were old and not anchored or

designed to current earthquake standards. Anchoring of the foundations and retrofitting to meet current seismic standards would reduce this risk.

A site-specific water tank failure assessment was also conducted for these tanks. Assuming an upper-bound earthquake at the site has a return period of 2,475 years, or a 2% chance of exceedance in 50 years, this is equivalent to a 4.0×10^{-4} probability of occurring in a given year. According to the ALA's study of tank damage during earthquakes, steel water tanks exposed to a PGA associated with the upper-bound earthquake at the site (0.53g) could result in severe damage (Damage State 4) or total failure (Damage State 5). Conservatively assuming that severe damage would result in the loss of the entire contents of the water tank and there is a 9.4% probability of this occurring with an upper-bound earthquake (i.e., 5 out of 53 tanks in the database exhibited severe damage), the probability that the water tank would catastrophically fail given the upper-bound earthquake occurs at the site is predicted to be $4.0 \times 10^{-4} \times 0.094 = 3.8 \times 10^{-5}$. This is equivalent to once every 26,300 years. It should again be noted that the ALA's database includes tanks that are older and not subject to recent AWWA and seismic standards; therefore, the probability of a maximum credible earthquake resulting in a release of water at the tank site should be much lower than this estimate.

2. Hazard Assessment

This page intentionally left blank.

3. Consequence Analysis

3.1 WATER PIPELINE FLOODING ANALYSIS

The CDE requires that the risk of releases from high volume (≥12 inches) water pipelines be evaluated. The CDE Guidance Protocol for School Pipeline Risk Analysis provides a methodology for evaluating the potential for flooding. A probability analysis is not required. Because all of the identified water pipelines in Table 1 are located beneath streets, a pipeline flooding analysis was conducted for these pipelines to determine the depth and location of water flow within the street in the event of a pipeline leak or rupture. For this worst-case analysis, it was conservatively assumed that all of the water flowing through the pipelines at their maximum capacity would reach the surface. In addition, no credit was taken for the presence of storm drains along these streets.

Release impacts were calculated based on the procedures specified in the CDE manual. The release rate was determined by multiplying the pipe area by an assumed velocity of 5 feet per second (fps). Then the release rate was compared to the carrying capacity of the street, taking into account longitudinal slope, to determine if the water would be contained within the confines of the street curbing (Jeffers & Associates, 2006). The results are provided in Table 2.

Table 2 Water Pipeline Flooding Analysis – Street Flow

Pipeline Diameter (inches)	Pipeline Location	Type	Release Rate (cfs)	Street Width (ft)	Depth of Flow in Street (in)	Curb Height (inches)	Exceeds Street Carrying Capacity?
24-inch	Bake Parkway	Domestic Main (DM)	15.71	78	4.8	8	No
18-inch	Bake Parkway	DM	8.84	78	3.9	8	No
16-inch	Bake Parkway	DM	6.98	78	3.6	8	No
12-inch	Bake Parkway	DM	3.93	78	3.0	8	No
12-inch	Orchard Road	DM	3.93	40	2.1	8	No
18-inch	Rancho Parkway South	DM	8.84	78	2.7	8	No
16-inch	Rancho Parkway South	DM	6.98	78	2.5	8	No
16-inch	Rancho Parkway	DM	6.98	88	4.2	8	No
12-inch	Rancho Parkway	DM	3.93	88	3.5	8	No
12-inch	Lake Forest Drive	DM	3.93	78	2.6	8	No
12-inch	Towne Centre Drive	DM	3.93	60	2.6	8	No
12-inch	Bake Parkway	Recycled Water (RW)	3.93	78	3.0	8	No
12-inch	Orchard Road	RW	3.93	40	2.1	8	No
12-inch	Rancho Parkway South	RW	3.93	78	2.1	8	No
12-inch	Rancho Parkway	RW	3.93	88	3.5	8	No
12-inch	Lake Forest Drive	RW	3.93	78	2.6	8	No

Assuming a standard 8-inch curb for arterial streets, the water released from a full-flow rupture of the water pipelines would be entirely contained within the confines of the street curbing and would not result in flooding at the school site. For this worst-case analysis, it was conservatively assumed that all of the water flowing through the pipeline at its maximum capacity would reach the surface. In addition, no credit was taken for the existing surface topography nor that only a portion of the water released from the pipeline would reach the surface, given the pipelines are buried at least 3 feet below ground surface.

3.2 WATER TANK FLOODING ANALYSIS

In the unlikely event that either of the 7.8-million-gallon aboveground water storage tanks experience a release during the maximum credible earthquake, an important question to be answered is where the water would flow that is released from the tanks. A flooding analysis was conducted to answer this question and to determine if students and staff at the school site would be impacted.

For this worst-case analysis, it was assumed that the 7.8-million-gallon IRWD storage tanks would catastrophically fail as the result of an earthquake. It was assumed that either of the tanks would be full at the time and all of the water in the tank would be released immediately from the bottom of the tank via either the 24-inch inlet/outlet piping (i.e., 2-foot diameter hole) for the Zone "II' West Reservoir tank and via the 12-inch inlet/outlet piping (i.e., 1-foot diameter hole) for the Zone "B' West Reservoir tank. This worst-case analysis is conservative because a catastrophic failure of the storage tank is highly unlikely. The analysis provided in Section 2.4 shows that the ground shaking that occurs with the maximum credible earthquake in the vicinity of the water tank site would most likely not result in catastrophic tank failure. The water release impacts were modeled, using the methodology and calculations described in detail in Appendix B. For the modeling analysis, it was conservatively assumed that the inlet/outlet piping to the tank would break and release all the water from the tank. Based on the location of the tanks on top of a knoll with a berm to the south (see Elevation Gradient in Appendix B), the majority of released water would not flow directly toward the school site but would flow to the east towards the access driveway and onto Rancho Parkway South, to the north and northwest toward Baker Ranch Community Park, and to the south/southwest along the drainage channel just north and east of the cul-de-sac at Mariposa.

For the domestic water tank (Zone "II" West Reservoir tank), the release rate varies over time as the water level in the tank decreases, with a maximum flow rate of 97.0 cubic feet per second (cfs). The tank would be completely emptied in approximately 6 hours. However, IRWD personnel would respond quickly and most likely would be able to stop flow from the tank before it is completely emptied. Similarly, for the reclaimed water tank (Zone "B" West Reservoir tank), the maximum released water flow rate was calculated to be 24.3 cfs. Due to the smaller inlet/outlet piping size for the reclaimed water tank, the reclaimed water tank would take longer to empty (i.e., 24 hours and 10 minutes), compared to the domestic water tank. The results of the analysis are provided in Appendix B.

To determine if a catastrophic failure of either tank would result in a release of water that would adversely impact the school site, it was conservatively assumed that all of the water from the Zone "II" tank would flow at the maximum rate of 97 cfs onto Rancho Parkway South. The released water would most likely flow in multiple directions to the east, north, and south/southwest and the flow rate from the Zone "B" tank

would be significantly less (i.e., 24 cfs) than the flow rate from the Zone "II" tank. A street flow analysis for Rancho Parkway South was conducted to determine if the released water would be confined within the street curbing. The results provided in Appendix B show that the maximum depth in the street would be 8.1 inches. The curb height of the street is 8 inches. Therefore, it is possible that 0.1 inches of water would overflow the curb. This assumes that the released water did not turn and flow southwest on Bake Parkway but continued straight over the curb. At this location (i.e., the intersection of Rancho Parkway South and Bake Parkway), if the water flowed straight over the curb, it would mainly impact the land just west of the school site. Conservatively assuming that some released water would reach the western boundary of the school site, a water depth of 0.1 inches is much less than CDE's water depth level of concern of 12 inches.

There also are two large volume water pipelines connected with the two tanks that are within the 1,500-foot radius: 1) a 12-inch reclaimed water line that connects from the Zone "B" reservoir to the 12-inch reclaimed water main beneath Rancho Parkway South and 2) a 18-inch overflow water pipeline connected to the Zone "II" tank that drains into a natural drainage channel. A break in the 12-inch reclaimed water main would follow the flow path presented above for the tank failure scenario and flow onto Rancho Parkway South. Since it has a flow rate significantly less than the 97 cfs analyzed in the tank failure scenario (3.93 cfs), a release from this pipeline would be completely contained within the street curbing of Rancho Parkway South and would not impact the school site. A break in the 18-inch overflow water pipeline from the Zone "II" tank would result in released water draining into the natural channel south of the two tanks and would not reach the school site.

Based on these results, there should be no significant flooding at the school site in the unlikely event that any the water storage tanks to the northwest or connected water pipelines were to fail due to a maximum credible earthquake.

3. Consequence Analysis

This page intentionally left blank.

4. Summary and Recommendations

4.1 SUMMARY

- Irvine Ranch Water District (IRWD) owns and operates 16 high volume water pipelines (domestic and recycled water) within 1,500 feet of the school site and two 7.8-million-gallon aboveground water storage tanks in close proximity to the school site.

- Based on the worst-case analysis for the water pipelines, the water released from a full-flow rupture of any of the water pipelines would be entirely contained within the confines of the street curbing and would not result in flooding at the school site.

- Both tanks are constructed of welded steel and are 200 feet in diameter, 35 feet in height, and operate with a high water level of 33 feet in each tank. The Lake Forest Zone "II" West Reservoir tank stores domestic water and the Lake Forest Zone "B" West Reservoir tank stores recycled water.

- The school site and water tank site are not located in an Alquist Priolo fault rupture hazard zone; the upper-bound earthquake for the water tank site was predicted to have a peak ground acceleration (PGA) of 0.53g.

- The probability that the tank would catastrophically fail due to ground shaking from the upper-bound earthquake was conservatively estimated to be 3.8×10^{-5}, or approximately once every 26,300 years.

- A worst-case analysis was conducted, assuming that the inlet/outlet connections to the water tanks ruptured during a maximum credible earthquake and all the water in each tank was released when the tank was at its maximum storage capacity.

- Based on the model results provided in Appendix B, the released water would flow to the east, north, and south/southwest, and away from the proposed school site to the southeast.

- Based on a worst-case analysis assuming all of the released water at a maximum rate of 97 cfs flowed down Rancho Parkway South, the maximum water depth in the street would be 8.1 inches, as compared to a curb height of 8 inches. Therefore, the street curbing overflow would be only 0.1 inches and there would be no significant flooding at the school site.

- The results of this analysis show that a release from the IRWD storage tanks due to a maximum credible earthquake would not result in a safety hazard to students and staff at the proposed Nakase Elementary School.

4.2 RECOMMENDATIONS

- Although it is highly unlikely that any released water from a catastrophic failure of IRWD water pipelines or storage tanks could reach the school site, the school's emergency response and evacuation plan could address the possibility of water releases from this storage tank and identify potential evacuation routes (i.e., to the south). The following recommendations, though not required, could be implemented:

    - Maintain contact names for the water agency (Irvine Ranch Water District) with the emergency response plan in case the school needs to report leakage or malfunctions of the storage tank.

    - Keep a copy of this report with the school's emergency response plan so that potential flow paths and evacuation routes can be determined in the unlikely event of accidental releases from this tank.

5. References

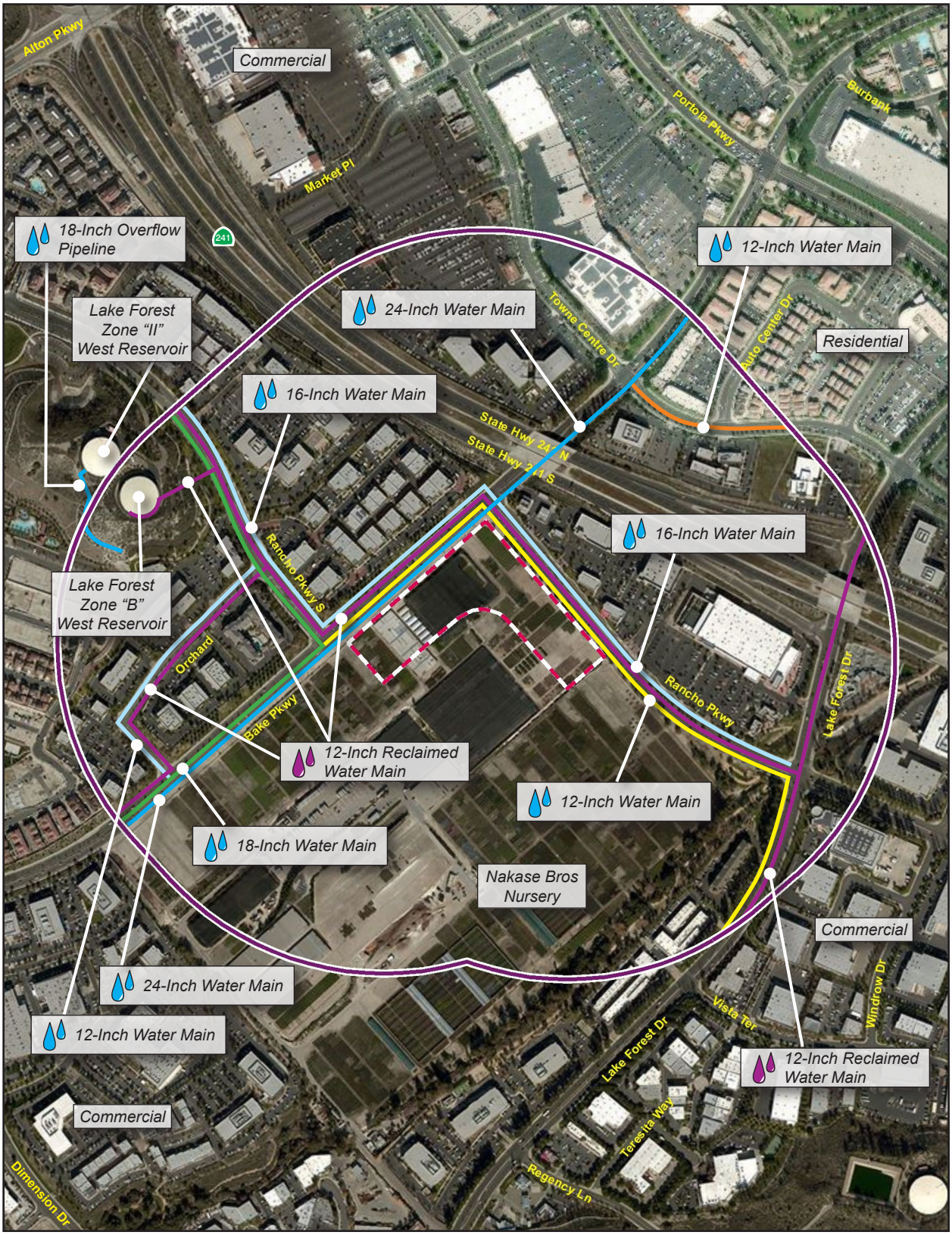
1. American Lifelines Alliance (ALA), 2001. *Seismic Fragility Formulations for Water Systems, Part 1 – Guideline.* April 2001.
2. California Department of Education (CDE), 2000. Resources for School Facilities Planning, School Selection and Approval Guide. Prepared by School Facilities Planning Division, CDE, Sacramento, CA.
3. CDE, 2007. Guidance Protocol for School Site Pipeline Risk Analysis, Prepared by URS Corporation. February, 2007.
4. Irvine Ranch Water District (IRWD), 2019. Water pipeline and tank information provided by Mr. Eric Akiyoshi, PE, Principal Engineer for IRWD to Ms. Danielle Clendening, Intern, for PlaceWorks. Dated January 29, 2019 and March 12, 2019.
5. Jeffers & Associates, 2006. Modified Manning's Equation Solver. Version 3.0.
6. National Pipeline Mapping System (NPMS), 2019. Gas Transmissions and Hazardous Liquids Pipeline Map produced by the NPMS Public Viewer at https://pvnpms.phmsa.dot.gov/PublicViewer/. Accessed on January 28, 2019.
7. PlaceWorks, 2018. *Water Pipeline Safety Hazard Assessment for Helen Keller Elementary School.* Dated January 2018.
8. United States Geological Survey, 2019. Unified Hazards Tool. Website accessed March 11, 2019 at https://earthquake.usgs.gov/hazards/interactive/.

5. References

This page intentionally left blank.

Figures

Figure 1 - Site Location and Pipeline Map



School Boundary

1,500-ft Radius

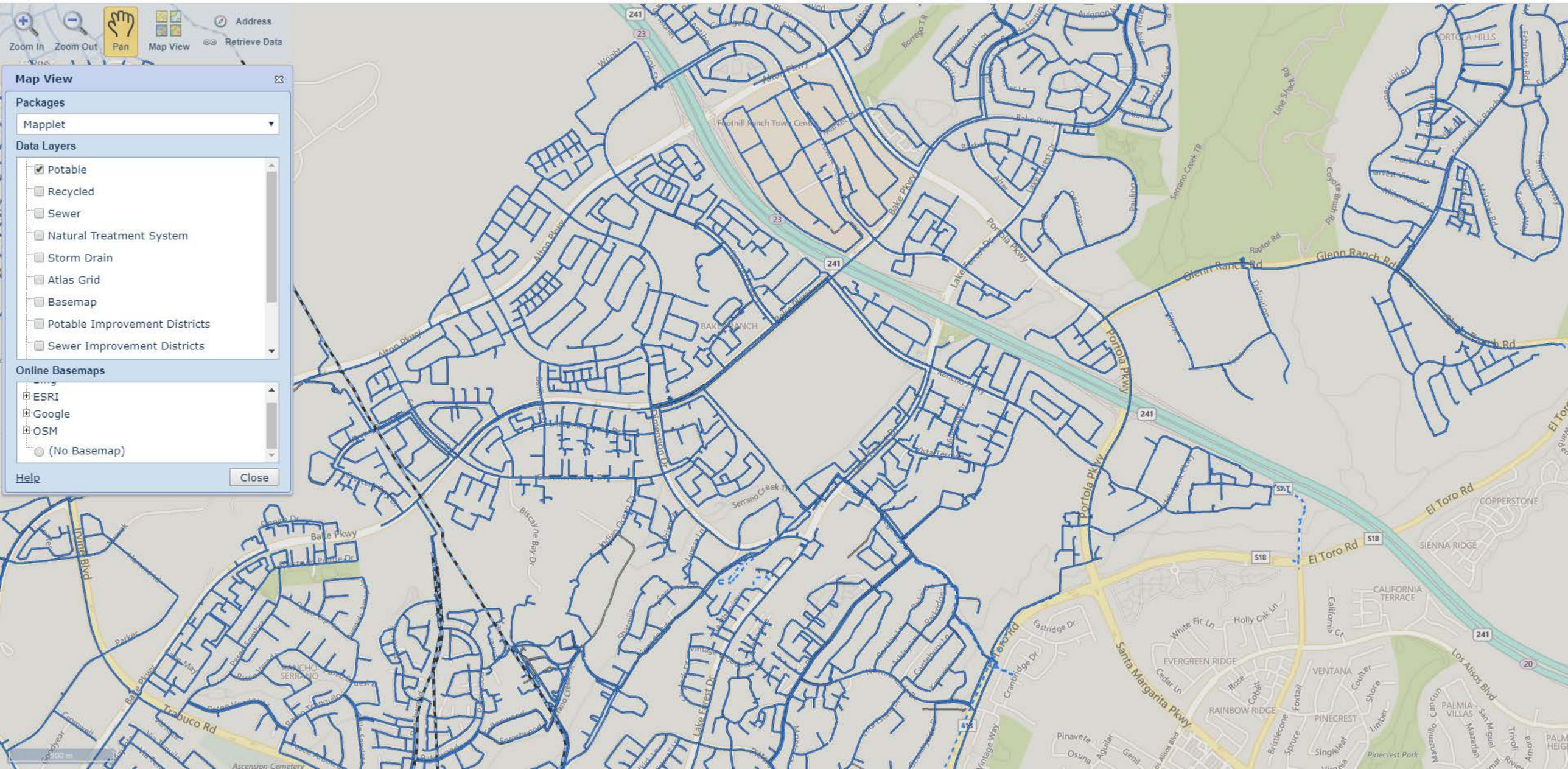
0 700
Scale (Feet)

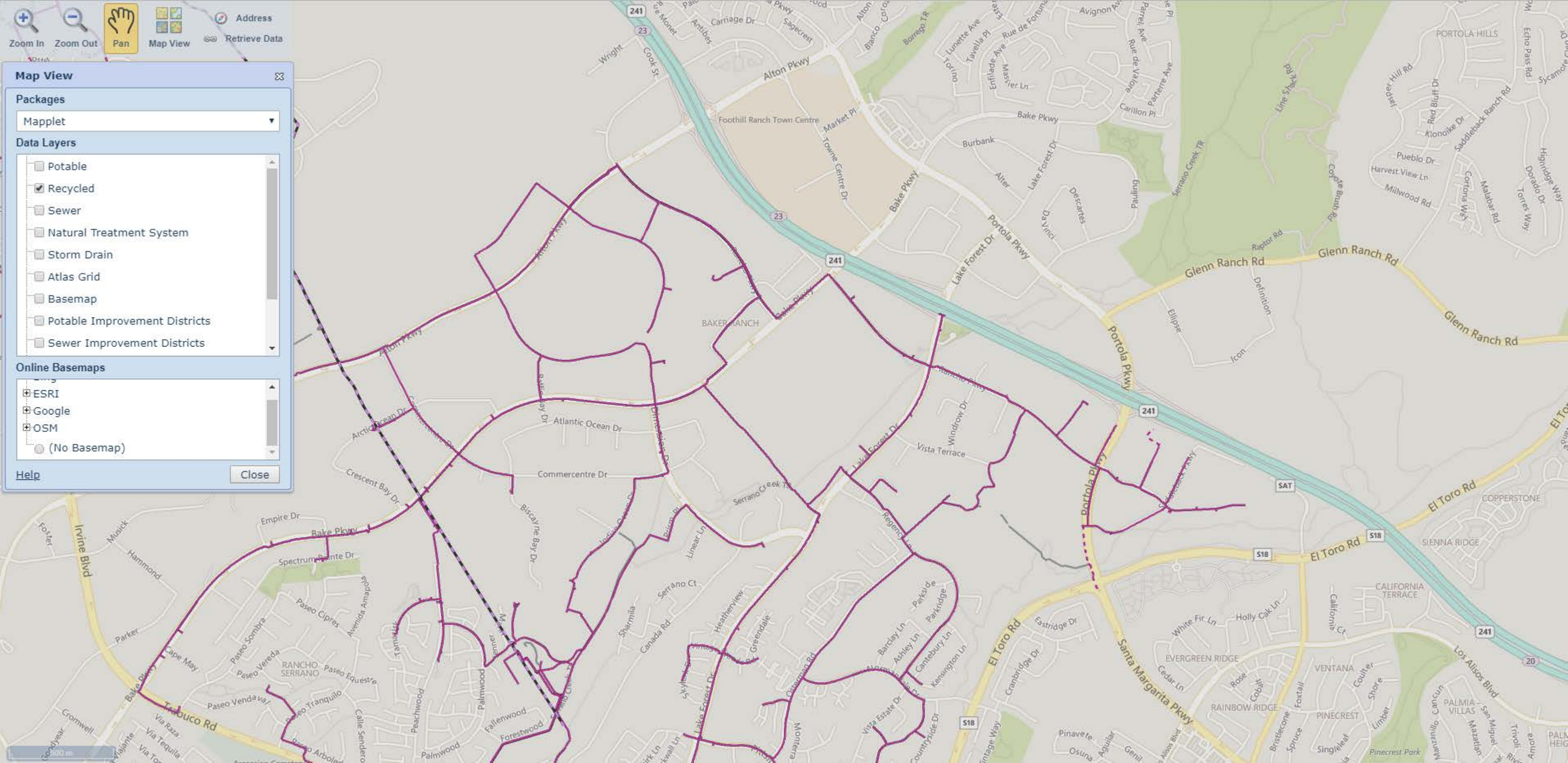
Source: ESRI, 2019

Appendix A. Agency Correspondence

Appendix

This page intentionally left blank.


Zoom In
Zoom Out
Pan
Map View
Address
Retrieve Data
Map View
Packages
Mapplet
Data Layers
Potable
Recycled
Sewer
Natural Treatment System
Storm Drain
Atlas Grid
Basemap
Potable Improvement Districts
Sewer Improvement Districts
Online Basemaps
ESRI
Google
OSM
(No Basemap)
Help
Close
Foothill Ranch Town Center
Portola Hills
Glenn Ranch Rd
El Toro Rd
Portola Pkwy
Santa Margarita Pkwy
Los Alisos Blvd
Irvine Blvd
Trabuco Rd
Bake Pkwy
Alton Pkwy
Lake Forest Dr
Serrano Creek Trl
Copperstone
Sienna Ridge
California Terrace
Evergreen Ridge
Ventana
Rainbow Ridge
Pinecrest
Palmia Villas
Pinecrest Park
Ascension Cemetery

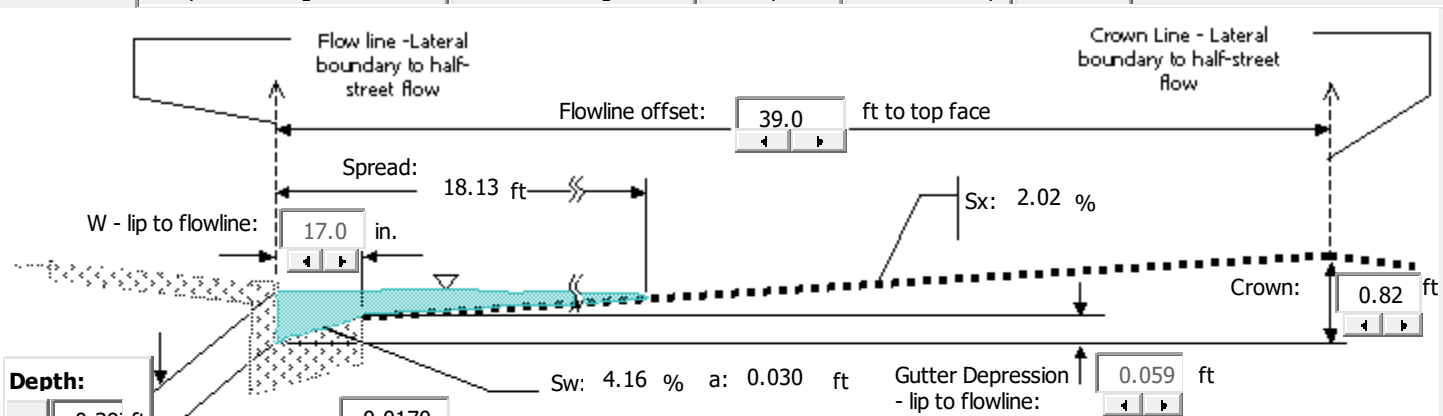

Zoom In
Zoom Out
Pan
Map View
Address
Retrieve Data
Map View
Packages
Mapplet
Data Layers
Potable
Recycled
Sewer
Natural Treatment System
Storm Drain
Atlas Grid
Basemap
Potable Improvement Districts
Sewer Improvement Districts
Online Basemaps
ESRI
Google
OSM
(No Basemap)
Help
Close
Alton Pkwy
Foothill Ranch Town Centre
Bake Pkwy
Lake Forest Dr
Portola Pkwy
Glenn Ranch Rd
El Toro Rd
Santa Margarita Pkwy
Los Alisos Blvd
Irvine Blvd
Trabuco Rd
Commercentre Dr
Atlantic Ocean Dr
Vista Terrace
BAKE RANCH
RANCHO SERRANO
PORTOLA HILLS
COPPERSTONE
SIENNA RIDGE
CALIFORNIA TERRACE
EVERGREEN RIDGE
VENTANA
RAINBOW RIDGE
PINECREST
PALMIA - VILLAS
241
23
SAT
S18
20

Modified Manning's Equation Solver
Version: 3.0<>3/5/2019 3:46:39 PM

© 2006 Jeffers & Associates, PLLC. All Rights Reserved

Print | Save | Quit

Parameters | Composite Triangular Sections | Head - Discharge Table | Assumptions | Inlet Geometry | Disclaimer



Local Parameters:
Local inlet flow line depression: 2.0 in.

Curb Opening Parameters:
C-O Apron wider than gutter: 0 in.
S'w 13.9 % Se: 4.90 %
Length of curb opening inlet: 12.0 ft
Lt: 41.05 ft
80 % Clear Efficiency 38.1 %
Curb opening flowby: 9.73 cfs

P-1-7/8-4
Print Chart 7

Grate Parameters:
Apron wider than grate: 2 in.
Length: 48 in. Width: 22 in.
% Factor 50 % Factor 50
Splash-over Vel: 7.41 ft/s Vel over grate: 6.28 ft/s
Eo: 46.40 %
Rs: 3.95 % Rf: 100.00 %
Side flow captured: 0.29 cfs Frontal captured: 2.26 cfs
Total combined CB flowby: 7.17 cfs

Street Parameters:
Q: 15.71 cfs
K: 120.5
Vel: 4.69 ft/s
Eo: 20.6 %
W/T: 0.0782

Standard Manning's:
Q: 12.96 cfs
K: 99.4
Vel: 3.87 ft/s
Rh: 0.18 ft
Area: 3.35 sf

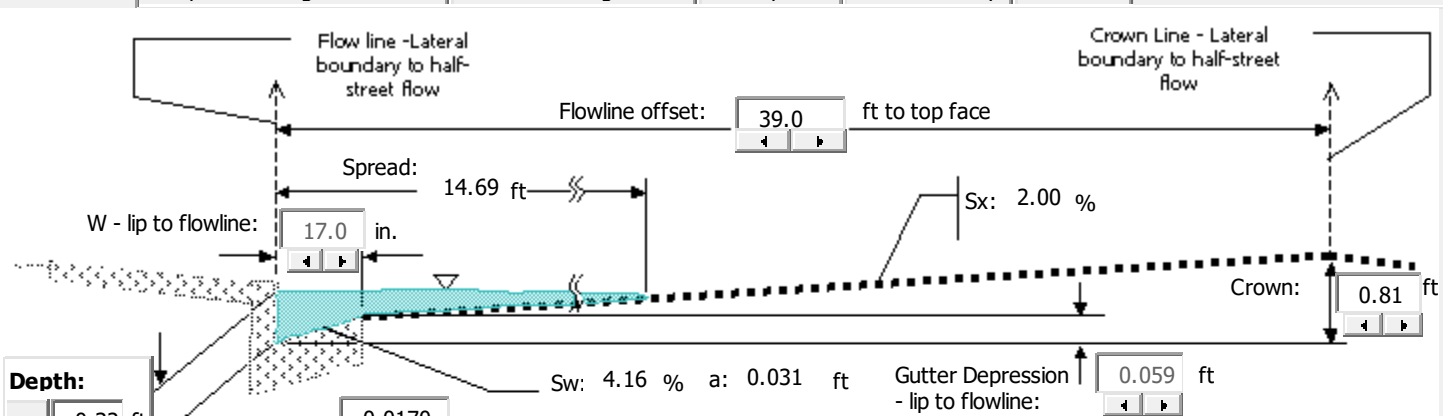
Street Flow - 24-Inch Domestic Water Pipeline
Bake Parkway

Modified Manning's Equation Solver
Version: 3.0<>5/10/2017 1:56:55 PM

© 2006 Jeffers & Associates, PLLC. All Rights Reserved

Print | Save | Quit

Parameters | Composite Triangular Sections | Head - Discharge Table | Assumptions | Inlet Geometry | Disclaimer



Local Parameters:
Local inlet flow line depression: 2.0 in.

Curb Opening Parameters:
C-O Apron wider than gutter: 0 in.
S'w 13.9 % Se: 5.53 %
Length of curb opening inlet: 12.0 ft
Lt: 29.96 ft
80 % Clear Efficiency 50.1 %
Curb opening flowby: 4.41 cfs

P-1-7/8-4
Print Chart 7

Grate Parameters:
Apron wider than grate: 2 in.
Length: 48 in. Width: 22 in.
% Factor 50 % Factor 50
Splash-over Vel: 7.41 ft/s Vel over grate: 5.27 ft/s
Eo: 64.72 %
Rs: 4.85 % Rf: 100.00 %
Side flow captured: 0.14 cfs Frontal captured: 1.43 cfs
Total combined CB flowby: 2.84 cfs

Street Parameters:
Q: 8.84 cfs
K: 67.8
Vel: 4.06 ft/s
Eo: 25.4 %
W/T: 0.0965

Standard Manning's:
Q: 7.28 cfs
K: 55.8
Vel: 3.34 ft/s
Rh: 0.15 ft
Area: 2.18 sf

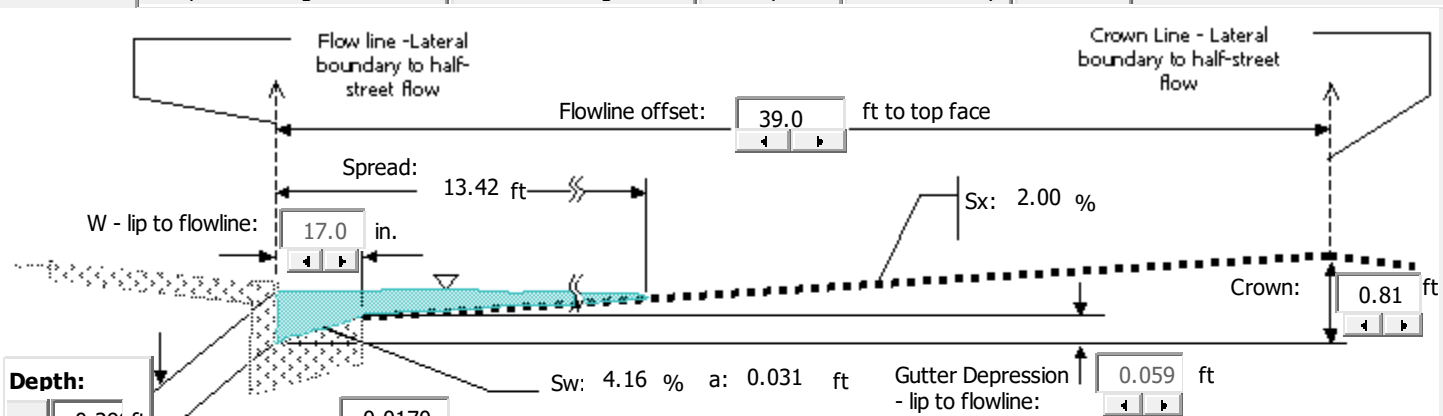
Street Flow - 18-Inch Domestic Water Pipeline
Bake Parkway, between Orchard Drive and
Rancho Parkway South

Modified Manning's Equation Solver
Version: 3.0<>5/10/2017 1:56:55 PM

© 2006 Jeffers & Associates, PLLC. All Rights Reserved

Print | Save | Quit

Parameters | Composite Triangular Sections | Head - Discharge Table | Assumptions | Inlet Geometry | Disclaimer



Street Parameters:

Q:	6.98	cfs
K:	53.5	
Vel:	3.83	ft/s
Eo:	27.7	%
W/T:	0.1056	

Standard Manning's:

Q:	5.74	cfs
K:	44.0	
Vel:	3.15	ft/s
Rh:	0.13	ft
Area:	1.82	sf

Local Parameters:

Local inlet flow line depression: 2.0 in.

Curb Opening Parameters:

C-O Apron wider than gutter: 0 in.

S'w 13.9 % Se: 5.85 %

Length of curb opening inlet: 12.0 ft

Lt: 26.23 ft

80 % Clear Efficiency 56.0 %

Curb opening flowby: 3.07 cfs

P-1-7/8-4

Print Chart 7

Grate Parameters:

Apron wider than grate: 2 in.

Length: 48 in. Width: 22 in.

% Factor 50 % Factor 50

Splash-over Vel: 7.41 ft/s Vel over grate: 4.86 ft/s

Eo: 74.63 %

Rs: 5.23 % Rf: 100.00 %

Side flow captured: 0.10 cfs Frontal captured: 1.15 cfs

Total combined CB flowby: 1.83 cfs

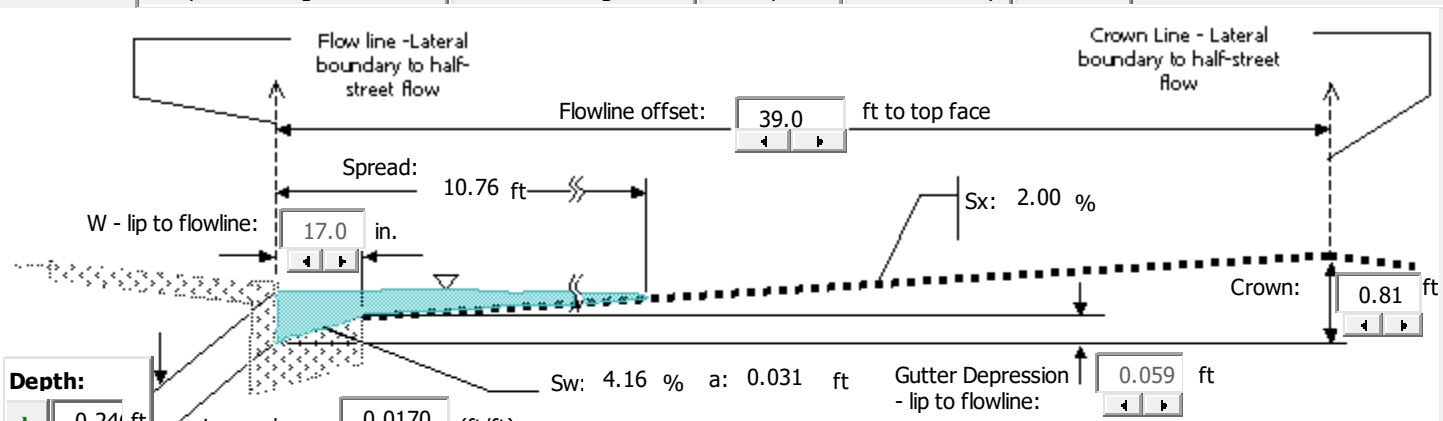
Street Flow - 16-Inch Domestic Water Pipeline
Bake Parkway, between Rancho Parkway South and Rancho Parkway

Modified Manning's Equation Solver
Version: 3.0<>3/5/2019 3:46:39 PM

© 2006 Jeffers & Associates, PLLC. All Rights Reserved

Print | Save | Quit

Parameters | Composite Triangular Sections | Head - Discharge Table | Assumptions | Inlet Geometry | Disclaimer



Street Parameters:

Q:	3.93	cfs
K:	30.1	
Vel:	3.33	ft/s
Eo:	34.1	%
W/T:	0.1316	

Standard Manning's:

Q:	3.22	cfs
K:	24.7	
Vel:	2.73	ft/s
Rh:	0.11	ft
Area:	1.18	sf

Local Parameters:

Local inlet flow line depression: 2.0 in.

Curb Opening Parameters:

C-O Apron wider than gutter: 0 in.

S'w 13.9 % Se: 6.75 %

Length of curb opening inlet: 12.0 ft

Lt: 18.91 ft

80 % Clear Efficiency 72.1 %

Curb opening flowby: 1.10 cfs

P-1-7/8-4

Print Chart 7

Grate Parameters:

Apron wider than grate: 2 in.

Length: 48 in. Width: 22 in.

% Factor 50 % Factor 50

Splash-over Vel: 7.41 ft/s Vel over grate: 3.76 ft/s

Eo: 98.73 %

Rs: 5.93 % Rf: 100.00 %

Side flow captured: 0.03 cfs Frontal captured: 0.54 cfs

Total combined CB flowby: 0.52 cfs

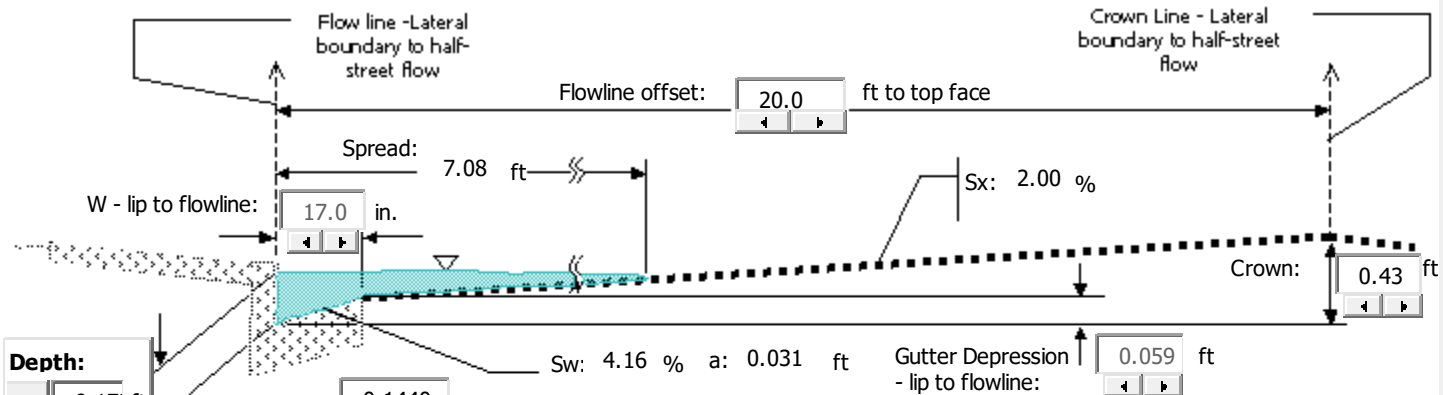
Street Flow - 12-Inch Domestic Water Pipeline
Bake Parkway, between Rancho Parkway South and Rancho Parkway
12-Inch Recycled Water Pipeline
Bake Parkway west of Orchard Road and between Rancho Parkway South and Rancho Parkway

Modified Manning's Equation Solver
Version: 3.0<>3/5/2019 4:46:39 PM

© 2006 Jeffers & Associates, PLLC. All Rights Reserved

Print | Save | Quit

Parameters | Composite Triangular Sections | Head - Discharge Table | Assumptions | Inlet Geometry | Disclaimer



Street Parameters:

Q:	3.93	cfs
K:	10.4	
Vel:	7.54	ft/s
Eo:	49.8	%
W/T:	0.2002	

Standard Manning's:

Q:	3.18	cfs
K:	8.4	
Vel:	6.10	ft/s
Rh:	0.07	ft
Area:	0.52	sf

Local Parameters:

Local inlet flow line depression: 2.0 in.

Curb Opening Parameters:

C-O Apron wider than gutter: 0 in.

S'w 13.9 % Se: 8.93 %

Length of curb opening inlet: 12.0 ft

Lt: 30.37 ft

80 % Clear Efficiency 49.5 %

Curb opening flowby: 1.18 cfs

P-1-7/8-4

Print Chart 7

Grate Parameters:

Apron wider than grate: 2 in.

Length: 48 in. Width: 22 in.

% Factor 50 % Factor 50

Splash-over Vel: 7.41 ft/s Vel over grate: 9.66 ft/s

Eo: 100.00 %

Rs: 0.93 % Rf: 79.79 %

Side flow captured: 0.01 cfs Frontal captured: 0.79 cfs

Total combined CB flowby: 1.18 cfs

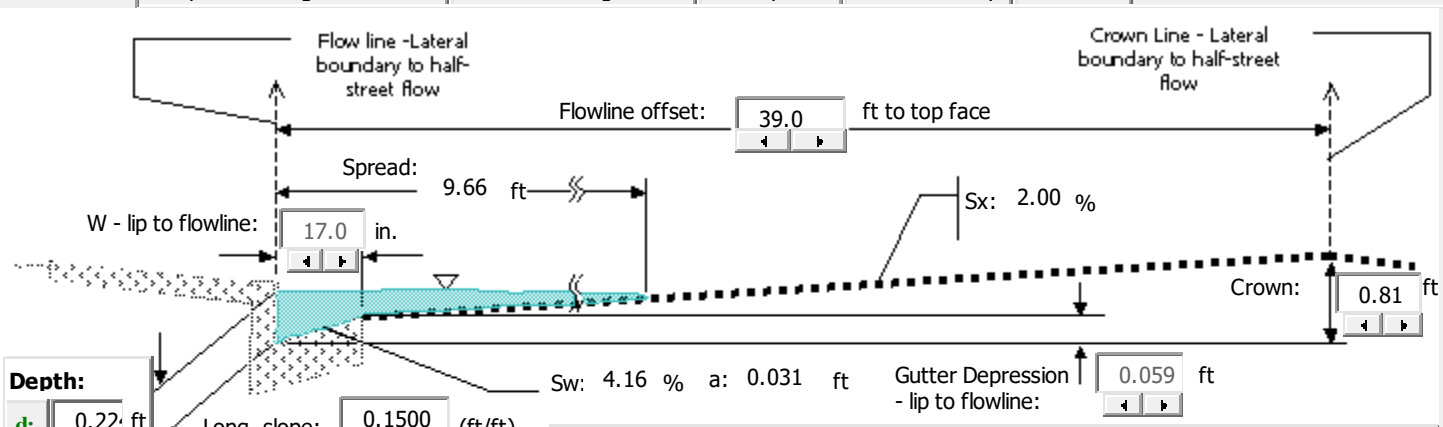
Street Flow - 12-Inch Domestic Water and Recycled Water Pipelines
Orchard Road

Modified Manning's Equation Solver
Version: 3.0<>3/5/2019 4:46:39 PM

© 2006 Jeffers & Associates, PLLC. All Rights Reserved

Print | Save | Quit

Parameters | Composite Triangular Sections | Head - Discharge Table | Assumptions | Inlet Geometry | Disclaimer



Street Parameters:

Q:	8.84	cfs
K:	22.8	
Vel:	9.26	ft/s
Eo:	37.7	%
W/T:	0.1466	

Standard Manning's:

Q:	7.22	cfs
K:	18.7	
Vel:	7.57	ft/s
Rh:	0.10	ft
Area:	0.95	sf

Local Parameters:

Local inlet flow line depression: 2.0 in.

Curb Opening Parameters:

C-O Apron wider than gutter: 0 in.

S'w 13.9 % Se: 7.25 %

Length of curb opening inlet: 12.0 ft

Lt: 48.95 ft

80 % Clear Efficiency 32.5 %

Curb opening flowby: 5.97 cfs

P-1-7/8-4

Print Chart 7

Grate Parameters:

Apron wider than grate: 2 in.

Length: 48 in. Width: 22 in.

% Factor 50 % Factor 50

Splash-over Vel: 7.41 ft/s Vel over grate: 13.05 ft/s

Eo: 86.47 %

Rs: 0.81 % Rf: 69.98 %

Side flow captured: 0.03 cfs Frontal captured: 1.81 cfs

Total combined CB flowby: 4.13 cfs

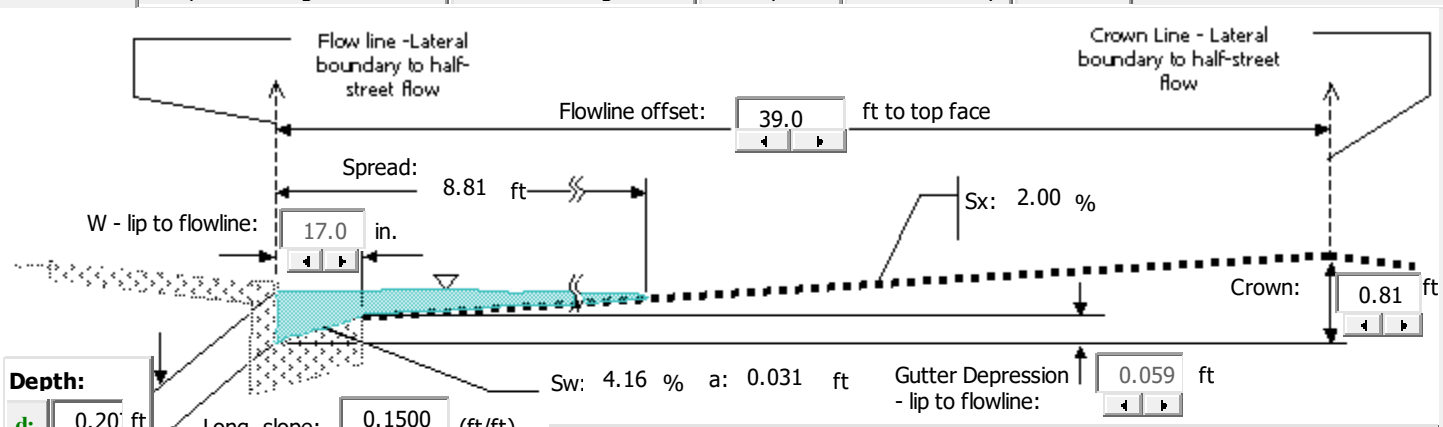
Street Flow - 18-Inch Domestic Water Pipeline
Rancho Parkway South

Modified Manning's Equation Solver
Version: 3.0<>3/5/2019 4:46:39 PM

© 2006 Jeffers & Associates, PLLC. All Rights Reserved

Print | Save | Quit

Parameters | Composite Triangular Sections | Head - Discharge Table | Assumptions | Inlet Geometry | Disclaimer



Street Parameters:

Q:	6.98	cfs
K:	18.0	
Vel:	8.76	ft/s
Eo:	41.0	%
W/T:	0.1608	

Standard Manning's:

Q:	5.69	cfs
K:	14.7	
Vel:	7.14	ft/s
Rh:	0.09	ft
Area:	0.80	sf

Local Parameters:

Local inlet flow line depression: 2.0 in.

Curb Opening Parameters:

C-O Apron wider than gutter: 0 in.

S'w 13.9 % Se: 7.71 %

Length of curb opening inlet: 12.0 ft

Lt: 42.71 ft

80 % Clear Efficiency 36.8 %

Curb opening flowby: 4.41 cfs

P-1-7/8-4

Print Chart 7

Grate Parameters:

Apron wider than grate: 2 in.

Length: 48 in. Width: 22 in.

% Factor 50 % Factor 50

Splash-over Vel: 7.41 ft/s Vel over grate: 12.10 ft/s

Eo: 93.82 %

Rs: 0.84 % Rf: 70.46 %

Side flow captured: 0.02 cfs Frontal captured: 1.46 cfs

Total combined CB flowby: 2.93 cfs

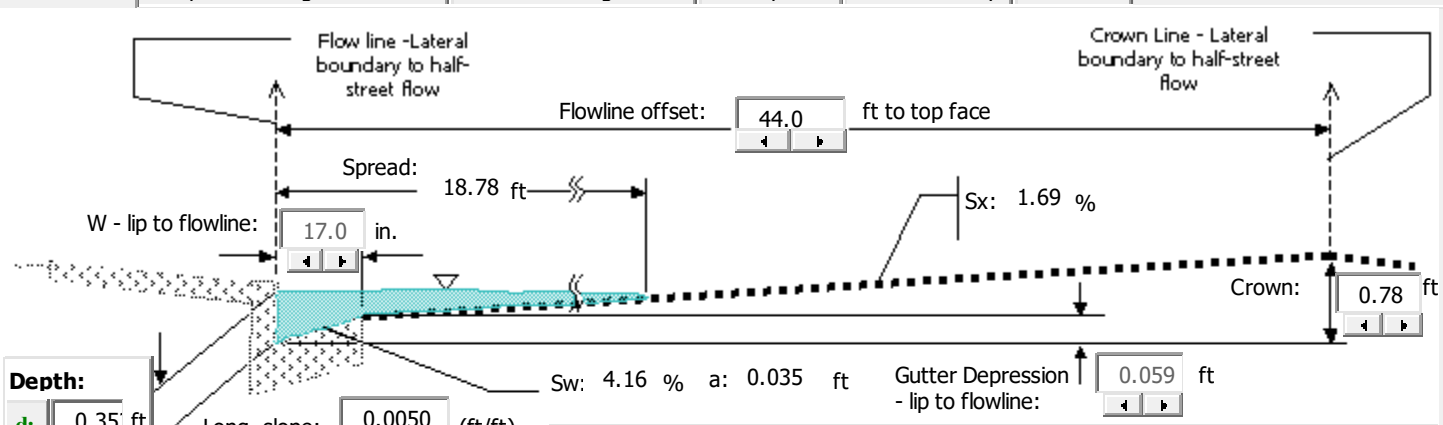
Street Flow - 16-Inch Domestic Water Pipeline
Rancho Parkway South

Modified Manning's Equation Solver
Version: 3.0<>3/5/2019 4:46:39 PM

© 2006 Jeffers & Associates, PLLC. All Rights Reserved

Print | Save | Quit

Parameters | Composite Triangular Sections | Head - Discharge Table | Assumptions | Inlet Geometry | Disclaimer



Street Parameters:

Q:	6.98	cfs
K:	98.7	
Vel:	2.32	ft/s
Eo:	20.4	%
W/T:	0.0754	

Standard Manning's:

Q:	5.76	cfs
K:	81.5	
Vel:	1.91	ft/s
Rh:	0.16	ft
Area:	3.01	sf

Local Parameters:
Local inlet flow line depression: 2.0 in.

Curb Opening Parameters:
C-O Apron wider than gutter: 0 in.
S'w 14.2 % Se: 4.59 %
Length of curb opening inlet: 12.0 ft
Lt: 21.02 ft
80 % Clear Efficiency 66.6 %
Curb opening flowby: 2.33 cfs

P-1-7/8-4
Print Chart 7

Grate Parameters:
Apron wider than grate: 2 in.
Length: 48 in. Width: 22 in.
% Factor 50 % Factor 50
Splash-over Vel: 7.41 ft/s Vel over grate: 2.80 ft/s
Eo: 63.06 %
Rs: 12.40 % Rf: 100.00 %
Side flow captured: 0.20 cfs Frontal captured: 0.73 cfs
Total combined CB flowby: 1.40 cfs

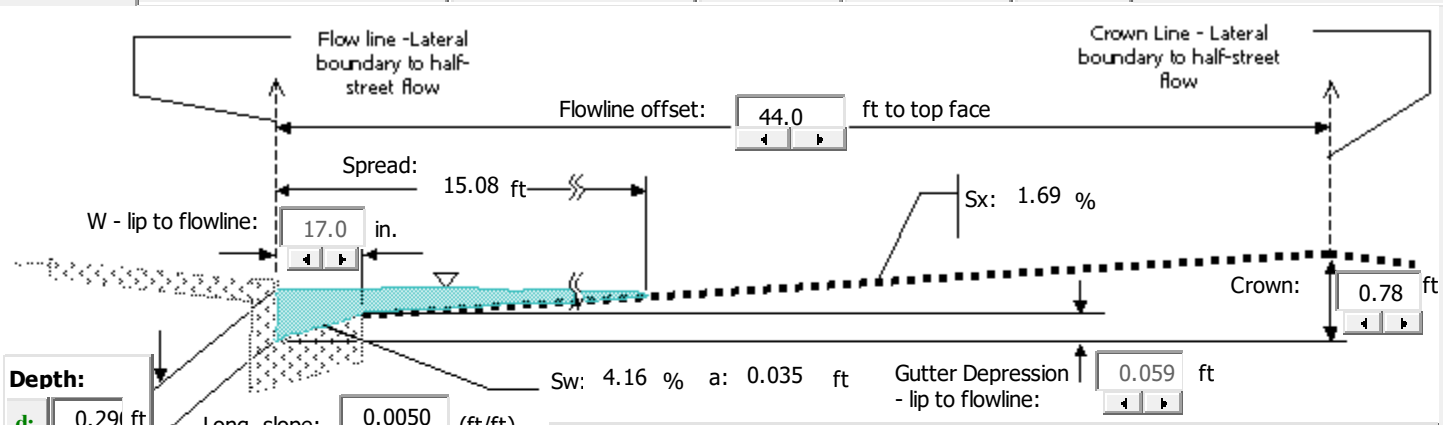
Street Flow - 16-Inch Domestic Water Pipeline
Rancho Parkway

Modified Manning's Equation Solver
Version: 3.0<>3/5/2019 4:46:39 PM

© 2006 Jeffers & Associates, PLLC. All Rights Reserved

Print | Save | Quit

Parameters | Composite Triangular Sections | Head - Discharge Table | Assumptions | Inlet Geometry | Disclaimer



Local Parameters:
Local inlet flow line depression: 2.0 in.

Curb Opening Parameters:
C-O Apron wider than gutter: 0 in.
S'w 14.2 % Se: 5.29 %
Length of curb opening inlet: 12.0 ft
Lt: 15.16 ft
80 % Clear Efficiency 83.5 %
Curb opening flowby: 0.65 cfs

P-1-7/8-4
Print Chart 7

Grate Parameters:
Apron wider than grate: 2 in.
Length: 48 in. Width: 22 in.
% Factor 50 % Factor 50
Splash-over Vel: 7.41 ft/s Vel over grate: 2.08 ft/s
Eo: 97.25 %
Rs: 14.59 % Rf: 100.00 %
Side flow captured: 0.05 cfs Frontal captured: 0.31 cfs
Total combined CB flowby: 0.28 cfs

Street Parameters:
Q: 3.93 cfs
K: 55.6
Vel: 2.01 ft/s
Eo: 25.3 %
W/T: 0.0939

Standard Manning's:
Q: 3.24 cfs
K: 45.8
Vel: 1.66 ft/s
Rh: 0.13 ft
Area: 1.95 sf

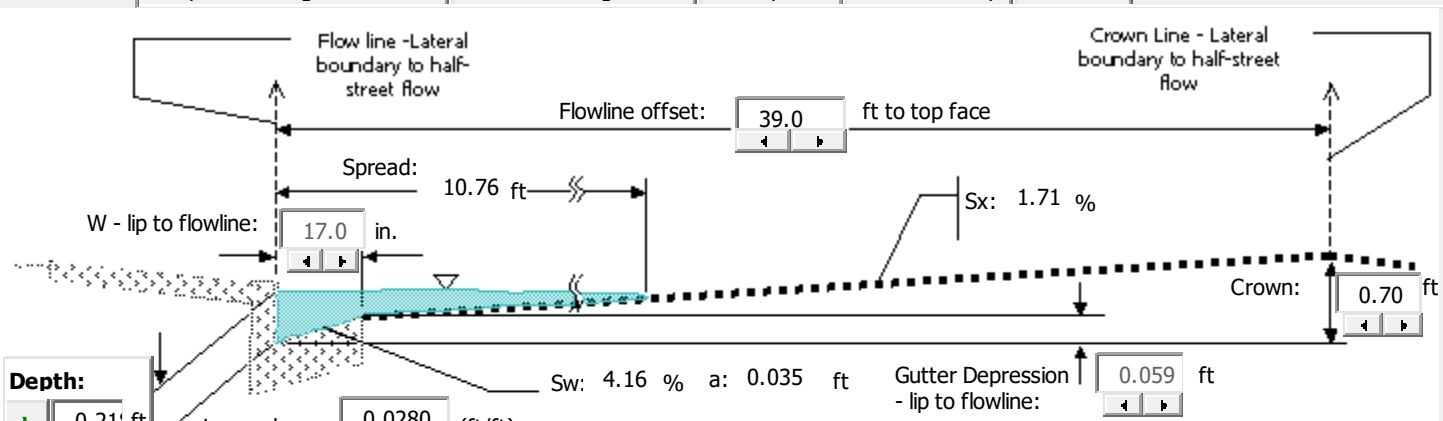
Street Flow - 12-Inch Domestic Water and Recycled Water Pipelines
Rancho Parkway

Modified Manning's Equation Solver
Version: 3.0<>5/10/2017 1:56:55 PM

© 2006 Jeffers & Associates, PLLC. All Rights Reserved

Print | Save | Quit

Parameters | Composite Triangular Sections | Head - Discharge Table | Assumptions | Inlet Geometry | Disclaimer



Street Parameters:

Q:	3.93	cfs
K:	23.5	
Vel:	3.88	ft/s
Eo:	35.0	%
W/T:	0.1316	

Standard Manning's:

Q:	3.21	cfs
K:	19.2	
Vel:	3.17	ft/s
Rh:	0.09	ft
Area:	1.01	sf

Local Parameters:
Local inlet flow line depression: 2.0 in.

Curb Opening Parameters:
C-O Apron wider than gutter: 0 in.
S'w 14.2 % Se: 6.69 %
Length of curb opening inlet: 12.0 ft
Lt: 22.10 ft
80 % Clear Efficiency 64.1 %
Curb opening flowby: 1.41 cfs

P-1-7/8-4
Print Chart 7

Grate Parameters:
Apron wider than grate: 2 in.
Length: 48 in. Width: 22 in.
% Factor 50 % Factor 50
Splash-over Vel: 7.41 ft/s Vel over grate: 4.81 ft/s
Eo: 98.43 %
Rs: 3.53 % Rf: 100.00 %
Side flow captured: 0.03 cfs Frontal captured: 0.69 cfs
Total combined CB flowby: 0.69 cfs

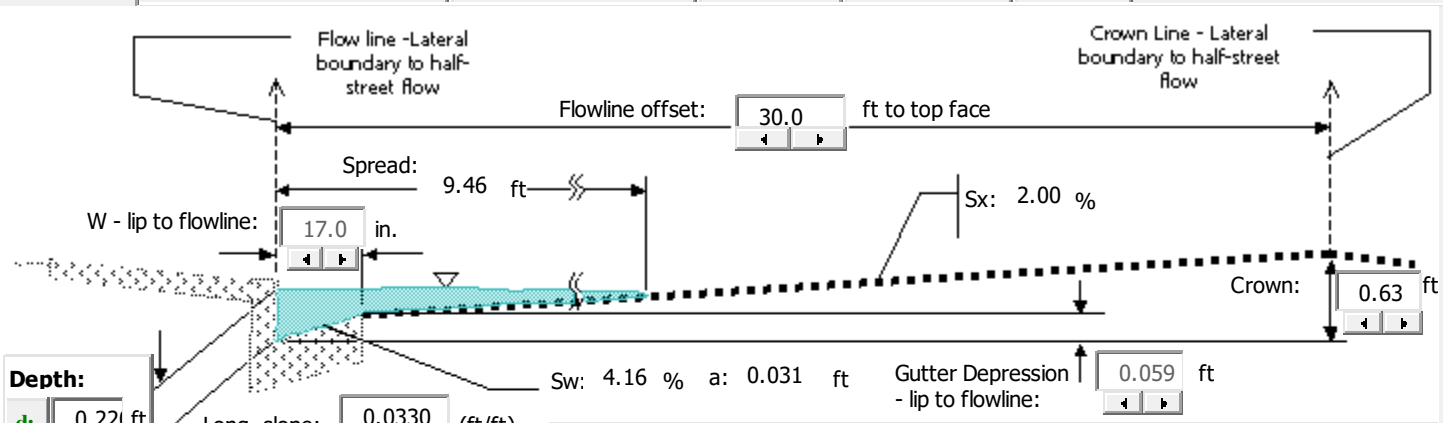
Street Flow - 12-Inch Domestic Water and Recycled Water Pipelines
Lake Forest Drive

Modified Manning's Equation Solver
Version: 3.0<>3/5/2019 4:46:39 PM

© 2006 Jeffers & Associates, PLLC. All Rights Reserved

Print | Save | Quit

Parameters | Composite Triangular Sections | Head - Discharge Table | Assumptions | Inlet Geometry | Disclaimer



Street Parameters:

Q:	3.93	cfs
K:	21.6	
Vel:	4.29	ft/s
Eo:	38.4	%
W/T:	0.1497	

Standard Manning's:

Q:	3.21	cfs
K:	17.7	
Vel:	3.50	ft/s
Rh:	0.09	ft
Area:	0.92	sf

Local Parameters:

Local inlet flow line depression: 2.0 in.

Curb Opening Parameters:

C-O Apron wider than gutter: 0 in.

S'w 13.9 % Se: 7.35 %

Length of curb opening inlet: 12.0 ft

Lt: 21.93 ft

80 % Clear Efficiency 64.5 %

Curb opening flowby: 1.39 cfs

P-1-7/8-4

Print Chart 7

Grate Parameters:

Apron wider than grate: 2 in.

Length: 48 in. Width: 22 in.

% Factor 50 % Factor 50

Splash-over Vel: 7.41 ft/s Vel over grate: 5.10 ft/s

Eo: 99.50 %

Rs: 3.37 % Rf: 100.00 %

Side flow captured: 0.02 cfs Frontal captured: 0.69 cfs

Total combined CB flowby: 0.68 cfs

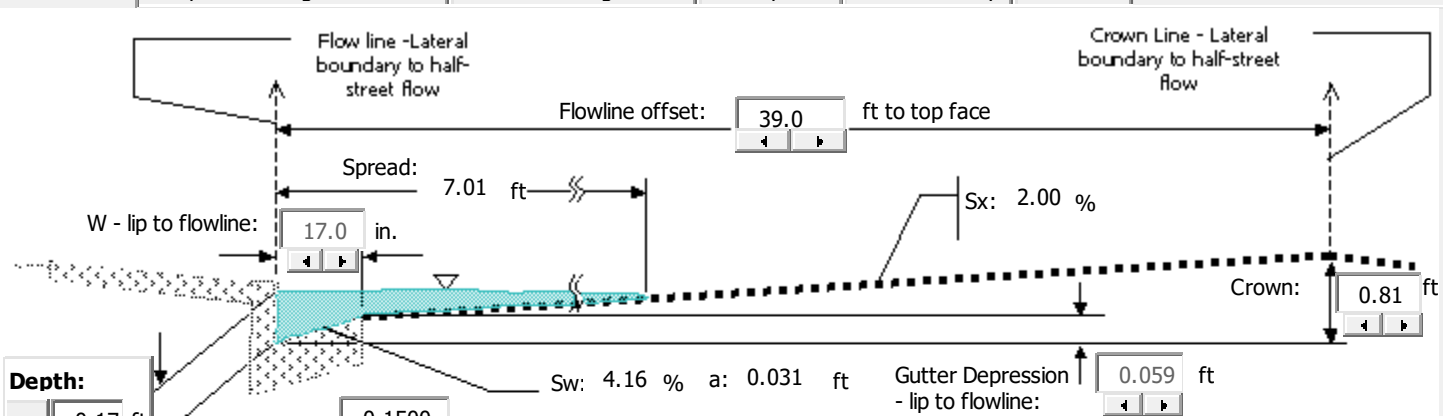
Street Flow - 12-Inch Domestic Water Pipeline
Towne Center Drive

Modified Manning's Equation Solver
Version: 3.0<>3/5/2019 4:46:39 PM

© 2006 Jeffers & Associates, PLLC. All Rights Reserved

Print | Save | Quit

Parameters | Composite Triangular Sections | Head - Discharge Table | Assumptions | Inlet Geometry | Disclaimer



Local Parameters:
Local inlet flow line depression: 2.0 in.

Curb Opening Parameters:
C-O Apron wider than gutter: 0 in.
S'w 13.9 % Se: 8.98 %
Length of curb opening inlet: 12.0 ft
Lt: 30.63 ft
80 % Clear Efficiency 49.2 %
Curb opening flowby: 2.00 cfs

P-1-7/8-4
Print Chart 7

Grate Parameters:
Apron wider than grate: 2 in.
Length: 48 in. Width: 22 in.
% Factor 50 % Factor 50
Splash-over Vel: 7.41 ft/s Vel over grate: 9.82 ft/s
Eo: 100.00 %
Rs: 0.89 % Rf: 78.31 %
Side flow captured: 0.01 cfs Frontal captured: 0.78 cfs
Total combined CB flowby: 1.20 cfs

Street Parameters:
Q: 3.93 cfs
K: 10.1
Vel: 7.66 ft/s
Eo: 50.1 %
W/T: 0.2020

Standard Manning's:
Q: 3.18 cfs
K: 8.2
Vel: 6.19 ft/s
Rh: 0.07 ft
Area: 0.51 sf

Street Flow - 12-Inch Recycled Water Pipeline
Rancho Parkway South

From: Eric Akiyoshi
To: Danielle Clendening
Subject: Re: Fwd: Pipeline Information Request for Proposed School Site in Lake Forest, CA
Date: Tuesday, January 29, 2019 11:35:19 AM

Danielle

Thank you for your e-mail. With regards to your facilities request. You can do the research on IRWD's online GIS Map and Records tool located here:
https://www.irwd.com/doing-business/gis-map-and-records

Regarding the two tanks you identified, items 1-6 have been filled in. Items 6-9 will need to be researched and we anticipate getting back to you within 5-7 business days.

Lake Forest Zone "II" West Reservoir

1. Tank Capacity: 7.8 million gallons
<!--[if !supportLists]-->2. ID: Lake Forest Zone "II" West Reservoir
<!--[if !supportLists]-->3. Height: approximately 35 ft
<!--[if !supportLists]-->4. Material: Steel
<!--[if !supportLists]-->5. Year of Construction: 1978
<!--[if !supportLists]-->6. Water Level of the Tank: High Water Level = 883 ft
<!--[if !supportLists]-->

Lake Forest Zone "B" West Reservoir

1. Tank Capacity: 7.8 million gallons
<!--[if !supportLists]-->2. ID: Lake Forest Zone "B" West Reservoir
<!--[if !supportLists]-->3. Height: approximately 35 ft
<!--[if !supportLists]-->4. Material: Steel
<!--[if !supportLists]-->5. Year of Construction: 1984
<!--[if !supportLists]-->6. Water Level of the Tank: High Water Level = 867 ft
<!--[if !supportLists]-->

If you have questions, feel free to contact me.

Eric Akiyoshi, P.E.
Principal Engineer
Planning and Technical Services
Irvine Ranch Water District
15600 Sand Canyon Avenue, Irvine, California 92618
Mailing: PO Box 57000, Irvine, California 92619-7000
(949) 453-5552 office (714) 222-5149 cell
Email: akiyoshi@irwd.com

>>> Danielle Clendening <dbclendening@placeworks.com> 1/28/2019 3:36 PM >>>
Good afternoon,

Saddleback Valley Unified School District, in compliance with CCR Title V Section 14010 (h), has contracted the services of PlaceWorks to conduct a safety hazard assessment related to water pipelines that are 12-inches in diameter or greater and pressurized sewer lines located within a 1,500-foot radius of a proposed elementary school site in Lake Forest, Orange County, CA. The proposed school site is located in the northeast corner of the intersection of Bake Parkway and Rancho Parkway. I have attached a pdf of a map showing the exact location of the site outlined in

yellow and an approximately 1,500-foot radius marked around the site in red.

This email is requesting information about any water pipelines 12-inches in diameter or greater and any pressurized sewer pipelines operated by Irvine Ranch Water District located within a 1,500-foot radius of the site. If there are no water or sewer lines that meet those specifications within the radius of the site, could I get a response stating such for the school district's safety hazard report.

Additionally, there appear to be two aboveground water storage tanks within 1,500 feet of the proposed school site. For the purposes of the District's safety hazard assessment we require the following information for each tank:

<!--[if !supportLists]-->1. Tank Capacity:
<!--[if !supportLists]-->2. ID:
<!--[if !supportLists]-->3. Height:
<!--[if !supportLists]-->4. Material:
<!--[if !supportLists]-->5. Year of Construction:
<!--[if !supportLists]-->6. Water Level of the Tank:
<!--[if !supportLists]-->7. Leak History:
<!--[if !supportLists]-->8. Inspection Frequency:
<!--[if !supportLists]-->9. Is there a seismic shutoff valve:

If this not the correct email to be sending such a request, could you please help direct this inquiry to the proper division.

Thank you so much for your help, please contact me if you have any questions or need more information!

DANIELLE CLENDENING
Intern

PLACEWORKS <!--[if !vml]-->

2850 Inland Empire Boulevard, Suite B | Ontario, California 91764
909.989.4449 | dbclendening@placeworks.com | placeworks.com

From:	Eric Akiyoshi
To:	Danielle Clendening
Subject:	RE: Fwd: Pipeline Information Request for Proposed School Site in Lake Forest, CA
Date:	Monday, March 11, 2019 3:55:21 PM

Danielle

Thank you for checking back. Here are some thoughts on the remaining questions.

Leak History - IRWD has owned and operating these tanks since January 2001. Neither the Lake Forest Zone "II" West, nor the Zone "B" West tanks have had any leaks during this time frame. Additionally, IRWD is not aware of any leaks prior to taking responsibility for the tanks.
Inspection Frequency - IRWD inspects its facilities on a weekly basis and monitors continuously with automated data acquisition. Tanks are typically inspected via underwater camera and SCUBA inspections approximately every 2 years.
Is there a seismic shutoff valve - IRWD has automated data acquisition and manual isolation valves for each of these tanks.

Regards

Eric Akiyoshi, P.E.
Principal Engineer
Planning and Technical Services
Irvine Ranch Water District
15600 Sand Canyon Avenue, Irvine, California 92618
Mailing: PO Box 57000, Irvine, California 92619-7000
(949) 453-5552 office (714) 222-5149 cell
Email: akiyoshi@irwd.com

>>> Danielle Clendening <dbclendening@placeworks.com> 10:53 AM 3/11/2019 >>>
Hi Eric,

Is there any update about questions 6-9 regarding the two water tanks?

Thank you for your assistance,

Danielle

From: Eric Akiyoshi <AKIYOSHI@irwd.com>
Sent: Tuesday, January 29, 2019 11:35 AM
To: Danielle Clendening <dbclendening@placeworks.com>
Subject: Re: Fwd: Pipeline Information Request for Proposed School Site in Lake Forest, CA

Danielle

Thank you for your e-mail. With regards to your facilities request. You can do the research on IRWD's online GIS Map and Records tool located here:
https://www.irwd.com/doing-business/gis-map-and-records

Regarding the two tanks you identified, items 1-6 have been filled in. Items 6-9 will need to be researched and we anticipate getting back to you within 5-7 business days.

Lake Forest Zone "II" West Reservoir
Tank Capacity: 7.8 million gallons
ID: Lake Forest Zone "II" West Reservoir

Height: approximately 35 ft
Material: Steel
Year of Construction: 1978
Water Level of the Tank: High Water Level = 883 ft

Lake Forest Zone "B" West Reservoir
Tank Capacity: 7.8 million gallons
ID: Lake Forest Zone "B" West Reservoir
Height: approximately 35 ft
Material: Steel
Year of Construction: 1984
Water Level of the Tank: High Water Level = 867 ft

If you have questions, feel free to contact me.

Eric Akiyoshi, P.E.
Principal Engineer
Planning and Technical Services
Irvine Ranch Water District
15600 Sand Canyon Avenue, Irvine, California 92618
Mailing: PO Box 57000, Irvine, California 92619-7000
(949) 453-5552 office (714) 222-5149 cell
Email: akiyoshi@irwd.com

>>> Danielle Clendening <dbclendening@placeworks.com> 1/28/2019 3:36 PM >>>
Good afternoon,

Saddleback Valley Unified School District, in compliance with CCR Title V Section 14010 (h), has contracted the services of PlaceWorks to conduct a safety hazard assessment related to water pipelines that are 12-inches in diameter or greater and pressurized sewer lines located within a 1,500-foot radius of a proposed elementary school site in Lake Forest, Orange County, CA. The proposed school site is located in the northeast corner of the intersection of Bake Parkway and Rancho Parkway. I have attached a pdf of a map showing the exact location of the site outlined in yellow and an approximately 1,500-foot radius marked around the site in red.

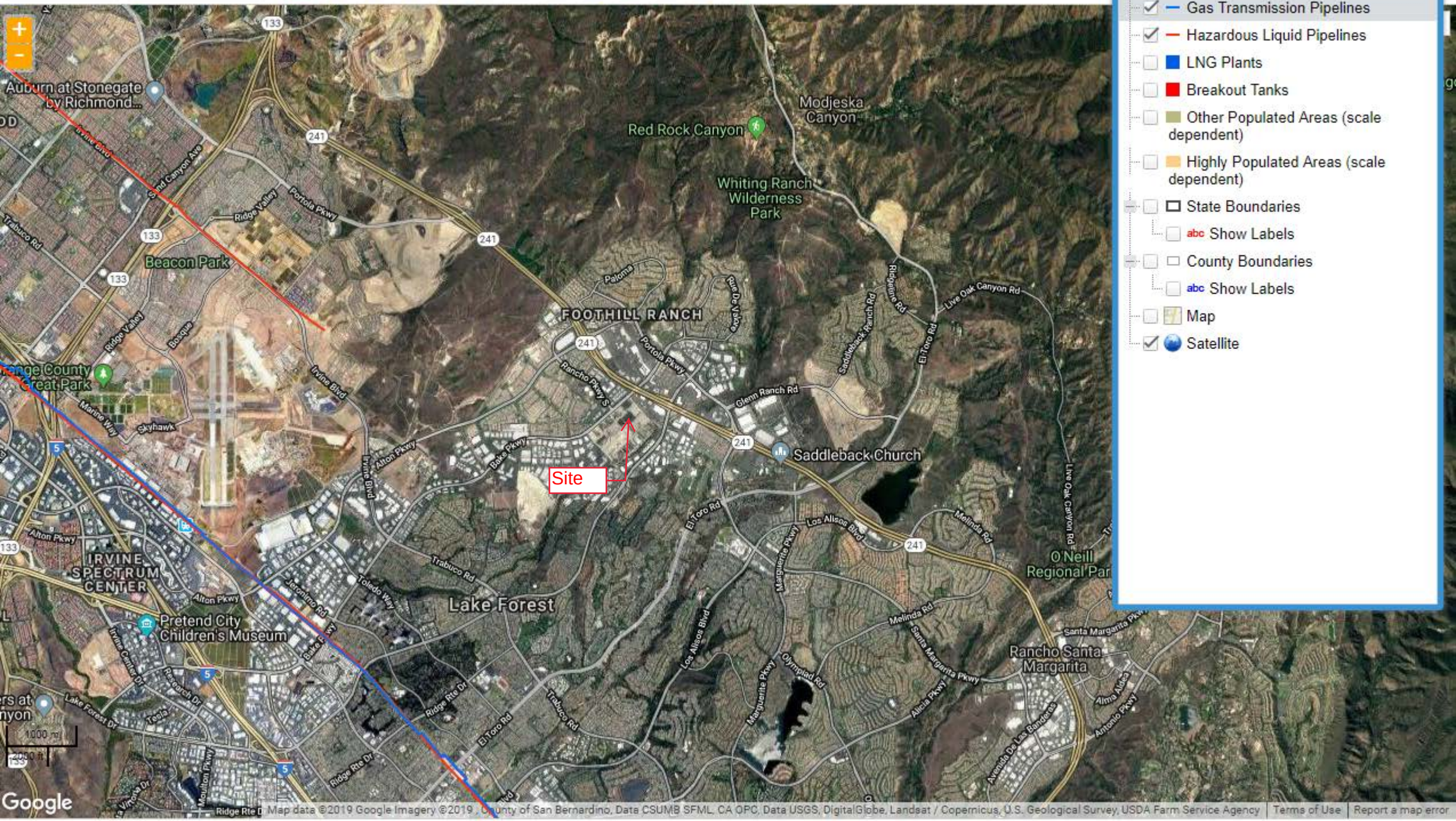
This email is requesting information about any water pipelines 12-inches in diameter or greater and any pressurized sewer pipelines operated by Irvine Ranch Water District located within a 1,500-foot radius of the site. If there are no water or sewer lines that meet those specifications within the radius of the site, could I get a response stating such for the school district's safety hazard report.

Additionally, there appear to be two aboveground water storage tanks within 1,500 feet of the proposed school site. For the purposes of the District's safety hazard assessment we require the following information for each tank:

1. Tank Capacity:
2. ID:
3. Height:
4. Material:

Public Viewer

Map Layers | Query Tools



Map Layers

- [ ] Accidents (Liquid)
- [ ] Incidents (Gas)
- [x] Gas Transmission Pipelines
- [x] Hazardous Liquid Pipelines
- [ ] LNG Plants
- [ ] Breakout Tanks
- [ ] Other Populated Areas (scale dependent)
- [ ] Highly Populated Areas (scale dependent)
- [ ] State Boundaries
  - [ ] abc Show Labels
- [ ] County Boundaries
  - [ ] abc Show Labels
- [ ] Map
- [x] Satellite

Ready | Zoom Level: 13 of 19 (1:54,168) | 33.666642, -117.758893 | COUNTY : Orange, CA

©USDOT PHMSA. All rights reserved.

Appendix

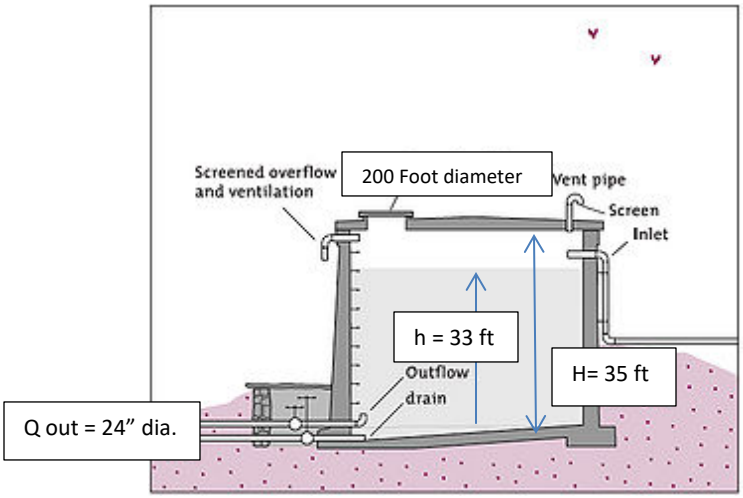
This page intentionally left blank.

Appendix B. Water Storage Tank Release Calculations

Appendix

This page intentionally left blank.

FLOW RATE FROM WATER TANK – Zone "II" West Reservoir



Water Tank Cross Section: $A_R = 1/4\pi D^2 = 1/4\pi(200)^2 = 31{,}416\ ft^2$

Piping Outlet Cross Section: $A_P = 1/4\pi D^2 = 1/4\pi(2)^2 = 3.14\ ft^2$

Flow Rate Equation from Piping Rupture:

$$Q = CA\sqrt{2gh}$$

Where Q = flow rate (cfs)

C = orifice coefficient (0.67)

A = area of opening (ft^2)

G = gravitational acceleration (32.2 ft/s^2)

h = water height above opening (ft)

$$dh = -\frac{Qdt}{A_R} = \frac{CA_P\sqrt{2gh}}{A_R}\,dt$$

$$\frac{A_R dh}{CA_P\sqrt{2gh}} = \frac{-31{,}416\,dh}{(0.67)(3.14)\sqrt{(2)(32.2)h}} = dt$$

$$-1{,}860\,h^{-1/2}\,dh = dt$$

$$-1{,}860\int_H^h h^{-1/2}\,dh = \int_0^t dt$$

$$-1{,}860\left(\frac{h^{1/2}}{-1/2H}\right) = t$$

$$-3{,}720\,(h^{\frac{1}{2}} - H^{\frac{1}{2}}) = t$$

$$h = \left(H^{\frac{1}{2}} - (\frac{t}{3720}\right)^2$$

H = 33 feet

Then h = $(33^{(1/2)} - 2.7E\text{-}04t)^2$

$$Q = (0.67)(3.14)\sqrt{(2)(32.2)}\,[33^{\left(\frac{1}{2}\right)} - 2.7^{-04}(t)] = 97.0 - 0.0045t$$

Then peak flow = 97.0 cfs at t = 0

RUNOFF FROM SITE

Runoff from site is based on the following:

Outflow from storage tank: Q = 97.0 – 0.0045t (cfs)

The results are provided in the following spreadsheet.

OUTFLOW FROM TANK - Zone "II" West Reservoir

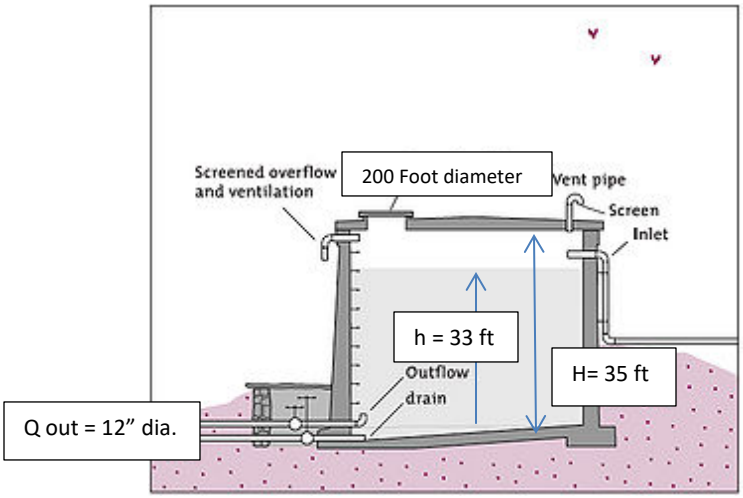
Time (min)	Outflow (cfs)
0	97.0
5	95.7
10	94.3
15	93.0
20	91.6
25	90.3
30	88.9
35	87.6
40	86.2
45	84.9
50	83.5
55	82.2
65	79.5
70	78.1
75	76.8
80	75.4
85	74.1
90	72.7
95	71.4
100	70.0
105	68.7
110	67.3
115	66.0
120	64.6

Time (min)	Outflow (cfs)
125	63.3
130	61.9
135	60.6
140	59.2
145	57.9
150	56.5
155	55.2
160	53.8
165	52.5
170	51.1
175	49.8
180	48.4
185	47.1
190	45.7
195	44.4
200	43.0
205	41.7
210	40.3
215	39.0
220	37.6
225	36.3
230	34.9
235	33.6
240	32.2

Time (min)	Outflow (cfs)
245	30.9
250	29.5
255	28.2
260	26.8
265	25.5
270	24.1
275	22.8
280	21.4
285	20.1
290	18.7
295	17.4
300	16.0
305	14.7
310	13.3
315	12.0
320	10.6
325	9.3
330	7.9
335	6.6
340	5.2
345	3.8
350	2.5
355	1.2
360	-0.2

Time to empty tank - 6 hours

FLOW RATE FROM WATER TANK – Zone "B" West Reservoir



Water Tank Cross Section: $A_R = 1/4\pi D^2 = 1/4\pi(200)^2 = 31{,}416\ ft^2$

Piping Outlet Cross Section: $A_P = 1/4\pi D^2 = 1/4\pi(1)^2 = 0.79\ ft^2$

Flow Rate Equation from Piping Rupture:

$$Q = CA\sqrt{2gh}$$

Where Q = flow rate (cfs)

C = orifice coefficient (0.67)

A = area of opening (ft^2)

G = gravitational acceleration (32.2 ft/s^2)

h = water height above opening (ft)

$$dh = -\frac{Q\,dt}{A_R} = \frac{CA_P\sqrt{2gh}}{A_R}\,dt$$

$$\frac{A_R\,dh}{CA_P\sqrt{2gh}} = \frac{-31{,}416\,dh}{(0.67)(0.79)\sqrt{(2)(32.2)h}} = dt$$

$$-7{,}439\,h^{-1/2}\,dh = dt$$

$$-7{,}439\int_H^h h^{-1/2}\,dh = \int_0^t dt$$

$$-7{,}439\left(\frac{h^{1/2}}{-1/2H}\right) = t$$

$$-14{,}879\,(h^{\frac{1}{2}} - H^{\frac{1}{2}}) = t$$

$$h = \left(H^{\frac{1}{2}} - \left(\frac{t}{14879}\right)\right)^2$$

H = 33 feet

Then h = $(33^{(1/2)} - 6.7E\text{-}05t)^2$

$$Q = (0.67)(0.79)\sqrt{(2)(32.2)}\,[33^{\left(\frac{1}{2}\right)} - 6.7^{-05}(t)] = 24.3 - 0.00028t$$

Then peak flow = 24.3 cfs at t = 0

RUNOFF FROM SITE

Runoff from site is based on the following:

Outflow from storage tank: Q = 24.3 – 0.00028t (cfs)

The results are provided in the following spreadsheet.

OUTFLOW FROM TANK - Zone "B" West Reservoir

Time	Outflow	Time	Outflow	Time	Outflow	Time	Outflow	Time	Outflow	Time	Outflow
(min)	(cfs)	(min)	(cfs)	(min)	(cfs)	(min)	(cfs)	(min)	(cfs)	(min)	(cfs)
0	24.3	240	20.3	480	16.2	720	12.2	960	8.2	1200	4.1
10	24.1	250	20.1	490	16.1	730	12.0	970	8.0	1210	4.0
20	24.0	260	19.9	500	15.9	740	11.9	980	7.8	1220	3.8
30	23.8	270	19.8	510	15.7	750	11.7	990	7.7	1230	3.6
40	23.6	280	19.6	520	15.6	760	11.5	1000	7.5	1240	3.5
50	23.5	290	19.4	530	15.4	770	11.4	1010	7.3	1250	3.3
60	23.3	300	19.3	540	15.2	780	11.2	1020	7.2	1260	3.1
70	23.1	310	19.1	550	15.1	790	11.0	1030	7.0	1270	3.0
80	23.0	320	18.9	560	14.9	800	10.9	1040	6.8	1280	2.8
90	22.8	330	18.8	570	14.7	810	10.7	1050	6.7	1290	2.6
100	22.6	340	18.6	580	14.6	820	10.5	1060	6.5	1300	2.5
110	22.5	350	18.4	590	14.4	830	10.4	1070	6.3	1310	2.3
120	22.3	360	18.3	600	14.2	840	10.2	1080	6.2	1320	2.1
130	22.1	370	18.1	610	14.1	850	10.0	1090	6.0	1330	2.0
140	21.9	380	17.9	620	13.9	860	9.9	1100	5.8	1340	1.8
150	21.8	390	17.7	630	13.7	870	9.7	1110	5.7	1350	1.6
160	21.6	400	17.6	640	13.5	880	9.5	1120	5.5	1360	1.5
170	21.4	410	17.4	650	13.4	890	9.3	1130	5.3	1370	1.3
180	21.3	420	17.2	660	13.2	900	9.2	1140	5.1	1380	1.1
190	21.1	430	17.1	670	13.0	910	9.0	1150	5.0	1390	0.9
200	20.9	440	16.9	680	12.9	920	8.8	1160	4.8	1400	0.8
210	20.8	450	16.7	690	12.7	930	8.7	1170	4.6	1410	0.6
220	20.6	460	16.6	700	12.5	940	8.5	1180	4.5	1420	0.4
230	20.4	470	16.4	710	12.4	950	8.3	1190	4.3	1430	0.3
										1440	0.1
										1450	-0.1

Time to empty tank - 24 hours and 10 minutes

USGS Store

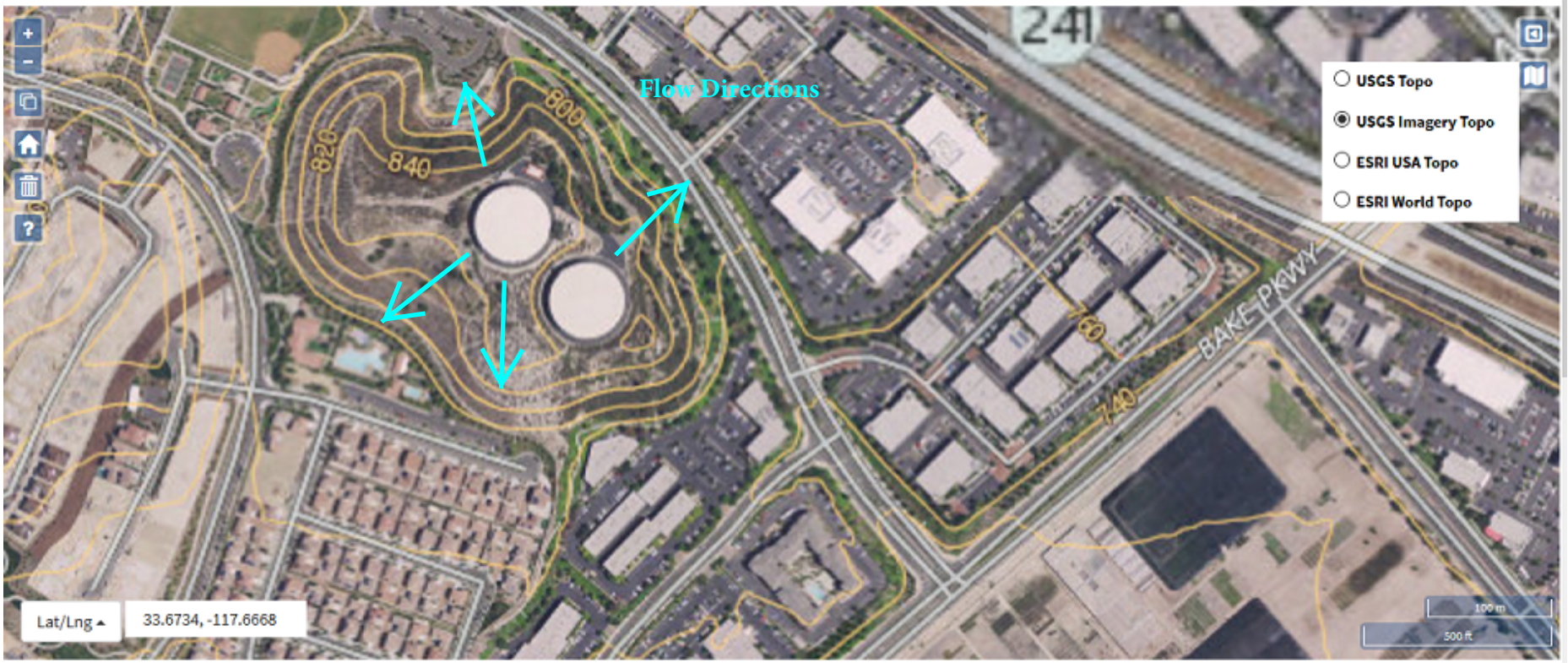
My Account |

Map Locator

Lake Forest, California

Clear

To use the map locator to find map products use the search bar or drop a pin by double clicking on the map view.

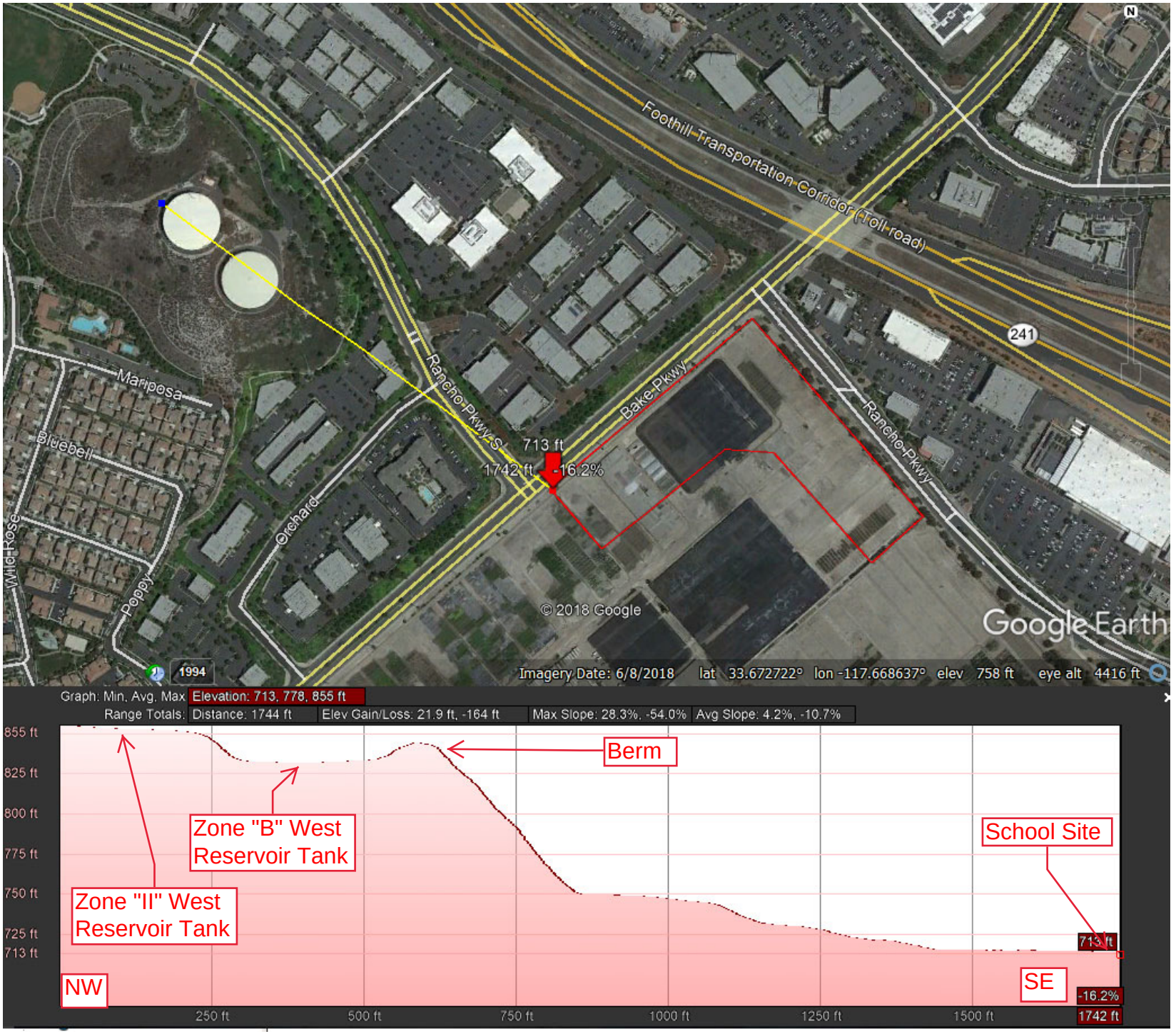


HOME

Map location pins dropped or searched for by address/place provide products within a 15 mile radius of specified location.

If you have any questions or issues please click here to email usgsstore@usgs.gov.

Elevation Gradient from Tank Site to Proposed School Site - Google Earth



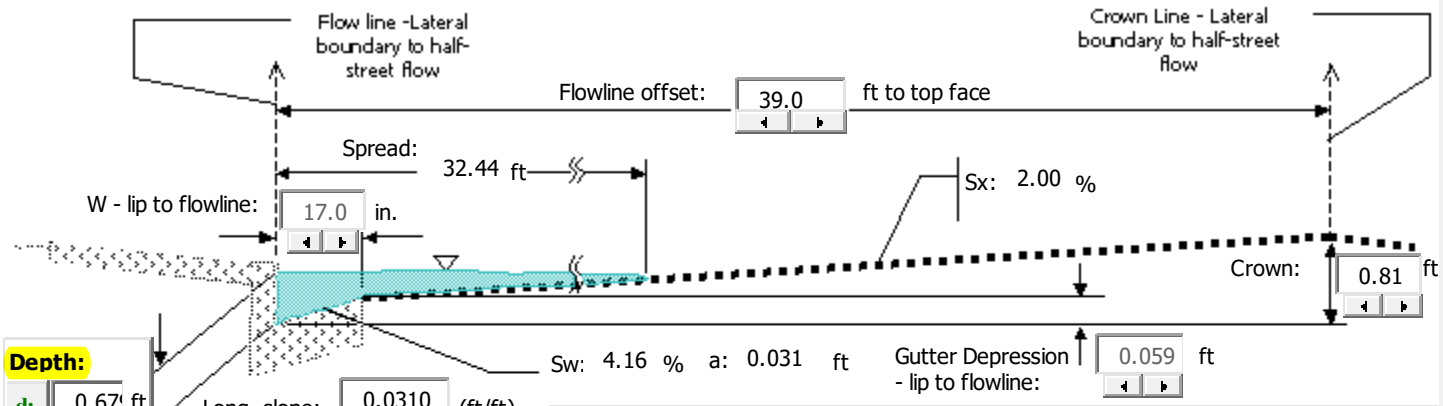
Modified Manning's Equation Solver

Version: 3.0<>3/5/2019 4:46:39 PM

© 2006 Jeffers & Associates, PLLC. All Rights Reserved

Print | Save | Quit

Parameters | Composite Triangular Sections | Head - Discharge Table | Assumptions | Inlet Geometry | Disclaimer



Local Parameters:

Local inlet flow line depression: 2.0 in.

Curb Opening Parameters:

C-O Apron wider than gutter: 0 in.

S'w 13.9 % Se: 3.62 %

Length of curb opening inlet: 12.0 ft

Lt: 126.59 ft

80 % Clear Efficiency 13.2 %

Curb opening flowby: 84.16 cfs

P-1-7/8-4

Print Chart 7

Grate Parameters:

Apron wider than grate: 2 in.

Length: 48 in. Width: 22 in.

% Factor 50 % Factor 50

Splash-over Vel: 7.41 ft/s Vel over grate: 12.75 ft/s

Eo: 20.49 %

Rs: 1.17 % Rf: 85.57 %

Side flow captured: 0.90 cfs Frontal captured: 7.38 cfs

Total combined CB flowby: 75.88 cfs

Street Parameters:

Q: 97.00 cfs

K: 550.9

Vel: 9.21 ft/s

Eo: 11.6 %

W/T: 0.0437

Standard Manning's:

Q: 80.26 cfs

K: 455.8

Vel: 7.62 ft/s

Rh: 0.32 ft

Area: 10.53 sf

Street Flow - Rancho Parkway South Tank Release

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Input

Edition

Dynamic: Conterminous U.S. 2014 (v4.1.1)

Spectral Period

Peak ground acceleration

Latitude

Decimal degrees

33.6719

Time Horizon

Return period in years

2475

Longitude

Decimal degrees, negative values for western longitudes

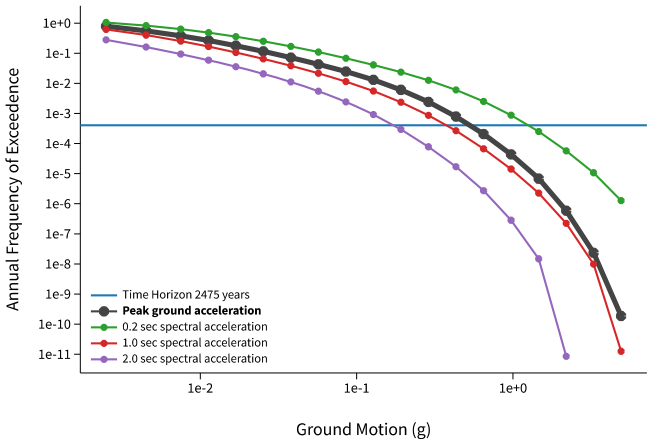
-117.667

Site Class

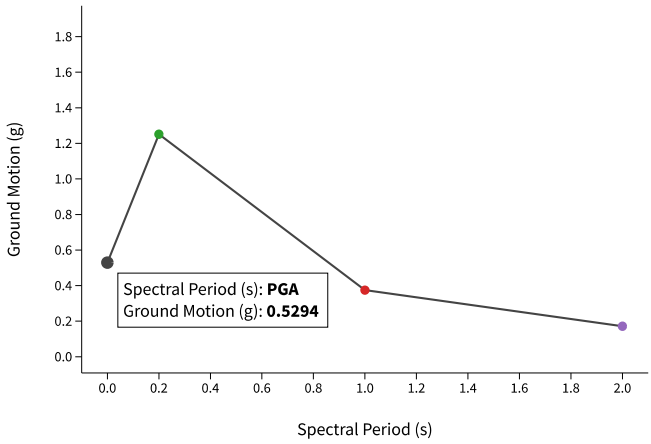
760 m/s (B/C boundary)

Hazard Curve

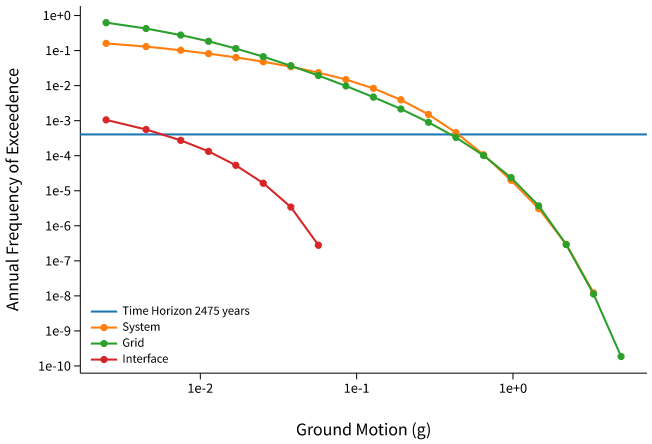
Hazard Curves



Uniform Hazard Response Spectrum



Component Curves for Peak ground acceleration

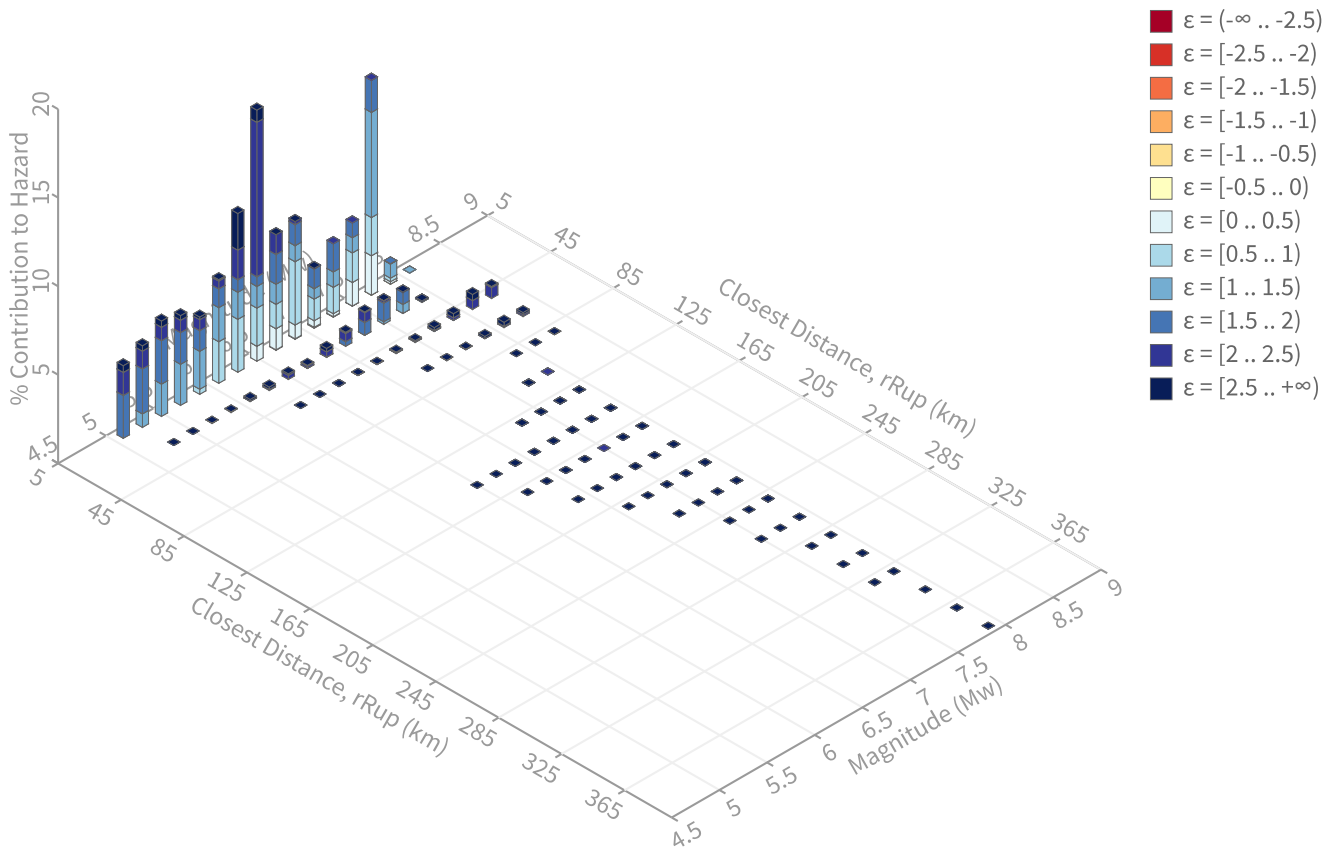


View Raw Data

Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 2475 yrs
Exceedance rate: 0.0004040404 yr^{-1}
PGA ground motion: 0.52942723 g

Recovered targets

Return period: 2807.7447 yrs
Exceedance rate: 0.00035615774 yr^{-1}

Totals

Binned: 100 %
Residual: 0 %
Trace: 0.06 %

Mean (for all sources)

r: 14.16 km
m: 6.61
ε_0: 1.5 σ

Mode (largest r-m bin)

r: 15.25 km
m: 6.48
ε_0: 1.82 σ
Contribution: 14.18 %

Mode (largest ε_0 bin)

r: 18.86 km
m: 6.47
ε_0: 2.26 σ
Contribution: 8.72 %

Discretization

r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ

Epsilon keys

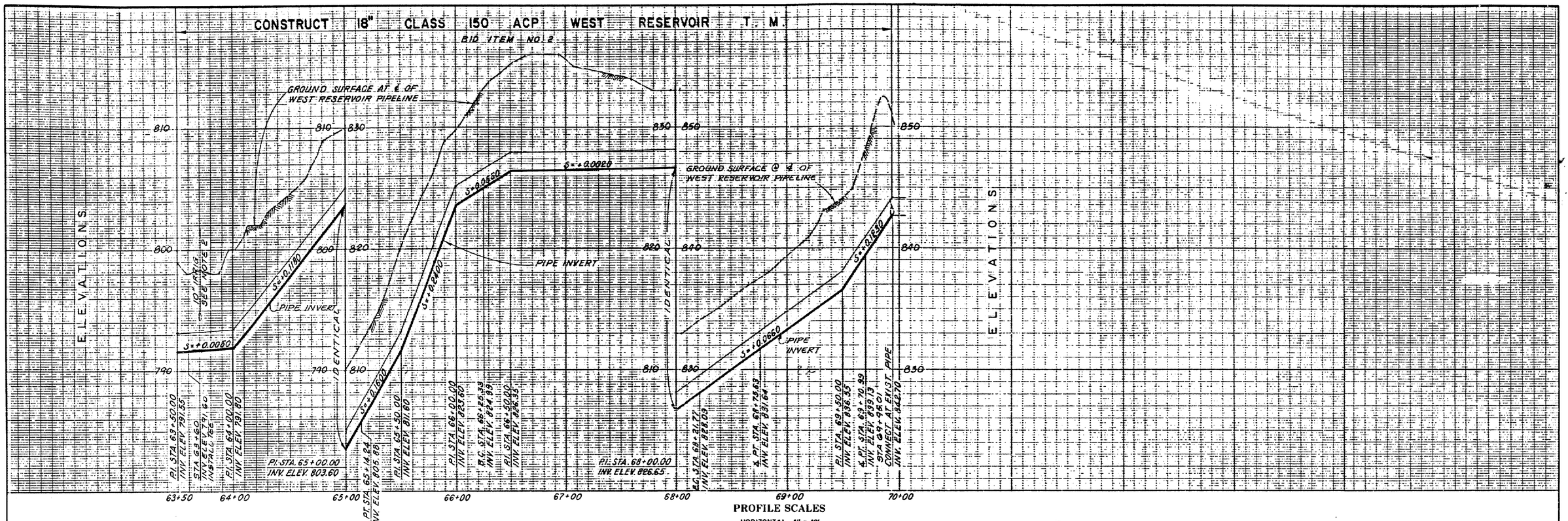
ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

Deaggregation Contributors

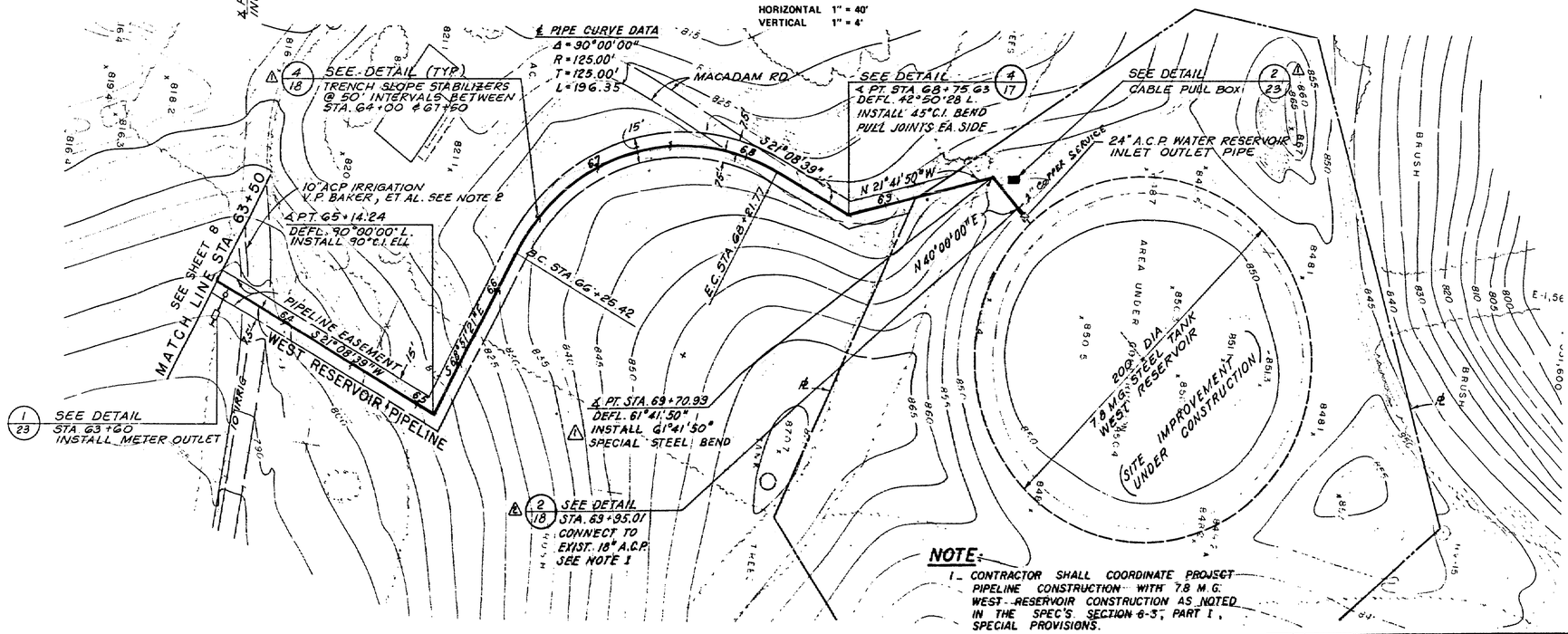
Source Set ↳ Source	Type	r	m	ε_0	lon	lat	az	%
UC33brAvg_FM32	System							27.48
Elsinore (Glen Ivy) rev [0]		18.88	7.04	1.87	117.581°W	33.825°N	24.97	10.89
San Joaquin Hills [2]		9.26	7.19	0.80	117.735°W	33.617°N	225.73	7.22
Chino alt 2 [3]		17.89	7.04	1.72	117.571°W	33.821°N	28.08	2.61
Newport-Inglewood (Offshore) [2]		21.80	7.45	1.75	117.821°W	33.524°N	221.08	1.35
UC33brAvg_FM31	System							25.89
Elsinore (Glen Ivy) rev [0]		18.88	7.02	1.89	117.581°W	33.825°N	24.97	10.51
San Joaquin Hills [2]		9.26	7.54	0.59	117.735°W	33.617°N	225.73	5.87
Chino alt 1 [4]		18.11	6.91	1.86	117.604°W	33.848°N	16.60	2.33
Newport-Inglewood (Offshore) [2]		21.80	7.46	1.74	117.821°W	33.524°N	221.08	1.43
Oceanside alt1 [6]		15.04	7.04	1.18	117.802°W	33.514°N	215.58	1.27
UC33brAvg_FM31 (opt)	Grid							23.44
PointSourceFinite: -117.667, 33.712		6.41	5.87	1.11	117.667°W	33.712°N	0.00	4.53
PointSourceFinite: -117.667, 33.712		6.41	5.87	1.11	117.667°W	33.712°N	0.00	4.53
PointSourceFinite: -117.667, 33.730		7.76	5.83	1.38	117.667°W	33.730°N	0.00	2.51
PointSourceFinite: -117.667, 33.730		7.76	5.83	1.38	117.667°W	33.730°N	0.00	2.51
PointSourceFinite: -117.667, 33.748		8.81	5.98	1.43	117.667°W	33.748°N	0.00	1.28
PointSourceFinite: -117.667, 33.748		8.81	5.98	1.43	117.667°W	33.748°N	0.00	1.28
PointSourceFinite: -117.667, 33.766		9.70	6.17	1.43	117.667°W	33.766°N	0.00	1.07
PointSourceFinite: -117.667, 33.766		9.70	6.17	1.43	117.667°W	33.766°N	0.00	1.07
UC33brAvg_FM32 (opt)	Grid							23.20
PointSourceFinite: -117.667, 33.712		6.41	5.87	1.11	117.667°W	33.712°N	0.00	4.52
PointSourceFinite: -117.667, 33.712		6.41	5.87	1.11	117.667°W	33.712°N	0.00	4.52
PointSourceFinite: -117.667, 33.730		7.75	5.83	1.37	117.667°W	33.730°N	0.00	2.47
PointSourceFinite: -117.667, 33.730		7.75	5.83	1.37	117.667°W	33.730°N	0.00	2.47
PointSourceFinite: -117.667, 33.748		8.82	5.97	1.43	117.667°W	33.748°N	0.00	1.27
PointSourceFinite: -117.667, 33.748		8.82	5.97	1.43	117.667°W	33.748°N	0.00	1.27
PointSourceFinite: -117.667, 33.766		9.70	6.17	1.43	117.667°W	33.766°N	0.00	1.07
PointSourceFinite: -117.667, 33.766		9.70	6.17	1.43	117.667°W	33.766°N	0.00	1.07

CONSTRUCT 18" CLASS 150 ACP WEST RESERVOIR T. M.

BID ITEM NO. 2



PROFILE SCALES
HORIZONTAL 1" = 40'
VERTICAL 1" = 4'



PLAN SCALE: 1" = 40'

NOTE:

1. CONTRACTOR SHALL COORDINATE PROJECT PIPELINE CONSTRUCTION WITH 7.8 M.G. WEST RESERVOIR CONSTRUCTION AS NOTED IN THE SPEC'S SECTION 6-3, PART I, SPECIAL PROVISIONS.
2. CONTRACTOR SHALL POTHOLE AND VERIFY EXIST. 10" IRRIG. PIPELINE LOCATION AND INVERT BEFORE CONSTRUCTION.

REV	DATE	DESCRIPTION	APP
2	11-2-79	ADDENDUM NO. 2 REVISION	R.P.K.
1	10-24-79	ADDENDUM NO. 1 REVISION	RPK

LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

WEST TRANSMISSION MAINS
WEST RESERVOIR TRANSMISSION MAIN
PLAN & PROFILE

Boyle Engineering Corporation
consulting engineers; architects

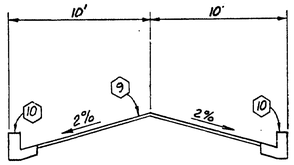
DESIGN D.M.
DRAWN J.C.
CHECKED R.P.K.
DATE AUG. '79
R.B. X-43
B-L04-125-06
D-2053

SHEET NO. 9 OF 23 SHEETS

EXCAVATION AND FILL QUANTITIES

THESE QUANTITIES ARE APPROXIMATE AND MAY VARY DEPENDING ON ACTUAL FIELD CONDITIONS.

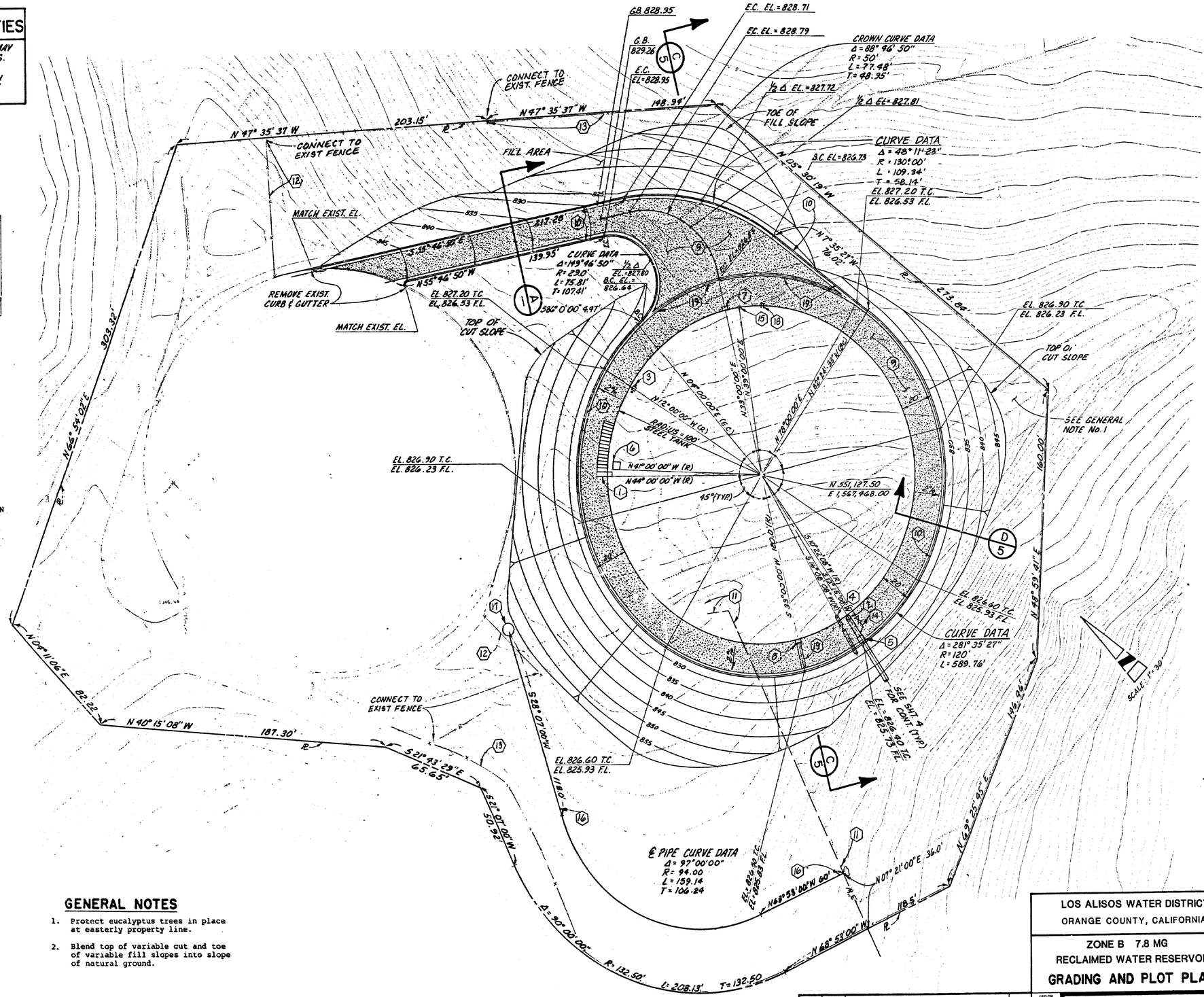
RESERVOIR SITE EXCAVATION..... 62,000cy
FILL AREA..... 2,100cy



SECTION A
N.T.S.

CONSTRUCTION NOTES

1. SPIRAL STAIRS AND PLATFORM. SEE DETAILS SHEET 7
2. OVERFLOW AND DRAIN. SEE DETAIL 1 SHEET 8.
3. LIQUID LEVEL INDICATOR. SEE DETAIL 1 SHEET 7.
4. 12" DIA. INLET-OUTLET PIPE. SEE SHEET 4 FOR PLAN AND PROFILE.
5. GRATE INLET CATCH BASIN. SEE DETAIL 3 SHEET 8.
6. ROOF HATCH AND CENTERLINE OF INSIDE LADDER SEE DETAIL 2 SHEET 6.
7. 36" DIA. MANHOLE. SEE DETAIL 1 SHEET 6.
8. 24" DIA. MANHOLE. SEE DETAIL 1 SHEET 6.
9. 3" A.C. PAVEMENT OVER NATIVE.
10. CURB AND GUTTER. SEE SECTION A SHEET 5.
11. REMOVE EXISTING PVC WATER LINE AND TANK.
12. TEMPORARY 6' CHAINLINK FENCE.
13. 6' CHAINLINK FENCE.
14. 8" DIA. TANK DRAIN. SEE DETAIL 2 SHEETS.
15. CONTROL AND POTENTIAL TEST BOX AND $CuSO_4$ TEST STATIONS.
16. 4" CL. 150 PVC WATER LINE.
17. RYAN-HERCO ROUND-FLAT BOTTOM FIBERGLASS TANK SIZE NO. 7800-108 AND 7801-108 COVER SECTION. SEE 8/5
18. 1" CORP STOP JONES J-50 OR APPROVED EQUAL IN OVERSIZE HALF COUPLING AND INSULATION BUSHING WELDED TO SIDE OF TANK. LOCATION OF CORP STOP TO BE DETERMINED BY DISTRICT AT TIME OF ERECTION OF TANK.
19. CROSS GUTTER. SEE DETAIL 1 SHEET 5.



GENERAL NOTES

1. Protect eucalyptus trees in place at easterly property line.
2. Blend top of variable cut and toe of variable fill slopes into slope of natural ground.

LOS ALISOS WATER DISTRICT
ORANGE COUNTY, CALIFORNIA

ZONE B 7.8 MG
RECLAIMED WATER RESERVOIR
GRADING AND PLOT PLAN

REV	DATE	DESCRIPTION	APP
1	1-87	ADDENDUM No. 1	H.R.G.

DESIGN L.G. | DRAWN D.G.B. | CHECKED H.U. | DATE AUG. 1986 | OC L04 260 12 | D-2309 | SHEET NO. 3 OF 10 SHEETS

Boyle Engineering Corporation
consulting engineers / architects

1.0 EXECUTIVE SUMMARY

1.1 INTRODUCTION

The California Environmental Quality Act (CEQA) requires that local government agencies, before taking action on projects over which they have discretionary approval authority, consider the environmental consequences of such projects. An Environmental Impact Report (EIR) is a document designed to provide to the public and to local and State governmental agency decision-makers an analysis of potential environmental consequences of a project to support informed decision-making.

This EIR has been prepared by the City of Lake Forest (City) to evaluate environmental impacts associated with the proposed Nakase Nursery/Toll Brothers Project (Project); to discuss alternatives; and to propose mitigation measures that will minimize, offset, or otherwise reduce or avoid the identified potentially significant environmental impacts.

This EIR has been prepared pursuant to the requirements of CEQA and the *State CEQA Guidelines*. The City is the Lead Agency, and as such, has reviewed all submitted drafts, technical studies, and reports for consistency with applicable City regulations and policies and has commissioned the preparation of this EIR to reflect its own independent judgment.

Data for this EIR were obtained from on-site field observations; discussion with affected agencies; review of adopted plans and policies; review of available studies, reports, and data; and specialized environmental assessments prepared for the Project (e.g., air quality, noise, and traffic).

The Executive Summary is intended to highlight the major areas of importance in the environmental analysis for the proposed Project as required by *State CEQA Guidelines* Section 15123. The Executive Summary includes a brief description of the proposed Project, areas of controversy known to the City, including issues raised by agencies and the public, a summary of the significant unavoidable impacts of the proposed Project, and a summary of alternatives evaluated in the EIR. This Executive Summary also provides a table summarizing (1) the potential environmental impacts that would occur as a result of Project implementation and operation; (2) the level of significance prior to implementation of mitigation measures; (3) regulatory compliance measures and mitigation measures that avoid or reduce the significant impacts of the proposed Project, and (4) the level of significance after mitigation measures are implemented.

1.2 SUMMARY OF PROJECT DESCRIPTION

The Nakase property (Project site) is located in the north-central portion of Lake Forest in Orange County, California. The Project site is bounded on the northwest by Bake Parkway, on the northeast by Rancho Parkway, on the southeast by the Serrano Creek Trail, and on the southwest by commercial, industrial, and office uses, with Dimension Drive beyond. State Route 241 (SR-241) is approximately 0.07 mile (mi) northeast of the Project site.

The Project proposes the approval of the “Nakase Property Area Plan” (referred to hereafter as the Area Plan and/or the Project) (Woodley Architectural Group 2019), which would facilitate the

development of the 122-acre (ac) Project site as a master planned community. The Area Plan would establish guidelines for the future development of the planned community, which would consist of up to 675 single-family residential units (contained in 5 distinct neighborhoods), 101 affordable housing units for senior citizens with up to 10 of these units available for permanent supportive housing, an elementary school that could accommodate up to 1,000 Kindergarten to Sixth Grade students, parks and open space, and an internal circulation system.

1.3 AREAS OF CONTROVERSY

Pursuant to *State CEQA Guidelines* Section 15123, this EIR acknowledges the areas of controversy and issues to be resolved that are known to the City or were raised during the scoping process. The City held a public scoping meeting at Lake Forest City Hall on Wednesday, July 25, 2018, to present the proposed Project and to solicit input from interested parties regarding environmental issues that should be addressed in this EIR. The material environmental issues and concerns raised in response to the Notice of Preparation (NOP) or at the scoping meeting included:

- **Traffic:** Concerns about additional traffic on Bake Parkway and the appropriate number of traffic lanes on Bake Parkway, evaluation of a traffic signal coordination program along Bake Parkway, concern regarding traffic conditions during peak hours, pedestrian and bike safety, parking issues, traffic-related air and noise pollution, concern with vehicle queuing and parking on nearby roads, concern about school-related traffic impacts, and concern about truck and motorcycle traffic on Bake Parkway.

- **Noise:** Concerns about traffic-related increases in noise pollution, suggestions of noise mitigation, including special pavement, triple-paned windows, or a noise barrier along Bake Parkway, concern with noise level along Bake and Rancho Parkways, concern about existing truck and motorcycle noise along Bake Parkway, concern about lack of enforcement of the City's noise ordinance, and concern about elevated backyard noise levels.

- **Air Quality:** Concern about additional vehicle emissions, concern about worsening air quality in adjacent neighborhoods, concern about particulate matter and carcinogens along Bake Parkway, suggestion to conduct sampling for particulate matter in neighborhoods along Bake Parkway between Trabuco Road and Portola Parkway, suggestion to prepare a health risk assessment for the project, suggestion to implement mitigation measures for the proposed project, and suggestion to adhere to guidelines from the South Coast Air Quality Management District (SCAQMD) and its Air Quality Handbook.

- **Alternatives:** Suggestion to evaluate the development of a park and/or garden on the Nakase site, suggestion to make the site into a community garden or forest, suggestion to more clearly define the Project's scope and evaluate a range of alternatives, and suggestion to pursue alternatives that would substantially lessen the project's air quality impacts.

- **Biological Resources:** Concern about potential impacts to coastal sage scrub and associated species, suggestion to include mitigation measures for potential impacts to riparian corridors and wetlands, suggestion to complete jurisdictional delineation, apply for Lake and Streambed

Alteration Agreement, and to satisfy the California Endangered Species Act Incidental Take Permit requirements, suggestion to avoid impacts where feasible and to mitigate for impacts to rare natural communities and sensitive plants, animals, or habitats, and concern to avoid impacts to nesting or migratory birds.

- **Hazards and Hazardous Materials:** Suggestion to complete a Water Pipeline Risk Assessment and Electromagnetic Field (EMF) study for the proposed school site, suggestion that the significance conclusion related to wildland fire hazards be revised to reflect a Fuel Modification Conceptual Plan and a Fire Protection Plan with an Ember Mitigation have been approved for the project, and suggestion to ensure that floodplains are identified and structures conform to Federal Emergency Management Agency (FEMA) regulations with regard to placement adjacent to flood hazards.

- **Hydrology:** Suggestion to review all local hydrology and hydraulic analyses to confirm the Project is protected from erosion and flooding, concern about increased runoff caused by the project, suggestion to incorporate mitigation measures to reduce impacts to hydrology, erosion, and flooding, and concerns about impacts to water quality and storm water runoff.

- **Land Use/Planning:** Opposition to zoning change for the nursery, concern about the Project's consistency with the 2016 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) and suggestion to include a direct comparison with the plan, suggestion to incorporate practices and policies that would reduce greenhouse gas (GHG) emissions in accordance with Assembly Bill 32 and Senate Bill 375 into the Area Plan, and suggestion to ensure consistency with applicable general plan and regional plans.

- **Public Services:** Suggestion to implement mitigation measures to public services, including fire services, and concern about potential increase in demand for public services.

Please note that this is not an exhaustive list of areas of controversy, but rather key issues that were raised during the scoping process. This EIR addresses each of these areas of concern or controversy in detail, examines project-related and cumulative environmental impacts, identifies significant adverse environmental impacts, and proposes mitigation measures and/or alternatives designed to reduce or eliminate potentially significant impacts. Appendix A to this EIR includes the NOP and copies of written comments received in response to the NOP, comments received via Facebook Live at the Public Scoping Meeting, as well as written comment cards received in response to the public scoping meeting. Appendix A also includes a comment summary.

1.4 SIGNIFICANT UNAVOIDABLE IMPACTS

Section 15126.2(b) of the *State CEQA Guidelines* requires that an EIR describe significant environmental impacts that cannot be avoided, including those effects that can be mitigated but not reduced to a less than significant level. The following is a summary of the impacts that are considered significant adverse and unavoidable after all mitigation is applied. These impacts are also described in detail in Chapter 4.0, Existing Environmental Setting, Environmental Analysis, Impacts, and Mitigation Measures.

1.4.1 Agricultural Resources

The proposed Project would conflict with the existing A-1 zoning and would convert 119.2 ac of Unique Farmland to non-agricultural uses, which would result in a significant impact to agricultural resources. Mitigation was considered to reduce the impact of the conversion of 119.2 ac of Unique Farmland to non-agricultural uses. However, the mitigation measures were not considered feasible; therefore, impacts pertaining to the conversion of Unique Farmland to a non-agricultural use from implementation of the proposed Project would be significant and unavoidable.

1.4.2 Greenhouse Gas Emissions

The proposed Project would be designed in compliance with existing regulations aimed at reducing GHG emissions. Specifically, the project would meet the 2019 Building Energy Efficiency Standards (California Code of Regulations [CCR] Title 24) and the California Green Building Standards Code (CALGreen). Although compliance with CCR Title 24 and CALGreen would help to reduce the proposed Project's GHG emissions, the overall emissions attributable to the proposed Project are expected to exceed the SCAQMD thresholds of 3.84 million tons of carbon dioxide equivalent per Service Population per year (MT CO_2e/SP/yr) for 2025 and 2.88 MT CO_2e/SP/yr for 2030. Therefore, the proposed Project would result in a significant unavoidable project impact and significantly contribute to an unavoidable cumulative impact related to GHG emissions and conflict with an applicable GHG reduction plan, policy, or regulation.

1.5 ALTERNATIVES

1.5.1 Alternatives Evaluated in this EIR

Public Resources Code (PRC) Section 21100 and *State CEQA Guidelines* Section 15126 require an EIR to identify and discuss a No Project Alternative and a reasonable range of alternatives to the proposed Project that would feasibly attain most of the basic objectives of the project and would avoid or substantially lessen any of the significant environmental impacts. The following four alternatives have been determined to represent a reasonable range of alternatives that have the potential to feasibly attain most of the basic objectives of the proposed Project but that may avoid or substantially lessen any of the significant impacts of the proposed Project. Therefore, the alternatives considered in this EIR include the following:

- **Alternative 1 – No Project Alternative:** CEQA requires analysis of a "No Project" Alternative. The purpose of describing and analyzing a no project alternative is to allow decision-makers to compare the impacts of approving the proposed Project with the impacts of not approving the proposed Project. According to *State CEQA Guidelines* Section 15126.6(e)(3)(C), the lead agency should proceed to analyze the impacts of the no project alternative by projecting what would reasonably be expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services. Because the current owners of the Project site have indicated their intent to sell the property, it is unlikely the Project site would continue to be used as a commercial nursery. As shown on Figure 3.5, General Plan Land Use and Business Development Overlay, the Project site is designated for Business Park uses on the City's General Plan Land Use Map. For this reason, under Alternative 1, it is assumed that while the proposed Area Plan would not be developed,

the Project site would not remain in the existing condition, and the Project site would be developed to the maximum intensity allowed under the existing General Plan designation of Business Park. The Business Park designation is intended to provide a mix of uses as allowed under the Commercial, Professional Office, and Light Industrial designations. Alternative 1 would include 1,841,700 square feet (sf) of Business Park use.

- **Alternative 2 – Urban Industrial/Residential:** The Project site would be developed in accordance with the Urban Industrial-Residential land use designation, which is a new land use designation being considered in the Lake Forest General Plan update. The Urban Industrial-Residential land use designation allows for a mix of light industrial and commercial uses at a density of 25 residential units per acre and a maximum floor-to-area ratio (FAR) of 1.0:1. Alternative 2 includes: 592 residential units; 101 senior affordable rental units; 4 ac of commercial/industrial uses; a 12.6 ac school; 24.9 ac of parks, open space, and habitat restoration area; and a 5.6 ac community garden.

- **Alternative 3 – No School Alternative:** Alternative 3 includes: development of 675 single-family residential units; 101 senior affordable rental units; 18.9 ac of parks, open space, and habitat restoration area; and a 2 ac community garden.

- **Alternative 4 – Reduced Project:** Alternative 4 includes: development of 600 single-family residential units; 101 senior affordable rental units; a 12.6 ac elementary school; a 2 ac community garden; and 18.9 ac of parks, open space, and habitat restoration area.

1.5.2 Identification of the Environmentally Superior Alternative

CEQA requires the identification of an Environmentally Superior Alternative among the alternatives evaluated in an EIR. *State CEQA Guidelines* Section 15126.6(e)(2) provides that, if the No Project/No Build Alternative is the Environmentally Superior Alternative, then the EIR shall also identify an Environmentally Superior Alternative among the other alternatives. Alternative 4 would have the least impact on the environment because the Project site would be developed at a reduced density, thereby reducing the most of the proposed Project's environmental impacts compared to the other alternatives. However, Alternative 4 would not reduce the significant impacts related to agricultural resources and GHG emissions to a less than significant level. These impacts would remain significant and unavoidable. Additionally, Alternative 4 would potentially meet all of the project alternatives. Accordingly, it is determined that Alternative 4 is the Environmentally Superior Alternative because it would meet all of the project' objectives and result in reduced environmental impacts as compared to the proposed Project.

1.6 SUMMARY OF IMPACTS AND MITIGATION MEASURES

Table 1.A identifies the potential Project environmental impacts, proposed mitigation measures, and level of significance after mitigation is incorporated into the Project. Environmental topics addressed in this EIR include: Aesthetics, Agricultural Resources, Air Quality, Biological Resources, Cultural Resources, Energy, Geology and Soils and Paleontological Resources, Greenhouse Gas Emissions, Hazards and Hazardous Materials, Hydrology and Water Quality, Land Use and Planning, Noise,

Population and Housing, Public Services, Recreation, Transportation and Traffic, Tribal Cultural Resources, Utilities, and Wildfire.

1.6.1 Secondary Effects of Mitigation Measures

In accordance with *State CEQA Guidelines* Section 15126.4(a)(1)(D), if any mitigation measure would cause one or more significant effects in addition to those that would be caused by the proposed Project, the effects of the mitigation measure shall be discussed. The mitigation measures proposed (as listed on Table 1.A) require the Applicant to provide the City with lighting, grading, excavation or other construction plans, or provide evidence that the Project would adhere to existing programs, regulations, or recommendations in technical reports. The regulations and policies listed in the mitigation measures have been evaluated during their respective adoptions or approval processes. No secondary effects related to the proposed mitigation measures are expected to occur.

Table 1.A: Summary of Project Impacts, Regulatory Compliance Measures, Mitigation Measures, and Level of Significance after Mitigation

Environmental Impact	Level of Significance Prior to Mitigation	Regulatory Compliance Measures and Mitigation Measures	Level of Significance After Mitigation
4.1: Aesthetics			
Threshold 4.1.1: The proposed Project would not have a substantial adverse effect on a scenic vista.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
Threshold 4.1.2: The proposed Project would not substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway.	No Impact	No mitigation is required.	No Impact
Threshold 4.1.3: The proposed Project would not conflict with applicable zoning and other regulations governing scenic quality.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
Threshold 4.1.4: The proposed Project would create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.	Potentially Significant Impact	**Mitigation Measure 4.1.1: Comprehensive Lighting Plan.** Prior to issuance of the first building permit for production homes, the Project Applicant/Developer shall prepare a comprehensive lighting plan for review and approval by the City of Lake Forest (City) Director of Community Development or designee. The lighting plan shall be prepared by a qualified engineer and shall address all aspects of lighting, including, but not limited to, height, type, location, infrastructure, and safety. The lighting plan shall include the following in conjunction with other measures as determined necessary by the illumination engineer: a. All Project lighting shall be hooded or shielded to focus the light downward and prevent light spillage onto adjacent properties. b. All lights shall be designed and located so that direct light rays are confined to the premises. c. Parking area lighting shall be Illuminating Engineering Society "Full Cut Off" designated or "fully shielded" fixtures so that no light is emitted above the lowest light-emitting part of the fixture. d. Light levels at the property line shall not exceed 0.1 foot-candle (fc) adjacent to the *Open Space & Habitat & Restoration Area* properties. e. Light standards shall not exceed 20 feet in height. The Lighting Plan shall also include a photometric survey. The photometric survey shall demonstrate that lighting values do not exceed 0.1 fc adjacent to the Open Space & Habitat & Restoration Area and that no direct rays shine onto public streets or adjacent sites.	Less than Significant Impact
4.2: Agricultural Resources			
Threshold 4.2.1: The proposed Project would convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use.	Potentially Significant Impact	No feasible mitigation measures are available.	Significant and Unavoidable Impact
Threshold 4.2.2: The proposed Project would not conflict with existing zoning or agricultural use, or a Williamson Act contract.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
Threshold 4.2.5: The proposed Project would not involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use.	Less Than Significant Impact	No mitigation is required.	Less than Significant Impact
Cumulative Impacts to Agricultural Resources: Because implementation of the proposed Project would result in the conversion, and elimination, of a significant amount of Unique Farmland remaining in the City, the contribution of the proposed Project to the loss of Important Farmland would be cumulatively considerable. Consequently, the cumulative impact of the proposed Project on Unique Farmland would be significant and unavoidable.	Potentially Significant Impact	No feasible mitigation measures are available.	Significant and Unavoidable Impact

Table 1.A: Summary of Project Impacts, Regulatory Compliance Measures, Mitigation Measures, and Level of Significance after Mitigation

Environmental Impact	Level of Significance Prior to Mitigation	Regulatory Compliance Measures and Mitigation Measures	Level of Significance After Mitigation
4.3: Air Quality			
Threshold 4.3.1: The proposed Project would not conflict with or obstruct implementation of the applicable air quality plan	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
Threshold 4.3.2: The proposed Project would not result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non- attainment under an applicable federal or state ambient air quality standard	Less than Significant Impact	**RCM AQ-1: South Coast Air Quality Management District (SCAQMD) Rule 403.** The Project Applicant shall ensure the Construction Contractor implements fugitive dust control measures in compliance with SCAQMD Rule 403. The Project Applicant shall include the following fugitive dust control measures for SCAQMD Rule 403 compliance in the Project plans and specifications: ● All clearing, grading, earth-moving, or excavation activities shall cease when winds exceed 25 miles per hour (mph) per SCAQMD guidelines in order to limit fugitive dust emissions. ● The Construction Contractor shall ensure that all disturbed unpaved roads and disturbed areas within the Project are watered, with complete coverage of disturbed areas, at least three (3) times daily during dry weather and preferably mid-morning, afternoon, and after work is done for the day. ● The contractor shall ensure that traffic speeds on unpaved roads and Project site areas are reduced to 15 mph or less. **RCM AQ-2**: **SCAQMD Rule 1113.** The Project Applicant shall ensure the Construction Contractor implements measures to control volatile organic compound (VOC) emissions from architectural coatings in compliance with SCAQMD Rule 1113. The Project Applicant shall include the following control measures for SCAQMD Rule 1113 compliance in the Project plans and specifications: ● Only "Low-Volatile Organic Compounds" paints (no more than 50 grams/liter of VOC) shall be used. **RCM AQ-3**: **SCAQMD Rule 445.** Prior to the issuance of building permits, the City of Lake Forest Director of Community Development, or designee, shall ensure that the project design does not include wood-burning stoves and fireplaces in new development in compliance with SCAQMD Rule 445. **RCM AQ-4: Title 24 of the California Code of Regulations (CCR).** Prior to issuance of building permits, the City of Lake Forest Director of Community Development, or designee, shall ensure that the project design complies with the 2019 Building Energy Efficiency Standards (CCR Title 24) energy conservation and the California Green Building Standards Code (CALGreen).	Less than Significant Impact
Threshold 4.3.3: The proposed Project would not expose sensitive receptors to substantial pollutant concentrations	Less than Significant Impact	Refer to RCM-AQ-1	Less than Significant Impact
Threshold 4.3.4: The proposed Project would not result in other emissions (such as those leading to odors adversely affecting a substantial number of people)	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
Cumulative Impact related to Air Quality: The proposed Project's construction- and operation-related regional daily emissions would be less than the SCAQMD significance thresholds for all criteria pollutants. Therefore, the proposed Project would not have a cumulatively considerable increase in emissions, and the proposed Project's cumulative air quality impacts would be less than significant.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
4.4: Biological Resources			
Threshold 4.4.1: The proposed Project would have a substantial adverse effect, either directly or through habitat modification, on a species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Services.	Potentially Significant Impact	**Mitigation Measure 4.4.1: Burrowing Owls.** A qualified biologist shall conduct a pre-construction presence/absence survey for burrowing owls no more than 14 days prior to site disturbance and submit the survey results to the Director of the City of Lake Forest Community Development Department, or designee~~,~~. If burrowing owls are not detected, no further action is necessary. If burrowing owls are detected during the pre-construction survey, the owls shall be evicted from the site (when not nesting) under the supervision of a qualified biologist and following accepted California Department of Fish and Wildlife (CDFW) protocols and as approved by the CDFW to avoid direct take of burrowing owl and compensate for the loss of habitat. Compensation for the loss of occupied burrowing owl habitat shall occur at a 1:1 ratio such that the habitat acreage and number of burrows occupied by burrowing owls impacted are replaced. As recommended~~required~~ by the 2012 CDFW Staff Report on Burrowing Owl Mitigation, if burrowing owl are detected on the Project site, a mitigation and management plan	Less than Significant Impact

Table 1.A: Summary of Project Impacts, Regulatory Compliance Measures, Mitigation Measures, and Level of Significance after Mitigation

Environmental Impact	Level of Significance Prior to Mitigation	Regulatory Compliance Measures and Mitigation Measures	Level of Significance After Mitigation
		shall be drafted and submitted to CDFW for approval, and shall ensure mitigation lands used to compensate for the loss of habitat and burrows occupied by burrowing owls are conserved and managed in perpetuity. **Mitigation Measure 4.4.2: Bats.** Bat roosting/nursery exit counts and acoustic surveys shall be performed in Serrano Creek by a qualified bat biologist prior to site disturbance to determine whether Serrano Creek supports a bat nursery and/or roost and by which species. The survey results shall be submitted to the Director of the City of Lake Forest Community Development Department, or designee. This survey work shall occur in late-spring/summer and potentially again in the fall, depending on the results of the summer work. This would be determined by the bat biologist. If the results of the bat work finds 25 or more individuals composed of non-special-status bat species and/or one or more bats with a special-status, a Bat Management Plan shall be developed to ensure bat mortality does not occur during construction. If it is determined that excluding the bats during non-breeding (generally October through March) is necessary, the Bat Management Plan~~plan~~ shall provide details (both in text and with graphic images) where exclusion devices shall be placed, the timing for exclusion work, and the timeline and methodology needed to exclude the bats. The Bat Management Plan~~plan~~ shall be reviewed and approved by CDFW. Prior to issuance of ~~any construction or~~ grading permits for work adjacent to Serrano Creek, documentation indicating CDFW approval of the Bat Management Plan~~plan~~ shall be provided to the City of Lake Forest Director of Community Development, or designee. **Mitigation Measure 4.4.3: Invasive Plant Species.** Prior to issuance of any building permits, the Project Applicant/Developer shall submit a final landscape plan to the Director of the City of Lake Forest Community Development Department, or designee, demonstrating that the landscaping palette for all common areas within the community does not include invasive exotic plants (i.e., those plant species rated as "high" or "moderate" in the California Invasive Plant Council's [Cal-IPC] Invasive Plant Inventory). Prior to the first final building inspection~~issuance of certificates of occupancy~~, the Project Applicant/Developer shall submit a copy of the Homeowner Association's (HOA) Covenants, Conditions, and Restrictions (CC&Rs) to the Director of the City of Lake Forest Community Development Department, or designee, for verification that the CC&Rs prohibit the use of invasive exotic plants in all on-site parks, open space, and other common areas. Further, the CC&Rs shall note that revisions to the HOA CC&Rs related to the maintenance of parks, open space, and other common areas shall be prohibited except with the review and approval of the Director of the City of Lake Forest Community Development Department, or designee. **Mitigation Measure 4.4.4: Preservation of Serrano Creek During Project Construction.** Prior to the start of grading or construction activities, the Director of the City of Lake Forest Community Development Department, or designee, shall verify that plans require the Project impact footprint, including any construction buffers, be staked and fenced (e.g., with orange snow fencing, silt fencing, or a material that is clearly visible). The Director of the City of Lake Forest Community Development Department, or designee, shall further verify that a qualified, experienced biologist has been retained by the Project Applicant/Developer and that the biologist shall: (1) be present on site during all grading or vegetation removal activities occurring within 100 ft of Serrano Creek to ensure that encroachment into Serrano Creek and/or the southern black willow forest does not occur; and (2) verify the boundary is properly delineated, staked, and fenced prior to the start of any ground disturbance or vegetation clearing. The Construction Site Manager shall ensure that the staking/fencing is maintained for the duration of construction and that any required repairs are completed in a timely manner. Prior to the removal of the staking/fencing at the completion of construction activities, a qualified, experienced biologist shall conduct a final inspection of the area to ensure that encroachment into Serrano Creek and/or the southern black willow forest has not occurred. The biologist shall provide a final report to the City of Lake Forest Director of Community Development, or designee. If encroachment did occur, the biologist shall evaluate the encroachment and provide a report to both the City of Lake Forest Director of Community Development and CDFW. The City and CDFW shall determine if and what additional mitigation would be required. **Mitigation Measure 4.4.5: Construction Best Management Practices.** Prior to the start of grading or construction activities, the Director of the City of Lake Forest Community Development Department, or designee, shall verify that the plans note the following requirements: ● Any open trenches shall be covered at the end of each workday in a manner to prevent the entrapment of wildlife, or be adequately ramped to provide an animal escape route.	

Table 1.A: Summary of Project Impacts, Regulatory Compliance Measures, Mitigation Measures, and Level of Significance after Mitigation

Environmental Impact	Level of Significance Prior to Mitigation	Regulatory Compliance Measures and Mitigation Measures	Level of Significance After Mitigation
		• Construction shall occur between 30 minutes before sunrise and 30 minutes after sunset. • No nighttime construction within 200 ft of Serrano Creek shall occur. • No construction lighting shall be placed within 200 ft of Serrano Creek unless a qualified biologist confirms the lighting does not illuminate Serrano Creek. • Active construction areas shall be watered regularly (at least once every 2 hours) to control dust and thus minimize impacts on vegetation within Serrano Creek. • Equipment operators and construction crews shall be informed of the importance of the construction limits by the biological monitor prior to any ground disturbance. • Construction personnel shall strictly limit their activities, vehicles, equipment, and construction materials to the limits of disturbance and the designated staging areas and routes of travel approved by the biological monitor. • Exotic plant species removed during construction shall be properly handled to prevent sprouting or regrowth. Construction equipment shall be cleaned of mud or other debris that may contain invasive plants and/or seeds and inspected to reduce the potential of spreading noxious weeds before mobilizing to the site and before leaving the site during the course of construction. The cleaning of equipment shall occur at least 300 ft from jurisdictional aquatic features, including Serrano Creek. If the location is closer, it must be approved by the biological monitor. • Vegetation shall be covered while being transported, and vegetation materials removed from the site shall be disposed of in accordance with applicable laws and regulations. • All equipment maintenance, staging, and dispensing of fuel, oil, coolant, or any other toxic substances shall occur only in designated areas within the limits of disturbance and at least 200 ft from jurisdictional aquatic features, including Serrano Creek. These designated areas shall be clearly marked and located in such a manner as to contain runoff and shall be approved by the biological monitor. • To avoid attracting predators, the Project site will be kept clear of trash and debris. All food-related trash items will be enclosed in sealed containers and regularly removed from the site. **Mitigation Measure 4.4.6: Perimeter Glass Fencing.** Prior to issuance of the first building permit, the~~The~~ Project Applicant/Developer shall submit a Wall and Fencing Plan to the City of Lake Forest Director of Community Development, or designee, for review and approval. The Wall and Fencing Plan shall specify, and include details for, the use of a permanent bird strike avoidance treatment consisting of either window film (CollidEscape Clear or equivalent) or UV (ultraviolet) patterned glass (or equivalent) on all perimeter glass fencing, including but not limited to the fencing around Serrano Creek and the radiant heat wall (refer to Figure 4.19.2: Fire Protection Plan). The Wall and Fence Plan shall include documentation addressing the bird strike avoidance effectiveness of the proposed treatment.	
Threshold 4.4.2: The proposed Project would have a substantial adverse effect on riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service.	Potentially Significant Impact	Refer to Mitigation Measures 4.4.1 (Aesthetics), 4.4.4 and 4.4.5, above. **Mitigation Measure 4.4.7: Habitat Management Plan.** Prior to the issuance of the first building permit~~start of grading or construction activities~~, the Director of the City of Lake Forest Community Development Department, or designee, shall verify that the Project Applicant/Developer has developed a Habitat Management Plan (HMP) for the Project site. The HMP shall describe the long-term management and maintenance requirements—including funding mechanisms and monitoring—for the Open Space & Habitat & Restoration Area and the southern black willow forest. In addition, the HMP shall, at a minimum: • Require the installation of permanent fencing along the perimeter of the Open Space & Habitat & Restoration Area and interior trails, if applicable. In addition, permanent signs shall be installed along all fencing indicating the purpose and need for the fencing and the restrictions within the Open Space & Habitat & Restoration Area. The maintenance of the fencing and signage shall be the responsibility of the HOA or a long-term land management entity. • Require that all lighting along the perimeter of Serrano Creek, particularly street lamps, be shielded and oriented in a manner that prevents spill light or glare into the Creek. This also includes outdoor lighting for those residences abutting Serrano Creek. It shall be the responsibility of the HOA to ensure lighting is maintained consistent with these criteria.	Less than Significant Impact

Table 1.A: Summary of Project Impacts, Regulatory Compliance Measures, Mitigation Measures, and Level of Significance after Mitigation

Environmental Impact	Level of Significance Prior to Mitigation	Regulatory Compliance Measures and Mitigation Measures	Level of Significance After Mitigation
		● The Project Applicant/Developer shall place the Open Space & Habitat & Restoration Area into a conservation easement or similar legal protection, along with sufficient funds (as approved by the City of Lake Forest Director of Community Development, or designee) to protect the lands in perpetuity. In addition, lands within the conservation easement shall be managed in perpetuity by a qualified entity designated by the Project Applicant/Developer and approved by the City of Lake Forest Director of Community Development, or designee.	
Threshold 4.4.3: The proposed Project would have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act through direct removal, filling, hydrological interruption, or other means.	Potentially Significant Impact	**Mitigation Measure 4.4.8: Jurisdictional Resources.** Prior to the issuance of any grading permits~~,~~, the Project Applicant/Developer shall coordinate with the United States Army Corps of Engineers (ACOE), Santa Ana Regional Water Quality Control Board (RWQCB), and the California Department of Fish and Wildlife (CDFW) regarding their jurisdiction over the on-site drainages. The results of the Project Applicant/Developer's coordination efforts with the ACOE, RWQCB, and CDFW regarding their jurisdiction over the on-site drainages, and any mitigation measures required by the resource agencies regarding impacts on their respective jurisdictions shall be documented in a memorandum submitted to the City of Lake Forest Director of Community Development, or designee, prior to issuance of grading permits. The Project Applicant/Developer shall be obligated to implement/comply with mitigation measures required by the resource agencies regarding impacts on their respective jurisdictions. The ratios at which ACOE, RWQCB, and CDFW may require permanent impacts to be mitigated vary from 1:1 (no net loss) to as high as 3:1. The jurisdictional areas of the ACOE, RWQCB, and CDFW are not additive areas because the jurisdictional areas on the site may be within the jurisdiction of one or more of these agencies. Therefore, the permits and associated jurisdictional replacement requirements would identify which mitigation areas apply to the corresponding jurisdiction. At a minimum, the following shall be implemented by the Project Applicant/Developer prior to issuance of building permits: ● A detailed Habitat Mitigation Monitoring Plan (HMMP) shall be prepared that describes the location of establishment, restoration, and/or enhancement, which shall include replanting requirements, success criteria, and monitoring following construction. The HMMP shall be ~~incorporated into the regulatory agencies permit, certification, and agreement required for the proposed Project and shall be~~ subject to review and approval by the resource agencies. ● To mitigate the loss of ACOE, RWQCB, and CDFW jurisdictional waters, the Project Applicant/Developer shall create a minimum of 4.19 acres (ac) of riparian vegetation on the Project site that shall be contiguous with, and contribute to, the existing riparian canopy associated with Serrano Creek within the conservation lands. If on-site mitigation options are not feasible, the Project Applicant/Developer shall purchase credits from an approved mitigation bank/in-lieu fee program at a minimum of a 1:1 ratio, for a minimum of 1.91 ac of mitigation credits. If on-site mitigation options are not feasible and an approved mitigation bank/in-lieu fee program cannot be identified to mitigate the loss of ACOE, RWQCB, and CDFW jurisdiction, the Project Applicant/Developer shall enhance, re-establish, or establish ACOE, RWQCB, and CDFW jurisdictional areas on off-site conserved lands at a minimum 1:1 ratio, for a minimum of 1.91 ac of enhancement, re-establishment, or establishment. **Mitigation Measure 4.4.9: Aquatic Resource Integrity Area.** The Project site is located within the boundaries of the San Diego Creek Watershed Special Area Management Plan (SAMP). The proposed Project would result in impacts to 0.95 ac of mapped Aquatic Resource Integrity Area. Mitigation for impacts to greater than 0.1 ac within this mapping unit shall be developed in coordination with the ACOE~~CDFW~~ unless the ACOE~~CDFW~~ determines that the Project site does not contain an Aquatic Resource Integrity Area (i.e., there is a mapping error in the SAMP). Prior to the issuance of any grading permits, the Project Applicant/Developer shall provide documentation to the City of Lake Forest Director of Community Development, or designee, that (1) ACOE~~CDFW~~ has determined that a mapping error exists (which may be accomplished through issuance of a Letter of Permission); OR (2) the Project Applicant/Developer shall implement mitigation as specified by the ACOE~~CDFW~~.	Less than Significant Impact
Threshold 4.4.4: The proposed Project would not interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.	Less than Significant Impact	**RCM BIO-1: Migratory Bird Treaty Act and California Department of Fish and Game Code.** In the event that any construction, vegetation clearing, or grading activities (including disking and demolition) should occur between February 1st and September 1st, a qualified biologist shall conduct a nesting bird survey within~~no more than~~ 3 days of~~prior to~~ commencement of construction activities to confirm the absence of nesting birds. If active nesting of birds is observed within 500 feet (ft) of the designated construction area during surveys, the biologist shall establish suitable buffers around the active nests (e.g., a minimum of 50 ft for passerines and 250 ft for raptors [including burrowing owls]). The buffer areas shall be avoided until the nests are no longer occupied and the juvenile birds can survive independently from the nests. Prior to commencement of grading activities ~~and issuance of any building permits~~, the Director of the City of Lake Forest Community Development, or designee, shall verify that all Project grading and construction plans include specific documentation regarding the	Less than Significant Impact

Table 1.A: Summary of Project Impacts, Regulatory Compliance Measures, Mitigation Measures, and Level of Significance after Mitigation

Environmental Impact	Level of Significance Prior to Mitigation	Regulatory Compliance Measures and Mitigation Measures	Level of Significance After Mitigation
		requirements of the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code Section 3503, that preconstruction surveys have been completed and the results reviewed by staff, and that the appropriate buffers (if needed) are noted on the plans and established in the field with orange snow fencing.	
Threshold 4.4.5: The proposed Project would conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.	Potentially Significant Impact	**RCM BIO-2: Tree Ordinance.** In compliance with City of Lake Forest Municipal Code Section 6.20.025, if any eucalyptus trees on the Project site are to be cut or trimmed between April 1st through October 31st, the Project Applicant/Developer shall first obtain a permit from the City of Lake Forest for the transportation of any logs, branches, or trunks to an off-site location for disposal. **Mitigation Measure 4.4.10: Invasive Short Hole Borers (ISHBs).** A designated biologist familiar with the signs of ISHBs shall survey trees on the Project site that are designated for removal or trimming. Surveys shall be conducted at least~~no more than~~ 30 days prior to removal or trimming activities. If any tree is determined to be infested/infected by ISHBs, a control plan shall be prepared and submitted to CDFW for review and approval. At a minimum, the control plan shall include methods of control, removal, and appropriate disposal techniques to prevent the spread of ISHBs. The results of the tree survey, and if warranted, a copy of the CDFW-approved control plan shall be submitted to the City of Lake Forest Director of Community Development, or designee, prior to issuance of ~~construction~~grading permits.	Less than Significant Impact
Threshold 4.4.6: The proposed Project would not conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
Cumulative Impacts to Biological Resources: During construction, the proposed Project would contribute to cumulatively considerable declines of native streambed vegetation and bats.	Potentially Significant Impact	Refer to Mitigation Measures 4.4.1, 4.4.2, 4.4.4, and 4.4.5.	Less than Significant Impact
4.5: Cultural Resources			
Threshold 4.5.1: The proposed Project would not cause a substantial adverse change in the significance of a historical resource as defined in §15064.5.	No Impact	No mitigation is required.	No Impact
Threshold 4.5.2: The proposed Project would potentially cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5.	Potentially Significant Impact	**Mitigation Measure 4.5.1 Archaeological Resources, Tribal Cultural Resources, and Human Remains.** Prior to issuance of a grading permit for any site within the Project Area, a qualified archaeologist shall be retained by the Applicant for that grading permit to provide professional archaeological services. The archaeologist shall be present at the pre-grading conference to establish procedures for archaeological resource surveillance. Those procedures shall include provisions for temporarily halting or redirecting work to permit sampling, identification, and evaluation of resources deemed by the archaeologist to potentially be historical resources or unique archaeological resources under CEQA. The archaeologist also shall conduct on-site archaeological monitoring for the grading operation. Should historical resources or unique archaeological resources be discovered during the grading operation, grading activities shall be modified to allow expeditious and proper analysis and/or salvage of the resources. Disposition of the resources shall be within the discretion of the City of Lake Forest. Prior to Approval of Grading or Improvement plans, the Applicant shall implement a grading monitoring plan to mitigate potential impacts to undiscovered buried archaeological resources on the Portola Center Project to the satisfaction of the City of Lake Forest. This program shall include, but shall not be limited to, the following actions: 1. Provide evidence to the lead agency that a qualified archaeologist and Native American monitor have been contracted to implement a grading monitoring program to the satisfaction of the City of Lake Forest. A letter from the Project Archaeologist shall be submitted to the City of Lake Forest Director of Development Services. A letter from the Native American Monitor shall also be submitted to the City of Lake Forest Director of Community Development. The letter shall include the following guidelines: a. The qualified archaeologist/historian and Native American Monitor shall attend the pre-grading meeting with the contractors to explain and coordinate the requirements of the monitoring program. b. The consulting archaeologist and Native American monitor shall monitor all areas identified for development as determined by the Principal Investigator of the excavations. c. An adequate number of monitors (archaeological/ historical/Native American) shall be present to ensure that all earth-	Less than Significant Impact

Table 1.A: Summary of Project Impacts, Regulatory Compliance Measures, Mitigation Measures, and Level of Significance after Mitigation

Environmental Impact	Level of Significance Prior to Mitigation	Regulatory Compliance Measures and Mitigation Measures	Level of Significance After Mitigation
		moving activities are observed and shall be on site during all grading activities as determined by the Principal Investigator of the excavations. d. During the original cutting of previously undisturbed deposits, the archaeological monitor(s) and Native American monitor(s) shall be on site full-time. Inspections will vary based on the rate of excavation, the materials excavated, and the presence and abundance of artifacts and features. The frequency and location of inspections shall be determined by the Principal Investigator. e. During the cutting of previously disturbed deposits, the archaeological monitor(s) and Native American monitor(s) shall be on site as determined by the Principal Investigator of the excavations. Inspections will vary based on the rate of excavation, the materials excavated, and the presence and abundance of artifacts and features. The frequency and location of inspections shall be determined by the Principal Investigator in consultation with the Native American monitor. f. Isolates and clearly non-significant deposits shall be minimally documented in the field and the monitored grading can proceed. g. In the event that previously unidentified, potentially significant cultural resources are discovered, the archaeologist shall have the authority to divert or temporarily halt ground disturbance operations in the area of discovery to allow for evaluation. The archaeologist shall contact the City of Lake Forest Director of Development Services at the time of discovery. Disposition of the resources shall be within the discretion of the City of Lake Forest. For significant cultural resources, a Research Design and Data Recovery Program to mitigate impacts shall be prepared by the consulting archaeologist, then carried out using professional archaeological methods. h. If any human bones are discovered, the Principal Investigator shall contact the County Coroner. In the event that the remains are determined to be of Native American origin, the Most Likely Descendant, as identified by the Native American Heritage Commission, shall be contacted in order to determine proper treatment and disposition of the remains. i. Before construction activities are allowed to resume in the affected area, the artifacts shall be recovered and features recorded using professional archaeological methods. The Principal Investigator shall determine the amount of material to be recovered for an adequate artifact sample for analysis. j. In the event that previously unidentified cultural resources are discovered, all cultural material collected during the grading monitoring program shall be processed and curated at a facility that meets federal standards per 36 CFR Part 79, and therefore shall be professionally curated and made available to other archaeologists/researchers for further study. The collections and associated records shall be transferred, including title, to the John D. Cooper Archaeological and Paleontological Curation Center, to be accompanied by payment of the fees necessary for permanent curation. Evidence shall be in the form of a letter from the curation facility identifying that archaeological materials have been received and that all fees have been paid. k. In the event that previously unidentified cultural resources are discovered, a report documenting the field and analysis results and interpreting the artifact and research data within the research context shall be completed and submitted to the satisfaction of the City of Lake Forest prior to the issuance of any building permits. The report shall include Department of Parks and Recreation Primary and Archaeological Site Forms. l. In the event that no cultural resources are discovered, a brief letter to that effect shall be sent to the City of Lake Forest by the consulting archaeologist that the grading monitoring activities have been completed. 2. Provide evidence to the Lead Agency that the following notes have been placed on the Grading Plan: a. The qualified archaeologist/historian and Native American monitor shall attend the pre-construction meeting with the contractors to explain and coordinate the requirements of the monitoring program. b. During the original cutting of previously undisturbed deposits, the archaeological monitor(s) and Native American monitor(s) shall be on site to perform full-time monitoring as determined by the Principal Investigator of the	

Table 1.A: Summary of Project Impacts, Regulatory Compliance Measures, Mitigation Measures, and Level of Significance after Mitigation

Environmental Impact	Level of Significance Prior to Mitigation	Regulatory Compliance Measures and Mitigation Measures	Level of Significance After Mitigation
		excavations. The frequency of inspections shall depend on the rate of excavation, the materials excavated, and the presence and abundance of artifacts and features. c. During the cutting of previously disturbed deposits, the archaeological monitor(s) and Native American monitor(s) shall be on site as determined by the Principal Investigator of the excavations. Inspections will vary based on the rate of excavation, the materials excavated, and the presence and abundance of artifacts and features. The frequency and location of inspections shall be determined by the Principal Investigator in consultation with the Native American monitor. d. In the event that previously unidentified, potentially significant cultural resources are discovered, the archaeologist shall have the authority to divert or temporarily halt ground disturbance operations in the area of discovery to allow for evaluation. The archaeologist shall contact the City of Lake Forest Director of Development Services at the time of discovery. Disposition of the resources shall be within the discretion of the City of Lake Forest. For significant cultural resources, a Research Design and Data Recovery Program to mitigate impacts shall be prepared by the consulting archaeologist, then carried out using professional archaeological methods. e. The consulting archaeologist shall monitor all areas identified for development <u>as determined by the Principal Investigator of the excavations</u>. f. If any human bones are discovered, the Principal Investigator shall contact the County Coroner. In the event that the remains are determined to be of Native American origin, the Most Likely Descendant, as identified by the Native American Heritage Commission, shall be contacted in order to determine proper treatment and disposition of the remains. g. Prior to rough grading inspection sign-off, provide evidence that the field grading monitoring activities have been completed to the satisfaction of the City of Lake Forest. Evidence shall be in the form of a letter from the Project Archaeologist. h. Prior to final grading release, submit to the satisfaction of the City of Lake Forest, a final report that documents the results, analysis, and conclusions of all phases of the Archaeological Monitoring Program. The report shall also include the following: • Department of Parks and Recreation Primary and Archaeological Site Forms. • Evidence that all cultural materials collected during the grading monitoring program has been curated, and therefore shall be professionally curated and made available to other archaeologists/ researchers for further study. The collections and associated records shall be transferred, including title, to the John D. Cooper Archaeological and Paleontological Curation Center, to be accompanied by payment of the fees necessary for permanent curation. Evidence shall be in the form of a letter from the curation facility identifying that archaeological materials have been received and that all fees have been paid. 3. In the event that no cultural resources area discovered, a brief letter to that effect shall be sent to the City of Lake Forest by the consulting archaeologist that the grading monitoring activities have been completed. 4. The qualified archaeologist retained shall prepare monthly progress reports <u>during monitoring</u> to be filed with the site developer(s) and the City of Lake Forest. 5. Artifacts recovered shall be prepared, identified, and cataloged before donation to the Gabrieleno Band of Mission Indians – Kizh Nation. If the Tribe does not want custody, an accredited repository designated by the City of Lake Forest shall be utilized. Any artifacts determined to be insignificant shall be offered to local schools for use in educational programs. 6. The qualified archaeologist retained shall prepare a final report to be filed with the site developer(s) and the City of Lake Forest. The report shall include a list of specimens recovered, documentation of each locality, interpretation of artifacts recovered and shall include all specialists' reports as appendices.	

Table 1.A: Summary of Project Impacts, Regulatory Compliance Measures, Mitigation Measures, and Level of Significance after Mitigation

Environmental Impact	Level of Significance Prior to Mitigation	Regulatory Compliance Measures and Mitigation Measures	Level of Significance After Mitigation
Threshold 4.5.3: The proposed Project would potentially disturb human remains, including those interred outside of formal cemeteries.	Potentially Significant Impact	Refer to Mitigation Measure 4.5.1 above.	Less than Significant Impact
Cumulative Impacts to Cultural Resources: Potential impacts of the proposed Project to unknown cultural resources, when combined with the impacts of past, present, and reasonably foreseeable projects in the City of Lake Forest, could contribute to a cumulatively significant impact due to the overall loss of historical and archaeological artifacts unique to the region.	Potentially Significant Impact	Refer to Mitigation Measure 4.5.1 above.	Less than Significant Impact
4.6: Energy			
Threshold 4.6.1: The proposed Project would not result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation.	Less than Significant Impact	**RCM EN-1: California Code of Regulations, Title 13, General Requirements for In-Use Off-Road Diesel-Fueled Fleets.** The construction contractor shall ensure that all non-essential idling of construction equipment is restricted to 5 minutes or less in compliance with California Code of Regulations (CCR) Title 13, Chapter 9, Article 4.8, Section 2449. Prior to issuance of any grading or building permits, the City of Lake Forest Director of Community Development, or designee, shall confirm that plans include notes with this requirement. **RCM EN-2: California Code of Regulations, Title 13, Airborne Toxic Control Measure to Limit School Bus Idling and Idling at Schools.** During operation, all school bus drivers shall comply with CCR Title 13, Article 1, Chapter 10, Section 2480 to limit bus idling at schools. School bus shall be turned off upon stopping at the school or within 100 feet of the school. School buses shall not be turned on more than 30 seconds before beginning to depart from the school or from within 100 feet of the school. School bus within 100 feet of the school shall not idle for more than 5 consecutive minutes and shall not idle for more than a cumulative 5 minutes in any 1 hour. In addition, refer to RCM AQ-4 and RCM GHG-1	Less than Significant Impact
Threshold 4.6.2: The proposed Project would not conflict with or obstruct a state or local plan for renewable energy or energy efficiency.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
Cumulative Impacts related to Energy: There are sufficient planned energy supplies to serve the proposed Project and related projects. The proposed Project's contribution to impacts related to the inefficient, wasteful, and unnecessary consumption of energy would not be cumulatively considerable.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
4.7: Geology and Soils			
Threshold 4.7.1(ii): The proposed Project would expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking.	Potentially Significant Impact	**RCM GEO-1: California Building Code Compliance Seismic Standards.** Structures and retaining walls shall be designed in accordance with the seismic parameters presented in the Geotechnical Evaluation (NMG Geotechnical 2017) and applicable sections of Section 1613 of the most current California Building Code (CBC). Prior to issuance of building permits for planned structures, the Project soils engineer and the Director of the City of Lake Forest Community Development Department, or designee, shall review building plans to verify that the structural design conforms to the requirements of the geotechnical study and the City of Lake Forest Municipal Code. **Mitigation Measure 4.7.1: Incorporation of and compliance with the recommendations in the Project Geotechnical Assessment.** All grading operations and construction shall be conducted in conformance with the recommendations included in the geotechnical evaluation on the Project site that has been prepared by NMG Geotechnical, Inc., titled Geotechnical Evaluation of Proposed Residential and School Site Development, Nakase Property, Lake Forest, California (April 19, 2017). Specific recommendations in the geotechnical evaluation address the following and shall be incorporated into the final Project plans and construction-level geotechnical report: 1. Removal of undocumented fill on the northern half of the Project site during remedial grading. 2. Removal of any soft or poor quality fill during remedial grading. If some of this material cannot be removed in order to prevent undermining the existing road, then a structural setback would be required to protect the planned structures from excessive differential settlement induced by the new fill loading. 3. Compact fill placement to reduce the potential for surface manifestations of liquefaction during seismic shaking. 4. Installation of a seismic shear key in the vicinity of Serrano Creek to mitigate the potential of lateral slope failure due to the	Less than Significant Impact

Table 1.A: Summary of Project Impacts, Regulatory Compliance Measures, Mitigation Measures, and Level of Significance after Mitigation

Environmental Impact	Level of Significance Prior to Mitigation	Regulatory Compliance Measures and Mitigation Measures	Level of Significance After Mitigation
		effects of liquefaction potential in the alluvium during a significant seismic shaking event. 5. Evaluation of the stability of the slopes If existing slopes are to essentially remain in place to ensure they have been graded to a standard that resulted in a 1.5 safety factor for gross and surficial stability. If there are any deficiencies with the existing slope, they would have to be regraded to project standards or a structural setback established to protect the planned structures. 6. Over-excavation to mitigate differential settlement in the design cut-and-fill transition areas. 7. Scour protection related to periodic surface flow in Serrano Creek. Additional site testing and final design evaluation shall be conducted by the Project Geotechnical Consultant to refine and enhance these requirements. The Project Applicant/Developer shall require the Project Geotechnical Consultant to assess whether the requirements in that report need to be modified or refined to address any changes in the Project features that occur prior to the start of grading. If the Project Geotechnical Consultant identifies modifications or refinements to the requirements, the Project Applicant/Developer shall require appropriate changes to the final Project design and specifications. Design, grading, and construction shall be performed in accordance with the requirements of the City of Lake Forest (City) Municipal Code (Title 8) and the California Building Code (CBC) applicable at the time of grading, appropriate local grading regulations, and the requirements of the Project Geotechnical Consultant as summarized in a final written report, subject to review by the Director of the City of Lake Forest Community Development Department, or designee, prior to commencement of grading activities. Grading plan review shall also be conducted by the Director of the City of Lake Forest Community Development Department or designee prior to the start of grading to verify that the requirements developed during the geotechnical design evaluation have been appropriately incorporated into the project plans. Design, grading, and construction shall be conducted in accordance with the specifications of the Project Geotechnical Consultant as summarized in a final report based on the CBC applicable at the time of grading and building, and the City's Building Code. On-site inspection during grading shall be conducted by the Project Geotechnical Consultant and the City of Lake Forest Director of Public Works/City Engineer, or designee, to ensure compliance with geotechnical specifications as incorporated into project plans. Prior to final of grading permits, the Project geotechnical engineer shall submit a Final Testing and Observation Geotechnical Report for Rough Grading to the City of Lake Forest Director of Public Works/City Engineer, or designee.	
Threshold 4.7.1(iii): The proposed Project would expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction.	Potentially Significant Impact	Refer to Mitigation Measure 4.7.1 and RCM GEO-1 above.	Less than Significant Impact
Threshold 4.7.2: The proposed Project would not result in substantial soil erosion or the loss of topsoil.	Less than Significant Impact	Refer to Regulatory Compliance Measures RCM WQ-1, RCM WQ-2, and RCM WQ-3 (Hydrology and Water Quality)	Less than Significant Impact
Threshold 4.7.3: The proposed Project would be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse.	Potentially Significant Impact	Refer to Mitigation Measure 4.7.1, RCM GEO-1 above. **Mitigation Measure 4.7.2: Corrosive Soils.** Prior to issuance of the first~~a~~ building permit, the Director of the City of Lake Forest Public Works Department, or designee, shall verify that the Project Applicant/Developer has retained the services of a licensed corrosion engineer to provide detailed corrosion protection measures. Where steel may come in contact with on-site soils, project construction shall include the use of steel that is protected against corrosion. Corrosion protection may include, but is not limited to, sacrificial metal, the use of protective coatings, and/or cathodic protection. Additional site testing and final design evaluation regarding the possible on-site presence of significant volumes of corrosive soils shall be performed by the Project Geotechnical Consultant to refine and enhance these recommendations. On-site inspection during grading shall be conducted by the Project Geotechnical Consultant and City of Lake Forest Director of Public Works/City Engineer, or designee, to ensure compliance with geotechnical specifications as incorporated into Project plans.	Less than Significant Impact
Threshold 4.7.4: The proposed Project would not be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact

Table 1.A: Summary of Project Impacts, Regulatory Compliance Measures, Mitigation Measures, and Level of Significance after Mitigation

Environmental Impact	Level of Significance Prior to Mitigation	Regulatory Compliance Measures and Mitigation Measures	Level of Significance After Mitigation
Threshold 4.7.6: The proposed Project would potentially directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.	Potentially Significant Impact	**Mitigation Measure 4.7.3: Paleontological Resources Impact Mitigation Program**. Prior to the issuance of the first preliminary ~~or precise~~ grading permit, the Project Applicant/Developer shall provide a letter to the Director of the City of Lake Forest Community Development Department, or designee, retained a qualified paleontologist (defined as a practicing paleontologist that is recognized in the paleontological community and proficient in vertebrate paleontology) who is listed on the County of Orange list of certified paleontologists. The paleontologist shall prepare a Paleontological Resources Impact Mitigation Program (PRIMP) for this Project. The PRIMP shall include the methods that will be used to protect paleontological resources that may exist within the Project site, as well as procedures for monitoring, fossil preparation and identification, curation into a repository, and preparation of a report at the conclusion of grading. The PRIMP shall be consistent with the guidelines of the Society of Vertebrate Paleontology. Excavation and grading activities in deposits with high paleontological sensitivity shall be monitored by a paleontological monitor following a PRIMP. No monitoring is required for excavations in deposits with no or low paleontological sensitivity. If paleontological resources are encountered during the course of ground disturbance, the paleontological monitor shall have the authority to temporarily redirect construction away from the area of the find in order to assess its significance. In the event that paleontological resources are encountered when a paleontological monitor is not present, work in the immediate area of the find shall be redirected and a paleontologist shall be contacted to assess the find for significance. Collected resources shall be prepared to the point of identification, identified to the lowest taxonomic level possible, cataloged, and curated into the permanent collections of a scientific institution. Prior to <u>issuance of the first building permit</u>~~approval of any occupancy permits~~, a report of findings shall be prepared to document the results of the monitoring program.	Less than Significant Impact
Cumulative Impacts to Geology and Soils: Potential impacts of the proposed Project to unknown paleontological resources and unique geologic features, when combined with the impacts of past, present, and reasonably foreseeable projects in the City of Lake Forest, could contribute to a cumulatively significant impact due to the overall loss of paleontological remains unique to the region. However, when resources are assessed and/or protected as they are discovered, impacts to these resources are less than significant.	Potentially Significant Impact	Refer to Mitigation Measure 4.7.3 above.	Less than Significant Impact
4.8: Greenhouse Gas Emissions			
Threshold 4.8.1: The proposed Project would generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.	Potentially Significant Impact	No feasible mitigation measures are available **RCM GHG-1**: **Title 20 of the California Code of Regulations (CCR).** Appliances installed in a project building will comply with the energy efficiency requirements in CCR Title 20, Appliance Energy Efficiency Standards. All appliances shall be Energy Star appliances. In addition, refer to RCM-AQ-3 and RCM-AQ-4	Significant and Unavoidable Impact
Threshold 4.8.2: The proposed Project would conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.	Potentially Significant Impact	No feasible mitigation measures are available	Significant and Unavoidable Impact
Cumulative Impact related to Greenhouse Gas Emissions: Because the Project's GHG emissions are considered significant and unavoidable, the Project's GHG emissions and contribution to global climate change impacts are considered cumulatively considerable and therefore significant and unavoidable.	Potentially Significant Impact	No feasible mitigation measures are available	Significant and Unavoidable Impact
4.9: Hazards and Hazardous Materials			
Threshold 4.9.1: The proposed Project would create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.	Potentially Significant Impact	**Mitigation Measure 4.9.1: Demolition Plan.** Prior to or concurrent with demolition permit applications, the Construction Contractor shall provide a Demolition Plan to the City of Lake Forest Director of Community Development or designee for review and approval. The Demolition Plan shall include the procedures for pre-demolition surveys and testing for hazardous building materials such as asbestos, lead-based paint, mercury, and polychlorinated biphenyls, and removal and disposal of hazardous building materials. All inspections, surveys, and analyses shall be performed by appropriately licensed and qualified	Less than Significant Impact

Table 1.A: Summary of Project Impacts, Regulatory Compliance Measures, Mitigation Measures, and Level of Significance after Mitigation

Environmental Impact	Level of Significance Prior to Mitigation	Regulatory Compliance Measures and Mitigation Measures	Level of Significance After Mitigation
		individuals in accordance with applicable regulations. All identified hazardous materials shall be removed, handled, and properly disposed of by appropriately licensed contractors according to all applicable regulations during demolition of structures. The Construction Contractor shall provide documentation (e.g., all required waste manifests, sampling, and air monitoring analytical results) to the City of Lake Forest Director of Community Development or designee showing that abatement of hazardous building materials has been completed in full compliance with all applicable regulations. The City of Lake Forest Director of Community Development or designee shall document that the Demolition Plan has been approved prior to issuance of demolition permits ~~and that the requirements of the Demolition Plan have been implemented prior to issuance of grading permits~~. **Mitigation Measure 4.9.2: Construction Contingency Plan.** Prior to or concurrent with grading permit applications, the Construction Contractor shall provide a Construction Contingency Plan to the City of Lake Forest Director of Development Services or designee for review and approval. The Construction Contingency Plan shall include provisions for emergency response in the event that unidentified hazardous materials, petroleum hydrocarbons, or hazardous or solid wastes are discovered during construction activities. The Construction Contingency Plan shall address field screening, contaminant materials testing methods, mitigation and contaminant management requirements, and health and safety requirements for construction workers. The construction contractor shall implement the Construction Contingency Plan during all construction activities. During construction, the construction contractor shall cease work immediately if an unexpected release of hazardous substances is found in reportable quantities. If an unexpected release of hazardous substances is found in reportable quantities, the construction contractor shall notify the National Response Center by calling 1-800-424-8802. The Construction Contractor shall clean up any unexpected releases under appropriate federal, State, and local agency oversight. The City of Lake Forest Director of Community Development or designee shall document that the Construction Contingency Plan has been approved and that the requirements of the Construction Contingency Plan have been implemented prior to the first final building inspection~~issuance of certificate of occupancy~~.	
Threshold 4.9.2: The proposed Project would create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.	Potentially Significant Impact	Refer to Mitigation Measures 4.9.1 and 4.9.2 above.	Less than Significant Impact
Threshold 4.9.3: The proposed Project would emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.	Potentially Significant Impact	Refer to Mitigation Measures 4.9.1 and 4.9.2 above. **Mitigation Measure 4.9.3: DTSC Oversight of School Site.** Prior to commencement of precise~~submittal of~~ grading ~~permits~~ for the elementary school portion of the Project site, the Saddleback Valley Unified School District~~Project Applicant~~ shall provide documentation to the California Division of the State Architect~~City of Lake Forest Director of Community Development or designee~~ that the Department of Toxic Substances Control (DTSC) has issued a "No Further Action" letter for the school site. The steps that may be required in order to gain a "No Further Action" letter from DTSC could include: DTSC review of all Phase I and Phase II ESAs for the project site; soil and/or groundwater testing, health risk analysis, Preliminary Endangerment Assessment preparation and approval, site remediation/cleanup, and public review of prepared reports.	Less than Significant Impact
Threshold 4.9.4: The proposed Project would not be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, it would create a significant hazard to the public or the environment.	No Impact	No mitigation is required.	No Impact
Threshold 4.9.6: The proposed Project would impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.	Potentially Significant Impact	Refer to Mitigation Measure 4.16.1 (Transportation and Traffic), below.	Less than Significant Impact
Cumulative Impacts related to Hazards and Hazardous Materials: The proposed Project would not result in a significant contribution to cumulative hazards or hazardous materials impacts.	Potentially Significant Impact	Refer to Mitigation Measures 4.9.1, 4.9.2, and 4.9.3 above.	Less than Significant Impact

Table 1.A: Summary of Project Impacts, Regulatory Compliance Measures, Mitigation Measures, and Level of Significance after Mitigation

Environmental Impact	Level of Significance Prior to Mitigation	Regulatory Compliance Measures and Mitigation Measures	Level of Significance After Mitigation
4.10: Hydrology and Water Quality			
Threshold 4.10.1: The proposed Project would not violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality.	Less than Significant Impact	**RCM WQ-1: Construction General Permit.** Prior to commencement of construction activities, the Applicant shall obtain coverage under the National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit), NPDES No. CAS000002, Order No. 2009-0009-DWQ, as amended by Order No. 2010-0014-DWQ and Order No. 2012-0006-DWQ, or any other subsequent permit. This shall include submission of Permit Registration Documents (PRDs), including permit application fees, a Notice of Intent (NOI), a risk assessment, a site plan, a Stormwater Pollution Prevention Plan (SWPPP), a signed certification statement, and any other compliance-related documents required by the permit, to the State Water Resources Control Board via the Stormwater Multiple Application and Report Tracking System (SMARTS). Construction activities shall not commence until a Waste Discharge Identification Number (WDID) is obtained for the project from the SMARTS and provided to the Director of the City of Lake Forest Public Works Department, or designee, to demonstrate that coverage under the Construction General Permit has been obtained. Project construction shall comply with all applicable requirements specified in the Construction General Permit, including but not limited to, preparation of a SWPPP and implementation of construction site Best Management Practices (BMPs) to address all construction-related activities, equipment, and materials that have the potential to impact water quality for the appropriate risk level identified for the project. The SWPPP shall identify the sources of pollutants that may affect the quality of stormwater and shall include BMPs (e.g., Sediment Control, Erosion Control, and Good Housekeeping BMPs) to control the pollutants in stormwater runoff. Construction Site BMPs shall also conform to the requirements specified in the latest edition of the Orange County Stormwater Program Construction Runoff Guidance Manual for Contractors, Project Owners, and Developers to control and minimize the impacts of construction and construction-related activities, materials, and pollutants on the watershed. Upon completion of construction activities and stabilization of the Project site, a Notice of Termination shall be submitted via SMARTS. **RCM WQ-2: Erosion and Sediment Control Plans.** In compliance with the requirements of Title 8 Buildings and Construction, Chapter 8.30, Grading and Excavation, Article XIII, Erosion Control of the City of Lake Forest Municipal Code, the Applicant shall submit a grading plan and erosion control plan to the Director of the City of Lake Forest Public Works Department, or designee, for review and approval prior to issuance of a grading permit. The Applicant shall also submit erosion and sediment control plans annually to the Director of the City of Lake Forest Public Works Department, or designee, for review and approval ~~by September 15th of each year during construction~~. **RCM WQ-3: Water Quality Management Plan.** Prior to issuance of building permits, the Applicant shall submit a Final Water Quality Management Plan (WQMP) to the Director of the City of Lake Forest Public Works Department, or designee, for review and approval in compliance with the Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and the Incorporated Cities of Orange County within the Santa Ana Region Areawide Urban Storm Water Runoff Orange County (North Orange County MS4 Permit), Order No. R8-2009-0030, NPDES No. CAS618030 (as amended by Order No. R8-2010-0062). The Final WQMP shall be prepared consistent with the requirements of the Model Water Quality Management Plan (WQMP) (County of Orange 2011), Technical Guidance Document for the Preparation of Conceptual/Preliminary and/or Project Water Quality Management Plans (WQMPs) (County of Orange 2013), the City of Lake Forest Local Implementation Plan (LIP) (2010), and Managing Wet Weather with Green Infrastructure Municipal Handbook Green Streets (EPA 2008), or subsequent guidance manuals. The Final WQMP shall specify the BMPs to be incorporated into the project design to target pollutants of concern in runoff from the project site. The Final WQMP shall also incorporate the results of the Final Hydrology Analysis to demonstrate that the detention facilities meet the hydromodification requirements of the North Orange County MS4 Permit. The Director of the City of Lake Forest Public Works Department, or designee, shall ensure that the BMPs specified in the Final WQMP are incorporated into the final project design. **RCM WQ-5: Groundwater Dewatering Permits.** If groundwater dewatering is required during excavation activities, the Applicant shall obtain coverage under one of two orders, or any subsequent orders, that apply to groundwater discharges to surface waters within the Newport Bay/San Diego Creek Watershed depending on the nature of the groundwater. The General Waste Discharge Requirements for Discharges to Surface Waters that Pose an Insignificant (De Minimus) Threat to Water Quality (Order No. R8-2009-0003, NPDES No. CAG998001) covers discharges to surface waters that pose an insignificant (de minimus) threat to water quality within. This Order would be applicable to the project if it can be demonstrated that the groundwater being discharged to surface waters does not contain pollutants of concern (selenium and nitrates) in the discharge. However, if groundwater is found to contain petroleum hydrocarbons, solvents, metals and/or salts,	Less than Significant Impact

Table 1.A: Summary of Project Impacts, Regulatory Compliance Measures, Mitigation Measures, and Level of Significance after Mitigation

Environmental Impact	Level of Significance Prior to Mitigation	Regulatory Compliance Measures and Mitigation Measures	Level of Significance After Mitigation
		the project would be subject to the General Discharge Permit for Discharges to Surface Waters of Groundwater Resulting from Groundwater Dewatering Operations and/or Groundwater Cleanup Activities at Sites Within the San Diego Creek/Newport Bay Watershed Polluted by Petroleum Hydrocarbons, Solvents, Metals and/or Salts (Order No. R8-2007-0041, NPDES No. CAG918002, as amended by R8 2009-0045~~R8-2007-0041~~), which covers general discharge permits for discharges to surface waters of groundwater resulting from groundwater dewatering operations and/or groundwater cleanup activities at sites within the San Diego Creek/Newport Bay Watershed that have been polluted by petroleum hydrocarbons, solvents, metals and/or salts, or nutrients, selenium, and other pollutants of TMDL concern. This shall include submission of a Notice of Intent (NOI) for coverage under the permit to the Santa Ana Regional Water Quality Control Board (RWQCB) at least 45 days prior to the start of dewatering. Groundwater dewatering activities shall comply with all applicable provisions in the permit, including water sampling, analysis, treatment (if required), and reporting of dewatering-related discharges. Upon completion of groundwater dewatering activities, a Notice of Termination shall be submitted to the Santa Ana RWQCB.	
Threshold 4.10.2: The proposed Project would not substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
Threshold 4.10.3(i): The proposed Project would not substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would result in substantial erosion or siltation on- or off-site.	Less than Significant Impact	**RCM WQ-4: Final Hydrology and Hydraulic Analyses.** Prior to issuance of building permits, the Applicant shall submit a Final Hydrology and Hydraulic Analyses to the Director of the City of Lake Forest Public Works Department, or designee, and the Orange County Flood Control District (OCFCD) for review and approval. The Final Hydrology and Hydraulic Analyses shall be prepared consistent with the requirements of the Orange County Hydrology Manual (Orange County Environment Agency 1986) and Orange County Hydrology Manual Addendum No. 1 (Orange County Environment Agency 1996), or subsequent guidance manuals. The Final Hydrology and Hydraulic Analyses shall confirm that the on-site storm drains, on-site detention basins, and any other drainage structures are appropriately sized to accommodate stormwater runoff from the design storm so that the peak flow of stormwater discharge from the Project site is less than existing conditions. The Final Hydrology and Hydraulic Analyses shall also demonstrate that the detention facilities meet the hydromodification requirements of the Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and the Incorporated Cities of Orange County within the Santa Ana Region Areawide Urban Storm Water Runoff Orange County (North Orange County MS4 Permit), Order R8-2009-0030, NPDES No. CAS618030 (as amended by Order No. R8-2010-0062). In compliance with the hydromodification requirements, the post-project runoff discharge volume for the 2-year storm shall not exceed that of the predevelopment condition by more than 5 percent, and the time of concentration of post-development runoff for the 2-year storm event shall not be greater than 5 percent less than that of the predevelopment condition. The Director of the City of Lake Forest Public Works Department, or designee, shall ensure that the drainage facilities specified in the Final Hydrology and Hydraulic Analyses are incorporated into the final project design. In addition, refer to RCM WQ-1, RCM WQ-2, and RCM WQ-3	Less than Significant Impact
Threshold 4.10.3(II): The proposed Project would not substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite.	Less than Significant Impact	Refer to RCM WQ-1, RCM WQ-2, RCM WQ-3, and RCM WQ-5	Less than Significant Impact
Threshold 4.10.3(III): The proposed Project would not substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff.	Less than Significant Impact	Refer to RCM WQ-1, RCM WQ-2, RCM WQ-3, and RCM WQ-5	Less than Significant Impact

Table 1.A: Summary of Project Impacts, Regulatory Compliance Measures, Mitigation Measures, and Level of Significance after Mitigation

Environmental Impact	Level of Significance Prior to Mitigation	Regulatory Compliance Measures and Mitigation Measures	Level of Significance After Mitigation
Threshold 4.10.3(iv): The proposed Project would not substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would Impede or redirect flood flows.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
Threshold 4.10.4: The proposed Project would not be in a flood hazard, tsunami, or seiche zone with the risk of release of pollutants due to project inundation.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
Threshold 4.10.5: The proposed Project would not conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.	Less than Significant Impact	Refer to RCM WQ-1, RCM WQ-2, RCM WQ-3, and RCM WQ-5	Less than Significant Impact
Threshold 4.10.6: The proposed Project would not deposit sediment and debris materials within existing channels obstructing flows.	Less than Significant Impact	Refer to RCM WQ-1, RCM WQ-2, RCM WQ-3, and RCM WQ-5	Less than Significant Impact
Threshold 4.10.7: The proposed Project would not exceed the capacity of a channel and cause overflow during design storm conditions.	Less than Significant Impact	Refer to RCM WQ-1, RCM WQ-2, RCM WQ-3, and RCM WQ-5	Less than Significant Impact
Threshold 4.10.8: The proposed Project would not adversely change the rate, direction or flow of groundwater.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
Threshold 4.10.9: The proposed Project would not cause a significant alteration of receiving water quality during or following construction.	Less than Significant Impact	Refer to RCM WQ-1, RCM WQ-2, RCM WQ-3, and RCM WQ-5	Less than Significant Impact
Threshold 4.10.10: The proposed Project would not substantially degrade water quality by discharge which affects the beneficial uses (i.e., swimming, fishing, etc.) of the receiving or downstream waters	Less than Significant Impact	Refer to RCM WQ-1, RCM WQ-2, RCM WQ-3, and RCM WQ-5	Less than Significant Impact
Threshold 4.10.11: The proposed Project would not result in an increase in any pollutant for which the receiving water body is already impaired as listed on the Clean Water Act Section 303(d) list	Less than Significant Impact	Refer to RCM WQ-1, RCM WQ-2, RCM WQ-3, and RCM WQ-5	Less than Significant Impact
Cumulative Impact related to Hydrology and Water Quality: The proposed Project and other related Projects would comply with applicable NPDES and City requirements, therefore, cumulative hydrology and water quality impacts would be less than significant. Therefore, the proposed Project's incremental hydrology and water quality impacts would not be cumulatively considerable.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
4.11: Land Use & Planning			
Threshold 4.11.2: The proposed Project would not cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
Threshold 4.11.3: The proposed Project would not substantially conflict with existing on-site or adjacent land use due to project-related significant unavoidable indirect effects (i.e. noise, aesthetics, etc.) that preclude use of the land as it was intended by the General Plan.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
Threshold 4.11.4: The proposed Project would not conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, planned community, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
Threshold 4.11.5: The proposed Project would not conflict with the Central and Coastal Natural Communities Conservation Program/Habitat Conservation Plan (NCCP/HCP) of which the City of Lake Forest is a participant.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact

Table 1.A: Summary of Project Impacts, Regulatory Compliance Measures, Mitigation Measures, and Level of Significance after Mitigation

Environmental Impact	Level of Significance Prior to Mitigation	Regulatory Compliance Measures and Mitigation Measures	Level of Significance After Mitigation
Cumulative Impacts to Land Use & Planning: The proposed Project's contribution to cumulative impacts associated with land use and planning would be less than significant.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
4.12: Noise			
Threshold 4.12.1: The proposed Project would result in the generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	Potentially Significant Impact	**RCM NOI-1: Ventilation Requirements.** Prior to the issuance of building permits, documentation shall be provided to the City of Lake Forest Director of Community Development, or designee, demonstrating that Project buildings meet ventilation standards required by the CBC with the windows closed. It is likely that a form of mechanical ventilation, such as an air-conditioning system, will be required as part of the Project design for all on-site buildings/units. **Mitigation Measure 4.12.1: Final Acoustical Study.** Prior to issuance of the first~~any~~ building permits, the Project Applicant/Developer shall submit a final acoustical study, prepared by a qualified acoustical consultant, to the City of Lake Forest. The Director of Community Development of the City of Lake Forest, or designee, shall verify that the final acoustical study demonstrates that all residential units will comply with the City's interior noise standard (45 dBA CNEL). Noise reduction techniques will be incorporated into construction plans in order to reduce interior noise levels. These techniques include, but are not limited to, weather-stripped solid core exterior doors, dual glazed windows with a minimum sound transmission class rating of 27, and/or exterior wall/roof assembles free of cut-outs or openings.	Less than Significant Impact
Threshold 4.12.2: The proposed Project would not result in the generation of excessive groundborne vibration or groundborne noise levels.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
Threshold 4.12.3: The proposed Project would not be located within the vicinity of a private airstrip, public airport, or an airport land use plan and would not expose people residing or working in the Project area to excessive noise levels.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
Cumulative Impacts to Noise and Vibration: The proposed Project's contribution to cumulative impacts associated with noise and vibration would be less than significant.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
4.13: Population and Housing			
Threshold 4.13.1: The proposed Project would not induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure).	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
Cumulative Impacts to Population and Housing: The proposed Project's contribution to cumulative impacts associated with population, housing, and employment growth would be less than significant.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
4.14: Public Services			
Threshold 4.14.1(i): The proposed Project would result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for fire protection.	Potentially Significant Impact	Refer to Mitigation Measure 4.16.1 (Transportation and Traffic) **Mitigation Measure 4.14.1 Secured Fire Protection Agreement.** The Project Applicant/Developer shall enter into a Secured Fire Protection Agreement with the Orange County Fire Authority (OCFA). The Secured Fire Protection Agreement shall specify the developer's pro-rata fair-share funding of capital improvements necessary to establish adequate fire protection facilities and equipment, and/or personnel. Evidence of an OCFA-approved agreement shall be submitted to City of Lake Forest Director of Community Development, or designee, prior to issuance of the first~~any~~ building permit~~s~~. **RCM PS-1 City of Lake Forest Municipal Code Section 8.24.010 (California Fire Code Adoption) and Section 7.08.145 (Fire Protection).** Prior to issuance of grading permits for planned structures, the City of Lake Forest Public Works Director, or designee, shall review the building plans to verify that the design conforms to the requirements of the Fire Code as adopted in the City Municipal Code.	Less than Significant Impact

Table 1.A: Summary of Project Impacts, Regulatory Compliance Measures, Mitigation Measures, and Level of Significance after Mitigation

Environmental Impact	Level of Significance Prior to Mitigation	Regulatory Compliance Measures and Mitigation Measures	Level of Significance After Mitigation
Threshold 4.14.1(ii): The proposed Project would result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for police protection.	Potentially Significant Impact	Refer to Mitigation Measure 4.16.1 (Transportation and Traffic)	Less than Significant Impact
Threshold 4.14.1(iii): The proposed Project would not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for schools.	Less than Significant Impact	Refer to RCM PS-1 above.	Less than Significant Impact
Threshold 4.14.1(iv): The proposed Project would not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for parks.	Less than Significant Impact	Refer to RCM REC-1 (Recreation)	Less than Significant Impact
Threshold 4.14.1(v): The proposed Project would not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for other public facilities.	Less than Significant Impact	**RCM PS-2: Payment of School Facility Fees.** Prior to issuance of a building permit, the Project Applicant/Developer shall submit proof of payment of all applicable school facility fees in accordance with Government Code Section 65995 to the Director of the City of Lake Forest Department of Community Development, or designee. This requirement may be satisfied through the dedication of land on the Project site to the Saddleback Valley Unified School District for future construction of a school.	Less than Significant Impact
Cumulative Impacts to Public Services: The proposed Project's potential impacts to fire services, police protection, school services, public libraries, and public transportation are not cumulatively considerable.	Less than Significant Impact	Refer to RCM PS-2 above.	Less than Significant Impact
4.15: Recreation			
Threshold 4.15.1: The Proposed project would increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.	Potentially Significant Impact	**RCM REC-1: Dedication of Parkland.** The Project Applicant/Developer shall comply with the applicable provisions of Chapter 7.38, Dedication of Land for Park Facilities and Payment of In Lieu Fees, of the City's Municipal Code~~, which requires applicable subdividers to dedicate to the City an amount of land equivalent to 5 ac per 1,000 estimated population for use as park facilities, or pay in-lieu fees instead of or in combination with the dedication of land, so long as the fees are equal to the value of parkland that would otherwise be dedicated~~. **Mitigation Measure 4.15.1 Park and Open Space Access and Maintenance.** Prior to the first final building inspection~~issuance of any certificate of occupancy~~, the Project Applicant/Developer shall submit documentation to the Director of the City of Lake Forest Community Development Department, or designee, demonstrating the following: • The HOA shall provide for the ongoing maintenance and care of all on-site park and open space facilities. • With the exception of the on-site private recreation center, all on-site parks shall also be private, but open and accessible to the public. Appropriate signage shall be posted in all on-site parks. • The HOA shall maintain maintenance records for a period not less than 2 years and shall make the records available to the City upon request. • Long-term funding for maintenance and care of on-site recreation, park, and open space facilities shall be funded through fees paid into the HOA. The Project Applicant/Developer, which will set up the HOA, shall oversee that adequate funding for park and open space maintenance is included within the HOA fee structure, including annual maintenance fees and	Less than Significant Impact

Table 1.A: Summary of Project Impacts, Regulatory Compliance Measures, Mitigation Measures, and Level of Significance after Mitigation

Environmental Impact	Level of Significance Prior to Mitigation	Regulatory Compliance Measures and Mitigation Measures	Level of Significance After Mitigation
		long-term maintenance reserve funds. • Revisions to the HOA's Covenants, Conditions, and Restrictions (CC&Rs) related to park and open space maintenance shall be prohibited except with the review and approval of the Director of the City of Lake Forest Community Development Department, or designee.	
Threshold 4.14.2: The proposed Project would not include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
Cumulative Impacts to Recreational Resources: The proposed Project, in conjunction with the cumulative projects in the City, has the potential to increase demand on the City's recreational resources. The cumulative Projects would also be subject to Municipal Code requirements for the provision of parkland and/or payment of in-lieu fees. Therefore, the cumulative impact of the proposed Project and the applicable related projects would be less than significant with respect to recreational facilities.	Potentially Significant Impact	Refer to Mitigation Measure 4.15.1 and RCM REC-1	Less than Significant Impact
4.16: Transportation and Traffic			
Threshold 4.16.1: The proposed Project would conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities.	Potentially Significant Impact	**Mitigation Measure 4.16.1 Construction Traffic Management Plan.** Prior to the issuance of grading permits, the Project Applicant/Developer shall prepare a Construction Traffic Control Plan for approval by the City of Lake Forest Director of Public Works/City Engineer, or designee, and shall implement the Plan during Project construction with the goal of maintaining acceptable intersection levels of service (LOS) during peak traffic hours. At a minimum, the Construction Traffic Management Plan shall include, but not be limited to, the following: • Provisions for temporary traffic control during all construction activities adjacent to public right-of-way to improve traffic flow on public roadways and ensure the safe access into and out of the site (e.g., warning signs, lights and devices, and flag person). • The delivery and removal of heavy equipment shall occur outside of the morning and evening peak periods (7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m., Monday through Friday). • Routine street closures shall be planned to occur outside of the morning and evening peak traffic hours (7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m., Monday through Friday). • Soil import and export activity shall not be permitted during the morning and evening peak traffic hours (7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m., Monday through Friday). • Rerouting construction trucks to reduce travel on congested streets. • Prohibiting construction-related vehicles from parking on public streets. • Providing safety precautions for pedestrians and bicyclists through such measures as alternate routing and protection barriers. • Scheduling construction-related deliveries, other than concrete and earthwork-related deliveries, so as to reduce travel during peak travel periods. • Obtaining the required permits for truck haul routes from the City of Lake Forest and/or Caltrans. • All emergency access to the Project site and adjacent areas shall be kept clear and unobstructed during all phases of demolition and construction. • The Orange County Sheriff's Department and the Orange County Fire Authority (OCFA) shall be notified a minimum of 1 week (7 days) in advance of any lane closures or roadway work so that emergency vehicles can be rerouted during construction if deemed necessary in the expert opinion of the Orange County Sheriff's Department and/or OCFA.	Less than Significant Impact

Table 1.A: Summary of Project Impacts, Regulatory Compliance Measures, Mitigation Measures, and Level of Significance after Mitigation

Environmental Impact	Level of Significance Prior to Mitigation	Regulatory Compliance Measures and Mitigation Measures	Level of Significance After Mitigation
		• The Orange County Transportation Authority (OCTA) shall be notified regarding any affected locations a minimum of 10 working days prior to construction so that transit service can be rerouted if deemed necessary in the expert opinion of the OCTA. • Flag persons shall be trained to assist in emergency response by restricting or controlling the movement of traffic that could interfere with emergency vehicle access. **Mitigation Measure 4.16.2 Intersection Improvements.** Unless physical improvements are already constructed, prior to ~~issuance of~~ the first final building inspection~~certificate of occupancy~~, the City of Lake Forest~~Project Applicant/Developer~~ shall construct a second northbound left-turn lane at the intersection of Bake Parkway/Jeronimo Road consistent with the design requirements of the City of Lake Forest.	
Threshold 4.16.2: The proposed Project would not conflict or be inconsistent with CEQA Guidelines section 15064.3 subdivision (b).	No Impact	No mitigation is required.	No Impact
Threshold 4.16.3: The proposed Project would substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).	Potentially Significant Impact	**Mitigation Measure 4.16.3 Sight Distance Analysis.** Prior to issuance of precise grading permits and building permits, the Project Applicant/Developer shall prepare a detailed sight distance analysis for all Project intersections. The sight distance analysis shall be prepared according to the City of Lake Forest Municipal Code and the Caltrans Highway Design Manual standards and guidelines, and indicate limited use areas (e.g., low height landscaping), and on-street parking restrictions (e.g., red curb), if necessary, and any turning restrictions (e.g., right in/right-out). Intersections on Bake Parkway, which has a 50 mph posted speed limit, should be provided with a minimum of 430 feet of stopping sight distance according to the Caltrans Highway Design Manual. Intersections internal to the project site would have a 25 mph speed limit and would require a minimum of 150 feet of stopping sight distance according to the Caltrans Highway Design Manual. The findings of the sight distance analysis shall be included in a report(s) subject to review and approval by the Directors of Planning and Building and Public Works, or designees. **Mitigation Measure 4.16.4 Rectangular Rapid Flashing Beacons (RRFBs).** Prior to ~~issuance of~~ the first final building inspection~~certificate of occupancy~~, RRFBs shall be installed at the crosswalks at the uncontrolled intersection of "B" Street/ "BB" Street and the uncontrolled intersection of "A" Street/"D" Street.	Less than Significant Impact
Threshold 4.16.4: The proposed Project would result in inadequate emergency access.	Potentially Significant Impact	Refer to Mitigation Measure 4.16.1 above.	Less than Significant Impact
Cumulative Impacts to Transportation and Traffic: The proposed Project's contribution to cumulative traffic impacts would be less than significant.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
4.17: Tribal Cultural Resources			
Threshold 4.16.1: The proposed Project would not cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k).	No Impact	No mitigation is required.	No Impact
Threshold 4.16.2: The proposed Project would cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is a resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1.	Potentially Significant Impact	Refer to Mitigation Measure 4.5.1 (Cultural Resources) above.	Less than Significant Impact

Table 1.A: Summary of Project Impacts, Regulatory Compliance Measures, Mitigation Measures, and Level of Significance after Mitigation

Environmental Impact	Level of Significance Prior to Mitigation	Regulatory Compliance Measures and Mitigation Measures	Level of Significance After Mitigation
Cumulative Impacts to Tribal Cultural Resources: The proposed Project's contribution to cumulative tribal cultural resource impacts would be less than significant.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
4.18: Utilities and Service Systems			
Threshold 4.18.1: The proposed Project would not require or result in the relocation or construction of new or expanded water, wastewater treatment, or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects.	Less than Significant Impact	Refer to Regulatory Compliance Measures AQ-4 (Air Quality) and GHG-1 (Greenhouse Gas)	Less than Significant Impact
Threshold 4.18.2: The proposed Project would have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
Threshold 4.18.3: The proposed Project would result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
Threshold 4.18.4: The proposed Project would not generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
Threshold 4.18.5: The proposed Project would comply with federal, state, and local management and reduction statutes and regulations related to solid waste.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
Cumulative Impacts to Utilities and Service Systems: The proposed Project's potential impacts to wastewater, portable water, solid waste, electricity, natural gas, and telecommunications services are not cumulatively considerable.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
4.19: Wildfire			
Threshold 4.19.1: The proposed Project would not impair an adopted emergency response plan or emergency evacuation.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
Threshold 4.19.2: The proposed Project would not, due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and therefore would not expose Project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact
Threshold 4.19.3: The proposed Project would not require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment.	No Impact	No mitigation is required.	No Impact
Threshold 4.19.4: The proposed Project would not expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff post-fire slope instability, or drainage changes.	Less than Significant Impact	**RCM FIRE-1: Fire Protection Plan.** The Project shall adhere to Chapter 7A of the CBC and/or Section R337 of the California Residential Code (CRC). All structures in the Nakase community shall adhere to the standards from Chapter 7A of the CBC and/or Section R337 of the CRC pertaining to roofing and venting to help prevent the intrusion of embers into structures. Residences adjoining the Fuel Management Zones shall meet all applicable standards set forth in Section R337 of the CRC because those structures would have direct exposure to the native vegetation beyond the Fuel Management Zones. **RCM FIRE-2: Fire Master Plan.** The Project Applicant/Developer shall develop a Fire Master Plan that identifies the proper installation and maintenance of fire access roadways, the locations of fire hydrants, a sufficient water supply, and emergency access to residences and structures within the Project site as required by the most current California Fire Code and Lake Forest Municipal Code.	Less than Significant Impact

Table 1.A: Summary of Project Impacts, Regulatory Compliance Measures, Mitigation Measures, and Level of Significance after Mitigation

Environmental Impact	Level of Significance Prior to Mitigation	Regulatory Compliance Measures and Mitigation Measures	Level of Significance After Mitigation
		RCM FIRE-3: Fuel Modification Plan. –*Technical Design for New Construction Fuel Modification Plans and Maintenance Program* A preliminary Fuel Modification Plan shall be submitted to and approved by the Fire Code Official prior to or concurrently with the approval of the tentative map. 2. A final Fuel Modification Plan shall be submitted to and approved by the Fire Code Official prior to the issuance of the grading permit. 3. The Fuel Modification Plan shall meet the criteria set forth in the Fuel Modification Section of –*Technical Design for New Construction Fuel Modification Plans and Maintenance Program.* 4. The fuel modification plan shall include provisions for the maintenance of the fuel modification in perpetuity. 5. The Fuel Modification Plan may be altered if conditions change. Any alterations to the fuel modification areas shall have prior approval from the Fire Code Official. 6. All elements of the Fuel Modification Plan shall be maintained in accordance with the approval plan and are subject to the enforcement process outlined in the California Fire Code.	
Cumulative Impacts to Wildfire: The proposed Project and all related projects are required to adhere to City, State, and federal regulations designed to reduce and/or avoid impacts related to wildfire. With compliance with these regulations, cumulative impacts related to wildfire would be less than significant.	Less than Significant Impact	No mitigation is required.	Less than Significant Impact

[1] Hazardous fire areas include all areas identified within California Fire Code Section 4906.2 and other areas as determined by the Fire Code Official as presenting a fire hazard due to the presence of combustible vegetation, or the proximity of the property to an area that contains combustible vegetation.

This page intentionally left blank

2.0 INTRODUCTION

This Environmental Impact Report (EIR) has been prepared to evaluate environmental impacts associated with the proposed Nakase Nursery/Toll Brothers Project (Project) in Lake Forest, California. The City of Lake Forest (City) is the "public agency which has the principal responsibility for carrying out or approving the project"[1] and, as such, is the "Lead Agency" for the proposed Project under the California Environmental Quality Act (CEQA) (Public Resources Code [PRC] Section 21000 et seq.). CEQA requires the Lead Agency to consider the information contained in the EIR prior to taking any discretionary action on the proposed Project. This EIR is intended to serve as an informational document to be considered by the City and any Responsible Agencies during deliberations on the proposed Project. PRC Section 21069 defines a "Responsible Agency" as a public agency other than the Lead Agency that has responsibility for carrying out or approving a project. The approvals and permits associated with the proposed Project are described in Chapter 3.0, Project Description.

Based upon the Initial Study prepared for the proposed Project, the City, as Lead Agency, determined that the proposed Project may have a significant effect on the environment and that an EIR would be required to more fully evaluate potential adverse environmental impacts that may result from development of the proposed Project. As a result, this EIR has been prepared in accordance with CEQA and the *State CEQA Guidelines* (California Code of Regulations [CCR], Title 14, Section 15000 et seq.). This EIR also complies with the procedures established by the City for the implementation of CEQA.

Questions regarding the preparation of this document and City review of the proposed Project should be referred to the following person:

Marie Luna, Senior Planner
City of Lake Forest Community Development Department
25550 Commercentre Drive, Suite 100
Lake Forest, CA 92630
Email: mluna@lakeforestca.gov
Phone: (949) 461-3466

2.1 PURPOSE AND TYPE OF EIR/INTENDED USES OF THE EIR

This EIR has been prepared to evaluate potential environmental impacts that could result from implementation of the proposed Project. As the Lead Agency, the City has the principal responsibility for approving the proposed Project. In that capacity, the City has decided to prepare this EIR and, after the public review process, will decide whether to certify the Final EIR.

The City and any Responsible Agencies have the authority to make decisions on discretionary actions relating to development of the proposed Project. As stated previously, this EIR is intended to serve as an informational document to be considered by the City and Responsible Agencies during

[1] As defined in PRC Section 21067.

deliberations on the proposed Project. This EIR evaluates a reasonable worst-case scenario of potential impacts associated with the proposed Project and identifies feasible mitigation and alternatives for any identified potentially significant impacts.

This EIR will serve as a Project EIR pursuant to *State CEQA Guidelines* Section 15161. According to Section 15161 of the *State CEQA Guidelines*, a Project EIR is appropriate for specific development projects and should examine the environmental impacts that could result from all phases of the project, including planning, construction, and operation.

As the Lead Agency for the proposed Project under CEQA, the City must consider the information contained in the Final EIR prior to taking any discretionary action with respect to the proposed Project. This EIR provides information to the Lead Agency and other public agencies, the general public, and decision-makers regarding the potential environmental impacts from construction and operation of the proposed Project. The purpose of the public review of this EIR is to evaluate the adequacy of the environmental analysis in terms of compliance with CEQA. *State CEQA Guidelines* Section 15151 states the following regarding standards from which adequacy is judged:

> "An EIR should be prepared with a sufficient degree of analysis to provide decision-makers with information which enables them to make a decision which intelligently takes account of environmental consequences. An evaluation of the environmental effects of a proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in the light of what is reasonably feasible. Disagreement among experts does not make an EIR inadequate, but the EIR should summarize the main points of disagreement among experts. The courts have not looked for perfection but for adequacy, completeness, and a good faith effort at full disclosure."

PRC Section 21002.1(a) states:

> "The purpose of an environmental impact report is to identify the significant effects on the environment of a project, to identify alternatives to the project, and to indicate the manner in which those significant effects can be mitigated or avoided."

An EIR is the most comprehensive form of environmental documentation identified in CEQA and the *State CEQA Guidelines* and provides the information needed to assess the environmental consequences of a proposed project. EIRs are intended to provide an objective, factually supported, full-disclosure analysis of the environmental consequences associated with a proposed project that has the potential to result in significant, adverse environmental impacts.

2.2 PUBLIC REVIEW PROCESS

In compliance with CEQA and the *State CEQA Guidelines,* the City has taken steps to promote opportunities for the public and other public agencies to participate in the environmental review process. The City conducted the scoping process, issued a Notice of Preparation (NOP), prepared an Initial Study for the proposed Project, and determined that an EIR was required to evaluate the potentially significant environmental effects of the proposed Project and related actions. Additionally, a public scoping session was conducted, as discussed below.

2.2.1 Notice of Preparation

On July 16, 2018, an NOP for the proposed Project was distributed by the City via the State Clearinghouse (SCH). The SCH issued a project number for this EIR (SCH No. 2018071035). In accordance with *State CEQA Guidelines* Section 15082, the NOP was circulated to the agencies and individuals listed in Appendix A and was posted at the Orange County Clerk's Office for a period of 30 days, during which time written comments were solicited pertaining to environmental issues/ topics that this EIR should evaluate. The NOP was also made available for public review at the City's Planning Department and on the City's website during the review period. Responses to the NOP were received from the following agencies:

- Governor's Office of Planning and Research, State Clearinghouse
- South Coast Air Quality Management District (SCAQMD)
- Southern California Association of Governments (SCAG)
- Southern California Edison (SCE)
- Santa Ana Regional Water Quality Control Board (RWQCB)
- Saddleback Valley Unified School District (SVUSD)
- California Department of Fish and Wildlife (CDFW)
- California Department of Transportation (Caltrans)
- City of Irvine
- Irvine Ranch Water District (IRWD)
- Native American Heritage Commission (NAHC)
- Natural Communities Coalition
- Orange County Public Works
- Orange County Fire Authority (OCFA)
- Transportation Corridor Agencies (TCA)

In addition, the following organizations and interested parties submitted written comments on the NOP:

- Autumnwood Homeowners Association
- Andrea Alexander
- Bob Holtzclaw
- Bob Stuart
- Charles Larson
- Judy Esposito
- Loretta Herrin
- Richard Sullivan
- Robert (Tim) and Melissa Leech
- Sima Soltani
- Sue Nath

2.2.2 Scoping Meeting and Areas of Controversy

The City held a public scoping meeting at Lake Forest City Hall on Wednesday, July 25, 2018, to present the proposed Project and to solicit input from interested parties regarding environmental issues that should be addressed in this EIR. The material environmental issues and concerns raised in response to the NOP or at the scoping meeting included:

- **Traffic:** Concerns about additional traffic on Bake Parkway and the appropriate number of traffic lanes on Bake Parkway, evaluation of a traffic signal coordination program along Bake Parkway, concern regarding traffic conditions during peak hours, pedestrian and bike safety, parking issues, traffic-related air and noise pollution, concern with vehicle queuing and parking on nearby roads, concern about school-related traffic impacts, and concern about truck and motorcycle traffic on Bake Parkway.

- **Noise:** Concerns about traffic-related increases in noise pollution, suggestions of noise mitigation, including special pavement, triple-paned windows, or a noise barrier along Bake Parkway, concern with noise level along Bake and Rancho Parkways, concern about existing truck and motorcycle noise along Bake Parkway, concern about lack of enforcement of the City's noise ordinance, and concern about elevated backyard noise levels.

- **Air Quality:** Concern about additional vehicle emissions, concern about worsening air quality in adjacent neighborhoods, concern about particulate matter and carcinogens along Bake Parkway, suggestion to conduct sampling for particulate matter in neighborhoods along Bake Parkway between Trabuco Road and Portola Parkway, suggestion to prepare a health risk assessment for the project, suggestion to implement mitigation measures for the proposed project, and suggestion to adhere to guidelines from the SCAQMD and its *Air Quality Handbook*.

- **Alternatives:** Suggestion to evaluate the development of a park and/or garden on the Nakase site, suggestion to make the site into a community garden or forest, suggestion to more clearly define the Project's scope and evaluate a range of alternatives, and suggestion to pursue alternatives that would substantially lessen the project's air quality impacts.

- **Biological Resources:** Concern about potential impacts to coastal sage scrub and associated species, suggestion to include mitigation measures for potential impacts to riparian corridors and wetlands, suggestion to complete jurisdictional delineation, apply for Lake and Streambed Alteration Agreement, and to satisfy the California Endangered Species Act Incidental Take Permit requirements, suggestion to avoid impacts where feasible and to mitigate for impacts to rare natural communities and sensitive plants, animals, or habitats, and concern to avoid impacts to nesting or migratory birds.

- **Hazards and Hazardous Materials:** Suggestion to complete a Water Pipeline Risk Assessment and Electromagnetic Field (EMF) study for the proposed school site, suggestion that the significance conclusion related to wildland fire hazards be revised to reflect a Fuel Modification Conceptual Plan and a Fire Protection Plan with an Ember Mitigation have been approved for the project, and suggestion to ensure that floodplains are identified and structures conform to

Federal Emergency Management Agency (FEMA) regulations with regard to placement adjacent to flood hazards.

- **Hydrology:** Suggestion to review all local hydrology and hydraulic analyses to confirm the Project is protected from erosion and flooding, concern about increased runoff caused by the project, suggestion to incorporate mitigation measures to reduce impacts to hydrology, erosion, and flooding, and concerns about impacts to water quality and storm water runoff.

- **Land Use/Planning:** Opposition to zoning change for the nursery, concern about the Project's consistency with the 2016 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) and suggestion to include a direct comparison with the plan, suggestion to incorporate practices and policies that would reduce greenhouse gas (GHG) emissions in accordance with Assembly Bill (AB) 32 and Senate Bill (SB) 375 into the Area Plan, and suggestion to ensure consistency with applicable general plan and regional plans.

- **Public Services:** Suggestion to implement mitigation measures to public services, including fire services, and concern about potential increase in demand for public services.

Please note that this is not an exhaustive list of areas of controversy, but rather key issues that were raised during the scoping process. This EIR addresses each of these areas of concern or controversy in detail, examines project-related and cumulative environmental impacts, identifies significant adverse environmental impacts, and proposes mitigation measures and/or alternatives designed to reduce or eliminate potentially significant impacts. Appendix A to this EIR includes the NOP and copies of written comments received in response to the NOP, comments received via Facebook Live at the Public Scoping Meeting, as well as written comment cards received in response to the public scoping meeting. Appendix A also includes a comment summary.

2.2.3 EIR Public Review Period

This EIR is being distributed to numerous public agencies and other interested parties for review and comment. This EIR is also available at the following locations and on the City's website for the proposed Project (https://www.lakeforestca.gov/924/Nakase-Property):

City of Lake Forest
Community Development Department
Planning Division
25550 Commercentre Drive, Suite 100
Lake Forest, CA 92630

Foothill Ranch Branch Library
27002 Cabriole
Foothill Ranch, CA 92610

El Toro Public Library
24672 Raymond Way
Lake Forest, CA 92630

All comments received from agencies and individuals on this EIR will be accepted during the public comment period, which will not be less than 45 days, in compliance with CEQA and the *State CEQA Guidelines*. All comments on this EIR should be sent to the following City contact person:

Marie Luna, Senior Planner
City of Lake Forest Community Development Department
25550 Commercentre Drive, Suite 100
Lake Forest, CA 92630
Email: mluna@lakeforestca.gov
Phone: (949) 461-3466

Following the close of the public comment period, the City will prepare written responses to all written comments received during the public comment period and will compile these comments and responses, together with any text changes to this EIR, into a Final EIR that includes all of the information required pursuant to *State CEQA Guidelines* Section 15132. The Final EIR will be provided to all public agencies that submitted comments on this EIR at least 10 days prior to certification of the Final EIR. The Final EIR shall consist of the EIR or a revision of the draft; comments and recommendations received on the EIR either verbatim or in summary; a list of persons, organizations, and public agencies commenting on the EIR; the response of the City to significant environmental points raised in the review and consultation process and in comments submitted on the Draft EIR; and any other information added by the City.

The City will make findings regarding the extent and nature of the impacts as presented in the Final EIR. The Final EIR must be certified as complete by the City Council prior to making a decision on the requested entitlements for the proposed Project. Public input is encouraged at all public hearings regarding the proposed Project.

2.3 SCOPE OF THIS EIR

As required by *State CEQA Guidelines* Section 15128, this EIR must identify the effects of the proposed Project that are determined to be significant. Environmental topics addressed in this EIR include: Aesthetics, Agricultural Resources, Air Quality, Biological Resources, Cultural Resources, Energy, Geology and Soils, Paleontological Resources, Greenhouse Gas Emissions, Hazards and Hazardous Materials, Hydrology and Water Quality, Land Use and Planning, Noise, Population and Housing, Public Services, Recreation, Transportation and Traffic, Tribal Cultural Resources, Utilities, and Wildfire.

As discussed in Section 2.2 above, the scoping process for this EIR included the preparation of an Initial Study. Per *State CEQA Guidelines* Section 15063, the City conducted an Initial Study to determine whether the proposed Project could have a significant effect on the environment. The City determined that the proposed Project may have a significant impact on the environment and issued an NOP soliciting comments from Responsible and Trustee Agencies and other interested parties, including members of the public. In addition to identifying potentially significant impacts of the proposed Project that required additional study, the Initial Study also identified effects determined not to be significant consistent with *State CEQA Guidelines* Section 15063(c)(3)(B). Impacts that were determined to be less than significant are discussed and evaluated in the Initial Study, which is included in Appendix A of this EIR. The analysis determined that the proposed Project would not have the potential to cause significant impacts in the following areas:

- Aesthetics (related to daytime glare, unscreened outdoor uses, building massing, contrasting architectural styles)
- Agriculture and Forestry (related to conflicts with existing zoning for forest land and the loss or conversion of forest land)
- Air Quality (odors)
- Geology and Soils (Alquist-Priolo Earthquake Fault Zones**,** landslides, and soils capability to support the use of septic tanks or other alternative wastewater disposal systems)
- Hazards and Hazardous Materials (wildland fires)
- Hydrology and Water Quality (flooding, flood hazard areas, and inundation)
- Land Use and Planning (division of an established community)
- Mineral Resources
- Population and Housing (displacement of housing and people)
- Transportation (parking)
- Utilities and Service Systems (wastewater treatment requirements of the applicable RWQCB)

Topics that would not have the potential to cause significant impacts are discussed solely in the Initial Study and can be found in Appendix A of this EIR. The City's Initial Study and Environmental Checklist Form are discussed in Chapter 4.0 of this document, and a copy of the Initial Study and Environmental Checklist for the proposed Project is included in Appendix A of this EIR.

2.4 FORMAT OF THE EIR

This EIR contains the information and analysis required by CEQA and the *State CEQA Guidelines*, including Section 15122–15131, and is generally organized as follows:

- **Chapter 1.0: Executive Summary.** Chapter 1.0 contains the Executive Summary of this EIR, which lists all significant project impacts, feasible mitigation measures that have been recommended to reduce any significant impacts of the proposed Project, and the level of significance of each impact following feasible mitigation. The summary is presented in a table format.

- **Chapter 2.0: Introduction.** Chapter 2.0 contains a discussion of the purpose and intended use of this EIR.

- **Chapter 3.0: Project Description.** Chapter 3.0 includes a discussion of the proposed Project's geographical setting, the project site's previous uses, and the proposed Project's objectives, characteristics, components, and construction phases, as well as the anticipated discretionary and ministerial permits and approvals for the proposed Project.

- **Chapter 4.0: Environmental Impact Analysis.** Chapter 4.0 includes an analysis of the proposed Project's environmental impacts. It is organized into the following topical sections: aesthetics, agricultural resources, air quality, biological resources, cultural resources, energy, geology and soils, greenhouse gas emissions, hazards and hazardous materials, hydrology and water quality, land use and planning, noise, population and housing, public services, recreation, transportation, tribal cultural resources, utilities and service system, and wildfire. The environmental setting discussions describe the "existing conditions" of the environment on the Project site and in the vicinity of the site as they pertain to the environmental issues being analyzed (*State CEQA Guidelines* Section 15125).

  The impact discussions identify and focus on the potentially significant environmental effects of the proposed Project. The direct and indirect effects of the proposed Project on the environment are identified and described, giving due consideration to both the short-term and long-term effects, as necessary (*State CEQA Guidelines* Section 15126.2[a]).

  Chapter 4.0 also includes within the analysis of each environmental topic a discussion of the cumulative effects of the proposed Project when considered in combination with other projects causing related impacts, as required by *State CEQA Guidelines* Section 15130. Cumulative impacts are based on the build out of the proposed Project and the known relevant approved and proposed projects in the surrounding area.

  The discussions of mitigation measures identify and describe feasible measures that could minimize or lessen potentially significant impacts for each significant environmental effect identified in this EIR (*State CEQA Guidelines* Section 15126[e]). The levels of significance before and after mitigation are provided. Significant unavoidable adverse effects are identified where mitigation is not expected to reduce the effects to less than significant levels.

- **Chapter 5.0: Alternatives to the Proposed Project.** In accordance with CEQA, the alternatives discussion in Chapter 5.0 describes a reasonable range of alternatives that could feasibly attain the basic objectives of the proposed Project and are capable of eliminating or substantially reducing any of the proposed Project's significant unavoidable adverse environmental effects or reducing them to a less than significant level. The alternatives analyzed in Chapter 5.0 include a No Project/Business Park Alternative (existing General Plan), Urban Industrial/Residential, No School Alternative, and a Reduced Project Alternative.

- **Chapter 6.0: Other CEQA Considerations.** Chapter 6.0 contains discussions on the following topics as required by *State CEQA Guidelines* Section 15126: (1) growth-inducing impacts of the proposed Project; and (2) whether there are any significant adverse environmental impacts associated with the proposed Project for which either no mitigation or only partial mitigation is feasible.

- **Chapter 7.0: List of Preparers.** Chapter 7.0 provides the organizations and persons contacted during preparation of this EIR, the EIR preparers and technical report authors, and other experts involved in the preparation of this EIR.

- **Chapter 8.0: References.** Chapter 8.0 provides the references used in this EIR.

2.5 INCORPORATION BY REFERENCE

An EIR may incorporate by reference all or portions of another document that is a matter of public record or is generally available to the public, consistent with *State CEQA Guidelines* Section 15150. Informational details from the documents that have been incorporated by reference are summarized in the appropriate sections of this EIR, along with descriptions regarding how the public may review these documents. All documents are available for review at the City of Lake Forest, Planning Division. These documents include:

- City of Lake Forest General Plan (available online at: https://www.lakeforestca.gov/292/Planning-Documents)

- City of Lake Forest Municipal Code (available online at: https://qcode.us/codes/lakeforest/)

This page intentionally left blank

3.0 PROJECT DESCRIPTION

This section describes the proposed Nakase Nursery/Toll Brothers Project (Project) evaluated in this Environmental Impact Report (EIR). A description of the proposed Project's location, objectives, and required approvals is provided.

3.1 REGIONAL LOCATION

The Nakase property (Project site) is located in the north-central portion of Lake Forest in Orange County, California. As shown on Figure 3.1, regional access to the Project site is provided by State Route 241 (SR-241), which is located approximately 0.07 mile (mi) northeast of the Project site, and Interstate 5 (I-5), which is located approximately 3.8 mi southwest of the Project site.

3.1.1 Project Vicinity and Surrounding Land Uses

The 122-acre (ac) Project site (Assessor's Parcel Number [APN] 612-221-01) is currently operating as the Nakase Brothers Wholesale Nurseries, an agricultural wholesale plant nursery. Refer to Figure 3.2 for the Project vicinity.

The areas surrounding the Project site consist of a mix of land uses, including commercial, office, open space, industrial, and residential uses. The Project site is bounded on the northwest by Bake Parkway, on the northeast by Rancho Parkway, on the southeast by the Serrano Creek Trail, and on the southwest by commercial, industrial, and office uses, with Dimension Drive beyond. Although not immediately adjacent to the Project site, single-family and multifamily residential uses exist to the northwest, northeast, and south of the Project site. As noted above, SR-241 is approximately 0.07 mi northeast of the Project site. Surrounding land uses are shown on Figure 3.3.

Residential planned communities in the vicinity of the Project site include the Foothill Ranch Planned Community (PC 8) to the north, the Portola Hills Planned Community (PC 9) to the northeast, the Baker Ranch Planned Community (PC 7) to the west, and the Rancho de Los Alisos Planned Community (PC 3) to the southeast.

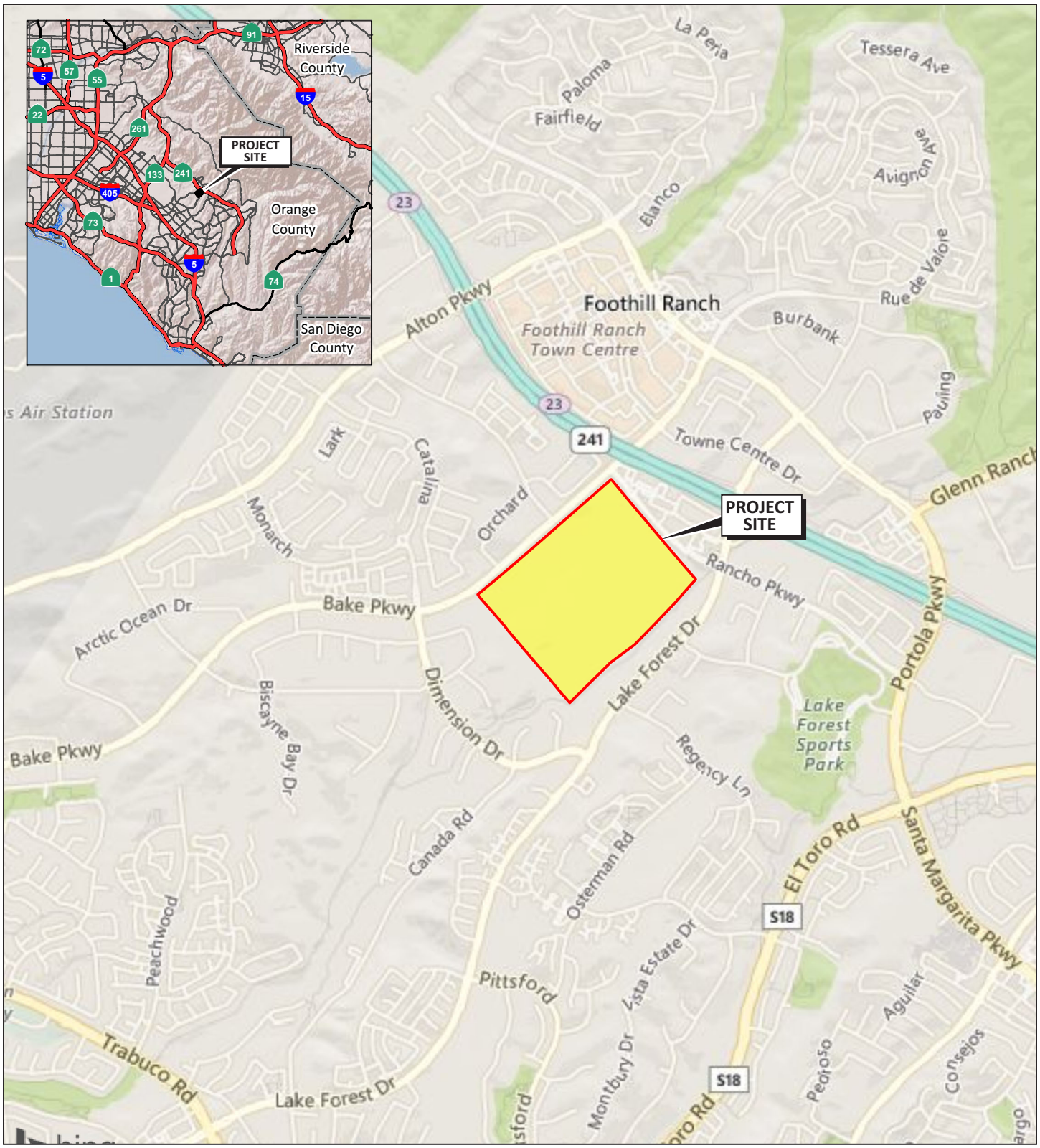
3.2 ENVIRONMENTAL SETTING

3.2.1 Existing Project Site Conditions

The Project site is currently developed with multiple structures used for nursery operations, an office trailer, and a gravel parking lot that is used for trailer storage and staff parking near the center of the Project site. Figure 3.4 provides photographs of existing conditions on the Project site.

A 20-foot (ft) Southern California Edison (SCE) easement is located adjacent to Bake Parkway on the Project site. In addition, there is a 20 ft wide water line easement that extends along the entire length of the Project site's southwestern property line, and an active irrigation water well that is roughly in the center of the Project site.

This page intentionally left blank



LSA

FIGURE 3.1

SOURCE: Bing Maps

Nakase Nursery/Toll Brothers
Regional Project Location

I:\CLF1801\G\Regional Location.cdr (6/26/2019)

This page intentionally left blank

LSA

FIGURE 3.2

N

0 500 1000

FEET

SOURCE: Bing Maps

Nakase Nursery/Toll Brothers
Project Vicinity

I:\CLF1801\G\Project Vicinity.cdr (6/26/2019)

This page intentionally left blank

LSA

LEGEND

Project Site

LandUse

- Single Family Residential
- Multi-Family Residential
- General Office
- Commercial and Services
- Institutional
- Industrial
- Transportation, Communications, and Utilities
- Mixed Commercial and Industrial
- Open Space and Recreation
- Agriculture

N

0 325 650
FEET

SOURCE: Bing (2017)

I:\CLF1801\GIS\LandUse.mxd (6/26/2019)

FIGURE 3.3

Nakase Nursery/Toll Brothers

Existing Land Uses

This page intentionally left blank

View facing south from Bake Parkway.

View facing east from Bake Parkway.

View facing south from Rancho Parkway.

View facing west from Rancho Parkway.

LSA

FIGURE 3.4

Nakase Nursery/Toll Brothers
Existing Site Photos

I:\CLF1801\G\Existing Site Photos.cdr (6/26/2019)

This page intentionally left blank

In the existing condition, there is one vehicular access point to the Project site via a non-exclusive easement between adjacent properties to the south. The easement extends from Lake Forest Drive, directly north of Dimension Drive, to the southernmost point of the Project site. Manufactured landscape slopes, chain-link fences, and block walls enclose the Project site. In addition, several mature trees line the northeastern and southeastern boundaries of the Project site.

3.2.2 Current General Plan Land Use Designation

The City's General Plan designates the Project site as Business Park and Business Development Overlay (BDO). The Business Park land use designation is intended to provide a mix of uses as allowed under the Commercial, Professional Office, and Light Industrial designations. The Business Park designation does not provide for agricultural uses. Thus, the existing land use is inconsistent with the current Business Park designation of the Project site.

The BDO designation applies to all areas designated for Commercial, Professional Office, Business Park, and Light Industrial land uses, and is intended to provide a balance of land uses that contribute to the future financial success of the City of Lake Forest (City). No proposed land use designation changes within the BDO may result in a loss of future net revenue for the City (City of Lake Forest 1994b). Refer to Figure 3.5 for the Project site's location in relation to the City's General Plan Land Use Map and the BDO.

3.2.3 Current Zoning

The Project site currently has a zoning designation of A1 – Agricultural District, which is intended to provide for agriculture, outdoor recreational uses, and other low-intensity uses requiring open space. According to Section 9.72.010 of the City's Zoning Code, the A1 – Agricultural District may be used as an interim zone in those areas that the General Plan may designate for more intensive urban uses in the future. Refer to Figure 3.6 for the Project site's location in relation to the City's Zoning Map.

3.2.4 Project Site History

Historically, the Project site has been used primarily for agriculture production. From 1938 through the late 1960s, the Nakase Nursery was developed with orchards. In the late 1960s, the northwestern portion of the Project site continued operation as an orchard while the remainder of the Project site was developed as a plant nursery. In 1988, the orchards were removed, and the entire Project site has been used as an agricultural wholesale plant nursery since the 1990s.

The previous site of the El Toro Marine Corps Air Station (MCAS) is located in Irvine, approximately 5 mi west of the Project Site. The El Toro MCAS was in operation from 1943 to 1999. In 2007, the El Toro MCAS site was redeveloped as the Orange County Great Park, located at 6950 Marine Way (Orange County Register 2006). When the El Toro MCAS was in use, the Project Site fell within the 65-decibel (dB) Community Noise Equivalent Level (CNEL) noise contour, which restricted residential uses on the property.

This page intentionally left blank

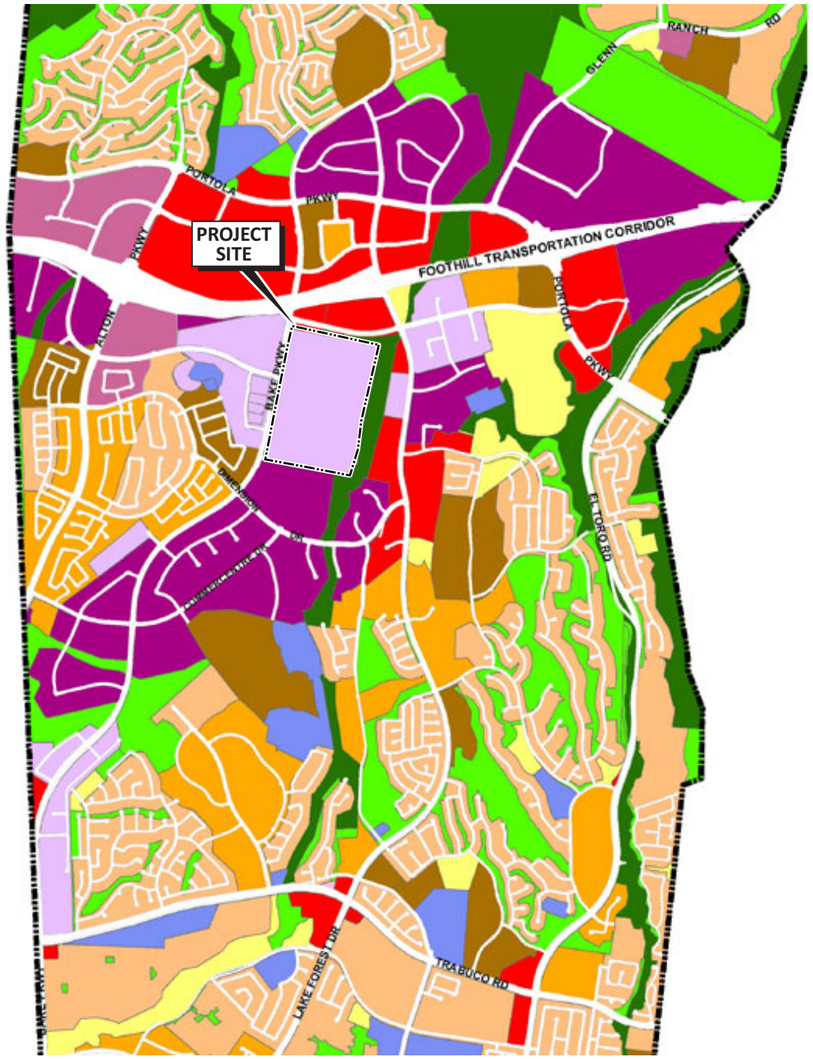
Land Use Designations

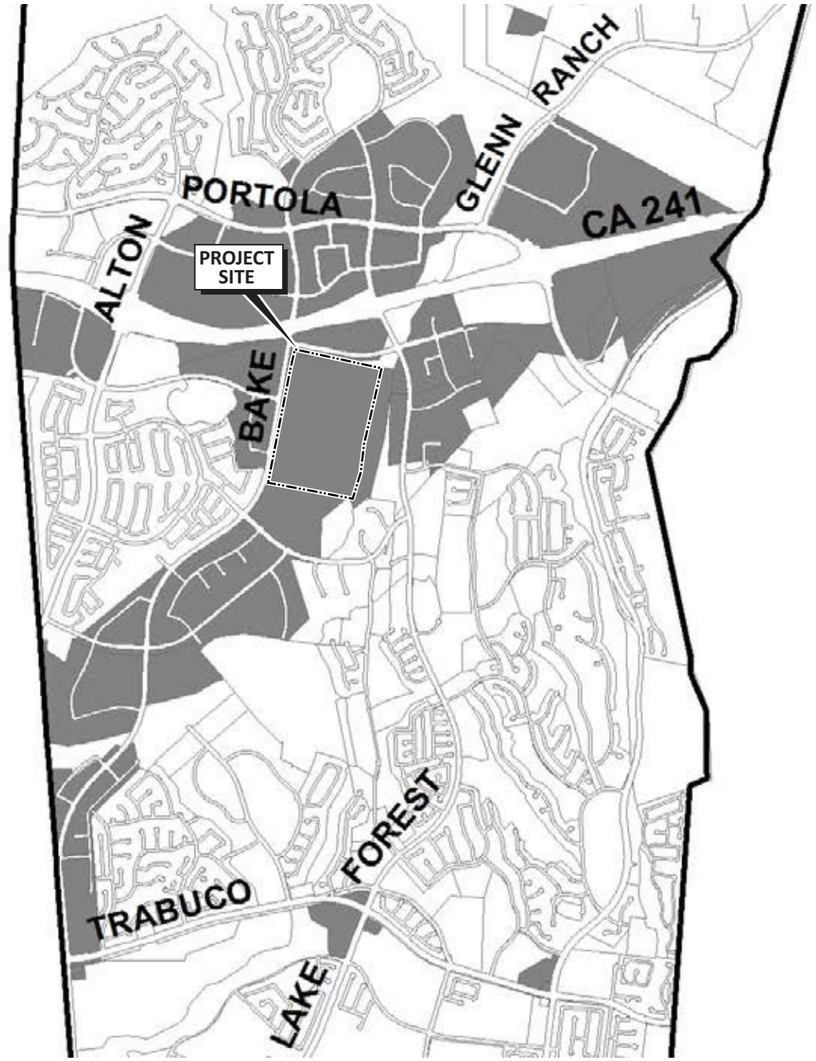
Residential Designations

- Very Low Density Residential (0 to 2 DUs/Net AC)
- Low Density Residential (2 to 7 DUs/Net AC)
- Low-Medium Density Residential (7 to 15 DUs/Net AC)
- Medium Density Residential (15 to 25 DUs/Net AC)
- High Density Residential (25 to 43 DUs/ Net AC)

Non-Residential Designations

- Commercial
- Professional Office
- Mixed-Use
- Business Park
- Light Industrial
- Public Facility
- Community Park/Open Space
- Regional Park/Open Space
- Open Space
- Lake
- Transportation Corridor
- City Boundary





Business Development Overlay

LSA

FIGURE 3.5

N

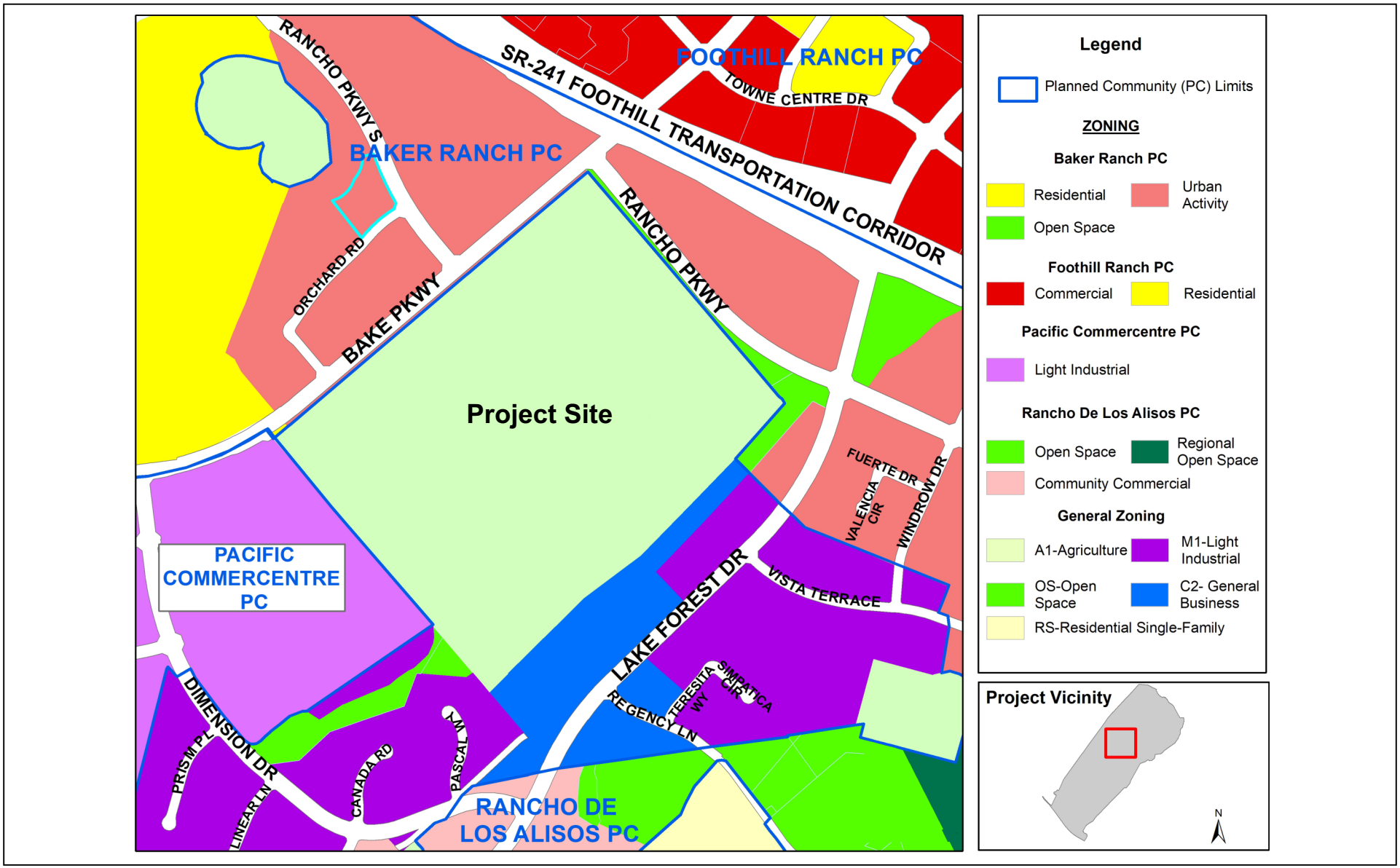
0 1500 3000
FEET

SOURCE: City of Lake Forest

I:\CLF1801\G\GPLU & BD Overlay.cdr (6/26/2019)

Nakase Nursery/Toll Brothers
General Plan Land Use and
Business Development Overlay

This page intentionally left blank



LSA

FIGURE 3.6

N

0 500 1000

FEET

SOURCE: City of Lake Forest, 2019

I:\CLF1801\G\Zoning.cdr (8/9/2019)

Nakase Nursery/Toll Brothers

Zoning Map

This page intentionally left blank

After the El Toro MCAS was decommissioned in 1999, the City authorized the Opportunity Study Area (OSA), which was intended to identify potential land uses for properties that previously fell under the 65 dB CNEL noise contour. Approximately 838 ac of undeveloped properties were analyzed under the OSA, and the City initiated a General Plan Amendment (GPA) to allow the properties to change their land use designation to residential, mixed uses, and parks. However, owners of the Nakase property declined to participate in the OSA, thereby retaining the commercial and light industrial land use designation that currently characterizes the Project site. Following approval of the GPA, properties to the north and west of the Project site have been developed with new residential projects, including the Portola Hills and Baker Ranch Planned Communities.

3.3 PROJECT CHARACTERISTICS

3.3.1 Land Use Plan

The Project proposes the approval of the "Nakase Property Area Plan" (referred to hereafter as the Area Plan and/or the Project) (Woodley Architectural Group 2019), which would facilitate the development of the 122 ac Project site as a master planned community. The planned community would be consistent with neighboring developments, while also demonstrating a distinct community character and establishing a sense of place.

The Area Plan would establish guidelines for the future development of the planned community, which would consist of single-family residential units (contained in five distinct neighborhoods), affordable housing units for senior citizens with up to 10 of these units available for permanent supportive housing, an elementary school, parks and open space, and an internal circulation system. Refer to Figure 3.7 for the Conceptual Land Use Plan. Table 3.A summarizes proposed land uses associated with the Area Plan and gross acreages for each land use.

3.3.2 Residential Uses

The Project proposes up to 675 two- and three-story, single-family residential units on approximately 51 ac of the Project site. Five separate neighborhoods would each display a distinct style of single-family home. All neighborhoods feature low-medium density product types, with the exception of the Neighborhood Two alternative, which features a medium-density attached "rowtown" product.

To meet the City's affordable housing policy as stipulated in the Housing Element (City of Lake Forest 2014), up to 101 senior affordable housing units (developed at a maximum density of 38.9 dwelling units per acre [du/acre]) would be constructed on 2.6 ac. The units would be available for rent, and the building would be two to three stories, with access provided by an elevator. The actual number of affordable units would be stipulated in the Development Agreement requirements.

This page intentionally left blank

LEGEND (General Plan Designations)

- Low-Medium Density Residential (7-15 DU/AC)
- Medium Density Residential (15-25 DU/AC) *
- High Density Residential (25-43 DU/AC)
- Public Facility
- Community Park/Open Space
- Regional Park/Open Space

* The Area Plan envisions alternative product type for Neighborhood 2. Under the proposed General Plan designation and Zoning district for Neighborhood 2, Rowtowns may be developed at the higher end of the low medium density range provided that the maximum number of units specified in Table 2.1 in the Area Plan for Neighborhood 2 is not exceeded, and provided that the maximum number of total units does not exceed 675 units.

LSA

FIGURE 3.7

N

0 250 500

FEET

SOURCE: Nakase Property Area Plan (August 2019)

Nakase Nursery/Toll Brothers

Conceptual Land Use Plan

I:\CLF1801\G\Concept_Land_Use.cdr (8/13/2019)

This page intentionally left blank

Table 3.A: Land Use Summary

Area/Feature	Proposed Land Use Designation	Acreage
Parks and Open Space		
Central Park	Community Park/Open Space	2.3
Private Recreation Center	Community Park/Open Space	2.5
5 Neighborhood Mini-Parks	Low Medium and Medium Density Residential	2.62
Neighborhood Park	Community Park/Open Space	3.59
Open Space and Habitat and Restoration Area	Regional Park/Open Space	10.4
	Total Acreage Allotted for Parks	***21.41***
Residential		
Neighborhood 1	Low-Medium Density Residential	12.8
Neighborhood 2	Medium Density Residential	5.6
Neighborhood 3	Low-Medium Density Residential	12.3
Neighborhood 4	Low-Medium Density Residential	13.0
Neighborhood 5	Low-Medium Density Residential	7.3
	Total Residential Acreage	***51***
Senior Affordable Residential		
Senior Affordable Residential	High Density Residential	2.6
School		
Elementary School	Public Facility	11.5 (including 4.0 acres of fields)
Utilitarian		
Street Medians, & Parkways	N/A	12.5
Roads	N/A	22.8
	Total Utilitarian	**35.3**

Source: *Nakase Property Area Plan* (Woodley Architectural Group 2019).

In addition, up to 10 of the residential units on the Project site would be permanent supportive housing (PSH)[1] units. The number of PSH units would not increase the total number of residential units on the Project site beyond 776 (675 single-family residential units plus 101 senior affordable units). All of the supportive services, if any, would be permitted by right within the zone.

Table 3.B provides a summary of the residential product types allowable under the proposed Area Plan, including the approximate net acreage, maximum density, and maximum number of units allowable within each neighborhood. Residential development potential would be limited by density and building heights. In no event would the total number of market rate dwelling units that may be developed pursuant to the Nakase Area Plan be higher than the maximum density established for all five neighborhoods.

The proposed Area Plan would allow adjustments to the number of residential dwelling in each neighborhood provided that the maximum number of 675 market-rate dwelling units established for the Nakase property is not exceeded and that maximum neighborhood densities remain below those set forth in Table 3.B. Such adjustments would occur at the time of final design of any portion of a particular neighborhood.

[1] According to the United States Interagency Council on Homelessness, PSH combines non-time-limited affordable housing assistance with wrap-around supportive services for people experiencing homelessness, as well as other people with disabilities.

Table 3.B: Residential Product Summary

Neighborhood	Product Type	Net Acres	Maximum Density[3]	Maximum No. of Units
1	Garden Clusters	12.8	14.2 du/ac	182
2	Sky Terraces/Rowtowns[1]	5.6	21.6 du/ac (applies to alternate rowtowns; otherwise, 15 du/ac)	121
3	Cottage Homes	12.3	11.4 du/ac	141
4	Traditional Single Family Homes	13.0	10.4 du/ac	135
5	Estate Homes/Backyard Towns[2]	7.3	13.2 du/ac	96
	Subtotal	***51***	**–**	***675***
N/A	Senior Affordable Housing	2.6	38.9 du/ac	101
	GRAND TOTAL	**53.6**	–	**776**

Source: *Nakase Property Area Plan* (Woodley Architectural Group 2019).

[1] The Area Plan envisions alternative product type for Neighborhood Two. Under the proposed General Plan designation and Zoning district for Neighborhood Two, rowtowns may be developed at the higher end of the low-medium density range provided the maximum number of units allowable in Neighborhood Two (121 units) is not exceeded and that the maximum number of total units in the Area Plan does not exceed 675 units.

[2] The Backyard Towns in Neighborhood Five are an alternative product that maintains the same maximum density as the standard Estate Homes product for the neighborhood.

[3] Section 2.3.8 of the Area Plan would allow for the transfer of dwelling units among the various neighborhoods, provided that the maximum number of 675 dwelling units established for the Nakase property is not exceeded and that the maximum neighborhood densities remain below those set forth in Tables 2.1 and 2.3 of the Area Plan.

du/ac = dwelling units per acre

Any requests for a transfer of market-rate dwelling units would require a Site Development Permit to be approved by the City's Planning Commission and would require: (1) an analysis of the other Nakase Planning Areas to ensure that the maximum number of dwelling units is not exceeded for the Area Plan as a whole, and (2) a demonstration that the specific development projects remain within the maximum density for each neighborhood. In the event the dwelling units are transferred, the applicable Area Plan exhibits would need to be updated to reflect the requested changes in dwelling units.

3.3.3 Elementary School

The proposed elementary school would accommodate up to 1,000 students from kindergarten through sixth grade. As shown on Figure 3.7, the school site would be located on the northeastern portion of the Project site at the corner of Bake Parkway and Rancho Parkway. Should the City Council approve the proposed Project, and subject to the Saddleback Valley Unified School District (SVUSD) environmental review and approval of the school site and the California Department of Education's (CDE) final site approval and completion of grading and backbone infrastructure, the Project Developer would dedicate the elementary school site to the SVUSD. It is the Project Applicant/Developers' intent that the school site be dedicated prior to or upon approval and recordation of the Final Map in conjunction with completion of site grading and backbone infrastructure, or as otherwise specified in the School Mitigation Agreement. In the event that SVUSD does not obtain CDE final site approval, medium residential and neighborhood park uses would be permitted on the school site. If the school site is developed with residential uses, the total number of residential units on the Project site would not exceed 675 residential units and 101 senior affordable rental units with up to 10 of these units available for permanent supportive housing.

3.3.4 Parks, Recreation, and Open Space

The Area Plan provides approximately 24.9 ac of parks, open space, and habitat restoration area. Table 3.C summarizes proposed park and open space uses. The location of park and open spaces uses is shown in Figure 3.7. The proposed Project includes the creation of a 4.8 ac park (referred to as "Central Park") in the central area of the Project site. There would be 2.5 ac of the Central Park devoted to a private recreational facility for resident use only that would include the following amenities: pools, shade structures, a community room, private restrooms, and other amenities (e.g., drinking fountains and trash receptacles). In addition, each of the five neighborhoods within the Area Plan would include a minimum 0.5 ac mini-neighborhood park, with all five mini-neighborhood parks totaling 2.62 ac. The proposed Project includes 11.8 ac of parks, open space, and habitat and restoration area. The Homeowner's Association (HOA) would maintain in perpetuity all of the parks, open space, and habitat and restoration areas, as well as the two underground water facilities located at the site: (1) a water detention basin located beneath the open play area at the Central Park,[1] and (2) a water quality filtration system located 4 ft below the surface of the Neighborhood Park. All parks, with the exception of the private recreational facility (which would be available to residents only), open space, and habitat and restoration areas would be private but open for public use.

Table 3.C: Proposed Parks and Open Space

Park Name	Description	Acreage
Central Park	Private park located in the center of the Master Plan	2.29
Private Recreational Center	Private clubhouse located in the center of the Master Plan	2.5
Neighborhood 1 Park	Private park located in the center of the neighborhood	0.5
Neighborhood 2 Park	Private park located in the center of the neighborhood	0.54
Neighborhood 3 Park	Private park located in the center of the neighborhood	0.52
Neighborhood 4 Park	Private park located in the center of the neighborhood	0.52
Neighborhood 5 Park	Private park located in the center of the neighborhood	0.54
Community Park	Private park located on the southern edge of the site	3.59
Open Space & Habitat & Restoration Area	Extensive system of open space and habitat area located on the eastern portion of the site. In addition, an internal trail system connects Bake Parkway along "A" Street and extends through "B" and "C" Streets to the Serrano Creek Regional Trail.	0.8
	Total Acreage Provided	**11.8**
	Total Acreage Credited[1]	**11.32**
	Total Public Park Credit Required	**11.37**
	Park Credit Deficit	**0.05**

Source: *Nakase Property Area Plan* (Woodley Architectural Group 2019).

[1] Based on Lake Forest Municipal Code 7.38.040 and subject to the Nakase Development Agreement, 1.15 acres of park credit per acre would be granted for public park creation and 0.25 acre of park credit per acre would be granted for private park/recreation center facilities of 0.5 acre or greater in size.

[1] The underground design of the water quality basins would allow for open space park uses above the structure. The structure would not be visible from the surface, with the exception of several maintenance access manholes.

3.3.5 Open Space & Habitat & Restoration Area

The Open Space & Habitat & Restoration Area would be located along the southeastern portion of the Project site, adjacent to Serrano Creek, and would total 10.4 ac. The Open Space & Habitat & Restoration Area includes an on-site trail that would provide pedestrian and bike connections between the Project site and the regional trail system (i.e., Serrano Creek Trail). Within the Open Space & Habitat & Restoration Area, the Project Applicant/Developer intends to create a minimum of 4.19 ac of riparian vegetation contiguous with the existing riparian canopy associated with Serrano Creek. This area would be irrigated only until plants are established, thereby creating a naturally self-sustaining native riparian habitat community.

The Open Space & Habitat & Restoration Area would be placed into a conservation easement or similar legal protection that would protect the lands in perpetuity. Lands within the conservation easement would be managed in perpetuity by a designated entity, approved by the City, and other than the City or the HOA. The Project Applicant/Developer would be responsible for setting up the conservation easement, and funding maintenance and management of conservation areas in perpetuity.

3.4 BUILDING AND SITE DESIGN

3.4.1 Architecture

The community features a series of character styles that reflect a California Contemporary aesthetic in its architectural style palette: Coastal Contemporary, California Modern, Modern Hacienda, and Spanish vernaculars. Together, the styles are intended to establish a cohesive community for the Nakase property that feels both contextual and altogether new in its expression. A brief description of each of the architectural styles is provided below.

3.4.1.1 Coastal Contemporary

The Coastal Contemporary merges streamlined forms, bold roof lines, stunning glass, and sharp metal details with subtle textures. Balanced, asymmetrical masses, deep roof overhangs, and carefully composed window patterns are essential for executing this style properly. Bay window projections framing window compositions are strongly encouraged as they add drama to Coastal Contemporary's inherent simplicity. The material palette is comprised predominantly of stucco, with accents of clean stone textures, metal, and rich wood tile. Stucco body colors should be light and tonal, allowing for bold, contrasting fascia and dark eyebrow roofs.

3.4.1.2 California Modern

The California Modern style is expressed through its sleek forms, structured massing, and minimalistic detailing. The style accentuates both the linear and vertical nature of the homes. This style is characterized by smooth stucco surfaces, metal canopy accents, and horizontal tile elements with floor-to-ceiling glass.

3.4.1.3 Modern Hacienda

Modern Hacienda is expressed through the purity of its forms, simplistic detailing, clean stucco, and rough stone textures, creating a style that is both rustic and elegant. The style follows plan forms ranging from simple rectilinear configurations to larger massing expressions. The roof forms utilize low-pitched gables with decorative corbel elements and exposed rafter tails. Clean, rectangular entries are highlighted by decorative precast and foam elements. Above all, the Modern Hacienda requires well-articulated details: gables with tight eaves, minimal overhangs at roofs, simple corbel details, decorative shutters, and refined wrought iron treatments.

3.4.1.4 Spanish

The Spanish style is an artful blend of Spanish Colonial and Spanish Eclectic vernaculars, with a refined edge. The style follows plan forms ranging from simple rectilinear configurations to larger massing expressions. The roof forms mirror that of the plan, combining low-pitched hipped roofs with decorative enclosed cornices. Simplistic in nature, clean stucco façades express the style's purity of forms, while wrought iron details, louvered shutters, and corner trim contribute to its articulation without becoming ornate and obtrusive.

3.4.2 Landscaping

In the existing condition, the Project site contains less than 0.5 ac of maritime succulent scrub occurring along the southwestern boundary of the Project site, riparian forest (best characterized as southern black willow forest) immediately adjacent to Serrano Creek, active agricultural areas, and bare ground that has been planted with ornamental trees, including Peruvian pepper tree and coast live oak. With the exception of the southern black willow forest, all existing landscaping on the Project site would be removed as part of Project implementation.

As illustrated on Figure 3.8, the Project would incorporate ornamental landscaping along Bake Parkway, Rancho Parkway, the Project site's southern boundaries, the internal access road, and throughout the Project site. Landscaping would include a variety of California friendly and drought-tolerant plants as specified in the Area Plan's Community Plant Material Guidelines. A multipurpose water quality basin would be located on the southwestern portion of the Project site.

On-site irrigation would include low-flow bubblers, spray heads, and drip systems, where applicable, to reduce the probability of water runoff and overspray. In addition, the proposed Project would also use irrigation controllers equipped with a soil moisture sensor, and rain shut-off and wind shut-off capabilities.

3.4.3 Fencing

Community walls and fences would be designed to emphasize the Contemporary California theme and provide community continuity. Walls would be used as safety buffers, noise abatement, and privacy buffers for the school and residences. Combination masonry with glass walls and tubular steel fences would be located along properties adjacent to open space areas, or where off-site views are desired. Proposed wall and fence locations are shown on Figure 3.9. The proposed Project includes the following theme fences and walls.

This page intentionally left blank

LSA

FIGURE 3.8

N

0 160 320
FEET

SOURCE: Nakase Property Area Plan (June 2019)

I:\CLF1801\G\Concept_Landscape_Plan_11x17.cdr (7/5/2019)

Nakase Nursery/Toll Brothers

Conceptual Landscape Plan

This page intentionally left blank

Community Theme Sound Wall Locations

Community Theme Solid Wall Locations

Community Theme Open View Glass Wall Locations

Community Theme Open View Fence Locations

Community Theme Low Wall with Open View Fence Locations

LSA

FIGURE 3.9

N

Nakase Nursery/Toll Brothers
Wall and Fence Diagram

SOURCE: Nakase Property Area Plan (Nov 2019)

I:\CLF1801\G\Wall_Fence_Diagrams.cdr (12/3/2019)

This page intentionally left blank

- **Community Theme Sound Wall:** The masonry community theme sound walls would be located along Bake Parkway and Rancho Parkway in compliance with the City's interior and exterior noise standards. The walls would be a maximum of 8 ft in height per recommendations of a Noise Study to be submitted and as permitted by the City's Planning Commission upon approval of the Area Plan. Each community theme sound wall would be constructed so that the top of each barrier is at least 8 ft higher than the pad elevation of the lot it is shielding. When the road is elevated above the pad elevation, the barrier shall extend to the planned 8 ft height above the highest point between the residential home and the road. The barriers shall provide a weight of at least 4 pounds per square foot (lbs/sf) of face area with no decorative cutouts or line-of-sight openings between shielded areas and the roadways. The barrier must present a solid face from top to bottom. All gaps (except for weep holes) would be filled with grout or caulking.

- **Community Theme Solid Wall:** The community theme solid wall would be a 6 ft tall masonry wall. These walls may be higher than 6 ft if required for privacy, sound attenuation, or sloped condition with a Site Development Permit approval.

- **Community Theme Open View Glass Wall:** The community theme open view glass wall would be a low masonry wall with glass on the top or upper portion of the wall. The community theme open view glass wall would be a maximum of 8 ft in height. It would be located to enhance view opportunities while also serving as a fire protection feature.

- **Community Theme Open View Fence:** The community theme open view fence would be a painted 6 ft tall tubular steel fence used to enhance view opportunities while preventing access to adjacent slopes.

- **Community Theme Low Wall With Open View Fence:** The community theme low wall with open view fence would be a low masonry wall with tubular fence on the top or upper portion of the wall. The community theme low wall with open view fence would be a maximum height of 8 ft. It would be used to enhance view opportunities.

- **Side Yard Wall:** The side yard wall is a maximum 8 ft tall masonry wall that would be located at side yards to provide privacy between units.

In addition to the various theme walls, the proposed Project includes the use of conventional masonry retaining walls. Retaining walls within the Project site would conform to the City's Retaining Wall Design Guidelines.

3.4.4 Lighting

The Area Plan specifies that exterior and interior lighting shall be designed and located to be directional to confine direct lighting to the premises. Proposed on-site lighting includes, but is not limited to, street lights, parking lot lights, bollard lighting, and accent lighting on buildings.

3.4.5 Signage

The proposed Project would include community identification monument signs at each primary and secondary community entrance and at the entrance to each neighborhood. On-site signage would also include directional (wayfinding) signage, signage associated with the parks trails, and residential neighborhoods, and address signage on the residential units. All signage within the Project site would be governed by the regulations of the City's Sign Code. Separate Planning Commission approval of a Planned Sign Program would be required for all on-site signs.

3.5 CIRCULATION

Three locations would provide access to the Project Site: two entries at Bake Parkway and one entry at Rancho Parkway. The two entries at Bake Parkway would line up with the existing roads (Rancho Parkway South and Orchard Street), thereby improving connectivity in the Project's vicinity. The Project proposes to widen Bake Parkway at each of the Project site entries to provide northbound right-turn lanes. Southbound turn lanes would extend from Bake Parkway to the Project's main entry. No left turns would be allowed into the Project from the secondary entry on Bake Parkway. Rancho Parkway would provide access to the commercial center north of the Project site. Rancho Parkway would also be widened at the Project site entry to provide an eastbound right-turn lane and a westbound left-turn lane. Refer to Figure 3.10 for the Conceptual Circulation Plan.

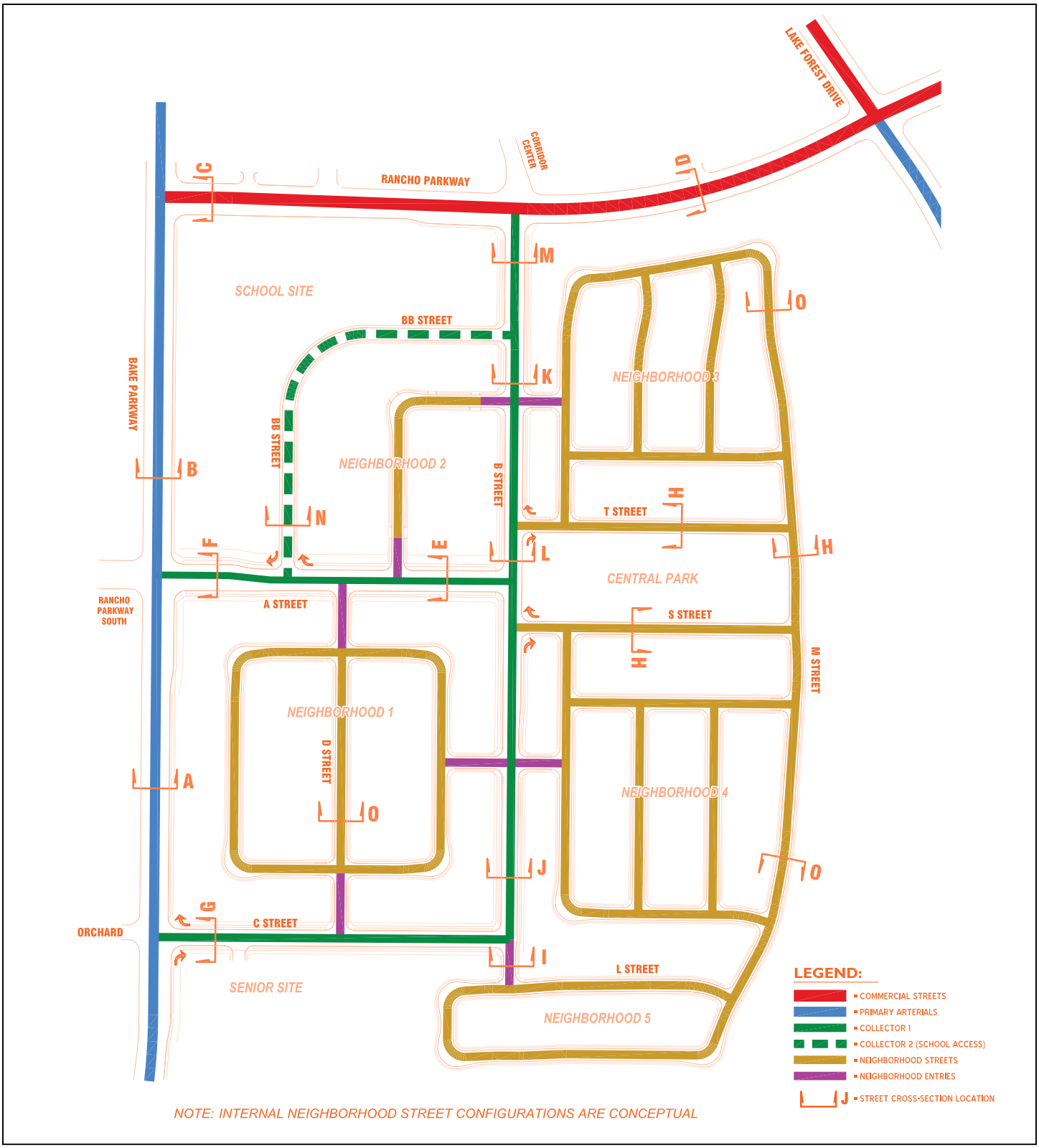
The proposed internal circulation system consists of three collector streets that would connect to smaller neighborhood streets. Street medians and parkways (totaling 3.2 ac) are proposed along the collector roads. As shown on Figure 3.11, designated off-street bicycle and pedestrian paths would extend along the collector streets and the perimeter of Central Park. An off-street bicycle and pedestrian path would ultimately connect to the Serrano Creek Trail from the southeastern Project site boundary. Figure 3.11 also shows that Class II bikeways (on-street bicycle lanes) would be located on both sides of Bake Parkway, Rancho Parkway South, and Rancho Parkway, consistent with the Circulation Element of the City's General Plan.

Figure 3.12 shows that all of the Project's proposed collector and neighborhood streets would have sidewalks (minimum 8 ft) on both sides. Marked crosswalks would be provided where sidewalks would cross collector streets and at other key intersections. At the southeast corner of the Project site, a sidewalk connection would be provided from the Nakase Property to the existing Serrano Creek Trail.

The proposed Project would require the construction of roadway and access improvements on four currently undeveloped remnant parcels surrounding the Project site. Figure 3.13 illustrates the locations of the four remnant parcels that would be required for Project implementation.

3.5.1 Parking

The City's Municipal Code (Chapter 9.168, Off-Street Parking) stipulates parking requirements for residential uses; the Project would be subject to the City's parking requirements. On-street parking would be provided to serve the Neighborhood Parks and Central Park. On-street parking would be



LSA

FIGURE 3.10

NO SCALE

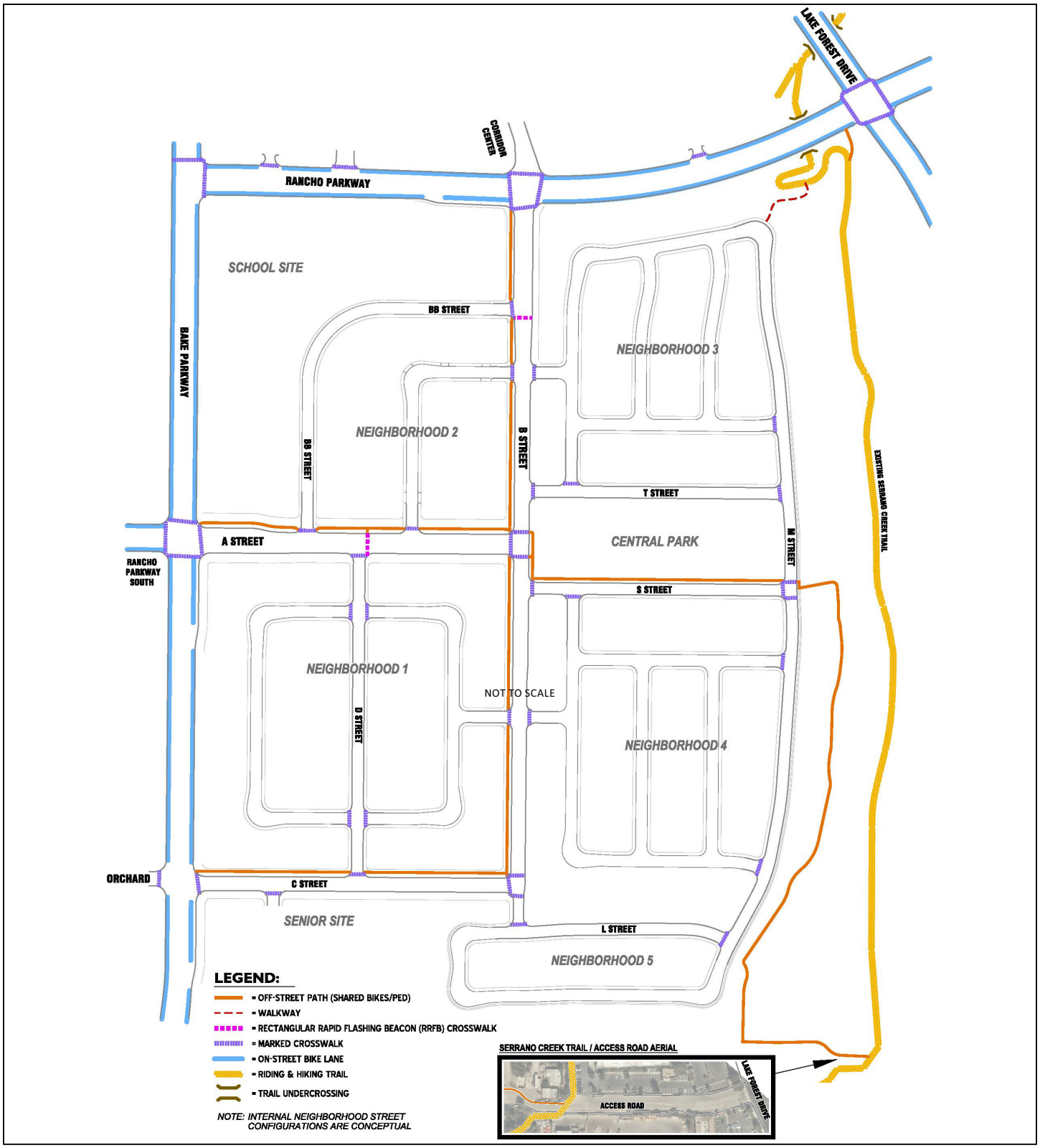
SOURCE: Nakase Property Area Plan (March 2019)

I:\CLF1801\G\Concept_Circulation_Plan.cdr (7/5/2019)

Nakase Nursery/Toll Brothers

Conceptual Circulation Plan

This page intentionally left blank



LSA

FIGURE 3.11

N

NO SCALE

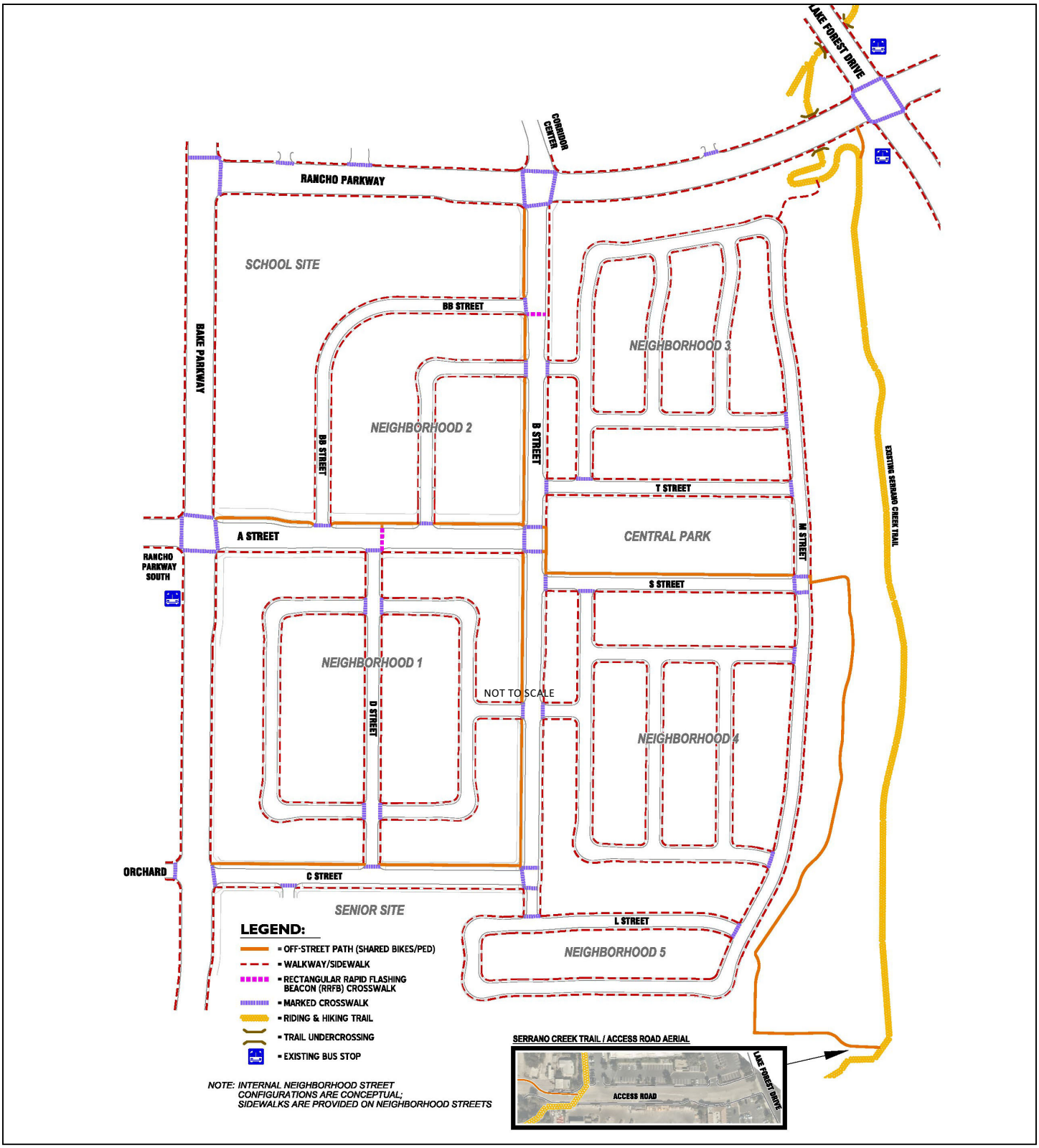
SOURCE: Nakase Property Area Plan (June 2019)

I:\CLF1801\G\Bike_Lane_Trail_Facility.cdr (7/5/2019)

Nakase Nursery/Toll Brothers

Bicycle Lanes and Trail Facilities

This page intentionally left blank



LSA

FIGURE 3.12

NO SCALE

SOURCE: Nakase Property Area Plan (June 2019)

I:\CLF1801\G\Pedestrian_Facilities.cdr (7/5/2019)

Nakase Nursery/Toll Brothers

Pedestrian Facilities

This page intentionally left blank

LSA

LEGEND

- Project Site (APN 612-221-01)
- Remnant Parcels Required for the Project
- Access Point
- Parcel Boundaries

0 250 500
FEET

SOURCE: Google Maps (2018)

I:\CLF1801\GIS\RemnantParcels.mxd (8/14/2019)

FIGURE 3.13

Nakase Nursery/Toll Brothers

Remnant Parcels Required for the Project

This page intentionally left blank

permitted on a portion of only some residential streets, including a portion of "B" and "C" Streets, in accordance with an on-street parking exhibit to be submitted by the Applicant, and as permitted by the City's Planning Commission upon approval of the Area Plan.

3.6 INFRASTRUCTURE IMPROVEMENTS

The following infrastructure improvements would serve the future development included in the Project:

- **Water:** The Project site receives domestic and recycled water service from the Irvine Ranch Water District (IRWD). An existing 24-inch domestic water main and an existing 12-inch recycled water main cross the Project site near its southern boundary. These existing water and recycled water mains would be relocated. Consequently, portions of the existing water line system would need to be rerouted to be aligned with the proposed circulation streets and lots. All rerouting of water facilities would be reviewed and approved by the City's Public Works Department and the IRWD. There are 8-inch domestic water lines and reclaimed water lines that are proposed to be installed in each of the Project's collector streets. These water lines would provide domestic water service and reclaimed water for landscaping for the Project's various uses.

- **Water Well Abandonment:** There is an existing irrigation well located in the center portion of the Project site, which produces 300 gallons per minutes (gpm). In accordance with Section 15.04.020 of the City's Municipal Code, the Project Applicant/Developer would be required to obtain a permit from the City for the proper decommissioning of the well in order to prevent the contamination of groundwater.

- **Sewer Service:** Sewer lines would be extended onto the Project site. A gravity sewer system would be installed and connected to the existing 21-inch sewer line in Bake Parkway. All connections to the existing wastewater lines would be reviewed and approved by the City's Public Works Department and the Orange County Sanitation District, as applicable.

- **Utilities:** The Project site receives electricity service from SCE. The Project proposes to underground the existing overhead 66-kilovolt (kV) power lines that are currently located on the east side of Bake Parkway within an existing 20 ft wide SCE utility easement. All undergrounding would be done consistent with the requirements of SCE. The proposed Project includes gas, cable, and telephone utility lines.

- **Drainage System:** On-site stormwater runoff would flow into a proposed on-site storm drain system in "B" Street and then diverted to the subsurface detention vault below Central Park. The on-site underground detention facility would comprise a system of modular vault structures with a solid impermeable floor. This structure would be designed to hold approximately 621,000 cubic feet (cf) of stormwater. Flows would then be directed to the southwestern portion of the Project site to the existing 10.5 ft x 10.5 ft reinforced concrete box, then to the existing off-site storm drain system, and ultimately into Serrano Creek, approximately 0.6 mi to the southwest of the Project site. Off-site stormwater runoff from north of Rancho Parkway would be connected to the proposed on-site storm drain system in "B" Street via the existing 84-inch storm drain

system in Rancho Parkway, which would then connect to the same existing 10.5 ft x 10.5 ft reinforced concrete box as on-site stormwater runoff at the southwestern portion of the Project site. The proposed location of the underground detention vaults are shown on Figure 3.14.

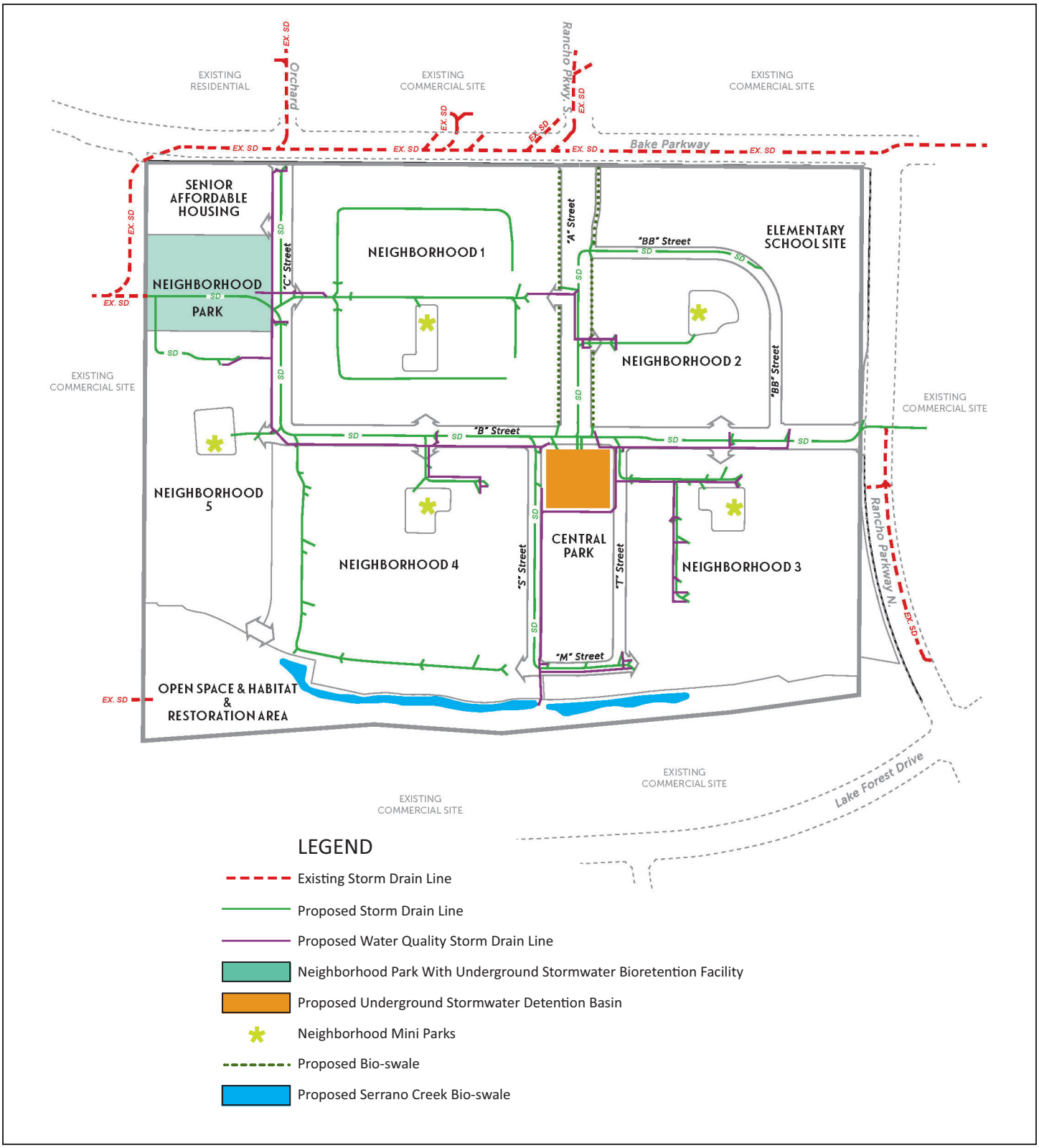
- **Stormwater Best Management Practices (BMPs):** The proposed Project would include a subsurface detention vault below Central Park and the Neighborhood Park, underground detention vaults in combination with proprietary biotreatment BMPs at each of the mini-neighborhood parks, a bioretention facility along Serrano Creek, and a linear bioretention facility along "A" Street. The proposed stormwater treatment system is shown on Figure 3.14.

3.7 SUSTAINABILITY FEATURES

Future development facilitated by approval of the proposed Project would be consistent with the California Green Building Standards Code (CALGreen) and would include the following sustainability features:

- Increased insulation values in walls and attic spaces
- Installation of high-efficiency windows and doors
- Installation of heating, ventilation, and air conditioning (HVAC) systems with a high Seasonal Energy Efficiency Ratio (SEER)
- Specified use of Energy Star appliances
- Installation of water-efficient plumbing fixtures
- Installation of tankless water heater systems
- Installation of light-emitting diode (LED) technology within homes
- Use of recycled water for common area landscape irrigation
- Use of drought-tolerant plants in landscape design
- Installation of water-efficient irrigation systems with smart sensor controls
- Installation of a 240-volt circuit in each home to allow easy installation of electric vehicle (EV) charging
- Installation of EV charging stations at Central Park and the elementary school[1]
- Installation of solar panels or solar-ready construction of residential structures to the extent required by CALGreen

[1] EV charging stations at the proposed elementary school would be subject to SVUSD construction standards.



LSA

FIGURE 3.14

N

0 250 500

FEET

SOURCE: Nakase Property Area Plan (June 2019)

Nakase Nursery/Toll Brothers

Storm Drain System & Storm Water Treatment

I:\CLF1801\G\Storm_Drain_Water.cdr (8/14/2019)

This page intentionally left blank

3.8 FIRE SAFETY

Fire engineering, code enforcement, and public education are the main components of fire prevention. The Orange County Fire Authority (OCFA) approved a conceptual Fire Master Plan (refer to Figure 4.19.1) in February 2018, a conceptual Fire Protection Plan with Ember Mitigation (refer to Figure 4.19.2) in January 2018, and a conceptual Fuel Modification Plan (refer to Figure 4.19.3) in March 2018. The Fire Master Plan and Fire Protection Plan address specific fire prevention and access elements required by the City of Lake Forest Municipal Code and the California Building Code (CBC). The Fire Master Plan establishes the proper location and adequacy of fire suppression facilities as well as fire access routes on the Project site. The Fire Master Plan also identifies the locations of fire hydrants, a water supply for firefighting, and emergency access to residences and structures on the Project site. According to OCFA, adherence to the elements of the Fire Master Plan is directly correlated with the effectiveness of first responders, including fire and emergency medical personnel.

The Fire Protection Plan identifies lots and structures that would be within the Ember Mitigation Zone and Radiant Heat Zone. It also identifies lots and structures that would require an attic fire sprinkler system and the conceptual location of the radiant heat wall (i.e., Community Theme Open View Glass Wall).

The Fuel Modification Plan is required by the City of Lake Forest Municipal Code. The Fuel Modification Plan requires the use of fire-resistant building materials, the construction of radiant heat walls, the selection of non-combustible plant species, and the establishment of setback areas and areas that would be permanently irrigated.

3.9 PROJECT CONSTRUCTION

3.9.1 Phasing and Staging

Development of the proposed Project would require excavation of the site; delivery of materials, equipment, and personnel; demolition of the 1,744-square-foot (sf) existing structure on the Project site; undergrounding of utilities; construction of the buildings; and installation of landscaping.

Demolition, grading, and building activities would involve the use of standard earthmoving equipment such as loaders, bulldozers, cranes and other related equipment. No blasting or pile driving is proposed. Construction worker vehicles would be parked on the Project site. It is anticipated that heavy equipment delivery would not occur on a daily basis, but rather periodically throughout the construction phase based on need.

In total, the proposed Project would require the demolition of approximately 2,848 tons of asphalt and 1,161 tons of concrete. The total amount of demolished material that is expected for the Project is 4,009 tons of debris. Hauling trips are based on the assumption that a truck can haul 20 tons (16 cubic yards [cy]) of material per load and assumes one haul truck that is importing material would also have a return trip. Therefore demolition is anticipated to require 401 hauling trips in order to remove 4,009 tons of debris. In addition, the proposed Project is expected require 150,000 cy of soil export. As such, the proposed Project is expected to generate 18,750 hauling trips

in order to export 150,000 cy of soil. Demolition debris export and soil export activities are not permitted during peak commute hours from 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m.

Construction trips that would be generated on a daily basis throughout each phase of construction would be derived from construction workers and delivery of construction materials. It has been assumed that construction workers would arrive up to 30 minutes prior to the workday and would leave up to 30 minutes after the workday ends. It is anticipated that the majority of construction employees would arrive between 6:00 a.m. and 7:00 a.m., and depart between 3:30 p.m. and 4:30 p.m.

The proposed Project would be implemented over an estimated period of 67 months (approximately 5.5 years). Demolition and site preparation would span approximately 3 months, and grading would span approximately 12 months. Paving and infrastructure would take approximately 4 months and 12 months, respectively, and would occur concurrently. Building construction would be implemented over an estimated period of 46 months. Project build out is anticipated to occur in 2025.

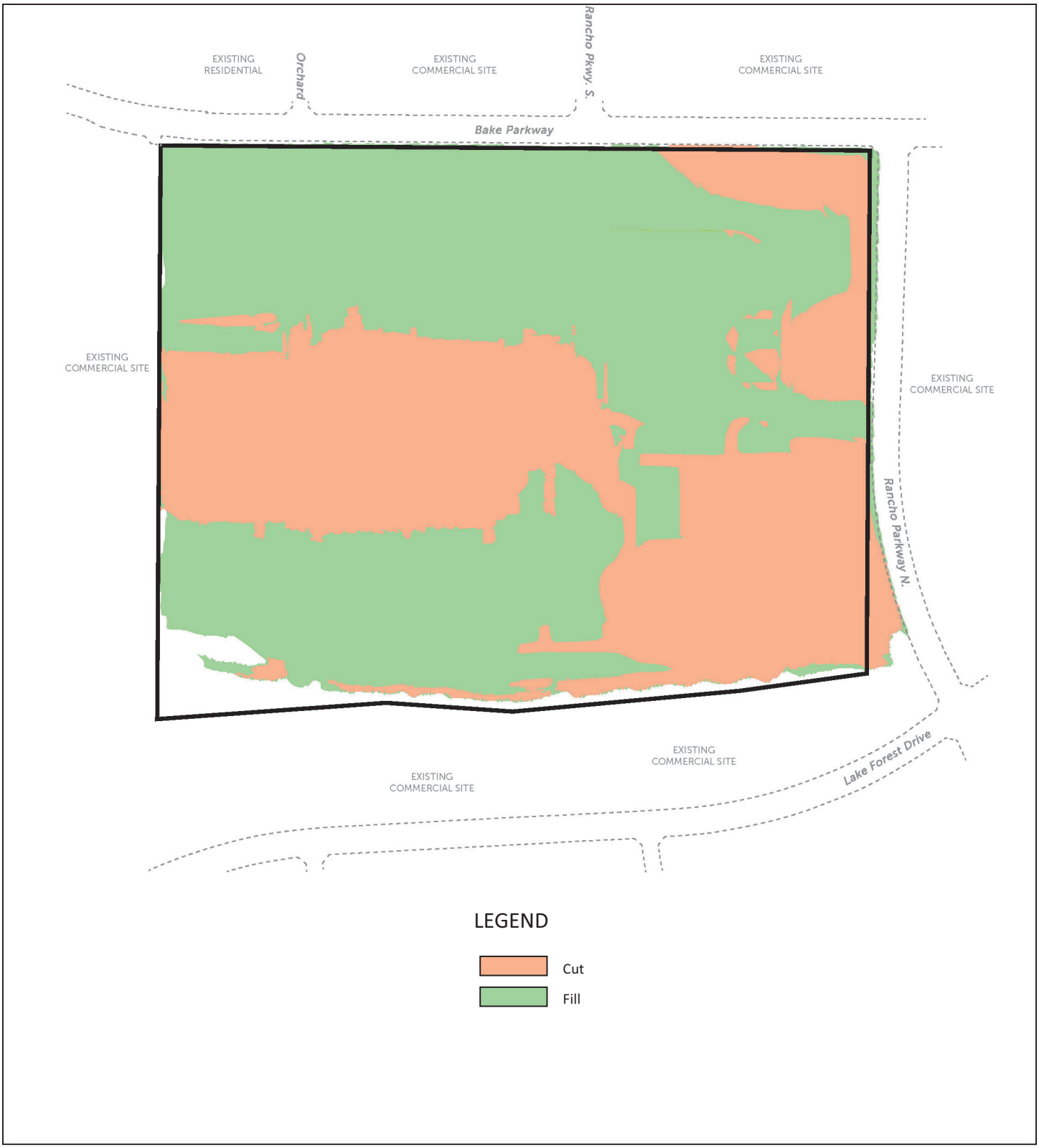
3.9.2 Grading and Earthwork

The grading operation is anticipated to involve a total amount of approximately 825,000 cy of cut-and-fill and approximately 1.8 million cy of remedial grading. In order to roughly balance soil on site, topographic highpoints on the site would be "cut" and the soil would be used to "fill" low points on the Project site. Areas of cut-and-fill are illustrated on Figure 3.15.

The Project site is located in a natural canyon area with adjoining topographic ridges. A majority of the former canyon areas are capped by a substantial volume of undocumented fill that resulted in creating a relatively flat working surface for the existing nursery. Remedial grading consists of removal of all of the undocumented fill and the upper portion of the slope wash and alluvium that is dry, porous, and relatively loose. The structural areas within the bedrock ridges would be over excavated and capped with compacted fill. The design cut slopes would be provided with stabilization fills to mitigate erosion potential of the friable sandstone. Along the Serrano Creek edge, a shear key would be constructed to reduce lateral earth movement during the design earthquake event.

The first phase of development consists of remedial grading to stabilize the site for development, grading and construction of backbone facilities. The entire site would be remedial graded to stabilize the site for development. Rough grading and infrastructure operations would be performed to support the backbone systems on Streets "A", "B", "C", and "BB". Improvements along Bake Parkway and Rancho Parkway would also be constructed within this phase.

Following the remedial grading step, the grading operation would continue with conventional grading. This grading is expected to utilize standard equipment and techniques to provide the cuts and fills necessary to implement the proposed Project. As discussed above, the Project is anticipated to require approximately 150,000 cy of export due to irregularities in the remedial shrinkage factors during grading as well as the uncertainties of the quantity of excess spoils generated from retaining walls, infrastructures, and homebuilding activities post-grading operation.



LSA

FIGURE 3.15

N

0 250 500

FEET

SOURCE: Nakase Property Area Plan (June 2019)

Nakase Nursery/Toll Brothers

Cut & Fill Map

I:\CLF1801\G\Cut_Fill.cdr (8/14/2019)

This page intentionally left blank

Development of in-tract infrastructure for neighborhoods and recreational amenities is anticipated to occur in multiple phases. Each of these phases includes construction of roadways and installation of underground utility and service infrastructure, as well as recreation amenities. The timing and sequence of the phasing may be adjusted based on market conditions.

3.10 PROJECT OBJECTIVES

The primary purpose of this project is to establish the Nakase Planned Community. The following project objectives have been established to aid decision-makers in their review of the proposed Project and its associated environmental impacts:

- Provide a comprehensive plan for development of the Nakase property that implements the goals and policies of the Lake Forest General Plan.
- Provide a site design that is sensitive to the existing natural features, including Serrano Creek.
- Provide a balanced mix of single-family and attached senior affordable homes, open space, and active public and private uses.
- Accommodate public uses by incorporating a new elementary school site that is conveniently located within easy walking distance of Project site residents.
- Provide an exceptional trail system and on-site parks that enhance the quality of life of the larger community.
- Reduce vehicular traffic and peak-hour trips through thoughtful site planning that emphasizes connectivity, access, and mobility.
- Provide for logical, attractive, and safe pedestrian and bicycle connections within the community.
- Create high-quality residential homes and distinct, identifiable neighborhoods with a range of specifically targeted single-family product types.

3.11 REQUIRED PERMITS AND APPROVALS

3.11.1 Discretionary Actions

Implementation of the proposed Project would require various approvals and permits from local, State, and federal agencies with jurisdiction over specific elements of the Project. The discretionary approvals by the City, as the Lead Agency, would include the following:

- **General Plan Amendment (GPA 05-17-5033):** The Project proposes to change the General Plan land use designation from Business Park to Low-Medium and Medium Density Residential, High-Density Residential, Public Facility, Neighborhood Parks, and Open Space.

- **Zone Change (ZC 05-17-5034):** The Project proposes to change the Project site's zoning classification from A1 – Agricultural District to Planned Community. Approval of the Planned Community Program would be required as part of the zone change.

- **Development Agreement:** A Development Agreement between the Applicant and the City would identify the terms for development of the Project site and would identify the Applicant's obligations associated with the proposed Project.

- **Vesting Tentative Tract Map:** A Vesting Tentative Tract Map would be required to subdivide the property.

- **Planned Sign Program:** Separate approval by the Planning Commission of a Planned Sign Program is required for Project identification signs.

Project approvals by the City are described in greater detail below.

3.11.1.1 General Plan Amendment and Zone Change

As previously stated, the Project Site is designated Business Park on the City's General Plan and is classified as A1 – Agricultural District on the City's Zoning Map. The current land use designation and zoning classification are inconsistent. To implement the Area Plan, the proposed Project would require approval of a GPA to change the General Plan land use designation of the property to Low-Medium and Medium Density Residential (Neighborhoods One through Five),[1] High Density Residential (senior affordable housing), Public Facility (elementary school site), Neighborhood Parks, and Open Space (habitat and restoration areas). A zone change would also be required to establish the Project Site's zoning classification as a Planned Community District. The zone change would require approval of the Area Plan, as well as the Nakase Property Supplemental Text and Development Plan.[2] The proposed land use designation and zoning classification would ensure consistency between the City of Lake Forest General Plan and Municipal Code concerning land use on the Project site. Approval of the Area Plan would be subject to approval of the GPA and Zone Change applications.

3.11.1.2 Planned Community Program

Chapter 9.112 of the City of Lake Forest Municipal Code requires that a Planned Community Program be developed for any project proposing a zone change to a Planned Community District. The Planned Community Program must address the entire Project site and would be subject to

[1] The Area Plan would allow for an alternative product type for Neighborhood Two. Under the proposed General Plan designation and Zoning district for Neighborhood Two, rowtowns may be developed at the higher end of the low-medium density range provided the maximum number of units specified in Table 2.1 of the Area Plan for Neighborhood Two is not exceeded and the maximum number of total units in the Area Plan does not exceed 675 units.

[2] The Nakase Property Supplemental Text and Development Plan would be considered equivalent to the planned community text, which is specified in Section 9.112.050 of the City of Lake Forest Municipal Code, as required under the Planned Community Program.

approval by the City's Planning Commission, as well as adoption by the City Council. The Planned Community Program should include the following components:

- Planned community text specifying permitted uses and site development standards applicable to the entire planned community area
- A statistical summary containing appropriate statistical information such as the minimum/ maximum numbers associated with certain aspects of development proposed in the planned community (i.e., maximum number of dwelling units, minimum number of acres of open space)
- A planned community zoning map displaying the proposed uses, exterior boundaries, arterial highways, and any applicable overlay or combining districts within the planned community area
- A planned community development map displaying information such as the general location of infrastructure facilities and a detailed statistical table regulating land uses in each planned community planning area

The Area Plan generally serves as the Planned Community Program for the proposed Project and is intended to guide development and land uses for the planned community within the Project site. Upon adoption, the Area Plan would become a part of the City's Zoning Code. In addition, the planned community zoning map would be considered a component of the City's Zoning Map. Therefore, the Area Plan was developed to serve as the mechanism for implementation of the GPA and zone change required for the proposed use of the Project site.

3.11.1.3 Development Agreement

A Development Agreement is a legal contract negotiated between a project applicant and a public agency that governs the land uses and terms and conditions of approval that may be allowed for a particular project. A Development Agreement can also outline public benefits that the project proponent is guaranteeing to the public agency (e.g., additional fees, land dedications, or public facility improvements). The Project's Development Agreement would include obligations associated with the development of the Project Site related to phasing of land use, timing of infrastructure and public improvements, and provisions for infrastructure financing. The proposed Project includes approval of a Development Agreement.

3.11.1.4 Vesting Tentative Tract Map

A subdivision is the division of any unit or units of land for the purpose of sale, lease, or financing, and may be initiated via a Tentative Parcel Map or Tentative Tract Map. According to Section 7.03.030 of the City of Lake Forest Municipal Code, a Tentative Tract Map is a preliminary map prepared for the purpose of creating five or more lots containing five or more units. Because the Project would include five or more lots, the City would consider approval of a Tentative Tract Map. The Applicant has expressed a desire to pursue the approval of a Vesting Tentative Tract Map for the proposed Project. A Vesting Tentative Tract Map confers a vested right to proceed with development for a specified time after recordation. The Vesting Tentative Tract Map would be prepared in accordance with the Subdivision Map Act and the City's Subdivision Ordinance. The

Vesting Tentative Tract Map would be submitted separately from and concurrently reviewed with the Area Plan.

3.11.2 Other Discretionary City Actions

The Project will require various subsequent permits and approvals to implement the Area Plan as indicated in Section 9.3 of the Area Plan. Subsequent permit approvals would be discretionary and subject to Planning Commission review and approval, and others would be administrative and subject to review and approval by City Directors, including the Director of Community Development, Community Services, and/or Public Works. Included among the types of subsequent discretionary permits requiring Planning Commission review and approval would be:

- Area Plan Amendments, including transferring allowable units from one neighborhood to another providing the land use densities within neighborhoods are not exceeded, and the total number of dwelling units permits throughout the Project are not exceeded.
- Tentative Map Amendments
- Subsequent Tentative Maps
- Site Development Permits (Site Plans) for each new single-family neighborhood, and multi-family neighborhoods such as the Senior Affordable Housing
- Alternative Development Standards
- Gateway/Community Monuments/Signage
- Master Landscape and Walls Plan
- Model Home Signage

Included among the types of subsequent administrative permits requiring Director review and approval would be:

- Model Home Signage
- Final Park Plan Designs
- Park Recreation Centers

3.11.3 Other Ministerial City Actions

Ministerial permits/approvals (e.g., well decommissioning permit, grading permits, and building permits) would be issued by the City or other appropriate agencies to allow Project site preparation, curb cuts (if necessary), and connections to the utility infrastructure, dwelling units, paving, landscaping, walls and fences, and other Project features subject to ministerial permits, including construction drawings for parks and trails

3.11.4 Probable Future Actions by Responsible Agencies

Because the Project also involves approvals, permits, or authorization from other agencies, these agencies are “Responsible Agencies” under the California Environmental Quality Act (CEQA). Section

15381 of the *State CEQA Guidelines* defines Responsible Agencies as public agencies other than the Lead Agency that will have discretionary approval power over the Project or some component of the Project, including mitigation. These agencies include, but are not limited to, the agencies identified in Table 3.D.

Table 3.D: Probable Future Actions by Responsible Agencies

Responsible Agency	Action
Orange County Fire Authority (OCFA)	Approval of Fire Master Plan, Fire Protection Plan, and Fuel Modification Plan
State Water Resources Control Board (SWRCB)	Applicant/Developer must submit Permit Registration Documents, including a Notice of Intent, to comply with the National Pollutant Discharge Elimination System (NPDES) North Orange County Permit (Order No. R8-2009-030).
Irvine Ranch Water District (IRWD)	Approval of an Addendum to the Lake Forest Sub-Area Master Plan
California Department of Fish and Wildlife (CDFW)	Approval of Section 1602 Permit, a Habitat Mitigation Monitoring Plan (HMMP), and possibly a Bat Management Plan. Determination and possible mitigation related to the aquatic resource integrity area.
Regional Water Quality Control Board (RWQCB)	Section 401 Water Quality Certification and Issuance of Waste Discharge Requirements (WDRs).
United States Army Corps of Engineers (ACOE)	Approval of Section 404 Permit and an HMMP.
Saddleback Valley Unified School District (SVUSD)	Approval of Educational Specifications, site selection, acceptance of land dedication from the Applicant/Developer, allocation of design and construction funding, all contracts for design and construction activities, and execution of any required easements.
City of Lake Forest	Review and approval of conditional use permit, design plans, and site plans
California Department of Education, School Facilities Planning Division	Approval of construction plans and allocation of construction funding.
Division of the State Architect	Approval of construction plans and grading permit.

Source: Compiled by LSA Associates, Inc. (2019).

This page intentionally left blank

4.0 EXISTING SETTING, ENVIRONMENTAL ANALYSIS, IMPACTS, AND MITIGATION MEASURES

OVERVIEW OF ENVIRONMENTAL SETTING

The Nakase property (Project site) is located in the north-central portion of Lake Forest in Orange County, California. As shown on Figure 3.1, regional access to the Project site is provided by State Route 241 (SR-241), which is located approximately 0.07 mile (mi) northeast of the Project site, and Interstate 5 (I-5), which is located approximately 3.8 mi southwest of the Project site.

Historically, the Project site has been used primarily for agricultural production. From 1938 through the late 1960s, the Nakase Nursery was developed with orchards. In the late 1960s, the northwestern portion of the Project site continued operation as an orchard while the remainder of the Project site was developed as a plant nursery. In 1988, the orchards were removed, and the entire Project site has been used as an agricultural wholesale plant nursery since the 1990s. The 122-acre (ac) Project site (Assessor's Parcel Number [APN] 612-221-01) is currently operating as the Nakase Brothers Wholesale Nurseries.

The areas surrounding the Project site consist of a mix of land uses, including commercial, office, open space, industrial, and residential. The Project site is bounded on the northwest by Bake Parkway, on the northeast by Rancho Parkway, on the southeast by Serrano Creek and Serrano Creek Trail, and on the southwest by commercial, industrial, and office uses, with Dimension Drive beyond. Although not immediately adjacent to the Project site, single-family and multifamily residential uses exist to the northwest, northeast, and south of the Project site. As noted above, SR-241 is approximately 0.07 mi northeast of the Project site. Surrounding land uses are shown on Figure 3.3.

Residential planned communities in the vicinity of the Project site include the Foothill Ranch Planned Community (PC 8) to the north, the Portola Hills Planned Community (PC 9) to the northeast, the Baker Ranch Planned Community (PC 7) to the west, and the Rancho de Los Alisos Planned Community (PC 3) to the southeast.

The Project site is currently developed with multiple structures used for nursery operations, an office trailer, and a gravel parking lot that is used for trailer storage and staff parking near the center of the Project site. Figure 3.4 provides photographs of existing conditions on the Project site.

In the existing condition, there is one vehicular access point to the Project site via a non-exclusive easement over adjacent properties to the south. The easement extends from Lake Forest Drive, directly north of Dimension Drive, to the southernmost point of the Project site. Manufactured landscape slopes, chain-link fences, and block walls enclose the Project site. In addition, several mature trees line the northeastern and southeastern boundaries of the Project site.

CHAPTER FORMAT

This chapter contains 20 sections, and each section addresses one environmental topic listed in Appendix G of the Guidelines for the California Environmental Quality Act (State CEQA Guidelines) (California Code of Regulations [CCR] Title 14, Chapter 3, Section 1500–15397).

For each environmental impact issue analyzed, the Environmental Impact Report (EIR) includes a detailed explanation of the existing conditions, thresholds of significance that will be applied to determine whether the project's impacts are significant or less than significant, analysis of the environmental impacts, and a determination of whether the project would have a significant impact if implemented. A "significant impact" or "significant effect" means "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project, including land, air, water, minerals, flora fauna, ambient noise, and object of aesthetic significance. An economic or social change by itself shall not considered to be a significant effect on the environment." (14 CCR Section 15382). Each environmental topic section in Chapter 4.0 also includes a discussion of the cumulative effects of the project when considered in combination with other projects, causing related impacts, as required by State CEQA Guidelines Section 15130.

Each of the sections is organized into nine subsections, as follows:

- **Introduction** briefly describes the topics and issues covered in the section.
- **Scoping Process** briefly summarizes any relevant comments that were received during the scoping process.
- **Existing Environmental Setting** describes the relevant physical conditions that exist at the time of the issuance of the Initial Study/Notice of Preparation (IS/NOP) that may influence or affect the issue under investigation. This section focuses on physical site characteristics that are relevant to the environmental topic being analyzed.
- **Regulatory Setting** lists and discusses the laws, ordinances, regulations, plans, and policies that relate to the specific environmental topic and how they apply to the proposed Project.
- **Methodology** describes the approach and methods employed to complete the environmental analysis for the issue under investigation.
- **Thresholds of Significance** sets forth the thresholds that are the basis of the conclusions regarding significance, which are primarily the criteria in Appendix G to the State CEQA Guidelines and the City of Lake Forest (City) Initial Study/Environmental Checklist, City of Lake Forest CEQA Significance Thresholds Guide, General Plan, or Zoning Code.
- **Project Impacts** describes the potential environmental changes to the existing physical conditions that may occur if the proposed Project is implemented. Evidence is presented to show the cause-and-effect relationship between the proposed Project and potential changes in the environment. In accordance with State CEQA Guidelines Section 15126.2(a), this EIR is required to "identify and focus on the significant environmental effects" of the proposed

Project. The magnitude, duration, extent, frequency, and range or other parameters of a potential impact are ascertained to the extent feasible to determine whether impacts may be significant. In accordance with CEQA, potential project impacts, if any, are classified as follows for each of the environmental topics discussed in this EIR.

  - **Significant and Unavoidable Impact:** If the proposed Project is approved with significant and unavoidable impacts, the decision-making body is required to adopt a statement of overriding considerations pursuant to State CEQA Guidelines Section 15093 explaining why the project benefits outweigh the unavoidable adverse environmental effects caused by those significant and unavoidable environmental impacts.

  - **Less than Significant Impact with Mitigation Incorporated:** This classification refers to potentially significant environmental impacts that can be feasibly mitigated to a level of insignificance. If the proposed Project is approved, the decision-making body is required to make findings pursuant to State CEQA Guidelines Section 15091 that significant impacts have been mitigated to the extent feasible through implementation of mitigation measures.

  - **Less than Significant Impact:** Less than significant impacts are environmental impacts that have been identified but are not potentially significant. No mitigation is required for less than significant impacts.

  - **No Impact:** A "no impact" determination is made when the proposed Project is found to have no environmental impact.

- **Level of Significance Prior to Mitigation** summarizes the potentially significant impacts of the project, if any, prior to mitigation.

- **Mitigation Measures** are project-specific measures that avoid, minimize, rectify, reduce, eliminate, or compensate for a potentially significant impact.

  - **Regulatory Compliance Measures** may also be identified in this section. Regulatory Compliance Measures describe any relevant and applicable laws or regulations that must be adhered to with respect to the construction or operation of the proposed project and would reduce or lessen potential impacts related to a particular issue area.

- **Level of Significance after Mitigation** describes the significance of potential impacts after implementation of mitigation measures. Potential significant unavoidable impacts are clearly stated in this section.

- **Cumulative Impacts** refers to potential environmental changes to the existing physical conditions that may occur as a result of project implementation together with all other reasonably foreseeable, planned, and approved future projects in the vicinity of the project site that produce related impacts. State CEQA Guidelines Section 15355 defines cumulative impacts as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." Cumulative impacts may result from

individually minor but collectively significant projects taking place over a period of time. Projects that have progressed to the stage where CEQA review has been initiated are normally treated as foreseeable probable future projects. For each of the environmental topics considered in this EIR, the geographic scope of the cumulative analysis is defined.

THRESHOLDS OF SIGNIFICANCE

The threshold questions used in this EIR are consistent with Appendix G of the *State CEQA Guidelines,* the City's *CEQA Significance Thresholds Guide* (March 2009), and the City's *Local CEQA Guidelines* (June 2019). In January 2018, the State Office of Planning and Research (OPR) submitted a proposal for comprehensive updates to the *State CEQA Guidelines* to the California Natural Resources Agency. Because those updates had not yet been approved when the Initial Study for the proposed Project was prepared and circulated in July 2018, the Initial Study relied on the threshold questions included in the City's *CEQA Significance Thresholds Guide* (March 2009) and the City's *Local CEQA Guidelines* that were in effect at that time.

On December 28, 2018, during preparation of this Draft EIR, the updated *State CEQA Guidelines* went into effect. On June 4, 2019, the Lake Forest City Council amended its *Local CEQA Guidelines* to be consistent with the updated *State CEQA Guidelines*. The updated *Local CEQA Guidelines* include revised thresholds related to several environmental topics. This EIR has been prepared in compliance with the updated *State CEQA Guidelines* and the current version of the City's *Local CEQA Guidelines*; therefore, the thresholds presented herein differ from the original thresholds utilized in the Initial Study prepared for the proposed Project.

RELATED PROJECTS

In accordance with State CEQA Guidelines Section 15130, cumulative impacts are anticipated impacts of the proposed project along with reasonably foreseeable growth. Reasonably foreseeable growth may be based on either:

- A list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the agency; or

- A summary of projections contained in the adopted General Plan or related planning document, or in a prior environmental document that has been adopted or certified, and that described or evaluated regional or areawide conditions contributing to the cumulative impact.

For the purposes of the EIR, a list of past, present, and probable future projects is used in the evaluation of potential cumulative impacts. All proposed, recently approved, under construction, and reasonably foreseeable projects that could produce a related or cumulative impact on the local environment when considered in conjunction with the proposed project are evaluated in an EIR. As stated above, an analysis of the cumulative impacts associated with these related projects and the proposed Project is provided in the cumulative impacts discussion under each individual impact category in Chapter 4.0.

In coordination with the City of Lake Forest and City of Irvine, a list of past, present, and probable future projects was developed. As shown in Table 4.A, the projects include various land uses, such as residential, commercial, office, and mixed-use. The locations of the related projects are shown on Figure 4.0.1. Although some projects on the list have been completed since issuance of the Notice of Preparation (NOP), they remain on the list because they are part of the cumulative analysis for the EIR.

It is noted that some of the related projects may not be completed by 2025 (the proposed Project's anticipated buildout year), may never be built, or may be approved and built at reduced densities. However, to provide a conservative forecast, the future baseline forecast assumes that all of the related projects will be fully built out by 2025.

The discussion of cumulative impacts "should be guided by the standards of practicality and reasonableness" (*Environmental Protection Info. Center v. Department of Forestry & Fire Protection* (2008) 44 Cal.4th 459, 524). A proposal that has not crystallized to the point that it would be reasonable and practical to evaluate its cumulative impacts need not be treated as a probable future project (*City of Maywood v. Los Angeles Unified School District* (2012) 208 Cal.App.4th 362, 397). Rather, a potential future project qualifies for inclusion in an analysis of cumulative impacts only to the extent the future project is "both probable and sufficiently certain to allow for meaningful cumulative impact analysis" (*Id*. at 398; see *City of Long Beach v. Los Angeles Unified School Dist*. (2009) 176 Cal.App.4th 889, 902 [when "review[ing] the agency's decision to include information in the cumulative impacts analysis[,] ... [w]e determine whether inclusion was reasonable and practical"]).

The Project Applicant/Developer started discussions with the City staff regarding the Nakase Project in 2017. Toll submitted the Nakase Project application and Area Plan before the City initiated the General Plan update process in January 2018, well before the City had developed scenarios to evaluate for purposes of the General Plan update process. Although the City is in the process of updating its General Plan, the City Council has directed staff to study numerous scenarios that vary widely, and the City Council has not selected a specific scenario. That is, the ultimate proposal for the General Plan update has not yet crystallized to the point where it would be reasonable and practical to evaluate its cumulative impacts. Thus, the potential, future General Plan update is not sufficiently certain or probable to be reasonably and practically analyzed as a probable future project. Further, a General Plan update is a broad planning document and not a discrete project that easily lends itself to a "list of projects" methodology for a cumulative impacts analysis —as is done in this EIR (as compared to a "summary-of-projects" methodology). Additionally, because new projects are continually being fed into the environmental review process, the City reasonable set a cutoff date for probable future projects at the time the Nakase Project application was submitted, well before the GPU was sufficiently certain (see *Gray v. County of Madera* (2008) 167 Cal.App.4th 1099, 1127 [lead agency has discretion to set the date of the project's application as the reasonable cutoff date for determining what other projects are pending and should be included in the cumulative impacts analysis]; and *San Franciscans for Reasonable Growth v. City & County of San Francisco* (1984) 151 Cal.App.3d 61, 74 n.14) [lead agencies may set a reasonable cutoff date for the new projects that will be included in the analysis]). Thus, the potential future General Plan update is not included in this EIR as a probable future project.

Table 4.A: Summary of Related Projects

Project No.	Project Name	Location	Status	Project Description
City of Lake Forest				
1	SDP 07-18-5191	Serrano Summit Drive, South of Commercentre Drive	Submitted July 10, 2018. Under review.	Private Recreation Center for future Serrano Summit development, including clubhouse, shade structures, swimming pool/spa, pool cabana, event lawn and parking lot
2		NW Corner of Katella, 26672 Portola Parkway	Submitted September 13, 2018. Under Review.	Remodel of existing 44,736 sf commercial space, including façade, roof and interior modifications, along with minor site modifications
3	SDP 08-18-5212	Portola Center Northeast, Lots 1-93, Tract 17300, Amendment #2	Approved September 13, 2018. Appeal period to end on September 28, 2018.	A request to approve floor plans and architecture for 93 homes on previously approved lots
4	SDP 08-18-5199	22377 El Toro Road	Approved August 30, 2018. Appeal period to end on September 14, 2018.	To convert the interior of a previous 4,000 sf building (Chase Bank) into an animal hospital for Serrano Animal and Bird Hospital.
5	SDP 06-18-5176	1 Saddleback Parkway	Submitted June 12, 2018. Under review.	Construction of a new 92,391 sf worship center, repurposing of existing worship center including addition of a 26,924 sf second story for classroom use, and site improvements including 57 new parking spaces at Saddleback Church.
6	SDP 06-18-5172	South of Commercentre Drive, between Civic Center Drive and Serrano Summit Drive	Submitted June 5, 2018. Under review.	101 single-family homes in conjunction with Tentative Tract Map 18162 (Amara at Serrano Summit) in the previously approved Serrano Summit residential development.
7	SDP 06-18-5173	South of Commercentre Drive, between Civic Center Drive and Serrano Summit Drive	Submitted June 5, 2018. Under review.	108 townhome condominium homes in duplex configuration, in conjunction with Tentative Tract Map 18162 (Soria at Serrano Summit) in the previously approved Serrano Summit residential development.
8	SDP 04-18-5156	Tract 15594 – North of Trabuco Road, east of Bake Parkway, at the northern end of Peachwood	Planning Commission recommended approval of the project to the City Council at the September 13, 2018 Planning Commission meeting. City Council review tentatively scheduled for October 16, 2018.	An amendment to Site Development Permit 2008-11, for 85 single-family detached homes in Tract 15594, the Teresina Development (previously Pinnacle at Serrano Highlands).
9	SDP 02-18- 5120/ UP 08- 18-5203/ PSP 02-18-5123/ PSP 08-18-5123	22441 El Toro Road	Submitted on February 8, 2018. Under review.	Construction of a new 1,710 sf drive-through restaurant (Coffee Bean & Tea Leaf) in an existing shopping center. The project also includes a request to open at 4:00 a.m., a planned sign program for the drive-through signage and amendment to the Planned Sign Program 2010-02 to modify the wall sign regulations and allow an additional monument sign.
10	TTM 18162	South of Commercentre Drive, between Biscayne Bay Drive and Indian Ocean Drive	Submitted May 4, 2018. Under Review.	A request to further subdivide a previously approved residential development (Tentative Tract Map 17331) into a 114 lot subdivision for 521 attached condominium and detached single-family homes on 42.7 acres (Serrano Summit).

Table 4.A: Summary of Related Projects

Project No.	Project Name	Location	Status	Project Description
11	GPA 03-18- 5133/ ZC 03-18-5134/ TPM 03-18-5135/ SDP 03-18-5137	23061 and 23071 El Toro Road	Submitted on March 7, 2018. Under Review.	A General Plan Amendment to change the General Plan designation from Transportation Corridor to Public Facility; a zone change to change the zoning of the property from General Agriculture (A-1) to Community Commercial; a Tentative Parcel Map to subdivide the parcel into two separate parcels; a Site Development Permit for the construction of two 3,312 sf, single-story buildings, which will be used for religious purposes. The project includes grading, landscaping, and a parking lot with 140 parking stalls.

NW = northwest
sf = square feet

This page intentionally left blank

LSA

LEGEND

Project Location

Related Projects

FIGURE 4.0.1

N

0 1250 2500

FEET

SOURCE: Google Maps (2018)

I:\CLF1801\GIS\RelatedProjects.mxd (7/8/2019)

Nakase Nursery/Toll Brothers

Related Projects

This page intentionally left blank

4.1 AESTHETICS

This section evaluates the existing visual and aesthetic resources on the Project site and in the surrounding area, and evaluates the potential for changes in aesthetic character that could result from implementation of the proposed Nakase Nursery/Toll Brothers Project (Project). This section also evaluates the potential loss of existing visual resources, effects on public views, visual compatibility with existing uses, and light and glare impacts.

Information presented in this section is based on photographs of the Project site taken during field surveys and site visits; the *Nakase Property Area Plan Visual Analysis* (Visual Analysis) (Kimley Horn 2019), which is provided in Appendix M of this Environmental Impact Report (EIR) and includes renderings of future development plans; and the City of Lake Forest (City) General Plan Land Use Element (1994b, revised 2016).

4.1.1 Scoping Process

The City received 28 comment letters during the public review period of the Initial Study/Notice of Preparation (IS/NOP). For copies of the IS/NOP comment letters, refer to Appendix A of this EIR. One comment letter included comments related to Aesthetics.

The letter from Southern California Edison (SCE) (August 14, 2018) suggested that the EIR include an analysis of the aesthetics impacts associated with Project-related utility work.

4.1.2 Existing Environmental Setting

The 122-acre (ac) Project site is currently operating as an agricultural wholesale plant nursery. The Project site is developed with multiple structures used for nursery operations, an office trailer, and a gravel parking lot near the center of the Project site that is used for trailer storage and staff parking (refer to Figure 3.4 in Chapter 3.0, Project Description, for photographs of existing conditions on the Project site).

The areas surrounding the Project site consist of a mix of land uses, including commercial, office, open space, industrial, and residential uses. The Project site is bounded on the northwest by Bake Parkway, on the northeast by Rancho Parkway, on the southeast by the Serrano Creek Trail, and on the southwest by commercial, industrial, and office uses, with Dimension Drive beyond. Although not immediately adjacent to the Project site, single-family and multifamily residential uses exist to the northwest, northeast, and south of the Project site. State Route 241 (SR-241) is approximately 405 feet (ft) north of the Project site.

Residential planned communities in the vicinity of the Project Site include the Foothill Ranch Planned Community (PC 8) to the north, the Portola Hills Planned Community (PC 9) to the northeast, the Baker Ranch Planned Community (PC 7) to the west, and the Rancho de Los Alisos Planned Community (PC 3) to the southeast.

According to the United States Census Bureau, the City of Lake Forest is located within the Mission Viejo-Lake Forest-San Clemente, CA Urbanized Area,[1] which also includes the Cities of Aliso Viejo, Dana Point, Laguna Beach, Laguna Hills, Laguna Niguel, Laguna Woods, Mission Viejo, Rancho Santa Margarita, San Clemente, and San Juan Capistrano, and the unincorporated communities of Coto de Caza, Ladera Ranch, and Las Flores. As described in *State CEQA Guidelines* Section 15387 and defined by the United States Census Bureau, an "urbanized area" is a central city or a group of contiguous cities with a population of 50,000 or more people, together with adjacent densely populated areas having a population density of at least 1,000 people per square mile.[2] Because the City is located in an urbanized area, the Project site is also located within an urbanized area.

The Project site is designated Business Park on the City's General Plan and is classified as General Agriculture (A-1) on the City's Zoning Map. According to Section 9.72.010 of the City's Zoning Code, the A-1 district may be used as an interim zone in those areas that the General Plan may designate for more intensive urban uses in the future.

4.1.3 Regulatory Setting

4.1.3.1 Federal Regulations

No federal policies or regulations pertaining to aesthetics are applicable to the proposed Project.

4.1.3.2 State Regulations

Caltrans Scenic Highway Program. The California Department of Transportation (Caltrans) Scenic Highway Program protects the natural scenic beauty of the State's highways and corridors through its designated Scenic Highways throughout the State. Caltrans defines a Scenic Highway as any freeway, highway, road, or other public right-of-way that traverses an area of exceptional scenic quality. Other considerations given to a Scenic Highway designation include how much of the natural landscape a traveler may see and the extent to which visual intrusions degrade the scenic corridor.

As described further below (Threshold 4.1.1), no officially designated Scenic Highways are located in the vicinity of the Project site.

4.1.3.3 Regional Regulations

No regional policies or regulations pertaining to aesthetics are applicable to the proposed Project.

4.1.3.4 Local Regulations

City of Lake Forest General Plan Land Use Element. The City of Lake Forest General Plan is intended to guide future growth and development within the City and is comprised of several elements. The

[1] United States Census Bureau. Mission Viejo-Lake Forest-San Clemente, CA Urbanized Area No. 57709. Website: https://www2.census.gov/geo/maps/dc10map/UAUC_RefMap/ua/ua57709_mission_viejo--lake_forest--san_clemente_ca/DC10UA57709.pdf (accessed March 14, 2019).

[2] United States Census Bureau. 2010 Census Urban Area FAQs. Website: https://www.census.gov/geo/reference/ua/uafaq.html (accessed March 14, 2019).

Land Use Element addresses land use planning in the City and provides a framework for the issues examined in the other General Plan elements. Goals and policies related to aesthetics are intended to enhance the City's image and identity and create a sense of community.

The following goals and policies applicable to the proposed Project and related to aesthetics and scenic quality are presented in the Land Use Element:

Goal 2.0: A distinct image and identity for Lake Forest.

Policy 2.1: Enhance the physical attributes of Lake Forest to create an identifiable and distinct community within Orange County.

Policy 2.2: Promote high quality in the design of all public and private development projects.

Goal 3.0: New development that is compatible with the community.

Policy 3.1: Ensure that new development fits within the existing setting and is compatible with the physical characteristics of available land, surrounding land uses, and public infrastructure availability.

Policy 3.2: Preserve and enhance the quality of Lake Forest residential neighborhoods by avoiding or abating the intrusion of disruptive, non-conforming buildings and uses.

Policy 3.4: Blend residential and nonresidential development with landscaping and architectural design techniques to achieve visual compatibility.

Lake Forest Municipal Code. The Lake Forest Municipal Code includes regulations related to zoning and lighting that are applicable to the proposed Project and related to aesthetics and scenic quality.

Zoning. Title 9, Planning and Zoning, of the Lake Forest Municipal Code includes provisions and regulations for planned development projects within the City. Chapter 9.112 requires that a Planned Community Program be developed for any project proposing a zone change to a Planned Community District. The proposed Nakase Property Area Plan (Woodley Architectural Group 2019) generally serves as the Planned Community Program for the Project and is intended to guide development and land uses for the planned community within the Project site. Upon adoption, the Area Plan would become a part of the City's Zoning Code and an additional planned community—the Nakase Planned Community. In addition, the Proposed Zoning Map for the Project site included in the Area Plan would be considered a component of the City's Zoning Map.

Lighting. The Lake Forest Municipal Code requires that street lighting along local streets be provided at illumination levels specified in plans that have been approved by the City Engineer.

Additionally, the Lake Forest Municipal Code requires that all lights shall be designed and located so that direct light rays are confined to the site. Such regulations prevent direct views of light sources and reduce the potential for glare during the day.

Citywide Design Guidelines. The *Citywide Design Guidelines* are intended to supplement the goals and policies set forth in the City's General Plan Land Use Element and the development standards in the City's Municipal Code. The design guidelines are intended to guide proposed development so that it is aesthetically pleasing, high quality, and reflective of the character of the surrounding community. The *Citywide Design Guidelines* are general in nature and provide examples of the expected level of design of development within the City. For example, the design guidelines provide direction on issues not typically covered by the development standards (e.g., building orientation, architectural styles, and building materials). Individual design guidelines should be viewed as qualitative rather than mandatory development standards, provided the project design meets or exceeds the intent of the guidelines.

The *Citywide Design Guidelines* do not apply to areas within the City that are subject to their respective design guidelines. Therefore, the *Citywide Design Guidelines* do not apply to the proposed Project because the Area Plan includes design guidelines that would be approved as part of the Project.

Nakase Area Plan Design Guidelines. The Area Plan includes design guidelines related to architectural and landscape design that would be approved as part of Project implementation. The Area Plan design guidelines are summarized below.

Architectural Design Guidelines. Chapter 7.4 of the Area Plan includes the following architectural design guidelines related to site planning, building form and massing, and building appearance:

- **Site Planning (All Neighborhoods):**
    - If the mechanical equipment is visible from public view, screen the equipment with the use of walls, fences, or landscaping compatible with the building architecture.
    - Encourage variation in architectural styles, front and side yard elevations, setbacks, building massing and variety and reversal of floor plans, where feasible, along residential streets.
    - Maximize view potential using building orientation and maintain privacy for residential buildings adjacent to natural open space and recreation areas with the use of landscaping and fencing.
- **Neighborhood Site Planning:**
    - ***Streetscape Variety:*** Encourage variety in architectural styles, front and active side elevations, setbacks, massing, and roof forms to create a pleasing streetscape and community experience.

- ***Corner Lots:*** Special consideration shall be given to highly visible lots through architectural enhancements (cantilevered elements, plane breaks, or special elevation treatments), and enhanced landscaping.

- ***Floor Plan & Style Plotting:*** Each single-family neighborhood shall provide a minimum of three (3) floor plans (not including reversed plans), and three (3) distinctly different elevations for each floor plan. Elevation designs shall be congruent with the styles as depicted herein. The same floor plan and elevation and color scheme shall not be permitted to occur directly across or on either side of a given home.

- ***Color Criteria:*** A minimum of three (3) different color schemes for each elevation style shall be provided for each neighborhood. Schemes containing similar body colors shall not be allowed on homes directly across from one another or on either side of a given home.

- ***Single-Family Waste Management:*** Space shall be provided within a garage or side yards for three (3) recycling/waste containers. Space shall be identified on plans.

- **Building Form and Massing:**

  - Organize the overall massing of each building unit to avoid the building appearing as a mixture of unrelated forms.

  - Set back certain parts of the second-story front elevation plate lines from first-story elevations to help break up monolithic building masses.

  - Residential areas oriented toward pedestrian activity should be designed at a "human scale".

  - To promote building articulation when a third-story option is offered, third floors in Neighborhoods 1 through 4 shall only cover a percentage of the floor below per Table 7.1. Additionally, at least two of the third-floor façades must also exhibit increased setbacks from the property line (also per Table 7.1).

- **Building Appearance:**

  - Roof forms, windows, entries and doors shall aesthetically complement each other and reflect the architectural style of the building.

  - Second-floor and third-floors decks and balconies are encouraged to provide outdoor living spaces and to open up to views.

  - Design gutters and downspouts as continuous architectural features that fit with the building's architectural style and match the surface or accent color of the building.

- Design all appurtenant structures (e.g., covered entries, balconies, patio covers, and similar) to be consistent with the primary structure.

Community Walls and Fence Design Guidelines. Chapter 7.6 of the Area Plan includes the following design guidelines related to community walls and fences:

- Walls are to be of a material, matching color, and surfacing consistent with any adjoining wall material.
- Landscaping (e.g., trees, shrubs or evergreen vines) should be used to soften the appearance of the walls according to the landscape plan.
- Combined solid fencing or walls, walks, and open fencing may be used to create interest. Masonry walls are required only where necessary for noise attenuation or soil retention.
- Walls used as rear or side yard walls should be constructed up to 6 ft in height, but may be higher if required for privacy or sloped condition with a Site Development Permit approval.
- Solid walls should be used to mitigate adverse noise impacts on residential units.
- A variance in wall maximum height up to 20 percent can be approved by the Planning Director.

Elementary School Design Guidelines. Chapter 7.8 of the Area Plan includes the following design guidelines related to the proposed elementary school:

- Curbs or raised planters shall be provided in all parking lot areas adjacent to sidewalks, streets or buildings so that car bumpers do not overhang the pedestrian travel way or strike the building.
- Service structures for commercial docking shall be located to the rear of buildings whenever possible.
- When parking is located adjacent to a public street, landscape buffering shall be used to screen views of parked cars.
- Plants used as screening shall be a compact, evergreen type with a minimum screening height of 36 inches (36”) and a minimum width of 2 ft (2’) at maturity.
- School sport fields will not be lit.

Senior Affordable Housing Design Guidelines. Chapter 7.9 of the Area Plan includes the following design guidelines related to the proposed senior affordable housing:

- Curbs or raised planters shall be provided in all parking lot areas adjacent to sidewalks, streets or buildings so that car bumpers do not overhang the pedestrian travel way or strike the building.

- Service structures for commercial docking shall be located to the rear of buildings whenever possible.

- When parking is located adjacent to a public street, landscape buffering shall be used to screen views of parked cars.

- Plants used as screening shall be a compact, evergreen type with a minimum screening height of 36 inches (36") and a minimum width of 2 ft (2') at maturity.

Landscape Design Guidelines. Chapter 8 of the Area Plan includes design guidelines related to landscaping. The guidelines include illustrative landscape sections, conceptual landscape areas, and plant palettes demonstrating spacing, the general location, and suggested types of plant materials to be implemented on the Project site. The plant palettes include a variety of trees, shrubs, ground cover, and vines.

4.1.4 Methodology

4.1.4.1 Key Concepts and Terminology

The concepts and terminology used in this analysis are described below.

- **Scenic Resources:** Scenic resources are defined as natural or man-made elements that contribute to an area's scenic value and are visually pleasing. Scenic resources include landforms, vegetation, water, or adjacent scenery and may include a cultural modification to the natural environment. The degree to which these resources are present in a community is clearly subject to personal and cultural interpretation. However, it is possible to qualify certain resources as having aesthetic characteristics and establish general guidelines for assessing the aesthetic impacts of new development.

- **Scenic Vista:** A scenic vista is a viewpoint that provides expansive views of a highly valued landscape for the public's benefit. It is usually viewed from some distance away. Aesthetic components of a scenic vista include (1) scenic quality, (2) sensitivity level, and (3) view access. A scenic vista can be impacted in two ways; a development project can have visual impacts by either directly diminishing the scenic quality of the vista or by blocking the view corridors or "vista" of the scenic resource. Important factors in determining whether a proposed project would block scenic vistas include the project's proposed height, mass, and location relative to surrounding land uses and travel corridors.

- **Sensitive View:** Sensitive views are generally those associated with designated vantage points and public recreational uses, but the term can be more broadly applied to encompass any valued public vantage point. Sensitivity level has to do with the (1) intensity of use of a visual resource; (2) visibility of a visual resource; and (3) importance of the visual resource to users.

- **Scenic Corridors:** Scenic corridors are channels that facilitate movement (primarily by automobile, transit, bicycle, or foot) from one location to another with expansive views of natural landscapes and/or visually attractive man-made development. Scenic corridors analyzed under the California Environmental Quality Act (CEQA) typically include State-designated Scenic Highways and locally designated scenic routes.

- **Scenic Quality:** The scenic quality of a streetscape, building, group of buildings, or other man-made or natural feature creates an overall impression of an area within an urban context. For example, a scenic vista along the boundary of a community, a pleasing streetscape with trees, and well-kept residences and yards are scenic resources that create a pleasing impression of an area. In general, concepts of scenic quality can be organized around four basic elements: (1) site utilization, (2) buildings and structures, (3) landscaping, and (4) signage. Adverse scenic quality effects can include the loss of aesthetic features or the introduction of contrasting features that could contribute to a decline in overall scenic quality.

- **Glare:** Glare is identified as a continuous or periodic intense light that may cause eye discomfort or be temporarily blinding to humans.

- **Light Source:** A device that produces illumination, including incandescent bulbs, fluorescent and neon tubes, halogen and other vapor lamps, and reflecting surfaces or refractors incorporated into a lighting fixture are considered to be light sources. Any translucent enclosure of a light source is considered to be part of the light source.

The impact analysis focuses on aesthetic-related changes to the Project site and surrounding area that may result from the approval of the proposed Project. This would include changes in vistas and viewsheds where visual changes would be evident, potential conflicts with applicable zoning and other regulations governing scenic quality, changes to scenic resources along designated scenic roads, and the introduction of new sources of light and glare.

The viewshed impact analysis evaluates project impacts from three viewing distance zones, as explained below.

- **Foreground Views:** These views include elements that are seen at a close distance and that dominate the entire view. These vantage points are generally 500 ft or less from the Project site, surrounding topography, and other prominent physical features in the project vicinity.

- **Middle-Ground Views:** These views include elements that are seen at a moderate distance and that partially dominate the view. These vantage points are generally located between 500 ft and 1 mile (mi) from the Project site.

- **Background Views:** These views include elements that are seen at a long distance and typically comprise horizon-line views that are part of the overall visual composition of the area. These vantage points are generally farther than 1 mi from the Project site.

Light and Glare. The analysis of light and glare identifies the location of light-sensitive land uses and describes the existing ambient conditions on and in the vicinity of the Project site. The analysis describes the proposed Project's light and glare sources and the extent to which Project lighting, including any potential illuminated signage, would spill off the Project site onto adjacent light-sensitive areas. The analysis also describes the affected street frontages, the direction in which the light would be focused, and the extent to which the proposed Project would illuminate sensitive land uses. The analysis also considers the potential for sunlight to reflect off of windows and building surfaces (glare) and the extent to which such glare would interfere with the operation of motor vehicles, aviation, or other activities. Glare can also be produced during evening and night-time hours by artificial light sources, such as illuminated signage and vehicle headlights. Glare-sensitive uses generally include residences and transportation corridors (i.e., roadways).

Shade/Shadow. Prolonged periods of shade and shadowing have the potential to negatively affect the character of certain land uses. Shadow-sensitive uses include routinely used outdoor spaces associated with residential, recreational, or institutional land uses; commercial uses (e.g., pedestrian-oriented outdoor spaces or restaurants with outdoor seating areas); nurseries; and existing solar collectors/panels.

4.1.4.2 Approach

As stated above, the assessment of aesthetic impacts is subjective by nature. This analysis identifies and objectively examines factors that contribute to the perception of aesthetic impacts due to Project implementation. The Project's potential aesthetic impacts have been assessed based on consideration of several factors, including scale, mass, proportion, and the concepts described above. Key views from public vantage points are used in the analysis to demonstrate pre- and post-project visual conditions at the Project site and surrounding area. Key views were taken from public roadways and not from private property. Overall, the analysis in this section evaluates aesthetic changes that would occur as a result of Project implementation.

Figure 4.1.1 illustrates the vantage point from which each key view photograph was taken and illustrates the representative view from that location. Figures 4.1.2(a) through 4.1.2(d) respectively illustrate each of the four key views selected for this analysis. The Project Renderings are conceptual representations of scale, mass, and proportion of future development allowable under the proposed Project.

Additionally, visual impacts have been evaluated based on the Project's consistency with goals and policies established in the Land Use Element (1994b, revised 2016) of the City's General Plan and development standards related to aesthetics in the City's Municipal Code.

This page intentionally left blank

LSA

FIGURE 4.1.1

LEGEND

1 - Key View Location

N

Nakase Nursery/Toll Brothers

Key View Locations

SOURCE: Kimley Horn

I:\CLF1801\G\Key View Map.cdr (6/26/2019)

This page intentionally left blank

Existing Condition - View from State Route 241 looking south.

Project Rendering - View from State Route 241 looking south.

LSA

FIGURE 4.1.2(a)

Nakase Nursery/Toll Brothers

Key View 1

SOURCE: Kimley Horn

I:\CLF1801\G\Key View 1.cdr (6/26/2019)

This page intentionally left blank

Existing Condition - View from intersection of Rancho Parkway South and Bake Parkway looking south.

Project Rendering - View from intersection of Rancho Parkway South and Bake Parkway looking south.

LSA

FIGURE 4.1.2(b)

Nakase Nursery/Toll Brothers

Key View 2

SOURCE: Kimley Horn

I:\CLF1801\G\Key View 2.cdr (6/26/2019)

This page intentionally left blank

Existing Condition - View from Bake Parkway looking northeast.

Project Rendering - View from Bake Parkway looking northeast.

LSA

FIGURE 4.1.2(c)

Nakase Nursery/Toll Brothers

Key View 3

SOURCE: Kimley Horn

I:\CLF1801\G\Key View 3.cdr (6/26/2019)

This page intentionally left blank

Existing Condition - View from Serrano Creek Trail looking northwest.

Project Rendering - View from Serrano Creek Trail looking northwest.

LSA

FIGURE 4.1.2(d)

Nakase Nursery/Toll Brothers

Key View 4

SOURCE: Kimley Horn

I:\CLF1801\G\Key View 4.cdr (6/26/2019)

This page intentionally left blank

4.1.5 Thresholds of Significance

The thresholds for aesthetics impacts used in this analysis are consistent with Appendix G of the *State CEQA Guidelines* and the City's *Local Guidelines for Implementing the California Environmental Quality Act (Local CEQA Guidelines)* (April 2017; updated June 2019). In January 2018, the State Office of Planning and Research (OPR) submitted a proposal for comprehensive updates to the *State CEQA Guidelines* to the California Natural Resources Agency. On December 28, 2018, during preparation of this EIR, the updated *State CEQA Guidelines* went into effect. On June 4, 2019, the Lake Forest City Council amended its *Local CEQA Guidelines* to be consistent with the updated *State CEQA Guidelines*. Among other revisions, the updated *Local CEQA Guidelines* includes revised thresholds related to aesthetics. This EIR has been prepared in compliance with the updated *State CEQA Guidelines* and the current version of the City's *Local CEQA Guideline*; therefore, the thresholds presented herein differ from the original thresholds utilized in the Initial Study prepared for the proposed Project (which is provided in Appendix A).

The proposed Project may be deemed to have a significant impact with respect to aesthetics if it would:

Threshold 4.1.1: Have a substantial adverse effect on a scenic vista.

Threshold 4.1.2: Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway.

Threshold 4.1.3: In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, conflict with applicable zoning and other regulations governing scenic quality.

Threshold 4.1.4: Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.

4.1.6 Project Impacts

Threshold 4.1.1: Would the project have a substantial adverse effect on a scenic vista?

Less than Significant Impact. The Project site is located in a fully developed area (with the exception of the Project site) in the northern portion of Lake Forest in Orange County, California. The Project site is located approximately 10 mi northeast of the Pacific Ocean, although the ocean cannot be seen from the Project site due to the San Joaquin Hills to the southwest of the city. The Santa Ana Mountains, which are the highest and most prominent mountains in Orange County, are visible from the Project site and surrounding area. The Serrano Creek Trail is adjacent to the Project site along the southeastern boundary and is considered an Open Space/Recreation Resource according to the City's Recreation and Resources Element. In addition, Nature Park is located adjacent to the southwest boundary of the Project site. According to the City's Recreation and Resources Element, Nature Park is a 4.5 ac park with walking trails, picnic tables, and a gazebo picnic area. The

Recreation and Resources Element notes that natural resources and open space contribute to the visual quality of the City. Upon Project implementation, views from Serrano Creek Trail, Nature Park, and the Santa Ana Mountains may be obstructed from some vantage points. As a result, the proposed Project has the potential to damage scenic resources, including views from public parks. Therefore, a key view analysis is provided below.

Key View Analysis. Figures 4.1.2(a) through 4.1.2(d), Key Views 1 through 4, respectively, illustrate each of the four key views selected for this analysis. The City identified the Key Views as the most representative views at which the Project site is visible from public locations. To determine impacts related to aesthetics, the Existing Conditions views are compared to Project Renderings. The Project Renderings are illustrative of typical development that is projected to occur upon Project implementation and are representative of the scale, mass, and proportion of future Project development. The following discussion describes the four key views in their existing and post-Project condition in order to analyze impacts associated with Project implementation.

Key View 1. As shown on Figure 4.1.2(a), Key View 1 depicts the view of the Project site from the southbound lanes of SR-241, just west of Bake Parkway, looking south. Key View 1 represents the view of the northern portion of the Project site as seen by motorists traveling southbound on SR-241 as it passes over Bake Parkway.

Existing Conditions. In the foreground and middle ground is Bake Parkway, which traverses north to south, as well as the signalized intersection of Bake Parkway and Rancho Parkway. Bake Parkway is a four-lane roadway with two lanes in each direction and includes a raised median. In the foreground of the Existing Conditions view, from left to right, is the corner of the Lake Forest Corridor Center, a commercial shopping center, on Rancho Parkway; the intersection of Bake Parkway and Rancho Parkway; and the landscaped slope of the Rancho Business Center, which is accessed from Rancho Parkway South. Additionally, overhead utility lines are located along the northbound lanes of Bake Parkway. The Project site, including shade structures and other equipment associated with nursery operations, is located in the middle ground. The background includes limited views of commercial uses an undeveloped hillside east of Lake Forest Drive and business parks on Dimension Drive.

Project Renderings. The elementary school site, proposed for the northwest corner of the Project site, would be visible to motorists on Rancho Parkway, Bake Parkway, and southbound SR-241. The proposed three-story residential development (with an option for a fourth story) (specifically in Neighborhood 2) would be visible behind the elementary school site. The Project Rendering includes an inset photograph showing the conceptual architecture for Neighborhood 2, which would have a maximum building height of 50 ft and would be built with a maximum density of 15.0 dwelling units per acre (du/ac) (21.6 du/ac for the alternate row-towns). The senior housing site would be visible in the background along Bake Parkway (refer to the right side of the Project Rendering). No major landform alteration would be required to implement the elementary school and various proposed residential neighborhoods within the Project

site. As shown in the Project Rendering, the Project would be designed following the California Contemporary aesthetic, which includes Coastal Contemporary, California Modern, Modern Hacienda, and Spanish architectural styles that would blend with existing commercial and residential development in the Project vicinity. Landscaping, consisting of mature accent trees, shrubs, and groundcover, would line the perimeter of the Project site.

As a part of the Project, the utility lines located along the sidewalk adjacent to the Project site's western boundary would be relocated underground. The utility line relocation would result in unobstructed views of the hillsides beyond the Project site to the south, which would improve view quality to and around the Project site.

The Area Plan includes architectural and landscape design guidelines that are intended to provide design direction and standards for the development of the Project site. Although implementation of the Project would represent a substantial change to the visual character of the site, Project compliance with these design guidelines would ensure that future design and development on the Project site are of high quality and would maintain the Project's overall vision. Further, improvements associated with the relocation of utility lines underground would help improve views to and from the Project site and the surrounding area. Therefore, implementation of the proposed Project, as shown in Key View 1, would not substantially adversely affect views of scenic vistas. Impacts would be less than significant, and no mitigation would be required.

Key View 2. As shown on Figure 4.1.2(b), Key View 2 depicts the view of the Project site from the intersection of Rancho Parkway South and Bake Parkway looking south. Key View 2 represents the view of the western portion of the Project site for motorists traveling southbound on Bake Parkway.

Existing Conditions. In the foreground is the signalized intersection of Bake Parkway and Rancho Parkway South. As stated previously, Bake Parkway is a four-lane roadway with two lanes in each direction and includes a raised median. In the middle ground, the existing nursery is visible and includes shade structures, nursery plantings, farm equipment, a chain-link fence, and truck trailers. Overhead utility lines are located along the northbound lanes of Bake Parkway. In the background, limited views of the business parks along Dimension Drive are shown.

Project Renderings. The proposed two-story residential development (with an optional third story) (specifically Neighborhood 1) would be visible to travelers along Bake Parkway and Rancho Parkway South. The Project Rendering includes an inset photograph showing the conceptual architecture for Neighborhood 1, which would have a maximum building height of 40 ft and would be built with a density of 14.2 du/ac. Within Neighborhood 1, the neighborhood design would feature two residences facing the street and two rear units accessible from a shared motor court. Landscaping, consisting of mature trees, shrubs, and groundcover, would line the perimeter of the Project site. As shown in the Project Rendering, the Project would be designed following

the California Contemporary aesthetic, which includes Coastal Contemporary, California Modern, Modern Hacienda, and Spanish architectural styles that would blend with existing commercial and residential development in the Project vicinity.

As a part of the Project, the utility lines located along the sidewalk adjacent to the Project site's western boundary would be relocated underground. The utility line relocation would result in unobstructed views of the hillsides beyond the Project site to the south, which would improve view quality to and around the Project site.

As discussed above, the Area Plan includes architectural and landscape design guidelines that are intended to provide design direction and standards for the development of the Project site. Although implementation of the proposed Project would represent a substantial change to the visual character of the site, compliance with these design guidelines would ensure that future design and development on the Project site are of high quality and would maintain the Project's overall vision. Further, improvements associated with relocating utility lines underground would help improve views to and from the Project site and the surrounding area. Therefore, implementation of the proposed Project, as shown in Key View 2, would not substantially adversely affect views of scenic vistas. Project impacts would be less than significant, and no mitigation would be required.

Key View 3. As shown on Figure 4.1.2(c), Key View 3 depicts the view from Bake Parkway looking northeast from just west of the business park on Dimension Drive. Key View 3 represents the view of the southwestern portion of the Project site as seen by motorists traveling northbound on Bake Parkway.

Existing Conditions. Bake Parkway, including a bicycle lane and the sidewalk, is seen in the foreground. As stated previously, Bake Parkway is a four-lane roadway with two lanes in each direction. In the middle ground, the existing nursery is visible from this viewpoint and is predominantly composed of vacant land and a chain-link fence. Nursery plantings and truck trailers are also visible. Overhead utility lines are located along the northbound lanes of Bake Parkway. Views of the Santa Ana Mountains are seen in the background.

Project Renderings. The proposed senior affordable housing development would be visible to travelers along Bake Parkway. The senior housing development would be two to three stories, have a maximum building height of 50 ft, and would be developed at a maximum density of 38.9 du/ac. Landscaping, consisting of mature trees, shrubs, and groundcover, would line the perimeter of the Project site. As shown in the Project Rendering (Figure 4.1.2(c)), the Project would be designed following the California Contemporary aesthetic, which includes Coastal Contemporary, California Modern, Modern Hacienda, and Spanish architectural styles that would blend with existing commercial and residential development in the Project vicinity. The existing sidewalk on Bake Parkway would be reconstructed to allow for a landscaped strip between Bake

Parkway and the sidewalk. A 20 ft landscaped area would be provided between the sidewalk and the wall located along the Project site's western boundary.

The utility lines located along the sidewalk adjacent to the Project site's western boundary would be relocated underground. The utility line relocation would result in unobstructed views in the Project site's vicinity and would improve view quality to and around the Project site.

The Area Plan includes architectural and landscape design guidelines that are intended to provide design direction and standards for the development of the Project site. Although implementation of the Project would represent a substantial change to the visual character of the site because the nursery would be replaced by residential development, Project compliance with these design guidelines would ensure that future design and development on the Project site are of high quality and maintain the Project's overall vision. As shown in Key View 3, implementation of the Project could obstruct views of the Santa Ana Mountains to the north and east of the Project site; however, the existing development in the vicinity of the Project site is of similar height and bulk as the proposed residential development. As such, existing development in these areas currently inhibits views of scenic vistas because Lake Forest is almost entirely developed. Further, views of the Santa Ana Mountains are unobstructed to the western side of the Project looking northwest from this viewpoint. Therefore, implementation of the proposed Project, as shown in Key View 3, would not substantially adversely affect views of scenic vistas. Impacts would be less than significant, and no mitigation would be required.

Key View 4. As shown on Figure 4.1.2(d), Key View 4 depicts the view from the Serrano Creek Trail looking northwest. Key View 4 represents the view of the eastern portion of the Project site for pedestrians and cyclists on the Serrano Creek Trail.

Existing Conditions. In the foreground, existing vegetation along the Serrano Creek Trail is visible. The Project site is in the middle ground and contains nursery plants and shade structures. Residential and office uses west of Bake Parkway are visible in the background as well as two water towers located adjacent to the Baker Ranch Community Park. Most views of the Project site from the Serrano Creek Trail are obstructed by existing vegetation.

Project Renderings. The proposed two-story residential development (with an optional third story) (specifically Neighborhood 3) would be visible to cyclists and pedestrians along the Serrano Creek Trail. The Project Rendering includes an inset photograph showing the conceptual architecture for Neighborhood 3, which would have a maximum building height of 40 ft and would be built at a maximum density of 11.4 du/ac. The Area Plan characterizes Neighborhood 3 as a residential community featuring traditional single-family homes with modest front yards and more expansive backyards. Landscaping, consisting of mature trees, shrubs, and groundcover, would line the perimeter of the Project site. The proposed landscaping would be designed to

complement the existing dense vegetation along the Serrano Creek Trail shown from this viewpoint.

The Area Plan includes architectural and landscape design guidelines that are intended to provide design direction and standards for the development of the Project site. Although implementation of the Project would represent a substantial change to the visual character of the site, Project compliance with these design guidelines would ensure that future design and development on the Project site are of high quality and maintain the Project's overall vision. As shown in Key View 4, implementation of the Project could obstruct views of the site from the Serrano Creek Trail; however, views of the Project site from the Serrano Creek Trail would be limited and infrequent due to existing dense vegetation, which significantly blocks views of the site. Key View 4 is one of the few viewpoints where the Project site would be visible from the Serrano Creek Trail; consequently, it is not representative of the typical views that trail users would experience. Therefore, implementation of the proposed Project, as shown in Key View 4, would not substantially adversely affect views of scenic vistas. Impacts would be less than significant, and no mitigation would be required.

Summary. Key Views 1 through 4 provided above illustrate development proposed on the Project site following implementation of the Area Plan. Although the Project would obstruct views of the Santa Ana Mountains in some places, views would be preserved to the western and eastern sides of the Project site and would be accessible to visitors around the site. Additionally, implementation of the proposed Project would alter one brief view from the Serrano Creek Trail; however, most views from the trail would be preserved due to dense vegetation obstructing views off the trail. Further, improvements associated with the relocation of utility lines underground would help improve views to and from the Project site and the surrounding area. For these reasons, implementation of the proposed Project would not substantially adversely affect views of scenic vistas. Impacts would be less than significant, and no mitigation would be required.

Threshold 4.1.2: Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

No Impact. As stated previously, the Project site is located in a fully developed area. The Project site is located approximately 10 mi northeast of the Pacific Ocean, although the ocean cannot be seen from the Project site due to the San Joaquin Hills southwest of the City. SR-241 is approximately 405 ft north of the Project site. According to the California Scenic Highway Mapping System, SR-241 is not officially designated as a State Scenic Highway, nor is it eligible for listing. In addition, there are no officially listed or eligible State Scenic Highways in the vicinity of the Project site.[1] The only officially designated State Scenic Highway in Orange County is a portion of State Route 91 (SR-91) located approximately 14 mi north of the Project site. The nearest State highway that is eligible for

[1] California Department of Transportation. California Scenic Highway Mapping System. Website: http://www.dot.ca.gov/hq/LandArch/16_livability/scenic_highways/ (accessed March 14, 2019).

official designation as a State Scenic Highway is a portion of Pacific Coast Highway (PCH or State Route 1 [SR-1]), which is located approximately 10.5 mi southwest of the Project site. Due to distance and intervening land uses, no portion of the Project site or surrounding area is viewable from the officially designated portion of SR-91 or the eligible portion of PCH. Therefore, the Project would not result in impacts related to the substantial damage of scenic resources within a State Scenic Highway. No mitigation would be required.

Threshold 4.1.3: In non-urbanized areas, would the project substantially degrade the existing visual character or quality of public views of the site and its surroundings (public views are those that are experienced from publicly accessible vantage point)? If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?

Less than Significant Impact. As stated previously, the United States Census Bureau designates the Project site as part of an urbanized area because the entire city is within the Mission Viejo-Lake Forest-San Clemente, CA Urbanized Area. The Project site's current land use designation (Business Park) and zoning classification (General Agriculture) are inconsistent. To implement the Area Plan, the Project would require approval of a General Plan Amendment (GPA) to change the Project site's General Plan land use designation to Low-Medium Residential and Institutional. A zone change would also be required to establish the Project site's zoning classification as a Planned Community District.

Zoning Code. Title 9, Planning and Zoning, of the Lake Forest Municipal Code includes provisions and regulations for planned development projects within the City. Chapter 9.112 requires that a Planned Community Program be developed for any project proposing a zone change to a Planned Community District. The Planned Community Program addresses the entire Project site and would be subject to approval by the City's Planning Commission, as well as adoption by the City Council. The Area Plan generally serves as the Planned Community Program for the Project and is intended to guide development and land uses for the planned community within the Project Site. Upon adoption, the Area Plan would become a part of the City's Zoning Code and an additional planned community—the Nakase Planned Community. In addition, the Proposed Zoning Map included in the Area Plan would be considered a component of the City's Zoning Map.

The Area Plan includes architectural and landscape design guidelines that are intended to provide design direction and standards for the development of the Project site. Compliance with these design guidelines would ensure that future design and development on the Project site are of high quality and would maintain the Project's overall vision. The Project proposes a series of styles that reflect a California Contemporary aesthetic: Coastal Contemporary, California Modern, Modern Hacienda, and Spanish architectural styles. The styles are cohesive and would provide for consistent design throughout the Project site.

Upon adoption of the Area Plan, the proposed Project would be consistent with the City's Zoning Code as it relates to aesthetics and scenic quality.

General Plan. The City of Lake Forest General Plan is intended to guide future growth and development within the city. The General Plan Land Use Element contains specific goals and policies related to aesthetics and scenic quality. As shown in Table 4.1.A and discussed above, the Project would be consistent with applicable General Plan goals and policies related to aesthetics and scenic quality. The proposed Project would be consistent with the City's General Plan as it relates to aesthetics and scenic quality.

Summary. The visual character and quality of the Project site and surrounding area would be preserved and enhanced through the application of the architectural and landscape design guidelines outlined in the Area Plan. The architectural and landscape design guidelines are intended to guide the quality and aesthetic value of future development introduced as a result of implementation of the Project. Any development undertaken as a result of implementation of the Project would be required to comply with the architectural and landscape design guidelines contained in the Area Plan. Furthermore, the Project would be consistent with other regulations governing scenic quality, including those outlined in the City of Lake Forest General Plan Land Use Element and the City's Municipal Code. Therefore, the proposed Project would neither substantially degrade the visual character of the Project site nor conflict with applicable zoning and other regulations governing scenic quality; therefore, no mitigation would be required.

Threshold 4.1.4: Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

Potentially Significant Impact.

Light. The Project site is currently developed with few structures, and the majority of the Project site is not illuminated at night.

Construction activities would occur during daylight hours. Any construction-related illumination during evening and nighttime hours would consist of the minimum lighting required for safety and security purposes only and would occur only for the duration required for the temporary construction process. Mitigation Measure 4.4.5 (refer to Section 4.4, Biological Resources) requires construction Best Management Practices (BMPs) intended to reduce and avoid indirect impacts to wildlife related to construction lighting. Mitigation Measure 4.4.5 prohibits the placement of construction lighting within 200 ft of Serrano Creek unless a qualified biologist confirms the lighting does not illuminate Serrano Creek. With implementation of Mitigation Measure 4.4.5, and due to the limited nature of nighttime construction lighting, light resulting from construction activities would not substantially impact sensitive uses, substantially alter the character of off-site areas surrounding the construction area, or interfere with the performance of an off-site activity. Therefore, construction of the proposed Project would not create a new source of substantial light that would substantially adversely affect day or nighttime views in the area, and light impacts associated with construction would be less than significant. No mitigation would be required.

Table 4.1.A: General Plan Consistency Analysis

Goals and Policies	Proposed Project Consistency
Land Use Element	
Goal 2.0: A distinct image and identity for Lake Forest.	**Consistent.** The Project would help maintain a distinct community identity because, upon implementation of the Area Plan, it would create an aesthetically cohesive development that would be visually consistent with other nearby residential planned communities. Implementation of architectural and landscape design guidelines included in the Area Plan is anticipated to improve the existing visual character of the Project site and would serve to provide increased visual cohesion between the Project site and surrounding area. Therefore, the proposed Project would be consistent with Goal 2.0 in the Land Use Element.
Policy 2.1: Enhance the physical attributes of Lake Forest to create an identifiable and distinct community within Orange County.	**Consistent.** The proposed Project would contribute to the creation of an identifiable and distinct community within Lake Forest. The Area Plan provides for over 28 acres of parks, open space, and habitat restoration area, most of which would be available for public use. Specifically, improvements along the southeastern portion of the Project site are anticipated to enhance existing physical attributes of Lake Forest due to its proximity to the Serrano Creek Trail. The proposed Project's Central Park would provide a memorable entry to the community as well as space for public events like Farmer's Markets, art fairs, and other community activities. Furthermore, implementation of architectural and landscape design guidelines included in the Area Plan would serve to provide increased visual cohesion between the Project site and its surrounding area and would create neighborhoods that possess a unique sense of place and individuality. Therefore, the Project would be consistent with Policy 2.1 in the Land Use Element.
Policy 2.2: Promote high quality in the design of all public and private development projects.	**Consistent.** The Area Plan includes architectural and landscape design guidelines that are intended to provide design direction and standards for the development of the Project site. Compliance with these design guidelines would ensure that future design and development on the Project site are of high quality and would maintain the Project's overall vision. Therefore, the Project would be consistent and compatible with Policy 2.2 in the Land Use Element.
Goal 3.0: New development that is compatible with the community.	**Consistent.** The Project proposes a series of styles that reflect a California Contemporary aesthetic: Coastal Contemporary, California Modern, Modern Hacienda, and Spanish architectural styles. The styles are cohesive and would provide for consistent design throughout the Project site. In addition, the proposed architectural styles included in the Area Plan would be compatible with the existing style of the surrounding communities. Furthermore, implementation of the architectural and landscape design guidelines included in the Area Plan is anticipated to improve the existing visual character of the Project site and would serve to provide increased visual cohesion between the Project site and the surrounding area. Therefore, the proposed Project would be consistent with Goal 3.0 in the Land Use Element.
Policy 3.1: Ensure that new development fits within the existing setting and is compatible with the physical characteristics of available land, surrounding land uses, and public infrastructure availability.	**Consistent.** The Area Plan would facilitate the development of the 122-acre Project site as a master planned community. The planned community would be consistent with neighboring developments and reflect the vision of the City of Lake Forest, while also demonstrating a distinct community character and establishing a sense of place. The areas surrounding the Project site consist of mixed land uses, including commercial, office, open space, industrial, and residential uses. Although not immediately adjacent to the Project site, single-family and multifamily residential uses exist to the northwest, northeast, and south of the site. Residential planned communities in the vicinity of the Project site include the Foothill Ranch Planned

Table 4.1.A: General Plan Consistency Analysis

Goals and Policies	Proposed Project Consistency
	Community (PC 8) to the north, the Portola Hills Planned Community (PC 9) to the northeast, the Baker Ranch Planned Community (PC 7) to the west, and the Rancho de Los Alisos Planned Community (PC 3) to the southeast. As discussed further in Chapters 4.14 (Public Services), 4.16 (Transportation/Traffic), and 4.18 (Utilities and Service Systems), the proposed Project would be compatible with available public infrastructure in Lake Forest. Therefore, the proposed Project would be consistent with Policy 3.1 in the Land Use Element.
Policy 3.2: Preserve and enhance the quality of Lake Forest residential neighborhoods by avoiding or abating the intrusion of disruptive, non-conforming buildings and uses.	**Consistent.** The Area Plan would facilitate the development of the 122-acre Project site as a master planned community. The Project proposes up to 675 two- and three-story, single-family residential units on approximately 50.5 acres of the Project site. Five separate neighborhoods would each display a distinct style of single-family home. In addition, the Project proposes affordable housing units for senior citizens, an elementary school, and parks and open space. Residential planned communities in the vicinity of the Project site include the Foothill Ranch Planned Community (PC 8) to the north, the Portola Hills Planned Community (PC 9) to the northeast, the Baker Ranch Planned Community (PC 7) to the west, and the Rancho de Los Alisos Planned Community (PC 3) to the southeast. The Project proposes a mix of residential, institutional, and recreation and open space uses as part of a master planned community. These uses are generally consistent with the land uses in the surrounding planned communities. As such, the proposed Project would preserve and enhance the quality of the Lake Forest residential neighborhoods. Therefore, the Project would be consistent with Policy 3.2 in the Land Use Element.
Policy 3.4: Blend residential and nonresidential development with landscaping and architectural design techniques to achieve visual compatibility.	**Consistent.** The Project proposes a mix of residential, institutional, and recreation and open space as part of a master planned community. The Area Plan includes architectural and landscape design guidelines that are intended to provide design direction and standards for the development of the Project site. Compliance with these design guidelines would ensure that future design and development would result in visual compatibility on the Project site. Therefore, the Project would be consistent and compatible with Policy 3.4 in the Land Use Element.

Source: General Plan Land Use Element (City of Lake Forest 1994b, revised 2016).
Area Plan = *Nakase Property Area Plan* (Woodley Architectural Group 2019)

The Project proposes adoption of the Area Plan, which would result in the development of a planned community, comprised of up to 675 single-family residential units, up to 101 senior affordable housing units, an elementary school with a capacity of up to 1,000 students, multiple parks and open space areas, recreation amenities, and an internal circulation system. Due to the intensification in land use from agriculture to a planned community, the Project would require the installation of new lighting. Spill light occurs when lighting fixtures such as streetlights, parking lot lighting, exterior building lighting, and landscape lighting are not properly aimed or shielded to direct light to the desired location, and light escapes and partially illuminates a surrounding location. Sensitive uses (e.g., the Serrano Creek Trail and Nature Park) surrounding the Project site could be impacted by the light from development within the boundaries of the Project site.

The Area Plan specifies that lighting should be unobtrusive and would be installed at a low level to ensure safety for the residents and to help reinforce the pedestrian scale of the community. Lighting installed as part of the planned community would use warm-colored white light-emitting diode (LED) light sources. Improvements to the Serrano Creek Trail would include bollard lighting in locations where feasible and appropriate. As proposed, the school site would not include overhead lighting for the sports fields. Further, to minimize spill-over lighting onto adjacent properties following implementation of the proposed Project, all exterior on-site lighting would be shielded. Mitigation Measure 4.1.1 (see Section 4.1.9.2, Mitigation Measures) requires the Project Applicant/Developer to prepare a comprehensive lighting plan and a photometric survey prior to construction to demonstrate that no spill lighting occurs in sensitive areas. This measure is intended to minimize the impacts of new sources of light to adjacent land uses including Serrano Creek, limit nighttime lighting to that necessary for security, and ensure that lighting is shielded to reduce spill lighting and night glow effects. Implementation of Mitigation Measure 4.1.1 would reduce potential impacts related to new lighting to a less than significant level.

Glare. As stated previously, the Area Plan would result in the development of a planned community comprised of up to 675 single-family residential units, up to 101 senior affordable housing units, an elementary school with a capacity of up to 1,000 students, multiple parks and open space areas, recreation amenities, and an internal circulation system. The anticipated building materials (e.g., concrete, stucco, wood) and proposed uses are typical of those found in the surrounding areas and are not anticipated to create unusual or isolated glare effects that would affect daytime visibility or views in the Project vicinity. In addition, the use of extensive landscaping along the Project's boundaries (refer to Figure 3.8 in Chapter 3.0, Project Description) and light shielding as required by Mitigation Measure 4.1.1 would prevent direct views of light sources and reduce the potential for glare during the day. With implementation of Mitigation Measure 4.4.1, impacts related to glare would be less than significant.

Summary. The proposed Project is not anticipated to incorporate design features that would result in excessive lighting or the generation of glare on site; however, Mitigation Measure 4.1.1 requires the Project Applicant/Developer to prepare a comprehensive lighting plan and a photometric survey prior to construction to demonstrate that no spill lighting would occur in sensitive areas. With implementation of Mitigation Measures 4.1.1 and 4.4.5, Project-related impacts related to light and glare are anticipated to be less than significant.

4.1.7 Cumulative Impacts

The purpose of this section is to evaluate any additional incremental impact that the proposed Project is likely to cause over and above the combined impacts of recently approved and proposed projects in the City and its sphere of influence. As defined in the *State CEQA Guidelines*, cumulative impacts are the incremental effects of an individual project when viewed in connection with the effects of past, current, and probable future projects within the cumulative study area. However, each development proposal received by the City is required to undergo environmental review pursuant to CEQA. If there were any potential for significant impacts to aesthetics, appropriate mitigation measures would be identified to reduce and/or avoid impacts related to aesthetics.

For the reasons outlined above in Section 4.1.6, Project Impacts, implementation of the proposed Project would not result in a significant cumulative impact related to aesthetics. The proposed Project and all related projects are required to adhere to City and State regulations designed to reduce and/or avoid impacts related to aesthetics. With compliance with these regulations, cumulative impacts related to aesthetics would be less than significant. Therefore, implementation of the proposed Project would not result in a significant cumulative impact related to aesthetics.

4.1.8 Level of Significance Prior to Mitigation

The following potential aesthetics impacts would be less than significant prior to mitigation: (1) scenic vistas, (2) scenic vistas in State Scenic Highways, and (3) visual character or quality of public views. Impacts related to light and glare would be potentially significant, and mitigation is required.

4.1.9 Regulatory Compliance Measures and Mitigation Measures

4.1.9.1 Regulatory Compliance Measures

There are no regulatory compliance measures applicable to the proposed Project.

4.1.9.2 Mitigation Measures

Mitigation Measure 4.1.1 **Comprehensive Lighting Plan.** Prior to issuance of the first building permit for production homes, the Project Applicant/Developer shall prepare a comprehensive lighting plan for review and approval by the City of Lake Forest (City) Director of Community Development or designee. The lighting plan shall be prepared by a qualified engineer and shall address all aspects of lighting, including, but not limited to, height, type, location, infrastructure, and safety. The lighting plan shall include the following in conjunction with other measures as determined necessary by the illumination engineer:

a. All Project lighting shall be hooded or shielded to focus the light downward and prevent light spillage onto adjacent properties.

b. All lights shall be designed and located so that direct light rays are confined to the premises.

c. Parking area lighting shall be Illuminating Engineering Society "Full Cut Off" designated or "fully shielded" fixtures so that no light is emitted above the lowest light-emitting part of the fixture.

d. Light levels at the property line shall not exceed 0.1 foot-candle adjacent to the Open Space & Habitat & Restoration Area properties.

e. Light standards shall not exceed 20 feet in height.

The Lighting Plan shall also include a photometric survey. The photometric survey shall demonstrate that lighting values do not exceed 0.1 fc adjacent to the Open Space & Habitat & Restoration Area and that no direct rays shine onto public streets or adjacent sites.

4.1.10 Level of Significance after Mitigation

With implementation of Mitigation Measures 4.1.1 and 4.4.5, the proposed Project would result in less than significant impacts related to aesthetics.

This page intentionally left blank

4.2 AGRICULTURE AND FORESTRY

This section examines the potential for the proposed Project to significantly impact agricultural resources. This section is based on information obtained from the California Department of Conservation (DOC) Farmland Mapping and Monitoring Program (FMMP), the United States Department of Agriculture, the Natural Resources Conservation Service, the Orange County Agricultural Commissioner/Sealer of Weights and Measures Office, the Orange County General Plan (2018), the City of Lake Forest General Plan Update Existing Conditions Report (2018c), and the 2008 City of Lake Forest *Opportunities Study Area Program Environmental Impact Report* (OSA PEIR). This section does not analyze impacts to forest resources because the Initial Study concluded that no forestland resources are within, adjacent to, or near the Project site.

4.2.1 Scoping Process

The City of Lake Forest (City) received 28 comment letters during the public review period of the Initial Study/Notice of Preparation (IS/NOP). For copies of the IS/NOP comment letters, refer to Appendix A of this Environmental Impact Report (EIR). No comments related to agriculture or forestry were received during the public scoping period.

4.2.2 Existing Environmental Setting

The proposed Project is located in Lake Forest, Orange County (County), California. This section discusses the status of agricultural resources in Orange County, Lake Forest, and on the Project site.

4.2.2.1 Orange County

Orange County was once a rural area supported primarily by an agricultural economy. During the 1930s and 1940s, the economy began to change, landowners began to convert agricultural land to urban development, and agricultural uses in Orange County began to decline (County of Orange 2005). Urban areas continue to encroach on agricultural lands in the County and there is continued pressure to convert agricultural land to urban uses. Additionally, the cost of irrigation water, agricultural land tax rates, labor costs, and damage from vandalism have increased production costs, making it more difficult to maintain a successful agricultural operation in the County.

The most recent agricultural land conversion data available for Orange County is for the 2014–2016 period and was obtained through the DOC FMMP (California DOC 2016a). Land converted in this period is shown in Table 4.2.A, Orange County Agricultural Land Conversion 2014–2016.

In summary, for the 2-year period from 2014 to 2016, the total amount of Important Farmland inventoried decreased by 356 acres (ac), and the total amount of agricultural land that was inventoried in the County decreased by 348 ac. The reason there was a larger decrease in Important Farmland than in agricultural land as a whole is because 8 ac of grazing land were added to the inventory of agricultural land in the County, thereby offsetting the loss of agricultural land by 8 ac. However, grazing land is not considered to be Important Farmland; therefore, it did not affect the net loss of acres of Important Farmland.

Table 4.2.A: Orange County Agricultural Land Conversion 2014–2016

Land Use Category	Total Acreage Inventoried		2014–2016 Acreage Changes		
	2014	2016	Acres Lost (-)	Acres Gained (+)	Net Acreage Changed
Prime Farmland	2,851	2,391	373	213	-160
Farmland of Statewide Importance	305	411	8	114	106
Unique Farmland	3,215	2,913	375	73	-302
Farmland of Local Importance	0	0	0	0	0
Important Farmland Subtotal	**6,071**	**5,715**	**756**	**400**	**-356**
Grazing Land	37,106	37,114	331	339	8
Agricultural Land Subtotal	**43,177**	**42,829**	**1,087**	**739**	**-348**
Urban and Built-Up Land	291,246	292,689	399	1,842	1,443
Other Land	174,279	172,173	1,352	246	-1,106
Water Areas	1,015	1,026	7	18	11
Total Area Inventoried	**509,717**	**509,717**	**2,845**	**2,845**	**0**

Source: California Department of Conservation, Division of Land Resources Protection, Farmland Mapping and Monitoring Program, Table A-23 Orange County 2014-2016 Land Use Conversion.

Table 4.2.B, Orange County Agricultural Production Value 2012 vs. 2017,[1] shows the value of agricultural production in 2012 versus 2017 and provides a percent change between these years.

Table 4.2.B: Orange County Agricultural Production Value 2012 vs. 2017

Agricultural Category	2012 Value	2017 Value	Percent Change
Livestock	$375,953	$2,094,000	457.5%
Field	$696,850	$1,187,000	70.3%
Nursery	$70,630,679	$61,670,000	-12.7%
Tree and Berry	$44,120,251	$33,935,000	-23.1%
Vegetable	$20,486,704	$14,351,000	-29.9%
Total	**$136,310,437**	**$113,237,000**	**-16.9%**

Source: Orange County Agricultural Commissioner's Office, *Orange County Annual Crop Report 2017* and *Orange County Crop Report 2012*, http://www.ocagcomm.com/services/report (accessed December 10, 2018).

While the value of livestock and field crops experienced an overall increase of 457.5 percent and 70.3 percent, respectively, the agricultural production value in Orange County decreased by 16.9 percent between 2012 and 2017.

4.2.2.2 City of Lake Forest

Lake Forest has had a development history similar to that of the County. In the early 20th century, Lake Forest, known at the time as El Toro, was an unincorporated agricultural community. After World War II, the area began to urbanize, and agricultural uses were eventually replaced with

[1] The 2017 Orange County Agricultural Production Value data is the most current year available from the Orange County Agricultural Commissioner's Office.

residential, commercial, and industrial uses (City of Lake Forest 2018c). Today Lake Forest is primarily urban with limited areas of land under agricultural production. The City of Lake Forest 2040 General Plan Update Existing Conditions Report presents existing "on the ground" land uses on individual parcels in the City from data that has been gathered by the Orange County Assessor's Office. According to the data, the City currently contains 18 parcels that are occupied by agricultural uses (general agricultural uses, horse ranches, nurseries, and other agriculture), totaling 192 ac. According to the most current 2016 FMMP data, the City contains 140.3 ac of Important Farmland. This acreage includes 0.2 ac of Prime Farmland, and 140.1 ac of Unique Farmland. Although there are 192 ac of land within the City currently in agricultural use, none of the land is designated for agricultural use because the existing Lake Forest General Plan does not include any agricultural land use designations. Chapter 9.72 of the Lake Forest Municipal Code discusses non-residential zoning districts in the City of Lake Forest, including zone designation A1 – Agricultural District. According to 2012 data from the Southern California Association of Governments (SCAG)[1], there are approximately 476 ac (which includes the proposed 122 ac Project site) of A1 – Agricultural District zoned parcels in the City of Lake Forest.

Given that agricultural uses in Lake Forest are limited to a total of 192 ac of land, the agricultural production value is not readily available; therefore, the agricultural production value of Lake Forest is not included as part of this existing conditions discussion.

4.2.2.3 Project Site

The Project site is located within Lake Forest and is approximately 122 ac in size (Assessor's Parcel Number [APN] 612-221-01). Historically, the Project site was used primarily for agriculture. Prior to the late 1920s, the Project site was used for cattle grazing. From the late 1920s through the late 1960s, the parcel was developed with orchards. In the late 1960s, the northwestern portion of the Project site continued operating as an orchard while the remainder of the Project site was converted to a retail nursery. In 1988, the citrus orchards were removed from the remainder of the Project site, and the parcel was fully converted to a retail nursery. The Project site is currently operating as a retail nursery with all products grown and/or sold in pots; in-ground cultivation is not occurring on site. The main source of water used on the Project site is an on-site well; however, the Irvine Ranch Water District (IRWD) does provide water to the site but is used only as backup and to supplement during hot weather.

According to the DOC FMMP, a majority of the Project site (119.2 ac of the 122 ac Project site) is considered Unique Farmland (DOC 2016). The Project site is not under a Williamson Act contract or a Farmland Security Zone (FSZ) contract. The City's General Plan Land Use Map designates the Project site as Business Park and Business Development Overlay (BDO). The Project site is classified as A1 – Agricultural District per the City's Zoning Code.

[1] Zoning information for the City of Lake Forest was acquired by using SCAG's 2012 general plan land use and zoning data, developed for the 2016 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS). The dataset is parcel-based and reviewed by local jurisdiction staff during the SCAG's Local Input Process (V 2.0). These data were deemed newer and more accurate than the City's hosted zoning information, which was from 2008.

Based on the United States Department of Agriculture (USDA) Soil Survey for Orange County, soil types on the proposed Project site are shown in Table 4.2.C, Soil Types of the Project Site. The dominant soil type on the Project site is Unit 207 Sorrento loam, 2 to 9 percent slopes covering approximately 48.9 ac or 40 percent of the Project site.

The DOC uses two systems to determine a soil's agricultural productive capability: the USDA Soil Capability Classification System and the Storie Index rating system.

The USDA Soil Capability Classification System indicates the suitability of soils for most kinds of crops. Soils are rated from Class I to Class VIII, with soils having the fewest limitations receiving the highest rating (Class I), and soils that are unsuitable for agriculture receiving the lowest rating (Class VIII). Specific subclasses are also used to further characterize soils.

Generally, as the range of the Capability Class increases, yields and profits from these lands are more difficult to obtain. Varying Capability Class ratings of soils are found on the Project site and are defined as follows (it should be noted that Class I and Class V soil types are not located on the Project site):

- **Class II:** These soils have some limitations that restrict the choice of plants or that require moderate conservation practices. These soils require careful soil management, including conservation practices, to prevent deterioration or to improve air and water relations when the soils are cultivated. The limitations are few and the practices easy to apply. The soils may be used for cultivated crops, pasture, range, woodland, or wildlife food and cover.

- **Class III:** These soils have severe limitations that reduce the choice of plants or require special conservation practices or both. These soils have more restrictions than those in Class II, and when used for cultivated crops, the conservation practices are usually more difficult to apply and maintain. They may be used for cultivated crops, pasture, woodland, range, or wildlife food and cover.

- **Class IV:** These soils have very severe limitations that restrict the choice of plants, require very careful management, or both. The restrictions in this class of soils are greater than those in Class III. When these soils are cultivated, more careful management is required and conservation practices are more difficult to apply and maintain. Soils in this class may be used for crops, pasture, woodland, range, or wildlife food and cover.

- **Class VI:** These soils have severe limitations that make them generally unsuitable to cultivation and limit their use largely to pasture or range, woodland, or wildlife food and cover. Some soils in this class can be safely used for common crops provided unusually intensive management is used. Some of the soils in this class are also adapted to special crops such as sodded orchards, blueberries, or the like, requiring soil conditions unlike those demanded by common crops. Depending upon soil features and local climate, the soils may be well or poorly suited to woodlands.

Table 4.2.C: Soil Types of the Project Site

Soil Unit Number	Soil Name	Acres	Proportion of Project Area	Soil Capability Classification	Storie Index Rating	Soil Description
135	Capistrano sandy loam, 2% to 9% slopes	5.6	5%	IIIe	90	This soil is gently sloping to moderately sloping and occurs mostly as long, narrow areas in small valleys. If the soil is bare, runoff is slow to medium and the erosion hazard is moderate. Present land uses for this soil include citrus, barley, pasture, range, wildlife, and recreation.
136	Capistrano sandy loam, 9% to 15% slopes	4.0	3%	IVe	81	This soil is strongly sloping and generally occurs on small toe slope fans and in small, narrow foothill valleys. If has the profile described as typical of the Capistrano services. If the soil is bare, runoff is medium and the erosion hazard is moderate. Present land uses for this soil include irrigated citrus, dryland barley, pasture, and range.
142	Cieneba sandy loam, 30% to 75% slopes, eroded	20.2	17%	VIIe	7	This soil is steep to very steep and eroded. It is only 5 to 15 inches deep over bedrock and is cut by gullies and intermittent drainage channels in many places. Geologic erosion is active, and small landslips are common. If the soil is bare, runoff is rapid and the erosion hazard is high. Present land uses for this soil are limited to range, watershed, and wildlife habitat.
149	Cropley clay, 2% to 9% slopes	27.8	23%	IIe	47	This soil is gently sloping to moderately sloping and occurs as irregular, oblong areas. If the soil is bare, runoff is medium and the erosion hazard is slight. Present land uses for this soil include citrus, barley, pasture, range, and urban development.
176	Myford sandy loam, 15% to 30% slopes	1.5	1%	VIe	27	This moderately steep soil generally occurs on side slopes of terraces. If the soil is bare, runoff is rapid and the erosion hazard is high. Available water capacity is 2 to 4 inches. The effective rooting depth is 12 to 19 inches for root-sensitive crops. For other crops, it is 60 inches or more. Present land uses for this soil include range, barley, and urban development.
174	Myford sandy loam, 2% to 9% slopes	11.6	10%	VIe	35	This gently sloping to moderately sloping soil generally occurs on broad terraces. If the soil is bare, runoff is medium and the erosion hazard is moderate. Available water capacity is 1.5 to 3.5 inches. The effective rooting depth is 5 to 12 inches for root-sensitive crops. For other crops, it is 60 inches or more. Present land uses for this soil include range, barley, and urban development.

Table 4.2.C: Soil Types of the Project Site

Soil Unit Number	Soil Name	Acres	Proportion of Project Area	Soil Capability Classification	Storie Index Rating	Soil Description
191	Riverwash	1.4	1%	VIIIw	40	This soil consists of areas of unconsolidated alluvium that is generally stratified, varies widely in texture, recently deposited by intermittent streams, and subject to frequent changes through stream overflow. Runoff is generally rapid, and the erosion hazard is high. Deposition and removal of fresh alluvium are common. Riverwash has little or no agricultural value. Present uses for this soil include watercourses, groundwater recharge, sand and gravel pits, and wildlife habitat.
207	Sorrento loam, 2% to 9% slopes	48.9	40%	IIe	90	This gently sloping to moderately sloping soil generally occurs on upper valley fans and along stream channels. If the soil is bare, runoff is slow to medium and the erosion hazard is slight to moderate. Available water capacity is 10 to 13 inches. Present land uses for this soil include irrigated crops, citrus, range, and urban development.
Total		**121.1**	**100%**			

Source: United States Department of Agriculture, Soil Conservation Service and Forest Service. 2016. *Soil Survey of Orange County and Western Part of Riverside County, California*.
IIe = Soil Capability Class II, Subclass (e), Erosion
IIIe = Soil Capability Class III, Subclass (e), Erosion
IVe = Soil Capability Class IV, Subclass (e), Erosion
VIe = Soil Capability Class VI, Subclass (e), Erosion
VIIe = Soil Capability Class VII, Subclass (e), Erosion
VIIIw = Soil Capability Class VIII, Subclass (w), Excess Water

- **Class VII:** Soils in this class have very severe limitations that make them unsuited to cultivation and that restrict their use largely to grazing, woodland, or wildlife. Physical conditions of soils in this class are such that it is impractical to apply such pasture or range improvements as seeding, liming, fertilizing, and water control with contour furrows, ditches, diversions, or water spreaders. Depending upon the soil characteristics and local climate, soils in this class may be well or poorly suited to woodland. They are not suited to any of the common cultivated crops; in unusual instances, some soils in this class may be used for special crops under unusual management practices.

- **Class VIII:** Soils and landforms in this class have limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, or water supply, or to aesthetic purposes. Soils and landforms in this class cannot be expected to return significant on-site benefits from management for crops, grasses, or trees, although benefits from wildlife use, watershed protection, or recreation may be possible. Badlands, rock outcrop, sandy beaches, riverwash, mine tailings, and other nearly barren lands are included in this class. It may be necessary to protect and manage plant growth in soils and landforms in this class in order to protect other more valuable soils, to control water, or for wildlife or aesthetic reasons.

As noted above, subclasses are used to further define specific limitations for soils classified in the USDA Soil Capability Classification System. The four kinds of limitations recognized at the subclass level include: risks of erosion, designated by symbol (e); wetness, drainage, or overflow (w); rooting-zone limitations (s); and climatic limitations (c). Subclasses that are identified for the soils located on the Project site are defined as follows:

- **Subclass (e), Erosion:** This subclass is made up of soils where the susceptibility to erosion is the dominant problem or hazard in their use. Erosion susceptibility and past erosion damage are the major soil factors for placing soils in this subclass.

- **Subclass (w), Excess Water:** This subclass is made up of soils where excess water is the dominant hazard or limitation in their use. Poor soil drainage, wetness, high water table, and overflow are the criteria for determining which soils belong in this subclass.

The Storie Index is another method used to rate soils and is also based on the soil characteristics and the land's potential utilization and productive capacity. The Storie index rating system ranks soils on a 100-point scale that is divided into six grade classes as follows:

- **Grade 1, Excellent:** 81 to 100 points
- **Grade 2, Good:** 61 to 80 points
- **Grade 3, Fair:** 41 to 60 points
- **Grade 4, Poor:** 21 to 40 points
- **Grade 5, Very Poor:** 11 to 20 points
- **Grade 6, Nonagricultural:** 10 points or less

Four factors that represent the inherent characteristics and qualities of the soil are considered in the Storie Index rating system: profile characteristics, texture of the surface layer, slope, and other

factors (i.e., drainage, salinity). The majority of the soils (62.6 ac) on the Project site have a Storie Index rating below 80 points.

4.2.3 Regulatory Setting

The following section describes the regulations applicable to analyzing the potential impacts to agricultural resources from development of the proposed Project.

4.2.3.1 Federal Regulations

Federal regulations regarding agricultural resources do not apply to the proposed Project.

4.2.3.2 State Regulations

California Department of Conservation (DOC) Farmland Mapping and Monitoring Program (FMMP). In 1982, the DOC began coordinating with the USDA Soil Conservation Service in the preparation and completion of Important Farmland mapping for California through the establishment of the FMMP. The FMMP created a greater level of mapping compared to the USDA Soil Conservation Service by modifying the federal criteria for use in California and incorporating irrigation criteria for farmland significance. The primary purpose of the FMMP is to monitor the conversion of California's agricultural lands. The DOC Division of Land Resource Protection works with landowners, local governments, and researchers to conserve California's farmland and open space resources based on information provided in the FMMP.

The DOC FMMP produces maps and statistical data used for analyzing impacts on agricultural resources. Agricultural land is categorized according to soil quality and irrigation status. The maps are updated every 2 years through review of aerial photographs, a computer mapping system, public review, and field reconnaissance. The latest statewide data available are for the period from 2014 to 2016. The FMMP categories are defined as follows:

- **Prime Farmland:** This land category has the best combination of physical and chemical features for sustaining long-term agricultural production. This land has the soil quality, growing season, and moisture supply needed to produce crops with sustained high yields. The land must have been used for irrigated agricultural production at some time during the 4 years prior to the mapping date.

- **Farmland of Statewide Importance:** This category is similar to Prime Farmland but with minor shortcomings (e.g., greater slopes or less ability to store soil moisture). The land must have been used for irrigated agricultural production at some time during the 4 years prior to the mapping date.

- **Unique Farmland:** This category consists of lesser quality soils used for the production of the State's leading agricultural crops. This land is usually irrigated, but may include non-irrigated orchards or vineyards. The land must have been cropped at some time during the 4 years prior to the mapping date.

- **Farmland of Local Importance:** This land category is important to the local agricultural economy as determined by each county's Board of Supervisors and a local advisory committee.

- **Grazing Land**: This type of land is occupied with vegetation suited to grazing livestock. This category was developed in cooperation with the California Cattleman's Association, University of California Cooperative Extension, and other groups interested in the extent of grazing activities. The minimum mapping unit is 40 ac.

- **Urban and Built-Up Land:** This type of land is occupied by structures with a building density of at least one unit to 1.5 ac, or approximately six structures to a 10 ac parcel. Common examples include residential, industrial, commercial, institutional facilities, cemeteries, airports, golf courses, sanitary landfills, sewage treatment, and water control structures.

- **Other Land:** This type of land is not included in any other mapping category. Common examples include low-density rural developments, brush, timber wetland, riparian area not suitable for livestock grazing, and water bodies smaller than 40 ac. Vacant and nonagricultural land surrounded on all sides by urban development that are greater than 40 ac are mapped as Other Land.

The DOC FMMP considers Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance collectively as Important Farmland (a term that will be used throughout this EIR section).

Williamson Act and Farm Land Security Act. The California Land Conservation Act, better known as the Williamson Act, has been the State's most important agricultural land protection program since its enactment in 1965. Fundamentally, the Williamson Act is a State policy administered by local governments. Local governments are not mandated to administer the Act, but those that do have some latitude to tailor the program to suit local goals and objectives.

Williamson Act contracts have a minimum term of 10 years, with renewal occurring automatically each year (local governments can establish initial contract terms for longer periods of time). The contracts run with the land and are binding on all successors in interest of the landowner. Only land located within an agricultural preserve is eligible for Williamson Act contracts. An agricultural preserve defines the boundary of an area within which a city or county would enter into contracts with landowners. The boundary is designated by resolution of the board of supervisors or city council having jurisdiction. The rules of each agricultural preserve specify the uses allowed. Generally, any commercial agricultural uses would be permitted within any agricultural preserve. In addition, local governments may identify compatible uses allowed with a use permit.

In August 1998, Senate Bill (SB) 1182 established the FSZ provisions of the Williamson Act. An FSZ is created within an agricultural preserve by County Board of Supervisors' approval and at the request of a landowner or group of landowners. FSZ contracts offer landowners greater property tax reductions in return for an initial contract term of 20 years, with renewal occurring automatically each year. Land restricted by an FSZ contract is valued for property assessment purposes at 65 percent of its Williamson Act valuation, or 65 percent of its Proposition 13 valuation, whichever is

lower. New special taxes for urban-related services must be levied at an unspecified reduced rate unless the tax directly benefits the land or living improvements. Cities and special districts that provide non-agricultural services are generally prohibited from annexing land enrolled under an FSZ contract. Similarly, school districts are prohibited from taking FSZ lands for school facilities.

4.2.3.3 Regional Regulations

Regional regulations regarding agricultural resources do not apply to the proposed Project.

4.2.3.4 Local Regulations

Orange County Resources and Development Management Department. The Orange County Resources and Development Management Department (RDMD) has instated the Pesticide Regulation Program to enforce State pesticide laws and regulations and to protect the agricultural and urban development throughout Orange County. This program also protects people working with and around pesticides from exposure to hazardous pesticide levels through an ongoing inspection program focused on commercial pesticide use. The California Department of Pesticide Regulation oversees the Orange County Pesticide Regulation Program.

City of Lake Forest General Plan. The City of Lake Forest General Plan contains goals, policies, and plans intended to guide growth and development of the City. The City is currently preparing General Plan Update 2040, which is anticipated to be approved in 2019. The current General Plan consists of the following elements:

- Land Use Element (revised September 2016)
- Housing Element (January 2014)
- Circulation Element (revised July 1, 2008)
- Recreation and Resources Element (revised September 2016)
- Safety and Noise Element
- Public Facilities and Growth Management Element

The current General Plan does not contain goals, policies, or plans related to the conservation of agricultural resources. The General Plan Land Use Element does not identify any agricultural land uses within the City's jurisdiction.

City of Lake Forest Municipal Code. The City's Municipal Code does not have any codes that pertain to agricultural conservation or right-to-farm policies. However, guidelines and provisions related to agricultural development are addressed in Chapter 9.72, A1 – Agricultural District:

- **A1 – Agricultural District** allows for agriculture, outdoor recreational uses, and low-intensity uses that predominantly have open space characteristics. This designation is also intended to be used as an interim zone in those areas the General Plan may designate for more intensive urban uses in the future. The Project site is currently zoned as A1 – Agricultural District.

4.2.4 Methodology

The potential Project impacts to agricultural resources were evaluated on a qualitative and quantitative basis. Quantitative impacts were assessed by completing the Land Evaluation and Site Assessment (LESA) model as well as using geographic information system (GIS) tools to calculate the exact acreage of Important Farmlands that would be impacted by development of the proposed Project. Qualitative impacts were assessed by evaluating the Project's potential for impacting agricultural activities within the City and County. The agricultural resources analysis is based on information from a number of sources, including the DOC, the Orange County Agricultural Commissioner's office, and the City of Lake Forest. The DOC LESA model was also used (refer to Appendix B).

4.2.4.1 California Agricultural Land Evaluation and Site Assessment Model

LESA is a term used to define an approach for rating the relative quality of land resources based on specific measurable features. The formulation of a California LESA Model is the result of SB 850 (Chapter 812/1993), which charges the Resource Agency (in consultation with the Governor's Office of Planning and Research) with developing an amendment to Appendix G of the California Environmental Quality Act (CEQA) Guidelines concerning agricultural lands. Such an amendment is intended "to provide lead agencies with an optional methodology to ensure that significant effects on the environment of agricultural land conversions are quantitatively and consistently considered in the environmental review process" (Public Resources Code [PRC] Section 21095). A LESA analysis is based on the definition of agricultural land contained in CEQA, PRC Section 21060.1:

> 21060.1 (a) "Agricultural land" means prime farmland, farmland of statewide importance, or unique farmlands, as defined by the United States Department of Agriculture land inventory and monitoring criteria as modified for California.
>
> 21060.1 (b) In those areas of the state where lands have not been surveyed for the classifications specific in subdivision (a), "agricultural land" means land that meets the requirement of "prime agricultural land" as defined in paragraph (1), (2), (3), or (4) of subdivision (c) of Section 51201 of the Government Code [the Williamson Act].

4.2.5 Thresholds of Significance

The thresholds for agriculture and forestry impacts used in this analysis are consistent with Appendix G of the State CEQA Guidelines. Agricultural impacts associated with implementation of the proposed Project may be considered significant if the agricultural impacts exceed the Thresholds of Significance identified below:

Threshold 4.2.1: Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use

Threshold 4.2.2: Conflict with existing zoning for agricultural use, or a Williamson Act contract

Threshold 4.2.3: Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?

Threshold 4.2.4: Result in the loss of forest land or conversion of forest land to non-forest use.

Threshold 4.2.5: Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use

The Initial Study, included as Appendix A, substantiates that there would be no impacts associated with Thresholds 4.2.3 and 4.2.4. These thresholds will not be addressed in the following analysis.

4.2.6 Project Impacts

A portion of the Project site (approximately 45 ac [Site 7]) was analyzed for conversion to urbanized uses in an EIR prepared by the City in 2008 (i.e., the OSA PEIR*)*. The Project impact analysis takes into account the impact conclusions on the 45 ac of land that were previously analyzed as part of the OSA PEIR.

Threshold 4.2.1: Would the Project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

Significant Impact. The Project site is currently occupied by a retail nursery with above-ground potted plant stock for sale. There is no in-ground agricultural production currently occurring on the Project site. Implementation of the proposed Project would result in the permanent conversion of 119.2 ac of Important Farmland (Unique Farmland as designated by the DOC FMMP) on the 122 ac Project site to non-agricultural uses.

In order to determine the significance of this conversion of Important Farmland to non-agricultural uses, the LESA model was prepared for the Project. The LESA model is composed of a Land Evaluation (LE) portion, which measures soil quality, and the Site Assessment (SA) portion, which evaluates other factors that contribute to the site's agricultural importance (e.g., parcel size and on-farm investments). A Final LESA Score of 0 to 39 points is not considered significant. A final score between 40 to 59 points is considered significant only if the LE and SA subscores are each greater than or equal to 20 points. A final score between 60 to 79 points is considered significant unless either the LE or SA subscore is less than 20 points. A final score between 80 to 100 points, however, is considered significant. The Project site achieved a Final LESA score of 56.7. According to the LESA model instructions described above, a final LESA score of 40 to 59 points is considered to be significant only if the LE and SA subscores are each greater than or equal to 20 points. The LE score

for the Project site was 31.2 and the SA score for the Project site was 25.5. Therefore, converting approximately 119 ac of Unique Farmland to a non-agricultural use would be considered a significant impact. The LESA model worksheets are provided in Appendix B.

The loss of Unique Farmland on the Project site would result in the decrease of Important Farmland inventory in both Orange County and the City of Lake Forest. In 2016, Orange County had an Important Farmland inventory of 5,715 ac, 2,913 ac of which were categorized as Unique Farmland. Implementation of the Project would convert 119.2 ac of Unique Farmland, which would result in a 2.1 percent decrease in the Important Farmland inventory of Orange County and a 4.1 percent decrease in the County's Unique Farmland inventory. In 2016, the City of Lake Forest had an Important Farmland inventory of 140.3 ac, 140.1 ac of which were categorized as Unique Farmland. Implementation of the Project would convert 119.2 ac of Unique Farmland, which would result in an 84.9 percent decrease in the Important Farmland inventory of the City and an 85 percent decrease in the City's Unique Farmland inventory. Once the land is converted to urban uses, the ability to use the land designated as Unique Farmland for future agricultural production would be lost. As noted above, the City's General Plan does not include agricultural land use designations nor do the four Citywide Theme proposed land use maps as identified in the recently prepared City of Lake Forest *Land Use Themes Report* (February 2019). As such, it can be assumed that the City recognizes and supports the notion that agricultural land within the City will be converted to non-agricultural land as the City builds out. Nevertheless, significance conclusions for this EIR are based on existing uses and conditions at the Project site. Therefore, given that a large percentage of the City's remaining agricultural land would be converted to a non-agricultural use with implementation of the proposed Project, and that this conversion would contribute to a depletion of Important Farmland inventory in both the County and the City, implementation of the proposed Project would result in a significant impact.

Mitigation measures were considered for the proposed Project in order to reduce the significant impact of converting the nursery on the Project site to non-agricultural uses; however, none of the mitigation measures were feasible. A discussion of the mitigation measures that were considered are discussed below in Section 4.2.9.

Threshold 4.2.2: Would the Project conflict with existing zoning or agricultural use, or a Williamson Act contract?

Less than Significant Impact. The City classifies the Project site as A1 – Agricultural District zoning. The A1 zoning classification was established in the City to provide for agriculture, outdoor recreational uses, and those low-intensity uses that have a predominantly open space character. This zone is also intended to be used as an interim zone in those areas the General Plan may designate for more intensive urban uses in the future. The existing City General Plan Land Use Element designates the Project site as BDO. The current use (retail nursery) occupying the Project site is consistent with the A1 zoning designation; however, the future use of the Project is not consistent with the A1 zoning classification. Given that the City's General Plan Land Use Element designates the future use of the Project site for a non-agricultural use, the Project site's zoning designation is an interim designation.

As part of the Project application process, the Project proponent is seeking a zoning classification amendment to change the zoning on the Project site from A1 to Planned Community District (PC). The zone change would require approval of the Project Area Plan, as well as the Nakase Property Supplemental Text and Development Plan.[1] Once the zone change is approved, the proposed use of the Project site would be consistent with the City's zoning classification as set forth in the City's Municipal Code, and impacts pertaining to conflicts with existing zoning would be less than significant.

The Project site is currently not under a Williamson Act contract. As such, implementation of the proposed Project would not conflict with a Williamson Act contract.

Threshold 4.2.5: Would the Project involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

Less Than Significant Impact. No changes to the existing environment other than those analyzed as part of the proposed Project (e.g., planned community with a variety of uses and associated infrastructure) would result in the conversion of agricultural uses to non-agricultural uses. There are various parcels within the City that are currently under the A1– Agricultural District zoning classification. The A1 zoning classification allows for agricultural uses and recognizes such uses on these parcels as an interim zone in which the General Plan may designate more intensive urban uses in the future. The City also designates these specific A1 zone classified parcels as urban land uses under the General Plan Land Use Element. As such, the City anticipates that these parcels will eventually be developed with urban uses. Implementation of the proposed Project would not influence the conversion of agricultural uses to non-agricultural uses because these parcels have already been designated for conversion to urban uses through the City's General Plan. Impacts involving other changes in the existing environment which, due to their location or nature, could result in conversion of farmland to non-agricultural uses would be less than significant.

4.2.7 Cumulative Impacts

The cumulative geographic study area for agricultural impacts is the City. Development of the proposed Project in combination with the related projects in the City (please refer to Chapter 4, Table 4.A of this EIR) has the potential to deplete the inventory of Important Farmland (Prime Farmland, Unique Farmland, and Farmland of Statewide Importance) in the City through the conversion of agricultural land to non-agriculture land.

According to the most current DOC FMMP data, in 2016, the City had 140.3 ac of Important Farmland. This acreage includes 0.2 acres of Prime Farmland, and 140.1 acres of Unique Farmland. The City of Lake Forest Opportunities Study Program EIR indicates that Important Farmland within the City will eventually be developed based on future approved land use designations. The loss of Important Farmland within the City is considered to be a significant cumulative impact.

[1] The Nakase Property Supplemental Text and Development Plan would be considered equivalent to the planned community text, specified in Section 9.111.050 of the City's Municipal Code

Table 4.A of this EIR provides a list of related Projects to be analyzed as part of the cumulative impact analysis. None of the related Projects provided in Table 4.A contain Important Farmland. Therefore, none of the related projects will convert Important Farmland to a non-agricultural use and thereby contribute to the reduction of Important Farmland inventory in the City. Implementation of the proposed Project would result in the conversion of 0.2 acre of Prime Farmland and 119.2 acres of Unique Farmland, which would reduce the total acreage of Important Farmland within the City. Because implementation of the Project would result in the conversion, and elimination, of a significant amount of Unique Farmland remaining in the City, the contribution of the proposed Project to the loss of Important Farmland would be cumulatively considerable. Consequently, the cumulative impact of the proposed Project on Unique Farmland would be significant and unavoidable.

There are no Williamson Act contracted lands in the City. Therefore, there are no Williamson Act contract lands associated with the related Projects. Furthermore, the proposed Project is not under a Williamson Act contract. Therefore, impacts on Williamson Act contract lands would be less than cumulatively considerable.

There are approximately 476 acres of land zoned for agricultural use in the City. The Project site is zoned for agricultural use; however, none of the related Projects are zoned for agricultural uses. Implementation of the proposed Project would reduce the amount of land zoned for agricultural use in the City (by 119.2 acres) through a rezone of the Project site to a non-agricultural zoning designation. Given that the existing zoning of the Project site is an interim zoning designation and project-related impacts associated with conflicts with agricultural zoning would be less than significant, and that the related Projects in the City are not zoned for agricultural use, impacts on agricultural zoning would be less than cumulatively considerable. Cumulative impacts of the proposed Project on agricultural zoned land would be less than significant.

The proposed Project would result in the conversion of agricultural land to non-agricultural land within the City. Once this land is converted, only 21 acres of agricultural land would remain in the City. The remaining 21 acres of land are not adjacent to or near the proposed Project site; as such, implementation of the proposed Project would not directly or indirectly influence the conversion of the remaining 21 acres of agricultural land to a non-agricultural use or involve other changes in the existing environment, which due to their location and nature, could result in the conversion of farmland to non-agricultural uses. The contribution of the proposed Project to the conversion of agricultural land to non-agricultural land would not be cumulatively considerable. As such, cumulative impacts of the proposed Project would be less than significant.

4.2.8 Level of Significance Prior to Mitigation

The conversion of 119.2 ac of Unique Farmland would be potentially significant. The proposed Project would conflict with the existing A1 – Agricultural District zoning but would not conflict with a Williamson Act contract. As noted above, as part of the Project application process, the Project proponent is seeking a zoning classification amendment to change the zoning on the Project site from A1 to PC. Likewise, impacts involving other changes in the existing environment which, due to their location or nature, could result in conversion of farmland to non-agricultural uses would be

less than significant. A discussion of potential measures to mitigate for the loss of this agricultural resource is provided below.

4.2.9 Mitigation Measures

Implementation of the proposed Project would result in a significant impact from the conversion of 119.2 ac of Unique Farmland to a non-agricultural use. Mitigation measures such as paying in-lieu fees for agricultural conversion impacts were considered for this Project; however, this was determined infeasible as the City and County do not have programs where developers can pay in-lieu fees that apply towards agricultural conservation. The preservation of equivalent quality agricultural land on a 1:1 ratio within the City and County was also considered; however, this mitigation was considered infeasible due to the lack of land designated as Important Farmland within the City and County.

According to the FMMP, the City has a current inventory of 140.3 ac of Important Farmland (0.2 ac of Prime Farmland and 140.1 ac of Unique Farmland) within its jurisdiction. The 140.1 ac of Unique Farmland includes the 119.2 acres of Unique Farmland designated on the Project site; therefore, without the Project site accounted for in the City's Unique Farmland inventory, the City would only have 21 ac of Unique Farmland left within its jurisdiction. In order to mitigate at a 1:1 ratio, 119.2 ac of Unique Farmland would need to be set aside and preserved in perpetuity. The remaining 21 ac of Unique Farmland within the City would not be enough to provide adequate mitigation for the loss of Unique Farmland caused by implementation of the proposed Project. Preserving Unique Farmland at a 1:1 ratio within the City could not be used as a mitigation measure to reduce agricultural conversion impacts due to a lack of available appropriate land.

Areas outside the City's jurisdiction were also considered for conserving agricultural uses to reduce the impacts associated with the proposed Project. According to the FMMP, the County (in 2016) had a 5,715 ac inventory of Important Farmland, of which 2,931 ac were designated as Prime Farmland, 411 ac were designated as Farmland of Statewide Importance, and 2,913 ac were designated as Unique Farmland. Land use patterns in the County were reviewed using GIS applications and compared to the FMMP's Important Farmland categories, which shows that the majority of the land designated as Prime Farmland, Unique Farmland, and Farmland of Statewide Importance in the County is entitled for urban development, is slated for future urban development, or is sparse and fragmented. Replacing the 119.2 ac of Unique Farmland on one contiguous similar size parcel would not be feasible. Replacing the 119.2 ac of Unique Farmland on one contiguous similar size parcel would not be feasible. Replacing agricultural uses within Orange County could not be used as a mitigation measure to reduce agricultural conversion impacts.

4.2.10 Level of Significance after Mitigation

As described above in Section 4.2.9, mitigation was considered to reduce the impact of the conversion of 119.2 ac of Unique Farmland to non-agricultural uses. The mitigation measures were not considered feasible; therefore, impacts pertaining to the conversion of Important Farmland to a non-agricultural use from implementation of the proposed project would be significant and unavoidable.

4.3 AIR QUALITY

This section discusses existing air quality, summarizes existing air quality regulations, and evaluates potential air quality impacts associated with the proposed Nakase Nursery/Toll Brothers Project (proposed Project). This section summarizes information provided in the *Air Quality Impact Analysis* (Urban Crossroads 2019a) and the *Nakase Elementary School Health Risk Assessment* (Placeworks 2019a) that were prepared for the proposed Project. The *Air Quality Impact Analysis* and *Nakase Elementary School Health Risk Assessment* are included in Appendix C of this Environmental Impact Report (EIR).

4.3.1 Scoping Process

The City of Lake Forest (City) received 28 comment letters during the public review period of the Initial Study/Notice of Preparation (IS/NOP). For copies of the IS/NOP comment letters, refer to Appendix A of this EIR. Eight comment letters included comments related to air quality.

The letter from South Coast Air Quality Management District (SCAQMD) (August 15, 2018) recommended the use of the SCAQMD *CEQA Air Quality Handbook* (1993), use of CalEEMod, SCAQMD significance thresholds, and preparation of a Health Risk Assessment. Additionally, SCAQMD provided information about SCAQMD permits and data availability and suggested potential mitigation measures and consideration of potential alternatives to lessen impacts to air quality.

The letter from Saddleback Valley Unified School District (SVUSD) (July 25, 2018) expressed concern regarding the direct and indirect air quality impacts to SVUSD schools and suggested that a Health Risk Assessment be completed for the proposed Project. SVUSD also suggested that the Health Risk Assessment address potential health impacts related to emissions associated with State Route 241 (SR-241).

The letter from Loretta Herin (July 25, 2018) requests that a wall be constructed along Bake Parkway to reduce air pollution at adjacent residences. The letter from Richard Sullivan (July 25, 2018) expressed concerns with the worsening air quality in the neighborhoods of Barclay and Normandale. The letter from Sue Nath (July 30, 2018) expressed concern about additional vehicle emissions. The letter from Andrea Alexander (August 6, 2018) expressed concern with airborne matter resulting from traffic and its link to cancer risk. The letter from Judy Esposito (August 6, 2018) expressed concern about potential increases in air pollution. The letter from Robert and Melissa Leech (August 9, 2018) suggests that particulate matter (PM) and dust be sampled to determine health exposure risk.

4.3.2 Existing Environmental Setting

Lake Forest, which includes the Project site, is within the 6,745-square-mile (sq mi) South Coast Air Basin (Basin), which is under SCAQMD jurisdiction. The Basin includes all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties. Background information about regional climate and air quality conditions in the Basin and local air quality conditions in the vicinity of the Project site are provided below.

4.3.2.1 Regional Climate

The distinctive climate of the Basin is determined by its terrain and geographical location. The Basin is located in a coastal plain with connecting broad valleys and low hills, bounded by the Pacific Ocean in the southwest quadrant, with high mountains forming the remainder of the perimeter.

The annual average temperatures throughout the Basin vary from the low to middle 60s (degrees Fahrenheit [°F]). Due to a decreased marine influence, the eastern portion of the Basin shows greater variability in average annual minimum and maximum temperatures. January is the coldest month throughout the Basin, with average minimum temperatures ranging from 47°F in downtown Los Angeles to 36°F in San Bernardino. All portions of the Basin have recorded maximum temperatures above 100°F.

Although the climate of the Basin can be characterized as semi-arid, the air near the land surface is quite moist on most days because of the presence of a marine layer (a shallow layer of sea air). The annual average relative humidity within the Basin is 71 percent along the coast and 59 percent inland. The marine layer is an important modifier of climate in the Basin. Humidity restricts visibility in the Basin, and the conversion of sulfur dioxide to sulfates is heightened in air with high relative humidity. The marine layer provides an environment for that conversion process, especially during the spring and summer months. Since the ocean effect is dominant, periods of heavy early morning fog are frequent and low stratus clouds are a characteristic feature. These effects decrease with distance from the coast.

More than 90 percent of the Basin's rainfall occurs from November through April. The annual average rainfall varies from approximately 9 inches in Riverside to 14 inches in downtown Los Angeles. Monthly and yearly rainfall totals are extremely variable. Summer rainfall usually consists of widely scattered thunderstorms near the coast and slightly heavier shower activity in the eastern portion of the Basin, with frequency being higher near the coast.

Due to its generally clear weather, approximately 75 percent of available sunshine is received in the Basin. The remaining approximately 25 percent is absorbed by clouds. On the shortest and longest days of the year, there are approximately 10 hours and 14.5 hours of possible sunshine, respectively. The ultraviolet portion of this abundant radiation is a key factor in photochemical reactions.

Wind patterns across the south coastal region of the Basin, which is where the Project site is located, are characterized by westerly and southwesterly onshore winds during the day and easterly or northeasterly breezes at night. Winds are characteristically light although the speed is somewhat greater during the dry summer months than during the rainy winter season.

The direction and speed of the wind determines the horizontal dispersion and transport of air pollutants within the Basin. During the late autumn to early spring rainy season, winds blow from the northwest from storms moving through the region. During this time, 5 to 10 periods of strong, dry offshore winds, locally termed "Santa Ana Winds", occur each year. During the dry season, which coincides with the months of maximum photochemical smog concentrations, the wind flow is bimodal, characterized by a daytime onshore sea breeze and a nighttime offshore wind. Summer

wind flows are created by the pressure differences between the relatively cold ocean and the unevenly heated and cooled land surfaces that modify the general northwesterly wind circulation over southern California. Nighttime offshore winds begin with the radiational cooling of the mountain slopes. Heavy, cool air descends down the slopes and flows through the mountain passes and canyons as it follows the lowering terrain toward the ocean. Another characteristic wind regime in the Basin is the "Catalina Eddy", a low-level cyclonic (counterclockwise) flow centered over Santa Catalina Island that results in an offshore flow to the southwest. On most spring and summer days, some indication of an eddy is apparent in coastal areas.

In the Basin, there are two distinct temperature inversion structures that control vertical mixing of air pollution. During the summer, warm high-pressure descending (subsiding) air is undercut by a shallow layer of cool marine air. The boundary between these two layers of air is a persistent marine subsidence/inversion. This boundary prevents vertical mixing, which effectively acts as an impervious lid to pollutants over the entire Basin. The mixing height for the inversion structure is normally around 1,000 to 1,500 feet (ft) above mean sea level (amsl).

A second inversion type forms in conjunction with cool air flowing from the surrounding mountains at night, followed by the seaward drift of this pool of cool air. The top of this cooler layer forms a sharp boundary with the warmer upper layer and creates nocturnal radiation inversions. The inversions occur primarily in the winter, when nights are longer and onshore flow is weakest. The inversions typically occur only a few hundred feet above mean sea level. These inversions effectively trap pollutants, such as oxides of nitrogen (NO_X) and carbon monoxide (CO) from vehicles, as the pool of cool air drifts seaward. Winter is therefore a period of high levels of primary pollutants along the coastline.

4.3.2.2 Criteria Pollutants

Certain air pollutants have been recognized as causing notable health problems and consequential damage to the environment either directly or in reaction with other pollutants due to their presence in elevated concentrations in the atmosphere. Criteria pollutants are regulated through the development of human health-based and/or environmentally based criteria for setting permissible levels. Criteria pollutants, their typical sources, and health effects are discussed below.

- **Carbon Monoxide (CO):** CO is a colorless, odorless gas produced by the incomplete combustion of carbon-containing fuels (e.g., gasoline or wood). CO concentrations tend to be the highest during the winter morning, when little to no wind and surface-based inversions trap the pollutant at ground levels. Because CO is emitted directly from internal combustion engines, motor vehicles operating at slow speeds are the primary source of CO in the Basin. The highest ambient CO concentrations are generally found near congested transportation corridors and intersections. Health effects of CO exposure include chest pain with exercise and electrocardiograph changes indicative of decreased oxygen supply to the heart. Inhaled CO has no direct toxic effect on the lungs, but exerts its effect on tissues by interfering with oxygen transport and competing with oxygen to combine with hemoglobin present in the blood to form carboxyhemoglobin. Individuals with a deficient blood supply to the heart are the most susceptible to the adverse effects of CO exposure. Individuals most at risk include fetuses,

patients with diseases involving heart and blood vessels, and patients with chronic hypoxemia (oxygen deficiency) as seen at high altitudes.

- **Sulfur Dioxide (SO_2):** SO_2 is a colorless, extremely irritating gas or liquid. It enters the atmosphere primarily from the burning of high-sulfur-content fuel oils and coal and from chemical processes at chemical plants and refineries. When SO_2 oxidizes in the atmosphere, it forms sulfates (SO_4). Collectively, these pollutants are referred to as oxides of sulfur (SO_X). A few minutes of exposure to low levels of SO_2 can result in airway constriction in some asthmatics, all of whom are sensitive to its effects. In asthmatics, an increase in resistance to air flow as well as a reduction in breathing capacity leading to severe breathing difficulties are observed after acute exposure to SO_2. In contrast, healthy individuals do not exhibit similar acute responses even after exposure to higher concentrations of SO_2.

- **Oxides of Nitrogen (NO_X):** NO_X consist of nitric oxide (NO), nitrogen dioxide (NO_2) and nitrous oxide (N_2O) and are formed when nitrogen (N_2) combines with oxygen (O_2). Their lifespan in the atmosphere ranges from 1 to 7 days for NO and NO_2 and to 170 years for N_2O. NO_X are typically created during combustion processes and are major contributors to smog formation and acid deposition. Of the seven types of NO_X compounds, NO_2 is the most abundant in the atmosphere. NO_2 absorbs blue light, resulting in a brownish-red cast to the atmosphere and reduced visibility. Because ambient concentrations of NO_2 are related to traffic density, commuters in heavy traffic may be exposed to higher concentrations of NO_2 than those indicated by regional monitors. An increase in acute respiratory illness, including infections and respiratory symptoms in children (not infants), is associated with long-term exposure to NO_2 at levels found in homes with gas stoves that are higher than ambient levels found in Southern California. An increase in resistance to air flow and airway contraction is observed after short-term exposure to NO_2 in healthy individuals. Larger decreases in lung functions are observed in individuals with asthma or chronic obstructive pulmonary disease (e.g., chronic bronchitis, emphysema) because they are more susceptible to NO_2 effects than healthy individuals.

- **Ozone (O_3):** O_3 is a highly reactive and unstable gas that is formed when volatile organic compounds (VOCs) and NO_X, both of which are byproducts of internal combustion engine exhaust, undergo slow photochemical reactions in the presence of sunlight. O_3 concentrations are generally highest during the summer months when direct sunlight, light wind, and warm temperature conditions are favorable to the formation of this pollutant. Short-term exposure (lasting for a few hours) to O_3 at levels typically observed in Southern California can result in breathing pattern changes, reduction of breathing capacity, increased susceptibility to infections, inflammation of the lung tissue, and some immunological changes. Individuals exercising outdoors, children, and people with preexisting lung disease (e.g., asthma and chronic pulmonary lung disease) are the most susceptible to O_3 effects.

- **Particulate Matter Less Than 10 Microns in Size (PM_{10}):** PM_{10} consists of tiny solid or liquid particles of soot, dust, smoke, fumes, and aerosols. The size of the particles (10 microns or smaller, about 0.0004 inch or less) allows them to easily enter the lungs where they may be deposited, resulting in adverse health effects. PM_{10} also causes visibility reduction. A consistent correlation between elevated ambient coarse particulate matter levels and an increase in

mortality rates, respiratory infections, number and severity of asthma attacks, and the number of hospital admissions has been observed in different parts of the United States and various areas around the world. The elderly, people with pre-existing respiratory or cardiovascular disease, and children are more susceptible than adults to the effects of high levels of PM_{10}.

- **Particulate Matter Less Than 2.5 Microns in Size ($PM_{2.5}$):** $PM_{2.5}$ consists of tiny solid or liquid particles that are 2.5 microns or smaller (which is often referred to as fine particles). These particles are formed in the atmosphere from primary gaseous emissions that include sulfates formed from SO_2 release from power plants and industrial facilities and nitrates formed from NO_X release from power plants, automobiles, and other types of combustion sources. The chemical composition of fine particles highly depends on location, time of year, and weather conditions. In addition to the health effects of PM_{10}, discussed above, daily fluctuations in $PM_{2.5}$ concentration levels have been related to hospital admissions for acute respiratory conditions in children, school and kindergarten absences, decreased lung growth and respiratory volumes in children, and increased medication use in children and adults with asthma. The elderly, people with pre-existing respiratory or cardiovascular disease, and children are more susceptible to the effects of high levels of $PM_{2.5}$.

- **Lead (Pb):** Lead is a heavy metal that is highly persistent in the environment. In the past, the primary source of lead in the air was emissions from vehicles burning leaded gasoline. As a result of the removal of lead from gasoline, there have been no violations at any of the SCAQMD's regular air monitoring stations since 1982. Currently, emissions of lead are largely limited to stationary sources such as lead smelters. Fetuses, infants, and children are more sensitive than others to the adverse effects of lead exposure. Exposure to low levels of lead can adversely affect the development and function of the central nervous system, leading to learning disorders, distractibility, inability to follow simple commands, and lower intelligence. Lead can be stored in the bone from early-age environmental exposure, and elevated lead levels in blood can occur due to a breakdown of bone tissue during pregnancy, hyperthyroidism (increased secretion of hormones from the thyroid gland), and osteoporosis (breakdown of bony tissue). Fetuses and breast-fed babies can be exposed to higher levels of lead because of their mothers being previously exposed to lead. In adults, increased lead levels are associated with increased blood pressure. Lead poisoning can cause anemia, lethargy, seizures, and death; however, it appears that lead has no direct effect on the respiratory system.

- **Volatile Organic Compounds (VOCs) and Reactive Organic Gases (ROG):** VOCs are hydrocarbon compounds (i.e., any compound containing various combinations of hydrogen and carbon atoms) that exist in the ambient air. VOCs contribute to the formation of smog through atmospheric photochemical reactions and may be toxic. Compounds of carbon (also known as organic compounds) have different levels of reactivity (i.e., they do not react at the same speed or do not form O_3 to the same extent when exposed to photochemical processes). VOCs often have an odor (e.g., gasoline, alcohol, and the solvents used in paints). Exceptions to the VOC designation include: CO, carbon dioxide (CO_2), carbonic acid, metallic carbides or carbonates, and ammonium carbonate. Similar to VOCs, ROGs are also precursors in forming O_3 and consist of compounds containing methane, ethane, propane, butane, and longer chain hydrocarbons, which are typically the result of some type of combustion/decomposition process. Smog is

formed when ROGs and NO_X react in the presence of sunlight. The SCAQMD uses the terms VOC and ROG interchangeably. VOCs and ROGs are considered criteria pollutants since they are a precursor to O_3, which is a criteria pollutant. Offensive odors can potentially affect human health in several ways. First, odorant compounds can irritate the eye, nose, and throat, which can reduce respiratory volume. Second, the VOCs and ROGs that cause odors can stimulate sensory nerves to cause neurochemical changes that might influence health, for instance, by compromising the immune system. Finally, unpleasant odors can trigger memories or attitudes linked to unpleasant odors, causing cognitive and emotional effects such as stress.

4.3.2.3 Regional Air Quality

As discussed in further detail later in Section 4.3.3, Regulatory Setting, both the State of California and the federal government have established health-based ambient air quality standards (AAQS) for the criteria air pollutants. Areas that meet the AAQS are classified as attainment areas, while areas that do not meet these standards are classified as nonattainment areas.

The SCAQMD monitors levels of various criteria pollutants at 38 permanent monitoring stations and 5 single-pollutant-source lead (Pb) air monitoring sites throughout the air district. Data collected at these stations are used by the California Air Resources Board (CARB) and United States Environmental Protection Agency (EPA) to classify air basins as attainment, nonattainment, maintenance, or unclassified, based on air quality data for the most recent 3 calendar years compared with the AAQS. Nonattainment areas are imposed with additional restrictions as required by the EPA. The air quality data are also used to monitor progress in attaining air quality standards.

In 2015, the federal and State AAQS (national ambient air quality standards [NAAQS] and California ambient air quality standards [CAAQS], respectively) were exceeded on 1 or more days for O_3, PM_{10}, and $PM_{2.5}$ at most monitoring locations. No areas of the Basin exceeded federal or State standards for NO_2, SO_2, CO, sulfates, or lead. See Table 4.3.A for the status of criteria pollutants in the Basin. For the NAAQS, the Basin is in nonattainment for O_3 (1-hour and 8-hour), $PM_{2.5,}$ and partial nonattainment for lead (Los Angeles County only). For the CAAQS, the Basin is in nonattainment for O_3 (1 hour and 8 hour), $PM_{2.5}$, and PM_{10}.

Table 4.3.A: Attainment Status of Criteria Pollutants in the South Coast Air Basin

Criteria Pollutant	State Designations	Federal Designations
Ozone – 1 hour standard	Nonattainment	Nonattainment (Extreme)
Ozone – 8 hour standard	Nonattainment	Nonattainment (Extreme)
PM_{10}	Nonattainment	Attainment (Maintenance)
$PM_{2.5}$	Nonattainment	Nonattainment (Serious)
Carbon Monoxide	Attainment	Attainment (Maintenance)
Nitrogen Dioxide	Attainment	Unclassifiable/Attainment
Sulfur Dioxide	Attainment	Unclassifiable/Attainment
Lead	Attainment	Nonattainment (Partial)[1]

Source: *Air Quality Impact Analysis* (Urban Crossroads 2019a).

[1] The partial nonattainment designation applies to the Los Angeles County portion of the South Coast Air Basin only for near-source monitors.

PM_{10} = particulate matter less than 10 microns in size

$PM_{2.5}$ = particulate matter less than 2.5 microns in size

4.3.2.4 Local Air Quality

Relative to the Project site, the nearest long-term air quality monitoring site for O_3, CO, PM_{10}, and $PM_{2.5}$ is the Saddleback Valley Monitoring Station (State Responsibility Area [SRA] 19), which is located approximately 2.05 miles (mi) south of the Project site in Lake Forest. The nearest long-term air quality monitoring site for NO_2 is the North Coastal Orange County Monitoring Station (SRA 18), which is located approximately 14.5 mi west of the Project site in Costa Mesa.

The most recent 3 years of data available (i.e., 2015, 2016, and 2017) at the monitoring stations is shown in Table 2-4 of the *Air Quality Impact Analysis* (Urban Crossroads 2019a). Table 2-4 of the *Air Quality Impact Analysis* also identifies the number of days AAQS were exceeded at the monitoring stations, which is considered to be representative of the local air quality at the Project site. Within the 3-year period monitored, O_3 concentrations exceeded the federal 1-hour standard on 10 days, the State 1-hour standard on 48 days, and the State 8-hour standard on 46 days. There were no exceedances of the federal 8-hour standard for O_3, for the State or federal 1-hour standards for NO_2, the federal 24-hour standard for PM_{10}, or the federal 24-hour standard for $PM_{2.5}$ during the 3-year period.

4.3.2.5 Sensitive Receivers

Some people are especially sensitive to air pollution and are given special consideration when evaluating air quality impacts from projects. These groups of people include children, the elderly, individuals with pre-existing respiratory or cardiovascular illness, and athletes and others who engage in frequent exercise. Structures that house these persons or places where they gather to exercise are defined as “sensitive receptors”. Sensitive receptors near the Project site include existing residential homes, hotels, and the existing Serrano Creek Trail area. The existing sensitive receptors in the vicinity of the project site are shown on Figure 4.12.1 and are described below.

- **Receptor R1:** Represents residential homes located approximately 197 ft north of the Project site across Bake Parkway.[1]
- **Receptor R2:** Represents the Staybridge Suites hotel, which is located approximately 264 ft north of the Project site across Bake Parkway.
- **Receptor R3:** Represents the Extended Stay America hotel, which is located approximately 216 ft southeast of the Project site on Lake Forest Drive.
- **Receptor R4:** Represents the Serrano Creek Trail, which is located approximately 80 ft southeast of and adjacent to the southern Project site boundary.

[1] The residential homes at R1 represent the nearest sensitive receivers to the Project site where an individual can remain for 24 hours.

4.3.2.6 Existing Project Site Emissions

The Project site is developed with a nursery. The estimated operation-source emissions generated by the existing nursery are summarized in Table 4.3.B. The existing operational emissions on the Project site from the nursery do not currently exceed SCAQMD maximum daily emissions thresholds (summarized later in Section 4.3.5, Thresholds of Significance).

Table 4.3.B: Existing Project Site Emissions

Existing Operational Activities	Maximum Daily Emissions (lbs/day)					
	VOC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Nursery	0.89	3.21	10.53	0.04	3.16	3.16

Source: *Air Quality Impact Analysis* (Urban Crossroads 2019a).
CO = carbon monoxide
lbs/day = pounds per day
NO_X = oxides of nitrogen
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
SO_X = oxides of sulfur
VOC = volatile organic compounds

4.3.3 Regulatory Setting

4.3.3.1 Federal Regulations

National Ambient Air Quality Standards. The EPA is responsible for implementing the federal Clean Air Act (CAA). The federal CAA was first enacted in 1955, and has been amended numerous times in subsequent years (i.e., 1963, 1965, 1967, 1970, 1977, and 1990). The CAA authorizes the federal government to set federal air quality standards for pollutant emissions. The CAA also specifies future dates for achieving compliance with the NAAQS. Pursuant to the federal CAA, the EPA is responsible for setting and enforcing the NAAQS for six major pollutants (O_3, CO, NO_X, SO_2, PM_{10}, $PM_{2.5}$, and lead), which are termed "criteria" pollutants. Criteria pollutants are defined as those pollutants for which the federal and State governments have established AAQS, or criteria, for outdoor concentrations in order to protect public health.

The 1990 amendments to the CAA that identify specific emission reduction goals for areas not meeting the NAAQS require a demonstration of reasonable further progress toward attainment and incorporate additional sanctions for failure to attain or to meet interim milestones. The sections of the CAA most directly applicable to the development of the Project site include Title I (Non-Attainment Provisions) and Title II (Mobile Source Provisions). Title I provisions were established with the goal of attaining the NAAQS for the criteria pollutants. The NAAQS were amended in July 1997 to include an additional standard for O_3 and to adopt an NAAQS for $PM_{2.5}$. The NAAQS are summarized in Table 4.3.C. All air basins have been formally designated as attainment or non-attainment for each NAAQS. The NAAQS attainment status for the Basin was previously summarized in Table 4.3.A.

Mobile source emissions are regulated in accordance with Title II provisions. These provisions require the use of cleaner-burning gasoline and other cleaner-burning fuels such as methanol and natural gas. Automobile manufacturers are also required to reduce tailpipe emissions of hydrocarbons and NO_X.

Table 4.3.C: Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[1]		National Standards[2]		
		Concentration[3]	Method[4]	Primary[3,5]	Secondary[3,6]	Method[7]
Ozone (O_3)[8]	1-Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8-Hour	0.070 ppm (137 µg/m^3)		0.070 ppm (137 µg/m^3)		
Respirable Particulate Matter (PM_{10})[9]	24-Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		—		
Fine Particulate Matter ($PM_{2.5}$)[9]	24-Hour	—	—	35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	12.0 µg/m^3	15 µg/m^3	
Carbon Monoxide (CO)	1-Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m^3)	—	Non-Dispersive Infrared Photometry (NDIR)
	8-Hour	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)	—	
	8-Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	
Nitrogen Dioxide (NO_2)[10]	1-Hour	0.18 ppm (339 µg/m^3)	Gas Phase Chemiluminescence	100 ppb (188 µg/m^3)	—	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)		53 ppb (100 µg/m^3)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[11]	1-Hour	0.25 ppm (655 µg/m^3)	Ultraviolet Fluorescence	75 ppb (196 µg/m^3)	—	Ultraviolet Fluorescence; Spectrophotometry (Pararosaniline Method)
	3-Hour	—		—	0.5 ppm (1300 µg/m^3)	
	24-Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (for certain areas)[11]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)[11]	—	
Lead[12,13]	30-Day Average	1.5 µg/m^3	Atomic Absorption	—	—	High-Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m^3 (for certain areas)[13]	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 µg/m^3		
Visibility-Reducing Particles[14]	8-Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24-Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1-Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24-Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

Source: *Air Quality Impact Analysis* (Urban Crossroads 2019a)
The footnotes for this table are provided on the following page.

Footnotes:

[1] California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1- and 24-hour), nitrogen dioxide, and particulate matter (PM_{10}, $PM_{2.5}$, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[2] National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once per year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over 3 years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than 1. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact the EPA for further clarification and current national policies.

[3] Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[4] Any equivalent measurement method which can be shown to the satisfaction of CARB to give equivalent results at or near the level of the air quality standard may be used.

[5] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

[6] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[7] Reference method as described by the EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the EPA.

[8] On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.

[9] On December 14, 2012, the national annual $PM_{2.5}$ primary standard was lowered from 15 µg/m^3 to 12.0 µg/m^3. The existing national 24-hour $PM_{2.5}$ standards (primary and secondary) were retained at 35 µg/^{3}, as was the annual secondary standard of 15 µg/m^3. The existing 24-hour PM_{10} standards (primary and secondary) of 150 µg/m^3 also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

[10] To attain the 1-hour standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards, the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

[11] On June 2, 2010, the new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until 1 year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard, the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

[12] The CARB has identified lead and vinyl chloride as "toxic air contaminants" with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

[13] The national standard for lead was revised on October 15, 2008, to a rolling 3-month average. The 1978 lead standard (1.5 µg/m^3 as a quarterly average) remains in effect until 1 year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standards are approved.

[14] In 1989, the CARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

°C = degrees Celsius
µg/m^3 = micrograms per cubic meter
CARB = California Air Resources Board
EPA = United States Environmental Protection Agency
mg/m^3 = milligrams per cubic meter
ppb = parts per billion
ppm = parts per million

The CAA also mandates that states submit and implement State Implementation Plans (SIPs) for local areas not meeting these standards. These plans must include pollution control measures that demonstrate how the standards will be met.

4.3.3.2 State Regulations

California Ambient Air Quality Standards. Assembly Bill (AB) 2595, the California Clean Air Act (CCAA), was signed into law in 1988 and requires all areas of the State to achieve and maintain the CAAQS. The CCAA mandates achievement of the maximum degree of emission reductions possible from vehicular and other mobile sources in order to attain the CAAQS by the earliest practical date. The CARB, which became part of the California Environmental Protection Agency (CalEPA) in 1991, is responsible for ensuring implementation of the CCAA and federal CAA and for regulating emissions from consumer products and motor vehicles within California. The CARB established the CAAQS for all pollutants for which the federal government has NAAQS and, in addition, establishes standards for sulfates, visibility, hydrogen sulfide, and vinyl chloride. However, at this time, hydrogen sulfide and vinyl chloride are not measured at any monitoring stations in the Basin because they are not considered to be a regional air quality problem. The CAAQS are summarized in Table 4.3.C. Generally, the CAAQS are more stringent than the NAAQS. All air basins have been formally designated as attainment or non-attainment for each CAAQS. The CAAQS attainment status for the Basin were previously summarized in Table 4.3.A.

Non-attainment areas are required to prepare Air Quality Management Plans (AQMPs) that include specified emission reduction strategies in an effort to meet clean air goals. These plans are required to include:

- Application of Best Available Retrofit Control Technology to existing sources;
- Developing control programs for area sources (e.g., architectural coatings and solvents) and indirect sources (e.g., motor vehicle use generated by residential and commercial development);
- A District permitting system designed to allow no net increase in emissions from any new or modified permitted sources of emissions;
- Implementing reasonably available transportation control measures and assuring a substantial reduction in growth rate of vehicle trips and miles traveled;
- Significant use of low emission vehicles by fleet operators; and
- Sufficient control strategies to achieve a 5 percent or more annual reduction in emissions or 15 percent or more in a period of 3 years for ROGs, NO_X, CO, and PM_{10}. However, air basins may use an alternative emission reduction strategy that achieves a reduction of less than 5 percent per year under certain circumstances.

4.3.3.3 Regional Regulations

Air Quality Management Planning. Together, the SCAQMD and CARB are responsible for ensuring compliance with all State and federal air quality standards within the Basin. In order to meet the CAAQS and NAAQS, the SCAQMD has adopted a series of AQMPs. AQMPs are updated regularly in order to more effectively reduce emissions, accommodate growth, and to minimize any negative fiscal impacts of air pollution control on the economy.

In March 2017, SCAQMD released the Final 2016 AQMP. The 2016 AQMP evaluates current integrated strategies and control measures to meet the NAAQS, as well as exploring new and innovative methods to reach its goals. Some of these approaches include utilizing incentive programs, recognizing existing co-benefit programs from other sectors, and developing a strategy with fair-share reductions at the federal, State, and local levels. The 2016 AQMP incorporates scientific and technological information and planning assumptions, including the 2016 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) and updated emission inventory methodologies for various source categories.

4.3.3.4 Local Regulations

City of Lake Forest General Plan. While air quality is not a State-mandated element of a general plan, the AQMP requires air quality to be addressed in general plans. Air quality is included as a sub-element of the Recreation and Resources Element of the City of Lake Forest General Plan (2015a) to fulfill AQMP requirements. The purpose of the air quality sub-element is to reduce pollutant levels through stationary source, mobile source, transportation and land use control measures, and energy conservation measures. The Recreation and Resources Element contains the following goals and policies aimed at improving air quality within the City through proper planning for land use, transportation, and energy use.

GOAL 7.0: Improvement of air quality.

Policy 7.1: Cooperate with the South Coast Air Quality Management District and Southern California Association of Governments in their efforts to implement the regional Air Quality Management Plan.

Policy 7.2: Cooperate and participate in regional air quality management planning, programs and enforcement measures.

Policy 7.3: Utilize transportation demand management to influence transportation choices related to mode and time of travel.

Policy 7.4: Implement Citywide traffic flow improvements

Policy 7.5: Implement land use policy aimed at achieving a greater balance between jobs and housing in Lake Forest.

Policy 7.6: Integrate air quality planning with land use and transportation planning.

Policy 7.7: Promote energy conservation and recycling by the public and private sector in Lake Forest.

4.3.4 Methodology

Evaluation of the Project's air quality impacts included the following:

- Determination of the short-term construction air quality impacts
- Determination of the long-term air quality impacts resulting from emissions from vehicular traffic and stationary sources
- Determination of regulatory compliance measures required to reduce short- and long-term air quality impacts from all sources
- Comparison of Project-related construction and operational emissions with applicable thresholds (summarized in Section 4.3.5, Significance Thresholds)
- Evaluation of health risk from vehicle emissions for students and staff at the proposed school

The evaluation of air quality impacts was prepared in conformance with appropriate standards, utilizing procedures and methodologies in the SCAQMD *CEQA Air Quality Handbook* (1993), *Final Localized Threshold Methodology* (2003), and the *Final Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds* (2006). The latest version of the CalEEMod (v2016.3.2), which was released by the SCAQMD in conjunction with the California Air Pollution Control Officers Association (CAPCOA) and other California air districts on October 17, 2017, was used to determine construction and operational air quality emissions of the proposed Project. Please refer to the *Air Quality Impact Analysis* (Urban Crossroads 2019a) for additional details on the air quality modeling methodology and assumptions used to estimate construction and operation emissions of the proposed Project.

The Health Risk Assessment and dispersions modeling for evaluation of health risk impacts to students and staff at the proposed school was conducted in compliance with the procedures developed by the EPA (i.e., the 2005 *Guideline on Air Quality Models*) and the Office of Environmental Health Hazard Assessment (OEHHA) (i.e., 2015 *Air Toxics Hot Spots Program Guidance Manual for the Preparation of Health Risk Assessments*). The air quality dispersion modeling was performed using the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD). Because the proposed school would not be operational during construction of the proposed Project, the health risk assessment was only conducted for the operational phase of the proposed Project. Please refer to the *Nakase Elementary School Health Risk Assessment* (Placeworks 2019a) for additional details on the air quality modeling methodology and assumptions used to estimate health risk to students and staff at the proposed school.

4.3.5 Thresholds of Significance

4.3.5.1 CEQA Thresholds of Significance

The thresholds for air quality impacts used in this analysis are consistent with Appendix G of the *State CEQA Guidelines* and the City of Lake Forest *CEQA Significance Thresholds Guide* (2009). The proposed Project may be deemed to have a significant air quality impact if it would:

Threshold 4.3.1: Conflict with or obstruct implementation of the applicable air quality plan;

Threshold 4.3.2: Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non- attainment under an applicable federal or state ambient air quality standard;

Threshold 4.3.3: Expose sensitive receptors to substantial pollutant concentrations;

Threshold 4.3.4: Result in other emissions (such as those leading to odors adversely affecting a substantial number of people).

The Initial Study, included as Appendix A, substantiates that impacts associated with Threshold 4.3.4 (odors and other emission) would be less than significant because odors during construction would be temporary and the uses associated with the operation of the proposed Project would not generate objectionable odors. This threshold will not be addressed in the following analysis.

4.3.5.2 SCAQMD Emissions Thresholds

The SCAQMD has established regional and localized significance thresholds for regulated pollutants, which are discussed below.

- **Regional Significance Thresholds:** The SCAQMD regional significance thresholds for regulated pollutants are shown in Table 4.3.D. Pursuant to SCAQMD guidelines, these thresholds of significance are used to assess the impacts of project-related construction and operational emissions on regional and local ambient air quality. According to SCAQMD guidelines, any projects with daily emissions that exceed the regional thresholds of significance should be considered as having an individually and cumulatively significant air quality impact.

- **Localized Significance Thresholds (LSTs):** The SCAQMD has established LSTs to evaluate whether there is potential for a project to contribute to, or cause, localized exceedances of the NAAQS or CAAQS. LSTs are based on the ambient concentrations of that pollutant within the project area and the distance to the nearest sensitive receptor. The LSTs for the proposed Project are shown in Table 4.3.D.[1]

[1] Since development projects typically result in negligible construction and long-term operation SO_2 emissions, SCAQMD does not provide an LST for this pollutant. There is also no ambient standard or SCAQMD LST for VOCs, since VOCs are not a criteria pollutant. VOCs are classified as a precursor pollutant, and only a regional emissions threshold has been established.

Table 4.3.D: SCAQMD Maximum Daily Emissions Thresholds

Pollutant	Construction (lbs/day)	Operation (lbs/day)
Regional Threshold		
NO_X	100	55
VOC	75	55
PM_{10}	150	150
$PM_{2.5}$	55	55
SO_X	150	150
CO	550	550
Pb	3	3
Local Threshold		
NO_X	96 (demolition); 150 (grading)	N/A
CO	914 (demolition); 1,626 (grading)	N/A
PM_{10}	14 (demolition); 27 (grading)	N/A
$PM_{2.5}$	5 (demolition); 9 (grading)	N/A

Source: *Air Quality Impact Analysis* (Urban Crossroads 2019a).

CO = carbon monoxide
lbs/day = pounds per day
N/A = not applicable
NO_X = oxides of nitrogen
Pb = lead
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
SO_X = oxides of sulfur
VOC = volatile organic compounds

The significance of localized emissions impacts depends on whether ambient levels in the vicinity of a project site are above or below State standards. If ambient levels are below the standards, as in the case of CO and NO_2, a project is considered to have a significant impact if project emissions result in an exceedance of one or more of these standards. If ambient levels already exceed a State or federal standard, as in the case of $PM_{2.5}$ and PM_{10}, then project emissions are considered significant if they increase ambient concentrations by a measurable amount.

- **Health Risk Assessment Thresholds:** Carcinogenic compounds are not considered to have threshold levels (i.e., dose levels below which there are no risks). Any exposure, therefore, would have some associated risk. The SCAQMD has established a maximum incremental cancer risk of 10 in 1 million ($1x10^5$) for CEQA projects and the OEHHA has established a typical risk management level of 10 in 1 million.

  The cumulative non-cancer chronic health impacts from vehicle emissions were determined by calculating the Hazard Index (HI), which is the sum of all hazard quotients from all the substances that affect the same organ system (e.g., respiratory system, cardiovascular system, reproductive system). An HI equal to or greater than 1.0 represents a significant chronic or acute health hazard.

4.3.6 Project Impacts

Threshold 4.3.1: Would the project conflict with or obstruct implementation of the applicable air quality plan?

Less than Significant Impact. Chapter 12, Sections 12.2 and 12.3 of the SCAQMD *CEQA Air Quality Handbook* (1993) outlines criteria for determining consistency with the SCAG 2016 AQMP. A project would be consistent with the AQMP if the project (1) would not increase the frequency or severity of an existing air quality violation or cause or contribute to new a new violation or delay the timely attainment of air quality standards or the interim emissions reductions specified in the AQMP, and (2) would not exceed the growth assumptions in the AQMP based on the year of Project build out.

As described further under Threshold 4.3.2 below, the short-term construction and long-term pollutant emissions from the proposed Project would not exceed the regional emissions thresholds established by the SCAQMD. Therefore, the proposed Project would not increase the frequency or severity of any air quality standard violation or cause a new air quality standard violation.

The City's General Plan designates the Project site as Business Park and Business Development Overlay (BDO). This land use designation provides opportunities for a mixture of all uses allowed under the Commercial, Professional Office, and Light Industrial land use designations. Such uses include a variety of retail, professional office, service-oriented business activities, administrative and corporate uses, and light industrial uses. Development of the proposed Project consists of approximately 675 single-family detached residential homes, 101 senior affordable housing residential units, an elementary school that could accommodate up to 1,000 students, and park/ open space uses. The proposed Project would require approval of a General Plan amendment to change the General Plan land use designation of the Project site to Low-Medium Residential and Institutional. According to the *Nakase Property Trip Generation Evaluation* (Urban Crossroads 2018), the currently adopted General Plan land use for the Project site would generate 14,122 more trip-ends per day than the proposed Project. Therefore, as shown in Table 4.3.E, the Project would result in a net decrease in VOCs, NO_X, CO, SO_X, PM_{10}, and $PM_{2.5}$ compared to the adopted General Plan land use designation, which was used for the growth assumption in the 2016 AQMP. Therefore, the proposed Project would result in fewer emissions, and consequently less air quality impacts, compared to the currently adopted general plan land use designation.

Table 4.3.E: Project and Current Permitted Land Uses – Operational Emissions

Proposed Use	Operational Emissions (lbs/day)					
	VOC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Currently Approved General Plan Land Use	73.62	156.96	424.24	1.82	166.26	45.63
Proposed Project	44.66	54.08	201.87	0.65	58.41	15.44
Net Change	**-28.96**	**-102.88**	**-222.37**	**-1.16**	**-107.85**	**-30.19**

Source: *Air Quality Impact Analysis* (Urban Crossroads 2019a).
CO = carbon monoxide
lbs/day = pounds per day
NO_X = oxides of nitrogen
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
SO_X = oxides of sulfur
VOC = volatile organic compounds

The proposed Project would not exceed the growth assumptions in the SCAG 2016 AQMP because (1) the Project's construction and operational emissions would not exceed the regional significance thresholds or cause or contribute to NAAQS or CAAQS violations, and (2) although the proposed Project is not consistent with the current General Plan land use designation on the Project site, the proposed Project is expected to generate a net decrease in emissions as compared to the uses allowed under the current land use designation, which was used for the growth assumption in the 2016 AQMP. Therefore, impacts related to conflict or obstruction of implementation of the applicable air quality plan would be less than significant, and no mitigation is required.

Threshold 4.3.2: Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?

Less than Significant Impact.

Construction. Construction activities that produce emissions include demolition, grading, infrastructure construction, building construction, paving, and architectural coating. Combustion emissions are produced from various sources, including construction equipment engines and motor vehicles transporting the construction crew and construction materials. Fugitive dust emissions are generally associated with land clearing and exposure of soils to the air and wind, as well as grading operations. Construction activities such as paving and painting can release VOCs. Construction emissions would vary daily as construction activity levels change; therefore, this analysis provides the worst-case construction emissions based on the construction schedule and construction equipment anticipated for Project construction.

As specified in Regulatory Compliance Measures RCM AQ-1 and RCM AQ-2, in Section 4.3.8, Regulatory Compliance Measures and Mitigation Measures, construction of the proposed Project would comply with SCAQMD standard conditions, including Rule 403 (Fugitive Dust) to control fugitive dust and Rule 1113 (Architectural Coatings) to control VOC emissions from paint. Compliance with SCAQMD standard conditions are regulatory requirements and were considered in the analysis of construction emissions. The maximum daily emissions of VOCs, NO_X, SO_X, CO, PM_{10}, and $PM_{2.5}$ that would result from construction of the proposed Project are summarized in Table 4.3.F and compared to the SCAQMD regional significance thresholds. As shown in Table 4.3.F, construction emissions associated with the proposed Project would not exceed the significance thresholds established by the SCAQMD for any of the criteria pollutants.

As previously discussed, the portion of the Basin in which the Project site is located is in nonattainment of the NAAQS for O_3 (1-hour and 8-hour) and $PM_{2.5}$. The Basin is in nonattainment of the CAAQS for O_3 (1-hour and 8-hour), $PM_{2.5}$, and PM_{10}. As shown in Table 4.3.F, emissions from construction of the proposed Project would not exceed the significance thresholds for O_3, $PM_{2.5}$, or PM_{10}. Therefore, construction of the proposed Project would not exceed the significance thresholds of criteria pollutants for which the project region is nonattainment under the CAAQS or NAAQS.

Table 4.3.F: Construction Emissions

Year	Emissions (lbs/day)					
	VOC	**NO_X**	**CO**	**SO_X**	**PM_{10}**	**$PM_{2.5}$**
2019	3.64	37.67	23.02	0.05	3.45	1.96
2020	50.8	69.66	37.66	0.12	12.53	6.09
2021	20.41	90.40	77.76	0.24	19.56	7.68
2022	19.19	79.16	73.84	0.24	15.92	6.06
2023	15.42	38.13	51.12	0.19	13.95	4.38
2024	15.11	36.60	49.17	0.19	13.84	4.28
2025	14.83	35.05	47.48	0.18	13.73	4.17
Maximum Daily Emissions	**20.41**	**90.40**	**77.76**	**0.24**	**19.56**	**7.68**
SCAQMD Regional Thresholds	75	100	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

Source: *Air Quality Impact Analysis* (Urban Crossroads 2019a).
CO = carbon monoxide
lbs/day = pounds per day
NO_X = oxides of nitrogen
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
SCAQMD = South Coast Air Quality Management District
SO_X = oxides of sulfur
VOC = volatile organic compounds

According to SCAQMD guidance, projects that exceed the significance thresholds are considered by SCAQMD to result in cumulatively considerable air quality impacts. Conversely, projects that do not exceed the significance thresholds are generally not considered to result in cumulatively considerable air quality impacts. Therefore, based on the fact that emissions during construction of the proposed Project would not exceed any of the air quality significance thresholds for any criteria pollutants, the proposed Project would not have a cumulatively considerable air quality impact. Therefore, with compliance with regulatory requirements (as specified in RCM AQ-1 and RCM AQ-2), construction impacts related to the cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under applicable NAAQS or CAAQS would be less than significant, and no mitigation is required.

Operation. Project operations would result in VOC, NO_X, SO_X, CO, PM_{10}, and $PM_{2.5}$ emissions from three primary sources: area source emissions, energy source emissions, and mobile source emissions, as described further below.

Area source emissions would be generated from the following sources:

- **Architectural Coating**: Over a period of time, the buildings that are part of the proposed Project would generate emissions from the evaporation of solvents contained in paints, varnishes, primers, and other surface coatings used during maintenance activities.

- **Consumer Products**: Consumer products include but are not limited to detergents, cleaning compounds, polishes, personal care products, and lawn and garden products. When released in the atmosphere, many of these products contain organic compounds that can react to form O_3 and other photochemically reactive pollutants.

- **Landscape Maintenance Equipment**: Landscape maintenance equipment would generate emissions from fuel combustion and evaporation of unburned fuel. Equipment in this category would include lawnmowers, shredders/grinders, blowers, trimmers, chainsaws, and hedge trimmers used to maintain landscaping.

In compliance with RCM AQ-3, the proposed Project would comply with SCAQMD Rule 445, which prohibits the use of wood-burning stoves and fireplaces in new development. Therefore, the proposed Project would not generate area source emissions from hearths/fireplaces.

Energy source emissions include criteria pollutant emissions from the generation of electricity and consumption of natural gas. However, because electricity-generating facilities for the Project area are located either outside the region (State) or are offset through the use of pollution credits (Regional Clear Air Incentives Market [RECLAIM]) for generation within the Basin, criteria pollutant emissions from off-site electricity generation is generally excluded from the evaluation of significance, and only natural gas use is considered. As specified in RCM AQ-4, the project building components (e.g., windows, roof systems, electrical and lighting systems, and heating, ventilation, and air conditioning systems) would be designed in compliance with 2019 Title 24 standards. Title 24 requires projects to implement energy efficiency measures that promote conservation. The 2019 Title 24 standards anticipate 30 percent less energy use for non-residential buildings and 53 percent less energy use for residential use due to lighting upgrades. Additionally, to reduce water demands and associated energy use, developments within the Area Plan would be required to implement a Water Conservation Strategy, install water-efficient plumbing fixtures, and demonstrate a minimum 20 percent reduction in indoor and outdoor water usage compared to the development without water conservation measures.

Project vehicle trips to and from the Project site would generate mobile source emissions. Vehicles traveling on paved roads would be a source of fugitive emissions due to the generation of road dust and tire wear particulates. Mobile source emissions are dependent on both overall daily vehicle trip generation and the effect of the Project on peak-hour traffic volumes and traffic operations in the vicinity of the Project site. The Project-related operational air quality emissions are primarily due to vehicle trips. According to the *Nakase Property Traffic Impact Analysis* (Urban Crossroads 2019c), the proposed Project is anticipated to generate a total of 8,789 trip ends per day with 1,202 a.m. peak-hour trips and 879 p.m. peak-hour trips. The proposed Project design would facilitate pedestrian access and encourages people to walk instead of drive, which reduces vehicle trips. Pedestrian connections would be constructed at selected roads within the Project site, providing pedestrian access to the various uses and activity centers within the Project. Furthermore, the proximity of the residential uses within the Area Plan to the proposed on-site school and to the surrounding commercial uses would reduce travel distances and regional vehicle miles traveled (VMT) by consolidating trips and reducing requirements for multiple trips. The proposed Project would also provide Below Market Rate (BMR) housing through the construction of senior housing dwelling units. Senior housing units tend to be associated with lower levels of auto ownership.

Table 4.3.G summarizes the Project's maximum daily emissions from area, energy, and mobile sources during operation with implementation of RCM AQ-3 and RCM AQ-4 and consideration of the project design features discussed above. The existing emissions from the on-site nursery were subtracted from the Project operational emissions to determine the new emissions resulting from the proposed Project. As shown in Table 4.3.G, emissions during operation of the proposed Project would not exceed the thresholds of significance for any criteria pollutants.

Table 4.3.G: Operations Emissions

Year		Emissions (lbs/day)					
		VOC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Area Source	Residential	31.74	13.61	69.44	0.09	1.40	1.40
	Other Uses	2.26	0.00	0.10	0.00	0.00	0.00
Energy Source	Residential	0.33	2.79	1.19	0.02	0.23	0.23
	Other Uses	0.02	0.19	0.16	0.00	0.01	0.01
Mobile Source	Residential	8.04	28.62	103.75	0.43	44.07	11.98
	Other Uses	2.38	8.42	30.11	0.13	12.70	3.45
Maximum Daily Emissions		**44.76**	**53.64**	**204.75**	**0.66**	**58.41**	**17.07**
Existing Emissions		-0.89	-3.10	-10.53	-0.04	-3.16	-0.87
Net Maximum Daily Emissions (Project minus Existing)		**43.87**	**50.54**	**194.22**	**0.63**	**55.25**	**16.20**
SCAQMD Regional Thresholds		55	55	550	150	150	55
Threshold Exceeded?		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

Source: *Air Quality Impact Analysis* (Urban Crossroads 2019a).
Note: Any discrepancies in the Maximum Daily Emissions, Existing Emissions, and Net Maximum Daily Emission rows are due to rounding.
CO = carbon monoxide
lbs/day = pounds per day
NO_X = oxides of nitrogen
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
SCAQMD = South Coast Air Quality Management District
SO_X = oxides of sulfur
VOC = volatile organic compounds

As previously discussed, the portion of the Basin in which the Project site is located is in nonattainment of the NAAQS for O_3 (1-hour and 8-hour) and $PM_{2.5}$. The Basin is in nonattainment of the CAAQS for O_3 (1-hour and 8-hour), $PM_{2.5}$, and PM_{10}. As shown in Table 4.3.G, emissions during operation of the proposed Project would not exceed the significance thresholds for O_3, $PM_{2.5}$, or PM_{10}. Therefore, operation of the proposed Project would not exceed the significance thresholds of criteria pollutants for which the project region is nonattainment under the CAAQS or NAAQS.

As discussed previously, according to SCAQMD guidance, projects that exceed the significance thresholds are considered by the SCAQMD to result in cumulatively considerable air quality impacts. Conversely, projects that do not exceed the significance thresholds are generally not considered to result in cumulatively considerable air quality impacts. Therefore, based on the fact that the emissions during operation of proposed Project would not exceed any of the air quality significance thresholds for any criteria pollutants, the proposed Project would not have a cumulatively considerable impact. Therefore, with compliance with regulatory requirements (as specified in RCM AQ-3 and RCM AQ-4), operational impacts related to the cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable NAAQS or CAAQS would be less than significant, and no mitigation is required.

Threshold 4.3.3: Would the project expose sensitive receptors to substantial pollutant concentrations?

Less than Significant Impact.

Construction. Construction activities (e.g., grading and the use of construction equipment on site) would result in localized exhaust emissions that have the potential to affect nearby sensitive receivers. The localized impacts from the daily emissions associated with on-site construction activities were evaluated at Receptor R1.[1]

As specified in RCM AQ-1, in Section 4.3.8, Regulatory Compliance Measures and Mitigation Measures, construction of the proposed Project would comply with SCAQMD standard conditions, including Rule 403 (Fugitive Dust) to control fugitive dust. Compliance with SCAQMD standard conditions are regulatory requirements and were considered in the analysis of construction emissions. Table 4.3.H identifies the localized impacts at the nearest receptor location to the Project site (R1) compared to the SCAQMD LSTs for NO_X, CO, PM_{10}, and $PM_{2.5}$. As shown in Table 4.3.H, construction emissions associated with the proposed Project would not exceed the LSTs established by SCAQMD. Because the project would not exceed the LSTs with compliance with regulatory requirements (as specified in RCM AQ-1), impacts related to exposure of sensitive receptors to substantial pollutant concentrations would be less than significant, and no mitigation is required.

Table 4.3.H: Localized Construction Emissions

	Emissions (lbs/day)			
	NO_X	**CO**	**PM_{10}**	**$PM_{2.5}$**
On-Site Demolition Activities				
Maximum Daily Emissions	**35.78**	**22.06**	**3.12**	**1.87**
SCAQMD Localized Significance Threshold	96	914	14	5
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**
On-Site Grading Activities				
Maximum Daily Emissions	50.20	31.96	10.91	5.61
SCAQMD Localized Significance Threshold	150	1,626	27	9
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**

Source: *Air Quality Impact Analysis* (Urban Crossroads 2019a).
CO = carbon monoxide
lbs/day = pounds per day
NO_X = oxides of nitrogen
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
SCAQMD = South Coast Air Quality Management District

Operation.

Localized Emissions. A project would generate localized exhaust emissions that have the potential to affect nearby sensitive receivers if the project includes stationary sources, or attracts mobile sources that may spend long periods queuing and idling at the site (e.g.,

[1] The residential homes at R1 represent the nearest sensitive receivers to the Project site where an individual can remain for 24 hours.

warehouse or transfer facilities). Although the proposed Project does not include such uses, the Project is expected to produce periods of mobile queuing and idling at the school. The localized impacts from the daily emissions associated with trips to and from the proposed school and vehicle idling at the school were evaluated at Receptor R1.[1] Table 4.3.I shows the maximum daily emissions for the Project's operational activities compared with the SCAQMD LSTs for NO_X, CO, PM_{10} and $PM_{2.5}$. As shown in Table 4.3.I, project operational source emissions would not exceed LSTs established by the SCAQMD. Therefore, because the project would not exceed the LSTs established by the SCAQMD, localized emissions from operation of the proposed Project would not expose sensitive receptors to substantial pollutant concentrations, impacts would be less than significant, and no mitigation is required.

Table 4.3.I: Localized Operations Emissions

	Emissions (lbs/day)			
	NO_X	**CO**	**PM_{10}**	**$PM_{2.5}$**
On-Site Demolition Activities				
Maximum Daily Emissions	**18.47**	**77.44**	**4.48**	**2.41**
SCAQMD Localized Significance Threshold	191	2,235	10	3
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**

Source: *Air Quality Impact Analysis* (Urban Crossroads 2019a).
CO = carbon monoxide
lbs/day = pounds per day
NO_X = oxides of nitrogen
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
SCAQMD = South Coast Air Quality Management District

CO Hot Spot. CO hot spots are caused by vehicular emissions, primarily when idling at congested intersections. Based on the analysis presented below, a CO "hot-spot" analysis is not needed to determine whether a change in the level of service (LOS) of an intersection in the vicinity of the Project site would have the potential to result in exceedance of either the CAAQS or NAAQS.

Vehicle emissions standards have become increasingly stringent in the last 20 years. Currently, the allowable CO emissions standard in California is a maximum of 3.4 grams/mile for passenger cars (there are requirements for certain vehicles that are more stringent). With the turnover of older vehicles, introduction of cleaner fuels, and implementation of increasingly sophisticated and efficient emissions control technologies, CO concentration in the Basin is now designated as attainment. In addition, CO concentrations in the Project vicinity have steadily declined.

The analysis prepared for CO attainment in the Basin by SCAQMD can be used to assist in evaluating the potential for CO exceedances in the Basin. To establish a more accurate record of baseline CO concentrations affecting the Basin, a CO "hot-spot" analysis was conducted by SCAQMD in 2003 for four busy intersections in Los Angeles at the peak

[1] The residential homes at R1 represent the nearest sensitive receivers to the Project site where an individual can remain for 24 hours.

morning and afternoon time periods. This analysis did not predict any violation of CO standards. According to the *Air Quality Impact Analysis* (Urban Crossroads 2019a), based on the SCAQMD 2003 AQMP and the 1992 Federal Attainment Plan for Carbon Monoxide (1992 CO Plan), peak CO concentrations in the Basin were a result of unusual meteorological and topographical conditions and not a result of traffic volumes and congestion at a particular intersection. Even if the traffic volumes of the proposed Project were double or triple that of the traffic volumes generated at the four busy intersections in Los Angeles, coupled with the ongoing improvements in ambient air quality, the Project would not be capable of resulting in a CO "hot spot" at any study area intersections. Similar considerations are also employed by other Air Districts when evaluating potential CO concentration impacts. More specifically, the Bay Area Air Quality Management District (BAAQMD) concludes that under existing and future vehicle emission rates, a given project would have to increase traffic volumes at a single intersection by more than 44,000 vehicles per hour (vph)—or 24,000 vph where vertical and/or horizontal air does not mix—in order to generate a significant CO impact.

The busiest Los Angeles intersection evaluated by the SCAQMD was at Wilshire Boulevard and Veteran Avenue, which has a daily traffic volume of approximately 100,000 vehicles per day and a.m. and p.m. traffic volumes of 8,062 vph and 7,719 vph, respectively. The 2003 AQMP CO "hot-spot" analysis estimated that the 1-hour concentration for this intersection was 4.6 parts per million (ppm), which indicates that, should the daily traffic volume increase four times to 400,000 vehicles per day, CO concentrations would be 18.4 ppm and would still not likely exceed the most stringent 1-hour CO standard of 20.0 ppm. At build out of the proposed Project, the highest average daily trips would be 88,000 daily trips on Bake Parkway between Rockfield Boulevard and the Interstate 5 (I-5) northbound ramp, which is lower than the highest daily traffic volumes of 100,000 vehicles per day at Wilshire Boulevard and Veteran Avenue. Additionally, the 2003 AQMP CO "hot-spot" analysis determined that the highest traffic volumes was 8,674 vph on La Cienega Boulevard and Century Boulevard. The highest trips on a segment of road for the "Without the Portola Extension" and "With the Portola Extension" scenarios are 8,350 vph and 8,310 vph, respectively, on Bake Parkway and Rockfield Boulevard. As such, Project-related traffic volumes are less than the traffic volumes identified in the 2003 AQMP CO "hot-spot" analysis. Because the proposed Project would not produce the volume of traffic required to generate a CO "hot spot", CO emissions from operation of the proposed Project would not expose sensitive receptors to substantial pollutant concentrations. Impacts related to CO hot spots would be less than significant, and no mitigation is required.

Health Risk Assessment. Although potential effects of the environment on the Project are typically not a subject of CEQA analysis, due to the proximity of SR-241 to the proposed school (300 ft northwest of the school site boundary), a Health Risk Assessment was conducted for informational purposes. The purpose of the Health Risk Assessment was to disclose the potential cancer risks to students and staff at the proposed school from diesel-fueled vehicles that use the freeway and emit carcinogenic compounds. Emissions of criteria pollutants and toxic air contaminants (TACs) from vehicles traveling on SR-241 were estimated and compared to the SCAQMD and OEHHA threshold of 10 in 1 million to determine if air quality at the proposed school would pose a short-term or long-term

exposure risk to students and staff. It should be noted that the EPA and OEHHA recommend that conservative assumptions be used in a Health Risk Assessment to ensure that the estimated risk does not underestimate the actual risk. Therefore, the estimated risks do not necessarily represent actual risks experienced by a population at or near a site.

An evaluation was also conducted using the HI approach for the potential non-cancer effects of chronic and acute exposures to non-carcinogenic impacts. The HI assumes that chronic and acute sub-threshold exposures adversely affect a specific organ or organ system (toxicological endpoint). A health hazard would be presumed to exist if the HI for the Project equals or exceeds 1.

The results of the Health Risk Assessment are provided in Table 4.3.J. Table 4.3.J shows the cancer risk and HI for students and staff at the proposed school compared to SCAQMD and OEHHA thresholds. Based on a comparison to the carcinogenic and non-carcinogenic thresholds established by OEHHA and SCAQMD, hazardous air emissions generated from the stationary and mobile sources within a 0.25 mi radius are not anticipated to pose an actual or potential health risk to students and staff at the proposed school because the cancer risk and HI for the proposed Project would not exceed the SCAQMD and OEHHA thresholds.

Table 4.3.J: Health Risk Assessment Results

Source	Cancer Risk (per million)		Chronic Hazard Index	Acute (1-Hour) Hazard Index	8-Hour Hazard Index
	Staff Exposure	Student Exposure			
Diesel-fueled Vehicles	0.05	0.08	0.001	0.002	0.001
SCAQMD and OEHHA Thresholds	10	10	1.0	1.0	1.0
Exceeds Threshold	**NO**	**NO**	**NO**	**NO**	**NO**

Source: *Health Risk Assessment* (Placeworks 2019a)~~*Air Quality Impact Analysis* (Urban Crossroads 2019a)~~
OEHHA = Office of Environmental Health Hazard Assessment
SCAQMD = South Coast Air Quality Management District

4.3.7 Cumulative Impacts

Air pollution is inherently a cumulative impact measured across an air basin. The discussion under Threshold 4.3.2, above, includes an analysis of the proposed Project's contribution to cumulative air impacts. To summarize the conclusion with respect to that analysis, the incremental effect of projects that do not exceed the project-specific thresholds are generally not considered to be cumulatively considerable per SCAQMD guidelines. The proposed Project's construction- and operation-related regional daily emissions are less than the SCAQMD significance thresholds for all criteria pollutants. In addition, adherence to SCAQMD rules and regulations on a project-by-project basis would substantially reduce potential impacts associated with the related projects and basin-wide air pollutant emissions. Therefore, the proposed Project would not have a cumulatively considerable increase in emissions, and the proposed Project's cumulative air quality impacts would be less than significant.

4.3.8 Level of Significance Prior to Mitigation

Construction and operation of the proposed Project would result in less than significant air quality impacts with implementation of Regulatory Compliance Measures.

4.3.9 Regulatory Compliance Measures and Mitigation Measures

The proposed Project would not result in significant impacts related to air quality, and no mitigation is required.

The following Regulatory Compliance Measures are SCAQMD Rules that are applicable to the proposed Project and are considered in the analysis of potential impacts related to air quality. The City of Lake Forest considers these requirements to be mandatory; therefore, they are not mitigation measures.

RCM AQ-1 **South Coast Air Quality Management District (SCAQMD) Rule 403.** The Project Applicant shall ensure the Construction Contractor implements fugitive dust control measures in compliance with SCAQMD Rule 403. The Project Applicant shall include the following fugitive dust control measures for SCAQMD Rule 403 compliance in the Project plans and specifications:

- All clearing, grading, earth-moving, or excavation activities shall cease when winds exceed 25 miles per hour (mph) per SCAQMD guidelines in order to limit fugitive dust emissions.
- The Construction Contractor shall ensure that all disturbed unpaved roads and disturbed areas within the Project are watered, with complete coverage of disturbed areas, at least three (3) times daily during dry weather and preferably mid-morning, afternoon, and after work is done for the day.
- The contractor shall ensure that traffic speeds on unpaved roads and Project site areas are reduced to 15 mph or less.

RCM AQ-2 **SCAQMD Rule 1113.** The Project Applicant shall ensure the Construction Contractor implements measures to control volatile organic compound (VOC) emissions from architectural coatings in compliance with SCAQMD Rule 1113. The Project Applicant shall include the following control measures for SCAQMD Rule 1113 compliance in the Project plans and specifications:

- Only “Low-Volatile Organic Compounds” paints (no more than 50 grams/liter of VOC) shall be used.

RCM AQ-3: **SCAQMD Rule 445.** Prior to the issuance of building permits, the City of Lake Forest Director of Community Development, or designee, shall ensure that the project design does not include wood-burning stoves and fireplaces in new development in compliance with SCAQMD Rule 445.

RCM AQ-4: **Title 24 of the California Code of Regulations (CCR).** Prior to issuance of building permits, the City of Lake Forest Director of Community Development, or designee, shall ensure that the project design complies with the 2019 Building Energy Efficiency Standards (CCR Title 24) energy conservation and the California Green Building Standards Code (CALGreen).

4.3.10 Level of Significance after Mitigation

Construction and operational air quality impacts would be less than significant.

4.4 BIOLOGICAL RESOURCES

This section provides a discussion of the existing biological resources within the boundaries of the proposed Project site and provides an analysis of potential impacts to biological resources from implementation of the proposed Project. Where impacts are identified, mitigation measures pursuant to the California Environmental Quality Act (CEQA), the State and Federal Endangered Species Act (CESA and FESA, respectively), and other pertinent regulations are recommended. This Biological Resources section is based on the information and findings of the *Biological Technical Report* (GLA 2019) and the *Biological Regulatory Overview for the Approximately 121-Acre Lake Forest Nursery Site* (GLA 2017), which are included in Appendix D.

It should be noted that the *Biological Technical Report* (GLA 2019) provides the results of general biological surveys and focused biological surveys for the 121.8-acre (ac) Project site and an additional 2.75 ac of adjacent road and slope improvements, totaling 124.55 ac.

4.4.1 Scoping Process

The City of Lake Forest (City) received 28 comment letters during the public review period of the Initial Study/Notice of Preparation (IS/NOP). For copies of the IS/NOP comment letters, refer to Appendix A of this EIR. Four comment letters included comments related to biological resources.

The letter from the California Department of Fish and Wildlife (CDFW) (August 14, 2018) expressed concern about potential impacts to coastal sage scrub and associated species, specifically coastal California gnatcatcher. The CDFW also outlined the procedure for payment of in-lieu fees to mitigate impacts to occupied coastal sage scrub and clarified that impacts to unoccupied coastal sage scrub also constitute impacts. The CDFW suggested mitigation measures to compensate for potential impacts to riparian corridors and wetlands and noted that completion of a jurisdictional delineation is required. They also noted that the Applicant is required to enter into a Lake and Streambed Alteration Agreement (LSAA) and requested that impacts to stream or riparian resources be identified in the Environmental Impact Report (EIR). CDFW also suggested that an assessment of floral and faunal species be conducted on the Project site and adjacent areas, and states that the EIR should also evaluate potential impacts related to lighting, noise, human activity, exotic species, and drainage on biological resources.

The EIR should also satisfy the CESA Incidental Take Permit requirements. The CDFW suggested mitigation for avoidance or protection of Rare Natural Communities; for any adverse Project-related impacts to sensitive plants, animals, or habitats; for proposed preservation and/or restoration areas; and for avoidance of nesting and migratory birds. Additionally, CDFW expressed concern with the expertise of the persons preparing the plans for restoration and revegetation, and the inclusion of certain elements in those plans. Finally, CDFW expressed concern with relocation, salvage, or transplantation of rare, threatened, or endangered species and with invasive shot hole borer (ISHB) beetles and their impact on trees, for which they suggested potential mitigation measures.

The letter from the Santa Ana Regional Water Quality Control Board (RWQCB) (August 15, 2018) suggested that a jurisdictional wetland delineation be performed. The RWQCB also commented that if the proposed Project would result in impacts to jurisdictional waters, then a Clean Water Act

(CWA) Section 401 permit from the RWQCB, a CWA Section 404 permit from the United States Army Corps of Engineers (ACOE), and a Streambed Alteration Agreement (SAA) from the CDFW would be required.

The letter from Southern California Edison (August 14, 2018) suggests analysis of the biological impacts associated with Project-related utility work. The letter from Judy Esposito (August 6, 2018) expressed concern about animals coming closer to residential areas to scavenge garbage.

4.4.2 Existing Environmental Setting

Agricultural land uses consisting of an active nursery operation occupy the vast majority of the Project site. Nursery activities have remained active since 1979, causing a general lack of native vegetation communities on the Project site, with the exception of a small patch of remnant coastal sage scrub occurring within the southeastern corner of the site and riparian forest located immediately adjacent to Serrano Creek along the southeastern boundary of the Project site. ~~A water quality treatment ditch~~ An on-site earthen and partly paved drainage system (herein referred to as the existing on-site drainage system) designed to infiltrate flows from nursery operations prior to leaving the Project site bisects the site and is routinely maintained free of vegetation. Developed areas consisting of equipment maintenance buildings and nursery offices were also observed at the Project site.

4.4.2.1 Vegetation

During vegetation mapping of the Project site, four different habitat (vegetation) types were identified. Table 4.4.A provides a summary of vegetation types/land uses and the corresponding acreage. Detailed descriptions of each vegetation type follow the table. Figure 4.4.1 is a vegetation map showing the location of each habitat type on the Project site.

Table 4.4.A: Summary of Vegetation/Land Use Types for the Project Site

Orange County Habitat Types	Acreage
Maritime Succulent Scrub/Southern Cactus Scrub	0.28
Southern Black Willow Forest	2.17
Active Agriculture	118.66
Bare Ground/Developed	3.44
Habitat Total	**124.55**

Source: *Biological Technical Report* (GLA 2019).
GLA = Glenn Lukos Associates, Inc.

Maritime Succulent Scrub/Southern Cactus Scrub (Coastal Sage Scrub). The 0.28 ac of maritime succulent scrub occurs along the southwestern boundary of the Project site. It appears to be a remnant patch from when lands in the vicinity were covered with natural vegetation including this form of sage scrub. This patch is vegetated with coast prickly pear (*Opuntia littoralis*), lemonade berry (*Rhus integrifolia*), California sagebrush (*Artemisia californica*), and telegraph weed (*Heterotheca grandiflora*).

LSA

FIGURE 4.4.1

N

0 250 500
FEET

SOURCE: Glenn Lukos Associates

I:\CLF1801\G\Vegetation_Map.cdr (7/5/2019)

Nakase Nursery/Toll Brothers
Vegetation Map

This page intentionally left blank

This native scrub is highly degraded at this location due to invasive weedy garden escapees from the nursery operation and is not expected to support wildlife associated with larger stands of sage scrub. A focused survey for coastal California gnatcatcher (*Polioptila californica californica*), an obligate sage scrub species that is federally listed as Threatened, was performed only due to the proximity of this patch to Serrano Creek, which could result in a California gnatcatcher visiting this area while moving up or downstream to reach existing open space well north and south of the Project site. Maritime succulent scrub is considered a special-status vegetation community.

The maritime succulent scrub/southern cactus scrub (coastal sage scrub) located on the Project site is not within federally designated Critical Habitat because it is a small (0.28 ac) remnant patch of this community and highly disturbed in nature. There is no federally designated Critical Habitat mapped within or adjacent to the Project site. The nearest Critical Habitat (for a California gnatcatcher) is located approximately 1 mile (mi) west and approximately 1.5 mi east of the Project site.

Southern Black Willow Forest. Approximately 2.17 ac of riparian forest, best characterized as southern black willow forest, was mapped during the survey of the Project site. As shown on Figure 4.4.1, the southern black willow forest is located on the Project site adjacent to Serrano Creek. This vegetation type consists of a mix of native riparian and nonnative plant species and includes eucalyptus (*Eucalyptus* sp.), coast live oak (*Quercus agrifolia*), western sycamore (*Platanus racemosa*), Fremont cottonwood (*Populus fremontii*), black willow (*Salix gooddingii*), mule fat (*Baccharis salicifolia*), toyon (*Heteromeles arbutifolia*), Spanish dagger (*Yucca gloriosa*), and mission prickly-pear (*Opuntia ficus-indica*). Southern black willow forest is considered a special-status vegetation community.

Active Agriculture. The Project site is primarily characterized as active agriculture (nursery stock), totaling 118.66 ac. The agricultural land use, consisting of the active nursery operation, contains a variety of nonnative ornamental plant species that are grown in containers for commercial resale.

Bare Ground/Developed. Approximately 3.44 ac of bare ground/developed land occurs between Rancho Parkway and the existing nursery and between Bake Parkway and the existing nursery. This land is outside the nursery property but is proposed for improvements. This area is bare ground, portions of which have been planted with ornamental trees, including Peruvian pepper tree (*Schinus molle*) and coast live oak.

4.4.2.2 Special-Status Plants

Eight species of special-status plants were initially judged to have potential to occur on the Project site, based on a preliminary review of habitat needs and site conditions. A focused plant survey was performed, and special-status plant species were confirmed absent from the Project site.

4.4.2.3 Wildlife

Animal species observed consisted of common avian species, and included common raven (*Corvus corax*), western kingbird (*Tyrannus verticalis*), northern mockingbird (*Mimus polyglottos*), mourning dove (*Zenaida macroura*), California towhee (*Melozone crissalis*), house finch (*Haemorhous mexicanus*), Bewick's wren (*Thryomanes bewickii*), and Say's phoebe (*Sayornis saya*).

4.4.2.4 Special-Status Animals

The Project site contains trees, shrubs, and ground cover that provide suitable habitat for nesting migratory birds. Two special-status species of wildlife were detected during the 2017 field studies: willow flycatcher (*Empidonax traillii*) and yellow warbler (*Setophaga petechia*). The Project site also provides suitable foraging habitat for several raptor species, including, but not limited to Cooper's hawk (*Accipiter cooperii*), red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), great horned owl (*Bubo virginianus*), barn owl (*Tyto alba*), and the white-tailed kite (*Elanus leucurus*). Cooper's hawk and red-tailed hawk nest in Serrano Creek with no other species nesting on the Project site during the field studies.

In addition, two special-status bats have potential to occur in Serrano Creek: western mastiff bat (*Eumops perotis californicus*) and western red bat (*Lasiurus blossevillii*). Neither species is State or federally listed but both are State Species of Special Concern. These bats, along with several non-special-status bats, have potential to roost and possibly breed in proximity to Serrano Creek.

Willow Flycatcher. During the focused surveys for southwestern willow flycatcher (*Empidonax traillii extimus*), a willow flycatcher was detected. The subspecies of willow flycatcher detected was confirmed to not be the southwestern willow flycatcher subspecies based on when the individual was observed. The subspecies detected was likely the subspecies *E. t. brewsteri*, which does not breed in southern California but migrates through the area in spring and fall. While only southwestern willow flycatcher is federally listed, all subspecies of willow flycatcher are State listed. The State does not protect habitat used by willow flycatchers migrating through and all non-extimus willow flycatchers are habitat generalists during migration.

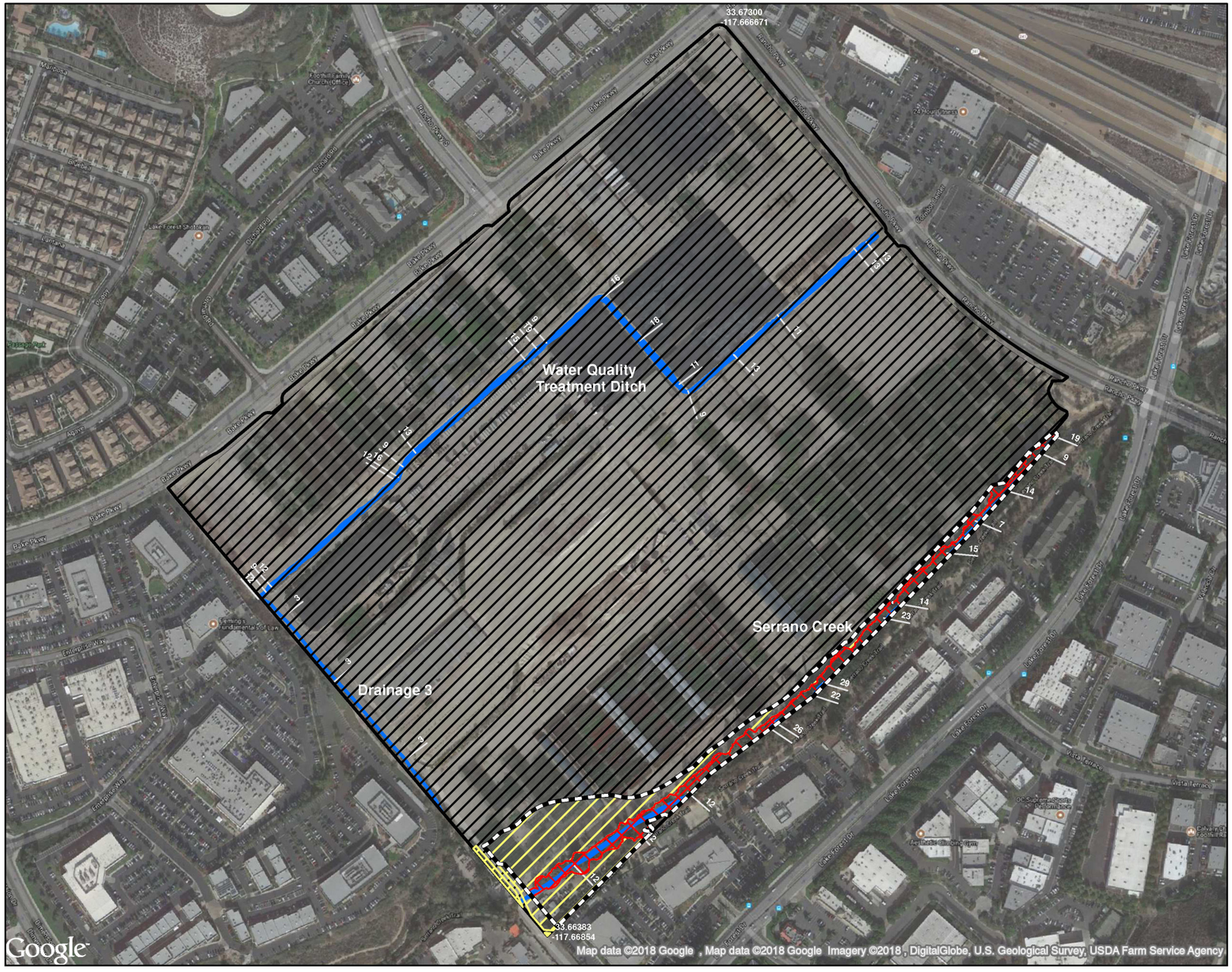
Yellow Warbler. This species of warbler is an obligate of riparian vegetation for nesting and was detected in Serrano Creek during the field studies. Yellow warbler is a state Species of Special Concern and may breed in proximity to Serrano Creek.

4.4.2.5 Delineation of Jurisdictional Waters

The Project site is within the San Diego Creek Watershed Special Area Management Plan (SAMP), and contains three drainage features: (1) the ~~Water Quality Treatment Ditch~~ existing on-site drainage system, (2) Serrano Creek, and (3) unvegetated ephemeral Drainage 3. These drainages are ultimately tributary to San Diego Creek, which is tributary to Upper Newport Bay, which is tributary to the Pacific Ocean.

Potential ACOE jurisdiction associated with the Project site totals 1.28 ac, none of which consists of jurisdictional wetlands, and a total of 4,971 linear feet of streambed is present. The boundaries of potential ACOE jurisdiction are depicted on Figure 4.4.2.

Potential RWQCB jurisdiction associated with the Project site totals 1.28 ac, none of which consists of jurisdictional wetlands (refer to Figure 4.4.2, ACOE/RWQCB Jurisdictional Areas). A total of 4,971 linear feet of streambed is present. As noted above, the ~~Water Quality Treatment Ditch~~ existing on-site drainage system, Serrano Creek, and Drainage 3 have been determined to be potential ACOE



- Project Boundary
- Permanent Impact Limits
- Temporary Impact Limits
- Conservation Area
- Avoidance Area
- Corps/RWQCB Non-Wetland Waters
- 3 Width in Feet

LSA

FIGURE 4.4.2

N

0 250 500
FEET

SOURCE: Glenn Lukos Associates

I:\CLF1801\G\ACOE-RWQCB_JD_Areas.cdr (7/5/2019)

Nakase Nursery/Toll Brothers
ACOE/RWQCB Jurisdictional Areas

This page intentionally left blank

jurisdictional waters, subject to regulation pursuant to Section 404 of the CWA and subject to regulation by the RWQCB pursuant to Section 401 of the CWA. Potential CDFW jurisdiction associated with the Project site totals 4.11 ac, of which 1.94 ac consist of non-riparian streambed and 2.17 ac consists of vegetated riparian habitat. The boundaries of potential CDFW jurisdiction within the Project site are depicted on the enclosed jurisdictional delineation map provided as Figure 4.4.3.

Table 4.4.B provides a summary of the total area of potential ACOE, RWQCB, and CDFW jurisdiction within the Project site.

The ~~Water Quality Treatment Ditch~~ existing on-site drainage system is an intermittent drainage feature that generally bisects the Project site from northeast to southwest. This ~~Water Quality Treatment Ditch~~ existing on-site drainage system is regularly maintained in order to remain free of vegetation and sediment for maximum capacity, on-site retention, and treatment of flows.

Serrano Creek is an intermittent drainage that extends along the southeastern boundary of the Project site. Serrano Creek supports a riparian forest consisting of both native and nonnative species, including eucalyptus, coast live oak, western sycamore, Fremont cottonwood, Goodding's black willow (*Salix gooddingii*), mule fat, toyon, Spanish dagger, and mission prickly-pear.

Drainage 3 is an unvegetated ephemeral drainage feature that is located along the southwestern boundary of the Project site. Drainage 3 drains into the ~~Water Quality Treatment Ditch~~ existing on-site drainage system that drains into an off-site portion of Serrano Creek.

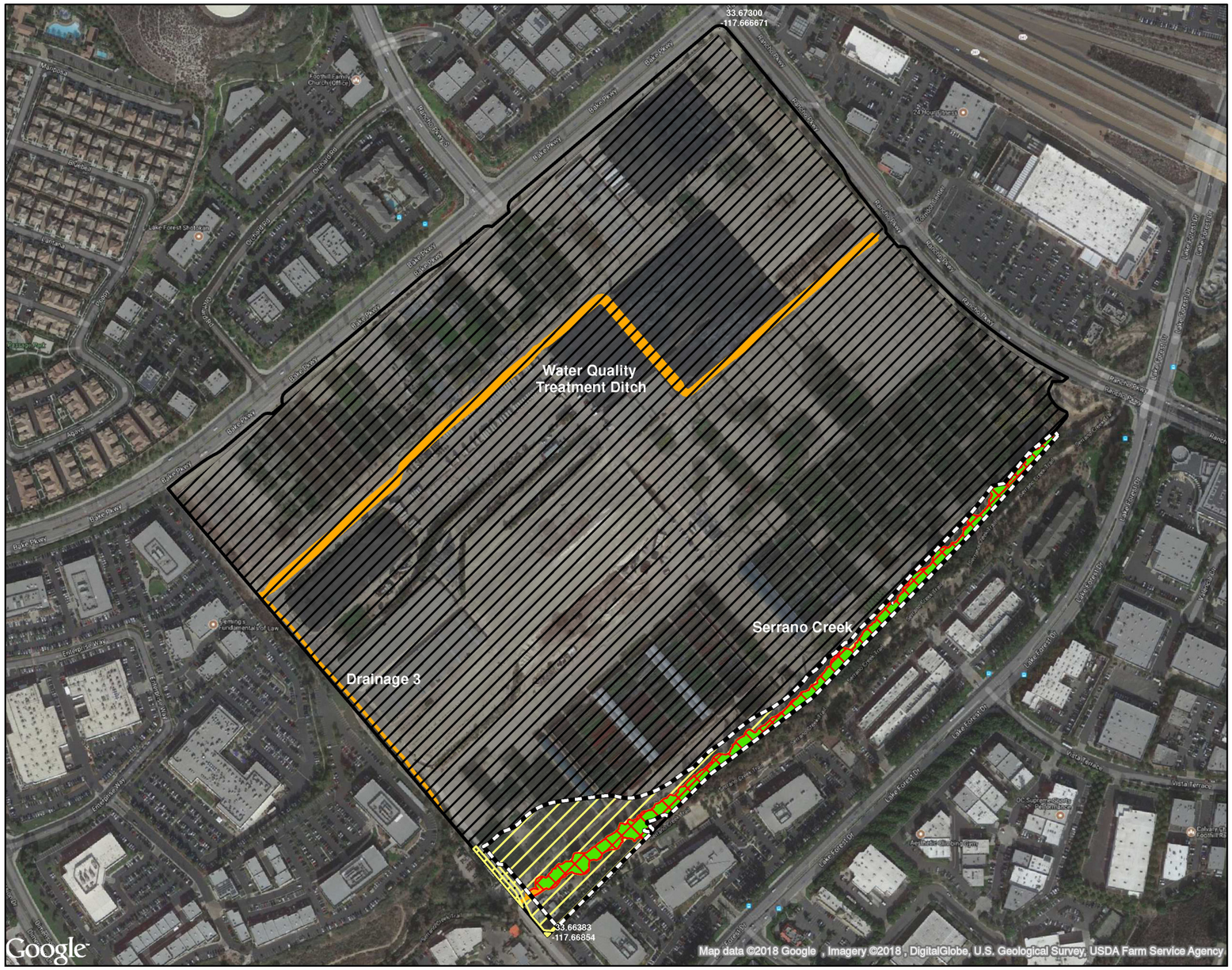
4.4.3 Regulatory Setting

4.4.3.1 Federal Regulations

Federal Endangered Species Act of 1973. The FESA defines an endangered species as "any species that is in danger of extinction throughout all or a significant portion of its range." A threatened species is defined as "any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." Under provisions of Section 9(a)(1)(B) of the FESA, it is unlawful to "take" any listed species.

"Take" is defined in Section 3(18) of FESA: "...harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Further, the USFWS, through regulation, has interpreted the terms "harm" and "harass" to include certain types of habitat modification that result in injury to, or death of species, as forms of "take." These interpretations, however, are generally considered and applied on a case-by-case basis and often vary from species to species. In a case where a property owner seeks permission from a federal agency for an action that could affect a federally listed plant and animal species, the property owner and agency are required to consult with the USFWS to ensure the action is not likely to jeopardize the continued existence of the listed species or result in destruction or adverse modification of designated critical habitat. Section 9(a)(2)(b) of the FESA addresses the protections afforded to listed plants.

This page intentionally left blank



Property Boundary
Permanent Impact Limits
Temporary Impact Limits
Conservation Area
Avoidance Area
CDFW Riparian
CDFW Unvegetated

LSA

FIGURE 4.4.3

N

0 250 500
FEET

SOURCE: Glenn Lukos Associates

I:\CLF1801\G\CDFW_JD_Areas.cdr (7/5/2019)

Nakase Nursery/Toll Brothers
CDFW Jurisdictional Areas

This page intentionally left blank

Table 4.4.B: Summary of ACOE, CDFW, and RWQCB Jurisdiction on the Project Site

Drainage Feature	Resource Type	ACOE			CDFW			Total RWQCB Acreage	Total Length (linear feet))
		Wetland (acres)	Nonwetland Waters (acres)	Total (acres)	Vegetated Streambed (acres)	Unvegetated Streambed (acres)	Total (acres)		
~~Water Quality Treatment Ditch~~ Existing On-Site Drainage System	Intermittent	0.0	0.92	0.92	0.0	1.84	1.84	0.92	3,032
Serrano Creek	Intermittent	0.0	0.29	0.29	2.17	0.03	2.20	0.29	928
Drainage 3	Ephemeral	0.0	0.07	0.07	0.0	0.07	0.07	0.07	1,011
Totals		**0.0**	**1.28**	**1.28**	**2.17**	**1.94**	**4.11**	**1.28**	**4,971**

Source: *Biological Technical Report* (GLA 2019).
ACOE = United States Army Corps of Engineers
CDFS = California Department of Fish and Wildlife
GLA = Glenn Lukos Associates, Inc.
RWQCB = Regional Water Quality Control Board

The take of federally listed species can be authorized under Section 10(a) of the FESA, with development of a Habitat Conservation Plan (HCP) or as part of a Section 7 consultation between the USFWS and another federal agency if the Project is subject to federal action (e.g., a Section 404 Permit). Upon development of an HCP, the USFWS can issue incidental take permits for listed species where the HCP specifies at minimum, the following: (1) the level of impact that will result from the taking, (2) steps that will minimize and mitigate the impacts, (3) funding necessary to implement the plan, (4) alternative actions to the taking that were considered by the applicant and the reasons why such alternatives were not chosen, and (5) such other measures that the Secretary of the Interior may require as being necessary or appropriate for the plan. In certain instances, such as for the California gnatcatcher, take of a Threatened species can be authorized by special rule (i.e., 4[d]). In the case of the California gnatcatcher, the 4(d) rule applies in jurisdictions that are participating in the State's Natural Communities Conservation Plan (NCCP) program dealing with coastal sage scrub plant communities.

Migratory Bird Treaty Act. The federal Migratory Bird Treaty Act (MBTA) governs take, possession, import, export, transport, selling, purchasing, or bartering of migratory birds and their eggs, parts, and nests, except as authorized under a valid permit. Section 704 of the MBTA states that the Secretary of the Interior is authorized and directed to determine if, and by what means, the take of migratory birds should be allowed and to adopt suitable regulations permitting and governing take while ensuring that take is compatible with protection of the species. Most bird species are protected under the MBTA.

In addition, under the California Fish and Game Code, it is unlawful to take, possess, or needlessly destroy any bird or the nests or eggs of any bird species except as otherwise provided in the California Fish and Game Code and regulations. This code also specifically protects raptors, including owls, and the CDFW considers a disturbance that results in nest abandonment or loss of reproductive effort as take. Disturbances of active nesting territories should be avoided during the nesting season.

Section 404 of the Clean Water Act. The ACOE regulates discharges of dredged or fill material into waters of the United States. These waters include wetlands and non-wetland bodies of water that meet specific criteria. The ACOE regulatory jurisdiction pursuant to Section 404 of the federal CWA is founded on a connection, or nexus, between the water body in question and interstate commerce. This connection may be direct, through a tributary system linking a stream channel with traditional navigable waters used in interstate or foreign commerce, or may be indirect, through a nexus identified in the ACOE regulations. The following definition of waters of the United States is taken from the discussion provided in 33 Code of Federal Regulations (CFR) 328.3:

> The term waters of the United States means:
>
> (1) All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce . . . ;
>
> (2) All interstate waters including interstate wetlands;

(3) All other waters such as intrastate lakes, rivers, streams (including intermittent streams) . . . the use, degradation or destruction of which could affect interstate or foreign commerce . . . ;

(4) All impoundments of waters otherwise defined as waters of the United States under the definition; and

(5) Tributaries of waters defined in paragraphs (a) (1)–(4) of this section."

The ACOE typically regulates as waters of the United States any body of water displaying an ordinary high water mark (OHWM). The landward limits of ACOE jurisdiction in tidal waters of the United States extend to the high tide line, and ACOE jurisdiction over nontidal waters of the United States extends laterally to the OHWM or beyond the OHWM to the limit of any adjacent wetlands, if present (33 CFR 328.4). The OHWM is defined as "that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding area" (33 CFR 328.3). Jurisdiction typically extends upstream to the point where the OHWM is no longer perceptible.

The ACOE and the United States Environmental Protection Agency (EPA) define wetlands as follows:

> Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions.

In order to be considered a jurisdictional wetland under Section 404, an area must possess three wetland characteristics: hydrophytic vegetation, hydric soils, and wetland hydrology. Each characteristic has a specific set of mandatory wetland criteria that must be satisfied in order for that particular wetland characteristic to be met. Several parameters may be analyzed to determine whether the criteria are satisfied.

4.4.3.2 State Regulations

California Endangered Species Act. The CDFW, via policies formulated by the California Fish and Game Commission (Commission), regulates species of plants and animals that are in danger of, or threatened with, extinction. The Commission has established a list of Endangered, Threatened, and candidate species that are regulated by the CDFW. Endangered species are native species or subspecies of plants and animals that are in serious danger of becoming extinct throughout all or a significant portion of their range. Threatened species are those species that, although not presently threatened with extinction, are likely to become Endangered species in the foreseeable future in the absence of special protection and management efforts. Candidate species are those species the Commission has formally noticed as being under review for addition to either the list of Endangered or Threatened species or a species proposed for listing.

California Environmental Quality Act. CEQA requires evaluation of a project's impacts on biological resources and provides guidelines and thresholds for use by lead agencies for evaluating the significance of proposed impacts. Furthermore, pursuant to *State CEQA Guidelines* Section 15380, CEQA provides protection for non-listed species that could potentially meet the criteria for State listing. For plants, CDFW recognizes that plants on Lists 1A, 1B, or 2 of the CNPS Inventory of Rare and Endangered Plants in California may meet the criteria for listing and should be considered under CEQA. CDFW also recommends protection of plants, which are regionally important, such as locally rare species, disjunct populations of more common plants, or plants on CNPS List 3 or 4.

California Natural Diversity Database. The CDFW administers the California Natural Diversity Database (CNDDB), which maintains lists of special-interest plants, animals, and natural communities that occur within California. These particular natural communities, or habitat types, are designated as sensitive because of their rarity (e.g., very localized distribution, few scattered occurrences) and/or because of some threat (e.g., development, off-road vehicles) to this specific habitat type. The purpose of these listings is solely informational; there is no regulatory protection of these communities afforded by the CNDDB listings.

Sections 1600-1603 of the California Fish and Game Code. Pursuant to Division 2, Chapter 6, Sections 1600-1603 of the California Fish and Game Code, the CDFW regulates all diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake, which supports fish or wildlife.

CDFW defines a stream (including creeks and rivers) as "a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life. This includes watercourses having surface or subsurface flow that supports or has supported riparian vegetation." CDFW's definition of "lake" includes "natural lakes or manmade reservoirs." CDFW also defines a stream as "a body of water that flows, or has flowed, over a given course during the historic hydrologic regime, and where the width of its course can reasonably be identified by physical or biological indicators."

It is important to note that the California Fish and Game Code defines fish and wildlife to include all wild animals, birds, plants, fish, amphibians, invertebrates, reptiles, and related ecological communities, including the habitat upon which they depend for continued viability (FGC Division 5, Chapter 1, section 45, and Division 2, Chapter 1, section 711.2(a), respectively).

Furthermore, Division 2, Chapter 5, Article 6, Section 1600 et seq. of the California Fish and Game Code does not limit jurisdiction to areas defined by specific flow events, seasonal changes in water flow, or presence/absence of vegetation types or communities.

Fish and Game Code Section 3503. Sections 3503, 3503.5, and 3513 protect native birds. Mitigation for avoidance of impacts to nesting birds are typically necessary to comply with these sections of the California Fish and Game Code in CEQA and other permitting documents. Specifically, Sections 3503, 3503.5, and 3513 of the California Fish and Game Code prohibit the take, possession, or destruction of birds, their nests, or eggs.

California Native Plant Society. The CNPS is a nonprofit organization whose purpose is to promote the preservation of native California plants. The CNPS has compiled an inventory comprised of the information focusing on geographic distribution and qualitative characterization of Rare, Threatened, or Endangered vascular plant species of California. The list serves as the candidate list for listing as Threatened and Endangered by the CDFW.

Section 401 of the Clean Water Act. Section 401 of the CWA requires any applicant for a Section 404 permit to obtain certification from the State that the discharge (and the operation of the facility being constructed) will comply with the applicable effluent limitation and water quality standards. In California, this 401 certification is obtained from the RWQCB. The ACOE, by law, cannot issue a Section 404 permit until a 401 certification is issued or waived. Areas subject to RWQCB jurisdiction typically coincide with those of the ACOE (i.e., waters of the United States, including any wetlands). The RWQCB also asserts authority over waters of the State under waste discharge requirements pursuant to the California Porter-Cologne Water Quality Control Act (Porter-Cologne Act), but this mechanism is typically not invoked in cases where the ACOE asserts permitting authority pursuant to the CWA.

4.4.3.3 Regional Regulations

Central/Coastal Subregion Natural Communities Conservation Program/Habitat Conservation Plan. The California Fish and Game Commission voted in favor of pursuing preparation of an NCCP, as proposed by pursuing preparation of an NCCP program, as proposed by Assembly Bill (AB) 2172 (California Fish and Game Code, Sections 2800 et seq.). AB 2172 authorizes the CDFW to enter agreements with any person or local, State, or federal agencies for preparing and implementing NCCPs and for preparing guidelines for developing and implementing NCCPs.

The purpose of the NCCP program is to provide regional or area wide protection and to promote perpetuation of natural wildlife diversity while allowing compatible and appropriate development and growth. The focus of the NCCP program represents a dramatic shift from “individual species” to “habitat” preservation. This NCCP/HCP is intended to ensure the long-term survival of the coastal California gnatcatcher and other special-status, coastal-sage-scrub-dependent plant and wildlife species, in accordance with State-sanctioned NCCP program guidelines.

The County of Orange (in conjunction with State and federal resource agencies, local jurisdictions/ municipalities, utility companies, the Transportation Corridor Agencies [TCA], and major private landowners) prepared the NCCP/HCP for the Central/Coastal Subregion (approved on July 10, 1996). The City of Lake Forest is a signatory to the NCCP/HCP. The Project site is located within the Central/Coastal Subregion of Orange County, California, but the Project Applicant is a non-participating landowner. As such, there are no specific requirements of the NCCP/HCP that applies to this Project.

Regional General Permit 74 and Special Area Management Plan. Regional General Permit 74 is one part of the permitting frameworks developed for the ACOE’s two SAMPs in Orange County, California (i.e., the San Diego Creek Watershed SAMP and the San Juan Creek/Western San Mateo Creek Watershed SAMP).

The SAMP permitting frameworks replace the pre-SAMP permitting procedures available in these watersheds prior to the ACOE formulation and adoption of the SAMPs. The SAMP permitting framework involves the establishment of abbreviated permit processing procedures in the form of Regional General Permit 74 and new CWA Section 404 letter of permission procedures in combination with the use of selected nationwide permits and standard individual permits.

Watershed-specific mitigation policies are also being implemented under both the SAMPs. The SAMP permitting frameworks consider the type of regulated activity, permanency of impacts, and location of proposed activity within the SAMP watersheds (i.e., whether the activity would affect sensitive aquatic resources also identified as aquatic resource integrity areas).

For the San Diego Creek Watershed SAMP, CDFW established a Watershed Streambed Alteration Agreement (WSAA) process that will augment Streambed Alteration Agreement (California Fish and Game Code Section 1600) processing procedures within the San Diego Creek Watershed in Orange County, California.

4.4.3.4 Local Regulations

City of Lake Forest General Plan. According to the Recreation and Resources Element of the City's General Plan, Lake Forest contains many important natural resources and features, including its eucalyptus forest and other trees, lakes, creeks, canyons, hillsides, mineral resource areas, and other open lands. These resources add to the value of property, provide visual changes in an urban environment that create interest, and offer important landmarks that communicate a sense of place and location within the community. These important resources can be preserved or enhanced to maintain the natural physical and visual quality of Lake Forest. Goals and policies applicable to the proposed Project include:

> **Goal 2.0:** Preservation and enhancement of important natural resources and features.
>
> **Policy 2.1:** Conserve and protect important natural plant and animal communities, such as areas supporting rare and endangered species, riparian areas, wildlife movement corridors, wetlands, and significant tree stands through appropriate site planning and grading techniques, re-vegetation and soil management practices, and other resource management techniques.

City of Lake Forest Municipal Code. From April 1st through October 31st of each year, the City of Lake Forest Municipal Code (Section 6.20.025) prohibits any person from pruning, cutting branches from, topping, or cutting down any eucalyptus tree on public property within Lake Forest or to transport on its streets or highways any logs, branches, or trunk of any eucalyptus tree, unless a eucalyptus tree cutting permit has been obtained from the City of Lake Forest (City).

4.4.4 Methodology

To adequately identify biological resources in accordance with the requirements of CEQA, Glenn Lukos Associates, Inc. (GLA) assembled biological data consisting of the following main components:

- Literature review and database searches;
- Delineation of aquatic resources (including wetlands and riparian habitat) subject to the jurisdiction of the ACOE, RWQCB, and CDFW;
- Performance of vegetation mapping for the Project site; and
- Performance of habitat assessments and site-specific biological surveys (focused surveys) to evaluate the presence/absence of special-status species in accordance with the requirements of CEQA.

The focus of the biological surveys was determined through initial site reconnaissance, a review of the CNDDB, CNPS 8th edition online inventory, Natural Resource Conservation Service (NRCS) soil data, other pertinent literature, and knowledge of the region. Site-specific general surveys within the Project site were conducted on foot in the proposed development areas for each target plant or animal. Vegetation was mapped directly onto a 200 ft scale (1 inch = 200 ft) aerial photograph following the Habitat Classification System Natural Resources Geographic Information System (GIS) Project. All flora and fauna identified on the Project site during vegetation mapping were included in a floral and faunal compendia prepared for the Project (refer to Appendices A and B of the *Biological Technical Report* which is Appendix D of this EIR). Vegetation communities not listed under the above-mentioned vegetation classification systems were named based on the dominant plant species present. All vegetation mapping was imported into ArcGIS for acreage analysis.

GLA senior biologist Zack West and regulatory specialist April Nakagawa visited the Project site on July 27 and 28, 2016, to conduct a general site review. Additional follow-up visits were made by Zack West and senior regulatory specialist Thienan Pfeiffer on October 6 and November 17, 2016, and at various times during March and April 2017. Site reconnaissance was conducted in such a manner as to allow inspection of the entire site by direct observation, including the use of binoculars. The Project site was inspected to determine whether any special-status species, habitats, or potential jurisdictional areas are present on site.

In addition to site reconnaissance, evaluation of the Project site included a review of the CNDDB for the El Toro quadrangle and surrounding quadrangles, a review of the CNPS on-line Inventory, a soil map review, and review of various documents provided by Toll Brothers, Inc.

4.4.4.1 Summary of Surveys

GLA conducted biological studies to identify and analyze actual or potential impacts to biological resources associated with development of the Project site. Observations of all plant and wildlife species were recorded during each of the above-mentioned survey efforts. The studies conducted include the following:

- Performance of vegetation mapping

- Performance of site-specific habitat assessments and biological surveys to evaluate the potential presence/absence of special-status species (or potentially suitable habitat) to the satisfaction of CEQA and federal and State regulations

- Focused surveys for:

    - Rare plants
    - Burrowing owl
    - Coastal California gnatcatcher
    - Least Bell's vireo
    - Southwestern willow flycatcher

- Delineation of aquatic resources (including wetlands and riparian habitat) potentially subject to the jurisdiction of the ACOE, RWQCB, and CDFW

Individual plants and wildlife species are evaluated in this report based on their "special status." For the purpose of this report, plants were considered "special status" based on one or more of the following criteria:

- Listing through FESA and/or CESA, and/or
- Occurrence in the CNPS Rare Plant Inventory (Ranks 1A/1B, 2A/2B, 3, or 4)

Wildlife species were considered "special-status" based on one or more of the following criteria:

- Listing through FESA and/or CESA, and
- Designation by the State as a Species of Special Concern (SSC) or California Fully Protected (CFP) species

Vegetation communities and habitats were considered "special status" based on their occurrence in the CNDDB inventory.

4.4.4.2 Botanical Resources

A site-specific survey program was designed to accurately document the botanical resources within the Project site, and consisted of five components: (1) a literature search; (2) preparation of a list of target special-status plant species and sensitive vegetation communities that could occur within the Project site; (3) general field reconnaissance surveys; (4) vegetation mapping; and (5) habitat assessments and focused surveys for special-status plants.

- **Literature Search:** Prior to conducting fieldwork, pertinent literature on the flora of the region was examined. A thorough archival review was conducted using available literature and other historical records. These resources included the following:

- CNPS Inventory of Rare and Endangered Plants for the United States Geological Survey (USGS) 7.5-minute quadrangles: *Black Star Canyon*, *Canada Gobernadora*, *Corona South*, *El Toro*, *Laguna Beach*, *Orange*, *San Juan Capistrano*, *Santiago Peak*, and *Tustin, California* (online edition, v8-02) (CNPS 2017); and

- CNDDB for the USGS 7.5-minute quadrangles: *Black Star Canyon*, *Canada Gobernadora*, *Corona South*, *El Toro*, *Laguna Beach*, *Orange*, *San Juan Capistrano*, *Santiago Peak*, and *Tustin, California*.

- **Vegetation Mapping:** Vegetation communities within the Project site were mapped according to the Habitat Classification System Natural Resources GIS Project.

- **Special-Status Plant Species and Habitats Evaluated for the Project Site:** As described above, a literature search was conducted to obtain a list of special-status plants with the potential to occur within the Project site. The CNDDB was initially consulted to determine well-known occurrences of plants and habitats of special concern in the region. Other sources used to develop a list of target species for the survey program included the CNPS online inventory.

  Based on this information, vegetation profiles and a list of target sensitive-plant species and habitats that could occur within the Project site were developed and incorporated into a mapping and survey program to achieve the following goals: (1) characterize the vegetation associations and land use; (2) prepare a detailed floristic compendium; (3) identify the potential for any special-status plants that may occur within the Project site; and (4) prepare a map showing the distribution of any sensitive botanical resources associated with the Project site, if applicable.

- **Botanical Surveys:** GLA biologist Zack West visited the site on April 19 and May 22, 2017, to conduct general and focused plant surveys. Surveys were conducted in accordance with accepted botanical survey guidelines. As applicable, surveys were conducted at appropriate times based on precipitation and flowering periods. An aerial photograph, a soil map, and/or a topographic map were used to determine the community types and other physical features that may support sensitive and uncommon taxa or communities within the Project site. Surveys were conducted by following meandering transects within target areas of suitable habitat. All plant species encountered during the field surveys were identified and recorded following the guidelines adopted by CNPS and CDFW.

4.4.4.3 Wildlife Resources

Wildlife species were evaluated and detected during field surveys by sight, call, tracks, and scat. Site reconnaissance was conducted in such a manner as to allow inspection of the entire Project site by direct observation, including the use of binoculars. Observations of physical evidence and direct sightings of wildlife were recorded in field notes during the visit.

Literature Search. A literature search was conducted to obtain a list of special-status wildlife species with the potential to occur within the Project site. Species were evaluated based on two factors: (1) species identified by the CNDDB as occurring (either currently or historically) on or in the vicinity

of the Project site; and (2) any other special-status animals that are known to occur within the vicinity of the Project site, or for which potentially suitable habitat occurs on the Project site.

Focused Surveys for Special-Status Animal Species. GLA biologists Zack West and April Nakagawa conducted habitat assessments for special-status animal species on July 27 and 28, 2016. An aerial photograph, soil map, and/or topographic map were used to determine the community types and other physical features that may support special-status and uncommon taxa within the Project site.

- **Burrowing Owl:** GLA biologists Jeff Ahrens and Kevin Livergood conducted focused surveys for the burrowing owl (*Athene cunicularia*) for all suitable habitat areas within the Project site. Surveys were conducted in accordance with survey guidelines described in the 2012 CDFW Staff Report on Burrowing Owl Mitigation. The guidelines stipulate that four focused survey visits should be conducted between February 15th and July 15th, with the first visit occurring between February 15th and April 15th. The remaining three visits should be conducted 3 weeks apart from each other, with at least one visit occurring between June 15th and July 15th. Focused surveys were conducted on March 17, April 26, May 30, and July 3, 2017. As recommended by the survey guidelines, the survey visits were conducted between morning civil twilight and 10:00 a.m. Weather conditions during the surveys were conducive to a high level of bird activity.

  Surveys were conducted by walking meandering transects throughout areas of suitable habitat, primarily rubble piles, culverts, and irrigation pipes located throughout the Project site. All suitable burrows were inspected for diagnostic owl sign (e.g., pellets, prey remains, whitewash, feathers, bones, and/or decoration) to identify potentially occupied burrows.

- **Coastal California Gnatcatcher:** GLA biologists Jeff Ahrens (Permit TE 052159-5) and Kevin Livergood (Permit TE-172638-2) conducted focused surveys for the coastal California gnatcatcher for all suitable habitat areas within the Project site. Surveys were conducted in accordance with the 1997 USFWS survey guidelines, which during the breeding season (March 15th through June 30th) require a minimum of six surveys (per survey polygon) with at least 1 week separating each survey visit. The survey guidelines limit individual biologists to surveying a maximum of 80 ac per day. The Project site contains approximately 0.28 ac of suitable habitat for the gnatcatcher. Therefore, the 0.28 ac survey area of suitable habitat was completed as a single survey polygon. Regardless, biologists recorded birds throughout the entire Project area during surveys.

  Focused surveys were conducted on March 17, March 24, March 31, April 7, April 14, and April 26, 2017. Pursuant to the survey guidelines, the surveys were conducted between sunrise and 12:00 p.m. Weather conditions during the surveys were conducive to a high level of bird activity.

- **Least Bell's Vireo:** GLA biologist Kevin Livergood conducted focused surveys for the least Bell's vireo (*Vireo bellii pusillus*) for all suitable habitat areas within the Project site. Surveys were conducted in accordance with the 2001 USFWS survey guidelines, which stipulate that eight

surveys should be conducted between April 10th and July 31st, with a minimum of 10 days separating each survey visit.

Focused surveys were conducted on April 14, April 26, May 8, May 18, May 30, June 12, June 23, and July 3, 2017. Pursuant to the survey guidelines, the surveys were conducted between sunrise and 11:00 a.m. Weather conditions during the surveys were conducive to a high level of bird activity.

- **Southwestern Willow Flycatcher.** GLA biologist Jeff Ahrens conducted focused surveys for the southwestern willow flycatcher for all suitable habitat areas within the Project site. Surveys were conducted in accordance with the 2010 USFWS survey guidelines, which stipulate that five surveys should be conducted between May 15th and July 17th, and divided into three survey periods. The southwestern willow flycatcher is one of four subspecies of willow flycatcher that occur within southern California, but is the only subspecies that breeds in southern California. The other subspecies may occur in southern California during the first and second survey periods as they migrate through the area on their way breeding areas, but will not breed in southern California. Therefore, the presence of the southwestern willow flycatcher is determined by willow flycatchers that remain in southern California during the third survey period.

  Focused surveys were conducted on May 20, June 1, June 15, June 25, and July 5, 2017. Pursuant to the survey guidelines, the surveys were conducted between sunrise and 10:00 a.m. Weather conditions during the surveys were conducive to a high level of bird activity.

4.4.4.4 Jurisdictional Delineation

A jurisdictional delineation was conducted for the Project site on April 7, 2017, by GLA biologist Zack West. Prior to beginning the field delineation, a 200 ft scale color aerial photograph and the previously cited USGS topographic maps were examined to determine the locations of potential areas of ACOE/CDFW jurisdiction and the San Diego Creek Watershed SAMP was reviewed for any Aquatic Resource Integrity Areas mapped within the boundaries of the Project site. Suspected jurisdictional areas were field checked for the presence of definable channels and/or wetland vegetation, soils, and hydrology. Glenn Lukos Associates, Inc. evaluated potential wetland habitats at the subject site using the methodology set forth in the ACOE 1987 Wetland Delineation Manual (Wetland Manual) and the 2008 Regional Supplement to the ACOE Wetland Delineation Manual: Arid West Supplement (Arid West Supplement). The presence of an OHWM was determined using the 2008 Field Guide to Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States in conjunction with the Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States. While in the field, the limits of the OHWM, wetlands, and CDFW jurisdiction were recorded using global positioning system (GPS) technology and/or on copies of the aerial photography. Other data were recorded onto the appropriate datasheets.

4.4.5 Thresholds of Significance

The thresholds for biological resource impacts used in this analysis are consistent with Appendix G of the *State CEQA Guidelines*. The proposed Project may be deemed to have a significant impact with respect to biological resources if it would:

Threshold 4.4.1: **Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service**

Threshold 4.4.2: **Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or US Fish and Wildlife Service**

Threshold 4.4.3: **Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means**

Threshold 4.4.4: **Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.**

Threshold 4.4.5: **Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance**

Threshold 4.4.6: **Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan**

None of the thresholds for biological resources were scoped out in the Initial Study, which is included in Appendix A. Therefore, all of the thresholds listed above are addressed in the following analysis.

4.4.6 Project Impacts

Threshold 4.4.1: **Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?**

Direct Impacts

Special Interest Plant Species.

No Impact. No special-status plants are present on the Project site; therefore, no impacts to these resources would occur and no mitigation is required.

Special Interest Animal Species.

Potentially Significant Impact. The proposed Project would remove 119.77 ac (115.26 ac permanently, 4.51 ac temporarily) of potential foraging habitat for two special-status bats: the western red bat and the western mastiff bat. The agricultural lands would not provide valuable foraging habitat but could be used to some degree by these species, if present. The number of individuals potentially foraging on site is judged to be low given the degraded condition of the site. In addition, large blocks of high-quality foraging habitat are present within Whiting Ranch Wilderness Park and Limestone Canyon Regional Park, located approximately 1 mi north of the Project site. Roosting and breeding (nursery) by these species and other non-special-status bats may occur in Serrano Creek, but potential roosting habitat is not proposed for removal. The removal of 119.77 ac of low-quality potential foraging habitat for bats would be a less than significant impact.

Serrano Creek provides potential nesting habitat for yellow warbler and the species was observed during field studies. The Project proposes no removal of potential habitat for this species. No direct impact would occur. Willow flycatcher was detected as a spring migrant in Serrano Creek. As discussed above, the subspecies of willow flycatcher detected was not the southwestern subspecies, which is federally listed as Endangered. All subspecies of willow flycatcher are State listed as Endangered, but the State does not provide protection of migrant habitat, thus no potential "take" of willow flycatcher would occur under CESA. The non-southwestern subspecies of willow flycatcher that migrates through southern California in spring and fall does not breed on the Project site and during migration are habitat generalists, including the use of residential landscaping. The proposed Project would not encroach into Serrano Creek. The potential foraging that could occur by these migrants in other parts of the Project site that are proposed for impact (nursery agriculture) is not judged important habitat for these subspecies given the broad range of vegetation used by them. Potential impacts to non-southwestern willow flycatchers during migration is less than significant, and no mitigation is required.

As discussed above, protocol surveys for burrowing owls were conducted on the Project site. Surveys were conducted in accordance with survey guidelines described in the 2012 CDFW Staff Report on Burrowing Owl Mitigation. While burrowing owls were not detected on the Project site during focused surveys, the CDFW survey guidelines requires a pre-construction survey prior to ground disturbance to ensure the species has not moved onto the site between when the survey was performed and commencement of construction. Mitigation Measure 4.4.1 requires a qualified biologist to conduct a pre-construction presence/absence survey for burrowing owls within 14 days prior to site disturbance. If burrowing owls are not detected, no further action is necessary. If burrowing owls are detected during the preconstruction survey visit, the owls shall be evicted from the site (when not nesting) following accepted CDFW protocols and as approved by the CDFW to avoid direct take of burrowing owl and compensate for the loss of habitat. Compensation for the loss of occupied burrowing owl habitat shall occur at a 1:1 ratio such that the habitat acreage and

number of burrows occupied by burrowing owls impacted are replaced. As required by CDFW, a mitigation management plan shall be drafted and submitted to CDFW for approval, and will ensure lands used to compensate for the loss of habitat and burrows occupied by burrowing owls are conserved and managed in perpetuity. With implementation of Mitigation Measure 4.4.1, potential impacts to burrowing owls would be reduced below a level of significance.

Indirect Impacts

Potentially Significant Impact. In the context of biological resources, indirect effects are those effects associated with developing areas adjacent to native open space. Potential indirect effects associated with development include water quality impacts associated with drainage into adjacent open space/downstream aquatic resources; dust effects; lighting effects; noise effects; invasive plant species from landscaping; and effects from human entry into adjacent open space (e.g., recreational activities [including hiking], pets, dumping). Temporary indirect effects may also occur as a result of construction-related activities.

More specifically, indirect effects of Project construction and habitation may contribute to the degradation of the existing functions and values of Serrano Creek, and may increase depredation of wildlife from noise and lighting; dissuaded use of Serrano Creek by wildlife from noise and lighting; introduction of nonnative invasive plants that outcompete native riparian plant species and thus cause reduced value to native plants and wildlife; and increased mortality to native wildlife from dogs and cats. These impacts can occur to non-special-status as well as special-status species (e.g., western red bat, western mastiff bat, nesting hawks).

As discussed above, two special-status bats have potential to occur in Serrano Creek: western mastiff bat and western red bat. Neither species is State or federally listed but both are State Species of Special Concern. These bats, along with several non-special-status bats, have potential to roost and possibly breed in Serrano Creek. Mitigation Measure 4.4.2 requires bat roosting/nursery exit counts and acoustic surveys prior to the start of any construction activities. The mitigation also requires the preparation of a Bat Management Plan if the surveys find 25 or more individuals composed of non-special-status bat species[1] and/or one or more bats with a special-status in order to ensure that bat mortality does not occur during construction. With implementation of Mitigation Measure 4.4.2, significant impacts to bats roosting in Serrano Creek would be avoided.

In order to reduce and/or avoid the introduction of nonnative invasive plants that may outcompete native riparian plant species and thus cause reduced value to native plants and wildlife, Mitigation Measure 4.4.3 requires that none of the plants installed in common areas (including parks and open space) on the Project site as part of the proposed Project would be invasive exotic plants (i.e., those plant species rated as “High” or “Moderate” in the California Invasive Plant Council Invasive Plant Inventory).

[1] For bats, the threshold of significance would be if the population of bats potentially impacted is 25 or more individuals with no special status and one individual bat with a special status. The threshold of significance is set at 25 or more individuals for non-special-status bats because the loss of 25 individuals would not pose a significant loss to the regional population of any non-special-status species with potential to roost on the Project site.

Mitigation Measures 4.4.4 and 4.4.5 would reduce indirect impacts to Serrano Creek and wildlife (including bats) in the Serrano Creek corridor during Project construction. These mitigation measures require the installation of construction fencing around Serrano Creek and the southern black willow forest to prevent encroachment. Mitigation Measure 4.4.5 also requires construction Best Management Practices (BMPs) intended to reduce and avoid indirect impacts to wildlife related to construction lighting, noise, dust, and the spread of exotic species. Mitigation Measure 4.4.6 requires the Project Applicant/Developer to create a Wall and Fencing Plan that includes details for the use of a permanent bird strike avoidance treatment consisting of either window film (CollidEscape Clear or equivalent) or UV (ultraviolet) patterned glass (or equivalent) on all perimeter glass fencing including, but not limited to the fencing around Serrano Creek and the radiant heat wall (refer to Figure 4.19.2: Fire Protection Plan). With the implementation of Mitigation Measures 4.4.2 through 4.4.6, potential indirect impacts to sensitive plant and animal species on the Project site would be reduced below a level of significance.

Threshold 4.4.2: Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

Potentially Significant Impact. Serrano Creek is vegetated with southern black willow forest, which is similar to southern mixed riparian forest and southern riparian scrub. In addition, a small patch of remnant maritime succulent scrub is present along the southwestern boundary of the property. These vegetation types can provide valuable habitat to a wide range of species associated with riparian habitats and sage scrub habitats, both of which have declined appreciably over the past several decades in Orange County and coastal southern California. As such, both the remnant maritime succulent scrub and the southern black willow forest are considered a special-status vegetation community.

The proposed Project does not include the removal of any of the southern black willow forest; therefore, there would be no direct impacts to this vegetation community. As discussed under Threshold 4.4.1, Mitigation Measures 4.4.4 and 4.4.5 would avoid indirect impacts to Serrano Creek and the southern black willow forest during Project construction. These mitigation measures require the installation of construction fencing around Serrano Creek and the southern black willow forest to prevent encroachment. Mitigation Measure 4.4.5 also requires construction BMPs intended to reduce and avoid indirect impacts to wildlife in the southern black willow forest related to construction lighting, noise, dust, and the spread of exotic species. Mitigation Measure 4.4.7 requires the Project Applicant/Developer to develop a Habitat Management Plan (HMP) for the Project site. The HMP would describe the long-term management and maintenance requirements (including funding mechanisms and monitoring) for the Open Space & Habitat & Restoration Area, including the southern black willow forest. Mitigation Measure 4.4.7 also requires that the Open Space & Habitat & Restoration Area, including the southern black willow forest, be placed in a permanent conservation easement or similar legal protection that would protect and manage the land in perpetuity. Mitigation Measure 4.1.1 in Section 4.1, Aesthetics, requires the Project Applicant/Developer to prepare a comprehensive lighting plan and a photometric survey prior to construction in order to demonstrate that no spill lighting occurs in sensitive areas. This measure is

intended to minimize the impacts of new sources of light to adjacent land uses, including Serrano Creek and the Open Space & Habitat & Restoration Area. Mitigation Measures 4.1.1, 4.4.4, 4.4.5, and 4.4.7 would ensure that the Project avoids impacts to sensitive riparian habitat (i.e., the southern black willow forest).

The Maritime Succulent Scrub/Southern Cactus Scrub (Coastal Sage Scrub) located at the Project site is a small (0.28 ac) remnant patch of this community that is highly disturbed in nature. It is not within federally designated Critical Habitat, is co-dominated by nonnative species (including ornamental species), and has a very low density. In addition, this community on the Project site represents Coastal Sage Scrub species that have been recruited, along with escaped ornamental and more invasive nonnative species, onto areas that were previously disturbed by agricultural activities, and does not represent intact Coastal Sage Scrub. Therefore, the Coastal Sage Scrub on the Project site holds marginal ecological value and, through focused surveys, was found not to support coastal California gnatcatcher or other special-status species. Based on the size and degraded quality of vegetation, potential impacts to the coastal sage scrub would be less than significant, and no mitigation is required.

The proposed Project would result in the loss of 119.77 ac (115.26 ac permanently, 4.51 ac temporarily) of foraging habitat that supports several species of raptors. As discussed under Threshold 4.4.4, Cooper's hawk and redtailed hawk both nest in the trees within Serrano Creek. There would be no proposed direct impacts to Serrano Creek, thus this nesting habitat would remain after Project implementation. Based on the degraded quality of the foraging habitat and the low number of individuals potentially affected, the loss of 119.77 ac of nursery agriculture lands would not be a significant impact, and no mitigation is required.

Threshold 4.4.3: Would the project have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

Potentially Significant Impact. Implementation of the proposed Project would permanently impact a 0.99 ac (4,078 linear feet of drainage) portion of the existing 1.28 ac (4,971 linear feet) of potential federal ACOE jurisdiction, none of which consists of jurisdictional wetlands. Development of the proposed Project would remove a 0.99 ac (4,078 linear feet) portion of the existing 1.28 ac (4,971 linear feet) of RWQCB jurisdiction, none of which are wetlands. For the CDFW jurisdiction on the Project site, an estimated 1.91 ac portion of the 1.94 ac of existing unvegetated streambed would be removed. The proposed Project would not impact the existing 2.17 ac of vegetated streambed. Refer to Table 4.4.C below for a summary of impacts by jurisdiction and feature.

While the ~~Water Quality Treatment Ditch~~ existing on-site drainage system and Drainage 3 do not support riparian vegetation (herbaceous or woody) or provide habitat to plant or wildlife species beyond what the adjacent uplands provide, the entirety of both the existing on-site drainage system and Drainage 3 would be permanently removed by the Project (Figure 4.4.2 and Figure 4.4.3).

Table 4.4.C: Summary of Proposed Impacts to ACOE, CDFW, and RWQCB Jurisdiction

Drainage Feature	Impact Type	ACOE			CDFW			Total RWQCB Acreage	Total Length (linear feet)
		Wetland (acres)	Nonwetland Waters (acres)	Total (acres)	Vegetated Streambed (acres)	Unvegetated Streambed (acres)	Total (acres)		
Existing On-site Drainage System (Intermittent)	Permanent	0.0	0.92	0.92	0.0	1.84	1.84	0.92	3,032
	Temporary	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Serrano Creek (Intermittent)	Permanent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
	Temporary	0.0	0.00.01	0.00.01	0.0	0.00.01	0.00.01	0.00.01	35
Drainage 3 (Ephemeral)	Permanent	0.0	0.07	0.07	0.0	0.07	0.07	0.07	1,011
	Temporary	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Totals[1]		**0.0**	**0.99**	**0.99**	**0.0**	**1.91**	**1.91**	**0.99**	**4,078**

Source: *Biological Technical Report* (GLA 2019).

[1] Totals may not equal sum of parts due to rounding error.

ACOE = United States Army Corps of Engineers
CDFW = California Department of Fish and Wildlife
GLA = Glenn Lukos Associates, Inc.
RWQCB = Regional Water Quality Control Board

Therefore, the Project would be required to comply with Mitigation Measure 4.4.8, which outlines the procedures for coordinating with the ACOE, CDFW, and RWQCB regarding potential jurisdictional areas and the associated permitting processes.

In addition to outlining the procedures for coordinating with ACOE, RWQCB, and the CDFW, Mitigation Measure 4.4.8 provides a range of mitigation scenarios that the resource agencies may require.

Additionally, as specified in RCM WQ-2, an erosion and sediment control plan would be prepared and submitted to the City Building Official prior to issuance of a grading or building permit in compliance with the City of Lake Forest Municipal Code. Erosion Control and Sediment Control BMPs would be designed to minimize erosion and retain sediment on site. With implementation of Erosion Control and Sediment Control BMPs, soil disturbance activities would not have the potential to contribute to the sedimentation/siltation, benthic community effects, and selenium impairments. With adherence to Mitigation Measure 4.4.8 and RCM WQ-2, impacts would be reduced below a level of significance.

The proposed Project would impact 0.95 ac that has been mapped under the San Diego Creek Watershed SAMP as an Aquatic Resource Integrity Area. The area mapped as an Aquatic Resource Integrity Area is an agricultural and developed upland area currently and historically used by the plant nursery operation. These areas were part of the nursery operation during the time the SAMP was developed, are outside of the existing riparian zone associated with Serrano Creek, and are located at an elevation of 10 feet (ft) or more above the bankfull channel of Serrano Creek. Therefore, it is believed these areas were incorrectly mapped as Aquatic Resource Integrity Areas as a result of the course level of remote-sensing-based mapping utilized to develop the SAMP.

The entirety of the existing riparian zone associated with Serrano Creek would be avoided by the proposed Project. Impacts to the riparian integrity of Serrano Creek would not occur from the development of the proposed Project because the entire riparian zone is being avoided (refer to Mitigation Measures 4.4.4 and 4.4.5). Nevertheless, Mitigation Measure 4.4.9 requires that mitigation for impacts to greater than 0.1 ac within this mapping unit be developed in coordination with the ACOE~~CDFW~~ unless the ACOE~~CDFW~~ determines that the Project site does not contain an Aquatic Resource Integrity Area (i.e., there is a mapping error in the SAMP). With implementation of Mitigation Measure 4.4.9, potential impacts related to the SAMP would be reduced below a level of significance.

Threshold 4.4.4: Would the project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

Less than Significant Impact. There are no wildlife corridors or wildlife nurseries on the Project site where development is proposed. Serrano Creek is considered a wildlife migration corridor, but is outside the Project footprint. Serrano Creek is an important link between the open space lands southwest and northeast of the Project site. Although Serrano Creek is in a degraded condition, it

still supports the necessary attributes needed to support animal movement, namely vegetation for cover and topography to guide animals up and downstream. The proposed Project would not directly encroach on Serrano Creek.

Nevertheless, due to the proximity of anticipated construction activities to Serrano Creek and the southern black willow forest, the proposed Project has the potential to impact active native bird nests if construction or demolition activities occur during the nesting season (January 15th to August 31st). Impacts to nesting native birds are prohibited by the MBTA and California Fish and Game Code. Therefore, Project implementation must be accomplished in a manner that avoids impacts to active nests during the nesting season. If any disturbance to the Project site (including disking, demolition, grading, or vegetation clearance) occurs between February 15th and August 31st, a qualified biologist shall conduct a nesting bird survey of the construction area and areas within 500 ft of the construction area within~~no more than~~ 3 days of commencement of such activities~~prior~~. As documented in RCM BIO-1, if active nests are identified, the biologist shall establish suitable buffers (i.e., a minimum of 50 ft for passerines, 250 ft for raptors [including burrowing owls]) around the nests. The buffer areas shall be avoided until the nests are no longer occupied and the juvenile birds can survive independently from the nests. Therefore, with compliance with the MBTA and California Fish and Game Code Section 3503, the proposed Project's potential impacts on nesting birds—including Cooper's hawk and red-tailed hawk in Serrano Creek—would be less than significant.

Threshold 4.4.5: Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

Potentially Significant. Lake Forest has a vast quantity of eucalyptus trees. These trees are endangered by the presence of a beetle identified as the eucalyptus longhorn borer (*Phoracantha semipunctata* and *Phorocantha recurve*). These beetles lay their eggs on the eucalyptus trees and the larvae bore holes within the trees, causing serious damage and destruction. The control of infestation by this beetle can be helped by regulating the maintenance of such trees in a healthy and nonhazardous condition through good arboricultural practices and by prohibiting the transportation and cutting of eucalyptus trees or logs during the period of April 1st through October 31st without a City permit. Because implementation of the proposed Project would require the removal of eucalyptus trees (including the transportation of cut logs, branches, or trunks on City streets) from the Project site, RCM BIO-2 requires the Project Applicant/Developer to comply with the City's permitting requirements (Lake Forest Municipal Code Section 6.20.025). No mitigation is required.

The polyphagous shot hole borer (PSHB) (*Euwallacea* sp.*)* is an invasive wood-boring beetle that attacks dozens of tree species in Southern California, including commercial avocado groves, common landscape trees, and native species in urban and wildland environments. PSHB spreads a disease called Fusarium Dieback (FD), which is caused by pathogenic fungi. Trees that are FD-susceptible may experience branch dieback, canopy loss, and, in some cases, tree mortality. Kuroshio shot hole borer (KSHB) is another ISHB species that also vectors FD. While the City does not have a specific policy related to ISHBs, with documented occurrences of both PSHB and KSHB in Lake

Forest,[1] the avoidance and preservation of Serrano Creek and its associated habitat would reduce the potential spread of invasive species (including ISHBs) because no disturbance to existing trees or transportation of tree material would occur. Additionally, Serrano Creek would be placed into a conservation easement (refer to Mitigation Measures 4.4.4, 4.4.5, and 4.4.7) or similar legal protection that would protect the lands in perpetuity. In addition, Mitigation Measure 4.4.10 requires that a survey of all on-site trees to be removed or trimmed as part of Project implementation be performed at least~~no more than~~ 30 days prior to the commencement of construction activities. If any tree is determined to be infested/infected by ISHBs, a control plan would be prepared and provided to CDFW and the City for review and approval. At a minimum, the plan would include methods of control, removal, and appropriate disposal techniques to prevent the spread of ISHBs. With the survey and implementation of the control plan, potential impacts related to ISHBs would be reduced to below a level of significance.

The City's General Plan Recreation and Resources Element includes the following policy related to the protection of biological resources.

> **Policy 2.1:** Conserve and protect important natural plant and animal communities, such as areas supporting rare and endangered species, riparian areas, wildlife movement corridors, wetlands, and significant tree stands through appropriate site planning and grading techniques, re-vegetation and soil management practices, and other resource management techniques.

As discussed in Responses to Thresholds 4.4.1 through 4.4.4, the potential impacts of the proposed Project on special-status species, riparian areas, wildlife movement corridors, and jurisdictional waters would be reduced to below a level of significance through implementation of Project-specific mitigation. Moreover, the proposed Project does not propose any changes to Serrano Creek or the adjacent southern black willow forest, which provide important habitat to plant and animal species. With implementation of Mitigation Measures 4.4.1 through 4.4.10, the proposed Project would not result in a significant impact related to local policies or ordinances protecting biological resources

Threshold 4.4.6: Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

Less than Significant Impact. The City is a participant in the Orange County Central and Coastal NCCP/HCP. According to the *Biological Technical Report* (GLA 2019; Appendix D), the Project site is located within the Orange County Central and Coastal NCCP/HCP planning area but outside the boundaries of the NCCP/HCP Reserve System. The Reserve System boundary is located approximately 3,960 ft (0.75 mi) northeast of the proposed Project site. The Project site, however, is in an area identified in the NCCP/HCP as urbanized and is located in an area designated for development. Development of the proposed Project would not result in the removal of any sensitive

[1] University of California, Division of Agriculture and Natural Resources, Invasive Shot Hole Borers, Distribution of PSHB/FD and KSHB/FD in California. Website: https://ucanr.edu/sites/pshb/Map/ (accessed June 18, 2019).

habitat species identified in the Orange County Central and Coastal NCCP/HCP. The proposed Project would not conflict with local ordinances or the adopted HCP, NCCP, or other approved local, regional, or State HCP. Therefore, the proposed Project would result in a less than significant impact related to local ordinances and the adopted NCCP/HCP, and no mitigation is required.

4.4.7 Cumulative Impacts

Cumulative impacts are defined as the direct and indirect effects of a proposed Project which, when considered alone, would not be deemed a substantial impact, but when considered in addition to the impacts of related projects in the area, would be considered potentially significant. "Related projects" refers to past, present, and reasonably foreseeable probable future projects, which would have similar impacts to the proposed Project (refer to Table 4.A for a list of probable future projects).

4.4.7.1 Native Vegetation

Development of the Project site would permanently remove 0.29 ac of maritime succulent scrub (coastal sage scrub. This patch is a remnant and, due to its very small size and lack of contiguity with other sage scrub, is not judged to provide resource values associated with coastal sage scrub vegetation. The permanent removal of 0.29 ac of maritime succulent scrub would not make a cumulatively considerable contribution to the regional decline of this vegetation community.

Direct impacts to Serrano Creek are not proposed, but there is potential for significant indirect impacts to occur to this section of the Creek by the adjacent proposed development. Although this portion of Serrano Creek shows degradation from being adjacent to surrounding development, the potential further decline of Serrano Creek as a result of Project construction and operation would be a cumulatively considerable contribution to the regional decline of native streambed vegetated with riparian vegetation (southern black willow forest) that supports animal movement, nesting raptors, yellow warbler, and potential roosting/nursery habitat for bats. Serrano Creek and its vegetation are expected to support a degree of wildlife movement/connectivity between the natural open space lands southwest and northeast of the Project site; the connectivity between these areas would be maintained by the proposed Project. Mitigation Measures 4.4.4 and 4.4.5 would reduce indirect impacts to Serrano Creek during Project construction. These mitigation measures require the installation of construction fencing around Serrano Creek and the southern black willow forest to prevent encroachment. Mitigation Measure 4.4.5 also requires construction BMPs intended to reduce and avoid indirect impacts to vegetation and wildlife related to construction lighting, noise, dust, and the spread of exotic species. With implementation of mitigation measures, the Project's contribution to the cumulative regional decline of native streambed vegetated with riparian vegetation would be less than significant.

4.4.7.2 Raptor Use

The Project site is used by nesting Cooper's hawk and red-tailed hawk. Other species of raptors may also use the site for foraging. No direct impact to occupied nesting habitat in Serrano Creek would occur, but there is potential for potentially significant indirect impacts to occur to Serrano Creek, which may dissuade raptors from nesting along this stretch of the Creek. These two species are common to the region, and the removal of nesting habitat for these or other common species of

raptors would not make a potentially cumulatively considerable contribution to the regional decline of raptors.

The proposed Project would remove 119.77 ac of potential raptor foraging habitat through development of the active nursery. Although the nursery may provide foraging habitat for raptors, it is not expected to be valuable because the lands are actively maintained to minimize use by small mammals (prey for raptors). This loss of 119.77 ac of potential raptor foraging habitat would not make a cumulatively considerable contribution to the regional decline of raptors.

4.4.7.3 Special-Status Wildlife

Yellow warbler is present in Serrano Creek and likely nests there. This species is strongly tied to riparian habitats for nesting. During migration, yellow warbler can be seen in a wide variety of native and nonnative vegetation, including residential landscaping and native upland vegetation. Yellow warbler is a species of Special of Concern. Development of the Project would not directly impact yellow warbler, but potential indirect impacts to Serrano Creek could be appreciable. However, the number of yellow warbler potentially affected would be limited to approximately two or three pairs, and this species remains a common species to many riparian habitats. The loss of nesting habitat for yellow warbler would not make a cumulatively considerable contribution to the regional decline of this species.

There is potential for bats to roost in Serrano Creek (including western mastiff bat and western red bat). The proposed Project would not directly remove potential roosting/nursery habitat but has the potential to cause bats to abandon Serrano Creek due to indirect degradation of habitat during construction. As discussed under Threshold 4.4.1, for bats, the threshold of significance for potential impacts to bats would be if the population of bats potentially impacted is 25 or more individuals with no special status and one individual bat with a special status. The threshold of significance is set at 25 or more individuals for non-special-status bats because the loss of 25 individuals would not pose a significant loss to the regional population of any non-special-status species with potential to roost on the Project site. Given the regional decline of bats over the past several decades, this potential indirect impact would make a cumulatively considerable contribution to the regional decline of bats. Mitigation Measures 4.4.2, 4.4.4, and 4.4.5 would be implemented to reduce potential indirect cumulative impacts to bats foraging and/or roosting in Serrano Creek to a less than significant level. Mitigation Measure 4.4.2 requires bat roosting/nursery exit counts and acoustic surveys prior to the start of any construction activities. The mitigation also requires the preparation of a Bat Management Plan if the surveys find 25 or more individuals composed of non-special-status bat species[1] and/or one or more bats with a special-status in order to ensure that bat mortality does not occur during construction. Mitigation Measures 4.4.4 and 4.4.5 would reduce indirect impacts to Serrano Creek and wildlife (including bats) in the Serrano Creek corridor during Project construction. These mitigation measures require the installation of construction fencing

[1] For bats, the threshold of significance would be if the population of bats potentially impacted is 25 or more individuals with no special status and one individual bat with a special status. The threshold of significance is set at 25 or more individuals for non-special-status bats because the loss of 25 individuals would not pose a significant loss to the regional population of any non-special-status species with potential to roost on the Project site.

around Serrano Creek and the southern black willow forest to prevent encroachment. Mitigation Measure 4.4.5 also requires construction BMPs intended to reduce and avoid indirect impacts to wildlife related to construction lighting, noise, dust, and the spread of exotic species. With implementation of mitigation measures, the Project's contribution to the cumulative regional decline of bats would be less than significant.

4.4.7.4 Native Nesting Birds

There is potential for native nesting birds to be affected by development of the Project. The types of birds potentially affected are common to the region, and the number of individuals would be limited given the type of vegetation proposed for removal (agriculture, remnant patch of scrub habitat). Migratory birds are protected by the MBTA and similar provisions under the California Fish and Game Code. Based on the types of species and the expected limited number of nesting pairs potentially affected, development of the Project would not make a cumulatively considerable contribution to the regional decline of native nesting birds.

4.4.7.5 Federal and State Jurisdictional Waters

The jurisdictional waters proposed for removal are associated with the nursery operations and do not provide the functions and values of natural drainages/streambeds. As such, the removal of 0.99 ac of ACOE non-wetland waters, 0.99 ac of RWQCB non-wetland waters, and 1.91 ac of unvegetated CDFW streambed would not make a cumulatively considerable contribution to the regional decline of jurisdictional waters.

4.4.8 Level of Significance Prior to Mitigation

Potential adverse impacts to native plant communities, sensitive species, riparian habitat, jurisdictional areas, and nesting birds would be significant, and mitigation is required. The proposed Project would not conflict with any local policies or ordinances or the provisions of the NCCP/HCP. Cumulative indirect impacts to native vegetation in Serrano Creek and cumulative impacts to bat species would be significant, and mitigation is required.

4.4.9 Compliance Measures and Mitigation Measures

4.4.9.1 Regulatory Compliance Measures

RCM BIO-1 **Migratory Bird Treaty Act and California Department of Fish and Game Code.** In the event that any construction, vegetation clearing, or grading activities (including disking and demolition) should occur between February 1st and September 1st, a qualified biologist shall conduct a nesting bird survey within~~no more than~~ 3 days of~~prior to~~ commencement of construction activities to confirm the absence of nesting birds. If active nesting of birds is observed within 500 feet (ft) of the designated construction area during surveys, the biologist shall establish suitable buffers around the active nests (e.g., a minimum of 50 ft for passerines and 250 ft for raptors [including burrowing owls]). The buffer areas shall be avoided until the nests are no longer occupied and the juvenile birds can survive independently from the nests. Prior to commencement of grading activities~~ and issuance of any building permits~~, the Director of the City of Lake Forest Community Development, or

designee, shall verify that all Project grading and construction plans include specific documentation regarding the requirements of the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code Section 3503, that preconstruction surveys have been completed and the results reviewed by staff, and that the appropriate buffers (if needed) are noted on the plans and established in the field with orange snow fencing.

RCM BIO-2 **Tree Ordinance.** In compliance with City of Lake Forest Municipal Code Section 6.20.025, if any eucalyptus trees on the Project site are to be cut or trimmed between April 1st through October 31st, the Project Applicant/Developer shall first obtain a permit from the City of Lake Forest for the transportation of any logs, branches, or trunks to an off-site location for disposal.

4.4.9.2 Mitigation Measures

Mitigation Measure 4.4.1 **Burrowing Owls.** A qualified biologist shall conduct a pre-construction presence/absence survey for burrowing owls no more than 14 days prior to site disturbance and submit the survey results to the Director of the City of Lake Forest Community Development Department, or designee~~,~~. If burrowing owls are not detected, no further action is necessary.

If burrowing owls are detected during the pre-construction survey, the owls shall be evicted from the site (when not nesting) under the supervision of a qualified biologist and following accepted California Department of Fish and Wildlife (CDFW) protocols and as approved by the CDFW to avoid direct take of burrowing owl and compensate for the loss of habitat. Compensation for the loss of occupied burrowing owl habitat shall occur at a 1:1 ratio such that the habitat acreage and number of burrows occupied by burrowing owls impacted are replaced. As recommended~~required~~ by the 2012 CDFW Staff Report on Burrowing Owl Mitigation, if burrowing owl are detected on the Project site, a mitigation and management plan shall be drafted and submitted to CDFW for approval, and shall ensure mitigation lands used to compensate for the loss of habitat and burrows occupied by burrowing owls are conserved and managed in perpetuity.

Mitigation Measure 4.4.2 **Bats.** Bat roosting/nursery exit counts and acoustic surveys shall be performed in Serrano Creek by a qualified bat biologist prior to site disturbance to determine whether Serrano Creek supports a bat nursery and/or roost and by which species. The survey results shall be submitted to the Director of the City of Lake Forest Community Development Department, or designee. This survey work shall occur in late-spring/summer and potentially again in the fall, depending on the results of the summer work. This would be determined by

the bat biologist. If the results of the bat work finds 25 or more individuals composed of non-special-status bat species and/or one or more bats with a special-status, a Bat Management Plan shall be developed to ensure bat mortality does not occur during construction. If it is determined that excluding the bats during non-breeding (generally October through March) is necessary, the Bat Management Plan~~plan~~ shall provide details (both in text and with graphic images) where exclusion devices shall be placed, the timing for exclusion work, and the timeline and methodology needed to exclude the bats. The Bat Management Plan~~plan~~ shall be reviewed and approved by CDFW. Prior to issuance of ~~any construction or~~ grading permits for work adjacent to Serrano Creek, documentation indicating CDFW approval of the Bat Management Plan~~plan~~ shall be provided to the City of Lake Forest Director of Community Development, or designee.

Mitigation Measure 4.4.3 **Invasive Plant Species.** Prior to issuance of any building permits, the Project Applicant/Developer shall submit a final landscape plan to the Director of the City of Lake Forest Community Development Department, or designee, demonstrating that the landscaping palette for all common areas within the community does not include invasive exotic plants (i.e., those plant species rated as "high" or "moderate" in the California Invasive Plant Council's [Cal-IPC] Invasive Plant Inventory). Prior to the first final building inspection~~issuance of certificates of occupancy~~, the Project Applicant/Developer shall submit a copy of the Homeowner Association's (HOA) Covenants, Conditions, and Restrictions (CC&Rs) to the Director of the City of Lake Forest Community Development Department, or designee, for verification that the CC&Rs prohibit the use of invasive exotic plants in all on-site parks, open space, and other common areas. Further, the CC&Rs shall note that revisions to the HOA CC&Rs related to the maintenance of parks, open space, and other common areas shall be prohibited except with the review and approval of the Director of the City of Lake Forest Community Development Department, or designee.

Mitigation Measure 4.4.4: **Preservation of Serrano Creek During Project Construction.** Prior to the start of grading or construction activities, the Director of the City of Lake Forest Community Development Department, or designee, shall verify that plans require the Project impact footprint, including any construction buffers, be staked and fenced (e.g., with orange snow fencing, silt fencing, or a material that is clearly visible). The Director of the City of Lake Forest Community Development Department, or designee, shall further verify that a qualified, experienced biologist has been retained by the Project

Applicant/Developer and that the biologist shall: (1) be present on site during all grading or vegetation removal activities occurring within 100 ft of Serrano Creek to ensure that encroachment into Serrano Creek and/or the southern black willow forest does not occur; and (2) verify the boundary is properly delineated, staked, and fenced prior to the start of any ground disturbance or vegetation clearing. The Construction Site Manager shall ensure that the staking/fencing is maintained for the duration of construction and that any required repairs are completed in a timely manner. Prior to the removal of the staking/fencing at the completion of construction activities, a qualified, experienced biologist shall conduct a final inspection of the area to ensure that encroachment into Serrano Creek and/or the southern black willow forest has not occurred. The biologist shall provide a final report to the City of Lake Forest Director of Community Development, or designee. If encroachment did occur, the biologist shall evaluate the encroachment and provide a report to both the City of Lake Forest Director of Community Development and CDFW. The City and CDFW shall determine if and what additional mitigation would be required.

Mitigation Measure 4.4.5: **Construction Best Management Practices.** Prior to the start of grading or construction activities, the Director of the City of Lake Forest Community Development Department, or designee, shall verify that the plans note the following requirements:

- Any open trenches shall be covered at the end of each workday in a manner to prevent the entrapment of wildlife, or be adequately ramped to provide an animal escape route.
- Construction shall occur between 30 minutes before sunrise and 30 minutes after sunset.
- No nighttime construction within 200 ft of Serrano Creek shall occur.
- No construction lighting shall be placed within 200 ft of Serrano Creek unless a qualified biologist confirms the lighting does not illuminate Serrano Creek.
- Active construction areas shall be watered regularly (at least once every 2 hours) to control dust and thus minimize impacts on vegetation within Serrano Creek.

- Equipment operators and construction crews shall be informed of the importance of the construction limits by the biological monitor prior to any ground disturbance.

- Construction personnel shall strictly limit their activities, vehicles, equipment, and construction materials to the limits of disturbance and the designated staging areas and routes of travel approved by the biological monitor.

- Exotic plant species removed during construction shall be properly handled to prevent sprouting or regrowth. Construction equipment shall be cleaned of mud or other debris that may contain invasive plants and/or seeds and inspected to reduce the potential of spreading noxious weeds before mobilizing to the site and before leaving the site during the course of construction. The cleaning of equipment shall occur at least 300 ft from jurisdictional aquatic features, including Serrano Creek. If the location is closer, it must be approved by the biological monitor.

- Vegetation shall be covered while being transported, and vegetation materials removed from the site shall be disposed of in accordance with applicable laws and regulations.

- All equipment maintenance, staging, and dispensing of fuel, oil, coolant, or any other toxic substances shall occur only in designated areas within the limits of disturbance and at least 200 ft from jurisdictional aquatic features, including Serrano Creek. These designated areas shall be clearly marked and located in such a manner as to contain runoff and shall be approved by the biological monitor.

- To avoid attracting predators, the Project site will be kept clear of trash and debris. All food-related trash items will be enclosed in sealed containers and regularly removed from the site.

Mitigation Measure 4.4.6: **Perimeter Glass Fencing.** Prior to issuance of the first building permit, the~~The~~ Project Applicant/Developer shall submit a Wall and Fencing Plan to the City of Lake Forest Director of Community Development, or designee, for review and approval. The Wall and Fencing Plan shall specify, and include details for, the use of a permanent bird strike avoidance treatment consisting of either window film (CollidEscape Clear or equivalent) or UV (ultraviolet) patterned glass (or equivalent) on all perimeter glass fencing, including but not limited to the fencing around Serrano Creek and

the radiant heat wall (refer to Figure 4.19.2: Fire Protection Plan). The Wall and Fence Plan shall include documentation addressing the bird strike avoidance effectiveness of the proposed treatment.

Mitigation Measure 4.4.7: **Habitat Management Plan.** Prior to the issuance of the first building permit~~start of grading or construction activities~~, the Director of the City of Lake Forest Community Development Department, or designee, shall verify that the Project Applicant/Developer has developed a Habitat Management Plan (HMP) for the Project site. The HMP shall describe the long-term management and maintenance requirements—including funding mechanisms and monitoring—for the Open Space & Habitat & Restoration Area and the southern black willow forest. In addition, the HMP shall, at a minimum:

- Require the installation of permanent fencing along the perimeter of the Open Space & Habitat & Restoration Area and interior trails, if applicable. In addition, permanent signs shall be installed along all fencing indicating the purpose and need for the fencing and the restrictions within the Open Space & Habitat & Restoration Area. The maintenance of the fencing and signage shall be the responsibility of the HOA or a long-term land management entity.

- Require that all lighting along the perimeter of Serrano Creek, particularly street lamps, be shielded and oriented in a manner that prevents spill light or glare into the Creek. This also includes outdoor lighting for those residences abutting Serrano Creek. It shall be the responsibility of the HOA to ensure lighting is maintained consistent with these criteria.

- The Project Applicant/Developer shall place the Open Space & Habitat & Restoration Area into a conservation easement or similar legal protection, along with sufficient funds (as approved by the City of Lake Forest Director of Community Development, or designee) to protect the lands in perpetuity. In addition, lands within the conservation easement shall be managed in perpetuity by a qualified entity designated by the Project Applicant/Developer and approved by the City of Lake Forest Director of Community Development, or designee.

Mitigation Measure 4.4.8: **Jurisdictional Resources.** Prior to the issuance of any grading permit~~s~~, the Project Applicant/Developer shall coordinate with the United States Army Corps of Engineers (ACOE), Santa Ana Regional Water Quality Control Board (RWQCB), and the California

Department of Fish and Wildlife (CDFW) regarding their jurisdiction over the on-site drainages. The results of the Project Applicant/Developer's coordination efforts with the ACOE, RWQCB, and CDFW regarding their jurisdiction over the on-site drainages, and any mitigation measures required by the resource agencies regarding impacts on their respective jurisdictions shall be documented in a memorandum submitted to the City of Lake Forest Director of Community Development, or designee, prior to issuance of a grading permit.

The Project Applicant/Developer shall be obligated to implement/ comply with mitigation measures required by the resource agencies regarding impacts on their respective jurisdictions. The ratios at which ACOE, RWQCB, and CDFW may require permanent impacts to be mitigated vary from 1:1 (no net loss) to as high as 3:1. The jurisdictional areas of the ACOE, RWQCB, and CDFW are not additive areas because the jurisdictional areas on the site may be within the jurisdiction of one or more of these agencies. Therefore, the permits and associated jurisdictional replacement requirements would identify which mitigation areas apply to the corresponding jurisdiction. At a minimum, the following shall be implemented by the Project Applicant/Developer prior to issuance of building permits:

- A detailed Habitat Mitigation Monitoring Plan (HMMP) shall be prepared that describes the location of establishment, restoration, and/or enhancement, which shall include replanting requirements, success criteria, and monitoring following construction. The HMMP shall be ~~incorporated into the regulatory agencies permit, certification, and agreement required for the proposed Project and shall be~~ subject to review and approval by the resource agencies.

- To mitigate the loss of ACOE, RWQCB, and CDFW jurisdictional waters, the Project Applicant/Developer shall create a minimum of 4.19 acres (ac) of riparian vegetation on the Project site that shall be contiguous with, and contribute to, the existing riparian canopy associated with Serrano Creek within the conservation lands. If on-site mitigation options are not feasible, the Project Applicant/Developer shall purchase credits from an approved mitigation bank/in-lieu fee program at a minimum of a 1:1 ratio, for a minimum of 1.91 ac of mitigation credits. If on-site mitigation options are not feasible and an approved mitigation bank/in-lieu fee program cannot be identified to mitigate the loss of ACOE, RWQCB, and CDFW jurisdiction, the Project

Applicant/Developer shall enhance, re-establish, or establish ACOE, RWQCB, and CDFW jurisdictional areas on off-site conserved lands at a minimum 1:1 ratio, for a minimum of 1.91 ac of enhancement, re-establishment, or establishment.

Mitigation Measure 4.4.9: **Aquatic Resource Integrity Area.** The Project site is located within the boundaries of the San Diego Creek Watershed Special Area Management Plan (SAMP). The proposed Project would result in impacts to 0.95 ac of mapped Aquatic Resource Integrity Area. Mitigation for impacts to greater than 0.1 ac within this mapping unit shall be developed in coordination with the ACOE~~CDFW~~ unless the ACOE~~CDFW~~ determines that the Project site does not contain an Aquatic Resource Integrity Area (i.e., there is a mapping error in the SAMP). Prior to the issuance of any grading permits, the Project Applicant/Developer shall provide documentation to the City of Lake Forest Director of Community Development, or designee, that (1) ACOE~~CDFW~~ has determined that a mapping error exists (which may be accomplished through issuance of a Letter of Permission); OR (2) the Project Applicant/Developer shall implement mitigation as specified by the ACOE~~CDFW~~.

Mitigation Measure 4.4.10 **Invasive Short Hole Borers (ISHBs).** A designated biologist familiar with the signs of ISHBs shall survey trees on the Project site that are designated for removal or trimming. Surveys shall be conducted at least~~no more than~~ 30 days prior to removal or trimming activities. If any tree is determined to be infested/infected by ISHBs, a control plan shall be prepared and submitted to CDFW for review and approval. At a minimum, the control plan shall include methods of control, removal, and appropriate disposal techniques to prevent the spread of ISHBs. The results of the tree survey, and if warranted, a copy of the CDFW-approved control plan shall be submitted to the City of Lake Forest Director of Community Development, or designee, prior to issuance of ~~construction~~grading permits.

4.4.10 Level of Significance after Mitigation

Potential impacts to biological resources associated with Project construction and operation would be reduced to levels that are less than significant with implementation of the mitigation measures listed above. Therefore, the proposed Project would not result in any significant unavoidable impacts related to biological resources.

4.5 CULTURAL RESOURCES

This section provides a discussion of the existing cultural resource environments and an analysis of potential impacts from implementation of the proposed Project. Cultural resources are sites, buildings, structures, objects, and districts over 50 years old that may have traditional or cultural value for the historical significance they possess. This section summarizes information obtained from a records search at the South Central Coastal Information Center (SCCIC) of the California Historical Resources Information System (CHRIS), from the Historical Resources Evaluation Report (HRER) prepared by GPA Consulting (GPA 2018), and from the Recreation and Resources Element of the City of Lake Forest (City) General Plan (2015). The results of the records search and the HRER are contained in Appendix E of this Environmental Impact Report (EIR).

4.5.1 Scoping Process

The City received 28 comment letters during the public review period of the Initial Study/Notice of Preparation (IS/NOP). For copies of the IS/NOP comment letters, refer to Appendix A of this EIR. One comment letter included comments related to Cultural Resources.

The letter from the Native American Heritage Commission (NAHC) (August 8, 2018) recommended that an archaeological records search be conducted through CHRIS and also recommended measures in the event of discovery of human remains.

4.5.2 Existing Environmental Setting

4.5.2.1 Cultural Resources

The area that is now Lake Forest was prehistorically occupied by Native Americans. This area is primarily within the traditional boundaries of the Gabrielino, but is also along the boundary of the territory of the Juaneño. Aliso Creek, which is approximately 0.65 mile (mi) southeast of the proposed Project site, is generally accepted as the boundary of the territory between the two groups, with Gabrielino territory to the northeast and Juaneño territory to the southwest (Kroeber 1925). However, because the proposed Project is located close to the current alignment of Aliso Creek, it is in an area of potential overlap between the two tribal territories.

The Recreation and Resources Element of the City's General Plan identifies the proposed Project site as being sensitive for archaeological resources since it is located in the Aliso Creek and Foothill areas (City of Lake Forest 2015). According to the results of the records search at the SCCIC, no cultural resources have been previously recorded within the proposed Project site. There have been 25 cultural resources previously recorded within 0.5 mi of the proposed Project site, 23 of which are classified as prehistoric.

The proposed Project site currently operates as a nursery and includes a residential building constructed circa 1931 and multiple structures used for nursery operations. However, the buildings on the proposed Project site do not appear to be individually eligible for listing in the National Register of Historic Places (National Register) or the California Register of Historical Resources (California Register) due to lack of significance and integrity (GPA 2018).

4.5.3 Regulatory Setting

4.5.3.1 Federal Regulations

The National Historic Preservation Act of 1966 (NHPA). The NHPA requires that the federal government list significant historic resources on the National Register. Federal agencies must consult the National Register when planning to undertake or grant approval through permits for a project. Prior to the issuance of any license or implementation of any project, the federal agency must consider the effects of a project or license on any historical buildings, sites, structures, or objects that are included on, or eligible for inclusion on, the National Register (16 United States Code [USC] Section 470(f)). This typically includes consultation with the federal agency responsible for the undertaking; the State Historic Preservation Officer (SHPO); local Native American groups and individuals; local and State historical societies and organizations; and relevant archival sources, including the appropriate facility of the CHRIS.

4.5.3.2 State Regulations

California Environmental Quality Act (CEQA) Requirements. CEQA defines a "historical resource" as a resource that meets one or more of the following criteria: (1) listed in, or determined eligible for listing in, the California Register; (2) listed in a local register of historical resources as defined in Public Resources Code (PRC) Section 5020.1(k); (3) identified as significant in a historical resource survey meeting the requirements of PRC Section 5024.1(g); or (4) determined to be a historical resource by a project's Lead Agency (PRC Section 21084.1 and *State CEQA Guidelines* Section 15064.5(a)). A historical resource consists of:

> "Any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California…. Generally, a resource shall be considered by the lead agency to be 'historically significant' if the resource meets the criteria for listing on the California Register of Historical Resources" (*State CEQA Guidelines* Section 15064.5(a)(3)).

In accordance with *State CEQA Guidelines* Section 15064.5(b), a substantial adverse change in the significance of a historical resource is a significant effect on the environment.

CEQA requires a Lead Agency to determine whether an archaeological cultural resource meets the definition of a historical resource, a unique archaeological resource, or neither (*State CEQA Guidelines* Section 15064.5(c)). Prior to considering potential impacts, the Lead Agency must determine whether an archaeological cultural resource meets the definition of a historical resource in *State CEQA Guidelines* Section 15064.5(c)(1). If the archaeological cultural resource meets the definition of a historical resource, it is treated like any other type of historical resource in accordance with *State CEQA Guidelines* Section 15126.4. If the archaeological cultural resource does not meet the definition of a historical resource, then the Lead Agency determines whether it meets the definition of a unique archaeological resource as defined in PRC Section 21083.2(g). In practice, however, most archaeological sites that meet the definition of a unique archaeological resource will also meet the definition of a historical resource. Should the archaeological cultural resource meet

the definition of a unique archaeological resource, it must be treated in accordance with PRC Section 21083.2. If the archaeological cultural resource does not meet the definition of a historical resource or an archaeological resource, the effects to the resource are not considered significant effects on the environment (*State CEQA Guidelines* Section 15064.5(c)(4)).

California Health and Safety Code (HSC) Section 7050.5. California HSC Section 7050.5 states that in the event of discovery or recognition of any human remains in any location other than a dedicated cemetery, there shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains until the Coroner of the county in which the remains are discovered has determined whether or not the remains are subject to the Coroner's authority. If the human remains are of Native American origin, the County of Orange (County) Coroner must notify the NAHC within 24 hours of this identification. The NAHC will identify a Native American Most Likely Descendant (MLD) to inspect the site and provide recommendations for the proper treatment of the remains and associated grave goods.

Public Resources Code Section 5097.5. PRC Section 5097.5 provides for the protection of cultural resources and prohibits the removal, destruction, injury, or defacement of archaeological features on any lands under the jurisdiction of State or local authorities.

California Register of Historical Resources (PRC Section 5020 et seq.). State law also protects cultural resources by requiring evaluations of the significance of prehistoric and historic resources in CEQA documents. A cultural resource is an important historical resource if it meets any of the criteria found in *State CEQA Guidelines* Section 15064.5(a). These criteria are nearly identical to those for the National Register, which are listed above.

The SHPO maintains the California Register. Properties listed, or formally designated eligible for listing, on the National Register are nominated to the California Register and then selected to be listed on the California Register, as are State Landmarks and Points of Interest.

The California Register criteria are based on National Register criteria. For a property to be eligible for inclusion in the California Register, one or more of the following criteria must be met:

1. It is associated with the events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States;

2. It is associated with the lives of persons important to local, California, or national history;

3. It embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of a master, or possesses high artistic values; and/or

4. It has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California, or the nation.

In addition to meeting one or more of the above criteria, the California Register requires that sufficient time has passed since a resource's period of significance to "obtain a scholarly perspective on the events or individuals associated with the resource." Fifty years is used as a general estimate

of time needed to develop the perspective to understand the resource's significance (California Code of Regulations [CCR] 4852[d][2]).

The California Register also requires that a resource possess integrity, which is defined as "the authenticity of an historical resource's physical identity evidenced by the survival of characteristics that existed during the resource's period of significance" (California Office of Historic Preservation 1999:2). To retain integrity, a resource should have its original location, design, setting, materials, workmanship, feeling, and association. Which of these factors is most important depends on the particular criterion under which the resource is considered eligible for listing (California Office of Historic Preservation 1999).

4.5.3.3 Regional Regulations

There are no regional regulations that are applicable to cultural resources relevant to the proposed Project.

4.5.3.4 Local Regulations

City of Lake Forest General Plan. The existing City of Lake Forest General Plan identifies goals and policies related to cultural resources. Goal 4.0 in the Recreation and Resources Element of the City's General Plan addresses historical and archaeological resources (and potential resources), and indicates that conservation of the resources and investigation of potential resource areas is an important undertaking for connecting with the community's past (City of Lake Forest 2015: 7-8). Two policies address this goal: (1) protection of resources, and (2) identification, designation, and protection of buildings or sites of historical significance (City of Lake Forest 2015: 8).

4.5.4 Methodology

A cultural resources records search was completed on February 28, 2018, at the SCCIC of the CHRIS at California State University, Fullerton. It included a review of all prehistoric and historic archaeological sites within a 0.5 mi radius of the proposed Project, as well as a review of known cultural resource survey and excavation reports in that area. The California State Historic Resources Inventory (HRI), National Register, California Historical Landmarks (SHL), California Points of Historical Interest (SPHI), and various local historical registers were examined.

An HRER was prepared to assess the eligibility of buildings currently occupying the proposed Project site for the National Register and California Register. See Section 1.2 of the HRER (Appendix E of this EIR) for a description of the methodology used to evaluate buildings on the proposed Project site (GPA 2018: 2).

4.5.5 Thresholds of Significance

The thresholds for cultural resources impacts used in this analysis are consistent with Appendix G of the *State CEQA Guidelines* and Form J of the City's *Local Guidelines for Implementing the California Environmental Quality* Act (2017). The proposed Project may be deemed to have a significant impact with respect to cultural resources if it would:

Threshold 4.5.1: Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?

Threshold 4.5.2: Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?

Threshold 4.5.3: Disturb any human remains, including those interred outside of formal cemeteries?

None of the thresholds for cultural resources were scoped out in the Initial Study, which is included in Appendix A. Therefore, all of the thresholds listed above are addressed in the following analysis.

4.5.6 Project Impacts

Threshold 4.5.1: Would the Project cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?

No Impact. The SCCIC records search results identified no previously recorded cultural resources on or in soils on the proposed Project site, and the HRER concluded that the existing buildings on the proposed Project site[1] (specifically the single-family residence and detached garage) are not a historical resource and do not appear eligible for listing in the National Register or California Register. As previously discussed, a historical resource as defined in Section 15064.5 of the *State CEQA Guidelines* can include resources listed in a local register. The existing buildings on the Project site (specifically the single-family residence and detached garage) have been recommended as ineligible for designation at a local level. As such, there are no historical resources as defined in Section 15064.5 of the *State CEQA Guidelines* located within the proposed Project site. The proposed Project will not cause a substantial adverse change in the significance of a historical resource, and no mitigation is required.

Threshold 4.5.2: Would the Project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?

Potentially Significant. The SCCIC records search included the proposed Project site and the areas within 0.5 mi of the proposed Project site. No archaeological resources have been previously recorded in the proposed Project site. There have been 25 archaeological resources previously recorded within 0.5 mi of the proposed Project site, 23 of which are classified as prehistoric. Four previous studies have included areas of the Project site. These studies consisted of a pedestrian field survey, a cultural resources assessment, archaeological monitoring, and unspecified archaeological services. However, most of the proposed Project site has not undergone any type of cultural resources study. Due to the number of archaeological resources recorded within 0.5 mi of the proposed Project site and the location of the proposed Project site in the archaeologically sensitive Aliso Creek and Foothill areas (as identified in the City's General Plan), there is potential that ground-disturbing construction activities will impact archaeological resources. Mitigation Measure 4.5.1 requires archaeological monitoring of ground-disturbing work on the proposed Project site. If

[1] The proposed Project site is referred to as "the Property" in the HRER.

archaeological resources are encountered during ground-disturbing work, construction activities in the area of the find will stop and the resource will be evaluated for significance. Pre-established procedures, as approved by the Director of Community Development, will be in place to address any significant finds. When archaeological resources are assessed and/or protected as they are discovered, impacts to these resources would be less than significant. As such, implementation of Mitigation Measure 4.5.1 would reduce the impact of the proposed Project on the significance of archaeological resources to less than significant.

Threshold 4.5.3: Would the Project disturb any human remains, including those interred outside of formal cemeteries?

Potentially Significant. No previously identified human remains are present on the proposed Project site, and there are no facts or evidence indicating that Native Americans or people of European descent are buried on the proposed Project site. However, undiscovered human remains may be present below the ground surface on any property. Disturbing human remains could violate the State's Health and Safety Code as well as destroy the resource. Mitigation Measure 4.5.1 requires compliance with the State's Health and Safety Code for the treatment of human remains. Implementation of Mitigation Measure 4.5.1 would reduce the impact of the proposed Project on human remains to less than significant.

4.5.7 Cumulative Impacts

Potential impacts of the proposed Project to unknown cultural l resources, when combined with the impacts of past, present, and reasonably foreseeable projects in the City of Lake Forest, could contribute to a cumulatively significant impact due to the overall loss of historical and archaeological artifacts unique to the region. As discussed above, the proposed Project will not have an impact on historical resources.

Other portions of Lake Forest are identified as sensitive for archaeological resources by the Recreation and Resources Element of the City's General Plan. However, each development proposal received by the City is required to comply with the requirements of CEQA, including an environmental review if applicable. If there were any potential for significant impacts to archaeological resources as a result of present or reasonably foreseeable projects in Lake Forest, an investigation would be required to determine the nature and extent of the resources and identify appropriate mitigation measures. When archaeological resources are assessed and/or protected as they are discovered, impacts to these resources are less than significant.

As such, implementation of Mitigation Measure 4.5.1 would ensure that the proposed Project, together with cumulative projects, would not result in a significant cumulative impact to unique archaeological and historical resources.

4.5.8 Level of Significance Prior to Mitigation

No impacts to historical resources would occur. Prior to mitigation, the proposed Project has the potential to result in significant impacts to archaeological resources and previously undiscovered buried human remains.

4.5.9 Mitigation Measures

Mitigation Measure 4.5.1 **Archaeological Resources, Tribal Cultural Resources, and Human Remains.** Prior to issuance of a grading permit for any site within the Project area, a qualified archaeologist shall be retained by the Applicant for that grading permit to provide professional archaeological services. The archaeologist shall be present at the pre-grading conference to establish procedures for archaeological resource surveillance. Those procedures shall include provisions for temporarily halting or redirecting work to permit sampling, identification, and evaluation of resources deemed by the archaeologist to potentially be historical resources or unique archaeological resources under the California Environmental Quality Act (CEQA). The archaeologist also shall conduct on-site archaeological monitoring for the grading operation. Should historical resources or unique archaeological resources be discovered during the grading operation, grading activities shall be modified to allow expeditious and proper analysis and/or salvage of the resources. Disposition of the resources shall be within the discretion of the City of Lake Forest.

Prior to Approval of Grading or Improvement plans, the Applicant shall implement a grading monitoring plan to mitigate potential impacts to undiscovered buried archaeological resources on the Nakase Nursery/Toll Brothers Project to the satisfaction of the City of Lake Forest. This program shall include, but shall not be limited to, the following actions:

1. Provide evidence to the Lead Agency that a qualified archaeologist and Native American monitor have been contracted to implement a grading monitoring program to the satisfaction of the City of Lake Forest. A letter from the Project Archaeologist shall be submitted to the City of Lake Forest Director of Community Development. A letter from the Native American Monitor shall also be submitted to the City of Lake Forest Director of Community Development. The letter shall include the following guidelines:

    a. The qualified archaeologist/historian and Native American monitor shall attend the pre-grading meeting with the contractors to explain and coordinate the requirements of the monitoring program.

b. The consulting archaeologist and Native American monitor shall monitor all areas identified for development as determined by the Principal Investigator of the excavations.

c. An adequate number of monitors (archaeological/ historical/Native American) shall be present to ensure that all earth-moving activities are observed and shall be on site during all grading activities as determined by the Principal Investigator of the excavations.

d. During the original cutting (used in this mitigation to refer to the "cut" part of "cut and fill") of previously undisturbed deposits, the archaeological monitor(s) and Native American monitor(s) shall be on site full time. Inspections will vary based on the rate of excavation, the materials excavated, and the presence and abundance of artifacts and features. The frequency and location of inspections shall be determined by the Principal Investigator.

e. During the cutting of previously disturbed deposits, the archaeological monitor(s) and Native American monitor(s) shall be on site as determined by the Principal Investigator of the excavations. Inspections will vary based on the rate of excavation, the materials excavated, and the presence and abundance of artifacts and features. The frequency and location of inspections shall be determined by the Principal Investigator in consultation with the Native American monitor.

f. Isolates and clearly non-significant deposits shall be minimally documented in the field, and the monitored grading can then proceed.

g. In the event that previously unidentified, potentially significant cultural resources (including tribal cultural resources) are discovered, the archaeologist, in consultation with the Native American monitor(s), shall have the authority to divert or temporarily halt ground disturbance operations in the area of discovery to allow for evaluation. The archaeologist shall contact the City of Lake Forest Director of Community Development at the time of discovery. After consultation with the property owner, archaeologist, and Native American monitor(s), disposition of the resources shall be within the discretion of the City of Lake Forest. For significant cultural resources, a Research

Design and Data Recovery Program to mitigate impacts shall be prepared by the archaeologist, in consultation with the Native American monitor(s), then carried out using professional archaeological and culturally sensitive methods.

h. If any human bones are discovered, the Principal Investigator shall contact the County Coroner. In the event the remains are determined to be of Native American origin, the Most Likely Descendant, as identified by the Native American Heritage Commission, shall be contacted in order to determine proper treatment and disposition of the remains.

i. Before construction activities are allowed to resume in the affected area, the artifacts shall be recovered and features recorded using professional archaeological methods. The Principal Investigator shall determine the amount of material to be recovered for an adequate artifact sample for analysis.

j. In the event that previously unidentified non-tribal cultural resources are discovered, those resources shall be processed and curated at a facility that meets federal standards per 36 CFR Part 79, and therefore shall be professionally curated and made available to other archaeologists/researchers for further study. The collections and associated records shall be transferred, including title, to the John D. Cooper Archaeological and Paleontological Curation Center, to be accompanied by payment of the fees necessary for permanent curation. Evidence shall be in the form of a letter from the curation facility identifying that the archaeological materials have been received and that all fees have been paid.

k. In the event that previously unidentified cultural resources are discovered, a report documenting the field and analysis results and interpreting the artifact and research data within the research context shall be completed and submitted to the satisfaction of the City of Lake Forest prior to the issuance of any building permits. The report shall include California Department of Parks and Recreation Primary and Archaeological Site Forms.

l. In the event that no cultural resources are discovered, a brief letter to that effect shall be sent to the City of Lake Forest by the consulting archaeologist that the grading monitoring activities have been completed.

2. Provide evidence to the City of Lake Forest that the following notes have been placed on the Grading Plan:

   a. The qualified archaeologist/historian and Native American monitor shall attend the pre-construction meeting with the contractors to explain and coordinate the requirements of the monitoring program.

   b. During the original cutting of previously undisturbed deposits, the archaeological monitor(s) and Native American monitor(s) shall be on site to perform full-time monitoring as determined by the Principal Investigator of the excavations. The frequency of inspections shall depend on the rate of excavation, the materials excavated, and the presence and abundance of artifacts and features.

   c. During the cutting of previously disturbed deposits, the archaeological monitor(s) and Native American monitor(s) shall be on site as determined by the Principal Investigator of the excavations. Inspections will vary based on the rate of excavation, the materials excavated, and the presence and abundance of artifacts and features. The frequency and location of inspections shall be determined by the Principal Investigator in consultation with the Native American monitor.

   d. In the event that previously unidentified, potentially significant cultural resources (including tribal cultural resources) are discovered, the archaeologist, in consultation with the Native American monitor(s), shall have the authority to divert or temporarily halt ground disturbance operations in the area of discovery to allow for evaluation. The archaeologist shall contact the City of Lake Forest Director of Community Development at the time of discovery. After consultation with the property owner, archaeologist, and Native American monitor(s), disposition of the resources shall be within the discretion of the City of Lake Forest. For significant cultural resources, a Research Design and Data Recovery Program to mitigate impacts shall be prepared by the archaeologist, in consultation with the

Native American monitor(s), then carried out using professional archaeological and culturally sensitive methods.

e. The consulting archaeologist shall monitor all areas identified for development as determined by the Principal Investigator of the excavations.

f. If any human bones are discovered, the Principal Investigator shall contact the County Coroner. In the event the remains are determined to be of Native American origin, the Most Likely Descendant, as identified by the Native American Heritage Commission, shall be contacted in order to determine proper treatment and disposition of the remains.

g. Prior to rough grading inspection sign-off, provide evidence that the field grading monitoring activities have been completed to the satisfaction of the City of Lake Forest. Evidence shall be in the form of a letter from the Project Archaeologist.

h. Prior to final grading release, submit to the satisfaction of the City of Lake Forest a final report that documents the results, analysis, and conclusions of all phases of the Archaeological Monitoring Program. The report shall also include the following:

    1) Department of Parks and Recreation Primary and Archaeological Site Forms.

    2) Evidence that all non-tribal cultural materials collected during the grading monitoring program have been curated, and therefore shall be professionally curated and made available to other archaeologists/researchers for further study. The collections and associated records shall be transferred, including title, to the John D. Cooper Archaeological and Paleontological Curation Center, to be accompanied by payment of the fees necessary for permanent curation. Evidence shall be in the form of a letter from the curation facility identifying that the materials have been received and that all fees have been paid.

3. In the event that no cultural resources are discovered, a brief letter to that effect shall be sent to the City of Lake Forest by the consulting archaeologist that the grading monitoring activities have been completed.

4. The qualified archaeologist retained shall prepare monthly progress reports during monitoring to be filed with the site developer(s) and the City of Lake Forest.

5. Artifacts recovered shall be prepared, identified, and cataloged before donation to the Gabrieleno Band of Mission Indians – Kizh Nation. If the Tribe does not want custody, an accredited repository designated by the City of Lake Forest shall be utilized. Any artifacts determined to be insignificant shall be offered to local schools for use in educational programs.

6. The qualified archaeologist retained shall prepare a final report to be filed with the site developer(s) and the City of Lake Forest. The report shall include a list of specimens recovered, documentation of each locality, and interpretation of artifacts recovered, and shall include all specialists' reports as appendices.

4.5.10 Level of Significance after Mitigation

No impacts to historical resources would occur. Mitigation Measure 4.5.1 would reduce potential impacts to archaeological resources and previously undiscovered buried human remains to a less than significant level. No significant unavoidable impacts to archaeological resources or human remains would occur with implementation of these measures.

4.6 ENERGY

This section discusses energy use resulting from implementation of the Nakase Nursery/Toll Brothers Project (proposed Project) and evaluates whether the proposed Project would result in the wasteful, inefficient, or unnecessary consumption of energy resources or conflict with any applicable plans for renewable energy and energy efficiency. The energy use analysis in this section is based on information from the California Emissions Estimator Model™ (CalEEMod™) v2016.3.2 modeling result in the *Air Quality Impact Analysis* (Urban Crossroads 2019a) and the *Greenhouse Gas Analysis* (Urban Crossroads 2019b) prepared for the proposed Project, and from the California Air Resources Board (CARB) EMFAC2017 model. The *Air Quality Impact Analysis* and *Greenhouse Gas Analysis* are included in Appendices C and G, respectively, of this Environmental Impact Report (EIR).

4.6.1 Scoping Process

The City of Lake Forest (City) received 28 comment letters during the public review period of the Initial Study/Notice of Preparation (IS/NOP). For copies of the IS/NOP comment letters, refer to Appendix A of this EIR. None of the comment letters included comments related to energy.

4.6.2 Existing Environmental Setting

4.6.2.1 Electricity

Electricity is a man-made resource. The production of electricity requires the consumption or conversion of energy resources (including water, wind, oil, gas, coal, solar, geothermal, and nuclear resources) into energy. Electricity is used for a variety of purposes (e.g., lighting, heating, cooling, and refrigeration, and for operating appliances, computers, electronics, machinery, and public transportation systems) (EIA 2019a).

In 2017, California's electricity was generated primarily by natural gas (33.67 percent), coal (4.13 percent), large hydroelectric (14.72 percent), nuclear (9.08 percent), and renewable sources (29 percent). Total electric generation in California in 2017 was 292,039 gigawatt-hours (GWh), up 0.5 percent from the 2016 total generation of 290,567 GWh. In 2017, California produced approximately 70.7 percent and imported 29.3 percent of the electricity it used (CEC 2019c).

The Project site is within the service territory of Southern California Edison (SCE). SCE provides electricity to more than 15 million people in a 50,000-square-mile (sq mi) area of Central, Coastal, and Southern California (SCE 2019). According to the California Energy Commission (CEC), total electricity consumption in the SCE service area in 2017 was 84,291.6 GWh (28,975 GWh for the residential sector). Total electricity consumption in Orange County in 2017 was 20,030.5 GWh (6,745 GWh for the residential sector) (CEC 2019a)

Based on the CalEEMod model in the *Greenhouse Gas Analysis* (Urban Crossroads 2019b), the estimated electricity usage for the existing nursery operations on the Project site is 71,825 kilowatt-hours per year (kWh/yr).

4.6.2.2 Natural Gas

Natural gas is a non-renewable fossil fuel. Fossil fuels are formed when layers of decomposing plant and animal matter are exposed to intense heat and pressure under the surface of the Earth over millions of years. Natural gas is a combustible mixture of hydrocarbon compounds (primarily methane) that is used as a fuel source. Natural gas is found in naturally occurring reservoirs in deep underground rock formations. Natural gas is used for a variety of uses (e.g., heating buildings, generating electricity, and powering appliances such as stoves, washing machines and dryers, gas fireplaces, and gas grills) (EIA 2019b).

Natural gas consumed in California is used for electricity generation (45 percent), residential uses (21 percent), industrial uses (25 percent), and commercial uses (9 percent). California continues to depend upon out-of-state imports for nearly 90 percent of its natural gas supply (CEC 2019d).

The Southern California Gas Company (SoCalGas) is the natural gas service provider for the Project site. SoCalGas provides natural gas to approximately 21.8 million people in a 24,000 sq mi service area throughout Central and Southern California, from Visalia to the Mexican border (SoCalGas 2019). According to the CEC, total natural gas consumption in the SoCalGas service area in 2018 was 5,156.1 million therms (2,147.4 million therms for the residential sector). Total natural gas consumption in Orange County in 2018 was 575.1 million therms (339.0 million therms for the residential sector) (CEC 2019a).

According to the CalEEMod model in the *Greenhouse Gas Analysis* (Urban Crossroads 2019b) prepared for the proposed Project, the estimated natural gas use for the existing nursery operations on the Project site is 177,650 thousand British thermal units per year (kBTU/yr) or 1,776.5 therms.

4.6.2.3 Petroleum/Transportation Energy

Petroleum is also a non-renewable fossil fuel. Petroleum is a thick, flammable, yellow-to-black mixture of gaseous, liquid, and solid hydrocarbons that occurs naturally beneath the earth's surface. Petroleum is primarily recovered by oil drilling. It is refined into a large number of consumer products, primarily fuel oil and gasoline.

Gasoline is the most used transportation fuel in California, with 97 percent of all gasoline being consumed by light-duty cars, pickup trucks, and sport utility vehicles. In 2017, total gasoline consumption in California was 366,820 thousand barrels (15.4 billion gallons) or 1,853.5 trillion BTU. Of the total gasoline consumption, 350,604 thousand barrels (14.7 billion gallons) or 1,771.6 trillion BTU were consumed for transportation (EIA 2019c). Based on fuel consumption obtained from EMFAC2017, 160.5 million gallons of diesel and 1.3 billion gallons of gasoline were consumed from vehicle trips in Orange County in 2018.

According to the CalEEMod model in the *Greenhouse Gas Analysis* (Urban Crossroads 2019b) prepared for the proposed Project, the vehicles trips to and from the existing nursery result in 1,349,192 vehicle miles traveled (VMT) annually. Fuel use associated with the vehicle trips generated by the existing nursery was calculated for the existing year 2018 based on vehicle fuel consumption for Orange County provided in EMFAC2017. The vehicle fuel consumption calculations

for the existing nursery are shown in Tables 4.6.A and 4.6.B. As shown in these tables, the estimated annual fuel consumption for the nursery was 54,189 gallons of gasoline and 758 gallons of diesel fuel in 2018.

4.6.3 Regulatory Setting

This section will include applicable federal, State, regional, and City regulations.

4.6.3.1 Federal Regulations

Corporate Average Fuel Economy (CAFE). Congress first passed the Corporate Average Fuel Economy law in 1975 to increase the fuel economy of cars and light-duty trucks. CAFE standards are federal regulations that are set to reduce energy consumed by on-road motor vehicles. The National Highway Traffic Safety Administration (NHTSA) regulates the standards and the United States Environmental Protection Agency (EPA) measures vehicle fuel efficiency. The standards specify minimum fuel consumption efficiency standards for new automobiles sold in the United States. The law has become more stringent over time. The current standard is 27.5 miles per gallon (mpg) for passenger cars and 20.7 mpg for light-duty trucks.

On May 19, 2009, President Obama put in motion a new national policy to increase fuel economy for all new cars and trucks sold in the United States. On April 1, 2010, the EPA and the United States Department of Transportation's (USDOT) NHTSA announced a joint final rule establishing a national program that would reduce greenhouse gas (GHG) emissions and improve fuel economy for new cars and trucks sold in the United States. The first phase of the national program applied to passenger cars, light-duty trucks, and medium-duty passenger vehicles for model years 2012 through 2016. This phase required these vehicles to meet a fuel economy standard of 35.5 mpg. The second phase applied to passenger cars, light-duty trucks, and medium-duty passenger vehicles for model years 2017 through 2025. This phase required these vehicles to meet an estimated fuel economy standard of 54.5 mpg (NHTSA 2019a).

On September 15, 2011, the EPA and USDOT issued a final rule for the first national standards to improve fuel efficiency of medium- and heavy-duty trucks and buses, model years 2014 through 2018. For combination tractors, the agencies proposed engine and vehicle standards that would achieve up to a 20 percent reduction in fuel consumption by the 2018 model year. For heavy-duty pickup trucks and vans, the agencies proposed separate gasoline and diesel truck standards, which would achieve up to a 10 percent reduction for gasoline vehicles and a 15 percent reduction for diesel vehicles (12 and 17 percent, respectively, if accounting for air conditioning leakage). Lastly, for vocational vehicles, the engine and vehicle standards would achieve up to a 10 percent reduction in fuel consumption (EPA 2019a). On October 25, 2016, the EPA and USDOT issued Phase 2 of the national standards to improve fuel efficiency standards for medium- and heavy-duty trucks and buses for model years 2021 through 2027 to achieve vehicle fuel savings as high as 25 percent, depending on the vehicle category (EPA 2019a).

Table 4.6.A: Existing Operational Trips – Fuel Efficiency

Year	Fuel	Vehicle Class	EMFAC2017 Outputs[1]			
			Fleet Mix (%)[2]	Fuel Consumption (1,000 gpd)	VMT (mi/day)	Fuel Efficiency[3] (mpg)
2018	Gas	LDA	55	1,675.4	48,157,950	28.7
		LDT1	4	194.0	4,826,370	24.9
		LDT2	21	773.1	17,237,481	22.3
		MDV	12	641.6	11,751,308	18.3
		LHD1	2	142.6	1,478,337	33.8
		LHD2	1	26.7	240,658	9.0
		MHDT	2	90.2	450,967	5.0
		HHDT	2	0.2	933	4.7
		OBUS	<1	9.5	46,675	4.9
		UBUS	<1	5.3	19,592	3.7
		MCY	<1	10.5	392,562	37.4
		SBUS	<1	2.1	18,946	9.0
		MH	<1	13.6	68,130	5.0
		Fleet Mix	–	–	–	24.4
	Diesel	LDA	11	8.6	388,724	45.2
		LDT1	<1	0.1	1,243	12.4
		LDT2	2	2.8	90,639	32.4
		MDV	6	8.8	219,282	24.9
		LHD1	23	40.2	822,767	20.5
		LHD2	9	16.8	309,685	18.4
		MHDT	31	171.9	1,660,358	9.7
		HHDT	12	176.4	811,091	4.6
		OBUS	0	0.0	0	0.0
		UBUS	0	5.3	0	0.0
		MCY	0	0.0	0	0.0
		SBUS	2	2.1	42,552	20.3
		MH	3	2.8	28,828	10.3
		Fleet Mix	–	–	–	17.8
	Electric	LDA	89	0	611,218	0.0
		LDT1	2	0	9,533	0.0
		LDT2	9	0	57,582	0.0
		MDV	1	0	5,213	0.0
		Fleet Mix	–	–	–	0.0
	Natural Gas	HHDT	48	12.6	27,260	2.2
		UBUS	52	21.3	84,522	4.0
		Fleet Mix	–	–	–	3.1

Sources: CARB EMFAC2017 Web Database, https://www.arb.ca.gov/emfac/2017/, accessed July 1–4, 2017; and *Greenhouse Gas Analysis* (Urban Crossroads 2019b).

[1] EMFAC2017 was run for Orange County for the existing year 2018. Data was aggregated over all vehicle model years and speed bins.

[2] Fleet mix is based on assumptions made in CalEEMod for the proposed Project.

[3] The fuel efficiency was calculated by dividing the VMT (mi/day) by the fuel consumption (gpd).

CalEEMod = California Emissions Estimator Model
CARB = California Air Resources Board
gpd = gallons per day
HHDT = heavy heavy-duty truck
LDA = light-duty automobile
LDT1 = light-duty truck 1
LDT2 = light-duty truck 2
LHD1 = light heavy-duty truck 1
LHD2 = light heavy-duty truck 2
MCY = motorcycle
MDV = medium-duty truck
MH = motor home
MHDT = medium heavy-duty truck
mi/day = miles per day
mpg = miles per gallon
OBUS = other bus
SBUS = school bus
UBUS = urban bus
VMT = vehicle miles traveled

Table 4.6.B: Existing Operational Trips – Fuel Usage

Year[1]	Land Use	Total Annual VMT[2] (mi/yr)	Fuel Type	Portion of Fleet[3] (%)	VMT by Fuel Type (mi/yr)	Fleet Mix Efficiency[4] (mpg)	Fuel Usage (gal/yr)
2018	Nursery	1,349,192	Gas	98	1,322,208	24.4	54,189
			Diesel	1	13,492	17.8	758
			Electric	1	13,492	N/A	0
			Natural Gas	<1	0	3.1	0

Sources: CARB EMFAC2017 Web Database, https://www.arb.ca.gov/emfac/2017/, accessed July 1–4, 2017; and *Greenhouse Gas Analysis* (Urban Crossroads 2019b).

[1] Calculated for operational year 2018.

[2] Total VMT is based on project's trip generation and trip lengths.

[3] Fleet distribution is based on EMFAC2017 output and CalEEMod assumptions.

[4] Fuel efficiency is based on fuel consumption and VMT data from EMFAC2017 for Orange County and total VMT.

CalEEMod = California Emissions Estimator Model
CARB = California Air Resources Board
gal/yr = gallons per year
mi/yr = miles per year
mpg = miles per gallon
VMT = vehicle miles traveled

Safer Affordable Fuel-Efficient Vehicles Rule. On August 2, 2018, the current Administration released a notice of proposed rulemaking, *The Safer Affordable Fuel-Efficient* (SAFE) *Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks* (SAFE Vehicles Rule) to amend the CAFE and GHG emission standards established in 2012 for model years 2021 through 2026. The SAFE Vehicles Rule would decrease fuel economy and would withdraw the California Waiver for the California Advanced Clean Car program, Zero Emissions Vehicle mandate, and GHG emission standards for model years 2021 through 2026. Final rulemaking on the SAFE Vehicles Rule is pending (NHTSA 2019b).

Energy Independence and Security Act of 2007. The Energy Independence and Security Act of 2007 (Public Law 110-140) seeks to provide the nation with greater energy independence and security by increasing the production of clean renewable fuels; improving vehicle fuel economy; and increasing the efficiency of products, buildings, and vehicles. It also seeks to improve the energy performance of the federal government. The Act sets increased CAFE standards; the Renewable Fuel Standard; appliance energy efficiency standards; building energy efficiency standards; and accelerated research and development tasks on renewable energy sources (e.g., solar energy, geothermal energy, and marine and hydrokinetic renewable energy technologies), carbon capture, and sequestration (EPA 2019c).

Energy Policy Act of 2015. The Energy Policy Act of 2015 (42 USC Section 13201 et seq.) was passed by the United States Congress on July 29, 2005, signed into law by President George W. Bush on August 8, 2005, and was the first major energy law enacted by the federal government in over a decade. The Energy Policy Act of 2005 seeks to reduce reliance on non-renewable energy resources and provide incentives to reduce current demand on these resources. For example, under this Act, consumers and businesses can obtain federal tax credits for purchasing fuel-efficient appliances and products (including hybrid vehicles), building energy-efficient buildings, and improving the energy efficiency of commercial buildings. Additionally, tax credits are available for the installation of qualified fuel cells, stationary microturbine power plants, and solar power equipment (FERC 2006 and FERC 2019).

4.6.3.2 State Regulations

Assembly Bill 1575, Warren-Alquist Act. In 1975, largely in response to the oil crisis of the 1970s, the State Legislature adopted Assembly Bill (AB) 1575 (also known as the Warren-Alquist Act), which created the CEC. The statutory mission of the CEC is to forecast future energy needs; license power plants of 50 megawatts (MW) or larger; develop energy technologies and renewable energy resources; plan for and direct State responses to energy emergencies; and, perhaps most importantly, promote energy efficiency through the adoption and enforcement of appliance and building energy efficiency standards. AB 1575 also amended Public Resources Code (PRC) Section 21100(b)(3) and *State CEQA Guidelines* Section 15126.4 to require EIRs to include, where relevant, mitigation measures proposed to minimize the wasteful, inefficient, and unnecessary consumption of energy caused by a project. Thereafter, the State Resources Agency created Appendix F to the *State CEQA Guidelines*. Appendix F assists EIR preparers in determining whether a project will result in the inefficient, wasteful, and unnecessary consumption of energy. Appendix F of the *State CEQA Guidelines* also states that the goal of conserving energy implies the wise and efficient use of energy and the means of achieving this goal, including (1) decreasing overall per capita energy consumption; (2) decreasing reliance on fossil fuels such as coal, natural gas, and oil; and (3) increasing reliance on renewable energy sources.

Senate Bill 1389, Energy: Planning and Forecasting. In 2002, the State Legislature passed Senate Bill (SB) 1389, which required the CEC to develop an integrated energy plan every 2 years for electricity, natural gas, and transportation fuels for the California Energy Policy Report. The plan calls for the State to assist in the transformation of the transportation system to improve air quality, reduce congestion, and increase the efficient use of fuel supplies with the least environmental and energy costs. To further this policy, the plan identifies a number of strategies, including assistance to public agencies and fleet operators in implementing incentive programs for zero emission vehicles (ZEVs) and their infrastructure needs, and encouragement of urban designs that reduce VMT and accommodate pedestrian and bicycle access.

In compliance with the requirements of SB 1389, the CEC adopts an *Integrated Energy Policy Report* every 2 years and an update every other year. The most recently adopted reports include the *2017 Integrated Energy Policy Report* (CEC 2018a) and the *2018 Integrated Energy Policy Report Update* (CEC 2018b). The *2017 Integrated Energy Policy Report* provides the results of the CEC's assessments of a variety of energy issues facing California. Many of these issues will require action if the State is to meet its climate, energy, air quality, and other environmental goals while maintaining energy reliability and controlling costs. The *2017 Integrated Energy Policy Report* covers a broad range of topics, including implementation of SB 350, integrated resource planning, distributed energy resources, transportation electrification, solutions to increase resiliency in the electricity sector, energy efficiency, transportation electrification, barriers faced by disadvantaged communities, demand response, transmission and landscape-scale planning, the California Energy Demand Preliminary Forecast, the preliminary transportation energy demand forecast, renewable gas, updates on Southern California electricity reliability, natural gas outlook, and climate adaptation and resiliency. The *2018 Integrated Energy Policy Report Update* included a review of the implementation of California's energy policies and updated the 2017 California energy demand forecasts that were adopted as part of the *2017 Integrated Energy Policy Report* proceedings.

The CEC circulated the 2019 Integrated Energy Policy Report for public review in February 2019 and is anticipated to approve the report in February 2020 (CEC 2019c).

Renewable Portfolio Standards. SB 1078 established the California Renewable Portfolio Standards program in 2002. SB 1078 initially required that 20 percent of electricity retail sales be served by renewable resources by 2017; however, this standard has become more stringent over time. In 2006, SB 107 accelerated the standard by requiring that the 20 percent mandate be met by 2010. In April 2011, SB 2 required that 33 percent of electricity retail sales be served by renewable resources by 2020. In 2015, SB 350 established tiered increases to the Renewable Portfolio Standards of 40 percent by 2024, 45 percent by 2027, and 50 percent by 2030. In 2018, SB 100 increased the requirement to 60 percent by 2030 and required that all State's electricity to come from carbon-free resources by 2045. SB 100 took effect on January 1, 2019 (CPUC 2019).

Title 24, California Building Code. Energy consumption by new buildings in California is regulated by the Building Energy Efficiency Standards, embodied in Title 24 of the California Code of Regulations (CCR), known as the California Building Code (CBC). The CEC first adopted the Building Energy Efficiency Standards for Residential and Nonresidential Buildings in 1978 in response to a legislative mandate to reduce energy consumption in the State. The CBC is updated every 3 years, and the current 2016 CBC went into effect on January 1, 2017. The next update is anticipated to become effective on January 1, 2020. The efficiency standards apply to both new construction and rehabilitation of both residential and non-residential buildings, and regulate energy consumed for heating, cooling, ventilation, water heating, and lighting. The building efficiency standards are enforced through the local building permit process. Local government agencies may adopt and enforce energy standards for new buildings, provided these standards meet or exceed those provided in CCR Title 24.

California Green Building Standards Code (CALGreen). In 2010, the California Building Standards Commission (CBSC) adopted Part 11 of the Title 24 Building Energy Efficiency Standards, referred to as the California Green Building Standards Code (CALGreen). CALGreen took effect on January 1, 2011. CALGreen is updated on a regular basis, with the most recent update consisting of the 2016 CALGreen standards that became effective January 1, 2017. The next update is anticipated to become effective on January 1, 2020. CALGreen established mandatory measures for residential and non-residential building construction and encouraged sustainable construction practices in the following five categories: (1) planning and design, (2) energy efficiency, (3) water efficiency and conservation, (4) material conservation and resource efficiency, and (5) indoor environmental quality. Although CALGreen was adopted as part of the State's efforts to reduce GHG emissions, the CALGreen standards have co-benefits of reducing energy consumption from residential and non-residential buildings subject to the standard.

California Energy Efficiency Strategic Plan. On September 18, 2008, the California Public Utilities Commission (CPUC) adopted California's first Long-Term Energy Efficiency Strategic Plan, presenting a roadmap for energy efficiency in California (CPUC 2008). The Plan articulates a long-term vision and goals for each economic sector and identifies specific near-term, mid-term, and long-term strategies to assist in achieving those goals. The Plan also reiterates the following four specific

programmatic goals known as the "Big Bold Energy Efficiency Strategies" that were established by the CPUC in Decisions D.07-10-032 and D.07-12-051:

- All new residential construction will be zero net energy (ZNE) by 2020.
- All new commercial construction will be ZNE by 2030.
- 50 percent of commercial buildings will be retrofit to ZNE by 2030.
- 50 percent of new major renovations of State buildings will be ZNE by 2025.

Assembly Bill 1493, Pavley, Vehicular Emissions: Greenhouse Gases. In response to the transportation sector accounting for more than half of California's carbon dioxide emissions, AB 1493 was enacted on July 22, 2002, requiring CARB to develop and adopt regulations that set fuel economy and GHG emission standards for passenger vehicles and light-duty trucks. Implementation of the regulation was delayed by lawsuits filed by automakers and the EPA's denial of an implementation waiver. The EPA subsequently granted the requested waiver in 2009, which was upheld in 2011 by the United States District Court for the District of Columbia.

Assembly Bill 1007, State Alternative Fuels Plan. Approved by Governor Arnold Schwarzenegger on September 29, 2005, AB 1007 required the CEC to prepare a plan to increase the use of alternative fuels in California. The State Alternative Fuels Plan was prepared by the CEC with CARB and in consultation with other federal, State, and local agencies to reduce petroleum consumption; increase use of alternative fuels (e.g., ethanol, natural gas, liquefied petroleum gas, electricity, and hydrogen); reduce GHG emissions; and increase in-State production of biofuels. The State Alternative Fuels Plan recommends a strategy that combines private capital investment, financial incentives, and advanced technology that will increase the use of alternative fuels; result in significant improvements in the energy efficiency of vehicles; and reduce trips and vehicle miles traveled through changes in travel habits and land management policies. The Alternative Fuels and Vehicle Technologies Funding Program legislation (AB 118, Statutes of 2007) proactively implements this plan (CEC and CARB 2007).

Executive Order S-01-07, Low Carbon Fuel Standard. Governor Arnold Schwarzenegger signed Executive Order (EO) S-01-07 on January 18, 2007. The order mandated that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020. In particular, EO S-01-07 established a Low Carbon Fuel Standard and directed the Secretary for Environmental Protection to coordinate the actions of the CEC, the CARB, the University of California, and other agencies to develop and propose protocols for measuring the "life-cycle carbon intensity" of transportation fuels. This analysis supporting development of the protocols was included in the State Implementation Plan (SIP) for alternative fuels (State Alternative Fuels Plan adopted by the CEC on December 24, 2007) and was submitted to CARB for consideration as an "early action" item under AB 32. The CARB adopted the Low Carbon Fuel Standard on April 23, 2009. After revisions in response to litigation, the Final Rulemaking Package adopting the regulation was filed with the California Office of Administrative Law (OAL) on October 2, 2015.

Title 20 Appliance Efficiency Standards. The 2006 Appliance Efficiency Regulations (20 CCR §1601–1608) were adopted by the CEC on October 11, 2006, and approved by the California OAL on December 14, 2006. The Appliance Efficiency Regulations regulate the sale of appliances in

California and include energy performance, energy design, water performance, and water design standards for both federally regulated appliances and non-federally regulated appliances. There are 23 categories of appliances included in the scope of these regulations. The standards within these regulations apply to appliances that are sold or offered for sale in California, except those sold wholesale in California for final retail sale outside the State and those designed and sold exclusively for use in recreational vehicles or other mobile equipment.

Title 13 California Code of Regulations. Title 13, CCR Division 3, Chapter 9, Article 4.8, Section 2449 (General Requirements for In-Use Off-Road Diesel-Fueled Fleets) limits idling of off-road diesel-fueled vehicles (including construction vehicles) to less than 5 consecutive minutes. Title 13 CCR Division 3, Chapter 10, Article 1, Section 2485 (Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling) limits idling of commercial vehicles to less than 5 consecutive minutes. Title 13, CCR Article 1, Chapter 10, Section 2480 (Airborne Toxic Control Measure to Limit School Bus Idling and Idling at Schools) regulates school bus idling at schools. A school bus must be turned off upon stopping at a school or within 100 feet (ft) of a school, and must not be turned on more than 30 seconds before beginning to depart from a school or from within 100 ft of a school. In addition, a school bus within 100 ft of a school must not idle for more than 5 consecutive minutes and must not idle for more than a cumulative 5 minutes in any 1 hour. Although these regulations are specifically for reduction of air emissions, they also reduce fuel consumption.

4.6.3.3 Regional Regulations

There are no regional energy regulations that apply to the proposed Project.

4.6.3.4 Local Regulations

City of Lake Forest Municipal Code. The City of Lake Forest has adopted the CBC (which includes CALGreen) and incorporated the CBC by reference into the City Municipal Code (Title 8, Building and Construction, Chapter 8.02 California Building Code, Article 1 General, Section 8.02.001 Adoption of the California Building Code by reference).

4.6.4 Methodology

Annual natural gas and electricity usage for operation of the existing nursery and the proposed Project were obtained from CalEEMod in the *Greenhouse Gas Analysis* (Urban Crossroads 2019b).[1]

Estimates of fuel consumption (diesel fuel and gasoline) from construction trucks and construction worker vehicles were based on trip estimates from CalEEMod in the *Air Quality Impact Analysis* and fuel efficiencies from the CARB EMFAC2017. Fuel consumption (diesel fuel and gasoline) from vehicle trips during operation was estimated for the existing nursery and for the opening year (2025) of the proposed Project based on trip estimates from CalEEMod in the *Greenhouse Gas Analysis* and fuel efficiencies from the CARB EMFAC2017.

[1] The *Air Quality Impact Analysis* (Urban Crossroads 2019a) only includes the CalEEMod results for the summer and winter scenarios. Therefore, the CalEEMod results for the annual scenario for operation was obtained from the *Greenhouse Gas Analysis* (Urban Crossroads 2019b).

4.6.5 Thresholds of Significance

The thresholds of significance for energy impacts used in this analysis are consistent with Appendix G of the State *CEQA Guidelines* and the City's *CEQA Significance Thresholds Guide* (March 2009). The proposed Project may be deemed to have a significant impact with respect to energy if it would:

Threshold 4.6.1: Result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation

Threshold 4.6.2: Conflict with or obstruct a state or local plan for renewable energy or energy efficiency

None of the thresholds of significance for energy impacts were scoped out in the Initial Study, which is included in Appendix A. Therefore, both of the thresholds listed above are addressed in the following analysis.

4.6.6 Project Impacts

Threshold 4.6.1: Would the project result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

Less than Significant Impact.

Construction. Construction of the proposed Project would require energy for activities such as the manufacture and transportation of building materials, demolition and grading activities, and building construction. Construction of the proposed Project would require electricity to power construction-related equipment. The electricity used during construction would vary during different phases of construction. The majority of construction equipment during demolition grading would be gas-powered or diesel-powered, and the later construction phases would require electricity-powered equipment such as that used for interior construction and application of architectural coatings.

Construction of the Project would not involve the consumption of natural gas. The construction-related equipment would not be powered by natural gas, and no natural gas demand is anticipated during construction.

Transportation energy represents the largest energy use during construction and would occur from the transport and use of construction equipment, delivery vehicles and haul trucks, and construction worker vehicles that would use petroleum fuels (e.g., diesel fuel and/or gasoline). Therefore, the analysis of energy use during construction focuses on fuel consumption. Construction trucks and vendor trucks hauling materials to and from the Project site would be anticipated to use diesel fuel, whereas construction workers traveling to and from the Project site would be anticipated to use gasoline-powered vehicles. Fuel consumption from transportation uses depends on the type and number of trips, VMT, the fuel efficiency of the vehicles, and travel mode.

Diesel fuel usage from construction off-road equipment was calculated using the same CalEEMod assumptions that were used in the *Air Quality Impact Analysis* (Urban Crossroads 2019a). CalEEMod utilized the construction equipment shown in Table 4.6.C. Average brake-specific fuel consumption and diesel fuel properties (heating value and density) from EPA AP-42 were used to obtain a fuel per horsepower-hour factor (EPA 1995).

Table 4.6.C: Construction Off-Road Equipment

Phase	Off-Road Equipment Type	Amount	Usage (hrs/day)	Total Usage (days)	Total Usage (hrs/equipment)
Demolition	Concrete/Industrial Saws	1	8	66	528
	Excavators	3	8	66	1,584
	Rubber-Tired Bulldozers	2	8	66	1,056
Grading	Excavators	2	8	269	4,304
	Graders	1	8	269	2,152
	Rubber-Tired Bulldozers	1	8	269	2,152
	Scrapers	2	8	269	4,304
	Tractors/Loaders/Backhoes	2	8	269	4,304
Infrastructure	Rubber-Tired Bulldozer	3	8	260	6,240
	Tractors/Loaders/Backhoes	4	8	260	8,320
Paving	Pavers	2	8	87	1,392
	Paving Equipment	2	8	87	1,392
	Rollers	2	8	87	1,392
Building Construction	Cranes	1	8	1001	8,008
	Forklifts	3	8	1001	24,024
	Generator Sets	1	8	1001	8,008
	Tractors/Loaders/Backhoes	3	8	1001	24,024
	Welders	1	8	1001	8,008
Architectural Coating	Air Compressors	1	8	1001	8,008

Source: *Air Quality Impact Analysis* (Urban Crossroads 2019a).
hrs/day = hours per day
hrs/equipment = hours per equipment type

These factors and other calculations are shown in Table 4.6.D. As shown in Table 4.6.D, total fuel usage from construction off-road equipment is estimated to be 290,233 gallons, the consumption of which would occur over the 5 years and 7 months of construction. As also shown in Table 4.6.D, the greatest amount of fuel (142,832 gallons) would be consumed by off-road equipment during the building construction and architecture coating phases. However, these phases would occur concurrently over 1,001 days (August 1, 2021 to June 2, 2025), which equates to an annual fuel consumption of 52,082 gallons per year. Therefore, the peak annual fuel consumption from off-road construction equipment would occur during the grading phase from February 2, 2020 to February 11, 2021, when an estimated 79,293 gallons would be consumed.

Table 4.6.D: Off-Road Construction Equipment Diesel Fuel Usage

Phase	Off-Road Equipment Type	Horsepower[1]	Load Factor[1]	Total Usage (hrs/equipment)	HP-Hour[2]	Fuel Usage (gal)[3]
Demolition	Concrete/Industrial Saws	81	0.73	528	31,221	1,598
	Excavators	158	0.38	1,584	95,103	4,869
	Rubber-Tired Bulldozers	247	0.40	1,056	104,333	5,342
Total Fuel Use – Demolition (11/1/19–1/31/20)						**11,809**
Grading	Excavators	158	0.38	4,304	258,412	13,231
	Graders	187	0.41	2,152	164,994	8,448
	Rubber-Tired Bulldozers	247	0.40	2,152	212,618	10,886
	Scrapers	367	0.48	4,304	758,193	38,819
	Tractors/Loaders/Backhoes	97	0.37	4,304	154,471	7,909
Total Fuel Use – Grading (2/2/20–2/11/21)						**79,293**
Infrastructure	Rubber-Tired Bulldozers	247	0.40	6,240	616,512	31,565
	Tractors/Loaders/Backhoes	97	0.37	8,320	298,605	15,289
Total Fuel Use – Infrastructure (2/12/21–2/10/22)						**46,854**
Paving	Pavers	130	0.42	1,392	76,003	3,891
	Paving Equipment	132	0.36	1,392	66,148	3,387
	Rollers	80	0.38	1,392	42,317	2,167
Total Fuel Use – Paving (4/1/21–7/30/21)						**9,455**
Building Construction	Cranes	231	0.29	8,008	536,456	27,467
	Forklifts	89	0.20	24,024	427,627	21,895
	Generator Sets	84	0.74	8,008	497,777	25,486
	Tractors/Loaders/Backhoes	97	0.37	24,024	862,221	44,146
	Welders	46	0.45	8,008	165,766	8,487
Architectural Coating	Air Compressors	78	0.48	8,008	299,820	15,351
Total Fuel Use – Building Construction and Architectural Coating (8/1/21–6/2/25)						**142,832**
Total Fuel Usage (gal)						**290,233**

Source: *Air Quality Impact Analysis* (Urban Crossroads 2019a).

[1] Load factor and horsepower are CalEEMod defaults for the equipment type and were obtained from the *Air Quality Impact Analysis*.

[2] HP-hour is the basis for the fuel calculation. HP-hour is calculated using the following formula: HP-hour = Total Hours x Load Factor x Horsepower.

[3] Off-road mobile source fuel usage is calculated using a fuel usage rate of 0.0512 gallons of diesel per HP-hour. This is calculated based on diesel.

CalEEMod = California Emissions Estimator Model
gal = gallons
HP-Hour = horsepower-hour
hrs/equipment = hours per equipment type

Information on total fuel consumption in Orange County was not available from the United States Energy Information Administration (EIA) California State Profile and Energy Estimates (EIA 2019c). However, vehicle consumption accounts for the majority of the total fuel consumption in California. In 2018, 160.5 million gallons of diesel fuel and 1.3 billion gallons of gasoline were consumed from vehicle trips in Orange County based on EMFAC2017. Compared to the annual fuel consumption from vehicle trips in Orange County, the peak annual fuel consumption of 79,293 gallons from off-road construction equipment during grading would be a small fraction of the annual fuel consumption in Orange County.

Fuel use from construction trucks and construction worker vehicles traveling to the Project site was based on the estimated number of trips that Project construction would generate and the average trip distance using the CalEEMod assumptions in the *Air Quality Impact Analysis (Urban Crossroads 2019a)*. Fuel efficiencies were estimated for the first full year of construction (2020)

using the CARB EMFAC2017, as shown in Table 4.6.E. It should be noted that calculating the fuel efficiency of vehicles for the year 2020 is a conservative approach because fuel efficiency is expected to continue to increase and improve during each year of construction as new fuel economy standards are established. Construction-related on-road vehicle fuel consumption calculations are shown in Tables 4.6.F and 4.6.G for construction trucks and construction worker vehicles, respectively.

Table 4.6.E: Year 2020 Construction Truck and Construction Worker Vehicle Fuel Efficiency

Vehicle Type	Vehicle Class	EMFAC2017 Outputs[2]		Diesel Fuel Efficiency[3] (mpg)
		Diesel Fuel Consumption (1,000 gpd)	VMT	
Construction Truck	HHDT	179.8	1,163,222	6.5
	MHDT	172.2	1,773,731	10.3
	HHDT/MHDT[1]	–	–	8.4
Construction Worker Vehicle	LDA	1624.8	48,945,590	30.1
	LDT1	194.2	5,047,196	26.0
	LDT2	721.9	1,7039,204	23.6
	Worker Mix[1]	–	–	27.5

Source: CARB EMFAC2017 Web Database, https://www.arb.ca.gov/emfac/2017/, accessed July 1–4, 2017; and *Air Quality Impact Analysis* (Urban Crossroads 2019a).

[1] For construction trucks, assumes 50% HHDT and 50% MHDT vehicles, consistent with assumptions in CalEEMod for hauling trucks. For construction worker vehicles, assumes 50% LDA, 25% LDT1, and 25% LDT2 vehicles, consistent with assumptions in CalEEMod for worker vehicles.

[2] EMFAC2017 was run for Orange County for the construction year 2020. Data was aggregated over all vehicle model years and speed bins.

[3] The fuel efficiency was calculated by dividing the VMT (mi/day) by the fuel consumption (gpd).

CalEEMod = California Emissions Estimator Model
CARB = California Air Resources Board
gpd = gallons per day
HHDT = Heavy Heavy-Duty Trucks
LDA = light-duty automobile
LDT1 = light-duty truck 1
LDT2 = light-duty truck 2
MHDT = Medium Heavy-Duty Trucks
mi/day = miles per day
mpg = miles per gallon
VMT = vehicle miles traveled

Table 4.6.F: Construction Truck Fuel Use

Phase	Trip Type	Total One-Way Trips	Trip Length (mi)	Total VMT[1,2]	Gasoline Fuel Efficiency (mpg)[3]	Fuel Usage (gal/yr)
Diesel Vehicles						
Demolition	Hauling	404	20	16,160	6.5	2,486
Grading	Hauling	18,750	20	750,000	6.5	115,385
Building Construction	Vendor	285	6.9	3,933	8.4	468
					Total Diesel Fuel Usage	**118,339**

Source: CARB EMFAC2017 Web Database, https://www.arb.ca.gov/emfac/2017/, accessed July 1–4, 2017; and *Air Quality Impact Analysis* (Urban Crossroads 2019a).

[1] Assumes 50% HHDT and 50% MHDT vehicles, consistent with assumptions in CalEEMod for hauling trucks.

[2] EMFAC2017 was run for Contra Costa County for the construction years 2019–2023. Data was aggregated over all vehicle model years and speed bins.

[3] The fuel efficiency was calculated by dividing the VMT (mi/day) by the fuel consumption (gpd).

CalEEMod = California Emissions Estimator Model
CARB = California Air Resources Board
gpd = gallons per day
gal/yr = gallons per year
HHDT = Heavy Heavy-Duty Trucks
MHDT = Medium Heavy-Duty Trucks
mi = miles
mi/day = miles per day
mpg = miles per gallon
VMT = vehicle miles traveled

Table 4.6.G: Construction Worker Vehicle Gasoline Fuel Use

Phase	Total One-Way Trips/Day	Total Days	Trip Length (mi)	Total VMT	Gasoline Fuel Efficiency (mpg)	Fuel Usage (gal/yr)
Demolition	15	66	14.7	29,106	27.5	1,058
Grading	20	269	14.7	158,172	27.5	5,752
Infrastructure	18	260	14.7	137,592	27.5	5,003
Paving	15	87	14.7	38,367	27.5	1,395
Building Construction	834	1,001	14.7	24,544,120	27.5	892,513
Architectural Coating	167	1,001	14.7	4,914,710	27.5	178,717
					Total Gasoline Fuel Usage	**1,084,438**

Sources: CARB EMFAC2017 Web Database, https://www.arb.ca.gov/emfac/2017/, accessed July 1–4, 2017; and *Air Quality Impact Analysis* (Urban Crossroads 2019a).
CARB = California Air Resources Board
gal/yr = gallons per year
mi = miles
mpg = miles per gallon
VMT = vehicle miles traveled

As shown in Table 4.6.F, total diesel fuel consumption would be 118,339 gallons from construction truck trips. As shown in Table 4.6.G, total gasoline consumption would be 1,084,438 gallons from construction worker vehicle trips. The peak annual fuel consumption from on-road vehicles would occur during the building construction and architectural coating phases, which would occur concurrently over 1,001 days, from August 1, 2021 to June 2, 2025. During the building construction and architectural coating phases, an estimated 1,071,698 gallons of fuel (468 gallons of diesel fuel and 1,071,230 gallons of gasoline) would be consumed, which equates to 390,779 gallons annually. In 2018, 160.5 million gallons of diesel fuel and 1.3 billion gallons of gasoline were consumed from vehicle trips in Orange County based on estimates from EMFAC2017. Therefore, peak annual gasoline demand generated by on-road trips during construction would be approximately 0.07 percent of the total annual gasoline and diesel fuel consumption in Orange County.

Impacts related to energy use during construction would be temporary and relatively small in comparison to the Orange County's overall use of the State's available energy sources. Additionally, implementation of Regulatory Compliance Measure (RCM) EN-1 would require the construction contractor to ensure that all non-essential idling of construction equipment is restricted to 5 minutes or less in compliance with CARB Rule 2449, thus reducing transportation energy consumption. For these reasons, Project construction would not result in the wasteful, inefficient, or unnecessary consumption of energy resources. Impacts would be less than significant, and no mitigation is required.

Operation. Energy use consumed by the proposed Project would be associated with natural gas use, electricity consumption, and fuel used for vehicle trips associated with the Project. Energy and natural gas consumption was estimated for the project using the CalEEMod model results in the *Greenhouse Gas Analysis* (Urban Crossroads 2019b) prepared for the proposed Project. The proposed buildings would be constructed to CALGreen standards, which were included in the CalEEMod inputs. Electricity, natural gas, and gasoline usage estimates associated with the

operation of the existing nursery and the operation of the proposed Project are shown in Table 4.6.H.

Table 4.6.H: Electricity and Natural Gas Demand from the Proposed Project

Land Use	Electricity (kWh/yr)	Natural Gas (kBTU/yr) / (therms/yr)
Existing Use		
Nursery	71,825	177,650 / 1,776.5
Proposed Use		
Elementary School	460,905	718,738 / 7,187.4
Retirement Community	429,963	900,969 / 9,009.7
Single-Family Housing	5,321,740	10,160,000 / 101,600
Total	**6,212,608**	**11,797,707 / 117,977.7**
Change from Existing	**+6,140,783**	**+11,602,057 / 116,020.6**

Source: *Greenhouse Gas Analysis* (Urban Crossroads 2019b.)
kBTU/yr = thousand British thermal units per year
kWh/yr = kilowatt-hours per year
therms/yr = therms per year

As shown in Table 4.6.H, the estimated potential increased electricity demand associated with operation of the proposed Project is 6,140,783 kWh per year (6.14 GWh per year) more than operation of the existing nursery. Total electricity consumption in Orange County in 2017 was 20,030.5 GWh. Therefore, the increased electricity demand associated with the proposed Project would be less than 0.03 percent of Orange County's total electricity demand.

As shown in Table 4.6.H, the estimated potential increased natural gas demand associated with the proposed Project is 116,020.6 therms per year compared to the existing nursery use. Total natural gas consumption in Orange County in 2018 was 575.1 million therms. Therefore, natural gas demand associated with the proposed Project would be less than 0.02 percent of Orange County's total natural gas demand.

The proposed Project would also result in energy usage associated with gasoline fuel consumed by Project-related vehicle trips. Fuel use associated with vehicle trips generated by the proposed Project was calculated based on the project's trip generation estimates from CalEEMod in the *Greenhouse Gas Analysis* (Urban Crossroads 2019b) prepared for the proposed Project. The proposed Project is estimated to generate approximately 5,948,016 VMT for the elementary school, 1,086,584 VMT for the retirement community, and 19,064,105 VMT for the single-family residential uses annually. Fuel use associated with the vehicle trips generated by the proposed Project was calculated for the 2025 operational year based on vehicle fuel consumption for Orange County provided in EMFAC2017. The vehicle fuel consumption calculations for the proposed Project for the 2025 opening year are shown in Tables 4.6.I and 4.6.J.

Table 4.6.I: Proposed Project Operational Trips – Fuel Efficiency

Year	Fuel	Vehicle Class	EMFAC2017 Outputs[1]			
			Fleet Mix (%)[2]	Fuel Consumption (1,000 gpd)	VMT (mi/day)	Fuel Efficiency[3] (mpg)
2025	Gas	LDA	57	1,458.1	50,397,810	34.6
		LDT1	4	185.9	5,474,703	29.4
		LDT2	21	601.6	16,783,491	27.9
		MDV	11	481.9	10,814,941	22.4
		LHD1	1	113.5	1,249,765	11.0
		LHD2	1	22.7	216,895	9.6
		MHDT	3	67.1	351,384	5.2
		HHDT	2	0.3	1,372	4.6
		OBUS	<1	8.0	43,165	5.4
		UBUS	<1	4.7	20,409	4.3
		MCY	<1	11.7	435,214	37.2
		SBUS	<1	2.6	24,717	9.5
		MH	<1	11.7	63,527	5.4
		Fleet Mix	–	–	–	**29.9**
	Diesel	LDA	13	10.3	556,199	54.0
		LDT1	<1	<0.1	914	0
		LDT2	3	3.6	142,974	39.7
		MDV	7	10.5	314,811	30.0
		LHD1	25	47.2	1,065,628	22.6
		LHD2	10	20.2	411,549	20.4
		MHDT	27	173.5	1,976,807	11.4
		HHDT	10	173.0	969,310	5.6
		OBUS	0	0.0	0	0
		UBUS	0	0.0	0	0
		MCY	0	0.0	0	0
		SBUS	1	4.9	38,030	7.8
		MH	3	2.6	28,623	11.0
		Fleet Mix	–	–	–	**22.0**
	Electric	LDA	74	0.0	1,893,890	0.0
		LDT1	4	0.0	95,830	0.0
		LDT2	14	0.0	251,954	0.0
		MDV	8	0.0	159,630	0.0
		Fleet Mix	–	–	–	**0.0**
	Natural Gas	HHDT	59	19.0	44,800	2.4
		UBUS	41	22.8	88,045	3.9
		Fleet Mix	–	–	–	**3.0**

Sources: CARB EMFAC2017 Web Database, https://www.arb.ca.gov/emfac/2017/, accessed July 1–4, 2017; and *Greenhouse Gas Analysis* (Urban Crossroads 2019b).

[1] EMFAC2017 was run for Orange County for the operational year 2025. Data were aggregated over all vehicle model years and speed bins.

[2] Fleet mix is based on assumptions made in CalEEMod for the proposed project.

[3] The fuel efficiency was calculated by dividing the VMT (mi/day) by the fuel consumption (gpd).

CalEEMod = California Emissions Estimator Model
CARB = California Air Resources Board
gpd = gallons per day
HHDT = heavy heavy-duty truck
LDA = light-duty automobile
LDT1 = light-duty truck 1
LDT2 = light-duty truck 2
LHD1 = light heavy-duty truck 1
LHD2 = light heavy-duty truck 2
MCY = motorcycle
MDV = medium-duty truck
MH = motor home
MHDT = medium heavy-duty truck
mi/day = miles per day
mpg = miles per gallon
OBUS = other bus
SBUS = school bus
UBUS = urban bus
VMT = vehicle miles traveled

Table 4.6.J: Proposed Project Operational Trips – Fuel Usage

Year[1]	Land Use	Total Annual VMT[2] (mi/yr)	Fuel Type	Portion of Fleet[3] (%)	VMT by Fuel Type (mi/yr)	Fleet Mix Efficiency[4] (mpg)	Fuel Usage (gal/yr)
2025	Elementary School	5,948,016	Gas	92	5,472,175	29.9	183,016
			Diesel	6	356,881	22.0	16,222
			Electric	2	118,960	N/A	0
			Natural Gas	<1	0	3.0	0
	Retirement Community	1,086,584	Gas	92	999,657	29.9	33,433
			Diesel	6	65,195	22.0	2,963
			Electric	2	21,732	N/A	0
			Natural Gas	<1	0	3.0	0
	Single-Family Housing	19,064,105	Gas	92	17,538,977	29.9	586,588
			Diesel	6	1,143,846	22.0	51,933
			Electric	2	381,282	N/A	0
			Natural Gas	<1	0	3.0	0
Total Diesel Consumption per Year – Proposed Project							**70,522**
Total Gasoline Consumption per Year – Proposed Project							**803,037**
Total Diesel Consumption per Year – Existing Nursery							758
Total Gasoline Consumption per Year – Existing Nursery							54,189
Diesel Consumption – Change from Existing							**+69,764**
Gasoline Consumption – Change from Existing							**+745,848**

Sources: CARB EMFAC2017 Web Database, https://www.arb.ca.gov/emfac/2017/, accessed July 1–4, 2017; and *Greenhouse Gas Analysis* (Urban Crossroads 2019b).

[1] Calculated for operational year 2025 only. Future years will likely use less fuel due to more efficient cars.

[2] Total VMT is based on project's trip generation and trip lengths.

[3] Fleet distribution is based on EMFAC2017 output and CalEEMod assumptions.

[4] Fuel efficiency is based on fuel consumption and VMT data from EMFAC2017 for Orange County and total VMT.

CalEEMod = California Emissions Estimator Model
CARB = California Air Resources Board
gal/yr = gallons per year
mi/yr = miles per year
mpg = miles per gallon
N/A = not applicable
VMT = vehicle miles traveled

As shown in Tables 4.6.I and 4.6.J, the estimated annual fuel consumption for the proposed Project would be 54,189 gallons of gasoline and 758 gallons of diesel. It should be noted that the estimated operational fuel from vehicle trips associated with the proposed Project is conservatively based on the year 2025. The fuel efficiency of vehicles is expected to continue to increase and improve throughout the life of the project as new fuel economy standards are established. Therefore, the actual annual fuel consumption during operation of the proposed Project would be anticipated to decrease each year.

As shown in Table 4.6.J, vehicle trips associated with the proposed Project would consume approximately 745,848 gallons of gasoline and 69,764 gallons of diesel fuel per year. Based on fuel consumption obtained from the CARB EMFAC2017, 160.5 million gallons of diesel and 1.3 billion gallons of gasoline were consumed from vehicle trips in Orange County in 2018. Therefore, gasoline demand generated by vehicle trips associated with the proposed Project would be less than 0.06 percent of the total gasoline and diesel fuel consumption in California.

As specified in RCM AQ-4 and RCM GHG-1, the proposed Project would be constructed to CALGreen standards and appliances would be energy efficient, which would help to reduce energy and natural gas consumption. Vehicles would continue to become more efficient each

year in compliance with federal and State regulations, which would reduce fuel consumption. Additionally, school buses would be required to limit idling, which reduces fuel consumption, as specified in RCM EN-2. The proposed Project would not result in the wasteful, inefficient, or unnecessary consumption of fuel or energy and would incorporate renewable energy or energy efficiency measures into building design, equipment use, and transportation. Impacts related to consumption of energy resources during operation would be less than significant, and no mitigation is required.

Threshold 4.6.2: Would the project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

Less than Significant Impact. In 2002, the Legislature passed SB 1389, which required the CEC to develop an integrated energy plan every 2 years for electricity, natural gas, and transportation fuels for the California Energy Policy Report. The plan calls for the State to assist in the transformation of the transportation system to improve air quality, reduce congestion, and increase the efficient use of fuel supplies with the least environmental and energy costs. To further this policy, the plan identifies a number of strategies, including assistance to public agencies and fleet operators in implementing incentive programs for ZEVs and their infrastructure needs, and encouragement of urban designs that reduce VMT and accommodate pedestrian and bicycle access.

The CEC recently adopted the *2017 Integrated Energy Policy Report* (CEC 2018a) and the *2018 Integrated Energy Policy Report Update* (CEC 2018b). The Integrated Energy Policy Report provides the results of the CEC's assessments of a variety of energy issues facing California. Many of these issues will require action if the State is to meet its climate, energy, air quality, and other environmental goals while maintaining energy reliability and controlling costs. The Integrated Energy Policy Report covers a broad range of topics, including implementation of SB 350, integrated resource planning, distributed energy resources, transportation electrification, solutions to increase resiliency in the electricity sector, energy efficiency, transportation electrification, barriers faced by disadvantaged communities, demand response, transmission and landscape-scale planning, the California Energy Demand Preliminary Forecast, the preliminary transportation energy demand forecast, renewable gas, updates on Southern California electricity reliability, natural gas outlook, and climate adaptation and resiliency. The City of Lake Forest relies on the State integrated energy plan and does not have its own local plan to address renewable energy or energy efficiency.

As indicated above, energy usage on the Project site during construction would be temporary in nature and would be relatively small in comparison to the overall use in the County. In addition, energy usage associated with operation of the proposed Project would be relatively small in comparison to the overall use in Orange County, and the State's available energy sources and energy impacts would be negligible at the regional level. Because California's energy conservation planning actions are conducted at a regional level, and because the Project's total impact on regional energy supplies would be minor, the proposed Project would not conflict with or obstruct California's energy conservation plans as described in the CEC's Integrated Energy Policy Report. Additionally, as demonstrated above under Threshold 4.6.1, the proposed Project would not result in the inefficient, wasteful, and unnecessary consumption of energy. Potential impacts related to conflict with or

obstruction of a State or local plan for renewable energy or energy efficiency would be less than significant, and no mitigation is required.

4.6.7 Cumulative Impacts

Please refer to Table 4.A and Figure 4.0.1 in Section 4.0, Existing Setting, Environmental Analysis, Impacts, and Mitigation Measures, for the descriptions and locations of the related projects considered in the cumulative impact analysis.

The geographic area for electricity service is that of the SCE boundaries, while the geographic area for natural gas service is that of the SoCalGas boundaries. The proposed Project would result in an increased services demand in electricity and natural gas. Although the proposed Project would result in a net increase in electricity, this increase would not require SCE to expand or construct infrastructure that could cause substantial environmental impacts. As discussed previously, the total annual electricity consumption in the SCE service area in 2017 was 84,291.6 GWh. By 2030, consumption is anticipated to increase by approximately 12,000 GWh for the low-demand scenario and by 22,000 GWh for the high-demand scenario (CEC 2018c). While this forecast represents a large increase in electricity consumption, the Project's percent of cumulative consumption would be less than 0.008 percent. The Project, in combination with cumulative development, is well within SCE's system-wide net annual increase in electricity supplies over the 2018 to 2030 period, and there are sufficient planned electricity supplies in the region for estimated net increases in energy demands.

Similarly, additional natural gas infrastructure is not anticipated due to cumulative development. Total natural gas consumption in the SoCalGas service area in 2018 was 5,156.1 million therms. Between 2018 and 2035, total natural gas consumption in the SoCalGas service area is forecast to remain steady for the low- and mid-demand scenarios and to increase by approximately 650 million therms in the high-demand scenario due to intense energy efficiency efforts (CEC 2018c). The Project's percent of cumulative consumption of natural gas in the SoCalGas service area would be less than 0.003 percent. It is anticipated that SoCalGas would be able to meet the natural gas demand of the related projects without additional facilities. In addition, both SCE and SoCalGas demand forecasts include the growth contemplated by the Project and the related projects. SCE and SoCalGas plan to continue to provide reliable service to its customers and upgrade their distribution systems as necessary to meet future demand.

Transportation energy use would also increase; however, this transportation energy use would not represent a major amount of energy use when compared to the amount of existing development and to the total number of vehicle trips and VMT throughout Orange County and the region. The proposed Project and related projects are required to comply with various federal and State government legislation to improve energy efficiency in buildings, equipment, and appliances, and reduce VMT. Increased energy efficiency to comply with building energy efficiency standards will reduce energy consumption on a per-square-foot basis. In addition, utility companies are required to increase their renewable energy sources to meet the Renewable Portfolio Standards mandate of 60 percent renewable supplies by 2030. Further, compliance with the existing regulatory requirements and project design features would ensure that the proposed Project does not result in

an inefficient, wasteful, and unnecessary consumption of energy. Therefore, the proposed Project's contribution to impacts related to the inefficient, wasteful, and unnecessary consumption of energy would not be cumulatively considerable, and no mitigation is required.

4.6.8 Level of Significance Prior to Mitigation

Energy impacts related to the inefficient, wasteful, and unnecessary consumption of energy as well as impacts due to conflicts or obstruction of a State or local plan for renewable energy or energy efficiency would be less than significant, and no mitigation is required.

4.6.9 Regulatory Compliance Measures and Mitigation Measures

4.6.9.1 Regulatory Compliance Measures

The following RCMs are applicable South Coast Air Quality Management District (SCAQMD) Rules. The City of Lake Forest considers these requirements to be mandatory; therefore, they are not mitigation measures.

RCM EN-1 **California Code of Regulations, Title 13, General Requirements for In-Use Off-Road Diesel-Fueled Fleets.** The construction contractor shall ensure that all non-essential idling of construction equipment and delivery vehicles is restricted to 5 minutes or less in compliance with California Code of Regulations (CCR) Title 13, Division 3, Chapter 9, Article 4.8, Section 2449 and CCR Title 13, Division 3, Chapter 10, Article 1, Section 2485. Prior to issuance of any grading or building permits, the City of Lake Forest Director of Community Development, or designee, shall confirm that plans include notes with this requirement.

RCM EN-2 **California Code of Regulations, Title 13, Airborne Toxic Control Measure to Limit School Bus Idling and Idling at Schools.** During operation, all school bus drivers shall comply with CCR Title 13, Article 1, Chapter 10, Section 2480 to limit bus idling at schools. School bus shall be turned off upon stopping at the school or within 100 feet of the school. School buses shall not be turned on more than 30 seconds before beginning to depart from the school or from within 100 feet of the school. School bus within 100 feet of the school shall not idle for more than 5 consecutive minutes and shall not idle for more than a cumulative 5 minutes in any 1 hour.

RCM AQ-4 **California Code of Regulations, Title 24.** Prior to issuance of building permits, the City of Lake Forest Director of Community Development, or designee, shall ensure that the project design complies with the 2019 Building Energy Efficiency Standards (CCR Title 24) energy conservation and green building standards.

RCM GHG-1 **California Code of Regulations, Title 20, Appliance Energy Efficiency Standards.** Appliances installed in project buildings shall comply with the energy efficiency requirements in CCR Title 20, Appliance Energy Efficiency Standards. All appliances shall be Energy Star appliances.

4.6.9.2 Mitigation Measures

The proposed Project would not result in significant impacts related to energy use, and no mitigation is required.

4.6.10 Level of Significance after Mitigation

Energy impacts during construction and operation would be less than significant.

This page intentionally left blank

4.7 GEOLOGY AND SOILS

This section provides a discussion of the existing geologic and soils environment and an analysis of potential impacts from implementation of the proposed Project. This section also addresses the potential for structural damage due to the local geology underlying the proposed Project site, as well as slope stability, ground settlement, soil conditions, grading, and regional seismic conditions. This section also evaluates potential impacts to paleontological resources. Data used to prepare this section were taken from the *Geotechnical Evaluation of Proposed Residential and School Site Development* (NMG Geotechnical, Inc. 2017) and the *Preliminary Geotechnical Exploration* (NMG Geotechnical, Inc. 2018) (both of which are included in Appendix F in this Environmental Impact Report [EIR]), as well as the City of Lake Forest General Plan (City of Lake Forest 2015), the City of Lake Forest Municipal Code, numerous State and federal studies of geologic and seismic hazards in the vicinity of Lake Forest, site-specific investigations in the Project area, and field observations.

4.7.1 Scoping Process

The City of Lake Forest (City) received 28 comment letters during the public review period of the Initial Study/Notice of Preparation (IS/NOP). For copies of the IS/NOP comment letters, refer to Appendix A of this EIR. No comments related to geology and soils were received during the IS/NOP public review period.

4.7.2 Existing Environmental Setting

4.7.2.1 Project Site

Historically, the Project site has been used primarily for agricultural production. From 1938 through the late 1960s, the Nakase Nursery was developed with orchards. In the late 1960s, the northwestern portion of the Project site continued operation as an orchard while the remainder of the Project site was developed as a plant nursery. In 1988, the orchards were removed, and the entire Project site has been used as an agricultural wholesale plant nursery since the 1990s. The 122-acre (ac) Project site is currently operating as the Nakase Brothers Wholesale Nurseries.

The Project site is bounded on the northwest by Bake Parkway, on the northeast by Rancho Parkway, on the southeast by Serrano Creek and Serrano Creek Trail, and on the southwest by commercial, industrial, and office uses, with Dimension Drive beyond. Although not immediately adjacent to the Project site, single-family and multifamily residential uses exist to the northwest, northeast, and south of the Project site.

According to the 2018 geotechnical report (NMG Geotechnical, Inc. 2018), in the existing condition, the topography of the Project site is gently sloping hillside terrain ranging in elevation from 675 feet (ft) in the southwestern portion to 750 ft in the central portion. It appears the Project site was lowered along portions of Bake Parkway by 3 to 8 ft and from the northern flank of the bedrock ridge by 5 to 12 ft, and that material was placed in the northern portion of the Project site to level out the topography.

4.7.2.2 Regional Geology

The Project site is located within the Los Angeles Basin, a northwest-trending alluviated lowland situated at the north end of the Peninsular Ranges geomorphic province of coastal Southern California. The Los Angeles Basin is bounded on the north by the Santa Monica Mountains and the Elysian, Repetto, and Puente Hills, and bounded on the east and southeast by the Santa Ana Mountains and San Joaquin Hills. The Los Angeles Basin is subdivided into four primary structural blocks that are distinguished from one another by contrasting basement rock types and stratigraphy. The Project site is located within the boundaries of the southwestern block of the Los Angeles Basin, most of which is a low plain that extends from Santa Monica at the northwest to Long Beach to the southeast.

4.7.2.3 Local Geology and Subsurface Conditions

The City of Lake Forest comprises about 17 square miles in a transition zone between an elevated coastal terrace and the Santa Ana Mountains. The western portion of Lake Forest, on the coastal terrace, is about 200 ft in elevation. The land becomes progressively higher and steeper to the east, eventually reaching elevations above 1,500 ft along the ridgeline of the Santa Ana Mountains.

Traces of fault segments associated with the Newport-Inglewood Fault Zones parallel the ocean edge of the coastal terrace. Traces of the Elsinore Fault Zone follow the ridge of the Santa Ana Mountains.

The geology of the region is complex and has undergone several alternating periods of subsidence and uplift, mass wasting (erosion), and sediment deposition. In the Santa Ana Mountains, igneous, metavolcanic, and metasedimentary rocks of Jurassic age (201.3 million to 145.0 million years ago) and younger form the core of the range. The exposed rocks in the mountainous areas are slightly metamorphosed volcanics, which have been intruded by granitic rocks of Cretaceous age (145.0 million to 66.0 million years ago), principally granites, gabbros, and tonalites. Overlying these rocks are about 15,000 ft of younger sandstones, siltstones, and conglomerates of upper Cretaceous age, composed largely of material eroded from the older igneous and metavolcanic rocks now underlying the Santa Ana Mountains. The valleys of creeks and washes cross the city, providing additional topographic relief in the foothills and on the coastal terrace. In Lake Forest, Aliso Creek, Serrano Creek, and Borrego Canyon Wash are major waterways whose ancestral channels cut deeply into the marine sediments of the terrace during the lower sea levels of the last Ice Age in late Pleistocene time. Over the last 17,000 years, the rivers have filled their channels to their present levels with unconsolidated sand, silt, and gravel (alluvium).

The subsurface investigation revealed that the majority of the Project site is underlain by deep quaternary alluvium deposited in three distinct canyons trending roughly northeast across the site. The central canyon and Serrano Creek merge together at the site, and the canyon parallel to Bake Parkway extends through the site. The quaternary alluvium is exposed throughout the majority of the site in the old canyon areas. The alluvium consisted of silty to clayey sands with occasional layers of gravel and beds of silt and clay. Based on the collected data and experience on adjacent properties, the alluvium is most likely up to 70 to 80 ft thick in the deepest part of the old canyons.

Slope wash is exposed on the lower flanks of the main bedrock ridge and the tips of the ridges exposed along Bake Parkway and Rancho Parkway. This material is similar to colluvium.

Undocumented fill covers the alluvium in the northern half of the site and along Serrano Creek. Based on a comparison of the 1949 United States Geological Survey (USGS) topographic map to the current topography, the site has been raised about 5 to 15 ft along Serrano Creek and about 4 to 10 ft adjacent to Rancho Parkway. Sandstone of the Capistrano Formation is exposed in the ridge in the south-central portion of the Project site and in limited exposure along Bake Parkway and Rancho Parkway. Bedding generally dips at low angles (8 to 19 degrees) northeast and northwest.

4.7.2.4 Local Groundwater Conditions

Groundwater is present within the alluvium beneath the site. The groundwater encountered during the geologic evaluation ranged from 20 to 45 ft deep. Based on maps published by the State of California, the historic high groundwater levels at the site ranged from 15 to 20 ft deep. Currently, there is a water-well located in the southwest corner of the site that provides irrigation water for the nursery operation.

4.7.2.5 Fault Systems and Seismic Conditions

The faulting and seismicity of Southern California are dominated by the San Andreas Fault Zone. The San Andreas Fault Zone separates two of the major tectonic plates that comprise the earth's crust. West of the San Andreas Fault Zone lies the Pacific Plate. This plate is moving northwest relative to the North American Plate, which is east of the San Andreas Fault Zone. This relative movement between the two plates is the driving force of fault ruptures in the western portion of Southern California. The San Andreas Fault generally trends northwest-southeast. North of the Transverse Ranges Province, the fault trends more in an east-west direction, causing a north-south compression between the two plates. The rate of north-south compression in Southern California has been estimated at between 5 and 20 millimeters per year. This compression has produced rapid uplift of many of the mountain ranges in Southern California, including those surrounding the Los Angeles Basin.

There are numerous faults in the Los Angeles Basin that are categorized as active, potentially active, and inactive. A fault is classified as active if it has either moved during the Holocene epoch (the last 10,000 to 11,500 years) or is included in an Alquist-Priolo Earthquake Fault Zone (as established by the California Geological Survey [CGS], formerly the Division of Mines and Geology). A fault is classified as potentially active if it has experienced movement during the Quaternary period (the last 1.8 million years), but shows little or no evidence of movement during the Holocene. Faults that have not moved in the last 1.8 million years generally are considered inactive. Surface displacement can be recognized by the existence of cliffs in alluvium, terraces, offset stream courses, fault troughs and saddles, the alignment of depressions, sag ponds, and the existence of steep mountain fronts.

The most significant active fault traces in the vicinity of Lake Forest are along the Newport-Inglewood and Elsinore Fault Zones, which are considered active. The Newport-Inglewood Fault Zone was responsible for both the 1933 Long Beach Earthquake and the 1920 Inglewood Earthquake. This zone is visible on the surface as a series of northwest-trending elongated hills

extending from Newport Beach to Beverly Hills, including Signal Hill and Dominguez Hills. The fault zone exhibits as much as 6,000 ft of right-lateral displacement that has occurred since mid-Pliocene time, about 3.4 million years ago, with a maximum displacement of 10,000 ft since late Miocene time, at least 5.3 million years ago. Active or potentially active fault segments of the Newport-Inglewood Fault Zone closest to Lake Forest include the north and south branches of the Newport-Inglewood Fault.

Other known active segments of faults at greater distances from Lake Forest that could pose seismic groundshaking hazards for the Project site include those of the Palos Verdes Fault Zone (about 26 miles [mi] southwest of the city), the San Jacinto Fault Zone (about 35 mi northeast of the city), the San Andreas Fault Zone (about 43 mi northeast of the city), the Sierra Madre Fault Zone (about 32 mi north of the city), and the Santa Monica–Raymond Fault Zone (about 42 mi northwest of the city).

There are no active faults within or immediately adjacent to the Project site based on review of the reports and maps published by the CGS. The closest active fault is the San Joaquin Hills Blind Thrust Fault, located 3.9 mi southwest of the site.

4.7.2.6 Liquefaction and Lateral Spreading

Soil liquefaction is a phenomenon that occurs during strong ground shaking, most commonly in generally low- to medium-density, saturated, low-cohesion soils, where the soils experience a temporary loss of strength and behave essentially as a fluid. In extreme cases, the soil particles can become suspended in groundwater, resulting in the soils becoming mobile and fluid like. Intervals of loose sand may, therefore, be subject to liquefaction if these materials are or were to become submerged and also exposed to strong seismic ground shaking. This loss of support can produce local ground failure such as settlement or lateral spreading that may damage overlying improvements. As discussed in the 2018 geotechnical report (NMG Geotechnical, Inc. 2018), a significant portion of the Project site along the southern edge parallel to Serrano Creek is located within a potential liquefaction zone as defined by the State's seismic hazard mapping.

Lateral spreading typically occurs as a form of horizontal displacement of relatively flat-lying alluvial material toward an open or “unconfined” face such as an open body of water, channel, or excavation. In soils, this movement is generally due to failure along a weak plane and is often associated with liquefaction. Because of the potential for liquefaction in the Project site and the proximity of the Project site to Serrano Creek, there is a potential for lateral spreading at the site as a result of seismic activity.

Secondary seismic hazards, such as tsunami or seiche, are considered negligible because the site is located away from the ocean and confined bodies of water and is at elevations well above sea level (700± ft).

4.7.2.7 Subsidence

Subsidence refers to broad-scale changes in the elevation of land. Common causes of land subsidence are pumping water, oil, and gas from underground reservoirs; dissolution of limestone

aquifers (sinkholes); collapse of underground mines; drainage of organic soils, and initial wetting of dry soils (hydrocompaction). Subsidence is also caused by heavy loads generated by large earthmoving equipment. The Project site is not located within an area of known subsidence that may be associated with groundwater, peat loss, or oil extraction.[1]

4.7.2.8 Seismically Induced Ground Settlement

This type of secondary seismic effect can result in damage to property when an area settles to different degrees over a relatively short distance. The sinking or settlement of a structure, area of fill, or other imposed load is usually the result of densification of the underlying soil. Soils susceptible to seismically induced settlement typically include loose granular materials. Ground settlement could occur on sites within a short distance of alluvial valleys or where a site is partially on bedrock formation, or partially on fill with inadequate internal compaction or consolidation of unsuitable soils. According to the geotechnical evaluation conducted by NMG Geotechnical, Inc. in 2017, there is a potential for minor settlement of the quaternary alluvium underlying the majority of the Project site.

4.7.2.9 Expansive Soils

Expansive soils contain types of clay minerals that occupy considerably more volume when they are wet or hydrated than when they are dry or dehydrated. Volume changes associated with changes in the moisture content of near-surface expansive soils can cause uplift or heave of the ground when they become wet or, less commonly, cause settlement when they dry out. According to the 2018 geotechnical report (NMG Geotechnical, Inc. 2018), on-site soils are granular in nature and are expected to have low to medium expansion potential.

4.7.2.10 Corrosive Soils

Corrosive soils contain chemical constituents that cause damage to construction materials such as concrete and ferrous metals. One such constituent is water-soluble sulfate, which, if high enough in concentration, can react with and damage concrete. Electrical resistivity, chloride content, and percentage of hydrogen (pH) levels are indicators of the soil's tendency to corrode ferrous metals. The geotechnical evaluation conducted by NMG Geotechnical, Inc. in 2017 determined that on-site soils are expected to be corrosive to metals.

4.7.2.11 Seismically Induced Landslides

The downslope movement of loose rock or soil is a potential secondary seismic effect that can occur during strong ground shaking. The proposed Project is not located within an area of earthquake-induced landslides, as defined by the State's seismic hazard mapping.

[1] United States Geological Survey (USGS). California Water Science Center, Areas of Land Subsidence in California Map. Website: https://ca.water.usgs.gov/land_subsidence/california-subsidence-areas.html (accessed June 13, 2019).

4.7.2.12 Paleontological Resources

The land within Lake Forest is mapped as containing 28 different geologic units, ranging in age from less than 200 years old to approximately 66 million years old (De Novo, 2018: 9-45 to 9-46). Geologic mapping by Morton and Miller (2006) indicates the Project site contains Holocene to late Pleistocene (less than 126,000 years ago) Young Alluvial Fan Deposits (i.e., Quaternary alluvium as described in Section 4.7.2.3) and the late Miocene to early Pliocene Oso Member of the Capistrano Formation (described in Section 4.7.2.3 as the Capistrano Formation). The marine Capistrano Formation is divided into two members, one informal and one formal: the siltstone member and the Oso Member, which is the member mapped in the Project site (Morton and Miller, 2006). These two members are laterally equivalent and date to the latest Hemphillian North American Land Mammal Age (approximately 7–4.9 million years ago) (Barnes and Raschke, 1991; Morton et al., 1976). Although not mapped by Morton and Miller (2006), as noted in Section 4.7.2.3, undocumented fill is also present at the surface in the Project site.

While undocumented fill may contain fossils, these fossils have been removed from their original location and are thus out of stratigraphic context. Therefore, they are not considered important for scientific study. With the exception of undocumented fill, the geologic units within the Project site have the potential to produce scientifically important paleontological resources. Pleistocene sediments similar to those found at depth in the Young Alluvial Fan Deposits have produced scientifically important fossils elsewhere in Orange County and the region (Bell et al., 2004; Jefferson 1991a, 1991b; Miller, 1971; Reynolds and Reynolds, 1991; Springer et al., 2009). Fossils from this time include large and small mammals, reptiles, fish, invertebrates, and plants. The Oso Member of the Capistrano Formation has produced specimens of algae, land plants, bivalves, gastropods, molluscs, bryozoans, echinoderms, shrimp, sharks, rays, bony fish, sea turtles, crocodiles, birds, dolphins, whales, sea lions, sea cows, walruses, camels, elephants, horses, and rhinoceros (Fierstine, 2008; Minch and Hull, 1993; Minch and Leslie, 1994; Schoellhamer et al., 1981; Sundberg, 1991). Moreover, the Recreation and Resources Element of the City's General Plan identifies the proposed Project site as being sensitive for important paleontological resources (City of Lake Forest, 2015).

4.7.3 Regulatory Setting

4.7.3.1 Federal Regulations

There are no federal regulations for geology and soils that are applicable to the proposed Project.

4.7.3.2 State Regulations

Alquist-Priolo Earthquake Fault Zoning Act (1972). The Alquist-Priolo Earthquake Fault Zoning Act of 1972 and updates (California Public Resources Code [PRC], Section 2621, et seq.) is the principal California State guidance to prevent the construction of habitable structures on the surface trace of active earthquake faults. If an active fault is found, a structure for human occupancy must be set back from the fault (generally 50 ft). The Alquist-Priolo Earthquake Fault Zoning Act only addresses the hazard of surface fault rupture; it does not consider other earthquake hazards. There are no known earthquake fault zones on or in the near vicinity of the Project site; therefore, regulations recommended by the CGS for investigations conducted in such zones do not specifically apply.

Seismic Hazard Mapping Act (1990). The Seismic Hazard Mapping Act (SHMA) was adopted by the State in 1990 to address the potential hazards posed by secondary effects of seismic activity, including strong ground shaking, soil liquefaction, and associated ground failure and seismically induced landslides. The CGS prepares and provides local governments with seismic hazard zone maps that identify areas susceptible to amplified shaking, liquefaction, earthquake-induced landslides, and other ground failures. The seismic hazard zones are referred to as "zones of required investigation" because site-specific geological investigations are required for construction projects located within these areas. Before a project can be permitted, a geologic investigation, evaluation, and written report must be prepared by a licensed geologist to demonstrate that the potential hazards can be successfully mitigated.

California Building Code (2016). The California Code of Regulations (CCR), Title 24, Part 2, the California Building Code (CBC), provides minimum standards for building design in the State. Local codes are permitted to be more restrictive than Title 24, but not less restrictive. The procedures and limitations for the designs of structures are based on site characteristics, occupancy type, configuration, structural system height, and seismic design category. Construction activities are subject to occupational safety standards for excavation, shoring, and trenching as specified in California Occupational Safety and Health Administration (Cal/OSHA) regulations (CCR, Title 8).

California Health and Safety Code. Sections 17922 and 17951–17958.7 of the California Health and Safety Code require cities and counties to adopt and enforce the current edition of the CBC, including a grading section. The City has adopted these provisions by reference (Title 8, Chapter 8.02, Section 8.02.001 of the City of Lake Forest Municipal Code) and also includes amendments to the CBC (Title 8, Chapter 8.02, Section 8.02.020 of the City's Municipal Code). Sections of Volume 2 of the CBC specifically apply to select geologic hazards. Chapter 16 of the 2016 CBC addresses requirements for seismic safety. Chapter 18 regulates excavation, foundations, and retaining walls. Chapter 33 contains specific requirements pertaining to site demolition, excavation, and construction.

Public Resources Code. Section 5097.5 of the Public Resources Code provides for the protection of cultural and paleontological resources and prohibits the removal, destruction, injury, or defacement of archaeological and paleontological features on any lands under the jurisdiction of State or local authorities.

Construction General Permit. Stormwater discharges from construction activities in California are regulated by the State Water Resources Control Board (SWRCB) *National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities*, Order No. 2009-009-DWQ, NPDES No. CAS000002 (Construction General Permit). The Construction General Permit regulates construction activity that disturbs of at least 1 ac of total land area. The Construction General Permit requires preparation and implementation of a Stormwater Pollution Prevention Plan (SWPPP) that describes the Erosion Control and Sediment Control Best Management Practices (BMPs) that would be implemented during construction to control erosion and sedimentation, particularly during storm events.

4.7.3.3 Local Regulations

North Orange County MS4 Permit. The City is a co-permittee of an NPDES Municipal Separate Storm Sewer System (MS4) permit for North Orange County. The Santa Ana Regional Water Quality Control Board (RWQCB) *Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and the Incorporated Cities of Orange County within the Santa Ana Region Areawide Urban Storm Water Runoff, Orange County*, Order No. R8-2009-0030, NPDES No. CAS618030, as amended by Order No. R8-2010-0062 (North Orange County MS4 Permit) regulates stormwater discharges into the City's MS4 system (i.e., storm drain system) and surface waters. The MS4 Permit stipulates operational requirements for new development and significant redevelopment, including implementation of Source Control, Site Design, Low Impact Development (LID), and Treatment Control BMPs to address pollutants of concern in stormwater runoff during operation. As specified by the North Orange County MS4 Permit, the proposed project is considered a "priority" project because it is a redevelopment project that would add or replace at least 5,000 square feet (sf) or more of impervious surface. As a priority project, the proposed Project is required to prepare a Water Quality Management Plan (WQMP) and implement BMPs to address pollutants in stormwater runoff, including pollutants associated with erosion, during operation. Please refer to Subsection 4.9.3, Regulatory Setting, in Section 4.9, Hydrology and Water Quality, of this EIR for additional discussion of the North Orange County MS4 Permit.

City of Lake Forest General Plan Safety and Noise Element. The Safety and Noise Element addresses hazards as mandated in State law (Government Code Section 65302(g)). This element also serves as a comprehensive program to identify and temper environmental factors that potentially threaten community health and safety. The Safety and Noise Element contains policies and programs to regulate existing and proposed development located in hazard-prone areas.

The following goal and policy apply to the proposed Project:

> **Goal 1.0** Reduction in the risk to the community from hazards associated with geologic conditions, seismic activity, and flooding.
>
> **Policy 1.1** Reduce the risk of impacts from geologic and seismic hazards.

City of Lake Forest General Plan Recreation and Resource Element. The existing City of Lake Forest General Plan identifies goals and policies related to cultural resources. Goal 4.0 in the Recreation and Resources Element of the City's General Plan addresses historical, archaeological, and paleontological resources (and potential resources) and indicates that conservation of the resources and investigation of potential resource areas is an important undertaking for connecting with the community's past (City of Lake Forest 2015: 7-8).

The following goal and policy apply to the proposed Project:

> **Goal 4.0** Conservation of important historic, archaeological, and paleontological resources.

Policy 4.1 Protect areas of important historic, archaeological, and paleontological resources.

City of Lake Forest Municipal Code, Chapter 8.02. Chapter 8.02 of the City's Municipal Code includes the adoption of the CBC by reference and amendments to the CBC.

- **Section 8.30.030** adopts the CBC for the purpose of prescribing regulations for the erection, construction, enlargement, alteration, repair, improving, removal, conversion, demolition, occupancy, equipment, use, height, area and maintenance of all buildings and structures. The California Building Code, 2016 Edition, is based on the 2015 International Building Code as published by the International Code Council with the amendments provided in Section 8.02.020.

- **Section 8.30.020** outlines amendments to the 2016 CBC, including modifications to design, plan review, permit, and payment of fee requirements.

City of Lake Forest Municipal Code, Chapter 8.30. Chapter 8.30 of the City's Municipal Code regulates grading and excavation activities.

- **Section 8.30.030** requires a grading permit obtained from the City Engineer prior to any grading, clearing of brush, grubbing excavation, or any other land disturbance activities.

- **Section 8.30.058** requires a soil engineering and engineering geology report for grading projects. The reports shall include information appropriate for the site including any information required by the City Engineer. Recommendations included in the reports and approved by the City Engineer shall be incorporated in the grading plans or specifications.

- **Section 8.30.100** specifies that cut slopes shall be no steeper than two horizontal to one vertical (2:1) unless otherwise recommended in the soil engineering or engineering geology report and approved by the City Engineer.

- **Section 8.30.110** specifies that unless otherwise approved by the City Engineer and recommended in the approved soil engineering report, fills shall conform to Subarticle 9 of the grading manual. The provisions therein may be waived for minor fills not intended to support structures upon written request by the applicant on a form prescribed by the City Engineer.

- **Section 8.30.150** specified that grading activities be undertaken in compliance with NPDES and City requirements. Each grading project shall implement BMPs to ensure that discharges of pollutants are effectively prohibited and will not cause or contribute to an exceedance of water quality standards. Section 8.30.150 also specifies that, prior to the issuance by the City of a grading permit, the Department of Public Works and/or Development Services Department shall review the project plans.

- **Section 8.30.152** species that projects with a grading permit shall submit an erosion control plan to the Building Official for approval by September 15th of each year.

City of Lake Forest Municipal Code, Chapter 15.14. Chapter 15.14 of the City's Municipal Code regulates stormwater quality and prohibits discharges of pollutants into surface waters unless the discharge is authorized by an NPDES permit.

- **Section 15.14.040** requires all new development and redevelopment projects to comply with the requirements of the North Orange County MS4 Permit. Section 15.14.040 specifies that, prior to the issuance of a grading permit or building permit, the Department of Public Works and/or Development Services Department shall review the project plans.

- **Section 15.14.050** requires preparation of an erosion and sediment control plan as a condition of approval for issuance of a construction or grading permit. Section 15.14.050 also requires implementation of construction BMPs to ensure that the discharge of pollutants from the site will be effectively prohibited and will not cause or contribute to an exceedance of water quality standards. Section 15.14.050 specified that construction and grading activities be undertaken in compliance with NPDES and City requirements.

- **Section 15.14.060** requires implementation of operational BMPs on all sites that have the potential to discharge a pollutant to the City's MS4.

4.7.4 Methodology

To assess the impacts of the proposed Project with respect to geologic and soil conditions, geotechnical investigation and field explorations were undertaken by NMG Geotechnical, Inc. in 2017 and 2018. The discussion below describes the scope of the geotechnical exploration.

- **Background Research and Data Review:** Various sources, including published geologic maps, historic stereographic aerial photographs, and data pertinent to the subject site were acquired and reviewed by NMG Geotechnical, Inc. in 2017 and 2018.

- **Site Reconnaissance:** Site reconnaissance and subsurface explorations of the Project site were conducted by NMG Geotechnical, Inc. in 2017 and 2018.

- **Field Investigation:** Preliminary field investigations were conducted by NMG Geotechnical, Inc. in 2017 and 2018 to identify subsurface conditions on the Project site related to soil types, groundwater, liquefaction, corrosive soils, and settlement. In 2017, the field investigation included drilling, logging, and sampling six hollow-stem auger borings (B-1 through B-6) to depths of 51.5 to 55 ft below ground surface (bgs) and advancing 13 cone penetrometer test (CPT) soundings (CPT-1 through CPT-13) to depths of 50 ft bgs. In 2018, 21 hollow-stem augered borings were drilled, logged, and sampled (B-1 through B-21) on the Project site to depths of 25.5 to 55 ft bgs; 23 CPT soundings (CPT-1 through CPT-23) were advanced to depths of 50 ft bgs; and 22 trench/test pits (T-1 through T-22) were excavated to depths of up to 16 ft bgs.

- **Geotechnical Laboratory Testing:** In 2017 and 2018, NMG Geotechnical, Inc. conducted limited laboratory testing on selected samples to determine in-situ moisture and density, consolidation potential, shear strength, expansion potential, grain size distribution, and maximum density/ optimum moisture content.

Per the City's General Plan, the proposed Project site is sensitive for paleontological resources; therefore, no paleontological field studies or locality searches were conducted because the paleontological sensitivity of the proposed Project site was previously determined.

Paleontological resources and soils, geology, and seismic hazards were assessed with respect to significance within the context of Appendix G of the *State CEQA Guidelines*.

4.7.5 Thresholds of Significance

The thresholds for geology and soils impacts used in this analysis are consistent with Appendix G of the *State CEQA Guidelines* and the City's CEQA Significance Thresholds Guide (March 2009). The proposed Project may be deemed to have a significant impact with respect to geology and soils if it would:

Threshold 4.7.1(i): Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.

Threshold 4.7.1(ii): Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking

Threshold 4.7.1(iii): Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction

Threshold 4.7.1(iv): Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving landslides

Threshold 4.7.2: Result in substantial soil erosion or the loss of topsoil

Threshold 4.7.3: Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse

Threshold 4.7.4: Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property

Threshold 4.7.5: Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water

Threshold 4.7.6: Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature

The Initial Study, included as Appendix A, substantiates that there would be no impacts associated with Thresholds 4.7.1(i), 4.7.1(iv), and 4.7.5. These thresholds will not be addressed in the following analysis.

4.7.6 Project Impacts

Threshold 4.7.1(ii): Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking?

Potentially Significant Impact. As with all of Southern California, the Project site is subject to strong ground motion resulting from earthquakes on nearby faults. There are several faults in the vicinity of the Project site that are capable of producing strong ground motion. The San Joaquin Hills Blind Thrust Fault is the closest active fault, located 3.9 mi southwest of the Project site. Other major regional active faults include Whittier-Elsinore, Newport-Inglewood, San Jacinto, and San Andres Faults. During an earthquake along any of these faults or faults in the region, seismically induced ground shaking would be expected to occur. The severity of the shaking would be influenced by the magnitude of the earthquake, the distance of the Project site to the seismic source, the soil conditions, and the depth to groundwater.

Peak ground acceleration (PGA) is a measure of earthquake acceleration on the ground and an important input parameter for earthquake engineering. Based on the geotechnical evaluation conducted in 2017 (NMG Geotechnical, Inc. 2017), a PGA of 0.53g was identified for the Project site. This acceleration is consistent with other areas in this region of California that are underlain by similar geologic materials and indicates that strong seismic ground shaking generated by seismic activity is considered a potentially significant impact that may affect people or structures associated with the proposed Project. Mitigation Measure 4.7.1 and Regulatory Compliance Measure (RCM) GEO-1 require the applicant to comply with the recommendations of a Final Geotechnical Evaluation and the most current CBC adopted by the City as its Building Code, which stipulates appropriate seismic design provisions that shall be implemented with Project design and construction. With implementation of Mitigation Measure 4.7.1 and RCM GEO-1, potential project impacts related to seismic ground shaking would be reduced to a less than significant level.

Threshold 4.7.1(iii): Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction?

Potentially Significant Impact. Liquefaction occurs when saturated, cohesionless soils temporarily lose shear strength (liquefy) due to increased pore water pressures induced by strong ground motion during an earthquake. Structures on or above potentially liquefiable soils may experience bearing capacity failures due to the temporary loss of foundation support, vertical settlements, and/or lateral spreading. Factors known to influence the potential for liquefaction include soil type, relative density, grain size, confining pressure, depth to groundwater, and the intensity and duration

of the seismic ground shaking. Assessment of liquefaction potential for a particular site requires knowledge of a number of regional and site-specific parameters, including the estimated design earthquake magnitude, the distance to the assumed causative fault, and the associated probable peak horizontal ground acceleration at the site, subsurface stratigraphy, and soil characteristics. Parameters such as distance to causative faults and estimated probable peak horizontal ground acceleration were determined using published references and online computer programs by the United States Geological Survey (USGS). Stratigraphy and soil characteristics were determined by means of a site-specific subsurface investigation combined with appropriate laboratory analysis of representative samples of on-site soils.

As discussed above, a significant portion of the Project site along the southern edge parallel to Serrano Creek is located within a potential liquefaction zone as defined by the State's seismic hazard mapping. As previously discussed, groundwater was observed at depths of 20 to 45 ft. These depths are generally consistent with published maps that indicate the historic high groundwater level in the vicinity of the Project site, which ranged from 15 to 20 ft deep. Because of the granular nature of some of the layers within the alluvium and the shallow groundwater over most of the site, there is a potential for liquefaction to occur during a future major earthquake, impacting the Project site.

Mitigation Measure 4.7.1 and RCM GEO-1 require the applicant to comply with the recommendations of a Final Geotechnical Evaluation and the most current CBC adopted by the City as its building code, which stipulates appropriate seismic design provisions that shall be implemented with Project design and construction. Adherence to the Seismic Zone 4 soil and foundation support parameters and the grading requirements in the CBC and City of Lake Forest Municipal Code will ensure the maximum practicable protection available from soil failure under static or dynamic conditions for structures and their associated trenches, slopes, and foundations. With implementation of Mitigation Measure 4.7.1 and RCM GEO-1 potential project impacts related to seismically induced liquefaction would be reduced to a less than significant level.

Threshold 4.7.2: Would the Project result in substantial soil erosion or the loss of topsoil?

Less than Significant Impact. As discussed in Section 4.9, Hydrology and Water Quality, during construction activities, soil would be exposed, and there would be an increased potential for soil erosion compared to existing conditions due to soil disturbance and the exposure of soil to weather conditions (e.g., wind and rain). During a storm event, soil erosion and loss of topsoil could occur at an accelerated rate. As specified in RCM WQ-1, the project would comply with the requirements of the Construction General Permit. Under the Construction General Permit, the project would be required to prepare a SWPPP and implement the construction BMPs detailed in the SWPPP during construction. In addition, as specified in RCM WQ-2 in Section 4.9, Hydrology and Water Quality, an erosion and sediment control plan would be prepared and submitted to the Director of the City of Lake Forest Public Works Department, or designee, prior to issuance of a grading or building permit. An erosion and sediment control plan would also be prepared annually during construction and submitted to the Director of the City of Lake Forest Public Works Department, or designee, for approval prior to September 15th of each year during construction. The SWPPP and erosion and sediment control plans would detail the BMPs to be implemented during construction. Construction BMPs would include, but not be limited to, Erosion Control and Sediment Control BMPs designed to

minimize erosion and retain sediment on site. With implementation of Erosion Control and Sediment Control BMPs, as required by RCM WQ-1 and RCM WQ-2, construction impacts related to erosion or the loss of topsoil would be less than significant.

As also discussed in Section 4.9, Hydrology and Water Quality, in the proposed condition, 80.3 ac (65.8 percent) of the Project site would be impervious surface area and not prone to on-site erosion or siltation because no soil would be included in these areas. The remaining 41.7 ac (41.7 percent) of the site would consist of pervious area, which would contain landscaping that would minimize on-site erosion and siltation by stabilizing the soil. However, the proposed project would increase impervious area on the Project site by 68.2 ac, which would result in a net increase in storm water runoff that can lead to downstream erosion in receiving waters (Serrano Creek). However, as specified in RCM WQ-3, the proposed Project would be required to comply with the hydromodification requirements of the North Orange County MS4 Permit and reduce stormwater runoff from the Project site so it does not exceed pre-development runoff rates or time of concentration by more than 5 percent. To achieve this, the proposed Project would include a subsurface detention vault below Central Park, underground detention vaults in combination with proprietary biotreatment BMPs at each of the five neighborhood parks, a biotreatment facility along Serrano Creek, and a linear biotreatment facility along "A" Street. These features will reduce flows during storm events so it does not exceed pre-development runoff rates or time of concentration by more than 5 percent. Compliance with the hydromodification requirements of the North Orange County MS4 Permit, as specified in RCM WQ-3, would ensure that the proposed Project would not result in downstream erosion impacts. For these reasons, operation impacts related to substantial soil erosion or loss of topsoil would be less than significant, and no mitigation is required.

Threshold 4.7.3: Would the project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?

Landslides and Unstable Slopes.

Potentially Significant. Landslides and other forms of mass wasting, including mud flows, debris flows, and soil slips occur as soil moves downslope under the influence of gravity. Landslides are frequently triggered by intense rainfall or seismic shaking. Because the site is located in a relatively flat area, landslides or other forms of natural slope instability do not represent a significant hazard to the project. In addition, as stated above, the site is not within a State-designated hazard zone for Earthquake-Induced Landslide. Therefore, potential impacts related to landslides would be less than significant, and no mitigation is required.

Slope stability issues do exist along the edge of the Project site adjacent to Bake Parkway and Rancho Parkway. Additional soil testing and borings will be required to determine graded conditions beneath the roadbed (e.g., fill thickness, topsoil/colluvium left in place, subdrains installed). Depending on the final grading plan for the proposed Project and the results of additional soil testing, a structural setback may be required to prevent undermining the existing road or excessive differential settlement induced by new fill loading that would cause structure damage to planned structures. Mitigation Measure 4.7.1 and RCM GEO-1 require the applicant

to comply with the recommendations of a Final Geotechnical Evaluation and the most current CBC adopted by the City as its building code. With implementation of Mitigation Measure 4.7.1 and RCM GEO-1, potential project impacts related to slope stability and differential settlement would be reduced to a less than significant level.

Lateral Spreading.

Potentially Significant. Lateral spreading often occurs on very gentle slopes or flat terrain. The dominant mode of movement is lateral extension accompanied by shear or tensile fracture. This failure is caused by liquefaction and is usually triggered by rapid ground motion, such as that experienced during an earthquake, but can also be artificially induced. When coherent material, either bedrock or soil, rests on materials that liquefy, the upper units may undergo fracturing and extension and may then subside, translate, rotate, disintegrate, or liquefy and flow. During the subsurface investigation, the potential for lateral slope failure was explored with CPTs advanced to 50 ft deep, in selected areas along the perimeter of Serrano Creek. Due to the effects of liquefaction potential in the alluvium during a significant seismic shaking event, the exposed slope associated with Serrano Creek may be subject to lateral slope failure. According to the geotechnical evaluations prepared for the proposed Project (NMG Geotechnical, Inc. 2017, 2018), a seismic shear key would be required to reduce impacts related to lateral spreading to a less than significant level. The top of the front cut for the sheet key would start at the environmental setback boundary and would extend along the Serrano Creek edge. The actual dimensions of the key would depend on additional subsurface exploration and site-specific analysis to be performed as part of the preparation of the Final Geotechnical Report. With implementation of these recommendations in accordance with Mitigation Measure 4.7.1, potential impacts related to lateral spreading would be reduced below a level of significance.

Subsidence.

No Impact. Subsidence refers to broad-scale changes in the elevation of land. Common causes of land subsidence are pumping water, oil, and gas from underground reservoirs; dissolution of limestone aquifers (sinkholes); collapse of underground mines; drainage of organic soils; and initial wetting of dry soils (hydrocompaction). Subsidence is also caused by heavy loads generated by large earthmoving equipment. The Project site is not located within an area of known subsidence that may be associated with groundwater, peat loss, or oil extraction.[1] Therefore, the proposed Project would not be subject to potential geotechnical hazards related to subsidence, and no mitigation is required.

Unsuitable Soils.

Potentially Significant. The results of the subsurface investigation within the Project site indicate that approximately 200,000 yards of fill were placed to create the site conditions. Given that this fill is undocumented, it is unlikely that most of the on-site fill materials were placed in

[1] United States Geological Survey (USGS). California Water Science Center, Areas of Land Subsidence in California Map. Website: https://ca.water.usgs.gov/land_subsidence/california-subsidence-areas.html (accessed June 13, 2019).

accordance with current grading standards and certified by a geotechnical professional. It is assumed that remedial grading was not performed for this work and that the undocumented fill is underlain by unsuitable alluvium. Therefore, the future settlement behavior of the existing on-site fill under the loading conditions during operation of the proposed Project cannot be accurately predicted, and the on-site fill is considered unsuitable for support of the proposed buildings and associated site improvements. As described in Mitigation Measure 4.7.1, to mitigate differential settlement in the design cut-and-fill transition areas, over-excavation will be performed. Undocumented fill and any soft or poor quality fill[1] would also be removed during remedial grading. Provided design and remedial grading are performed in accordance with the applicable requirements in the CBC adopted by the City as its building code with certain amendments (RCM GEO-1), excessive settlement resulting from compression of existing undocumented fill and alluvial soils on the Project site would be reduced to a less than significant level.

Corrosive Soils.

Potentially Significant Impact. Corrosive soils contain constituents or physical characteristics that attack concrete (water-soluble sulfates) and/or ferrous metals (chlorides, ammonia, nitrates, low pH levels, and low electrical resistivity). Corrosive soils could potentially create a significant hazard to the project by weakening the structural integrity of the concrete and metal used to construct the building and could potentially lead to structural instability. Structural damage and foundation instability caused by corrosive soils is a potentially significant impact.

As discussed previously, on-site soils are not corrosive to concrete but are very corrosive to metals. Project impacts related to corrosive soils would be less than significant with implementation of Mitigation Measure 4.7.2. Mitigation Measure 4.7.2 requires protection of ferrous metals and copper against corrosion. Corrosion protection may include, but is not limited to, sacrificial metal, the use of protective coatings, and/or cathodic protection. With implementation of Mitigation Measure 4.7.2, potential impacts related to corrosive soils would be reduced to a less than significant level.

Threshold 4.7.4: Would the project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?

Less than Significant Impact. Expansive soils are characterized by their ability to undergo substantial volume changes (shrink or swell) due to variations in moisture content as a result of precipitation, landscape irrigation, utility leakage, roof drainage, perched groundwater, drought, or other factors. Liquefaction may result in unacceptable settlement or heave of structures or concrete slabs supported on grade. According to the geotechnical evaluations prepared for this project (NMG

[1] Fill dirt used in construction projects must meet specifications outlined by the project's geotechnical engineer. Generally, good quality, inorganic, clean fill dirt from subsoil consists of at least 50 percent clay and does not contain any additives or dangerous materials (e.g., refuse, rubble, muck, metal, glass, wood, or other foreign materials).

Geotechnical, Inc., 2017, 2018), on-site soils are generally granular in nature and are expected to have low to medium expansion potential. Therefore, the potential for expansive soils impacting the proposed Project is considered to be less than significant, and no mitigation is required.

Threshold 4.7.6: Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Potentially Significant Impact. According to the City of Lake Forest General Plan, the proposed Project site is located in an area that has been previously determined as sensitive for paleontological resources. As such, it is possible that ground-disturbing construction activities could impact significant previously undiscovered paleontological resources. To mitigate adverse impacts to unknown buried paleontological resources that may exist on site, Mitigation Measure 4.7.3 requires that an Orange County Certified Paleontologist be retained to develop a Paleontological Resources Impact Mitigation Program (PRIMP), that paleontological monitoring occur during ground-disturbing activities in paleontologically sensitive deposits, and that a final paleontological monitoring report be prepared describing the results of the monitoring effort. The PRIMP should follow guidelines developed by the Society of Vertebrate Paleontology and should include, but not be limited to, the methods that will be used to protect paleontological resources that may exist within the Project site, as well as procedures for monitoring, fossil preparation and identification, curation into a repository, and preparation of a report at the conclusion of grading. Implementation of Mitigation Measure 4.7.3 would ensure that impacts to paleontological resources are reduced below a level of significance.

4.7.7 Cumulative Impacts

As defined in the *State CEQA Guidelines*, cumulative impacts are the incremental effects of an individual project when viewed in connection with the effects of past, current, and probable future projects within the cumulative impact area for geology and soils. Typically, geology and soils impacts are specific to a particular Project site and there is little, if any, cumulative relationship between the development of a proposed project and development within a larger cumulative area. Moreover, while seismic conditions are regional in nature, seismic impacts on a given Project site are site-specific. For example, development within the Project site would not alter geologic events or soil features/characteristics (e.g., ground shaking, seismic intensity, or soil expansion or compression). Therefore, for geology and soils, the study area considered for the cumulative impact of other projects consisted of (1) the area that could be affected by proposed Project activities, and (2) the areas affected by other projects whose activities could directly or indirectly affect the geology and soils of the Project site. In general, only projects occurring adjacent to or very close to the Project site were considered. None of the 11 cumulative projects identified in Table 4.A (Section 4.0) are located adjacent to or in the immediate vicinity of the proposed project, and therefore would not contribute to cumulative geology and soils impacts.

In addition, the proposed Project, as well as foreseeable projects, would be required to comply with the applicable State and local requirements, including but not limited to the CBC that has been adopted by the City as its building code. Therefore, the Project-specific geology and soils impacts, as well as the impacts associated with other projects, would be reduced to a less than significant level.

Seismic impacts are a regional issue and are also addressed through compliance with applicable codes and design standards. For these reasons, the Project's contribution to cumulative geotechnical and soil impacts is less than significant.

Potential impacts of the proposed Project to unknown paleontological resources and unique geologic features, when combined with the impacts of past, present, and reasonably foreseeable projects in the City of Lake Forest, could contribute to a cumulatively significant impact due to the overall loss of paleontological remains unique to the region. However, each development proposal received by the City is required to undergo environmental review pursuant to the California Environmental Quality Act (CEQA). If there were any potential for significant impacts to paleontological resources or unique geologic features, an investigation would be required to determine the nature and extent of the resources and identify appropriate mitigation measures. When resources are assessed and/or protected as they are discovered, impacts to these resources are less than significant.

As such, implementation of Mitigation Measure 4.7.3 would ensure that the proposed Project, together with cumulative projects, would not result in significant cumulative impacts to unique paleontological resources or unique geologic features.

4.7.8 Level of Significance Prior to Mitigation

The potential for surface fault rupture, erosion, subsidence, landslides, and expansive soil is less than significant, and no mitigation is required. The potential impacts related to seismic shaking, liquefaction, lateral spreading, settlement due to undocumented fill, and corrosive soil would be potentially significant prior to mitigation. The proposed Project would also have potential impacts on paleontological resources prior to mitigation.

4.7.9 Regulatory Compliance Measures and Mitigation Measures

4.7.9.1 Regulatory Compliance Measures

The following RCM is a requirement of the CBC that is applicable to the proposed Project and is considered in the analysis of potential impacts related to geology and soils. The City of Lake Forest considers these requirements to be mandatory; therefore, they are not mitigation measures.

RCM GEO-1 **California Building Code Compliance Seismic Standards.** Structures and retaining walls shall be designed in accordance with the seismic parameters presented in the geotechnical evaluations prepared for this project (NMG Geotechnical, Inc., 2017, 2018) and applicable sections of Section 1613 of the most current California Building Code (CBC). Prior to issuance of building permits for planned structures, the Project soils engineer and the Director of Public Works, or designee, shall review building plans to verify that the structural design conforms to the requirements of the geotechnical study and the City of Lake Forest Municipal Code.

4.7.9.2 Mitigation Measures

In addition to regulatory requirements, the following mitigation measures would reduce potential impacts related to seismic ground shaking, liquefaction, and compressible/collapsible soils to a less than significant level.

Mitigation Measure 4.7.1 Incorporation of and compliance with the recommendations in the Project Geotechnical Assessment. All grading operations and construction shall be conducted in conformance with the recommendations included in the geotechnical evaluations for the Project site prepared by NMG Geotechnical, Inc., specifically the *Geotechnical Evaluation of Proposed Residential and School Site Development, Nakase Property, Lake Forest, California* dated April 19, 2017, and the *Preliminary Geotechnical Exploration, Proposed Development, Nakase Nursery, Tentative Tract 18142, Lake Forest, Orange County, California* dated July 13, 2018. Specific recommendations in the geotechnical evaluations address the following and shall be incorporated into the final Project plans and construction-level geotechnical report:

1. Removal of undocumented fill on the northern half of the Project site during remedial grading.

2. Removal of any soft or poor quality fill during remedial grading. If some of this material cannot be removed in order to prevent undermining the existing road, then a structural setback would be required to protect the planned structures from excessive differential settlement induced by the new fill loading.

3. Compact fill placement to reduce the potential for surface manifestations of liquefaction during seismic shaking.

4. Installation of a seismic shear key in the vicinity of Serrano Creek to mitigate the potential of lateral slope failure due to the effects of liquefaction potential in the alluvium during a significant seismic shaking event.

5. Evaluation of the stability of the slopes If existing slopes are to essentially remain in place to ensure they have been graded to a standard that resulted in a 1.5 safety factor for gross and surficial stability. If there are any deficiencies with the existing slope, they would have to be regraded to project standards or a structural setback established to protect the planned structures.

6. Over-excavation to mitigate differential settlement in the design cut-and-fill transition areas.

7. Placement of cement-treated soil or equivalent to be installed along the southeastern edge of the seismic shear key to protect the planned development from future potential erosion associated with the adjacent Serrano Creek.

Additional site testing and final design evaluation shall be conducted by the Project Geotechnical Consultant to refine and enhance these requirements. The Project Applicant/Developer shall require the Project Geotechnical Consultant to assess whether the requirements in that report need to be modified or refined to address any changes in the Project features that occur prior to the start of grading. If the Project Geotechnical Consultant identifies modifications or refinements to the requirements, the Project Applicant/Developer shall require appropriate changes to the final Project design and specifications. Design, grading, and construction shall be performed in accordance with the requirements of the City of Lake Forest (City) Municipal Code (Title 8) and the California Building Code (CBC) applicable at the time of grading, appropriate local grading regulations, and the requirements of the Project Geotechnical Consultant as summarized in a final written report, subject to review by the City of Lake Forest Director of Public Works, or designee, prior to commencement of grading activities.

Grading plan review shall also be conducted by the Director of Public Works or designee prior to the start of grading to verify that the requirements developed during the geotechnical design evaluation have been appropriately incorporated into the project plans. Design, grading, and construction shall be conducted in accordance with the specifications of the Project Geotechnical Consultant as summarized in a final report based on the CBC applicable at the time of grading and building, and the City's Building Code. On-site inspection during grading shall be conducted by the Project Geotechnical Consultant and the City of Lake Forest Director of Public Works/City Engineer, or designee, to ensure compliance with geotechnical specifications as incorporated into project plans. Prior to final of grading permits, the Project geotechnical engineer shall submit a Final Testing and Observation Geotechnical Report for Rough Grading to the City of Lake Forest Director of Public Works/City Engineer, or designee..

Mitigation Measure 4.7.2 **Corrosive Soils.** Prior to issuance of the first~~a~~ building permit, the Director of the City of Lake Forest Public Works Department, or designee, shall verify that the Project Applicant/Developer has retained the services of a licensed corrosion engineer to provide detailed corrosion protection measures. Where steel may come in

contact with on-site soils, project construction shall include the use of steel that is protected against corrosion. Corrosion protection may include, but is not limited to, sacrificial metal, the use of protective coatings, and/or cathodic protection. Additional site testing and final design evaluation regarding the possible on-site presence of significant volumes of corrosive soils shall be performed by the Project Geotechnical Consultant to refine and enhance these recommendations. On-site inspection during grading shall be conducted by the Project Geotechnical Consultant and City of Lake Forest Director of Public Works/City Engineer, or designee, to ensure compliance with geotechnical specifications as incorporated into Project plans.

Mitigation Measure 4.7.3 **Paleontological Resources Impact Mitigation Program.** Prior to the issuance of the first preliminary ~~or precise~~ grading permit, the Project Applicant/Developer shall provide a letter to the Director of the City of Lake Forest Community Development Department, or designee, stating that they have retained a qualified paleontologist (defined as a practicing paleontologist that is recognized in the paleontological community and proficient in vertebrate paleontology) who is listed on the County of Orange list of certified paleontologists. The paleontologist shall prepare a Paleontological Resources Impact Mitigation Program (PRIMP) for this Project. The PRIMP shall include the methods that will be used to protect paleontological resources that may exist within the Project site, as well as procedures for monitoring, fossil preparation and identification, curation into a repository, and preparation of a report at the conclusion of grading. The PRIMP shall be consistent with the guidelines of the Society of Vertebrate Paleontology.

Excavation and grading activities in deposits with high paleontological sensitivity shall be monitored by a paleontological monitor following a PRIMP. No monitoring is required for excavations in deposits with no or low paleontological sensitivity.

If paleontological resources are encountered during the course of ground disturbance, the paleontological monitor shall have the authority to temporarily redirect construction away from the area of the find in order to assess its significance. In the event that paleontological resources are encountered when a paleontological monitor is not present, work in the immediate area of the find shall be redirected and a paleontologist shall be contacted to assess the find for significance.

Collected resources shall be prepared to the point of identification, identified to the lowest taxonomic level possible, cataloged, and curated into the permanent collections of a scientific institution.

Prior to issuance of the first building permit~~approval of any occupancy permits~~, a report of findings shall be prepared to document the results of the monitoring program.

4.7.10 Level of Significance after Mitigation

With implementation of RCM GEO-1 and Mitigation Measures 4.7.1, 4.7.2, and 4.7.3, all identified potentially significant impacts related to geotechnical hazards and paleontological resources would be reduced below a level of significance.

4.8 GREENHOUSE GAS EMISSIONS

This section provides a discussion of global climate change (GCC), existing regulations pertaining to GCC, and an analysis of greenhouse gas (GHG) emissions associated with the proposed Nakase Nursery/Toll Brothers Project (proposed Project). This section summarizes information provided in the *Nakase Property Greenhouse Gas Analysis* (Urban Crossroads 2019b) prepared for the proposed Project. The *Nakase Property Greenhouse Gas Analysis* is included in Appendix G of this Environmental Impact Report (EIR).

4.8.1 Scoping Process

The City of Lake Forest (City) received 28 comment letters during the public review period of the Initial Study/Notice of Preparation (IS/NOP). For copies of the IS/NOP comment letters, refer to Appendix A of this EIR. One comment letter included comments related to GHG emissions. The letter from the California Department of Transportation (Caltrans) (August 13, 2018) suggests incorporating practices and policies into the Area Plan to reduce GHG emissions in accordance with Assembly Bill (AB) 32 and Senate Bill (SB) 375.

4.8.2 Existing Environmental Setting

4.8.2.1 Global Climate Change

GCC refers to the change in average meteorological conditions on the earth with respect to temperature, wind patterns, precipitation and storms. Global temperatures are regulated by naturally occurring atmospheric gases such as water vapor, carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). These gases, which trap heat in the atmosphere, are often referred to as GHGs. These particular gases are important due to their residence time (the duration they stay) in the atmosphere, which ranges from 10 years to more than 100 years. These gases allow solar radiation into the Earth's atmosphere but prevent radioactive heat from escaping, thus warming the Earth's atmosphere.

GHGs are released into the atmosphere by both natural and anthropogenic (human) activity. Without the natural GHG effect, the Earth's average temperature would be approximately 61 degrees Fahrenheit (°F), cooler than it currently is. The cumulative accumulation of GHGs in the Earth's atmosphere is considered to be the cause for the observed increase in the Earth's temperature. Higher global temperatures have many secondary effects:

- Increased air pollution
- Health effects such as risk of death from dehydration, heat stroke/exhaustion, heart attack, stroke, and respiratory distress caused by extreme heat
- Changes in precipitation and snow melt
- Rising sea levels
- Reduction in agricultural production
- Increased abundance and range of invasive species and pests

- Increased risk of wildfire
- Alteration of natural ecosystems

These effects are detailed further in the *Nakase Property Greenhouse Gas Analysis (*Urban Crossroads 2019b).

GCC is currently one of the most controversial environmental issues in the United States, and much debate exists within the scientific community about whether or not GCC is occurring naturally or as a result of human activity. Some data suggest that GCC has occurred over the course of thousands or millions of years. These historical changes to the Earth's climate have occurred naturally without human influence, as in the case of an ice age. However, many scientists believe that the climate shift taking place since the industrial revolution (1900) is occurring at a quicker rate and magnitude than in the past. Scientific evidence suggests that GCC is the result of increased concentrations of GHGs in the Earth's atmosphere, including CO_2, CH_4, N_2O, and fluorinated gases. Many scientists believe that this increased rate of climate change is the result of GHGs resulting from human activity and industrialization over the past 200 years.

4.8.2.2 Primary Greenhouse Gases

The following discussion summarizes the characteristics of the primary GHGs:

- **Water Vapor (H_2O):** Water vapor is the most abundant, important, and variable GHG in the atmosphere. The main source of water vapor is evaporation from the oceans (approximately 85 percent). Other sources include: evaporation from other water bodies, sublimation (change from solid to gas) from sea ice and snow, and transpiration from plant leaves. Water vapor is not considered a pollutant. In the atmosphere, water vapor maintains a climate necessary for life. Changes in its concentration are primarily considered to be a result of climate feedback related to the warming of the atmosphere rather than a direct result of industrialization. A climate feedback is an indirect, or secondary, change, either positive or negative, that occurs within the climate system in response to a forcing mechanism. The feedback loop in which water is involved is critically important to projecting future climate change, and is described below.

  As the temperature of the atmosphere rises, more water is evaporated from ground storage (rivers, oceans, reservoirs, soil). Because the air is warmer, the relative humidity can be higher (in essence, the air is able to "hold" more water when it is warmer), leading to more water vapor in the atmosphere. As a GHG, the higher concentration of water vapor is able to absorb more thermal indirect energy radiated from the Earth, thus further warming the atmosphere. The warmer atmosphere can then hold more water vapor, absorb more thermal energy, and warm the atmosphere. This cycle continues and is referred to as a "positive feedback loop." The extent to which this positive feedback loop will continue is unknown because there are also dynamics that hold the positive feedback loop in check. For example, when water vapor increases in the atmosphere, more of it will eventually also condense into clouds that are more able to reflect incoming solar radiation (thus allowing less energy to reach the Earth's surface and heat it up).

- **Carbon Dioxide (CO_2):** CO_2 is an odorless and colorless GHG. CO_2 is emitted from natural and man-made sources. Natural sources include: the decomposition of dead organic matter; respiration of bacteria, plants, animals and fungus; evaporation from oceans; and volcanic outgassing. Anthropogenic sources include the burning of coal, oil, natural gas, and wood. CO_2 is naturally removed from the air by photosynthesis, dissolution into ocean water, transfer to soils and ice caps, and chemical weathering of carbonate rocks.

  Since the industrial revolution began in the mid-1700s, the sort of human activity that increases GHG emissions has increased dramatically in scale and distribution. Data from the past 50 years suggests a corollary increase in levels and concentrations. As an example, prior to the industrial revolution, CO_2 concentrations were fairly stable at 280 parts per million (ppm). Today, they are around 370 ppm, an increase of more than 30 percent. Left unchecked, the concentration of CO_2 in the atmosphere is projected to increase to a minimum of 540 ppm by 2100 as a direct result of anthropogenic sources.

- **Methane (CH_4):** CH_4 is an extremely effective absorber of radiation, though its atmospheric concentration is less than CO_2 and its lifetime in the atmosphere is brief (10 to 12 years) compared to other GHGs. Methane has both natural and anthropogenic sources. It is released as part of the biological processes in low oxygen environments, such as in swamplands or in rice production (at the roots of the plants). Over the last 50 years, human activities such as growing rice, raising cattle, using natural gas, and mining coal have added to the atmospheric concentration of methane. Other anthropocentric sources include fossil-fuel combustion and biomass burning.

- **Nitrous Oxide (N_2O):** N_2O, also known as laughing gas, is a colorless GHG. Concentrations of N_2O began to rise at the beginning of the industrial revolution. In 1998, the global concentration was 314 parts per billion (ppb). N_2O is produced by microbial processes in soil and water, including those reactions that occur in fertilizer containing nitrogen. In addition to agricultural sources, some industrial processes (fossil-fuel-fired power plants, nylon production, nitric acid production, and vehicle emissions) also contribute to its atmospheric load. It is used as an aerosol spray propellant (e.g., in whipped cream bottles). It is also used in potato chip bags to keep chips fresh. It is used in rocket engines and in race cars. Nitrous oxide can be transported into the stratosphere, be deposited on the Earth's surface, and be converted to other compounds by chemical reaction.

- **Chlorofluorocarbons (CFCs):** CFCs are gases formed synthetically by replacing all hydrogen atoms in CH_4 or ethane (C_2H_6) with chlorine and/or fluorine atoms. CFCs are nontoxic, nonflammable, insoluble, and chemically unreactive in the troposphere (i.e., the level of air at the Earth's surface). CFCs have no natural source, but were first synthesized in 1928. They were used for refrigerants, aerosol propellants, and cleaning solvents. Due to the discovery that they are able to destroy stratospheric ozone, a global effort to halt their production was undertaken and CFCs are no longer being used. As a result, the levels of the major CFCs are now remaining steady or declining. However, their long atmospheric lifetimes mean that some of the CFCs will remain in the atmosphere for over 100 years.

- **Hydrofluorocarbons (HFCs):** HFCs are synthetic, man-made chemicals that are used as a substitute for CFCs in applications such as automobile air conditioners and refrigerants. Out of all the GHGs, they are one of the groups with the highest global warming potential. The HFCs with the largest measured atmospheric abundances are (in order), HFC-23 (CHF_3), HFC-134a (CF_3CH_2F), and HFC-152a (CH_3CHF_2). Prior to 1990, the only significant hydrofluorocarbon emissions were of HFC-23. HFC-134a emissions are increasing due to its use as a refrigerant. The United States Environmental Protection Agency (EPA) estimates that concentrations of HFC-23 and HFC-134a are now about 10 parts per trillion (ppt) each, and that concentrations of HFC-152a are about 1 ppt.

- **Perfluorocarbons (PFCs):** PFCs have stable molecular structures and do not break down through chemical processes in the lower atmosphere. High-energy ultraviolet rays, which occur about 60 kilometers above the Earth's surface, are able to destroy the compounds. Because of this, PFCs have very long lifetimes, between 10,000 and 50,000 years. Two common PFCs are tetrafluoromethane (CF_4) and hexafluoroethane (C_2F_6). The EPA estimates that concentrations of CF_4 in the atmosphere are over 70 ppt. The two main sources of PFCs are primarily aluminum production and semiconductor manufacture.

- **Sulfur Hexafluoride (SF_6):** SF_6 is an inorganic, odorless, colorless, nontoxic, nonflammable gas. Out of all the GHGs, they are one of the groups with the highest global warming potential. The EPA indicates that concentrations in the 1990s were about 4 ppt. SF_6 is used for insulation in electric power transmission and distribution equipment, in the magnesium industry, in semiconductor manufacturing, and as a tracer gas for leak detection.

4.8.2.3 Greenhouse Gas Inventories

This section summarizes the latest information on global, national, California, and local GHG emission inventories.

Global Emissions. Worldwide anthropogenic (human) GHG emissions are tracked by the Intergovernmental Panel on Climate Change (IPCC) for industrialized nations (referred to as Annex I) and developing nations (referred to as Non-Annex I). Human GHG emissions data for Annex I nations are available through 2016. For the Year 2016, the sum of these GHG emissions totaled approximately 28,747,554 gigagrams (Gg) of carbon dioxide equivalent (CO_2e).

United States Emissions. California emitted 6,511,302 million metric tons of CO_2e (MMT CO_2e) in 2016. The United States, as a single country, was the number two producer of GHG emissions in 2016 (behind China). The primary GHG emitted by human activities in the United States was CO_2, representing approximately 81.6 percent of total GHG emissions. CO_2 from fossil fuel combustion, which is the largest source of GHG emissions in the United States, accounted for approximately 93.5 percent of the GHG emissions.

State of California Emissions. The California Air Resources Board (CARB) compiles GHG inventories for the State of California. In 2004, California is estimated to have produced 492 MMT CO_2e. Despite a population increase of 16 percent between 1990 and 2004, California has significantly slowed the rate of growth of GHG emissions due to the implementation of energy efficiency programs as well as

adoption of strict emission controls. Based on the 2018 GHG inventory, which includes data for the years 2000–2016, California emitted 429.4 MMT CO_2e (including emissions resulting from imported electrical power) in 2016 (i.e., the latest year for which data are available). Although California's rate of growth of GHG emissions is slowing, the State is still a substantial contributor to the total United States emissions inventory.

4.8.2.4 Existing Project Site Greenhouse Gas Emissions

The Project site is currently developed with a nursery. The estimated GHG emissions generated by the existing nursery are summarized in Table 4.8.A. As shown in Table 4.8.A, the existing operational emissions from the nursery on the Project site are approximately 599 metric tons of CO_2e (MT CO_2e) per year.

Table 4.8.A: Existing Project Site Greenhouse Gas Emissions

Existing Operational Activities	Total Greenhouse Gas Emissions (MT/yr)			
	CO_2	CH_4	N_2O	Total CO_2e
Nursery (all sources)	593.12	0.22	0.00	599.10

Source: *Nakase Property Greenhouse Gas Analysis* (Urban Crossroads 2019b).
CH_4 = methane
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
MT/yr = metric tons per year
N_2O = nitrous oxide

4.8.3 Regulatory Setting

4.8.3.1 Federal Regulations

Prior to the last decade, there have been no concrete federal regulations of GHGs or major planning for climate change adaptation. The following are federal actions regarding GHGs and fuel efficiency over the last decade.

GHG Endangerment. In *Massachusetts v. Environmental Protection Agency,* 549 U.S. 497, which was decided on April 2, 2007, the United States Supreme Court found that four GHGs, including CO_2, are air pollutants subject to regulation under Section 202(a)(1) of the federal Clean Air Act (CAA). The Court held that the EPA Administrator must determine whether emissions of GHGs from new motor vehicles cause or contribute to air pollution, which may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision.

On December 7, 2009, the EPA Administrator signed two distinct findings regarding GHGs under Section 202(a) of the CAA:

- **Endangerment Finding:** The Administrator found that the current and projected concentrations of the six key well-mixed GHGs (i.e., CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6) in the atmosphere threaten the public health and welfare of current and future generations.

- **Cause or Contribute Finding:** The Administrator found that the combined emissions of these well-mixed GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution, which threatens public health and welfare.

These findings do not impose requirements on industry or other entities. However, this was a prerequisite for implementing GHG emissions standards for vehicles, as discussed in the section titled "Clean Vehicles" below. After a lengthy legal challenge, the United States Supreme Court declined to review an Appeals Court ruling that upheld the EPA Administrator's findings.

Clean Vehicles. Congress first passed the Corporate Average Fuel Economy law in 1975 to increase the fuel economy of cars and light duty trucks. The law has become more stringent over time. On May 19, 2009, President Obama put in motion a new national policy to increase fuel economy for all new cars and trucks sold in the U.S.

On April 1, 2010, the EPA and the United States Department of Transportation (USDOT) National Highway Safety Administration announced a joint final rule establishing a national program that would reduce GHG emissions and improve fuel economy for new cars and trucks sold in the United States. The first phase of the national program applied to passenger cars, light-duty trucks, and medium-duty passenger vehicles for model years 2012 through 2016. This phase required these vehicles to meet an estimated combined average emissions level of 250 grams of CO_2 per mile, which is equivalent to 35.5 miles per gallon (mpg). The second phase applied to passenger cars, light-duty trucks, and medium duty passenger vehicles for model years 2017 through 2025. This phase required these vehicles to meet an estimated combined average emissions level of 163 grams of CO_2 per mile, which is equivalent to 54.5 mpg.

On September 15, 2011, the EPA and the USDOT issued final rules for the first national standards to reduce GHG emissions and improve fuel efficiency of heavy-duty trucks and buses, model years 2014 to 2018. For combination tractors, the agencies proposed engine and vehicle standards that would achieve up to a 20 percent reduction in CO_2 emissions and fuel consumption by the 2018 model year. For heavy-duty pickup trucks and vans, the agencies proposed separate gasoline and diesel truck standards, which would achieve up to a 10 percent reduction for gasoline vehicles and a 15 percent reduction for diesel vehicles (12 and 17 percent, respectively, if accounting for air conditioning leakage). Lastly, for vocational vehicles, the engine and vehicle standards would achieve up to a 10 percent reduction in fuel consumption and CO_2 emissions.

Mandatory Reporting of GHGs. The Consolidated Appropriations Act of 2008, passed by Congress in December 2007, requires the establishment of mandatory GHG reporting requirements. On September 22, 2009, the EPA issued the Final Mandatory Reporting of GHGs Rule, which became effective January 1, 2010. The rule requires reporting of GHG emissions from large sources and suppliers in the United States, and is intended to collect accurate and timely emissions data to inform future policy decisions. Under the rule, suppliers of fossil fuels or industrial GHGs, manufacturers of vehicles and engines, and facilities that emit 25,000 MT or more per year of GHG emissions are required to submit annual reports to the EPA.

New Source Review. The EPA issued a final rule on May 13, 2010, that established thresholds for GHG emissions that define when permits under the New Source Review Prevention of Significant Deterioration and Title V Operating Permit programs are required for new and existing industrial facilities. This final rule modified the requirements of the CAA permitting programs to limit which facilities are required to obtain Prevention of Significant Deterioration and Title V permits.

Standards of Performance for GHG Emissions for New Stationary Sources: Electric Utility Generating Units. On March 27, 2012, as required by a settlement agreement, the EPA proposed new performance standards for emissions of CO_2 for new, affected, fossil fuel-fired electric utility generating units. New sources greater than 25 megawatts (MW) would be required to meet an output-based standard of 1,000 pounds of CO_2 per megawatt hour (MWH), based on the performance of widely used natural gas combined cycle technology. On February 9, 2016, the United States Supreme Court issued a stay of this regulation pending litigation. Additionally, the current EPA Administrator has signed a measure to repeal the Clean Power Plan, including the CO_2 standards.

Cap and Trade. Cap and trade refers to a policy tool where emissions are limited to a certain amount and can be traded, or provides flexibility on how the emitter can comply. There currently is no federal GHG cap-and-trade program; however, some states have joined to create initiatives to provide a mechanism for cap and trade. The Western Climate Initiative partner jurisdictions have developed a comprehensive initiative to reduce regional GHG emissions to 15 percent below 2005 levels by 2020. The partners were originally California, British Columbia, Manitoba, Ontario, and Quebec. However, Manitoba and Ontario are not currently participating. California linked with Quebec's cap and trade system January 1, 2014, and joint offset auctions took place in 2015.

SmartWay Program. The SmartWay Program is a public-private initiative among the EPA, large and small trucking companies, rail carriers, logistics companies, commercial manufacturers, retailers, and other federal and state agencies. Its purpose is to improve fuel efficiency and the environmental performance (reduction of both GHG emissions and air pollution) of the goods movement supply chains. SmartWay effectively refers to requirements geared towards reducing fuel consumption. Most large trucking fleets driving newer vehicles are compliant with SmartWay design requirements. Moreover, over time, all heavy-duty trucks will have to comply with the CARB GHG regulation that is designed with the SmartWay Program in mind to reduce GHG emissions by making them more fuel-efficient.

4.8.3.2 State Regulations

Assembly Bill 32. In September 2006, the California State Legislature enacted AB 32, which requires that GHGs emitted in California be reduced to 1990 levels by the year 2020. "GHGs" as defined under AB 32 include CO_2, CH_4, N_2O, HFCs, PFCs, and SF. Since AB 32 was enacted, a seventh chemical, nitrogen trifluoride (NF_3), has also been added to the list of GHGs. CARB is the State agency charged with monitoring and regulating sources of GHGs. CARB approved the 1990 GHG emissions level of 427 MMT CO_2e on December 6, 2007. Therefore, emissions generated in California in 2020 are required to be equal to or less than 427 MMT CO_2e. Emissions in 2020 in a "business as usual" (BAU) scenario were estimated to be 596 MMT CO_2e, which do not account for reductions from AB 32 regulations. At that level, a 28.4 percent reduction was required to achieve

the 427 MMT CO_2e 1990 inventory. In October 2010, CARB prepared an updated 2020 forecast to account for the recession and slower forecasted growth. The forecasted inventory without the benefits of adopted regulation is now estimated at 545 MMT CO_2e. Therefore, under the updated forecast, a 21.7 percent reduction from BAU is required to achieve 1990 levels.

CARB Scoping Plan. The CARB 2008 Scoping Plan contains measures designed to reduce the State's emissions to 1990 levels by the year 2020 to comply with AB 32. The Scoping Plan identifies recommended measures for multiple GHG emission sectors and the associated emission reductions needed to achieve the year 2020 emissions target—each sector having a different emission reduction target. Most of the measures target the transportation and electricity sectors.

In November 2017, CARB released the final 2017 Scoping Plan Update, which identifies the State's post-2020 reduction strategy. The 2017 Scoping Plan Update reflects the 2030 target of a 40 percent reduction below 1990 levels, set by Executive Order (EO) B-30-15 and codified by SB 32. Key programs that the Scoping Plan Update builds upon include the Cap-and-Trade Regulation, the Low Carbon Fuel Standard, and much cleaner cars, trucks, and freight movement utilizing cleaner, renewable energy and strategies to reduce CH_4 emissions from agricultural and other wastes. The 2017 Scoping Plan establishes a new emissions limit of 260 MMT CO_2e for the year 2030, which corresponds to a 40 percent decrease in 1990 levels by 2030.

Senate Bill 32 and Assembly Bill 197. On September 8, 2016, Governor Jerry Brown signed SB 32 and its companion bill, AB 197. SB 32 requires the State to reduce statewide GHG emissions to 40 percent below 1990 levels by 2030, a reduction target that was first introduced in EO B-30-15. The new legislation builds upon the AB 32 goal of 1990 levels by 2020 and provides an intermediate goal to achieving EO S-3-05, which sets a statewide GHG reduction target of 80 percent below 1990 levels by 2050. AB 197 created a legislative committee to oversee regulators to ensure that CARB not only responds to the Governor, but to the Legislature as well.

Cap-and-Trade Program. The Scoping Plan identifies a cap-and-trade program as one of the key strategies for California to reduce GHG emissions. According to CARB, a cap-and-trade program will help put California on the path to meet its goal of reducing GHG emissions to 1990 levels by the year 2020 and ultimately achieving an 80 percent reduction from 1990 levels by 2050. Under cap and trade, an overall limit on GHG emissions from capped sectors is established, and facilities subject to the cap will be able to trade permits to emit GHGs within the overall limit.

Senate Bill 375 – Sustainable Communities and Climate Protection Act of 2008. Passing the Senate on August 30, 2008, SB 375 was signed by the Governor on September 30, 2008. According to SB 375, the transportation sector is the largest contributor of GHG emissions, which emits over 40 percent of the total GHG emissions in California. SB 375 states, "Without improved land use and transportation policy, California will not be able to achieve the goals of AB 32." SB 375 does the following: (1) requires Metropolitan Planning Organizations (MPOs) to include sustainable community strategies in their Regional Transportation Plans (RTPs) for reducing GHG emissions, (2) aligns planning for transportation and housing, and (3) creates specified incentives for implementation of the strategies.

Assembly Bill 1493 – Pavley Regulations and Fuel Efficiency Standards. AB 1493, enacted on July 22, 2002, required CARB to develop and adopt regulations that reduce GHGs emitted by passenger vehicles and light-duty trucks. Implementation of the regulation was delayed by lawsuits filed by automakers and by the EPA's denial of an implementation waiver. The EPA subsequently granted the requested waiver in 2009, which was upheld by the United States District Court for the District of Columbia in 2011.

Senate Bill 350 – Clean Energy and Pollution Reduction Act of 2015. In October 2015, the legislature approved and the Governor signed SB 350, which reaffirms California's commitment to reducing its GHG emissions and addressing climate change. Key provisions include an increase in the renewables portfolio standard, higher energy efficiency requirements for buildings, initial strategies towards a regional electricity grid, and improved infrastructure for electric vehicle (EV) charging stations. Provisions for a 50 percent reduction in the use of petroleum statewide were removed from the bill because of opposition and concern that it would prevent the bill's passage.

Executive Order S-3-05. Former California Governor Arnold Schwarzenegger announced on June 1, 2005, through EO S-3-05, the following reduction targets for GHG emissions:

- By 2010, reduce GHG emissions to 2000 levels.
- By 2020, reduce GHG emissions to 1990 levels.
- By 2050, reduce GHG emissions to 80 percent below 1990 levels.

The 2050 reduction goal represents what some scientists believe is necessary to reach levels that will stabilize the climate. The 2020 goal was established to be a mid-term target. Because this is an Executive Order, the goals are not legally enforceable for local governments or the private sector.

Executive Order S-01-07 – Low Carbon Fuel Standard. Governor Arnold Schwarzenegger signed EO S-01-07 on January 18, 2007. The order mandated that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020. In particular, the EO S-01-07 established a Low Carbon Fuel Standard and directed the Secretary for Environmental Protection to coordinate the actions of the California Energy Commission, the CARB, the University of California, and other agencies to develop and propose protocols for measuring the "life-cycle carbon intensity" of transportation fuels. This analysis supporting development of the protocols was included in the State Implementation Plan (SIP) for alternative fuels (State Alternative Fuels Plan adopted by the California Energy Commission on December 24, 2007) and was submitted to CARB for consideration as an "early action" item under AB 32. The CARB adopted the Low Carbon Fuel Standard on April 23, 2009. After revisions in response to litigation, the Final Rulemaking Package adopting the regulation was filed with the Office of Administrative Law (OAL) on October 2, 2015.

Executive Order S-13-08. EO S-13-08 states that "climate change in California during the next century is expected to shift precipitation patterns, accelerate sea level rise and increase temperatures, thereby posing a serious threat to California's economy, to the health and welfare of its population and to its natural resources." Pursuant to the requirements in EO S-13-08, the 2009 California Climate Adaptation Strategy prepared by the California Natural Resources Agency was

adopted, which is the ". . . first statewide, multi-sector, region-specific, and information-based climate change adaptation strategy in the United States." Objectives include analyzing risks of climate change in California, identifying and exploring strategies to adapt to climate change, and specifying a direction for future research.

Executive Order B-30-15. On April 29, 2015, Governor Edmund G. Brown, Jr. issued EO B-30-15 to establish a California GHG reduction target of 40 percent below 1990 levels by 2030. EO B-30-15 aligns California's GHG reduction targets with those of leading international governments ahead of the United Nations Climate Change Conference in Paris in late 2015. In addition, EO B-30-15 sets a new interim statewide GHG emission reduction target to reduce GHG emissions to 40 percent below 1990 levels by 2030 in order to ensure California meets its target of reducing GHG emissions to 80 percent below 1990 levels by 2050, and directs the CARB to update the Climate Change Scoping Plan to express the 2030 target in terms of MMT CO_2e. EO B-30-15 also requires the State's climate adaptation plan to be updated every 3 years, and for the State to continue its climate change research program, among other provisions. As with EO S-3-05, EO B-30-15 is not legally enforceable for local governments and the private sector. Legislation that would update AB 32 to make post-2020 targets and requirements a mandate is in process in the State Legislature.

Executive Order B-55-18 and Senate Bill 100. SB 100 and EO B-55-18 were signed by Governor Brown on September 10, 2018. Under the existing renewables portfolio standard, 25 percent of retail sales are required to be from renewable sources by December 31, 2016, 33 percent by December 31, 2020, 40 percent by December 31, 2024, 45 percent by December 31, 2027, and 50 percent by December 31, 2030. SB 100 raises California's renewables portfolio standard requirement to 50 percent renewable resources target by December 31, 2026, and to achieve a 60 percent target by December 31, 2030. SB 100 also requires that retail sellers and local publicly owned electric utilities procure a minimum quantity of electricity products from eligible renewable energy resources so that the total kilowatt hours of those products sold to their retail end-use customers achieve 44 percent of retail sales by December 31, 2024, 52 percent by December 31, 2027, and 60 percent by December 31, 2030. In addition to targets under AB 32 and SB 32, EO B-55-18 establishes a carbon neutrality goal for the state of California by 2045, and sets a goal to maintain net negative emissions thereafter. EO B-55-18 directs the California Natural Resources Agency, the California Environmental Protection Agency (CalEPA), the Department of Food and Agriculture, and the CARB to include sequestration targets in the Natural and Working Lands Climate Change Implementation Plan consistent with the carbon neutrality goal.

California Code of Regulations, Title 20, Appliance Efficiency Standards. California Code of Regulations (CCR), Title 20, Division 2, Chapter 4, Article 4, Sections 1601–1608: Appliance Efficiency Regulations, regulates the sale of appliances in California. The Appliance Efficiency Regulations include standards for both federally regulated appliances and non-federally regulated appliances. There are 23 categories of appliances included in the scope of these regulations. The standards within these regulations apply to appliances that are sold or offered for sale in California, except those sold wholesale in California for final retail sale outside the state and those designed and sold exclusively for use in recreational vehicles or other mobile equipment.

California Code of Regulations, Title 24, Energy Efficiency Standards and California Green Building Standards. CCR, Title 24, Part 6: California's Energy Efficiency Standards for Residential and Nonresidential Buildings, was first adopted in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficient technologies and methods. Energy efficient buildings require less electricity; therefore, increased energy efficiency reduces fossil fuel consumption and decreases GHG emissions. The newest 2016 version of Title 24 was adopted by the California Energy Commission (CEC) and became effective on January 1, 2017.

CCR, Title 24, Part 11: California Green Building Standards Code (CALGreen), is a comprehensive and uniform regulatory code for all residential, commercial, and school buildings that went into effect on January 1, 2011, and is administered by the California Building Standards Commission. CALGreen established mandatory green building standards in California. CALGreen is updated on a regular basis, with the most recent update consisting of the 2016 California Green Building Code Standards that became effective January 1, 2017.

Model Water Efficient Landscape Ordinance. The Model Water Efficient Landscape Ordinance (Model Ordinance) was required by AB 1881, the Water Conservation Act. The bill required local agencies to adopt a local landscape ordinance at least as effective in conserving water as the Model Ordinance by January 1, 2010. Reductions in water use of 20 percent consistent with (SB X7-7) 2020 mandate are expected upon compliance with the ordinance. Governor Brown's Drought Executive Order of April 1, 2015 (EO B-29-15) directed the California Department of Water Resources (DWR) to update the Model Ordinance through expedited regulation. The California Water Commission approved the revised Model Ordinance on July 15, 2015, effective December 15, 2015. New development projects that include landscape areas of 500 square feet (sf) or more are subject to the Model Ordinance. The revised ordinance requires:

- More efficient irrigation systems,
- Incentives for graywater usage,
- Improvements in on-site stormwater capture,
- Limiting the portion of landscapes that can be planted with high-water-use plants, and
- Reporting requirements for local agencies.

CARB Refrigerant Management Program. The CARB adopted a regulation in 2009 to reduce refrigerant GHG emissions from stationary sources through refrigerant leak detection and monitoring, leak repair, system retirement and retrofitting, reporting and recordkeeping, and proper refrigerant cylinder use, sale, and disposal. The regulation is set forth in Sections 95380 to 95398 of CCR Title 17. The rules implementing the regulation establish a limit on statewide GHG emissions from stationary facilities with refrigeration systems with more than 50 pounds of high global warming potential refrigerant. The refrigerant management program is designed to (1) reduce emissions of high global warming potential GHG refrigerants from leaky stationary, non-residential refrigeration equipment; (2) reduce emissions from the installation and servicing of refrigeration and air-conditioning appliances using high global warming potential refrigerants; and (3) verify GHG emission reductions.

Tractor-Trailer GHG Regulation. The tractors and trailers subject to this regulation must either use EPA SmartWay-certified tractors and trailers, or retrofit their existing fleet with SmartWay-verified technologies. The regulation applies primarily to owners of 53-foot (ft) or longer box-type trailers, including both dry-van and refrigerated-van trailers, and owners of the heavy-duty tractors that pull them on California highways. These owners are responsible for replacing or retrofitting their affected vehicles with compliant aerodynamic technologies and low-rolling-resistance tires. Sleeper cab tractors model year 2011 and later must be SmartWay certified. All other tractors must use SmartWay-verified, low-rolling-resistance tires. There are also requirements for trailers to have low-rolling-resistance tires and aerodynamic devices.

Phase 1 and 2 Heavy-Duty Vehicle GHG Standards. CARB has adopted a new regulation for GHG emissions from heavy-duty trucks and engines sold in California. It establishes GHG emission limits on truck and engine manufacturers and aligns with the national EPA rule for new trucks and engines. Existing heavy-duty vehicle regulations in California include engine criteria emission standards, tractor-trailer GHG requirements to implement SmartWay strategies (i.e., the Heavy-Duty Tractor-Trailer Greenhouse Gas Regulation), and in-use fleet retrofit requirements such as the Truck and Bus Regulation.

Senate Bill 97 and the CEQA Guidelines Update. Passed in August 2007, SB 97 added Section 21083.05 to the Public Resources Code (PRC). The code states "(a) On or before July 1, 2009, the Office of Planning and Research shall prepare, develop, and transmit to the Resources Agency guidelines for the mitigation of GHG emissions or the effects of GHG emissions as required by this division, including, but not limited to, effects associated with transportation or energy consumption. (b) On or before January 1, 2010, the Resources Agency shall certify and adopt guidelines prepared and developed by the Office of Planning and Research pursuant to subdivision (a)." The Office of Planning and Research's recommended amendments to the *State CEQA Guidelines* for addressing GHG emissions became effective on March 18, 2010.

The CEQA Amendments provide guidance to public agencies regarding the analysis and mitigation of the effects of GHG emissions in CEQA documents. The *State CEQA Guidelines* amendments fit within the existing CEQA framework by amending existing *State CEQA Guidelines* to reference climate change. A new section, *State CEQA Guidelines* Section 15064.4, was added to assist agencies in determining the significance of GHG emissions. The new section allows agencies the discretion to determine whether a quantitative or qualitative analysis is best for a particular project. However, little guidance is offered on the crucial next step in this assessment process—how to determine whether the project's estimated GHG emissions are significant or cumulatively considerable. Also amended were *State CEQA Guidelines* Sections 15126.4 and 15130, which address mitigation measures and cumulative impacts, respectively. GHG mitigation measures are referenced in general terms, but no specific measures are championed. The revision to the cumulative impact discussion requirement (Section 15130) simply directs agencies to analyze GHG emissions in an EIR when a project's incremental contribution of emissions may be cumulatively considerable; however, it does not answer the question of when emissions are cumulatively considerable. Section 15183.5 permits programmatic GHG analysis and later project-specific tiering, as well as the preparation of GHG reduction plans. Compliance with such plans can support a determination that a project's cumulative effect is not cumulatively considerable, according to Section 15183.5(b).

4.8.3.3 Regional Regulations

South Coast Air Quality Management District (SCAQMD). SCAQMD is the agency responsible for air quality planning and regulation in the South Coast Air Basin (Basin). The SCAQMD addresses the impacts to climate change from projects subject to SCAQMD permits as a lead agency if they are the only agency having discretionary approval for the project and acts as a responsible agency when a land use agency must also approve discretionary permits for the project. The SCAQMD acts as an expert commenting agency for impacts to air quality. This expertise carries over to GHG emissions, so the agency helps local land use agencies through the development of models and emission thresholds that can be used to address GHG emissions.

SCAQMD Interim Thresholds. In 2008, SCAQMD formed a Working Group to identify GHG emissions thresholds for land use projects that could be used by local lead agencies in the Basin. The Working Group developed several different options that are contained in the SCAQMD draft guidance document titled *Interim CEQA GHG Significance Threshold for Stationary Sources, Rules and Plans* (December 5, 2008) that could be applied by lead agencies. The Working Group has not provided additional guidance since release of the interim guidance in 2008. The SCAQMD Board has not approved the thresholds; however, the guidance document provides substantial evidence supporting the approach to determine significance of GHG emissions that can be considered by the lead agency in adopting its own threshold. The current interim thresholds consist of the following tiered approach:

- Tier 1 consists of evaluating whether or not the project qualifies for any applicable exemption under CEQA.
- Tier 2 consists of determining whether the project is consistent with a GHG reduction plan. If a project is consistent with a qualifying local GHG reduction plan, it does not have significant GHG emissions.
- Tier 3 consists of screening values, which the lead agency can choose, but must be consistent with all projects within its jurisdiction. A project's construction emissions are averaged over 30 years and are added to the project's operational emissions. If a project's emissions are below one of the following screening thresholds, then the project is less than significant:
    - **Residential and Commercial Land Use:** 3,000 MT CO_2e per year
    - **Based on Land Use Type:** Residential, 3,500 MT CO_2e per year; Commercial, 1,400 MT CO_2e per year; or Mixed-Use, 3,000 MT CO_2e per year
- Tier 4 has the following options:
    - **Option 1:** Reduce BAU emissions by a certain percentage (which is currently undefined)
    - **Option 2:** Early implementation of applicable AB 32 Scoping Plan measures

- **Option 3, 2020 Target for Service Populations[1] (SP):** 4.8 MT CO_2e/SP/year for projects and 6.6 MT CO_2e/SP/year for plans;
- **Option 3, 2035 Target:** 3.0 MT CO_2e/SP/year for projects and 4.1 MT CO_2e/SP/year for plans

- Tier 5 involves mitigation offsets to achieve target significance threshold.

4.8.3.4 Local Regulations

The City of Lake Forest does not have any plans, policies, regulations, significance thresholds, or laws addressing climate change at this time. However, the City of Lake Forest *Local Guidelines for Implementing the California Environmental Quality Act* (2017) contains guidelines for estimating GHG emissions and determining significance for CEQA compliance.

The Recreation and Resources Element of the City of Lake Forest General Plan (2015a) includes goals and policies addressing energy conservation. The General Plan states that energy requirements can be diminished through innovative architectural design, building construction, structural orientation, and landscaping.

The City has established ECOnomic, which is a voluntary green home education program. The City, through ECOnomic, encourages homeowners and building professionals to incorporate green building design into construction projects. The City also promotes utility company incentive programs to retrofit existing development with energy efficient lighting, air conditioning, and heating systems to reduce energy consumption.

4.8.4 Methodology

Evaluation of impacts related to GHG emissions from the proposed Project included the following:

- Determination of the short-term construction and long-term operational GHG emissions
- Determination of regulatory compliance measures required to reduce GHG emissions
- Comparison of Project-related construction and operational GHG emissions with applicable SCAQMD thresholds (summarized in Section 4.8.5, Thresholds of Significance).

The latest version of the California Emissions Estimator Model™ (CalEEMod™) v2016.3.2, released by the SCAQMD in conjunction with the California Air Pollution Control Officers Association (CAPCOA) and other California air districts on October 17, 2017, was used to determine the GHG emissions from the proposed Project.

GHG emissions from the proposed Project were calculated as the sum of the construction emissions amortized over the life of the project plus the operational GHG emissions. To amortize the construction GHG emission over the life of the Project, SCAQMD recommends calculating the total GHG emissions for the construction activities, dividing it by a 30-year project life, then adding it to the annual GHG emissions during operation. As such, construction GHG emissions were amortized

[1] Service Population is defined as the total residents and employees associated with a project.

over a 30-year period then added to the annual operational GHG emissions to determine the Project-related GHG emissions.

Operational GHG emissions were calculated from the following sources:

- Area Source Emissions
- Energy Source Emissions
- Mobile Source Emissions
- Solid Waste
- Water Supply, Treatment, and Distribution
- On-Site Equipment Emissions

Promulgated regulations that would affect the Project's emissions were accounted for in calculations of the Project's GHG emissions. In particular, the Pavley Standards, Low Carbon Fuel Standards, and Renewable Portfolio Standards will be in effect for the AB 32 target year of 2020, and therefore are accounted for in the Project's emission calculations. Additionally, the calculation of the Project's GHG emissions takes into consideration Regulatory Compliance Measures (RCMs), which are detailed in Section 4.8.8, Regulatory Compliance Measures and Mitigation Measures, and project features incorporated into the project design that reduce GHG emissions by reducing energy, gas, and water use and vehicle emissions. Please refer to the *Nakase Property Greenhouse Gas Analysis* (Urban Crossroads 2019b) for additional details on the GHG modeling methodology and assumptions used to estimate the GHG emissions of the proposed Project.

4.8.5 Thresholds of Significance

4.8.5.1 CEQA Thresholds of Significance

Thresholds for GHG emissions impacts used in this analysis are consistent with Appendix G of the *State CEQA Guidelines* and the City's *CEQA Significance Thresholds Guide* (2009). The proposed Project may be deemed to have a significant impact with respect to GHG emissions if it would:

Threshold 4.8.1: Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; or

Threshold 4.8.2: Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

None of the thresholds for GHG emissions were scoped out in the Initial Study, which is included in Appendix A. Therefore, all of the thresholds listed above are addressed in the following analysis.

Although the SCAQMD's draft significance criteria discussed above in Section 4.8.3.3, Regional Regulations, have not been adopted, the City has determined that the SCAQMD's project-level efficiency threshold methodology can be used to set an appropriate significance criterion by which to determine whether the project emits a significant amount of GHGs. The Tier 4, Option 3 threshold of 4.8 MT CO_2e/SP/year for the year 2020 is applicable to the proposed Project. However, because the build-out year of the proposed Project is 2025, the Project's GHG threshold for 2025 was

calculated using the same methodology that SCAQMD used to determine the 2020 and 2030 threshold, as described below.

The SCAQMD derived the project-level efficiency target of 4.8 MT CO_2e/SP/year based on the 2020 GHG reduction target for land use of 295,530,000 MT CO_2e/year in the CARB 2008 Scoping Plan divided by the 2020 statewide population and employment estimates of 61,200,412 persons. A GHG threshold for 2030 was calculated using the GHG reduction target in the CARB 2017 Scoping Plan of 40 percent below 2020 levels by 2030, which equates to 2.88 MT CO_2e/SP/year. The GHG threshold for the 2025 build-out year for the proposed Project was calculated by linear interpolation between the 2020 target of 4.8 MT CO_2e/SP/year and the 2030 target of 2.88 MT CO_2e/SP/year, which yields a 2025 target of 3.84 MT CO_2e/SP/year. Based on this methodology, GHG thresholds for the proposed Project are as follows:

- 3.84 MT CO_2e/SP/year for 2025
- 2.88 MT CO_2e/SP/year for 2030

4.8.6 Project Impacts

Threshold 4.8.1: Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Significant Impact. Construction activities associated with the proposed Project would result in emissions of CO_2 and CH_4 from construction activities. Operational activities associated with the proposed Project would result in emissions of CO_2, CH_4, and N_2O from the following sources: Area Source Emissions, Energy Source Emissions, Mobile Source Emissions, Solid Waste, Water Supply, Treatment and Distribution, and On-Site Equipment Emissions. These emissions would contribute to the total GHGs emitted from the Project site.

The proposed Project would be required to comply with several regulations aimed at reducing GHG emissions. As specified in RCM AQ-3 (see Section 4.8.8), the proposed Project is required to comply with SCAQMD Rule 445, which prohibits the use of wood burning stoves and fireplaces in new development. As specified in RCM AQ-4 (see Section 4.8.8), the Project building components (e.g., windows, roof systems, electrical and lighting systems, and heating, ventilation, and air conditioning systems [HVAC]) would be designed in compliance with 2019 CCR Title 24 standards. CCR Title 24 requires projects to implement energy efficiency measures that promote conservation. The 2019 CCR Title 24 standards anticipate 30 percent less energy use for non-residential buildings and 53 percent less energy use for residential use due to lighting upgrades compared to the 2016 standards. As specified in RCM GHG-1 (see Section 4.8.8), appliances installed in the Project buildings would comply with the energy efficiency requirements in CCR Title 20.

In addition to compliance with existing regulations, the Project would include several features aimed at reducing GHG emissions. These features are discussed in Chapter 3.0, Project Description, of this EIR and include:

- Senior housing dwelling units (these tend to have lower levels of auto ownership which in turn decrease vehicle emissions)

- Pedestrian connections between the Nakase Planned Community neighborhoods
- Implementation of a Water Conservation Strategy
- Electric vehicle charging stations and carpool parking spaces for employees at the future school site, and employees and residents at the senior housing site.
- Installation of insulation in walls and attic spaces
- Installation of high-efficiency windows and doors
- Installation of HVAC systems with a high Seasonal Energy Efficiency Ratio (SEER)
- Installation of water-efficient plumbing fixtures
- Installation of tankless water heater systems
- Installation of light-emitting diode (LED) technology within homes
- Use of recycled water for common area landscape irrigation
- Use of drought-tolerant plants in landscape design
- Installation of water-efficient irrigation systems with smart sensor controls
- Stormwater Best Management Practices (BMPs)
- Installation of a 240-volt circuit in each home to allow easy installation of EV charging

GHG emissions for the proposed Project in 2025 and 2030 with compliance with regulatory requirements (RCM AQ-3, RCM AQ-4, and RCM GHG-1) and Project Design Features (PDFs) are summarized in Tables 4.8.B and 4.8.C. As shown in these tables, the proposed Project would result in 4.91 MT CO_2e/SP/year in 2025 and 4.42 MT CO_2e/SP/year in 2025 after implementation of regulatory requirements and PDFs. The total GHG emissions of the proposed Project would exceed the thresholds of 3.84 MT CO_2e/SP/year for 2025 and 2.88 MT CO_2e/SP/year for 2030. Thus, project-related emissions would have a potentially significant impact related to generation of GHG emissions.

No feasible mitigation measures exist that would substantially lessen GHG emissions to levels that are less than significant. More than 73 percent of all mobile-source emissions in 2025 and 66 percent of all mobile-source emissions in 2030 (by weight) would be generated by the proposed Project's mobile sources (traffic). Neither the Project Applicant nor the City can substantively or materially affect reductions in Project mobile-source emissions beyond the regulatory requirements and PDFs included as part of the proposed Project. Additionally, even if mitigation were applied to reduce all other sources of GHG emissions to the maximum extent possible, the proposed Projects mobile-source emissions alone would still exceed the threshold of significance. Therefore, impacts related to generation of GHG emissions would remain significant and unavoidable.

Threshold 4.8.2: Would the project conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Significant Impact. The Project's consistency with AB 32 and SB 32 are discussed below.

Table 4.8.B: 2025 Project Greenhouse Gas Emissions

Emissions Source		Emissions (MT/yr)			
		CO_2	CH_4	N_2O	Total CO_2e
Annual construction-related emissions amortized over 30 years		372.21	0.04	0.00	373.19
Area	Other Uses	0.03	$7.00E^{-05}$	0.00	0.03
	Residential	199.42	0.02	$3.42E^{-03}$	200.84
Energy	Other Uses	128.25	0.01	$1.96E^{-03}$	129.01
	Residential	1,712.09	0.09	0.03	1,722.16
Mobile	Other Uses	2,042.38	0.08	0.00	2,044.38
	Residential	6,906.23	0.27	0.00	6,912.99
Waste	Other Uses	37.16	2.20	0.00	92.07
	Residential	170.14	10.06	0.00	421.52
Water Usage	Other Uses	29.98	0.07	$1.90E^{-03}$	32.18
	Residential	170.81	1.33	0.03	213.96
Total CO_2e (All Sources)		**12,142.31**			
Existing Emissions		***-599.10***			
Net CO_2e (Project Minus Existing)		***11,543***			
Project Service Population		**2,349**			
Total CO_2e/Service Population		**4.91**			
2025 GHG Service Population Threshold		**3.84**			
Threshold Exceeded?		**YES**			

Source: *Nakase Property Greenhouse Gas Analysis* (Urban Crossroads 2019b).
CH_4 = methane CO_2e = carbon dioxide equivalent MT/yr = metric tons per year
CO_2 = carbon dioxide GHG = greenhouse gas N_2O = nitrous oxide

Table 4.8.C: 2030 Project Greenhouse Gas Emissions

Emissions Source		Emissions (MT/yr)			
		CO_2	CH_4	N_2O	Total CO_2e
Annual construction-related emissions amortized over 30 years		372.21	0.04	0.00	373.19
Area	Other Uses	0.03	$7.00E^{-05}$	0.00	0.03
	Residential	199.42	0.02	$3.42E^{-03}$	200.84
Energy	Other Uses	115.19	0.01	$1.96E^{-03}$	115.94
	Residential	1,549.03	0.09	0.03	1,559.10
Mobile	Other Uses	1,822.25	0.07	0.00	1,823.97
	Residential	6,161.18	0.23	0.00	6,167.00
Waste	Other Uses	37.16	2.20	0.00	92.07
	Residential	170.14	10.06	0.00	421.52
Water Usage	Other Uses	25.71	0.07	$1.90E^{-03}$	27.91
	Residential	147.85	1.33	0.03	191.00
Total CO_2e (All Sources)		**10,972.55**			
Existing Emissions		***-599.10***			
Net CO_2e (Project Minus Existing)		***10,373***			
Project Service Population		**2,349**			
Total CO_2e/Service Population		**4.42**			
2030 GHG Service Population Threshold		**2.88**			
Threshold Exceeded?		**YES**			

Source: *Nakase Property Greenhouse Gas Analysis* (Urban Crossroads 2019b).
CH_4 = methane CO_2e = carbon dioxide equivalent MT/yr = metric tons per year
CO_2 = carbon dioxide GHG = greenhouse gas N_2O = nitrous oxide

Assembly Bill 32. The 2008 CARB Scoping Plan identifies strategies to reduce California's GHG emissions in support of AB 32, which requires the State to reduce its GHG emissions to 1990 levels by 2020. Measures that are applicable and supported by the Project (e.g., energy efficiency) are summarized in Table 4.8.D. Many of the strategies identified in the CARB Scoping Plan are not applicable at the project level (e.g., long-term technological improvements to reduce emissions from vehicles) and are therefore not listed in Table 4.8.D. While some of the measures are not directly applicable, the Project would not conflict with their implementation (refer to Table 3-5 of the *Nakase Property Greenhouse Gas Analysis* [Urban Crossroads 2019b] for additional discussion of the measures that are not applicable to the Project). The Project would not conflict with any of the provisions of the CARB Scoping Plan and in fact would support six of the action categories contained in the Scoping Plan through energy efficiency, water conservation, recycling, and landscaping, as detailed in Table 4.8.D.

Table 4.8.D: Scoping Plan Consistency Summary

Action Category	Supporting Measures	Consistency
Energy Efficiency	**E-1:** Building, Appliance, and Utility Energy Efficiency Standards and Programs (Electricity) **E-2:** Combined Heat and Power (CHP) Systems **CR-1:** Building, Appliance, and Utility Energy Efficiency Standards and Programs (Natural Gas) **CR-2:** Solar Water Heating (CSI Thermal Program)	**Consistent.** The project will include a variety of building, water, and solid waste efficiencies consistent with 2016 CALGreen requirements.
Million Solar Roofs (MSR) Program	**E-4**: Senate Bill 1 Million Solar Roofs (California Solar Initiative, New Solar Home Partnership, Public Utility Programs) and earlier solar programs.	**Consistent.** The MSR program sets a goal for use of solar systems throughout the State as a whole. The Project's roof structures will be designed to support solar panels.
Green Building Strategy	**GB-1:** Green Building Standards	**Consistent.** The project will include a variety of building, water, and solid waste efficiencies consistent with 2016 CALGreen requirements.
Recycling and Waste	**RW-1**: Landfill Methane Control **RW-2:** Increasing the Efficiency of Landfill Methane Capture **RW-3:** Mandatory Commercial Recycling	**Consistent.** The project will be required to recycle a minimum of 50 percent of waste from construction and operational activities per the California Integrated Waste Management Act of 1989 (AB 939).
Sustainable Forests	**F-1:** Sustainable Forest Target	**Consistent.** The project will increase carbon sequestration by increasing on-site trees per the project landscaping plan.
Water	**W-1:** Water Use Efficiency **W-2**: Water Recycling **W-3:** Water System Energy Efficiency **W-4:** Reuse Urban Runoff **W-5:** Renewable Energy Production **W-6:** Water Public Goods Charge	**Consistent.** The project will include use of low-flow fixtures and efficient landscaping per State requirements.

Source: *Nakase Property Greenhouse Gas Analysis* (Urban Crossroads 2019b).
CALGreen = California Green Building Standards Code
City = City of Lake Forest

Senate Bill 32. At the State level, EO S-3-05 and EO B-30-15 are orders from the State's Executive Branch for the purpose of reducing GHG emissions. The goal of EO S-3-05 is to reduce GHG emissions to 1990 levels by 2020 and was codified by the Legislature as the 2006 Global Warming Solutions Act (AB 32). As discussed above, the proposed Project is consistent with AB 32. Therefore, the proposed Project does not conflict with this component of EO S-3-05. The Executive Orders also establish goals to reduce GHG emissions to 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050. However, studies have shown that, in order to meet the 2030 and 2050 targets, aggressive technologies in the transportation and energy sectors, including electrification and the decarbonization of fuel, would be required. In its Climate Change Scoping Plan, CARB acknowledged that the "measures needed to meet the 2050 target are too far in the future to define in detail." In the First Scoping Plan Update, however, CARB generally described the type of activities required to achieve the 2050 target: "energy demand reduction through efficiency and activity changes; large scale electrification of on-road vehicles, buildings, and industrial machinery; decarbonizing electricity and fuel supplies; and rapid market penetration of efficiency and clean energy technologies that requires significant efforts to deploy and scale markets for the cleanest technologies immediately."

Unlike the 2020 and 2030 reduction targets of AB 32 and SB 32, respectively, the 2050 target of EO S-3-05 has not been codified. Accordingly, the 2050 reduction target has not been the subject of any analysis by the CARB. For example, the CARB has not prepared an update to the aforementioned Scoping Plan that provides guidance to local agencies as to how they may contribute to the achievement of the 2050 reduction target.

In 2017, the California Supreme Court examined the need to use the EO S-3-05 2050 reduction target in *Cleveland National Forest Foundation v. San Diego Association of Governments* (2017) 3 Cal.5th 497 (Cleveland National). The case arose from the San Diego Association of Governments (SANDAG) adoption of its 2050 RTP, which included its Sustainable Communities Strategy (SCS), as required by SB 375 (discussed above). On review, the Supreme Court held that SANDAG did not violate CEQA by not considering the EO S-3-05 2050 reduction target.

Further, the proposed Project is much smaller in size and scope in comparison to the RTP examined in Cleveland National. Accordingly, there is no information presently available to assess the proposed Project's consistency with regard to the 2050 target of EO S-3-05.

The 2017 CARB Scoping Plan builds on the 2008 Scoping Plan to achieve the 40 percent reduction from 1990 levels by 2030. The proposed Project would be consistent with the following major elements of the 2017 Scoping Plan framework for achieving the GHG reductions:

- Implementing and/or increasing the standards of the Mobile Source Strategy, which include increasing the number of zero emission vehicle (ZEV) buses and trucks. When adopted, this measure would apply to all buses accessing the Project site.

- Low Carbon Fuel Standard, with an increased stringency (18 percent by 2030). When adopted, this measure would apply to all fuel purchased in the State and used by residents of the proposed Project.

- Implementing SB 350, which expands the Renewables Portfolio Standard (RPS) to 50 percent RPS and doubles energy efficiency savings by 2030. When adopted, this measure would apply when electricity is provided to the proposed Project by a utility company.

- Implementing the proposed Short-Lived Climate Pollutant Strategy (SLPS), which focuses on reducing CH_4 and HFC emissions by 40 percent and anthropogenic black carbon emissions by 50 percent by year 2030. When adopted, the proposed Project would be required to comply with this measure and reduce SLPS accordingly if it were to emit any CH_4 or HFC emissions during any on-site activities.

- 20 percent reduction in GHG emissions from refineries by 2030. The proposed Project would be required to comply with this measure if it were to utilize any fuel from refineries.

The remaining major elements of the 2017 CARB Scoping Plan framework are not applicable to the proposed Project; however, the Project would not conflict with implementation of these elements (refer to Section 3.9 of the *Nakase Property Greenhouse Gas Analysis* [Urban Crossroads 2019b] for additional discussion of the Scoping Plan elements that are not applicable to the Project).

As discussed above, the Project would not conflict with any of the 2017 Scoping Plan elements. Notwithstanding, because the Project exceeds the applicable service population GHG thresholds and consequently has the potential to result in a cumulatively considerable impact with respect to GHG emissions, a significant and unavoidable impact would occur related to conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions. As discussed previously, there is no available mitigation to substantially lessen this significant impact. Therefore, impacts related to conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions would remain significant and unavoidable.

4.8.7 Level of Significance Prior to Mitigation

Impacts related to the generation of GHG emissions and conflict with an applicable GHG reduction plan, policy, or regulation are considered significant and unavoidable.

4.8.8 Regulatory Compliance Measures and Mitigation Measures

The following RCMs are SCAQMD rules that are applicable to the proposed Project and are considered in the analysis of potential impacts related to GHG emissions. The City considers these requirements to be mandatory; therefore, they are not mitigation measures.

RCM AQ-3: **South Coast Air Quality Management District (SCAQMD) Rule 445.** Prior to the issuance of building permits, the City of Lake Forest Director of Community Development, or designee, shall ensure that the project design does not include wood-burning stoves and fireplaces in new development in compliance with SCAQMD Rule 445.

RCM AQ-4: **Title 24 of the California Code of Regulations (CCR).** Prior to issuance of building permits, the City of Lake Forest Director of Community Development, or designee, shall ensure that the project design complies with the 2019 Building Energy Efficiency Standards (CCR Title 24) energy conservation and the California Green Building Standards Code (CALGreen).

RCM GHG-1: **Title 20 of the California Code of Regulations (CCR).** Appliances installed in a project building will comply with the energy efficiency requirements in CCR Title 20, Appliance Energy Efficiency Standards. All appliances shall be Energy Star appliances.

Even with compliance with the regulatory requirements listed above, impacts related to GHG emissions would be significant. However, there are no feasible mitigation measures to further reduce impacts related to GHG emissions.

4.8.9 Level of Significance after Mitigation

There is no feasible mitigation available to substantially lessen the significant impacts related to generation of GHG emissions and conflict with an applicable GHG reduction plan, policy, or regulation. Therefore, impacts related to GHG emissions would remain significant and unavoidable.

4.8.10 Cumulative Impacts

Project-related GHG emissions are not confined to a particular air basin but are dispersed worldwide. Hence, GHG impacts are by nature a cumulative impact. Consequently, it is speculative to determine how an individual project's GHG emissions would impact California. Therefore, impacts identified under Threshold 4.8.1 are not project-specific impacts to GCC, but are the proposed Project's contribution to this cumulative impact. Because the Project's GHG emissions were considered significant and unavoidable, the Project's GHG emissions and contribution to GCC impacts are considered cumulatively considerable and therefore significant and unavoidable. There is no feasible mitigation available to substantially lessen these cumulatively significant GHG emission impacts.

4.9 HAZARDS AND HAZARDOUS MATERIALS

This section addresses potential hazards and hazardous material impacts at the Project site and in the surrounding area that may result from implementation of the proposed Project. Pertinent information and findings from the following reports are summarized in this section:

- *Phase I Environmental Site Assessment, 20621 Lake Forest Drive, Lake Forest, California 92630* (Hillman Consulting 2018b)
- *Limited Phase II Subsurface Investigation Report, 20621 Lake Forest Drive, Lake Forest, California* (Hillman Consulting 2018a)
- *Updated Geologic and Environmental Hazards Assessment Report, Nakase Elementary School* (Placeworks 2019d).
- *Soil Characterization Assessment* (ENGEO 2016)
- *Nakase Elementary School EMF Study and Exemption Request* (Placeworks 2019a)
- *Nakase Elementary School Health Risk Assessment* (PlaceWorks 2019b)
- *Nakase Elementary School Water Pipeline and Tank Safety Hazard Assessment* (PlaceWorks 2019c)

The complete reports are included in Appendix H.

4.9.1 Scoping Process

The City of Lake Forest (City) received 28 comment letters during the public review period of the Initial Study/Notice of Preparation (IS/NOP). For copies of the IS/NOP comment letters, refer to Appendix A of this Environmental Impact Report (EIR). Three comment letters included comments related to hazards and hazardous materials.

The letter from the OC Fire Authority (July 31, 2018) suggested that the significance conclusion related to wildland fire hazards be revised to reflect that a Fuel Modification Conceptual Plan and a Fire Protection Plan with Ember Mitigation have been approved for the proposed Project. The letter from Charles Larson (August 4, 2018) expressed concern regarding the proximity of the potential school site to the gas station across Rancho Parkway.

4.9.2 Existing Environmental Setting

The approximately 122-acre (ac) Project Site is currently operating as an agricultural wholesale plant nursery and has been used for agricultural production (orchards) and/or a nursery since the late 1930s. In 2018, a Phase I Environmental Site Assessment (ESA) (Hillman Consulting 2018b) was conducted for the Project site to determine if any Recognized Environmental Conditions (RECs) were associated with the Project site. A REC is defined by the American Society of Testing Materials (ASTM) as the presence or likely presence of any hazardous substances or petroleum products in,

on, or at a property: (1) due to a release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment.

The 2018 Phase I ESA included the following:

- A non-invasive visual reconnaissance of the Property and adjoining properties in accordance with ASTM guidelines for evidence of RECs
- Interviews of past and present owners and occupants as well as State and local government officials seeking information related to the potential presence of RECs at the Property
- A review of standard physical record sources for available topographic, geologic, and groundwater data
- A review of standard historic record sources (e.g., fire insurance maps, city directories, aerial photographs, prior reports and interviews) to determine prior uses of the Property from the present back to the Property's first developed use or back to 1940, whichever is earlier
- A review of standard environmental record sources, including federal and State environmental databases (provided by Environmental Data Resources [EDR]), and additional environmental record sources, to identify potential regulator concerns with the Property, adjoining properties, and properties located within the surrounding area

Notable environmental conditions identified in the 2018 Phase I ESA are listed below:

- A National Priority List (NPL) site is located within 1 mile (mi) of the Property. The site is described as Marine Corps Air Station (MCAS) El Toro, which is approximately 4,736 feet (ft) northwest of the Project site and cross-gradient relative to the Project site. In 1985, trichloroethylene (TCE) was found in a portion of the groundwater basin beneath the former MCAS EL Toro and Central Irvine. TCE is a volatile organic compound (VOC) that was widely used as a solvent for aircraft cleaning. Prior to the 1970s, the disposal of cleaning solvents was not regulated. As a result of past disposal practices, a 1 x 3 mi plume of groundwater contamination extended west of MCAS El Toro. Based on a review of the EDR report and published groundwater plume maps, the TCE contaminant plume is about 450 ft deep and located over 2 mi from the boundary of the Project site. In addition, the groundwater flow at the plume is toward the west and migrates away from the Project site. MCAS El Toro has been under federal facility remedial investigation since the 1990s. Considering its current status, the Project site's distance from the TCE plume and respective downgradient location (i.e., groundwater at MCAS El Toro flows away from the Project site), this listing is not considered to be a REC in connection with the Project site.
- Seven pole-mounted transformers were observed on the northeast side of the Project site. No signs of leaking or staining were observed in the area of the transformers.

- Two 25-gallon (gal) drums containing grease and two 55 gal drums containing tractor fluid were observed in the maintenance garage. No staining or leaking was noted in the areas of the drums.

- Five aboveground storage tanks (ASTs) containing diesel and gasoline as well as large quantities of pesticides are stored on the adjoining property to the southeast, are not part of the Project site, and were not assessed.

- Rancho Parkway Shell #07, located at 26721 Rancho Parkway is located on the underground storage tank (UST) and EDR Historic Auto databases. This site adjoins the Project site to the north-northeast and is upgradient of the Project site (i.e., groundwater at the gas station flows toward the Project site). The UST listing indicates a UST is registered as being on the Project site. Considering a lack of reported spills or releases, this listing is not considered to be a REC in connection with the Project site.

- The Home Depot at 20021 Lake Forest Drive is located on the RCRA-SQG (federal Resource Conservation and Recovery Act-Small Quantity Generator), FINDS, and ECHO databases. This site adjoins the Project site to the northeast and is upgradient of the Project site. The RCRA-SQG listing indicates the site is registered as a small-quantity generator of hazardous waste with no reported violations. The FINDS listing indicates the site is on the California Hazardous Waste Tracking System – Datamart, RCRA, and State Master databases. The site is in the RCRA program with no reported spills or violations. Due to a lack of reported spills or violations, these listings are not considered to be RECs in connection with the Project site.

- The Project site appears to have been historically utilized as orchards and/or a nursery since circa 1938. There is the potential for soil contamination due to historic application of pesticides; however, based on the *Soil Characterization Assessment* (ENGEO 2016) indicating no impact on the soil from organochlorine pesticides, these are not considered to be a REC in connection with the Project site.

Other information documented in the 2018 Phase I ESA included:

- Fifty-five gallon storage drums were observed around the Project site during a previous Phase I ESA site reconnaissance (2016) that contained various hazardous materials (e.g., herbicides and pesticides), but no leaks were noted. Several ASTs containing fertilizers and petroleum products (i.e., gasoline and diesel) were noted on the Project site. A historical diesel UST was also documented on the Project site.

- The *Soil Characterization Assessment* (ENGEO 2016) documented that soil test results found that lead and arsenic concentrations were within the range of expected background concentrations.

- The *Soil Characterization Assessment* (ENGEO 2016) found that the site soils are suitable for future residential development, but recommended additional testing at the historical UST location.

- Asbestos-containing materials (ACMs), lead-based paint, and polychlorinated biphenyls (PCBs) may be present in structures on the Project site.

- The Project Site is in a low risk area for radon.

Additional testing was conducted at the historical UST location as part of the Limited Phase II ESA (Hillman Consulting 2018a). Four soil gas probes were installed in accessible locations at the UST site. Results from soil gas sampling indicated no detectable levels of VOCs, thereby indicating no significant vapor intrusion threat potential. No additional testing at this location was recommended.

The *Updated Geologic and Environmental Hazards Assessment Report* (Placeworks 2019d) for the Project site focused on hazards pertinent to proposed school sites. This report determined there were no chemical pipelines on the Project site, or pressurized sewer lines, high-pressure natural gas pipelines, or fuel ASTs on or within 1,500 ft of the Project site. In addition, the Project site is not a former hazardous waste disposal site or solid waste disposal site. The nearest oil or gas well to the Project site is 1.38 mi to the southwest. The State of California Division of Oil, Gas, and Geothermal Resources (DOGGR) lists the well status as plugged and abandoned.

As discussed in the *Updated Geologic and Environmental Hazards Assessment Report* (Placeworks 2019d), there currently are SCE 66 kV double-circuit overhead transmission lines that are within a 20 ft wide SCE easement along the south side of Bake Parkway that run parallel to the northwestern boundary of the proposed school site. The southern edge of the SCE easement would be the school's northwestern property line. As part of the Project, these 66 kV lines would be undergrounded prior to construction of the proposed school on the Project site.

4.9.3 Regulatory Setting

Hazardous materials, including hazardous substances and wastes, are regulated by many state and federal laws. Statutes govern the generation, treatment, storage, and disposal of hazardous materials, substances, and waste as well as the investigation and mitigation of waste releases, air and water quality, human health, and land use.

The Governor's Office of Emergency Services (Cal OES) established and updates the Standardized Emergency Management System (SEMS) as needed in accordance with the California Emergency Services Act for emergency response and evacuation. SEMS facilitates response prioritization, interagency cooperation, and the efficient flow of resources and information.

SEMS incorporates the following:

- Incident Command System (field-level emergency response system)
- Interagency coordination for allocation of resources
- Mutual aid (providing emergency resources from non-affected jurisdictions)
- Operational Area Concept (coordinate damage information, resource requests and emergency response within the affected area)

Local agencies involved in emergency response and evacuation include the Orange County Sheriff's Department (OCSD), Orange County Fire Authority (OCFA), and City of Lake Forest Police Department.

4.9.3.1 Federal Regulations

The primary federal laws regulating hazardous materials are the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) (42 United States Code [USC] Section 9601 et seq.) and the Resource Conservation and Recovery Act of 1976 (RCRA) 42 USC Section 6901 et seq.). The purpose of CERCLA, often referred to as "Superfund," is to identify and clean up abandoned contaminated sites so that public health and welfare are not compromised. The RCRA provides for "cradle-to-grave" regulation of hazardous waste generated by operating entities. Other federal laws applicable to the project site are listed below.

- The Clean Air Act (CAA) (42 USC Section 7401 et seq.) protects the public from exposure to airborne contaminants known to be hazardous to human health. Under the CAA, the United States Environmental Protection Agency (EPA) established National Emissions Standards for Hazardous Air Pollutants.

- The Clean Water Act – National Pollutant Discharge Elimination System (Section 402[p]) (33 USC Section 1342[p]) regulates discharges and spills of pollutants, including hazardous materials to surface waters and groundwater.

- The Safe Drinking Water Act (42 USC Section 300(f) et seq.) regulates discharges of pollutants to underground aquifers and establishes standards for drinking water quality.

- The Toxic Substances Control Act (15 USC Section 2601 et seq.) regulates manufacturing, inventory, and disposition of industrial chemicals, including hazardous materials.

- The Federal Insecticide, Fungicide, and Rodenticide Act (7 USC Section 136 and 40 Code of Federal Regulations [CFR] Parts 152–171) regulates the manufacturing, distribution, sale, and use of pesticides.

- The Hazardous Materials Transportation Act (49 USC Section 5101 et seq. and 49 CFR, Parts 101, 106, 107, and 171–180) regulates the transport of hazardous materials by motor vehicles, marine vessels, and aircraft.

- The Hazardous Materials Transportation Uniform Safety Act of 1990 (Public Law 101-615) regulates the safe transport of hazardous material intrastate, interstate, and for foreign commerce.

- The Emergency Planning and Community Right to Know Act (42 USC Section 11001 et seq. and 40 CFR, Parts 350.1 et seq.) regulates facilities that use hazardous materials in quantities that require reporting to emergency response officials.

4.9.3.2 State Regulations

The State of California has established many laws and regulations that expand on federal laws. Laws and regulations applicable to the project site are listed below.

- The California Public Resources Code (PRC) Section 21151.4 requires the lead agency to consult with any school district with jurisdiction over a school within 0.25 mi of the project about potential effects on the school if the project might reasonably be anticipated to emit hazardous air emissions or handle an extremely hazardous substance or a mixture containing an extremely hazardous substance.

- The Porter-Cologne Water Quality Control Act (California Water Quality Code, Section 13000 et seq.) regulates water quality through the State Water Resources Control Board and the Regional Water Quality Control Boards, including oversight of water monitoring and contamination cleanup and abatement.

- The Hazardous Materials Release Response Plans and Inventory Law (California Health and Safety Code, Section 25500 et seq.) requires facilities using hazardous materials to prepare Hazardous Materials Business Plans.

- The Hazardous Waste Control Act (California Health and Safety Code, Section 25100 et seq.) regulates the identification, generation, transportation, storage, and disposal of materials deemed hazardous by the State of California.

- The Safe Drinking Water and Toxic Enforcement Act (Proposition 65, California Health and Safety Code, Section 25249.5 et seq.) regulates the discharge of contaminants to groundwater.

- Cortese List Statute (California Government Code, Section 65962.5) requires the Department of Toxic Substances Control (DTSC) to compile and maintain lists of potentially contaminated sites throughout the state, and includes the Hazardous Waste and Substances Sites List.

- The Unified Hazardous Waste and Hazardous Materials Management Regulatory Program (Unified Program) (California Environmental Protection Agency [CalEPA] 2012) consolidates, coordinates, and makes consistent the administrative requirements, permits, inspections, and enforcement activities of six environmental and emergency response programs. CalEPA and other state agencies set the standards for their programs, while local governments implement the standards. These local implementing agencies are called Certified Unified Program Agencies (CUPA).

- State of California Division of Oil, Gas, and Geothermal Resources Regulatory Program (DOGGR) supervises the drilling, operation, maintenance, and abandonment of oil, gas, and geothermal wells throughout the State. The regulatory program set forth by DOGGR for the management of these resources emphasizes the appropriate development of oil, natural gas, and geothermal resources in the State through sound engineering practices that protect the environment, prevent pollution, and ensure public safety.

4.9.3.3 School Sites

PRC Section 21151.8 (School Sites and Hazardous Materials); CEQA Guidelines, Section 15186 (School Facilities). CEQA prohibits lead agencies from approving environmental documents for any project involving the purchase of a school site or the construction of a new school unless the following conditions occur:

- The EIR identifies whether the property to be purchased or to be constructed upon is a current or former hazardous waste site or a site that contains underground or aboveground pipelines carrying hazardous substances. The lead agency notifies in writing and consults with the administrative agency in which the school site is located, and with the local air pollution control district, to identify facilities within 0.25 mi of the school site that may reasonably be anticipated to emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste.

- If facilities within a 0.25 mi radius of the school site that may reasonably be anticipated to emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste are identified, the school district's governing board must make one of the following findings:

    - The health risks from the identified facilities do not and will not constitute an actual or potential endangerment of public health to persons who attend or are employed at the school; or

    - Corrective measures required under order by another agency having jurisdiction over the facilities will, before the school is occupied, result in the mitigation of all chronic or accidental air emissions to levels that do not constitute an actual or potential endangerment of public health to persons who would attend or be employed at the proposed school. If this finding is made, the board shall make a subsequent finding, prior to occupancy at the school, that the emissions have been so mitigated.

Education Code, Sections 17213.1, 17213.2, and 17268. These statutes require extensive DTSC involvement in the environmental review process for projects that will receive State funding. Prior to acquiring a school site or approving a school construction project, school districts must contract for the preparation of a Phase I ESA.

The Phase I ESA must contain sufficient information to determine whether there is a potential for exposure to hazardous materials and must conclude that either (1) a further investigation of the site is not required, or (2) a Preliminary Endangerment Assessment (PEA) is necessary. If the Phase I ESA concludes, or DTSC determines, that a PEA must be conducted, a school district has two options: it can either proceed to contract with a qualified environmental assessor to conduct a PEA of the property under DTSC oversight, or it can drop the school site from further consideration.

If a school district chooses to proceed with a PEA, it must enter into an Environmental Oversight Agreement with DTSC to oversee preparation of the PEA. DTSC must then assist the district with scoping the work plan for the PEA investigation. Sampling could include soil gas, soil matrix, groundwater, and other sampling and calculation of cancer risks and non-cancer risks. Based on

information developed during the PEA and a conservative human and ecological risk evaluation, the DTSC would then make a decision regarding potential risks posed by the site. Possible outcomes of the DTSC's decision include the following:

- The potential requirement for further investigation through the Remedial Investigation/ Feasibility Study process if the site is found to be significantly impacted by hazardous materials.
- The need to perform a removal action if localized hazardous impacts are found.
- Issuance of a "No Further Action" finding if the site is found not to be significantly impacted and risks to human health and the environment are found to be within acceptable levels based on the conservative screening level human health risk assessment. Any human health risk assessment must be quantitative for both residential and school-based receptors. The effort entails data aggregation, selection of chemicals of potential concern, exposure assessment, toxicity assessment, and risk characterization.

A school district can choose to enter into a Voluntary Cleanup Agreement (VCA) with DTSC if the district elects to perform the removal action to prepare the site for use as a school site. Before a site's school buildings can be occupied, DTSC must certify that all necessary response actions have been completed to ensure that hazardous materials at the school site no longer pose a significant risk to children and adults, except for the operation and maintenance activities.

Education Code, Section17215. Before acquiring title to property for a new school site, the governing board of the school district is required to give the California Department of Education (CDE) written notice of the proposed acquisition if the proposed site is within 2 mi of an airport runway or a potential runway is included in an airport master plan that is nearest to the site. CDE must then notify the California Department of Transportation (Caltrans), which in turn would investigate the proposed site and submit a written report of its findings, including recommendations concerning acquisition of the site. As part of the investigation, the owner and operator of the airport would be granted the opportunity to comment upon the proposed school site. If the written report does not favor the acquisition of the property for a school site, State funds or local funds cannot be used for acquisition of, or school construction at, the subject site.

Education Code, Section 17251; CDE Regulations, 5 California Code of Regulations (CCR) Section 14010 (Standards for School Site Selection). Section 17251 requires CDE to establish standards for use by school districts in assessing school sites. The CDE regulations adopted pursuant to Section 17251 contain the following standards for school sites, among others:

- For power lines and transmission lines, the property line of a proposed school site shall be at least: (1) 100 ft from the edge of an easement for a 50- to 133-kilovolt (kV) line; (2) 150 ft from the edge of an easement for a 220 to 230 kV line; and (3) 350 ft from the edge of an easement for a 500 to 550 kV line (5 CCR Section 4010[c]).
- For railroads, the proposed site shall be a sufficient distance from a railroad track easement. If the proposed school site is within 1,500 ft of a railroad track easement, a safety study shall be

completed by a competent professional. An analysis of the following safety factors shall be completed: (1) distance from the track easement to the site; (2) identification of whether tracks are mainline or spur; (3) type of cargo to be transported; (4) projected train speed; (5) frequency/schedule of rail traffic compared to school schedules; (6) distance of grade, curve, bridge, signal, or other track features to the proposed school; (7) requirements for sound and safety barriers; (8) pedestrian/vehicle safety near track crossing; and (9) proximity of rail easement to high-pressure gas lines (5 CCR Section 14010[d]).

- The site shall not be adjacent to a road or freeway that any site-related traffic studies have determined will have safety problems (5 CCR Section 14010[e]).

- The site shall not be located near an aboveground water or fuel storage tank or within 1,500 ft of the easement of an aboveground or underground pipeline that can pose a safety hazard as determined by a risk analysis study, conducted by a competent professional, which may include certification from a local public utility commission (5 CCR Section14010[h]).

- Existing or proposed zoning of the surrounding properties shall be compatible with schools in that it would not pose a potential health or safety risk to students or staff in accordance with Education Code Section 17213 and Government Code Section 65402 and available studies of traffic surrounding the site (5 CCR Section 14010[m]).

- If the proposed site is on or within 2,000 ft of a significant disposal of hazardous waste, the school district shall contact the DTSC for a determination of whether the property should be considered a Hazardous Waste Property or a Border Zone Property (5 CCR Section 14010[t]).

- The site shall be conveniently located for public services, including fire protection and police protection whenever feasible (5 CCR Section 14010[p]).

- CDE School Facilities Planning Division, School Site Selection and Approval Guide) outlines the requirements of the CDE regulations for site selection that are described above and includes recommendations designed to ensure a safe school environment and facilitate State approval of sites.[1] The guide helps school districts determine compliance with the requirements of CDE Regulations Section 14010 et seq. and Education Code Section 17213 et seq.

4.9.3.4 Regional Regulations

The Orange County Health Care Agency (HCA) is the CUPA for the County of Orange and the City of Lake Forest, and has jurisdiction over the following six programs:

- Hazardous Materials Disclosure
- Business Emergency Plan
- Hazardous Waste
- Underground Storage Tank

[1] School Site Selection, and Approval Guide. https://www.cde.ca.gov/ls/fa/sf/schoolsiteguide.asp (accessed May 21, 2019)

- Aboveground Petroleum Storage Tank
- California Accidental Release Prevention

OCFA is the administering agency for the chemical inventory and business emergency plan regulations for the City. OCFA's disclosure activities are coordinated with the HCA. OCFA's Hazardous Materials Services Section (HMSS) is staffed with technical and administrative personnel who are assigned implementation and management of the disclosure program.

Orange County Hazardous Materials Area Plan (Hazardous Materials Area Plan). The Hazardous Materials Area Plan was prepared by the OCFA to assist agencies and businesses in Orange County in their pre-emergency planning and emergency response role. The Hazardous Materials Area Plan also serves to provide the public with information about facilities that may pose a threat or potential hazard to the community health and safety. Furthermore, this plan is designed to assist in the prevention or mitigation of the damage to the health and safety of persons and the environment from the release or threatened release of hazardous materials into the workplace or environment. The jurisdictions covered by the Hazardous Materials Area Plan include the unincorporated areas of the Orange County, those cities contracted with the OCFA, and the City of Laguna Beach. Lake Forest is currently contracted to and served by the OCFA.

An objective of the Hazardous Materials Area Plan is to prescribe procedures for the effective and economical allocation of resources in time of hazardous materials emergency. This is done by establishing an emergency organization, assigning tasks, specifying policy and general procedures, and providing coordination of planning for all phases of emergency planning for a hazardous materials incident or emergency.

4.9.3.5 Local Regulations

City of Lake Forest Municipal Code. Chapter 6.16 of the City of Lake Forest Municipal Code addresses hazardous materials.[1] The intent of this chapter is to:

- Enable emergency service personnel in the City to know of the use and dangers of hazardous materials in the community in order to plan for and respond to potential emergencies and exposure to such materials;

- Provide basic information on the location, type, and health risks of hazardous materials used or stored in the City to firefighters, health officials, planners, elected officials, and other emergency response personnel; and

- Implement the community's right and need for basic information on the use and disposal of hazardous materials in the City and provide for an orderly system for the provision of such information.

City of Lake Forest Emergency Preparedness Plan. The City of Lake Forest Emergency Preparedness Plan was developed to: (a) help City staff determine the actions needed to prevent disasters where

[1] City of Lake Forest Municipal Code. Website: http://qcode.us/codes/lakeforest/ (accessed May 21, 2019).

possible; (b) reduce the vulnerability of residents to any disasters that cannot be prevented; (c) establish capabilities for protecting citizens from the effects of disasters; (d) respond effectively to the actual occurrence of disasters; and (e) provide for recovery in the aftermath of any emergency involving extensive damage or other debilitating influence on the normal pattern of life within the community.

Emergency response to accidents in Lake Forest that are associated with hazards and hazardous waste material is typically undertaken by the OCFA. In addition, the fire service in Orange County supports an effective system of mutual aid and automatic aid between neighboring jurisdictions for the sharing of common resources. However, depending on the situation and location of a hazardous waste incident, agencies other than the City and County Fire Departments would also help provide emergency response. The planning basis for response to a hazardous material incident in Lake Forest is the Orange County Hazardous Materials Area Plan, as described above.

The OCFA actively enforces codes and ordinances to ensure that a reasonable degree of fire safety exists in facilities and occupancies to minimize the threat to life and property. This activity is ongoing and conducted daily. Comprehensive pre-emergency planning, fire protection engineering, and training programs are currently in place and are designed to ensure the Department's ability to meet future service demands.

4.9.4 Methodology

The analysis in this section indicates whether potential hazards or hazardous materials impacts are present due to past or present use of the Project site and/or properties in the immediate vicinity of the Project site. This section analyzes the potential impacts of the proposed Project as compared to existing conditions based on the setting described in the technical reports listed in the first paragraph of this section.

4.9.5 Thresholds of Significance

The thresholds for hazards and hazardous materials impacts used in this analysis are consistent with Appendix G of the State CEQA Guidelines and the City's *CEQA Significance Thresholds Guide* (March 2009). The proposed Project may be deemed to have a significant impact with respect to hazards and hazardous materials if it would:

Threshold 4.9.1: Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.

Threshold 4.9.2: Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.

Threshold 4.9.3: Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.

Threshold 4.9.4: Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, it would create a significant hazard to the public or the environment.

Threshold 4.9.5: For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, result in a safety hazard or excessive noise for people residing or working in the project area.

Threshold 4.9.6: Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.

Threshold 4.9.7: Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires.

The Initial Study, included as Appendix A, substantiates that there would be no impacts associated with Thresholds 4.9.5 and 4.9.7; therefore, these thresholds will not be addressed in the following analysis.

4.9.6 Project Impacts

Threshold 4.9.1: Would the Project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

Potentially Significant Impact.

Construction. Construction of the proposed Project would temporarily increase the regional transport, use, and disposal of construction-related hazardous materials and petroleum products (e.g., diesel fuel, lubricants, paints and solvents, and cement products containing strong basic or acidic chemicals). These materials are commonly used at construction sites, and the construction activities would be required to comply with applicable State and federal regulations for proper transport, use, storage, and disposal of excess hazardous materials and hazardous construction waste. In addition, Regulatory Compliance Measures WQ-1 and WQ-4 (refer to Section 4.10 of this EIR) requires compliance with the waste discharge permit requirements to avoid potential impacts to water quality due to spills or runoff from hazardous materials used during construction.

Hazardous waste might also be generated during demolition, excavation, or other activities that require the removal of potential hazardous building materials (e.g., ACMs, lead-based paint, mercury, and PCBs) or unknown hazardous materials. The demolition of structures containing hazardous building materials requires specialized procedures and equipment and appropriately certified personnel. Procedures for handling and disposal of hazardous building materials is specified in Mitigation Measure 4.9.1, Demolition Plan. The plan will specify how to appropriately contain, remove, and dispose of hazardous building materials to protect human health and the environment. Any suspect hazardous materials unearthed during construction would require work be stopped as well as notification to OCFA for evaluation, which could

require testing, removal, and disposal at appropriate facilities in accordance with State and federal regulations. Procedures for handling suspect or unknown hazardous materials are specified in Mitigation Measure 4.9.2, Construction Contingency Plan. Therefore, with implementation of Mitigation Measures 4.9.1 and 4.9.2, impacts related to the routine transport, use, or disposal of hazardous materials during construction would be less than significant.

Operation. Operation and maintenance of the Project would involve transport, use, and disposal of small quantities of hazardous materials or wastes associated with routine maintenance of residential and school facilities. The City of Lake Forest, County of Orange, and contracted solid waste disposal providers are required to ensure that hazardous materials are disposed of at appropriate facilities. Provision of educational pamphlets and special pickups/disposal sites for household hazardous waste and electronic waste provided by these entities minimizes the potential for improper disposal of these substances. Therefore, impacts related to the routine transport, use, or disposal of hazardous materials during operation and maintenance would be less than significant, and no mitigation is required.

Threshold 4.9.2: Would the Project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

Potentially Significant Impact. Reasonably foreseeable upset and accident conditions have the potential to occur during demolition and excavation activities because of the amount of construction activity and ground disturbance. Residential and school development on the Project site would not result in substantial reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment because these land uses do not involve the use or handling of substantial quantities of hazardous materials or acutely hazardous materials.

As discussed in the Threshold 4.9.1 analysis, a Demolition Plan and procedures for handling unknown hazardous materials during construction are specified in Mitigation Measures 4.9.1 and 4.9.2, respectively. Therefore, with implementation of Mitigation Measures 4.9.1 and 4.9.2, impacts related to reasonably foreseeable upset and accident conditions would be less than significant with mitigation incorporated.

Threshold 4.9.3: Would the Project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

Potentially Significant Impact. As discussed in the Initial Study, as part of the Project, the Project Applicant/Developer would offer land to the Saddleback Valley Unified School District (SVUSD) for construction of an elementary school with a capacity of 1,000 students on the Project site. The elementary school would be located on the corner of Bake Parkway and Rancho Parkway, at the northwestern portion of the Project site. In addition, five other schools are within or just outside of a 0.5 mi radius of the Project site.

Construction. There is the potential for hazardous emissions during demolition and excavation activities as discussed in the Threshold 4.9.1 analysis. There is no plan to use acutely hazardous materials during construction or operation. As discussed in the Threshold 4.9.1 analysis, specific steps to comply with regulatory requirements for use, storage, and disposal of hazardous materials and waste would be addressed through implementation of a Demolition Plan and a Construction Contingency Plan during construction (Mitigation Measures 4.9.1 and 4.9.2, respectively). Therefore, with implementation of Mitigation Measures 4.9.1 and 4.9.2, impacts related to hazardous emissions or handling of hazardous materials during construction would be less than significant for the Project site and nearby schools.

Section 4.9.2 summarizes the findings of the Phase I and Phase II ESAs (Hillman Consulting 2018a,b) conducted on the site, which indicate there are potential hazardous building materials (e.g., ACMs, lead-based paint, mercury, PCBs) on the Project site that would need to be evaluated and removed prior to demolition (required by Mitigation Measure 4.9.1). However, there are no current RECs associated with the Project site. Therefore, the 2018 Phase I and Phase II ESAs did not identify any further investigation required for development of the Project site with residential structures.

Operation. As discussed in the Threshold 4.9.1 analysis, operation and maintenance of the Project site would involve the use and disposal of small quantities of hazardous materials or wastes associated with routine maintenance of residential and school facilities. Existing regulations and procedures are in place to minimize impacts related to use and disposal of household hazardous waste associated with the proposed facilities, and no mitigation is required.

However, as discussed in Section 4.9.3, there are State Education Code requirements related to the screening of future school sites for the presence of hazardous materials that must be overseen by the DTSC, and the DTSC must make a determination that “No Further Action” is required prior to approval of a site for school development that receives State funding. It is expected that the Saddleback Valley Unified School District would apply for State funding for the new elementary school.

In order to gain approval for development of a school at the Project site that would receive State funding, previous Phase I and II ESAs (Hillman Consulting 2018a, 2018b; ENGEO 2016) would need to be submitted to the DTSC for review, and the DTSC would determine whether or not additional sampling and analysis, preparation of a Preliminary Endangerment Assessment (PEA), site remediation, and public review of reports are required in order to obtain a finding of “No Further Action”. Mitigation Measure 4.9.3, DTSC Oversight of School Site, includes the outline of the process for a DTSC finding of “No Further Action”; therefore, with implementation of Mitigation Measure 4.9.3, impacts related to hazardous emissions or hazardous materials within 0.25 mi of a school would be less than significant.

Electromagnetic Field. As discussed in Section 4.9.2, there currently are SCE 66 kV double-circuit overhead transmission lines that are within a 20 ft wide SCE easement along the south side of Bake Parkway that run parallel to the northwestern boundary of the proposed school site. The

southern edge of the SCE easement would be the school's northwestern property line. As part of the Project, these 66 kV lines would be undergrounded prior to construction of the proposed school on the Project site. CCR, Title 5, Section 14010(c) specifies a distance setback requirement of 25 ft from 50 kV to 130 kV underground power lines for proposed school sites.

CDE allows an exemption to measure the setback distance from the centerline of the transmission line instead of the edge of the easement if it can reasonably be assumed that the utility would not place the utility line closer to the school site within the easement. Because the SCE easement is relatively narrow at this location (i.e., 20 ft wide), it is reasonable to assume that the undergrounded transmission lines would be placed in the center of the easement to maximize the space needed by SCE for future maintenance and repairs. Assuming the undergrounded lines are in the center of the SCE easement, the 25 ft setback zone would encroach 15 ft onto the northwestern portion of the school site.

The CDE Power Line Setback Exemption Guidance Policy requires an electromagnetic field (EMF) study and an exemption request to be prepared for limited activity uses (i.e., landscaping, parking lots, driveways) within any setback zone. SVUSD would prepare the final proposed school site plan and would be responsible for confirming that hardcourts and a grass playfield are not located within the setback zone. These uses are considered unrestricted uses, and CDE would require preparation of an EMF Management Plan for the school site if unrestricted uses (classrooms, athletic fields, and joint-use facilities) are proposed within the setback zone. Conformance with existing regulations and CDE requirements would ensure that impacts related to EMF would be less than significant. No mitigation is required.

Threshold 4.9.4: Would the Project be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

No Impact. The 2018 Phase I ESA (Hillman Consulting 2018b) determined the Project site is not on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and there are no current RECs associated with the Project site. Therefore, the Project site is not a hazardous materials site that would create a significant hazard to the public or the environment.

Threshold 4.9.6: Would the Project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

Potentially Significant Impact.

Construction. Development of the proposed Project would require excavation of the site; delivery of materials, equipment, and personnel; demolition of the 1,744-square-foot (sf) existing structure on the Project site; undergrounding of utilities; construction of the buildings; and installation of landscaping. The proposed Project would be implemented over an estimated period of 67 months (approximately 5.5 years). Demolition and site preparation would span approximately 3 months, and grading would span approximately 12 months. Paving and infrastructure would take approximately 4 months and 12 months, respectively, and would

occur concurrently. Building construction would be implemented over an estimated period of 46 months.

Construction activities have the potential to affect emergency access by requiring partial lane closures during street improvements and utility installation or by increasing emergency vehicle response times. Mitigation Measure 4.16.1 requires that a Construction Traffic Management Plan (CTMP) be prepared for the proposed Project to ensure that emergency vehicles would be able to navigate through streets adjacent to the Project site that may experience congestion due to construction activities. Mitigation Measure 4.16.1 also requires that all emergency access to the Project site and adjacent areas be kept clear and unobstructed during all phases of demolition and construction. Traffic management personnel (flag persons), required as part of the CTMP, would be trained to assist in emergency response by restricting or controlling the movement of traffic that could interfere with emergency vehicle access. If a partial street closure (i.e., a lane closure) would be required, notice would be provided to the Orange County Sheriff's Department, and flag persons would be used to facilitate the traffic flow until construction is complete. With implementation of Mitigation Measure 4.16.1, potential impacts related to emergency access during construction would be less than significant. No additional mitigation is required.

Operation. The proposed Project would take access from three existing intersections (one traffic signal on Bake Parkway, one unsignalized intersection on Bake Parkway, and one traffic signal on Rancho Parkway). The access analysis presented in the *Nakase Property Traffic Impact Analysis* (Urban Crossroads 2019c) demonstrates that each of these intersections is anticipated to operate at a satisfactory level of service (LOS). Existing routes for emergency vehicles would not be impeded by the Project, and emergency vehicles would have multiple routes to access the Project site. Further, as part of the Project approval process, emergency access to/from the site would be required to meet all applicable City codes and standards. OCFA approved a conceptual Fire Master Plan (refer to Figure 4.19.1) in February 2018, a conceptual Fire Protection Plan with Ember Mitigation (refer to Figure 4.19.2) in January 2018, and a conceptual Fuel Modification Plan (refer to Figure 4.19.3) in March 2018. The Fire Master Plan and Fire Protection Plan address specific fire prevention and access elements required by the City of Lake Forest Municipal Code and the California Building Code (CBC). The Fire Master Plan establishes the proper location and adequacy of fire suppression facilities as well as fire access routes on the Project site. The Fire Master Plan also identifies the locations of fire hydrants, a water supply for firefighting, and emergency access to residences and structures on the Project site. According to OCFA, adherence to the elements of the Fire Master Plan is directly correlated with the effectiveness of first responders, including fire and emergency medical personnel. The proposed Project meets or exceeds the requirements of OCFA to not hinder fire access and fire department and operations for the planned community. Further, OCFA actively enforces codes and ordinances to ensure a reasonable degree of fire safety exists in facilities and occupancies to minimize the threat to life and property. This activity is ongoing and conducted daily and would occur on the Project site during Project operation. Comprehensive pre-emergency planning, fire protection engineering, and training programs are currently in place and are designed to ensure the Department's ability to meet future service demands including service demands related to emergency response and emergency evacuation. Therefore, the proposed

Project would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. Therefore, Impacts would be less than significant and no mitigation measures are required.

4.9.7 Cumulative Impacts

The hazardous materials study area considered for cumulative impacts consisted of the Project site and surrounding properties (i.e., structures and activities on these properties) that could directly or indirectly affect the presence or fate of hazardous materials on the Project site. In general, only projects occurring adjacent to or very close to the Project site are considered due to the limited potential impact area associated with release of hazardous materials into the environment.

In the existing condition, the Project site may contain hazardous building materials, but these materials would not present a hazard until they are disturbed, leaking, or are damaged. Mitigation Measure 4.9.1 addresses the procedures for handling and disposal of these materials prior to demolition activities. The 2018 Phase I ESA (Hillman Consulting 2018b) did not identify any current hazards associated with building materials on the Project site. In addition, the 2018 Phase I ESA did not identify any RECs for the Project site based on on-site or off-site conditions. For any site with previous commercial or industrial use, there is the potential for unknown hazardous materials to be encountered during excavation activities. Mitigation Measure 4.9.2 includes standard procedures to address handling and disposal of previously unknown hazardous materials encountered during excavation.

With the exception of hazardous materials transport, the proposed Project would not create potential significant cumulative impacts off site. Transport of hazardous materials is closely regulated and, with implementation of Mitigation Measures 4.9.1 through 4.9.3, would be adequately monitored to ensure there would be no significant impact to the environment or to human health. In addition, the California Department of Transportation (Caltrans), the California Highway Patrol, and local police and fire departments are trained in emergency response procedures for safely responding to accidental spills of hazardous substances on public roads, further reducing potential impacts.

The proposed Project would be required to comply with OCSD and OCFA requirements for emergency access and egress such that emergency response and evacuation would not be impaired.

For the reasons identified above, the proposed Project would not result in a significant contribution to cumulative hazards or hazardous materials impacts.

There are no known projects in the vicinity of the Project site that could be affected by on-site handling of hazardous materials or that could result in significant hazards or hazardous materials impacts at the Project site.

The transport of hazardous materials from and to the project site during construction and operation has the potential to combine with impacts from transport of hazardous materials from other projects in adjacent cities on the State highway system. However, the transport of hazardous materials is subject to strict regulations, and local and State agencies are trained in emergency

response procedures. Therefore, the temporary transport of existing hazardous materials and the future transport of household hazardous materials to and from the project site do not present a significant cumulative hazard.

For the reasons outlined above, implementation of the proposed Project would not result in a significant cumulative impact related to hazards and hazardous materials.

4.9.8 Level of Significance Prior to Mitigation

Potential impacts related to the routine transport, use, or disposal of hazardous materials and reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment would be potentially significant prior to implementation of mitigation measures. Similarly, potential impacts related to hazardous emissions and the handling of hazardous materials, substances, or waste within 0.25 mi of a proposed school would be significant prior to mitigation implementation. The Project site is not on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5; therefore, no mitigation is required. Construction activities have the potential to affect emergency access by requiring partial lane closures during street improvements and utility installation or by increasing emergency vehicle response times; mitigation is required.

4.9.9 Mitigation Measures

Mitigation Measure 4.9.1: **Demolition Plan**. Prior to or concurrent with demolition permit applications, the Construction Contractor shall provide a Demolition Plan to the City of Lake Forest Director of Community Development or designee for review and approval. The Demolition Plan shall include the procedures for pre-demolition surveys and testing for hazardous building materials such as asbestos, lead-based paint, mercury, and polychlorinated biphenyls, and removal and disposal of hazardous building materials. All inspections, surveys, and analyses shall be performed by appropriately licensed and qualified individuals in accordance with applicable regulations. All identified hazardous materials shall be removed, handled, and properly disposed of by appropriately licensed contractors according to all applicable regulations during demolition of structures. The Construction Contractor shall provide documentation (e.g., all required waste manifests, sampling, and air monitoring analytical results) to the City of Lake Forest Director of Community Development or designee showing that abatement of hazardous building materials has been completed in full compliance with all applicable regulations. The City of Lake Forest Director of Community Development or designee shall document that the Demolition Plan has been approved prior to issuance of demolition permits ~~and that the requirements of the Demolition Plan have been implemented prior to issuance of grading permits~~.

Mitigation Measure 4.9.2 **Construction Contingency Plan.** Prior to or concurrent with grading permit applications, the Construction Contractor shall provide a Construction Contingency Plan to the City of Lake Forest Director of Development Services or designee for review and approval. The Construction Contingency Plan shall include provisions for emergency response in the event that unidentified hazardous materials, petroleum hydrocarbons, or hazardous or solid wastes are discovered during construction activities. The Construction Contingency Plan shall address field screening, contaminant materials testing methods, mitigation and contaminant management requirements, and health and safety requirements for construction workers. The construction contractor shall implement the Construction Contingency Plan during all construction activities. During construction, the construction contractor shall cease work immediately if an unexpected release of hazardous substances is found in reportable quantities. If an unexpected release of hazardous substances is found in reportable quantities, the construction contractor shall notify the National Response Center by calling 1-800-424-8802. The Construction Contractor shall clean up any unexpected releases under appropriate federal, State, and local agency oversight. The City of Lake Forest Director of Community Development or designee shall document that the Construction Contingency Plan has been approved and that the requirements of the Construction Contingency Plan have been implemented prior to the first final building inspection~~issuance of certificate of occupancy~~.

Mitigation Measure 4.9.3 **DTSC Oversight of School Site.** Prior to commencement of precise~~submittal of~~ grading ~~permits~~ for the elementary school portion of the Project site, the Saddleback Valley Unified School District~~Project Applicant~~ shall provide documentation to the California Division of the State Architect~~City of Lake Forest Director of Community Development or designee~~ that the Department of Toxic Substances Control (DTSC) has issued a "No Further Action" letter for the school site. The steps that may be required in order to gain a "No Further Action" letter from DTSC could include: DTSC review of all Phase I and Phase II ESAs for the project site; soil and/or groundwater testing, health risk analysis, Preliminary Endangerment Assessment preparation and approval, site remediation/cleanup, and public review of prepared reports.

4.9.10 Level of Significance after Mitigation

All impacts would be less than significant after implementation of Mitigation Measures 4.9.1 through 4.9.3.

This page intentionally left blank

4.10 HYDROLOGY AND WATER QUALITY

This section evaluates the potential impacts to hydrology and water quality conditions from implementation of the Nakase Nursery/Toll Brothers Project (proposed Project). The analysis in this section is based in part on the *Preliminary/Conceptual Water Quality Management Plan* (Hunsaker & Associates 2019b) (Appendix I), the *Preliminary Hydrology Analysis* (Hunsaker & Associates 2019a) (Appendix I), the *Geotechnical Evaluation of Proposed Residential and School Site Development* (NMG Geotechnical, Inc. 2017) (Appendix F), and the *Preliminary Geotechnical Exploration* (NMG Geotechnical, Inc. 2018) (Appendix F) that were prepared for the proposed Project and are included in this Environmental Impact Report (EIR).

4.10.1 Scoping Process

The City of Lake Forest (City) received 28 comment letters during the public review period of the Initial Study/Notice of Preparation (IS/NOP). For copies of the IS/NOP comment letters, refer to Appendix A of this EIR. Five comment letters included comments related to hydrology and water quality.

The letter from Orange County Public Works (OCPW) (August 13, 2018) expressed concern about whether the project would result in increased development runoff and requested that the EIR identify and recommend mitigation for these impacts. OCPW also noted that all hydrological and hydraulic studies should comply with current guidelines and criteria specified in the *Orange County Hydrology Manual* and the *Orange County Flood Control Design Manual*. They commented that the City should approve the hydrology and hydraulic analyses to confirm that the proposed Project is protected from erosion and flooding in a 100-year storm event. Additionally, OCPW noted that an encroachment permit would be required for any project work within the Orange County Flood Control District (OCFCD) right-of-way.[1] They also suggested that the City ensure that floodplains are identified and structures conform to Federal Emergency Management Agency (FEMA) regulations.

The letter from the Santa Ana Regional Water Quality Control Board (RWQCB) (August 15, 2018) expressed concern related to the National Pollutant Discharge Elimination System (NPDES) permitting and control of residual nitrogen leaving the Project site and suggested Best Management Practices (BMPs) and mitigation to address impacts from stormwater runoff into waters of the United States (i.e., Serrano Creek). They also expressed concern with the adequacy of the proposed underground detention basin and increased peak flows downstream of the Project site. They asked if the basin could destabilize Serrano Creek. The Santa Ana RWQCB also requested clarification of whether the on-site drainage channel would be filled in or replaced with a concrete channel. They suggested maintaining the flow gaging stations at locations where Serrano Creek and the unnamed interior drainage channel exit the Project site, and noted a Water Quality Standards Certification would be required for any impacts to Serrano Creek or the unnamed interior drainage channel.

[1] Please note that although OCPW expressed concern about encroachment into OCFCD right-of-way, the proposed Project would not include improvements within OCFCD right-of-way and no encroachment permit would be required.

The letter from the California Department of Transportation (Caltrans) (August 13, 2018) expressed concern regarding the mitigation of hydrology and water quality impacts, particularly those related to discharges entering Caltrans right-of-way.[1] Additionally, Caltrans recommended coordination with the OCFCD during the encroachment permit process, which would be required if the proposed Project would require any work within State Highway System lands.

The letter from Judy Esposito (August 6, 2018) expressed concern about water quality in waterways receiving runoff from the Project site. The letter from the Autumnwood Homeowners Association (HOA) (August 8, 2018) requested a full analysis of Serrano Creek flooding impacts, including slope stability and erosion. They also noted that CEQA requires a discussion of the Project's consistency with regional flood control and erosion control plans in the EIR.

4.10.2 Existing Environmental Setting

4.10.2.1 Surface Waters

The Project site is located within the San Diego Creek Watershed, which is a subwatershed of the larger 154-square-mile (sq mi) Newport Bay Watershed. The Newport Bay Watershed is defined by the foothills of the Santa Ana Mountains to the east (Loma Ridge), and the San Joaquin Hills to the west and southwest.[2] The San Diego Creek Watershed is approximately 112 sq mi in area and located in parts of Irvine, Aliso Viejo, Laguna Hills, Laguna Woods, Lake Forest, Orange, Santa Ana, and Tustin.

For regulatory purposes, the Santa Ana RWQCB designates watershed areas in Hydrologic Units (HUs), which are further divided into Hydrologic Areas (HAs) and Hydrologic Subareas (HSAs). As designated by the Santa Ana RWQCB, the Project site is located within the Santa Ana River HU, Lower Santa Ana River HA, and East Coast Plain HSA (Santa Ana RWQCB 1995).

The Project site is bound on the southeast by Serrano Creek. Serrano Creek is an approximately 7.5-mile (mi) long tributary of San Diego Creek. Serrano Creek originates in the Santa Ana Mountains in a canyon in Whiting Ranch Wilderness Park, near the boundary of the Cleveland National Forest. From the Santa Ana Mountains, Serrano Creek then flows southwest into the City of Lake Forest, then into San Diego Creek, Newport Bay, and the Pacific Ocean. Serrano Creek carries intermittent flows.

4.10.2.2 On-Site Drainage

In the existing condition, on-site drainage is divided into two drainage areas. Drainage Area "A" consists of the western/northwestern portion of the site (approximately 76.6 acres [ac]). Stormwater runoff within Drainage Area "A" drains southwesterly via sheet flow. Flow then channelizes in an on-site natural and partly paved drainage system that connects to an existing

[1] Please note that although Caltrans expressed concern about stormwater discharge to Caltrans right-of-way, stormwater from the Project site would not drain to Caltrans right-of-way.

[2] United States Environmental Protection Agency (EPA). Newport Bay Watershed. Website: https://19january2017snapshot.epa.gov/www3/region9/water/watershed/measurew/newport-bay/index.html (accessed June 22, 2019).

10.5 x 10.5-foot (ft) reinforced concrete box and the existing storm drain system (OCFCD Facility No. F19-P07), located along the southwest Project site boundary. This existing storm drain system discharges into Serrano Creek approximately 0.6 mi to the southwest of the Project site. Run-on to Drainage "A" consists of runoff from off-site areas to the north of the Project site (approximately 227.9 ac) that discharge into the Project site via an existing 84-inch reinforced concrete pipe (RCP) at Rancho Parkway and Corridor Center. Total tributary area (on site and off site) to the OCFCD Facility No. F19-P07 connection is 304.45 ac.

Drainage Area "B" consists of the eastern/southeastern portion of the Project site (approximately 43.4 ac). Stormwater runoff within Drainage Area "B" drains southeasterly via sheet flow. Flow then channelizes in an on-site natural and partly paved drainage prior to discharging to Serrano Creek via OCFCD Facility No. F19, which is located along the southern corner of the Project site. There is no off-site run-on to Drainage Area "B".

The Project site discharges directly to an Environmentally Sensitive Area (ESA). Serrano Creek is considered an ESA because it is listed as impaired on the 2014/2016 California 303(d) List of Water Quality Limited Segments (303[d] list), as discussed further below.

4.10.2.3 Surface Water Quality

As discussed in greater detail in Section 4.10.4, Methodology, the receiving waters for stormwater runoff from the Project site are impaired on the 303(d) list for several constituents. Serrano Creek is listed as impaired for ammonia, indicator bacteria, pH, benthic community effects, and toxicity. San Diego Creek (Reach 2 – above Jeffrey Road to the headwaters) is listed as impaired for indicator bacteria, nutrients, sedimentation/siltation, and unknown toxicity. San Diego Creek (Reach 1 – below Jeffrey Road) is listed as impaired for fecal coliform, selenium, toxaphene, nutrients, pesticides, sedimentation/siltation, benthic community effects, dichlorodiphenyltrichloroethane (DDT), malathion, and toxicity. Upper Newport Bay is listed as impaired for chlordane, copper, DDT, indicator bacteria, metals, nutrients, polychlorinated biphenyls (PCBs), pesticides, sediment toxicity, sedimentation/siltation, and malathion. Lower Newport Bay is listed as impaired for chlordane, copper, DDT, indicator bacteria, nutrients, PCBs, pesticides, and sediment toxicity.

4.10.2.4 Groundwater

According to the California Department of Water Resources (DWR), the Project site is within the Coastal Plain of the Orange County Groundwater Basin. The Coastal Plain of the Orange County Groundwater Basin is bounded on the north by the Puente Hills and Chino Hills, on the east by the Santa Ana Mountains, on the south by the San Joaquin Hills, on the southwest by the Pacific Ocean, and on the northwest by a low topographic divide at approximately the Orange County-Los Angeles County line (DWR 2004).

For regulatory purposes, the Santa Ana RWQCB divides the Coastal Plain of Orange County Groundwater Basin into three Groundwater Management Zones. The Project site is within the Irvine Groundwater Management Zone (Santa Ana RWQCB 1995). The Irvine Groundwater Management Zone is bounded to the north by the Chino Hills, to the northeast by the Santa Ana Mountains, to

the south by the San Joaquin Hills, to the southwest by the Pacific Ocean, and to the northwest by State Route 55 (SR-55).

Recharge to the Coastal Plain of the Orange County Groundwater Basin occurs from percolation of the Santa Ana River flow, infiltration of precipitation, and injection into wells (DWR 2004). A portion of the flow from the Santa Ana River directly below Prado Dam is diverted to recharge groundwater (Santa Ana RWQCB 2004).

According to the *Geotechnical Evaluation of Proposed Residential and School Site Development* (NMG Geotechnical, Inc. 2017) and the *Preliminary Geotechnical Exploration (*NMG Geotechnical, Inc. 2018) that were prepared for the proposed Project, groundwater is present within the alluvium beneath the Project site. The groundwater encountered during the geotechnical evaluation ranged from 20 to 45 ft below ground surface (bgs). Based on maps published by the State of California, the historic high groundwater levels at the site ranged from 15 to 20 ft bgs. Currently, there is a water well located in the southwest corner of the Project site that provides irrigation water for the nursery operation.

4.10.2.5 Groundwater Quality

Water in the Coastal Plain of the Orange County Groundwater Basin is primarily sodium-calcium bicarbonate based. Total dissolved solids range from 232 to 661 milligrams per liter (mg/L) and average 475 mg/L. Near the coast, groundwater is impaired from seawater intrusion. Groundwater is impaired by salinity, nitrate, and methyl tertiary-butyl ether (MTBE) (DWR 2004).

4.10.2.6 Floodplains

According to FEMA Flood Insurance Rate Map (FIRM) Map No. 06059C0316J (December 3, 2009), a portion of the Project site along the southeast boundary is located within Zone AO of the Serrano Creek 100-year floodplain. Zone AO is defined by FEMA as a Special Flood Hazard Area subject to inundation by the 1 percent annual chance flood (100-year flood) with flood depths between 1 ft and 3 ft. However, a Letter of Map Revision (LOMR) became effective on July 16, 2018, after a 90-day appeal period, and affects the floodplains mapped on the Project site. The proposed LOMR was noticed to the public in the Saddleback Valley News on March 9 and 16, 2018. The LOMR changed the portion of the Serrano Creek adjacent to the Project site to Zone AE (i.e., areas subject to inundation by the 1 percent annual chance flood event determined by detailed methods with base flood elevations shown). The LOMR revised the FIRM to remove a majority of the southeastern boundary of the Project site from the 100-year floodplain. Only the southern corner of the Project site remains mapped within a 100-year floodplain.

4.10.3 Regulatory Setting

4.10.3.1 Federal Regulations

Clean Water Act. In 1972, the Federal Water Pollution Control Act (now referred to as the Clean Water Act [CWA]) was amended to require that the discharge of pollutants into waters of the United States from any point source be effectively prohibited unless the discharge is in compliance with an NPDES permit. In 1987, the CWA was again amended to require that the United States

Environmental Protection Agency (EPA) establish regulations for the permitting of storm water discharges (as a point source) by municipal and industrial facilities and construction activities under the NPDES permit program. The regulations require that Municipal Separate Storm Sewer System (MS4) discharges to surface waters be regulated by an NPDES permit.

The CWA requires states to adopt water quality standards for water bodies and have those standards approved by the EPA. Water quality standards consist of designated beneficial uses for a particular water body (e.g., wildlife habitat, agricultural supply, fishing), along with water quality criteria necessary to support those uses. Water quality criteria are set concentrations or levels of constituents (e.g., lead, suspended sediment, and fecal coliform bacteria) or narrative statements that represent the quality of water that support a particular use. Because California had not established a complete list of acceptable water quality criteria for toxic pollutants, the EPA Region IX established numeric water quality criteria for toxic constituents in the form of the California Toxics Rule (CTR).

When designated beneficial uses of a particular water body are being compromised by water quality, Section 303(d) of the CWA requires identifying and listing that water body as impaired. Once a water body has been deemed impaired, a Total Maximum Daily Load (TMDL) must be developed for each impairing water quality constituent. A TMDL is an estimate of the total load of pollutants from point, nonpoint, and natural sources that a water body may receive without exceeding applicable water quality standards (often with a "factor of safety" included, which limits the total load of pollutants to a level well below that which could cause the standard to be exceeded). Once established, the TMDL is allocated among current and future dischargers into the water body.

Direct discharges of pollutants into waters of the United States are not allowed except in accordance with the NPDES program established in Section 402 of the CWA.

Clean Water Act, Section 303, List of Impaired Water Bodies. The State Water Resources board (SWRCB), in compliance with Section 303(d) of the CWA, prepared a 2014/2016 list of impaired water bodies in California. The SWRCB approved the 2014/2016 California Integrated Report (CWA Section 303(d) List/305(b) Report) on October 3, 2017. On April 6, 2018, the EPA approved the 2014/2016 California 303(d) List of Water Quality Limited Segments (303[d] list) The 303(d) list includes a priority schedule for the development of TMDL implementation for each contaminant impacting the water body.

Serrano Creek is listed on the 303(d) list as impaired for ammonia, indicator bacteria, pH, benthic community effects, and toxicity. San Diego Creek (Reach 2) is listed as impaired for indicator bacteria, nutrients, sedimentation/siltation, and unknown toxicity. San Diego Creek (Reach 1) is listed as impaired for fecal coliform, selenium, toxaphene, nutrients, pesticides, sedimentation/siltation, benthic community effects, DDT, malathion, and toxicity. Upper Newport Bay is listed as impaired for chlordane, copper, DDT, indicator bacteria, metals, nutrients, PCBs, pesticides, sediment toxicity, sedimentation/siltation, and malathion. Lower Newport Bay is listed as impaired for chlordane, copper, DDT, indicator bacteria, nutrients, PCBs, pesticides, and sediment toxicity.

National Flood Insurance Act. Congress acted to reduce the costs of disaster relief by passing the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. The intent of these acts was to reduce the need for large, publicly funded flood control structures and disaster relief efforts by restricting development in floodplains. FEMA administers the National Flood Insurance Program (NFIP) to provide subsidized flood insurance to communities that comply with FEMA regulations limiting development in a floodplain. FEMA issues FIRMs of communities participating in the NFIP. These maps delineate flood hazard zones in the community. The City of Lake Forest manages local storm drain facilities, and the OCFCD is responsible for regional flood control planning within Orange County.

4.10.3.2 State Regulations

Porter-Cologne Water Quality Control Act of 1970. The federal CWA places the primary responsibility for the control of water pollution and planning the development and use of water resources with the states, although it does establish certain guidelines for the states to follow in developing their programs.

California's primary statute governing water quality and water pollution is the Porter-Cologne Water Quality Control Act of 1970 (Porter-Cologne Act). The Porter-Cologne Act grants the SWRCB and the nine RWQCBs broad powers to protect water quality and is the primary vehicle for the implementation of California's responsibility under the federal CWA. The Porter-Cologne Act grants the SWRCB and RWQCBs the authority and responsibility to adopt plans and policies, to regulate discharges to surface water and groundwater, to regulate waste disposal sites, and to require cleanup of discharges of hazardous materials and other pollutants. The Porter-Cologne Act also establishes reporting requirements for unintended discharges of any hazardous substance, sewage, oil, or petroleum product.

Each RWQCB must formulate and adopt a water quality plan for its region. The regional plans are to conform to the policies set forth in the Porter-Cologne Act and established by the SWRCB in its State water policy. The Porter-Cologne Act also provides that an RWQCB may include in its region a regional plan with water discharge prohibitions applicable to particular conditions, areas, or types of waste. The City, including the Project site, is within the jurisdictional boundaries of the Santa Ana RWQCB (Region 8).

California Toxics Rule. As stated previously, because California had not established a complete list of acceptable water quality criteria for toxic pollutants, EPA Region IX established numeric water quality criteria for toxic constituents in the form of the CTR. The CTR provides water quality criteria for certain potentially toxic compounds for inland surface waters, enclosed bays, estuaries, and waters designated for human health or aquatic life uses. The CTR is often used by the RWQCBs when establishing water quality objectives and TMDLs. Although the CTR criteria do not apply directly to discharges of storm water runoff, they are utilized as benchmarks for toxics in urban runoff. The CTR is used as a benchmark to evaluate the potential ecological impacts of storm water runoff to receiving waters. The CTR establishes acute and chronic surface water quality standards for certain water bodies. Acute criteria provide benchmarks for the highest permissible concentration below which aquatic life can be exposed for short periods of time without deleterious effects. Chronic criteria provide benchmarks for an extended period of time (i.e., 4 days or more) without

deleterious effects. The acute CTR criteria have a shorter relevant averaging period (less than 4 days) and provide a more appropriate benchmark for comparison for storm water flows.

CTR criteria apply to the receiving water body and are calculated based on the probable hardness values of the receiving waters. At higher hardness values for receiving waters, certain constituents (including copper, lead, and zinc) are more likely to be complexed (bound with) components in the water column. This in turn reduces the bioavailability and resulting potential toxicity of these metals.

Total Maximum Daily Load Requirements. The following TMDLs apply to San Diego Creek, and Upper and Lower Newport Bay, which are downstream receiving waters for the Project site. There are no approved TMDLs for Serrano Creek.

- **Pesticides:** The EPA issued mass-based TMDLs for legacy pesticides (e.g., chlordane, dieldrin, and DDT), PCBs, and organophosphate pesticides (diazinon and chlorpyrifos) for all water bodies in the Newport Bay Watershed, including San Diego Creek. Legacy pesticides are pesticides that are banned or restricted by the EPA. Because their rate of decomposition is slow, these pesticides frequently remain at elevated levels in the environment for years after their widespread use has ended. The EPA TMDLs did not specify implementation plans and left that responsibility up to the RWQCB. The Santa Ana RWQCB adopted a Water Quality Control Plan (Basin Plan) amendment in April 2003 to incorporate a diazinon and chlorpyrifos TMDL and implementation plan into the Basin Plan. The RWQCB adopted a Basin Plan amendment on September 7, 2007, to incorporate an organochlorine compound TMDL and implementation plan for San Diego Creek and Newport Bay into the Basin Plan (Resolution No. 2012-0051). In 2003, the Santa Ana RWQCB adopted an amendment to the Basin Plan to incorporate a TMDL for diazinon and chlorpyrifos for the San Diego Creek and Upper Newport Bay (Resolution No. R8-2003-0039).

- **Metals:** The EPA established TMDLs for dissolved cadmium, copper, lead, and zinc in Newport Bay on June 14, 2002. The TMDL targets are expressed as concentration limits, based on the CTR criteria at various hardness values associated with different flow regimes. The concentration-based TMDLs apply to all freshwater discharges into Lower Newport Bay, including discharges from agricultural, urban, and residential lands (including flows from stormwater systems).

  The Santa Ana RWQCB is in the process of adopting an amendment to the Basin Plan (Resolution No. R8-2018-0071) to incorporate a TMDL for copper and non-TMDL action plans for zinc, mercury, arsenic, and chromium. The draft amendment was circulated for public review in the Fall of 2018. Public workshops for the TMDL and action plans were held in May 2019.

- **Nutrients:** The Santa Ana RWQCB adopted an amendment to the Basin Plan in 1998 establishing a TMDL for nutrients in the Newport Bay/San Diego Creek Watershed (Resolution No. 98-9, as amended by Resolution No. 98-100).

- The nutrient TMDLs for the Newport Bay/San Diego Creek Watershed establish targets for reducing the annual loading of nitrogen and phosphorus to Newport Bay by 50 percent and meeting the narrative and numeric water quality objectives by 2012.

- For nitrogen, the overall annual target is divided into a summer season allocation and a winter season allocation. Attainment is to be achieved in two stages: a 30 percent and 50 percent reduction in summer loads by 2002 and 2007, respectively, and a 50 percent reduction in winter loads by 2012.

- For phosphorus, the attainment targets require either a 30 percent and 50 percent reduction by 2002 and 2007, respectively, or a reduction of total annual loads of 86,912 pounds (lbs) by 2002 and 62,080 lbs by 2007.

- **Selenium:** The EPA TMDL (2002) load targets for the metal selenium in Lower Newport Bay are established in pounds per year and are based on a water quality criteria of 71 micrograms per liter (µg/L) dissolved selenium. The TMDL load targets include flows from storm drain systems, open space, nurseries, agricultural uses, dewatering, and groundwater pumping operations. In 2017, the Santa Ana RWQCB adopted an amendment to the Basin Plan to incorporate a TMDL for selenium in the Newport Bay Watershed (Resolution No. 218-0041).

- **Sediment:** In 1998, the Santa Ana RWQCB adopted phased sediment TMDL targets for the Newport Bay Watershed (Resolution No. 98-69, as amended by Resolution No. 98-101). An initial TMDL target was to reduce the annual average sediment load from 250,000 to 125,000 tons per year (tpy) and to capture half the remaining sediments in sedimentation basins, limiting the total load to Newport Bay to 62,500 tpy. The base existing load of 250,000 tpy was derived from the local sediment control plan (the 2008 plan). Recognizing the episodic nature of sediment loads, the TMDLs are defined in terms of 10-year running annual averages. As part of the TMDL, monitoring data and information are collected by the Newport Bay Watershed Executive Committee. The Santa Ana RWQCB will use the data collected by this monitoring program to reevaluate the sediment TMDL as part of its planning process.

- **Fecal Coliform:** In 1999, the Santa Ana RWQCB amended the Basin Plan by adopting TMDLs for fecal coliform in Newport Bay (Resolution No. 99-10, amended by Order No. R8-2010-0062). The Santa Ana RWQCB has adopted phased TMDL criteria for fecal coliform bacteria in Newport Bay, with the initial focus on additional monitoring and assessment to address areas of uncertainty. The TMDL load targets include flows from storm drain systems, agricultural uses, natural sources, and vessel waste. The waste load allocation for fecal coliform in Newport Bay in urban runoff, including stormwater, and in agricultural runoff that must be met by December 30, 2013, are as follows: the geometric mean must be less than 200 organisms/100 milliliters (mL), and not more than 10 percent of the samples can exceed 400 organisms/100 mL for any 30-day period. This waste load allocation is already in effect for fecal coliform from natural sources and from vessel waste. The waste load allocation for fecal coliform in Newport Bay in urban runoff (including stormwater), agricultural runoff, and from natural sources that must be met by December 30, 2019, are as follows: the monthly median must be less than 14 most probable number (MPN)/100 mL, and not more than 10 percent of the samples can exceed 43 MPN/

100 mL. This waste load allocation is already in effect for vessel waste. Order R8-2019-0050 set a time schedule for the permittees to comply with the TMDL requirements.

General Construction Activity Storm Water Permit. The *General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities,* Order No. 2009-0009-DWQ, NPDES No. CAS000002, as amended by Order Nos. 2010-0014-DWQ and 2012-0006-DWQ (Construction General Permit), adopted by the SWRCB, regulates construction activity that includes clearing, grading, and excavation resulting in soil disturbance of at least 1 ac of total land area. The Construction General Permit authorizes the discharge of stormwater to surface waters from construction activities.

The Construction General Permit requires that all developers of land where construction activities will occur over more than 1 ac do the following:

- Complete a Risk Assessment to determine pollution prevention requirements pursuant to the three risk levels established in the General Permit;
- Eliminate or reduce non-stormwater discharges to storm sewer systems and other waters of the United States;
- Develop and implement a Stormwater Pollution Prevention Plan (SWPPP) that specifies BMPs that will reduce pollution in stormwater discharges to the Best Available Technology/ Economically Achievable/Best Conventional Pollutant Control Technology standards;
- Perform inspections and maintenance of all BMPs; and
- Conduct stormwater sampling, if required based on risk level.

To obtain coverage under the Construction General Permit, a project applicant must electronically file all permit registration documents with the SWRCB prior to the start of construction. Permit registration documents must include a:

- Notice of Intent (NOI),
- Risk Assessment,
- Site map,
- SWPPP,
- Annual fee, and
- Signed certification statement.

Typical BMPs contained in SWPPPs are designed to minimize erosion during construction, stabilize construction areas, control sediment, and control pollutants from construction materials. The SWPPP must also include a discussion of the program to inspect and maintain all BMPs.

Sustainable Groundwater Management Act. The Sustainable Groundwater Management Act (SGMA) of 2014 is a comprehensive three-bill package that Governor Jerry Brown signed into California state law in September 2014. The SGMA provides a framework for sustainable management of groundwater supplies by local authorities, with a limited role for State intervention if necessary to protect the resource. The plan is intended to ensure a reliable groundwater supply for California for years to come.

The SGMA requires governments and water agencies of high- and medium-priority basins to halt overdrafts of groundwater basins. The SGMA requires the formation of local groundwater sustainability agencies (GSAs) that are required to adopt Groundwater Sustainability Plans to manage the sustainability of the groundwater basins.

4.10.3.3 Regional Regulations

Water Quality Control Plans (Basin Plans). The Santa Ana RWQCB has adopted a Basin Plan for their region of responsibility that delineates water resource area boundaries based on hydrological features. For the purposes of achieving and maintaining water quality protection, specific beneficial uses have been identified for each of the surface waters and groundwater management zones described in the Basin Plan. Once beneficial uses are designated, appropriate water quality objectives can be established, and programs that maintain or enhance water quality can be implemented to ensure the protection of beneficial uses.

Beneficial uses of surface receiving waters for the Project site are shown in Table 4.10.A. As shown in Table 4.10.A, beneficial uses of surface receiving waters for the Project site include: groundwater recharge (GWR); navigation (NAV); water contact recreation (REC1); non-contact water recreation (REC2); commercial and sport fishing (COMM); warm freshwater habitat (WARM); preservation of biological habitats of special significance (BIOL); wildlife habitat (WILD); rare, threatened, or endangered species (RARE); spawning, reproduction and development (SPWN); marine habitat (MAR); shellfish harvesting (SHEL); and estuarine habitat (EST). The surface receiving waters are excepted from the municipal and domestic supply (MUN).

Beneficial uses of the Irvine Groundwater Management Zone include municipal and domestic supply (MUN), agricultural supply (AGR), industrial service supply (IND), industrial process supply (PROC).

Basin Plans also establish implementation programs to achieve water quality objectives to protect beneficial uses and require monitoring to evaluate the effectiveness of the programs. These objectives must comply with the State antidegradation policy (State Board Resolution No. 68-16), which is designed to maintain high-quality waters while allowing some flexibility if beneficial uses are not unreasonably affected.

Table 4.10.A: Beneficial Uses of Surface Receiving Waters

Receiving Water	Beneficial Use													
	MUN	GWR	NAV	REC1	REC2	COMM	WARM	BIOL	WILD	RARE	SPWN	MAR	SHEL	EST
Surface Waters														
Serrano Creek	❖	☐		☐	☐		☐		☐					
San Diego Creek Reach 2 (above Jeffrey Road to headwaters)	❖	☐		☐	☐		☐		☐					
San Diego Creek Reach 1 (below Jeffrey Road)	❖			●[1]	●		●		●					
Upper Newport Bay	❖			●	●	●		●	●	●	●	●	●	●
Lower Newport Bay	❖		●	●	●	●			●	●	●	●	●	

Source: *Water Quality Control Plan, Santa Ana River Basin* (Santa Ana RWQCB 1995, updated 2008 and 2011).

Note: ● = Existing or Potential Beneficial Use
☐ = Intermittent Beneficial Use
❖ = Excepted from MUN

[1] Access prohibited in all or part per agency with jurisdiction.

BIOL = preservation of biological habitats of special significance
COMM = commercial and sport fishing
EST = estuarine habitat
GWR = groundwater recharge
MAR = marine habitat
MUN = municipal and domestic supply
NAV = navigation
RARE = rare, threatened, or endangered species
REC1 = water contact recreation
REC2 = non-contact water recreation
RWQCB = Regional Water Quality Control Board
SHEL = shellfish harvesting
SPWN = spawning, reproduction and development
WARM = warm freshwater habitat
WILD = wildlife habitat

Basin Plans have established narrative and numeric water quality objectives for inland surface streams and groundwater. If water quality objectives are exceeded, the RWQCBs can use their regulatory authority to require municipalities to reduce pollutant loads to the affected receiving waters. Relevant surface water quality objectives for all inland surface waters, bays and estuaries, and groundwater under the jurisdiction of the Santa Ana RWQCB that are applicable to the receiving waters for the Project site are shown in Tables 4.10.B, 4.10.C, and 4.10.D, respectively.

In addition to the water quality objectives applicable to all surface waters, bays and estuaries, and groundwater, the Santa Ana RWQCB has designated site-specific water quality objectives for waters. The site-specific water quality objectives for San Diego Creek Reach 2 (above Jeffrey Road to the headwaters) are:

- **Total Dissolved Solids:** 720 mg/L
- **Total Inorganic Nitrogen:** 5 mg/L

The site-specific water quality objectives for San Diego Creek Reach 1 (below Jeffrey Road) are:

- **Total Dissolved Solids:** 1,500 mg/L
- **Total Inorganic Nitrogen:** 13 mg/L
- **Chemical Oxygen Demand:** 90 mg/L

Table 4.10.B: Surface Water Quality Objectives for Inland Surface Waters

Constituent	Concentration
Algae	Waste discharges shall not contribute to excessive algal growth in inland surface receiving waters.
Ammonia, Un-ionized	Waters with WARM Beneficial Use Designation: Varies based on pH and temperature.
Boron	Shall not exceed 0.75 mg/L in inland surface waters of the region as a result of controllable water quality factors.
Chlorine (residual)	Chlorine residual in wastewater discharged to inland surface waters shall not exceed 0.1 mg/L.
Color	Waste discharges shall not result in coloration of the receiving waters that causes a nuisance or adversely affects beneficial uses. The natural color of fish, shellfish or other surface water resources used for human consumption shall not be impaired.
Floatables	Waste discharges shall not contain floating materials, including solids, liquids, foam, or scum, that cause a nuisance or adversely affect beneficial uses.
Metals	Varies based on hardness.
Oil and Grease	Waste discharges shall not result in deposition of oil, grease, wax, or other materials in concentrations that result in a visible film or in coating objects in the water or which cause a nuisance or adversely affect beneficial uses.
Oxygen (dissolved)	Waters with WARM Beneficial Use Designation: Shall not be depressed below 5 mg/L as a result of controllable water quality factors.
	Waste discharges shall not cause the median dissolved oxygen concentration to fall below 85% of saturation or the 95th percentile concentration or fall below 75% of saturation within a 30-day period.
Pathogen Indicator Bacteria	Waters with REC1 and REC2 beneficial use designations: waste discharges shall not cause or contribute to excessive risk of illness from microorganisms pathogenic to human beings. Pathogen indicator concentrations shall not exceed a geometric mean of at least 5 samples in a 30-day period of 126 E. coli organism per 100 mL as a result of controllable water quality factors unless it is demonstrated to the Regional Board's satisfaction that the elevated indicator concentrations do not result in excessive risk of illness among people recreating in or near the water.
pH	Shall not be raised above 8.5 or depressed below 6.5 as a result of controllable water quality factors.
Solids (suspended and settleable)	Shall not cause nuisance or adversely affect beneficial uses as a result of water quality factors.
Sulfides	Shall not increase as a result of controllable water quality factors.
Surfactants	Waste discharges shall not contain concentrations of surfactants that result in foam in the course of flow or use of the receiving water or that adversely affect aquatic life.
Taste and Odor	Shall not contain taste- or odor-producing substances at concentrations that cause a nuisance or adversely affect beneficial uses. The natural taste and odor of fish, shellfish or other regional inland surface water resources used for human consumption shall not be impaired.
Temperature	Waters with WARM beneficial use designation: shall not be raised above 90°F June through October or above 78°F during the rest of the year as a result of controllable water quality factors.
Toxic Substances	Shall not be discharged at levels that will bioaccumulate in aquatic resources to levels that are harmful to human health. Concentrations of toxic pollutants in the water column, sediments, or biota shall not adversely affect beneficial uses.
Turbidity	Where natural turbidity is between 0 and 50 NTU, increases shall not exceed 20%. Where natural turbidity is between 50 NTU and 100 NTU, increases shall not exceed 10 NTU. Where natural turbidity is greater than 100 NTU, increases shall not exceed 10%.

Source: *Water Quality Control Plan, Santa Ana River Basin* (Santa Ana RWQCB 1995, updated February 2016).
°F = degrees Fahrenheit
mg/L = milligrams per liter
mL = milliliter
NTU = nephelometric turbidity units
pH = percentage of hydrogen
REC1 = water contact recreation
REC2 = non-contact water recreation
RWQCB = Regional Water Quality Control Board
WARM = warm freshwater habitat

Table 4.10.C: Surface Water Quality Objectives for Bays and Estuaries

Constituent	Concentration
Algae	Waste discharges shall not contribute to excessive algal growth.
Ammonia, Un-ionized	Waters with WARM beneficial use designation: varies based on pH and temperature.
Chlorine (residual)	Chlorine residual in wastewater discharged to enclosed bays and estuaries shall not exceed 0.1 mg/L.
Color	Waste discharges shall not result in coloration of the receiving waters that causes a nuisance or adversely affects beneficial uses. The natural color of fish, shellfish or other bay and estuarine water resources used for human consumption shall not be impaired.
Floatables	Waste discharges shall not contain floating materials, including solids, liquids, foam, or scum, that cause a nuisance or adversely affect beneficial uses.
Oil and Grease	Waste discharges shall not result in deposition of oil, grease, wax, or other materials in concentrations that result in a visible film or in coating objects in the water or which cause a nuisance or adversely affect beneficial uses.
Oxygen (dissolved)	Shall not be depressed to levels that adversely affect beneficial uses as a result of controllable water quality factors.
Pathogen Indicator Bacteria	Waters with REC1 Beneficial Use: Fecal coliform log mean less than 200 organisms/100 mL based on five or more samples/30-day period, and not more than 10% of the samples exceed 400 organisms/100 mL for any 30-day period. Water with SHEL Beneficial Use: Fecal coliform median concentration not more than 14 MPN/100 mL and not more than 10% of samples exceed 43 MPN/100 mL.
pH	Shall not be raised above 8.6 or depressed below 7.0 as a result of controllable water quality factors; ambient pH levels shall not be changed more than 0.2 units.
Radioactivity	Shall not be present in concentrations which are deleterious to human, plant, or animal life.
Solids (suspended and settleable)	Shall not cause nuisance or adversely affect beneficial uses as a result of water quality factors.
Sulfides	Shall not increase as a result of controllable water quality factors.
Surfactants	Waste discharges shall not contain concentrations of surfactants that result in foam in the course of flow or use of the receiving water or that adversely affect aquatic life.
Taste and Odor	Shall not contain taste- or odor-producing substances at concentrations that cause a nuisance or adversely affect beneficial uses. The natural taste and odor of fish, shellfish, or other enclosed bay and estuarine resources used for human consumption shall not be impaired.
Temperature	Shall meet the objective specified in the SWRCB's Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (Thermal Plan).
Toxic Substances	Shall not be discharged at levels that will bioaccumulate in aquatic resources to levels that are harmful to human health. Concentrations of toxic pollutants in the water column, sediments, or biota shall not adversely affect beneficial uses.
Turbidity	Where natural turbidity is between 0 and 50 NTU, increases shall not exceed 20%. Where natural turbidity is between 50 and 100 NTU, increases shall not exceed 10 NTU. Where natural turbidity is greater than 100 NTU, increases shall not exceed 10%.

Source: *Water Quality Control Plan, Santa Ana River Basin* (Santa Ana RWQCB 1995; updated February 2016).
mg/L = milligrams per liter
mL = milliliter
MPN = most probable number
NTU = nephelometric turbidity units
pH = percentage of hydrogen
REC1 = water contact recreation
RWQCB = Regional Water Quality Control Board
SHEL = shellfish harvesting
WARM = Warm Freshwater Habitat

Table 4.10.D: Groundwater Quality Objectives for Groundwater Basins

Constituent	Concentration
Arsenic	Waters with MUN Beneficial Use Designation: Shall not exceed 0.05 mg/L as a result of controllable water quality factors.
Bacteria, Coliform	Waters with MUN Beneficial Use Designation: Total coliform numbers shall not exceed 2.2 organisms/100 mL median over any 7-day period as a result of controllable water quality factors.
Barium	Waters with MUN Beneficial Use Designation: Shall not exceed 1.0 mg/L as a result of controllable water quality factors.
Boron	Shall not exceed 0.75 mg/L as a result of controllable water quality factors.
Chloride	Waters with MUN Beneficial Use Designation: Shall not exceed 500 mg/L as a result of controllable factors.
Color	Waste discharges shall not result in coloration of the receiving waters that causes a nuisance or adversely affects beneficial uses.
Cyanide	Waters with MUN Beneficial Use Designation: Shall not exceed 0.2 mg/L as a result of controllable water quality factors.
Fluoride	Waters with MUN Beneficial Use Designation: Shall not exceed 1.0 mg/L as a result of controllable water quality factors.
Hardness	Waters with MUN Beneficial Use Designation: Shall not be increased as a result of waste discharges to levels that adversely affect beneficial uses.
Metals	Waters with MUN Beneficial Use Designation: Shall not exceed the following: Cadmium 0.01 mg/L; Chromium 0.05 mg/L; Cobalt 0.2 mg/L; Copper 1.0 mg/L; Iron 0.3 mg/L; Lead 0.05 mg/L; Manganese 0.05 mg/L; Mercury 0.002 mg/L; Selenium 0.01 mg/L; and Silver 0.05 mg/L, as a result of controllable water quality factors.
Methylene Blue-Activated Substances	Waters with MUN Beneficial Use Designation: Shall not exceed 0.05 mg/L as a result of controllable water quality factors.
Oil and Grease	Waste discharges shall not result in deposition of oil, grease, wax, or other materials in concentrations that cause a nuisance or adversely affect beneficial uses.
pH	Shall not be raised above 9 or depressed below 6 as a result of controllable water quality factors.
Radioactivity	Waters with MUN Beneficial Use Designation: Shall not exceed the California Code of Regulations, Title 22, standards of 5 pCi/L for combined radium-226 and radium-228, 15 pCi/L for gross alpha particle activity, 20,000 pCi/L for tritium, 8 pCi/L for strontium-90, 50 pCi/L for gross beta particle activity, and 20 pCi/L for uranium.
Sodium	Waters with AGR Beneficial Use Designation: Shall not exceed a sodium absorption rate of 9.
	Waters with MUN Beneficial Use Designation: Shall not exceed 180 mg/L as a result of controllable water quality factors.
Sulfate	Waters with MUN Beneficial Use Designation: Shall not exceed 500 mg/L as a result of controllable water quality factors.
Taste and Odor	Shall not contain taste- or odor-producing substances in concentrations that adversely affect beneficial uses.
Toxic Substances	All waters shall be maintained free of substances in concentrations that are toxic or that produce detrimental physiological responses in human, plant, animal, or aquatic life.

Source: *Water Quality Control Plan, Santa Ana River Basin* (Santa Ana RWQCB 1995, last updated February 2016).
AGR = agricultural supply
MUN = municipal supply
mg/L = milligrams per liter
mL = milliliter
pCi/L = picocuries per liter
pH = percentage of hydrogen

There are no site-specific water quality objectives for Serrano Creek, Upper Newport Bay, or Lower Newport Bay.

The site-specific water quality objectives for the Irvine Groundwater Management Zone are:

- T**otal Dissolved Solids:** 910 mg/L
- **Nitrate as Nitrogen:** 3.4 mg/L

Orange County National Pollutant Discharge Elimination System Permit. The City is a Permittee of the *Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and the Incorporated Cities of Orange County within the Santa Ana Region Areawide Urban Storm Water Runoff Orange County* (North Orange County MS4 Permit), Order R8-2009-0030, NPDES No. CAS618030, as amended by Order No. R8-2010-0062. The North Orange County MS4 Permit regulates discharges into the MS4 system in the cities and county areas within Orange County that are in the Santa Ana Region. As discussed further below, the North Orange County MS4 Permit requires preparation of a Water Quality Management Plan (WQMP) and implementation of post-construction BMPs for new development and significant redevelopment projects that qualify as Priority Projects.

The proposed Project is considered a Priority Project under the following categories specified in the North Orange County MS4 Permit:

- **Priority Project, Category 1:** New development projects that create 10,000 square feet (sf) or more of impervious surface. This category includes commercial, industrial, residential housing subdivisions, mixed-use, and public projects on private or public property that fall under the planning and building authority or the Permittees.

- **Priority Project, Category 5:** Impervious surface of 2,500 sf or more located within, directly adjacent to (within 200 ft), or discharging directly into receiving waters within ESAs.

- **Priority Project, Category 7:** Streets, roads, highways, and freeways. This category includes any paved surface that is 5,000 sf or greater and used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

Drainage Area Management Program. The Drainage Area Management Plan (DAMP) was created by the County of Orange, the OCFCD, and incorporated cities (permittees), and includes specific water pollutant requirements of the North Orange County Stormwater Program. The DAMP is the principal guidance and compliance document for the county-wide implementation of the Stormwater Program. It is the foundation for the permittees to implement model programs designed to prevent pollutants from entering receiving waters to the maximum extent practicable. Section 7 of the DAMP discusses issues relating to new developments and significant redevelopments.

Local Implementation Plan. The City Local Implementation Plan (LIP) is the principal guidance and compliance document specific to the City's jurisdiction for compliance with the requirements of the

North Orange County MS4 Permit. The LIP provides the description and details of the City's water quality program implementation activities. The LIP is designed to work in conjunction with the Orange County DAMP. It should be noted that the Lake Forest LIP takes precedence over DAMP requirements.

Model Water Quality Management Plan. The *Model Water Quality Management Plan* (County of Orange 2011) was developed to aid Orange County, the OCFCD, the cities in Orange County (permittees), and developers in Orange County to address post-construction urban runoff and stormwater pollution from new development and significant redevelopment projects that qualify as Priority Projects. The proposed Project is categorized as street, road, highway, and freeway of 5,000 sf or more of paved surface and, thus, is considered a Priority Project.

Priority Projects are required to develop a Project WQMP to minimize adverse impacts of development to on-site hydrology, volume and rate of runoff, and pollutants of concern. Project WQMPs include project-specific BMPs to minimize these effects (e.g., Low Impact Development [LID], site design measures, source control BMPs). The requirements identified in the Project WQMPs are subject to Section 7 of the DAMP.

According to the North Orange County MS4 Permit, all street and road construction of 10,000 sf or more of paved surface or street, road, highway, and freeway of 5,000 sf or more of paved surface must also comply with the EPA guidance *Managing Wet Weather with Green Infrastructure Municipal Handbook: Green Streets* (December 2008 EPA-833-F-08-009) to the maximum extent practicable.

Technical Guidance Document. The County of Orange developed the Technical Guidance Document for the Preparation of Conceptual/Preliminary and/or Project Water Quality Management Plans (WQMPs) (TGD) (County of Orange 2013) in cooperation with the incorporated cities of Orange County to aid agency staff and project proponents with addressing post-construction urban runoff and stormwater pollution from new development and significant redevelopment projects in Orange County. The TGD serves as a technical guidance to complete the Project WQMP.

Orange County Construction Runoff Guidance Manual. The *Construction Runoff Guidance Manual for Contractors, Project Owners, and Developers* (County of Orange 2012a) presents the requirements related to construction from the DAMP. The goal of this Guidance Manual is to control pollutant discharges from construction sites. As such, it helps applicants with building and grading permits to understand the water quality requirements during the construction phase of development projects.

Groundwater Dewatering Permit. The Santa Ana RWQCB requires a permit for discharging wastes to surface waters from activities involving groundwater extraction. There are two Orders that apply to groundwater discharges to surface waters in the Newport Bay/San Diego Creek Watershed. The *General Waste Discharge Requirements for Discharges to Surface Waters that Pose an Insignificant (De Minimus) Threat to Water Quality (*Order No. R8-2009-0003, NPDES No. CAG998001) covers general waste discharge requirements for discharges to surface waters that pose an insignificant (de minimus) threat to water quality within the Santa Ana Region. This Order is applicable if it can be

demonstrated that the groundwater being discharged to surface waters does not contain pollutants of concern (selenium and nitrates) in the discharge. However, if groundwater is found to contain petroleum hydrocarbons, solvents, metals and/or salts, the project would be subject to the *General Discharge Permit for Discharges to Surface Waters of Groundwater Resulting from Groundwater Dewatering Operations and/or Groundwater Cleanup Activities at Sites Within the San Diego Creek/Newport Bay Watershed Polluted by Petroleum Hydrocarbons, Solvents, Metals and/or Salts* (Order No. R8-2007-0041, NPDES No. CAG918002, as amended by ~~R8-2007-0041~~ R8-2009-0045).[1] This Order covers general discharge permits for discharges to surface waters of groundwater resulting from groundwater dewatering operations and/or groundwater cleanup activities at sites within the San Diego Creek/Newport Bay Watershed polluted by petroleum hydrocarbons, solvents, metals and/or salts, or nutrients, selenium, and other pollutants of TMDL concern. Under both Orders, permittees are required to monitor their discharges of groundwater extraction waste from construction to ensure that effluent limitations for constituents are not exceeded.

4.10.3.4 Local Regulations

City of Lake Forest General Plan. The Recreation and Resources Element of the City of Lake Forest General Plan includes a water quality plan that specifies that all new development projects and substantial rehabilitation projects will be required to incorporate BMPs as identified in the County DAMP and City LIP.

The Safety and Noise Element of the City of Lake Forest General Plan includes mapping of flood-prone areas. This Element also specifies that the City will control development in the floodway and floodway fringe. Development in the flood-prone areas are subject to requirements specified by the City.

City of Lake Forest Municipal Code Chapter 8.30. Chapter 8.30 of the City's Municipal Code regulates grading and excavation activities.

- **Section 8.30.150** specifies that grading activities be undertaken in compliance with NPDES and City requirements. Each grading project shall implement BMPs to ensure that discharges of pollutants are effectively prohibited and will not cause or contribute to an exceedance of water quality standards. Section 8.30.150 also specifies that, prior to the issuance by the City of a grading permit, the Department of Public Works and/or Development Services Department shall review the project plans.

- **Section 8.30.152** specifies that projects with a grading permit shall submit an erosion control plan to the Director of the City of Lake Forest Public Works Department, or designee, for approval by September 15th of each year.

- **Section 8.30.154** specifies required maintenance of erosion control and sediment control BMPs after rainstorms for projects with a grading permit.

[1] Order No R8-2007-0041 is anticipated to be replaced in December 2019 by Order No. R8-2019-0061, which is currently under review by the United States Environmental Protection Agency.

City of Lake Forest Municipal Code Chapter 15.14. Chapter 15.14 of the City's Municipal Code regulates stormwater quality and prohibits discharges of pollutants into surface waters unless the discharge is authorized by an NPDES permit.

- **Section 15.14.040** requires that all new development and redevelopment projects comply with the requirements of the North Orange County MS4 Permit. Section 15.14.040 specifies that, prior to the issuance of a grading permit or building permit, the Department of Public Works and/or Development Services Department shall review the project plans.

- **Section 15.14.050** requires preparation of an erosion and sediment control plan as a condition of approval for issuance of a construction or grading permit. Section 15.14.050 also requires implementation of construction BMPs to ensure that the discharge of pollutants from the site will be effectively prohibited and will not cause or contribute to an exceedance of water quality standards. Section 15.14.050 specified that construction and grading activities be undertaken in compliance with NPDES and City requirements.

- **Section 15.14.060** requires implementation of operational BMPs on all sites that have the potential to discharge a pollutant to the City's MS4.

4.10.4 Methodology

Project impacts to hydrology and water quality are evaluated based on the proposed Project's adherence to local, regional, State, and federal standards; the proposed land uses and project design; changes in pre- and post-project stormwater flows; and proposed BMPs for control of surface runoff and reduction of pollutants in stormwater runoff.

4.10.5 Thresholds of Significance

The thresholds for hydrology and water quality impacts used in this analysis are consistent with Appendix G of the *State CEQA Guidelines* and the *City of Lake Forest CEQA Significance Thresholds Guide* (2009). The proposed Project may be deemed to have a significant impact with respect to hydrology and water quality if it would:

Threshold 4.10.1: Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality.

Threshold 4.10.2: Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin.

Threshold 4.10.3: Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:

i. Result in substantial erosion or siltation on- or off-site;

ii. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;

iii. Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff; or

iv. Impede or redirect flood flows.

Threshold 4.10.4: In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation.

Threshold 4.10.5: Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

Threshold 4.10.6: Deposit sediment and debris materials within existing channels obstructing flows.

Threshold 4.10.7: Exceed the capacity of a channel and cause overflow during design storm conditions.

Threshold 4.10.8: Adversely change the rate, direction or flow of groundwater.

Threshold 4.10.9: Cause a significant alteration of receiving water quality during or following construction.

Threshold 4.10.10: Substantially degrade water quality by discharge which affects the beneficial uses (i.e., swimming, fishing, etc.) of the receiving or downstream waters

Threshold 4.10.11: Increase in any pollutant for which the receiving water body is already impaired as listed on the Clean Water Act Section 303(d) list

The IS/NOP, included as Appendix A, substantiates that there would be no impacts associated with inundation from tsunami or seiche. In addition, the IS/NOP substantiates that impacts associated with inundation from flooding or impeding or redirecting flood flows would be less than significant. Therefore Thresholds 4.10.3(iv) and 4.10.4 will not be addressed in the following analysis.

4.10.6 Project Impacts

Threshold 4.10.1: Would the project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?

AND

Threshold 4.10.9: Would the project cause a significant alteration of receiving water quality during or following construction?

Less than Significant Impact.

Construction. The proposed Project consists of the development of the 122 ac Project site as a master planned community with single-family residential, affordable housing units for senior citizens, an elementary school, parks and open space, and an internal circulation system. Pollutants of concern during construction include sediments, trash, petroleum products, concrete waste (dry and wet), sanitary waste, and chemicals. Each of these pollutants on its own or in combination with other pollutants can have a detrimental effect on water quality. During construction, approximately 120 ac of soil would be disturbed (Serrano Creek accounts for 2 ac of the 122 ac site and would not be disturbed). During soil-disturbing construction activities, excavated soil would be exposed, and there would be an increased potential for soil erosion and sedimentation compared to existing conditions. In addition, chemicals, liquid products, petroleum products (e.g., paints, solvents, and fuels), and concrete-related waste may be spilled or leaked and have the potential to be transported via stormwater runoff into receiving waters (primarily Serrano Creek, which is the closest receiving water downstream of the Project site). Sediment from increased soil erosion and chemicals from spills and leaks have the potential to be discharged to downstream receiving waters during storm events, which can affect water quality and impair beneficial uses.

Because construction of the proposed Project would disturb greater than 1 ac of soil, the proposed Project is subject to the requirements of the Construction General Permit, as specified in Regulatory Compliance Measure (RCM) WQ-1. As also specified in RCM WQ-1, a SWPPP would be prepared and construction BMPs detailed in the SWPPP would be implemented during construction, in compliance with the requirements of the Construction General Permit. In addition, as specified in RCM WQ-2, an Erosion and Sediment Control Plan would be prepared and submitted to the City's Public Works Department prior to issuance of a grading or building permit in compliance with the City Municipal Code. An Erosion and Sediment Control Plan would also be prepared annually during construction and submitted to the City's Public Works Department for approval prior to September 15 of each year. The SWPPP and Erosion and Sediment Control Plans would detail the BMPs to be implemented during construction. Construction BMPs would include, but not be limited to, Erosion Control and Sediment Control BMPs designed to minimize erosion and retain sediment on site, and Good Housekeeping BMPs to prevent spills, leaks, and discharge of construction debris and waste into receiving waters. Compliance with the requirements of the Construction General Permit and City Municipal Code, including incorporation of construction BMPs to target and reduce pollutants of concern in stormwater runoff, would ensure that construction impacts related to Waste Discharge Requirements (WDRs), water quality standards, degradation of water quality, and alteration of receiving water quality would be less than significant.

According to the *Geotechnical Evaluation of Proposed Residential and School Site Development* (NMG Geotechnical 2017) and the *Preliminary Geotechnical Exploration* (NMG Geotechnical, Inc. 2018) that were prepared for the proposed Project, groundwater is present within the alluvium beneath the Project site. The groundwater encountered during the geotechnical evaluation ranged from 20 to 45 ft bgs. Based on maps published by the State of California, the historic high groundwater levels at the site ranged from 15 to 20 ft bgs. Because groundwater levels fluctuate

seasonally, excavation for installation of some project features during certain times of the year (e.g., underground utilities, storm drains, and detention vaults) have a potential to encounter groundwater. In the event that excavation extends to depths where groundwater is present, groundwater dewatering would be required. Groundwater may contain high levels of total dissolved solids, nitrate, sediment, selenium, or other constituents, or high or low pH levels that could be introduced to surface waters when dewatered groundwater is discharged to surface waters. Depending on the water quality of the discharge, groundwater dewatering activities during excavation would be conducted in accordance with the either the *General Waste Discharge Requirements for Discharges to Surface Waters that Pose an Insignificant (De Minimus) Threat to Water Quality (*Order No. R8-2009-0003, NPDES No. CAG998001) or the *General Discharge Permit for Discharges to Surface Waters of Groundwater Resulting from Groundwater Dewatering Operations and/or Groundwater Cleanup Activities at Sites Within the San Diego Creek/Newport Bay Watershed Polluted by Petroleum Hydrocarbons, Solvents, Metals and/or Salts* (Order No. R8-2007-0041, NPDES No. CAG918002, as amended by ~~R8-2007-0041~~ R8-2009-0045) as specified in RCM WQ-5. Both permits would require testing and treatment (as necessary) of groundwater encountered during groundwater dewatering prior to release to surface waters. As a result, groundwater dewatering would not introduce pollutants to receiving waters at levels that would violate water quality standards or WDRs, degrade water quality, or alter the quality of the receiving water. Impacts to surface water quality from groundwater dewatering would be less than significant.

Although groundwater dewatering may be required, dewatered groundwater would be discharged to the storm drain system, which discharges to Serrano Creek, rather than back into groundwater and therefore would not introduce pollutants to groundwater. Infiltration of stormwater has the potential to affect groundwater quality in areas of shallow groundwater. However, according to the *Preliminary/Conceptual Water Quality Management Plan* (Hunsaker & Associates 2019b) prepared for the proposed Project, the majority of on-site soils are not favorable for infiltration. The northern central portion of the Project site, near the proposed school site, is the only location with potentially favorable soils for infiltration. Because the majority of the soils on the Project site are not favorable for infiltration, any infiltration during construction would be minimal. Additionally, as discussed above, groundwater could occur at depths from 15 to 20 ft bgs. Pollutants in stormwater are generally removed by soil through absorption as water infiltrates. In areas of deep groundwater, there is more absorption potential and, as a result, less potential for pollutants to reach groundwater. As such, due to the depth to groundwater, it is not expected that any stormwater that may infiltrate during construction would affect groundwater quality because there is not a direct path for pollutants to reach groundwater. Therefore, project construction activities would not substantially degrade groundwater quality.

In conclusion, construction of the proposed Project would comply with existing NPDES regulations (as specified in RCM WQ-1, RCM WQ-2, and RCM WQ-5), which include preparation of a SWPPP and Erosion and Sediment Control Plans and implementation of Construction BMPs to target and reduce pollutants of concern in stormwater runoff, and testing and treatment (if required) of any groundwater prior to discharge to surface waters. Compliance with regulatory requirements would ensure that impacts related to violation of any water quality standards or

waste discharge requirements, degradation of surface or ground water quality, and alteration of receiving water quality during construction would be less than significant, and no mitigation is required.

Operation. Expected pollutants of concern from long-term operation of the proposed Project include suspended solids/sediment, nutrients, heavy metals, pathogens (bacteria/virus), pesticides, oil and grease, toxic organic compounds, and trash and debris. According to the *Preliminary/Conceptual Water Quality Management Plan* (Hunsaker & Associates 2019b), potential sources of these pollutants include the following:

- **Suspended Solids/Sediment:** Disturbed or unstabilized landscaping areas and disturbed earth surfaces
- **Nutrients:** Fertilizers, sediment, and trash/debris.
- **Heavy Metals and Toxic Organic Compounds:** Automobiles and uncovered parking areas
- **Pathogens (Bacteria/Virus):** Food wastes, pet wastes, sediment and landscaping areas
- **Pesticides:** Landscaping and open space areas
- **Oil and Grease:** Streets and parked vehicles
- **Trash and Debris:** Landscaping activities, food wrappers and food wastes

The project would be required to comply with the requirements of the North Orange County MS4 Permit and associated guidance documents. The North Orange County MS4 Permit requires that a WQMP be prepared for priority new development and redevelopment projects. WQMPs specify the Site Design, Source Control, LID, and Treatment Control BMPs that would be implemented to capture, treat, and reduce pollutants of concern in stormwater runoff. Site Design BMPs are stormwater management strategies that emphasize conservation and use of existing site features to reduce the amount of runoff and pollutant loading generated from a project site. Source Control BMPs are preventative measures that are implemented to prevent the introduction of pollutants into stormwater. LID BMPs mimic a project site's natural hydrology by using design measures that capture, filter, store, evaporate, detain, and infiltrate runoff rather than allowing runoff to flow directly to piped or impervious storm drains. Treatment Control BMPs are structural BMPs designed to treat and reduce pollutants in stormwater runoff prior to releasing it to receiving waters. The proposed BMPs would improve water quality compared to the existing nursery, which is currently untreated.

A *Preliminary/Conceptual Water Quality Management Plan* (Hunsaker & Associates 2019b) prepared for the project specifies the Source Control, Site Design, and LID BMPs proposed for the Project (no Treatment Control BMPs are proposed). The *Preliminary/Conceptual Water Quality Management Plan* will be refined during final design based on the final site plans, as specified in RCM WQ-3. The proposed Project BMPs are detailed below.

Proposed Site Design BMPs include minimize impervious area; maximize natural infiltration capacity; preserve existing drainage patterns and time of concentration; disconnect impervious

areas; protect existing vegetation and sensitive areas, and revegetate disturbed areas; and revegetate disturbed areas and xeriscape landscaping.

Proposed Non-Structural Source Control BMPs include education for property owners, tenants and occupants; activity restrictions; common area landscape management; BMP maintenance; common area litter control; employee training; housekeeping of loading docks; common area catch basin inspections; and street sweeping public streets and parking lots.

Proposed Structural Source Control BMPs include storm drain system stenciling and signage; trash and waste storage areas; use of efficient irrigation systems and landscape design, water conservation, smart controllers, and source control; energy dissipation and protection of slopes and channels; dock areas; and wash water control for food preparation areas.

Please refer to the *Preliminary/Conceptual Water Quality Management Plan* included in Appendix I for additional details of the proposed Site Design BMPs, Non-Structural Source Control BMPs, and Structural Source Control BMPs.

The proposed LID BMPs include several categories of BMPs: Hydrologic Source Controls, Infiltration BMPs, Biotreatment BMPs, and Hydromodification BMPs. The proposed Hydrologic Source Controls include impervious surface area dispersion (e.g., rooftop disconnections) and street trees (canopy interception). In addition, trees would be planted along the parkways and within common lot areas.

Proposed Infiltration BMPs and Biotreatment BMPs include bioretention without underdrains and subsurface infiltration galleries. Specifically, the proposed Project would include a subsurface detention vault below Central Park, underground detention vaults in combination with proprietary biotreatment BMPs at each of the five neighborhood parks, a bioretention facility along Serrano Creek, and a linear bioretention facility along “A” Street. Because the northern portion of the Project site is the only area with potentially favorable soils for infiltration, the detention facility at the neighborhood park near the proposed school may be changed to an infiltration BMP during final design if the soils at this location are determined to be favorable for infiltration. The detention vault below Central Park is also classified as a Hydromodification BMP, which would meet the North Orange County MS4 Permit requirements for hydromodification. Because the underground detention vaults would be sized to meet the North Orange County MS4 Permit hydromodification requirements (i.e., stormwater discharge from the Project site would not exceed pre-development runoff rates or time of concentration by more than 5 percent), hydromodification impacts in Serrano Creek (e.g., erosion, sedimentation, channel instability) would not occur. Refer to Figure 4.10.1 for the proposed locations of the BMPs.

This page intentionally left blank

LEGEND

- PROJECT LIMITS
- NAP — NOT A PART
- DRAINAGE MANAGEMENT AREA (DMA) LIMITS
- DMA / ACRE — DMA DESIGNATION AND ACREAGE
- GENERAL FLOW DIRECTION (ONSITE)
- GENERAL FLOW DIRECTION (OFFSITE)
- PROJECT STORM DRAIN SYSTEM
- LOW FLOW DRAINAGE SYSTEM
- EXISTING/OFFSITE STORM DRAIN SYSTEM
- UNDERGROUND BIORETENTION FACILITY WITH UNDERDRAINS
- BIORETENTION FACILITY WITH UNDERDRAINS (BIO-1)
- PARKWAY LINEAR BIORETENTION FACILITY WITH UNDERDRAINS (BIO-1)
- PARK AREA UNDERGROUND BIORETENTION FACILITY WITH UNDERDRAINS AND PROPRIETARY BIOTREATMENT (BIO-7)
- PARK AREA
- PROJECT PHASE AREA (ALL INTERNAL STREETS PRIVATE)
- DISCHARGE POINT
- DIVERSION STRUCTURE
- UNDERGROUND DETENTION

LSA

FIGURE 4.10.1

N

0 200 400
FEET

SOURCE: Hunsaker & Associates

I:\CLF1801\G\Stormwater BMPs.cdr (6/26/2019)

Nakase Nursery/Toll Brothers
Proposed Stormwater Best Management Practices (BMPs)

This page intentionally left blank

The proposed BMPs would target and reduce pollutants of concern from runoff from the Project site in compliance with the North Orange County MS4 Permit requirements. Compliance with the requirements of the North Orange County MS4 Permit, including incorporation of operational BMPs to target pollutants of concern, would ensure that water quality impacts, degradation of water quality, and alteration of receiving water quality during Project operation would be less than significant.

As discussed previously, infiltration of stormwater could have the potential to affect groundwater quality in areas of shallow groundwater. However, any infiltration would be minimal due to the low infiltration potential of the majority of on-site soils. The only potential location for an infiltration BMP is the neighborhood park near the proposed school (if the soils at this location are determined to be favorable for infiltration). Due to the depth to groundwater, it is not expected that any stormwater that may infiltrate during operation would affect groundwater quality because there is no direct path for pollutants to reach groundwater. In addition, the proposed Project would be required to implement LID features to treat stormwater before it could reach groundwater. Therefore, project operation would not substantially degrade groundwater quality.

In conclusion, construction of the proposed Project would comply with existing NPDES regulations (as specified in RCM WQ-3), which includes preparation of a Final WQMP and implementation of operational BMPs to target and reduce pollutants of concern in stormwater runoff from the Project site. Compliance with regulatory requirements would ensure that impacts related to violation of any water quality standards or WDRs, degradation of surface water or groundwater quality, and alteration of receiving water quality during Project operation would be less than significant, and no mitigation is required.

Threshold 4.10.2: Would the project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

Less than Significant Impact.

Construction. According to the *Geotechnical Evaluation of Proposed Residential and School Site Development* (NMG Geotechnical Inc. 2017) and the *Preliminary Geotechnical Exploration* (NMG Geotechnical, Inc. 2018) that were prepared for the Project, groundwater encountered during the geotechnical evaluation ranged from 20 to 45 ft bgs, and the historic high groundwater levels at the Project site ranged from 15 to 20 ft bgs. Because groundwater levels fluctuate seasonally, excavation for installation of some project features (e.g., underground utilities, storm drains, and detention vaults) has a potential to encounter groundwater, and groundwater dewatering may be required. However, groundwater dewatering would be localized and temporary, and the volume of groundwater removed would not be substantial. In addition, any volume of water removed during groundwater dewatering would be minimal compared to the size of the Coastal Plain of the Orange County Groundwater Basin, which has a surface area of 350 sq mi and a storage capacity of 38,000,000 acre-feet (af) (California DWR 2004). Groundwater dewatering would not interfere with the sustainable management of the groundwater basin because the groundwater basin has been sustainably managed over the last

10 years and will continue to be sustainably managed (refer to response to Threshold 4.10.5 for additional discussion on sustainable groundwater management). Therefore, construction impacts related to a decrease in groundwater supplies or interference with groundwater recharge in a manner that may impede sustainable groundwater management would be less than significant, and no mitigation is required.

Operation. Development of the proposed Project would increase impervious surface area by approximately 68.2 ac, which would decrease on-site infiltration. In addition, according to the *Preliminary/Conceptual Water Quality Management Plan* (Hunsaker & Associates 2019b) prepared for the Project, the majority of the soils on the Project site are not favorable for infiltration; therefore, existing on-site infiltration would be minimal. Therefore, the additional impervious surface areas would not substantially decrease infiltration compared to existing conditions. Additionally, any decrease in infiltration would be minimal in comparison to the size of the Orange County Groundwater Basin. Furthermore, neither groundwater extraction nor injection would occur during operation. For these reasons, impacts related to depletion of groundwater supplies or interference with groundwater recharge in a manner that may impede sustainable groundwater management would be less than significant, and no mitigation would be required.

Threshold 4.10.3: Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:

i. Result in substantial erosion or siltation on- or off-site?

Less than Significant Impact.

Construction. During Project construction activities, soil would be exposed and disturbed, drainage patterns would be temporarily altered during grading and other construction activities, and there would be an increased potential for soil erosion and siltation compared to existing conditions. Additionally, during a storm event, soil erosion and siltation could occur at an accelerated rate. Project construction would not disturb Serrano Creek because the proposed Project does not include physical improvements to the creek. As discussed above in response to Thresholds 4.10.1 and 4.10.9, the Construction General Permit requires preparation of a SWPPP (RCM WQ-1) and the City of Lake Forest Municipal Code requires preparation of erosion and sediment control plans (RCM WQ-2). The SWPPP and erosion and sediment control plans would detail Erosion Control and Sediment Control BMPs to be implemented during project construction to minimize erosion and retain sediment on site. With compliance with the requirements of the Construction General Permit and City Municipal Code and with implementation of the construction BMPs, construction impacts related to on- or off-site erosion or siltation would be less than significant, and no mitigation is required.

Operation. In the proposed condition, 80.3 ac (65.8 percent) of the Project site would be impervious surface area and not prone to on-site erosion or siltation because no soil would be included in these areas. The remaining 41.7 ac (41.7 percent) of the site would consist of pervious surface area, which would contain landscaping that would minimize on-site erosion

and siltation by stabilizing the soil. Therefore, on-site erosion and siltation impacts would be minimal. However, the proposed Project would increase impervious area on the Project site by 68.2 ac, which would result in a net increase in stormwater runoff that can lead to downstream erosion in receiving waters (Serrano Creek). Serrano Creek is susceptible to hydromodification.[1] However, as specified in RCM WQ-3, the proposed Project would be required to comply with the hydromodification requirements of the North Orange County MS4 Permit and reduce stormwater runoff from the Project site so it does not exceed pre-development runoff rates or time of concentration by more than 5 percent. To achieve this, the proposed Project would include a subsurface detention vault below Central Park, underground detention vaults in combination with proprietary biotreatment BMPs at each of the five neighborhood parks, a bioretention facility along Serrano Creek, and a linear bioretention facility along "A" Street. These features will reduce flows during storm events so it does not exceed pre-development runoff rates or time of concentration by more than 5 percent. Additionally, as detailed in the *Preliminary Hydrology Analysis* (Hunsaker & Associates 2019a), the proposed detention systems would reduce peak flow from the Project site for the 2-year, 25-year, and 100-year storm events compared to existing conditions. As specified in RCM WQ-4, a Final Hydrology Study would be required to be prepared and submitted to the City for approval. The Final Hydrology Study would also be required to demonstrate that the final design of the Project meets the hydromodification requirements and that, with implementation of detention facilities, the peak flow of stormwater runoff in the proposed condition would be less than existing conditions. Because the stormwater runoff from the Project site would not exceed the North Orange County MS4 Permit hydromodification requirements (i.e., would not exceed pre-development runoff rates or time of concentration by more than 5 percent), an analysis of flooding impacts and erosion and slope stability within Serrano Creek is not required. Compliance with the hydromodification requirements of the North Orange County MS4 Permit, as specified in RCM WQ-3 and RCM WQ-4, would ensure that the proposed Project would not increase downstream erosion or siltation impacts. For these reasons, operation impacts related to substantial on- or off-site erosion or siltation would be less than significant, and no mitigation is required.

Threshold 4.10.3: Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:

ii. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite?

Less than Significant Impact.

Construction. As discussed in response to Thresholds 4.10.1 and 4.10.9, Project construction would comply with the requirements of the Construction General Permit and would include the preparation and implementation of a SWPPP. The SWPPP would include construction BMPs to

[1] Hydromodification is the alteration of the hydrologic characteristics of water bodies. Increased stream flows and changes in sediment transport caused by increased impervious areas from urbanization or other land use changes can result in increased stream flows, erosion, and changes in sediment transport.

control and direct on-site surface runoff and would include detention facilities, if required to ensure that stormwater runoff from the construction site does not exceed the capacity of the stormwater drainage systems. With implementation of BMPs, construction impacts related to a substantial increase in the rate or amount of surface runoff that would result in flooding would be less than significant, and no mitigation is required.

Operation. In the existing condition, on-site drainage is divided into two drainages. Drainage Area "A" consists of the western/northwestern portion of the Project site (approximately 76.6 ac). Stormwater runoff in Drainage Area "A" flows through an on-site natural and partly paved drainage system that connects to an existing 10.5 x 10.5 ft reinforced concrete box and the existing storm drain system (OCFCD Facility No. F19-P07), located along the southwest Project site boundary. This existing storm drain system discharges into Serrano Creek approximately 0.6 mi to the southwest of the Project site. Run-on to Drainage Area "A" consists of runoff from off-site areas (approximately 227.9 ac) to the north of the Project site that discharge into the Project site via an existing 84-inch reinforced concrete pipe at Rancho Parkway and Corridor Center.

Drainage Area "B" consists of the eastern/southeastern portion of the Project site (approximately 43.4 ac). Stormwater runoff within Drainage Area "B" channelizes in an on-site natural and partly paved drainage prior to discharging to OCFCD Facility No. F19, which discharges to Serrano Creek and is located along the southern corner of the Project site. There is no off-site run-on to Drainage Area "B".

The proposed Project would alter the on-site drainage patterns. In the proposed condition, Drainage Area "A" and a majority of Drainage Area "B" would be combined into one drainage area of 111.9 ac. As a result, stormwater runoff from the majority of the Project site would flow into a proposed on-site storm drain system in "B" Street and then would be diverted to the subsurface detention vault below Central Park. Flows would then be directed to the southwestern portion of the Project site to the existing 10.5 x 10.5 ft reinforced concrete box, then to the existing off-site storm drain system (i.e., OCFCD Facility No. F19-P07), and ultimately into Serrano Creek approximately 0.6 mi to the southeast of the Project site. Off-site stormwater runoff from north of Rancho Parkway would be connected to the proposed on-site storm drain system in "B" Street via the existing 84-inch storm drain system in Rancho Parkway, which would then connect to the same existing 10.5 x 10.5 ft reinforced concrete box as the on-site stormwater runoff at the southwestern portion of the Project site. Runoff from the remaining 7.3 ac of the southern portion of the Project site would continue to flow to Serrano Creek via OCFCD Facility No. F19, which is located at the southern corner of the Project site.

The proposed Project would reduce the tributary area to OCFCD Facility No. F19 from 43.4 acres to 7.3 acres. As a result, as detailed in the *Preliminary Hydrology Analysis* (Hunsaker & Associates, June 2019), flow to Serrano Creek at via OCFCD Facility No. F19 would be reduced from 82.2 cfs to 12.2 cfs during a 100-year storm event.

The proposed Project would increase the on-site tributary area to OCFCD Facility No. F19-P07, from 76.6 ac to 111.9 ac. The increased impervious surface area on the Project site would

increase stormwater runoff generated on the Project site and discharged to OCFCD Facility No. F19-P07 (and ultimately Serrano Creek) without implementation of detention measures. As mentioned previously, in the existing and proposed conditions, discharge to OCFCD Facility No. F19-P07 consists of both on-site and off-site stormwater runoff; therefore, the hydrologic analysis took into consideration the combined on-site and off-site flows to this storm drain facility. As shown in Table 4.10.E, without detention measures, the proposed Project would increase discharge to OCFCD Facility No. F19-P07 by 76.2 cubic feet per second (cfs), 174.8 cfs, and 221.4 cfs for the 2-year, 25-year, and 100-year storm events, respectively. However, the proposed detention vault below Central Park would be designed to reduce stormwater discharge to below existing conditions. With the proposed underground detention vault, stormwater flows would be reduced by 6.4 cfs, 139.7 cfs, and 217.3 cfs for the 2-year, 25-year, and 100-year storm events, respectively, compared to existing conditions. Because stormwater runoff from the Project site would be reduced to less than existing conditions at both discharge points (OCFCD Facility Nos. F19 and F19-P07), the proposed Project would not result in off-site flooding. Additionally, the proposed on-site storm drain systems, detention systems, and stormwater BMPs would be sized to collect and convey stormwater runoff on the Project site so that on-site flooding would not occur.

Table 4.10.E: Existing and Proposed Stormwater Discharge to OCFCD Facility No. F19-P07

Scenario	Area (acres)	2-Year Storm Event (cfs)	25-Year Storm Event (cfs)	100-Year Storm Event (cfs)
Existing Runoff from On- and Off-Site Areas	304.5	208.6	508.7	671.2
Proposed Runoff from On- and Off-Site Areas without Detention Measures	339.8	284.8	683.5	892.6
Proposed Runoff from On- and Off-Site Areas with Detention Measures	339.8	202.2	369.0	453.9
Change from Existing Without Detention Measures	**-**	**+76.2**	**+174.8**	**+221.4**
Change from Existing with Detention Measures	**-**	**-6.4**	**-139.7**	**-217.3**

Source: *Preliminary Hydrology Analysis* (Hunsaker & Associates 2019a).
cfs = cubic feet per second
OCFCD = Orange County Flood Control District

As specified in RCM WQ-4, a Final Hydrology Study would be required to be prepared and submitted to the City and County for approval. The Final Hydrology Study would also be required to confirm that the final design of the Project meets the hydromodification requirements, that peak flow of stormwater runoff in the proposed condition would be less than existing conditions with implementation of detention facilities, and that the on-site detention facilities are appropriately sized to accommodate stormwater runoff from the design storm. As demonstrated in the *Preliminary Hydrology Analysis* (Hunsaker & Associates 2019a) and to be subsequently confirmed in the Final Hydrology Study, impacts related to an increase in the rate or amount of surface runoff in a manner that would result in on- or off-site flooding would be less than significant, and no mitigation is required.

Threshold 4.10.3: Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:

iii. Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?

AND

Threshold 4.10.7: Would the project exceed the capacity of a channel and cause overflow during design storm conditions?

Less than Significant Impact.

Construction. As discussed above in response to Thresholds 4.10.1 and 4.10.9, construction of the proposed Project has the potential to introduce pollutants to the storm drain system from erosion, siltation, and accidental spills. However, as specified in RCM WQ-1 and RCM WQ-2, the Construction General Permit requires preparation of a SWPPP, and the City of Lake Forest Municipal Code requires preparation of erosion and sediment control plans. Both the SWPPP and erosion and sediment control plans would identify construction BMPs to be implemented during construction to reduce impacts to water quality, including those impacts associated with soil erosion, siltation, and spills. In addition, any groundwater extracted during groundwater dewatering activities that is discharged to surface waters would be tested and treated (if necessary) to ensure that any discharges meet the water quality limits specified in the applicable NPDES permit (as specified in RCM WQ-5). RCM WQ-1, RCM WQ-2, and RCM WQ-5 are existing NPDES requirements with which the Project is required to comply. These measures would prevent substantial additional sources of polluted runoff being discharged to the storm drain system through implementation of construction BMPs that target pollutants of concern in runoff from the Project site as well as testing and treatment (if required) of groundwater prior to its discharge to surface waters.

Additionally, as discussed above in response to Threshold 4.10.3.ii, the SWPPP would include construction BMPs to control and direct surface runoff on site and would include detention measures if required to ensure that stormwater runoff from the construction site does not exceed the capacity of the stormwater drainage systems. For these reasons, construction impacts related to creation or contribution of runoff water that would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff would be less than significant, and no mitigation is required.

Operation. As discussed above in response to Thresholds 4.10.1 and 4.10.9, operation of the Project has the potential to introduce pollutants to the storm drain system from the proposed on-site uses. However, as specified in RCM WQ-3, permanent operational BMPs that target and reduce pollutants of concern in stormwater runoff would be implemented and maintained throughout the life of the Project. RCM WQ-5 is an existing NPDES requirement with which the Project is required to comply. This measure would prevent substantial additional sources of

polluted runoff being discharged to the storm drain system through implementation of operational BMPs to target pollutants of concern in runoff from the Project site. Additionally, as discussed above in response to Threshold 4.10.3.ii, the proposed detention vault below Central Park would reduce stormwater runoff from the Project site to below existing conditions to both downstream storm drain systems (OCFCD Facility Nos. F19 and F19-P07). For these reasons, operational impacts related to creation or contribution of runoff water that would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff would be less than significant, and no mitigation is required.

Threshold 4.10.5: Would the project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

Less Than Significant Impact. The Project site is within the jurisdiction of the Santa Ana RWQCB. As discussed in Section 4.10.3.3, Regional Regulations, the Santa Ana RWQCB adopted a Basin Plan that designates beneficial uses for all surface and groundwater within its jurisdiction and establishes the water quality objectives and standards necessary to protect those beneficial uses. As discussed in detail above in response to Thresholds 4.10.1 and 4.10.9, the proposed Project would comply with existing NPDES requirements and would implement construction and operational BMPs to reduce pollutants of concern in stormwater runoff (RCM WQ-1, RCM WQ-2, and RCM WQ-3). Additionally, during construction, any dewatered groundwater would be tested and treated (if necessary) prior to discharge to surface waters (RCM WQ-5). Compliance with these regulatory requirements would ensure that proposed Project would not degrade or alter water quality, cause the receiving waters to exceed the water quality objectives, or impair the beneficial use of receiving waters (refer to response to Threshold 4.10.10 for further discussion of impacts to beneficial uses). As such, the proposed Project would not result in water quality impacts that would conflict with the Santa Ana RWQCB Water Quality Control Plan (Basin Plan). Construction and operational impacts related to a conflict with the Basin Plan would be less than significant, and no mitigation is required.

The SGMA, which was enacted in September 2014, requires governments and water agencies of high- and medium-priority basins to halt overdraft of groundwater basins. The SGMA requires the formation of local groundwater sustainability agencies, which are required to adopt Groundwater Sustainability Plans to manage the sustainability of the groundwater basins. The project site is located within the Coastal Plain of the Orange County Groundwater Basin, which is managed by the Orange County Water District (OCWD). The San Juan Valley Groundwater Basin is identified by the California DWR as a medium priority basin; therefore, OCWD is required to develop a Groundwater Sustainability Plan and bring the groundwater basin into balanced levels of pumping and recharge by 2042. The SGMA established a process for local agencies to develop an alternative in lieu of a Groundwater Sustainability Plan. In compliance with this requirement, OCWD prepared and submitted the *Basin 8-1 Alternative – OCWD Management Area* (OCWD 2017) to the California DWR as an alternative to a Groundwater Sustainability Plan (California DWR 2019). The *Basin 8-1 Alternative – OCWD Management Area* demonstrates that the groundwater basin has been sustainably managed over the last 10 years and will continue to be sustainably managed. As detailed in response to Threshold 4.10.2, any groundwater extracted during groundwater dewatering during construction would be minimal and would not interfere with the sustainable management of the groundwater basin. Additionally, project operation would not require groundwater extraction.

Although the project would increase water use, which may be obtained from groundwater, the Irvine Ranch Water District (IRWD), which supplies municipal water, ensures that sufficient water supplies are available so that groundwater overdraft does not occur. For these reasons, the proposed Project would not conflict with or obstruct the implementation of a sustainable groundwater management plan. Therefore, construction and operational impacts related to conflict with or obstruction of water quality control plans or sustainable groundwater management plans would be less than significant, and no mitigation is required.

Threshold 4.10.6: Would the project deposit sediment and debris materials within existing channels, obstructing flows?

Less than Significant Impact. As discussed above in response to Thresholds 4.10.1 and 4.10.9, construction of the proposed Project has the potential to introduce pollutants to the downstream receiving waters, including sediment from erosion and siltation. However, as specified in RCM WQ-1 and RCM WQ-2, the Construction General Permit requires preparation of a SWPPP, and the City of Lake Forest Municipal Code requires preparation of erosion and sediment control plans. Both the SWPPP and the erosion and sediment control plans would identify construction BMPs to be implemented during construction to reduce impacts to water quality, including those impacts associated with soil erosion and siltation, so that sediment and debris are not discharged into downstream receiving waters. In addition, any groundwater extracted during groundwater dewatering activities that is discharged to surface waters would be tested and treated (if necessary) to ensure that any discharges meet the water quality limits specified in the applicable NPDES permit (as specified in RCM WQ-5) so that sediments and debris are not discharged into downstream surface waters at concentrations that could obstruct channel flow.

As also discussed above in response to Thresholds 4.10.1 and 4.10.9, operation of the Project has the potential to introduce pollutants of concern, including suspended solids/sediment and trash and debris to the storm drain system during operation. However, as specified in RCM WQ-3, permanent operational BMPs would be implemented and maintained throughout the life of the Project. The BMPs would target and reduce pollutants of concern in stormwater runoff, including suspended solids/sediment and trash and debris, so they are not discharged to downstream surface waters at concentrations that could obstruct channel flow.

RCM WQ-1, RCM WQ-2, RCM WQ-3, and RCM WQ-5 are existing NPDES requirements with which the Project is required to comply. These measures would prevent substantial impacts to water quality through implementation of construction and operational BMPs to target pollutants of concern in runoff from the Project site and testing and treatment (if required) of groundwater prior to its discharge to surface waters. The NPDES permits are designed to ensure that Projects do not result in discharges that contain sediment and debris materials in levels that could obstruct flow in downstream receiving waters. Therefore, with compliance with the NPDES requirements, impacts related to sediment deposits and debris materials within existing channels and obstructing flows would be less than significant. No mitigation is required.

Threshold 4.10.8: Would the project adversely change the rate, direction or flow of groundwater?

Less than Significant Impact. As discussed in response to Threshold 4.10.2, groundwater dewatering may be required during excavation. However, groundwater dewatering would be localized and temporary and would not be in quantities that could adversely change the rate, direction, or flow of groundwater due to the size of the groundwater basin and limited dewatering activities. Project operation would not involve extraction or injection of groundwater and there would be no potential for Project operation to adversely change the rate, direction, or flow of groundwater. For these reasons, impacts related to change in the rate, direction, or flow of groundwater would be less than significant and no mitigation is required.

Threshold 4.10.10: Would the project substantially degrade water quality by discharge which affects the beneficial uses (i.e. swimming, fishing, etc.) of the receiving or downstream waters?

Less than Significant Impact. Beneficial uses of surface receiving waters for the Project site are discussed in Section 4.10.3.3, Regional Regulations, and listed in Table 4.10.A. As discussed above in response to Thresholds 4.10.1 and 4.10.9, construction of the proposed Project has the potential to introduce pollutants to the downstream receiving waters from erosion, siltation, and accidental spills. However, as specified in RCM WQ-1 and RCM WQ-2, the Construction General Permit requires preparation of a SWPPP, and the City of Lake Forest Municipal Code requires preparation of erosion and sediment control plans. Both the SWPPP and erosion and sediment control plans would identify construction BMPs to be implemented during construction to reduce impacts to water quality, including those impacts associated with soil erosion, siltation, and spills. In addition, any groundwater extracted during groundwater dewatering activities that is discharged to surface waters would be tested and treated (if necessary) to ensure that any discharges meet the water quality limits specified in the applicable NPDES permit (as specified in RCM WQ-5).

As also discussed above in response to Thresholds 4.10.1 and 4.10.9, operation of the Project has the potential to introduce pollutants to the storm drain system from the proposed on-site uses. However, as specified in RCM WQ-3, permanent operational BMPs that target and reduce pollutants of concern in stormwater runoff would be implemented and maintained throughout the life of the Project.

RCM WQ-1, RCM WQ-2, RCM WQ-3, and RCM WQ-5 are existing NPDES requirements with which the Project is required to comply. These measures would prevent substantial impacts to water quality through implementation of construction and operational BMPs to target pollutants of concern in runoff from the Project site, and testing and treatment (if required) of groundwater prior to its discharge to surface waters. The NPDES permits are designed to ensure that Projects do not result in discharges that contain pollutants in levels that could degrade water quality and degrade beneficial uses. Therefore, with compliance with NPDES requirements, impacts related to the degradation of water quality by discharge that affects the beneficial uses of the receiving or downstream waters would be less than significant. No mitigation is required.

Threshold 4.10.11: Increase in any pollutant for which the receiving water body is already impaired as listed on the Clean Water Act Section 303(d) list?

Less than Significant Impact. As discussed in greater detail in Section 4.10.4, Methodology, the receiving waters for runoff from the Project site are listed as impaired on the 303(d) list for several constituents. Serrano Creek is listed on the 2014/2016 303(d) list as impaired for ammonia, indicator bacteria, pH, benthic community effects, and toxicity. San Diego Creek (Reach 2) is listed as impaired for indicator bacteria, nutrients, sedimentation/siltation, and unknown toxicity. San Diego Creek (Reach 1) is listed as impaired for fecal coliform, selenium, toxaphene, nutrients, pesticides, sedimentation/siltation, benthic community effects, DDT, malathion, and toxicity. Upper Newport Bay is listed as impaired for chlordane, copper, DDT, indicator bacteria, metals, nutrients, PCBs, pesticides, sediment toxicity, sedimentation/siltation, and malathion. Lower Newport Bay is listed as impaired for chlordane, copper, DDT, indicator bacteria, nutrients, PCBs, pesticides, and sediment toxicity.

Construction. Construction of the proposed Project would not contribute to the DDT, PCB, toxaphene, or chlordane impairments because these chemicals have been banned from use in the United States. It is unlikely that insecticides or pesticides would be used during construction, so construction of the Project would not contribute to the malathion or pesticide impairments. However, during construction activities, chemicals, liquid products, petroleum products (e.g., paints, solvents, and fuels), and concrete-related waste may be spilled or leaked and may have the potential to contribute to the ammonia, bacteria, nutrients, toxicity, pH, benthic community effects, copper, metals, and sediment toxicity impairments. Construction activities involve the use of a variety of chemicals and materials.

As discussed above under the response to Thresholds 4.10.1 and 4.10.9, in compliance with the requirements of the Construction General Permit, a SWPPP would be prepared and construction BMPs detailed in the SWPPP would be implemented during construction, as specified in RCM WQ-1. Construction BMPs would include Good Housekeeping BMPs to prevent spills, leaks, and discharge of construction debris and waste into receiving waters. Therefore, with implementation of construction BMPs that prevent spills and construction materials from reaching receiving waters, construction of the proposed Project would not contribute to the existing nutrients, toxicity, pH, benthic community effects, copper, metals, and sediment toxicity impairments.

During construction activities, soil disturbance would increase soil erosion and sedimentation, which could contribute to the sedimentation/siltation, benthic community effects, and selenium impairments (if selenium is present on site because selenium is a naturally occurring element in soil and groundwater in the region). In compliance with the requirements of the Construction General Permit, a SWPPP would be prepared and construction BMPs detailed in the SWPPP would be implemented during construction, as specified in RCM WQ-1. In addition, as specified in RCM WQ-2, an erosion and sediment control plan would be prepared and submitted to the City's Public Works Department prior to issuance of a grading or building permit in compliance with the City of Lake Forest Municipal Code. An erosion and sediment control plan would also be prepared annually during construction and submitted to the City's Public Works Department for

approval prior to September 15th of each year during construction. The SWPPP and erosion and sediment control plans would detail the BMPs to be implemented during construction. Construction BMPs would include Erosion Control and Sediment Control BMPs designed to minimize erosion and retain sediment on site. With implementation of Erosion Control and Sediment Control BMPs, soil disturbance activities would not have the potential to contribute to the sedimentation/siltation, benthic community effects, and selenium impairments.

As part of the good housekeeping BMPs, construction workers would be provided access to portable toilets. Waste from leaking portable toilets has the potential to contribute to ammonia, bacteria, nutrients, toxicity, pH, benthic community effects, and sediment toxicity impairments. Portable toilets would be located in the on-site staging areas and would be contained to prevent pollutants from being washed into receiving waters in the event of a leak. In addition, disposal of waste from the portable toilets would be performed by contracted waste haulers who would handle, haul away, and dispose of portable toilet waste in accordance with applicable regulations. Therefore, use of portable toilets during construction of the proposed project would not contribute to the ammonia, bacteria, nutrients, toxicity, pH, benthic community effects, and sediment toxicity impairments.

As discussed above under the response to Thresholds 4.10.1 and 4.10.9, groundwater dewatering may be required during construction. Groundwater may contain high levels of total dissolved solids, nitrate, sediment, selenium, or other constituents, or high or low pH levels that could be introduced to surface waters when dewatered groundwater is discharged to surface waters. Groundwater discharged to surface waters could contribute to the nutrients, toxicity, pH, benthic community effects, sedimentation/siltation, selenium, or sediment toxicity impairments. Depending on the water quality of the discharge, groundwater dewatering activities during excavation would be conducted in accordance with either the *General Waste Discharge Requirements for Discharges to Surface Waters that Pose an Insignificant (De Minimus) Threat to Water Quality (*Order No. R8-2009-0003, NPDES No. CAG998001) or the *General Discharge Permit for Discharges to Surface Waters of Groundwater Resulting from Groundwater Dewatering Operations and/or Groundwater Cleanup Activities at Sites Within the San Diego Creek/Newport Bay Watershed Polluted by Petroleum Hydrocarbons, Solvents, Metals and/or Salts* (Order No. R8-2007-0041, NPDES No. CAG918002, as amended by Order No. ~~R8-2007-0041~~ R8-2009-0045), as specified in RCM WQ-5. Both permits would require testing and treatment (as necessary) of groundwater encountered during groundwater dewatering prior to its discharge to surface waters. As a result, groundwater dewatering would not introduce pollutants to receiving waters at levels that contribute to an existing impairment.

In conclusion, construction of the proposed Project would comply with existing NPDES regulations (as specified in RCM WQ-1, RCM WQ-2, and RCM WQ-5), which includes preparation of a SWPPP and erosion and sediment control plans, implementation of construction BMPs to target and reduce pollutants of concern in stormwater runoff, and testing and treatment (if required) of any groundwater prior to its discharge to surface waters. Compliance with regulatory requirements would ensure that discharges of stormwater or groundwater during construction would not contribute to an existing impairment in downstream surface waters. Therefore, impacts related to an increase in any pollutant for which the receiving water body is

already impaired as listed on the CWA Section 303(d) list would be less than significant, and no mitigation is required.

Operation. Expected pollutants of concern from long-term operation of the proposed Project include suspended solids/sediment, nutrients, heavy metals, pathogens (bacteria/virus), pesticides, oil and grease, toxic organic compounds, and trash and debris. DDT, PCBs, toxaphene, or chlordane have been banned from use in the United States and are not a pollutant of concern for the project; therefore, project operation would not contribute to these existing impairments.

Suspended solids can be introduced from on-site disturbed or unstabilized landscaping or disturbed earth surfaces and contribute to the sedimentation/siltation, benthic community effects, and selenium impairments. Sources of nutrients include fertilizers, sediment, and trash/debris, which can contribute to the nutrients' impairment. Potential sources of trash and debris also include landscaping activities, food wrappers, and food waste and could contribute to the nutrients' impairment. Ammonia is used as a household cleaning agent and could contribute to the ammonia impairment if discharged to surface waters. Automobiles and stormwater runoff from streets and uncovered parking areas would contain oil and grease, metals, and toxic organic compounds, and could contribute to the existing copper, metals, benthic community effects, toxicity, and sediment toxicity impairments. Pathogens (bacteria/viruses) could be introduced from food waste, pet waste, sediment, and landscaping areas, and contribute to the existing bacteria impairment.

As discussed above under the response to Thresholds 4.10.1 and 4.10.9, and detailed in the *Preliminary/Conceptual Water Quality Management Plan* (Hunsaker & Associates 2019b), a variety of BMPs is proposed as part of the Project. The purpose of the WQMP is to identify the pollutants of concern for a project and specify the BMPs that would target and reduce the pollutants of concern in stormwater runoff on the Project site. As specified in RCM WQ-3, these BMPs would be implemented during Project operation. With implementation of BMPs during operation, the pollutants of concern described above would be removed by the BMPs to levels that would not contribute to the existing impairments. Therefore, impacts related to an increase in any pollutant for which the receiving water body is already impaired as listed on the CWA Section 303(d) list would be less than significant, and no mitigation is required.

4.10.7 Cumulative Impacts

Cumulative development in the San Diego Creek and Newport Bay Watersheds is a continuation of the existing urban pattern of development that has already resulted in extensive modifications to watercourses in the area. The area's watercourses have been channelized and drainage systems have been put into place to respond to the past urbanization that has occurred in this area. For the cumulative analysis related to hydrology and water quality, the cumulative projects being considered include the related projects discharging to the same watersheds as the proposed Project (i.e., the San Diego Creek and Newport Bay Watersheds). The related projects within the San Diego Creek and Newport Bay Watersheds include Related Projects 1, 2, 6, 7, 8, and 10. (Please refer to Table 4.A and Figure 4.0.1 in Section 4.0, Existing Setting, Environmental Analysis, Impacts, and

Mitigation Measures, for the descriptions and locations of these related projects.) Each of these related projects could potentially increase the volume of stormwater runoff and contribute to pollutant loading in stormwater runoff reaching both the City's storm drain system and the San Diego Creek and Newport Bay Watersheds, thereby resulting in cumulative impacts to hydrology and surface water quality. The remaining related projects are within the Aliso Creek Watershed and are not considered in this analysis because they do not have the potential to contribute to the hydrology- and water quality-related impacts of the proposed Project to result in cumulative impacts.

New development and redevelopment can result in increased stormwater runoff and increased urban pollutants in stormwater runoff from project sites. Each related project must include BMPs to reduce impacts to water quality and hydrology in compliance with local ordinances and plans adopted to comply with requirements of the various NPDES permits. Specifically, all projects that disturb 1 ac or more of soil must comply with the requirements of the Construction General Permit, the North Orange County MS4 Permit, and the City of Lake Forest Municipal Code. The preparation and approval of a SWPPP, erosion and sediment control plans (for construction), and a WQMP (for operation) would be required for each related project to determine appropriate BMPs to minimize water quality impacts. In addition, the preparation and approval of a hydrology study would be required to determine the hydrologic control required to minimize increases in runoff from each site so they do not exceed existing conditions or result in hydromodification impacts. In addition, the City's Public Works Department reviews all development projects on a case-by-case basis to ensure that sufficient local and regional drainage capacity is available.

Each related project must consider impaired receiving waters and TMDLs for receiving waters. The TMDL program is designed to identify all constituents that adversely affect the beneficial uses of water bodies and then identify appropriate reductions in pollutant loads or concentrations from all sources so that the receiving waters can maintain/attain the beneficial uses in the Basin Plan. Thus, by complying with TMDLs, a project's contribution to overall water quality improvement in the San Diego/Newport Bay Watershed in the context of the regulatory program is designed to account for cumulative impacts.

Regional programs and BMPs such as TMDL programs and the MS4 Permit Program have been designed under an assumption that the San Diego Creek Watershed and Newport Bay Watershed would continue their pattern of urbanization. The regional control measures contemplate the cumulative effects of proposed development. The proposed Project would be required to comply with the requirements of the Construction General Permit and the North Orange County MS4 Permit and implement construction and operational BMPs to reduce pollutants in stormwater runoff. Compliance with these regional programs and permits constitutes compliance with programs intended to address cumulative water quality impacts. As stated above, each related project would be required to develop a SWPPP, erosion and sediment control plans, a WQMP, and a hydrology study, and would be evaluated individually to determine appropriate BMPs and treatment measures to reduce impacts to surface water quality and hydrology. Because the proposed Project and other related Projects would comply with applicable NPDES requirements and would include BMPs to reduce the volume of stormwater runoff and pollutants of concern in stormwater runoff, the cumulative hydrology and water quality impacts of the proposed Project and the related projects

would be less than significant. Therefore, the proposed Project's incremental hydrology and water quality impacts would not be cumulatively considerable.

4.10.8 Level of Significance Prior to Mitigation

Construction and operational impacts related to hydrology and water quality would be less than significant with implementation of RCM WQ-1 through RCM WQ-5.

4.10.9 Regulatory Compliance Measures and Mitigation Measures

4.10.9.1 Regulatory Compliance Measures

The following RCMs are existing regulations that are applicable to the proposed Project and are considered in the analysis of potential impacts related to hydrology and water quality. The City of Lake Forest considers these requirements to be mandatory; therefore, they are not mitigation measures.

RCM WQ-1 **Construction General Permit.** Prior to commencement of construction activities, the Applicant shall obtain coverage under the *National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit),* NPDES No. CAS000002, Order No. 2009-0009-DWQ, as amended by Order No. 2010-0014-DWQ and Order No. 2012-0006-DWQ, or any other subsequent permit. This shall include submission of Permit Registration Documents (PRDs), including permit application fees, a Notice of Intent (NOI), a risk assessment, a site plan, a Stormwater Pollution Prevention Plan (SWPPP), a signed certification statement, and any other compliance-related documents required by the permit, to the State Water Resources Control Board via the Stormwater Multiple Application and Report Tracking System (SMARTS). Construction activities shall not commence until a Waste Discharge Identification Number (WDID) is obtained for the project from the SMARTS and provided to the Director of the City of Lake Forest Public Works Department, or designee, to demonstrate that coverage under the Construction General Permit has been obtained. Project construction shall comply with all applicable requirements specified in the Construction General Permit, including but not limited to, preparation of a SWPPP and implementation of construction site Best Management Practices (BMPs) to address all construction-related activities, equipment, and materials that have the potential to impact water quality for the appropriate risk level identified for the project. The SWPPP shall identify the sources of pollutants that may affect the quality of stormwater and shall include BMPs (e.g., Sediment Control, Erosion Control, and Good Housekeeping BMPs) to control the pollutants in stormwater runoff. Construction Site BMPs shall also conform to the requirements specified in the latest edition of the Orange County Stormwater Program *Construction Runoff Guidance Manual for Contractors, Project Owners, and Developers* to control and minimize the impacts of construction and construction-related activities, materials, and pollutants on the watershed. Upon completion of

construction activities and stabilization of the Project site, a Notice of Termination shall be submitted via SMARTS.

RCM WQ-2 **Erosion and Sediment Control Plans.** In compliance with the requirements of Title 8 Buildings and Construction, Chapter 8.30, Grading and Excavation, Article XIII, Erosion Control of the City of Lake Forest Municipal Code, the Applicant shall submit a grading plan and erosion control plan to the Director of the City of Lake Forest Public Works Department, or designee, for review and approval prior to issuance of a grading permit. The Applicant shall also submit erosion and sediment control plans annually to the Director of the City of Lake Forest Public Works Department, or designee, for review and approval ~~by September 15th of each year during construction~~.

RCM WQ-3 **Water Quality Management Plan.** Prior to issuance of building permits, the Applicant shall submit a Final Water Quality Management Plan (WQMP) to the Director of the City of Lake Forest Public Works Department, or designee, for review and approval in compliance with the *Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and the Incorporated Cities of Orange County within the Santa Ana Region Areawide Urban Storm Water Runoff Orange County* (North Orange County MS4 Permit), Order No. R8-2009-0030, NPDES No. CAS618030 (as amended by Order No. R8-2010-0062). The Final WQMP shall be prepared consistent with the requirements of the *Model Water Quality Management Plan (WQMP*) (County of Orange 2011), *Technical Guidance Document for the Preparation of Conceptual/Preliminary and/or Project Water Quality Management Plans (WQMPs)* (County of Orange 2013), the City of Lake Forest *Local Implementation Plan (LIP)* (2010), and *Managing Wet Weather with Green Infrastructure Municipal Handbook Green Streets* (EPA 2008), or subsequent guidance manuals. The Final WQMP shall specify the BMPs to be incorporated into the project design to target pollutants of concern in runoff from the Project site. The Final WQMP shall also incorporate the results of the Final Hydrology and Hydraulic Analyses to demonstrate that the detention facilities meet the hydromodification requirements of the North Orange County MS4 Permit. The Director of the City of Lake Forest Public Works Department, or designee, shall ensure that the BMPs specified in the Final WQMP are incorporated into the final project design.

RCM WQ-4 **Final Hydrology and Hydraulic Analyses.** Prior to issuance of building permits, the Applicant shall submit Final Hydrology and Hydraulic Analyses to the Director of the City of Lake Forest Public Works Department, or designee, and the Orange County Flood Control District (OCFCD) for review and approval. The Final Hydrology and Hydraulic Analyses shall be prepared consistent with the requirements of the Orange County Hydrology Manual (Orange County Environment Agency 1986) and Orange County Hydrology Manual Addendum No. 1 (Orange County Environment Agency 1996), or subsequent guidance manuals. The Final Hydrology and Hydraulic Analyses shall confirm that the on-site storm drains, on-site detention basins, and any other drainage structures are appropriately sized to accommodate stormwater

runoff from the design storm so that the peak flow of stormwater discharge from the Project site is less than existing conditions. The Final Hydrology and Hydraulic Analyses shall also demonstrate that the detention facilities meet the hydromodification requirements of the *Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and the Incorporated Cities of Orange County within the Santa Ana Region Areawide Urban Storm Water Runoff Orange County* (North Orange County MS4 Permit), Order R8-2009-0030, NPDES No. CAS618030 (as amended by Order No. R8-2010-0062). In compliance with the hydromodification requirements, the post-project runoff discharge volume for the 2-year storm shall not exceed that of the predevelopment condition by more than 5 percent, and the time of concentration of post-development runoff for the 2-year storm event shall not be greater than 5 percent less than that of the predevelopment condition. The Director of the City of Lake Forest Public Works Department, or designee, shall ensure that the drainage facilities specified in the Final Hydrology and Hydraulic Analyses are incorporated into the final project design.

RCM WQ-5 **Groundwater Dewatering Permits.** If groundwater dewatering is required during excavation activities, the Applicant shall obtain coverage under one of two orders, or any subsequent orders, that apply to groundwater discharges to surface waters within the Newport Bay/San Diego Creek Watershed depending on the nature of the groundwater. The *General Waste Discharge Requirements for Discharges to Surface Waters that Pose an Insignificant (De Minimus) Threat to Water Quality (*Order No. R8-2009-0003, NPDES No. CAG998001) covers discharges to surface waters that pose an insignificant (de minimus) threat to water quality within. This Order would be applicable to the project if it can be demonstrated that the groundwater being discharged to surface waters does not contain pollutants of concern (selenium and nitrates) in the discharge. However, if groundwater is found to contain petroleum hydrocarbons, solvents, metals and/or salts, the project would be subject to the *General Discharge Permit for Discharges to Surface Waters of Groundwater Resulting from Groundwater Dewatering Operations and/or Groundwater Cleanup Activities at Sites Within the San Diego Creek/Newport Bay Watershed Polluted by Petroleum Hydrocarbons, Solvents, Metals and/or Salts* (Order No. R8-2007-0041, NPDES No. CAG918002, as amended by ~~R8-2007-0041~~ R8-2009-0045), which covers general discharge permits for discharges to surface waters of groundwater resulting from groundwater dewatering operations and/or groundwater cleanup activities at sites within the San Diego Creek/Newport Bay Watershed that have been polluted by petroleum hydrocarbons, solvents, metals and/or salts, or nutrients, selenium, and other pollutants of TMDL concern. This shall include submission of a Notice of Intent (NOI) for coverage under the permit to the Santa Ana Regional Water Quality Control Board (RWQCB) at least 45 days prior to the start of dewatering. Groundwater dewatering activities shall comply with all applicable provisions in the permit, including water sampling, analysis, treatment (if required), and reporting of dewatering-related discharges. Upon completion of groundwater dewatering activities, a Notice of Termination shall be submitted to the Santa Ana RWQCB.

4.10.9.2 Mitigation Measures

The proposed Project would not result in significant impacts related to hydrology and water quality, and no mitigation is required.

4.10.10 Level of Significance after Mitigation

Construction and operational impacts related to hydrology and water quality would be less than significant.

This page intentionally left blank

4.11 LAND USE AND PLANNING

This section describes the existing land uses on the Project site and in its vicinity, and evaluates the compatibility of the proposed Project with surrounding land uses and relevant policy and planning documents. The consistency analysis presented in this section was prepared in compliance with *California Environmental Quality Act Guidelines* (State CEQA Guidelines) Section 15125(d). Information presented in this section is based on information provided in the City of Lake Forest (City) General Plan (last amended in 2016), the City's General Plan Land Use Map (2016), the City's Zoning Code (2019), the City's Zoning Map (2019), the Orange County (County) Natural Community Conservation Plan and Habitat Conservation Plan (NCCP/HCP) (1996), and the Nakase Project Fiscal Impact Analysis (Stanley R. Hoffman Associates, May 2018), which is included in Appendix N of this EIR. In addition, pursuant to State CEQA Guidelines Section 15125(d), this Environmental Impact Report (EIR) evaluates the proposed Project's consistency with other applicable planning documents as they relate to specific topical sections within Chapter 4.0, Existing Environmental Setting, Environmental Analysis, Impacts, and Mitigation Measures.

4.11.1 Scoping Process

The Initial Study/Notice of Preparation found that the proposed Project would not disrupt/realign the existing roadway network or affect/disrupt residential neighborhoods in the Project site vicinity; therefore, it was determined that implementation of the proposed Project would not physically divide an established community. This topic will not be discussed further in this section.

The City of Lake Forest (City) received 28 comment letters during the public review period of the Initial Study/Notice of Preparation (IS/NOP). For copies of the IS/NOP comment letters, refer to Appendix A of this EIR. Five comment letters included comments related to Land Use/Planning.

The letter from the Southern California Association of Governments (SCAG) (August 15, 2018) expressed concern with the proposed Project's consistency with the 2016 Regional Transportation Plan/Sustainable Community Strategies (RTP/SCS). SCAG also suggested including a side-by-side comparison table for consistency analysis in the EIR and recommended the use of the Final Program EIR for 2016 RTP/SCS for guidance and potential project-level mitigation measures.

The letter from Sima Soltani (July 24, 2018) expressed favor for new housing on the Project site. The letter from Loretta Herrin (July 25, 2018) suggested evaluating the development of a cemetery for veterans or an aquatic center on the Project site. The letter from Bob Stuart (July 25, 2018) expressed opposition to a zoning change for the nursery. The letter from Charles Larson (August 4, 2018) expressed favor for agricultural zoning on the Project site.

4.11.2 Existing Environmental Setting

The Project site is located in the north-central portion of the City of Lake Forest, which is in the south-central portion of the County. The current Nakase Brothers Wholesale Nursery is located at 20621 Lake Forest Drive. As illustrated in Figure 3.1, Regional Project Location, the Project site is bounded by Rancho Parkway to the northeast, Bake Parkway to the northwest, Serrano Creek to the southeast, and light industrial uses to the southwest. The Project site is rectangular in shape and

consists of a single parcel (Assessor's Parcel Number [APN] 612-221-01) totaling approximately 122 acres (ac).

As shown in Figure 3.3, Existing Land Uses, the Project site is developed with a wholesale plant nursery. Figure 3.3 also shows that the Project site is surrounded by a variety of residential, business park, regional park/open space, commercial, and light industrial land uses. Specifically, land uses surrounding the Project site include a commercial center with a Home Depot, 24 Hour Fitness, FedEx, Auto Repair Shop, Shell Gas Station, and various restaurants immediately northeast of the site. Business parks with several office buildings and surface parking lots are immediately southwest of the Project site. Business parks and a hotel are located to the northwest of the Project site beyond Bake Parkway and to the southeast of the Project site on the opposite side of Serrano Creek. Although not immediately adjacent to the Project site, single-family and multifamily residential uses exist to the northwest, northeast, and south of the Project site.

4.11.3 Regulatory Setting

4.11.3.1 Federal Regulations

There are no federal regulations applicable to land use and planning.

4.11.3.2 State Regulations

California State Planning and Zoning Law. This law, which is codified in California Government Code sections 65000-66037, delegates most of the State's local land use and development decisions to cities and counties. The California Government Code establishes specific requirements pertaining to the regulation of land uses by local governments, including general plan requirements, specific plans, subdivisions, and zoning. California Government Code Section 65302 requires that all California cities and counties include the following seven elements in their general plan:

- Land Use
- Circulation
- Housing
- Conservation
- Open Space
- Noise
- Safety

Cities and counties in the San Joaquin Air Pollution Control District must also address air quality in their general plans. Cities and counties that have identified disadvantaged communities must also address environmental justice in their general plans, including air quality.[1]

[1] Senate Bill 1000 (SB 1000), adopted in 2016 requires both cities and counties that have disadvantaged communities to incorporate environmental justice (EJ) policies into their general plans, either in a separate EJ element or by integrating related goals, policies, and objectives throughout the other elements. This update, or revision if the local government already has EJ goals, policies, and objectives, must happen "upon the adoption or next revision of two or more elements concurrently on or after January 1, 2018."

Sustainable Communities and Climate Protection Act of 2008 (Senate Bill 375). This statute requires California's regional planning agencies to include a Sustainable Communities Strategy (SCS) or Alternative Planning Strategy in their Regional Transportation Plans (RTP). Senate Bill 375 (SB 375) was enacted to reduce greenhouse gas emissions from automobiles and light trucks through integrated transportation, land use, housing and environmental planning. Under the law, California's regional planning agencies are required to include a Sustainable Communities Strategy (SCS) in their Regional Transportation Plans (RTP). The SCS provides a plan for meeting the regional emissions reduction targets established by the California Air Resources Board (ARB). If the emissions reduction targets cannot be met through the SCS, an Alternative Planning Strategy (APS) may be developed that shows how the targets would be achieved through alternative development patterns, infrastructure, or additional transportation measures of policies. SB 375 also offers local governments regulatory and other incentives to encourage more compact new development and transportation alternatives.

The requirements of SB 375 are reflected in the 2016 RTP/SCS adopted by the Southern California Association of Governments (SCAG), which serves as the regional planning agency in the six-county metropolitan region composed of Orange, Los Angeles, Ventura, Riverside, San Bernardino, and Imperial Counties. The 2016–2040 RTP/SCS is discussed in further detail below.

4.11.3.3 Regional Regulations

The Project site is covered by several planning documents and programs that have varying degrees of regulation over use of the Project site. The following paragraphs explain regional regulations, plans, and policies applicable to the Project site that are analyzed in this EIR section.

Southern California Association of Governments (SCAG). As discussed above, regional planning in Orange, Los Angeles, Ventura, Riverside, San Bernardino, and Imperial Counties is conducted by SCAG. SCAG is also the federally designated Metropolitan Planning Organization (MPO) for these six counties. As the designated MPO, SCAG is mandated by the federal government to research and prepare plans for transportation, a growth forecast, hazardous waste, and air quality. The growth forecast serves as the foundation of these plans. Of the various plans adopted by SCAG, the Regional Comprehensive Plan and the 2016–2040 RTP/SCS are relevant to the Project.

Regional Comprehensive Plan and Guide. In 2008, SCAG adopted the Regional Comprehensive Plan (RCP) for the purpose of providing a comprehensive strategic plan for defining and solving housing, traffic, water, air quality, and other regional challenges. The 2008 RCP has two primary objectives in implementing this strategic plan: (1) integrating transportation, land use, and air quality planning approaches, and (2) outlining key roles for public and private sector stakeholders to implement reasonable policies regarding transportation, land use, and air quality approaches. While the 2008 RCP outlines several policies to inform local decision-makers within the SCAG region with respect to policy and planning decisions, these policies are considered recommendations and are not mandated by law.

With respect to land use policy, the 2008 RCP includes a Land Use and Housing chapter that aims to link land use and transportation planning decisions to the projected population and economic growth in the SCAG region. Specifically, the Land Use and Housing chapter of the 2008

RCP promotes sustainable planning for land use and housing in the SCAG region by maximizing the efficiency of the existing circulation network, providing a greater variety in housing types, promoting a diverse and growing economy, and protecting the existing natural environment. The 2008 RCP identifies 2% Strategy Areas as part of the Sustainability Planning Grant (formerly known as Compass Blueprint growth vision); however, these areas have since been updated and replaced by the High-Quality Transit Areas (HQTAs) identified in the 2016–2040 RTP/SCS.

Regional Transportation Plan/Sustainable Communities Strategy. On April 7, 2016, SCAG adopted the 2016–2040 RTP/SCS. The 2016–2040 RTP/SCS is a long-range planning document that provides a common foundation for regional and local planning, policymaking, and infrastructure goals in the SCAG region. The overall vision for the 2016–2040 RTP/SCS is to allow for compact communities that are connected by numerous public transit options, are more walkable, and are safe for bicyclists. By promoting more compact communities and improving the regional transit system, SCAG's 2016–2040 RTP/SCS aims to reduce vehicular miles traveled and associated air quality and greenhouse gas emissions, promote active lifestyles, and fuel economic growth.

The 2016–2040 RTP/SCS establishes a number of initiatives aimed at improving the regional transit system and reducing automobile reliance in the SCAG planning area. Examples of these initiatives include promoting alternative modes of transportation and active transportation (e.g., bicycling and focusing new growth near transit and HQTAs and Livable Corridors). HQTAs are defined as walkable transit villages or corridors within 0.5 mile of a well-serviced transit stop or transit corridor with a 15-minute or less service frequency during peak commuting hours. Livable corridors are defined as arterials characterized by a mix of higher-density residential uses, employment centers, active transportation, and alternative transportation modes. In addition, the 2016–2040 RTP/SCS aims to provide sustainable transportation options or residents of the region through the creation of Neighborhood Mobility Areas (NMAs). NMAs promote active transportation and encourage biking, walking, skateboarding, neighborhood electric vehicles, and senior mobility devices in place of automobile use. Overall, the 2016–2040 RTP/SCS aims to focus new growth around transit.

The following goals in the 2016–2040 RTP/SCS are applicable to the proposed Project:[1]

Goal 1: Align the plan investments and policies with improving regional economic development and competitiveness.

Goal 2: Maximize mobility and accessibility for all people and goods in the region.

Goal 3: Ensure travel safety and reliability for all people and goods in the region.

Goal 4: Preserve and ensure a sustainable regional transportation system.

Goal 5: Maximize the productivity of our transportation system.

[1] Goal 9 of the 2016–2040 RTP/SCS relates to planning/policy actions to be taken by regional and local agencies; therefore, it does not apply to the Project.

Goal 6: Protect the environment and health of our residents by improving air quality and encouraging active transportation (e.g., bicycling and walking).

Goal 7: Actively encourage and create incentives for energy efficiency, where possible.

Goal 8: Encourage land use and growth patterns that facilitate transit and active transportation.

Orange County Natural Community Conservation Plan and Habitat Conservation Plan. The City of Lake Forest, including the Project site, is located within the Central and Coastal Subregion of the Orange County NCCP/HCP. The Central and Coastal Subregion encompasses approximately 208,000 ac of developed, agricultural, and undeveloped natural lands. The majority of land within this subregion has already been developed with urban land uses. Habitats of concern subject to potential development pressure include, but are not limited to, coastal sage scrub and other sage, chaparral, woodland and forest, riparian, wetlands, and native annual grasses. As part of the NCCP/HCP, projects that would impact sensitive habitat areas, as designated by the NCCP/HCP, are required to pay NCCP/HCP in lieu fees to mitigate impacts to sensitive biological resources.

The Project site is located within the jurisdiction of the Central and Coastal Orange County NCCP/HCP. Specifically, the Project site is located within an area identified as “developed” and is located well outside the habitat reserve.

4.11.3.4 Local Regulations

The City has preeminent decision-making authority regarding allowable land uses on the Project site. The City’s General Plan and Zoning Code both apply to the Project site.

City of Lake Forest General Plan. The City of Lake Forest General Plan contains goals, policies, and plans that are intended to guide land use and development decisions. The General Plan consists of a Land Use Map and the following six elements, or chapters, which together fulfill the State requirements for a General Plan:

- Land Use Element
- Housing Element
- Circulation Element
- Recreation and Resources Element (satisfies the State’s Conservation and Open Space Element requirements)
- Safety and Noise Element (satisfies the State’s Safety and Noise Element requirements)
- Public Facilities/Growth Management Element (optional element not required by State law)

At the heart of the General Plan is the Land Use Element (2010). This element presents the City’s goals and policies directing the long-term growth, development, and revitalization of the City. The

Land Use Element serves as a guide to the allocation of land use in the City and has major impacts on key issues and subject areas examined in the other elements of the General Plan. The Land Use Map, which illustrates land uses within the City, is a primary feature of the Land Use Element. Land use designations indicate the type and nature of development that is allowed in a given location.

As shown on Figure 3.5, General Plan Land Use and Business Development Overlay, the Project site is designated for Business Park uses on the City's General Plan Land Use Map. The Business Park designation is intended to provide a mix of uses as allowed under the Commercial, Professional Office, and Light Industrial designations. The Business Park designation does not provide for agricultural uses. Thus, the existing land use is inconsistent with the current Business Park designation of the Project site. As stated in the City's General Plan Land Use Element, the maximum intensity of development allowed within the Business Park designation is a Floor Area Ratio (FAR)[1] of 1.0:1.

The Project site is also within the Business Development Overlay (BDO) established by the City. The BDO designation applies to most areas designated for Commercial, Professional Office, Business Park, and Light Industrial land uses, and is intended to provide a balance of land uses that contribute to the future financial success of the City. Proposed land use designation changes within the BDO may not result in a loss of future net revenue for the City.[2]

The following policies included in the City's General Plan are relevant to the proposed Project:

- **Circulation Element**
  - **Policy 4.1:** Promote the provision of non-vehicular circulation within Lake Forest.
  - **Policy 4.3:** Improve pedestrian access from neighborhoods to commercial areas.
  - **Policy 5.1:** Require sufficient off street parking for all land uses and maximize the use of parking facilities in Lake Forest.
- **Housing Element**
  - **Policy 1.1:** Ensure the provision of a variety of housing opportunities (ownership and rental) in Lake Forest including low-density single-family homes, moderate-density townhomes, higher-density apartments and condominiums, mixed-use development, second dwelling units, and mobile homes to fulfill regional housing needs.
  - **Policy 1.3:** Ensure that the design of new residential development is compatible with that of existing residences.
  - **Policy 1.4:** Encourage the development of residential units that are designed and marketed to meet the needs of extremely low income households and special groups, such as the elderly, persons with disabilities (including developmental disabilities), and those in need of temporary shelter.

[1] Floor area ratio is the ratio of a building's total (gross) floor area to the size of the piece of land on which it is built.

[2] City of Lake Forest General Plan. Land Use Element. June 1994 (revised September 2016).

- **Policy 1.5:** Encourage the development of new housing units in close proximity to public transportation and community services, including mixed use development in the Baker Ranch and Portola Hills Planned Communities.
- **Policy 1.8:** Encourage residential developments to incorporate a minimum of 15% affordable units, including units affordable to extremely low income households.
- **Policy 4.4:** Encourage the provision of designs which support aging in place (such as universal design) in new development.

- **Land Use Element**
  - **Policy 2.1:** Enhance the physical attributes of Lake Forest to create an identifiable and distinct community within Orange County.
  - **Policy 2.2:** Promote high quality in the design of all public and private development projects.
  - **Policy 3.1:** Ensure that new development fits within the existing setting and is compatible with the physical characteristics of available land, surrounding land uses, and public infrastructure availability.
  - **Policy 3.3:** Ensure that the affected public agencies can provide necessary facilities and services to support the impact and intensity of development in Lake Forest and in areas adjacent to the City.
  - **Policy 3.4:** Blend residential and nonresidential development with landscaping and architectural design techniques to achieve visual compatibility.
  - **Policy 4.1:** Ensure that all development proposals within the planned community areas conform to applicable development plans and agreements.
  - **Policy 5.7:** Preserve the fiscal well-being of the community by ensuring that land use designation changes for land within the Business Development Overlay will not result in a loss of future net revenue for the City.

- **Public Facilities/Growth Management Element**
  - **Policy 8.1:** Utilize information on the jobs/housing balance in the City and region as a factor in land use decision-making.

- **Recreation and Resources Element**
  - **Policy 1.2:** Maximize the utilization of existing parks, recreational facilities, and open space within Lake Forest.
  - **Policy 1.6:** Promote the future development of community centers as focal points for local activities.
  - **Policy 1.7:** Develop a network of multipurpose trails to provide convenient, safe access to recreational, residential, and commercial areas.

- **Policy 2.1:** Conserve and protect important natural plant and animal communities, such as areas supporting rare and endangered species, riparian areas, wildlife movement corridors, wetlands, and significant tree stands through appropriate site planning and grading techniques, re-vegetation and soil management practices, and other resource management techniques.
- **Policy 2.3:** Encourage the expansion of reclaimed water production and use.
- **Policy 2.4:** Conserve and protect important topographical features, watershed areas, and soils through appropriate site planning and grading techniques, re-vegetation and soil management practices, and other resource management techniques.
- **Policy 4.1:** Protect areas of important historic, archaeological, and paleontologic resources.
- **Policy 5.1:** Solicit citizen participation during the early stages of major public or private development projects and regulatory programs.
- **Policy 7.1:** Cooperate with the South Coast Air Quality Management District and Southern California Association of Governments in their efforts to implement the regional Air Quality Management Plan.
- **Policy 7.5:** Implement land use policy aimed at achieving a greater balance between jobs and housing in Lake Forest.
- **Policy 7.6:** Integrate air quality planning with land use and transportation planning.
- **Policy 7.7:** Promote energy conservation and recycling by the public and private sector in Lake Forest.

- **Safety and Noise Element**
  - **Policy 1.1:** Reduce the risk of impacts from geologic and seismic hazards.
  - **Policy 1.2:** Protect the community from flooding hazards.
  - **Policy 2.4:** Reduce the risk to the community from fire.
  - **Policy 5.1:** Utilize noise/land use compatibility standards as a guide for future planning and development decisions.
  - **Policy 5.2:** Provide noise control measures, such as berms, walls, and sound attenuating construction in areas of new construction or rehabilitation.
  - **Policy 6.1:** Reduce noise impacts to sensitive land uses from transportation noise sources.

City of Lake Forest Municipal Code. Zoning is the division of a city into districts and the application of land use and development regulations specific to each district. The City of Lake Forest Zoning Code, Title 9 of the Municipal Code, includes development standards applicable to the Project site. It establishes zone-specific height limits, setback requirements, parking ratios, and other development standards, and specifies permitted and prohibited uses.

It is the intent of the City that the General Plan Land Use Element and the Zoning Code be consistent in order to ensure that long-term goals and objectives are implemented through land use

regulations and other tools. The Zoning Code is a primary tool for implementing the City's General Plan. As shown in Figure 3.6, Zoning Map, the Project site's zoning classification is General Agriculture (A1). The A1 district allows for agriculture, outdoor recreational uses, and other low-intensity uses requiring open space. According to Section 9.72.010 of the City's Zoning Code, the A1 district may be used as an interim zone in those areas which the General Plan may designate for more intensive urban uses in the future. This is the case with the Project site, which is currently designated for Business Park uses.

Approval of the proposed Project would include a Zone Change (ZC 05-17-5034) to Planned Community. Approval of the Planned Community Program outlined in the Area Plan would be required as part of the Zone Change. Should the City Council approve the proposed Project, the Area Plan would replace and supersede the Zoning requirements that apply to the Project site with those contained in the Area Plan. It should be noted that the Area Plan would not replace every provision of the City's Zoning Code. Some of the development standards established in the Zoning Code, including the off-street parking requirements, would still apply to the proposed Project. If the Area Plan is silent regarding a particular item addressed in the City's Zoning Code, the Zoning Code would continue to apply.

4.11.4 Methodology

The impact analysis presented in this Land Use and Planning section evaluates potential physical impacts of the proposed Project on land use compatibility and considers whether the proposed Project would result in potential inconsistencies with relevant plans or policies contained in applicable planning documents adopted by the City and other agencies. Neither CEQA nor the *State CEQA Guidelines* set forth standards for determining whether or not a project is consistent with an applicable plan; rather, the final determination that a project is consistent or inconsistent with an applicable plan is made by the Lead Agency when it acts on the project. The analysis in this Draft EIR discusses the findings of policy review and is meant to provide a guide for decision-makers during policy interpretation.

A project's inconsistency with a plan or policy is only considered significant if such inconsistency would result in a significant physical environmental impact (per *State CEQA Guidelines* Section 15382). This EIR section determines whether or not the proposed Project would conflict with any adopted land use policies or programs and whether mitigation is feasible. Under this approach, a policy or program conflict is not in and of itself considered a significant environmental impact. An inconsistency between the proposed Project and an applicable plan is a legal determination that may or may not indicate the likelihood of an environmental impact. In some cases, an inconsistency may be evidence that an underlying physical impact is significant and adverse.

4.11.5 Thresholds of Significance

The proposed Project may be deemed to have a significant impact with respect to land use and planning if it would:

Threshold 4.11.1: Physically divide an established community

Threshold 4.11.2: Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect

Threshold 4.11.3: Substantially conflict with existing on-site or adjacent land use due to project-related significant unavoidable indirect effects (i.e. noise, aesthetics, etc.) that preclude use of the land as it was intended by the General Plan

Threshold 4.11.4: Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, planned community, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect

Threshold 4.11.5: Conflict with the Central and Coastal Natural Communities Conservation Program/Habitat Conservation Plan (NCCP/HCP) of which the City of Lake Forest is a participant

The Initial Study, included as Appendix A, substantiates that there would be no impacts associated with Threshold 4.11.1. This threshold will not be addressed in the following analysis.

4.11.6 Project Impacts

Threshold 4.11.2: Would the Project cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

AND

Threshold 4.11.4: Would the Project conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, planned community, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?

Less Than Significant Impact. The main documents regulating land use for the Project site and the immediate vicinity are the City's General Plan and its Zoning Code. The proposed Project's relationship to these planning documents is described below. In light of SCAG's request to evaluate the Project's consistency with the 2016–2040 RTP/SCS, the proposed Project's relationship to that document is also provided below.

SCAG Regional Comprehensive Plan. The 2008 Regional Comprehensive Plan (RCP) addresses regional goals related to growth and infrastructure in the Southern California region. The RCP also addresses issues such as housing, traffic, air quality, and water resources as a guide for local agencies to use in preparing plans that deal with regional issues. The RCP outlines a vision of how the Southern California region can balance growth with conservation in order to achieve a higher quality of life. In order to achieve this balance, the RCP establishes the following land use

goals: (1) focus growth in existing centers and along major transportation corridors, (2) encourage mixed-use development, (3) provide new housing opportunities, (4) encourage development near existing and planned transportation stations to reduce traffic congestion and associated air pollutants, (5) preserve existing single-family neighborhoods, and (6) protect open space and environmentally sensitive habitat areas from development. RCP Goal 2 does not apply to the proposed Project.

The Project site is located immediately south of Bake Parkway, which is a Primary Roadway consisting of four lanes. The proposed Project would replace a wholesale plant nursery with a mix of land uses, including a residential neighborhood, an elementary school site, and neighborhood parks. Although the Project would not include new commercial or industrial development, it would be located on a site that is surrounded by existing commercial and industrial uses. Uses proposed as part of the Project would be easily accessed from Bake and Rancho Parkways and other major transportation corridors near the site (e.g., SR-241). In addition, the proposed Project would be located immediately adjacent to Class II bike lanes and bus stops on Bake Parkway and 3.5 mi northeast of the Irvine Transportation Center, a multimodal transit station that includes a Metrolink/Amtrak train station and serves as hub for express, local and rail-feeder bus services operated by OCTA. Residents may utilize alternative transportation to commute to jobs in surrounding business parks or the nearby Irvine Spectrum employment center. Therefore, the Project would be consistent with RCP Goal 1 to focus growth along major transportation corridors and Goal 4 to encourage new development near existing transportation stations.

The proposed Project would provide up to 776 new housing units on the Project site. Therefore, the Project would be consistent with RCP Goal 3 to provide new housing opportunities.

Development of the proposed Project would be consistent with existing single-family neighborhoods in the vicinity of the Project site. As such, the proposed Project would not interfere or conflict with the existing land use patterns and visual character of established residential neighborhoods near the site. Therefore, the Project would be consistent with RCP Goal 5 of preserving existing single-family neighborhoods.

The proposed Project would include a 10.4 ac open space and habitat restoration area on the Project site adjacent to Serrano Creek. The open space and habitat restoration area would be placed into a conservation easement or similar legal protection that would protect the lands in perpetuity. Therefore, the Project would be consistent with RCP Goal 6 of protecting open space and environmentally sensitive habitat areas from development.

For the reasons stated above, the proposed Project would be consistent with applicable goals and policies in SCAG's 2008 RCP.

SCAG Regional Transportation Plan/Sustainable Community Strategies. Table 4.11.A provides a consistency analysis of the goals from the 2016–2040 RTP/SCS that are relevant to the proposed Project. In order to eliminate repetitive policies and focus on key issues, goals that are not relevant to the proposed Project are not included in Table 4.11.A. As stated in Table 4.11.A, the proposed Project would be consistent with applicable goals in the 2016–2040 RTP/SCS, and no mitigation is required.

City of Lake Forest General Plan. As noted above, the proposed Project includes a General Plan Amendment request to modify the land use designation of the Project site from Business Park to Low-Medium and Medium Density Residential, High Density Residential, Public Facility, Community Park/Open Space, and Regional Park/Open Space. The Business Development Overlay applies to areas designated for Commercial, Professional Office, Business Park, and Light Industrial land uses. The General Plan Amendment would remove the Business Development Overlay from the Project site. Therefore, upon its approval by the City Council, the proposed Project would be consistent with the land use designations contained in the City's General Plan.

Table 4.11.B provides a consistency analysis of the policies from the City's General Plan that are relevant to the proposed Project. In order to eliminate repetitive policies and focus on key issues, policies that are not relevant to the proposed Project are not included in Table 4.11.B. As stated in Table 4.11.B, the proposed Project would be consistent with most of the applicable General Plan policies, with the exception of General Plan Recreation and Resources Element Policy 7.5 and General Plan Housing Element Policy 4.4. By adding 776 new housing units to the Project site, the proposed Project would lower the City's jobs-to-household ratio, resulting in a greater imbalance between jobs and housing in the City (Recreation and Resources Element Policy 7.5). In addition, the proposed Project does not contain any specific design elements that would support aging-in-place (General Plan Housing Element Policy 4.4). Despite these inconsistencies, the Project would generally be consistent with the goals and policies contained in the City's General Plan. As discussed elsewhere in this EIR, the change in planned land uses on the Project site and the resulting change in the City's jobs-housing balance alone would not result in any significant and unavoidable impacts. Similarly, although universal design is encouraged in new development, it is not required under the General Plan. Thus, inconsistency with General Plan Housing Element Policy 4.4 would not result in any significant and unavoidable impacts. Therefore, the proposed Project would result in less than significant impacts related to potential conflicts with applicable land use plans, policies, and regulations, and no mitigation is required.

City of Lake Forest Municipal Code. As described above, the proposed Project includes a Zone Change to Planned Community and the Area Plan would include a Planned Community Program applicable to the Project site. Should the City Council approve the proposed Project, the Area Plan would replace and supersede the Zoning requirements that apply to the Project site with those contained in the Area Plan. Some provisions of the City's Zoning Code would remain in effect. Therefore, upon its approval by the City Council, the proposed Project would be consistent with the City's Municipal Code and Zoning. Therefore, the proposed Project would result in less than significant impacts related to potential conflicts with applicable land use plans, policies, and regulations, and no mitigation is required.

Table 4.11.A: Regional Transportation Plan/Sustainable Communities Strategy Policy Consistency Analysis

Goals	Consistency Analysis
RTP/SCS Goal 1: Align the plan investments and policies with improving regional economic development and competitiveness.	**Consistent.** Development of the currently underutilized Project site would provide additional housing opportunities in a region that is currently experiencing a severe housing shortage. The Project would change the General Plan Land Use designation on the Project site from Business Park to allow residential uses and an elementary school site, which would likely decrease the potential number of jobs in the City of Lake Forest. However, the development of up to 776 new housing units in an area of Lake Forest that is surrounded by business parks would improve the region's economic competitiveness by ensuring that area workers would have access to new housing in close proximity to their jobs. Therefore, the proposed Project would be consistent with Goal 1 in the 2016–2040 RTP/SCS.
RTP/SCS Goal 2: Maximize mobility and accessibility for all people and goods in the region.	**Consistent.** The proposed Project would result in the conversion of a wholesale plant nursery to a residential community and an elementary school site. The Project site is located directly adjacent to Bake Parkway, which is a Primary Roadway that runs in a general north-south direction through the Cities of Irvine and Lake Forest. The Project site would also be located approximately 0.5 mi south of the SR-241/Alton Parkway interchange. Access to SR-241 from the Project site is also available via Rancho Parkway and Lake Forest Drive (to and from the northwest) and Portola Parkway South interchanges. The SR-241/Lake Forest Drive interchange is located approximately 0.2 mi northeast of the Project site and the SR-241/Portola Parkway South interchange is approximately 0.5 mi east of the Project site. The Project would provide off-street bicycle and pedestrian paths along the on-site collector streets, the perimeter of the Central Park, and a connection to the Serrano Creek Trail from the southeastern Project site boundary. The Project bikeways would connect with existing Class II bikeways (on-street bicycle lanes), which are located on both sides of Bake Parkway, Rancho Parkway South and Rancho Parkway. The Project would provide access to the site from Bake and Rancho Parkways, which would serve to connect the site with the local and regional transportation systems. As such, development of the proposed Project would maximize mobility and accessibility to the site, which is currently only accessible via a single driveway off Lake Forest Drive. In addition, the Project would provide connections to the existing regional bikeway and trail network, which would enhance nonmotorized mobility and accessibility in the region. Therefore, the proposed Project would be consistent with Goal 2 in the 2016–2040 RTP/SCS.
RTP/SCS Goal 3: Ensure travel safety and reliability for all people and goods in the region.	**Consistent.** All proposed pedestrian, bike, roadway, and trail improvements included as part of the proposed Project would comply with City and OCFA standards to ensure their safety and reliability. Therefore, the proposed Project would be consistent with Goal 3 in the 2016–2040 RTP/SCS.
RTP/SCS Goal 4: Preserve and ensure a sustainable regional transportation system.	**Consistent.** As described above in the analysis for Goal 2, the Project would provide a robust on-site circulation system that would accommodate pedestrians and cyclists. The Project would also provide connections to the existing regional bikeway and trail network, thereby encouraging the use of active transportation modes. Therefore, the proposed Project would be consistent with Goal 4 in the 2016–2040 RTP/SCS.
RTP/SCS Goal 5: Maximize the productivity of our transportation system.	**Consistent.** The Project would provide access to the site from Bake and Rancho Parkways, which would serve to connect the site with the local and regional transportation systems. Signalized intersections at these access points will include road-embedded sensors and will be well-timed for maximum efficiency. As such, development of the proposed Project would maximize the productivity of the existing roadway network in the vicinity of the site. In addition, the Project would provide connections to the existing regional bikeway and trail network, which would encourage greater use of the region's existing sidewalks, bikeways, and multi-purpose trails. Therefore, the proposed Project would be consistent with Goal 5 in the 2016–2040 RTP/SCS.

Table 4.11.A: Regional Transportation Plan/Sustainable Communities Strategy Policy Consistency Analysis

Goals	Consistency Analysis
RTP/SCS Goal 6: Protect the environment and health of our residents by improving air quality and encouraging active transportation (e.g., bicycling and walking).	**Consistent.** As described above in the analysis for Goal 2, the Project would provide a robust on-site circulation system that would accommodate pedestrians and cyclists. The Project would also provide connections to the existing regional bikeway and trail network, thereby encouraging the use of active transportation modes. As described in Section 4.3, Air Quality, of this EIR, construction and operation of the proposed Project would result in less than significant air quality impacts with the implementation of Regulatory Compliance Measures. Because the Project would encourage active transportation and not degrade air quality, the proposed Project would be consistent with Goal 6 in the 2016–2040 RTP/SCS.
RTP/SCS Goal 7: Actively encourage and create incentives for energy efficiency, where possible.	**Consistent.** The proposed Project would provide energy efficiency through compliance with the California Green Building Standards Code (CALGreen). Sustainability features proposed as part of the Project include, but are not limited to: the installation of a 240-volt circuit in each home to facilitate electric vehicle (EV) charging; the installation of light-emitting diode (LED) technology within homes; and the installation of EV charging stations at Central Park. As such, the proposed Project would be consistent with Goal 7 in the 2016–2040 RTP/SCS.
RTP/SCS Goal 8: Encourage land use and growth patterns that facilitate transit and active transportation.	**Consistent.** As described above in the analysis for Goal 2, the Project would provide a robust on-site circulation system that would accommodate pedestrians and cyclists. The Project would also provide connections to the existing regional bikeway and trail network, thereby encouraging the use of active transportation modes. The Project site is currently served by OCTA Route 206, which provides bus service along Bake Parkway and a portion of Dimension Drive. OCTA Route 177, which provides bus service along Lake Forest Drive, is also located near the Project site. Both bus routes would provide opportunities for Project residents to use transit service. The Project would facilitate transit use and active transportation by providing new housing on the Project site, which is already connected to Class II bikeways and served by existing transit service on Bake Parkway. New residents would be able to cycle or take transit to work in the Irvine Spectrum, a major regional employment center that is approximately 4 mi southwest of the Project. Therefore, the proposed Project would be consistent with Goal 8 in the 2016–2040 RTP/SCS.

Source: Southern California Association of Governments. 2016–2040 Regional Transportation Plan/Sustainable Communities Strategy.
City = City of Lake Forest
EIR = Environmental Impact Report
mi = miles
OCFA = Orange County Fire Authority
OCTA = Orange County Transportation Authority
RTP/SCS = Regional Transportation Plan/Sustainable Community Strategies
SR-241 = State Route 241

Table 4.11.B: General Plan Policy Consistency Analysis

Policies	Consistency Analysis
Circulation Element	
Policy 4.1: Promote the provision of non-vehicular circulation within Lake Forest.	**Consistent.** The proposed Project would provide off-street bicycle and pedestrian paths along the on-site collector streets, the perimeter of the Central Park, and a connection to the Serrano Creek Trail from the southeastern Project site boundary. The Project bikeways would connect with existing Class II bikeways (on-street bicycle lanes), which are located on both sides of Bake Parkway, Rancho Parkway South and Rancho Parkway. By providing connections to the existing regional bikeway and trail network as well as the existing sidewalks on Bake and Rancho Parkways adjacent to the Project site, the Project would promote the provision of non-vehicular circulation within Lake Forest. Therefore, the proposed Project would be consistent with General Plan Circulation Element Policy 4.1.
Policy 4.3: Improve pedestrian access from neighborhoods to commercial areas.	**Consistent.** As described above in the analysis for Circulation Element Policy 4.1, the Project would provide a robust on-site pedestrian circulation system that would connect with existing sidewalks along Bake and Rancho Parkways adjacent to the Project site. These connections would facilitate pedestrian movement between the Project's neighborhoods and nearby commercial centers on Bake and Rancho Parkways. Therefore, the proposed Project would be consistent with General Plan Circulation Element Policy 4.3.
Policy 5.1: Require sufficient off street parking for all land uses and maximize the use of parking facilities in Lake Forest.	**Consistent.** The proposed Project's residential uses would be required to provide off-street parking in compliance with Chapter 9.168, Off-Street Parking, of the City's Municipal Code. On-street parking will be provided to serve the Neighborhood Parks and Central Park. Therefore, the proposed Project would provide sufficient off-street parking for the Project's land uses would be considered consistent with General Plan Circulation Element Policy 5.1.
Housing Element	
Policy 1.1: Ensure the provision of a variety of housing opportunities (ownership and rental) in Lake Forest including low-density single-family homes, moderate-density townhomes, higher-density apartments and condominiums, mixed-use development, second dwelling units, and mobile homes to fulfill regional housing needs.	**Consistent.** The proposed Project includes the development of five residential neighborhoods consisting of 675 single-family residential for-sale units and one senior affordable housing neighborhood. Four of the residential neighborhoods would be developed at a low-medium density (7-15 du/ac); one would be developed at a medium density (15-25 du/ac), and the senior residential neighborhood would be developed at a high density (25-43 du/ac). The proposed Project would provide conventional single-family detached homes, single-family detached four-pack cluster homes, single-family attached homes, and senior affordable apartment homes. By providing several different housing product types, the proposed Project would diversify housing opportunities available in the City. Therefore, the proposed Project would provide housing opportunities to fulfill regional housing needs and is considered consistent with the General Plan Housing Element Policy 1.1.
Policy 1.3: Ensure that the design of new residential development is compatible with that of existing residences.	**Consistent.** Although not immediately adjacent to the Project site, single-family and multifamily residential uses exist to the northwest, northeast, and south of the Project site within several residential planned communities. These planned communities include the Foothill Ranch Planned Community to the north, the Portola Hills Planned Community to the northeast, the Baker Ranch Planned Community to the west, and the Rancho de Los Alisos Planned Community to the southeast. The proposed Project would be designed following the California Contemporary aesthetic, which includes Coastal Contemporary, California Modern, Modern Hacienda, and Spanish architectural styles that would blend with existing residential development in the Project vicinity. In addition, the residential densities of the proposed Project would generally be similar to those of the surrounding residential communities. Therefore, the proposed Project would be designed to be compatible with existing residences and is considered consistent with the General Plan Housing Element Policy 1.3.

Table 4.11.B: General Plan Policy Consistency Analysis

Policies	Consistency Analysis
Policy 1.4: Encourage the development of residential units that are designed and marketed to meet the needs of extremely low income households and special groups, such as the elderly, persons with disabilities (including developmental disabilities), and those in need of temporary shelter.	**Consistent.** As described above in the analysis for Housing Element Policy 1.1, the proposed Project would provide up to 101 rental housing units, which would be made affordable to senior citizens. Therefore, the proposed Project would be consistent with General Plan Housing Element Policy 1.4.
Policy 1.5: Encourage the development of new housing units in close proximity to public transportation and community services, including mixed-use development in the Baker Ranch and Portola Hills Planned Communities.	**Consistent.** The Project site is located adjacent to OCTA Route 206, which provides bus service along Bake Parkway and a portion of Dimension Drive. OCTA Route 177, which provides bus service along Lake Forest Drive, is also located near the Project site (the nearest bus stops are located at the intersection of Lake Forest Drive/Rancho Parkway). Both bus routes would provide opportunities for Project residents to use transit service. The Project would provide park space and an elementary school site. Emergency services and other community services are located within a 2 mi radius of the Project site. Therefore, the proposed Project would develop new housing in close proximity to public transportation and community services and is considered consistent with General Plan Housing Element Policy 1.5.
Policy 1.8: Encourage residential developments to incorporate a minimum of 15% affordable units, including units affordable to extremely low income households.	**Consistent.** The City implements this policy by requiring the preparation of an Affordable Housing Implementation Plan (AHIP). The AHIP, which is included in the Development Agreement between the Applicant and the City, must demonstrate how the project complies with the City's Affordable Housing Point System by meeting certain affordable housing production requirements. The Affordable Housing Point System awards "points" for each affordable unit provided on-site. Additional points are awarded if the units are made available as rental units for very low- or low-income households (points are weighted toward production of very-low income units). Two bedroom and second units receive additional points. The City requires that the Project provide a number of affordable units that is greater than 8.5 percent of the total number of market-rate units for which the Project is entitled. Based on the total number of market rate housing units proposed for the Project site (675), the Applicant will be required to achieve 101 points (an amount equal to 15 percent of the total number of market-rate units approved as part of the Project) under the City's Affordable Housing Point System. The AHIP included in the Development Agreement shows that the proposed Project would meet the City's affordable housing production requirements by achieving the minimum number of points required under the Affordable Housing Point System. Therefore, the proposed Project would be consistent with General Plan Housing Element Policy 1.8.
Policy 4.4: Encourage the provision of designs which support aging in place (such as universal design) in new development.	**Inconsistent.** The Project's single-family residential units do not contain any specific design elements that would support aging in place. Therefore, the proposed Project would be inconsistent with General Plan Housing Element Policy 4.4.
Land Use Element	
Policy 2.1: Enhance the physical attributes of Lake Forest to create an identifiable and distinct community within Orange County.	**Consistent.** As described in Section 4.1, Aesthetics, the proposed Project would contribute to the creation of an identifiable and distinct community within Lake Forest. The proposed Project includes over 24 ac of public parks, public and private recreational facilities, sport fields, trails, open space, and habitat restoration area. Specifically, improvements along the southeastern portion of the Project site are anticipated to enhance existing physical attributes of Lake Forest due to proximity to the Serrano Creek Trail. The proposed Project's Central Park would provide a memorable entry to the community and provide space for public events like Farmer's Markets, art fairs, and other community activities. Further, implementation of architectural and landscape design guidelines included in the Area Plan would serve to provide increased visual cohesion between the Project site and surrounding area and

Table 4.11.B: General Plan Policy Consistency Analysis

Policies	Consistency Analysis
	create neighborhoods that possess a unique sense of place and individuality. Therefore, the proposed Project would be consistent with General Plan Land Use Element Policy 2.1.
Policy 2.2: Promote high quality in the design of all public and private development projects.	**Consistent.** The Area Plan included as part of the proposed Project provides detailed architectural and landscape design guidelines that will provide design direction and standards for future development and landscaping on the Project site. As discussed above, the proposed Project would be designed following the California Contemporary aesthetic, which includes Coastal Contemporary, California Modern, Modern Hacienda, and Spanish architectural styles that would blend with existing residential development in the Project vicinity. The purpose of the design guidelines and development standards is to ensure that all design and development on the Project site is of high quality and maintains the Project's overall vision. Therefore, the proposed Project represents high-quality design and would be consistent with General Plan Land Use Element Policy 2.2.
Policy 3.1: Ensure that new development fits within the existing setting and is compatible with the physical characteristics of available land, surrounding land uses, and public infrastructure availability.	**Consistent.** As demonstrated in Section 4.11, Land Use and Planning; Section 4.3, Air Quality; Section 4.12, Noise; and Section 4.16, Transportation, the Project is designed to be compatible with surrounding land uses. The Project would make use of existing infrastructure to minimize the need for additional public investment. Therefore, the proposed Project would be consistent with General Plan Land Use Element Policy 3.1.
Policy 3.3: Ensure that the affected public agencies can provide necessary facilities and services to support the impact and intensity of development in Lake Forest and in areas adjacent to the City.	**Consistent.** As discussed further in Section 4.14, Public Services, and Section 4.18, Utilities and Service Systems, the affected public agencies were contacted during preparation of this EIR to determine potential Project-related impacts to affected public agencies. As described in Sections 4.14 and 4.18, the Project's impacts to utilities and other public services would be less than significant. Therefore, the proposed Project would be consistent with General Plan Land Use Element Policy 3.3.
Policy 3.4: Blend residential and nonresidential development with landscaping and architectural design techniques to achieve visual compatibility.	**Consistent.** Figure 3.8 depicts the Conceptual Landscape Plan for the proposed Project. As discussed above, the proposed Project would be designed following the California Contemporary aesthetic, which includes Coastal Contemporary, California Modern, Modern Hacienda, and Spanish architectural styles that would blend with existing residential development in the Project vicinity. The proposed Project would incorporate landscaping to achieve visual compatibility with surrounding land uses as well as to provide privacy for residents. Therefore, the proposed Project would use landscaping and architectural design to blend residential and non-residential development and is considered consistent with General Plan Land Use Element Policy 3.4.
Policy 4.1: Ensure that all development proposals within the planned community areas conform to applicable development plans and agreements.	**Consistent.** Should the Project be approved, the Area Plan would establish a new planned community area on the Project site. Any future development on the Project site would be required to conform with the development standards and design guidelines set forth in the Area Plan. The proposed Project also includes a Development Agreement intended to ensure that the proposed Project would not negatively affect the fiscal stability of the City. Therefore, the proposed Project would be consistent with General Plan Land Use Element Policy 4.1.
Policy 5.7: Preserve the fiscal well-being of the community by ensuring that land use designation changes for land within the Business Development Overlay will not result in a loss of future net revenue for the City.	**Consistent.** The City's General Plan designates the Project site as Business Park and Business Development Overlay (BDO). To implement the Area Plan, the Project would require approval of a General Plan Amendment to change the Project site's General Plan land use designation to Low-Medium Density Residential and Medium Density Residential (Neighborhoods One through Five, including the neighborhood parks), High Density Residential (Senior Affordable Housing), Public Facility (school site), Community Park/Open Space and Regional Park/Open Space (habitat restoration area). Neighborhood park uses would be included in each of the proposed Project's five residential neighborhoods. A Fiscal Impact Analysis (FIA) (Appendix N) prepared by the Applicant, compares the estimated net revenue to the City resulting from

Table 4.11.B: General Plan Policy Consistency Analysis

Policies	Consistency Analysis
	implementation of the proposed Project with the estimated new revenue resulting from a hypothetical development scenario based upon the current Business Park General Plan designation. According to the FIA, the proposed Project would generate an estimated $99,826 more in annual revenue to the City. Therefore, the proposed Project would be consistent with General Plan Land Use Element Policy 5.7.
Public Facilities/Growth Management Element	
Policy 8.1: Utilize information on the jobs/housing balance in the City and region as a factor in land use decision-making.	**Consistent.** According to the Existing Conditions Report prepared for the City's General Plan Update, the City of Lake Forest has a jobs-to-household ratio of 1.40, which is slightly lower than that of Orange County overall (1.55). This means that slightly more of the City's employed residents commute to jobs out of the City than come in from elsewhere. The proposed Project's addition of 776 new housing units on the Project site would slightly lower the City's jobs-to-household ratio from 1.40 to 1.36. This information will be provided to City decision makers prior to considering approval of the proposed Project. Therefore, the proposed Project would be consistent with General Plan Public Facilities/Growth Management Element Policy 8.1.
Recreation and Resources Element	
Policy 1.2: Maximize the utilization of existing parks, recreational facilities, and open space within Lake Forest.	**Consistent.** The proposed Project would provide a multi-purpose trail connection to the Serrano Creek Trail from the southeastern Project site boundary. By providing a connection to the existing regional trail network, the Project would encourage additional use of existing parks and recreational facilities located along the Serrano Creek Trail within Lake Forest, including Nature Park and the Whiting Ranch Open Space Preserve. Therefore, the proposed Project would be consistent with General Plan Recreation and Resources Element Policy 1.2.
Policy 1.6: Promote the future development of community centers as focal points for local activities.	**Consistent.** The proposed Project's Central Park would provide a memorable entry to the community and provide space for public events like Farmer's Markets, art fairs, and other community activities. In addition, a private community clubhouse and recreational facility, including pools, cabanas, multipurpose rooms, barbeques, and entertainment areas, would be provided within the Central Park for use by residents only. The community clubhouse and recreational facility would serve as a gathering place for the Project's residents. Therefore, the proposed Project would be consistent with General Plan Recreation and Resources Element Policy 1.6.
Policy 1.7: Develop a network of multipurpose trails to provide convenient, safe access to recreational, residential, and commercial areas.	**Consistent.** The proposed Project would provide off-street bicycle and pedestrian paths along the on-site collector streets, the perimeter of the Central Park, and a connection to the Serrano Creek Trail from the southeastern Project site boundary. The Project bikeways would connect with existing Class II bikeways (on-street bicycle lanes), which are located on both sides of Bake Parkway, Rancho Parkway South and Rancho Parkway. By providing connections to the existing regional bikeway and trail network as well as the existing sidewalks on Bake and Rancho Parkways adjacent to the Project site, the Project would provide convenient, safe access to recreational, residential, and commercial areas. Therefore, the proposed Project would be consistent with General Plan Recreation and Resources Element Policy 1.7.
Policy 2.1: Conserve and protect important natural plant and animal communities, such as areas supporting rare and endangered species, riparian areas, wildlife movement corridors, wetlands, and significant tree stands through appropriate site planning and grading techniques, re-vegetation and soil management practices, and other resource management techniques.	**Consistent.** As discussed in greater detail in Section 3.0, Project Description, the proposed Project would provide an open space and habitat restoration area along Serrano Creek in the southern portion of the Project site. The Project site does not otherwise contain any important natural plant and animal communities. Therefore, the proposed Project would be consistent with General Plan Recreation and Resources Element Policy 2.1.

Table 4.11.B: General Plan Policy Consistency Analysis

Policies	Consistency Analysis
Policy 2.3: Encourage the expansion of reclaimed water production and use.	**Consistent.** The proposed Project would install 8-inch reclaimed water lines in each of the Project's collector streets. These water lines would provide reclaimed water for landscaping for the Project's various uses. Therefore, the proposed Project would be consistent with General Plan Recreation and Resources Element Policy 2.3.
Policy 2.4: Conserve and protect important topographical features, watershed areas, and soils through appropriate site planning and grading techniques, re-vegetation and soil management practices, and other resource management techniques.	**Consistent.** As discussed in greater detail in Section 3.0, Project Description, the proposed Project would provide an open space and habitat restoration area along Serrano Creek in the southern portion of the Project site. Therefore, the proposed Project would be consistent with General Plan Recreation and Resources Element Policy 2.4.
Policy 4.1: Protect areas of important historic, archaeological, and paleontologic resources.	**Consistent.** Section 4.5, Cultural Resources, analyzes the potential for the proposed Project to result in potential impacts to archaeological or historic resources. As discussed in that section, the proposed Project would result in no impacts related to adverse changes in the significance of a historical resource because there are no previously recorded cultural resources in the proposed Project site, and the existing structure on the Project site is not a historical resource. Section 4.5 also states that the proposed Project would result in less than significant impacts related to archaeological resources with the implementation of mitigation. Section 4.7, Geology and Soils, evaluates whether the proposed Project would result in potential impacts to paleontological resources. As discussed in that section, the proposed Project would result in less than significant impacts related to the destruction of paleontological resources with the implementation of mitigation. Therefore, the proposed Project would be consistent with General Plan Recreation and Resources Element Policy 4.1.
Policy 5.1: Solicit citizen participation during the early stages of major public or private development projects and regulatory programs.	**Consistent.** The City has encouraged public participation in the environmental review process for the proposed Project. In July 2018, the City circulated the NOP for the proposed Project and held a scoping meeting at Lake Forest City Hall on July 25, 2018. On August 15, 2019, the Community Services Commission reviewed conceptual park designs and made recommendation to the Planning Commission and City Council. The City will continue to solicit input from stakeholders throughout the Project's environment review. Therefore, the proposed Project would be consistent with General Plan Recreation and Resources Element Policy 5.1.
Policy 7.1: Cooperate with the South Coast Air Quality Management District and Southern California Association of Governments in their efforts to implement the regional Air Quality Management Plan.	**Consistent.** As described in Section 4.3, Air Quality, the proposed Project would not conflict with the AQMP or result in any significant impacts related to implementation of the AQMP. Therefore, the proposed Project would be consistent with General Plan Recreation and Resources Element Policy 7.1.
Policy 7.5: Implement land use policy aimed at achieving a greater balance between jobs and housing in Lake Forest.	**Inconsistent.** As described above in the analysis for Public Facilities/Growth Management Element Policy 8.1, the proposed Project's addition of 776 new housing units on the Project site would lower the City's jobs-to-household ratio from 1.40 to 1.36, resulting in a slightly greater imbalance between jobs and housing in the City. Therefore, the proposed Project would be inconsistent with General Plan Recreation and Resources Element Policy 7.5.
Policy 7.6: Integrate air quality planning with land use and transportation planning.	**Consistent.** As described above in the analysis for Recreation and Resources Element Policy 7.1, the proposed Project would not conflict with the AQMP or result in any significant impacts related to implementation of the AQMP. Therefore, the proposed Project would be consistent with General Plan Recreation and Resources Element Policy 7.6.

Table 4.11.B: General Plan Policy Consistency Analysis

Policies	Consistency Analysis
Policy 7.7: Promote energy conservation and recycling by the public and private sector in Lake Forest.	**Consistent.** As described in Section 3.0, Project Description, the proposed Project would be consistent with California's Title 24 energy efficiency code and would incorporate sustainability features intended to result in energy conservation. For example, the proposed Project would reduce operational emissions associated with energy consumption by installing Energy Star appliances, tankless water heater systems, and utilizing high-efficiency heating, ventilation, and air-conditioning (HVAC) systems. Therefore, the proposed Project would be consistent with General Plan Recreation and Resources Element Policy 7.7.
Safety and Noise Element	
Policy 1.1: Reduce the risk of impacts from geologic and seismic hazards.	**Consistent.** As discussed in Section 4.7, Geology and Soils, the Project would result in less than significant impacts related to geologic and seismic hazards with the implementation of mitigation. Therefore, the proposed Project would be consistent with General Plan Safety and Noise Element Policy 1.1.
Policy 1.2: Protect the community from flooding hazards.	**Consistent.** As discussed in Section 4.10, Hydrology and Water Quality, the Project would result in less than significant impacts related to causing a substantial increase in the rate or amount of surface runoff in a manner that would result in flooding during construction or operation. Therefore, the proposed Project would be consistent with General Plan Safety and Noise Element Policy 1.2.
Policy 2.4: Reduce the risk to the community from fire.	**Consistent.** As described further in Section 4.19, Wildfire, the Project site is not located in a VHFHSZ, as designated by the California Department of Forestry and Fire Protection (CAL FIRE). However, the open space approximately 0.2 mi northeast of the Project site on the other side of SR-241 is considered a VHFHSZ. As such, the proposed Project would include a conceptual fuel modification plan to employ three fuel modification zones. The three proposed zones would provide an integral level of protection for structures from wildfires by slowing the speed and reducing the intensity of the fire. A conceptual Fire Master Plan and a conceptual Fire Protection Plan with Ember Mitigation has also been approved for the proposed Project. The Fire Master Plan and Fire Protection Plan address specific fire prevention and access elements required by the Lake Forest Municipal Code and the California Building Code. As discussed in Section 4.19, Wildfire, the Project would result in less than significant impacts related to wildfire. Therefore, the proposed Project would be consistent with General Plan Safety and Noise Element Policy 2.4.
Policy 5.1: Utilize noise/land use compatibility standards as a guide for future planning and development decisions.	**Consistent.** Section 4.12, Noise, of this EIR evaluates whether the proposed Project would result in any violations of the City's noise standards. As discussed in that section, the Project would result in less than significant off-site construction, traffic, and operational noise and vibration impacts. This information will be provided to City decision makers prior to considering approval of the proposed Project. Therefore, the proposed Project would be consistent with General Plan Safety and Noise Element Policy 5.1.
Policy 5.2: Provide noise control measures, such as berms, walls, and sound attenuating construction in areas of new construction or rehabilitation.	**Consistent.** As described further in Section 3.0, Project Description, the proposed Project would construct 8-foot high noise barriers along Bake Parkway on the northwestern perimeter of the senior affordable housing and Neighborhood 1 to reduce noise for residential uses. 8-foot high noise barriers would also be constructed along Rancho Parkway on the northeastern perimeter of Neighborhood 3 for noise attenuation. Therefore, the proposed Project would be consistent with General Plan Safety and Noise Element Policy 5.2.
Policy 6.1: Reduce noise impacts to sensitive land uses from transportation noise sources.	**Consistent.** As discussed in Section 4.12, Noise, the proposed Project would result in less than significant traffic noise impacts. Therefore, the proposed Project would be consistent with General Plan Safety and Noise Element Policy 6.1.

Source: City of Lake Forest General Plan, as amended.

ac = acres
AQMP = Air Quality Management Plan
du/ac = dwelling units per acre
EIR = Environmental Impact Report
mi = miles
NOP = Notice of Preparation
OCTA = Orange County Transportation Authority
VHFHSZ = very high fire hazard severity zone

Threshold 4.11.3: Would the Project substantially conflict with existing on-site or adjacent land use due to project-related significant unavoidable indirect effects (i.e. noise, aesthetics, etc.) that preclude use of the land as it was intended by the General Plan?

Less than Significant Impact. As identified elsewhere in this EIR, development of the proposed Project would not result in significant noise, aesthetic, or other unavoidable impacts that could adversely affect adjacent uses. The existing on-site nursery use would cease prior to construction or operation; therefore, no potential conflicts with any existing on-site land uses would occur.

As discussed in Section 4.12, Noise, of this EIR, the Project would result in less than significant off-site construction, traffic, and operational noise and vibration impacts on surrounding land uses.

According to Section 4.3, Air Quality, the Project would result in less than significant air quality impacts because it would not expose nearby sensitive receptors to substantial pollutant concentrations during construction or operation (Threshold 4.3.3). In addition, the Project's construction and operational emissions would not exceed the significance thresholds established by the SCAQMD for any of the criteria pollutants (Threshold 4.3.2). The Initial Study, included as Appendix A, substantiates that impacts associated with Threshold 4.3.4 (odors and other emissions) would be less than significant because odors during construction would be temporary and the uses associated with the operation of the proposed Project would not generate objectionable odors.

Section 4.1, Aesthetics, concludes that the proposed Project would result in less than significant impacts related to aesthetics. The proposed Project would serve to provide increased visual cohesion between the Project site and the surrounding area. The landscape and architectural design guidelines set forth in the Area Plan would ensure that the Project's development would be visually compatible with surrounding land uses (Threshold 4.1.3). Finally, the proposed Project is not anticipated to result in excessive lighting or generate glare that would adversely affect surrounding land uses (Threshold 4.1.4). Therefore, the proposed Project would result in a less than significant impact related to potential conflicts with adjacent land uses, and no mitigation is required.

Threshold 4.11.5: Would the Project conflict with the Central and Coastal Natural Communities Conservation Program/Habitat Conservation Plan (NCCP/HCP) of which the City of Lake Forest is a participant?

Less than Significant Impact. The City is a participant in the Orange County Central and Coastal NCCP/HCP. According to the *Biological Technical Report for the Nakase Property Project* (Glenn Lukos Associates, Inc., March 2019; Appendix D), the Project site is located within the Orange County Central and Coastal NCCP/HCP planning area but outside the boundaries of the NCCP/HCP Reserve System. The Reserve System boundary is located approximately 3,960 ft (0.75 mi) northeast of the proposed Project site. The Project site is in an area identified in the NCCP/HCP as urbanized and is located in an area designated for development. As described in the response to Threshold 4.4.6 in Section 4.4, Biological Resources, in this Draft EIR, development of the proposed Project would not result in the removal of any sensitive habitat species identified in the Orange County Central and Coastal NCCP/HCP. The proposed Project would not conflict with the Orange County

Central and Coastal NCCP/HCP. Therefore, the proposed Project would result in a less than significant impact related to conflict with the Orange County Central and Coastal NCCP/HCP, and no mitigation is required.

4.11.7 Cumulative Impacts

As defined in Section 15130 of the *State CEQA Guidelines*, cumulative impacts are the incremental effects of an individual project when viewed in connection with the effects of past, current, and probable future projects within the cumulative impact area for land use and planning. The cumulative impact area for land use for the proposed Project is the City of Lake Forest. Several development projects are approved and/or pending within the City. Table 4.A (refer to Chapter 4.0) lists adopted and planned projects within the City, and Figure 4.0.1, Related Project Locations, maps the locations of these projects. Each of these projects, as well as all proposed development in the City, would be subject to its own General Plan consistency analysis and would be reviewed for consistency with adopted land use plans and policies.

The City of Lake Forest is an urbanized area with a wide variety of established land uses. The land around the Project site has been developed with a variety of residential, business park, regional park/open space, commercial, and light industrial land uses. As previously stated, the Project site is designated for Business Park uses on the City's General Plan Land Use Map. However, the proposed Project would amend the General Plan to modify the land use designation of the Project site from Business Park to Low-Medium and Medium and High Density Residential, Public Facility, Community Park/Open Space, and Regional Park/Open Space to accommodate the proposed uses allowed under the Area Plan. The proposed Project also includes a Zone Change to Planned Community and the adoption of the Area Plan, which includes a Planned Community Program applicable to the Project site. Should the City Council approve the proposed Project, the proposed Project would be consistent with the City's General Plan and Zoning Code and cumulative land use impacts would be considered less than significant.

The proposed Project would include land uses that would be compatible with the surrounding neighborhoods and commercial areas and would replace the existing on-site nursery use. Therefore, the proposed Project would not contribute to a pattern of development that adversely impacts adjacent land uses or conflicts with existing on site or surrounding land uses.

There are no incompatibilities between the proposed Project and planned future projects in the City, which primarily include residential developments. As discussed previously, the proposed Project would not divide an established community; conflict with the SCAG 2016-2040 RTP/SCS or the City-adopted plans, policies, or zoning; or conflict with any NCCP/HCPs. All identified City-related projects would be reviewed for consistency with adopted land use plans and policies by the City. For this reason, the related projects are anticipated to be consistent with applicable General Plan and zoning requirements, or would be subject to allowable exceptions; further, they would be subject to CEQA, mitigation requirements, and design review. Therefore, the proposed Project would not contribute to a significant cumulative land use compatibility impact in the study area, and no mitigation is required.

4.11.8 Level of Significance Prior to Mitigation

The proposed Project would result in less than significant impacts related to land use and planning.

4.11.9 Regulatory Compliance Measures and Mitigation Measures

4.11.9.1 Regulatory Compliance Measures

There are no regulatory compliance measures applicable to land use.

4.11.9.2 Mitigation Measures

The proposed Project would not result in potentially significant impacts related to land use and planning, so no mitigation is required.

4.11.10 Level of Significance after Mitigation

No mitigation is required. The proposed Project would not result in potentially significant impacts related to land use and planning.

This page intentionally left blank

4.12 NOISE

This section of the Environmental Impact Report (EIR) evaluates the potential noise impacts associated with construction and operation of the proposed Nakase Nursery/Toll Brothers Project (proposed Project). The analysis in this section is based on the information provided in the *Noise and Vibration Impact Analysis* (Urban Crossroads 2018a) prepared for the Project, which is included in Appendix J of this EIR.

4.12.1 Scoping Process

The City of Lake Forest (City) received 28 comment letters during the public review period of the Initial Study/Notice of Preparation (IS/NOP). For copies of the IS/NOP comment letters, refer to Appendix A of this EIR. Seven comment letters included comments related to Noise.

- The letter from Southern California Edison (SCE) (August 14, 2018) suggests analysis of the noise impacts associated with project-related utility work.

- The letter from Loretta Herin (July 25, 2018) suggests the addition of a wall along Bake Parkway and installation of special pavement to reduce traffic noise at adjacent residents.

- The letter from the Saddleback Valley Unified School District (SVUSD) (July 25, 2018) requested that the EIR address environmental issues related to potential noise impacts to District schools and, specifically, potential noise impacts to the proposed school site from traffic traveling on Bake Parkway and Rancho Parkway.

- The letter from Andrea Alexander (August 6, 2018) expressed concern about existing truck and motorcycle noise on Bake Parkway and lack of noise ordinance enforcement. The commenter suggested triple-paned windows and a 10- to 12-foot (ft) wall to protect existing residents from additional traffic noise.

- The letter from Judy Esposito (August 6, 2018) expressed concern about potential increases in noise.

- The letter from the Autumnwood Homeowner's Association (HOA) (August 8, 2018) requested the EIR to evaluate noise impacts.

- The letter from Robert and Melissa Leech (August 9, 2018) stated that the existing daytime noise levels exceed 90 A-weighted decibels (dBA), and noise levels would be exacerbated as a result of the proposed Project. They also suggested a curfew on industrial traffic between 10:00 p.m. and 6:00 a.m., installation of a higher wall or landscaping to reduce traffic noise, and conducting a noise study to compare with the original environmental studies.

4.12.2 Existing Environmental Setting

4.12.2.1 Existing Project Site and Vicinity

The Project site is located southeast of Bake Parkway and southwest of Rancho Parkway in Lake Forest. State Route 241 (SR-241) is located roughly 300 ft northwest of the Project site. The Project site is currently occupied by the Nakase Brothers Wholesale Nursery, an agricultural wholesale plant nursery. Existing residential uses are located northwest of the Project site, and office and commercial uses are located northwest, northeast, southeast, and southwest of the Project site. The Serrano Creek Trail runs adjacent to the southeastern Project site boundary.

4.12.2.2 Existing Noise Levels

The ambient noise levels in the Project study area are dominated by transportation-related noise associated with the arterial roadway network. As described in Section 4.12.4, Methodology, eight 24-hour noise level measurements were taken at sensitive receiver locations in the vicinity of the Project site to determine existing noise levels in the vicinity of the Project site. The receiver locations are described in Table 4.12.A and are shown on Figure 4.12.1. The existing ambient noise levels are also detailed in Table 4.12.A. The daytime and nighttime average noise levels (L_{eq}) shown in this table represent the average of all hourly noise levels observed during the time periods. The median noise levels (L_{50}) represent the noise levels occurring 50 percent of the time. The 24-hour noise level is represented by the Community Noise Equivalent Level (CNEL), which is the weighted average of the intensity of a sound, with corrections for time of day, and averaged over 24 hours.

Table 4.12.A: Existing Noise Levels

Receiver No.	Distance to Project Site (ft)	Location	Average Noise Level (dBA L_{eq})		Average Noise Level (dBA L_{50})		24-hour Noise Level (CNEL)
			Daytime	Nighttime	Daytime	Nighttime	
L1	140	North of the Project site on Rancho Parkway adjacent to existing commercial uses	64.1	60.0	58.9	48.0	67.8
L2	115	East of the Project site adjacent to an existing pedestrian trail and an Extended Stay America hotel	54.4	50.1	50.8	42.8	57.8
L3	45	Southeast of the Project site at an adjacent pedestrian trail near existing office buildings on Lake Forest Drive	46.2	42.3	43.2	39.4	49.8
L4	0	Western Project site boundary adjacent to an existing parking lot for office uses	52.2	49.9	48.5	46.6	57.0
L5	151	Southwest of the Project site within an existing parking lot for office uses	50.0	48.4	47.0	46.1	55.3
L6	390	Northwest of the Project site near existing residential homes on Agave	46.7	43.8	43.9	41.8	51.1
L7	250	North of the Project site across Bake Parkway adjacent to an existing Staybridge Suites hotel	56.6	53.8	54.4	52.0	61.1
L8	0	Northwestern Project site boundary adjacent to Bake Parkway	75.1	71.5	69.5	56.0	79.0

CNEL = Community Noise Equivalent Level
dBA = A-weighted decibels
ft = feet
L_{50} = median noise level
L_{eq} = equivalent continuous noise level

LEGEND:

▲ Noise Measurement Locations

LSA

FIGURE 4.12.1

N

Nakase Nursery/Toll Brothers
Noise Measurement Locations

SOURCE: Urban Crossroads

I:\CLF1801\G\Noise_Measure_Locations.cdr (7/5/2019)

This page intentionally left blank

4.12.3 Regulatory Setting

4.12.3.1 Federal Regulations

No federal regulations related to noise were used in the preparation of this analysis.

4.12.3.2 State Regulations

The State of California regulates freeway noise, sets standards for sound transmission, provides occupational noise control criteria, identifies noise standards, and provides guidance for local land use compatibility. State law requires that each county and city adopt a General Plan that includes a Noise Element, which is to be prepared per guidelines adopted by the Governor's Office of Planning and Research (OPR). The purpose of the Noise Element is to limit the exposure of the community to excessive noise levels. In addition, the California Environmental Quality Act (CEQA) requires that all known environmental effects of a project be analyzed, including environmental noise impacts.

The State of California's noise insulation standards are codified in the California Code of Regulations (CCR), Title 24, Building Standards Administrative Code, Part 2, and the California Building Code (CBC). These noise standards are applied to new construction in California for the purpose of controlling interior noise levels resulting from exterior noise sources. The regulations specify that acoustical studies must be prepared when noise-sensitive structures (e.g., residential buildings, schools, or hospitals) are developed near major transportation noise sources, and where such noise sources create an exterior noise level of 60 dBA CNEL or higher. Acoustical studies that accompany building plans for noise-sensitive land uses must demonstrate that the structure has been designed to limit interior noise in habitable rooms to acceptable noise levels. For new residential buildings, schools, and hospitals, the acceptable interior noise limit for new construction is 45 dBA CNEL.

4.12.3.3 Regional Regulations

There are no regional regulations applicable to noise.

4.12.3.4 Local Regulations

City of Lake Forest General Plan. The City of Lake Forest has adopted a Safety and Noise Element of the General Plan to address public safety and quality of life issues. The Safety and Noise Element specifies the maximum exterior and interior noise levels for new developments impacted by transportation noise sources (e.g., arterial roads, freeways, airports, and railroads). In addition, the Safety and Noise Element identifies noise standards designed to protect, create, and maintain an environment free from noise that may jeopardize the health or welfare of sensitive receivers, or degrade quality of life.

The noise criteria identified in the City of Lake Forest Safety and Noise Element are guidelines to evaluate the land use compatibility of transportation-related noise (Table 4.12.B). The land use compatibility criteria provides the City with a planning tool to gauge the compatibility of land uses relative to existing and future exterior noise levels. The Noise/Land Use Compatibility Matrix in the City of Lake Forest General Plan provides guidelines to evaluate the acceptability of transportation-related noise-level impacts. These guidelines are based on the Governor's OPR and are used to assess the long-term traffic noise impacts on land uses. Noise-sensitive land uses such as

Table 4.12.B: Noise/Land Use Compatibility Matrix

Land Use Category	Community Noise Equivalent Level CNEL						
	55	60	65	70	75	80	
Residential – Single-Family, Multifamily, Duplex	A	A	B	C[1]	C		
Residential – Mobile Homes	A	A	B	C	C		
Transient Lodging – Motels, Hotels	A	A	B	B	C	C	
Schools, Libraries, Churches, Hospitals, Nursing/Convalescent Homes, Preschools, Day Care Centers (1)[2]	A	A	B	C	C		
Auditoriums, Concert Halls, Amphitheaters, Meeting Halls	B	B	C	C			
Sports Areas, Outdoor Spectator Sports, Amusement Parks	A	A	A	B	B		
Playgrounds, Neighborhood Parks	A	A	A	B	C		
Golf Courses, Riding Stables, Cemeteries	A	A	A	A	B	C	C
Office and Professional Buildings	A	A	A	B	B	C	
Commercial Retail, Banks, Restaurants, Theaters	A	A	A	A	B	B	C
Industrial, Manufacturing, Utilities, Wholesale, Service Stations	A	A	A	A	B	B	B
Agriculture	A	A	A	A	A	A	A

Source: Table SN-3, City of Lake Forest General Plan, Safety and Noise Element (June 21, 1994).

Zone A. **Normally Acceptable**—Specified land use is satisfactory, based on the assumption that any buildings involved are of normal conventional construction without any special noise insulation requirements.

Zone B. **Conditionally Acceptable**—New construction or development should be undertaken only after detailed analysis of noise reduction requirement is made and needed noise insulation features in the design are determined. Conventional construction, with closed windows and fresh air supply systems or air-conditioning, will normally suffice.

Zone C. **Normally Unacceptable**—New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of noise reduction requirements must be made and needed noise insulation features included in the design.

Notes: (1) Religious institutions (Churches, synagogues, temples and other places of worship) of a small size (occupancy of 100 persons or less) may occupy existing buildings within areas of exterior noise levels ranging from 65 to 75 dB CNEL without providing additional noise insulation for the building.

(2) Shaded areas indicate new construction or development should generally not be undertaken. Source: J.J. Van Houten & Associates.

[1] General Plan Amendment 95-01, dated May 16, 1995.
[2] General Plan Amendment 94-01, dated July 11, 1995.

dB = decibels
dBA = A-weighted decibels
CNEL = Community Noise Equivalent Level

single-family homes and schools are considered normally acceptable with exterior noise levels below 60 dBA CNEL and are conditionally acceptable with noise levels below 65 dBA CNEL. For conditionally acceptable land use, new construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features are included in the design.

The City provides exterior and interior noise level standards as shown in Table 4.12.C. These land use specific noise level standards are used to regulate transportation-related noise levels for noise sensitive uses.

Table 4.12.C: Interior and Exterior Noise Standards

Land Use	Noise Standards	
	Interior[1]	Exterior
Residential: Single-Family, Multifamily, Duplex, Mobile Home	45 dBA CNEL	65 dBA CNEL[2]
Residential: Transient Lodging, Hotels, Motels, Nursing Homes, Hospitals	45 dBA CNEL	65 dBA CNEL
Private Offices, Church Sanctuaries, Libraries, Board Rooms, Conference Rooms, Theaters, Auditoriums, Concert Halls, Meeting Halls, etc.	45 dBA $L_{eq}(12)$[3]	—
Schools	45 dBA $L_{eq}(12)$	67 dBA $L_{eq}(12)$[4]
General Offices, Reception, Clerical, etc.	50 dBA $L_{eq}(12)$	—
Bank Lobby, Retail Store, Restaurant, Typing Pool, etc.	55 dBA $L_{eq}(12)$	—
Manufacturing, Kitchen, Warehousing, etc.	65 dBA $L_{eq}(12)$	—
Park, Playgrounds	—	65 dBA CNEL
Golf Courses, Outdoor Spectator Sports, Amusement Parks	—	70 dBA CNEL

Source: *Noise and Vibration Impact Analysis* (Urban Crossroads 2018a)

[1] Noise standard with windows closed. Mechanical ventilation shall be provided per Uniform Building Code requirements to provide a habitable environment. Indoor environment excludes bathrooms, toilets, closets, and corridors.

[2] Outdoor environment limited to rear yard of single-family homes, multifamily patios and balconies (with a depth of 6 ft or more), and common recreation areas.

[3] Religious institutions (churches, temples, and other places of worship) of a small size (occupancy of 100 persons or less) may occupy existing buildings within areas of exterior noise levels ranging from 65 to 75 dBA CNEL without providing additional noise insulation for the building.

[4] Outdoor environment limited to playground areas, picnic areas, and other areas of frequent human use.

CNEL = Community Noise Equivalent Level
dBA = A-weighted decibels
ft = feet/foot
$L_{eq}(12)$ = the A-weighted equivalent sound level averaged over a 12-hour period (usually the hours of operation)

City of Lake Forest Municipal Code. To analyze noise impacts originating from a designated fixed location or private property such as the Project, stationary-source (operational) noise such as the proposed playgrounds, sports fields, outdoor pool/spa activities, a dog park, and school parking lot vehicle movements are typically evaluated against standards established under a jurisdiction's Municipal Code. The Project operational noise impacts are governed by the City of Lake Forest Municipal Code, Title 11 – Peace and Safety, Division II – Offenses Against Public Peace, Chapter 11.16 – Noise Control. Section 11.16.040 , Exterior Noise Standards, of the Municipal Code identifies the maximum permissible exterior noise levels for residential uses that shall be no greater than 55 dBA 7:00 a.m. to 10:00 p.m. and no greater than 50 dBA 10:00 p.m. to 7:00 a.m. for a period of 30 minutes. Further thresholds that are dependent on the duration of activity are described below.

In order to properly assess the impact of events at exterior residential property that occur for periods of time less than 30 minutes within a given hour, Section 11.16.040(B) provides the following noise level additions:

1. The noise standard for a cumulative period of more than 30 minutes in any hour; or
2. The noise standard plus 5 dBA for a cumulative period of more than 15 minutes in any hour; or
3. The noise standard plus 10 dBA for a cumulative period of more than 5 minutes in any hour; or
4. The noise standard plus 15 dBA for a cumulative period of more than 1 minute in any hour; or
5. The noise standard plus 20 dBA for any period of time.

If the ambient noise level exceeds any of the first four noise limit categories above, the cumulative period applicable to said category shall be increased to reflect that ambient noise level. If the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under the fifth category shall be increased to reflect the maximum ambient noise level. Additionally, In the event the alleged offensive noise consists entirely of impact noise, simple tone noise, speech, music, or any combination thereof, each of the above noise levels shall be reduced by 5 dBA.

A summary of the exterior daytime and nighttime noise level standards are presented in Table 4.12.D below.

Table 4.12.D: Summary of Stationary-Source Noise Level Standards

Land Use	Time Period	Maximum Permissible Exterior Noise Levels[1]				
		L_{50} (30 min)	L_{25} (15 min)	L_8 (5 min)	L_2 (1 min)	L_{max} (Anytime)
Residential	Daytime (7:00 a.m.–10:00 p.m.)	55	60	65	70	75
	Nighttime (10:00 p.m.–7:00 a.m.)	50	55	60	65	70

Source: Sections 11.16.040(A) and (B) of the City of Lake Forest Municipal Code.

[1] The percent noise level is the level exceeded "n" percent of the time during the measurement period. List the noise level exceeded 25% of the time.

L_{max} = maximum instantaneous noise level

min = minutes

In regard to the regulation of construction noise impacts, the City's Municipal Code, Section 11.16.060(H), exempts the following type of noise:

> Noise sources associated with construction, repair, remodeling, or grading of any real property, provided said activities do not take place between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a legal City of Lake Forest holiday.

Noise from construction activities are typically limited to the hours of operation established under a city's Municipal Code. However, both the City of Lake Forest Municipal Code and the City's *CEQA Significance Thresholds Guide* (City of Lake Forest 2009) consider construction noise exempt from the Municipal Code stationary-source noise level standards (Section 11.16.060 of the Municipal Code), and do not establish a numeric maximum acceptable construction-source noise level threshold for potentially affected receivers, which would allow for a quantified determination of potential impacts under CEQA.

To evaluate whether the Project will generate potentially significant construction noise levels at off-site sensitive receiver locations, a construction-related noise level threshold is adopted from the *Criteria for Recommended Standard: Occupational Noise Exposure prepared by the National Institute for Occupational Safety and Health* (NIOSH). A division of the U.S. Department of Health and Human Services, NIOSH identifies a noise level threshold based on the duration of exposure to the source. The construction-related noise level threshold starts at 85 dBA for more than 8 hours per day, and for every 3 dBA increase, the exposure time is cut in half. This results in noise level thresholds of

88 dBA for more than 4 hours per day, 92 dBA for more than 1 hour per day, 96 dBA for more than 30 minutes per day, and up to 100 dBA for more than 15 minutes per day.

For the purposes of this analysis, the lowest, more conservative construction noise level threshold of 85 dBA L_{eq} is used as an acceptable threshold for construction noise at the nearby sensitive receiver locations. Since this construction-related noise level threshold represents the energy average of the noise source over a given time, they are expressed as L_{eq} noise levels. Therefore, the noise level threshold of 85 dBA L_{eq} over a period of 8 hours or more is used to evaluate the potential Project-related construction noise level impacts at the nearby sensitive receiver locations.

4.12.4 Methodology

Evaluation of noise and vibration impacts associated with the proposed Project included the following:

- Determination of the short-term construction noise and vibration impacts
- Determination of the long-term noise impact impacts resulting from off-site traffic and Project operation stationary sources
- Determination of the land use compatibility of the proposed Project as compared to the City's exterior and interior noise criteria

The evaluation of noise and vibration impacts was prepared in conformance with appropriate standards, utilizing procedures and methodologies in the City of Lake Forest Safety and Noise Element and Municipal Code as well as the *Criteria for Recommended Standard: Occupational Noise Exposure prepared by the National Institute for Occupational Safety and Health* (NIOSH). The Federal Highway Administration (FHWA) Traffic Noise Prediction Model (FHWA-RD-77-108) was used to determine traffic noise impacts. Please refer to the *Noise and Vibration Impact Analysis* (Urban Crossroads 2018a) for additional details on the noise and vibration modeling methodology and assumptions used to estimate construction and operation impacts of the proposed Project.

4.12.4.1 Receiver Locations

To assess the potential for long-term operational and short-term construction noise impacts, the following receiver locations as shown on Figure 4.12.2, Sensitive Receptor Locations, were identified as representative locations for focused analysis. Land uses that are considered relatively insensitive to noise include commercial, and office developments. Land uses that are typically not affected by noise include: industrial, manufacturing, utilities, agriculture, natural open space, undeveloped land, parking lots, warehousing, liquid and solid waste facilities, salvage yards, and transit terminals.

This page intentionally left blank

LEGEND:

- Receiver Locations
- Distance from receiver to Project site boundary (in feet)
- 6' Existing Barrier Height (in feet)
- Existing Barrier

LSA

FIGURE 4.12.2

N

Nakase Nursery/Toll Brothers
Sensitive Receptor Locations

SOURCE: Urban Crossroads

I:\CLF1801\G\Receptor Locations.cdr (7/5/2019)

This page intentionally left blank

Sensitive receivers near the Project site include existing homes, hotels, and the existing Serrano Creek Trail area, as described below. Other sensitive land uses in the Project study area that are located at greater distances than those identified in this report would experience lower noise levels than those presented in this report due to the additional attenuation from distance and the shielding by intervening structures.

- **R1:** Located approximately 197 ft north of the Project site, R1 represents existing residential north of Bake Parkway.
- **R2:** Location R2 represents the existing Staybridge Suites hotel, which is located roughly 264 ft north of the Project site across Bake Parkway.
- **R3:** Location R3 represents the existing Extended Stay America hotel, which is located approximately 216 ft southeast of the Project site on Lake Forest Drive.
- **R4:** Location R4 represents the existing Serrano Creek Trail area, which is located adjacent to the southern Project site boundary approximately 80 ft southeast.

4.12.5 Thresholds of Significance

The thresholds for noise impacts used in this analysis are consistent with Appendix G of the *State CEQA Guidelines*. The following thresholds were used to evaluate the potential noise impacts of the proposed Project:

Threshold 4.12.1: Would the project result in the generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Threshold 4.12.2: Would the project result in the generation of excessive groundborne vibration or groundborne noise levels?

Threshold 4.12.3: For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the Project area to excessive noise levels?

None of the thresholds for noise were scoped out in the Initial Study, which is included in Appendix A of this EIR. Therefore, all of the thresholds listed above are addressed in the following analysis.

4.12.5.1 City Significance Criteria Summary

According to the criteria presented above, noise and vibration impacts shall be considered significant if any of the following occur as a direct result of the proposed development. Table 4.12.E shows the significance criteria summary matrix.

Table 4.12.E: Significance Criteria Summary

Analysis	Receiving Land Use	Condition(s)	Significance Criteria	
			Daytime[1]	Nighttime[2]
Off-Site Traffic Noise	Noise- Sensitive	Exterior Noise Level Criteria	≥ 3 dBA CNEL Project Increase & Resulting With Project Noise Level > 65 dBA CNEL	
On-Site Traffic Noise	Residential & School	Exterior Noise Level Standard	65 dBA CNEL	
		Interior Noise Level Standard	45 dBA CNEL	
Operational Noise	Noise- Sensitive	Exterior Noise Level Standards	See Table 4.12.D.	
Construction Noise & Vibration	Noise- Sensitive	Noise Level Threshold	85 dBA L_{eq}	N/A
		Vibration Level Threshold (Building Damage)	0.3 in/sec PPV	N/A
		Vibration Level Threshold (Distinctly Perceptible)	0.04 in/sec PPV	N/A

[1] Daytime = 7:00 a.m. to 10:00 p.m.
[2] Nighttime = 10:00 p.m. to 7:00 a.m.
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibels
in/sec = inches per second
L_{eq} = equivalent continuous sound level
N/A = no nighttime construction activity is permitted, so no nighttime construction noise level limits are identified.
PPV = peak particle velocity

- **Off-Site Traffic Noise:** When both of the following criteria are met at noise-sensitive land uses (e.g., residential, hotels, motels, nursing homes, hospitals, parks, playgrounds and recreation areas, and schools):
    - Project traffic will cause a noise level increase of 3 dBA CNEL or more on a roadway segment adjacent to a noise-sensitive land use; and
    - The resulting "future with project" noise level exceeds the 65 dBA CNEL exterior noise level standard for sensitive land uses.
- **On-Site Traffic Noise:** If the on-site noise levels:
    - Exceed the exterior noise level standard of 65 dBA CNEL for outdoor areas (e.g., rear yard of single-family homes, multi-family patios and balconies (with a depth of 6 ft or more), common recreation areas, playgrounds, or picnic areas); or
    - Exceed an interior noise level of 45 dBA CNEL for noise-sensitive uses.
- **Operational Noise:** If Project-related operational (stationary source) noise levels exceed the noise level standards for sensitive land uses as presented in Sections 11.16.040(A) and (B) of the City of Lake Forest Municipal Code as well as in Table 4.12.D.
- **Construction Noise and Vibration:**
    - If Project-related construction activities create noise levels that exceed the 85 dBA L_{eq} acceptable noise level threshold at the nearby sensitive receiver locations; or
    - If Project-related construction activities generate vibration levels that exceed the California Department of Transportation (Caltrans) building damage vibration level threshold for older

residential structures of 0.3 inches per second (in/sec) peak particle velocity (PPV), or the *distinctly perceptible* human annoyance vibration level threshold of 0.04 in/sec PPV at nearby sensitive receiver locations.

4.12.6 Project Impacts

Threshold 4.12.1: Would the Project result in the generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Potentially Significant Impact.

Construction Noise Impacts. This section summarizes potential impacts resulting from the short-term construction activities associated with the development of the proposed Project. Based on the reference construction noise levels, the Project-related construction noise levels when the highest reference noise level is operating at the edge of primary construction activity nearest each sensitive receiver location would range from 53.3 to 65.2 dBA L_{eq} at the sensitive receiver locations, and therefore would not exceed the construction noise level threshold of 85 dBA L_{eq} at any receiver location. The noise impact due to unmitigated Project construction noise levels is, therefore, considered a less than significant impact at all receiver locations, and no mitigation is required.

Off-Site Traffic Noise Impacts. To assess the off-site transportation CNEL noise level impacts associated with development of the proposed Project, noise contours were developed based on *Nakase Property Traffic Impact Analysis* (Urban Crossroads 2019c). Noise contour boundaries represent the equal levels of noise exposure and are measured in CNEL from the center of the roadway. Noise contours were developed for the following scenarios:

- **Existing Conditions Without/With Project:** This scenario refers to the existing present-day noise conditions without and with the proposed Project.

- **Interim Year 2020 Without/With Project:** This scenario refers to Interim Year noise conditions without and with the proposed Project.

- **2040 General Plan With Approved Business Park Land Use Without Portola Extension Without/With Project:** This scenario refers to the ambient noise conditions at future Year 2040 without and with the proposed Project, and includes all cumulative projects identified in the Traffic Impact Analysis (TIA).

- **2040 General Plan With Approved Business Park Land Use With Portola Extension Without/With Project:** This scenario refers to the ambient noise conditions at future Year 2040 without and with the proposed Project, and includes all cumulative projects identified in the TIA.

Noise contours were used to assess the proposed Project's incremental traffic-related noise impacts at land uses adjacent to 39 study area roadway segments conveying Project traffic. The noise contours represent the distance to noise levels of a constant value and are measured from the center of the roadway for the 70, 65, and 60 dBA noise levels. The noise contours do not consider the effect of any existing noise barriers or topography that may attenuate ambient noise levels. In addition, because the noise contours reflect modeling of vehicular noise on area roadways, they appropriately do not reflect noise contributions from the surrounding stationary noise sources within the Project study area.

The off-site traffic noise modeling shows conditions would range from 63.6 to 78.5 dBA CNEL and the proposed Project would generate noise level increases of 0.1 to 0.72 dBA CNEL on the study area roadway segments for all scenarios. The Project-related noise level increases are considered less than significant at the noise-sensitive land uses adjacent to roadways conveying Project traffic since they would not result in an exceedance of the 3 dBA CNEL increase criteria when the with Project noise level exceeds the 65 dBA CNEL noise level standard for sensitive land uses. No mitigation is required.

Off-Site Operational Noise Impacts. This section summarizes the potential operational noise impacts that may result from the Project's stationary noise sources on the off-site sensitive receiver locations. The hourly noise levels associated with the playgrounds, sports fields, outdoor pool/spa activities, a dog park, and school parking lot vehicle movements are expected to range from 17.9 to 32.5 dBA L_{50} at the sensitive off-site receiver locations.

To demonstrate compliance with local noise regulations, the Project-only operational noise levels were evaluated against the exterior noise level threshold based on the City's exterior noise level standards. Table 4.12.F shows that the with Project operational noise levels would not exceed the City's daytime and nighttime exterior noise level standards at any receiver location, and therefore are considered a less than significant noise impact. No mitigation is required.

Table 4.12.F: Unmitigated Operational Noise Level Compliance

Receiver Location	Land Use	Noise Level at Receiver Locations (dBA)					Threshold Exceeded?[1]
		L_{50} (30 min)	L_{25} (15 min)	L_8 (5 min)	L_2 (1 min)	L_{max} (<1 min)	
Daytime	Residential Standards	55	60	65	70	75	–
Nighttime		50	55	60	65	70	–
R1	Residential	17.9	21.2	25.8	30.1	46.1	No
R2	Hotel	27.1	31.0	36.2	40.1	58.0	No
R3	Hotel	27.3	31.0	35.5	39.1	55.8	No
R4	Recreation	32.5	35.6	39.3	42.6	55.5	No

[1] Refer to Table 4.12.D for operational noise level standards
dBA = A-weighted decibels
L_{max} = maximum instantaneous noise level
min = minutes

On-Site Noise Impacts. A noise impact analysis has been completed to determine the noise exposure levels that would result from adjacent and dominant traffic noise sources in the Project study area. The primary source of traffic noise affecting the Project site is anticipated to be from SR-241, Bake Parkway, Rancho Parkway, and Lake Forest Drive. The proposed Project would also experience some traffic noise impacts from the Project's internal local streets. Due to the low traffic volume and low speeds of vehicles traveling within the Project site, traffic noise from these roadways would not make a significant contribution to the noise environment beyond the right-of-way.

Exterior Noise Analysis. Using the FHWA traffic noise prediction model, the expected future exterior noise levels were calculated at the noise-sensitive residential and school uses within the Project site. The future exterior traffic noise levels are expected to range from 51.6 to 64.7 dBA CNEL at the outdoor areas (e.g., residential private yards and school playground and picnic areas) within the Project site with the planned 6 ft high noise barriers for residential uses. No exterior noise barriers are required to satisfy the City's 65 dBA CNEL exterior noise level standard at the school outdoor playground and picnic areas. With the planned noise barriers, the future exterior noise levels are considered to be a less than significant noise impact and no mitigation is required.

Interior Noise Analysis. To ensure that the interior noise levels comply with the City of Lake Forest interior noise level standards, future noise levels were calculated at the building façades.

Noise Reduction Assumptions. The interior noise level is the difference between the predicted exterior noise level at the building façade and the noise reduction of the structure. Typical building construction will provide a Noise Reduction (NR) of approximately 12 dBA with "windows open" and a minimum 25 dBA noise reduction with "windows closed." However, sound leaks, cracks and openings within the window assembly can greatly diminish its effectiveness in reducing noise. Several methods may be incorporated into the Project design in order to achieve required sound attenuation, including, but not limited to: (1) weather-stripped solid core exterior doors; (2) dual-glazed windows; (3) mechanical ventilation/air conditioning; and (4) exterior wall/roof assembles free of cut-outs or openings.

Use of dual-paned windows is required by the CBC for energy conservation in new residential construction. In addition, all residential and school windows and exterior doors would have a minimum sound transmission class (STC) rating of 27 or higher. As required by the CBC, the proposed Project would install heating, ventilating, and air conditioning (HVAC) units in all residential units because window closure is a necessary condition to meet the interior noise exposure standard (refer to Regulatory Compliance Measure [RCM] NOI-1). In addition, roof sheathing would be per manufacturer's specification or caulked plywood of at least 0.5 inch thick, ceilings in residential and school uses would be per manufacturer's specification or well-sealed gypsum board of at least 0.5 inch thick, and insulation with at least a rating of R-19 would be used in the attic space to provide additional sound attenuation.

Interior Noise Level Assessment. The analysis shows that the buildings associated with the proposed Project would require a windows-closed condition and a means of mechanical ventilation (e.g. air conditioning) (refer to RCM NOI-1). The future exterior noise levels at the first-floor building façades are expected to range from 51.7 to 62.2 dBA CNEL. The first-floor interior noise level analysis shows that the City of Lake Forest 45 dBA CNEL residential and school interior noise level standard can be satisfied with incorporation of the design features described above (e.g., dual-pane windows with an STC rating of 27 or higher).

The future exterior noise levels at the second-floor building façades are expected to range from 56.9 to 69.2 dBA CNEL. The second-floor interior noise level analysis shows that the City's 45 dBA CNEL residential and school interior noise level standard can be satisfied by incorporation of the design features described above (e.g., dual-pane windows with an STC rating of 27 or higher). Therefore, impacts related to interior noise levels are anticipated to be less than significant, but a final noise study would be required to verify design and building performance. Mitigation Measure 4.12.1 requires that a final noise study be prepared prior to obtaining building permits for the Project. This report would utilize the precise grading plans, architectural floor plans and elevations, and actual building design specifications, and may include additional measures, if necessary, to ensure that the City's 45 dBA CNEL interior noise level standards are met.

Threshold 4.12.2: Would the project result in the generation of excessive groundborne vibration or groundborne noise levels?

Less than Significant Impact. Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods used, distance to the affected structures and soil type. It is expected that ground-borne vibration from Project construction activities would cause only intermittent localized effects. The proposed Project's construction activities most likely to cause vibration impacts are:

- **Heavy Construction Equipment:** Although all heavy mobile construction equipment has the potential of causing at least some perceptible vibration while operating close to buildings, the vibration is usually short-term and is not of sufficient magnitude to cause building damage.

- **Trucks:** Trucks hauling building materials to construction sites can be sources of vibration intrusion if the haul routes pass through residential neighborhoods on streets with bumps or potholes. Repairing the bumps and potholes generally eliminates the problem.

Ground-borne vibration levels resulting from construction activities occurring within the Project site were estimated using data published by the Federal Transit Administration (FTA). Construction activities that would have the potential to generate low levels of ground-borne vibration within the Project site include mobile equipment activities and pile driving, among others. Using the vibration source level of construction equipment and the construction vibration assessment methodology published by the FTA, it is possible to estimate the Project vibration impacts.

Based on the reference vibration levels provided by the FTA, a large bulldozer represents the peak source of vibration with a reference velocity of 0.089 in/sec PPV at 25 ft. At distances ranging from 130 to 304 ft from primary Project construction activities, construction vibration velocity levels are expected to range from 0.002 to 0.008 in/sec PPV. Therefore, the Project construction vibration levels would remain below the Caltrans building damage threshold of 0.3 in/sec PPV at all receiver locations, and no mitigation is required.

Compared with the Caltrans construction vibration standard for human annoyance, the proposed Project construction activities would remain below the distinctly perceptible vibration standard of 0.04 in/sec PPV at all receiver locations. Therefore, Project-related vibration impacts at the nearby sensitive receiver locations would be less than significant, and no mitigation is required.

Additionally, the Project site would require up to 150,000 cubic yards (cy) of soil export during the construction process. Truck vibration levels are dependent on vehicle characteristics, load, speed, and pavement conditions. When haul trucks are traveling to and from the project site along local roadways, typical vibration levels for the Nakase Property heavy truck activity at normal traffic speeds would approach 0.004 in/sec PPV at 25 ft based on the FTA *Transit Noise Impact and Vibration Assessment Manual*. This would be below the Caltrans building damage threshold of 0.3 in/sec PPV and human annoyance threshold of 0.04 in/sec PPV for the receptors along the surrounding roadways. No mitigation is required.

Once on site, trucks would be traveling at very low speeds so it is expected that delivery truck vibration levels at adjacent properties would approach 0.002 in/sec PPV at 25 ft and would remain well below the Caltrans building damage threshold of 0.3 in/sec PPV and human annoyance threshold of 0.04 in/sec PPV for all surrounding uses. No mitigation is required.

During operation, the proposed Project would not include any activities that would generate substantial ground-borne vibration or ground-borne noise. Therefore, operation of the proposed Project would not result in excessive ground-borne vibration or ground-borne noise levels, and no mitigation is required.

Threshold 4.12.3: For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the Project area to excessive noise levels?

Less than Significant Impact. The closest airport to the Project site is John Wayne Airport, which is located approximately 11 miles (mi) northwest of the Project site. The Project site is not located within 2 mi of a public airport or within an airport land use plan nor is the Project within the vicinity of a private airstrip. As such, the Project site would not be exposed to excessive noise levels from airport operations; therefore, impacts are considered less than significant and no mitigation is required.

4.12.7 Cumulative Impacts

Less than Significant Impact. The off-site impacts related to noise and vibration are associated with off-site traffic. For the proposed Project, two scenarios for the Year 2040 conditions with the project were analyzed, the first being without the Portola Extension and the second with the Portola Extension.

For the first scenario, the 2040 General Plan With Approved Business Park Land Use Without Portola Extension with Project conditions would range from 65.6 to 78.5 dBA CNEL, and the proposed Project would generate a noise level increase of up to 0.1 dBA CNEL on the study area roadway segments. The Project-related noise level increases are considered less than significant under 2040 General Plan With Approved Business Park Land Use Without Portola Extension with Project conditions at the noise-sensitive land uses adjacent to roadways conveying Project traffic because they would not result in an increase of 3 dBA CNEL when the with Project noise level exceeds the 65 dBA CNEL noise level standard for sensitive land uses. No mitigation is required.

For the second scenario, the 2040 General Plan With Approved Business Park Land Use With Portola Extension with Project conditions would range from 65.6 to 78.5 dBA CNEL, and the proposed Project would generate a noise level increase of up to 0.2 dBA CNEL on the study area roadway segments. The Project-related noise level increases are considered less than significant under 2040 General Plan With Approved Business Park Land Use With Portola Extension with Project conditions at the noise-sensitive land uses adjacent to roadways conveying Project traffic because they would not result in an increase of 3 dBA CNEL when the with Project noise level exceeds the 65 dBA CNEL noise level standard for sensitive land uses. No mitigation is required.

4.12.8 Level of Significance Prior to Mitigation

The following potential noise impacts would be less than significant prior to mitigation: (1) general construction activities; (2) long-term traffic-related noise impacts to off-site uses; (3) long-term off-site stationary source noise impacts from on-site uses; (4) long-term traffic related noise impacts to proposed exterior on-site uses; (5) vibration; and (6) noise associated with aircraft and airport operations. Impacts related to interior noise levels would be potentially significant and mitigation is required.

4.12.9 Regulatory Compliance Measures and Mitigation Measures

4.12.9.1 Regulatory Compliance Measures

RCM NOI-1 **Ventilation Requirements.** Prior to the issuance of building permits, documentation shall be provided to the City of Lake Forest Director of Community Development, or designee, demonstrating that Project buildings meet ventilation standards required by the CBC with the windows closed. It is likely that a form of mechanical ventilation, such as an air-conditioning system, will be required as part of the Project design for all on-site buildings/units.

4.12.9.2 Mitigation Measures

Mitigation Measure 4.12.1 **Final Acoustical Study.** Prior to issuance of the first~~any~~ building permit~~s~~, the Project Applicant/Developer shall submit a final acoustical study, prepared by a qualified acoustical consultant, to the City of Lake Forest. The Director of Community Development of the City of Lake Forest, or designee, shall verify that the final acoustical study demonstrates that all residential units will comply with the City's interior noise standard (45 dBA CNEL). Noise reduction techniques will be incorporated into construction plans in order to reduce interior noise levels. These techniques include, but are not limited to, weather-stripped solid core exterior doors, dual glazed windows with a minimum sound transmission class rating of 27, and/or exterior wall/roof assembles free of cut-outs or openings.

4.12.10 Level of Significance after Mitigation

With implementation of Mitigation Measure 4.12.1, all potential impacts related to noise would be less than significant.

This page intentionally left blank

4.13 POPULATION AND HOUSING

This section describes the existing population and housing characteristics of Lake Forest and Orange County and evaluates the potential impacts of the proposed Nakase Nursery/Toll Brothers Project (proposed project) on population, housing, and employment growth. This section is based on sources of demographic information provided by various agencies, including the Southern California Association of Governments (SCAG), the City of Lake Forest (City) General Plan's Housing Element (2014), the California Department of Finance, and the United States Census Bureau.

Lake Forest and Orange County demographic information was used to describe the existing population, housing, and employment characteristics in Lake Forest and Orange County. SCAG projections for these topics were identified for the existing conditions and project build out. City of Lake Forest (City) goals and policies regarding population and housing were used to evaluate potential impacts that could result from implementation of the proposed Project.

4.13.1 Scoping Process

The City received 28 comment letters during the public review period of the Initial Study/Notice of Preparation (IS/NOP). (For copies of the IS/NOP comment letters, refer to Appendix A of this Environmental Impact Report [EIR].) Two comment letters included comments related to population and housing.

The letter from SCAG (dated August 15, 2018) expressed concern with including appropriate demographics and growth forecast data. The letter from Judy Esposito (dated August 6, 2018) expressed concern regarding the potential population increase in Lake Forest due to the proposed Project.

4.13.2 Existing Environmental Setting

4.13.2.1 Population, Housing, and Employment Trends in the City and County

Lake Forest is characterized by urban areas, including single-family, multifamily, and mobile home residential uses and concentrations of commercial, office, and industrial uses. Lake Forest also contains several regional and community parks and open space.

In its existing condition, the 122-acre (ac) Project site is currently operating as the Nakase Brothers Wholesale Nurseries, an agricultural wholesale plant nursery that employs 100 to 249 employees.[1] The project site does not contain any residential uses and therefore does not contain any population or housing.

Lake Forest and Orange County are located within the SCAG planning area, which encompasses a population exceeding 19 million residents in an area of more than 38,000 square miles. SCAG is a

[1] California Employment Development Department. Employer Details, Nakase Brothers Wholesale Nursery. Website: https://www.labormarketinfo.edd.ca.gov/aspdotnet/databrowsing/empDetails.aspx?menuChoice=emp&empid=980686893&geogArea=0604000059 (accessed June 6, 2019).

federally designated Metropolitan Planning Organization (MPO)[1] encompassing six counties (i.e., Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura Counties) and 191 cities. In 2016, the SCAG Regional Council adopted the 2016–2040 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) Final Growth Forecast by Jurisdiction (SCAG 2016b) to predict the most likely growth scenario for the Southern California region in the future. The SCAG RTP/SCS Growth Forecast is meant to provide a common foundation for regional and local planning, policymaking, and infrastructure provisions within the SCAG region.

The growth forecast for Orange County and Lake Forest in the SCAG RTP/SCS Growth Forecast is provided in Tables 4.13.A and 4.13.B. These projections are used as a reference point for discussing population and housing growth throughout this section.

Table 4.13.A: SCAG Population, Households, and Employment Forecasts for Orange County (2012–2040)

Year	Population	Households	Employment
2012	3,071,600	999,500	1,526,500
2020	3,271,100	1,074,700	1,730,400
Percent Change (2012–2020)	**6.5%**	**7.5%**	**13.4%**
2035	3,431,200	1,135,300	1,870,500
Percent Change (2012–2035)	**11.7%**	**13.6%**	**22.5%**
2040	3,461,500	1,152,300	1,898,900
Percent Change (2012–2040)	**12.7%**	**15.3%**	**24.4%**

Source: 2016–2040 RTP/SCS Final Growth Forecast by Jurisdiction (SCAG 2016b). Website: http://www.scag.ca.gov/Documents/2016_2040RTPSCS_FinalGrowthForecastbyJurisdiction.pdf (accessed May 15, 2019).
RTP = Regional Transportation Plan SCS = Sustainable Community Strategy
SCAG = Southern California Association of Governments

Table 4.13.B: SCAG Population, Households, and Employment Forecasts for Lake Forest (2012–2040)

Year	Population	Households	Employment
2012	78,500	26,300	39,200
2020	90,700	30,300	44,700
Percent Change (2012–2020)	**15.5%**	**15.2%**	**14.0%**
2035	90,800	30,400	48,700
Percent Change (2012–2035)	**15.7%**	**15.6%**	**24.2%**
2040	90,700	30,500	49,000
Percent Change (2012–2040)	**15.5%**	**16.0%**	**25.0%**

Source: 2016–2040 RTP/SCS Final Growth Forecast by Jurisdiction (SCAG 2016b). Website: http://www.scag.ca.gov/Documents/2016_2040RTPSCS_FinalGrowthForecastbyJurisdiction.pdf (accessed May 15, 2019).
RTP = Regional Transportation Plan SCS = Sustainable Community Strategy
SCAG = Southern California Association of Governments

[1] An MPO is a federally mandated and federally funded transportation policymaking organization that is made up of representatives from local government and governmental transportation authorities. In 1962, the United States Congress passed legislation that required the formation of an MPO for any urbanized area with a population greater than 50,000.

Population. As shown in Tables 4.13.A and 4.13.B, according to the 2016–2040 RTP/SCS Final Growth Forecast by Jurisdiction (SCAG 2016b), the Lake Forest's population is anticipated to grow by approximately 15.5 percent between 2012 and 2020, and Orange County's population is expected to grow by 6.5 percent between 2012 and 2020 (approximately 0.8 percent and 1.9 percent per year, respectively). Lake Forest's population is anticipated to increase by approximately 15.7 percent by 2035 and 15.5 percent by 2040 from the 2012 population of 78,500 persons. This indicates that the population in Lake Forest is anticipated to decline slightly from 2035 to 2040. Orange County's population is anticipated to increase by approximately 11.7 percent by 2035 and 12.7 percent by 2040 from the County's 2012 population of 3,071,600 persons, thereby showing an anticipated steady increase in population from the base year.

Age Characteristics. A city's age distribution often shapes its housing demand. According to the City of Lake Forest General Plan Housing Element (2014), different age groups require different accommodations based on lifestyle, family type, income level, and housing preference. Table 4.13.C provides a comparison of Lake Forest's and Orange County's population by age group using data from the 2013–2017 American Community Survey (ACS) 5-year estimate. As shown in Table 4.13.C, Lake Forest and Orange County have similar proportions of residents in each age group. The largest difference between Lake Forest and Orange County is in the 45 to 64 years age group (29.6 percent and 26.4 percent, respectively). The largest portion of the population for Lake Forest belongs in the 45 to 64 years age group, and the largest portion of the population for Orange County belongs in the 25 to 44 years age group. The median age of Lake Forest is also about 1.5 years higher than that of Orange County, suggesting that the population of Lake Forest is slightly older overall than that of Orange County.

Table 4.13.C: Lake Forest and Orange County Age Characteristics

Age Group	Lake Forest		Orange County	
	Persons	Percentage	Persons	Percentage
Under 18 Years	18,144	22.2%	716,767	22.7%
18 to 24 Years	6,831	8.3%	306,891	9.7%
25 to 44 Years	22,533	27.5%	869,275	27.6%
45 to 64 Years	24,137	29.6%	836,438	26.4%
65 and Over	10,167	12.4%	426,445	13.5%
Total	**81,812**	**100.0%**	**3,155,816**	**100.0%**
Median Age	39.0		37.5	

Source: United States Census Bureau. Table S0101, American Community Survey 2013–2017 5-Year Estimate. Website: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_17_5YR_S0101&prodType=table (accessed May 21, 2019).

Households.[1] As shown in Tables 4.13.A and 4.13.B, Lake Forest's number of households is anticipated to grow by 15.2 percent and Orange County's number of households is anticipated to grow by 7.5 percent between 2012 and 2020 (approximately 1.9 percent and 0.9 percent per year,

[1] The Southern California Association of Governments forecasts "households" not housing units. As defined by the United States Census Bureau, "households" are equivalent to occupied housing units.

respectively). Lake Forest's number of households is anticipated to increase by approximately 15.6 percent by 2035 and 16.0 percent by 2040 from the 2012 number of households of 26,300. Orange County's number of households is anticipated to increase by approximately 13.6 percent by 2035 and 15.3 percent by 2040 from the 2012 number of 999,500 households.

Employment. As shown in Tables 4.13.A and 4.13.B, according to the 2016–2040 RTP/SCS Final Growth Forecast by Jurisdiction (SCAG 2016b), employment in Lake Forest is anticipated to grow by approximately 14 percent between 2012 and 2020, and employment in Orange County is expected to grow by 13.4 percent between 2012 and 2020, representing an increase of approximately 1.7 percent per year for both. The employment in Lake Forest is anticipated to increase by approximately 24.2 percent by 2035 and 25.0 percent by 2040 from the 2012 estimated employment of 39,200 employees. Orange County's estimated employment is anticipated to increase by approximately 22.5 percent by 2035 and 24.4 percent by 2040 from the County's 2012 employment of 1,526,500 employees. These growth projections suggest that employment is expected to grow steadily from 2012 to 2040 in both Lake Forest and Orange County.

As of April 2019, Lake Forest had a labor force of 48,000, and Orange County had a labor force of 1,605,600, with approximately 1,200 and 41,600 people unemployed, respectively.[1] The April 2019 unemployment rate was 2.4 percent for Lake Forest and 2.6 percent for Orange County.[2] As of April 2019, construction employment in Orange County was 104,200. This is similar to construction employment in recent years (105,300 employees in April 2018 and 105,400 employees in April 2017).[3] Construction in Orange County is approximately 13 percent above Orange County's 10-year construction employment average from April 2009 to April 2019 (90,486 construction jobs).[4]

Jobs/Housing Balance. Jobs/housing balance is a regional concept that encourages the designation and zoning of sufficient vacant land for residential uses with appropriate standards to ensure that adequate housing is available to serve the needs derived from the local employment base. The jobs-to-housing ratio can be used as the general measure of balance between a community's employment opportunities and the housing needs of its residents. Theoretically, a city's jobs/employment ratio (jobs to employed residents) would be 1:1 if the number of jobs in the city equaled the number of employed residents. However, assuming a simple ratio of one job to one household is inappropriate in modern economies that have many households with more than one person in the workforce. According to SCAG's The New Economy and Jobs/Housing Balance in Southern California (2001), a balance between jobs and housing in a metropolitan region can more appropriately be defined as a provision of an adequate supply of housing to house workers employed in a defined area (i.e., subregion or community)..

---

1 Monthly Labor Force Data for Cities and Census Designated Places, Orange County, April (California Employment Development Department 2019b). Website: https://www.labormarketinfo.edd.ca.gov/data/labor-force-and-unemployment-for-cities-and-census-areas.html#CCD (accessed June 6, 2019).

2 Ibid.

3 California Employment Development Department. 2019a. Industry Employment—Official Estimates, Anaheim-Santa Ana-Irvine Metropolitan Division (Orange County), 2000–Present. Website: https://www.labormarketinfo.edd.ca.gov/data/employment-by-industry.html (accessed June 6, 2019).

4 Ibid.

The City of Lake Forest General Plan Public Facilities/Growth Management Element (1994a) outlines the need to improve the jobs/housing balance as one of nine major issues to be addressed by the goals and policies contained therein. The City has been developed primarily with residential uses and some commercial and service sector uses. Lake Forest and the surrounding subregions are considered "housing rich," and many residents drive to other parts of Orange County or neighboring counties for employment.

SCAG applies the jobs-to-housing ratio at the regional and subregional level as a tool for analyzing the fit between jobs, housing, and infrastructure. The American Planning Association (APA) is an authoritative resource for community-planning best practices, including recommendations for assessing jobs-to-housing ratios. The APA recognizes that an ideal jobs-to-housing ratio will vary from jurisdiction to jurisdiction. In general, the recommended target for an appropriate jobs-to-housing ratio is 1.5, with a recommended range of 1.3 to 1.7 (Weitz 2003).

Lake Forest is currently within the jobs-to-housing ratio range recommended by the APA. According to the 2016–2040 RTP/SCS Final Growth Forecast by Jurisdiction (SCAG 2016b), Lake Forest had a jobs-to-housing ratio of 1.5 in 2012 and is projected to have a jobs-to-housing ratio of 1.5 in 2020 and 1.6 in 2035 through 2040. The increase in the jobs-to-housing ratio suggests that the job growth expected in the region will be larger than the expected growth in housing.

4.13.3 Regulatory Setting

4.13.3.1 Regional Regulations

Southern California Association of Governments. As the designated MPO for the six-county subregion that includes Orange County, SCAG prepares several plans to address regional growth, including the RTP/SCS. The regional growth forecasts undertaken by SCAG are developed for three planning horizons: 2020, 2035, and 2040. SCAG is mandated by federal and State law to research and draw up plans for transportation, growth management, hazardous waste management, and a regional growth forecast that is the foundation for these plans and regional air quality plans developed by the South Coast Air Quality Management District (SCAQMD). SCAG prepares several plans to address regional growth, including the Regional Comprehensive Plan and Guide, Regional Housing Needs Assessment (RHNA), the Regional Transportation Plan (RTP), the Regional Transportation Improvement Program (RTIP), and the annual State of the Region reports to measure progress toward achieving regional planning goals and policies.

Regional Comprehensive Plan. The Regional Comprehensive Plan (RCP), prepared by SCAG to address regional growth, was adopted in 2008 by the member agencies of SCAG. The RCP sets broad goals for the Southern California region and identifies strategies for local and regional agencies to guide their decision-making process. The RCP provides strategies for local governments to address issues related to future growth within a regional context. The RCP is provided to local governments for their voluntary use when preparing local plans and handling local issues of regional importance.

The current RCP incorporates and summarizes the SCAG Compass Growth Vision and the 2% Strategy adopted by the Regional Council in April 2008. The recommendations made in the RCP call

for infrastructure and resource activities consistent with the envisioned growth pattern. The policies in the RCP attempt to reduce emissions and increase mobility through strategic land use changes.

The majority of the RCP goals and policies are applicable to SCAG and the local governments and are not applicable at the individual project level. However, the following RCP/Compass Blueprint land use and housing strategies are applicable to the proposed Project:

- Focusing growth in existing and emerging centers and along major transportation corridors
- Injecting new life into underused areas by creating vibrant new business districts, redeveloping old buildings, and building new businesses and housing on vacant lots

Regional Transportation Plan/Sustainable Communities Strategy. The 2013–2035 RTP/SCS was adopted on April 7, 2016. The Plan is a long-range visioning plan that balances future mobility and housing needs with economic, environmental, and public health goals. The Plan charts a course for closely integrating land use and transportation so that the region can grow smartly and sustainably. The long-term vision will address regional transportation and land use challenges and opportunities.

The RTP/SCS includes:

- Visions, policies, and performance measures
- Forecasts (e.g., population, households, employment, land use, and housing needs)
- A financial plan
- A list of projects (to be initiated and/or completed by 2040)
- An analysis of priority focus areas (e.g., goods movement and active transportation)

Regional Growth Forecast. The regional growth forecasts undertaken by SCAG are developed in 5-year increments through 2040. The projected growth in population, household, and employment is the data relied upon during development of SCAG's RTP, Sustainable Communities Strategy (SCS), and RHNA. Consistency with the growth forecast at the subregional level is one criterion that SCAG uses in exercising its federal mandate to review "regionally significant" development projects for conformity with regional plans.

Regional Housing Needs Assessment. Local jurisdictions are required by State law (Government Code Section 65580 et seq.) to plan for their fair share of projected housing construction needs in their region. Housing unit construction goals are set by the State Department of Housing and Community Development and allocated to cities through regional planning agencies such as SCAG. This is called the RHNA. Future housing need refers to the proportion of the region's future housing needs allocated to a community. Each jurisdiction's future housing need is calculated in terms of four factors: (1) the number of units needed to accommodate forecast global household growth; (2) the number of units needed to replace demolition due to attrition in the housing stock (i.e., fire damage, obsolescence, redevelopment, and conversion to nonhousing uses); (3) maintenance of an ideal vacancy rate for a well-functioning housing market; and (4) an adjustment to avoid an overconcentration of lower-income households in any one jurisdiction.

The RHNA prepared by SCAG defines the housing unit construction goals for the region. The City's fair share for the planning period between January 1, 2014, and October 1, 2021, (the last adopted RHNA period) was established by SCAG at 2,727 units. The RHNA target number was based on projected household growth and the resulting need for construction of additional housing units allocated over a 5- to 7-year planning period (2014–2021). This 2,727-unit share was divided into the following income groups according to median family income (MFI):

Income Level	Percentage of Area MFI	No. of Units
Very Low	0–50%	647
Low	51–80%	450
Moderate	81–120%	497
Upper	>120%	1,133

MFI = median family income

Each jurisdiction is required to create an annual report on the status and progress in implementing the housing element of its general plan using forms and definitions adopted by the California Department of Housing and Community Development (HCD). The most recent, available Annual Progress Report (APR) summary for Lake Forest is the 2017 APR. As of December 2017, 2,588 units had been permitted in Lake Forest, which reduced the RHNA unit requirement to 1,393 overall. Table 4.13.D shows a summary of the 5th Cycle APR data received by the HCD up to the 2017 APR. As shown in Table 4.13.D, although 2,588 housing units were permitted, 1,133 units were in excess of RHNA requirements in the Above Moderate-Income category. There have been no Very Low-Income or Low-Income housing units permitted in the 2014–2021 planning period.

Table 4.13.D: Remaining Regional Housing Needs in the City of Lake Forest

	Very Low-Income	Low-Income	Moderate-Income	Above Moderate-Income	Total
Fair Share Housing Allocation	647	450	497	1,133	2,727
Building Permits	0	0	201	2,387	2,588
Remaining Units	647	450	296	0	1,393

Source: California Department of Housing and Community Development. Annual Progress Report Permit Summary—Pivot Table with 5th Cycle Summary Data. Website: http://www.hcd.ca.gov/community-development/housing-element/docs/Annual_Progress_Report_Permit_Summary.xls (accessed December 2018).

4.13.3.2 Local Regulations

City of Lake Forest General Plan Housing Element. The Housing Element is required by California State law to be a component of every city's General Plan because housing needs are recognized as a statewide concern. As such, the Housing Element of a jurisdiction's General Plan is the only element that is subject to approval by the State. Pursuant to State law, the Housing Element must identify the city's housing needs, the sites that can accommodate these needs, and the policies and programs to assure that the housing units necessary to meet these needs can be provided. The primary goal of the Housing Element is to provide a range of housing opportunities for all income groups.

In January 2014, the 2013–2021 Housing Element was adopted as a guide for housing within Lake Forest. The Housing Element provides an indication of the need for housing in the community in terms of housing affordability, availability, adequacy, and accessibility. The Housing Element also provides a strategy to address housing needs and identifies a series of specific housing programs to meet community needs. The following goals are found in the City's Housing Element:

- **Goal 1.0:** Adequate housing to meet the existing and future needs of Lake Forest residents
- **Goal 2.0:** Maintenance and enhancement of the quality of existing residential neighborhoods.
- **Goal 3.0:** Increased opportunities for home ownership.
- **Goal 4.0:** Promote equal opportunity for all residents to reside in housing of their choice.

The Housing Element also contains objectives, policies, and programs that are intended to formulate the City's approach to pursuing the production, preservation, and rehabilitation of housing units and to meeting its goals outlined above.

4.13.4 Methodology

Although the City of Lake Forest's 2017 *Local Guidelines for Implementing the California Environmental Quality Act* (CEQA) and 2009 *CEQA Significance Thresholds Guide* do not outline requirements specific to the Population and Housing section analysis of an EIR, the City of Lake Forest 2017 CEQA Guidelines states that EIRs must contain the following:

- A description of the direct and indirect significant environmental impacts of the proposed project explaining which, if any, can be avoided or mitigated to a level of insignificance, indicating reasons that various possible significant effects were determined not to be significant and denoting any significant effects which are unavoidable or could not be mitigated to a level of insignificance. Direct and indirect significant effects shall be clearly identified and described, giving due consideration to both short-term and long-term effects.

- An analysis of the growth-inducing impacts of the proposed action. The discussion should include ways in which the project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment.

- A discussion of any significant, reasonably anticipated future developments and the cumulative effects of all proposed and anticipated action.

- A discussion of any economic or social effects, to the extent that they cause or may be used to determine significant environmental impacts.

- A statement briefly indicating the reasons that various possible significant effects of a project were determined not to be significant and, therefore, were not discussed in the EIR.

These requirements are relevant for the purposes of this analysis.

Population and housing growth are examples of economic and social changes. Although socioeconomic information and impact analysis play a role in environmental impact assessment

under CEQA, social and economic changes resulting from a project are not treated as significant effects on the environment (*State CEQA Guidelines* Section 15064e). Pursuant to Section 15064e, socioeconomic data have four principal uses under CEQA:

- Where a physical change is caused by economic or social effects of a project, the physical change may be regarded as a significant effect in the same manner as any other physical change resulting from the project. Alternatively, economic and social effects of a physical change may be used to determine that the physical change is a significant effect on the environment.

- If the physical change causes adverse economic or social effects on people, those adverse effects may be used as a factor in determining whether the physical change is significant.

- Evidence of economic and social impacts that do not contribute to or are not caused by physical changes in the environment is not substantial evidence that the project may have a significant effect on the environment.

Lake Forest and Orange County demographic information was used to describe the existing population, housing, and employment characteristics in Lake Forest and Orange County. SCAG projections for these topics were identified for the existing conditions and project built out. City goals and policies regarding population and housing were used to evaluate potential impacts that could result from implementation of the proposed Project.

4.13.5 Thresholds of Significance

The thresholds for population and housing impacts used in this analysis are consistent with Appendix G of the *State CEQA Guidelines*. The proposed Project may be deemed to have a significant impact with respect to population and housing if it would do the following:

Threshold 4.13.1: Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)

Threshold 4.13.2: Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere

The Initial Study, included as Appendix A, substantiates that there would be no impacts associated with Threshold 4.13.2. These thresholds will not be addressed in the following analysis.

4.13.6 Project Impacts

Threshold 4.13.1: Would the Project induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

Less than Significant Impact.

Direct Growth. The proposed Project involves a General Plan Amendment and Zone Change to establish the Nakase Property Area Plan. The proposed Project includes the development of up to 675 single-family residential units and up to 101 senior affordable-housing units on the Project site. Because the Project site was previously designated by the City's General Plan as Business Park and Business Development Overlay (BDO), residential uses were not envisioned on the Project site. Therefore, any population and housing growth anticipated as a result of the Project is not previously assumed in the City's General Plan.

The 2010 United States Census estimates that the average household size in Lake Forest was 2.93 persons per household.1 Based on that estimate, the proposed 101 senior affordable-housing units of the senior residential community and the 675 single-family residential units would generate a total of approximately 2,274 residents.

As shown in Table 4.13.B, SCAG projects that Lake Forest's population will increase by 12,200 from 2012 to 2020, by 12,300 by 2035, and by 12,200 by 2040, and the number of households will increase by 4,000 from 2012 to 2020, by 4,100 by 2035, and by 4,200 by 2040. Because housing was not anticipated on the Project site, the proposed Project would increase the population by approximately 2,274 net new residents and the number of housing units by 776 net new dwelling units not previously assumed in the 2012 SCAG projections. The estimated increase in population from the proposed Project accounts for a 2.5 percent increase over Lake Forest's projected population growth through 2040 and a 2.5-percent increase over the Lake Forest's household growth through 2040.

According to the California Department of Finance Demographic Research Unit (May 2019), Lake Forest's estimated population was 86,346 in January 2019; the addition of 2,274 residents represents an increase of approximately 2.6 percent. The estimated number of households in the Lake Forest was 30,035 in January 2019, and the addition of 776 housing units would represent an increase of approximately 2.6 percent. Therefore, while the proposed Project would result in population growth, the growth attributable to the proposed Project would not be substantial in relation to the current conditions in Lake Forest or the projected conditions of Lake Forest.

The addition of new affordable-housing units also supports the affordable-housing goals of the City. Policy 1.8 of the City's General Plan Housing Element encourages residential developments to incorporate a minimum of 15 percent affordable units, including units affordable to extremely low-income households. The City implements this policy by requiring the preparation of an Affordable Housing Implementation Plan (AHIP). The AHIP, which is included in the Development Agreement between the Applicant and the City, must demonstrate how the project complies with the City's Affordable Housing Point System by meeting certain affordable-housing production requirements. The Affordable Housing Point System awards "points" for each affordable unit provided on site. Additional points are awarded if the units are made available as rental units for very low- or low-income households (points are weighted toward

1 US Census Bureau, (2010) 2010 Demographic Profile Data. Table DP-1

production of very low-income units). Two-bedroom and second units receive additional points. Based on the total number of market rate housing units proposed for the Project site (675), the Applicant will be required to achieve 101 points (an amount equal to 15 percent of the total number of market-rate units approved as part of the Project) under the City's Affordable Housing Point System. The production of affordable housing units pursuant to the AHIP process will help the City meet its RHNA requirements. As shown in Table 4.13.D, there is a need for more very low-income, low-income, and moderate-income housing units in Lake Forest to meet the fair share housing allocations under the RHNA 5th Cycle (2014–2021). The 101 senior affordable-housing units proposed as part of this project will help the City meet requirements in the Very Low-Income and Low-Income categories.

Therefore, the proposed Project's direct impact on population growth would be less than significant, and no mitigation would be required.

Indirect Growth.

Construction. Commencement of construction activities on the Project site would require that nursery operations on the Project site cease, which would result in the displacement of up to 249 employees currently employed by the Nakase Brothers Wholesale Nursery. Given the low unemployment rate in the region (as of April 2019, the County's unemployment rate was 2.6 percent), it is anticipated that workers would find employment elsewhere.[1]

Construction of the proposed Project would provide short-term jobs over an estimated period of 67 months (approximately 5.5 years). Construction activities required include demolition and site preparation, grading, paving and infrastructure, and building construction. Many of the construction jobs would be temporary or seasonal and would be specific to the variety of construction activities. This workforce would include a variety of craftspeople, such as cement finishers, ironworkers, welders, carpenters, electricians, painters, and laborers. Although the proposed Project would increase the number of employees at the Project site, none of these construction employees are expected to relocate, thereby creating a permanent increase in population or an increased demand for housing in the vicinity of the Project site. Permanent population and housing growth is not anticipated as a result of construction of the proposed Project because of the following:

- The work requirements of most construction projects are highly specialized, so construction workers remain at a job site only for the time frame in which their specific skills are needed to complete a particular phase of the construction process. For this reason, construction workers typically commute to individual job sites that may change several times a year.

- The supply of general construction labor in the region has been stable over recent years and is 13 percent above the County's 10-year average, suggesting a well-functioning

[1] Labor Force Data for Cities and Census Designated Places, Orange County, April 2019 (California Employment Development Department 2019b). Website: https://www.labormarketinfo.edd.ca.gov/data/labor-force-and-unemployment-for-cities-and-census-areas.html#CCD (accessed June 6, 2019).

construction job market and available regional labor pool. Therefore, it is expected that local and regional construction workers would be available to serve the proposed Project.

Project-related construction workers would not be expected to relocate their household's place of residence as a consequence of working on the proposed Project; therefore, the proposed Project would not be expected to induce substantial population growth or demand for housing through increased construction employment.

Operation. An elementary school is proposed on the Project site, which would accommodate up to 1,000 students from kindergarten through sixth grade. The proposed school is expected to employ 60 workers. Due to the limited number of jobs induced and the available labor pool within Lake Forest and the region, the proposed Project would cause few, if any, people to move or relocate to the area solely for the purpose of being close to the Project site for employment. Therefore, although the proposed Project would provide employment opportunities, the proposed Project would not result in substantial indirect growth or create a significant demand for housing in the Project site vicinity.

Furthermore, the proposed Project would be located within a developed area of Lake Forest that is already served by all utilities. The proposed Project would include some roadway widening and the construction of collector streets, as well as infrastructure improvements (e.g. water, sewer service, utilities, and drainage system) to and within the project site (see sections 4.16, Transportation, and 4.18, Utilities). However, these roadway and other infrastructure improvements would not induce additional population growth because they would only serve Project residents, visitors, and employees and would not provide additional infrastructure capacity for other projects.

As a result, the development of the proposed Project would not indirectly induce substantial population growth, and the indirect impact would be less than significant. No mitigation would be required.

Jobs/Housing Balance. The proposed Project would result in the construction of 776 housing units and the generation of approximately 60 jobs on the Project site. As discussed above, the SCAG forecasts show the jobs-to-housing ratio in Lake Forest was approximately 1.5 in 2012 and that it is expected to increase to 1.6 in 2035 and 2040. The 776 housing units proposed by the Project would result in a 2.5 percent increase over SCAG's projected housing growth in Lake Forest. The proposed Project would cause nursery operations on the Project site to cease, which would result in the displacement of up to 249 employees currently employed by the Nakase Brothers Wholesale Nursery. Given the region's low unemployment rate, it is anticipated that workers would find employment elsewhere. Therefore, although the Project may negatively affect the City's jobs-to-housing ratio by adding a greater number of residential units than job opportunities, the change would not be significant because Lake Forest is situated in a job-rich region and is located adjacent to Irvine, which has an especially high jobs-to-housing ratio of

2.48.[1] Impacts resulting from the proposed Project related to the job-housing balance would be less than significant, and no mitigation would be required.

4.13.7 Cumulative Impacts

The purpose of this section is to evaluate any additional incremental impact that the proposed Project is likely to cause over and above the combined impacts of recently approved and proposed projects in Lake Forest and its sphere of influence. The impact area used to assess potential cumulative population and housing impacts is Lake Forest because the proposed project would affect population, housing, and employment within Lake Forest. The implementation of the proposed Project in conjunction with the 11 proposed projects identified in Table 4.13.E below would contribute to population and housing growth in the project vicinity. The related projects include 908 residential units that would all be constructed in Lake Forest. The US Census estimates the average housing size in Lake Forest to be 2.93 persons per household. Based on Lake Forest's average household size, the combined construction of the proposed residential units and related residential units would yield a total of approximately 4,934 new residents (2,274 residents [proposed Project] + 2,660 residents [related projects]) and a total of approximately 1,684 new housing units (776 units [proposed Project] + 908 units [related projects]).

Table 4.13.E: City of Lake Forest Related Projects Population and Employment Projections

Related Project No.	Land Use	Size	Generation Rate	Total Population	Total Employees
1	Private Recreation	2 ac	8.25 empl/ac	-	17
2	Commercial	Remodeling of existing 1.027 ac	-	-	-
3	Single-Family	93 du	2.93 persons/du	272	-
4	Animal Hospital	0.092 ac	28.39 empl/ac	-	3
5	Religious Facility	2.121 ac	11.20 empl/ac	-	31
	Classroom	0.389 sf			
6	Single-Family	101 du	2.93 persons/du	296	-
7	Townhome Condominium Duplexes	108 du	2.93 persons/du	316	-
8	Single-Family Detached Homes	85 du	2.93 persons/du	249	-
9	Restaurant	0.039 ac	112 empl/ac	-	4
10	Condominium/ Single-Family	521 du	2.93 persons/du	1,527	-
11	Religious Facility	0.152 ac	11.20 empl/ac	-	2
	TOTAL	**908 du**		**2,660**	**57**

Note: Generation rates from nonresidential projects were obtained from the Employment Density Summary Report prepared for SCAG by the Natelson Company.
ac = acres empl/ac = employees per acre
du = dwelling units sf = square feet

[1] University of California, Irvine, School of Social Ecology. 2017. *Metropolitan Futures Initiative (MFI) Quarterly Report: Jobs-Housing Balance in Egohoods in Southern California*. Website: https://mfi.soceco.uci.edu/files/2017/01/UCi16_MFI_Report4_Jobs-Housing-Balance.pdf (accessed August 12, 2019).

If the proposed Project and all 908 of the related residential units were constructed, the cumulative population increase of 4,934 new residents in Lake Forest would not be considerable compared to SCAG's forecast increase of 12,200 people between 2012 and 2040, as shown in Table 4.13.B. Therefore, the proposed Project's contribution to cumulative impacts associated with population growth would be less than significant, and no mitigation would be required.

4.13.8 Level of Significance Prior to Mitigation

The proposed Project would not result in potentially significant impacts related to population, housing, or employment growth.

4.13.9 Regulatory Compliance Measures and Mitigation Measures

The proposed Project would not result in potentially significant impacts related to population, housing, or employment growth, and no mitigation would be required.

4.13.10 Level of Significance after Mitigation

The proposed Project would not result in potentially significant impacts related to population, housing, or employment growth.

If all 908 of the related residential units were constructed, the cumulative increase of 1,684 housing units would not be considerable compared to SCAG's projected Lake Forest housing increase of 4,200 units between 2012 and 2014, as shown in in Table 4.13.B. Therefore, the proposed Project's contribution to cumulative impacts associated with direct housing growth would be less than significant, and no mitigation would be required.

In total, the related projects would have the potential to result in 57 additional employees in Lake Forest. The combined construction of the related employee-generating projects and the proposed Project would yield approximately 117 new employees. (60 employees [proposed Project] + 57 employees [related projects]). The 117 new employees would also be relatively few compared to SCAG's forecasted employment increase of 9,800 employees between 2012 and 2040 in Lake Forest as shown in in Table 4.13.B. Construction of the related projects would result in increased temporary (short-term) employment opportunities. Although the related projects would increase the number of available construction jobs, none of these employees are expected to relocate, thereby creating a permanent increase in population or an increased demand for housing in the Project area. Therefore, cumulative impacts relating to population and housing growth due to job growth would be less than significant, and no mitigation would be required.

The related projects include a variety of residential, commercial, and recreational uses. Some of these related projects may include the extension of roads or infrastructure. However, it is expected that those infrastructure improvements would only serve the applicable related projects. Therefore, it is not anticipated that the related projects would extend roads or other infrastructure into previously undeveloped areas that would be available for future development.

Based on the analysis above, the proposed Project in combination with the related projects would not result in a significant impact on population or housing because the increase in population,

housing, and employment that would be generated by the proposed Project and the related projects would not be considerable compared to the growth expected under these forecasts. In addition, roadways and other infrastructure are not anticipated to be extended into previously undeveloped areas that would but available for future development. Therefore, the cumulative impact of the proposed Project and the related projects on population growth would not be significant, and no mitigation would be required.

This page intentionally left blank

4.14 PUBLIC SERVICES

This section describes the public services within whose jurisdiction the Project site is located and evaluates the potential impacts of the proposed Project on public services. This section is based on multiple data sources, including written correspondence and coordination with public service providers (Appendix K). This section addresses the following public services (service providers are noted in parenthesis):

- Fire Protection (Orange County Fire Authority [OCFA])
- Police Protection (Orange County Sheriff's Department [OCSD])
- Public Schools (Saddleback Valley Unified School District [SVUSD])
- Parks (City of Lake Forest)
- Public Libraries (OC Public Libraries [OCPL])

4.14.1 Scoping Process

The City of Lake Forest (City) received 28 comment letters during the public review period of the Initial Study/Notice of Preparation (IS/NOP). For copies of the IS/NOP comment letters, refer to Appendix A of this Environmental Impact Report (EIR). Six letters included comments related to Public Services.

The letter from SVUSD provided generation rates and enrollment and capacity information for the school capacity analysis and provided additional California school siting requirements. The letter from OCFA (July 31, 2018) suggested mitigation measures to reduce potential impacts to fire services. The letter from Orange County Public Works (OCPW) (August 13, 2018) expressed concern about demand on library services based on increase population from the proposed Project and provided information on library service standards.

The letters from Bob Holtzclaw (July 25, 2018) and Charles Larson (August 4, 2018) expressed concern that SVUSD may not use the potential school site. Charles Larson also opined that Foothill Ranch Elementary isn't overcrowded. The letter from the Autumnwood Homeowners Association (August 8, 2018) provided general concerns about potential impacts to public safety services.

4.14.2 Existing Environmental Setting

4.14.2.1 Fire Protection

The City contracts with the OCFA for fire protection services. OCFA is a Joint Powers Authority responsible for reducing loss of life and property from fire, medical, and environmental emergencies. OCFA serves 24 ~~23~~ cities in Orange County (County) and all unincorporated areas in the County and protects over 1.9 ~~1.8~~ million residents through its 79 ~~72~~ fire stations located throughout the County.

In addition to providing fire, emergency medical, and rescue services, OCFA provides a variety of public services, including:

- Receiving and dispatching emergency calls
- Providing public education programs to schools, businesses, community associations, childcare providers and other members of the community
- Administering a Reserve Firefighter Program
- Adopting and enforcing codes and ordinances relative to fire and life safety issues associated with commercial, industrial, and residential development
- Maintaining a firefighting helicopter used for emergency responses throughout the yea;
- Coordinating the inspection of all commercial buildings, investigating all fires, and enforcing fire code hazardous materials ~~regulations~~ inspections
- Working with developers and jurisdictional planning departments on development projects impacting fire protection services, from conception through planning process approval
- ~~Conducting new construction inspections, fire safety inspections, and State Fire Marshal-required inspections (including high-rise, jail, board-and-care, and day care inspections), and enforcing applicable fire codes and ordinances;~~
- Interacting with developers, architects, and engineers to meet the fire protection requirements for buildings and developments by reviewing all architectural blueprints, development plans, and proposals submitted in OCFA's jurisdiction
- Conducting an inventory program of hazardous materials stored, handled, and used within OCFA's jurisdiction, and maintaining related information on a data base accessible to all emergency response agencies in the event of a major emergency
- Conducting California Fire Code inspections, assisting in reducing risks associated with the use of hazardous materials in the community, and administering the State-mandated Risk Management and Prevention program
- Investigating fires to determine their cause, preparing arson and hazardous materials cases for the District Attorney’s Office, and initiating actions to recover costs for negligently caused fires
- Developing and maintaining a fire-safe corridor between the wildland and community developments through fuel modifications and inspections

Lake Forest is in Division V, which includes Battalion 4. Division V serves the cities of Lake Forest, Laguna Woods, Newport Coast, Aliso Viejo, Laguna Hills, Laguna Niguel, and the unincorporated areas of Emerald Bay and Laguna.[1]

Fire Station Nos. 19, 42, and 54 are the three OCFA Stations within Lake Forest. Located at 19811 Pauling Avenue, 0.57 mile (mi) east of the Project site, Fire Station No. 54 personnel would be the first to the Project site in the event of an emergency and would therefore be designated as the "first-in" station. Station No. 54 is staffed by three captains, three engineers, and six ~~three~~ firefighters. In 2018, ~~the three stations in Lake Forest~~ OCFA responded to 5,176 calls in Lake Forest.[2]

"Second call" stations are fire stations that support the "first-in" station. Fire Station Nos. 19 and 42 would be designated as the "second call" stations to support Fire Station No. 54. Fire Station No. 19 is at 23022 El Toro Road, Lake Forest, 2.87 mi southwest of the Project site. Station No. 19 is staffed by three captains, three engineers, and six firefighters. Station No. 42 is at 19150 Ridgeline Road, Lake Forest, 2.46 mi northeast of the Project site. Station No. 42 is staffed by three captains, three engineers, and three firefighters.

In the previous decade, OCFA's average response time[3] for emergency calls remained relatively constant at less than 7 minutes per call.[4] Response time, which measures the elapsed time between a 9-1-1 call answer and the first fire department unit arrival, is 7:58 (80th percentile) and 9:17 (90th percentile).[5] The ratio of firefighters per 1,000 residents is almost 6 firefighters per 10,000 residents. Emergency call load also increased by 72 percent during that period. The significant jump in call volume was in part due to Santa Ana joining the OCFA[6].

4.14.2.2 Police Protection

The City contracts with the OCSD for law enforcement services. According to the OCSD's website, the OCSD has approximately 3,800 sworn and professional staff members and more than 800 reserve personnel. The Southwest Operations Division and Southeast Operations Division of the OCSD provide law enforcement services to an area encompassing the entire southern portion of the County. The Southeast Operations Division provides law enforcement services to the City. The Southeast Operations Division deploys 65 patrol cars during each 24-hour period. This requires

1 Orange County Fire Authority, Operations Directory: https://www.ocfa.org/aboutus/departments/OperationsDirectory/Division5.aspx (accessed July 23, 2018).

2 Orange County Fire Authority, Station Statistics. Website: https://www.ocfa.org/Uploads/Transparency/OCFA%20Annual%20Report%202018.pdf (accessed June 18, 2019).

3 OCFA defines response time as the time interval between Dispatch Notification and Arrival on Scene. It includes Dispatch time, Turnout time, and Travel time. Response time goals are established through OCFA policy. Response time performance is generally measured for the first unit on scene (Distribution) and for an Effective Response Force (Concentration). Incident response times are impacted by many variables including availability of first due units, travel distance, traffic, geography, weather, and street networks.

4 Orange County Fire Authority Fiscal Year 2018/19 Adopted Budget Website: https://www.ocfa.org/Uploads/Transparency/OCFA%202018-2019%20Adopted%20Budget.pdf (Accessed June 10, 2019).

5 Ibid.

6 Ibid.

approximately 223 staff members, of which 168 are sworn peace officers.[1] OCSD personnel are assigned to the City, including 5 sergeants, 3 investigators, 38 deputies, an investigative assistant, 5 community service officers, and 1 crime prevention specialist. Services to the City are provided out of OCSD's Saddleback Station at 20202 Windrow in Lake Forest, 0.2 mi east of the Project site. The OCSD/Police Services Department embraces the concept of community-oriented policing, which encompasses the active participation of local government, civic and business leaders, residents, schools, churches, and other public and private agencies.

The Federal Bureau of Investigation (FBI) indicates that 1.2 police officers per 1,000 residents is the average ratio for Western-region cities with populations less than 100,000 (FBI 2014). The OCSD does not use a standard officer-to-population or standard response time objective ratio to measure the adequacy of policing levels in Lake Forest. Instead, the OCSD analyzes demographics, service calls, population, crime trends, and other changing factors to determine the level of police protection services needed. The current officer-to-resident ratio in the City is estimated to be 0.54 police officer per 1,000 residents.[2]

Response times to the Project site depend on various factors, including the location of patrol vehicles at the given moment. Emergency calls receive the quickest response, with alarm calls and non-emergency calls having longer response times. Written correspondence with the OCSD dated July 10, 2019, confirmed that response times for Lake Forest for both Priority 1 (i.e., red light/siren) and Priority 2 (i.e., urgent—no lights/siren) are less than 5 minutes and 7 minutes, respectively.

Planned expansions to police facilities include the planned Community Policing Center being constructed as a part of the new Lake Forest Civic Center and expected to open in summer of 2019. The Schematic Design the City Council approved on September 20, 2016 included an Emergency Operations Center, a deputy sheriff workroom, a dedicated interview room, a dedicated lobby, offices, and a Sheriff's Team of Active Retired Seniors (STARS) work area the Community Policing Center (City of Lake Forest 2016a, 2016b).

4.14.2.3 Public Schools

The provision of education and school facilities in Lake Forest is the responsibility of SVUSD, which enrolled 27,329 students as of the 2017–2018 school year and includes all or part of Lake Forest, Rancho Santa Margarita, Mission Viejo, Foothill Ranch, Laguna Hills, Trabuco Canyon, and Laguna Hills. Governed by a six-member Board of Education—including one student member—SVUSD currently (2017–2018 school year) operates 23 elementary schools (K–6), 1 kindergarten through 12th grade (K–12) school, 4 middle schools (7–8), 4 comprehensive high schools (9–12), 1 alternative education high school, 1 continuation school, 1 special education high school (7–12), and 1 adult school.

---

1 Orange County Sheriff's Department. Website. Southeast Operations. Website: http://www.ocsd.org/divisions/fieldops/southeast (accessed July 1, 2019).

2 There are 46 deputy sheriffs assigned to the City of Lake Forest. According to the California Department of Finance. E-5 Population and Housing Estimates for Cities, Counties, and the State, 2011–2014 with 2010 Census Benchmark City/County Population and Housing Estimates, Lake Forest's population in 2018 was 85,048. Therefore, 46/85.048 = 0.54.

The Project site is not currently included within a specific school attendance boundary. Potential schools serving the Project site would include Portola Hills Elementary School, Lake Forest Elementary School, Foothill Ranch Elementary, Rancho Canada Elementary, Serrano Intermediate School, El Toro High School, and Trabuco Hills High School. Table 4.14.A below shows enrollment and capacity data for SVUSD schools. Foothill Ranch Elementary is the elementary school closest to the Project site (0.7 mi). However, there is an existing shortage of 262 seats at Foothill Ranch Elementary. Lake Forest Elementary is the next in proximity, 1.4 mi from the Project site. There is also an existing shortage of seats at Lake Forest Elementary. Portola Hills Elementary and Rancho Canada Elementary are almost equidistant from the Project site, 1.9 mi and 1.8 mi from the Project site, respectively. As shown in Table 4.14.A, Rancho Canada Elementary has a large surplus of 307 seats. Santiago Elementary is 2.7 mi from the Project site and is not likely to accommodate any students from the proposed Project. Serrano Intermediate School is 2.8 mi from the Project site and El Toro High School and Trabuco Hills High School are 2.3 mi and 1.2 mi, respectively, from the Project site. The intermediate and high schools serving the Project vicinity all have existing surpluses.

Table 4.14.A: Saddleback Valley Unified School District Enrollment Capacity

School Facility	Capacity	Enrollment	Surplus (Shortage) of Seats
Foothill Ranch Elementary	932	1,194	(262)
La Madera Elementary	609	610	(1)
Lake Forest Elementary	755	864	(109)
Olivewood Elementary	455	519	(64)
Portola Hills Elementary	664	653	11
Rancho Canada Elementary	872	565	307
Santiago Elementary	520	368	152
Total Elementary School Capacity	**4,807**	**4,771**	**34**
Serrano Intermediate	1,458	1,169	289
Total Intermediate School Capacity	**1,458**	**1,169**	**289**
El Toro High School	2,754	2,435	319
Trabuco Hills High School	2,943	2,831	112
Total High School Capacity	**5,697**	**5,266**	**431**

Source: Correspondence, "Response to Notice of Preparation of the Nakase Property Area Plan Environmental Impact Report" (SVUSD 2018b).
SVUSD = Saddleback Valley Unified School District

Table 4.14.B shows the number of projected unhoused students from development projects in Lake Forest through calendar year 2027. As shown in Table 4.14.B, there are a total of 2,395 projected unhoused students.

The demand for public school facilities is driven by residential land use. As the Project site does not currently include residential land uses, the existing land use does not create any demand on public school facilities.

Table 4.14.B: Projected Unhoused Students from Future Units

School Level	Projected Students from Future Units[1]	Surplus Seats[2]	Projected Unhoused Students
Elementary School	1,657	30	1,627
Intermediate School	455	258	197
High School	956	385	571
Total	**3,068**	**673**	**2,395**

Source: Table 7, Saddleback Unified School District Residential Development School Fee Justification Study (SVUSD 2018c)

[1] Projected students from future units are non-mitigated future units (units of which the developer/applicant has not mitigated their impacts on the school district through the execution of a mitigation agreement wherein such units pay fees separate from school fees and Alternative Fees.)

[2] Surplus seats were determined based on the total surplus shown in Table 4.14.A, apportioned between the mitigated and non-mitigated future units. Of the surplus seats identified, it was determined that these seats are available to house students generated from non-mitigated future units.

SVUSD = Saddleback Valley Unified School District

4.14.2.4 Parks

Section 4.15, Recreation, provided later in this chapter, contains a detailed discussion related to parks and recreational facilities within Lake Forest. The City maintains and operates 32 public parks, consisting of approximately 280 acres (ac). In addition, Limestone/Whiting Wilderness Park encompasses 1,101 ac of natural land in Lake Forest. Private parks are also distributed throughout Lake Forest in various Planned Communities. According to the City of Lake Forest General Plan Recreation and Resources Element, the City determines the need for park space based on its population. The City requires 5 ac of park space per 1,000 residents. Some school recreational facilities can be used to meet the park goal of 5 ac per 1,000 residents. Up to 50 percent of the school facilities can be used, provided the school facilities are open to the public. Because the Project site does not currently contain residential land uses, the existing land use does not contribute to a demand for park facilities within Lake Forest or Orange County.

4.14.2.5 Public Libraries

The OCPL system provides library services to Orange County, including the Lake Forest, and includes 33 branches, 2 of which are in Lake Forest. The Foothill Ranch Library is at 27002 Cabriole Way, 1 mi northeast of the Project site. The El Toro Library is at 24672 Raymond Way, approximately 4.5 mi southwest of the Project site.

Correspondence with OCPL received November 21, 2018 confirmed that the Foothill Ranch Library is 12,914 square feet (sf), including a Community Room and Friends of the Library space. According to OCPL, resources are limited and need upgrading to meet the needs of a new community. Improvements could include upgraded electrical; wireless internet; furniture; heating, ventilation, and air conditioning; and space. Parking is also limited.

The El Toro Library is 13,940 sf, including a Community Room and the Friends of the Library space. According to OCPL, resources at this library are lacking, as there is no room to add shelving for collections or kiosks for checking out laptops and chargers. The existing community room does not accommodate the programming needs and parking is limited for the building. The library also needs new furniture to accommodate electrical outlets for users.

According to the City of Lake Forest General Plan Public Facilities and Growth Management Element, the City uses a library demand of 0.2 sf of library space per capita. Based on the City's 2018 population,[1] the City has an existing demand for 17,009.2 sf of library space. The Foothill Ranch Library (12,914 sf) and the El Toro Library (13,940 sf) are cumulatively 26,854 sf, which exceeds the demand for library space required by the City's General Plan.

It should also be noted that, according to the Public Services and Facilities Element of the Orange County General Plan, the same standard (i.e., 0.2 sf of library space per capita) has been accepted by the Orange County Board of Supervisors as a planning guide for the purpose of projecting the number and location of new libraries needed.

According to correspondence with OCPL received November 21, 2018, the American Library Association no longer sets quantitative "space per capita standards" for public library buildings and the library demand standard of 0.2 sf of library space per capita is no longer relevant. OCPL's previously adopted volumes per capita standard of 1.5 volumes of books per capita is also no longer used, because the function of the library system has dramatically changed and continues to evolve. According to OCPL, libraries are not "just for books"; communities expect libraries to be used as gathering places, community hubs, a place to go for educational programming and lectures. According to the OCPL, both El Toro and Foothill Ranch branches are at maximum capacity. Because the Project site does not contain residential land uses and does not contribute to the population within Lake Forest, the existing land use does not contribute to a demand on public library facilities within Lake Forest or Orange County.

4.14.2.6 Public Transportation

The proposed Project is within the Orange County Transportation Agency (OCTA) bus service area. OCTA connects Lake Forest with several nearby cities (including Santa Ana, Mission Viejo, Irvine, and Laguna Hills) and several regional destinations such as John Wayne Airport and Irvine Station. OCTA also provides paratransit service through its ACCESS Service. This shared-ride paratransit serves areas within 0.75 mile of an OCTA fixed route service

OCTA currently maintains 3 bus routes, Route 206 on Bake Parkway, 480 on Lake Forest Drive, and 177 on Lake Forest Drive. There is a northbound and southbound bus stop for route 206 on Bake Parkway directly in front of the Project site, a north/south bus stop for route 480 on Lake Forest and Regency, and a north and southbound bus stop for route 177 southeast of the Project site on Town Centre Drive and Alton. Route 85 provides 35 weekday trips per day and 17 Saturday trips.[2] Route

[1] According to the California Department of Finance. E-5 Population and Housing Estimates for Cities, Counties, and the State, 2011–2014 with 2010 Census Benchmark City/County Population and Housing Estimates, the City's population in 2018 was 85,048.

[2] Orange County Transportation Authority. Bus Book, Route 85. Website: https://www.octa.net/ebusbook/RoutePDF/route085.pdf (accessed 6/25/2019)

206 provides 6 weekday trips per day and no weekend trips[1]. Route 480 provides 9 weekday trips per day and no weekend trips[2].

According to the City of Lake Forest Existing Conditions Report, transit ridership in Lake Forest was generally low. The majority of residents in Lake Forest use motor vehicles as the primary mode of travel, and only 2 percent traveled by transit. Transit ridership near the Project site on Routes 206 and 408 were also generally low at approximately 150 to 250 total annual riders at each stop. Transit ridership on the 177 bus route was generally higher from approximately 150 to 1,500 total annual riders at each stop[3].

4.14.3 Regulatory Setting

4.14.3.1 Federal Regulations

There are no federal policies or regulations applicable to public services for the proposed Project.

4.14.3.2 State Regulations

Assembly Bills 2926, 1600, and 2751. To assist in providing facilities to serve students generated from new development projects, the State enacted Assembly Bill (AB) 2926 in 1986, which allows school districts to collect impact fees from developers of new residential, commercial, and industrial developments. Development impact fees are also referenced in the 1987 Leroy Greene Lease-Purchase Act, which requires school districts to contribute a matching share of the costs for the construction, modernization, or reconstruction of school facilities. Subsequent legislation has modified the fee structure and general guidelines. In 1987, the provisions of AB 2926 have been expanded and revised by AB 1600, which limits the ability of a school district to levy School Fees unless (i) there is a need for the School Fee revenues generated, and (ii) there is a nexus or relationship between the need for School Fee revenues and the type of development project on which the School Fee is imposed. (The requirements of AB 1600 were clarified with the passage in 2006 of AB 2751, which codifies the findings of *Shapell Industries vs. Milpitas Unified School District*.)

Senate Bill 50 and California Education Code Section 17620. Senate Bill 50 and California Education Code Section 17620. Senate Bill (SB) 50, the Leroy F. Greene School Facilities Act of 1998, was signed into law on August 27, 1998. It is a program for funding school facilities largely based on matching funds. The approval of Proposition 1A authorized funds for SB 50 in the amount of $9.2 billion, including grants for construction of new schools and modernization of existing schools. The new construction grant provides funding on a 50/50 State and local match basis. The modernization grant provides funding on a 60/40 State and local match basis. Districts that are unable to provide some or all of the local match requirements and are able to meet financial hardship provisions may

1 Orange County Transportation Authority. Bus Book, Route 206. Website: https://www.octa.net/ebusbook/RoutePDF/route206.pdf (accessed 6/25/2019)

2 Orange County Transportation Authority. Bus Book, Route 480. Website: https://www.octa.net/ebusbook/RoutePDF/route480.pdf (accessed 6/25/2019)

3 City of Lake Forest 2040 Existing Conditions Report. City of Lake Forest. Website: https://static1.squarespace.com/static/5abd4a977e3c3a6cd57d9c48/t/5be09638c2241bf46b6609fb/1541445207077/Chapter+4_Mobility.pdf (accessed 6/24/2019).

be eligible for additional State funding.[1] SB 50 (codified as California Education Code Section 17620) allows the SVUSD to levy a fee, charge, dedication, or other requirement against any development project within its boundaries for the purpose of funding the construction or reconstruction of school facilities. The maximum fee amount that school districts can assess is limited by statutes provided in California Government Code Section 65995. The SVUSD collects the maximum new school construction facility fee at a rate of $3.79 per square foot of new residential construction.[2]

The payment of these fees by a developer serves to mitigate all potential impacts on school facilities that may result from implementation of a project to levels that are less than significant (see California Government Code Section 65996). Stated another way, the provisions of SB 50 provide full and complete mitigation of school facilities impacts, notwithstanding any contrary provisions in the California Environmental Quality Act (CEQA) or other State or local laws. The California Department of Education permits local school districts to increase facility fees subject to Department of Education review and with approval of a nexus study from the school District that demonstrates that costs incurred by the school District for the provision of school facilities and services are higher than Level 1 funding provides. In such an instance, a nexus must be demonstrated in the study between the increase proposed by the local school District and the actual cost of provision of school facilities and services.

California Building Code Title 24. Title 24 of the California Code of Regulations, also known as the California Building Code (CBC or Title 24), contains the design standards that govern the construction of buildings in California to "safeguard life or limb, health, property, and public welfare by regulation and controlling the design, construction, quality of materials, use and occupancy, location and maintenance of all buildings and structures and certain equipment." The 2016 Edition of the CBC contains general building design and construction requirements relating to fire and life safety, structural safety, and access compliance. The Triennial 2016 CBC edition became effective January 1, 2017, and is composed of 12 parts. Part 2 of the CBC outlines building design and construction requirements relating to fire, life safety, and structural safety.

California Fire Code. The California Fire Code (CFC) includes regulations for emergency planning, fire service features, fire protection systems, hazardous materials, fire flow requirements, and fire hydrant locations and distribution. Several fire safety requirements include: installation of sprinklers in all high-rise buildings; the establishment of fire resistance standards for fire doors, building materials, and particular types of construction; and the clearance of debris and vegetation within a prescribed distance from occupied structures in wildlife hazard areas.

Office of Emergency Services. The State of California passed legislation authorizing the Office of Emergency Services to prepare a Standard Emergency Management System (SEMS) program, which sets forth measures by which a jurisdiction should handle emergency disasters. Non-compliance

1 State of California. 2007. *Office of Public School Construction, School Facility Program Handbook*, April.

2 Saddleback Valley Unified School District Adjustment in Developer Fees. Effective July 9, 2018. https://www.svusd.org/uploaded/SVUSD_Department_Files/MOC/Documents/2017-18/Developer_Fees_Level_1_Notification_Memo_Levied_July_9_2018_ADA.pdf (accessed 6/21/2019).

with SEMS could result in the State withholding disaster relief from the non-complying jurisdiction in the event of an emergency disaster.

4.14.3.3 Regional Regulations

There are no regional policies or regulations applicable to public services for the proposed Project.

4.14.3.4 Local Regulations

City of Lake Forest Municipal Code. The City of Lake Forest Municipal Code includes the following requirements that would apply to the proposed Project related to the provision of public services

- **Section 8.24.010** adopts the 2016 CFC based on the International Fire Code, 2015 Edition, with errata, published by the International Code Council, with appendices and amendments for the purposes of prescribing regulations governing conditions hazardous to the life and property from fire or explosion.

- **Section 8.30.030** adopts the CBC for the purpose of prescribing regulations for the erection, construction, enlargement, alteration, repair, improving, removal, conversion, demolition, occupancy, equipment, use, height, area and maintenance of all buildings and structures per California Building Code, 2016 Edition, based on the 2015 International Building Code as published by the International Code Council with the amendments provided in Section 8.02.020.

- **Section 8.30.020** outlines amendments to the 2016 CBC including modifications to design, plan review, permit, and payment of fee requirements.

- **Section 7.08.145** discusses the requirements for subdivisions in high or extremely high hazard areas including providing appropriate fire protection by means of fire breaks, fuel modification programs, access roads, sufficient water supply, landscaping, and open spaces.

City of Lake Forest General Plan Public Facilities/Growth Management Element. The primary purpose of the Public Facilities/Growth Management Element is to ensure that growth and development correspond to the provision of adequate public facilities. The Public Facilities/Growth Management Element expresses the City's intention to ensure acceptable service levels for public facilities as development occurs. The following policies are relevant to public services:

> **Policy 3.1:** Work closely with Orange County Fire and the Orange County Sheriff's Department in determining and meeting community needs for safety facilities and services.
>
> **Policy 3.2:** Periodically evaluate level of service to ensure that Lake Forest has appropriate levels of fire, police, and emergency medical services.
>
> **Policy 5.1:** Work closely with Orange County Library in determining and meeting community needs for library facilities and services, including hours of operation.

Policy 6.1: Work closely with the Saddleback Valley Unified School District in determining and meeting community needs for public education and related activities.

Policy 7.1: Work closely with the County of Orange, Caltrans, surrounding jurisdictions, and other transportation agencies to provide needed transportation facilities.

City of Lake Forest General Plan Safety and Noise Element. The Safety and Noise Element addresses public safety and quality of life issues. The Safety and Noise Element is a comprehensive program to identify and temper environmental factors that potentially threaten community health and safety. The Safety and Noise Element contains policies and programs to regulate existing and proposed development located in hazard-prone areas. The following policies are relevant to public services:

Policy 2.4: Reduce the risk to the community from fire.

Policy 3.1: Provide substantive levels of police protection.

Policy 3.2: Improve public awareness of ways to reduce criminal activity and Orange County Sheriff's Department responsiveness (Neighborhood Watch, improved communication and education methods).

4.14.4 Methodology

Information regarding public services was obtained through the use of questionnaires sent to public agencies in charge of fire, police, library, and school services. Responses were received by OCSD and OCPL on July 10, 2019 and November 21, 2018, respectively. Information for school facilities was provided during project scoping comments in a letter received on July 5, 2018, and in an additional letter dated September 21, 2017 from SVUSD to the City of Lake Forest summarizing activities and discussions between SVUSD and the Project Applicant/Developer. The information from these questionnaires and correspondence is used in tandem with local regulations to determine if the additional demands of the proposed Project would significantly impact the public services that provide for the area. Copies of the letters referenced above are available in Appendix K of this EIR.

4.14.5 Thresholds of Significance

The thresholds for public services impacts used in this analysis are consistent with Appendix G of the *State CEQA Guidelines* and the City's CEQA Significance Thresholds Guide (March 2009). The proposed Project may be deemed to have a significant impact with respect to public services if it would:

Threshold 4.14.1(i): **Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain**

acceptable service ratios, response times or other performance objectives for fire protection

Threshold 4.14.1(ii): **Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for police protection**

Threshold 4.14.1(iii): **Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for schools**

Threshold 4.14.1(iv): **Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for parks.**

Threshold 4.14.1(v): **Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for other public facilities**

None of the thresholds for public services were scoped out in the Initial Study, which is included in Appendix A. Therefore, all of the thresholds listed above are addressed in the following analysis.

4.14.6 Project Impacts

Threshold 4.14.1(i): **Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for fire protection?**

Potentially Significant Impact.

Construction. Construction activities have the potential to affect fire protection services, such as emergency vehicle response times, by potentially requiring partial lane closures during street improvements and utility installation. Mitigation Measure 4.16.1 requires that a Construction Traffic Management Plan (CTMP) be prepared for the proposed Project to ensure that emergency vehicles would be able to navigate through streets adjacent to the Project site that may experience congestion due to construction activities. Mitigation Measure 4.16.1 also requires that all emergency access to the Project site and adjacent areas be kept clear and unobstructed during all phases of demolition and construction. Traffic management personnel (flag persons), required as part of the CTMP, would be trained to assist in emergency response by restricting or controlling the movement of traffic that could interfere with emergency vehicle access. If a partial street closure (i.e., a lane closure) is required, notice would be provided to the OCSD, and flag persons would be used to facilitate the traffic flow until construction is complete. With implementation of Mitigation Measure 4.16.1, potential impacts related to emergency access during construction would be less than significant. No additional mitigation is required.

Construction of the proposed Project could also increase the potential for accidental on-site fires from such sources as the operation of construction equipment and the use of flammable construction materials. As required by Occupational Safety and Health Administration and Fire and Building Code requirements, the construction contractor would be required to carefully store flammable materials in appropriate containers and to immediately and completely clean up spills of flammable materials when they occur. In addition, construction managers and personnel would be trained in emergency response, and fire suppression equipment specific to construction sites would be maintained on site for the duration of the construction period. Adherence to existing laws would ensure that the proposed Project would not have a significant construction impact related to fire. Construction-related impacts to fire protection, emergency medical services, and fire department response times would be less than significant, and no mitigation is required.

Operation. The proposed Project is designed to comply with adopted fire protection standards as required by the City's Municipal Code (Regulatory Compliance Measure [RCM] PS-1). The proposed Project would incorporate fire hydrants, attic sprinkler protection, a fire department access road, radiant heat zone, and ember mitigation zones as part of its fire protection plan. The proposed Project also includes a fire master plan and fuel modification plan, which the OCFA requires prior to issuance of a building permit. The fire master plan identifies standard design features, including the design of fire department connections, and the fuel modification plan identifies the approved fuel modification zones. The design would include fire lanes and entry points so the Project could allow access for firefighting equipment in the event of a fire. These access driveways would be developed in accordance with the code requirements for site access widths to allow for firefighting equipment to adequately enter and exit the Project site. Adherence to applicable codes as described in RCM PS-1 would decrease the demand for fire services and ensure that there is adequate emergency access on site. In addition, as discussed in Section 4.16, the proposed Project would not result in a significant unavoidable traffic impact to any study area intersections. Therefore, the proposed Project would not impair emergency

response vehicles, and average response times in the area would remain within acceptable response time limits.

The population and housing growth anticipated as a result of the proposed 101 senior affordable housing units and 675 single-family residential units, and the associated 2,274 residents generated would incrementally increase demand for fire protection and emergency service calls. To address the increase in demand for fire and emergency medical services, OCFA requires all developers to enter into a secured fire protection agreement with OCFA to ensure the availability of adequate fire protection services. The agreements specify a developer's pro-rata, fair-share funding for capital improvements necessary to establish and maintain adequate fire protection facilities, equipment, and personnel. Mitigation Measure 4.14.1 requires the developer to enter into the secured fire protection agreement prior to issuance of any building permits for the proposed Project. Implementation of Mitigation Measure 4.14.1 would reduce potential impacts related to the Project's demand for fire protection services to a less than significant level. With implementation of Mitigation Measure 4.14.1, the proposed Project would not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered government facilities in order to maintain acceptable service ratios, response times, or other performance objectives for fire protection. No mitigation is required.

Threshold 4.14.1(ii): Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for police protection?

Potentially Significant Impact.

Construction. Construction activities have the potential to affect emergency police services by potentially requiring partial lane closures during street improvements and utility installation. Project construction may also necessitate halting traffic to accommodate trucks entering or exiting the Project site during construction (e.g., for the movement of construction equipment). As such, construction activities could temporarily increase response times for emergency vehicles in the vicinity of the Project site. Mitigation Measure 4.16.1 requires that a CTMP be prepared for the proposed Project to ensure that emergency vehicles would be able to navigate through streets adjacent to the Project site that may experience congestion due to construction activities. Mitigation Measure 4.16.1 also requires that all emergency access to the Project site and adjacent areas be kept clear and unobstructed during all phases of demolition and construction. Traffic management personnel (flag persons), required as part of the CTMP, would be trained to assist in emergency response by restricting or controlling the movement of traffic that could interfere with emergency vehicle access. If a partial street closure (i.e., a lane closure) would be required, notice would be provided to the OCSD, and flag persons would be used to facilitate the traffic flow until construction is complete. With implementation of Mitigation

Measure 4.16.1, potential impacts related to emergency access and police response times during construction would be less than significant. No additional mitigation is required.

Operation. The population and housing growth anticipated as a result of the proposed Project would result in additional demand for police protection and emergency service calls such that additional police officers may be required to respond to calls for service. As discussed above, the FBI indicates that 1.2 police officers per 1,000 residents is the average ratio for Western region cities with populations less than 100,000. To provide that staffing level, the proposed Project would require 2.73 additional deputies. To maintain the City's current deputy staffing level with OCSD, the proposed Project would require 1.44 additional deputies. Implementation of the proposed Project would generate additional funding for the City through property tax revenue. These funds could be used for the development of needed facilities, additional personnel, or new equipment, if required. The allocation of additional tax revenues would be at the discretion of City policymakers based on City needs. Additionally, OCSD indicated in a letter dated July 10, 2019 that, upon completion of the proposed Project, the OCSD would be able to adequately serve the proposed Project.

A Neighborhood Watch Program would be established by the applicant/developer on the Project site. Neighborhood Watch Programs prevent crime and create a partnership between law enforcement and the community thereby reducing calls for service. The OCSD recommends that the Project Applicant/Developer to establish a Neighborhood Watch Program in consultation with OCSD. A neighborhood watch would further reduce calls for service. Regardless, the proposed Project would not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios or other performance objectives for police protection.

As discussed above, the OCSD currently maintains a response time of less than 5 minutes for all emergency incidents. The proposed Project would not increase response times by increasing traffic volumes on area roadways to the point where additional significant congestion would occur. As discussed in Section 4.16, Transportation and Circulation, of this EIR, the proposed Project would not result in a significant impact to any study area intersections after implementation of appropriate mitigation measures. As such, traffic from operation of the proposed Project would not contribute to or result in a substantial increase in response times for police or emergency vehicles, and no mitigation is required.

Threshold 4.14.1(iii): Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for schools?

Less than Significant Impact.

Construction. As detailed throughout this EIR, the proposed Project includes dedication of land to SVUSD for future construction of a public elementary school on the Project site. According to a letter from SVUSD to the City of Lake Forest, a Letter of Intent was presented to the District by the Project Applicant/Developer. Three sites were originally identified as possible school sites on the Project site, and an experienced school architectural firm was hired by the Project Applicant/Developer based on SVUSD's recommendation to provide schematic plans in compliance with California Department of Education (CDE) design guidelines for an elementary school at each site. The Developer also hired a planning and environmental firm to review compliance with the CDE Site Selection and Approval Guide. After review of the options, two sites were submitted to the CDE for review. The CDE Field Representative reviewed the CDE 4.0 submittal and visited the sites. Both sites comply with CDE guidelines, and the initial site evaluation recommended that the District proceed with the sites for further evaluation. After various meetings and discussions, SVUSD provided a draft mitigation agreement that is currently in negotiation by both parties.

To the extent to which details are known, the elementary school is integrated into the proposed Project, and the associated physical environmental impacts are analyzed throughout this EIR. As discussed in Section 4.9, Hazards and Hazardous Materials, additional studies to fulfill school siting requirements were also conducted, including an Electromagnetic Field Study, a Health Risk Assessment, a Geologic and Environmental Hazards Assessment Report, and a Water Pipeline and Tank Safety Hazard Assessment. Potential impacts related to construction of the proposed school would be less than significant with implementation of all applicable mitigation, as detailed in this EIR.

Although the proposed Project would cause a slight increase the number of employees at the Project site during construction, as detailed in Section 4.13 of this EIR, construction workers are not anticipated to change their place of residence as a result of working at the Project site. Therefore, there would be no increase in student enrollment at the schools serving the Project site during construction. Potential impacts related to the provision of school services for construction of the proposed Project would be less than significant.

Operation and School Capacities with No School. Table 4.14.C provides the estimated student enrollment for the proposed Project. The senior affordable housing units are not expected to generate any students; therefore, the table includes only the 675 single-family residential units. While it is likely that some of the students generated by the proposed Project would already reside in the area served by the SVUSD and would already be enrolled in SVUDS schools, for the purposes of this analysis, it is conservatively assumed that all students generated by the proposed Project are not currently enrolled in the SVUSD schools near the Project site but would be enrolled upon relocation to the Project site.

Table 4.14.C: Estimated Student Enrollment

School Level	Single-Family Detached Units	SVUSD Student Generation Factors	Students Generated
Elementary School	675	0.1929	135
Intermediate School	675	0.0654	45
High School	675	0.1459	102
Total		**0.4042**	**282**

Source: Public comment letter titled "Response to Notice of Preparation of the Nakase Property Area Plan Environmental Impact Report" (SVUSD 2018b).
SVUSD = Saddleback Valley Unified School District

As shown in Table 4.14.C, the Project would generate an estimated 282 students consisting of 135 elementary school students, 45 intermediate school students, and 102 high school students. As discussed in Section 4.14.2, Existing Environmental Setting, the Project site is not currently included within a specific school attendance boundary. However, potential schools serving the Project site would include Portola Hills Elementary School, Lake Forest Elementary School, Rancho Canada Elementary School, Foothill Ranch Elementary School, Serrano Intermediate School, El Toro High School, and Trabuco High School.

As shown in Table 4.14.A, elementary schools in the SVUSD have 34 seats available. Therefore, elementary schools that could potentially serve the Project site would not have adequate capacity to accommodate the 135 elementary school students the Project is expected to generate. As shown in Table 4.14.D below, the proposed Project would create a shortage of 101 elementary school seats if no school is constructed on the Project site (or elsewhere in the District boundaries). Serrano Intermediate School has a surplus of 289 seats and, therefore, has adequate capacity to accommodate the 45 intermediate school students the Project is expected to generate. High schools in Lake Forest have a surplus of 319 seats and, therefore, would have adequate capacity to accommodate the 102 high school students the Project is expected to generate.

Table 4.14.D: School Seat Shortage/Surplus

School Level	Existing Surplus/ (Shortage)	Students Generated by Proposed Project	Surplus/(Shortage) After Implementation of Proposed Project	
			Without the School	With the School
Elementary School	34	135	(101)	899
Intermediate School	289	45	244	244
High School	431	102	329	329
Totals	**754**	**282**	**472**	**1,472**

Source: Residential Development School Fee Justification Study (SVUSD 2018c).
SVUSD = Saddleback Valley Unified School District

Pursuant to California Education Code Section 17620(a)(1), the governing board of any school District is authorized to levy a fee, charge, dedication, or other requirement against any construction within the boundaries of the district for the purpose of funding the construction or

reconstruction of school facilities.[1] The Project Applicant/Developer would be required to pay such fees to reduce and/or avoid any impacts of new residential development on school services as provided in California Government Code Section 65995. This requirement may be satisfied through the dedication of land on the Project site to the SVUSD for future construction of a school. Therefore, with implementation of RCM PS-2 requiring the payment of development fees (or dedication of land in lieu of payment of fees), impacts to school services and facilities associated with the proposed Project would be less than significant.

Operation and School Capacities with Proposed School. As detailed above**,** Table 4.14.C provides the estimated student enrollment for the proposed Project. The senior affordable housing units are not expected to generate any students; therefore, only the 675 single-family residential units are included in Table 4.14.C. As shown in Table 4.14.C, the Project would generate an estimated 282 students, consisting of 135 elementary school students, 45 intermediate school students, and 102 high school students. As shown in Table 4.14.A, elementary schools in the SVUSD have 34 seats available. Therefore, elementary schools that could potentially serve the Project site would not have adequate capacity to accommodate the 135 elementary school students the Project is expected to generate. As shown in Table 4.14.D, the proposed Project would create a shortage of 101 elementary school seats if no school is constructed on the Project site (or elsewhere in the District boundaries).

The proposed elementary school is expected to accommodate 1,000 students, which would reduce impacts on school services and facilities. As shown in Table 4.14.D, with dedication of the proposed school site, the SVUSD would have the ability to add 1,000 elementary school seats, thereby eliminating the shortage of 101 seats resulting from the proposed Project. However, if the SVUSD does not accept the dedication of the school site, the Applicant would pay school fees consistent with California Government Code Section 65995. With dedication of the proposed elementary school site or the payment of any school fees (as required by RCM PS-2), impacts would be less than significant and no mitigation is required.

Threshold 4.14.1(iv): Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for parks?

Less than Significant Impact. Please refer to Section 4.15, Recreation, of this Draft EIR for a detailed discussion related to the proposed Project's potential impacts to parks and recreational facilities. As discussed in Section 4.15, the provision of onsite parks and recreational facilities would offset the

[1] On January 24, 2018, the State Allocation Board increased the maximum residential School Fee authorized by Section 17620 of the Education Code from $3.48 to $3.79 per residential building square foot for unified school districts. Based on the square footage of the average residential unit constructed within SVUSD, the School Fees would provide for less than 100 percent of the school facilities cost impacts. Therefore, the School District is fully justified in levying the maximum residential School Fee of $3.79 per square foot for all new non-mitigated residential development within its boundaries.

additional demand for parks facilities generated as a result of the addition of 101 senior affordable housing units and 675 single-family residential units. The proposed Project would also be consistent with the City's parkland dedication requirements, as required by RCM REC-1, and impacts on existing park and recreational facilities would be less than significant. Therefore, with the provision of onsite private amenities, the proposed Project would not require the construction of new or expansion of existing construction or expansion of existing recreational facilities to maintain acceptable service ratios or performance objectives. Therefore, the proposed Project's potential impact on parks would be less than significant.

Threshold 4.14.1(v): Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for other public facilities?

Less than Significant Impact.

Public Libraries.

Construction. Short-term construction activities would not have any impact on the existing OCPL system because there are no nearby libraries that could be impacted by construction activities and construction activities would not generate demand for library services. It is unlikely that the construction workers would increase the demand for library services during the temporary construction of the proposed Project, as most workers would commute directly to and from the Project site for the sole purpose of working on the proposed Project. Therefore, no new libraries would be required to be developed nor would an existing library need to be expanded to provide adequate public library services during proposed Project's construction. Therefore, the proposed Project's potential impact on public libraries during construction would be less than significant.

Operation. Demand for library services is typically determined based on the size of the resident population. As discussed in Section 4.13, Population and Housing, the projected increase in population associated with the proposed 101 senior affordable housing units and 675 single family residential units would be approximately 2,274 persons. As discussed above, the City uses a library demand ratio of 0.2 sf of library space per capita. Based on the City's 2018 population,[1] the City has an existing demand for 17,009.2 sf of library space. The Foothill Ranch Library (12,914 sf) and the El Toro Library (13,940 sf) are cumulatively 26,854 sf, an amount that exceeds the demand for library space the City's General Plan requires. The additional population growth associated with the proposed Project would result in a demand for 454.8 sf of additional library space in the City. Based on the City's demand ratio,

[1] According to the California Department of Finance. E-5 Population and Housing Estimates for Cities, Counties, and the State, 2011–2014 with 2010 Census Benchmark City/County Population and Housing Estimates, the City's population in 2018 was 85,048.

this increase in demand for library space can be accommodated by the existing libraries in Lake Forest.

As noted above, OCPL does not use a library demand ratio. According to the OCPL, existing libraries in the City are at maximum capacity and no additional library facilities are currently planned that would mitigate the increase in demand for library services represented by the proposed Project. Because the City has its own adopted demand ratio for libraries, this information is provided for disclosure purposes only.

Implementation of the proposed Project would generate additional funding for the City through property tax revenue the proposed Project would generate. These funds could be used for the development of new or expanded library facilities or new library equipment, if required. The allocation of additional tax revenues would be at the discretion of City policymakers based on City needs.

Regardless, based on the City's library demand ratio, the proposed Project would not require the expansion of existing library facilities in the City in order to maintain acceptable service ratios. Therefore, impacts to public library facilities would be less than significant and no mitigation would be required.

Public Transportation.

Construction. Overall, short-term demolition and construction activities would require minimal use of public transportation, and they are not expected to have any adverse impacts on the availability of the public transportation system. The proposed Project would not require the temporary or permanent relocation of any bus stops, and, consistent with the requirements of the Mitigation Measure 4.16.1, OCTA would be notified regarding any affected bus stop locations or routes a minimum of 10 working days prior to construction so that transit service can be rerouted if deemed necessary in the OCTA's expert opinion. Therefore, impacts related to the provision of public transportation services during construction of the proposed Project would be less than significant, and no mitigation is required.

Operation. Operation of the proposed Project is not anticipated to result in a substantial increase in demand for OCTA services within the city. As previously discussed, the OCTA currently operates a northbound and southbound bus stop for Route 206 on Bake Parkway directly in front of the Project site, a northbound/southbound bus stop for Route 480 on Lake Forest and Regency, and a northbound and southbound bus stop for Route 177 southeast of the Project site on Town Centre Drive and Alton.

As discussed previously, transit ridership in the vicinity of the Project site and Lake Forest overall is generally low. Transit ridership near the Project site on Routes 206 and 408 were also generally low at 150 to 250 total annual riders at each stop. Transit ridership on the 177 bus route was generally higher from 150 to 1,500 total annual riders at each stop. There are numerous trips for Routes 480, 206, and 177 (35 daily weekday trips and 17 Saturday trips for Route 85, 6 weekday trips per day for Route 206, and 9 weekday trips per day for Route

480). Therefore, the proposed Project would not create a public transportation need that requires service expansion, and OCTA would be able to provide adequate services to the proposed Project. Therefore, the proposed Project would not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, in order to maintain acceptable service ratios, response times or other performance objectives for public transportation. No mitigation is required.

4.14.7 Cumulative Impacts

As defined in the State CEQA Guidelines, cumulative impacts are the incremental effects of an individual project when viewed in connection with the effects of past, current, and probable future projects within the cumulative impact area for public services. The Project site is a plant nursery in Lake Forest, which is currently not generally served by public service providers because residential uses do not exist on the Project site. The cumulative area for public services is listed below for each individual public service provider.

4.14.7.1 Fire Protection

The geographic area for cumulative analysis of fire protection services is defined as the service territory of Fire Station No. 54. As stated above, Fire Station No. 54 would accommodate the Project's need for fire protection services. Although the proposed Project would increase calls for service, the increase in calls for service is not anticipated to result in an excessive increase in calls for service. Therefore, the proposed Project would not have a cumulatively significant impact on the provision of fire services.

Of the 11 related projects, all would potentially be served by Fire Station No. 54 or Fire Station No. 42. Operation of the related projects are anticipated to increase the overall demand for fire protection services provided by Fire Station No. 54. As discussed in Section 4.13, Population and Housing, the cumulative population and housing growth from the proposed Project and the related projects (4,934 residents and 1,684 housing units, respectively) in Lake Forest would be relatively small compared to the Southern California Association of Governments' (SCAG) projected population increase in Lake Forest and the County. Thus, the proposed Project and the related projects' relatively small increase in population above the SCAG growth forecasts indicates they would be accommodated as part of OCFA's long-term growth planning for fire and other public facilities. Additional demands for fire protection services would be funded by existing funding sources (i.e., property taxes and government funding), to which the proposed Project and related projects would contribute. Additionally, to address the increase in cumulative regional demand for fire and emergency medical services, the OCFA requires all developers to enter into a secured fire protection agreement with OCFA to ensure the availability of adequate fire protection services. The agreements specify a developer's pro-rata fair-share funding for capital improvements necessary to establish and maintain adequate fire protection facilities, equipment, and personnel. Therefore, the proposed Project's contribution to fire protection impacts would not be cumulatively considerable, and no mitigation is required.

4.14.7.2 Police Protection

The geographic area for the cumulative analysis of police protection services is defined as the service area for the OCSD's Southeast Operations Division. Although the proposed Project would result in an increase in calls for service, it would not result in the need for additional or physically altered police facilities.

All 11 related projects are within Lake Forest. As discussed in Section 4.13, Population and Housing, the cumulative population and housing growth from the proposed Project and the related projects in Lake Forest would be relatively small compared to the SCAG forecasted population and housing growth for the city. Additional demands for OCSD services would be funded by existing funding sources (i.e., property taxes and government funding), to which the proposed Project and related projects would contribute. Thus, the proposed Project and the related projects' demand for police services would be accommodated by the City and OCSD's long-term growth planning for police protection services and facilities. Therefore, the proposed Project's contribution to police protection impacts would not be cumulatively considerable, and no mitigation is required.

4.14.7.3 Schools

The geographic area for cumulative analysis of school services is the school district that serves the proposed project (i.e., SVUSD). As discussed above, the proposed Project would not result in significant impacts to school facilities with the implementation of RCM PS-2. However, a cumulative increase in the demand for school services is anticipated to take place with the development of future residential project, the proposed Project itself, and more specifically, the future household growth within the school boundaries currently servicing the Project site. As shown in Table 4.14.E, there is a total of 11 related projects. All related projects are within Lake Forest and within the SVUSD. As Table 4.14.E shows, related projects would generate approximately 204 elementary school students, 61 intermediate school students, and 133 high school students, for a total of 398 students.

As discussed above, the proposed Project would generate an increase of 135 elementary school students, 45 intermediate school students, and 102 high school students, for a total of 282 students. When added to the students generated by the related projects, the cumulative student generation would include 339 elementary school students, 106 intermediate students, and 235 high school students for a total of 680 students overall.

As shown in Table 4.14.F, the intermediate schools and high schools in the area would have adequate capacity to serve the proposed Project and related projects. However, there would be a shortage of 305 elementary school seats without the dedication of the proposed school site. All related projects would be required to fulfill payment of requisite development fees pursuant to California Government Code Section 65995, as described in RCM PS-2. Because the proposed Project and all future related projects would be required to pay school fees as required by RCM PS-2, cumulative impacts that the proposed Project may have on school services would be less than significant. If the school site is developed as proposed, there would be adequate capacity for the cumulative elementary school students generated, which would further reduce impacts to school services and facilities. If the SVUSD does not accept the dedication of the elementary school site,

Table 4.14.E: Estimated Related Project Student Generation

Related Project No.	Land Use	Size	Elementary School	Intermediate School	High School
City of Lake Forest					
1	Private Recreation	2 acres	0	0	0
2	Commercial	Remodeling of existing 1.027 ac	0	0	0
3	Single-family	93 DU	18	6	14
4	Animal Hospital	0.092 acre	0	0	0
5	Religious Facility	2.121 acres	0	0	0
	Classroom	0.389 sf			
6	Single-family	101 DU	19	7	15
7	Townhome condominium duplexes	108 DU	26	7	14
8	Single-family detached homes	85 DU	16	6	12
9	Restaurant	0.039 acre	0	0	0
10	Condominium/ Single-family	521 DU	125	35	78
11	Religious Facility	0.152 acre	0	0	0
Total		**908 DU**	**204**	**61**	**133**

Note: For multifamily units, the "mutifamily attached" student generation factor was used. For Project 10, because the number of condominium/single-family units has not been determined for a conservative analysis, the greater student generation factor was used (multifamily for elementary school and single-family for intermediate and high school).
DU = dwelling units
sf = square feet

Table 4.14.F: Cumulative Impacts to Saddleback Valley Unified School District

School	Existing Surplus/ (Shortage)	Cumulative Students	Existing Surplus/ (Shortage)	
			Without Proposed Elementary School	With Proposed Elementary School
Elementary School	30	339	(309)	691
Intermediate School	258	106	152	152
High School	385	235	150	250

Source: Residential Development School Fee Justification Study (SVUSD 2018c).
SVUSD = Saddleback Valley United School District

the Project Applicant/Developer would pay school mitigation fees, and the proposed Project's contribution to school impacts would not be cumulatively considerable, and no mitigation is required.

4.14.7.4 Public Library

The geographic area for an assessment of cumulative impacts pertaining to library services is the city of Lake Forest. Of the 11 related projects, only the 5 projects involving residential uses would introduce new residents to the library service area and potentially increase demand for library services. Nonresidential projects are viewed as having relatively limited impacts attributable to occasional and incidental use of library facilities for generalized research purposes. Employees generated by the nonresidential projects would not be expected to patronize local libraries to a measurable extent, as they typically would not have long periods of time during their work to visit

library facilities and would be more likely to use libraries near their homes during non-work hours. The 5 related projects proposing residential uses would generate a total of 2,660 residents and the cumulative increase in residents from the proposed Project in addition to the related projects would be 4,934 residents, as discussed in Section 4.13, Population and Housing. As discussed above, the City uses a library demand ratio of 0.2 sf of library space per capita. Based on Lake Forest's 2018 population,[1] the City has an existing demand for 17,009.2 sf of library space. The proposed Project and the related projects would result in a demand for 986.8 sf of additional library space. As the Foothill Ranch Library (12,914 sf) and the El Toro Library (13,940 sf) are cumulatively 26,854 sf, the existing libraries could accommodate anticipated demand from future projects. Therefore, the proposed Project's contribution to library impacts would not be cumulatively considerable, and no mitigation is required.

4.14.7.5 Public Transportation

The geographic area for the cumulative analysis of transit services is defined as the service territory for the OCTA, which includes all 11 of the related projects. As discussed above, transit ridership in Lake Forest is generally low. Transit ridership on routes 206, 408, and 177 serving the Project site are generally low, and there are numerous trips for each route on weekdays (only Route 85 runs on weekends). With OCTA's ability to meet the future transit demands within the Project area, the increased demand for public transit from the proposed Project in addition to the related projects would create a public transportation need that requires service expansion of the OCTA. Therefore, the proposed Project's contribution to public transportation impacts would not be cumulatively considerable, and no mitigation is required.

4.14.8 Level of Significance Prior to Mitigation

Impacts related to police services, schools, parks, libraries, and public transportation would be less than significant prior to mitigation. The proposed Project would result in potentially significant impacts to fire protection services, and mitigation is required.

4.14.9 Regulatory Compliance Measures and Mitigation Measures

4.14.9.1 Regulatory Compliance Measures

The proposed Project would comply with the following regulatory standards, the implementation of which is intended to reduce impacts related to public services:

RCM PS-1 **City of Lake Forest Municipal Code Section 8.24.010 (California Fire Code Adoption) and Section 7.08.145 (Fire Protection).** Prior to issuance of grading permits for planned structures, the City of Lake Forest Public Works Director, or designee, shall review the building plans to verify that the design conforms to the requirements of the Fire Code as adopted in the City Municipal Code.

[1] According to the California Department of Finance. E-5 Population and Housing Estimates for Cities, Counties, and the State, 2011–2014 with 2010 Census Benchmark City/County Population and Housing Estimates, the City's population in 2018 was 85,048.

RCM PS-2 **Payment of School Facility Fees.** Prior to issuance of a building permit, the Project Applicant/Developer shall submit proof of payment of all applicable school facility fees in accordance with Government Code Section 65995 to the Director of the City of Lake Forest Department of Community Development, or designee. This requirement may be satisfied through the dedication of land on the Project site to the Saddleback Valley Unified School District for future construction of a school.

4.14.9.2 Mitigation Measures

Mitigation Measure 4.14.1 **Secured Fire Protection Agreement.** The Project Applicant/Developer shall enter into a Secured Fire Protection Agreement with the Orange County Fire Authority (OCFA). The Secured Fire Protection Agreement shall specify the developer's pro-rata fair-share funding of capital improvements necessary to establish adequate fire protection facilities and equipment, and/or personnel. Evidence of an OCFA-approved agreement shall be submitted to City of Lake Forest Director of Community Development, or designee, prior to issuance of the first~~any~~ building permit~~s~~.

4.14.10 Level of Significance after Mitigation

With implementation of Mitigation Measure 4.14.1, potentially significant impacts would be reduced below a level of significance.

This page intentionally left blank

4.15 RECREATION

This section describes the parks and other recreational facilities near the Nakase property (Project site) and evaluates the potential impacts of the proposed Nakase Nursery/Toll Brothers Project (proposed Project) on those facilities. This section also discusses the existing setting of recreational facilities within and near Lake Forest and sets forth the relevant regulatory requirements that apply to the analysis of the proposed Project's impact on recreational facilities. This section is based, in part, on information provided in the Recreation and Resources Element of the City of Lake Forest (City) General Plan and applicable provisions of the City's Municipal Code.

4.15.1 Scoping Process

The City received 28 comment letters during the public review period of the Initial Study/Notice of Preparation (IS/NOP). For copies of the IS/NOP comment letters, refer to Appendix A of this Environmental Impact Report (EIR). Two comment letters included comments related to Recreation.

The letter from Sue Nath (July 30, 2018) suggested evaluating the development of a park or garden on the Nakase site. The letter from Judy Esposito (August 6, 2018) suggested making the nursery site into community gardens or a forest.

4.15.2 Existing Environmental Setting

4.15.2.1 Existing Project Site

The Project site is located in the north-central portion of Lake Forest. The approximately 122-acre (ac) Project site is currently operating as the Nakase Brothers Wholesale Nurseries, an agricultural wholesale plant nursery. Historically, the main portion of the Project site has been used primarily for agricultural production. The Project site is bounded on the northwest by Bake Parkway, on the northeast by Rancho Parkway, on the southeast by the Serrano Creek Trail, and on the southwest by commercial, industrial, and office uses, with Dimension Drive beyond. Manufactured landscape slopes, chain-link fences, and block walls enclose the Project site. In addition, several mature trees line the northeastern and southeastern boundaries of the Project site.

Serrano Creek Trail is a 7.2-mile (mi) moderately trafficked out-and-back trail that roughly follows the path of Serrano Creek. A portion of the trail is located adjacent to the Project site. Serrano Creek Trail offers a number of activity options and is accessible year-round. Dogs and horses are also able to use this trail. The southern end of Serrano Creek Trail starts at Serrano Creek Park, while the northern end, which is part of Limestone/Whiting Ranch Wilderness Park, merges with another trail in Limestone/Whiting Ranch Wilderness Park.

Nature Park is a 4.5 ac neighborhood park located immediately adjacent to the southern boundaries of the proposed Project. The park features mature oak trees, grass areas, walking paths, and a picnic area.

The City's General Plan designates the Project site as Business Park and Business Development Overlay (BDO). The Project site currently has a zoning designation of A1–Agricultural District, which

is intended to provide for agriculture, outdoor recreational uses, and other low-intensity uses requiring open space.

4.15.2.2 Existing Recreational Facilities within the City

The City provides a variety of recreational opportunities, including nature parks, a skate park, a sports park, and a recreation center. There are 32 public parks in Lake Forest, which range in size from the approximately 0.2 ac Cavanaugh Park to the 86 ac Lake Forest Sports Park. The City classifies parks as community, neighborhood, or mini-parks based on size and characteristics:

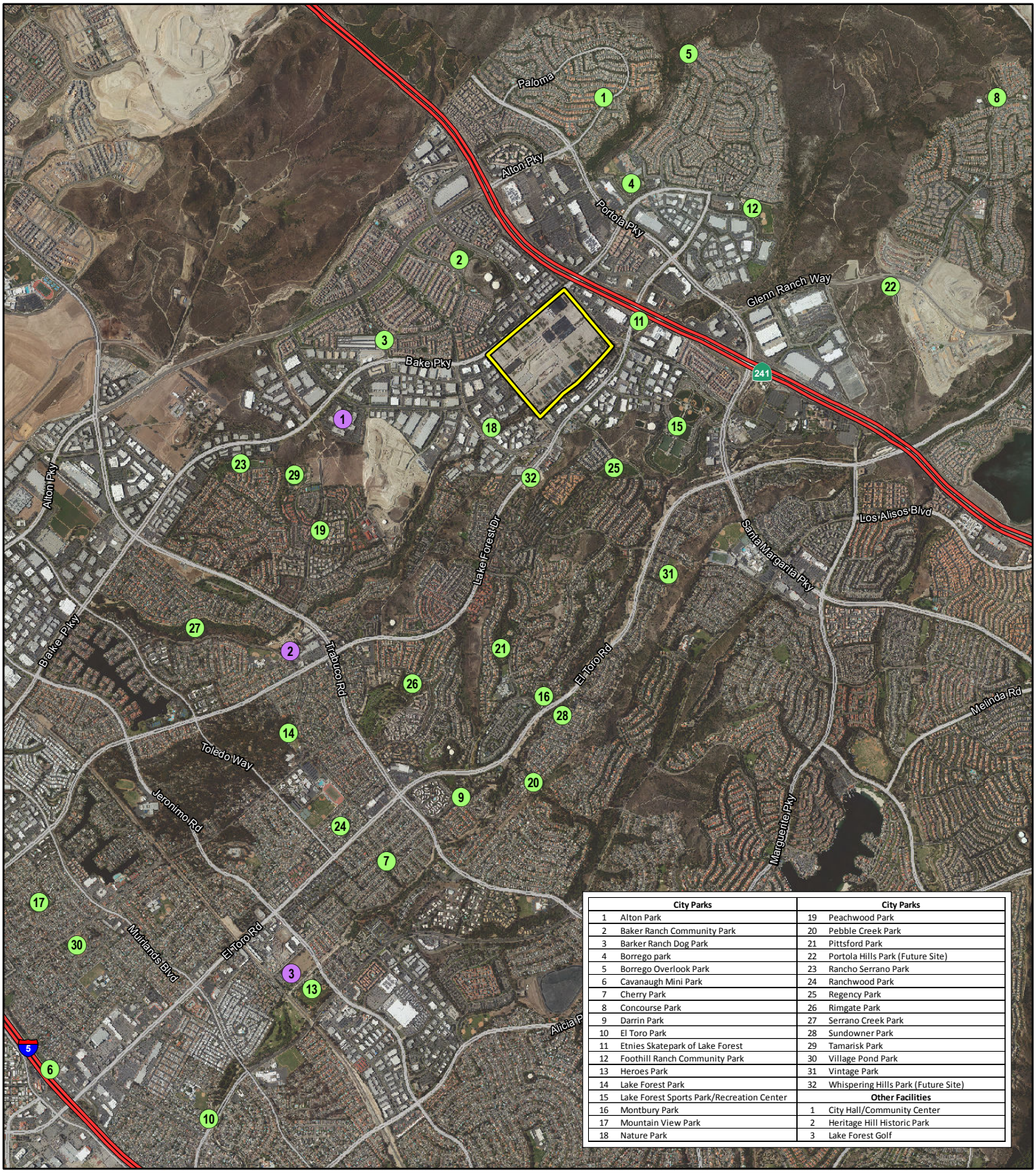
- **Community Parks:** Community parks serve neighborhoods and are intended to have a service radius of approximately 2 to 3 mi. These parks are generally over 10 ac in size and include a variety of facilities, such as active recreational facilities (e.g., athletic fields and group picnic areas). In addition, these large parks often include community centers. Baker Ranch Community Park is located approximately 0.4 mi from the northwest boundaries of the Project site. The 86 ac Lake Forest Sports Park/Recreation Center is located approximately 0.45 mi from the eastern boundaries of the Project site and is one of the largest sports parks in Orange County, with 57 ac devoted to sports fields and a multifunctional recreation center. Other community parks in Lake Forest include Borrego Park, El Toro Park, Foothill Ranch Community Park, Heroes Park, Pittsford Park, Serrano Creek Park, and Tamarisk Park.

- **Neighborhood Parks:** Neighborhood parks are smaller than community parks but are typically at least 3 ac. Neighborhood parks are often adjacent to schools, greenbelts, open space linkages, or other community open space or recreational facilities to facilitate an integrated open space system and normally include tot lots, picnic facilities, and a multiuse court. Lake Forest contains numerous neighborhood parks, including Regency Park, which is approximately 0.41 mi from the southeast boundaries of the Project site, and the Etnies Skatepark, which is approximately 0.13 mi from the eastern borders of the Project site. Other neighborhood parks in Lake Forest include Alton Park, Borrego Canyon Overlook Park, Cherry Park, Concourse Park, Darrin Park, Lake Forest Park, Montbury Park, Mountain View Park, Nature Park, Peachwood Park, Pebble Creek Park, Portola Hills, Rancho Serrano Park, Ranchwood Park, Rimgate Park, Village Pond Park, and Vintage Park.

- **Mini-Parks:** Mini-parks are generally less than 1 ac in size and are usually established in higher-density areas as a substitute for backyards. The City's mini-parks serve various age groups depending on characteristics of the neighborhood. The Barker Ranch Dog Park is a mini-park located approximately 0.5 mi from the western boundaries of the Project site. Other mini-parks in Lake Forest include Cavanaugh Park and Sundowner Park.

Figure 4.15.1 provides the locations of existing recreational facilities near the Project site.

Table 4.15.A provides the acreages and amenities offered by existing City park and recreational facilities. In total, the existing park and recreational facilities listed in this table total 239.15 ac, making up the majority of the City's parkland inventory.



City Parks		City Parks	
1	Alton Park	19	Peachwood Park
2	Baker Ranch Community Park	20	Pebble Creek Park
3	Barker Ranch Dog Park	21	Pittsford Park
4	Borrego park	22	Portola Hills Park (Future Site)
5	Borrego Overlook Park	23	Rancho Serrano Park
6	Cavanaugh Mini Park	24	Ranchwood Park
7	Cherry Park	25	Regency Park
8	Concourse Park	26	Rimgate Park
9	Darrin Park	27	Serrano Creek Park
10	El Toro Park	28	Sundowner Park
11	Etnies Skatepark of Lake Forest	29	Tamarisk Park
12	Foothill Ranch Community Park	30	Village Pond Park
13	Heroes Park	31	Vintage Park
14	Lake Forest Park	32	Whispering Hills Park (Future Site)
15	Lake Forest Sports Park/Recreation Center	**Other Facilities**	
16	Montbury Park	1	City Hall/Community Center
17	Mountain View Park	2	Heritage Hill Historic Park
18	Nature Park	3	Lake Forest Golf

LSA

LEGEND

Project Location

Existing Recreational Facilities

City Parks

Other Facilities

N

0 1750 3500

FEET

FIGURE 4.15.1

Nakase Nursery/Toll Brothers

Existing Recreational Facilities

SOURCE: Google Maps (2018); City of Lake Forest (2019)

I:\CLF1801\GIS\RecreationalFacilities.mxd (6/17/2019)

This page intentionally left blank

Table 4.15.A: Existing City Parks and Recreation Facilities

Name	Location	Acreage	Facilities
Alton Park	Alton Parkway between Bonita Vista and Mallorca	2.3	Tot lot, half-court basketball
Baker Ranch Community Park	26380 Rancho Parkway South	8	Soccer field with overlay
Barker Ranch Dog Park	26500 Baffin Bay Drive	0.5	Perimeter fencing for large and small dog areas, dog water stations
Borrego Canyon Overlook Park	Viaggio Lane near Tessera Avenue	1.6	Tot lot, picnic area, gazebo
Borrego Park	Bake Parkway near Burbank	11	Baseball field, basketball court, play area, restrooms
Cavanaugh Park	23782 Cavanaugh Road	0.2	Play apparatus and half-court basketball
Cherry Park	22651 Cherry Avenue	4.5	Play apparatus, half-court basketball, open play area, picnic shelter, individual and group picnic tables, barbecue grills
Concourse Park	Saddleback Ranch Road near Ranchwood Way	7.0	Basketball court, tot lots, picnic areas
Darrin Park	22461 Cherry Avenue	3.1	Play apparatus, half-court basketball, open play area, individual picnic tables, barbecue grills
El Toro Park	23701 Los Alisos Boulevard	10	Volleyball courts, handball courts (outdoor), and lighted tennis courts
Heroes Park	25420 Jeronimo Road	12.4	Lighted Little League fields, lighted soccer fields, and restrooms
Etnies Skate Park	Lake Forest Drive near Rancho Parkway	5.3	Skate area for all ages, restrooms, picnic tables.
Foothill Ranch Community Park	Pauling near Lake Forest Drive	15.5	Tennis courts, volleyball court, baseball field
Heritage Hill Historical Park (County of Orange Facility)	25151 Serrano Road	4.12[1]	Open space, historic buildings, educational programs, picnic tables, restrooms, maintenance structure
Lake Forest Park	24000 Serrano Road	2.3	Picnic tables, hiking trail, passive open space
Lake Forest Sports Park and Recreation Center	28000 Rancho Parkway	86	Multipurpose facility, lighted ball fields/soccer fields, multipurpose court, group picnic areas, restrooms, active play areas
Mountain View Park	4061 Dylan Street	5.3	Softball field, half-court basketball, play apparatus, volleyball courts, handball courts, lighted tennis courts, open play area, picnic table, barbecue
Montbury Park	21962 Montbury Drive	3.5	Passive open space
Nature Park	26251 Dimension Drive	4.5	Walking trail, picnic tables, gazebo picnic area
Peachwood Park	Peachwood near Palmwood	2.7	Open space, tot lot, picnic area
Pebble Creek Park	26441 Pebble Creek Road	1.9	Play apparatus, passive open space
Pittsford Park	21701 Pittsford Drive	10	Play apparatus, picnic tables, picnic shelter, tennis courts, restrooms
Rancho Serrano Park	20842 Paseo Sombra	5.1	Picnic tables, passive open space
Ranchwood Park	22500 Killy Street	1.9	Half-court basketball, play apparatus, volleyball court, open space
Regency Park	21478 Regency Lane	5.0	Large, flat turf area; soccer field overlay. City holding bond for future improvements
Rimgate Park	29772 Rimgate Drive	5.0	Half-court basketball courts, play apparatus, grass volleyball court, tennis court, picnic tables, picnic shelter, passive open space
Serrano Park (Tamarisk Park)	Tamarisk at Peachwood	11.2	Baseball fields, soccer field, open play, basketball court, picnic tables
Serrano Creek Park	25101 Serrano Road	44	Play apparatus, walking trail, picnic tables, restrooms
Sundowner Park	22041 Sundowner Lane	0.8	Play apparatus, picnic tables, passive open space
Village Pond Park	23102 Ridge Route Drive	4.7	Picnic tables, pond, passive open space

Table 4.15.A: Existing City Parks and Recreation Facilities

Name	Location	Acreage	Facilities
Vintage Park	21000 Vintage Street	4.8	Basketball courts, play apparatus, parcourse, open play area, picnic tables, barbecues
Portola Park	28040 Glenn Ranch Road	5	Dog park, pickleball courts, restrooms
	Total Acres	**285.1**	

Source: Table RR-2, City of Lake Forest General Plan Recreation and Resources Element (City of Lake Forest 2016c).
[1] Acreage is not included in the total acreage calculation because it is a County of Orange facility.

In addition to the existing City parks and recreation facilities, residents of the City are able to utilize various regional recreation amenities, including:

- **Regional Parks:** The County of Orange (County) owns and maintains regional recreational parks within and near Lake Forest. Local County parks include Limestone/Whiting Ranch Wilderness Park, Heritage Hill Historical Park, and O'Neill Regional Park. These regional parks offer additional recreational opportunities to residents of Lake Forest. According to the City Recreation and Resources Element (City of Lake Forest 2015a), Limestone/Whiting Ranch Wilderness Park encompasses 1,101 ac of land in Lake Forest. In total, Limestone/Whiting Ranch Wilderness Park is approximately 2,500 ac of riparian and oak woodland canyons, rolling grassland hills, and steep slopes of coastal shrub and chaparral. Park amenities include bike trails, an equestrian center, equestrian trails, and hiking trails.

- **Cleveland National Forest:** The Cleveland National Forest is the southernmost National Forest in California. Consisting of 460,000 ac, the forest offers a wide variety of terrains and recreational opportunities. It is administered by the United States Forest Service, a government agency within the United States Department of Agriculture. The Cleveland National Forest is located approximately 2.5 mi from the Project site.

- **Trails and Bikeways:** Lake Forest's trail system includes pedestrian and bike trails within open space corridors and along regional trails. The County maintains a coordinated system of trails, including bikeways, equestrian trails, and hiking trails, within Lake Forest. There are a number of proposed improvements, including an off-street bike trail connecting Aliso Creek Trail with Serrano Creek in the northern portion of Lake Forest and the Foothill Transportation Corridor, a riding and hiking trail that would follow the Borrego Wash, a connection between Aliso Creek Trail and Serrano Creek Trail, and a realignment of portions of Aliso Creek Riding and Hiking Trail. The locations of the hiking trails, equestrian trails, and bicycle paths are shown on Figure 4.15.2.

HOME & GARDENS
LIMESTONE CANYON & WHITING RANCH WILDERNESS PARK
OSO RESERVOIR
CORRIDOR
REGIONAL
LIMESTONE CANYON & WHITING RANCH WILDERNESS PARK
LAKE MISSION VIEJO
CASPERS WILDERNESS PARK
O'NEILL REGIONAL PARK
GREAT PARK
EL TORO U.S.M.C.A.S. (Decommissioned)
HERITAGE HILL HISTORICAL SITE
Irvine Valley College
Jeffrey
Serrano Creek
Aliso Creek
Trabuco Creek
Oso Creek
Tijeras Creek
Live Oak Canyon
Vulture Crags
Bell View
Bell Cyn.
Borrego Canyon
FOOTHILL TRANSPORTATION
405 FRWY
SOURCE: County of Orange

Riding and Hiking Trails
- Existing
- Proposed

Off–Road Paved Bikeways
- Existing
- Proposed

Open Space Categories
- County Regional Park
- National Forest & Federal Land
- State Park or Local Reserve

Additional Features
- Historical Sites
- Rest Areas
- Existing Staging Areas
- Proposed Staging Areas
- Train Stations
- Colleges
- Points of Interest
- Lake Forest City Boundary
- Project Site

N

0 0.5 1
MILES

LSA

FIGURE 4.15.2

Nakase Nursery/Toll Brothers
Trails and Bikeways

I:\CLF1801\G\Trails&Bikeways.cdr (6/19/2019)

This page intentionally left blank

- **Schools:** City residents also enjoy access to open space and recreational facilities at public schools. Public school playgrounds, under the jurisdiction of the Saddleback Valley Unified School District (SVUSD), are open to the public after school hours. Organized sports leagues (e.g., baseball, soccer, and football) utilize ball fields through a permit process with the SVUSD. According to the Recreation and Resources Element, the City utilizes some school recreational facilities to meet the park goal of 5 ac per 1,000 persons. Up to 50 percent of the school facilities can be used, provided the school facilities are open to the public. At this time, the City does not intend to pursue a joint-use agreement with the SVUSD for school recreational facilities proposed as part of the proposed Project.

  Schools under the jurisdiction of the SVUSD that are located in Lake Forest include Foothill Ranch Elementary School, Portola Hills Elementary School, Gates Elementary School, Lake Forest Elementary School, La Madera Elementary School, Olivewood Elementary School, Rancho Canada Elementary School, Santiago STEAM Magnet Elementary School, Serrano Intermediate School, and El Toro High School.

- **Community Facilities:** The City has a number of community facilities that host many of its recreation and cultural programs. These facilities include City Hall, the Community Center, and the Senior Center. In addition, both the El Toro Library and Foothill Ranch Libraries include a Community Room and a Friends of the Library space, which serve as gathering places for the community.

- **Private Recreational Facilities:** Private facilities in Lake Forest also offer recreational amenities to the residents in the community. In addition to parks and trails, Lake Forest has many private recreational facilities. The privately owned facilities shown in Table 4.15.B are open to the public unless otherwise noted and partially count toward the City's parkland inventory.

Table 4.15.B: Existing Privately Owned Parks and Recreation Facilities (Open to the Public Unless Otherwise Noted)

Name	Location	Acreage	Facilities
The Grove[1]	101 Mariposa	2.62	Pool, Recreation Building
Passage Park	101 Wild Rose	0.8	Tot Lot, BBQ/Picnic Area, Shade Structure, Half-Court Basketball
Odyssey Park	100 Clover	0.93	Tot Lot, BBQ/Picnic Area, Shade Structure, Half-Court Basketball
Arbors[1,2]	101 Bellflower	2.2	Tot Lot, BBQ/Picnic Area, Shade Structure, Half-Court Basketball, Pool (Private)
Total Acres Counting toward Parkland Credit		**3.98**	

Source: Table RR-2A, General Plan Recreation and Resources Element (City of Lake Forest 2016c).

[1] Private Facility—open to residents of Baker Ranch only; acreage only counts for partial credit (0.25 of full acreage).

[2] Pool is open to residents of Baker Ranch only; pool is 0.8 acre, which only counts for partial credit (0.25 of acreage).

In addition to the privately owned recreational facilities in Table 4.15.B, there are privately owned recreational facilities open to the public for a user fee, such as the Lake Forest Golf and Practice Center and Serrano Creek Equestrian Center. Although these privately owned facilities do not count towards the City's parkland inventory, the amenities offered by these facilities also help meet residents' recreational needs by providing golf courses, equestrian centers, and pool, basketball, barbecue, and picnic areas.

According to the Recreation and Resources Element, the City encourages the inclusion of such facilities in private development, especially those open to the public.

4.15.3 Regulatory Setting

4.15.3.1 Federal Regulations

Americans with Disabilities Act. The Americans with Disabilities Act (ADA) of 1990 (42 United States Code [USC] 12181) prohibits discrimination on the basis of disability in public accommodation and State and local government services. Under the ADA, the Architectural and Transportation Barriers Compliance Board issues guidelines to ensure that facilities, public sidewalks, and street crossings are accessible to individuals with disabilities. Play areas, meeting rooms, park restrooms, and other buildings and park structures must comply with ADA requirements. Park facilities proposed as part of the proposed Project would be required to be ADA compliant.

4.15.3.2 State Regulations

Quimby Act of 1975. The Quimby Act (California Government Code Section 66477) allows the legislative body of a city or county to require by ordinance the dedication of land, the payment of an in-lieu park fee, or a combination thereof for the approval for a final tract or parcel map. In cases where such a dedication or park fee is not obtained through a map, it may be imposed when building permits are issued. The following conditions must be met to comply with the Quimby Act:

- The city or county ordinance must include definitive standards for determining the proportion of a subdivision to be dedicated and the amount of any fee to be paid in lieu thereof.

- The legislative body must adopt a general plan containing a recreation element, and any proposed park or recreational facility must be consistent with the principles and standards established in the element

4.15.3.3 Local Regulations

City of Lake Forest Municipal Code. The following sections of Chapter 7.38, Dedication of Land for Park Facilities and Payment of In Lieu Fees, of the City's Municipal Code are applicable to the proposed Project:

- **Section 7.38.020, Parkland Dedication Requirements**, requires the dedication of land for park facilities as a condition of the approval of a tentative map or tentative parcel map for a subdivision if the subdivision contains 51 or more separate lots or parcels

- **Section 7.38.030, Standards for Determining the Amount of Dedicated Parkland**, establishes that the amount of land dedicated to the City for park facilities shall be consistent with the standards and policies for park facilities adopted in the General Plan or an applicable specific plan and shall bear a reasonable relationship to the need for park facilities by the inhabitants of the subdivision.

- **Section 7.38.040, Amount of Dedicated Parkland to be Required**, establishes the following:

- The number of acres required to be dedicated to the City for park facilities shall be 5 ac per 1,000 estimated population in the subdivision based on the maximum number of dwelling units permitted within the subdivision.

- If the subdivider provides park and recreational improvements to the dedicated land, the value of improvements together with any equipment located thereon shall be credited against the payment of fees or dedication of land.

- A development with private open space shall receive an adjustment to its parkland dedication obligation, as specified in Section 7.38.050.

- **Section 7.38.050, Adjustments to Amount of Dedicated Parkland Which May be Required to Account for Private Open Space**, establishes that if a development includes private open space set aside for active recreation purposes, the number of acres required to be dedicated to the City for park facilities shall be reduced by an amount equal to 25 percent of the number of acres required as determined by Section 7.38.040. The private open space must meet these requirements:

  - The private open space is open to and accessible by all residents of the subdivision.

  - The private open space includes one or more of the following active recreational elements:

    - Open spaces dedicated to active recreational pursuits such as soccer, golf, baseball, softball, and football.

    - Tennis courts, basketball courts, racquetball courts, badminton courts, shuffleboard courts, or similar hard-surfaced areas especially designed and exclusively used for court games.

    - Recreational swimming pools or other swimming areas and those fenced areas directly adjacent to such swimming pools or swimming areas.

  - Use of the private open space is restricted for active recreational purposes by a recorded covenant that runs with the land and that can be terminated only with the prior written consent of the City Council.

- **Section 7.38.090, Payment of In Lieu Fees for Park and Recreation Purposes**, establishes that a payment of in-lieu fees may be required instead of or in combination with the dedication of land, so long as the fees are equal to the value of the parkland that would otherwise have been dedicated.

City of Lake Forest General Plan Recreation and Resources Element. The Recreation and Resources Element of the City's General Plan describes existing park and recreational facilities within Lake Forest, compares the existing acreage of facilities to the standard set forth in the City's Municipal Code (provided above), and identifies goals and policies for the provision of park and recreational facilities.

According to the *Lake Forest General Plan Update Existing Conditions Report* (October 2018), Lake Forest currently has a total of 294 ac of park and recreational facilities, as shown in Table 4.15.C. Based on the City standard of 5 ac for each 1,000 residents, optimally the City should have 424.7 ac of park and recreational facilities within its boundaries to serve its potential population. Therefore, the City has a shortfall of approximately 130.7 ac. Table 4.15.C also includes adjustments to dedicated parkland from the existing privately owned recreational facilities open to the public that are shown in Table 4.15.B.

Table 4.15.C: Park Acreage Needs

Population[1]	Park Acreage Required[2]	Available Acreage from Existing and Planned Parkland[3]	Surplus/(Shortfall) of Acreage
84,931	424.7 ac	294 ac	(130.7 ac)

Source: Existing Conditions Report. Chapter 7: Community Services and Facilities (City of Lake Forest 2018).
[1] Lake Forest's 2017 population as provided in the Existing Conditions Report.
[2] Using the standard of 5 ac per 1,000 persons.
[3] Total parkland area as provided in the Existing Conditions Report. County and regional parks are not included.
ac = acre(s)

The following policies in the Recreation and Resources Element apply to the proposed Project:

Policy 1.1: Promote the development and maintenance of a balanced system of public and private recreational lands, facilities, and programs to meet the needs of the Lake Forest population.

Policy 1.3: Operate and maintain public park and recreational facilities in a manner that ensures safe and convenient access for all members of the community.

Policy 1.4: Require parkland improvements and facilities that are durable and economical to maintain.

4.15.4 Methodology

Recreation impacts are assessed based on the physical effects of the proposed Project on existing recreational facilities in the area. Specifically, impacts to recreational facilities are assessed based on the potential for the proposed Project to generate increased demand on recreational facilities that could result in deterioration of, or contribute toward substantial accelerated deterioration of, those facilities or require the construction of new facilities or expansion of existing facilities that could have an adverse physical effect on the environment. For the purposes of this analysis, "recreational facilities" are defined as parks and designated public areas used for active or passive recreation. The City's Municipal Code and the Recreation and Resources Element contain requirements for the dedication of land or the payment in-lieu fees for recreational purposes in connection with residential development projects, based on a standard of 5 ac of park and recreational land for each 1,000 residents. The potential effects of construction of new recreational facilities proposed as part

of the proposed Project are evaluated throughout this EIR and therefore are not discussed or analyzed further in this section.

4.15.5 Thresholds of Significance

The thresholds for recreation impacts used in this analysis are consistent with Appendix G of the *State CEQA Guidelines* and the City's *CEQA Significance Thresholds Guide* (2009). The proposed Project may be deemed to have a significant impact with respect to recreation if it would do the following:

Threshold 4.15.1: Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated

Threshold 4.15.2: Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment

None of the thresholds for recreation were scoped out in the Initial Study, which is included in Appendix A. Therefore, all of the thresholds listed above are addressed in the following analysis.

4.15.6 Project Impacts

Threshold 4.15.1: Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

Potentially Significant Impact. The following analysis of potential impacts to parks is based on the estimated population increase anticipated by the proposed Project build out. The proposed Project includes the development of up to 675 single-family residential units and up to 101 senior affordable-housing units. According to Section 4.12, Population and Housing, using a rate of 2.93 persons per household, as determined by the 2010 United States Census, the proposed single-family residential units and senior affordable-housing units are expected to increase the population in Lake Forest by approximately 2,274 persons.

As discussed above, the City's Municipal Code, Chapter 7.38, Dedication of Land for Park Facilities and Payment of In Lieu Fees, requires applicable subdividers to dedicate to the City an amount of land equivalent to 5 ac per 1,000 estimated population for use as park facilities, or pay in-lieu fees instead of or in combination with the dedication of land, so long as the fees are equal to the value of parkland that would otherwise be dedicated. The proposed Project proposes a maximum of 776 units, including a maximum of 675 single-family homes and a maximum of 101 senior affordable-housing units. In accordance with the City's Municipal Code, this number of units would require parkland dedication of 11.37 ac, as shown in Table 4.15.D.

Table 4.15.D: Required Parkland Dedication

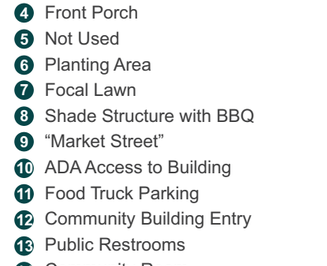
Product Type	Population Factor	Population	Acres per Person	Park Acreage	Total Park Acreage
675 Residential Dwelling Units	2.93	1,978	0.005	9.889	11.37
101 Affordable Senior Units	2.93	296	0.005	1.48	

On-site parks are eligible for a public park credit of 1.15 ac for every net acre, and private recreational uses are eligible for a public park credit of 0.25 ac for every net acre.[1] As shown in Table 4.15.E, the Project Applicant/Developer is proposing to provide 11.32 ac of parkland on the Project site, which would be 0.05 ac less than the minimum park requirements in the City's Municipal Code. The location of park and open spaces uses is shown on Figure 3.7, and the conceptual design of three of the various park uses is shown on Figure 4.15.3. Should any shortages in parkland dedication be determined by the City upon final park design and the actual number of units built, the Project Applicant/Developer would pay park in-lieu fees for any shortage in parkland dedication. The amount of park in-lieu fees to be paid by the applicant would be determined in accordance with Lake Forest Municipal Code section 7.38.090 D (Regulatory Compliance Measure [RCM] REC-1). This section requires park in-lieu fees based on an appraisal prepared by an appraiser mutually acceptable to the City and Project Applicant/Developer, or as determined by the Development Agreement, which would be considered by the City Council at a later date.

While it is anticipated that residents of the proposed Project would use existing park and natural open space areas located in Lake Forest and Orange County—including, but not limited to, Serrano Creek Trail, Limestone/Whiting Ranch Wilderness Park, and O'Neill Park—the proposed on-site recreation facilities are intended to serve the majority of the recreation demands of new residents. The additional population generated by the proposed Project is likely to utilize the recreational amenities provided as part of the proposed Project because these amenities would be conveniently accessed. In addition, as currently proposed, the public would have access to some of the on-site parks and open space to be developed as part of the proposed Project, which may help address the parkland shortfall in the City.

[1] According to Section 7.38.050 of the City's Municipal Code, if a planned development includes private open space set aside for active recreational purposes, the acres of parkland required to be dedicated to the City shall be reduced by a number equivalent to 25 percent of the number of acres of the recreational space. The private recreation center proposed as part of the proposed Project includes recreational uses accessible by all residents of the planned community and includes an active recreational component. Therefore, the private recreation component of the proposed Project meets the requirements of Municipal Code Section 7.38.050 to qualify for an adjustment to the amount of dedicated parkland. The private recreational center would reduce the parkland dedication requirement by 0.625 ac (2.5 ac x 0.25).

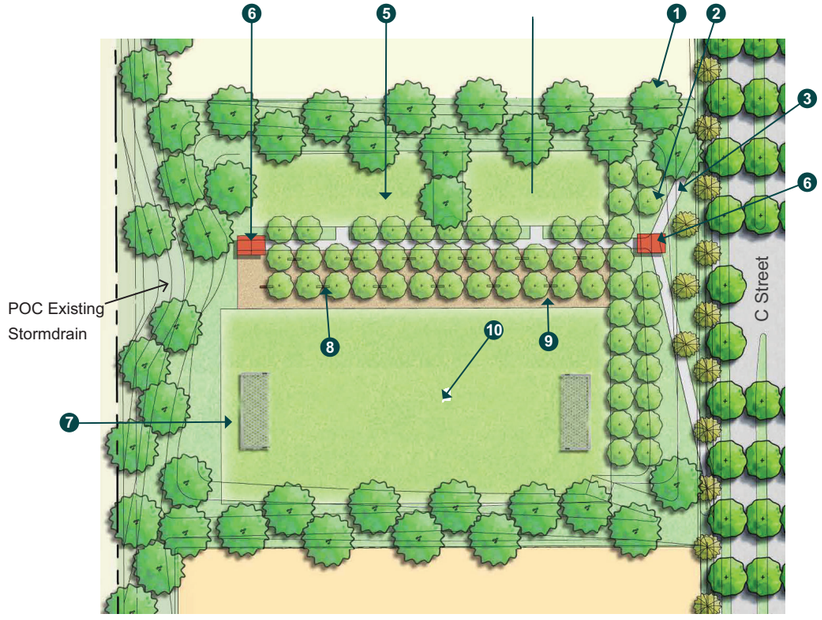
1. Parallel Parking Spaces
2. Open Lawn / Play
3. Grand Steps at Trellis
4. Front Porch
5. Not Used
6. Planting Area
7. Focal Lawn
8. Shade Structure with BBQ
9. “Market Street”
10. ADA Access to Building
11. Food Truck Parking
12. Community Building Entry
13. Public Restrooms
14. Community Room
15. Perpendicular Parking Spaces
16. Private Residents Restrooms
17. Community Play Pool
18. Outdoor Cooking Area
19. Cabanas
20. Water Feature
21. Wading Pool
22. Beach Entry
23. Mechanical Room
24. Spa
25. Entry Shade Structure
26. Quiet Pool
27. Quiet Spa

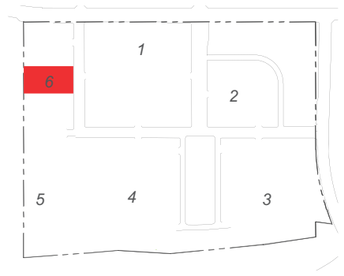


Central Park & Recreation Area Plan

LEGEND

1. Accent Trees
2. Canopy Tree
3. Walkway
4. Fenced Dog Area (Little Dogs)
5. Fenced Dog Area (Big Dogs)
6. Shade Structure with Seating
7. Soccer and Multi Sport Field
8. Benches
9. Decomposed Granite
10. Underground Bio-Remediation





Neighborhood Park

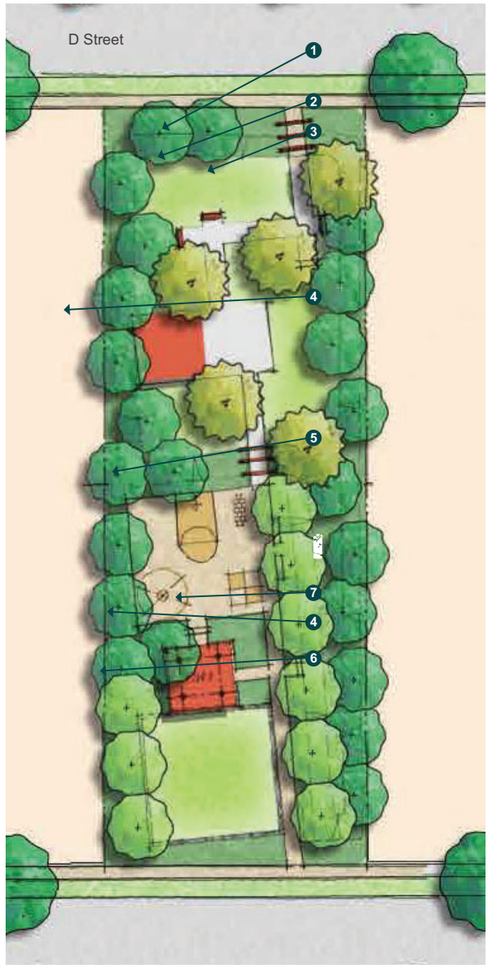
LSA

FIGURE 4.15.3
Page 1 of 3

NOT TO SCALE
SOURCE: Nakase Property Area Plan (March 2019)
I:\CLF1801\G\Proposed Parks.cdr (6/19/2019)

Nakase Nursery/Toll Brothers
Proposed Parks

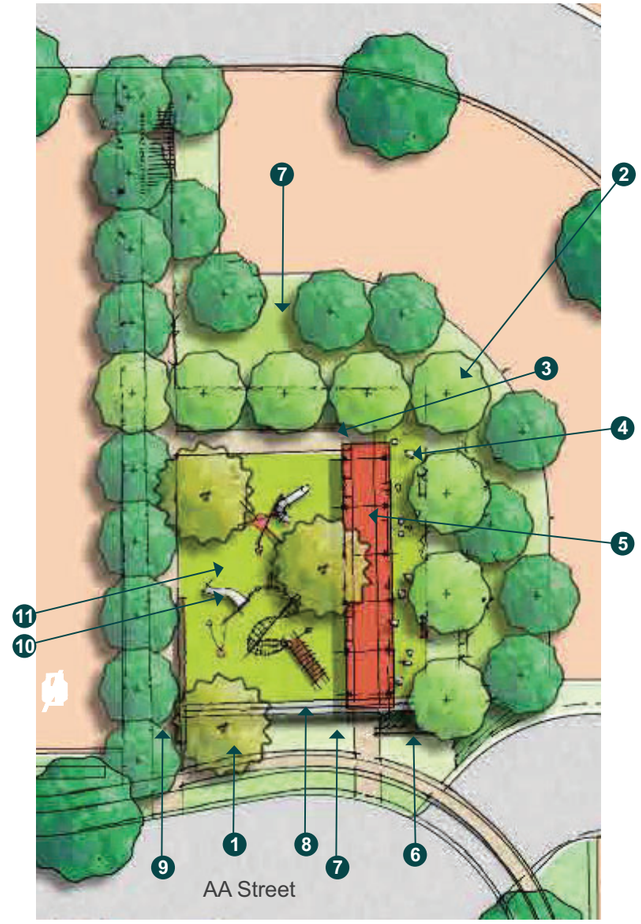
This page intentionally left blank



LEGEND

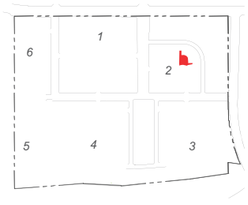
1. Arbor
2. Walkway
3. Accent Trees
4. Shade Structure with Picnic Tables
5. Multi-Purpose Sports Court
6. Open Lawn
7. Canopy Trees

Neighborhood One Park

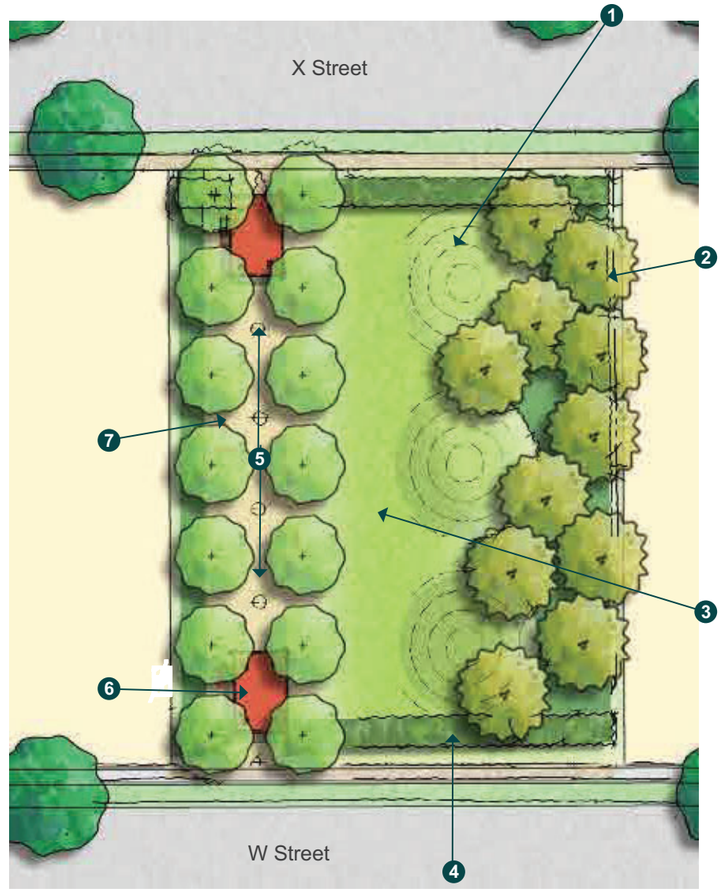


LEGEND

1. Accent Trees
2. Canopy Trees
3. Benches
4. Rock Play
5. Shade Structure with Benches
6. Low Decorative Wall
7. Open Lawn
8. Steps
9. Ramp
10. Play Equipment
11. Play Surface



Neighborhood Two Park



LEGEND

1. Turf Mounds
2. Accent Trees
3. Open Lawn
4. Low Hedge
5. Tree Allée & Walkway
6. Shade Structures with Benches
7. Seating

Neighborhood Three Park

LSA

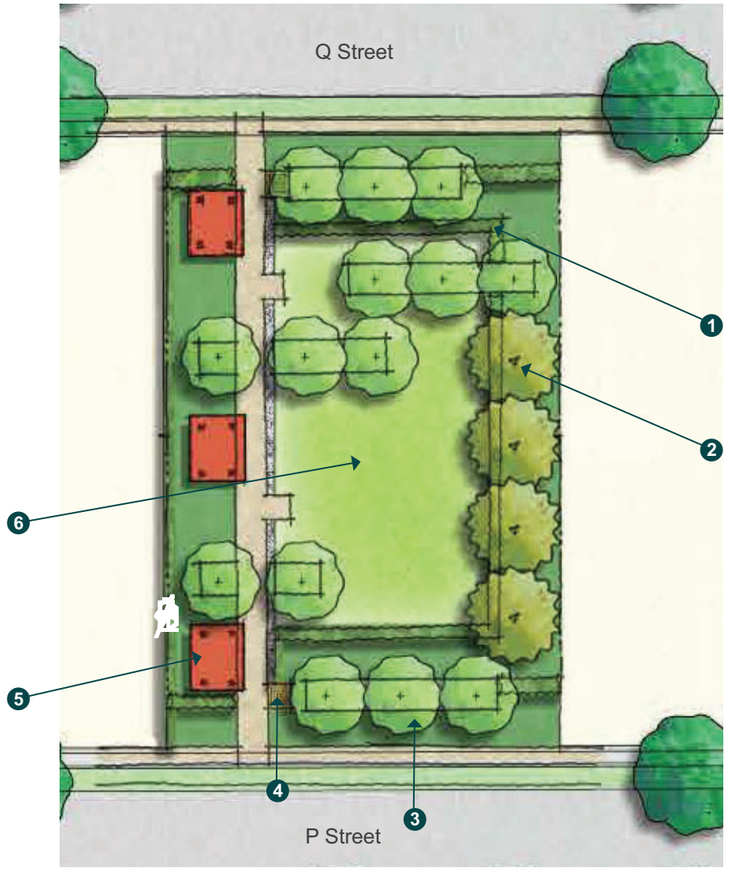
FIGURE 4.15.3
Page 2 of 3

N

NOT TO SCALE
SOURCE: Nakase Property Area Plan (March 2019)
I:\CLF1801\G\Proposed Parks.cdr (6/19/2019)

Nakase Nursery/Toll Brothers
Proposed Parks

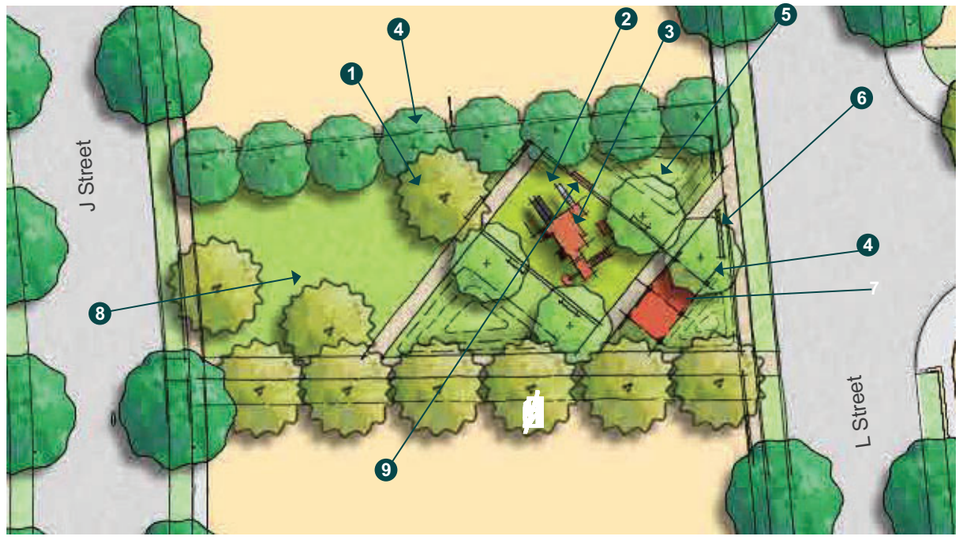
This page intentionally left blank



LEGEND

1. Low Hedge
2. Accent Trees
3. Canopy Trees
4. Accent Feature
5. Shade Structures with Picnic Tables
6. Open Lawn

Neighborhood Four Park



LEGEND

1. Accent Trees
2. Play Surface
3. Play Equipment
4. Canopy Tree
5. Turf Mounds
6. Low Decorative Wall
7. Shade Structure with Picnic Tables
8. Open Lawn
9. Benches

Neighborhood Five Park

LSA

FIGURE 4.15.3
Page 3 of 3

N

NOT TO SCALE
SOURCE: Nakase Property Area Plan (March 2019)
I:\CLF1801\G\Proposed Parks.cdr (6/19/2019)

Nakase Nursery/Toll Brothers
Proposed Parks

This page intentionally left blank

Table 4.15.E: Public Park Credit

Park Name	Description[1]	Acreage	Public Park Credit
Central Park	Private park located in the center of the Master Plan	2.29	2.634
Private Recreational Center	Private clubhouse located in the center of the Master Plan	2.5	0.625
Neighborhood One Mini Park	Private park located in the center of the neighborhood	0.5	0.575
Neighborhood Two Mini Park	Private park located in the center of the neighborhood	0.54	0.621
Neighborhood Three Mini-Park	Private park located in the center of the neighborhood	0.52	0.598
Neighborhood Four Mini-Park	Private park located in the center of the neighborhood	0.52	0.598
Neighborhood Five Mini-Park	Private park located in the center of the neighborhood	0.54	0.621
Neighborhood Park	Private park located on the southern edge of the Project site	3.59	4.129
Restoration Area Trail	Internal trail system connecting Bake Parkway along "A" Street and extending through "B" and "C" Streets to the Serrano Creek Trail.	0.8	0.92
	Total Acreage	**8.8**	**11.32**
	Total Public Park Credit Required		**11.37**
	Park Credit Shortage		**0.05**

Note: Based on Lake Forest Municipal Code Section 7.38.040 and subject to the Nakase Development Agreement, 1.15 acres of park credit per acre would be granted for public park creation, and 0.25 acre of park credit per acre would be granted for a private park/recreation center facility of 0.5 acre or greater in size.

[1] All parks are private but are open for public use, including the Restoration Area Trail.

ac = acre(s)

Residents are far more likely to use an on-site amenity that is a walkable distance than to drive to more distant facilities. Furthermore, the proposed senior affordable-housing development would generate minimal demand on park facilities such as tot lots, playgrounds, soccer fields, baseball diamonds, and basketball courts, which are designed primarily for use by children and younger adults. Therefore, the park and recreational facilities offered by the proposed Project are expected to offset most of the increased demand on park and recreational facilities generated by the increased population. Additionally, as discussed in the Project Description, the Homeowner's Association (HOA) would also maintain the parkland proposed as part of the proposed Project in perpetuity, thereby offsetting the need for maintenance and upkeep of park and recreational facilities.

In summary, the proposed Project would create demand for 11.37 ac of park dedication based on the City's Municipal Code. The proposed Project would construct 11.32 ac of public park. Any shortages in parkland dedication requirements would be offset by the payment of in-lieu fees in accordance with Lake Forest Municipal Code Section 7.38.090(D). RCM REC-1 requires the Project Applicant/Developer to dedicate land or pay in lieu fees instead of or in combination with the dedication of land, so long as the fees are equal to the value of parkland that would otherwise be dedicated. Furthermore, in order to avoid the deterioration of the proposed parks and ensure ongoing public access to and maintenance of on-site parks, Mitigation Measure 4.15.1 requires that on-site parks be maintained in perpetuity by the HOA on the Project site. The proposed Project would also increase use of existing off-site recreation resources, but any increase is not anticipated to be substantial due to the variety of on-site recreation uses and the greater accessibility of on-site uses.

Therefore, the provision of park and recreational facilities within the Project site would be sufficient for the demand of the future residents of the Project and consistent with the City's Municipal Code; as a result, existing public park and recreational facilities would not be adversely impacted or be substantially degraded by the project's population. Impacts would therefore be less than significant with incorporation of RCM REC-1 and Mitigation Measure 4.15.1.

Threshold 4.14.2: Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

Less than Significant Impact. The proposed Project would result in new residential development and a demand for new recreational facilities. The proposed Project includes the construction of both private and public recreational facilities on site, as detailed above. These recreational facilities are integrated into the proposed Project, and their associated physical environmental impacts are analyzed throughout this EIR. The proposed Project would be consistent with the City's Municipal Code requirements to provide 5 ac of parkland per 1,000 people or pay in lieu-fees in accordance with Lake Forest Municipal Code Section 7.38.090(D). Therefore, there should be no need to construct additional recreational facilities beyond those described in Chapter 3.0 as a result of the proposed Project. Impacts would be less than significant, and no mitigation is required.

4.15.7 Cumulative Impacts

The Project site is located within Lake Forest, and the proposed Project is subject to the City of Lake Forest's Municipal Code Chapter 7.38 requirements for payment of park fees, the dedication of land for park and recreational purposes, or both as outlined in RCM REC-1. Therefore, for purposes of this analysis, the geographic area for potential cumulative impacts on recreational facilities is Lake Forest. The proposed Project, in conjunction with related projects in Lake Forest, would increase Lake Forest's population. However, consistent with the City's Municipal Code requirements, the proposed Project includes on-site recreational facilities for its residents that address increased demand for park facilities and reduce the proposed Project's demand for off-site recreational facilities. With the exception of the private recreation center, all proposed park space would be available to the public. In addition, as required by Mitigation Measure 4.15.1, the HOA would maintain on-site parks and open space in perpetuity. The proposed Project, in conjunction with the cumulative projects in Lake Forest (as listed earlier in Table 4.A in Chapter 4.0), has the potential to increase the population in Lake Forest by approximately 5,002 persons. The cumulative projects would also be subject to Municipal Code requirements for the provision of parkland and/or payment of in-lieu fees. Therefore, the cumulative impact of the proposed Project and the applicable related projects would be less than significant with respect to recreational facilities, and the proposed Project's contribution to a potentially significant cumulative impact on park and recreational facilities would not be cumulatively considerable.

4.15.8 Level of Significance Prior to Mitigation

In order to avoid the deterioration of proposed parks and ensure ongoing public access to and maintenance of on-site parks, Mitigation Measure 4.15.1 is required. The proposed Project would not require the construction or expansion of recreational facilities beyond those proposed as part of the proposed Project.

4.15.9 Mitigation Measures

4.15.9.1 Regulatory Compliance Measure

RCM REC-1: **Dedication of Parkland.** The Project Applicant/Developer shall comply with the applicable provisions of Chapter 7.38, Dedication of Land for Park Facilities and Payment of In Lieu Fees, of the City's Municipal Code~~, which requires applicable subdividers to dedicate to the City an amount of land equivalent to 5 ac per 1,000 estimated population for use as park facilities, or pay in-lieu fees instead of or in combination with the dedication of land, so long as the fees are equal to the value of parkland that would otherwise be dedicated~~.

4.15.9.2 Mitigation Measures

Mitigation Measure 4.15.1: **Park and Open Space Access and Maintenance.** Prior to the first final building inspection~~issuance of any certificate of occupancy~~, the Project Applicant/Developer shall submit documentation to the Director of the City of Lake Forest Community Development Department, or designee, demonstrating the following:

- The Homeowner's Association (HOA) shall provide for the ongoing maintenance and care of all on-site park and open space facilities.
- With the exception of the on-site private recreation center, all on-site parks shall also be private, but open and accessible to the public. Appropriate signage shall be posted in all on-site parks.
- The HOA shall maintain maintenance records for a period not less than 2 years and shall make the records available to the City of Lake Forest (City) upon request.
- Long-term funding for maintenance and care of on-site recreation, park, and open space facilities shall be funded through fees paid to the HOA. The Project Applicant/Developer, which will set up the HOA, shall oversee that adequate funding for park and open space maintenance is included within the HOA fee structure, including annual maintenance fees and long-term maintenance reserve funds.

- Revisions to the HOA's Covenants, Conditions, and Restrictions (CC&Rs) related to park and open space maintenance shall be prohibited except with the review and approval of the Director of the City of Lake Forest Community Development Department, or designee.

4.15.10 Level of Significance after Mitigation

With incorporation of RCM REC-1 and Mitigation Measure 4.15.1, potential impacts of the proposed Project related to park and recreational resources would be reduced below a level of significance.

4.16 TRANSPORTATION/TRAFFIC

This section analyzes the existing and planned transportation and circulation conditions for the proposed Nakase Nursery/Toll Brothers Project (proposed Project) and the surrounding area, and identifies circulation impacts that may result during, or subsequent to, the development of the proposed Project. The analysis contained in this section is based in part on the *Nakase Property Traffic Impact Analysis* (Urban Crossroads 2019c), which is provided in Appendix L to this Environmental Impact Report (EIR).

4.16.1 Scoping Process

The City of Lake Forest (City) received 28 comment letters during the public review period of the Initial Study/Notice of Preparation (IS/NOP). For copies of the IS/NOP comment letters, refer to Appendix A of this EIR. Of the 28 comment letters received, 14 included comments related to Transportation/Traffic.

The letter from the Transportation Corridor Agencies (August 14, 2018) requested a map showing the traffic study area. The letter from the City of Irvine (August 14, 2018) requested that the traffic study prepared for the proposed Project include all North Irvine Transportation Mitigation-funded intersections and all City of Irvine intersections and roadway links within these boundaries. In addition, the City of Irvine requested that the traffic study analyze short- and long-term interim year scenarios and future build-out analysis along with the missing segment of Portola Parkway. The letter also suggested clarifying that the proposed Project is part of the Lake Forest Transportation Mitigation fee program.

The letter from the California Department of Transportation (Caltrans) (August 13, 2018) recommended the completion of a Caltrans-formatted Traffic Impact Study and discussion of potential transportation impacts, in addition to the development of a Safe Routes to School program and discussion of the Senior Mobility Program.

The letter from Southern California Edison (SCE) (August 14, 2018) suggests that the EIR analyze traffic impacts associated with project-related utility work.

The letter from Saddleback Valley Unified School District (SVUSD) (July 25, 2018) expressed concern regarding the direct and indirect impacts to SVUSD schools (including traffic, pedestrian safety, bicycle safety, and parking) along with issues raised about traffic conditions during peak hours, vehicle queuing along “BB” street and access points, and pedestrian/bike safety along school routes.

The letter from Loretta Herin (July 25, 2018) expressed concern regarding additional traffic on Bake Parkway. The letter from Bob Holtzclaw (July 25, 2018) expressed concern regarding additional traffic on Bake Parkway. A letter from Jim Johnson (July 25, 2018) expressed concern about additional traffic on Bake Parkway, suggested that Bake Parkways may need to be widened to three or four lanes between Trabuco Road and State Route 241 (SR-241), and suggested evaluation of a traffic signal coordination program along Bake Parkway.

The Letter from Richard Sullivan (July 25, 2018) expressed concern with parking and accidents along Normandale Drive and Oesterman Road. The letter from Sue Nath (July 25, 2018) expressed concern about additional traffic on Bake Parkway. The letter from Charles Larson (August 4, 2018) expressed concern about school-related traffic impacts, particularly at Rancho Parkway and Bake Parkway.

The letter from Andrea Alexander (August 6, 2018) suggested an ordinance to ban trucks and motorcycles on Bake Parkway between Muirlands Boulevard and Trabuco Road and rerouting truck traffic to Alton Parkway. The letter also suggests elimination of tolls on SR-241 at Bake Parkway and Portola Parkway to divert traffic away from Bake Parkway, and the reduction of lanes on Bake Parkway to make Alton Parkway a more desirable route. The commenter was also concerned about the proposed Project's contribution to traffic congestion.

The letter from Judy Esposito (August 6, 2018) expressed concern about potential increases in traffic. The letter from the Autumnwood Homeowner's Association (HOA) (August 8, 2018) requested that the EIR evaluate traffic impacts. Finally, a letter from an Anonymous Sender (August 30, 2018) suggests analysis of circulation throughout the area, north and south, and analysis of a direct route through the Project site from Rancho Parkway south to the Sports Park Complex.

4.16.2 Existing Environmental Setting

The Project site is bordered by Bake Parkway and Rancho Parkway to the west and north, respectively, with Serrano Creek to the east. Lake Forest Drive is located just east of Serrano Creek. In the study area, Bake Parkway and Lake Forest Drive are classified by the City of Lake Forest Arterial Highway Plan as Primary Arterials (4-Lane Divided Roadways). Rancho Parkway is a Commercial Street along the northern Project boundary. As discussed in greater detail below, one study area intersection (#29 – Bake Parkway/Jeronimo Road) is operating at an unacceptable level of service (LOS) (i.e., "E" or worse) in the a.m. peak hour in the Existing condition. All other study area intersections are operating at acceptable LOS in the Existing condition.

The Orange County Transportation Authority (OCTA), a public transit agency, serves Lake Forest and the project area with bus service along Bake Parkway and a portion of Dimension Drive (Route 206). Route 177 serves Lake Forest Drive. OCTA periodically reviews and updates its transit service to address ridership, budget, and community demand needs. Changes in land use can affect these periodic adjustments, which may lead to either enhanced or reduced service where appropriate.

Bike lanes along Bake Parkway, Lake Forest Drive, Rancho Parkway, and Rancho Parkway South are included in the City of Lake Forest General Plan. In addition, Serrano Creek Trail starts at Serrano Creek Park, southerly to the Nakase Property site, and extends northerly to the Limestone/Whiting Ranch Wilderness Park. This multipurpose trail accommodates running, walking, equestrian uses, and biking.

4.16.3 Regulatory Setting

4.16.3.1 Federal Regulations

No relevant federal transportation/traffic regulations apply to the proposed Project.

4.16.3.2 State Regulations

Senate Bill 743. On December 28, 2018, the California Office of Administrative Law cleared the revised *State CEQA Guidelines* for use. Among the changes to the *State CEQA Guidelines* was removal of vehicle delay and LOS from consideration under the California Environmental Quality Act (CEQA). With the adopted guidelines, transportation impacts are to be evaluated based on a project's effect on vehicle miles traveled (VMT). Lead agencies are allowed to opt in to the revised transportation guidelines, but the new guidelines must be used starting July 1, 2020.

The City has not yet established thresholds related to VMT. However, the State has provided technical guidelines for the implementation of Senate Bill (SB) 743, which identifies potential thresholds against which to measure the proposed Project's impacts related to VMT.

The Technical Advisory for Evaluating Transportation Impacts Under CEQA provides the following guidance:

> "*Recommended threshold for residential projects:* A proposed Project exceeding a level of 15 percent below existing VMT per capita may indicate a significant transportation impact. Existing VMT per capita may be measured as regional VMT per capita or as city VMT per capita. Proposed development referencing a threshold based on city VMT per capita (rather than regional VMT per capita) should not cumulatively exceed the number of units specified in the SCS for that city, and should be consistent with the SCS."

4.16.3.3 Regional Regulations

Orange County Congestion Management Program. OCTA is a multimodal transportation agency that began in 1991 with the consolidation of seven separate agencies. OCTA serves Orange County residents and travelers by providing: countywide bus and paratransit service; Metrolink rail service; the 91 Express Lanes; freeway, street, and road improvement projects; individual and company commuting solutions; motorist aid services; and regulation of taxi operations. State law requires that a Congestion Management Program (CMP) be developed, adopted, and updated biennially for every county that includes an urbanized area, and requires that it include every city and the county government within that county. As the Congestion Management Agency for Orange County, OCTA is responsible for implementing the Orange County CMP.

OCTA adopted the CMP in 1991 to reduce traffic congestion and to provide a mechanism for coordinating land use and development decisions in Orange County. Compliance with the CMP requirements ensures a city's eligibility to compete for State gas tax funds for local transportation projects.

Within Lake Forest, the CMP Highway System includes two arterials: El Toro Road and Trabuco Road. The intersections of El Toro Road/Trabuco Road and El Toro Road/Interstate 5 (I-5) ramps are the only CMP intersections in Lake Forest. The intersection of El Toro Road/Trabuco Road is a study intersection.

Based on CMP requirements, a Traffic Impact Analysis (TIA) is required for CMP purposes for any proposed development generating 2,400 or more daily trips, with the exception of developments that will directly access a CMP Highway System roadway segment, for which the threshold for requiring a TIA is reduced to 1,600 or more trips per day. The proposed Project is estimated to generate a total of ~~8,739~~ 8,789 daily trips. Thus, the proposed Project requires a TIA for CMP purposes.

Based on CMP requirements, the extent of the study area for a TIA is determined by comparing a project's daily trips on a CMP roadway segment to the daily LOS E capacity of that segment. The CMP requires that the study area for a project extend far enough to cover any CMP roadway segment on which the project traffic would represent 3 percent or more of the roadway segment's LOS E capacity.

4.16.3.4 Local Regulations

Lake Forest Traffic Mitigation (LFTM) Program. The LFTM Program was adopted in 2006 and incorporated as Section 7.19 of the City of Lake Forest Municipal Code. The LFTM Program is designed to maintain adequate LOS on the City's arterial street system by planning and funding a set of citywide transportation improvements. The proposed Project was not a planned development project at the time the LFTM Program was adopted; therefore, the proposed Project would not participate in the LFTM Program.

City of Lake Forest General Plan. The City of Lake Forest General Plan contains goals, policies, and plans that are intended to guide land use and development decisions. The Circulation Element contains policies that relate to traffic and circulation.

Six major issues are addressed by the goals, policies, and implementation actions of the Circulation Element: (1) supporting the development of regional transportation facilities; (2) providing a suitable system of City roadways; (3) increasing the use of public transit and non-vehicular modes of travel; (4) ensuring the existence of convenient and suitable parking for vehicles; (5) improving the efficiency of the transportation system and controlling demands on the system; and (6) identifying and utilizing sources of funding for transportation system improvements. Specifically, the City's General Plan includes the following goals and policies:

> **Goal 1.0:** Support for the development of an efficient network of regional transportation facilities.
>
> **Goal 2.0:** A system of roadways in the community that meets local needs.
>
> > **Policy 2.1:** Provide and maintain a City circulation system that is in balance with planned land uses in Lake Forest and surrounding areas in the region.
> >
> > **Policy 2.3:** Improve the Lake Forest circulation system roadways in concert with land development to ensure adequate levels of service.
>
> **Goal 3.0:** Increased use of public transportation.

Policy 3.1: Promote the provision of public transit facilities within areas of major development.

Policy 3.3: Encourage the provision of special transit services in Lake Forest.

Policy 3.4: Promote access and public transit service between Lake Forest and regional-serving transportation centers.

Goal 4.0: Promotion of non-vehicular modes of travel.

Policy 4.1: Promote the provision of non-vehicular circulation within Lake Forest.

Policy 4.2: Provide and maintain a non-vehicular component of the Lake Forest overall circulation system that supports bicycles, equestrians, and pedestrians and is coordinated with those of other service districts in Lake Forest and with adjacent jurisdictions.

Policy 4.3: Improve pedestrian access from neighborhoods to commercial areas.

Goal 5.0: Convenient and suitable parking facilities for motorized and non-motorized vehicles.

Policy 5.1: Require sufficient off street parking for all land uses and maximize the use of parking facilities in Lake Forest.

Policy 5.2: Eliminate the use of on street parking on identified arterial streets where maximum traffic flow is desired.

Policy 5.3: Promote the provision of access between the parking areas of adjacent properties along arterial roadways to improve overall traffic flow.

Goal 6.0: Maximized transportation system efficiency.

Policy 6.1: Improve operational measures of the traffic system designed to maximize the efficiency of the system while minimizing delay and congestion.

Policy 6.2: Improve intersection capacity at key intersections to improve traffic flow.

Goal 7.0: Utilization of various financing methods to improve the overall transportation system.

Policy 7.1: Utilize available financing methods and sources of funding to make necessary improvements to the overall transportation system in Lake Forest.

> **Policy 7.3:** Maintain the transportation standards required to qualify for revenue from the Congestion Management Plan and the Revised Traffic Improvement and Growth Management Ordinance (Measure M).

City of Lake Forest Municipal Code. Guidelines and provisions related to traffic and circulation are addressed in Chapter 12 (Vehicles and Traffic) of the City's Municipal Code. Chapter 9 addresses parking.

Chapter 12.04, General Provisions and Administration:

> **Section 12.04.020: Traffic Manual.** To guide the application of the laws contained in the City's Traffic Ordinance not in the California Vehicle Code, the City adopted the California Manual on Uniform Traffic Control Devices (California MUTCD), as it may be amended from time to time by the California Department of Transportation. The California MUTCD defines engineering policies, procedures, and interpretations of traffic engineering practice.
>
> **Section 12.04.040: Traffic Administration.** It shall be the general duty of the Director of Public Works/City Engineer or designee to determine the installation, design, operation, and maintenance of traffic-control devices, design and/or review traffic flow systems and appurtenances, conduct engineering analyses of traffic accidents; devise remedial measures; conduct engineering and traffic investigations of traffic conditions. The Director of Public Works/City Engineer shall also cooperate with the California Highway Patrol, the Orange County Sheriff's Department, the Orange County Fire Authority, and other agencies as appropriate in the development of ways and means to improve traffic conditions and maximize traffic safety.

North Irvine Transportation Mitigation Program. According to Section 6-3-701 of the City of Irvine Municipal Code, the North Irvine Transportation Mitigation Program (NITM Program) was established for the purpose of providing funding for the coordinated and phased installation of required traffic and transportation improvements required under CEQA documents previously certified or adopted by the City of Irvine in connection with land use entitlements for City Planning Areas 1, 2, 5, 6, 8, 9, 30, 40 and 51. Portions of City Planning Areas 1, 2, 5, 6, 8, 9, 30, 40 and 51 are located in Irvine and portions are located outside Irvine but within the City's sphere of influence.

4.16.4 Methodology

The TIA prepared for the proposed Project is consistent with the objectives and requirements of the City, the Orange County CMP, Caltrans methodology, and applicable CEQA provisions.

4.16.4.1 Analysis Scenarios and Study Area

The traffic analysis has evaluated weekday a.m. peak-hour (7:00 a.m. to 9:00 a.m.) and weekday p.m. peak-hour (4:00 p.m. to 6:00 p.m.) traffic conditions at study area intersections for the following analysis scenarios, which are further described below:

- Existing (2017) Conditions
- Existing Plus Project Conditions
- Interim Year Cumulative 2020 Without Project
- Interim Year Cumulative 2020 With Project
- 2040 General Plan Cumulative With Current Approved Project Land Use, Without Portola Westerly Extension (including the five intersection improvement scenarios listed below)
- 2040 General Plan Cumulative With Project, Without Portola Westerly Extension (including the five intersection improvement scenarios listed below)
- 2040 General Plan Cumulative With Current Approved Project Land Use, With Portola Westerly Extension (including the five intersection improvement scenarios listed below)
- 2040 General Plan Cumulative With Project, With Portola Westerly Extension (including the five intersection improvement scenarios listed below)

In addition, all of the 2040 General Plan scenarios include an analysis of these five intersection improvement alternatives:

1. **Intersection Alternative Scenario #1:** The City's current baseline model including all of the LFTM Program improvements, North Irvine Transportation Mitigation (NITM) Program improvements, and Foothill Circulation Phasing Plan (FCPP) improvements.

2. **Intersection Alternative Scenario #2:** Scenario #1 without three (3) LFTM Program improvements in Irvine at intersections of Alton Parkway/Irvine Boulevard (#25), Bake Parkway/Rockfield Boulevard (#31), and Lake Forest Drive and I-5 southbound ramps/Avenida de la Carlota (outside the study area)

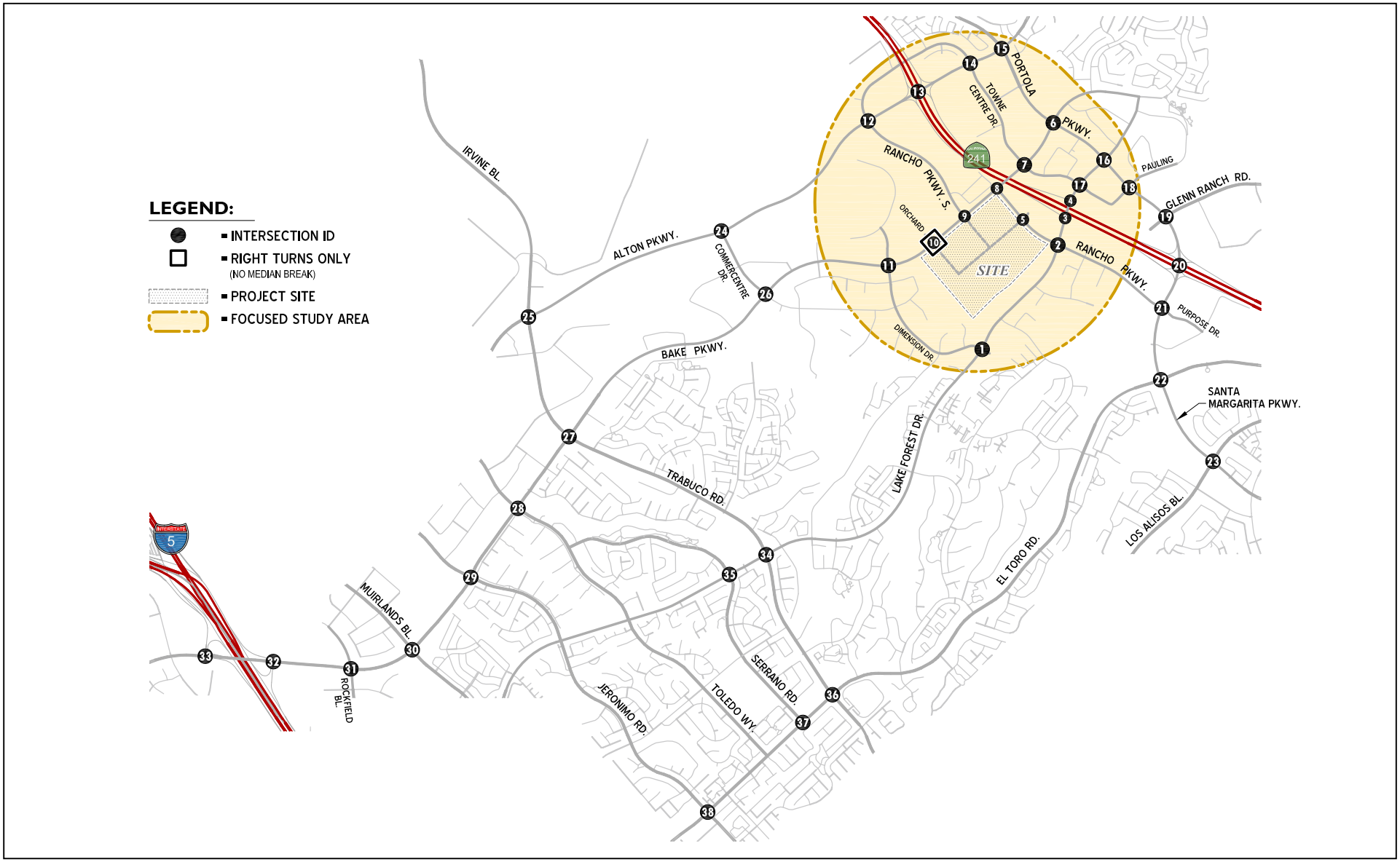
3. **Intersection Alternative Scenario #3:** Scenario #2 without the second southbound right turn on El Toro Road and Portola Parkway/Santa Margarita Parkway (#22)

4. **Intersection Alternative Scenario #4:** Scenario #2 without the fourth westbound through lane on Bake Parkway and Trabuco Road/Irvine Boulevard (#27)

5. **Intersection Alternative Scenario #5:** Scenario #2 without both the second southbound right turn on El Toro Road and Portola Parkway/Santa Margarita Parkway (#22), and the fourth westbound through lane on Bake Parkway and Trabuco Road/Irvine Boulevard (#27).

Figure 4.16.1 and Table 4.16.A identify the study area intersections. Off-site study area intersections are generally signalized, except for the intersection of Orchard Road/Bake Parkway.

This page intentionally left blank



LSA

FIGURE 4.16.1

NO SCALE

SOURCE: Urban Crossroads

Nakase Nursery/Toll Brothers

Study Area Intersections

I:\CLF1801\G\Study_Area_Intersections.cdr (7/8/2019)

This page intentionally left blank

Table 4.16.A: Study Intersections

#	Intersection	Jurisdiction	LOS Criteria
1	Lake Forest Drive/Dimension Drive	Lake Forest	D
2	Lake Forest Drive/Rancho Parkway	Lake Forest (LFTM)	D
3	Lake Forest Drive/SR-241 SB Off-Ramp	Caltrans	D
4	Lake Forest Drive/SR-241 NB On-Ramp	Caltrans	D
5	Corridor Center/Rancho Parkway	Lake Forest	D
6	Bake Parkway/Portola Parkway	Lake Forest (LFTM)	D
7	Bake Parkway/Towne Center Drive	Lake Forest	D
8	Bake Parkway/Rancho Parkway	Lake Forest	D
9	Bake Parkway/Rancho Parkway South	Lake Forest	D
10	Bake Parkway/Orchard Road (unsignalized)	Lake Forest	D
11	Dimension Drive/Bake Parkway	Lake Forest	D
12	Alton Parkway/Rancho Parkway South	Lake Forest	D
13	Alton Parkway/SR-241 Ramps	Caltrans	D
14	Alton Parkway/Towne Centre Drive	Lake Forest	D
15	Alton Parkway/Portola Parkway	Lake Forest	D
16	Lake Forest Drive/Portola Parkway	Lake Forest	D
17	Lake Forest Drive/Towne Centre Drive	Lake Forest	D
18	Towne Centre Drive/Portola Parkway	Lake Forest	D
19	Glenn Ranch Road/Portola Parkway	Lake Forest	D
20	Portola Parkway/SR-241 Ramps	Caltrans	D
21	Portola Parkway/Rancho Parkway	Lake Forest	D
22	El Toro Road/Portola Parkway	Lake Forest (LFTM)	D
23	Los Alisos Boulevard/Santa Margarita Parkway	Mission Viejo	D
24	Alton Parkway/Commercentre Drive	Lake Forest	D
25	Alton Parkway/Irvine Boulevard	Irvine (LFTM/NITM)	E
26	Bake Parkway/Commercentre Drive	Lake Forest	D
27	Bake Parkway/Irvine Boulevard-Trabuco Road	Irvine / Lake Forest (LFTM/NITM)	E
28	Bake Parkway/Toledo Way	Irvine / Lake Forest	D
29	Bake Parkway/Jeronimo Road	Irvine / Lake Forest (LFTM/NITM)	D
30	Bake Parkway/Muirlands Boulevard	Irvine	D
31	Bake Parkway/Rockfield Boulevard	Irvine	D
32	Bake Parkway/I-5 NB Ramps	Caltrans	E
33	Bake Parkway/I-5 SB Ramps	Caltrans	E
34	Lake Forest Drive/Trabuco Road	Lake Forest	D
35	Lake Forest Drive/Serrano Road	Lake Forest	D
36	El Toro Road/Trabuco Road	Lake Forest / CMP	E
37	El Toro Road/Serrano Road	Lake Forest	D
38	El Toro Road/Jeronimo Road	Lake Forest	D

Source: *Nakase Property Traffic Impact Analysis* (Urban Crossroads 2019c)
Caltrans = California Department of Transportation
CMP = Congestion Management Program intersection
I-5 = Interstate 5
LFTM = Lake Forest Transportation Mitigation Program intersection
LOS = level of service
NB = northbound
NITM = North Irvine Transportation Mitigation Program intersection
SB = southbound
SR-241 = State Route 241

4.16.4.2 Intersection Level of Service Methodology

Intersection Capacity Utilization (ICU) Methodology. Stantec Consulting prepared the traffic volume forecasts using the Lake Forest Traffic Analysis Model (LFTAM). For signalized intersections in the City and nearby jurisdictions (City of Irvine and City of Mission Viejo), the ICU method is used to determine intersection performance. To calculate the ICU value for an intersection, the volume of traffic using the intersection is compared with the capacity of the intersection.

The term "level of service" (LOS) describes traffic operations of roadway facilities. LOS is a qualitative description of traffic flow based on several factors such as speed, travel time, delay, and freedom to maneuver. Six levels are typically defined ranging from LOS A (representing completely free-flow conditions) to LOS F (representing breakdown in flow resulting in stop-and-go conditions). LOS E represents operations at or near capacity, which is an unstable level where vehicles are operating with the minimum spacing for maintaining uniform flow. For signalized intersections, LOS is directly related to the volume-to-capacity (v/c) ratios and is correlated to an LOS designation as described in Table 4.16.B.

Table 4.16.B: LOS/ICU Value Comparison

Level of Service	Intersection Capacity Utilization
A	< 0.60
B	0.61–0.70
C	0.71–0.80
D	0.81–0.90
E	0.91–1.00
F	> 1.00

Source: *Nakase Property Traffic Impact Analysis* (Urban Crossroads 2019c)
ICU = intersection capacity utilization
LOS = level of service

A number of assumptions are required regarding specific input values to the ICU methodology. The specific assumptions include the use of a saturation flow rate of 1,700 vehicles per lane per hour (vplph). No capacity adjustments are applied for protected movements with dedicated lanes (including both right and left turns). A lost time factor of 5 percent is applied to the ICU calculations. Finally, a "de facto" right-turn lane is assumed to exist when the outermost through lane is 19 feet (ft) or greater in width and parking is prohibited.

Highway Capacity Manual (HCM) Methodology. The HCM methodology expresses the LOS at an intersection in terms of delay time for the various intersection approaches. The HCM uses different procedures depending on the type of intersection control.

HCM methodology is used for the signalized intersections under Caltrans jurisdiction as well as unsignalized intersections. Intersection LOS operations are based on an intersection's average control delay. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The LOS rating is based on the weighted average control delay expressed in seconds per vehicle (see Table 4.16.C). At two-way or side-street stop-controlled

Table 4.16.C: LOS/HCM Value Comparison

Level of Service	Signalized Intersection Delay (seconds)	Unsignalized Intersection Delay (seconds)
A	≤10.0	≤10.0
B	>10.0 and ≤20.0	>10.1 and ≤15.0
C	>20.0 and ≤35.0	>15.1 and ≤25.0
D	>35.0 and ≤55.0	>25.1 and ≤35.0
E	>55.0 and ≤80.0	>35.1 and ≤50.0
F	>80.0	>50.0

Source: *Nakase Property Traffic Impact Analysis* (Urban Crossroads 2019c).
HCM = Highway Capacity Manual
LOS = level of service

intersections, LOS is calculated for each controlled movement and for the left-turn movement from the major street, as well as for the intersection as a whole. For approaches composed of a single lane, the delay is computed as the average of all movements in that lane. For all-way stop-controlled intersections and signalized intersections, LOS is computed for the intersection as a whole. However, if traffic volume at a signalized intersection exceeds the green light capacity of the traffic signal, then the intersection is determined to operate at LOS F regardless of the average vehicle delay.

4.16.4.3 Potentially Significant Traffic Impact Criteria

Per the City's General Plan, LOS D (i.e., peak-hour ICU less than or equal to 0.90) or better is generally considered acceptable at intersections. However, at Critical Intersections, LOS E (i.e., peak-hour ICU less than or equal to 1.00) is acceptable with the requirement that regular monitoring takes place. Critical Intersections are a set of identified intersections that are either deficient today or are estimated to be deficient in the future even with reasonable improvements, but are considered Principal Intersections and critical to the function of the overall roadway network.

Per the City's General Plan, a project impact occurs when a study area intersection exceeds the acceptable LOS and the impact of the development is greater than 0.01. Project mitigation will be required to bring back the intersection v/c to 0.90 or baseline if the baseline is greater than 0.90 (or 1.00 at Critical Intersections).

For nearby jurisdictions (City of Irvine, City of Mission Viejo, and Caltrans), LOS D or better is generally considered acceptable at intersections, with the exception of the following locations where LOS E is acceptable: Bake Parkway/I-5 ramp intersections (#32 and #33), Alton Parkway/Irvine Boulevard (#25), Bake Parkway/Irvine Boulevard–Trabuco Road (#27), and El Toro Road/Trabuco Road (#36 – CMP intersection).

For ICU greater than the acceptable LOS, mitigation of the project contribution is required to bring the intersection back to an acceptable LOS or to the "without" project conditions if the project contribution is greater than 0.03 at CMP locations outside the City of Irvine (the impact threshold

specified in the CMP), 0.02 or greater at locations in the Cities of Irvine and Mission Viejo, and greater than 0.01 in the City of Lake Forest.

4.16.5 Thresholds of Significance

The following thresholds of significance are based on Appendix G of the *State CEQA Guidelines*. Based on these thresholds, implementation of the proposed Project may have a significant adverse impact with respect to transportation if it would:

Threshold 4.16.1: Conflict with program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities;

Threshold 4.16.2: Conflict or be inconsistent with CEQA Guidelines Section 15064.3 subdivision (b);

Threshold 4.16.3: Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment); or

Threshold 4.16.4: Result in inadequate emergency access.

The Initial Study, included as Appendix A, identified potentially significant impacts related to City of Lake Forest performance criteria and potentially hazardous design features. Thresholds related to CEQA Guidelines section 15064.3 and emergency access were not evaluated in the Initial Study. Therefore, all thresholds are analyzed in this EIR.

4.16.6 Project Impacts

Threshold 4.16.1: Would the Project conflict with program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities?

Potentially Significant.

Project Construction. The proposed Project would be implemented over an estimated period of 67 months (approximately 5.5 years). Demolition and site preparation would span approximately 3 months, and grading would span approximately 12 months. Paving and infrastructure would take approximately 4 months and 12 months, respectively, and would occur concurrently. Building construction would be implemented over an estimated period of 46 months. Project build out is anticipated to occur in 2025.

The site-specific construction fleet would vary due to actual construction needs, but construction vehicle trips would derive from construction workers, vendor deliveries, and material hauling. According to the City of Lake Forest Municipal Code, noise from construction activities is limited to the hours between 7:00 a.m. and 8:00 p.m. on weekdays and on Saturdays. No noise from construction activities is permitted on Sundays or City holidays.

During demolition, the proposed Project would require the demolition of approximately 2,848 tons of asphalt and 1,161 tons of concrete. The total amount of demolished material that is expected for the Project is approximately 4,009 tons of debris. Hauling trips are based on the assumption that a truck can haul 20 tons (16 cubic yards [cy]) of material per load and assumes that one haul truck importing material would also have a return trip. Therefore, demolition is anticipated to require approximately 401 hauling trips in order to remove 4,009 tons of debris. Over a 66-day period, the Project demolition activity therefore equates to approximately 3 trucks daily (for a total of 6 hauling trips per day) and 15 worker trips per day. In addition, the Project is expected require 150,000 cy of soil export. As such, the Project is expected to generate 18,750 hauling trips in order to export 150,000 cy of soil. Hauling trips are based on the assumption that a truck can haul 20 tons (16 cy) of material per load and assumes that one haul truck exporting material will also have an inbound trip, as noted above. As such, the Project is expected to generate 18,750 hauling trips in order to export 150,000 cy of soil. This potential grading activity equates to approximately 70 hauling trips per day and 20 worker trips per day over a 269-day period. Soil export activity will not be permitted during peak commute hours from 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m.

The infrastructure, building construction, and architectural coating activity equates to approximately 143 medium-duty truck trips per day, 143 heavy-duty truck trips per day, and 1,034 worker trips per day over a 1,001-day period. The delivery and removal of heavy equipment is recommended to occur outside of the morning and evening peak hours in order to have nominal impacts to traffic and circulation near the vicinity of the Project. With time-of-day restrictions, it is anticipated that traffic impacts associated with the delivery and removal of heavy equipment are less than significant.

Construction employee trips are estimated based on the number of construction workers anticipated to be on site throughout the various stages of construction. Each construction worker is assumed to drive to and from the construction site each day. It has been assumed that construction workers would arrive up to 30 minutes prior to the workday and would leave up to 30 minutes after the workday ends. It is anticipated that the majority of construction employees would arrive between 6:00 a.m. and 7:00 a.m., and depart between 3:30 p.m. and 4:30 p.m.

During all phases of construction, construction trips would be greater than the number of trips associated with the existing nursery operations, but fewer than the number of trips associated with operation of the proposed Project. The most intense level of traffic activity generated by the Project construction phases is estimated to occur in conjunction with infrastructure, building construction, and architectural coating. In comparison to a single car, a truck affects roadway operations based upon several variables (e.g., headway, speed, density). In order to account for these effects, truck volume is converted to passenger car equivalent (PCE) to represent traffic flow. The Project construction activities associated with infrastructure, building construction, and architectural coating could amount to the trips shown in Table 4.16.D.

Table 4.16.D: Infrastructure, Building Construction, and Architectural Coating Trips

Trip Category	Daily Vehicle Trips	PCE Factor	PCE Daily Trips
Medium Truck	143	2	286
Heavy Truck	143	3	429
Worker	1,034	1	1,034
Total	**1,320**		**1,749**

Source: *Nakase Property Traffic Impact Analysis* (Urban Crossroads 2019c)
PCE = passenger car equivalent

These estimated daily construction traffic levels exceed the traffic generated by the existing nursery, which ranges from 127 to 332 trip-ends per day. However, traffic operations during the proposed construction phases of the Project (including vehicle trips associated with construction employees, export of soil, import of construction materials, etc.) are anticipated to occur during off-peak periods. Nevertheless, study area intersections may potentially be impacted by workers and trucks during the various construction phases. More specifically, while the traffic impacts associated with the volume of traffic during construction would be less than the traffic impacts determined through the analysis of Project operation, construction activities would have the potential to reduce roadway capacity. Mitigation Measure 4.16.1 would reduce potential impacts associated with temporary construction traffic, including haul trips and equipment deliveries. Mitigation Measure 4.16.1 requires the development of a Construction Traffic Management Plan (CTMP) that would be required and approved by the City of Lake Forest Director of Public Works/City Engineer. In general, the CTMP would ensure that to the extent practicable, construction traffic would access the Project site during off-peak hours, and that construction traffic would be routed to avoid travel through, or proximate to, sensitive land uses. With incorporation of Mitigation Measure 4.16.1, potential impacts associated with construction traffic would be reduced to a less than significant level.

Project Operation.

City Program, Plan, or Ordinance: Roadway. Existing peak-hour traffic operations have been evaluated for the study intersections based on the analysis methodologies described above. Table 4.16.E identifies the existing LOS for the study intersections. One study area intersection (#29 - Bake Parkway/Jeronimo Road) operates at an unacceptable LOS (LOS E or worse) during the a.m. peak hour in the Existing condition.

The TIA calculates the potential trip generation for the project using rates established in the Institute of Transportation Engineers (ITE) *Trip Generation Manual* (10th Edition). As shown in Table 4.16.F, the proposed Project is anticipated to generate a total of approximately 8,789 trip-ends per day with 1,202 vehicles per hour during the a.m. peak hour, and 879 vehicles per hour during the p.m. peak hour. It should be noted that Table 4.16.F provides a conservative analysis of the Project's new trips without taking credit for existing trip generation at the Project site. The trip distribution patterns for the proposed Project were determined in conjunction with the City traffic modeling consultant and City staff during

Table 4.16.E: Summary of Peak-Hour Intersection Operation – Existing Conditions

Int. #	Intersection	AM Peak Hour		PM Peak Hour	
		ICU/Delay	LOS	ICU/Delay	LOS
1	Lake Forest Drive/Dimension Drive	0.41	A	0.52	A
2	Lake Forest Drive/Rancho Parkway	0.42	A	0.57	A
3	Lake Forest Drive/SR-241 SB Off-Ramp	0.29	A	0.36	A
4	Lake Forest Drive/SR-241 NB On-Ramp	0.24	A	0.28	A
5	Corridor Center/Rancho Parkway	0.25	A	0.27	A
6	Bake Parkway/Portola Parkway	0.42	A	0.49	A
7	Bake Parkway/Towne Center Drive	0.39	A	0.49	A
8	Bake Parkway/Rancho Parkway	0.44	A	0.55	A
9	Bake Parkway/Rancho Parkway South	0.51	A	0.52	A
10	Bake Parkway/Orchard Road (unsignalized)	14.0 sec	B	13.0 sec	B
11	Dimension Drive/Bake Parkway	0.40	A	0.56	A
12	Alton Parkway/Rancho Parkway South	0.48	A	0.39	A
13	Alton Parkway/SR-241 Ramps	0.32	A	0.39	A
14	Alton Parkway/Towne Centre Drive	0.25	A	0.31	A
15	Alton Parkway/Portola Parkway	0.41	A	0.27	A
16	Lake Forest Drive/Portola Parkway	0.36	A	0.49	A
17	Lake Forest Drive/Towne Centre Drive	0.30	A	0.41	A
18	Towne Centre Drive/Portola Parkway	0.38	A	0.55	A
19	Glenn Ranch Road/Portola Parkway	0.41	A	0.48	A
20	Portola Parkway/SR-241 Ramps	0.35	A	0.38	A
21	Portola Parkway/Rancho Parkway	0.42	A	0.50	A
22	El Toro Road/Portola Parkway	0.62	B	0.65	B
23	Los Alisos Boulevard/Santa Margarita Parkway	0.75	C	0.73	C
24	Alton Parkway/Commercentre Drive	0.37	A	0.43	A
25	Alton Parkway/Irvine Boulevard	0.47	A	0.42	A
26	Bake Parkway/Commercentre Drive	0.50	A	0.67	B
27	Bake Parkway/Irvine Boulevard-Trabuco Road	0.63	B	0.68	B
28	Bake Parkway/Toledo Way	0.70	B	0.59	A
29	Bake Parkway/Jeronimo Road	0.94	**E**	0.77	C
30	Bake Parkway/Muirlands Boulevard	0.56	A	0.67	B
31	Bake Parkway/Rockfield Boulevard	0.56	A	0.68	B
32	Bake Parkway/I-5 NB Ramps	0.84	D	0.67	B
33	Bake Parkway/I-5 SB Ramps	0.67	B	0.73	C
34	Lake Forest Drive/Trabuco Road	0.59	A	0.67	B
35	Lake Forest Drive/Serrano Road	0.54	A	0.53	A
36	El Toro Road/Trabuco Road	0.64	B	0.62	B
37	El Toro Road/Serrano Road	0.53	A	0.47	A
38	El Toro Road/Jeronimo Road	0.69	B	0.80	C

Source: *Nakase Property Traffic Impact Analysis* (Urban Crossroads 2019c).
Notes: ICU value is expressed in volume-to-capacity ratio.
Average delay is expressed in seconds of delay per peak-hour vehicle.
LOS shown in **Bold** with gray shading indicates unacceptable LOS.

I-5 = Interstate 5
ICU = Intersection Capacity Utilization
Int. = intersection
LOS = level of service
NB = northbound
SB = southbound
SR-241 = State Route 241

Table 4.16.F: Project Trip Generation Summary

Land Use	Size	Unit	ADT	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Trip Rates[1]									
Elementary School (520)	–	Student	1.89	0.36	0.31	0.67	0.08	0.09	0.17
Single Family Detached (210)	–	DU	9.44	0.19	0.55	0.74	0.62	0.37	0.99
Senior Adult Housing – Attached (252)	–	DU	3.70	0.07	0.13	0.20	0.14	0.12	0.26
Neighborhood Park (411)[2]	–	Acre	5.00	0.30	0.21	0.51	0.28	0.23	0.51
Central Park (411)[2]	–	Acre	30.00	1.18	0.82	2.00	1.65	1.35	3.00
Trip Generation									
Zone 1									
Single Family Detached (210)	182	DU	1,718	35	100	135	113	67	180
Senior Adult Housing – Attached (252)	101	DU	374	7	13	20	14	12	26
Neighborhood Park (411)	0.5	Acre	3	0	0	0	0	0	0
Subtotal			**2,095**	**42**	**113**	**155**	**127**	**79**	**206**
Zone 2									
Elementary School (520)	1,000	Student	1,890	360	310	670	80	90	170
Single Family Detached (210)	110	DU	1,038	21	61	82	68	41	109
Neighborhood Park (411)	0.3	Acre	2	0	0	0	0	0	0
Subtotal			2,930	381	371	752	148	131	279
Zone 3									
Single Family Detached (210)	142	DU	1,340	27	78	105	88	53	141
Neighborhood Park (411)	0.4	Acre	2	0	0	0	0	0	0
Central Park (411)	4.8	Acre	144	6	4	10	8	6	14
Subtotal			1,486	33	82	115	96	59	155
Zone 4									
Single Family Detached (210)	241	DU	2,275	46	133	179	149	89	238
Neighborhood Park (411)	0.6	Acre	3	0	0	0	0	0	0
Subtotal			2,278	46	133	179	149	89	238
Net Trip Generation			**8,789**	**503**	**699**	**1,202**	**521**	**358**	**879**

Source: *Nakase Property Traffic Impact Analysis* (Urban Crossroads 2019c)
[1] Trip rates are referenced from the Institute of Transportation Engineers *Trip Generation Manual,* 10th Edition (2017).
[2] Trip rates modified by TIA.
ADT = average daily trips

the traffic study scoping process. They are based upon the LFTAM, combined with Project land use access characteristics and local knowledge of traffic patterns, and project access considerations, such as the locations of right-turn in/out only driveways. Five percent (5%) of trips are anticipated to remain internal to the Project site because of interactions between residential, park, and school uses.

The resulting Project traffic volumes were added to existing traffic volumes, and the intersection LOS was calculated for the Existing Plus Project condition. Table 4.16.G summarizes the intersection analysis results, which indicates that the intersection of Bake Parkway/Jeronimo Road is anticipated to continue to operate at an unacceptable LOS (LOS E or worse) during peak hours with the addition of Project traffic. A change in ICU value of 0.02 indicates a potentially significant impact at this intersection.

Table 4.16.G: Existing Plus Project Intersection Level of Service Summary

Intersection		Existing (2017)				Existing Plus Project				Change With Proposed Project	
		AM		PM		AM		PM		AM	PM
		V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS		
1	Lake Forest Drive/Dimension Drive	0.41	A	0.52	A	0.42	A	0.52	A	0.01	0.00
2	Lake Forest Drive/Rancho Parkway	0.42	A	0.57	A	0.52	A	0.61	A	0.10	0.04
3	Lake Forest Drive/SR-241 SB Off-Ramp	0.29	A	0.36	A	0.32	A	0.37	A	0.03	0.01
4	Lake Forest Drive/SR-241 NB On-Ramp	0.24	A	0.28	A	0.26	A	0.30	A	0.02	0.02
5	Corridor Center/Rancho Parkway	0.25	A	0.27	A	0.41	A	0.49	A	0.16	0.22
6	Bake Parkway/Portola Parkway	0.42	A	0.49	A	0.44	A	0.50	A	0.02	0.01
7	Bake Parkway/Towne Center Drive	0.39	A	0.49	A	0.42	A	0.50	A	0.03	0.01
8	Bake Parkway/Rancho Parkway	0.44	A	0.55	A	0.47	A	0.57	A	0.03	0.02
9	Bake Parkway/Rancho Parkway South	0.51	A	0.52	A	0.58	A	0.57	A	0.07	0.05
10	Bake Parkway/Orchard Road (unsignalized)	14.0 sec	B	13.0 sec	B	15.9 sec	C	18.3 sec	C	1.9 sec	5.3 sec
11	Dimension Drive/Bake Parkway	0.40	A	0.56	A	0.48	A	0.63	B	0.08	0.17
12	Alton Parkway/Rancho Parkway South	0.48	A	0.39	A	0.51	A	0.39	A	0.03	0.00
13	Alton Parkway/SR-241 Ramps	0.32	A	0.39	A	0.32	A	0.39	A	0.00	0.00
14	Alton Parkway/Towne Centre Drive	0.25	A	0.31	A	0.26	A	0.32	A	0.01	0.01
15	Alton Parkway/Portola Parkway	0.41	A	0.27	A	0.43	A	0.28	A	0.02	0.01
16	Lake Forest Drive/Portola Parkway	0.36	A	0.49	A	0.37	A	0.49	A	0.01	0.00
17	Lake Forest Drive/Towne Centre Drive	0.30	A	0.41	A	0.32	A	0.41	A	0.02	0.00
18	Towne Centre Drive/Portola Parkway	0.38	A	0.55	A	0.38	A	0.56	A	0.00	0.01
19	Glenn Ranch Road/Portola Parkway	0.41	A	0.48	A	0.42	A	0.49	A	0.01	0.01
20	Portola Parkway/SR-241 Ramps	0.35	A	0.38	A	0.35	A	0.38	A	0.00	0.00
21	Portola Parkway/Rancho Parkway	0.42	A	0.50	A	0.45	A	0.52	A	0.03	0.02
22	El Toro Road/Portola Parkway	0.62	B	0.65	B	0.64	B	0.67	B	0.02	0.02
23	Los Alisos Boulevard/Santa Margarita Parkway	0.75	C	0.73	C	0.76	C	0.74	C	0.01	0.01
24	Alton Parkway/Commercentre Drive	0.37	A	0.43	A	0.38	A	0.44	A	0.01	0.01
25	Alton Parkway/Irvine Boulevard	0.47	A	0.42	A	0.47	A	0.43	A	0.00	0.01
26	Bake Parkway/Commercentre Drive	0.50	A	0.67	B	0.54	A	0.71	C	0.04	0.04
27	Bake Parkway/Irvine Boulevard-Trabuco Road	0.63	B	0.68	B	0.65	B	0.70	B	0.02	0.02
28	Bake Parkway/Toledo Way	0.70	B	0.59	A	0.72	C	0.60	A	0.02	0.01
29	Bake Parkway/Jeronimo Road	**0.94**	**E**	0.77	C	**0.96**	**E**	0.78	C	0.02	0.01
30	Bake Parkway/Muirlands Boulevard	0.56	A	0.67	B	0.56	A	0.68	B	0.00	0.01
31	Bake Parkway/Rockfield Boulevard	0.56	A	0.68	B	0.56	A	0.69	B	0.00	0.01
32	Bake Parkway/I-5 NB Ramps	0.84	D	0.67	B	0.85	D	0.69	B	0.01	0.02
33	Bake Parkway/I-5 SB Ramps	0.67	B	0.73	C	0.68	B	0.76	C	0.01	0.03
34	Lake Forest Drive/Trabuco Road	0.59	A	0.67	B	0.60	A	0.68	B	0.01	0.01
35	Lake Forest Drive/Serrano Road	0.54	A	0.53	A	0.54	A	0.53	A	0.00	0.00
36	El Toro Road/Trabuco Road	0.64	B	0.62	B	0.65	B	0.62	B	0.01	0.00
37	El Toro Road/Serrano Road	0.53	A	0.47	A	0.53	A	0.47	A	0.00	0.00
38	El Toro Road/Jeronimo Road	0.69	B	0.80	C	0.70	B	0.82	D	0.01	0.02

Source: *Nakase Property Traffic Impact Analysis* (Urban Crossroads 2019c).
Notes: ICU value is expressed in volume-to-capacity ratio.
Average delay is expressed in seconds of delay per peak-hour vehicle.
LOS shown in **Bold** indicates unacceptable LOS.
I-5 = Interstate 5 SR-241 = State Route 241
ICU = Intersection Capacity Utilization V/C = volume-to-capacity
LOS = level of service

The addition of a second northbound left-turn lane at the intersection of Bake Parkway/ Jeronimo Road is included in the LFTM and NITM programs. It should be noted that the proposed Project was not a planned development project at the time the LFTM program was adopted; therefore, the proposed Project cannot participate in the LFTM program. However, sufficient funding is available within the LFTM and NITM programs to construct the physical improvement necessary to mitigate the Project's impact. ~~Nevertheless,~~ Mitigation Measure 4.16.2 requires the City~~Project Applicant/Developer~~ to construct the improvements if the improvements are not already completed prior to ~~issuance of~~ the first final building inspection~~certificate of occupancy~~. With implementation of Mitigation Measure 4.16.2, impacts related to potential conflicts with City program, plan, ordinance or policy addressing the circulation system would be reduced below a level of significance.

CMP Program, Plan, or Ordinance: Roadway. Within the study area, Intersection 36 (El Toro Road/Trabuco Road) is monitored in the Orange County CMP. As indicated in Table 4.16.F, this intersection operates at LOS B during the a.m. peak hour and LOS B during the p.m. peak hour in existing conditions. This intersection would continue to operate at LOS B during both the a.m. and p.m. peak hours with the addition of Project traffic. The Project's contribution to intersection ICU is 0.01 or less, which is below the significance threshold established by the Orange County CMP. No mitigation is required.

Caltrans Program, Plan, or Ordinance: Roadway. Table 4.16.A shows that six study intersections are within Caltrans' jurisdiction. The TIA compared the capacity of these intersections to the volume of traffic in Existing, Interim Year Cumulative 2020 conditions, and 2040 General Plan Cumulative conditions. As a result of this analysis, the TIA identified less than significant impacts to the v/c ratio of these Caltrans intersections with implementation of the proposed Project. No mitigation is required.

City Program, Plan, or Ordinance: Transit, Bicycle, and Pedestrian. The proposed Project takes access at existing intersections and would not interfere with transit, bicycle, or pedestrian connectivity. In addition, the Project incorporates pedestrian and bicycle connectivity within the Project site. Therefore, the Project is not anticipated to conflict with program, plan, ordinance or policy addressing the transit, bicycle, and pedestrian facilities.

Summary. The Project's potential impacts to the roadway network during construction would be reduced to a less than significant level with incorporation of Mitigation Measure 4.16.1. The Project's potential impacts to the roadway network upon completion of the Project would be reduced to a less than significant level with incorporation of Mitigation Measure 4.16.2. The Project is not anticipated to have a significant impact to CMP or Caltrans facilities and no mitigation is required. The Project is not anticipated to have a significant impact on transit, bicycle, or pedestrian facilities and no mitigation is required.

Threshold 4.16.2: Would the Project conflict or be inconsistent with CEQA Guidelines section 15064.3 subdivision (b)?

No Impact. According to *State CEQA Guidelines* Section 15064.3(a), project-related transportation impacts are generally best measured by evaluating the project's VMT. VMT refers to the amount and distance of automobile travel attributable to a project.

State CEQA Guidelines Section 15064.3(b) sets forth criteria for analyzing transportation impacts, with the applicable methodology based on project type, and specifying other criteria for conducting VMT analysis.

For land use projects, VMT exceeding an applicable threshold of significance may indicate a significant impact. Generally, projects located within 0.5 mile (mi) of an existing high-quality transit corridor[1] should be considered to have a less than significant impact. *State CEQA Guidelines* Section 15064.3(b)(2) addresses VMT associated with transportation projects and states that projects that reduce VMT (e.g., pedestrian, bicycle, and transit projects) should be presumed to have a less than significant impact. Subdivision (b)(3) of *State CEQA Guidelines* Section 15064.3 acknowledges that Lead Agencies may not be able to quantitatively estimate VMT for every project type. In these cases, a qualitative analysis may be used. The regulation further states that Lead Agencies have the discretion to formulate a methodology that would appropriately analyze a project's VMT (*State CEQA Guidelines* Section 15064.3(b)(4)). *State CEQA Guidelines* Section 15064.3(c) states that while an agency may elect to be governed by the provisions of this section immediately, it is not required to perform such analysis until July 1, 2020.

The proposed Project is considered a land use project and is not within 0.5 mi of an existing high-quality transit corridor. Consequently, Section 15064.3 of the *State CEQA Guidelines* is applicable to the proposed Project.

Using the average daily trips (ADT) established in the *Nakase Property Traffic Impact Analysis* (Urban Crossroads 2019c), the California Emissions Estimator Model (CalEEMod) was used to determine existing and post-project VMT. Under existing conditions, the existing nursery generates an annual VMT of 2,698,384 or 10,836.88 VMT per capita. The proposed Project would generate an annual VMT of 26,098,705. This would be 11,322.65 VMT per capita. Compared to existing conditions, the proposed Project would generate a higher annual VMT per capita.

At this time, the City has not established a methodology that would appropriately analyze VMT impacts within its jurisdiction. In addition, the City has not adopted thresholds or standards for assessing potential VMT impacts. Therefore, this information is provided for disclosure purposes only and traffic impacts in this EIR are based on the City's standard LFTAM, which is based on LOS. No mitigation is required.

[1] According to Public Resources Code (PRC) Section 21155(b), a high-quality transit corridor means a corridor with fixed route bus service with service intervals no longer than 15 minutes during peak commute hours.

Threshold 4.16.3: Would the Project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

Potentially Significant Impact.

Construction. Development of the proposed Project would require excavation of the site; delivery of materials, equipment, and personnel; demolition of the 1,744-square-foot (sf) existing structure on the Project site; undergrounding of utilities; construction of the buildings; and installation of landscaping. Demolition, grading, and building activities would involve the use of standard earthmoving equipment (e.g., loaders, bulldozers, cranes and other related equipment). No blasting or pile driving is proposed. All construction equipment, including construction worker vehicles, would be staged on the Project site for the duration of the construction period to the extent feasible. In addition, as required by Mitigation Measure 4.16.1, large construction equipment would be delivered during off-peak times so as to reduce travel during peak travel periods. Construction workers are anticipated to drive standard vehicles that would not result in incompatible uses. Therefore, because construction equipment would be staged on site for the duration of the construction period and would be delivered during non-peak hours as required by Mitigation Measure 4.16.1, Project construction is not anticipated to result in incompatible uses that increase on-road hazards. No additional mitigation is required.

Operation.

Access and On-Site Circulation. Three existing intersections would provide access to the proposed Project (one traffic signal on Bake Parkway, one unsignalized intersection on Bake Parkway, and one traffic signal on Rancho Parkway). The access analysis presented in the TIA demonstrates that each of these intersections is anticipated to operate at a satisfactory LOS.

"A" Street is essentially the easterly extension of Rancho Parkway South, serving as the Project main entrance. At the intersection of Bake Parkway/Rancho Parkway South, northbound traffic entering the site is accommodated by a separate right-turn lane, and two eastbound travel lanes accommodate traffic inbound to the site along "A" Street. "A" Street includes two travel lanes in each direction divided by a raised median. To efficiently serve residential traffic entering and exiting the site, the landscaped median on "A" Street prohibits eastbound traffic from making left turns onto "BB" Street. Traffic exiting the site is served by westbound dual left-turn lanes, a single westbound through lane, and a separate westbound right-turn lane on "A" Street approaching Bake Parkway.

"C" Street extends into the site from a right-in/right-out intersection (no break in the existing median) with Bake Parkway, which provides one travel lane in each direction through to "B" Street. At the Bake Parkway/"C" Street intersection, northbound traffic entering the site is served by a separate right-turn lane**.**

"B" Street includes two lanes in each direction between the Corridor Center/Rancho Parkway intersection and the "BB" Street intersection. At the Corridor Center/Rancho

Parkway intersection, the northbound approach on "B" Street is configured with one left-turn lane, and one shared through right lane. Between "BB" Street and "A" Street, the cross section for "B" Street consists of one southbound lane and two northbound lanes to accommodate turning movements related to the school site. Southwest of "A" Street, "B" Street then transitions into a cross section that accommodates one lane in each direction.

At the intersection of "B" Street/Rancho Parkway South, eastbound traffic entering the site is served by a separate right-turn lane, and two southbound travel lanes accommodate traffic inbound to the site along "B" Street. Traffic exiting the site is served by a northbound left-turn lane as well as a northbound shared through/right-turn lane on "B" Street approaching Rancho Parkway at the existing Corridor Center driveway. Because "BB" Street provides exclusive access to the school site, a separate southbound right-turn lane is provided on "B" Street approaching the "B" Street/"BB" Street intersection. At the "B" Street/"BB" Street intersection, a northbound shared through/left-turn lane is provided in addition to a separate northbound through lane.

"B" Street intersects "A" Street at the center of the Nakase Property development. At the "B" Street/"A" Street intersection, separate eastbound left- and right-turn lanes are provided on "A" Street. In the vicinity of the "B" Street/"A" Street intersection, "B" Street includes one southbound lane and two northbound lanes in order to provide flexibility for left-turn movements. The intersections of "B" Street/"T" Street and "B" Street/"S" Street are restricted to right turns only (no median break) near the "B" Street/"A" Street intersection.

On-street parking would not be allowed on "A" Street. Along "T" Street and "S" Street adjacent to the park, on-street parking is accommodated for community and public events. Along "BB" Street adjacent to the school, on-street parking is accommodated for student drop-off and pick-up purposes. Along "B" Street and "C" Street, on-street parking can be accommodated within 22 ft wide single travel lanes.

Mitigation Measure 4.16.3 requires a sight distance analysis for all Project intersections according to the City of Lake Forest Municipal Code and the Caltrans HCM standards and guidelines. The analysis will indicate limited use areas (e.g., low height landscaping), and on-street parking restrictions (e.g., red curb), if necessary, and any turning restrictions (e.g., right-in/right-out). With implementation of Mitigation Measure 4.16.3, potential impacts related to geometric design features would be reduced below a level of significance.

Pedestrian Safety. Residential streets within Nakase Property include curb extensions/ chokers at intersections to both visually enhance the look and feel of the intersection and to promote pedestrian activity. At key local street intersections, curb extensions have the combined benefits of aesthetic appeal and accommodations for non-motorized travelers. The use of landscaped curb extensions/chokers that project into the street 4 ft to 6 ft at street corners to promote vehicle slowing and to shorten the street-crossing distance for pedestrians would enhance pedestrian safety.

As stated in Mitigation Measure 4.16.4, Rectangular Rapid Flashing Beacons (RRFBs) are required at the crosswalks at the uncontrolled intersection of "B" Street/"BB" Street and the uncontrolled intersection of "A" Street/"D" Street in order to enhance driver's awareness of crosswalks needed for efficient school access. The RRFBs can be activated by pedestrians manually by a push button or passively by a pedestrian detection system. RRFB control at a crosswalk has the potential to be an effective traffic control device since it fulfills a need, commands attention, conveys a clear meaning, commands respect of road users, and gives adequate time for proper response.

On-street parking is allowed on neighborhood streets and segments of "BB" Street, "C" Street, and "B" Street. On-street parking, in effect, reduces the width of the street, leading to slower driving. Parking also separates traveling cars from the sidewalk, helping to improve pedestrian safety. With incorporation of Mitigation Measure 4.16.4, potential impacts related to pedestrian safety would be less than significant.

Threshold 4.16.4: Would the Project result in inadequate emergency access?

Potentially Significant Impact.

Construction. Development of the proposed Project would require excavation of the site; delivery of materials, equipment, and personnel; demolition of the 1,744 sf existing structure on the Project site; undergrounding of utilities; construction of the buildings; and installation of landscaping. The proposed Project would be implemented over an estimated period of 67 months (approximately 5.5 years). Demolition and site preparation would span approximately 3 months, and grading would span approximately 12 months. Paving and installation of infrastructure would take approximately 4 months and 12 months, respectively, and would occur concurrently. Building construction would be implemented over an estimated period of 46 months.

Construction activities would potentially affect emergency access by requiring partial lane closures during street improvements and utility installation or by increasing emergency vehicle response times. Mitigation Measure 4.16.1 requires that the Project Applicant/Developer prepare a CTMP to ensure that emergency vehicles would be able to navigate through streets adjacent to the Project site that may experience congestion due to construction activities. Mitigation Measure 4.16.1 also requires that all emergency access to the Project site and adjacent areas be kept clear and unobstructed during all phases of demolition and construction. Traffic management personnel (flag persons), required as part of the CTMP, would be trained to assist in emergency response by restricting or controlling the movement of traffic that could interfere with emergency vehicle access. If a partial street closure (i.e., a lane closure) would be required, notice would be provided to the Orange County Sheriff's Department, and flag persons would be used to facilitate the traffic flow until construction is complete. With implementation of Mitigation Measure 4.16.1, potential impacts related to emergency access during construction would be less than significant. No additional mitigation is required.

Operation. Three existing intersections (one traffic signal on Bake Parkway, one unsignalized intersection on Bake Parkway, and one traffic signal on Rancho Parkway) would provide access

to the project site. The TIA access analysis demonstrates that each of these intersections is anticipated to operate at satisfactory LOS. The Project would not impede existing routes for emergency vehicles, and emergency vehicles would have multiple routes to access the Project site. Further, as part of the Project approval process, emergency access to/from the site would be required to meet all applicable City codes and standards. The Orange County Fire Authority (OCFA) approved a conceptual Fire Master Plan (refer to Figure 4.19.1) in February 2018, a conceptual Fire Protection Plan with Ember Mitigation (refer to Figure 4.19.2) in January 2018, and a conceptual Fuel Modification Plan (refer to Figure 4.19.3) in March 2018. The Fire Master Plan and Fire Protection Plan address specific fire prevention and access elements required by the City of Lake Forest Municipal Code and the California Building Code (CBC). The Fire Master Plan establishes the proper location and adequacy of fire suppression facilities as well as fire access routes on the Project site. The Fire Master Plan also identifies the locations of fire hydrants, a water supply for firefighting, and emergency access to residences and structures on the Project site. According to OCFA, adherence to the elements of the Fire Master Plan is directly correlated with the effectiveness of first responders, including fire and emergency medical personnel. The *Nakase Property Area Plan* (Woodley Architectural Group 2019) meets or exceeds the requirements of OCFA to not hinder fire access and fire department and operations for the planned community. Thus, operational impacts related to emergency access would be considered less than significant, and no mitigation measures are required.

4.16.7 Cumulative Impacts

4.16.7.1 Interim Year (2020)

Interim Year (2020) volume forecasts were developed by the City's traffic model consultant using the LFTAM without the Project land uses (assuming existing commercial nursery operations) and with the proposed Project. LOS calculations were conducted for the study intersections to evaluate their operations with existing off-site roadway and intersection geometrics. Interim Year (2020) intersection analysis results are summarized in Table 4.16.H, which indicates that one study area intersection (Bake Parkway/Trabuco Road) is anticipated to operate at an unacceptable LOS during peak hours without the Project and in the Plus Project condition. The Project does not cause an increase in ICU of greater than 0.01. Therefore, the Project impact is less than significant, and no mitigation is required.

4.16.7.2 General Plan Buildout Year (2040)

The TIA evaluated the Project's potential cumulative impacts in the General Plan Buildout Year (2040) scenario. The Lake Forest General Plan designates the Nakase Property for approximately 1,841,700 sf of business park use. The proposed Project would generate 14,122 fewer trips per day with 1,377 fewer vehicles per hour during the a.m. peak hour and 1,442 fewer vehicles per hour during the p.m. peak hour in comparison to the adopted City of Lake Forest General Plan business park land use for the site.

Table 4.16.H: Interim Year (2020) Intersection Level of Service Summary

	Intersection	Interim Year (2020) Without Project				Interim Year (2020) Plus Project				Change With Proposed Project	
		AM		PM		AM		PM		AM	PM
		V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS		
1	Lake Forest Drive/Dimension Drive	0.43	A	0.47	A	0.44	A	0.47	A	0.01	0.00
2	Lake Forest Drive/Rancho Parkway	0.50	A	0.59	A	0.63	B	0.73	C	0.13	0.14
3	Lake Forest Drive/SR-241 SB Off-Ramp	0.40	A	0.44	A	0.41	A	0.46	A	0.01	0.02
4	Lake Forest Drive/SR-241 NB On-Ramp	0.32	A	0.36	A	0.32	A	0.37	A	0.00	0.01
5	Corridor Center/Rancho Parkway	0.23	A	0.52	A	0.39	A	0.49	A	0.16	-0.03
6	Bake Parkway/Portola Parkway	0.48	A	0.70	B	0.47	A	0.68	B	-0.01	-0.02
7	Bake Parkway/Towne Center Drive	0.57	A	0.62	B	0.60	A	0.63	B	0.03	0.01
8	Bake Parkway/Rancho Parkway	0.62	B	0.67	B	0.58	A	0.67	B	-0.04	0.00
9	Bake Parkway/Rancho Parkway South	0.69	B	0.65	B	0.71	C	0.68	B	0.04	0.03
10	Bake Parkway/Orchard Road (unsignalized)	20.5 sec	C	14.3 sec	B	21.8 sec	C	22.8 sec	C	1.3 sec	8.5 sec
11	Dimension Drive/Bake Parkway	0.56	A	0.70	B	0.59	A	0.73	C	0.03	0.03
12	Alton Parkway/Rancho Parkway South	0.50	A	0.52	A	0.58	A	0.53	A	0.08	0.01
13	Alton Parkway/SR-241 Ramps	0.44	A	0.42	A	0.44	A	0.42	A	0.00	0.00
14	Alton Parkway/Towne Centre Drive	0.38	A	0.43	A	0.38	A	0.43	A	0.01	0.00
15	Alton Parkway/Portola Parkway	0.44	A	0.31	A	0.43	A	0.32	A	-0.01	0.01
16	Lake Forest Drive/Portola Parkway	0.55	A	0.71	C	0.55	A	0.73	C	0.00	0.02
17	Lake Forest Drive/Towne Centre Drive	0.39	A	0.51	A	0.40	A	0.52	A	0.01	0.01
18	Towne Centre Drive/Portola Parkway	0.62	B	0.64	B	0.61	B	0.64	B	-0.01	0.00
19	Glenn Ranch Road/Portola Parkway	0.59	A	0.60	A	0.59	A	0.59	A	0.00	-0.01
20	Portola Parkway/SR-241 Ramps	0.43	A	0.54	A	0.43	A	0.55	A	0.00	0.01
21	Portola Parkway/Rancho Parkway	0.45	A	0.48	A	0.45	A	0.48	A	0.00	0.00
22	El Toro Road/Portola Parkway	0.59	A	0.78	C	0.62	B	0.78	C	0.03	0.00
23	Los Alisos Boulevard/Santa Margarita Parkway	0.79	C	0.83	D	0.77	C	0.83	D	-0.02	0.00
24	Alton Parkway/Commercentre Drive	0.49	A	0.58	A	0.52	A	0.60	A	0.03	0.02
25	Alton Parkway/Irvine Boulevard	0.79	C	0.71	C	0.79	C	0.71	C	0.00	0.00
26	Bake Parkway/Commercentre Drive	0.61	B	0.74	C	0.64	B	0.75	C	0.03	0.01
27	Bake Parkway/Irvine Boulevard-Trabuco Road	**1.02**	**F**	**0.93**	**E**	**1.03**	**F**	**0.92**	**E**	0.01	-0.01
28	Bake Parkway/Toledo Way	0.76	C	0.65	B	0.76	C	0.66	B	0.00	0.01
29	Bake Parkway/Jeronimo Road	0.85	D	0.80	C	0.87	D	0.80	C	0.02	0.00
30	Bake Parkway/Muirlands Boulevard	0.62	B	0.70	B	0.62	B	0.70	B	0.00	0.01
31	Bake Parkway/Rockfield Boulevard	0.60	A	0.72	C	0.61	B	0.72	C	0.00	0.01
32	Bake Parkway/I-5 NB Ramps	0.88	D	0.63	B	0.88	D	0.64	B	0.01	0.02
33	Bake Parkway/I-5 SB Ramps	0.75	C	0.78	C	0.76	C	0.79	C	0.01	0.01
34	Lake Forest Drive/Trabuco Road	0.83	D	0.79	C	0.82	D	0.82	D	-0.01	0.03
35	Lake Forest Drive/Serrano Road	0.69	B	0.59	A	0.69	B	0.61	B	0.00	0.02
36	El Toro Road/Trabuco Road	0.70	C	0.76	C	0.69	B	0.75	C	-0.01	-0.01
37	El Toro Road/Serrano Road	0.54	A	0.63	B	0.54	A	0.62	B	0.00	-0.01
38	El Toro Road/Jeronimo Road	0.72	C	0.75	C	0.70	B	0.76	C	-0.02	-0.01

Source: *Nakase Property Traffic Impact Analysis* (Urban Crossroads 2019c).
Notes: ICU value is expressed in volume-to-capacity ratio.
Average delay is expressed in seconds of delay per peak-hour vehicle.
LOS shown in **Bold** indicates unacceptable LOS.

I-5 = Interstate 5
ICU = Intersection Capacity Utilization
LOS = level of service
NB = northbound
SB = southbound
SR-241 = State Route 241

The TIA evaluates the Project's potential impacts in multiple scenarios including with and without the western extension of Portola Parkway and with and without several specific LFTM improvements. In each of these scenarios, the Project was found to have less than significant impacts, which can be attributed to the lower trip generation compared to the General Plan land use designation. Therefore, the Project's contribution to cumulative traffic impacts would be less than significant and no mitigation is required.

4.16.8 Level of Significance Prior to Mitigation

Information related to *State CEQA Guidelines* Section 15064.3 subdivision (b) was provided for information purposes only because the City has not yet adopted VMT metrics or thresholds of significance related to VMT. The Project would have a potentially significant impact related to hazards due to geometric design features and emergency access; therefore, mitigation is required. Potential adverse impacts to program, plan, ordinance or policy addressing the circulation system may occur during construction and operation of the Project and mitigation is required. The Project's contribution to cumulative traffic impacts would be less than significant and no mitigation is required.

4.16.9 Regulatory Compliance Measures and Mitigation Measures

4.16.9.1 Regulatory Compliance Measures

There are no Regulatory Compliance Measures (RCMs) related to traffic that are applicable to the proposed Project.

4.16.9.2 Mitigation Measures

Mitigation Measure 4.16.1: **Construction Traffic Management Plan (CTMP).** Prior to the issuance of grading permits, the Project Applicant/Developer shall prepare a CTMP for approval by the City of Lake Forest Director of Public Works/City Engineer, or designee, and shall implement the Plan during Project construction with the goal of maintaining acceptable intersection levels of service (LOS) during peak traffic hours. At a minimum, the CTMP shall include, but not be limited to, the following:

- Provisions for temporary traffic control during all construction activities adjacent to public right-of-way to improve traffic flow on public roadways and ensure the safe access into and out of the site (e.g., warning signs, lights and devices, and flag person).
- The delivery and removal of heavy equipment shall occur outside of the morning and evening peak periods (7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m., Monday through Friday).

- Routine street closures shall be planned to occur outside the morning and evening peak traffic hours (7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m., Monday through Friday).
- Soil import and export activity shall not be permitted during the morning and evening peak traffic hours (7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m., Monday through Friday).
- Rerouting construction trucks to reduce travel on congested streets.
- Prohibiting construction-related vehicles from parking on public streets.
- Providing safety precautions for pedestrians and bicyclists through such measures as alternate routing and protection barriers.
- Scheduling construction-related deliveries, other than concrete and earthwork-related deliveries, so as to reduce travel during peak travel periods.
- Obtaining the required permits for truck haul routes from the City of Lake Forest and/or the California Department of Transportation (Caltrans).
- All emergency access to the Project site and adjacent areas shall be kept clear and unobstructed during all phases of demolition and construction.
- The Orange County Sheriff's Department and the Orange County Fire Authority (OCFA) shall be notified a minimum of 1 week (7 days) in advance of any lane closures or roadway work so that emergency vehicles can be rerouted during construction if deemed necessary in the expert opinion of the Orange County Sheriff's Department and/or OCFA.
- The Orange County Transportation Authority (OCTA) shall be notified regarding any affected locations a minimum of 10 working days prior to construction so that transit service can be rerouted if deemed necessary in the expert opinion of the OCTA.
- Flag persons shall be trained to assist in emergency response by restricting or controlling the movement of traffic that could interfere with emergency vehicle access.

Mitigation Measure 4.16.2 **Bake Parkway/Jeronimo Road.** Unless physical improvements are already constructed, prior to ~~issuance of~~ the first final building inspection~~certificate of occupancy~~, the City of Lake Forest~~Project Applicant/Developer~~ shall construct a second northbound left-turn lane at the intersection of Bake Parkway/Jeronimo Road consistent with the design requirements of the City of Lake Forest.

Mitigation Measure 4.16.3 **Sight Distance Analysis.** Prior to issuance of precise grading permits and building permits, the Project Applicant/Developer shall prepare a detailed sight distance analysis for all Project intersections. The sight distance analysis shall be prepared according to the City of Lake Forest Municipal Code and the Caltrans *Highway Design Manual* (HCM) standards and guidelines, and indicate limited use areas (e.g., low-height landscaping), and on-street parking restrictions (e.g., red curb), if necessary, and any turning restrictions (e.g., right-in/right-out). Intersections on Bake Parkway, which has a 50-mile-per-hour (mph) posted speed limit, should be provided with a minimum of 430 feet (ft) of stopping sight distance according to the Caltrans *Highway Design Manual*. Intersections internal to the project site would have a 25 mph speed limit and would require a minimum of 150 ft of stopping sight distance according to the Caltrans *Highway Design Manual*. The findings of the sight distance analysis shall be included in a report(s) subject to review and approval by the Directors of Planning and Building and Public Works, or designees.

Mitigation Measure 4.16.4: **Rectangular Rapid Flashing Beacons (RRFBs).** Prior to ~~issuance of~~ the first final building inspection~~certificate of occupancy~~, RRFBs shall be installed at the crosswalks at the uncontrolled intersection of "B" Street/"BB" Street and the uncontrolled intersection of "A" Street/"D" Street.

4.16.10 Level of Significance after Mitigation

Potential impacts to transportation/traffic associated with Project construction and operation would be reduced to levels that are less than significant with implementation of the mitigation measures listed above.

This page intentionally left blank

4.17 TRIBAL CULTURAL RESOURCES

This section provides a discussion of the existing tribal cultural resource environment and an analysis of potential impacts to tribal cultural resources from implementation of the proposed Nakase Nursery/Toll Brothers Project (proposed Project). According to California Public Resources Code (PRC) Section 21080.3.1 and Chapter 532, Statutes 2014 (i.e., Assembly Bill [AB] 52), "tribal cultural resources" are defined as the following:

1. Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are either: (A) included or determined to be eligible for inclusion in the California Register of Historical Resources; or (B) included in a local register of historical resources as defined in subdivision (k) of Section 5020.1

2. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Section 5024.1

This section summarizes information obtained from Senate Bill [SB] 18 and AB 52 Native American consultation efforts. The record of these consultation efforts is contained in Appendix O of this Environmental Impact Report (EIR).

4.17.1 Scoping Process

The City of Lake Forest (City) received 28 comment letters during the public review period of the Initial Study/Notice of Preparation (IS/NOP). For copies of the IS/NOP comment letters, refer to Appendix A of this EIR. One comment letter included comments related to cultural resources and tribal cultural resources.

The letter from the Native American Heritage Commission (NAHC) (August 8, 2018) outlines the City's tribal consultation requirements under AB 52 and SB 18. The NAHC recommended the City consult with Native American Tribes and analyze impacts and include mitigation for tribal cultural resources in the EIR.

4.17.2 Existing Environmental Setting

The area that is now Lake Forest was prehistorically occupied by Native Americans. This area is primarily within traditional boundaries of the Gabrielino but is also along the boundary of the territory of the Juaneño. Aliso Creek—located approximately 0.65 mile (mi) southeast of the Project site—is generally accepted as the boundary of the territory between the two groups, with Gabrielino territory to the northeast and Juaneño territory to the southwest (Kroeber 1925). However, because the proposed Project is located close to the current alignment of Aliso Creek, it is in an area of potential overlap between the two tribal territories.

4.17.3 Regulatory Setting

4.17.3.1 Federal Regulations

There are no federal regulations that are applicable to tribal cultural resources relevant to the proposed Project.

4.17.3.2 State Regulations

Senate Bill 18 Tribal Consultation. California Government Code Section 65352.3 (adopted pursuant to the requirements of SB 18) requires local governments to contact, refer plans to, and consult with tribal organizations prior to making a decision to adopt or amend a General or Specific Plan. The tribal organizations eligible to consult have traditional lands in a local government's jurisdiction and are identified, upon request, by the NAHC. As noted in the California Office of Planning and Research's Tribal Consultation Guidelines (2005), "The intent of SB 18 is to provide California Native American tribes an opportunity to participate in local land use decisions at an early planning stage, for the purpose of protecting, or mitigating impacts to, cultural places."

Assembly Bill 52 Tribal Consultation. California PRC Section 21080.3.1 and Chapter 532, Statutes 2014 (i.e., AB 52), require that a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource, as defined, is a project that may have a significant effect on the environment. The bill requires a lead agency to begin consultation with a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project, if the tribe requested to the lead agency, in writing, to be informed by the lead agency of proposed projects in that geographic area and the tribe requests consultation, prior to determining whether a negative declaration, mitigated negative declaration, or environmental impact report is required for a project. The bill specifies examples of mitigation measures that may be considered to avoid or minimize impacts on tribal cultural resources. The bill makes the above provisions applicable to projects that have an NOP or a notice of negative declaration or Mitigated Negative Declaration filed on or after July 1, 2015. By requiring the lead agency to consider these effects relative to tribal cultural resources and to conduct consultation with California Native American tribes, this bill imposes a State-mandated local program.

4.17.3.3 Regional Regulations

There are no regional regulations that are applicable to tribal cultural resources relevant to the proposed Project.

4.17.3.4 Local Regulations

There are no local regulations that are applicable to tribal cultural resources relevant to the proposed Project.

4.17.4 Methodology

4.17.4.1 Senate Bill 18

The NAHC was contacted on February 8, 2018, to conduct a Sacred Lands File (SLF) search and provide a Native American Contact List for the Project site. The NAHC responded on February 9, 2018, stating that an SLF search was completed for the Project site with negative results. The NAHC also recommended that 20 Native American individuals representing the Kumeyaay, Gabrielino, Juaneño, Luiseño, and Kitanemuk Serrano Tataviam groups be contacted for information regarding cultural resources that could be affected by the proposed Project. These 20 individuals were contacted via a letter sent on April 19, 2018, and contacted again on May 15, 2018, via email or phone as a follow-up. With the exception of Andrew Salas, Gabrieleno Band of Mission Indians—

Kizh Nation, no responses were received. Mr. Salas's group had already reached out directly to the City of Lake Forest to participate in consultation per AB 52 (discussed below).

4.17.4.2 Assembly Bill 52

The NAHC was contacted on February 8, 2018, to conduct an SLF search and provide a Native American Contact List for the Project site. The NAHC responded on February 9, 2018, stating that an SLF search was completed for the Project site with negative results. The NAHC also recommended that 20 Native American individuals representing the Kumeyaay, Gabrielino, Juaneño, Luiseño, and Kitanemuk Serrano Tataviam groups be contacted for information regarding cultural resources that could be affected by the proposed Project. These 20 individuals were contacted by the City of Lake Forest via a letter sent on April 24, 2018. On May 4, 2018, Mr. Salas contacted the City of Lake Forest directly via email, stating that the Project site is located within the tribal territory of the Gabrieleno Band of Mission Indians—Kizh Nation and that they would like to consult with the agency. A consultation phone call was held on July 19, 2018, with a follow-up memorandum prepared on July 25, 2018. As a result of this consultation phone call, Mr. Salas's group sent a document on August 28, 2018, containing recommended mitigation measures for tribal cultural resources for the proposed Project. As discussed below, the recommendations have been incorporated into this document.

4.17.5 Thresholds of Significance

The thresholds for tribal cultural resources impacts used in this analysis are consistent with Appendix G of the *State CEQA Guidelines*. The proposed Project may be deemed to have a significant impact with respect to tribal cultural resources if it would:

Threshold 4.16.1: **Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k).**

Threshold 4.16.2: **Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is a resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.**

None of the thresholds for tribal cultural resources were scoped out in the Initial Study, which is included in Appendix A. Therefore, all of the thresholds listed above are addressed in the following analysis.

4.17.6 Project Impacts

Threshold 4.16.1: Would the Project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k)?

No Impact. A cultural resources records search was completed on February 28, 2018, at the South Central Coastal Information Center (SCCIC) of the California Historical Resources Information System (CHRIS) at California State University, Fullerton. It included a review of all prehistoric and historic archaeological sites within a 0.5 mi radius of the proposed Project, as well as a review of known cultural resource survey and excavation reports in that area. The California State Historic Resources Inventory (HRI), National Register of Historic Places (National Register), California Historical Landmarks (SHL), California Points of Historical Interest (SPHI), and various local historical registers were examined. In addition, a Historical Resources Evaluation Report (HRER) was prepared to assess the eligibility of buildings currently occupying the Project site for the National Register and the California Register of Historical Resources (California Register). The SCCIC records search results identified no previously recorded cultural resources in the Project site, and the HRER concluded that the current property on the Project site is not a historical resource. As such, there are no historical resources as defined in Section 15064.5 of the *State CEQA Guidelines* or PRC 5020.1(k) on the Project site.

Native American consultation was conducted in compliance with SB 18 and AB 52. During the consultation process, the Gabrieleno Band of Mission Indians – Kizh Nation stated that the Project site is located within their tribal territory and requested consultation with the Lead Agency. During a July 19, 2018, phone consultation meeting with the City, Mr. Salas stated that the Project site is adjacent to historic waterways and, as such, the tribe has concerns about the project unearthing buried cultural resources, including burials and/or cremations. No information regarding specific known tribal cultural resources on the Project site was provided by the tribe.

Therefore, no tribal cultural resources listed or eligible for listing in the California Register or in a local register exist within the Project area, and there are no known tribal cultural resources on the Project site. The proposed Project would not cause a substantial adverse change in the significance of a tribal cultural resource defined as a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American Tribe, and that is listed or eligible for listing in the California Register of

or in a local register of historical resources as defined in PRC Section 5020.1(k), and no mitigation is required.

Threshold 4.16.2: Would the Project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is a resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1? In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

Potentially Significant Impact. Native American consultation was conducted in compliance with SB 18 and AB 52. During the consultation process, the Gabrieleno Band of Mission Indians – Kizh Nation stated that the Project site is located within their tribal territory. During a July 19, 2018, phone consultation meeting with the City, Mr. Salas of the Gabrieleno Band of Mission Indians – Kizh Nation stated that the Project site is adjacent to historic waterways, and, as such, the Tribe has concerns about the project unearthing unknown buried cultural resources, including burials and/or cremations. The Tribe requested Native American monitoring during ground-disturbing activities and provided recommended mitigation measures to the City via email on August 28, 2018. The Tribe's recommendations have been incorporated into mitigation measures for the proposed Project.

Mitigation Measure 4.5.1 requires the retention of a qualified Native American Monitor (Monitor) and requires the presence of the approved Monitor during all grading activities. Mitigation Measure 4.5.1 further requires that all archaeological and tribal cultural resources encountered during construction activities be evaluated by the Monitor. In the event that previously unidentified tribal cultural resources are discovered, all material collected during the grading monitoring program shall be processed and curated at a facility that meets federal standards per 36 Code of Federal Regulations (CFR) Part 79.

Mitigation Measure 4.5.1 also requires diversion of construction work in the event any human skeletal material or related funerary objects are encountered during ground disturbance and notification of the County Coroner. If the remains are determined to be Native American, the County Coroner will notify the NAHC, which will determine and notify a Most Likely Descendant (MLD). Mitigation Measure 4.5.1 details steps for the treatment of previously unknown Native American burials. Implementation of Mitigation Measures 4.5.1 would reduce potential impacts related to unknown buried tribal cultural resources to a less than significant level.

4.17.7 Cumulative Impacts

Potential impacts of the proposed Project to unknown tribal cultural resources, when combined with the impacts of past, present, and reasonably foreseeable projects in the City of Lake Forest, could contribute to a cumulatively significant impact due to the overall loss of tribal cultural

resources in the region. However, each development proposal received by the City is required to undergo environmental review pursuant to CEQA. If there were any potential for significant impacts to tribal cultural resources, an investigation would be required to determine the nature and extent of the resources and identify appropriate mitigation measures that would reduce or avoid significant impacts.

4.17.8 Level of Significance Prior to Mitigation

No impacts to known tribal cultural resources listed or eligible for listing in the California Register or in a local register would occur. Prior to mitigation, the proposed Project has the potential to result in significant impacts to previously undiscovered tribal cultural resources.

4.17.9 Regulatory Compliance Measures and Mitigation Measures

4.17.9.1 Regulatory Compliance Measures

There are no regulatory compliance measures applicable to tribal cultural resources.

4.17.9.2 Mitigation Measures

For clarity, Mitigation Measure 4.5.1 is provided below.

Mitigation Measure 4.5.1 **Archaeological Resources, Tribal Cultural Resources, and Human Remains.** Prior to issuance of a grading permit for any site within the Project area, a qualified archaeologist shall be retained by the Applicant for that grading permit to provide professional archaeological services. The archaeologist shall be present at the pre-grading conference to establish procedures for archaeological resource surveillance. Those procedures shall include provisions for temporarily halting or redirecting work to permit sampling, identification, and evaluation of resources deemed by the archaeologist to potentially be historical resources or unique archaeological resources under the California Environmental Quality Act (CEQA). The archaeologist also shall conduct on-site archaeological monitoring for the grading operation. Should historical resources or unique archaeological resources be discovered during the grading operation, grading activities shall be modified to allow expeditious and proper analysis and/or salvage of the resources. Disposition of the resources shall be within the discretion of the City of Lake Forest.

Prior to Approval of Grading or Improvement plans, the Applicant shall implement a grading monitoring plan to mitigate potential impacts to undiscovered buried archaeological resources and tribal cultural resources on the Nakase Nursery/Toll Brothers Project to the satisfaction of the City of Lake Forest. This program shall include, but shall not be limited to, the following actions:

1. Provide evidence to the Lead Agency that a qualified archaeologist and Native American monitor have been contracted to implement a grading monitoring program to the satisfaction of the City of Lake Forest. A letter from the Project Archaeologist shall be submitted to the City of Lake Forest Director of Community Development. A letter from the Native American Monitor shall also be submitted to the City of Lake Forest Director of Community Development. The letter shall include the following guidelines:

    a. The qualified archaeologist/historian and Native American monitor shall attend the pre-grading meeting with the contractors to explain and coordinate the requirements of the monitoring program.

    b. The consulting archaeologist and Native American monitor shall monitor all areas identified for development.

    c. An adequate number of monitors (archaeological/ historical/Native American) shall be present to ensure that all earth-moving activities are observed and shall be on site during all grading activities.

    d. During the original cutting (used in this mitigation to refer to the “cut” part of “cut and fill”) of previously undisturbed deposits, the archaeological monitor(s) and Native American monitor(s) shall be on site full time. Inspections will vary based on the rate of excavation, the materials excavated, and the presence and abundance of artifacts and features. The frequency and location of inspections shall be determined by the Principal Investigator.

    e. During the cutting of previously disturbed deposits, the archaeological monitor(s) and Native American monitor(s) shall be on site as determined by the Principal Investigator of the excavations. Inspections will vary based on the rate of excavation, the materials excavated, and the presence and abundance of artifacts and features. The frequency and location of inspections shall be determined by the Principal Investigator in consultation with the Native American monitor.

    f. Isolates and clearly non-significant deposits shall be minimally documented in the field, and the monitored grading can then proceed.

g. In the event that previously unidentified, potentially significant cultural resources (including tribal cultural resources) are discovered, the archaeologist, in consultation with the Native American monitor(s), shall have the authority to divert or temporarily halt ground disturbance operations in the area of discovery to allow for evaluation. The archaeologist shall contact the City of Lake Forest Director of Community Development at the time of discovery. After consultation with the property owner, archaeologist, and Native American monitor(s), disposition of the resources shall be within the discretion of the City of Lake Forest. For significant cultural resources, a Research Design and Data Recovery Program to mitigate impacts shall be prepared by the archaeologist, in consultation with the Native American monitor(s), then carried out using professional archaeological and culturally sensitive methods.

h. If any human bones are discovered, the Principal Investigator shall contact the County Coroner. In the event the remains are determined to be of Native American origin, the Most Likely Descendant, as identified by the Native American Heritage Commission, shall be contacted in order to determine proper treatment and disposition of the remains.

i. Before construction activities are allowed to resume in the affected area, the artifacts shall be recovered and features recorded using professional archaeological methods. The Principal Investigator shall determine the amount of material to be recovered for an adequate artifact sample for analysis.

j. In the event that previously unidentified non-tribal cultural resources are discovered, those resources shall be processed and curated at a facility that meets federal standards per 36 CFR Part 79, and therefore shall be professionally curated and made available to other archaeologists/researchers for further study. The collections and associated records shall be transferred, including title, to the John D. Cooper Archaeological and Paleontological Curation Center, to be accompanied by payment of the fees necessary for permanent curation. Evidence shall be in the form of a letter from the curation facility identifying that

the materials have been received and that all fees have been paid.

k. In the event that previously unidentified cultural resources are discovered, a report documenting the field and analysis results and interpreting the artifact and research data within the research context shall be completed and submitted to the satisfaction of the City of Lake Forest prior to the issuance of any building permits. The report shall include California Department of Parks and Recreation Primary and Archaeological Site Forms.

l. In the event that no cultural resources are discovered, a brief letter to that effect shall be sent to the City of Lake Forest by the consulting archaeologist that the grading monitoring activities have been completed.

2. Provide evidence to the City of Lake Forest that the following notes have been placed on the Grading Plan:

a. The qualified archaeologist/historian and Native American monitor shall attend the pre-construction meeting with the contractors to explain and coordinate the requirements of the monitoring program.

b. During the original cutting of previously undisturbed deposits, the archaeological monitor(s) and Native American monitor(s) shall be on site to perform full-time monitoring as determined by the Principal Investigator of the excavations. The frequency of inspections shall depend on the rate of excavation, the materials excavated, and the presence and abundance of artifacts and features.

c. During the cutting of previously disturbed deposits, the archaeological monitor(s) and Native American monitor(s) shall be on site as determined by the Principal Investigator of the excavations. Inspections will vary based on the rate of excavation, the materials excavated, and the presence and abundance of artifacts and features. The frequency and location of inspections shall be determined by the Principal Investigator in consultation with the Native American monitor.

d. In the event that previously unidentified, potentially significant cultural resources (including tribal cultural

resources) are discovered, the archaeologist, in consultation with the Native American monitor(s), shall have the authority to divert or temporarily halt ground disturbance operations in the area of discovery to allow for evaluation. The archaeologist shall contact the City of Lake Forest Director of Community Development at the time of discovery. After consultation with the property owner, archaeologist, and Native American monitor(s), disposition of the resources shall be within the discretion of the City of Lake Forest. For significant cultural resources, a Research Design and Data Recovery Program to mitigate impacts shall be prepared by the archaeologist, in consultation with the Native American monitor(s), then carried out using professional archaeological and culturally sensitive methods.

e. The consulting archaeologist shall monitor all areas identified for development.

f. If any human bones are discovered, the Principal Investigator shall contact the County Coroner. In the event the remains are determined to be of Native American origin, the Most Likely Descendant, as identified by the Native American Heritage Commission, shall be contacted in order to determine proper treatment and disposition of the remains.

g. Prior to rough grading inspection sign-off, provide evidence that the field grading monitoring activities have been completed to the satisfaction of the City of Lake Forest. Evidence shall be in the form of a letter from the Project Archaeologist.

h. Prior to final grading release, submit to the satisfaction of the City of Lake Forest a final report that documents the results, analysis, and conclusions of all phases of the Archaeological Monitoring Program. The report shall also include the following:

    1) California Department of Parks and Recreation Primary and Archaeological Site Forms.

    2) Evidence that all non-tribal cultural materials collected during the grading monitoring program have been curated, and therefore shall be professionally curated

and made available to other archaeologists/researchers for further study. The collections and associated records shall be transferred, including title, to the John D. Cooper Archaeological and Paleontological Curation Center, to be accompanied by payment of the fees necessary for permanent curation. Evidence shall be in the form of a letter from the curation facility identifying that the materials have been received and that all fees have been paid.

3. In the event that no cultural resources are discovered, a brief letter to that effect shall be sent to the City of Lake Forest by the consulting archaeologist that the grading monitoring activities have been completed.

4. The qualified archaeologist retained shall prepare monthly progress reports to be filed with the site developer(s) and the City of Lake Forest.

5. Artifacts recovered shall be prepared, identified, and cataloged before donation to the Gabrieleno Band of Mission Indians – Kizh Nation. If the Tribe does not want custody, an accredited repository designated by the City of Lake Forest shall be utilized. Any artifacts determined to be insignificant shall be offered to local schools for use in educational programs.

6. The qualified archaeologist retained shall prepare a final report to be filed with the site developer(s) and the City of Lake Forest. The report shall include a list of specimens recovered, documentation of each locality, and interpretation of artifacts recovered, and shall include all specialists' reports as appendices.

4.17.10 Level of Significance after Mitigation

No impacts to known tribal cultural resources listed or eligible for listing in the California Register or in a local register would occur. Mitigation Measure 4.5.1 would reduce potential impacts to newly discovered tribal cultural resources to a less than significant level.

This page intentionally left blank

4.18 UTILITIES AND SERVICE SYSTEMS

This section describes the utility providers within whose jurisdiction the proposed Nakase Nursery/Toll Brothers Project (proposed Project) site is located and evaluates the potential impacts of the proposed Project on utilities and service systems. This section is based on multiple data sources, including written correspondence and coordination with the utility providers (Appendix K); Section 4.6, Energy; Section 4.10, Hydrology and Water Quality; utility provider websites; and adopted planning documents of utility providers and the City of Lake Forest (City) General Plan Update Existing Conditions Report (City of Lake Forest 2018c). This section addresses the following utilities (service providers are noted in parentheses):

- Electricity (Southern California Edison [SCE])
- Natural Gas (Southern California Gas Company [SoCalGas])
- Solid Waste (Frank R. Bowerman Landfill; Orange County Waste & Recycling [OCWR])
- Wastewater and Potable Domestic Water (Irvine Ranch Water District [IRWD])
- Storm Drainage (Orange County Flood Control District [OCFCD])/City of Lake Forest

4.18.1 Scoping Process

The City received 28 comment letters during the public review period of the Initial Study/Notice of Preparation (IS/NOP). For copies of the IS/NOP comment letters, refer to Appendix A of this Environmental Impact Report (EIR). Three comment letters included comments related to Utilities and Service Systems.

The letter from SCE (August 14, 2018) expressed concern about encroachment onto SCE right-of-way and potential landscaping conflicts with SCE lines, and requested a set of plans from the Applicant. SCE also requested that the Applicant enter into a Method of Service Agreement with SCE and fund an electric service study. The letter from Judy Esposito (August 6, 2018) expressed concern about sewer capacity. The letter from the IRWD (August 3, 2018) indicated that the Applicant would be required to identify the proposed Project's potential impacts to IRWD's potable and recycled water and sewer systems in a technical memorandum or an addendum to the 2010 Lake Forest Sub-Area Master Plan (SAMP).

4.18.2 Existing Environmental Setting

4.18.2.1 Wastewater

The IRWD owns and operates the City's sewer system. The IRWD provides sewer treatment to more than 390,000 residential customers per year in the cities of Irvine, Tustin, Lake Forest, Newport Beach, Orange, and Costa Mesa in addition to unincorporated areas of Orange County. Wastewater is removed via the sanitary sewer system, which consists of approximately 1,100 miles (mi) of sewer lines ranging in size from 4 inches to 60 inches in diameter, 102,000 sewer connections, and 12 mi of force mains across IRWD's 181-square-mile (sq mi) service area (IRWD 2018a).

The IRWD is a multiservice agency responsible for providing domestic water service, sewage collection and treatment, water recycling, and urban runoff natural treatment in Central Orange County, California. Collected wastewater for the Project site is pumped to one of two treatment

plants owned and operated by the IRWD: the Michelson Water Recycling Plant (MWRP) or the Los Alisos Water Recycling Plant. The IRWD operates ~~four~~ two treatment plants and two ocean outfalls, in addition to multiple programs to meet the needs of its member agencies and the requirements of the Clean Water Act (CWA) and applicable National Pollutant Discharge Elimination System (NPDES) permits.

The MWRP is located approximately 9.4 mi southwest of the Project site and provides treatment of wastewater generated by the Project site. The MWRP Phase 2 expansion project, which was completed in March 2009, increased the capacity of the MWRP from approximately 18 million gallons per day (mgd) to 28 mgd (MWRP 2019). About 20 percent of the IRWD's current water supply is recycled water, enough to provide landscape irrigation for 80 percent of the IRWD's business and community customers including parks, school grounds, and golf courses. The MWRP Phase 2 Expansion allows the IRWD to continue providing water to meet the community's needs while decreasing the IRWD's dependence on imported potable water. Based on flow-monitoring information, approximately 20.3 mgd are currently being conveyed to the MWRP for treatment (IRWD 2018b). Therefore, the MWRP is currently operating at approximately 72.5 percent of its daily design capacity.

The existing nursery uses on the Project site generate a negligible amount of wastewater. Written correspondence dated November 19, 2018, from the IRWD indicated that the IRWD will be able to adequately serve the proposed Project, and the IRWD's SAMP addendum will analyze the need for any improvements (if necessary) to accommodate additional sewer loads from the proposed Project.

4.18.2.2 Water Supply

The Project site is also within the IRWD's domestic water service area. The IRWD's drinking water is a blend of groundwater from the Orange County Groundwater Basin and surface water imported by the Metropolitan Water District of ~~Orange County~~ Southern California (MWD~~OC~~). The IRWD's service area covers approximately 84,000 acres (ac) within central Orange County. The IRWD provides water service to more than 390,000 residential customers per year in the cities of Irvine, Tustin, Lake Forest, Newport Beach, Orange, and Costa Mesa in addition to unincorporated areas of Orange County. The IRWD delivers 90,403 acre-feet (af) of potable water to residential and commercial uses annually through 111,511 connections.

The IRWD is a special district, operating under State law, separately from the County of Orange (County) government. The IRWD published the 2015 Urban Water Management Plan (UWMP), which outlines how the IRWD will provide customers with a reliable supply of drinking water over the 5-year period from 2015 to 2020. The State requires the IRWD to update its UWMP every 5 years. The UWMP provides the California Department of Water Resources with information on the present and future water resources and demands and provides an assessment of the IRWD's water resource needs.

As described above, the IRWD relies on a combination of purchased or imported water, groundwater, and recycled water to meet its water needs. As described in its 2015 UWMP, the IRWD's total water supply was 95,220 acre feet per year (afy) in 2015. This consists of 18,696 afy of

imported or purchased water wholesaled by the ~~Metropolitan Water District (~~MWD~~)~~ through the Municipal Water District of Orange County (MWDOC), 2,826 afy of surface water, 50,833 afy of groundwater, and 22,866 afy of recycled water.[1] Groundwater makes up the largest portion of the IRWD's total water supply, at approximately 53 percent.

Although the IRWD currently provides water to the nursery uses on the Project site, the primary source of water on the Project site comes from an irrigation well located near the center of the Project site, which produces 300 gallons per minute (gpm).[2]

4.18.2.3 Existing Water Demand

The IRWD serves the Project site with domestic and recycled water facilities. IRWD maintains a 24-inch domestic water main and a 12-inch recycled water main located within Bake Parkway, which services the Project site and surrounding uses. Domestic water from the Bake Parkway water main is conveyed across the southern boundary of the Project site via an additional, on-site, 18-inch water line. The domestic water main extends further to the east to serve an existing commercial center adjacent to Lake Forest Drive. Although the nursery's existing water demand is supplied mainly by the existing irrigation well located on site, correspondence with the property owner on December 27, 2018, indicated that the IRWD provided a backup and supplemental water supply during hot weather.[3] The IRWD provided an annual total water usage to the Project site of 3,341,316 gallons (gal) of water in 2018 and 5,515,752 gal of water in 2017.[4]

The total water demand as of 2015 in the IRWD service area was 90,430 afy, consisting of 64,154 afy of potable and raw water and 26,249 afy of recycled water demand. The total water demand in the IRWD service area is projected to increase to 96,445 afy in 2020, 105,961 afy in 2025, 109,431 afy in 2030, and 111,277 afy in 2035 during normal years. Each of these total-water-demand projections is expected to increase by 7 percent during a worst-case multiple-dry-years scenario.

4.18.2.4 Fire Flow

The Orange County Fire Authority (OCFA) is responsible for fire suppression within the City. The OCFA relies on the area's infrastructure, including the adequacy of nearby water supplies to suppress fire. Thus, the City has adopted the 2016 California Fire Code (CFC) (Section 8.24.010 of the City of Lake Forest's Municipal Code) with amendments (Section 8.24.030 of the City of Lake Forest's Municipal Code) that lists the minimum required fire flow and flow durations. Fire flow is the flow rate of water supply (measured in gpm) available for firefighting measured at 20 pounds per square inch (psi) pressure. Available fire flow is the total water flow available at the fire hydrants, also measured in gpm.

---

1 *2015 Urban Water Management Plan*. (Irvine Ranch Water District 2016). Website: https://www.irwd.com/images/pdf/doing-business/environmental-documents/UWMP/IRWD_UWMP_2015_rev_01-03-17_FINAL.pdf (accessed June 29, 2019).

2 Feingold, Ilan (Toll Brothers). December 27, 2018. Email message to Marie Luna et al. re Nakase water supply questions.

3 Ibid.

4 Ibid.

4.18.2.5 Water Supply and Demand Projections

The supply and demand forecasts for the third-dry-year scenario (considered to be the worst-case scenario) included in the IRWD's 2015 UWMP are shown in Table 4.18.A. As shown in Table 4.18.A, in the multiple-dry-year scenario, the IRWD's projected water demand in 2025 would be 113,378 afy, and the IRWD's projected water supply in 2025 would be 154,549 afy. This would result in a projected surplus of 41,171 afy of water.

Table 4.18.A: Water Supply and Demand Projections Comparison Third-Dry-Year Supply (2020–2035)

Year	Water Supply (afy[1])	Water Demand (afy)	Surplus (afy)
2020	142,197	103,195	39,002
2025	154,549	113,378	41,171
2030	154,549	117,091	37,458
2035	154,549	119,066	35,483

Source: Table 7-4, 2015 Urban Water Management Plan (IRWD 2016).

[1] An acre-foot is the amount of water necessary to cover 1 acre of surface area to a depth of 1 foot and is approximately 326,000 gallons of water.

afy = acre-feet per year

4.18.2.6 Storm Drains

The City owns and operates the storm water control systems in Lake Forest. Until recently, the OCFCD owned and operated the storm water control system within Lake Forest. The City took over control of all facilities recently and is currently in the process of tracking, mapping, and analyzing the facilities.[1] At this time, the City does not have its own mapping of the storm water facilities.

In the existing condition, 12.1 ac of the Project site is impervious area, which comprises approximately 9.9 percent of the 122 ac Project site. As discussed in Section 4.10, Hydrology and Water Quality, in the existing condition, onsite drainage is divided into two drainages. Drainage Area A consists of the western/northwestern portion of the Project site (approximately 76.6 ac). Storm water runoff within Drainage Area A drains southwesterly via sheet flow. Flow then channelizes in an onsite natural and partly paved drainage system that connects to an existing 10.5' x 10.5' reinforced concrete box (RCB) and the existing storm drain system (OCFCD Facility No. F19-P07), located along the southwest Project site boundary. This existing storm drain system discharges into Serrano Creek approximately 0.6 mi to the southwest of the Project site. Run-on to Drainage Area A consists of runoff from off-site areas to the north of the Project site (approximately 227.9 ac) that discharge into the Project site via an existing 84-inch reinforced concrete pipe (RCP) at Rancho Parkway and Corridor Center. The total tributary area (on site and off site) to the OCFCD Facility No. F19-P07 connection is 304.45 ac. The existing 100-year historic flow to the existing 10.5' x 10.5' RCB is 671 cubic feet per second (cfs).

[1] City of Lake Forest General Plan Update: Existing Conditions Report. (City of Lake Forest 2018c). Website: https://static1.squarespace.com/static/5abd4a977e3c3a6cd57d9c48/t/5be097d8c2241bf46b6623ba/1541445626140/LakeForestECR_Complete_110118_WebVersion.pdf (accessed Aug. 14, 2019).

Drainage Area B consists of the eastern/southeastern portion of the Project site (approximately 43.4 ac). Storm water runoff within Drainage Area B drains southeasterly via sheet flow. Flow then channelizes in an on-site natural and partly paved drainage prior to discharging to Serrano Creek via OCFCD Facility No. F19, which is located along the southern corner of the Project site. There is no offsite run-on to Drainage Area B. The existing 100-year historic flow to Serrano Creek is 84 cfs.

4.18.2.7 Solid Waste

The Project site is located within OCWR's service area. OCWR owns and operates three active landfills and four household hazardous-waste collection centers, and monitors 12 closed landfills. All three landfills are permitted as Class III landfills, which accept all types of nonhazardous municipal solid waste for disposal; however, no hazardous or liquid waste can be accepted.

The Frank R. Bowerman Landfill is the closest OCWR landfill to the Project site, approximately 3 mi northwest of the Project site, and would be expected to provide solid waste disposal for the construction and operation of the proposed Project. Solid waste considered unacceptable waste at the Frank R. Bowerman Landfill includes asbestos, batteries, brake linings, chemicals, fuel tanks, mufflers, paints, poisons, hazardous waste, animal parts, body parts, medical wastes, radioactive materials, auto body shredder wastes, fuels, heavy metals, explosives, pesticides, contaminated soil, liquid waste (moisture content greater than 50 percent), and nuisance dust. One of the four household waste collection centers provided by OCWR is located at 6411 Oak Canyon in Irvine, approximately 5 mi west of the Project site.[1] Waste considered unacceptable at the Frank R. Bowerman Landfill would be hauled to the household waste collection center.

The Frank R. Bowerman Landfill, which is permitted to receive a daily maximum of 11,500 tons per day (tpd), receives an average of approximately 8,500 tpd.[2] The Frank R. Bowerman Landfill is currently receiving approximately 73.9 percent of its permitted daily capacity. The Frank R. Bowerman Landfill is approximately 725 ac, with 534 ac permitted for refuse disposal. The landfill opened in 1990 and is scheduled to close in approximately 2053.

The Frank R. Bowerman Landfill is subject to regular inspections from the California Department of Resources Recycling and Recovery (CalRecycle) and its Local Enforcement Agency (LEA), the California Regional Water Quality Control Board (RWQCB), and the South Coast Air Quality Management District (SCAQMD) to ensure compliance with applicable regulations.

Assembly Bill (AB) 939 was enacted in 1989. This bill mandated a 25 percent reduction of waste being disposed of in the landfill system by 1995, and a 50 percent reduction by 2000. In response to AB 939, the California Integrated Waste Management Board (now known as CalRecycle) was established to monitor compliance with waste reduction requirements. According to CalRecycle, all counties within the State are required to have an approved Countywide Integrated Waste Management Plan (CIWMP), which outlines methods for waste diversion and demonstrates

1 Household Hazardous Waste. (OC Waste & Recycling 2018b). Website: http://www.oclandfills.com/hazardous (accessed July 7, 2019).

2 Frank R. Bowerman Landfill. (OC Waste & Recycling 2018a). Website: http://www.oclandfills.com/civicax/filebank/blobdload.aspx?BlobID=83644 (accessed July 7, 2019).

sufficient solid-waste disposal capacity for a minimum of 15 years. In compliance with AB 939, the County prepared a CIWMP, which is kept current, demonstrating the required 15-year disposal capacity and allowing disposal of a maximum daily imported waste stream of 1,000 tpd. Imported tonnage varies depending on demand and is limited by the solid waste facility permit for each site.

Solid waste generated by the existing uses on the Project site mainly consist of compostable organic plant matter that may be reused on site.

4.18.2.8 Natural Gas

Natural gas consumed in California is used for electricity generation (45 percent), residential uses (21 percent), industrial uses (25 percent), and commercial uses (9 percent). California continues to depend upon out-of-state imports for nearly 90 percent of its natural gas supply (CEC 2019d).

SoCalGas is the natural gas service provider for the Project site. SoCal Gas provides natural gas to approximately 21.8 million people in a 24,000 sq mi service area throughout Central and Southern California, from Visalia to the Mexican border.[1] SoCalGas owns and operates four natural gas storage facilities within southern California: Aliso Canyon, Honor Rancho, La Goleta, and Playa Del Rey.[2] According to the California Energy Commission (CEC), total natural gas consumption in the SoCalGas service area in 2018 was 5,156.1 million therms (2,147.4 million therms for the residential sector).[3] Total natural gas consumption in Orange County in 2018 was 575.1 million therms (339.0 million therms for the residential sector).[4]

According to the California Emissions Estimator Model (CalEEMod) modeling results in the *Nakase Property Greenhouse Gas Analysis* (Urban Crossroads 2019b), the estimated natural gas use for the existing nursery operations on the Project site is 177,650 thousand British thermal units per year (kBTU/yr) (1,776.5 therms).

4.18.2.9 Electricity

In 2017, California's electricity was generated primarily by natural gas (33.67 percent), coal (4.13 percent), large hydroelectric (14.72 percent), nuclear (9.08 percent), and renewable sources (29 percent). Total electric generation in California in 2017 was 292,039 gigawatt-hours (GWh), up 0.5 percent from the 2016 total generation of 290,567 GWh. In 2017, California produced approximately 70.7 percent and imported 29.3 percent of the electricity it used (CEC 2019c).

The Project site is within the service territory of SCE, which provides services through a grid of transmission lines and related facilities. SCE provides electricity to more than 15 million people in a

1 About SoCalGas (SoCalGas2019). Website: https://www3.socalgas.com/about-us/company-profile (accessed June 29, 2019).
2 2018 California Gas Report (California Gas and Electric Utilities 2018). Website: https://www.socalgas.com/regulatory/documents/cgr/2018_California_Gas_Report.pdf (accessed June 29, 2019).
3 Gas Consumption by Entity for 2018 (California Energy Commission 2019f). Website: http://www.ecdms.energy.ca.gov/gasbyutil.aspx (accessed July 7, 2019).
4 Ibid.

50,000 sq mi area of Central, Coastal, and Southern California.[1] According to the CEC, total electricity consumption in the SCE service area in 2018 was 83,400 GWh (28,617 GWh for the residential sector). Total electricity consumption in Orange County in 2018 was 19,858 GWh (6,814 GWh for the residential sector) (CEC 2019a).

Based on the CalEEMod modeling output in the *Greenhouse Gas Analysis,* the existing nursery operations generate an electricity usage on the Project site of 71,825 kilowatt hours per year (kWh/yr) for the existing nursery operations.

4.18.2.10 Telecommunications Facilitates

Telephone, television, and internet services are offered by a variety of providers in Lake Forest, including AT&T, Cox Communications, Frontier Communications, HughesNet, Lake Forest DirectTV, and Planet Dish. Cox Communications is currently the only non-satellite TV service provider in Lake Forest. Satellite internet providers include ViaSat Satellite. These services are privately operated and offered to each location in Lake Forest for a fee defined by the provider.

4.18.3 Regulatory Setting

4.18.3.1 Federal Regulations

No federal regulations for utilities and service systems apply to the proposed Project.

4.18.3.2 State Regulations

California Integrated Waste Management Act of 1989. The California Integrated Waste Management Act of 1989 (Public Resource Code [PRC] Division 30), enacted through AB 939 and modified by subsequent legislation, required all California cities and counties to implement programs to reduce, recycle, and compost at least 50 percent of wastes by 2000 (PRC Section 41780). The State determines compliance with this mandate to "divert" 50 percent of generated waste (which includes both disposed and diverted waste) through a complex formula. This formula requires cities and counties to conduct empirical studies to establish a "base year" waste generation rate against which future diversion is measured. The actual determination of the diversion rate in subsequent years is arrived at through deduction, not direct measurement: instead of counting the amount of material recycled and composted, the city or county tracks the amount of material disposed at landfills, then subtracts the disposed amount from the base year amount. The difference is assumed to be diverted (PRC 41780.2).

Water Supply Assessment. PRC Section 21151.9 requires that any proposed "project," as defined in Section 10912 of the Water Code, prepare a Water Supply Assessment (WSA) in compliance with Water Code Section 10910 et seq. Water Code Section 10910 et seq. outlines the necessary information and analysis that must be included in an EIR to ensure that a proposed land development has a sufficient water supply to meet existing and planned water demand over a 20-year horizon.

[1] Southern California Edison's Service Area (SCE 2019). Website: https://newsroom.edison.com/internal_redirect/cms.ipressroom.com.s3.amazonaws.com/166/files/20193/SCE%20Service%20Area%20Fact%20Sheet_Ver2_04252019.pdf (accessed June 20, 2019).

According to WSA requirements, a "project" is defined as any of the following:

- A residential development of more than 500 dwelling units (du)
- A shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet (sf) of floor space
- A commercial office building employing more than 1,000 persons or having more than 250,000 sf of floor space
- A hotel or motel, or both, having more than 500 rooms
- An industrial, a manufacturing, or a processing plant, or an industrial park planned to house more than 1,000 persons, occupying more than 40 ac of land, or having more than 650,000 sf of floor area
- A mixed-use project that includes one or more of the projects specified above
- A project that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500 du project

If a public water system has fewer than 5,000 service connections, a "project" means any proposed residential, business, commercial, hotel or motel, or industrial development that would account for an increase of 10 percent or more in the number of the public water system's existing service connections, or a mixed-use project that would demand an amount of water equivalent to, or greater than, the amount of water required by residential development that would represent an increase of 10 percent or more in the number of the public water system's existing service connections.

The IRWD completed a WSA in 2005 for the City of Lake Forest's Opportunity Study, which covered a total of 5,844 du, including 450 single-family units on the Project site. Therefore, 450 of the proposed 776 units are already included in the IRWD's baseline demands, leaving only 326 units unaccounted for. The 450 units were also accounted for in the IRWD's most recent 2015 UWMP. Water Code Section 10910 (the "Assessment Law") requires a WSA for project approval for projects subject to the California Environmental Quality Act (CEQA) and meeting the definition of "project." This section defines the term "project" to include residential development of more than 500 du or other types of development projects using a comparable amount of water. Therefore, the IRWD determined that a WSA for the proposed Project is not required.

Senate Bill 1374. SB 1374 requires that the annual report submitted to CalRecycle include a summary of the progress made in diversion of construction and demolition waste materials. In addition, SB 1374 required that CalRecycle adopt a model ordinance suitable for adoption by any local agency to require 50 to 75 percent diversion of construction and demolition waste materials from landfills by March 1, 2004. Local jurisdictions are not required to adopt their own construction and demolition ordinances, nor are they required to adopt CalRecycle's model by default. However,

adoption of such an ordinance may be considered by CalRecycle when determining whether to impose a fine on a jurisdiction that has failed to implement its Source Reduction and Recycling Element (SRRE).

Assembly Bill 75. AB 75, passed in 1999, took effect on January 1, 2000. This bill adds new provisions to the PRC, mandating that State agencies develop and implement an Integrated Waste Management Plan (IWMP); it also mandates that community service districts providing solid-waste services report disposal and diversion information to the city, county, or regional agency in which the community service district is located.

Title 24 of the California Code of Regulations. Energy and water consumption by new buildings in California is regulated by the California Green Building Standard Standards Code, embodied in California Code of Regulations (CCR) Title 24. Title 24 provides efficiency standards for new construction and the rehabilitation of both residential and nonresidential buildings, including building energy consumption, water conservation, and operational efficiencies. Title 24 regulates building energy consumption for heating, cooling, ventilation, water heating, and lighting with regard to both electricity and natural gas, while also regulating water consumption through the installation of efficient plumbing fixtures. The efficiency standards apply to both new construction and rehabilitation of both residential and nonresidential buildings. The building efficiency standards are enforced through the local building permit process. Local government agencies may adopt and enforce energy standards for new buildings, provided these standards meet or exceed Title 24 Building Code requirements. The 2016 Standards went into effect January 1, 2017, following approval by the California Building Standards Commission.

Assembly Bill 341. AB 341, enacted in 2011 and begun in 2012, changes the due date of the State agency waste management annual report to May. The bill makes a legislative declaration that it is the policy goal of the State of California that not less than 75 percent of solid waste generated be source reduced, recycled, or composted by 2020.

Public Health and Safety Code Part 9.5, Section 115700. Public Health and Safety Code Part 9.5, Section 115700, requires the proper decommissioning of inactive wells to prevent the contamination of groundwater. The section provides specifics for the casting, securing, and marking of wells and the surrounding area. This section also provides that at minimum, permanently inactive wells shall be destroyed in accordance with standards developed by the Department of Water Resources pursuant to Section 13800 of the Water Code and adopted by the State Water Resources Control Board or local agencies in accordance with Section 13801 of the Water Code. Minimum standards recommended by the department and adopted by the state board or local agencies for the abandonment or destruction of groundwater monitoring wells or class one hazardous injection wells shall not be construed to limit, abridge, or supersede the powers or duties of the department, in accordance with Section 13801 of the Water Code.

4.18.3.3 Regional Regulations

Metropolitan Water District 2015 Regional Urban Water Management Plan. The MWD's 2015 Regional UWMP lists and describes the various uses, demand, supplies, target reductions, and compliance measures for 26 member agencies. These include 14 cities, 11 municipal water districts,

and one county water authority serving approximately 18.7 million people in Southern California. The 2015 Regional UWMP found that under the current supply demands for a multiple-dry-year scenario (i.e., drought conditions), the MWD would have sufficient supply to meet the projected growing demand for water from 2020 to 2040 while still meeting statewide reduction targets of 20 percent of 2009 levels by 2020. The MWD is currently working to develop programs to increase its water supply and create a large surplus during multiple-dry-year scenarios to ensure that water demands will still be addressed during emergency drought situations. With demands projected to be around 2.3 million af in 2040 during multiple-dry-year scenarios, the MWD would have a surplus of 2,000 af with current capabilities and 288,000 af with the implementation of the programs under development.

4.18.3.4 Local Regulations

City of Lake Forest Municipal Code. The following City of Lake Forest Municipal Code sections are relevant to utilities and service systems:

- **Section 15.04.020 Permit Required for Construction or Destruction of a Well:** This section outlines requirements for the proper construction and decommissioning of wells.

- **Section 8.02.001, Adoption of the California Building Code:** This section adopts and incorporates by reference the California Building Code (CBC) (which includes the California Green Building Standards [CALGreen] Code).

City of Lake Forest General Plan Public Facilities/Growth Management Element. The primary purpose of the Public Facilities/Growth Management Element is to ensure that growth and development correspond to the provision of adequate public facilities. The Public Facilities/Growth Management Element expresses the City's intention to ensure acceptable service levels for public facilities as development occurs. The following policies are relevant to utilities:

- **Policy 1.1:** Work closely with local water and sewer districts in determining and meeting community needs for water and sewer service.

- **Policy 2.1:** Work closely with local providers of energy and communications in determining and meeting community needs for energy and communications, and to underground overhead transmission facilities.

4.18.4 Methodology

Utility providers were sent a questionnaire requesting information regarding current service provided to the Project site and possible constraints or impacts to this service associated with Project build out, which is anticipated to occur in 2025. The impact analyses are based on the IRWD's response to the water and wastewater questionnaire, data obtained through websites, and planning documents adopted by the utility providers. Correspondence with utility providers is included in Appendix K.

4.18.5 Thresholds of Significance

The proposed Project may be deemed to have a significant impact with respect to utilities and service systems impacts if it would do the following:

Threshold 4.18.1: **Require or result in the relocation or construction of new or expanded water, wastewater treatment, or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects**

Threshold 4.18.2: **Not have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years**

Threshold 4.18.3: **Not result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments**

Threshold 4.18.4: **Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals**

Threshold 4.18.5: **Fail to comply with federal, state, and local management and reduction statutes and regulations related to solid waste**

The Initial Study, included as Appendix A, substantiates that impacts associated with the exceedance of wastewater treatment requirements would be less than significant. However, this threshold was removed from Appendix G during the CEQA updates mentioned previously. Therefore, all thresholds listed above are analyzed in this section.

4.18.6 Project Impacts

Threshold 4.18.1: **Would the Project require or result in the relocation or construction of new or expanded water, wastewater treatment, or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?**

Water.

Less than Significant Impact. As discussed previously, the IRWD provides domestic and recycled water service through an existing 24-inch domestic water main and an existing 12-inch recycled water main that cross the Project site near its southern boundary. These existing water and recycled water mains would be relocated. Consequently, portions of the existing water line system would need to be rerouted to be aligned with the proposed on-site street circulation system and lots. All rerouting of water facilities would be reviewed and approved by the City's Public Works Department and the IRWD. As described in Chapter 3.0, Project Description, 8-inch

domestic water lines and reclaimed water lines are proposed to be installed in each of the proposed Project's collector streets. These water lines would provide domestic water service and reclaimed water for landscaping for the proposed Project's various uses. The existing water well in the central portion of the Project site would also be sealed and decommissioned in accordance with Section 115700 of the Public Health and Safety Code and Section 13801 of the Water Code to prevent the contamination of groundwater. The proposed Project would increase demand for water, and on-site infrastructure would be required for the proposed Project to be completed. A discussion of water use during construction and operation of the proposed Project is included below.

Construction. Short-term demand for water may occur during demolition, excavation, grading, and construction activities on site. Water demand for soil watering (fugitive dust control), cleanup, masonry, painting, and other activities would be temporary and would cease at Project build out. Overall, short-term demolition and construction activities would require minimal water and are not expected to have any adverse impacts on the existing water system or available water supplies. Therefore, impacts associated with short-term demolition and construction activities would not require or result in the construction of new water treatment facilities or the expansion of existing facilities, and construction of the proposed Project would not require the need for new or expanded water entitlements. No mitigation would be required.

Operation. The proposed Project includes the installation of water distribution infrastructure as well as the relocation of IRWD lines on the southern edge of the Project site as described above. These improvements would be funded and constructed by the developer, built to IRWD standards, and offered for dedication to the IRWD.

An increase in long-term demand for water is anticipated to occur during operation of the proposed Project. The total average daily water demand for the existing uses on the Project site provided by the IRWD was approximately 3,341,316 gallons per year (gpy) in 2018 and 5,515,752 gpy in 2017. Table 4.18.B provides the estimated water demand on the Project site at Project build out. As shown in Table 4.18.B, the Project's proposed structures will result in a demand of approximately 61,029,460 gpy of potable water (landscaping water needs are calculated separately), which is 57,688,144 gpy greater than the water usage provided by the IRWD on site in 2018 and 55,513,708 gpy greater than the water usage provided by the IRWD on site in 2017.

As required of all new development in California, the proposed Project would comply with State law regarding water conservation measures, including pertinent provisions of Title 24 of the CCR regarding the use of water-efficient appliances, which are adopted in the City of Lake Forest's Municipal Code Section 8.02.001 by reference (Regulatory Compliance Measure AQ-4). Specific measures are listed below:

Table 4.18.B: Water Demand at Project Build Out

Land Use	Project Feature	Water Use Factors	Project Water Usage (gpd)	Project Water Usage (gpy)
Single-Family Residential Units	675 du	200 gpd/du	135,000	49,275,000
Senior Affordable-Housing Units	101 du	215 gpd/du	21,715	7,925,975
School	375 tsf	28 gal/tsf/day	10,489	3,828,485
Subtotal (potable water demand only)			**167,204**	**61,029,460**
Landscaping	N/A		103,274	37,695,010
Total (includes potable and recycled water demands)			**270,478**	**98,724,470**

Source: Land Use and Water Use Factors (IRWD 2018c). Provided by the IRWD in written correspondence dated November 28, 2018.
du = dwelling unit(s)
gal = gallon(s)
gpd = gallons per day
gpy = gallons per year
tsf = thousand square feet

- 1.28 gal per flush water closets (CALGreen)
- 2.0 gal per minute showerheads (CALGreen)
- 1.8 gal per minute kitchen faucets (CALGreen)

Additionally, residential units will also incorporate the following water efficiency and water conservation measures:

- Water-efficient plumbing fixtures that contribute to a 20 percent reduction in domestic and irrigation water demand.
- Provision of drought-tolerant plants for exterior landscape design.
- Installation of water-efficient irrigation systems that employ “smart” sensors that can tell if it has rained or if the landscape needs irrigation using moisture sensors.
- Use of recycled water for common area landscape irrigation.

Incorporation of these water conservation measures would reduce the water demands of the proposed Project. The 37,695,010 gpy of water needed for landscaping purposes will be provided by reclaimed water lines installed in each of the proposed Project’s collector streets.

According to the IRWD’s 2015 UWMP (IRWD 2016), the City’s projected water surplus in 2025 is expected to be 41,171 afy for a third-dry-year scenario as shown in Table 4.18.A. The increase in potable water demand as a result of the proposed Project (61,029,460 gpy or 187.29 afy) would represent a very small portion (0.45 percent[1]) of the City’s projected

[1] 187.29 afy/41,171 afy

surplus water supply in 2025 under the worst-case scenario. Therefore, because the potable water demand associated with the proposed Project would only represent 0.45 percent of the surplus water supply in the IRWD's service area in 2025 under the worst-case scenario, the proposed Project would not necessitate new or expanded water facilities, and the IRWD would be able to accommodate the increased demand for potable water. Therefore, sufficient water supplies from existing entitlements are available to serve the proposed Project.

Additionally, an addendum to the 2010 Lake Forest SAMP, a water and sewer facility planning study prepared by the IRWD for a specific planning area or development proposal, would be required prior to final approval of the development plans. Section 1.2 of the IRWD Procedures Guidelines states, "Larger projects may require the preparation of a service feasibility study or a Sub-Area Master Plan (SAMP) to determine whether the existing IRWD facilities are adequate to serve the needs of the proposed development at build out or if new IRWD facilities are required to be constructed to handle the additional demands."[1]

Therefore, given that the proposed Project would comply with the IRWD's standard requirements for facility planning and that adequate water distribution facilities would exist to serve the proposed Project, the proposed Project would not require the relocation or construction of new or expanded facilities beyond the on-site improvements detailed above. No mitigation would be required.

Wastewater.

Less than Significant Impact. Wastewater collection for the proposed Project would be provided by the IRWD, and treatment of wastewater generated by the proposed Project would be provided by the MWRP. As discussed above, the MWRP has a total design capacity of 28 mgd and currently treats an average wastewater flow of 20.3 mgd. Therefore, the MWRP is currently operating at approximately 72.5 percent of its daily design capacity. To serve the proposed Project, sewer lines would be extended onto the Project site. A gravity sewer system would be installed and connected to the existing 21-inch sewer line in Bake Parkway.

Construction. No significant increase in wastewater flows is anticipated as a result of construction activities on the Project site. Sanitary services during construction would be provided by portable toilet facilities, which transport waste off site for treatment and disposal. Therefore, during construction, potential impacts to wastewater treatment and wastewater conveyance infrastructure would be less than significant, and no mitigation would be required.

Operation. Project development would include the construction of new residential and school uses and is anticipated to result in an increase in wastewater generation during operation. The total daily average wastewater generated by the existing uses on the Project

[1] Procedural Guidelines and General Design Requirements (IRWD 2011). Website: https://www.irwd.com/assets/files/Development%20Services/Procedural%20Guidelines%20and%20General%20Design%20Requirements%20%20Nov%202011.pdf (accessed July 1, 2019).

site is negligible. As shown in Table 4.18.C, the proposed Project is estimated to generate 119,852 gpd of wastewater. The estimated increase in wastewater associated with the proposed Project would represent 1.6[1] percent of the MWRP's remaining daily capacity. The increase of wastewater generated by the proposed Project is anticipated to be accommodated within the existing design capacity of the MWRP, which currently accepts 72.5 percent of its capacity.

Table 4.18.C: Wastewater Generation at Project Build Out

Land Use	Project Feature	Wastewater Flow Generation Factor Factors[1]	Project Wastewater Generation (gpd)	Project Wastewater Generation (gpy)
Single-Family Residential Units	675 du	150 gpd/du	101,250	36,956,250
Senior Affordable Housing Units	101 du	110 gpd/du	11,110	4,055,150
School	375 tsf	20 gal/tsf/day	7,492	2,734,580
		Total	**119,852**	**43,745,980**

Source: Land Use and Water Factors. (IRWD 2018c). Provided by the IRWD in written correspondence dated November 28, 2018.
du = dwelling unit(s)
gal = gallon(s)
gpd = gallons per day
gpy = gallons per year
tsf = thousand square feet

As discussed above, the proposed Project would include the installation of a new gravity sewer system that would connect to the existing 21-inch sewer line in Bake Parkway. The installation of sewer facilities sufficient to serve a proposed Project is a standard condition for development projects. In addition, as discussed above, a SAMP addendum, a water and sewer facility planning study prepared by the IRWD for a specific planning area or development proposal, is required prior to final approval of the development plans.

Therefore, the proposed Project would not require, nor would it result in, the construction of new wastewater treatment or collection facilities or the expansion of existing facilities other than those facilities to be constructed on site. Therefore, impacts related to the construction of wastewater treatment or collection facilities and the capacity of the wastewater treatment provider would be less than significant, and no mitigation would be required.

Storm Water Drainage.

Less than Significant Impact. The capacity of the downstream storm drain network depends on peak discharge rates entering the system. In the existing condition, storm water runoff from the Project site drains into two existing drainages. Storm water runoff from the western/northwestern portion of the Project site drains southwesterly, and flow then channelizes in an on-site natural and partly paved drainage system located along the southwest Project site boundary. Storm water runoff from the eastern/southeastern portion of the Project

1 119,852 gpd/7.7 mgd

site drains southeasterly in an on-site natural and partly paved drainage prior to discharging to Serrano Creek.

In the proposed condition, 80.3 ac (65.8 percent) of the Project site would be impervious surface area. The remaining 41.7 ac (41.7 percent) of the site would consist of pervious area, which would contain landscaping that would minimize on-site erosion and siltation by stabilizing the soil. The proposed Project would result in a permanent increase in impervious area of 68.2 ac (an increase of 9.9 percent to 65.8 percent of the Project site). An increase in impervious area would increase the volume of runoff during a storm. However, the Project provides an integrated site design for storm water measures that incorporate water runoff, storm water management, bio swales, bio retention basins, and infiltration where feasible to reduce impacts on storm water infrastructure and sown-stream impacts. As discussed in Section 4.10, Hydrology and Water Quality, the proposed Project would include a subsurface detention vault below Central Park, underground detention vaults in combination with proprietary biotreatment Best Management Practices (BMPs) at each of the five neighborhood parks, a bioretention facility along Serrano Creek, and a linear bioretention facility along A Street. These features would reduce flows during storm events so that they would not exceed predevelopment runoff rates or time of concentration by more than 5 percent. Therefore, peak discharge would not adversely affect the capacity of downstream networks, and construction or expansion of storm water drainage facilities would not be required. Therefore, impacts to storm water drainage facilities would be less than significant, and no mitigation would be required.

Electric Power.

Less than Significant Impact. The proposed Project includes a new on-site electrical system that would connect to the existing SCE lines surrounding the Project site. The Project proposes to underground the existing overhead 66-kilovolt (kV) power lines that are currently located on the east side of Bake Parkway within an existing 20 ft wide SCE utility easement. Impacts related to the undergrounding of the 66 kV power lines are discussed in other sections of this EIR. As discussed in Section 4.1, Aesthetics, the undergrounding of SCE lines would improve view quality for visitors to and around the Project site. As discussed in Section 4.9, Hazards and Hazardous Materials, the 66 kV lines would not present a significant electromagnetic-frequency hazard to staff members or students at the proposed school site. A discussion of electricity use during construction and operation of the proposed Project is included below.

Construction. Short-term construction activities would be limited to providing power to the staging area and portable construction equipment and would not substantially increase demand for electricity. Heavy equipment used for construction is primarily powered by diesel fuel. Temporary electric power would be provided via existing utility poles located on the east side of Bake Parkway. Given the limited nature of potential demand for electricity during construction and the availability of existing power lines adjacent to the Project site, there would not be a need to construct new or alter existing electric transmission facilities. Impacts to regional electricity supplies would be less than significant.

Operation. Operation of the proposed Project would increase on-site electricity demand compared to existing conditions. Current electricity usage on the Project site based on the

CalEEMod model output in the *Greenhouse Gas Analysis* is assumed to be 71,825 kWh/yr for the existing nursery operations.

As discussed in Section 4.6, Energy, the proposed Project is estimated to consume a total of 6,212,608 kWh/yr (6.2 gigawatts per year [GWh/yr]) of electricity with the implementation of energy efficiency measures and sustainability features as required by the Title 24 of the CBC (RCM AQ-4), which is 6,140,783 kWh/yr (6.14 GWh/yr) more than operation of the existing nursery. Specifically, the proposed Project would reduce electricity consumption by incorporating the following energy efficiency measures in the design of residential units in addition to complying with Title 24 requirements:

- Increasing insulation values in walls and attic spaces
- Limiting air leakage through the building envelope
- Controlling energy losses in the heating, ventilation, and air conditioning (HVAC) system (specifying high Seasonal Energy Efficiency Ratio (SEER) rated equipment and reducing duct leakage)
- Incorporating high-efficiency windows and doors
- Providing and installing ENERGY STAR® appliances
- Installing highly efficient lighting and lighting control systems
- Installation of EV charging stations at Central Park and the elementary school[1]
- Installation of solar panels or solar ready construction of residential structures to the extent required by CALGreen

Total electricity consumption in Orange County in 2017 was 20,030.5 GWh. Therefore, the increased electricity demand associated with the proposed Project would be less than 0.03 percent of Orange County's total electricity demand. Service providers utilize projected demand forecasts in order to provide an adequate supply or plan for surplus in the service area. As discussed in Section 4.6, Energy, there are sufficient planned electricity supplies in the SCE service area for estimated net increases in energy demands through 2030.

Because the proposed Project would only represent a small fraction of electricity demand in Orange County, the Project would exceed Title 24 requirements, and there would be sufficient electricity supplies available, energy demand for the proposed Project would be less than significant. No mitigation would be required.

The supply and distribution network within the area surrounding the Project site would remain essentially the same as exists today, with the exception of on-site improvements to underground the existing overhead 66 kV power lines that are currently located on the east side of Bake Parkway within an existing 20 ft wide SCE utility easement, and levels of service

[1] EV charging stations at the proposed elementary school would be subject to SVUSD construction standards.

(LOS) to off-site users would not be adversely affected. The relocated and undergrounded distribution facilities on Bake Parkway would provide electrical service to the residential, school, and recreational uses. The proposed Project would not increase electrical demand beyond existing projections from the local electricity provider, and the Project site is within a developed service area with existing demand. Therefore, the proposed Project would not require the construction of any physical improvements related to the provision of electricity service that would result in significant environmental impacts, and the Project's potential impacts would be less than significant. No mitigation would be required.

Natural Gas.

Less than Significant Impact. Gas distribution services will be extended through all on-site streets from private streets to which the Project will connect. The developer will be responsible for construction connections to these distribution facilities and the backbone distribution systems for the Project.

Construction. Short-term construction activities would not result in demand for natural gas since construction activities/equipment would not require accessing existing adjacent natural gas facilities. Therefore, construction activities would not impact natural gas services, and the proposed Project would not require new or physically altered gas transmission facilities.

Operation. Operation of the proposed Project would result in increased demand for natural gas due to natural gas use on the Project site. Based on the CalEEMod output in the *Greenhouse Gas Analysis,* the natural gas usage on the Project site is assumed to be 177,650 kBTU/yr (1,776.5 therms/yr) for the existing nursery usage. The estimated natural gas demands of the proposed Project as provided in Section 4.6, Energy, is 11,797,707 kBTU/yr (117,977.7 therms/year). Therefore, the proposed Project would require an increase of approximately 11,620,057 kBTU/yr (116,020.6 therms/yr) of electricity compared to existing conditions.

Total natural gas consumption in Orange County in 2018 was 575.1 million therms. Therefore, natural gas demand associated with the proposed Project would be less than 0.02 percent of Orange County's total natural gas demand. The estimated increase in natural gas demand associated with the proposed Project would represent a very small fraction of the natural gas demand in Orange County with the incorporation of Title 24 requirements and green features (Regulatory Compliance Measure AQ-4).

As noted above, service providers utilize projected demand forecasts in order to provide an adequate supply or plan for surplus in the service area. As discussed in Section 4.6, Energy, it is anticipated that SoCalGas would be able to meet the natural gas demand in its service area through 2035. Because the proposed Project would only represent a small fraction of natural gas demand in Orange County, the Project would exceed Title 24 requirements, and there would be sufficient natural gas supplies available, natural gas demand for the proposed Project would be less than significant. No mitigation would be required.

The supply and distribution network within the area surrounding the Project site would remain essentially the same as exists today except for standard on-site improvements, and LOS to off-site users would not be adversely affected. Existing gas transmission and distribution services maintained by SoCalGas would provide natural gas service to the proposed Project. The proposed Project would not increase natural gas demand beyond existing projections from the local natural gas provider, and the Project site is within a developed service area with existing demand. Therefore, the proposed Project would not require the construction of any physical improvements related to the provision of natural gas service that would result in significant environmental impacts, and the Project's potential impacts would be less than significant.

Telecommunications Facilities.

Less than Significant Impact. Telephone, cable, and internet services existing along Rancho Parkway will be extended into the Project site at the Project's three entrances. Internal to the Project, the Project Developer will be responsible for constructing adequate telecommunication facility extensions to the various neighborhoods in the Project. Additionally, cable box locations will be carefully planned and coordinated with the utility company, the landscape architect, and the Developer to be unobtrusive and screened from public view where possible. The construction and expansion of these facilities would occur on site during the site preparation and earthwork phase and are not expected to impact any telephone, cable, or internet services offsite that serve the surrounding areas. Additionally, telecommunication facilities are generally installed concurrently with utility expansions, and impacts associated with the expansion of telecommunications facilities are already considered in the air quality, noise, and construction traffic analysis. Therefore, the proposed impacts associated with the relocation or construction of new or expanded telecommunication facilities and impacts would be less than significant. No mitigation would be required.

Threshold 4.18.2: Would the Project have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years?

Less than Significant Impact. As discussed under Threshold 4.18.1, the relatively small increase in water use would be accounted for in the anticipated growth rates for the City through the SAMP. The proposed Project would not necessitate new or expanded water entitlements, and the IRWD would be able to accommodate the increased demand for potable water under a worst-case scenario as forecasted in the 2015 IRWD UWMP. Additionally, in written correspondence dated November 19, 2018, the IRWD indicated that it would be able to adequately serve the proposed Project. Therefore, the IRWD would have sufficient water supplies available to serve the Project from existing entitlements and resources and would not require new or expanded entitlements. Therefore, impacts related to water supplies available to serve the Project during normal, dry, and multiple dry years would be less than significant, and no mitigation would be required.

Threshold 4.18.3: Would the Project result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

Less than Significant Impact. As discussed under Threshold 4.18.1, although the Project would increase water demand on site, the increased wastewater flows from the proposed Project can be accommodated within the existing design capacity of the MWRP, which will serve the Project site. Additionally, the relatively small increase in wastewater generation would be accounted for in the anticipated growth rates for Lake Forest though the SAMP. Additionally, in written correspondence dated November 19, 2018, the IRWD indicated that it would be able to adequately serve the proposed Project. Therefore, the wastewater treatment provider that would serve the proposed Project would have adequate capacity to serve the Project's projected demand in addition to its existing commitments. Therefore, impacts related to wastewater generation would be less than significant, and no mitigation would be required.

Threshold 4.18.4: Would the Project generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?

Less than Significant Impact. The Project site is located within OCWR's service area. OCWR owns and operates three landfills in Orange County that accept municipal solid waste. These include the Frank R. Bowerman Landfill in Irvine, which accepts commercial waste only; the Olinda Alpha Landfill in Brea, which accepts both public and commercial waste; and the Prima Deshecha Landfill in San Juan Capistrano, which also accepts both public and commercial waste. All three landfills are Class III and only accept nonhazardous municipal solid waste.

Regular trash pickup is provided by the City of Lake Forest through a contract with CR&R, Inc. CR&R provides and manages hazardous waste collection facilities at several locations throughout Orange County and collects solid waste, green waste (i.e., grass, tree, and shrub clippings), and items for recycling. The company provides three different carts for automated collection of waste, recyclables, and green waste. The closest household waste collection center location to the Project site is in Irvine, approximately 5 mi west of the Project site. Any waste considered unacceptable at the Frank R. Bowerman Landfill would be hauled to the household waste collection center.

The Frank R. Bowerman Landfill is the closest OCWR landfill to the proposed Project site, approximately 3 mi west of the Project site, and would be expected to provide solid waste disposal for the construction and operation of the proposed Project. The Frank R. Bowerman Landfill, which is permitted to receive a daily maximum of 11,500 tpd, receives an average of approximately 8,500 tpd. The landfill opened in 1990 and is scheduled to close in approximately 2053.

Solid waste generated by the existing uses on the Project site mainly consist of compostable organic plant matter that may be reused on site. As such, the estimated 8,760 pounds of solid waste generated by the proposed Project as illustrated in Table 4.18.D would be an increase relative to current conditions on site.

Table 4.18.D: Projected Solid Waste Generation

Land Use	Proposed Project	Generation Rate	Total Solid Waste Generated per Day (lbs)
Single-Family Residential	776 units	10 lbs/du/day	7,760
School	1,000 students	1 lb/student/day	1,000
		Total	**8,760**

Source: CalRecycle. Estimated Solid Waste Generation Rates. Website: https://www2.calrecycle.ca.gov/WasteCharacterization/General/Rates (accessed 14 August 2019).
du = dwelling unit(s)
lb/lbs = pound/pounds

The increase in solid waste generated by the proposed Project would constitute approximately 0.15 percent of the remaining average daily capacity (3,000 tons per day) at the Frank R. Bowerman Landfill. The proposed Project would be served by a landfill with sufficient permitted capacity to accommodate its solid waste disposal needs. Therefore, the proposed Project would result in less than significant impacts related to solid waste and landfill facilities, and no mitigation would be required.

Threshold 4.18.5: Would the Project comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

Less than Significant Impact. Solid waste practices in California are governed by multiple federal, State, and local agencies that enforce legislation and regulations ensuring that landfill operations minimize impacts to public health and safety and the environment. The Project site is located within OCWR's service area. An important part of OCWR's mission is to apply sound environmental practices to ensure compliance with these regulations. Additionally, OCWR has an adopted a CIWMP that requires countywide facilities to meet the 15-year capacity requirements. OCWR is also obligated to obtain a Solid Waste Facilities Permit, a Storm Water Discharge Permit, and permits to construct and operate gas management systems and meet Waste Discharge Requirements. The LEA, the SCAQMD, and the RWQCB enforce landfill regulations related to health, air quality, and water quality, respectively. The proposed Project would not inhibit OCWR's compliance with the requirements of each of the governing bodies.

AB 939 changed the focus of solid waste management from landfill to diversion strategies such as source reduction, recycling, and composting. The purpose of the diversion strategies is to reduce dependence on landfills for solid waste disposal. AB 939 established mandatory diversion goals of 25 percent by 1995 and 50 percent by 2000. CalRecycle tracks and monitors solid waste generation rates on a per capita basis. Per capita solid waste generation rates and total annual solid waste disposal volumes for the City of Lake Forest between 2011 and 2016 are shown in Table 4.18.E below. It should be noted that more recent data has not yet been made available.

Table 4.18.E: Solid Waste Generation Rates in Lake Forest

Year	Waste Generation Rates (pounds/person/day)		Total Disposal Tonnage (tons/year)
	Per Resident	Per Employee	
2011	4.6	10.3	65,028
2012	4.5	9.9	64,184
2013	4.4	9.6	64,771
2014	4.5	9.3	65,081
2015	4.4	9.1	64,856
2016	4.2	8.9	63,663

Source: Table 7-3, City of Lake Forest Existing Conditions Report (City of Lake Forest 2018).

The City has complied with State requirements to reduce the volume of solid waste through recycling and reuse of solid waste. As shown in Table 4.18.E, both the per capita waste generation rates and the total annual disposal tonnage in Lake Forest were at their lowest levels in 2016. The City's per capita disposal rates in 2016 were 4.2 and 8.9 pounds per person per day for residents and employees, respectively. The City's per capita disposal rate satisfies the target rate established by CalRecycle (of 10.6 pounds/person/day for residents and 24.2 pounds/person/day for employees).[1] Household waste recycling services are also provided through the City to comply with State-mandated solid waste reduction goals. Therefore, the proposed Project would comply with federal, State, and local statutes and regulations related to solid waste, and no mitigation would be required.

4.18.7 Cumulative Impacts

As defined in the *State CEQA Guidelines*, cumulative impacts are the incremental effects of an individual project when viewed in connection with the effects of past, current, and probable future projects within the cumulative impact area for public services and utilities. The Project site is a nursery site in Lake Forest currently served by utility providers. The cumulative area for utilities is listed below for each individual utility provider.

4.18.7.1 Wastewater

The geographic area for the cumulative analysis for wastewater treatment is defined as the IRWD service area. Within its service area, the IRWD uses United States Census Bureau population information with population projections as well as existing land use and build out or zoned land use to project current and future wastewater flows. The proposed Project would not generate wastewater above the current capacity of the MWRP; furthermore, it is anticipated that the IRWD's existing and planned wastewater treatment capacity would be sufficient to accommodate the growth forecasted within its service area, and development that is generally consistent with this forecast can be adequately served by the existing IRWD facilities. The proposed Project would not induce significant population, employment, or housing growth, either directly or indirectly.

[1] *Lake Forest General Plan Update: Existing Conditions Report*. (City of Lake Forest 2018c). Website: https://static1.squarespace.com/static/5abd4a977e3c3a6cd57d9c48/t/5be097d8c2241bf46b6623ba/1541445626140/LakeForestECR_Complete_110118_WebVersion.pdf (accessed August 14, 2019).

According to correspondence with the IRWD dated November 19, 2018, the IRWD will be able to adequately serve the proposed Project, and the SAMP addendum will analyze the need for any improvements, if necessary, to accommodate the additional wastewater demand. If the IRWD determines that new facilities or improvements to wastewater infrastructure are necessary to support the proposed Project, additional environmental analysis pursuant to CEQA may be required. In addition, the proposed Project would not contribute wastewater that would exceed the service capacity of the MWRP. Therefore, the proposed Project's contribution to wastewater generation in the IRWD service area would not be cumulatively considerable, and no mitigation would be required.

4.18.7.2 Potable Water

The geographic area for the cumulative analysis of water infrastructure includes the Project site and the IRWD's service area. According to correspondence with the IRWD dated November 19, 2018, the IRWD will be able to adequately serve the proposed Project, and the SAMP addendum will analyze the need for any improvements, if necessary, to accommodate the additional sewer loads. If the IRWD determines that new facilities or improvements to water infrastructure are necessary to support the proposed Project, additional environmental analysis pursuant to CEQA may be required. Therefore, the proposed Project's contribution to water demand in the City would not be cumulatively considerable, and no mitigation would be required.

4.18.7.3 Solid Waste

The geographic area for the cumulative analysis of solid waste infrastructure is OCWR's service territory. Development associated with the proposed Project would contribute to an increased demand for landfill capacity for solid waste. As stated previously, the landfill serving the Project site would be the Frank R. Bowerman Landfill, which is not scheduled to close until 2053. As discussed under Threshold 4.18.5 above, the proposed Project would only constitute approximately 0.15 percent of the remaining average daily capacity at the Frank R. Bowerman Landfill. Additionally the Frank R. Bowerman Landfill is currently only receiving 73.9 percent of the 11,500 tons it is permitted to receive. Therefore, the Frank R. Bowerman Landfill has sufficient permitted capacity to provide adequate capacity for Orange County's solid waste needs, and with compliance with federal, State, and local statues and regulations related to solid waste, which require reductions in solid waste generation, the proposed Project's contribution to solid waste impacts would not be cumulatively considerable, and no mitigation would be required.

4.18.7.4 Electricity

The geographic area for the cumulative analysis of impacts to the provision of electricity is the service territory of SCE. SCE's service area covers approximately 50,000 sq mi spanning Central, Coastal, and Southern California, with a total population of 15 million people. The projections of statewide electricity supply capacity demand rates are cumulative in nature. They are based on population and economic growth in addition to such physical variables as average temperature and water supplies (important to hydroelectric generation) in a given year. The total annual electricity consumption in the SCE service area in 2017 was 84,291.6 GWh. By 2030, consumption is anticipated to increase by approximately 12,000 GWh for the low-demand scenario and by 22,000 GWh for the high-demand scenario (CEC 2018c). While this forecast represents a large increase in

electricity consumption, the proposed Project's percentage of cumulative consumption would be less than 0.008 percent. Therefore, any increase in electrical demand resulting from the proposed Project would be incremental compared to the increase in regional electrical demand.

Title 24 of the CCR regulates energy and water consumption in new construction and regulates building energy consumption for heating, cooling, ventilation, water heating, and lighting. Therefore, in relation to the cumulative study area, the proposed Project would not generate a significant cumulative increase in demand for electricity or a significant disruption in service or service level. Therefore, the proposed Project's contribution to electricity impacts would not be cumulatively considerable, and no mitigation would be required.

4.18.7.5 Natural Gas

The geographic area for the cumulative analysis of impacts to the provision of natural gas is the service territory for SoCalGas. The SoCalGas service area covers approximately 24,000 sq mi, throughout Central and Southern California, from Visalia to the Mexican border. Total natural gas consumption in the SoCalGas service area in 2018 was 5,156.1 million therms. Between 2018 and 2035, total natural gas consumption in the SoCalGas service area is forecast to remain steady for the low- and mid-demand scenarios and to increase by approximately 650 million therms in the high-demand scenario due to intense energy efficiency efforts (CEC 2018c). The proposed Project's percentage of cumulative consumption of natural gas in the SoCalGas service area would be less than 0.003 percent. Sufficient gas supplies and infrastructure capacity are available, or have already been planned, to serve past, present, and reasonably foreseeable projects. Furthermore, like the proposed Project, all future projects would be subject to Title 24 requirements and would be evaluated on a case-by-case basis to determine the need for specific distribution improvements. Because the natural gas provider has identified adequate capacity and additional development within the SoCalGas service area and because the proposed project would comply with Title 24, the proposed Project's contribution to natural gas impacts would not be cumulatively considerable, and no mitigation would be required.

4.18.7.6 Telecommunications Facilities

The geographic area for the cumulative analysis of impacts to the provision of natural gas is Lake Forest. Telephone, cable, and internet services are provided to residents through private providers of these services. The construction and expansion of telecommunication facilities for the proposed Project would occur on site and are not expected to impact any telephone, cable, or internet services offsite that serve the surrounding areas. Likewise, construction and expansion of telecommunication facilities would generally occur on site to extend through proposed related developments. Therefore, cumulative impacts associated with the relocation or construction of new or expanded telecommunication facilities would be less than significant. No mitigation would be required.

4.18.8 Level of Significance Prior to Mitigation

The proposed Project would have no significant and impacts related to utilities and service systems prior to the implementation of Mitigation Measures.

4.18.9 Regulatory Compliance Measures and Mitigation Measures

4.18.9.1 Regulatory Compliance Measures

The proposed Project would comply with the following regulatory standards, the implementation of which are intended to reduce impacts related to utilities.

RCM AQ-4 **Title 24 California Code of Regulations (CCR).** Prior to issuance of building permits, the City of Lake Forest Director of Community Development, or designee, shall ensure that the project design complies with the 2019 Building Energy Efficiency Standards (Title 24 CCR) energy conservation and green building standards.

RCM GHG-14 **Title 20 California Code of Regulations (Appliance Energy Efficiency Standards).** Appliances installed in project buildings will comply with the energy efficiency requirements in Title 20 CCR, Appliance Energy Efficiency Standards. All appliances shall be Energy Star appliances.

4.18.9.2 Mitigation Measures

The proposed Project would not result in significant impacts. Therefore, no mitigation would be required.

4.18.10 Level of Significance after Mitigation

The proposed Project would have no significant and impacts related to utilities and service systems.

This page intentionally left blank

4.19 WILDFIRE

This section describes the existing setting and wildfire risks in the City of Lake Forest (City), which is in the south-central area of Orange County (County). This section evaluates the potential impacts of the proposed Project with regard to wildfire and post-wildfire environmental risks. This section is based on:

- Federal, State, and local policies;
- City of Lake Forest General Plan:
    - Safety and Noise Element (1994a);
    - Public Facilities and Growth Management Element (1994b)
- City of Lake Forest 2040 General Plan Existing Conditions Report, Chapter 8: Hazards, Safety, and Noise (2018a)
- County of Orange and Orange County Fire Authority (OCFA) *Local Hazard Mitigation Plan* (2015);
- California Department of Forestry and Fire Protection (CAL FIRE) fire hazard severity zone (FHSZ) maps (2012b);
- California Department of Conservation maps (2015);
- *Preliminary Hydrology Analysis* (Hunsaker & Associates 2019); and
- *Geotechnical Evaluation of Proposed Residential and School Site Development* (NMG Geotechnical 2017).

4.19.1 Scoping Process

The City received 28 comment letters during the public review period of the Initial Study/Notice of Preparation (IS/NOP). For copies of the IS/NOP comment letters, refer to Appendix A of this Environmental Impact Report (EIR). One letter from OCFA included comments related to wildfire. The letter from OCFA (July 31, 2018) suggested that the significance conclusion in the Hazards and Hazardous Materials section of the IS/NOP related to wildland fire hazards be revised to reflect that a Fuel Modification Conceptual Plan and a Fire Protection Plan with Ember Mitigation have been approved for the proposed Project. Since the IS/NOP was circulated in July 2018, the City's Local Guidelines for Implementing CEQA (2017) (which is more commonly referred to as the Local CEQA Guidelines) have been updated to be consistent with the revised State CEQA Guidelines (2019). Among other changes, the revised Local CEQA Guidelines replaced the Hazards and Hazardous Materials threshold question related to wildfire that OCFA commented on with four different questions regarding wildfire. Because none of the following thresholds related to wildfire were addressed in the IS/NOP, they will be addressed in the following analysis.

4.19.2 Existing Environmental Setting

A wildfire is a nonstructural fire that occurs in vegetative fuels. Wildfire generally does not include prescribed or controlled fires set by firefighters to manage fuel loads in fire-prone landscapes. Wildfires can occur in undeveloped areas and spread to urban areas where the landscape and

structures are not designed and maintained to be ignition resistant. A wildland-urban interface (or WUI) is an area where urban development is located in proximity to open space or "wildland" areas. The potential for wildland fires represents a hazard where development is adjacent to open space or within close proximity to wildland fuels or designated FHSZ. Steep hillsides and varied topography can also contribute to the risk of wildland fires. Fires that occur in WUI areas may affect natural resources as well as life and property.

Wildfire ignition sources may include: lightning, improperly managed camp fires, cigarettes, arson, sparks from automobiles, lawnmowers, and maintenance equipment, and other sources. Wildfire spread is often dramatically exacerbated when prolonged hot and dry weather conditions are coupled with strong wind events. In Southern California, wildfire season has historically extended from late summer through fall, when most vegetative fuels are dried out and Santa Ana wind events are most common. However, climate change has increasingly led to conditions that are conducive to wildfire spread throughout much of the year. Key factors in assessing wildland fire risk include potential ignition sources, building materials and design, community design, structural density, the presence of slopes and vegetative fuels, fire occurrence and weather, as well as occurrences of drought (County of Orange & OCFA 2015).

CAL FIRE has mapped areas of significant fire hazards in the State through its Fire and Resources Assessment Program (FRAP). These maps place areas of California into different FHSZ, based on a hazard scoring system using subjective criteria for fuels, fire history, terrain influences, housing density, and occurrence of severe fire weather where urban conflagration could result in catastrophic losses. As part of this mapping system, land where CAL FIRE is responsible for wildland fire protection and generally located in unincorporated areas is classified as a State Responsibility Area (SRA). Where local fire protection agencies (e.g., OCFA) are responsible for wildfire protection, the land is classified as a Local Responsibility Area (LRA). CAL FIRE currently identifies the Project site as an LRA. In addition to establishing local or State responsibility for wildfire protection in a specific area, CAL FIRE designates areas as very high fire hazard severity zones (VHFHSZ) or non-VHFHSZ.

According to the CAL FIRE Very High Fire Hazard Severity Zone Maps for the Orange County Region, the Project site is designated as a non-VHFHSZ (CAL FIRE 2012b). The Project site is currently being used as a wholesale plant nursery. Although the plants being grown on the Project site are generally combustible, the Orange County *Local Hazard Mitigation Plan* (2015) identifies the Project site as having a moderate fuel hazard ranking (County of Orange & OCFA 2015). The areas immediately surrounding the Project site are developed with commercial, industrial, and residential uses; however, a finger of undeveloped land extends from the Whiting Ranch Wilderness Park to the center median of State Route 241 (SR-241), approximately 0.2 mile (mi) northeast of the Project site. This undeveloped land is designated as a VHFHSZ. The foothills of the Santa Ana Mountains, which feature steep slopes, combustible vegetation, and regrowth from recent wildfires, are located approximately 1.3 mi north of the Project site. This area, which includes portions of Whiting Ranch, Foothill Ranch, and Portola Hills, is designated as a VHFHSZ, as identified by CAL FIRE.[1] The foothills

[1] California Department of Forestry and Fire. FHSZ Viewer. Website: https://egis.fire.ca.gov/FHSZ/ (accessed August 7, 2019).

of the Santa Ana Mountains to the northeast of the Project site are designated as a High FHSZ in an SRA.[1]

4.19.3 Regulatory Setting

4.19.3.1 Federal Regulations

National Incident Management System (NIMS). The NIMS provides a systematic, proactive approach to guide government agencies, nongovernmental organizations, and the private sector to work together to prevent, report to, recover from, and mitigate the effects of incidents, regardless of cause, size, location, or complexity, in order to reduce the loss of life and property harm to the environment. The City participates in NIMS, which improves its ability to prepare for and respond to potential incidents and hazard scenarios.

4.19.3.2 State Regulations

CAL FIRE and Resources Assessment Program. CAL FIRE publishes maps that predict the threat of fire for each county within the State. LRAs, SRAs, or Federal Responsibility Areas (FRAs) are classified as either VHFHSZ or non-VHFHSZ based on factors including fuel availability, topography, fire history, and climate. The 2012 Strategic Fire Plan for California was generated by CAL FIRE to provide guidelines and objectives in order to account for associated fire impacts.

California Fire Code (CFC). Chapter 8.24.010 of the City of Lake Forest Municipal Code adopts the CFC, which is updated every 3 years. The CFC includes regulations for emergency planning, fire service features, fire protection systems, hazardous materials, fire flow requirements, and fire hydrant locations and distribution. Several fire safety requirements include: installation of sprinklers in all high-rise buildings; the establishment of fire resistance standards for fire doors, building materials, and particular types of construction; and the clearance of debris and vegetation within a prescribed distance from occupied structures in wildlife hazard areas.

California Strategic Fire Plan. This statewide plan is a strategic document that guides fire policy for much of California. The plan is aimed at reducing wildfire risk through pre-fire mitigation efforts tailored to local areas through assessments of fuels, hazards, and risks.

California State Hazard Mitigation Plan. The purpose of the State Hazard Mitigation Plan (SHMP) is to significantly reduce deaths, injuries, and other losses attributed to natural- and human-caused hazards in California. The SHMP provides guidance for hazard mitigation activities emphasizing partnerships among local, State, and federal agencies as well as the private sector.

California Government Code. California Government Code §51175 defines VHFHSZ and designates lands considered by the State to be a very high fire hazard.

California Government Code §51189 directs the Office of the State Fire Marshal to create building standards for wildland fire resistance. The code includes measures that increase the likelihood of a

[1] California Department of Forestry and Fire. FHSZ Viewer. Website: https://egis.fire.ca.gov/FHSZ/ (accessed August 7, 2019).

structure withstanding intrusion by fire (e.g., building design and construction requirements that use fire-resistant building materials) and provides protection of structure projections (e.g., porches, decks, balconies, and eaves) and structure openings (e.g., attics, eave vents, and windows).

California Public Resources Code (PRC). The State's Fire Safe Regulations are set forth in PRC §4290, which include the establishment of SRAs. PRC §4291 sets forth defensible space requirements, which are applicable to anyone that …owns, leases, controls, operates, or maintains a building or structure in, upon, or adjoining a mountainous area, forest-covered lands, brush covered lands, grass-covered lands, or land that is covered with flammable material (§4291(a)).

Assembly Bill 337. Per Assembly Bill (AB) 337, local fire prevention authorities and CAL FIRE are required to identify VHFHSZ in LRAs. Standards related to brush clearance and the use of fire resistant materials in FHSZ are also established.

California Code of Regulations (CCR).

CCR Title 8 (Industrial Relations). In accordance with CCR Title 8 §1270 and §6773 (Fire Prevention, and Fire Protection and Fire Equipment), the California Occupational Safety and Health Administration (Cal/OSHA) establishes fire suppression service standards. The standards range from fire hose size requirements to the design of emergency access roads.

CCR Title 14 (Natural Resources). Division 1.5 (Department of Forestry and Fire Protection), Title 14 of the CCR establishes a variety of wildfire preparedness, prevention, and response regulations.

CCR Title 19 (Public Safety). Title 19 of the CCR establishes a variety of emergency fire response, fire prevention, and construction and construction materials standards.

CCR Title 24 (California Building Standards Code). The CFC is set forth in Part 9 of the Building Standards Code. The CFC, which is pre-assembled with the International Fire Code (IFC) by the International Code Council (ICC), contains fire-safety building standards referenced in other parts of Title 24.

California Health and Safety Code §13000 et seq. and California Building Code (CBC). State fire regulations are set forth in §13000 et seq. of the California Health and Safety Code, which is divided into "Fires and Fire Protection" and "Buildings Used by the Public." The regulations provide for the enforcement of the CBC and mandate the abatement of fire hazards.

The California Health and Safety Code establishes broadly applicable regulations, such as standards for buildings and fire protection devices, in addition to regulations for specific land uses, such as childcare facilities and high-rise structures.

California Health and Safety Code Division 11 (Explosives). Division 11 of the California Health and Safety Code establishes regulations related to a variety of explosive substances and devices, including high explosives and fireworks. Section 12000 et seq. establishes regulations related to

explosives and explosive devices, including permitting, handling, storage, and transport (in quantities greater than 1,000 pounds).

California Health and Safety Code Division 12.5 (Buildings Used by the Public). Division 12.5 establishes requirements for buildings used by the public, including essential services buildings, earthquake hazard mitigation technologies, school buildings, and post-secondary buildings.

California Residential Code §R337. Section R337 establishes minimum standards for the protection of life and property by increasing the ability of a building located in any FHSZ within an SRA or any WUI Fire Area to resist the intrusion of flame or burning embers projected by a vegetation fire and contributes to a systematic reduction in conflagration losses. This section regulates materials and construction methods for exteriors susceptible to wildfire exposure.

California Building Code (CBC), Chapter 7A. Chapter 7A applies to building materials, systems, and/or assemblies used in the exterior design and construction of new buildings located within a WUI Fire Area. This section of the CBC establishes minimum standards for features such as fire-retardant-treated wood and wood shingles, surface treatment protection, ignition-resistant construction, roof coverings and gutters, vents, exterior walls and coverings, exterior porch ceilings, underfloor protection, exterior windows, skylights, and doors, decking, and accessory structures.

Executive Order N-04-19. On January 9, 2019, Governor Newsom announced Executive Order (EO) N-04-19, which requires State agencies to identify innovative and sustainable solutions to address the State's wildfire crisis, such as (e.g., upgraded fire detection technology).

Executive Order N-05-19. On January 9, 2019, Governor Newsom also announced EO N-05-19, which requires CAL FIRE and other State agencies to compile policy and regulatory recommendations concerning wildfire mitigation, emphasizing environmental sustainability and public health. EO N-05-19 requires the incorporation of socioeconomic analysis when conducting risk management of wildfires and mandates that agencies identify geographic areas with populations that are more vulnerable to the impacts of wildfires.

4.19.3.3 Regional Regulations

OCFA Fire Master Plans for Commercial & Residential Development, Guideline B-09. Guideline B-09 of the 2017 Fire Master Plans for Commercial & Residential Development establishes general guidelines pertaining to the installation and maintenance of fire department access roadways, access walkways to and around buildings, and hydrant quantity and placement as required by the 2016 CFC and CBC, and as amended by local ordinance. The proper installation and maintenance of fire access roadways, the proper sitting of hydrants, adequate water supply, and proper access to structures are essential in enabling effective emergency response and firefighting operations.

County of Orange and OCFA Local Hazard Mitigation Plan (2015). This Plan identifies risks and vulnerabilities, establishes hazard mitigation strategies, describes emergency organization, task assignments, and general procedures, and provides for coordination of response in the event of an emergency. The Plan does not identify specific emergency response or evacuation routes.

4.19.3.4 Local Regulations

Lake Forest General Plan. The City of Lake Forest General Plan Safety and Noise Element (1994a) and Public Facilities and Growth Management Element (1994b) identify goals and policies related to fire protection services. According to the Safety and Noise Element, Lake Forest is subject to both wild and urban fires. The natural vegetation in the region is highly prone to wildfire, and a fire in the adjacent Cleveland National Forest could spread to developed areas in Lake Forest. The City will reduce the potential for dangerous fires by coordinating with OCFA to implement fire hazard education, fire protection, and fuel modification programs. Goals and policies from both the Safety and Noise Element and Public Facilities and Growth Management Element are listed below.

- **Safety and Noise Element (1994):**

  Goal 4.0 Improved ability of the City to respond to natural and human-related emergencies.

  Policy 4.1 Support the development of local preparedness plans and multi-jurisdictional cooperation and communication for emergency situations.

  Goal 2.0 Protection of the community from hazards associated with aircraft overflights, hazardous materials use, fire, and ground transportation.

  Policy 2.4 Reduce the risk to the community from fire.

  Goal 1.0 Reduction in the risk to the community from hazards associated with geologic conditions, seismic activity, and flooding.

  Policy 1.1 Reduce the risk of impacts from geologic and seismic hazards.

  Policy 1.2 Protect the community from flooding hazards.

- **Public Facilities and Growth Management Element (1994):**

  Goal 3.0 Effective coordination with Orange County Fire and Orange County Sheriff's Department.

  Policy 3.1 Work closely with Orange County Fire and the Orange County Sheriff's Department in determining and meeting community needs for safety facilities and services

  Policy 3.2 Periodically evaluate level of service to ensure that Lake Forest has appropriate levels of fire, police and emergency medical services.

City of Lake Forest Municipal Code.

Title 6, Health and Sanitation (6.16 Hazardous Materials). This section discusses hazardous materials including disclosure to OCFA.

Title 7, Subdivisions (7.08.145 Fire Protection). This section discusses the requirements for subdivisions in high or extremely high hazard areas, including providing appropriate fire protection by means of fire breaks, fuel modification programs, access roads, sufficient water supply, landscaping, and open spaces.

Title 8, Buildings and Construction (8.02 California Building Code, 8.06 California Residential Code, 8.24 Fire Code). This section includes the adoption of the 2016 California Fire Code and the adoption of additional amendments.

Title 9, Planning and Zoning (9.144.070.7 Public Display of Fireworks). This section covers public firework displays, including requiring permits from OCFA or the Fire Chief.

Title 11, Peace and Safety (11.56 Fire Alarm Systems). This section covers regulations relating to fire alarm systems.

City of Lake Forest Emergency Preparedness Plan. Under State law, local governments are required to create and administer an Emergency Operations Plan (EOP) under the guidelines provided by the Federal Emergency Management Agency (FEMA). The State Office of Emergency Services (OES) adopts these emergency management guidelines for business activities in the Emergency Operations Center (EOC). City of Lake Forest Municipal Code §2.20.080 states that the Lake Forest Disaster Council is responsible for the development of the Emergency Preparedness Plan, which shall serve as the EOP and provide for the effective mobilization of the resources of the City, both public and private, to meet any condition constituting a local emergency, state of emergency, or state of war emergency.

4.19.4 Methodology

This section addresses factors that could expose people or structures to fire or post-fire flooding or landslides, risk or impair emergency response, or require installation of infrastructure that could exacerbate fire risk. Past case law supports that CEQA should evaluate a proposed project's impact on the environment (e.g., potential of a housing development to degrade water quality), rather than the environment's impact on a project (e.g., potential for an earthquake to destroy a housing development). In *California Building Industry Association v. Bay Area Air Quality Management District* (CBIA v. BAAQMD) (Supreme Court of California 2015), the CBIA challenged BAAQMD's adoption of CEQA air pollutant significance thresholds that required analysis of impacts on "new receptors" (residents and workers drawn to an area as a result of a proposed project). The California Supreme Court found that "agencies subject to CEQA generally are not required to analyze the impact of existing environmental conditions on a project's future users or residents," except where a proposed project may exacerbate those environmental hazards or conditions that already exist. Therefore, this section will not directly focus on the risk of wildfire to the Project, rather it will address whether the Project exacerbates the risk of a natural disaster by bringing new development to vulnerable areas. The analysis is based on review of FHSZ maps, local and regional Hazard Mitigation Plans, and Project conformance to OCFA fire codes and fire plans (including a Fuel Modification Plan).

4.19.5 Thresholds of Significance

The thresholds for wildfire impacts used in this analysis are consistent with Appendix G of the State CEQA Guidelines and the City's *CEQA Significance Thresholds Guide* (2019). If the proposed Project would be located in or near SRAs or lands classified as VHFHSZ, the proposed Project may be deemed to have a significant impact with respect to wildfires if it would:

Threshold 4.19.1: Substantially impair an adopted emergency response plan or emergency evacuation plan.

Threshold 4.19.2: Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire.

Threshold 4.19.3: Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment.

Threshold 4.19.4: Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff post-fire slope instability, or drainage changes.

The IS/NOP was prepared prior to the revised State CEQA Guidelines (2019) and, therefore, only addressed the Project's potential environmental impacts related to wildfire in the context of exposing people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands (the Hazards and Hazardous Materials section of the IS/NOP determined that the Project would result in no impacts). Because none of the following thresholds related to wildfire were addressed in the IS/NOP, they are all addressed in the following analysis.

4.19.6 Project Impacts

Threshold 4.19.1: Would the Project impair an adopted emergency response plan or emergency evacuation plan?

Less than Significant Impact. According to CAL FIRE VHFHSZ in the LRA map for Lake Forest, the Project site is in a non-VHFHSZ. The nearest VHFHSZ is located approximately 0.2 mi northeast of the Project site along Serrano Creek and terminates near the SR-241 center median. As discussed in Section 4.8.3, the Orange County Sheriff's Department and OCFA are the local agencies that would oversee emergency response and emergency evacuation at the Project site. OCFA has approved a conceptual Fire Master Plan for the Nakase Property, which identifies the proper size and location of fire suppression facilities (e.g., hydrants), adequate water supply, and fire access routes.

Construction. The Project site is near a VHFHSZ, but is not located in or near an SRA, as defined by CAL FIRE. All large construction vehicles entering and exiting the site would be guided by the use of personnel using signs and flags to direct traffic. The Project does not include any characteristics that would physically impair or otherwise interfere with emergency response or evacuation in the Project vicinity. The proposed Project may require temporary lane closures on Bake Parkway, Lake Forest Drive, and Rancho Parkway to allow for utility connections; however, temporary lane closures would be implemented consistent with the recommendations of the *California Temporary Traffic Control Handbook* (California Inter-Utility Coordinating Committee 2018). Among other things, the manual recommends early coordination with affected agencies

to ensure that emergency vehicle access is maintained. In this manner, officials can plan and respond appropriately to direct the public away from Bake Parkway, Rancho Parkway, or Lake Forest Drive, as appropriate, in the event of an emergency requiring evacuation. Therefore, construction of the proposed Project would not substantially impair an adopted emergency response plan or emergency evacuation plan. No mitigation would be required.

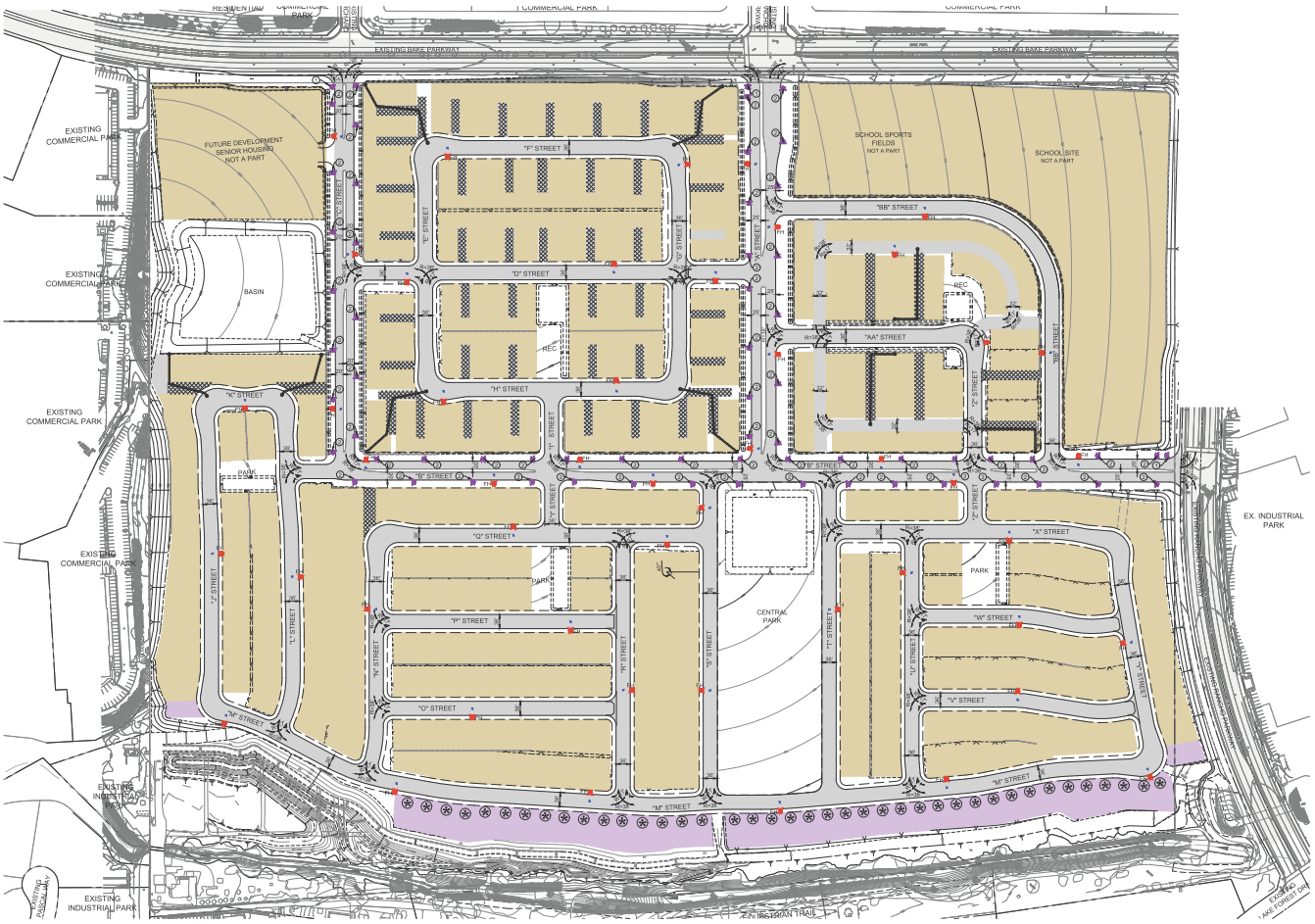
Operation. The proposed Project includes the development of up to 675 single-family residential units on approximately 61.4 acres (ac) of the Project site and up to 101 senior affordable housing units on 3.9 ac of the Project site. The proposed Project also includes parks, an internal circulation system, and an elementary school. According to the Traffic Impact Analysis (Urban Crossroads 2019), the proposed Project is not anticipated to result in any substantial traffic queuing along Bake Parkway, Lake Forest Drive, Rancho Parkway, or within the Project limits during Project operation. The City of Lake Forest General Plan Safety and Noise Element (1994a) does not officially designate any specific evacuation routes within the City. Roads that are used as response corridors and evacuation routes usually follow the most direct path to or from various parts of the community. For the Project site, the main corridors utilized would be Bake Parkway, Rancho Parkway, and Lake Forest Drive.

The proposed Project would provide emergency access via two streets along Bake Parkway and one street along Rancho Parkway. All roadways and structures within the proposed Project would be developed in accordance with City and OCFA emergency access standards. The proposed Project would also be required to comply with all applicable codes and ordinances for emergency vehicle access, which would ensure adequate access to, from, and on site for emergency vehicles.

OCFA approved a conceptual Fire Master Plan (refer to Figure 4.19.1) in February 2018, a conceptual Fire Protection Plan with Ember Mitigation (refer to Figure 4.19.2) in January 2018, and a conceptual Fuel Modification Plan (refer to Figure 4.19.3) in March 2018. The Fire Master Plan and Fire Protection Plan address specific fire prevention and access elements required by the Lake Forest Municipal Code and the CBC. The Fuel Modification Plan is required by the Lake Forest Municipal Code.

The Fire Master Plan (refer to Figure 4.19.1) establishes the proper location and adequacy of fire suppression facilities, as well as fire access routes on the Project site. The Fire Master Plan also identifies the locations of fire hydrants, a water supply for firefighting, and emergency access to residences and structures on the Project site. According to OCFA, adherence to the elements of the Fire Master Plan is directly correlated with the effectiveness of first responders, including fire and emergency medical personnel. The Area Plan for the Nakase Property meets or exceeds the requirements of OCFA to not hinder fire access and fire department and operations for the planned community. Figure 4.19.1 shows the locations of fire hydrants, fire lanes, fire hose pull distances, fire apparatus turning radii, lots that would require attic sprinkler protection, existing and proposed fire access roads, Radiant Heat Zones, and Ember Mitigation Zones on the Project site.

This page intentionally left blank



LEGEND

PROPOSED FIRE HYDRANT

INDICATES BLUE REFLECTIVE FIRE HYDRANT MARKER. MARKER SHALL BE PLACED 6" FROM CENTERLINE OF STREET

PROPOSED FIRE LANE SIGNAGE AS INDICATED ON PLAN AND DETAILS HEREON

300' HOSE PULL DISTANCE - MAXIMUM SINGLE FAMILY DWELLING UNIT

R38'
R17'
20'

INDICATES O.C.F.A REQUIRED TURNING RADII: 20' WIDE PATH WITH 17' INSIDE AND 38' OUTSIDE

ATTIC FIRE SPRINKLER PROTECTION:
AUTOMATIC FIRE SPRINKLERS SHALL BE PROVIDED INTO THE ATTIC SPACES FOR LOTS 285 THROUGH 308 AND 448 THROUGH 433 PER THE CONCEPTUAL FUEL MODIFICATION PLAN, OCFA SR 220514

EXISTING FIRE DEPARTMENT ACCESS ROAD WITH ALL-WEATHER PAVED SURFACE MEETING OCFA GUIDELINE B-09 TO SUPPORT VEHICULAR LOADS OF 68,000 LBS WITH A ROAD BASE OVER SOIL COMPACTED TO A LEAST 90%

PROPOSED FIRE DEPARTMENT ACCESS ROAD WITH ALL-WEATHER PAVED SURFACE MEETING OCFA GUIDELINE B-09 TO SUPPORT VEHICULAR LOADS OF 68,000 LBS WITH A ROAD BASE OVER SOIL COMPACTED TO A LEAST 90%

RADIANT HEAT ZONE:
LOTS INDICATED ON THIS PLAN SHALL COMPLY WITH ALL PORTIONS OF THE 2016 CALIFORNIA BUILDING CODE CHAPTER 7A AND/OR 2016 CALIFORNIA RESIDENTIAL CODE SECTION R337, AS INDICATED ON THE NAKASE RANCH FIRE PROTECTION PLAN SR220513.

EMBER MITIGATION ZONE:
LOTS INDICATED ON THIS PLAN SHALL COMPLY WITH PORTIONS OF THE 2016 CALIFORNIA BUILDING CODE CHAPTER 7A AND/OR 2016 CALIFORNIA RESIDENTIAL CODE SECTION R337 PERTAINING TO ROOFING VENTING ONLY AS INDICATED ON THE ON THE NAKASE RANCH FIRE PROTECTION PLAN SR220513.

LSA

FIGURE 4.19.1

N

NO SCALE

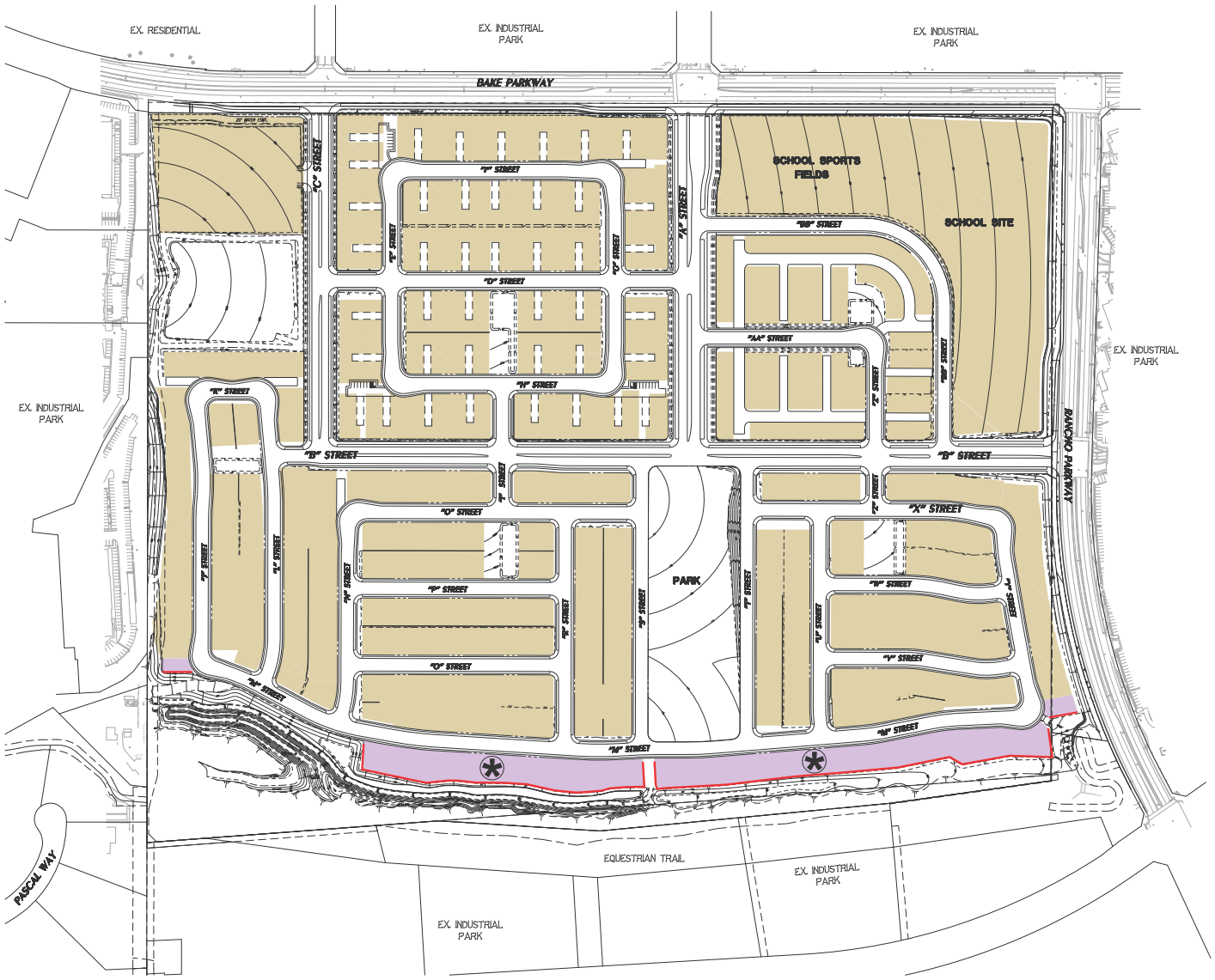
SOURCE: Hunsaker & Associates

I:\CLF1801\G\Fire Master Plan.cdr (8/15/2019)

Nakase Nursery/Toll Brothers

Fire Master Plan

This page intentionally left blank



LEGEND

RADIANT HEAT ZONE

EMBER MITIGATION ZONE

ATTIC FIRE SPRINKLER PROTECTION

SOILID BLOCK AND/OR GLASS FENCING (RADIANT HEAT WALL)
Final location and design by the project Landscape Architect and Civil Engineer

LSA

FIGURE 4.19.2

N

NO SCALE

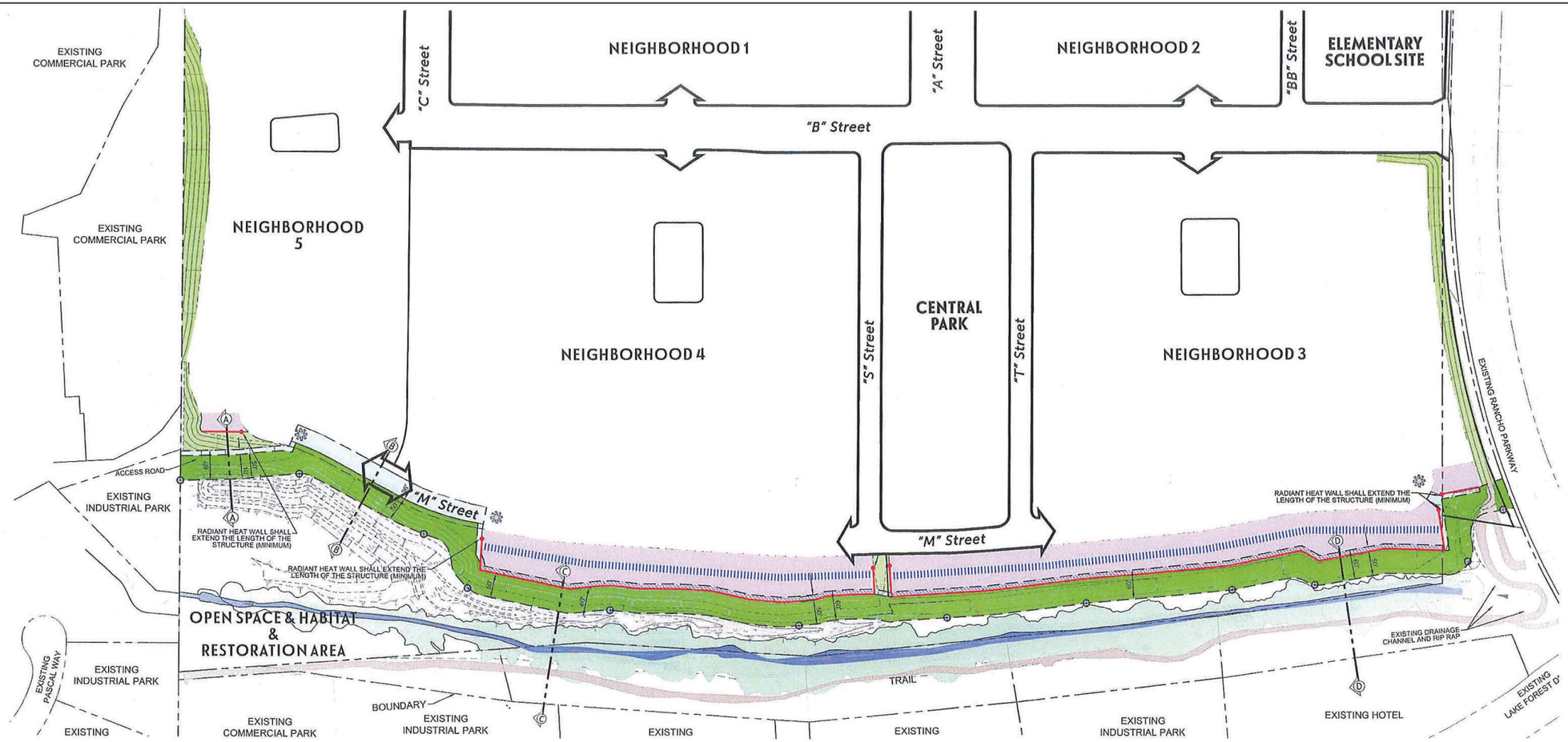
SOURCE: Hunsaker & Associates

I:\CLF1801\G\Fire Protection Plan.cdr (8/15/2019)

Nakase Nursery/Toll Brothers

Fire Protection Plan

This page intentionally left blank



LEGEND

PRIVATE HOMEOWNER SETBACK AREA (PHSA):
10'-0"-36'-0" Private Homeowner Lots directly adjoining the Fuel Management Zone B shall meet the requirements per the "Private Homeowner Setback Area Directly Adjoining Zone B Fuel Management" description provided on sheet FM-2

ZONE A - NON-COMBUSTILBE CONSTRUCTION:
10'-0" Setback zone for non-combustible construction only. Zone A shall be maintained by the Homeowner's Association.

ZONE B - WET ZONE
(100% REMOVAL UNDESIRABLE SHRUBS):
Minimum 50' from Zone A or the Private Homeowner Setback Area. Zone B shall be permanently irrigated, fully landscaped with approved drought tolerant, deep rooted, moisture retentive material. If any new plant material is added this zone shall be planted with container shrub material. Zone B area shall be maintained by the Homeowners Association.

RADIANT HEAT ZONE:
Lots indicated on this plan shall comply with all portions of the 2016 California Residential Code Section R337, as indicated on the Nakase Ranch Fire Protection Plan SR220517

ACCESS POINT *
Location of emergency and maintenance access easements within every 500 lineal feet of the fuel modification area. Access easements shall have a minimum 10-foot width; alternatively, 5-foot wide easements provided every 250 feet may be acceptable. Any gates installed into the fuel modification area and shall be a minimum of 36 inches wide. The easements shall be maintained free of vegetation or any structures greater than 5 inches in height.

IDENTIFICATION MARKER*
Permanent identification markers shall be constructed to identify the limits of applicable Fuel Management zones. Marker design shall be 2" dia. x 8'-0" long galvanized pipe embed minimum 2'-6" into solid ground. 1" reflector tape 1 tape band at top for Zone B. Expose pipe 2'-0" above vegetation minimum.

*** Emergency and Maintenance Access Points as well as Identification Zone Markers locations shall be finalized at the time of the Precise Fuel Management Plan once lotting is available.**

ATTIC FIRE SPRINKLER PROTECTION:
Indicates structures on lots that shall have the Automatic Fire Sprinklers provided into the Attic Spaces.

SOLID BLOCK AND/OR GLASS FENCING (RADIANT HEAT WALL)
Final location and design by the project Landscape Architect and Civil Engineer

EMBER MITIGATION ZONE:
Lots indicated on this plan shall comply with portions of the 2016 California Building Code Chapter 7A and/or 2016 California Residential Code Section R337 pertaining to Roofing Venting only as indicated on the on the Nakase Ranch Fire Protection Plan SR220513.

SPECIAL MAINTENANCE AREA (SMA)- WET ZONE:
The Special Maintenance Areas have maintenance requirements to reduce the chances of ignition from wildfires. They need maintenance just as fuel modification zones do and shall be maintained on a year round basis, with removal of all dead and dying plant material, replacement of dead or diseased species with plant material with the same growth characteristics from the approved landscape plans. Irrigation shall be verified on a regular basis to ensure it is in a working a condition and the plants shall be irrigated as necessary to keep them healthy with their appropriate moisture content. A copy of the approved Landscape Plans shall be provided to the HOA by the developer and remain on record indefinitely with the HOA. Copies of plans shall be provided to the contracted maintenance company. It is the responsibility of the HOA to forward a copy of the approved Landscape Plans to any new property management company. The HOA shall inspect the special maintenance areas twice a year to ensure the special maintenance areas retain the original design of the areas. The following are further Special Maintenance Area (SMA) requirements:

- Directly underneath Trees and tree canopies, ground cover that naturally grows no taller than 2 feet in height shall be installed.
- The areas are completely irrigated and have plants that need irrigation to retain healthy fuel moisture.

The following are further Special Maintenance Area (SMA) requirements (cont.):

- Any dead and dying specimens and branches shall be removed.
- Leaf litter on top of vegetative cover shall be removed.
- Landscape design Plans shall be retained by the HOA indefinitely and the slopes shall always remain as they were designed.
- As plants migrate or new plants seed-in, those shall be removed to retain the original design.
- Future changes to slope designs shall be approved by OCFA.
- The maintenance requirements of the special maintenance areas shall be factored into the funding with the fuel modification zones.
- Special Maintenance Areas shall be designed and also maintained as to not provide direct flame or an excessive amount of radiant heat on structures.
- Special Maintenance Areas will have a limited use of native grasses as approved by OCFA.

LSA

FIGURE 4.19.3

N

0 125 250
FEET

SOURCE: C2 Collaborative

I:\CLF1801\G\Fuel Modification Plan.cdr (6/26/2019)

Nakase Nursery/Toll Brothers
Fuel Modification Plan

This page intentionally left blank

The Fire Protection Plan (refer to Figure 4.19.2) identifies lots and structures that would be within the Ember Mitigation Zone and Radiant Heat Zone. The Fire Protection Plan also identifies lots and structures that would require an attic fire sprinkler system and the conceptual location of the radiant heat wall.

All three plans conform to City and OCFA standards and facilitate effective emergency response and operation. Therefore, operation of the proposed Project would not physically interfere with or impair an adopted emergency response or emergency evacuation plan. No mitigation would be required.

Threshold 4.19.2: Would the Project, due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose Project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

Less than Significant Impact. Topography influences the movement of air, thereby directing a fire course. For example, if the percentage of uphill slope doubles, the rate of spread in wildland fire will likely double (County of Orange & OCFA 2015). Wind events magnify the risks of wildfire and have the potential to expose inhabitants of the City to elevated pollutant concentrations from a wildfire and the uncontrolled spread of wildfire from open space areas in the foothills of the Santa Ana Mountains in the northeastern areas of Lake Forest.

The proposed Project would introduce new development and a permanent population in an undeveloped area that does not contain any permanent residents. The Project site is located in a developed portion of Lake Forest. In its existing condition, the Project site is relatively flat terrain ranging in elevation from 705 to 735 feet (ft) across the northern half of the site with low points of approximately 685 ft at the southwest and southeast corners, and a ridge in the south central portion of the site ranging from 720 to 750 ft. Bake Parkway is roughly 10 ft above the northern perimeter of the Project site, and the commercial development to the south is 10 ft above to 25 ft below the southern perimeter. As previously stated, the Project site is not located in a VHFHSZ, nor is it located in an SRA. The nearest VHFHSZ is 0.2 mi northeast of the Project site. The area surrounding the Project site contains suburban development, but is characterized by hilly areas containing vegetative fuel and the increasingly steep slopes of the Santa Ana Mountains to the northeast.

The proposed Project includes the development of up to 675 single-family residential units on approximately 61.4 ac of the Project site and up to 101 senior affordable housing on 3.9 ac of the Project site. The proposed Project also includes parks, an internal circulation system, and an elementary school. As discussed in Section 4.13, Population and Housing, the Project is anticipated to result in a population increase of approximately 2,305 people. The Project proposes a residential development and school in an area characterized by existing residential and commercial uses. Adjacent roadways, including Bake Parkway, Rancho Parkway, and Lake Forest Drive, surround the Project site and would serve as fire breaks in the unlikely event of the uncontrolled spread of a wildfire. Additionally, SR-241 separates the Project site from the nearest VHFHSZ area to the northeast. With a right-of-way of more than 200 ft, it is expected that SR-241 would also serve as an

effective fire break in the unlikely event that a wildfire enters the WUI to the northeast of the Project site via the Whiting Ranch Wilderness Park.

As detailed in Regulatory Compliance Measure RCM FIRE-3, the proposed Project is required to adhere to a Fuel Modification Plan that complies with the OCFA *Vegetation Management Guideline –Technical Design for New Construction Fuel Modification Plans and Maintenance Program.* Adherence to the Fuel Modification Plan would reduce the chance of structure ignition on the Project site in the unlikely event of a wildfire by requiring the use of fire-resistant building materials, the construction of radiant heat walls, the selection of non-combustible plant species, and the establishment of setback areas and areas that would be permanently irrigated. Furthermore, the proposed development would result in clearing, grading, paving, and revegetation according to OCFA requirements, resulting in the unavailability of vegetative/combustible materials in areas of the Project site that would be particularly vulnerable to wildfire spread from the native vegetation along Serrano Creek.

As stated previously, the Project site is not located in a VHFHSZ. Despite the VHFHSZ to the northeast of the Project site, the uncontrolled spread of a wildfire in the vicinity of the Project site is unlikely due to the existing non-combustible development and roadways, specifically SR-241 and Rancho Parkway. Impacts of downwind pollutant concentrations from a wildfire to occupants as a result of the Project would be negligible. Therefore, due to slope, prevailing winds, location, and other factors, the proposed Project would not exacerbate wildfire risks, and no mitigation is required.

Threshold 4.19.3: Would the Project require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?

No Impact. Utility and infrastructure improvements included as part of the Project are described in Section 3.0, Project Description. These improvements include the relocation of two existing water and recycled water mains and the subsequent rerouting of water facilities, the extension of sewer lines throughout the Project site, the installation of a gravity sewer system to connect to existing sewer lines in Bake Parkway, the undergrounding of existing overhead power lines along Bake Parkway, and the installation of an underground detention basin beneath the proposed Central Park to redirect runoff flows.

Although the Project would include internal on-site roadways, the proposed Project does not include any changes to public or private roadways that would exacerbate fire risk or that would result in impacts to the environment. Although utilities, including water facilities, sewer facilities, storm drain lines, and power lines would be modified and/or extended throughout the Project site, these improvements would be underground and would not exacerbate fire risk. All utility lines, pipes, utility junction boxes, and transformers will be located underground. Project design and implementation of utility improvements would be reviewed and approved by the City's Public Works Department as part of the Project approval process to ensure the proposed Project is compliant with all applicable fire codes, design standards, and regulations.

The Project site is not located in a VHFHSZ, nor is it located in or near an SRA. As discussed above, a VHFHSZ is located approximately 0.2 mi northeast of the Project site. The installation of Project-related utilities and an on-site roadway network would not exacerbate fire risk due to the Project site's location in an urban and built-out area outside of a designated fire hazard zone. Furthermore, the improved connectivity of water lines would aid in fire suppression compared to existing conditions on the Project site in the unlikely event of a wildfire. Therefore, the proposed Project would not require the installation or maintenance of associated infrastructure (e.g., roads, fuel breaks, emergency water sources, power lines, or other utilities) that would exacerbate fire risk or result in temporary or ongoing impacts to the environment. There would be no temporary or ongoing impact to the environment, and no mitigation would be required.

Threshold 4.19.4: Would the Project expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff post-fire slope instability, or drainage changes?

Less than Significant Impact.

Landslides. Landslides and other forms of mass wasting, including mud flows, debris flows, and soil slips, occur as soil moves downslope under the influence of gravity. Landslides are frequently triggered by intense rainfall or seismic shaking but can also occur as a result of erosion and downslope runoff caused by rain following a fire. According to the *Geotechnical Evaluation* (NMG Geotechnical 2017), landslides or other forms of natural slope instability do not represent a significant hazard to the Project because the site is located in a relatively flat area, and there is no evidence of landslides in the Project vicinity. Additionally, the Project site does not lie within a designated Landslide Hazard Zone (California DOC 2015). Further, as stated previously, the Project site is not located in a VHFHSZ or in or near an SRA. As discussed above in the response to Threshold 4.19.2, the Project would be required to adhere to the approved conceptual Fire Protection Plan, Fire Master Plan, and Fuel Modification Plan (Regulatory Compliance Measures RCM FIRE-1, RCM FIRE-2, and RCM FIRE-3, described further in Section 4.19.5.2). Adherence to these measures would reduce the likelihood of urban conflagration on the Project site in the unlikely event of a wildfire.

In the extremely unlikely event that a wildfire should spread to the Project site, it would not expose any on-site slopes to erosion and potential failure because, as discussed above, the Project site does not contain any steep slopes that are prone to landslide. The proposed Project would not expose people or structures to significant risks, including downslope landslides, as a result of runoff, post-fire slope instability, or drainage changes. There would be no impact to Project occupants or nearby residents or workers related to post-wildfire landslide risks, and no mitigation would be required.

Flooding. According to the FEMA Flood Hazard Map, the Project site is partially within Zone X (Area with Minimal Flood Hazard) of a 100-year floodplain and partially within a Zone AE Regulatory Floodway associated with the Serrano Creek Channel (FEMA 2018). Zone X designates areas of moderate flood risk, and are the areas between the limits of the base flood and the 0.2 percent annual chance flood, or 500-year flood. Zone AE includes areas subject to inundation by the 1 percent annual chance flood with base flood elevations determined.

Regulatory floodways are the channel of a river, and adjacent land must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation. Existing development surrounds the Serrano Creek Channel on both sides. Northeast of SR-241, Serrano Creek runs throughout a VHFHSZ (CAL FIRE 2012a). A fire northeast of the Project site could trigger increased downstream sediment movement, which could raise the elevation of potential flooding along Serrano Creek in the vicinity of the Project site. In the event that the upper Serrano Creek watershed were to experience a major fire, it is expected that the County would implement emergency Best Management Practices (BMPs) in Whiting Ranch Wilderness Park (wattles, sandbags, etc.) to limit the amount of additional sedimentation that enters Serrano Creek. Such measures would allow Serrano Creek to hydraulically convey any minor increases in sediment loads without increasing the risk of flooding on the Project site.

As discussed above in the response to Thresholds 4.19.1 and 4.19.2, the proposed Project would be required to adhere to the conceptual Fire Protection Plan, Fire Master Plan, and Fuel Modification Plan approved by OCFA. Adherence to these plans would reduce the likelihood of urban conflagration on the Project site in the unlikely event of a wildfire. In addition, according to the *Preliminary Hydrology Analysis* (Hunsaker & Associates Irvine, Inc. 2019), the Project itself will not exceed the existing peak discharge for 2-year, 25-year, or 100-year frequency storm events and will reduce the potential for flooding conditions in downstream storm drain facilities and on private property as compared to existing conditions.

In the unlikely event that a wildfire should spread to the Project site, it is not expected that the Project would contribute any additional runoff or sedimentation to Serrano Creek or other downstream drainages. This is due to the lack of steep slopes that are prone to landslide or erosion on the Project site and the fact that the Project's drainage improvements would remain intact after a major wildfire, allowing them to continue to reduce the potential for flooding conditions in downstream storm drain facilities. Therefore, downslope or downstream flooding as a result of runoff, post-fire slope instability, or drainage changes are unlikely to expose occupants or structures to significant risks. Impacts to Project occupants related to post-wildfire flooding risks would be less than significant, and no mitigation is required.

4.19.7 Cumulative Impacts

The purpose of this section is to evaluate any additional incremental impact that the proposed Project is likely to cause over and above the combined impacts of recently approved and proposed projects in the City and its sphere of influence. As defined in the *State CEQA Guidelines*, cumulative impacts are the incremental effects of an individual project when viewed in connection with the effects of past, current, and reasonably foreseeable projects within the cumulative study area for wildfire.

For the reasons outlined above in Section 4.19.6, Project Impacts, implementation of the proposed Project would not result in a significant cumulative impact related to wildfire. The proposed Project and all related projects are required to adhere to City, State, and federal regulations designed to reduce and/or avoid impacts related to wildfire. With compliance with these regulations, cumulative impacts related to wildfire would be less than significant.

Potential impacts of the proposed Project with regard to wildfire, when combined with the impacts of past, present, and reasonably foreseeable projects in the City of Lake Forest, could contribute to a cumulatively significant impact due to the increased risk of wildfire and impacts to resources and human life as a result of wildfire. However, each development application received by the City is required to undergo environmental review pursuant to CEQA. If there were any potential for significant impacts with regard to wildfire and related risks, an investigation would be required to determine the nature and extent of the resources and identify the appropriate mitigation measures.

4.19.8 Level of Significance Prior to Mitigation

The proposed Project would result in less than significant impacts related to wildfire.

4.19.9 Regulatory Compliance Measures and Mitigation Measures

4.19.9.1 Regulatory Compliance Measures

The following Regulatory Compliance Measures are included in the proposed Project and are considered in the analysis of potential impacts related to wildfire. The City of Lake Forest considers these requirements to be mandatory; therefore, they are not mitigation measures or voluntary Project Design Features.

RCM FIRE-1: **Fire Protection Plan.** The Project shall adhere to Chapter 7A of the CBC and/or Section R337 of the California Residential Code (CRC). All structures in the Nakase community shall adhere to the standards from Chapter 7A of the CBC and/or Section R337 of the CRC pertaining to roofing and venting to help prevent the intrusion of embers into structures. Residences adjoining the Fuel Management Zones shall meet all applicable standards set forth in Section R337 of the CRC because those structures would have direct exposure to the native vegetation beyond the Fuel Management Zones.

RCM FIRE-2: **Fire Master Plan.** The Project Applicant/Developer shall develop a Fire Master Plan that identifies the proper installation and maintenance of fire access roadways, the locations of fire hydrants, a sufficient water supply, and emergency access to residences and structures within the Project site as required by the most current California Fire Code and Lake Forest Municipal Code.

RCM FIRE-3: **Fuel Modification Plan.** Section 8.24.030 of Chapter 8.24 of Title 8 of the Lake Forest Municipal Code requires that all new buildings to be built or installed in areas with or adjacent to land having hazardous combustible vegetation shall comply with the requirements in the edition of the OCFA *Vegetation Management Guideline – Technical Design for New Construction Fuel Modification Plans and Maintenance*

Program in use at the time of plan submittal. In addition, all new buildings to be built or installed in hazardous fire areas[1] shall comply with the following:

1. A preliminary Fuel Modification Plan shall be submitted to and approved by the Fire Code Official prior to or concurrently with the approval of the tentative map.

2. A final Fuel Modification Plan shall be submitted to and approved by the Fire Code Official prior to the issuance of the grading permit.

3. The Fuel Modification Plan shall meet the criteria set forth in the Fuel Modification Section of OCFA C-05, *Vegetation Management Guideline – Technical Design for New Construction Fuel Modification Plans and Maintenance Program.*

    a. The fuel modification plan shall include provisions for the maintenance of the fuel modification in perpetuity.

4. The Fuel Modification Plan may be altered if conditions change. Any alterations to the fuel modification areas shall have prior approval from the Fire Code Official.

5. All elements of the Fuel Modification Plan shall be maintained in accordance with the approval plan and are subject to the enforcement process outlined in the California Fire Code.

4.19.9.2 Mitigation Measures

The proposed Project would not result in significant impacts related to wildfire, and no mitigation is required.

4.19.10 Level of Significance after Mitigation

The proposed Project would not result in significant impacts related to wildfire.

[1] Hazardous fire areas include all areas identified within California Fire Code Section 4906.2 and other areas as determined by the Fire Code Official as presenting a fire hazard due to the presence of combustible vegetation, or the proximity of the property to an area that contains combustible vegetation.

5.0 ALTERNATIVES

5.1 INTRODUCTION

The California Environmental Quality Act (CEQA) requires that an Environmental Impact Report (EIR) include a discussion of reasonable project alternatives that would "feasibly attain most of the basic objectives of the project, but would avoid or substantially lessen any significant impacts of the project, and evaluate the comparative merits of the alternatives" (*State CEQA Guidelines*, Section 15126.6). This chapter identifies potential alternatives to the Nakase Nursery/Toll Brothers Project (proposed Project), evaluates the potential impacts of each alternative, and compares the potential impacts of each alternative against the proposed Project's impacts, as required by CEQA.

Key provisions of the *State CEQA Guidelines* on alternatives (Section 15126.6[b] through [f]) are summarized below to explain the foundation and legal requirements for the alternatives analysis in the EIR:

- The discussion of alternatives shall focus on alternatives to the project or its location that are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives or would be more costly (15126.6[b]).

- The specific alternative of 'no project' shall also be evaluated along with its impact (15126.6[e][1]). The 'no project' analysis shall discuss the existing conditions at the time the Notice of Preparation is published, and at the time the environmental analysis is commenced, as well as what would reasonably be expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services. If the environmentally superior alternative is the 'no project' alternative, the EIR shall also identify an environmentally superior alternative among the other alternatives (15126.6[e][2]).

- The range of alternatives required in an EIR is governed by the 'rule of reason' that requires the EIR to set forth only those alternatives necessary to permit a reasoned choice. The alternatives shall be limited to ones that would avoid or substantially lessen any of the significant effects of the project. Of those alternatives, the EIR need examine in detail only the ones that the lead agency determines could feasibly attain most of the basic objectives of the project. The range of feasible alternatives shall be selected and discussed in a manner to foster meaningful public participation and informed decision-making. Among the factors that may be taken into account when addressing the feasibility of alternatives are site suitability, economic viability, availability of infrastructure, general plan consistency, other plans or regulatory limitations, jurisdictional boundaries, and whether the proponent can reasonably acquire, control or otherwise have access to the alternative site (or the site is already owned by the proponent) (15126.6[f]).

- For alternative locations, only locations that would avoid or substantially lessen any of the significant effects of the project need be considered for inclusion in the EIR (15126.6[f][2][A]).

- If the lead agency concludes that no feasible alternative locations exist, it must disclose the reasons for this conclusion, and should include the reasons in the EIR. For example, in some cases there may be no feasible alternative locations for a geothermal plant or mining project which must be in close proximity to natural resources at a given location (15126.6[f][2][B]).

- An EIR need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative (15126.6[f][3]).

Pursuant to the guidelines stated above, a range of alternatives to the proposed Project is considered and evaluated in this EIR. These alternatives were developed in the course of project planning and environmental review. The discussion in this section provides:

1. A description and analysis of impacts for each of the alternatives considered;

2. Comparative analysis of each alternative that focuses on the potentially significant unavoidable environmental impacts of the proposed Project, e.g., agricultural and greenhouse gas (GHG) emissions (the purpose of this analysis is to determine whether alternatives are capable of eliminating or reducing the significant environmental impacts of the project to a less than significant level); and

3. Conclusions regarding the alternative's: (1) ability to avoid or substantially lessen the significant unavoidable impacts of the project; (2) ability to attain the project objectives (as stated below); and (3) merits compared to the merits of the proposed Project.

5.2 PROPOSED PROJECT

5.2.1 Project Objectives

As discussed in Section 3.10, Project Objectives, of this EIR, the following project objectives have been established to aid decision-makers in their review of the proposed Project and its associated environmental impacts:

- Provide a comprehensive plan for development of the Nakase's Property that implements the goals and policies of the Lake Forest General Plan.

- Provide a site design that is sensitive to the existing natural features, including Serrano Creek.

- Provide a balanced mix of single-family and attached senior affordable homes, open space, and active public and private uses.

- Accommodate public uses by incorporating a new elementary school site conveniently located within easy walking distance for Project site residents.

- Provide an exceptional trail system and on-site parks that enhance the quality of life of the larger community.

- Reduce vehicular traffic and peak-hour trips through thoughtful site planning that emphasizes connectivity, access, and mobility.

- Provide for logical, attractive, and safe pedestrian and bicycle connections within the community.

- Create high-quality residential homes and distinct, identifiable neighborhoods with a range of specifically targeted single-family product types.

5.2.2 Significant Adverse Unavoidable impacts of the Proposed Project

The following discussion focuses on alternatives that would reduce or avoid the significant adverse unavoidable impacts of the Proposed Project. The following is a summary of the impacts that are considered significant, adverse, and unavoidable after all mitigation is applied. These impacts are also described in detail in Chapter 4.0, Existing Setting, Environmental Analysis, Impacts, and Mitigation Measures.

5.2.2.1 Existing Setting, Environmental Analysis, Impacts, and Mitigation Measures.

Agricultural Resources. The proposed Project would conflict with the existing A-1 zoning and would convert 119.2 acres (ac) of Unique Farmland to non-agricultural uses, which would result in a significant impact to agricultural resources. Mitigation was considered to reduce the impact of the conversion of 119.2 ac of Unique Farmland to non-agricultural uses. However, the mitigation measures were not considered feasible; therefore, impacts pertaining to the conversion of Unique Farmland to a non-agricultural use from implementation of the proposed Project would be significant and unavoidable.

Greenhouse Gas Emissions. The proposed Project would be designed in compliance with adopted regulations aimed at reducing GHG emissions. Specifically, the project would meet the 2019 Building Energy Efficiency Standards (California Code of Regulations [CCR] Title 24) and the California Green Building Standards Code (CALGreen). Although compliance with CCR Title 24 and CALGreen would help to reduce the proposed Project's GHG emissions, the overall emissions attributable to the proposed Project are expected to exceed the South Coast Air Quality Management District (SCAQMD) thresholds of 3.84 million tons of carbon dioxide equivalent per Service Population per year (MT CO_2e/SP/yr) for 2025 and 2.88 MT CO_2e/SP/yr for 2030. Therefore, the proposed Project would result in a significant unavoidable project impact and significantly contribute to an unavoidable cumulative impact related to GHG emissions and conflict with an applicable GHG reduction plan, policy, or regulation.

5.3 ALTERNATIVES INITIALLY CONSIDERED BUT REJECTED FROM FURTHER CONSIDERATION

Section 15126.6(c) of the *State CEQA Guidelines* suggests that EIRs identify any alternatives that were considered by the Lead Agency but were rejected during the scoping process and briefly explain the reasons underlying the Lead Agency's determination. In evaluating an appropriate range

of alternatives to the proposed Project, a number of alternatives were considered and rejected for differing reasons by the City of Lake Forest (City).

The following is a discussion of the development alternatives considered during the environmental review process and the reasons they were not selected for detailed analysis in this Draft EIR.

5.3.1 Alternative Sites

CEQA requires that the discussion of alternatives focus on alternatives to the project or its location that are capable of avoiding or substantially lessening any significant impacts of the project. The key question and first step in the analysis is whether any of the significant impacts of the project would be avoided or substantially lessened by relocating the project. Only locations that would avoid or substantially lessen any of the significant impacts of the project need be considered for inclusion in the EIR (*State CEQA Guidelines*, Section 15126.6[f][2][A]). Among the factors that may be taken into account when addressing the feasibility of alternatives are site suitability, economic viability, availability of infrastructure, General Plan consistency, other plans or regulatory limitations, jurisdictional boundaries, and whether the applicant can reasonably acquire, control, or otherwise have access to the alternative site (*State CEQA Guidelines*, Section 15126.6[f][1]). If it is determined that no feasible alternative locations exist, the EIR must disclose the reasons for this conclusion (*State CEQA Guidelines*, Section 15126.6[f][2][B]).

No alternative locations to undertake the proposed Project are analyzed in the Draft EIR. The proposed Project involves development of the Nakase Property Area Plan (Woodley Architectural Group 2019) (hereafter referred to as the Area Plan) on the Project site. There is no other property in Lake Forest that would support a development similar to the proposed Project. The surrounding area is highly urbanized, and no land is currently available for development that is large enough (approximately 122 ac) to develop the proposed Project. In addition, the Project Applicant/Developer does not own or control any other property within Lake Forest or in the vicinity of the Project site that would be suitable for development of the Area Plan. Moreover, the Project Applicant/Developer cannot reasonably acquire or control an alternative site in a timely fashion that would allow for the implementation of a project with similar uses and square footage.

In addition, development of the proposed Project at an alternative site (assuming one was available) could potentially result in some environmental impacts that were similar to or greater than those of the proposed Project's environmental impacts, depending on the proximity of the alternate site to sensitive uses. Conversely, given that the Project site is located in a highly urbanized area, it is unlikely that relocating the proposed Project to another site would substantially lessen any of its impacts. The exception to this would be impacts related to agricultural resources. The City currently contains 18 parcels that are occupied by agricultural uses (general agricultural uses, horse ranches, nurseries, and other agriculture), totaling 192 ac of which 122 ac are the Project site. Because of the limited number of agricultural parcels in the City, development of the proposed Project on an alternative site could reduce or avoid impacts to agricultural resources.

Nevertheless, no alternative sites were considered feasible because the Project Applicant/Developer does not own or control another Project site in Lake Forest, no suitable alternative site is available that would achieve the underlying purpose and objectives of the proposed Project, and development

of the proposed Project on an alternative site would likely result in many of the same environmental impacts as development of the proposed Project on the Project site. Therefore, this alternative was rejected from further consideration.

5.3.2 No Project/No Development

This alternative would have assumed that the proposed Project site would remain in the same condition as it was at the time the Notice of Preparation (NOP) was published and no new development of any kind would occur on the Project site. This alternative was deemed infeasible as the current owners of the Project site—the Nakase Family—have indicated their intention to close the nursery and sell the property. As shown on Figure 3.5, General Plan Land Use and Business Development Overlay, the Project site is designated for Business Park uses on the City's General Plan Land Use Map. The Business Park designation is intended to provide a mix of uses as allowed under the Commercial, Professional Office, and Light Industrial designations. Therefore, in the absence of the proposed Project, it could be reasonably assumed that Business Park uses would be developed on the Project site. Development of Business Park uses on the Project site is evaluated as Alternative 1 below.

5.3.3 Public Park

As shown on Figure 3.5, General Plan Land Use and Business Development Overlay, the Project site is designated for Business Park uses on the City's General Plan Land Use Map. The Business Park designation is intended to provide a mix of uses as allowed under the Commercial, Professional Office, and Light Industrial designations. Development of a public park on the Project site would require a General Plan Amendment and Zone Change. It would also require acquisition of the Project site by the City of Lake Forest.

Development of park uses on the Project site would result in the same impact to Unique Farmland (i.e., conversion of 119.2 ac of Unique Farmland to non-agricultural uses) as the proposed Project. The primary source of GHG emissions associated with a public park would be vehicle trips. Because vehicle trips would likely be the same or less than the vehicle trips associated with the existing nursery, it is likely that GHG impacts would be less than that of the proposed Project.

Nevertheless, this alternative was deemed infeasible as the City recently developed the Lake Forest Sports Park and has not (1) designated the Project site for park uses in the General Plan; or (2) set aside funding for the acquisition of the land and development of park uses. In addition, development of a public park on the Project site would not achieve any of the intended Project objectives.

5.3.4 Community Garden/Farm

As shown on Figure 3.5, General Plan Land Use and Business Development Overlay, the Project site is designated for Business Park uses on the City's General Plan Land Use Map. The Business Park designation is intended to provide a mix of uses as allowed under the Commercial, Professional Office, and Light Industrial designations. Development of a community garden/farm on the Project

site would require a General Plan Amendment.[1] It would also require acquisition of the Project site by the City of Lake Forest or another entity capable of developing and managing a community garden or farm on the Project site.

Development of a community garden/farm would avoid potential impacts to Important Farmland because the 119.2 ac of Unique Farmland on the Project site would not be converted to non-agricultural use. The primary source of GHG emissions associated with a community garden/farm would be vehicle trips. Because vehicle trips would likely be the same or less than the vehicle trips associated with the existing nursery, it is likely that GHG impacts would be less than that of the proposed Project.

This alternative was deemed infeasible because the City recently developed the Lake Forest Sports Park and has not (1) designated the Project site for agricultural uses in the General Plan; or (2) set aside funding for the acquisition of the land and development of park uses. In addition, there are no pending applications for development or operation of a community garden/farm on the Project site, and any such project would not achieve any of the Project objectives.

5.4 ALTERNATIVES UNDER CONSIDERATION

Section 21100 of the Public Resources Code (PRC) and Section 15126 of the *State CEQA Guidelines* require an EIR to identify and discuss a No Project Alternative and a reasonable range of alternatives to the proposed Project that would feasibly attain most of the basic objectives of the project and would avoid or substantially lessen any of the significant environmental impacts. Based on the criteria listed above, the following four alternatives have been determined to represent a reasonable range of alternatives that have the potential to feasibly attain most of the basic objectives of the proposed Project but that may avoid or substantially lessen any of the significant impacts of the proposed Project. Therefore, the alternatives considered in this EIR include the following:

- **Alternative 1 – No Project Alternative:** CEQA requires analysis of a "No Project" Alternative. The purpose of describing and analyzing a no project alternative is to allow decision-makers to compare the impacts of approving the proposed Project with the impacts of not approving the proposed Project. According to *State CEQA Guidelines* Section 15126.6(e)(3)(C), the lead agency should proceed to analyze the impacts of the no project alternative by projecting what would reasonably be expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services. Because the current owners of the Project site have indicated their intent to close the nursery and sell the property, it is unlikely the Project site would continue to be used as a commercial nursery. As shown on Figure 3.5, General Plan Land Use and Business Development Overlay, the Project site is designated for Business Park uses on the City's General Plan Land Use Map. For this reason, under Alternative 1, it is assumed that while the proposed Area Plan would not be developed, the Project site would not remain in the existing condition, and the Project site would be developed to the maximum intensity allowed under the existing General Plan

[1] The existing Lake Forest General Plan does not include any agricultural land use designations.

designation of Business Park. The Business Park designation is intended to provide a mix of uses as allowed under the Commercial, Professional Office, and Light Industrial designations. Alternative 1 would include 1,841,700 square feet (sf) of Business Park use.

- **Alternative 2 – Urban Industrial/Residential:** The Project site would be developed in accordance with the Urban Industrial-Residential land use designation, which is a new land use designation being considered in the Lake Forest General Plan update. The Urban Industrial-Residential land use designation allows for a mix of light industrial and commercial uses at a density of 25 residential units per acre and a maximum floor-to-area ratio (FAR) of 1.0:1. Alternative 2 includes: 592 residential units; 89 senior affordable rental units; 4 acres (ac) of commercial/industrial uses; a 11.5 ac school; 21.41 ac of parks, open space, and habitat restoration area; and a 5.6 ac community garden.

- **Alternative 3 – No School Alternative:** Alternative 3 includes: development of up to 675 single-family residential units; 101 senior affordable rental units; 21.41 ac of parks, open space, and habitat restoration area; and a 3.5 ac community garden.

- **Alternative 4 – Reduced Project:** Alternative 4 includes: development of 600 single-family residential units; 90 senior affordable rental units; 11.5 ac elementary school; a 2 ac community garden; and 19.41 ac of parks, open space, and habitat restoration area.

For the purpose of this analysis, it is assumed that all of the alternatives would comply with applicable federal, State, and local regulations, policies, and ordinances. The Alternatives are further described below and their potential impacts compared to those of the proposed Project.

5.4.1 Alternative 1: No Project Alternative

5.4.1.1 Description

For Alternative 1, the Area Plan would not be approved, and the land use designation on the Project site would remain Business Park and Business Development Overlay (BDO), as designated in the current City of Lake Forest General Plan (dated June 1994, revised September 2016). The Business Park designation allows for a mixture of all uses allowed under Commercial, Professional Office, and Light Industrial land use designations.[1,2] The Business Park designation allows for a maximum FAR of 1.0:1. Alternative 1 would develop the Project site to the maximum intensity allowed under the current General Plan designation of Business Park and BDO. As such, Alternative 1 would include 1,841,700 sf of Business Park use. Because of the proximity to the Project site, it is assumed Alternative 1 would also include an Open Space & Habitat & Restoration Area along Serrano Creek.

1 Professional office allows for single-tenant or multi-tenant offices, including legal, medical, general financial, administrative, corporate, and general business offices as well as supportive commercial uses.

2 Light Industrial allows for a mixture of light industrial uses, wholesale businesses, light manufacturing and processing, storage, distribution and sales, research and development, warehousing and storage, high technology production, retail sales, and related uses.

5.4.1.2 Environmental Analysis

Aesthetics. The Project site is located in a fully developed area (with the exception of the Project site) in the northern portion of Lake Forest. Although the proposed Project would obstruct some views of the Santa Ana Mountains and some views from the Serrano Creek Trail, most views would be preserved; therefore, the proposed Project would result in less than significant impacts related to scenic vistas. The proposed Project would not impact a State Scenic Highway because none are located in the vicinity of the Project site. The visual character and quality of the Project site and its surrounding area would be preserved and enhanced through application of the architectural and landscape design guidelines outlined in the Area Plan. Therefore, the proposed Project would neither substantially degrade the visual character of the Project site nor conflict with applicable zoning and other regulations governing scenic quality, and impacts would be less than significant. The Project site is currently developed with few structures, and the majority of the Project site is not illuminated at night. The proposed Project would add lighting to the Project site that could result in impacts related to light and glare. However, the proposed Project includes mitigation measures that require preparation of a comprehensive lighting plan and a photometric survey to demonstrate that no spill lighting or glare would occur in sensitive areas. With implementation of mitigation, impacts related to light and glare would be less than significant.

Alternative 1 would develop the Project site with business park use consistent with the existing Business Park and BDO land use designation. Alternative 1 would fully develop the Project site, although the use would differ from the proposed Project. Alternative 1 would likely result in similarly scaled development. Additionally, the overall visual changes to the Project site would be similar to those associated with the proposed Project because both projects would add an urban use to a site that is currently used as a nursery. Therefore, the Alternative 1 impacts to scenic vistas, degradation of the visual character of the Project site, and conflict with applicable zoning and other regulations governing scenic quality would be less than significant and similar to the proposed Project. Alternative 1 would not impact a State Scenic Highway because there are none in the vicinity of the Project site.

Alternative 1 would require nighttime lighting, similar to the proposed Project. Because Alternative 1 would introduce nighttime lighting to a Project site that is not currently illuminated at night on the majority of the site, Alternative 1 would result in potentially significant impacts related to new sources of nighttime light. The mitigation measures would be the same as the proposed Project, would require preparation of a comprehensive lighting plan and photometric survey, and would reduce potential impacts related to lighting and glare to less than significant.

In summary, Alternative 1 would result in a potentially significant impact related to nighttime lighting, which would be reduced to less than significant with mitigation. No impact to State Scenic Highways would occur. Other potential impacts related to aesthetics would be less than significant. Alternative 1 would result in a project of similar scale although the use would be different than the proposed Project and therefore would result in aesthetic impacts that are similar to the proposed Project.

Agricultural Resources. According to the California Department of Conservation (DOC), 119.2 ac of the approximately 122 ac Project site is designated as Unique Farmland. The Project site is currently

being used as a retail nursery with all products grown and/or sold in pots. The proposed Project would permanently convert 119.2 ac of Unique Farmland to a non-agricultural use, which would result in a significant and unavoidable impact. The Project site has an agricultural district zoning designation; however, the Project Applicant/Developer is seeking a zoning classification amendment. Once the zone change is approved, the future use of the Project site would be consistent with the City's zoning designation, and impacts pertaining to conflicts with existing agricultural zoning would be less than significant. The Project site is not currently under a Williamson Act contract; therefore, the proposed Project would not conflict with an existing Williamson Act contract. The proposed Project would not involve other changes in the existing environment, which due to the location or nature, could result in conversion of farmland to a non-agricultural use. Mitigation measures were considered for the proposed Project in order to reduce the significant impact of converting Unique Farmland on the Project site to non-agricultural uses; however, none of the mitigation measures were feasible in large part because there is a lack of land designated as Important Farmland in Lake Forest or Orange County that could be used to offset the agricultural land conversion impact from the proposed Project.

Alternative 1 would develop the Project site with business park use consistent with the existing Business Park land use designation. Alternative 1 would change the use on the Project site, and would convert 119.2 ac of Unique Farmland to a non-agricultural use. Impacts pertaining to conflict with existing agricultural zoning associated with Alternative 1 would be less than significant. Alternative 1 would not conflict with an existing Williamson Act contract and would not involve other changes in the existing environment that, due to the location or nature, could result in conversion of farmland to a non-agricultural use. The conversion of 119.2 ac of Unique Farmland to a non-agricultural use would result in a significant and unavoidable impact for which there are no feasible mitigation measures to address. Therefore, the agricultural impacts of Alternative 1 would be comparable to the agricultural impacts of the proposed Project. Alternative 1 would not reduce or avoid a significant unavoidable impact of the proposed Project.

Air Quality. Air quality emissions associated with construction and operation of the proposed Project would not exceed SCAQMD significance thresholds. Therefore, impacts of the proposed Project related to the cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under applicable national ambient air quality standards (NAAQS) or California ambient air quality standards (CAAQS) would be less than significant. The proposed Project is consistent with the SCAQMD Final 2016 Air Quality Management Plan (AQMP) because (1) the construction and operation emissions of the proposed Project would not exceed the regional significance thresholds or cause or contribute to NAAQS or CAAQS violations; and (2) although the proposed Project would not be consistent with the land use designations of the Project site, the proposed Project is expected to generate less emissions as compared to the existing land use designation. Therefore, impacts related to conflict or obstruction of implementation of the applicable air quality plan would be less than significant.

Alternative 1 would develop the Project site with business park use consistent with the existing Business Park and BDO land use designation. The same grading footprint and similar construction would be required under Alternative 1 compared to the proposed Project; therefore, construction emissions would be similar and less than significant. According to the *Nakase Property Trip*

Generation Evaluation (Urban Crossroads 2018), the existing General Plan land use for the Project site would generate 14,122 more trip-ends per day than the proposed Project. The additional trip-ends would generate more operational emissions than trips associated with the proposed Project. The operational emissions of Alternative 1 were calculated as part of the *Air Quality Impact Analysis* (Urban Crossroads 2019a) and are summarized in Table 4.3.E of this EIR. Emissions generated during operation of Alternative 1 would exceed the SCAQMD thresholds for volatile organic compounds (VOCs), oxides of nitrogen (NO_x), and particulate matter less than 10 microns in size (PM_{10}). The portion of the South Coast Air Basin (Basin) in which the Project site is proposed is in nonattainment of the NAAQS for ozone (O_3) (1-hour and 8-hour), particulate matter less than 2.5 microns in size ($PM_{2.5}$) and is in nonattainment of the CAAQS for O_3 (1-hour and 8-hour), $PM_{2.5}$, and PM_{10}. As such, Alternative 1 would result in a cumulatively considerable net increase of criteria pollutants for which the region is nonattainment. Although Alternative 1 would be consistent with the land use designation of Business Park and BDO, operation of Alternative 1 would exceed the regional significance thresholds or cause or contribute to NAAQS or CAAQS violations. Therefore, Alternative 1 would not be consistent with the SCAQMD Final 2016 AQMP. Therefore, operational impacts of the No Project Alterative would be significant and greater than the proposed Project.

Biological Resources. No special-status plants are present on the Project site; therefore, the proposed Project would not impact special-status plant species. The proposed Project would remove 119.77 ac (115.26 ac permanently, 4.51 ac temporarily) of low-quality potential foraging habitat for two special-status bats: the western red bat and the western mastiff bat. The proposed Project would impact a small (0.28 ac) patch of Maritime Succulent Scrub/Southern Cactus Scrub (Coastal Sage Scrub) that is highly disturbed in nature and would not require mitigation because of its small size and degraded nature. While burrowing owls were not detected on the Project site during focused surveys, the proposed Project includes mitigation to ensure that the species has not moved onto the site between the dates the survey was performed and construction commences through implementation of a pre-construction survey prior to ground disturbance, per California Department of Fish and Wildlife (CDFW) survey guidelines. Bats have the potential to roost and possibly breed in Serrano Creek; therefore, mitigation would be implemented to reduce indirect impacts to bats during construction. Bat roosting/nursery exit counts and acoustic surveys would be conducted prior to the start of any construction activities, and a Bat Management Plan would be prepared, if required based on the results of the survey. Project construction has the potential to introduce and spread nonnative species; therefore, mitigation would be implemented to ensure the proposed landscaping would not include invasive exotic plants. Additionally, indirect impacts to Serrano Creek would be reduced through mitigation measures that require installation of construction fencing and implementation of Best Management Practices (BMPs). Additionally, a Habitat Management Plan (HMP) would be prepared, and the Open Space & Habitat & Restoration Area would be placed in a permanent conservation easement to avoid impacts to sensitive riparian habitat associated with Serrano Creek. The proposed Project would impact the on-site drainage that transverses the Project site and contains potential CDFW, United States Army Corps of Engineers (ACOE), and RWQCB jurisdiction. Mitigation measures for jurisdictional waters includes coordination with the ACOE, CDFW, and RWQCB regarding potential jurisdictional areas and the associated permitting processes and enhancement, and the establishment or re-establishment of jurisdictional areas on off-site conserved lands. Finally, compliance with the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code Section 3503 would reduce construction impacts to nesting birds,

including Cooper's hawk and red-tailed hawk in Serrano Creek. In summary, compliance with the mitigation summarized above and existing regulatory requirements (e.g., the MBTA) would reduce potentially significant impacts of the proposed Project to biological resources to less than significant.

Alternative 1 would develop the Project site with business park use consistent with the existing Business Park and BDO land use designation. Because Alternative 1 would involve development on the same Project site and would include an Open Space & Habitat & Restoration Area along Serrano Creek, impacts of Alternative 1 would essentially be the same as the proposed Project. Because the potential biological impacts of Alternative 1 would be comparable to those associated with the proposed Project, the same mitigation measures would be required. After implementation of mitigation, impacts to biological resources would be less than significant and comparable to the proposed Project.

Cultural Resources. The proposed Project would develop the Project site, which would require ground-disturbing construction activities. The proposed Project would not cause a substantial adverse change in the significance of a historical resource as defined by CEQA because no previously recorded historical resources were identified in the Project site. Due to the number of cultural resources recorded within 0.5 mi of the Project site and the location of the proposed Project site in the archaeologically sensitive Aliso Creek and Foothill areas (as identified in the City's General Plan), there is potential for ground-disturbing construction activities to impact archaeological resources. The proposed Project would incorporate mitigation measures to reduce potentially significant impacts to archaeological resources through archaeological monitoring and to reduce potentially significant impacts to previously undiscovered buried human remains through compliance with Health and Safety Code Section 7050.5. The mitigation measures would reduce potential impacts of the proposed Project to a less than significant level.

Alternative 1 would develop the Project site with business park use consistent with the existing Business Park and BDO land use designation, and would require ground-disturbing construction activities for the development. Similar to the proposed Project, Alternative 1 would not cause a substantial adverse change in the significance of a historical resource as defined by CEQA because no previously recorded historical resources were identified in the Project site. Because the Project site is in an area of archaeological sensitivity, there is potential that ground-disturbing construction activities would impact archaeological resources. Alternative 1 would be required to incorporate mitigation measures to reduce potentially significant impacts to archaeological resources through archaeological monitoring and to reduce potentially significant impacts to previously undiscovered buried human remains through compliance with Health and Safety Code Section 7050.5. The mitigation measures would reduce the potential impacts of Alternative 1 related to cultural resources to a less than significant level.

In summary, Alternative 1 would result in no impacts to historical resources and less than significant impacts with mitigation incorporated for archaeological resources and human remains. Alternative 1 would result in comparable cultural resources impacts compared to the proposed Project because both alternatives include ground-disturbance on the Project site.

Energy. Construction of the proposed Project would require energy for activities such as the manufacture and transportation of building materials, demolition and grading activities, and building construction. Total diesel fuel consumption would be 118,339 gallons from construction truck trips. Total gasoline consumption would be 1,084,438 gallons from construction worker vehicle trips. During operation, electricity demand would be 6,140,783 kilowatt-hours (kWh) per year, and natural gas demand would be 116,020.6 therms per year compared to the existing nursery use. The proposed Project would be constructed to CALGreen standards and appliances would be energy efficient, which would help to reduce energy and natural gas consumption. The proposed Project is estimated to generate approximately 5,948,016 vehicle miles traveled (VMT) for the elementary school, 1,086,584 VMT for the retirement community, and 19,064,105 VMT for the single-family residential uses annually, which would result in annual fuel consumption of 54,189 gal of gasoline and 758 gal of diesel. Although Project construction and operation would require use of energy, the proposed Project would not result in wasteful, inefficient, or unnecessary consumption of energy resources nor would it conflict with or obstruct a State or local plan for renewable energy or energy efficiency; therefore, impacts would be less than significant.

Alternative 1 would develop the Project site with business park uses consistent with the existing Business Park and BDO land use designation. The same grading footprint and similar construction would be required under Alternative 1 compared to the proposed Project; therefore, energy use during construction would be comparable to the proposed Project. Alternative 1 would likely result in a similarly scaled project overall, and the buildings would be required to be constructed to CALGreen standards to reduce energy use. Therefore, natural gas and electricity consumption during operation would be comparable to the proposed Project. However, according to the *Nakase Property Trip Generation Evaluation* (Urban Crossroads 2018), the currently adopted General Plan land use for the Project site would generate 14,122 more trip-ends per day than the proposed Project, which would result in a greater consumption of fuel during operation.

In summary, energy demand of Alternative 1 would be comparable to the proposed Project during construction and greater than the proposed Project during operation. Although construction and operation would require using energy, and operational energy demand would be greater than the proposed Project during operation, Alternative 1 would not result in the wasteful, inefficient, or unnecessary consumption of energy resources nor would it conflict with or obstruct a State or local plan for renewable energy or energy efficiency; therefore, impacts would be less than significant.

Geology and Soils. The proposed Project would not result in any impacts related to subsidence. Potential impacts related to expansive soils would be less than significant, and no mitigation is required. Impacts related to strong seismic ground shaking, liquefaction, slope stability, lateral spreading, unsuitable soils (from settlement), and corrosive soils are considered potentially significant, and mitigation is required. The mitigation measures require compliance with the recommendations in a *Final Geotechnical Evaluation* and compliance with the California Building Code (CBC). With implementation of mitigation, the proposed buildings would be designed and constructed to current safety standards, and all potentially significant impacts related to soils and geology would be less than significant. The proposed Project would increase erosion and loss of topsoil during construction; however, Erosion Control and Sediment Control BMPs would be implemented during construction in compliance with the requirements of the Construction General

Permit to ensure that impacts related to erosion would be less than significant. The Project site is in an area previously determined as sensitive for paleontological resources; therefore, it is possible that ground-disturbing construction activities could impact significant previously undiscovered paleontological resources. A Paleontological Resources Impact Mitigation Program (PRIMP) would be prepared and implemented to reduce potentially significant impacts to paleontological resources to less than significant.

Alternative 1 would develop the Project site with business park uses consistent with the existing Business Park and BDO land use designation. The same grading footprint and similar construction would be required compared to the proposed Project. Additionally, Alternative 1 would likely result in a similarly scaled project overall as the proposed Project. The required grading and construction activities would result in the same or similar impacts related to geology and soils as the proposed Project. While some construction specifications would be different for the No Project Alternative compared to the proposed Project, the overall risks related to seismic ground shaking, erosion, slope stability, unsuitable (corrosive) soils, expansive soils, and paleontological resources would be comparable. Therefore, it is anticipated that the No Project Alternative would result in impacts related to geology and soils similar to the proposed Project, and the same mitigation measures would be required.

In summary, Alternative 1 would result in potentially significant impacts related to geology, soils, and paleontological resources. These impacts would be less than significant with implementation of mitigation measures. Alternative 1 would result in impacts related to geology, soils, and paleontological resources that would be comparable to those of the proposed Project.

Greenhouse Gas Emissions. The proposed Project would result in 4.91 MT CO_2e/SP/yr of GHG emissions in 2025 and 4.42 MT CO_2e/SP/yr in 2030. The total GHG emissions of the proposed Project would exceed the thresholds of 3.84 MT CO_2e/SP/yr for 2025 and 2.88 MT CO_2e/SP/yr for 2030; therefore, the proposed Project would result in a potential significant impact related to generation of GHG emissions. No feasible mitigation measures exist that would reduce GHG emissions to levels that are less than significant. More than 73 percent of all mobile-source emissions in 2025 and 66 percent of all mobile-source emissions in 2030 (by weight) would be generated by the proposed Project's mobile sources (traffic). Neither the Project Applicant/Developer nor the City can substantively or materially affect reductions in Project mobile-source emissions beyond the regulatory requirements and project design features included as part of the proposed Project. Additionally, even if mitigation were applied to reduce all other sources of GHG emissions to the maximum extent possible, the proposed Project's mobile-source emissions alone would still exceed the threshold of significance. Therefore, impacts related to generation of GHG emissions would remain significant and unavoidable.

Alternative 1 would develop the Project site with business park uses consistent with the existing Business Park and BDO land use designation. According to the *Nakase Property Trip Generation Evaluation* (Urban Crossroads 2018), the currently adopted General Plan land use for the Project site would generate 14,122 more trip-ends per day than the proposed Project, which would result in a greater GHG emissions. Therefore, Alternative 1 would result in greater GHG impacts than the proposed Project. Therefore, Alternative 1 would result in significant and unavoidable impacts

related to generation of GHG emissions. Alternative 1 would not reduce or avoid a significant unavoidable impact of the proposed Project.

Hazards and Hazardous Materials. The proposed Project may result in a significant impact related to the possible discovery of unknown waste or suspect materials, or upset or accident of hazardous materials on the Project site during demolition, grading, or construction activities. In addition, the presence of asbestos-containing materials (ACMs), lead-based paint, mercury, and polychlorinated biphenyls (PCBs) cannot be ruled out in the existing structure that is proposed to be demolished. Mitigation would be implemented that includes preparation of a Demolition Plan to specify how to appropriately contain, remove, and dispose of hazardous building materials or unknown hazardous materials to protect human health and the environment. Operation and maintenance of the Project site would involve transport, use, and disposal of small quantities of hazardous materials or wastes associated with routine maintenance of residential and school facilities. Adopted regulations and procedures are in place to minimize impacts related to use and disposal of household hazardous waste associated with the proposed facilities, which would include a school. In order to gain approval for development of a school at the Project site that would receive State funding, previous Phase I and II Environmental Site Assessments (ESAs) prepared for the Project would need to be submitted to the Department of Toxic Substances Control (DTSC) for review. The DTSC would determine whether or not additional sampling and analysis, preparation of a Preliminary Endangerment Assessment (PEA), site remediation, and public review of reports are required in order to obtain a finding of "No Further Action". Coordination with the DTSC is included as mitigation to reduce impacts related to hazardous emissions or hazardous materials within 0.25 mi of a school. With implementation of the mitigation discussed above, impacts related to hazardous waste would be less than significant.

Alternative 1 would develop the Project site with business park uses consistent with the existing Business Park and BDO land use designation. Alternative 1 would not include a school, so no impact related to hazardous emissions or hazardous materials within 0.25 mi of a school would occur. Alternative 1 would involve demolition of the existing structure, grading, and construction of new buildings that would result in similar impacts related to hazardous waste and materials compared to the proposed Project. Alternative 1 may result in a significant impact related to the possible discovery of unknown waste or suspect materials, or upset or accident of hazardous materials on the Project site during demolition, grading, or construction activities. In addition, the presence of ACMs, lead-based paint, mercury, and PCBs cannot be ruled out in the existing structure that would be demolished. Mitigation would be implemented similar to the proposed Project, which includes preparation of a Demolition Plan to specify how to appropriately contain, remove, and dispose of hazardous building materials or unknown hazardous materials to protect human health and the environment. Operation and maintenance of the Project site would involve transport, use, and disposal of small quantities of hazardous materials or wastes associated with routine maintenance of the businesses. Adopted regulations and procedures are in place to minimize impacts related to use and disposal of household hazardous waste associated with the proposed facilities. In summary, with implementation a Demolition Plan, impacts related to hazardous waste would be less than significant and comparable to that of the proposed Project.

Hydrology and Water Quality. The proposed Project would develop the Project site with a new use and would increase impervious surface area on the Project site, which would increase stormwater runoff and change the pollutants of concern in stormwater runoff. The proposed Project would implement a comprehensive Water Quality Management Plan (WQMP) and BMPs to address pollutants of concern and to ensure protection of beneficial uses of receiving waters. In addition, the proposed Project includes drainage infrastructure and BMPs to minimize development impacts to the site hydrology in compliance with hydromodification requirements. The hydrology and water quality impacts of the proposed Project would be less than significant upon compliance with existing plans, programs, and policies in place to ensure compliance with National Pollutant Discharge Elimination System (NPDES) regulations.

Alternative 1 would develop the Project site with business park use consistent with the existing Business Park and BDO land use designation. Alternative 1 would change the use on the Project site, increase impervious surface area, increase stormwater runoff, and change the pollutants of concern in stormwater runoff. Alternative 1 would be required to implement BMPs and drainage infrastructure to reduce pollutants of concern on the Project site and reduce stormwater runoff in compliance with NPDES and hydromodification requirements.

With compliance with adopted regulations, Alternative 1 would result in less than significant impacts related to hydrology and water quality. The hydrology and water quality impacts of Alternative 1 would be comparable to the hydrology and water quality impacts of the proposed Project with implementation of BMPs and drainage infrastructure in compliance with adopted regulations.

Land Use and Planning. The proposed Project would be consistent with the Southern California Association of Governments (SCAG) 2008 Regional Comprehensive Plan (RCP) and Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) (2016a) by siting residential uses near commercial/industrial uses and major transportation corridors and transit stops, providing new housing, and providing an open space and habitat restoration area. The proposed Project would require a General Plan Amendment to modify the land use designation of the Project site from Business Park to Low-Medium and Medium Density Residential, High-Density Residential, Public Facility, Neighborhood Parks, and Open Space and a Zone Change from General Agriculture (A-1) to Planned Community. Upon the approval of the General Plan Amendment and Zone Change request by the City Council, the proposed Project would be consistent with the land use designations contained in the City's General Plan and the City's Municipal Code and zoning. The proposed Project would not result in noise, air quality, or aesthetic impacts that conflict with adjacent land uses and would not conflict with the Orange County Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP). Impacts related to land use and planning would be less than significant, and no mitigation is required.

Alternative 1 would develop the Project site with business park use consistent with the existing Business Park and BDO land use designation. Alternative 1 would be consistent with the SCAG 2008 RCP and RTP/SCS (2016a) by siting commercial uses near residential development, focusing growth near major transportation corridors and transit stops, and providing an open space and habitat restoration area. However, Alternative 1 would not meet the SCAG goal of providing new housing

opportunities. Alternative 1 would be consistent with the existing Business Park and BDO land use designation and would not require a General Plan Amendment. However, a Zone Change would be required to change the zoning from General Agriculture (A-1) to Community Commercial. Upon the approval of the Zone Change request by the City Council, Alternative 1 would be consistent with the land use designations contained in the City's Municipal Code and zoning. Alternative 1 would not result in noise, air quality, or aesthetic impacts that conflict with adjacent land uses and would not conflict with the Orange County NCCP/HCP. Impacts related to land use and planning would be less than significant and comparable to those of the proposed Project.

Noise. Construction noise levels would range from 53.3 to 65.2 dBA L_{eq} (equivalent continuous sound level measured in A-weighted decibels) at sensitive receiver locations. Construction vibration velocity levels are expected to range from 0.002 to 0.008 inches/second (in/sec) peak particle velocity (PPV). During operation, off-site traffic-associated trips generated from the proposed Project would increase noise levels by 0.1 to 0.72 dBA CNEL (Community Noise Equivalent Level measured in A-weighted decibels) on the study area roadway segments. Operational noise generated from the on-site uses would range from 17.9 to 32.5 dBA L_{50} (median noise level measured in A-weighted decibels) at the sensitive off-site receiver locations. The construction noise, construction vibration, off-site traffic, or on-site operational noise levels would not exceed City noise level standards or California Department of Transportation (Caltrans) construction vibration standards, and impacts would be less than significant. Operation would not generate excessive ground-borne vibration or ground-borne noise, and impacts would be less than significant. Adjacent traffic noise from nearby roadways and freeways would not exceed the City's exterior noise standards at the proposed outdoor uses on the Project site with the planned 6-foot (ft) high noise barriers, and impacts would be less than significant. Additionally, interior noise levels within the proposed residences and school, which would be constructed to meet ventilation standards and include dual-paned glass, are not anticipated to exceed the City's interior noise standards. However, a final Noise Study would be required to verify the design and building performance, which is included as mitigation to ensure interior noise levels are reduced to less than significant.

Alternative 1 would develop the Project site with business park use consistent with the existing Business Park and BDO land use designation. Alternative 1 would generate similar noise levels during the construction period because the scale of the development would be similar. Alternative 1 would include business park uses and would likely not include the outdoor park uses that generate most of the operational noise for the proposed Project. Therefore, operational noise impacts at nearby sensitive receivers from on-site uses would be less than the proposed Project. Alternative 1 would generate 14,122 more vehicle trip-ends per day than the proposed Project. Therefore, Alternative 1 would result in greater off-site traffic noise compared to the proposed Project, but would be anticipated to be less than significant. Alternative 1 would not require mitigation for interior noise levels because business uses are not considered sensitive uses; therefore, a final Noise Study would not be required for Alternative 1.

In summary, Alternative 1 would result in less than significant impacts at off-site sensitive receivers. Alternative 1 would generate similar construction noise, less on-site operation noise, and greater off-site operational traffic noise compared to the proposed Project.

Population and Housing. The proposed Project includes the development of up to 675 single-family residential units and up to 101 senior affordable rental units, which would serve a total of approximately 2,274 residents. Because the Project site is designed as Business Park and BDO, residential uses were not envisioned on the Project site and the population increase from the proposed Project would not have been accounted for in the City's projected population growth. While the proposed Project would result in population growth, the growth attributable to the proposed Project would not be substantial in relation to the current or projected conditions in the City. The addition of new affordable housing units also supports the affordable housing goals of the City. Although the proposed Project would provide short-term construction jobs and the proposed school would employ 60 workers, up to 249 nursery employees would also be displaced. However, given the availability of jobs in the region, it is anticipated that workers would find employment elsewhere. Although the Project may contribute to a decline in the jobs-housing ratio by adding a greater number of residential units to the City than job opportunities, the overall increase in housing compared to employment is not of sufficient magnitude to negatively affect the forecasted jobs-housing ratio. The proposed Project would result in less than significant impacts related to population, housing, and employment growth.

Alternative 1 would develop the Project site with business park use consistent with the existing Business Park and BDO land use designation. Alternative 1 would not include housing and would not induce substantial population growth because the majority of employees at the business park would likely already live in the region. However, Alternative 1 would not support the affordable housing goals of the City. Alternative 1 would displace the 249 nursery employees; however, Alternative 1 also would provide employment opportunities at the businesses that would occupy the business park, which would offset the displacement. Alternative 1 would increase the jobs-housing ratio by adding additional job opportunities within the City, which would help achieve the City's goal of achieving a better balance between jobs and housing.

The No Project Alterative would result in less than significant impacts related to population, housing, and employment growth. However, because Alternative 1 would not include housing and would achieve a better balance between jobs and housing, this alternative would have less impact related to population and housing than the proposed Project.

Public Services. Public service impacts related to fire and police protection services would be potentially significant; however, implementation of a Construction Traffic Management Plan (CTMP) would reduce construction impacts to less than significant, and a secured fire protection agreement and establishment of a Neighborhood Watch Program would reduce operational impacts to less than significant. The proposed Project includes the construction of a public elementary school on the Project site. The Project Applicant/Developer would include an elementary school to reduce impacts on school services from the additional students generated by the proposed Project; therefore, potential impacts related to the provision of school services for construction of the proposed Project would be less than significant. With the provision of on-site private parks and amenities, the proposed Project would not require the construction of new or an expansion of existing construction, or the expansion of existing recreational facilities or parks to maintain acceptable service ratios or performance objectives. Based on the City's library demand ratio, the population growth that would result from the proposed Project would not require the expansion of

existing library facilities in Lake Forest in order to maintain acceptable service ratios. Finally, the Orange County Transportation Authority (OCTA) would be able to provide adequate transit services to the proposed Project. Therefore, with implementation of the mitigation described above for fire and police service impacts, impacts to public services would be less than significant.

Alternative 1 would develop the Project site with business park use consistent with the existing Business Park and BDO land use designation. The new business park use on the Project site would increase demand for fire and emergency medical services; however, the Orange County Fire Authority (OCFA) requires all developers to enter into a secured fire protection agreement with OCFA to ensure the availability of adequate fire protection services. Alternative 1 does not include construction of housing and therefore would not increase population within Lake Forest. Therefore, Alternative 1 would not substantially increase demand for police protection, library, park, school, or transit services.

In summary, with implementation of the mitigation described above for fire and police service impacts, impacts of Alternative 1 to public services would be less than significant. Alternative 1 would not result in additional population that would increase demand for other public services; therefore, impacts to public services would be less than the proposed Project.

Recreation. The proposed Project includes the development of up to 675 single-family residential units and up to 101 senior affordable housing, which would increase the population in Lake Forest by approximately 2,274 persons. The increase in population would result in potentially significant impacts to existing neighborhood and regional parks and other recreational facilities. The proposed Project includes both private and public recreational uses on site. The City Municipal Code requires dedicating land equivalent to 5 ac per 1,000 residents or payment of in-lieu fees to reduce impacts to parklands. The proposed Project would meet the City's public park requirement of 11.37 ac by including approximately 21.41 ac of parks, open space, and habitat restoration area, of which 11.32 ac would be classified as public parks. Additionally, the proposed Project includes mitigation that requires on-site parks to be maintained in perpetuity. Therefore, impacts related to the use of existing neighborhood and regional parks and recreational facilities would be less than significant with implementation of mitigation.

Alternative 1 would develop the Project site with business park use consistent with the existing Business Park and BDO land use designation. Alternative 1 would not include housing and would not increase the population in Lake Forest. Employees of the business park would be reasonably expected to utilize parks near their home; therefore, Alternative 1 would not substantially increase the use of existing parks in the vicinity of the Project site. Alternative 1 would therefore result in less than significant impacts to existing neighborhood and regional parks and recreational facilities. Because Alternative 1 would not increase the population in Lake Forest, impacts to park and recreational facilities would be less than that of the proposed Project.

Transportation/Traffic. The proposed Project would increase VMT to 26,098,705 from the 2,698,384 VMT generated by the existing nursery. The proposed Project would not be inconsistent with *State CEQA Guidelines* Section 15064.3(b) because the City has not established thresholds for assessing VMT impacts; therefore, traffic impacts were assessed based on level of service (LOS). The

proposed Project is anticipated to generate a total of approximately 8,789 trip-ends per day, which would contribute to an impact at the Bake Parkway/Jeronimo Road intersection that is currently operating at an unacceptable LOS. The proposed Project would mitigate the impact at this location to acceptable levels through a combination of fee payments to the City pursuant to a Fair Share Agreement or construction of specific improvements. All construction equipment would be staged on site, and mitigation would be implemented to require that large construction equipment be delivered during off-peak times to reduce travel during peak travel periods so that construction would not result in incompatible uses that increase on-road hazards. Mitigation measures also require a distance analysis to be prepared for all Project intersections to determine limited use areas (e.g., low height landscaping), on-street parking restrictions (e.g., red curb), if necessary, and any turning restrictions (e.g., right-in/right-out). With implementation of mitigation, project construction and operation would not result in incompatible uses that increase on-road hazards, and impacts would be reduced to less than significant. Preparation of a CTMP is required as mitigation to ensure that emergency vehicles would be able to navigate through streets adjacent to the Project site that may experience congestion due to construction activities. Impacts related to emergency access during construction would be reduced to less than significant with implementation of mitigation. The Area Plan meets or exceeds the OCFA requirements to not hinder fire and emergency access; therefore, operational impacts related to emergency access would be considered less than significant.

Alternative 1 would develop the Project site with business park use consistent with the existing Business Park and BDO land use designation. Alternative 1 would generate similar traffic impacts during the construction period because the scale of the development would be similar. A CTMP would be required for Alternative 1 to reduce impacts to emergency access during construction. According to the *Traffic Impact Analysis* (Urban Crossroads 2019c) prepared for the Project, Alternative 1 would generate 14,122 more vehicle trip-ends per day than the proposed Project, which would result in greater impacts compared to the proposed Project. The No Project Alterative would mitigate traffic impacts through a Fair Share Agreement or construction of specific improvements, similar to the mitigation included for the proposed Project. Alternative 1 would be required to meet or exceed the OCFA requirements to not hinder fire and emergency access.

In summary, Alternative 1 would result in less than significant impacts related to traffic after implementation of mitigation measures similar to those of the proposed Project. Alternative 1 would result in comparable traffic impacts during construction and greater traffic impacts during operation compared to the proposed Project.

Tribal Cultural Resources. The proposed Project would develop the Project site, which would require ground-disturbing construction activities. No previously recorded cultural resources were identified in the Project site, and no specific information regarding tribal cultural resources was received during the Native American consultation. Therefore, the proposed Project would not cause a substantial adverse change in the significance of a tribal cultural resource as defined by CEQA that is listed or eligible for listing in the California Register of Historical Resources (California Register) or a local register. Based on the results of Native American consultation with the Gabrieleno Band of Mission Indians – Kizh Nation, there is potential that ground-disturbing construction activities would impact previously undiscovered significant tribal cultural resources. The proposed Project would

incorporate mitigation measures to reduce potentially significant impacts to previously undiscovered significant tribal cultural resources through Native American monitoring and evaluation of archaeological resources by the Native American monitor, and reduce potentially significant impacts to Native American buried human remains through compliance with Health and Safety Code Section 7050.5. The mitigation measures would reduce potential impacts to a less than significant level.

Alternative 1 would develop the Project site with business park use consistent with the existing Business Park and BDO land use designation, and would require ground-disturbing construction activities during the development. Similar to the proposed Project, Alternative 1 would not cause a substantial adverse change in the significance of a tribal cultural resource as defined by CEQA that is listed or eligible for listing in the California Register or a local register because no previously recorded cultural resources were identified in the Project site during the records search or during the Native American consultation. Based on the results of the Native American consultation, there is potential that ground-disturbing construction activities would impact previously undiscovered significant tribal cultural resources. Alternative 1 would be required to incorporate the same mitigation measures as the proposed Project that require Native American monitoring and evaluation of archaeological resources by the Native American monitor, and compliance with Health and Safety Code Section 7050.5. The mitigation measures would reduce potential impacts related to tribal cultural resources to a less than significant level.

In summary, Alternative 1 would result in no impacts to tribal cultural resources that are listed or eligible for listing in the California Register or a local register, and less than significant impacts with mitigation incorporated for previously undiscovered significant tribal cultural resources and Native American human remains. Alternative 1 would result in comparable tribal cultural resources impacts compared to the proposed Project because both alternatives include ground-disturbance on the Project site.

Utilities and Service Systems. Utilities and service systems include water, wastewater, electricity, natural gas, telecommunication, solid waste, and storm drain facilities. The proposed Project would increase demand for these services; however, there is sufficient supplies and capacity available to service the increased demand. Impacts related to utilities and service systems would be less than significant.

Alternative 1 would develop the Project site with business park use consistent with the existing Business Park and BDO land use designation. Alternative 1 would increase demand for these services; however, it is anticipated that there would be sufficient supplies and capacity available to service the increased demand. Impacts related to utilities and service systems would be less than significant and comparable to the proposed Project.

Wildfire. The Project site is designated as a non-very high fire hazard severity zone (non-VHFHSZ) and it is not located in or near a State Responsibility Area (SRA). However, the Project site is in the vicinity of a VHFHSZ. The proposed Project would result in no impact related to installation or maintenance of infrastructure that may exacerbate fire risk. The proposed Project would result in less than significant impacts related to impairment of an adopted emergency response or

evacuation plan, exacerbation of wildfire risk, and exposure of people or structures to post-wildfire risks.

Alternative 1 may require temporary lane closures on nearby local roadways during construction; however, these closures would be anticipated to be implemented consistent with the *California Temporary Traffic Control Handbook* (California Inter-Utility Coordinating Committee 2018). Although Alternative 1 would increase traffic trips on study area roadways, this alternative would not be expected to impair an adopted emergency response or evacuation plan because any traffic impacts would be mitigated through payment pursuant to a Fair Share Agreement or construction of specific improvements. Therefore, construction and operation of Alternative 1 would not substantially impair an adopted emergency response plan or emergency evacuation plan.

The Project site is not located in a VHFHSZ. Despite the VHFHSZ to the northeast of the Project site, the uncontrolled spread of a wildfire in the vicinity of the Project site is unlikely due to the density of existing non-combustible development and roadways, specifically State Route 241 (SR-241) and Rancho Parkway. Due to the lack of steep slopes, prevailing winds, location, and other factors, Alternative 1 would not exacerbate wildfire risks or expose people or structures to post-fire risks.

The build out of the Project site consistent with the current land use designation would be expected to include installation of utilities and an on-site roadway network. The installation of Project-related utilities and an on-site roadway network would not exacerbate fire risk due to the Project site's location in an urban and built-out area outside of a designated fire hazard zone. Therefore, Alternative 1 would not require the installation or maintenance of associated infrastructure (e.g., roads, fuel breaks, emergency water sources, power lines, or other utilities) that would exacerbate fire risk or result in temporary or ongoing impacts to the environment.

In summary, Alternative 1 would result in no impact related to installation or maintenance of infrastructure that may exacerbate fire risk and less than significant impacts related to impairment of an adopted emergency response or evacuation plan, exacerbation of wildfire risk, and exposure of people or structures to post-wildfire risks. Alternative 1 would result in similar wildfire impacts compared to the proposed Project because both alternatives include development of the Project site from a nursery to an urban use.

5.4.1.3 Project Objectives

Alternative 1 would be potentially consistent with the following two project objectives:

- Provide a comprehensive plan for development of the Nakase Property that implements the goals and policies of the Lake Forest General Plan.

- Provide a site design that is sensitive to the existing natural features, including Serrano Creek.

Alternative 1 would develop the Project site with business park use consistent with the existing Business Park and BDO land use designation. As such, this alternative would include construction of a business park and would not include housing or a school. Therefore, the No Project Alternative would not be consistent with the following six project objectives:

- Provide a balanced mix of single-family and attached senior affordable homes, open space, and active public and private uses.
- Accommodate public uses by incorporating a new elementary school site conveniently located within easy walking distance for Project site residents.
- Provide an exceptional trail system and on-site parks that enhance the quality of life of the larger community.
- Provide for logical, attractive, and safe pedestrian and bicycle connections within the community.
- Create high-quality residential homes and distinct, identifiable neighborhoods, with a range of specifically targeted single-family product types.
- Reduce vehicular traffic and peak-hour trips through thoughtful site planning that emphasizes connectivity, access, and mobility.

5.4.2 Alternative 2: Urban Industrial/Residential

5.4.2.1 Description

Alternative 2 assumes that the Project site would be developed in accordance with the Urban Industrial-Residential land use designation, which is a newly proposed land use designation being considered in the City's General Plan update. The Urban Industrial/Residential land use designation in the General Plan update (the Lake Forest General Plan 2040) would allow for a mix of light industrial and commercial uses, including manufacturing and production (e.g., food, beverage, apparel, design, furniture, custom, or small run manufacturing). Live-work units and home-based businesses are envisioned to be located in this designation. The intent of the Urban Industrial-Residential designation is to promote creation of a vibrant mixed-use workplace environment with employment and living opportunities located in proximity. The maximum intensity allowed under this designation is 25 residential units per acre and a maximum FAR for commercial/industrial uses of 1.0:1.

Alternative 2 would include a mix of residential and commercial/industrial uses in Planning Area 1 and a community garden in Planning Area 2. Total uses for Alternative 2 include 592 residential units, 89 senior affordable rental units, 4 ac of commercial/industrial uses, a 11.5 ac school, a 5.6 ac community garden, and 21.41 ac of parks, open space, and habitat restoration area. Table 5.A summarizes the uses assumed on the Project site for Alternative 2.

Table 5.A: Land Use Statistics for Alternative 2 (Urban Industrial/Residential)

Land Use	Planning Area	Maximum DU/ac	Acreage	Maximum # of Units
Residential	1	25	8.8	220
	2	N/A	5.6	0
	3	11.4	12.3	141
	4	10.4	13	135
	5	13.2	7.3	96
Commercial/ Industrial	1	1:1 FAR	4	174,240
School	Elementary School Site	N/A	11.5	N/A
Affordable Housing	Senior Affordable Housing	4.2 (high density)	2.6	89
Parks and Open Space	Community Garden/Farm (Planning Area 2)	N/A	5.6	N/A
	Central Park/Private Recreation Center	N/A	4.8	N/A
	Neighborhood Mini-Parks	NA	2.62	N/A
	Neighborhood Park	N/A	3.59	N/A
	Open Space & Habitat & Restoration Area	N/A	10.4	N/A
Utilitarian	Street Medians & Parkways	N/A	12.5	N/A
	Roads	N/A	22.8	N/A

Note: Grey highlighted rows show how Alternative 2 differs from the proposed Project.
DU/ac = dwelling units per acre
FAR = floor-to-area ratio
N/A = not applicable

5.4.2.2 Environmental Analysis.

Aesthetics. The Project site is located in a fully developed area (with the exception of the Project site) in the northern portion of Lake Forest. Although the proposed Project would obstruct some views of the Santa Ana Mountains and some views from the Serrano Creek Trail, most views would be preserved; therefore, the proposed Project would result in less than significant impacts related to scenic vistas. The proposed Project would not impact a State Scenic Highway because there are none in the vicinity of the Project site. The visual character and quality of the Project site and surrounding area would be preserved and enhanced through the application of the architectural and landscape design guidelines outlined in the Area Plan. Therefore, the proposed Project would not substantially degrade the visual character of the Project site or conflict with applicable zoning and other regulations governing scenic quality, and impacts would be less than significant.

The Project site is currently developed with few structures, and the majority of the Project site is not illuminated at night. The proposed Project would add lighting to the Project site, which could result in impacts related to light and glare. However, the Project includes mitigation measures that require preparation of a comprehensive lighting plan and a photometric survey to demonstrate that no spill lighting or glare would occur in sensitive areas. With implementation of mitigation, impacts related to light and glare would be less than significant.

Since Alternative 2 would result in a similarly scaled project overall, the overall visual changes to the site would be similar to those associated with the proposed Project. Therefore, the impacts of Alternative 2 to scenic vistas, degradation of the visual character of the Project site, and conflict with applicable zoning and other regulations governing scenic quality would be less than significant and similar to the proposed Project. Alternative 2 would not impact a State Scenic Highway because there are none in the vicinity of the Project site.

Alternative 2 would require nighttime lighting similar to that required for the proposed Project. Because Alternative 2 would introduce nighttime lighting to a Project site that is not currently illuminated at night over the majority of the site, Alternative 2 would result in potentially significant impacts related to new sources of nighttime light. The mitigation measures would be the same as the proposed Project, would require preparation of a comprehensive lighting plan and photometric survey, and would reduce potential impacts related to lighting and glare to less than significant.

In summary, Alternative 2 would result in a potentially significant impact related to nighttime lighting, which would be reduced to less than significant with mitigation. No impact to State Scenic Highways would occur. Other potential impacts related to aesthetics would be less than significant. Alternative 2 would result in a similar project overall and therefore would result in aesthetic impacts similar to those of the proposed Project.

Agricultural Resources. According to the DOC, 119.2 ac of the approximately 122 ac Project site is designated as Unique Farmland. The Project site is currently being used as a retail nursery with all products grown and/or sold in pots. The proposed Project would permanently convert 119.2 ac of Unique Farmland to a non-agricultural use, which would result in a significant and unavoidable impact. The Project site has an agricultural district zoning designation; however, the Project Applicant/Developer is seeking a zoning classification amendment. Once the change to the zoning designation is approved, the future use of the Project site would be consistent with the City's zoning designation, and impacts pertaining to conflicts with existing agricultural zoning would be less than significant. The Project site is not currently under a Williamson Act contract; therefore, the proposed Project would not conflict with an existing Williamson Act contract. The proposed Project would not involve other changes in the existing environment that, due to the location or nature, could result in conversion of farmland to a non-agricultural use. Mitigation measures were considered for the proposed Project in order to reduce the significant impact of converting Unique Farmland on the Project site to non-agricultural uses; however, none of the mitigation measures were feasible in large part because there is a lack of land designated as Important Farmland in Lake Forest or Orange County that could be used to offset the agricultural land conversion impact from the proposed Project.

Alternative 2 would develop the Project site with a mix of residential and commercial/industrial uses consistent with the proposed Urban Industrial/Residential land use designation in the General Plan update. Alternative 2 would also include a 5.6 ac community garden. Alternative 2 would change the use of the Project site and convert 113.6 ac of Unique Farmland to a non-agricultural use while retaining 5.6 ac for gardening. Impacts pertaining to conflict with existing agricultural zoning associated with Alternative 2 would be less than significant. Alternative 2 would not conflict with an existing Williamson Act contract and would not involve other changes in the existing environment

that, due to the location or nature, could result in conversion of farmland to a non-agricultural use. In addition, Alternative 3 would retain the agricultural character on a portion of the Project site in recognition that the Project site has been in agricultural production since 1938 and is a large percentage of the City's remaining agricultural land. Alternative 2 would convert fewer acres of Unique Farmland than the proposed Project. However, the reduction in agricultural conversion amounts to approximately 5 percent of the Unique Farmland converted by the proposed Project. This reduction is not sufficient to reduce significant and unavoidable impacts associated with converting agricultural land to non-agricultural use to a less than significant impact.[1] There are no feasible mitigation measures to address the conversion of 113.6 ac of Unique Farmland to a non-agricultural use and thereby reduce the significant impacts to agricultural resources. Therefore, the agricultural impacts of Alternative 2 would be comparable to the agricultural impacts of the proposed Project.

Air Quality. Air quality emissions associated with construction and operation of the proposed Project would not exceed SCAQMD significance thresholds. Therefore, impacts of the proposed Project related to the cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under applicable NAAQS or CAAQS would be less than significant. The proposed Project is consistent with the SCAQMD Final 2016 AQMP because: (1) the construction and operation emissions of the proposed Project would not exceed the regional significance thresholds or cause or contribute to NAAQS or CAAQS violations; and (2) although the proposed Project would not be consistent with the land use designations of the Project site, the proposed Project is expected to generate a net decrease in emissions as compared to the currently adopted land use designation. Therefore, impacts related to conflict or obstruction of implementation of the applicable air quality plan would be less than significant.

Alternative 2 would include a mix of residential and commercial/industrial uses consistent with the proposed Urban Industrial/Residential land use designation in the General Plan update. Alternative 2 would include 592 residential units, 89 senior affordable rental units, and 4 ac of commercial/industrial uses. The same grading footprint and similar construction would be required for Alternative 2 as would be for the proposed Project; therefore, construction emissions would be similar to the proposed Project and less than significant. Alternative 2 would include fewer housing units but additional acres of commercial/industrial uses that would be anticipated to generate an amount of vehicle trips similar to the proposed Project. Therefore, emissions generated during operation of Alternative 2 would not be anticipated to exceed the SCAQMD thresholds, and Alternative 2 would not result in a cumulatively considerable net increase of criteria pollutants for which the Project region is nonattainment. The proposed Project would be consistent with the SCAQMD Final 2016 AQMP because: (1) the construction and operation emissions would not exceed the regional significance thresholds or cause or contribute to NAAQS or CAAQS violations; and (2) Alternative 2 would be consistent with the land use designations of the Project site once the General Plan update is approved. Therefore, impacts related to conflict or obstruction of implementation of

[1] The California Department of Conservation has indicated that the Project site would lose its Important Farmland designation if the remaining agricultural use is less than 10 ac (e-mail communication with Troy Dick, Research Analyst II, California Department of Conservation, Division of Land Resources Protection, Farmland Mapping and Monitoring Program, July 19, 2019).

the applicable air quality plan would be less than significant. For these reasons, the Alternative 2 air quality impacts would be less than significant and similar to the proposed Project.

Biological Resources. No special-status plants are present on the Project site; therefore, the proposed Project would not impact special-status plant species. The proposed Project would remove 119.77 ac (115.26 ac permanently, 4.51 ac temporarily) of low-quality potential foraging habitat for two special-status bats: the western red bat and the western mastiff bat. The proposed Project would impact a small patch (0.28 ac) of Maritime Succulent Scrub/Southern Cactus Scrub (Coastal Sage Scrub) that is highly disturbed in nature and would not require mitigation because of its small size and degraded nature. While burrowing owls were not detected on the Project site during focused surveys, the Project includes mitigation to ensure the species has not moved onto the site between the dates the survey was performed and construction commences through a pre-construction survey prior to ground disturbance, per CDFW survey guidelines. Bats have the potential to roost and possibly breed in Serrano Creek; therefore, mitigation would be implemented to reduce indirect impacts to bats during construction. Bat roosting/nursery exit counts and acoustic surveys would be conducted prior to the start of any construction activities, and a Bat Management Plan would be prepared, if required, based on the results of the survey. Project construction has the potential to introduce and spread nonnative species; therefore, mitigation would be implemented to ensure that the proposed landscaping would not include invasive exotic plants. Additionally, indirect impacts to Serrano Creek would be reduced through mitigation measures that require installation of construction fencing and implementation of BMPs. Additionally, an HMP would be prepared and the Open Space & Habitat & Restoration Area placed in a permanent conservation easement to avoid impacts to sensitive riparian habitat associated with Serrano Creek. The proposed Project would impact the on-site drainage that transverses the Project site and contains potential CDFW, ACOE, and RWQCB jurisdiction. Mitigation measures for jurisdictional waters include coordination with ACOE, CDFW, and RWQCB regarding potential jurisdictional areas and the associated permitting processes and enhancement, re-establishment, or establishment of jurisdictional areas on off-site conserved lands. Finally, compliance with the MBTA and California Fish and Game Code Section 3503 would reduce construction impacts to nesting birds, including Cooper's hawk and red-tailed hawk, in Serrano Creek. In summary, compliance with the mitigation summarized above and existing regulatory requirements such as the MBTA would reduce potentially significant impacts to biological resources to less than significant.

Alternative 2 would develop the Project site with business park use consistent with the existing Business Park and BDO land use designation. Because Alternative 2 would involve development on the same Project site and would include an Open Space & Habitat & Restoration Area along Serrano Creek, Alternative 2 impacts would be essentially the same as the proposed Project. Because the potential biological impacts of Alternative 2 would be comparable to those associated with the proposed Project, the same mitigation measures would be required. After implementation of mitigation, Alternative 2 impacts to biological resources would be less than significant and comparable to the proposed Project.

Cultural Resources. The proposed Project would develop the Project site, which would require ground-disturbing construction activities. The proposed Project would not cause a substantial adverse change in the significance of a historical resource as defined by CEQA because no previously

recorded historical resources were identified in the Project site. Due to the number of cultural resources recorded within 0.5 mi of the Project site and the location of the proposed Project site in the archaeologically sensitive Aliso Creek and Foothill areas (as identified in the City's General Plan), there is potential that ground-disturbing construction activities would impact archaeological resources. The proposed Project would incorporate mitigation measures to reduce potentially significant impacts to archaeological resources through archaeological monitoring and reduce potentially significant impacts to previously undiscovered buried human remains through compliance with Health and Safety Code Section 7050.5. The mitigation measures would reduce potential impacts to a less than significant level.

Alternative 2 would develop the Project site with a mix of residential and commercial/industrial uses consistent with the proposed Urban Industrial/Residential land use designation in the General Plan update, and would require ground-disturbing construction activities for the development. Similar to the proposed Project, Alternative 2 would not cause a substantial adverse change in the significance of a historical resource as defined by CEQA because no previously recorded historical resources were identified in the Project site. Because the Project site is in an area of archaeological sensitivity, there is potential that ground-disturbing construction activities would impact archaeological resources. Alternative 2 would be required to incorporate mitigation measures to reduce potentially significant impacts to archaeological resources through archaeological monitoring and reduce potentially significant impacts to previously undiscovered buried human remains through compliance with Health and Safety Code Section 7050.5. The mitigation measures would reduce potential impacts related to cultural resources to a less than significant level.

In summary, Alternative 2 would result in no impacts to historical resources and less than significant impacts with mitigation incorporated for archaeological resources and human remains. Alternative 2 would result in cultural resources impacts comparable to those of the proposed Project because both alternatives include ground disturbance on the Project site.

Energy. Construction of the proposed Project would require energy for activities such as the manufacture and transportation of building materials, demolition and grading activities, and building construction. Total diesel fuel consumption would be 118,339 gal from construction truck trips. Total gasoline consumption would be 1,084,438 gal from construction worker vehicle trips. During operation, electricity demand would be 6,140,783 kWh per year, and natural gas demand would be 116,020.6 therms per year compared to the existing nursery use. The proposed Project would be constructed to CALGreen standards and appliances would be energy efficient, which would help to reduce energy and natural gas consumption. The proposed Project is estimated to generate approximately 5,948,016 VMT for the elementary school, 1,086,584 VMT for the retirement community, and 19,064,105 VMT for the single-family residential uses annually, which would result in an annual fuel consumption of 54,189 gal of gasoline and 758 gal of diesel. Although Project construction and operation would require the use of energy, the proposed Project would not result in the wasteful, inefficient, or unnecessary consumption of energy resources or conflict with or obstruct a State or local plan for renewable energy or energy efficiency, and impacts would be less than significant.

Alternative 2 would include a mix of residential and commercial/industrial uses consistent with the proposed Urban Industrial/Residential land use designation in the General Plan update. Alternative 2 would include 592 residential units, 89 senior affordable rental units, and 4 ac of commercial/industrial uses. The same grading footprint and similar construction would be required for Alternative 2 as would the proposed Project; therefore, energy use during construction would be comparable to the proposed Project. Alternative 2 would likely result in a similarly scaled project overall, and the building would be required to be constructed to CALGreen standards to reduce energy use. Alternative 2 would include fewer housing units but additional acres of commercial/industrial uses that would be anticipated to generate a similar amount of vehicle trips as the proposed Project. Therefore, energy use during operation would be comparable to the proposed Project. Although construction and operation would require the use of energy, the operational energy demand would be similar to that of the proposed Project and would not result in the wasteful, inefficient, or unnecessary consumption of energy resources or conflict with or obstruct a State or local plan for renewable energy or energy efficiency. Therefore, Alternative 2 impacts related to energy use would be less than significant.

Geology and Soils. The proposed Project would not result in any impacts related to subsidence. Potential impacts related to expansive soils would be less than significant, and no mitigation is required. Impacts related to strong seismic ground shaking, liquefaction, slope stability, lateral spreading, unsuitable soils (from settlement), and corrosive soils are considered potentially significant, and mitigation is required. The mitigation measures require compliance with the recommendations in the *Final Geotechnical Evaluation* and compliance with the CBC. With implementation of mitigation, the proposed buildings would be designed and constructed to current safety standards, and all potentially significant impacts related to soils and geology would be less than significant. The proposed Project would increase erosion and loss of topsoil during construction; however, Erosion Control and Sediment Control BMPs would be implemented during construction in compliance with the requirements of the Construction General Permit to ensure that impacts related to erosion would be less than significant. The Project site is in an area previously determined as sensitive for paleontological resources; therefore, it is possible that ground-disturbing construction activities could impact significant previously undiscovered paleontological resources. A PRIMP would be prepared and implemented to reduce potentially significant impacts to paleontological resources to less than significant.

Alternative 2 would include a mix of residential and commercial/industrial uses consistent with the proposed Urban Industrial/Residential land use designation in the General Plan update. The same or similar grading footprint and similar construction as the Proposed Project would be required. Additionally, Alternative 2 would likely result in a similarly scaled project overall as the proposed Project. The required grading and construction activities would result in the same or similar impacts related to geology and soils as the proposed Project. While some construction specifications would be different for Alternative 2 when compared to the proposed Project, the overall risks related to seismic ground shaking, erosion, slope stability, unsuitable (corrosive) soils, expansive soils, and paleontological resources would be comparable. Therefore, it is anticipated that Alternative 2 would result in similar impacts related to geology and soils as the proposed Project, and the same mitigation measures would be required.

In summary, Alternative 2 would result in potentially significant impacts related to geology and soils. These impacts would be less than significant with implementation of mitigation measures. Alternative 2 would result in impacts related to geology and soils that would be comparable to those of the proposed Project.

Greenhouse Gas Emissions. The proposed Project would result in 4.91 MT CO_2e/SP/yr of GHG emissions in 2025 and 4.42 MT CO_2e/SP/yr in 2030. The total GHG emissions of the proposed Project would exceed the thresholds of 3.84 MT CO_2e/SP/yr for 2025 and 2.88 MT CO_2e/SP/yr for 2030; therefore, the proposed Project would result in a potentially significant impact related to GHG emissions generation. No feasible mitigation measures exist that would reduce GHG emissions to levels that are less than significant. More than 73 percent of all mobile-source emissions in 2025 and 66 percent of all mobile-source emissions in 2030 (by weight) would be generated by the proposed Project's mobile sources (traffic). Neither the Project Applicant/Developer nor the City can substantively or materially affect reductions in Project mobile-source emissions beyond the regulatory requirements and project design features included as part of the proposed Project. Additionally, even if mitigation were applied to reduce all other sources of GHG emissions to the maximum extent possible, the proposed Projects mobile-source emissions alone would still exceed the threshold of significance. Therefore, impacts related to the generation of GHG emissions would remain significant and unavoidable.

Alternative 2 would include a mix of residential and commercial/industrial uses consistent with the proposed Urban Industrial/Residential land use designation in the General Plan update. Alternative 2 would include fewer housing units but additional acres of commercial/industrial uses that would be anticipated to generate a similar amount of vehicle trips as the proposed Project. Emissions would likely be similar to the proposed Project. Therefore, the total GHG emissions of Alternative 2 would likely exceed the thresholds of 3.84 MT CO_2e/SP/yr for 2025 and 2.88 MT CO_2e/SP/yr for 2030; therefore, Alternative 2 would result in a potentially significant impact related to GHG emissions generation. No feasible mitigation measures exist that would reduce GHG emissions to levels that are less than significant. A majority of the GHG emissions would be generated by the mobile sources (traffic). Neither the Project Applicant/Developer nor the City can substantively or materially affect reductions in Project mobile-source emissions beyond the regulatory requirements and project design features that would be included in Alternative 2. Additionally, even if mitigation were applied to reduce all other sources of GHG emissions to the maximum extent possible, Alternative 2's mobile-source emissions alone would likely still exceed the threshold of significance. Therefore, Alternative 2 impacts related to the generation of GHG emissions would remain significant and unavoidable but similar to that of the proposed Project.

Hazards and Hazardous Materials. The proposed Project may result in a significant impact related to the possible discovery of unknown waste or suspect materials, or upset or accident of hazardous materials on the Project site during demolition, grading, or construction activities. In addition, the presence of ACMs, lead-based paint, mercury, and PCBs cannot be ruled out in the existing structure that would be demolished. Mitigation would be implemented that includes preparation of a Demolition Plan to specify how to appropriately contain, remove, and dispose of hazardous building materials or unknown hazardous materials to protect human health and the environment. Operation and maintenance of the Project site would involve transport, use, and disposal of small

quantities of hazardous materials or wastes associated with routine maintenance of residential and school facilities. Adopted regulations and procedures are in place to minimize impacts related to use and disposal of household hazardous waste associated with the proposed facilities. The proposed Project would include a school. In order to gain approval for development of a school at the Project site that would receive State funding, previous Phase I and II ESAs prepared for the Project would need to be submitted to the DTSC for review. The DTSC would determine whether or not additional sampling and analysis, preparation of a PEA, site remediation, and public review of reports are required in order to obtain a finding of "No Further Action". Coordination with DTSC is included as mitigation to reduce impacts related to hazardous emissions or hazardous materials within 0.25 mi of a school. With implementation of the mitigation measures discussed above, impacts related to hazardous waste would be less than significant.

Alternative 2 would include a mix of residential and commercial/industrial uses consistent with the proposed Urban Industrial/Residential land use designation in the General Plan update. Alternative 2 would involve demolition of the existing structure, grading, and construction of new buildings that would result in similar impacts related to hazardous waste and materials as the proposed Project. Alternative 2 may result in a significant impact related to the possible discovery of unknown waste or suspect materials, or upset or accident of hazardous materials on the Project site during demolition, grading, or construction activities. In addition, the presence of ACMs, lead-based paint, mercury, and PCBs cannot be ruled out in the existing structure that would be demolished. Mitigation would be implemented similar to the proposed Project, which includes preparation of a Demolition Plan to specify how to appropriately contain, remove, and dispose of hazardous building materials or unknown hazardous materials to protect human health and the environment. Operation and maintenance of the Project site would involve transport, use, and disposal of small quantities of hazardous materials or wastes associated with routine maintenance of the residents, businesses, and school. Adopted regulations and procedures are in place to minimize impacts related to use and disposal of household hazardous waste associated with the proposed facilities. Alternative 2 would include a school, and impacts related to hazardous emissions or hazardous materials within 0.25 mi of a school could occur; therefore, a finding of "No Further Action" would be required from the DTSC. With implementation a Demolition Plan and a finding of "No Further Action", impacts related to hazardous waste would be less than significant and comparable to that of the proposed Project.

Hydrology and Water Quality. The proposed Project would develop the Project site with a new use and would increase the impervious surface area on the Project site, which would increase stormwater runoff and change the pollutants of concern in stormwater runoff. The proposed Project would implement a comprehensive WQMP and BMPs to address pollutants of concern and to ensure protection of beneficial uses of receiving waters. In addition, the proposed Project includes drainage infrastructure and BMPs to minimize development impacts to the site hydrology in compliance with hydromodification requirements. Hydrology and water quality impacts of the proposed Project would be less than significant upon compliance with existing plans, programs, and policies in place to ensure compliance with NPDES regulations.

Alternative 2 would develop the Project site with a mix of residential and commercial/industrial uses consistent with the proposed Urban Industrial/Residential land use designation in the General Plan

update. Alternative 2 would change the use on the Project site, increase impervious surface area, increase stormwater runoff, and change the pollutants of concern in stormwater runoff. Alternative 2 would be required to implement BMPs and drainage infrastructure to reduce pollutants of concern on the project site and reduce stormwater runoff in compliance with NPDES and hydromodification requirements.

With compliance with adopted regulations, Alternative 2 would result in less than significant impacts related to hydrology and water quality. With implementation of BMPs and drainage infrastructure in compliance with adopted regulations, the hydrology and water quality impacts of Alternative 2 would be comparable to that of the proposed Project.

Land Use and Planning. The proposed Project would be consistent with the SCAG 2008 RCP and RTP/SCS by siting residential uses near commercial/industrial uses, near major transportation corridors and transit stops, providing new housing, and providing an open space and habitat restoration area. The proposed Project would require a General Plan Amendment to modify the land use designation of the Project site from Business Park to Low-Medium and Medium Density Residential, High Density Residential, Public Facility, Neighborhood Parks, and Open Space, and a Zone Change from General Agriculture (A-1) to Planned Community. Upon the approval of the General Plan Amendment and Zone Change request by the City Council, the proposed Project would be consistent with the land use designations contained in the City's General Plan and the City's Municipal Code and zoning. The proposed Project would not result in noise, air quality, or aesthetic impacts that would conflict with adjacent land uses and would not conflict with the Orange County NCCP/HCP. Impacts related to land use and planning would be less than significant, and no mitigation is required.

Alternative 2 would develop the Project site with a mix of residential and commercial/industrial uses consistent with the proposed Urban Industrial/Residential land use designation in the General Plan update. Alternative 2 would be consistent with the SCAG 2008 RCP and RTP/SCS by siting commercial uses near residential development, providing new housing opportunities that focus growth near major transportation corridors and transit stops, and providing an open space and habitat restoration area. Alternative 2 would be consistent with the Urban Industrial/Residential land use designation when the General Plan Update is approved in 2020 and would not require a General Plan Amendment. However, a Zone Change would be required to change the zoning from General Agriculture (A-1) to Low-Medium and Medium Density Residential, High Density Residential, Public Facility, Neighborhood Parks, Open Space, and Community Commercial. Upon the approval of the Zone Change request by the City Council, Alternative 2 would be consistent with the land use designations contained in the City's Municipal Code and zoning. Alternative 2 would not result in noise, air quality, or aesthetic impacts that would conflict with adjacent land uses and would not conflict with the Orange County NCCP/HCP. Impacts related to land use and planning would be less than significant and comparable to those of the proposed Project.

Noise. Construction noise levels would range from 53.3 to 65.2 dBA L_{eq} at the sensitive receiver locations. Construction vibration velocity levels are expected to range from 0.002 to 0.008 in/sec PPV. During operation, off-site traffic-associated trips generated from the proposed Project would increase noise levels by 0.1 to 0.72 dBA CNEL on the study area roadway segments. Operational

noise generated from the on-site uses would range from 17.9 to 32.5 dBA L_{50} at the sensitive off-site receiver locations. The construction noise, construction vibration, off-site traffic, on on-site operational noise levels would not exceed City noise level standards or Caltrans construction vibration standards, and impacts would be less than significant. Operation would not generate excessive ground-borne vibration or ground-borne noise, and impacts would be less than significant. Adjacent traffic noise from nearby roadways and freeways would not exceed the City's exterior noise standards at the proposed outdoor uses on the Project site with the planned 6 ft high noise barriers, and impacts would be less than significant. Additionally, interior noise levels within the proposed residences and school, which would be constructed to meet ventilation standards and include dual-paned glass, are not anticipated to exceed the City's interior noise standards. However, a final Noise Study would be required to verify the design and building performance, which is included as mitigation to ensure that interior noise levels are reduced to less than significant.

Alternative 2 would develop the Project site with a mix of residential and commercial/industrial uses consistent with the proposed Urban Industrial/Residential land use designation in the General Plan update. Alternative 2 would generate similar noise levels during the construction period because the scale of the development would be similar. Alternative 2 would include fewer housing units but additional acres of commercial/industrial uses that would be anticipated to generate a similar amount of vehicle trips as the proposed Project. Therefore, Alternative 2 would generate similar operational noise levels as the proposed Project. It is not anticipated that any heavy landscaping or farming equipment would be used in the community garden; therefore, this use would not generate excessive noise. Therefore, similar to the proposed Project, a final Noise Study would be required to demonstrate that the interior noise levels within the proposed buildings would be less than the City's interior noise.

In summary, Alternative 2 would result in less than significant impacts at off-site sensitive receivers. On-site noise levels would be less than significant after mitigation (i.e., preparation of a final Noise Study). Alternative 2 would generate construction and operational noise similar to that of the proposed Project.

Population and Housing. The proposed Project includes the development of up to 675 single-family residential units and up to 101 senior affordable rental units that would serve approximately 2,274 residents. Because the Project site is designed as Business Park and BDO, residential uses were not envisioned on the Project site and the population increase from the proposed Project would not have been accounted for in the City's projected population growth. While the proposed Project would result in population growth, the growth attributable to the proposed Project would not be substantial in relation to the current or projected conditions in Lake Forest. The addition of new affordable housing units also supports the affordable housing goals of the City. Although the proposed Project would provide short-term construction jobs and the proposed school would employ 60 workers, up to 249 nursery employees would also be displaced. However, given the availability of jobs in the region, it is anticipated that workers would find employment elsewhere. Although the Project may contribute to a decline in the jobs-housing ratio by adding a greater number of residential units to the City than job opportunities, the overall increase in housing compared to employment is not of a sufficient magnitude to negatively affect the forecasted jobs-

housing ratio. The proposed Project would result in less than significant impacts related to population, housing, and employment growth.

Alternative 2 would develop the Project site with a mix of residential and commercial/industrial uses consistent with the proposed Urban Industrial/Residential land use designation in the General Plan update. Although Alternative 2 would include fewer housing units and serve fewer residents than the proposed Project, the increased population of 1,996 persons resulting from the alternative would not have been accounted for in the City's projected population. While Alternative 2 would result in population growth, the growth attributable to the alternative would not be substantial in relation to the current or projected conditions in Lake Forest. Additionally, Alternative 2 would support the affordable housing goals of the City by providing senior affordable housing. Alternative 2 would displace the 249 nursery employees; however, Alternative 2 would also provide short-term construction jobs, and the proposed school and commercial/industrial uses would employee workers. Alternative 2 may contribute to a decline in the jobs-housing ratio by adding a greater number of residential units to the City than job opportunities. However, because Alternative 2 includes fewer residential units and more job opportunities than the proposed Project, the decline in the jobs-housing ratio would be less than that of the proposed Project.

In summary, Alterative 2 would result in less than significant impacts related to population, housing, and employment growth. However, because Alternative 2 would include fewer housing units and more job opportunities than the proposed Project, it would result in less of a decline in the balance between jobs and housing. Therefore, Alternative 2 would have a reduced impact related to population and housing when compared to the proposed Project.

Public Services. Public service impacts related to fire and police protection services would be potentially significant; however, implementation of a CTMP would reduce construction impacts to less than significant, and a secured fire protection agreement and establishment of a Neighborhood Watch Program would reduce operational impacts to less than significant. The proposed Project includes the construction of a public elementary school on the Project site, and the Project Applicant/Developer would include an elementary school to reduce impacts on school services from the additional students generated by the proposed Project. Therefore, potential impacts related to the provision of school services for construction of the proposed Project would be less than significant. With the provision of on-site private parks and amenities, the proposed Project would not require constructing new or expanding existing construction, or expanding existing recreational facilities or parks to maintain acceptable service ratios or performance objectives. Based on the City's library demand ratio, the population growth that would result from the proposed Project would not require expanding existing library facilities in Lake Forest in order to maintain acceptable service ratios. Finally, OCTA would be able to provide adequate transit services to the proposed Project. Therefore, with implementation of the mitigation described above for fire and police service impacts, impacts to public services would be less than significant.

Alternative 2 would develop the Project site with a mix of residential and commercial/industrial uses consistent with the proposed Urban Industrial/Residential land use designation in the General Plan update. Alternative 2 would include fewer housing units and would result in less population growth than the proposed Project. The increased population from Alternative 2 would increase demand for

fire and emergency medical services, police protection, library, park, school, and transit services, although the increased demand would be less than the proposed Project. Alternative 2 would include mitigation similar to that of the proposed Project, including implementation of a CTMP, establishment of a Neighborhood Watch Program, and payment of development fees. Additionally Alternative 2 would include a school, parks, and open space to reduce demand for schools and parks. Therefore, with implementation of mitigation, impacts to public services would be less than significant.

In summary, with implementation of the mitigation described above, Alternative 2 impacts to public services would be less than significant. Alternative 2 would result in less of an increase in population; therefore, impacts to public services would be less than the proposed Project.

Recreation. The proposed Project includes the development of up to 675 single-family residential units and up to 101 senior affordable housing that would increase the population in Lake Forest by approximately 2,274 persons. The increase in population would result in potentially significant impacts to existing neighborhood and regional parks and other recreational facilities. The proposed Project includes both private and public recreational uses on site. The City Municipal Code requires dedication of land equivalent to 5 ac per 1,000 residents or payment of in-lieu fees to reduce impacts to parklands. The proposed Project would meet the City's public park requirement of 11.37 ac by including approximately 21.41 ac of parks, open space, and habitat restoration area, of which 11.32 ac would be classified as public parks. Additionally, the proposed Project includes mitigation that requires on-site parks to be maintained in perpetuity. Therefore, impacts related to the use of existing neighborhood and regional parks and recreational facilities would be less than significant with implementation of mitigation.

Alternative 2 would develop the Project site with a mix of residential and commercial/industrial uses consistent with the proposed Urban Industrial/Residential land use designation in the General Plan update. Alternative 2 would increase the population within the City by 1,996 persons, which is a public park requirement of 9.98 ac using the City's standard of 5 ac of recreational space per 1,000 residents. Alternative 2 would include 21.41 ac of parks, open space, and habitat restoration area, of which 11.32 ac would be classified as public parks. Alternative 2 would include mitigation similar to the proposed Project, which would require on-site parks to be maintained in perpetuity. Therefore, impacts related to the use of existing neighborhood and regional parks and recreational facilities would be less than significant with implementation of mitigation. Alternative 2 would result in impacts to parks and recreational facilities comparable to those of the proposed Project because both alternatives would offset impacts by dedicating parkland through construction of on-site parks.

Transportation/Traffic. The proposed Project would increase VMT to 26,098,705 from the 2,698,384 VMT generated by the existing nursery. The proposed Project would not be inconsistent with *State CEQA Guidelines* Section 15064.3(b) because the City has not established thresholds for assessing VMT impacts; therefore, traffic impacts were assessed based on LOS. The proposed Project is anticipated to generate a total of approximately 8,789 trip-ends per day, which would contribute to an impact at the Bake Parkway/Jeronimo Road intersection, which is currently operating at an unacceptable LOS. The proposed Project would mitigate the impact at this location to acceptable levels through a combination of fee payments to the City pursuant to a Fair Share

Agreement or construction of the specific improvements. All construction equipment would be staged on site, and mitigation would be implemented to require that large construction equipment be delivered during off-peak times to reduce travel during peak travel periods so that construction would not result in incompatible uses that increase on-road hazards. Mitigation measures also require a distance analysis to be prepared for all Project intersections to determine limited use areas (e.g., low height landscaping), and on-street parking restrictions (e.g., red curb), if necessary, and any turning restrictions (e.g., right in/right-out). With implementation of mitigation, project construction and operation would not result in incompatible uses that increase on-road hazards, and impacts would be reduced to less than significant. Preparation of a CTMP is required as mitigation to ensure emergency vehicles would be able to navigate to the Project site through adjacent streets that may experience congestion due to construction activities. Impacts related to emergency access during construction would be reduced to less than significant with implementation of mitigation. The Area Plan meets or exceeds OCFA requirements to not hinder fire and emergency access; therefore, operational impacts related to emergency access would be considered less than significant.

Alternative 2 would develop the Project site with a mix of residential and commercial/industrial uses consistent with the proposed Urban Industrial/Residential land use designation in the General Plan update. Alternative 2 would generate similar traffic impacts during the construction period because the scale of the development would be similar. A CTMP would be required for Alternative 2 to reduce impacts to emergency access during construction. Alternative 2 would include fewer housing units but additional acres of commercial/industrial uses, which would be anticipated to generate a similar amount of vehicle trips as the proposed Project. Therefore, traffic impacts would be similar compared to the proposed Project. Alternative 2 would mitigate traffic impacts through a Fair Share Agreement or construction of specific improvements, similar to the mitigation included for the proposed Project. Alternative 2 would be required to meet or exceed OCFA requirements to not hinder fire and emergency access.

In summary, Alternative 2 would result in less than significant impacts related to traffic after implementation of mitigation measures similar to those of the proposed Project. Alternative 2 would result in comparable traffic impacts during construction and operation compared to the proposed Project.

Tribal Cultural Resources. The proposed Project would develop the Project site, which would require ground-disturbing construction activities. No previously recorded cultural resources were identified in the Project site and no specific information regarding tribal cultural resources was received during the Native American consultation. Therefore, the proposed Project would not cause a substantial adverse change in the significance of a tribal cultural resource as defined by CEQA that is listed or eligible for listing in the California Register or a local register. Based on the results of Native American consultation with the Gabrieleno Band of Mission Indians – Kizh Nation, there is potential that ground-disturbing construction activities would impact previously undiscovered significant tribal cultural resources. The proposed Project would incorporate mitigation measures to reduce potentially significant impacts to previously undiscovered significant tribal cultural resources through Native American monitoring and evaluation of archaeological resources by the Native American monitor, and reduce potentially significant impacts to Native American buried human

remains through compliance with Health and Safety Code Section 7050.5. The mitigation measures would reduce potential impacts to a less than significant level.

Alternative 2 would develop the Project site with a mix of residential and commercial/industrial uses consistent with the proposed Urban Industrial/Residential land use designation in the General Plan update, and would require ground-disturbing construction activities for the development. Similar to the proposed Project, Alternative 2 would not cause a substantial adverse change in the significance of a tribal cultural resource as defined by CEQA that is listed or eligible for listing in the California Register or a local register because no previously recorded cultural resources were identified in the Project site during the records search or during the Native American consultation. Based on the results of Native American consultation, there is potential that ground-disturbing construction activities would impact previously undiscovered significant tribal cultural resources. Alternative 2 would be required to incorporate the same mitigation measures as the proposed Project that require Native American monitoring and evaluation of archaeological resources by the Native American monitor, and compliance with Health and Safety Code Section 7050.5. The mitigation measures would reduce potential impacts related to tribal cultural resources to a less than significant level.

In summary, Alternative 2 would result in no impacts to tribal cultural resources that are listed or eligible for listing in the California Register or a local register, and less than significant impacts with mitigation incorporated for previously undiscovered significant tribal cultural resources and Native American human remains. Alternative 2 would result in comparable tribal cultural resources impacts compared to the proposed Project because both alternatives include ground disturbance on the Project site.

Utilities and Service Systems. Utilities and service systems include water, wastewater, electricity, natural gas, telecommunication, solid waste, and storm drain facilities. The proposed Project would increase demand for these services; however, there are sufficient supplies and capacity available to service the increased demand. Impacts related to utilities and service systems would be less than significant.

Alternative 2 would develop the Project site with a mix of residential and commercial/industrial uses consistent with the proposed Urban Industrial/Residential land use designation in the General Plan update. Alternative 2 would increase demand for these services; however, it is anticipated that there would be sufficient supplies and capacity available to service the increased demand. Impacts related to utilities and service systems would be less than significant and comparable to the proposed Project.

Wildfire. The Project site is designated as a non-VHFHSZ and is not located in or near an SRA. However, the Project site is in the vicinity of a VHFHSZ. The proposed Project would result in no impact related to installation or maintenance of infrastructure that may exacerbate fire risk. The proposed Project would result in less than significant impacts related to impairment of an adopted emergency response or evacuation plan, exacerbation of wildfire risk, and exposure of people or structures to post-wildfire risks.

Alternative 2 may require temporary lane closures on nearby local roadways during construction; however, these closures would be anticipated to be implemented consistent with the *California Temporary Traffic Control Handbook* (California Inter-Utility Coordinating Committee 2018). Study area intersections would be expected to either operate at acceptable LOS if the Project site was developed consistent with the Urban Industrial/Residential land use designation, or the Project would be required to mitigate for any intersection impacts. Therefore, construction and operation of Alternative 2 would not substantially impair an adopted emergency response plan or emergency evacuation plan.

The Project site is not located in a VHFHSZ. Despite the VHFHSZ to the northeast of the Project site, the uncontrolled spread of wildfire in the vicinity of the Project site is unlikely due to the density of existing non-combustible development and roadways, specifically SR-241 and Rancho Parkway. Due to the lack of steep slopes, prevailing winds, location, and other factors, Alternative 2 would not exacerbate wildfire risks or expose people or structures to post-fire risks.

Build out of the Project site consistent with the Urban Industrial/Residential land use designation would be expected to include installation of utilities and an on-site roadway network. The installation of Project-related utilities and an on-site roadway network would not exacerbate fire risk due to the Project site's location in an urban and built-out area outside of a designated fire hazard zone. Therefore, Alternative 2 would not require the installation or maintenance of associated infrastructure (e.g., roads, fuel breaks, emergency water sources, power lines, or other utilities) that would exacerbate fire risk or result in temporary or ongoing impacts to the environment.

In summary, Alternative 2 would result in no impact related to installation or maintenance of infrastructure that may exacerbate fire risk and less than significant impacts related to impairment of an adopted emergency response or evacuation plan, exacerbation of wildfire risk, and exposure of people or structures to post-wildfire risks. Alternative 2 would result in similar wildfire impacts compared to the proposed Project because both alternatives include development of the Project site from a nursery to an urban use.

5.4.2.3 Project Objectives

Alternative 2 would develop the Project site with a mix of residential and commercial/industrial uses consistent with the proposed Urban Industrial/Residential land use designation in the General Plan update. Alternative 2 would include fewer housing units but also additional acres of commercial/industrial uses compared to the proposed Project. Alternative 2 would be potentially consistent with all of the Project objectives, which include:

- Provide a comprehensive plan for development of the Nakase Property, which implements the goals and policies of the Lake Forest General Plan.
- Provide a site design that is sensitive to the existing natural features, including Serrano Creek.
- Reduce vehicular traffic and peak-hour trips through thoughtful site planning that emphasizes connectivity, access, and mobility.

- Provide a balanced mix of single-family and attached senior affordable homes, open space, and active public and private uses.
- Accommodate public uses by incorporating a new elementary school site conveniently located within easy walking distance for Project site residents.
- Provide an exceptional trail system and on-site parks that enhance the quality of life of the larger community.
- Provide for logical, attractive, and safe pedestrian and bicycle connections within the community.
- Create high-quality residential homes and distinct, identifiable neighborhoods with a range of specifically targeted single-family product types.

5.4.3 Alternative 3: No School Alternative

5.4.3.1 Description

Alternative 3 would be similar to the proposed Project, but without a school and with a community garden. Alternative 3 would include development of up to 675 single-family residential units, 101 senior affordable rental units, a 3.5 ac community garden, and 21.41 ac of parks, open space, and habitat restoration area. Alternative 3 would not include the school that is included in the proposed Project. Instead, Planning Area 2 would be expanded to encompass the school site and would include residential uses as well as a 3.5 ac community garden. Table 5.B summarizes the uses assumed on the Project site for Alternative 3.

Table 5.B: Land Use Statistics for Alternative 3 (No School)

Land Use	Planning Area	Maximum DU/ac	Acreage	Maximum # of Units[1]
Residential	1	14.2	12.8	182
	2	21.6	13.6	294
	3	11.4	12.3	141
	4	10.4	13	135
	5	13.2	7.3	96
School	Elementary School Site	N/A	0	N/A
Affordable Housing	Senior Affordable Housing	38.9 (high density)	2.6	101
Parks and Open Space	Community Garden/Farm (Planning Area 2)	N/A	3.5	N/A
	Central Park/Private Recreation Center	N/A	4.8	N/A
	Neighborhood Mini-Parks	N/A	2.62	N/A
	Neighborhood Park	N/A	3.59	N/A
	Open Space & Habitat & Restoration Area	N/A	10.4	N/A
Utilitarian	Street Medians & Parkways	N/A	12.5	N/A
	Roads	N/A	22.8	N/A

Note: Grey highlighted rows show how Alternative 3 differs from the proposed Project.
[1] Although the total number of residential units in Planning Areas 1-5 exceed 675 based on allowable density, the total development would be capped at 675 residential units and 101 senior affordable housing units.
DU/ac = dwelling units per acre
N/A = not applicable

5.4.3.2 Environmental Analysis

Aesthetics. The Project site is located in a fully developed area (with the exception of the Project site) in the northern portion of Lake Forest. Although the proposed Project would obstruct some views of the Santa Ana Mountains and some views from the Serrano Creek Trail, most views would be preserved; therefore, the proposed Project would result in less than significant impacts related to scenic vistas. The proposed Project would not impact a State Scenic Highway because none are located in the vicinity of the Project site. The visual character and quality of the Project site and the surrounding area would be preserved and enhanced through the application of the architectural and landscape design guidelines outlined in the Area Plan. Therefore, the proposed Project would not substantially degrade the visual character of the Project site nor conflict with applicable zoning and other regulations governing scenic quality and impacts would be less than significant. The Project site is currently developed with few structures, and the majority of the Project site is not illuminated at night. The proposed Project would add lighting to the Project site that could result in impacts related to light and glare. However, the Project includes mitigation measures that require preparation of a comprehensive lighting plan and a photometric survey to demonstrate that no spill lighting or glare would occur in sensitive areas. With implementation of mitigation, impacts related to light and glare would be less than significant.

Since Alternative 3 would result in a similarly scaled project overall, the overall visual changes to the site would be similar to those associated with the proposed Project. Therefore, the impacts of Alternative 3 to scenic vistas, degradation of the visual character of the Project site, and conflict with applicable zoning and other regulations governing scenic quality would be less than significant and similar to the proposed Project. Alternative 3 would not impact a State Scenic Highway because there are none in the vicinity of the Project site.

Alternative 3 would require nighttime lighting similar to that of the proposed Project. Because Alternative 3 would introduce nighttime lighting to a Project site that is not currently illuminated at night on the majority of the site, the alternative would result in potentially significant impacts related to new sources of nighttime light. The mitigation measures would be the same as the proposed Project, would require preparation of a comprehensive lighting plan and photometric survey, and would reduce potential impacts related to lighting and glare to less than significant.

In summary, Alternative 3 would result in a potentially significant impact related to nighttime lighting that would be reduced to less than significant with mitigation. No impact to State Scenic Highways would occur. Other potential impacts related to aesthetics would be less than significant. Alternative 3 would result in a similar project overall and therefore would result in aesthetic impacts similar to that of the proposed Project.

Agricultural Resources. According to the DOC, 119.2 ac of the approximately 122 ac Project site is designated as Unique Farmland. The Project site is currently being used as a retail nursery with all products grown and/or sold in pots. The proposed Project would permanently convert 119.2 ac of Unique Farmland to a non-agricultural use, which would result in a significant and unavoidable impact. The Project site has an agricultural district zoning designation; however, the Project Applicant/Developer is seeking a zoning classification amendment and once the zone change is approved, the future use of the Project site would be consistent with the City's zoning designation

and impacts pertaining to conflicts with existing agricultural zoning would be less than significant. The Project site is not currently under a Williamson Act contract; therefore, the proposed Project would not conflict with an existing Williamson Act contract. The proposed Project would not involve other changes in the existing environment that, due to the location or nature, could result in the conversion of Unique Farmland to a non-agricultural use. Mitigation measures were considered for the proposed Project in order to reduce the significant impact of converting Unique Farmland on the Project site to non-agricultural uses; however, none of the mitigation measures were feasible in large part due to a lack of Important Farmland within the City or County that could be used to offset the agricultural land conversion impact from the proposed Project.

Alternative 3 would develop the Project site with single-family residential and senior affordable rental uses as well as a 3.5 ac community garden. Alternative 3 would change the use on the Project site and would convert 117.2 ac of Unique Farmland to a non-agricultural use while retaining 3.5 ac for gardening. Impacts pertaining to conflict with existing agricultural zoning associated with Alternative 3 would be less than significant. Alternative 3 would not conflict with an existing Williamson Act contract and would not involve other changes in the existing environment that, due to the location or nature, could result in conversion of Unique Farmland to a non-agricultural use. Alternative 3 would convert 2 fewer acres of Unique Farmland than the proposed Project. In addition, Alternative 3 would retain the agricultural character on a portion of the Project site in recognition that the Project site has been in agricultural production since 1938 and is a large percentage of the City's remaining agricultural land. However, the reduction in agricultural conversion amounts to approximately 2 percent of the Unique Farmland converted by the proposed Project. This reduction is not sufficient to reduce the significant and unavoidable impacts associated with the conversion of agricultural land to a non-agricultural use to less than significant.[1] There are no feasible mitigation measures to address the conversion of 117.2 ac of Unique Farmland to a non-agricultural use and thereby reduce the significant impacts to agricultural resources. Therefore, the agricultural impacts of Alternative 3 would be comparable to the agricultural impacts of the proposed Project.

Air Quality. Air quality emissions associated with construction and operation of the proposed Project would not exceed SCAQMD significance thresholds. Therefore, impacts of the proposed Project related to the cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under applicable NAAQS or CAAQS would be less than significant. The proposed Project is consistent with the SCAQMD Final 2016 AQMP because: (1) the construction and operation emissions of the proposed Project would not exceed the regional significance thresholds or cause or contribute to NAAQS or CAAQS violations; and (2) although the proposed Project would not be consistent with the land use designations of the Project site, the proposed Project is expected to generate a net decrease in emissions as compared to the currently adopted land use designation. Therefore, impacts related to a conflict or obstruction of implementation of the applicable air quality plan would be less than significant.

[1] The California Department of Conservation has indicated that the Project site would lose its Important Farmland designation if the remaining agricultural use is less than 10 ac (e-mail communication with Troy Dick, Research Analyst II, California Department of Conservation, Division of Land Resources Protection, Farmland Mapping and Monitoring Program, July 19, 2019).

Alternative 3 would include the same amount of residential development as the proposed Project but would not include a school. A similar grading footprint but less construction would be required for Alternative 3 compared to the proposed Project; therefore, construction emissions would be less than the proposed Project and less than significant. Alternative 3 would generate 1,890 fewer vehicle trips daily than the proposed Project because there would be no trips associated with a school. Therefore, emissions generated during operation of Alternative 3 would be less than the proposed Project and would not exceed the SCAQMD thresholds. As such, Alternative 3 would not result in a cumulatively considerable net increase of criteria pollutants for which the project region is nonattainment. Alternative 3 would be consistent with the SCAQMD Final 2016 AQMP because: (1) the construction and operation emissions would be less than the proposed Project and would not exceed the regional significance thresholds or cause or contribute to NAAQS or CAAQS violations; and (2) although Alternative 3 would not be consistent with the land use designations of the Project site, the alternative would be expected to generate a net decrease in emissions as compared to the currently adopted land use designation. Therefore, impacts related to conflict or obstruction of implementation of the applicable air quality plan would be less than significant. For these reasons, Alternative 3 air quality impacts would be less than significant and less than that of the proposed Project.

Biological Resources. No special-status plants are present on the Project site; therefore, the proposed Project would not impact special-status plant species. The proposed Project would remove 119.77 ac (115.26 ac permanently, 4.51 ac temporarily) of low-quality potential foraging habitat for two special-status bats: the western red bat and the western mastiff bat. The proposed Project would impact a small patch (0.28 ac) of Maritime Succulent Scrub/Southern Cactus Scrub (Coastal Sage Scrub) that is highly disturbed in nature and would not require mitigation because of its small size and degraded nature. While burrowing owls were not detected on the Project site during focused surveys, the proposed Project includes mitigation to ensure the species has not moved onto the site between the dates the survey was performed and construction commences through a pre-construction survey prior to ground disturbance, per CDFW survey guidelines. Bats have the potential to roost and possibly breed in Serrano Creek; therefore, mitigation would be implemented to reduce indirect impacts to bats during construction. Bat roosting/nursery exit counts and acoustic surveys would be conducted prior to the start of any construction activities, and a Bat Management Plan would be prepared, if required, based on the results of the survey. Project construction has the potential to introduce and spread nonnative species; therefore, mitigation would be implemented to ensure that the proposed landscaping would not include invasive exotic plants. Additionally, indirect impacts to Serrano Creek would be reduced through mitigation measures that require installation of construction fencing and implementation of BMPs. Additionally, an HMP would be prepared and the Open Space & Habitat & Restoration Area would be placed in a permanent conservation easement to avoid impacts to sensitive riparian habitat associated with Serrano Creek. The proposed Project would impact the on-site drainage that transverses the Project site and contains potential CDFW, ACOE, and RWQCB jurisdiction. Mitigation measures for jurisdictional waters includes coordination with ACOE, CDFW, and RWQCB regarding potential jurisdictional areas and the associated permitting processes and enhancement, re-establishment, or establishment of jurisdictional areas on off-site conserved lands. Finally, compliance with the MBTA and California Fish and Game Code Section 3503 would reduce construction impacts to nesting birds, including Cooper's hawk and red-tailed hawk in Serrano

Creek. In summary, compliance with the mitigation summarized above and existing regulatory requirements, such as the MBTA, would reduce potentially significant impacts to biological resources to less than significant.

Alternative 3 would include the same amount of residential development on the Project site as the proposed Project, but would not include a school. Alternative 3 would also include a 3.5 ac community garden. Because Alternative 3 would involve development on the same Project site and would include an Open Space & Habitat & Restoration Area along Serrano Creek, Alternative 3 impacts would be essentially the same as that of the proposed Project. Because the potential biological impacts of Alternative 3 would be comparable to those associated with the proposed Project, the same mitigation measures would be required. After implementation of mitigation, impacts to biological resources would be less than significant and comparable to that of the proposed Project.

Cultural Resources. The proposed Project would develop the Project site, which would require ground-disturbing construction activities. The proposed Project would not cause a substantial adverse change in the significance of a historical resource as defined by CEQA because no previously recorded historical resources were identified in the Project site. Due to the number of cultural resources recorded within 0.5 mi of the Project site and the location of the proposed Project site in the archaeologically sensitive Aliso Creek and Foothill areas (as identified in the City's General Plan), there is potential that ground-disturbing construction activities would impact archaeological resources. The proposed Project would incorporate mitigation measures to reduce potentially significant impacts to archaeological resources through archaeological monitoring and reduce potentially significant impacts to previously undiscovered buried human remains through compliance with Health and Safety Code Section 7050.5. The mitigation measures would reduce potential impacts to a less than significant level.

Alternative 3 would develop the Project site with single-family residential and senior affordable rental uses, and would require ground-disturbing construction activities for the development. Similar to the proposed Project, Alternative 3 would not cause a substantial adverse change in the significance of a historical resource as defined by CEQA because no previously recorded historical resources were identified in the Project site. Because the Project site is in an area of archaeological sensitivity, there is potential that ground-disturbing construction activities associated with the residential development and community garden would impact archaeological resources. Alternative 3 would be required to incorporate mitigation measures to reduce potentially significant impacts to archaeological resources through archaeological monitoring and reduce potentially significant impacts to previously undiscovered buried human remains through compliance with Health and Safety Code Section 7050.5. The mitigation measures would reduce potential impacts related to cultural resources to a less than significant level.

In summary, Alternative 3 would result in no impacts to historical resources and less than significant impacts with mitigation incorporated for archaeological resources and human remains. Alternative 3 would result in comparable cultural resources impacts compared to the proposed Project because both alternatives include ground disturbance on the Project site.

Energy. Construction of the proposed Project would require energy for activities such as the manufacture and transportation of building materials, demolition and grading activities, and building construction. Total diesel fuel consumption would be 118,339 gal from construction truck trips. Total gasoline consumption would be 1,084,438 gal from construction worker vehicle trips. During operation, electricity demand would be 6,140,783 kWh per year and natural gas demand would be 116,020.6 therms per year, compared to the existing nursery use. The proposed Project would be constructed to CALGreen standards and appliances would be energy efficient, which would help to reduce energy and natural gas consumption. The proposed Project is estimated to generate approximately 5,948,016 VMT for the elementary school, 1,086,584 VMT for the retirement community, and 19,064,105 VMT for the single-family residential uses annually, which would result in an annual fuel consumption of 54,189 gal of gasoline and 758 gal of diesel. Although Project construction and operation would require using energy, the proposed Project would not result in the wasteful, inefficient, or unnecessary consumption of energy resources, or conflict with or obstruct a State or local plan for renewable energy or energy efficiency, and impacts would be less than significant.

Alternative 3 would include the same amount of residential development as the proposed Project but would not include a school. A similar grading footprint but less construction would be required for Alternative 3 compared to the proposed Project; therefore, energy use during construction would be less than the proposed Project. Alternative 3 would include the same amount of residential development on the Project site as the proposed Project but would not include a school. Buildings would be required to be constructed to CALGreen standards to reduce energy use. Because Alternative 3 includes less development than the proposed Project, consumption of natural gas and electricity during operation would be less. Alternative 3 would generate 5,948,016 fewer VMT, which would consume less fuel compared to the proposed Project, because there would be no school to generate these trips. Therefore, energy use during operation would be less than the proposed Project. Although construction and operation would require use of energy, operational energy demand would be less than the proposed Project during both construction and operation. Alternative 3 would not result in the wasteful, inefficient, or unnecessary consumption of energy resources or conflict with or obstruct a state or local plan for renewable energy or energy efficiency; therefore, impacts related to energy use would be less than significant.

Geology and Soils. The proposed Project would not result in any impacts related to subsidence. Potential impacts related to expansive soils would be less than significant, and no mitigation is required. Impacts related to strong seismic ground shaking, liquefaction, slope stability, lateral spreading, unsuitable soils (from settlement), and corrosive soils are considered potentially significant, and mitigation is required. The mitigation measures require compliance with the recommendations in the *Final Geotechnical Evaluation* and compliance with the CBC. With implementation of mitigation, the proposed buildings would be designed and constructed to current safety standards, and all potentially significant impacts related to soils and geology would be less than significant. The proposed Project would increase erosion and loss of topsoil during construction; however, Erosion Control and Sediment Control BMPs would be implemented during construction in compliance with the requirements of the Construction General Permit to ensure impacts related to erosion would be less than significant. The Project site is in an area previously determined as sensitive for paleontological resources; therefore, it is possible that ground-

disturbing construction activities could impact significant previously undiscovered paleontological resources. A PRIMP would be prepared and implemented to reduce potentially significant impacts to paleontological resources to less than significant.

Although Alternative 3 is reduced in size compared to the proposed Project because the school would not be constructed, the required grading and construction activities would result in the same or similar impacts related to geology and soils as the proposed Project. While some construction specifications would be different for this alternative compared to the proposed Project, the overall risks related to strong seismic ground shaking, liquefaction, slope stability, lateral spreading, unsuitable soils (from settlement), corrosive soils, and paleontological resources would be comparable. Therefore, it is anticipated that Alternative 3 impacts related to geology and soils would be similar to that of the proposed Project, and the same mitigation measures would be required.

In summary, Alternative 3 would result in potentially significant impacts related to geology and soils. These impacts would be less than significant with implementation of mitigation measures. Alternative 3 would result in impacts related to geology and soils that would be comparable to those of the proposed Project.

Greenhouse Gas Emissions. The proposed Project would result in 4.91 MT CO_2e/SP/yr in 2025 and 4.42 MT CO_2e/SP/yr in 2030 of GHG emissions. The total GHG emissions of the proposed Project would exceed the thresholds of 3.84 MT CO_2e/SP/yr for 2025 and 2.88 MT CO_2e/SP/yr for 2030; therefore, the proposed Project would result in a potentially significant impact related to GHG emissions generation. No feasible mitigation measures exist that would reduce GHG emissions to levels that are less than significant. More than 73 percent of all mobile-source emissions in 2025 and 66 percent of all mobile-source emissions in 2030 (by weight) would be generated by the proposed Project's mobile sources (traffic). Neither the Project Applicant/Developer nor the City can substantively or materially affect reductions in Project mobile-source emissions beyond the regulatory requirements and project design features included as part of the proposed Project. Additionally, even if mitigation were applied to reduce all other sources of GHG emissions to the maximum extent possible, the proposed Project's mobile-source emissions alone would still exceed the threshold of significance. Therefore, impacts related to the generation of GHG emissions would remain significant and unavoidable.

Alternative 3 would include the same amount of residential development as the proposed Project but would not include a school. The *Greenhouse Gas Analysis* (Urban Crossroads 2019b) included GHG modeling for residential sources and for "other" sources (which consist primarily of school emissions). The GHG modeling results for just the proposed residential uses are shown in Tables 5.C and 5.D, which represent the GHG emissions for Alternative 3. As shown in Tables 5.C and 5.D, the total GHG emissions of Alternative 3 would exceed the thresholds of 3.84 MT CO_2e/SP/yr for 2025 and 2.88 MT CO_2e/SP/yr for 2030, respectively; therefore, Alternative 3 would result in a potentially significant impact related to the generation of GHG emissions. No feasible mitigation measures exist that would reduce GHG emissions to levels that are less than significant. A majority of the GHG emissions would be generated by the mobile sources (traffic). Neither the Project Applicant/ Developer nor the City can substantively or materially affect reductions in Project mobile-source

Table 5.C: 2025 Greenhouse Gas Emissions for Alternative 3 (No School)

Emissions Source		Emissions (MT/yr)			
		CO_2	CH_4	N_2O	Total CO_2e
Annual construction-related emissions amortized over 30 years		372.21	0.04	0.00	373.19
Area	Residential	199.42	0.02	$3.42E^{-03}$	200.84
Energy	Residential	1,712.09	0.09	0.03	1,722.16
Mobile	Residential	6,906.23	0.27	0.00	6,912.99
Waste	Residential	170.14	10.06	0.00	421.52
Water Usage	Residential	170.81	1.33	0.03	213.96
Total CO_2e (All Sources)		**9,844.66**			
Existing Emissions		***-599.10***			
Net CO_2e (Project Minus Existing)		***9,245.56***			
Project Service Population		**2,289**			
Total CO_2e/Service Population		**4.04**			
2025 GHG Service Population Threshold		**3.84**			
Threshold Exceeded?		**YES**			

Source: *Greenhouse Gas Analysis* (Urban Crossroads 2019b).
Note: Service Population = 776 residential units times 2.95 persons per household = 2,289
CH_4 = methane
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
GHG = greenhouse gas
MT/yr = metric tons per year
N_2O = nitrous oxide

Table 5.D: 2030 Greenhouse Gas Emissions for Alternative 3 (No School)

Emissions Source		Emissions (MT/yr)			
		CO_2	CH_4	N_2O	Total CO_2e
Annual construction-related emissions amortized over 30 years		372.21	0.04	0.00	373.19
Area	Residential	199.42	0.02	$3.42E^{-03}$	200.84
Energy	Residential	1,549.03	0.09	0.03	1,559.10
Mobile	Residential	6,161.18	0.23	0.00	6,167.00
Waste	Residential	170.14	10.06	0.00	421.52
Water Usage	Residential	147.85	1.33	0.03	191.00
Total CO_2e (All Sources)		**8,912.65**			
Existing Emissions		***-599.10***			
Net CO_2e (Project Minus Existing)		***8,313.55***			
Project Service Population		**2,289**			
Total CO_2e/Service Population		**3.63**			
2030 GHG Service Population Threshold		**2.88**			
Threshold Exceeded?		**YES**			

Source: *Greenhouse Gas Analysis* (Urban Crossroads 2019b).
Note: Service Population = 776 residential units times 2.95 persons per household = 2,289
CH_4 = methane
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
GHG = greenhouse gas
MT/yr = metric tons per year
N_2O = nitrous oxide

emissions beyond the regulatory requirements and project design features that would be included in Alternative 3. Additionally, even if mitigation were applied to reduce all other sources of GHG emissions to the maximum extent possible, the Alternative 3 mobile-source emissions alone would still exceed the threshold of significance. Therefore, impacts related to the generation of GHG emissions would remain significant and unavoidable but would be less than that of the proposed Project.

Hazards and Hazardous Materials. The proposed Project may result in a significant impact related to the possible discovery of unknown waste or suspect materials, or upset or accident of hazardous materials on the Project site during demolition, grading, or construction activities. In addition, the presence of ACMs, lead-based paint, mercury, and PCBs cannot be ruled out in the existing structure that would be demolished. Mitigation would be implemented that includes preparation of a Demolition Plan to specify how to appropriately contain, remove, and dispose of hazardous building materials or unknown hazardous materials to protect human health and the environment. Operation and maintenance of the Project site would involve the transport, use, and disposal of small quantities of hazardous materials or wastes associated with the routine maintenance of residential and school facilities. Adopted regulations and procedures are in place to minimize impacts related to use and disposal of household hazardous waste associated with the proposed facilities.

The proposed Project would include a school. In order to gain approval for development of a school at the Project site that would receive State funding, previous Phase I and II ESAs prepared for the Project would need to be submitted to the DTSC for review. The DTSC would determine whether or not additional sampling and analysis, preparation of a PEA, site remediation, and public review of reports are required in order to obtain a finding of “No Further Action”. Coordination with DTSC is included as mitigation to reduce impacts related to hazardous emissions or hazardous materials within 0.25 mi of a school. With implementation of the mitigation discussed above, impacts related to hazardous waste would be less than significant.

Alternative 3 would include the same amount of residential development as the proposed Project but would not include a school. Because Alternative 3 would not include a school, no impact related to hazardous emissions or hazardous materials within 0.25 mi of a school would occur. Alternative 3 would involve demolition of the existing structure, grading, and construction of new buildings, which would result in impacts related to hazardous waste and materials similar to that of the proposed Project. Alternative 3 may result in a significant impact related to the possible discovery of unknown waste or suspect materials, or upset or accident of hazardous materials on the Project site during demolition, grading, or construction activities. In addition, the presence of ACMs, lead-based paint, mercury, and PCBs cannot be ruled out in the existing structure that would be demolished. Mitigation would be implemented similar to the proposed Project that includes preparation of a Demolition Plan to specify how to appropriately contain, remove, and dispose of hazardous building materials or unknown hazardous materials to protect human health and the environment. Operation and maintenance of the Project site would involve transport, use, and disposal of small quantities of hazardous materials or wastes associated with the routine maintenance of the residents and school. Adopted regulations and procedures are in place to minimize impacts related to use and disposal of household hazardous waste associated with the proposed facilities. In

summary, with implementation a Demolition Plan, impacts related to hazardous waste would be less than significant and comparable to that of the proposed Project.

Hydrology and Water Quality. The proposed Project would develop the Project site with a new use and would increase impervious surface area on the Project site, which would increase stormwater runoff and change the pollutants of concern in stormwater runoff. The proposed Project would implement a comprehensive WQMP and BMPs to address pollutants of concern and to ensure protection of beneficial uses of receiving waters. In addition, the proposed Project includes drainage infrastructure and BMPs to minimize development impacts to the site hydrology in compliance with hydromodification requirements. Hydrology and water quality impacts of the proposed Project would be less than significant upon compliance with existing plans, programs, and policies in place to ensure compliance with NPDES regulations.

Alternative 3 would develop the Project site with single-family residential and senior affordable rental uses. Alternative 3 would change the use on the Project site, increase impervious surface area, increase stormwater runoff, and change the pollutants of concern in stormwater runoff. Alternative 3 would be required to implement BMPs and drainage infrastructure to reduce pollutants of concern on the Project site and reduce stormwater runoff in compliance with NPDES and hydromodification requirements.

With compliance with adopted regulations, Alternative 3 would result in less than significant impacts related to hydrology and water quality. The hydrology and water quality impacts of Alternative 3 would be comparable to the hydrology and water quality impacts of the proposed Project with implementation of BMPs and drainage infrastructure in compliance with adopted regulations.

Land Use and Planning. The proposed Project would be consistent with the SCAG 2008 RCP and RTP/SCS by siting residential uses near commercial/industrial uses and major transportation corridors and transit stops, providing new housing, and providing an open space and habitat restoration area. The proposed Project would require a General Plan Amendment to modify the land use designation of the Project site from Business Park to Low-Medium and Medium Density Residential, High Density Residential, Public Facility, Neighborhood Parks, and Open Space and a Zone Change from General Agriculture (A-1) to Planned Community. Upon the approval of the General Plan Amendment and Zone Change request by the City Council, the proposed Project would be consistent with the land use designations contained in the City's General Plan and the City's Municipal Code and zoning. The proposed Project would not result in noise, air quality, or aesthetic impacts that would conflict with adjacent land uses and would not conflict with the Orange County NCCP/HCP. Impacts related to land use and planning would be less than significant, and no mitigation is required.

Alternative 3 would include the same amount of residential development as the proposed Project but would not include a school. Alternative 3 would be consistent with the SCAG 2008 RCP and RTP/SCS by siting commercial uses near residential development, providing new housing opportunities that focus on growth near major transportation corridors and transit stops, and providing an open space and habitat restoration area. Alternative 3 would require a General Plan

Amendment to modify the land use designation of the Project site from Business Park to Low-Medium and Medium Density Residential, High Density Residential, Neighborhood Parks, and Open Space and a Zone Change from General Agriculture (A-1) to Planned Community. Upon the approval of the General Plan Amendment and Zone Change request by the City Council, Alternative 3 would be consistent with the land use designations contained in the City's General Plan and the City's Municipal Code and zoning. Alternative 3 would not result in noise, air quality, or aesthetic impacts that would conflict with adjacent land uses and would not conflict with the Orange County NCCP/HCP. Impacts related to land use and planning would be less than significant and comparable to those of the proposed Project.

Noise. Construction noise levels would range from 53.3 to 65.2 dBA L_{eq} at the sensitive receiver locations. Construction vibration velocity levels are expected to range from 0.002 to 0.008 in/sec PPV. During operation, off-site traffic-associated trips generated from the proposed Project would increase noise levels by 0.1 to 0.72 dBA CNEL on the study area roadway segments. Operational noise generated from the on-site uses would range from 17.9 to 32.5 dBA L_{50} at the sensitive off-site receiver locations. The construction noise, construction vibration, off-site traffic, and on-site operational noise levels would not exceed City noise level standards or Caltrans construction vibration standards, and impacts would be less than significant. Operation would not generate excessive ground-borne vibration or ground-borne noise, and impacts would be less than significant. Adjacent traffic noise from nearby roadways and freeways would not exceed the City's exterior noise standards at the proposed outdoor uses on the Project site with the planned 6 ft high noise barriers, and impacts would be less than significant. Additionally, interior noise levels within the proposed residences and school, which would be constructed to meet ventilation standards and include dual-paned glass, are not anticipated to exceed the City's interior noise standards. However, a *Final Noise Study* would be required to verify the design and building performance, which is included as mitigation to ensure interior noise levels are reduced to less than significant.

Alternative 3 would develop the Project site with single-family residential and senior affordable rental uses, but would not include the school that is proposed as part of the proposed Project. Alternative 3 would generate similar noise levels during the construction period, but the duration of noise exposure would be less because the construction period would be slightly reduced. Alternative 3 would generate reduced operational noise compared to the proposed Project because the number of vehicular trips generated would be fewer. It is not anticipated that any heavy landscaping or farming equipment would be used in the community garden; therefore, this use would not generate excessive noise. Similar to the proposed Project, a *Final Noise Study* would be required to demonstrate that the interior noise levels within the proposed buildings would be less than the City's interior noise.

In summary, Alternative 3 would result in less than significant impacts at off-site sensitive receivers. On-site noise levels would be less than significant after mitigation (preparation of *Final Noise Study*). Alternative 3 would generate similar construction noise but for a shorter duration and would generate less operational noise than the proposed Project.

Population and Housing. The proposed Project includes the development of up to 675 single-family residential units and up to 101 senior affordable rental units, which would serve approximately

2,274 residents. Because the Project site is designed as Business Park and BDO, residential uses were not envisioned on the Project site, and the population increase from the proposed Project would not have been accounted for in the City's projected population growth. While the proposed Project would result in population growth, the growth attributable to the proposed Project would not be substantial in relation to existing or projected conditions in Lake Forest. The addition of new affordable housing units also supports the affordable housing goals of the City. Although the proposed Project would provide short-term construction jobs and the proposed school would employ 60 workers, up to 249 nursery employees would be displaced. However, given the availability of jobs in the region, it is anticipated that workers would find employment elsewhere. Although the Project may contribute to a decline in the jobs-housing ratio by adding a greater number of residential units to the City than job opportunities, the overall increase in housing compared to employment is not of sufficient magnitude to negatively affect the forecasted jobs-housing ratio. The proposed Project would result in less than significant impacts related to population, housing, and employment growth.

Alternative 3 includes the development of up to 675 single-family residential units and up to 101 senior affordable rental units, which would serve approximately 2,274 residents. The increased population from Alternative 3 would be the same as the proposed Project, which would not have been accounted for in the City's projected population. While Alternative 3 would result in population growth, the growth attributable to Alternative 3 would not be substantial in relation to the existing or projected conditions in Lake Forest. Additionally, Alternative 3 would support the affordable housing goals of the City by providing senior affordable housing. Alternative 3 would displace 249 nursery employees. Although Alternative 3 would provide short-term construction jobs, this alternative would not provide long-term job opportunities. Alternative 3 would contribute to a decline in the jobs-housing ratio by adding a greater number of residential units to the City than job opportunities. Additionally, because Alternative 3 includes the same residential units and fewer job opportunities than the proposed Project, the decline in the jobs-housing ratio would be greater than that of the proposed Project.

In summary, Alternative 3 would result in less than significant impacts related to population, housing, and employment growth. However, because Alternative 3 would include the same amount of housing and fewer job opportunities than the proposed Project, it would result in a greater decline in the balance between jobs and housing.

Public Services. Public service impacts related to fire and police protection services would be potentially significant; however, implementation of a CTMP would reduce construction impacts to less than significant, and a secured fire protection agreement and establishment of a Neighborhood Watch Program would reduce operational impacts to less than significant. The proposed Project includes the construction of a public elementary school on the Project site, and the Project Applicant/Developer would include an elementary school to reduce impacts on school services from the additional students generated by the proposed Project. Therefore, potential impacts related to the provision of school services for construction of the proposed Project would be less than significant. With the provision of on-site private parks and amenities, the proposed Project would not require the construction of new or expansion of existing construction, or expansion of existing recreational facilities or parks to maintain acceptable service ratios or performance objectives.

Based on the City's library demand ratio, the population growth that would result from the proposed Project would not require the expansion of existing library facilities in Lake Forest in order to maintain acceptable service ratios. Finally, OCTA would be able to provide adequate transit services to the proposed Project. Therefore, with implementation of the mitigation described above for fire and police service impacts, impacts to public services would be less than significant.

Alternative 3 would develop the Project site with single-family residential units and senior affordable rental units similar to the proposed Project, but would not include the school. Because Alternative 3 would include the same housing as the proposed Project, the increase in population and the resulting demand for public services would be comparable. The increased population from Alternative 3 would result in the same increase in demand for fire and emergency medical services, police protection, library, park, and transit services as the proposed Project. However, because Alternative 3 would not include a school, the increase in demand for schools from the additional students on the Project site would be greater than that of the proposed Project. Alternative 3 would include similar mitigation as the proposed Project, including implementation of a CTMP, establishment of a Neighborhood Watch Program, and payment of development fees. Additionally, Alternative 3 would include parks and open space to reduce demand for parks. Therefore, with implementation of mitigation, impacts to public services would be less than significant.

In summary, with implementation of the mitigation, Alternative 3 impacts to public services would be less than significant. Alternative 3 would result in the same increase in population; therefore, impacts related to increased demand for fire and emergency medical services, police protection, library, park, and transit services would be the same as the proposed Project. However, because Alternative 3 does not include a school, the increase in demand for schools services would be greater than the proposed Project.

Recreation. The proposed Project includes the development of up to 675 single-family residential units and up to 101 senior affordable housing, which would increase the population in Lake Forest by approximately 2,274 persons. The increase in population would result in potentially significant impacts to existing neighborhood and regional parks and other recreational facilities. The proposed Project includes both private and public recreational uses on site. The City Municipal Code requires dedication of land equivalent to 5 ac per 1,000 residents or payment of in-lieu fees to reduce impacts to parklands. The proposed Project would meet the City's public park requirement of 11.37 ac by including approximately 21.41 ac of parks, open space, and habitat restoration area, of which 11.32 ac would be classified as public parks. Additionally, the proposed Project includes mitigation that requires on-site parks to be maintained in perpetuity. Therefore, impacts related to the use of existing neighborhood and regional parks and recreational facilities would be less than significant with implementation of mitigation.

Alternative 3 would include the development of up to 675 single-family residential units and up to 101 senior affordable housing, which would increase the population in Lake Forest by approximately 2,274 persons. Alternative 3 would be required to meet the City's public park requirement of 11.37 ac through dedication of land or payment of in-lieu fees. Alternative 3 would include 21.41 ac of parks, open space, and habitat restoration area, of which 11.32 ac would be classified as public

parks.[1] The remaining 0.05 ac would be offset through payment of in-lieu fees. Alternative 3 would also include mitigation similar to the proposed Project that would require the on-site parks to be maintained in perpetuity. Therefore, impacts related to the use of existing neighborhood and regional parks and recreational facilities would be less than significant with implementation of mitigation. Alternative 3 would result in comparable impacts to parks and recreational facilities as the proposed Project because both alternatives would offset impacts through construction of on-site parks and dedication of land or payment of in-lieu fees.

Transportation/Traffic. The proposed Project would increase VMT to 26,098,705 from the 2,698,384 VMT generated by the existing nursery. The proposed Project would not be inconsistent with *State CEQA Guidelines* Section 15064.3(b) because the City has not established thresholds for assessing VMT impacts; therefore, traffic impacts were assessed based on LOS. The proposed Project is anticipated to generate a total of approximately 8,789 trip-ends per day that would contribute to an impact at the Bake Parkway/Jeronimo Road intersection, which is currently operating at an unacceptable LOS. The proposed Project would mitigate the impact at this location to acceptable levels through a combination of fee payments to the City pursuant to a Fair Share Agreement or construction of the specific improvements. All construction equipment would be staged on-site, and mitigation would be implemented to require that large construction equipment be delivered during off-peak times to reduce travel during peak travel periods so that construction would not result in incompatible uses that increase on-road hazards. Mitigation measures also require a distance analysis to be prepared for all Project intersections to determine limited use areas (e.g., low-height landscaping), and on-street parking restrictions (e.g., red curb), if necessary, and any turning restrictions (e.g., right-in/right-out). With implementation of mitigation, project construction and operation would not result in incompatible uses that increase on-road hazards, and impacts would be reduced to less than significant. Preparation of a CTMP is required as mitigation to ensure that emergency vehicles would be able to navigate to the Project site through adjacent streets that may experience congestion due to construction activities. Impacts related to emergency access during construction would be reduced to less than significant with implementation of mitigation. The Area Plan meets or exceeds the OCFA requirements to not hinder fire and emergency access; therefore, operational impacts related to emergency access would be considered less than significant.

Alternative 3 would include the same amount of residential development as the proposed Project but would not include a school. A smaller grading footprint and less construction would be required for Alternative 3 compared to the proposed Project; therefore, Alternative 3 would require fewer construction trips than the proposed Project. A CTMP would be required for Alternative 3 to reduce impacts to emergency access during construction. Alternative 3 would generate 5,948,016 fewer VMT than the proposed Project because there would be no vehicle trips associated with the school. Therefore, traffic impacts would be less than the proposed Project. Alternative 3 would be required to mitigate any traffic impacts through a Fair Share Agreement or construction of the specific improvements, similar to the mitigation included for the proposed Project. Alternative 3 would be required to meet or exceed the OCFA requirements to not hinder fire and emergency access.

[1] Only 0.8 ac of trail within the open space and habitat and restoration area trail is classified as a public park.

In summary, Alternative 3 would result in less than significant impacts related to traffic after implementation of mitigation measures similar to those of the proposed Project. Alternative 3 would result in less traffic impacts during construction and operation compared to the proposed Project.

Tribal Cultural Resources. The proposed Project would develop the Project site, which would require ground-disturbing construction activities. No previously recorded cultural resources were identified in the Project site, and no specific information regarding tribal cultural resources was received during the Native American consultation. Therefore, the proposed Project would not cause a substantial adverse change in the significance of a tribal cultural resource as defined by CEQA that is listed or eligible for listing in the California Register or a local register. Based on the results of Native American consultation with the Gabrieleno Band of Mission Indians – Kizh Nation, there is potential that ground-disturbing construction activities would impact previously undiscovered significant tribal cultural resources. The proposed Project would incorporate mitigation measures to reduce potentially significant impacts to previously undiscovered significant tribal cultural resources through Native American monitoring and evaluation of archaeological resources by the Native American monitor, and reduce potentially significant impacts to Native American buried human remains through compliance with Health and Safety Code Section 7050.5. The mitigation measures would reduce potential impacts from the proposed Project to a less than significant level.

Alternative 3 would develop the Project site with single-family residential and senior affordable rental uses and a community garden, and would require ground-disturbing construction activities for the development. Similar to the proposed Project, Alternative 3 would not cause a substantial adverse change in the significance of a tribal cultural resource as defined by CEQA that is listed or eligible for listing in the California Register or a local register because no previously recorded cultural resources were identified in the Project site during the records search or during the Native American consultation. Based on the results of Native American consultation, there is potential that ground-disturbing construction activities would impact previously undiscovered significant tribal cultural resources. Alternative 3 would be required to incorporate the same mitigation measures as the proposed Project that require Native American monitoring and evaluation of archaeological resources by the Native American monitor, and compliance with Health and Safety Code Section 7050.5. The mitigation measures would reduce potential impacts related to tribal cultural resources to a less than significant level.

In summary, Alternative 3 would result in no impacts to tribal cultural resources that are listed or eligible for listing in the California Register or a local register, and less than significant impacts with mitigation incorporated for previously undiscovered significant tribal cultural resources and Native American human remains. Alternative 3 would result in comparable tribal cultural resources impacts compared to the proposed Project because both alternatives include ground-disturbance on the Project site.

Utilities and Service Systems. Utilities and service systems include water, wastewater, electricity, natural gas, telecommunication, solid waste, and storm drain facilities. The proposed Project would increase demand for these services; however, there are sufficient supplies and capacity available to

service the increased demand. Impacts related to utilities and service systems would be less than significant.

Alternative 3 would develop the Project site with single-family residential and senior affordable rental uses but would not include a school. Alternative 3 would increase demand for utilities and service systems services; however, the increase in demand would be somewhat less than the proposed Project because there would be no demand associated with operation of the school. Therefore, there would be sufficient supplies and capacity available to service the increased demand. Impacts related to utilities and service systems would be less than significant and somewhat less than the proposed Project.

Wildfire. The Project site is designated as a non-VHFHSZ and is not located in or near an SRA. However, the Project site is in the vicinity of a VHFHSZ. The proposed Project would result in no impact related to installation of maintenance of infrastructure that may exacerbate fire risk. The proposed Project would result in less than significant impacts related to impairment of an adopted emergency response or evacuation plan, exacerbation of wildfire risk, and exposure of people or structures to post-wildfire risks.

Alternative 3 would require temporary lane closures on nearby local roadways during construction, similar to the proposed Project; however, these closures would be anticipated to be implemented consistent with the *California Temporary Traffic Control Handbook* (California Inter-Utility Coordinating Committee 2018). Because Alternative 3 would generate less traffic than the proposed Project, study area intersections would be expected to operate at acceptable LOS. Therefore, the construction and operation of Alternative 3 would not substantially impair an adopted emergency response plan or emergency evacuation plan.

The Project site is not located in a VHFHSZ. Despite the VHFHSZ to the northeast of the Project site, the uncontrolled spread of a wildfire in the vicinity of the Project site is unlikely due to the density of existing non-combustible development and roadways, specifically SR-241 and Rancho Parkway. Due to the lack of steep slopes, prevailing winds, location, and other factors, Alternative 3 would not exacerbate wildfire risks or expose people or structures to post-fire risks.

Alternative 3 would include installation of utilities and an on-site roadway network. The installation of Project-related utilities and an on-site roadway network would not exacerbate fire risk due to the Project site's location in an urban and built-out area outside of a designated fire hazard zone. Therefore, Alternative 3 would not require the installation or maintenance of associated infrastructure (e.g., roads, fuel breaks, emergency water sources, power lines, or other utilities) that would exacerbate fire risk or result in temporary or ongoing impacts to the environment.

In summary, Alternative 3 would result in no impacts related to the installation or maintenance of infrastructure that may exacerbate fire risk, and less than significant impacts related to impairment of an adopted emergency response or evacuation plan, exacerbation of wildfire risk, and exposure of people or structures to post-wildfire risks. Alternative 3 would result in similar wildfire impacts compared to the proposed Project because both alternatives include development of the Project site from a nursery to a residential use.

5.4.3.3 Project Objectives

Alternative 3 would develop the Project site with single-family residential and senior affordable rental uses but would not include a school. Alternative 3 would be potentially consistent with the following seven project objectives:

- Provide a comprehensive plan for development of the Nakase Property that implements the goals and policies of the Lake Forest General Plan.
- Provide a site design that is sensitive to the existing natural features, including Serrano Creek.
- Reduce vehicular traffic and peak-hour trips through thoughtful site planning that emphasizes connectivity, access, and mobility.
- Provide a balanced mix of single-family and attached senior affordable homes, open space, and active public and private uses.
- Provide an exceptional trail system and on-site parks that enhance the quality of life of the larger community.
- Provide for logical, attractive, and safe pedestrian and bicycle connections within the community.
- Create high-quality residential homes and distinct, identifiable neighborhoods with a range of specifically targeted single-family product types.

Because Alternative 3 would not include a school, it would not be consistent with the following project objective:

- Accommodate public uses by incorporating a new elementary school site conveniently located within easy walking distance for Project site residents.

5.4.4 Alternative 4: Reduced Project

5.4.4.1 Description

Alternative 4 assumes the Project site would be developed with single-family residential, senior affordable rental units, an elementary school, and parks, open space, and habitat restoration area similar to the proposed Project but at a reduced intensity. Alternative 4 includes development of 600 single-family residential units, 90 senior affordable rental units, an 11.5 ac elementary school, 19.41 ac of parks, open space, and habitat restoration area, and a 2 ac community garden. Alternative 4 would include 75 fewer single-family residential units, 11 fewer senior affordable units, and 2.3 fewer acres of parks, open space, and habitat restoration area than the proposed Project, and would include the addition of a 2 ac community garden. Table 5.E summarizes the uses assumed on the Project site for Alternative 4.

Table 5.E: Land Use Statistics for Alternative 4 (Reduced Project)

Land Use	Planning Area	Maximum DU/ac	Acreage	Maximum # of Units
Residential	1	12.5	12.8	160
	2	17.9	5.6	100
	3	10.2	12.3	125
	4	9.6	13	125
	5	12.3	7.3	90
School	Elementary School Site	N/A	11.5	N/A
Affordable Housing	Senior Affordable Housing	34.6 (high density)	2.6	90
Parks and Open Space	Community Garden/Farm	N/A	2	N/A
	Central Park/Private Recreation Center	N/A	2.8	N/A
	Neighborhood Mini-Parks	NA	2.62	N/A
	Neighborhood Park	N/A	3.59	N/A
	Open Space & Habitat & Restoration Area	N/A	10.4	N/A
Utilitarian	Street Medians & Parkways	N/A	12.5	N/A
	Roads	N/A	22.8	N/A

Note: Grey highlighted rows show how Alternative 4 differs from the proposed Project.
DU/ac = dwelling units per acre
N/A = not applicable

5.4.4.2 Environmental Analysis.

Aesthetics. The Project site is located in a fully developed area (with the exception of the Project site) in the northern portion of Lake Forest. Although the proposed Project would obstruct some views of the Santa Ana Mountains and some views from the Serrano Creek Trail, most views would be preserved; therefore, the proposed Project would result in less than significant impacts related to scenic vistas. The proposed Project would not impact a State Scenic Highway because there are none in the vicinity of the Project site. The visual character and quality of the Project site and surrounding area would be preserved and enhanced through the application of the architectural and landscape design guidelines outlined in the Area Plan. Therefore, the proposed Project would not substantially degrade the visual character of the Project site, would not conflict with applicable zoning and other regulations governing scenic quality, and its impacts would be less than significant. The Project site is currently developed with few structures, and the majority of the Project site is not illuminated at night. The proposed Project would add lighting to the Project site that could result in impacts related to light and glare. However, the Project includes mitigation measures that require preparation of a comprehensive lighting plan and a photometric survey to demonstrate that no spill lighting or glare would occur in sensitive areas. With implementation of mitigation, impacts related to light and glare would be less than significant.

Since Alternative 4 results in a smaller project overall, the overall visual changes to the site would be less than those associated with the proposed Project. Therefore, the impacts of Alternative 4 to scenic vistas, degradation of the visual character of the Project site, and conflict with applicable zoning and other regulations governing scenic quality would be less than significant and less than the proposed Project. Alternative 4 would not impact a state scenic highway because none are located in the vicinity of the Project site.

Alternative 4 would require less nighttime lighting than the proposed Project. However, because Alternative 4 would introduce nighttime lighting to a Project site that is not currently illuminated at night on the majority of the site, Alternative 4 would result in potentially significant impacts related to new sources of nighttime light. The mitigation measures would be the same as the proposed Project and would require preparation of a comprehensive lighting plan and photometric survey and would reduce potential impacts related to lighting and glare to less than significant.

In summary, Alternative 4 would result in a potentially significant impact related to nighttime lighting which would be reduced to less than significant with mitigation. No impact to state scenic highways would occur. Other potential impacts related to aesthetics would be less than significant. Alternative 4 would result in a smaller project overall compared to the proposed Project and would therefore result in aesthetic impacts that are less than the proposed Project.

Agricultural Resources. According to the DOC, 119.2 ac of the approximately 122 ac Project site is designated as Unique Farmland. The Project site is currently being used as a retail nursery with all products grown and/or sold in pots. The proposed Project would permanently convert 119.2 ac of Unique Farmland to a non-agricultural use, which would result in a significant and unavoidable impact. The Project site has an agricultural district zoning designation. However, the Project Applicant/Developer is seeking a zoning classification amendment. Once the zone change is approved, the future use of the Project site would be consistent with the City's zoning designation, and impacts pertaining to conflicts with existing agricultural zoning would be less than significant. The Project site is not currently under a Williamson Act contract; therefore, the proposed Project would not conflict with an existing Williamson Act contract. The proposed Project would not involve other changes in the existing environment that, due to the location or nature, could result in conversion of Unique Farmland to a non-agricultural use. Mitigation measures were considered for the proposed Project in order to reduce the significant impact of converting Unique Farmland on the Project site to non-agricultural uses; however, none of the mitigation measures were feasible in large part because a lack of land designated as Important Farmland within the City or Orange County that could be used to offset the agricultural land conversion impact from the proposed Project.

Alternative 4 would develop the Project site with single-family residential and senior affordable rental uses but at a lower density of single-family residential uses than the proposed Project. Alternative 4 would also include a 2 ac community garden. Alternative 4 would change the use on the Project site and would convert 117.2 ac of Unique Farmland to a non-agricultural use, while retaining 2 ac for gardening. Impacts pertaining to conflict with existing agricultural zoning associated with Alternative 4 would be less than significant. Alternative 4 would not conflict with an existing Williamson Act contract and would not involve other changes in the existing environment that, due to the location or nature, could result in conversion of Unique Farmland to a non-agricultural use. In addition, Alternative 3 would retain the agricultural character on a portion of the Project site in recognition that the Project site has been in agricultural production since 1938 and is a large percentage of the City's remaining agricultural land. Alternative 4 would convert 2 fewer acres of Unique Farmland than the proposed Project. However, the reduction in agricultural conversion amounts to approximately 2 percent of the Unique Farmland converted by the proposed Project. This reduction is not sufficient to reduce the significant and unavoidable impacts associated

with the conversion of agricultural land to a non-agricultural use to a less than significant impact.[1] There are no feasible mitigation measures to address the conversion of 117.2 ac of Unique Farmland to a non-agricultural use and thereby reduce the significant impacts to agricultural resources. Therefore, the agricultural impacts of Alternative 4 would be comparable to that of the proposed Project.

Air Quality. Air quality emissions associated with construction and operation of the proposed Project would not exceed SCAQMD significance thresholds. Therefore, impacts of the proposed Project related to the cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under applicable NAAQS or CAAQS would be less than significant. The proposed Project is consistent with the SCAQMD Final 2016 AQMP because (1) the construction and operational emissions of the proposed Project would not exceed the regional significance thresholds or cause or contribute to NAAQS or CAAQS violations; and (2) although the proposed Project would not be consistent with the land use designations of the Project site, the proposed Project is expected to generate a net decrease in emissions as compared to the currently adopted land use designation. Therefore, impacts related to conflict or obstruction of implementation of the applicable air quality plan would be less than significant.

Alternative 4 would develop the Project site with single-family residential and senior affordable rental uses but at a lower density of single-family residential uses than the proposed Project. A similar grading footprint but less construction would be required for Alternative 4 compared to the proposed Project; therefore, construction emissions would be less than the proposed Project and less than significant. Alternative 4 would generate fewer vehicle trips as the proposed Project because there would be fewer residential uses and therefore fewer residents. Therefore, emissions generated during operation of Alternative 4 would be less than the proposed Project and would not exceed the SCAQMD thresholds. As such, Alternative 4 would not result in a cumulatively considerable net increase of criteria pollutants for which the project region is nonattainment. Alternative 4 would be consistent with the SCAQMD Final 2016 AQMP because (1) the construction and operational emissions would be less than the proposed Project and would not exceed the regional significance thresholds or cause or contribute to NAAQS or CAAQS violations; and (2) although Alternative 4 would not be consistent with the land use designations of the Project site, Alternative 4 would be expected to generate a net decrease in emissions as compared to the currently adopted land use designation. Therefore, impacts related to conflict or obstruction of implementation of the applicable air quality plan would be less than significant. For these reasons, Alternative 4 air quality impacts would be less than significant and less than the proposed Project.

Biological Resources. No special-status plants are present on the Project site; therefore, the propose Project would not impact special-status plant species. The proposed Project would remove 119.77 ac (115.26 ac permanently, 4.51 ac temporarily) of low-quality potential foraging habitat for two special-status bats: the western red bat and the western mastiff bat. The proposed Project

[1] The California Department of Conservation has indicated that the Project site would lose its Important Farmland designation if the remaining agricultural use is less than 10 ac (e-mail communication with Troy Dick, Research Analyst II, California Department of Conservation, Division of Land Resources Protection, Farmland Mapping and Monitoring Program, July 19, 2019).

would impact a small patch (0.28 ac) of Maritime Succulent Scrub/Southern Cactus Scrub (Coastal Sage Scrub) that is highly disturbed in nature and would not require mitigation because of its small size and degraded nature. While burrowing owls were not detected on the Project site during focused surveys, the proposed Project includes mitigation to ensure the species has not moved onto the site between the dates the survey was performed and construction commences through a pre-construction survey prior to ground disturbance, per CDFW survey guidelines. Bats have the potential to roost and possibly breed in Serrano Creek; therefore, mitigation would be implemented to reduce indirect impacts to bats during construction. Bat roosting/nursery exit counts and acoustic surveys would be conducted prior to the start of any construction activities, and a Bat Management Plan would be prepared, if required, based on the results of the survey. Project construction has the potential to introduce and spread nonnative species; therefore, mitigation would be implemented to ensure the proposed landscaping would not include invasive exotic plants. Additionally, indirect impacts to Serrano Creek would be reduced through mitigation measures that require installation of construction fencing and implementation of BMPs. Additionally, an HMP would be prepared, and the Open Space & Habitat & Restoration Area placed in a permanent conservation easement to avoid impacts to sensitive riparian habitat associated with Serrano Creek. The proposed Project would impact the on-site drainage that transverses the Project site and contains potential CDFW, ACOE, and RWQCB jurisdiction. Mitigation measures for jurisdictional waters includes coordination with ACOE, CDFW, and RWQCB regarding potential jurisdictional areas and the associated permitting processes and enhancement, re-establishment, or establishment of jurisdictional areas on off-site conserved lands. Finally, compliance with the MBTA and California Fish and Game Code Section 3503 would reduce construction impacts to nesting birds, including Cooper's hawk and red-tailed hawk, in Serrano Creek. In summary, compliance with the mitigation summarized above and existing regulatory requirements, such as the MBTA, would reduce potentially significant impacts to biological resources to less than significant.

Alternative 4 would develop the Project site with business park uses consistent with the existing Business Park and BDO land use designation. Because Alternative 4 would involve development on the same Project site and would include an Open Space & Habitat & Restoration Area along Serrano Creek, Alternative 4 impacts would be essentially the same as the proposed Project. Because the potential biological impacts of Alternative 4 would be comparable to those associated with the proposed Project, the same mitigation measures would be required. After implementation of mitigation, impacts to biological resources would be less than significant and comparable to the proposed Project.

Cultural Resources. The proposed Project would develop the Project site, which would require ground-disturbing construction activities. The proposed Project would not cause a substantial adverse change in the significance of a historical resources as defined by CEQA because no previously recorded historical resources were identified in the Project site. Due to the number of cultural resources recorded within 0.5 mi of the Project site and the location of the proposed Project site in the archaeologically sensitive Aliso Creek and Foothill areas (as identified in the City's General Plan), there is potential that ground-disturbing construction activities would impact archaeological resources. The proposed Project would incorporate mitigation measures to reduce potentially significant impacts to archaeological resources through archaeological monitoring and reduce potentially significant impacts to previously undiscovered buried human remains through

compliance with Health and Safety Code Section 7050.5. The mitigation measures would reduce potential impacts to a less than significant level.

Alternative 4 would develop the Project site with single-family residential and senior affordable rental uses but at a lower density than the proposed Project, and would require ground-disturbing construction activities for the development. Similar to the proposed Project, Alternative 4 would not cause a substantial adverse change in the significance of a historical resource as defined by CEQA because no previously recorded historical resources were identified in the Project site. Because the Project site is in an area of archaeological sensitivity, there is potential that ground-disturbing construction activities would impact archaeological resources. Alternative 4 would be required to incorporate mitigation measures to reduce potentially significant impacts to archaeological resources through archaeological monitoring and reduce potentially significant impacts to previously undiscovered buried human remains through compliance with Health and Safety Code Section 7050.5. The mitigation measures would reduce potential impacts related to cultural resources to a less than significant level.

In summary, Alternative 4 would result in no impacts to historical resources and less than significant impacts with mitigation incorporated for archaeological resources and human remains. Alternative 4 would result in comparable cultural resources impacts compared to the proposed Project because both alternatives include ground disturbance on the Project site.

Energy. Construction of the proposed Project would require energy for activities such as the manufacture and transportation of building materials, demolition and grading activities, and building construction. Total diesel fuel consumption would be 118,339 gal from construction truck trips. Total gasoline consumption would be 1,084,438 gal from construction worker vehicle trips. During operation, electricity demand would be 6,140,783 kWh per year and natural gas demand would be 116,020.6 therms per year, compared to the existing nursery use. The proposed Project would be constructed to CALGreen standards and appliances would be energy efficient, which would help to reduce energy and natural gas consumption. The proposed Project is estimated to generate approximately 5,948,016 VMT for the elementary school, 1,086,584 VMT for the retirement community, and 19,064,105 VMT for the single-family residential uses annually, which would result in an annual fuel consumption of 54,189 gal of gasoline and 758 gal of diesel. Although Project construction and operation would require using energy, the proposed Project would not result in the wasteful, inefficient, or unnecessary consumption of energy resources or conflict with or obstruct a State or local plan for renewable energy or energy efficiency, and impacts would be less than significant.

Alternative 4 would develop the Project site with single-family residential and senior affordable rental uses but at a lower density of single-family residential uses than the proposed Project. A similar grading footprint but less construction would be required for Alternative 4 compared to the proposed Project; therefore, energy use during construction would be less than the proposed Project. Alternative 4 would include less residential development than the proposed Project and the building would be required to be constructed to CALGreen standards to reduce energy use. Because Alternative 4 includes less development than the proposed Project, the consumption of natural gas and electricity during operation would be less. Alternative 4 would generate fewer vehicle trips,

which would reduce fuel consumption compared to the proposed Project because there would be fewer residential uses and therefore fewer residents. Therefore, energy use during operation would be less than the proposed Project. Although construction and operation would require using energy, construction and operational energy demand would be less than the proposed Project during both construction and operation, and would not result in the wasteful, inefficient, or unnecessary consumption of energy resources or conflict with or obstruct a State or local plan for renewable energy or energy efficiency. Therefore, Alternative 4 impacts related to energy use would be less than significant.

Geology and Soils. The proposed Project would not result in any impacts related to subsidence. Potential impacts related to expansive soils would be less than significant, and no mitigation is required. Impacts related to strong seismic ground shaking, liquefaction, slope stability, lateral spreading, unsuitable soils (from settlement), and corrosive soils are considered potentially significant, and mitigation is required. The mitigation measures require compliance with the recommendations in the *Final Geotechnical Evaluation* and compliance with the CBC. With implementation of mitigation, the proposed buildings would be designed and constructed to current safety standards, and all potentially significant impacts related to soils and geology would be less than significant. The proposed Project would increase erosion and loss of topsoil during construction; however, Erosion Control and Sediment Control BMPs would be implemented during construction in compliance with the requirements of the Construction General Permit to ensure that impacts related to erosion would be less than significant. The Project site is in an area previously determined as sensitive for paleontological resources; therefore, it is possible that ground-disturbing construction activities could impact significant previously undiscovered paleontological resources. A PRIMP would be prepared and implemented to reduce potentially significant impacts to paleontological resources to less than significant.

Although Alternative 4 is reduced in overall development intensity compared to the proposed Project, the required grading and construction activities would result in the same or similar impacts related to geology, soils, and paleontological resources as the proposed Project. While some construction specifications would be different for Alternative 4 compared to the proposed Project, the overall risks related to strong seismic ground shaking, liquefaction, slope stability, lateral spreading, unsuitable soils (from settlement), corrosive soils, and paleontological resources would be comparable. Therefore, it is anticipated that Alternative 4 would result in similar impacts related to geology, soils, and paleontological resources as the proposed Project, and the same mitigation measures would be required.

In summary, Alternative 4 would result in potentially significant impacts related to geology, soils, and paleontological resources. These impacts would be less than significant with implementation of mitigation measures. Alternative 4 would result in impacts related to geology, soils, and paleontological resources that would be comparable to those of the proposed Project.

Greenhouse Gas Emissions. The proposed Project would result in 4.91 MT CO_2e/SP/yr in 2025 and 4.42 MT CO_2e/SP/yr in 2030 of GHG emissions. The total GHG emissions of the proposed Project would exceed the thresholds of 3.84 MT CO_2e/SP/yr for 2025 and 2.88 MT CO_2e/SP/yr for 2030; therefore, the proposed Projects would result in a potential significant impact related to generation

of GHG emissions. No feasible mitigation measures exist that would reduce GHG emissions to levels that are less than significant. More than 73 percent of all mobile-source emissions in 2025 and 66 percent of all mobile-source emissions in 2030 (by weight) would be generated by the proposed Project's mobile sources (traffic). Neither the Project Applicant/Developer nor the City can substantively or materially affect reductions in Project mobile-source emissions beyond the regulatory requirements and project design features included as part of the proposed Project. Additionally, even if mitigation were applied to reduce all other sources of GHG emissions to the maximum extent possible, the proposed Projects mobile-source emissions alone would still exceed the threshold of significance. Therefore, impacts related to generation of GHG emissions would remain significant and unavoidable.

Alternative 4 would develop the Project site with single-family residential and senior affordable rental uses but at a lower density of single-family residential uses than the proposed Project. Alternative 4 would include approximately 10 percent less housing and residents compared to the proposed Project. Alternative 4 would also include a school. The *Greenhouse Gas Analysis* (Urban Crossroads 2019b) included GHG modeling for residential sources and for "other" sources (which consist primarily of school emissions). The GHG emissions were calculated assuming residential emissions would be reduced by 10 percent compared to the proposed Project (see Tables 5.F and 5.G). As shown in Tables 5.F and 5.G, the total GHG emissions of Alternative 4 would exceed the thresholds of 3.84 MT CO_2e/SP/yr for 2025 and 2.88 MT CO_2e/SP/yr for 2030, respectively; therefore Alternative 4 would result in a potential significant impact related to generation of GHG emissions. Although construction emissions would be reduced because less construction would be required compared to the proposed Project, no reduction would be large enough to reduce the impact to less than significant. No feasible mitigation measures exist that would reduce GHG emissions to levels that are less than significant. A majority of the GHG emissions would be generated by the mobile sources (traffic). Neither the Project Applicant/Developer nor the City can substantively or materially affect reductions in Project mobile-source emissions beyond the regulatory requirements and project design features that would be included in Alternative 4. Additionally, even if mitigation were applied to reduce all other sources of GHG emissions to the maximum extent possible, Alternative 4's mobile-source emissions alone would still exceed the threshold of significance. Therefore, impacts related to the generation of GHG emissions would remain significant and unavoidable, but would be less than that of the proposed Project.

Hazards and Hazardous Materials. The proposed Project may result in a significant impact related to the possible discovery of unknown waste or suspect materials, or upset or accident of hazardous materials on the Project site during demolition, grading, or construction activities. In addition, the presence of ACMs, lead-based paint, mercury, and PCBs cannot be ruled out in the existing structure that would be demolished. Mitigation would be implemented that includes preparation of a Demolition Plan to specify how to appropriately contain, remove, and dispose of hazardous building materials or unknown hazardous materials to protect human health and the environment.

Table 5.F: 2025 Greenhouse Gas Emissions for Alternative 4 (Reduced Project)

Emissions Source	Emissions (MT/yr)
	Total CO_2e
Annual construction-related emissions amortized over 30 years	373.19
Residential (90% less than proposed Project emissions of 9,471.47)	8,524.33
School	2,297.67
Total CO_2e (All Sources)	**11,195.18**
Existing Emissions	***-599.10***
Net CO_2e (Project Minus Existing)	***10,596.08***
Project Service Population	**2,096**
Total CO_2e/Service Population	**5.06**
2025 GHG Service Population Threshold	**3.84**
Threshold Exceeded?	**YES**

Source: *Greenhouse Gas Analysis* (Urban Crossroads 2019b).
Note: Service Population = 690 residential units times 2.95 persons per household plus 60 employees = 2,096
CH_4 = methane
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
GHG = greenhouse gas
MT/yr = metric tons per year
N_2O = nitrous oxide

Table 5.G: 2030 Greenhouse Gas Emissions for Alternative 4 (Reduced Project)

Emissions Source	Emissions (MT/yr)
	Total CO_2e
Annual construction-related emissions amortized over 30 years	373.19
Residential (90% less than proposed Project emissions of 8,539.46)	7,685.51
School	2,059.92
Total CO_2e (All Sources)	**10,118.62**
Existing Emissions	***-599.10***
Net CO_2e (Project Minus Existing)	***9,519.52***
Project Service Population	**2,096**
Total CO_2e/Service Population	**4.54**
2030 GHG Service Population Threshold	**2.88**
Threshold Exceeded?	**YES**

Source: *Greenhouse Gas Analysis* (Urban Crossroads 2019b).
Note: Service Population = 690 residential units times 2.95 persons per household plus 60 employees = 2,096
CH_4 = methane
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
GHG = greenhouse gas
MT/yr = metric tons per year
N_2O = nitrous oxide

Operation and maintenance of the Project site would involve transport, use, and disposal of small quantities of hazardous materials or wastes associated with routine maintenance of residential and school facilities. Adopted regulations and procedures are in place to minimize impacts related to use and disposal of household hazardous waste associated with the proposed facilities. The proposed Project would include a school. In order to gain approval for development of a school at the Project site that would receive State funding, previous Phase I and II ESAs prepared for the Project would need to be submitted to the DTSC for review. The DTSC would determine whether or not additional sampling and analysis, preparation of a PEA, site remediation, and public review of reports are required in order to obtain a finding of "No Further Action". Coordination with the DTSC is included as mitigation to reduce impacts related to hazardous emissions or hazardous materials within 0.25 mi of a school. With implementation of the mitigation discussed above, impacts related to hazardous waste would be less than significant.

Alternative 4 would develop the Project site with single-family residential and senior affordable rental uses but at a lower density of single-family residential uses than the proposed Project. Alternative 4 would involve demolition of the existing structure, grading, and construction of new buildings that would result in similar impacts related to hazardous waste and materials compared to the proposed Project. Alternative 4 may result in a significant impact related to the possible discovery of unknown waste or suspect materials, or upset or accident of hazardous materials on the Project site during demolition, grading, or construction activities. In addition, the presence of ACMs, lead-based paint, mercury, and PCBs cannot be ruled out in the existing structure that would be demolished. Mitigation would be implemented similar to the proposed Project that includes preparation of a Demolition Plan to specify how to appropriately contain, remove, and dispose of hazardous building materials or unknown hazardous materials to protect human health and the environment. Operation and maintenance of the Project site would involve transport, use, and disposal of small quantities of hazardous materials or wastes associated with routine maintenance of the residents and school. Adopted regulations and procedures are in place to minimize impacts related to use and disposal of household hazardous waste associated with the proposed facilities. Alternative 4 would include a school, and impacts related to hazardous emissions or hazardous materials within 0.25 mi of a school could occur; therefore, a finding of "No Further Action" would be required to be obtained from the DTSC. With implementation a Demolition Plan and a finding of "No Further Action", impacts related to hazardous waste would be less than significant and comparable to that of the proposed Project.

Hydrology and Water Quality. The proposed Project would develop the Project site with a new use and would increase impervious surface area on the Project site, which would increase stormwater runoff and change the pollutants of concern in stormwater runoff. The proposed Project would implement a comprehensive WQMP and BMPs to address pollutants of concern and to ensure protection of beneficial uses of receiving waters. In addition, the proposed Project includes drainage infrastructure and BMPs to minimize development impacts to the site hydrology in compliance with hydromodification requirements. Hydrology and water quality impacts of the proposed Project would be less than significant upon compliance with existing plans, programs, and policies in place to ensure compliance with NPDES regulations.

Alternative 4 would develop the Project site with single-family residential and senior affordable rental uses but at a lower density of single-family residential uses than the proposed Project. Alternative 4 would change the use on the Project site, increase impervious surface area, increase stormwater runoff, and change the pollutants of concern in stormwater runoff. Alternative 4 is anticipated to include less impervious surface area than the proposed Project; therefore, the increased runoff and pollutant loading would be less than the proposed Project. Similar to the proposed Project, Alternative 4 would be required to implement BMPs and drainage infrastructure to reduce pollutants of concern on the Project site and reduce stormwater runoff in compliance with NPDES and hydromodification requirements.

With compliance with adopted regulations, Alternative 4 would result in less than significant impacts related to hydrology and water quality. The hydrology and water quality impacts of Alternative 4 would result in less hydrology and water quality impacts compared to the proposed Project. However, Alternative 4 would also be required to implement BMPs and drainage infrastructure in compliance with adopted regulations similar to the proposed Project.

Land Use and Planning. The proposed Project would be consistent with the SCAG 2008 RCP and RTP/SCS by siting residential uses near commercial/industrial uses and major transportation corridors and transit stops, providing new housing, and providing an open space and habitat restoration area. The proposed Project would require a General Plan Amendment to modify the land use designation of the Project site from Business Park to Low-Medium and Medium Density Residential, High Density Residential, Public Facility, Neighborhood Parks, and Open Space and a Zone Change from General Agriculture (A-1) to Planned Community. Upon the approval of the General Plan Amendment and Zone Change request by the City Council, the proposed Project would be consistent with the land use designations contained in the City's General Plan and the City's Municipal Code and zoning. The proposed Project would not result in noise, air quality, or aesthetic impacts that would conflict with adjacent land uses and would not conflict with the Orange County NCCP/HCP. Impacts related to land use and planning would be less than significant, and no mitigation is required.

Alternative 4 would develop the Project site with single-family residential and senior affordable rental uses but at a lower density of single-family residential uses than the proposed Project. Alternative 4 would be consistent with the SCAG 2008 RCP and RTP/SCS by siting commercial uses near residential development, providing new housing opportunities that focus on growth near major transportation corridors and transit stops, and providing an open space and habitat restoration area. Alternative 4 would require a General Plan Amendment to modify the land use designation of the Project site from Business Park to Low-Medium and Medium Density Residential, High Density Residential, Public Facility, Neighborhood Parks, and Open Space and a Zone Change from General Agriculture (A-1) to Planned Community. Upon the approval of the General Plan Amendment and Zone Change request by the City Council, Alternative 4 would be consistent with the land use designations contained in the City's General Plan and the City's Municipal Code and zoning. Alternative 4 would not result in noise, air quality, or aesthetic impacts that would conflict with adjacent land uses and would not conflict with the Orange County NCCP/HCP. Alternative 4 impacts related to land use and planning would be less than significant and comparable to those of the proposed Project.

Noise. Construction noise levels would range from 53.3 to 65.2 dBA L_{eq} at the sensitive receiver locations. Construction vibration velocity levels are expected to range from 0.002 to 0.008 in/sec PPV. During operation, off-site traffic-associated trips generated from the proposed Project would increase noise levels by 0.1 to 0.72 dBA CNEL on the study area roadway segments. Operational noise generated from the on-site uses would range from 17.9 to 32.5 dBA L_{so} at the sensitive off-site receiver locations. The construction noise, construction vibration, off-site traffic, and on-site operational noise levels would not exceed City noise level standards or Caltrans construction vibration standards, and impacts would be less than significant. Operation would not generate excessive ground-borne vibration or ground-borne noise, and impacts would be less than significant. Adjacent traffic noise from nearby roadways and freeways would not exceed the City's exterior noise standards at the proposed outdoor uses on the Project site with the planned 6 ft high noise barriers, and impacts would be less than significant. Additionally, interior noise levels within the proposed residences and school, which would be constructed to meet ventilation standards and include dual-paned glass, are not anticipated to exceed the City's interior noise standards. However, a *Final Noise Study* would be required to verify design and building performance, which are included as mitigation to ensure interior noise levels are reduced to less than significant.

Alternative 4 would develop the Project site with single-family residential and senior affordable rental uses but at a lower density of single-family residential uses than the proposed Project. Alternative 4 would generate similar noise levels during the construction period, but the duration of the noise exposure would be less because the construction period would be reduced. Alternative 4 would generate less operational noise impacts than the proposed Project because the number of vehicular trips generated would be somewhat fewer. It is not anticipated that any heavy landscaping or farming equipment would be used in the community garden; therefore, this use would not generate excessive noise. Similar to the proposed Project, a *Final Noise Study* would be required to demonstrate that the interior noise levels within the proposed buildings would be less than the City's interior noise.

In summary, Alternative 4 would result in less than significant impacts at off-site sensitive receivers. On-site noise levels would be less than significant after mitigation (preparation of *Final Noise Study*). Alternative 4 would generate similar construction noise, but for a shorter duration, and would generate less operational noise than the proposed Project.

Population and Housing. The proposed Project includes the development of up to 675 single-family residential units and up to 101 senior affordable rental units, which would serve approximately 2,274 residents. Because the Project site is designed as Business Park and BDO, residential uses were not envisioned on the Project site, and the population increase from the proposed Project would not have been accounted for in the City's projected population growth. While the proposed Project would result in population growth, the growth attributable to the proposed Project would not be substantial in relation to the current or projected conditions in Lake Forest. The addition of new affordable housing units also supports the affordable housing goals of the City. Although the proposed Project would provide short-term construction jobs and the proposed school would employ 60 workers, up to 249 nursery employees would be displaced. However, given the availability of jobs in the region, it is anticipated that workers would find employment elsewhere. Although the Project may contribute to a decline in the jobs-housing ratio by adding a greater

number of residential units to the City than job opportunities, the overall increase in housing compared to employment is not of a sufficient magnitude to negatively affect the forecasted jobs-housing ratio. The proposed Project would result in less than significant impacts related to population, housing, and employment growth.

Alternative 4 would develop the Project site with up to 600 single-family residential units and up to 90 senior affordable rental units, which would serve approximately 2,022 residents. Although Alternative 4 would include fewer housing units and serve fewer residents than the proposed Project, the increased population from Alternative 4 would not have been accounted for in the City's projected population. While Alternative 4 would result in population growth, the growth attributable to Alternative 4 would not be substantial in relation to the existing or projected conditions in Lake Forest. Additionally, Alternative 4 would support the affordable housing goals of the City by providing senior affordable housing. Alternative 4 would displace 249 nursery employees; however, Alternative 4 would also provide short-term construction jobs and the proposed school would employee 60 workers. Alternative 4 would contribute to a decline in the jobs-housing ratio by adding a greater number of residential units to the City than job opportunities. However, because Alternative 4 includes fewer residential units and the same job opportunities than the proposed Project, the decline in the jobs-housing ratio would be less than that of the proposed Project.

In summary, Alternative 4 would result in less than significant impacts related to population, housing, and employment growth. However, because Alternative 4 would include less housing and the same job opportunities than the proposed Project, it would result in less of a decline in the balance between jobs and housing. Therefore, Alternative 4 would have less impact related to population and housing than the proposed Project.

Public Services. Public service impacts related to fire and police protection services would be potentially significant; however, implementation of a CTMP would reduce construction impacts to less than significant, and a secured fire protection agreement and establishment of a Neighborhood Watch Program would reduce operational impacts to less than significant. The proposed Project includes the construction of a public elementary school on the Project site, and the Project Applicant/Developer would include an elementary school to reduce impacts on school services from the additional students generated by the proposed Project. Therefore, potential impacts related to the provision of school services for construction of the proposed Project would be less than significant. With the provision of on-site private parks and amenities, the proposed Project would not require the construction of new or expansion of existing construction, or expansion of existing recreational facilities or parks to maintain acceptable service ratios or performance objectives. Based on the City's library demand ratio, the population growth that would result from the proposed Project would not require the expansion of existing library facilities in Lake Forest in order to maintain acceptable service ratios. Finally, OCTA would be able to provide adequate transit services to the proposed Project. Therefore, with implementation of the mitigation described above for fire and police service impacts, impacts to public services would be less than significant.

Alternative 4 would develop the Project site with up to 600 single-family residential units and up to 90 senior affordable rental units, which would serve approximately 2,022 residents. Alternative 4

would include less housing and would result in less population growth than the proposed Project. The increased population from Alternative 4 would increase demand for fire and emergency medical services, police protection, library, park, school, and transit services, although the increased demand would be less than the proposed Project. Alternative 4 would include similar mitigation as the proposed Project, including implementation of a CTMP, establishment of a Neighborhood Watch Program, and payment of development fees. Additionally, Alternative 4 would include a school, and parks and open space to reduce demand for schools and parks. Therefore, with implementation of mitigation, impacts to public services would be less than significant.

In summary, with implementation of mitigation, Alternative 4 impacts to public services would be less than significant. Alternative 4 would result in less of an increase in population; therefore, impacts to public services would be less than the proposed Project.

Recreation. The proposed Project includes the development of up to 675 single-family residential units and up to 101 senior affordable rental units, which would increase the population in the City by approximately 2,274 persons. The increase in population would result in potentially significant impacts to existing neighborhood and regional parks, and other recreational facilities. The proposed Project includes both private and public recreational uses on site. The City's Municipal Code requires dedication of land equivalent to 5 ac per 1,000 residents or payment of in-lieu fees to reduce impacts to parklands. The proposed Project would meet the City's public park requirement of 11.37 ac by including approximately 21.41 ac of parks, open space, and habitat restoration area, of which 11.32 ac would be classified as public parks. Additionally, the proposed Project includes mitigation that requires on-site parks to be maintained in perpetuity. Therefore, impacts related to the use of existing neighborhood and regional parks and recreational facilities would be less than significant with implementation of mitigation.

Alternative 4 would develop the Project site with up to 600 single-family residential units and up to 90 senior affordable rental units. Alternative 4 would increase the population within Lake Forest by 2,022 persons, which is a public park requirement of 10.11 ac using the City's standard of 5 ac of recreational space per 1,000 residents. Alternative 4 would include 19.41 ac of parks, open space, and habitat restoration area, of which 9.02 ac would be classified as public parks. The remaining 2.35 ac would be offset through payment of in-lieu fees. Alternative 4 would also include mitigation similar to the proposed Project that would require on-site parks to be maintained in perpetuity. Therefore, impacts related to the use of existing neighborhood and regional parks and recreational facilities would be less than significant with implementation of mitigation. Alternative 4 would result in comparable impacts to parks and recreational facilities as the proposed Project because both alternatives would offset impacts by dedicating parkland through construction of on-site parks or payment of in-lieu fees.

Transportation/Traffic. The proposed Project would increase VMT to 26,098,705 from the 2,698,384 VMT generated by the existing nursery. The proposed Project would not be inconsistent with *State CEQA Guidelines* Section 15064.3(b) because the City has not established thresholds for assessing VMT impacts; therefore, traffic impacts were assessed based on LOS. The proposed Project is anticipated to generate a total of approximately 8,789 trip-ends per day that would contribute to an impact at the Bake Parkway/Jeronimo Road intersection, which is currently

operating at an unacceptable LOS. The proposed Project would mitigate the impact at this location to acceptable levels through a combination of fee payments to the City pursuant to a Fair Share Agreement or construction of the specific improvements. All construction equipment would be staged on site, and mitigation would be implemented to require that large construction equipment be delivered during off-peak times to reduce travel during peak travel periods so that construction would not result in incompatible uses that increase on-road hazards. Mitigation measures also require a distance analysis to be prepared for all Project intersections to determine limited use areas (e.g., low-height landscaping), and on-street parking restrictions (e.g., red curb), if necessary, and any turning restrictions (e.g., right-in/right-out). With implementation of mitigation, project construction and operation would not result in incompatible uses that increase on-road hazards, and impacts would be reduced to less than significant. Preparation of a CTMP is required as mitigation to ensure that emergency vehicles would be able to navigate to the Project site through adjacent streets that may experience congestion due to construction activities. Impacts related to emergency access during construction would be reduced to less than significant with implementation of mitigation. The Area Plan meets or exceeds the OCFA requirements to not hinder fire and emergency access; therefore, operational impacts related to emergency access would be considered less than significant.

Alternative 4 would include fewer residential units than the proposed Project. A similar grading footprint but less construction would be required for Alternative 4 compared to the proposed Project; therefore, construction trips would be less than the proposed Project. A CTMP would be required for Alternative 4 to reduce impacts to emergency access during construction. Alternative 4 would generate fewer vehicle trips compared to the proposed Project because there would be fewer residential uses and therefore fewer residents. Therefore, traffic impacts would be less than the proposed Project. Alternative 4 would be required to mitigate any traffic impacts through a Fair Share Agreement or construction of specific improvements, similar to the mitigation included for the proposed Project. Alternative 4 would be required to meet or exceed the OCFA requirements to not hinder fire and emergency access.

In summary, Alternative 4 would result in less than significant impacts related to traffic after implementation of mitigation measures similar to those of the proposed Project. Alternative 4 would result in less traffic impacts during construction and operation compared to the proposed Project.

Tribal Cultural Resources. The proposed Project would develop the Project site, which would require ground-disturbing construction activities. No previously recorded cultural resources were identified in the Project site, and no specific information regarding tribal cultural resources was received during the Native American consultation. Therefore, the proposed Project would not cause a substantial adverse change in the significance of a tribal cultural resource as defined by CEQA that is listed or eligible for listing in the California Register or a local register. Based on the results of Native American consultation with the Gabrieleno Band of Mission Indians – Kizh Nation, there is potential that ground-disturbing construction activities would impact previously undiscovered significant tribal cultural resources. The proposed Project would incorporate mitigation measures to reduce potentially significant impacts to previously undiscovered significant tribal cultural resources through Native American monitoring and evaluation of archaeological resources by the Native

American monitor, and reduce potentially significant impacts to Native American buried human remains through compliance with Health and Safety Code Section 7050.5. The mitigation measures would reduce potential impacts to a less than significant level.

Alternative 4 would develop the Project site with single-family residential and senior affordable rental uses but at a lower density than the proposed Project, and would require ground-disturbing construction activities for the development. Similar to the proposed Project, Alternative 4 would not cause a substantial adverse change in the significance of a tribal cultural resource as defined by CEQA that is listed or eligible for listing in the California Register or a local register because no previously recorded cultural resources were identified in the Project site during the records search or during the Native American consultation. Based on the results of Native American consultation, there is potential that ground-disturbing construction activities would impact previously undiscovered significant tribal cultural resources. Alternative 4 would be required to incorporate the same mitigation measures as the proposed Project that require Native American monitoring and evaluation of archaeological resources by the Native American monitor, and compliance with Health and Safety Code Section 7050.5. The mitigation measures would reduce potential impacts related to tribal cultural resources to a less than significant level.

In summary, Alternative 4 would result in no impacts to tribal cultural resources that are listed or eligible for listing in the California Register or a local register, and less than significant impacts with mitigation incorporated for previously undiscovered significant tribal cultural resources and Native American human remains. Alternative 4 would result in comparable tribal cultural resources impacts compared to the proposed Project because both alternatives include ground disturbance on the Project site.

Utilities and Service Systems. Utilities and service systems include water, wastewater, electricity, natural gas, telecommunication, solid waste, and storm drain facilities. The proposed Project would increase demand for these services; however, there is sufficient supplies and capacity available to service the increased demand. Impacts related to utilities and service systems would be less than significant.

Alternative 4 would develop the Project site with single-family residential and senior affordable rental uses but at a lower density than the proposed Project. Alternative 4 would increase demand for these services; however, the increase in demand would be less than the proposed Project. Therefore, there would be sufficient supplies and capacity available to service the increased demand. Impacts related to utilities and service systems would be less than significant and also less than the proposed Project.

Wildfire. The Project site is designated as a non-VHFHSZ and is not located in or near an SRA. However, the Project site is in the vicinity of a VHFHSZ. The proposed Project would result in no impact related to installation or maintenance of infrastructure that may exacerbate fire risk. The proposed Project would result in less than significant impacts related to impairment of an adopted emergency response or evacuation plan, exacerbation of wildfire risk, and exposure of people or structures to post-wildfire risks.

Alternative 4 would require temporary lane closures on nearby local roadways during construction, similar to the proposed Project; however, these closures would be anticipated to be implemented consistent with the *California Temporary Traffic Control Handbook* (California Inter-Utility Coordinating Committee 2018). Because Alternative 4 would generate less traffic than the proposed Project, study area intersections would be expected to operate at acceptable LOS. Therefore, construction and operation of Alternative 4 would not substantially impair an adopted emergency response plan or emergency evacuation plan.

The Project site is not located in a VHFHSZ. Despite the VHFHSZ to the northeast of the Project site, the uncontrolled spread of wildfire in the vicinity of the Project site is unlikely due to the density of existing non-combustible development and roadways, specifically SR-241 and Rancho Parkway. Due to the lack of steep slopes, prevailing winds, location, and other factors, Alternative 4 would not exacerbate wildfire risks or expose people or structures to post-fire risks.

Alternative 4 would include installation of utilities and an on-site roadway network. The installation of Project-related utilities and an on-site roadway network would not exacerbate fire risk due to the Project site's location in an urban and built-out area outside of a designated fire hazard zone. Therefore, Alternative 4 would not require the installation or maintenance of associated infrastructure (e.g., roads, fuel breaks, emergency water sources, power lines, or other utilities) that would exacerbate fire risk or result in temporary or ongoing impacts to the environment.

In summary, Alternative 4 would result in no impact related to installation or maintenance of infrastructure that may exacerbate fire risk and less than significant impacts related to impairment of an adopted emergency response or evacuation plan, exacerbation of wildfire risk, and exposure of people or structures to post-wildfire risks. Alternative 4 would result in similar wildfire impacts compared to the proposed Project because both alternatives include development of the Project site from a nursery to a residential use.

5.4.4.3 Project Objectives

Alternative 4 would develop the Project site with single-family residential and senior affordable rental uses but at a lower density than the proposed Project. Alternative 4 would be potentially consistent with all of the project objectives, which include:

- Provide a comprehensive plan for development of the Nakase Property that implements the goals and policies of the Lake Forest General Plan.
- Provide a site design that is sensitive to the existing natural features, including Serrano Creek.
- Reduce vehicular traffic and peak-hour trips through thoughtful site planning that emphasizes connectivity, access, and mobility.
- Provide a balanced mix of single-family and attached senior affordable homes, open space, and active public and private uses.
- Accommodate public uses by incorporating a new elementary school site conveniently located within easy walking distance for Project site residents.

- Provide an exceptional trail system and on-site parks that enhance the quality of life of the larger community.
- Provide for logical, attractive, and safe pedestrian and bicycle connections within the community.
- Create high-quality residential homes and distinct, identifiable neighborhoods with a range of specifically targeted single-family product types.

5.5 IDENTIFICATION OF ENVIRONMENTALLY SUPERIOR ALTERNATIVE

CEQA requires the identification of an Environmentally Superior Alternative among the alternatives evaluated in an EIR. *State CEQA Guidelines* Section 15126.6(e)(2) provides that, if the No Project/No Build Alternative is the Environmentally Superior Alternative, then the EIR shall also identify an Environmentally Superior Alternative among the other alternatives. Table 5.H provides, in summary format, a comparison of the level of impacts of each alternative to the proposed Project.

Alternative 4 has the least impact on the environment because the Project site would be developed at a reduced density, thereby reducing the most of the proposed Project's environmental impacts compared to the other alternatives. However, Alternative 4 would not reduce the significant impacts related to agricultural resources and GHG emissions to a less than significant level. These impacts would remain significant and unavoidable. Additionally, Alternative 4 would potentially meet all of the project alternatives. Accordingly, it is determined that Alternative 4 is the Environmentally Superior Alternative because it would meet all of the project' objectives and result in reduced environmental impacts as compared to the proposed Project.

Table 5.H: Comparison of the Environmental Impacts of the Proposed Project and Project Alternatives

Impact Area	Proposed Project Impact with Mitigation (if any)	Alternative 1: No Project (Business Park)	Alternative 2: Urban Industrial/Residential	Alternative 3: No School	Alternative 4: Reduced Project
Aesthetics	Less than Significant[1]	Similar	Similar	Similar	Less
Agricultural Resources	Significant and Unavoidable	Similar	Similar	Similar	Similar
Air Quality	Less than Significant	Greater and Significant	Similar	Less	Less
Biological Resources	Less than Significant[1]	Similar	Similar	Similar	Similar
Cultural Resources	Less than Significant[1]	Similar	Similar	Similar	Similar
Energy	Less than Significant	Similar (construction) Greater (operation)	Similar	Less	Less
Geology and Soils	Less than Significant[1]	Similar	Similar	Similar	Similar
Greenhouse Gas Emissions	Significant and Unavoidable	Greater	Similar	Less (remains Significant)	Less (remains Significant)
Hazards and Hazardous Materials	Less than Significant[1]	Similar	Similar	Similar	Similar
Hydrology and Water Quality	Less than Significant	Similar	Similar	Similar	Similar
Land Use and Planning	Less than Significant	Similar	Similar	Similar	Similar
Noise	Less than Significant[1]	Similar (construction) Less (on-site operation) Greater (off-site traffic)	Similar	Similar (construction) Less (operational)	Similar (construction) Less (operational)
Population and Housing	Less than Significant	Less	Less	Greater	Less
Public Services	Less than Significant[1]	Less	Less	Greater (schools) Similar (all other public services)	Less
Recreation	Less than Significant[1]	Less	Similar	Similar	Similar
Transportation/Traffic	Less than Significant[1]	Similar (construction) Greater (operation)	Similar	Less	Less
Tribal Cultural Resources	Less than Significant[1]	Similar	Similar	Similar	Similar
Utilities and Service Systems	Less than Significant	Similar	Similar	Less	Less
Wildfire	Less than Significant	Similar	Similar	Similar	Similar

[1] Mitigation identified.

6.0 OTHER CEQA CONSIDERATIONS

6.1 SUMMARY OF SIGNIFICANT UNAVOIDABLE IMPACTS

Section 15126.2(c) of the *State CEQA Guidelines* requires that an Environmental Impact Report (EIR) describe any significant impacts that cannot be avoided. Specifically, Section 15126.2(c) states that an EIR shall:

> "Describe any significant impacts, including those which can be mitigated but not reduced to a level of insignificance. Where there are impacts that cannot be alleviated without imposing an alternative design, their implications and the reasons why the project is being proposed, notwithstanding their effect, should be described."

The Executive Summary of this document (Chapter 1.0) contains a detailed summary that identifies the proposed Project's environmental impacts as compared to existing conditions, proposed mitigation measures, and the level of significance of any impacts after mitigation. The following is a summary of the impacts that are considered significant, adverse, and unavoidable after all mitigation is applied. These impacts are also described in detail in Chapter 4.0, Existing Environmental Setting, Environmental Analysis, Impacts, and Mitigation Measures.

6.1.1 Agricultural Resources

The conversion of 119.2 acres (ac) of Important Farmland (Unique Farmland as designated by the California Department of Conservation [DOC] Farmland Mapping and Monitoring Program [FMMP]) to a non-agricultural use would be potentially significant. As described in Section 4.2.9 of this Draft EIR, mitigation was considered to reduce the impact of the conversion of 119.2 ac of Important Farmland to non-agricultural uses. However, the mitigation measures were not considered feasible; therefore, impacts pertaining to the conversion of Important Farmland to a non-agricultural use from implementation of the proposed Project would be significant and unavoidable.

6.1.2 Greenhouse Gas Emissions

The proposed Project would exceed the applicable South Coast Air Quality Management District (SCAQMD) Service Population greenhouse gas (GHG) thresholds for 2025 and 2030. Thus, Project-related emissions would have a potentially significant impact related to the generation of GHG emissions.

No feasible mitigation measures exist that would reduce GHG emissions to levels that are less than significant. More than 73 percent of all mobile-source emissions in 2025 and 66 percent of all mobile-source emissions in 2030 (by weight) would be generated by the proposed Project's mobile sources (traffic). Neither the Project Applicant/Developer nor the City of Lake Forest (City) can substantively or materially affect reductions in Project mobile-source emissions beyond the regulatory requirements and project design features included as part of the proposed Project. Additionally, even if mitigation were applied to reduce all other sources of GHG emissions to the maximum extent possible, the proposed Project's mobile-source emissions alone would still exceed

the threshold of significance. Therefore, impacts related to the generation of GHG emissions would remain significant and unavoidable.

6.1.3 Conflict with Greenhouse Gas Emissions Reduction Plans, Policies, and Regulations

Although the Project would not conflict with any of the 2017 Scoping Plan elements, as discussed above, it would exceed the applicable Service Population GHG thresholds and consequently has the potential to result in a cumulatively considerable impact with respect to GHG emissions. This would result in a significant and unavoidable impact related to a conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions. As discussed previously, there is no available mitigation to substantially lessen or reduce this significant impact to less than significant. Therefore, impacts related to conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions would remain significant and unavoidable.

6.2 ENERGY IMPACTS

According to Section 15126.2(b) of the *State CEQA Guidelines*, "[i]f analysis of the project's energy use reveals that the project may result in significant environmental effects due to wasteful, inefficient, or unnecessary consumption use of energy, or wasteful use of energy resources, the EIR shall mitigate that energy use."

As described in Section 4.6, Energy, of this Draft EIR, the proposed Project would not result in significant impacts related to energy use. Therefore, no mitigation is required.

6.3 GROWTH-INDUCING IMPACTS

Sections 15126(d) and 15126.2(e) of the *State CEQA Guidelines* require that an EIR analyze growth-inducing impacts and discuss the ways in which a proposed project could foster economic or population growth or construction of additional housing, either directly or indirectly, in the surrounding environment. This section examines ways in which the proposed Project could foster economic or population growth, or the construction of additional housing either directly or indirectly in the surrounding environment. *State CEQA Guidelines* Section 15126.2(d) also requires a discussion of the characteristics of projects that may encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively. To address these issues, potential growth-inducing effects were examined through analysis of the following questions:

- Would the project remove obstacles to, or otherwise foster, population growth (e.g., through the construction or extension of major infrastructure facilities that do not presently exist in the project area, or through changes in existing regulations pertaining to land development)?

- Would the project foster economic growth?

- Would approval of the project involve some characteristic that may encourage and facilitate other activities that could significantly affect the environment?

Growth-inducing effects are not to be construed as necessarily beneficial, detrimental, or of little significance to the environment (*State CEQA Guidelines*, Section 15126.2(e)). This issue is presented to provide additional information on ways in which the proposed Project could contribute to significant changes in the environment beyond the direct consequences of developing the proposed land uses as described in earlier sections of this Draft EIR.

6.3.1 Removal of Obstacles to, or Otherwise Foster, Population Growth

The area surrounding the Project site is already highly urbanized and developed with a mix of residential, hotel, business park, regional park/open space, commercial, and light industrial land uses, so limited population growth is feasible within the vicinity of the Project site. In any event, the proposed Project would not remove impediments to population growth in the area surrounding the Project site. While the proposed Project may require water, sewer, electricity, and natural gas lines on site and in the immediate vicinity of the Project site, such improvements would be intended primarily to meet Project-related demand and would not necessitate substantial utility infrastructure improvements. In addition, all roadway improvements planned with respect to the proposed Project are intended to provide for better circulation flows within the Project site and the immediate Project vicinity, and would not foster off-site population growth.

The construction of the proposed Project would generate a substantial number of construction-related jobs. However, the proposed Project would not promote construction workers relocating their places of residence as a direct consequence of working on the proposed Project. The work requirements of most construction projects are highly specialized so construction workers remain at a job site only for the limited time in which their specific skills are needed to complete a particular phase of the construction process. In addition, as described in Section 4.13, Population and Housing, the supply of general construction labor in the region has been stable over recent years and is 13 percent above Orange County's 10-year average, suggesting a well-functioning construction job market and available regional labor pool. Therefore, given the availability of construction workers, the proposed Project would not induce material population growth from a short-term employment perspective.

Upon completion of the proposed Project, the 101 senior affordable housing units and 675 single-family residential units are estimated to generate a total of approximately 2,274 new residents on the Project site. While this direct population growth would increase the demand for neighborhood-serving commercial uses in the area surrounding the Project site, the proposed Project would be located in a built out area of Lake Forest that is already served by neighborhood-serving retail and service uses. Although some local businesses that provide goods and services to nearby residents may hire a small number of additional employees to accommodate the minor increase in clientele associated with the proposed Project, this additional hiring is not expected to induce material population growth because most of these new employees are not expected to change their place of residence.

With regard to Project operation, the proposed school is expected to employ 60 workers. Due to the limited number of jobs induced and the available labor pool within Lake Forest and the region, it is unlikely that the employment offered by the Project would cause people to move or relocate to the

area solely for the purpose of being close to the Project site. Therefore, although the proposed Project would provide employment opportunities, it would not result in substantial indirect growth or create a significant demand for housing in the Project site vicinity.

Therefore, given that the employment opportunities generated by the construction and operation of the proposed Project would be filled by people who would commute to the Project site, the potential population growth associated with Project employees would be minimal.

6.3.2 Foster Economic Growth

The proposed Project would introduce new residents that would invigorate the local economy by spending on goods and services at local businesses. As described in the *Nakase Project Fiscal Impact Analysis* prepared by Stanley R. Hoffman Associates (Appendix N), the proposed Project's residents are projected to spend approximately $28.57 million in retail purchases on an annual basis in Lake Forest. As previously discussed, the construction of the proposed Project would generate a substantial number of construction-related jobs and new employment opportunities in Lake Forest during the construction period. As also discussed, the new school would be expected to employ 60 workers, and these positions would likely be filled by persons already residing in Lake Forest or the region. Therefore, the proposed Project would foster economic growth.

6.3.3 Other Characteristics

The proposed Project involves a General Plan Amendment and Zone Change to establish the Nakase Property Area Plan (Area Plan). The proposed Project includes the development of up to 675 single-family residential units and up to 101 senior affordable rental units on the Project site. Because the Area Plan included as part of the Project would not modify the existing General Plan land use designations or zoning classifications on any off-site properties, the Project would not directly increase the City's population beyond the number of residents who would live in the 776 on-site residential units. While it is conceivable that the Project's approval could attract the interest of new housing developers to Lake Forest who may seek the approval of General Plan Amendments or Zone Changes on other undeveloped or underutilized properties in the City for the purpose of developing new housing, it is highly unlikely given that the City of Lake Forest has very little land that would be able to accommodate new housing development that has not already been designated for housing. Any future growth in the City is likely to occur regardless of whether or not the Project is approved.

6.4 SIGNIFICANT IRREVERSIBLE ENVIRONMENTAL CHANGES

Section 15126.2(d) of the *State CEQA Guidelines* requires that an EIR consider and discuss significant irreversible changes that would be caused by implementation of a proposed project. The *State CEQA Guidelines* specify that the use of nonrenewable resources during the initial and continued phases of a project should be discussed because a large commitment of such resources makes removal or non-use thereafter unlikely. Primary and secondary impacts (e.g., a highway improvement that provides access to a previously inaccessible area) should also be discussed because such changes generally commit future generations to similar uses. Irreversible damage can also result from environmental accidents associated with a project and should be discussed.

The types and level of development associated with the proposed Project would consume limited, slowly renewable, and nonrenewable resources. This consumption would occur during construction of the proposed Project and would continue throughout the operational lifetime of the proposed Project. The development of the proposed Project would require a commitment of resources that would include (1) building materials, (2) fuel and operational materials/resources, and (3) the transportation of goods and people to and from the Project site.

Construction of the proposed Project would require consumption of resources that are not replenishable or that may renew so slowly as to be considered nonrenewable. These resources would include certain types of lumber and other forest products (e.g., hardwood lumber), aggregate materials used in concrete and asphalt (e.g., sand, gravel, and stone), metals (e.g., steel, copper, and lead), petrochemical construction materials (e.g., plastics), and water. Fossil fuels (e.g., gasoline and oil) would also be consumed in the use of construction vehicles and equipment. Water, which is a limited, slowly renewable resource, would also be consumed during construction of the proposed Project. However, given the temporary nature of construction activities, water consumption during construction would result in a less than significant impact on water supplies. Furthermore, the use of construction vehicles and equipment would require the consumption of nonrenewable fossil fuels such as natural gas and oil. As with other resources consumed during construction, the consumption of nonrenewable fossil fuels for energy use would occur on a temporary basis during construction of the proposed Project.

Operation of the proposed Project would continue to expend similar nonrenewable resources that are currently consumed within Lake Forest and on site. These include energy resources such as electricity, petroleum-based fuels, fossil fuels, and water. Energy resources would be used for heating and cooling buildings, transportation within the Project site, and building lighting. Fossil fuels are primary energy sources for project construction and operation. This existing, finite energy source would thus be incrementally reduced. Under Title 24, Part 6 of the California Code of Regulations (CCR), conservation practices limiting the amount of energy consumed by the proposed Project would be required during operation. Nevertheless, the use of such resources would continue to represent a long-term commitment of essentially nonrenewable resources.

The proposed Project would result in the limited use of potentially hazardous materials contained in typical cleaning agents and pesticides for landscaping on the Project site. Such materials would be used, handled, stored, and disposed of in accordance with applicable government regulations and standards that would serve to protect against a significant and irreversible environmental change resulting from the accidental release of hazardous materials.

In summary, construction and operation of the proposed Project would commit the use of slowly renewable and nonrenewable resources and would limit the availability of these resources on the Project site for future generations or for other uses during the life of the proposed Project. However, the continued use of such resources during operation would be on a relatively small scale and consistent with regional and local urban design and development goals for the area. As a result, the use of nonrenewable resources in this manner would not result in significant irreversible changes to the environment under the proposed Project.

This page intentionally left blank

7.0 LIST OF PREPARERS AND PERSONS CONSULTED

7.1 CITY OF LAKE FOREST

The following individuals from the City of Lake Forest (City) were involved in the preparation of this Draft Environmental Impact Report (EIR):

- Gayle Ackerman, AICP, Director of Community Development, Community Development Department
- Niki Wetzel, AICP, Assistant Director of Community Development, Community Development Department
- Marie Luna, Senior Planner, Community Development Department
- Ron Santos, Senior Planner, Community Development Department
- Doug Anderson, Traffic Engineer, Public Works Department
- Dave Rogers, P.E., Traffic Engineering Manager, Public Works Department

7.2 EIR PREPARERS

The following individuals were involved in the preparation of this Draft EIR. The nature of their involvement is summarized below.

7.2.1 LSA

The following individuals were involved in the preparation of this Draft EIR:

- Nicole Dubois, Principal in Charge
- Ryan Bensley, AICP, Associate/Project Manager
- Ashley Davis, Principal, Environmental
- Lisa Williams, Principal, Environmental
- Ken Wilhelm, Principal, Transportation
- Arthur Black, Associate, Transportation
- Art Homrighausen, Principal, Biologist
- Pam Reading, Managing Principal, Environmental
- Nicole West, Associate, Environmental
- Kerrie Collison, Senior Cultural Resources Manager
- Amy Fischer, Managing Principal, Air/Noise
- John (JT) Stephens, Associate, Air Quality
- Sarah Rieboldt, Associate/Senior Paleontologist
- Chris Graham, Environmental Planner
- Shelby Cramton, Environmental Planner
- Cara Carlucci, Environmental Planner
- Justin Roos, Associate, GIS
- Tom Flahive, Senior GIS Programmer
- Gary Dow, Associate, Graphics
- Mathew Phillips, Graphics Technician

- Andrea Bean, Assistant Environmental Planner
- Patrick Kallas, Assistant Environmental Planner
- Elise Miller, Assistant Environmental Planner
- Marlene Watanabe, Assistant Environmental Planner
- Beverly Inloes, Associate, Senior Technical Editor/Word Processor
- Michael Mello, Technical Editor

7.3 TECHNICAL REPORT PREPARERS

The following individuals were involved in the preparation of the technical reports in support of this Draft EIR. The nature of their involvement is summarized below.

7.3.1 ENGEO Incorporated

The following individuals were involved in the preparation of the *Soil Characterization Assessment* (September 2016):

- Lauren Gordon, Staff Engineer
- Shawn Munger, CHG, Principal

7.3.2 Glenn Lukos Associates, Inc.

The following individuals were involved in the preparation of the *Biological Technical Report* (March 2019):

- Zach West, Senior Biologist/Regulatory Specialist
- Tricia Campbell, Principal/Senior Biologist

7.3.3 GPA Consulting

The following individuals were involved in the preparation of the *Historical Resources Evaluation Report* (December 2018):

- Teresa Grimes, Principal Architectural Historian
- Audrey Von Ahrens, Architectural Historian II

7.3.4 Hillman Consulting

The following individuals were involved in the preparation of the *Phase I Environmental Site Assessment* (July 2018):

- James M. Riggs, MS, CHMM, Project Manager
- Stephen Bartlett, Environmental Technician

The following individual was involved in the preparation of the *Limited Phase II Subsurface Investigation Report* (November 2018):

- Daniel Louk, Professional Geologist

7.3.5 Hunsaker Associates

The following individual was involved in the preparation of the *Preliminary Hydrology Analysis* (June 2019):

- Mohammed Rowther, P.E., Director of Public Work Department

The following individual was involved in the preparation of the *Preliminary/Conceptual Draft Water Quality Management Plan* (WQMP) (June 2019):

- Fred Graylee, Principal

7.3.6 Kimley Horn

The following individual was involved in the preparation of the *Nakase Property Area Plan Visual Analysis* (2018):

- Laura Worthington Forbes, Regional VP

7.3.7 NMG Geotechnical, Inc.

The following individuals were involved in the preparation of the *Geotechnical Evaluation of Proposed Residential and School Site Development* (April 2017):

- William Goodman, CEG, Principal Geologist
- Ted Miyake, RCE, Principal Engineer

7.3.8 PlaceWorks

The following individual was involved in the preparation of the *Nakase Elementary School Health Risk Assessment* (May 2019) and the *Nakase Elementary School Water Pipeline and Tank Safety Hazard Assessment* (June 2019), and the *Nakase Elementary School EMF Study and Exemption Request* (May 2019).

- Steve Bush, PE, Senior Engineer

The following individual was involved in the preparation of the *Nakase Elementary School Updated Geologic and Environmental Hazards Assessment* (June 2019).

- Michael Watson, PG, Associate Geologist

7.3.9 Stanley R. Hoffman Associates

The following individual was involved in the preparation of the *Nakase Project Fiscal Impact Analysis* (May 2018):

- Stanley R Hoffman, President

7.3.10 Urban Crossroads

The following individuals were involved in the preparation of the *Nakase Property Air Quality Impact Analysis* (July 2019) and the *Nakase Property Greenhouse Gas Analysis* (July 2019):

- Haseeb Qureshi, Senior Associate
- Alyssa Tamase, Assistant Analyst

The following individuals were involved in the preparation of the *Nakase Property Noise and Vibration Impact Analysis* (November 2018)

- Bill Lawson, PE, INCE, Principal
- Alex Wolfe, INCE, Associate

The following individuals were involved in the preparation of the *Nakase Property Traffic Impact Analysis* (July 2019)

- John Kain, AICP, Principal
- Marlie Whiteman, P.E., Senior Associate
- Janette Cachola, Senior Analyst

7.4 PROJECT APPLICANT

7.4.1 Toll Brothers

- Ilan Feingold, Senior Project Manager
- Rick Nelson, Division President
- Peter Kim, PE, Vice President Land Development

7.5 PERSONS CONSULTED

The following individuals were consulted during the preparation of this Draft EIR:

- Irvine Ranch Water District
    - Mitch Robinson, PE, Associate Engineer
- Orange County Public Library
    - Julie A. Oakley, Administrative Manager
- Orange County Sheriff's Department
    - Brett Channing, Director of Management Services
- Gabrieleno Band of Mission Indians—Kizh Nation
    - Andrew Salas, Chairperson
    - Matthew Teutimez, Environmental Director
    - Brandy Salas, Administrative Specialist

8.0 REFERENCES

California Air Resources Board (CARB). 2008. California Greenhouse Gas Emissions Inventory, 2018.

_____. 2019. Clean Car Standards – Pavley, Assembly Bill 1493. Website: https://ww3.arb.ca.gov/cc/ccms/ccms.htm (page last reviewed January 11, 2017), accessed June 29, 2019.

_____. EMFAC2017 Web Database: https://www.arb.ca.gov/emfac/2017/, accessed July 1–4, 2017.

California Department of Conservation (DOC). 2015. California Geological Survey, Geologic Hazards Map Viewer, Landslide Inventory and Deep-Seated Landslide Susceptibility Map. Website: https://maps.conservation.ca.gov/cgs/lsi/, accessed May 30, 2019.

_____. 2016a. *Farmland Mapping and Monitoring Program.* Website: ftp://ftp.consrv.ca.gov/pub/dlrp/FMMP/2016, accessed December 15, 2018.

_____. 2016b. *The California Land Conservation Act of 1965, 2016 Status Report, Williamson Act Program.* December. Website: https://www.conservation.ca.gov/dlrp/wa/Documents/stats_reports/2016%20LCA%20Status%20Report.pdf, accessed December 15, 2018.

California Department of Finance, Demographic Research Unit. 2019. E-5 Population and Housing Estimates for Cities, Counties, and the State, 2011-2019 with 2010 Census Benchmark. May. Website: http://www.dof.ca.gov/Forecasting/Demographics/Estimates/e-5/, accessed May 15, 2019.

California Department of Forestry and Fire Protection (CAL FIRE). 2012a. Fire Protection Resource Assessment Program (FRAP). Fire Hazard Severity Zone Viewer. Website: https://egis.fire.ca.gov/FHSZ/, accessed May 30, 2019.

_____. 2012b. Wildland Hazard & Building Codes, Orange County FHSZ Map. State and Local Responsibility Areas. Website: https://www.fire.ca.gov/fire_prevention/fhsz_maps_orange, accessed May 28, 2019.

California Department of Housing and Community Development. Annual Progress Report Permit Summary – Pivot Table with 5th Cycle Summary Data. Website: http://www.hcd.ca.gov/community-development/housing-element/docs/Annual_Progress_Report_Permit_Summary.xls, accessed December 2018.

California Department of Resources Recycling and Recovery. Estimated Solid Waste Generation Rates. Website: https://www2.calrecycle.ca.gov/WasteCharacterization/General/Rates (accessed 14 August 2019).

California Department of Transportation (Caltrans). California Scenic Highway Mapping System. Website: http://www.dot.ca.gov/hq/LandArch/16_livability/scenic_highways/ (accessed March 14, 2019).

California Department of Water Resources (DWR). 2004. *California's Groundwater, Bulletin 118* – South Coast Hydrologic Region, Coastal Plain of Orange County Groundwater Basin. February.

_____. 2019. GSA Map Viewer. Website: https://sgma.water.ca.gov/webgis/index.jsp?appid=gasmaster&rz=true, accessed June 26, 2019.

California Employment Development Department (EDD). 2019a. Industry Employment – Official Estimates, Anaheim-Santa Ana-Irvine Metropolitan Division (Orange County), 2000–Present. Website: https://www.labormarketinfo.edd.ca.gov/data/employment-by-industry.html, accessed June 6, 2019.

_____. 2019b. Monthly Labor Force Data for Cities and Census Designated Places (CDP), Orange County, April. Website: https://www.labormarketinfo.edd.ca.gov/data/labor-force-and-unemployment-for-cities-and-census-areas.html#CCD, accessed June 6, 2019.

_____. Employer Details, Nakase Brothers Wholesale Nursery. Website: https://www.labormarketinfo.edd.ca.gov/aspdotnet/databrowsing/empDetails.aspx?menuChoice=emp&empid=980686893&geogArea=0604000059, accessed June 6, 2019.

California Energy Commission (CEC). 2018a. 2017 Integrated Energy Policy Report. California Energy Commission. Publication Number: CEC-100-2017-001-CMF. February.

_____. 2018b. 2018 Integrated Energy Policy Report Update. California Energy Commission. Publication Number: CEC-100-2018-001-VI. February

_____. 2018c. California Energy Demand, 2018-2030 Revised Forecast. Publication Number: CEC-200-2018-002-CMF. February. Website: https://efiling.energy.ca.gov/getdocument.aspx?tn=223244, accessed July 1, 2019.

_____. 2019a. California Gasoline Data, Facts, and Statistics. Website: https://ww2.energy.ca.gov/almanac/transportation_data/gasoline/, accessed June 29, 2019.

_____. 2019b. Electricity Consumption by Entity. Website: http://www.ecdms.energy.ca.gov/elecbyutil.aspx, accessed June 29, 2019.

_____. 2019c. Notice of Request for Public Comments on the Draft Scoping Order for the 2019 Integrated Energy Policy Report. Docket No. 19-IEPR-01.

_____. 2019d. Supply and Demand of Natural Gas in California. Website: https://ww2.energy.ca.gov/almanac/naturalgas_data/overview.html, accessed June 29, 2019.

_____. 2019e. Electricity Consumption by County for 2018. Website: http://www.ecdms.energy.ca.gov/elecbycounty.aspx, accessed July 8, 2019.

_____. 2019f. Gas Consumption by Entity for 2018. Website: http://www.ecdms.energy.ca.gov/gasbyutil.aspx, accessed July 7, 2019.

_____. 2019g. Total System Electric Generation. Website: https://ww2.energy.ca.gov/almanac/electricity_data/total_system_power.html, accessed June 29, 2019.

California Energy Commission (CEC) and California Air Resources Board (CARB). 2007. State Alternatives Fuel Plan- Commission Report. CEC-600-2007-011-CMF. December.

California Gas and Electric Utilities. 2018. California Gas Report. Website: https://www.socalgas.com/regulatory/documents/cgr/2018_California_Gas_Report.pdf, accessed June 29, 2019.

California Inter-Utility Coordinating Committee. 2018. *California Temporary Traffic Control Handbook, Seventh Edition.* May.

California Public Utilities Commission (CPUC). 2008. California Long-Term Energy Efficiency Strategic Plan. September. Website: https://www.cpuc.ca.gov/General.aspx?id=4125, accessed August 15, 2019.

_____. 2019. Renewables Portfolio Standard (RPS) Program. Website: https://www.cpuc.ca.gov/rps/, accessed June 29, 2019.

City of Lake Forest. 1994a. General Plan, Public Facilities/Growth Management Element. Website: https://www.lakeforestca.gov/DocumentCenter/View/840/7---Public-Facilities-and-Growth-Management-Element-PDF, accessed July 2, 2019.

_____. 1994b (revised September 6, 2016). General Plan, Land Use Element. Website: https://www.lakeforestca.gov/DocumentCenter/View/829/2---Land-Use-Element-revised-September-2016-PDF, accessed June 6, 2019.

_____. 2008a. *Opportunities Study Area Program Environmental Impact Report*. Chapter 5, Other CEQA Considerations. June.

_____. 2008b. Zoning Map.

_____. 2009. *City of Lake Forest CEQA Significance Thresholds Guide*, published November 20, 2001, revised March 2009. Website: https://www.lakeforestca.gov/DocumentCenter/View/823/CEQA-Significance-Thresholds-Guide-PDF, accessed June 2019.

_____. 2014. General Plan, 2013-2021 Housing Element. January. Website: https://www.lakeforestca.gov/292/Planning-Documents, accessed May 15, 2019 and July 2, 2019.

_____. 2015. General Plan, Safety and Noise Element. Prepared June 21, 1994, Revised May 19, 2015. Website: https://www.lakeforestca.gov/DocumentCenter/View/843/6---Safety-and-Noise-Element-PDF, accessed June 12, 2019, July 2, 2019.

_____. 2016a. City Council Agenda Report: Civic Center Schematic Design Review. September 20. Website: https://lakeforestca.gov/DocumentCenter/View/4190/Civic-Center-Schematic-Review-PDF?bidId=, accessed June 25, 2019.

_____. 2016b. City Council Agenda Report: Lake Forest Civic Center Update. November 15. Website: https://lakeforestca.gov/DocumentCenter/View/4507/Lake-Forest-Civic-Center-Update-PDF, accessed June 25, 2019.

_____. 2016c. General Plan, Recreation and Resources Element. Prepared June 21, 1994, revised September 2016. Website: https://www.lakeforestca.gov/DocumentCenter/View/841/5---Recreation-and-Resources-Element-revised-September-2016-PDF, accessed May 20, 2019 and July 2, 2019.

_____. 2017. *Local Guidelines for Implementing the California Environmental Quality Act*.

_____. 2018a. *2040 General Plan Existing Conditions Report*, *Chapter 3: Demographic and Market Trends.* Website: https://static1.squarespace.com/static/5abd4a977e3c3a6cd57d9c48/t/5be0956e575d1fcea8d822b0/1541444991745/Chapter+3_Market+Demand.pdf, accessed July 3, 2019.

_____. 2018b. *2040 General Plan Existing Conditions Report*, *Chapter 8: Hazards, Safety, and Noise.* Website: https://static1.squarespace.com/static/5abd4a977e3c3a6cd57d9c48/t/5be0969c70a6ada0ee9aa6ee/1541445291387/Chapter+8_Hazards%2C+Safety%2C+Noise.pdf, accessed May 29, 2019.

_____. 2018c. *Lake Forest General Plan Update: Existing Conditions Report*. October. Website: https://static1.squarespace.com/static/5abd4a977e3c3a6cd57d9c48/t/5be097d8c2241bf46b6623ba/1541445626140/LakeForestECR_Complete_110118_WebVersion.pdf, accessed June 12, June 24, and June 29, 2019).

_____. 2019. *Land Use Themes Report*. February. Website: https://static1.squarespace.com/static/5abd4a977e3c3a6cd57d9c48/t/5c8978eb971a181b1ed5700b/1552513293064/LandUseThemesReport_031319_WithAppendices.pdf (accessed August 2019).

_____. Municipal Code. Website: http://qcode.us/codes/lakeforest/, accessed May 21, 2019.

_____. Citywide Design Guidelines

County of Orange. 1996. *Natural Community Conservation Plan & Habitat Conservation Plan, County of Orange, Central and Coastal Subregion, Parts I & II: NCCP/HCP.* July 17. Website: https://www.fws.gov/carlsbad/HCPs/documents/Central%20Coastal%20OC%20NCCP%20Parts%20I%20&%20II%20-%20Plan.pdf, accessed July 5, 2019.

_____. 2005. General Plan, Chapter VI, Resources Element. Website: http://www.ocpublicworks.com/ds/planning/generalplan, accessed December 13, 2018.

_____. 2011. *Model Water Quality Management Plan*. May 19. Website: https://cms.ocgov.com/gov/pw/watersheds/documents/wqmp/default.asp, accessed August 15, 2019.

_____. 2012a. *Construction Runoff Guidance Manual for Contractors, Project Owners, and Developers*. December.

_____. 2012b. General Plan, Chapter V, Public Services and Facilities.

_____. 2013. *Technical Guidance Document for the Preparation of Conceptual/Preliminary and/or Project Water Quality Management Plans (WQMPs)*. May 19.

County of Orange, Cities of Orange County, and Orange County Flood Control District. 2003. *Drainage Area Management Plan.* July 1.

County of Orange & Orange County Fire Authority (OCFA). 2015. *Local Hazard Mitigation Plan*. November. Website: http://cams.ocgov.com/Web_Publisher/Agenda07_12_2016_files/images/O00216-000668A.PDF, accessed May 29, 2019.

De Novo Planning Group (De Novo). 2018. City of Lake Forest General Plan Update: Existing Conditions Report. Prepared October 2018. Website: https://static1.squarespace.com/static/5abd4a977e3c3a6cd57d9c48/t/5be097d8c2241bf46b6623ba/1541445626140/LakeForestECR_Complete_110118_WebVersion.pdf (accessed December 3, 2018).

ENGEO Incorporated. 2016. *Soil Characterization Assessment.* September.

Federal Emergency Management Agency (FEMA). March 2018. Letter of Map Revision Determination Document, City of Lake Forest, Orange County, California, Effective July 16, 2018.

Federal Bureau of Investigation (FBI). 2014. 2014 Crime in the United States. Table 71, Full-Time Law Enforcement Officers by Region and Geographic Division by Population Group Number and Rate per 1,000 Inhabitants.

Federal Energy Regulatory Commission (FERC). 2006. Energy Policy Act of 2005 – Fact Sheet. August 8.

_____. 2019. Energy Policy Act of 2005. Public Law 109-58-Aug. 8, 2005. Website: https://ferc.gov/enforcement/enforce-res/EPAct2005.pdf, accessed June 29, 2019.

Federal Transit Administration (FTA). 2018. *Transit Noise and Vibration Impact Assessment Manual*. September.

Glenn Lukos Associates, Inc. (GLA). 2017. *Biological Regulatory Overview for the Approximately 121-Acre Lake Forest Nursery Site, Lake Forest, Orange County, California*. April.

_____. 2019. *Biological Technical Report for the Nakase Property Project Located in the City of Lake Forest, Orange County, California*. March.

Governor's Office of Planning and Research (OPR). December 2018. *Technical Advisory on Evaluating Transportation Impacts Under CEQA.*

GPA Consulting (GPA). 2018. *Historical Resources Evaluation Report: Nakase Property, Lake Forest, California*. December.

Hillman Consulting. 2018a. *Limited Phase II Subsurface Investigation Report, 20621 Lake Forest Drive, Lake Forest, California*. November.

_____. 2018b. *Phase I Environmental Site Assessment, 20621 Lake Forest Drive, Lake Forest, California*. July.

Hunsaker & Associates Irvine, Inc. 2019a. *Preliminary Hydrology Analysis: Nakase Property, Vesting Tentative Tract Map No. 18142.* June 10.

_____. 2019b. *Preliminary/Conceptual Water Quality Management Plan*. June 10.

Institute of Transportation Engineers (ITE). 2017. *ITE Trip Generation*, *10th Edition*.

Irvine Ranch Water District (IRWD). 2011. Procedural Guidelines and General Design Requirements, Development Services (originally prepared January 1995, revised November 2011). Website: https://www.irwd.com/assets/files/Development%20Services/Procedural%20Guidelines%20and%20General%20Design%20Requirements%20%20Nov%202011.pdf, accessed July 1, 2019.

_____. 2016. *2015 Urban Water Management Plan*. June. Website: https://www.irwd.com/images/pdf/doing-business/environmental-documents/UWMP/IRWD_UWMP_2015_rev_01-03-17_FINAL.pdf, accessed June 29, 2019.

_____. 2018a. *IRWD Sewer System Management Plan*. June.

_____. 2018b. *IRWD Sewer System Management Plan 2018 Appendices*. Website: https://www.irwd.com/images/pdf/water-sewer/irwd_sewer_system_management_plan_appendices.pdf, accessed June 27, 2019.

_____. 2018c. January 2018 Land Use and Water Use Factors (received November 28, 2018).

_____. 2018d. Response to Wastewater and Water Questionnaire (dated November 19).

_____. Michelson Water Recycling Plant (MWRP). Website: https://www.irwd.com/construction/mwrp-facility, accessed June 27, 2019.

Kimley-Horn. 2018. *Nakase Property Area Plan Visual Analysis.*

Kroeber, Alfred L. 1925. *Handbook of the Indians of California.* Bulletin No. 78, Bureau of American Ethnology, Smithsonian Institution, Washington, D.C.

Nakase Property Fire Protection Plan. 2018.

National Highway Traffic Safety Administration (NHTSA). 2019a. Corporate Average Fuel Economy. Website: https://www.nhtsa.gov/laws-regulations/corporate-average-fuel-economy, accessed June 29, 2019.

_____. 2019b. The Safer Affordable Fuel-Efficient 'SAFE' Vehicles Rule. Website: https://www.nhtsa.gov/corporate-average-fuel-economy/safe, accessed June 29, 2019.

The Natelson Company, Inc. 2001. Employment Density Study Summary Report, prepared for: Southern California Association of Governments. October.

NMG Geotechnical. 2017. *Geotechnical Evaluation of Proposed Residential and School Site Development, Nakase Property, Lake Forest, California*. April.

_____. 2018. *Preliminary Geotechnical Exploration, Proposed Development, Nakase Nursery Site, Tentative Tract 18142, Lake Forest, Orange County, California*. July.

OC Public Library. 2018. Response to Library Questionnaire Titled: "Response to: Nakase Property Area Plan Environmental Impact Report, City of Lake Forest". (Dated November 21, 2018)

Orange County Agricultural Commissioner's Office. n.d. *Orange County Agricultural Commissioner's Office Orange County Annual Crop Report 2012.* Accessed December 14, 2018. http://www.ocagcomm.com/services/report.

Orange County Environment Agency. Orange County Hydrology Manual. 1986. October.

_____. 1996. Orange County Hydrology Manual Addendum No. 1. October

Orange County Fire Authority (OCFA). Community Risk Reduction. 2017. Fire Master Plans for Commercial & Residential Development Guideline B-09.

_____. FY 2018/19 Adopted Budget. Website: https://www.ocfa.org/Uploads/Transparency/OCFA%202018-2019%20Adopted%20Budget.pdf, accessed June 10, 2019.

_____. Operations Directory for Division 5. Website: https://www.ocfa.org/aboutus/departments/OperationsDirectory/Division5.aspx, accessed July 23, 2018.

_____. Station Statistics. Website: https://www.ocfa.org/Uploads/Transparency/OCFA%20Annual%20Report%202018.pdf, accessed June 18, 2019.

Orange County Water District (OCWD). 2017. Basin 8-1 Alternative – OCWD Management Area. January 1.

Orange County Sheriff's Department (OCSD). 2018. Response to Police Protection Questionnaire (dated November 12, 2018).

_____. Southeast Operations. Website: http://www.ocsd.org/divisions/fieldops/southeast, accessed July 1, 2019.

Orange County Transportation Authority (OCTA). 2017. *2017 Orange County Congestion Management Program.* October.

_____. 2019a. Bus Book Route 85, Mission Viejo to Laguna Niguel via Marguerite Pkwy/Crown Valley Pkwy. June 9. Website: https://www.octa.net/ebusbook/RoutePDF/route085.pdf, accessed June 25, 2019.

_____. 2019b. Bus Book Route 206, Santa Ana to Lake Forest Express via 5 Fwy. June 9. Website: https://www.octa.net/ebusbook/RoutePDF/route206.pdf, accessed June 25, 2019.

_____. 2019c. Bus Book Route 480, Irvine Metrolink Station to Lake Forest. June 9. Website: https://www.octa.net/ebusbook/RoutePDF/route480.pdf, accessed June 25, 2019.

OC Waste & Recycling. 2018a. Frank R. Bowerman Landfill. December. Website: http://www.oclandfills.com/civicax/filebank/blobdload.aspx?BlobID=83644, accessed July 7, 2019.

_____. 2018b. Household Hazardous Waste. December. Website: http://www.oclandfills.com/hazardous, accessed July 7, 2019.

Placeworks. 2019a. *Nakase Elementary School EMF Study and Exemption Request.* May.

_____. 2019b. *Nakase Elementary School Health Risk Assessment*. May.

_____. 2019c. *Nakase Elementary School Water Pipeline and Tank Safety Hazard Assessment.* June.

_____. 2019d. *Updated Geologic and Environmental Hazards Assessment Report, Nakase Elementary School.* June.

Saddleback Valley Unified School District (SVUSD). 2018a. Adjustment in Developer Fees, effective July 9, 2018. Website: https://www.svusd.org/uploaded/SVUSD_Department_Files/MOC/Documents/2017-18/Developer_Fees_Level_1_Notification_Memo_Levied_July_9_2018_ADA.pdf, accessed June 21, 2019.

_____. 2018b. Public Comment Letter. "Response to Notice of Preparation of the Nakase Property Area Plan Environmental Impact Report," dated July 25, 2018.

_____. 2018c. Residential Development School Fee Justification Study. Table 7, Projected Unhoused Students From Future Units. April 24.

Santa Ana Regional Water Quality Control Board (Santa Ana RWQCB). 1995. *Water Quality Control Plan, Santa Ana River Basin* (Basin Plan). Updated 2008 and 2011.

_____. 1998a. Resolution No. 98-69. A Resolution Amending the Water Quality Control Plan for the Santa Ana River Basin Establishing a Total Maximum Daily Load for Sediment in the Newport Bay/San Diego Creek Watershed and Rescinding and Replacing Resolution No 97-77.

_____. 1998b. Resolution No. 98-101. Resolution Revising the Amendment to the Water Quality Control Plan for the Santa Ana River Basin Incorporating a Total Maximum Daily Load for Sediment in the Newport Bay/San Diego Creek Watershed.

_____. 1999 Resolution No. 99-10. A Resolution Amending the Water Quality Control Plan for the Santa Ana River Basin to Establish a Total Maximum Daily Load for Fecal Coliform Bacteria in Newport Bay.

_____. 2003 Resolution No. 2003. Resolution Amending the Water Quality Control Plan for the Santa Ana River Basin to Incorporate a Diazinon and Chlorpyrifos Total Maximum Daily Load for San Diego Creek and Upper Newport Bay.

_____. 2004. Watershed Management Initiative Chapter. November.

_____. 2009a. *General Discharge Permit for Discharges to Surface Waters of Groundwater Resulting from Groundwater Dewatering Operations and/or Groundwater Cleanup Activities at Sites Within the San Diego Creek/Newport Bay Watershed Polluted by Petroleum Hydrocarbons, Solvents, Metals and/or Salts*. Order No. R8-2009-0045, Amending Order No. R8-2007-0041, NPDES No. CAG918002.

_____. 2009b. *General Waste Discharge Requirements for Discharges to Surface Waters that Pose an Insignificant (De Minimus) Threat to Water Quality.* Order No. R8-2009-0003, NPDES No. CAG998001.

_____. 2009c. *Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and the Incorporated Cities of Orange County within the Santa Ana Region Areawide Urban Storm Water Runoff Orange County*. Order No. R8-2009-0030, NPDES No. CAS618030, as amended by Order No. R8-2010-0062.

_____. 2012. Resolution No. 2012-0051. Approving an Amendment to the Water Quality Control Plan for the Santa Ana Region to Incorporate Organochlorine Compounds Total Maximum Daily Loads (TMDLs) for San Diego Creek, Upper and Lowe Newport Bay, Orange County, California.

_____. 2018. Resolution No. 2018-0041. Resolution Amending the Water Quality Control Plan for the Santa Ana River Basin to Incorporate Nutrient TMDL for the Newport Bay/San Diego Creek Watershed, Orange County, California.

_____. 2018. Resolution No. 98-9. Approving an Amendment to the Water Quality Control Plan for the Santa Ana River Basin to Incorporate Total Maximum Daily Loads for Selenium in Freshwater: Newport Bay Watershed, Orange County, California.

_____. 2019. Resolution No. R8-2019-0050. Time Schedule Order No. R8-2019-0050 for the County of Orange, and the Cities of Tustin, Irvine, Laguna Hills, Costa Mesa, Santa Ana, Orange, Lake Forest, and Newport Beach to comply with the Requirements Prescribed in Order No. R8-2009-0030 as amended by Order No. R8-2010-0062 (NPDES Permit No. CAS618030).

_____. Copper (Cu) TMDLs and Metals Non-TMDL Action Plans for Newport Bay. Website: https://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/tmdl_metals.html (accessed June 24, 2019).

South Coast Air Quality Management District (SCAQMD). 1993. *CEQA Air Quality Handbook.* April (revised November 1993).

_____. 2003. *Final Localized Threshold Methodology.* June (revised July 2008).

_____. 2006. *Final Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds.* October.

_____. 2016a. The 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy: A Plan for Mobility, Accessibility, Sustainability and a High Quality of Life. April. Website: http://scagrtpscs.net/Documents/2016/final/f2016RTPSCS.pdf, accessed May 15, 2019.

_____. 2017. Final 2016 Air Quality Management Plan. March.

Southern California Association of Governments (SCAG). 2008. *Final 2008 Regional Comprehensive Plan, Helping Communities Achieve a Sustainable Future.* October. Website: https://www.scag.ca.gov/documents/f2008rcp_complete.pdf, accessed June 10, 2019.

_____. 2016a. *2016-2040 Regional Transportation Plan/Sustainable Communities Strategy: A Plan for Mobility, Accessibility, Sustainability and a High Quality of Life.* April. Website: http://scagrtpscs.net/Documents/2016/final/f2016RTPSCS.pdf, accessed July 5, 2019.

_____. 2016b. 2016-2040 RTP/SCS Final Growth Forecast by Jurisdiction. April. Website: https://www.scag.ca.gov/Documents/2016_2040RTPSCS_FinalGrowthForecastby Jurisdiction.pdf, accessed May 15, 2019.

Southern California Edison (SCE). 2019. Incorporated Cities and Counties Served by SCE. April 25. Website: https://newsroom.edison.com/internal_redirect/cms.ipressroom.com.s3. amazonaws.com/166/files/20193/SCE%20Service%20Area%20Fact%20Sheet_Ver2_ 04252019.pdf, accessed June 20, 2019.

_____. Our Service Territory. Website: https://www.sce.com/about-us/who-we-are/leadership/our-service-territory, accessed June 29, 2019.

Southern California Gas Company (SoCalGas). 2019. About SoCalGas. Website: https://www3.socalgas.com/about-us/company-profile, accessed June 29, 2019.

Stanley R. Hoffman Associates. 2018. *Nakase Project Fiscal Impact Analysis*. May.

State of California. 2007. *Office of Public School Construction, School Facility Program Handbook.* April.

California Governor's Office of Planning and Research (OPR). 2005. Tribal Consultation Guidelines, Supplement to General Plan Guidelines. April 15.

_____. 2017. Technical Advisory for Evaluating Transportation Impacts Under CEQA. November.

State Water Resources Control Board (SWRCB). 2010. *National Pollutant Discharge Elimination System (NPDES) Permit, Construction General Permit for the State of California, Department of Transportation (Caltrans) Properties, Facilities, and Activities.* Order No. 2009-0009-DWQ, as amended by Order Nos. 2010-0014-DWQ and 2012-0006-DWQ (NPDES No. CAS000002). July.

Supreme Court of California. 2015. *California Building Industry Association v. Bay Area Air Quality Management District, No. S2113478*. Decided December 17, 2015.

Toll Brothers. 2018. Ilan Feingold, email message to Marie Luna et al. re: Nakase water supply questions, dated December 27, 2018.

United States Census Bureau. 2010 Census Urban Area FAQs. Website: https://www.census.gov/geo/reference/ua/uafaq.html (accessed March 14, 2019).

_____. American Community Survey 2013-2017 5-Year Estimate Table S0101. Website: https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml (accessed May 21, 2019).

_____. Mission Viejo-Lake Forest-San Clemente, CA Urbanized Area No. 57709. Website: https://www2.census.gov/geo/maps/dc10map/UAUC_RefMap/ua/ua57709_mission_viejo--lake_forest--san_clemente_ca/DC10UA57709.pdf (accessed March 14, 2019).

United States Department of Agriculture, Soil Conservation Service and Forest Service. 2016. Soil Survey of Orange County and Western Part of Riverside County, California.

United States Energy Information Administration (EIA). 2019a. Electricity Explained- Use of Electricity. https://www.eia.gov/energyexplained/index.php?page=electricity_use; accessed June 29, 2019.

---. 2019b. Natural Gas Explained- Use of Natural Gas. https://www.eia.gov/energyexplained/index.php?page=natural_gas_use; accessed June 29, 2019.

---. 2019c. California State Profile and Energy Estimates. Table F3: Motor gasoline consumption, price, and expenditure estimates, 2017. https://www.eia.gov/state/seds/data.php?incfile=/state/seds/sep_fuel/html/fuel_mg.html&sid=CA; accessed June 29, 2019.

United States Environmental Protection Agency (EPA). 1995. AP-42, Compilation of Air Pollutant Emission Factors. January.

_____. 2008. *Managing Wet Weather with Green Infrastructure Municipal Handbook Green Streets* (EPA-833-F-08-009). December

_____. 2019a. Final Rule for Phase 1 Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles. https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-phase-1-greenhouse-gas-emissions-standards-and; accessed June 29, 2019.

_____. 2019b. Final Rule for Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles - Phase 2. https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-greenhouse-gas-emissions-and-fuel-efficiency; accessed June 29, 2019.

_____. 2019c. Summary of the Energy Independence and Security Act. https://www.epa.gov/laws-regulations/summary-energy-independence-and-security-act; accessed June 29, 2019.

_____. Newport Bay Watershed. Website: https://19january2017snapshot.epa.gov/www3/region9/water/watershed/measurew/newport-bay/index.html (accessed June 22, 2019).

United States Geological Survey (USGS). California Water Science Center, Areas of Land Subsidence in California Map. Website: https://ca.water.usgs.gov/land_subsidence/california-subsidence-areas.html (accessed 6/13/2019).

United States Census Bureau. 2010. 2010 Demographic Profile Data. Table DP-1.

_____. Table S0101, American Community Survey 2013–2017 5-Year Estimate. Website: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_17_5YR_S0101&prodType=table (accessed May 21, 2019).

University of California, Division of Agriculture and Natural Resources, Invasive Shot Hole Borers, Distribution of PSHB/FD and KSHB/FD in California. Website: https://ucanr.edu/sites/pshb/Map/ (accessed June 18, 2019).

University of California, Irvine, School of Social Ecology. 2017. Metropolitan Futures Initiative (MFI) Quarterly Report: Jobs-Housing Balance in Egohoods in Southern California. Website: https://mfi.soceco.uci.edu/files/2017/01/UCi16_MFI_Report4_Jobs-Housing-Balance.pdf (accessed August 12, 2019).

Urban Crossroads. 2018a. *Nakase Property Noise and Vibration Impact Analysis*. November.

_____. 2018b. *Nakase Property Trip Generation Evaluation*.

_____. 2019a. *Air Quality Impact Analysis*. Prepared May 13, 2019, revised July 9, 2019.

_____. 2019b. *Nakase Property Greenhouse Gas Analysis*. May.

_____. 2019c. *Nakase Property Traffic Impact Analysis.* Prepared May 16, 2018, revised July 12, 2019.

Weitz, Jerry. 2003. Planning Advisory Service Report No. 516: Jobs-Housing Balance. American Planning Association.

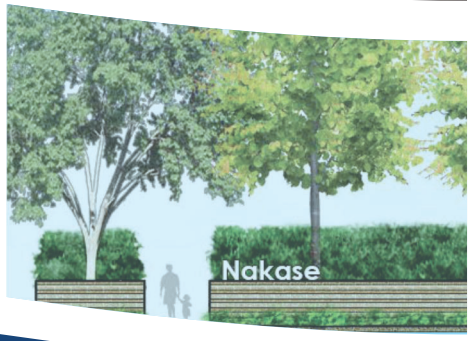
Woodley Architectural Group. 2019. *Nakase Property Area Plan*. June 13.

This page intentionally left blank

Nakase Nursery/Toll Brothers Project

Final Environmental Impact Report
SCH No. 2018071035

Volume II



City of Lake Forest
25550 Commercentre Drive, Suite 100
Lake Forest, CA 92630

December 2019

This page intentionally left blank

FINAL ENVIRONMENTAL IMPACT REPORT

NAKASE NURSERY/TOLL BROTHERS PROJECT

CITY OF LAKE FOREST, CALIFORNIA

SCH #2018071035

Submitted to:

City of Lake Forest
25550 Commercentre Drive, Suite 100
Lake Forest, CA 92630

Prepared by:

LSA
20 Executive Park, Suite 200
Irvine, California 92614
949.553.0666

Project No. CLF1801

December 2019

This page intentionally left blank

TABLE OF CONTENTS

TABLE OF CONTENTS i
LIST OF ABBREVIATIONS AND ACRONYMS xiii
1.0 EXECUTIVE SUMMARY 1-1
1.1 Introduction 1-1
1.2 Summary of Project Description 1-1
1.3 Areas of Controversy 1-2
1.4 Significant Unavoidable impacts 1-3
1.4.1 Agricultural Resources 1-4
1.4.2 Greenhouse Gas Emissions 1-4
1.5 Alternatives 1-4
1.5.1 Alternatives Evaluated in this EIR 1-4
1.5.2 Identification of the Environmentally Superior Alternative 1-5
1.6 Summary of Impacts and Mitigation Measures 1-5
1.6.1 Secondary Effects of Mitigation Measures 1-6
2.0 INTRODUCTION 2-1
2.1 Purpose and Type of EIR/Intended Uses of the EIR 2-1
2.2 Public Review Process 2-2
2.2.1 Notice of Preparation 2-3
2.2.2 Scoping Meeting and Areas of Controversy 2-4
2.2.3 EIR Public Review Period 2-5
2.3 Scope of this EIR 2-6
2.4 Format of the EIR 2-7
2.5 Incorporation by Reference 2-9
3.0 PROJECT DESCRIPTION 3-1
3.1 Regional Location 3-1
3.1.1 Project Vicinity and Surrounding Land Uses 3-1
3.2 Environmental Setting 3-1
3.2.1 Existing Project Site Conditions 3-1
3.2.2 Current General Plan Land Use Designation 3-11
3.2.3 Current Zoning 3-11
3.2.4 Project Site History 3-11
3.3 Project Characteristics 3-17
3.3.1 Land Use Plan 3-17
3.3.2 Residential Uses 3-17
3.3.3 Elementary School 3-22

3.3.4 Parks, Recreation, and Open Space 3-23
3.3.5 Open Space & Habitat & Restoration Area 3-24
3.4 Building and Site Design 3-24
3.4.1 Architecture 3-24
3.4.2 Landscaping 3-25
3.4.3 Fencing 3-25
3.4.4 Lighting 3-31
3.4.5 Signage 3-32
3.5 Circulation 3-32
3.5.1 Parking 3-32
3.6 Infrastructure Improvements 3-41
3.7 Sustainability Features 3-42
3.8 Fire Safety 3-45
3.9 Project Construction 3-45
3.9.1 Phasing and Staging 3-45
3.9.2 Grading and Earthwork 3-46
3.10 Project Objectives 3-49
3.11 Required Permits and Approvals 3-49
3.11.1 Discretionary Actions 3-49
3.11.2 Other Discretionary City Actions 3-52
3.11.3 Other Ministerial City Actions 3-52
3.11.4 Probable Future Actions by Responsible Agencies 3-52
4.0 EXISTING SETTING, ENVIRONMENTAL ANALYSIS, IMPACTS, AND MITIGATION MEASURES 4-1
4.1 Aesthetics 4.1-1
4.1.1 Scoping Process 4.1-1
4.1.2 Existing Environmental Setting 4.1-1
4.1.3 Regulatory Setting 4.1-2
4.1.4 Methodology 4.1-7
4.1.5 Thresholds of Significance 4.1-21
4.1.6 Project Impacts 4.1-21
4.1.7 Cumulative Impacts 4.1-31
4.1.8 Level of Significance Prior to Mitigation 4.1-32
4.1.9 Regulatory Compliance Measures and Mitigation Measures 4.1-32
4.1.10 Level of Significance after Mitigation 4.1-33
4.2 Agriculture and Forestry 4.2-1
4.2.1 Scoping Process 4.2-1
4.2.2 Existing Environmental Setting 4.2-1
4.2.3 Regulatory Setting 4.2-8
4.2.4 Methodology 4.2-11

4.2.5 Thresholds of Significance 4.2-11
4.2.6 Project Impacts 4.2-12
4.2.7 Cumulative Impacts 4.2-14
4.2.8 Level of Significance Prior to Mitigation 4.2-15
4.2.9 Mitigation Measures 4.2-16
4.2.10 Level of Significance after Mitigation 4.2-16

4.3 Air Quality 4.3-1

4.3.1 Scoping Process 4.3-1
4.3.2 Existing Environmental Setting 4.3-1
4.3.3 Regulatory Setting 4.3-8
4.3.4 Methodology 4.3-13
4.3.5 Thresholds of Significance 4.3-14
4.3.6 Project Impacts 4.3-16
4.3.7 Cumulative Impacts 4.3-24
4.3.8 Level of Significance Prior to Mitigation 4.3-25
4.3.9 Regulatory Compliance Measures and Mitigation Measures 4.3-25
4.3.10 Level of Significance after Mitigation 4.3-26

4.4 Biological Resources 4.4-1

4.4.1 Scoping Process 4.4-1
4.4.2 Existing Environmental Setting 4.4-2
4.4.3 Regulatory Setting 4.4-9
4.4.4 Methodology 4.4-18
4.4.5 Thresholds of Significance 4.4-24
4.4.6 Project Impacts 4.4-24
4.4.7 Cumulative Impacts 4.4-33
4.4.8 Level of Significance Prior to Mitigation 4.4-35
4.4.9 Compliance Measures and Mitigation Measures 4.4-35
4.4.10 Level of Significance after Mitigation 4.4-42

4.5 Cultural Resources 4.5-1

4.5.1 Scoping Process 4.5-1
4.5.2 Existing Environmental Setting 4.5-1
4.5.3 Regulatory Setting 4.5-2
4.5.4 Methodology 4.5-4
4.5.5 Thresholds of Significance 4.5-4
4.5.6 Project Impacts 4.5-5
4.5.7 Cumulative Impacts 4.5-6
4.5.8 Level of Significance Prior to Mitigation 4.5-6
4.5.9 Mitigation Measures 4.5-7
4.5.10 Level of Significance after Mitigation 4.5-12

4.6 Energy 4.6-1

4.6.1 Scoping Process 4.6-1
4.6.2 Existing Environmental Setting 4.6-1
4.6.3 Regulatory Setting 4.6-3

4.6.4 Methodology 4.6-9
4.6.5 Thresholds of Significance 4.6-10
4.6.6 Project Impacts 4.6-10
4.6.7 Cumulative Impacts 4.6-19
4.6.8 Level of Significance Prior to Mitigation 4.6-20
4.6.9 Regulatory Compliance Measures and Mitigation Measures 4.6-20
4.6.10 Level of Significance after Mitigation 4.6-21

4.7 Geology and Soils 4.7-1

4.7.1 Scoping Process 4.7-1
4.7.2 Existing Environmental Setting 4.7-1
4.7.3 Regulatory Setting 4.7-6
4.7.4 Methodology 4.7-10
4.7.5 Thresholds of Significance 4.7-11
4.7.6 Project Impacts 4.7-12
4.7.7 Cumulative Impacts 4.7-17
4.7.8 Level of Significance Prior to Mitigation 4.7-18
4.7.9 Regulatory Compliance Measures and Mitigation Measures 4.7-18
4.7.10 Level of Significance after Mitigation 4.7-22

4.8 Greenhouse Gas Emissions 4.8-1

4.8.1 Scoping Process 4.8-1
4.8.2 Existing Environmental Setting 4.8-1
4.8.3 Regulatory Setting 4.8-5
4.8.4 Methodology 4.8-14
4.8.5 Thresholds of Significance 4.8-15
4.8.6 Project Impacts 4.8-16
4.8.7 Level of Significance Prior to Mitigation 4.8-21
4.8.8 Regulatory Compliance Measures and Mitigation Measures 4.8-21
4.8.9 Level of Significance after Mitigation 4.8-22
4.8.10 Cumulative Impacts 4.8-22

4.9 Hazards and Hazardous Materials 4.9-1

4.9.1 Scoping Process 4.9-1
4.9.2 Existing Environmental Setting 4.9-1
4.9.3 Regulatory Setting 4.9-4
4.9.4 Methodology 4.9-11
4.9.5 Thresholds of Significance 4.9-11
4.9.6 Project Impacts 4.9-12
4.9.7 Cumulative Impacts 4.9-17
4.9.8 Level of Significance Prior to Mitigation 4.9-18
4.9.9 Mitigation Measures 4.9-18
4.9.10 Level of Significance after Mitigation 4.9-19

4.10 Hydrology and Water Quality 4.10-1

4.10.1 Scoping Process 4.10-1
4.10.2 Existing Environmental Setting 4.10-2

4.10.3 Regulatory Setting 4.10-4
4.10.4 Methodology 4.10-18
4.10.5 Thresholds of Significance 4.10-18
4.10.6 Project Impacts 4.10-19
4.10.7 Cumulative Impacts 4.10-38
4.10.8 Level of Significance Prior to Mitigation 4.10-40
4.10.9 Regulatory Compliance Measures and Mitigation Measures 4.10-40
4.10.10 Level of Significance after Mitigation 4.10-43

4.11 Land Use and Planning 4.11-1

4.11.1 Scoping Process 4.11-1
4.11.2 Existing Environmental Setting 4.11-1
4.11.3 Regulatory Setting 4.11-2
4.11.4 Methodology 4.11-9
4.11.5 Thresholds of Significance 4.11-9
4.11.6 Project Impacts 4.11-10
4.11.7 Cumulative Impacts 4.11-22
4.11.8 Level of Significance Prior to Mitigation 4.11-23
4.11.9 Regulatory Compliance Measures and Mitigation Measures 4.11-23
4.11.10 Level of Significance after Mitigation 4.11-23

4.12 Noise 4.12-1

4.12.1 Scoping Process 4.12-1
4.12.2 Existing Environmental Setting 4.12-2
4.12.3 Regulatory Setting 4.12-5
4.12.4 Methodology 4.12-9
4.12.5 Thresholds of Significance 4.12-13
4.12.6 Project Impacts 4.12-15
4.12.7 Cumulative Impacts 4.12-20
4.12.8 Level of Significance Prior to Mitigation 4.12-20
4.12.9 Regulatory Compliance Measures and Mitigation Measures 4.12-20
4.12.10 Level of Significance after Mitigation 4.12-21

4.13 Population and Housing 4.13-1

4.13.1 Scoping Process 4.13-1
4.13.2 Existing Environmental Setting 4.13-1
4.13.3 Regulatory Setting 4.13-5
4.13.4 Methodology 4.13-8
4.13.5 Thresholds of Significance 4.13-9
4.13.6 Project Impacts 4.13-9
4.13.7 Cumulative Impacts 4.13-13
4.13.8 Level of Significance Prior to Mitigation 4.13-14
4.13.9 Regulatory Compliance Measures and Mitigation Measures 4.13-14
4.13.10 Level of Significance after Mitigation 4.13-14

4.14 Public Services 4.14-1

4.14.1 Scoping Process 4.14-1

4.14.2 Existing Environmental Setting 4.14-1
4.14.3 Regulatory Setting 4.14-8
4.14.4 Methodology 4.14-11
4.14.5 Thresholds of Significance 4.14-11
4.14.6 Project Impacts 4.14-12
4.14.7 Cumulative Impacts 4.14-21
4.14.8 Level of Significance Prior to Mitigation 4.14-24
4.14.9 Regulatory Compliance Measures and Mitigation Measures 4.14-24
4.14.10 Level of Significance after Mitigation 4.14-25

4.15 Recreation 4.15-1

4.15.1 Scoping Process 4.15-1
4.15.2 Existing Environmental Setting 4.15-1
4.15.3 Regulatory Setting 4.15-10
4.15.4 Methodology 4.15-12
4.15.5 Thresholds of Significance 4.15-13
4.15.6 Project Impacts 4.15-13
4.15.7 Cumulative Impacts 4.15-22
4.15.8 Level of Significance Prior to Mitigation 4.15-23
4.15.9 Mitigation Measures 4.15-23
4.15.10 Level of Significance after Mitigation 4.15-24

4.16 Transportation/Traffic 4.16-1

4.16.1 Scoping Process 4.16-1
4.16.2 Existing Environmental Setting 4.16-2
4.16.3 Regulatory Setting 4.16-2
4.16.4 Methodology 4.16-6
4.16.5 Thresholds of Significance 4.16-14
4.16.6 Project Impacts 4.16-14
4.16.7 Cumulative Impacts 4.16-25
4.16.8 Level of Significance Prior to Mitigation 4.16-27
4.16.9 Regulatory Compliance Measures and Mitigation Measures 4.16-27
4.16.10 Level of Significance after Mitigation 4.16-29

4.17 Tribal Cultural Resources 4.17-1

4.17.1 Scoping Process 4.17-1
4.17.2 Existing Environmental Setting 4.17-1
4.17.3 Regulatory Setting 4.17-1
4.17.4 Methodology 4.17-2
4.17.5 Thresholds of Significance 4.17-3
4.17.6 Project Impacts 4.17-4
4.17.7 Cumulative Impacts 4.17-5
4.17.8 Level of Significance Prior to Mitigation 4.17-6
4.17.9 Regulatory Compliance Measures and Mitigation Measures 4.17-6
4.17.10 Level of Significance after Mitigation 4.17-11

4.18 Utilities and Service Systems 4.18-1

4.18.1 Scoping Process 4.18-1
4.18.2 Existing Environmental Setting 4.18-1
4.18.3 Regulatory Setting 4.18-7
4.18.4 Methodology 4.18-10
4.18.5 Thresholds of Significance 4.18-11
4.18.6 Project Impacts 4.18-11
4.18.7 Cumulative Impacts 4.18-22
4.18.8 Level of Significance Prior to Mitigation 4.18-24
4.18.9 Regulatory Compliance Measures and Mitigation Measures 4.18-25
4.18.10 Level of Significance after Mitigation 4.18-25

4.19 Wildfire 4.19-1

4.19.1 Scoping Process 4.19-1
4.19.2 Existing Environmental Setting 4.19-1
4.19.3 Regulatory Setting 4.19-3
4.19.4 Methodology 4.19-7
4.19.5 Thresholds of Significance 4.19-7
4.19.6 Project Impacts 4.19-8
4.19.7 Cumulative Impacts 4.19-20
4.19.8 Level of Significance Prior to Mitigation 4.19-21
4.19.9 Regulatory Compliance Measures and Mitigation Measures 4.19-21
4.19.10 Level of Significance after Mitigation 4.19-22

5.0 ALTERNATIVES 5-1

5.1 Introduction 5-1

5.2 Proposed Project 5-2

5.2.1 Project Objectives 5-2
5.2.2 Significant Adverse Unavoidable impacts of the Proposed Project 5-3

5.3 Alternatives Initially Considered but Rejected from Further Consideration 5-3

5.3.1 Alternative Sites 5-4
5.3.2 No Project/No Development 5-5
5.3.3 Public Park 5-5
5.3.4 Community Garden/Farm 5-5

5.4 Alternatives under Consideration 5-6

5.4.1 Alternative 1: No Project Alternative 5-7
5.4.2 Alternative 2: Urban Industrial/Residential 5-22
5.4.3 Alternative 3: No School Alternative 5-38
5.4.4 Alternative 4: Reduced Project 5-54

5.5 Identification of Environmentally Superior Alternative 5-71

6.0 OTHER CEQA CONSIDERATIONS 6-1

6.1 Summary of Significant Unavoidable Impacts 6-1

6.1.1 Agricultural Resources 6-1

6.1.2 Greenhouse Gas Emissions 6-1
6.1.3 Conflict with Greenhouse Gas Emissions Reduction Plans, Policies, and Regulations 6-2
6.2 Energy Impacts 6-2
6.3 Growth-Inducing Impacts 6-2
6.3.1 Removal of Obstacles to, or Otherwise Foster, Population Growth 6-3
6.3.2 Foster Economic Growth 6-4
6.3.3 Other Characteristics 6-4
6.4 Significant Irreversible Environmental Changes 6-4
7.0 LIST OF PREPARERS AND PERSONS CONSULTED 7-1
7.1 City of Lake Forest 7-1
7.2 EIR Preparers 7-1
7.2.1 LSA 7-1
7.3 Technical Report Preparers 7-2
7.3.1 ENGEO Incorporated 7-2
7.3.2 Glenn Lukos Associates, Inc. 7-2
7.3.3 GPA Consulting 7-2
7.3.4 Hillman Consulting 7-2
7.3.5 Hunsaker Associates 7-3
7.3.6 Kimley Horn 7-3
7.3.7 NMG Geotechnical, Inc. 7-3
7.3.8 PlaceWorks 7-3
7.3.9 Stanley R. Hoffman Associates 7-3
7.3.10 Urban Crossroads 7-4
7.4 Project Applicant 7-4
7.4.1 Toll Brothers 7-4
7.5 Persons Consulted 7-4
8.0 REFERENCES 8-1

FIGURES

Figure 3.1: Regional Project Location 3-3
Figure 3.2: Project Vicinity 3-5
Figure 3.3: Existing Land Uses 3-7
Figure 3.4: Existing Site Photos 3-9
Figure 3.5: General Plan Land Use and Business Development Overlay 3-13
Figure 3.6: Zoning Map 3-15
Figure 3.7: Conceptual Land Use Plan 3-19
Figure 3.8: Conceptual Landscape Plan 3-27
Figure 3.9: Wall and Fence Diagram 3-29
Figure 3.10: Conceptual Circulation Plan 3-33
Figure 3.11: Bicycle Lanes and Trail Facilities 3-35
Figure 3.12: Pedestrian Facilities 3-37
Figure 3.13: Remnant Parcels Required for the Project 3-39
Figure 3.14: Storm Drain System & Storm Water Treatment 3-43
Figure 3.15: Cut & Fill Map 3-47
Figure 4.0.1: Related Project Locations 4-9
Figure 4.1.1: Key View Locations 4.1-11
Figure 4.1.2(a): Key View 1 ..... 4.1-13
Figure 4.1.2(b): Key View 2 ..... 4.1-15
Figure 4.1.2(c): Key View 3 ..... 4.1-17
Figure 4.1.2(d): Key View 4 ..... 4.1-19
Figure 4.4.1: Vegetation Map 4.4-3
Figure 4.4.2: ACOE/RWQCB Jurisdictional Areas 4.4-7
Figure 4.4.3: CDFW Jurisdictional Areas 4.4-11
Figure 4.10.1: Proposed Stormwater Best Management Practices (BMPs) 4.10-25
Figure 4.12.1: Noise Measurement Locations 4.12-3
Figure 4.12.2: Sensitive Receptor Locations 4.12-11
Figure 4.15.1: Existing Recreational Facilities 4.15-3
Figure 4.15.2: Trails and Bikeways 4.15-7
Figure 4.15.3: Proposed Parks 4.15-15
Figure 4.16.1: Study Area Intersections 4.16-9
Figure 4.19.1: Fire Master Plan 4.19-11
Figure 4.19.2: Fire Protection Plan 4.19-13
Figure 4.19.3: Fuel Modification Plan 4.19-15

TABLES

Table 1.A: Summary of Project Impacts, Regulatory Compliance Measures, Mitigation Measures, and Level of Significance after Mitigation 1-7
Table 3.A: Land Use Summary 3-21
Table 3.B: Residential Product Summary 3-22
Table 3.C: Proposed Parks and Open Space 3-23
Table 3.D: Probable Future Actions by Responsible Agencies 3-53

Table 4.A: Summary of Related Projects 4-6
Table 4.1.A: General Plan Consistency Analysis 4.1-29
Table 4.2.A: Orange County Agricultural Land Conversion 2014–2016 ..... 4.2-2
Table 4.2.B: Orange County Agricultural Production Value 2012 vs. 2017 ..... 4.2-2
Table 4.2.C: Soil Types of the Project Site 4.2-5
Table 4.3.A: Attainment Status of Criteria Pollutants in the South Coast Air Basin 4.3-6
Table 4.3.B: Existing Project Site Emissions 4.3-8
Table 4.3.C: Ambient Air Quality Standards 4.3-9
Table 4.3.D: SCAQMD Maximum Daily Emissions Thresholds 4.3-15
Table 4.3.E: Project and Current Permitted Land Uses – Operational Emissions 4.3-16
Table 4.3.F: Construction Emissions 4.3-18
Table 4.3.G: Operations Emissions 4.3-20
Table 4.3.H: Localized Construction Emissions 4.3-21
Table 4.3.I: Localized Operations Emissions 4.3-22
Table 4.3.J: Health Risk Assessment Results 4.3-24
Table 4.4.A: Summary of Vegetation/Land Use Types for the Project Site 4.4-2
Table 4.4.B: Summary of ACOE, CDFW, and RWQCB Jurisdiction on the Project Site 4.4-13
Table 4.4.C: Summary of Proposed Impacts to ACOE, CDFW, and RWQCB Jurisdiction 4.4-29
Table 4.6.A: Existing Operational Trips – Fuel Efficiency 4.6-4
Table 4.6.B: Existing Operational Trips – Fuel Usage 4.6-5
Table 4.6.C: Construction Off-Road Equipment 4.6-11
Table 4.6.D: Off-Road Construction Equipment Diesel Fuel Usage 4.6-12
Table 4.6.E: Year 2020 Construction Truck and Construction Worker Vehicle Fuel Efficiency 4.6-13
Table 4.6.F: Construction Truck Fuel Use 4.6-13
Table 4.6.G: Construction Worker Vehicle Gasoline Fuel Use 4.6-14
Table 4.6.H: Electricity and Natural Gas Demand from the Proposed Project 4.6-15
Table 4.6.I: Proposed Project Operational Trips – Fuel Efficiency 4.6-16
Table 4.6.J: Proposed Project Operational Trips – Fuel Usage 4.6-17
Table 4.8.A: Existing Project Site Greenhouse Gas Emissions 4.8-5
Table 4.8.B: 2025 Project Greenhouse Gas Emissions 4.8-18
Table 4.8.C: 2030 Project Greenhouse Gas Emissions 4.8-18
Table 4.8.D: Scoping Plan Consistency Summary 4.8-19
Table 4.10.A: Beneficial Uses of Surface Receiving Waters 4.10-11
Table 4.10.B: Surface Water Quality Objectives for Inland Surface Waters 4.10-12
Table 4.10.C: Surface Water Quality Objectives for Bays and Estuaries 4.10-13
Table 4.10.D: Groundwater Quality Objectives for Groundwater Basins 4.10-14
Table 4.10.E: Existing and Proposed Stormwater Discharge to OCFCD Facility No. F19-P07 ..... 4.10-31
Table 4.11.A: Regional Transportation Plan/Sustainable Communities Strategy Policy Consistency Analysis 4.11-13
Table 4.11.B: General Plan Policy Consistency Analysis 4.11-15
Table 4.12.A: Existing Noise Levels 4.12-2
Table 4.12.B: Noise/Land Use Compatibility Matrix 4.12-6
Table 4.12.C: Interior and Exterior Noise Standards 4.12-7
Table 4.12.D: Summary of Stationary-Source Noise Level Standards 4.12-8
Table 4.12.E: Significance Criteria Summary 4.12-14

Table 4.12.F: Unmitigated Operational Noise Level Compliance 4.12-16
Table 4.13.A: SCAG Population, Households, and Employment Forecasts for Orange County (2012–2040) 4.13-2
Table 4.13.B: SCAG Population, Households, and Employment Forecasts for Lake Forest (2012–2040) 4.13-2
Table 4.13.C: Lake Forest and Orange County Age Characteristics 4.13-3
Table 4.13.D: Remaining Regional Housing Needs in the City of Lake Forest 4.13-7
Table 4.13.E: City of Lake Forest Related Projects Population and Employment Projections 4.13-13
Table 4.14.A: Saddleback Valley Unified School District Enrollment Capacity 4.14-5
Table 4.14.B: Projected Unhoused Students from Future Units 4.14-6
Table 4.14.C: Estimated Student Enrollment 4.14-17
Table 4.14.D: School Seat Shortage/Surplus 4.14-17
Table 4.14.E: Estimated Related Project Student Generation 4.14-23
Table 4.14.F: Cumulative Impacts to Saddleback Valley Unified School District 4.14-23
Table 4.15.A: Existing City Parks and Recreation Facilities 4.15-5
Table 4.15.B: Existing Privately Owned Parks and Recreation Facilities (Open to the Public Unless Otherwise Noted) 4.15-9
Table 4.15.C: Park Acreage Needs 4.15-12
Table 4.15.D: Required Parkland Dedication 4.15-14
Table 4.15.E: Public Park Credit 4.15-21
Table 4.16.A: Study Intersections 4.16-11
Table 4.16.B: LOS/ICU Value Comparison 4.16-12
Table 4.16.C: LOS/HCM Value Comparison 4.16-13
Table 4.16.D: Infrastructure, Building Construction, and Architectural Coating Trips 4.16-16
Table 4.16.E: Summary of Peak-Hour Intersection Operation – Existing Conditions 4.16-17
Table 4.16.G: Existing Plus Project Intersection Level of Service Summary 4.16-19
Table 4.16.H: Interim Year (2020) Intersection Level of Service Summary 4.16-26
Table 4.18.A: Water Supply and Demand Projections Comparison Third-Dry-Year Supply (2020–2035) 4.18-4
Table 4.18.B: Water Demand at Project Build Out 4.18-13
Table 4.18.C: Wastewater Generation at Project Build Out 4.18-15
Table 4.18.D: Projected Solid Waste Generation 4.18-21
Table 4.18.E: Solid Waste Generation Rates in Lake Forest 4.18-22
Table 5.A: Land Use Statistics for Alternative 2 (Urban Industrial/Residential) 5-23
Table 5.B: Land Use Statistics for Alternative 3 (No School) 5-38
Table 5.C: 2025 Greenhouse Gas Emissions for Alternative 3 (No School) 5-45
Table 5.D: 2030 Greenhouse Gas Emissions for Alternative 3 (No School) 5-45
Table 5.E: Land Use Statistics for Alternative 4 (Reduced Project) 5-55
Table 5.F: 2025 Greenhouse Gas Emissions for Alternative 4 (Reduced Project) 5-62
Table 5.G: 2030 Greenhouse Gas Emissions for Alternative 4 (Reduced Project) 5-62
Table 5.H: Comparison of the Environmental Impacts of the Proposed Project and Project Alternatives 5-72

APPENDICES

A: IS/NOP AND SCOPING COMMENT LETTERS
B: LESA MODEL WORKSHEETS
C: AIR QUALITY AND HEALTH RISK ASSESSMENT REPORTS
D: BIOLOGICAL RESOURCES TECHNICAL REPORTS
E: HISTORICAL RESOURCES EVALUATION REPORT AND RECORDS SEARCH RESULTS
F: GEOTECHNICAL EVALUATIONS
G: GREENHOUSE GAS ANALYSIS
H: HAZARDS REPORTS
I: HYDROLOGY AND WATER QUALITY REPORTS
J: NOISE AND VIBRATION IMPACT ANALYSIS
K: PUBLIC SERVICE AND UTILITY QUESTIONNAIRE RESPONSES
L: TRAFFIC IMPACT ANALYSIS
M: VISUAL ANALYSIS
N: FISCAL IMPACT ANALYSIS
O: TRIBAL CONSULTATION CORRESPONDENCE

LIST OF ABBREVIATIONS AND ACRONYMS

°F	degrees Fahrenheit
µg/L	micrograms per liter
303(d) list	2014/2016 California 303(d) List of Water Quality Limited Segments
A-1	Agricultural District
AAQS	ambient air quality standards
AB	Assembly Bill
ac	acre/acres
ACMs	asbestos-containing materials
ACOE	United States Army Corps of Engineers
ACS	American Community Survey
ADA	Americans with Disabilities Act
ADT	average daily trips
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
af	acre-feet
afy	acre-feet per year
AGR	agricultural supply
AHIP	Affordable Housing Implementation Plan
AMI	Advanced Metering Infrastructure
amsl	above mean sea level
Annex I	industrialized nations
APA	American Planning Association
APN	Assessor's Parcel Number
APR	Annual Progress Report
APS	Alternative Planning Strategy
AQMP	Air Quality Management Plan
Area Plan	Nakase Property Area Plan
Arid West Supplement	ACOE Wetland Delineation Manual: Arid West Supplement
AST	aboveground storage tank
ASTM	American Society of Testing Materials

BAAQMD	Bay Area Air Quality Management District
Basin	South Coast Air Basin
BAU	business as usual
Bcf	billion cubic feet
BDO	Business Development Overlay
bgs	below ground surface
BIOL	preservation of biological habitats of special significance
BMP	Best Management Practice
BMR	Below Market Rate
C_2F_6	hexafluoroethane
C_2H_6	ethane
CAA	Clean Air Act
CAAQS	California ambient air quality standards
CAFE	Corporate Average Fuel Economy
CAL FIRE	California Department of Forestry and Fire Protection
Cal OES	Governor's Office of Emergency Services
Cal/OSHA	California Occupational Safety and Health Administration
CalEEMod	California Emissions Estimator Model
CalEPA	California Environmental Protection Agency
CALGreen	California Green Building Standards Code
California DWR	California Department of Water Resources
California MUTCD	California Manual on Uniform Traffic Control Devices
California Register	California Register of Historical Resources
Cal-IPC	California Invasive Plant Council
CalRecycle	California Department of Resources Recycling and Recovery
Caltrans	California Department of Transportation
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CBC	California Building Code
CBIA	California Building Industry Association
CC&Rs	Covenants, Conditions, and Restrictions

CCAA	California Clean Air Act
CCR	California Code of Regulations
CDE	California Department of Education
CDFW	California Department of Fish and Wildlife
CEC	California Energy Commission
CED	California Energy Demand
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
CESA	California Endangered Species Act
cf	cubic feet
CF_3CH_2F	HFC-134a
CF_4	tetrafluoromethane
CFC	California Fire Code
CFCs	chlorofluorocarabons
CFP	California Fully Protected
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGS	California Geological Survey
CH_3CHF_2	HFC-152a
CH_4	methane
CHF_3	HFC-23
CHRIS	California Historical Resources Information System
City	City of Lake Forest
CIWMP	Countywide Integrated Waste Management Plan
Cleveland National	Cleveland National Forest Foundation v. San Diego Association of Governments (2017) 3 Cal.5th 497
CMP	Congestion Management Program
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNPS	California Native Plan Society
CO	carbon monoxide

CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
COMM	commercial and sport fishing
County	County of Orange
CPT	cone penetrometer test
CPUC	California Public Utilities Commission
CRC	California Residential Code
CTMP	Construction Traffic Management Plan
CTR	California Toxics Rule
CUPA	Certified Unified Program Agencies
CWA	Clean Water Act
cy	cubic yards
DAMP	Drainage Area Management Plan
dB	decibels
dBA	A-weighted decibels
dBA L_{eq}	equivalent continuous sound level measured in A-weighted decibels
DDT	dichlorodiphenyltrichloroethane
De Novo	De Novo Planning Group
DOC	California Department of Conservation
DOGGR	California Department of Oil, Gas, and Geothermal Resources
DTSC	Department of Toxic Substances Control
du	dwelling unit
du/ac	dwelling units per acre
EDR	Environmental Data Resources
EIA	United States Energy Information Administration
EIR	Environmental Impact Report
EJ	Environmental Justice
EMF	electromagnetic field
EO	Executive Order
EOC	Emergency Operations Center
EOP	Emergency Operations Plan

EPA	United States Environmental Protection Agency
ESA	Environmental Site Assessment
EST	estuarine habitat
EV	electric vehicle
FAR	floor-to-area ratio
FBI	Federal Bureau of Investigation
FD	Fusarium Dieback
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FESA	Federal Endangered Species Act
FHSZ	fire hazard severity zone
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FMMP	Farmland Mapping and Monitoring Program
FRA	Federal Responsibility Area
FRAP	Fire and Resources Assessment Program
FSZ	Farmland Security Zone
ft	foot/feet
FTA	Federal Transit Administration
gal	gallon/gallons
GCC	global climate change
Gg	gigagrams
GHG	greenhouse gas
GIS	geographic information system
GLA	Glenn Lukos Associates, Inc.
GPA	General Plan Amendment
gpd	gallons per day
gpm	gallons per minute
GPS	global positioning system
gpy	gallons per year
GSA	*groundwater sustainability agency*

GWh	gigawatt-hours
GWR	groundwater recharge
H_2O	water vapor
HA	Hydrologic Area
HCA	Orange County Health Care Agency
HCD	California Department of Housing and Community Development
HCM	Highway Capacity Manual
HCP	Habitat Conservation Plan
HFCs	hydrofluorocarbons
HI	Hazard Index
HMMP	Habitat Mitigation Monitoring Plan
HMP	Habitat Management Plan
HMSS	Hazardous Materials Services Section
HOA	Homeowner's Association
HQTA	High-Quality Transit Area
HRER	Historical Resources Evaluation Report
HRI	California State Historic Resources Inventory
HSA	Hydrologic Subarea
HU	Hydrologic Unit
HVAC	heating, ventilation, and air conditioning
I-5	Interstate 5
ICC	International Code Council
ICU	intersection capacity utilization
IFC	International Fire Code
in/sec	inches per second
IND	industrial service supply
IPCC	Intergovernmental Panel on Climate Change
IRWD	Irvine Ranch Water District
IS/NOP	Initial Study/Notice of Preparation
ISHB	invasive shot hole borer beetle
ITE	Institute of Transportation Engineers

IWMP	Integrated Waste Management Plan
kBTU/yr	thousand British thermal units per year
KSHB	Kuroshio shot hole borer
kV	kilovolts
kWh	kilowatt-hours
kWh/yr	kilowatt-hours per year
L_{50}	median noise level
lbs/sf	pounds per square foot
LCFS	Low Carbon Fuel Standard
LEA	Local Enforcement Agency
LED	light-emitting diode
Leq	equivalent continuous sound level
LESA	Land Evaluation and Site Assessment
LFTAM	Lake Forest Traffic Analysis Model
LFTM Program	Lake Forest Traffic Mitigation Program
LID	Low Impact Development
LIP	Local Implementation Plan
LOMR	Letter of Map Revision
LOS	level of service
LRA	Local Responsibility Area
LSAA	Lake and Streambed Alteration Agreement
LSTs	localized significance thresholds
MAR	marine habitat
MBTA	Migratory Bird Treaty Act
MCAS	Marine Corps Air Station
MFI	median family income
mg/L	milligrams per liter
mgd	million gallons per day
mi	mile/miles
mi/day	miles per day
mL	milliliter

MLD	Most Likely Descendant
MMT	million metric tons
MMT CO_2e	million metric tons of carbon dioxide equivalent
Model Ordinance	Model Water Efficient Landscape Ordinance
mpg	miles per gallon
mph	miles per hour
MPN	most probable number
MPO	Metropolitan Planning Organization
MS4	Municipal Separate Storm Sewer System
MT	metric tons
MT CO_2e/SP/yr	million tons of carbon dioxide equivalent per Service Population per year
MTBE	methyl tertiary-butyl ether
MUN	municipal and domestic supply
MW	megawatts
MWD	Metropolitan Water District
MWDOC	Metropolitan Water District of Orange County
MWH	megawatt hour
MWRP	Michelson Water Recycling Plant
N_2	nitrogen
N_2O	nitrous oxide
NAAQS	national ambient air quality standards
NAHC	Native American Heritage Commission
National Register	National Register of Historic Places
NAV	navigation
NCCP	Natural Communities Conservation Plan
NCCP/HCP	Natural Communities Conservation Plan/Habitat Conservation Plan
NF_3	nitrogen trifluoride
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act of 1966
NHTSA	National Highway Traffic Safety Administration

NIMS	National Incident Management System
NIOSH	National Institute for Occupational Safety and Health
NITM Program	North Irvine Transportation Mitigation Program
NMA	Neighborhood Mobility Area
NO	nitric oxide
NO_2	nitrogen dioxide
NOI	Notice of Intent
Non-Annex I	developing nations
non-VHFHSZ	non-very high fire hazard severity zone
NOP	Notice of Preparation
North Orange County MS4 Permit	Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and the Incorporated Cities of Orange County within the Santa Ana Region Areawide Urban Storm Water Runoff Orange County
NO_X	oxides of nitrogen
NPDEs	National Pollutant Discharge Elimination System
NPL	National Priority List
NR	Noise Reduction
NRCS	Natural Resource Conservation Service
O_2	oxygen
O_3	ozone
OAL	Office of Administrative Law
OCFA	Orange County Fire Authority
OCFCD	Orange County Flood Control District
OCPL	OC Public Libraries
OCPW	Orange County Public Works
OCSD	Orange County Sheriff's Department
OCTA	Orange County Transportation Authority
OCWD	Orange County Water District
OCWR	Orange County Waste and Recycling
OEHHA	Office of Environmental Health Hazard Assessment
OES	State Office of Emergency Services

OHWM	ordinary high water mark
OPR	State Office of Planning and Research
OSA	Opportunity Study Area
OSA PEIR	Opportunities Study Area Program Environmental Impact Report
Pb	lead
PC 3	Rancho de Los Alisos Planned Community
PC 7	Baker Ranch Planned Community
PC 8	Foothill Ranch Planned Community
PC 9	Portola Hills Planned Community
PCBs	polychlorinated biphenyls
PCE	passenger car equivalent
PCH	Pacific Coast Highway
PEA	Preliminary Environmental Assessment
PFCs	perfluorocarbons
PGA	peak ground acceleration
pH	percentage of hydrogen
PM	particulate matter
PM_{10}	particulate matter less than 10 microns in size
$PM_{2.5}$	particulate matter less than 2.5 microns in size
Porter-Cologne Act	Porter-Cologne Water Quality Control Act of 1970
ppb	parts per billion
ppm	parts per million
ppt	parts per trilliion
PPV	peak particle velocity
PRC	Public Resources Code
PRDs	Permit Registration Documents
PRIMP	Paleontological Resources Impact Mitigation Program
PROC	industrial process supply
Project	Nakase Nursery/Toll Brothers Project
PSH	permanent supportive housing
PSHB	polyphagous shot hole borer beetle

psi	pounds per square inch
RARE	rare, threatened, or endangered species
RCM	Regulatory Compliance Measure
RCP	Regional Comprehensive Plan *or* reinforced concrete pipe
RCRA	Resource Conservation and Recovery Act of 1976
RCRA-SQG	Resource Conservation and Recovery Act-Small Quantity Generator
RDMD	Orange County Resources and Development Management Department
REC1	water contact recreation
REC2	non-contact water recreation
RECLAIM	Regional Clean Air Incentives Market
RECs	Recognized Environmental Conditions
RHNA	Regional Housing Needs Assessment
ROGs	reactive organic gases
RPS	Renewables Portfolio Standard
RRFB	Rectangular Rapid Flashing Beacon
RTIP	Regional Transportation Improvement Program
RTP	Regional Transportation Plan
RTP/SCS	Regional Transportation Plan/Sustainable Communities Strategy
RWQCB	Regional Water Quality Control Board
SAA	Streambed Alteration Agreement
SAFE Vehicles Rule	The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks
SAMP	Special Area Management Plan *or* Sub-Area Master Plan
SANDAG	San Diego Association of Governments
SB	Senate Bill
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCCIC	South Central Coastal Information Center
SCE	Southern California Edison
SCH	State Clearinghouse
SCS	Sustainable Communities Strategy

SEER	Seasonal Energy Efficiency Ratio
SEMS	Standardized Emergency Management System
sf	square foot/feet
SF_6	sulfur hexafluoride
SGMA	Sustainable Groundwater Management Act of 2014
SHEL	shellfish harvesting
SHL	California Historical Landmarks
SHMA	Seismic Hazard Mapping Act
SHMP	State Hazard Mitigation Plan
SHPO	State Historic Preservation Officer
SIP	*State Implementation Plan*
SLF	Sacred Lands File
SLPS	Short-Lived Climate Pollutant Strategy
SMA	Special Maintenance Area
SMARTS	Stormwater Multiple Application and Report Tracking System
SO_2	sulfur dioxide
SO_4	sulfates
SoCalGas	Southern California Gas Company
SO_X	oxides of sulfur
SP	Service Population
SPHI	California Points of Historical Interest
SPWN	spawning, reproduction and development
sq mi	square mile/miles
SR-1	State Route 1
SR-241	State Route 241
SR-55	State Route 55
SR-91	State Route 91
SRA	State Responsibility Area
SRRE	Source Reduction and Recycling Element
SSC	Species of Special Concern
STARS	Sheriff's Team of Active Retired Seniors

State CEQA Guidelines	Guidelines for the California Environmental Quality Act
STC	sound transmission class
SVUSD	Saddleback Valley Unified School District
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TACs	toxic air contaminants
TCA	Transportation Corridor Agencies
TCE	trichloroethylene
TGD	Technical Guidance Document for the Preparation of Conceptual/Preliminary and/or Project Water Quality Management Plans (WQMPs)
TIA	Traffic Impact Analysis
TMDL	Total Maximum Daily Load
tpd	tons per day
tpy	tons per year
Unified Program	Unified Hazardous Waste and Hazardous Materials Management Regulatory Program
USC	United States Code
USDA	United States Department of Agriculture
USDOT	United States Department of Transportation
USFWS	United States Fish and Wildlife
USGS	United States Geological Survey
UST	underground storage tank
UV	ultraviolet
UWMP	Urban Water Management Plan
v/c	volume-to-capacity
VCA	Voluntary Cleanup Agreement
VHFHSZ	very high fire hazard severity zone
Visual Analysis	Nakase Property Area Plan Visual Analysis
VMT	vehicle miles traveled
VOC	volatile organic compound
vph	vehicles per hour

vplph	vehicles per lane per hour
WARM	warm freshwater habitat
WDID	Waste Discharge Identification Number
WDR	Waste Discharge Requirements
Wetland Manual	ACOE 1987 Wetland Delineation Manual
WILD	wildlife habitat
WQMP	Water Quality Management Plan
WSA	Water Supply Assessment
WSAA	Watershed Streambed Alteration Agreement
WUI	wildland-urban interface
ZEV	zero emission vehicle
ZNE	zero net energy